

undercurrent®

THE PRIVATE, EXCLUSIVE GUIDE FOR SERIOUS DIVERS

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Critical Review Of Worldwide Diving:

Reports From Our Readers

What can be more disappointing than to plan a dream dive vacation for months, only to have the trip turn out to be a complete bust? That's what happened to me in 1973. After careful research, I selected a small Jamaican resort that sounded appealing, and was angered and disappointed to discover that the articles that I had read bore no relation to the inferior realities of the resort. This experience spawned *Undercurrent*. One of the greatest rewards of writing reviews is the knowledge that we have steered thousands of divers away from inferior resorts to diving experiences where their expectations are fulfilled, and often, surpassed. Although 99% of the time our reviews are completely accurate, we have goofed, and reader input helps correct any errors we make and also updates our reports (which is especially necessary in view of the upheavals in management, etc. that occur at resorts and greatly affect their quality).

To keep our objectivity intact, we ask readers periodically to let us know of their traveling experiences, and those experiences are printed in this issue. In some cases readers have updated our reviews, in other cases they have provided us information about resorts and areas that we have never visited. We have sorted through the hundreds of questionnaires and letters received during the past six months, and take this opportunity to share our readers' views with you.

C.C., Travel Editor.

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GRAND CAYMAN: More divers fly to Grand Cayman for vacations than to any other diving mecca, and no wonder: the water is clear and warm, the North Wall is exciting, and a wide range of fish and coral provide an infinite array of good dive sites. We reviewed Cayman in early 1978. This is our reader update:

Spanish Bay Reef: We're deeply disappointed to learn from our readers that what we found as a first-class dive resort has apparently declined rapidly. Although some travelers have enjoyed their stay (G.H. Young of Oklahoma City, writes that in August he found "good people, good food and good diving--a professional operation"), most are not complimentary. Ellen Murphy of Augusta, Kansas, writes that forty divers had to make-do with one boat, so they ran split schedules to reach the close (but not the best) reefs. Her group overlapped with the people enrolled in the Churches' photography course (which is run several times a year), and said they indeed became second-class citizens then; she got ten boat dives in a full week. C.B. Bell, a Bradenton, FL M.D. said the diving, was "quite disorganized" in June and in July. Bernard Kaplan, M.D., from Alexandria, LA, wrote "unfriendly new management. . .paid for unlimited diving, but had difficulty getting a third tank. . .did not take us to the best sites (Bob Soto's operation did better). . .friction between management and dive guides." Perhaps it is best summed up by one respondent who prefers to remain anonymous: "Since your review it has been downhill all the way. The delicious buffet lunches are now spartan. Dinners are no longer cordon bleu, as they once were. The telephones have been disconnected. It is now a second rate operation with poor management and unreasonably high prices."

When Undercurrent reviewed SBR, our article was subtitled "The Best of the Lot." That has appeared in a number of SBR advertisements, misleading divers who trust our objectivity. Our lawyers have written the SBR management to discontinue using Undercurrent in their advertisements. We permit entire reprints of articles, with the date of the review, and we're angry that nearly two years later people are being lured to the resort with the good name of Undercurrent.

Sunset House And Casa Bertmar: Just down the street from each other, these motel style structures remain the best budget diving destinations on Cayman. There's decent beach diving so one can get 3-4 dives in daily and 7-foot moray, Waldo, is an unusual attraction for divers from either hotel. One can expect decent accommodations (better at the Sunset House), hearty meals and similar diving experiences at both, however it's all in the eye of the beholder. For example, Marjorie Bank from Atlanta writes of her mid-summer visit to Casa Bertmar:

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"The divemaster has complete control, but allows experienced divers carte blanche; good site orientation, caters to underwater photographers; dive shop manager very competent and warm; entire operation family oriented; the ambience is conducive to lasting friendships. A tremendous value." Then there's G.E. Smith (no address given) who says of his August trip: "Not for serious divers or photographers... little freedom to deviate for the experienced...they changed the dive schedule without informing everyone and I missed the boat; when I complained the divemaster harassed me and the owner got angry." Readers--you figure it out. Our conclusion is that there are inconsistencies in any operation, and although our visit here in 1978 led us to prefer the ambience of the Sunset House, both seem to cater well to the budget-minded.

Bob Soto: The Diving Lodge is as seedy as ever, and while Soto's operation on 7-mile beach gets the approval of most novices, experienced divers are not impressed. L. DeFuria of Pompano Beach, Florida, writes that after reading of Soto in dive magazines for years, he was disappointed to find "the dive shop run down, sloppy, and the help slow and barely courteous." Tom Carr led a group from his Richmond, Virginia dive shop in August and reports: "Soto did not live up to his publicity; the dive shop had nothing we needed; rental lights failed; 3000 psi tanks were rarely filled above 2000 psi and some only to 1700-1800; boat broke down two of the five days there; divemasters bitched all the time about something."

