PROJECT STICKYBEAK: PROVISIONAL REPORT ON AUSTRALIAN DIVING-RELATED DEATHS IN 1981

Douglas Walker

Two persons using snorkels, seven with scuba, and two hookah divers were identified as having died during 1981. One of the snorkel users was only 8 years old and died quietly while in close proximity to adults on the beach, the other was fatally injured when hit by a power boat close to shore. The boat was proceeding into the direction of the sun at moderate speed and had been steered carefully to avoid surf skiriders. The water was a little choppy and though the victim was towing a plastic bottle float it had no flag so he was not readily visible to anyone in a boat.

Three of the scuba divers were totally inexperienced and untrained, while a fourth's experience was probably not great. One experienced diver died as a consequence of a series of events initiated by an asthma attack, another from the combined effects of fatigue, cold, entering the water while on reserve, no line in a poor visibility situation, and running out of air. The seventh scuba diver was experienced and one of a group of underwater photographers at a wreck in 40m deep water. He was seen to start his ascent alone but he never reached the surface and his body was never recovered, though his camera was found attached to the anchor line. It is possible that nitrogen narcosis and cold could have effected his actions for he was equipped with a buoyancy vest and failed either to drop his weights or indicate any problem to other divers nearby.

Both of the hookah divers who died were said to be very experienced. One died when he was dragged underwater when his hose fouled kelp as he was being pulled back to his boat on the surface, regulator out of his mouth. It is not known whether his descent was deliberate and he suffered anoxia due to a kinked hose or whether he "dry drowned" when unexpectedly submerged; neither of those pulling him back was watching at the critical moment. The other died in association with the low air situation when the compressor's reservoir started to lose its air pressure. He was thought to be starting to ascend and attention was concentrated on his buddy, who seemed to be in distress after his emergency ascent. When the victim's absence was realised his hose was used to pull him up, but parted at the junction with the regulator portion of hose when the pull strain became direct on this joint.

Information is also presented concerning an additional 1980 fatality. The diver, making his third scuba dive, was using hired equipment. He lost his dentures while on the surface and was unable therefore to retain his regulator. His buddy, though equally inexperienced, tried valiantly to save him but rough water claimed the victim.

CASE REPORTS

These reports are based in most instances on inquest documentation, though in one case no inquest was thought necessary and in another the absence of a body has led to delay in holding any inquest. Basic case details are shown in Table 1.

Case Sn 81/1

This 8 year old child was swimming in a channel between the beach and a sandbank, water depth about 6 feet. His mother and other adults were nearby keeping a general watch over his activities. He was seen to expel water from his snorkel and was not seen again until found by a searcher on the sea bed. Nobody noticed anything to indicate a swimmer in trouble. The case is included to illustrate the potential for disaster in the untrained use of even so simple a piece of equipment as a snorkel. It is not possible to say whether this tragedy was due to inhalation of water down the snorkel, build-up of carbon dioxide from use of too large a snorkel, post hyperventilation blackout, or some other reason.

CHILD. SNORKEL. SURFACE.

Case Sn 81/2

The power of Press Publicity is much less than is generally claimed, for none of the persons skin diving off the rocky point were aware that a powerboat was to make a speed trip up this area of coast that day. The boat driver saw the surf skiers and avoided their vicinity but had no hope of seeing anyone swimming on the surface as there was a small chop and he had the sun in his eyes. The wet suited victim was towing a plastic bottle float but this had no flag to make it conspicuous. There were two other divers in the area but they were near to the rocks while he was about 10m further out. The powerboat had a well tuned engine and was only proceeding at part power and this was thought to explain how none of the divers was aware of its approach. The boat's contact with the victim was heard and the other divers swam out to the area of blood which quickly disappeared. The battered body was soon recovered and brought ashore. The boat was seen to stop after a short delay and the driver was seen to examine the propeller before he continued up the coast. He was apparently unaware that he had hit anyone till informed by police at his next landfall.

This accident would not have occurred had the diver used a flag on a float, and might have been avoided if the boat's approach were noticed. However, he was making a surface snorkel recreational swim before starting a journey and not spearfishing or sport diving and this tragedy was the type of misadventure which can easily occur when surface craft mix with swimmers of any type. It is necessary to be positively visible to surface craft as even non-fatal contacts can have serious effects on the victim.

