would, according to the White House, be "folded into the DENR" once Congress approves *that* reorganization, if it ever does.

The House, but not the Senate, responded quickly to the idea of putting the DENR aside. Representative Chet Holifield's Government Operations Committee held a few hurried days of hearings in late November, and the ERDA proposal is expected to come up for a floor vote in the House before the Christmas recess. ERDA's reason for being, of course, is to spend or distribute much of the $10 billion the President has pledged for energy R & D over the next 5 years.

By reopening the debate over the DENR, however, the White House also has resurrected the sticky question of how the R & D agency is supposed to relate to the resource agency. Holifield, for one, wants an independent agency answering to the President. Senator Henry Jackson (D–Wash.), on the other hand, has said that he thinks the R & D agency either ought to be part of the DENR or subordinate to it and its strategies of resource development. The White House, publicly at least, has left unclear which role the FEA would assume. The 4 December fact sheet from the White House said only that the FEA "will be separate from ERDA" but will be responsible for "R & D coordination."

The Congress is unlikely to disentangle the President's various messages before it goes home for Christmas. In the meantime, the Senate is proceeding along a sharply divergent track from the House and Administration approaches to managing energy R & D. On 7 December, the Senate approved by an 82 to 0 vote Henry Jackson's proposal to spend $20 billion on energy R & D over the next 10 years. Virtually all of this, at a rate of $2 billion a year, would support nonnuclear technology; the Administration's proposal, in contrast, calls for spending an average of just under $1 billion over 5 years for nonnuclear work (*Science*, 30 November).

The Jackson bill's approach to management of R & D is fundamentally different from the Administration's. As an interim measure, to take effect until Congress reorganizes energy research, the bill would establish a federal research management project led by an independent chairman named by the President. Serving with the chairman would be one person of assistant secretary rank from each federal agency with a major energy research program.

The differences between the House and Senate approaches will in all likelihood be the subject of intense and secret bartering in a close conference committee of the two Houses next year. The FEA, for its part, carries the aura of a late-hatching mayfly from the Washington swamp. If it follows the pattern of its predecessors, its life expectancy is brief.—ROBERT GILLETTE

Mapping: Shadow of the Big Bird Hovers over Mappers, OMB Report

Like the proverbial East and West which never meet, mapping, charting, and geodesy activities in the federal government have proliferated since their inception in the 1820's, but they have never managed—blue-ribbon panels notwithstanding—to get it all together. On the civilian side, for example, 28 different agencies were making land surveys of the United States last year; 17 were performing marine charting and geodesy, 14 had facilities for making aerial and satellite photos into maps and maplike products, while some 18 agencies and numerous private contractors were doing the printing.

Now, a special task force of the Office of Management and Budget (OMB), undeterred by the failure of past attempts to bring coherence into this situation, has concluded that all civilian mapping should be consolidated into a single new agency and linked more closely with the military. In their report, the task force argues that such an arrangement could not only save the government money and streamline its operations, but also could modernize civilian mapping itself by adopting hitherto unavailable "advanced technology" developed for secret military and intelligence purposes.

OMB brass and the White House, and allegedly the National Security Council staff, are reviewing the task force's plan, which was first put forth in a 200-page classified report last March and sanitized in a shorter, public version released in October. Although implementation of the report's conclusions is far from certain, some civilian mappers are wary of them. Part of their uneasiness is easily attributable to the jitters preceding any major bureaucratic shakeup. But a more substantive worry is that the task force's approach may be the first step into bed with the military mappers. Once such a cozy partnership gets going, civilian mappers fear, the relationship will at best appear unseemly and at worst will be destructive of the civilian's programs. These objections seem to be the latest chapter in a long history of controversy between military and civilian mappers over classification and control of equipment, data, and programs.

The sanitized report often mentions the need for civilian mappers to adopt equipment, data, and know-how of the Department of Defense (DOD); but those who have seen the classified report indicate that it argues even more strongly than the sanitized version for military-civilian liaison. But some civilian mappers object. Said one, "There's no question that with the world situation being what it has been for the last several years, if we had to compete with the military, we would come in second, third, or even fourth."

