favor: Jean Mayer and Victor Sidel of Harvard, Louis Lasagna of Johns Hopkins, and Benjamin Spock of Western Reserve.

The core of their testimony was that, first, as a physician, Levy's primary duty is to his own interpretation of the ethical codes that govern medicine; that, second, the historic separation of military from medical functions had practical as well as ethical roots; and that, third, they would have grave doubts about training Special Forces themselves, as long as the program implied the paramountcy of military-political judgments. "Even if the Special Forces aidmen do a little bit of good?" they were asked by defense counsel Alan Levine. "The risk to the independence and status of medicine rarely comes from people who want to hurt medicine," Mayer replied. "The long-term advantages of independence so far outweigh the immediate gains that I would not do it. Anything that makes medicine backslide into an agent of any ideology is bad for medicine." "There are situations," according to Sidel, "in which the short-term effects may be good but may lead to deleterious consequences. You can't just run in without a thought for the long-term implications." Saying the Special Forces "do some good" is "trying to make the ends justify the means," Lasagna said. "I just don't believe the gains are worth the losses to the ethical core of medicine or to the realistic supplying of medical care on the battlefield." Like Mayer, he argued that the political use of medicine by the Special Forces jeopardized the entire tradition of the noncombatant status of medicine. The four agreed with Levy that a physician is responsible for even the secondary ethical implications of his acts: that he must not only act ethically himself but also anticipate that those to whom he teaches medicine will act ethically as well.

The prosecution took a turn at ethics, too. William DeMaria of Duke University endorsed the Special Forces program, arguing that he would not be responsible for what aidmen did after he had trained them; he testified that there are occasions on which military orders should take precedence over medical ethics. Another prosecution witness, North Carolina practitioner Amos Johnson, a former head of the American Academy of General Practice, was asked, on cross-examination, whether he thought the training of medics who were also combatants raised any ethical issues. "Let me ask you a question," Johnson responded. "Do they operate under the Geneva convention?" Told to assume that they did not, Johnson replied, "Then it doesn't bug me at all." (The practice of marking Green Beret aidmen with the red cross varies in Vietnam; some carry marked ID cards, and others do not; none evidently carries any external symbol.) "If I were the enemy," Johnson continued, "and my medical care wasn't too good, I'd rather have this person shoot me, because if he doesn't kill me then a few minutes later, if he captures me, he may be using his medical skill to save my life."

The Army also took the paradoxical tack of trying to make Levy look like a reactionary, implying that he was against the training of paramedical health personnel to serve as physicians' assistants. Neither Levy nor those who testified for him are opposed to such training. But "in civilian programs, paramedical personnel are always agents of the doctors," Mayer pointed out. "They are not, for example, ward captains."

How can a military court plausibly adjudicate these issues? For the defense it was a question of individual responsibility. For the government it was a question of military order. In the context of Fort Jackson, where formations of trainees were marching outside the courtroom, running, shouting, firing their weapons, and going through bayonet drill, such an assertion of individuality seemed improbable, and the questions of conscience on which it was based seemed remote. To the ten combat officers who court-martialed him, Howard Levy was simply a disobedient and seditious officer. To those who observed him out of khaki he seemed an intense political activist, a sober physician, and above all a quintessential civilian. The most unsettling thing about Howard Levy's trial was the fact that a system over which he had no control, whose purposes were not his purposes, and whose values were not his values had sufficient power to put him in jail for committing crimes that to him were the opposite of crimes.

—ELINOR LANGER

Nuclear Energy: New Study Assails British Program

London. A new and scathingly critical report* on the management of Britain's nuclear power program makes the whole undertaking look like a technological Crimean War.

Britain gained an early and impressive world lead in the production of electricity by nuclear power stations, but, according to the monograph's author, Duncan Burn, two principal blunders were made: (i) premature concentration of development efforts on one type of reactor, and (ii) a decision to go ahead on a large program of building nuclear power plants in a period when the favored design was not competitive with fossil-fuel plants.

Burn is an economist with experience as a civil servant and as industrial correspondent for the *Times*. Now an economic consultant, Burn from 1962 to 1965 was director of the economic development office of the Heavy Electrical Generator Manufacturers. The Institute of Economic Affairs, which published the report, is a private research and education trust which specializes in the study of markets and pricing systems. A number of its publications give technical support to arguments for the defense of private enterprise from public intervention.

The British nuclear power program has been criticized before, but Burn's broadside has special impact just now. Nuclear power scored a "breakthrough" in the United States last year when orders were placed for 22 plants, rated at a total 17,000 megawatts (electrical).

* Duncan Burn, *The Political Economy of Nuclear Energy* (Institute of Economic Affairs), 21 shillings.

Comprising half of all new generating plants on order in the U.S., these planned nuclear stations symbolized the fact that costs of atomic power were for the first time competitive with the costs of power generated in plants burning fossil fuel anywhere in the United States. While this was happening in the U.S., hoped-for export orders for British nuclear plants have not materialized and sales at home have lagged. As a consequence, plans for further reorganization of the nuclear energy industry are under discussion in Britain, and a new Parliamentary select committee on science and technology, with broad investigative powers, has picked the nuclear energy program as a worthy subject for early scrutiny in its examination of British science and technology.

