

Oil on the waters: Modest progress in cleanup technology

"It is as difficult to get oil off the water as it is to get smoke back in the smokestack. There are no fancy, ingenious methods."

by Joan Arehart-Treichel

In March 1967 the oil tanker *Torrey Canyon* rushed into the rocks off the southwest tip of England and ripped open. Some 100,000 tons of crude oil spewed into the sea. To save resort beaches in England and northern France, 2.5 million gallons of detergents were dumped into the waters and on the shores. Fifty thousand sea birds drowned in the oil or were poisoned by the detergents. Sudsy seawater killed seaweed, crabs, starfish and lobsters, and left countless creatures without legs and claws. Ultimately the British Royal Air Force bombed the hemorrhaging tanker. She sank beneath the sea.

With soaring international demands for energy and petroleum transport, it was clear the *Torrey Canyon* would not be the last tanker to crash. Who would meet future disasters, and how?

In the United States, the Federal Government and the oil and tanker industries launched efforts to devise effective and nontoxic techniques to clean up oil spills. Today, five years and millions of Federal and industrial dollars later, scientists in the field agree the results are beginning to show.

Five years ago, about the best means of cleaning up oil was to put straw on it, then scoop up the oily straw by hand or with pitchforks. Now industry—backed by government or industry funds—has devised an arsenal of oil cleanup chemicals.

Thin-layer chemicals can be used to herd oil together and to thicken it, so it can be scooped from the water. Although straw is still widely used as an absorbent, because it is cheap and easily available, chemicals are available as absorbents too. Still other chemicals have been found that disperse oil throughout the water. Other chemicals show promise as oil-burning agents.

If five years ago straw was the best

means of picking up oil, the best means of containing oil before pickup was a hastily rigged Navy boom. Oil drums were fastened to each side of sections of plywood. A skirt hanging between the drums scooped oil off the water. Such a boom was makeshift and built on location after a spill occurred.

Now booms are commercially built and available before a spill takes place. Skimmers have been devised to remove oil from the water after the oil has been contained with chemicals and a boom. Some skimmers are paddle-wheels that skim thickened oil off the water. Others are conveyor belts, coated with absorbent materials, which dip into the water and pick up the oil. Still others are large metal disks that rotate down into the oil.



EPA

Fuel oil on New Haven shorefront.



EPA

Burning oil from tanker in Chedabucto Bay, Nova Scotia.

The U.S. Coast Guard has almost finished developing booms for use on the high seas. It is now working on an air-delivery capability for booms. It is also developing high-sea oil-skimmer devices. They will be tested later this year. It is researching means of detecting oil spills electronically, rather than visually, from airplanes. Such a device could be used in all kinds of weather.

Because of detergents' past disastrous effects on wildlife, the use of detergents for dispersing oil has fallen off greatly.

Says L. P. Haxby of the Shell Oil Co. in Houston: "When we first embarked on oil spill cleanup procedures through the American Petroleum Institute and the Coast Guard, people asked, 'Haven't you found a solution for oil spills yet?' Well, one of the first things we have learned is that there is no one, single solution . . . nor a single piece of equipment for every spill."

What approach is taken to a spill depends on the cleanup equipment available at the nearest Coast Guard station or oil or tanker company headquarters.

The Coast Guard is stockpiling equipment in various areas so that it can be flown to the scene of disaster. A lot of this equipment is just coming into inventory now, reports Robert J. Ketchel of Coast Guard headquarters in Washington. Some of it is still in the research and development phase.

The Environmental Protection Agency has not required or recommended a particular cleanup approach "because it depends on the location, types of equipment available, sea condition, weather, type of oil, and so forth," says Peter B. Lederman of EPA's Edison, N.J., facility. But, he says, if at all possible, the EPA prefers that oil be contained and removed from the water rather than dispersed throughout



Coast Guard

Coast Guard ship and helicopter examine a slick: "There's no single solution."

the water or sunk. Some other countries favor dispersion and sinking over containment and recovery. "I would think most people would use burning agents as a last resort."

Oil spill cleanups have also improved as Coast Guard, tanker and oil company personnel have become better trained to handle spills. For several years now, cooperatives of oil company, tanker and Coast Guard personnel have been set up in the major ports of the world. The cooperatives have phone numbers of people to call if a spill is reported. They also have a list of equipment available to clean it up. The American Petroleum Institute was instrumental in setting up these cooperatives. Admits a leading oil company executive, "It would be a gross misrepresentation to say that in the 3,000 ports of the world these guys are wait-

ing on tenterhooks to rush out and clean up oil. It's just not so. But the approach is being made."

The Coast Guard has set up a National Response Center with regional response teams to assess spills and then decide on appropriate action. Information coming to the local response center is fed to the national center and to the Environmental Protection Agency. The general goal is four hours from the time of notification to the start of cleanup action.

