

to normal. "If you go to the beaches of South Padre Island today," said ACS oil spill symposium participant Edward B. Overton, "you'll find good swimming and good fishing." Although it looks like "the end of the world" on the beaches during an oil spill, "The environment springs back," says Overton of the Center for Bio-Organic Studies. "In some people's minds, it's as though we create a sterile area after we've had a spill. This is not the case."

Other researchers do not share Overton's optimism. Some believe, for example, that the 37 tar mats, or areas of buried oil, in the subtidal region off the coast of Texas may present a continuing pollution problem. These mats reportedly measure about 60 meters long and 6 meters wide.

In addition, "Scientists still have not been able to account for the bulk of the 140 million gallons of oil that spilled from the Ixtoc I and that, according to NOAA, had covered up to 10 percent of the surface area of the Gulf of Mexico in the fall of 1979," Golob reported at the ACS meeting. Golob says that PEMEX unsuccessfully

used a variety of cleanup techniques, including skimmers, dispersants and the Sombrero oil collection device — a 300-ton octagonal steel cone similar in shape to a Mexican hat — to recover the spilled oil. Even though local storms and hurricanes were in part to blame for the overall failure of these techniques, Golob says, "If the Mexicans — with equipment from the best manufacturers and expertise from the finest spill experts worldwide — were not able to deal with the Ixtoc I spill, then the cleanup problems encountered ... raise questions about the adequacy of existing equipment and technology to meet the demands of any massive open-ocean spill, whether from a well blowout or a tanker stranding."

Golob says Ixtoc I analyzers should address not only those issues concerning blowout prevention and cleanup technologies, but also the political questions, such as compensation for damages from a transboundary incident.

These issues were discussed last December during the Senate hearing on the

Campeche oil spill. The hearings were particularly timely because in just 13 days the U.S. Department of Interior intended to hold the first lease sale for marine oil and gas activities on Georges Bank — an area off the New England coast considered to be the world's most productive fishing ground and thought to contain only 3.4 percent of the oil and 4.4 percent of the gas recoverable from the Outer Continental Shelf. When the sale proceeded as scheduled, following the Dec. 11, 1979, lease sale of a similarly controversial tract off the coast of Alaska, groups that oppose rapid development of offshore drilling feared that Ixtoc already had left the political arena — months before the well was capped.

Overton, though, says that while an increase in ocean drilling, and therefore future accidental inputs of fossil fuels in the marine environment, is inevitable, "We learned from the *Amoco Cadiz* spill, we are learning from the Ixtoc I spill and we will learn from future spills. This is an ongoing study.... We have not forgotten Ixtoc." □

Mussel-bound monitors

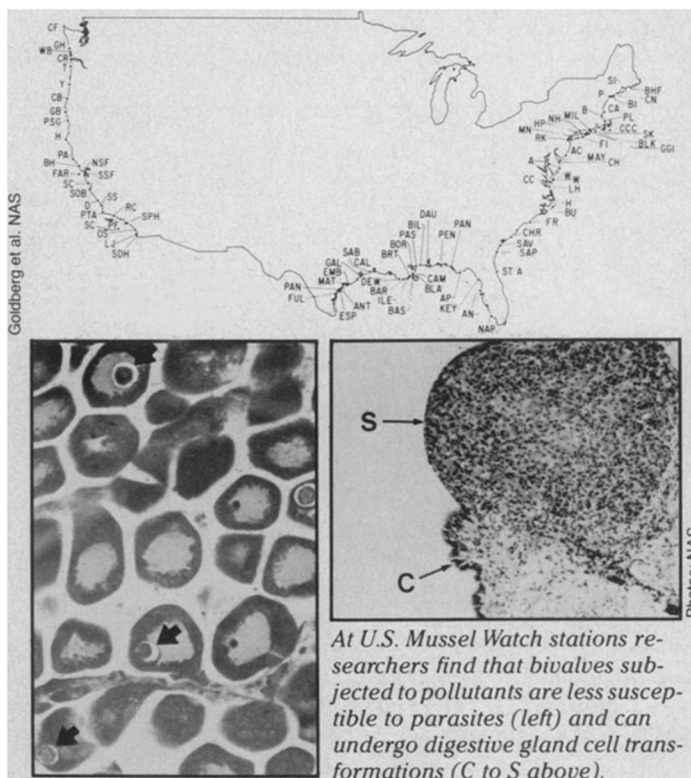
Where the ocean meets the shore is a dynamic environment highly susceptible to society's discards — fossil fuels, trace metals, halogenated hydrocarbons and radionuclides. Researchers recognizing the increasing threat to this precious environment have organized "Mussel Watch," a systematic and continuing program for monitoring coastal contaminants.

Mussel Watch is a strategy of using bivalves — mussels, oysters and clams — as vigilantes of marine pollutants. The program involves periodically analyzing tissues of bivalves from specific Mussel Watch stations to identify areas of elevated contamination and to provide baseline data from which future hot spots can be identified. As a routine part of the program, for example, oyster samples were taken from the shores of Port Aransas, Tex., before the Ixtoc I exploratory well blew out in June of 1979 and began spewing oil into the Gulf of Mexico. With this pre-Ixtoc baseline data in hand, mussel watchers on the Texas coast recently began analyses of post-Ixtoc oyster samples for fossil fuel compounds to aid in gauging the spill's impact.

If elevated concentrations of fossil fuel compounds are discovered in these samples, however, mussel watchers must consider all possible sources of contamination. The National Academy of Sciences estimates that 6.11 million metric tons of petroleum enter the worldwide marine environment each year from sources such as natural seeps (.6 million metric tons per year), industrial and municipal wastes (.6), river runoff (1.6), urban runoff (.3) and offshore production and tanker traffic (2.21). Oiled oysters can flag a problem but not its origin.

Another limitation of the Mussel Watch program is the fact that many different variables — bivalve size, sex, reproductive state and physiological condition, for example — may influence the levels of pollutants accumulated by mussels. Such observations have stimulated work in the development of an "artificial mussel," such as one made with polyurethane foam "tissues." These synthetic, pollutant-concentrating tissues would not be influenced by nature's variables.

Despite the limitations, bivalves could easily be global pollutant barometers, says Mussel Watch participant John W. Farrington, because they are composed of "cosmopolitan species." Explains Farrington, of Woods Hole Oceanographic Institution in Massachusetts, "Mussels and oysters have cousins worldwide; the mussel you see on the East Coast is close to the one you see



in the Mediterranean, which is close to the one you see on the West Coast." The similarity between species helps to standardize the program.

Evaluating the merit of a global Mussel Watch program was one concern of the recent NAS-sponsored International Mussel Watch Workshop in Barcelona, Spain. Now, a second Mussel Watch conference is in the works, and organizers hope to hold it in Southeast Asia to encourage input from Third World countries there. Farrington says this region could benefit from Mussel Watch not only because the program offers a relatively simple and inexpensive screen, or first-step, analysis for pollutants, but also because "a whole chunk of the world's population is living on the coast there."