

## The *Lammer Law*, British Virgin Islands

### *Largest Trimaran Afloat*

She was advertised as "by far the largest trimaran in the world -- taking 18 pampered guests, basking in the luxury of their own private million-dollar yacht, the *Lammer Law*." And when I stepped aboard the 92x42-foot craft in the harbor of Tortola I knew immediately I had discovered something special. It was not that I was greeted by a captain in blue blazer and white ducks, because Skipper John Rice looks like any other modern-day, barefoot Caribbean captain outfitted in his shorts and tee shirt, his skin brown, his hair bleached by the sun. Rather, here was an enormous craft that had been under sail for only a few short months, her layout nearly perfect, her deck sparkling, her inside social lounge greater than 500 square feet, and her main deck running the full width of the craft. My fear of claustrophobia quickly ebbed. There would be room enough for everybody on this three-deck-dandy.

Once aboard I was shown to my stateroom, the appropriate way to describe a carpeted and curtained cabin with a dresser, wardrobe and chair, double bed (or twin beds for less intimate companions), and private bathroom complete with a shower, toilet, and washbasin. Since we had arrived just before sunset, I quickly unpacked and, with my seven other companions, repaired to the main deck for introductory cocktails and a full roast beef dinner with all the trimmings. No doubt a week of luxury awaited us. I had dived the British Virgins before and knew that fine diving too was in store -- as long as the captain could find the reefs. And with his experience -- eight years in these waters, I had been told -- he should have no problem.

Now you might be tempted to stop reading at this point, fearing that the tab for the *Lammer Law* would be far too great to be within your reach. Compared to other luxury diving, not so. Per person the price is \$115/day, including diving (tanks are unlimited, but one is required to observe the tables since the nearest chamber is hours away). And unlike most "all-inclusive" tabs, even drinks are included. Today when two tank boat dives run \$40/person and three drinks mean a \$10 bar tab, \$115/person is surely not excessive.

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Over drinks and dinner I got my first chance to meet the crew. John, the skipper, a bright and humorous fellow, is in his mid-30's, and has been at the helm of one boat or another in his eight plus years in the islands. He has a license for 100-ton vessels as does his first mate, Linda Sorenson, who's been in the Caribbean just as long as John. Both claim to be scuba instructors and ably accompanied us on each of our dives. Linda's mother, Ruth Sorenson, runs the galley. The engineer, Joe Bilbao, is responsible for the twin 210-hp diesels, two 40-kw generators, two electric compressors, and the 60-hp motors on the two 16' inflatables. Mitzi Shae is boatswain and our stewardess was Fred, whose gender is just the opposite that of her nickname. John and Linda asked about our diving interests, got a line on our experience, and discussed plans for the week. The meals were planned around diving, we were told, which meant that breakfast would be served at 8, the first dive at 9 or so, lunch at noon, another dive at 2, cocktails at 6, dinner at 7 and a night dive afterwards, if we could handle it. Additional dives would be scheduled whenever we wished.

The first morning we traveled to nearby Peter Island for a shallow-water check-out dive, then weighed anchor and set sail for distant reefs. Two of our shipmates who had never dived before received a short resort course and within a day or two demonstrated remarkable proficiency in the water. During our dives either Linda or John accompanied us, permitting us full freedom as long as we observed the tables. If divers wanted more than the organized three daily dives, John or Linda would also join. So that experienced divers would not be prevented from the more difficult dives, the inexperienced (who never dived alone--John or Linda would always accompany them) were often separated from those who could handle the tougher or deeper dives, who would be watched by a crew member circling above in an inflatable boat, following bubbles. During our week at sea we visited many sites. These are just a few.

Anegada Reef: The Wreck of the Rocus: Twenty miles from Virgin Gorda, this reef is the last dive between the BVI's and Africa. The Rocus is an unusual dive. She was carrying a load of bones to a fertilizer factory in Mexico when she sank with her bow on the surface and the stern at 45 feet. Salvagers blew the mid-section wide open. And everywhere there are bones: skulls, jaw bones, rib bones, leg bones. But there are plenty of ocean fish and I saw large ocean triggers, permit and tuna. White reef tip sharks are reported as frequent visitors, though I saw none. At the reef the tropical fish are plentiful and snorkeling for nondivers was exceptional.

Santa Monica Rocks: From a bottom at 120-140 feet, the rocks rise to within six feet of the surface. Dozens of valleys, caves pinnacles and crevices are decorated with an unimaginable range of sponges and corals, home to a grand range of coney and chromis, and groupers and grunts, and butterflies and blennies. Two large eagle rays glided within four feet of me, I caught a puffer that blew up larger than a basketball, and down in the crevices I spotted dozens of lobsters throughout the dive. There's a lot to see here. I could've stayed a week.

Ginger Island: Here we drifted at 60 feet in the current while Mitzi followed our bubbles in the Zodiac. Along the reef there were all the usual Caribbean reef fish, and several schools of amberjack, horseeye jack and blue runners scooted by. While we drifted, a dozen 5-6 foot barracuda drifted with us, both on our left and our right, keeping their distance but nevertheless floating along.

