PETROLOGY OF RECRYSTALLIZED ANT ROCKS FROM APOLLO 17 RAKE SAMPLES: 72559 (ANORTHOSITIC TROCTOLITE) AND 78527 (NORITE), R.D. Warner, K. Keil and G.J. Taylor, Department of Geology and Institute of Meteoritics, University of New Mexico, Albuquerque, N.M. 87131 and C.E. Nehru, Department of Geology, Brooklyn College of the City University of New York, Brooklyn, N.Y. 11210.

We report results of detailed petrological-mineralogical study of two rake samples of ANT-suite mineralogy and composition. Both samples have been analyzed by INAA (1,2); the major element data are reproduced in Table 1.

Sample 72559 is a highly annealed rock containing ∿ 75% plagioclase, 14% olivine, 10% orthopyroxene, and minor amounts of high-Ca pyroxene, Mg-Al spinel, chromite, armalcolite, ilmenite, rutile, zircon, metal and troilite. Plagioclase (0.05-0.45 mm, average ∿ 0.1 mm) and olivine (0.02-0.35 mm, average ∿ 0.05 mm) are seriate and occur as equant crystals. The smaller crystals form a granoblastic matrix, with ∿ 120° triple junctions common; matrix grain size is similar over $\geq$ 1 mm^2 domains but varies by a factor of up to 5 throughout the rock. Orthopyroxene (and minor high-Ca pyroxene) occur as irregular poikiloblastic crystals 0.15-0.4 mm long. There are minor local variations in the proportions of plagioclase to mafic minerals. Opaque minerals are widely disseminated; sparse grains of Mg-Al-rich spinel are enclosed by single plagioclase crystals. Silicate minerals are extremely uniform in composition, irrespective of grain size: plagioclase is An_{94-97}; olivine is Fo_{80-82}; orthopyroxene is $En_{79-80}Fs_{16-17}Wo_4$ and high-Ca pyroxene $En_{48-49}Fs_8Wo_{42-44}$ (Fig. 1). In contrast, opaque oxides exhibit a significantly wider range in composition (Fig. 2). At least two polymineralic relics are exposed in our thin section of 72559. One, ∿ 0.55x1.1 mm, consists almost 100% of granoblastic plagioclase of grain size, shape and composition (An_{96-97}) similar to that in the surrounding rock. The other, ∿ 0.9x1.1 mm, is of troctolite (plagioclase + olivine) mineralogy and has partly preserved an igneous texture (displayed by intersecting plagioclase laths): it, too, contains mineral compositions identical to those in the surrounding rock.

Sample 78527 is less annealed than 72559. It is mineralogically a norite, containing ∿ 52% plagioclase, 46% orthopyroxene, 2% olivine, and trace amounts of high-Ca pyroxene, armalcolite, ilmenite, rutile, chromite, zircon, baddeleyite, metal, troilite and K-Si-rich interstitial phase. In a few places the sample is thinly coated by dark breccia material suggesting that it was a clast in a soil breccia. The rock consists of large, subangular to subrounded plagioclase crystals (up to 2 mm long and 1 mm wide) and subrounded, subequant crystals of orthopyroxene (up to 0.8 mm) and olivine (up to 0.9 x 1.3 mm) in a fine-to medium-grained recrystallized matrix. The large olivine crystals typically are polygonized. A number of large plagioclase and orthopyroxene grains display shock features. The matrix appears to be more mafic than the coarser grains and is dominated by irregular poikiloblastic orthopyroxene crystals that enclose small rounded grains of plagioclase (abundant) and olivine (uncommon, but locally abundant near large olivines). Opaque minerals are sparsely disseminated throughout the matrix. As in 72559, silicate minerals show very limited

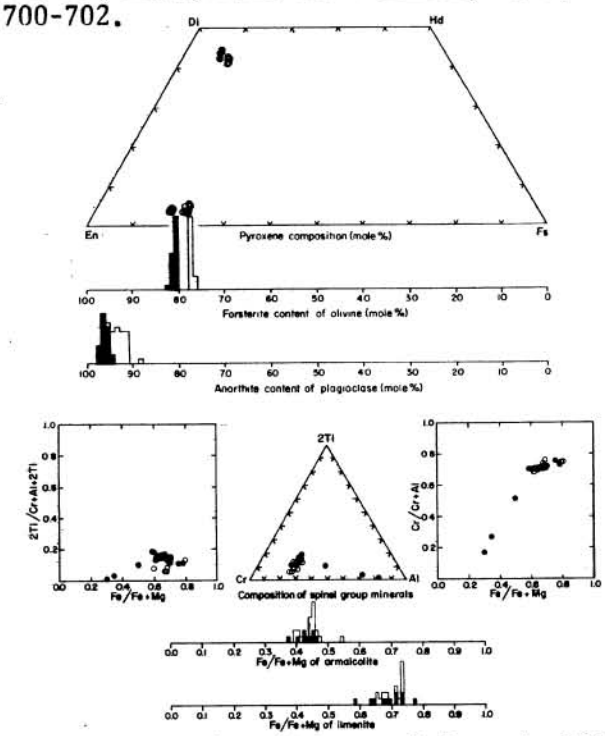
ranges in composition (plagioclase, An_{91-95} + one grain An_{88}; olivine, Fo_{76-77}; orthopyroxene, $En_{75-77}Fs_{19-20}Wo_{4-6}$ and high-Ca pyroxene, En_{48-49} $Fs_{10}Wo_{41-43}$) while opaque oxides are noticeably more variable (Figs. 1 and 2). There is no variation in composition between the larger grains and smaller recrystallized matrix grains.

Petrographic evidence indicates monomict or nearly monomict derivation for both rocks: high bulk rock MgO/(MgO+FeO) coupled with low CaO/Al_2O_3 (Table 1) and low abundances of K_2O and REE (1,2) suggest that the source material was exclusively ANT-suite. The precursors underwent crushing, granulation and later recrystallization in the solid state to form the present annealed rocks. The > 1 mm size of the larger relic crystals in 78527 indicates that the original (norite) rock was of relatively coarse grain size. The precursor to 72559 was either finer-grained or more extensively crushed (or both). During solid state recrystallization silicate (but not opaque) mineral compositions in both rocks became thoroughly homogenized. Width of the two-pyroxene gap suggests final equilibration temperatures of ∿ 1000°C for 72559 and ∿ 1050°C for 78527. The recrystallization process did not obliterate the presence of minor polymineralic relic material in 72559 or of shock features in mineral relics in 78527, however.

References. (1) Laul, J.C. and Schmitt, R.A., 1975, in "Lunar Science VI", p. 489-491. (2) Murali, A.V., Ma, M.-S., Laul, J.C. and Schmitt, R.A., 1977, in "Lunar Science VIII", p. 700-702.

Table 1. INAA major element data.

	72559,1	78527,2
TiO_2 (wt.%)	<0.2	0.6
Al_2O_3	25.2	16.8
Cr_2O_3	0.13	0.21
FeO	5.3	7.4
MnO	0.06	0.09
MgO	10	15
CaO	13.7	9.2
Na_2O	0.30	0.42
K_2O	0.09	0.07
MgO/(MgO+FeO)	0.65	0.67
CaO/Al_2O_3	0.54	0.55



Figs. 1 and 2. Mineral compositions in 72559 (filled symbols) and 78527 (open symbols).