

Budget 1981: Increases for R&D

Stressing a need to cut mounting budget deficits, President Jimmy Carter sent to Congress Monday plans for a fiscal year 1981 budget that show a paring of the fat in nearly all areas except spending on defense and federally funded research.

In research, the big winner remains the Defense Department. Its share of the pie totals 45 percent of the federal government's proposed spending on research and development obligations — roughly \$17 billion. (Budget obligations refer to orders, contracts, services rendered or other fiscal commitments by agencies that will require outlays during that fiscal year or future ones.) And DOD's 20.2 percent increase for R&D spending over this year's figure amounts to a whopping 69 percent of the overall federal increase proposed for R&D in the Carter budget. Even its budget for research contracts to colleges and universities increased more than that for any other agency — 25 percent.

The primary goal of DOD research is development of new strategic and tactical weapons, and indeed most weapons-development programs show real growth in the FY 1981 budget. The MX program, for instance, budgeted at \$1.5 billion, calls for "substantial" increases in development of cruise missiles and adaptations of B-52 bombers to carry cruise missiles. Other major increases would go for research into anti-satellite warfare, development of new combat vehicles and of antitank missiles. Emphasis in basic research

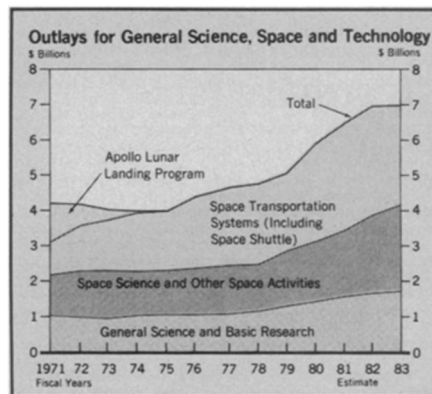
ranges from materials engineering and electronics to human behavior—all fields relevant to improved preparation for combat. Surpassing the technological capabilities, quality and commercial availability of high-energy lasers and particle beams (for weapons) and high-speed integrated circuits (for communications and electronic warfare) is another primary DOD goal.

DOE

In marked contrast to DOD, the Department of Energy shows only a modest increase, at 4.7 percent to \$8.1 billion. But the small increase masks some big changes. For example, Carter's proposed budget provides no money for the Clinch River Breeder Reactor (CRBR), the Waste Isolation Pilot Plant that was to store high-level radioactive wastes from defense programs (SN: 7/21/79, p. 47), or for the NOVA laser and target irradiation facility (to be used in laser-fusion experiments and now under construction at Lawrence Livermore Laboratory).

The biggest drop in DOE's proposed budget authority shows up under the nuclear fission program—from \$1.2 billion in FY 1980 to \$925 million in FY 1981. Although research on light-water reactors would double in the 1981 budget to \$50 million (consistent with the President's vow to increase safety-related programs in the wake of Three Mile Island), a major drop in the liquid-metal fast-breeder program — largely owing to the cutback on CRBR from \$614 million last year — accounts for most of the change.

Funding of solar applications would in-



crease 20 percent. Augmented by \$355 million in tax credits and \$436 million worth of programs outside DOE, the overall solar commitment by the federal government would run \$1.5 billion.

For the first time DOE's coal work — research, development and commercialization — would exceed \$1 billion. Especially notable are two "solvent-refined coal" plants slated for a 115 percent funding increase in FY 1981 to \$155 million. Fusion watchers will find interesting Carter's proposed slowdown in the inertial-confinement program (which includes laser-fusion experiments). While magnetic-confinement-fusion funding would increase 13.5 percent next year to \$404 million, the inertial-confinement program does not come close to keeping pace with inflation.

Phasing down the federal oil-exploration program is primarily responsible for the proposed 17.4 percent drop in budget authority to \$532.3 million, at the Interior Department's U.S. Geological Survey. However, minor increases elsewhere in its program would expand the creation and updating of resource maps and supervise mineral leasing programs on federal lands. Other small increases for Interior would continue research in its Bureau of Mines and initiate a \$16.6 million helium fund. Protecting the critical habitat of migratory birds covered by international treaties, developing more humane predator-control techniques and accelerating the endangered-species listing and protection programs are among high priority budget items in Interior's Fish and Wildlife Service.

