dive in to save his wife when there were supposedly plenty of safety personnel in the water.

"There is a general outcry and an uproar in the diving community," Hernandez said. "The video has always been shown to public after each successful record. The video will be proof of how many divers were there.

"Audrey's death became a tragedy and it's becoming a tragicomedy perhaps because there are so many facts people don't know a month after she died," he said. "Carlos and Pipin have a complete conflict of interest and their lack of disclosure is a total mockery."

Ferreras has declined interview requests, only speaking to the press during a memorial service. But Serra insists there were enough safety divers and emergency medical personnel present. He says Hernandez is a disgruntled former employee who is seeking notoriety through "sickening" personal attacks.

He says that little information has been released out of respect to Mestre's parents and Ferreras, who need time to grieve. "The investigation continues. There is no cover-up. We have to understand the painful process of healing," Serra said.

Serra has acknowledged that the sled malfunctioned and stopped while Mestre was at 530 feet. A safety diver stationed near the bottom of the line saw that Mestre had fainted and began taking her to the surface. Ferreras eventually dove in with an air tank to bring his wife up.

While Mestre's death has been felt throughout the diving community, participants say such danger is ever-present and must be accepted. "The ocean is more powerful than you. You have to make a major peace with the ocean and realize every time you go out you can die," said Briseno, whose husband, Matthew, was working as a safety diver during Mestre's fatal dive. "Yes, death is always possible. But that is the way I would choose to die. It is acceptable to me that I would die free diving."

Ferreras said at his wife's funeral that he plans to reach her record depth of 558 feet. "I can't retire right now. If I stop doing what I've been doing, everything she worked for would be worthless," Ferreras said.

Briseno and many others say the main challenge for the sport now is establishing a centralized governing body that can standardize safety practices and records. "The different bodies that organize the sport need to get together on safety procedures," Briseno said. "The training, the safety and the records: They need to agree on the basics."

Is Your Gear Safe with Nitrox?

at what oxygen content is ignition possible?

While Nitrox rapidly continues to gain popularity in the U.S. and abroad, there's a simmering debate within the industry about the maintenance of Nitrox compressors and scuba equipment. The problem is that at some increased level of oxygen in Nitrox, standard compressors and regulators can become flammable. So, the industry requires an "oxygen clean protocol," which specifies components and lubricants that are not flammable and are therefore safe. Yet, some experts believe that the oxygen level currently recommended for cleaning may be too liberal to be safe.

Traditional American compressors and scuba gear are set up for compressed air, which contains tiny amounts of condensed hydrocarbons. The slurry visible in the condensation traps of standard oil-lubricated compressors shows how much oil exists in the compression chambers and thus the output. Only proper filtration removes this oil from the breathing gas. The Compressed Gas Association, a trade organization that develops standards for compressed gas practices, has a safe standard for scuba air (called "Grade-E"): no more than five milligrams of hydrocarbons per cubic meter.

A greater percentage of oxygen increases the risk of oxidation in compressors, scuba tanks and regulators. Oxidation can result in fires or even explosions. Rapid pressurization, such as when a tank is being filled or when a cylinder valve rapidly pressurizes a regulator's first stage, heats the gas. As a result, fires have occurred in fill stations and scuba gear.

Bill High, president of Professional Scuba Inspectors, recounted the case of a San Diego diver whose titanium Atomic regulator caught fire while he was breathing a decompression mix of 78.4 percent oxygen on the beach.

Is That Welding Oxygen in Your Nitrox Tank?

In most countries there are no universal standards for handling Nitrox, so regulations and practices vary from location to location. In fact, operations in countries such as St. Eustatius, Belize, Fiji, Papua New Guinea and nearly all distant dive venues use industrial grade (i.e., welding) oxygen in their mixes. Medical grade oxygen is either unavailable or prohibitively expensive, they say.

While ANDI recommends that only gas rated for human consumption be used for diving, apparently the risk of contaminants in industrial grade oxygen is generally low. As PSI's Bill High told *Undercurrent*, both medical grade and industrial grade oxygen "come out of the same faucet." The difference is in how storage cylinders are handled. Industrial grade oxygen cylinders are returned for filling while still slightly pressurized. New oxygen is added on top of the old gas. Medical grade cylinders are vacuum cleaned to clear out any cross contaminants that may have slipped through the manifold when the cylinder was in use.

If you're nervous about getting a Nitrox fill from a foreign dive operator, ANDI's Charlie Johnson suggests you ask to see their most recent air analysis certificates. Standards vary widely, so you'll probably need to have the operator interpret the results for you. But if there's a history of the air being tested frequently and recently (every three months), that's a good indicator that the operator is being careful.

Dedicated Nitrox divers often carry their own oxygen analyzers to measure the oxygen content in their mixes. Charlie Johnson says that other kits are available that can detect gross amounts of carbon monoxide.

Charlie Johnson, vice president of American Nitrox Divers International (ANDI), said the fire melted the diver's wet suit to his body, burning him badly enough to require plastic surgery. Johnson says that Atomic recommends that the titanium regulator in question only be used with mixes of 40 percent oxygen or less. Elliott Forsyth, technical consultant for Oxygen Safety Consultants, Inc. notes that "The construction materials need to be compatible from a flammability standpoint," he states, "and the regulator needs to be tolerant of potential ignition mechanisms." Cleaning alone is not enough.

