

# National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



WPR22FA361

## **MATERIALS LABORATORY**

Factual Report 23-054

July 5, 2023

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## **A. ACCIDENT INFORMATION**

Location: Sahuarita, Arizona  
Date: September 28, 2022  
Vehicle: Grumman American Aviation Corp. AA-5B, N74349  
Investigator: Fabian Salazar (AS-WPR)

## **B. COMPONENTS EXAMINED**

Portion of control cable.

## **C. EXAMINATION PARTICIPANTS**

Specialist Adrienne Lamm  
National Transportation Safety Board  
Washington, D.C.

## **D. DETAILS OF THE EXAMINATION**

A portion of control cable was submitted for examination. Figure 1 shows that most of the cable was still bundled and had separated approximately 8 inches from the cut end. Two strands had unwound from the overall cable and extended an additional 5 inches, as shown in Figure 4.

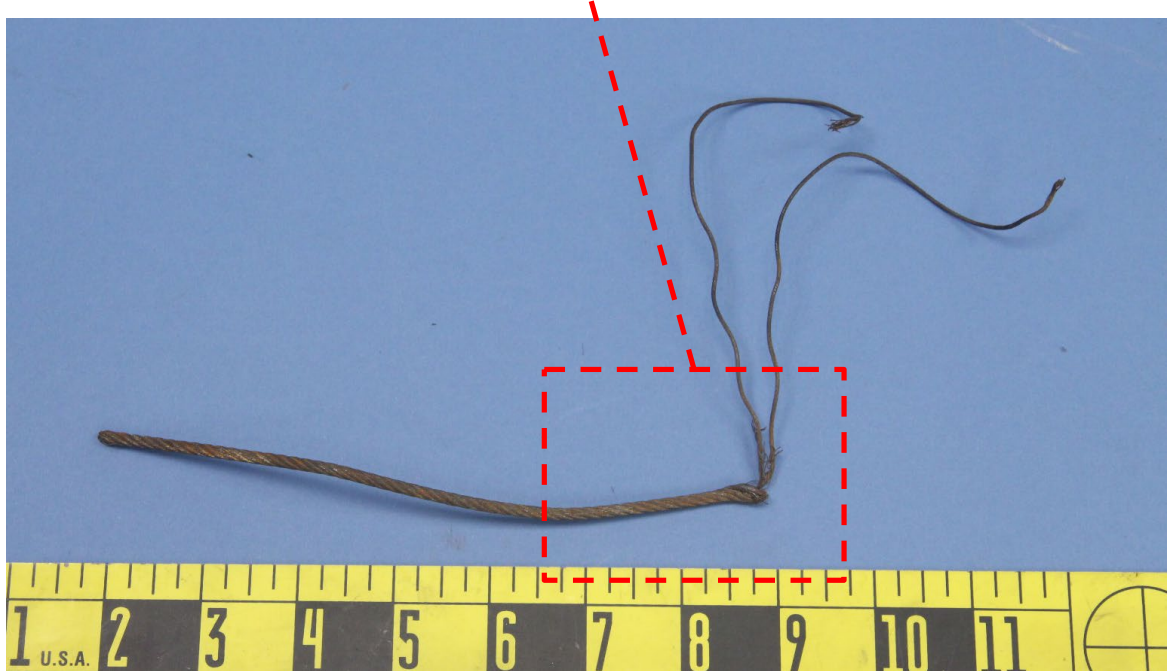
The separated wire ends throughout the entire length of the cable were examined using a 5x to 50x magnification stereo microscope. Digital microscope images of wire fracture surfaces at the still bundled segment of cable are shown in Figures 2 and 3. Digital microscope images of wire fracture surfaces at the ends of the unwound strands are shown in Figures 5 and 6.

There were flat, elongated, angular fracture surfaces on the ends of many of the wires (indicated by yellow arrows in Figures 3, 5, and 6). The angular fracture surfaces had rub marks and the cross-sections of the wires adjacent to the separations had thinned. At the separated end of the still bundled segment of cable the thinned wires were still grouped together into strands, as indicated by the yellow dotted circles in Figure 2. The orientation and characteristics of the fractured wire ends is consistent with between-strand wear and subsequent overstress separation.

