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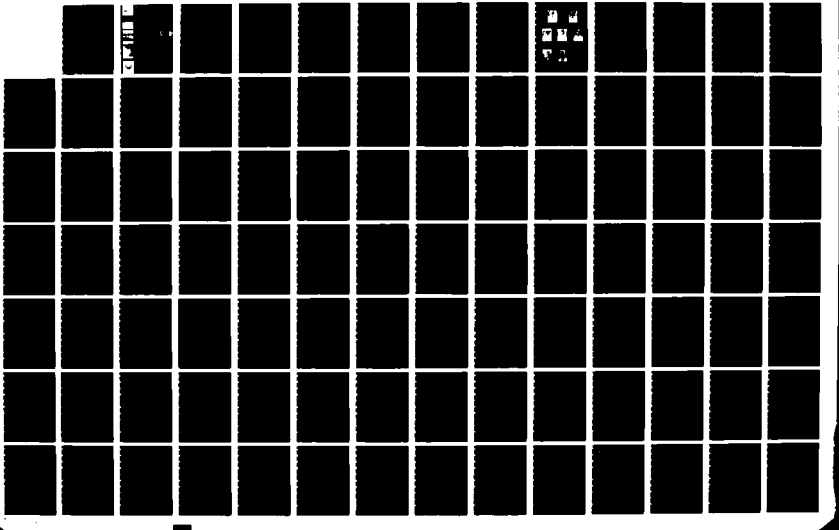
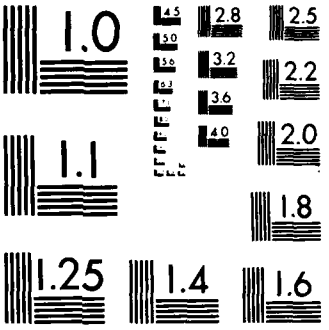


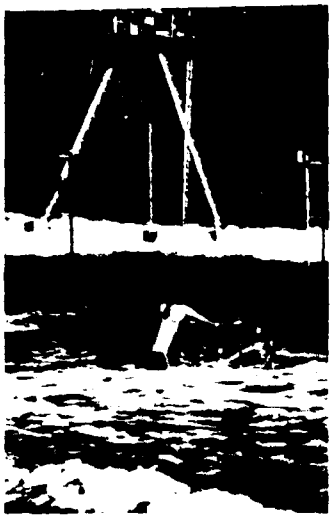


US Army Corps of Engineers

PROCEEDINGS OF THE 46TH MEETING OF THE COASTAL ENGINEERING RESEARCH BOARD

21-22 October 1986

VICKSBURG, MISSISSIPPI



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US Army Engineer Waterways Experiment Station
Coastal Engineering Research Center

June 1987

Final Report

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Washington, DC 20314-1000

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US Army Engineer Waterways Experiment Station
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These proceedings provide summaries of the papers presented at the semiannual meeting of the Coastal Engineering Research Board (CERB). Also included are discussions of CERB business, the Chief of Engineers' initiatives, recommendations for research and development by CERB members, and public comment.

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PREFACE

The Proceedings of the 46th meeting of the Coastal Engineering Research Board (CERB) were prepared for the Office, Chief of Engineers (OCE), by the Coastal Engineering Research Center (CERC), of the US Army Engineer Waterways Experiment Station (WES). These proceedings provide a record of the papers presented, the questions and comments in response to them, and the interaction among program participants and the CERB.

The meeting was hosted by WES under the direction of COL Dwayne G. Lee, Commander and Director.

Acknowledgments are extended to the following: Mrs. Sharon L. Hanks, for assisting in setting up the meeting and assembling information for this publication; Mr. C. E. Chatham, Jr., for organizing the field trip; Mr. Robert Hall for maintaining the sound equipment; Mr. Andre Z. Szuwalski and Dr. Fred E. Camfield for preparing the draft proceedings from the transcript; and Ms. Shirley A. J. Hanshaw who edited these proceedings, all of whom are at WES. Thanks are extended also to Mses. Elizabeth J. Brady and Rhonda K. Hall, Court Reporters, for taking verbatim dictation of the meeting.

The proceedings were reviewed and edited for technical accuracy by Dr. James R. Houston, Chief, CERC, Mr. Charles C. Calhoun, Jr., Assistant Chief, CERC, and Mr. Thomas W. Richardson, Chief, Engineering Development Division, CERC. COL Dwayne G. Lee, Executive Secretary of the Board and Commander and Director, WES, provided additional review.

Approved for publication in accordance with Public Law 166, 79th Congress, approved 31 July 1945, as supplemented by Public Law 172, 88th Congress, approved 7 November 1963.

Henry J. Hatch
Major General, Corps of Engineers
President, Coastal Engineering Research Board

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WEDNESDAY, 22 OCTOBER

INTRODUCTION

The 46th Meeting of the Coastal Engineering Research Board (CERB) was held at the Holiday Inn in Vicksburg, Mississippi, on 21-22 October 1986. It was hosted by the US Army Engineer Waterways Experiment Station, under the direction of COL Dwayne G. Lee, Commander and Director.

The Beach Erosion Board (BEB), forerunner of the CERB, was formed by the Corps in 1930 to study beach erosion problems. In 1963, Public Law 88-172 dissolved the BEB by establishing the CERB as an advisory board to the Corps and designating a new organization, the Coastal Engineering Research Center (CERC), as the research arm of the CERB. The CERB functions to review programs relating to coastal engineering research and development and to recommend areas for particular emphasis or suggest new topics for study. The Board's four military and three civilian members officially meet twice a year at a particular coastal Corps District or Division to do the following:

(1) Disseminate information of general interest to Corps coastal Districts and Divisions.

(2) Obtain reports on coastal engineering projects in the host (local) District or Division; receive requests for research needs.

(3) Provide an opportunity for State and private institutions and organizations to report on local coastal research needs, coastal studies, and new coastal engineering techniques.

(4) Provide a general forum for public inquiry.

(5) Provide recommendations for coastal engineering research and development.

Presentations during the 46th CERB meeting dealt with the challenges that were presented to the Board by LTG E. R. Heiberg at the 44th CERB meeting in Sausalito, California (4-6 November 1985). Documentated in these proceedings are summaries of presentations made at the meeting, discussions which followed these presentations, and recommendations by the Board for coastal engineering research and development. A verbatim transcript is on file at CERC.

THE COASTAL ENGINEERING RESEARCH BOARD
OCTOBER 1986

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46TH COASTAL ENGINEERING RESEARCH BOARD MEETING
USAE Waterways Experiment Station
Vicksburg, Mississippi
21-22 October 1986

ATTENDEES

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Dr. Chiang Chung Mei
Dr. Dag Nummedal

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Mr. William R. Murden (WRSC-D)

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WATERWAYS EXPERIMENT STATION (WES)
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Dr. James R. Houston (WESCV-Z)
Mr. Charles C. Calhoun, Jr. (WESCV-A)
Dr. Don C. Banks (WESGR)
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Ms. Mary F. Vincent (WESFV)
Mr. Stephen E. Wagner (WESCW-D)
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VISITORS
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Mr. Thomas E. White (Scripps Institute of Oceanography)

46TH MEETING OF THE COASTAL ENGINEERING RESEARCH BOARD
21-22 October 1986
Holiday Inn
Vicksburg, Mississippi

AGENDA

21 October

8:00 - 8:30	Registration	
8:30 - 8:35	Opening Remarks	MG George R. Robertson (NPD)
8:35 - 8:40	Handing Over Gavel	MG George R. Robertson (NPD) MG Henry J. Hatch (DAEN-CWZ)
8:40 - 8:50	Welcome to Waterways Experiment Station	COL Dwayne G. Lee (WESZA)
8:50 - 8:55	Announcements	Mr. Andre Z. Szuwalski (WESCV-I)
8:55 - 9:10	Review of CERB Business	COL Dwayne G. Lee (WESZA)
9:10 - 9:40	Review of CERC Programs	Dr. James R. Houston (WESCV-Z)
9:40 - 10:00	COFFEE BREAK	
10:00 - 10:15	Chief's Initiatives	MG George R. Robertson (NPD)
10:15 - 10:45	Education and Training Career and Advancement	Mr. Charles C. Calhoun, Jr. (WESCV-A)
10:45 - 11:30	Discussion of Education and Training and Career Advancement	
11:30 - 12:00	Dredging Program	Mr. William R. Murden (WRSC-D)
12:00 - 12:30	Discussion of Dredging Program	
12:30 - 1:15	LUNCH	
1:15 - 1:35	Wave Data Collection Program	Mr. Thomas W. Richardson (WESCD)
1:35 - 2:30	Discussion of Wave Data Collection Program	

AGENDA (Continued)

2:30 - 2:40	COFFEE BREAK	
2:40 - 3:00	Private Sector Initiatives	Mr. John G. Housley (DAEN-CWP-F) Dr. James R. Houston (WESCV-Z)
3:00 - 4:00	Discussion of Private Sector Initiatives	
4:00	RECESS	
7:00 - 7:30	Cocktails (No host - Delta Point)	
7:30 - 9:00	Dinner (Delta Point)	

22 October

7:30	Bus Pickup at Holiday Inn	
7:45 - 9:15	Tour of CERC Facilities (coffee and pastries provided) J. V. Hall Building L-Shaped Wave Flume	
9:15 - 9:30	Return to Holiday Inn	
9:30 - 9:35	Resume Meeting	MG. Henry J. Hatch (DAEN-CWZ)
9:35 - 9:40	Announcements	Mr. Andre Z. Szuwalski (WESCV-I)
9:40 - 10:15	SUPERDUCK	Mr. Curtis Mason (WESCD-F)
10:15 - 10:45	PUBLIC COMMENT	
10:45 - 11:30	Final Discussion and Recommendations by Members of the Board	CERB
11:30 - 11:45	Selection of Date and Place for Next Meeting	MG Henry J. Hatch (DAEN-CWZ)
11:45 - 12:00	Closing Remarks	MG Henry J. Hatch (DAEN-CWZ)
12:00	ADJOURN	

OPENING REMARKS

MG HENRY J. HATCH, PRESIDENT (INCOMING)
Coastal Engineering Research Board
Director of Civil Works
Washington, DC

MG George R. Robertson, acting on behalf of BG Patrick J. Kelly, opened the 46th meeting of the Coastal Engineering Research Board (CERB). Before passing the gavel to the new President, MG Henry J. Hatch, MG Robertson asked him to make a few comments on House Resolution (HR) 6*. MG Hatch's comments follow.

MG Hatch said passage of HR 6 brought to a close an agonizing 15-year period of great uncertainty concerning the future of the Civil Works program. He said the major stumbling block has been the inability of the Administration and Congress to agree on how to share the financial burden in the future of building, operating, and maintaining water projects for the United States.

MG Hatch further stated that on the same day HR 6 was passed the Continuing Resolution Amendment (CRA) was also passed. The CRA includes many items that have not been sorted out yet by the Corps, but it includes the studies of Great Lakes levels and sea level rise. He continued, "I can't give you many of the specifics on the impacts of CRA and HR 6 except to say on the downside the CRA confirms what we knew would happen, and that is we took a modest hit in our Research and Development (R&D) program. I can't tell you precisely how that affects each element."

MG Hatch said on the positive side that the Civil Works program generally can look to a bright future. All of those works which Congress has authorized pursuing, if they have any impact on the business of this Board, can contribute resources to the R&D effort.

He concluded his remarks by saying that HR 6 and the CRA "will have breathed life into our programs to an extent we frankly hadn't really dreamed of."

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* Water Resources Development Act of 1986, Public Law 99-662.

HANDING OVER THE GAVEL

MG George R. Robertson, Acting President
Coastal Engineering Research Board
Commander
US Army Engineer Division, North Pacific
Portland, Oregon

MG George R. Robertson turned over the gavel to the new President, MG Henry J. Hatch. MG Robertson noted that MG Hatch is the first Director of Civil Works to assume this position since 1979 when the present Chief of Engineers, LTG E. R. Heiberg III, assumed the position. LTG Heiberg maintained the presidency when he became the Deputy Chief of Engineers.

MG Robertson mentioned that BG Kelly is remaining a member of the Board. BG Kelly sent his apologies for not being able to attend. MG Robertson went on to say that acting in BG Kelly's behalf, "It gives me great pleasure to pass on a very significant gavel as President of the CERB. Welcome aboard, sir."

REVIEW OF COASTAL ENGINEERING RESEARCH BOARD BUSINESS

COL Dwayne G. Lee, Executive Secretary
Coastal Engineering Research Board
Commander and Director
US Army Engineer Waterways Experiment Station
Vicksburg, Mississippi

I will report to the CERB on several items of old business that will not be covered elsewhere in the meeting. First, I'd like to call the Board's attention to the recent building dedication and related activities that we had here at the US Army Engineer Waterways Experiment Station (WES). Prior to the Coastal Engineering Research Center's (CERC's) move to Vicksburg, the primary laboratory building at Ft. Belvoir was called the J. V. Hall, Jr., Building. At the time of the move, that building was transferred to another agency, and the building no longer carried the J. V. Hall name. To rectify that situation, we dedicated CERC's main laboratory reasearch facility here at WES in honor and memory of J. V. Hall, Jr. The dedication took place on the 15th of July this summer and was presided over by LTG E. R. Heiberg III, Chief of Engineers. J. V. Hall, Jr., was the first engineer on the staff of the Beach Erosion Board which was established in 1931, the predecessor to CERC. One of Mr. Hall's greatest contributions in the field of engineering was his responsibility for the preparation of Technical Report No. 4, titled "Shore Protection Planning and Design." Today that report is known as the Shore Protection Manual (SPM) and is used throughout the world. Mr. Hall was one of the first coastal engineers recognized as an expert both inside and outside the Corps of Engineers. We're extremely proud of this facility and the research going on at CERC.

I'd like to quote a statement that LTG Heiberg made during the dedication: "As I am privileged to travel and talk to engineers around the world, I can tell you that everyone in the business knows CERC and envies what we have here in this immense contribution to coastal engineering research."

In addition to the building dedication, CERC inducted two former employees into its gallery of distinguished employees, Mr. George Watts and Mr. Thorndike Saville, Jr. Mr. Watts served as the Chief of the Engineering Development Division from 1966 until he retired in 1978. Mr. Saville served as CERC's Technical Director from 1971 until his retirement in 1981. Finally,

after the dedication ceremony, the Chief, along with our secretaries and Management Support Group, cut the ribbon to open the new addition to CERC's headquarters building.

In another item of CERB business, one of LTG Heiberg's charges to the Board during its 44th meeting in November 1985 was to recommend ways that research and development could generate significant payoffs for the Corps of Engineers. One mission for such an approach was dredging. Steps in that direction have been taken, and a Corps Dredging Research Program has been approved by both MG Henry J. Hatch, as the Director of Civil Works, and Secretary Dawson in his capacity. We hope it will be initiated in fiscal year 1988 (FY 88).

You will hear more specifics on the Dredging Research Program later on from Mr. Bill Murden. I will say now that a Program Manager with the Dredging Research Program has been selected and is now on board and working at CERC. He is Mr. Lim Vallianos, and he brings with him over 25 years of coastal and dredging experience, most of it as Chief of the Coastal Engineering Branch in the US Army Engineer District, Wilmington (SAW). He then worked in private industry as the Chief Coastal Engineer at Moffat and Nichol Engineers. Following that, he was in the Planning Division, Civil Works Directorate, Office of the Chief of Engineers.

The Dredging Research Program of the magnitude envisioned will require a tremendous joint effort between the Corps field offices, the Corps labs, the Chief's office, and the Dredging Division at the Water Resources Support Center. This coordination and continued planning will take place in FY 87 so that we can start running and be at full steam in FY 88. Mr. Vallianos will provide the necessary bridge between these various groups to make the Dredging Research Program a great success.

Another new person at CERC that I would like to introduce is Navy LT Robert "Bob" Johnson who will coordinate the research and development that we have with the Navy and help us at CERC learn how to speak Navy. LT Johnson reported to CERC early in August after completing a tour of duty at the Naval Air Station at Cecil Field, Florida. He received his commission as a Navy Civil Engineer Corps officer in 1981 after having served 8 years as an enlisted man. He holds a B.S. degree in industrial engineering from North Dakota State University.

At the last Board meeting in Alaska, CERC presented to the Board a new program that CERC would be undertaking, the Automated Coastal Engineering (ACE) System. The purpose of the ACE System is to develop computer-aided designed products that are practical and easily used in the field. I will bring the Board up to date on what's transpired since the Alaska meeting. CERC conducted six regional workshops to obtain field personnel input into the development of the ACE Sytem. Based on that input, a Pilot Committee was formed consisting of six Corps field personnel selected on a regional basis and one representative each from the Chief of Engineers' office and from CERC. The Pilot Committee will guide development of the system and assure maximum conformance of that system to the needs of the field.

The first committee meeting was held just this month and hosted by the US Army Engineer Division, South Pacific (SPD). The response of the field to the ACE concept as we perceive it and understand it so far has been exellent, with many field personnel offering to assist in its development. The ACE System appears to be an ideal vehicle to transfer technology to the field in the most direct and user-friendly way. At the conclusion of my remarks I'll ask Mr. John Oliver of the US Army Engineer Division, North Pacific (NPD), who's Chairman of the Pilot Committee, to report on that meeting just a few weeks ago.

