

C.5 Summary for Sample 2

1. The thinning of the steel occurred by high temperature corrosion due to a combination of oxidation and sulfidation.
2. The sulfidation attack of steel grain boundaries accelerated the corrosion and erosion of the steel.
3. The high concentration of sulfides in the grain boundaries of the corroded regions of the steel occurred due to copper diffusing from the HSLA steel combining with iron and sulfur, making both discrete and continuous sulfides in the steel grain boundaries.

C.6 Suggestions for Future Research

The severe corrosion and subsequent erosion of Samples 1 and 2 are a very unusual event. No clear explanation for the source of the sulfur has been identified. The rate of corrosion is also unknown. It is possible that this is the result of long-term heating in the ground following the collapse of the buildings. It is also possible that the phenomenon started prior to collapse and accelerated the weakening of the steel structure. A detailed study into the mechanisms of this phenomenon is needed to determine what risk, if any, is presented to existing steel structures exposed to severe and long-burning fires.