UNDERCURRENTS

Newsletter of the Bluegrass Dive Club / www.bluegrassdiveclub.com

December 2018-January 2019 Volume 48, Number 12-Volume 49, Number 1

January's Club Meeting

Date: **Tuesday, January 22nd**
Time: 7:30-PM (business)
Social at 7

Location: **Bronte Bistro**
Lexington Green

Program: DVD on Little Cayman by Dan Miller

Past President's Message

By Tracey Combs

Happy Holidays fellow divers. I hope everyone had a wonderful Christmas. I want to thank Mark and Stella Kidd for hosting our Christmas party again this year. I appreciate the hospitality of the Kidd's.

It has been both a privilege and a pleasure to serve the Bluegrass Dive Club as president. I personally want to thank the returning board members for serving BGDC another year and welcome the new board members. Our officers help make our club successful and I appreciate their dedication to the club.

Please take a moment to look at the dive calendar and plan your next trip with the club!

Our next general meeting is Tuesday, January 22 at Bronte Bistro. Please note the date and venue change. You do not have to be a member to attend. Details are on the website. Everyone is welcome! Let's make 2019 a great year for the Bluegrass Dive Club.

President's Message

By Mark Kidd

2019 is here and the Bluegrass Dive Club is at work planning some great trips and events for diver and non-diver. I have been witness to over 40 years fun and fellowship with many of you all.

Our Board has been in discussion for a while of how to build a new core of divers to take the club back to a more diverse group with our large exotic dive sites.

We have heard from many divers a longing for more drivable dive destinations to Florida Springs, Key West, North Carolina, etc. Time and money have always been the big reason we don't dive as much as we would like. With more trips of 4 days or less at reasonable prices The Club hopes to promote diving to the next generation.

With our new venue for meetings at the Book Store in Lexington Green that hosts a great menu and activities for non-divers on site I hope to see many of my longtime friends and new friends to be as 2019 progresses.

I encourage your ideas and participation in a group of fun seeking friends!

The Editor's Notes

By John Geddes

I hope Everyone had a wonderful Christmas and a Happy New Year!

Now the Question is, did you miss the Newsletter in December?

Since Alex our Webmaster does such a great job in getting the word out and this was mainly so everyone would know about the Christmas Party, I decided to do a combined Newsletter for December and January.

During November's Board meeting we voted to change our meeting to the **4th Tuesday** of every month **AND** location to be **Bronte Bistro** in Joseph-Beth at the Lexington Green, therefore it wasn't a real need to send the Newsletter out at the normal time. So back on track and ready to be received before the first meeting of the year and here we go with pics from the Christmas Party!

2019 BGDC Officer's

Mark Kidd, President	221-7104
Kris Harn, Vice President	333-6911
Kathryn Bowers, Secretary	619-0166
Dan Miller, Treasurer	948-5133
Trip Director - Open Position	
Bart Bertello, Safety Info Dir.	502-299-3656
Alex Fassas, Webmaster	582-1600
John Geddes, Newsletter Editor	608-0682

Vice President's Report

By Kris Harn

11-13-18
General membership meeting

A general membership meeting was held on 11-13-18 at the Urban Squirrel. 11 people were in attendance.

11-27-18
Board of Directors meeting

A board of directors meeting was held on 11-27-18 at Bronte Bistro. Reviewed reports, trips, new and unfinished business. Motion passed: Board meeting will be held on the second Tuesday of the month and the Regular meeting will be held on the fourth Tuesday of the month. Starting times did not change. Meetings will be at Bronte Bistro.

From The Secretary

By Kathryn Bowers

Greetings from your new secretary! We'll see if I can remember to type on something other than my phone. I've really enjoyed diving with the club. While I learned to dive in collage I was never certified. I did my open water certification dive in 1984. We walked in from the beach at Roosevelt Rhodes NAS at night. Club trips have all been more fun even the one where I took a 5 hour tour of a decompression chamber, I don't recommend it.

At the final board meeting of 2018 (I needed to write that date one more time) the meeting was moved to the 2nd Tuesday of the month so as you read this the January board meeting hasn't happened; nothing to report there. There was no December meeting since we were all attending a fabulous party at the home of Mark and Stella Kidd. I'm sure I'm safe in saying "Thanks" from everyone Mark and Stella!

