STUDY OF THE EFFECTIVENESS OF THE COMMITTEE ON OCEANOGRAPHY OF THE FEDERAL COUNCIL FOR SCIENCE AND TECHNOLOGY

HEARINGS

BEFORE THE

SUBCOMMITTEE ON OCEANOGRAPHY

OF THE

COMMITTEE ON MERCHANT MARINE AND FISHERIES

HOUSE OF REPRESENTATIVES

EIGHTY-SEVENTH CONGRESS

SECOND SESSION

FEBRUARY 28, MARCH 1 AND 2, 1962

Printed for the use of the
Committee on Merchant Marine and Fisheries

U.S. GOVERNMENT PRINTING OFFICE
80597 WASHINGTON : 1962

STUDY OF THE EFFECTIVENESS OF THE COMMITTEE ON OCEANOGRAPHY OF THE FEDERAL COUNCIL FOR SCIENCE AND TECHNOLOGY

HEARINGS

BEFORE THE

SUBCOMMITTEE ON OCEANOGRAPHY

OF THE

COMMITTEE ON MERCHANT MARINE AND FISHERIES

HOUSE OF REPRESENTATIVES

EIGHTY-SEVENTH CONGRESS

SECOND SESSION

FEBRUARY 28, MARCH 1 AND 2, 1962

Printed for the use of the
Committee on Merchant Marine and Fisheries

U.S. GOVERNMENT PRINTING OFFICE
80597 WASHINGTON : 1962

COMMITTEE ON MERCHANT MARINE AND FISHERIES

HERBERT C. BONNER, North Carolina, *Chairman*

FRANK W. BOYKIN, Alabama
EDWARD A. GARMATZ, Maryland
LEONOR K. (MRS. JOHN B.) SULLIVAN, Missouri
T. A. THOMPSON, Louisiana
HERBERT ZELENKO, New York
FRANK M. CLARK, Pennsylvania
THOMAS L. ASHLEY, Ohio
JOHN D. DINGELL, Michigan
L. MENDEL RIVERS, South Carolina
TORBERT H. MACDONALD, Massachusetts
ALTON LENNON, North Carolina
VICTOR L. ANFUSO, New York
THOMAS N. DOWNING, Virginia
BOB CASEY, Texas
THOMAS F. JOHNSON, Maryland
JAMES A. BYRNE, Pennsylvania
CHARLES A. VANIK, Ohio
HARLAN HAGEN, California

THOR C. TOLLEFSON, Washington
WILLIAM K. VAN PELT, Wisconsin
JOHN H. RAY, New York
WILLIAM S. MAILLIARD, California
THOMAS M. PELLY, Washington
H. R. GROSS, Iowa
MILTON W. GLENN, New Jersey
GORDON L. McDONOUGH, California
GEORGE A. GOODLING, Pennsylvania
ROBERT F. ELLSWORTH, Kansas
STANLEY R. TUPPER, Maine
F. BRADFORD MORSE, Massachusetts

JOHN M. DREWRY, *Chief Counsel*
BERNARD J. ZINCKE, *Counsel*
NED P. EVERETT, *Special Counsel*
PAUL S. BAUER, *Consultant*
WILLIAM B. WINFIELD, *Chief Clerk*

SUBCOMMITTEE ON OCEANOGRAPHY

JOHN D. DINGELL, Michigan, *Acting Chairman*

ALTON LENNON, North Carolina
TORBERT H. MACDONALD, Massachusetts
BOB CASEY, Texas
CHARLES A. VANIK, Ohio

THOMAS M. PELLY, Washington
GORDON L. McDONOUGH, California
ROBERT F. ELLSWORTH, Kansas
F. BRADFORD MORSE, Massachusetts

CONTENTS

STUDY OF THE EFFECTIVENESS OF THE COMMITTEE ON OCEANOGRAPHY OF THE FEDERAL COUNCIL FOR SCIENCE AND TECHNOLOGY

WEDNESDAY, FEBRUARY 28, 1962

HOUSE OF REPRESENTATIVES,
COMMITTEE ON MERCHANT MARINE AND FISHERIES,
SUBCOMMITTEE ON OCEANOGRAPHY,
Washington, D.C.

The subcommittee met at 10:15 a.m., pursuant to call, in room 219, House Office Building, Hon. John D. Dingell (acting chairman) presiding.

Mr. DINGELL. The committee will come to order.

Today we are conducting the first of the open hearings on oceanography before this subcommittee in the 2d session of the 87th Congress.

Our subcommittee has before it legislation introduced and referred to us in the first session of this Congress; namely H.R. 4276. Exhaustive hearings were held on this bill in the last session.

The position of the administration as expressed by all executive departments and agencies with respect to this legislation was that no legislation was necessary since the Committee on Oceanography of the Federal Council for Science and Technology was doing an outstanding job of coordination of our national program for oceanography.

From the aspect of legislative oversight of executive performance within our jurisdiction, the following general questions will be asked of the Council through its Oceanographic Committee:

1. What have you done?
2. What are you doing? and
3. What are you going to do?

These questions are of sufficient breadth to ascertain the answers to the subquestions: What, why, when, and how so understandable to the news media of our country.

It is with great pleasure that I welcome our first witness Hon. James H. Wakelin, Jr., Assistant Secretary of the Navy for Research and Development, and Chairman of the Interagency Committee on Oceanography of the Federal Council for Science and Technology.

Following Secretary Wakelin, the chairman of the various working panels advisory to the Committee on Interagency Oceanography will be heard in the following order:

Dr. Harris B. Stewart, Jr., Ocean Survey.
Comdr. R. J. Alexander, U.S. Navy, Oceanographic Ships.
Dr. B. C. Dees, Training and Manpower.
Mr. D. L. McKernan, Equipment and Facilities.
Mr. R. E. Abel, ICO Working Group.

Dr. A. E. Maxwell, Oceanographic Research and International Oceanography.

Gentlemen, I would like to express the thanks of the Chair to both of you for being present this morning. I am aware of the fact that the subcommittee members are very busy, and very frequently do have conflicting commitments and problems with regard to other committees, and I want to express my thanks to each of you for being present this morning.

Mr. Secretary, I want to thank you for being present this morning. I want to pay tribute before you begin as a man of ability and integrity and devotion, and I think we are indeed fortunate to have you present with us this morning.

Mr. WAKELIN. Thank you, sir.

STATEMENT OF JAMES H. WAKELIN, JR., ASSISTANT SECRETARY OF THE NAVY FOR RESEARCH AND DEVELOPMENT AND CHAIRMAN OF THE INTERAGENCY COMMITTEE ON OCEANOGRAPHY OF THE FEDERAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Mr. WAKELIN. Mr. Chairman, gentlemen, it is a pleasure for me to appear before you to discuss with you the activities of the Interagency Committee on Oceanography. Your committee, in past hearings and in its several reports entitled "Oceanography 1961," has developed significant documentation on the importance of oceanography to our Nation and the progress being made to provide our national effort with a more coherent planning structure. It was my pleasure to appear before you during these past hearings which were conducted by your former and very able chairman, the Honorable George P. Miller. I am indeed honored to come before this committee again, this time under your chairmanship, to continue our discussions. Knowing of your interest in this subject and from our previous conversations, I am certain that under your leadership this Subcommittee on Oceanography will continue to pursue enthusiastically the objectives in the marine sciences for which we are all endeavoring.

With your permission, Mr. Chairman, I will not repeat in detail material already available to the committee in your fine reports. As Chairman of the Interagency Committee on Oceanography, I would like to offer for the record a brief history of the development of our organization, outline our working mechanism, highlight one or two recent developments, and then offer to your committee statements from the Chairmen of our substantive working panels and working group. For your information, Mr. Chairman, the following is a list of those who will appear before your committee to comment in detail on the specific activities of the ICO in the various areas of oceanography.

Mr. Robert B. Abel, Secretary, ICO, Office of Naval Research.

Dr. Harris B. Stewart, Jr., Chairman, Ocean Survey Advisory Panel, Department of Commerce.

Dr. Arthur E. Maxwell, Chairman, Oceanographic Research Panel and also Chairman of the newly developed International Programs Panel, Office of Naval Research.

Comdr. Robert J. Alexander, Chairman, Oceanographic Ships Panel, Office of the Chief of Naval Operations.

Dr. Bowen C. Dees, Chairman, Training and Manpower Panel, National Science Foundation.

Dr. Donald L. McKernan, Chairman, Equipment and Facilities Panel, Department of Interior.

As you know, Mr. Chairman, our current emphasis on oceanography was initiated by the report of the National Academy of Sciences Committee on Oceanography "Oceanography 1960–70" issued in 1959.

As a background to their organization for this study, I should like to read for the record one of the letters addressed to Dr. Bronk which requested the establishment for a group in the National Academy of Sciences to perform just this function, and I think it also reflects the character and the scope of our current endeavor in oceanography.

On the 9th of August of 1956, Rear Adm. Rawson Bennett, Chief of Naval Research at that time, addressed the following letter to Dr. Bronk:

In recent months there has been an increasing demand for advice on oceanographic problems of great magnitude. Many of these questions are of broad scope and long range, having far-reaching effects on the safety and benefit of mankind as well as considerable influence upon the foreign policy of the United States. They often require the concerted action of oceanographers and scientists in related fields. At present, there is no established means through which the oceanographic institutions can act as a unit.

After recent informal discussions between representatives of the Office of Naval Research, the Atomic Energy Commission, the National Science Foundation, and the U.S. Fish and Wildlife Service, we feel that there is an urgent need to establish a group which may be called upon for advice on current oceanographic problems and, in addition, will provide adequate planning, coordination, and direction of oceanographic research. The group should include physicists, biologists, engineers, and fisheries' experts in addition to the oceanographers. It is suggested that a continuing committee with a rotating membership containing these and possibly scientists of other disciplines be organized under the auspices of the National Academy of Sciences-National Research Council. The committee should have a full-time executive secretary and sufficient secretarial help so that the members can be fully apprised of the needs of the oceanographers and supporting agencies.

Some of the matters on which the proposed committee might provide advice and guidance are:

1. Ever-present problems arising from the international character of the oceans which must now be dealt with through organizations like UNESCO, the Pacific Science Association, and the Pan American Institute of Geography and History. Advice on international affairs should be obtained from the collected efforts of a group assembled, by virtue of their knowledge and foresight, especially for this purpose.

2. The need for advice on the disposal of atomic wastes which has been clearly demonstrated by the recent report of the "Committee on the Effects of Atomic Radiation on Oceanography and Fisheries." One of this Committee's recommendations was that a continuing committee on atomic radiation in relation to oceanography and fisheries be established. It is felt that the subcommittee of the latter type might logically evolve from the more general committee mentioned above.

3. Long-range planning which is essential now for the most expeditious and judicious use of the oceans as a food and mineral resource for the world.

4. The planning, coordination, and direction of the long-range, purely scientific investigation of the oceans which require much additional effort. Some of this may be provided by the Committee by keeping oceanographers informed of technical advances in other fields, by bringing scientists of other disciplines into oceanography and by advice to the agencies supporting oceanography with regard to adequate support in both money and facilities necessary to carry out a fundamental research program.

This office believes that the establishment of the proposed committee will be of value to the Navy, and we hope you will give the suggestion your consideration. Should you concur with these ideas, we will arrange to send representatives to meet with you or your staff to discuss the establishment of the committee.

It is signed by R. Bennett, Chief of Naval Research.

Similar letters were addressed to Dr. Bronk also from the Atomic Energy Commission, the National Science Foundation, and, I believe, the Department of the Interior.

I bring this up, Mr. Chairman, to show the interest that we (the Navy) have had in sponsoring a group within the National Academy to assist us in our science efforts in the whole realm of oceanography.

The Committee was then established, and held its first meeting in November of 1957. It produced the report after a long and intensive study.

The Federal Council for Science and Technology came into being in March 1959. Oceanography was among the many items in the initial Federal Council calendars. In May 1959, Dr. Killian, science adviser to the President, informed Dr. York, then the Director of Research and Engineering of the Department of Defense, of the Federal Council's decision to form a subcommittee of the Council's Standing Committee to look into plans for meeting the Nation's needs in oceanography and, specifically, to evaluate the report of NASCO.

Dr. York was asked to appoint a Department of Defense representative to serve as chairman of a group composed of representatives from DOD, AEC, NSF, the Departments of Commerce and Interior, with an observer from the Bureau of the Budget. On July 16, Dr. York addressed a letter to me appointing me as chairman and the subcommittee met for the first time shortly thereafter. In September 1959, the subcommittee submitted its report to the Federal Council generally endorsing the objectives and program included in the NASCO report. It further recommended the establishment of a permanent committee of the Federal Council in order to review Federal programs in oceanography and to serve as a coordinating mechanism whereby oceanographic activities of the United States would be developed in conformity with our vital national interests in the oceans.

On January 22, 1960, the Federal Council determined that our subcommittee should be made a permanent committee of the Council, and we became the Interagency Committee on Oceanography of the Federal Council. At this time, also, the Department of Health, Education, and Welfare was added to the Committee and the National Academy of Sciences Committee on Oceanography became an observer to the committee in its capacity under congressional statute as an adviser to the Federal Government in science and its use for the general welfare.

In November 1960, in recognition of the Coast Guard's interest, capabilities, and potential in our oceanographic endeavors, the Treasury Department was invited to participate and become a permanent member of our Committee. With the increase of Federal activity in the international aspects of oceanography, the Department of State was asked to participate with us and joined us in observer status on May 18, 1961.

Now to go back for a moment. With the advent of the new administration in January 1961, the status of the Interagency Committee on Oceanography was reviewed by the new Chairman of the Federal Council on Technology, Dr. Jerome B. Wiesner. And on March 10,

1961, he addressed a letter to me affirming the continuance of the ICO as a permanent committee of the Council under section 4 of Executive Order 10807, the Executive order establishing the Federal Council.

In this letter, Dr. Wiesner outlined the following mission for the ICO: To develop annually a national oceanographic program incorporating its best judgment as to balance and emphasis in terms of both long-range scientific needs and requirements of Government agencies through the following mechanisms:

(*a*) Reviewing current activities and planned programs of individual agencies in the context of the Government's overall long-range effort.

(*b*) Engaging in coordinated budget planning so as to recommend level of funding required for each fiscal year.

(*c*) Considering special problems that may arise in implementing the national program and recommending solutions therefor.

He also stated that the Committee should consider, in addition, any other matters it deems relevant and important in advancing oceanography in the national interest.

Although not definitive as an indication of permanence, Mr. Chairman, I wish to inform the committee that the ICO has been formally recognized within the Federal Register, the 1961–1962 edition of the U.S. Government Organization Manual, on page 557.

The ICO as a group has wholeheartedly accepted this responsibility to assist in the meaningful development of oceanographic activity in our country. Its work has been materially enhanced by the individual associations within the Committee, the willingness of each member to cooperate in the national interest, and the increased understanding we have all gained of each other's programs.

I have three charts, Mr. Chairman, which I would like to present. They will give your committee a quick review of our present organization and associations and an idea of the manner in which we work. I know that most of your committee, individually and perhaps collectively, is quite familiar with these charts. I show them merely to establish a starting point for these hearings wherein we can see the place of the ICO in the context of the Federal Council and also the diversity of Federal agencies among which the ICO must provide the coordinating mechanism for the Federal program.

Mr. DINGELL. Mr. Secretary, would you like to have those included in the record?

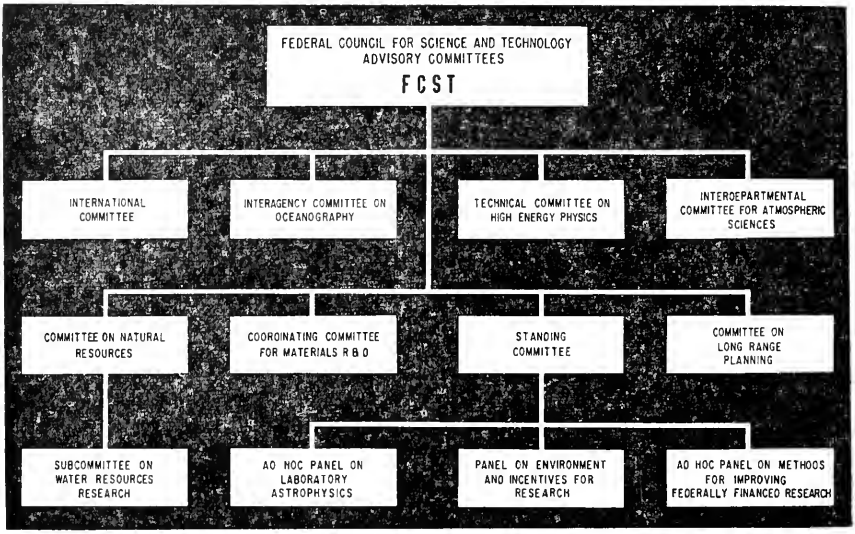
Mr. WAKELIN. May we, sir?

Mr. DINGELL. I think it would be very helpful.

Mr. WAKELIN. Can we bring these up to the first table? Then we will start again.

Mr. DINGELL. All right, and then the reporter can copy them in the record.

(The charts referred to follow:)



INTERAGENCY COMMITTEE ON OCEANOGRAPHY

Defense (Navy)

Interior (Bureau of Commercial Fisheries)

Commerce (U. S. Coast and Geodetic Survey)

Treasury (U. S. Coast Guard)

National Science Foundation

Health, Education, and Welfare (Office of Education)

Atomic Energy Commission

OBSERVERS

State Department

Bureau of the Budget

National Academy of Sciences–Committee on Oceanography

AGENCIES PARTICIPATING IN THE NATIONAL OCEANOGRAPHIC PROGRAM

Office of Naval Research

Bureau of Ships

U.S.N. Hydrographic Office

Beach Erosion Board (U.S. Army, Corps of Engineers)

Weather Bureau

Coast & Geodetic Survey

Bureau of Commercial Fisheries

Bureau of Mines

Bureau of Sports Fisheries and Wildlife

National Science Foundation

Atomic Energy Commission

Public Health Service

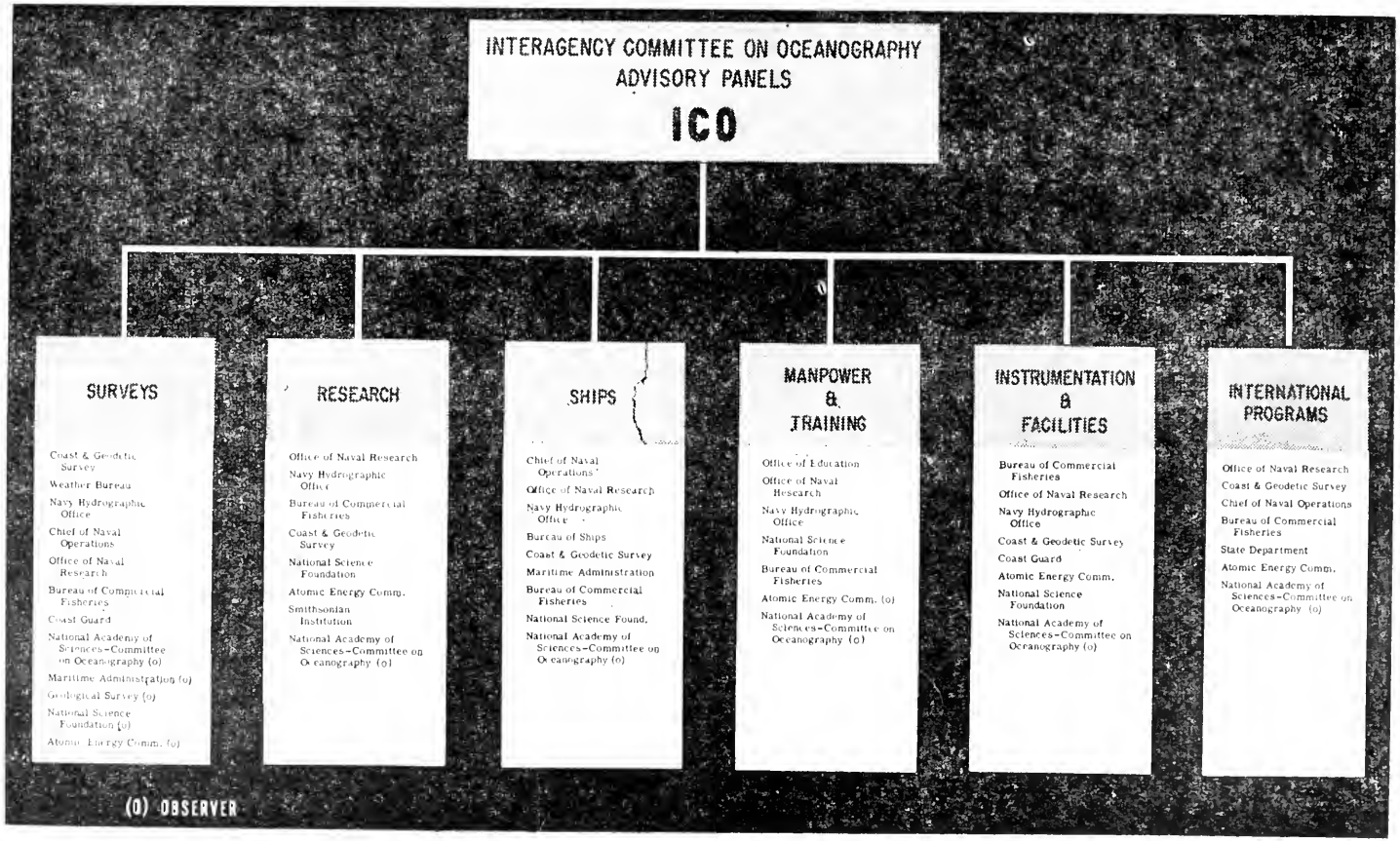
Office of Education

U.S. Coast Guard

Geological Survey

Maritime Administration

Smithsonian Institution


INTERAGENCY COMMITTEE ON OCEANOGRAPHY
ADVISORY PANELS
ICO
SURVEYS
Coast & Geodetic Survey
Weather Bureau
Navy Hydrographic Office
Chief of Naval Operations
Office of Naval Research
Bureau of Commercial Fisheries
Coast Guard
National Academy of Sciences–Committee on Oceanography (o)
Maritime Administration (o)
Geological Survey (o)
National Science Foundation (o)
Atomic Energy Comm. (o)
RESEARCH
Office of Naval Research
Navy Hydrographic Office
Bureau of Commercial Fisheries
Coast & Geodetic Survey
National Science Foundation
Atomic Energy Comm.
Smithsonian Institution
National Academy of Sciences–Committee on Oceanography (o)
SHIPS
Chief of Naval Operations
Office of Naval Research
Navy Hydrographic Office
Bureau of Ships
Coast & Geodetic Survey
Maritime Administration
Bureau of Commercial Fisheries
National Science Found.
National Academy of Sciences–Committee on Oceanography (o)
MANPOWER & TRAINING
Office of Education
Office of Naval Research
Navy Hydrographic Office
National Science Foundation
Bureau of Commercial Fisheries
Atomic Energy Comm. (o)
National Academy of Sciences–Committee on Oceanography (o)
INSTRUMENTATION & FACILITIES
Bureau of Commercial Fisheries
Office of Naval Research
Navy Hydrographic Office
Coast & Geodetic Survey
Coast Guard
Atomic Energy Comm.
National Science Foundation
National Academy of Sciences–Committee on Oceanography (o)
INTERNATIONAL PROGRAMS
Office of Naval Research
Coast & Geodetic Survey
Chief of Naval Operations
Bureau of Commercial Fisheries
State Department
Atomic Energy Comm.
National Academy of Sciences–Committee on Oceanography (o)
(O) OBSERVER

Mr. WAKELIN. The first is a chart of the Federal Council for Science and Technology, indicating its many committees and interests, as well as the Interagency Committee on Oceanography. The second chart represents the current structure of the ICO and indicates as well those agencies participating in the national oceanographic program at present. The third chart is a representation of the organization of the ICO itself. Our own organization and panel structure, in spite of the manner shown, should not be considered structurally rigid. We have adopted an approach which enables the ICO to operate freely in any manner and to associate itself with any Federal group in order that the most meaningful results can be achieved. Titles and blocks should be considered merely representations of the kinds of things we do. Membership is not fixed in the ordinary sense but is open to any interested agency desiring to participate. The panels provide us with a forum for agencies who meet to consider a particular aspect of oceanographic planning. A chairman is selected to inject the necessary initiative and sense of responsibility into our efforts.

Within the ICO we do review and endorse agency programs, individually and within the context of the total national effort, as generated by the member agencies. I feel that this is a necessary procedure. Each agency has a statutory responsibility provided by law. We in the ICO have never considered ourselves to be a controlling, an operating, or a directing authority. As you know, we have neither the control of funds nor the program authority to do this; and we cannot assume the prerogatives and responsibility of departmental officials in deciding their overall program emphasis. Yet, I believe we have been effective. The national program which we put together in the ICO must, first of all, meet these statutory commitments of the various member agencies. Additionally, sometimes through specific ICO action, but perhaps more often through exchange of information and discussion of programs at committee and panel meetings, agency efforts are adjusted to form a more nearly coordinated program than would be the case without the ICO.

For the past few years what we have done in program coordination and budget recommendation is to provide initial guidelines to the Federal departments and to the Bureau of the Budget for a sound national program. Additionally, through the medium of a written statement of this program, we have hoped to influence the various departments in their oceanographic budgets by relating the work of their agencies to the total national program.

The manner in which we work is evident from our organization chart. The annual agency programs are first submitted to the Interagency Committee on Oceanography and then delegated to the panels for consideration of specific functional areas. The panels develop these areas, insofar as is practicable, into a consolidated national program. The segments are placed into the context of an overall national program by the working group who then present it to the parent committee for review, resolution of problems, endorsement, and transmittal to the Federal Council. I wish to emphasize, Mr. Chairman, that our Committee develops a plan. The plan which we develop is not a ceiling nor a goal which we must achieve at any cost. It is our best estimate based on existing requirements, previous achievements and budgets, and guidelines received from the administration.

The implementation and the fiscal development of the program remains the responsibility of the various agencies involved. Following the transmission of the ICO program to the Federal Council, Mr. Chairman, it is reviewed by the Council and by a special panel assembled for this purpose by the President's science adviser. This special panel and I, as Chairman of the Committee, then present programs and findings jointly at a meeting of the Council. Actions of the Council, including consideration of oceanography in relation to other science areas requiring emphasis in the national interest, are then passed to the several departments as recommendations. Note here again the emphasis that the fiscal and substantive program developments of our national efforts still reside at the departmental level.

At this point, Mr. Chairman, with your permission, it might be well to digress and present a short history of the development of our panels. During the deliberations of the subcommittee, we organized several informal task groups to consider various functional areas. When our status was changed and we began operations as the ICO, we formalized this task group arrangement and formed Panels.

In May 1960, the ICO established the Ocean Survey Advisory Panel, and in June 1960, established panels for Research and Facilities, Ships, and for the Data Center. Members of the Data Center Panel culminated their work in an interagency agreement establishing the National Oceanographic Data Center. The agreement includes a Data Center Advisory Board. While the ICO maintains an interest in the progress at the Data Center, it is no longer concerned with its functioning, its policy, or its direct administration. The Advisory Board provides the necessary coordination with the agencies participating and the administrative functions have been turned over to the Hydrographic Office.

Consequently, on January 26, 1961, the Data Center Panel was disestablished. Our next step was to recognize that research and facilities were each becoming major parts of our program and that the ICO needed to place specific emphasis on instrumentation. Consequently, also on January 26, 1961, the Research and Facilities Panel was reorganized into a Research Panel and an Instrumentation and Facilities Panel. The Manpower and Training Panel was established on April 18, 1961, for a similar reason, that of assuring specific attention to a growing manpower problem.

The most recent development in our panel structure is the establishment of the International Programs Panel on January 11, 1962. As you know, in July 1960 there was held at Copenhagen, Denmark, the Intergovernmental Conference on Oceanographic Research. Of the four members of the U.S. delegation, three were members of the ICO. The conference recommended the establishment of an Intergovernmental Oceanographic Commission within the structure of UNESCO. The General Conference of UNESCO at its 11th session in November 1960 adopted this proposal and established the Intergovernmental Oceanographic Commission in order to promote scientific investigations with a view to learning more about the nature and resources of the oceans through the concerted action of its members. The first session of this new IOC was convened by the Director-General of UNESCO and was held at UNESCO headquarters in Paris from October 19–27, 1961.

I know, Mr. Chairman, that you are well acquainted with this first session, having attended yourself with several members of your staff. As you know, of the five members of the U.S. delegation, of which I was the Chairman, three were members of the ICO, the other two being Dr. Revelle of the Department of the Interior and Rear Admiral Stephan, the Oceanographer of the Navy. Our reason for establishing this new International Programs Panel is evident in the report of the delegation, copies of which have been made available to your committee.

Specifically, we hope through our panel to develop the plans and the requirements of the United States in fulfilling our obligations as agreed to in the resolutions adopted by the Commission. Further, we hope through this new panel to work closely with the Department of State in order that we consider programs and policies which might be fruitful in the pursuit of national policy and objectives at the international level.

As you will note, Mr. Chairman, when you hear from the Panel representatives, there have been many areas, other than through the development of a written annual program, wherein the ICO has endeavored to enhance the national effort. These have arisen more or less as a byproduct of our existence, generated by ourselves and by individual agencies exhibiting a willingness to work in this "national" environment. I think it is significant that the "accommodation" approach to cooperation has given way to specific provisions for cooperation by all agencies in their programs.

Before concluding, Mr. Chairman, perhaps one or two examples of our activities aside from program and budget planning would be of interest. During the special review of the program which the ICO submitted to the Federal Council, it appeared that special attention was warranted in the area of environmental study of radiological and other pollutants. In order to give this area proper emphasis, the Research Panel set aside this unique problem area as a separate objective in our overall research program in order that it receive independent review. The ICO then asked that the AEC, in cooperation with the Public Health Service and the Bureau of Commercial Fisheries, examine the content of the program to determine its adequacy. This was done and the results have been incorporated into the research plan through the Research Panel.

In another objective area of research, that of marine biology, I have asked the Chairman of the Research Panel, Dr. Maxwell, to set aside another small working group similarly to examine the current program in biological oceanography. The interest of the National Institutes of Health in this field, as well as their requirements for the products of research currently being undertaken, will be explored.

In our endeavors to investigate other fruitful areas for coordination, the working group has been requested to hold discussions of our programs and our requirements with National Aeronautics and Space Administration to determine the extent to which we might serve their program and to seek their advice on communications problems relative to data retrieval from fixed stations and cooperation, if possible, with their range vessels.

With reference to industrial participation, you will hear of our specific activities from Mr. Donald McKernan, Chairman of our Facilities and Instrumentation Panel. It is true that we are still

young in our efforts to inject industrial know-how into our programs and that such effort as we have been able to take has been primarily in the field of instrumentation. There are other activities in progress, however, which I would like to highlight. As you know, there is in existence a National Security Industrial Association. This organization was established originally as the Navy Industrial Association, and broadened to include the other two services and the Marine Corps, following its initial establishment by Mr. James Forrestal, Secretary of the Navy during World War II.

The NSIA is a nonprofit association representing all of industry without regard to special interests or to corporate size. It serves as a means by which the full spectrum of American industry can be concentrated on the vital problems affecting our national security. You can see from this that its principal concern has been national defense and the Defense Establishment.

Recently, the Antisubmarine Warfare Committee of NSIA organized an oceanography task team chaired by Dr. Alfred J. Carsola, of the Lockheed Aircraft Corp. This group had its first meeting at the National Oceanographic Data Center on January 17–18, 1962, and received information on the Navy's total program in oceanography. I think, Mr. Chairman, because of my very intimate association with the ICO and with the Federal program in oceanography, I flavored my remarks, presented to this task team in its opening session, to suggest a broad view of oceanographic investigation by this industrial team. In this message, I said, after noting the Navy's special interest in the whole field of oceanography:

> Perhaps you might consider at some future time a still greater enlargement of oceanographic perspective for this group. You are aware, I am sure, of the pronouncements by the Congress and the President that oceanography is an area of vital national interest. In addition to its defense aspects related to the security of our country, it has significance in our national programs relating to welfare and economy, both domestic and international.

The staff of the ICO has discussed this concept thoroughly with the NSIA people. It is interesting to note that at this first session of the oceanography task team, representatives from the Bureau of Commercial Fisheries, the Corps of Engineers of the Army, NASA, AEC, Coast and Geodetic Survey, and the Department of State, as well as the staff of this committee were present. The task team has indicated to me what is in essence a followup on this broader perspective. On April 20 they will conduct their second meeting under the sponsorship of the Coast and Geodetic Survey. Furthermore, I understand they are considering a visit to Woods Hole Oceanographic Institution. The ICO staff is further exploring the possibility of a joint meeting between this group and the National Academy of Sciences Committee on Oceanography. I feel that this NSIA group may serve to be our principal contact with industry at some future date just as NASCO is our associaton with the scientific community now.

One final item, Mr. Chairman, before I conclude. I would like to recommend that your committee consider hearing from Dr. Woodrow C. Jacobs, the Director of the National Oceanographic Data Center. The Data Center is not only working extremely well in the coordination of data acquisition and dissemination among the Federal agencies and the scientific community, but is also taking the lead in this

regard on an international scale as well as initiating similar programs with that segment of industry whose work involves data acquisition and study.

This concludes my statement, Mr. Chairman, and I am open to your questioning, and that of the committee.

Thank you.

Mr. DINGELL. Mr. Secretary, I want to commend you on a very fine statement. I am one of your enthusiastic admirers.

Mr. WAKELIN. Thank you, sir.

Mr. DINGELL. Mr. Bauer.

Mr. BAUER. Mr. Chairman. In your presentation, you make reference to a national oceanographic program. You make further reference to the Government's overall, long-range efforts, and you make reference to a plan. What is the plan and what is our national, overall effort, and do you have a copy of this plan that you refer to?

Mr. WAKELIN. Mr. Bauer, are you referring to a plan over the successive 8 to 10 years in the future? There are a number of plans that we have, and I would like to answer your question in the context that you would want.

Mr. BAUER. Well, on page 7 you mention that you review and endorse agency programs within the context of the total national effort as generated by the agencies, and it has been our experience in the last two sessions of the Congress that we are unable to get a plan of oceanographic effort from the Department of Interior. We have seen the TENOC plan that is purely Navy, but as far as a composite plan, we have not seen such a piece of paper.

Do you have such a piece of paper?

Mr. WAKELIN. I do not have such a piece of paper, but I know now to what particular group of plans you refer.

We in the ICO have asked the departments and the agencies in the ICO to submit to us a 10-year program somewhat similar in their agencies and departments as the TENOC program developed last year in the Navy. We have not received complete program plans from all of the agencies. We have seen drafts of the Interior's plans. We have talked to the National Science Foundation about their submitting their plan to us within the next several weeks.

We have a plan from the Smithsonian, the Department of Commerce, and the Beach Erosion Board. I believe that covers all that we have in ICO right now.

I would think by the end of March or April we should have all of the departments' and agencies' plans at our disposal and then could develop through committee action the total national plan over the next 10 years.

Mr. MORSE. Mr. Chairman, may I interrupt there?

I think a necessary first step, Mr. Secretary, is the establishment of objectives and goals. Have you defined the goals?

Mr. WAKELIN. I think our goals were fairly well described scientifically in the NASCO report that was issued in 1959 by the Academy. Of course, the goals that we have as individual agencies have to coincide with the roles and missions of our agencies and departments.

Mr. MORSE. We are talking about a national oceanographic effort, and it would seem to me that the very first step would be the establishment of identifiable specific objectives. If we have adopted the NASCO recommendations, all well and good. If the NASCO report

contains a specific definition of our objectives, fine. If not, we should have a specific set of goals.

Mr. WAKELIN. Yes. Actually, in the development of the TENOC plan, there are objectives laid out in the Navy's context.

Mr. MORSE. For the Navy.

Mr. WAKELIN. That is right. Obviously, we could not develop a detailed plan without having a set of broad objectives, and we hope to get these from each of the other agencies and departments this spring. But let me say this: that each of the panels of the ICO which integrate across the departmental interests have a set of objectives to which they have geared their plans for this budget preparation, that is, for fiscal 1963.

These can be broadened, I think, when we get the long-range plans from the other departments, into a set of national goals. We hope the planning of the ICO will then form a coherent national program.

Mr. MORSE. Well, I would think that until such time as you have decided upon the national goals that it would be abortive to develop plans and programs by these several participating agencies.

Mr. WAKELIN. Each of the agencies has its own long-range goals.

Mr. MORSE. Which may or may not be consistent with the national goals.

Mr. WAKELIN. That is correct, and that is why we want to review all the agencies' goals over the next 10 years, and develop a set of national goals for the next 10 years.

Mr. MORSE. For the achievement of the national goals.

Mr. WAKELIN. Yes, sir.

Mr. MORSE. Thank you, Mr. Chairman.

Mr. BAUER. Well, in other words, Mr. Secretary, you don't have in existence now a written statement of the national program for our overall national effort. Is that right?

Mr. WAKELIN. We have for 1961, 1962, and for next year's budget as an annual program. We have not developed a complete 10-year program on a national basis, Mr. Bauer.

Mr. BAUER. And no long-range plans?

Mr. WAKELIN. These would be our long-range plans.

Mr. BAUER. Mr. Chairman, at this time I would like to introduce into the record a translation from the French of the resolutions of the Conference of the International Council for the Exploration of the Sea, adopted as a long-range plan in 1899, under a conference held by King Oscar of Sweden. I obtained this from Copenhagen. I believe I sent Secretary Wakelin a copy of this, and I was wondering if you happened to see it?

Mr. WAKELIN. I have, sir, and I have read it.

Mr. DINGELL. Without objection, so ordered.

(The information referred to follows:)

THE LIBRARY OF CONGRESS,
LAW LIBRARY,
Washington, D.C., February 9, 1962.

Hon. HERBERT C. BONNER,
Chairman, Committee on Merchant Marine and Fisheries,
House of Representatives, Washington, D.C.

DEAR MR. BONNER: Your recent memorandum addressed to Dr. Elsbree, Director of the Legislative Reference Service, requesting the translation of the resolution beginning on page 11 of "Volume XLVII: Rapports Et Procès-Verbaux Des Réunions," Copenhague, Juin 1928, from the French, was transferred to the

Law Library for attention. The translation has been completed by Dr. Domas Krivickas, of the European Law Division. Two copies of the translation are enclosed herewith together with the book from which the translation was made.

Very truly yours,

LAWRENCE KEITT, *Law Librarian.*

[Translation from French]

RESOLUTIONS OF THE CONFERENCE

The following resolutions were adopted unanimously:

Considering that an efficient exploitation of the sea should be based. as much as possible, on scientific research, that international cooperation is the best way to attain satisfactory results in this direction, especially if during the research one does not lose sight of the fact that the main goal is the progress and improvement of fishing through international conventions, this international assembly has resolved to recommend to the states concerned the following research plan which should be carried out during a period of at least five years.

After each delegate had submitted the instructions received from his government, the work was divided between sections of which the first, A, had to prepare the program for hydrographic work, and the second, B, for biologic work. Finally, a joint program was set up for the organization and administration of international cooperation.

Program of Hydrographic and Biologic Work in the Northern Areas of the Atlantic Ocean, the North Sea, the Baltic Sea, and Adjacent Seas.

The basic principles of this program, which will be given later on *in extenso*, with the additions and amendments introduced during the next year and up to 1927, included:

The establishment of a Permanent International Council for the exploration of the sea, consisting of two delegates from each country, who will elect the president, vice-president, secretary general and alternates, and will prepare the statutes and the order of work of this institution;

a record of fishing statistics which it will endeavor to prepare for the participating countries according to the principles adopted in common;

the establishment of a central laboratory for physical and chemical research connected with the exploration of the sea;

a synoptic study of the sea during all seasons by means of periodical cruises over the entire territory of research.

A. HYDROGRAPHIC WORK

I

The object of hydrographic research shall be: the distinction of the various levels of waters according to their geographical distribution, depth, temperature, salinity, gas content, plankton [content] and currents in order to establish the basic principles not only for the determination of the external conditions of the useful creatures of the sea, but also for meteorological predictions for extended periods in the interest of agriculture.

II

As hydrographic conditions are subject to seasonal changes, and as these seriously influence the distribution and conditions of existence of the useful sea creatures, and weather conditions and other meteorological conditions in general, it is desirable that the observations be made, as much as possible, simultaneously during the four typical months of February, May, August and November at certain established points and according to the same established lines.

III

The observations mentioned in Article II will be:

(a) Observations of temperature, humidity, and atmospheric pressure every two hours, using automatic registering instruments for interpolation and the Assmann aspirator;

The meteorological bureaus shall have an opportunity to make, on board the vessels, physical observations in the higher altitudes of the atmosphere by means of kites;

The other meteorological observations shall be made according to the methods adopted by the meteorological bureaus of the nations represented;

The meteorological and hydrographical observations made on board the special steamers in the course of the surveillance during the typical months, shall be immediately recorded under the control of the central bureau (see C) for publication in a bulletin where the maritime and atmospheric conditions shall be given in tables and synoptic tables in cooperation with the meteorological institutions of the nations represented.

(b) The temperature of the surface of the water shall be taken every two hours and, if necessary, even more frequently. It would be desirable to have automatic registering apparatus employed for the interpolation recording.

The observations of the vertical distribution of the temperature shall be made at the points mentioned in Article II and shall be made at regular intervals of 0, 5, 10, 15, 20, 30, 40, 50, 75, 100, 150, 200, 250, 300, 400 metres and so on; however, all critical parts of the curve shall be established by supplementary studies.

The temperature at the bottom shall be determined with all possible care.

(c) At each point and each depth where the temperature is observed, a sample of water shall be taken in order to establish its salinity and density.

By salinity is meant the total weight in grams of a solid substance dissolved in 1000 grams of water.

By density is meant the weight in grams [1] of 1 cubic centimeter of water with a temperature of $t°$ *in situ*, that is to day, the specific gravity *in situ* with reference to pure water of +4° C. $\left(=S\,\frac{t°}{4°}\right)$.

In order to determine this [salinity and density], it must be added, a preliminary determination of the salinity must be made on board with suitable instruments, although the exact determination of the salinity and density of all samples must be made in a scientific laboratory.

(d) At certain depths at the points mentioned in Article II, as well as elsewhere on the surface, samples of water for an analysis of their gas constituents (oxygen, nitrogen and carbonic acid) shall be collected.

IV

For the measurement of depth, the unit employed shall be the metre, however, at the same time the depth may also be given in fathoms.

The geographical points shall be in reference to Greenwich longitude [east or west], and the horizontal distances shall be expressed in miles (1852 metres).

The thermometers used in determining the temperature of the surface shall be in centigrades or Fahrenheit, however, for publication all numbers shall be reduced to centigrades.

On the centigrade thermometers, the distance between the lines of the degrees shall be at least 5 mm and the degree shall be divided into at least two parts; the Fahrenheit thermometer shall be divided in a corresponding manner.

For moderate depths the use of *Pettersson* isolated waterbottles is recommended and the thermometers used for this apparatus shall have a space of at least 10 mm between the lines of one degree and the degree shall be divided into 10 parts.

For the greatest ocean depths Negretti-Zambra thermometers or others of the same type shall be used.

The glass in these thermometers and the thermometers themselves shall be checked and approved by the central bureau (See C(a)).

For the determination of salinity and density, physical or chemical methods may be used provided the salinity can be determined with an accuracy of 0.05 in one thousand (and the density up to 0.00004).

The determination of these conditions may be based either on a chemical analysis of the halogen by gravimetry or volumetry or by a physical determination of the specific gravity by means of pycnometers of hydrostatic and hydrometric balance provided the measures are taken excluding the agitation produced by thermal effects, capillarity, viscosity, etc.

The chemical analysis shall be checked by physical methods, and the physical determinations by a chemical analysis in the following way:

At least three samples of each collection examined shall be chosen and sent to the central bureau. *Standard samples* will be returned in exchange.[2]

[1] Units of weights instead of units of quantity should be used here.

[2] By *standard* water is meant samples of filtered sea water whose physical and chemical qualities are known as accurately as possible through analysis; and a report of which shall be sent to the various laboratories at the same time as the samples. With regard to the halogen, the samples of ordinary water shall be compared with the standard water by means of analytic methods.

The *specific gravity* shall be represented in the tables by the formula $S\left(\frac{0°}{4°}\right)$.

V

The samples for the analysis of gas shall be collected every time in a pair of sterilized vacuum tubes.

It would be desirable for the existing tables on the absorption of nitrogen and oxygen to be revised.

VI

Qualitative observations of plankton shall be made every six hours, passing the water through a silk net for 15 minutes, and at the same time a sample of water shall be collected (III(c)).

At the points mentioned in Article II, samples for quantitative analysis shall be collected at the different depths according to hydrographic conditions, using the method of Professor *Hensen*.

Petersen's modification for *Hensen's* net is recommended.

The bacteriological institutions shall be given an opportunity to perform investigations in the ocean.

VII

Observations of currents and tides shall be made as frequently as circumstances permit.

The currents shall be examined, if possible, by linear direct meters and by the float of wood on the surface and the intermediate waters, and by drift-bottles on the bottom.

The vessel shall be anchored occasionally in order to permit frequent observations during the period of high tide.

VIII

It would be desirable to make a map of the bottom of the sea in order to show its nature.

A description of the deposits should be made according to a definite plan to be established later.

IX

Normal observations shall be made along the lines provisorily drawn on the attached map where R signifies Russian, F Finnish, S Swedish, G German, Da Danish, Du Dutch, N Norwegian, and B British lines in February, May, August and November. Each participating country shall furnish, for this purpose, an exploration vessel equipped for hydrographic and biologic research in the interest of fishing.

The plan for these periodic voyages is laid out in the following map:

[The Map]

Special points shall be decided by the respective countries, and once established' subsequent observations shall be repeated there.

The special instructions for the stations will be issued by the respective countries and the communications concerning the scope and nature of the observations shall be made through the central bureau (see C (a) and (e)).

X

For carrying out these researches it would be desirable to use motorized vessels on regular routes, lightships, etc., and seacoast stations when it is necessary to make observations on the temperature and to collect samples of sea water and plankton.

These observations shall be made not only during typical months but also in the periods between.

B. Biologic Work

I

(a) The determination of the topographic and bathymetric distribution of the spawn and larvae of useful sea fish, for instance, by quantitative methods such as those of *Hensen*, with special reference to the most important species such as plaice, codfish and haddock, herring, etc.

(b) Constant investigation of the life and living conditions of young fish of useful species in their postlarval stage up to their maturity, with special reference to their local distribution.

(c) Systematic observation of fish for sale in a state of maturity with regard to the local varieties and their migrations, their living conditions, food (for instance by examining the contents of their stomachs), and their natural enemies, i.e., observations on the presence and nature of the food of fish at the bottom of the sea, on the surface, and in intermediate waters at a depth of at least 600 metres.

(d) Determination of the periodic variations in the presence, abundance and average size of useful fish and their causes.

II

(a) Experimental fishing in the fishing areas known at the time of fishing, as well as outside these areas and in other periods.

(b) Preparation of uniform statistical data on the results of this fishing with detailed indications of the number, species, size, weight and condition of the fish: for instance, as the "Scottish Fishery Board" did on board the "Garland."

(c) The use of uniform instruments appropriate for the experimental catching of fish of various species and different sizes.

(d) The experimental marking and release of fish, for example, plaice, in as great a quantity as possible and in wide areas, as was done, for example by Dr. *C. G. John Pettersen* and Dr. *T. W. Fulton* (Reports of the Biologic Station of Denmark and of the "Scottish Fishery Board") and others.

III

(a) It would be desirable to collect uniform statistics on the number, weight and value of caught fish, the means used for fishing and the people engaged in that work, as, for instance, was done in the General Reports by the "Scottish Fishery Board."

(b) It is necessary to collect material for the preparation of maps indicating the fishing areas and the kind of fishing done in them (see A–VIII).

C. Organization of a Central Bureau

I

The assembly recommends that for hydrographic and biologic research of the sea there should be an international council with a central bureau provided with a laboratory. The functions of the central bureau should be:

(a) to issue uniform directives for hydrographic and biologic research in accordance with the resolutions adopted in the program of the present assembly, or in accordance with amendments which may be introduced later with the consent of the nations represented;

(b) to control the instruments and to assure uniformity of methods;

(c) to undertake special works which might be entrusted to it by the participating governments;

(d) to publish periodic reports and journals which could be useful for the performance of cooperative work;

(e) to decide, in order to attain uniformity in publications, on the graphic presentation, the scales, signs and colors to be used on maps;

(f) to establish relations with the administrations of telegraphs in order to obtain, from time to time, regularly, determinations of the changes in the resistance of cables which cross the areas in all directions.

II

(a) The Permanent International Council shall consist of representatives chosen by the Governments concerned. Each government may appoint two representatives who may be replaced at the meetings by alternates;

(b) The Council shall appoint its president and vice-president, and shall designate all persons doing business with the central bureau. If the secretary general represents the hydrographic sciences, his main assistant must represent the biological sciences, and vice versa:

(c) The Council itself shall establish its own order of procedure;

(d) The expenses of the Central Bureau shall be estimated at approximately 4,800 pounds sterling per year.

The participating governments shall decide in what city the central bureau should be established, and this city must be the place of residence of the secretary general, and must be a city conveniently situated for hydrographic and biological research;

(f) It shall be the business of the participating governments to decide among themselves the quota that each one shall pay.

D

It would be desirable for the investigations to commence on May 1, 1901.

E

The assembly declares that it is of the greatest importance for deep sea fishing and for long range meteorological forecasts to have the islands of Faroe and Iceland included as soon as possible in the European telegraph network.

F

The relations between the quantity of halogen contained in water and the density of the water must be carefully examined by an experimental revision of the tables compiled by *Knudsen* (Ingolf, Exp. II, 37). The tables compiled by *Makaroff*, *Krümmel* and others for the relation between specific gravity, density and salinity are also urgently in need of an experimental revision.

It has been proposed that these investigations be carried out at the Institute of Technology in Copenhagen under the direction of a committee composed of Messieurs Sir *John Murray*, *Knudsen*, *Pettersson*, *Nansen*, *Krümmel*, *H. N. Dickson* and *Makaroff*. The funds necessary for carrying out this work shall be requested from scientific associations granting funds for such purposes.[3]

G

The assembly recommends that these resolutions be communicated to the French and Belgian Governments by the participating nations.

H

In case the resolutions of the assembly are approved by the states, it may be presumed that some time will pass before the organization of the central bureau is accomplished. In the meantime, perhaps the Governments would like to have an organization in connections with the assembly which could be useful for the formation of the council and of the central bureau.

The members of the 3rd committee, *Akerman*, *Drechsel*, *von Grimm*, *Herwig*, *Hoek*, Sir *John Murray*, *Nansen* and *Pettersson* offer their services in this connection.

STOCKHOLM, *June 23, 1899*.

Signed: A. R. AKERMAN, President.
O. PETTERSSON, *Secretary General*.

(Dr. Domas Krivickas, European Law Division, Law Library, Library of Congress, February 8, 1962.)

Mr. MORSE. Would you summarize the report, Mr. Bauer?

Mr. BAUER. The essential division of the long-range plan is to study the hydrographic work of the seas, and the Europeans by the term "hydrography" mean all that we mean in physical and chemical oceanography, as well as geological oceanography. In this the necessity of having standardization of instrumentation is spelled out, something that we are just about perhaps to arrive at.

In this, it describes the methods of examining the biota of the seas, and as I understand it, we have as yet no long-range national planning for the subject of marine biology.

[3] In regard to this resolution, the British Association voted an allocation of 100 pounds sterling for this purpose and the Russian Government promised the same sum. Requests for funds for the same purpose were made in Germany, Denmark, Sweden, and Norway to scientific associations etc.

Dr. M. Knudsen of Copenhagen, who was appointed chief of the work of revision by the assembly, is now ready to undertake the experimental part of the work in the laboratory of the Polytechnic Institute of Copenhaben.—O. P.

I think it is a very excellent document, and that is why I submit it.

Now, Mr. Chairman, if I may continue?

Mr. DINGELL. Proceed.

Mr. BAUER. Mr. Secretary, when you look at the plans presented for a budget cycle by the various departments, do you come to an indication of priorities? In other words, if you have so much money, what are the relative priorities? Is it defense, commercial fisheries, sport fisheries, and so on? Do you consider that in your discussion?

Mr. WAKELIN. Yes. Each one of the panels which reviews our programs, in the areas into which our program is broken, consider first the submissions of the agencies, the scientific content, the roles and missions of the agencies with respect to the programs they have submitted, and then they themselves arrange roughly in an order of priority the most important to the least important items.

Now, these are reviewed first with respect to their content and with respect to the national program in that particular field. Then we as a committee have to review the budget implications of these suggestions. These suggestions, of course, are not always considered at the same level in the ICO as they are developed in the panel structure.

We have to arrange a series of priorities, and then estimate what we consider the best overall balanced program in the national effort should be, with a certain amount of money available.

Mr. BAUER. Well, that being the case, it looks as though it is a year-to-year operation. Is that correct?

Mr. WAKELIN. Yes, sir.

Mr. BAUER. Now, along that line, what is the first priority? If there is so much money in the pot, who comes first?

Mr. WAKELIN. I don't think any individual agencies come first.

Mr. BAUER. What field, is it national defense, perhaps?

Mr. WAKELIN. I don't believe that I can answer that in terms of our national program. I would certainly say that national defense is a very important part of the oceanographic program.

Mr. BAUER. Well, supposing that the Coast Survey wished to conduct a survey. Should the survey be from the interest of national defense, first, with so much money available, or should it be from the Bureau of Commercial Fisheries, or the Bureau of Sports Fisheries, or the Geological Survey, or the production of information for navigational aids? Someone must make a decision on priorities, must they not?

Let us just take the survey for an example.

Mr. WAKELIN. On the survey effort, we have an extensive survey effort in the Department of the Navy in defense, which is not entirely related to our national effort in oceanography. These are defense items which are vital to our existence as a nation in terms of seapower, and the knowledge of the seas.

Mr. BAUER. Well, does not the Coast Survey contribute toward that effort?

Mr. WAKELIN. Of course.

Mr. BAUER. In other words, if the Joint Chiefs of Staff put a requirement that such-and-such a survey is necessary, and you are cognizant of that, I presume, in your ICO?

Mr. WAKELIN. Indeed.

Mr. BAUER. Then would the Coast Survey cooperate and take an area that was of interest to the Joint Chiefs of Staff as a first priority?

Mr. WAKELIN. I cannot answer that for the Coast and Geodetic Survey. It would be our suggestion that this be considered very seriously in their survey plans, Mr. Bauer.

Mr. BAUER. Did you give any consideration to last year's survey between Kodiak, Alaska, and Honolulu as a national defense problem?

Mr. WAKELIN. Yes.

Mr. BAUER. Now, the next thing I would like to ask you is, you will concur that we have no national program other than a year-to-year basis. Is that right?

Mr. WAKELIN. That is correct. We have a national plan which we have developed, but this must, I think, be filled in by details to be supplied to us this year by the various agencies in the ICO.

We have two long-range plans which are going to guide us in this regard, Mr. Bauer.

We have the NASCO report, 1960–70, "Oceanography." We also have our own analysis, agency by agency, of the recommendations of the NASCO report. I think it is out of context to say we have no national plan. We have no fully developed plan in detail for the next 10 fiscal years, covering all of the agencies with their own programs ground in.

Mr. BAUER. And no guidelines such as this ICES plan?

Mr. WAKELIN. I think you will find that as far as the science of the seas is concerned, the National Academy's report outlines fairly well the program to which the ICES has made reference here, and the ICES program is a specific program.

Mr. BAUER. Do you coordinate all of the efforts?

Mr. WAKELIN. Not all of them; no.

Mr. BAUER. Which ones do you coordinate?

Mr. WAKELIN. Well, the ICO does not coordinate in detail at present the Indian Ocean operation.

Mr. BAUER. Why not?

Mr. WAKELIN. This is the responsibility of the National Science Foundation.

Mr. BAUER. Is there a piece of paper in existence that would establish that responsibility?

Mr. WAKELIN. There is a letter from Dr. Kistiakowsky to Dr. Waterman establishing the Federal Government's interest in this expedition.

Mr. BAUER. It is rather amazing, because on requesting the National Science Foundation to come up with a piece of paper that made the Indian Ocean expedition one of our national ventures, the only thing that the National Science Foundation was able to find was a press release of President Eisenhower dated June 13, 1960, and at this time, Mr. Chairman, I would like permission to submit that.

Mr. DINGELL. Without objection, so ordered.

(The press release referred to follows:)

[Press release, June 13, 1960—Anne Wheaton, Associate Press Secretary to the President]

THE WHITE HOUSE

The White House announced today that the Federal Government will lend support to the Nation's leading oceanographers in an international expedition to the Indian Ocean. The expedition, a scientific project of extraordinary scope and magnitude, will begin late this year and extend through 1964. It will greatly extend man's knowledge of these least-known waters of the world, which cover a seventh of the earth's surface.

Like the recent International Geophysical Year, the International Indian Ocean Expedition will incorporate a many-sided scientific attack on a single area of interest under the leadership of a special committee of the International Council of Scientific Unions, a nongovernmental organization with headquarters in The Hague. Scientific responsibility for U.S. participation will be borne by the National Academy of Sciences-National Research Council, national representative to the International Council.

Acting upon the recommendation of the Federal Council for Science and Technology and the Special Assistant to the President for Science and Technology, the President approved a plan calling for key contributions by the Department of the Navy and the National Science Foundation. The Navy will make available oceanographic ships sponsored by the Navy and operated by leading U.S. oceanographic institutions. The Foundation will be responsible for planning and coordinating Federal support for U.S. participation in the program including the provision of financial support.

Responsibility for planning the scientific content of the U.S. program has been assigned by the Academy-Research Council to its Committee on Oceanography. The Committee has expressed the hope that the expedition, in addition to its anticipated contributions to fundamental knowledge, will afford unusual benefits to the heavily populated, protein-deficient nations on the ocean's perimeter, both in terms of increased fish harvests and in the further training of local scientists and technologists in the techniques of oceanographic research.

The expedition's peak activity is expected to occur during 1962 and 1963 when ships and scientific personnel from well over a dozen nations will be conducting biology, geophysics, and submarine geology.

Details of the U.S. program will be worked out following a general planning session of participating nations to be convened in Copenhagen in July by the Special Committee on Oceanic Research of the International Council of Scientific Unions.

NOTE.—A more complete description of the International Indian Ocean Expedition is attached.

A PRELIMINARY PROSPECTUS ON THE INTERNATIONAL INDIAN OCEAN EXPEDITION

(The following material has been prepared by office of the Coordinator of the International Indian Ocean Expedition to describe the area under exploration, design of the projected expedition, scientific problems to be studied, and their practical implications. Further information on the scientific program may be obtained from the Information Office of the National Academy of Sciences-National Research Council.)

THE INDIAN OCEAN

Physical characteristics.—Although the Indian Ocean's 28 million square miles cover over 14 percent of the earth's surface, relatively little is known or understood about the region, which has an area five and a half times that of Antarctica and greater than that of Asia and Africa combined. The ocean's behavior affects all of these continents, yet only the most general features of its topography and circulation and the distribution of living organisms are known. For instance, more than 300 times as many bathythermograph observations have been taken in the North Atlantic as in the Indian Ocean; almost half of the area has had no biological sampling and in most of the remainder observations range from four to one per 5-degree square.

The Indian Ocean has several unique characteristics. Nowhere else in the world is there a similar seasonal reversal of the prevailing wind. The wind system in that part of the ocean lying above the equator is characterized by the two monsoons, one blowing from the northeast for approximately 6 months and the other blowing from the southwest for the rest of the year. This phenomenon

has a vast but essentially still unknown effect upon the currents and organisms in the waters.

Another notable feature is the apparent productivity of this ocean. In June 1957, a Russian ship not far from the main trade route between Colombo and the Gulf of Aden reported millions of tons of dead fish floating in an area some 1,000 kilometers long and 200 kilometers wide extending across the middle of the ocean. Similar reports came simultaneously from British ships in the region. During the same year smaller fish kills were reported in nearby parts of the Arabian Sea. It is not known how the fish were killed, but the very size of this catastrophe gives some idea of the potential midocean resources which are currently untapped. There is further fragmentary evidence of unusually high productivity.

The Indian Ocean is one of our last unexplored frontiers. Since 1873, fewer than two dozen vessels have carried out oceanographic investigations there. Modern techniques have been used only in quite limited areas. Limited coverage has left great gaps both in areas visited and in the nature, intensity, and accuracy of observations. No systematic study has been attempted nor do the combined profiles of the observations reported give more than a preliminary picture of the ocean's behavior and characteristics.

Socioeconomic characteristics.—Many of the nations lying in the tropical and subtropical regions which surround the Indian Ocean are among the world's most densely populated countries, with continuing rapid growth. Over a quarter of the world's people live in these countries.

Population pressures on the existing food supplies result in prevalence of diseases attributed to protein starvation. Such protein deficiencies are common in India, Ceylon, Indonesia, Malaya and in parts of the east coast of Africa. Some of the nations bordering the Indian Ocean have a seafaring tradition and conduct extensive fisheries. To feed their crowded populations, they are interested in expanding these fisheries.

EXPEDITION DESIGN

Participation.—Under the nongovernmental sponsorship of the International Council of Scientific Unions (ICSU) and its Special Committee on Oceanic Research (SCOR) scientists in the various nations experienced in oceanographic research will staff vessels provided by marine laboratories of these several nations. Scientists from countries unable to provide vessels will be invited to work on the expedition's ships. Every effort will be made to obtain active participation by each nation bordering the Indian Ocean. The degree and nature of participation will depend to some extent on the ability of each country to provide funds, facilities, and personnel, and in part on general interest in advancement of the science of oceanography.

Up to June 1, 1960, the following nations had formed national committees of SCOR and had announced plans to send both ships and scientific parties on the expedition: Australia, Ceylon, France, Germany (Federal Republic), India, Indonesia, Japan, Pakistan, Union of South Africa, Union of Soviet Socialist Republics, United Kingdom, United States of America. National committees of these additional countries plan to contribute scientific parties: China (Taiwan), Denmark, Israel, the Netherlands. Portugal and other countries now forming national committees may also announce plans to participate.

Timing of the expedition.—The period of peak activity will occur in 1962 and 1963. Preliminary plans will be completed by August 1960 and the first cruises in the coordinated effort will occur in late 1960. The expedition will continue into 1964 and data analysis will undoubtedly continue past that date. An atlas incorporating the full findings is contemplated.

Because of the present scarcity of information on the Indian Ocean, there will need to be continuous revision and reexamination of the plans as new data are acquired. Every effort will be made to complete preliminary processing and analysis of data within 6 to 8 months in order to redirect subsequent cruises. This fact, together with the importance of obtaining a series of observations of the same area in different seasons, makes a program spread over several years more desirable than a major simultaneous effort.

Procedure.—A preliminary and tentative cruise pattern for the entire Indian Ocean has been agreed upon by members of SCOR and national committees. In regions where seasonal differences due to monsoons are significant, ships will cruise twice along the same track. To complete the pattern will require about 10 ship-years of operation over a total of 180,000 miles.

Uniform standards for observation techniques and instrumentation will be established. Exchanges of scientists between ships of participating nations will

be arranged. Existing world data centers will be used as repositories, and new biological centers for analysis and custody of biological specimens will be established in the Indian Ocean area.

Ships participating in the expedition will devote at least half their time to work according to the coordinated grid and half to independent investigations determined by the scientists involved. The intensity of studies in a given area will depend on the nature of the phenomena anticipated; thus many more observations may be expected in the boundary currents at the borders than in midocean. Division of national responsibility for the various segments of the coordinated plan will be negotiated at meetings in 1960 and 1961. All nations that have agreed to participate have also agreed to adjust their plans to the common program.

PROBLEMS TO BE STUDIED

Physical oceanography.—Several fundamental oceanographic problems can be studied more efficiently in the Indian Ocean than elsewhere because of the reversal of the winds. Understanding the oceanic processes here will contribute to a knowledge of all oceans. The plan is to study basic questions such as: How long does it take the winds to set up a current? How rapidly does this current deepen with time? What percentage of the energy required to maintain an ocean current comes from the winds and what part of it comes from the horizontal density gradients due to regional climatic differences? How does internal friction and how does friction with the bottom influence the velocity-depth distribution? What is cause and what is effect in the general circulation of the oceans?

The Indian Ocean is a vast environmental laboratory eminently suited for the investigation of these problems. It is a complete ocean system, yet small enough to be studied as a whole. Although too large for a single nation's efforts, it is ideal for an international cooperative endeavor. Extending from polar through tropical waters, and divided in its northern part into small oceans each subject to radical seasonal reversals of wind, it offers unparalleled opportunity for a wide variety of specialized investigations.

Chemical oceanography.—The Indian Ocean is unique among the world's seas in several ways. One of these, of course, is the extent of our scientific ignorance about it. From this point of view, the systematic collection of physical and chemical data during the survey will be very valuable, because for the first time it will be possible to describe the distribution of plant nutrients and dissolved organic compounds.

Perhaps a more significant singularity of the Indian Ocean is the fact that it is such a large basin closed off from exchange with other seas north of about 40° S. Into this vast gulf pour quantities of drainage water from the land carrying their burden of substances dissolved from the rocks and soil. Thus it is an ideal place to study the effect of runoff on the composition of sea water. For example, studies of elements such as copper and barium, with a relatively short residence time in the sea, should show concentrations markedly higher than in the Pacific or Atlantic.

In recent years the application of geochemical techniques to oceanic problems has added much to our understanding of residence times and of the rates of exchange between surface and deep waters. During the expedition samples will be collected for carbon 14 dating, for analysis of carbon and oxygen isotopes, and for radium assay. This geochemical survey of an entire ocean will permit a much better evaluation of the circulation than has been possible where the sampling has been neither so systematic nor so extensive.

Meteorology.—The meteorological objective is to obtain increased understanding of the energy exchange between sea and atmosphere, particularly near the air-sea boundary. To this end, basic research will be carried out on radiation input and on interaction of atmospheric pressure, winds, cloudiness, rainfall, and evaporation with temperature, movement, and roughness of the sea. A SCOR working group is drafting a list of desirable objectives in conjunction with various meteorological organizations.

Marine biology.—In addition to its effect on the circulation of near-surface waters, the monsoonal reversal of winds is expected to have important biological repercussions. Regions of upwelling and of high productivity should develop, decay, and shift from place to place, so that dramatic changes in the distribution and abundance of marine organisms can be anticipated. Nowhere else in the world ocean is it possible to study the interaction of atmosphere and biosphere on such a scale.

Standard biological collections and measurements made systematically over the whole area will define the biological "structure" of the ocean, the three-dimensional distribution of plants and animals. Integration of these observations will

permit an assessment of the magnitude of the living resources. They also will provide the basic biological information—the distribution of fish eggs and larvae, and of fish food, for example—which are essential to the eventual understanding of fluctuations in the abundance and availability of commerical fish.

Since the war great advances have been made in the techniques for measuring primary production of organic matter. The widespread, systematic use of these methods by the ships of the expedition will help us to assay, for the first time, the fertility of the Indian Ocean.

Marine geology and geophysics.—Except for data collected during the IGY, bottom topography and the crustal structure underlying the Indian Ocean are barely known. Old soundings delineate major structural components comparable to those of the Pacific and the Atlantic: trenches, undersea mountain ranges, a midocean swell, and possibly fracture zones. The arrangement of these components and their relationship to the structures of the bordering continents are markedly different in the Pacific and Atlantic. Is the Indian Ocean a Pacific- or an Atlantic-type ocean? Precise modern soundings, in addition to clarifying this issue, will be of immediate use in providing a base map for all the other studies and data necessary for navigational charts, and it is even possible that they may uncover rich shallow-water fisheries at considerable distances from shore. Integrated geophysical studies—of the areal pattern of heat flowing from beneath the crust, the gravity field, the crustal thickness, and magnetic characteristics of oceanic and border areas—will certainly furnish basic information for the problems of ocean and continent development.

Intensive coring, dredging, and bottom photography will yield data on processes of sedimentation, productivity, climatic, and magnetic changes during the last several millions of years and the distribution of potential ores of manganese, nickel, and cobalt in manganese nodules.

PRACTICAL IMPLICATIONS

The proposed research will provide fundamental and valuable scientific knowledge. Some findings will have direct and immediate bearing on economic development and human welfare. Location of shoals and regions of upwelling will identify likely fishing areas. Studies of distribution, nature, and seasonal variation in nutrients and marine organisms will indicate what to fish for and when. Preliminary quantitative estimates of fish population, when supplemented by exploratory fishing, will suggest the magnitude of the fishery resource.

The data obtained will provide an essential part of the information on which decisions can ultimately be reached on the nature of fishery operations, markets and methods of marketing, extent of investment, and related development problems. A new source of protein could mean food for hungry people. If it came from the ocean, land and other capital devoted to protein food raising could be shifted to other uses. Marine organisms could also provide fertilizer and animal feed in areas now lacking adequate supplies.

Meteorological information, related to oceanographic knowledge, will be obtained on a synoptic basis. This may lead to better long-range weather forecasting. The ability to predict the onset of the monsoon and to estimate variations in the quantity of rainfall bears directly on flood control and on water regimen for agricultural use. The understanding of variations in location and intensity of ocean currents can lead to more economic routing of ships. Such knowledge applied in the North Atlantic has resulted in savings of as much as 10 percent in fuel consumption.

Charting and sampling the ocean floor through soundings, cores, geophysical measures, dredging, and photography provide information useful for navigation and fisheries and may reveal resources of economic value.

Finally, as never before, intensive training and experience in oceanographic research will be available to residents of a maritime area. Possibly 20 vessels, with facilities for about 350 scientists, will operate on the expedition. Exchange of scientists between ships and partial cruises by individuals will increase the number of training billets available and vary their experience. Data processing centers and biological classification laboratories will serve as nuclei for post-expedition scientific development around the Indian Ocean.

