NASA BUDGET

Anticipating the ax

NASA

Dr. Paine: Optimism amid stringency.

As President Nixon and battalions of aides struggle to ready the fiscal 1971 space budget for delivery to Congress, the National Aeronautics and Space Administration is already trimming programs for which money will not be available.

The most dramatic cutback is the slowing down of the Apollo (see page 61) program and elimination of Apollo 20. In addition NASA plans to shut down its Electronics Research Center in Cambridge, Mass., possibly as early as June. Opened in September 1964, ERC is the space agency's youngest center, employing slightly more than 800 people.

The Viking unmanned Mars-landing mission formerly scheduled for 1973 is being delayed until the next favorable launch opportunity, which is not until two years later. And production of the manned space flight program's mighty Saturn 5 booster will be halted indefinitely after number 15 comes off the line this fall. This is the booster presently earmarked for Apollo 19.

The effect of these cutbacks, combined with the need for still more economy, will trim an estimated 50,000 jobs from the agency's in-house, contractor and university work force by the end of 1971, says NASA Administrator Dr. Thomas O. Paine.

Dr. Paine, however, does not sound nearly so dismal a note as did his predecessor, James E. Webb, under similar circumstances. Webb used to predict technological crises, catastrophic unemployment and Russian space spectaculars whenever budget cuts were imminent.

Though labeling the forthcoming budget, expected to be slightly more than $3.6 billion compared with this year's $3.7 billion, "a fairly stringent reduction" from the agency's desires, Dr. Paine describes it as "a level that we can still have a first-class program with."

Among the major programs likely to be retained in President Nixon's budget are a pair of Mars orbiters in 1971, Jupiter flybys in 1972 and 1973, a combined Venus-Mercury flyby in 1973 and the Apollo Applications Program's orbiting workshop in 1972. A major effort is scheduled to begin on the planned earth-to-orbit shuttle vehicle, possibly with about $100 million in fiscal 1971, and a less-advanced study of a permanent space station for the middle or late 1970's.

WORKING NETWORK

Go, and catch a falling star

Five years ago the Smithsonian Astrophysical Observatory set up a network of 16 unmanned camera stations in the Midwest to photograph very bright meteorites and fireballs. This Prairie Network sought to determine the orbits, size and loss of mass of meteorites flaming through the earth's atmosphere, and, it was hoped, assist in recovering some of the objects.

The cameras have caught the flash of many meteorites during that time. But until this month not a single one that had been photographed was later found on the ground.

Then, on Jan. 3 three of the network's stations recorded a bright fireball over wide parts of the Midwest. Analysis of the photographs at SAO's headquarters in Cambridge, Mass., enabled the scientists to pinpoint the probable location of impact to about one square mile. Gunther Schwartz, field manager of the network, set off on a ground search, hindered by a ground-blanketing snowfall that had occurred during the interval.

On his third day in the field, at 2:45 p.m. Jan. 9, he found the meteorite in the snow in the middle of an infrequently traveled country road near Lost City, Okla.

The object, rushed to the Smithsonian Institution in Washington for preliminary study, is a 22-pound bronzite chondrite, a common variety of stony meteorite that constitutes about 35 percent of all meteorite falls recovered.

The scientific significance rests not so much with the object itself as with the quick recovery and the photographic record of its path into the atmosphere. The fast recovery will allow scientists to do radioisotopic analyses of the meteorite's very short-lived isotopes, a fruitful clue to meteorite history usually missing from most objects recovered. Slices were immediately sent to three laboratories for such study.

But the scientists are also excited by the photographs. On more than 700 occasions pieces of rock and metal seen to fall to earth have been later recovered. But only once before, at Pribram, Czechoslovakia, on April 7, 1959, has a photographed meteorite been recovered.

The latest find, according to the photographs, had an orbit which took it beyond the orbit of Mars and into the asteroid belt. Its orbit is less elliptical than most asteroids.

