COMPOSITIONAL SIMILARITIES BETWEEN UNGROUPED LOONGANA 001 AND CV4 COOLIDGE; G. W. Kallemeyn, Institute of Geophysics and Planetary Physics, University of California, Los Angeles, CA 90024

Loongana 001 was initially determined to be a carbonaceous chondrite, possibly related to CR chondrites or ALH85085, due to its low abundance of moderately volatile elements. But it has a significantly lower abundance of Fe than ALH85085, and its olivine Fa and pyroxene Fs compositions are more Fe-rich than typical CR values. New INAA data suggest a close compositional relationship to the CV4 carbonaceous chondrite, Coolidge, although the abundance pattern of Loongana 001 was apparently disturbed by terrestrial contamination of some elements.

The Loongana 001 meteorite was found in 1990 in the Nullarbor area of Western Australia. The meteorite is weathered, with all original metal now oxidized. An initial study by Spettel et al. [1] concluded that it was a carbonaceous chondrite based on the presence of Ca,Al-rich inclusions and its relatively high matrix/chondrule ratio. They suggested that its low abundance of moderately volatile elements indicated a relationship to CR chondrites or the ungrouped ALH85085. Olivine in Loongana 001 is equilibrated with a mean composition of ~Fa11, while pyroxene is somewhat less equilibrated with a mean composition ~Fs6-7 [2,3]. This is in contrast to typical CR chondrites in which olivine compositions peak at Fa <2 and pyroxene values peak at Fs<3.

Coolidge was classified as a CV4 chondrite by Van Schmus and Wood [4]. Olivine and pyroxene compositions are Fa14 and Fs11, respectively [5]. McSween [6] further classified Coolidge as a 'reduced group' subtype of the CV chondrites, having metal more abundant than magnetite and having a relatively low matrix/chondrule ratio. He noted that a significant amount of metal was oxidized due to terrestrial weathering. Kallemeyn and Wasson [7] performed INAA analysis of Coolidge. They found refractory lithophile abundances similar to those in CV chondrites, but that abundances of moderately volatile elements were significantly lower. They concluded that Coolidge had an initial formation history similar to typical CV chondrites, but lost its volatiles during open-system metamorphism on the parent body.

Preliminary INAA data show that Loongana 001 is compositionally similar to Coolidge. Refractory lithophile element abundances (CI, Mg-normalized), excepting the REE, are similar and in the range of CV chondrites (~1.35× CI). These abundances in mean CR chondrites are much lower (~CI ). The REE in Loongana 001 show a fractionated pattern, with the light-REE enriched relative to the heavy-REE and to mean CV, suggesting contamination by a terrestrial source. Moderately volatile lithophile element abundances are nearly identical to Coolidge, significantly lower than both mean CR or CV chondrite values.

Refractory siderophile element abundances in Loongana 001 are similar to Coolidge and mean CV values, but higher than mean CR values. Loongana 001 and Coolidge have similar patterns of moderately volatile siderophile and chalcophile element abundances. Two notable exceptions

are a lower abundance of Fe in Coolidge and a very high abundance of Br in Loongana 001. The Fe content of our Coolidge sample was probably atypically low due to weathering. An XRF study of another Coolidge [8] sample gives an Fe/Mg ratio very similar to our Loongana 001 ratio. The high Br in Loongana is likely due to terrestrial contamination. The abundances of moderately volatile elements in both Coolidge and Loongana 001 are significantly lower than those of either mean CR or CV chondrites.

In Fig. 1 Zn/Mn vs. Al/Mn ratios are plotted for Coolidge and Loongana 001, along with the carbonaceous chondrite groups (except CI which plots off scale to the upper left) and several ungrouped chondrites. The established chondrite groups form distinct clusters on such a diagram. Coolidge and Loongana 001 plot near each other and far from the other grouped and ungrouped chondrites.

It would appear that Loongana 001 and Coolidge are related compositionally. They are probably members of the CV clan, but whether or not they should both be classified as CV4 or as members of a new grouplet is unclear. In recent years, some 'former' CV chondrites were reclassified into the CK group. Further petrographic studies of both are needed to confirm their relationship to one another, and to help settle the question of group membership.

References: [1] Spettel B., Palme H., Wlotzka F. and Bischoff A. (1992) *Meteoritics* 27, 290-291. [2] Wlotzka F. (1992) *Meteoritics* 27, 482. [3] A. Rubin, unpublished data [4] Van Schmus W. R. and Wood J. A. (1967) *GCA* 31, 747-765. [5] Van Schmus W. R. (1969) In *Meteorite Research*, 480-491. [6] McSween H. Y. (1977) *GCA* 41, 1777-1790. [7] Kallemeyn G. W. and Wasson J. T. (1982) *GCA* 46, 2217-2228. [8] McCarthy T. and Ahrens L. *EPSL* 14, 97-102.