

Analysis of Some New Hampshire Garnets

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My collecting focus for the past several years has been to obtain as many New Hampshire mineral species as I could find. How many are there? Depending on which particular reference list you choose to use, there are close to 300 unique mineral species in New Hampshire. The reference list I am presently using has 278 entries. One previous benchmark of NH species was a display I coordinated for the Nashua Mineral Society's 1995 mineral show. For that show, our display committee solicited specimens from over 20 New England mineral collectors and museums. The show display exhibited 214 unique New Hampshire species. Our reference list had 256 entries, (distilled from several sources, including the 1990 New Hampshire "Rocks and Minerals" issue, Phillip Morrill's list, and a list from Janet Cares). Since 1995, I have added 27 species to my working version of the NH list and deleted 10 species. Bob Janules' study of the Mascot Mine in Gorham, NH is responsible for many of the recent additions. Certainly any state species list is a fluid document. Present and future collectors will keep it growing.

A proven New Hampshire Spessartine garnet was, until recently, absent in my collection. Differentiating the Almandine and Spessartine garnet series is difficult for the amateur collector, (for me anyway). There is a solid solution series that traverses the chemistry between the iron, Almandine, garnet and the manganese, Spessartine, garnet. Some specimens may have an intermediate composition between Fe rich and Mn rich.

One test method I have tried with some success is to intensely heat garnet fragments with a propane torch. This apparently changes the oxidation state of any iron present. The result is that when the fragment cools, if it is an iron garnet, the grain will be attracted by a small, strong, magnet. Some garnet grains will show a moderate attraction to the magnet, others a weak or no attraction. Try this test for yourself with a known Almandine garnet fragment.

This fall I have had five candidate New Hampshire Spessartine garnets analyzed using an EDS microprobe service. The analysis results and the locality details for these specimens follow.

Locality 1: A quartz outcrop, north of the Ore Hill Mine, Warren, NH.

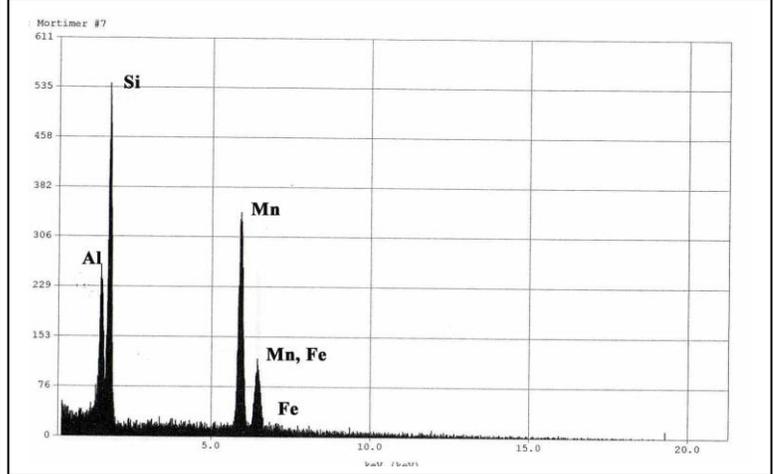
Specimen Description: Crude, manganese stained, crystals in quartz, with glassy, orange, interior. Crystal size, about 1.5 cm.

Analysis: Because these "crystals" are so crude, I was uncertain if they were actually garnet. My propane torch test showed no magnetic response. However, the EDS¹ analysis clearly showed the mineral to be Spessartine, with only a slight trace of iron.

¹ The element cutoff for the EDS instrument used for these analyses was Sodium. Elements with atomic numbers less than Sodium, (includes Oxygen and Carbon), do not show up on the plots. An excellent tutorial on the subject of EDS analysis may be found at <http://jan.ucc.nau.edu/~wittke/Microprobe>.



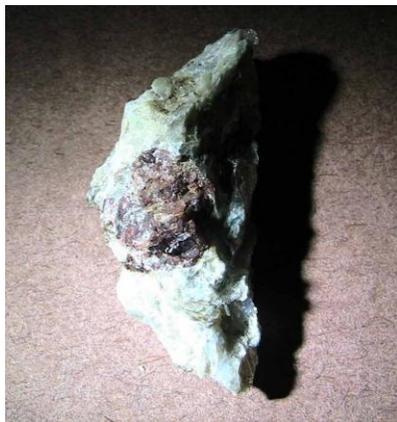
Ore Hill, Warren, NH - Spessartine



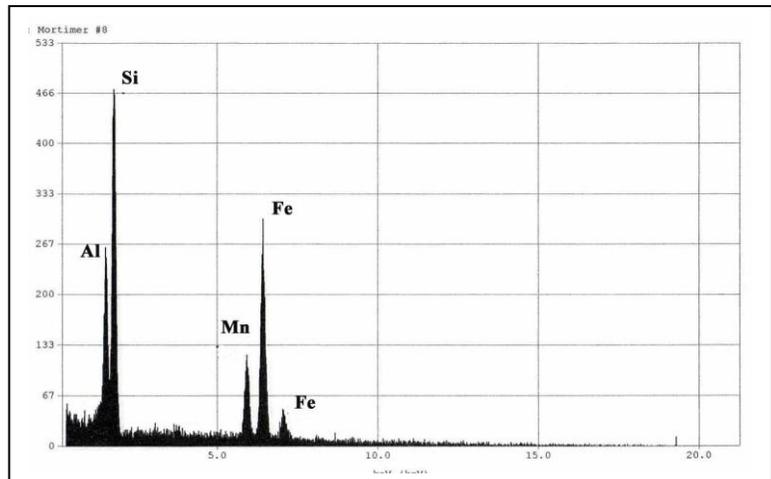
Locality 2: East shore, Lake Warren, Alstead, NH. A personal communication from Carl Francis of Harvard had informed me that Spessartine had been found in a Biotite schist near Lake Warren, in Alstead, NH.

