EVIDENCE FOR AT LEAST TWO SOURCE MELT COMPOSITIONS FOR THE LOWER YAXCOPOIL-1 IMPACT-MELT BRECCIAS. H. E. Newsom, M. J. Nelson and M. N. Spilde. Univ. of New Mexico, Institute of Meteoritics, Dept. of Earth and Planetary Sciences, Albuquerque, NM 87131 U.S.A. Email:newsom@unm.edu.

Introduction: The Yaxcopoil-1 drill core, in the annular trough of the crater, consists of layered impactites with an upper "reworked suevite", and lower "impact melt breccia" [1-5]. We find that the elemental signatures in the lower impact melt breccia cannot be explained by any one unaltered parent lithology, and favor an explanation for the Mg and K signatures by a combination of aqueous alteration and at least two compositionally distinct impact melts.

Results: The lower units at a depth below ~ 847 m, and presumably deposited first, contain an impact melt breccia. Microprobe, SEM, and X-ray diffraction analyses indicate that the matrix of the breccias is physically distinct from the melt clasts and locally exhibits flow texture around clasts, and alteration to smectite clay. K-enrichment is seen on puzzle-like angular, silicate melt clast rims in element maps, while the matrix material consists of a separate Mg-rich (20% or greater), lithology with no K-enrichment. In contrast, the K-enrichment is present only in the rims of the Si-, Al- rich melt clasts. XRD analyses did not detect the presence of chlorite or other hydrothermal minerals.

Conclusions: These results support the following sequence of events to form the lower portion of the Yax-1 breccias: (1) Impure dolomite and silicate basement lithologies were melted and ejected during crater formation, consistent with the model of Stöffler et al [6], (2) The silicate melt was quenched, brecciated, and enriched in potassium by seawater, or another K-rich fluid during transport or shortly after deposition, and (3) This deposit was later permeated by Mg-rich dolomitic melt, possibly from melt bodies in the ejecta deposit that were not as well mixed as seen in the upper ejecta material. Dual melts have also been identified at the Ries crater [7, 8] and at the Haughton structure, Canada [9, 10].

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