From the Treasurer

By Dan Miller

2019 Membership Dues

Student (High School or College ID)	$10.00
Single & Family (1 diver)	30.00
Family (non divers)	30.00
Family (2 or more divers)	40.00

Renewal: Please send payment to the address listed below, please make sure there is a correct indication of your mailing address, phone number and it is very important to indicate an email address.

Contact / Mail to: Bluegrass Dive Club c/o
Dan Miller
824 Gunpower Drive

Lexington, KY 40509

New Members: Visit the website to fill out an on-line form or to access a Microsoft Word printable form. CLICK HERE.

Past Trip Director's Report

By Steve Gahafer

Little Cayman

This should be a great trip with valet diving at your service. If you have never been to Little Cayman now is your chance to go. The dates are May 25th – June 1st.
You can find out more about this trip on the web site at Little Cayman 2019. If you have any questions please email me.

Papua New Guinea

This trip will be one that people will be taking about for a long time.

We start out at the Rapopo Plantation Resort September 4th-12th 2019. This part of the trip includes 5 days of 2 tank dives.

On the last day, while letting our equipment get good and dry, we have arranged for a full day tour consisting of some of the local World War II sites. Some of the sites include Mt. Tarvurvur Volcano, Admiral Yamamoto's Bunker, and the Japanese Barge Tunnel. These are just three of the several sites we will visit.

The second part of the trip is optional and starts at the end of the dive portion of the trip. It is a 5 day/4 night tour September 12th – 16th that includes two full days with VIP Passes to the Goroka Festival.

We will also travel to the village of the Asaro Mudmen to spend the day with them.

The trip page is up on the web site and waiting for people to sign up. We already have four people confirmed with at least two more seriously considering it. We only have 10 confirmed spots. If you are thinking about this trip now is the time to sign.

I would like to think everyone for all your support and help the past two years I have been on the board. Because of some things that have changed over the past year I am not able to continue on the Board.

The Trip Director spot is still open and really needs to be filled so the club has a person actively looking for new trips. If you would like more information about it please feel free to contact me or another board member.

Again, thanks to everyone for your support and encouragement of the past couple of years.

We are always looking for new places to go so if you have any suggestions, let me know.

Past Safety Corner

By Rick Stephan

Note: *I submit this month's Safety Corner article with somewhat bittersweet feelings. This is my last article as Safety Information Director for the Bluegrass Dive Club. I've been a member of the club for something like 38 years, on the board for 30+ of those years. I've been president, vice-president, treasurer, trip director, and SID from the time we were located at the High Street YMCA and mailing out newsletters through the USPS, through our move to the Greeneleaf Inn, to the Racquet Club and now the Urban Squirrel. I cherish the friendships and experiences that the club has given me. Hence my willingness to serve on the board. While I definitely plan to continue to be a club member and involved however I can, it is time to let someone else take over these reins for a while.*

Well, enough of the maudlin sentimentality. This month's article is from Wikipedia (and had citations quoted for most of the statistics), and is about the very reason I've submitted so many varied articles over the years: what happens when you are NOT safe while scuba diving. The article provides some statistics about reasons for the most common accidental deaths while diving, and provides some analysis.

As we know, scuba diving is inherently dangerous. Humans can't live underwater unless everything is done correctly. Travel, exposure to the elements, contact with strange plants and creatures, all these things can make one sick or even die. So, we prepare and plan and go diving with good friends like in the BGDC – so we can assure ourselves of a great time and the opportunity to go again. Thanks for "listening" to me all these years, and as always remember: safe diving is fun!

Scuba diving fatalities

From Wikipedia, the free encyclopedia

The risks of dying during recreational, scientific or commercial diving are small, and on scuba, deaths are usually associated with poor gas management, poor buoyancy control, equipment misuse, entrapment, rough water conditions and pre-existing health problems. Some fatalities are inevitable and caused by unforeseeable situations escalating out of control, but the majority of diving fatalities can be attributed to human error on the part of the victim.

Equipment failure is rare in open circuit scuba, and while the cause of death is commonly recorded as drowning, this is mainly the consequence of an uncontrollable series of events taking place in water. Air embolism is also frequently cited as a cause of death, and it, too is the consequence of other factors leading to an uncontrolled and badly managed ascent, possibly aggravated by medical conditions. About a quarter of diving fatalities are associated with cardiac events, mostly in older divers. There is a fairly large body of data on diving fatalities, but in many cases the data is poor due to the standard of investigation and reporting. This hinders research which could improve diver safety.

Scuba diving fatalities have a major financial impact by way of lost income, lost business, insurance premium increases and high litigation costs.

