

The Tiara Beach Hotel, Cayman Brac, BWI...

-- Grand Cayman Without The Cattle Boats

The fellow at the Cayman Air check-in desk in Miami was relaxed and chatty as he helped my buddy and me hoist our bulging duffels onto the scale. "Going diving?" he asked. "Yup," I said, "at the Tiara Beach." "You'll love it," he responded. Actually, it had been a close call between that and the new Brac Reef. On former stays I'd dived with Winston McDermott's Brac Aquatics. This time I wanted to try the new Peter Hughes operation at Tiara. "Which hotel do you like?" I queried. "Well," he said, not directly answering the question. "The Tiara is more ... uh ... tropical ... and the Brac Reef is rather ... citified, if such be possible on an island like the Brac."

Despite some shortfalls, I've always been fond of the Brac. On my first trip in 1981 I found much of Undercurrent's disappointed 1977 report still true. The dive operation was too casual, the gear schlepping and bumpy pickup truck trip to the marina too cumbersome, the uncharming rooms and boarding-house food at the Buccaneer too depressing. Nor was getting there half the fun. Planes left erratically. Luggage often trailed a day later. But diving was good, though the sites we dived were repeated too many times during week-long stays. By my next trip in 1983, things were perking up. The Divi Hotel operations had taken over the rundown but beautifully situated Brac Reef Hotel, renamed it the Tiara, and had begun major refurbishing.

Two years later, the changes are remarkable. One can get to Brac in an hour on a 727 from Miami. There are now three hotels, the brand new "citified" Brac Reef, the older but charming Tiara, and that old workhorse, the Buccaneer, for the budget-conscious groups. And, except for sojourners at the Buccaneer, no more heavy gear lugging and twice-daily truck trips.

On my first day, I strolled down to the dive shop to get the lowdown from manager Craig Burns (from Dive Bonaire) and chief divemaster Colin Tozer (from San Salvador's Riding Rock Inn). Peter Hughes was off tending to business at one of his many other enterprises. I flashed my C-card, signed a release, picked up weights and was off to the dock, just a few steps over the sandy beach that edges

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up to the hotel's rooms. Except for that first trip to the dock, I hardly laid a hand on my gear the whole week. Assisting divemasters Bunny and Norbert took charge of my gear and swiftly rigged up my BCJ and regulator to one of the tanks lined up in well-secured racks. Each day I would arrive at the boat to find my gear moved from overnight storage, hooked up and ready to go.

The boat chugged cautiously out the shallow channel promptly at 9 a.m. (On-time performance was common to every departure.) First stop: West Chute, a pleasant sloping wall at the west end of the island. Dives here had been in the log book from my first two trips, so I told my buddy to follow me. I knew the way. It was a fine dive, with an impressive sampling of all the life that abounds on Brac reefs -- hogfish, trumpets, black durgons, squirrelfish, angels, groupers, chromis, jacks, snappers, chubs, butterflies, and more -- plus, a glorious array of sponges and gorgonians. But no sharks and no truly big fish. Bottom time ran out long before air. As we returned, I was puzzled that I couldn't locate the boat. And with 100-foot visibility! At last I saw several other divers and tagged along. After a hundred yards it occurred to me that they didn't look so familiar after all. I surfaced, my buddy in tow, near a craft from Brac Aquatics. After a taxing surface swim back to the proper boat, Norbert said, "You gotta follow the orange tanks. Winston's people, they dive with every which ways colors."

Our next stop that morning was at Patch Reef, a collection of coral heads which turned out to be a macro heaven, one of the few places I found much tiny life. But here it was present in abundance. Every nook and cranny housed either cleaner or Petersen's shrimp, arrow crabs or crimson file shells. And there were generous numbers of petite, jewel-like fish, as well as an army of soldierfish and bigeyes patrolling under every ledge.

There is a pattern to a two tank Brac morning dive. One first visits a wonderful wall, whether sloping or a steep vertical drop, then after a minimal surface interval, takes a lazy dive on a pleasant shallow reef of either long ridges or impressively dense coral head patches. The afternoon dive is something in between. The terrain is similar to Grand Cayman, but the Caymanian cattle-boat, follow-the-leader rigidity of diving is thankfully missing. I wasn't ever aware of anyone checking out my diving skills, but on later dives I noticed that one of the divemasters (who was always in the water) rather discreetly observed all newcomers at least at the beginning of their first dive. Paired-up diving was obligatory, but tables management was left up to the individual.

It was only on that first morning that we could dive the north side of the Brac. Northwest winds blew up, and stayed with us the rest of the week. Just as on Grand Cayman, where such winds often keep divers off the north wall, boats must head for the more protected south side anchorages. After my experiences in previous years, I was afraid it would be "more of the same, but our boat hit new and unspoiled locations and Brac south walls seemed just as impressive as the wilder north shore. On one dive, called "Inside Out" because we had a choice between making a standard wall dive on the outside or an equally interesting dive

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on the backside of the wall crest, I did a little of both, drifting up from the wall to the interior reef through a stunning canyon. I was delighted by the contrasts between the marine life on the two sides, caused perhaps by differences in sunlight and currents.