POWERBOAT. SURFACE TRAUMA. NO FLAG.

Case SC 81/1

Personality factors can be critical in either positive or negative ways. The laudable desire to overcome a physical limitation can spur the performer to the heights, or death.

TABLE 1

PROJECT STICKYBEAK 1982 BASIC INFORMATION ON FATALITIES

CASE	AGE	EXPERIENCE VICTIM	EXPERIENCE BUDDY	WATER DEPTH DIVE	INCIDENCE	EQUIPMENT OWNER	EQUIPMENT VEST	COMMENT
Sn 81/1	8	Not Signif.	-	6 ft	Not Signif.	Own	No	Unnoticed death
Sn 81/2	33	Not Signif.	-	20 ft	Surface	Own	No	Trauma (powerboat)
Sc 81/1	22	Experienced	Experienced	15 ft	Surface	Own	Yes	ASTHMA. Night dive. Panic. Separation. Ditched vest and tank instead of weight belt.
Sc 81/2	40	2nd use	Experienced	Not Signif.	Not Signif.	HIRED	Yes	Poor supervision. Imperfect regulator and vest. Separation.
Sc 81/3	30	Experienced	Experienced	120 ft	Ascent	Own	Yes	Separation. Possible effects of cold and narcosis. Body never recovered.
Sc 81/4	25	First use	C Card	5 ft	Surface	HIRED	Yes	Separation. Fatigue. Loss of face mask and fins. Excess weights. Vest not used.
Sc 81/5	26	First use	Experienced	10 ft	10 ft	HIRED	No	Water in mask, then loss of fins and mask. Valiant attempt to rescue by buddy.
Sc 81/6	20	Experienced	Experienced	25 ft	Surface	Own	No	Out of air. Surface. Choppy water. Separation. No snorkel. Unable to ditch weights (belt turned).
Sc 81/7	47	Experienced	Experienced	Not Signif.	Not Signif.	Own	No	Fatigue. Cold. Poor visibility. No line. Under ship. Entered water on reserve. Out of air. Lost way.
Sc 81/1	45	Experienced	Experienced	35 ft	Surface to 15 ft	Own	Yes	Entangled in kelp. Pulled under by hose. Failed to drop weight belt. Separation.
Sc 81/2	36	Experienced	Experienced	30 ft	Ascent	Own	No	Compressor gasket blew; Reservoir slowly emptied. Buddy needed help while victim died unnoticed. Failed to drop weight belt.

This highly experienced young diver suffered from episodes of severe asthma and one dive nearly ended fatally for this reason. He refused to follow advice from diving instructors and diving doctors to stop diving, possibly regarding his personal survival as proof that they were wrong. This dive, which ended fatally, was a night dive with a buddy from a small protected beach. Their first dive was without incident. After a break of half an hour ashore the victim used his Ventolin inhaler and they made a second dive. When he indicated a low-air situation they both surfaced. He was seen to inflate his backpack type buoyancy vest and start to swim towards the nearest land, a rocky shore area, ignoring his buddy's call to swim to the sandy beach from which they started the dive. He called out that he needed his inhaler before he was lost to sight by his buddy in the dark. After reaching the beach the buddy ditched his equipment and started to search along the rocky shoreline. The victim's backpack was seen floating away and then the body was found wedged among the rocks, held down by the weight belt, in a few feet depth of water.

It is apparent that the victim would almost certainly have survived if he had not left his buddy, under the stress of his asthma symptoms, and swum to a nearby but suitable exit area. The mistake of pulling the backpack release rather than that of his weight belt was the final factor, the sudden loss of buoyancy causing his immediate and fatal submergence. Later testing showed that the backpack on release would have entangled his arms for a time and prevented him from reaching the weight belt release even if he had retained the presence of mind to make the attempt.

ASTHMA. SEPARATION. SURFACE LOSS BUOYANCY FROM ERROR DITCHING BACKPACK FLOTATION. RETAINED WEIGHT BELT. NIGHT DIVE. PANIC RESPONSE.