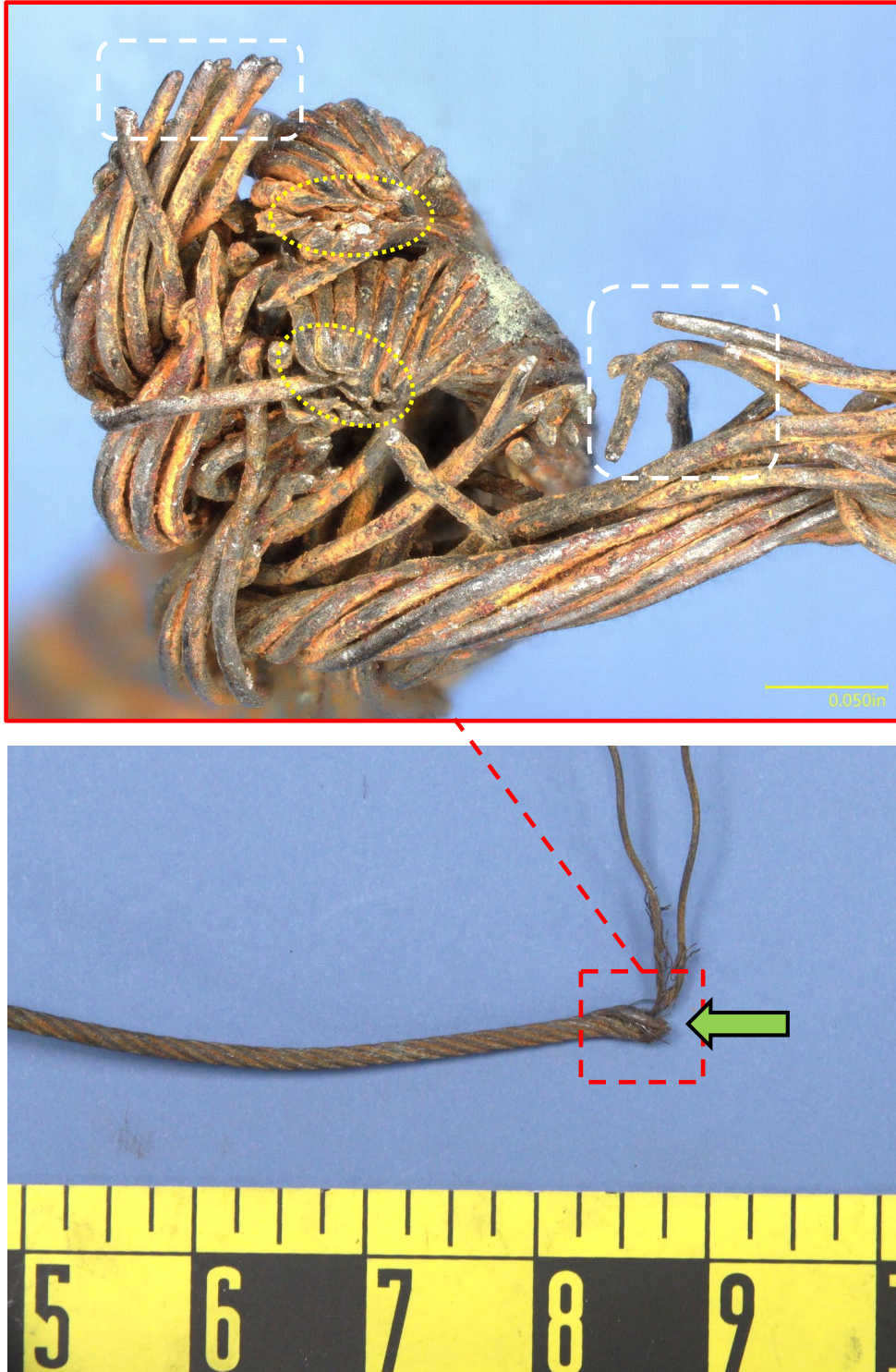
The remaining wires had cup-and-cone like fracture surfaces accompanied by adjacent necking of the wire cross-section (indicated by white dashed lines in Figure 2 and white arrows in Figures 3, 5, and 6), which is consistent with overstress separation.