Despite the rather typical late-winter windy weather, we were taken twice to Little Cayman, which for my money, offers some of the best diving in the Caribbean. The Island Fever was able to make the 18-mile trip in little over an hour. Our first stop was at Jackson Bight, where the wall starts slightly shallower than the walls on the Brac. Within moments of my descent I was treated to the spectacle of an enormous eagle ray making a lazy fly-by to check me out. I was constantly inspected by full-grown and juvenile barracudas, who circled within respectable distances. Large tarpon shimmered in the underwater sunrays. French and gray angels paraded by in pairs; queen angels were doing solo numbers. Brilliant queen triggers scooted away, while vast numbers of Bermuda chubs, creole wrasses, jacks and snappers schooled past, apparently oblivious. Each sponge seemed larger or more colorful than the last. A truly mind-blowing dive, as was a second in a shallower part of Bloody Bay.

Another day, back at a different part of the splendid Jackson Bight wall, I spotted a narrow rift breaking the steep face. Light behind it promised a possible access to an area atop the wall. I worried that the tunnel would not be wide enough for a safe pass-through, but it turned out to be a fine trip. Just as I emerged I saw spread before me a dense colony of garden eels, I settled on my belly and they soon peeped their heads back out of their holes, even the ones only five feet away.

While below, winds had changed abruptly. The boat had turned on its anchor almost 180°, and getting back onboard was a struggle, despite the fine ladder. For a diver in trouble, they deployed a long trailing line (even though we had no problem with currents) -- and always had a decompression line for their suggested safety stops (and two tanks with regulators hanging off at a ten-foot depth). It was on the very choppy return trip that I really appreciated the shelter and comfort of the well-designed Island Fever (although there was no head to accommodate these day long trips). The 36-foot diesel-powered craft is said to carry 20 divers in comfort, but when there were as few as 16, elbow and gear room was a bit tight. On the single day when 20 divers were present, they did charter another boat and split the group.

Yet among all this glory there were two or three dives that bordered on being bummers. Sites like Butterfly and Lounge Chair seemed sparsely furnished with moving things despite interesting canyons, tunnels, cuts and blowholes. Nothing stirring in the whole radius of view, save for a couple of yellowtails in the elkhorn off yonder. Sometimes my buddy and I exchanged our shoulder-shrug signal. "Are you as bored as I? Let's pack it in." My only other disappointment, as a photographer, was that many fish were too shy to approach, since they haven't been fed by divers. But now I face my own internal contradictions. I come here to be in the wild, and then I want to tame it. I suppose I should forego my photographer's ego in the excess and let the fish be.

Tiara Beach, Cayman Brac, B.W.I.

Star Chart:

| | |
|--------------------------------|-----------|
| Diving for Experienced Divers: | ★ ★ ★ ★ |
| Diving for Beginners: | ★ ★ ★ ★ |
| Snorkeling from beach: | 0 |
| Snorkeling from Boat: | ★ ★ ★ |
| Hotel | ★ ★ ★ ★ |
| Hotel Food | ★ ★ ★ ★ |
| Moneysworth | ★ ★ ★ ★ ½ |

★ poor, ★★ fair, ★★★ average, ★★★★ good, ★★★★★ excellent

Now for the hotel. I am quite taken by the Tiara Beach, although I recognize that the new Brac Reef might be regarded by many as an equally acceptable place to go for a week's getaway (though not by me). Tiara's manager since mid-1984 has been David Feinberg, formerly of the Flamingo on Bonaire. Barefoot and affable, David was always in evidence, playing the gracious host to divers and nondivers alike. During my stay all 33 rooms in the hotel were full, and two-thirds were nondivers. Activities have been added to appeal to landlubbers; there is now, due to dredging, a swimming beach beautifully landscaped with mature palms, as well as a swimming pool and a tennis court. Mopeds, bikes, windsurfers, a sunfish, paddleboats, island tours and snorkeling picnics are there to amuse. And there are "resort courses" taught by Colin and Craig; judging by the relaxed behavior of five students who joined us on one afternoon dive, they do a very satisfactory job.

My room, as were all, was spacious and simply furnished with tropical fabrics and woods. There was an air-conditioner but what with good cross-ventilation and the ceiling fan, I had no need for it. Maids kept the place squeaky clean. The dining room was largely open to the air and had a lovely "island" feeling with hanging plants, bamboo furnishings and more tropical fabrics. The food was most satisfactory. Breakfasts featured choices of juices

Is My Certification Useless?