Case SC 81/2

The day-trip advertisement included an offer of the opportunity to dive with scuba while visiting an offshore reef resort, an offer taken up by the victim and his wife when the boat reached the island. Their only experience was a half hour of instruction in shallow water ten days before. The equipment available for hire was criticised by some apparently experienced divers, criticism not appreciated by the person in charge of the equipment. There were three inexperienced persons wishing to dive, the victim and his wife being joined by another day tripper. This person soon decided not to make a dive after all, having no wish to don strange apparatus and immediately descend to the sea bed alongside the moored boat, a depth of 50 feet. They were handed the necessary equipment, the "instructor" explaining that he had an extra weight on his belt because he had a wetsuit and that they could blow up their vests if they needed a rest. After their introductory dip, apparently a special feature so that people could boast of a 50 feet dive, the "instructor" led the two remaining neophytes on an underwater swim towards the seemingly distant reef. He led the way, though he returned to them on one or more occasions, to urge them to greater speed. The victim's wife then saw him swim past her and turned around to see that her husband was floating quietly just above the sea bed. The victim was brought to the surface and towed ashore, where several persons assisted with resuscitation measures. Though the victim reached the hospital alive, he died three days later from the cerebral and pulmonary effects of the incident.

Examination of the equipment showed that the regulator was faulty, requiring four times the correct breathing effort, and the buoyancy vest contained an empty CO_2 cylinder. Neither the boat's captain nor the "instructor" gave any evidence at the inquest on the grounds that it could incriminate them.

GROSS INEXPERIENCE. HIRED SCUBA. DEFECTIVE EQUIPMENT. SEPARATION. TOTALLY INADEQUATE SUPERVISION.

Case SC 81/3

Adverse weather conditions forced a group of underwater photographers to change their intended dive location and they agreed on a boat dive on a wreck in about 40m depth water. There were several boats and 12 people diving, the non-divers remaining in the boats. Buddy pairs were organised but as underwater visibility was 20 feet and as photography is an individual pursuit, separation of buddies occurred. The victim was seen at one time sitting on the wreck making some adjustments of his weight belt, and later seen starting his ascent. It was only when another diver surfaced with the victim's camera, which he had found tied to the anchor line, that his absence was noticed. Search failed to reveal any trace of him. He was wearing a buoyancy vest which would have resulted in the ultimate surfacing of the body had it been inflated. No adverse local factors were known and he is said to have had some experience of this depth of dive. The facts of this fatal incident can never be known but nitrogen narcosis, and possibly cold, could explain the seeming failure to seek aid from others if in trouble, or to drop his weight belt or to inflate his vest. Pulmonary barotrauma with air embolism was not necessarily the cause, but is a possibility.

SEPARATION. 40M DIVE. DEATH DURING ASCENT. UNKNOWN FACTORS.

Case SC 81/4

Two sets of diving equipment were hired by the victim's friend, a newly certificated diver with a short experience of diving, as he intended to show his two friends how to dive while they were on holiday at a caravan park near the mouth of a river. He gave them verbal instruction one evening and the next day offered them a chance to try a scuba dive. They had a boat and he first gave the victim's friend a chance. He entered the water first and then she followed. Her mask immediately flooded and she sank to the river bed, 6 feet below, because she was excessively weighted. She was unable to rise until he assisted her. He later stated that they had a quiet swim around, while her

version was that she returned immediately to the boat and refused to have anything more to do with diving.

Later in the day they landed on a beach near the mouth of the river and the victim decided that he would try to scuba dive. The buddy gave him a couple of practice immersions in 1m deep water, with oral inflation of the vest experience, before making a short underwater swim in slightly deeper water near the beach. After a short time the victim indicated that he was tired and wished to return to the beach. It is not known whether his earlier difficulty in getting a comfortable fit with his fins had been satisfactorily resolved, but he had no wet-suit and was overweighted. The weight belts, being hired, had weights which could not be removed and the buddy, who had a wet suit, chose the weight most appropriate for his own needs, the lighter belt. He claimed that he had been taught that one always wore a weight belt even if without a wet suit, compensating by vest inflation. The organisation concerned deny that he was ever told anything of the sort. Possibly he had never given any thought to the matter before questioning at the inquest. During the return to the shore the victim swam on the surface using his scuba regulator while the buddy swam behind and below him. Foreseeing no problems, the buddy swam below the victim and reached the shore first. He noted that his friend was only a few yards away then turned and removed his tank. When he looked next he could not see any sign of the victim, not even bubbles. Initially he thought that a trick was being played on him or that the other had decided to continue and dived again, then he became alarmed and started a search both from the shore and in the water. The police were informed and called in an experienced local diver, who quickly located the body.