The task force's chairman, and by all accounts its majordomo, is a 19-year veteran of the Central Intelligence Agency (CIA) named E. E. ("Wilkie") Donelson, who now works in a tight-security wing of OMB. Donelson is credited with having pulled together the Defense Mapping Agency (DMA) from warring service mapping agencies 2 years ago. Hence, for a task force that he heads to find disarray and fragmentation in the hydra-headed civilian mapping groups and to tell them to centralize is not exactly surprising.

The OMB group was composed of representatives of those agencies which

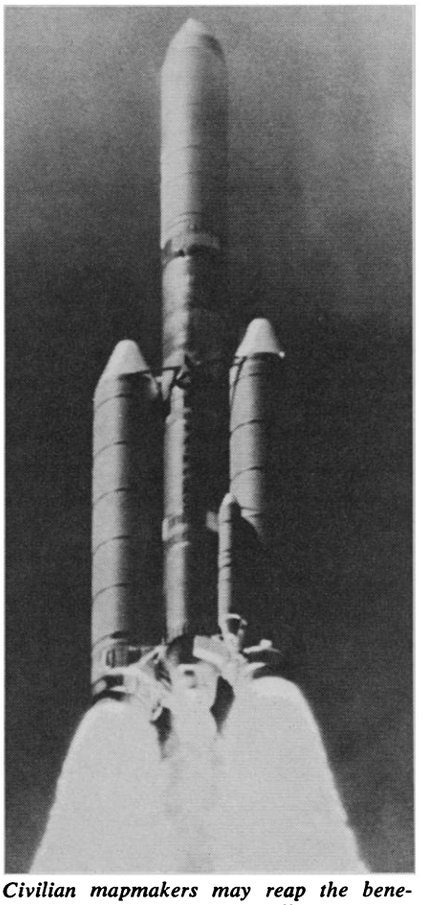
are the heavyweights among federal mappers: the U.S. Geological Survey (USGS), which has lead responsibility for land mapping of the United States; the Commerce Department's National Oceanic and Atmospheric Administration (NOAA), which heads up national geodetic and nautical charting and mapmaking; the Agriculture Department's Forest Service (FS); and the military's DMA, which helps to implement DOD's responsibility for U.S. mapping of foreign areas.*

In addition, the group included a sixth "invisible man," named Leonard Dykes of CIA, whose existence is not even indicated on the censored report's masthead. In an interview, however, Dykes said that he had taken part only as a "consultant," since CIA policy forbids "participation" in domestic activities.

Donelson appears to have run the show. Said someone familiar with the group: "He would listen repeatedly to dissenting views. Repeatedly, that is, so he could tell you what was wrong with them."

This task force is not the first to try to consolidate federal mapping, charting, and geodesy. In the 1930's, another panel called for centralization, but its recommendations were never implemented. The OMB made a more recent attempt to pull things together in an interagency circular issued in 1967 calling for closer coordination. Even so, says the Donelson report, there has been, since the 1930's, a "disturbing proliferation and duplication of activity. . . . [T]he conventional budgetary process alone could not constrain the growth of surveying and mapping. . . ." And, it adds, the future growth of community planning, the environmental movement, and coastal management will cause the demand for maps, charts, and related data to skyrocket in the years ahead.

The centralization the OMB group recommends as the solution would require only an executive reorganization plan such as the one that dissolved the White House Office of Science and Technology last July. Should the new agency be created, Donelson would prefer to see it placed in the President's proposed Department of Energy and Natural Resources (DENR). Should DENR be delayed, however, Donelson would like to put it into Interior or Commerce's NOAA depending, he says,



Civilian mapmakers may reap the benefits of the Big Bird spy satellite.

on the level of interest of departmental leaders and how much visibility it would have.

An incredibly broad spread of current federal programs would either be moved under the new agency or have their actions reviewed by it under the task force's plan. Among them are the International Decade of Ocean Exploration and Seabed Assessment programs of the National Science Foundation (NSF), the Smithsonian Institution's Astrophysical Observatory, and programs in the Federal Aviation Administration, the Department of Housing and Urban Development, the Soil Conservation Service, and even the Bureau of Indian Affairs.

