Government Labs: Britain's Harwell Finds New Role in Industrial Work

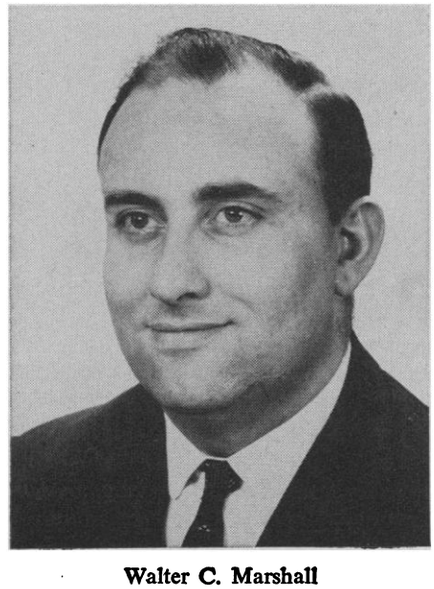
Harwell, England. Among the more durable works of man are big government laboratories that have outlived the purposes for which they were created.

In the United States, research administrators and congressmen have found this to be the case when they sought to cut down or reassign some of the major national research centers that were established in the great research boom during and after World War II (*Science*, 25 October 1968). The French government is confronted by a similar situation, mainly concerning nuclear power research facilities that have run out of important tasks. And the Soviets, too, are reported to be acquainted with the problem—which comes down to the fact that a big facility, with a big payroll and, usually, a tenured staff, eventually becomes so well rooted in the politics of research and the economics of the surrounding area that it is easier to leave it alone, or subtly starve it, than it is to change it swiftly or kill it.

There are some notable exceptions to this pattern. One of them is the AEC's Oak Ridge (Tennessee) National Laboratory, which has involved itself in a number of problems outside its original nuclear energy assignment, especially in the field of desalinization. Another, which is attracting a good deal of attention among research administrators from several nations, is here at Harwell, some 50 miles west of London, where the government's vast Atomic Energy Research Establishment—5500 employees and a $36-million-a-year budget—is rapidly being redeployed to perform general industrial research, after nearly a quarter of a century of concentrating on the development and testing of nuclear materials. Harwell is the largest of some 15 research establishments operated by the United Kingdom Atomic Energy Authority. The Authority's total annual budget is about $172 million.

Harwell's redeployment, widely regarded as off to a successful start, is proceeding, however, along lines that would be politically, if not legally, untenable in the United States. For Harwell, a government-owned research facility, is seeking to pay its way by contracting to perform research for individual industrial firms—with ironclad assurances that their competitors will not get a scrap of the results. In this respect, it is operating in the fashion of the major industrial research consulting firms, such as Arthur D. Little and the Battelle Institute, which have been so successful in the United States but which have no significant British counterparts. Harwell, however, has added a new dimension to industrial research: it mainly seeks to do business only with the strongest firm in any field, and makes little or no attempt to help improve the position of the weaker ones.

In the United States, where the results of government-conducted research are usually put into the public domain, the Harwell pattern would inevitably lead to charges of favoritism and giveaways. But in Britain, where the need to succeed in world industrial competition is a national obsession, Harwell's tactics have yet to stir any public dissent. If they did, it would probably be argued that there are various government agencies and research associations to look after the laggards, though the performance of these bodies, which make their findings available to all comers, is generally far from distinguished. The Harwell design, on the other hand, has been approvingly referred to as one of "maximum unfairness," without stirring any disagreement from Harwell.



Walter C. Marshall

Walter Marshall, the 36-year-old physicist who is Harwell's director and the man responsible for this design, candidly explains, "We once had terribly strong feelings about being fair and making all our results available to anybody. The only outcome was that nobody took up the results, except possibly some American firms. So, we've switched to a policy of commercial bargains with single firms. We found that if they're willing to put money into something that they want us to work on, or if they're willing to collaborate on a project, that means they're serious about it. That made all the difference, and now we have more industrial work than we can handle."

What about firms complaining that the government is unfairly assisting their competitors?

Marshall, who is well acquainted with the American scene, replies: "It's very different here from the way it is in the United States. We can simply say, 'Hard luck,' to firms that complain about competitors getting our help. They couldn't get away with it in the States, but it's no problem here."

As was the case with many other nuclear research centers in the early 1960's, Harwell's future began to be questioned as nuclear developments moved from the experimental to the commercial stage. With a good deal of nuclear work remaining to be done—a quarter of the staff and one-third of the budget are still devoted to reactor development—there was no thought of closing down the establishment. But growth had ceased, several small outposts of the laboratory were either disbanded or relocated on Harwell's half-mile-square premises, and the place, by all accounts, reflected the spirit of a slowly but irreversibly sinking ship. The first major step toward changing its fortunes came with the passage of the 1965 Science and Technology Act, which authorized the United Kingdom Atomic Authority to perform research outside the nuclear field. At Harwell, the prime mover in making use of the new law was Marshall, a University of Birmingham graduate, whose experi-

NEWS IN BRIEF

● **HARRIS' COMMITTEE MAY BE PHASED OUT:** The Senate Government Research Subcommittee, which gave Senator Fred Harris (D–Okla.) a foothold as an influence on scientific affairs in the Senate, is scheduled to be phased out in September. Harris, who is chairman of the subcommittee, has also been serving as Democratic National Committee Chairman since his appointments to the post in January. He will continue to serve as chairman of the Government Research Subcommittee until it is disbanded. Senate sources say the committee phaseout is part of a plan to reduce the number of Government Operations Committee subcommittees. These sources say that Harris' subcommittee would be the first to go because Harris has less seniority than other subcommittee chairmen. There is some speculation, however, that in the politicking that is likely to occur his subcommittee could be saved.