Dear *Undercurrent*:

I received my scuba divers certification in August, 1985, by IDEA, the International Diving Educators Association. But, when I went to Tortola in the British Virgin Islands, the dive shop didn't want to accept my card. Is the training I've received as complete as it would have been with the better known agencies? Why doesn't IDEA advertise?

Diane Wall
Blacksburg, VA

Dear Diane,

Back in the '50s, those people who got certified usually did so through local clubs and organizations. In 1956, the Florida Skin Diving Association certified people in Florida. In 1976 the instructional arm of the FSDA separated itself and in 1980 this group incorporated itself in Florida as a profit-making association with the name International Dive Educators Association.

David Scroggins, the Director of IDEA, told *Undercurrent* that they certify 20,000 divers a year. Since 1956, 500,000 divers have been certified through FSDA and IDEA, Scroggins claims.

IDEA doesn't advertise in *Skin Diver* or elsewhere because, Scroggins says, that would only reach certified divers, who are not their market. But without advertising, their existence is not well-known outside of the south. If you write to Scroggins at IDEA, (P.O. Box 17374, Jacksonville, FL.

32245), he'll contact the Tortola shop and explain his program.

We can't comment about how well you were trained since we haven't seen you dive. We can say that we've seen poorly trained divers who had been certified by every training agency. In our view the most significant variable in training is whether you had a good, conscientious instructor who left you feeling confident when the course was over. If you did, then it doesn't matter what card you carry.

An IDEA card is not the only card that has problems. Los Angeles County has a small certification agency and people have reported problems with that card. Club Med won't accept PADI, NAUI or any of the U.S. cards. Unless you carry a Club Med certification card or the CMAS card (an international card), they put you through their own brand of workout before you can dive. To retaliate, some dive shops in the U.S. give the Club Med card the brush off and won't fill tanks for people who sport those cards.

Most charter operations today give little credence to a C-card. Some ask for a log book. Others require a check out dive to prove your skills. And most give close surveillance on your first dive just to see if you can do what your card claims you can. I'd recommend you carry a log book next time you go traveling. That will indicate your experience and that you're serious about what you do.

-- Ben Davison

and pineapple and papaya, then pancakes, French toast or eggs with sausages or bacon. (Or all of the above.) Lunches were simple affairs, sometimes served from the barbecue area on the beach. Sandwiches and fruit were sent to the boat on Little Cayman trip days. Dinners were buffets with a choice of a couple of entrees; during the week we were offered steak, grilled snapper, chicken curry, roast turkey, turtle stew, shrimp and prime ribs. Desserts were the likes of key lime pie, simple cakes, flan. Though not a complaint of mine, some guests found the food oversalted.

Perhaps the most charming and unique place on the Tiara property is the bar, which is out over the water, reached by a wide dock. A thatched roof serving area and the scattering of wood benches and glass tables is perfect for this isolated outpost -- a wonderful place to relax with a beer after a dive or a rum punch or a pina colada while watching the sunset or the moonrise. Without the bar, there'd be little to do in the evenings except to fiddle with one's O-rings, or snooze through a self-serving slide show on the other Divi properties in the Caribbean. The diving management is not at all integrated into the social life at the hotel. Too bad, because not only is it fun to sit around and schmooze with dive veterans of local parts when they're not "on duty," but the lack of this lays a feeling of impersonality on the diving.

At Brac's tiny outpost airport, I had a chance to compare notes with a few friends who'd put into the Brac Reef for the week. They had been pleased. Their rooms, while not quite as large as ours, were simple, but adequate and neat. The food -- also simple but adequate. They had made the same number of dives as I (except that they had been offered two night dives, in contrast to our one), and liked Brac Aquatics' operation and service. They too had gotten to Little Cayman twice. They appreciated the hotel's swimming pool and hot tub but the promised tennis court had yet to materialize. Those who had dropped by Tiara shared my feelings of the contrast: The Tiara is bamboo, palms, thatch and batik; the Brac Reef is television in the bar, formica and vinyl. Pricewise, it's difficult to make comparisons, because of a confusing array of packages offered, with many diving and meal options. My week at Tiara had been priced at \$964 each, and included seven nights, with all meals and beverages (no bar bill to settle at the end), and six days of morning and afternoon diving. A seemingly comparable package at Brac Reef ran about \$915 (per person, double) at that late winter season. Cheaper packages, with two-tank morning dives only, two meals only and pay-as-you-go bar tabs, were available at both places and they drop substantially

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in the summer. But they don't drop as far as the Brac Reef claims in an ad in the April Skin Diver. An unthinking copy writer (to give them benefit of the doubt), heralds a tab of \$249 for two people for 4 days, 3 nights, diving and airfare from Miami; if you were to call you would learn the price is \$249/person.