Burn supports his argument with a double case history detailing the order, by the Jersey Central Power and Light Company from General Electric at the end of 1963, of a nuclear power plant at Oyster Creek, New Jersey, and an appraisal of British and American reactors by the British Central Electricity Generating Board (CEGB) in 1965. This appraisal led to the selection of the British Advanced Gas Cooled Reactor (AGR) for the Dungeness B power station on the south coast of England.

Burn says that a British firm's bid for building a plant incorporating the American boiling water reactor (BWR) was as much as 80 percent higher than the successful bid for building the Oyster Creek plant. The appraisers also, says Burn, overstressed such things as the importance of the shutdown of the plant necessary to change fuel elements in the BWR. It is possible to make fuel-element changes in the AGR while the plant is in operation. Worst of all perhaps, Burn indicates, "the estimate for the AGR was . . . for the most advanced design available, that for the BWR was for a design and design capacity relation slightly obsolete."

Burn finds much to criticize in the structure of the British atomic energy industry and the conditions under which it operates. These conditions, he says, have been determined by the atomic energy policy in Britain. Like the Atomic Energy Commission in the United States, the United Kingdom Atomic Energy Authority (AEA) was given responsibility for both military and civil applications of atomic energy. In practice, says Burns, the AEA has been much less successful than the AEC in fostering the development of private industry in the nuclear field, perhaps because it has maintained a tighter hold on research and even on manufacturing functions.

In the United States, the AEC supported development of several competitive reactor designs over an extended period. The AEA, says Burn, decided early to concentrate resources in the development of the CO_2-cooled, graphite-moderated Magnox reactor and its AGR successor. The Americans, Burn contends, kept the options on reactor design open longer than the British did and in general were readier to encourage research in industry and to turn over AEC-born technology when it was commercially ripe.

The market for power stations in the United States is made up of a large number of utilities companies, private and public (TVA is the largest and a special example of a public company). In Britain, where utilities are nationalized, the nuclear energy industry deals with one customer, the CEGB for England and Wales and another authority for Scotland. With the AEA controlling technology and the CEGB controlling the market, it is not surprising that competition in the nuclear energy industry has been dampened.

To meet the special conditions, the government encouraged the combination of private firms into consortia to bid for nuclear-power-station contracts. Five consortia were originally formed, and these have been reduced to three. As the size of the stations has increased, the frequency of orders has been reduced, so that the interval between orders under the conditions now prevailing is about 18 months. As a result, overhead costs for the consortia have been high, and the government appears to have demonstrated its sense of responsibility to the consortia by awarding orders in turn.

The AEA's public response to Burn's attack has been a well-modulated one, its main emphasis being that things are not as clear-cut as Burn makes them seem. "His book," said one spokesman, "very largely ignores the difficulty of making a straight comparison between nuclear power costs in one country and another. . . .

"For example, by the austere ground rules used in Britain, none of the Calder Hall type stations which have been built so far will produce electricity as cheaply as the most modern coal-fired station—although they come very close to doing so. But if one applies U.S. 'ground rules'—a 30-year-life and 85 percent load factor—then the last four out of eight stations are fully competitive."

Although not all the variables are in Britain's favor, on the central questions of the choice of the gas-graphite reactor and the go-signal on a nuclear-power-plant program Burn does begrudge the British the benefit of some reasonable doubts. The decision to take the leap in the nuclear dark was taken, as Burn says, in the 1950's when coal was in short supply and political unrest in the Middle East clouded the future of Britain's oil supply.

As for the AGR itself, the original case for the gas-cooled reactor for Britain still looks fairly good to the layman, although probably not as good as the AEA made it seem. The BWR that the Americans were working on required enriched uranium as fuel, and this could be obtained relatively cheaply in the United States from AEC diffusion plants run on low-cost TVA power. The first gas-cooled reactors were designed to run on natural uranium, and the AGR, on slightly enriched uranium. In addition, the AGR has a prestressed concrete pressure vessel which provides a built-in safety feature, thus is more suitable than the BWR for use near cities. In crowded Britain this seems an important consideration.

Discussing expenditures on research, Burn advances the surprising information that Britain, despite much smaller resources, has put nearly as much into research relevant to nuclear power as the United States has—over $2.6 billion as compared with about $3 billion. While British expenditure has been very heavy, British officials say that American spending on research for such things as naval reactors has been left out of Burn's bookkeeping and that the total American investment in research in the field is probably much greater.

In a comparison of British and American costs it must be noted that the plants to which Burn devotes most attention have not yet been completed and that there is always some risk in counting the cost of kilowatts before they are generated. Plant costs are rising fairly rapidly now in the United States, after a period of relative stability, and British prices may soon look more attractive.

