

Argo's legacy: Batch of oily pancakes

If any good came out of the *Argo Merchant's* 7.7-million-gallon oil spill last December (SN: 1/1/77, p. 6), it was the additional knowledge made available to marine researchers about the behavior and movement of oil at sea. For more than two months, the biggest spill in history transformed the waters off Nantucket into a huge, aquatic laboratory for a National Oceanic and Atmospheric Administration (NOAA) study team.

In its preliminary report on the spill, NOAA concludes that *Argo's* No. 6 industrial fuel oil "apparently did not greatly contaminate the water or seafloor, but appeared to have had some impact on the marine ecosystem there."

The oil did not enter the water column. But instead of spreading out thinly and dispersing, the oil formed large, floating pancakes—50 to 90 feet in diameter and several inches thick—that shrunk in area and thickened over time. NASA's Nimbus 6 satellite tracked a buoy placed in one of the pancakes and relayed environmental information to the scientists. In addition, Navy divers swarmed around several of the slicks and obtained unique photographs and observations on the underside of globules, which they reported, "looked like burned carbon."

Small amounts of oil that were detected in the water column appeared to be a light-weight "cutter stock" used to dilute the heavier No. 6 oil. No oil contamination greater than 250 parts per billion was found, and that was diluted to background levels by turbulent mixing within a few days.

Although the full biological impact of the spill will take more than a year to assess, NOAA's fisheries biologists report substantial contamination of zooplankton in the slick area, with lower levels of oil contamination among near-surface sea life on the Nantucket Shoals. Comments one NOAA investigator, "I don't think we expected to find that much oil on the plankton." Nearly all the pollock eggs sampled near the site were contaminated, with a high proportion of dead, moribund or deformed embryos. Oil globules were found adhering to the surface membranes of most of the eggs. Of the 305 fish examined, however, only three had traces of oil-like material in their stomach.

The impact on seabirds and marine mammals apparently was slight. But a number of oiled birds washed ashore at Nantucket and Martha's Vineyard, and some as far away as Dartmouth, Nova Scotia—"suggesting," say the researchers, "that the oil affected some species, principally murre, well away from the spill site." Scientists speculate that the murre, which spend more time on the water than most other sea birds,



The Argo Merchant left this trail of heavy, No. 6 oil last December after breaking up some 54 kilometers off the Nantucket coast. The oil formed into large, thickening "pancakes" that eventually floated out to sea.

could have been hard hit by the spill. But because little baseline data is available on the area's bird population, the researchers conclude that the spill's full effect on the birds "will probably never be known for sure."

On March 10, large tar balls began coming ashore on Nantucket's southwest coast. The balls were reportedly as much as a foot in diameter, and one found on the island's eastern shore weighed 70 pounds. While scientists are guessing the tar is from the *Argo* spill, laboratory analysis is not advanced enough to determine whether the oil came from the Liberia-registered ship or from another source of No. 6 oil. Oil deposits on the Massachusetts island beaches are no-

torious in the spring, when well-traveled eddies spin their way around Cape Cod. Theoretically, says one researcher, the Nantucket tar balls "could have come from anywhere."

As for *Argo's* oily pancakes, most have been swept out to the Atlantic, destined to remain globular passengers of the Gulf Stream. Some will deposit satellite tar balls on distant shores, scientists say, and perhaps a few of the pancakes themselves may make landfall. One enterprising NOAA scientist suggests that pancakes in future spills might be easily cleaned up by a type of sea-going scooper, where a shovel device is attached to the front of a boat. Until now, most oil cleanups have been limited to spills that come ashore. □

Human experimentation rules debated

A national commission is in the midst of proposing new rules governing use of human subjects in biomedical research. The recommendations for use of prisoners were published in the *FEDERAL REGISTER* in January. A draft of the report on research involving children was completed last month, and the group has yet to finish its proposal on research using mentally ill subjects.

Researchers working on drug development, as well as those exploring the physical bases of diseases, are concerned about the impact of new rules covering human experimentation. Members of the American Society for Pharmacology disagree on the effect they expect from the national commission proposal.

The impact will be favorable to research, Robert J. Levine of Yale University School of Medicine told a symposium at the meeting of the Federation of American Societies for Experimental Biology this week in Chicago. In contrast to a 1974 proposal by the Department of Health, Education and Welfare, the in-

volvement of any group in basic research has not been forbidden. "In addition, the bureaucracy recommended by the commission to safeguard the rights and welfare of 'special populations' is much less cumbersome than that proposed by HEW," Levine says. Levine also praised the commission for dropping the distinction between therapeutic and nontherapeutic research. Yet another decision that Levine feels should aid research is the favoring of no-fault compensation for any subject injured during an experiment.

Louis Lasagna of the University of Rochester School of Medicine has much less favorable feelings toward the Commission for the Protection of Human Subjects. "The pronouncements of the national commission on prison research illustrate beautifully how well-intentioned desires to reform prisons can lead otherwise intelligent people to destroy properly performed research that scrupulously involves informed consent and full explanation and avoids coercion to the satisfaction of all but the most tunnel-visioned doctri-

naire," Lasagna says.

