Note that this is a low resolution PDF. The photos in the book are much sharper and clearer.

Chapter 8
Working as a Commercial Diver

A diver is only as good as his last dive.

Just as the pressure is strong on a tender to prove himself, there is also pressure on the new or "break-out" diver to prove his worth. It's always important in this type of situation to keep your head and not let yourself get talked into situations that are not safe.

Your most important tool as a diver is your brain and your ability to think through potential problems before they occur. Take the time to analyze each dive before you get in the water so you will have a plan for how to do the dive and how you will handle different situations should they occur. Make sure you have all of the tools and equipment you need ready to go and that they are in good working order.

The ADCI (Association of Diving Contractors International) requires that a Job Hazard Analysis (JHA) be completed before each dive. This is a formal procedure for identifying the sequence of the dive, evaluating the potential hazards you might encounter, determining safe procedures and protection, and assigning responsibility. The JHA is a very important part of helping to ensure your safety and must not be omitted. The JHA may also be referred to as a "JSA" or "Job Safety Analysis," or as a "JHR" or "Job Hazard Review."

As a diver, you must constantly be thinking about your safety.

Safety Gear

Whenever you dive, it's vital to be sure that you have the right safety equipment and that it's operating correctly. Just because you have a bail-out bottle doesn't mean the bottle is full or that the regulator is working properly. Always check your gear for proper operation prior to diving.

You may need additional safety equipment for dives with certain specialized tools. For example, if you are using a high-pressure water blaster, you should wear a pair of foot guards, also sometimes referred to as a "metatarsal guards," to help protect you from accidentally shooting yourself in the foot with the blaster. Although this may sound funny, these blasters produce 10,000 p.s.i. or higher of water pressure and more than one diver has been seriously injured using this equipment.

Job Hazard Analysis (JHA)

#1 - Before the dive starts break the job into individual, observable steps.

#2 - Identify potential hazards with each job step. Consider environmental and health hazards.

#3 - Recommend safe procedures and personal protection equipment.

#4 - Assign a specific person responsibility for implementing safety procedures or protection.

#5 - Distribute the JHA to all personnel involved in the job or task.

#6 - Modify the JHA as the job situation changes...

A Job Hazard Analysis (or Job Safety Analysis) should be performed before every working dive.

If you will be welding or cutting underwater, you'll want to equip your helmet with a welding lens to help protect your eyes from the light of the arc. This equipment is vital to protecting your vision.

Just Say No – Sometimes…

Sometimes you have to know when it is time to turn down a dive. If you feel the circumstances surrounding the dive are too dangerous, you are under no obligation to dive. You always have the right to refuse to dive and you should not suffer any consequences for doing so. Again, we've always found that if we turned down the dive, nobody else stepped forward to make it in our place.

If you do get hassled by a supervisor or company management for refusing to dive, don't back down. Do what you think is right, even if it means looking for a new job. It's better to be alive and uninjured than the alternative.

Standing by to Dive

On most jobs, the diving will go on continuously until the work is completed. The supervisor will normally set up a "diving rotation," that is the order in which people will make the dives. While the first diver is in the water, the diver who will make the second dive is standing by to make his dive, as well as acting as a safety diver for the person who is already working in the water.

When you are the standby diver it is important for you to be ready at all times to go to the immediate aid of the diver who is in the water. This means that you need to be dressed in to everything except your mask or helmet. Your suit needs to be on, you need to be wearing your harness and bail-out bottle, and your fins should be on your feet. The only thing you should need to do is to don your mask or helmet and get into the water, and that should take less than a minute to do.

As the standby diver, you should be able to hear the communications between the person who is running the dive and the diver. Most dive stations will be set up so that this is possible, either with a separate speaker, or you may be able to hear at least the supervisor through the speakers in your mask or helmet. If you can hear that there is a problem, you should be starting to don your head gear before the supervisor even says anything.

Pay attention to what's going on while you are standing by so you are ready to act

Standby divers have the responsibility to be prepared to enter the water at a moment's notice.

If you must enter the water by jumping, turn on the free-flow on your mask or helmet first.

instantly if you are needed. You would want whoever stands by for you to be equally prepared.

Communicating with Topside

During your dive, you must communicate with topside frequently to keep them informed as to your progress and location in the water. Just as airplane pilots and police officers have certain terms and phrases they regularly use to keep their communications brief and understandable, divers have their own language. We will explain these terms as we discuss different tasks that divers perform.

