

Committee to work with the very best talent in this Nation to search out new ways to develop inexpensive, high-quality synthetic foods as dietary supplements. A promising start has already been made in isolating protein sources from fish [see page 738], which are in

plentiful supply throughout the world; improve the quality and the nutritional content of food crops; apply all of the resources of technology to increasing food production."

Scientists have taken the lead in calling attention to the implications of

what is happening to the food and population variables. They are also providing a sobering estimate of what is possible in the way of countermeasures, both scientific and political. The prospects will be discussed in another article in this space.—JOHN WALSH

Nonprofits: Air Force Says We Can't Do Without Them

Los Angeles. Directors and employees of this country's major nonprofit corporations are resting more easily these days, following publication of a special Air Force report certifying that the nonprofits are doing pretty much what they ought to be doing in pretty much the ways they ought to be doing it. The Air Force report, released last month, certified something else as well—that the time-honored tactic of "appointing a committee" when the going gets rough has lost none of its utility. When the Air Force committee was created last autumn,* the nonprofits were operating in a rather unstable environment. A study of the Aerospace Corporation by the House Armed Services Committee had given massive publicity to charges that the company was too opulent in dealing with its employees and too willful in dealing with the Air Force (*Science*, 3 Sept. 1965), and the questions raised by the Aerospace case were provoking broad interest, in Washington, in the role and conduct of the nonprofits as a whole.

* The Air Force report was prepared by an *ad hoc* group of the Air Force Systems Command Board of Visitors. Cochairmen of the committee were Howard Johnson, president-elect of M.I.T., and Major General John W. O'Neill, commander of the Electronics Systems Division of the Air Force Systems Command. Other members were Charles A. Anderson, president, Walker Manufacturing Company; William O. Baker, vice president (research), Bell Telephone Laboratories; Lyle Garlock, vice-president, Eastern Airlines; Thomas Jones, president, Northrop Corporation; James Kerr, president, AVCO Corporation; and General Nathan Twining, USAF (retired). The committee did not consider nonprofits as a whole but concentrated on two special Air Force-sponsored organizations, Aerospace and the MITRE Corporation. It also reviewed the role of the System Development Corporation, an information-system, computer-technology firm associated with the Air Force on a somewhat different basis.

The Armed Services Committee was planning a comprehensive study, and other congressional units were also developing material for their investigative mills. Now those plans have been laid aside: the Word is that all is well, or can be made well by only minor tinkering.

This sanguine conclusion rests primarily on need. The nonprofits studied by the committee, particularly Aerospace and MITRE, come very close to being extensions of the Air Force itself. They help plan, develop, and operate some of this country's major military operations in the missile and space field. In the case of Aerospace these include Titan II, Minuteman III, the Manned Orbiting Laboratory, the military communications satellite program, and Vela Hotel (a program for detection of atomic explosions in space), to name only a few. MITRE has been heavily engaged in work on early-warning systems for missile attack, in operational command and control systems, and in other phases of military defense and communications.

What the companies do, among other things, is known in the trade as "general systems engineering/technical direction" (GSE/TD). It involves the monitoring and integrating of a number of activities and components performed or produced by independent commercial contractors contributing to a given system. Aerospace in particular is a kind of technical umpire, or—as business sometimes complains—a kind of cop. The companies were set up because neither traditional private enterprise nor traditional government organiza-

tions seemed able to perform the function effectively, and if the result is a curious form of enterprise, nonetheless Air Force reliance on the companies is too great to encourage tampering for the sake of satisfying any textbook abstractions about "government." These are practical institutions, invented and run by practical men out of military necessity. Yet it is worth noting that in a paradoxical way these pillars of defense are implicitly subversive of American capitalism's marketplace ideology. And they are a standing rebuke to the comforting idea that the government can run on *noblesse oblige* alone; the government has been unable to make the internal adaptations necessary to motivate highly trained men to take on the demanding jobs.

Aerospace was created in 1959 in response to Air Force need to gather high-level technical, scientific, and managerial manpower to supervise its burgeoning space and missile operations. An earlier arrangement under which the systems engineering function for the ICBM program was performed by private industry had proved unsuccessful, not because the industry staff was incompetent but because industry was reluctant to give up the opportunities for producing components which the role of objective overseer requires. A related difficulty was that associated contractors were reluctant to make certain kinds of disclosures to fellow-businesses with which they were essentially in competition. The idea of the nonprofit, enjoined from producing hardware, committed to nothing but the "national interest," getting the job done, was a direct response to these tensions. And, according to the Air Force report, it continues to be appropriate. The committee found that "the innovation, begun by the Air Force about a decade ago, of augmenting its professional resources with an independently managed technical organization that is distinct from the necessarily partisan commitment of a particular hardware contractor, continues to be an indispensable

factor in developing and acquiring complex aerospace systems and in assuring their function through command and control."