"This gives us an opportunity to extrapolate back in space," says Roy S. Clarke Jr., associate curator for the division of meteorites of the Smithsonian's National Museum. "This now ties the whole thing up together in a way that's very nice. We have its orbit, a detailed record of its passage through the atmosphere, and we know where it's been in the planetary system." Such information should prove invaluable in interpreting the data derived from the meteorite and fitting it into some scientific perspective useful in better understanding the solar system.

In this sense, the scientists are happy the object is one of the most common types of meteorites rather than an offbeat variety. Anything they learn from it will help cast light on the over-all population of meteorites, generally believed to be small stray asteroids. □

NEW ENGLAND SYSTEM

Watchdog for floods

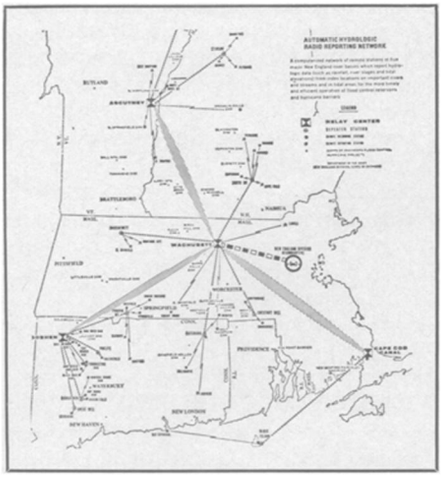
Not all floods are the same. Floods from melting snow, in the North Central United States, for example, give a fairly clear warning; in New England, flash floods usually hit fast and hard.

Last year the U.S. Weather Bureau computerized its flood-predicting facility and successfully foretold the onset—and the extent—of spring floods in the Midwest (SN: 3/29, p. 302).

As of last week, flood watchers are tackling the more challenging task presented by New England weather, as the U.S. Army Corps of Engineers put into operation, after a year and a half and $800,000, what it calls "the world's most comprehensive, fully automated" flood alert system. Using a computer and advanced electronics to measure rising water levels and meteorological changes, the system permits the prediction of floods or hurricane tides.

The nerve center for the system as well as New England headquarters for the Corps is at Waltham, Mass. The New England installation is serving as a test bed for later, broader coverage.

"We will observe and evaluate performance of this system with great interest as we consider the installation of similar systems in other regions," says Lieut. Gen. Frederick J. Clarke, chief



Corps of Engineers

From 41 stations, warning of floods.

of engineers. "I look forward to the day when all parts of our country may be able to enjoy such protection."

The system, whose electronics were developed by Motorola, Inc., relies on 41 battery-powered monitoring stations scattered from Long Island Sound to northern Vermont. The stations use sensors to collect data such as river and reservoir levels, tidal conditions, barometric pressure, rainfall, and wind direction and velocity. These data are encoded into electronic pulses, which are transmitted to the computer center at Waltham.

The interpretation of the data is done by men with the aid of the computer, which has in its memory a history of similar data for when floods occurred. Based on this information, an electronic plotter plots the data and humans make predictions based on them.

"The ultimate goal," says Carl P. Nierzwicki, director of Motorola's applied systems unit, "is to automate the system so that the final predictions will be done by computer."

For the present, though, the information from the computer is passed on to the Weather Bureau, the only agency authorized to issue flood warnings, or used by the Corps to take its own protective action. Should the director of the control system decide that a flood—either inland or coastal—is imminent he can order the Corps' preventive flood control measures into operation. These measures take two forms: hurricane barriers and dams. The dams—35 of them in New England—are simply reservoirs to catch the overflow from rivers and streams.

As for the hurricane barrier, says Saul Cooper, chief of the reservoir center at Waltham, "During coastal storms or hurricanes, they keep the tidal surge from coming into the harbor. They close off the navigational opening." Four such barriers now exist along the New England coast. "More will have to be built," predicts Cooper.