● **SST REVIEW:** President Nixon has approved the membership of an ad hoc committee to review all aspects of the Supersonic Transport (SST) program. The committee includes the President's Science Advisor Lee A. DuBridge and Air Force Secretary Robert C. Seamans, Jr. The 11-member committee, chaired by Transportation Undersecretary James M. Beggs, is expected to make its recommendation to the President in March. The selection of the ad hoc committee is the third step in a federal review of the SST program to determine whether the government will continue subsidizing its development. Other reviews, with particular emphasis on Boeing's resubmitted SST designs for a fixed-wing aircraft, have been conducted by the Federal Aviation Administration, and by the Transportation Department.

● **ATOMARIUM:** The Atomic Energy Commission (AEC) plans to donate a $1.5-million atomarium, a small nuclear research reactor system, to the New York Hall of Science for use by New York college students interested in conducting nuclear research. The reactor, to be built over a 3-year period at a cost of $435,000, will be supplemented with a laboratory and nuclear displays. It will be part of a new $10.8-million science museum, which New York City is expected to finance.

ence included the directorship of Harwell's theoretical physics division; time spent at Berkeley in the physics department, at Harvard's school of engineering and applied physics, and at the Bell Laboratories; and 10 weeks of lecturing at Oak Ridge in 1962, where he struck up a friendship with director Alvin Weinberg, who was doing some reorganizing within that research establishment. (Weinberg, who has long argued that the national laboratories should be turned loose on major national problems, such as air and water pollution, housing, and transportation, is an enthusiastic admirer of Marshall's scientific and administrative abilities.)

The present extent of Harwell's involvement in industrial work is difficult to measure since some industrial research overlaps with activities that would be performed there anyway; some is done on a collaborative basis (that is, Harwell and an industrial firm will team up on a project, with each performing its portion in its own facilities); and some research is carried out in the expectation that an industrial firm will recognize its importance and eventually contract with Harwell to keep it going. At present, Marshall reports, about 35 percent of the staff is engaged in industrial work, and in the fiscal year that ended last 31 March these activities produced about $360,000 in fees, royalities, and other income; he expects this figure to rise to $1.2 million in the current year and, after that, to rise even faster, especially from royalites, which are collectible over a 15-year period. Though Marshall and his associates stress that it is difficult to predict the future in industrial research, they think it quite likely that, in another year, these activities may produce as much as $7 million in cash income.

Harwell's Ceramics Center, which was one of the first to move into the industrial program, currently has a budget of nearly $1 million a year. Of this amount, about two-thirds is devoted to industry-related research. The Non-Destructive Testing Center operates on a yearly budget of $420,000, and about half its work is now performed for outside industrial organizations. Over the past years the Center's professional staff has risen from five to 15 persons. The Center performs routine testing of materials for its clients, among whom are 15 firms that retain its services for a $2400-a-year fee each. In one of Harwell's few departures from its policy of working with individual firms, the Non-Destructive Testing Center compiles a monthy bibliography of relevant literature, which is published by a commercial firm under the title *NDT Info.* But to stress the fact that clients can expect confidential treatment of their interests, the NDT building has added something that was previously considered unnecessary: a guard at the front door. In desalinization the Atomic Energy Authority authorized Harwell to spend nearly $5 million in a collaborative program with a British firm that was encountering stiff international competition, Weir Westgarth. The firm has lately been doing extremely well in the sale of flash evaporators, and the Ministry of Technology, which, administratively, sits over the Atomic Energy Authority, has cited this case as an example of Harwell's success in working with industry.

Recalling the early days of Harwell's move into industrial activities, Marshall said, "The beginning of any such enterprise is depressing. The first reaction of industry was that they didn't need any more research. They had lots of doubts as to whether we could be businesslike. It was a very slow process. We got them to visit here, and we argued that we could be hardheaded about business and could give them access to facilities that they couldn't possibly afford themselves. It took a while, but now we have as much as we can handle along with the other responsibilities that we have to meet." One ingredient in gaining industry's confidence was a program analysis unit which was assigned to make cost-effectiveness studies both for Harwell's use and to demonstrate to prospective clients that Harwell is attentive to problems of investment and profit. So far, some of Britain's most technologically advanced industrial firms have signed up for Harwell's services, including Rolls Royce, Imperial Chemical Industries, Pilkington, Unilever, and Courtalds.