Submitted by:

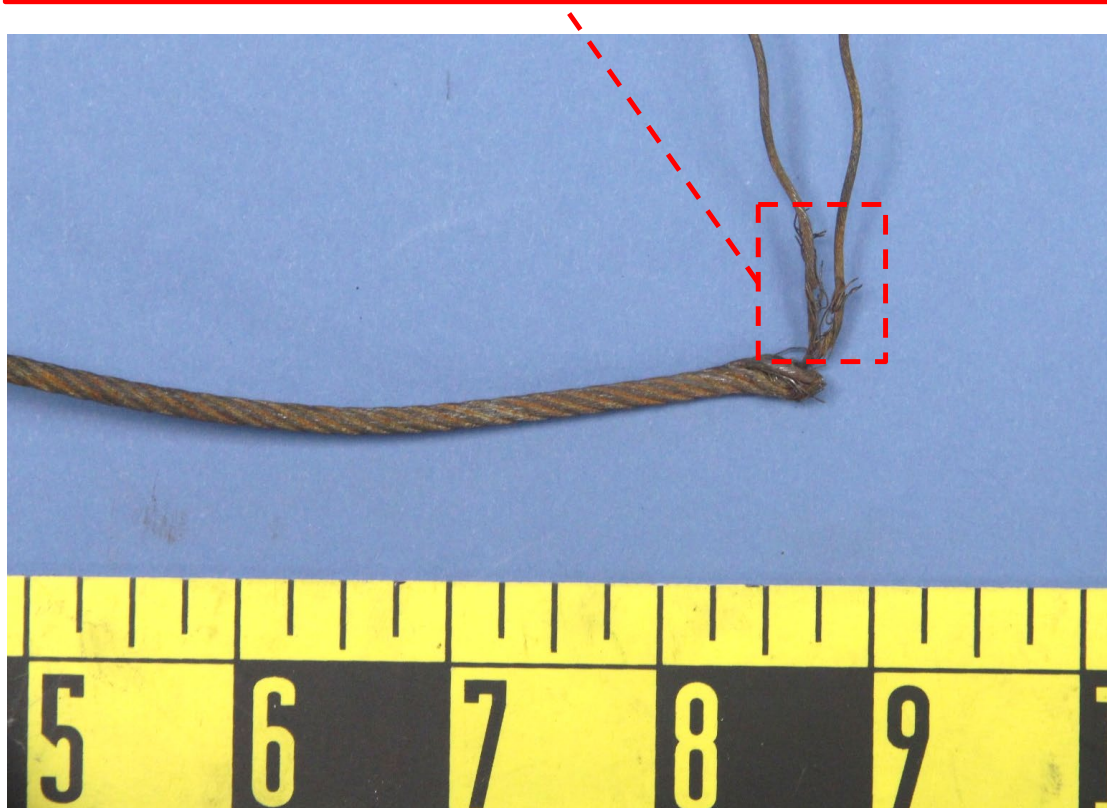
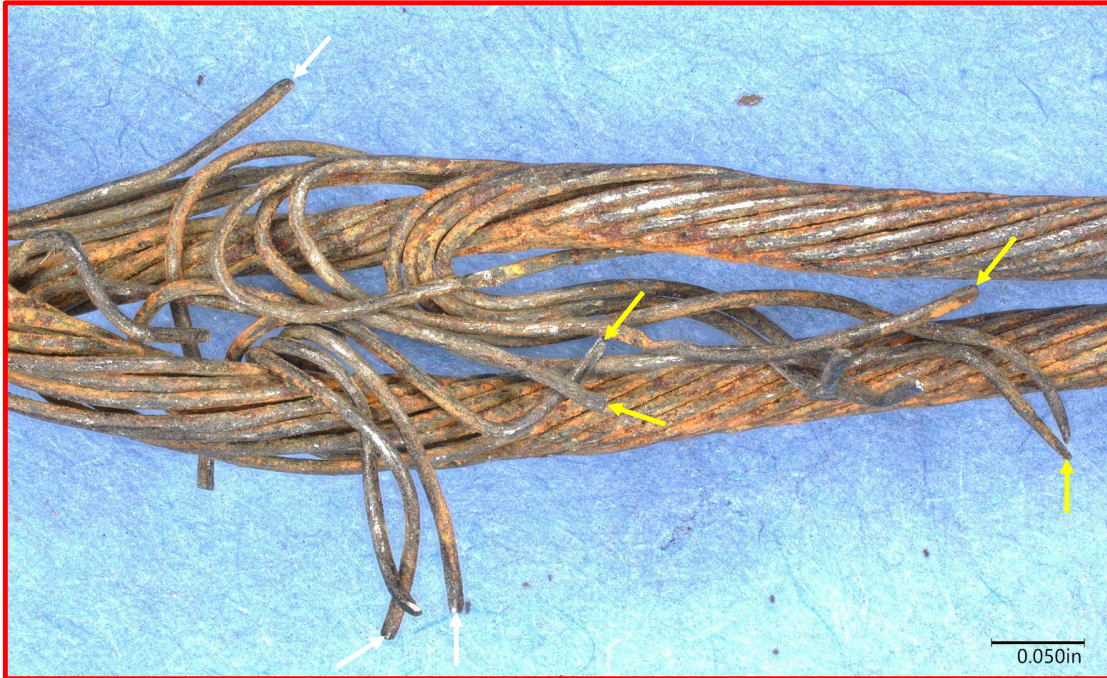
Adrienne V. Lamm  
Materials Engineer



