Reported by William Short of **Hurstwic**
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I was eager to compare the composition of an iron bloom smelted during the Viking age to the composition of the iron bloom that Hurstwic created with Darrell Markewitz at The Wareham Forge last month. A portion of our bloom (H001) is shown in the photo. For comparison, we used the Viking-age bloom S101, a bloom fragment excavated from Skógar in Fnjóskadalur in north Iceland. The analysis was reported by Nordland (2015). The bloom was created between the years 940 and 1104.
Both blooms are highly magnetic. Both blooms were analyzed using SEM-EDS. The composition of both the iron, and the slag inclusions were measured separately.
Composition is in weight percent for each element detected:

Iron portion of the bloom (S101 [Viking age] / H001 [modern])
Fe: 100% / 100%

Slag intrusion portion of the bloom (S101 / H001)
O: 48.3% / 42.2%
Na: 0.1% / *
Mg: 0.7% /3.4%
Al: 0.7% /8.1%
Si: 5.9% / 31.6%
P: 0.2% / *
S: 0.3% / *
K: 0.2% / 2.5%
Ca: 1.3% / 6.5%
Ti: 0.1% / 0.5%
Mn: 0.5% / 1.5%
Fe: 41.4% / 3.8%

A few comments…
I did not expect the iron to be so pure. The SEM-EDS method is limited in that it can detect C only at levels above 1% or so, but other impurities can be detected at lower levels. I expected to see something other than Fe in those sections of the bloom, so the purity of the iron surprised me. But then, the iron from Skógar was equally pure. I'm happy to see we can make our iron as pure as Viking-age iron smelters!
There are significant differences between the composition of the slag intrusions in the two samples, but there are many possible explanations. I did not expect a perfect match. There was a surprisingly high amount of Fe in the slag for S101, something commented on by Nordland.
The photos of the macrostructure of H001 show a porous structure with uniform sprinkling of intrusions. The photos of the microstructure are not yet in my hands.