FURTHER PETROLOGIC STUDIES OF METAMORPHOSED CARBONACEOUS CHONDRITES, Edward R.D. Scott, Institute of Meteoritics and Department of Geology, University of New Mexico, Albuquerque, NM 87131

In our first study of metamorphosed carbonaceous chondrites [1] we provided mineralogic data on Coolidge, Karoonda and Pecora Escarpment (PCA) 82500. We conclude that Karoonda, PCA 82500, Yamato 6903 [2] and Mulga (west) [3] have closely related mineralogy and may have come from the same body. Detailed bulk chemical data are lacking, though Kallemeyn and Wasson [4] conclude that Karoonda is not a CV or CO chondrite. Here we report petrologic studies of three sections of a new metamorphosed C chondrite, Allan Hills (ALH) 82135 [5] and one section of Y 6903.

ALH 82135 Apparent sizes of nine chondrules range from 0.4 to 1.4 mm, mean 0.6 mm. These chondrules and recognizable chondrule fragments account for 3 ± 2 vol.% of the sections. Eleven analyzed chondrules contain olivines with mean concentrations of 27.0 - 28.2 mole% Fa and 0.02-0.08 wt.% CaO. Matrix olivines contain 27.5 ± 0.3 Fa and 0.04 ± 0.015 wt.% CaO. Low-Ca pyroxenes are rare in chondrules and rarer in the matrix; 11 grains gave 25.1 ± 0.5 Fs and 0.7 ± 0.3 Wo. Both matrix and chondrule olivines in the Smithsonian Institution section appear to be slightly richer in CaO than those in section 82135,8. Plagioclase grains 50-200 μm in size are abundant in the matrix and contain An 20-75.

The distribution and composition of opaque phases closely resemble those in Karoonda and PCA 82500. Abundant magnetite and sparse pentlandite and pyrite form 1-50 μm sized grains in the matrix and chondrules. Pentlandite contains 28-36 wt.% Ni and 0.3-0.6% Co, and pyrite contains 1.6% Ni and 2-3% Co.

Y 6903 Two olivine-rich chondrules contain olivine with Fa 29.1 ± 0.3 and 0.03 ± 0.01 wt.% CaO, low-Ca pyroxene with Fs 25.4-26.9 and Wo 0.5-1.3 and a little Ca-rich pyroxene with Fs 8-11 and Wo 40-48. Matrix olivines are almost identical in composition: Fa 29.2 ± 0.3 and 0.03 ± 0.02 wt.% CaO. Two low-Ca pyroxenes in the matrix were found with Fs 25.0. These data are entirely consistent with results of Okada [2].

Discussion. ALH 82135 is very closely similar in mineralogy to Karoonda and PCA 82500 as Mason [5] suggested. However, olivine and low-Ca pyroxene compositions are more equilibrated and plagioclase grains are larger. Y 6903 and ALH 82135 could be classed as C5 chondrites, and Karoonda and PCA 82500 as C4, using the criteria that type 5 chondrites have homogeneous low-Ca pyroxene compositions (σ/mean Fs <2%). This criteria would be easier to apply than estimating the relative abundances of ortho- and clinopyroxene, as these minerals are rare. Wieler et al. [6] find that ALH 82135 and PCA 82500 lack solar-wind gases, and that both have long cosmic-ray exposure ages (20 and 43 Myr), like Karoonda and Y 6903. This suggests that these C4/5 chondrites may be derived from bodies that did not supply us with C3 chondrites.

References [1] Scott E.R.D. and Taylor G.J. (1985) JGR 90 Suppl., in press. [2] Okada A. (1975) Mem. Natl. Inst. Polar Res., Sp. Iss. 5, 14-66. [3] Binns R.A. et al. (1977) Meteoritics 12, 179. [4] Kallemeyn G.W. and Wasson J.T. (1982) GCA 46, 2217-2228. [5] Mason B. (1984) Antarctic Meteorite Newsletter 7 No. 2, p. 12 [6] Wieler R. et al., this volume.