ESSA NEWS

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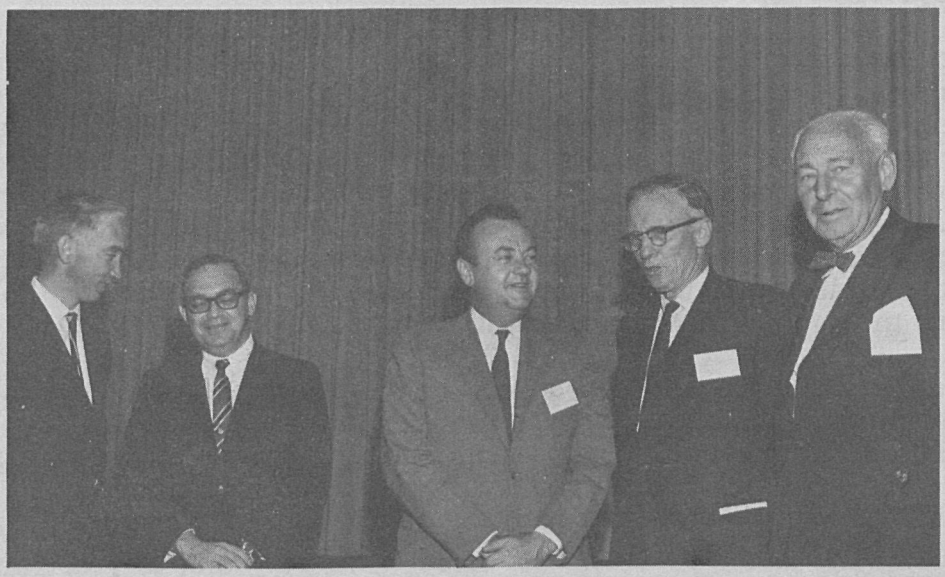
• **Transfer Ceremonies Held at Boulder** A formal ceremony, held at Boulder on October 13, marked the transfer of the Central Radio Propagation Laboratory from the National Bureau of Standards to ESSA and its change of name to Institute for Telecommunication Sciences and Aeronomy.

Dr. C. Gordon Little, Director of the Institute, presided at the ceremony, which was attended by national, state, and local dignitaries. Dr. J. Herbert Hollomon (Assistant Secretary of Commerce for Science and Technology), Dr. A.V. Astin (Director of the National Bureau of Standards), and Dr. Robert M. White (ESSA Administrator) spoke briefly.

Dr. Lloyd V. Berkner, Director of the Southwest Center for Advanced Studies, delivered the principal address, titled "Environmental Science in the Nation's Development," which is reprinted in this issue of ESSA News.



PARTICIPATING IN THE BOULDER CEREMONY WERE (LEFT TO RIGHT): DR. C. GORDON LITTLE; DR. ROBERT M. WHITE; DR. J. HERBERT HOLLOMON; DR. A. V. ASTIN, AND DR. LLOYD V. BERKNER, THE PRINCIPAL SPEAKER

The Environmental Sciences in the Nation's Development

BY DR. LLOYD V. BERKNER

October 13, 1965, should go down in history as a key day in erecting milestones along the road of progress of the environmental sciences and the human services derived from them.

Today, the great Montana seismic array is dedicated, to round out the detailed recommendations of the Panel on Seismic Improvement of 1959.

Today, the 140-foot precision radio telescope at the National Radio Astronomy Observatory is unveiled.

Today, the National Academy of Sciences completes its meeting at Seattle, which has highlighted the problem of science and government.

And today, here in Boulder, we complete the launching of the newly born Environmental Science Services Administration of the Department of Commerce, as the Central Radio Propagation Laboratory is merged to complete the form of this agency.

We are come together here today to celebrate the effectuation of a great national strategic decision. This is the decision to bring together as a single agency, diverse but related Federal services, heretofore organized haphazardly under the general aegis of the Department of Commerce -- services growing out of the hazards, vicissitudes, and opportunities of our natural environment. I hope that the formality of this occasion will emphasize the great wisdom of this strategy and the altogether new national opportunities that it offers. This step forms a pattern of Federal organization for the public welfare that, with time, can be further developed for the benefit of all.