On my way back to Miami, I sat next to a woman who had been born on the Brac. She asked if I had seen any sharks. "No," I said, "Lots of barracudas, but no large and dangerous stuff." "Don't be so sure," she replied. She then recounted a chilling tale about a relative diving on the Brac 13 years ago who had been menaced by a large shark. Unthinkingly, he lashed out at the shark with his dive knife, whereupon the animal tore into his arm. Despite surgery, to this day he has little use of the limb. So that made two lessons from this trip: Don't follow the wrong color tanks. Never assume there ain't sharks out there.

Divers Compass: Try to book on one of the three-per-week 727s from Miami. It's vital to reconfirm return reservations.... Small boutiques at hotels, but no big-ticket shopping temptations.... Be sure depth gauge is perfectly calibrated; walls are deep, the chamber's far.... Water temps of 80°-82° make tropical suits or shorties a nicety.... Sanitation and water seem reliable.... Either hotel would be suitable for a group.... Reservations: through any good travel agent. Direct contacts for Tiara are Divi Hotels Exec Offices, 520 W. State St., Ithaca, NY 14850, (607) 277-DIVI. For Brac Reef: USA Sales Office, 5920 Rodman St., Hollywood, FL 33023, (305) 987-8880 ...

Drugs And The Diver: Part II

-- For Decompression Sickness, Nothing Works

In the last issue we presented the first installment of a two part series on how drugs affect divers. This is the second part.

This article has drawn heavily on the publications of two physicians, Dr. Kenneth Kizer, who is now the California State Director of Public Health, and Dr. Christopher Duecker. Duecker has recently published a fine book entitled *Scuba Diving in Safety and Health*, which may be obtained for \$11.95 from Diving Safety Digest, Post Office Box 2735, Menlo Park, CA 94062.

★ ★ ★ ★ ★

Drugs Used For Nondiving Conditions:

Most often it is the disease itself, rather than the medicine used to treat it, that affects diving safety. For example, in determining whether a person with epilepsy should or should not dive, the underwater effects of his *anticonvulsant drugs* are not important. The very presence of a convulsive disorder by itself makes diving unsafe. Medicines do not modify this truth.

Many similar examples can be mentioned. The patient with heart disease should not dive; *digoxin's* underwater effects are not the issue. Pulmonary disease makes diving unsafe, and this again is inherent to the disease, not the medicines

used in its treatment.

High blood pressure (hypertension) is a common affliction. Mild hypertension, without impairment of cardiac function, may be tolerable in sport divers. However, several of the medicines used in hypertension therapy may be dangerous under water. Sedatives have been discussed. *Diuretics* can cause excessive fluid loss and this may compound the partial dehydration seen with decompression sickness. Often divers neglect to drink enough to compensate for fluid loss associated with vigorous exercise while breathing dry compressed air. Electrolyte deficiencies not infrequently accompany diuretic use, and this may increase the risk of cardiac dysrhythmias. Some of the newer *antihypertensive drugs* limit cardiac response to exercise. This restriction of exercise capacity may be dangerous in diving. Cardiac output sufficient for daily activity may be inadequate in rough sea. These drugs have not been investigated for possible pressure interactions.

The Undersea Medical Society has found that questions about *oral contraceptives* and diving are the most frequent ones asked. Some fear has been voiced because of the association of oral contraceptives and vascular thrombosis. This risk is one that deserves careful consideration. Unfortunately, there are no data in the literature on the effects of oral contraceptives in the hyperbaric environment.

The Lingering Effect Of Marijuana

Although everyone advises divers not to go down while stoned on marijuana, most smokers believe that after the effect wears off -- seemingly in two to three hours -- diving is safe again. Here's new evidence that suggests that's not true at all.

Science News reports that pilots who get high on marijuana the day before taking control of an aircraft may have difficulty landing the plane safely, even though they feel alert and normal.

"Furthermore, there is a need for concern about the performance of those entrusted with complex behavioral and cognitive tasks within 24 hours after smoking marijuana," says J.A. Yesavage of Stanford University.

The investigators recruited 10 experienced private pilots and trained them on a computerized flight simulator landing task. All subjects had smoked marijuana before, but none was a daily user. They abstained from the drug for the test period, which began with a baseline flight. Each then smoked one joint, comparable to a strong social dose. The landing test was repeated one, four and 24 hours later.

The worse performances compared with baseline occurred one hour after smoking. But 24 hours later, the pilots still experienced significant difficulty in aligning the computerized airplane and landing it at the center of the runway. Their problems were so significant that in actual flight, said the researchers, "such errors can easily lead to crashes." The pilots themselves, however, reported no awareness of any marijuana after effects on their performance, mood or alertness.

When one looks at the number of unexplained diver deaths, one can only speculate about whether the errors of dead divers might somehow be associated with heavy partying -- and heavy smoking -- the night before. The data from this study clearly suggests that if you're going to be a safe diver, fully in control of your faculties, then you had better stay away from grass a day or two before a dive.

Many divers get diarrhea when they travel. Recent studies have shown that large doses of Pepto Bismol may have a positive effect on eliminating diarrhea. Pepto Bismol is relatively benign and should have no effect on one's capacity to dive.