Beach Club Colony and Scuba Cayman: For divers who want accommodations on a 7-mile beach, this is a much better option than the Holiday. As for the dive operation, R. Woods of Aspen says "I can't say enough nice things about guides Clinton Ebanks and Wally Rivers; they give everyone a great diving time."

Bermuda: Sub-tropical summer and fall diving, but full wet suits otherwise. The island is pretty, pleasant and pricey, and convenient to easterners. Overall diving is equivalent to average Caribbean diving, but shallow water wrecks add appeal. Sonesta Hotel is the big advertiser for diving, but Deborah Williams of Holland, NY, writes: "it is not a helpful operation. . .likes to herd people in groups." Lloyd Hirsch (Putnam Valley, NY) says "Bermuda is beautiful but the dive operation at the Sonesta just packs the novices into a raft and takes them to the same reef that they took them to the day before." Experienced divers should seek out Dave McLeod's operation at the Somerset Bridge Hotel. (Continued in the November/December issue.)

Those Little Mentioned Causes Of Diving Fatalities

Part I: When Will We Know How To Save Ourselves?

Last month, *Undercurrent* concluded a three part series on "Why Divers Die," detailing the research of the University of Rhode Island National Underwater Data Center. We presented a number of cases describing the cause of death, hoping that the reader, by understanding the range of accident possibilities, will reinforce the normal caution he exercises while diving.

But a closer look at these cases—and a close look at other data published previously in *Undercurrent*—reveals to us glaring limitations in our understanding of scuba fatalities. From the Rhode Island study we may learn the so-called cause of death—lost under the ice, drowning, embolism, tangled in kelp—but it is not necessarily *this* cause of death that will help us end the tragedies. What we really need to know is the *cause of*

the accident that preceded the death. Why did the diver get himself into the position he did which led ultimately to his death? In so many cases there seems to develop a state of panic in which the diver makes a decision which proves erroneous and he does not save himself. The industry labels the fatal accident "diver error" and chalks up one more death for which we believe the diver himself was totally responsible.

No doubt existentialists would argue that an individual has full responsibility for his life and for his death. It follows, then, that a diver too is ultimately alone in his responsibility and any diver, faced with an emergency and hovering on the verge of final panic, understands what it indeed means to be alone.

But we must be—and that means the entire industry

DACOR Recalls PACER Regulator:

Purge Button May Stick

Dacor Corporation has instituted a voluntary recall of their PACER regulators. According to Dacor President Sam Davison, a diver in Florida pushed the purge button while beneath the surface and the button stuck, causing the regulator to freeflow. The diver swam to his buddy to use his octopus regulator, and both divers safely rose to the surface. The diver informed Dacor of the problem.

Davison told *Undercurrent* that they could replicate the problem on only one regulator in a test of 1,000 regulators in the factory. The front cover of the PACER had been bathed in acid for cleaning prior to chrome plating. The acid bath weakened the cover structure, permitting the button to stick on some devices. Davison said that the problem would not cut off a diver's air supply, but it could cause a freeflow which "would empty a 71 cubic foot tank in 3 minutes and 40 seconds."

All PACER regulators shipped from the Dacor factory prior to August 1, 1979 are affected by the recall. All PACER owners who believe they have a faulty unit should take it to their nearest Dacor dealer for free repair or, if no dealer is nearby, return it to the factory (161 Northfield Road, Northfield, IL 60093).

The Consumer Product Safety Commission told *Undercurrent* that Dacor has informed them of the voluntary recall and that the federal government agency would be conducting its own evaluation.

U.S. Divers Recalls Calypso Regulators:

First Stage Problem May Cut Off Airflow

The U.S. Divers Corporation has instituted a voluntary recall of model 1083 Calypso J, 1084 Calypso IV, and 1084 Calypso VI regulators.

U.S. Divers President John Cronin told *Undercurrent* that the high pressure seat in the first stage of the regulator could move from its normal position and restrict or shut off the air flow to the diver. U.S. Divers has designed a new part to overcome the problem and divers owning the regulator may return it to any U.S. Divers dealer for free repair.

U.S. Divers learned of the problem when informed of a malfunction of a rental regulator in a dive shop. They were able to replicate the malfunction in their laboratory, determined that the problem could indeed be hazardous, and informed the U.S. Consumer Products Safety Commission of the recall.