In other parts of the world, the focus over several yars on the International Indian Ocean Expedition would serve as a device to attract students to the field of oceanography, helping to relieve a world shortage of marine scientists.

Mr. BAUER. Now as to the funding, with respect to the Indian Ocean, is that purely going to be funded by the National Science Foundation?

Mr. WAKELIN. No, the Department of Commerce, the Department of Interior, and the Department of the Navy have in their budgets the support of the International Indian Ocean Expedition.

Mr. BAUER. As far as the Navy is concerned, then, is it in the interest of national defense that we look into the Indian Ocean?

Mr. WAKELIN. We consider it so; yes, sir.

Mr. BAUER. More so than performing some other surveys that could be made closer by?

Mr. WAKELIN. With respect to a priority of surveys, I would say that the Indian Ocean Expedition does not compete in the exact context of the term "survey." We are conducting detailed surveys in the Atlantic and the Pacific, of course, in the national defense; but the Indian Ocean Expedition is planned at present to be an overlook of the whole Indian Ocean area, rather than a specific survey of that area.

We are performing meteorological research, physical, chemical oceanography, biological oceanography, as a first look on an expedition basis rather than a detailed charting and hydrographic study of the Indian Ocean. So, I think to answer your question, Mr. Bauer, the survey there is part of the whole program, and not the principal reason for our being in the Indian Ocean.

Mr. BAUER. In other words, you have so much money in the Navy, and you are going into the Indian Ocean with Office of Naval Research money. Is that right?

Mr. WAKELIN. We are supplying ships and personnel for some months' duty over the next 3 years in the Indian Ocean, as we can see it possible through our operations at sea.

Mr. BAUER. At this time, Mr. Chairman, I would like to introduce an excerpt from the National Fisherman, volume 4, March 1962, which says that the University of Rhode Island gets a hundred thousand dollars grant to study circulation of the Indian Ocean at the Equator.

Mr. DINGELL. Without objection, so ordered.

(The excerpt referred to follows:)

[From the National Fisherman, March 1962]

RHODE ISLAND SCHOOL GETS $100,000 GRANT

SOUTH KINGSTON, R.I.—The new school of oceanography of the University of Rhode Island has received a $100,000 grant to study circulation in the Indian Ocean at the Equator.

The National Science Foundation made the grant to URI after it was discovered that the Scripps Oceanographic Institution at La Jolla, Calif., which was supposed to get it, had no one available to make the study.

The reason: Dr. John A. Knauss, of the Scripps staff, had been hired to head URI's new oceanographic school.

As a result, Scripps agreed to make available the *Argo*, its 213-foot, 2,000-ton former Navy salvage vessel, for the Indian Ocean study and URI will supply Dr. Knauss and staff.

The 30-month study will be made with an Australian vessel from July to September this year and with several Japanese vessels from February to May next year.

Mr. BAUER. Now with respect to your budget operations, Mr. Chairman, I notice in the budget breakdown furnished this committee that your budgetary level of Coast Guard is at the same level as it was in the previous fiscal year. Is that not correct?

Mr. WAKELIN. That is correct.

Mr. BAUER. And yet this committee succeeded in having any limitations on the Coast Guard's activities removed in the field of oceanography. Is that correct?

Mr. WAKELIN. Yes, sir; and with our support and concurrence.

Mr. BAUER. So they have the sum of $134,000 to conduct oceanography in the advanced sense.

Now I notice that they are going to put on telemetering buoys in the North Atlantic in connection with their ice patrol. Is that in the $134,000 that was the same as last year?

Mr. WAKELIN. Yes; part of that is for the support of their buoy effort. I might say in regard to the Treasury's interest and support of our program, Mr. Bauer, that I have been holding detailed conferences with Secretary James Reed, who has just come into the Treasury Department, and whose responsibility will be, in part, that of the Coast Guard. We are trying to work out a mechanism by which they can assume more responsibility this year and next year than is planned for in their budget, and we hope they can do this administratively at present. I would certainly support an increased budget level for the Coast Guard, in the use of their already existing ships and in the supply to them of necessary instrumentation to get oceanographic data over and beyond their normal patrol functions.

Mr. BAUER. That is all I have, Mr. Chairman.

Mr. DINGELL. Mr. Drewry?

Mr. DREWRY. Perhaps this has already been covered, Mr. Secretary, but this point is the thing that interested me.

You engage in coordinated budget planning so as to recommend the level of funding required for each fiscal year, and you do that within the framework of the existing statutory commitments of the various agencies.

Mr. WAKELIN. Yes, sir.

Mr. DREWRY. The Coast Guard is an excellent example of the problem. The Department of the Treasury has a great many activities under its jurisdiction which are largely unrelated to the functions of the broad general market functions of the Coast Guard.

Now the economy thinking of the Secretary of Treasury concerned with things such as Internal Revenue, customs matters, for instance, might be such that the Coast Guard would not be given the break it should have in order to carry out its expanded functions.

How can you, how can the ICO, say to the Secretary of Treasury that in the interests of the overall national oceanographic program you need to do more to get greater funding level in your Coast Guard? Do you do that, or do you tell the Secretary of the Treasury that in order to get this show on the road, the Coast Guard is the logical, already authorized agency to do a certain type of work, and yet, they are not given enough money to carry out the work which is necessary to keep the broad oceanographic program going?

Mr. WAKELIN. Yes, sir; I would like to answer that in two parts.

First, I think it is a little bit early, in view of the fact that their enlargement of charter is only a matter of about a year old.

Secondly, we have made direct representations to Mr. James Reed and to Mr. Dillon expressing our interest and our concern about enlarging the Coast Guard's functions in their ocean station vessels by adding adequate instrumentation for performing oceanographic data acquisition when it is possible for them to do so; and they have been quite enthusiastic in their answers to us. They are anxious to get going in this program, and I think that is quite encouraging.

Mr. DREWRY. Well, that is my basic point, Mr. Wakelin, you feel that the ICO, or the Federal Council, acting on the recommendation of ICO, is in a position to take an aggressive part not only in going along within the commitments of the agencies themselves, but aggressively urging the agencies to expand where expansion may be necessary?

The Coast Survey would broaden their jurisdiction, and one of the emphatic things brought out in our hearings in the past 3 years has been that before you can get down to some of the more detailed and refined and sophisticated needs that there is just the plain, old drudgery of getting surveys done.

Mr. WAKELIN. Yes, sir.

Mr. DREWRY. And the broadening of jurisdiction of the Coast Survey would allow it to work with the Hydrographic Office.

Mr. WAKELIN. Yes.

Mr. DREWRY. Now the Coast Survey in the past has been sort of an orphan in the Department of Commerce, and would your agencies or would the Federal Council go right to the cabinet head and say, "Look, you are involved in this oceanographic program through the Coast Survey. Now they need to be souped up in order to carry the program forward"?

Mr. WAKELIN. Yes; this communication works both through the ICO and through the Federal Council, to the secretarial levels of the various departments. This is actually what has happened in the review of the Coast Guard's proposed budget for 1963.

Mr. DREWRY. I think this involves the thing that was behind our proposed bill, where we develop it, that by having a statutory basis for an oceanographic program, that you would be able to have, as has been expressed, more horsepower in dealing with the department heads in making up the component elements, but as I understand what you are saying is that you feel that you can and are taking that approach.

Mr. WAKELIN. We have, Mr. Drewry, yes, sir. I would just like to answer that, if I may, in another way.

Each one of the members of the Interagency Committee on Oceanography has been very enthusiastic not only as a team member of the committee but also in trying to impart within his own department the relationship of his work and his bureau and his office to the whole national structure.

This has been most effective in a great many departments who have previously had lower budgets and lower support of oceanography. I might just say, in summary, that if one looks at the actual budgets in the various departments and the total program in oceanography over the last 3 years, and the proposed budget for 1963, you find a group of figures such as this: $55 million for the national effort in 1960, which was the first budget that we had anything to do with organizing on a national basis; $60 million in 1961; $101 million in 1962; and

the proposed budget for 1963, which is the President's budget, is $123.97 million.

Now I do not wish to imply that this is all the doing of the ICO, but I think we have helped a great deal to focus the agencies' requirements and their responsibilities in the national context, rather than just fulfilling their own roles and missions individually.

Mr. DREWRY. That is all I have, Mr. Chairman.

Mr. DINGELL. Just one very brief question. Our counsel here has led up to something that concerned me.

Am I correct that there has been a change in the definition of what constitutes oceanographic activity for purposes of activity and for purposes of budgeting?

Mr. WAKELIN. Not any substantive change, Mr. Chairman, I would say.

Mr. DINGELL. The point I am leading up to is simply this: is it not correct that a portion of the increase with regard to oceanographic activity in the budget stems from a change in definition of what constitutes oceanography within the various agencies concerned, and what constitutes oceanographic activity within the various agencies concerned? Am I correct in this, Mr. Secretary?

Mr. WAKELIN. To a degree, and let me qualify my answer in this regard. The figures that I read in reply to Mr. Drewry's question were made on a comparable basis—these are comparative figures that are not increased by having a budget unit added to it which had previously not been there.

Now let me say that the Coast and Geodetic Survey puts all of their survey operations in as part of the oceanographic program. We had until last year excluded part of the Hydrographic Office's program of the Navy from our national oceanographic efforts, and that is in the area of $9 million. We decided that, to make the whole program look conformal, the part of the Navy's surveys which was unclassified, should be part of the Survey effort in the public program.

When we did this, we added $9 million to the level of the budget that year, but in comparing that with earlier years, this was also added back, so that the increment did not look as though it was a brand new item for funding.

Mr. DINGELL. I see. You are saying, then, that there was no juggling for purposes of improving appearances?

Mr. WAKELIN. There is a discontinuity of $9 million if you do not make the previous budgets conformal.

Mr. DINGELL. I yield for a question.

Mr. BAUER. With respect to this budget that you have presented us with, budget plan summary, is this budget concerned at all with any classified oceanography?

Mr. WAKELIN. No, sir.

Mr. BAUER. Would it be a breach of security to indicate the total amount of what the classified oceanography is?

Mr. WAKELIN. I would rather give it to the committee in executive session, if I might, Mr. Chairman.

Mr. DINGELL. I think that would be thoroughly acceptable to the committee.

Mr. WAKELIN. If that is agreeable with you, sir?

Mr. DINGELL. I think it is agreeable. If it is agreeable with the members of the committee, I have no objection.

Mr. Lennon?

Mr. LENNON. Mr. Secretary, such authority as the ICO has and the only authority it has flows from section 4 of the Executive Order 10807, is that not true?

Mr. WAKELIN. That is correct, sir.

Mr. LENNON. And a year ago, or almost a year ago, March the 10th, you were advised by the then Chief of the FCST what your mission would be for ICO. You state here that your mission was to develop annually a national oceanography, or oceanographic program.

Does this statement here that you read today represent the program that has been developed as a result of that directive that you received on March 10 of 1961? Is this the program?

Mr. WAKELIN. No, this is not the program in any sense of the word, Mr. Lennon. This is a description of the manner in which we operate in the Interagency Committee on Oceanography.

The program that is part of the President's budget is a separate document.

Mr. LENNON. Now the thing that has concerned me during the last a little more than 2 years, and you bring it up again in your statement on page 7:

> We in the ICO have never considered ourselves to be a controlling, operating, or a directing authority. As you know, we have neither the control of funds nor the program authority to do this, and we cannot assume the prerogatives and responsibility of departmental officials in deciding their overall program emphasis.

You concede that. That is an admission that we have, and that is the weakness of this program.

Mr. WAKELIN. I think that is a very fair, objective, and complete statement of our status.

Mr. LENNON. And I think that is the weakness of this program. I have thought so all the while. You refer to it again on page 9 in your statement, and I quote:

> Notice here again the emphasis that the fiscal and substantive program developments of our national efforts still reside at the departmental level.

Again you concede what I believe to be the weakness of this program. I think it is human nature to assume that every department and agency and bureau which participates in this program of at least short-range objectives, and perhaps even long-range objectives, but as I understand your statement, you are not permitted or authorized, as a part of your mission, to do anything more than to project a program on an annual basis. Is that a fair statement of what you said?

Mr. WAKELIN. I think that the adjective "annual" ought to be expanded. We have the responsibility to develop on a national basis a 10-year program in oceanography, as a forward look.

Mr. LENNON. Well, you state here that you are authorized by the letter from the Chief of the FCST to develop annually a national oceanographic program.

Mr. WAKELIN. Yes, sir.

Mr. LENNON. Now were you authorized to develop a long-range program, giving all of these bureaus and agencies short- and long-range objectives?

Mr. WAKELIN. Yes, sir; we have even been encouraged to do this by Dr. Wiesner.

Mr. LENNON. You didn't mention that in your statement.

Mr. WAKELIN. No, I did not, and that, I think, is a serious omission.

Mr. LENNON. I, for one, have never been able to recognize that you can have a long-range national objective program when each department and each participating department, agency, and bureau has in substance the veto over the long-range objectives of your total program, and that is what I think you have got here, and that is the inherent weakness, I believe, of the ICO.

Do you care to comment on that statement?

Mr. WAKELIN. Would you feel that the provisions of the proposed bill 4276 would help us in this regard? And the reason I ask is for my own information. It seems to me that if one is considering a structure established by statute, that if one were to address oneself to this particular issue, that this in a sense would be excising from each department, then, a functional responsibility, and putting it into a new organization. I feel that you are asking me a question about the whole executive structure, using oceanography as an example, if you understand my reply, sir.

Mr. LENNON. Well, it has a national and international scope, and importance that has been attributed to it by the President, who is constantly referring in public appearances, and even messages to the Congress in the field of oceanography. It does seem to me that it would be worthy of the dignity and the recognition of a department set aside to obtain some long-range national objective, in which the various departments and agencies and bureaus who participate in it would not have the veto through their own budgetary problems over the total program.

You will have to recognize that even though the program was authorized prior to this Executive order of last year, that it was only this committee which from time to time in the hearings developed the fact that departments or agencies which should be participating in the ICO came in only after it developed in these various hearings that we have had that they were not in it, and that they had a real part or place in it.

Much to my surprise, time and time again, agencies appeared here who have a very vital interest in this program, and it was conceded that they hadn't even been approached. Ultimately and subsequently, they were brought in, by invitation, for which we are glad, but it just doesn't seem to me that we can ever do the job that is necessary to be done unless we can have some central agency.

Now you take the Coast Guard. There are many of us who feel that the Coast Guard is admirably equipped to participate to an appreciable degree in this program. What is your budget for fiscal 1962? $134 million?

Mr. WAKELIN. $134 million, sir, for oceanography.

Mr. LENNON. All right, now what part of this is included in the Coast Guard's budget for oceanography—$134-and-some-odd thousand? Is that right?

Mr. WAKELIN. $134,000 is the level that we are talking to in the President's budget, for the Treasury Department.

Mr. LENNON. Well, let us see to what extent the Coast Guard could participate in this program, budgetwise, for fiscal 1962. What does your figure show there, Mr. Secretary?

Mr. WAKELIN. For 1962 it is the same figure, sir, $134,000.

Mr. LENNON. $134,000. And for the projected figures for 1963, what is the Coast Guard's quota of this total oceanography budget?

Mr. WAKELIN. In the President's budget, it is $134,000 again, sir.

Mr. LENNON. As against a total of $123,971,000 for the total program. That is my point, Mr. Secretary. Each department and agency is going to pull its own oars. It is going to project the facet of this overall program that it is interested in, and it is going to push that. Now concededly the ICO will try to bring it in line with the total national objective, but until there is spelled out a total national objective of the ICO, how are you going to bring into one central agency and reconcile the jealousies, the petty jealousies that all agencies have to excell in whatever field that they are in?

We saw what happened here several years ago in the Army, the Navy, and the Air Force, and there is not a man or woman either within the sound of my voice who doesn't know that if you had had NASA back in 1955 or 1957, the sputnik I and II wouldn't have gone up in 1957 before we had something in orbit.

And you have got the same thing here, and you will continue to have it, until you set up a central agency that the Congress can bring before it and ask, "What are you doing?" And I just wanted to get into that.

I am not lecturing; I just have a very strong feeling about this, that if the President is right about it in what he said, then you are wrong about it, because you cannot have a goal that he has set forth in this field unless you have a central responsible agency that has authority to veto within its discretion the budgets of the individual departments that participate in this program, and say what department ought to get how much, and why.

I believe you happen to be the chairman at the moment. Let me yield to my friend, Mr. Ellsworth.

Thank you, Mr. Secretary, I feel very strongly about this, and have for some time.

Mr. ELLSWORTH. Thank you, Mr. Chairman.

I would like to say, first of all, that I would like to encourage the chairman to follow up on Secretary Wakelin's suggestion that we invite Mr. Woodrow Jacobs, of the Data Center, to come and testify before our committee. And secondly, Mr. Secretary, I would like to thank you for a very fine statement this morning, and a very broad statement and a clear one.

I do have a couple of questions or so that I would like to ask. First of all, Mr. Secretary, I would like to ask, is every Government department or agency that is conducting oceanography represented in some way on the ICO?

Mr. WAKELIN. We believe this to be the case.

Mr. ELLSWORTH. You believe that everyone is? Now along the lines of some of the questioning that has been directed to you already, I am just wondering if you have available, and if you could either read to us this morning or provide for the record later, figures to show the 1961 budget request, department by department and agency by agency for oceanography compared to their actual expenditures in the departments and agencies?

Mr. WAKELIN. For 1961.

Mr. ELLSWORTH. For fiscal year 1961.

Mr. WAKELIN. We can supply this for the record.
(The information requested follows:)

Fiscal year 1961 budget

[Millions]

Department/Agency	Fiscal year 1961 budget submission [1]	Fiscal year 1961 expenditures [2]
Defense	$32.7	$31.6
Commerce	13.2	11.4
Interior	7.4	8.7
HEW	.7	.7
NSF	9.3	7.9
AEC	2.2	1.7
Treasury	.1	.1
Total	65.6	62.1

[1] Source: H. Rept. 2078 dated July 1, 1960, "Ocean Sciences and National Security." The total shown on p. 132, table 25, of the reference, indicates a budget submission of $55.754. This has been adjusted to make table 25 conformable to the national program by addition of the following items not included in table 25:

Table 25 total	$55.754
Navy surveys	9.3
Army program	.4
Air Force program	.1
Total	65.6

[2] Source: "The budget of the U.S. Government for the fiscal year ending June 30, 1963," schedule G p. 330.

National oceanographic plan summary, 1961–63

[Figures in thousands]

Agency and function	1961 actual budget	1962 President's budget	1962 appropriation	1963 President's budget	Net growth 1961 actual to 1963 President's budget
Defense	$31,615	$42,158	$42,081	$57,295	+$25,680
Commerce	11,400	24,691	23,034	23,942	+12,542
Interior	6,777	15,472	14,248	15,256	+8,479
National Science Foundation	7,883	19,607	16,687	20,140	+12,257
Atomic Energy Commission	1,691	3,610	3,596	5,345	+3,654
Health, Education and Welfare	694	1,150	1,259	1,609	+915
Treasury	133	134	134	134	+1
Smithsonian				250	+256
Total	60,193	106,822	101,039	123,971	+63,778
Research	28,924	37,144	36,466	46,875	+17,951
Instrumentation	875	2,970	3,000	6,466	+5,591
Ship construction	14,048	37,050	34,010	38,303	+24,255
Surveys	14,900	16,646	16,849	16,982	+2,082
Indian Ocean exploration	760	2,080	1,300	3,670	+2,910
Facilities	410	10,422	8,904	11,065	+10,655
Data Center	276	510	510	610	+344
Total	60,193	106,822	101,039	123,971	+63,778
Defense Department (total)	31,615	42,158	42,081	57,295	+25,680
Navy (total)	31,077	41,593	41,593	56,370	+25,293
Research	16,618	15,692	15,692	19,759	+3,141
Instrumentation		2,150	2,150	5,370	+5,370
Ship construction	4,200	13,600	13,600	18,153	+13,953
Surveys	9,311	9,321	9,321	9,351	+40
IIOE	760	580	580	1,300	+540
Facilities				2,087	+2,087
Data Center	188	250	250	350	+162
Army, research (total)	435	488	488	925	+490
Air Force, research (total)	103	100			−103

National oceanographic plan summary, 1961–63—Continued

[Figures in thousands]

Agency and function	1961 actual budget	1962 President's budget	1962 appropriation	1963 President's budget	Net growth 1961 actual to 1963 President's budget
Department of Commerce (total)	$11,400	$24,691	$23,034	$23,942	+$12,542
Coast & Geodetic Survey (total)	11,267	24,258	22,851	23,709	+12,442
Research	11	512	230	549	+538
Instrumentation	850	820	850	831	−49
Ship construction	4,700	16,725	14,185	14,500	+9,800
Surveys	5,446	5,941	7,344	7,477	+2,031
HOE					
Facilities	250	180	162	272	+22
Data Center	10	80	80	80	+70
Weather Bureau (total)	133	433	133	183	+50
Research	123	423	123	173	+50
Instrumentation Data Center	10	10	10	10	(1)
Maritime Administration, research (total)			50	50	50
Interior Department (total)	6,777	15,472	14,248	15,256	+8,479
Bureau of Commercial Fisheries (total)	6,188	14,869	13,619	14,006	+7,818
Research	3,938	7,409	7,409	8,465	+4,527
Instrumentation	25			70	+45
Ship construction	2,055	3,225	3,225	2,650	+595
Surveys		1,250		20	+20
HOE				70	+70
Facilities	160	2,905	2,905	2,651	+2,491
Data center	10	80	80	80	+70
U.S. Geological Survey (total)	425	425	425	1,000	+575
Research	425	425	425	550	+125
Instrumentation				195	+195
Facilities				255	+255
Bureau of Sports Fisheries and Wildlife, research (total)	154	158	154	200	+46
Bureau of Mines (total)	10	20	50	50	+40
Research		20		50	+50
Surveys	10		50		−10
National Science Foundation (total)	7,883	19,607	16,687	20,140	+12,257
Research	4,742	7,190	7,050	8,960	+4,218
Ship construction	3,093	3,500	3,000	3,000	−93
HOE		1,500	720	2,300	+2,300
Facilities		7,337	5,837	5,800	+5,800
Data Center	48	80	80	80	+32
Atomic Energy Commission (total)	1,691	3,610	3,596	5,345	+3,655
Research	1,681	3,600	3,586	5,335	+3,655
Data Center	10	10	10	10	(1)
Health, Education, and Welfare (total)	694	1,150	1,259	1,609	+915
Public Health Service, research	660	1,150	1,150	1,500	+840
Office of Education, research	34		109	109	+75
Treasury Department, surveys (total)	133	134	134	134	+1
Smithsonian Institution, research (total)				250	+250

[1] No change.

Mr. ELLSWORTH. All right, I would appreciate it if you could. I think it might be enlightening as to the fate, perhaps, of some of the recommendations—once they got back into the hands of the various departments and out of control of the ICO again—what the fate of it was.

Mr. Secretary, I would like to second a great many of the sentiments that have been expressed here this morning. I notice that from time to time in your statement, for example, on page 7, you say that "We in the ICO have never considered ourselves to be a controlling, operating, or directing authority." You say that you neither have the control or funds for the program authority to do this. At the top of the page, you say that, "Agency efforts are adjusted to form a more nearly coordinated program than would be the case without the ICO," and you say subsequently, that you have hoped to influence the various departments in their oceanographic budget.

At the top of page 9, you say that the implementation and fiscal development of the program remains the responsibility of the various agencies involved, and from time to time, in your extemporaneous testimony, you used words like "we hope," "we want to," and "we would suggest," to the various agencies the development of programs.

I would like to say that I feel very strongly, as evidently a good many other members of the committee do, that this is not enough, that this is not sufficient for the development of a truly national and truly long-range oceanographic program, and development that would conform with the President's continued emphasis on it.

I would like to refer to your testimony on page 5, where you say that he—referring to Dr. Wiesner—

He also stated that the committee should consider, in addition, any other matters it deems relevant and important in advancing oceanography in the national interest—

and I would like to ask if you don't feel that within the framework of that authority, you could very well develop and set forth in writing a long-range national set of national goals, right within the authority you already have?

Mr. WAKELIN. Yes, sir; but we interpret this statement to mean just that in terms of our long-range plans and our long-range goals, which we are now working on.

Mr. ELLSWORTH. Thank you.

Mr. Secretary, how do you insure against two things that I am sure you are confronted with and every operation of this kind is confronted with, and that is duplication and also the problems that arise out of self-evaluation programs, as far as the individual departments and agencies are concerned in their oceanographic work?

Mr. WAKELIN. In the first place, we have a very close association with the National Academy of Sciences, and Mr. Vetter and Dr. Spilhaus meet with us as observers, and quite often, within the panel structures, we view from the scientific community's point of view our programs in the whole field of oceanography, either in research, or instrumentation, or surveys, or ship construction, or in manpower and training.

We also have had, during the last three budget hearings, prior to the submission to the President of our plan, a committee convened by the Federal Council and chaired by Dr. Maurice Ewing of Co-

lumbia University, with the people that he has selected to work with him to review our whole national effort.

So we have Dr. Ewing's panel that has in the last 2 or 3 years reviewed our program, the relationship to the National Academy, and of course, a close working relationship with civilian oceanographic institutions at Woods Hole, at Columbia, the Miami University, Texas A. & M., and the University of Washington, on the west coast. We have constant feedin and recommendations from the civilians who are most knowledgeable in this field.

Mr. ELLSWORTH. But the only way that that filters back into the actual operating departments and agencies and finds itself reflected in their spending of money and in their operations is through the power of persuasion. Is that correct?

Mr. WAKELIN. Yes, sir; entirely.

Mr. ELLSWORTH. Well, if you can provide those figures on fiscal year 1961, I would appreciate it, and I have no further questions, Mr. Chairman.

Mr. LENNON. We are delighted and honored to have our chairman of our parent committee here, this morning. Mr. Bonner, would you like to ask something?

Any more questions?

Mr. BAUER. One last question, Mr. Secretary, and that is, we have a precedent in the executive department for creating such a group as has been described by Congressman Lennon, and so on, and is spelled out in H.R. 4276, do we not? We have a precedent, do we not?

Mr. WAKELIN. Yes, sir.

Mr. BAUER. And I am referring to the President's message on water resources and the companion bill before the House, H.R. 8177, and also the creation of the Space Council, which is now Public Law 87–26 passed in the 87th Congress. I just want to get that in.

Mr. WAKELIN. Yes, sir.

Mr. LENNON. Thank you very much, Mr. Secretary.

Mr. BONNER. May I ask him one question?

Mr. LENNON. Yes, sir; Mr. Chairman.

Mr. BONNER. You have been a very interesting witness. I haven't had the opportunity to hear as much of the testimony on this subject as I would have desired. But do I understand that you advocate some one agency to coordinate this work? It looks to me from your statement that this thing is just scattered all over everywhere, helter-skelter, and there is no central organization, is there?

Mr. WAKELIN. We feel that the Interagency Committee on Oceanography provides the coordinating mechanism, Mr. Chairman.

Mr. BONNER. But you don't have any—as Mr. Lennon, I think, asked the question—you don't have any influence on these various agencies to bring them in to carry on coordinated, uniform programs, do you.

Mr. WAKELIN. Yes, sir; we have a great deal of influence.

Mr. BONNER. Influence, that is all you have——

Mr. WAKELIN. We have the influence, but we don't have the authority; yes, sir.

Mr. BONNER. That is what I meant.

Mr. WAKELIN. Yes, sir.

Mr. BONNER. Well then, in your opinion, shouldn't there be somebody that does have the authority to coordinate and direct uniform system of this study?

Mr. WAKELIN. I would like to answer that, Mr. Chairman, in another way, if I may.

First of all, I think that the Interagency Committee on Oceanography is most effective in the coordination and planning of a national effort. I think that if one is talking about directing the work, this is a responsibility which we have never had, and I would doubt that it would be good for us to have, as an operating agency at this time. The reason I say so is the following: If one looks at basic research in the national picture, if one looks at national resources, at the whole program of meteorology, in all of these areas which are scientific at base, and which also bear on roles and missions of the various agencies, if we excise oceanography as a special function and set up a special agency for this, then I think we ought to consider what we should do for the other programs of the national interest. Nuclear physics is another one. Basic medical research is another national program which is coordinated in much the same way, Mr. Chairman.

I think there is a larger problem that we ought to address ourselves to in the scientific community, if we are going to start with oceanography.

Mr. BONNER. Well, did I understand or do I misunderstand you that there are projects here and projects there carried out by different agencies that are overlapping?

Mr. WAKELIN. I don't believe the degree of duplication and overlapping is a very vital problem to us. But each of the agencies which contributes to the national program, and which is a part of the national program, actually operates its research, its survey work, its facilities, in its own department.

Mr. BONNER. And one might be doing that, whereas if they were coordinated, they would get better results for the particular interest each individual department may have?

Mr. WAKELIN. They are now coordinated, but they are not operated by the Committee.

Mr. BONNER. They are not what?

Mr. WAKELIN. They are not operated by the Committee. The operation of each part of the oceanographic program lies within the responsibility of an agency or a department.

Mr. BONNER. Well, these hearings—one reason I wanted to come up here and get a little information myself—have been going on 3 years. Has there been any progress made?

Mr. WAKELIN. We feel that we have made a great deal of progress in the Interagency Committee on Oceanography, not only through your help and the help of this subcommittee, but the help of the scientific community in oceanography, in bringing out at a national level the interest and importance of oceanography.

Our whole national effort has increased budgetwise by a factor of five in the last 6 years, from the order of $23 millions in 1959 to about $123 millions proposed for 1963.

We feel also that insofar as our responsibilities are concerned, we have made a very good first attempt in bringing the oceanographic work of the separate departments into a coordinated national program, Mr. Chairman.

Mr. BONNER. Well, the full committee, at the time this subcommittee was set up, felt that the subject of the oceans, and the seas, was a subject under the jurisdiction of this committee.

Mr. WAKELIN. Yes, sir.

Mr. BONNER. And therefore, we directed the establishment of that subcommittee, and I am interested to know of its measurements, and of whether it is just hearing reports from one agency and another agency, and especially the long-range program that Mr. Lennon asked you about.

Now if you are just going from year to year, I don't think that you in a vast subject of this kind, a field of this width, can make much headway with just a program from year to year. This has been going on 3 years, and you haven't got any scheduled program for continuity of the work, and I don't know whether we have made much headway here.

Mr. WAKELIN. We have a program proposed by the——

Mr. BONNER. Is some other committee of Congress having hearings on this subject with a proposal similar to that which is pending before this committee?

Mr. WAKELIN. No, sir; not that I know of, in the House.

Mr. BONNER. Well, do you think there should be something of the nature that this bill the committee has before it proposes?

Mr. WAKELIN. I think if one proposes this bill for enactment on oceanography, that one also should address oneself to the other areas of a similar kind which are concerned with national efforts.

Mr. BONNER. Well now, you mean in some jurisdiction that this committee doesn't have delegated to it?

Mr. WAKELIN. No, I am not referring to jurisdiction. I am referring to fields of science that are becoming important in the whole national effort, such as the field of nuclear physics.

Mr. BONNER. Well, some of the things you refer to would be under the jurisdiction of the Armed Services Committee, or Science and Space, and so forth.

Mr. WAKELIN. Yes, and of course, I testify before Mr. Mahon's committee on that part of our appropriation in the Navy that concerns oceanography, as well.

Mr. BONNER. For economy, I would think that some directive authority, or the coordination of the various funds spent in different agencies that I have heard mentioned here today would promote this subject, and be of value, not only to this Nation, but to the world. Wouldn't it?

Mr. WAKELIN. I think for coordination, it would be.

Mr. BONNER. That is just what I am asking. Should there be some coordinative agency?

Mr. WAKELIN. We have authority now to coordinate and plan for the national effort, and we don't have authority over the funds in the various departments in the operating agencies.

Mr. BONNER. Mr. Bauer, was that what you were trying to develop?

Mr. BAUER. Yes, sir.

Mr. BONNER. Conceivably, your effort was to develop this that I am trying to bring up.

Mr. BAUER. Yes, what I tried to bring out was that we have no national program as such that is long range in nature, and that

furthermore, any coordination that was measured by ICO is on a friendship basis, because they have no authority or responsibility to a national program of oceanography.

Mr. BONNER. That is what I gather, just from my short attentive listening to your fine statement. You yourself admit that there is a lack of something, and there should be more coordination by authority. And I think Mr. Lennon—is that what you were talking of, Mr. Lennon?

Mr. LENNON. Yes, Mr. Chairman, I think the guts of Secretary Wakelin's statement is here, and I read from his statement, "Whatever national program that we put together in the ICO must, first of all, meet the statutory commitments of the agencies."

Mr. WAKELIN. This is correct.

Mr. LENNON. Now that is the most significant thing you said, and that is certainly to my rather prejudiced way of thinking, bearing out what I said all the time. If you have got any national program, be it long-range or short-range objectives, that must first of all be contingent upon the statutory commitments of the several agencies, I don't see that you can have a long-range program.

Now I would like for you to tell me over what period of years we have had statutory enactment of law in the various agencies and departments for them to participate in any fashion of oceanography. It certainly would run at least 15 or 20 years, wouldn't it?

Mr. WAKELIN. Oh, yes; and farther back than that.

Mr. LENNON. Are you here now prepared to say that in all of the statutory enactments over the last quarter of a century on this subject, delegating to this Department and agency and this Bureau authority in this field, that you would not find some inconsistencies in statutory regulations of the various agencies that are involved in this program?

Mr. WAKELIN. Oh, I think they must exist. I can't quote chapter and verse on it.

Mr. LENNON. Therefore, the necessity for a new law, for bringing these departments and agencies and bureaus in a central department that we can bring them before this committee on whatever committee may have jurisdiction, and say, "Now what is the program? Short-range, long-range, what is being done about it?" That is the thing that we are interested in.

I can see your hesitancy about endorsing such a move, because you think—and I think I have heard you express this before—that if you moved into this field with a central agency, you would be asked to move into this one and that one and the other one, all in the field of science and related matters.

Mr. BONNER. With respect to that, doesn't the Secretary of Defense have jurisdiction as the head of studies by the Marine Corps and the Navy, and the Army and the Air Force, in outer space and science and development in that field?

Mr. WAKELIN. Yes, sir.

Mr. BONNER. So there is, in that field, then, a coordinated head?

Mr. WAKELIN. In the Department of Defense, yes.

Mr. BONNER. And a directive. Well, that is why you are doing all this work in outer space, missiles, and so forth, for peaceful purposes as well as other purposes. So it is coordinated there.

Mr. WAKELIN. Yes, it is.

Mr. BONNER. Now what other field, then, were you talking about?

Mr. WAKELIN. I am talking about a number of other scientific fields.

Mr. BONNER. And I understood you to say you hesitated because it seemed that the policy of the Budget of the administration was not favorable to the proposal that is pending before this committee, or some such proposal.

Mr. WAKELIN. No, sir.

Mr. BONNER. Did I misunderstand you in your testimony?

Mr. WAKELIN. Yes, sir, I do not hesitate on that point.

Mr. BONNER. Would you think, then, to coordinate this, it might be better to bring down the Director of the Bureau of the Budget?

Mr. WAKELIN. Yes.

Mr. BONNER. To get to the bottom of this matter.

Mr. WAKELIN. Right.

Mr. BONNER. Have you had him down.

Mr. DINGELL. No, Mr. Chairman, we have not scheduled the Director of the Budget. It also appears that it might be wholesome for the committee to consider having Dr. Wiesner, who is Scientific Adviser to the President, to appear, too.

Mr. BONNER. Well, of course, I haven't had the pleasure of meeting many of the gentlemen that you have mentioned. Dr. Wiesner. What authority has he?

Mr. DINGELL. He is the President's science adviser.

Mr. BONNER. He is the head of the works.

Mr. DINGELL. As I read the signals that come up from downtown, would it be fair to infer that Dr. Wiesner is perhaps the principal formulator of policy within the administration on this point?

Mr. WAKELIN. On science and technology.

Mr. BONNER. Well, that covers the whole field.

Mr. WAKELIN. Yes, it does, sir.

Mr. BONNER. We are interested in this subject.

Mr. WAKELIN. But in this regard, Mr. Bonner, I might suggest that there are other very important programs in the field of science over which the Federal Council for Science and Technology has a responsibility to coordinate the national effort on a planning and programing basis. They include the Committee on Atmospheric Sciences, which is concerned with the national program on meteorological work, our program on oceanography, the program on nuclear physics.

Mr. BONNER. All this comes under Dr. Wiesner?

Mr. WAKELIN. That is all Dr. Wiesner's Council, yes.

Mr. BONNER. Have you had Dr. Wiesner yet?

Mr. DINGELL. Not yet, Mr. Chairman, no.

Mr. WAKELIN. There is also a Committee on Water Resources, and a very important Committee on Development of Materials.

Now my only concern about oceanography is not that I feel that legislation couldn't help us. I think in some respects it would. I don't feel that we should look at oceanography as a special part of science, without considering other programs in the national interest that are planned on a national basis.

Mr. BONNER. Well, then, do I understand you to mean, then, there should be a Department of Scientific Development?

Mr. WAKELIN. No.

Mr. BONNER. In that Department, of course, one committee of Congress could have jurisdiction on certain functions, and this committee would have jurisdiction on oceanography.

Mr. WAKELIN. I am not talking about a Department of Science. I am talking about similar legislation as a prospect that includes all these other fields of science——

Mr. BONNER. What secretary, Cabinet status, is this Dr. Wiesner?

Mr. WAKELIN. He is a Special Assistant to the President for Science and Technology.

Mr. BONNER. Well, I don't want to upset the President's business, because I am very favorably inclined to the gentleman, but I think something should be done in this field, bringing this to a head. We will be running on here for another year or two, holding hearings.

Mr. WAKELIN. I think as far as coordination of the national program is concerned, that in the coordination role, we are doing a job. If you wish, then, to take out from each of the agencies their authority over funds for oceanography and to set up a separate department or agency, this is quite another matter.

Mr. BONNER. You mean that setting up an oceanographic agency would conflict and interfere with the other scientific developments that are going on?

Mr. WAKELIN. In part, and also, of course, each of the agencies has by statute responsibilities in this field that one would have to consider in setting up such a new agency.

The Coast and Geodetic Survey, the Bureau of Commercial Fisheries, the Atomic Energy Commission, the National Science Foundation, the Department of Defense: each of us has to do a certain amount of work in oceanography basic to our mission, and if you are going to excise that from the responsibility of Mr. McNamara in Defense, and Mr. Udall in the Interior, then I think you are talking about quite a reorganization of the executive department. In an area in which many of our interests overlap, Mr. Chairman.

Mr. BONNER. That is all.

Mr. LENNON. Mr. Secretary, how did the Department of Defense react when in 1958 the Congress enacted the statute providing for NASA? And why was the necessity for it?

Mr. WAKELIN. I think this is the pursuit, Mr. Lennon, of space exploration and space research for peaceful purposes; and of course the Department of Defense still continues its military applications in a research, development, test, evaluation, and operational status in space, necessary for the common defense.

Mr. LENNON. Well, don't we have a comparable situation with respect to exploration of the field of oceanography for peaceful purposes in addition to the facets as enjoyed by the missions of the various defense agencies in oceanography?

Mr. WAKELIN. Not entirely. Because I don't believe that in the space effort there were many roles and missions that had been conducted in the various agencies for a long period of time, such as Interior, Commerce, AEC, and the National Science Foundation as well as Defense, all of whom have had for a long period of time programs in the field of oceanography.

Mr. LENNON. But those fields they are interested in in the Department of Commerce and the Department of the Interior are certainly related to peaceful purposes in oceanography.

Mr. WAKELIN. Indeed, but they are long-established functions as a role of their performing for their department the necessary background and research and development to fulfill their roles and missions.

Mr. LENNON. Could not such a separate agency relate both the national defense effort and peaceful purposes to oceanography, and bring them together, and yet let them continue their missions under the jurisdiction of this central agency?

Mr. WAKELIN. Then I think if you did that, you would have to revise the roles and missions of each of the executive departments which have been conducting their work in oceanography over a long period of time.

Mr. LENNON. How are you going to relate a national total effort? Because we know every agency is interested in a little bit different facet, at least, so far as its immediate objectives are concerned, in the field of oceanography. Isn't that true?

Mr. WAKELIN. Yes.

Mr. LENNON. They have a different puprose, a different motivation. What is going to bring them together with a long-range objective?

Mr. WAKELIN. But many interests of these several departments concerned with this are not in conflict with the national program, and they are not separate from it.

Mr. LENNON. Well, maybe when you bring to us a long-range national objective for oceanography, maybe I might change my views, and let me see what is the national objective of oceanography. I haven't gotten that yet.

Mr. WAKELIN. There are two such plans we can show you immediately. The National Academy's plan in 1959, and our own plan for the Navy that would be a prototype for the whole national program in oceanography and as a part of the whole national effort. These are very interesting plans to look at.

Mr. DINGELL. Will you yield?

Mr. LENNON. Yes, sir, Mr. Chairman.

Mr. DINGELL. I am concerned now with regard to this. I happen to know, Mr. Secretary, that you had had a great deal to do with the TENOC plan, that you were probably the leading light behind it, and it is an excellent plan, but would you say in fairness that this is or should be or will be the national program on oceanography, if it ever is evolved?

Mr. WAKELIN. It is certainly as good a guide to the Navy's work in oceanography over the next 10 years as any long-range plan would be.

Mr. DINGELL. I agree. It is an excellent plan for the Navy, but is it a plan for the whole endeavor of the United States with regard to say, Bureau of Commercial Fisheries, Coast and Geodetic Survey——

Mr. WAKELIN. Oh, indeed not.

Mr. DINGELL. And this other plan, you say National Science Foundation?

Mr. WAKELIN. National Academy's.

Mr. DINGELL. Would we be fair in inferring that perhaps the National Academy plan might be an excellent plan for the National Academy, but it might not comport with the needs of all of the other agencies of the Federal Government? This would be fair to say, would it not?

Mr. WAKELIN. But the National Academy considered programs for each of the Government agencies and departments then working in the field of oceanography.

Mr. DINGELL. Do you know of your own knowledge that the National Academy coordinated with these other agencies in regard to the formulation of their plans?

Mr. WAKELIN. I don't know the details of the level of coordination, but I do know that they had to work closely with the Government departments in order to prepare such a plan, and were requested to by the Navy, the Atomic Energy Commission, the Science Foundation, and Interior.

Mr. DINGELL. Would it be fair to infer, then, perhaps, that this should be the plan, and we should simply adopt that? Wouldn't that be in effect an admission that if the National Academy of Sciences can do this, we ought to have them coordinate it, and to get rid of, perhaps the ICO?

Mr. WAKELIN. This is a possibility. I don't believe, however, that it is right to delegate to the Academy responsibilities for work performed in Government departments under their own Government funding. I think, as a coordinating mechanism, it has worked very closely with us.

What we did, Mr. Chairman, was the following when we received the NASCO report: We reviewed this, and set up our own 10-year program in the ICO, through the membership of the ICO. We have that plan now, which was generated early in 1960. We don't feel this is of sufficient depth and explains the whole program in enough detail to be helpful, as helpful to the national interest, as our TENOC program was in the Navy.

As a result of this, we asked the Navy to develop the 10-year oceanographic program, developed originally for scientific work—we asked the Chief of Naval Operations to include the operational aspects to the program, and to integrate the whole effort, research, development, and operations, into a 10-year plan for the whole Navy.

Now we are asking the other Government agencies to do the same thing from their point of view, in terms of their own roles and missions, and when these are integrated, we will have truly a national plan as a Government agency development.

Mr. DINGELL. That is right, and formulated reasonably, I hope, by the heads of the sundry departments involved; am I correct? At least after careful consideration by these?

Mr. WAKELIN. Yes, sir.

Mr. DINGELL. Now I don't want to transgress on Mr. Lennon's time, but I do want to pursue this: Now, what attention have the heads of the various and sundry departments given to the affairs of the ICO?

Mr. WAKELIN. Direct attention?

Mr. DINGELL. Direct attention.

Mr. WAKELIN. Their direct attention through their Under Secretaries at that level has been given to the program in the Federal Council for Science and Technology when we present our total program to them each year.

Mr. DINGELL. Has any of them ever attended a meeting of the ICO?

Mr. WAKELIN. No, they haven't.

Mr. DINGELL. Has anyone at Cabinet level, other than yourself, ever attended a meeting of the ICO, or participated in the deliberations of ICO?

Mr. WAKELIN. I do not believe so.

Mr. DINGELL. You see, Mr. Secretary, I happen to think you are an extraordinarily able and dedicated public servant, and I think you have done a fine job in this field, but I think you are the only man on a policy level in Government who has ever devoted any significant amount of time to this problem of coordination of oceanography, and I will make that bald statement and challenge you, as a representative of the administration, to deny it or to rebut it.

Has anyone at the policymaking level in Government, aside from yourself, ever given any thought to the coordination of this whole program?

Mr. WAKELIN. Oh, yes, the Secretaries of the various departments have given very serious thought to our proposal for a National Oceanographic Center.

Mr. DINGELL. The Secretaries did?

Mr. WAKELIN. And entered into an agreement among themselves as to its support.

Mr. DINGELL. Have they ever given any other attention to this program?

Mr. WAKELIN. Each one of the Secretaries must review it, as it comes up in their total budget preparations.

Mr. DINGELL. I see. They must review it as it comes up in the course of their total budget preparations, but Mr. Secretary, isn't it true to say that they only review it after somebody else has made the basic decision, and they rarely upset the basic decisions of the people down below?

Am I correct?

Mr. WAKELIN. I can't speak for any Department other than the Navy in this regard.

Mr. DINGELL. As a matter of general assumption, it would be fairly general to say that determinations of budget made at a lower level are rarely upset, wouldn't it?

Mr. WAKELIN. I can't comment in general on this. I don't know, Mr. Chairman.

Mr. DINGELL. Now let's talk about this business of the requests, or rather of the projected governmental program. This has been kicking around now how long, Mr. Secretary?

Mr. WAKELIN. Which program, the national program in oceanography?

Mr. DINGELL. The national program in oceanography. That has been bouncing around for how long?

Mr. WAKELIN. I would say in terms of certainly the last 4 years.

Mr. DINGELL. And the initial requests went out to the sundry departments concerned when?

Mr. WAKELIN. The initial request to——

Mr. DINGELL. To the departments concerned to submit their participating portion.

Mr. WAKELIN. On a 10-year plan?

Mr. DINGELL. Yes, of the national oceanographic program that you referred to in your notes.

Mr. WAKELIN. In that time period, I would say it has been no longer than a year.

Mr. DINGELL. No longer than a year, and you indicated you have seen drafts; but have you seen anything else, further than rough drafts?

Mr. WAKELIN. We have, of course, talked with each of the members. I have talked with each of the members of the ICO about their preparation of the plan and about their ideas of the plan, and how far they are along in some of the features of it, but we have not had complete returns from each of the agencies for their 10-year program plans.

Mr. DINGELL. What agency has made any return to you?

Mr. WAKELIN. The Smithsonian has.

Mr. DINGELL. The Smithsonian. Has anyone else?

Mr. WAKELIN. And the Navy.

Mr. DINGELL. And the Navy, and, of course, you are responsible to see that the Navy has, and you have done an excellent job. As I have indicated, my concern is not that you are not doing an excellent job. My concern is that apparently there is not enough attention by others in Government to this same problem.

Those two agencies have submitted returns to you. Is there any other agency that has?

Mr. WAKELIN. Yes, we have a draft of the program suggested for the Department of Interior. We have the approved plans of the Department of Commerce.

Mr. DINGELL. All right, now, that is three departments.

Mr. WAKELIN. We are going to get shortly the Atomic Energy Commission's, within the next several weeks, if it isn't in now. The Atomic Energy Commission's long-range plans, and the National Science Foundation's long-range plans.

Mr. DINGELL. And who else?

Mr. WAKELIN. There is Health, Education, and Welfare and the Treasury Department.

Mr. DINGELL. Those are the only other agencies?

Mr. WAKELIN. That are involved in the ICO.

Mr. DINGELL. And you are expecting these momentarily?

Mr. WAKELIN. I would expect to have all of them in the next 2 months.

Mr. DINGELL. Now let's switch over. You have in ICO what size staff, sir?

Mr. WAKELIN. We have Mr. Robert Abel, who is going to talk to you later.

Mr. DINGELL. I mean full-time personnel staff whose principal responsibility is carrying out staff functions by, for, and on behalf of ICO.

Mr. WAKELIN. As far as full-time staff is concerned, certainly Mr. Robert Abel, in the Office of Naval Research, assisted them by two other people.

Mr. DINGELL. Now Mr. Robert Abel is in the Office of Naval Research. His principal job is somewhere else in the Office of Naval Research, is it not?

Mr. WAKELIN. His principal function right now is Executive Secretary of the ICO.

Mr. DINGELL. Does he devote full time to this?

Mr. WAKELIN. As far as I know, he does.

Mr. DINGELL. He has no other responsibility?

Mr. WAKELIN. He may have, but I don't think he has time to fulfill anything else except this particular role.

Mr. DINGELL. Well, in what you are talking of, he is shortchanging the Government with regard to one responsibility or the other, because he doesn't have time enough to carry them both out, am I right?

Mr. WAKELIN. As far as I know, he has been delegated to work in the Office of Naval Research for me, and the ICO, and he reports to me.

Mr. DINGELL. This is his principal job in the Government. Then he has no other job.

Mr. WAKELIN. That is correct.

Mr. DINGELL. Now who else do you have, full-time staff, in ICO?

Mr. WAKELIN. We don't have anyone else full time, with the exception of Comdr. Steven Anastasion, who spends a major fraction of his time as my special assistant. A very able man. Exceptionally fine, and an outstanding officer.

Mr. DINGELL. True, I agree. Does he have other responsibilities in the Government, too?

Mr. WAKELIN. Only as I delegate the responsibilities to him.

Mr. DINGELL. But his responsibilities are as your aid?

Mr. WAKELIN. He is one of my aids, yes.

Mr. DINGELL. Now this has been very helpful, but as to meetings of ICO, is there any regular schedule of meetings for ICO?

Mr. WAKELIN. There isn't any regular scheduled group of meetings, Mr. Chairman. As the pressure of work builds up we convene the ICO.

Mr. DINGELL. Approximately how often does the ICO convene for meetings?

Mr. WAKELIN. Of the order of once every 1 or 2 months, as a full committee. Of course, the panels are in conference a great deal of the time in between the ICO meetings.

Mr. DINGELL. I see. Now is there an attendance taken at ICO meetings?

Mr. WAKELIN. Yes.

Mr. DINGELL. Do you always have a quorum, and what constitutes a quorum?

Mr. WAKELIN. We are not organized on a quorum basis, with respect to parliamentary procedures, but usually we have representatives, in fact, we always have representatives from each of the departments. If they are not members of the ICO, their alternates come.

Mr. DINGELL. Do you have designated members of the ICO who are supposed to attend meetings of ICO?

Mr. WAKELIN. Yes, sir.

Mr. DINGELL. Do these members generally attend?

Mr. WAKELIN. Yes. In fact, they almost always attend.

Mr. DINGELL. Now can you tell us what subprograms under the national oceanographic program have been worked on by ICO?

Do you have any subprograms under that that have been worked on by ICO?

Mr. WAKELIN. I am not sure I understand the question.

Mr. DINGELL. Or subdivisions of the major programs that have been worked on by ICO itself?

Mr. WAKELIN. In addition to the work of the panels, which are specific to various functional areas, such as research, ships, manpower and training, facilities, and instrumentation, almost all of the work in the ICO is directed to one panel or another. The newest one, of course, is our International Programs Panel.

Mr. DINGELL. How often do these panels meet?

Mr. WAKELIN. They meet at least once a month.

Mr. DINGELL. At least once a month, to solve major programs in the field of oceanography?

Mr. WAKELIN. These are continuing programs, Mr. Chairman, and each of the panel members may be involved in the operation of that particular part of a program in his own agency, but as far as the coordination is concerned, this doesn't consume vast amounts of time.

Mr. DINGELL. Now, what staff do you have to assist the panels in providing continuity of direction to the sundry panels?

Mr. WAKELIN. The panel staffs, of course, have available to them people in the various departments where their responsibilities are.

Mr. DINGELL. Who have other responsibilities within their respective departments?

Mr. WAKELIN. Indeed.

Mr. DINGELL. Who are in effect part-time employees. Am I correct?

Mr. WAKELIN. Well, I can't speak for all of them, but each of the panel chairmen will come before you, and I think they can, themselves, answer this question better than I.

Mr. DINGELL. Now, let me ask you this question. Are you familiar with the budgets of all of the departments of Government and agencies of Government which are involved in oceanography? And I only ask you, are you familiar in a general way with them?

Mr. WAKELIN. With the budgets in oceanography?

Mr. DINGELL. Yes; of assorted and sundry Government departments.

Mr. WAKELIN. Yes.

Mr. DINGELL. Was there a meeting of ICO on budgets of the agencies involved in the field of oceanography?

Mr. WAKELIN. We have numbers of meetings on budget problems.

Mr. DINGELL. Was there with regard to the budget requests of these various agencies ever a meeting of ICO?

Mr. WAKELIN. Oh, yes, indeed; of course. We meet the beginning of each calendar year to consider the next year's budget.

Mr. DINGELL. All right; now, with regard to that, are you familiar with the requests of the agencies to the Bureau of the Budget with regard to their oceanographic activities, Mr. Secretary?

Mr. WAKELIN. Yes.

Mr. DINGELL. Can you, or is there somebody in Government who can, submit to this committee a statement or a list of the initial budgetary requests of the agencies as started out in the budgetary process of these different agencies in Government dealing with oceanography?

Mr. WAKELIN. I can only speak for the Navy Department, and I think the other members of the other departments should speak for their own departments, Mr. Chairman.

Mr. DINGELL. Would I be fair in inferring, though, that the requests of everybody but the Navy got substantially whittled down in the field of oceanography?

Mr. WAKELIN. They were decreased. I don't know whether I would say "substantially whittled down." They weren't decreased by a major fraction of their request.

Mr. DINGELL. But they were substantially limited with regard to any increase of activity in the field of oceanography. Am I correct?

Mr. WAKELIN. In certain special areas; yes.

Mr. DINGELL. And as a matter of fact, the only agency in Government which received any significant increase in oceanographic dollar budget was the Navy, whereas most of the other agencies received substantial reductions in their requests and very slight increases, if any, in their actual oceanographic activity. Am I correct?

Mr. WAKELIN. If you will allow me simply to look at the various agencies across the board, I would say apart from—well, let us compare 1962 actually with the President's budget which is now before the Congress.

There was an increase for the Department of Defense, a very small increase for Commerce, a small increase for Interior, a modest increase for the National Science Foundation, a substantial increase in the Atomic Energy Commission, a small increase in Health, Education, and Welfare, the same for Treasury, and a sum for taxonomy of $250,000 for the Smithsonian, which I can't tell you was in last year in their own budget or not, so this may not be an increase of that amount.

Mr. DINGELL. So actually, aside from Department of the Navy, there was a very insignificant increase in the budgets of these agencies. Am I correct?

Mr. WAKELIN. The whole budget went up by $22,900,000.

Mr. DINGELL. Yes.

Mr. WAKELIN. Across the board. If you have got the same figures I have, sir.

Mr. DINGELL. But the largest portion of that was the Navy's; am I correct?

Mr. WAKELIN. The largest portion of the increase—and this is of the order of $15,200,000—was for the Navy.

Mr. DINGELL. I want you to know, Mr. Secretary, I am not critical of your part in this. I think the Navy well deserves and I commend you for the Navy having achieved an increase in its oceanographic budget, but I wonder, these other agencies, it would appear that ICO was not much help in achieving any additional emphasis on the part of these other agencies.

Mr. WAKELIN. Would you, Mr. Chairman, explain for my information, if I might ask this question, how your bill 4276 would help this particular problem?

Mr. DINGELL. Well, the idea is not to make an assumption or an assertion that the bill that we have been discussing would make any significant increase, or any steps toward the solution of the problem, but it would appear that at least it would give some emphasis to consideration of budgetary problems. Am I correct, Mr. Secretary? It will give some statutory dignity to the agency which is in effect supervising the whole control of these budgetary operations with regard to coordination, and it might give, at least we are hopeful it would give, a counterweight to the Bureau of the Budget with regard to the increase as opposed to the Budget's natural effort and pressure to cut budgets, and hold down expenses, which is a sizable thing. Am I correct?

Mr. WAKELIN. In that regard, I certainly consider the Bureau of the Budget's responsibilities are those of trying to arrive at a total figure for the whole national budget by integrating over a number of national programs, one of which is oceanography. So that in this regard, I could not be assured that your bill would give us any more total support in the Bureau of the Budget than the current mechanism of going through the ICO and the Federal Council, and working closely with the Bureau of the Budget people, as we do right now.

Mr. DINGELL. Mr. Secretary, the point I have been leading up to is simply this: Wouldn't it be fair to infer that on the basis of raw figures alone that ICO has had modest success, if at all, in increasing activities by governmental agencies involved in the field of oceanography in that field?

Mr. WAKELIN. Do you consider a factor of 5 over the last 6 years as being inconsequential?

Mr. DINGELL. Let us talk in terms of the agencies other than the Department of the Navy. It has been relatively lacking in success with agencies outside of the Department of the Navy, and I speak just in terms of last year's budget.

Mr. WAKELIN. Yes.

Mr. DINGELL. I haven't made scrutiny, but it wouldn't be unfair to make that statement, would it?

Mr. WAKELIN. I think it would be unfair. That is my personal opinion.

Mr. DINGELL. Can you give us an idea of what the proposed budgets in this field were that came from the representative departments to the Bureau of the Budget, so that we can make an objective comparison between what was requested, and what the various and sundry departments thought was appropriate and necessary, as opposed to what the Bureau of the Budget finally let them have?

Mr. WAKELIN. I am not sure that I can give you the precise figure, but they are of the order of $136 million versus $124 million.

Mr. DINGELL. $136 million and $124 million. So that that is a cut of approximately $12 million and this cut came principally outside of the Navy's budget, I am correct? It came in the various civilian agencies?

Mr. WAKELIN. It came mostly outside of the Navy, right. But I don't understand how your proposed bill is going to help in this regard, because the budget process must consider oceanography along with all the other national efforts. I am not opposed to the bill. Please understand that.

Mr. DINGELL. Mr. Secretary, I am not even discussing the bill at the moment.

Mr. Secretary, I appreciate your helpfulness this morning, and your very fine statement, and I want to commend you.

Mr. Bauer has a few more questions.

Mr. BAUER. Mr. Secretary, one last approach here.

If you look at the oceans as an environment, you of course would have to consider the atmospheric part of the environment, the part having to do with the physics and chemistry of the oceans, and the part having to do with the biology of the oceans. Is that not correct?

Mr. WAKELIN. Yes, sir.

Mr. BAUER. Do you regard the oceans as important as study of environmental problems and requiring coordination as water resources?

Mr. WAKELIN. Indeed.

Mr. BAUER. In the study of the oceans, is it not true that solid state physics could conceivably be involved as well as nuclear physics, as well as the other particular scientific disciplines that you have mentioned?

Mr. WAKELIN. Yes.

Mr. BAUER. And why is there any objection to regarding the oceans as an environment and coordinating the oceans as an environment precisely in the same fashion that outer space has been coordinated by the space council, and the President has indicated that he wants to have the water resources of the United States brought in in similar fashion?

Mr. WAKELIN. With respect to coordination, I have no objection.

Mr. BAUER. That is all I have, Mr. Chairman.

Mr. DINGELL. Mr. Drewry?

Mr. Secretary, we want to thank you very much for your kindness in coming before the committee. You have been most generous with your time, and most helpful to the committee.

There were a number of other witnesses who were scheduled today, Dr. Stewart, Commander Alexander, Dr. Dees, Mr. McKernan, Mr. Abel, and Dr. Maxwell.

Gentlemen, the committee apologizes to you for having detained you this morning. Would it be possible for you to be back, here with us tomorrow morning at 10 o'clock?

Off the record.

(Off the record.)

Mr. DINGELL. Mr. Secretary, thank you very much.

Mr. WAKELIN. Thank you, sir.

Mr. DINGELL. The subcommittee stands adjourned until 10 o'clock tomorrow.

(Whereupon, at 12:25 p.m., the hearing was recessed, to resume at 10 a.m., Thursday, March 1, 1962.)

STUDY OF THE EFFECTIVENESS OF THE COMMITTEE ON OCEANOGRAPHY OF THE FEDERAL COUNCIL FOR SCIENCE AND TECHNOLOGY

THURSDAY, MARCH 1, 1962

HOUSE OF REPRESENTATIVES,
COMMITTEE ON MERCHANT MARINE AND FISHERIES,
SUBCOMMITTEE ON OCEANOGRAPHY,
Washington, D.C.

The subcommittee met at 10:10 a.m., pursuant to recess, in room 219, House Office Building, Hon. John D. Dingell (acting chairman) presiding.

Mr. DINGELL. The subcommittee will come to order.

The Subcommittee on Oceanography of the Committee on Merchant Marine and Fisheries has been conducting a general oversight on the conduct of the ICO. We are honored to have with us this morning a group of distinguished witnesses from the Interagency Committees on Oceanography.

Our first witness is Mr. D. L. McKernan, Chairman of the Equipment and Facilities Panel. Mr. McKernan is also Director of the Bureau of Commercial Fisheries.

We are privileged to have you with us, Mr. McKernan. You are certainly most welcome.

Do you have anyone with you that you would like to have sit with you today?

STATEMENT OF DONALD L. McKERNAN, CHAIRMAN, INTERAGENCY COMMITTEE ON OCEANOGRAPHY PANEL ON FACILITIES, EQUIPMENT, AND INSTRUMENTATION, ACCOMPANIED BY GILBERT JAFFE, HYDROGRAPHIC OFFICE, U.S. NAVY; A. J. GOODHEART, U.S. COAST AND GEODETIC SURVEY, DEPARTMENT OF COMMERCE; LT. COMDR. R. P. DINSMORE, U.S. COAST GUARD; DR. DIXY LEE RAY, NATIONAL SCIENCE FOUNDATION; AND F. D. JENNINGS, OFFICE OF NAVAL RESEARCH

Mr. MCKERNAN. Mr. Chairman, I have a number of members of my panel who are specialists in this field, and perhaps if technical questions come up during the course of our discussions this morning, it might be well if I simply introduced them, and then if you wouldn't mind, we could call on them to give you more complete information on any subject that you desire.

Mr. DINGELL. That would be fine.

Mr. McKernan. I should like to introduce, Mr. Chairman, some of the members of our panel who are here.

Mr. Gilbert Jaffe, of the Hydrographic Office of the Navy. Perhaps Mr. Jaffe would stand, so you can see what good-looking men we have on this panel.

Mr. Goodheart, from the Department of Commerce, Coast and Geodetic Survey in the Department of Commerce.

Lt. Comdr. R. P. Dinsmore, U.S. Coast Guard.

Dr. Dixy Lee Ray, from the National Science Foundation.

Mr. Dingell. Dr. Ray is well known to the committee.

Mr. McKernan. And today we also have Mr. F. D. Jennings, of the Office of Naval Research. Yesterday he was away on an official visit and wasn't here. It is wonderful to have him here.

And yesterday, at least, we had an observer from the National Academy of Sciences Committee on Oceanography, Mr. Richard Vetter. I am not sure whether he is here this morning or not. Perhaps he will come in later, Mr. Chairman.

All of these people, in addition to myself, will be pleased to contribute toward a more complete record of our hearing.

Mr. Dingell. Ladies and gentlemen, you are most welcome. The committee is happy to have you here, and we look forward to hearing from you.

Mr. McKernan. I am a member of the Interagency Committee on Oceanography, and am Chairman of the Panel on Equipment, Facilities, and Instrumentation. I have a prepared statement which I submit for the record. If there are no objections, I will briefly discuss my remarks in this paper.

Mr. Dingell. Without objection, so ordered.

(The statement referred to follows:)

Statement of Donald L. McKernan, Chairman, Interagency Committee on Oceanography, Panel on Facilities, Equipment, and Instrumentation

PURPOSE AND OBJECTIVES

Mr. Chairman, the Panel on Facilities, Equipment, and Instrumentation is one of the newer panels of the Interagency Committee. It was organized in January 1961 to insure coordination between Government agencies, private oceanographic institutions and industry in the development of instruments, procurement of major items of equipment and construction of shoreside facilities. The principal objective of the panel is to give impetus to development of instruments and instrument systems for oceanographic research and surveys.

Last year we believed that plans for new techniques and new ways of obtaining oceanographic information were not proceeding as rapidly as they should. There was a need for new instruments to be placed on research and survey ships which were scheduled for construction. We recognized progress being made in other fields of science as a result of close work with industry. Following this example, we believed industry know-how had to be applied to oceanographic instrumentation so that rapid advances could be made. There were a number of instrumentation problems before us, and our panel was organized to meet them.

PANEL MEMBERSHIP

Representation on the panel is from all member agencies of ICO which have operational requirements in oceanography. In addition, liaison is obtained with non-Government scientists through a representation from the National Academy of Sciences Committee on Oceanography. Membership on this panel is by designation from each agency. Special care has been taken to insure that, where possible, instrument specialists serve on the panel.

For the record, our present membership is as follows:
Interior:
Bureau of Commercial Fisheries, D. L. McKernan, Chairman.
Bureau of Commercial Fisheries, alternate, H. H. Eckles.
Navy:
Office of Naval Research, F. D. Jennings.
Hydrographic Office, G. Jaffe.
Hydrographic Office, alternate, Comdr. T. K. Treadwell.
Commerce:
U.S. Coast & Geodetic Survey, A. J. Goodheart.
U.S. Coast & Geodetic Survey, alternate, Theodore V. Ryan.
Treasury: U.S. Coast Guard, Lt. Comdr. R. P. Dinsmore.
Atomic Energy Commission: Dr. I. E. Wallen.
National Science Foundation, Dr. R. G. Bader.
National Science Foundation, alternate, Dr. Dixy Lee Ray.
National Academy of Sciences Committee on Oceanography:
Observer, A. C. Vine.
Alternate, R. C. Vetter.

WAYS OF ACCOMPLISHING OBJECTIVES

During the past year the Panel held a series of meetings to develop and coordinate the 1963 instrument and facilities program which each agency had submitted to ICO. Descriptions of facilities and plans for instrument development, with estimated costs, were studied by an ad hoc group which summarized submissions for the Panel. The purpose and need of each recommendation were discussed. An evaluation was made on whether each item was necessary to the oceanographic program and whether balance in programs was being maintained. A final recommendation was then made to the Interagency Committee for inclusion in the 1963 program. One of the main benefits of the Panel's review of facilities was pointing out opportunities for future cooperation; for example, development of a port facility in Seattle.

Ad hoc groups have carried out special tasks such as determination of need for an instrument test and calibration center and organization of a symposium on instrumentation.

ACCOMPLISHMENTS OF THE PANEL

Although this panel of the Interagency Committee has been organized just slightly over a year, we have undertaken a number of special tasks which we believe will contribute to progress of the total oceanographic program. One of the most important of these was the Government-industry oceanographic instrumentation symposium which I have just mentioned.

A general introduction and background on oceanography was given to 700 industry members who attended this symposium which we held in August 1961.

This was a cooperative undertaking by Government and non-Government scientists, marine surveyors, and others interested in oceanography. The information presented and that developed during question periods allowed each company to determine its interest in the oceanographic program and its capability for developing and producing instruments for the various fields of science which make up oceanography.

Written descriptions of future instrument needs were prepared as handouts. These were given to the attendees and also received wide circulation by mail. We believe these lists, which are being kept up to date, will be helpful to both Government and industry in future instrument development. Results of the symposium will be published in about 2 months and will be a compendium of knowledge about the oceanographic program and future needs for instrumentation. It is our aim that the proceedings and additional materials which will be presented with them, will answer many of the questions about oceanography which are often asked by industry members and other persons. For the record the proceedings will contain the following:

1. Papers presented by the speakers.
2. Answers to questions asked at the meeting.
3. A list of scientific agencies which use oceanographic instruments.
4. A list of industrial groups which manufacture oceanographic instruments.
5. Attendance list.
6. Required oceanographic instruments for oceanographic survey vessels.
7. Requirements for oceanographic instruments for ships-of-opportunity.

8. Requirements for shipboard oceanographic synoptic system for regional and mobile observational networks (ASWEPS).
9. List of instruments needed in fishery research.
10. Oceanographic bibliography.

As a result of the symposium and industry's general interest in oceanography we are developing a master instrumentation proposal and capability file at the National Oceanographic Data Center. Reviews of proposals made by each agency are to be placed in the file and also made available to other Government or nonprofit research groups which might have an interest in the instruments concerned. The file will be privileged so as to protect the rights and ideas of companies. This file will, however, be a central source of information on instrument possibilities. Considerable time can be saved by maintaining a central system for exchange of information over that required if each agency carries out separate reviews and maintains a separate file.

Another task which we have undertaken has been study of the need for an instrument test and calibration center, following which recommendations were made to the Interagency Committee for two such facilities. At the present time the Hydrographic Office has plans to develop an instrument center, in the same building as the data center. This will be the forerunner of the first national test and calibration center and will provide experience on which a cooperative, jointly operated facility can be designed.

We have other accomplishments, Mr. Chairman, but to save time I will mention them very briefly. In cooperation with the Research Panel we carried out a review of oceanographic facilities which are planned for Seattle. Our program submissions showed that three agencies—Coast and Geodetic Survey, Office of Naval Research, and the Bureau of Commercial Fisheries—had plans for new facilities in Seattle. This information was pointed out to the Research Panel and members of this panel went to Seattle to discuss possibilities of a joint facility. Dr. Maxwell, Chairman of the Research Panel, will tell you about the results of the study which was carried out.

At the request of the Department of Defense, we contacted each agency on the Interagency Committee to determine their interest in Tongue Point, Oreg., as a possible oceanographic facility. Our panel did not discover a need for the base, but the study was necessary and, we believe, a help to the Department of Defense.

