

NOBLESVILLE METEORITE BRECCIA: RECOVERY AND INITIAL CHARACTERIZATION, M. E. Lipschutz, S. F. Wolf and S. Gartenhaus (Purdue Univ., W. Lafayette, IN 47907), M. M. Lindstrom, D. W. Mittlefehldt, M. E. Zolensky (NASA-JSC, Houston, TX 77058), J. F. Wacker (Battelle Northwest, Richland, WA 99352), P. H. Benoit, D. W. G. Sears (Univ. of Arkansas, Fayetteville, AR 72701) and R. T. Dodd (SUNY-Stony Brook, NY 11794)

At about 1900 CDT (2400 GMT) on 31 Aug. 1991, two boys, Brodie Spaulding (13) and Brian Kinzie (9) were standing in front of Spaulding's house when a 1.1 kg stony meteorite came from N or NNW and landed 3.6 m in front of the boys, who picked it up almost immediately. No sound or light accompanied the fall and a search for possible observers along the meteorite's flight path was fruitless. The meteorite, which exhibits well-developed flight markings (including a complete black and brown fusion crust) indicating a well-oriented fall, was identified at Purdue on 12 Sept. 1991. It was received at NASA-JSC for processing on 17 Sept. 1991 and the main mass was at Battelle for counting by 19 Sept. 1991 - within 3 weeks after fall.

Noblesville is a genomict breccia composed of light-colored slightly-rounded H6 clasts in darker H4 (locally H3?) matrix. Neither clast nor matrix contains features (veins, melt pockets, metal-troilite eutectic intergrowths, etc.) indicative of severe shock. Shock classifications are facies b (5-20 GPa) for clasts and b or c (i.e. up to 22 GPa) for the matrix, which lacks conspicuous feldspar.

Whole-rock analysis by RNAA of Ag, Au, Bi, Cd, Co, Cs, Ga, In, Rb, Sb, Se, Te, Tl and Zn of a 220 mg sample reveals a composition very similar to those of numerous H4-6 chondrite falls (Lingner et al., 1987). Noblesville exhibits none of the compositional characteristics of typical H chondrite regolith breccias (e.g. Xiao and Lipschutz, 1991).

Preliminary INAA data obtained from a clast-free matrix separate and from a large clast confirm that both are H-chondrite-like (e.g. Wasson and Kallemeyn, 1988). The matrix seems depleted in lithophile REE and somewhat enriched in metal and siderophiles relative to clasts. This metal enrichment in the matrix is recognizable even in the hand specimen. Final results will be presented at LPSC XXIII.

The thermoluminescence (TL) peak temperature and peak width of Noblesville are normal for an H chondrite. It has a low TL sensitivity, consistent with its matrix being of petrographic type 4. The natural TL of Noblesville is low (7.0 ± 0.1 krad), consistent with mild heating at a perihelion distance of ~ 0.8 AU: such low values are exhibited by $\sim 15\%$ of ordinary chondrite falls.

Data have been obtained for ^7Be (53 d), ^{22}Na (2.6 y), ^{26}Al (7.0×10^5 y), ^{51}Cr (27 d), ^{54}Mn (312 d), ^{57}Co (271 d), ^{58}Co (71 d) and ^{60}Co (5.3 y) and upper limits for ^{46}Sc (84 d) and ^{48}V (16 d). The ^{26}Al value of 50.9 ± 0.7 dpm/kg is somewhat low relative to the average saturated activity of 55 ± 8 dpm/kg for H chondrites (Evans and Reeves, 1987). Although a precise ^{60}Co value is not yet available, its activity of 1-2 dpm/kg implies that the preatmospheric mass of Noblesville was 1-10 kg, i.e. not too different from its recovered mass. Preliminary results for ^{22}Na of >100 dpm/kg - much higher than the 50-100

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dpm/kg typical of chondrites - may reflect on unusual, recent higher intensity irradiation, perhaps during the close solar approach indicated by the natural TL.

In summary, Noblesville is a genomict breccia formed by the mixing of H6 clasts in H4 matrix under conditions free of substantial shock-loading. It seems to have been relatively small during exposure to cosmic rays and to have had an unusual orbit. It appears to be one of 10 H chondrites of diverse petrographic types that form a well-defined linear array on a year-day plot (Fig. 1), hence may sample a stream of meteoroids that is, like Noblesville, genomict.

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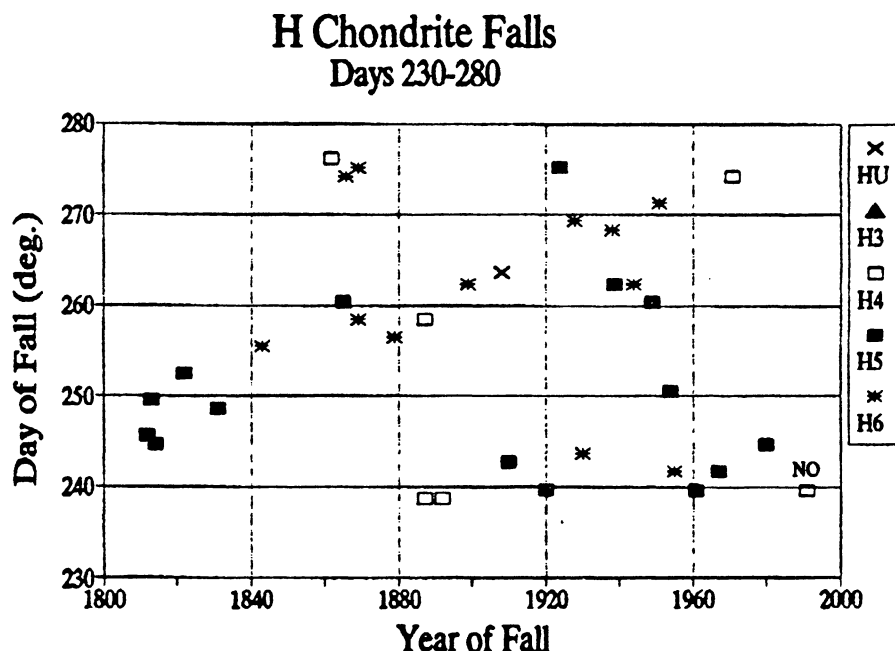


Fig. 1. Fall characteristics of H chondrites for days 230-280 in each year since 1800. Two arrays seem evident, with Noblesville (NO) falling on the array around day 240.