On the first issue the report raises, the need for centralization, many civilian mappers regard some form of it as inevitable. They concede that there is some duplication at present. But others disagreed. One is William Fisher, senior scientist for the Earth Resources Observation Systems program (EROS), which processes ERTS-1 satellite results and which would be absorbed into the new agency. "I don't think the duplication is nearly as bad as Donelson makes it out to be," he said. Moreover, he argued the whole philosophy behind letting separate mapping programs spring up in the user agencies was to ensure that the products met user needs. Centralization, by contrast, would "move mapmakers away from map users."

Donelson remains unpersuaded by such arguments. In addition to seeking consolidation among civilians, he is considering an eventual merger of civilian and military mappers. "I would object strongly today to merging DMA and the civilians. There would be too many problems; the civilians just aren't ready for it. But that doesn't mean it couldn't happen some day."

The other main thrust of the report is the need for closer military ties. Specifically, the Donelson report proposes that a key civilian activity—the $33 million per year topographic program of the USGS, which has responsibility for issuing standard quadrangles of the entire United States—should start adopting DOD's advanced technology. Dykes, an expert on foreign mapping, says his personal view is that "the U.S., among the most advanced countries, find itself to be the poorest mapped," and the report's statement that only 56 percent of the standard topographic map series of the continental United States is published seems to bear this out. Moreover, the topographic program falls behind each year, since it receives roughly six times as many requests for maps as it can handle.

So the Donelson group argues that, for the sake of efficiency, the USGS should borrow 2 of DMA's 39 automated analytical plotters, and strive for eventual acquisition of about 20. These Swiss-made machines, which cost $500,000 each, are far more sophisticated than the $20,000 manual models USGS now relies on. With DMA assistance, the program could catch up with its work, and modernize its operation in the process.

USGS's representative on the task force, Rupert B. Southard, defends this kind of military aid. He points out that, already, in some of its geologic and hydrologic work, as well as ordinary mapping operations, USGS relies on its classified facility in Reston, Virginia, called the Special Mapping Center. According to another source, military materials are sanitized for civilians there, and both DOD and CIA experts "consult" with civilians "on purely technical questions." In addition, CIA consultations are said to extend to all units

* These were Robert B. Southard, Capt. Charles K. Townsend, John R. Swinnerton, and Doyle G. Frederick, respectively.

NEWS & NOTES

• **UNEMPLOYMENT**: Nearly 100,000 scientists and engineers found themselves unemployed because of the cutbacks in the aerospace and related industries which began in 1968. Efforts by the Department of Labor to obtain new jobs for these highly trained but highly specialized people were "reasonably successful," according to an analysis by the General Accounting Office (GAO).

Some 50,000 professionals applied for help, of whom by March 1973 some 30,000 had been assisted in finding new jobs, the Department of Labor reports. (The GAO says this claim is somewhat overstated.) The most productive part of the reemployment program was a "skill conversion study," designed to establish the potential for adapting the skills of aerospace scientists and engineers to other occupations. Eleven suitable industries were identified, and training courses were devised. Of the 329 people who signed on for the courses, 302 had found jobs as of January 1973, most of them in the new occupations for which they had been trained.

The total cost of the Department of Labor's reemployment program was $42 million, or $1400 per person assisted.

• **RIGHT TO COPY**: The U.S. Court of Claims in Washington late last month handed down a decision which allows the National Institutes of Health (NIH) and National Library of Medicine (NLM) to continue to photocopy scientific articles for medical researchers. The decision is viewed as being limited in application and as not settling broad issues raised by photocopying of copyrighted material. The court puts ultimate responsibility for redefining the doctrine of "fair use" in the era of the photocopying machine with Congress.

In dismissing the lawsuit brought against NIH and NLM by Williams & Wilkins, a medical publisher, the judges stressed the potential harm to medical research from any prohibition of photocopying by the libraries. Williams & Wilkins have not yet decided whether they will appeal the 4 to 3 split decision.

The two sides differ on the implications of the opinion. Sources in the publishing company say that after reading the opinion "we don't feel so badly about it." Government officials are inclined to believe the opinion implies extension of the fair use doctrine to other disciplines.

of USGS. Southard says that, as a result of the Donelson group's urging, other agencies, such as the Environmental Protection Agency, have begun using the center.