That this strategy could be adopted at all demonstrates the great internal strength of our American Federal institution. In most nations, the first aim of a federal bureacracy is self perpetuation, no matter how antiquated and unserviceable its structure. To remodel and renovate such government organizations, to redirect their stragetic course, ordinarily requires a political coup or a military revolution. It is all the more remarkable, then, that the force toward this new strategy came, not from outside, but from vision and wisdom of the leaders of the independent agencies within--Dr. Robert M. White of the Weather Bureau, Admiral H. Arnold Karo of the Coast and Geodetic Survey, Dr. Allen Astin of the National Bureau of Standards, with the whole effort coordinated and directed within the newly founded office of Assistant Secretary of Commerce for Science and Technology led by its first Secretary,

Mr. Herbert Hollomon. May I salute each of you for the high order of statesmanship that has made possible this new national opportunity in the environmental sciences. May I salute, too, the supporting staffs of each agency who have contributed so significantly to this consolidation.

Beyond the Department itself, concurrence and assent was required by many others who would be affected. Among these are the Office of the President, involving the Office of Science and Technology, and the Budget Bureau, as well as the President himself, who issued the final orders. Involved, too was the Congress, with the reorientation of its committee responsibilities and authorities. The foresight of each element of our governmental complex gives confidence in the strength of our American system.

What are these new opportunities opened by the merger of the environmental services into a single entity? In a sense, my reply is Chapter II of a lecture given at the University of Buffalo in 1958. The time was intimate post-Sputnik, when Cliff Furnas asked me to analyze some of the deficiencies of the direction of science and technology by government. In that lecture, we recognized three broad and independent responsibilities for science and its emergent technologies in the Federal complex.

The first was the responsibility of mission-oriented Departments such as Defense and Agriculture for the advancement of science both within and outside the Departments and the derivation from science of new technologies related to their mission.

The second was the responsibility for extramural support of fundamental science, so basic that mission orientation was not yet apparent, by such agencies as the National Science Foundation and the Public Health Service.

The third was the responsibility for services emergent from science which are broadly applicable to the welfare and benefit of the whole population -- city, State and Federal -- services not clearly dependent on any Department as related to or defined by its mission.

One can identify a dozen or more such broad services in various Departments of the Federal establishment, each quasi-independent in character, each relatively small in scope, and each generally neglected and even unnoticed by their parent Departments. While each agency was established to fulfill some critical national need emergent from a rising science, their invisibility below the bureaucratic rubble prevented anything like their optimum response to the National need.

It has been characteristic of most of these science-oriented service agencies that, in one way or another, they relate to man's optimum adaptation to his natural environment. Thus, for example, the basic interest of the Weather Bureau is in the troposphere and the complex of weather produced within it. The Coast and Geodetic Survey deals with the shape of the earth, its connecting surfaces, and the oceans around them. The Central Radio Propagation Laboratory is concerned with the atmosphere at all levels through which

the communications among the peoples of the world must be maintained. One can go on through a long list of such independent services whose quality and development rests on a progressive environmental science.

As science has progressed, it has become overwhelmingly apparent that these broad environmental services are intimately interrelated. A major factor in understanding the continental weather and climatology is the state of the surrounding oceans, their current and temperature. Exact surveying involving first-order geodesy requires radio methods and intimate knowledge of propagation phenomena. Atmospheric gravity waves originating at the surface are propagated upward to affect inospheric radio propagation. One can cite literally dozens of such interrelations.

Since the services arising from the environmental sciences are now so intimately interwoven, it no longer makes sense to manage each of them separately, particularly when an activity of one agency can so vitally affect the viability of another. Organized separately, it is a matter of chance that one agency will undertake the work so vitally needed by the others. Even if an agency would, I doubt that the Congressional Appropriations Subcommittee would recognize or support the need, since different subcommittees are assigned to the work of different agencies.

I suppose that the unity of the environmental science services became apparent to all during the International Geophysical Year. Here, for the first time, an integrated plan for observation and service was formulated right across the board of the environmental sciences. Moreover, special appropriations made possible participation of all agencies, both public and private, in rather completely related programs. The awareness of this unity was enhanced by the need for atomic detection and for a viable space activity. This remarkable public recognition and support of the need for unified study of our environment during IGY has been a major step in political growth of our society.

And so, today, we celebrate the first major step of Government organization as a consequence of this recognition of unity of the environmental sciences. This is the consolidation of the three great services -- Weather Bureau, Coast and Geodetic Survey, and Central Radio Propagation Laboratory -- into the new Environmental Science Services Administration.