The final item I'd like to discuss relates to the graduate institute at WES. At the last CERB meeting, my predecessor, COL Allen F. Grum, briefly discussed the idea and concept of a graduate institute at WES. I'd like to bring you up to date on that. That graduate institute has been established. It is now an association of three universities (Texas A&M, Louisiana State University, and Mississippi State University) and WES. That association is one through which academic credit and graduate degrees can be earned from the member universities through graduate course work offered here at WES. The institute provides a formalized means for these three member universities to interact among themselves and WES through a short-term exchange of university faculty and WES employees and through the use of the WES research facilities. The purposes of the institute are to enhance the exchange of scientific and technological information between the faculty at the member universities and the researchers at WES and to support graduate studies and research in scientific and technical areas of mutual interest.

The institute's administration will be the responsibility of WES. We have established an institute administrator to carry out those administrative tasks, and he is Dr. Jim Pennington from our Environmental Laboratory. The institute will be offering several programs of interest to coastal engineers, including programs in marine sciences, geology, civil engineering, ocean engineering, and oceanography. Courses have been initiated with Louisiana State University offering one course in coastal processes that's being taught by Dr. Dag Nummedal, one of our CERB members. Mississippi State is teaching five courses this fall semester, and Texas A&M will offer its first course in the spring of 1987. So the institute has been established and agreements have been signed with all three universities.

At this time I would like to ask Mr. John Oliver to come forward and give us a short briefing on the results of the first ACE pilot committee meeting.

AUTOMATED COASTAL ENGINEERING (ACE) SYSTEM PILOT COMMITTEE MEETING UPDATE

Mr. John G. Oliver
Civil Engineer
US Army Engineer Division, North Pacific
Portland, Oregon

As COL Lee said, the Pilot Committee had the first meeting in October and elected officers. The Committee's objective is to provide, recommend, and promote computer-based tools to increase the Corps' coastal engineering capabilities. We wanted to get off to a fast start, so we took several actions at the initial meeting. After we decided what we wanted to do, the first action was to set up a Corps-wide coastal communications network. The network will cost about $30,000 a year and will be modeled after the DREDGENET. The target date for installation was Christmas of this year; and, of course, as usual the critical path is funding and approval.

The benefits of such a system are technology transfer, opportunity awareness, and education--all areas found to need improvement through our field survey.

Another action we took was to inventory existing software. We asked the districts, "What are you using to solve these kinds of problems at this time?" The inventory will be back to us early in December.

The third action we took was to integrate the Microcomputer Application for Coastal Engineering (MACE) programs into an ACE System. The purpose was to combine all those little programs known as MACE into a combined system.

Our next meeting is in January, and we intend to progress as fast as we have the money and the manpower to work on the ACE System.

DISCUSSION

MG HATCH: MG Hatch asked if the CERB had an opportunity to comment on the ACE Pilot Committee activities. He said it would be worthwhile to circulate an information paper and solicit comments. MG Hatch said ACE could be a major vehicle for technology transfer.

MR. OLIVER: Mr. Oliver said that the minutes (Appendix A) of the Pilot Committee meeting will be made available to the CERB members.

OVERVIEW OF THE COASTAL ENGINEERING RESEARCH AND DEVELOPMENT PROGRAM

Dr. James R. Houston
Chief, Coastal Engineering Research Center
US Army Engineer Waterways Experiment Station
Vicksburg, Mississippi

I will discuss the Coastal Engineering Research and Development Program which is the R&D program at CERC funded by General Investigation (GI) funds. The program consists of 25 to 30 work units.

A year ago at this time, Mr. Charles Calhoun, Jr., made this presentation and discussed funding in this program for the period of time that the Directorate of Research and Development had detailed figures, essentially for this decade. His data reveals the actual funding and includes the effects of inflation.

The Coastal Engineering R&D Program has clearly been in a long-term decline. In 1972 the actual dollar funding was almost the same as in 1986. Taking into account the effects of inflation (that is, going back to 1986 dollars), the funding level of this program in 1972 was about $11.8 million when expressed in 1986 dollars. The funding in 1986 was $5.2 million. In addition, our Field Research Facility requires about a million dollars a year for amortized payback costs and operating expenses. We have a technology transfer work unit which costs about a half million dollars a year. Therefore, the comparison of dollars going for research is $11.8 million in 1972 versus $3.7 million in 1986.

We thought until Friday that the GI R&D budget, in addition to the coastal budget as a component of that budget, was going to get a reasonable increase in 1987. I would like to expand upon this because there has been a lot of hard work done this year to attempt to achieve an increase.

The Directorate of R&D worked very diligently this year along with the Civil Works R&D committee of the Corps. The civilian CERB members may not realize that the Corps of Engineers' budget has been in long-term decline. Under these conditions it is obviously somewhat difficult to justify one component of the budget having an increase. This past year the Directorate of R&D, working with the R&D Review Committee, convinced the Corps, the Office of Management and Budget, and the House that an increase was needed in GI funding. Unfortunately, the Senate had a different funding level, and we

learned Friday that the Senate funding level had prevailed. We are not sure at this point what the funding level of the Coastal Engineering R&D Program will be. My understanding is the cut in GI funding will probably be about 6 or 7 percent.

The funding cut I am discussing is only for the Coastal Engineering R&D Program and not the total CERC budget. It is informative to consider the mix of funding at CERC and how it has changed with time. When CERC moved from Ft. Belvoir to WES, it combined with a division that was in the Hydraulics Laboratory, the Wave Dynamics Division, which did most of the reimbursable coastal engineering work. CERC at Ft. Belvoir did most of the R&D work.

In 1972 the Wave Dynamics Division was very small, and I am estimating that probably 90 percent of the budget at CERC came from the Coastal Engineering R&D Program and about 10 percent was reimbursable. As late as 1981, approximately 60 percent of the CERC budget came from the Coastal Engineering R&D Program, and it will probably provide about 30 percent of CERC's 1987 budget.

CERC has other R&D programs. One is the Repair, Evaluation, Maintenance and Rehabilitation (REMR) Program which is an R&D program dealing with the problems of repair and rehabilitation of coastal projects. CERC manages a Field Data Collection Program (FDCP) and the Monitoring Completed Coastal Projects (MCCP) Program in which our district offices participate fairly heavily. Mission support is a category which includes basic reimbursable work that CERC does primarily for district offices and OCE. Although virtually all of the mission support work is in the Corps, we have a small amount of funding for military work with the Defense Nuclear Agency, the US Navy, and some Army activities.

Before moving to WES at the end of FY 83, CERC at Ft. Belvoir had a declining budget because of the drop in GI R&D funding which, I think contributed to the move to WES. Since the move to WES, although the GI R&D budget has continued to decline, the total budget has actually increased for a variety of reasons. One reason is that when CERC joined WES it joined a consortium of other laboratories, and there is a lot of synergism that develops under these circumstances. Currently CERC has joint projects with all other laboratories at WES. In addition, WES has a long history of service to districts. CERC at Ft. Belvoir did little reimbursable work for districts,

concentrating instead on R&D. The reimbursable work in coastal engineering was done at WES in the Wave Dynamics Division that later combined with CERC. When CERC combined with WES it gained the reputation of WES for service to districts. Finally, the REMR program started around the same time as the move, and it has contributed to some of the rise seen in the budget.

The question has been raised concerning the way CERC has managed to handle an expanding total program with manpower cutbacks at WES. The answer is contracting. One of the mechanisms CERC is using for contracting is the Intergovernmental Personnel Act (IPA). This legislation allows university professors to work part- to full-time for Government organizations such as CERC. These personnel are not counted as manpower. WES contracts with the university. Over the last year, we have added 20 professors to our IPA program.

CERC has a contract student program also that has been growing. COL Grum mentioned a year ago that WES had to eliminate its student co-op program because of manpower cuts. As a result of manpower limitations, we have gone to a system of contracting with students directly.

In the last CERB meeting, COL Grum described the broad agency announcement contract approach which allows WES to publicize areas in which it is interested in having research performed. The announcement gives everyone the opportunity to send in unsolicited proposals. WES evaluates these proposals based on scientific merit and benefit to WES (in terms of accomplishing its particular missions). Selections are then made which require no further competitive process. This approach has allowed WES to contract much more rapidly.

Since the program started, CERC has awarded 15 broad agency announcements representing a dollar figure of about $700,000.

DISCUSSION

MG ROBERTSON: MG Robertson asked how the process of using contract students versus co-op students works and whether this process is used Corpswide.

COL LEE: COL Lee answered that there is a provision in the Federal Acquisition Regulation (FAR) that states only research and development activities within the Department of Defense are authorized to contract the services of a student.

DR. LÉ MEHAUTÉ: Dr. LéMehauté expressed concern that CERC has been able to attract mission-oriented contracts because of the capabilities developed through the R&D Program. He stated, "A declining R&D Program depletes this reservoir of capability and may lead to less mission-oriented work because CERC will be unable to keep pace with changes in the state of the art."

MR. PFEIFFER: Mr. Pfeiffer said that CERC is a microcosm of what is happening throughout Civil Works R&D. He said, "The downward trend in R&D is going to bankrupt us over time."

CHIEF OF ENGINEERS INITIATIVES

MG George R. Robertson
Commander
US Army Engineer Division, North Pacific
Portland, Oregon

We have talked a little bit this morning about some of the intensified directions we have been taking, particularly in the education, manpower, and financing areas. A lot of this activity is a direct result of a charge given to this Board by the Chief of Engineers a year ago at Sausalito, California. He gave us various challenges from which we developed a number of initiatives. Since we have a few new members, I think it's worthwhile to review the challenges before we get into detailed reports on the status of some of the actions we've been taking.

LTG E. R. Heiberg III, the ex-President of the Board, takes a deep interest in the work of CERC and the CERB. If you glance through some of the words taken from his talk in which he issued challenges to the Board last November, you will see some of the topics that have already been talked about, particularly, growing our own professionals and looking for the areas of big payoff.

I will give you a sequence of events resulting from those charges. BG Patrick J. Kelly, then President, convened a special meeting of the Board the day following the Chief's address to discuss how we were going to tackle those challenges and who would get to do the legwork. In January of the following year, BG Kelly called another special meeting of the Board members and a few representatives from CERC, the Water Resources Services Center (WRSC), and the Office, Chief of Engineers (OCE). We formed two different task forces and categorized the various challenges.

On the dredging issue, Mr. William Murden pulled the dredging folks together to get that started. I'm delighted to see that we have a program manager already on board. Basically we dredge the same way we've been dredging for a hundred years. We haven't made any real big breakthroughs. Some Europeans are out in front of us, but there's no reason why we can't supplement their efforts and come up with breakthroughs in the way we go about our dredging business.

On the 3rd of July, BG Kelly sent a memo to the Chief, zeroing in on some of the initiatives. In the memo to the Chief, we started out with about nine initiatives. BG Kelly recommended we concentrate our efforts in four areas: education and training, the dredging program, wave data collection, and private sector initiatives. These topics will be discussed today.

EDUCATION AND TRAINING AND CAREER ADVANCEMENT

Mr. Charles C. Calhoun, Jr.
Assistant Chief, Coastal Engineering Research Center
US Army Engineer Waterways Experiment Station
Vicksburg, Mississippi

I will report today on one of the working groups BG Kelly formed at the Alaska meeting. Members of the group were Mr. Herb Kennon, NPD; Messrs. Jesse Pfeiffer, John Housley, and Jay Lockhart, OCE; and me. In addition, I want to thank Mr. John Oliver, NPD, and Messrs. Tom Richardson and Orson Smith, CERC, who gave us support.

The topics we were asked to look at were the Corps organizational structure, career development, and education and training. The first problem we had was to define what coastal engineering is, and we defined it as "the engineering or scientific efforts related to public works development in the coastal environment." Our next problem was to define who performed coastal engineering. We call them "coastal specialists" rather than coastal engineers. The definition we arrived at for a coastal specialist was "a professional who is a specialist in technical aspects of coastal problems or coastal works." This definition includes those professionals who develop the dredging projects.

After the CERB meeting in Alaska BG Kelly sent a letter to all of the field offices requesting information on manpower and work load. Later, six regional workshops were held across the US to discuss the topics and the ACE System. Meetings were held in Baltimore, Detroit, New Orleans, Jacksonville, Los Angeles, and Portland where the final meeting was held. Over a hundred people attended, ranging from top managers and supervisors to the "working bees." At the conclusion of the meeting in Portland, all the members of the working group met and formulated the initial information that is in a memorandum (Appendix B) submitted to BG Kelly. This memorandum gives a good indication of what the field is saying, and some of it is rather surprising. What BG Kelly really asked in his charge to us was, "What is the overall health of coastal engineering and what can be done to improve it?" As far as work load is concerned, Table 1 (Appendix B) shows the number of studies that involved coastal problems, and Table 2 (Appendix B) shows the number of studies involving coastal structures. You can see from the tables that there

has been and is projected to be growth. We are probably more healthy than we thought when our working group started out. The data were developed before passage of HR 6 and consequently do not reflect impacts from that legislation.

There is some interesting information on "coastal specialists" in Table 3 (Appendix B). We have approximately 337 coastal specialists in the field. This number does not include those at CERC or OCE but only in the districts and divisions. It is interesting to note where the specialists are located within the districts and divisions. Planning has had quite an increase since 1976.

We found from the six regional meetings that the coastal specialist is invisible within the structure of the Corps of Engineers. Some districts have coastal branches, but there are many coastal specialists located throughout the Corps' structure. Rarely is there a coastal engineering branch. Even at the Chief's office level, there is only one branch that has the word "coastal" in it. We have a minimum of 337 people out there, and many of them do not feel they have a home.

There were strong opinions expressed at the meeting concerning the need to centralize specialists, who will carry projects from start to finish, in a group within the district. It was noted at the meetings that professional development would be imposed by having the coastal experts centralized at the district level in their own organizations.

The strongest reaction we got at the meetings was against regional centralization of the coastal experts. This has been done in two divisions where basically the coastal engineering function is centralized in one district. There was unanimous agreement at the meetings that this was absolutely the last option to consider. One reason cited was that coastal engineering requires an in-depth knowledge of the site and specific features of the particular area which you cannot get if you are located hundreds of miles away. Another reason not to have regional centralization was to avoid confusion on the part of the general public. One district office might handle permits, while another could handle construction.

The Chief indicated we must grow our own professionals, and I think we are growing them fairly well. However, when they reach maturity, they're gone. The major problem is lack of promotion potential. There is not one GS-13 technical coastal specialist in a district office. There are some in

divisions, but there are absolutely no GS-13 (or above) coastal specialists in any district, which limits desire to stay on the technical side of the house. There are problems also in a lot of the districts just to get to a GS-12 for these coastal specialists. We have an extremely serious problem here. We lose these people to consulting companies, other Federal agencies, or they simply leave the field and turn to a different aspect of civil engineering.

We recommend that each district have at least one individual who is the senior technical person, i.e., the mentor or "guru," of coastal engineering within that district. At WES we have technical specialists up to GS-15. Requirements to move up the ladder are clearly defined. A board is convened to scrutinize the credentials of each individual being considered for promotion above GS-12. Before any action can be taken to promote the individual, this board must be satisfied that the individual is qualified. We have our own guidelines as to what this board considers. Guidelines would have to be developed at the district.

The Personnel Office at OCE indicated there is absolutely nothing to prevent promotions in the district to GS-13 if the individuals are doing the work. We have looked at the standards, and it seems like the coastal engineering profession fits in an area where our better people can be promoted higher than a GS-12 without having to go to the supervisory level.

The next item is education and training. There was no consensus relative to the training an individual needs to be labeled as a coastal specialist. The development of a Planning Associates type of course received a lot of support. The Vicksburg Graduate Institute presents an ideal situation in which we can develop a very good program and "grow our own," as the Chief said.

On-the-job training is another avenue for growing our own but must be guided by a mentor, an individual who has the academic background and the experience to bring these people along.

Another point mentioned was that dredging must be a part of the education and training system and is probably the least understood by conventional coastal engineers. The dredging process should be a part of the training for anyone who is considered a coastal specialist.

Specific recommendations from our working group are as follows:

(1) Maintain the expertise at the district level (the smallest geographical area where a specialist can have a good feel for what is actually going on).

(2) Try to centralize at the district level.

(3) Have a coastal branch that has the word "coastal" in it and gives identity to people who are working in the particular area.

(4) Develop an improved education and training program for coastal specialists.

(5) Make sure specialists are aware of existing opportunities (Many specialists were not familiar with individual development plans.).

(6) Encourage professional activities.

(7) Most importantly, improve promotion potential or develop a system for promoting to GS-13 and above.

DISCUSSION

DR. NUMMEDAL: Dr. Nummedal said the recommendations about promoting technical people up an independent career ladder is the kind of development a number of companies have been going through in the last few years.

Companies like Shell, Exxon, and Arco had the problem that the Corps has; namely, the technical people stayed in the job for a few years and then were siphoned off either to independent companies or into management. He said those particular companies established a career ladder promoting people on the same time scale they would promote managerial people and found it to be extremely successful in retaining people and developing the kind of expertise needed to plan for the future. He feels it is undoubtedly the right way to go.

Dr. Nummedal went on to say that in reading Corps reports he feels that the quality of those reports would be greatly improved if the author of the report were identified. He said there are too many anonymous reports coming out of the Corps. He has tried a number of times to call district offices and get more information on a particular report but has had difficulty trying to find out who actually wrote it. In many cases you may not even be able to find out who was actually responsible for any one given statement. He feels strongly that when Corps reports come out the author should be identified; then the level of responsibility that these authors feel will increase, and quality will increase.

