BRITISH MOUNTAINEERING COUNCIL

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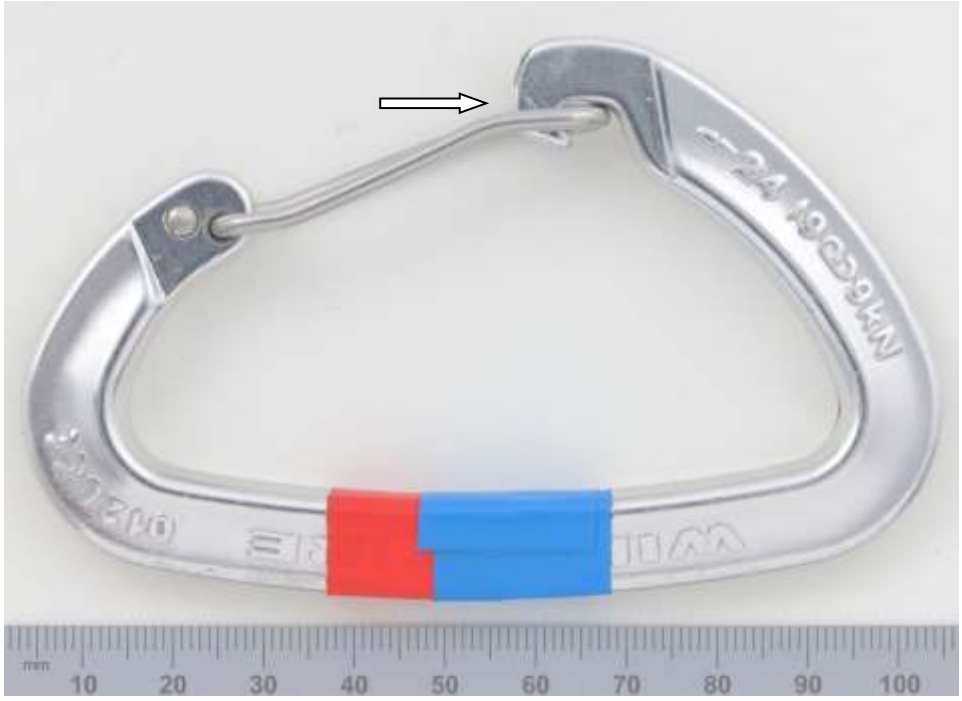
TECHNICAL COMMITTEE MEMORANDUM TCM 13/02

Broken Wild Country Wildwire karabiner

Incident Ref. IR08/13/C.PAT

SUMMARY

This memorandum details the failure of a karabiner in the notched area near the ‘nose’. No injuries were sustained by the user, and the most likely explanation for the failure appears to be a pre-existing forging flaw.



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Approved by the Technical Committee	

1. INTRODUCTION

A BMC member has made the committee aware (see EIP incident report ref 08/13/c.PAT, dated 8/8/13) of the failure of a karabiner forming part of a quick draw. The user reports that the tip ('nose') of the karabiner at the bolt end of the quick draw fell off whilst he was clipping the rope at the other end. No injuries were sustained, but the karabiner was sent to the BMC Technical committee for examination.

2. EXAMINATION

The broken karabiner arrived at TWI in late December 2013. From a cursory visual examination (Figure 1 and Figure 2), the karabiner appears to be in a safe condition, because the failure surface (arrowed) was located at the very tip of the nose, and therefore did not affect the ability of the snap gate to snap shut. Moreover, there was no indication of sharp edges likely to have caused injury after the failure. A closeup view of the nose region (Figure 3) shows the failed area from the side, along with some surface scratches, whilst Figure 4 shows the failure surface in more detail.

EDX semi-quantitative analysis showed the presence of Zn, Mg and Cu, consistent with the composition of Al alloy grade 7075.

The following additional examinations were carried out:

- The failure surface was examined by scanning electron microscopy (Figure 5)
- A metallographic section was taken through the failure surface, which was then etched in Keller's reagent and examined by light microscopy (Figure 6).