The sea bed slopes rapidly in this area so though the victim was last seen where water was about 5 feet deep, he was found where the depth was 18 feet. Both fins and mask were off but the weight belt was still in position and the vest uninflated. Possibly this totally inexperienced and untrained men, fatigued and over-weighted, lost mask and fins while out of his depth and inhaled water, dying rapidly before solving his survival problems.

The buddy had intended to let his friend try a pool dive first, a safer proposition than open water, but the pool had been closed.

FIRST SCUBA DIVE. HIRED EQUIPMENT. OVERWEIGHTED AS BELT WEIGHTS FIXED. SEPARATION. SURFACE PROBLEM. LOSS OF FINS AND MASK.

Case SC 81/5

While their friends were preparing a BBQ, two of the party had a beer each and prepared to dive. The buddy, who had been diving for 10 years, had hired two scuba units so he could take his friend for his first dive. One of those remaining on shore offered to time them and let them know when their air would be getting low (sic). It was realised that something was wrong when the buddy surfaced about 10 minutes later, about 5m off the shore, and called for help. He later described how they had been swimming over the sea bed in 10 feet deep water when the victim tapped him on the shoulder and pointed to show that he had some water in his mask, then pointed to the surface. He had seemed to start towards the surface then to be kicking his way along the sea bed with one flipper missing, soon losing the second fin also. The buddy was close behind and picked up both fins. He tapped the victim on the shoulder to offer them back, then noticed that he had now lost his mask and no longer had the regulator in his mouth. The buddy put his own regulator in the victim's mouth and tried to ditch his weight belt, but the victim was kicking wildly and dislodged the buddy's mask. This forced him to surface as he could hold his breath no longer, dropping both his weights and tank to assist his escape from a risk of himself drowning. Without a weight belt he was unable to descend again, having excessive buoyancy. Recovery of the victim was affected by others of the party after they first dived and rescued the tank and weights. All equipment was later recovered and confirmed to be functioning correctly.

FIRST SCUBA DIVE. HIRED TANKS. SHALLOW DIVE. LOSS OF FINS AND MASK. RETAINED WEIGHT BELT. BUDDY MADE VALIANT ATTEMPTS TO SAVE. SEPARATION DURING INCIDENT.

Case SC 81/6

From the information available, it seems that the two divers had 2 to 3 year's scuba diving experience each, but neither had received formal instruction. They were fishing for crabs and crayfish around a reef they reached by swimming from the shore. The water was choppy though calm underwater. After a while they surfaced and sat on the reef to talk. They were low on air so the buddy said that he would dive to collect the catch bag while the victim started the return to shore. When he surfaced he observed his friend on the surface proceeding as arranged, so he himself swam underwater (to avoid the chop) until he was forced to surface through running out of air. He completed his swim using his snorkel. After arriving he discovered that his friend had been seen waving his arm and heard to shout for help before disappearing from sight. He attempted a search but was unsuccessful, though later searchers recovered the body 3 hours later from 20 to 25 feet deep water.

Examination showed that the tank was empty and that the weight belt was still on, the quick release jammed under the tank at the victim's back and out of his reach. This had resulted from its excessive looseness. The victim had no buoyancy vest and distained to carry a snorkel "because it gets in the way". He had been unable to survive the surface swim fully weighted in choppy water without a snorkel, drowning as he had no buddy to assist him.

SEPARATION. SURFACE CHOPPY WATER. NO VEST. NO SNORKEL. LOOSE BELT TURNED SO UNABLE TO

REACH QUICK RELEASE. FAILED TO DITCH EQUIPMENT AS SITUATION REQUIRED.