The next logical step he said is that supervisors should encourage their people to publish and participate in coastal engineering and related meetings. He suggested that promotion be tied to documented publications or reports.

MG HATCH: MG Hatch agreed with Dr. Nummedal. He said, "We frequently bury the authority in anonymity. Sometimes it's a good idea because higher levels in our organization so drastically alter what started out as a very good piece, and the author would just as soon not be associated with it." He went on to say that if the Corps could structure its work so that the basic work and study (before all of the critiquing endorsements are added to it) could bear the author's name, it would stimulate pride in the work and yield a better quality product.

MR. MCCORMICK: Mr. McCormick said that the notion of the dual ladder was brought up about 3 or 4 years ago at a blue ribbon panel led by Mr. Lloyd A. Duscha. The panel included not only coastal specialists but also technical specialists in other disciplines capped generally at the GS-12 level as well as some at the GS-11 level. One of the recommendations of that panel to the Chief was that the Corps pursue the dual track. Mr. McCormick said the idea "just sort of died," but he was delighted to hear it resurface. He said there is tremendous support on the technical side for it. He feels that if this Board would bring up the idea again it would be very helpful.

He went on to say he supports the idea of decentralization of the coastal work as long as the work load is there.

MR. WANKET: On the subject of centralization, Mr. Wanket urged the Board to evaluate the cons as well as the pros.

He said there is virtually no discipline that the Corps of Engineers has that is not susceptible to centralization of some sort, but there are definite disadvantages to it. He went on to say that none of the Corps projects proceed without an interdisciplinary requirement among various elements or groups. He continued, "And as we centralize a particular discipline, we create a tendency to avoid the communication that has to occur in a multidisciplinary process."

MR. MCCORMICK: Mr. McCormick said that the Corps has centers now that are working effectively (for example, the Hydroelectric Design Center in NPD), as complete multidisciplinary entities. A complete design package is done under one roof by that group and then handed off to the constructing districts, and that leads to better integration of those disciplines than you would have if you just separated out coastal work.

MR. WANKET: Mr. Wanket brought up the engineering regional centers notion. He said, "I noted the rejection of the working group on the concept of regional coastal centers. We have, in fact, set up a regional center in SPD. Our Los Angeles District (SPL) handles all coastal engineering matters relating to the coast of California."

He said that BG Kelly, in his first periodic letter, told LTG Heiberg that the regional concept--the coastal design center concept--was an outstanding success in SPD. Mr. Wanket said that the Board "ought to factor that in your recommendations concerning regional considerations before you flat-out reject it."

MR. KENNON: Mr. Kennon said that is a difficult issue to deal with in terms of functional responsibilities. He said that in offices where the group did the planning, initial investigation, design, operation, and maintenance of the projects the people felt they had a better perspective, a better progression

in their careers, and were willing to serve longer in their jobs because they were able to move with the job.

DR. MEI: Dr. Mei asked if it is a worthwhile idea to have centers at both levels rather than at the district level alone or at the regional level in order to coordinate the work of various districts.

MG HATCH: MG Hatch answered that efficiency would suggest that the Corps probably couldn't afford that. On the other hand, he said, if there are important technical aspects of the work of the districts in the coastal engineering arena, there needs to be some comparable capability for the review of that effort at the next higher level.

MR. MCCORMICK: Mr. McCormick agreed and said that the Corps should maintain district and division level expertise. The Corps has that now and should maintain it. He said, "I think the thrust here, though, is to put most of our eggs at district level where the work is."

MG HATCH: MG Hatch said, "I think it's essential for the Board not to come out particularly strongly in directing centralization or decentralization at any level."

MG ROBERTSON: MG Robertson suggested that it might be appropriate to establish in a district a technical advisory ad hoc committee to the District engineer to advise on career development, education, and training. He questioned, "If there is a technical track for GS-13, which division is going to get it--planning, engineering, or co-ops? And who's going to decide?" He said he did not know how to do it and hoped the committee that BG Kelly appointed has some ideas.

MR. KENNON: Mr. Kennon said that within all the constraints already discussed, there isn't a way to organize the Corps uniquely. He feels that a general statement of philosophy by the CERB which would emphasize the synergism of pulling coastal engineering specialists together in some fashion could be put in that letter. He said the committee would draft a letter for the Board's consideration.

MG HATCH: At this point in the meeting MG Hatch directed the Board's secretary, COL Lee, to translate the various committee reports and ensuing discussions into a document suitable for the review of the Board in draft form and then perhaps signing by the chariman. This document would then be forwarded to the Chief, with the Board's recommendations included. He said, "Craft the correspondence from the Board to the Chief in a fashion that lends itself to fairly simple, straightforward, clear, and concise review by him, and perhaps... recommending specific actions to be taken by members of the staff at Headquarters, for example, in the personnel arena. This Board should feel perfectly free to make whatever recommendations it wants to the Chief to include, for the benefit of the Chief of Staff, some recommended specific actions and someone to take them."

MG Hatch then continued the discussion on education and training, specifically career development. He said the dual track notion would stimulate and inspire engineers to stay in the field. He added, "I would be certainly amenable, as the President, with the concurrence of the Board, to taking off

on the dual track notion, perhaps citing the Bonneville experience, or perhaps even drawing on what the blue ribbon panel looked at before and attempting to rekindle in our headquarters a look at the dual track notion."

MR. WANKET: Mr. Wanket said he supports a dual tracking section, but he asked that the concept be extended to all technical disciplines, not just to coastal engineering.

MG. HATCH: MG Hatch directed the Secretary to write a letter with the notion that the dual track should be expanded beyond the area of coastal engineering.

MG Hatch went on to say, "And I might add a little philosophical footnote to that. I think if we fail to take advantage of that managerial technique, so prevalent in private industry and already exercised by at least one Federal bureaucracy, we fail to fully expand on the synergism of the military/civilian team; whereas the former is essentially limited from doing that. But we shouldn't limit the civilian side by doing the same thing, and that is insisting that there is essentially only one track which we now have. So, let's not allow that bias to influence the manner in which we manage our civil service."

MG Hatch suggested that the Board recommend to the Chief the establishment of a group to develop a technical career ladder for coastal engineers with representatives from OCE, CERC, the field, and definitely somebody from OCE's Personnel Office.

MG Hatch then asked for comments regarding the SKAP (Coastal Engineering is not included on the SKAP form.).

MR. MCCORMICK: Mr. McCormick felt that a good forum to bring this issue of the SKAP to the surface would be in the Chief's planning board meeting for the engineer/scientist career planning board. He felt that the best way that could be done would be to add it to the SKAP form as an identifiable career field.

MG HATCH: MG Hatch asked, with regard to the education and training issue, if the Board is supportive of a Planning Associates notion for coastal engineering.

DR. MEI: Dr. Mei said he supports the plan for the Vicksburg Graduate Institute. He went on to say it's very likely that as the years go on the Vicksburg Graduate Institute is going to have its own emphasis on the coastal engineering endeavor, but at the same time there will have been several coastal engineering programs in existence at various universities in the US. He feels it is important to make full use of existing programs and, perhaps, as a part of the planning associate program, to encourage the Corps of Engineers to take sabbaticals at these various places so that they get a different kind of education. Dr. Mei asked whether there were any statistics on the number of engineers on long-term training.

COL LEE: COL Lee answered that there were five at WES in the 1985-1986 academic year. No one had statistics for the Corps as a whole.

MG HATCH: MG Hatch directed these statistics be obtained. The OCE Personnel Office could possibly provide the information.

DR. NUMMEDAL: Dr. Nummedal emphasized another type of in-house training program, the purpose of which would be to bring up young coastal engineers from around the districts to work at the Field Research Facility with the scientists and engineers from CERC in the field, both to get to know them personally and to get to know the state of the art of that aspect of coastal engineering.

MG HATCH: The next item that MG Hatch brought up was the mentor, or senior coastal engineer, notion at every district and division. Everybody agreed that it is a reasonable notion to try to implement. The next item discussed was the Individual Development Plan (IDP) for Corps employees. MG Hatch was surprised that some of the engineers didn't know about IPD's. He said that is a reflection on the leadership at all levels. The Board endorsed the notion of educating the coastal engineers through the IDP plan. MG Hatch then suggested that at a subsequent meeting the Board might want to take a look at the education that is being provided to these engineers.

DREDGING RESEARCH PROGRAM DEVELOPMENT

Mr. William R. Murden
Chief, Dredging Division
Water Resources Support Center
US Army Corps of Engineers

Mr. President, members of the Board, ladies and gentlemen, it is a pleasure to participate in this meeting and to present the status of the proposed dredging research program which I generally outlined for you during your last meeting in May. In the interim a number of Corps organizational elements and personnel have collaborated in giving basic form and substance to the program. Also, the suggestions and the comments of the Board members were extremely helpful in formulating the specifics of the program. Our proposal has met with favorable reviews by the Office of the Assistant Secretary of the Army for Civil Works and is currently under futher administration review by the Office of Management and Budget. At this point, we have great expectations that the program will be included in the President's budget for FY 88.

There has been little applied research in the general area of dredging in the US in the recent past. Therefore, it is extremely fertile ground for a research program directed at producing significant cost savings. As you will recall, LTG Heiberg, in giving his charge for new initiatives at the 44th meeting, stated his views as follows: "Dredging is here to stay, and maybe there is a payoff there."

It is around that basic charge and the imperatives of fiscal responsibility that we have formulated the components of the Dredging Research Program. In short, the singular objective of the program is to reduce the cost of dredging to a minimum, consistent with the Corps' mission performance requirements and environmental responsibilities. This objective can be accomplished through a number of actions. These include: increasing efficiencies of procedures, operations, and equipment; reducing the number of change orders through improved initial definition of operational requirements; reducing the economic impact of contract claims; and sharing the program successes throughout the Corps and elsewhere.

A workshop held in New Orleans in 1984 set the stage for development of the program. A number of other coordination activities followed, including

workshops, meetings, and other forms of communication leading to the assemblage and prioritization of topics for inclusion within the program. Important in this synthesis of research topics was the fact that program needs and objectives were identified by the Corps' divisions and districts, that is, the users of the products which will be generated through the R&D program.

The development of the research program was a combined effort by OCE, WRSC, CERC, the Engineering Topographic Laboratory (ETL), and others. Since the problems attending dredging management and operations are broad in scope and fall within various engineering/scientific domains, a multidisciplinary approach was required. The program includes five broad functional categories of research as follows:

(1) Material. This category will deal with the properties and behavior of the material involved in and affecting dredging operations.

(2) Mechanics. In this area, attention will be focused on types of equipment and systems that can be utilized to perform dredging operations more efficiently.

(3) Monitoring. In this general area we will be looking at a wide variety of measuring, recording, and reporting equipment and systems needed to conduct dredging operations as intended and to optimally manage such operations.

(4) Management. Within this functional area, improved management methods will be developed and adopted for application to the Corps' dredging mission.

(5) Technology transfer. This part of the proposed dredging program constitutes the bottom line, that is, how to convey the products of the research effort to the users in a timely manner and in a readily usable form.

Under the material category there are six topical areas as follows: First, depth and density measurements in fine-grained materials pertains to determining when it is necessary to maintain channels where siltation is characterized by low density or fluid mud layers. We know that vessels can safely navigate through such materials up to a certain level of density beyond which navigation is significantly impeded or becomes hazardous. Work in this area will involve developing instrument packages and procedures for use in detecting the three-dimensional distribution of fluid mud materials and, next, to measure and record the varying densities of the material deposits.

Definition of navigable depths is the second area and consists of three phases. First, we want to quantify the potential savings that would accrue from a reduction in the present frequency of dredging fluid mud. Included in this first phase would be a documentation of the area and the vertical extent of the fluid mud deposits encountered in our waterways and harbor. In the second phase of the effort, field and laboratory tests would be performed to quantify the physical chacteristics of various types of fluid mud. Physical properties such as viscosity and shear stresses will be related to changes in density. The third phase will focus on establishing the upper limit of navigability of ships vis-a-vis the properties of the fluid mud. This process would include flume or towing tank tests with model vessels and probably some limited full-scale vessel field tests for enhancement and verification of the laboratory results.

Shear stress is the third item. Fundamental to the cause and effect relationships associated with sediment transport and, hence, siltation and the necessity for dredging, is the magnitude of the flow shear stress and, in particular, the bottom shear stress. The basic physics of these parameters is poorly understood. And there is no substantive guidance or procedure for its calculation. Research in this area will include two work units. The first involves theoretical and mathematical investigations to develop the best methodology for calculating shear stresses. The second work unit would involve developing methods and instrumentation and conducting field measurements of shear stress under a wide spectrum of environmental conditions.

The fourth topical area in the material category is the fate and stability of dredged materials. Standard procedures have not been developed or applied for numerical models in analyzing the fate and stability of dredged material placed in open-water sites or in monitoring of such areas. This research would be aimed at establishing standard analytical and field monitoring procedures. The first and second work units would be concerned with material placement in offshore and estuarial environments, respectively, and would involve the application of an ensemble of numerical models in developing a standard application framework for simulating the hydrodynamic and sediment interactions. The third work unit would be directed at improving and standardizing techniques and equipment associated with the monitoring of open water sites which are used for the placement of dredged material.

Standard descriptors is the fifth area. There is no unified classification system which can provide the engineer with material parameter descriptions directly useful in rating the relative ease or difficulty of dredging the various materials by the different methods and equipment. To address this deficiency, we will be looking at the characteristics of cohesive and noncohesive soils on the one hand and then hard or rock materials on the other. The research effort involving field and laboratory activities will result in a material classification system capable of describing the influence of in situ material properties on the excavation, transport, and placement of dredged materials.

The final category under materials is the capping of contaminated dredged materials. This research area would focus on the need to assure that the cap used to cover contaminated dredged material placed in open-water sites would be stable under short- and long-term exposure to various environmental conditions. Research under this task would combine integrated field tests and physical and numerical model investigations to establish a standardized methodology for the design and placement of stable caps under varying physical, chemical, and biological conditions.

The next broad functional research category is mechanics. This functional area would be comprised of four topical areas of research to include, first, use of high-density polyethylene pipe on board Corps of Engineers' dredges. High-density polyethylene pipe is highly resistant to abrasion and has only one-eighth the weight of mild steel pipe. Therefore, the use of this type of piping system on board Corps hopper dredges would significantly lower the center of gravity of the vessels, thereby increasing or improving vessel stability characteristics and their operation time in heavy seas. Moreover, reductions in weight would allow us to carry more material or payload in the hoppers.

However, a problem in utilizing plastic piping systems on board hopper dredges is that large molded pipe elbow fittings are costly to produce. The first step would be to determine the magnitude of potential savings to be derived from this type of system on dredges. If potential cost savings were sufficiently large, the dialogue would be initiated with appropriate manufacturing firms to explore the capabilities of the industry to economically produce complete plastic pipe systems as components for dredging

plants. If this should not prove to be feasible, we could also look at coupling steel elbows to the plastic piping system.

The second topical area under mechanics is localized shoaling. Navigation from waterways and within harbors is often impeded by localized shoals which are not amenable to elimination by means of project-designed channels or channel realignment. Also, localized shoals are costly to remove by conventional dredging plant because the volume of material in each of the shoals is usually quite small, and the shoals are usually scattered over long distances. Two research units are included in this topical area. The first unit would be directed at developing methods for handling localized shoaling, including such methods as vessels modified to scour shoals by a downward deflection of their prop wash, the use of drags, skimmers, bars, or rakes, or water and air jets and possible combination of these methods. In the second work unit, we would look at the existing types of passive methods for localized shoal control, mainly training structures, deflection dikes, and jetties.

The third topical area under mechanics is dragheads. The efficiency of hopper dredging is highly dependent on the design characteristics of various dragheads used to excavate specific types of material such as mud, hard-packed sands, loose sands, and coral. You have heard the term, I'm sure, "where the rubber meets the road." The draghead is where the steel meets the bottom because this is the element that shears the material from the waterway. Unfortunately much of the information concerning draghead designs and related efficiencies is of a proprietary nature. Improvement in the efficiency of draghead designs would involve field and laboratory investigations to evaluate the performance of existing draghead units in Corps inventory, the establishment of the design variables controlling draghead performance, selection of units for improvement, and fabrication and testing of improved draghead designs.

The last topical area under mechanics is eductor design. The Corps has pioneered in the use of eductors, or jet pumps, in sand bypassing systems. In current practice, we are using less than optimum adaptations of eductors designed basically for other applications simply because these have been the only units that were available. The first phase will be directed at producing an efficient system in terms of the eductor unit, the deployment and recovery

system, and the means of minimizing cavitation effects and debris clogging. The second phase would involve field testing and demonstrations.

The third functional area is monitoring, which would consist of five basic topics or areas. The first is vertical positioning and sea state. This topic has two work units. The first deals with being capable of accurately determining the datum elevation of dredging plant and survey vessels operating in expansive open waters. Vertical datum control with these conditions is a major problem and one that can result in unnecessary expenditures through overdredging or contract claims. The first unit would focus on developing a real-time system for measuring, reporting, and recording on-site tide and wave conditions in open waters. The second work unit would be directed at quantifying sea conditions and attendant vertical motions of dredge plant and survey vessels in open waters in the interest of increasing operational time and reducing unsupported contract claims for downtime. The capabilities in inertial positioning equipment would be combined with a satellite-based global positioning system to develop an operation system that will accurately reflect the vertical motions of dredges and survey vessels.