U.S. Divers has been marketing the Calypso since 1971, so, in their words, a "substantial number of regulators is involved." The company says that "consumers are warned to immediately stop using these regulators." Additional information may be received by writing U.S. Divers at 3323 West Warner Ave., Santa Ana, CA 92702.

Scubapro Recall?

Rumor is Ridiculous

With two major manufacturers involved in recalls, normally unimpeachable sources told *Undercurrent* rumors are that Scubapro too has a recall coming.

We called Scubapro President Dick Bonin to check. "Well," he said, "those are only rumors and they're just untrue. I don't know of any incident or any reason whatsoever for us to institute a recall of any of our regulators at this time."

So, not only does the PACER and Calypso freeflow, but so do the rumors.

must be—concerned with the events that leads the diver to his panic—the state which precedes and perhaps even seals his death. Were there circumstances seemingly extraneous to the so-called cause of death which, once analyzed, can be viewed as contributors? Were there factors which may have pushed an otherwise sensible diver into panic and therefore into bad decisions that failed to save him? Does the industry inadvertently overlook ingredients in fatalities which deserve careful scrutiny by those who wish to increase diver safety?

We think so.

During the four-year history of *Undercurrent*—and in the prior multi-year diving history of the staff and associates—we have never heard a single voice from anyone with an economic stake in the industry acknowledge that his product, that his training methods, or that his ideas could have made the slightest contribution to the fatality of a diver. On the contrary, we have listened to these people bend over backwards to explain in great detail why a product or procedure implicated in an accident or fatality simply couldn't have contributed. After all, they say, the diver simply screwed up.

At a very minimum such responses are frustrating, but they're to be understood. It would be naive to expect these people to jump to the fore, volunteering how they might have had some indirect effect on an accident or an injury. But by denying categorically the connection, the industry in effect denies that there may be problems yet to be solved. And indeed, there are problems.

We intend to write a two part series describing issues we believe sport divers must seriously contemplate if they are to increase their own safety. We will also suggest means by which the industry might improve its own practices. In this issue we will discuss diver training and the sport diver's ability to rescue himself in an out-of-air situation without relying on his buddy. In the next issue we will

discuss equipment.

Diver certification and training

If there is a single skill that most divers have not perfected when they finish their training courses, it is the skill of saving their own lives when they are out-of-air at depth. Nearly all basic courses, regardless of the certifying agency, emphasize buddy breathing (or now the use of a buddy's octopus rig), a skill that requires a dependable buddy who has air and is willing to share it. When looking at the fatal diving cases, it is clear that relying on another diver simply didn't work. That's not surprising.

We must first realize that divers who are presumably in pairs spend a great deal of time apart from each other. Some become purposely separated, but most lose each other temporarily, becoming separated by a rock or a coral head, disappearing in kelp or the hull of a ship, or drifting too far apart when the visibility is low. Then, when a frightening event occurs, a diver looks for his buddy and he is nowhere to be seen. The resulting panic strikes quickly and the diver who undertakes an emergency ascent must risk a serious accident.

But even if the out-of-air diver can find his buddy before he panics, it could be that his buddy too is low on air and is unable to provide much assistance. And where the buddy can assist, there are cases where he fails to: the buddy may panic, the buddy may be incompetent as a rescuer, or he just may outright refuse the kind of aid required, electing instead to save himself. In many, many cases, the deceased diver was clearly on his own—and being on his own could not save himself.

Surely, learning buddy breathing (just as hoping to rely on a buddy's octopus) is critical and the skill should be taught. But too often for the out-of-air diver, buddy breathing is inapplicable or inadequate. Too often the only solution is for the diver to head to the surface alone. But, the Rhode Island data demonstrates that many divers simply don't know how to do that properly; the final proof of their lack of self-rescue skills is their death certificate.

Have no doubt, though, that hundreds, perhaps even thousands, of divers save themselves each year. But, do one out of ten emergency ascents result in injury or death? One out of 50? Do divers make it easily from 25 feet, barely from 50 feet, and hardly ever from 75 feet? And of those who are lucky enough to save themselves—those who probably were making the first emergency ascent of their diving career—do they dive again?

We strongly suspect—and scores of conversations with divers help verify this—that few divers who graduate from basic training have received adequate instruction in emergency ascent techniques. Every training agency teaches it to some degree, so all students, if the instructor offers a complete course, have read about it and heard their instructor lecture on

fundamentals such as how one must exhale continuously on the way up. Most trainees have sat in five or ten feet of water and undertaken either short or simulated ascents, and many have been taken into open water for one or two carefully controlled ascents, accompanied by an instructor, from 25 feet or so.

