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DEPT. OF TRANSPORTATION  
DOCKET SECTION

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To: Lieutenant Diane Kalina, U. S. C. G.

Date: 2/24/98

From: Eric Hofsommer, former commercial diver in the Gulf of Mexico

Re: Suggested Amendments to the Coast Guard's commercial Diving Regulations

Dear Lieutenant Kalina,

I worked as a commercial diver in the Gulf of Mexico for 11 years. My career as a diver ended abruptly six months ago following two incidents which nearly claimed my life. The two incidents were exactly one year apart and both resulted from carelessness on the part of my employer ( the same company in both cases ). However, the danger to which I was exposed is not created by that company alone. Many diving companies are playing with the gray areas in the Coast Guard's Commercial Diving Regulations and are , therefore , putting their employees at tremendous risk . While I no longer have a personal stake in the diving industry , I would consider it a sin to withhold information that could conceivably save the life of one or more divers.

First, some background information about my qualifications. I worked in the Gulf of Mexico for 11 years , served as a diving supervisor for eight years, a mixed gas diving supervisor for six years. I was a S.A.T. diver for three years.

While I loved diving as a profession , I saw a lot of things that I didn't (and don't ) like. Things that put me and my associates at unnecessary risk. Most divers won't speak up for fear of losing their jobs. That's largely due to a Louisiana law called "Right to work" which, in my opinion, is unfair in the extreme. It means that divers can be fired without even being given a reason. The diving companies thus gain tremendous power to shut the mouths of anyone who would speak against them. Since there are only a handful of diving companies , your career grinds to a halt if you are "blackballed." I hope you can see how easy it might be for a diving company to give false information to (or even lie to) a Coast Guard investigator who is not fully versed in the commercial diving business. I'd like to share some of my thoughts on how your procedures and regulations might be modified to provide far greater safety for those who work in the Gulf

I. The first area needing attention is the diving vessels themselves. Many dive companies have boats that are only used for diving, although they classify these boats as "Off-Shore Supply Vessels." This saves the companies thousands of dollars in the safety equipment that a "Diving Support Vessel" would be required to carry. By **safety equipment, I am** referring to such basic items as

- fire suppression systems throughout the vessel,

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- heat detectors,
- smoke detectors below decks where personnel are not always present.

I can tell you from personal experience (the second incident that nearly took my life before I left the diving industry) that it's terrifying to be sitting in a S. A.T. system when the boat is on fire, knowing full well that there is no possible means of escape if the boat sinks! It is my strong belief that any vessel that is deemed qualified to operate in the gulf of Mexico as a dive boat, where any decompression is involved, should be required by law to be registered as a Diving Support Vessel. Some companies, such as Oceaneering International, have vessels that are classified as DSV's ( Because they do a lot of Navy work and must follow government regulations). From my experience, Oceaneering is by far the safest of the diving companies. There is a genuine concern for the safety of their employees. I can say this because of personal experience, working for three different diving companies during my 11 year career in the industry. On the other side, there are companies whose only concern seems to be making a buck. Little attention is paid to safety. I witnessed many instances of unnecessary risk being taken, there's a very poor safety program and virtually no preventive maintenance!

II The second area I would like to address is underwater burning. This refers to cutting metal underwater using electricity, oxygen, and an electrode. It is a very effective way to cut metal underwater, but there is a danger to it. When metal is burned, it creates hydrogen. When a pocket of hydrogen-no matter how small - builds up and comes in contact with heat ( burning rods burn at 10,000 degrees F ), there's an explosion. These are known as O<sub>2</sub> pops; they're painful when small and deadly when large. I'm not suggesting that burning be outlawed. Rather, I'm saying that there are certain types that are done, not out of necessity, but to save money - at the diver's expense.

One example is below **mudline** burning. This is done either by going inside a drive pile or casing, or by hand jetting down the outside of a casing or well stub. At best, the gas is going to go into the mud. At worst, you're burning through metal with grout concrete behind it. The reason this is so dangerous is due to the build-up of the hydrogen gas in pockets either made in the mud or when the grout was poured. Thus a potential bomb has been created that requires only a little heat to be ignited. Many divers have been hurt - some even killed - by this. These casualties are bound to be recorded in your records. In most cases, this type of burning is needless.

A Diving company that claims this procedure is safe is lying. In addition to the reasons cited above, consider the fact that jetting down to burn a casing or drive pile creates a high risk of a cave-in. The average depth to cut a well stub is 15 feet below the mud line. This means you have to jet down at least 18 feet to make your cut. It is possible to jet a safe hole in most cases, but bottom conditions or pressure from topside to get a turnkey job done can make things very perilous.