Dr. Ken Kizer looked at prescription drugs for treating diarrhea and recommends against some basic drugs normally gotten through prescription: diphenoxylate HCl with atrophine (Lomotil),

paregoric, and loperamide (Imodium) contain narcotics or have narcotic-like effects. Vibramycin, a tetracycline antibiotic, has been shown to have some beneficial effect on diarrhea in studies, but it produces a phototoxic reaction in many people once they enter the sun. They get burned and blistered. Trimethoprim combined with sulfamethoxazole (i.e., Bactrim or Septra) is preferred, although it too can cause phototoxic reactions in some people.

Drugs Used To Treat Decompression Sickness And Embolism:

So far, no drugs have proved useful in treating decompression sickness, although many divers believe that an aspirin or two helps protect them. There is no evidence to bear this out. Chris Duecker writes that "particular interest has centered on aspirin's ability to interfere with blood platelet aggregation. This aggregation, initiated by gas bubbles, may be important in decompression sickness. Laboratory results were encouraging, but in human subjects aspirin has failed to modify platelet changes caused by decompression sickness. So aspirin has not been shown effective in the prevention of decompression sickness.

Oxygen is not a drug, but it has been shown effective in treating decompression sickness and air embolism. More and more boats are becoming equipped (and should be equipped) with on-board oxygen tanks for the treatment of injured divers.

Conclusion:

The effect of most drugs on divers is simply not known. They have not been tested under pressure and one can only speculate what might occur should a diver using certain substances descend to 100 feet. Chris Duecker serves up these basic principles to remember if you find it necessary to take certain drugs and dive.

- *effects tolerable in ordinary activity may be dangerous when diving.
- *drug action on the surface may be changed unpredictably under water.
- *individuals vary in their responses to drugs.
- *no drug should be used under water without it first being used on the surface.
- *when accepting a prescription medicine, be certain that the physician knows you will use it under water in vigorous, stressful activity.
- *when choosing a nonprescription drug, read the label carefully.
- *do not exceed the recommended dosage.

If you follow these rules, you should be able to have diving completely in control, without physiological or psychological affects from the drug you take.

Are The Navy Tables Too Liberal? Part I

-- A Comparison Of Nine Decompression Tables

Making a no decompression dive following the U.S. Navy Tables is for many confusing enough. But if you have been paying attention to the changes and additions in dive tables, confusion can turn to pure frustration.

Today at least eight decompression tables are available in the United States and more are being developed. When combined with multi-level dive theories, the range of decompression or no decompression decisions that one can face is boundless.

Two decompression computers have been developed for sport divers -- neither follows the U.S. Navy Tables -- and two more are expected to be on the market shortly. Whether these computers are accurate is one question (the users believe they are), but perhaps the fundamental question is just what set of tables do they follow and are those tables valid?

We've asked a true expert on tables, Karl Huggins, who is with the Sea Grant Program at the University of Michigan and has himself developed a set of tables, to give us a comparison of the tables currently being used in the United States. Here is his report:

★ ★ ★ ★ ★ ★

Imagine being a dive master with a boat load of divers who have just finished their first dive of the day. Every diver informs you that his dive profile was 50 feet for 49 minutes. However, after the divers work their tables, with no fudge factors, Repetitive Groups of "G", "H", "J", "E", and "F" are reported. And to make matters worse no one has made any mistake! Which diver is correct?

In fact all the previous results can be correct if the divers are using tables other than the U.S. Navy tables that also use repetitive group letters for the computation of repetitive dives.

It all used to be so simple. Ever since the beginning of sport diving in the 1950s the U.S. Navy Tables have been the standard in this country. Now, however, there is movement away from this standard. There are recommendations for New No-Decompression Limits and other tables which are being used by a growing number of divers. To further complicate the issue there are numerous rumors that the U.S. Navy is developing a new set of decompression tables to replace the present ones. What is one to do?

The Present U.S. Navy Tables

Since the U.S. Navy Tables have been around for so long, why are they now being forsaken by many divers in favor of other tables?

The present U.S. Navy Tables were designed for military use, not for sport divers. The Navy considered some incidence of decompression sickness acceptable (although, contrary to some opinions, there is no built-in decompression sickness rate in the present tables), because they were concerned with job efficiency and had recompression chambers available to immediately treat any diver who might develop decompression sickness.

Navy diving operations do not correlate well with sport diving. It is rare to find an on site recompression chamber at a sport diving location. Most importantly the recreational sport diver is not concerned with job efficiency while diving, just relaxation and enjoyment. If, by using the U.S. Navy Tables, he is being exposed to unacceptable risks, then more conservative No-Decompression Limits and tables should be considered.

If this is the case then why are the Navy tables the standard of the community? Basically they were all that were available when the sport started. As New No-Decompression Limits and tables have been developed and released, over the past few years, many sport divers have been assimilating them in order to add further safety in their diving.