The function of the manager beyond "partisan commitment" has inevitably involved the nonprofits in difficulties with industry. For one thing, nobody likes the cops. For another, there are times when the nonprofits' "objective" role may actually lead to losses for a company. A number of the contracts awarded contain incentive clauses—for example, extra compensation for getting the job done by a certain time—and a company's own assessment of its readiness may be influenced by its drive for profits. Aerospace has no such drive—it operates on a fixed budget—and can force the contractor to take another look, even if it means missing the deadline.

Nonprofits versus Industry

The conflicts resulting from the clash of interests emerge in two ways. One is a kind of continual haggling between the nonprofits and the industrial contractors over operational details. The second is a kind of undercover lobbying by the aerospace industry against the nonprofits. Political pressures from industry, in fact, partly accounted for the reevaluation just completed. Industry is not particularly worried about "competition" per se, for while the GSE function might lead to an inside track on components, for example, real profits come from producing hardware, not giving advice. But there is a general feeling that it is somehow "un-American" to do things not-for-profit that could be done profitably. Air Force policy takes note of this feeling by limiting the amount of work it assigns to Aerospace and MITRE: the nonprofits are only employed when they seem uniquely suited to the job at hand. Aerospace industry rhetoric to the effect that the nonprofits may stand deleteriously between the customer and the producer is not taken very seriously. "What they really mean," said an official of one nonprofit recently, "is that they can put things over on the Air Force that they can't get away with us." But a basic advantage of the nonprofits, recognized both by the Air Force reviewers and by officials of the nonprofits themselves, is their ability to choose between alternative components, uninfluenced by calculations of profit and loss. "When the companies do GSE themselves," said one Aerospace Cor-

poration official last week, "they're inevitably attracted by their own products. Martin wants to use its booster; Boeing wants to use its booster, and so on. We only want to find the best one." When all is said and done, it is evident that industrial firms distrust the nonprofits far less than they distrust each other. The problem of sharing data, in any event, has been largely resolved.

But if the nonprofits stand as something of a reproach to industry, they also reflect the inadequacy of government. When the need for trained scientific and technical managers first became acute, and again when the criticism from Congress blossomed forth last year, the Air Force looked around to see if it could do the job itself. The review committee sets forth a particularly candid assessment of why an "in-house capability" is not likely to be acquired.

A military organization composed of military personnel and civil service employees, capable and dedicated though they may be, cannot be expected to provide the quantity, quality, diversity, and range of scientific and engineering talents, organized and managed in the flexible fashion needed to meet all requirements. Military officers are educated and trained primarily for a military career, with all that this entails. While many hold advanced technical degrees, relatively few have been able to find sufficient time, while pursuing a military career with its varied assignments, to embrace a scientific or engineering discipline with the required intensity and perseverance to become outstanding national authorities in a professional field.

While the possibility of acquiring the required depth of competence within the civil service is greater than within the military officer group, there are difficulties which effectively preclude satisfying the Air Force's needs. The civil service salary structure is sufficiently high to attract and encourage a junior scientific and engineering staff, but it does not have the upper limits required to obtain or retain many senior individuals in their field. The military hierarchy, under which the civil service operates, inhibits the retention of leaders in the scientific and engineering field. There are many professional scientists and engineers who for reasons of their own will not become federal employees. Furthermore, the flexibility often needed to meet the changing technological requirements is available in private enterprise to a degree that the Government cannot readily achieve. In its current configuration, the Air Force is faced with manning and grade ceilings which effectively preclude obtaining the required quantity and quality of professional personnel. Finally, the growth of responsibilities of the Air Force Systems Command from an unexpended balance of about \$8

billions 1 July 1966 represents the measure of increasing demands on this Command, clearly not to be satisfied internally.

For these reasons, the Air Force is no more ready to assume total responsibility for the internal accomplishment of its systems planning and engineering design than it was five years ago. Although the Air Force competence has been improved both in quality and quantity of its technical officers and professional civil servants, the complexity of the tasks being performed have increased in approximate proportion to the improvements. As an over-all result, the percentage of work being accomplished in-house actually has been reduced.

If industry is too biased and government too inept, if individuals cannot be induced to subordinate corporate and private gain to the "national interest," the pragmatic response is to create a structure in which private and national interests become identical. The nonprofits are ideologically and politically embarrassing—but they work. And the proper objective, according to the Air Force report, is therefore to make them "acceptable"—to Congress, to industry, to the public, to all the onlookers whose possible criticisms might have a destabilizing effect on the corporations and therefore on national defense. This is to be accomplished by restrictions on some of the more vulnerable management characteristics of the nonprofits, which have tended to operate in the style to which business, rather than government, has become accustomed. An extremely generous incentive-compensation plan offered by Aerospace to employees making over \$20,000 a year, for example, together with an equally generous life insurance program, is to be curtailed. The fees paid to the nonprofits—long a matter of contention between the companies and the Air Force—will probably be reduced, and the government may take title to corporate facilities now owned by the nonprofits independently. The fee restrictions could conceivably lead to reductions in the kind of executive emoluments some of the companies have traditionally provided for their staffs, but salaries and the generally ample style of operation will probably be largely unaffected.