Wreck of the Rhone: Unlike the other sites which get few visitors, the Rhone gets a score or more daily, but it still remains the best Caribbean wreck dive for sport divers. One morning we dived its 80-foot bow, where schools of squirrels and snappers and sergeant majors live, all sufficiently tame to pay little attention



to divers. In the bow lives a 150-lb. Jewfish, but the highlight of this dive was a snarling fight between two moderate-size barracuda, who flashed a lot of teeth at each other while they darted about staking out their territory. In the afternoon we unearthed a couple of small octopus in 40 feet of water. When we offered Vienna Sausage, to swarms of tropicals gathered, their frenzy alerted four large amberjacks who came in from deeper water, quickly scattering the tropicals. At night we chased feeding octopus back into the wreck and observed sleeping parrot fish wrapped in their membrane blankets. At dawn we watched the sunrise from below, while one set of residents slipped into their holes to hide from the day while others slipped out of their holes.

And Walter, the Friendly Whale: While under full sail through Sir Francis Drake Channel, doing little else than enjoying the sun and sail, a chill shot up my back when I heard "thar she blows" from one of the other passengers. In the distance, perhaps a mile away, I saw one vertical spray, then another, and then another. Linda, at the helm, switched on the twin diesels until we were a few hundred yards away, then went back to the sails as we approached four marvelous humpback whales--two adults about 50 feet long, and two calves, about 15-20 feet. For ten minutes we sailed no more than 50 feet from them. One of the calves sounded, then breached in a minute or so, coming out of the water almost to his flukes, before falling back. I was ecstatic. Everyone aboard cheered and clapped spontaneously. Apparently the little fellow heard us. For the next fifteen minutes he put on a show, breaching and rolling on his back, clapping his lateral fins together. He circled the boat twice, rolling over on his back or sticking his head out of the water to peer at us, the strange two-legged creatures. Several of us finally decided to snorkel with him, but as soon as we hit the water one of his parents quickly corralled the child actor and they finned off forever. Apparently the whales run through the channel every winter. There's no guarantee you'll see them aboard this or any other craft, but wow! What a treat if you do.

Indeed, our diving and cruising were excellent. Nondivers had plenty of deck space for relaxation and those who sought more action could waterski behind one of the inflatables or be motored to nearby islands for beachcombing or snorkeling. One evening we ventured ashore for dinner at the Bitter End Yacht Club on Virgin Gorda (we paid for this ourselves, the only "hidden" in the bill) and played darts until the wee hours--there would be no dawn dive the next day! Food during the trip was plentiful and excellent. Though not exotic, it could be described as solid American/English fare with a few special touches. Breakfast eggs were occasionally other than ordinary--shirred or baked with parmesan cheese--and accompanied by bacon, sausage, pancakes, or even kippers (though whoever had kippers would not be permitted to dive since no one would buddy breathe with him in an emergency). Lunches were quiche, lobster salad, hamburgers, cold cuts, and a wheel of ripe Stilton cheese. Dinner, preceded by cocktails, accompanied by wine, might be lamb, tuna, wahoo, pork with vegetables, fresh and frozen, and a range of English desserts--trifle, puddings, or baked meringue. During cocktail hour sausage, scallops, chips and dips were available. The bar was always open, but those who were diving were necessarily limited in their consumption.

I often had the best intentions to dive at night, but the cocktails and dinner and after-dinner Drambuie in the moonlight were too often too tempting. The crew, however, was always ready for night dives.

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Although I'm paid to be critical, I admit to having few complaints about my journey. Surely the crew and the accommodations and the table fare were just fine and of course the diving in the outer reaches of the British Virgins is generally much better than any diving reachable on two-tank dives from resorts throughout most of the Caribbean. This trip was one of the first few of the Lammer Law (she was launched in October, 1980), so a few minor problems had yet to be corrected-- e.g., the low voltage lights didn't work properly. Perhaps the engine room could be insulated better, yet compared to many other live-aboard dive boats these engines purred. And, of course, when the craft was under sail, which amounted to roughly half the time, the sound of the sheets and the bow cutting through the waters was our serenade.

Live-aboard dive boats are, of course, not for everyone. But the sheer size of the Lammer Law will meet the privacy and space needs of all but the most claustrophobic. The Lammer Law served this experienced diver well, just as I suspect it will serve old salts or novice diver/sailors. 'Tis a fine boat with a fine crew, touring some of the best diving and sailing waters in the Caribbean.

Reservations: Bob and Dorothy Smith run the toll free booking office (800-648-3393). The entire boat can be chartered for \$2000/day (\$2200 after December 1) while the individual rate is \$115/day (\$130 after December 1). Cruises are 7, 10 or 14 days and leave from Tortola, in the British Virgin Islands (reached easily from either St. Croix or St. Thomas). Special arrangements can be made to depart from St. Maarten for cruises of the Leeward Islands. Duncan and Annie Muirhead, who pilot the Misty Law (see Undercurrent, September, 1977), own the Lammer Law.

Divers Compass: After a dive cruise it's good form to tip the crew; each person in our group of eight left \$50-\$75 with Skipper John, who was to divide it among the crew members. . . . strobes can be charged when the engine is running. . . . there is no spearfishing from the Lammer Law. . . .