Other Tables

The British Royal Navy Tables and the Swiss Tables have been available to sport divers for some time. They are more conservative than the U.S. Navy Tables and have been adopted by various groups. New No-Decompression Limits and Decompression Tables have been made available to sport divers in recent years. These, too, are more conservative than the U.S. Navy Tables and represent additional safety to divers.

British Royal Navy Tables

The British Tables have been used for years by many sport divers and are taught by the British Sub Aqua Club, the Brit's primary training organization. They are very conservative and offer less flexible repetitive dive procedures. Their depths are presented in meters of sea water (msw) as opposed to feet of sea water (fsw). The tables have not been officially recognized by American certification organizations.

Swiss Tables

The Swiss Tables were developed by the Laboratory of Hyperbaric Physiology in Zurich. They have been undergoing various adjustments over the past few years to accommodate new data. The

Depth Gauge Testing

Dear *Undercurrent*:

I was most happy to see your comments about the Dive Tech, HPC depth gauge tester in your January issue.

As you can imagine the manufacturers of gauges are not happy with the advent of the HPC. Already the stirrings of discontent (would malcontent be more appropriate?) are evident. In Australia the diving consumer has now become more discriminating and many shops with the HPC are sending back their stock of depth gauges (as you are aware, many of the new ones have an error factor) to the distributors and are asking for accurate gauges to sell in place of the inaccurate ones that are being tested.

A number of things are being learned about testing gauges in water as is done with the HPC. When a gauge is tested under air pressure, any temperature change in the chamber during the test will cause significant changes in the readings. As you are no doubt aware, such temperature variations are normal when air is compressed (heat) and then decompressed (cold).

Even subtle temperature changes can cause a significant error. For example, if the gauge is locked into the chamber after all components (testing chamber and depth gauge) reach an ambient temperature of 78°F and then, maintain-

ing this ambient temperature the test gauge and pressure gauge are put under pressure to equal exactly 33 feet of sea water. When the chamber temperature is elevated to 88°F the readings on the master gauge and the depth gauge being tested increase to 42 feet of sea water.

As you can see, a test incorrectly carried out in an air chamber can cause readings which could seriously disadvantage the diver.

As more is learned of this effect I have no doubt that a great debate shall occur as to which testing procedure is appropriate for depth gauges. I have no doubt that those in the industry who are unhappy with widescale gauge tests shall do their best to cause such testing to cease. A rather strange attitude to me really.

If I were a gauge manufacturer I think that good marketing sense would be to honestly list the limitations of mechanical depth gauges and suggest that, because of the comparatively modest price of these gauges, they should come to be regarded to have a planned obsolescence lifetime. That would make for consumer awareness, safer diving and better profits for the companies distributing the gauges. I guess we shall have to wait and see how the industry shapes up.

Robert L. Sands, President
Dive Tech, Inc.
Kempsey, Australia

present tables, which were published in 1983, consist of five sets of tables to be used at various altitudes. The No-Decompression Limits and decompression schedules on the whole are more conservative than the U.S. Navy Tables. The depths in these tables are also presented in meters. The repetitive dive system for these tables utilizes the same type of Repetitive Group and Surface Interval Table system as the U.S. Navy Tables.

The Spencer No-Decompression Limits

In 1976 Dr. Merrill Spencer of the Institute of Applied Physiology in Seattle published a report recommending new No-Decompression Limits based on the Doppler Ultrasonic Bubble Detection work he was performing. He found that divers who were exposed to the U.S. Navy No-Decompression Limits developed large counts of venous gas emboli (VGE) or "Silent Bubbles." These bubbles are thought to be

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nitrogen bubbles which have been released from solution during ascent. Further studies by Dr. Andrew Pilmanis at the Catalina Marine Science Center confirmed the presence of high degrees of silent bubbles following "No-Decompression" dives in open water. Pilmanis found silent bubble formation in all his subjects who were exposed to 100 fsw for 25 minutes.

The Huggins Tables

In 1981 the author computed a set of Repetitive Dive Tables based on Spencer's New No-Decompression Limits. The tables, presented in the same format as the U.S. Navy Tables, have not been officially tested. However, they are more conservative than the U.S. Navy Tables when they are used to compute No-Decompression Limits and Repetitive No-Decompression Limits.

The Bassett No-Decompression Limits And Tables

During his last years with the U.S. Air Force Dr. Bruce Bassett was working on the problem of flying after diving. He found that the U.S. Navy model produced a large amount of silent bubbles in his subjects. Based on these results he modified the allowable supersaturation ratios in the U.S. Navy Decompression model and published them with his recommendations for flying after diving. The supersaturation ratios in a decompression model directly affects the No-Decompression Limits. Using these new ratios Bassett computed his recommendations for new No-Decompression Limits.