Besides warning of floods and high tides, the system can also help fight water pollution. Because it measures water levels, it can indicate the general contamination of a stream. Too low a flow, for example, could mean that the proportion of pollutants to water is too high, and more water can be released into the stream. Work on this has already begun, says Cooper. □

APOLLO SLOWDOWN

More time for science

While complaining that the Apollo program has not included enough science (SN: 8/9, p. 112), some lunar scientists have also held the seemingly opposite position that the lunar samples are being delivered too quickly (SN: 9/20, p. 235). Researchers studying the initial batch of samples, those from Apollo 11, were barely halfway through gathering their data when Apollo 12 was sent to the moon for more (SN: 11/29, p. 493).

Until last week, the same thing was to have happened with Apollo 13. As scientists met in Houston for the first open discussion of their Apollo 11 analyses, the Lunar Receiving Laboratory was completing preparations to release the Apollo 12 samples for study with Apollo 13 to be launched on March 12, little more than two months later.

But the anticipation of continued tight budgets and the resultant desire by the National Aeronautics and Space Administration for more careful mission planning have combined to give the time-pressed scientists just what they want. With the slowdown of the Apollo program as a whole (SN: 1/3, p. 5), NASA has decided to begin by delaying Apollo 13 for one month.

"Thank God!" exclaimed Dr. Edward Anders of the University of Chicago when he heard of the announcement. "That," added Dr. Paul Gast of Lamont-Doherty Geological Observatory, "is the best news I've heard in a long time."

Apollo 13 will be the first lunar landing mission aimed at a site in the moon's rugged highlands. Besides offering the chance of finding material from the earliest days of the moon, the rough Fra Mauro site could be the most challenging yet for the astronauts' landing abilities.

Apollo 14, once scheduled for July, was tentatively retargeted for September due to the over-all slowdown, and might be held to October due to the postponement of Apollo 13. Also for budgetary reasons, the final mission in the Apollo program, Apollo 20, has been deleted from the lineup and its Saturn 5 booster reassigned to launch the Apollo Applications Program's orbiting workshop in 1972 (SN: 1/3, p. 21). The program's reduced pace, however, is likely to mean that Apollo spacecraft will still be going to the moon in 1974.

As the flight-shuffling goes on, Apollo officials are also developing plans for additional scientific instruments to go on upcoming missions.

A sieve to let the astronauts collect some pure moon dust by separating out even small rough particles may be sent along on Apollo 13. Another possibility is a hand-held microscope, which might go on subsequent flights as well, to let the astronauts take advantage of their geological training by selecting some samples on the basis of tiny details such as their crystalline structure.

Several noted lunar researchers, including geologist Eugene Shoemaker and seismologist Gary Latham, have high hopes for the success of one Apollo 14 proposal: a hand-held magnetometer that could be moved from place to place by the astronauts to measure local variations in the lunar magnetic field. Evidence had been pointing increasingly toward an almost nonexistent field until the magnetometer in the Apollo 12 experiment package detected a field of about 30 gammas, about 0.1 percent as strong as earth's. Apollos 13 and 14, however, do not include plans for permanently implanted magnetometers, so the portable instrument would provide an alternate way of seeing whether the field is similar in widely separated areas of the moon.

Another tool under study for Apollo 14 is essentially a piece of flypaper, says Anthony J. Calio, director of science and applications at the Manned Spacecraft Center in Houston. The astronauts would place its sticky surface face down on the moon to pick up a sample that would include only the topmost layer of lunar material. This would give scientists a chance to examine material known to be the most recently exposed to bombardment of cosmic rays, solar particles and micrometeoroids.

And definitely planned for inclusion on the first flight after it becomes available—probably Apollo 14—is a two-wheeled cart resembling a ricksha that an astronaut will pull behind him to carry a larger volume of rock samples and instruments.

One experiment that had been proposed for a future mission has proved to be so controversial that now even its author has recommended against it. Dr. Latham had suggested setting off a nu-