He sees nothing wrong with having more such arrangements so long as they remain balanced. "It's the difference between alcoholism and having a single drink before dinner. It's a question of the right mix."

But the OMB report may involve more than using elegant new ground equipment. Some who have seen the classified version indicate that the real motive behind the proposed cooperation is for civilians to get data from the DOD's most advanced superspy satellite, a 25,000 pound spacecraft known colloquially as the Big Bird. According to reports in the aviation trade press,† Big Bird may have aboard cameras which measure ground resolution in inches; side scanning radar which can "see" through clouds, fog, and darkness with resolutions perhaps as fine as a few feet; and possibly the world's most advanced mapping camera. "All they'd have to do would be to switch Big Bird on when it flies over the United States," speculated one scientist. Speaking hypothetically, Southard said that, if such data were made available, it would make some of USGS's current operations unnecessary. Donelson, however, declined to comment on "any of those matters."

Crucial to a broad spectrum of private and public activities—from real estate development to intercontinental ballistic missiles—is the national geodetic program, in which the task force finds serious flaws. The geodetic program locates very precisely the positions of a network of points on the ground relative to the earth's crust. Up-to-date knowledge of these points is vital, since the ground stretches, rises, and falls almost continuously. As the Donelson report points out, the Great Lakes, for example, are slowly tilting southward, while the Gulf coast shorelines of Texas and Louisiana are subsiding—in places by as much as a foot per year.

A major conclusion of the Donelson report is that the civilian horizontal and vertical geodetic control networks are in terrible shape. The system of horizontal points, it concludes, "has unacceptable errors of unknown magnitude"; as for the vertical network, it says, "Only a small percentage of control established is now usable." Attempts by the National Ocean Survey (NOS) in NOAA, which has the responsibility for the network, to bring it up to date have largely added to the confusion: A major geodetic survey of the greater Washington, D.C., area was undertaken in 1969 only for the surveyors to learn that the points could not be aligned with networks for surrounding Maryland and Virginia; one network or the other was evidently wrong. The military needs to know these points to very high accuracies in order to guide missiles from one spot to another halfway across the globe. The Atomic Energy Commission needs to know them to judge the seismic safety of nuclear power plant sites.

The Donelson group's formula for remedying the problem is that NOS should take advantage of the DOD Doppler satellite tracking program—which has been successfully applied to geodetic surveying of missile ranges. These satellite results could upgrade the current U.S. network in half as much time and at reduced cost when compared to NOS's present plans.

Two key map programs from a safety standpoint—the NOAA aeronautical and nautical charting programs on which commercial ships and planes rely—get high marks from the Donelson group, primarily for having coordinated their actions adequately with related Navy and Air Force programs. But marine geophysical mapping does not come off as well. The NSF's International Decade of Ocean Exploration, the Naval Electronic Systems Command, as well as some other Navy programs, are guilty of "multiple survey coverage." The report recommends partial declassification of Navy data in this field, but at the same time recommends that more civilians be given security clearances.

One further aspect of the report is an unusually acidic section devoted to the ERTS-1 satellite program—which would fall under the new civilian agency's purview. ERTS-1, with its low-resolution cameras (410 to 1050 feet) has been hailed as the premier experiment in which satellite sensing has been used for world-wide resource inventory and environmental management. But the OMB report states that ERTS-1 "will have little usefulness for standard map production. . . . In the face of the availability of higher resolution photography, ERTS imagery . . . will be of limited value."

† Philip J. Klass, a senior aviation writer, has compiled much of what he and others have written about spy satellites in a book, *Secret Sentries in Space* (Random House, New York, 1971).

EROS scientists claim that this passage, and the entire section, is unfair, since ERTS was never intended to be used in the production of standard maps, and since the uses of low-resolution sensing are completely different from those of high-resolution photography. ERTS backers fear that the Donelson group aims to substitute classified low-resolution programs for ERTS, thus nullifying the need for future, unclassified programs. At the very least, they fear, ERTS or its successors will be at the bottom of the totem pole in the new agency, and they cite the report's caustic comments as evidence.