When you speak to topside during your dive, the supervisor or life support technician will confirm they heard your transmission by responding with a "Roger" or by repeating what you said. When you are spoken to by topside you must also respond with a "Roger" or by repeating their instructions.

Keep your communications as brief as possible so that you are prepared to listen to directions from topside.

Entering the Water

You may be expected to enter the water as soon as the previous diver exits the water and the next standby diver is ready to go. However, there may be a slight delay if the job you're on has been set up to use only one particular hose for diving and the second hose for standing by, and your mask or helmet needs to be transferred to that hose. There may also be a delay if the supervisor needs to brief you on the progress of the job or the dive plan has changed.

If you can enter the water by using a stage this is preferable to jumping. If you have to jump, be sure to turn the free-flow valve in your mask or helmet on slightly before you enter, to help prevent the exhaust valve from inverting and flooding your mask.

Sometimes if the visibility is poor, or there is a strong current, the stage may be connected to the down line by a running shackle. This can make it much easier to get to the job site.

Depending on the conditions and the depth of your dive, it may be appropriate for you to exit the stage so that your hose leads through the side of the stage. This makes it easy for you to find the stage at the end of your dive, especially if the visibility is poor. The tenders can still feed you hose and haul it back in when they need to do so.

As soon as you enter the water, tell topside, "Diver in the water." When you leave the surface, tell them, "Diver on the down line, leaving the surface," so they know when to start the clock for your descent.

As you descend through the water column, it's essential for you to provide instructions for the tenders in regards to your hose. A good tender will not provide you with any slack in your hose unless you request it. If you are making a descent in deep water you can tell topside, "Slack the diver as he goes." Once you reach the bottom, if you are not moving away from the down line, simply say, "All stop on the diver's slack."

Using the Down Line

Commercial divers always work with a down line, which is a stout nylon or polypropylene line strung from the surface down to

the work site. The purpose of the down line is to provide a direct link to the job site so that you do not waste any time locating the site and to provide a way to lower tools to the diver efficiently.

The down line will normally have a weak link on its lower end made from manila, so it can be broken if need be, without the need to send a diver to the bottom to disconnect it. The manila line is spliced to the nylon or poly. An "eye" is spliced into manila to connect the down line to the structure you are working on at the bottom. The line is taken around the structure and a shackle is used to fasten the eye back on the line. The pin on the shackle should be positioned through the eye in the manila so that the pin does not rub on the down line itself and unscrew it.

The first diver in the water is responsible for establishing the down line at the work site. When you are taking the down line to the bottom you will need to tell topside to, "Slack the downline and slack the diver." If this task falls to you, try to pick a place to attach the line where it will not chafe against the structure. When the down line is connected to the structure, be sure to tell the com box operator that you have it established and where it is located on the structure.

Once you've connected the line to the work site, be sure that you don't take a turn around it yourself so that you are prevented from making a direct ascent to the surface. Have the topside crew take the slack out of the line so that it is taut, by telling them to, "Come up on the down line and make it "fast" (i.e., tie it off)." It's also important to ensure that you do not spiral around the line as you are making your ascent to the surface at the end of your dive.

If you need additional tools during the dive, the tenders will lower them to you using the down line. They will connect another heavy shackle to the line with a light weight line connected to the shackle. Any items to be lowered to you will also be connected to the shackle. The shackle and tools are then dropped down to you using this second "messenger" line. You can also send items you don't need back to the surface when the tenders retrieve the messenger line and shackle.

If the down line has already been established on the bottom when it is your turn to dive, just be sure that you make your descent to the bottom and your ascent to the surface on the same side of the line. If you don't, your hose will be wrapped around the down line and you will not be able to make a direct ascent to the surface in an emergency.

Managing Your Diving Hose

As a diver, one of the most important skills that you can learn is how to manage your diving hose underwater. Commercial diving hoses are heavy and awkward, especially if there is a hot water hose as part of the bundle. You need to be aware of where your hose is at all times.

Most hoses used by commercial diving firms are sinking hoses, although in recent years some of the "twisted" umbilicals on the market have been designed to float. There are advantages and disadvantages to both types of hose.

