Analysis of A Submitted Wire

PURPOSE

Examine submitted wire for evidence of electrical arc damage.

FACTUAL DATA

A 73 cm length of primary wire was submitted by the National Transportation Safety Board (NTSB) for analysis (Figure 1).

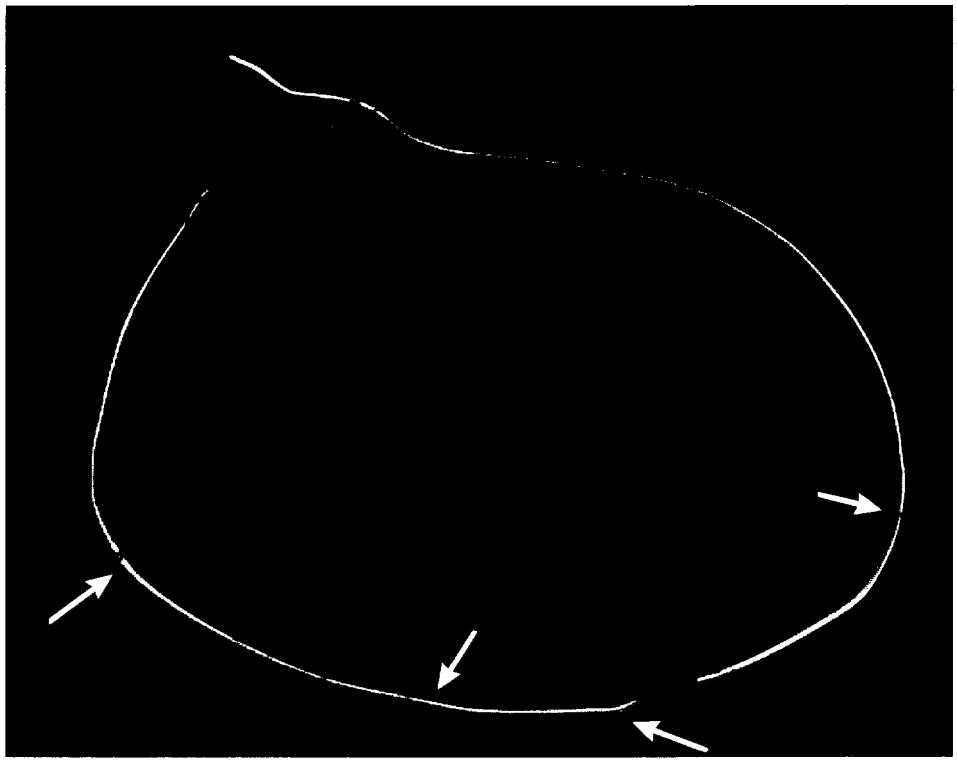

Figure 1. Wire sample submitted for analysis. The insulation exhibited blackened areas (black arrows) and mechanical damage (white arrows).

The wire was removed from TWA 800 wreckage on 26 June 1997 and was reported to be a BMS 1342A (Poly-X) type wire that was associated with the routing of center wing tank probe wires. There were three blackened areas (black arrows, Figure 1) and at least four mechanically damaged areas (white arrows, Figure 1) on the wire insulation. The blackened areas were typically associated with thermal damage. Multiple orientation images of the largest blackened area are shown in Figure 2.

