On-Scene Diving Accident Investigation

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When a diving accident occurs, an investigation of some type usually follows. In many cases, there are multiple investigators, each with a different agenda. If the police become involved, their approach is to look for any evidence of a homicide. The U.S. Coast Guard (U.S.C.G.) normally performs some type of investigation any time there is a death that occurs when diving takes place from a vessel in U.S. coastal waters. In the event of an accident during an organized dive through a dive store, such as a travel event or training, the certification agency's insurance carrier will normally dispatch an investigator under the direction of an attorney to research the case, interview those involved and collect the equipment. Unfortunately, in most cases, the investigation takes place some time after the event has occurred. The quickest response in some cases may be the U.S.C.G., if they fly an investigator out to a vessel. In most cases, the police will meet a boat, or travel to a beach site. In the diving industry, the investigation may not take place until weeks or even months after the event has taken place. It depends on how fast the persons involved report the event, how long it takes the paperwork to move through the legal department of the training agency and how proactive the insurance carrier is in dispatching an investigator. If the investigator is tied up with other work or cannot make contact with the persons who were involved in a timely manner, there may be further delays in the investigation. No matter how quickly an investigation is launched, in almost every case, the body has been recovered and resuscitation attempted, equipment has been removed and possibly damaged or lost, and the people at the site have returned to their homes. The equipment may be mishandled by the authorities who are unfamiliar with the gear and have stored it improperly. This paper addresses the steps involved in a recreational diving accident investigation as performed by the author. They cover personal interviews with witnesses and those involved, equipment inspection (not testing), sequestration of the equipment, site inspection and document collection. Equipment used in the course of an accident investigation will also be discussed.

Introduction

Scuba diving is an adventure sport, and because of this, there is always some risk in diving. Whether a person is snorkeling on a shallow tropical reef in warm, clear water, or performing a penetration dive using a rebreather inside a deep wreck in the North Atlantic, risks are always present.

When a diving accident takes place, an investigation of some type almost always follows. Investigations may be of several different kinds, depending on the organization performing the investigation. While most recreational diving accidents are usually straightforward, if the incident takes places in an extended-range environment or using special equipment, the investigation may require additional expertise that is beyond the scope of the investigator. In the investigation of diving accidents, it is important to remember that there is nobody who is an expert in all types of diving or all pieces of equipment.
In most cases in the United States, the investigator will normally be working under the direction of an attorney for the insured.

In some municipalities, there may be no one from the police or coroner’s office who has the experience to investigate a diving accident. In other locations, there may be detailed investigations if there are qualified personnel to conduct the work.

In the United States, the job of the investigator is normally to gather the facts of the case, collect any relevant documents, secure and inspect the equipment, visit the site and take statements from the persons involved in the case. It is generally not the job of the investigator to form opinions about the incident or arrive at conclusions, rather merely to report the facts, usually in the form of a written report.

If there is litigation, the expert witness will examine all the documents collected by the investigator, inspect or test the equipment and offer testimony as to what he believes took place either in deposition, court or both. The expert may also assist with developing lines of inquiry for the attorneys who are handling the case, perform re-creations of the incident or other tasks as directed by the attorneys. Investigators need a wide range of skills and equipment to do their job and must be conversant with the latest technology.

Protocol
Appendix D is a checklist to guide on-scene investigations. The tables shown here represent a baseline dive accident investigation protocol. The protocol should be expanded to cover the specific equipment that is involved in a particular accident.

Motivations for Investigations
Different agencies have their own reasons for conducting diving accident investigations. For a police department, their motivation normally is to determine whether a homicide took place. In the United States, the Occupational Safety and Health Administration (OSHA) will usually investigate if they feel there was a workplace violation. The U.S. Coast Guard is mandated to investigate any fatality that involves a vessel in U.S. waters, particularly a vessel that is carrying passengers for hire.

In the sport-diving industry, risk managers are normally concerned with instructional dives or organized dives conducted by a dive store. Most insurance companies are aggressive in investigating diving accidents and will investigate any accident or claim that takes place in an instructional setting.

Timeframe for Investigations
In many diving accidents, some type of rescue/recovery usually takes place within a brief interval from the time the dive organizer discovers there is a problem. When this occurs, the person is normally stripped of his or her equipment, and

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the diving suit, if worn, is usually cut away to aid with life-saving efforts. In most cases, the investigator arrives on the scene hours, if not days, weeks or even months later. This is particularly true when the accident takes place in a remote location.