If you are working with a sinking umbili-

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Commercial divers always work with a downline.

cal on an oil platform and you are in mid-water, between the bottom and the surface, there will be a "belly" in the umbilical where it dips down from the surface to your position. This belly will be subject to drag from any currents running through the site.

Umbilicals that sink will lie on the bottom when you are working there, and they snag easily on any obstructions. If you have any sort of visibility it's important to watch for this as you work your way along.

When you are using a sinking umbilical and you must move away from where the down line is fastened, you'll want to pull some slack to you and coil up some hose to pay out as you move across the bottom. You'll need to tell topside how much slack to give you before you start to move.

Floating umbilicals pose a different set of difficulties. Floating hoses will float to a point near where you are located and then arc down through the water column to you. This means that they are less likely to snag on obstructions underwater, but they could be caught in the propellers of any boats that might pass through the dive site.

Divers working in strong currents have sometimes tied their hoses off to parts of underwater platforms to help reduce the drag on their hose and make it easier for them to stay in position. We don't recommend this procedure because you must untie the hose before you can surface. In an emergency, you could be trapped underwater.

In some cases, it is considered acceptable to use a welding rod bent in a single loop to secure your hose to a structure when there is a strong current. This will help to relieve the strain on the hose but can still be pulled free if needed. Check with your supervisor to see if this is acceptable to him before you use this technique.

ROVs

It's not uncommon today for a diver to be accompanied on his dives by an ROV (Remotely Operated Vehicle). These swimming "robots" are controlled by an operator on the surface who can see where the vehicle is going. Most ROVs have multiple thrusters that allow them to maneuver in any direction, at least one (and possibly several) video cameras, and perhaps a manipulator (robotic arm) to allow the ROV to perform mechanical work.

ROVs range in size from the very small units, that are basically nothing more than a "swimming eyeball," to large "work class" ROVs that may have as many as three cameras and two mechanical arms that allow sophisticated movement and manipulation. The ROV is powered by a tether connected to a topside generator and controls. The ROV operator may work side-by-side with the diving supervisor during the course of a dive.

Some divers are uncomfortable having an ROV at their side because the diving supervisor (and potentially the client) gets to watch everything that the diver does underwater during the dive. The positive side of this is that the supervisor can usually suggest ways to help you get the job done more quickly and with improved safety. In addition, the ROV can provide lighting and be used to carry tools.

ROVs have taken over some of the work that was traditionally done by divers, such as inspecting pipelines and platforms, replacing anodes, pipeline "tie-ins," and other tasks. It usually costs less to operate an ROV than to put a diver on the bottom, particularly in deep water. ROVs today operate at depths that far exceed a diver's capabilities. If an ROV is damaged or destroyed, the consequences are not nearly as serious as when a diver is injured or killed. Although some divers worry about ROVs completely replacing them, there will probably always be work for divers underwater.

Working in Black Water

While sport divers don't normally dive in conditions where the underwater visibility is zero, commercial divers must frequently dive in situations of this type. This lack of visibility increases the risk factor for all types of dives, but especially on any dives where you must rig lines or cables or where heavy objects are lifted underwater.

It's especially important that you do not trap any of your equipment or parts of your body inside any bights of line or cable that

Remotely Operated Vehicles commonly accompany divers on many jobs today. The ROV can provide lighting and carry heavy tools for the diver.

will be lifted underwater. If you are careless, it's possible to pinch off your hose or cut off a limb in this type of environment, when the line or cable tightens.

If you must rig in black water, be sure to take the time to double check that your hose and body are clear of all lines and fittings before any lift is made. The safest place to be during a lift will usually be on top of the load until it is clear of the work site.

Bell and Saturation Diving

Working out of a diving bell is one of the most exciting types of dives that you can do. It's a real rush to see the depth gauge indicating a depth of 300 feet or more, and being able to look out of the port and see your bell partner working outside, while you are sitting dry inside the bell and listening to the diving supervisor talking on the communications system. Of course, the fact that you are making a lot of money while doing this helps make it exciting, too!

There's a good chance that your first bell dive will start out with you entering the bell at atmospheric pressure on the deck of a barge or ship, rather than from within the pressurized chamber of a saturation system. You'll don your hot water suit and harness before you enter the bell. Your helmet may have already been connected for you by one of the tenders.

Saturation diving is the most sophisticated type of diving that you can do.