According to previous plans, instrument specialists from each agency on the panel reviewed specifications and made recommendations for modification of an instrument system for which the Hydrographic Office will soon place a developmental contract. This was done to insure that the system will furnish data which will be useful to all cooperating agencies.

FUTURE PLANS

The main job of the panel in the future will be to continue planning on a coordinated basis to define immediate and long-range needs for major oceanographic facilities and equipment and to foster the Government's oceanographic instrumentation program.

Development of observational oceanographic buoys is being pursued by both Government and non-Government research groups. The panel plans to follow this work, and to fill gaps in effort where necessary. In this connection we are working closely with the new Devices Panel of the National Academy of Sciences Committee on Oceanography which is studying radiofrequency requirements for data transmission. We plan to assist at the appropriate time in obtaining frequency allocations for use by marine scientists on oceanographic buoy systems. We also plan experiments on anchoring of buoys and further studies on radio transmission problems. We believe the panel can carry out an important function in insuring that oceanographic buoy systems meet the needs of all agencies which require data from them.

We expect to establish an encyclopedia of oceanographic instrumentation which would furnish accurate descriptions of instruments now in existence whether descriptions of them have been published or not. This would then be kept up to date by an active staff who would be knowledgeable in the instrumentation field. The encyclopedia will be very useful for the working oceanographer to locate instruments which he may need and might prevent expenditure of funds and waste of time for development of instruments which are already in existence.

The panel also plans to give special attention to biological instrumentation. A meeting of marine biologists and biological oceanographers is planned for the summer of 1962 to define their instrumentation requirements. Following this

we expect to hold a symposium in which industry members and marine biologists will discuss instrument development programs.

Mr. Chairman, if our future plans are successfully carried out, we will have a good exchange of information between Government agencies, private institutions, and working scientists at all levels. Duplication of effort should be avoided and mutual sharing of results should enhance the varied programs which now constitute the national effort in oceanography. The work of this panel should result in better instruments and proper facilities for oceanography in the United States.

Mr. McKernan. This particular panel, Mr. Chairman, is one of the newer ones on the Interagency Committee.

It was organized in January of 1961 to insure coordination between Government agencies, private oceanographic institutions, and industry in the development of instruments and instrument procurement.

The principal objective of this committee came from a feeling of the Interagency Committee on Oceanography that there should be some impetus put into instrumentation development, instrumentation research, and to acquiring instrument systems for new vessels which are being constructed in various departments of Government for the national oceanographic program.

As you may have noted from my introductions, we have people represented on this committee from practically all of the operating departments of Government, men who are specialists in this particular field, and we have been working very closely with a special committee of the National Academy of Sciences Committee on Oceanography. The people on this committee from outside of Government, mostly from educational institutions, are internationally known specialists in the field of instrumentation.

During the past year, we have held a series of meetings, developing the 1963 instrumentation and facilities program, which has been submitted to the Interagency Committee on Oceanography.

Mr. Chairman, I was a very interested listener yesterday in your discussions, and my real purpose here this morning would be to give the committee an idea of how the Interagency Committee on Oceanography does coordinate oceanographic efforts.

This is in a sense the story of one panel which has been set up under the Interagency Committee on Oceanography, but I believe it is a typical and excellent example of coordination which has occurred through this Committee on Oceanography.

We have held some 17 meetings over the past year of this particular panel, and we have discussed each other's problems in oceanography and our programs, with special attention being given to the kinds and types and systems of instruments which would contribute to the national effort. I believe that there have been a number of accomplishments.

I wouldn't say that they were anything to get on the rooftops and holler about, but, on the other hand, they are rather solid accomplishments in the way of coordinating our effort in getting more for our dollar and leading the way toward the development of better instruments in oceanography for all disciplines, biological, physical, and chemical.

In the first place, soon after our Committee got started, we felt that we ought to bring in industry, because we thought that there was a tremendous amount of engineering and technical skill in various instrument companies.

We were aware of the great success that the Defense Department has had, and NASA as well, in using or contracting out to various specialized industries instrument systems of various kinds. So we held an instrumention symposium—in a sense a preliminary, rather broad one—to discuss the needs in the field of oceanography and to discuss the possibilities of what these companies contribute.

There were about 700 people attending this symposium, representing a great number of companies throughout the United States. I believe the meeting was very successful. It has been followed by a more specialized meeting in the Navy, since that time, and there is now under consideration by our panel and by the Panel on Instrumentation of the National Academy of Sciences Committee on Oceanography a special biological meeting, to discuss with industry and Government and non-Government scientists the needs and possible developments for instruments in biological oceanography.

I believe that most of us in the panel believe—I may be biased here, Mr. Chairman, because I am a biologist myself—but many of us believe that the biological instruments that we are using on our ships, oceanographic ships and fishery research ships, are really further behind modern instrumentation than probably any other field.

I believe that the general meeting we held last September bore this out, that we are pretty much in the neighborhood of a hundred years behind knowledge in physics, and chemistry and electronics in developing more systematic and more automatic instruments in biological oceanography.

As a result of this, we are developing a master instrumentation proposal and capability file at the National Oceanographic Data Center. Now the advantage of this is, to me, that all of the agencies of Government know what other departments are doing. We have one central filing system where all of the proposals that are brought before individual Government agencies are available for examination. One central file where we can see what industry capabilities are.

All of us don't have to, in a sense, talk to literally hundreds of agents of these companies ourselves. When these proposals can come in, they can be considered and filed, and they can be available to all, to any Government agent who has a need for any particular instrument or system of instruments.

Another task that we have undertaken has been to study the need for an instrument test and calibration center, and recommendations have been made to the ICO for two such facilities. We are now considering the proper timing of funding for these facilities. Informal conversation has led me to believe that the Navy Hydrographic Office is going to start such an instrumentation center, even without special funding, by bringing together some of their own specialists, over here at the Weapons Center. So in a sense, we are gaining some leadtime now in this very important field.

We are thinking ultimately of an instrumentation test and calibration center on the Atlantic coast, perhaps, to be located here in Washington, and another one on the west coast eventually.

We believe, by the way, that this kind of cooperation exemplifies the efforts and the success of the Interagency Committee on Oceanography. I would call to your attention that the National Oceanographic Data Center is another example of this coordination and the success of it.

From the standpoint of a civilian agency who uses these facilities, and who is represented on the governing body, I would say that this has been a tremendous success. It is exciting and stimulating to all of our scientists to see the coordination and cooperation between various departments of Government who are bringing together their information in one center. It means we know where we can go for data. Furthermore, we have a voice in how it is arranged and how it is put together.

This is new, of course. There are lots of bugs in it, but, nevertheless, it is working very well.

We have many other accomplishments, Mr. Chairman, that are important to me, perhaps, because I am not an instrumentation specialist myself, as you are well aware, I am a biologist, and I suspect that I have learned more about instruments from my participation in this Committee than anyone else.

But one minor example of cooperation that has resulted from the deliberations of these various panels of the ICO has been the planning of oceanographic facilities, or the discussion of oceanographic facilities in the Pacific Northwest. Two committees, our own and the Research Panel, met in Seattle and discussed with various people at the University of Washington and the Government agencies the needs in this area.

We have been largely guided—we and the various Government agencies, I mean—in our funding by the deliberations and the coordination that has been carried out by these regional meetings. It is our plan in the ICO to continue these, and to visit other parts of the country where there are substantial establishments by various departments carrying out programs in oceanography. We will see where further coordination of physical facilities and of programs might be carried out right on the spot, talking to people that are right in these areas.

I am sure Dr. Maxwell, who will meet with you and discuss with you the Research Panel, will discuss this in perhaps greater length.

Mr. Chairman, I believe you mentioned when we started yesterday, when you started this series of discussions, that you would like to know something about future plans, and in our panel we have been considering this matter of future plans at some length. I certainly don't mean to imply that we have resolved all of the problems of coordination in Government, because we haven't, but I believe that we have made substantial contribution toward this coordination.

We are thinking this year, for example, in terms of observational oceanographic buoys and systems of taking observations of ocean phenomena by telemetering buoys. These would take the temperatures and the chemical composition of the water, perhaps eventually even certain aspects of the biological composition of the water, and telemeter this into centers where it could be compiled and used by scientists. Maybe some of us who are prone to seasickness when we go to sea can simply sit in our office and get these observations directly from such systems.

These are almost magical to a biologist who does not have specialized training in electronics, but I am told by experts in this field that we are in this particular area right now, and that we do have such systems that are now being tested, and that these are very successful.

A number of agencies in Government are contributing toward research in this area, including our own Bureau, and a number of other agencies in Government. We are attempting to coordinate this effort, to know exactly what each other is doing, and to make sure that all phases of this work are carried out within the best public interest.

In connection with this, of course, there are many technical problems involved, such as a radiofrequency problem. That is, if you have buoys out in the ocean, and they have to radio in, you have the tremendously complicated problem of how to get enough frequencies available for them and also for ships and aircraft and other needs.

We are working very broadly in Government, and are attempting to work within organizations both nationally and internationally to attempt to resolve this problem. It apparently is not an insurmountable problem, and again, we are told by experts in this field that this can be done, although it will take some time.

In fact, we are intending to go to international meetings this fall, and have certain specific suggestions from the U.S. Government concerning the radio band frequencies which would apply to such things as buoys, and other needs in the field of oceanography.

We expect to establish an encyclopedia of oceanographic instrumentation, which would furnish accurate descriptions of instruments now in existence, whether these descriptions have been published or not. We would hope to keep this encyclopedia up to date by a staff who would be knowledgeable. No matter where in the world, or no matter where in industry such developments were taking place, we would hope to filter them into a central place, where all new developments would be available to any scientist or technician in oceanography. He could take advantage of this encyclopedia, and could either develop his own specialized instruments from the knowledge gained through the encyclopedia or could perhaps order them directly in the numbers needed for his specialized use.

I mentioned before that we are considering for sometime in 1962 a meeting of marine biologists and biological oceanographers to define more clearly the needs in biological oceanography.

I believe, Mr. Chairman, that if our plans are successfully carried out, that we will establish a good working relationship between specialists in the field of instruments and that we will open up lines of communication, we will tend to prevent duplication of effort, and we would hope to stimulate the effort in the development of better, more efficient instruments for the use of those in the field of oceanography.

I believe this is a brief summary of how our panel works, Mr. Chairman. I believe it has worked well. I think it has been successful, and my own opinion is that it is rather typical of the various panels that have been set up within the Interagency Committee on Oceanography.

Thank you very much.

Mr. DINGELL. Mr. Bauer?

Mr. BAUER. Thank you, Mr. Chairman.

I would like to talk first about facilities.

Just how do you go about coordinating the construction or the planning of new facilities? Do you take what each agency or department

has decided to do, and then approve it, or do you come up with suggestive ideas as to the necessity, and so on?

Mr. McKernan. The way this has worked so far is that our panel has received suggestions in the very early stages of budget formation from the various groups. We have reviewed the need for them in terms of the general national program and the direction that the Interagency Committee on Oceanography has indicated we should go. We have attempted to critically examine them in terms of whether or not they are needed and when they are needed. When we have finally made our recommendations to the ICO, that is, when the Panel has made its recommendation to ICO, we have incorporated the preliminary thinking within the departments, and we have incorporated a critical review of the need and the timing for these particular facilities.

Now what happens is that there is a matter of our initial examination, our initial recommendations. These then go gack to the departments, such as in my own small bureau, and we then put this through our own budget process. We make these recommendations to our own Assistant Secretary, and they go on up to the Department.

In the meantime, they have had further review within the ICO, perhaps at another stage, or with further deliberation, it is decided to set some other priorities. Then I have come back within my own Department and said, "Now we have given a little different emphasis to this, and the recommendation now is to wait until next year," or perhaps, "We want to speed this up, and so we would like to add another facility for this year."

Then our Department, of course, goes through its regular review. At the present time in our own Department, we have had excellent cooperation from everyone in realizing that we are giving much more than the usual critical review within our oceanogrpahic program. I think the system is a good one although it is far from perfect.

Then the ICO takes this program, which by this time has had rather thorough critical review, has in a sense been firmed up both within the Department and within the ICO. After the ICO has approved this program, it has undergone review by, for example, the Ewing Committee and the National Academy of Science's Committee on Oceanography. Then, Federal Council examines it.

Now, on the Federal Council are secretarial officials. From our Department, at the present time, it is the Secretary's science adviser, a very famous oceanographer, by the way, Dr. Roger Revelle. He, in a sense, is speaking for the Secretary in giving general approval or disapproval, or critical approval, to the Interagency Committee on Oceanography's budget in oceanography.

In this way, it seems to me, we have a horizontal review as well as vertical review within the departments, and I think pretty successfull, although not perfect.

Mr. Bauer. Mr. McKernan, you mentioned another committee. We are somewhat confused, I believe, at least the staff is. What is the Ewing Committee? What do they do? I thought we had heard of all the committees.

Mr. McKernan. Well, I believe that Secretary Wakelin mentioned yesterday that the programs in oceanography have not only been reviewed by the Interagency Committee on Oceanography but the President's Science Adviser has asked Dr. Ewing, as Secretary Wakelin mentioned yesterday, to set up a group of non-Government

oceanographers to give a final look at this program, and to make sure that all of the national interests, both within Government and from without Government, have been given consideration.

Now, as I understand it, this is a committee to advise the President's Science Adviser on what he might recommend the Federal Council do with this program when it comes in to them. So, in a sense, it is an independent review that the Federal Council has by another group on how this works.

Now, this is a rather brief review. As I remember, it takes about a week. They draw in top scientists in oceanography from various institutions, and they ask us to critically review the program much like you are critically reviewing our program.

Mr. BAUER. Well, do you know the composition of the Committee?

Mr. MCKERNAN. Yes; I am not sure I can remember all of them.

Mr. BAUER. Would you supply it for the record?

Mr. MCKERNAN. I would be glad to.

Mr. BAUER. Now does this Committee review the budget recommendations of ICO?

Mr. MCKERNAN. Yes.

Mr. BAUER. And the members of this Committee are recipients of the moneys that are in the budget?

Mr. MCKERNAN. No; not necessarily.

Mr. BAUER. Well, Dr. Ewing is.

Mr. MCKERNAN. Well, Dr. Ewing may have some contracts, but I am quite certain you will find——

Mr. BAUER. How about the other members?

Mr. MCKERNAN. I am quite certain you will find that for example in our own budget, none of the people that reviewed this program are recipients of any of our funds.

Mr. BAUER. Anyone from Woods Hole on the Committee?

Mr. MCKERNAN. I think so.

Mr. BAUER. Isn't it true that you have a contract with Woods Hole for the sum of $28,000 for oceanographic research?

Mr. MCKERNAN. I would have to check, but I don't believe that anyone from Woods Hole was on this last year. Art? Dr. Maxwell I believe Dr. Carritt, from MIT. Dr. Carritt from MIT was on this committee.

Mr. BAUER. Well, the point that I am raising is, Isn't it possible that if the program were reviewed by the benefactors of the program it could create a conflict of interest?

Mr. MCKERNAN. I think this is possible. I would hope, of course, that this weren't so. It would be impossible within the United States to get eminent oceanographers who were not directly or indirectly supported in one way or another by contracts of the Government, because this is the way much of the very expensive ship operations is derived at the present time, from contracts with Government.

By the way, I agree this is a disadvantage. I don't right offhand see how you overcome it.

Mr. BAUER. Doesn't industry have competent oceanographers working for them?

Mr. MCKERNAN. Of course, quite a lot of the industry has contracts with the Government, too.

Mr. BAUER. In the field of oceanography?

Mr. McKernan. They have had, and especially in the field of instrumentation, of course.

Mr. Bauer. But not in the support of general operations to the tune of 90 percent of their entire budget. Is that right?

Mr. McKernan. Well, I would suspect that some specialized industries are supported almost a hundred percent, although I have no personal knowledge of this, but I would suspect that some of these instrumentation agencies are supported almost entirely by Government, Mr. Bauer.

Mr. Bauer. The next question, sir, is, Is HEW a member of the panel?

Mr. McKernan. HEW a member of our panel?

Mr. Bauer. Yes.

Mr. McKernan. I don't believe they are active in our panel.

Mr. Bauer. Do you coordinate HEW's requirements with facilities and instrumentation?

Mr. McKernan. Yes, to the extent that they have such requirements, these requirements do come into our panel.

Mr. Bauer. How many shellfish laboratories are operated by the Bureau of Commercial Fisheries?

Mr. McKernan. I think about four, Mr. Bauer. I am pretty sure this is right.

Mr. Bauer. On the Atlantic coast you have three, do you not?

Mr. McKernan. No, we have four on the Atlantic coast, and then in fact, there is some work going on at our Woods Hole Lab which would be a fifth.

Mr. Bauer. Did you coordinate the development and construction of the shellfish research center to be built in Providence, R.I., by HEW?

Mr. McKernan. Yes, we did.

Mr. Bauer. Why was it necessary?

Mr. McKernan. Well, we have communicated a considerable amount of information to your chairman on this subject. I am not sure that we have satisfactorily answered all the problems, but we have attempted to do so.

Mr. Dingell. As a matter of fact, the chairman in his correspondence gleaned that it came as quite a surprise to both the Bureau of Commercial Fisheries and the Department of Health, Education, and Welfare that these two facilities to which Mr. Bauer is referring were being set up, and I will submit the correspondence I had back and forth with the Department of Health, Education, and Welfare and with the Department of Interior on this point to speak for itself.

(The document referred to is as follows:)

Department of the Interior,
Office of the Secretary,
Washington, D.C., February 8, 1962.

Hon. John D. Dingell,
House of Representatives, Washington, D.C.

Dear Mr. Dingell: This is in reply to your letter of January 19, 1962, which transmitted a copy of your letter of the same date to the President concerning your proposal for the consolidation of Public Health Service and Bureau of Commercial Fisheries shellfish research laboratories in New England. The two laboratories under consideration are the Public Health Service Shellfish Sanitation Research Center scheduled for construction at Kingston, R.I., with funds appropriated for fiscal year 1962, and the Bureau of Commercial Fisheries Shellfish Research Center at Milford, Conn., authorized by Public Law 87–173.

The Fish and Wildlife Service has maintained close technical and administrative relationship with the U.S. Public Health Service for many years. The two agencies have conducted cooperative research on many occasions and in several instances the Bureau of Commercial Fisheries has provided laboratory space for projects of the Public Health Service. The frequent contacts and free exchange of information has been extremely helpful to both agencies.

During the planning for the Public Health Service Shellfish Sanitation Research Centers, representatives of the Public Health Service consulted with the Bureau of Commercial Fisheries in an attempt to consolidate facilities to a mutual advantage. In fact, the Bureau of Commercial Fisheries offered the use of land at several of its laboratories.

One of the criteria established by Public Health Service for selecting a location was a supply of uncontaminated sea water. Waters in the vicinity of several Bureau of Commercial Fisheries laboratories, including that at Milford, Conn., are moderately contaminated by domestic sewage. The low level of contamination does not adversely affect biological research programs conducted by Bureau of Commercial Fisheries at these locations, but must make these waters unsatisfactory for sanitation research of the Public Health Service.

We have also considered the possibility of combining facilities proposed for the new Milford laboratory with those which the Public Health Service is planning to construct at Kingston, R.I. We have many years of experience at Milford, and know that the water conditions there are favorable for the culture of oyster and clam larvae. We do not know whether the sea water at Kingston, R.I., is equally satisfactory. Therefore, we would be taking a certain risk in the construction of a large facility for rearing shellfish in a new location.

We are conducting several other shellfish research projects at the Milford laboratory, in close connection with the oyster industry of Long Island Sound. It would be impractical to relocate all functions of our present laboratory in Rhode Island because of the distance from Long Island Sound. If, on the other hand, we continued some of our operations at Milford and established the new shellfish hatchery-laboratory in Rhode Island, the coordination of the two operations would require extensive travel back and forth which would be generally undesirable as well as expensive.

In conclusion, we are convinced that expansion of research facilities at Milford in accordance with Public Law 87–173, will best suit the research purposes of the Bureau of Commercial Fisheries.

Sincerely yours,

(Signed) Stewart,
STEWART L. UDALL,
Secretary of the Interior.

THE SECRETARY OF HEALTH, EDUCATION, AND WELFARE,
Washington, February 8, 1962.

Hon. JOHN D. DINGELL,
House of Representatives, Washington, D.C.

DEAR MR. DINGELL: Thank you for sending me an informational copy of your letter to President Kennedy on the establishment of Public Health Service Shellfish Research Centers in Alabama and Rhode Island.

The White House has requested our comments and those of the Department of the Interior preparatory to preparing a reply to your letter.

I am sure that you will be hearing from them soon.

Sincerely,

ABRAHAM RIBICOFF, *Secretary.*

THE WHITE HOUSE,
Washington, January 29, 1962.

Hon. JOHN D. DINGELL,
House of Representatives, Washington, D.C.

DEAR CONGRESSMAN: The President has asked me to reply to your letter of January 19 concerning shellfish laboratory facilities.

The questions you raise with respect to the relationship of the Department of Health, Education, and Welfare shellfish research facilities to those of the Department of the Interior certainly merit serious inquiry and the Director of the Bureau

of the Budget has been asked to look into the situation. He will advise you further regarding his findings and conclusions.

Thank you for bringing this matter to our attention.

Sincerely yours,

LAWRENCE F. O'BRIEN,
Special Assistant to the President.

THE SECRETARY OF THE INTERIOR,
Washington, January 24, 1962.

Hon. JOHN D. DINGELL,
House of Representatives, Washington, D.C.

DEAR JOHN: I just want to acknowledge your kind note of January 19 in which you transmit a copy of your letter to the President of even date.

We are most interested in your letter and are doing some background exploring.

Best personal regards.

Sincerely,

STEWART L. UDALL,
Secretary of the Interior.

JANUARY 19, 1962.

Hon. JOHN F. KENNEDY,
The White House, Washington, D.C.

DEAR MR. PRESIDENT: I enclose copies of GSA releases Nos. 1595 and 1597. The first announces that the Department of Health, Education, and Welfare is initiating steps to build a shellfish research laboratory in Mobile, Ala. The second announces that the Department of Health, Education, and Welfare is building a shellfish research center in Providence, R.I. Both of the above will deal with sanitation in harvesting and marketing of shellfish. The cost will be about $1½ million.

I am sure you recall that last year my committee reported and the Congress enacted legislation setting up a shellfish research institution in Connecticut to be administered in large part by the Bureau of Commercial Fisheries of the Department of the Interior.

The Department of Health, Education, and Welfare's research will be conducted largely on the dangers of shellfish for human consumption, I assume, under the interstate-quarantine program of that Department.

It would appear that the two Departments could get together, construct one facility, staff it jointly, and maintain and operate it jointly. This should be done both for economy and because diseases, pollution, reproduction, and natural enemies of the shellfish very frequently are related directly or indirectly to the problems we have with danger to human health from shellfish from polluted waters and from other causes.

It appears there is a chance to save the taxpayers some money and I hope that bringing this matter to your attention will be of assistance to you.

With every good wish,

Respectfully yours,

JOHN D. DINGELL,
Member of Congress.

Mr. MCKERNAN. I think that would be an excellent idea, because if the record appears this way, why this means that there is some misunderstanding, and we certainly did not communicate properly with the chairman, because we held several meetings with the Health, Education, and Welfare people and ascertained that the problems of absolutely pure water which were needed in their research could not be obtained at any of the locations where we were carrying out shellfish research.

Mr. DINGELL. Well now, as a matter of fact, let's look at this business of absolutely pure water. Shellfish can live in water which is substantially polluted; am I correct?

Mr. MCKERNAN. Substantially polluted.

Mr. DINGELL. Substantially polluted, right?

Mr. MCKERNAN. Right.

Mr. DINGELL. And can also live in water which is less polluted.

Mr. MCKERNAN. Yes.

Mr. DINGELL. And for all intents and purposes, pollution which would adversely affect the life of the shellfish would adversely affect the life of a human being, would it not?

Mr. MCKERNAN. No, not necessarily. Not at all. I don't think these are necessarily related.

For example, hepatitis. The organism causing hepatitis, which may be passed by shellfish, would have no effect on the shellfish, on the species, whatsoever.

Mr. DINGELL. Now where did HEW propose to set up their two laboratories?

Mr. MCKERNAN. One in the gulf and one in Rhode Island.

Mr. DINGELL. You are going to tell me that they have set up in an area where there is absolutely pure water in Rhode Island?

Mr. MCKERNAN. This is my understanding, Mr. Chairman.

Mr. DINGELL. This is what they report to me, but I want to know, is there absolutely pure water in Rhode Island, where they set up?

Mr. MCKERNAN. Well, Mr. Chairman, perhaps I am at fault in one respect, but what we have done is in a sense take the word of their specialist in this regard, so I can't come before you and say that we have tested the water in this particular locality. We do know that it is very pure water.

Mr. DINGELL. As I understand, as a matter of fact, the water in the coastal area up and down Rhode Island is substantially polluted, is it not?

Mr. MCKERNAN. I would question this, Mr. Chairman, but I have no personal knowledge. I think that there may well be currents—I know that there are current systems along the coast which bring about such flushing that there could be pure water. I don't know in this particular location of personal knowledge.

Mr. DINGELL. Well, a current system which removes pollution does not remove it absolutely; isn't that a fact?

Mr. MCKERNAN. No, not necessarily. For example, I am sure you could see if you had a swift current going by any particular location you might have pure water, depending upon the kind of pollution, whether it was continuous or intermittent pollution, and these kinds of things.

Now, in this particular case, what we did was to get together our technical people with their technical people, and we attempted to look at the criteria that each had. Now the criteria that they presented to us appeared to me to make pretty good sense.

Mr. DINGELL. So the fact of the matter—I don't want to belabor the point and take the time of the committee—but the simple fact of the matter is this: that it is possible to put these three shellfish laboratories together in one area and one facility at a substantial saving to the Federal Government, is it not?

Mr. MCKERNAN. Physically, it is possible. Assuming the objectives that the HEW has set out are proper objectives for their laboratory, I could not answer your question in the affirmative.

Mr. DINGELL. But as a matter of fact, though, it is possible—and you are a biologist, and you understand these things quite well—

and it is possible to do fairly complete research on both the health of shellfish and the health of humans who will consume shellfish in one facility, is it not?

Mr. McKernan. I would not like to answer that with an equivocal "Yes" or "No."

Mr. Dingell. Well, will you deny that statement, then?

Mr. McKernan. Yes, I will deny that statement. If the objectives are, for example, to test the accumulation of E coli, why then you would have to have the kind of environment to start your experiments which was relatively free of this, and then you would have to design your experiments so that the accumulation of such organisms would be at a known rate.

Now, if you were trying to find out whether shellfish accumulated these pollutants or not, you could not have extraneous sources of the pollutants coming in at odd hours or times.

Mr. Dingell. It is still possible to do all of this at one facility, is it not?

Mr. McKernan. It is physically possible, but scientifically——

Mr. Dingell. It is physically and scientifically possible—I mean, if it is physically possible, it is also scientifically possible.

Mr. McKernan. It may not make good scientific sense to do so.

Mr. Dingell. Well, it is both physically and scientifically possible to accomplish this research at one facility, is it not?

Mr. McKernan. It is possible, but it may not make for good scientific results.

Mr. Dingell. Yes, and it is possible to have good scientific results, and have it physically and scientifically possible; is it not? I am getting into the realm of theory, but I——

Mr. McKernan. You have lost me, Mr. Chairman.

Mr. Dingell. I regard it as being very foolish for the Government to establish three facilities. Frankly, when the departments do this, it makes it very difficult for somebody like myself who supports these appropriations. It subjects me to criticism, and it makes it very, very difficult in Congress to get money for Governmental agencies, when we find out that there are three of these facilities set up in three different places, all to do research on shellfish, and as I read shellfish, as I understand them—I am not an expert on the subject—it is possible physically and scientifically to do the research in one place on both the health of the shellfish and on the individual, and on the impact on human beings who will consume them.

By the way, I intend to pursue this further. I am not satisfied with the correspondence I received from either your Department or the Department of Health, Education, and Welfare on the subject.

Mr. McKernan. Mr. Chairman, I would welcome participation in this with you, and I would hope to convince you, as I myself have been convinced, that after carefully examining the objectives of the two Departments, that these particular facilities appear to be justified.

I certainly want to offer my own services and those of my staff. We have had rather long and searching examination into this. I appreciate your interest in it very much. If I were you, I would do the same, and I certainly would welcome this. I would even say that it might be possible that our examination has not been searching enough, but I also would say that we have conscientiously attempted to look into this problem, and so far, I am convinced of the merits of the proposal, but I would certainly——

Mr. DINGELL. I am convinced of the breakdown of coordination here in regard to these two facilities.

Mr. Bauer.

Mr. BAUER. Mr. McKernan, is it a fair statement to say if you have an oyster, and the oyster gets sick and dies, and doesn't transmit sickness to a human being, then that is the property of the investigative responsibility of the Bureau of Commercial Fisheries?

Mr. MCKERNAN. Yes.

Mr. BAUER. And if the oyster gets sick and someone eats the sick oyster and gets sick himself, that is the responsibility of the Department of Health, Education, and Welfare?

Mr. MCKERNAN. Yes.

Mr. BAUER. And if the oyster doesn't get sick, but absorbs a little beastie that makes people sick, then that is the Department of Health, Education, and Welfare that has the responsibility?

Mr. MCKERNAN. Yes.

Mr. BAUER. Does the oyster care how you organize departments?

Mr. MCKERNAN. Not in the slightest.

Mr. BAUER. Thank you, sir.

The next question I would like to ask you, sir, is with respect to the development of the facility for biological research at Scripps; are you concerned with that?

Mr. MCKERNAN. Oh, yes. Are you talking about the laboratory which has been authorized and is now in design by our Bureau at Scripps?

Mr. BAUER. That is correct, sir. Where do you intend to build it? On whose land?

Mr. MCKERNAN. On land which now belongs to Scripps, but which is being deeded to the Federal Government.

Mr. BAUER. In other words, it will be on your land?

Mr. MCKERNAN. Yes.

Mr. BAUER. Now, with respect to the Seattle Conference, I notice in your statement that it was decided that the additional facility in Seattle was not necessary. Is that correct? I think you said that.

Mr. PELLY. That was Tongue Point, Oreg.

Mr. MCKERNAN. I don't believe I said that there was no new facility needed.

Mr. BAUER. What came out of the Seattle discussions? Was there any new agreement as to the necessity for the facility?

Mr. MCKERNAN. They talked about a number of things at Seattle. They talked about separate facilities, physical facilities, or joint physical facilities, somewhere, for all interested agencies.

They felt that there was enough reason, enough established facilities at the present time, so that some of the groups should go ahead on their own and further develop their own facilities. For example, we have an existing laboratory very close to the university but not on the campus, and it was decided to go ahead with the expansion of that particular facility, that this seemed to be most efficient.

On the other hand, with respect to the needs for facilities, expansion of facilities at the Department of Oceanography in the campus of the University of Washington, it is my understanding that they agreed that having these facilities right on the campus for teaching and graduate research needs was also necessary.

Now, with respect to joint vessel facilities there, between ourselves and the Coast and Geodetic Survey, if my memory serves me cor-

rectly, I believe they decided to try and carry those out together. This is still under study at the present time.

Mr. PELLY. If he will yield to me at that point, I talked to the group about the university there, and they seemed to feel it highly desirable to have their own docking facilities for oceanographic vessels and I would certainly hope that that would be carefully reviewed, because I think that it is the oceanography department of the university that certainly is conscious of what their particular problems are.

Mr. MCKERNAN. Well, I am probably stepping out of my role a little bit here, because I believe Dr. Maxwell who was there can be more specific. On the other hand, I am also trying to be responsive.

I think that there is still under study joint facilities between Coast and Geodetic Survey and ourselves which might be done efficiently at some savings also.

Mr. BAUER. Now, with respect to instrumentation, you mentioned biological instrumentation. Would you tell the committee which department of the Government has taken the lead in biological instrumentation development?

Mr. MCKERNAN. Well, I believe that since we have begun thoroughly considering this matter within the ICO, that the Department of Interior has taken the lead, but I certainly would want to hasten to give due credit to the National Science Foundation, who have also considered this to be important, and I know are giving careful consideration to any applications for grants and for funds to carry out biological instrumentation needs.

They participate very actively in our own committee, and in the panel of which I am Chairman, so that I believe both of these particular agencies are giving good consideration to this, and then, of course, there is the biological group at ONR, under the very able Dr. Sid Galler, who is concerned with this matter also.

Mr. BAUER. Well, isn't it historically true that ONR have taken the lead in the development of biological instrumentation for many years?

Mr. MCKERNAN. No; I think that this is a matter of opinion, and I would not feel I could necessarily agree with this, although I wouldn't want to take anything away from ONR for the very excellent work they have done in various fields.

I believe our own Bureau in the last few years has made some major contributions in this regard.

Mr. BAUER. Now, with respect to buoys, I understand that the Bureau of Aeronautics in 1949 initiated the program to develop the methods of anchoring telemetering radio buoys, and have carried on extensive work, and as a matter of fact, have had buoys operating in deep water for many years. Is that correct?

Mr. MCKERNAN. I am not aware that they had moored buoys, because we are still having trouble in the moorings. Can I call on Mr. Jaffe to expand on that?

Mr. Jaffe?

Mr. JAFFE. Yes; I think that there are moored buoys which are available for oceanography. As you probably know, the most critical problem in the buoy situation is that of telemetering the information over long distances, so while there are a number of prototype buoys that have been developed, the real crux of the

problem is still in the communication of information from the buoy over long distances.

Mr. BAUER. Are you familiar, Mr. McKernan, with HEW's plans in Lake Michigan to put out a hundred telemetering buoys with the development of the instrumentation that is being done by the Army Engineers?

Mr. MCKERNAN. I am generally familiar with this; yes, Mr. Bauer.

Mr. BAUER. As I understand, Woods Hole has put out a string of telemetering buoys for some years, also.

Mr. MCKERNAN. Well, I think Mr. Richardson has been doing some pioneering work in this field, and some very excellent work. He now has this string of buoys that extend out from New England, and I believe these are quite successful. They are being watched very carefully by all of the scientists interested in buoy systems, but I am sure that no one believes that these are the final production models at the present time.

I believe, incidentally, Mr. Bauer, that all of these buoys store their information, rather than send it. This, of course, brings problems, you have to come and pick up the information. What we are searching for, of course, is being in a position not to have to go out once a week or once a month to collect the information. I think also there are limited sensor points on this particular buoy. The accumulation of information at various depths is still a problem that none of us have solved to my satisfaction.

Mr. BAUER. Now, one further question with respect to standardization of instrumentation. Is this something new?

Mr. MCKERNAN. Oh, no. This standardization of instrumentation has been a subject of discussion among scientists interested in the oceans and in other fields for, I suppose, centuries. It is being given a great deal of attention at the present time both nationally and internationally.

The works of ICES in the North Atlantic, Northeast Atlantic, is very excellent work but I would point out that the countries who are members of ICES have come into the IOC, the Intergovernmental Oceanographic Commission, and are requesting further study and development of standardization of oceanographic equipment on an international basis. So there is a great deal yet to be learned about what is the best, on how to standardize various pieces of equipment.

I presume this could go on forever, because the development of new oceanographic instruments will probably go on forever, and these will take various forms in different counties for different specific purposes, and therefore, there will always be a need for further standarization of these instruments, as they are developed independently by scientists, even within a single country.

Mr. BAUER. It is rather remarkable, because in the hearings in the last session of this Congress, Dr. Fye testified that standardization was not necessary.

Mr. MCKERNAN. Well, I am sure you will get many different ideas about this, almost as many as you have scientists. I believe most of us in Government believe that there is a great need for standardization, especially with respect to survey instruments.

Dr. Fye, of course, being an outstanding research scientist, would see the development of instruments in a very normal fashion as the development of a special instrument to handle a special problem with

which he is engaged. Now in this instance, I would agree with him that the need for standardization is not very great.

On the other hand, if we are going to send survey ships out all over the world, if we are going to cooperate broadly with other nations, it is very necessary to take plankton tows, for example, in somewhat the same manner, and take our temperatures at approximately the same depth, or at least have some system of connecting these so that we can understand the ocean currents and the ocean weather very broadly in the world's oceans.

Mr. BAUER. I would like to point out, Mr. Chairman, that yesterday in the record, we introduced the organization of ICES in 1899, and—

the functions of the central bureau should be—

I am quoting—

to control the instruments and assure the uniformity of methods.

It certainly has been in existence a long time.

Mr. DINGELL. By the way, Mr. McKernan, you are familiar with the function that Mr. Bauer has referred to, are you not?

Mr. MCKERNAN. You mean ICES? Yes, Mr. Chairman, our Bureau has sent an observer to ICES for, I think, about 15 years or so. We are very familiar with the organization. We work very closely with it in connection with the International Northwest Atlantic Fisheries Commission. That is the Commission in the Northwest Atlantic Ocean and of some 15 or so members of ICES, I think 12 of them are members of what we call ICNAF, the International Commission for Northwest Atlantic Fisheries.

Mr. DINGELL. Incidentally, the United States does not belong to this.

Mr. MCKERNAN. No.

Mr. DINGELL. I wonder why.

Mr. MCKERNAN. Because we don't have any direct interests in the Northeast Atlantic, and it has always seemed to us that to send someone over as an observer, we can cooperate with their scientists without spending an exorbitant amount of time in these places where we don't have a direct interest. Perhaps we might have an interest in defense at the present time, but that would be something that I would not be quite so familiar with, Mr. Chairman.

Mr. DINGELL. Do we have a direct interest in the Indian Ocean, for example, where we are doing significant exploratory work?

Mr. MCKERNAN. Well, in the Indian Ocean, of course, our scientists have found or believe that there are some unusual circumstances in this ocean, and in a sense, what they have done is to launch a rather large international expedition to this particular area of the world, where not too much is known. I think it is quite an experiment in international cooperation, but I believe it would certainly be said to be true that we don't have—our Government doesn't have—much in the way of direct interest here.

I would add, however, that even our own Bureau is very much interested in the fisheries resources of any nation in the world, since some of our fishing fleets are developing great capacity for going large distances. We have fleets that have fished in the central Pacific, in the Society Islands, and are now fishing off the west coast of Africa.

We have interest in knowing whether or not there are resources in the Indian Ocean which might be harvested.

Mr. DINGELL. Thank you, Mr. McKernan.

Any more questions?

Mr. Pelly?

Mr. PELLY. Mr. Chairman, I might comment, it is an awful comedown—now this is a pun—to come from the Space Committee yesterday and come down back to earth. There we are being offered a proposed budget of, I think, $3.7 billion, and here I am worrying about how we are going to have some housing for people that want to do a little research work down in Friday Harbor, and the one question I have in connection with facilities, is there any possible way that the Federal Government could assist a university in stimulating some housing for a research station such as we have there at Puget Sound?

Mr. MCKERNAN. I am not going to offer money from other Government agencies, but I would expect that there is consideration of research needs in facilities by agencies, various agencies of Government, and the university probably is pretty familiar with this, Mr. Pelly, because they deal very directly with the Office of Naval Research and with the National Science Foundation as well as with ourselves.

Mr. PELLY. I wondered if your panel would ever consider it would be helpful on matters like that which I understand are vital. As I understand, we have some 60 positions that aren't filled in the Federal Government today because we haven't trained enough people in oceanographic research. And it is only through the facilities such as we have there that you can ever hope to fill the need.

Mr. MCKERNAN. Well, we are very much interested in the training of oceanographers. You are going to hear from the chairman of that panel of ICO later in this session. Perhaps he can discuss this matter more fully than I, but with respect to facilities, we are always willing to discuss anything along these lines, although I couldn't——

Mr. PELLY. Well, for space, you can get hundreds of millions of dollars for facilities, and nobody would ever question it; you need a dock to house an oceanographic vessel and the universities are hard put to it to know where to go to get the funds.

Mr. MCKERNAN. Yes. Of course, this committee has been extremely important in helping us, we in the Federal Government who are budgeting for oceanography. This committee has been very important in bringing before the Congress as well as the public the importance of expanding the Nation's oceanographic program. I can't emphasize that too much.

Mr. PELLY. The chairman is very much interested, I know, in legislation to try to formalize some of the informal committees and panels that have been carrying on the work in order to try to facilitate getting adequate interest and funds to carry on the necessary work. We are told that it isn't needed, and the administration is against it. Well, I am just wondering that if the Science and Astronautics Committee can talk in terms of billions of dollars, where I can't see that there is nearly the resources for man that maybe there will be down in our oceans, and, as I say, it is very difficult sometimes to realize, for me not to want to support the Miller bill, for example, and see it reported to the floor, because the only thing I would fear in that connection is that it would not be enacted into law, and it might actually hurt, rather than help.

Certainly, I may say, this idea of consolidating appeals to me a great deal, because I know the chairman is interested in economy, but certainly no questions like that would be raised when you came to facilities for measuring the orbit of Colonel Glenn, or something like that, when this may be much more important that we are doing.

I may say that I am very sympathetic to the chairman's position here, when I listen to the differences that come up as between two committees.

I got the impression, however, if I may say, Mr. Chairman, that the academic facilities as far as those that are engaged in the places like the schools and colleges of our country, they don't feel that they can join together with some of the agencies of Government and have joint facilities because it just isn't going to be practical from their standpoint, and I hope that that will be fully looked into. I am for economy as much as we can possibly do so, but not at the expense of scientific freedom to carry on this research work.

Mr. Chairman, I talked too much.

Mr. DINGELL. Not at all. You have been very helpful.

Mr. MCKERNAN. Well, commenting on that just briefly, Mr. Chairman, if you don't mind, I tend to agree that there is a danger in too much coordination, that is, trying to pull facilities together too much at the disadvantage of some of these people and yet, I am sure you will agree that we ought to examine these things, whatever we decide to do, it ought to be in an area of complete understanding of the problems and this is what I think the panels of the ICO are attempting to do, to examine these things and see what is best. Then we have the advantage of, in a sense, a feed in from the academic institutions through the National Academy of Sciences Committee on Oceanography and, for example, in our own panel, a member of the faculty of the University of Washington, Dr. Dixy Lee Ray, has been active and this has helped, you see.

Mr. PELLY. I am told that it is almost impossible to schedule scientific research, and tie it in, maybe with a particular voyage that is scheduled ahead of time for the Coast and Geodetic Survey, and that altogether, it is just very difficult to coordinate the various programs.

Mr. MCKERNAN. Of course, it really depends upon the scientific project underway. Sometimes this is difficult, and sometimes it is not. Many times, when it is not, it has not been done in the past. We are trying to, in effect, correct this, so that when it is possible, it is done, and recognize it when it is not possible that it doesn't have to be done.

You don't have to cram some scientist aboard a boat that is going to be out for 4 months taking surveys when what he wants is perhaps a 1-day trip to examine some special phenomenon in the ocean.

Mr. PELLY. Does the panel keep minutes, and are those minutes available to the committee, for example, as to the discussions on these various projects?

Mr. MCKERNAN. We have not kept formal minutes of the panel's sessions in ICO, but we have kept informal minutes for the information of our own people.

Mr. PELLY. It would seem to me that maybe if we did formalize the panels, then there wouldn't be a necessity to keep minutes. It might be easier for someone to go back and find out why there had

been three different stations established when maybe one could have done the same job, as the chairman seems to have found.

That is all.

Mr. DINGELL. Thank you very much, Mr. Pelly.

Mr. Lennon?

Mr. LENNON. Mr. McKernan, are the chairmen of the several panels members of the ICO?

Mr. MCKERNAN. No; they are not.

Mr. LENNON. In other words, the chairmen of these panels that are set up to make the study of the problems, then, do not go back and sit as members of the ICO?

Mr. MCKERNAN. I am a member of the ICO, and I am a member of this particular panel.

Mr. LENNON. You are the chairman of this particular panel?

Mr. MCKERNAN. I am chairman of this panel.

Mr. LENNON. You are also a member representing the Department of the Interior in the ICO?

Mr. MCKERNAN. Yes.

Mr. LENNON. Now, the chairmen of the other various panels represent their various departments and agencies on the ICO?

Mr. MCKERNAN. Yes; they are to a considerable extent staff members of the ICO. For example, Admiral Karo, from the Coast and Geodetic Survey, his head staff member is the chief oceanographer of the Coast and Geodetic Survey. Dr. Harris Stuart is a chairman.

Mr. LENNON. What I am trying to find out is, do these panel chairmen attend the ICO meetings?

Mr. MCKERNAN. Yes.

Mr. LENNON. But not the members of the ICO?

Mr. MCKERNAN. Right.

Mr. LENNON. They are subordinate to members of the ICO?

Mr. MCKERNAN. Yes.

Mr. LENNON. Do you know the members of the other five panels set up under the ICO?

Mr. MCKERNAN. Yes. Now, I may not know every single member personally, Mr. Lennon, but in general, the answer to your question is "Yes."

Mr. LENNON. In general, you do, because you are on the ICO?

Mr. MCKERNAN. Yes; and I see these men and talk to them and listen to them.

Mr. LENNON. Well, now, the representative of the Navy, Mr. Jennings, on your panel, is he a member of any one of the other panels?

Mr. MCKERNAN. No; I don't believe so.

Mr. LENNON. Do you know that?

Mr. MCKERNAN. We can ask him. He is here.

Mr. Jennings, are you a member of any other panel?

Mr. JENNINGS. Yes, sir; I am a member of the Research Ship Panel.

Mr. MCKERNAN. The Research Ship Panel. I am sorry, Mr. Lennon, I shouldn't have answered quite so quickly.

Mr. LENNON. Well, now, Mr. G. Jaffe on our panel, is he a member of any other panel?

Mr. JAFFE. No, sir; I am not.

Mr. LENNON. Your alternate, Commander Treadwell, is he a member of any other panel?

Mr. McKernan. Do you know, Mr. Jaffe?

Mr. Jaffe. No, sir; I don't believe he is.

Mr. Lennon. You don't know that. He is the alternate, I believe, Mr. Jennings?

Mr. McKernan. We just hear authoritatively that he is not.

Mr. Lennon. That he is not, for the record.

Now, is Mr. A. J. Goodheart?

Mr. Goodheart. I am not.

Mr. Lennon. Not a member of another panel. How about your alternate, Mr. Theodore Ryan?

Mr. McKernan. No; I don't believe he is. Is he a member of another panel?

Dr. Stuart. Yes; Mr. Ryan is a member of the Research Panel.

Mr. Lennon. Mr. Ryan is a member of the Research Panel and the alternate to another on this panel?

Dr. Stuart. Yes, sir.

Mr. Lennon. How about Mr. Dinsmore of the Coast Guard?

Mr. Dinsmore. Sir, I am an alternate member of the panel, and I work very closely with the panel. I am a member of the Ships Panel.

Mr. Lennon. You are a member, then, of two panels?

Mr. Dinsmore. I am a member of two panels, and an alternate member of the third panel.

Mr. Lennon. Dr. Bader represents the National Science Foundation on your panel?

Dr. Ray. Dr. Richard Bader is the representative of the facilities panel, and I am his alternate.

Mr. Lennon. Is he a member of any one of the other five panels?

Dr. Ray. I believe he is alternate on the Ships Panel. Is that right? He is not a member of any other panel. He may serve as alternate on one of the others.

Mr. Lennon. But he, of course, is a member of that panel there and you are his alternate. Are you on any other panel?

Dr. Ray. I am a member of the NASCO Committee on the Research Panel. I do not represent the Science Foundation and Dr. Bader is the Science Foundation representative on the Research Panel.

Mr. Lennon. Then you people wear different hats when you attend different panels, and there are not enough people in Government from these various agencies who are competent—to have a person competent in their field—to have one separate person for each panel?

Mr. McKernan. Well, Mr. Lennon, the answer to your question is "No."

Mr. Lennon. There are?

Mr. McKernan. There are adequate people. There are some advantages.

Mr. Lennon. Why do you use the same people on the same panels so often?

Mr. McKernan. Because the responsibilities of these panels sometimes overlap, and there is a great advantage in having sometimes the same people on these different panels.

Mr. Lennon. You must have a reason for it. It is obvious that that is what is being done, that on all panels, the majority of them serve on at least two, and sometimes on three.

Mr. McKernan. The reason for this is that there is an advantage in having in a sense, kind of an interlocking directorate. I suppose one might look at it that way, if he were in business. There is also the fact that some of these people that you have met and are talking to here spend a great deal of their time on ICO matters. They are staff people in the various departments, and yet some of them spend half, two-thirds, maybe up to three-fourths of their time on ICO matters. They are well informed about the meetings of the ICO itself, and the transition from ICO directives to action in these panels is very easy.

Mr. Lennon. Well, Mr. McKernan, who is the person that is designated as the recording secretary of your panel?

Mr. McKernan. Mr. Eckles, my alternate. I don't believe I introduced him before, and I wish to apologize for that.

Mr. Lennon. Well, just to identify him, he is the person who keeps the notes and records, and the Alternate Chairman in your absence.

Mr. McKernan. Yes.

Mr. Lennon. And he attends all the meetings of your panel?

Mr. McKernan. Yes, unless he happens to be out of town, or something, in which case, another staff member is asked.

Mr. Lennon. Somebody else's secretary?

Mr. McKernan. Right.

Mr. Lennon. And that secretary has the minutes of all the proceedings and all of the things that take place at these panel meetings?

Mr. McKernan. Yes.

Mr. Lennon. Would you supply those for the record?

Mr. McKernan. Yes.

(The information requested follows:)

Interagency Committee on Oceanography,
of the Federal Council for Science and Technology,
Washington, D.C., April 6, 1962.

Hon. John D. Dingell,
Chairman, Subcommittee on Oceanography, Merchant Marine and Fisheries Committee, House of Representatives, Washington, D.C.

Dear Mr. Dingell: While testifying before your Subcommittee on Oceanography on March 1, 1962, I was requested to furnish two items of information for the record which were not then available. Since I was appearing in my capacity as chairman of the facilities, equipment, and instrumentation panel of the interagency committee on oceanography, it has been necessary to obtain review and clearance of the material from the parent Federal Council for Science and Technology and from its chairman, the special assistant to the President for science and technology.

It has been determined, as a matter of policy, that both the council and its constituent committees should be fully responsive to detailed and specific substantive questions. I should thus be pleased to extract from the minutes and from other relevant ICO staff materials any particular information which your committee requests.

In reference to questions regarding membership of the ad hoc panel that reviewed the proposed 1963 oceanographic program, it should be noted that this panel is one of a large number of such groups that were appointed by the Special Assistant to advise him and the President on the balance, scope, and scientific justification of important research programs in a wide variety of fields. Such consultation must be developed on a confidential basis so as to assure a comprehensive and candid evaluation. While it has been the policy of the Office of Special Assistant not to release names of panel members, I am advised that in this case an exception will be made; the names of scientists on the Oceanography Panel are listed as follows:

Dr. Maurice Ewing, director, LaMont Geological Observatory, Columbia University, Palisades, N.Y.

Dr. Clifford A. Barnes, department of oceanography, University of Washington, Seattle, Wash.
Dr. Dayton E. Carritt, Massachusetts Institute of Technology, Cambridge, Mass.
Dr. John Knauss, Scripps Institution of Oceanography, University of California, La Jolla, Calif.
Dr. Gordon Lill, Lockheed Aircraft Corp., Burbank, Calif.
Dr. John E. Nafe, LaMont Geological Observatory, Columbia University, Palisades, N.Y.
Dr. Donald Pritchard, Chesapeake Bay Institute, the Johns Hopkins University, Baltimore, Md.
Dr. Dixy Lee Ray, Special Assistant to the Assistant Director, Biological and Medical Sciences, National Science Foundation, Washington, D.C.
Dr. Karl M. Wilbur, department of zoology, Duke University, Durham, N.C.

There is one further item which we would appreciate the opportunity of clarifying. In the course of the hearings, a question arose concerning the need for the Federal Government to solicit advice from outside consultants and the potential problem on conflict of interest. Because from time to time such solicitation of assistance is in the national interest and because of the concern that has developed over interpretation of current legislation in this regard, the President has issued a policy memorandum of February 9, 1962 (31FR1341) and Executive Order 11007 of February 26, 1961, on the subject of "Preventing Conflicts of Interest on the Part of Advisers and Consultants to the Government." A copy of the President's memorandum is attached.

I have been informed by the Office of the Special Assistant that the use of outside consultants has been in conformity with this memorandum.

Sincerely yours,

DONALD L. MCKERNAN,
Chairman, Panel on Equipment, Facilities, and Instrumentation.

Mr. LENNON. In writing? According to dates?

And how many meetings have you had since you all have been in existence since January 1961?

Mr. MCKERNAN. We have had 17 meetings.

Mr. LENNON. Of your panel?

Mr. MCKERNAN. Yes, of the Facilities and Instrumentation Panel—our panel, I should say.

Mr. LENNON. Now the ICO meets approximately how often, Doctor?

Mr. MCKERNAN. I was under the impression that we met more often than Assistant Secretary Wakelin said yesterday.

Mr. LENNON. I was, too. How often do they meet?

Mr. MCKERNAN. It seems to me we meet almost every month. Now, apparently, Assistant Secretary Wakelin indicated that we were meeting about every other month, and since I haven't examined this exactly, I wouldn't know which is correct, whether we met only six times in the last year or more.

Commander Anastasion, who is here, might be able to tell us exactly how many times we met this last year.

Mr. LENNON. But your panel, I think you said, met about once every 2 weeks.

Mr. MCKERNAN. We happen to have met 17 times. We got started late, you see, Mr. Lennon. We had some special problems and we have attempted to meet these problems by perhaps more frequent meetings.

Mr. LENNON. Now, Doctor, as the head of the Bureau of Commercial Fisheries, is it likely that your Department would be notified if it developed in certain coastal areas of our country that certain shellfish were causing sickness among human beings?

Mr. McKernan. Yes; it is very likely we would be notified of this by local health authorities and others, because our scientists are for the most part the leading shellfish scientists in the Nation.

Mr. Lennon. When did you receive your first notice of the potentiality of disease being carried by shellfish in the Providence, R.I., area?

Mr. McKernan. I can't give you that information. I would be glad to supply it for the record, Mr. Chairman.

Mr. Lennon. Do you have any recollection at all about it?

Mr. McKernan. No, I don't; but we learned about it very quickly.

Mr. Lennon. To what extent was this illness present within this area that was attributable to the disease of shellfish, particularly oysters?

Mr. McKernan. Well, if you will permit me to recollect, and it has been some time ago, and events have passed——

Mr. Lennon. Yes.

Mr. McKernan (continuing). But as I remember, we were in direct consultation with local health authorities and there was some question as to whether shellfish were even involved.

Mr. Lennon. What type of disease was it?

Mr. McKernan. I believe it was infectious hepatitis, and you know the transmission of this disease is not well understood, and as I recollect, Mr. Lennon, the final outcome of this was that it was very likely due, or most likely due to the poaching of shellfish from condemned grounds.

Mr. Dingell. Would you yield to me at that point?

Mr. Lennon. For a couple of questions.

Mr. Dingell. I had better wait, because I want to question on that.

Mr. McKernan. I would like to repeat that I could be wrong about that, because I am answering from my memory.

Mr. Lennon. The records in your office will reflect any information that came to you from the public health authorities of that area that there was a possibility that this disease that you described or defined, probably, or could possibly, have come from diseased shellfish.

Mr. McKernan. Yes, Mr. Lennon.

Mr. Lennon. And it was your conclusion, I believe you said it was your conclusion——

Mr. McKernan. My "recollection"; could we put it that way?

Mr. Lennon. Your recollection that perhaps this was not so, that it was not attributable to diseased shellfish. Is that right?

Mr. McKernan. No, it is my recollection that there was some question about the origin of the disease, and then it seems to me, if my recollection serves me properly, that it was finally decided that there had been some lack of enforcement of condemned oyster grounds, polluted grounds.

Mr. Lennon. Who was responsible——

Mr. McKernan. I shouldn't say oyster, because I believe it was clams.

Mr. Lennon. Clams. Whose responsibility was it to prohibit and to enforce the law against poaching on this contaminated area?

Mr. McKernan. The State's.

Mr. Lennon. The State. The State of Rhode Island?

Mr. McKernan. Yes.

Mr. Dingell. If the gentleman would yield, I believe—am I right on this—that it was Raritan Bay, N.J.?

Mr. McKernan. We have had a number of them, and I believe that there was one in Rhode Island, also.

Mr. Dingell. The most recent one, the worst, was an outbreak of infectious hepatitis that occurred in Raritan Bay, N.J.; am I right?

Mr. McKernan. Yes.

Mr. Lennon. Now, subsequent to that, about the same time, did you receive some information from the public health authorities that this same condition had been brought about in the Mobile, Ala., area?

Mr. McKernan. Yes. We were aware that the Public Health Service was studying this in Mobile Bay, Ala., and again, if my recollection serves me correctly, without any records before me, our shellfish specialists cooperated with the Public Health Service at that time.

Mr. Lennon. Does the Bureau of Commercial Fisheries have any laboratory facilities in the Rhode Island area coast?

Mr. McKernan. Well, we have a laboratory at Milford, Conn., Mr. Lennon.

Mr. Lennon. Which serves that area?

Mr. McKernan. Which serves this general Atlantic area; yes.

Mr. Lennon. The New England coast area?

Mr. McKernan. Yes.

Mr. Lennon. When did you first learn that HEW intended to establish this laboratory in Rhode Island to study the deleterious effect on human beings that may be attributed to shellfish?

Mr. McKernan. Mr. Lennon, I wish to apologize for not having these records here. Had I realized these questions were coming up, I would have brought them. I will be glad to supply this, but I am afraid if I try to remember this, I will give you incorrect information.

Mr. Lennon. Would it have been a year ago?

Mr. McKernan. Something of this order; yes. It was quite a long time ago; so long I can't remember.

Mr. Lennon. And I assume they conferred with you about this matter, that is, HEW?

Mr. McKernan. Yes.

Mr. Lennon. And was any suggestion made that perhaps the expansion of your laboratory there in Milford, Conn., could turn its attention to the problem that the health authorities were finding, in particular, HEW, in this field?

Mr. McKernan. Yes, as I recollect, there was discussion of this.

Mr. Lennon. And it was decided that it couldn't be done, and the best approach was to establish a new, million dollar facility in Providence, R.I., to study this question of the effects on human beings of diseased shellfish?

Mr. McKernan. Yes.

Mr. Lennon. And you do not think it could be done under the same building with your laboratory in Milford?

Mr. McKernan. With the present——

Mr. Lennon. Even on a cooperative basis with HEW?

Mr. McKernan. With the present information that has been supplied me by my staff people who examined this critically with other staff people, no, I do not think it can be done.

Mr. LENNON. Where is your shellfish laboratory in the gulf coast?

Mr. MCKERNAN. It is at Pensacola—at Gulf Breeze, near Pensacola.

Mr. LENNON. And serves that area?

Mr. MCKERNAN. And this is carrying out research in estuarine problems and oyster studies in this area.

Mr. LENNON. And the same determination was made between your Department and HEW that your facilities there could not be enlarged and new scientists brought in to study there that the decision was made up in Rhode Island?

Mr. MCKERNAN. Yes. I would like to be responsive to your question.

Mr. LENNON. You spent another half a million dollars up there?

Mr. MCKERNAN. Yes, and the reasons for this were the requirements laid down by HEW that they needed an area that was, as I remember, entirely free of pollution.

I was in no position then, nor am I in a position now, to question these criteria.

Now, because I am a biologist, and I can realize that carrying out certain experiments they well might need pollution-free water, and then they said they did need pollution-free water to carry these on, they discussed the various kinds of work they were going to do, this seemed logical to us.

Mr. LENNON. These two shellfish research centers, one in Providence and one in Mobile, that the design contract has already been let or the contract for the design, are they authorized, of course, by the Congress?

Mr. MCKERNAN. This is HEW's budget, and I don't know.

Mr. LENNON. They are just so big. I think when we started it was about 30,000 employees in 1953, and now it is 63 thousand.

Mr. CHAIRMAN. I ask unanimous consent to have placed in the record at this point GSA news release of January 3, 1962, pertaining to the construction of a shellfish research center by HEW at Providence, R.I., and ask unanimous consent to have placed in the hearing record at this time a GSA release of January 2, 1962, for plans pertaining again to the construction of a shellfish research center at Mobile, Ala.

Mr. DINGELL. Without objection, it is so ordered.

(The information referred to follows:)

[GSA No. 1597, for immediate release, Jan. 3, 1962]

The General Services Administration has announced the selection of two Providence, R.I., architectural firms to design a shellfish research center to be built in Providence.

Plans and specifications for the project are expected to be completed by early spring by Kiely-Fletcher & Associates and Fenton G. Keyes Associates.

The facility, which has a limit of cost of $1,065,000, is to be built for the Department of Health, Education, and Welfare. It will provide 20,300 gross square feet of space for research activities involving sanitation aspects of the harvesting and marketing of shellfish.

[GSA No. 1595, for immediate release, Jan. 2, 1962]

The design contract for a Department of Health, Education, and Welfare facility in Mobile, Ala., has been awarded to two Mobile firms, the General Services Administration has announced.

The Shellfish Sanitation Research Center will conduct research into sanitation aspects of the harvesting and marketing of shellfish.

Plans and specifications for the complex of laboratories and offices that will provide approximately 10,300 gross square feet of space are to be prepared by J. B. Converse & Co., Inc., and Harry Inge Johnstone by early spring. A limit of cost of $508,000 has been set for the project.

Mr. LENNON. Now I will yield to you.

Mr. DINGELL. Well, the chairman will recognize that you have been very patient, Mr. Morse.

Mr. MORSE. I have no questions.

Mr. DINGELL. Mr. Pelly?

Counsel?

Now, I want to get away from this shellfish situation, but before I do, I want to read a section I received from the letter directed to me by Secretary Udall on this point. It says here:

> We have many years experience at Milford, and know the water conditions there are favorable for culture of oyster and clam larvae. We do not know whether the sea water at Kingston, R.I., is equally satisfactory.

Now that sounds to me like you didn't look at Kingston, R.I., to see whether it was satisfactory in determining whether or not you were going to combine the facilities. Am I correct, on the face of the Secretary's letter?

Mr. MCKERNAN. Now, if you would allow me to explain, I am very familiar with this particular letter. Our point here is that at Milford, Conn., we have carried out years of research work. We have been working on oysters in this particular location for years. It is in the center, or was in the center of a thriving oyster industry.

Now, we know, for example, that this particular water is very favorable to the culturing, artificial culturing of clam and oyster larvae, and we have successfully done this within this laboratory. We have accomplished some very wonderful things, I think, in the case of handling shellfish.

We don't know, in this Kingston area, that we could culture oysters with the same degree of success that we are having here; furthermore, it would take quite a lot of time, and a lot of facilities, if we were to find out whether we can successfully spawn oysters at any time of the year, whether we could raise the larvae successfully in Kingston.

Mr. DINGELL. Doesn't that indicate to you that you have not made a proper scrutiny, when it says, "We do not know what the water conditions are"? Doesn't that indicate that there hasn't been a proper scrutiny of the water conditions to determine whether or not we could save the taxpayers some money?

Mr. MCKERNAN. Mr. Chairman, I would submit that it would probably take us 2 or 3 years to find this out. We would have to set up some sort of a field installation at this location to find out whether it would accomplish the same thing that we are accomplishing at Millford. This is what we intended to convey in this particular letter. We intended to convey this as directly as we could, but I don't think it means that we were not willing to cooperate with another agency. Quite the contrary; we are.

Mr. DINGELL. I want to direct your attention a little bit. The Bureau of Commercial Fisheries requested how much from the Bureau of the Budget for the conduct of general oceanographic research?

Mr. MCKERNAN. In 1963?

Mr. DINGELL. Yes.

Mr. MCKERNAN. Mr. Chairman, I have considered a question of this kind to be one that is within the executive department, and I would rather a question of this nature be submitted to my Secretary. You know, our requests to the Executive, to the Bureau of the Budget, are released in a sense—the President's budget comes before you early in January. The departments submit their budget before this time.

Mr. DINGELL. Then, let me make it a little simpler. Let me ask you this: Did you receive for general oceanographic research within the Bureau of Commercial Fisheries the same amount that was requested of the Bureau of the Budget in your initial request directed to the Bureau of the Budget?

Mr. MCKERNAN. Again, Mr. Chairman, I certainly want to be responsive to you, but I wonder if I am accomplishing my job and carrying out my responsibilities by directly revealing that information. I would suspect that the Secretary might well—the fact is that we didn't get much of an increase.

Mr. DINGELL. The fact of the matter is you received a cut, did you not, for fiscal 1962?

Mr. MCKERNAN. For fiscal 1963?

Mr. DINGELL. For fiscal 1962, you received a cut, in calendar 1963 you also received a cut, did you not?

Mr. MCKERNAN. No.

Mr. DINGELL. Did you receive any substantial increase?

Mr. MCKERNAN. No; we did not receive a substantial increase, but we did not receive a cut.

Mr. DINGELL. But the increase was small?

Mr. MCKERNAN. Over the preceding fiscal year, we did not receive a cut.

Mr. DINGELL. Your increase was very slight?

Mr. MCKERNAN. Yes.

Mr. DINGELL. Now, the next question I wonder is, do you have a permanent staff assigned to your committee of ICO?

Mr. MCKERNAN. In a sense, yes, we have organized within the Bureau a group who are handling much of this. We have one particular Branch of Marine Fisheries, headed by Mr. Howard Eckles, who is coordinating the staff work for ICO, and then we brought in Mr. Vernon Brock, a well-known oceanographer, who is heading a group here in Washington. He has several staff members who are attempting to coordinate our efforts in the field of oceanography with those of other Government agencies.

In other words, we are attempting to staff up to handle this problem as best we can within the funds available.

Mr. DINGELL. Are you telling us, then, that the Bureau of Commercial Fisheries is furnishing the staff for this agency?

Mr. MCKERNAN. Yes, with respect to our responsibilities, the Department's responsibilities in oceanography, we are furnishing the staff.

Mr. DINGELL. How about with regard to the whole responsibility of your subcommittee? Is this all being furnished? Are the staff all

being furnished for coordination purposes by the Bureau of Commercial Fisheries for the whole operation?

Mr. McKernan. Oh, no, Mr. Chairman. We are sharing that. We have an excellent group and these men are competent professionals, and what we do is assign tasks to some others. For example, at our next-to-the-last meeting, we assigned Mr. Goodheart of Coast and Geodetic Survey the job of bringing together all information on buoy systems. This will provide us with more precise information on this subject. So we tend to share these tasks. And I think what you are getting at, these people, some of them, anyway, have other tasks as well.

Mr. Dingell. I am very much concerned how you can have a man doing a full-time job in the Bureau, and have him do another full-time job in coordinating the use of facilities, and so forth, in the Federal Government.

Mr. McKernan. In other words, I like what I am doing, and I enjoy the work with the ICO. It is one of the real satisfactions I get out of my work here. I enjoy associating with these very dedicated and very hard working people and I get a sense of accomplishment, Mr. Chairman, because I believe that the ICO has been successful, although not perfect, by any means.

Mr. Dingell. Mr. McKernan, we appreciate your kindness in being here. Thank you very much.

The next witness is Comdr. R. J. Alexander, chairman of Oceanographic Ships Panel.

Commander, you are certainly welcome, and we appreciate your courtesy and kindness in coming.

STATEMENT OF COMDR. ROBERT J. ALEXANDER, U.S. NAVY, CHAIRMAN, SHIPS PANEL, INTERAGENCY COMMITTEE ON OCEANOGRAPHY

Commander Alexander. Mr. Chairman and gentlemen, before proceeding with my testimony I would first like to express my appreciation for this opportunity to appear before your committee to discuss the organization, operations, and accomplishments of the Ships Panel of the Interagency Committee on Oceanography. It is not usual for one in my circumstances to testify before a congressional committee and I consider it a very great honor and a privilege to be here.

I have a written statement which, with your permission, I would like to submit for the record.

Mr. Dingell. Thank you, Commander. We appreciate that.

Commander Alexander. On June 14, 1960, the chairman of the Interagency Committee on Oceanography, the Honorable James H. Wakelin, Jr., requested me to establish a panel to review critically for the ICO the oceanographic research and survey ship requirements of the various Federal agencies. The panel, when formed, was immediately to undertake the following tasks:

(*a*) Review individual agency ship construction and conversion programs to determine what ships would be required through fiscal year 1963. This has since been expanded to include ship requirements through fiscal year 1971.

(*b*) Comment on the characteristics of ships currently planned and means for funding the construction or conversion.

(*c*) Recommend types of ships which may be standardized to reduce cost of construction.

(*d*) Recommend standardization of equipage and scientific instrumentation where feasible.

(*e*) Recommend the sizes of ships for appropriate assignment to certain laboratories and for specific types of programs.

(*f*) Determine reasonable estimates of cost of construction based on latest information available to agency representatives including an estimate of cost of operations of new ships under various types of operation, that is, manning by civilian laboratories, MSTS, and Navy crews.

In addition to the above charter delineated in Dr. Wakelin's letter of June 14, 1960, the ships panel was subsequently asked to obtain background information on how Government agencies design, contract for, build, inspect, and accept oceanographic ships.

Before discussing the accomplishments of the ships panel, I would like to say a few words on the general composition of the panel and give a brief summary of our methods of operating. The panel is composed of 16 members, alternates, and observers from the various agencies concerned with oceanographic ship construction or operation.

The following agencies are represented: Office of Chief of Naval Operations, National Science Foundation, Office of Naval Research, U.S. Coast and Geodetic Survey, U.S. Navy Hydrographic Office, Maritime Administration, Bureau of Commercial Fisheries, Bureau of Ships, U.S. Coast Guard, and National Academy of Sciences Committee on Oceanography.