The second area under monitoring is production meters. The Corps takes little advantage of existing dredge-production meter technology, notwithstanding a considerable use of such instruments by many foreign dredging fleets. Our reluctance to apply production meters basically stems from a lack of confidence in the accuracies of such equipment and the difficulties we have experienced in obtaining timely and effective maintenance of the equipment. Research in this area would be conducted to quantify and qualify results obtained from the use of various types of production meters.

The third area under monitoring is the hopper load. The volumetric quantity of dredged material in the bins of hopper dredges or dump scows is presently estimated using the vessel displacement method. This method poses problems when fine-grained sediments are being dredged and the bin slurries and their overflows have high concentrations of suspended sediments. Equipment and procedures are needed to derive an accurate calculation of the total quantity of material dredged, the amount retained in the hoppers, and the amount lost back to the dredge site environment during the overflow processes. Nuclear density probes, draft indicators, and microprocessors to monitor and measure hopper loads would be evaluated under this work unit.

The fourth area under monitoring is the silent inspector. The manned inspection of contract dredging operations by the Corps is becoming increasingly difficult because manpower restrictions, escalating contract workload and personnel turnover. Therefore, we have a strong interest in the means of inspection and quality control which will rely essentially on electronic instrumentation and devices.

Finally, under monitoring we have horizontal positioning. Most onboard horizontal positioning systems require daily labor-intensive calibration. Additionally, all systems currently in use require the installation of shore stations at control survey sites. These shore stations must also be maintained on a daily basis. With the recent development of the navigation satellite timing and ranging global positioning system, there is a potential for a much more efficient means of determining the horizontal position of dredging, dump barges, and survey vessels. With this type of system, it would be possible to position a vessel with only one shore station without the need for line-of-site access or an on-site calibration point. Additionally, a single permanent shore station could be as much as 50 to 100 nautical miles from the vessel position, thus allowing the station to do multiple operations being performed in the same general geographic region.

We now reach the fourth broad category of research, management. This category, which was ranked very high by the field operating offices, consists of three broad topical areas. First is comprehensive management of dredging operations which would be accomplished through a basic operational research work unit involving the overall dredging management processes and related elements. Additional work units would be identified and prioritized on the basis of field input and on problem areas identified through the operations research work unit.

The second category includes methods of forecasting maintenance dredging requirements. The present reliance on historical shoaling rates to forecast dredging needs is inadequate when the historical records are short, when projects are altered, or when new work is being considered. The first and second work units were developed for forecasting models for ocean entrance conditions and for riverine and estuarial conditions. The third work unit would involve field verification of the forecasting models.

The third topic under the management category is open-water placement site capacity and management. Cost-efficient selection and use of such sites require the capability of properly selecting a site, the methods for establishing the three-dimensional shape of the site, and the capability to specify placement procedures to produce the desired shape and the consolidation that would maximize site capacity. The research direction in this area would build upon past experience by first examining those sites that are considered to be the most successful that exist today. Numerical and physical modeling of these sites would focus our attention on greater capacities which could be achieved by alterations in the existing geometrics and, if such, alterations would result in stable mounds in the placement area.

The fifth and final broad category of research is technology transfer. Effective technology transfer ensures the timely transmittal and readily usable forms of research units for users throughout the Corps. Therefore, this would be a prime component of the program. Our plans call for an extension of the ongoing and effective technology transfer activities within the dredging operations technology support program being managed here at WES. These activities include a newsletter, technical notes, reports, the automated dredging and placement alternative management system, videos, workshops, courses, and meetings. The information developed in the program would be made available rapidly through the most applicable of these various means.

This completes my summary of the Dredging Research Program. We hope that the program will be initiated in FY 88. In the interim, we will continue coordinating and fine tuning the program elements and objectives. Once implemented, the research topics and work units will be modified based on findings and recommendations arising from the program reviews.

The Corps laboratories will manage the R&D program and perform some of the work within their manpower and talent constraints. We will also utilize the services of private firms, universities, field offices, and other Corps specialty organizations such as the marine design center. Technical monitors will assemble final needs, priorities, and work areas and oversee the program's technical progress and sufficiency.

In addition to reviews and suggestions from the CERB, the program will have a field review group. This group will play an increasingly direct role

as the work progresses toward the demonstration and implementation stages. Also, a separate advisory group of dredging industry representatives will be formed. Such a group was utilized during the course of the dredging material research program and provided an important perspective on R&D needs and direction as well as a direct link to the industry when information was sought. The day-to-day direction of the program will be the responsibility of Mr. Lim Vallianos.

Lastly, I will make a few comments on program life span and funding. The dredging research program proposal is formulated to span a 6-year period and to be financed through the operation and maintenance appropriation. It is not appropriate to disclose the funds required at this point because the program is still under consideration by the President's staff and within the President's budget. I am delighted that we are about to embark on what I am sure will be an exciting, interesting, and productive program.

One of the great things that has evolved during my attendance at the recent Board meetings is the recognition by the members that coastal engineering and dredging technology are closely interrelated, and I appreciate the CERB members' contribution in this area. Please note that I did not use words like "spoil" or even "disposal" in this presentation.

I attended an interagency workshop titled "The Beneficial Uses of Dredged Material" earlier this month in Pensacola, Florida. It was a very successful workshop because almost all of the presentations were positive. I do not believe that anyone in the Corps used the word "spoil" at the workshop, but I heard the word over and over from speakers from other agencies. It is most important that we think and talk in positive terms when we refer to dredged material. If we do not do so, we cannot blame the environmental agencies and the public for thinking in negative terms.

In closing, I would like to comment on a personal basis. During my long career with the Corps, and particularly its dredging activities, I cannot think of any one thing that I've considered more important or had more hope for than the implementation of an applied research program directed at the dredging program. Seeing my hopes come to fruition as well as having some part in the genesis of the program is truly one of the great events in my professional career. This would not be the case if I did not have the utmost confidence that the program will significantly contribute to the improvement of a field to which we have all given so much time and thought.

DISCUSSION

DR. HERBICH: Dr. Herbich said that the ports of Rotterdam and Europoort have adopted what is called a "nautical depth." And the navigation charts now refer to the depth where specific gravity at the bottom is 1.2. Ships plow through this depth without any problems. He went on to say that we have been practicing this over the years but have not adopted this concept. He added that the Marine Board Committee of which he was a part recommended the nautical depth as the depth of channels in silty materials.

DR. MEI: Dr. Mei suggested that it is useful to consider an advisory committee to guide the Dredging Research Program and that it should be composed of members from not only the dredging community but also industry, government, and universities. Dr. Mei then asked if it is possible to consider the Superfund as another source of funding for this kind of research.

MR. MURDEN: Mr. Murden said several advisory committees will be funded and that the Corps is working very closely with the Environmental Protection Agency (EPA) on Superfund.

DR. LE MÉHAUTÉ: Dr. Le MéHauté asked how this research is going to be organized and where the manpower is going to be.

MR. MURDEN: Mr. Murden answered that it still is general but that the direct management would be centralized at CERC. Mr. Lim Vallianos would be the direct project manager. Mr. Murden went on to say that some basic part of the program would be done with in-house personnel but would largely draw upon universities. Private firms will also conduct work.

WAVE DATA COLLECTION PROGRAM

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I should point out that this particular topic wasn't specifically identified by LTG Heiberg, in his address to the CERB in Sausalito, as being an area that we were to look at. Rather, it was identified later by the task working groups as being a potential area under the general heading of big payoffs.

The real impetus for making this presentation has come over a period of time from the CERB, and it was particularly emphasized at the last CERB meeting in Alaska. Several presentations on the Alaska Coastal Data Collection Program and the problems that have been encountered with support for that program from the State of Alaska compelled the CERB to send a letter to the governor of Alaska requesting that the State reinstitute its support and prompted BG Kelly to request that CERC look more deeply into innovative areas to improve our wave data collection and increase the scope of our wave data collection program.

When we say "wave data collection" in CERC, what we are talking about is something called "the Field Wave Gaging Program." That program is part of a larger program, the coastal FDCP. One mission of the program is acquiring long-term index wave data sets on all coasts of the United States, including the Great Lakes, Alaska, and Hawaii, to serve as the basis for design, operation, and maintenance of Corps projects.

The Field Wave Gaging Program has been in place for approximately 10 years. It has been funded at a substantial level for about 7 of those 10 years. But it has also been almost totally restricted to the Pacific Coast during that period of time. There simply has not been enough money to expand it beyond where it already exists.

The need to expand the Field Wave Gaging Program has been a topic of discussion at virtually every CERB meeting since I have been associated with CERC. I took the liberty of going back through the minutes of the last eight CERB meetings and summarizing the comments (Appendix C) from the CERB relating to the field data collection program. Most of those comments relate to field wave measurements.

There are a couple of comments that are worth noting. At the 41st meeting Dr. Le MéHauté very eloquently pointed out that nothing could replace actual wave measurement in the field. He did that in response to a presentation on some of the hindcasting work we have done which serves as a basis for a lot of design in the Corps of Engineers. He succinctly pointed out that nothing, even the best hindcasting that can be done at this stage, will be a replacement for actual field wave measurements.

Then at the Sausalito CERB meeting, Mr. Wanket from SPD pointed out that whatever we do in the future in terms of expanding the wave gaging programs cannot have a detrimental impact on the efforts that are already under way. I think one of the key terms in the Engineer Regulation (ER) that authorizes and directs the function of the Field Wave Gaging Program is the phrase "long-term." We need long-term data at specific sites to develop the design statistics that we use to project our 50-, 100- year, or whatever, recurrence interval phenomena. I think that particular trend of thought from the CERB is a very important factor in some of the initiatives that we have come up with, and I will present that to you today.

Another factor that I alluded to a minute ago is the funding situation. The program began in FY 79. There was a little bit of money in FY 77 and FY 78, but we really got serious about the FDCP in FY 79. And in terms of constant dollars, the funding increased slightly in FY 80 and FY 81 but then began a fairly precipitous decline to about FY 85.

I do not know for FY 87 yet what our final funding levels will be. It is fair to say we are not going to get an increase, and the most we can hope for is more or less level funding, which for the Field Wave Gaging Program means subsistence level funding. We cannot make any radical changes.

What immediately faces us in the near term, the 1- to 2-year time frame, and what may face us in a continuing fashion, are several constraints under which we are operating: first, the funding situation which is at a subsistence level, and, secondly, the need to continue with our exisiting efforts. I think those both have posed very significant constraints on the range of possibilities available to us.

And then a third is not so much a constraint as a caution; that is, one thing we have learned from the experience with the Alaska Coastal Data Collection Program is that even the most pressing needs are not necessarily

sufficient to ensure continuation of a local cost sharing. What it indicates to us is that we have to be very careful in developing new cost-sharing opportunities and that we have to establish a little bit of history with the cost-sharing sponsor for a period of time to get him used to the idea.

I do not mean to imply any criticism of the way the Alaska Coastal Data Collection Program has been handled; but certainly from the standpoint of what we can do in expanding the Field Wave Gaging Program to other coasts, I think we are going to have to be very careful in how we go about seeking cost-sharing partners and nurturing that relationship. That notion is supported by the success we have had with cost-sharing partners in California and in Florida. The State of California just recently doubled its contribution to the data collection efforts in that state. The State of Florida has had a wave gaging program, to which we contribute, going for approximately 10 years, but it still contributes the lion's share of that money.

I think it is very important to establish that history and commitment on the part of the cost-sharing sponsor. We certainly have proven to have it in the Corps of Engineers.

I think in the near term we do not want to promise or begin to spread ourselves too thinly in the area of cost sharing. We do not want to go to a lot of states on the East Coast or Gulf Coast and say, "Hey, we've got something here. We want to cost share with you; we want to develop this program here; we want to develop that program there." I think the second thing that constrains us from doing that in the near term is the funding situation. We simply do not have, at this point, the dollars to offer to those folks, to establish anything more than a beginning effort, that is, to begin to establish the goodwill and to determine who is serious about cost sharing and who is not.

That does not cut out all of our options in the near term, and I will discuss some of those in a minute. One option it leaves us, and one of which we should always take advantage is that we should be maximizing access that the Corps has both to our data sources and other data sources that Federal agencies or states may have. If somebody else is out there collecting wave data, then we ought to be doing everything we can under this program to make those data accessible to the Corps of Engineers. I think it also leaves the opportunity for us to begin exploring in a cautious fashion who some potential, reliable cost-sharing partners might be.

And that brings us to the midterm, the 2- to 5-year time frame, which is the important time frame for expanding the Wave Data Collection Program. In the midterm, we hope to effect some significant reductions in the cost of keeping a particular station monitored with a wave gage, and, particularly, in terms of directional wave gages. We are doing that through ongoing efforts in our R&D program.

I do not know how the change of the funding situation that Dr. Houston described earlier is going to affect that. I hope it will have a minimal effect, but we are proceeding under our R&D program to look at ways of lowering costs of keeping a gage in place for a period of time. The National Oceanic and Atmospheric Administration (NOAA) also has an R&D program under way to look at ways of lowering its costs for acquiring wave data. The 2- to 5-year time frame is about the time when those efforts should begin bearing fruit. In that midterm we will be able to acquire more data and occupy more stations at a lower total cost, although that advantage could be offset somewhat by increased cost in other areas. If we have a series of storm events that destroy a lot of our existing gages, then our existing funds will be more wisely used to reestablish those to keep the long-term continuity.

I should point out we do not expect those cost reductions to be revolutionary. We expect them to be evolutionary, incremental. I do not see cutting the cost of a wave gage by a factor of 10. I think we would be very pleased to reduce the cost of keeping the gage in by 25, 30, or maybe even 40 percent.

The second aspect of the midterm time frame is very important. If we begin exploring cooperative funding opportunities now, that is the time frame in which we should begin to have an assessment as to which of those really have the potential for paying off. So, we should be poised at that point to take advantage of those. Now, both of those lead, inevitably, to the conclusion that in the midterm time frame we must have increased funding in the FDCP to take advantage of these opportunities, both the ability to establish more gages at a lower cost on other coasts and to take advantage of what appear to be potentially viable cost-sharing opportunities while still maintaining the gaging that we have been doing for the past 10 years, because that is about the time frame that that gage will begin paying off in terms of long-term statistical predictions.

In the area of 5 years and beyond, what we do in that time frame is really going to depend to a large degree on what happened in the midterm time frame. If we have been successful in doing all three, lowering the costs of our gaging and establishing good long-term relationships with more cost-sharing partners and then plussing up our funding in an incremental fashion to accommodate those two, I think we will be in good shape to have a viable national wave gaging program. If we do not, I think we will be in a worse situation than we are in right now as far as meeting the requirements and the mission given to us under that ER are concerned.

With that introduction out of the way, I would like to talk about some specific initiatives that we are going to undertake in this next fiscal year. The first four of these fall under the initiative I mentioned that was really left open to us in the near term, that is, to try to optimize the use of data that are already being collected and that other people are collecting for us. The first one of these that we will undertake immediately is to provide access through the Coastal Engineering Information Management System (CEIMS) to the field wave gaging system headquartered at Scripps Institution of Oceanography.

Let me describe very briefly what CEIMS is. Several years ago, under the FDCP, CERC and the technical monitor for the program, Mr. John Lockhart, Jr., recognized that it really was not going to do us a lot of good in the long run to collect all these data if they were not really accessible to people in the field and if they were not readily catalogable and usable in a computer-based form. So CERC began looking into the possibility of establishing a data base system under the FDCP. A number of preliminary studies were done over the first couple of years, and we finally decided on a direction in which the system should go. We had funding to implement those recommendations in the last 2 years.

The system, as it exists, is headquartered on the Cybernet system, one of the most accessible mainframe systems to all Corps of Engineers field operating activities. CEIMS consists of two subsystems. A user coming into the system through a terminal or a personal computer will access the index subsystem, and one of the key things, as far as the initiatives I will be talking about are concerned, is that the index subsystem will be interfaced with other data bases.

The index subsystem already exists. It already contains information on data characteristics, has a rather extensive bibliography of publications relating to coastal engineering, and will house translation routines to allow the users to access outside data bases. It will contain not necessarily the data themselves but information about the characteristics of those data and where users can go to retrieve the data.

The second subsystem will contain the data and a series of utility programs to manipulate them. But specifically I want to concentrate on the index subsystem which we are considering using to access some other existing sources of data.

We would like for a district to be able to access the data we are now collecting under the Field Wave Gaging Program through an all-purpose system like CEIMS. That is the first topic.

The second topic deals with our wave hindcast represented by the Sea State Engineering Analysis System (SEAS) which is the archive for all our hindcast data that were done in the FDCP and Littoral Environment Observation (LEO) System.

One very cost-effective thing we have identified that we can do to make those data more accessible to the field would be to take them off the magnetic tapes and transfer them to optical disks. The data would then be much more accessible and would provide at some point in the future the possibility of simply transferring those systems to the field through copies of the optical disks.

The third initiative we propose to take is to make better use of wave data that NOAA collects through the National Data Buoy Center in Bay Saint Louis, Mississippi. We are going to explore the possibility of accessing both real-time NOAA buoy data and the archived NOAA buoy data through the CEIMS system.

NOAA publishes status reports, I believe once every week or once every two weeks, on all of its data buoys. There are approximately 50 data buoys that could potentially provide nondirectional wave information to the Corps of Engineers if we could provide access capability. Some of it is probably too far offshore to be of much immediate use to us. The buoys themselves are scattered in a wide variety of locations around the United States. There are several in Alaska and about seven or eight each in the Great Lakes, the Gulf of Mexico, and off the East Coast. Some of those will be in water shallow

enough to be useful for us and possibly as supplemental index data. Other buoys may be too far offshore to be of much use because of the intervening wind effects on the water surface between the buoy and shore. But we will explore the possibility of being able to utilize those data more effectively.