Statistics

Diving fatality data published in Diving Medicine for Scuba Divers (2015)

- 90% died with their weight belt on. (Ditching the weight belt may have been helpful in many of the cases, but not necessarily all.).
- 86% were alone when they died (either diving solo or separated from their buddy).
- 50% did not inflate their buoyancy compensator.
- 25% first got into difficulty on the surface
- 50% died on the surface.

Past Safety Corner Cont.

- 10% were under training when they died.
- 10% had been advised that they were medically unfit to dive.
- 5% were cave diving.
- 1% of rescuers died.

Fatality rates of 16.4 deaths per 100,000 persons per year among DAN America members and 14.4 deaths per 100,000 persons per year the British Sub-Aqua Club (BSAC) members were similar and did not change during 2000-2006. This is comparable with jogging (13 deaths per 100,000 persons per year) and motor vehicle accidents (16 deaths per 100,000 persons per year), and within the range where reduction is desirable by Health and Safety Executive (HSE) criteria.

Data for 17 million student-diver certifications during 63 million student dives over a 20-year period from 1989-2008 show a mean per capita death rate of 1.7 deaths per 100,000 student divers per year. This was lower than for insured DAN members during 2000-2006 at 16.4 deaths per 100,000 DAN members per year, but fatality rate per dive is a better measure of exposure risk, A mean annual fatality rate of 0.48 deaths per 100,000 student dives per year and 0.54 deaths per 100,000 BSAC dives per year and 1.03 deaths per 100,000 non-BSAC dives per year during 2007. The total size of the diving population is important for determining overall fatality rates, and the population estimates from the 1990s of several million U.S. divers need to be updated.

The most frequent root cause for diving fatalities is running out of or low on gas. Other factors cited include buoyancy control, entanglement or entrapment, rough water, equipment misuse or problems and emergency ascent. The most common injuries and causes of death were drowning or asphyxia due to inhalation of water, air embolism and cardiac events. Risk of cardiac arrest is greater for older divers, and greater for men than women, although the risks are equal by age 65.

Several plausible opinions have been put forward but have not yet been empirically validated. Suggested contributing factors included inexperience, infrequent diving, inadequate supervision, insufficient predive briefings, buddy separation and dive conditions beyond the diver's training, experience or physical capacity.

Cause of death- *According to death certificates, over 80% of the deaths were ultimately attributed to drowning, but other factors usually combined to incapacitate the diver in a sequence of events culminating in drowning, which is more a consequence of the medium in which the accidents occurred than the actual accident. Often the drowning obscures the real cause of death. Scuba divers should not drown unless there are other contributory factors as they carry a supply of breathing gas and equipment designed to provide the gas on demand. Drowning occurs as a consequence of preceding problems, such as cardiac disease, pulmonary barotrauma, unmanageable stress, unconsciousness from any cause, water aspiration, trauma, equipment difficulties, environmental hazards, inappropriate response to an emergency or failure to manage the gas supply.*

The data gathered in relation to the actual causes of death is changing. Although drowning and arterial gas embolisms are cited in the top three causes of diver deaths, stating these as solitary causes does not recognize any pre-existing health issues. Researchers may know the actual causes of death, but the sequence of events that led to the cause of death is often not clear, especially when local officials or pathologists make assumptions.

In many diving destinations, resources are not available for comprehensive investigations or complete autopsies, The 2010 DAN Diving Fatalities workshop noted that listing drowning as a cause of death is ineffective in determining what actually occurred in an incident, and that lack of information is the primary reason for personal injury lawsuits filed in the industry.

Manner of death

If the manner of death is deemed to be accidental (or due to misadventure, where this

Past Safety Corner Cont.

is applicable), which is usually the case, the incident leading to death is seldom analyzed sufficiently to be useful in determining the probable sequence of events, particularly the triggering event, and therefore is not usually useful for improving diver safety.

The chain of events leading to diving fatalities is varied in detail, but there are common elements: a triggering event, which leads to a disabling or harmful event and causes a disabling injury, which may itself be fatal or lead to drowning. One or more of the four events may not be unidentifiable.

Death usually followed a sequence or combination of events, most of which may have been survivable in isolation. In the more than 940 fatality statistics studied by DAN over ten years, only one third of the triggers could be identified.