More stringent laws have also improved oil spill cleanups. Five years ago, about the only law on the books in the United States concerning oil spills was the Rivers and Harbors Refuse Act of 1899. Then the Federal Water Pollution Control Act was passed in 1970. It was addressed specifically to oil spills and is now the basic law

on the subject. Its main thrust is that the company that spills the oil is liable for reporting it and cleaning it up. If the spiller defaults in cleanup, it is the job of the EPA and the Coast Guard. The law, of course, pertains only to U.S. coastal waters. For international waters, many—but not all—countries have agreed to oil-spill-cleanup provisions outlined by the International Maritime Consulting Organization (IMCO) of the United Nations.

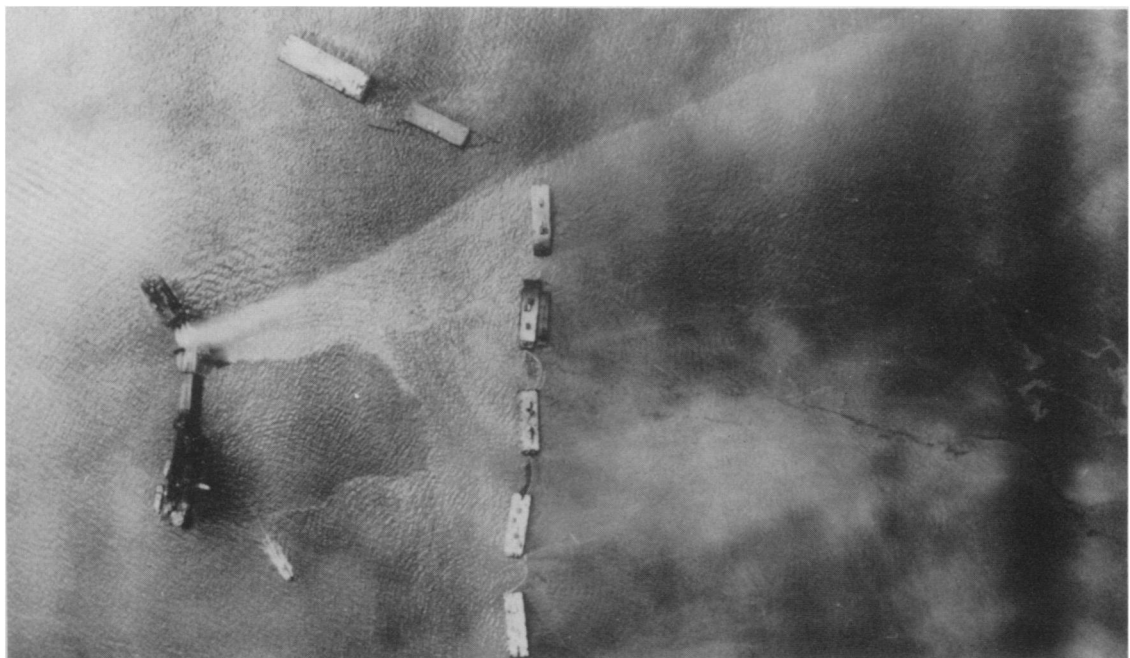
Oil companies and tanker companies have also set up insurance plans to pay for oil spill cleanups. This money has likewise reinforced cleanups.

But with a challenge as vast and costly as oil spills, many problems still need to be overcome. One of the most pressing questions concerns the effect of the new cleanup chemicals on marine life. Some work has been done on the toxicology of dispersants. Says Lederman: "Some of them are toxic, no doubt about it." But the larger difficulty of dispersants, notes EPA aquabiologist Ralph Nadeau, is that they disperse oil into tiny droplets that marine life swallow. These drops coat the respiratory tracts of a variety of marine organisms, and can suffocate them. It is because of dispersants' potentially harmful effects on marine organisms that the United States prefers containment and recovery of oil to dispersion of oil. However, Britain uses dispersants generously, in order to preserve the integrity of its recreational beaches.

So far, Nadeau says, relatively little research has been carried out on the effects of surface chemicals, absorbents and burning agents on marine life.

Will the EPA get to a point where it can recommend or require cleanup chemicals on the basis of their effec-

Oil in Gulf of Mexico south of New Orleans after month-long oil well fires of March 1970. Fire-fighting boats spray water on oil well platform as oil flows toward line of barges and booms deployed to check its movement.



EPA

tiveness and safety for marine life? Lederman replies, "We will probably eventually make a list of the things we find satisfactory in the laboratory. Yet we try not to be a product-endorsing agent, in the sense of a GOOD HOUSEKEEPING seal of approval."

Even after five years of stepped-up efforts, Art McKenzie of the Standard Oil Co. (New Jersey) in New York City admits, "There are no fancy, ingenious inventive methods for getting oil off the water. It is as difficult to get oil off the water as it is to get smoke back into the smokestack. It looks easy. But try it sometime in the kitchen sink. And when oil washes ashore, and you use shovels, straw, dispersants or other chemicals, it is a tough, dirty, highly expensive job."

