The Ancient Meteorite Crater at Holleford Ontario
by Leo Enright

Aerial photo of Holleford Meteorite Crater.

Holleford Crater, an interesting and very ancient meteorite impact feature, is named after the tiny village located partly within its boundaries. It is a circular depression about 30 meters deep and 2.35 km in diameter, located at latitude 44 deg 47 minutes north, longitude 76 deg 38 minutes west, about 27 km north-north-west of Kingston, Ontario.

Although several farms had been maintained at the site for over 100 years, its discovery and confirmation as a meteorite impact site dates only to the mid-1950's. The 1950's research was led by Canadian scientists from the Dominion Observatory in Ottawa, and the project that led to its discovery was the result of the discovery of two other meteorite impact sites, the New Quebec Crater and the crater at Brent, Ontario.

First identification of the feature was a result of a 1955 study of 200,000 aerial photographs of areas of the Canadian Shield conducted by the Dominion Observatory under the direction of Dr. Carlyle S. Beals, the Dominion Astronomer at the time.

Subsequently, the research program included a study of the surface geology by the Geologic Survey of Canada, and a series of four geophysical studies, namely (1) magnetic observations of the area, (2) seismic studies which proved consistent with the theory that it was an impact site, (3) gravity studies which also proved consistent with the impact theory, and (4) a diamond drilling program in which 3 holes were drilled. The drill core contained breccia and similar materials at depths predicted for a meteorite impact site.

The conclusions were that the feature outlined a very ancient meteorite impact crater formed in the Precambrian Bedrock below. It was over a half-billion years old, and probably formed by an impacting body 100m in diameter, travelling at 20 km/s with an energy of impact six times that of the object that formed the Barringer Crater. Primary reference for the research conducted at Holleford is Volume XXIV of the Publications of the Dominion Observatory (1960).

See also the Miller Hall Geology Museum.
Directions:
From Kingston Follow highway 38 north through Harrowsmith and into Hartington. Turn right/east at the store/gas station. Immediately on the right is a fire station. You are now on the correct road. Follow the road east for a km or two and it will take a bend to the north. Continue for another km or so and it comes to a T-branch. Turn right/east and continue up the hill. You are now roughly on the rim of the crater. Continue along to the first large barn with a windmill on the north side and you should see a historical society sign inside the fenceline. This is private property. If you continue up the hill east to another T branch you are close to the other rim.

I will be adding mileage figures to aid in navigation shortly, as well as more material provided by Queen's University.

The Meteorite Crater at Holleford Ontario
A Summary of the Essential Data
(For the CASCA Crater Tour, Sunday June 2nd, 1996)

Location: Latitude 44 deg 27 min North Longitude 76 deg 38 min West (at the village of Holleford) 5 km ENE of the village of Hartington
Diameter: 2.35 km

Prelude to Discovery: Discovery of New Quebec Crater (viewed from aircraft) in 1943. Its confirmation as of meteorite origin - July, 1950
Identification of Brent Meteorite Crater - 1951

Date of Identification of Holleford Feature as Possible Meteorite Impact Site: 1955
Method of Identification: systematic study of 200,000 aerial photographs of Canadian Shield areas in Ontario and Quebec conducted by The Dominion Observatory, Ottawa.
Director: Dr. Carlyle S. Beals, The Dominion Astronomer

The Identification Photograph: Royal Canadian Air Force Aerial Survey Photograph Number A13969-44

The Research Programs (1955 - 1957):
A. The Surface Geology Study: Date: Summer, 1955 Leader: Ur. M.J. Frarey, the Geological Survey of Canada

B. The Geophysical Studies:
1. The Magnetic Observations: Summer, 1955 Done by the Geological Survey of Canada
2. The Seismic Studies: Date: Summer, 1955 Leaders: J.H. Hodgson and PL. Willmore
   Siemological Division of G.S.C. Method: Detonation of three shots
   Conclusions: Consistent with meteorite impact theory
3. The Gravity Studies: Date: Summer, 1955 Leader: A.M. Bancroft
   Done by Gravity Division of Dominion Observatory
   Method: Network of 109 gravity stations set up
   Conclusion: Suggested presence of breccia 100 - 300 m. below the surface. Drilling program should be attempted.
4. The Diamond Drilling Program: Dates: 1956 and 1957
Method: 3 drill holes in SE direction from centre, first two drill holes to be very deep.
Observation: interbedded breccia and breccia located at depth of predictions in each of the three holes.
Conclusion: Breccia and fracturing of bedrock indicated clearly an impact site. A profile of the real crater could be drawn.

Conclusions: This feature outlines a very ancient meteorite impact crater formed in the Precambrian Rock below.
Estimated Age: 550 000 000 years
Estimated Size of Impacting Body: 100 m. in diameter
Estimated Velocity of Impact: 20 km./sec
Energy of Impact: 6X that of Barringer Crater impact (Between 20 X 10e21 and 31 x 10e24 ergs)