1. Insufficient gas (41%)
2. Entrapment (20%)
3. Equipment problems (15%)

Disabling agents were also identified in one third of the cases. The most common identified were:

1. Emergency ascent (55%)
2. Insufficient gas (27%)
3. Buoyancy trouble (13%)

Disabling injuries were identified in nearly two thirds of the cases:

1. Asphyxia (33%)
2. Arterial gas embolism (29%)
3. Cardiac incidents (26%)
4. Trauma (5%)
5. Decompression sickness (3.5%)
6. Unexplained loss of consciousness (2.5%)
7. Inappropriate gas (2%)

Contributory factors

The "DAN Annual Diving Report 2016 edition" lists their Ten Most Wanted Improvements in Scuba as:

- Correct weighting
- Greater buoyancy control
- More attention to gas planning
- Better ascent rate control
- Increased use of checklists
- Fewer equalizing injuries
- Improved cardiovascular health in divers
- Diving more often (or more pre-trip refresher training)
- Greater attention to diving within limits
- Fewer equipment issues / improved maintenance

Diving techniques

Inadequate gas supply

The ANZ survey found in 56% of fatalities and the DAN survey in 41%, that the diver was either running low or was out of gas. When equipment was tested following death, few victims had an ample gas supply remaining. The surveys indicated that most problems started when the diver became aware of a low on air situation. 8% of the divers died while trying to snorkel on the surface, apparently trying to conserve air. Concern about a shortage of air may affect the diver's ability to cope with a second problem which may develop during the dive, or may cause the diver to surface early and possibly alone in a stressed state of mind, where he is then unable to cope with surface conditions.

Buoyancy problems

In the ANZ survey, 52% of the fatalities had buoyancy problems. Most of these were due to inadequate buoyancy, but 8% had excessive buoyancy. In the DAN survey buoyancy problems were the most common trigger event leading to death. Buoyancy changes associated with wetsuits were found to be a significant factor. Based on a formula for approximate weight requirement based on wetsuit style and thickness, 40% of the divers who died were found to be grossly over-weighted at the surface. This would have been aggravated by suit compression at depth.

A correctly weighted diver should be neutrally buoyant at or near the surface with cylinders nearly empty. In this state, descent and ascent are equally easy. This requires the diver to be slightly negative at the start of the

Past Safety Corner Cont.

dive, but this and the buoyancy loss due to suit compression should be is easily compensated by partial inflation of the buoyancy compensator. The practice of over-weighting is dangerous at it may overwhelm the capacity of the buoyancy compensator and makes the buoyancy changes with depth more extreme and difficult to correct. A failure of the buoyancy compensator would be exacerbated. This dangerous practice is unfortunately promoted by some instructors as it expedites shallow water training and allows divers to learn to descend without fully learning the appropriate skills.

In a different survey on buddy diver fatality it was found that regardless of who was first to be low on air, the over-weighted diver was six times more likely to die.

In spite of being heavily reliant on their buoyancy compensators, many divers also misused them. Examples of this include accidental inflation or over-inflation causing rapid uncontrolled ascents, confusion between the inflation and dump valves, and inadequate or slow inflation due to being deep or low on air. The drag caused by a buoyancy compensator inflated to offset the weight belt can contribute to exhaustion in divers attempting to swim to safety on the surface. The American Academy of Underwater Sciences reported in 1989 that half the cases of decompression sickness were related to loss of buoyancy control. When twin-bladder buoyancy compensators are used, confusion as to how much gas is in each bladder can lead to a delay in appropriate response, by which time control of the ascent may have already been lost.

Failure to ditch weights

90% of the fatalities did not ditch their weights. Those on the surface had to swim towards safety carrying several kilograms of unnecessary weight, which made staying at the surface more difficult than it needed to be. In some fatalities the weights had been released but became entangled. In other cases, the belt could not be released because it was worn under other equipment, or the release buckle was inaccessible because a weight had slid over it, or it had rotated to the back of the body. Other fatalities have occurred where release mechanisms have failed.

Buddy system failures

In spite of the general acceptance, teaching and recommendation of the buddy system by most, if not all diver certification organizations, only 14% of divers who died still had their buddy with them at the time. In a Hawaiian study 19% of the fatalities died with their buddy present. In the ANZ study 33% of the fatalities either dived alone or voluntarily separated from their buddies before the incident, 25% separated after a problem developed and 20% were separated by the problem. In the DAN study, 57% of those who started diving with a buddy were separated at the time of death.