While oxygen makes up 21 percent of the air we breathe, the most common Enriched Air Nitrox (EAN) mixes have 32 percent oxygen (EAN/32) and 36 percent oxygen (EAN/36). Some tech divers use mixes containing 50 percent oxygen.

Decompression cylinders such as the one in the San Diego tragedy often contain far higher percentages. Bill High notes that some gas mixing processes introduce 100 percent oxygen into the cylinder, then adding the remaining gas to create the desired percentage.

Despite the risk, the benefits of Nitrox (longer bottom times, less deco time, decreased narcosis, and, some divers report, warmer and less tiring dives) have created a spiralling consumer demand that has industry scrambling to adopt standards to allow dive shops and divers to use Nitrox without causing everyone to retool completely.

It has become necessary for Nitrox divers and stations to use Nitrox-compatible materials (that is material with a higher heat tolerance), including o-rings and lubricants. But the next step is to define the level at which Nitrox requires special cleaning of equipment to remove flammab le lubricants and thus reduce the danger of hydrocarbon combustion in oxygen-rich environments.

To Nitrox clean a regulator, it must be fully disassembled, and the o-rings and filter must be replaced with Nitrox-compatible parts. A degreasing solution such as Blue Gold is used to remove old grease and hydrocarbons, and a Nitrox-compatible grease is applied. The entire process should add about $15 to the cost of a standard annual regulator service.

Two factions with divergent opinions have debated the question. ANDI, a Nitrox training agency, proposed that the scuba industry follow Compressed Gas Association guidelines: scuba gear and compressors using EAN with greater than 23.5 percent oxygen should require special treatment. One source of contamination would be simply the CGA Grade-E Air, the industry standard for normal scuba air; the allowable condensed hydrocarbon content is too high. Such a standard, however, would require any diver who planned to switch between Nitrox and compressed air to maintain separate scuba systems for each. That's too much to ask your average recreational diver to swallow.

Most other agencies that certify fill stations and technicians lined up behind a cleaning threshold of 40 percent oxygen, meaning that systems using compressed air or EAN up to 40 percent did not need to be specially oxygen-clean. That would allow recreational divers using the common Nitrox mixes to use air, as well, with Nitrox-compatible regulators.

The Divers Alert Network held a workshop in November 2000 to resolve this debate, engaging most training agencies, several manufacturers and outside experts. DAN published a document saying the consensus was that 40 percent oxygen was an acceptable noncleaning threshold. Charlie Johnson says that the paper, which was not a transcription of the proceedings, left out many contrary arguments. He told *Undercurrent* that "Some experts outside the scuba industry say the 40 percent threshold is laughable. Some say it's criminally negligent. None say it's appropriate." Nevertheless, it seems to be the de facto industry standard.

Apparently everyone at the DAN workshop agreed on one conclusion: Manufacturers' recommendations for product use must be followed. That puts the responsibility on the manufacturers to test their equipment and to know what environments it can tolerate. It also offers the rest of the industry some protection, because manufacturers' recommendations are used to protect equipment makers, such as Atomic, from liability when their products are misused, as in the San Diego regulator fire. You can bet those recommendations are conservative, or some lawyer isn't earning his retainer.

Even ANDI has dropped its crusade to lower the threshold.

"the fire melted the diver's wet suit to his body, burning him badly enough to require plastic surgery."

"We were taking too many arrows in the back," says Johnson. Instead, ANDI, like the rest of the industry, advises trainees to follow those good old manufacturers' recommendations.

So before your next Nitrox fill, check the product literature about your tank and regulator and make sure you don't exceed the recommendations. Some equipment is rated for use with air only. Others will state that the equipment as sold (without further modification) should only be used with certain levels of oxygen.

And be sure the shop you buy your gear from knows what they're doing. Mistakes do happen. One Florida shop owner who prefers to remain nameless tells us that last summer she spotted Scubalux Nitrox aluminum tanks being lubricated with silicon grease before being fitted with valves in a local plant. Since silicon has a low flammability point at high pressures, it is not Nitrox compatible, so it's no wonder and probably a good thing that the plant has since been closed.

Finally, if your equipment is a few years old, chances are it's not Nitrox compatible, meaning it has o-rings and lubricants with low flash points. Some regulator casings, such as those made of titanium, may not be Nitrox compatible. If you're planning to use Nitrox regularly (such as on a live-aboard trip), and you want to play it safe, take your regulator to a shop with a certified Nitrox technician and get it tuned and cleaned for Nitrox. Then be sure not to use it with air again until you're through diving Nitrox. This advice goes double for anyone planning to use Nitrox with more than 40 percent oxygen.

Flotsam & Jetsam

Snorkelers versus divers in Cayman: Watersports operators in the Cayman Islands killed two tiger sharks at Stingray City in September. The killings were prompted by appearances of a 9 ft. hammerhead at the site, where large groups of semi-tame southern stingrays congregate. Snorkeling operators were afraid that a large shark would discourage tourists from visiting the site, so they tried to capture it, but didn't, while killing two tiger sharks as accidental bycatch. Their actions were condemned by Tim Austin, of the Cayman Department of the Environment. 'The sharks were taken by members of the fishing community and watersports operators," Austin told the British magazine, DIVE. This episode has generated a lot of outrage, but he said Cayman authorities could not prosecute because sharks are not a protected species in Cayman waters and the Sandbar is not in a 'no-take' zone. Underwater photographer Doug Perrine said it was particularly ironic that the killings came just after the Cayman government passed a law