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TECHNICAL COMMITTEE MEMORANDUM TCM 10/03

Cracked Black Diamond Helmet

Incident ref: *02/10/F.KNO*

SUMMARY

A Black Diamond helmet was received exhibiting a crack on the back rim. This was reported to have been found when removing the helmet from a rucksack prior to a climb. No injuries were sustained as a result of this breakage.

Following inspection of various areas of damage on the helmet, it is believed a significant crushing force was exerted across the sides of the helmet, causing bending of the back rim and the subsequent cracking observed.

Figure 1: Black Diamond 'Half Dome'

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1. INTRODUCTION

A Black Diamond helmet was received exhibiting a crack on the back rim. This was reported to have been found when removing the helmet from a rucksack prior to a climb. No injuries were sustained as a result of this breakage.

The helmet is the 'Half Dome' model from Black Diamond, lot RM 2110_A.

2. ANALYSIS

No details are available as to the age of this helmet; however it appears well used with light overall surface scratching indicative of normal use. The internal cradle, foam, webbing and chin straps all appear worn but intact.

A crack approximately 50mm long is present in the rear rim of the helmet, just left of centre (Fig. 2).

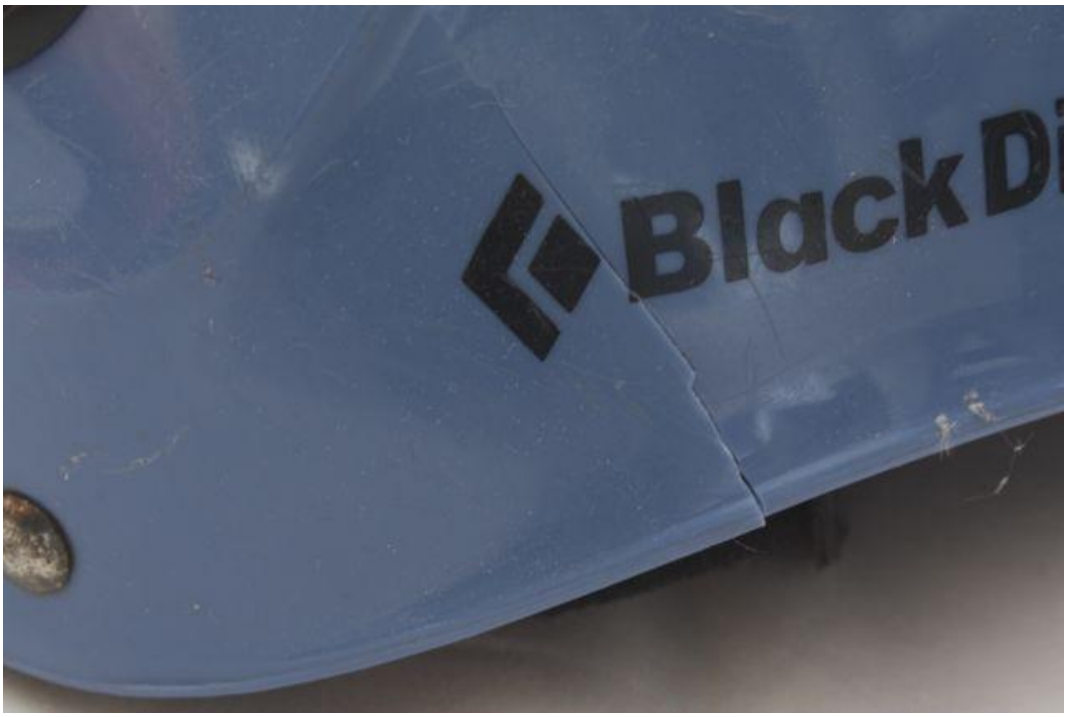

Figure 2: Crack on rear rim

Further inspection of the helmet revealed a number of damaged areas on the lateral regions on the rim near the ventilation holes (Fig. 3 & 4). A number of white marks are visible at the top of each strut between the ventilation holes, and also adjacent to the anterior rivet on each side. These marks typically indicate that plastic deformation of the material has occurred in this region.

Figure 3: Helmet RHS with deformation marks circled

Figure 4: Helmet LHS with deformation marks circled

3. DISCUSSION

The helmet exhibited a large crack on the rear rim and plastic deformation marks on either side. Presence of these marks on both sides of the helmet suggests that some crushing force may have been applied simultaneously to the sides of the helmet.