It is truly the exceptional case in which a police diver qualified in underwater crime scene investigation arrives on the scene within a short period of time and conducts a thorough crime scene analysis. This is not the fault of law enforcement but simply the reality of sport diving, as well as the intense efforts usually made by those present to rescue their fellow divers.

Conversely, in other cases, the body may not be recovered until some time after the event has occurred, or the victim may die after rescue. In one case handled by this writer, the body could not be located by the police, and friends of the deceased were prevented by weather for searching for the body until more than a week had gone by. When the body was recovered, the well-meaning amateur divers were unable to drag the diver with all of his gear back into their small inflatable and towed the body back through several miles of kelp before dragging the body across a boulder-strewn cove to deposit it on the beach.

Tasks in an Investigation

There are numerous tasks that normally take place in a diving accident investigation. These tasks include, but are not limited to:

- Interview of witnesses and anyone who may have been involved in the incident.
- Inspection of the site, which may include a beach, a boat, a dive store and/or a swimming pool. This may or may not involve diving the area, depending on your knowledge of the site and the details of the incident.
- Inspection of the equipment, including emergency/rescue equipment. The equipment is normally photographed and secured for holding by the attorneys representing the defense.
- Collection of documents from the instructor, dive store, vessel and other public or private agencies. (Other documents that may be included in the final report include charts, 911 logs, U.S.C.G. reports, etc.)
- Interaction with public agencies

Some attorneys may prefer that interviews be recorded on video, while others may prefer an audio recording and transcript. Still others may insist on a narrative report written by the investigator.

In some jurisdictions public agencies may be very cooperative, while in others obtaining documents such as an autopsy report may require a subpoena obtained by the attorney who is overseeing the work of the investigator.

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The end result for most investigations is a comprehensive report that will allow a risk manager, who may not even be a scuba diver, to make a decision on how the loss should be handled.

**Skills and Traits for Dive Accident Investigators**

There are a number of skills that are vital to conducting an effective investigation, no matter what format the final report may take. An effective investigator must have the following talents and abilities:

- The ability to elicit people's trust and help
- The capacity to write clear narrative reports
- The skill to take good photographs
- The ability to think critically and shift gears as new information presents itself
- Sensitivity to nonverbal cues from people being interviewed
- Tenacity

The investigator must be compassionate and nonjudgmental while conducting interviews. The people you will be interviewing will have gone through a traumatic experience. In all likelihood they will be experiencing some form of survivor guilt and will sometimes blame themselves, even if there was nothing they could have done to prevent the accident. It is not uncommon for the interview to be a very emotional experience for most people, including the investigator himself.

To ensure that you gather all of the information available, it is imperative that you be tenacious in your determination to secure interviews with all of the people who were directly involved in the incident. In many cases, people who you think may only be peripherally involved may have important information. In addition, it is vital to follow up all leads on any documents that may relate to the incident.

**Tools of the Dive Accident Investigator**

There are many tools that are used by the skilled dive accident investigator. At a minimum, any person conducting an investigation will probably need the items listed here:

- A digital camera capable of taking high-resolution photos that can be enlarged for courtroom presentation (Some digital cameras also shoot acceptable video, but it may be difficult to use for extended video captures.)
- A video camera capable of taking widescreen video (Frame grabs are possible from HD video cameras that may be acceptable for court use.)
- Laptop computer with network card for conducting Internet searches, sending email, etc.
- Smartphone with capability to send email and access web
- Color printer for printing reports
- Flatbed scanner for scanning student documents, charts, reports from other agencies, etc.
- Nautical charts/maps of the region where the incident took place (Maps are used to locate hospitals, fire department stations, etc.)
Voice recorder for recording interviews (always ask permission first)

Magnifying glass for reading very small serial numbers etched into equipment

Chalk to help make serial numbers readable, especially when stamped into black plastic equipment (Chalk is rubbed into numbers to increase readability.)

Handheld GPS for precisely locating sites, especially those that have no name

Oxygen analyzer to ensure gas mixture in cylinder is as purported to be

Gas sample kit, which will usually be rented from a lab capable of gas analysis to test for carbon monoxide, oils, etc., in the victim's air supply

Fiberglass measuring tape for taking dimensions on vessels, on beaches, at swimming pools or other locations

Vernier calipers to measure small pieces of equipment, damage to gear, depth of gouges, etc.