Fields of Science	1967	1980	Percent Real Growth 1967-80
Total	\$2,324,744	\$2,520,892	+ 8.4
Life Sciences	889,031	1,057,802	+ 19.0
Psychology	66,518	52,360	- 21.3
Physical Sciences	750,369	649,182	- 13.5
Environmental Sciences	263,424	352,134	+ 33.7
Mathematics	80,859	67,376	- 16.7
Engineering	192,608	234,943	+ 22.0
Social Sciences	69,145	73,690	+ 6.5
Other	12,739	33,405	+162.2

Budget authority increases in Carter's FY 1981 proposals still haven't totally countered the lag, particularly in physical fields, that occurred in the lean 1960s.

Agency	RESEARCH & DEVELOPMENT (Millions of dollars)			BASIC RESEARCH (Millions of dollars)		
	1980 Est.	1981 Est.	Percent change 1980-81	1980 Est.	1981 Est.	Percent change 1980-81
Total	\$31,956	\$36,136	+13.1	\$4,531	\$5,074	+12.0
DOD	13,781	16,565	+20.2	431	523	+21.4
NASA	5,114	5,617	+ 9.8	538	581	+ 8.1
DOE	4,919	5,106	+ 3.8	523	593	+13.4
HHS	3,784	4,011	+ 6.0	3,332	3,544	+ 6.3
NSF	897	1,056	+17.7	814	952	+16.9
USDA	743	786	+ 5.8	289	324	+12.1
EPA	415	445	+ 7.3	14	19	+35.7
INTERIOR	419	415	- 1.0	76	78	+ 2.6
ALL OTHERS	1,884	2,135	+13.3	118	164	+38.9

Data provided by OSTP and OMB

EPA

With all the emphasis on chemical spills and dumps lately, it's not surprising that the biggest spending increase for the Environmental Protection Agency is in its hazardous-wastes program. Funds for waste management would increase to \$125.5 million from \$83.7 million as the agency implements new rules. And a "superfund" proposal wending through the Congress could contribute up to \$45 million in cleanup costs for future Love Canals and kepone-like nightmares if authorizing legislation passes this year.

NASA

A professional football team would call it a "building year": Invest a bundle in some high-priced rookies (who management hopes will live up to their agents' billing and have a long, successful future), stick by some tried-and-true veterans and hometown favorites (part of whose job is to bring the fans to the ticket windows) and hold down the fancy stuff—new plays, exotic offenses, razzle-dazzle, etc. The team is the National Aeronautics and Space Administration; the big rookie is the space shuttle; the veteran hometowners are down-to-earth studies of natural resources, the environment, communications and the like; and the "fancy stuff" is science, particularly the exploration of the solar system.

Of every dollar proposed by NASA for its fiscal 1981 budget plan, nearly 48¢ is for the shuttle. "Applications" programs and aeronautics get about 12¢, and almost 27¢ is taken up by management costs (mostly salaries), a bit of construction work, and tracking-network activities. Of the remainder, 11.6¢ are for space science—planets, stars, and the very nature of NASA's space domain.



NASA's proposed Gamma Ray Observatory.

The only proposed new program in the space science section of the agency's \$5.737 billion request is the Gamma Ray Observatory, an earth-orbiting satellite to be lofted by the shuttle in 1985 for studies of such phenomena as supernovas, pulsars, quasars, antimatter and the nature of the early universe. Missing are the long-sought Venus Orbiter Imaging Radar and early funding to enable a flyby of Halley's comet that would then go on to a lengthy rendezvous with comet Tempel 2. (This may lose Halley completely as a spacecraft target, or at least until it returns in the late 21st century, since some scientists feel that the flyby alone would not be worth its cost.) Proposed "new starts" do include NASA participation in two multi-agency projects, though in neither case as lead agency: a National Oceanic Satellite System and an operational version of the Landsat earth-resources monitoring system.