Case SC 81/7

The victim was a professional diver of many years' experience. With a companion he was using a heavy scrubber to clean the hull of a vessel in a harbour. The job lasted all day as time was important, the divers standing in the open cool of the wharf between dives in the cold dirty water. Before entering the water for the last time the diver pulled his reserve lever. After a short time he indicated to his buddy that he was low on air and they both started to ascend. When he failed to surface a search was organised and he was discovered, unconscious, on the harbour floor. It is not certain whether life was then extinct or whether he died after he had been brought out of the water.

FATIGUE. COLD. OUT OF AIR. DIVED WITH RESERVE ON. NO LINE IN POOR VISIBILITY WATER CONDITIONS.

Case H 81/1

Two very experienced hookah divers were in a kelp area where there were many fish to watch and crayfish to catch. After about 45 minutes at 45 feet the buddy found that his hose was entangled in the kelp and had to ditch his weight belt (with the attachment hose) at 14 feet and surface. This equipment was retrieved by his friend.

After a rest and a light meal they dived again, this time for 15 minutes. The buddy then indicated to the other his intention to return to the boat and that the other should follow him. The signal was acknowledged. The buddy again found himself fouled on the kelp and had to ditch his equipment, making a successful ascent despite the failure of his buoyancy vest to function. After surfacing he orally inflated his vest and swam to the boat.

About 5 minutes later the other diver surfaced 30m away, gave the "OK" signal and took the regulator out of his mouth. He had a catch bag containing crayfish in one hand and called to be pulled back to the boat. When last seen he was vertical in the water, at which time his hose had become taut and the people in the boat were concentrating on winding the hose back with a reel. When they next looked, he was no longer at the surface and they presumed initially that he had dived to free his hose from kelp. However, they noted that there were no bubbles apparent and became worried. The buddy put on mask, snorkel and fins and dived to find out what had happened. The victim was found thoroughly entangled in kelp, apparently dead. With some difficulty the body was pulled to the surface.

The hookah equipment was tested and found fault-free, the hose kink resistant. However; the victim's vest was found to contain no carbon dioxide cylinder, though this is unlikely to have affected the outcome of this incident. The pathologist reported the cause of death as asphyxia due to failure of the air supply and did not accept the possibility of "dry drowning" as a cause. It is possible that the victim was dragged underwater unexpectedly when the hose became hitched around kelp 15 feet below the surface, suffering laryngospasm and cardiac death before he could replace his regulator or drop his weight belt. Hose kinking, though possible, could only affect him if he had been using his regulator at the critical time. This tragedy, involving careful, safety conscious divers with good equipment, occurred when the victim was unobserved and alone at a critical time while on the surface.

SURFACE. HOSE FOULED ON KELP UNDERWATER. VICTIM PULLED UNDERWATER AND TANGLED IN KELP.

Case H 81/2

Hookah users are prime examples of the Sword of Damocles situation, for they can pass from complete ease to an emergency (out-of-air) situation with extreme rapidity. The two divers in this incident were at 30 feet catching crayfish when their friends in the boat noticed that the pressure gauge on the reserve air tank showed falling pressure. Both hose lines were therefore given three hard pulls and then a start was made to pulling the hoses into the boat. A short time later there was a small explosion as the leaking gasket on the compressor completed its failure.

It was apparent that the victim had started to ascend so attention was concentrated on the other diver, who had surfaced but seemed to be in a distressed condition. It was only after he had been pulled into the boat that it was realised that the victim had failed to surface. He was seen to be hanging motionless about 15 feet below the boat, a "dead weight" and no bubbles seemed to be ascending. The hose parted at the connection with the regulator hose unit when it was pulled to raise the body. The condition of the survivor gave them so much worry that they abandoned further attempts to recover the body and ran the boat straight back to the beach to obtain an ambulance. It is believed that the survivor's distress was the result of swallowing, and possibly also inhaling, some water. The body was recovered later with the weight belt still worn. It is not known why the victim failed to drop his belt while ascending when the air supply petered out. Pulmonary barotrauma with air embolism may have occurred but the autopsy report is inadequate to decide this point.

HOOKAH FAILURE. DEATH ON ASCENT.