Emergency Ascent: A Special Case

On February 4, a Florida diver was treated in the Key West recompression chamber for chest pains after his CO₂ cartridge cord caught on a rock and inflated his BC at 90 feet, causing a rapid and uncontrollable ascent. Although the diver tried to dump his BC on the way up, he was unable.

This accident illustrates that even if a diver is so cautious as to never run out of air, there can be situations in which he must be able to apply emergency ascent skills to surface without injury. In this case, the diver obviously had to exhale the entire way—while he furiously tried to bleed his BC—but if he was well-trained in emergency ascent he also could have flared by turning nearly vertical in the water and spreading his arms and legs to slow his ascent.

We don't know what this diver did, but he's lucky to come out with a minor, treatable problem. Although CO₂ cartridges are being used less, there are plenty of cases where automatic inflators fill a BC inadvertently. Could you handle this kind of an emergency?

None of this training simulates a real out-of-air situation, however, where the diver is alone, does not have air on his back if he gets in trouble, and does not have someone standing by to help. The training is devised mainly to give a diver an idea of what he must do should he ever find himself out of air and by himself. So later, should that diver run out of air at 50 or 75 or 100 feet and he must begin an emergency ascent, it will in fact be the *first* he has ever tried. He has not developed an automatic response—a set of procedures he activates without thought. Instead, he must recall what his instructor has told him, try to remember the simulation he tried in training (when open water diving was so new to him that he was in semi-shock throughout) and hope it all comes together enough to get him to the surface alive.

The diver with little emergency ascent training may not have confidence that he can make it. He has not practiced exhaling continuously as he rises, so he must fight off the tendency to inhale. He has little concept of the speed of his emergency ascent, and he may rush to the surface as quickly as he can, especially as his body begins to register a need for oxygen. No wonder, then, that an emergency ascent is often not successful.

The diver is faced with a complex and unnatural task. He may be just as likely to panic as he is to complete the ascent uneventfully. However, had he been well-trained in the technique, had he practiced it, had he become accustomed to the unnatural process, his likelihood for panic would be substantially reduced and the likelihood that he would save himself would be substantially increased.

Why, then, is one permitted to graduate from a scuba diving class without becoming proficient in the most fundamental of scuba skills, self rescue? The answer is in the liability for accidents. Every emergency ascent carries some risk. If 200,000 certified students annually perform 5 practice ascents, then it is likely that one or more serious injuries or deaths may result from the 1,000,000 ascents. That's a risk that the insurance industry doesn't like and agencies have decided not to take it.

"With emergency ascent training the most dangerous of the skills to be practiced in certification courses—and with the likelihood that law suits resulting from injury or death might creep into the millions—it is no mystery why certifying organizations shy away from having their charges practice emergency ascents from 50 feet—or even 25 feet."

Both insurance agencies and certifying agencies are businesses and with the extraordinary suits arising out of any liability issue in this society, one cannot underplay their concern. To understand how the insurance industry views diving, the words of Jon Hardy (in a deposition taken in regard to a suit between Ed Brawley and John Gaffney) are revealing. Hardy says:

"When you start getting down to the real nitty gritty of the technology of diving instruction, the insurance company has no idea what it's all about.... They're taking a look at a business thing, at how many

premium dollars are we going to take in, how great is the potential risk, what is the track record, how many accidents have occurred, how many claims have come from those accidents. So they look at those kind of things and make business insurance decisions. When you start talking about emergency ascent and things like that, the insurance underwriters don't know what an emergency ascent is."

When the dollars don't work for an insurance company, they have two choices: raise the premiums or terminate the insurance.

Neither is a suitable alternative for the training agency or the individual instructor. With emergency ascent training the most dangerous of the skills to be practiced in certification courses—and with the likelihood that law suits resulting from injury or death might creep into the millions—it is no mystery why certifying organizations shy away from having their charges practice emergency ascents from 50 feet—or even 25 feet.

In a broader sense, what does that mean to the typical scuba diver? It means that a few—two, three, four, who knows the exact figure—make it through training without being involved in a serious accident. Had they engaged in serious emergency ascent training, statistically we could presume that accidents might have occurred. But now, 200,000 divers annually are set free as certified divers, without the referred skills for self rescue they need. And of the 150 or more diver deaths each year, how many would have been prevented if the divers had been well-trained in emergency ascent? Two? Ten? Twenty? One hundred? We don't know.

But we have one hypothesis: If all certified divers were well trained in emergency ascent procedures—there would be fewer serious injuries and accidents.