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Perhaps an explanation of the difference between burning through metal with mud or grout behind it would be useful. When you're burning from inside a casing into mud, Pockets of gas are created. Periodic flushing can be done with air or HeO2 to minimize the risk to a degree, but you're still going to get pops. The difference between an explosion in mud and grout is that most mud has a certain amount of give to it. Grout, on the other hand, has absolutely no give.

Alternatives to burning would be explosives or cutting tools. Explosives were previously used all the time with great effectiveness. The Wildlife and Fisheries Department moved in, however, and made it so expensive that most oil companies won't consider this approach anymore. It seems a sea turtle is more important than a diver these days! The second alternative, cutting tools, requires the use of a Jack-Up Rig. This is also costly, especially since divers are required to hook up to the piece when it's done in most cases .

Burning is a very important tool to the diving industry but , I feel this type of burning should be outlawed except in case of emergency . We need to stop gambling with peoples lives to save money.

**III.** The third area I would like to cover is the **dive-supervisor**. Proper training is essential. In far too many instances, the dive-supervisor is simply the guy on the job with the most time in the Gulf Dive supervisors need training that leads to certification under a standardized program. They should then be licensed and held personally accountable for the safety level of their jobs. If a boat captain is bullied by a company into doing something illegal, his license gets pulled and he, and his family, suffer. The company then usually shrugs its collective shoulders and points at the captain, saying "he knew the rules." If dive supervisors were similarly licensed, they wouldn't be so inclined to let companies push them into doing something illegal or simply unsafe. They would know that their careers were on the line. This would lead to their actually inspecting dive gear, refusing to use unsafe equipment, and to refuse unsafe jobs, even shutting jobs down they consider unsafe.

Serious accidents and deaths do occur in the Gulf The following are some suggestions in such an unfortunate event:

1. Get a qualified person to the site of the accident as soon as possible, either a member of the Coast Guard or a civilian with Coast Guard authority.
2. If the accident or incident is still in progress, stay out of the way, but start gathering information.
3. If this is deemed a serious diving accident, standard operating procedure is to shut down diving operations and treat the affected person or persons. In

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such a case, the investigating authority should secure the vessel to ensure that no one goes around the dive controls. [For example, in the case of the diver Troy Elwood, who died as a result of helium contamination of his dive hose, all valves in question should have been tagged for removal and inspection. The surface diving section of the rack should have been secured and a guard posted to guarantee that no tampering would take place. The boat should have been brought back to the dock and detained until all questions were answered and all valves requiring inspection were removed in the presence of a Coast Guard official or civilian with Coast Guard authority.]

4. Check and inspect everything! Don't believe what a company tells you. Companies like the one that killed the diver mentioned above don't care about the people. Their interest is confined to their safety record and the amount of money the accident is going to cost them. Money seems to be the bottom line, unfortunately.
5. Prosecute any and all persons who are found to have knowingly and willingly disregarded rules and regulations that contributed to the accident. If there's a personal penalty attached to actions, people will think twice before submitting to company pressure.
6. If a boat is found to have discrepancies, detain it until any and all defects are fixed and the boat is demonstrated to be in full working order.

### **Proposed Amendments to Coast Guard Commercial Diving Regulations**

#### **U.S.C.G. 46 CFR 197.210 Designation of diving supervisor**

As previously mentioned, this person needs to be properly trained and licensed. This will help ensure compliance with Coast Guard regulations since a person who knows his job is on the line, or that he/she could be fined, or even go to prison over his/her actions, will be less willing to do whatever the company says or to cover up the company's illegal acts.

#### **U.S.C.G. 46 CFR 197.310 Air compressor system**

All breathing air compressors should have to be registered with the Coast Guard. Air quality tests, preventive maintenance and repairs should have to be turned over to the Coast Guard every six months. At the very least, dive companies should be required by law to keep records for at least 5 years on all preventive maintenance and maintenance performed on all breathing air compressors. (I've seen diving companies put motor oil in these air compressors!)

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### **U.S.C.G. 46 CFR 197.318 Gauges and time keeping devices.**

There are already rules in place governing depth gauges, but they seem to be followed only at the companies' convenience. A vessel with diving operations being conducted on it should have all watches and time keeping devices synchronized.

### **U.S.C.G. 46 CFR 197.328 PVHO-General**

This is one of the strongest example of a "gray " area. First and foremost, I need to stress the importance of **double wall integrity**.