A common cause of separation was one diver running low on air and leaving their buddy to continue the dive alone. In some cases more than two divers dived together, without adequate team planning, leading to confusion as to who was responsible for whom. Groups of divers following a dive leader without formal buddy pairing before the dive would be split into pairs to surface by the dive leader as they reached low air status. This would frequently pair the least experienced and competent divers for the ascent including those over-breathing due to anxiety.

Past Safety Corner Cont.

In others cases, the survivor was leading the victim and not immediately aware of the problem. It is common for the more experienced diver to lead, and also common for the follower not to remain in a position where he can easily be monitored, so the follower may only get intermittent attention and may be inconveniently situated when something goes wrong. By the time the lead diver notices the absence of the buddy it may be too late to assist.

Buddy rescue

In a minority of cases the buddy was present at the time of death. In 1% of cases the buddy died attempting rescue.

Buddy breathing

4% of fatalities were associated with failed buddy breathing.

In a study of failed buddy breathing conducted by NUADC, more than half were attempted at depths greater than 20 meters. In 29% the victim's mask was displaced, and a lung over-pressure injury occurred in 12.5% of cases. One in 8 victims refused to return the demand valve, however, donating a regulator rarely results in the donor becoming the victim. The use of a secondary (octopus regulator) second stage or a completely separate emergency air supply (bailout cylinder) would appear to be a safer alternative.

Human factors

A survey of DAN America members during 2000 to 2006 indicated a low incidence of cardiac-related fatalities in divers less than 40 years old. The rates increased until about 50 years old and stabilized for older divers at a relative risk of approximately 13 times greater than for younger divers. Relative risk for older divers was also found to be greater for asphyxia (3.9 times) and arterial gas embolism (2.5 times). Relative risk between males and females reduced from about 6 to 1 at 25 years to even at 65 years. DAN Europe figure follow a similar trend.

The victim had a pre-existing condition which would widely be considered a contraindication to diving in about 25% of fatalities. Some disorders have no demonstrable pathology and are easily overlooked in an investigation, which results in incomplete understanding of the incident. Drowning can obscure some pathologies which may then not show up at autopsy.

A large percentage (40 to 60%) of deaths in the Edmonds summary were associated with panic, a psychological reaction to stress which is characterized by irrational and unhelpful behavior, which reduces the chances of survival. Panic typically occurs when a susceptible diver is in a threatening and unfamiliar situation, such as running out of breathing gas, or loss of ability to control depth, and is commonly complicated by inappropriate response to the triggering situation, which generally makes the situation worse. Evidence of panic is derived from behavioral reports from eyewitnesses.

Fatigue was a factor in a significant number of cases (28% according to Edmonds). Fatigue is caused by excessive exertion, is aggravated by physical unfitness, and reduces the reserves available for survival. Factors cited as causes of fatigue include excessive drag due to over-weighting, drag due to over-inflation of the BCD, and long surface swims in adverse sea conditions, and it was not restricted to unfit divers. Fatigue was also associated with salt-water aspiration syndrome, cardiac problems and asthma.

Salt water aspiration was a factor in 37% of cases in the Edmonds summary. This refers to inhalation of a small amount of sea water by the conscious diver, often in the form of spray. Salt water aspiration may be caused by regulator a leak, rough conditions on the surface, or residual water in the regulator after regulator recovery or buddy breathing. Salt water aspiration may cause respiratory distress, fatigue or panic and other complications.

Autopsy evidence of pulmonary barotrauma was found in 13% of the cases summarized by Edmonds et al. This was sometimes a complicating factor, but at other times the direct cause of death. Factors associated with pulmonary barotrauma include panic, rapid buoyant ascent, asthma and regulator failure. In half of these cases a cause for the

Past Safety Corner Cont.

barotrauma was identified, but a roughly equal number remain unexplained.

In cases where the Edmonds summary found cardiac failure was implicated there was either gross cardiac pathology or a clinical indication of cardiac disease in the autopsy findings. 26% of deaths in the DAN studies were due to cardiac failure. 60% of these victims complained of chest pain, dyspnea or feeling unwell before or during the dive. Cardiac causes are implicated in about 45% of scuba deaths in divers over 40 years old, and they tend to be relatively experienced divers, frequently with a history of cardiac disease or high blood pressure. The associated triggers include exercise, drugs, hypoxia from salt water aspiration, cardio-pulmonary reflexes, respiratory abnormalities, restrictive dive suits and harness, and cold exposure.