## Why Divers Die: Part I

### *A Report from the University of Rhode Island*

Since 1970, the University of Rhode Island National Underwater Accident Center (NUADC) has been compiling and analyzing statistics on underwater fatalities. John J. McAniff has been working with the Center since its inception and is the author of the most current report covering deaths occurring in 1977 and 1978. Undercurrent editors have studied that report, discussed the results with McAniff, and we are publishing

a condensed version, for which we take all responsibility for editorial changes. In this issue we report on deaths with "environmental-related causes." In future issues we will present training, medical, rescue and equipment aspects of the deaths.

We believe that reporting the causes of sport diver deaths is an important service to the diving community. Many of the cases cited begin with simple diver

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error—errors many of us repeat without giving much thought to them. But those errors are often compounded into more serious situations and the result is an unexpected and unnecessary underwater death.

Study the cases carefully. You may tuck away some information that someday will save your life.

\* \* \* \*

The total sport diver fatalities for 1977 and 1978 (Table 1), indicate a very dramatic decrease when compared to the three previous years.

The increase in the number of openwater dives during training and a trend toward continuing education as offered by advanced open-water courses and specialty courses may contribute to reduced fatalities. Though Florida has consistently produced the largest number of fatalities there was a 25% drop from 1977 and 1978 (30 each year) compared to 1975 and 1976 (40 each year). Most of this decrease can be attributed to fewer cave diving fatalities.

The frequency of sport diver fatalities in salt water—about 60% of the total—has varied little over the nine years. The freshwater data shows a major change in cave diving fatalities. Beginning with 10 fatalities each in 1970 and 1971, caves accounted for an increasing number of deaths through 1974, when 25 were recorded. The totals of 20 and 21 cave deaths for 1975 and 1976 were still considered quite high, but 1977 deaths were at a nine-year low, with only seven cave fatalities, while 1978 there were 13 deaths, still about half of those recorded in 1974.

The reasons for the sudden decrease in cave fatalities are not clear, but there is the possibility that more strict control by private owners of some of the properties where caves are located as well as local regulation have had some effect. In addition, some of the more dangerous caves have not only been posted as "Closed to Diving" but also have in fact been sealed off to prevent penetration.

This cave diving case—a double fatality—points out some of the factors that contribute to deaths.

"The two victims, both age 22 and neither certified for cave diving, entered the water about 6:30 p.m. with two other equally inexperienced divers. Only diver #1 had previously dived this location. He detailed a plan

which indicated they would enter the cave at a depth of 70 feet then proceed with a penetration of about 2400 feet by staging additional scuba tanks along the cave at various intervals. The two survivors apparently made a shallow penetration and then returned to the surface because silting had reduced visibility to zero. When divers #1 and #2 did not return, a team of expert cave divers were called in. Diver #2 was located 600 feet into the cave and the leader, diver #1 was located 1000 feet inside. Both divers were wearing double tanks and both tanks were completely empty. The two victims may have left the permanent safety line and considerable silting may have prevented them from finding the reserve tanks that had been placed earlier. Each victim carried a single light and neither was suitable for this purpose. Victim #1 had started to take a cave diving course about two years earlier but dropped out after the first session."

*"Later the man's underwater slate was found with the message, 'Don't worry, I know the way out.' Neither made it."*

In another tragic cave accident, a 27-year-old man was accompanied by a 13-year-old boy to a depth of 37 feet and a cave penetration of 65 feet. Later the man's underwater slate was found with the message, "Don't worry, I know the way out." Neither made it.

The above accounts support our opinion that cave diving is many times more dangerous than other types of diving. Over the nine years of this study, 13 percent (140 lives) of all U.S. sport diving fatalities have occurred in caves; The National Association of Cave Diving, NUADC, and the national sport diver training agencies have persistently emphasized that cave diving requires special training as well as extensive special equipment. A diver without such training should never attempt cave diving.

More than 50 percent of nonprofessional underwater diving fatalities happen in fairly shallow water (Table 2). During 1977, 50% occurred in waters shallower than 26 feet; in 1978 50% occurred in water shallower than 29 feet. This should not lead to the conclusion that deeper diving is safer; the statistics simply reflect that most sport scuba diving takes place in shal-

**TABLE 1**

**Summary of U.S. Underwater Deaths, 1970-78**

	Number of Fatalities																											
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1970		1971		1972		1973		1974		1975		1976		1977		1978		
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Nonprofessional underwater fatalities	99	11	104	8	107	12	118	7	129	15	123	8	137	10	98	4	95	21										
Professional, scuba diving	3	0	2	0	2	0	0	0	6	0	4	0	6	0	14	0	5	0										
Professional, surface-supplied air or mixed gas	6	0	2	0	2	0	4	0	8	0	8	0	7	0	7	0	6	0										
On-duty military	0	0	0	0	0	0	0	0	2	0	1	0	1	0	2	0	1	0										
Skindiving	18	1	17	0	15	1	22	0	25	2	16	1	11	3	18	1	13	3										
Total	138		133		139		151		187		161		175		144		144											

M = Male, F = Female



TABLE II

**Depth of Nonprofessional Sport Diver Fatal Accident  
(or depth at which Body was Recovered); 1970-78**

Percentage of Total Cases	Depth at or Above Which Percentage Occurred (feet)									
	1970	1971	1972	1973	1974	1975	1976	1977	1978	
25	17	18	15	15	18	23	17	17	16	
50	30	40	48	40	43	40	30	26	29	
75	60	75	90	70	78	78	65	58	54	
90	130	140	250	120	125	120	100	110	101	

lower water. The more expert or more brazen diver will dive deeper. Although the U.S. Navy, the Coast Guard and NOAA set 130 feet as the practical depth limit for scuba diving, in 1977 five diving fatalities occurred beyond that limit. In 1978 there were three cases. A description of these cases should emphasize the danger.