In assessing the promise of this new national strategy, we should measure the impact of the environmental services on humanity. In a single hurricane, Betsy, we have just seen a significant loss of life and perhaps a billion dollars in property damage. What does this represent in human tragedy and grief? Yet I must be quick to remark that but for the timely warnings, the loss would have been much greater. We are gaining steadily toward our control of such events.

The great drought engulfing the Northeast has brought water supplies to a bare minimum. What lies ahead? Already the cost to our economy is incalculable. Yet on occasion, man has artificially stimulated rain, though the process is yet beyond reasonable understanding and control.

Our multibillion-dollar communication industry depends basically on the effective and optimum allocation of radio channels. Yet the effectiveness of such allocation depends on a wide variety of nature's whims. To understand and even control the propagation of waves is at the heart of the problem of optimizing our communications.

Earthquakes are the greatest killers and destroyers that man knows. They strike, today, without warning, destroying whole cities and countrysides -- obliterating years of labor by whole populations. Yet earthquakes arise from now definable orgins. Certainly the potentiality of warning, however short, can be foreseen, though not yet within reach of our capability. Already the earthquake-produced tidal waves -- the dread tsunamis -- can be predicted within a few hours of life-saving warning.

So we see from these few examples that the value of the environmental science services to our citizens must be measured in units of tens of billions of dollars annually with corresponding values in terms of human life and welfare. Even as I composed these remarks, at my home in Ft. Lauderdale, Florida, I was reminded that just one month ago I was well prepared by suitable warning for the furies of Betsy's 115-mile winds as it traveled westward ultimately to devastate New Orleans. Thus, the work of this new Administration will impinge intimately on the lives of every one of us, often in many different ways. As these services are brought together, abundant new benefits can be foreseen.

First, I would mention the value of a single national warning service, bolstered by an adequate national communication network, and with well-manned and well-organized local outlets. Heretofore, warnings, forecasts, predictions, and advices on environmental events have been handled independently and by different methods. Not always have they been fully effective, for want of resources. Now a national warning service can provide data on weather and storms, earthquakes, tsunamis, solar and interplanetary data affecting radio and space travel, geomagnetic storms and radio blackouts. In particular, the national service can provide local outlets of the greatest effectiveness and the requisite speed. Already available data will become vastly more useful, and one can easily foresee that the national warning service will become a major national asset.

Second, the scientific horizons of the new Administration are enormously broadened. Now the geomagnetic scientists of the Coast Survey have a direct stake in the relation of geomagnetism to radio transmission, and the radio scientists of CRPL a more direct access to relevant geomagnetism. The ships of the Coast Survey now are directly involved in meteorology or ionospheric sounding at sea, as well as in their traditional pursuits. True oceanography over the whole scale of scientific disciplines within a single agency--the ESSA -- is now possible for the first time. I would foresee the use of new radio techniques by the experts at CRPL applied to the immense problem of air-surface heat interchange so that this critical problem can be finally attacked. Literally dozens of new opportunities for development of new sensors, new measurements, are opened by the broadened vistas opened to this new Administration.

Third, the mixing of a variety of breeds of scientific skills represented by the three merged agencies offers exciting new scientific horizons. An altogether new quality of vigor is certain to emerge in the broadened scientific attack on problems of our environment.

Fourth, the professional quality of the service and the professional opportunity is certain to be vastly enhanced. Now, a member of the ESSA with broad vision can legitimately develop his identity and his interest across the whole of environmental science and the emergent national services. In particular, the access of the whole Administration to a highly qualified and expanded uniformed service gives many advantages. In the environmental sciences, the tools are ships at sea and disciplined logistics in extraordinary situations. Here, the Officer Corps having advanced training and deep understanding of scientific and service objectives can be invaluable. Such a Corps must never dominate the Administration, but its opportunity should be measured, along with the civilian components, in terms of qualification. Certainly, with foresight, such a uniformed component of an essentially science-based Administration can become a model for the world to copy. It starts from the already dedicated nucleus created in the Coast Survey.

Finally, I would mention the advantages of a unified budget and administration. For the first time we have a single agency responsible for a major part of our environmental services. For the first time there is an urgent force to fill the gaping scientific cracks so evident before. Certainly there will be economies to be gained, but even more important, there are new opportunities to be exploited for man's benefit.