In at least 9% of fatalities in the ANZ survey cited by Edmonds et al. the diver was asthmatic, and in at least 8% of the cases asthma contributed to the death. In other surveys this correlation is not so clear. Surveys have shown that between 0.5% and 1% of recreational divers are asthmatics. Edmonds considers that the statistics imply that asthma is a significant risk factor and that asthmatics should not be permitted to dive. This opinion was prevalent for a long time, but recent studies by DAN suggest that asthma may be managed successfully in some cases. Factors contributing to death in this group include panic, fatigue and salt water aspiration, and the cause of death was usually drowning or pulmonary barotrauma. The diving environment can provoke or aggravate asthma in several ways, such as salt water aspiration, breathing cold dry air, strenuous exertion, hyperventilation, and high work of breathing.

In 10% of the cases summarized by Edmonds et al., vomiting initiated or contributed to the accident. It was often caused by sea sickness or salt water aspiration or ingestion, but ear problems and alcohol were also cited as causes.

Nitrogen narcosis was cited as a contributory or triggering factor in 9% of cases reviewed by Edmonds et al., but was never the sole cause of death.

Respiratory disease

Drugs

Decompression sickness

Equipment

Edmonds et al. (2014) suggest that a significant percentage of deaths are associated with equipment failure (35%) or misuse (35%), while the diving fatalities workshop of 2012 found that equipment failure *per se* was uncommon. This is not necessarily contradictory, as they include incompetent operation under equipment failure and specify overlap between malfunction and misuse.

In 14% of deaths there was a regulator fault reported, and in 1% the regulator was misused. Subsequent testing of the regulators showed that most of the problems were caused by leaks resulting in inhalation of salt water, but in some cases there was excessive breathing resistance following a mechanical dysfunction. In a few cases the regulator failed catastrophically, or the hose burst. The difficulty of breathing from the regulator was often aggravated by other factors such as panic, exhaustion or badly adjusted buoyancy.

In 8% of cases the buoyancy compensator malfunctioned. This was usually due to a problem with the inflator mechanism,

Past Safety Corner Cont.

but in some cases the BCD could not stay inflated. In 6% of the fatalities, the buoyancy compensator was not used competently, usually by overinflation which caused an uncontrolled ascent, or deflating when more buoyancy was required at the surface. Overweighting can also be classified as misuse of equipment.

Edmonds et al. found that 13% of victims lost one or both fins. This was sometimes due to defective or ill-fitting fins, but in most cases the cause was not apparent. In 12% of deaths there were problems associated with the cylinder, usually from user error, such as use of an underfilled or undersized cylinder, the cylinder becoming unsecured from the harness, and failure to open the cylinder valve. In less than 5% of fatalities, there were problems due to malfunction or misuse of weight belt (excluding overweighting which is not a failure of the equipment), harness, mask, exposure suit, submersible pressure gauges and entanglement in lines deployed by the diver.

Environment

Edmonds et al. indicate that 25% of fatal incidents started at the surface, and 50% of the divers died at the surface. In many cases they divers surfaced because they ran out of breathing air.

Difficult water conditions were implicated in 36% of fatalities in the Edmonds et al. summary. These included current stronger than the diver could manage, rough water, surf, surge from wave movement, and impaired visibility caused by these conditions. These conditions were frequently encountered when the diver was obliged to surface in an unsuitable place due to earlier problems, and were often exacerbated by overweighting and/or the high drag of an excessively inflated buoyancy compensator, leading to exhaustion or panic which resulted in drowning.

Excessive depth was considered a factor in 12% of fatalities summarized by Edmonds et al. The fatal dive was often the deepest ever for the victim. Greater depth can expose a diver to factors such as increased air consumption, impaired judgment caused by nitrogen narcosis, colder water, reduced thermal insulation of a compressed wetsuit, reduced visibility and lighting, slower response of buoyancy compensator inflation, increased work of breathing, greater heat loss when using helium mixtures, higher risk of decompression sickness and a necessarily prolonged ascent time.

Other environmental factors cited as contributory to fatalities include caves, marine animal injury (including shark and other animal bites, and marine stings, difficulties entering and exiting the water, cold, entanglements, entrapment, and night diving.

Experience

The DAN fatalities workshop of 2011 found that there is a real problem that divers do not follow the procedures they have been trained in, and dive significantly beyond their training experience and fitness levels, and that this the basic cause of most accidents. In litigation involving diving accident, the legal panel reported that 85% to 90% of the cases were attributable to diver error. This is consistent with several scientific studies. Medical issues are a significant part of the problem, and certified divers are responsible for assessing their own fitness and ability to do any particular dive. Experience was also cited as a significant factor, with occasional divers at higher risk than regular divers, and the majority of fatalities had only entry level or slightly higher qualification ("Advanced open-water diver" certification is included in this grouping).

