XENON ISOTOPES IN NANODIAMONDS AND OTHER PRESOLAR GRAINS. J. D. Gilmour[1], A. B. Verchovsky[2] and G. Turner[1], [1]Dept of Earth Sciences, University of Manchester, Manchester M13 9PL, UK, [2]PSSRI, Open University, Milton Keynes MK7 6BT.

Introduction: Nanodiamonds isolated from primitive meteorites contain isotopically 'normal' Xe-P3 and components enriched in heavy and light isotopes - Xe-HL, exotic Xe-P6. Excesses of ^{129}Xe from ^{129}I decay are also observed [1]. We discuss these in the light of data obtained from size-separated Efremovka nanodiamond samples produced at the Vernadsky Institute, Moscow [2].

Results: Excess ^{129}Xe is present in low temperature releases from the largest grain size separate (ED9: 1.5 - 9nm) but not in the remainder (ED2,3,4: <3 nm). In addition, the signature of Xe-P6 is also observed only in separate ED9.

^{129}Xe Excess: ^{129}Xe excesses are widespread in nanodiamond separates [1]. Step-heating release patterns suggest that the site of this component is identical to that of Xe-P3, but ratios of excess ^{129}Xe to Xe-P3 show a distinctive dependence on the extent of parent body processing of the host meteorite. Nanodiamonds from meteorites less processed than reduced CV3 meteorites have similar ^{129}Xe concentrations but decreasing concentrations of Xe-P3, greater degrees of processing have led to ^{129}Xe loss. These observations are most readily explained if the nanodiamond ^{129}Xe excess was present as ^{129}I during processing, xenon loss from this site being associated with a parent body process, as for other components [3]. The data constrain the trapping of the P3 component to within 10 Ma before parent body processing unless even the most P3-rich nanodiamonds have lost >85% of their original Xe-P3. This is consistent with the reported initial iodine ratio for a nanodiamond-rich separate from Inman, which was similar to that of other early solar system reservoirs (^{129}I/^{127}I $= 10^{-4}$ [4]).

Xe-HL and Xe-P6 These components, hosted by nanodiamonds with distinct grain size distributions, are distinguished from each other by a variation in the extent of enrichment of the heavy isotopes and by the ratio of excess ^{134}Xe (over solar) to excesses of ^{131,132,136}Xe. The relative abundance of ^{134}Xe is sensitive to minor parameter changes in both current models of Xe-H production: neutron fluence in the neutron burst model [5] and precursor half life in the model of involving separation of radioactive precursors [6]. Tellurium data are more consistent with the latter [7].

However, the characteristic signature of Xe-H is not observed only in nanodiamonds. Accumulated data from nanodiamonds [1] and SiC xenon analyses [8] require contributions from 3 nucleosynthetic sources - one s-process and two sources of the r-process isotopes. Both r-process endmembers are also observed in SiC grains, suggesting that any model dependent on the size of nanodiamonds for recoil loss of xenon isotopes trapped as radioactive precursors is incorrect.

References: [1] Huss G. R. and Lewis R. S. (1994a) *Meteoritics* **29**, 791-810. [2] Verchovsky A. B. et al. (1998) *Science*, **281**, 1165-1168. [3] Huss G. R. and Lewis R. S. (1994b) *Meteoritics* **29**, 811-829. [4] Nichols Jr. R. H. et al. (1991) *Geochim. Cosmochim. Acta* **55**, 2921-2936. [5] Clayton D. D. (1989) *Ap. J.* **340**, 613-619. [6] Ott U. (1996) *Ap. J.* **461**, 344-348. [7] Richter S. et al. (1998) *Nature* **391**, 261-263. [8] Lewis R. S. et al. (1994) *Geochim. Cosmochim. Acta* **58**, 471-494.