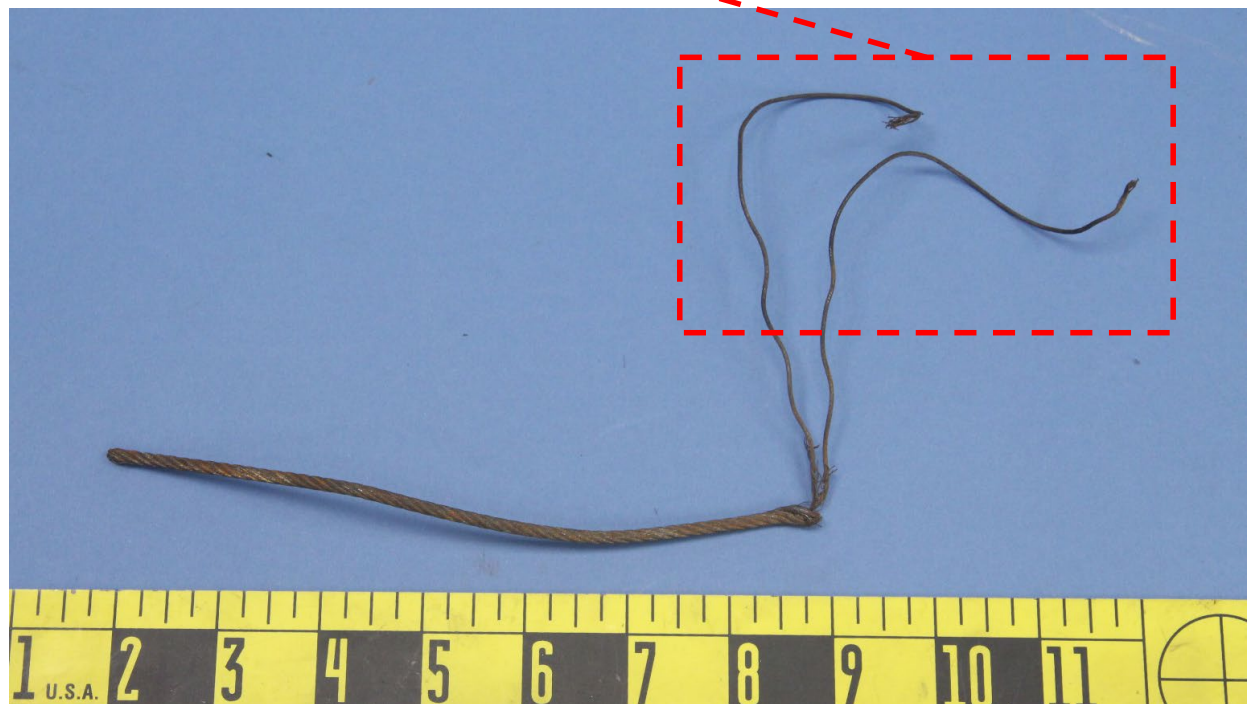
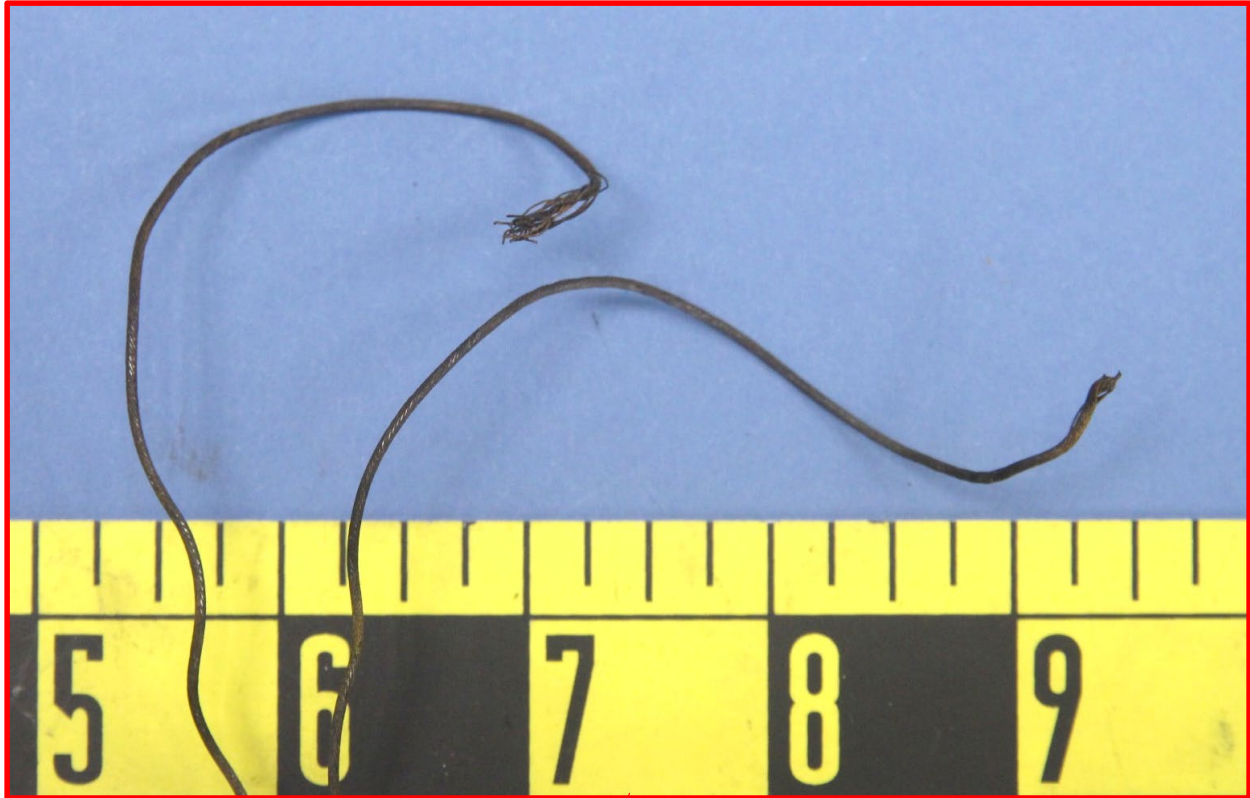
**Figure 1.** An overall photo of the submitted portion of cable is shown in the bottom. A close-up photo showing the separated still bundled end of the cable is shown in the top.