Considering everything, though, most authorities on oil spill cleanup concur that progress has been made. Says Ketchel, "I'd say in the last year or two there have been significant advances in technology, in the develop-

ment of equipment and procedures for dealing with spills." And Haxby: "I think we are making progress. I don't claim we have all the solutions yet, but we certainly have more than when we started on it."

Even with progress in cleanup technology, though, spills themselves don't seem to be diminishing. There were 8,496 spills reported last year, according to EPA and Coast Guard figures. It is easy to see why prevention of spills is considered even more crucial than cleanup. Efforts are under way.

The Torrey Canyon and other accidents, for example, prompted the National Industrial Pollution Control Council to recommend to the U.S. Government that it set up, in the major ports of the world, traffic control systems similar to airplane control systems. IMCO has established traffic lanes in international waters, so that ships will avoid collisions. Standard Oil (New Jersey) has set up a center in Grenoble, France, to train ship captains how to

avoid collisions with other ships. IMCO is looking into other ways to upgrade officers on the world's 4,000 tankers and 46,000 dry cargo ships.

About 80 percent of the world's tankers are now trying to avoid operational pollution. This release results when the tanker carries water instead of oil on its ballast passage and empties this oily water into the ocean when it is ready to load up oil again. Now, before the ballast water is poured into the ocean, the oil is separated out. Some tanker owners are currently experimenting with cleaning tankers with oil rather than with water.

Next spring, IMCO is meeting in Brussels and should come up with more international treaties tightening oil spill prevention—for example, the amount of oil a tanker might discharge during cleaning on the high seas.

Only time will tell whether such preventive methods reduce spillage. Says McKenzie, "I think we are making progress, but it's hard to measure." □

A House committee's critical appraisal of oil spill regulation

At 2:45 a.m. on April 25, 1971, bargemen loading diesel oil onto their barges from a Texaco refinery at Anacortes, Wash., notified the Coast Guard that they had noticed a leak. A Coast Guard representative came, inspected the scene and found only slight traces of oil. On April 26, the Coast Guard closed the case. But new reports came in indicating that greater quantities of oil had been spilled. At 4 p.m. on April 27, Coast Guard officials realized they had a serious problem on their hands and they convened a "response team," made up of themselves, officials of Texaco, of the barge companies and of the Environmental Protection Agency. Texaco admitted at the meeting that 232,860 gallons of diesel oil had been lost into Puget Sound and various straits and channels connected with it. By this time (38 hours after the spill was reported) it was too late for containment. About 1,000 birds (grebes, scoters, loons and others) were affected, with an 80 percent kill of the 360 birds treated. There was "evidence of environmental damage" more than 14 days after the spill, EPA reported.

This account is taken from a report of the House Committee on Government Operations, "Protecting America's Estuaries: Puget Sound and the Straits of Juan de Fuca," issued Sept. 18.

The report deals only with the Puget Sound area, a biologically rich estuarine area "beginning to feel the pinch of pollution." But many of the conclusions of the House committee are applicable nationwide. Here are some of them:

- The Army Corps of Engineers is supposed to get clearance from the Fish and Wildlife Service before it issues permits for waste discharge into waterways, but has failed to do so, and instead has resumed an earlier policy of assuming absence of comment from FWS means the Interior Department agency approves. The Corps in 1971 issued a waste discharge permit to Atlantic-Richfield Co. to dump wastes into the Strait of Georgia in Washington, without even preparing the required environmental impact statement.

- "Although the Coast Guard reported 8,496 oil spills in the nation in calendar year 1971, it has not vigorously enforced the Refuse Act of 1899 or the civil penalty provisions of the 1970 [Water Quality Improvement] act in all cases of illegal discharge."

- Delay by EPA and the Coast Guard in regulating sewage discharges from ships may result in the United States failing to meet the timetable of a U.S.-Canadian agreement on such discharges.

- "Some Interior Department field representatives, despite their lack of technical expertise, have overruled the department's fish and wildlife experts on several occasions."

- "The EPA's enforcement efforts against polluters in the Puget Sound area have been weak."

The report is not entirely critical. For instance, it says, "The Coast Guard's new proposed regulations concerning oil transfer facilities and vessels are an excellent step toward preventing oil spills."

It seems clear that prevention of oil spills may be the only real solution. The report indicates that prevention may have two broad aspects: First, provision for safeguards in the storage, transfer and transport of oil and, second, imposing some limits on an oil-hungry economy.

Refinery capacity in the Puget Sound area increased eightfold from 1955 to 1972. Coast Guard Rear Adm. Joseph J. McClelland told the House committee that the volume of crude oil shipped into the Puget Sound area by the year 2000 will be 31 million tons, "two and a half times" present levels.

Much of the growth is expected to come from super-tankers bringing Alaskan North Slope oil from Valdez on the south coast of Alaska. The super-tankers are huge and unwieldy, and a University of Washington team of economists and engineers has predicted that an eventual spill from one of the huge ships into Puget Sound is a certainty (SN: 5/20/72, p. 325). The team members say the ecological consequences could be irreversible.

—Richard H. Gillyuly