Membership of the Ships Panel consists of the following: Myself as chairman for the Office of Chief of Naval Operations; Dr. J. Lyman, National Science Foundation; Mr. F. Jennings, Office of Naval Research; Capt. J. C. Mathison, USCGS, Coast Survey; Comdr. R. C. Darling, USCGS (alternate), Coast Survey, who is the alternate to Captain Mathison; Comdr. F. L. Slattery, U.S. Navy Hydrographic Office; Mr. B. Byrnes (alternate), Hydrographic Office, who is the alternate to Commander Slattery; Mr. L. C. Hoffman, Maritime Administration; Mr. V. L. Russo (alternate), Maritime Administration, who is the alternate to Mr. Hoffman; Mr. J. King, Bureau of Commercial Fisheries; Mr. H. Eckles (alternate), Bureau of Commercial Fisheries, who is the alternate to Mr. King; Lt. Comdr. E. Venning, U.S. Navy, Bureau of Ships; Mr. B. K. Couper, Bureau of Ships; Lt. Comdr. R. P. Dinsmore, USCG, Coast Guard; Dr. P. Fye (observer), NASCO; Mr. R. Vetter (alternate), NASCO; Mr. R. Wilson of Bureau of Commercial Fisheries has recently relieved Mr. J. King.

It should be noted that 5 of the above members are ship design personnel and 11 are experienced operators of oceanographic ships. This membership has accumulated a total of over 240 years of operating and/or design experience with oceanographic ships and represents an excellent cross section of specialized technical oceanographic knowledge.

Meetings are called by me as chairman when needed in order to complete the various tasks currently assigned to the panel. Members, alternates, and observers have equal voice in our meetings and a serious effort is made to achieve unanimity. I am proud to say

that through spirited discussion, debate, and mutual respect with which all members hold one another, we have always achieved the unanimous approval of panel members for all recommendations submitted to the Interagency Committee on Oceanography. Considering the heterogeneous background of the membership, this unanimity speaks highly of the spirit of cooperation that all members bring to panel meetings.

A series of meetings are called to discuss specific problems. When the problem has been resolved to the satisfaction of the panel, a letter is sent to the chairman of the Interagency Committee on Oceanography submitting the comments and/or recommendations of the panel. Since its inception in June 1960, the panel has convened to discuss four major problem areas. Each problem area has involved four or five meetings so I would estimate that the ships panel has convened 16 to 20 times for official gatherings. In addition, individual subgroups of panel members have met to prepare details for consideration by the entire panel. I mention this to show that the ships panel is active and, I believe, effective.

The first series of meetings was held to undertake the tasks assigned by Dr. Wakelin's letter of June 14, 1960. This resulted in the first preliminary report of August 2, 1960, which recommended: Fiscal year 1962 and fiscal year 1963 shipbuilding requirements; that except under special circumstances, ships of the future oceanographic ship program be restricted to new construction ships; and that the panel continue to study long-range requirements, standardization of equipage, and sizes of ships.

The second series of meetings was designed to complete the work of the first series and culminated in the Ships Panel Report of March 24, 1961. This report submitted recommendations on fiscal year 1963 ship requirements and operating schedules for fiscal year 1962, including a chartlet showing general areas of operation for research and survey ships.

The subject of standardization of research and survey ships was held in abeyance until the modern ships now under construction become operational. There is a danger in standardizing too soon and putting things "in concrete," so to speak, which would inhibit normal, healthy development.

Therefore, until we have gained operational experience with modern ships, the panel recommends that agencies continue their own individual developments, keeping all other activities informed of their work. This has worked out very well and has brought about a great measure of standardization merely through exchange of information.

The third series of meetings was held at the request of the chairman, Federal Council of Science and Technology, to obtain background information on how agencies process their ship-construction programs from initial design stages through final acceptance.

As a result of these meetings, the panel on October 2, 1961, submitted to the ICO a summary of agency shipbuilding procedures. The panel's recommendations were designed to protect fully the interests of the Government while at the same time giving a certain amount of freedom to the individual user laboratories to insure that the final ship meets the needs of the laboratory concerned.

These recommendations were favorably endorsed by the Interagency Committee on Oceanography and are now being studied by the Federal Council for Science and Technology.

The fourth series of meetings is currently in progress and will result, in a few days, in submitting the proposed operating schedules for U.S. oceanographic ships for fiscal year 1963 similar to the schedule published in March 1961 as ICO Pub No. 1. If the committee desires, this document will be submitted for the record as soon as it is published.

In conclusion, I would like to list those areas where the Ships Panel has contributed to bringing about a more effective national oceanographic program:

1. The published yearly operating schedules serve to acquaint all agencies with the work of others. This in itself eliminates duplication which might otherwise have occurred were it not for this exchange of information. It also invites joint participation in oceanographic expeditions. Preliminary review of the fiscal year 1963 operation areas shows that all agencies gave serious consideration to where others were operating. This year shows a much better distribution of ships than did last year.

2. The Coast Guard is investigating the feasibility of establishing an oceanographic ship category as recommended by the Ships Panel. Establishment of an oceanographic ship category would remove confusion among designers as to whether cargo or passenger ship standards should prevail.

3. Ship construction procedures have been recommended by the panel and endorsed by the ICO. These procedures are currently under study by the Federal Council for Science and Technology.

4. The Ship and Survey Panels held a joint meeting at the request of the Coast and Geodetic Survey to discuss and comment on the proposed design of the Coast Survey's world ocean survey ship. As a result of these comments, the Coast Survey is incorporating design features in this important class of ship which are truly unique and will give it a greatly increased capability over the original design.

5. Review and exchange of agency shipbuilding programs has resulted in three specific reassignments of ships to prevent duplication or to give a better distribution of ships. In fiscal year 1960, the Navy reassigned a ship destined for Woods Hole Oceanographic Institute to the use of east coast Government laboratories because the National Science Foundation was already providing a ship for Woods Hole. In fiscal year 1962, the Coast Survey reassigned a proposed ship from being a replacement for an overage coastal survey ship to the Nation's first world ocean survey ship. This is the first ship planned for world ocean surveys and gave great impetus to the world survey program. And lastly, in fiscal year 1962, the National Science Foundation approved assignment of a ship to Texas Agriculture and Mechanical College because the Navy's long-range plan could not provide a ship to Texas A. & M. before fiscal year 1965. This in turn will be followed by a revision of the Navy's long-range plan to take into consideration the planned programs of other agencies. This mutual give and take is very beneficial and will go far in giving a proper balance to the number, size, and assignment of ships needed to meet our country's oceanographic requirements.

This terminates my written statement, but before trying to answer the questions which the committee may have, I would again like to thank you for permitting me to appear before you today.

This concludes my written statement, Mr. Chairman.

Mr. MORSE. Thank you very much, Commander Alexander. I think it would be very helpful if you would submit for the record the proposed operating schedule which you referred to on page 5 of your testimony.

Commander ALEXANDER. Yes, sir.

Mr. MORSE. Let me ask one question, if I may. Back on page 4, you were talking about the first series of meetings, and you said that among your recommendations was that the future oceanographic program would be restricted to new construction of ships. What did you mean by that?

Commander ALEXANDER. This was in reference to conversions, Mr. Chairman. Before 1960, I think almost entirely all ships were conversions. The Coast and Geodetic Survey and the Bureau of Ships made a detailed investigation separately, and both arrived at the same conclusion, that conversions, except for special purposes, were not economical.

Mr. MORSE. I see. Thank you.

Mr. Bauer?

Mr. BAUER. Commander, following our chairman's question, do you consider that the U.S. naval ship *Eltanin* is not an efficient oceanographic ship?

Commander ALEXANDER. No, sir; the *Eltanin* was a special-purpose ship within the meaning of the panel.

Mr. BAUER. What do you mean by special purpose? Doesn't it have the capabilities of going to any ocean in the world, and conducting oceanographic research in many and various disciplines?

Commander ALEXANDER. No, sir; in the case of the *Eltanin*, we had to have a ship that would be capable of operating freely in the Antarctic ice.

Mr. BAUER. Aside from that, let's talk about the oceanographic capability. Can it operate without going into the ice in a perfectly satisfactory manner?

Commander ALEXANDER. The *Eltanin*?

Mr. BAUER. Yes.

Commander ALEXANDER. Yes, sir; it can operate almost anywhere.

Mr. BAUER. What is the matter with the conversion, then?

Commander ALEXANDER. The *Eltanin*—and I would like to modify my last answer a little—the *Eltanin* would be perfectly capable of doing classical oceanographic work, but there are some types of oceanographic work that would be beyond its capability.

Mr. BAUER. Will you tell the committee what they are?

Commander ALEXANDER. Well, there would be certain types of acoustic or seismic work, where we would need an absolutely quiet ship. We would like to have a ship that would be fairly stable, so that we could take gravity observations.

Mr. BAUER. Do you have any oceanographic ship in our oceanographic fleet that is any more stable than the *Eltanin*?

Commander ALEXANDER. I am not familiar with the stability of the *Eltanin*, but icebreakers in general are extremely instable in the

sense that they roll a lot and this would be not satisfactory for gravity work.

Mr. BAUER. Is the *Eltanin* an icebreaker? Is it constructed as an icebreaker?

Commander ALEXANDER. It has the same general configuration and I was under the impression that the *Eltanin,* when not in ice, would probably roll too much for gravity work.

Mr. BAUER. Are you familiar with the roll tanks that are installed?

Commander ALEXANDER. We have no experience with roll tanks except as they are on the *Vema.* They are extremely successful on the *Vema.* I presume that they would be equally successful on the *Eltanin.*

Mr. BAUER. Except to the rolling, the only objection that you have to the *Eltanin* is the acoustic noise that the ship would produce with relation to seismic work; is that correct?

Commander ALEXANDER. Yes, sir, and in general, a ship that is designed for cargo or other purposes is not conveniently compartmented for scientific work.

Mr. BAUER. Have you been aboard the *Eltanin*?

Commander ALEXANDER. Yes, sir; I was very impressed with it.

Mr. BAUER. Do we have a better compartmented ship in our oceanographic fleet?

Commander ALEXANDER. We have now the Coast Survey ship *Surveyor,* which has been designed for hydrographic work.

We have the new Coast Survey ship for world ocean surveys and three 1,375-ton Navy ships that are under construction. Except for the *Surveyor,* we have no better-constructed ship; no, sir.

Mr. BAUER. Let's look at it from a biological ship point of view. Is there a necessity in the national program of having a national biological ship?

Commander ALEXANDER. A specially constructed ship, Mr. Bauer?

Mr. BAUER. For biological purposes, or one that will permit scientists to indulge in the study of the biota of the seas?

Commander ALEXANDER. The panel has not had any requests from any of the agencies for specially constructed biological ships. We have discussed in our panel meetings only ships that could be used for all types of oceanography.

Mr. BAUER. In other words, the National Science Foundation has not indicated that they have any desire or plans for a national oceanographic ship for the Indian Ocean in the field of marine biology; is that correct?

Commander ALEXANDER. I have the National Science Foundation's shipbuilding program, and I do not have any ship in this that is for the biological research.

Mr. BAUER. Let's talk about the conversion possibilities. The biologists are not necessarily interested in seismic work; are they?

Commander ALEXANDER. No, sir. And I imagine that for biological work, it might be possible to use a conversion.

Mr. BAUER. Do you think that biology is of sufficient importance in the world of oceans for us to have a national biological ship? That is the question.

Commander ALEXANDER. I am not a biologist, Mr. Bauer, but I would say yes.

Mr. BAUER. You are the ship coordinator for IC'O?

Commander ALEXANDER. Yes, sir; but, as I pointed out, we have no agencies that have indicated that they have a requirement for a purely biological ship.

Mr. BAUER. That is rather strange, because I have a copy of the requirements of the National Science Foundation which set up the necessity of a biological ship for the Indian Ocean. I thought that that was certainly under your cognizance.

Commander ALEXANDER. We have not considered it, sir.

Mr. BAUER. Very well. Now, let me ask you a few things here.

You mentioned in the organization of your panel that you have five members that are ship design personnel. How many naval architects do you have on the panel?

Commander ALEXANDER. I am not completely familiar with whether they are naval architects. They are design personnel. We have Capt. J. A. Mathison and Comdr. R. C. Darling, who work very closely with the design features of ships for the Coast and Geodetic Survey, Mr. L. C. Hoffman, and Mr. Vito Russo of the Maritime Administration are both, I believe, design people, and Lt. Comdr. E. Venning of the Bureau of Ships is a naval engineer, and I would presume that he is a naval architect.

Mr. BAUER. In other words, when you say you have design personnel, that could be someone that sets up a requirement for what they expect to get out of the ship; is that correct?

Commander ALEXANDER. No, sir. The people I listed as design people are those that can give us specific technical information on regular design features that you would expect to get from a naval architect.

Mr. BAUER. Now, you made a report, did you not, to the Chairman of the Interagency Committee on Oceanography with respect to the capabilities of the various Government agencies that are concerned with the design, the supervision of design, and qualification of the ship in its trials, and so on, did you not?

Commander ALEXANDER. Yes, sir.

Mr. BAUER. And in that report, did you show that the Coast and Geodetic Survey had anything larger than a small staff to develop preliminary design plans?

Commander ALEXANDER. I don't have a copy of the report with me, Mr. Bauer. That report was sent to the Interagency Committee and has since been forwarded to the Federal Council, but as I recall, the Coast Survey does have a small staff, and we have two of their members on the panel.

Mr. BAUER. Are they capable of supervising the construction, the trials, going into the details of design structure, or do they give it to the Maritime Administration?

Commander ALEXANDER. The preliminary design and requirements would be generated with the Coast Survey and the Maritime Administration mutually, and then the Maritime Administration would handle the complete procedures thereafter.

Mr. BAUER. What was the reaction of the U.S. Coast Guard to your report? Do you happen to remember?

Commander ALEXANDER. No, sir; I don't recall that we received a report from the Coast Guard.

Mr. BAUER. Mr. Chairman, at this time, I would like to introduce this into the record.

Mr. DINGELL. So ordered.
(The information referred to follows:)

U.S. COAST GUARD,
November 13, 1961.

From: Rear Adm. Donald McG. Morrison, U.S. Coast Guard, member.
To: Chairman, Interagency Committee on Oceanography.
Subject: Contracting procedures for ship construction.
Reference: (*a*) Chairman, Ship's Panel ltr 2, October 1961, same subject.

1. Commander Anastasion has asked for comments on the recommendations set forth in reference (*a*).

2. These recommendations have been reviewed by Coast Guard staff officers and the following comments are made.

(*a*) The recommendation concerning review of contract designs and procedures for Government-funded oceanographic vessels is concurred with. It is pointed out that compliance with applicable Federal laws and Coast Guard regulations require that vessel plans and specifications be submitted to the Coast Guard for approval. It is for this reason that the Coast Guard does not wish to become involved with the preparation of vessel designs other than for Coast Guard vessels. It further should be pointed out that certain of the vessels coming under the applicability of this recommendation will be destined as public vessels which are not subject to Coast Guard inspection regulations. The Coast Guard is willing to make available its inspection facilities to public vessels at the request of the agency concerned. This presently is being done in the case of the Navy's MSTS and certain AGOR vessels. The Coast Guard holds that privately operated vessels whether federally funded or not are subject to the inspection laws.

(*b*) The Coast Guard concurs strongly with the recommendation that Government-funded oceanographic vessels be constructed or converted in U.S. shipyards.

(*c*) Recommendation (*c*) requests the Coast Guard and American Bureau of Shipping to investigate the feasibility of establishing an oceanographic ship category. The Coast Guard feels that such an investigation would be useful, and in fact has already made considerable progress in this direction. Instructions have been issued to our marine inspection offices indicating how the present regulations should be applied to this special category of vessels. Should it develop that further modification is justified without detracting from the basic safety of the operation, these instructions can be modified or special legislation can be sought to provide authority for departure from normal requirements to the extent justified by this special type of operation.

D. McG. MORRISON.

DEPARTMENT OF THE NAVY,
OFFICE OF THE CHIEF OF NAVAL OPERATIONS,
Washington, D.C., October 2, 1961.

From: Chairman, Ships Panel.
To: Chairman, Interagency Committee on Oceanography.
Subject: Background information on agency procedures for contracting for ship construction.

1. In accordance with a request of Commander Anastasion, a series of Ships Panel meetings were held to obtain background information on how Government agencies design, contract for, build, inspect, and accept oceanographic ships.

2. A brief summary of the various agency procedures is submitted below:

(*a*) Navy (Bureau of Ships): The Bureau of Ships has an experienced and effective organization established to process shipbuilding procurements. The ship characteristics are prepared jointly by the Ship Characteristics Board within the Office of the Chief of Naval Operations and the user laboratory. Upon approval of the characteristics by the Ship Characteristics Board, preliminary and contract designs are prepared by engineers in the Bureau of Ships. A very small percentage are prepared under contract by private design agents. When funds are appropriated to build a certain class ship, proposals are solicited from qualified bidders. The Bureau maintains lists of qualified bidders which are based upon capability data submitted to the Bureau yearly by interested shipyards throughout the country. The Bureau notifies each shipbuilder as to the type ships for which invitations will be extended during the ensuing year. Periods of 45 to 90 days are allowed for preparation of bid proposals. Awards to other than the low bidder are the exception and must be thoroughly justified in accord-

ance with Armed Services Procurement Regulation. The Bureau through its field agents inspects the ship at different stages of its construction to insure compliance with the contract plans and specifications. Prior to delivery and again prior to expiration of the guarantee period the ship is inspected by a naval board of inspection and survey. Contractor-responsible deficiencies are determined and charged to him as adjustments of the contract price.

(*b*) Maritime Administration. In general, the Maritime Administration's procedures are similar to those of the Bureau of Ships but are more simplified. These procedures are followed but are not available as written directives. Ship characteristics are prepared by the user in conjunction with the Maritime Administration. Preliminary and contract plans and specifications are prepared either by MARAD or by private naval architects, but they are reviewed by the Maritime Administration.

The Maritime Administration does not keep a complete bidder's list as does the Bureau of Ships; however, MARAD keeps current records of shipbuilding facilities existing in all U.S. shipyards capable of building seagoing vessels and has a detailed knowledge of the capabilities of most of these yards.

The bids are invited on the basis of contract plans and specifications, performance conditions, time limits, etc., specified in the invitation. Invitations to bids are nationally advertised. A shipyard having the facilities required to construct the ship may submit a bid.

There is no bidder's conference as such, but a prospective bidder may request clarification of any part of the invitation, in writing. Written replies to such inquiries are simultaneously distributed to all prospective bidders.

The lowest responsive bidder gets the contract, unless statutory provisions require different allocation of the contract in the national interest. If the Maritime Administration has no current and detailed knowledge of the capabilities of the responsive bidder, a specific survey to establish the ability of the bidder to perform all the requirements of the contract is carried out by the technical, legal, and financial personnel of the Maritime Administration. Final determination of the responsiveness of the bidder, in such cases, is made on the basis of this survey.

MARAD personnel carry out plan approval and inspection throughout the construction of the ship and witness tests and trials. Upon completion, the ship is inspected by the Trial and Guarantee Survey Board before delivery is accepted.

(*c*) Coast and Geodetic Survey: The Coast and Geodetic Survey has a small staff to develop preliminary design plans, determine ship characteristics and approve key plans. Design of the ship is usually given to the Maritime Administration, but on occasion a private naval architect may design the ship under contract by MARAD. All other details of contracting and inspection are handled by MARAD, but Coast and Geodetic Survey personnel are assigned to the shipyard as a part of the shipyard construction inspection staff.

(*d*) Bureau of Commercial Fisheries: The Bureau has a decentralized system for new vessel construction. Preliminary operational requirements are defined by the staff of the laboratory or field station having need for the vessel. This statement is reviewed and approved by the region and central office. A qualified naval architect is selected by negotiation. Depending on the amount of the contract, it is approved at either the regional office or central office level. The plans may also be submitted to the Bureau of Ships for their review. After approval of final plans and specifications, bid invitations for the vessel construction are prepared and issued to as large a list as possible of prospective bidders. Award is made to the lowest responsible bidder in accordance with requirements of Federal procurement regulations. Performance bond and payment bond are required. The architect usually performs inspection, conducts dock and sea trials, and certifies as to completion of contract.

(*e*) Coast Guard: The Coast Guard has small in-house construction capabilities but a large competent staff of naval architects to prepare ship designs, process contracts, and inspect ships. With minor exceptions the Coast Guard system closely parallels the system of the Bureau of Ships.

(*f*) National Science Foundation: Grants are made to research institutions to cover acquisition costs of various items of equipment for basic research, including research vessels. In the case of vessels, appropriate controls are provided in the grant letter whereby all critical stages in design and procurement are subject to Foundation concurrence. An advisory committee, with representation from Bureau of Ships, Maritime Administration, and Bureau of Commercial Fisheries, has been established to advise in the technical administration of these procurement procedures. The Foundation has also acquired an antarctic research vessel, which is being converted by and will be operated by MSTS. The Foundation

also makes grants for charter of special-purpose vessels, as in the case of the Mohole project and the Indian Ocean expedition.

(*g*) The Office of Naval Research procures small research ships for its oceanographic program through the following procedures. After a need for the ship has been determined, a prime contract for the design and construction of the ship is let to the research activity that will eventually use the ship. This contract will give the contractor authorization to let subcontracts for the design and construction to be handled in accordance with the approved procedures. Included in this prime contract are stipulations that after the design is completed, the plans will be submitted to the Office of Naval Research, who in turn will request the Bureau of Ships to review them. After approval by the Bureau of Ships, the plans are returned to the contractor for the purpose of obtaining competitive bids. When the various bids have been received, a contractor will be selected with the mutual approval of the prime contractor and the Office of Naval Research. The acceptance of the delivery of the ship must be approved by personnel designated by the Office of Naval Research. These ships, because of their small size, are usually handled as Government-furnished equipment to the institution's research contracts.

3. In view of the above, the following recommendations are submitted in behalf of the Panel for consideration by the Interagency Committee on Oceanography.

(*a*) The Maritime Administration, Bureau of Ships, and Coast Guard are the only agencies within the Government capable of designing, bidding out, contracting, approving, inspecting, and accepting delivery of a ship within their own organization. These agencies are uniquely qualified to handle all aspects of shipbuilding including the reviews and/or justifications associated with Government appropriations.

Recommendation: In order fully to protect the Government's interest, it is recommended that all agencies providing funds for the construction of oceanographic ships in excess of 300 gross tons be urged to adopt the following procedures:

(1) Ship characteristics, preliminary design, and contract design may be prepared by private contractor or Government agency at the option of the funding agency. These characteristics and designs should meet the requirements of the user laboratory.

(2) The final contract design should be reviewed for technical feasibility by the Maritime Administration or the Bureau of Ships. In this review, the responsibility of these agencies shall extend only to determining that the proposed design of the private contractor is sound from a naval architectural and marine engineering standpoint and to checking that the contract plans and specifications form a satisfactory basis for competent bidding. The efficiency and the economics of the proposed design shall remain the responsibility of the funding agency and user laboratory in the case of designs prepared by private contractors. In order to prevent conflict between their Inspection and Design Sections, the Coast Guard Design Section should not be concerned with the design or construction of ships other than those specifically destined for Coast Guard usage. All vessels delivered shall, however, comply with all the applicable laws of the United States and the requirements of the various regulatory bodies such as the U.S. Coast Guard and Public Health Service.

(3) After approval of the final design, and with the concurrence of the funding agency; the Maritime Administration, Bureau of Ships, the funding agency, or the user laboratory will handle all of the remaining details (except for Coast Guard ships which will be handled within the Coast Guard). These details include but are not limited to the bidding out, contracting, and inspection of the ship during the construction stages.

(4) The acceptance trials of ships built with Government funds will be conducted either by the Trial and Guarantee Survey Board of the Maritime Administration or by the Board of Inspection and Survey of the the Navy. These Boards will be augmented to include representatives from the user laboratory or agency and will act as a representative of the funding agency to insure that the finished ship meets the contract specifications. The funding agency will follow the recommendations of the Board prior to acceptance of the ship.

(*b*) On occasion various agencies have used Government funds to have ships for U.S. purposes built in foreign shipyards. Although theoretically legal, this policy is in conflict with the spirit of a series of Executive orders and legislative acts dating back to 1936. "Buy American" is so much a part of U.S. policy that deviations for expediency or economy should only be approved at the Cabinet level or, in the case of independent agencies, by the head of that agency.

Recommendation: It is recommended that the construction or conversion of all oceanographic ships funded by the Government for U.S. oceanographic use should

be carried out in U.S. shipyards. Deviations from this policy may be approved only by the head of the agency receiving the appropriation.

(c) There are no formal Coast Guard or American Bureau of Shipping requirements established specifically for oceanographic ships. This causes a certain amount of confusion among designers as to whether cargo or passenger ship standards should prevail. The establishment of a category of oceanographic ship would remove this confusion.

Recommendation: It is recommended that the Coast Guard and American Bureau of Shipping be requested to investigate the feasibility of establishing an oceanographic ship category. In the event it is feasible to establish such a category it is further recommended that all U.S. oceanographic ships in excess of 300 gross tons be constructed in accordance with the requirements to be established by the Coast Guard and/or American Bureau of Shipping.

R. J. ALEXANDER.

Mr. BAUER. Now, what do you mean by operating experience?

Commander ALEXANDER. These men have been to sea on oceanographic ships for a very long time.

Mr. BAUER. Has Mr. Couper ever been at sea in an oceanographic ship?

Commander ALEXANDER. Mr. Couper has been at sea; yes.

Mr. BAUER. On an oceanographic ship?

Commander ALEXANDER. Yes, sir; Mr. Couper, before he worked in the Bureau of Ships, was employed at the Navy Hydrographic Office, and is an experienced oceanographer.

Mr. BAUER. I see. In other words, the operation comes from the fact that you go to sea on an oceanographic ship; is that correct?

Commander ALEXANDER. As an oceanographer.

Mr. BAUER. How about Mr. Eckels?

Commander ALEXANDER. Mr. Eckels is a biologist, and he has been to sea on Bureau of Commercial Fisheries ships.

Mr. BAUER. Now not as an oceanographer?

Commander ALEXANDER. I presume that a fisheries expert would be an oceanographer.

Mr. BAUER. How about Mr. Hoffman?

Commander ALEXANDER. Mr. Hoffman is one of the men I listed as being in design personnel.

Mr. BAUER. He is in design?

Commander ALEXANDER. Yes, sir; he is in Maritime Administration design.

Mr. BAUER. In other words, operations, to be an operator you must have gone to sea as an oceanographer. Is that correct?

Commander ALEXANDER. Yes, sir.

Mr. BAUER. Now, on page 4 of your statement, one of the functions seems to be of your working group that you publish charts showing areas for operations of research and survey ships.

Commander ALEXANDER. Yes, sir.

Mr. BAUER. Why doesn't that come logically under the survey panel?

Commander ALEXANDER. We were——

Mr. BAUER. You make the decision, in other words, as to where the ships go, or do you just take the information from the survey panel and put it on a chart?

Commander ALEXANDER. Well, this was just developed by the panel as a part of its report. In our original report, we listed the characteristics of all of the oceanographic ships within the United States and we thought it would be a good idea, while we had this

information, to also include the operating schedule. This was favorably received by the ICO, so we just developed it.

Mr. BAUER. Now, on page 6 you have mentioned the National Science Foundation approved the assignment of a ship to Texas Agricultural and Mechanical College because the Navy's long-range plan could not provide a ship to Texas A. & M. before fiscal 1965. Who owns the ship?

Commander ALEXANDER. Sir?

Mr. BAUER. Who owns that ship?

Commander ALEXANDER. The National Science Foundation ship is under construction.

Mr. BAUER. The National Science Foundation?

Commander ALEXANDER. That is part of their shipbuilding program; yes, sir.

Mr. BAUER. I thought they had stopped at Woods Hole.

Commander ALEXANDER. No, sir. When I say that they are providing the ship, I mean they are providing the funds. The ship has not actually been built yet.

Mr. BAUER. Who will own the ship? The Navy or the National Science Foundation or Texas A. & M.?

Commander ALEXANDER. Texas A. & M. will retain title.

Mr. BAUER. I see. That is all I have, Mr. Chairman.

Mr. MORSE. Thank you, Mr. Bauer.

Do you have any questions, Mr. Drewry?

Mr. DREWRY. Right along that line, Commander Alexander, the Texas A. & M. and the Navy's long-range plan would not provide a ship for Texas A. & M. before fiscal 1965. We are now dealing with fiscal 1963. When will this National Science Foundation ship be available? How much sooner?

Commander ALEXANDER. What I meant by that, sir, was that funds would not be provided by the Navy for the Texas A. & M. ship before fiscal year 1965, which meant the ship would be available in fiscal year 1967 from the Navy's plan. Texas A. & M., according to my records, will have a ship built, funded with fiscal year 1962 money; keel will be laid down in fiscal year 1963 and should be available sometime in fiscal year 1964, or the beginning of 1965. We gain 2 years.

Mr. DREWRY. You gain 2 years?

Commander ALEXANDER. Yes, sir.

Mr. DREWRY. Now, this is a new ship that you are talking about. Now, back to the point about your position on new ships. I don't think anybody can quarrel too much with the concept that something that is built specifically for a particular purpose might in general be better than something—and possibly cheaper—than something that has to be extensively converted, because conversion involves tearing out as well as putting in.

But I don't quite understand how firm that position is as a matter of policy when I think we can expect that the construction of new survey ships is not going to be a huge program every year. In fact, as the general oceanographic program is getting off the ground, there will be other things, perhaps, making earlier demands on funds than much shipbuilding, at least. In fact, you haven't got, really, the people to serve on the overall program that is in concept for TENOC or NASCO or whatever.

You do not preclude the use of conversions of existing vessels or ships of opportunity to gain basic data of a survey nature while you are waiting to get the money for new ships, do you?

Commander ALEXANDER. No, sir; the Navy has an extensive program for using ships of opportunity. We wouldn't gain very much, really, in time, by using conversion, because we will start to work shortly on fiscal year 1964 programs. That would mean that if we wanted a conversion, we would now have to enter it into fiscal year 1964 programs and it wouldn't be available for 2 years.

Mr. DREWRY. Well, that was basically my point. Can you bring new ships into being fast enough to allow the program to proceed at a maximum available speed?

Commander ALEXANDER. Well, we have a number of ships coming in now, sir. I don't think we would gain anything by bringing additional ships in that were conversions, right at this point.

Mr. DREWRY. Now, on page 6, you refer to the resulting reassignment of ships to prevent duplication or give better distribution. I just want to see if I understand correctly, your statement that in fiscal 1962 the Coast Survey reassigned a proposed ship from being a replacement for an overage coastal survey ship to the Nation's first world ocean survey ship. Does that mean that an authorized ship for the Coast Survey, which was contemplated to replace an overage coastal ship, is now going to be redesigned to serve as a world ocean survey ship, rather than coastal survey ship? Is that the point?

Commander ALEXANDER. No, sir. At the time we were dealing with dollars and with numbers. A ship was allowed in the Coast Survey program but it was designated initially as a replacement ship. As a result of the ICO's studies, we realized that the world ocean survey program needed a ship as soon as possible so the Coast Survey decided to delay the replacement, and utilize this ship as a world ocean survey ship.

Mr. DREWRY. This had not yet gotten to the point of congressional authorization?

Commander ALEXANDER. Not to the congressional authorization or to the design stage.

Mr. DREWRY. That is all, Commander. Thank you.

Mr. DINGELL. Commander, I was unfortunately called away to vote on another committee in another matter, and I apologize for being away.

I was concerned by a couple of things in your statement that I would like to perhaps explore with you very briefly.

The first point is, you indicated that the panel has recommended that, except in special circumstances, the oceanographic ship program be restricted to new construction ships in the future. Am I correct on that?

Commander ALEXANDER. Yes, sir.

Mr. DINGELL. Does this mean that there is an inadequate supply of existing vessels which could be acquired more cheaply for this purpose?

Commander ALEXANDER. This is one of the points that was brought out in the Bureau of Ships study in the Coast Survey ship, Mr. Chairman. The Bureau of Ships made a rather detailed study, and one of the ground rules was to determine how many ships would be available that would give us the same capability of AGOR 1,375-ton ship, and what would it cost.

The cost was approximately the same, and if I recall correctly, there were only four ships available in the reserve fleet to do this. These ships would have a life expectancy of about 10 years, as opposed to 30 years for a new construction ship, and running a cost estimate throughout, it was about four or five times more expensive to build the conversion than to build a new ship.

Mr. DINGELL. Would you submit a copy of that to this committee, please?

Commander ALEXANDER. I will try to get one, sir, yes.

Mr. DINGELL. If you would, please.

(The requested information follows:)

DEPARTMENT OF COMMERCE,
COAST AND GEODETIC SURVEY,
Washington, June 20, 1958.

To: Director.

Subject: Study of conversion of existing naval vessels to hydrographic surveying ships for Coast and Geodetic Survey.

A. SCOPE

1. Pursuant to your instructions, a study of the feasibility of conversion of existing naval vessels to ships suitable for the hydrographic survey operations of the Bureau was initiated on December 2, 1957. The dimensions and characteristics of naval vessels in the size range suitable for hydrographic surveying were reviewed and all classes of ships within this range listed for study.

2. On December 5, 1957, Rear Adm. Charles Pierce and Capt. S. B. Grenell visited the Office of Deputy Chief of Naval Operations, Logistics, and conferred with staff members. Plans, characteristics, and photographs of the selected types were studied and capabilities of the ships discussed. As a result of this study the following classes were selected for detailed examination.

Class	Length	Beam	Draft	Light displacement	Speed
	Feet	*Feet*	*Feet*	*Tons*	*Knots*
MSF type B	221	32	11	880	18
MSF type D	185	36	10	720	15
ATA	143	34	15	610	13
ATF	205	39	17	1,240	17

3. All ships in these classes were constructed during the period 1942–45. None of the ships in these classes have been reported as excess to the needs of the Navy. No inquiries have been made concerning the availability for transfer of ships of the type listed since it was not desired that the study be restricted to only those available.

4. During the detailed examination, ships of the selected classes were visited and all compartments inspected. Machinery, hull structure, and arrangement were studied and excerpts made from the ship's characteristics cards for further study and analysis. Operational features and behavior at sea were discussed with the ship's officers. General plans and structural data were obtained from Bureau of Ships in order that changes in arrangement and other details of conversion might be studied.

B. RESULTS

1. MSF type B

(*a*) U.S.S. *Requisite* was examined at Seattle, Wash., on December 13, 1957, by Capt. F. G. Johnson, Comdr. F. J. Bryant, and Chief Engineer J. E. Baker. On December 17, Captain Johnson, Chief Engineer Baker, and Chief Engineer James Piner made a further examination. *Requisite*, although now designated AGS 18 was formerly AM 109 of the fleet minesweeper class now redesignated MSF (B). This ship has been converted to a surveying ship by the Navy and is now in active service for hydrographic operations. The conversion has not been successful. The hull structure and shell plating is extremely light, consisting principally of light bulb angles and 10.2-pound plate. Although strengthened by intermediate frames and doubler plates during conversion, the hull

was extensively damaged during a recent cruise in the northern Bering Sea and the ship is now awaiting major repairs. Operational qualities are poor. The narrow beam, comparatively shoal draft, and shape of the hull section cause the ship to be unstable under ordinary weather conditions and boat handling is always difficult and often impossible. The main deck is awash even in moderate seas. Steering is poor; the ship has twin screws and a single rudder which is ineffective at low speeds. Below 6 knots the rudder is useless for steering and reliance must be had on steering with the engines. Quarters are inadequate and no satisfactory rearrangement is possible.

(*b*) It is concluded that ships of this class cannot be successfully converted to hydrographic surveying ships of even moderate efficiency. Because of the unsatisfactory operating qualities, no detailed estimate of the cost of an attempted conversion have been made. Further details are contained in a report from Captain Johnson attached hereto as appendix D.

2. MSF type D

(*a*) No ships of this class are in active service. U.S.S. *Cruise* (MSF 215), in reserve status at the Philadelphia Naval Shipyard, was examined on January 21, 1958 by Rear Adm. H. A. Karo and Comdr. F. J. Bryant. Ships of this class have a raised foesle deck extending about two-thirds the length of the hull and an armored superstructure. Propulsion is principally twin-screw geared diesel although some have other types of diesel drive. Constructed as antimagnetic minesweepers, this class is fitted with special service generators and heavy magnetic coils which would require extensive removals. The propulsion machinery is divided between two engine rooms. Steering is manual, electric assisted, by cables. The anchor windlass has a single wildcat and capstan so that only one anchor can be handled. Crew quarters are on the second deck and could be made reasonably adequate by extensive rearrangement at considerable expense, officers quarters are poor and cannot be much improved. Heating and ventilation systems and evaporator and fresh water tankage are inadequate. Insulation of the shell plating throughout will be required for habitability. The hull structure and shell plating are excessively light and will require extensive strengthening. Shell plating is principally 10.2-pound plate and frames are light bulb angles.

(*b*) It is concluded that ships of this class can be converted to moderately successful hydrographic surveying ships though at excessive cost. The efficiency of the converted ship would be approximately 60 percent of that of a similar ship designed and constructed specifically for hydrographic surveying. The minimum cost of conversion is estimated as $2,078,000. Detailed estimates of conversion costs are contained in appendix A.

(*c*) Major features of the conversion required are as follows:

(1) Strengthen hull by installation of intermediate frames, web frames, and doubler plating in way of shell.

(2) Extend main deckhouse aft by 12 feet 6 inches to provide CPO quarters.

(3) Extend deckhouse on superstructure deck forward by 7 feet to provide space for commanding officer quarters and plotting room and to permit extension of bridge deck area.

(4) Cut away armored superstructure and rebuild, preferably in aluminum, to compensate for increased topside weight of launches and davits.

(5) Extend bridge deck area forward and aft to provide a radioroom, chartroom, and adequate working space on bridge. The existing bridge is a steering station only.

(6) Install davits on superstructure deck to handle 4 launches, 26 to 30 feet in length.

(7) Revise officers quarters to provide accommodations for seven officers.

(8) Revise crew accommodations to provide quarters and sanitary facilities for a crew of 68 men, the minimum required for continuous operation.

(9) Revise heating, ventilation, lighting, and sanitary systems to suit the new arrangements.

(10) Renew propulsion engines, ships service generators, heating boiler, supply and exhaust fans, evaporator, and auxiliary machinery.

(11) Insulate shell plating in way of accommodations.

(12) Provide complete outfit and equipment.

3. ATA class

(*a*) U.S.S. *Accokeek*, ATA–181, was examined at Philadelphia Naval Shipyard on January 22, 1958 by Rear Adm. H. A. Karo and Comdr. F. J. Bryant. Ships of this class are auxiliary ocean tugs with single screw diesel electric propulsion.

There are two main propulsion generator sets driving two motors geared to a single shaft. All propulsion machinery is housed in one compartment. There is a raised focsle deck extending off about one-fourth of the length; the main deckhouse extends off about two-thirds of the length. The towing machinery is in the after part of the deckhouse and the aft one-third of the length is open deck over a large salvage hold with restricted 'tween deck height. Steering is manual, by means of cable. The pilot house is small, amounting to hardly more than a steering station; there is a small chartroom and a radioroom on the foscle deck. Officers quarters and crew mess facilities are on the main deck; crew quarters are on the second deck. The ship has difficulty in making headway against head seas and yaws considerably in normal weather. Because of the deep draft, steering is good at low speed. General operating characteristics are good. Reasonably adequate accommodations for 5 officers and 30 crew members can be provided by rearrangement of main and second deck compartments and by extension of the superstructure deck and main deckhouse. Heating and ventilation and evaporator capacity are inadequate. Generator capacity is inadequate. The shell plating and house sides require insulation in way of accommodations for habitability.

(*b*) It is concluded that ships of this class can be converted to hydrographic surveying ships of restricted utility though at considerable cost. The capabilities of the converted craft would approximate those required for class III surveying ship but operating efficiency would be limited by the excessive draft (15-foot) which cannot be changed. The operational area would be restricted to certain areas of southeast Alaska and even there the deep draft would be a handicap to successful operation. In addition to this restriction on operations, the efficiency of the converted ship would be approximately 80 percent of that of a ship designed and constructed specifically for hydrographic surveying. The minimum cost of conversion is estimated at $1,072,000. Detailed estimates of conversion costs are contained in appendix B.

(*c*) Major features of the conversion required are as follows:

(1) Extend focsle deck and shell plating above main deck aft approximately 8 feet.

(2) Extend main deckhouse aft approximately 20 feet to provide space for shops and additional crew quarters.

(3) Extend deckhouse on superstructure deck aft approximately 8 feet to provide office and plotting room space.

(4) Extend bridge deck and pilothouse aft approximately 8 feet to provide enlarged bridge area and space for chartroom. Restep foremast on flying bridge deck to eliminate obstruction in working space on bridge deck.

(5) Install davits on main deck to handle two launches, 24 to 26 feet in length.

(6) Revise crew accommodations to provide quarters and adequate sanitary facilities for a crew of 30 men.

(7) Rearrange officers quarters to provide accommodations for five officers.

(8) Revise heating, ventilation, lighting, and sanitary facilities to suit the new arrangement.

(9) Insulate shell plating and exterior sides of deckhouse in way of accommodations.

(10) Renew main propulsion generators, ships service generators, heating boiler, supply and exhaust fans, evaporator, and auxiliary machinery.

(11) Provide complete outfit and equipment.

4. AFT class

(*a*) U.S.S. *Seneca*, ATF 91, was examined at Naval Operating Base, Norfolk, Va., on February 14, 1958, by Capt. W. N. Chovan and Comdr. F. J. Bryant. Ships of this class are fleet ocean tugs with single screw diesel electric propulsion. There are four main propulsion generator sets in one compartment driving four motors in a separate compartment. The four motors drive the single shaft through a common reduction gear. The ship is flush deck with considerable sheer; bulwarks extend the full length of the main deck. The towing machinery in installed on the main deck aft of the deckhouse. There is a tripod mast aft with a 10-ton boom. Operation characteristics except steering are good. Steering is by means of an electrohydraulic steering engine; the poor steering qualities are the result of the hull form rather than defects in the steering system. Stability is good and decks are reasonably dry in rough weather. For operation of the main propulsion machinery the control station is in the motor room but an engineer watch must also be maintained in the generator room. This requires a minimum of four engine room personnel per watch. Officer's quarters are in the

superstructure deckhouse and main deckhouse. The crew messroom and sanitary facilities are in the main deckhouse; crew quarters are on the second deck. The pilothouse is reasonably adequate in size but the chartroom is extremely small There is a small radioroom on the superstructure deck.

Accommodations for a complement of 9 officers and 70 crew members can be provided by rearrangement of existing compartments and extension of the main deckhouse and superstructure. This is the minimum complement needed for continuous operation and provides for eight additional engineroom personnel required for duplicate watch in the two propulsion machinery compartments.

The main propulsion switchboard is a live front installation and as located it creates an extremely dangerous situation as to safety of personnel. Conversion and operation replacement of this hazardous installation with a modern deadfront switchboard to meet minimum safety standards.

(*b*) It is concluded that the ATF class provides the best possibilities of any of the classes examined for conversion to a satisfactory hydrographic surveying ship. Operational efficiency will be restricted by the excessive (17-foot) draft and operational costs will be increased by the necessary 15-percent increase in complement over that required for a ship of the same or greater capabilities designed specifically for hydrographic surveying. Operating costs will be further increased by the fact that converted ships of this class will only have the capabilities of class II surveying ships but will be almost 50 percent larger (1,240 tons light displacement as against 860). The estimated cost of conversion is $1,856,000. Detailed estimates of conversion costs are attached as appendix C.

(*c*) Major features of the conversion required are as follows:

(1) Remove towing machinery and extend main deckhouse aft approximately 40 feet to provide additional crew quarters and workshop space.

(2) Extend superstructure deckhouse forward for approximately 15 feet and aft for approximately 8 feet to provide plotting room and office space.

(3) Extend pilothouse and bridge deckhouse forward for approximately 12 feet and aft for approximately 10 feet to provide chartroom and radio room space.

(4) Extend height of stack casing by approximately 8 feet to clear new superstructure.

(5) Revise crew accommodations to provide quarters and sanitary facilities for a crew of 70 men.

(6) Revise officers accommodations to provide quarters for nine officers.

(7) Insulate shell plating and deckhouse sides in way of accommodations.

(8) Revise heating, ventilation, lighting, and sanitary systems to suit new arrangement of accommodations.

(9) Renew propulsion engines, ship's service generators, heating boiler, supply and exhaust fans, evaporator, and auxiliary machinery.

(10) Install davits on superstructure deck to handle four 26- to 30-foot motor launches.

(11) Replace existing main propulsion switchboard.

(12) Provide complete outfit and equipment.

C. ANALYSIS

1. In assessing the results of the examination of the four classes of existing naval vessels it is apparent that three of the four classes can be converted ot hydrographic surveying vessels of varying degrees of efficiency at costs totaling from one-half to two-thirds of the costs of new construction. In addition to these initial amounts there will be certain increased operating and maintenance costs. The increased operating costs may be ascribed to the following factors:

(1) Ten- to fifteen- percent increase in complement due to arrangement of machinery spaces.

(2) Greater consumption of fuel and other consumable supplies due to the fact that these ships are approximately 50-percent larger than ships of equivalent capabilities specifically designed for hydrographic surveys would be.

(3) Increased maintenance costs due to age, general obsolescence, and light construction.

(4) Intangible costs due to poor operating characteristics, inefficient arrangement, and restriction on possible operating areas.

2. The three classes of ships which it is believed possible to convert for hydrographic surveys will require extensive alteration and rearrangement of substantial cost. All of these ships are 14 to 16 years old and the majority have had hard

service. A considerable part of the auxiliary machinery will require replacement since it will have reached the end of its normal operating life. While the condition of the main propulsion machinery cannot be evaluated except for particular ships, it would not be realistic to assume that it would not require replacement, if not immediately then within a very few years.

3. Regardless of the extent of alteration and conversion which may be undertaken, these ships will remain 15-year-old hulls whose remaining service life cannot be substantially extended. In no case can this remaining service life exceed 15 years and an average not exceeding 10 years can be expected. A substantial part of the cost of a hydrographic surveying ship is in the provision of its outfit and specialized equipment necessary for performance of its mission. The cost of this equipment approximates 10 percent of the cost of construction. This cost is not reduced for converted ships as against new construction since the equipment to be provided is identical.

4. On the basis of the elements discussed in 2 and 3 above the following estimations have been made:

(*a*) MSF type D (class II).

(1) Increased operating costs based on the 10-percent increase in personnel required: $30,000 per year.

(2) Increased operating costs due to propulsive inefficiency: $10,000 per year.

(3) Increased cost of repair and maintenance due to age and obsolescence of hull and machinery: $20,000 per year.

(4) Loss of productive work due to inefficient operations and additional time required for repair and maintenance: 50 days per year at $1,500 per day, $75,000 per year.

(*b*) ATA class (class III).

(1) Increased operating cost due to propulsive inefficiency: $5,000 per year.

(2) Increased cost of maintenance due to age and obsolescence of hull and machinery: $10,000 per year.

(3) Loss of productive work due to inefficient operations and additional time required for repair and maintenance: 15 days per year at $800 per day, $12,000 per year.

(*c*) ATF class (class II).

(1) Additional operating cost based on the 15-percent increase in personnel required: $50,000 per year.

(2) Increased operating cost due to excess displacement and propulsive inefficiency: $35,000 per year.

(3) Increased cost of repair and maintenance due to age and obsolescence of hull and machinery: $30,000 per year.

(4) Loss of productive work due to inefficient operations and additional time required for repair and maintenance: 15 days per year at $1,600 per day, $24,000 per year.

(5) Considering the costs of conversion, the increased operating costs, and cost of inefficient operation, the following estimate forms the basis for comparison of the final cost of converted ships and new construction over a 10-year period.

(*a*) MSF type D (class II):	
(1) Conversion cost	$2,078,000
(2) Increased operating costs	600,000
(3) Inefficient operations	750,000
Total	3,428,000
(*b*) ATA class (class III):	
(1) Conversion cost	$1,072,000
(2) Increased operating cost	150,000
(3) Inefficient operations	120,000
Total	1,342,000
(*c*) ATF class (class II):	
(1) Conversion cost	$1,856,000
(2) Increased operating cost	1,150,000
(3) Inefficient operations	240,000
Total	3,246,000

D. CONCLUSIONS

1. The MSF type B class is basically unsuitable for conversion to a hydrographic surveying ship.

2. The MSF type D class can be converted to a hydrographic surveying ship of low efficiency. The cost of conversion plus increased operational costs over a 10-year period will approximate 90 percent of the cost of new construction. The expected service life of this type of ship will not exceed 10 years.

3. The ATA class can be converted to a hydrographic surveying ship of reduced efficiency restricted to selected areas of operation. The cost of conversion plus increased operational costs over a 10-year period will approximate 80 percent of the cost of new construction.

4. The ATF class can be converted to a hydrographic surveying ship of reduced efficiency. Conversion costs plus increased operating costs over a 10-year period will approximate 80 percent of the cost of new construction. Converted ships of this class will be restricted to selected areas of operation because of excessive draft.

5. The service life of the converted ships will probably not exceed 10 years.

6. The limited utility and restricted operational areas of the converted ships will require an increase in the overall number of ships required for performance of the Bureau's hydrographic surveying functions.

7. Conversion of existing naval vessels to hydrographic surveying ships is not economically justifiable. At a cost of 80 to 90 percent of the cost of new construction this would be a stopgap measure and would only postpone meeting our fundamental needs for a period of 10 years.

F. J. BRYANT,
Commander, Cost and Geodetic Survey,
Chief, Vessels and Equipment Branch.

STUDY OF CONVERSION OF EXISTING NAVAL VESSELS TO HYDROGRAPHIC SURVEYING SHIPS FOR COAST AND GEODETIC SURVEY

APPENDIX A.—*Detailed estimates for cost of conversion of the MSF type D class*

(*a*) Structural changes and accommodations:	
1. Strengthen structural hull (100 tons, at $2,000)	$200,000
2. Enlargement of deckhouse, main deck aft (15 tons, at $2,000)	30,000
3. Alteration and enlargement of deckhouse, superstructure, and bridge decks (substitute aluminum for steel—50 tons, at $3,000)	150,000
4. Insulation of shell and house sides in way of accommodations (4,000 square feet, at $15)	60,000
5. Deck covering in accommodations (10,000 square feet, at $2)	20,000
6. Furniture and furnishings	60,000
7. Subdivision of accommodations	24,000
8. Galley and mess equipment	16,000
9. Revision of lighting to suit new arrangement	12,000
10. Revision and improvement of ventilation and heating to suit new arrangement	64,000
11. Provision of sanitary facilities, including piping and flushing system	38,000
Subtotal	674,000
(*b*) Removals and alterations of equipment:	
1. Provision of new anchor windlass, including installation costs	20,000
2. Removal of magnetic minesweeping system	15,000
3. Installed cost of boat davits and winches	120,000
Subtotal	155,000

APPENDIX A.—*Detailed estimates for cost of conversion of the MSF type D class*—Continued

(*c*)	Replacement, overhaul, and alteration of auxiliary machinery and outfit:	
	1. Installed cost of 8,000-g.p.d. evaporator	$16, 000
	2. Installed cost of new heating boiler	30, 000
	3. Installed cost of 2 200-kw. ship's service generators	80, 000
	4. Installed cost of steering engine to replace existing manual installation	32, 000
	5. Overhaul of machinery not replaced	20, 000
	6. Alterations to main switchboard and electrical system	28, 000
	7. Machine tools	18, 000
	8. Special tools and equipment	8, 000
	Subtotal	232, 000
(*d*)	Main propulsion machinery:	
	1. Overhaul of main engines and reduction gears	60, 000
	2. Additional for main engine replacement if required	345, 000
	Subtotal	405, 000
(*e*)	Provision of navigation, electronic, and surveying equipment:	
	1. Launches and boats	80, 000
	2. Installed cost of automatic steering system (gyropilot)	24, 000
	3. Communications radios	28, 000
	4. Radar, Loran, and RDF (installed cost)	27, 000
	5. Fathometers	24, 000
	6. Electronic positioning systems	132, 000
	7. Oceanographic winch and equipment	18, 000
	8. Miscellaneous navigation equipment	7, 000
	9. Underwater log system (installed)	10, 000
	10. Surveying equipment and instruments	12, 000
	11. Electronic test equipment	4, 000
	Subtotal	366, 000
(*f*)	General costs:	
	1. Design and engineering costs	80, 000
	2. Berthing equipment	12, 000
	3. General repairs and overhaul	154, 000
	Subtotal	246, 000

SUMMARY

(*a*)	Structural changes and accomodations	674, 000
(*b*)	Removals and alterations of equipment	155, 000
(*c*)	Replacement, etc., auxiliary machinery	232, 000
(*d*)	Main propulsion machinery	405, 000
(*e*)	Navigation, electronic, and surveying equipment	366, 000
(*f*)	General costs	246, 000
	Total	2, 078, 000

APPENDIX B.—*Detailed estimates for cost of conversion of the ATA class*

(*a*) Structural changes and accommodations:	
1. Removals (towing winch, fittings, monitor, etc.)	$18,000
2. Extension of deckhouse, main deck aft (12 tons at $2,000)	24,000
3. Alteration and enlargement of deckhouse, bridgedeck (12 ton at $2,000)	24,000
4. Insulation of shell and house sides in way of accommodations (2,000 square feet at $15)	30,000
5. Deck covering in accommodations (4,000 square feet at $2)	8,000
6. Furniture and furnishings	40,000
7. Subdivision of accommodations	12,000
8. Galley and mess equipment	10,000
9. Revision of lighting to suit new arrangement	8,000
10. Revision and improvement of ventilation and heating to suit new arrangement	36,000
11. Provision of sanitary facilities, including piping and flushing system	22,000
Subtotal	232,000
(*b*) Removals and alterations of equipment:	
1. Installed cost of boat davits and winches	45,000
2. Provision of additional refrigeration space	24,000
Subtotal	69,000
(*c*) Replacement, overhaul, and alteration of auxiliary machinery and outfit:	
1. Installed cost of 4,000-g.p.d. evaporator	12,000
2. Installed cost of new heating boiler	18,000
3. Installed cost of 2 100-kw. ships service generators	50,000
4. Installed cost of steering engine to replace existing manual installation	26,000
5. Overhaul of machinery not replaced	18,000
6. Alterations to switchboard and electrical system	16,000
7. Installed cost of new refrigeration machinery	17,000
8. Alterations to fresh and salt water systems	8,000
9. Machine tools	6,000
10. Special tools and equipment	4,000
Subtotal	175,000
(*d*) Main propulsion machinery:	
1. Overhaul of main generator sets	40,000
2. Replacement of main propulsion switchboard	36,000
3. Additional for main generator sets replacement	225,000
Subtotal	301,000
(*e*) Provision of navigating, electronic, and surveying equipment:	
1. Launches and boats	40,000
2. Installed cost of automatic steering system (gyro pilot)	22,000
3. Communications radios	15,000
4. Radar, loran, and RDF	15,000
5. Fathometers	18,000
6. Electronic positioning systems	60,000
7. Miscellaneous navigation equipment	3,000
8. Underwater log system (installed)	8,000
9. Surveying equipment and instruments	6,000
10. Oceanographic equipment	12,000
11. Electronic test equipment	3,000
Subtotal	202,000

APPENDIX B.—*Detailed estimates for cost of conversion of the ATA class*—Con.

(*f*) General costs:	
1. Design and engineering costs	$30,000
2. Berthing equipment	6,000
3. Replacement of propeller	3,000
4. General repairs and overhaul	54,000
Subtotal	93,000

SUMMARY

(*a*) Structural changes and accomodations	232,000
(*b*) Removals and alterations of equipment	69,000
(*c*) Replacement, etc., auxiliary machinery	175,000
(*d*) Main propulsion machinery	301,000
(*e*) Navigation, electronic, and surveying equipment	202,000
(*f*) General costs	93,000
Total	1,072,000

APPENDIX C.—*Detailed estimates for cost of conversion of the ATF class*

(*a*) Structural changes and accommodations:	
1. Removals (towing equipment, monitor, etc.)	$34,000
2. Extension of deckhouse, main deck aft (18 tons, at $2,000)	36,000
3. Extension of deckhouse, main deck, and bridge deck forward (25 tons, at $2,000)	50,000
4. Insulation of shell and house sides in way of accommodations (6,000 square feet, at $15)	90,000
5. Deck covering in accommodations (10,000 square feet, at $2)	20,000
6. Deck covering, weather deck (8,000 square feet, at $2)	16,000
7. Furniture and furnishings	60,000
8. Subdivision of accommodations	26,000
9. Revision of galley and messroom spaces	34,000
10. Galley and mess equipment	16,000
11. Revision of lighting to suit new arrangement	10,000
12. Revision of ventilation and heating systems	80,000
13. Provision of sanitary facilities	40,000
Subtotal	512,000
(*b*) Removals and alterations of equipment:	
1. Installed cost of boat davits and winches	120,000
2. Provision of additional refrigeration space	28,000
Subtotal	148,000
(*c*) Replacement, overhaul, and alteration of auxiliary machinery and outfit:	
1. Installed cost of 8,000-g.p.d. evaporator	16,000
2. Installed cost of new heating boiler	34,000
3. Installed cost of 2 200-kw. ships service generators	80,000
4. Replacement of main propulsion switchboard	60,000
5. Overhaul of machinery not replaced	24,000
6. Machine tools	18,000
7. Special tools and equipment	8,000
Subtotal	240,000
(*d*) Main propulsion machinery:	
1. Overhaul of main propulsion generator sets	40,000
2. Additional for replacement of main propulsion generator sets	410,000
Subtotal	450,000

APPENDIX C.—*Detailed estimates for cost of conversion of the ATF class*—Con.

(*e*) Provision of navigation, electronic, and surveying equipment:	
1. Launches and boats	$80,000
2. Installed cost of automatic steering system (gyropilot)	24,000
3. Communications radios	28,000
4. Radar, Loran, and RDF (installed cost)	27,000
5. Fathometers	24,000
6. Electronic positioning systems	132,000
7. Oceanographic winch and equipment	26,000
8. Miscellaneous navigation equipment	7,000
9. Underwater log system (installed)	10,000
10. Surveying equipment and instruments	12,000
11. Electronic test equipment	4,000
Subtotal	374,000
(*f*) General costs:	
1. Design and engineering costs	60,000
2. Berthing equipment	12,000
3. General repairs and overhaul	60,000
Subtotal	132,000

SUMMARY

(*a*) Structural changes and accommodations	512,000
(*b*) Removals and alterations of equipment	148,000
(*c*) Replacement, etc., auxiliary machinery	240,000
(*d*) Main propulsion machinery	450,000
(*e*) Navigation, electronic, and surveying equipment	374,000
(*f*) General costs	132,000
Total	1,856,000

DEPARTMENT OF THE NAVY,
OFFICE OF THE CHIEF OF NAVAL OPERATIONS,
Washington, D.C., August 18, 1960.

MEMORANDUM FOR THE ASSISTANT SECRETARY OF THE NAVY (RESEARCH AND DEVELOPMENT)

Subject: New construction versus conversion of ships for surveys and oceanographic research.
Reference: (*a*) Assistant SECNAV (R. & D.) memorandum of March 11, 1960.
Enclosure: (1) BUSHIPS letter ser 440–108 of July 29, 1960.

1. As requested by reference (*a*), the Bureau of Ships, assisted by representatives from the Offices of the Chief of Naval Operations, Chief of Naval Research, Hydrographer of the Navy, and Commander, Military Sea Transportation Service, has conducted a study to determine the most feasible approach to provide the Navy with oceanographic research and survey ships required during the forthcoming years. The results of this study are forwarded as enclosure (1).

2. Conversion of old ships may be expected to require more frequent and expensive repairs than new construction and, hence, converted ships may be less available for extended operations. It is the policy of the Chief of Naval Operations to examine very closely expensive conversions of ships as compared to new construction ships in view of the limitations inherent in any conversion, short remaining life, and overall economy. In general, if the cost of a new ship is less than 1½ times the cost of a conversion, the new ship is probably more economical.

3. (*a*) From a study of the "usefulness factor," it appears that only ship types AVP–54, AK–270, C1–M–AV1 and ARS–33 should be considered for conversion, and of these only C1–M–AV1 are available in the number required to contribute significantly to the planned 28-ship oceanographic research and survey program.

(*b*) The small number of AVP–54, AK–270 and ARS–33 available, four, three and one, respectively, will require three designs at considerable cost for the eight ships. In addition, the AVP, of which four are available, is the most expensive

in both conversion and operating costs. The C1–M–AV1 hulls are of World War II construction and have the potential implication of costly repairs and limited life.

4. The reduced scope conversion of AK–270 and C1–M–AV1 or new construction AGS as survey ships only may be an economical means of providing a single purpose survey ship. However, it has been the strong position of the representative of DCNO (development) at working level meetings of the Ship Characteristics Board considering the 1,200-ton surveying ship (AGS) in the fiscal year 1962 shipbuilding program that this ship should have those features eliminated in paragraph 4 of enclosure (1) to permit flexibility of assignment to either research or survey work to meet the changing requirements for such work.

5. In view of the above, it is recommended that new construction ships be built to perform oceanographic research and survey. Further, it is suggested that AGOR and AGS types be built to the same hull and machinery design with only the actual scientific working spaces adapted to perform the research or survey functions, thereby achieving the economies accruing from elimination of design and "lead ship" costs, as well as providing for flexibility of assignment to either research or survey tasks with minimum cost for alteration.

JOHN SYLVESTER,
Deputy Chief of Naval Operations (Logistics).

DEPARTMENT OF THE NAVY,
BUREAU OF SHIPS,
Washington, D.C., July 29, 1960.

To: Chief of Naval Operations (Chairman, Ship Characteristics Board).
From: Chief, Bureau of Ships.
Subject: New construction versus conversion of ships for ocean surveys and oceanographic research.
References: (*a*) Chairman, SCB ltr Ser 181P42 of April 29, 1960.
(*b*) SCB Memorandum 72–60 Ser 0170P42 of April 25, 1960.
Enclosures: (1) Comparison of conversions to oceanographic research and survey ships.
(2) Comparison of new construction oceanographic research and survey ships.
(3) BUSHIPS member SCB ltr Ser 420–172 of July 13, 1960

1. Reference (*a*) requested this Bureau to conduct a study to determine the most feasible approach to providing the Navy with the oceanographic research and survey ships required during the forthcoming years. As stated in reference (*a*), an ad hoc meeting, with representatives from the Offices of the Assistant Secretary of the Navy (R. & D.), Chief of Naval Operations, Bureau of Ships, Office of Naval Research, Hydrographic Office, and MSTS attending, was held to define the parameters of the study. The following guidelines were developed.

(*a*) Four new construction types would be considered: SCB project 185 plus the three types for which general characteristics were promulgated in reference (*b*).

(*b*) Bureau of Ships would determine those reserve fleet ships considered most suitable for conversion and would study those types. New construction requirements would be used for guidance in determining the extent of modifications included in the conversions.

(*c*) All ships would be MSTS civil service manned.

(*d*) All armament and associated magazines would be removed.

2. In investigating the conversions, the first effort by this Bureau entailed determining the type ships to be considered. Ten types were chosen and studied of which three, ATA–211, ATF–155 and APD–127 were discarded as unsuitable because of stability requirements. The remaining seven are listed in enclosure (1) with pertinent information. Because of the widely varying sizes (from 785 tons to 5,850 tons full load displacement) the actual capabilities to be built into the conversions exhibit considerable variation. However, each conversion incorporates the following, in differeing degree:

(*a*) Survey control center.
(*b*) Library, drafting and office space.
(*c*) Wet and dry laboratory space.
(*d*) Photo laboratory.
(*e*) Gravity meter room.
(*f*) Antirolling tank.
(*g*) Storage batteries for ultraquiet operation.

(*h*) Gas turbine generator for quiet operation.
(*i*) Air conditioning of the living, messing, laboratory, and office spaces.
(*j*) Bow propulsion unit.
(*k*) Winches for research and survey.
(*l*) Explosive and scientific storage.
(*m*) Electronics based on new construction requirements.

3. In order to provide some measure of operational usefulness of these seven conversions, the design studies were submitted to the Office of Naval Research and the Hydrographic Office for review and evaluation. Both offices independently assigned a usefulness factor to these conversions as research and survey ships. In both cases the AVP–54 conversion was rated first choice and considered equal in usefulness to the SCB project 185 AGOR. The assigned factors are indicated in enclosure (1).

4. After development of the conversion cost estimates, the Hydrographic Office recommended that consideration be given to a conversion to an ocean survey ship that would be capable of conducting ocean surveys under the direction of the Hydrographer, but would be able to collect only limited oceanographic and meteorological data. The proposal recommended that the AK270 and the C1–M–AV1 types be investigated. Eliminated under this reduced scope conversion would be the following:

(*a*) Storage batteries for ultraquiet operation.
(*b*) Gas turbine generator for quiet operation.
(*c*) All air-conditioning except for the laboratories, survey control center, and gravity meter room.
(*d*) Bow propulsion unit.
(*e*) All winches except the BT and hydrographic winches. Added under this limited conversion would be the following:
(*a*) Accommodations for 4 additional scientific personnel bringing the total to 20.
(*b*) One additional echo sounder, deep, AN/UQN–1B, bringing the total to two.
(*c*) One additional precision depth recorder, bringing the total to two.
(*d*) One streaming winch, T–MK six double drum, on the fantail for magnetic tail.

Information on these reduced scope conversions is also included in enclosure (1).

5. In accordance with the guidelines, four new construction types received original consideration. Early in the study it became apparent that some departure from these guidelines was appropriate. A first draft of preliminary characteristics was developed for a 500-ton AGOR from the general characteristics. These preliminary characteristics were used in this study, were reported on in enclosure (3) and were priced at $3.2 million for the lead ship. It should be noted parenthetically that consideration of a 500-ton AGOR has been recently dropped by the Ship Characteristics Board because the sponsors within OPNAV did not consider that this ship offered sufficient oceanographic capability for the cost. In studying the 1,200-ton AGS it became apparent that it differed in only minor fashion from the project No. 185 AGOR, these differences entailing elimination of some installed equipment for research and the addition of some for survey. Depending upon final selection of equipments, it appeared that the AGS would be about $1.1 million (exclusive of future characteristics changes) more than the $4.9 million AGOR. The 2,000-ton AGS was studied to meet the general characteristics provided. Pertinent characteristics of new construction ships are shown in enclosure (2).

6. The following comments are considered appropriate when using the information in this study. All nine conversions summarized in enclosure (1) and the 1,200 ton and 2,000 ton new constructions are feasible. Except for the AK270, the conversion ships are of World War II construction. These ships are already old and carry with them an implication of frequent repairs, especially of auxiliary machinery. Estimation of useful life after conversion is difficult at best and subject to many variables. For use in further analysis a figure of 10 years additional useful life is a reasonable approximation. The new construction and conversion costs are engineering estimates of end costs covering the basic contract with design work, spare parts, Government-furnished material, post trial corrections and including 13½ percent escalation. The costs are not based on definitive characteristics; they assume inclusion in the fiscal year 1962 shipbuilding and conversion program; and they are not keyed to a specific ship within a class in the case of a conversion. They thus reflect for conversions, to a great extent, statistical averages of expected conditions; and considerable variation from these estimates would not be unexpected in an actual program.

R. B. Bradley, Jr. (By direction.)

Comparison of conversions to oceanographic research and survey ships

Type ship	AVP 54	AK 270	C1-M-AV1	ARS 33	MSF 374	MSF 362	AN 89	Reduced scope to survey AK 270	Conversions ships only C1-M-AV1
CHARACTERISTICS									
Length	310 feet 9 inches.	266 feet 2 inches.	338 feet 8 inches.	213 feet 6 inches.	220 feet 10 inches.	184 feet 6 inches.	166 feet 3 inches.	266 feet 2 inches.	338 feet 8 inches.
Beam	41 feet	51 feet 6 inches.	50 feet	39 feet	32 feet 2 inches	33 feet	33 feet 6 inches.	51 feet 6 inches.	50 feet.
Displacement full load (tons)	2,593	3,885	5,850	1,966	1,270	965	785	3,885	5,850.
Usefulness factor:									
ONR	100	92	96	96	60	59	50		
HYDRO	100	85	80	75	Zero	Zero	Zero	100 [1]	100.[1]
Number available in reserve fleet.	4	3 [2]	50 [3]	1	50	41	11	3 [2]	50.[3]
Endurance	5,430 at 15, 6,980 at 12.	15,000 at 12	36,000 at 10.4	8,950 at 12	4,590 at 15, 6,460 at 12.	5,970 at 12	5,700 at 9	15,000 at 12	36,000 at 10.4.
Provisions (days)	60	90	90	45	45	45	35	90	90.
Number of crew	47	43	37	38	48	48	28	43	37.
Number of scientists	22	16	16	16	16	14	15	20	20.
Conversion cost	$6,400,000	$4,400,000	$4,900,000	$6,100,000	$4,000,000	$4,200,000	$3,900,000	$2,100,000	$2,700,000.
Annual operating and maintenance cost (5-year average).	$889,000	$722,000	$652,000	$703,000	$857,000	$785,000	$552,000	$722,000	$652,000.

[1] For survey use.
[2] Assigned MSTS.
[3] Assigned NDRF.

Comparison of new construction, oceanographic research and survey ships

Ship type	AGOR 500-ton	AGOR(SCB#185) 1,200-ton	AGS 2,000-ton
CHARACTERISTICS			
Length	152 feet	204 feet	250 feet.
Beam	28 feet	37 feet	43 feet.
Displacement (full load, tons)	500	1,370	2,000.
Endurance	{4,500 at 12 {4,000 at 12 [1]	{12,000 at 12	12,000 at 15.
Provisions (days)	30	60	60.
Number of crew	17 or 15 [1]	22	32.
Number of scientists	5	15	18.
Bow propeller	No (yes) [1]	Yes	Yes.
Antirolling tank	Yes	Yes	Yes.
Construction cost (millions)	$3.2	$4.9	$9.7.
Annual operating and maintenance cost (5-year average).	$488,000	$560,000	$684,000.

[1] Indicates reductions if bow propeller is included.

Mr. DINGELL. Now, are you indicating to the committee today that the most efficient type of vessel for oceanographic research is the AGOR type which you have mentioned?

Commander ALEXANDER. No, sir, we have several different types. I am more familiar with the AGOR which is a Navy ship, but the Coast Survey has a very remarkable ship under construction, and has a whole series in future years. The National Science Foundation also is providing funds for a ship to be built by Woods Hole.