It's crucial that you know where every valve and gauge is inside the bell and that you can locate them by feel if all power is cut to the bell and there is no internal lighting. Prior to ever making a bell dive you should take every opportunity possible to hoist yourself up inside the bell and memorize the location of every piece of equipment.

Just as a pilot walks around his airplane, to be sure that everything is in working condition before he takes off, it's a good idea to take a walk around the bell and satisfy yourself that everything is working properly, both inside and outside of the bell. This is especially important if your dive is the first dive at the start of the job and the diving system has just been installed offshore. If there is anything that you don't feel is working properly, you'll want to see that it gets fixed before you make your dive. You'll want to pay particular attention to the emergency gas supply, emergency power supply, and through-water communications system. Also, be sure you are satisfied with the connection for the lift wire and that the lifting shackle has been properly secured or "moused."

Since each diver's "lock-out" (time spent outside the bell underwater) may last up to four hours or more, you will probably want to take some snacks with you to eat while the bell is in the water, as well as something to drink to help keep yourself hydrated. You may also want to take some paper towels for prepping your mask, cleaning ports, or other applications. Toilet paper isn't a bad idea, either.

Once you're inside the bell, the supervisor will take you through a pre-dive check-list to ensure that everything is operational. When the pre-dive check is complete, the deck crew will then close the outer hatch and the bell will be hoisted over the side.

As the bell is dropped into the water, the outer hatch should seal properly, so that

the internal pressure stays the same until you reach the bottom. Brace yourself as the bell goes through the air-water interface to make sure you aren't thrown against the inside of the bell and injured.

If you started your dive with the internal pressure at topside atmospheric pressure, the internal pressure should remain the same throughout the descent. (If you started the dive already saturated in the diving complex, initially, the bell will have an internal pressure greater than the surrounding pressure.)

Once you reach the depth where you will work, the supervisor will have you blow down the bell to the bottom depth. When the pressure inside equals the pressure outside, you'll be able to open the bottom hatch. If you started your bell run already saturated, with the bell on the sat system, you will need to equalize the pressure in the trunk space between the top and bottom hatches. The supervisor will instruct you when it is time to do this.

You'll need to assist your bell-mate in donning his gear. This can be extremely awkward since most diving bells are extremely cramped for space inside. Take extra care not to drop anything through the bottom hatch as it may be lost forever, especially if the bell is in midwater and not close to the bottom.

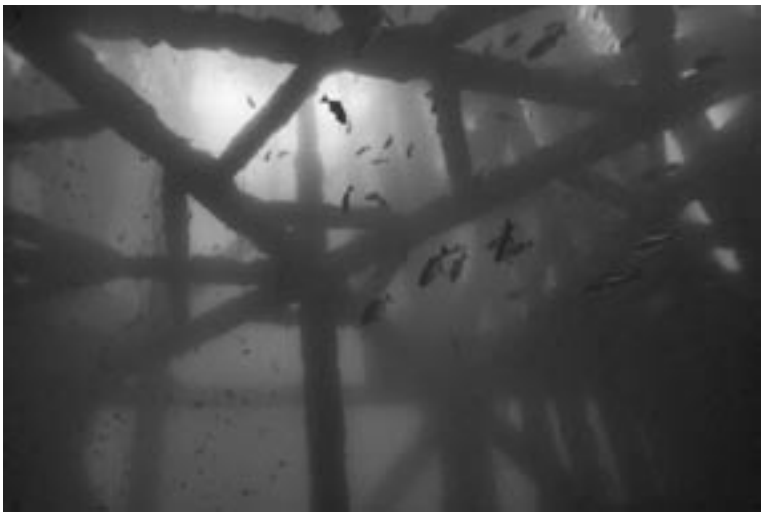
As the bell "man" (or bell tender) you will need to pay attention to what's going on while your bell partner is in the water. Keep an eye on the bell manifold pressure so you know at all times how much pressure is being supplied to the diver in the water. If you see a sudden drop in the supply pressure from topside, be prepared to switch your partner over to the emergency supply immediately.

Listen carefully to the diving supervisor so you can anticipate your partner's needs. Your mask or helmet should be set up so that you can don it instantly in the event you need to go to the assistance of the diver in the water. If possible, your hose should be connected to your harness and set up so that it will feed out to you if you need to leave the bell to perform a rescue.

