C-ANOMALOUS PHASES IN QUE 99177 AND MET 00426. Christine Floss and Frank J. Stadermann. Laboratory for Space Sciences and Physics Dept., Washington University, St. Louis, MO 63130, USA. Email: floss@wustl.edu; fjs@wustl.edu.

Introduction: Carbon-rich phases (e.g., nanodiamonds, SiC, graphite) were the first forms of stardust identified in primitive meteorites [1-3] and, with the exception of nanodiamonds, are usually present in concentrations of ≤10-20 ppm [e.g., 4]. We have been investigating the stardust inventories of two primitive CR chondrites, QUE 99177 and MET 00426, which have very high abundances of O-anomalous presolar grains [5, 6]. Here we report on the C-bearing presolar phases found in these two meteorites.

Experimental and Results: We used the NanoSIMS to carry out isotopic (C,O and C,N) imaging on matrix material in QUE 99177 and MET 00426 and found 34 and 35 grains with anomalous C isotopic compositions, respectively, in the two meteorites. Of the 69 grains, 43 are ^{13}C-rich with ^{12}C/^{13}C ratios between 5 and 82, similar to ratios observed in mainstream and type A+B SiC grains [4]. The remaining 26 grains are ^{12}C-rich, with ^{12}C/^{13}C ratios between 100 and 136. Nitrogen isotopes were measured in 35 of the grains. Grains that are ^{13}C-rich typically have low N abundances with normal N isotopic compositions, although two grains are ^{14}N-rich and one is ^{15}N-rich. In contrast, ^{12}C-rich grains tend to contain more N and are more likely to have anomalous N isotopic compositions (generally ^{15}N-rich).

Auger Nanoprobe elemental analyses show that the grains can be broadly divided into two subgroups: those that are very C-rich and those with lower C abundances. C-rich grains are usually dark with irregular shapes in secondary electron (SE) images, and typically have Auger spectra that are dominated by C, but also contain some N and/or O. Most of the grains with isotopically light C and heavy N fall into this category, although there are exceptions.

Grains with lower C abundances, most of which are ^{13}C-rich, are often light-colored or are difficult to distinguish from surrounding material in the SE images. Some of these have been clearly identified as SiC. In other cases, a positive identification is lacking, but elemental maps combined with isotopic characteristics also suggest SiC.

Discussion: Estimates of the abundance of SiC are ~20-50 ppm in QUE 99177 and ~30-110 ppm in MET 00426, higher than previous maximum estimates for primitive meteorites [7, 8]. The presence of large amounts of carbonaceous material with C (and often N) isotopic anomalies is unexpected. Similar phases have been found in IDPs [9] and primitive meteorites [10], and are usually thought to have an interstellar origin [e.g., 9]. However, the abundances found here (~60-140 ppm) are unprecedented and, together with high SiC abundances, attest to the primitive nature of these meteorites.

References: [1] Lewis R. S. et al. 1987, *Nature* 326:160-162. [2] Bernatowicz T. et al. 1987. *Nature* 330:728-730. [3] Amari S. et al. 1990. *Nature* 345:238-240. [4] Zinner E. 2004. In *Treatise in Geochemistry*, Vol 1 (ed. A. M. Davis), pp. 17-39. [5] Floss C. and Stadermann F. J. 2007. *Meteorit. Planet. Sci.* 42:A48. [6] Floss C. and Stadermann F. J. 2008. #1280. 39th Lunar Planet. Sci. Conf. [7] Gao X. et al. 1996. *Meteorit. Planet. Sci.* 31:A48. [8] Huss G. et al. 2003. *Geochim. Cosmochim. Acta* 67:4823-4848. [9] Floss C. et al. Science 303:1355-1358. [10] Busemann H. et al. 2006. #2005. 37th Lunar Planet. Sci. Conf.