Report 3916

Metallurgical examination of fire-dog from Baldock.

AM Lab.No. 680504.

The fracture which had been exposed for some time still contained some bright areas. A piece removed from near the fracture showed that the metal was wrought iron with a carbon content of about 0.2%. The structure was that of of ferrite and lamellar pearlite showing slow cooling from 700°C. The slag stringers were two-phase and had been cut end on. The grain size was fine and there were no signs of grain growth in the area of the fracture due, for example, to long heating in high temperatures. Considering that the fracture was near the knobbed end this is not very surprising.

The hardness is 162 HV.

The fracture is really no different from a cold fracture in a modern wrought iron containing some phosphorus which tends to segregate at the grain boundaries and increase the corrosion resistance in a dry atmosphere. It is known that other elements such as Cu, Ni and As can also segregate at the grain boundaries[1-3] and it would be interesting to know the trace element content. But the hardness is very typical of a wrought iron of 0.2% C with only a moderate phosphorus (0.1-0.2%) content.

A considerable area of the fracture shows a tough, fibrous, fracture typical of wrought iron and I would not regard the few specular areas of cleavage or intercrystalline fracture as being unusual for an iron of this composition.

Incidentally, I have a full set of photos of the other fire-dog from this site, 680505, dated February 1974.

References.

1. R.F. Tylecote and R. Thomsen. Archaeometry, 1973, 15, 193-98.
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3. B.E. Hopkins and H.R.Tipler. The effect of phosphorus on the tensile and notch-impact properties of high purity iron and iron-carbon alloys. J.I.S.I., 1958, 188, 213-237.

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Mount 460.

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