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EPA Divers: Getting Down to the Nitty Gritty

by Roy Popkin

They tell jokes on themselves: "What's a large orange monster from the deep that smells like a hog farm on a hot summer evening? No, it's not the Loch Ness monster. It's just another EPA Region 4 diver completing a routine operation." Or, "That photo looks overexposed because it's solid black, but it really shows EPA divers at work."

Translated, the first "joke" describes an EPA scientist wearing a dry suit and full face gear who has just emerged from a 60-foot, zero-visibility descent into a six-foot bed of bypassed sewage sludge during a sediment oxygen demand study. The second reflects the fact that over 70 percent of the dives made by EPA's underwater teams take them into poor visibility or total darkness created by sediments, underwater growth, and pollutants.

From the "Flower Garden" in the Gulf of Mexico to the polluted bottom of Boston harbor and Seattle's Puget Sound and the site of the "Delaware Wreck" in the Atlantic Ocean, EPA divers are doing a job that is far from the glamour of a Cousteau film or a Barbados TV commercial. They don't find sunken treasure or the remains of privateers, but they do find evidence of illegal dumping, the impacts of on-shore pollution, and, in many ways, a scientific treasure trove.

EPA's divers are not a separate organzational unit, although their role has been formally recognized for at least 10 years. There are a formal certification and training program, "dive masters" in a number of locations, and a diving chapter in the Agency Safety Manual.

Many of the dives made by EPA's underwater teams take them into poor visibility or total darkness. This diving candidate at Gulf Breeze, Florida, uses a modified mask that gets its air supply from the surface. This type of dry suit has been safely used in hazardous environments, such as oil spills. Steve Barsky photo.

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Currently, there are about 35 men and women who are EPA-certified divers, an equal number with equivalent certification, and arrangements with a small number of contract divers from such resources as the University of Rhode Island. Even though diving is not an official EPA job category,it is an important activity performed by EPA marine biologists, engineers, technicians, and others whose jobs require underwater sampling, research, or exploration. In fact, only one-fourth of the Agency's divers ever dove for sport or recreation. Most of them learned diving skills because they needed them to better perform their EPA duties. This year three members of the Emergency Response Team assigned to Edison, New Jersey, are being trained as divers.

Says Jonathan Amson, the dive master for EPA headquarters and Regions 2 and 3: "EPA diving is hard work; it's not macho. It's not like sport diving. It's not playing. You may have six to eight things to do on the bottom and only 15 minutes in which to do them. It's a necessary part of the Agency's high quality science. Fortunately, you can make a diver out of a scientist even if you can't always make a scientist out of a diver."

The divers support a variety of EPA programs involving ocean dumping, Section 404 estuary actions, waste management activities related to spills, National Pollution Discharge Elimination System (NPDES) permits, and technical assistance to states. They also perform Superfund reconnaissance, enforcement efforts (where they become underwater detectives), and the collection of data for water quality, oceanographic, and other ecological surveys. About a quarter of the dives are done from the EPA Ocean Survey Ship, the *Peter W. Anderson*, two to 150 miles off-shore. And perhaps another 25 percent are inland in rivers, deep lakes, estuary waters, and quarries—the latter usually part of Superfund investigations to determine if drums of toxic wastes have been dumped there.

According to Amson, who has to approve all dives planned from the *Anderson*, EPA limits diving depths to 130 feet, beyond which decompression chambers would be required. The average depth is between 80 and 90 feet, he says, but Region 4 divers working in estuaries and shallow harbors often dive in six to ten feet of water ("sort of like diving standing on your head").

Perhaps the busiest group is the seven divers in Region 4. The team is led from the Athens, Georgia, research laboratory. Some of them have done over 500 individual dives on EPA missions; the core group has been diving together since 1976.

Often called "dean" of the diving program is Region 4 dive master Don Lawthorn, an engineering technician who began diving in 1969, while working for the Interior Department, but has never been a recreational diver. He learned to dive in connection with a study of effluents from power plants in the Miami-Fort Lauderdale area. His deepest dive was 18 miles from Tampa, in the Gulf of Mexico, where a team of divers went down over 100 feet to find flat, ecologically safe areas in which to dump the product of dredging operations. One member of that team, Bruce Reynolds, now stationed at EPA's Narragansett, Rhode Island, laboratory, recalls that, in contrast to most dives, "the water was so clear you could see other divers 35 yards away and you could lay out your tools just as you would in a laboratory."

Diver Phillip Murphy credits "the uncertainty associated with collecting bottom samples through remote devices" as an important factor behind the creation of the team. Obviously a water quality model, for example, is only as accurate as the data input to it. New and innovative approaches were developed that required diving for gear deployment and data collection. Today, all sediment oxygen demand chambers in waters deeper than three feet are placed by diving teams to protect the integrity of the samples and resultant models. The lidded chambers used for sediment samples and monitoring the rate at which sediment uses up oxygen, are anchored so they don't leak. Because each operation involves seven chambers, attached to 18 cables, deploying them is tricky and necessitates being under water longer than one can breathe without a mask and tank. The danger of becoming entangled in the mass of cables means the divers work in pairs.

The worst place Reynolds has worked is the bottom of Long Island Sound, where heavy algae growth and sediments make it so "totally dark you can't tell whether your eyes are open or closed."

Unfortunately for the divers, such studies are usually related to the cleanup of degraded waters. "Dirty water diving" involves chemical and biological hazards such as oil/asphalt spills and bypassed sewage sludge, physical conditions such as zero visibility and currents approaching three knots or more, and a variety of marine creatures.