Based on Dr. Bassett's recommendations on modifications to the No-Decompression limits a set of repetitive dive tables was produced by John Knight and John Lippmann in Australia. These tables are a rearrangement of the U.S. Navy tables in order to accommodate Dr. Bassett's suggestions on No-Decompression limits and the use of safety stops.

DCIEM No-Decompression Limits And Tables

Over the past few years the Defense and Civil Institute of Environmental Medicine (DCIEM) in Canada has been modifying their decompression model based on Doppler studies. Early in 1984 they

released their recommendations for new No-Decompression Limits.

In September of 1984 DCIEM released their new No-Decompression and Decompression Tables. These tables have a different format than the present U.S. Navy Tables and may require the use of a small calculator to compute repetitive No-Decompression Limits. The tables also include corrections for altitude diving.

These tables are based on hundreds of man-dives that were evaluated using Ultrasonic Doppler Detection. The primary goal of DCIEM's work was to upgrade their decompression model which is programmed into their decompression computers.

The Pandora Dive Tables

The Pandora Tables, are designed for the Archaeological Pandora Project in Australia. They are claimed to be "one of the most thoroughly controlled field tested tables of any currently accepted sport diving table." The tables are basically a modification of the U.S. Navy tables. All of the entries in the No-Decompression table deeper than 30 fsw have been slightly reduced. The major change is in the way repetitive dives are handled. The Repetitive Group designators are slid to the left for repetitive dives. The location of Repetitive Group F (for the first dive) is replaced by Group G for the second dive and Groups H and I for the third and fourth dives respectively.

The Jeppesen No-Decompression Limits

With the increasing number of recommendations for shorter No-Decompression Limits Jeppesen Sanderson, publishers of the "Open Water Sport Diver Manual," decided to include a more conservative recommendation in their manual's fourth edition. They presented the recommendations on the present U.S. Navy Tables by shading in the area on the table which fell within Spencer's New No-Decompression Limits, in order to fit the recommendations to the present numbers on the table at which they ended up at some depths, with No-Decompression Limits even more conservative than Spencer's.

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TABLE 1
COMPARISON OF NO-DECOMPRESSION LIMITS
No-Decompression Limit (Minutes)

| Depth (FSW) | U.S. Navy | British* | Swiss* | Spencer | Bassett | DCIEM | Pandora | Jeppesen | NMRI 1% |
|-------------|-----------|----------|--------|---------|---------|-------|---------|----------|---------|
| 30 | None | 232 | 300 | 225 | 220 | 380 | None | 205 | 170 |
| 40 | 200 | 137 | 120 | 165 | 120 | 175 | 198 | 130 | 100 |
| 50 | 100 | 72 | 75 | 75 | 70 | 75 | 98 | 70 | 70 |
| 60 | 60 | 46 | 53 | 50 | 50 | 50 | 58 | 50 | 40 |
| 70 | 50 | 38 | 35 | 40 | 40 | 35 | 48 | 40 | 25 |
| 80 | 40 | 27 | 25 | 30 | 30 | 25 | 37 | 30 | 15 |
| 90 | 30 | 23 | 22 | 25 | 25 | 20 | 27 | 25 | 10 |
| 100 | 25 | 18 | 20 | 20 | 20 | 15 | 22 | 20 | 8 |
| 110 | 20 | 16 | 17 | 15 | 15 | 12 | 16 | 15 | 7 |
| 120 | 15 | 12 | 15 | 10 | 12 | 10 | 11 | 10 | 5 |
| 130 | 10 | 11 | 12 | 5 | 10 | 8 | 6 | 5 | 5 |

*Metric conversion to next greater depth

Comparison Of The No-Decompression Limits

As it can be seen in Table 1 most of the other No-Decompression Limits are more conservative than the U.S. Navy limits. These new limits tend to be in close agreement at depths greater than 50 fsw even though most were determined separately. This indicates that the new No-Decompression Limits may represent a more acceptable range of No-Decompression Limits for sport divers.

New U.S. Navy Tables

The U.S. Navy is working on a new set of tables. In fact, work is being done by two separate groups: the Navy Experimental Diving Unit (NEDU) and Navy Medical Research Institute (NMRI).

NEDU E-L Algorithm Project

For the past five years NEDU has been developing a Decompression Model and Algorithm called the E-L Algorithm to program into their Underwater Decompression Computer, used with their constant partial pressure of oxygen closed-circuit mixed gas system. This model assumes that nitrogen is absorbed by tissue groups at an exponential rate and discharged at a slower linear rate. Thus surface off-gassing is slower and residual nitrogen levels are higher for repetitive dives.

According to Commander Thalmann of NEDU, there is no plan to use the E-L Algorithm to calculate a set of new U.S. Navy Air Decompression Tables. The Navy believes that the current No-Decompression Limits are "fine" for Navy operations. Even if the E-L Algorithm is used to generate air tables, the model is in many cases less conservative than the present U.S. Navy Tables. However, repetitive dives would be more conservative. If the model were used to generate new tables it would take

approximately two years to test the tables and approve them for release.