Double wall integrity is defined as the following: any penetrate in the hull of a PVHO must have the following - (a) a valve on both the inside and outside of the penetrate; (b) a plug on both the inside and outside of the penetrate; (c) a combination of both plug and valve inside and outside of the chamber; (d) internal to external wires need to have a pressure rating of at least one-and-a-half times the system's greatest working depth.

Any PVHO, whether a deck chamber, S.A.T. chamber, or a class # 1 diving bell, must have double wall integrity.

One of the greatest concerns of divers under pressure is the compromising of the pressure boundaries. The portable deck chamber used in surface diving is the area most affected by this. **Damage** is often done to the external valves during transport, by gear shifting on deck in rough seas, or by improperly placed crane loads. This damage is not always obvious and can be easily missed.

The diver inside the PVHO must have the ability to stop the loss of pressure. We also can't forget the new tender who often gets stuck running the chamber and sometimes walks away during blow down and forgets what he's doing. The diver must have a way to shut off incoming air.

If the Coast Guard were to inspect all deck chambers, I believe it would be horrified. There are examples of chambers out of hydro, with no communications, out-of-date view ports (or unable to be seen through), no sound powered phones, silicone grease used on the O rings, no O2 dump systems ( though not a requirement but a good thing to have) ,**pop-off** valves that don't work, and pneumo gauges out of calibration.

**Sound powered phones.** Two-way communication is also covered in this section. The only legal direct two-way communication between occupants of other separately pressurized compartments of the same PVHO is sound powered phones. This is due to the regulations covering electrical equipment in the PVHO. Many deck chambers and

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S.A.T. systems have no sound powered phones in them at all. There needs to be a backup system in working order for every communications system, and for that matter, every system in, on, or in support of, any S.A.T. system in operation. When the fire occurred that almost took my life, there were no working backup systems for anything. That is what almost cost us our lives.

**Defusers.** These reduce noise and ensure protection for both blast and vacuum injuries. Thus, they need to be required both inside and outside on all exhaust ports and inside on all inlet valves. Internal exhaust defusers need to be made out of long tubes that are drilled with holes and positioned at the bottom of the chamber since CO<sub>2</sub> is heavier than air and settles at the lowest point. This ensures maximum removal of CO<sub>2</sub> during scheduled ventilation periods.

#### **U.S.C.G. 46 CFR 197.330 PVHO-closed bells.**

Class 1 diving bells need to have emergency locator transmitters installed on every bell in the Gulf This is a regulation, but is not implemented in most cases.

Internal manual CO<sub>2</sub> monitoring devices need to be requirements in every S.A.T. system and every bell. CO<sub>2</sub> is a diver's worst enemy under pressure when all support from topside has been severed (i.e., the boat has sunk or the bell has become detached from its umbilical). Most companies use what's known as a Dragger pump and tube assembly. I can tell you from experience that these do not work at all under pressure. The instructions tell you to pump the tube ten times and take the reading. I know for a fact that after the third pump the tube is completely purple, which suggests that the divers are dead! Another way must be found to monitor CO<sub>2</sub> under pressure.

There is also a need for a battery backup attached to every Class 1 bell. This will ensure that lights and scrubbers will function during a power outage and save valuable time in an emergency.

All S.A.T. systems operating in the Gulf of Mexico must be required to have escape pods capable of decompressing the maximum number of divers allowed in the system from the systems deepest working depth rating.

Class 1 bells must not be considered escape pods due to time and availability restrictions. If the bell were working on bottom when an emergency occurred, the men on the bottom might have time to get a seal. The men in the system on deck, however, could be considered as good as dead because their only means of escape would be on bottom. Even when the bell is mated with the system, the time frame needed to rig it out as an escape pod is unacceptable.

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The fire I was involved in is a prime example of this. It took us over an hour to strip the bell down. We worked in total darkness with no lights, scrubbers, or power of any kind. Even when the bell was ready to launch, it would have been impossible to do so because the hydraulics used to launch the bell were electric and all power on the boat was out

**U.S.C.G. 46 CFR 197.332 PVHO Decompression Chambers.**

Section (i) states that a PVHO must have at least a 2 ATA per minute travel rate to 60 FSW. You would be hard pressed to **find** a single chamber in the Gulf that could meet this requirement. A chamber is usually run as follows: a diver enters the outer lock and obtains a seal. In most cases the inner lock has been blown down to around 80 FSW, depending on the sizes of the inner and outer locks. The diver opens a crossover valve and blows himself down to depth. This is about the only way to get the diver to treatment depth in the allotted time.