A load applied to both sides of the helmet would result in a bending force being exerted to the front and rear regions of the rim. It is possible that an excessive force in this region will have resulted in the crack forming at the rear.

The damage on the Black Diamond helmet was compared with damage previously observed on another damaged helmet for verification purposes. The damage on this helmet of similar construction was known to be caused by a severe fall. As can be seen in Figure 5, the damage caused is a deep crack and abrasion marks (highlighted) which appears significantly different to the damage observed on the Black Diamond helmet. This suggests that it is unlikely that the damage to the Black Diamond helmet occurred due to a similar fall or impact.

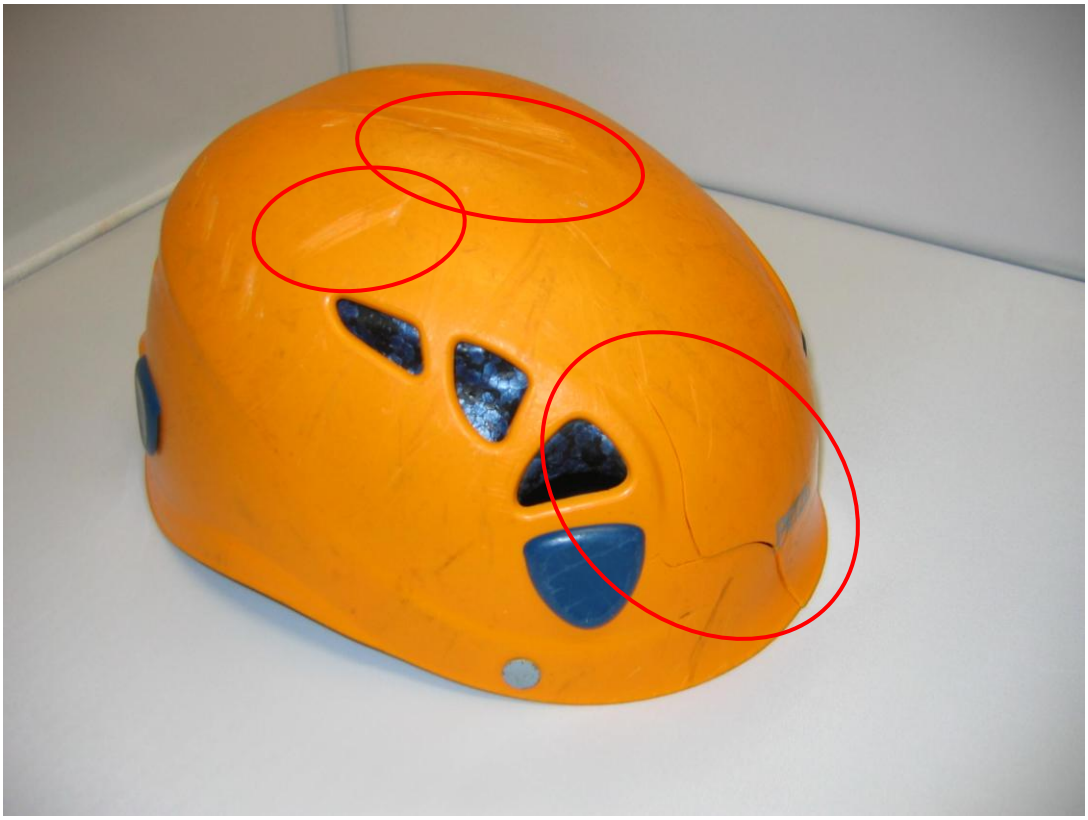

Figure 5: Fall damaged helmet.

4. CONCLUSION

The crack observed in this helmet is believed to have been caused when the helmet was excessively loaded in the lateral regions, causing a bending force at the front and rear rims and leading to cracking. The crack was initially observed when removing the helmet from a rucksack upon arriving at a climbing venue. Assuming the crack was not present if not observed when packing the bag, it is speculated that the damage occurred during transit. Packing a bag heavily, throwing a bag into a vehicle or sitting on a bag could all potentially cause the damage observed here. Black Diamond instructions for this helmet (www.blackdiamondequipment.com) instruct the user to maintain care when transporting the equipment.

It is believed that the damage caused to this helmet occurred during transport and is attributed to misuse.