At present, there is no way of knowing whether the upper levels of government are aware of the disputes which the Donelson report has stirred in the mapping community. In fact, the entire mapping controversy would appear to be a problem in search of a science adviser. An NSF spokesman says that someone in the new science and technology policy office is reviewing the report "on behalf of" H. Guyford Stever, the NSF director who is the President's science adviser. But whether Stever's voice will be heard in the interagency wrangling of the next few months remains to be seen.

—DEBORAH SHAPLEY

Addiction Research Center: Pioneers Still on the Frontier

Ever since the middle 1930's, the Addiction Research Center (ARC) near Lexington, Kentucky, has been, in effect, a national laboratory for research on narcotics. Because it is the only place where narcotics research using human subjects—volunteers from the federal prison system—has been permitted, the ARC has been literally the center of research in the pharmacology, physiology, and neurology of addiction. And government scientists there have produced the major body of work on the subject.

The Lexington center was established as the principal research arm of the Public Health Service (PHS) in the narcotics field. For many years the center operated as a division of the federal narcotics hospital at Lexington, which is scheduled to be taken over by the Bureau of Prisons early next year (*Science*, 7 December). The ARC, which has been administered within PHS by the National Institute of Mental Health since 1947, will continue to operate in a wing of the hospital but will retain its affiliation to NIMH after the Bureau of Prisons takes over the hospital.

The contributions of the Lexington researchers have ranged across applied and basic research. Standard withdrawal techniques for morphine and heroin and later for methadone, barbiturates, and alcohol were developed there. The scientific characterization of the morphine abstinence syndrome and tests for opiate dependence came out of the center. Over the years, a mass of information on the addictive effects of new drugs has been produced by the ARC. In recent years pioneering studies on the narcotic antagonists and research on long-term physiological changes caused by opiate use has been among the most important work done there.

The researchers at the ARC have belonged to the PHS Commissioned Corps or held Civil Service status. Probably because the ARC unit has remained small, administrators at the center have kept active as researchers. Among those who were influential in the center's early and middle periods were Lawrence Kolb, first director of the hospital; Clifton K. Himmelsbach, first head of the research division which became the ARC; and Harris Isbell, director of the center from 1944 to 1963. The current director, who guided ARC during the process of separation from the hospital, is William R. Martin. All have been names to conjure with in addiction research.

It was Himmelsbach, an M.D.–pharmacologist who had been groomed for the job as first head of the research division, who first put together a multidisciplinary mix of physicians, psychiatrists, psychologists, physiologists, and chemists. One close observer says it may have been the first clinical research team in the present sense.

At the beginning, says Himmelsbach, the center was assigned two main purposes. The first was to search for a nonaddicting analgesic—"the bee without a sting." The second purpose was to study the actions of narcotics and to develop a rational approach to treatment. The magnitude of the task facing the center is not easily appreciated today, for 40 years ago very little was known about narcotics and less about addiction.

When the Lexington hospital was opened in 1935 there was no effective technique for the withdrawal of addicts from morphine. "And some of the methods used were worse than nothing," says Himmelsbach. "We had to find a way to separate a man from the drug in a respectable way." It must be recalled that in those days, before the criminally organized international traffic in heroin, addicts had access to relatively pure narcotics, and withdrawal was a more harrowing and dangerous process than it usually is today. Lexington researchers developed the process of gradual withdrawal from opiates, which was standard until methadone came along to make it easier.

A basic understanding of addiction was lacking in the early days. Himmelsbach recalls, for example, that "a lot of people thought [the withdrawal syndrome] was in the mind." Himmelsbach's research helped to establish a detailed knowledge of physical dependence, and he was also instrumental in developing tests for dependence.

A major theme at the center continued to be the search for a nonaddicting narcotic, even though the goal seemed to keep receding. To understand the rationale behind narcotics research in this period, it is necessary to recognize the high priority given the effort to find a nonaddicting narcotic. In some ways, it took on the quality of a quest for a grail; certainly it heavily influenced the shape of the research program into the 1950's.

It is not surprising that addiction research in those days was a small, closed world. Such research was un-