At a depth of 132 feet, the victim speared a number of large fish which he placed on a stringer that was attached to the boat's electric winch with a stainless steel cable. Somehow the cable became entangled around the victim's regulator and both his wrists. The buddy survivor tried to untangle the victim but failed because he was running out of air. The buddy surfaced and used the electric winch to hoist the victim to the surface, but by the time the victim reached the boat, he was dead.

Another death occurred while members of a dive club were searching for a previous drowning victim. One diver ran out of air at 140 feet and began buddy

breathing. At 80 feet the buddy also ran out of air and made a rapid swimming ascent. The victim diver surfaced unconscious, then dropped back to the bottom. A massive air embolism was the cause.

The victim diver in another case was at 175 feet when both he and his buddy ran low on air. They started for the surface, but only one diver made it. The victim was recovered about an hour later with no air in his tank. He had embolized.

Another case involved an out-of-air situation at 165 feet. The two divers buddy breathed until the buddy donor choked on water. He made an emergency buoyant ascent, leaving behind his buddy, who was later found dead.

In 1977-78, five sport divers died under ice. One death occurred in 30 feet of water. Two divers were searching for two snowmobiles which had gone through the ice. The buddy survivor experienced problems with his regulator and had difficulty breathing.

## Those Four L.A. Dive Deaths

### *...Bad Air Not The Cause*

The death of four divers diving from the same southern California dive boat (see *Undercurrent* January 1981) was ruled accidental by the Los Angeles County Coroners Inquest. Because the circumstances were so unusual—it was the first dive of the day and four of the forty divers aboard did not return—speculation about the cause spread crazily. The inquest has put that speculation to sea, but there are some important facts useful to sport divers:

- ★ all four divers had been certified within the past year
- ★ although they indicated that they had sufficient experience to make a dive to 130 feet, this was apparently their first deep dive; they were found in 130 feet of water
- ★ the air pressure in the three tanks recovered ranged from 46 to 52 psi, not enough to fill a BC at that depth
- ★ one diver was found standing upright on the bottom, held there by his weightbelt which was hanging between his legs, caught under the crotchstrap of his BC

It had been rumored that the deaths were due to bad air, but a Los Angeles Police Department spokesman said the four tanks had been filled at three different locations. None had been filled on the boat. He speculated that the divers' lack of experience, their anxiety over a deep dive, and the probable narcosis effect on inexperienced divers contributed to their drowning. They were most likely hyperventilating slightly before dropping down, perhaps overweighted for the depth, got to about 60 feet then really started dropping, begin breathing harder, got narked, didn't read their submersible pressure gauge....

And the rest is history. On one dive, four divers who thought they knew more than they did never made it back alive.



He signaled the victim that he was surfacing, so the victim detached the three-foot buddy line and indicated he would stay down and continue his search. The victim failed to surface. His body was recovered several days later.

In another case both divers employed a safety line to surface tenders. The victim experienced breathing problems and tried to buddy breathe with his partner. In the process, both divers' masks were knocked off and they lost each other in the silty water. The survivor surfaced, and the tenders immediately hauled the victim in with the safety line. Extensive efforts to resuscitate the victim were unsuccessful.

Another incident took two lives. Victim #1, a fully certified scuba diving instructor (though not a certified ice diving instructor) was accompanied by a much less-experienced person. Both were tethered to a single safety line tended from the surface. Another fully-suited diver stood by. The two divers apparently swam to the full extent of the safety line, about 150 feet, then

signaled to take up slack. Two signals for more slack were made, and then there was no response from the divers on the safety line. The tender pulled both in and CPR was attempted but without success. The vest worn by victim #2 had no CO<sub>2</sub> cartridge and was partially filled with water. The regulator diaphragm had been blown out of the breathing apparatus of victim #1 and his tank had free-flowed until it was empty, but victim #2 still had 2000 psi of air in his tank when recovered.

In another case both divers went under ice for the first time. Each had only four or five other dives logged. The survivor stated she could not clear her ears at the 40 foot depth. Her mouthpiece began leaking water and she couldn't get enough air. She tried to signal with the safety line, but gave the wrong signal. The tender answered by giving her more line rather than pulling in. When the tenders received no answer to a line signal of "are you OK?" they pulled both divers in and both were unconscious and not breathing. Heroic resuscitation efforts revived the second diver but were not successful with diver #1.

## Diving With a Turkey Buddy—

### *Some Pre-dive Self-Protection Tips*

In our last issue we published an article entitled *The Turkey Diver; A view from the Resort Guide*. The author was Lou Fead, now directing trips and instructing divers at the Underwater Explorers Society at Freeport, Bahamas (see sidebar) and Dee Mosteller, a past contributing editor to *Sport Diver*, contributed to this article. To follow up that article, we have written a second piece addressing the problem we have all experienced at one time or another: handling the turkey diver who gets assigned as our buddy. In too many cases, we have been on a dive boat, without our own buddy, and found ourselves assigned one of the birds Fead and Mosteller identified in their article. The problem, of course, is not what to do if the turkey gets in trouble, but what your turkey buddy will do if *you* get in trouble. With a little bit of pre-dive practice with your new buddy, you just might help him help you.