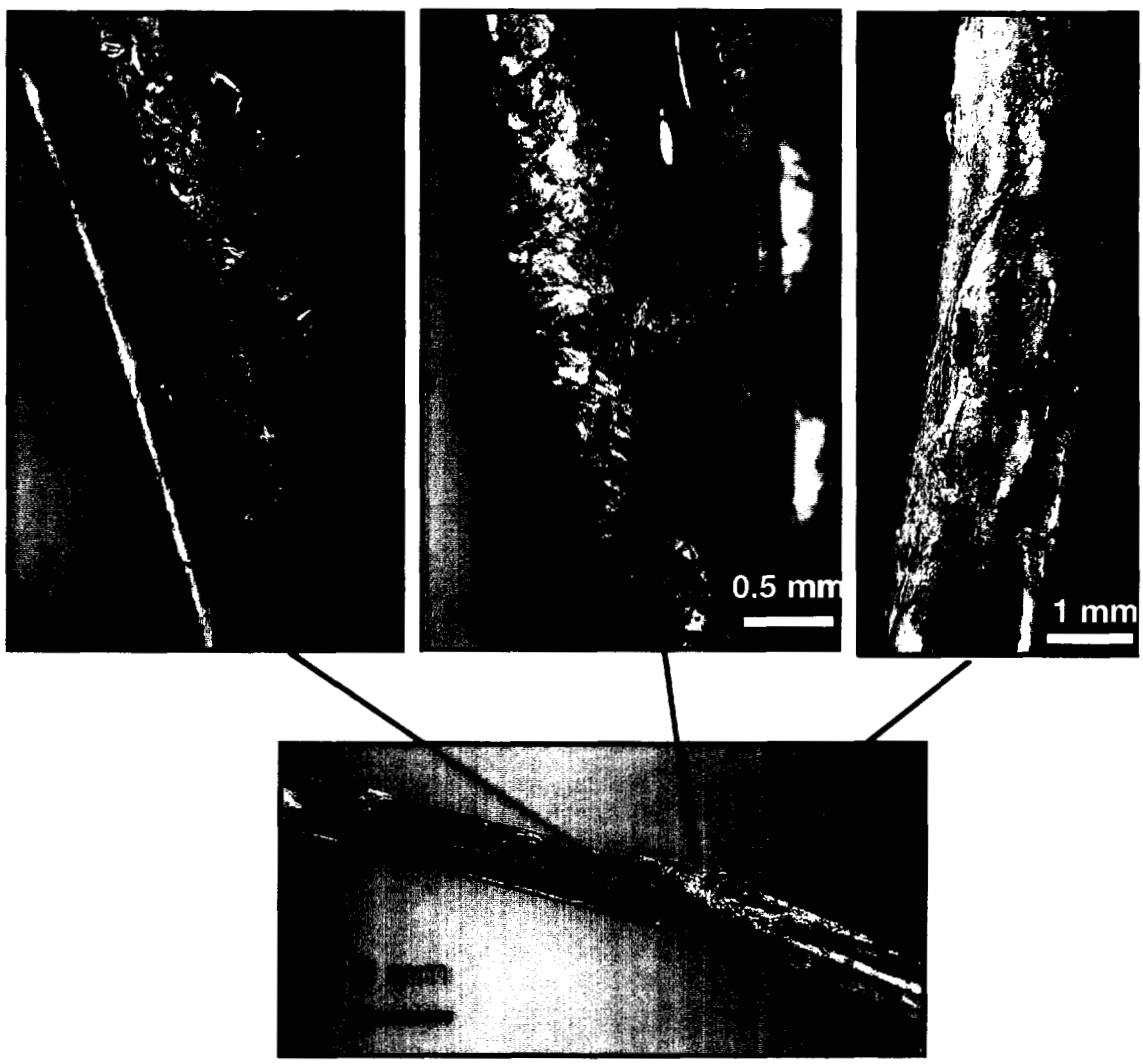

Figure 2. Multiple images of the largest blackened and thermally damaged area on the submitted wire.

Note the black residue on the insulation surface and mechanical damage to the multi-layered insulation. The amber tape was not carbonized and only exhibited mechanical damage. The black residue was easily removed mechanically from the insulation surface. Another blackened and raised area is shown in Figure 3.