The fourth initiative has to do with the State of Florida which has had a wave gaging system in place for approximately 10 years. It is headquartered at the University of Florida. We contribute funds to it from the FDCP as a cost-sharing effort. They have approximately 11 stations around the State of Florida, principally on the East Coast. Except for one at Cape Canaveral, these are all nondirectional nearshore stations. We also provide funds to the system currently through the hurricane surge data collection work unit to provide surge measurement capabilities at each of these wave monitoring stations. There is under way in the State of Florida, primarily through the US Army Engineer District, Jacksonville (SAJ), an initiative to develop the Coast of Florida Storm and Tidal Effects Study. Similar to the Coast of California Storm and Tidal Wave Study, it is a regional coastal processes study that will provide both the Corps and the State design and planning information on what to do with the coastal zone there over the next 10 or 15 years.

A reconnaissance report has been prepared by SAJ, and it is awaiting a signature by the State of a cost-sharing agreement. Hopefully there will be a new regional coastal processes study in the Corps of Engineers in FY 87, assuming the State signs the cost-sharing agreement. One of the earliest initiatives under that regional processes study will be to upgrade the Florida wave gaging system, both to expand its coverage (particularly on the West Coast) and to upgrade the nondirectional system to what would largely become a directional nearshore system. At that point we would be very interested in exploring access to that system through CEIMS. The directional data would be of tremendous use to the Corps of Engineers in Florida for project design and for all other purposes the Corps has for nearshore wave data.

The fifth initiative involves NOAA, particularly the National Data Buoy Center, and its plans to increase buoy monitoring efforts in the coastal zone. NOAA has committed itself over the next few years to acquire a number of smaller buoys (3-m discus buoys) and support approximately five or six of these buoys with a Directional Wave Analyzer package. NOAA has quoted us some

competitive prices on deployment of these buoys, and we will be definitely looking into use of those buoys as part of our wave gaging programs.

There is an R&D effort under way also with the National Data Buoy Center to develop a lower cost directional package to put into these 3-m buoys, basically using accelerometers and a two-axis magnetometer for measuring the directional wave characteristics, which, if successful, should lower the cost of maintaining these buoys even further.

The final initiative is to look into establishing further cooperative funding opportunities, principally on coasts where we do not maintain wave gages now -- the Gulf Coast, Great Lakes, and East Coast.

The key to being innovative with our Wave Data Collection Program is going to be a combination of initiatives, including lowering the cost of our wave gaging and maintaining a particular station, making better use of existing wave data, and exploring more realistic and long-term cooperative funding possibilities. But none of these efforts will come to any sort of fruition without an incremental and sustained increase in the wave data collection budget within the Corps of Engineers.

DISCUSSION

DR. MEI: Dr. Mei asked how much work is being done at CERC to obtain data collected outside CERC's program.

DR. VINCENT: Dr. Vincent answered that in the Wave Information Study (WIS) CERC does use the data that come both from the NOAA data buoys and from the California program to attempt to verify the models. He went on to say that a possible effort this year is a detailed hindcast of the storm period of 1983 on the West Coast which was particularly severe and for which there is a good deal of information available from gages.

Dr. Vincent said also that another source of data with which the Corps has not come to grips is the enormous amount that is now coming down from satellites. He said those data will be significant in attempting to evaluate how well our large-scale hindcast model works.

MR. RICHARDSON: Mr. Richardson said one of the trade-offs in a gaging program involves conflicting considerations, such as accuracy or sensitivity versus survivability. He said NOAA is exploring the possibility of a cheaper type of directional measurement system which, among other benefits, would lower the cost of losing the buoy.

DR. LE MÉHAUTÉ: Dr. Le MeHaute stressed that "we are dealing here with a very long-term investment." He said to obtain a design wave height for a structure using a 100-year wave, 30 years of good observations are needed. He went on to say that directional wave spectrum is very important information to gather.

The next problem he said lies in the presentation of data to the engineering community who must make use of it. He would like to see a standardized mode of presentation and suggested that CERC take the initiative in this area. Another line of research which could be explored, he suggested, is long-term statistics, that is, determining the interval or duration in which a system will return to states which are similar to previous ones. He would like to see a connection between long-term meterological statistics and long-term wave climate statistics.

MR. RICHARDSON: Mr. Richardson said that the idea of a wave data standard is something that CERC has been working on for several years, and the progress on it is intermittent as people are working on other projects.

In response to Dr. Le MeHaute's comment about connections between long-term meterological and wave climate statistics, Mr. Richardson said that NOAA maintains about 50 buoys in various parts of the oceans that measure wave characteristics. The principal purpose of those buoys is to obtain atmospheric meterological findings. But, he said, the meterological data that come off those buoys are archived in one place. The wave data are stripped out and sent someplace else. He said, "That's not really a very smart way to treat the data package. The waves are, in fact, the result of those meterological functions, but institutionally we're still looking at them as two different sets of data."

DR. NUMMEDAL: Dr. Nummedal feels that there is potentially a large user community out there which has not been considered. He said in terms of real-time forecasting, if you could provide to the maritime industry accurate reports on the sea states along the US coastline, you might tap a funding source that's probably larger than all engineering projects combined.

MR. PFEIFFER: Mr. Pfeiffer asked, "Now that HR 6 is real, could the timing of the wave gaging program as presented be accelerated?"

MR. RICHARDSON: Mr. Richardson answered that it could. He said the program as laid out is more of a pragmatic one based on past experience, and the fact is it has been recognized as a continuing need in the Corps for a number of years.

MG HATCH: MG Hatch said that a "major subject for us to wrestle with back home has to do with the entire impact of HR 6 on the R&D program." He said the projects that have been authorized offer anyone in the R&D business an opportunity to review those projects to ensure that the sponsors (i.e. the Corps of Engineers' sponsors) are well aware of what the R&D community thinks are some opportunities for R&D participation and design of those projects.

MR. MCCORMICK: Mr. McCormick said that leaning on project funds is not a very reliable source. It needs to be identified as a separate item and appropriate money for that on a continuing basis rather than trying to draw off the project, even though there is a lot of money that can be taken properly from projects, both in the design phase and in the operations phase. He said you cannot count on that.

DR. VINCENT: Dr. Vincent said the thing that is extraordinarily valuable is collecting all this wave information in a consistent format, with the foresight to know what the quality of it is, and storing it in a way so that years from now when someone in the district needs wave information there is a very simple way in which they can get it.

He said that in terms of standards for wave information, the World Meterological Organization has been working on it. He suggested CERC check with this organization and see whether or not what it is doing makes any sense, and if not, perhaps guide it to go in the direction we think is valuable.

In terms of climatology, he thinks that technically it is quite possible to take a wave data information set, relate it to those atmospheric variables, and go back in time to make a quasi-climatology.

Finally, Dr. Vincent said that the view of NOAA, even though it is beginning to do systematic wave forecast, is that the private sector should be doing forecasting.

MR. RICHARDSON: Mr. Richardson said that CERC is developing a good relationship with the NOAA people in Bay Saint Louis, Mississippi. One of the characteristics of NOAA over the past 10 years has been its volatility and the lack of long-term constant direction that the Corps of Engineers has had. The National Data Buoy Center, even though it has changed hats many times, has been one of the activities of NOAA that has survived.

MR. HOUSLEY: Mr. Housley said that when MG Koisch was president of CERB and Bob White was the head of NOAA there was an exchange of letters between NOAA and the Corps about getting wave information properly assembled and each agency "doing its own thing." The Corps agreed to get the inshore data, and NOAA was going to get the offshore data. OCE has tried to make this happen, but NOAA hasn't come through. Only with the National Data Buoy Center has the Corps been able to make any progress at all.

MG HATCH: MG Hatch suggested that it might be worthwhile to have a policy level communication from the Chief of Engineers or, even, Bob Dawson, expressing at least some concern for the priority of this effort.

Secondly, he said we need to look at this question of standards. He wondered if the Board might make some recommendation to the Chief of Engineers that he would try to become a party to the World Meterological Organization.

MG ROBERTSON: MG Robertson asked about onshore facilities for measuring waves.

DR. THOMPSON: Dr. Thompson responded concerning a device called the Coastal Ocean Dynamics Application Radar (CODAR). The main impetus behind CODAR work right now is the remote sensing demonstration program which is funded out of Operations and Maintenance funds at the Chief's office.

Phase I of a two-phase field demonstration project has been completed. Phase I was conducted in southern California at Point Mugu where CODAR was used to measure directional wave spectra offshore and compared with those from a NOAA directional buoy.

CODAR is also capable of measuring surface currents, but that was not extensively done during the Phase I demonstration. The demonstration program was aimed more at wave measurements. Mr. Thompson said there was a demonstration 2 years ago at Delaware Bay to look at the surface current

measurement capabilities of CODAR. That demonstration was done in conjunction with NOAA, and the results looked quite good. He said this system has nothing in the water, the antenna is mounted on the dune, and the electronics are in some safe housing shoreward of the antenna. It seems to be quite a reliable device, and it looks like it gives pretty accurate results.

PRIVATE SECTOR INITIATIVES

Mr. John G. Housley
Office, Chief of Engineers
Dr. James R. Houston
Chief, Coastal Engineering Research Center

The private sector initiative came up as a result of the Chief's initiative presented to the Board at the meeting in the fall of 1985 when the topic was how to get more funding. One of the suggestions was to privatize CERC. Another idea was to sell the services of CERC to other agencies and the private sector.

We have tried to do some research to find out why the constraints under which we are laboring are in position and what we can do about it. There are two kinds of constraints: statutory and institutional (or policy). We have divided this presentation into two parts. I am going to talk about the statutory constraints, and Dr. Houston is going to talk about the other constraints.

In 1980, Congress passed an act called the National Science, Engineering, and Technology Policy and Priorities. In part of it Congress declares that the United States shall adhere to a national policy for science and technology which includes various principles.

Principle No. 5 states: that the development and maintenance of a solid base for science and technology in the United States includes:

> (a) strong participation of and cooperative relationships with state and local governments and the private sector; (b) the maintenance and strengthening of diversified scientific and technological capabilities in Government, industry, and universities, and the encouragement of independent initiatives based on such capabilities together with elimination of needless barriers through scientific and technological innovation. It is the responsibility of the Federal Government to promote prompt, effective, reliable and systematic transfer of scientific and technological information by such appropriate methods as programs conducted by nongovernmental organizations, including industrial groups and technical societies. In particular, it is recognized as a responsibility of the Federal Government, not only to coordinate and unify its own science and technology information systems, but to facilitate in the close coupling of institutional scientific research with commercial applications to the useful findings of science.

There is another act, called the Stephenson/Wilder Technology Innovation Act, and it states, in part, that:

> The Congress finds and declares that Government, antitrust, economic trade, patent procurement regulatory, research and development, and tax policies have a significant impact on industrial innovation and development of technology but there is insufficient knowledge of their effects in particular sectors of the economy. No comprehensive national policy exists to enhance technological innovation for commercial and public purposes. There is a need for such a policy including a strong and national policy supporting domestic technology transfer, utilization of the science, and technology resources of the Federal Government. The Federal laboratories and other performers of the Federally-funded research and development frequently provide scientific and technological developments of potential use in state and local governments and private industry. These developments should be made accessible to those governments and industry. There is a need to provide means of access and give adequate personnel and funding to these needs.
>
> It is the continuing responsibility of the Federal Government to ensure the full use of the results of the Nation's Federal investment, research, and development; to this end the Federal Government shall strive where appropriate, to transfer Federally-owned and/or originated technology to state and local governments and to the private sector. Agencies which have established organizational structures outside their Federal laboratories, which have as their principal purpose the transfer of Federally-owned or originated technology to state and local governments and into the private sector, may elect to perform the functions of this subsection in such organizational structures.

Because of concern that US firms cannot compete successfully with foreign firms, a legislative initiative has been discussed in OCE and with the Secretary's office to get included in a legislative initiative of the Secretary of the Army which would revise one of the existing laws to say, "The Secretary may also authorize the Chief of Engineers to provide services on a non-exclusive and reimbursable basis to US private firms competing against foreign firms for the planning, design or construction management of overseas projects where the Corps has expertise not reasonably or expeditiously available in the private sector."

The constraints under which we have labored are relatively few statutorily and Dr. Houston is going to address some other constraints at this time.

Actually, a wide variety of topics has been discussed under the general heading of "private sector initiatives." Although there has been considerable discussion among the CERB members and at the public task force meetings, there has been little agreement or consensus of the Board.

In reading through all of the proceedings, I identified three alternatives that seemed to have been raised and discussed in great detail. In addition, late last week in reading the Stephenson/Wilder Act, I identified a fourth alternative that was not discussed at earlier CERB meetings.

In reading through all of the discussions, I notice there seems to have been a variety of objectives discussed. One was an objective relating to providing certain facilities to enable US private industry to successfully compete against foreign industry and government consortiums. This objective has been discussed at length in earlier meetings, and CERB members have given examples where foreign competition has been a problem. Many firms in Europe have joined in consortiums with their national laboratories, such as the Danish Hydraulics Institute and the Delft Hydraulics Laboratory, to compete against US companies. At first the competition was in Europe and Third World countries, and now it is occurring in this country.

US companies have indicated it would be nice if they could have a similar arrangement with government labs such as CERC that would allow the labs to enter bids in which there is foreign competition. This arrangement would allow US firms to be on equal competitive footing with foreign industry.

DISCUSSION

MG HATCH: MG Hatch asked, "Who is paying for the services of Delft?"

DR. HOUSTON: Dr. Houston answered that it is part of the bid; that is, Delft's costs are included in the foreign companies' bids for the work.

MG HATCH: MG Hatch asked if those national assets are being provided to the private sector overseas on a reimbursable basis.

DR. HOUSTON: Dr. Houston responded by saying he thinks there may be significant subsidies provided by The Netherlands for the operation of Delft.

MR. MURDEN: Mr. Murden said there is a government subsidy behind the Delft Hydraulics Lab that comes through Delft University. Usually it is a consortium of three to five dredging firms who are going to bid in Australia or India. It is a combination of government subsidy and a private enterprise consortium.

MG ROBERTSON: MG Robertson said, as he understands it, one of the advantages Delft has is being able to enter the bidding package so that a potential client or nation asking for services knows that expertise is backing up the bid.

He went on to say one of the problems the Corps has is that CERC, for example, could not be part of a bid package.

DR. HOUSTON: Dr. Houston agreed and gave as an example an ad in the October 1986, American Society of Civil Engineers (ASCE) news that says Engineering Hydraulics, Incorporated, and Delft Hydraulics Laboratory are expanding their activities and seeking candidates with an M.S./Ph. D. and 3 to 5 years' experience in coastal and estuarine engineering. The ad also gives some of the qualifications of the candidates. It says the successful candidates will spend 6 months in training at the Delft Hydraulics Laboratory in the Netherlands followed by an assignment at Engineering Hydraulics, Incorporated, offices in the beautiful Pacific Northwest. The Danish Hydraulics Institute has had an office in New York City for quite a while and has been successful in some US bids on that basis.

A second objective discussed in earlier CERB and task force meetings was to allow CERC to serve national interests in coastal engineering by lifting a variety of government imposed constraints and thus allowing the government to operate more like the private sector. This objective included everything from being able to serve state and local governments more easily to getting away from constraints such as manpower, overtime, and contracting constraints.

One of the benefits identified was that CERC, with few imposed constraints, could aid US private industry in competition with foreign government/industry consortiums. A second benefit would be that work for the private sector would provide additional revenues to CERC, and, in particular, might help support the amortized payback and cost of existing facilities, perhaps allowing CERC to build more advanced facilities because of a bigger customer base.

Probably the most fundamental constraint to CERC's performing work for the private sector is that of manpower constraint. The Corps has had manpower problems, and there have been difficulties in performing work just for other Federal agencies, let alone private companies. Last year at WES there were instances where work from districts was turned down because of lack of personnel to do the work. It becomes difficult to discuss doing work for private industry given these manpower constraints.

In looking through all of the CERB and task force discussions, I have identified three alternatives that were discussed extensively: maintain status quo, privatize CERC, and initiate a pilot program. A fourth alternative was put together very recently.

I will discuss each alternative and mention the pros and the cons of each. A pro for maintaining status quo is "no use tilting windmills." The

Administration's position on manpower is based on strong fundamental beliefs and cannot be changed. Another argument for this alternative is that the other two alternatives are fairly radical and largely address problems that are not necessarily the Corps' problems. The con was that the objective would not be achieved.

MG HATCH: MG Hatch asked if the objectives stated were proposed by LTG Heiberg.

DR. HOUSTON: Dr. Houston answered that these objectives were not in the general's speech. They were raised later by the Board and the task forces when discussing innovative ways to obtain finance.

MG HATCH: MG Hatch said that in our discussion we should not lose sight of the central purpose of CERC which has to do with supporting the Corps in its mission to support the Nation in water resource development. He said the objectives as stated do not cover the whole spectrum. He added, "Some of our folks out in the divisions and districts would argue that the reason you exist is so they can do their job."

However, he said this Board would probably conclude that the view from this point should be broader than that.