The current training is acceptable, because once certified, no one but the diver can take any responsibility for his safety: the insurance companies, the agencies

Diving Into A Time Warp

Skindiving in Australia and New Zealand recently told a little tale worth passing on to our readers. It seems that just a few months ago two Australian prawn fishermen decided to take a dive after a successful day of fishing near Hope Island, Queensland. In thirty feet of water they spotted a copper chest, which they hurriedly raised, hoping to find it overflowing with precious jewelry from a pirates' den.

Instead, it contained a dozen bottles of Canadian Club whiskey, which seemed a bit odd to the two divers, yet they were still pleased to let the liquid warm their chilly souls. A few weeks later, while spinning the yarn in their local pub, someone mentioned that years ago he had seen ads about the whiskey being dropped and that there were other prizes for the finders. The divers and their mates poured through old *Playboys* to locate the ad and finally found what they were looking for in a 1968 edition.

Promptly they contacted the Australian distributor of Canadian Club who knew nothing about the ads or the find, so they contacted the U.S. Headquarters where the ad was quickly remembered—in fact 17 cases had been hidden around the world—and the find was verified.

So our fishermen/scuba divers proceeded to enjoy the rest of the whiskey, which had received the additional eleven year's aging underwater, but they're now a bit puzzled about what to do with the main prize: a pair of tickets to the 1968 Olympic Games in Mexico City.

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10/79U

Making New Friends At Forty Feet:

A Horror Story

When we were kids we used to sit around the campfire, spinning "true" yarns about scary events we would swear had happened to us. We hadn't heard many diving stories worth repeating around the campfire until we came across this piece, written by John Burgess and appearing recently in *Opp*, Alabama's *Opp News*. We can't attest to the veracity of the tale, but we can attest to the chills it produced.

Our oldest son, David, has gotten into the world of scuba diving and at lunch Tuesday he related this true story that was told to him by his diving instructor some weeks back.

Like boys will, Dave asked the instructor what was the most frightening thing that he has ever had happen to him while he was diving. Without hesitating the instructor said that it was an incident that happened to him many years ago when the sport of diving was still in its infancy and he was among the few certified divers in this part of the country.

Of course, everyone knew that he put on air tanks and descended into the far depths of water, and most of them thought he was crazy.

Anyhow, he said that this didn't deter them in the slightest when a man in a Volkswagen went plumping off an embankment at an hydro electric dam near his home and sank in some 40 feet of water.

In fact, he said they had him and his gear on the scene only minutes after the mishap had occurred. Shortly he found himself swimming down through the murky waters of the hydro electric lake unable to see more than a few inches in front of his face.

Miraculously, though, he said he went almost directly to the car and touched the top with his hand.

Using his hands as his eyes he swam around the car until he found an open window and then he shoved his head and arms into the car to see if he could locate the man's body.

Suddenly, there 40 feet beneath the surface of a muddy lake, locked in almost pitch blackness, a hand shot out of nowhere and clamped in a steel like vise on his wrist.

He said nothing that has ever happened to him before or since has ever come even halfway as close to frightening him as badly as did that hand.

He said he went into an absolute and instant panic, something that divers, especially experienced ones, are conditioned not to do no matter what happens.

He said that he screamed into his mouth piece, nearly losing it, and he thrashed around like a 175 lb. fish on a tight line, but nothing he did would dislodge him from that steel grip that held his arm.

Finally, from sheer exhaustion, he said he stopped fighting and cautiously reached down with his other hand and felt the hand and arm of another human.

Slowly, carefully, he pulled himself further into the car until he suddenly broke into a chamber of air that had been trapped inside at the top, and there was the driver of the car with his head in the air pocket, still alive but in a state of absolute, total shock.

So bad was the man's state of mind that it took some minutes to get him to release his grip and to understand that he could go safely to the surface with the diver by both of them using the same breathing apparatus.

He said that the man was rescued and that he (the diver) was kind of the town hero for several weeks after, but even this, he declared, didn't stop months of horrible nightmares for him. Nightmares, he said, in which a cold clammy hand would suddenly shoot out of the blackness and clamp onto his wrist like a steel band refusing to let go no matter what he did.

Sometimes, it would appear, reality can be as bad, if not worse, than fiction.

and the instructors hope they are now off the hook.

Are there solutions? One possibility might be that serious emergency ascent training could be a separate and distinct part of training, for which divers paid a special fee to cover the increased insurance risks—and that special course could be monitored by the industry to keep the fee in line with the cost of claims. But, unless it were mandatory within the certification process, divers would not sign up—only a tiny percentage of divers now enroll in advanced open water training where they do get more personal attention in emergency ascent training.