Mr. DINGELL. That is the next point I wanted to treat. Has there been any effort to standardize the vessels for oceanographic purposes by the Government agencies which are constructing these vessels?

Commander ALEXANDER. We haven't been able to come up with firm standardization, for instance, we will have a certain class of ships. But just by mutual exchange of information, the Navy has a—I will call it a medium-sized ship—1,375 tons; the Coast Survey is 1,200 tons. The Coast Survey has a ship between 3,300 and 3,800 tons for world ocean survey. The Navy ship is approximately 2,600 tons.

Mr. DINGELL. Then we have two different classes for medium vessels and for world oceanographic surveys.

Commander ALEXANDER. Yes, sir, but they are so close in characteristics and capabilities that for all intents and purposes, they are standardized. The prices are almost alike.

Mr. DINGELL. They are standardized between the two ships, or between the ships in the same class?

Commander ALEXANDER. Well, there is standardization between ships in the same class.

Mr. DINGELL. But there is no standardization between the two competing types which we have established, am I correct?

Commander ALEXANDER. You mean between Coast Survey and the Navy?

Mr. DINGELL. Coast Survey and the Navy, and also as between the Navy and the Coast Survey in Woods Hole, or the National Science Foundation. Am I correct on this point?

Commander ALEXANDER. Well, we have three basic classes of ships, Mr. Chairman. We have a small class, which would be between 500 and 800 tons. We have a medium class, which is now between 1,000 and 1,375 tons, and we have what we would call a large class ship

between 2,600 and 3,800 tons. Within those limits, there has been no standardization. We haven't established just one tonnage that will be good for each class.

Mr. DINGELL. Now, Commander, I am concerned here, because as I read it, we are constructing at least three different classes of ships in the case of the ships that are being constructed by NSF, by the Coast and Geodetic Survey, and by the Navy. What I am going to ask you first is, is there any reason why there has to be so many different kinds and types of vessels for oceanographic survey work?

Commander ALEXANDER. Yes, sir.

Mr. DINGELL. I am not talking about as between the small, the medium, and the large vessel. I am talking about is there any reason why we couldn't have a standard hull, let's say, for small vessels, for large vessels, and for medium-sized vessels, and then change the compartmentation to suit the needs of the agencies which are going to use the vessel.

Commander ALEXANDER. Well, each agency has slightly different requirements than any of the others, and except in the case of the National Science Foundation, the Coast Survey, and the Navy research ships, there just was no way we could standardize on it. The Maritime Administration uses different techniques than does the Bureau of Ships.

Mr. DINGELL. Are you telling me that there is a sufficient difference in the requirements of the vessels that they could not use a standard hull design for the different classes of ships that they are going to utilize within the respective agencies?

Commander ALEXANDER. Well, there are no major differences, Mr. Chairman. There are minor requirement differences, but there are major differences in ship design and shipbuilding techniques among the different agencies.

Mr. DINGELL. Now, as a matter of fact, though, Commander, isn't it true that it is possible to achieve substantial economies by building classes of vessels as opposed to competing and different and divergent classes of vessels?

Commander ALEXANDER. I am not so sure that this would be so, sir. If we standardized on a class that was uneconomical, we would have a turkey with us for the 30 years.

Mr. DINGELL. Of course, if you standardized on a turkey, it would be true whether you were standardizing on a turkey in one instance, or in a number of instances, and this is true in ship construction generally. This is why you have architects and engineers; am I right?

Commander ALEXANDER. Yes, sir; but right now we have three basically different approaches to a medium-sized ship, one by a private naval architect through the National Science Foundation, one through a Maritime Administration architect for the Coast Survey, and one through a Bureau of Ships architect, and they are all fairly close.

Mr. DINGELL. Yes; but now substantial economies would be effected in the taxpayers' interest by having these vessels for all three be standardized insofar as hull is concerned; right?

Commander ALEXANDER. I don't agree with that; no, sir.

Mr. DINGELL. You don't agree with that?

Commander ALEXANDER. No, sir.

Mr. DINGELL. Will you tell me why?

Commander ALEXANDER. Well, the Navy's ship is $4.2 million to build, and the Coast Survey's ship, approximately the same tonnage, is between $4.5 and $4.9 million. I don't see that if we tried to cram the Navy's type of ship down the Coast Survey's throat, or vice versa, that we would necessarily achieve the same type of economy.

We might be able to establish a standardization of ships in a few years after we have enough ships operating so that we can have a basis for standardization. I don't think we can do that now.

Mr. DINGELL. The Navy very frequently standardizes vessels and has a class before they have launched the first ship or laid the first keel; am I correct?

Commander ALEXANDER. Yes, sir, but in a general class of, say, destroyers, the Navy has had extensive experience with destroyer operating capabilities. We have no experience at all with a modern oceanographic ship of any type.

Mr. DINGELL. Well, an oceanographic ship we haven't experienced yet, we have had oceanographic vessels at sea now for how long?

Commander ALEXANDER. Well, they have been at sea for years.

Mr. DINGELL. We have had substantial numbers, too?

Commander ALEXANDER. Yes; but they are all conversions.

Mr. DINGELL. Except for the *Atlantis*?

Commander ALEXANDER. That is correct.

Mr. DINGELL. Do the Russians have standardized classes of oceanographic vessels?

Commander ALEXANDER. Not that I am able to determine. The type of ships that they have all seem to be of different tonnages and capabilities.

Mr. DINGELL. Now, let me ask you, the Navy is going to standardize on the AGOR; are they not?

Commander ALEXANDER. Yes, sir.

Mr. DINGELL. All right. Now, is there any reason why if the Navy is going to standardize on the AGOR for their widely divergent types of oceanographic research that these other agencies would not standardize on it?

Commander ALEXANDER. Well, the Navy will make the ship plans available to the other agencies. I don't know that we could really require the other agencies to follow the Bureau of Ships' design plan.

Mr. DINGELL. I am aware of that. But Congress can.

Now, the thing that concerns me is, has the question of standardizing of vessels ever been explored in your committee meetings and deliberations?

Commander ALEXANDER. Yes, sir; we explored this extensively.

Mr. DINGELL. And what was the result?

Commander ALEXANDER. Well, we agreed that we shouldn't standardize, at least until we have enough operating experience with new ships to find out what types of equipment, what special design features are worthwhile for using in the standardized hull.

Mr. DINGELL. Now, are there any of these features, outside of hull design, so compelling in production of different hull designs for the vessel, itself, that we could not standardize just on the bare hull?

Commander ALEXANDER. I am not in my own mind at all sure, Mr. Chairman, that a 1,300-ton ship will be adequate. We are liable

to find in a few years that we need larger ships. Standardization of this type right now for a whole class of ships might be harmful.

Mr. DINGELL. How many times was the subject of ship standardization discussed within your committee?

Commander ALEXANDER. This was one of the main problems that we discussed through one whole series of meetings before we submitted the recommendations to the CIO. I would estimate that we had four or five meetings concerned with standardization and similar problems.

Mr. DINGELL. And the result of these was that you agreed to disagree in regard to basic ship construction; am I correct?

Commander ALEXANDER. Only for the present, Mr. Chairman. We did agree that the problem should be deferred until we could have enough operating experience with modern ships.

Mr. DINGELL. Now, just one more brief series of questions, here.

You indicate that you are going to establish programs for operating scheduling of oceanographic vessels, for fiscal year 1963. Have you ever done this before?

Commander ALEXANDER. Yes, sir; we did it in fiscal year 1962.

Mr. DINGELL. Are you going to add emphasis to that, or do you contemplate adding emphasis to that kind of a program in future?

Commander ALEXANDER. I don't understand your question, sir.

Mr. DINGELL. Well, in other words, are you going to increase your emphasis on coordinating your schedules on publishing advanced schedules for oceanographic vessels?

Commander ALEXANDER. We hope every March to come up with another pamphlet that will list all of the oceanographic ships that the United States has and the areas in which they operate.

This year we have added a new feature over what we had last year. We are carrying a column on how many visiting scientists can be accommodated aboard each ship.

Mr. DINGELL. Is this information made generally available through the appropriate channels to the people who are in the oceanographic field?

Commander ALEXANDER. Yes, sir; we ran off enough copies of ICO pamphlet No. 1 to give rather thorough distribution to Government laboratories and private institutions. We have since had a number of requests from industry. This year, we hope to be able to print enough copies so that everyone who wants a copy can have one.

Mr. DINGELL. Now, with regard to the Woods Hole vessel that you discussed earlier, has there been any coordination on the design and the letting of the contract with you with the Bureau of Ships and with other Government agencies?

Commander ALEXANDER. I am speaking from memory now, Mr. Chairman. I wouldn't like to be held to what I say, but I seem to recall that in our meetings, the National Science Foundation had checked out the design with a committee composed of representatives of the Bureau of Ships, Maritime Administration, and Bureau of Commercial Fisheries. The contract arrangements, of course, were handled with the National Science Foundation, itself.

Mr. DINGELL. Within the National Science Foundation?

Commander ALEXANDER. That is my impression; yes, sir.

Mr. DINGELL. Were bids let on that, do you remember?

Commander ALEXANDER. I presume they were; yes, sir.

Mr. DINGELL. Was the question of bids ever discussed with you, sir, or within the framework of your committee?

Commander ALEXANDER. No, sir.

Mr. DINGELL. They were not?

Commander ALEXANDER. No, sir.

Mr. DINGELL. As to the relative capabilities or acceptance, and so forth, of bids and the abilities of different shipbuilders to provide a seaworthy and sound vessel according to the terms of the contract to meet the needs of the Government?

Commander ALEXANDER. Not with specific reference to the Woods Hole ship. We did make an extensive study of how each agency allocated bids once the design was established.

Mr. DINGELL. Woods Hole has the first vessel being built by the Government for a private concern, is it not, or a private agency?

Commander ALEXANDER. Well, no, sir.

Mr. DINGELL. Of this type?

Commander ALEXANDER. I think the very first one that will be made available for private institutions will be the first fiscal year 1960 Navy AGOR that will be made available for Lamont.

Mr. DINGELL. I see. The AGOR is good enough for Lamont, but the AGOR is not good enough for Woods Hole, is that it?

Commander ALEXANDER. No, sir. We had two ships planned in fiscal year 1960 for the Navy. One was to go to Lamont, and one was to go to Woods Hole. During one of our initial panel meetings, we found that the National Science Foundation was making plans to provide a ship for Woods Hole. At that time, we thought that the ship would be available before the Navy ship was, so the Navy diverted that ship to Government laboratories.

Mr. DINGELL. Do you know the difference in cost between the two vessels?

Commander ALEXANDER. The Navy's ship costs $4.2 million and this will be a ship that is ready for sea. My records show $3.5 million in 1962 and $1.5 million in 1961 for NSF. The National Science Foundation has spread their costs over a number of years. I think the costs for both ships are on the same order.

Mr. DINGELL. So it is nearer $5 million instead of $3.2?

Commander ALEXANDER. $4.2 million for the Navy, sir.

Mr. DINGELL. And an even $5 million for the NSF?

Commander ALEXANDER. I presume so, Mr. Chairman. I would have to check.

Mr. DINGELL. That is $800,000 difference, because they are——

Commander ALEXANDER. If you will permit me, sir, I would like to check the figures and then submit them for the record.

(The requested information follows:)

DEPARTMENT OF THE NAVY,
OFFICE OF THE CHIEF OF NAVAL OPERATIONS,
Washington, D.C., March 7, 1962.

Mr. JOHN DREWRY,
Chairman, Subcommittee on Oceanography,
House Merchant Marine and Fisheries Committee,
House of Representatives, Washington, D.C.

DEAR MR. DREWRY, The attached material, requested by the subcommittee is submitted for inclusion in the record of the subcommittee's hearings on the national oceanographic program.

I have also been informed by Dr. John Lyman of the National Science Foundation that my testimony on March 1, 1962, concerning the Foundation's shipbuilding

program should be modified somewhat. It is therefore requested that the following statement be entered in the record as a modification of my original testimony:

"The National Science Foundation provides funds to private institutions to build or convert ships for oceanographic purposes. In the case of the Woods Hole ship, Foundation funds were provided Woods Hole to build a new ship. The design of this ship was reviewed by a committee composed of the Maritime Administration, Bureau of Ships, and Bureau of Commercial Fisheries. Funds are being provided to Texas A & M to convert a surplus Army ship to an oceanographic ship. In both instances, title to the ships will remain with the institutions concerned and not with the National Science Foundation or any other branch of the Government."

I regret the necessity for the above corrections and trust that the changes will meet with the committee's approval.

Sincerely yours,

ROBERT J. ALEXANDER,
Commander, U.S. Navy,
Chairman, Ship's Panel of Interagency Committee on Oceanography.

Comparison of medium-sized oceanographic ships sponsored by various Government agencies

	National Science Foundation	Coast Survey	Navy
Length---feet	195	190	204
Draft---do	16	14	15
Displacement---tons	2,110	1,350	1,350
Speed---knots	13	14	12
Range---miles	8,000	6,000	12,000
Crew	28	46	23
Scientists	25	23	15
Design cost	$300,000	$300,000	$408,000
Contract cost	3,876,000	3,890,000	2,469,000
Spare parts and miscellaneous	656,400	500,000	790,000
Total cost	4,832,400	4,690,000	3,667,000

Although generally similar in size and mission, a comparison of the above ships based primarily on cost may be open to misinterpretation because of the variations in personnel accommodations and range among the three ships. The above figures apply to the first ship in a class. Follow-on ships will be less costly because design costs are absorbed in the first ship. In addition to the above funds the Navy has budgeted an additional $600,000 to cover potential growth and unexpected contingencies. If this money is not needed before delivery of the ship, the total cost of the Navy ship will be $3,667,000 as indicated.

Mr. DINGELL. I would like to know that. I think it would also be useful to us to have information as to the cost of instrumentation that is going to be furnished by the Navy and by the NSF.

Commander ALEXANDER. You mean extra instrumentation, Mr. Chairman, above the $4.2 million?

Mr. DINGELL. Yes, so that we can get a fair comparison. I don't want to compare bare bones.

Commander ALEXANDER. I understand; yes, sir.

Mr. DINGELL. Commander, you have been very helpful. I want to commend you on your excellent testimony this morning. The committee is grateful to you.

Commander ALEXANDER. Thank you, sir.

Mr. DINGELL. And I know that you work very hard and I hope you will take the good wishes and the commendations of the committee with you.

Commander ALEXANDER. Thank you very much, sir.

Mr. BAUER. Mr. Chairman, at this time I would like to introduce for the record the information about the *Eltanin.*

Mr. DINGELL. Without objection, it is so ordered.
(The information referred to follows:)

USNS "ELTANIN" ON WASHINGTON, D.C., VISIT TO JOIN U.S. RESEARCH FLEET

The USNS *Eltanin*, recently converted to serve as a floating laboratory for research in antarctic waters, joins the research fleet of the United States with this week's official visit to Washington to mark the event. She will begin her first antarctic cruise in early April, following her postconversion shakedown cruises, the National Science Foundation announced today.

"*Eltanin* is really a full antarctic research station, but afloat instead of land based," said Dr. Alan T. Waterman, NSF Director, in making the announcement. "She will be equipped not only for physical oceanography and marine biology studies, but also for atmospheric physics research, submarine geology, and meteorology. She will enable U.S. scientists to do research in areas of the world that have scarcely been explored, let alone studied scientifically.

"We are proud," he said, "to make her available to the scientific community, and delighted with the excellent arrangements being made by the Military Sea Transportation Service, which operates *Eltanin* for us."

Dr. Albert P. Crary, Chief Scientist of the Foundation's Office of Antarctic Programs has been named Chief Scientist for NSF aboard the *Eltanin* for her first cruise.

With a length of 266 feet and full load displacement of 3,886 tons, *Eltanin* will accommodate about 32 scientists and technicians from 12 university and Government scientific organizations. She will be operated by a 47-man civilian crew of the U.S. Navy's Military Sea Transportation Service.

Eltanin is named after a navigational star of the constellation Draco in the far northern sky. Completed in 1957, her original purpose was resupply of arctic radar stations. Her bow is cut back to enable her to ride onto ice instead of hitting it, to help her break through, but she is not designed to penetrate heavy pack ice.

Master of the ship is Capt. Sven Rydberg of MSTS.

Conversion of *Eltanin* consisted of substantial rearrangement of both interior and deck spaces, to provide scientists with the laboratories and facilities they require. Cargo holds were replaced by a meteorology laboratory, marine biology laboratory, electronics laboratory, hydrographic laboratory, and scientists' staterooms. A large cosmic ray scintillation counter was installed.

Aft, a hangar for inflating weather balloons and a platform for launching them was provided. A helicopter deck was also added.

Large antiroll tanks have also been provided, which will make the ship more stable. Equipment added includes a deep-sea coring winch, bathythermograph winches, and antenna for measuring low-frequency and high-frequency radio noise.

The National Science Foundation budgeted $1,500,000 in fiscal year 1961 for conversion of the *Eltanin*, and $700,000 in fiscal 1962 for maintenance and operations.

The course of the *Eltanin* in antarctic waters will be a series of north-south lines, each leg about 125 miles apart, crossing and recrossing the antarctic convergence, where the cold waters from Antarctica sink under the warmer waters of the Atlantic, Pacific, and Indian Oceans. This is an area of especial interest to scientists because it is exceptionally rich in marine life, the action of the currents is very important to Southern Hemisphere oceanic movements, and the climate of the Southern Hemisphere is believed to be vitally affected by the action of waters at the convergence.

Eltanin will steam south to the antarctic pack ice, steam westward, parallel the ice front, then northward to 55° S. latitude (at about the tip of South America), move further westward again and repeat the process. Each cruise will be about 6 weeks long, with a rest and resupply period in Valparaiso, Chile, or other southern ports following each cruise.

The first cruise will take place in the Drake Passage and Scotia Sea areas, the famous stormy waters off Cape Horn between South America and Antarctica. Succeeding cruises will take place in the southernmost areas of the Pacific Ocean.

Scientific work to be undertaken on *Eltanin's* first cruise will consist of the following:

> A study of the fundamental biological characteristics of the southern oceans, particularly in the area of the antarctic convergence, will be made by University of Southern California scientists. In an area abundant in

many forms of sea life, they will study the kinds and distribution of the fish, with the aid of a $108,450 NSF grant.

Studies of the plankton (miniscule marine life that serve as basic food source for most other sea creatures) and nutritional factors of the southern oceans will be undertaken by Lamont Geological Observatory of Columbia University with the aid of a $34,585 NSF grant.

Gravity and magnetic studies will be made by the Polar Research Center of the University of Wisconsin, to gain a better understanding of geophysical characteristics of the Antarctic and its surrounding regions. A Foundation grant of $23,032 supports this work.

Studies of large-scale circulation of the atmosphere in the Southern Hemisphere will be aided by U.S. Weather Bureau meteorology studies aboard the *Eltanin*, to provide data in areas never before reported on systematically. An NSF grant of $93,390 supports this phase of the Weather Bureau's extensive antarctic research efforts.

The area distribution of calcium carbonate saturation at various ocean depths will be studied by the Texas A. & M. Research Foundation under an NSF grant of $36,670. Purpose of these studies is to understand carbonate sedimentation and the mechanism of equilibrium of carbon dioxide between the air and the sea.

Collection of airborne insects—part of a Pacific-wide study that has been carried on for several years—will be undertaken by the Bernice P. Bishop Museum of Honolulu with the aid of a $9,180 grant from the Foundation.

Low-frequency radio noise signals will be studied by Stanford University scientists. These "whistlers" are known to bounce from points near the earth's surface out into space, then back again, following the earth's magnetic lines of force. *Eltanin's* track will lie along these magnetic force lines. Stanford's work is assisted by a $186,010 NSF grant.

Geology of the Antarctic Continent and the southern parts of South America, to find out about structural connections between the two, will be studied by Florida State University workers under a $33,420 grant from the Foundation.

Bartol Research Foundation, Swarthmore, Pa., will continue its cosmic ray meson studies aboard the *Eltanin*. Bartol has participated in such studies on the Antarctic Continent for several years and will be supported in this phase of the work by an NSF grant of $37,950.

The Boulder Laboratories of the National Bureau of Standards will carry out a program to determine the range and variability of radio noise of the ocean areas in high southern latitudes, under an NSF grant of $71,850.

The University of Alaska, which has vast experience in the study of northern aurora, will have a special photometer aboard the *Eltanin* to observe the southern aurora. The photometer will continuously record specific wave lengths of the auroral light, including atomic oxygen radiation, nitrogen groups, and high latitude sodium twilight. This work is supported by a $38,612 NSF grant.

The Lamont Geological Observatory of Columbia will conduct ocean current studies with special current meters attached to anchored buoys, so that over a period of several days or weeks, absolute current values will be obtained at intervals from the surface to the bottom of the oceans. An NSF grant of $104,061 supports this project.

Texas Instruments, Inc., of Dallas, has contracted with the foundation to provide a team of six men to operate the deep-sea winch, run the electronics and machine ships, and do routine collecting for the oceanographic scientists aboard. The contract amount is $139,775.

Dr. A. P. Crary, chief scientist for NSF on *Eltanin*'s first cruise, is a veteran of several years research in both the Arctic and Antarctic. About 1 year ago, February 12, 1961, he became probably the first man ever to have set foot on both the North and South Poles when he arrived at the South Pole with an eight-man scientific party he had led overland 1,200 miles from McMurdo Sound. He had been at the North Pole in 1952 doing scientific work on ice island T–1. During the International Geophysical Year he was deputy chief scientist of the Antarctic program of the U.S. National Committee for the IGY, station scientific leader of the Little America Station, and leader of two major traverses from that station. He now resides in Washington, D.C.

Capt. Sven Rydberg, master of the *Eltanin*, has had 27 years' sea service. He is an MSTS veteran and has served as first officer on many ships. His last assignment before coming to the *Eltanin* was as master of the USNS *AKL–17*,

involved in resupplying Texas towers off the east coast. He lives at 2 Ridgewood Drive, Rye, N.Y. The Rydbergs have three children.

Mr. DINGELL. The Chair and the committee apologize to those who were present again with us today for having taken so long. This is a very important subject and I know our witnesses have been very patient and understanding and, as I have indicated, the Chair is particularly appreciative of that attitude.

We still have remaining on the witness list Dr. Stewart, Dr. Maxwell, Mr. Abel, and Dr. Dees.

Gentlemen, would it be convenient for you to be with us tomorrow?

As I say, I do apologize. I am aware of your concern and the fact that you are busy, and appreciate your interest.

If there is no objection on your part, then, gentlemen, we will ask you to be present with us tomorrow. The subcommittee will stand adjourned until 10 o'clock tomorrow.

(Whereupon, at 12:25 p.m., the hearing in the above-entitled matter was recessed, to be reconvened at 10 a.m. on the following day.)

STUDY OF THE EFFECTIVENESS OF THE COMMITTEE ON OCEANOGRAPHY OF THE FEDERAL COUNCIL FOR SCIENCE AND TECHNOLOGY

FRIDAY, MARCH 2, 1962

HOUSE OF REPRESENTATIVES,
COMMITTEE ON MERCHANT MARINE AND FISHERIES,
SUBCOMMITTEE ON OCEANOGRAPHY,
Washington, D.C.

The subcommittee met at 10 a.m., pursuant to recess, in room 219, House Office Building, Hon. John D. Dingell (acting chairman) presiding.

Mr. DINGELL. The Subcommittee on Oceanography of the Merchant Marine and Fisheries Committee will come to order.

We are honored to have as our first witness this morning Mr. Robert B. Abel, Assistant Research Coordinator of the Office of Naval Research.

Mr. Abel, you are most welcome, and we are happy to have you.

Mr. ABEL. Thank you, Mr. Chairman.

STATEMENT BY ROBERT B. ABEL, SECRETARY, INTERAGENCY COMMITTEE ON OCEANOGRAPHY OF THE FEDERAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Mr. ABEL. Gentlemen, I am most grateful for the privilege of appearing before you as Secretary of the Interagency Committee on Oceanography. The working group of the Interagency Committee on Oceanography might be considered the staff arm of the ICO. Its present membership includes:

Chairman, Research Panel, Dr. A. E. Maxwell (Office of Naval Research), and Dr. I. E. Wallen (Atomic Energy Commission).

Chairman, Surveys Panel, Dr. H. B. Stewart, Jr. (Coast and Geodetic Survey).

Chairman, Ships Panel, Comdr. R. J. Alexander, of the Office of the Chief of Naval Operations.

Chairman, Manpower and Training Panel, Dr. B. C. Dees (National Science Foundation).

Assistant Chairman, Instrumentation and Facilities Panel, Mr. H. H. Eckles (Bureau of Commercial Fisheries).

Comdr. S. N. Anastasion, assistant to Dr. Wakelin, the Chairman of the Interagency Committee.

Dr. John Lyman, National Science Foundation.

Mr. Robert B. Abel, ICO Secretary.

In beginning, I should emphasize that this group is not a formally constituted body as are the advisory panels. As has been noted in

previous testimony, advisory panels address themselves to interagency problems pertaining to individual oceanographic subject areas: Research, survey, instrumentation and facilities, ship construction, and manpower and training. Problems involving more than one of these areas are normally handled by joint meetings of panels.

Occasionally problems arise which cut across many individual panel structures. On these few occasions the panel chairmen are called together with such other representatives of Government agencies as would be directly interested in the subject at hand. This usually occurs with respect to preparation of the national oceanographic program document, both as a recommendation to the Federal Council for Science and Technology, and later in published form as the President's program for the particular fiscal year.

Normal procedure in preparing the program begins with compiling the various panel contributions. and forwarding them with drafts of introductory, concluding, and other such statements as apply to all panel chairmen. They are then convened as a working group to review and modify the program as necessary in preparation for printing.

Pursuant to the request of the Special Assistant to the President for Science and Technology, the working group will shortly be preparing a 10-year national oceanographic plan. This plan is designed to spell out what we are trying to achieve in the marine sciences during the next 10 years.

Once the objectives and problems have been defined, the ICO can more effectively achieve cooperative effort among participating agencies. The annual national oceanographic program will be more meaningful if developed in the context of future goals and future agency missions. In addition we will be in far better position to develop our programs in phase, taking into account that all facets of oceanographic activity are closely interrelated and increase in emphasis on one facet must be achieved by correspondingly stimulating others.

For example, an increase in research requires an increase in manpower; increased manpower requires expansion of training facilities and faculties. None of these is developed overnight. The long-range plan may be somewhat similar to the Navy's TENOC plan, but it will be more general in nature, owing to the heterogenous nature of participating agencies.

Now if you will permit me to run down some of the miscellaneous activities. The Coordinating Committee on Oceanography is an informally constituted body tenuously affiliated with the ICO. It is composed of middle-management representatives of all of the Washington agencies sponsoring or carrying out oceanographic programs. The purpose of its forum-type meetings is essentially that of communications. Each member describes the progress of his programs for the edification of others.

The meetings are held successively in each of the Government agencies participating in the national oceanographic program. The chairman of the day, selected from the host agency, runs the meeting and carries out any recommendations originated therein.

The working group has served as a convenient mechanism for extending the boundaries of the ICO to allied programs of nonmember agencies. For instance, the Smithsonian Institution is now represented on the ICO's Panel on Research. This brings into the pro-

gram an excellent project concerning taxonomic research on marine organisms.

We are currently exploring, with representatives of the National Aeronautics and Space Administration, areas of profit common to research in the ocean and in space. It is too early to predict the outcome of these meetings, but the potential of communications satellites with respect to monitoring remote chains of unmanned oceanographic stations cannot be ignored.

Other activities with which we are or will shortly be in communication for like purposes includes the National Security Industrial Association (as described by Dr. Wakelin), the Science Information Exchange Service, the National Institutes of Health, and, of course, allied committees and panels of the Federal Council for Science and Technology.

That concludes my statement, Mr. Chairman. I will be happy to answer any questions within my capacity.

Mr. DINGELL. Mr. Bauer?

Mr. BAUER. Would you give us for the record, Mr. Abel, the statistical picture of the various members of the various working groups, and how many various committees and memberships in the ICO there are, for the record?

Mr. ABEL. Yes. Will you permit me, then, to exclude the working group itself, since it is an informal association of the panel chairmen, and called together almost by definition? And also excluding the, I should say, out-of-town representatives; that is, the representatives of the National Academy of Sciences Committee on Oceanography, who are affiliated with each of the ICO panels, as observers.

There are 45 professional scientists in the Government agencies holding memberships in 72 Panel positions. Of these, 30 members hold 1 panel membership, 7 people hold 2 panel memberships, 6 people hold 3 panel memberships, and 2 people hold 5 panel memberships; including an alternate membership on the ICO itself.

Now I should emphasize that in an agency which directs its effort elsewhere, not within-house programs, such as the Office of Naval Research, for instance, you simply do not have any number of scientists who can be placed on Committee and panel memberships. When you are limited to a staff of two or three, and that is all you have to draw from, it is definitively necessary for them to accept these positions.

What it comes out to, in brief, is that the average member of ICO panel structures holds down about 1½—if you will permit this sort of statistic—panel memberships.

Mr. BAUER. On the other hand, is it not true, Mr. Abel, that there be certain Panels that—well, let us mention specifically the Panel of Research, about which we will hear from Dr. Maxwell later—took a month off and worked continuously on the problems of their panel. Is that correct?

Mr. ABEL. I am afraid that Dr. Maxwell would be in a much better position to answer that than myself. I do not recollect any such occasion, although there was a period of 3 days, if I remember correctly—and I cannot state for sure—that they had occasion to visit research activities out of town.

Undoubtedly, Dr. Maxwell can expound on this. This is entirely an educational maneuver that is quite profitable.

Mr. BAUER. How about the Survey Panel?

Mr. ABEL. No, sir; I do not believe so.

Mr. BAUER. In other words, the Survey Panel, was that the one that took the month to get the show on the road?

Mr. ABEL. I am afraid I do not understand the question. What I was referring to was a 3-day trip out of town to review certain activities within their area of cognizance.

Mr. BAUER. I was referring to amount of time away from their Government positions. In other words, what I am driving at is the question of when there are two people, for example, who are on five panels, and an alternate member of ICO, how much time can he devote to his official position? I think one of these is Mr. Eckles, is it not?

Mr. ABEL. Well, Mr. Eckles does serve on more than one panel, it is true, but in a great many cases, as I understand it, Mr. Bauer, the positions that these men hold down both nominally and actually or completely are very closely identified with ICO work; and in some cases the very nature of the jobs that they hold nominally in the Departments are so bound up with ICO work as to be almost unrecognizably different.

Mr. BAUER. Do you have any budgetary information you can supply this committee?

Mr. ABEL. Yes, I have the comparisons of the actual 1961 budget, the 1962 budget and the 1963 President's budget for submission for the record, sir.

(Previously submitted for the record. See p. 32.)

Mr. BAUER. In these budget splitups that you have, is there any question of the budget moneys there being associated with the renaming of an already existing job as an oceanographic position?

Mr. ABEL. You mean a——

Mr. BAUER. In other words, after the National Academy's report, is it not true that suddenly we had people that were formerly, we will say, good fisheries biologists who became oceanographers?

Mr. ABEL. The semantic problem associated with defining an oceanographer has proved, possibly, the toughest single job facing any of us. It has been described by so many people, by so many committees, so differently that it would be impossible for me—or, I suspect, almost anyone—to say to any given person in any given job "You are" or "are not an oceanographer."

Mr. BAUER. Did the money suddenly appear in the oceanographic splitup that previously was in, say, the Bureau of Commercial Fisheries for marine biology, fisheries biology, and so on?

Mr. ABEL. Not to my knowledge, sir. There was one hydrographic survey where it was decided after examination of the work that it should be included properly as part of the national oceanographic program. Accordingly, in all of our fiscal submissions, we have extrapolated these figures back so that the figures are comparable and in harmony.

Mr. BAUER. Is that the same situation that you have in the Coast and Geodetic Survey? I think there was some $9 million?

Mr. ABEL. Yes, sir; it is about $9.3 million, as I remember it, and the situation in the Coast and Geodetic Survey is it was the same kind of activity, but had been reported right along.

Mr. BAUER. In other words, there was no transfer of funds into the oceanographic splitup that you have, budgetwise, that went with

the reassignment of the jobs as oceanographers to those people who were formerly fisheries biologists, or surveyors, or something of that nature?

Mr. ABEL. Not to my knowledge, sir.

Mr. BAUER. That is all I have, Mr. Chairman.

Mr. DINGELL. Mr. Pelly?

Mr. PELLY. Well, just for my information, Mr. Abel, are you a full-time secretary? Are all your efforts directed in connection with your work for the Interagency Committee?

Mr. ABEL. Yes.

Mr. PELLY. Or do you have another hat or two?

Mr. ABEL. I suppose we all do, really, Mr. Pelly. My nominal position is, as I was introduced—an assistant research coordinator in the Office of Naval Research. I devote about full time to the affairs of the Interagency Committee on Oceanography. It is true that there is a portion of the ICO identified work that is naturally bound up with ONR activities, and in that sense, I do associate with the Office of Naval Research, and carry our functions of that office.

Mr. PELLY. Dr. Wakelin assigned you to this particular responsibility, I take it?

Mr. ABEL. Yes, sir; I report to Dr. Wakelin.

Mr. PELLY. And as such, though, your actual position is in the Navy's own budget, though, not under any other?

Mr. ABEL. Yes, that is correct.

Mr. PELLY. That is all.

Mr. DINGELL. If Dr. Wakelin had not assigned you to practically full time, there would be no full time staff with regard to the ICO; am I correct, Mr. Abel?

Mr. ABEL. Commander Anastasion, who is Mr. Wakelin's assistant, devotes a great part of his schedule to the ICO affairs, and in addition, I have an assistant full time for ICO, and a secretary, also full time for ICO.

Mr. DINGELL. I see. But if ONR were not furnishing the staff, as you indicated—by the way, it is a very excellent staff.

Mr. ABEL. Thank you, sir.

Mr. DINGELL. ICO would have no full-time staff; am I correct?

Mr. ABEL. That is literally true, sir. I wonder if I might point out something? The great part of the ICO staff activity comes from without the nominal ICO staff. It is performed by a great deal of very excellent panel work on the part of the members in other agencies, whose jobs are so closely identified with ICO work that they really contribute, and sizably.

Mr. DINGELL. Right. Now I am concerned with a couple of items which appeared in your statement on page 3.

You indicated "the purpose of its forum-type meetings"—referring to the Coordinating Committee on Oceanography—"is essentially that of communications."

Is that the only purpose of the Coordinating Committee's meetings?

Mr. ABEL. No, sir; I should have clarified that, admittedly. To me personally, the Coordinating Committee on Oceanography has a responsibility for—and carries it out in excellent fashion—exactly one product, and that is education.

As we go to these CCO meetings, we are addressed by members, consecutively, of one agency after another, who describe in some

detail the programs which they are carrying out. This is a marvelous mechanism for associating the people of other agencies with these projects, and acquainting them with the work done.

Mr. DINGELL. Well, concededly, it is very good, but the point I am getting at is this: Are you directing, or does the Coordinating Committee of ICO direct its attention to any supervisory scrutiny, to assure that coordination takes place?

Mr. ABEL. Very informally, sir, the panel chairmen, and most of the panel members, commonly attend all of the CCO meetings, and by a process of absorption are thereby acquainted with the value of these meetings, and the information that is disseminated therein.

Mr. DINGELL. Well, I will concede there is value in these meetings, but that still does not resolve the question. Are we better having a mere interchange of information, or should we direct ourselves at having a more forceful coordination program? That is what this committee is interested in, and apparently these are excellent forums, excellent insofar as interchange of information, but the point I am leading to is: Are they adequate, in view of the fact that it appears to me, at least on first blush, that there is need for actual and quite forceful coordination in some instances?

Now, how we work this, I do not know. I would like to have your comments.

Mr. ABEL. Yes, sir; the ICO does not exercise a command authority over the Coordinating Committee on Oceanography. The Coordinating Committee on Oceanography is an informal structure. It exists simply because there is value received from it, and it is necessary to the ICO members and their staff men, and the Panel Chairmen, to know what is going on.

This is the essence of the work they do, and this is one mechanism by which they obtain this information.

Mr. DINGELL. Now let us take a case in point. Let us take the instance where we have all of these shellfish research organizations being conducted by at least two agencies of the Government, up and down the east and west coast: some dealing with the impact of shellfish on human beings; some dealing with the impact of pollution on shellffsh; and one thing and another.

How do we utilize an instrumentality which exists solely for the interchange of information to determine priorities necessary to assure that we will have one facility where one facility will do the job; or two, rather than three or six or nine?

Mr. ABEL. I am insufficiently acquainted with that particular situation, Mr. Chairman, but I can answer in the broad sense, that in order to achieve coordination, you first must have knowledge. And whether you obtain the knowledge from systematic perusal of reports or from listening to people telling you what is going on is immaterial; but you have to have the input of knowledge.

This seems to me to be one excellent mechanism for doing this; for instance, taking this case without going into the details of it, there are Federal agencies who exercise sponsorship of some of these projects you are speaking of.

Now within the course of the coordinating committee meetings, it is probable that someone associated with these projects will be describing them, and this is the instance for pickup on the part of the panel members, and the panel chairmen, whose responsibilities lie therein.

Mr. DINGELL. All right, now conceding that that is true, would you say that if we have the series of different instrumentalities, of different divisions of the Government, performing substantially similar or identical work, that we have a situation where this committee and perhaps the Congress can infer that the ICO is not as perfect in its functions as we would like to have it be, with regard to coordinating activities of the Government; and its serving only as an interchange is not a sufficient carrying out of the functions that we would like to have it carry out?

That is an awful question.

Mr. ABEL. I agree, sir. As staff secretary to the organization, it is a little bit difficult for me to comment on a possible situation like that.

I think it is fairly well acknowledged, though, and it has been brought out from previous testimony, the ICO is not perfect. Its members are trying to make it perfect, and there is, we hope, considerable progress in this field.

Mr. DINGELL. Well, I think this committee seeks to assist. We are not holding public criticism; nor are we trying to embarrass any person who comes before us. But, at the same time, we want to help the ICO, perhaps to scrutinize the changes you can make for yourself or perhaps help this committee determine if there is not legislative change that we can make to assist you to perfect the ICO.

Now, let me ask you this: I know that generally the various representatives of the agencies to this are sub-Cabinet in stature. Now, assuming that this is an informational interchange, without any higher authority, how is someone who is sub-Cabinet, and not necessarily policy level, going back and on the basis of an informational interchange only going to compel policy changes within the agency of which he is a representative in order to effect a more perfect coordination by that agency with other agencies doing the same or similar or competing work?

Mr. ABEL. Are you speaking now of the relationship of the Coordinating Committee to the ICO?

Mr. DINGELL. I am speaking in terms of the relationship of the Coordinating Committee to the ICO, and in terms of the individual membership of the representative delegations, if you want to use the term, of the representative Government agencies with regard to their own duties in ICO to their duties and their responsibilities in effecting a coordination.

In other words, how is, let us say, a person under policy level going to come in, get information, and then go back and compel the whole vast bureaucracy that he represents in his particular agency, to effect changes which will perfect the coordination of that agency with another agency which is doing similar, or competing, or complementing work with another agency?

Mr. ABEL. Well, there again, sir, I think that is policy opinion, which I am not well qualified to comment on; but it seems to me that anyone who is in any line position is entitled to use any information at his disposal to conduct affairs at levels of organizational structure subservient to himself.

Mr. DINGELL. I do not challenge this. This is true. But how does somebody out of a policymaking level, without extraordinary backing by those on policymaking level, effect a change of position

of the Department he represents to more perfectly coordinate the organizations of that Department with other Departments?

Mr. ABEL. Let me see if I understand this. You are asking how a person who does not have a certain authority——

Mr. DINGELL. A nonpolicy person; and as I read the list of officers and members and delegates of ICO and also the Coordinating Committee, there is not a man there, with the possible exception of Secretary Wakelin, who is of policy level.

Mr. ABEL. Well, the degree of policymaking ability consistent with each of the ICO member's position, is something that he would be far more qualified to comment on than myself. I think that most of them are bureau chiefs.

Mr. DINGELL. I am not trying to embarrass you, I assure you, and I am not trying to create problems with the organizations which you represent, and on which you serve, but will you concede that as a matter of policy within the Government, effective coordination can only be achieved between persons on the policy level; as opposed to persons who are subpolicy level?

Mr. ABEL. Yes, at that actual point of policy determination and effectuation, but previous to that point, there must be a feed-in of information and education which has to be carried out at a level whereby the man can physically associate himself with the material at hand.

Mr. DINGELL. Is it not true, though, that the vast majority of the representation of the various Government agencies on ICO are not only subpolicy, but substantially subpolicy in dignity and position?

Mr. ABEL. I cannot answer concerning policy. They are bureau chiefs. They are not at the Secretarial level, sir, nor at the Assistant Secretarial level; except for Dr. Wakelin, that is correct.

Mr. DINGELL. As I read the law, policy-level positions are Cabinet positions, are they not, and under those positions, they are strictly administrative, and are so viewed in the civil service law: for example, with regard to changing-of-the-guard when there is a change of the administration. Am I wrong on that?

Mr. ABEL. It sounds right. I would presume that a man in charge of a bureau dictates policy within his bureau.

It is correct, of course, that these gentlemen are not members of the Cabinet.

Mr. DINGELL. I would like to ask just one more question, and I am going to yield to Mr. Bauer.

You noted on page 2 of your statement that a recommendation to the Federal Council for Science and Technology from ICO is later published as the President's program in oceanography for the fiscal year. Has there been a publication of the President's program for oceanography for this year?

Mr. ABEL. No, sir. It is in process right now. We expect it——

Mr. DINGELL. It is in process?

Mr. ABEL. Yes, sir.

Mr. DINGELL. Was there one published for last year?

Mr. ABEL. Yes, sir, March 19.

Mr. DINGELL. There was one published last year. Let me get to this point, now. Would I be fair in inferring that before we can have an intelligent appraisal, or an intelligent formulation of our annual programs for oceanography that we ought to have a long-term program for oceanography? Am I correct in that?

Mr. ABEL. Yes, sir; that would be extremely valuable, and that is what we hope to effect in a matter of a few months.

Mr. DINGELL. And at this moment, we do not have a long-range program for Government oceanography; am I right?

Mr. ABEL. No, sir; not at this very moment.

Mr. DINGELL. And yet we are publishing annual programs?

Mr. ABEL. Yes. I cannot actually give a clear answer as to why the chicken came before the egg in this case. I would suspect it is harder to write a 10-year program, especially in the situation where the ICO has but recently come into existence.

Mr. DINGELL. This is not intended to be critical, because I understand that ICO is a very new creature in the Government, and has had only a limited amount of time in which to begin its operations. We are anxious to see that it gets off on the right foot. Mr. Abel, you have been most helpful.

Mr. Bauer?

Mr. BAUER. I just have one question: Does the Army have any interest in oceanography?

Mr. ABEL. Yes, sir.

Mr. BAUER. Where is that interest?

Mr. ABEL. It lies mostly within the Beach Erosion Board of the Corps of Engineers.

Mr. BAUER. Is that an important function?

Mr. ABEL. May I give a personal opinion in this case?

Mr. BAUER. Yes.

Mr. ABEL. Yes. I believe myself that they carry out quite an important function.

Mr. BAUER. Why are they not represented on any panel of the ICO?

Mr. ABEL. A representative of the Beach Erosion Board is listed in the roster of the ICO membership and panel membership you have there; and he is associated in panel treatments of areas where he has an affiliation.

Mr. BAUER. As a consultant? That is the situation there?

Mr. ABEL. Yes, I believe that is a fair statement.

Mr. BAUER. Is not everyone that works for the Government able to be a consultant in the ICO?

Mr. ABEL. Yes, sir, it is a matter of degree.

Mr. BAUER. Do you not think it is of sufficient importance, for example, to have someone representing the Army's interests in the Research Panel?

Mr. ABEL. This is possibly so, and as I stated before, it would probably be better expounded upon by Dr. Maxwell, as Research Panel Chairman.

Mr. BAUER. And also the Survey Panel?

Mr. ABEL. It is possible. These panels cut across the structures of a great many agencies, and I believe myself it is important to achieve a balance between thoroughness of representation and mobility; and mobility is very important to the operations of a panel.

Mr. BAUER. You are, of course, familiar with the work that the Beach Erosion Board has done in wave research on the Continental Shelf of the United States?

Mr. ABEL. Somewhat, sir.

Mr. BAUER. And that is of importance in oceanography, is it not?

Mr. ABEL. Yes, sir.

Mr. BAUER. Thank you. One more question: With respect to the budget message that is the President's plan for oceanography, are you referring to the breakdown in this appendix to the budget giving the breakdown by departments and the agencies concerned with respect to say, research, and so on and so forth? Is that the plan that you are talking about?

Mr. ABEL. Yes, sir. We can submit this for the record.

Mr. BAUER. Thank you.

Mr. DINGELL. Counsel?

Mr. DREWRY. Mr. Abel, the Coordinating Committee on Oceanography has been in existence for quite some time, has it not?

Mr. ABEL. In one form or another, it has, sir; and I should emphasize in this connection that there is no legal association of the CCO with the ICO. They are two different bodies.

Mr. DREWRY. I will state what my feeling is, and you can tell me whether I am right or wrong.

At the time that this committee was established, back in early 1959, I think it had been just established, there was then a group of, as you say, middle-management representatives of a number of agencies that for some time had been meeting periodically together, rotating chairmanships, and calling in various people or asking various people if they would like to drop by; and then asking them questions when they came.

Right after our committee was called into existence, I was invited to come down and sit with the group, and to explain what I know about where we were trying to go with the subcommittee.

As I understood it, it was strictly a voluntary group of individuals in middle-management positions concerned with various aspects of things which go to make up the broad, general discipline of oceanography.

Mr. ABEL. Yes, sir.

Mr. DREWRY. Is that the nature of it? That it did not exist by any Executive order or statute; but just as a voluntary association of people concerned with the problem of dissemination of information and to do the best that they could to carry out on a coordinated basis, at least through the exchange of information, a program which they felt should be coordinated?

Mr. ABEL. Yes, sir; that is correct.

Mr. DREWRY. Now you say it is tenuously affiliated with ICO, it is extremely tenuous anyway, and its effectiveness has been the good will and the desire of the people who are involved in it?

Mr. ABEL. Yes, sir; and these are powerful factors.

Mr. DREWRY. I think it is. I always have thought so. But it does not have any stature; it cannot ask for appropriations for itself, for instance.

Mr. ABEL. No, sir; it cannot.

Mr. DREWRY. It does not have any established working staff, that is, any job positions set up as secretary, or legman, or anything, for the Coordinating Committee on Oceanography?

Mr. ABEL. I am not exactly sure of that, sir. I believe that a secretary in Dr. Maxwell's office does have some assignment for duties connected with this. I could not be sure, and this is something I think Dr. Maxwell may be able to answer better later.

Mr. DREWRY. Well, I would be glad if somebody can tell me, but I mean, does the Secretary of the Interior, for instance, take on official

recognition of the existence of this? Does he assign functions to somebody from the Bureau of Mines or the Bureau of Commercial Fisheries to go to meetings?

Mr. ABEL. No, sir.

Mr. DREWRY. Or does he just accept the fact that someone like Mr. McKernan, or someone else, is going to be away for an hour or two, once every month or so; that he is gone to a meeting downtown, or over at the Navy Department, and that is perfectly acceptable, because it seems to be for a good purpose? It is no more formal than that?

Mr. ABEL. Yes, sir; that is correct.

Mr. DREWRY. All right. Then we come back to another thing. You are appearing as secretary of the ICO, but except for your discussion of the Coordinating Committee, your statement seems to be concerned with the activities of the working group of the Interagency Committee on Oceanography. Is that correct?

Mr. ABEL. Yes, sir. I have a letter here establishing the billet in which I serve as secretary of the ICO, which I can submit for the record, or I can read it into the record, depending on your preference.

Mr. DREWRY. But what is the working group? I notice that is set up in capitals over here on the third page, or in initial capitals, and your general discussion seems to be focused on the working group.

Now what is the distinction between the working group and the ICO?

Mr. ABEL. The working group is not formally constituted as is the ICO itself. When I first acceeded to the position of secretary of the ICO, my first association with the committee in actuality was attending a meeting of the so-called informal working group; and this is nothing more than an assembly of the chairmen of the panels, convened occasionally to review matters which cut across many panel structures. It is a convenience, and it really takes the place of having to convene a great number of panels all together.

Mr. DREWRY. Well, how does the working group know when to form itself into the working group? Does Dr. Wakelin say, "Fellows, we have got some problems here that cut across a number of different panels, and some of the panel chairmen think maybe we had better put some heads together." Does it work out that way, or does the Panel Chairman of the Survey Panel, for instance, say "Mr. Abel, we have got a problem, and I think that it concerns other panels. Let's call the working group together." Does it work like that?

Mr. ABEL. Yes, sir, the latter supposition is more nearly correct. I convene the panel chairmen as a problem arises, according to my own opinion, or perhaps from any of the panel chairmen, or from Commander Anastasion.

Mr. DREWRY. And yet it seems to me to be a very potent group. I notice on page 2 that the Special Assistant to the President for Science and Technology, who is Dr. Wiesner, who is head of the Federal Council, of which the ICO is a part, that Dr. Wiesner has directed the working group, not the ICO, to prepare this 10-year program.

Mr. ABEL. That is simply a matter of poor statement on my part, sir. Dr. Wiesner has requested the ICO to prepare a 10-year plan. In actuality, as I tried to describe in the other part of my testimony, the plan originates within the panels. The panels for-

ward their contributions by functional area to me. My assistant and I compile these contributions into a first draft of the national program.

We originate and introduce such other topics as would be relevant within the structure of the national program as it is finally reported, and a conclusion, with added fiscal data; and then, of course, since the plan must be in form technologically satisfactory to the panels, the panel chairmen are called together to review this.

I will send out copies of the draft to the panel chairmen, with the request that they review them, they come together, and in session, put together in better fashion another draft of the program preliminary to its being issued to the ICO members themselves for review.

Mr. DREWRY. One of the points that I am trying to raise, or just what has been concerning the chairman and perhaps all of us, is that there is a tremendous amount of ability and goodwill and conscientious effort being exerted; and yet the fashion of the exertion seems to be upon a very loose basis, with no really direct lines of force that could assure an implementation of some of these things that are thought to be desirable goals for the programs.

Mr. ABEL. Mr. Drewry, I would suggest that there are three well-established sections. It is a poor way of putting it, but within the ICO, there is the ICO Committee membership itself, there are the panel structures, and there is the ICO staff.

There is a fairly well-formulated interchange of administration between these three branches.

Mr. DREWRY. I think that is all, Mr. Chairman.

Mr. DINGELL. Mr. Abel, appropos of the questions our committee counsel was asking you, in the event that there is a difference of opinion—let me change that. Has there ever been a difference of opinion in the ICO or the Coordinating Committee that you know of which was substantial?

Mr. ABEL. Between two members?

Mr. DINGELL. Between two members or between two agencies?

Mr. ABEL. Oh, I suspect there must have been any number of differences of opinion.

Mr. DINGELL. Can you recall any specific one?

Mr. ABEL. Well, that is a little difficult to describe. There are so many questions which will come up before the ICO in its panels, and since each one of these organizations consists of at least a half a dozen to a dozen members, I do not think you can expect to achieve unanimity on the first go-around; there are going to be differences, yes.

Mr. DINGELL. I am sure there are. The question is: How do we achieve a resolution of these problems? Who enforces, when we achieve a substantial difference of opinion, a resolution and a coordination of differences of opinion which exist within ICO and within the Coordinating Committee?

Mr. ABEL. Oh, there are——

Mr. DINGELL. Who has the responsibility to do it? Does ICO have the authority to do it? Does the Coordinating Committee have the authority to do it?

Mr. ABEL. Well, at first stage, when there is disagreement as there is anywhere, it is talked out. Then, of course, one of two things happens: Either someone is convinced contrary to his original opinion, or he is not.

Now, if there remain differences of opinion which cannot be resolved by talking it out, or eventually by voting——

Mr. DINGELL. Excepting you indicated that these were advisory, and were instruments for communication, as opposed to superintendents and making of policy decisions.

Mr. ABEL. The panels are advisory; that is correct.

Mr. DINGELL. That is right. So in the event there is a dichotomy between two Government agencies, how are they resolved within ICO, or within the Coordinating Committee? Who resolves them?

Mr. ABEL. Who resolves differences of opinion between two agencies?

Mr. DINGELL. Yes, differences of policy between two agencies.

Mr. ABEL. There will be normally an attempt to resolve differences of opinion at almost any level by discussion. Now I simply do not consider myself qualified to comment on how authority is, or should be, leveled at the agency level.

Mr. DINGELL. We are not asking you for a policy statement on this, we are asking you merely to enunciate whatever policy may have been already set up by this organism. Is there a policy determination, either by ICO or the Coordinating Committee as to how disputes and differences between agencies with regard to policy in the general field of oceanography shall be resolved?

Mr. ABEL. No, sir; I honestly do not remember any single event ever arising that would necessitate it.

Mr. DINGELL. I asked you about a policy statement——

Mr. PELLY. If the Chairman would yield; Mr. Abel, you indicated that you either decided one of these differences of opinion one way or the other?

Mr. ABEL. Yes, sir; I am trying to——

Mr. PELLY. Is there not a third alternative where one agency would just simply back off and not want to tread on the toes of another agency; and there would be no resolution or solution of the problem at all?

Mr. ABEL. Yes, sir; I am just trying to think back to such a situation. I cannot remember any.

Mr. PELLY. It seemed to me yesterday when the Director of the Bureau of Commercial Fisheries was here, there was every indication that they just backed away from a problem of duplication when it existed; they would just not want to oppose some other agency of the Government, and as a result of that, we have duplication.

Mr. ABEL. I am not sufficiently conversant, if you are speaking of the fisheries problem.

Mr. PELLY. We have in some manner a basis of authority, so that there would be a definite decision on a policy basis, then you would not have one agency backing away from another. Either it comes under the jurisdiction of one agency or another.

We have the same thing between committees in the Congress, and there is an authority, there is a Speaker to decide which committee shall have jurisdiction. And I think you do not have that under the informal setup which you describe.

Mr. ABEL. To the extent that you stated, that is true, sir. I am wondering, just as a personal opinion, what happens when you do have a difference of opinion between departments.

Mr. DINGELL. That is what we are trying to find out, particularly with regard to the field of oceanography. What we are trying to find out: Is there anything in the structure of ICO, or the Coordinating Committee, which would tend toward, or work toward, a solution of differences of this sort? I am not asking you to say that this is what should be done; I am asking you, is there anything there that you know of? You are the secretary, and this is the reason we are directing these questions to you.

Mr. ABEL. No, sir; I do not know of any single jurisdiction which can look down from above and say it must be done this way. The ICO, you understand, does report to the Federal Council for Science and Technology, and ultimately to the President.

Mr. DINGELL. Yes, but within the ICO itself, there is no actual instrumentation for other than dissemination of information. Am I correct?

Mr. ABEL. No, sir; I do not think so. It seems to me that the——

Mr. DINGELL. It is really just a clearinghouse now, because it cannot at this moment effectuate policy determinations and resolution of policy differences within the agencies involved. Am I correct?

Mr. ABEL. That is correct. The ICO cannot determine a policy.

Mr. DINGELL. I am not trying to lay snares for you. I just want you to give us truthful answers, and this committee is not interested in causing you any personal inconvenience or hurt; I assure you of that. We are trying to explore this thing carefully to try to determine how it is working, and whether or not it is subject to change.

Now let me go further. Assuming that there were mechanisms vested in ICO to resolve these things, how would an individual member who is of middle-management, as you have indicated, go back to the agency and enforce a policy change within the agency?

Mr. ABEL. You say if a jurisdictional authority were assigned to the ICO? In the matter of oceanography or in any agency?

Mr. DINGELL. Yes, how would any representative who represents middle-echelon management go back and enforce the policy change within his Department?

Mr. ABEL. There again, I believe it is somewhat over my head administratively; but it seems to me, personally, he has to reckon with the basic missions of each of the agencies and departments he represents; and these go, of course, far beyond oceanography.

Mr. PELLY. Will the Chairman yield?

Mr. DINGELL. I will be happy to.

Mr. PELLY. Would it be a normal procedure for the Bureau of the Budget to settle many of these differences that might arise, as between agencies, and is there some place or procedure by which such decisions could be resolved by the Bureau of the Budget?

Mr. ABEL. Personally, I rather doubt it; but then again, I cannot remember the situation's ever having arisen.

Mr. PELLY. I think maybe it has not arisen, because everybody has backed away from every problem that came up. But I am just trying to explore in my mind, is there some way to formalize a situation such as we have, so that there can be a resolution of differences of opinion, and some authoritative basis for making a policy decision and enforcing it?

Mr. ABEL. Well, again, as a personal opinion, I do think that each of the members must, and certainly does, recognize that each of the

other members must at all times be considerate of the missions of his own agency and in this sense oceanography might be thought of as rather a service input to any individual agency; so that, for instance, in problems of weather predictions, it is useful, and it is needed by the Weather Bureau, in problems of antisubmarine warfare, it is required by the Navy, and so on, throughout the structures of the Government.

Again, although I know I am not qualified to comment intelligently on this sort of thing, the lack of recognition of the need for oceanography to be indelibly bound up within the mission of each agency would be rather harmful.

Mr. PELLY. Well, if the chairman would yield further, I just want to say that I have a personal feeling that maybe because of the dedication of Secretary Wakelin, maybe there have been no occasions, maybe, at the moment, to have great disputes and as a result of that, a certain bad situation.

But in the future, in looking to any legislation which might be passed to formalize it, I would rather imagine that we are not always going to have a Dr. Wakelin, and there will be stronger views coming up which have to be settled. Certainly, it does not seem that in every case the President of the United States should have to resolve those differences.

If there were authority placed a little lower, why then, in turn, we would have a more efficient and effective organization.

That is all.

Mr. DINGELL. Yes, sir.

Mr. Abel, you have been very helpful, and the committee is appreciative of your kindness and your helpful testimony this morning. Thank you very much, sir.

Mr. ABEL. Thank you very much, sir.

Mr. DINGELL. Our next witness is Dr. A. E. Maxwell, Chairman, Oceanographic Research Panel.

Dr. Maxwell, you are certainly most welcome this morning, we are honored to have you with us, and we appreciate your courtesy in being here.

STATEMENT OF DR. ARTHUR E. MAXWELL, HEAD, GEOPHYSICS BRANCH, OFFICE OF NAVAL RESEARCH, AND CHAIRMAN OF THE INTERAGENCY COMMITTEE ON OCEANOGRAPHY'S RESEARCH PANEL

Dr. MAXWELL. Thank you, Mr. Chairman.

I have a prepared statement, Mr. Chairman, and with your permission, I would like to proceed and read it.

Mr. BAUER. Mr. Chairman, could I interrupt a moment? It might be well to point out for the record that at this particular moment, Dr. Maxwell is wearing the hat of Chairman of the Oceanographic Research Panel.

In a little while, he will turn his hat around a little bit more, and talk to us about international cooperation. He is also the chairman of that committee.

Mr. DINGELL. Doctor, wearing either hat, or having it turned front or back, you are welcome to the committee, and if you would prefer to read your prepared statement, you may certainly do so, and if you would prefer to speak extemporaneously from it, you may also do so. The committee will leave that to your wishes.

Dr. MAXWELL. Thank you, Mr. Chairman.

It is a great privilege for me to appear before this committee as Chairman of the Interagency Committee on Oceanography Research Panel and to have this opportunity to provide you with some background on the Panel's objectives, history, its method of operation, and a brief account of some of the Panel's accomplishments.

The Panel on Oceanographic Research and Facilities, as it was originally known, was established in June 1960 at the request of the Interagency Committee on Oceanography (ICO). Because the Panel encompassed both research and facilities at that time, its scope was considerably broader than at present. To illustrate this scope, I would like to read to you the letter of June 14, 1960, which authorized the formal establishment of the Panel.

From the Chairman, Interagency Committee on Oceanography, to me via the Chief of Naval Research; subject: Oceanographic Research and Facilities Panel, establishment of:

1. This is to confirm my request to you at the meeting of the Interagency Committee on Oceanography on June 10, 1960, to form a panel of representatives to review critically for the ICO the oceanographic research programs and facilities required of the various Federal agencies. You are to obtain assistance from each of the member agencies represented on the ICO, including at least one representative each from the National Science Foundation, Atomic Energy Commission, Bureau of Commercial Fisheries, U.S. Coast and Geodetic Survey, and Navy, both the Bureau of Ships, and the Office of Naval Research, who is thoroughly familiar with his agency plans and budgets at the task level.

2. The Panel thus formed shall immediately undertake the following tasks:

(*a*) Review individual agency programs at the task level for technical validity, for satisfying agency need, for proper balance of the overall agency program.

(*b*) Determine the soundness of the continuing projects of the agency with respect to agency as well as national needs. Determine how critical new or augmented projects are to the agency or national needs. Recommend need for support in critical areas not now included in the agency programs.

(*c*) Consider adequacy of existing research facilities including laboratories, instrumentation, vehicles, docks, and shop facilities. Recommend additional facilities required to satisfy true requirements for the next several years. Consider adequacy of numbers of personnel including professionals and technicians for conduct of research programs by agencies at laboratories and aboard ship. Recommend the number and specialty of additionally needed personnel to satisfy the true requirements of the agency research programs for the next several years.

(*d*) Compile and review the national research program for adequacy from the national viewpoint, for desirable and/or unnecessary duplication and for adequate balance of current and projected programs. Recommend additional projects to provide balance or projects which should be eliminated. Consider the need for increased support of research in critical oceanographic disciplines.

(*e*) Consider the need for establishing one or more additional major oceanographic centers. If determination is in the affirmative recommend where and what organizations should be encouraged in the field of oceanography.

(*f*) Determine current requirements for oceanographic research ships by institution and geographic areas. Comment on the adequacy of existing hulls at each major laboratory and the need for additional ships to conduct projected programs. Determine capability of other institutions to usefully employ oceanographic ships now. If so, for what purposes and how would they be manned by scientific personnel. Recommend schedule of priority for assignment of new ships to laboratories, considering most logical support by geographic areas.

(*g*) Consider carefully the extension of the agency programs into wider areas of basic research. For example, see statement by Mr. Robert Paul, executive secretary, Sport Fishing Institute, before the House Merchant Marine and Fisheries Committee on May 20, 1960. Increase in basic research effort by BCF is a good example.

(*h*) Consider the preparation of a report to delineate the oceanographic research programs of the separate agencies to indicate what areas of research are being covered, by whom and at what level in the United States.

3. A special panel under the chairmanship of Lt. Comdr. R. J. Alexander has been established to review the overall oceanographic research and survey ship

requirements. Your panel should be of considerable assistance to Lieutenant Commander Alexander in reviewing the research ship requirements.

4. The Federal Council for Science and Technology is anticipating that the fiscal year 1962 proposed national program and budget for oceanography will be available for review about August 2, 1960. The research portion of the national program to be considered by your panel is possibly the most critical element of the national program. It is requested that I be advised after the first meeting of your panel when a report to the Interagency Committee on Oceanography will be available for consideration.

Signed JAMES H. WAKELIN, Jr.

I have taken the considerable time to read this letter because I feel it conveys, concisely, the objectives of the Research Panel as well as illustrates the interrelationships of the various panels that have been established by the ICO.

Before proceeding further, I would like to emphasize to you the importance of the activities of the Research Panel especially in the development of the national oceanographic program by the ICO. The research portion of this program represents the nucleus about which the remainder of the national program is constructed.

For example, research and survey ships are not built just to increase our research oceanographic fleet, nor are laboratories constructed, students educated, nor surveys carried out for their own end. All of these activities are undertaken for the common purpose of more fully understanding the oceans in order that we might better utilize this vast resource. It is the function of the Research Panel to coordinate and guide the various agencies research programs and it is these programs which provide for this better understanding of the seas. The coordination and guidance must be sound, and the peripheral programs, such as surveys, instrumentation, ship construction and education must be in consonance with the research programs, if we are to have an effective national oceanographic program.

To carry out the important functions of this Panel, the membership was carefully selected from the agencies suggested in Secretary Wakelin's letter. Particular attention was given to obtaining members each of whom had an intimate knowledge of his agency's research program. Since its original formation, the Panel has been modified to include members from the Smithsonian Institution, the Hydrographic Office and an observer from the Committee on Oceanography of the National Academy of Sciences.

Present members of the Panel are: myself, as Chairman from the Office of Naval Research, Mr. B. E. Olson from the U.S. Navy Hydrographic Office, Mr. V. Brock, from the Bureau of Commercial Fisheries, Dr. H. B. Stewart, Jr., from the U.S. Coast and Geodetic Survey, Dr. R. G. Bader from the National Science Foundation, Dr. I. E. Wallen from the Atomic Energy Commission, Dr. F. A. Chace, Jr., from the Smithsonian Institution, Dr. Dixy Lee Ray, observer from the National Academy of Sciences' Committee on Oceanography.

The Panel carries out its functions by holding meetings at which past assignments are reviewed and future activities assigned as the responsibility of individual members. This has proved to be an effective method whereby the workload can evenly be distributed and the results collated by the entire Panel. Interactions with other ICO panels are achieved through an overlapping of memberships, thereby enabling the Panel to keep abreast with the activities of the others.

In general, the Panel's efforts have culminated in the form of reports to the ICO.

In June 1960 when the Panel was created, it met in nearly continuous session for about a month. The product of these meetings was the first effective coordination of oceanographic research programs within the Federal Government. A report was issued on July 15, 1960, that contained a description of the fiscal year 1962 oceanographic research programs and budgets broken down by agencies, along with an evaluation of the programs and major changes that were anticipated. This represented a great stride forward, but the Panel was not satisfied with its efforts. Although the report had achieved what had never been done before—namely, to bring together, in one volume, all of the diverse oceanographic research programs of the agencies, thus providing good coordination, the Panel still felt that proper guidance was lacking.

When the ICO established a separate Panel on Facilities, Equipment, and Instrumentation early in 1961, it relieved the Research and Facilities Panel of part of its responsibilities. This, in turn, enabled the now reformed Research Panel to concentrate its efforts on a critical review of the research programs with an eye toward providing more positive guidance. The first step was to reorganize the research report so that the oceanographic programs could be evaluated in terms of the fundamental problems of the oceans. Accordingly, a new Panel report was composed in which broad objectives were listed along with the individual agency's research programs that contributed toward attaining these objectives.

This report, which will be a part of the ICO fiscal year 1963 national oceanographic program, is still in draft form. I would like, however, to give to you at this time a list of the research objectives in the report so that you may have a feeling for its organization and contents.

Objective 1: To describe the distribution of physical and chemical properties of the ocean and to understand the dynamic processes which affect this distribution.

Objective 2: To determine the interrelationship of the ocean and atmosphere.

Objective 3: To determine the distribution, kind, and adaptation of the living populations of the sea and to understand the interrelationship of the marine organisms to the physical and chemical properties of the sea.

Objective 4: To describe the sea floor and to understand its evolution; including the topography, geophysical nature, and subsurface structure, with particular interest in the sea floor's relation to the surrounding land masses.

Objective 5: to determine if the oceans have been, or are being significantly modified, or how they can be exploited to benefit mankind.

Objective 6: To determine the impact of radioactivity and other pollution on the ocean.

I would like to point out to you that objective 6 has only recently been added to our report, illustrating the document is not static, but is being revised continually as conditions warrant. The panel believes that it has come a long way toward the development of an integrated research program by using this approach of research objectives to review the research programs, instead of the earlier method

of simply listing together all of the agencies' separate programs. By organizing the research report in this manner, it is possible to see that the various agency programs are striving to achieve common goals. It is also possible to identify areas where research effort needs to be strengthened, thus enabling the panel to provide a measure of guidance by feedback to the agency programs. Here I want to emphasize that the panel does not dictate what research should be pursued, it provides a mechanism whereby each agency can determine how its own program fits in with others and where the overall program can be continuously reviewed and monitored.

We, as a panel, are still not satisfied that we are doing the best possible job. One of our difficulties has been the lack of detailed knowledge of each other's research programs. In an attempt to alleviate this difficulty and also at the same time to get firsthand information on present and planned oceanographic programs in a restricted geographical area, the panel met as a group at Seattle, Wash.

This meeting was held on October 2 and 3, 1961, in part at the University of Washington and partly at the Seattle laboratory of the Bureau of Commercial Fisheries in conjunction with the Seattle office of the U.S. Coast and Geodetic Survey. The first day and a half of meetings were devoted to educating the panel on the diverse marine research activities in the Seattle area, while the last half day was spent in a roundtable discussion where the panel gave its reactions to what it had seen and learned.

The meeting proved to be highly successful in that the panel came away well informed, and also because the meeting had stimulated the interest of the local activities to the point where a series of subsequent meetings have been held in an attempt to better coordinate their efforts. This coordination has been particularly effective in the determination of an integrated plan for expansion of facilities in the area. In addition, as a result of this meeting, the Coast and Geodetic Survey has established an annual program planning meeting in Seattle, at which time any interested research group can provide an input to the Coast Survey's program in the Pacific.

A similar informative type meeting was held in Washington, D.C., on January 24, 1962, when Dr. Gunter Seckel of the Hawaii laboratory of the Bureau of Commercial Fisheries presented a long-range research and survey program for the central Pacific jointly to the Research and Survey Panels.

It is through meetings of the nature of the last two mentioned, that each member of the Research Panel has been able to obtain a better grasp of research programs outside his own agency. We hope to have many more of these meetings.

Future plans of the Research Panel include a thorough review of our fiscal year 1963 research report with the idea of evolving from it a long-range research program that can be scrutinized annually. This would contain, in addition to the broad objectives I have already mentioned, more detailed specific programs within these objectives and the relative importance of each. By continually identifying each year some of the major unsolved problems in the specific programs, we should be able to provide knowledgeable guidance for the research program without curtailing the freedom of the scientist or using unwarranted direction.