DR. MEI: Dr. Mei recalled that the original motivation was to increase funding and income to CERC with an objective to promote more interaction in coastal engineering at large, including the support of more research, both basic and applied.

MG ROBERTSON: MG Robertson recalled that the Chief mentioned he had a continued disappointment in not being able to shout about supporting basic research. The Chief said, "I must find ways to bring in others who have that latent interest such as universities, other countries, some parts of the private sector, and maybe elements of the chain of government other than the Federal Government." The Chief is looking for funding to support basic research which also supports the building up of the Corps' capability of basic research and keeping up with the state of the art.

DR. HOUSTON: The original purpose had to do with generating funds for CERC. Most of the discussion, though, has centered on the other issues, namely, supporting private industry and competition or somehow lifting constraints to serve a national interest.

MR. MURDEN: Mr. Murden reiterated a point covered at an earlier Board meeting that the Board should explore letting universities and private industry utilize CERC's facilities during off-hours rather than using them 8 to 10 hours a day. This step would initially reduce operating costs.

DR. NUMMEDAL: Dr. Nummedal said that outside the United States, coastal engineering, as we know it, is not done by an agency such as the Army Corps of Engineers; it is rather a national laboratory that the whole nation is supporting. He said that based on that observation the Board started considering CERC as a national laboratory. He continued, "Should we necessarily restrict ourselves to be an Army Corps laboratory? Granted the Army Corps of Engineers is the major user of all the expertise and technology development that is

coming out of this laboratory, but it's not the only user. Maybe one way of regaining preeminence or leadership in coastal engineering on a global basis is to consider some of those other potential users. So, I think I respectfully would like to disagree with your listing of priorities. Maybe we should not start by asking what we need to do here at the lab in order to develop the Army Corps of Engineers. We should set up the national needs first and then try to identify how we, as a coastal engineering lab within the Army Corps of Engineers, support those national needs."

MR. PFEIFFER: Mr. Pfeiffer said that the national lab concept just does not work. "Shell doesn't do basic R&D or fundamental R&D. They're going to get you something to make them some money, period. And if you go to work for an A&E firm, it's the same kind of thing. You're going to end up doing more design work and a piddling amount of research."

DR. HOUSTON: There was some talk that privatizing CERC might attract administrative support because it transfers functions from government to the private sector. One con is that the Corps of Engineers loses control over research activities. There are certainly a lot of areas in which CERC holds a monopoly in expertise, and some of the feeling was that if CERC were a private company it would hold a monopoly. Coastal engineering also could suffer because CERC would diversify into more financially promising areas. CERC has a multidisciplinary group of people, and in a private sector environment it would likely diversify. In addition, the Corps of Engineers might tend to spend less money in coastal R&D if they were dealing with a private company rather than a government lab.

There were task forces that involved CERB and non-CERB members, and the participants discussed a 5-year experimental program. It appeared to be an experimental program where CERC would have one foot in each door; that is, it would be a quasi-government, quasi-private sector organization. This would be an experiment where some or all the constraints would be lifted and the benefits and problems monitored. We have found legislation that considers experimental demonstration projects, although it addresses only personnel management, which is just one aspect of what has been discussed. The Civil Service Reform Act of 1978 provided for demonstration projects where certain provisions of the law could be lifted in the conduct of the experiment.

One of the pros of the pilot program is that it would seem to achieve the objectives. It is a controlled experiment that could be reversed if it did not work. Administration support might be attracted since it is an experiment on lab/private sector cooperation, thereby increasing efficiency of government labs.

One of the cons of this alternative is that the development and selling of this detailed pilot program will be a fairly significant effort. The chance of success may be low. Another con is that traditionally in this country the government and private sector have been kept separate. There are reasons governing the constraints that regulate government. The constraints are intermingled, and lifting some of them is going to be difficult.

If there were a pilot program study, OCE would be the appropriate study manager because most of the topics discussed are policy issues. The pilot program might identify constraints, give reasons for modifications, and cite potential problems with modifying the constraints. COL Lee mentioned to me that a week ago some legislation was passed that might supercede part of the Stephenson/Wilder Technology Act. We do not have that legislation yet, but

COL Lee was under the impression it might liberalize the act even more. I am going to quote parts of the act and then mention another possibility. It says,

> The Secretary (the Secretary of Commerce) shall provide assistance for the establishment of centers for industrial technology. Such centers shall be affiliated with any university or other nonprofit organizations or institutions. The objective of the centers is to enhance technology innovation through utilization and the capability and expertise that exists in Federal laboratories. The activities of the center shall include but not be limited to research support of a technological and industrial innovation including cooperative industry, university, basic and applied research, and technical assistance and advisory services to industry.

The Act directs the National Science Foundation (NSF) to provide assistance to the establishment of centers for industrial technology and then makes a broad statement that the Federal laboratories and others should, as much as possible, support the projects authorized under the Act. It occurred to me that either a university, a consortium of universities, or even a nonprofit organization that is established by industry could establish one of these centers for industrial technology in Vicksburg or at WES. It would seem there would be a possibility that a university consortium established as a center in Vicksburg which had engineers and technicians could operate our facilities and be involved in bids with the private sector. CERC has performed a lot of overtime work, and there are constraints relating to working overtime. If there were an organization of this sort in Vicksburg, CERC would probably contract with them on some of the overflow work.

Earlier I discussed the IPA. It works both ways. Government employees can go to work under that Act for universities. This could be done for short periods of time if particular expertise were needed in some area by a center for industrial technology. So, there are possibilities that something could be established that would allow universities and CERC to work more closely together with the university in a position to participate in foreign bidding with the private sector.

A pro would probably be that no legislation is needed to implement this approach. On the con side there may be neither a university, university consortium, nor nonprofit group established by industry that is interested in pursuing this.

DR. MEI: Dr. Mei said that it seems the legislation being discussed has its intended effect on establishing engineering research centers largely funded by NSF, and there have been a number of research centers already started. He said that usually these research centers are established in universities with some support from industry but that it does not involve national laboratories. Dr. Mei wondered whether national laboratories can become a major component of this collaboration.

DR. HOUSTON: Dr. Houston answered that the legislation seems to leave room to include government labs.

DR. NUMMEDAL: Dr. Nummedal said it seemed to him that if you are looking at a pilot program like that there are probably three components rather than two. One component would be the consortium of universities whose primary responsibility would be to support the basic research. The second component would be CERC, as an Army Corps lab responding to the needs of the Army Corps of Engineers. The third component, separate from the other but loosely tied in by some organization would be a semiprivate organization that would market the capabilities of the laboratories, and bid on domestic or foreign projects. If this kind of structure were developed, the university consortium should have as its primary responsibility the development of that basic research capital from which it, and the other two, could benefit.

DR. HOUSTON: Dr. Houston said that irrespective of this particular initiative, it might be a good idea for CERC and WES to form close relationships with universities, something similiar to the relationship the Construction Engineering Research Laboratory (CERL) has with the University of Illinois.

MG HATCH: MG Hatch said that HR 6, if he understood it correctly, will allow the Corps to take on reimbursable work for state and local governments. He said, "Now, apparently, we'll have a clear legislative opportunity to take on reimbursable work for entities other than the private sector which we haven't before."

DR. LE MÉHAUTÉ: Dr. Le Méhauté wanted to recall the beginning of this discussion. He said the idea was to fill a gap in the United States. This gap is created by the the Corps' having a monopoly in the American market; therefore, it is not economic for the private sector to invest in those kinds of activities. As a result, the private sector has had to go to foreign laboratories to fill the gap. He went on to say that on a purely economic basis it generally does not pay for a private company to invest in laboratory facilities, and "that's why research services of high quality have to be subsidized by the government in one way or another." He said, further, "And I think that allowing CERC, without changing its status, to go after all kinds of work is not only feasible but also desirable." Dr. Le Méhauté said he was involved in a case in which Global Marine contracted with the Navy (David Taylor Model Basin) to use its deepwater basin. He asked why CERC could not attract this type of work.

MG HATCH: MG Hatch asked Mr. Pfeiffer if he would to look into that. He said, "One might find that there is some sort of a convoluted contractural relationship between private industry and the Navy, and they're somehow able to tie that all together."

MR. PFEIFFER: Mr. Pfeiffer said he had recently talked with an engineer from an A&E company. Generally, these companies tend to take what the Corps has available and not research it themselves. Architects, engineers, and contractors for major public works projects in this country tend to do very little research. He said, "They are relying on the LSU's, the MIT's, and the Corps of Engineers for their new technology; they're not doing it themselves. So, if we're looking for a cost-sharing partner, we might not find it in the guys we normally work with; we might find it in the offshore industry. But I'm not sure they're interested in beach erosion."

MG HATCH: MG Hatch asked if the examples that members of the Board cited relative to the collaboration between the private sector and national laboratories from European countries included those national laboratories providing research and development support or design support. He then asked, "What is Delft doing? Is it really R&D they're doing in conjunction with the private sector there or is it design?"

MR. MURDEN: Mr. Murden answered that it is both.

MR. MCCORMICK: Mr. McCormick said that there is a provision in the rules for operating division soils labs which allows them to do work for the private sector on a reimbursable basis provided the facility is unique. In other words, this is true for cases in which the private sector is unable to go anywhere else in the country and buy that service.

MG HATCH: MG Hatch asked Mr. Pfeiffer if he ever tried to apply that sort of presence or authority in this business.

MR. PFEIFFER: Mr. Pfeiffer said, "We can do it, and he has rightly stated it. We must have the unique facility; and if we have the unique facility, then we can."

MG HATCH: MG Hatch asked if the "facility" simply means a piece of physical equipment, a building, or the totality of that plus the talents?

MG ROBERTSON: MG Robertson answered that it includes both.

DR. HOUSTON: Dr. Houston said that WES has done work for the private sector in the past on a small scale. But if WES were to "start going at it in a much larger way, then we will run into things like manpower constraints."
MG ROBERTSON: MG Robertson said that the Board received a dual challenge from the Chief, on manpower and dollars. The idea is to come up with innovative ways to help solve both those problems and reduce the costs of the Federal taxpayer to maintain state-of-the-art facilities that can support the Corps' mission. He added, "We have been looking into possible ways to decrease the Federal investment, increase our capability by the use of cost sharing with private industry and others and to get off the manpower constraints a little bit by use of university students and joint projects with universities. All of this is a big package, but the ultimate goal is to reduce the Federal investment in manpower and dollars and still increase our capability to meet a national need and a Corps need for coastal research."

DR. LE MÉHAUTÉ: Dr. Le MéHauté said he is not convinced that the objective of saving the taxpayer money in this case is appropriate. There are a number of national priorities and duties which cannot be fulfilled by any one organization, state, or private company, and one is long-term basic research.

He is an advocate for the private sector, but he feels there are some areas that the private sector cannot fulfill. There is interest in research and in coastal engineering as a national mission because there is more than one state with a shoreline. Most of the population that lives along the coastline has an interest in solving this problem, not on a local but on a national scale. He said, "So, I don't think it's the mission of the Corps to save taxpayers money. The mission should be to get more for the invested

money. I think if I compare what we are doing here with what is being done in foreign countries, the investment in laboratory installation, by the Corps at WES, is below what is being done in other countries. For example, the facility at Trondheim has a unique wave basin where an engineer can study a structure in the laboratory at a prototype scale. It's a 7-m deep wave tank where they can make 3-m waves. In Delft they also have unique facilities for studying stratified flow in estuaries." Dr. Le Mé Hauté said it's not a matter of duplicating what is being done in foreign countries. It is rather a matter of first identifying the national needs; secondly fulfilling those needs by building unique facilities -- unique in the sense that they will allow the Corps of Engineers to be at the forefront of the research in that field -- and, thirdly, opening this facility to the private sector to establish a center of excellence based on the uniqueness of that capability. Dr Le MéHauté said that opening CERC to the private sector as a service will fulfill a national need.

MG HATCH: MG Hatch said that one of the impacts that cannot be assessed today is what HR 6 might have done for the Corps in terms of working with state and local governments. State and local governments open up a whole family of other contacts. There are many indirect ways to deal with sources of funds if a path is opened to local and state governments.

MG HATCH: MG Hatch said a number of the things that were mentioned that could be accomplished in foreign or Corps laboratories, although not the responsibility of the private sector, are not Federal responsibilities either. The Corps does not design port facilities, for example. However, state and local governments do. So, there is perhaps a linkage to the port authority world that the Corps did not have before, in that port authorities are public entities. So, if the Corps can perform work for state and local governments this might go a long way toward opening up markets for an expanded funding base."

MR. PFEIFFER: Mr. Pfeiffer brought up a point on how the Corps buys major facilities which, traditionally, has occurred through the Plant Replacement and Improvement Program (PRIP). But that has its limits, as it has to be charged back to customers. He said we have been able to manage as long as the facilities were in the 1- to 3- million dollar range, but at the Alaska CERB meeting a major new facility in the 10- to 20- million dollar range was discussed, and facilities of this size are tough to charge back to a district.

MG HATCH: MG Hatch said that HR 6 could offer a whole new realm of possibilities to assist the Corps in amortizing what would be capital investment in some facilities.

COL LEE: COL Lee said that all the things that had been discussed in the day's forum about expanding the national laboratory concept of CERC -- opening it up to a greater spectrum of the research community, the academic community, and the private sector constituted a radical and somewhat revolutionary way of doing business from what the Corps has done in the past. He said regardless of anything that has been discussed, we are talking about some major changes.

He added, "And as an institution we have not historically shown tremendous flexibility in adapting to major changes. We tend to move much in the way that ships turn at sea with great reluctance. While the Board may endorse a

move in this direction, it seems to me that the only way that something like this is going to come to pass is if somewhere in the structure, in the system, there is someone high enough who becomes convinced that this is a good idea and then charges WES or CERC to go ahead."

"Now, where does that come from today? I have no earthly idea. And the most disturbing feature about all these discussions, to me with my Commander and Director hat on, is the uncertainty of the direction in which we are headed. My supposition is based on what my folks have found in terms of the legislative base we have today and what we know has been some increased flexibility in that regard, but we don't know the specifics yet because the legislation is less than 7 to 10 days old. I think the law is there. The question is not what the law says. The question is what do we really want to do and who is big enough in the overall scheme of things to stand up and say, 'That's it. Go?'"

MG HATCH: MG Hatch said that this is the only research and development endeavor of the full spectrum of the Corps' efforts that is blessed with a Board providing this level of assistance and guidance.

He said, "We've had a number of good notions shared here. I can clearly see there are some potential spin-offs into WES and even other labs of some of the things we talked about. I think if the state and local government thing and HR 6 open up and give us these opportunities, manpower is going to be our constraint. It won't be money. But again, if you have money flowing in, then sometimes you can substitute money for faces and money for effort, if you're clever; therein lies also the continued possibilities for the academic world to be of assistance."

SUPERDUCK

Mr. Curtis Mason
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US Army Engineer Waterways Experiment Station
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SUPERDUCK, the world's largest surf zone and nearshore processes experiment, was conducted at the CERC Field Research Facility (FRF) in Duck, North Carolina, during September and October 1986. Twenty investigators from CERC joined with others from 11 universities, 5 government agencies, and 4 foreign countries to collect, analyze, and interpret data on coastal waves, currents, winds, and sediment transport. This presentation gives an overview of the experimental objectives, describes briefly the studies conducted, and summarizes their accomplishments.

Previous experiments and long-term data collection conducted at the FRF indicated that large morphological changes to nearshore bar systems occur, often very quickly. Four bathymetric maps taken in October 1982 during DUCK '82 can be considered, including (1) prestorm bathymetry; (2) a during-storm bathymetry on the 13th with a change in the nearshore bar morphology and the beach condition; (3) further change on the 15th towards a three-dimensional percentage configuration of the bar; and (4) on the 19th, in the very late stages of the storm, a return to approximately prestorm conditions. You might note that if one went out and made observations and measurements on the 7th and the 19th he would say there was essentially no change as a result of the storms. But we see great change, and it happens very quickly.

To date, the processes controlling these changes are not well understood. Thus, the primary objective of the experiment was to obtain a comprehensive set of measurements of the waves, currents, and atmospheric conditions which drive sediment transport and deposition and to relate these processes to observed changes in morphology. This enhanced understanding of the fundamental processes affecting coastal areas is absolutely essential to effective engineering solutions to Corps projects.

A second objective of SUPERDUCK concerned the need for comprehensive sets of field data to evaluate, calibrate, and improve the numerical and analytical models being developed here at CERC. Finally, the experiment provided CERC

with an opportunity to develop and test improved predictive and measurement techniques used by Corps field offices.

Like the preliminary experiment, DUCK '85, which I discussed at the San Francisco CERB meeting last November, SUPERDUCK was conducted in two parts to take advantage of seasonal variations in wave heights. Experiments requiring low wave conditions were conducted between the 6th and 24th of September, while those focusing on storm processes took place between the 6th and 22nd of October. A third group of experiments was designed to collect data throughout the fall. SUPERDUCK was a cooperative effort among 40 principal investigators, and there was a total of 150 participants with highly interactive data and resource exchanges.

The low-wave energy experiments were conducted a sufficient distance north of the pier to avoid effects from the pier and were heavily CERC-oriented. The objectives of the photopole experiment of Dr. Steven Hughes and Mr. Bruce Ebersole of CERC and Dr. Shintaro Hotta of Tokyo Metropolitan University were to measure surf zone wave heights and water levels and to define wave transformation processes during breaking. The line of photopoles used by the investigators extended from approximately the upper portion of the foreshore to approximately the 8-ft water depth.