In commenting on the opportunity of ESSA to establish a new relationship with the Nation's science as a whole we must recognize the national opportunities developing outside of Government since the mid-century. These have come particularly as an outgrowth of the experience of the IGY. Here at Boulder the creation of NCAR, based on the recommendations of the National Academy of Sciences, is an outstanding development. Elsewhere new great schools of environmental science are developing: at MIT under Frank Press, at the University of Miami under Fred Singer, and at my own institution, the Graduate Research Center of the Southwest, under Francis Johnson and Anton Hales, as typical examples. Within Government the Public Health Service is recognizing that with the conquest of infectious disease, problems of environmental health are becoming the foremost killers in society. Thus the very creation of ESSA is in a sense a part of this national response to the increasing national need for environmental services of a new order. In reacting to this growing national need I am confident that the ESSA will undertake those measures that can mobilize and develop our whole national capability, thus breaking out of the hard traditional shell of bureaucratic introspection.

In closing, I would add but two comments. The ESSA now becomes a major Federal agency with a broadly defined mission. Like Defense, or Agriculture, or Health, it cannot do the job solely from within. Like the other great mission-oriented agencies, it must have close coupling with the whole of our national institution of science -- the universities, the basic research institutions, the science-based industries. This close association with the whole

science of our time can only be developed through contract or grant relationship with non-Federal institutions. In turn, the facilities of the Administration offer unparalleled opportunity for our non-Federal scientists to get into the very middle of the environmental problems. Such a relation will destroy the bureaucratic isolation that can atrophy any agency -- it can maintain a more intimate sense of dynamics and accomplishment.

To create this new relationship will require special and substantial appropriations and their skillful administration. While their formal administration may be centralized, I would urge their substantive administration to a scientist-to-scientist basis. But to obtain the funds for this new but essential excursion will require hard work at the very top of our Government by the Secretary of Commerce, by the several offices of the President, and by the President himself. Yet, when the enormity of the problem is clearly shown, I have no doubt of the favorable response of the Congress.

As a second comment, I would remark as a non-Government scientist that the whole job is not yet done. Certainly it will take a little time to consolidate the enormous gains now within reach. Yet we cannot rest until the task is complete. Other areas of environmental science are still disconnected, still having gaping crevasses in the continuity of our environmental services. This is not a job easily done. To do this involves climbing of departmental barriers with years of tradition and custom. Yet in the creation of ESSA, the almost impossible has been done, so perhaps this ultimate goal can be achieved.

With a sense of satisfaction on the part of each of us, we participate in this first major Federal step to recognize the unity of the sciences and emergent services of our environment. We see that with unbelievable prescience, the great NCAR enterprise and the many laboratories in many branches of geophysics of several universities are located in close juxtaposition with the CRPL which itself is destined to even greater responsibilities under the ESSA. We can foresee here an interaction, a healthy competition and collaboration that will make Boulder a world center. I can only conclude by again saluting all of you for your wisdom, vision, and statesmanship, coupled with the hard work, that has made the Environmental Science Services Administration of the United States of America a reality.

● **Senator Lauds Hurricane Warnings** As the 1965 hurricane season neared its close, Senator George A. Smathers of Florida praised the Weather Bureau for its storm forecasting and urged greater effort to modify nature's violence. "Gordon Dunn, director of the National Hurricane Center at Miami, and his staff merit the grateful acknowledgement of the government and people they served so well," the Senator said. The 36 hours' warning of hurricane Betsy given to the affected area of Florida "unquestionably saved lives and prevented heavier property damage," Senator Smathers added.

● **Director, User Affairs, Attends Radio-TV Conference** Paul H. Kutschenreuter, Director, User Affairs, chaired a Severe Weather Clinic at the annual conference of the Radio-Television News Directors Association at Tampa-St. Petersburg, Fla., on October 22. With "The Palm Sunday Tornadoes and Hurricane Betsy" as its theme, a panel composed of Mr. Kutschenreuter; Gordon Dunn, Director of the National Hurricane Center at Miami; Bob Thomas, WKY-TV, Oklahoma City; and Roy Leep, WTVT-TV, Tampa, discussed the responsibilities of the Weather Bureau and the radio-television industry in providing adequate severe weather warnings to the public.

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