

“Every Dive May Be a Polluted Water Dive”

By: Steven Barsky

For commercial divers working in coastal or inland waters, the risks of exposure to biological and chemical contaminants has reached record levels. As the population of the U.S. continues to grow, these problems have gotten worse. Pollution, natural disasters, and transportation accidents have all contributed to the dangers that divers face on a daily basis.

At the Underwater Intervention Conference in January of 2000, Viking encountered an amazing number of divers who work in these environments, yet contended that they did not dive in contaminated water. In many cases, it was almost as if they did not want to acknowledge the dangers they face because they did not want to confront the problem. Part of the reason for that attitude stems from the mentality: “We’re tough. We’re professional divers and we expect to dive in terrible conditions.”

Commercial divers are not the only professionals who face serious hazards in waters contaminated by toxins and biohazards. They also are not alone in their denial of the risks they face. Scientific divers and public safety divers face the same risks and are usually less protected than the commercial diver, who usually wears at least a full-face mask, if not all of the gear that should be worn when facing substances that can maim, cripple, or kill.

Never Presume That You’re Safe

Fred Jackson, a lieutenant with the Cuyahoga Fire Department in Ohio, is in charge of Special Operations/Water Rescue for his agency. He is also one of the authors of the National Fire Protection



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Association (NFPA) Standard #1670 on Operations and Training for Technical Rescue Incidents, including search and rescue diving.

Jackson’s divers are accustomed to diving in polluted water; a few years ago, the Cuyahoga River caught fire because it was full of chemicals. As the person responsible for diving operations in his department, Jackson requires his divers to be totally encapsulated with either a full face mask or a full coverage diving helmet, a vulcanized rubber dry suit, and mating dry gloves. Personal experience has taught him not to take risks when it comes to diving in polluted water.

About nine years ago, Jackson was exposed to something in the Cuyahoga river that caused a fungus to grow on his body, causing the loss of all pigment in some of his skin. The treatment for the fungus was a powerful drug with the potential for serious liver damage. When Jackson accidentally transferred the fungus to one of his twin sons who was less than two years old, he became greatly concerned. While

story continues on page 2



both father and son were eventually cured, Jackson's team now follows complete haz-mat decontamination procedures after virtually every dive they make.

Biological Contamination

While the chemical hazards of the Cuyahoga might appear obvious, the dangers of biological contamination are often much more subtle. Mike Berry, a sergeant with the Virginia State Police, found out the hard way when he was exposed to single-celled amoebae in waters close to home.

Following a dive in a farmer's pond 14 years ago, Berry ended up with a pounding headache that wouldn't go away for a week. He took personal sick leave to stay at home, not realizing the seriousness of his condition.

Several years later, Berry made another dive in an abandoned quarry to recover a large amount of stolen evidence. Although the water he was diving in looked clear, he noticed a distinct lack of fish and other living organisms. The amoebae that leaked into his ordinary scuba mask, which covered only his nose and eyes, again made its way up his nose and into his brain. By the time Berry got home from the dive, the pain was so severe that he was rushed to the hospital by ambulance and was told he might not survive. After a spinal tap and a complete diagnosis, Berry was treated with antibiotics and morphine. He couldn't work for two and a half months and the full effects of the amoebae did not leave him for four months.

It wasn't until this second exposure that Berry's department issued full-face masks, vulcanized rubber dry suits, and dry gloves to every member on the dive team. This type of gear affords excellent protection from virtually all biohazards, as well as

from many chemicals.

One of the major problems with diving in polluted water is that contaminants are frequently suspended in the water around the diver. Some chemicals may float on the surface and others may pool on the bottom, but biological hazards are in suspension and can enter through any weak point in the diver's gear.

Responding to the May '96 ValuJet crash in the Everglades, divers had strong concerns about biohazards and chemicals they might encounter at the site. In addition to biohazards that were naturally present, such as fecal coliforms from animal wastes, there was also potential exposure to biohazards from crash victims, as well as aviation fuel and other toxics from the plane.

The presence of biohazards in the water have become all too common. One of the most dangerous biohazards to divers was identified only a few years ago in the waters of North Carolina. *Pfiesteria piscicida*, a toxic dinoflagellate, is the agent behind numerous fish kills along the East Coast. *Pfiesteria*, which causes lesions in fish and kills them in a matter of hours, is also toxic to human beings. Divers and laboratory workers exposed to *Pfiesteria* have suffered from open sores, loss of memory, loss of reasoning ability, and symptoms that resemble dementia. *Pfiesteria* can suck the contents out of red blood cells, leaving nothing but empty shells.

Pfiesteria and species related to it have been identified all along the eastern coast of the U.S. from Maryland to Florida. It lies dormant during the winter, but becomes active during warm weather, especially when high levels of pollutants such as animal wastes are present. In North Carolina, where factory hog farms spill hog wastes into the water, *Pfiesteria* is a serious problem.

While *Pfiesteria* may be one of the more dramatic hazards faced by professional divers, a more insidious hazard is one that lurks in virtually every city; non-point source pollution. Non-point source pollution includes any type of chemical or biological waste that flows with the run-off from rain into our lakes, streams, rivers, and oceans. Environmentalists and biologists now recognize this type of pollution as a major problem.

A good example of non-point source pollution occurs in Santa Barbara, Calif., where the level of bacteria at local beaches has reached such high levels that many popular sites are now closed for weeks each year. No one source has been identified as the root of the problem, although leaking septic tanks are

story continues on page 3

certainly an issue, as are wastes from wild animals and pets. Similar problems have occurred in Huntington Beach, Calif.; Key West, Fla; and at beaches in Hawaii.

Better Equipment Means Increased Safety

New and better protection has been developed for divers to protect them from the biological and chemical hazards so prevalent at most dive sites. There is a variety of new full-face masks that cover the eyes, nose, and mouth, as well as improved helmets that connect directly to the diver's suit, providing total encapsulation. Helmets like the SuperLite-17K[®] have been designed to provide a more positive connection to the suit, ensuring better protection. Helmets used for diving in coastal waters must be fitted with a double exhaust system to prevent backflow into the breathing system of contaminants like the amoebae that infected Mike Berry's brain.

In addition to the development of more advanced equipment, manufacturers are taking a more aggressive

stance in testing their equipment and making this information available to divers. While no standards currently exist for polluted water diving equipment, manufacturers are testing to topside standards for Haz-Mat suits such as those listed by the American Society for Testing Materials (ASTM) and European Norm (EN).

When selecting equipment, it is important for divers to be sure that equipment has been tested to equivalent standards. Divers should select gear based upon the most conservative and stringent test methods.

Diving in polluted water presents many risks, but today we have better equipment, information, and training to deal with this danger. With the proper gear and education there is no reason for commercial divers to place themselves at risk.

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