Dr. Hotta's system of 16 mm motion picture cameras mounted on scaffolding obtained images of waves passing that array of black photopoles. Dr. Hughes constructed special sleds to provide mobile photopoles for high wave conditions. These were towed into position in deeper water. Computer processing of the film at WES provides digital time series for further analysis and for the surf zone sediment transport experiment with Dr. Kraus. Dr. Kraus' experiment was intended to provide quantitative estimates of longshore sediment transport rates during relatively low wave conditions. The streamer sediment trap he used is made of polyester sieve cloth and stainless steel. It is designed to trap suspended sediment being transported alongshore at selected depths. We have a vertical array of these traps. They are placed in a cross-shore transect within the study area, and each trap is tended by a person to ensure that it streams out in the longshore current. Sediment was removed from the streamers and weighed on the beach using portable electronic balances. Results to date indicate the traps performed as expected and provided unique data on the cross-shore and vertical distribution of suspended longshore sediment transport.

The objectives of the surf zone current measurements sponsored by Dr. Rao Vemulakonda of CERC were to obtain current data under a variety of incident wave conditions, to evaluate numerical models under development at WES, and to provide current data for the sediment trap experiment which would allow calculations of longshore sediment transport rates using the mean current speeds. These measurements also provided quantitative data on longshore current speeds for comparison with the visual techniques employed by Ms. Joan Pope and her group to test methods used in the national Littoral Environmental Observations (LEO) program. These methods included the use of dyes and floating objects to measure currents, protractors for wave approach angle measurements, and several techniques to estimate wave height and period.

One of the real benefits of SUPERDUCK and similar experiments conducted at the facility over the past 6 years has been the participation of non-CERC investigators. Since these studies are usually funded by other agencies, they reduce Corps costs and provide unique data sets that complement the ones that we collect. In addition, the infusion of outside ideas and expertise usually enhances the scientific quality and usefulness of many of our studies.

During the low wave energy portion, Dr. Jim Kirby of the University of Florida provided valuable surf zone wave height information using staff wave gages and pressure gages attached to the photopoles. He will be comparing his data with those from the photopole array to evaluate gage performance and capabilities.

Dr. Tony Dalrymple from the University of Delaware installed current meters on portable tripods to study the current distribution associated with rip current in the study area. Rip currents are important in sediment transport processes in the surf zone; and very little is known about their behavior, formation, and other charcteristics.

During October a large group of investigators focused on storm-induced processes affecting the beaches, surf zone, and offshore areas of Duck. Fortuitously a large northeaster impacted the study area beginning on the 10th. A plot of the significant wave height for the 17th of October, measured in about 9 m of water, shows that wave heights in excess of 3 m developed very quickly.

Also, we got a very good data set of longshore currents. The mean currents reached about 2 mps. As the wave angle changed, they decreased; but we did see a very rapid buildup and continued movement of the nearshore flow.

One of the efforts most crucial to many investigators' needs was the accurate surveying conducted by Messrs. William Birkemeier and Peter Howd from CERC's FRF. Their intent was to determine temporal and spatial variability of the nearshore morphology during storms and to investigate the variability and interaction of morphology with infragravity waves. The survey area known as the mini-grid extended about 350 m north and 250 m south of a cross-shore current meter line and seaward about 1 km.

The Coastal Research Amphibious Buggy (CRAB) is our prime means of surveying. Used with a Zeiss, infrared laser beams are sent to a set of prisms on the CRAB, and the reflected images are picked up by the instrument. The very precisely measured horizontal and vertical angles to that point are determined so that a microprocessor gives us the x-y-and z-coordinates of the CRAB at that time. It takes about 6 to 8 sec for each shot, and then we put a number of points together to come up with the bathymetric mix. The area was usually surveyed daily, and we provided these data on a daily basis to the other investigators so they could plan the day's experiments from their standpoint.

Several important changes occurred, of course, to the nearshore morphology. On the 9th of October, just prior to that storm, we had a relatively linear nearshore bar; and the beach was somewhat cuspate, nearly three-dimensional. On the 10th, during those high waves and very strong currents, we tried to get the CRAB out. We found that in 2-mps longshore currents you cannot collect data accurately, and, in fact, the equipment is in a hazardous situation. So, we waited until the next day when things had calmed down a little bit. What we found was that the bar had gone very linear, had moved offshore a considerable distance, and that the beach was relatively flat and with parallel contours.

On the 13th, two days later, the three-dimensional bathymetry started to develop. That development continued, and we did get the response of the bar to infragravity wave activity. To measure that infragravity wave activity, we added a longshore array of current meters. These are electromagnetic current meters attached to pipes which are jetted into the bottom using the CRAB and a jet pump.

When that storm came through, a very deep trough developed in the vicinity of the current meters, in the neighborhood of 8 to 9 ft deep. We had used

divers to orient the meters very precisely in order to get good indications of the longshore current directions.

Messrs. Birkemeier and Howd will be investigating the interaction between the morphological response and infragravity waves while Dr. Joan Oltman-Shay, Oregon State University, will concentrate on the forcing and composition of the infragravity waves.

Data were collected for 4-hr periods centered about each high and low water from October 6th to the 22nd. All ten current meters in that array functioned throughout the storm. All the data appear to be exceptional. We also had a cross-shore array of four current meters implaced in the minigrid area to define the cross-shore variability of surf zone currents that was primarily used by other investigators; but we will, of course, have data available to us for looking at variability in the cross-shore direction as well.

The storm sedimentation study headed by Dr. Suzette Kimball of CERC was designed to measure temporal and spatial variability in nearshore sediment size, texture, mineralogy, and structure, particularly under the influence of storms. During SUPERDUCK the remotely operated sediment coring device known as ROSCO was deployed along the foreshore to obtain 1/2-m cores during the wide variety of incident wave conditions.

This is an air-driven system which punches a core into the sand, obtains about 1/2 m of sediment, pulls it back up, and rotates that set through to get a total of about 17 cores per run. Detailed surveys of the region were also conducted. Correlations between the sedimentary features and physical parameters will enhance Corps design information on beach changes and sediment charcteristics.

As emphasized by the proposed initiation of a dredging research program, a critical need exists within the Corps for more fundamental knowledge of the processes affecting dredged material disposed offshore. To address this need, the first phase of an offshore material placement experiment was conducted during SUPERDUCK. Its objective was to evaluate several techniques for monitoring offshore disposal and borrowed sites.

Dr. Lee Weishar of CERC and Dr. Guy Meadows from the University of Michigan developed an experiment to measure the cross-shore sediment flux at two depths along the SUPERDUCK cross-shore profile and relate these

measurements to waves and currents forcing the transport. A current meter, a pressure gage, and an optical backscattering suspended sediment sensor were mounted on a tripod. Tripods were placed on the bottom at the 22- and 38-ft depths. A sea sled equipped with five current meters and a telemetry system was deployed to provide information on the vertical distribution of currents near the tripods in order to allow bed shear calculation. The sled was used also during pre- and postexperiment surveys in deeper water where the CRAB cannot operate. The tripod sensors collected data throughout the experiment which will prove extremely useful to the dredge material program.

Ms. Leslie Fields designed a tracer study to monitor the movement of dyed sand placed on the bottom near Dr. Weishar's offshore tripod. Here the intent is for divers to place known amounts of dyed sand on the bottom, allow waves and currents to act on it, and then to measure where the sand has gone and how rapidly it has moved there.

Twenty-four hours after those divers put that material on the bottom, Ms. Fields used the Virginia Institute of Marine Science camera system, known as REMOTS, to sample the area and determine the rates of sediment movement. A frame was suspended from our boom on the Lighter Amphibious Resupply Cargo (LARC) vehicle and allowed to go to the bottom and sit there. Then a wedge with weights was driven into the bottom. That wedge consists of a Plexiglas plate which is 90 deg to your field of view and a mounted camera which looks through a mirror and takes a snapshot of the vertical slice that the Plexiglas is punched into. She got the images back, counted the number of grains, and looked at how much dyed sand was at each of the various grid points.

Mr. Jim Clausner of CERC, using a slightly modified version of Dr. Kraus' sediment traps, measured the suspended sediment transport near Dr. Weishar's offshore tripod. Four trap frames were placed orthogonally on the bottom. The traps were deployed near the tripod so that the measured volumes could be correlated to the wave and current conditions measured at the site.

Drs. Charles E. Long and Jon M. Hubertz of CERC and Sethu Raman of North Carolina State University measured the vertical variation of wind velocity at the end of the pier. These measurements, along with current data from other participants, will be used to determine the mechanisms producing momentum transfer between the atmosphere and the ocean.

Of course, no experiment would be complete without CODAR which was installed in a van by Mr. David B. Driver of CERC to measure surface currents and waves out to 40 km from shore. Sufficient data were collected over the wide range of experimental conditions to assist in interpreting the impact of offshore waves and currents on nearshore processes and to benefit numerical model input requirements. Sea truth data to compare CODAR results were collected by Dr. Michael E. Andrew of CERC using an ENDECO directional wave buoy located 6 km off the end of the pier.

Dr. Rob Holman from Oregon State University applied a newly developed video technique to document nearshore morphology changes. The method relies on waves breaking over bars to provide the imaging signal. Video cameras aimed at the study area were installed on the top of our new 120-ft tower. In order to obtain sufficient data, 10-min time exposures were taken and digitally integrated by a companion PC-based computer system. This technique is very useful in delineating the evolution of bar systems.

Dr. Holman has left this system with us, and we will be taking daily 10-min time exposures of the morphology at DUCK over the next year. This loaned equipment will certainly benefit us. He has compared his results with detailed bathemetric surveys, and he indicated that the time exposure techniques do reproduce the morphology in terms of both longshore and cross-shore scales.

Dr. Asbury Sallenger and Mr. Bruce Jaffee from the US Geological Survey installed an array of sonic altimeters for obtaining real-time bottom elevation data under storm conditions at fixed points along the same cross-shore profile used by Drs. Weishar and Meadows. A sonar mounted on a pipe looking downward and a wave gage are also parts of that instrument. We had seven sonars and they operated well throughout the SUPERDUCK time frame.

Our objective is to eventually have a long-term measurement system at the FRF that will allow electronic measurements of the bathymetry rather than using CRAB profiles.

Dr. Meadows installed a portable X-band radar to obtain line spectra of sea surface elevation, and he is developing the software necessary to obtain two-dimensional spectra of these conditions. Working with Dr. Weishar, he installed three water-level recorders spaced at about 5-km apart in 6-m water depths to measure the longshore gradient in sea surface elevation for momentum balance computations. Drs. Mark Denny and Lani West from Stanford University

sampled the foreshore during October to determine the effects of storms on the interstitial distributions of benthic organisms.

Dr. Ed Thornton from the Naval Postgraduate School, working with our staff, constructed a sea sled to measure the local momentum balance and the vertical distribution of mean currents in the nearshore and rip currents. The sled was successfully deployed, using the CRAB, and towed back to shore under a wide variety of surf zone conditions. Since the poststorm bathymetry produced a nearly linear bar in the north portion of the minigrid, the momentum balance experiments were conducted there. The rip current and nearshore circulation investigations were conducted to the south where the bathymetry exhibited a quasi-crescentic morphology.

This sled has three electromagnetic current meters that give you a vertical velocity profile of the lower 1-1/2 m of water. There are also two differential pressure gage slope arrays to measure the gradient and momentum in the surf zone. The sled has an anemometer at the top. The signals from these instruments were telemetered back and collected on a computer system in the FRF building.

Dr. Dennis Trizna of the Naval Research Lab modified the radar to provide output to his computers which allowed real-time two-dimensional wave spectra to be calculated at selected points within a 2-km radius of the FRF.

Dr. Marshal Earle of MEC, Incorporated, brought his PC-based wave forecasting system to the FRF to do real-time comparisons of wave directional spectra with SUPERDUCK wave gages.

Finally, Drs. John Fisher and Margerie Overton of North Carolina State University conducted a dune erosion study under the auspices of the Sea Grant Program. They constructed a 1-m^3 dune on the foreshore and monitored its demise with a video camera and still cameras. Erosion rates will be correlated with runup measurements made just seaward of the dune using capacitance wave gages.

Dr. Mike Andrew from CERC designed a gage known as the short base directional wave array which consists of seven extremely sensitive parascientific wave gages on a triangular base, and it will be left in place for long-term data collection. The signals from each of those gages are digitized and collected on PC's. The gage is intended to provide an accurate, highly portable system for use by Corps field offices at remote sites. This is the first field test.

The FRF also installed, just prior to the experiment, a permanent offshore linear array designed by ourselves and Scripps Institute of Oceanography. This array was installed in 8 m of water and will provide high resolution directional wave data at the FRF. A slope array is embedded in the linear array to provide a means to detect any inhomogeneity in the nearshore wave field. In addition, we installed a new Scripps gage within the array. Comparisons between these three directional gages will provide the Corps with a much better understanding of the capabilities of each system under a wide variety of incident wave conditions.

Mr. Edward Hands of CERC designed an experiment to investigate the usefulness of seabed drifters. These are the orange plastic bottom-following drogues for use in nearshore coastal engineering studies. He tested several methods for deploying them on the bottom without divers. They were collected as they washed ashore. These seabed drifters provided evidence of strong onshore near-bottom transport from well beyond the surf zone, underscoring the importance of local winds on nearshore current.

Dr. Jerry Appell of NOAA deployed a Remote Acoustic Doppler System current meter near Dr. Weishar's offshore sled to allow comparison of vertical current profiles. This meter performed very well throughout the experiment and provides data useful not only to NOAA but also to many of our studies on the vertical distribution of nearshore flow.

Mr. Kent Hathaway, a contract student from the Florida Institute of Technology, deployed a seismic system for measuring ocean waves as part of his Ph. D. dissertation work. He will be looking at the microseism variability as a function of changes in incident wave directions and bathymetry.

Mr. John H. Lockhart, Jr., from UCE conducted the beach scour experiment. Its objective was to determine the maximum depth of scour during a storm event or season. A 10-ft-deep hole jetted on the beach was filled with dyed sand in August. As storms occurred, the beach was cut back, and the maximum depth of scour was indicated by the depth to which the dyed sand had been removed. The technique should provide an inexpensive method for districts to monitor maximum beach erosion elevations.

Training was provided to 25 Corps district and division personnel during SUPERDUCK. By actively assisting in many of the experiments, they gained firsthand knowledge and experience of coastal instrumentation, measurement techniques, and processes.

In summary, the SUPERDUCK experiment was extremely successful. The rich data set, collected over a wide range of oceanographic and meteorological conditions, will expand our knowledge of coastal processes affecting many aspects of the Corps' research program and yield benefits to construction, operations, and maintenance responsibilities, as well. Comparisons of several new measurement systems not only benefit the planning and implementation of future R&D efforts but also have immediate and long-term value to Corps field offices. Our understanding of the response of beaches, bar systems, and nearshore bottom areas to storms has been enhanced by the addition of the largest process data set ever collected.

The collection of such a comprehensive data set was not a trivial task. Talented and dedicated people, working together, were required to achieve the technical objectives and provide the logistical support necessary for success. The staff of the FRF is pleased to have played a significant role in meeting the research and logistical requirements of the experiment, one that yields substantial benefits to Corps and national R&D needs.

DISCUSSION

MG HATCH: MG Hatch asked the following questions: "Whose idea was SUPERDUCK?" "How was it funded?" "How did the wide variety of participants become involved?" "What was the future planning?"

MR. MASON: Mr. Mason replied that the impetus for it came from previous studies. DUCK '82 and DUCK '85 were precursors to this experiment, and there was a general recognition that we needed to do something bigger and better to define the processes. Considerable interest was generated in other sectors to do more at our facilities in the future.

DR. HOUSTON: Dr. Houston indicated the funding was GI R&D money, money from WRSC to do the experiments on dredged material disposal movement, and a large amount of it was funded by outside investigators who paid their own way and brought their own equipment. There were participants from eleven universities, four foreign countries, and five other federal agencies.

MG HATCH: MG Hatch asked if the data would be shared among all participants.

MR. MASON: Mr. Mason said that is a requirement.

MG ROBERTSON: MG Robertson said, "It might not be a bad idea to put this in for one of Secretary Dawson's cost-sharing awards. He's looking for recommendations. This is a great example of how much we're getting out of just a little bit of Federal investment."

MG HATCH: MG Hatch added, "Yes. It seems like it was a very exciting enterprise from a variety of perspectives: stretching the Federal dollar; involving a variety of non-Federal entities in what we were doing; piggybacking; and transferring technology, at least of the data collection."

MR. MASON: Mr. Mason said someone from WES did a videotape production of the experiment. It will be shown to both technical and nontechnical audiences.
MG HATCH: MG Hatch said in addition to the coastal engineering community taking full advantage of this, he thought there was an opportunity to discuss this technique in broader R&D circles, marrying Army, Corps, or defense laboratory efforts with other sectors of our society. The information should be shared with others on how it was accomplished.

Questions from the Board, particularly civilian members were requested.

DR. MEI: Dr. Mei asked whether there are already some publications, reports, and papers, that have resulted from this very large effort.

MR. MASON: Mr. Mason replied there are none yet, but a number are planned. Also, a number have already been published from the previous experiments, DUCK '82 and DUCK '85. Usual places of publication are the Journal of Geophysical Research, ASCE publications, the Journal of Sedimentary Petrology, WES technical reports; and, certainly, the coastal sediments conference coming up next spring will have several papers on DUCK '85.