Since your bell run may take place at any hour of the day or night, it may occur at a time when you would normally be asleep, or you may have already worked a full shift be-

An individual diver's bell "lock-out" may last four hours or more in the water.

The interior of most diving bells is very cramped.



When you are working out of a bell, you must always know where the bell and you are in relation to the structure you are working on. An offshore oil platform like this one can be a real maze underwater.

fore you are asked to dive without any prior notice. In these situations, it's easy to become drowsy inside the bell. Don't let this happen! If the bell heater is making the bell too warm, turn it off. It's essential that you remain awake and alert throughout your turn as the bell tender.

Pay attention to where the bell is in relationship to any underwater structures. If the bell appears to be moving closer to the structure, let topside know immediately. You don't want to have the bell damage any part of the client's structure, or for the bell itself to be damaged.

Depending on the type of vessel you are working from, the bell may heave up and down in the water column, especially if there is no compensation system to deal with this topside. In this situation, the water level will rise and fall in the bell's trunk, forcing you to equalize continuously. This can be extremely uncomfortable, but there is nothing you can do about it except to grin and bear it.

If there are lights illuminating the work site, and you can see your bell partner, keep an eye on him as much as possible. You want to see if he has any problems and be alert if he needs to be rescued so that you are taking action before topside realizes there is a problem. You would want the same thing done for you.

Once your bell mate has finished his turn in the water, he will return to the bell so that you can trade places. This should be done as quickly and efficiently as possible.

When you first drop into the bell stage, take a moment to make sure that all of your gear is working properly. If the bell is heaving up and down, you may need to brace yourself between the bottom of the bell and the stage to don your fins and secure any tools you need to your harness. Be careful to avoid injury in this situation.

After you leave the stage, you may need to follow the down line to the job site, especially if the visibility is poor or the bell is a long distance from the work site. Be sure not to take a turn around the down line or you will not be able to return to the bell quickly in an emergency.

When you have both finished diving, the supervisor will want you to prepare to leave the bottom as quickly as possible. First, you'll need to close the outside hatch and dog it tight. Next, you'll need to close the inner hatch, taking extra care to make sure nothing is between the hatch and the sealing surface that would interrupt the seal. Take care with your fingers and toes when you close this hatch to avoid injury.

Once you're sure the hatch is closed, the supervisor will start to bring the bell up. Watch the internal depth carefully to make sure you are not losing pressure and notify the dive supervisor immediately if you see that this is a problem. When the bell nears the surface, brace yourself as it moves through the interface again.

After the bell is on deck, it will be mated to the saturation system where you will com-

plete your decompression. When the bell is lifted up for this purpose, be sure to brace yourself to help avoid injury.

With the bell on the entrance lock and the pressure in the trunk equalized, you'll be able to open the top hatch. Carefully, climb down into the entrance lock and transfer any of your personal gear out of the bell as quickly as possible. You need to clear the bell so that the next dive team is able to get inside and start their bell checks as soon as you are able to do so.

Ideally, your crew should be able to "turn the bell around," i.e., bring it up, swap dive teams, and put it back in the water - in under an hour. An experienced dive crew should be able to do this easily.

Once you're back in the sat system and the bell has been put back in the water, you can take your time getting out of your gear and get yourself cleaned up. Your hot water suit and other equipment can be passed out through the medical lock so it can be cleaned up for the next dive.

Emergency Procedures

Accidents are always possible in the commercial diving environment and it's imperative that you think through in advance how you will handle different types of incidents. This doesn't mean that you should spend all your time thinking about morbid events, but you should be clear about how you could respond to emergencies. Probably the most important reason for this type of mental preparation is that different equipment and diving environments may require different sorts of reactions.

Some of the more common incidents to which you may need to respond include a loss of your topside breathing gas supply and the rescue of an unconscious diver. Less common incidents include things like the loss of a diving bell, or the need to evacuate divers who are in saturation aboard a ship that is about to sink.

Loss of the Topside Breathing Gas Supply

It's possible to lose your gas supply due to any number of reasons, including such causes as a compressor failure, a severed hose, or a trapped or crushed hose. You need to consider each of these scenarios and how you might respond depending on where the incident takes place. Unfortunately, there is no one correct response for all situations.