The FY 1981 budget plan would represent an 8.86 percent increase over the es-

timate for FY 1980 (which includes a proposed \$300 million supplemental appropriation for the oft-delayed shuttle). "This budget," according to NASA administrator Robert Frosch, "will build on NASA's basic strengths in a time of serious national economic stresses and international tensions." He calls it "positive."

NOAA/NBS

The National Oceanic and Atmospheric Administration's 1981 request is a mixed bag. On the surface, NOAA's request is about \$3.6 million less than its \$823.9 million 1980 appropriation. But with a \$20 million carry-over from Coastal Zone Management programs and with other offsets, NOAA programs aim to gain about \$10 million. This figure, however, represents only 1 percent over 1980 program funding, which means the agency will lose more than 10 percent to inflation.

Among the elements slashed are marine programs such as aquaculture research, some fishery habitat investigations and international fisheries management. Delaying the Solar Backscatter Ultraviolet instrument would cut \$1.8 million and reduced support of SEASAT another \$1.5 million. In addition, about \$1.6 million would be withdrawn from hurricane studies, atmospheric chemistry studies and weather modification research.

Even so, Deputy Administrator Bud Walsh feels the budget reflects a "strong continuation of performance" for the 10-year-old agency of the Department of Commerce. In support of this, he points to NOAA's new designation as the lead agency for operating civilian satellites. The main impact of this transfer from NASA is that NOAA assumes authority for Landsat and hopes to gain \$1.2 million for that purpose in 1981. The agency is also assuming a greater share in the development of a National Oceanic Satellite System designed to gather information about the world's oceans. A request of \$6.4 million accompanies that responsibility.

Among the \$415 million designated for weather and climate research, \$1.5 million is being requested for a new study of heat flux from the ocean and its relation to climate. The U.S. Climate Program Office hopes to gain \$400,000 for the second year of the National Climate Program.

With a 13.2 percent increase in the requested 1981 budget, the Department of Commerce's National Bureau of Standards plans to hold its own against inflation. Included in the \$107,869,000 request is \$3.3 million to develop test procedures and measurement techniques to be used in the manufacture of Very Large Scale Integrated circuits and \$5 million for basic research on standards and measurements. Commerce also announced requests totaling \$10.2 million to implement presidential policies on "industrial innovation," including aid to small businesses in high-risk technologies.

NSF

A drop in the budget bucket is all the National Science Foundation gets, but ripples caused by that drop usually indicate the administration's current attitude toward science. NSF's fiscal 1981 budget continues to reflect the President's oft-expressed interest in science and proposes a new project that might help quench our thirst for oil.

NSF's proposed budget of \$1,148 million amounts to an inflation-beating 15.5 percent increase over the program level for 1980. Basic research would get \$951.5 million, up 16.9 percent. Applied research would get \$93.4 million, up 25.4 percent.

The big winner at NSF would be a 10-year Ocean Margin Drilling Program—a basic research project that NSF says "would be of special value to the petroleum industry." Accordingly, a number of major oil companies already have been approached, and eight have expressed interest in participating in and helping pay for what would be a \$700 million project. Foreign governments are also being invited to take part and pay up to \$5 million each per year.

The OMD would follow and build on the work of the Deep Sea Drilling Project, and its primary objective would be to increase scientific knowledge about the margins of the world's oceans (some of which may have significant deposits of oil). This, however, calls for a drilling vessel of greater capability than the *Glomar Challenger* and one equipped to prevent blow-out should petroleum under pressure be encountered. So it is possible that the much-talked-about, Central Intelligence Agency-built *Glomar Explorer* (SN: 6/24/78, p. 410) will be converted into the world's largest drillship for this project. If feasibility and design studies warrant a go-ahead, drilling would start in January 1984.

HHS

A moderate increase in funding, about 5 percent more than the 1980 budget, was proposed for the Public Health Service, which includes most health-related research and comes under the Department of Health and Human Services. Money was requested for two important laboratory construction projects. One would be new facilities to replace obsolete Food and Drug Administration laboratories that conduct research to support regulatory decisions. The other would be an addition to the Appalachian Laboratory for Occupational Safety and Health, under the Center for Disease Control, to allow additional research into the health effects of mining. The request for each project is \$25 million.

