



# Kirby Morgan Dive Systems, Inc.®

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## Safety Notice #1 of 1991 5 June 1991

Prepared by Bev Morgan

**SUBJECT:** Life threatening damage to the SuperLite-17 Commercial Diving Helmet resulting from underwater explosions in combination with over tightening/inadequate replacement of the Port Retainer Mount Screws and Inserts.

### **BACKGROUND:**

A diver lost his life in the Gulf of Mexico while burning off casing below the mud line. He was wearing a SuperLite-17B. Examination of the helmet by Morgan showed the thread inserts of the port retainer had stripped out from an unknown force which displaced the Face Port outwardly enough to break its seal to the helmet. Flooding of the interior of the helmet must have resulted from this damage.

In addition, the rubber exhaust valve of the demand regulator had a section forced into the interior of the regulator body. This section jammed and did not allow the valve to return to its normal position. It also appears the diver was rendered unconscious. The combination of flooded helmet interior, flooded regulator, and unconscious diver, working from the surface to over 200 ft. in depth resulted in little chance for survival. Morgan has concluded that an explosive force of some type created an over pressure which forced the rubber exhaust valve into the regulator body and a counter force caused the Face Port to displace outwardly. The counter force could have been a secondary shock wave resulting from the primary explosion or could have been the springing back of the Lexan lens that may have been deformed inwardly from the explosion.

Morgan observed other explosion damage to the helmet. The three helmet weights were loose and the mount holes were elongated. The helmet appears to have been violently and instantaneously pushed rearward resulting in the weights, due to their mass, remaining motionless slightly longer. The demand regulator body was pushed in, the cover indenting the regulator body all around at the diaphragm seat.

It is possible that an explosion resulted from a trapped gas pocket on the outside of the steel casing which was being cut by the diver with an electric arc/oxygen torch. The forces and counter forces of such an underwater explosion are beyond the scope of this notice.

Divers working for another company in the Gulf of Mexico experienced similar damage to the Face Port on two SuperLite-17 helmets while burning under similar circumstances. There was no injury to these divers. Another diver's SuperLite-17 (that was not involved in the accidents, but the diver was employed by the second company) was examined. Five of the threaded inserts that receive the Port Retainer screws were loose. This is probably the result of over torquing the Port Retainer Mount Screws.

The inserts in the fatal accident were brass, expansion type. The inserts on the second two helmets were stainless steel, threaded type.

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## CONCLUSIONS:

1. The user of any diving equipment while burning or welding underwater where there is a possibility of explosion is at risk. No helmet or mask can prevent injury to the diver subjected to an underwater explosion.
2. Any diving helmet can lose its watertight integrity if subjected to the force of an explosion. A helmet with stripped out face port retainer mount screws is more subject to damage.
3. The SuperLite-17 has been involved in at least three incidents where the face port has been forced outwardly by an explosion. Over torquing the screws will probably cause stripping of the inserts. This in turn will make the Port Retainer more subject to failure in the event of explosive force acting on the helmet.

## RECOMMENDATIONS:

1. We highly recommend that extreme caution be exercised by all divers, regardless of helmet/mask used to avoid the possibility of underwater explosions. It cannot be over stressed that any underwater explosion can result in the death of the diver.
2. All SuperLight Helmets, KMB-10 & 28 BandMasks, HeliOx-18 & DSI 18 BandMasks should be inspected for possible stripped-out Port Retainer thread inserts in the main body of the Helmet/Mask.
3. With the Port Retainer removed, thread port retainer screw into the insert by hand until it bottoms out. A manual screwdriver may be used if needed, but only with light pressure applied. Grasp the head of the screw with pliers and pull outward with a medium hand force. If the insert moves, it has been stripped and must be replaced.
4. If any thread inserts in any helmet/mask are stripped, the helmet/mask should not be used until the insert is properly replaced.  
Only factory authorized replacement of stripped or loosened thread inserts is recommended.
5. Only factory supplied screws, and only the correct screws should be used to replace any lost or otherwise needed replacement screws. Screws longer than the correct replacement screws will bottom out before the port retainer is tight, resulting in a leak around the port. Attempts to correct this by over tightening the screws will result in damage to the frame of the unit and loosen the inserts.
6. Recommended tightening torque for the Port Retainer Screws is 12 inch pounds as checked with a torque measuring screwdriver.
7. Any helmet/mask manufactured by Diving Systems International that have been rebuilt by someone other than the factory should be not be used if the thread inserts were replaced.

END, Safety Notice 060591, 5 June, 1991 Diving Systems International

by Bev Morgan

Addendum: It was later determined that the threaded inserts in the fatal incident had been replaced by untrained personnel, and had been replaced incorrectly. The resulting weakness in the inserts resulted in the face port being dislodged in the explosion. Diving Systems has since upgraded the inserts in all SuperLite helmets and masks and instituted a strict repair policy regarding the replacement of inserts. **ONLY FACTORY AUTHORIZED** repairs are recommended.

