EVIDENCE CONFIRMING METORITIC IMPACT AT WETUMPKA CRATER, ALABAMA, USA. D. T. King, Jr.[1], Thornton L. Neathery[2], Lucille W. Petruny[3], Christian Koeberl[4], and Willis E. Hames[1]. [1]Dept. Geology, Auburn University, Auburn, AL 36849-5305 USA [kingdat@auburn.edu], [2]Neathery and Associates, 1212-H 15th St. East, Tuscaloosa, AL 35404 USA, [3]Dept. Earth & Env. Sci., Wesleyan University, Middletown, CT 06457 USA, [4]Institute of Geochemistry, University of Vienna, Althanstrasse 14, A-1090 Vienna, Austria.

Introduction: Wetumpka impact crater, located in Elmore County, Alabama, USA (N32° 31.5', W86° 10.5'), is a prominent 6.5 km diameter semi-circular, rimmed structure, which formed in a target consisting of essentially unconsolidated sedimentary units overlying crystalline basement rock. At time of formation, estimated at 80 to 83 m.y. ago, this target was covered by up to 100 m of seawater as the area was part of a Late Cretaceous continental shelf [1,2]. Crater shape (semi-circular, open on southwest quadrant) suggests oblique impact [3] on a southwesterly trajectory [2]. Wetumpka has total gravity relief of 10 mGal [4] and maximum magnetic relief of 0.015 Gauss [5].

Target stratigraphy: In this region, three soft Upper Cretaceous units lie unconformably upon crystalline pre-Cretaceous Appalachain bedrock. In age order, they are: Tuscaloosa Group (60 m); Eutaw Formation (30 m); and Mooreville Chalk (30 m) [3].

Surface geology: Surficial crater geology consists of two main terraines: (1) a heavily weathered, semi-circular rim composed of Appalachian piedmont bedrock, which has up to 87 m modern relief, and (2) a highly dissected crater floor composed of contiguous tracts of slightly to highly disturbed target strata (consisting of Tuscaloosa Group and minor but significant irregularly shaped tracts of Eutaw Formation and Mooreville Chalk) [3]. Only one, small outcrop of impactite facies, which encompasses an area of a few hundred square meters, occurs within this crater. This centrally located outcrop coincides with a topographic high, which may represent Wetumpka's rebound peak.

Subsurface geology: All three stratigraphic units mentioned previously plus crystalline bedrock were involved in this impact event and contributed clastic material to Wetumpka's subsurface impactoclastic crater-filling unit [6]. Core drilling at Wetumpka's crater center reveals that disturbed target strata are only 64 m thick and that over 130 m of impactite facies occur below that level [6]. In Wetumpka's subsurface crater-filling unit, impactite facies, consisting of impactite sands and monomict and polymict impact breccias, are intercalated with 1 to 5 m-thick blocks of target strata and crystalline basement [6].

Petrography: Polymict breccias are comprised of crystalline bedrock clasts and cataclastic matrix. In thin section, cataclastic matrix contains fine-sand sized shocked-quartz grains. These grains display two sets of PDFs, which appear to indicate shock pressures toward the lower end of the 8 to 25 GPa range. We are currently measuring crystallographic orientation of all quartz PDFs to better understand shock-pressure effects at Wetumpka. Impact-related planar microstructures are also present in plagioclase and micas within polymict breccia matrix.

Geochemistry: A possible extraterrestrial iridium component in Wetumpka impactites is being determined by multiparameter coincidence spectrometry, which is sensitive enough to permit detection of iridium at levels below 1 ppb.

Conclusion: Owing to initial studies done over 25 yr ago [3], Wetumpka impact structure has been described as a "probable impact crater" on some crater lists. Now, we are reporting shocked quartz and impactites, which provide key evidence confirming meteoritic impact at Wetumpka.

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