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*"The problem, of course, is not what to do if the turkey gets in trouble, but what your turkey buddy will do if you get in trouble."*

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The certification agencies have worked hard to establish the buddy system as *the* safe system for diving. Throughout basic and advanced courses we are taught to dive with another diver and most of us find the rule inviolable (for another opinion, one that says *Never Dive Alone* is a rule ready to be broken, see *Undercurrent*, July 1978). As we gain diving experience, we develop our favorite buddies and, perhaps

end up diving exclusively with a spouse or an old friend.

Long-standing buddy teams develop a second nature between them, each person learning to respond to the other's needs with the minimal of signals. Although these buddy teams often don't practice safety procedures, there's a presumption that they can aid each other in difficult circumstances, based perhaps on the flimsy evidence that they feel comfortable with each other. For sure, there is trust—and that's an important ingredient.

But if you do any diving at all, you've come to realize that whether you have a long standing buddy or whether you dive in teams with different divers, you're bound to be paired someday to a diver you know nothing about. If you're like most divers, you'll chat about the weather, discuss the diving conditions, make some feeble check of the other's equipment, and then hit the water. What you don't realize is that you *don't* have a buddy team. You are simply one of two divers, assigned to each other because that's what the rules require. Whether you two will have fun together is the most elementary of issues. Whether you two can save each other is the real issue. The answer is most likely *No*.

#### **Roles Divers Play**

In a buddy team of strangers, one diver often begins by playing one of two destructive roles. One role is that



## Sharpening-Your-Skills Dive Vacation

For divers who have not been in the water for a long time and feel ill-equipped to handle themselves or to aid their buddy, a unique course is being offered on Cayman Brac. Under the tutelage of Lou Fead, author of *Easy Diver*, divers are given six instructional dives in this "Skill Sharpening Dive Vacation" as Fead calls it. The dives include:

- ★ an antics dive (a review of the basics: lost mask, lost weight belt, emergency ascent, etc.)
- ★ a buoyancy control dive (to review practical ways to use the BC more effectively)
- ★ a deep dive (to experience and deal with the effects of nitrogen narcosis)
- ★ a navigation dive (to learn the use of the compass and other means to direct oneself underwater)
- ★ a night dive (to learn the techniques of diving in the dark)
- ★ a rescue dive (to practice resuscitation at sea and other techniques)

In addition, two fun dives are offered each day, along with all the standard activities of any tropical dive vacation. Michael Lipkin, M.D., an *Undercurrent* reader, recently took the vacation and writes:

"My buddy and I have made over seventy dives together, but we learned more about diving in one week than we had in years. And everything learned was put to use in open water and it was fun, even for my skeptical buddy....Lou's approach to the buddy system is remarkable. He can be paired up with a new buddy and within five minutes make that person into someone who could lend him effective assistance rather than being a helpless witness, a hapless hinderance, an annoying nuisance, or the works. And he taught us to do likewise. Lou was ably assisted by Dee Mosteller. They worked well as a team and made learning easy and fun."

The next session will be at Cayman Brac, October 17-24. The price, double occupancy, is \$760/person, which includes all instruction, diving, lodging and three meals per day. Contact:

Bob French and Nancy Ackerman French  
Sea Safaris  
3701 Highland #304  
Manhattan Beach, California 90266  
(213) 546-2464

of "hot shot," where a littany of achievements is spouted. The other diver, of course, is usually put off, doesn't pay attention, and doesn't believe that his assigned buddy is ever going to need him. The other role played is that of "novice," which may be true—or may not. A passive person can appear as a novice, when in fact he is not. But, the result of either role is that the buddies fail to become a team, they maintain a distance between them, and they go below ill-equipped—and sometimes put off with each other. Obviously, there are better ways to get started with strangers.

### Making the Relationship Work

Regardless of which role you play—if any—if you're to ensure that your dive will be both fun and safe, don't wait for the other diver to take the leadership in cementing the buddy relationship. Take the responsibility yourself by focussing on two tasks in your pre-dive conversation.

First, develop simple communication to get both of you on the same diving track, exchanging thoughts about what each other wants from the dive, and how to

work together for mutual benefit. You may be a photographer, and he may not. But you can still achieve your objectives if you give each other the attention you need prior to the dive.

Second, you need a practical buddy check to familiarize each with the other's gear so there'll be no surprises if any assistance is required. And, a discussion of emergency procedures puts a nice cap on the pre-dive conversation.

Communication should start right after the buddy assignment is made. If you're one of those folks who likes to talk as though Cousteau were a lifelong diving buddy, try practicing a bit of humility and speak honestly of your background—how long you've been diving, how often, and where. If you're one of those shy buddies, novice or not, realize that the more information your partner has about you, the more likely he'll be able to assist you if you need it. Both buddies need to share their experience and skills to plan the forthcoming dive. Depth limits, length of the dive, and the remaining air required before terminating the dive should be established to match individual experience as well as the dive conditions.