Case SC 80/6

This case is reported as a late addition to the Provisional Report on the 1980 fatalities. A group of six friends hired four scuba units with the intention of diving for crayfish. One of the group had some experience of diving with an experienced local diver whose name they used in the dive shop. Because of their inexperience (sic) the victim was paired with another of the group. This was to be the victim's third dive, both previous dives had been in sheltered water (that and the previous day). No fear was felt before undertaking this dive "as he had already dived to 85 feet". They intended to keep close together as a true buddy pair

but came across some crayfish about 100 to 150 yards off the rocky shoreline in 20 to 25 feet deep water. The buddy asked the victim to return to the shore to obtain a catch bag, which he started to do, swimming on the surface using his regulator air supply.

A short time later the buddy followed underwater and saw the victim above him treading water. He surfaced and found that the victim had lost his mask and dentures and was unable to retain the mouthpiece. After a short struggle the buddy dragged the victim to a rock and started to pull him out of the water, but a large wave washed them off and contact was lost. There was a surge building up, especially over the rocks, making conditions unsafe for inexperienced divers. The victim was recovered a couple of hours later by an experienced diver. The weight belt was missing, presumed dropped by the victim.

THIRD SCUBA DIVE. HIRED EQUIPMENT. SURFACE DIFFICULTY. INEXPERIENCED BUDDY MADE VALIANT EFFORTS TO SAVE VICTIM. NO VEST. WATER POWER EXITING PROBLEM. LOST DENTURES CRITICAL.

DISCUSSION

Snorkel Deaths

There continues to be a welcome absence of deaths of spearfishermen resulting from the practice of hyperventilation. The two snorkel users reported indicate areas of danger marginal to "diving" but of potential significance, the use of snorkels by those who are insufficiently good swimmers to manage the problems which may arise, and the possibly increasing danger to all types of swimmers from the near-to-shore use of powered boats. It is unrealistic to suggest that every swimmer show a flag while near to the shoreline, though not when diving or swimming in sea lanes. A number of reports of serious but non-fatal incidents involving power craft suggest that the problem is requiring active attention by maritime organisations.

Scuba Deaths

The scuba fatalities, seven in 1981 and one from 1980, reinforce the generally accepted safety guidelines, beginning with the basic one that untrained divers are at risk if let loose in the sea. In all four fatalities involving totally inexperienced divers hired equipment was being used. Separation was a factor, as was the need for efficient buoyancy aid. The value of a snorkel and the helplessness of the scuba diver bereft of his fins is also apparent. The value of a buddy should be again apparent, despite the failure of the two buddies to save their companions under unusually difficult circumstances.

The divers who were experienced who died had all broken the accepted rules for safe diving, all being considerably separated from their buddies at critical time. The asthmatic whose death is reported died through a combination of factors, the death card being the mistake of ditching his back pack. Had he worn a conventional vest he would have survived, as also he would have done had he remained calmly on the surface and allowed his buddy to tow him to the beach. Panic, which can affect ANYONE under stress conditions, denied him this option. The professional diver's death illustrates that even the experienced cannot afford to take chances; one day comes the reckoning. Here the unadvised practice of diving without a line with scuba in a low visibility situation without possibility of direct ascent to the surface (he was under the ship's hull) was compounded by fatigue and cold impairing alertness when the out-of-air situation arose.

Hookah Deaths

Hookah divers should be constantly aware of the possibility that their air supply can be suddenly unavailable. The two victims here reported were experienced and could have been expected to survive such incidents. In the first case the kelp was a scenic and fruitful but entangling environment. The buddy had two unpleasant emergency ascents because of hose entanglement, having to ditch his belt (and regulator) on each occasion. It seems probable that the victim was surprised by his submergence and thereby was too late to ditch his belt before becoming totally entangled in the kelp and losing his air supply. Strangely, for they were careful divers, both had inoperative buoyancy vests. The second hookah fatality cannot be readily explained, though air embolism could have occurred, those in the boat being too occupied to notice the victim's momentary surfacing (if it occurred). As the air loss was not instantaneous, an experienced hookah diver would have been expected to survive.

Advice

Had all these scuba and hookah divers dived "by the book" they would have most probably survived. The fewer the chances taken, the greater the favourable factors in the dive plan, the better the expectation that misadventures are survived comfortably. Think and act to keep the odds in your own favour.