Another possibility is to teach the use of a BC as a personal octopus or emergency rebreather (see *Undercurrent*, February, 1979). For many divers the technique would be less threatening to perform and safer than the standard "blow-and-go" ascent. We have discussed the technique with a number of people in the training business, who acknowledge its value but seem lukewarm about teaching it. So far the reasons offered are nonspecific, although one key member of a training agency said it was "too complicated."

It would seem, then, that the certified diver himself must take the responsibility to develop and sharpen his self rescue skills. He can enroll in an advanced course which offers more sophisticated training in emergency ascent. He can hire an instructor to work with him personally. He can practice the techniques with his buddies, realizing, however, the inherent danger in free ascents improperly executed. He can follow the techniques of BC rebreathing outlined in our February article, and practice that with his buddies.

And most of all he—that is, you—can recognize the limits of your own self rescue skills and plan your dives accordingly. If the notion of having to make an emergency ascent from 100 feet is frightening—if you wonder wheth-

er you could ever make it to the surface from that depth—then you might consider next time how to limit your dives to depths at which you feel confident about saving yourself.

NOTE: With the exception of the YMCA, which until about a year ago *prohibited* emergency ascent training, but now makes it optional, the national training agencies all require some form to be taught. What is required is indeed limited and may become even more

limited depending upon the instructor's own predilection toward emergency ascent training. Although the national certification agencies work hard to develop consistency among their instructors and the instruction, what the graduating student has actually been taught and required to perform varies from instructor to instructor and from region to region.

Next issue: The relationship of equipment to safe diving.

Poseidon Unisuit, O'Neill Supersuit

—U.S. Navy Comparison Tests

The United States Navy recently evaluated two commercially available dry suits, the Poseidon Systems Unisuit and the O'Neill Supersuit. These suits have rated among the best of approximately ten dry suits evaluated by the Naval Coastal Systems Center in Panama City, Florida, so they were put through separate and extensive tests. The two suits represent two different approaches to suit design: the Unisuit is loosefitting, the Supersuit is snugfitting.

The Unisuit: The Unisuit, manufactured by Poseidon Systems, is one piece, ¼-inch neoprene foam, sandwiched between two nylon coats. A 52-inch waterproof zipper runs from the base of the neck, under the crotch, and up to the waist. Boots and hood are attached, dry gloves are separate. A 3/16-inch (nylon outside, smooth skin inside) neoprene cuff at the wrist and a thin neoprene collar pulled down around the neck, seal the suit on the diver's skin. For

durability and toughness, the boot soles are dipped in raw neoprene. Push-button buoyancy controls near the diver's chest comprise an inlet valve on the right side and an exhaust valve on the left side. The Unisuit is a loosefitting dry suit which allows the addition of diver thermal protection undergarments.

Supersuit: The one-piece Supersuit, manufactured by O'Neill, Inc., is, like the Unisuit, constructed of neoprene and nylon. The seams are cemented and strapped by a 1/16-inch layer of nylon tape; at the neck and wrist, neoprene seals fold under against the diver's skin. A 33-inch zipper extends across the back of the shoulders. Softsoled boots are attached; hood, gloves and overshoes are separate. Dual-button valve buoyancy controls connect to the end of a 6-inch long hose attached to the left shoulder. One button activates the air supply; the other activates the exhaust. The Supersuit is a form-fitting dry suit with a fit similar to a wet suit. While additional garments are not as easily adopted as with the Unisuit, it is designed primarily as a suit for swimmers where a snug fit is imperative.



THE O'NEILL SUPERSUIT

Test Procedures And Results

A series of eight manned tests were conducted in a pool and open water. Although the tests included both scuba and a surface-to-diver supply system, *Undercurrent* will report only those results applicable to scuba.

Test I: Evaluation of Surface and Floating Attitudes: In fifteen feet of water, the diver assumed a variety of positions on the bottom to determine if the suits would float unconscious divers face-up on the surface regardless of initial ascent position or level of suit inflation.

In one test the divers inflated their wet suits with the low pressure inflator until they attained a slightly positive buoyancy. They would then go limp and float to the surface, retaining their weight belt. Neither suit permitted the diver's face to be sufficiently out of the water to breathe if he had minimum buoyancy, had not dropped his weight belt, and was unconscious. If the diver had dropped his weight belt, however, either suit would float his face sufficiently out of the water so he

could breathe.

In a second test the divers, after donning an additional twenty pounds of weight beyond their normal load, inflated their suits until they became slightly buoyant, then the weight belt was ditched, resulting in a rapid, uncontrolled ascent. At the surface, the divers floated with their faces out of the water (with or without weight belts). Our conclusion is that these variable volume dry suits are adequate substitutes for conventional flotation devices.