Webmaster

By Alex Fassas

Welcome to 2019! With the New Year come many changes. Likely you have read elsewhere in this newsletter that the Bluegrass Dive Club has both a new monthly member meeting date and location, beginning Tuesday, January 8, 2019, at Bronte's Bistro in Joseph Beth Books at Lexington Green. Also, we have a new roster of club officers for 2019, some familiar and some new.

The BGDC Website will be updated with all of the new meeting dates and location information by the time you read this newsletter. The club website will continue to see updates to format and content in the coming months.

Safety Information Director

By Bart Bertello

Hi everyone and welcome to my first article as your Safety Information Director. I hope I can do the job half as well as Rick did, and first and foremost, maintain the club's excellent safety record. In that regard, my first thoughts are that this position is aptly called ***Safety Information Director****, not Safety Director. So I am tasked with providing pertinent information to you the diver and as the diver,* ***you are responsible for your safety.***

Therefore, my focus will be to provide you relevant safety information for your use. Each article will focus on a specific safety risk. Consider it as: ***I learned about diving safety from that****. I will draw from my experience, hopefully yours, and the dive community to highlight real safety risks that we must be aware of. So if you see or hear of something that we should be concerned with, please pass it to me. There is nothing like first hand experience to drive a point home. So here we go.*

Scuba Regulator Hose Failure

When I thought about a subject for this first article, my mind immediately went to a recent regulator hose failure I witnessed. (That's the same regulator hose that we entrust our lives to.) I then quickly recalled two similar instances, one personally, that I also won't forget. The worst of these was a total separation of a fellow diver's low pressure hose on the dive boat during pre-dive prep. The loud whoosh got everybody's attention. Being an aircraft engineer who worked with pressure hoses and connections, I was very interested and examined the failed parts closely. The hose fitting that screws into the regulator first stage was completely corroded

Safety Infor Director Cont.

through! What if that failure had happened on the dive? We'll talk about that later. My personal experienced was when I got back into diving after a long hiatus and was enthralled by the air integrated dive computer I demo'd in the pool. So the dive instructor lent me his spare reg with one of the computers for my first Caribbean trip. I was familiar with the reg and the computer but had not used this set. During the diving I heard a progressively louder noise and my buddies said one of my hoses was really bubbling. On the boat the high pressure hose was now hissing profusely from the swaged (crimped) fitting at the reg 1st stage. The hose looked old and sure enough it was original with just a new computer put on it.

The other event was many years ago on a California boat when someone was looking for an o-ring for a badly leaking hose, also at the reg 1st stage fitting. I offered my o-ring kit and looked at the fitting and reg port (where hose screws in). Both had significant salt deposits that had damaged and interfered with the o-ring seating thus preventing the hose from sealing. After carefully cleaning the parts to prevent contamination of the reg and/or the hose (not ideal on a boat), a new o-ring did the trick. I'm sure that after each of these experiences I must have shaken my head and said that that should not have happened.

Accordingly, this article is going to talk strictly about regulator hose failures and how to prevent them. We'll also look at the underwater failure situation.

Hose Maintenance and Inspection. Concurrent with your routine regulator service, all hoses should be removed, inspected, cleaned, and o-rings replaced. Every inch must be examined closely. Special attention must be given to the swaged (crimped) metal end fittings for evidence of corrosion and salt deposit buildup. Hoses should be replaced if worn, damaged, or beyond recommended service life. Make sure the shop does a thorough job and provides you documentation/photos of any discrepancies.

This will indicate how well your have been taking care of your hoses. If your regulator does not see a shop regularly, you should learn to do this yourself. There is plenty of good information on the web and from equipment manufacturers.

Corrosion and/or Salt Deposits. These are totally different animals and not necessarily indicative of each other. Generally, the chrome plated brass hose fittings and connecting regulator ports and tubes have good corrosion resistance. But they are not corrosion proof. Corrosion can take place in areas where salt water is entrapped such as mating threads of the hose fitting and reg port, damaging both. The thin protective chrome plate can also wear off from normal service. Corrosion should be suspected if there is any discoloration or hard crusting on the surfaces, especially the threads. Corrosion damage to the metal can only be confirmed by cleaning and close examination. Salt deposits, while not damaging to the metal, can build up and interfere with the function of the fitting, port, and o-ring seal as well as contribute to loss of chrome plating. Deposits can be cleaned away with no detrimental effects. Both corrosion and salt deposits can be checked and prevented by frequent cleaning and regular inspections. And remember, hoses are a lot cheaper than regulators to replace.