NMRI Maximum Likelihood Method

The NMRI method is a new approach to the development of Decompression Tables. They are looking at decompression sickness as a probabilistic event depending upon the "dose" (depth/time exposure) produced from the dive profile. Using statistical models they have developed tables with a 5% and a 1% decompression sickness probability. High priority missions could make use of the 5% tables because of the need of greater in-water efficiency. Lower priority operations could make use of the 1% tables.

Donald Chandler, Deputy Director of the Hyperbaric Medicine Center at NMRI, stated last year that the tables, at that time, needed to be submitted to the medical review panel for approval of the tables for testing. Following this approval the tables would be sent to NEDU for testing and validation, a process that would take at least two years.

If and when these New U.S. Navy Tables become available, will this apply to the average sport diver? Just like the present U.S. Navy Tables, it must be remembered that these tables are being developed for military use and that the Navy is concerned primarily with their diving operations and not the activities of sport divers. Before the sport diving population wholeheartedly accepts a new set of Navy tables we must ask, "are these tables safe enough for the average sport diver, our diving practices and dive locations?"

Which Tables Should We Use?

The U.S. Navy Tables are still the "standard" of the sport diving community in this country. All the national certifying agency's standards use the U.S.

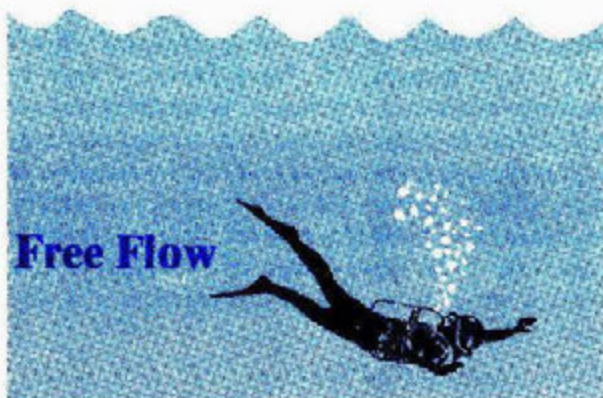
Navy Tables in teaching decompression procedures in basic classes. Failure to do so may leave an instructor open to adverse legal consequences. A question to ponder is: what happens if an instructor teaches only the U.S. Navy Tables in class (with none of the newer recommendations) and a student develops decompression sickness while following the Navy Tables. Is the instructor then liable for not giving out new No-Decompression Limit recommendations that are available to the sport diving community? I do not know!

Diving is in a transitional period. The standards of the past are being replaced. The procedure that I recommend, and is practiced in the University of Michigan scuba program is that the U.S. Navy Tables are taught as the foundation for working decompression problems. In addition to the U.S. Navy Tables, more conservative No-Decompression Limits are then taught as the limits that should be followed in order to increase the student's diving safety.

I also believe that instead of waiting for a new set of "Sport Diving Tables" to appear magically we should encourage the certifying agencies to work together with diving physiologists, decompression experts, and the Undersea Medical Society to produce a set of tables that are designed for the Sport Diving Community, not the military or commercial diving population.

Note:

There are no doubt many other tables available to the sport diver which were not mentioned here. I apologize if I have omitted anyone's favorite set of tables. If you know of any other tables being used by sport divers I would find them of great interest. Information on, or copies of, other tables can be directed to me through the Michigan Sea Grant address listed in the accompanying sidebar.



Tables Available From:

BASSETT TABLES

R. J. Knight Pty. Ltd.
80 Wellington Parade
East Melbourne, Victoria 3002
Australia

DCIEM TABLES

DCIEM
1133 Sheppard Ave. W.
P.O. Box 2000
Downsview, Ontario M3M 3B9
Canada

HUGGINS/SEA GRANT TABLES

Michigan Sea Grant
Publications Office
2200 Bonisteel Blvd.
Ann Arbor, MI 48109

JEPPESEN TABLES

Jeppesen Sanderson, Inc.
55 Inverness Drive East
Englewood, CO 80112-5498

PANDORA TABLES

Dive Tech Inc.
Kempsey
Australia

BRITISH TABLES

British Sub Aqua Club Manual

SWISS TABLES

In:
Decompression - Decompression Sickness
by A. A. Buhlmann
Available from:
Springer-Verlag Publishers, New York
Best Publications

The AM-1 Personal Diving Computer got a lot of play in the diving industry a couple of years back, but we didn't find much use for what was little more than a hand-held calculator that couldn't perform many of the functions that were truly useful to a diver (see *Undercurrent*, April, 1984). No matter. The company that marketed it, American Scubatronics, has disappeared into the depths. Several angry readers have written us saying they sent checks for the purchase of the device and the checks were canceled, but no computer ever arrived. We did our best to track down American Scubatronics but got nowhere. We wish we could help.