Retooled Supersuit Available In 1980

The O'Neill Supersuit has been out of production for several months, although models may still be found in many dive shops. Supersuit's Jack O'Neill told *Undercurrent* that they stopped producing the suit to respond to the demand for their lightweight wet suits and other products, but expect to produce a slightly revised version of the Supersuit in 1980. *Undercurrent* was told that O'Neill would replace the neoprene with another material, insulite, but O'Neill would neither confirm nor deny the rumor.

Three other manufacturers—White, Lord Byron and Parkway (The Jetsuit)—produce suits with some characteristics similar to the tight-fitting Supersuit, if you're a diver who prefers that cut and can't locate a Supersuit.

Test II: Diver's Flotation Device/Dry Suit Compatibility: Only one of the flotation devices tested, the Fenzy VI, is currently available to sport divers. No problems were encountered when using the Fenzy with the Supersuit, but there were problems when the Fenzy was used with the Unisuit.

While the vest harness did not interfere with the operation of the vest or suit, the on/off valve of the pony bottle (mounted under the Fenzy) made the operation of the inlet valve very difficult and actually disconnected the suit inflator as the diver swam through the water. Connecting the suit inflator hose was also difficult due to the bottle valve and inlet valve interference. Operation of the inlet valve with the gloved hand was nearly impossible because the proximity of the bottle and inlet valves made it difficult to identify the suit inlet valve control.

Test III: Suit compatibility with Scuba Harness: There were no problems in using the standard, single backpack-type harness with either suit.

Test IV: Air Consumption Evaluation: Air consumption tests were conducted in the Gulf of Mexico at 60 and 100 feet to determine how much air is normally used for suit inflation during multidepth dives. The amount of air used for inflation is critical in determin-

ing whether the low pressure suit inflator should be connected to an independent source or to the diver's primary air supply. The suit air supply for this test was a small 15.5 cubic-foot, 3000 psi, pony bottle attached to the divers' scuba tanks. Air consumption was determined by gauging the pony bottle before and after each dive scenario. The dive scenario included swimming at varied depths and maintaining neutral buoyancy throughout the dive, then using the automatic inflator at the end of the dive for positive buoyancy.

Six man dives were made in each suit, three to 60 feet and three to 100 feet. The Supersuit used considerably less air than the Unisuit, averaging 1.83 cubic-feet per dive or 2.5% of a full, 71.2 cubic-foot scuba tank. The Unisuit used 3.14 cubic feet, or 4.4% of a 71.2 cubic-foot scuba tank. An air consumption of less than 5% of a single 71.2 cubic-foot scuba tank for suit inflation poses no threat to diver safety, while providing the advantages of thermal protection.

Supplying the variable volume dry suits from the diver's first stage regulator proved to present far less doffing/donning complication, greater in-water comfort, and less logistic support, than attaching a pony bottle to the diver's tank or attaching it to the diver's waist or to his flotation device.

Test V: Suit Failure Evaluation: Loss of swim fins: In an extreme situation a diver's fins can be blown off by a diver's expanding foot pocket if either suit is fully inflated. However, in any other than the extreme case, loss of swim fins is no problem with either suit, especially if the diver is in the vertical position. In fact, fin loss can be completely avoided if the diver uses the fin keeper straps which come with each Unisuit. These straps also work well with the Supersuit.

Emergency ascent with a flooded suit: Each suit was completely flooded. Even though hooded suits caused the divers to become negatively buoyant, they were easily able to swim to the surface, fifteen feet above, under their own power. Using the inflator to form an air pocket in the shoulder area of each suit allowed the divers to attain the desired buoyancy.

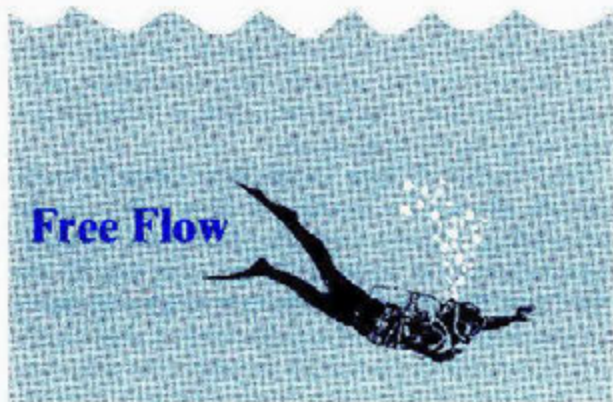
Inlet/exhaust valve flow capability: A serious problem could develop if the inlet valve remained open and the exhaust valve could not vent the excess air. To test this, inlet valves on each suit were fully depressed for fifteen seconds before the exhaust valves were opened. Divers in both suits were easily able to maintain their fifteen foot test depth; no indication of blowup was experienced since exhaust valves in other suits were more than adequate to handle the excessive flow.

