

the oil into countless droplets, dispersants promote oxygen depletion of the seawater since the marine microorganisms must use the dissolved oxygen to biodegrade the oil droplets.

Two dispersants were used at Santa Barbara: Corexit and Polycomplex A-11. It was the continual discharge of oil that prevented the chemicals from dispersing the oil. Hal Shawlee, manager of civic affairs of the Union Oil Company, points out, "The slick would have been larger if the dispersants weren't used to contain it, even though the oil continued to flow."

Under containment and collection, one of the commonest devices employed is a boom, which is nothing more than a barrier floating in the water. Booms can contain the oil and prevent it from spreading. A drawback, however, is that in rough weather, oil can slosh over or slip under. To prevent oil from escaping underneath, plastic booms come equipped with skirts that extend down into the water. At Santa Barbara's harbor entrance, a plastic boom was used, while a double log boom was constructed south of the offshore well. The oil washed over the plastic boom and got through to the harbor.

A comparatively new device is a bubble barrier. Submerged, perforated tubes release compressed air to produce a rising curtain of bubbles and an upswelling of water that creates a current to drive back the oil. Another plan, still in the experimental stage, is high molecular weight alcohols that repel oil. Placed around the perimeter of a spill, they push it back for collection in barges, provided wind and tide are favorable and the oil deposit isn't too large.

The fourth method, sinking the oil, is unreliable because the material used to sink the oil often separates from it in the water and the oil reappears.

The Torrey Canyon incident of 1967 sparked the drive for new chemicals and methods to fight oil slicks. The British, for example, developed a self-propelled pontooned-shaped vessel designed to scoop up oil leaked during transfer from ship to shore (SN: 8/31, p. 208). The oil collection apparatus works by a system of belts to which floating oil adheres and is then carried into the vessel.

More recently a West German firm put oil-absorbing chemicals into plastic sacks to prevent wind dispersal when sprayed from a plane. In the U.S., the Cabot Corporation, of Boston, last month successfully tested a silicon dioxide compound that acts like millions of tiny nonflammable wicks, permitting the burning of thick oil slicks (SN: 2/8, p. 143). But none of these techniques has, as yet, handled a big spill.

NUCLEAR WEAPONS

Missiles and bombers

For a decade and a half, a basic schism among U.S. military policy planners has been the issue of whether manned bombers or long-range missiles would be the country's key weapon system.

The Air Force and other bomber boosters have argued that planes can be scrambled on short notice, making them less vulnerable than sitting-duck missile sites to an enemy first strike. Their opponents argue that the range and speed of missiles make them much more difficult than aircraft to defend against.

In the late 1950's, the airplane team, temporarily in the lead, came up with the idea for the giant B-70 as the super-bomber which would settle the matter once and for all. By the time of the plane's first flight in 1964, policymakers led by Defense Secretary Robert McNamara decided that it was both too expensive—the research and development plus the two prototype aircraft cost more than \$1.5 billion, and a fleet would have included at least 200 planes—and too vulnerable to new anti-aircraft weapons. The prototype B-70's became XB-70's and were put out to pasture for experimental research.

Since then the missile team has held sway, and built up a substantial head of Defense Department steam for second and third generation strategic missiles and an Anti-Ballistic Missile (ABM) system that would blanket the U.S.

In recent weeks, however, the controversy has opened anew, with signs indicating that the bomber boosters are far from out of the picture.

A key item in the Defense Department's fiscal 1970 budget request is \$77 million for AMSA, an Advanced Manned Strategic Aircraft. By itself, AMSA could be (and is) subject to many of the same arguments that flashed back and forth during the B-70's planning days. A new weapon, however, strategically leaked by Pentagon sources, may give the plane a fighting chance.

The weapon is a Subsonic Cruise Armed Decoy, SCAD, an unmanned, nuclear-tipped drone bomber which would be carried by the dozens by manned aircraft. Equipped with devices to make them look like full-sized planes to enemy radar defenses, the SCAD missiles might have a range as great as 1,000 miles. And because of their warheads, they could not be ignored by defenders even if radar penetrated their electronic disguise.

The SCAD has reportedly already made itself felt by contributing to the twin decisions to cut back on procurement of the FB-111, bomber version of



NASA

XB-70: an old controversy revived.

the F-111, which could carry only a few of the drones, and to move ahead with AMSA. Even the current B-52 is believed capable of carrying 20 to 30 SCAD weapons, and the new bomber would carry even more.

Proposed commitment to a new weapons system, as in the case with the growing conflict over ABM, complicates a pending decision on the nuclear non-proliferation treaty, signed by 87 countries but so far ratified by only nine; the non-nuclear powers are waiting while they evaluate the intentions of the U.S. and the Soviet Union.

On Feb. 5, President Nixon formally asked the Senate to ratify the treaty, which would bar the sale or gift of nuclear weapons to non-nuclear countries. U.S. ratification was held off last year by the Soviet invasion of Czechoslovakia and the Presidential campaign. Hearings were to begin early this week, and Senate Minority Leader Everett Dirksen predicted ratification after about a week of floor debate.

To go into effect, the treaty must be ratified by the U.S., the Soviet Union and Great Britain (which has already done so), plus 40 other countries. Russia is expected to ratify the treaty shortly after U.S. action, but it is less certain that 32 non-nuclear powers will be similarly ready to follow suit.

It is as a concession to the non-nuclear powers, in fact, that the treaty will have to be re-ratified after five years in order to remain in effect. The nuclear powers, under the treaty, would be bound "to pursue negotiations in good faith on effective measures relating to the cessation of the arms race at an early date, and to nuclear disarmament. . . ." The intent of this provision is to assure the non-nuclear powers that the treaty is a peace-seeking move, and not just a dog-in-the-manger power grab. "There's a lot of persuad-

ing yet to come," says an official of the U.S. Arms Control and Disarmament Agency. "We're not out of the woods yet."