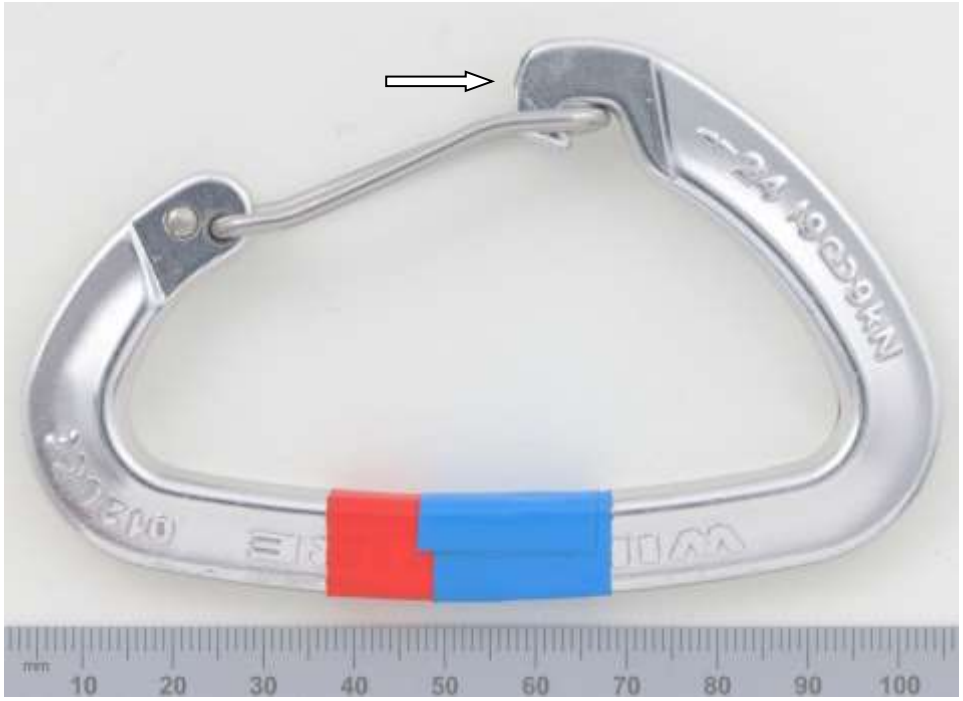

Figure 1 General view of karabiner from side 1 (D012291_001)

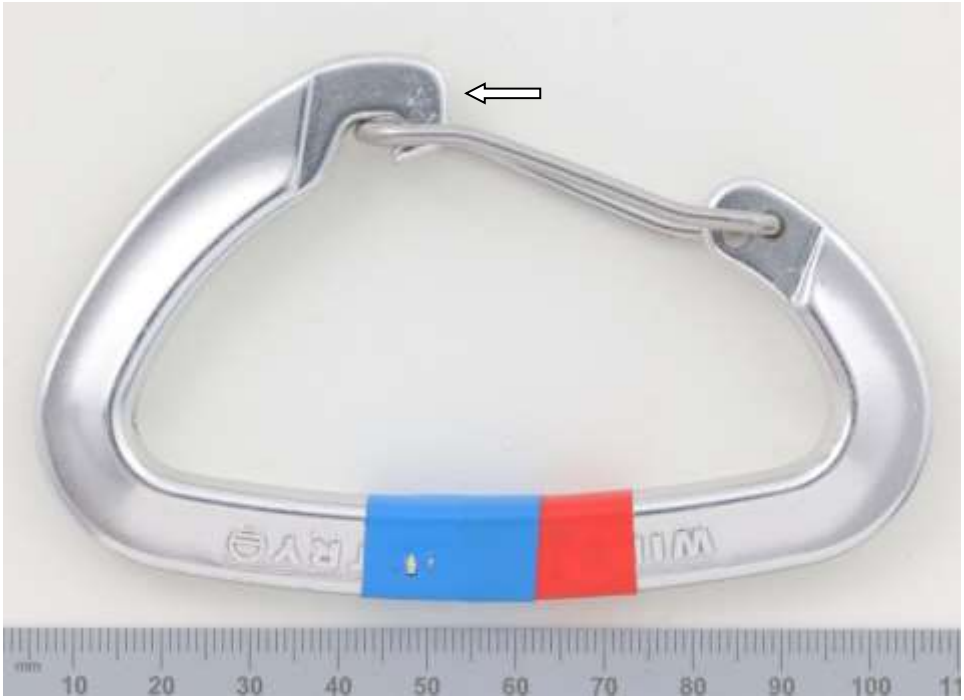

Figure 2 General view of karabiner from side 2 (D012291_002)