As for morale, Marshall said that, at the time the industrial program got under way, it was so low, because of uncertainty about Harwell's future, that it had nowhere to go but upward. One division head said, "This is a very agreeable place to work, but as the nuclear work was running out, people became understandably fearful about the future. Now the future is bright, and I'd say that most people are quite happy about it. The problem, however, is to get these scientists and engineers to think like businessmen, which isn't easy. We keep stressing that we want to concentrate on work that can make a profit, but our

people weren't brought up that way, and it requires a change of attitude for them to come around to this point of view."

The stress on profit has had a restraining effect on Harwell's taking on the sort of social problems that have been singled out as suitable for national laboratories in the United States. One exception is air pollution, which has been under study since 1967 by the Health Physics and Medical Department. Work has been done on atmospheric conditions in a heavily industrialized area in the north, but, as one of the officials of the division put it, "No industry wants to pay us to tell them what a mess they're making of the atmosphere. And we get pressure, in odd remarks, about the need for all parts of Harwell to be profit-minded. We argue back that there's an economic return to be had from stopping pollution, but that it is a long-term one and it cannot be easily measured. Our work goes on," he said, "but there is no question that pollution in the U.K. is still pre-political as compared with the United States."

What lessons does Harwell's apparently successful venture into new fields hold for the national laboratories of the United States? Not many, according to Marshall. "There is no role for a U.S. government laboratory in the field of industrial research. There are other means of handling such research there. But, more important, America's problems are social, not economic, and that, it seems to me, should determine the direction of the national laboratories. Here, our problems are economic. We have to improve the performance of industry, and that comes ahead of everything."—D. S. GREENBERG

Radioactive Pollution: Minnesota Finds AEC Standards Too Lax

In a move that could have national repercussions, the Minnesota Pollution Control Agency (MPCA) announced last month that it will limit radioactive discharges from nuclear reactors to levels considerably below those currently allowed by the Atomic Energy Commission (AEC). If the proposed state restrictions are put into effect, as seems likely, and if they survive a possible court test, the action taken by Minnesota could serve as a precedent and catalyst for further efforts to crack down on radioactive contamination at the state level.

The Minnesota situation is worth examining in some detail for several reasons. For one thing, control of radioactive pollution is expected to become an increasingly important issue throughout the nation as the numerous nuclear power plants now under construction or on order start going into operation in the 1970's. For another thing, a nationally known consultant called in by Minnesota has cast doubt on the adequacy of existing AEC regulations to cope with radioactive effluent from the expected proliferation of new reactors. In a detailed critique, the consultant claims that existing AEC standards treat each reactor as an isolated entity, whereas effective pollution control demands consideration of the combined effect of radiation from multiple sources. Finally, the crackdown proposed by Minnesota has raised important legal questions as to whether the states can enforce more stringent rules than the AEC, or must simply accept the AEC's judgment as infallible.

The MPCA's "get tougher" policy culminates more than a year of public debate and controversy over pollution from a nuclear generating plant now under construction near Monticello, Minnesota (pop. about 1500), some 33 to 37 miles upstream on the Mississippi River from the water intakes for the "Twin Cities" of St. Paul and Minneapolis. The plant is being built for Minneapolis-based Northern States Power Company (NSP) by the General Electric Company. It will use a single-cycle boiling water reactor, with a net power capability of 545 megawatts, and is scheduled to go into operation in May of 1970. The reactor will be located in a largely agricultural area. The nearest residence is about half a mile away; some 4000 persons live within 5 miles.

The Monticello project at first encountered no particular difficulties. Detailed construction plans were approved routinely by the AEC, the U.S. Public Health Service, the Federal Water Pollution Control Administration, and, at least tacitly, by the Minnesota State Board of Health. Nor was there much hint at an AEC construction permit hearing in May 1967 that the proposed Monticello plant would run into vigorous opposition from the public.

But controversy erupted when the power company sought a waste disposal permit from the MPCA, a new state agency empowered to protect the public from air and water pollution. At a February 1968 meeting of the fledgling agency, two University of Minnesota scientists—Dean E. Abrahamson, assistant professor of anatomy, and Charles W. Huver, associate professor of zoology—offered sharp and unexpected criticism of alleged pollution perils from the Monticello plant. Soon other scientists joined the cause, including such notables as Maurice B. Visscher, professor and former chairman of physiology at Minnesota; and Eville Gorham, head of the botany department, who gained fame in the radiation field when he first reported the unusual capacity of lichens to absorb fallout and thus increase the radiation hazard in the Arctic food chain.

The concerned scientists laid down a steady barrage of criticism in the press, at public meetings, and in private conversations with MPCA members. Ultimately, many of them joined in a formal organization known as the Minnesota Committee for Environmental Information, which at last count had some 100 dues-paying members, including a smattering of lawyers and other laymen. Abrahamson is president of the organization.

Critics of the reactor voiced some concern over thermal pollution and over the possibility of an accident, but most of the criticism focused on the discharge of low-level radioactive wastes, particularly liquid wastes, during normal operation. Some critics argued that the plant should not be allowed to release any radioactivity to the surrounding environment since all radioactivity is dangerous to some degree. Others urged that radioactive discharges be held to a bare minimum. They charged