REFRACTORY INCLUSIONS IN A NEW SECTION OF THE UNIQUE CARBONACEOUS CHONDRITE ACFER 094. S. B. Simon[1] and L. Grossman[1,2]. [1]Dept. Geophys. Sci. [2]The Enrico Fermi Inst. Univ. of Chicago, Chicago, IL 60637. E-mail: sbs8@uchicago.edu

Introduction: Acfer 094 is a unique, primitive carbonaceous chondrite. Its unusual suite of refractory inclusions has been compared to those of CO and CR chondrites [1, 2]. Recently, additional material became available from the U.S. National Museum. We studied a thin section for comparison of its CAIs with previous work, and to report new or unusual inclusions.

Methods: We searched the section (USNM 7233-1) by simultaneously collecting backscattered electron images and Al X-ray maps at 90x with the SEM. The constituent phases of each Al-rich object were identified by energy-dispersive analysis. We also mounted and polished 62 particles from a sample that was disaggregated as part of a search for presolar grains at Wash. U.

Results: We found 291 CAIs and 22 amoeboid olivine aggregates in the thin section and nine CAIs among the mounted grains. The CAIs have 28 different mineral assemblages. One contains corundum, 40 (13.3%) have hibonite (hib), and 14 (4.7%) contain grossite, a smaller proportion than [2]. Spinel-, melilite-rich inclusions, many of which may be fragments of Type A inclusions, are the most abundant. One potential Type B fragment and one isolated hibonite grain were found. Inclusions are largely unaltered and ≤50 μm across. Many have rims of anorthite, Al-diopside and/or gehlenitic melilite; rims of the latter, rare in other meteorites, are common here.

Discussion: *The most unusual inclusions.* Inclusions 59-1 and 59-3 consist of fine, wormy spinel grains rimmed by melilite, with slightly coarser grossite (59-1), or hib (4-5 wt% TiO_2) and pv (59-3), and much void space. 59-3 also has a clast of relatively coarse spinel and hib (0.5–1 wt% TiO_2) enclosed in gehlenite; this clast, its host inclusion and the melilite-anorthite-Al-diopside rim sequence on the latter represent at least 3 generations of nebular material. This occurrence of a hib-bearing inclusion inside another is unlike previously reported compound inclusions.

Both 59-2 and 59-6 have straight, crystallographically controlled hib-spinel contacts but corroded hib-grossite and spinel-melilite contacts. 59-6 has hib laths partially enclosed and wetted by perovskite (pv). The hib-spinel (59-2) and hib-spinel-pv (59-6) assemblages are probably relict. For 59-6 we infer a crystallization sequence of hib-grossite-pv-spinel-melilite. Inclusion 27-3 (90 × ~50 μm) has ~50 vol% relatively coarse (5-30 μm), anhedral pv grains with interstitial hibonite and spinel enclosed in a gehlenite rim. The common occurrence of melilite rims suggests that, unlike those in CMs, many refractory objects in Acfer 094 encountered a nebular region where melilite was condensing.

Comparison with previous work. Like [1, 2], we find melilite-rich inclusions to be the most common type and that the Acfer 094 population is most like that of the CO chondrites. Many Acfer CAIs are a) small; b) fragments; or c) rimmed, so shape cannot be used to determine origin. An irregularly-shaped fragment can be igneous, and a round, rimmed object can be a condensate. Unlike [2], who concluded that most Acfer 094 CAIs are gas-solid condensates, we find, among the ~60% of our samples large enough for interpretation, subequal proportions of compact inclusions with textures consistent with crystallization from liquids and "fluffy" inclusions that likely were never molten.

References: [1] Weber D. 1995. *Meteoritics* 30:595-596. [2] Krot A. N. et al. 2004. *Geochim. Cosmo. Acta* 68:2167-2184.