Independence Not Threatened

In general, officials of companies affected by the report and by recent policy decisions based on it feel that their independence will continue to be protected. This independence, in the philosophy of the non-profiters, is the

very essence of their usefulness. "We have to be able to tell the Air Force just what we think," one official commented recently, "and to do that we have to have a little room of our own to think in, a personality of our own, and money of our own to play with." The tension between the Air Force and Aerospace officials at contract-negotiation time has grown essentially out of the paradox that Air Force negotiators have attempted to impose their own rather austere standards on Aerospace when it is in part that austerity that has made it necessary to create an outside organization to do the job. The position of the Air Force

committee is that there is a trade-off between independence and stability. "As intimate members of the Air Force Systems Command management team," the report says, "[the nonprofits] must forgo some part of normal corporate independence. This is the price of whole-hearted acceptance of the Corporations by the individuals and agencies for whom they work, and by those whose decisions influence the Corporations' future. Moreover, acceptance and appreciation of the vital roles of these Corporations is the only key to assuring their stability. Other symbols of stability, such as buildings and accumulated assets, are at best a facade

and at worst, can detract from acceptability. Acceptance must be earned by the Corporations not only by demonstrated technical accomplishments, but also by the attitudes and business practices of corporate management." What is called for, essentially, is compromise—and, to judge from the warmth with which most officials of the nonprofits have greeted the report, they appear to feel that a compromise has been laid out which will not affect their basic character or threaten their basic interests. For this they have largely to thank the axiom of this technological age, that war is too sophisticated to be left to the generals.—ELINOR LANGER

Water Pollution: New Agency Moving from HEW to Interior

Although it is not yet time for the hurrahs of conservationists, who often have felt dismay and frustration at the extent of pollution and the inadequacy of control efforts, federal activities in the antipollution field may gain a clearer sense of direction and a fresh momentum in the next few weeks.

On 10 May the Federal Water Pollution Control Administration (FWPCA) will be transferred from the Department of Health, Education, and Welfare to the Department of Interior. Sometime thereafter, an internal reorganization will be undertaken within FWPCA, a new agency provided for by Congress last year as the successor to a division of the U.S. Public Health Service. This reorganization, though supposedly designed to promote greater efficiency, seems likely to produce a round or two of bureaucratic infighting before everyone has settled down to the job at hand.

FWPCA's transfer to Interior will be made under an executive reorganization plan which President Johnson submitted to Congress in March, to become effective within 60 days unless disapproved by either House. The plan has been searchingly examined and has drawn some critical comments, but no serious opposition. A resolution of disapproval

introduced last week by a Republican congressman is expected to get short shrift.

Almost immediately after FWPCA moves to Interior, Secretary Stewart L. Udall is expected to issue guidelines for states to follow in preparing water quality standards, an essential element of the new federal scheme for pollution control. FWPCA Commissioner James M. Quigley says, "The guidelines are coming out, I hope, if not the first day, the first week we are in Interior."

Water quality standards were provided for by the 1965 amendments to the Federal Water Pollution Control Act. The states have until 30 June 1967 to prescribe acceptable standards; thereafter, the Secretary of the Interior may prescribe standards for states which have failed to act. Prompt announcement of the guidelines will be necessary if states are to meet the deadline. Already there is concern that the states will press for, and get, an extension of time, thus delaying for another year or so an essential step toward cleaning up their streams.

Commissioner Quigley indicates that new abatement actions will be initiated within the next few months, once Secretary Udall has had time to review

those cases of "gross pollution" where immediate federal intervention seems justified, even though the states have not had time to prescribe water quality standards. "I'm sure there are a half dozen situations, probably more, which are so bad that we should not wait before moving," Quigley told *Science* last week.

The federal abatement program has been on dead center since last September, when the last abatement conference (for the Hudson River) was called. FWPCA's enforcement specialists say that pollution is bad enough in some 80 situations to warrant federal intervention under existing law. Quigley attributes the failure to call any new abatement conferences since September to the two major reorganizations—the breaking of ties with the Public Health Service and now the move from HEW to Interior.

The plan for the transfer to Interior has been under review by Government Operations subcommittees of the House and Senate. The Senate subcommittee happens to be chaired by Senator Abraham A. Ribicoff, who, as a former Secretary of HEW, was once responsible for the antipollution program. A member of the Ribicoff subcommittee is Senator Edmund S. Muskie, chairman of the Senate Subcommittee on Air and Water Pollution and a leader in the antipollution fight. While Muskie and Ribicoff have reservations about moving FWPCA to Interior, they seem to take the position that, in carrying out the antipollution program which Congress has enacted, the President should be permitted the administrative arrangements he thinks appropriate.