The initial feelers last year on Soviet-U.S. arms reduction talks, which would placate the nuclear have-nots, are still far from the conference table.

The development that could have a sharp effect on the non-nuclear powers' confidence is the upcoming U.S. decision on the fate of the Anti-Ballistic Missile system. The ABM has been coming in for heavy fire from scientists who question its effectiveness, Congressmen who object to the cost, and from community groups objecting to the planting of nuclear warheads in their backyards.

One proposed ABM site, for example, is Bainbridge Island, near Seattle. Within a day after the announcement, Washington Representative Thomas M. Pelly received almost 140 protesting telegrams. New Jersey Senator Harrison Williams rose in the Senate to call the ABM a monster, and other angry responses were heard in regard to sites near Boston, Chicago and San Francisco.

On Feb. 4, House Armed Services Committee Chairman L. Mendel Rivers (D-S.C.) advised Defense Secretary Melvin Laird to stop acquiring new ABM sites until a "definitive statement" of position on the matter was made by Nixon. Two days later, Laird announced that all ABM construction and site acquisition would be halted, until Congressional hearings had probed the status and potential of the defense weapon.

Laird himself apparently sees any major Congressional vote-shuffling as unlikely. "Most of the people that are taking the position against the anti-ballistic missile system," he says, "... took that position in the last session of Congress."

He emphasized, however, that neither research and development nor procurement has been discontinued. So, with the program moving on, the hearings will probe for any ways in which it might fail to meet its promise. One of these is likely to be cost; the \$5 billion "thin" system originally proposed now may run to almost \$10 billion. Another is effectiveness against sophisticated, decoy-laden strategic missiles with electronic countermeasures.

Nevertheless, some officials feel that the ABM is bound to come. One such is House Appropriations Committee Chairman George D. Mahon (D-Tex.), who feels that the Administration will ask Congressional approval for the system, and get it. "I know the Joint Chiefs of Staff," he says, "and I know Secretary Laird, and I know what their thoughts are on this matter."

PHYSICAL SOCIETY

Science and defense

It is often said that to find out what is really new in physics the curious party should not sit down at the formal sessions of the American Physical Society, but rather listen in on the informal conversations in the hotel corridors. Here physicists, famous and not, discuss the latest and most daring of their experiments and speculations, things they don't yet dare to put into formal presentations.

This informal information mill was working as usual during the national APS meeting, but in the halls of the New York Hilton it was being upstaged by a form of corridor activity that is new to the society's meetings. People were handing out leaflets, gathering signatures on petitions, and distributing lapel buttons.

The leaflets invited interested persons to the inaugural meeting of a new organization, Scientists for Social and Political Action. The petition sought formation of a new division of the society, one which would concern itself with social and political questions rather than with some sub-specialty of physics as all the present divisions do.

About 300 people attended the group's inaugural meeting, and about 100 joined to organize an entity that, according to Dr. Michael Goldhaber of the Rockefeller University, will be free of highly defined organizational structure. It intends to be a collection of autonomous local chapters that will stand ready to acquaint the public with the scientific facts about problems such as the ABM (Anti-Ballistic Missile), pollution and urban transportation.

The move is the second attempt by activists to prod the society into taking an active part in social issues. A constitutional amendment that would have allowed the APS to take official stands on public policy was defeated last year (SN: 7/27, p. 82).

In all of this, the "military-industrial complex" and the Department of Defense figure as serious villains. "The Vietnam War," says Joel Feigenbaum, a graduate student at Cornell University, "has destroyed the confidence of scientists that we could trust the Government with the results of our research." Yet a great deal of that research depends on the DOD budget, an aspect of the system that the young activists definitely want to revolutionize.

The activists want to wean scientists away from their financial dependence on the military. There are not entirely humorous suggestions of a kind Scientists Anonymous to provide moral and perhaps material help to those who are trying to kick the DOD habit.

As a dramatization of opposition to the Defense Department, students and faculty at several universities have put together the so-called March 4 movement.

This calls for stopping all research work for one day, March 4, by anyone who elects to participate. Meetings and symposia will be substituted. Massachusetts Institute of Technology, Cornell and Yale Universities are the original centers of the March 4 idea, but it has spread, organizers say, to about 20 or 25 more campuses. Even the Bell Telephone Laboratories are expected to send a busload of participants to MIT.

Although some of the elders of the American Physical Society reacted to this ferment as if they had discovered an anarchist conspiracy in their attic, the society officials did not provide anything like a direct confrontation with regard to the request for formation of the division. They took the request under cautious and conservative, but real, consideration. One of them rather plaintively remarked, "To become a member of the older generation, you just have to live enough years."

The petition to form a social affairs division of the society has been referred to a committee on formation of new divisions, standard procedure that has been gone through with every other division.

CIGARETTE COMMERCIALS

Smoke-free wasteland

Television without Marlboro country, television without Newport's spring-time lovers or the worn boots of the Camel walker—as incredible as television without football.

But that cough-free wasteland is exactly what the Federal Communications Commission imagined when it proposed a ban on all television and radio cigarette commercials.

Citing reports that 9 out of every 10 lung cancer victims are smokers (lung cancer kills 50,000 Americans every year), and that smoking is associated with 25,000 deaths annually from bronchitis and emphysema, FCC Chairman Rosel H. Hyde has declared that "in the case of such a threat to public health, the authority to act is really a duty to act." The commission is charged by law with licensing broadcasters to use the airways "in the public interest." Cigarettes, it decided in a six-to-one vote, are not in that interest.

At the same time, the FCC commissioners were quick to declare that the proposed ban on cigarette ads should