

Researchers Discover New Pollutants Infiltrating Virginia Rivers

By Robert Hale and James Schultz

Historically, some chemicals that have performed as originally intended also have caused unforeseen problems when released into the environment. Polychlorinated biphenyls (PCBs) and dichloro diphenyl trichloroethane (DDT) are two such examples. VIMS researchers have recently discovered that another chemical with detrimental environmental properties—a widely used class of fire retardants known as brominated diphenyl ethers (BDEs)—have become dispersed throughout the Roanoke and Dan rivers, in south central Virginia.

The biological effects caused by BDEs are not immediately obvious to the eye, but interactions of these chemicals with cellular metabolism may lead to long-term damage to exposed organisms, including humans. Medical researchers suspect that BDEs may impair immune system responses, disrupt endocrine function and delay intellectual and physical development. BDEs are also of mounting concern in Europe, where Swedish researchers have recently reported that concentrations of BDEs in human breast milk have been

doubling every five years. Although overall levels remain low, the dramatic increase over time is alarming.

“Although we don’t yet know the full extent of their toxic effects, we do know that BDEs are persistent and that they can bioaccumulate to high levels,” says Dr. Robert Hale, associate professor in the Department of Environmental Sciences. “We’re finding that their environmental properties rival those of PCBs. BDEs persist in the field, accumulate in aquatic animals and exhibit similar modes of toxicity. They’re bad news—particularly since we continue to release them.”

PCBs were used as insulators or fire retardants in hydraulic fluids and electrical transformers. Although PCB manufacture was halted in the 1970s, the chemical, nevertheless, persists in measurable quantities in soil and water, and in the bodies of many fish and animal species worldwide, even in areas far removed from their original point of manufacture. Implicated as a cause of liver cancer in lab animals, PCBs may cause eye, skin and respiratory irritation in people in direct physical contact.

BDEs, on the other hand, continue to be widely used in the production of flame-resistant plastics, in the housings of personal computers and as a constituent of foam padding in seat cushions. Because BDEs have only recently been identified as an environmental threat, their release to the biosphere is not explicitly regulated by the federal government or the states.

The BDEs were detected by VIMS in the course of a study supported by and in collaboration with Virginia’s Department of Environmental Quality (DEQ), examining the extent of contamination in edible fish from state tributaries. After the discovery of the BDEs, the Commonwealth formed a task force consisting of DEQ, the Virginia Health Department, VIMS, and several other state and federal agencies to further investigate the extent of pollution throughout the Dan and Roanoke river watersheds.

The source of the BDEs and their route of entry to the rivers is currently uncertain. However, the polyurethane foam production process may be key. VIMS research has already shown that BDEs can be released to the atmo-

sphere from foam manufacturers’ exhaust stacks.

“Our data show that these BDEs have been widely released without anyone really noticing,” Hale says. “The BDEs detected to date are likely the top of the iceberg. Even if we found the source today and eliminated it, the chemicals already released will remain in the environment for years to come. And the longer they are used, the greater these levels will be.”

An article on VIMS’ BDE research was recently featured in the journal Environmental Science and Technology



Dr. Rob Hale and research team. Top row, L to R: Greg Mears, Dr. Rob Hale, and Mike Gaylor. Bottom row, L to R: Mark LaGuardia, Ellen Harvey, Matt Mainor, and Mara Jacobs.

Sea Scallop Research Resumed in June

By Sally Mills

Scientists in the Marine Advisory Program are gearing up for another season of sea scallop research in the Mid-Atlantic Closed Areas. This is a cooperative effort among VIMS, the National Marine Fisheries Service (NMFS), and commercial fishermen. A 15-day trip to the Hudson Canyon South site took place in June aboard the vessel, *Alice Amanda*, owned by Mark Shackelford of S&S Marine in Hampton, Virginia, and captained by Kenny Brown of Gloucester Point. Under the direction of Dr. William DuPaul, students and researchers are planning a second survey to the Virginia Beach site in August. The 2000 survey provided baseline information to help resource managers set harvest limits for scallops in these two areas, which are scheduled to re-open in March 2001.

Among other things, the data are used to estimate total biomass in each closed area, or an estimate of the number of pounds of scallop meats available for harvesting. That information directly impacts how the opening of an area will take place, including the length of the opening and the number of vessel trips allowed. Final decisions are made by the New England Fisheries Management Council with input from NMFS and the Sea Scallop Plan Development Team.

Researcher Dave Rudders has been part of the sea scallop research team for three years and has witnessed some refinements in the equipment used to conduct surveys. One advancement that is sure to help resource managers is the “inclinometer,” an instrument adapted from torpedoes. Its small sensor indicates when the dredge is in contact with the ocean bottom.



This 10-minute commercial survey tow yielded 30 baskets of 4-inch scallops.

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