Continue communicating by establishing the signals you'll use in the water. Use the standard ones for *OK*, *not OK*, *up*, *down*, *stop*, *danger*, *low on air so let's surface*, plus the others that hopefully won't be needed—*out of air*, *let's share air*, and *help*. And include special signals for *lobster*, *pose over there*, etc. With signals straight, your dives won't be lost to communication confusion. For extra insurance, you might even carry a slate and pencil.

Talk alone won't ensure that your buddy can save your life in an emergency—but a practical buddy check might. Unlike most buddy checks wherein you look over your buddy's straps, and see if his air is on, a practical check for saving *your* life is done with *your buddy checking you* at the start of the dive to show he or she can float you back to safety if you're disabled. You probably believe you can save him, but you may not be so sure about whether he can save you. That's what the buddy check is for. Selfish? Only if you believe saving *your* own life is selfish.

In the buddy check find and operate each other's inflators and releases. Your oral inflator, direct (power) inflator, CO<sub>2</sub> inflator, or bottle inflator, should be examined by your buddy as his first means of floating you—if you can't do it yourself. The buddy should operate the inflators (except for the CO<sub>2</sub>), to really get the feel for saving your life, and so you know he or she can actually manipulate the hardware.

Releases include those for your weights (on a belt, in the backpack, or dangling in a goodie bag hooked to your BC) and those for your backpack. Being able to dump your weights—both diving lead and treasures

collected on a dive—will help your buddy raise you to the surface should your disability strike on the bottom. Knowing how to shuck your backpack, even one with a BC attached, gives your buddy the capability of stripping you of your gear so your body can be lifted into a boat, or carried onto a beach, for further resuscitative efforts.

A full buddy check ought to continue on into the water. Most dive guides are too much in a hurry to permit their charges some water time to check each other out, but if you make a firm enough request—and your buddy has already shown his feathers—then you might get a sympathetic ear from a responsible guide. After all, your guide is responsible for the safety of everyone aboard. If you do indeed get the time, practice routine emergency procedures. Submerged buddy breathing when you reach the bottom, octopus breathing, perhaps even unlocking weight belts can give you some indication about whether the turkey is up to the real test—and can give the turkey reassurance that he can handle problems. The practice provides the opportunity to test and develop skills before the need arises.

Now if your turkey buddy is still a turkey after your mini-training session, abort the dive and complain loudly. With proper shouting, screaming and foot-stomping, the resort will change your assignment in fear of losing you as a customer—and in fear of losing others.

And if your dive guide won't help out and make the change, then perhaps it's been he, all along, who's the real turkey.

## Six Injured As Two Aluminum Tanks Explode

### *Cylinders Weakened By Custom Paint Job*

Within four days of each other, two aluminum tanks being filled in Florida dive shops exploded, injuring six people. The most seriously injured was Ron Morrison, 33, owner of the Lakeland Dive Center, where the second tank was being filled. He had both legs severed by the blast.

In the first incident at Scuba West Dive Shop, five people were injured including shop co-owner Steve Gerrard, who underwent surgery for multiple fractures of his left arm and facial wounds. The four others received only minor injuries.

Gerrard told Bill Stevens of the *St. Petersburg Times* that "I remember everything vividly. I never blacked out. No metal hit me. It was all the air blast."

"I heard a pop when it exploded, although I guess it was louder because people told me they heard it two miles away. I remember something hit me in the face and I knew I was hurt bad. I couldn't see out of my left eye. I looked in the glass and saw a severe cut on my

face and my eye was mush, so I laid down and waited for help. I closed my other eye and kept hearing people screaming from pain. I was very lucky, though, considering Ron Morrison."

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*"The 400°F heat weakened the tank substantially, causing the 3000 psi tanks to explode when they reached a pressure of 1500 psi."*

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The cause of the accidents was not in the construction of the tanks, but rather due to a structural weakening caused by a customized paint job the tank owners had had applied to their tanks. That paint job, apparently applied at B&B Powder Company in Lakeland, Florida, was an "electroplating" process normally used by hot rodders and other car owners for an exceptionally tough, chip-resistant finish. According to Lakeland police investigating the accident, the tanks were subjected to temperatures up to 400°F for an hour



to impart the high gloss finish. The 400°F heat weakened the tank substantially, causing the 3000 psi tanks to explode when they reached a pressure of 1500 psi.

The owner of the second tank told police that after hearing of the first explosion he took his tank into the Lakeland Center and told Morrison, the victim, to be sure to hydrostat the tanks before refilling them. We tried to contact Morrison, but he was apparently still in the hospital and not speaking to the press. Had the tank been hydrostated, the accident would not have occurred. The tank would have been subjected to increasing pressure in an explosion-proof chamber. To pass the hydrostatic test, a tank must show only a minimal expansion when pumped to 5/3rds the pressure stamped on the tank. For an aluminum tank to pass, 5000 psi would be pumped in.

Although the tanks were of different brands—one was a U.S. Divers tank and the other was a Dacor cylinder—they were both manufactured by Luxfer USA Ltd., the supplier of aluminum diving tanks. *Undercurrent* spoke with Luxfer President Don Borden in Riverside, California, who said that their tests have definitely confirmed that the high temperatures to which the tanks had been subjected had weakened the tanks and caused the subsequent explosion. Luxfer recovered one of the exploded tanks and a third tank which had been painted, but not filled. Tests of these tanks were inconclusive regarding the maximum temperature reached, but Borden said federal regulations require a tank to be condemned if it has reached 350°F. He admitted the figure is conservative, since tanks heated to as much as 400°F for a very short time may not be damaged, but the police reported that these tanks were held at 400°F for an

## HYDROSTAT NOW

If you have any reason to suspect that your tank has been subjected to high temperatures in a painting process or for any other cause, don't get your tank refilled until you have a hydrostatic test administered. Any dive shop can have your tank tested and the price is normally under \$10.