Electronic scale, which is required for weighing diving weights, especially if they have been hand poured

Jumpsuit to help protect your clothes and body in the event that you must inspect equipment that has been exposed to a biohazard or is very dirty

Latex gloves are desirable for handling equipment contaminated by blood or vomit

Gear inspection checklist with a list of the equipment you expect to encounter and notes to remind you to check serial numbers, pockets or other features

Interview questions based upon your understanding of events surrounding the incident

An investigator may not need all of these items on every investigation, but the more prepared one is when he enters the field, the easier it will be to conduct a thorough investigation.

If the investigator is an experienced diver, unless there is something especially unusual about the site or the circumstances of the accident, it is usually not necessary to dive the site.

Conducting Interviews
Whenever possible, interviews with people who have been involved with a diving accident should be conducted in person rather than over the telephone. This allows the interviewer to establish better rapport and to gauge the person's facial expressions and body language while discussing what transpired.

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Normally, the investigator will need to set up personal interviews in advance, which takes time and schedule coordination. However, some people will want to complete their interview upon initial contact by telephone. Should this occur, as long as the interviewee is not one of the principal parties to the incident, the investigator should be prepared to conduct the interview on the spot. Unfortunately, it’s not uncommon for people to change their mind and be unwilling to cooperate at a later date, unless compelled to tell their story under the force of a subpoena.

Although the investigator’s basic list of interview questions will normally be prepared in advance, he must always be prepared to ask new questions as the information from the incident unfolds. In many cases, interviews may be back-to-back, and it will be important to add new questions on the fly.

One technique that is often helpful in preparing interview questions is to create a chronology of events. This will often reveal information that is missing. However, it is essential to realize that not everyone's timekeeping devices will be synchronized. Just because one person’s account of when events took place is different from another’s does not necessarily indicate that a particular person is not telling the truth. It’s also vital not to “cue” the witness based upon information the investigator may already know.

Investigators must be discrete and cannot discuss their investigations with people beyond the offices of the law firm supervising their work. In the United States, their activities are normally considered “attorney/client work product.”

**Sequence of Interview Questions**

The sequence of questions asked by the investigator usually follows the normal sequence of events that took place during the accident. The interview will usually include questions about the diver’s training, events leading up to the dive and the incident, any attempts made at rescue and resuscitation, and any other postdive events that may have relevance.

In an instructional accident, typical questions will include the history of the diver's training, any unusual events that occurred during training, the source of the gear used by the diver, any use of drugs or alcohol by the deceased or instructional staff, and the plan for the dive. If the diver completed training at more than one facility, it is important to interview any instructional staff who may have interacted with the diver under different circumstances.

The interview will then normally segue into the events of the dive itself. Questioning will include issues such as sea conditions topside, underwater visibility at the site, buddy separation, instructional supervision and problems the victim experienced during the dive. When and where the victim was last seen, as well as their actions at the time should be covered in detail.

The details of the rescue and/or recovery will be very important. It is always essential to interview the person who recovered the body, the people who participated in administering CPR as well as any other bystanders who may have observed the event. The investigator must keep in mind that new divers or nondiving bystanders may not understand exactly what they saw or may not be able to describe the events in terms used by the diving industry.

**People to Interview Following a Sport Diving Accident**

There are usually many people to interview following a diving accident. This list will vary, depending on whether it was a training incident or merely organized
recreational diving. Some of the people to interview might include:

- Any instructional staff if the dive was being conducted for purposes of training
- Vessel crew, if the dive was conducted from a vessel, including captain, deckhands, etc.
- Other divers who may have been on site
- Any rescue personnel who may have been involved in the incident

In other types of diving incidents, there will usually be other individuals who may be relevant to the investigator’s inquiry. For example, in a public safety diving accident there will normally be a dive team leader, and there may be a line tender who is tending a tethered scuba diver. There will also usually be other dive team members on site.

Inspecting Diving Equipment

Although the investigator may have a preliminary list of what equipment to expect, it is not uncommon to be confronted with other unlisted equipment. Visually inspect each piece of equipment, and note any serial numbers or other marks (such as rental numbers). Note any obvious defects, such as a torn mouthpiece or a broken drysuit zipper. Investigators do not normally disassemble any equipment.