Specimen Description: The pink garnets I found were in pegmatite boulders on the east shore of Lake Warren. Although the crystals were not especially aesthetic, their light pink color looked promising for a NH species collector seeking Spessartine. The broken crystal in photo is about 1 cm across

Analysis: The EDS analysis of these Alstead garnets showed them to be Almandine-Spessartine, with the iron content exceeding the manganese content.



Alstead, NH - Almandine-Spessartine



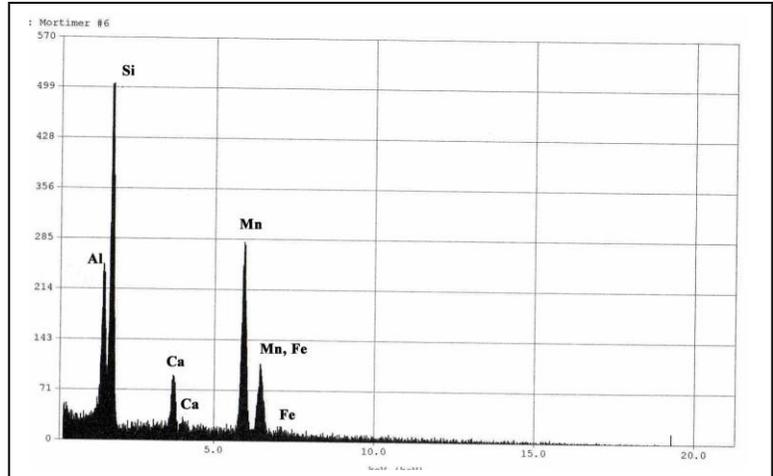
Locality 3: Tower Hill, Hinsdale, NH

Specimen Description: Small orange-red garnets are associated with the manganese mineral deposit on Tower Hill in Hinsdale. This environment makes this a likely site for Spessartine garnets.

Analysis: These specimens are predominantly manganese garnets, with lesser amounts of iron and Calcium present. These qualify Spessartine garnets, but the presence of Calcium and Iron indicates some mix of Grossular and Almandine in the recipe.



Hinsdale, NH
1 – 2 mm Spessartine garnets



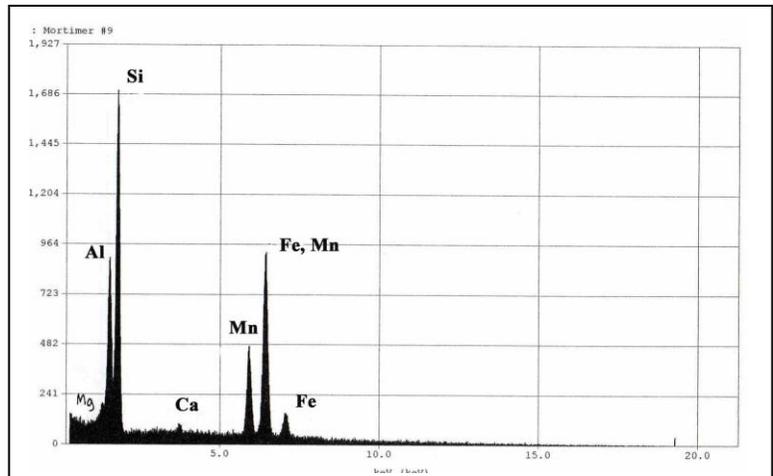
Locality 4: Joe Hill Area, Springfield, NH. Many veteran NH field collectors have heard of the Joe Hill Farm locality in Springfield, NH, where “all (old time) collectors got there spessartites”, (Phillip Morrill). Many collectors, including myself, have searched for this lost locality, but no one I know has found it. Perhaps it is simply “worked out.” When I was searching the area in 1995, I did find some garnets in a pegmatite ledge in this area.

Specimen Description: 7 mm red garnet in a feldspar muscovite matrix.

Analysis: The EDS analysis shows my Joe Hill garnet to be Fe rich with Mn present, thus another Almandine-Spessartine garnet.



Joe Hill Area Springfield, NH
Almandine-Spessartine



Locality 5: EE Smith Mine, (upper pegmatite cut), Alexandria, NH.

Specimen Description: I discovered 1 to 2 mm yellow green “garnets” in association with some manganese stained red garnets in pieces of a vuggy albite mine dump rock. The shape of these crystals clearly said “garnet”, but the color was unlike any New England garnet I had seen.

Analysis: These small crystals are apparently not garnet. The prominent element present, other than Aluminum and Silicon, (and implied Oxygen), is Potassium. On closer inspection, the interiors of these

“garnets” appear to be mica-like. They are easily scratched with an Xacto knife. My guess is that these are Muscovite or Glauconite pseudomorphs after Almandine-Spessartine. I will be seeking the opinion of others at our next meeting.