Figure 3 Closeup of failed area from the side (D012291_003)

Figure 4 Closeup of failure surface (D012291_006)

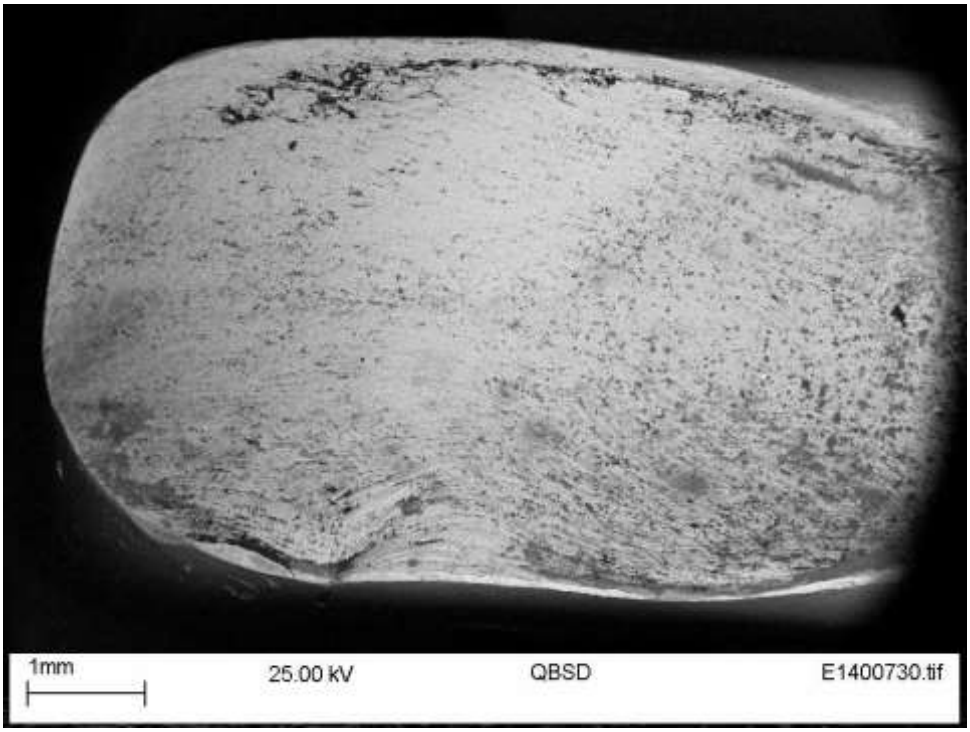

Figure 5 SEM image of failure surface

Figure 6 Section through failure surface, etched in Keller's reagent and examined by light microscopy (DM2500M2014-02-21-15-25-37)

The failure surface as viewed by SEM (Figure 5) is seen to be smooth and rather featureless; the change in contrast apparent in Figure 4 (associated with a change in angle of the failure surface) can not be seen. No obvious cracking mechanism was seen.

The cross-section through the failure surface Figure 6) reveals the microstructure of the alloy and what appears to be a relatively shallow forging flaw (top right of figure). The concave edge towards the bottom of the image corresponds to the failure surface, and again no obvious cracking mechanism (eg stress corrosion) is seen.

The most likely explanation for this failure appears to be that it was associated with a forging flaw that extended almost through-thickness and opened up during use (light impact associated with clipping).

It is recommended that this failure should be referred to Wild Country for comment, as it may not be an isolated case.

3. CONCLUSIONS AND RECOMMENDATIONS

This memorandum details the failure of a karabiner in the notched area near the ‘nose’. No injuries were sustained by the user, and the most likely explanation for the failure appears to be a pre-existing forging flaw that opened up during use. It is recommended that the BMC should refer the case to Wild Country for comment, in case it is not an isolated incident.

4. ACKNOWLEDGEMENTS

The author is grateful to her colleague Dr Mike Gittos for his valuable contribution to this investigation.