

## ***Appendix D—Equipment Found at H-2 and the Fatalities Site***

Equipment used by Jeff Allen and Shane Heath for rappelling from H-193 to the ground and for construction of the helispot was found at H-2. The equipment had been readied for transport. One of the saws had been wrapped with chain saw chaps, the hand tools had been wrapped in fiberglass tape, and all of the equipment was stacked in a single pile. Though severely damaged by fire, the stack appears to have contained helicopter rappel equipment, a radio, three hand tools, and two chain saws with associated maintenance tools. Only steel, glass, brass, and some aluminum were still intact. The rest of the material was either consumed or melted by the fire. Some pieces of cast aluminum melted, indicating material temperatures of at least 1,000 °F (photos 1 and 2).

The remains of two fire shelters, personal items such as watches, cameras, keys, and belt buckles, and work-related items, including a radio, carabiners, and batteries were found at the fatalities site. Only steel, glass, and brass items were intact. The glass watch face was distorted as if it had softened. Glass begins to soften when it reaches about 1,100 °F. Two flight helmets on the site were charred, easily compressed, and brittle (photo 3).

The fire shelters were the older style (NSN# 4240-01-121-8698, NFES# 0169), which meet agency requirements (photo 4). The shelters were separate from other materials, which indicates they had been removed from their packs. One of the shelters was accordion folded in the same shape in which it was packaged, indicating that it had not been unfolded prior to the burnover. The exposed top layers of the folded shelter had no remaining foil and the fiberglass layer was white and



*Photo 1—H-2, chain saws, and rappel equipment.*

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Photo 2—H-2, chain saws, rappel equipment, and melted aluminum.



Photo 3—Fatalities site, fire shelters, and flight helmets.

very fragile. Where foil was present on the more protected layers, it was completely delaminated from the fiberglass cloth. Aluminum used in the shelters melts at about 1,200 °F. The fiberglass used in the shelters softens between 1,350 and 1,611 °F. The condition of the exposed fiberglass indicates that material temperatures were within this range.

The second fire shelter was unfolded lengthwise but almost completely folded width-wise. This indicates that the shelter was removed from its plastic bag and partially unfolded prior to the burnover. The foil had melted from 10 of the 12 layers of the shelter and was present on the two layers that lay closest to the ground. Foil that remained had completely delaminated from the fiberglass layer. The fiberglass cloth was white and extremely brittle, indicating that it had reached a softening temperature between 1,350 and 1,611 °F.

Crown fires studied with instruments by MTDC have reached temperatures over 2,000 °F. Temperatures from approximately 1,300 °F have damaged fire shelters, melting aluminum, and fracturing and disintegrating fiberglass cloth. Conditions inside fire shelters tested in these conditions were not survivable. The condition of the partially unfolded fire shelter found at the fatalities site resembled fire shelters tested under these severe conditions. This indicates that the shelter was subjected to temperatures from 1,300 °F to potentially over 2,000 °F.



*Photo 4—Fatalities site where fire shelters were not deployed.*