The recommendations on use of prisoners were the most controversial proposals. According to Karen Lebacqz of the Pacific School of Religion in Berkeley and a member of the commission, the group rejected the argument that prisoners cannot give *truly* voluntary consent. The commission did require that to reduce pressure on the prisoners, certain minimum living standards must be met by the prison (such as single-occupancy cells and an opportunity to work for remuneration comparable to that received for research participation). Furthermore, participation in research must not be a factor in parole judgments, and channels of public appeal and monitoring must be available. The commission concluded that research using prisoners should be done only if there are compelling reasons to use prisoners instead of some presumably less "vulnerable" group.

Lasagna feels that the "laundry list" of proposed requirements almost certainly cannot be met by any prison, and that elimination of prison research will certainly deprive researchers of a research population that is both healthy and available for continuous close scrutiny and medical supervision.

Lasagna points out one prison facility, the Addiction Research Center in Lexington, Ky., "whose demise will be of incalculable harm." Studies on morphine users there have provided information on the mechanisms of drug addiction and have predicted whether new medicines will be addictive. Lasagna called on William R. Martin of the center to confirm that no population so far identified could substitute for the imprisoned group. "Without such a facility, this work will not be done, and the sick public will become the unwilling [and unconsenting] research subjects of the future," Lasagna says. Lebacqz disagrees, contending that different subject populations will be found to test addictive properties of drugs.

Proposals on use of children and the mentally ill brought a more favorable response from the pharmacologists. Stanford Cohen of Wayne State University School of Medicine emphasized the need to test on children drugs that will be used on children. "Children are different in unpredictable ways," Cohen says. Gerald L. Klerman was concerned that research would be limited by the recommendation that mentally ill patients participate only in studies that could directly benefit them, and that costs would be increased by proposals for appointing legal representatives of subjects and for a federal agency to approve investigators and facilities. Nonetheless, Klerman concludes, "In my opinion, the commission has acted with great care and consideration and the scientific community can feel it has had an opportunity to present its point of view before an informed, competent and responsible group." □

NASA urged to resume talksat R&D

One of the major accomplishments of the National Aeronautics and Space Administration has been the development of certain areas of space technology—notably communications satellites—to the point where they could be taken over by the private sector as self-sustaining enterprises. In 1973, however, budget ceilings forced the agency to cut back its research and development in the field, leaving satellite communications to commercial entrepreneurs and quasi-governmental consortia. Now a special committee of the National Research Council's Space Applications Board has urged that NASA get back into the act.

At a too-brief glance, the committee's 33-page report seems like a vote for the ultimate boondoggle, with NASA doing all the R&D, checking it out on test satellites, paying all the bills and then turning the whole Christmas present over to industry. Yet that, according to committee member Eberhardt Rechtin, chief engineer at Hewlett-Packard, "is exactly what we *don't* want." It would be "a false R&D subsidy," he says, adding that it would be rather pointless to spend \$50 million to \$100 million a year hyping a business whose whole proceeds are only about \$250 million a year.

Instead, the committee's report—prepared at NASA request—calls for the agency to assume the role of identifying and working with a wide spectrum of potential satellite-communications users who are individually too small to take advantage of present services at what the industry would have to charge. Experimental programs that have been conducted with the Applications Technology Satellite ATS-6, for example, have shown potential for remote-area medical services, interstate teacher-to-classroom broadcasts and a variety of community projects.

Such uses, however, also pose special

technological challenges. If low-income areas are to get by with inexpensive ground stations, for example, the satellites will have to be more powerful. One approach is stronger transmitters, such as the 200-watt (at 12 GHz) monster now being tried on a Canadian-U.S. probe called CTS. Another avenue lies in the development of large, high-gain antennas, perhaps like the 10-meter-diameter mesh "dish" on ATS-6. Power by a sharp-focusing antenna, however, creates another problem if the users are localized and widely separated: limited coverage. The signal beam of ATS-6 is only about 1° wide at 2.6 GHz, the report points out, which would necessitate about 75 separate beams to usefully cover the part of the earth that the satellite can see from its geosynchronous orbit. Multiple "feed horns" may thus be necessary to direct the signals where they are needed. There are other problems too, such as a need for on-board switching to see that the various signals coming up to the satellite will be relayed down in the proper directions.

The committee report describes several possible levels of NASA involvement, but its choice is a program in which the agency would plan, develop and test an "experimental public-service satellite communications system program." An absolute "must," however, is that potential users would be consulted every step of the way, right from the beginning. First, needs of the users would be noted, together with projections for the requisite technology and a plan for the program design. Then a three-phase progression would lead to test satellites, criteria for judging the worth of the use-tests, and finally a fledgling "operational" system. All this while, the users and the system would be coming more closely together, finally leading, the committee hopes, to a system that could stand on its own. □



Furling the ATS-6 10-meter antenna for pre-launch storage: Shape of things to come?