The proposed 1981 budget for the National Institutes of Health increased only about 4 percent over 1980 to a total of \$3.6 billion. However, Congress usually adds to the presidential budget in this area. NIH

director Donald S. Fredrickson says that the 1981 budget has in it the greatest increase in recent years over the previous year's actual appropriations. But, Fredrickson admits, "there will be belt tightening in many areas." Contract funding, for example, would be reduced in several areas, including cancer research. Of the 11 institutes that comprise NIH, the National Cancer Institute received proportionally the smallest proposed increase, less than 1 percent.

The belt continues to tighten around the collective waist of graduate students. Lacking a boost in funding, NIH has elected to raise stipends and decrease the number of trainees it supports. "We are down to a level where we are concerned about any further change," Fredrickson told SCIENCE NEWS. "No doubt the federal contribution is crucial to maintaining the high quality of people in biomedical and behavior sciences research."

The National Institute of Environmental Health Sciences is the only NIH institute to receive an increase greater than inflation. One of the smallest institutes, its proposed budget was raised 15 percent to a total of \$97 million. That increase includes \$5 million to continue staffing and equipping the new environmental health sciences facility in North Carolina. The project is scheduled for completion in late 1981. Money from NIEHS, and from NCI, would also go to expand the National Toxicology Program, which is concerned with testing

chemicals of public health concern.

Stabilization of the number of NIH-funded research grants is an innovation of the 1981 budget. In the past, the number of new and competing grants vacillated from year to year. Because most grants run 3 to 4 years, the fluctuations made long-term planning difficult for the institutes. Under the new policy, approximately 5,000 research grants will be awarded each year (the average for five years has been 4,700), to make a total of about 16,000 grants receiving NIH support at any time.

Much of the mental health-related funding hinges on the final disposition of the proposed Mental Health Systems Act, which the administration hoped would pass last year but still remains before Congress. Included in the President's 1981 fiscal year proposals is an overall increase of \$38 million — about 8 percent — in research, prevention and treatment of behavioral problems. About \$20 million of this is aimed at bolstering community mental health center resources, particularly among the previously "underserved" — children and youth, the aged, minorities, the poor, rural residents and the chronically mentally ill. A proposed \$18 million would go toward mental health research, with \$4.3 million for drug abuse study and \$3 million for alcoholism research. A supplemental request for a \$50 million addition to the 1980 budget would enable some projects to be initiated in the current fiscal year. □

Science Talent Search finalists chosen

For 39 years the Annual Science Talent Search, financed by Westinghouse and administered by Science Service, has been selecting some of the top scientific talent among American youth. Three former STS winners have gone on to win Nobel Prizes in science, and one winner has subsequently won a Lasker Award.

Once again, 40 young people have been chosen as finalists in the STS competition. The 27 boys and 13 girls were chosen from among 950 completely qualified contestants. In late February they will visit Washington to attend the Science Talent Institute and to display their research projects and research results. Then 10 of the 40 finalists will be chosen by a board of judges as winners and will receive scholarships totaling \$74,500. The remaining contestants will get awards of \$500 each.

The qualities that helped lead to the selection of this year's 40 finalists are those shared by previous ones — curiosity, initiative, independence, entrepreneurship, creativity and nonconformity. For instance, Gary Eugene McGahan of Decatur, Ala., read about the ability of honey bees to communicate flower locations by secreting a substance and set out — successfully — to demonstrate the existence of a similar substance, an alarm pheromone, in earthworms. Mark William

Turner of Niceville, Fla., studied the effect of nozzle design on the performance of solid propellant rocket motors. Using engineering skills he had learned while repairing cars, he designed and built an eight-foot air track, a small glider, eight types of rocket nozzles and a Time Pulse Generator for measurements. Using two types of solid propellant rocket motors, he conducted a series of 50 tests with various combinations of nozzles, fed test data into a computer and found that his experimental results using relatively inexpensive, homemade components compared favorably with proven rocket propulsion theory. George Frank Weinert of Gaithersburg, Md., analyzed the feasibility of a theory that the parting of the Red Sea described in the Old Testament could have been caused by heavy celestial bodies passing the earth at close distance, thereby creating a strong gravitational attraction similar to the tidal forces caused by the moon and sun.