As a start on this, the Research Panel has already established an ad hoc group to review objective 3 of our fiscal year 1963 report, which concerns the marine life in the oceans. This is our next step toward further developing the panel's report into a viable document that will be the cornerstone of the national oceanographic program.

Mr. Chairman, I appreciate this opportunity to appear before you today, and I shall be happy to answer any questions you might have.

Mr. DINGELL. Doctor, your statement has been most helpful to the committee.

Mr. Bauer?

Mr. BAUER. Dr. Maxwell, on page 8 you mention an ad hoc group to review objective 3 of our fiscal year 1963 report. Who composes the group?

Dr. MAXWELL. This group is not complete in its membership yet. The group is chaired by Dr. Sidney Galler, head of the Biology Branch of the Office of Naval Research. He has, as far as I know, selected Dr. Fenner Chace and Dr. Dixy Lee Ray, also members of our panel, as members of this ad hoc group. In addition, I believe he has selected Mr. Robert Paul of the Fish and Wildlife Service, and a Dr. Joseph Flynn from New York.

I think this is not a complete list of his membership at this time.

Mr. BAUER. Dr. Maxwell, Secretary Wakelin mentioned this ad hoc committee in his testimony, as well as your testimony.

Now the Navy has an interest in marine biology, does it not?

Dr. MAXWELL. Yes, sir, the Navy does.

Mr. BAUER. Do you happen to know how many projects the Navy has in marine biology in this country, and how many foreign projects, just in round figures?

Dr. MAXWELL. No, sir; I do not have the exact number. I know it does have several dozen research projects in marine biology, which are largely in this country, but some in foreign countries.

Mr. BAUER. As I remember, in the 86th Congress, I think we counted up over a hundred, because I think we got it in the record at that time.

Dr. MAXWELL. Yes; I would not be surprised if it were as many as a hundred.

Mr. BAUER. Now with respect to this program of the President's in the budget that is being constantly referred to, are you familiar with the President's program on research for the Bureau of Commercial Fisheries?

Dr. MAXWELL. Mr. Bauer, I am familiar with the portion of the Bureau of Commercial Fisheries' research program that is a part of the Interagency Committee on Oceanography report.

Mr. BAUER. Could I read—and I think you will see why this is being brought out—could I read for the record then the appendix to the fiscal 1963 budget, Department of Interior, page 501, section 3, having to do with the authorization for research in the Bureau of Commercial Fisheries.

3. Research: Research is conducted (*a*) to learn more about variations in abundance of important commercial food fishes and other aquatic animals; (*b*) to discover declining species and better measures for conserving, developing, and managing fisheries resources; (*c*) to improve the cultivation of aquatic animals, including shellfish; and (*d*) in the design of fish protective devices.

Funds for this activity are supplemented by moneys appropriated under the permanent account, "Promote and develop fishery products and research pertaining to American fisheries." In 1961, these supplementary funds totaled

$2,805,000. It is estimated they will amount to $2,579,000 in 1962, and $2,719,000 in 1963.

Now would you say that is limited to motivation of commercial importance of the fish that are concerned with the mission of the Bureau of Commercial Fisheries? Or is it in the general sense regarded as an oceanographic phase which might be called marine biology?

Dr. MAXWELL. I think it is certainly a combination of both, Mr. Bauer. It is certainly oriented toward the commercial species of fish, and a part of this program is also a part of a basic research program which is essential to understand more fully the environment which affects this fishery.

Mr. BAUER. In other words, the motivation is from the point of view of the commercial fishes.

Dr. MAXWELL. I would say that is true.

Mr. BAUER. We have another one in the Bureau of Sport Fisheries research program, of similar nature, with the motivation of sport fishes.

What I am leading up to is, do we have anywhere in our governmental setup an organization that is concerned with basic research in marine biology, which you know of, as their primary motivation? Not how many fish you can catch with a rod and reel, or how many fish you can sell in a fish market.

Dr. MAXWELL. If I understand your question correctly, Mr. Bauer, you are asking me if there is any organization set up that is concerned specifically with this problem?

Mr. BAUER. That is correct.

Dr. MAXWELL. I know of no such organization within the Federal Government that is set up for this. There are certainly groups such as the American Institute of Biological Sciences, which I would guess has this as their primary objective.

Mr. BAUER. That is true, but as far as the Government is concerned, then, the Smithsonian would have the only purely scientific approach to marine biology we have in the Government—is that correct?—outside of the National Science Foundation, and the Office of Naval Research?

Dr. MAXWELL. No, I believe it is fair to say that our Panel, as it looks at this program, looks at it from the point of view which you have mentioned. A part of the research program is oriented toward fisheries, a part of the research program is oriented toward Navy problems concerned with biology, but in addition to this, there is the part concerned which is under the auspices of the National Science Foundation, the Smithsonian Institution, and others of this nature, and these certainly fall into the category which you have mentioned. Therefore, I feel that our group does look at this from the broad point of view.

Mr. BAUER. In other words, you would look at your group as the coordination means for basic marine biology in the ICO. Is that correct?

Dr. MAXWELL. I would say that is a part of our function, yes, sir. We look at the other areas as well.

Mr. BAUER. Now with respect to your objectives, which I think are very admirable, did you have the opportunity of reading the trans-

lation that I submitted to Dr. Wakelin, the objectives of ICES established in 1899?

Dr. MAXWELL. Yes, sir, I have read this.

Mr. BAUER. These are very similar to the ICES objectives, are they not?

Dr. MAXWELL. Yes, these are somewhat more general, but I think as objectives they are in nature very similar to the ICES.

Mr. BAUER. And these are the first objectives that we have seen in this committee, I think, Mr. Chairman, leading toward a national program of oceanography. I think that Dr. Maxwell, if I may say so, is to be commended for coming up with some objectives.

Now, Dr. Maxwell, one final question, when you are Chairman of your working group, Research Panel, rather, and you enter into discussions, do you think toward the national program, or do you think as head of the Earth Sciences Division of the Office of Naval Research?

Dr. MAXWELL. Well, if I might correct your latter statement, I am not head of the Earth Sciences Division, I am head of the Geophysics Branch.

Mr. BAUER. Excuse me, Geophysics Branch.

Dr. MAXWELL. As we meet as a research panel, we meet with the idea of considering a national program. I think there as a person concerned with how my program—and when I refer to "my program," I refer to the Office of Naval Research's program in oceanography—how it best fits into the national program, and how it should be modified to take into account other programs within the Federal agencies. I feel my job both as Chairman of this Research Panel and as head of the Geophysics Branch, which essentially monitors our oceanographic program, is one and the same and that if there were no ICO at all, I would still feel it my responsibility to know the programs of these other agencies.

Mr. BAUER. But what I was getting at, Dr. Maxwell, I think you understand, and that is, here you have established very admirable objectives for the establishment of a national oceanographic research program. Whether or not they have been adopted, I don't know, but they certainly should be.

Now on the other hand, you have to come up with a recommended national oceanographic research program, do you not, for consideration?

Dr. MAXWELL. Yes, sir.

Mr. BAUER. You have to produce one?

Dr. MAXWELL. Yes, sir.

Mr. BAUER. And when you produce it, won't you really be wearing two hats as Chairman of the Production Committee, should we say?

Dr. MAXWELL. No, sir, when we meet as a research panel, I would like to think at least that I would throw away any Navy hat I might have at this time, and that I would be working toward a national program. Because I feel that our national program, all the way through, has gone far beyond the Navy's interest in this. We have taken into account the interests of all the other agencies, and what we feel are the interests of the country as a whole in this regard, and I think it would be completely fair to say that I was not acting in the capacity of a Navy person when putting together this report.

Mr. BAUER. That is all I have, Mr. Chairman.

Mr. DINGELL. Mr. Pelly.

Mr. PELLY. I just have one question. I hate to refer to this matter that has been gone into considerably, the matter of duplication of facilities, but I notice in the letter of Dr. Wakelin's to you, as Chairman of the Interagency Committee on Oceanography, that you were charged with reviewing the research programs and under (d), to review any unnecessary duplication.

Now my question is, did you review the duplication as between the fish and wildlife laboratories and the new laboratories of the Department of Health, Education, and Welfare?

Dr. MAXWELL. Mr. Pelly, yes; our Committee did take into account the programs of the Public Health Service and the Bureau of Commercial Fisheries in our research report under objective 3, and also under objective 1, which concerns the general physical oceanography.

We did not discuss this matter of duplication in great detail in our panel, but we were well aware of the situation and what the Public Health Service was doing.

Mr. PELLY. Well, you are actually charged with the responsibility of reviewing any possible duplication, and you knew that both these investigations were going into research for shellfish, and I wondered actually if you felt that your group was so constituted that you could in the national interest have enough authority to avoid any possible duplication, or whether there would be some procedure or change in formulation of the setup, so that we could in the national interest save the taxpayers some money that might go into duplication?

Dr. MAXWELL. Mr. Pelly, I do believe that if our group felt that there was duplication in one of these cases, that our efforts and voice would be heard in this. Whether it would be critical in making any decisions on it or not, I cannot say, but certainly we would bring it to the attention of the ICO. We have done this in some cases, I might add, in particular a case in Seattle, where there are a number of different laboratories that would like to build facilities in the same general area.

Again, as a research group, we looked into the research program there, but this included the facilities needed to carry out this research program. We suggested at our meeting in Seattle that the people get together out there, instead of building duplicate facilities, look into the feasibility of building a joint facility, both in terms of laboratories, pier facilities, or other things of that nature.

I am happy to say that as a result of our meeting in Seattle, the University of Washington, the Bureau of Commercial Fisheries, and the Coast and Geodetic Survey have sat down several times since and have discussed this whole program. We hope—and I say "we hope" because I have not heard of the final results of this—they are proceeding along the lines of at least a coordinated effort. Whether this will turn out in the final instance to be one single, large pier facility or laboratory, or two or three of them, brought together, remains to be seen. But they are certainly looking along the lines of a coordinated effort now, whereas before our group met there, they were thinking as individuals.

Mr. PELLY. I am aware of the meetings that you had out there in October, and I realize, though, that there are so many in the area, so many particular projects and facilities that are being sought by various agencies of Government, and the area is so vast that it would be very

difficult for a panel to go into each area and try to resolve all the problems.

Dr. MAXWELL. This is true, Mr. Pelly. I would like to explain in a few words how we try to get around this situation.

For example, the panel assigns to a particular panel member problems that come up. In particular as we were trying to put together the research report, we would assign each objective to a certain person, and give him the responsibility of running down all the details on this program. This included getting all the people involved in this together. We would assign the person the responsibility who was most familiar with this particular area. And it is in this manner that we hope not to put the burden on the panel members in areas in which they are not familiar, but instead to put it on a particular member of the panel who is well qualified and allow him to choose other capable people to do the job.

Mr. PELLY. Well, I certainly would agree that you are going about trying to solve the problem in the best way. Otherwise, you could not spread yourself very far. But I just wondered if there was any particular formalization or authority that could be vested in the Committee or a procedure established to obtain greater authority, that actually, you would be more effective in trying to do what you obviously are very diligently trying to accomplish.

Dr. MAXWELL. Well, as Mr. Abel so ably said a few moments ago, that the great success in the ICO has been the ability to get people together and for these people to agree on things. In this sense, direction has not been a necessity in the working of the ICO, so far. I think perhaps some of the success of the ICO is due to the fact that the decisions are not really binding or mandatory on people, but that the people are willing to accept the feelings of the majority in these cases, and to abide by them.

Mr. PELLY. I know in the educational field, there have been voluntary agreements as to which university would go into forestry and another university nearby would go into, maybe, law, and another one medicine, in order to try to avoid duplication, and I think that has worked quite well, and I certainly am very much concerned that any legislation that we might from this committee report out, that it might work in the opposite direction, and get away from that voluntary sort of arrangement which you say is very effective.

On the other hand, I am still concerned with information that one agency will back away from taking a position as against another agency, because they just don't want to tread on somebody else's toes.

Dr. MAXWELL. Yes, sir.

Mr. PELLY. I think you had had that between Services in the past.

Dr. MAXWELL. Yes, sir, I certainly recognize this as being a very difficult problem.

Mr. PELLY. Well, I think maybe the President is wise in waiting before recommending some legislation until this thing has had a chance to work, and I don't think we should rush into any reporting out any bill now, and rather, probably, we should wait until something comes up from the executive branch, and by that time, I am sure your experience will be very helpful.

Dr. MAXWELL. Yes; I think one of the good things we can say about the ICO is that it has evolved considerably over the last 2 years. It has changed its emphasis and even has changed its structure and

organization to meet new situations as they come up. I think nearly everybody concerned with the ICO recognizes it is not a perfect organization the way it is currently set up, but I think nearly all of these people also realize that they do not know exactly what the perfect organization is. They prefer to let things sort of evolve into the best possible way of handling things.

Mr. PELLY. Well, you know the situation that exists as far as scholarships and research projects as between the agencies. You can't even find out, there are so many of them, as to how they dovetail, and the Committee on Education and Labor now is setting about to try to come up with some tabulation as to the total number of scholarships and programs that we have, so that the Congress can have some overall idea of what we are doing, and I think the same would be true, probably, in oceanography, as between agencies.

Dr. MAXWELL. This is very possible.

Mr. PELLY. If it hadn't been for the Navy, I would say, I don't think there would have been very much of a program at all. But now I think we are starting about a little bit extended program, and it is well to get started in the right way.

Dr. MAXWELL. Yes, sir.

Mr. DINGELL. Counsel?

Dr. Maxwell, you have been a splendid witness, most frank and most helpful. The committee is very much appreciative of your kindness and your helpfulness today.

May I ask you briefly one question: You have set forth in the direction of Secretary Wakelin to you in his letter a number of things, starting with 2 at the bottom of 1, and then going (*a*), (*b*), (*c*), (*d*), (*e*), (*f*), wherein the committee has achieved a direction to assume a very heavy responsibility. To review individual agencies programs for technical validity, for satisfying agency need, for a proper balance of the overall agency program.

To determine the soundness of continuing projects of the agency with respect to agency as well as national needs. To determine how critical new or augmented projects are to agency or national needs; recommend needs for support in critical areas not now included in agency programs. To consider adequacy of existing research facilities, including laboratories, instrumentation, vehicles, docks and shop facilities. Recommend additional facilities required to satisfy true requirements for the next several years. Consider adequacy of numbers of personnel, including professional, and so on, and to compile and review the national research program for adequacy from the national viewpoint for desirable and/or unnecessary duplication, and for adequate balance of current and projected programs, recommend national programs to provide balance and subjects which should be eliminated.

Then on under (*f*), determine current requirements for oceanographic research ships by institutional and geographic areas.

Now I assume that your Panel is like all the other ICO Panels, an instrument for exchange of information. Am I correct?

Dr. MAXWELL. No, it is more than that. That is certainly one of the functions of our Panel, but our Panel also brings together the diverse Federal agency programs at one point where they are continuously reviewed and monitored by this group for some of the several reasons you have just indicated.

Mr. DINGELL. You have indicated that they review. Subsequent to the review, what happens? Recommendations are made?

Dr. MAXWELL. If there are areas in which recommendations are needed, yes, sir, recommendations are made.

Mr. DINGELL. Does your Panel have any authority to enforce the carrying out of its recommendations, or to supervise the conduct of agencies pursuant to its recommendations?

Dr. MAXWELL. Our Panel has no authority to do this, but Mr. Chairman, I would like to point out that the members on our Panel are in general the people from these various agencies that have cognizance of the research programs, and therefore, there is considerable feedback from our Panel directly to the various agencies.

If, for example, the Panel were to be critical of my own program within the Office of Naval Research, I would consider this advice very heavily in connection with my own program, and perhaps modify it, to come up to the expectations and criticisms of the Panel.

Mr. DINGELL. But assuming that the agency concerned, after it had its program reviewed, chose not to make compliance with the recommendations, or not to accord the appropriate dignity to the recommendations. Then what would happen?

Dr. MAXWELL. Should this situation come about, then our Panel would make a report to the ICO of course we would make a report in any case on this, and then it would be up to the Interagency Committee on Oceanography to take further action.

Mr. DINGELL. All right, what would the ICO Committee do, since it is essentially a reviewing, clearing house agency without authority to do other than to recommend?

Dr. MAXWELL. Well, again you have this same feedback mechanism which I mentioned earlier, except at a somewhat higher level within the Federal agencies, and this is a very effective mechanism to get a program changed and modified.

Mr. DINGELL. Doctor, we appreciate your courtesy in being with us this morning. I was wondering if in view of the time, if you would object to filing your statement with regard to the international programs. Would you have any objection to doing that?

Dr. MAXWELL. No objection at all.

Mr. DINGELL. It would be helpful to us. The committee is rather pressed for time. And I do apologize to you, and thank you for your kindness and courtesy in being with us this morning.

Mr. BAUER. Mr Chairman, I would like to ask Dr. Maxwell if he will submit for the record the U.S. Report of IOC. I believe you have such a copy?

Mr. DINGELL. Do you have that?

Dr. MAXWELL. Yes, this is for the intergovernmental oceanographic meeting at UNESCO?

Mr. BAUER. Yes, sir.

Dr. MAXWELL. I have the summary report, and I would be very happy to supply this for the record.

Mr. DINGELL. Doctor, we appreciate your courtesy in being with us this morning. We thank you for your very helpful testimony.

Dr. MAXWELL. Thank you, Mr. Chairman.

(The additional material to be supplied follows.)

STATEMENT OF DR. ARTHUR E. MAXWELL, HEAD, GEOPHYSICS BRANCH, OFFICE OF NAVAL RESEARCH AND CHAIRMAN OF THE INTERAGENCY COMMITTEE ON OCEANOGRAPHY PANEL ON INTERNATIONAL PROGRAMS

Mr. Chairman and members of the committee, it is a great pleasure to appear before you, also, as Chairman of the Panel on International Programs of the Interagency Committee on Oceanography. Although this Panel has not been in existence very long, I feel it would be of interest at this time to give you a résumé of why the Panel was formed, what we have done, and what we plan to do in the future.

Mr. Chairman, through your own personal contacts, I know you are well aware that the U.S. Government has recently assumed new international responsibilities in the field of oceanography. These responsibilities result primarily, from a series of international meetings sponsored by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) which have culminated in the formation of the Intergovernmental Oceanographic Commission. This Commission held its first meeting in Paris from October 19 to 27, 1961. Fortunately, the Chairman of this Committee and members of his staff were able to attend this meeting and therefore, I need not go into details of the meeting other than to express the fact that this Commission is enthusiastically supported by 40 nationsand a number of international organizations. The principal accomplishment of the meeting was the adoption of a number of resolutions by the Commission that require actions on the part of member States. Although I do not intend to read these resolutions in full at this time, I will refer to them ocassionally throughout my talk and with the chairman's permission, I would like to leave a copy of the summary report of the first session of the Intergovernmental Oceanographic Commission with the committee to be made a part of the record.

One result of the Commission meeting was to stimulate the Interagency Committee on Oceanography (ICO) into taking a more aggressive course of action with respect to international oceanographic programs. This was reflected in the form of comprehensive discussions within both the Research Panel and the Survey Panel of the ICO, as well as at the ICO meeting of December 21, 1961. At this meeting, the Chairman of the ICO asked that I call a special meeting of representatives from the member agencies to discuss specifically the problem of establishing a Panel on International Programs. On the 28th of December 1961, this ad hoc group met and, after reviewing the resolutions of the Commission, recommended to the Chairman of the Interagency Committee that a Panel on International Programs be established. In addition, this ad hoc group suggested the following guidelines as the charter for the proposed Panel: (1) The Panel would have the responsibility to insure that U.S. participation in the Commission activities and other international programs proceeded in an aggressive, judicious, and timely manner. This would include assistance to the State Department in the preparation of U.S. position papers for future Commission meetings, the collation of existing international programs and the development of new international programs; (2) the Panel would provide a forum whereby various U.S. inputs to the Commission and other international programs could have a common meeting point. This focus of international efforts would insure that the U.S. Government, especially the Interagency Committee on Oceanography, would be aware of all aspects of U.S. participation in international programs.

These recommendations were considered by the Interagency Committee on Oceanography on January 11, 1962, at which time the Panel was formally established.

Membership of the Panel consists of the following persons:

Dr. A. E. Maxwell, Chairman, Office of Naval Research.
Dr. H. B. Stewart, Jr., U.S. Coast and Geodetic Survey.
Comdr. R. J. Alexander, Office of the Chief of Naval Operations.
Mr. V. Brock, Bureau of Commercial Fisheries.
Dr. I. E. Wallen, Atomic Energy Commission.
Col. W. R. Sturges, State Department.
Dr. J. Lyman, National Science Foundation.
Mr. R. B. Abel, ex officio, Office of Naval Research.
Comdr. S. N. Anastasion, ex officio, Office of the Assistant Secretary of the Navy (R. & D.).
Dr. P. M. Fye, observer, National Academy of Sciences (Woods Hole Oceanographic Institution).

It is noted that a number of the Panel members are also members of other ICO Panels and, in particular, the membership contains the Chairmen of the Research Panel, Ships Panel, and Survey Panel. This membership was set up purposely to allow the other Panels to feed the results of their work directly into this new Panel. It is my hope as the Chairman of the Panel on International Programs, that most of the Panel's work can be accomplished through the existing Panel structure of the ICO, thereby making this a true forum to discuss international programs.

The first meeting of the Panel was on the 30th of January 1962, and since it has been the only meeting to date, I would like to review the meeting in some detail in order that you might see how the Panel operates. I will review the meeting in terms of actions taken as a result of resolutions adopted by the Commission at its Paris meeting.

Resolution 1 requested that members submit to the Secretary of the Commission their views on the establishment of advisory channels to the Commission in all fields of oceanography, for consideration by the Commission at its second session. In response to this resolution, the Panel requested the Chairman to write a letter to Mr. McKernan and Dr. Revelle and suggest that they prepare a position paper on this resolution that could be discussed by the Panel and other appropriate groups in April and then be forwarded to the ICO for further consideration. This letter has been sent.

The next Commission resolution requiring action was No. 3, which requested that members consider certain cooperative international oceanographic programs. It was recommended that members initiating proposals for such programs should convene working groups consisting of all interested members and bodies to explore avenues of planning, coordination, and cooperation, to prepare specific programs, and to take appropriate and early actions so that all aspects of oceanographic study should be taken into account where possible, and all findings be fully published upon completion of each program. With regard to this resolution, the Panel felt strongly that the United States should take actions necessary to assume leadership in international programs coming under the auspices of the Commission. After examining several proposed programs for international cooperation, the Panel decided the cooperative tropical Atlantic investigations was the most desirable program to pursue at this time. Further, the Panel felt that the United States should proceed with dispatch in organizing this investigation and suggested a time schedule along the following lines: (1) February 26, call a meeting on this program inviting all interested U.S. participants. As you have already heard, this meeting was held this past Monday. (2) March 5, the Panel on International Programs review the February 6 meeting and prepare a report to be submitted to the joint National Academy of Sciences' Committee on Oceanography (NASCO), Interagency Committee on Oceanography meeting scheduled for March 15–16. (3) If program is approved by these groups, notify the Secretary of the Commission of the U.S. plans and request the Secretary to determine the interest of other member states of the Commission. (4) Finally, in accordance with the Commission resolution, the United States, as initiating member, would call a working group meeting of interested member states to develop the program. It is possible that such a working group meeting might be called to coincide with the Commission meeting during September of this year.

Commission resolutions 4 and 10, respectively, commend to the members participation in the International Indian Ocean Expedition, and suggest members submit to the Secretariat the information on their existing declared national and regional programs, plans of cruises of international interest and information on berths available for scientists of other countries. The Panel agreed that the U.S. participation in the International Indian Ocean Expedition should be submitted to the Commission as a U.S. program of declared international interest. Mr. Vetter, Executive Secretary of the Academy's Committee on Oceanography was requested to prepare a statement of this participation that could be reviewed by the Panel at its next meeting and forwarded to the Commission via the ICO and State Department. In addition Commander Alexander, Chairman of the Ships Panel, was assigned the responsibility for collecting the cruise plans of U.S. research and survey ships in context with the ICO resolutions.

Resolution 7 of the Commission requested members to provide the Secretariat with full information annually on what fixed stations of various types are in operation, what data are being gathered and at what intervals, and on plans of future developments. It also recommended that members make more complete use of weather ships. Action on this resolution by the Panel included a request that the Panel Chairman contact Lt. Comdr. R. P. Dinsmore of the U.S. Coast

Guard and ask him to prepare the required information on weather ships. Also the Chairman was requested to write a letter to Dr. William Richardson of the Woods Hole Oceanographic Institution, named by the State Department as the U.S. expert on buoys to the Commission, to inform him of these resolutions and to offer him the assistance of the Panel. These actions have been carried out by the Chairman.

The last resolution adopted by the Commission on which the Panel took action, was No. 9. It recommended that members exchange all oceanographic data taken by ships and recording stations outside territorial waters, within the limits of declared national programs, commencing on January 1, 1960, and that members establish national oceanographic data centers to facilitate collection, processing, analysis, and exchange of oceanographic data. In response, the Panel asked Dr. Woodrow Jacobs, Director of the National Oceanographic Data Center, to determine the various laws, regulations, rules, etc. pertaining to data exchange with member States of the Commission. This would include contacting the State Department, Hydrographic Office, Commerce Department, and National Academy of Sciences. He was requested to collate this information and make it available to the Panel at its meeting on March 5.

Other items on which the Panel took action were: (1) To recommend to the ICO that Rear Adm. H. Arnold Karo, Director of the Coast and Geodetic Survey be named as the U.S. member of the Consultative Committee of the Intergovernmental Oceanographic Commission with Mr. Donald McKernan and Dr. Roger Revelle as alternates, and (2) to inform Mr. James Snodgrass of the Scripps Institution of Oceanography, who was named by the State Department as the U.S. expert on radio frequencies for oceanography, of the existence of the Panel and offer its assistance where possible.

I have taken a great deal of your time to give you this detailed summary of the actions of our Panel in hopes that the Committee can get an idea of what we plan to do in the future. All of the Panel members feel strongly that the results of their work are urgently needed to maintain the position of leadership in international oceanography that the United States has long held. I am sure that with the dedication of these Panel members, this goal will be realized. I appreciate this opportunity to appear before you on behalf of our Panel, and I would be glad to answer any questions you may have.

Distribution: general

UNESCO/NS/176
PARIS, 1 February 1962
Original: English

UNITED NATIONS EDUCATIONAL,
SCIENTIFIC AND CULTURAL ORGANIZATION

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION

REPORT ON THE FIRST SESSION OF THE COMMISSION

Unesco, Paris 19-27 October 1961

1. INTRODUCTION

1. The Intergovernmental Oceanographic Commission established by resolution 2.31 adopted by the General Conference of Unesco at its eleventh session, and in conformity with the recommendation of the Intergovernmental Conference on Oceanic Research (Copenhagen 11-16 July 1960) met for its first session in Paris at Unesco Headquarters from 19 to 27 October 1961.

2. By the end of the session, a total of 40 States had become members of the Commission. These are: Argentina, Australia, Belgium, Brazil, Canada, Chile, China, Cuba, Denmark, Dominican Republic, Ecuador, Finland, Federal Republic of Germany, France, Ghana, India, Israel, Italy, Ivory Coast, Japan, Korea, Mexico, Mauritania, Monaco, Morocco, Netherlands, Norway, Pakistan, Poland, Rumania, Spain, Switzerland, Thailand, Tunisia, Union of Soviet Socialist Republics, United Arab Republic, United Kingdom, United States of America, Uruguay, Viet-Nam. Of these States only four, Chile, Ivory Coast, Pakistan and Rumania, did not send delegations to the first session of the Commission. Rumania was represented at the meeting by the Permanent Delegate to Unesco in the capacity of an observer. Observers from the following States not members of the IOC were also present: Ceylon, Guatemala, Honduras, Iceland and South Africa.

3. Representatives and observers of the following intergovernmental and non-governmental organizations also attended the session: International Atomic Energy Agency (IAEA), Food and Agriculture Organization (FAO), World Meteorological Organization (WMO), World Health Organization (WHO), Intergovernmental Maritime Consultative Organization (IMCO), International Civil Aviation Organization (ICAO), International Council of Scientific Unions (ICSU), International Union of Geodesy and Geophysics (IUGG), International Association of Physical Oceanography (IAPO), International Union of Biological Sciences (IUBS), Special Committee on Oceanic Research (SCOR), Permanent Association of Navigational Congresses, International Hydrographic Bureau (IHB), International Council for the Exploration of the Sea (ICES), Inter-American Tropical Tuna Commission.

4. The session was opened by the Acting Director-General of Unesco, Mr. René Maheu, who welcomed the delegates on behalf of Unesco (see Annex 1) and stressed the importance of the newly created Commission as an instrument for solving those problems of oceanography which require concerted international action.

5. The Commission received the following cable from the Soviet Oceanographic Expedition aboard the research vessel "Vityaz":

> "ON BEHALF OF MEMBERS SOVIET OCEANOGRAPHIC EXPEDITION ON BOARD VITYAZ IN CENTRAL PACIFIC OCEAN I AM SENDING MY BEST WISHES TO PARTICIPANTS OF CONFERENCE AND WISH EVERY SUCCESS IN CREATING INTERNATIONAL PROGRAMS FOR STUDYING OCEANS DIRECTED TOWARDS GOOD OF ALL MANKIND
>
> Professor KORT"

This cable was announced to the plenary meeting and the answering cable was approved and sent to the Chief of the Expedition, Professor V.G. Kort:

"ON BEHALF MEMBERS INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION THANKS YOUR CABLE BEST WISHES FOR SMOOTH SAILING AND SUCCESSFUL VOYAGE

BRUUN
Chairman

II. ORGANIZATION OF THE SESSION

6. In accordance with Article 7 (3) of the IOC Statutes, the Commission formally invited those intergovernmental and non-governmental organizations which had been informed by the Director-General of Unesco of the convening of the first session of the Commission to participate in the work of the Commission. (List of Organizations at Annex II).

7. The Commission also decided that, in view of the importance of the first session, it would be desirable to elect first a temporary Bureau and a Steering Committee to serve during the first session only. A Permanent Bureau would, in accordance with Article 6 of the Statutes, be elected by the end of the session. A change was accordingly made in Article 10 of the Draft Provisional Rules of Procedure submitted to the Commission. (See Annex III).

8. The Commission set up its Bureau for the duration of the session as follows:

Chairman:	Dr. A. BRUUN (Denmark)
Vice-Chairmen:	Dr. W.M. Cameron (Canada) Vice-Admiral V.A. Tchekourov (Union of Soviet Socialist Republics)

This Bureau, together with the following eight selected representatives, constituted the Steering Committee of the session:

Captain R.H.R. Bagnati (Argentina)
Professor H. Lacombe (France) - Rapporteur
Dr. D.G. Meseck (Federal Republic of Germany)
Dr. N.K. Panikkar (India)
Mr. M. Toda (Japan)
Professor S. Szymborski (Poland)
Vice-Admiral Sir Archibald Day (United Kingdom)
The Hon. James Wakelin Jr. (United States of America).

9. Subject to the change indicated in paragraph 7 above, the Commission approved at the beginning of its session the Draft Provisional Rules of Procedure submitted to it in document IOC/1-2. It decided, however, to review these Rules at the end of its session and adopted a revised set of Provisional Rules of Procedure which is reproduced in Annex III of this report.

10. The Commission adopted the Agenda of the session after adding two major items:

Item 9: Fritjof Nansen Memorial Session
Item 10: Other business; Revision of Provisional Rules of Procedure; Election of the Bureau; Date and place of the second session of the IOC.

Also, several sub-items were added to Items 4 and 5:

Item 4(b): Advisory Committee on Fisheries Aspects of Oceanography.
4(e): Discussion of Provisional Rules of Procedure in connexion with the relations of IOC with other organizations.
5(f): Preliminary consideration of Unesco Programme in Marine Sciences in 1963-1964.

Consideration of the programme of the Charles Darwin Station on the Galapagos Islands was included under sub-item 5(a). (See approved Agenda - Annex IV).

11. The Commission unanimously approved the Report of the Secretariat (document NS/IOC/1-8) presented by Dr. Wooster, Director of the Office of Oceanography of Unesco and Secretary of the Commission.

12. At the end of the first plenary meeting the representative of the USSR made a declaration stressing that the success of international co-operation in oceanography depended upon the participation in the work of the Commission of all States active in oceanographic research. In this connexion, the USSR delegation expressed regret at the absence from the Commission of the lawful delegates of the People's Republic of China, and denied the right of the representative of Taiwan to represent China with its 650,000,000 people, at the meeting. This statement was commented upon by the representative of China who pointed out that his right to represent China was based upon the decision of the General Conference of Unesco.

13. The Commission, after preliminary discussion in plenary session of certain items of its Agenda, appointed three working groups to examine related problems in detail and to prepare draft resolutions to be submitted to the Commission for approval. These drafts were examined and revised by the Steering Committee before presentation to the plenary meeting.

The working groups were constituted as follows:

Working Group No. I: For Item 4 of the Agenda - Relationship between the IOC and other organizations.

1. India (Chairman, Dr. Panikkar)
2. Australia
3. USSR
4. U.S.A.
5. Brazil
6. Norway
7. United Kingdom
8. Germany
9. Canada

with observers from FAO, WMO, IAEA, ICES, ICSU, SCOR and other organizations present at the meeting.

Working Group No. II: For Item 5 of the Agenda - Co-operative International Programmes of Oceanographic Investigations.

All interested members were invited to work in this group under the chairmanship of the representative of the USSR, Commodore K.P. Ryzhkov.

Working Group No. III: For Items 5 and 6 of the Agenda - Co-ordination of National Programmes and Technical Questions including Exchange of Data.

All interested members were invited to work in this group under the the chairmanship of the representative of the United States of America, Dr. Roger Revelle. This group was further split into four ad hoc working parties concerned with different technical questions.

III. CONSIDERATION OF THE MAJOR ITEMS OF THE AGENDA

Item 4: Relations between the IOC and other organizations

Discussions concentrated mainly upon the relationship between IOC and FAO and SCOR. Some members suggested that a new Consultative Committee on the Fisheries Aspects of Oceanography should be established by the IOC. At the same time, the Commission was informed of the proposed creation by FAO of its own Advisory Committee on

Marine Resources Research and the intention of SCOR to establish a Working Group on Fisheries Aspects of Oceanography. Many speakers emphasized that existing relations between the IOC and other organizations already provided all the channels necessary for the transmission of appropriate advice from these organizations and their committees or working groups to the IOC. A good spirit of co-operation dominated this discussion and general understanding of the necessity to simplify the whole system of organizations interested in oceanography was widespread.

(See resolution 1 - Annex V)

Item 5: International oceanographic programme

Working paper NS/IOC/1-6 served as a basis for the discussion. However the opinion was expressed, and further supported, that the IOC should not only co-ordinate co-operative international programmes, but also assist in the distribution of information of international interest in respect to declared national programmes of international interest. No specific recommendation was agreed upon in connexion with initiating new large-scale co-operative oceanographic programmes. Rather a series of such programmes was referred back to the States members of the Commission and to the Secretariat for further development. It was the general feeling in connexion with the Indian Ocean Expedition that the IOC should gradually take over from SCOR the co-ordinating functions with respect to this expedition by working out, together with SCOR, appropriate steps in this direction. Technical questions were mainly referred to working groups of experts, the establishment of which was recommended in the resolutions, or to appropriate international organizations.

Strong support was shown for the development of a comprehensive programme for world ocean study, and the Secretariat was requested to initiate its preparation.

An opinion was expressed by the representative of the United Kingdom that: "The Secretary should ensure that any proposals laid before the Commission for its approval and co-ordination shall in their final form contain estimates of the contributions in resources and manpower that Member States would be invited to make".

It was also suggested by the representative of France that some previous recommendations should be re-emphasized, especially those accepted at the Copenhagen meeting with respect to training and the importance of providing careers for young marine scientists.

(See resolutions 2, 3, 4, 5, 6, 7 - Annex V)

A group of Latin American States introduced a declaration concerning the development of oceanography in that region. In this connexion a resolution was adopted urging increased support to developing countries interested in participating in international oceanographic programmes.

(See resolution 8 and declaration - Annex V)

During the preliminary discussion of the Unesco Draft Programme in Marine Sciences for 1963-1964 some delegates (China, Japan, USSR) expressed their opinions on the priority of certain regions in applying Unesco assistance for the development of marine sciences. Some representatives raised a question concerning Unesco's financial support of IOC activities. Representatives of India and USSR stressed the importance of the rôle Unesco might play in the creation of an international pool of equipment proposed by Spain. It was suggested that the Unesco book coupons might be useful in solving immediate currency difficulties. The representative of the USSR introduced a draft resolution recommending some redistribution of budgetary means in the proposed Unesco Marine Science Programme for 1963-1964. However, in view of the declaration of the group of Latin American States and the corresponding resolution adopted (see above), the representative of the USSR did not insist on the Commission's making a separate decision on the Soviet draft resolution, and asked only that it be included in the report of the meeting.

(See Annex VI)

Item 6: Data centres, exchange of data and publications connected with Intergovernmental Oceanographic Commission activities

Document NS/IOC/1-7 served as a basis for discussion at the plenary meeting. However, the discussion took place mainly in Working Group No. III and in the ad hoc group under the chairmanship of the representative of the Federal Republic of Germany, Dr. Böhnecke. The importance of data exchange was stressed, not only in connexion with co-operative international programmes, but also for the declared national and regional programmes of international interest.

It was recognized that immediate exchange of oceanographic data in accordance with the Data Centre's Manual of the International Geophysical Year should be started for such programmes commencing from 1 January 1960. Ways and means of exchange of bathymetric data were also discussed at length. The problem of publishing a new General Bathymetric Chart of the Oceans was raised several times and the opinion was expressed that Unesco might assist financially in this matter. However, no specific recommendation was made in this connexion in view of the forthcoming International Hydrographic Conference in May 1962.

It was the general feeling that an oceanographic newsletter, which the Office of Oceanography of Unesco proposes to publish, should contain information concerning national programmes of international interest.

It was also suggested that Unesco should study the feasibility and practicability of the creation of an international pool of equipment.

(See resolution 9 - Extract from IGY Data Centre Manual and resolution 10 - Annex V)

Item 7: Standardization and intercalibration of methods and instruments

The importance of any work in this field was stressed many times and it was the general feeling that the best way of carrying out intercalibration work would be to bring together scientists and equipment aboard oceanographical vessels for joint oceanographic tests. As an example, the recent Unesco-SCOR intercalibration tests at Honolulu and aboard "Vityaz" and "Gascoyne" were cited. Representatives expressed the opinion that the distribution of standard equipment could be put into effect through the proposed international pool of equipment. It was felt that the task of planning new steps in the programme of standardization and intercalibration of methods and equipment should be delegated to SCOR because of the essentially scientific nature of this task.

(See resolution 11 - Annex V)

Item 8: International research and training vessel

The summary report on the international research and training vessel (document NS/IOC/1-4) prepared by the Office of Oceanography of Unesco, served as a basis for the discussion. The majority of speakers expressed the opinion that at the moment there was no vital necessity to have an international oceanographic research and training vessel and that the tasks which might be assigned to such a vessel could be more efficiently and cheaply carried out aboard national vessels.

Different representatives, especially the representative of Brazil, informed the Commission of the possibilities offered by their countries to take on board scientific or technical personnel of other countries for training.

At the same time, the representatives of India and Viet-Nam and of one or two other States, still considered the International Oceanographic Research and Training Vessel both necessary and useful.

A special drafting committee was appointed to summarize opinions. It was decided not to close the issue permanently and to reserve the possibility for the IOC to return to the question at some appropriate future time.

(See resolution 12 - Annex V)

Item 9: Fritjof Nansen Memorial Session

Professor A.D. Dobrovolsky from Moscow State University gave a lecture honouring the memory of the great explorer and humanist Fritjof Nansen. He described his life and work and the enormous impact which his oceanographical achievements made and still make on the development of marine sciences.

Dr. Böhnecke (Federal Republic of Germany) followed Professor Dobrovolsky with his own recollections of Nansen's influence on his own scientific progress.

Professor Mosby from the University of Bergen gave a short talk of his own contacts with Nansen and showed some original slides depicting certain of Nansen's expeditions.
(See Annex VII)

Item 10: Election of the Bureau, creation of a Consultative Committee, date and place of the second session of the IOC

At the end of the session, the Bureau, comprising:

Chairman: Dr. A. BRUUN (Denmark)

Vice-Chairmen: Dr. W.M. Cameron (Canada)
Vice-Admiral V.A. Tchekourov (USSR)

was re-elected for a full term of office expiring at the end of the second session.

The Commission also decided to establish a consultative committee to work with the Bureau and the Secretariat in the development of the programme of the Commission during the period prior to the beginning of the second session. This committee consists of representatives of France, India, U.S.A., Argentina, Japan, United Kingdom, Federal Republic of Germany, Poland, Brazil, Australia and others as needed.

The Commission had previously received an invitation from the Government of Monaco to hold the second session in the Principality. The Commission heartily welcomes this gesture of recognition and expresses its gratitude to the Government of Monaco. However, a fairly strong tendency was demonstrated among the delegates towards holding the second session of the IOC in Unesco Headquarters. The Commission decided in favour of that opinion, but asked its Secretariat to inform the Government of Monaco that it was favourably disposed to holding a future session in Monaco. It was therefore agreed that the second session of the IOC take place in Paris in September/October of 1962 and that the Provisional Agenda should be distributed three months in advance to all Member States, which recommendation was introduced into the Revised Provisional Rules of Procedure. The importance of not conflicting with the dates of the 1962 meeting of ICES was pointed out.

The representative of the USSR proposed that a second paragraph should be added to Rule 6 of the Provisional Rules of Procedure stipulating that the provisional agenda for each session of the Commission should be distributed to Member States six months in advance of the session. The Commission decided not to accept the proposal in that form, but considered it an important suggestion for the work of the Secretariat which should be incorporated in the report of the session.

In closing the first session of the Commission, its Chairman, Dr. Bruun, on behalf of the Bureau, expressed his thanks for the help received during the session from all representatives and observers, members of the Secretariat and Unesco, including interpreters and technical staff, and especially noted the sincere spirit of international co-operation which had dominated the whole session. He also expressed, on behalf of the re-elected Bureau, their appreciation of the Confidence manifested by the Commission.

In issuing this Summary Report, the Secretariat of the Commission wishes to record its deep sorrow at the passing away of its distinguished Chairman. Dr. Bruun died in Copenhagen on 13 December 1961. He leaves in the memories of all those who worked with him in Paris in October the memory of a wise and eminent man of science devoted to the cause of international co-operation in oceanography.

ANNEX I

ADDRESS BY MR. RENE MAHEU,
ACTING DIRECTOR-GENERAL OF UNESCO,
AT THE OPENING OF THE FIRST SESSION OF THE
INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION

Paris, 19 October 1961

Ladies and Gentlemen,

It is with great pleasure that I welcome you to this inaugural meeting of the Intergovernmental Oceanographic Commission. As you all know, the purpose of this Commission is to contribute to the development of scientific research through the concerted efforts of its members to obtain a better knowledge of the nature and resources of the oceans. The meeting in this hall of the representatives of 40 nations shows clearly how much the creation of the Commission, decided by Unesco's General Conference less than a year ago, meets a need of the international community.

Science has a long tradition of international co-operation behind it. The scientific study of the oceans is one of the best examples by which to illustrate the need for this kind of co-operation. The very vastness of the seas necessitates the combination and co-ordination of efforts and resources in order to make research work a success. The oceans, whose waters mingle and circulate over the whole surface of the planet, cover approximately three-quarters of the earth's surface and, beyond the limits of territorial waters, the high seas are a truly international area.

The scientific study of the ocean has become more important to mankind than ever before. There are several reasons for this. The sea is a principal means of communication, used by a considerable portion of world trade. It is a source of mineral wealth, some of which is dissolved, the rest deposited on the sea bed. Being a reservoir of water and heat, it regulates meteorology and climates. With its store of proteins, it nourishes hungry millions. It is also a gigantic ditch into which man discharges the waste from his organic exchanges and the detritus, as it were, of his civilization. In order to master the sea and to make rational use of the possibilities it offers, one must have a thorough knowledge of the complex natural phenomena which take place within it. Moreover, it may be said that, on the whole, scientists are less interested in solving immediate practical problems than in satisfying their ardent curiosity for the truth. The sea offers an almost unlimited field for such research.

At the time of the first great oceanographic expedition, carried out by the British vessel "Challenger" in 1873-1876, a single ship could collect an enormous amount of new data. But as their knowledge increased, scientists felt more and more the need for numerous, detailed and systematic observations. There can be no doubt that in our own time, the solution of many important oceanographic problems requires the simultaneous and closely co-ordinated action of a large number of vessels.

This international action, which had been steadily developing over a decade, gained strong impetus from the International Geophysical Year. In the North Atlantic and the Pacific, international co-operation made it possible to study vast regions of the ocean. The international Indian Ocean Expedition, which is now being organized by the Special Committee on Oceanic Research and which Unesco has agreed to sponsor, will provide an opportunity for more than 20 nations and 40 ships to work together on the exploration of an immense and still largely unknown ocean.

Other aspects of oceanography also require concerted action by all nations concerned. For this research to be successful, it is essential to obtain rapidly and in convenient form the results which have already been gathered from a study of the same or similar problems. Thus the exchange of oceanographic data and information is of international importance. No doubt new documentation centres will have to be added to those that already exist. But more than a purely quantitative effort is required. The free exchange of information poses the capital problem of their quality and comparability; hence the need for the standardization of methods and the calibration of instruments on an international basis. Nor is that all. The examination of technical questions relating

to navigational aids, the distribution of radio frequencies for oceanographic research, and the operation of recording stations submerged in international waters - here are further problems the solution of which depends, to varying degrees, on collaboration between nations.

During the last few years, governments, National Commissions for Unesco and governmental and non-governmental scientific organizations have frequently drawn Unesco's attention to these problems and invited it to extend its programme of marine sciences.

Realizing the need for dynamic and co-ordinated international action in this field, Unesco's General Conference, at its tenth session, held in Paris in November 1958, adopted a resolution (resolution 2.42) which provided for the convening of an intergovernmental conference on oceanographic research. This conference - in the preparation of which the United Nations, FAO, WMO and IAEA were closely associated, and I should like to thank them once again - was held in Copenhagen in July 1960. It considered and approved a body of measures designed, on the one hand, to ensure the common use by the Member States concerned of international services for oceanographic research and the training of personnel and, on the other hand, the immediate application of an international research and training programme in the marine sciences.

The principal recommendation of the Copenhagen Conference was that an Intergovernmental Oceanographic Commission be set up with the help, and within the framework, of Unesco, with the task of recommending to Member States concerted action in oceanographic research.

At its eleventh session, in November-December 1960, the General Conference adopted the recommendations of the Copenhagen Conference and set up within the framework of Unesco the Intergovernmental Oceanographic Commission. The General Conference approved the funds needed to run the Commission, and in particular those required to set up an Office of Oceanography to assure its Secretariat.

The office is attached to the Department of Natural Sciences of Unesco. This administrative arrangement will, I feel sure, make it possible for the work of the Commission and of Unesco, whose programme embraces activities closely related to the Commission's field of work, especially as regards promoting the development of research institutions and the training of research workers, to progress harmoniously, side by side. It is, in my opinion, highly desirable that the plans to be drawn up and executed by your Commission and Unesco's plans should be systematically but flexibly co-ordinated, while at the same time, as its sponsors requested, the Commission should be guaranteed that freedom of action which is essential to the advancement of its work.

Unesco looks upon your Commission as an instrument which can be of great assistance in solving those problems of oceanography for which, as I said before, concerted international action is imperative. In performing this task, you may be assured of Unesco's assistance and support. However, it should, no doubt, be said that there are many other problems which need to be examined by scientists, institutions or specialized laboratories, research work in which it is not the Commission's function to direct or to co-ordinate. Nor, it must be remembered, is it the Commission's duty to carry out meteorological research - that is a function of WMO - nor fishery research, which comes within the field of competence of FAO.

It is, moreover, desirable that in executing its programmes the Commission should co-operate closely with other institutions of the United Nations family, particularly the United Nations Food and Agriculture Organization (FAO), the World Meteorological Organization (WMO), the International Atomic Energy Agency (IAEA) and all other competent intergovernmental and non-governmental organizations, respecting their various fields of competence, but working together with them to arrange meetings and other forms of useful collaboration.

What I have just said needed to be said, I think, but it does not alter the fact that the tasks which your Commission is called upon to perform and the opportunities that lie before it within the field of action which I have just indicated are as wide as the oceans themselves and are of the utmost importance for the advancement of science and the good of mankind. Unesco, therefore, is greatly honoured by your presence, and cordially wishes you success in your endeavours. With high hopes, therefore, I declare the first session of the Intergovernmental Oceanographic Commission open.

ANNEX II

LIST OF ORGANIZATIONS INFORMED OF CONVENING OF THE FIRST SESSION OF THE INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION

INTERGOVERNMENTAL ORGANIZATIONS

1. International Hydrographic Bureau
2. Commission for Fisheries Research in the West Pacific
3. International Whaling Commission
4. International Commission for the Scientific Exploration of the Mediterranean Sea
5. Caribbean Commission
6. South Pacific Commission
7. Commission for Technical Co-operation in Africa South of the Sahara
8. General Fisheries Council for the Mediterranean
9. Indo-Pacific Fisheries Council
10. International Council for the Exploration of the Sea
11. Pan American Institute of Geography and History
12. Inter-American Tropical Tuna Commission
13. International Commission for the North West Atlantic Fisheries
14. International North Pacific Fisheries Commission
15. International Pacific Halibut Commission
16. Permanent Commission for the Conservation and Exploitation of the Maritime Resources of the South Pacific
17. Permanent Commission of the International Fisheries Convention
18. International Pacific Salmon Fisheries Commission
19. North-West Pacific Fisheries Commission
20. International North Pacific Fur Seal Commission

NON-GOVERNMENTAL ORGANIZATIONS

1. International Council of Scientific Unions (ICSU)
   (a) International Union of Geodesy and Geophysics (IUGG)
   (b) International Union of Biological Sciences
   (c) International Association of Physical Oceanography (of IUGG)
   (d) Special Committee on Oceanic Research (of ICSU)
   (e) International Geographical Union
2. Union of International Engineering Organizations
3. Permanent International Association of Navigation Congresses
4. International Union for the Conservation of Nature and of Natural Resources
5. Pacific Science Association
6. Gulf and Caribbean Fisheries Institute

ANNEX III

PROVISIONAL RULES OF PROCEDURE

(Revised text adopted by the Commission at its first session)

Section I - Membership

Rule 1

The Intergovernmental Oceanographic Commission (hereinafter called the Commission) is composed of States which have given notice of their willingness to participate in oceanographic programmes which require concerted action, in accordance with the procedure laid down in Article 2 of the Statutes of the Commission as adopted by the General Conference of Unesco at its eleventh session.

Rule 2

Each State member of the Commission shall notify the Secretariat of the Commission of the names of its designated representatives as well as of advisers and experts.

Section II - Sessions

Rule 3

The first session of the Commission shall be convened by the Director-General of Unesco. The place and date of that session shall be communicated in advance to all interested States and Organizations.

Rule 4

Other sessions shall be convened by the Secretary of the Commission under instructions from the Bureau of the Commission.

Section III - Agenda

Rule 5

The provisional agenda of the first session of the Commission shall be prepared by the Director-General of Unesco.

Rule 6

1. The provisional agenda of other sessions of the Commission shall be prepared by the Secretary of the Commission in consultation with the members of the Bureau and the Director-General of Unesco.

2. The provisional agenda shall be communicated to the members of the Commission at least three months before the opening of each session.

Rule 7

The provisional agenda of a session of the Commission shall include:

(a) Items whose inclusion has been decided by the Commission itself;
(b) Items proposed by any State member of the Commission;
(c) Items proposed by the United Nations or by any of the Agencies of the United Nations system;
(d) Items which the Director-General of Unesco or the Secretary of the Commission may deem necessary to raise.

Rule 8

At the beginning of each session the Commission shall adopt the agenda for that session.

Rule 9

The Commission may, during a session, modify the order of items on the agenda. A majority of two-thirds shall be required for the addition or deletion of items during a session.

Section IV - Bureau

Rule 10

1. At the beginning of its first session, the Commission shall elect a Chairman and two Vice-Chairmen who shall remain in office until the end of that session.

2. The Commission shall also at its first session and for the duration of that session constitute a Steering Committee composed of the Chairman, the Vice-Chairmen and of eight other elected members.

Rule 11

Thereafter the Chairman and Vice-Chairmen shall be elected and shall hold office in accordance with the provisions of Article 6 of the Statutes of the Commission.

Rule 12

If the Chairman is unable to act at any meeting or any part thereof, he shall be replaced alternatively by one of the two Vice-Chairmen. A Vice-Chairman acting as Chairman shall have the same powers and duties as the Chairman.

Rule 13

The Chairman or a Vice-Chairman acting as Chairman shall participate in the meetings of the Commission in that capacity and not as the representative of the State by which he is accredited. In such a case, an alternate representative shall be entitled to represent the State member concerned in the meetings of the Commission and shall exercise the right to vote.

Rule 14

If the Chairman ceases to represent a State member of the Commission or is so incapacitated that he can no longer hold office, a Vice-Chairman shall become Chairman for the unexpired portion of the term of office. If that Vice-Chairman also ceases to represent a State member of the Commission or is so incapacitated that he can no longer hold office, the other Vice-Chairman shall become Chairman for the unexpired portion of the term of office.

Rule 15

Members of the Bureau are eligible for re-election.

Section V - Committees

Rule 16

Committees set up by the Commission in accordance with Article 5 of the Statutes of the Commission shall meet in accordance with the decisions of the Commission, or of the Bureau.

Rule 17

These Committees shall elect their own Chairman, Vice-Chairman and, if necessary, their own Rapporteur.

Rule 18

These rules of procedure shall apply to the proceedings of committees unless the Commission decides otherwise.

Section VI - Secretariat

Rule 19

The Director of the Unesco Office of Oceanography shall be the Secretary of the Commission. He shall act in that capacity at all meetings of the Commission, of the Committees and of the Bureau. He may designate another member of the Secretariat of the Commission to take his place at any meeting.

Rule 20

The Secretary shall direct the members of the Secretariat of the Commission provided in accordance with Article 8, paragraph 1, of the Statutes.

Rule 21

The Secretary or his representatives may make oral as well as written statements to the Commission or its Committees and to the Bureau concerning any question under consideration.

Rule 22

In carrying out his functions as defined in Article 8 of the Statutes, on behalf of the Commission, the Secretary shall act under the authority of the Director-General of Unesco.

Section VII - Languages

Rule 23

English, French, Russian and Spanish shall be the working languages of the Commission.

Rule 24

Any representative may make a speech in a language other than the working languages currently in use for a particular session of the Commission or of a committee, on the conditic that he provide for the interpretation of his speech into one or the other of the said working languages.

Section VIII - Conduct of business

Rule 25

All meetings of the Commission shall be open to the public unless the Commission decides otherwise.

Rule 26

A simple majority of the States members of the Commission shall constitute a quorum.

80597 O - 62 - 11

Rule 27

Experts and observers may, with the authorization of the Chairman, make oral or written statements before the Commission and its Committees.

Rule 28

The Chairman of the Commission shall declare the opening and closing of each meeting, direct the discussions, ensure observance of these Rules, accord the right to speak, put questions to the vote and announce decisions. He shall rule on points of order and, subject to these Rules, shall have control of the proceedings and over the maintenance of order at meetings.

Rule 29

The Chairman shall call upon speakers in the order in which they have expressed the desire to speak.

Rule 30

During the discussion on any matter, a representative may at any time raise a point of order and the point of order shall be forthwith decided by the Chairman. Any representative may appeal against the ruling of the Chairman which can only be overruled by a majority of the members present and voting. A representative may not in raising a point of order speak on the substance of the matter under discussion.

Section IX - Voting

Rule 31

Each State member of the Commission shall have one vote.

Rule 32

1. Except on matters for which the Commission shall decide that a majority of two-thirds is required, decisions shall be made by a majority of the members present and voting.

2. Decisions as to the matters which require a two-thirds majority shall be made by a majority of the members present and voting.

3. For the purpose of these Rules, the phrase "members present and voting" means members casting an affirmative or negative vote. Members who abstain from voting are considered as not voting.

Rule 33

Voting shall normally be by show of hands, except that any member may request a roll-call. The vote and abstention of each member participating in a roll-call shall be inserted in the record.

Rule 34

1. When an amendment is moved to a proposal, the amendment shall be voted on first. When two or more amendments are moved to a proposal, the Commission shall first vote on the amendment furthest removed from the original proposal and then on the amendment next furthest therefrom, and so on, until all amendments have been put to a vote. If one or more amendments are adopted, the amended proposal shall then be voted on. If no amendment is adopted, the proposal shall be put to the vote in its original form.

2. A motion is considered an amendment to a proposal if it adds to, deletes from or revises that proposal.

Rule 35

All elections shall be decided by secret ballot unless, in the absence of objections, the Commission decides otherwise.

Rule 36

If a vote is equally divided on matters other than elections, the proposal shall be regarded as rejected.

Section X - Records

Rule 37

1. Summary records of the meetings of the Commission shall be prepared by the Secretariat of the Commission and circulated to its members.

Section XI - Reports

Rule 38

1. The Secretary shall submit an annual report to the Commission.

2. The Commission shall submit reports on its activities to each ordinary session of the General Conference of Unesco.

3. Copies of these reports shall be circulated by the Director-General of Unesco in accordance with Article 10 of the Statutes of the Commission.

Section XII - Amendments

1. The Commission may amend these Rules of Procedure by a majority of the members present and voting.

2. Suspension of any of these Rules shall require a two-thirds majority of the members present and voting.

ANNEX IV

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION

First Session

Paris, Unesco, 19-27 October 1961

AGENDA

1. Introduction

   (a) Opening of the session and introductory remarks
   (b) Formal invitation of intergovernmental and non-governmental organizations' representatives to take part in the meeting as observers

2. Organization of Commission

   (a) Election of Chairman
   (b) Adoption of provisional Rules of Procedure
   (c) Election of other officers
   (d) Adoption of Agenda

3. Report of the Secretariat

4. Relationship between the Intergovernmental Oceanographic Commission and other organizations

   (a) Special Committee on Oceanic Research
   (b) Advisory Committee on Fisheries Aspects of Oceanography
   (c) United Nations Specialized Agencies
   (d) Other intergovernmental and non-governmental organizations
   (e) Discussion of provisional Rules of Procedure in connexion with relations of IOC with other organizations

5. International Oceanographic Programme

   (a) Comments on previous recommendations (including the Programme of Charles Darwin Station on Galapagos Islands)
   (b) New proposals
   (c) Joint programme
   (d) Aids to navigation
   (e) Recording stations
   (f) Preliminary consideration of Unesco programme in marine sciences for 1963-1964

6. Data centres - exchange of data and publications connected with the Intergovernmental Oceanographic Commission activities

7. Standardization and intercalibration of methods and instruments

8. International research and training vessel

9. Fritjof Nansen Memorial Session

10. Other business. Revision of provisional Rules of Procedure, election of the Bureau, date and place of the second session of the IOC

ANNEX V

RESOLUTIONS ADOPTED BY THE COMMISSION AT ITS FIRST SESSION

RESOLUTION I

RELATIONSHIP BETWEEN THE INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION AND OTHER ORGANIZATIONS

The Commission

Recalling that the Statutes of the Commission prescribe that the purpose of the Commission shall be to promote scientific investigation with a view to learning more about the nature and resources of the oceans, through the concerted action of its members,

Bearing in mind the very wide scope of oceanography and the many important fields in which scientific investigation of the nature and of the resources of the oceans is pursued, in particular those concerned with fisheries of the world,

Bearing in mind further the interest and valuable work of many organizations, intergovernmental and non-governmental, world-wide and regional, in oceanography or directly related fields and that these organizations could contribute to the development and implementation of a well co-ordinated and integrated international programme in oceanography,

Noting that the Economic and Social Council, at its thirty-second session, expressed the hope that the Commission would take fully into account the activities and interests of all organizations concerned with oceanography,

Appreciating that oceanography and fishery research are complementary undertakings and that the Food and Agriculture Organization of the United Nations has the primary responsibility within the United Nations family for fisheries,

Appreciating further that the Food and Agriculture Organization plans to consider at its forthcoming conference the establishment of an Advisory Committee on Marine Resources Research,

Aware that the Special Committee on Oceanic Research of the International Council of Scientific Unions is now serving Unesco as an advisory body on oceanography and has, since its inception in 1957, contributed greatly towards the development of international co-operation in oceanic research,

Aware also that the Special Committee on Oceanic Research is in process of establishing a working group of experts in fisheries and oceanographic sciences:

1. Invites the United Nations and its Specialized Agencies and other intergovernmental and non-governmental organizations concerned with oceanography in its various disciplines, to co-operate with the Commission to the fullest possible extent;

2. Expresses the hope that the Food and Agriculture Organization, the World Meteorological Organization and other interested agencies of the United Nations family will find it possible to designate members of their Secretariats to co-operate actively with the Secretariat of the Commission, the extent of such co-operation to be decided by agreement between these organizations and Unesco;

3. Requests the Members to submit to the Secretary of the Commission their views on the establishment of advisory channels to the Commission in all fields of oceanography, including fisheries oceanography, for consideration by the Commission at its second session;

4. Requests the Bureau and the Secretary of the Commission, in the interim, to seek and receive the advice of those organizations which now advise Unesco on oceanographic matters and other intergovernmental and non-governmental organizations of a world-wide or regional nature, which could contribute to the development of international programmes in oceanography.

5. Requests the Secretary of the Commission to submit to members, at least three months before the second session of the Commission, a draft report on the matters raised in 3 and 4 above.

RESOLUTION 2

POSTS AND CAREERS IN MARINE SCIENCES

The Commission

Noting the present shortage of experts in the marine sciences, which may well delay their development for many years, although

Welcoming the considerable financial effort already made by Unesco and planned for future years to further the advancement of these sciences, but

Convinced that an effort by the various countries is also required to ensure their full development, and

Repeating the invitation set forth in paragraph 5 of the recommendation concerning the training programme submitted by the Intergovernmental Conference on Oceanographic Research held in Copenhagen,

Recommends that Unesco be invited without delay to address an urgent appeal to governments for the creation by them, within the specialized organs, of permanent posts and assured careers for the many young scientists and technicians who are attracted by the marine sciences.

RESOLUTION 3

CO-OPERATIVE INTERNATIONAL OCEANOGRAPHIC PROGRAMMES

The Intergovernmental Oceanographic Commission,

Having received numerous proposals for oceanographic research which, to be effective, would require the concerted action of several Member States,

Recognizing that each proposal, by co-operative effort, would add materially to man's knowledge of the world ocean,

Bearing in mind that to proceed with such co-operative research the implications of each proposal should be carefully examined and weighed by all States considering participation, and being

Cognizant that the Commission might also contribute significantly to the formulation of a comprehensive programme for an eventual world ocean study,

Recommends for earnest consideration by such States as may desire to participate in the co-operative programmes, each of the following proposals, (initiated by the member body indicated below) as parts of a general study of the world ocean:

(a) North Atlantic Synoptic Survey (U.S.A),
(b) Co-operative programme of study of the Eastern Tropical Pacific Ocean (EPOC and IATTC)
(c) North Atlantic Expedition for studying fields of currents (USSR)
(d) West Pacific Expedition for studying fields of currents (USSR)
(e) West African Guinean Year (CCTA/CSA and U.S.A.)
(f) South Atlantic study (regional agreement between Brazil, Uruguay and Argentina)
(g) Standard section programme to study time changes in characteristics of the ocean (USSR)
(h) North Pacific Synoptic Survey (U.S.A.)
(i) Australian-Asiatic Seas Expedition (Naga II) (Thailand, South Viet-Nam)
(j) Gulf of Mexico and Caribbean Study (Mexico, Cuba and Dominican Republic)
(k) Currents of the Drake passage (Argentina, document NS/IOC/INF.13)

Noting that there may be other projects suitable for such consideration which have not been brought to the attention of the Commission at this time;

Recommends that an initiating member or body, in consultation with the Bureau and with the assistance of the Secretariat, convene a working group consisting of all interested members and bodies to explore avenues of planning, co-ordination and co-operation (including consultation with appropriate national and international organizations) to prepare specific programmes, and to take appropriate and early action with a view that all aspects of oceanographic study should be taken into account where possible, and that all their findings be fully published upon the completion of each programme;

Requests the Secretariat to collate all proposals on oceanographic research submitted by Member States and by other bodies prior to the next meeting of the Commission; and

Requests the Secretariat to initiate the preparation of a comprehensive programme for world ocean study through the most effective means he deems appropriate.

RESOLUTION 4

INDIAN OCEAN EXPEDITION

The Intergovernmental Oceanographic Commission, having considered the international research programme for the Indian Ocean (the International Indian Ocean Expedition), and

Recognizing that the foregoing programme would benefit by the voluntary co-operation of Member States of the Commission,

Appreciating that SCOR has taken and will continue to take a prominent part in the co-ordination of that expedition, and that the appropriate rôle of the Commission in that programme has not yet been clarified,

Bearing in mind that the proposed programmes would also profit from the advice and co-operation of international agencies presently concerned in oceanic research,

Commends the International Indian Ocean Expedition to its members for possible participation; and

Instructs the Secretary to assume such co-ordinating functions with respect to that Expedition as can be worked out in consultation with SCOR and other appropriate bodies.

RESOLUTION 5

AIDS TO NAVIGATION

The Commission

Recognizing that accurate navigation is essential for detailed systematic oceanographic investigations, and further

Recognizing that systems of aids to navigation presently available for use do not generally meet the requirements of detailed oceanographic investigation except for limited specific areas and that such systems, if possessing the required accuracy should continue to be established in the interim,

Aware that several systems of aids to navigation, are presently under development which show promise of meeting the long-range ocean-wide requirements of detailed systematic oceanographic investigation,

Resolves that the Commission through its member governments actively encourage and support the continued development and subsequent establishment of a ground based long-range radio navigation system capable of meeting the world-wide requirements for detailed systematic oceanographic investigations; and

Recommends that in the establishment of the accepted world-wide ground based system of long-range radio navigation, priority be given to those areas for which no aids are presently available and for which large-scale oceanographic investigations are planned;

Further recommends that the International Hydrographic Bureau at Monaco, Intergovernmental Maritime Consultative Organization and the International Civil Aviation Organization be requested through their member governments to co-operate with IOC in the expeditious development, and subsequent establishment of a single national and international ground based long-distance radio navigation aid capable of meeting the accuracy requirements for detailed systematic oceanographic investigation (repeatability ± 50 m. and position accuracy ± 0, 25 nautical miles);

Further recommends that steps be taken by Member States to assist those countries having ships taking part in the international co-operative oceanographic investigations to obtain and effectively use the equipment required for these navigational systems;

Further recommends that the development of other promising and economical systems of navigation even of lesser accuracy such as certain methods of satellite navigation, be actively pursued.

RESOLUTION 6

COMMUNICATIONS

The Commission

Recognizing the vital rôle that communications play in any substantive oceanographic investigations, and

Recognizing further that existing frequencies in the radio communications spectrum are almost completely absorbed,

Aware that the continued development of new instrumentation and techniques will further complicate the problem,

Aware that we must move aggressively forward to a solution of this vital problem,

Authorizes the Bureau of the Commission to establish a working group of experts on radio communications to be responsible for the study and establishment of oceanographic radio communication requirements. The working group should render its initial report with recommendations in time for approval, adoption, and presentation by the Commission and its member governments to the next study session of the Administrative Radio Conference. The expenses including travel of the individual members of the working group should be met by the member governments and organizations having experts on the working group or by Unesco.

RESOLUTION 7

FIXED STATIONS

The Intergovernmental Oceanographic Commission,

Considering the attached report NS/IOC/INF.16, prepared by the ad hoc working group on fixed stations,

1. Recommends to Member States that they provide the Secretariat of IOC annually with full information on what stations of the various types are in operation, what data are being gathered from them and at what time intervals, and on plans for future developments (including technical information on engineering and instrumental matters);

2. Recommends to Member States concerned that they make fuller use of weather ships for the needs of oceanography;

3. Recommends to Unesco that steps be taken in consultation with IMCO to clarify the legal status of unmanned and manned observing buoys;

4. Requests the Bureau to establish a working group of experts from Member States, WMO and other appropriate international organizations, to study the existing network of fixed stations and the needs of extending it (types, number, locations, kinds of observations and their spacing in time) and prepare proposals for meeting these needs. The working group should report to the next session of the IOC. Expenses of the individual members, including travel, should be met by the member governments and organizations having representatives on the working group, or by Unesco.

ADDENDUM TO RESOLUTION 7
(NS/IOC/INF.16)

REPORT OF THE WORKING PANEL ON OBSERVING STATIONS AND WEATHER SHIPS

From the contributions at this, and other, conferences[1] it is evident that the employment of "fixed" stations for taking oceanographic observations is of increasing importance to modern oceanography, and that the establishment of networks of such stations is of interest to many Member States. Information gathered continuously, or at frequent intervals, from fixed stations is obtainable at relatively small cost and is indispensable for the solution of several types of oceanographic problems. Series of data from fixed points, closely spaced in time, make possible the study of time variations in oceanographic parameters; some of these vary importantly with frequencies of a few minutes, other with frequencies of days, months or years. A network of fixed stations at suitable locations can provide sets of truly synoptic observations which can be employed to monitor changes in the ocean circulation and the distribution of properties, and thus can assist in the solution of problems of forecasting. Such data, taken in conjunction with observations by moving ships, which cannot themselves be truly synoptic, can assist in the proper interpretation of the information from such moving ships.

The fixed stations now in use, or in the advanced planning stage, are of four kinds. Coastal and island stations, ocean station vessels (weather ships), unmanned anchored buoys, and manned anchored platforms.

Coastal and Island Stations

A large number of stations are presently being maintained at coastal and some island locations for the recording of sea level (tides) and a few for long-period wave records. At most of these there are taken records, at least daily, of surface temperature and salinity. During the I.G.Y., there were also taken near a number of such stations, especially at oceanic islands, shallow casts for temperature and salinity, at daily and weekly intervals, for computing steric sea level.

