PORTALES VALLEY: DISCOVERY OF A LARGE GRAPHITE NODULE. A.Ruzicka[1], J. F. McHone[2], and M. Killgore[3], [1]Department of Geology, Portland State University, Portland OR 97207, USA, [2]Department of Physics, University of Alabama, Birmingham AL 35294, USA, [3]Southwest Meteorite Laboratory, P.O. Box 95, Payson AZ 85547, USA.

Introduction: We report the discovery of a large (~17 x 20-25 mm) graphite nodule in the Portales Valley (H6) chondrite. Although carbides and carbon-rich aggregates are abundant in some ordinary chondrites, these assemblages do not include much graphite and they occur mainly in weakly metamorphosed chondrites [1,2,3]. Graphite itself is relatively rare in chondrites [2,4]. So far as we know, large, nodular graphite has not previously been reported in an ordinary chondrite, and the presence of such material in Portales Valley further attests to unusual characteristics of this very "unordinary" ordinary chondrite.

Discovery of the Nodule: The nodule was discovered after a saw blade broke while cutting a large slab of Portales Valley (PV). The slab was cut after another blade was installed, and the accompanying reflected light view was obtained, which shows the dark nodule, and how the saw cut pattern (diagonal lines) was different for the two saws. The pattern change corresponds to the location of the nodule, and this suggests that the blade malfunctioned as it reached the nodule. Something (diamond?) in the nodule was responsible for breaking the blade.

Size, texture and occurrence: The nodule is enclosed in coarse FeNi-metal in PV (see image), in an area where coarse metal veins intersect. Parallel cuts through PV in the vicinity of the nodule show that the nodule is entirely enclosed within coarse metal that shows Widmannstatten texture. The kamacite lamellae in this area are unusually thick and some of them are curved (bent) around the nodule. In reflected light, the nodule shows little internal texture, other than trails of metal inclusions (mainly <50 microns across) and thin (<2 micron-wide) cross-cutting veins of what appears to be Fe-metal alloy. Analogous textures are visible in some graphite nodules located in iron meteorites [e.g., 5]. The margins of the nodule are irregular in detail, and close to the margin, inclusions of graphite and metal are enclosed in one another. This suggests contemporaneous formation of graphite and metal.

Raman spectroscopy: Raman spectroscopy of the nodule was performed using the system setup described previously [6]. The Raman spectrum of the nodule shows a large peak at ~1580 cm^{-1}, which corresponds to that of graphite, as well as a smaller, broad, unidentified peak at ~1360 cm^{-1} that is not present in the graphite standard, nor in a kimberlite diamond standard. The kimberlite diamond has a Raman intensity peak at ~1330 cm^{-1}, and this does not not appear to be present in the spectrum of the nodule. However, the position and intensity of the two Raman peaks in the nodule resemble those of weakly- or unshocked graphite [7], which may contain a small amount of diamond or other high-pressure C polymorph.

References: [1] Krot A. et al. (1997) GCA 61, 219-237. [2] Brearley A. (1990), GCA 54, 831-850. [3] Scott E.R.D. et al. (1981) EPSL 56, 19-31. [4] Ramdohr P. (1973) The Opaque Minerals in Stony Meteorites, 245 pp. [5] Kurat G. et al. (2000) LPS XXXI, #1666. [6] McHone J.F. et al. (2000) LPS XXXI, #1877. [7] Lapke C. et al. (2000) LPS XXXI, #1040.