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C *Limited Metallurgical Examination*

C.1 Introduction

Two structural steel members with unusual erosion patterns were observed in the WTC debris field. The first appeared to be from WTC 7 and the second from either WTC 1 or WTC 2. Samples were taken from these beams and labeled Sample 1 and Sample 2, respectively. A metallurgic examination was conducted.

C.2 Sample 1 (From WTC 7)

Several regions in the section of the beam shown in Figures C-1 and C-2 were examined to determine microstructural changes that occurred in the A36 structural steel as a result of the events of September 11, 2001, and the subsequent fires. Although the exact location of this beam in the building was not known, the severe erosion found in several beams warranted further consideration. In this preliminary study, optical and scanning electron metallography techniques were used to examine the most severely eroded regions as exemplified in the metallurgical mount shown in Figure C-3. Evidence of a severe high temperature corrosion attack on the steel, including oxidation and sulfidation with subsequent intergranular melting, was readily visible in the near-surface microstructure. A liquid eutectic mixture containing primarily iron, oxygen, and sulfur formed during this hot corrosion attack on the steel. This sulfur-rich liquid penetrated preferentially down grain boundaries of the steel, severely weakening the



Figure C-1 Eroded A36 wide-flange beam.