It appears most desirable to increase the number of such stations, especially on off-shore oceanic islands and at them to obtain not only sea level, temperature, and salinity observations, but also to obtain meteorological data, data on chemical constituents of the ocean at various depths, solar radiation and simple biological observations.

(1) See example document: IOC/1-6, IOC/INF.1, IOC/INF.11, and Ocean/92(1), and NS/163 of Paris Conference of March 1960.

A network of island stations can be a very important part of a programme of detailed research and survey in an ocean area. Such a network is an integral part of the EPOC plan for a co-operative study of the Eastern Tropical Pacific, and is a part of the plan for the Indian Ocean Expedition. In the tropical Atlantic there exist a series of oceanic islands which could be similarly employed in that region.

Ocean Station Vessels (weather ships)

These platforms, operating at fixed points in the open sea for weather observations and air-sea rescue, under the auspices of ICAO and other agencies offer a magnificent, but largely unused, opportunity for obtaining time-series data on physical, chemical and biological parameters both at the surface and at various depths. To take advantage of this opportunity, all such ships should be provided with suitable oceanographic winches and other oceanographic equipment, and with a small team of oceanographic observers. Supplementary meteorological observation of special interest to oceanography may be added to the present routine weather observation in consultation with interested specialists.

It is also possible to employ a local network of anchored instrument buoys in connexion with a weather ship, the data being gathered by the ship by the removal of data records or by telemetering to obtain time-series at a number of points simultaneously.

Weather vessels can also be of great value in obtaining repeated hydrographic and biological sections when travelling to their stations and their home ports.

Manned Anchored Platforms

Light ships have for many years been employed to collect various types of oceanographic data. Their continued, and expanded, use should be encouraged in order to obtain time series, at fixed locations in deep water, of some types of data, which are not currently amenable to automatic instrumental recording, there are under development special-purpose manned stations, such as the FLIP stations of the Scripps Institution of Oceanography, and the similar station being developed for use in the Mediterranean by the group at Monaco. Such stations are costly, and will, therefore, probably be used in only small numbers, but they will have capabilities not possible in the small unmanned buoys.

Unmanned Stations (buoys)

Although oceanic islands and weather ships offer good possibilities for obtaining important synoptic and time-series oceanographic data, their locations are not under control of the oceanographer, and there are large areas of the sea in which they do not exist. In order to obtain, at deep sea locations, such data at reasonable cost, there are being developed in a number of laboratories, anchored data-collecting systems which can be placed where needed.

A network of such instrument-systems needs to be established at suitable points in the World Ocean and especially at such critical points as the regions where deep water is formed, at current boundaries, at places where the mixed-layer depth is highly variable, etc.

From such stations can be taken automatically data from the atmosphere, such as barometric pressure, wind direction and velocity, and solar radiation, and data from the sea, such as temperature at various depths, current direction and velocity and transparency. Instruments under development will make possible the automatic recording of salinity, oxygen, and some simple biological parameters. Such data may be stored in the buoy and retrieved by ships, or may be read out by telemetering systems. The telemetering may be at long-range to shore stations, or by short-range telemetering on demand to aircraft or satellites.

Technical problems which are not yet fully or satisfactorily solved include anchoring systems, data transducers, data storage devices, power sources, data readout and telemetering systems. Close co-operation in developing these new instrument systems could greatly facilitate the solution of such problems.

Action by the IOC

The greater, and more effective, use of fixed observing stations of the various types noted above could be promoted by the co-operative efforts of the Member States of IOC in a number of ways:

1. Collection and dissemination of information on what stations of the various types are now in operation, what data are being gathered from them, at what time intervals, and plans for future developments.

2. Planning for the types, numbers and locations of stations needed for an ocean-wide synoptic network.

3. Arriving at joint decisions on time-intervals at which various kinds of observations should be taken and setting, where necessary, standard observing hours.

4. Promoting necessary intergovernmental or other international arrangements for establishment of coastal and island stations.

5. Clarify the legal status of unmanned and manned anchored buoys - i.e. the rights and duties of persons and States placing them in the sea.

6. Joint action with ICAO and other agencies for the use of ocean station vessels for oceanography.

7. Exchanging of technical information on engineering and instrumental problems with relation to development of unmanned anchored stations.

It would be useful if there were established by the IOC a standing Committee to carry out these functions on a continuing basis, with the aid of the IOC Secretariat and, where required, (e.g. for items 5 and 7 above) the assistance of other experts.

RESOLUTION 8

RESOLUTION IN CONNEXION WITH THE JOINT DECLARATION SUBMITTED BY THE DELEGATIONS OF ARGENTINA, BRAZIL, CUBA, ECUADOR, MEXICO, URUGUAY AND THE DOMINICAN REPUBLIC

The Commission,

Noting the Joint Declaration submitted by Argentina, Brazil, Cuba, Ecuador, Mexico, Uruguay and the Dominican Republic,

Appreciating the needs of these Latin American countries for assistance in the training of oceanographers and for the development of oceanographic activities,

Recommends that these interested members include in their requests for technical assistance, proposals in the marine sciences; and also

Recommends that these countries initiate and develop projects in the marine sciences under the Special Fund of the United Nations with the assistance of the Office of Oceanography of Unesco; and

Recommends that the Director-General consider the possibility of increasing or modifying the allocations of the Unesco oceanographic programme to give further assistance to developing countries interested in participating in international oceanographic programmes.

ADDENDUM TO RESOLUTION 8

JOINT DECLARATION SUBMITTED BY THE DELEGATIONS OF ARGENTINA, BRAZIL, CUBA, ECUADOR, MEXICO, URUGUAY AND THE DOMINICAN REPUBLIC TO THE PLENARY MEETING OF THE INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION AT ITS FIRST SESSION

The delegations of Argentina, Brazil, Cuba, Ecuador, Mexico, Uruguay, and the Dominican Republic, present at the First session of the Intergovernmental Oceanographic Commission,

Aware of the substantial progress achieved by oceanography in highly industrialized countries and of the fact that nations in process of development, despite their efforts to intensify their activities in this field, are increasingly failing to keep abreast of this progress because of their inadequate human and economic resources,

Noting that a thorough knowledge of the oceans can be obtained only through more intensive and effective international co-operation, which makes it urgent to provide a larger number of oceanographic research centres furnished with equipment and specialized technical staff,

Observing that the funds so far assigned by Unesco to oceanographic research in countries in process of development have proved insufficient for the purpose, and

Bearing in mind that the Latin American countries have not yet been able to contribute effectively and as much as they would like to do, to the advancement of world oceanography owing to the above-mentioned lack of resources,

Invite the Intergovernmental Oceanographic Commission to recommend the Director-General of Unesco to make appreciable increase in the budget of its Regular programme and of the Technical Assistance programme, and to grant special funds for the promotion of oceanographic research, the development of existing institutions and the training of the necessary technical staff, in order to speed up the progress of such research in Latin American countries, so that they may acquire sufficient knowledge and experience to be able to make a real and substantial contribution to implementation of regional oceanographic projects in their respective areas.

RESOLUTION 9

EXCHANGE OF OCEANOGRAPHIC DATA

The Intergovernmental Oceanographic Commission,

Desiring to foster the full and expeditious exchange of oceanographic data,

Noting the existence of the data centres listed in document IOC/1-7, including the centre for bathymetric data under the International Hydrographic Bureau with sub-centres at various national hydrographic offices,

Reiterates the recommendation made by the Intergovernmental Conference on Oceanographic Research at Copenhagen in July 1960 that oceanographic data should be exchanged and that system of World Data Centres established during the International Geophysical Year should be continued in future;

Recommends that all oceanographic data taken by ships and recording stations outside territorial waters within the limits of declared national programmes be exchanged under the headings listed and by the methods prescribed in the IGY data centre manual, commencing from 1 January 1960, in accordance with the attached extracts from the manual (IOC/INF.17).

Recommends to member countries the establishment of national oceanographic data centres in order to facilitate the collection, processing, analysis, and exchange of oceanographic data;

Urges member countries to participate with the I.H.B., in co-operation with World Date Centres A and B for Oceanography, in the preparation of bathymetric plotting sheets for the world ocean on as large a scale as possible;

Recommends to the Governments of the U.S.A., USSR, and the United Kingdom that they appoint representatives of World Data Centre A, World Data Centre B and the Permanent Service for Mean Sea Level to a working group of experts on the organization of oceanographic data exchanges and invites the International Council for the Exploration of the Sea, the International Hydrographic Bureau and the World Meteorological Organization to designate representatives to this working group.

The mission of this working group shall be the facilitating of exchanges of oceanographic data, the standardization of forms for reporting and coding data, the encouragement of the preparation of data catalogues, and the assistance of development of national oceanographic data centres.

The working group should meet at the call of the Secretary of the Intergovernmental Oceanographic Commission and should report to the next session of the Intergovernmental Oceanographic Commission. Expenses of the individual members, including travel, should be met by the member governments and organizations having representatives on the working group, or by Unesco.

Requests the Secretary and the Bureau of the Commission to seek advice from appropriate bodies on the volume and nature of the data to be exchanged in the future.

ADDENDUM TO RESOLUTION 9

IGY LIST OF DATA TO BE EXCHANGED
(NS/IOC/INF.17)

Projects

(a) Shore stations recordings of:

- (i) Sea level
- (ii) Long period waves

(b) Afloat:

- (i) Serial station for depth, temperature, salinity and chemical analysis
- (ii) Colour and transparency
- (iii) State of sea and swell
- (iv) Currents
- (v) Bottom sediments
- (vi) Bathymetry
- (vii) Bathythermography
- (viii) Meteorology and actinometry
- (ix) Biology

Description and presentation of data

(a) Sea-level records. These will be the mean monthly sea levels computed from hourly observations from a recording gauge or alternatively according to standard observations on a tide staff.

(b) Long period wave records will be retained at the appropriate institutions and parts of them made available on request together with relevant details at cost of reproduction. Periods of observations and the range of frequencies covered should be reported for inclusion in WDC indexes.

(c) Serial station records:

(i) Depth as accurately as possible using suitable standard depths.
(ii) Temperature in °C to + 0.01°.
(iii) Salinity by accurate method to + 0.02 per cent.
(iv) Concentrations of 0_2, $Si0_4$, $P0_4$, $N0_2$, $N0_3$, H_2S (if present), $C0_2$, NH_2, H_3B0_3, C_{14}, D_20_1, T_20, and other chemical species, pH, alkalinity and radio-activity. Whenever non-standard methods of analysis are used, specifications are to be given.

(d) Colour and transparency. Data at selected stations should be included with serial station records.

(e) State of sea and swell. Visual observations and averaged results of instrumental measurements of height, period and direction of waves, expressed in the customary units. Full details of scales to be furnished with tabulated results.

(f) Currents. Observational data on currents along sections and at anchor stations, at specified levels, and with information about the method and circumstances of measurement e.g. ship behaviour, etc.

(g) Bottom sediments. A field description of each bottom sample in accordance with the specifications in USHO Publication No. 607, p. 155.

(h) Bathymetry

(i) The sounding at each station to be included with the data under (c).

(ii) For echo soundings the system preferred is an overlay of the ship's track chart showing all navigational fixes on a chart of scale about 1:400,000 (1: 250,000 to 1:600,000) showing soundings as closely spaced as they can conveniently be written. If an overlay cannot be furnished, tabulated soundings at an interval of not more than 2 1/2 miles are desired. In either case, full details of the assumed speed of sound, corrections (if any) to sounding for actual speed, and any corrections to frequency standard are to be furnished.

(iii) Original echograms will be handled similarly to long wave records. Para. (b).

(i) Bathythermography. Tabulations of temperatures at standard depths as on Form IBM 8180850, with data on time, date and location.

(j) Meteorology

(i) Tabulated data for standard marine observations of air temperature, ocean surface temperature, absolute or relative humidity, speed and direction of wind, barometric pressure, cloud, visibility and other atmospheric phenomena, and precipitation. If scales used are not explicit c.g.s. units, conversion tables should be furnished.

(ii) Upper air data. Radiosonde observations of temperature, humidity and pressure using WMO format. Speed and direction of wind with a description of method used.

(iii) Actinometry. Daily observations of the total, direct, diffused and reflected radiation carried out during daylight and the results of 24 hour observations of effective radiation in selected situations.

(k) Biology. Data on quantity and composition of plankton standard layers, if feasible.

Other observations:

References should be given for inclusion in WDC indexes, of any types of data obtained, e.g. submarine geology, submarine geophysics, special echo soundings and marine biological observations.

General:

(a) Results should be presented chronologically for each expedition beginning with its first day of work.

(b) Each table heading is to contain the date, time and the name of the observing ship (or station) and be accompanied by a chart, showing the positions of ship stations. An indication is to be given of how positions have been fixed e.g. dead reckoning, observation, bearing, etc.

(c) The time in use is to be stated e.g. GMT or time zone; and in the case of a serial station the time is that of dropping the messenger for the first cast.

(d) Data should be presented in final processed form after all instrumental corrections have been made. But in the case of serial stations interpolation to standard depths is to be omitted if this will delay transmission.

Time schedules and transmission:

Cruise data are to be forwarded as expeditiously as possible and in any case not later than 6 months after completion of the cruise. In the case of Antarctic expeditions and similar long cruises during which analysis may be conducted on board, three months is the desirable interval after the end of the voyage. All other data should be forwarded within one year after collection.

One copy of the data is to be sent to both WDCs whenever feasible. Alternatively data should be sent in duplicate to one of the WDCs. The method used is to be made clear on the transmittal note.

Data which are already being sent to certain organizations will continue in accordance with established schedules and in addition to transmission to WDCs, e.g.

(a) Mean sea-level observations to the Liverpool Observatory and Tidal Institute, The Observatory, Birkenhead for the Mean Sea Level Committee of the IAPO. It is hoped that a copy of all mean sea-level observations will be sent direct to the LTI for the MSL Committee as well as to one or both WDCs.

(b) Bathymetric data to the International Hydrographic Bureau, Quai des Etats-Unis, Monaco, for the Carte Bathymétrique Internationale des Océans.

(c) North Atlantic Serial Station data to the International Council for the Exploration of the Sea.

RESOLUTION 10

CO-ORDINATION OF NATIONAL AND REGIONAL PROGRAMMES

The Commission recommends that:

1. (a) Regional organizations and member countries as soon as possible should submit to the Secretariat of the IOC, information on their existing national and regional programmes;

(b) Plans of cruises of international interest projected for the future should also be submitted together with information on berths available for scientists of other countries; likewise scientists prepared to carry out work at sea should submit details of their availability for future cruises;

(c) Reports on the general results of all cruises should be forwarded expeditiously as the cruises are completed;

(d) Descriptions of newly-developed instruments and techniques should also be forwarded to the Office of Oceanography of Unesco.

2. (a) The oceanography newsletter which the Office of Oceanography of Unesco proposes to publish should contain a brief summary of the information mentioned above;

(b) The newsletter should be reproduced by any rapid and economical method of publication and sent as quickly as possible to mailing lists furnished by each member country.

3. The Secretariat of the IOC in consultations with the Bureau of the Commission, SCOR and other appropriate agencies, should consider the feasibility and practicality of the creation of the international pool of scientific equipment and study means whereby such a pool can be created. Such a pool might be created even on a partial basis in time for the International Indian Ocean Expedition.

4. Member States should be urged to distribute scientific papers and abstracts to the mailing lists referred to in paragraph 2 (b) above.

RESOLUTION 11

STANDARDIZATION AND INTERCALIBRATION OF OCEANOGRAPHIC METHODS AND EQUIPMENT

The Commission

Recognizing that there is a pressing need for a co-ordinated programme that ensures that oceanographic observations will be more meaningful and useful for oceanographic research in general,

Recognizing further that this can be accomplished by a carefully planned programme which includes to varying degrees the standardization, intercalibration and absolute calibration of observational methods and equipment, and that the formulation of such a programme should be carried out by those scientists most intimately involved in the collection and use of such data,

Convinced that in order to have comparable results this will probably involve some standardization of methods and equipment but equally convinced that world-wide standardization of all oceanographic techniques is not now desirable,

Aware that such a programme should proceed in an orderly fashion so that the final results will be the assurance that accurate oceanographic data can be mutually exchanged among oceanographers,

Further aware of the excellent work in this field being carried out by IAPO, ICES and ICSEM, and of the recent intercalibrations at Honolulu and aboard "Vityaz" and "Gascoyne" sponsored jointly by SCOR and Unesco,

Requests SCOR to undertake the following task:

Appoint as soon as possible working groups for the purpose of examining, summarizing, and criticizing the present oceanographic methods and equipment in common use to determine where these methods or equipment do not provide universally usable, accurate data, or where such data cannot presently be utilized to the utmost, and to recommend by report to the IOC appropriate

steps whereby these methods or equipment should be made universally usable. This may in some cases be accomplished by standardization or by intercalibration, or by such methods as these experts may determine.

RESOLUTION 12

INTERNATIONAL RESEARCH AND TRAINING VESSEL

Noting the proposal for an International Oceanographic Research and Training Vessel to be sponsored by Unesco,

Following the resolutions adopted at the Intergovernmental Conference on Oceanographic Research, held in Copenhagen in July 1960 and the General Conference of Unesco at its eleventh session in November/December 1960,

Being of the opinion that it is difficult at the present time for such a vessel to be operated directly by an international organization, that further examination of this problem is required, and that it may well be found that training can be more efficiently and cheaply carried out aboard national vessels,

Considers that the present time is not suitable for carrying out the proposal;

Recommends that nations operating national oceanographic research vessels be encouraged to accept scientists for training from other nations, without such vessels. This offer has already been made by Brazil and by several other countries;

Recommends in addition that the member nations continue to keep in mind the proposal for one or more international vessels which could be operated on an international or regional basis and that the item be inserted in the agenda of the Intergovernmental Oceanographic Commission at an appropriate future time.

ANNEX VI

DRAFT RESOLUTION OF THE REPORT BY THE SECRETARIAT CONCERNING THE PLANNED UNESCO BUDGET FOR 1963-1964 IN THE SPHERE OF OCEANOGRAPHY

(Proposal by the USSR delegation)

The Intergovernmental Oceanographic Commission, having heard the report by the Secretariat concerning the planned Unesco budget for 1963-1964 in the sphere of oceanography,

Recommends, within the limits of proposed expenditure for 1963-1964, that:

(a) Provision be made for an increase in assistance to the development of oceanographic research in the countries of Africa which have acceded to independence in recent years, and in particular Ghana;

(b) Provision be made for an increase in the volume of resources supplied to India for the creation of an oceanographic centre in Cochin;

(c) Provision be made to give the financial assistance to Ecuador for investigations in the vicinity of the Galapagos Islands, in the conduct of which several countries are interested.

80597 O - 62 - 12

ANNEX VII

Professor A.D. Dobrovolsky
Moscow State University, USSR

FRITJOF NANSEN MEMORIAL

The name of Fritjof Nansen is known the world over but it seems to me that there are two countries to the people of which he is especially dear, that is to say, Norway, of which country he was a faithful son, and the USSR, to whom he was a true friend. Regardless of nationality, all oceanographers of the world respect and cherish this man because he was the founder of marine science. The first session of the IOC would undoubtedly select Nansen as its President if only he had been alive. This thought is not as fantastic as it might appear at first glance, for only 100 years have passed since his birth. Recently I read in the newspaper that in England there was a wedding of a man 102 years old and his bride 73! But it was not the fate of Nansen to live to be 100 years old and the only thing we can do now is to honour his memory by our recollections of him.

In a short talk it is impossible to give, in adequate detail, a full account of Nansen's life. Therefore I will draw your attention only to certain incidents. First of all, it should be noted that Nansen, at only 20 years of age, went to sea, to the waters of Greenland, in the fishing boat "Jason". This fact alone is not surprising as Norway is a seafaring nation, but what is remarkable is that Nansen went to sea as a scientist. His first scientific problem was a study of the feeding of seals. However, already in this first expedition, he paid attention to the ice movements and currents. Already he had the idea of the Greenland crossing and was thinking over the plan of this enterprise.

To visit the central regions of the Greenland ice plateau was a thought in many people's minds at that time, but only Nansen's attempt to cross this plateau was successful. This fact can be accounted for primarily by his careful planning and thorough preparation of the Expedition, which characterized all other expeditions undertaken by Nansen. Already in 1888, when he had crossed Greenland, he was thinking of the journey to the North Pole. Even when proposing to his future wife after his return from Greenland, he warned her that he would go to the North Pole and in fact did so.

In 1893 his ship "Fram" sailed on a voyage which many at that time regarded as crazy. Indeed it was considered a very complicated way of committing suicide! Really, Nansen's fundamental idea in that expedition was an act of defiance: instead of fighting the ice as his predecessors had, he decided to surrender to it. Nansen knew that Siberian trees had been found on the east coast of Greenland and that the wreckage of the American ship "Jeanette" which perished near our New Siberian Islands had been brought to the same place (these facts were established by the Norwegian Mohn). Certainly, then a ship could take the same route. If one assumed that the ice floes follow the shortest route along the great circles of the globe, then to get to the North Pole it would be necessary to enter the ice floes near the New Siberian Islands. So Nansen did just this.

However, for the success of the expedition, it was necessary to have a specially designed ship which would withstand the pressure of the ice floes. Here again, Nansen didn't follow the straightforward idea that such a ship must be of extremely solid construction, but suggested a very clever idea whereby the ship's hull was rounded to permit its being pushed upward by the lateral pressure of the ice floes. This idea was successfully incorporated in the design of "Fram" by the shipbuilder Colin Archer.

However, Nansen never actually arrived at the North Pole. The "Fram" did not drift along a great circle, so Nansen and Johansson made a brave attempt to walk to the Pole on foot. Eventually they were forced to turn back without reaching their goal. But this did not discourage Nansen. From the very beginning, his purpose was a scientific study of the Arctic Ocean, not merely an adventure for its own sake. In this purpose he succeeded. We can say with assurance

that it was Nansen who discovered for us the great depths of the Arctic Ocean. Thanks to him we knew the oceanographical characteristics of this Ocean, the movement of its ice floes, its interchange with the Atlantic Ocean, etc.

Apart from its geographical and regional importance, the work of that expedition had also a theoretical significance concerning the ice drift. Nansen established that the speed of the ice drift was approximately 1/50th of the wind speed and the direction of the drift was about 30 degrees to the right of the wind. Several years ago these rules were supplemented by Professor Zubov (USSR) who showed that the ice was drifting along isobars (lines of equal atmospheric pressure) and that the speed of the drift was proportional to the pressure gradient.

The fact that the drift did not coincide with the direction of the wind forced Nansen to consider that this was in effect caused by the earth's rotation (Coriolis force). He also correctly came to the conclusion that this force should influence the development of currents. On the basis of this suggestion the young Swedish scientist Wilfrid Ekman, to whom Nansen proposed the mathematical solution of this problem, created an elegant theory of wind-driven currents. This theory is still important and is being developed and generalized by present-day scientists.

The scientific results of the "Fram" expedition are published in five volumes, of which Volume 3 - Oceanography (1902) is especially interesting. I am sure that every oceanographer of our time will find there many interesting and fresh thoughts. As well, it is an excellent example of clarity and logic of expression which may serve as a model to both young and old in the scientific world.

One of the questions studied by Nansen on the basis of "Fram's" observations, was the question of water exchange between the Central Arctic Basin and the Greenland Sea, but there was not enough data for solving this problem at the time. Therefore Nansen undertook a new journey to the Spitzbergen region on the small schooner "Veslamo" (1913). This was, one might say, a family affair. Aboard, together with Nansen, were his son and daughter. From this expedition came very interesting material for clarifying the problem of water exchange and also for the study of mixing processes (especially of winter convection and tidal currents). After this expedition, he wrote the book "Spitzbergen Waters" which even today has not lost its interest.

Later, Nansen, together with another Norwegian scientist Helland Hansen, conducted several expeditions in the northern part of the Atlantic on the small vessel "Armauer Hansen". The results of these studies, published in 1925 jointly by both scientists, are of exceptional interest. The authors examined extensive material and showed many features pertaining to the hydrology of this part of the World Ocean. Here, by the way, was first successfully applied the method of T-S analysis for the characterization of water masses. In this region were also found great internal waves with amplitudes up to 100 metres. At about the same time, Nansen became especially interested in the possibilities of studying the Arctic from the air. He had an excellent sense of reality and a gift for seeing into the future. He was able to see in aviation, then very weak, a powerful means of future investigation. He was the first Chairman of the International Aero-Arctic Society and his foresight has since been justified. Recent aircraft expeditions to the Central Arctic Basin conducted by the U.S.A., Canada and especially the USSR, have permitted the collection of extremely interesting and important data. I think that the underwater Lomonosov Ridge, extending from the New Siberian Islands to Greenland and discovered by Soviet expeditions landed on ice floes, represents so far the greatest geographical discovery of the second half of this century.

Another fascinating example of Nansen's ability to look into the future, is his book "To the Land of the Future" which he wrote after journeying across Siberia. On the ship "Correct" he went through the Barents and Kara Seas into the Gulf of Yenisei, and then up along the river by mainland. Now we can quite distinctly see the contours of this "land of the future": the most powerful hydroelectric power station in Bratsk, the longest electric railroad from Moscow to Baikal, the vast expanse of newly cultivated land, numerous industrial centres, the new scientific centre in Novosibirsk, etc. What was to Nansen merely a dream of the future has become for us a reality.

Nansen is also famous through the fact that he himself designed the equipment for his investigations and worked out himself methods of data processing. It is enough to remind you that we still work with the Nansen Bottle, with a Nansen Plankton Net, with Nansen's Clamp and Nansen's Magnifying Glass for reading thermometers, etc.

Nansen suggested a very interesting device for measuring bottom currents, based on the principle of a pendulum-weather vane and also proposed a very interesting way of calculating currents from ice drift observations, etc.

I think that our Commission should take into account the fruitful experience of Nansen when studying the oceans and when organizing international co-operation. If in our work we remember about Nansen, then I think our efforts cannot but be successful.

ANNEX VIII

LIST OF MEMBER COUNTRIES AND PARTICIPANTS OF THE SESSION

A. DELEGATIONS OF MEMBER COUNTRIES

	Country		Name and Title
1.	Argentina	Delegate	Captain R.H.R. BAGNATI Head of Delegation Chief, Naval Hydrographical Service BUENOS AIRES
		"	Captain de Croveta ARAGNO Chief, Department of Oceanography Naval Hydrographical Service BUENOS AIRES
2.	Australia	"	Dr. G.F. HUMPHREY Chief, Division of Fisheries and Oceanography CSIRO Marine Laboratory CRONULLA
		"	Dr. Gardner DAVIES Australian Permanent Delegate to Unesco
3.	Belgium	"	Professor A. CAPART Director of the Royal Belgium Institute of Natural Sciences
		"	Mr. M. DELOZ Assistant Adviser to the Administration of Scientific Research of the Ministry of Education and Culture
		Observer	Dr. E. LELOUP Director of the Institute of Marine Studies OSTEND
4.	Brazil	Delegate	Captain of Frigate "Castro Moreira da Silva" Brazilian Navy RIO DE JANEIRO
		Observer	Dr. M. VANNUCCI National Research Council SAO PAULO
5.	Canada	Delegate	Dr. William M. CAMERON Head of Delegation Director of Oceanographic Research Department of Mines and Technical Surveys OTTAWA
		"	Dr. H.B. HACHEY Chief Oceanographer Fisheries Research Board of Canada Secretary, Canadian Committee on Oceanography OTTAWA

	Country		Name and Title
6.	Chile		No representative present
7.	China	Delegate	Dr. KEH-MING-CHAO Deputy Permanent Delegate to Unesco
8.	Cuba	"	Dr. Dario GUITART Head of the Delegation Director of the National Aquarium HAVANA
		"	Dr. A. Alvarez de LOS RIOS Cultural Attaché Cuban Embassy PARIS
9.	Denmark	Delegate	Professor Dr. H.E. STEEMAN NIELSEN Head of the Delegation Professor, High School of Pharmacy COPENHAGEN
		"	Dr. Erik BERTELSEN Director, Danish Institute for Fisheries and Marine Research CHARLOTTENLUND
		"	Dr. A.F. BRUUN Lecturer in Oceanology University of Copenhagen COPENHAGEN
10.	Dominican Republic	"	Rev. F. Robles TOLEDANO Permanent Delegate of the Dominican Republic
			Mr. Parra MURGA First Secretary of the Delegation of the Dominican Republic
11.	Ecuador	"	Mr. Cristobal BONIFAZ JIJON Ambassador of Ecuador to France
		"	Mr. Fernand SUARES Consul of Ecuador in Dunkirk
12.	Finland	"	Miss Eugenie LISITZIN, Dr. Sc. Acting Head Finnish Oceanographic Institute HELSINKI
13.	Federal Republic of Germany	"	Dr. MESECK Head of the Delegation Federal Ministry of Food and Agriculture BONN
		"	Dr. G. BOHNECKE Secretary, Special Committee on Oceanic Research Neuer Wall 34, HAMBURG 36

Country		Name and Title
13. Federal Republic of Germany (continued)	Delegate	Dr. G. ZWIEBLER President, German Hydrographic Institute HAMBURG
	"	Professor Dr. G. DIETRICH Director, Oceanographic Institute of the University of KIEL
	"	Professor Dr. LUNDBECK Department of Maritime Fisheries in the Federal Research Institute for Fisheries
	"	Dr. MOCKLINGHOFF Federal Ministry of Food and Agriculture BONN
	"	Professor Dr. Otto von SIMSON Permanent Delegate to Unesco PARIS
	"	Mr. Frenke SEIFERT HAMBURG
14. France	"	Professor H. LACOMBE Head of the Delegation Director, Laboratory of Physical Oceanography, Museum of Natural History PARIS
	"	Mr. Jean FURNESTIN Directeur L'Institut Scientifique et Technique des Pêches Maritimes
	"	Vice-Admiral MONAQUE Président du Comité Central d'Oceanographie et d'Etude des Côtes
	"	Dr. M. PERES Professor of the Faculty of Sciences MARSEILLE
	Observer	Dr. MONCEAUX PARIS
15. Ghana	Delegate	Dr. Walter POPLE Lecturer of University GHANA
16. India	"	Dr. N.K. PANIKKAR Secretary, Indian National Committee on Oceanic Research NEW DELHI
17. Israel	"	Dr. M. MENAT HAIFA

Country		Name and Title
17. Israel (continued)		Mr. D. PELEG Scientific Counsellor Israeli Embassy PARIS
18. Italy	Delegate	Professor Paulo DORE Head of Delegation Professor of Bologna University BOLOGNA
	"	Professor Umberto d'ANCONA Instituto di Zoologia e Anatomia Comparata PADUA
	"	Dr. Gaetano CANNONE Chief, Fisheries Section Ministry of Merchant Marine ROME
	"	Capt. Ernesto DEBRAZZI Director, Italian Hydrographic Institute of the Navy GENOA
	"	Professor Carlo MALDURA Laboratorio Centrale di Idrobiologia ROME
	"	Professor Mario PICOTTI Instituto Sperimentale Talscografico TRIESTE
	Observer	Dr. Sergio PAROLETTI Fisheries Section Ministry of Merchant Marine ROME
19. Ivory Coast		No representative present
20. Japan	Delegate	Mr. Morikuni TODA Permanent delegate to Unesco Counsellor, Japanese Embassy PARIS
	"	Professor Dr. Ken SUGAWARA Nagoya University NAGOYA
	"	Dr. Kazuhiko TERADA Chief, Marine Division Japan Meteorological Agency TOKYO

Country		Name and Title
21. Korea	Delegate	Ambassador Sun Yup PAIK Head of the Delegation Embassy of Korea PARIS
	"	Mr. Bae Dong HWAN Chief, Fisheries Section Ministry of Agriculture and Forestry SEOUL
	"	Mr. Young Chan LOW Third Secretary Embassy of Korea PARIS
	"	Mr. Young Chul LEE Expert of the Delegation
	Observer	Mr. Hong Soon YONG Student SEOUL
21. Mexico	Delegate	Dr. Jorge CARRANZA Director Biological Station VERACRUZ
	"	Mr. Julio Faesler CARLISE Commercial Attaché Embassy of Mexico LONDON
23. Mauritania	"	Mr. Gusseynou DIOP Conseiller d'Ambassade PARIS
	"	Mr. PEDOYA Conseiller d'Ambassade PARIS
24. Monaco	"	Mr. Arthur CROVETTO Head of the Delegation Ministre Plénipotentiaire Ministère d'Etat MONACO
	"	Commandant Jacques-Yves COUSTEAU Director, Oceanographic Museum MONACO
	"	René NOVELLA General Secretary National Commission for Unesco MONACO

Country		Name and Title
25. Morocco	Delegate	Mr. LARAKI Director-General of the Merchant Marine CASABLANCA
	"	Mr. VARLET Director of Scientific Institute of Fisheries CASABLANCA
26. Netherlands	"	Professor P. GROEN Head of the Delegation Senior Scientific Officer Royal Netherlands Meteorological Institute DE BILT
	"	Dr. H. POSTMA Zoological Station DEN HELDER
	"	Professor Dr. P. KORRINGA Director, Ryksinstituut voor Visseryonddrzock IJMUIDEN
27. Norway	"	Professor Dr. H. MOSBY Head of the Delegation Geophysical Institute University of BERGEN
	"	Professor Dr. T. BRAARUD Institute of Marine Biology University of OSLO
	"	Dr. G. ROLLEFSEN Directorate of Fisheries BERGEN
28. Pakistan		No representative present
29. Poland	"	Dr. Stanislaw SZIMBORSKI Director, Polska Akademia Nauk SOPOT
30. Rumania	Observer	Dr. Arthur NEDELCU-KARASSI Permanent Delegate of Rumania to Unesco PARIS
31. Spain	Delegate	Mr. José Maria ULLRICH Secretary to Spanish Embassy PARIS
32. Switzerland	"	Professor Adolf PORTMANN Head of the Delegation Director, Zoological Institute at the University of Basle BASLE
	"	Mrs. MANGOLD WIRZ Zoological Institute BASLE

Country		Name and Title
33. Thailand	Delegate	Mr. Boon INDRAMBARAYA Dean of the Faculty of Fisheries University of Agriculture BANGKOK
	"	Capt. Amporn PENYAPOL, R.T.N. Chief of Oceanographic Division Royal Thai Navy BANGKOK
34. Tunisia	"	Mr. Brahm DOUIK
35. United Arab Republic	"	Professor Hámed Abdel Fattah GOHAR University of Cairo CAIRO
36. United Kingdom	"	Vice-Admiral Sir Archibald DAY Head of the Delegation Office of the Minister for Science LONDON
	"	Dr. G.E.R. DEACON Director, National Institute of Oceanography WORMLEY
	"	Dr. J.B. TAIT Marine Laboratory ABERDEEN
	"	Lt. Cdr. D.F.D. SCOTT Admiralty LONDON
37. Uruguay	"	Capt. of Frigate "Munoz Basso" Oceanographic Service MONTEVIDEO
38. United States of America	"	The Hon. James H. WAKELIN Jr. Head of the Delegation Asst. Secretary of the Navy for Research and Development WASHINGTON D.C.
	"	Rear-Admiral H. Arnold KARO Director U.S. Coast and Geodetic Survey WASHINGTON, D.C.
	"	Mr. Donald L. Mc KERNAN Department of the Interior WASHINGTON, D.C.
	"	Dr. Roger REVELLE Scientific Adviser to the Secretary Department of the Interior WASHINGTON, D.C.

Country		Name and Title
38. United States of America (continued)	Delegate	Rear-Admiral E.C. STEPHAN Hydrographer of the Navy Department of the Navy WASHINGTON, D.C.
	Adviser	Dr. Andrew W. ANDERSON Regional Fishery Attaché (Europe) American Embassy COPENHAGEN
	"	Dr. W.M. CHAPMAN Director, Van Camp Foundation SAN DIEGO, California
	"	Dr. Robert L. FISHER Scripps Institution of Oceanography LA JOLLA, California
	"	Mr. Michael G. KELAKOS First Secretary American Embassy PARIS
	"	Dr. John LYMAN National Science Foundation WASHINGTON, D.C.
	"	Dr. Arthur MAXWELL Office of Naval Research Department of the Navy WASHINGTON, D.C.
	"	Dr. Harris B. STEWART Jr. Chief Oceanographer U.S. Coast and Geodetic Survey Department of Commerce WASHINGTON, D.C.
	Observer	Cdr. S.N. ANASTASION Assistant to Chairman of the Delegation WASHINGTON, D.C.
	"	Cdr. John A. DAVIS Jr. U.S. Navy CHEVY CHASE, Maryland
	"	Hon. John D. DINGLE Chairman of the Sub-committee of Oceanography Member of Congress WASHINGTON, D.C.
	"	Hon. John DREWRY Chief, Counsel of the House Merchant Marine and Fisheries Committee WASHINGTON, D.C.

Country		Name and Title
38. United States of America (continued)	Observer	Mr. Paul S. BAUER Special Consultant Merchant Marine and Fisheries Committee United States Congress WASHINGTON, D.C.
	"	Rear-Admiral R. BENNETT WASHINGTON, D.C.
	"	Senator Norris COTTON Lebanon, NEW HAMPSHIRE
	"	Senator J.M. BUTLER BALTIMORE
	"	Miss J.S. GEMMEL Secretary to Chairman of the Delegation WASHINGTON, D.C.
	"	Dr. John B. HERSEY Woods Hole Oceanographic Institute WOODS HOLE, Mass.
	"	Mr. Daniel MARKEL Senate Committee on Commerce WASHINGTON, D.C.
	"	Capt. William MORAN Aide to the Chairman of the Delegation WASHINGTON, D.C.
	"	Dr. Dixie Lee RAY National Science Foundation WASHINGTON, D.C.
	"	Dr. Adrian F. RICHARDS Office of Naval Research London Branch LONDON
	"	Mr. Harold E. ROLAND Jr. WASHINGTON, D.C.
	"	Cdr. Walter C. SANDS Office of Naval Research London Branch LONDON
39. Union of Soviet Socialist Republics	Delegate	Vice-Admiral V.A. TCHEKOUROV Head of the Delegation Head of the Hydrographic Service LENINGRAD
	"	Dr. A.P. ALEXSEEV Deputy Director, Polar Institute of Oceanography and Fisheries MURMANSK

	Country		Name and Title
39.	Union of Soviet Socialist Republics (continued)	Delegate	Dr. N.A. BELINSKY Central Institute of Forecasting Hydrometeorological Service MOSCOW
		"	Professor A.D. DOBROVOLSKY Department of Oceanography Moscow State University MOSCOW
		"	Commodore K.P. RYZHKOV Hydrometeorological Service MOSCOW
		"	Dr. N.N. SYSSOEV Acting Director, Institute of Oceanology Academy of Sciences of the USSR MOSCOW
		"	Professor L.A. ZENKEVITCH Chairman, National Committee on Oceanography Academy of Sciences of the USSR MOSCOW
40.	Viet-Nam	"	Mr. Ngnen Dinh HUNG Director, Institute of Oceanography NWATRANG
B.	OBSERVERS		
	Guatemala		Mr. Francisco Azurdia SOTO Permanent Delegate to Unesco Embassy of Guatemala PARIS
	Honduras		Mr. Carlos Roberto REINA
	Iceland		Mr. H.E. ANDERSEN Ambassador of Iceland to France PARIS
			Mr. Tomas A. TOMASSON First Secretary Embassy of Iceland PARIS
	South Africa		Mr. J.A. KING Scientific Adviser Embassy of South Africa LONDON

C. REPRESENTATIVES

International Atomic Energy Agency (IAEA)	Professor Carlo SALVETTI Director, Research and Laboratories VIENNA
	Professor I. HELA Director, IAEA Laboratory MONACO
	Mr. I.C. ROBERTS First Officer, Division of Health, Safety and Waste Disposal VIENNA
	Mr. Roch de MAUTORT Administrative Officer IAEA Laboratory MONACO
	Mr. Andre FINKELSTEIN
Food and Agriculture Organization (FAO)	Dr. D.B. FINN Director of Fisheries, FAO ROME
	Dr. M. RUIVO Chief, Research Programme Section, FAO ROME
World Meteorological Organization (WMO) and World Health Organization (WHO)	Dr. K. LANGLO Chief, Technical Division GENEVA
Intergovernmental Maritime Consultative Organization (IMCO)	Mr. Roger GROSCLAUDE Chief of External Relations and Legal Matters LONDON
International Civil Aviation Organization (ICAO)	Mr. N. DETIERE Air Transport Officer PARIS
International Council of Scientific Unions (ICSU)	Dr. A.E. DECAE Administrative Secretary THE HAGUE
	Mr. Robert G. SNIDER Co-ordinator, International Indian Ocean Expedition NEW YORK
International Union of Geodesy and Geophysics (IUGG) and International Association of Physical Oceanography (IAPO)	Dr. G.E.R. DEACON WORMLEY, United Kingdom
International Union of Biological Sciences (IUBS)	Dr. R. CURRIE WORMLEY, United Kingdom

REPRESENTATIVES (continued)

Special Committee on Oceanographic Research (SCOR)	Professor Dr. P. TCHERNIA PARIS
International Hydrographic Bureau (IHB)	Rear-Admiral Robert W. KNOX President, International Hydrographic Bureau MONACO
International Council for the Scientific Exploration of the Sea (ICES)	Dr. J. FURNESTIN Director of the Scientific and Technical Institute of Fisheries PARIS
	Dr. Arni FRIDRIKSSON Secretary-General of the Council Charlottenlund Slot CHARLOTTENLUND, Denmark
	Dr. J.B. TAIT Chairman of the Council's Hydrographical Committee Marine Laboratory ABERDEEN (Scotland)
Inter-American Tropical Tuna Commission	Dr. M.B. SCHAEFER Director of Investigations LA JOLLA, California

UNESCO

Mr. René MAHEU, Acting Director-General
Dr. H. RODERICK, Acting Director, Department of Natural Sciences
Mr. C. LUSSIER, Acting Legal Adviser
Mr. R. SCOTT, Office of Legal Adviser

SECRETARIAT OF THE COMMISSION

Dr. W.S. WOOSTER, Director, Office of Oceanography, Secretary of the IOC
Dr. K.N. FEDEROV, Assistant Secretary of the IOC
Dr. Y. TAKENOUTI, Assistant Secretary of the IOC
Dr. HOWELL-RIVERO, Assistant Secretary of the IOC

Mr. DINGELL. Dr. Harris B. Stewart, Jr., Chairman, Ocean Surveys Advisory Panel.

Doctor, the committee welcomes you, and thanks you for your courtesy in being present.

STATEMENT OF DR. HARRIS B. STEWART, JR., CHAIRMAN OF THE OCEAN SURVEYS ADVISORY PANEL, INTERAGENCY COMMITTEE ON OCEANOGRAPHY

Dr. STEWART. Thank you, sir. I think in view of the lateness of the hour, Mr. Chairman, with your permission, I will somewhat abridge my prepared statement, if this is legitimate procedure.

Mr. DINGELL. This would be appropriate, Doctor.

(The prepared statement of Dr. Stewart follows:)

STATEMENT OF DR. HARRIS B. STEWART, JR., CHAIRMAN OF THE OCEAN SURVEYS ADVISORY PANEL, INTERAGENCY COMMITTEE ON OCEANOGRAPHY

I am Dr. Harris B. Stewart, Jr., chief oceanographer of the Coast and Geodetic Survey of the U.S. Department of Commerce and a Deputy Assistant Director of that Bureau. However, I am here today in neither of these capacities, but rather as Chairman of the Ocean Surveys Advisory Panel of the Interagency Committee on Oceanography. The "Surveys Panel," as we call it, is an outgrowth of the old Task Group B, a working group of the Subcommittee on Oceanography of the Federal Council for Science and Technology, the predecessor of the present ICO. When the Federal Council determined that the subcommittee should be a permanent committee of the Council in early 1960, the former Task Group B became the Ocean Surveys Advisory Panel, and our first meeting was held on June 15, 1960. At that meeting, Adm. Charles Pierce (U.S.C. & G.S.) was elected Chairman, and on his retirement the following year, I assumed the chairmanship of this Panel. The present Panel membership includes representatives from 10 different agencies: The Atomic Energy Commission, Bureau of Commercial Fisheries, Coast and Geodetic Survey, Coast Guard, Geological Survey, Maritime Administration, National Academy of Sciences Committee on Oceanography, National Science Foundation, Navy, and the Weather Bureau. For the record, I have listed the various representatives:

Harris B. Stewart, Jr., U.S. Coast and Geodetic Survey, Chairman.
Jack C. Thompson, Weather Bureau.
Capt. Max G. Ricketts, U.S. Coast and Geodetic Survey, alternate.
Lt. Comdr. J. A. Adelman, Navy Hydrographic Office.
Comdr. R. J. Alexander, Operations, Navy, alternate.
Dr. A. E. Maxwell, Office of Naval Research.
Joseph E. King, Bureau of Commercial Fisheries.
Howard Eckles, Bureau of Commercial Fisheries, alternate.
Capt. E. V. Carlson, U.S. Coast Guard.
Lt. Comdr. R. P. Dinsmore, U.S. Coast Guard, alternate.
Dr. C. O'D. Iselin, Woods Hole Oceanographic Institution, observer for the National Academy of Sciences Committee on Oceanography.
R. C. Vetter, National Academy of Sciences Committee on Oceanography alternate.
Vito Russo, Maritime Administration, observer.
James Trumbull, U.S. Geological Survey, observer.
Dr. D. D. Keck, National Science Foundation, observer.
Dr. John Lyman, National Science Foundation, alternate.
Dr. Irvin E. Wallen, Atomic Energy Commission, observer.
Dr. Woodrow Jacobs, National Oceanographic Data Center, observer.

You will notice as you hear from the other panel chairmen that many of these names are repeated on the other panels. This, I feel, is part of the strength of the ICO panel structure. It does mean that several of us spend a good deal of time at panel meetings and carrying out the work of these panels, but, by the same token, it also means that there is the cross-fertilization between the panels that is an essential to the efficient operation of the whole. This means, for example, that those working with the ocean surveys program are also completely

familiar with the research objectives of the research portion of the national oceanographic program, know the ship scheduling plans developed through the Ships Panel, the instrumentation developments and plans being worked on through the Instrumentation and Facilities Panel, the manpower problems involved through participation in the work of the Manpower and Training Panel, and the international aspects of the survey program have already been discussed in meetings of the newly formed Panel on International Programs. When a subject overlaps the areas of two panels, they meet together. For example, members of the Surveys Panel and the Ships Panel met with scientists from the private oceanographic institutions last September to go over the plans for the Coast and Geodetic Survey's new oceanographic survey ship; and recently a plan developed in Hawaii for cooperative surveys to provide the data for the solution of a specific research problem in the central Pacific was presented at a joint meeting of the Research and the Surveys Panels.

All this is merely to point out that in addition to the feed-in of material from the various panels to the ICO as shown in the diagram presented by Chairman Wakelin, there is also a vigorous exchange among the panels. They are anything but self-contained and isolated from the other panels of the ICO. I felt that this aspect of the ICO's operations was worth pointing out.

But what of the Ocean Surveys Advisory Panel itself? The Panel—as do the other panels—has a technical feed-in to the ICO during the planning stages of the national oceanographic program for the coming fiscal year. We also have—as have the other panels—prepared each year budget summaries of proposed agency work in our particular field of panel responsibility. By doing this at several points during the annual budget cycle, the ICO has been able to keep tabs on how the budgetary support for the national oceanographic program as a whole is progressing.

Although these two Panel activities require considerable time and effort on the part of the Panel members, they are primarily staff functions to the ICO. The real raisons d'etre of the Surveys Panel are, I feel, (1) the development of interagency survey plans on the national level, and (2) the initiation and fostering of operational cooperation—what I like to call cooperation at the "wet-deck" level. With your permission, Mr. Chairman, I would like to expand these two points a bit and, in so doing, point out some specific examples of the accomplishments of this Panel.

One of the first tasks of the Ocean Surveys Advisory Panel was to prepare a national program for the systematic investigation of the world ocean. This was a monumental task. To accomplish it, we appointed an ad hoc working group composed of representatives of the agencies most concerned, and chaired by Capt. C. N. G. Hendrix, at that time attached to the Navy Hydrographic Office. The program went through many revisions. It contained, at its stage of maximum thickness, chapters on navigational control, on the survey needs of all the various agencies, and of the nongovernmental oceanographic community, and even presented silhouettes of the various oceanographic ships that might be involved in such surveys. I have a copy of this volume with me today. Subsequently the written version of the U.S. national program for oceanwide surveys was considerably condensed, and in its present form has been transmitted to the ICO and submitted to the National Academy of Sciences Committee on Oceanography for their comments. I will gladly leave a copy of this document with you today for inclusion in the record.

Your committee, Mr. Chairman, has heard over the past few years a great deal of testimony on this Nation's need for more knowledge of the seas. There is one point, however, that I would like to reemphasize in connection with our need for a U.S. oceanwide survey program. We must have maps of the ocean. By this I do not mean only navigational charts—although we need these too. I mean good base maps of the shape of the sea floor, of its gravitational and magnetic characteristics, of the distribution of its bottom sediments, of the currents—both surface and subsurface—of the temperature and its variation as well as that of the other physical, chemical, and biological characteristics of the oceans. Before any land area can be developed and exploited, base maps are necessary. The same is true of the oceans; yet while, on one hand, we say that United States must exploit the seas for our general welfare—even for our very survival—on the other hand, we are forced to say that our maps of the sea are not as good as were those of North America at the time of the Lewis and Clark Expedition in 1805. This, Mr. Chairman, is indeed a singularly deplorable situation, and it is toward the remedying of this situation that the Ocean Surveys Panel has developed our plan for oceanwide surveys—the systematic investiga-

tion of our oceans. A man cannot sit down at an empty desk and say, "today I will do research in oceanography." He must have the data to work with. From these oceanwide surveys will come the basic facts, the data, on which this country can base a strong and productive oceanographic research effort. The oceanwide surveys will point up special areas and problems toward which the research effort can be directed.

Toward this end, the Ocean Survey Advisory Panel has—in addition to developing the survey program—also been working on a set of general instructions for the conduct of oceanwide surveys. I have brought with me and will leave with you for inclusion in the record the preliminary draft of these instructions worked up by the Panel. We have recently decided to go ahead with a full manual for carrying out the work at sea on these surveys. This manual, when completed, will be an interagency manual, probably published through the National Oceanographic Data Center. It will be looseleaf, so that as changes in techniques are developed the manual can be brought up to date. It will be a long task, but the Panel feels that such a manual is essential in order that data collected by different ships at different times will be compatible, and so that all data will be in a form readily able to be assimilated into the National Oceanographic Data Center.

This idea of a concerted effort to learn more about the world ocean is not an idea limited to a few members of the Federal Government. It was most recently put forward in this country by the National Academy of Sciences Committee on Oceanography, and the present plan of the Ocean Surveys Advisory Panel follows quite closely the basic objectives set down in chapter 9 of the NASCO report. This is neither a purely U.S. idea nor a new idea. The British Challenger Expedition in 1872–76 was motivated by the same need.

On April 27, 1927, the National Academy of Sciences adopted a resolution that "The President of the Academy be requested to appoint a Committee on Oceanography from the sections of the Academy concerned to consider the share of the United States of America in a worldwide program of oceanographic research, and report to the Academy." In T. Wayland Vaughan's report to the Academy of 1937 entitled "International Aspects of Oceanography," he states "Oceanography is necessarily a subject of worldwide extent * * *. It is obvious that any comprehensive systematic investigation of the oceans must in large measure be an international enterprise." The present NASCO Committee concurred in this. The Ocean Surveys Panel concurs. The Soviet Union also concurs, and I have here the Russian plan for oceanwide systematic investigations. The printed material is a translation of an information paper submitted at the Copenhagen meetings in July of 1960. The large chart is the modification of this plan submitted at the Paris meetings of the Intergovernmental Oceanographic Commission last fall. The Russian oceanographers and the U.S. oceanographers all have the same end in mind—learning about the world ocean. I will leave these interesting documents with your committee, Mr. Chairman, and you might wish to insert them in the record, for they do show that the program we envisage and on which we have started on a modest scale is one of international importance and concern.

The Surveys Panel helped in the preparation of the position papers for the U.S. delegation to the first meeting of the Intergovernmental Oceanographic Commission at Paris last fall. The Panel prepared the background material and wrote the U.S. Proposal on Oceanwide Systematic Investigations. I will leave a copy of this background material and of the proposal itself for your committee.

Currently an ad hoc working group of the Surveys Panel headed up by Mr. Vernon Brock of the Bureau of Commercial Fisheries is developing the detailed plans for the first national multiship cooperative investigation of a portion of the world ocean to be carried out by various Government agencies. This is known as the tropical Atlantic investigation. The plan as originally put forward had as its purpose "To provide environmental data essential for pelagic fisheries research and to contribute substantially to the understanding of the oceanography of the eastern tropical Atlantic." The program was initiated to coincide with inshore trawler surveys being supported through the former ICA and would provide offshore data on a singularly interesting portion of the Atlantic. Already the Bureau of Commercial Fisheries and the Navy have cooperated on this program by having BCF biologists aboard Navy vessels in the general area collecting valuable data on the physical and biological oceanography. This program worked very well, and BCF has just completed a set of instructions so the Navy ships can continue this work without the necessity of having biologists aboard. Just yesterday a planning session for this tropical Atlantic investigation was held at the data center with representatives from all of the Government agencies concerned and from several of the private oceanographic institutions. A good plan

is developing, and I feel that this particular cooperative project will produce good results both scientifically and from the point of view of international relations.

The committee might be interested in some of the background work that the Surveys Panel has put into this. I have here the original questionnaire sent out to the Panel members last March in which they were asked for their agency's views on such a cooperative effort in the tropical Atlantic. I have the May 8 Panel report on the results of this questionnaire, the minutes of the August 4 meeting of the Panel at which this was the main agenda item, and the minutes of the Panel meeting last December 1 at which the current status of the project was discussed. I will leave these for you, for the record, Mr. Chairman, for I believe it will be of interest to this committee to see how such a program has been developed by the Panel. I am sorry that the minutes of yesterday's productive meeting are not yet available.

The first real function, then, of the Ocean Surveys Advisory Panel has been in the field of developing a national program of oceanographic surveys. The second function has been the initiation and fostering of interagency cooperation at the "wet deck" level.

There are numerous examples since the inception of the ICO of the type of close cooperation to which I refer. Probably the first, however, was the 1960 Explorer Expedition of the Coast and Geodetic Survey. Actually aboard and carrying out programs planned closely with the Coast Survey were personnel from the Weather Bureau and the Navy Electronics Laboratory, from the Marine Physical Laboratory and the Tuna Oceanography Research Group of the Scripps Institution of Oceanography, and from Oregon State College. In addition, programs were planned and carried out in conjunction with the Geological Survey, Bureau of Commercial Fisheries, National Museum of the Smithsonian, Bureau of Mines, Public Health Service, and even the Census Bureau and the Post Office Department. It was, indeed a cooperative expedition. I have brought with me, Mr. Chairman and will leave for your committee the first copy of the report on this expedition. This copy was especially collated and bound by personnel of the Government Printing Office prior to the regular run of the report, due for delivery to the Coast and Geodetic Survey later this week. I am pleased to present you with this first copy. However, a program in which the Ocean Surveys Advisory Panel played a more important role was the United States' first attempt at the oceanwide surveys program. The U.S. Coast and Geodetic Survey ship *Pioneer* during calendar year 1962 started the oceanwide surveys in the North Pacific. It was indeed the beginning of what the Panel hopes will in time become a full-scale international oceanwide survey program. The guidelines under which the survey was planned and carried out were those of the NASCO report and of the Surveys Panel of the ICO. It was not just a Coast Survey show. The Weather Bureau had a meteorologist aboard carrying out part of their upper atmosphere program and contributing immeasurably to the success of the whole venture by his careful surface weather analyses and predictions. The Weather Bureau was sufficiently pleased with this cooperative venture, that they are doubling the meteorological program on the *Pioneer* this season. The Geological Survey had several people aboard, both geophysicists and geologists.

The former worked closely with the geophysicists of the Coast Survey in both the towed magnetometer program and the shipboard gravity meter program. Their geologists carried out an extensive program of sediment studies on the sediment cores collected by the Coast Survey. They also worked closely with the meteorologist and ran analyses of radioisotopes in collected rainwater. The Bureau of Commercial Fisheries Laboratory at Seattle had a man aboard whose program of plankton sampling and midwater trawls was closely integrated in the planning of the station operations. He also worked closely with two biologists from the University of Hawaii who were aboard carrying out studies of the phytoplankton productivity. Their studies, in turn, depended heavily on the water temperature and chemistry data obtained by the Coast Survey in their oceanographic station program, and the data from these water samples were also used by the Geological Survey scientists interested in the chemical exchange across the water-sediment interface at the bottom.

There was also aboard from the Scripps Institution of Oceanography a radiochemist supported by the Atomic Energy Commission. He was collecting and concentrating water samples for determinations of the cesium 137 concentration. These various scientific programs were not carried out on the former not-to-interfere basis, but were in fact planned as part of the overall program and integrated into the other projects going on aboard. The really exciting thing about the *Pioneer* operation insofar as the Ocean Surveys Panel is concerned was that it represented a start on the oceanwide surveys program. For the first

time in the long and honorable history of exploration of the world ocean, a ship with good navigational control—in this case loran-C—and was able to carry out a systematic grid-type survey on the deep sea hundreds of miles from the nearest land. The *Pioneer*'s lines were 10 nautical miles apart, and the resultant charts from the phase I, or underway phase, will, for the first time, provide accurately located information for use in making a map of that part of the sea floor. In addition, there will be available gravity anomaly maps and total field magnetic intensity maps of the same area with the same control. The *Pioneer* operation will continue this year, and the Ocean Surveys Panel has just recently approved a change in her program to allow a more concentrated arrangement of oceanographic station observations in one area rather than the long line of stations run last year from Midway north to the Aleutians, east along the trench, and south into Hawaii.

I have here for the record summary charts of the phase I and phase II operations of the *Pioneer* last year that I will leave with the committee. This same spirit of cooperation at the "wet deck" level is also evident in the operations of the Navy Hydrographic Office and the Coast Guard. The *Rehoboth* of the Hydrographic Office this past year in connection with military surveys in the Central Pacific carried out a multifaceted operation very similar to that of the *Pioneer* but with a much wider spacing of lines.

The *Rehoboth*'s operations also included magnetometer and gravity operations, hydrographic operations, and oceanographic station observations in addition to cooperative studies of phytoplankton productivity with personnel from the University of Hawaii and special meteorological observations made for the Weather Bureau. I would also like to leave with you, Mr. Chairman, both a summary of this operation and a copy of the letter from the Hydrographic Office sent to Government agencies and private institutions announcing this survey and inviting cooperation in the work. This is exactly the type of interagency cooperation that the Surveys Panel is encouraging.

The Coast Guard's operations in the Bering Sea are another good example of this sort of cooperation. This coming year, for example, the *Northwind* will be doing cooperative oceanographic work with the Bureau of Commercial Fisheries as part of the International Fur Seal Patrol operations. She will be operating in the Bering Sea, and her operations will include the making of oceanographic profiles across the Oyashio Current. She will later be working farther north with personnel from the Navy Electronics Laboratory. To show you how this cooperation works, a recent letter from Dr. K. O. Emery at the University of Southern California expressed an interest in obtaining bottom samples from the Bering Sea in conjunction with some studies he is carrying out with a Japanese marine geologist, Dr. Hiroshi Niino. Not only will he be able to have samples from the Coast Guard's *Northwind's* operations with the Bureau of Commercial Fisheries and later with the Navy Electronics Laboratory, but also from the Bering Sea surveys of the Coast Survey ship *Surveyor* doing some hydrographic and oceanographic work south and east of the *Northwind's* area. In this way another of the Survey Panel's objective—getting the most worth out of every survey operation—is being realized.

In conclusion, there are one or two other aspects of the Panel's operations that are worth mentioning. At the request of the Coast Guard, the Panel has through the ICO rendered assistance to that agency in planning for their oceanographic operations. The statutory authority of the Coast Guard has—as you know—just recently been broadened to include oceanographic operations. The Panel was glad of the opportunity to be of service to them in offering recommendations. The equipping of their ocean stations vessels with the necessary gear to obtain time-series oceanographic data was, we felt, of the highest priority and the acquisition of these data will be of considerable use in the overall national survey program.

The Panel has recently met jointly with the newly formed NASCO Panel on Surveys. In response to their recommendations, the *Pioneer* operations will be slightly modified this year to include lines run into shallower water so the marine geophysical data can more readily be tied in with land data, specific east-west lines will run on their recommendation to examine a specific area where the magnetics people on the west coast feel a prominent anomaly may be found on the basis of data already in hand from the area to the east. This is mentioned merely to point out that the Panel also works closely with the NASCO group.

Finally, Mr. Chairman, I would like to express my appreciation for being asked to come before your committee today to explain some of what the Ocean Surveys Advisory Panel of the ICO has been doing. My statement has been long, and I thank you for your patience. I shall be glad to answer any questions that you may have relevant to the Panel's operations.

Dr. STEWART. I am Chairman of the Ocean Survey Advisory Panel of the Interagency Committee on Oceanography.

The first page and a half of my statement summarizes the history of this particular Panel, and then lists the members.

You will notice, or you have noticed—and I am going now to the prepared statement—that many of these names are repeated on the other panels. This, I think, is part of the strength of this ICO panel structure. It does mean that several of us spend a good deal of time at panel meetings and carrying out the work of these panels, but, by the same token, it also means that there is the cross-fertilization between these panels which is essential to the efficient operation of the whole. I think this is an important point to make.

The panel, as do other panels, has a technical feed in to the ICO during the planning stages of the national oceanographic program for the coming fiscal year. We also have, as have the other panels, prepared each year budget summaries of the proposed agency work in our particular field, by doing this at several points during the annual budget cycle, the ICO has been able to keep tabs on how budgetary support for the national program is progressing.

Although these two panel activities require considerable time and effort on the part of panel members, they are primarily staff functions to the ICO. The real raison d'etre of the Survey Panel is, I feel, (1) the development of interagency survey programs and plans at the national level, and (2) the initiation and fostering of operational cooperation, what I like to call cooperation at the "wet deck" level.

With your permission, Mr. Chairman, I would like to expand these two points a bit, and in so doing, point out specific examples of the accomplishments of this particular panel. One of the first tasks of the Ocean Survey Advisory Panel was to prepare a national program for the systematic investigation of the world's oceans. This was a monumental task.

To accomplish it, we appointed an ad hoc working group composed of representatives of the agencies most concerned and chaired by Capt. C. N. G. Hendrix of the Hydrographic Office. At that time, I was of the Hydrographic Office. The program went through many revisions, as a program such as this always does. It contained at its stage of maximum thickness chapters on navigational control, survey needs of all the various agencies as of the nongovernmental oceanographic community. It even presented silhouettes of the various oceanographic ships that might be involved in such surveys.

Subsequently, the written version of the U.S.——

Mr. BAUER. Mr. Chairman, may I interrupt?

Would you submit this for committee study, please?

Dr. STEWART. I have a copy of it here, Mr. Bauer. It is very fat. It is only a draft from which the final one was worked. This was merely a working paper of this group, Mr. Bauer. I will submit it, if you wish, but I also submit that this was merely the work of an ad hoc group, it was not approved by the panel, and the final document of it I have here, and will indeed submit this, if this is agreeable with the committee.

Mr. DINGELL. That would be acceptable.

(The document will be found in subcommittee files.)

Dr. STEWART. This written version here that I have has been transmitted to the ICO, and submitted to the National Academy of

Science's Committee on Oceanography for their comments, and I will leave a copy of this with you, Mr. Chairman.

Incidentally, this program, entitled "Proposed U.S. National Program for Oceanwide Systematic Investigations" is, I believe, a present-day counterpart of the 1899 Akerman-Pettersson report of the ICES that Mr. Bauer had put into the record a few days ago.

This is, in fact, a U.S. program for a comparable type operation.

Your committee, Mr. Chairman, has heard over the past few years a great deal of testimony on this Nation's need for more knowledge of the seas.

There is one point, however, that I would like to reemphasize in connection with our need for U.S. oceanwide survey program. We must have maps of the ocean. By this, I don't mean only navigational charts, although we need these too, but I mean good maps of the shape of the sea floor, of its gravitational and magnetic characteristics, of the distribution of its bottom sediments, of the currents, both surface and subsurface, of the temperature, and its variation, and so on.

Before any land area can be developed and exploited, base maps are necessary. The same is true of the oceans, yet while on one hand, we say that the United States must exploit the seas for our general welfare, even for our very survival, on the other hand, we are forced to say that our maps of the sea are not as good as were those of North America at the time of the Lewis and Clark Expedition in 1805.

This, Mr. Chairman, is indeed a singularly deplorable situation, and it is toward the remedying of this situation that the Ocean Surveys Panel has developed this plan for oceanwide surveys.

We must have the data to work with. An oceanographer cannot sit down at an empty desk and say, "Today I will do research in oceanography." He must have the data.

In these oceanwide surveys will come the basic facts, the data on which this country can base a strong and productive oceanographic research effort.

The oceanwide survey will point up special areas and problems toward which the research effort can be directed. Toward this end, the Ocean Survey Advisory Panel has, in addition to developing the survey program, also been working on a set of general instructions for the conduct of oceanwide surveys. I have brought with me and will leave with you for inclusion in the record a preliminary draft of these instructions as they have been developed by this particular panel. These are instructions for carrying out these oceanwide surveys.

Mr. DINGELL. Doctor, would you leave them with us for Mr. Bauer and the committee staff to scrutinize? I know they are rather voluminous, and although we are anxious to have a complete record, we don't want to get it too big.

Dr. STEWART. Yes, I shall be glad to leave all of these in that particular category, Mr. Chairman, and you can decide for yourselves which you wish to include in the record.

To move along. The Panel is now currently working on a manual, which will be an interagency manual for use in conducting oceanwide surveys.

This idea of a concerted effort to learn more about the world ocean is not limited to a few members of the Federal Government. It was most recently pushed forward in this country by the NASCO report,

and the present plan of the Ocean Survey Advisory Panel follows quite closely the basic objectives of chapter 9 of the NASCO report.

These surveys are obviously necessary. The present NASCO concurred in the necessity for such surveys. The Ocean Survey concurs in this, and the Soviet Union also concurs in this. I have here, Mr. Chairman, the Russian plan for oceanwide surveys, oceanwide systematic investigations, which again, I will leave.

The printed material there is a translation of an information paper submitted at the Copenhagen meetings in July of 1960. I also have a large Russian chart, showing their plan for oceanwide surveys,which I will also leave for the scrutiny of the committee, but the Russian oceanographers and the U.S. oceanographers all have the same end in mind, learning about the world ocean.

The Survey Panel, Mr. Chairman, also helped in the preparation of position papers for the U.S. delegation to the first meeting of the Intergovernmental Oceanographic Commission in Paris last fall. The Panel prepared the background material and wrote the U.S. proposal for oceanwide systematic investigation. I will leave a copy of this background material, and of the proposal for your committee.

Currently, an ad hoc working group of the Survey's Panel headed up by Mr. Vernon Brock of the Bureau of Commercial Fisheries is developing the detailed plans for the first national multiship cooperative investigation of a portion of the world ocean to be carried out by various Government agencies and private institutions.

This is known as the tropical Atlantic investigation. The plan as originally put forward, had as its purpose:

To provide environmental data essential for pelagic fisheries research and to contribute substantially to the understanding of the oceanography of the eastern tropical Atlantic.

The program was initiated to coincide with inshore trawler surveys being supported through the former ICA, and would provide offshore data on a singularly interesting portion of the Atlantic. Already the Bureau of Commercial Fisheries and the Navy have cooperated on this program by having BCF biologists aboard Navy vessels in the general area collecting valuable data on the physical and biological oceanography.

This program worked very well, and the Bureau of Commercial Fisheries has just completed a set of instructions so that the Navy ships can continue this work without having to have biologists aboard.

Mr. BAUER. Do you have a set of those instructions?

Dr. STEWART. I do not, sir.

Mr. BAUER. Would you supply them?

(The following was furnished for insertion.)

DEPARTMENT OF THE INTERIOR,
FISH AND WILDLIFE SERVICE,
BUREAU OF COMMERCIAL FISHERIES,
Washington, D.C., March 13, 1962.

Hon. JOHN D. DINGELL,
Chairman, Subcommittee on Oceanography, House Committee on Merchant Marine and Fisheries, House of Representatives, Washington, D.C.

DEAR MR. DINGELL: During the course of testimony before your subcommittee by Dr. Harris Stewart, U.S. Coast and Geodetic Survey, on March 1, 1962, interest was shown in the cooperation between our Bureau and the Navy.

The particular context of the interest, as we understand it, was in what we have called the ships of opportunity program, as encouraged by the Interagency

Committee on Oceanography. The development of this program has been in response to the need for more information about the ocean, and the realization that information could be collected from many ships not now doing so, such as operational Navy fleet units, Military Sea Transportation ships, and fishing vessels.

The program is being carried out jointly by the U.S. Navy Hydrographic Office and Biological Laboratories of our Bureau.

A feasibility study of the procurement of oceanographic data from American tuna clippers operating in the eastern tropical Pacific is presently being carried out by the U.S. Navy Hydrographic Office and scientists of the Bureau's Biological Laboratory at San Diego.

An outstanding example of cooperation in this program was participation by Bureau scientists in *Solant-Amity III*, carried out by a group of five operational Navy fleet units to west African waters, September 14 to December 18, 1961. The Bureau is presently planning a major program of oceanography in the tropical Atlantic, an area which is particularly lacking in oceanographic data. It was from this special interest that Bureau scientists participated aboard vessels of the force.

