FLYNN CREEK CRATER DRILL CORES: CURRENT STATUS OF THE USGS COLLECTION IN FLAGSTAFF AZ J.F.McHone[1] and J.J.Hagerty[2]. [1]Planetary Geology Group, Arizona State Univ., Tempe AZ 85287-1404, [2]U.S.Geological Survey, Astrogeology Science Center, Flagstaff, AZ 86001. jhagerty@usgs.gov

Introduction: Between 1967 and 1979 the US Geological Survey conducted a drilling program at Flynn Creek Crater in north central Tennessee [1-3]. The project produced more than 3.8 km of nearly continuous core from 18 separate bore holes. These samples are now contained in 1,271 standard core storage boxes archived at the USGS in Flagstaff, Arizona where they currently are being organized and will be made available for scientific study [**Fig. 1**].

History of Flynn Creek Crater: A thin 3-10 m thick deposit of Devonian black shale occurs over much of the North American interior, from Michigan and Vermont to Alabama. Now known in Tennessee as the Chattanooga Shale, its persistence and distinct appearance have been exploited as a geological marker for more than 140 years [4]. Black shales are of economic interest as potential fuels and industrial minerals and are frequent targets for mapping programs. In 1926, while field mapping the recently published Gainesboro TN 15-minute topographic quadrangle, Lusk [5] discovered uniquely thick outcrops of Chattanooga. Shale exposed at Flynn Creek in Jackson County was up to 150 ft thick compared to a regional 10-50 ft. A belt of well-developed surface karst lies less than 20 miles east, and Lusk [5] interpreted the Flynn Creek anomaly as a sinkhole formed in underlying Ordovician limestone and filled with organic-rich Devonian sea muds.

In 1936 Wilson and Born [6] carefully mapped the intensely disturbed Flynn Creek area and identified large blocks uplifted as much as 500 feet above their normal positions. They concluded the site was an explosion structure in which a deep "crypto-volcano" beneath Ordovician limestone blasted a crater which eventually filled with up to 250 ft of Devonian black mud. That same year, Boon and Albritton [7] suggested Flynn Creek and other "cryptovolcanic structures" could, in fact, be meteorite impact structures.

In 1946, Dietz [8] proposed the non-genetic term "cryptoexplosion" and commented on similarities between Flynn Creek and Steinheim in Germany. He further suggested Flynn Creek and Steinheim were impact features analogous to central peak craters on the Moon.

Figure 1. Flynn Creek Crater samples in standard core boxes at the USGS Astrogeology Science Center, Flagstaff Arizona.

During the 1940s black shales around the world were discovered to be radioactive due to the presence of uranium. The Manhattan Engineering District funded the USGS to study North American black shales, emphasizing the Chattanooga, as a future uranium source [9]. Bore holes at Flynn Creek further revealed its buried crater form structure. Shoemaker and Eggleton in their 1961 report to the Atomic Energy Commission [10] described Flynn Creek as a "buried crater with the form and structure of a meteorite crater".

Flynn Creek Crater Drilling Program: Shoemaker approved the Flynn Creek structure as a doctoral study topic for USGS geologist David J. Roddy. Roddy not only completed a 1966 Cal. Tech. PhD dissertation [11] but also established a successful multi-year core drilling program [1,2]. A total of 18 separate holes were drilled with nearly complete recovery of over 3.8 km of continuous core [3]. As cores were recovered and examined, they were warehoused locally in stand-

ard boxes until operations were completed in late 1979 [3]. Eventually the entire collection was transported to Flagstaff, Arizona with plans to establish a public access facility. Such plans were unfortunately interrupted with Dr. Roddy's untimely death in 2002. The cores were neglected in obscurity until a recovery and preservation effort was revived. The boxes were located, and in some cases refreshed, then transported and shelved in a secure SeaVan shipping container at the USGS Astrogeology Science Center in Flagstaff. Here they are presently in the process of being identified, inventoried (all 1,271 boxes of NX and BX core), and catalogued for future access by interested scientists.

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