Accidental blowup: At fifteen feet the divers assumed an upside down, vertical position, held themselves stationary and fully inflated their suits. After letting go, they were able to right themselves and achieve negative buoyancy within ten feet from the bottom. One should note that the diver must wear the correct size. A small diver in a large suit loses much mobility and dexterity; air can become trapped in the folds of the suit material and thus make it extremely difficult to

vent the suit adequately under emergency conditions.

Tests VI: Evaluation Of Swimming Characteristics: The two suits represent different approaches to the design of variable volume dry suits. The Unisuit is a loose fitting suit, allowing the addition of several layers of undergarments for increased thermal protection. The supersuit is form fitting, similar to a wet suit. To wear undergarments, a diver would need to use an extra large size.

The Unisuit is very well suited to diving with surface supplies of air, where limited mobility is not required. But, the supersuit has excellent swimming characteristics and the test divers unanimously agreed that for distance swims, the Supersuit was the more comfortable of the two tested. Both suits provided adequate thermal protection for either the free swimming or tethered divers, without adversely affecting the diver's performance.



The Florida Underwater Council recently published the history of the recompression chamber located on Grand Cayman. In the six year Cayman history, thirty seven divers have been treated, eight for bends symptoms in the limbs, seventeen for bends symptoms in the neurological system, and eight for air embolisms. One case was a fake by someone who simply wanted to experience the chamber. Thirty three of the thirty six legitimate patients now have no symptoms. Of the three with lingering symptoms, one has some numbness on the soles of his feet, a second has a permanent limp, and the third has a lingering but slight deficiency in his right leg. There were eight chamber cases in 1978, while an estimated 250,000 dives were made at Cayman.

How did the J valve and the K valve get their non-descript names? Way back before you were old enough to snorkel, U.S. Divers was in the scuba business and at that time their little catalogue had so few items in it, that they assigned letters of the alphabet to each of the items they sold. They sold two tank valves, one which appeared tenth in their catalogue and was therefore assigned a "J" for ordering and a second, which followed, was assigned a "K." Those designations, for want of a better description, have become the generic names of the valves.

Test VII: Suit Accessories Evaluation: The hoods and gloves of both suits were acceptable, offering a high level of comfort, watertight integrity and ease of use.

Conclusion

The Poseidon Unisuit and the O'Neill Supersuit may be used safely and effectively as variable volume dry suits.

Any diver who purchases a dry suit should undertake extensive pool training and experimentation before taking the suit into open water. Suit blowup is a potential hazard among divers unfamiliar with this type of suit and training is essential to learn how the suit responds and how one can safely overcome any inadvertent problems.

Tomales Bay is less than an hour drive from San Francisco, but few local divers venture into the waters, since Great White sharks are regularly spotted there. San Francisco's Steinhart Aquarium has recently offered a reward for anyone capturing a Great White which can be transported to the Aquarium and kept alive. In August, both a 250 pounder and a 500 pounder were delivered alive. The larger animal expired quickly, but the smaller one, after being walked about by scientists in scuba gear, encouraged onlookers when it slipped from its stupor and attacked a soupfin shark swimming in the tank with it. Apparently, however, the ultimate shock of being transported by truck from the ocean to an aquarium became too much for the little fellow, and he too eventually succumbed. Both sharks had been put in a large roundabout tank with other fish. The roundabout is a special tank which permits the inhabitants—red snapper, striped bass, amberjack, yellowtails, and the like—to swim in the same direction, straight ahead, against the current, 24 hours a day. The Great White, however, moving feebly at first with its foot-wide mouth open and its needle sharp teeth exposed, scared most of the fish into swimming in the opposite direction.

It's uncertain whether they'll ever be able to raise the *Monitor* from its resting ground in 210 feet of water off the coast of North Carolina, but divers surveying the wreck have made some interesting finds, including U.S. Navy mustard bottles and hand blown champagne bottles. One discovery is that the *Monitor* appears to have been damaged from U.S. Navy depth charges dropped in the Second World War to clear the area of German submarines. Although the 60-70 degree Gulf Stream water is a plus for working divers, the four hour decompression time in the 22-foot research sub has caused some problems. Diver Richard Roesch said, "I had a guy freak out in here.... Tore his finger nails off trying to claw his way out."