ENVIRONMENTAL
Fact Sheet

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

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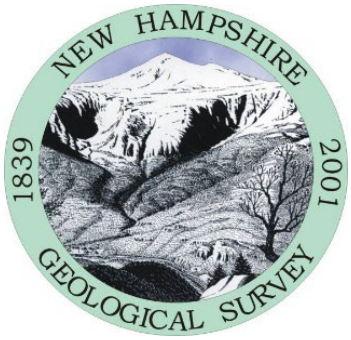
Meteorites in New Hampshire

Meteorites are chunks of metallic or stony material that have traveled through the solar system, survived their plunge through the Earth's atmosphere and landed on the Earth's surface. While out in space, debris in the solar system are called **meteoroids**. However, they become **meteors** when they enter our atmosphere. Meteoroids are generally the size of a grain of sand and are quickly vaporized by the heat of friction created as they collide with air molecules of the upper atmosphere. We see this vaporization as a "shooting star," or when several meteors appear seconds or minutes apart we see a "meteor shower." Intersecting the Earth's orbit and surviving a ride through the atmosphere without being vaporized is a very rare event. Meteors that endure the friction of the atmosphere must be large enough to survive vaporization, but heating of the outside surfaces can still cause their surface to "melt," giving parts of the surface a smooth molten appearance. However, the inside may still be cold, since out in space their temperature can approach absolute zero (0 = -273˚C, -459ºF). The interior may be over 400˚C (752ºF) if the meteoroid had been orbiting in direct sunlight. A meteor that actually lands on Earth's surface is called a **meteorite** and is difficult to identify, especially if you did not actually see the "fall."



Types of Meteorites:

- **Metallic meteorites** have enough iron and/or nickel in them to be attracted to a magnet and will be heavy for their size. Sawing off a portion of an iron/nickel metallic meteorite may reveal a cross hatched pattern in the silvery-looking metal. Having cooled slowly over several million years in orbit, the presence of this pattern proves that it is an extraterrestrial object.
- **Stony meteorites** are not magnetic or particularly heavy for their size. Though they can contain iron and nickel metals they are primarily composed of silicate materials. They may have what appear to be small "clumps" within the stony mass, which are rounded grains of silicate minerals called **chondrules**.

Why is it so difficult to find meteorites in New Hampshire?

New Hampshire's landscape was greatly altered by multiple glaciations in recent geologic time. Soil layers were scraped away completely in places to expose underlying bedrock, while in other places bedrock was buried under thick layers of stony glacial till or water-sorted deposits of sand and gravel. Any meteorites that might have been lying on or near the land surface before glaciation would have been thoroughly mixed up with all the other rock debris during the advance and retreat of the last glacier. Therefore, finding a meteorite in our rocky soil is much harder than finding one on the relatively "clean" surface of a glacier or sand dune. To complicate matters, New Hampshire's bedrock contains minerals that are magnetic, and rocks commonly have been smoothed and polished by glacial ice or by being tumbled in rivers and streams. Also, industrial processes such as iron smelting and glassmaking in more recent times have left behind waste slags that once were in a molten state, and in the former case are also magnetic and feel relatively heavy for their

size. Most meteorites are found in the world's deserts, where they may be easy to find among the sand or ice. In particular, the greatest number of meteorites are found in Antarctica (a polar desert) and in the Sahara Desert in Africa. Because meteorites are rare to begin with, finding one is like finding the proverbial "needle in a haystack." In fact, as of 2024, there has been only one confirmed meteorite found in New Hampshire, in Newport. Final classification of this meteorite is, as of 2024, pending isotope classification and registration. However, if you think you've found one, search the web for "Meteorite ID."

Identification of Meteorites

Meteorite identification is a difficult task to complete just from pictures alone. Although meteorites are often magnetic, the use of a magnet as a tool to identify a meteorite may not yield an accurate identification, as there are rocks on Earth that will attract a magnet. In order to be definitively classified as a meteorite, a specimen will first need to be sent to a lab that classifies and verifies meteorites so that it can be examined and tested. Such laboratories may be found by performing a web search for these types of facilities. The New Hampshire Geological Survey (NHGS) does not verify meteorites, and neither do jewelers. Although NHGS does not verify meteorites, and proper identification requires the services of a laboratory, here are some properties to look for to help determine if a meteorite is a possibility. It should be noted that these are general guidelines, and they do not replace examination at a laboratory.

- **Density**: Meteorites are usually heavy for their size (about 3 times denser than an Earth rock), as they have iron and other dense minerals.
- **Magnetic**: As most meteorites have iron, a magnet will typically be drawn to them. For "stony" meteorites, if you hang a magnet to a piece of string, the magnet might not attach, but it will be attracted.
- **Unusual Shape**: Meteorites are seldom perfectly rounded. Instead, they are typically angular and pitted. The pitting is referred to as "regmaglypts." However, such pits do not extend into the object itself.
- **Fusion Crust**: Stony meteorites typically have a smooth thin surface crust that melted as it passed through Earth's atmosphere and is typically brown to black in color and is darker than the interior of the object. The presence of fusion crust suggests that the object *may* be a meteorite.

Meteorites do not have the following:

- **Light-colored crystals:** For example, New Hampshire's state mineral, Beryl, is a light-colored mineral found throughout the state. Such light-colored minerals would not be found in a meteorite.
- **Bubbles:** Rocks on Earth may have bubbles or cavities in them. However, meteorites do not.
- **Streak:** If you scratch an unglazed ceramic surface with a meteorite, it should not leave streak. A rock, used to scratch such a surface, may leave a streak of some type of color on the ceramic surface. The presence of such colors, such as red or black, after streaking, suggest that types of minerals are present that are not found in meteorites. However, some igneous rocks (which are present in New Hampshire) will not leave a streak on a ceramic surface either. Thus, even if the object did not leave a streak on a ceramic surface, it is not a guarantee that the object in question is a meteorite.

For questions, please contact NHGS - Public Outreach at (603) 271-1976 or geology@des.nh.gov.