Heavy salt deposits

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Blue-green discoloration; possible corrosion

Clean and not so clean hose fittings

Pre-dive Inspection and Post-dive Cleaning. Before each dive, give your hoses a good inspection along with the rest of your regulator. Ask for assistance from someone knowledgeable if you have any concerns. Post-dive, a good cleaning is imperative to prevent corrosion, salt deposits, and sand/debris accumulation. Along with your reg, hoses should be soaked in warm water and flushed well with fresh water. Work any swivel connectors back and forth to clean them. After your last dive, slide back the hose strain protectors to expose the connections and soak, flush, and remove any deposits or debris with a tooth brush. Air dry the areas thoroughly. Look for any evidence of corrosion, especially in the threaded areas. Examine the swaged (crimped) metal fitting at the hose ends for any hose or fitting damage.

A word on hose strain protectors: There has always been a debate as to whether they do more harm than good in that they can entrap salt water, sand, and debris, contributing to corrosion and salt deposit build-up. In my opinion, hose protectors are worthwhile to provide strain relief to the swaged end fitting, prolonging the life of the fitting. This is common practice in industry applications where the fitting is subject to stress and strain. Your garden hose a perfect example. With a little attention and cleaning, these concerns can be alleviated. There are also flow-through strain protectors on the market like these:

Hose Treatment and Storage. Hoses must be treated with the care that a life critical piece of equipment should receive. Consider the high energy gas containment and delivery device they are and the wear and tear they endure. Follow all manufacturer's instructions and precautions when handling hoses. To reduce stress on the swaged fitting, don't let hoses hang or swing from your reg. Support the weight of the hose and connected 2nd stage/computer as much as possible. Carry your reg by the loosely coiled hoses. Don't coil tightly, bend, twist, or kink your hoses. Protect them carefully with your reg from impact damage at all times, especially when on the boat; brass is a rather soft material. Pack

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them carefully with your reg when you are on a trip. Finally, remember to open your tank valve slowly to reduce the stress and strain that 3000psi will impact on the hose parts and materials, again, same as for your reg.

Hose Failure under Water. Lastly, let's talk about a hose separation or rupture underwater. You can find videos of just that on the web. It can be scary but need not be threatening. A test conducted by a leading dive magazine found that with a 3000 psi tank and total rupture of the low pressure hose, you have approx 80 seconds before tank is empty. (The high pressure hose took 22 minutes due to very small orifice at 1st stage port.) Depth had no appreciable effect. You should have plenty of time to evaluate the problem and to find your buddy or team and make an Alternate Air Source Ascent with one of them, just as you've been trained. Along with your out-of-air sign, the escaping air and noise should make it obvious to your alternate air buddy what your predicament is. But the noise and bubbles could also be very distracting and your tank should be turned off.

Well that about covers it. The lesson I took from this information is to diligently take care of my regulator hoses and faithfully follow good buddy or buddy team practices whenever diving.

Remember: Safe diving is fun diving.

Bluegrass Dive Club 2019 Calendar

January
8, Tuesday Board Meeting
22, Tuesday Dive Club Meeting

February
12, Tuesday Board Meeting
26, Tuesday Dive Club Meeting

March
12, Tuesday Board Meeting
26, Tuesday Dive Club Meeting

April
9, Tuesday Board Meeting
23, Tuesday Dive Club Meeting

May
4, Saturday Club's Derby Party
14, Tuesday Board Meeting
28, Tuesday Dive Club Meeting

June
11, Tuesday Board Meeting
25, Tuesday Dive Club Meeting

July
9, Tuesday Board Meeting
23, Tuesday Dive Club Meeting

August
13, Tuesday Board Meeting
27, Tuesday Dive Club Meeting
First person, one free drink…

September
10, Tuesday Board Meeting
24, Tuesday Dive Club Meeting

October
8, Tuesday Board Meeting
22, Tuesday Dive Club Meeting

November
12, Tuesday Board Meeting
26, Tuesday Dive Club Meeting

December
TBA, Saturday Club Christmas Party

Dive Committee Members

Mark Kidd	221-7104
Ralph Covington	621-3862
John Geddes	608-0682