Furthermore, if you have any reason to suspect that your tank has rust inside—whether aluminum or steel—have your shop perform a visual inspection to determine if a hydrostatic test is necessary.

A filled tank with weak walls is a bomb with a hair trigger. Don't take any risks with your life and the lives of others.

hour. Because metal does not radiate heat as fast as it absorbs it, a 400°F external temperature might mean that the metal could be much hotter internally.

"Before this accident," Borden said, "we were not aware of the extent of repainting tanks or the process used." He admits to being surprised at the high heat used. Luxfer itself has conducted tests on a number of paints for their tanks, and according to Borden not one paint manufacturer among those tested by Luxfer recommends heating their product above 250°F.

Given the seriousness of the injuries in the explosion, one can expect lawsuits, but pinning down the responsibility for the accidents will be no easy task. To begin, unless one is in the aluminum tank business, it's unlikely he would know the damage caused by heating a tank. Certainly it's not information published in diving manuals, talked about in dive classes, or written about in magazines. Even the 1978 University of Rhode Island study on aluminum tanks made no mention of the problems of heat exposure. And, no information about the heat exposure problem accompanies the tank on its way to the dive shop or the consumer.

So, is Luxfer responsible for not informing the consumers of the problems of heat? What about U.S. Divers and Dacor—they sold the tanks to the dive shop? And what about the dive shops that sold the tank to the unsuspecting divers? And then there are the divers who owned the tanks. Should they have known better, even though no one told them? And what about the company that applied the paint job? What should they be required to know about high temperatures and aluminum tanks? And what about the owner of the second tank? He took his in for a hydrotest, he claims, after the first tank exploded, but without informing the shop owner of that explosion. And what about the shop owner? Shouldn't he have known something was wrong when he saw that paint job? He's supposed to be an expert on diving equipment.

Luxfer's Borden clearly sees the dimension of the problem and in our discussion with him he was indeed



THESE KIND OF LETTERS HELP UNDERLINE THE KIND OF SERVICE WE PROVIDE OUR READERS AND THE ENTIRE DIVING COMMUNITY.



open and concerned. "I don't sleep well at night," he confessed, "and I don't like that." Luxfer, he said, indeed "has a responsibility to warn the consumer about how and how not to use this piece of equipment. But we share that responsibility with the training agencies, distributors, dive shops and publications such as *Undercurrent*."

"Obviously something has to be done to provide information with the tank," he said, "but right now we don't know just what it will be. Maybe we should have known that people would be painting their tanks, but we didn't. Now we just don't know what they are doing with them," he said.

Borden pointed out the legal Catch 22 that Luxfer finds itself in—a problem other manufacturers have expressed about product liability. "If you spell out to

the owner not to subject the tank to extremes of heat or whatever and don't mention something else which then results in an accident, then a liability has been created for not mentioning this 'something else.' " Nevertheless, he repeated, something has to be done.

Much to Luxfer's credit, they responded quickly to the problem. They performed their tests rapidly and as soon as the results were in, issued a technical bulletin to U.S. Divers & Dacor for distribution to all dive shops stating candidly that two individuals were injured in tank explosions and that the problem seemed to be excessive heat applied to the tanks. Luxfer President Borden could have reacted defensively. Instead, he took the offense to determine the problem and communicate it to the shops. That kind of action saves lives.

## *...And More Lessons For The Industry*

In the case of tanks, we understand why no one would have thought that a couple of divers would have their tank painted in a process that would destroy the integrity of the metal. It might be impossible to state such a specific problem in a brochure accompanying the tank.

At the same time the manufacturer and we presume the distributors—U.S. Divers and Dacor—know that a tank is not to be subjected to a heat of 350°F. In fact,

the Compressed Gas Association specifies that an aluminum cylinder which has been exposed to more than 350°F *shall be condemned*. That information should be included with new tanks. No one has to anticipate whether the heat comes from a painting process or from an excursion into a satanic den. The only relevant point is that the tank can't be heated to 350°F. And every diver ought to be told that.

Other problems with tanks could be explained in

### **The Anti-shark Suit Revisited**

If you wish evidence of the value of the metal link shark protection suit we reported in our April issue, then you need go no farther than the May, 1981 issue of *National Geographic*. On the cover is a photo of a blue shark biting the arm of a diver—but to no avail, since the suit withstands the piercing teeth. Inside is another photo of a diver being bitten unsuccessfully by a shark. The diver? None other than Valerie Taylor, who writes:

"The jaws slammed shut as the shark tore at my elbow, whipping my arm from side to side. I waited for the blood and pain, but there was none. The mesh had defeated the destructive, sawing motion typical of the blue shark bite. . .

"On another dive, sharks were all around me—torpedo shapes, gray against blue—moving faster than my eye could follow. Suddenly I felt a blow and heard a terrible grating noise. A shark had grabbed me by the face, ripping away my air hose. I turned toward Ron, unable to see because my mask had flooded. Groping to find my mouthpiece, I surfaced, but was too weak. The weight of the suit dragged me down. Blackness began to overtake me. Ron jammed the mouthpiece in my face. I gulped air and sank down, unable to move, shaken, bruised—but alive.