**Figure 2.** A close-up photo showing the separated still bundled end of the cable is shown in the bottom. A digital microscope image of the separated still bundled end of the cable looking in the direction of the green arrow is shown in the top. The yellow dotted lines encircle separated wire ends that had thinned and the white dashed lines indicate separated wire ends with cup-and-cone fractures.

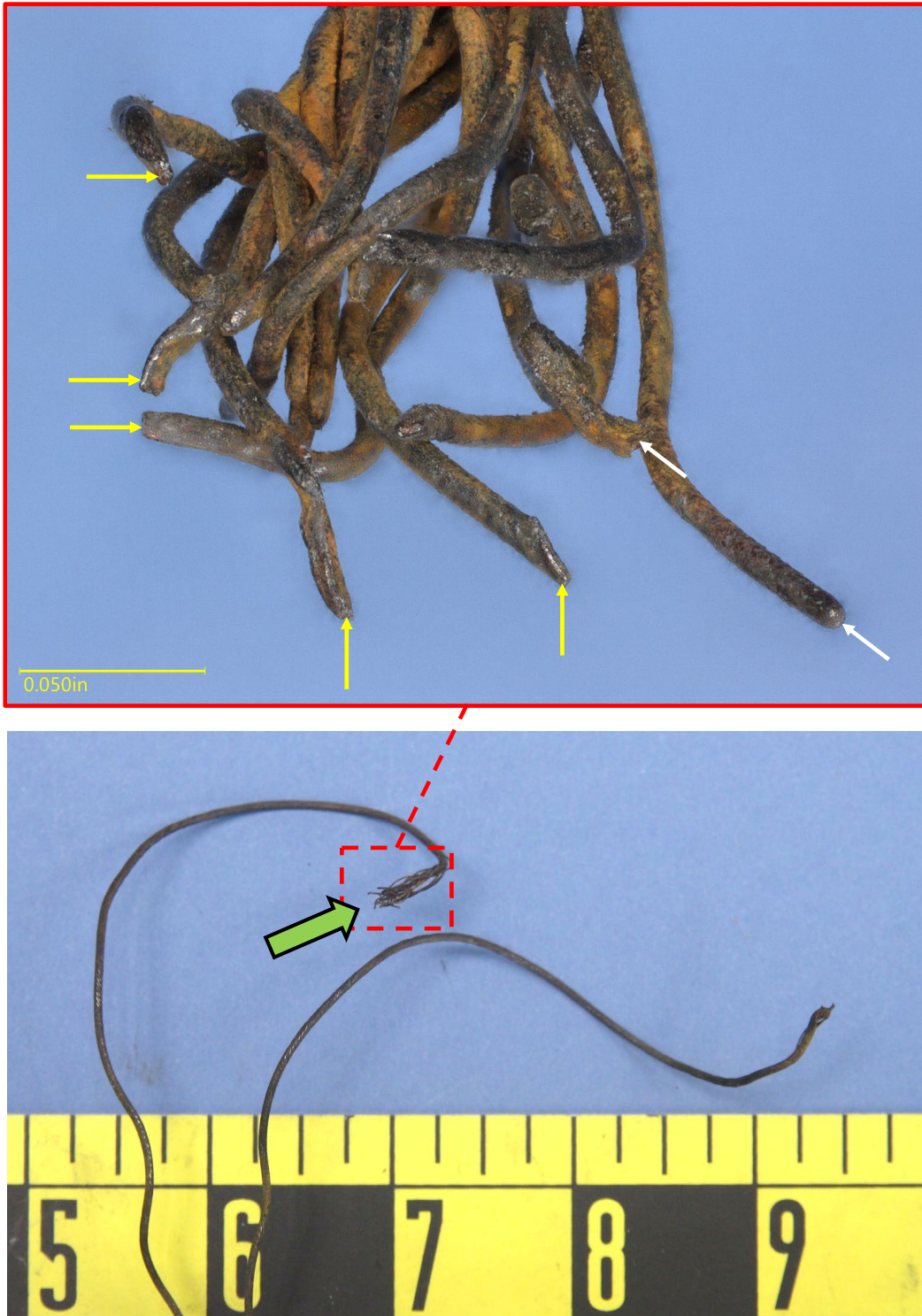


**Figure 3.** A close-up photo showing the separated still bundled end of the cable is shown in the bottom. A digital microscope image of the unwound strands with wires that separated from the still bundled end of the cable is shown in the top. The yellow arrows point to separated wire ends that had thinned and the white arrows point to separated wire ends with cup-and-cone fractures.