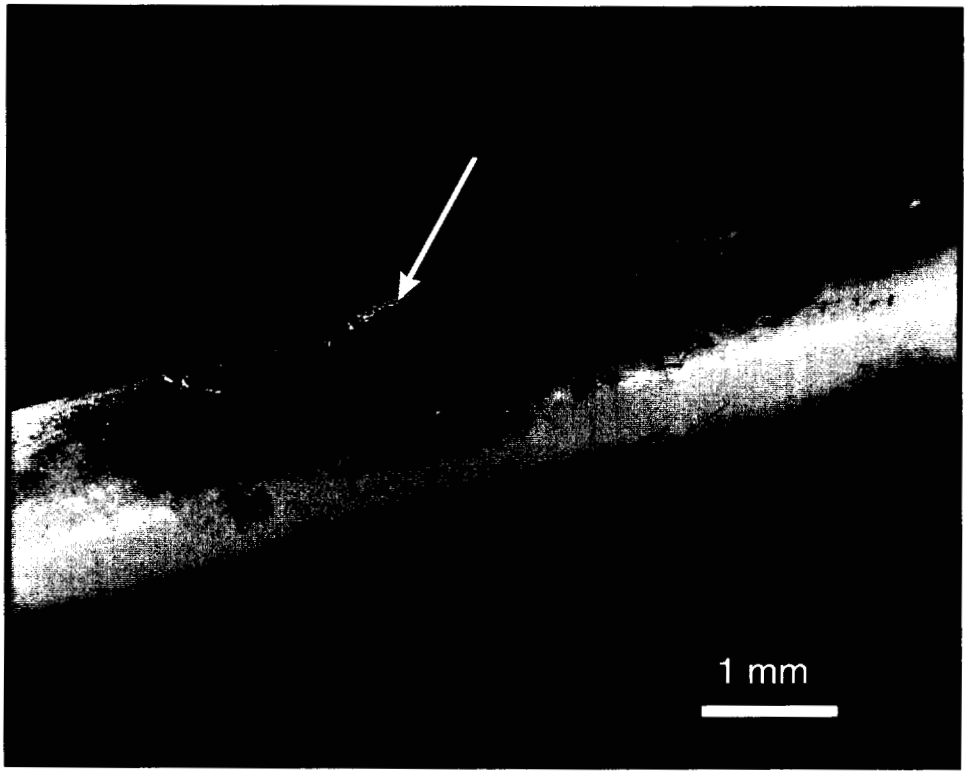

Figure 3. Blackened and thermally damaged area on wiring. Note raised area (arrow).

Note the crazed and melted appearance of the raised area. In all cases, the thermal damage progressed from the outside towards the conductor. A typical example of a mechanically damaged insulation area is shown in Figure 4.

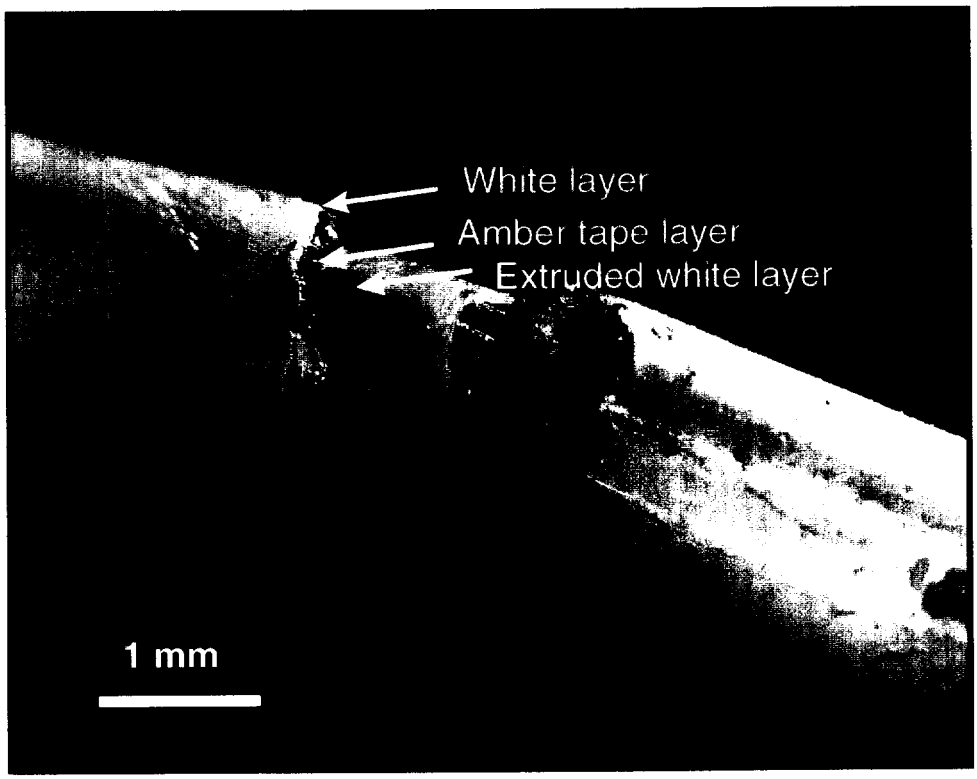

Figure 4. Typical mechanically damaged insulation area. Note the damage reveals the multiple layered insulation construction.

The insulation was flexible and bending of the insulation outside damaged areas did not produce cracks.

SUMMARY OF FINDINGS

There was no evidence of carbonization of the insulation or melting of exposed conductors which are typically associated with arc damage.

The thermal insulation damage progressed from the outside toward the conductor. This implies the insulation was exposed to an external thermal source.

The black residue could be removed mechanically.

Mechanical damage was isolated and there was no evidence of insulation embrittlement.

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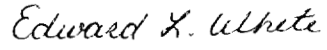

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PUBLICATION REVIEW: This report has been reviewed and approved.

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