TRACE ELEMENTS IN METEORITIC TROILITE. A. Kracher1 and F. Brandstätter2. 1Ames Laboratory, Iowa State University, Ames, IA 50011-3020, USA. akracher@iastate.edu. 2Naturhistorisches Museum, Burggring 7, A-1010 Vienna, Austria.

Introduction: Troilite has not received much attention in evaluating the history of meteorite parent bodies. But on thermodynamic grounds one would expect some chalcophilic elements, e.g., Cr and Cu, to show temperature-dependent partitioning behavior that could be potentially useful in tracking parent body differentiation. Here we report on a feasibility study of analyzing relevant elements in troilite from eight H chondrites and six iron meteorites of groups IAB, IIE, IIIAB and IIICD.

Analytical: We have developed electron microprobe techniques that allow determination of trace elements in troilite with detection limits of 10-40ppm, depending on the element, by a combination of off-peak backgrounds and background standards. Elements analyzed were Ti, Cr, Mn, Cu, Zn, and Se.

Results:
Chondrites: Troilite from H chondrites has generally low trace element contents, with Ti, Mn, and Zn usually below detection limit. Analyses of Se confirm the ~140ppm expected from the chondritic S/Se ratio [1]. Chromium concentrations in 7 of the 8 samples are 20-40ppm, except for anomalous high values due to inclusions. The exception is Forest Vale (H4), which shows a range of 310-420ppm Cr. Copper varies from <20ppm to 870±230ppm in different chondrites, uncorrelated with petrologic type.

Irons: Unlike chondritic troilite there are no Cr-poor regions in troilite from irons, except for Watson (IIE) with ~150ppm Cr. All IAB samples show erratic Cr values (range 2000-9400ppm), suggesting ubiquitous Cr-rich inclusions. Cape York (IIIAB) troilite contains 970±30ppm Cr, roughly consistent with 1300ppm found previously [2]. The Se/S ratio is chondritic in IAB troilite and Watson (IIE), but troilite from Georgetown(iron) (IIICD-anom) and, as noted before [3], Cape York (IIIAB) is depleted in Se. Like chondrites, Cu does not show a consistent pattern in troilite from irons (range 120-960ppm).

Conclusions: The number of meteorites included in this exploratory study is too small to allow firm conclusions about the history of individual meteorite groups, but some general patterns emerge. The behavior of Cr is drastically different between chondrites and irons, indicating strong dependence on temperature and redox state. A similar though perhaps weaker dependence is expected for Mn and Zn, but their concentrations are too low to detect variations by electron microprobe analysis. The Se depletion in some iron meteorites and the erratic behavior of Cu remain enigmatic and deserve further study.