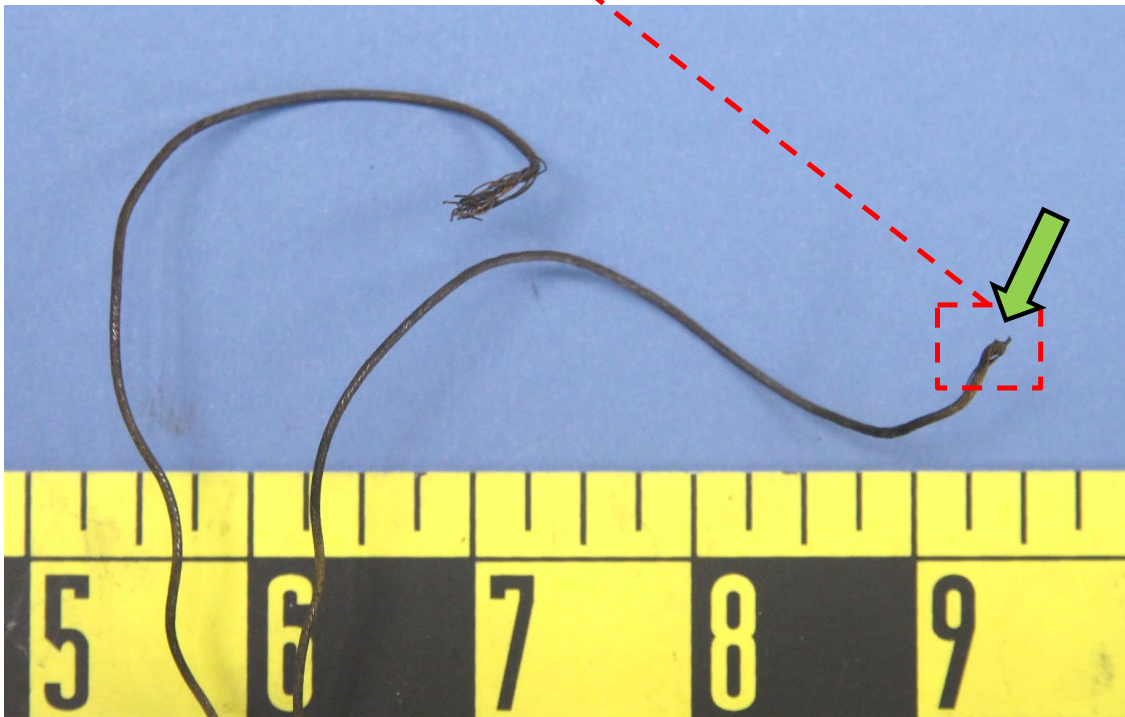


**Figure 4.** An overall photo of the submitted portion of cable is shown in the bottom. A close-up photo showing the unwound strands of the cable is shown in the top.





**Figure 5.** A close-up photo showing the unwound strands of the cable is shown in the bottom. A digital microscope image of the strand looking in the direction indicated by the green arrow is shown in the top. The yellow arrows point to separated wire ends that had thinned and the white arrows point to separated wire ends with cup-and-cone fractures.



**Figure 6.** A close-up photo showing the unwound strands of the cable is shown in the bottom. A digital microscope image of the strand looking in the direction indicated by the green arrow is shown in the top. The yellow dotted line encircles and the yellow arrows point to separated wire ends that had thinned and the white arrows point to separated wire ends with cup-and-cone fractures.