The British point out that the Oyster Creek plant and the "breakthrough" it heralded was a brilliant marketing stroke rather than a triumph for new

Route to the Top: Government to Campus

University faculties have long served as a pool of manpower for the upper reaches of the federal bureaucracy. They still do, but of late, a new pattern has begun to emerge in the manpower flow: increasingly, universities are reaching into the federal service to fill their senior administrative posts. One reason is that Washington has lured or revealed some exceptional talents, and the academic world wants them for its own. But not to be discounted is the fact that, since federal money has become a mainstay of higher education, familiarity with the intricacies of the Washington scene is a valuable commodity in academic executive suites.

Last year, Bowen Dees, the number 3 man in the National Science Foundation, became vice president of the University of Arizona, after having served with NSF from its founding day in 1951. Lincoln Gordon, who left a Harvard professorship in 1961 to become ambassador to Brazil and later Assistant Secretary of State for Inter-American Affairs, is to become president of Johns Hopkins University. J. Herbert Hollomon, who came out of industry to become Assistant Secretary of Commerce for Science and Technology, has been named president of the University of Oklahoma.

The latest move from government to high academic position is that of David Z. Robinson, who will be leaving the staff of the Office of Science and Technology in July to become vice president for academic affairs at New York University, which can match any place for ambitious designs in growth and excellence. As an OST staff member, Robinson, a 39-year-old Harvard Ph.D. in chemical physics, has been properly anonymous in comparison with some of his predecessors on the government-to-university route. But as an OST specialist on basic research, high-energy physics, computers, and administration of federal research grants, he is well known and highly respected in government and in the scientific community. Donald F. Hornig, the presidential science adviser, is said to be extremely unhappy about Robinson's impending departure, but after nearly 6 years' service on the White House science staff, and many offers, Robinson felt that the N.Y.U. offer was too good to pass up.

According to an announcement from N.Y.U., Robinson will be involved "in planning and administering the University's instructional, research, and public service programs." Prior to his Washington service, Robinson was assistant director of research for Baird Associates (now Baird-Atomic) and served as a scientific liaison officer in the London branch of the Office of Naval Research. At OST, Robinson's salary was $25,800. At N.Y.U. it will be "substantially higher." His return to the campus, it should be pointed out, is partially the result of the traditional flow from the university to government. The post he will fill represents a consolidation of the office of vice president for scientific affairs, which Werner Baum filled until becoming deputy administrator of the Environmental Science Services Administration last January, and the office of assistant executive vice president, which Frederick H. Jackson will leave in July to become president of Clark University.

Meanwhile, academic recruiters continue to set their lures for veterans of the Washington scene. These operations are, of course, conducted with great discretion, and just who has been wooing whom is rarely revealed until a match is made. But it is no secret that two highly placed figures have been attracting a swarm of offers. These are Hornig and John Wilson, deputy director of NSF. Hornig is more or less committed to remain in his post at least until after the election, while Wilson, whose career, with one brief exception, has been entirely in government, seems quite happy where he is. But academic recruiters are an enterprising and determined lot, and one of the rules of academic courting is that "No" is an extremely encouraging sign. Robinson himself points out that he had intended to stick with OST at least until election time, and that his first response to the N.Y.U. offer was firmly in the negative.—D. S. GREENBERG

technology. Oyster Creek, they say, was a "loss leader" and GE gambled on later sales and the use of standardized design ("replication") to turn the loss into a profit.

Perhaps most important, it should be remembered that the next major step ahead, technologically, should be the appearance of the fast-breeder reactor, which produces more plutonium from uranium than it consumes. The British have a prototype fast reactor scheduled to start operating in 1970–71, ahead of everyone else except possibly the Russians. Things then may look different and more favorable for the British.

When all this is conceded, the effect of Burn's discussion is to leave doubts as to whether the British have the knack of managing to the point of commercial payoff a massive research and development program in a high-technology area such as nuclear power.

This is a question that looms over current attempts to reorganize the British nuclear energy industry. The AEA view is that technological progress has overtaken planning, and that an overhaul of the machinery is in order. The discussion seems to focus on two recommendations: (i) that the number of consortia be reduced further, from three to two, and (ii) that responsibility for reactor design, now split between the AEA, CEGB, and the consortia, be concentrated in the AEA. To Burn and people who agree with him, this seems like proposing that the ills of centralization be cured with more centralization.

What is new in the present situation is that a Minister of Technology with broader responsibilities and readier access to advice than his predecessors will be charged with making the key decision on the reforms. The Minister, Anthony Wedgewood Benn, in February appeared to be disposed to follow AEA advice, but now the word is that he is keeping an open mind. The views of the Parliamentary select committee on science and technology will also count if the committee is able to master its subject in a reasonable time. While it is too early to tell whether it will ever rival the forcefulness and verve of the Congressional Joint Committee on Atomic Energy, the Commons committee has already accomplished something by providing a forum for a more open public discussion of the complicated questions involved than has ever before preceded a major decision on nuclear power policy in Britain.—JOHN WALSH