I believe that a separate 120 CFM compressor with an oversized secondary volume tank should be required on all jobs requiring decompression. (Deck Chambers)

**U.S.C.G. 46 CFR 197.340 Breathing gas supply.**

Section (c). A diver carried reserve breathing supply should be required at all times, regardless of the depth of the water.. This could have saved the lives of two divers who were working in shallow water within the last eight months.

**U.S.C.G. CFR 197.402 Responsibilities of the person in charge.**

Section (i). This person should be highly qualified, tested periodically, licensed, and held responsible for his actions. There are far too many people out there *playing* the role of diving supervisor who have no clue as to what to do in an emergency. Airline pilots are tested routinely because people's lives are at stake.

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What makes diving so different? If anything, diving is much more dangerous because of the many different variables involved. We need to eliminate the “warm body” mentality that arises when personnel run short! Licenses should also carry different degrees, just like boat captain’s licenses. In other words, there should be shallow air, deep air, gas, live boating, and saturation licenses.

**U.S.C.G. 46 CFR 197.450 Breathing gas tests.**

section (1). These six-month tests should be mandatory and the results submitted to the Coast Guard. Gear not tested should be immediately beached until tests are complete. Stiff fines should be imposed for non-compliance. Remember, people are breathing this stuff into their lungs!

**U.S.C.G. 46 CFR 197.454 First aid and treatment equipment.**

Diver medics need to be required on all diving jobs.

**U.S.C.G. 46 CFR 197.456 Breathing supply hoses.**

Section (1). Dive hoses should be cut back five feet on the working end of the hose each year. This is the section of hose that catches the most abuse. Annual pressure tests should be performed on these hoses. The results should be submitted to the Coast Guard with the signature of the equipment manager, who will be held responsible for false reports.

**U.S.C.G. 46 CFR 197.458 Gauges and time keeping devices.**

This section needs to be revised as follows.

(a) Every time keeping device on the dive station is to be synchronized. (This can be done as part of the pre-job safety meeting.) This includes personal watches, chamber stop watches and dive shack clocks. The supervisor will sign off on this part of the pre-job safety meeting and will be held responsible for non-compliance.

(b) The diving supervisor will personally inspect every depth gauge on the dive station and sign off that all gauges are correct and within calibration dates.

(c) The diving supervisor will be held responsible for all violations of these rules as will the diving company that employs him.



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**U.S.C.G. 46 CFR 197.460 Diving Equipment.**

This section needs to be reinforced by adding it to the pre-dive checklist on each dive sheet. It should also have to be signed by the dive supervisor. The only exception to this rule should be in the event that the standby diver has to be sent to assist the primary diver (i.e., a separate signature at that time).

**U.S.C.G. 46 CFR 197.462 Pressure vessels and pressure piping.**

This section is complied with only when the dive company is forced to-at least that's the experience I noted at the last diving company I worked for. The Coast Guard needs to actively track PVHOs and hold surprise inspections on dive companies. Companies found not complying with Coast Guard Regulations should face stiff monetary penalties and the people responsible should be criminally prosecuted.

**U.S.C.G. 46 CFR 197.482 Log book entries.**

Section 11 puts time frames on accidents as far as what's to be reportable. This is another area where some dive companies take serious advantage of the "gray" aspect. An example: at the last company I worked for I witnessed many instances where injured tenders and divers were ordered to come into work so their accident wouldn't be considered a lost-time accident. Dive companies do this for one reason only: MONEY. They don't want customers to know how unsafe their practices are-and they don't want insurance companies to raise their rates.

It would seem appropriate to report to the Coast Guard any fatality or injury resulting in a physician's care. This would give a clear indication of which dive companies were sincere about safety, and which were not. Why should a discharge of any amount oil or chemical offshore be reportable-but a dive company doesn't have to report an injury unless it incapacitates a person for more than 72 hours, or hospitalizes him for more than 24 hours?

**U.S.C.G. 46 CFR 197.484 Notice of casualty.**

In the case of a fatality, all information should be collected by the Coast Guard personnel at the scene. All Equipment in question should be secured and the vessel brought in and held until all questions are answered satisfactorily.

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As you have undoubtedly gathered , Lieutenant Klina , I spent a great deal of time reviewing the Regulations and making suggestions that could enhance safety in the commercial diving industry . There are many other areas I could discuss , but I've **confined** myself only to things I consider critically important . Many aspects of commercial diving are not covered at all in the Coast Guard Regs. My 11 years offered me many learning opportunities and I would be more than happy to help you in any way that you deem appropriate . It's time , after all , to make the Gulf of Mexico a safer place to work !

Please feel free to contact me to discuss any of this material.

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Sincerely,

**Eric Hofsommer**