The universal response for losing your topside air supply will normally be to turn on your bail-out bottle and make a direct ascent to the surface. However, if you have a decompression obligation or are making a dive inside a structure like a wreck, or saturation dive, this becomes a much more serious situation.

Probably the most dangerous circumstance in which you could lose your air supply would be if your hose was crushed due to the collapse of a wreck or a fall by an overhead load. If your hose is crushed, but not severed, you must act quickly as you will be trapped at depth. Although you may be able to cut through the diving hose with a knife, it's unlikely you will be able to sever the communications wire this way. In this situation, probably the most efficient way to cut through this type of cable is with a pair of sidecutters.

Recovering an Unconscious Diver

If you ever have to rescue an unconscious diver underwater, be prepared for a physically and emotionally exhausting experience. It's very difficult to move an unconscious diver quickly through the water. Although you may have some assistance from your topside crew, you may have to swim the diver around obstructions without any help from the surface. If you are working out of a diving bell, you will be completely on your own, with no one to help you.

If there is a stage available, getting a diver out of the water is relatively easy, but if the diver must be hoisted up a ladder it can be extremely difficult. Most diving harnesses will have a "D-ring" on them located between the diver's shoulder blades specifically to assist the

crew in lifting an unconscious diver.

Diving bells will typically have a pad eye welded into the top of the bell and a block and tackle or hoist for pulling an unconscious diver inside. If you are working out of a small bell, it can be extremely difficult to position the diver's legs and other gear so that you are able to close the hatch.

Lost Bell

Although it rarely happens, diving bells have at times lost their lift wires and umbilicals. When this happens, the surface crew must take swift action to perform an effective rescue. If the water depth is less than 300 FSW, there's a good chance that the topside crew will send a surface-supplied diver down to attempt to put a new lift wire on the bell. Each diving company will have their own set of procedures in dealing with this type of accident.

In most situations, where a lift wire and umbilical are severed, the accident that will cause this will probably be rather abrupt. The tender inside the bell will need to take immediate action and switch the diver over to the bell emergency gas supply and activate the emergency power system.

Your bell should be equipped with some type of wireless communication system and you should attempt to use this to establish a link with topside. Keep in mind, however, that these systems do not always work. Your bell should be equipped with an emergency pinger/locator and this should be activated promptly. It's important to remember that if you are in this situation, there probably are serious problems with your surface-support vessel and a rescue may be hours away.

If your bell has lost its umbilical and lift wire connection to the surface, there will probably still be a good length of both the umbilical and cable attached to the bell. These wires and hoses may be entangled in any structure you were working on and this would possibly complicate the rescue of the bell.

Even if the torn cable and hoses are not entangled, their weight may prevent the bell from surfacing under its own lift if the ballast weights are ditched. In either case, if topside cannot initiate a rescue, one of you will probably need to lock out to cut away this debris using a hack saw or cable cutter. This is a dangerous situation since you will not have a hot water supply to keep you warm and you will be breathing a heli-ox mix which drains heat away from your body.

You also need to know whether the emergency gas supply and power supply will need to be ditched for the bell to float. Since each company's equipment works differently, this is an important subject that you'll want to discuss with the supervisor and other divers on the job before you ever make a saturation dive. If the emergency gas and power must be ditched, too, there will be an extremely short window during which the bell can be recovered and you would survive.

The first thing that you'll probably want to do, once both of you are back inside, will be to close the bottom hatch and get a seal on it. If you know that surface conditions are good, but there is no rescue operation underway, you'll probably want to try to release your ballast weights and if everything works properly, the bell should float to the surface.

Floating on the surface inside a diving bell can be extremely uncomfortable or even a dangerous situation, especially if surface conditions are rough. Some bells are equipped with restraining harnesses for you to wear in this situation.

If you are unable to drop the weights, or the bell does not surface for some other reason, you'll need to be prepared to wait for a rescue. All bells should be equipped with a lung-powered scrubber system for removing carbon dioxide, and some type of passive heating system for keeping the divers warm in the event of this type of emergency. As the oxygen level in the bell drops, you'll need to either add additional oxygen or flush the bell with fresh mix.

Evacuation by Hyperbaric Lifeboat

Sometimes the topside crew will know in advance that the situation is deteriorating and may prepare to evacuate the divers who are in saturation by putting them in the hyperbaric lifeboat and either transferring it to another vessel or launching it in the ocean. This

is a serious decision and not one to be taken lightly. Situations that might require this type of action would include a fire on a vessel or a vessel that was in danger of sinking.