Amson provides another insight into how divers have improved EPA's underwater science. His first EPA dive, in 1973, was to place monitoring equipment in the "Flower Garden," a coral reef 150 miles southeast of Galveston in the Gulf of Mexico, for the purpose of measuring the results of effluent from the mouth of the Mississippi River. "In those days," he says, "there was a lot of trial-and-error with results that often didn't show what was needed. Since the diving program began, we have done innovative things like using the ship and trailing tape cameras to study the bottom. We can track densities and movement of chemicals because we can return to the exactly the same place time after time to monitor the growth or impact of pollutants on the same groups of underwater plants, which may be only a few inches tall."

Dive master Jim Patrick at the Gulf Breeze Laboratory was another instigator of the "formal" EPA dive program. "By 1978, there had been a lot of shallow water diving in the south and up at Narragansett. Region 4 had a team. The time seemed right to formalize what was going on. There was a need to get serious about it." Patrick contacted Tony Brown, director of the Agency safety program, who took steps to set up an appropriate training program. Now there are one or two EPA training programs annually, at Gulf Breeze. Initially, the training was provided under a contract with the National Oceanic and Atmospheric Administration (NOAA). Now it is conducted by EPA. Considerable emphasis is placed on the physics and physiology of diving, diving into contaminated waters, and accident prevention.

Safety is a paramount consideration. In addition to the 130-foot depth limit, EPA divers are not allowed to go into

areas with unknown dangers. In Superfund investigations, for example, a remote observation vehicle is often used first to find out what might be in a quarry or deep lake. Divers going into known or suspected pollution wear a double-lined suit specially developed by the EPA and NOAA called the "SUS" (suit under suit). It was designed to provide maximum protection from chemicals in the water. Also, a buddy system is used to protect divers against being trapped, alone, in the dark.

Patrick himself recalls collecting samples for a pathologist in a channel at the bottom of Pensacola Bay. It was dark, and littered with bridge pilings and pieces of steel cable. He and his buddy had to keep each other out of trouble. Actually, the most serious accidents to EPA divers have been ruptured eardrums, but dive master Dwayne Karna of Region 10, whose divers work in heavily trafficked Lake Union and Puget Sound around Seattle, worries about the danger from boats of all sizes whose pilots "often ignore our flags and markings."

On the east coast, EPA divers are involved in a number of biomonitoring research projects, in which they test the effects of pollution on mussels placed in underwater cages. The divers have to collect, replace, and otherwise service the mussels and the cages. They also collect sediment cores for analysis, as well as collect worms and small shellfish with a suction dredge that works like a small vacuum cleaner. They dive into extremely polluted areas like Boston Harbor to study the impact of pumping sewage into the harbor. The worst place Reynolds has worked, he says, is the bottom of Long Island Sound, where heavy algae growth and sediments make it so "totally dark you can't tell whether your eyes are open or closed."

For other regions he has helped check the fate of sewage sludge in the New York Bight, the effluent from a big chemical plant in Toms River, New Jersey, and was part of a diving team that examined a 750- by 150-foot floating drydock deliberately sunk in 120 feet of water 30 miles off the Delaware Coast, at an Atlantic Ocean site informally known as "Delaware Wreck." The team studied the wreck to see how the wooden parts had withstood submersion, what underwater plants were growing on it, and whether fish had turned it into a habitat.

In another unusual east coast project, Richard Traver, an engineer at the EPA Releases Control Branch in Edison, New Jersey, is coordinating an underwater search the Army is conducting in Chesapeake Bay to locate drums of white phosphorus dumped by the Aberdeen Proving Ground in the early 1920s.

Karna heads the only dive team on the west coast. Its divers, one of whom is stationed in Alaska, do many inspections related to NPDES complaints, generally in locations around company or publicly owned treatment works outfalls. They also do a lot of underwater investigative work for Superfund and did the underwater sampling that located hydrocarbons in Seattle's Lake Union, subsequently posted as unsafe for swimming and fishing. They also check for organic enrichment under floating fish farms in the area.

The divers frequently participate in enforcement investigations. Three years ago, Reynolds was asked to collect samples off a Rhode Island company's outfall to see if the company was dumping pollutants illegally. The "above water" team included the Rhode Island state police and state environmental inspectors. Reynolds and his colleagues found blasting sand in the bottom sediments; the company was ultimately fined for its actions.

There was one Region 10 investigation that could have been especially dangerous. Although most of the companies being inspected are friendly, Karna recalls that in this instance there was a phone call to the regional office in which the caller implied that a lift suspended over the pier would be dropped on the divers. The harbor police boat crew working with the divers donned their guns while the divers continued below, in muck so dark they had to hold hands to keep in contact. They did find, by the gritty feeling, illegally dumped pollutants. The company was convicted.

On the lighter side, EPA divers do run into marine creatures, but to date they have not caused serious problems. Murphy reports that a manatee cub once mistook an EPA diver in a wet suit for its mother and paired with him until driven away, and Amson came up from a dive off the Delaware coast to be asked if he'd seen a six-foot shark close to him. He hadn't, even though sharks were his special interest when he was in graduate school; the big fish had left him alone during the dive. EPA divers checking effluent discharges from a seafood plant in Petersburg, Alaska, found a giant octopus living in an outboard motor casing.

Light moments, however, are few and far between. Says diver Reynolds, "Sports divers run around, take pictures. It's all fun. Research diving can be dangerous. It's all work ... but worthwhile." □

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EPA Diving Training Director Jim Patrick exits the water during diver certification training. Instruction is given in diving physiology, use of underwater equipment, and safety procedures required to monitor pollution or to document pollution damage.