Briefly, the program aboard the vessels was:

1. Bathythermograph observation. A unique and valuable coverage was obtained from a special series of six lines of bathythermograph stations in the Gulf of Guinea.
2. Surface trolling for tuna in the Gulf of Guinea was carried out, from two vessels of the force, with a catch of 19 tuna and 10 fish of other species.
3. 300 porpoises and fish schools were heard, recorded, and tracked by sonar.
4. Bathymetry. A seamount rising 6,000 feet from the floor of the Guinea Abyssal Plain was discovered.
5. A watch was maintained for sea birds and fish schools at the surface, and the distribution of 735 sea birds was recorded in the Gulf of Guinea.

We have, up to this point, handled the field operations of the ships of opportunity program on a specific problem basis, because the operational requirements of vessels with primary missions other than oceanography require us to fit our plans in with theirs.

Insofar as the *Solant* and *Amity III* cruise was concerned, Bureau scientists participated for the entire operation and a need to develop instructions for the collection of oceanographic data of interest to the Bureau did not develop. However, for future cruises to areas of interest to the Bureau, it is planned to either send Bureau scientists or such instructions as appropriate. As pointed out earlier, it is difficult to provide a standard set of instructions since both the nature of the cruises and the kinds of data desired are not standard; in fact certain kinds of data such as those involving estimates of school sizes and fish species based on evidence at the surface of the sea can only be reliably obtained by a trained and experienced observer.

Sincerely yours,

H. E. Crowther,
Acting Director
(For Donald L. McKernan, Director).

Dr. Stewart. All right. Just this past Monday, a planning session for this tropical Atlantic investigation was held at the National Oceanographic Data Center, with representatives from all of the Government agencies concerned, and from several of the private oceanographic institutions. These were Woods Hole, Narragansett Marine Laboratory, Bingham Oceanographic Laboratory of Yale, Department of Meteorology and Oceanography of New York University, Chesapeake Bay Institute, the Marine Laboratory of the University of Miami, and the Department of Oceanography at Texas A. & M.

These were excellent planning sessions for a cooperative investigation of the tropical Atlantic, and I will leave with you a copy of the agenda of these meetings, also a copy of the plan for the investigation of the tropical Atlantic.

This is being carried out and coordinated through an ad hoc panel of our Surveys Panel.

I think we are developing a good plan for this tropical Atlantic investigation, and I feel that this particular project will produce good results both scientifically and from the point of view of international relations.

I have here on the off chance that the committee might be interested in the Panel's method of operation in setting this up, the original questionnaire sent out to Panel members last March, in which they were asked for their agency's views on such a cooperative effort in the tropical Atlantic. I have the May 8 panel report on the results of this questionnaire.

I have also the minutes of the August 1, 1961, meeting of the Panel, at which this was the main agenda item.

I also have the minutes of the Panel meeting last December 1, at which the current status of the project was discussed. I will leave all of these for you, Mr. Chairman, so that you will have on hand papers showing how this Panel actually works.

I am sorry that the minutes of Monday's meeting are not yet available. The first real function, then, of the Ocean Surveys Advisory Panel is in the field of developing a national program of oceanographic surveys.

The second function has been the initiation and fostering of interagency cooperation at what I like to call the wet-deck level. There were numerous examples of this since the inception of the ICO. Probably the first, however, was the 1960 *Explorer* expedition of the Coast and Geodetic Survey. Actually aboard and carrying out programs planned closely with the Coast Survey were personnel from the Weather Bureau, the Navy Electronics Laboratory, from the Marine Physical Laboratory, and the tuna oceanography research group of the Scripps Institution of Oceanography, and from Oregon State College.

In addition, programs were planned and carried out abroad in conjunction with the Geological Survey, the Bureau of Commercial Fisheries, the National Museum of the Smithsonian, the Bureau of Mines, the Public Health Service, even the Census Bureau and the Post Office Department. It was indeed a cooperative expedition.

I have brought with me, Mr. Chairman, and will leave for your committee the first copy of the report of this particular expedition. This copy was especially collated and bound by personnel of the Government Printing Office prior to the regular running of the report, due for delivery to the Coast Survey this week. I am pleased to present you, sir, with this first copy of the report of this truly cooperative expedition.

However, a program in which the Ocean Survey Advisory Panel played a more important role was the United States first attempt at oceanwide surveys. The Coast and Geodetic Survey ship the *Pioneer*, during calendar year 1961, started oceanwide surveys in the Pacific. This is the program initially proposed by the National Academy of Sciences and pushed forward by the Interagency Committee on Oceanography. It was indeed the beginning of what the Panel hopes will in time become a full-scale international oceanwide survey program.

The guidelines under which the survey was planned and carried out were those of the NASCO report, and of the Surveys Panel of the ICO. It was not just a Coast Survey show. The Weather Bureau

had a meteorologist aboard, carrying out a part of their upper atmosphere program, and contributing immeasurable to the success of the whole venture by his careful surface weather analysis and predictions. The Weather Bureau was sufficiently pleased with this cooperative venture so that they are doubling the meteorological program aboard the *Pioneer* this season. The Geological Survey and the Bureau of Commercial Fisheries sent people. The University of Hawaii was involved. These are all listed in my statement, without going into details.

There was also aboard from the Scripps Institution of Oceanography, a radiochemist, supported by the AEC. However, the really exciting part of the *Pioneer* operation, insofar as the Ocean Survey Advisory Panel was concerned, is that it represented a start on this oceanwide survey program. For the first time, a ship with good navigational control—in this case, loran-C—was able to carry out a systematic grid-type survey on the deep sea, hundreds of miles from the nearest land.

I have, sir, and will leave again for your consideration, a copy of the paper of Rear Adm. H. Arnold Karo, the Director of the Coast and Geodetic Survey, his paper presented before the Institute of Navigation meeting in San Diego last January.

This paper summarizes in considerable detail exactly what went on in this first attempt at oceanwide surveys. I will leave this, too, for your consideration.

The *Rehoboth* of the Hydrographic Office this past year, in connection with military surveys in the central Pacific, carried out also a multifaceted operation very similar to that of the *Pioneer*, but with much wider spacing of lines. The *Rehoboth's* operations also included magnetometer and hydrographic operations and oceanographic station operations, in addition to cooperative studies of phytoplankton productivity with personnel from the University of Hawaii and special meteorological observations made for the Weather Bureau.

I would like to leave with you, Mr. Chairman, both a summary of this operation of the Hydrographic Office's, plus a copy of a letter from the Hydrographic Office sent to various Government agencies and private institutions announcing this survey in advance, and inviting cooperation of the other Government agencies and the private institutions. It is exactly the type of interagency cooperation that the Survey Panel is encouraging.

The Coast Guard's operations in the Bering Sea are another good example of this sort of cooperation fostered by the ICO Ocean Surveys Panel. This coming year, the *Northwind* will be doing cooperative oceanographic work with the Bureau of Commercial Fisheries, as part of the International Fur Seal Patrol. She will be operating in the Bering Sea, and her operations will include the making of oceanographic profiles across the Oyashio Current. She will later be working farther north with personnel from the Navy Electronics Laboratory. To show you how this cooperation works, a recent letter by Dr. K. O. Emory at the University of Southern California expressed an interest in obtaining bottom samples from the Bering Sea in conjunction with some study he is carrying out with a Japanese marine geologist. Not only will he be able to have samples from the *Northwind's* operations, but also from the Bering Sea survey of the Coast and Geodetic Survey ship *Surveyor* doing some hydrographic and

oceanographic work south and east of the *Northwind's* area. Thus in another way in the Surveys Panel objective, getting the most out of every operation at sea, is being realized.

In conclusion, there are one or two other aspects of the Panel's operations that are worth mentioning. At the request of the Coast Guard, the Panel has through the ICO rendered assistance to that agency in planning for their oceanographic operations. The statutory authority of the Coast Guard has, as you know, just recently been broadened to include oceanographic operations. The Panel was glad of the opportunity to be of service to them in offering recommendations.

The equipping of their ocean station vessels, we felt, with the necessary gear to obtain time-series oceanographic data was of the highest priority and the acquisition of these data will be of considerable use in the overall national survey program.

The Panel has recently met jointly with the newly formed NASCO Panel on Surveys. In response to their recommendations, the *Pioneer* operations will be slightly modified this year to include lines run into shallower water, so the marine geophysical data can be more readily tied in with land data, specific east-west lines will run on their recommendation to examine a specific area where the magnetics people on the west coast feel a prominent anomaly may be found on the basis of data already in hand.

This is merely mentioned to point out that the Panel also works closely with the NASCO group, and uses their recommendations to modify the plans of the agencies involved.

Finally, Mr. Chairman, I would like to express my appreciation for being asked to come before your committee today to explain some of what the Ocean Surveys Advisory Panel of the ICO has been doing. I shall be glad to answer any questions that you may have.

Mr. DINGELL. Doctor, on behalf of the committee, I would like to commend you for a very fine statement, and to express the gratitude of the committee for the very careful preparation that went into your statement. The committee is particularly appreciative, I am sure, of not only the extensive job you have done this morning, but also the work that must have gone into preparation. I think that it would not be untoward for the Chair to speak on behalf of the committee and say that we are very much impressed with the work that your Panel has done.

Mr. Bauer?

Mr. BAUER. I have no questions.

Mr. DINGELL. Mr. Drewry?

Mr. DREWRY. No questions.

Mr. DINGELL. I have one brief question, and that is this: Your Panel is set up as are the other Panels, insofar as its basic authority, is it not?

Dr. STEWART. Right; it is, sir.

Mr. DINGELL. It operates principally through interchange of information, does it not?

Dr. STEWART. No, sir; in that interchange of information line that was injected early in Mr. Abel's testimony, I believe there was some confusion. He was referring in talking of the interchange of information to the Coordination Committee on Oceanography, the informal group that has no tie-in with the ICO at all.

Mr. DINGELL. I see.

Dr. STEWART. Our Panel, as are the other Panels, are operation Panels of the ICO, and are far and above merely information exchange groups, sir.

Mr. DINGELL. Does your Panel actually establish broad policy as to survey areas which should be investigated?

Dr. STEWART. Yes, sir; it does this.

Mr. DINGELL. Does it have any authority to implement the broad policy which it establishes?

Dr. STEWART. As a panel? No. However, it does accomplish the implementation of these things, by having the members of the ICO return to their individual agencies and crank these plans into their agency programs.

I believe, sir, the tropical Atlantic investigation, which I covered in my statement, is a typical example of this. This is a program that was initiated within the ICO. The Government agencies agreed that this needed doing, and the Government agencies themselves are putting forth the ships and the equipment, and the manpower to do this.

Mr. DINGELL. Has your Panel, or has the ICO established a long-range program for oceanographic survey?

Dr. STEWART. Yes, sir. This is included.

Mr. DINGELL. You have put that in.

Dr. STEWART. This is included here.

Mr. DINGELL. Doctor, you have done a very fine job this morning. Thank you very much.

On behalf of the committee and the staff, thank you very much, and if you will leave the information which you have, Mr. Bauer will review it, and the staff will review it, and we will insert as much as we appropriately can in the record.

Dr. STEWART. It is voluminous. I apologize, but I wanted to be sure that the data were available to your committee, sir.

Mr. DINGELL. I think that is the right course, and it is appreciated.

Dr. B. C. Dees, chairman of the training and manpower.

Mr. ABEL. Mr. Chairman, Dr. Dees is unable to attend, due to other hearing commitments. I would be glad to file his statement.

Mr. DINGELL. All right, I think that would be most appreciated by the committee, and I am sure if there are any questions, we can refer them to Dr. Dees.

(The prepared statement of Dr. Dees follows:)

STATEMENT BY BOWEN C. DEES, CHAIRMAN, MANPOWER AND TRAINING PANEL OF THE INTERAGENCY COMMITTEE ON OCEANOGRAPHY

It is a great pleasure for me to appear before the committee to discuss the work of the Manpower and Training Panel of the Interagency Committee on Oceanography. Although this Panel is one of the more recently organized ones, I believe you will agree that it has been given an important assignment.

OBJECTIVES

The Manpower and Training Panel of ICO has been concerned, first, with securing a thorough understanding of the present and prospective situation with respect to manpower in the field of oceanography. The Panel has reviewed the available National Academy of Sciences Committee on Oceanography and the American Society of Limnology and Oceanography reports to determine their implications for scientific manpower. It has further examined the manpower implications in the national oceanographic program. The present supply of

oceanographers has been analyzed as has the prospective supply as indicated by those now in training.

The Panel has reviewed the manpower situation as a prerequisite to the development of programs which are designed to resolve those manpower problems which impede the progress of the national program. It is expected that some programs (over and above those already in being) will then be proposed for the consideration of the ICO and the Federal Council on Science and Technology. Upon acceptance by these bodies, approved programs will become a part of the national oceanographic program, and will attain the same recognition by the executive department agencies as the other segments of that program.

Stated briefly, the objectives of the Manpower and Training Panel are to identify those problem areas in manpower which are likely to impede the national oceanographic program and to propose programs to the ICO for the solution of such problems.

MEMBERSHIP OF THE PANEL

Present membership of the panel includes A. R. Gordon from the Navy Hydrographic Office; James W. McGary from the Office of Naval Research; Robert C. Czapiewski and T. B. Ryan from the Coast and Geodetic Survey; J. Lockwood Chamberlin and Ralph B. Silliman from the Bureau of Commercial Fisheries; George W. Courtney, Jr., and Irvin E. Wallen from the Atomic Energy Commission; Henry H. Armsby from the Office of Education; and Bowen C. Dees and Keith Kelson from the National Science Foundation. Gordon A. Riley and Richard C. Vetter are members representing NASCO in order to guarantee adequate liaison with that body. In addition, others are invited to participate in the work of the panel on topics of particular concern to their respective agencies.

ACTIVITIES OF THE PANEL

In its review of the manpower situation, the panel determined that about 2,600 professional scientists and engineers were employed in oceanography in early 1962. Included under this definition are all those with bachelor degree level or equivalent training, regardless of the field of academic degree. This number includes about 1,400 attached to universities, private laboratories, and State laboratories, in addition to about 1,200 in Government agencies.

Although the panel has not had sufficient time to analyze the demand-supply situation in all areas of oceanography, it appears to the panel that there is a considerable range in the degree of manpower shortage situations in different specializations. The panel has attempted to locate critical shortage areas and has identified two which should be considered as examples rather than an exhaustive listing.

Manpower-shortage situations of a serious character have been identified in physical oceanography and in taxonomy. In the former field, a substantial number of unfilled positions have been found in Government agencies and a smaller number in the universities. Furthermore, large numbers of positions in physical oceanography have in the past been filled by persons whose academic training has not been as directly related to their employment field as would be desirable. The relatively small numbers of scientists with university degrees in oceanography, in which physical oceanography is usually emphasized, have been insufficient to staff the increasing requirements for their services.

A quite different situation obtains in taxonomy, another identified shortage area. The number of positions available to taxonomists who have special competence in marine biology has not been large, and the past lack of effective demand has not encouraged training of additional workers in this area. A situation results in which the ability of the universities to train for this field has been impaired. In the face of substantial expansion in ocean surveys programs, there is the imminent danger that necessary taxonomic work on new collections arising from the surveys program will be long delayed. An inventory of taxonomic specialists in marine organisms at U.S. museums and herbaria shows no specialists available for some important groups and extremely thin coverage for others.

The panel has also estimated professional manpower requirements implicit in the proposed national oceanographic program. On the basis of preliminary estimates of oceanography program expenditures planned by the Federal agencies over the next 8 years, it appears likely that requirements will be for two or three times as many professional scientists and engineers in 1970 as at present. In addition there will be a not insignificant number required for replacements on account of retirement, transfer to other fields, etc. Altogether, approximately 700 new professional recruits into oceanography will be needed each year (on the

average) to staff programs now proposed. It should be emphasized again that such estimates are based upon preliminary estimates of research programs being proposed by the Federal agencies for the Federal program. When the 10-year program is finally fixed and adopted, it will be possible to estimate manpower requirements with greater confidence.

There is no doubt that the supply of scientists and engineers now engaged in oceanography falls short of the numbers required to staff programs of the magnitude now being considered. Nor are there sufficient numbers now in graduate training in oceanography to supply the gap, although the recent increase in graduate enrollments is encouraging. Such numbers can only be secured through a sharp increase in oceanography enrollments and through "conversion" of science students from other fields; individuals entering oceanographic work from other fields of science have of course been the principal source of marine scientists in the past. Even with these measures contributing to the maximum, the upgrading of those now in the field, transfers from related fields, and improved utilization of research and training facilities will be required to meet requirements of the magnitude now contemplated.

The panel is now considering several recommendations directed toward improving the supply situation as promptly as possible. I want particularly to emphasize that the panel's report is still incomplete, and the recommendations being considered are by no means fully documented. Accordingly my comments on such recommendations should be considered highly tentative, and limited to my own views of the panel's thinking. These recommendations are mainly directed toward those Federal agencies which are responsible for the oceanography research and training programs. Generally, these recommendations will be designed to encourage each agency (*a*) to examine its own use of professional oceanographers, (*b*) to determine the nature of the training required for the tasks to be performed in oceanography, (*c*) to fix the numbers of personnel required by levels of training necessary to perform such tasks, and (*d*) to develop training programs (both within the Federal agencies and at outside institutions) by means of which staff personnel may achieve higher competencies. The panel is also considering a mechanism through which Federal agency manpower training plans in this area may be periodically reviewed by the ICO.

Other recommendations of the panel will probably be directed toward promoting greater interest in the subject of oceanography in secondary schools and colleges. Federal agencies will be asked to make information on oceanography available to educational institutions which may wish to use it in connection with science instruction. Plans will be recommended under which Federal agency staff members can be made available for discussions or lectures on appropriate oceanographic topics. Visits to Federal marine laboratories and facilities at appropriate times by students would be encouraged. Federal agencies with responsibilities for the support of science education will be asked to support the educational institutions in their efforts to obtain suitable instructional materials and provide adequate teacher training relevant to this field. Other recommendations are designed to support training by the Federal agencies in a manner consistent with the manpower requirements engendered by their support of research.

Finally, the panel has been considering the impact of Federal programs on the educational institutions and private laboratories. It believes the recommendations which it will make to the Federal agencies will be beneficial to these institutions. However, at a later date, the earlier surveys of these research and training institutions should be brought up to date, particularly from the standpoint of the impact of Federal agency programs.

FUTURE PLANS

The immediate future work of the panel will be devoted to the completion of its interim report as already suggested. It will then probably want to turn its attention to a more detailed examination of the oceanography manpower and training situation in the non-Federal agencies. It will be particularly interested in the influence of the Federal program on college and university research and training activities. On a longer range basis, the panel is looking for ways of improving our basic information on the supply of and requirements for personnel in this field. It is contemplated that an estimate of the supply of scientists in oceanography will be prepared each year through the cooperative efforts of the National Register of Scientific and Technical Personnel. Similar information on requirements will be sought.

Another program of the panel deserving mention is the development of a directory of academic course offerings in oceanography. Each educational institution

offering degree credit level instruction in oceanography will be requested by the panel to report such courses, their level, fields covered, degrees offered, etc. These data will then be assembled into an oceanography educational directory for distribution to institutions and students seeking such information. The panel is scheduling completion of this directory by spring.

The panel is of the opinion that its efforts to provide a better understanding of scientific manpower problems in oceanography represent only a beginning. If this type of work is to be maximally useful, a continuing and consistent surveillance over the manpower situation is required.

Mr. DINGELL. Are there any other witnesses to be heard this morning?

Commander Anastasion?

Commander ANASTASION. Yes, sir, Mr. Wakelin suggested that you call the Chairman of the data center. He is here. If you do not have the time, we can file his statement.

Mr. DINGELL. We would appreciate it. Doctor, you would have no objection to filing your statement, would you?

Dr. JACOBS. No, sir. I might point out that this prepared statement was rather hurriedly prepared. I have a couple of areas where I think the language is a little unfortunate, if I could have an opportunity to correct these?

Mr. DINGELL. Doctor, in order to be perfectly fair, we intend to keep the record open for a substantial period, to have an opportunity to add information as appears necessary to the departments and to the committee, so would 10 days be sufficient for you to refine the statement to your satisfaction?

Dr. JACOBS. Yes, sir.

Mr. DINGELL. Well, if you have no objection to that, then, I would suggest you don't file it today, and then you have 10 days in which to do it, submit it to the committee, or even briefly more than that, if you desire.

(The following was furnished for insertion:)

STATEMENT OF DR. WOODROW C. JACOBS, DIRECTOR, NATIONAL OCEANOGRAPHIC DATA CENTER

Mr. Chairman, gentlemen, I would first of all like to express my appreciation for this opportunity to appear before you for the purpose of presenting the organization, accomplishments, and plans for the National Oceanographic Data Center (NODC). It would appear quite appropriate to make such a presentation at this time in view of the continued interest your committee has had in the center since it was first proposed by the Interagency Committee on Oceanography early in 1960.

BACKGROUND

In the decade prior to 1960, the need for a central depository and service agency for oceanographic data had been expressed many times by the scientific community and by representatives of government, and, in June 1960, as a result of this expressed need, the Federal Council for Science and Technology unanimously recommended that a National Oceanographic Data Center be established. This action, itself, was based upon the specific recommendation submitted to it by the Interagency Committee on Oceanography. This action will probably be looked upon in the historical sense, as the first formal action taken toward the implementation of a national oceanographic program. We trust that history will also show that the establishment of the center was the logical and most practical first step to take toward augmentation of our national research and survey effort in oceanography.

On December 23, 1960, an interagency agreement for the establishment and operation of a National Oceanographic Data Center was signed by the Director of the National Science Foundation, the Secretary of the Navy, the Secretary of the Interior, the Secretary of Commerce, and the Acting Chairman of the United

States Atomic Energy Commission. This agreement defined the pro rata share of each sponsoring agency, established an Interagency Advisory Board, and outlined the mission of the center. The Interagency Advisory Board was established on the basis of one representative from each of the contributing agencies plus two representatives appointed by the National Academy of Sciences. The current membership of the Board is the same as it was at the time of its first meeting on January 16, 1961. The representatives and their agencies are as follows:

Mr. Howard Eckles, Chairman, Bureau of Commercial Fisheries.
Dr. Vincent Schultz, Atomic Energy Commission.
Dr. Harris B. Stewart, Coast and Geodetic Survey.
Mr. Boyd E. Olson, U.S. Navy Hydrographic Office.
Dr. Arthur E. Maxwell, Office of Naval Research.
Dr. John Lyman, National Science Foundation.
Mr. Robert Schloemer, Weather Bureau.

and the two representatives appointed by the National Academy of Sciences:

Dr. Milner B. Schaefer, Inter-American Tropical Tuna Commission.
Dr. Donald W. Pritchard, the Johns Hopkins University.

The NODC Advisory Board is charged with the responsibility for transmitting joint policy and providing technical guidance to the center. By its formal actions, it reflects the majority opinion of the sponsoring agencies.

The interagency agreement further outlines in considerable detail, the functions of the data center and the methods of operation. I will not attempt to elaborate upon these details at this time Mr. Chairman, but with your permission, I would like to leave with your committee a copy of the agreement to be made a part of the record.

While the data center, itself, actually came into being in November 1960, using temporary quarters provided by the U.S. Navy Hydrographic Office at Suitland, Md., the formal dedication ceremony, which officially inaugurated the center at its new location within the reservation of the Naval Weapons Plant, was held on January 16, 1961. This central metropolitan location has proved to be exceptionally convenient to the users of the data center and to the staffs of the sponsoring agencies.

ACCOMPLISHMENTS

Although the NODC has been in existence for only a year, its archives already comprise what is probably the world's largest collection of marine environmental data. However, we do not want to take undue credit for this circumstance; the oceanographic data previously held by the Hydrographic Office, and accumulated by them over a period of a decade or more, still constitutes a sizable fraction of our present holdings.

During this first year we have accessioned into our files all of the physical and chemical data from about 200,000 oceanographic stations (each station is comprised of sounding measurements at 10 or more depths and includes temperature, salinity, and other chemical data). In addition to these data, we have on hand about 700,000 bathythermograms (BT's) which provide temperature information at depths up to 900 feet. We are now processing BT's at the rate of 5,000 per month. Through our normal production, and through a contract with the J. I. Thompson Co., we have been able to reduce our original backlog of BT's (100,000) by about 35,000. New BT records received during the year totaled 51,000.

The data files also include several millions of surface observations (sea swell, surface temperature, current drift, etc.) which have been collected since the turn of the century by the cooperative observers of the merchant marine. Most of these data are available on punched cards or magnetic tapes for rapid servicing by electronic data processing equipment.

In addition to our domestic exchanges, at the present time we exchange data with the Hydrographic Office of Argentina, the Atlantic and Pacific Oceanographic Groups and Department of Mines and Technical Surveys, Canada, the hydrographic offices of Chile and France, Navy and fisheries organizations of Great Britain, the hydrographic departments of the Netherlands and New Zealand, Navy of the Union of South Africa, and various government agencies in Tokyo, and the Hydrographic Office of Japan. Most of these exchanges involve bathythermograph data primarily; however, those with Canada and Japan include physical and chemical data at the surface and depths (oceanographic station data).

The NODC has also made an exchange with the Hydrographic Institute at Split, Yugoslavia. The NODC has provided them with NODC publications, and the institute has agreed to supply observational data on an "as available basis."

One of the most important exchange agreements instituted during the last year was the International Council for the Exploration of the Sea (ICES). Under the agreement the NODC will provide to the ICES punchcards of all of the Bulletin Hydrographique (the official publication of the ICES) data for the years 1902 to 1956 (the latest publication) in exchange for which ICES will provide punchcards of future data collections. This is an especially important exchange inasmuch as the ICES embraces 16 member nations. Their files also include data submitted to them by the International Commission for the North Atlantic Fisheries (ICNAF).

The International Indian Ocean Expedition (IIOE), besides affording us an opportunity for further development of our new physical-chemical data form, has also given us an opportunity to solidify additional international exchanges and to obtain observations from one of the world's oceans for which there are very few data.

This month (March) will usher in an additional phase in the activity of the center with the establishment here of World Data Center–A for oceanography (WDC–A), formerly housed at Texas A. & M. College. As you may recall, the World Data Centers were originally set up to cover the data activities of the IGY, but by international agreement these are to be continued under the IGC, the International Geophysical Cooperation, which has replaced and extended the IGY activities. The establishment of the World Data Center for Oceanography here will expand the international functions of the center although it should be pointed out that all of the international data collecting activities will not come under the WDC–A charter. Those activities which are strictly in the national interest will continue to be conducted solely as an NODC function—the data acquisition being accomplished either through purchase or through the international exchange of forms, documents, or computer inputs.

The Intergovernmental Oceanographic Commission (IOC), at its Paris meetings in October 1961, recommended the establishment of national data centers by its members. Such an action by member countries will serve to facilitate greatly the international exchange of data by providing intermediate focal points for the assembling of information. At the present time, we find it necessary to contact and negotiate with an excessively large number of individual services and research institutions in order to fulfill our requirements for foreign oceanographic materials.

RELATIONS WITH INDUSTRY

Although most of our requests over the past year have come from scientists engaged in research, it has become apparent that industry is looking to us for support. It is also apparent that our relationship with industry can be reciprocal inasmuch as they provide data to us for areas where data are sparse. Oil companies, for example, provide us geological data from their offshore drilling sites. We retain these data as proprietary information so long as the companies wish them to remain so.

With the present involvement of industry in all phases of oceanography, the possibilities for mutual cooperation are extensive and important.

DATA PROCESSING

The activities of the center are not limited simply to data archiving and dissemination, but they include also computational support where this is required. At the present time the center possesses some basic computer equipment but the bulk of the work is actually performed on an IBM 7070 and related equipment housed at the Navy Hydrographic Office.

This phase of the center's activities will be expanded as rapidly as is warranted by the increased oceanographic research and operational effort. We are in the process of building up our mathematical and programing staff and are currently working on programs for the mechanization of biological and geological information commensurate with those programs which currently exist for the computational support of physical and chemical oceanography.

PUBLICATIONS

The NODC publications at the present time consist of three series:

1. General series, which includes publications of a general or descriptive nature (such as atlases and data tabulations).

2. The manual series, which includes observational and recording instruction documents.

3. Catalog series, which contains primary inventories of NODC holdings.

The three most recent publications are:

"Inventory of Worldwide BT Data."

"Inventory Oceanographic Data, North Atlantic Ocean."

"Oceanographic Vessels of the World"—this in collaboration with the IGY World Data Center A, at Texas A. & M.

In addition to the series described, the center also issues a monthly newsletter which has a current distribution list of approximately 400. This was originally intended only as a house organ for distribution to the Board and to a limited number of those agencies specifically interested in NODC activities. However, the occasional inclusion of items of general oceanographic interest brought such a favorable response from reviewers that its scope has now been broadened permanently to include an increased number of such items. This response has simply pointed out that there has been a long-felt need for a general across-the-board oceanographic news publication.

It has also become apparent that the NODC is a convenient outlet for oceanographic publications, such as operating and instruction manuals and the like, and whose use cuts across agency lines. This obviates the necessity for each agency to publish and distribute its own instruction manuals.

Additional publications will be issued under the byline of the World Data Center A as a part of the data publication to which the United States is committed, and which is contributed to by all participants of the IGC.

QUALITY CONTROL OF OCEANOGRAPHIC DATA

No discussion of the present and future role of NODC would be complete without some discussion of the part it plays in monitoring the quality and adequacy of the national oceanographic data gathering effort. The data center holds a unique position midway in the circuit between the data gathering mechanisms and programs on the one hand, and the research and operational interests which these observational programs were designed to support on the other hand. This unique strategic position that it holds rather emphatically spells out the role it must play in the evaluation of the accuracy and adequacy, not only of instrumentation and observational procedures, but perhaps of the conduct of the survey programs themselves. The present organizational structure of the data center contains a branch whose staff is identified solely with the important area of quality control.

RESEARCH AND TECHNIQUE DEVELOPMENT

A number of research investigations are now underway to improve our service to oceanographers and to improve the quality of the data. Among the more important of these investigations is our work on the development of holding-recall systems for biological and geological-geophysical data. These two areas in oceanographic data processing have long been beglected and the staggering mass of data accumulated over the past years, and currently being accumulated, makes it exceedingly urgent that systems be devised for the processing and recall of these data.

Thus far the NODC has made significant advances in a holding-recall system for geological and geophysical data. We have begun a pilot project to evaluate the keyword (UNITERM) system for indexing documents on bottom sediments and gravity. Upon completion of the pilot program, Dr. Harris B. Stewart, Jr., chairman of our ad hoc committee for geology and geophysics, will convene his committee to consider the feasibility of the system and submit recommendations to the Interagency Advisory Board.

Within the past month and a half we have been fortunate to add to our staff a Ph. D. in biology who will assist us in the development of a corollary system for holding and recall of biological data. As with the geological-geophysical system, the biological holding-recall system is being developed in concert with the oceanographic community. The community has already provided our biologist with a good point of departure in a report of our ad hoc committee on biological data processing. The biological program will be coordinated closely with the geological-geophysical program so that all NODC systems will be compatible.

FUTURE OF NODC

I have very briefly described the recent activities of the center and now, perhaps, it is appropriate to say something about plans for the future. At the present moment, NODC is not much more than a rather elaborate extension of the traditional data archiving activities that it inherited from the Navy Hydrographic Office. In the past, almost the entire effort has gone into the collecting and processing of the chemical and physical oceanographic data. Nevertheless, actions are already underway to extend the activities to include geological, bathymetric, and biological information. Eventually it is expected that most, if not all, elements of the marine environment will come under the cognizance of the center.

In cases where environmental data are not uniquely oceanographic in nature, but are data which are frequently used in oceanographic work, it will be necessary that NODC provide the acquisition channels for the information from another data center or some other appropriate collection source. For example, we have opened discussions with the meteorological center at Asheville, N.C., for the purpose of exploring the means for providing the communications and facilities required for the rapid transfer of meteorological and oceanographic data between the two data centers. Eventually other data and information centers will be brought into the picture.

It should be borne in mind that it takes time to develop a data center to the point where it can satisfy the majority of the research and operational requirements from its own resources. This suggests that in the initial stages of development the center must endeavor to place itself in position to utilize the resources of others wherever these resources may be physically located. This means, in short that we place early emphasis on the intelligence function, i.e., the preparation and maintenance of files and inventory of national and international data and information sources and further, that we provide the mechanisms for the rapid acquisition of these materials when the need arises.

In the long-term sense it will not be sufficient that NODC merely keep track of information on oceanographic data in the narrow meaning of the word. We intend to extend our responsibility to cover oceanographic information in the broadest possible sense. Many of the users (particularly in the operational areas) will not be oceanographically well informed and for this reason it will be necessary that NODC be in position to give technical advice to these users along a broad technical front. Such a service will pay for itself many times over through the duplication of operational or research effort that is prevented by such an activity.

Mr. DINGELL. Were there any other witnesses who desired to be heard?

Now I want to express the thanks of the committee to all who were present today, and participated, and I also want to express the apologies of the committee that so many people with heavy schedules were compelled to wait upon the pleasure of the committee for so long.

The committee will stand adjourned to the call of the Chair, and the record will remain open for 10 days or longer as the Chair and staff directs. The committee will stand adjourned.

(Whereupon, at 12:15 p.m., the hearing was adjourned, subject to the call of the Chair.)

APPENDIX

(The following outstanding document was obtained from Prof. Peter Dohrn, Director of the Naples Zoological Station. Its inclusion in the record is for the purpose of emphasizing the approach and recommendations to young oceanographers by one of the world's most outstanding oceanographers, the late Prof. Fridtjof Nansen.)

College Echoes—"Adventure"

(By Fridtjof Nansen)

Rectorial address delivered at St. Andrews University, October 3, 1926

Solomon is said to have compared "the people unto the sea, and orators and counselors to the wind, for that the sea would be calm and quiet if the winds did not trouble it." If, in the present case, I may call you the sea, I am pretty sure that you are troubled enough already without the help of any orators. And yet though I have never before felt any desire to cultivate windy oratory, I do wish I could be a tempest today to your credit.

But winds, whether strong or weak, may blow from so many quarters. I wonder what direction you expect me to blow from? I have been wondering how on earth you ever came to think of making me your rector. Was it because, long ago, long before you were born, I expect, a young fellow with the same name as mine made some journeys through the frozen North? You may have heard something about it when you were children. Or could it be because, during some recent years, my name has happened to be connected with several undertakings intended to alleviate the sufferings of unfortunate fellow creatures?

I could not find out, and that was disheartening, as it might have given me my cue for this address, the delivery of which, I understand, will be my chief duty as your rector.

But after all, why should I worry? You will not remember what it was about anyhow.

You must not think that we old people are as self-satisfied as we seem. We know well enough that although you are extraordinarily nice to us, and evidently like to see us—sometimes at any rate—still, to be quite honest, you often think us intolerable bores with our heavy learning and good advice; at least I remember I did when I was your age, and not without reason perhaps.

Long ago La Rochefoucauld said that "old folk like to give good precepts in order to console themselves for no longer being able to give bad examples."

I do not know that we can altogether accept that definition, though there may be more truth in it than we realize at first. I am sure, however, we shall all agree with the same sage when he said that: "we never meet with any intelligent people but those who are of the same opinion as ourselves." As a rule, it is only by sad experience that we are enabled to verify the wisdom of opinions that differ from ours. How much easier life would be if we could be taught by others. But the real wisdom of life we have to discover with our own eyes.

"Experience doth take dreadfully high wages," your immortal Carlyle said, "but she teacheth like none other." Stick to that, young friends. Listen to authority and age; you may learn a great deal from those who are older than ourselves—but trust your own eyes still more, and keep them open. A truth acquired by the use of your own eyes, though imperfect, is worth 10 truths told you by others, for besides increasing your knowledge it has improved your capacity to see.

But although I believe that as strongly as any of you, here I stand nonetheless, your rector, rather an old man, I am sorry to say, and I have to deliver an improving address to you who are setting sail on your voyage through life. What shall I say?

Well, I presume that a rectorial address should first say a few wise words about the ocean of life which you are to navigate. But I am afraid I can make you no wiser in that respect, the sea is so rough now, and the mist and sand so dense that it is difficult to see ahead.

A dangerous sea for the young to navigate, they say. I should think it would be a remarkably interesting voyage. One act of the play is finished, a new act is just beginning. There is ferment everywhere. Old established truths are overthrown, it is for you to find new ones. Yes, indeed, the sea is difficult. Many may be wrecked, perhaps, but all the more will remain to be done by everyone of you who has got the grit to do it.

My friend Amundsen observed the other day that he was glad he was not born later as then there would have been nothing left for him to explore except the moon. It made one think of Martin Frobisher who, 350 years ago, "resolved wyth himself to go * * * and to accomplishe" the North-West Passage, "or to bring true certificate of the truth, or else never to returne againe, knowing this to be the onely thing of the world that was left undone yet, whereby a notable mind mighte be made famous and fortunate."

Now, it is not the aim and end of life to become "famous and fortunate." It is not so easy as that. You have come here to do your part, and to do it well wherever you are placed. And there have been many things worth doing since Frobisher's days, and will be more than enough for you too, my friends. Let one speak of some of them. We have heard much lately about the decline of European civilisation; it has reached its old age, they say, and is on its way downhill. And amongst other things they point to the lack of originality, and to a certain alarming sterility in the productiveness of the West European brain nowadays, perhaps especially manifesting itself in the art of our time, and in the lack of commanding personalities. But do not allow yourselves to become pessimists. This talk of decline is nothing new. Let us get it into true perspective. We like of course to think that mankind is constantly making progress, it is such a nice comforting idea. But, is it right? Progress implies that we know whither we are going, and we can only advance towards a fixed point. But such such a point is just what is lacking. You will remember that Archimedes long ago said, though in a different connection: "Give me a fixed point and I can lift the earth!"

Fancy if some of the ancient leaders of thought: Buddha, Socrates, the Christ—came back to us and we showed them all our marvelous inventions and our scientific discoveries, the result of the great progress since their days. Would they not smile indulgently at us—as we smile at our children when they show us their favorite toys? I imagine the following dialog might have taken place between Socrates and Marconi:

Socrates, after having seen all the inventions would say: "This is all very interesting, but what have you learnt about yourself?"

Marconi: "But do you not see what enormous importance it has for the whole of human life, for business, for economic conditions and development, to be able to convey information quickly!"

Socrates: "But how has it all helped you? Have you become a better man by it? And if it helps somebody, perhaps others suffer."

Marconi: "But look at the broadcasting which brings beautiful music and good lectures to thousands, and even to millions of people."

Socrates: "How then do these people get time for that which is infinitely more important, to think for themselves."

No, we have no reason to boast outselves better than our fathers. Indeed, it is doubtful whether there is any proof of the superiority of the so-called civilized man over his "uncivilized" ancestors. Let us go back some 5,000 or 6,000 years to the ancient Egyptians, living in a stone age. When we see what those people accomplished with their implements, can we say honestly that we feel ourselves superior to them?

And if we go back 12,000 or 15,000 years we find the Cro-Magnon people, a race certainly in no respect inferior to any of us, with a magnificent stature, taller than we are, 6 feet, three inches in height, and what skulls. Look at that beautiful high arch of intelligence from their fine forehead to the neck—a cranium with one-sixth more brain than that of the modern European. Fancy if such a man had the education and knowledge of an undergraduate of our days, what could he not have made out of life if placed in our midst? They would certainly have done at least as well as any of us.

Oh, no, my friends, let us be modest. The rising trend of evolution, which carried our ancestors from the level of the apes to that of the Cro-Magnon people,

stopped thousands of years ago, owing to the conditions of modern social life, especially to its urbanization, which interfere with "the survival of the fittest," and make the inferior elements of mankind the most prolific. The human race is certainly still changing, and changing rapidly, but "it is no use galloping if you are going in the wrong direction." These are questions of the very gravest importance, to be earnestly studied by those of you who are going to be the reformers we await so anxiously. But surely, even if the race may not have improved physically of late, our ideas have done so. Our ethics and morality have developed far beyond the primitive stage. Yes, certainly, so far as individuals go, though not to the extent that many people think, and certainly not when the individuals combine into groups.

Nations have hardly begun as yet to have real morality. They are little more than collections of beasts of prey. Private human virtues such as modesty, unselfishness, charity, love of one's neighbor, the feeling of solidarity, still strike them only too often as ridiculous folly if they are urged to practice them in their policies. This may sound a harsh judgment, and perhaps it is too harsh. But let me give you an example that should have shocked much more profoundly than it did the public conscience of mankind: I mean the proceedings of the special Assembly of the League of Nations in March last. Now, this League is just a great and remarkable adventure. A new ship sailing out along new tracks with the future hopes of mankind on board. It marks, we trust, the beginning of a new era in the world's history, attempting as it does, to introduce into the dealings between nations, respect for those virtues I mentioned, and to create a feeling of solidarity and establish real cooperation between them for the betterment of the world. We, therefore, expected much. But alas, a new spirit of the world cannot be created in a day, and amongst the crew of that ship there are still many sailors who have not forgotten their old habits. The nations of the world met in Geneva in March for one single purpose, which everyone believed to be not only desirable, but even essential to the future of Europe—the purpose of admitting Germany to the League. Everyone imagined that the way was clear. After the Locarno meetings, after the noble speeches breathing international brotherhood and love, we really thought that the nations of the world had at last turned over a new leaf. We may still hope, since the events of this September, that Locarno may have been the begining of something new and better. But in March a great many of our first bright hopes were tragically dispelled. Then we had the spectacle of one nation after another raising obstacles to the fulfilment of our common purpose, and doing so with a disregard for decency which we had none of us believed it would be possible for them to show. And in the end, as you remember, we had to leave Geneva defeated and dismayed, because some States were still determined to think solely of their own interests instead of the world at large.

Well, in September, we repaired in part the disaster that had happened, and we are profoundly grateful for much that was said and done, but we remember, too, the foul, occult powers that were at work in March, and remembering that we cannot resist the conviction that there is something rotten outside Hamlet's state of Denmark.

Let me, however, give you another example: The Russian famine in 1921–22, when the Volga region and the most fertile parts of Russia were ravaged by a terrible drought—when something like 30 million people, or more, were starving and dying, dying by the thousands.

A heart-rending appeal for help went out to all the world, and eventually a great many people in this and in other countries helped, and helped generously. But many more were busy trying to find out first who was to blame: was it drought? Or was it the political system of the Russian state? As if that could ameliorate the terrible suffering or make any difference whatever to those who were dying of starvation.

But what was worse, there was in various transatlantic countries such an abundance of maize at that time that the farmers did not know how to get rid of it before the new harvest, so they had to burn it as fuel in their railway engines. At the same time the ships in Europe were idle, and laid up, for there were no cargoes. Simultaneously there were thousands, nay millions, of unemployed.

All this while 30 million people in the Volga region—not far away and easily reached by our ships—were allowed to starve and die, the politicians of the world at large, except in the United States, trying to find an excuse for doing nothing, on the pretext that it was the Russians' own fault—a result of the Bolshevik system.

Fancy, if the unemployed had been put on board the idle ships, had been sent to South America, and had brought the maize to the Black Sea, and saved the

stricken millions, how much suffering they could have relieved. Do you not think the world would have been the better for it? I tell you, that there is something rotten in the condition of the world. There is still ample scope for improvement.

The touchstone of real culture should be the feeling of solidarity and continuity. You, your family, your class, your nation are only parts of the whole, passing links in space and time. But of that feeling there seems to be nothing as yet between nations, and mighty little between classes. In their relations you still have the morality of the savage, who only considers his own advantage.

How strange that we have not yet outgrown these perpetual struggles and disputes between different classes of the same people, that we have no more rational means of settling them than brute force, strikes, and lockouts—and that we use this weapon and stop working, even while there is unemployment and privation.

I often wonder what an inhabitant of some other globe would say if he could look down and see how we manage things upon this little planet of ours. Would he think that there were intelligent beings on this earth? Wasn't it Bernard Shaw who said some time ago that he did not know what the inhabitants of the other globes were doing but he was firmly convinced that they used our earth as a lunatic asylum. Yes, there can be no doubt that excessive nationalism as well as class warfare are dangers, but there may be dangers on the other side too. Let us not forget that national patriotism, as was mentioned by Lord Cecil on the last Assembly of the League, is a necessary stimulus for the development of the world. Beware of the tendency toward uniformity, toward creating a great uniform human family. Desirable as it may be in some respects, I cannot help seeing a great danger in it. Increasing urbanization, uniform education, the rapidly improving means of transport and communication, tend to abolish distance, and to wipe out those characteristic differences between natures and cultures which have made life interesting and beautiful, and acted as an important stimulus to new thought. There are several ideals in vogue nowadays, which, if realized, would lead us toward a dangerous monotony, a uniform greyness, in which it would be difficult to develop one's own personality. All this may be difficult to alter, but we ought not to shut our eyes to it.

It is not a very encouraging picture which your rector has drawn of the sea you have to navigate, of the stage in which you have to act your part in life. He has drawn it to the best of his knowledge, well aware that it is useless to paint with many colors when you will so soon be caught in the baffling grey mists of reality.

But you have the buoyant strength of youth, and when they tell you that civilization is going downhill, remember it has been bad enough many times before in history. In spite of its age, the world is young, and now let us trust that in the spring, when a new summer is born—

"April for all I choose
In it the old things tumble,
In it things new refresh us,
It makes a mighty rumble—
But peace is not so precious
As that his will man shows;

* * * * * * *

In April the summer grows." [1]

What we call development goes in great waves up and down. If you are in the trough you have always the possibility of rising on to a crest ahead of you. The great thing in human life is not so much where we stand as in what direction we are moving. And, mind you, it is not the stage that makes your actions great or small. It is for you yourselves to create your role on the stage.

"Men at some time are masters of their fates
The fault, dear Brutus, is not in our stars
But in ourselves, that we are underlings."

If the world is out of joint it is for you to put it right, to make it a better place to live in, each of you to the best of his ability—as I told you, there is ample scope for improvement. The old beaten tracks do not take us to our goal.

It is time to begin prospecting in new lands.

We need you, young friends, with fresh eyes capable of seeing the simple, elemental things—ready to try new trials, to run risks, and dare the unknown.

My distinguished predecessors, Barrie and Kipling, have spoken to you about courage and about independence, two heaven-born qualities for this voyage of life,

[1] Translated by A. K. Palmer from Bjoustierne Bjornson.

and never more needed than in our day. They are worth infinitely more than all your wireless and broadcasting, and all the rest. But a third genius is needed to complete the group of deities—it is the spirit of adventure. It is about this genius that I wish to say a few words to you today.

Who is she? No less than the spirit that urges mankind forward on the way toward knowledge. The soul's mysterious impulse to fill the void spaces, analogous to nature's horror vacui.

Don't you remember how as a child, when some part of the house was closed, and vaguely suspected of being haunted, you felt fearfully frightened, and yet pined to get there, to meet those mysterious ghosts? The risks added to the charm, and one day when you were alone you somehow managed to get in. But how disappointed you were when you saw no ghosts after all.

That was your awakening spirit of adventure. It is in every one of us. It is our mysterious longing to do things, to fill life with something more than our daily walk from home to office, and from office back home again. It is our perpetual yearning to overcome difficulties and dangers, to see hidden things, to penetrate into regions outside our beaten track—it is the call of the unknown—the longing for the land of beyond—the divine force, deeply rooted in the soul of man, which drove the first hunters out into new regions—the mainspring perhaps of our greatest actions, winged human thought, knowing no bounds to its freedom.

We will find in the lives of men who have done anything, of those whom we call great men, that it is this spirit of adventure, the call of the unknown, that has lured and urged then on along their course.

Kipling says in "Kim": "God causes men to be born * * * who have a lust to go abroad at the risk of their lives and discover news—today it may be of far-off things—tomorrow of some hidden mountain—and the next day of some nearby men who have done a foolishness against the state. These souls are very few, and of these few, not more than 10 are of the best." But, my young friends, though modesty is a becoming virtue, let us always believe that we are in amongst those 10.

For most of us ordinary people, life is a voyage from harbor to harbor along a fairly safe coast. We run no great risks. There are plenty of shoals and sunken rocks, no doubt, but we have reliable charts and sailing directions, and, if anything unforeseen should happen, we can always put in for the night at the nearest port. On the whole a fairly comfortable, and not very exciting existence. But what about the things worth doing, the achievements, the aims to live and die for?

No, although so many of us have to do it, coastal navigation is not really to the liking of our race. Your ancestors and mine—the Norsemen—they did not hug the coast. With their undaunted spirit of adventure, they hoisted their sails for distant shores, and no fear of risks could keep them back—the call of the unknown summoned them across the seas, and it was they who led the way across the oceans. If it had not been for that spirit of adventure in our race, how differently history would read today, and in my opinion the difference would not be for the better.

Let me tell you an example of the awakening spirit of adventure in the history of the British Empire, how it led on the one hand to disaster, but on the other to greatness.

In the middle of the 16th century, England's power on the sea was very modest. We hear, for instance, that in 1540 London had, with the exception of the royal fleet, only four ships of more than 120 tons burden. Then awoke the idea that it might be possible to find a short route to the riches of Cathay or China north of Norway and Russia.

This seemed a promising adventure. The merchants of London, a society named "The Mystery and Company of the Merchant Adventurers," equipped three ships, and placed the expedition under the command of the gallant general Sir Hugh Willoughby, on account of his tall, handsome appearance, and of his rare qualities as a soldier.

The ships sailed in May, 1553, amid great expectations and much rejoicing. Willoughby, with 2 ships and 62 men, had to winter on the coast of the Kola Peninsula, and when Russian fishermen came to the place next spring, they found two ships with only dead men on board. They had all died of scurvy. When the two ships were subsequently sailed homeward one of them was wrecked on the coast of Norway, and the new crew lost; the other, with 24 men on board, disappeared, and was never heard of again.

Such was the unlucky fate of those two ships in spite of their names: *Bona Esperanza* and *Bona Confidentia*. But the third vessel, *Edward Bonaventure*, under command of the able Richard Chancellor, was separated from the two other

ships in a gale north of Norway, and arrived at Vardö. Here Chancellor evidently heard about the route to the White Sea, and the long-established trade between the Norwegians and Russians. This was a new adventure, and as other ships never came he decided to try that route.

He met, however, with some Scotsmen, who do not seem to have been as enterprising as Scotsmen are supposed to be. They warned him earnestly against the voyage. But he sailed all the same, "determining," as he declared, "either to bring that to pass which was intended, or else to die the death."

They came into the White Sea and to the river Dvina. Chancellor went to Moscow, and was there received by the Russian czar, Ivan the Terrible. Next summer he returned in his ship to England, bearing a letter from the czar.

This voyage, and the so-called discovery of this old Norse route to Russia through the White Sea, form an important turning point in the development of English commerce and shipping. It meant the opening of a great new market for English goods, a profitable trade with Russia developed quickly, and the Muscovy Co., which received special privileges, became so rich and powerful that it could soon support important undertakings in other parts of the world as well. A rapid development of the English mercantile marine followed. Thus it came about that England was soon in a position to compete with the stronger seapowers even in other regions. This episode, in fact, marks the beginning of Great Britain's power on the sea.

The story shows how apparently small accidents may prove decisive in the history of a whole people. If those ships had not been separated, how differently everything might have turned out. But still more: If it had not been for the true spirit of adventure in that one man, Richard Chancellor, and if he had not been of the type who grasp their opportunities, he would not have entered the White Sea—England's important trade with Russia would not have commenced at that time—the development of her shipping would have been very different, and the history of the world would have proceeded along other lines.

I am convinced that the future development of the possibilities of your own people as well as of those of mankind will depend on some of you young people striking boldly out along new tracks. I am sure that the great events in the world always depend on the spirit of adventure shown by certain individuals in grasping opportunities when they occur. And so it is in the personal life of every one of us.

Let me tell you a little about myself, not because that self is a personage of any great importance, or a good example, but simply because it is the only one I have, and we must all of us judge life from the standpoint of our own experience. Now when I look back upon my own life, it strikes me that if anything worth doing has ever been accomplished on that crooked course of regrettable irregularities it was only due to a certain spirit of adventure, acting, however, in a sporadic and imperfect way.

In his admirable address, Barrie proposed that a good subject for his successor's rectorial address would be "the mess the Rector himself has made of life." Little did he know how much to the point that subject would be for your present Rector. Barrie warned you against Macconnachie, his imaginary other half, who is always flying around on one wing, dragging him with him. And what shall we other poor mortals say, whose Macconnachies do not write charming plays for us, like Barrie's, but merely lead us astray? How many nasty tricks that unruly fellow has played me. When we were young, and plodding steadily along a fairly promising road, he would suddenly bolt up some unexpected sidetrack, and I had to follow and try to make the best of it.

Now, do not mistake that fanciful creature for the spirit of adventure. Far from it, he is just Master Irresponsible, an emotional, impulsive, and quarrelsome person, who is very easily bored, and thinks it extremely dull when you go on with the same thing for long, and who therefore is always on the lookout for something new to turn up, like a child looking round for new things to play with.

But the spirit of adventure may still save the situation and see you through, once you have been diverted on to a new trail. For its nature is not to want continually to change: on the contrary, it is to want to see the end of things. And once you have embarked upon an undertaking, the spirit of adventure will not give in, whether you sink or swim, till the work is done, and done well. Do not think that adventure is child's play or that the heights can be won in a day. You wish to rise, and be great, but remember:

"The heights by great men reached and kept
Were not attained by sudden flight;
But they, while their companions slept,
Were toiling upwards in the night."

Real greatness was never attained without patience and industry—"Genius is an inexhaustible power of taking trouble," Carlyle said. "Patience is power," adds an Eastern proverb, "with time and patience the mulberry leaf becomes satin."

Check Master Irresponsible then, and consider well before you move. Make your preparations carefully; they can never be too careful—the road is long. No guesswork, no approximations. But when you strike out then throw your whole self into the enterprise. Set all your sails. No wavering, for "self-trust is the first secret of success," and don't check your boat when you are tacking.

We pass many crossroads on our way through life, and the test of a man is how he behaves at each crossroad, Some people cannot decide, they waver, wishing to keep all ways open, and always looking back, they end by getting nowhere. The traveler of the right mettle may consider well, but then he takes one road, and sticks to that, and he always arrives somewhere. For him, the only road is the road ahead of him, and there is no way back.

I have always thought the much-praised "line of retreat" is a snare for people who wish to reach their goal. Let me tell you one secret of such so-called successes as there may have been in my life, and here I believe I give you really good advice. It was to burn my boats and demolish the bridges behind me. Then one loses no time in looking behind when one should have quite enough to do in looking ahead—then there is no choice for you or your men but forward. You have to do or die.

Let me try to tell you how it worked in my case. I have to apologize once more for devoting so much time to myself, but I see no way of avoiding that, if I am really to tell you something about my life. I was an undergraduate even younger than most of you, probably, and a "ne'er do well" except for some little sport perhaps.

According to Carlyle, the first of all problems for a man to find out is what kind of work he is to do in this universe.

But even this little problem I had not been able to solve. I had a leaning to science, but to which science? Physics and chemistry interested me most, but Master Irresponsible, over whom I had no control at that time, did not like that kind of work much. One day he suddenly took it into his head that zoology would be better, as that promised more fun—more shooting and out-of-door life—consequently we went in for zoology.

Then one day the irresponsible creature suddenly suggested that we should go on a voyage to the Arctic Sea, under the pretext of studying the animal life of the polar regions—I was 20 then. Off we went. That was the first fatal step that led me astray from the quiet life of science. It gave me more Arctic sport, more interest in various polar problems than actual zoological research. And on that voyage we were caught and beset in the pack ice, and drifted for over 3 weeks toward the then unknown east coast of Greenland. I saw the mountains and glaciers, and a longing awoke in me, and vague plans revolved in my mind of exploring the unknown interior of that mysterious land. I returned home. I was made curator of the Zoological Museum at Bergen. The Arctic dreams were more or less forgotten. I went in, body and soul, for zoology, and especially for microscopical anatomy. For 6 years I lived in a microscope; it was an entirely new world. Master Irresponsible kept me fairly quiet during 3 years, and we were well on the way to becoming a promising young zoologist. During that period, too, I visited this university, just 40 years ago, and met for the first time your great zoologist, my old friend, Professor McIntosh, who is still among us. I wrote some works especially on the microscopical anatomy of the nervous system. They contained some discoveries of value, I believe, but still more important were perhaps the new problems which they raised. We were full of ambitious plans for investigations to solve those problems. Most of those investigations have later been made by others, but some of the problems are still waiting to be solved, I believe.

Anyhow, we had possibilities of doing work worth doing, and of becoming a sound man of science, and a university professor. I still feel a pang of regret when I think of those lost opportunities.

But just then Master Irresponsible took advantage of a weak moment, and played me one of his fatal tricks. We had just finished a treatise on the nervous system, with the result that the author's own nervous system was overstrained, and needed a little rest. Then he brought back the Arctic dreams, and told me that the time had come to carry out our old plan of crossing Greenland. It would not take long, and we could soon return to the nervous system again with renewed vigor.

He would not have succeeded if he had not been joined by a stronger ally—the spirit of adventure. To resist those two together was hopeless. I had to go.

Many attempts had been made to cross Greenland, the unknown interior of which was supposed to be covered by an enormous icecap, called the Inland Ice. But all of these attempts had been made from the inhabited west coast, and had not succeeded. How then was my plan formed?

It was one autumn evening in Bergen (in 1883); I was sitting and listening indifferently as the day's paper was being read by my friend the clergyman. But suddenly my attention was roused by a telegram: Nordenskiold had come back from his expedition toward the interior of Greenland, he had had two Lapps with him, who had found good snow for skiing, and had covered incredible distances on ski. In that same moment it struck me that an expedition of Norwegian ski runners, going in the opposite direction, from east to west, will cross Greenland. The plan was ready.

So it struck me that the only sure road to success was to force a passage through the floe belt, land on the desolate and icebound east coast of Greenland, and thence cross through the unknown, over to the inhabited west coast. In this way one would burn one's boats behind one, there would be no need to urge one's men on, as the east coast would attract no one back, while in front would lie the colonies on the west coast with the allurements and amenities of civilization. This plan, when it was published, was declared by the so-called competent authorities to be utterly impossible. One of them, a Dane, who had traveled along the icebound east coast of Greenland, where I proposed to land, declared in a public lecture that the plan "betrayed absolute ignorance of the true conditions," and showed "such absolute recklessness that it was scarcely possible to criticize it seriously." I daresay he was right in his way.

Some authorities criticized especially the unpardonable rashness of destroying the bridges behind you. The first thought of a good general and leader was always to secure a safe line of retreat, without which his men would not go on with confidence. But I always thought "the line of retreat" a wretched invention, as I told you before, and I was justified by the events. In spite of my youthful ignorance and lack of experience, and although our preparations and equipment were lamentably imperfect in several respects, as my companion, Captain Sverdrup, would tell you, if he were to give you his candid opinion, the expedition was carried out in accordance with the plan. The method worked out extremely well, the lack of the line of retreat simplified matters, and acted as a stimulus, making up for the defects in our preparations.

The same method was also used for our next expedition. Of course, having once set foot on the Arctic trail, and heard the "call of the wild" of the unknown regions, we could not return to the microscope and the histology of the nervous system again, much as I longed to do so. I had conceived an idea that there was a continuous drift of the ice across the unknown regions round the North Pole, from the sea north of Bering Straits and Siberia on into the sea between Greenland and Spitsbergen. I found more and more proofs which definitely convinced me of the existence of such a drift.

Then it struck me that this drift of the ice could be used for transport of an expedition across the unknown regions. It would only mean building a ship of a special shape, sufficiently strong to resist the ice pressure, and this ship we could push as far as possible into the pack ice on the side where it was drifting northward, let her be frozen in, and then the ice would carry us across the regions which the previous expeditions had tried in vain to reach.

It simply meant working with the forces of nature instead of against them.

Here again the same principle was applied. Once we were well started on this expedition, there would be no line of retreat. Our hope was ahead of us, and so the ship was called the *Fram*, which means forward.

When this plan was published it was severely attacked by most of the very first authorities on polar exploration in Great Britain and in other countries.

As the prominent Arctic navigator, Admiral Sir George Nares expressed it: It totally disregarded the adopted Arctic axioms for successfully navigating an icy region, which were: "that it is absolutely necessary to keep close to a coast line, and that the farther we advance from civilization the more desirable it is to insure a reasonably safe line of retreat." He did not believe in a drift of the polar ice as assumed by me.

That splendid Arctic explorer, Admiral Sir Leopold McClintock said that it was impossible to build a ship strong enough to resist the ice pressure in the winter, and he believed, as did the majority of the others, that "there was no probability of ever seeing the *Fram* again when once she had given herself over to the pitiless polar ice."

The ship was built. Her famous builder with the Scotch name, Colin Archer, was a Norwegian whose father had come from this country. The expedition was carried out in full accordance with the plan. We had a great deal more knowledge and more experience this time.

The drift of the ice was found to be very nearly what was expected, and the ship was strong enough to resist even the most desperate attacks of the ice. We went into the pack ice north of the New Siberian Islands in 1893, and the ship came out of the ice again north of Spitsbergen 3 years later safe and sound, after having drifted across the unknown regions.

But the spirit of adventure is always urging you on, once you begin to listen to it. When we had drifted with the *Fram* for a long time we saw that she would drift across, and the end of the expedition would be attained. But then the adventurous spirit found that something more could be done by two of us leaving the ship with dogs and sledges. We could travel across the drift ice toward the pole, and in that way explore parts of the unknown region outside the drift route of the *Fram*. But in that case we could not think of returning to the drifting ship, as we should not know where she had drifted to in the meantime. We should have to go to Franz Josef Land and Spitsbergen, where we might find a sealing vessel to bring us home. Again we had to break the line of retreat, and again the method worked well.

Hjalmar Johansen went with me, and, while the *Fram* and the rest of the expedition were left in the safe hands of Captain Sverdrup, we set off from the ship with dogs and sledges on March 14, 1895. We expected our sledge expedition to last 3 months at most, and carried food for that period. But the ice was more difficult than we expected.

At last we reached the north coast of a land which afterward turned out to be Franz Josef Land, but it was so late in the season that we could not get through, so we had to winter. Instead of the 3 months we were provisioned for, we had to live through 15 months before we met with people. We built a stone hut, we shot bears and walrus, and for 10 months we tasted nothing but bear meat. The hides of the walrus we used for the roof of our hut, and the blubber for fuel. In the following summer we quite unexpectedly met British people, the Jackson-Harmsworth Expedition, on the south coast of Franz Josef Land, and came home in their ship.

I tell you all this just to make you understand how things, that might seem impossible, can be done when you have to do them, and how a life you may think hard, is easily lived when you have a goal to work for. You may think it was hard to live a long winter dug in, and on nothing but bear meat, but I can assure you it was a happy time, for we had the spring and the homecoming to look forward to.

You may notice that in the case of these plans, as also on many occasions later in life, I had the misfortune to have most of the competent authorities of the world against me, declaring my views and my plans to be impossible. However, I had had the advantage of living a great deal alone in my life, and had thus acquired the habit of making up my mind without asking the opinion of others.

It has obvious advantages to stand alone, it makes you more independent in your actions, and you are less apt to be misled by others. Ibsen has said that man is strongest who stands most alone.

But this does not imply that every man who stands alone is strong, or that every plan which competent people declare to be impossible should be attempted. Beware of obstinacy and foolhardiness. For a strong man there is a great danger in resistance and contradiction. It takes a superior man to allow himself to be convinced in the heat of argument by the logic of another.

I think it was Montaigne who wondered whether the fanaticism which is created by the unflinching defiance of the judge's violence and of the danger, has not more than once made a man persist, even to the stake, in an opinion for which —among friends and in freedom—he would not have singed his little finger. There is certainly a profound truth there. It is the spirit of adventure, but the reverse of the medal.

You have to take risks, and cannot allow yourself to be frightened by them, when you are convinced that you are following the right course. Nothing worth having in life is ever attained without taking risks. But they should be in reasonable proportion to the results which you hope to attain by your enterprise, and should not merely depend on luck, giving your ability to overcome the risks no chance of coming into play. Even an animal may have that kind of foolhardiness, and success can give you no real satisfaction if it depends on mere accident.

Let me tell you a case where, in my opinion, the risks should not have been taken. It was the ill-fated expedition of the prominent Swede, Andrée. He had formed the project of crossing the unknown north polar regions in a balloon. It was in

1896, before the days of dirigibles. He hoped to be able to steer his balloon to some limited extent by means of a drag rope and a sail, and to be able to keep the balloon up during the time required for the winds to carry it across the unknown regions. He went to Spitsbergen in 1896, intending to start from there in his balloon. He did not, however, think the meteorological conditions sufficiently favorable for a start that summer. He therefore returned, and postponed his start till the following year.

In the meantime we came back from our expedition in the *Fram* across the unknown north Polar Sea, and our meteorological observations collected during 3 years in those regions were naturally of great interest to Andrée. At his request I sent him a full extract of them when he was again on his way north to Spitsbergen in the early summer of 1897. I also sent him a letter in which I pointed out that, as he would see, the prevailing winds and the meteorological conditions during the summer months would not, as a rule, be favorable to his undertaking. And I expressed the hope that, as he had once had the courage to return when he saw that the conditions were unfavorable, he would be able to show the same courage again.

He wrote back from Tromsö, thanked me for the documents and my kind advice, but declared that he would not be able to show that courage a second time.

On July 11, 1897, the noble Swede and his gallant companions started on their flight from Spitsbergen into the unknown. They never returned.

This was certainly the noble spirit of adventure, which did not shrink back before risks. We cannot but admire it, but we profoundly regret that those splendid qualities could not have been used for a better purpose.

Why do I give these examples from the life of exploration and adventure? Because all of us are explorers in life, whatever trail we follow. Because it is the explorers with the true spirit of adventure we now need if humanity shall really overcome the present difficulties, and find the right course across that dangerous sea ahead of us which I mentioned at the beginning. Mind you, you will all find your adventure, for even life itself is an adventure.

But try not to waste your time in doing things which you know can be done equally well by others. Everyone should try to hit upon his own trail. Do not lose your opportunities, and do not allow yourselves to be carried away by the superficial rush and scramble which is modern life. The first great thing is to find yourself, and for that you need solitude and contemplation—at least sometimes.

I tell you deliverance will not come from the rushing noisy centers of civilization: it will come from the lonely places. The great reformers in history have come from the wilderness.

My friend Knud Rasmussen told me a remarkable story about a medicine man, a conjurer of the primitive Eskimo of the "Barren Grounds" in northern Canada. I should like for your benefit to repeat it here. This simple savage who had hardly ever seen a white man, said to his friend and colleague Rasmussen: "The true wisdom is only found far from men, out in the great solitude, and can only be attained through suffering. Privation and suffering is the only road to wisdom—and they alone can open a man's mind for that which is hidden to others."

I think those words of a savage show more understanding of the secret of wisdom than you will find in a great many people in our countries. He went on to describe how in order to become a sage, i.e., a medicine man or conjurer, a man has to fast for 14 days in an unheated snow hut at the coldest time in the middle of winter. Then comes another medicine man with a drink of hot water and a little raw meat. And after that the man has to go on fasting again as long as he possibly can. He should never finish his struggle for wisdom, but most people are satisfied too soon, and that is the reason why there is so little wisdom in the world.

This is the true spirit of adventure, which must always press on. It makes one think of those lines by Tennyson:

> "This grey spirit yearning in desire
> To follow knowledge like a sinking star,
> Beyond the utmost bound of human thought."

These are questions well worth thinking over, but I tell you there are many people who do not get time even to think over what they themselves hold to be the purpose of their lives. What is the purpose of yours? Are you, all of you, certain you have the answer ready?

Are you out for happiness? Well, many people are. But believe me, my friends, you need not look for it. The great thing is to do your best and to be

independent of all other "necessities." Dear me, how perfectly unnecessary many of those "necessities" really are:

"And if by chance of circumstance
We have to go bare-foot, sir,
We'll not repine—a friend of mine
Has got no feet to boot, sir.
This happiness a habit is
And life is what we make it,
See! There's the trail to Sunnydale!
Up, friend! and let us take it."

Are you poor? What luck! No time lost in looking after your belongings There is always so much trouble with property. And you cannot really be poor on this earth. Let me tell you what your great poet Wergeland once said:

"Have I no heaven because it is full of drifting clouds,
fairylands of the sun?
Complain not under the stars of the lack of bright
spots in your life!
Ha! are they not twinkling as if they would speak
to you?
How Venus sparkles to-night! Have the heavens
also spring?
What riches for a mortal!"

My dear young friends, let me give you one warning based on long and sad experience: Do not let your flight be clogged by all those trifles which are now considered necessities of life. Mind you, by making your baggage train longer you clip your wings.

Ah youth, youth, what a glorious world! Unknown realms ahead of you hidden behind the mists of the morning. As you move on, new islands appear—mountain summits shoot up through the clearing mists one behind another, waiting for you to climb, dense forests unfold for you to explore, free boundless plains for you to traverse.

You are "foot loose and heart free" to sail beyond the sunset, and to roam the universe.

What a joyous thing to see the day dawning and know that you are bound on a voyage to new realms. "Your soul bounds upward on beams of light to the vault of heaven." You laugh at the risks and smile at the dangers, youth's buoyant faith and self-trust is in command. The storm cannot reach you.

And lo! far ahead, above the mist and the scud, rises your Land of Beyond!

We all have a Land of Beyond to seek in life—what more can we ask? Our part is to find the trail that leads to it. A long trail, a hard trail, may be—but the call comes to us, and we have to go.

Rooted deep in the nature of everyone of us is the spirit of adventure, the call of the wild—vibrating under all our actions, making life deeper and higher and nobler.

"Have you known the Great White Silence?
Have you broken trail on snowshoes? Mushed your
huskies up the river.
Dared the unknown, led the way, and clutched the
prize?
Have you suffered, starved, and triumphed,
grovelled down, yet grasped at glory,
Grown bigger in the bigness of the whole?
'Done' things just for doing, letting babblers
tell the story . . . .
Have you seen . . . .
The simple things, the true things, the silent men
who do things—
Then listen to the Wild—it's calling you.
Let us probe the silent places, let us seek what
luck betide us,
Let us journey to a lonely land I know.
There's a whisper on the night wind, there's a star
agleam to guide us,
And the Wild is calling, calling . . . let us go."

○