There has been at least one case where saturation divers were evacuated from a drill rig that was on fire by transferring them to the bell and placing the bell on the back of a supply ship. This will never be a simple procedure because there usually won't be time to transfer the bell control van along with the bell. In addition, the crew will have to rig makeshift accommodations to control the temperature in the bell within a safe range.

Reporting Decompression Sickness

Decompression sickness is a risk in all diving and is taken very seriously by most working professionals.

Every diver in the crew should undergo a field neurological exam following the completion of their decompression at the end of each dive or whenever they exit the decompression chamber. This simple test can help to uncover subtle cases of decompression sickness that might otherwise be missed.

Decompression sickness can produce serious permanent disabilities in divers and must always be treated promptly. As a diver, it is your obligation to report any suspected cases of decompression sickness to your diving supervisor immediately. You should never feel as though you are jeopardizing your position within the company for reporting decompression sickness.

Responsibility for Paperwork

As a diver, you will be responsible for completing a wide variety of paperwork for each job. If you are the lead diver on a three-man team, or you are a supervisor of a crew, there will be even more paperwork to which you must attend.

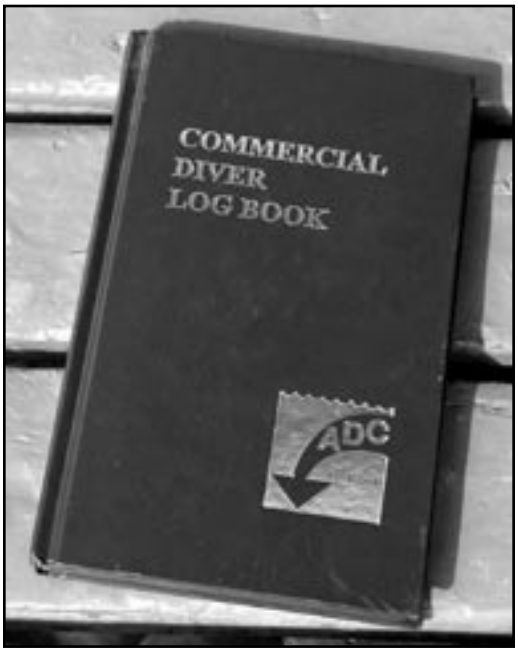
The typical paperwork that must be completed on every job includes dive logs, daily work logs (time sheet), consumables and equipment logs. If you are on an inspection or repair job, you will also be expected to submit reports as to what took place on the job. You will be evaluated on the legibility of your handwriting, the completeness of your paperwork, and the clarity of your writing. Illegible or incomplete documents or unintelligible writing will not advance your career.

The paperwork you submit for your jobs becomes a legal record of what took place. If a customer disputes a charge, or a diver suffers decompression sickness and sues the company, your paperwork will be a central part of the legal proceedings.

Two types of dive logs are used throughout the commercial diving industry. Each diver is expected to maintain a personal dive log which is a record of his personal experience. In addition, a company dive log is normally completed for each dive, which includes specific times, gas mixtures, location, personnel, and similar information.

The daily job log or work log includes a list of the personnel on the job, dives made, hours worked, and progress on the job. This is part of the paperwork that is used to bill the customer. In most situations, a customer's representative will be on hand to sign this paperwork each day.

The consumables log includes all of the



Each diver is expected to maintain his own logbook.

special items that are used for the job and billed to the customer. This form usually has a list of every consumable item that is not considered part of overhead, such as helium-oxygen mixtures, fuel, video tapes, and other special items. Each company handles these items differently, but there are almost always some items in this category that will be billed back to the client.

Equipment logs normally reflect all of the equipment used on the job and may also include mobilization and demobilization charges. In most cases, the office will instruct you in how to complete this paperwork and which items should be billed. Like the job and consumables logs, the equipment log will usually need to be signed by the customer's representative.

Your Mobile Office

As a diver today, it's a good idea to carry a laptop computer and a digital camera with you on every job to which you are dispatched, especially if you are on a small crew or are a supervisor.

Using a laptop in the field will allow you to prepare reports that have a polished appearance, complete paperwork swiftly, and transmit documents electronically back to your office. A digital camera is also highly recommended so that you can photograph conditions topside at the work site and include these in your reports to management.