As an investigator, equipment inspection rather than testing is normally the rule. Testing may be destructive and may change the amount of air remaining in the cylinder(s) or cause other changes. Testing is normally conducted when all parties that may be involved with any pending litigation are present.

It must be kept in mind that equipment that has been stored for any length of time will usually not be in the condition that it was in at the time of the accident. Batteries in dive lights and dive computers may not be functional, O-rings and diaphragms may have deteriorated, and salt water may have caused corrosion or metal parts to “freeze,” making them inoperable.

If the investigation calls for the assessment of gear with which the investigator has no direct experience, such as a particular model of rebreather, it will be necessary to find someone with the required knowledge to help examine this gear. In these circumstances, it behooves the investigator to learn as much about the gear as possible prior to the inspection. Make sure that the person assisting with the exam proceeds slowly and explains each step they plan to take prior to taking any action. Be sure to check the records of the Consumer Product Safety Commission (CPSC) to see if any of the equipment has been recalled.

Vessel Inspection

In some cases, the vessel itself may be directly involved in the accident. It is not unusual for a vessel to strike a diver. In some cases this may lead to death due to
unconsciousness or serious bleeding. When insufficient safety equipment is present, such as side rails or safety chains, or the diver performs an unsafe act, such as leaning out over the side, divers have been known to fall over the side and be run down by the vessels they were traveling on.

In cases involving a vessel, the investigator will want to try to obtain any drawings of the vessel. If these are not available, it’s vital to take the measurements of the vessel. If the vessel involved was backing down to pick up a diver, the investigator will want to be sure to measure the line of sight from the helm to the stern (or swim step if visible). If the diver was struck by the prop(s), it may be necessary to make a dive to take measurements on the diameter of the prop(s), their placement on the hull and any other hardware present. Underwater photos or video will be very helpful in these cases.

**Dive Store Inspection**

If the incident involved rental equipment provided by a dive store, then a visit to the store is in order. Particular attention must be paid to the repair department, records of rental gear maintenance, compressor testing and all training records. Copies of any receipts for credit card transactions made by the victim must be obtained.

**Compiling the Report**

The end result of a dive accident investigation is normally a written report containing all of the materials collected by the investigator in one document. This report is normally delivered to the attorney who has been assigned to handle the case on behalf of the insurance carrier.

A good report will include all of the following documents:

- Table of contents
- Narrative summary of the events of the incident
- Chronology of the events
- Individual interviews
- Nautical chart (or map) locating where the event took place
- Photographs of the equipment and the site, vessel (if applicable) and dive store
- Photographs of the equipment
- Documents from public agencies (police, fire, U.S.C.G.)

**Conclusion**

Conducting a diving accident investigation is never a fun task. At best, the investigator can only pursue his work with compassion and take solace in the knowledge that his investigation may help to prevent similar events from occurring in the future.

**Acknowledgement**

The author would like to express his appreciation to Stephen Hewitt, Esq., who served as a mentor for him through many diving accident investigations.

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Recommended Reading


Discussion

KEN KURTIS: I am scuba consultant with the LA County coroner. How many fatality investigations do you do a year?

STEVEN BARSKY: Right now I do them as part of my expert witness work, so they are a little bit different. As an accident investigator you get to go out and directly talk to the people. As an expert witness, you do not get to directly talk to the people in most cases. So now I am probably doing two or three cases a year, but back in the ‘90s and late-’80s, I probably did a total of about 80 cases. Again, it is all industry driven, and it is driven by a lot of politics.

DR. SIMON MITCHELL: Who usually instructs you in these matters? Who brings you into this situation in a typical case?

BARSKY: In a typical case if it was direct, only accident investigation, then your case is going to usually come through the insurance company. The insurance company may call you directly, or maybe the attorney’s office may call you. As an expert witness, it is always through the attorney’s office.

MITCHELL: Do you find that your terms of reference make a difference to the way people react to you in your investigations?

BARSKY: In the insurance-driven investigation, the people who are involved who are insured have an obligation to talk. They have to share what happened. I have had people who have been less than forthcoming. The worst-case scenario I can think of is I had a guy set up to do an interview — a very busy guy, assistant instructor, divemaster in Los Angeles in the entertainment business. We had set up this interview. I got to his office. I could see him sitting there; there was a glass wall. He did not want to talk to me. I told the secretary, “Look, just tell him if he does not talk to me in the next five minutes — we have an appointment — I am going to have to call the insurance company and tell them he did not cooperate.” But that is rare. That is really rare.