"Back on the boat we examined four neat tooth punctures in my chin. The teeth had pierced the gap where the hood meets the suit. A tiny tip of tooth remains embedded in my jaw, where it will stay as a reminder of the day a shark bit my face."

The suit works, but the grey reef shark in the Coral Sea somehow was smart enough to go for the only unprotected part of Valerie Taylor.

The two pictures of shark bites are alone worth the cover price of the May *National Geographic*, but if they're not enough for you, the issue also includes an excellent 20-page spread on the Great Barrier Reef by the Taylors.



writing when a tank is purchased. For example, a couple of years back a diver, who had stored his full tank for several months, took it from his garage and went diving in 12 feet of water. He died of carbon dioxide poisoning. A tiny speck of corrosion in the tank fed on the oxygen in the air and ultimately depleted that oxygen. The submersible gauge showed a full tank. But, it didn't show the composition of the air within. Since there wasn't enough oxygen to support the diver underwater, he just slowly fell asleep—and never woke up. Would it not be sensible to alert a diver who buys a steel tank to the problems of storing it full?

Other life-supporting equipment also comes to the consumer without adequate information. Regulators provide the most glaring example. We reported in the Navy studies of regulators last fall, noting that many regulators fail to pass the old Navy standards and some regulators, once below 100 feet, have difficulty delivering air in all but the most calm circumstances. Of course that kind of information about regulator performance is never provided to the consumer by the manufacturer. It does not show up in training courses. It is not discussed in certification agencies' publications.

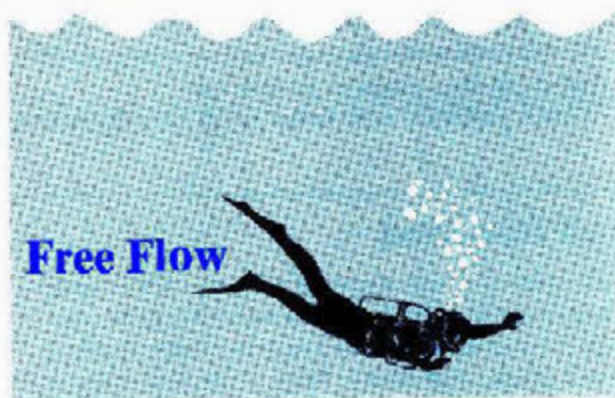
The SOS decompression meter is another device that

comes without adequate information. When we first began writing about it in 1976, Scubapro kept its lips sealed about the device's performance, allowing divers to believe that the meter read out data consistent with the U.S. Navy tables—which of course, it doesn't. After a series of articles, the instructions accompanying the meter have changed, but the face still is misleading. Scubapro remains mum. So do the training agencies.

Regarding the tank explosions, we expect the industry to exhibit more concern about these accidents than they do about regulator and decompression meter-related accidents. One reason, of course, is that they don't have to place blame on one of their own. They can pin the rap on the nonindustry people who painted the tanks, not on the dive industry itself.

Well, the entire industry ought to take the rap. And take it hard. There's not a single company nor a single training agency that makes a thorough effort to provide the accurate product information divers need to dive safely. The industry still hides behind worries of potential liability. The concern is not so much that a diver will get hurt, but whether the manufacturer or agency will take the blame.

It's too damn bad. For all of us.



The Explorer's Club, that staid national organization whose members have traveled to the remote corners of the world in search of new adventures, has for its seventy-five year history remained a bastion of male chauvinism. Not one woman has been admitted. But this year the gentlemen brought themselves into the 20th century by admitting record setting diver Sylvia Earle and astronaut Kathryn Sullivan. The vote, 753-618, reflected the resistance by members who, one board member said, "are very conservative guys who are afraid women would change things."

Outside of the Hawaiian islands, it's pretty tough to find a bona-fide American dive resort. But Chicago's Berry Scuba has announced plans to convert Talley's Pro Dive Center on Florida's Crystal River into a full

blown dive resort, which will require converting two buildings on the property into bunkhouses for 20 divers. Though divers are probably delighted with the new development, we don't suppose the news will be well received by the endangered manatees, Crystal Springs' main attraction, who already are hassled by too many boats and too many divers.

If last month's article on the trials of treasure hunters didn't deter you from pursuing your fortune underwater, then you might care to pick up on this ad we discovered in the current issue of PADI's *Undersea Journal*:

*We are now recruiting 21 certified scuba divers and 3 certified Divemasters for a private treasure salvaging expedition planned for September 1981. Voyage will be in the Caribbean and consist of 15 day shifts at sea for rotating crews. Divers will earn \$100 per day plus housing and meals and comprehensive insurance policy. Divemasters will earn \$150 per day plus 2.5 percent commission of find. Operations will be six months duration with a break for Christmas holidays. All divers must be in good physical condition and be at least 18 years of age with valid certification. Only hard-working and safety-conscious divers need apply. Interested divers should contact:*

*Capt. Miguel Garcia  
Project Tri-Star  
Box 350, Punta Borinquen  
Aguadilla, Puerto Rico 00604*

Go for it!