Moving Up

If you are successful as a diver, perform well and are well-liked, eventually you will be promoted to lead diver. As a lead diver, you will make more money, have the opportunity to go on better jobs, and make the more important (deeper) dives on the jobs you go on. This is an important step in your career.

As you gain experience and maturity, eventually you will almost certainly be asked to supervise, if you have any talents in this area at all. If you're interested in becoming a diving supervisor, be sure to read Chapter 11 on *Working as a Diving Supervisor*.

Carry a laptop computer with you on the job to keep your paperwork up to date.

Interfacing with the Client

If you are the diver that has been sent out as part of a three-man dive team, you will frequently be interfacing with the client's representative directly. It's important that you present a professional appearance at all times, both in your dress and personal conduct.

Nobody expects you to wear a suit and tie to a diving job, but you should have a clean company T-shirt or polo shirt and a pair of jeans in presentable condition for wearing when you go to get your paperwork signed. Be polite and be sure to ask if the client has a moment to speak with you, rather than just barging in and demanding that your paperwork be signed.

Dealing with clients in the oil patch and other construction environments can be difficult, but you must remain calm and always stress safety above all other issues. Author Steve Barsky has shut down drilling rigs operating at thousands of dollars a day when conditions were too dangerous to dive. In all cases, the clients have backed down when the safety issues were explained to them calmly but firmly.

Be sure to have a supply of business cards with you whenever you meet with a client, so that you can hand them one at the start of your meeting. If your company does not supply cards, have some printed up with your name and photograph. You want to have clients asking for you by name if you want to advance quickly in the industry.

True Tales of Commercial Diving from the North Sea

On a typical bell diving job, the ship or barge from which the bell is operating must be anchored to the bottom with a minimum of four anchors to provide the stability and safety needed to conduct the operation. This is a time consuming and expensive process, as it normally takes a separate vessel to run the anchors out and drop them before diving operations can commence. If you could avoid laying anchors, almost a full day of work could be saved.

In order to eliminate the need to lay an anchor spread, naval architects developed ships that operated with "dynamic positioning systems." Dynamically positioned (DP) vessels use a Global Positioning System (GPS) (or other transponders) and multiple thrusters to hover in an extremely tight radius that must not exceed more than a few feet in any direction. These ships were first deployed for diving back in the late 70s.

While the concept of a dynamically positioned vessel is a good idea in theory, they may not always perform as expected, which can cause diving accidents. In 1978, when "DP" ships were a new concept, the Global Positioning System did not exist and DP technology was rather primitive. An incident that happened in the North Sea almost took the life of author Steve Barsky.

I was diving back inside an oil platform at a depth of 100 feet when the diving supervisor told me to work my way back to the down line and prepare to come up. The water was very green and visibility was poor. Although the dive was being terminated after only five minutes, I was not alarmed until the supervisor told me to forget the down line, that the tenders would pull me back to the stage.

I met the stage at a depth of 40 feet and quickly climbed inside, where I was immediately hoisted to the surface. When I reached the deck and removed my mask, the tenders' eyes were wide and they both looked at me and remarked that I had almost been killed. They suggested that I turn around and look at the platform that I had been diving on behind me.

When I looked over my shoulder I saw that the ship was almost 300 feet away from the platform, but when I had entered the water we were only 50 feet from the platform. Apparently, the dynamic positioning system went haywire and the ship began to move rapidly away from the structure. This action alone could have caused me a serious injury, but another problem could have been equally serious or fatal.

A line had been tied to both the ship and the platform so that mail could be lowered to the ship from above. Unfortunately, the line had been tied tight on both ends and when the ship pulled away, the line ripped a 15 foot section of chain link fencing off the side of the platform.

The fencing sailed through the air and landed in the water, apparently just missing me. If it had struck me while I was in the water, it could have killed me on impact, or torn my hose out of the tenders' hands, dragging me to the bottom at 400 FSW. When I went over and tried to lift the line to which the section of fence was attached, I was unable to budge it.

A few days later, the DP system failed again, while a diver was working outside the bell at 400 FSW. The bell crashed into the platform, tilting on its side, partially flooding the interior. Following this incident, we all refused to work from this ship unless an anchor spread was laid.

Steve Barsky