CAPT. JOHN MURRAY, U.S. Navy: You implied with looking at the gear that if you reached a point or if there was something about the particular investigation that made you question maybe the BC malfunctioned or maybe you did not drop weights as the person intended to, that you sort of would be careful not to alter the piece of gear, that you sort of would inspect it but not actually detach the weights if they were detachable. So how do you figure out where you are going to send it in that situation? For me the answer is easy because I send it to NEDU [Navy Experimental Diving Unit]. How do you figure that out?

BARSKY: The way I would figure that out is I would talk to the attorney and say, “This is the situation I believe we have. This is the way it appears to me, and how do you want me to proceed?” And let it go from there. Because it is always going to come back to — if it goes to litigation, and the assumption is in our society here in the United States it probably is going to go to litigation, particularly if there was a death involved — if you have altered it from the way it was, all bets are off. And it is very, very difficult to establish a defense. Again, if this is done on behalf of the dive industry, it is going to be a defense case. Did I answer your question?

MURRAY: I guess I am concerned at getting to obviously root cause and trying to make sure you prevent future diving accidents. So if the Diamond brand of BC has a problem, I want that to be found and to be fixed; fix future BCs if there is a problem with a particular gas mix or something. So ultimately somebody who is competent to actually evaluate how this particular device functioned or did not function seems like it is important. Are you implying that ultimately — if you are driven by the insurance industry — that they are going to know how to actually get the definitive answer, that when you contact them, they are going to say, send this BC to the manufacturer or send this drysuit back to Bare?

BARSKY: Generally what is going to happen is at some point there possibly is going to be a joint inspection by both parties, by plaintiffs and the defense. So, for example, I get a rebreather investigation with a semi-closed-circuit rebreather. Most people in the room can probably figure out which one that was in the case that took place in Hawaii. We had a joint inspection of the equipment as it was received from the police department by myself and Joe Dituri, who was representing the plaintiff’s side. At that particular time we went through and tested the rebreather and found certain issues with it. That is all at that point in time we could come up with. That is as far as it went. It was videotaped. Everybody saw what happened. There were attorneys there from both sides. It really depends upon the circumstances.

GREG SHULTZ, U.S. Coast Guard: Getting back to the discussion of root cause, does DAN take a look at — if we have multiple accidents — events tied in with pieces of equipment? We can associate that through our investigations. But on the
recreational side and specifically within the insurance side you have fragments of pieces of information. Is anyone collecting those and trying to see if there is causal analysis that will drive to a certain piece of gear? Is there anybody that is doing that?

DR. RICHARD VANN: It is an important question. Somebody needs to do that. DAN has done that, but DAN is not an investigative agency, so DAN cannot go out and do studies of equipment. What we do is just contact the coroners, Coast Guard, family members and so forth and request that information be sent in. Then we will analyze that information based on what we can get. But there is definitely a need for a central collection agency to do it, if it is DAN or somebody else. Somebody needs to do it and it needs to be formalized.

DAVID CARVER, Los Angeles County Sheriff’s Department: Dealing with multiple jurisdictions around the country and other parts of the world, where have you found that most of the equipment that needs to be looked at is kept in the interim months and years between the time of the accident or fatality occurs and you get called?

BARSKY: That really depends. Usually what happens is it normally goes to the police department, and it's in the police evidence locker for a period of time, which may or may not be well stored. For instance, in this rebreather case I was talking about, the rebreather was stored in an un-air-conditioned evidence locker after it had been dragged across the beach through the sand, and it was unrisned. So it was full of sand. It was in a hot place, and it had been stored there for two months. So what sort of shape do you think it was in? Typically what happens is — when I was doing field investigations, I was doing lots of those — I would try to get there as soon as possible and take custody of the equipment. Normally what happens is, in a case where there is a training agency involved, the equipment is going to go to the attorney’s office who will be defending the case, theoretically if there is a case, if a case occurs. So that equipment will be stored at their offices, and that is usually what happens. But there is a period of time usually where it is in the hands of law enforcement. It may or may not be inspected. I know, for instance, Ken, you were doing gear inspections in LA. There was a dive shop in Monterey that for a long time did gear inspections and issued reports and proclamations. It just really depends upon where it takes place. Some places it’s just turned right back out. You are in the middle of Minnesota or Michigan, some of those places, small towns, and there may be nobody there who knows what to do with it.