Although most of the finalists are planning on a science career, they have other interests besides science. For instance, Faith Louise Van Nice of Hillsboro, Ore., dances ballet and works on an old sports car. Kenneth Gainsford Brownlee of Schenectady, N.Y., skis, which probably explains why his winning STS project is a

ski lift arrangement that slows ski lift chairs when skiers want to get on or off. Jenae Rose Bunyak of Cut Bank, Mont., plays on basketball and track teams, jogs, collects stamps and photographs wildlife.

In addition to their wide interests, the finalists come from 32 cities in 17 states.

The 40 finalists are:

ALABAMA: Gary Eugene McGahan, Austin H.S., Decatur.

ARKANSAS: David Edmund Wickliff, Fayetteville H.S., Fayetteville.

CALIFORNIA: Scott Cameron Thornburg, Alhambra H.S., Alhambra; David Thomas Gleba, La Jolla H.S., La Jolla; Robin Chu Hsin Chang, Los Altos H.S., Los Altos; Bryan Edward Penprase, San Marino H.S., San Marino; Alan Glenn Murray, Foothill H.S., Santa Ana.

CONNECTICUT: David Benjamin Rothenberg, Staples H.S., Westport.

FLORIDA: Pamela Lynne Epstein, Merritt Island H.S., Merritt Island; Mark William Turner, Niceville H.S., Niceville.

HAWAII: Anthony Charles Laberge, Aiea H.S., Aiea.

ILLINOIS: Joel Friedman, Evanston Twp. H.S., Evanston; Craig Richard Bina, Wheeling H.S., Wheeling.

INDIANA: Tony James Bohnert, Jasper H.S., Jasper.

MARYLAND: George Frank Weinert, Seneca Valley H.S., Germantown; Heather Lynn Dick, Rockville H.S., Rockville.

MICHIGAN: John Michael Andersland, East Lansing H.S., East Lansing; Craig Thomas Perdue, Stevenson H.S., Livonia.

MONTANA: John Ward Vidic, Helena Sr. H.S., Helena; Jenae Rose Bunyak, North Toole County H.S., Sunburst.

NEW YORK: Naomi Taylor, Benjamin N. Cardozo H.S., Bayside; Mark Paul Prestigiacomo, W.C. Mephram H.S., Bellmore; Karen Lisa Jerome, South Shore H.S., Brooklyn; Arielle Nadine Bienenstock, Yeshiva of Flatbush Joel Braverman H.S., Brooklyn; David Elmer Galbi, Maine-Endwell Sr. H.S., Endwell; David Chiang, Bronx H.S. of Science, New York; Sarah Julia Kupferberg, Bronx H.S. of Science, New York; Lee Diana Turkel, Bronx H.S. of Science, New York; Philip Sung-En Wang, Bronx H.S. of Science, New York; Melissa Willene Hull, Hunter College H.S., New York; Paul Neil Feldman, Stuyvesant H.S., New York; Brian Randolph Greene, Stuyvesant H.S., New York; Lisa Joy Randall, Stuyvesant H.S., New York; Kenneth Gainsford Brownlee, Linton H.S., Schenectady.

OREGON: Faith Louise Van Nice, Hillsboro Sr. H.S., Hillsboro.

TENNESSEE: Eugene Giles Brady III, Memphis Catholic H.S., Memphis.

TEXAS: Lourdes Gamez, Loretto Academy, El Paso.

VIRGINIA: Michael Vincent Finn, Lake Braddock Secondary School, Burke; John Alexander Maturi, J.E.B. Stuart H.S., Falls Church.

WISCONSIN: Karen Laurel Middleton, James Madison Memorial H.S., Madison. □