ACKNOWLEDGEMENTS

This report, like its predecessors, could not have been made without the ready support and assistance of the Attorney-General's and Justice (or Law) Department in each State, the co-operation of the Police in elucidating extra details in certain cases, and the active interest and assistance of several organisations and individual divers. The active interest of the Water Safety Council in NSW, South Australia and Western Australia in this investigation is noted with appreciation, and in particular the support over the years of the AUF and FAUI. Many others, unnamed, have greatly assisted with information, news cuttings and encouragement. It is hoped that such support will continue and additional persons and groups will become involved.

PROJECT STICKYBEAK

This project is an on-going investigation seeking to document all types and severities of diving-related incidents. Information, all of which is treated as being CONFIDENTIAL in regard to identifying details, is utilised in reports (such as this) and case reports on non-fatal incidents. Such reports can be freely used by any interested person or organisation to increase diving safety through better awareness of critical factors. Information may be sent, in confidence, to:-

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PO Box 120
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FIRST AID PRIORITIES FOR DIVERS THE TOBERMORY VIEWPOINT

G Harpur

Due to the large number of divers attracted to the Tobermory area by the clear waters and abundant marine artifacts, we are provided with many opportunities to examine those events surrounding diving accidents which influence their outcome. In the past year approximately 30,000 dives were committed, principally between the 24th May and the Thanksgiving weekend in October, by some 7500 divers of whom 30% were student divers on their initial open water experience. Since 1974, there have been 36 accidents resulting in major injury to divers as well as countless minor incidents with less serious sequelae. In this paper I intend to present a review of the more serious incidents and accidents with particular attention to those factors which contributed to the serious or fatal outcome.

Our figures indicate that on any given dive in the last two years, the diver's chance of being injured was 0.04% and of being killed was 0.003%. These figures do show a higher incidence than is reported elsewhere, eg. the Rhode Island surveys, and may reflect the effects of cold water and the high proportion of novice divers. Training accidents have been rare, with only 1 fatality and 2 serious incidents occurring in the past 7 years.

There have been 16 deaths in the period 1974 to 1981, out of a total of 36 serious accidents. Of these deaths, 11 died before reaching the surface, 3 died after reaching the surface but before reaching the recompression facility and 2 died after completing an initial treatment table. The remaining 20 divers all survived and were entirely intact, so far as could be clinically determined, after one or more treatment runs. There were no survivors who sustained any long term injuries as a result of their accidents. This type of sharp division is probably unusual and can be most likely explained by the unique character of our situation in Tobermory. Most of the diving takes place within the confines of Fathom Five Provincial Park and this area is controlled by both OPP (Ontario Provincial Police) and Park staff routinely, so a very rapid response to any accident is possible. The average time from the victim arriving at the surface until being placed back under pressure, when indicated, is between 30 and 40 minutes. This organization also permits a very detailed investigation of each incident and accident to be carried out at the same time as the victim is being treated. Park staff and OPP dive team members conduct interviews with other members of the diving group. In more serious cases, exhaustive studies are conducted on the equipment and air supply, with the assistance and such technical support as DCIEM (Defence and Civilian Institute of Environmental Medicine) and the Centre for Forensic Science in Toronto.

TABLE 1

FACTORS RESPONSIBLE FOR INCIDENTS WHERE A DIVER FAILED TO SURFACE OR SURFACED WITH ASSISTANCE

DIVER FITNESS

Training

- None or taught by a friend
- Diving alone
- Improper response to:
  - freeze-up
  - emergency ascent
  - buoyancy control
  - shallow water blackout

Psychological State

- Unfit
- Temporary conditions
- Pre-existing long term conditions

Medical Conditions

- Temporary
- Pre-existing long term

EQUIPMENT

- Inadequate
- Malfunction

RESCUE

- Poorly organised or no plan
- Improper technique

If we consider first the group of divers who failed to make the surface on their own, we can divide them into subgroups according to the various factors which accounted for this failure in each case. In some of the accidents, more than one of the factors listed in Table 1 may have been present. The following brief case histories serve to illustrate these points.