MG HATCH: MG Hatch said that it may take a year or two, but the Ph. D. dissertations and Master's theses, articles, and technical reports we put out need to be gathered, adding the bottom line to the whole exercise.

DR. MEI: Dr. Mei suggested that at the next CERB meeting a list of publications be provided for the period prior to and between the two CERB meetings.

DR. NUMMEDAL: Dr. Nummedal indicated that at the upcoming Coastal Sediments '87 Conference in May 1987 there is going to be a special session dedicated to the DUCK '85 experiment. He agreed with General Hatch that there should be an effort made to compile everything so everyone knows the totality of the publications that are coming out of this experiment.

MG HATCH: MG Hatch said a continued link to other participants is needed so that they can provide automatically that kind of information.

MR. MASON: Mr. Mason said a series of workshops is scheduled after the experiment relating to how people are analyzing their data, what kind of progress they are making, and what they have learned that can help the other investigators.

DR. LE MÉHAUTÉ: Dr. Le Méhauté noted that gathering data is relatively expensive, and analyzing the data is a very essential part of these experiments. He said there should be a good set of breakthrough papers on all the experiments.

MG ROBERTSON: MG Robertson asked if there were any type of system for making these broad data available for nonparticipants to help in the analysis of the data.

MR. MASON: Mr. Mason replied there is an agreement between the investigators that the general data release will occur 2 years after the collection and that there was an intent to publish a summary of the data as a report for other people to look at so that they can request data tapes in which they have a particular interest.

MG ROBERTSON: MG Robertson asked about the camera setup brought over by a Tokyo University professor.

DR. HOUSTON: Dr. Houston replied that the professor owns three or four of the cameras, and the rest of them were donated by a company in Japan.

MG ROBERTSON: MG Robertson noted that it is a fantastic opportunity to gain all kinds of data for minimum cost to any one agency.

DR. MEI: Dr. Mei asked if NOAA is a participating agency in this experiment.

MR. MASON: Mr. Mason replied that NOAA was a participant.

DR. MEI: Dr. Mei commented on the potential benefits of this type of experiment and stated that its success might promote further research through NOAA's Sea Grant program.

MR. MASON: Mr. Mason noted that there was a Sea Grant experiment from North Carolina State University.

DR. NUMMEDAL: Dr. Nummedal commented on the Nearshore Sediment Transport Study (NSTS) experiment previously sponsored by Sea Grant and suggested that it would be worthwhile considering reestablishing a mechanism to have a National Sea Grant effort. He noted there was clearly a great deal of enthusiasm among all participants in this project. He inquired about the possibility of similar types of experiments on other coasts.

DR. HOUSTON: Dr. Houston replied, "There are plans this year for some very small experiments on different coasts."

DR. NUMMEDAL: Dr. Nummedal commented that the primary benefit of the Field Research Facility is that we have developed there, over the last 10 years, an extremely talented pool of people, and that those people are very mobile.

MR. MASON: Mr. Mason replied that the people are important but that equipment is needed also. He noted that the equipment is not very portable, but it could be moved if necessary.

MG HATCH: MG Hatch indicated that Mr. Mason's observation should be considered.

PUBLIC COMMENT

At this point in the meeting, there was an opportunity for any public comment by representatives of the public.

DR. HERBICH: Dr. Herbich said that coastal engineering, as such, has not really been recognized as well as some other engineering or established departments like civil, mechanical, and electrical. Coastal engineering was generated through the efforts in the early days of Professors Johnson, Wiegel, and others at the University of California and has gradually grown and been established as a definite type of engineering. This can be documented in that we have had coastal engineering conferences over the years, and they have grown. The ASCE recognized this and took over that function that was originally established by the Wave Research Council which was basically an effort of the University of California.

He noted that funding is getting more difficult to obtain, so planning must be refined to get sources of funds from all places, Federal, State, and non-Federal; and he thought that the SUPERDUCK experiment was an excellent example of that effort.

He expressed an opinion that the Sea Grant programs should be more involved with the coastal engineering effort and noted that Sea Grant programs have not fulfilled the expectations that were generated 20 years ago. Because so much money goes into fisheries and horticulture and other things, it is very hard to get Sea Grant money for engineering projects. He said that we should try to do as much as we can with support from as many agencies as we can find, and, of course, get some of the money from Federal sources because no one else is going to pay for it. He thought that if the SUPERDUCK experiment were better known to Sea Grant and to all the universities, there could be more participation from other universities and other agencies. He congratulated CERC on the efforts being made and noted, "It's quite impressive."

MG HATCH: MG Hatch stated, "The period for public comments is closed."

FINAL DISCUSSION AND RECOMMENDATIONS

Below is a synopsis of questions and comments by members of the Board.

MG HATCH: MG Hatch asked if we routinely invite representatives of other key agencies to sit in on these meetings every time.

DR. HOUSTON: Dr. Houston said not for every meeting, but we have selectively invited them to participate.

MG HATCH: MG Hatch asked the secretary to consider that. He indicated there may be some benefits in inviting NOAA and possibly some other agencies. He then asked if there is a single section, or separate professional association, with which coastal engineers associate themselves.

MR. CONVERSE: Mr. Converse said it is the Waterways, Port, Coastal and Ocean Division of ASCE which sponsors the coastal specialty conferences, and it is involved in the international coastal engineering conferences sponsored by the Coastal Engineering Research Council which is under the Technical Council on Research of ASCE.

MG HATCH: MG Hatch said that the Board would probably unanimously agree that encouraging participation in that organization by the coastal specialists within the Corps would be a sound move. One of the things noted was the need or desire for some form of better identity of coastal specialists within the Corps of Engineers.

DR. LE MÉHAUTÉ: Dr. Le Méhauté said the Corps has traditionally been deeply involved in ASCE activities and, particularly, coastal engineering. Many members of the Corps belong to committees of ASCE's Waterway, Port, Coastal and Ocean Division. Dr. Ed Thompson is the journal editor of that division of ASCE.

MG HATCH: MG Hatch said that CERC is probably fine in that regard, but he was more concerned with the other 300 coastal specialists who are scattered throughout the Corps of Engineers.

MR. VALLIANOS: Mr. Vallianos noted that there are several other organizations involved in coastal engineering. These include the American Beach and Shore Preservation Association, the Permanent International Association of Navigators Congresses (PIANC), and the Dredging Association.

MG HATCH: MG Hatch directed the secretary to put together the Board's recommendations to the Chief of Engineers in draft form and to send it to the Board members for comment.

MR. MCCORMICK: Mr. McCormick raised a question about creating specialists without isolating them in the organization.

MG HATCH: MG Hatch indicated that it was not intended to isolate the specialists, and they should still be able to advance in the organization. He then asked for any other comments in response to charges by the Chief.

DR. LE MÉHAUTÉ: Dr. Le Méhauté indicated he was sure the Board had reached a consensus and that there were three possible alternatives for CERC: privatization, status quo, and pilot studies. He did not think that the status quo was desirable. We need to keep CERC in a leading position on an international basis, but there is no reason to stop there. We have to keep pushing for excellence, prestige, recognition, and influence on the international scale.

He did not think the privatization was realistic. The only thing which remained was the pilot studies. He suggested that CERC be given the authorization to try to attract either commercial business in the United States or foreign business on a few years' basis and see how it works under the constraints of the Corps of Engineers.

DR. NUMMEDAL: Dr. Nummedal said he agreed and wanted to be more specific. He said, "Clearly we must reverse the current trend in downward funding for basic research within CERC."

He also said that we cannot expect to compete with the European labs or the Japanese labs unless we do what they do, namely, market our capabilities. He noted that Delft lab has set up a semiautonomous corporation that enables that lab to pursue a marketing effort. He proposed an expanded version of CERC consisting of three components: (1) a consortium of universities that has as its primary goal to develop and enhance basic research in all aspects of coastal engineering; (2) a semiautonomous corporation that can market the capabilities of both university research and CERC and, on its own, pursue technical developments for foreign countries or for customers outside the Corps; and (3) CERC which would remain a Corps of Engineers laboratory and would have as its primary mandate support of the mission of the Army Corps of Engineers.

He also proposed that the Board sponsor a fact-finding mission consisting of some Board members, someone from OCE, and the Chief of CERC, or whoever is designated, to investigate the affiliations of the European laboratories to see what plans they have for the future, how they are structured, and how they are connected with the basic research program and the marketing efforts in those countries.

DR. LE MÉHAUTÉ: Dr. Le Méhauté indicated that 2 years ago he was sent on a similar mission on behalf of the NSF, and he spent 3 months in Europe investigating Eurpoean laboratories. He prepared a report on his mission.

DR. NUMMEDAL: Dr. Nummedal recommended to the secretary, via MG Hatch, that copies of that report be brought to the attention of the Board.

MG HATCH: MG Hatch concurred. He then discussed the proposals of the Board and possible recommendations to the Chief of Engineers. He suggested a thorough look at HR 6 and the continuing resolution and an assessment of the impact over the short and medium range of those two pieces of legislation on the program.

He indicated that HR 6 opens the door to state and local governments and believed the Board would endorse the legislation yet to be forwarded to Congress that would open that door wider to private sector involvement.

He believed that Dr. Le Méhauté's proposal, to the extent legal constraint would permit, and the academic consortium portion of Dr. Nummedal's proposal could move forward.

MG ROBERTSON: MG Robertson concurred and recommended that CERC review HR 6 and report to the Board at the next meeting.

DR. HOUSTON: Dr. Houston agreed that the next CERB meeting would be an appropriate period of time.

MG HATCH: MG Hatch said that he thought it was a good idea to have that as a feature of the next meeting.

DR. MEI: Dr. Mei noted that the chief goal is to raise the standard of excellence of coastal engineering research and practice in this country. He stated that it was useful to reemphasize again that "in our research, both conducted at CERC and elsewhere, that proper attention and emphasis must be given to those basic aspects that are essential to the applications of coastal engineering practice." He discussed CERC's role in coastal engineering research, the role of universities, and the support given by CERC to universities.

DR. HOUSTON: Dr. Houston noted that CERC had awarded 15 contracts under the Broad Agency Announcement in the last 6 or 7 months, mainly to universities. He mentioned that these are all mission-related research and that the Corps of Engineers does not give grants. He pointed out that there is an agreement between the Corps of Engineers and NSF to use the Corps of Engineers on a noninterference basis, that universities have use of the physical models at CERC, and that 20 to 30 universities have used the FRF. He discussed research carried out at CERC and emphasized that it is mission related research.

DR. LE MÉHAUTÉ: Dr. Le Méhauté noted that mission oriented research is the best aspect of research in the United States and in the Corps of Engineers. He further stated, "I think the superiority of the research done by the Corps of Engineers is that it is pertinent."

DR. HOUSTON: Dr. Houston concurred and noted that CERC is funding large amounts of money to universities that are willing to work on Corps problems.

DR. MEI: Dr. Mei provided further discussion on university research and noted that he supported mission-oriented research as well.

MR. PFEIFFER: Mr. Pfeiffer noted that mission oriented research is well received in Washington and in Congress.

MG HATCH: MG Hatch noted that there was a general consensus acknowledging that mission orientation is essential.

DATE AND PLACE OF NEXT MEETING

MG HATCH: MG Hatch noted that the next item of business was to consider future meetings.

MR. DEBRUIN: Mr. Debruin referred to a letter signed by GEN Helms inviting the CERB to have the next meeting in US Army Engineer Division, Southwest, Galveston District, at Corpus Christi.

MG HATCH: MG Hatch indicated that with the concurrence of the Board he intended to accept the invitation. That date was set as 19 to 21 May 1987.

CLOSING REMARKS

I'd like to offer some expressions of the Board's appreciation to a variety of folks. First I'll start with my personal thanks to the Board.

It's nice to be part of the CERB. And thank you very much for your welcoming of the newest president. Some special thanks to the Commander of WES who has taken on the mantle of secretary, to Jim and all of your people, all the people that made presentations, and to a lot of you attendees who stuck with it throughout the entire period.

Some of the folks locally I would like to thank are Ms. Sharon Hanks, the overall coordinator for our effort here; Mr. Andy Szuwalski, the CERB coordinator; Mses. Brenda White and Betsy Farrell, for secretarial assistance; Mr. Robert Hall, our sound technician; Mses. Lisa Brady and Rhonda Hall, our court reporters who stuck with it; and Mr. Steve Wagner, who helped with all the equipment. This was super site support. I would like to add thanks, also, to Holiday Inn management for supporting this extremely well.

Ladies and gentlemen, the 46th meeting of the CERB is hereby adjourned.

(Meeting adjourned at 11:50 a.m.)

APPENDIX A

MINUTES OF THE AUTOMATED COASTAL ENGINEERING (ACE) PILOT COMMITTEE MEETING (1 and 2 OCTOBER 1986)

MINUTES OF THE AUTOMATED COASTAL ENGINEERING (ACE) PILOT COMMITTEE MEETING

(1 and 2 October 1986)

1. ATTENDANCE. The first meeting of the ACE Pilot Committee was held at the offices of U.S. Army Engineer Division, South Pacific (SPN) in San Francisco, CA, on 1 and 2 October 1986. The meeting was hosted by Mr. Douglas Pirie of that office, and was attended by the following:

ATTENDEE:	OFFICE:	
Douglas Pirie	SPDCO-ON	
John G. Housley	DAEN-CWP-F	
Thomas Bender	NCBED-DC	
Edward Fulford	NABPL-P	
A. J. Combe III	LMNED-HC	
John Oliver	NPDEN-TE	
Charles Linwood Vincent	WESCP	
Walter Day	SPDED	*
G. W. Domurat	SPDPD-C	*
Hugh Converse	SPDED-W	*
Jesse A. Pfeiffer, Jr.	DAEN-RDC	*
John H. Lockhart, Jr.	DAEN-CWH-D	*
Charles C. Calhoun	WESCV-A	*
David Leenknecht	WESCR-PT	*

NOTE: * Indicates an invited guest

2. Prior to that meeting, the attendees visited the offices of SPN, where demonstrations were provided for committee members on existing uses of microcomputers by coastal specialists at SPN. The demonstrations included both commercial and custom software using IBM AT and Hewlett Packard micro computers for various aspects of project management, volumetric and areal computations, local databasing, communications, and wave runup computations.

3. INTRODUCTION. The meeting opened with introductory remarks by Dr. Vincent concerning his hopes and goals for the meeting and the ACE program in general. He reviewed the general goals presented in the July 86 ACE Workshops and offered the suggestion that the ACE system initially be developed as a test "prototype" system using existing knowledge, hardware, and software, and offered a diagram of a conceptual ACE system (Figure 1). Mr. Pfeiffer reviewed the salient features and success of the Computer Aided Structural Engineering (CASE) program. He noted that the program was directed by committees of Corps Field Office representatives, was funded within the Structural Engineering Research Program, and had wide effects on many aspects of structural works in the Corps. After explaining the selection of Dr. Vincent as the ACE Program Manager within CERC, he listed possible funding sources for the ACE system as the Coastal Engineering Research Program, the Dredging Program, Field Offices, and others.

4. STRUCTURE of PILOT COMMITTEE. The Pilot Committee established the structure and term of current and future members, and established criteria and procedures for the appointment of future members. Mr. John Oliver was elected chairman of the present group, and Mr. Earl Howard was elected vice-chairman; each will serve 2-year terms, both as officers and members of the committee. In order to provide continuity in the early years of ACE development, a staggered schedule was adopted for the terms of the initial committee members:

LENGTH OF TERM:	MEMBERS:
2 years	John Oliver, Earl Howard
3 years	Douglas Pirie, Jay Combe
4 years	Edward Fulford, Thomas Bender

The following criteria were established for selecting successive members to the Pilot Committee:

a. The expertise and qualifications of the prospective members.

b. Maintain a representative mix of members with respect to functional work areas (Engineering, Construction-Operations, and Planning).

c. Maintain a representative mix of members with respect to coastal regions.

The mechanism for appointing successive members will be recommendation by the Pilot Committee, and actual appointment by the Director of Civil Works. The OCE member of the committee will be rotated at 3-year terms between the Coastal Engineering Research Program Technical Monitors (currently Mr. Housley and Mr. Lockhart). The CERC ACE Program Manager (currently Dr. Vincent) will have continuing membership.

5. MEETINGS and QUORUMS. Several decisions were made by the committee concerning the frequency of meetings, and the constitution of a quorum. The Pilot Committee will meet a minimum of twice per year; more frequently if necessary. An annual meeting would be scheduled at CERC coincident with the annual review of the Coastal Engineering Research Program, so the members are able to stay abreast of user needs and also participate in the review process. It was recommended that other meetings be held at or near Field Offices in order to conduct site visits and review the use of ACE and other coastal microcomputer applications within the Corps coastal community. Meetings for the upcoming year were tentatively scheduled as follows:

DATE:	HOST:	LOCATION:
Jan 12-13	LMN	New Orleans, La
March or April	CERC	Vicksburg, Ms
June or July	SPD	Oceanside, Ca

The committee established the policy of requirements for a quorum as attendance by four Pilot Committee members from the Field Offices, plus the OCE member, and the CERC member. The chairman or vice-chairman must also be present. Pilot Committee members may designate substitutes to attend meetings in their absence, but the substitute attendees may not vote on committee decisions, nor will they count as part of the quorum.

6. OBJECTIVES, GOALS, APPROACH. The committee adopted the following statement of objectives for the ACE Pilot Committee:

> Provide, recommend, and promote computer-based tools to increase Corps Coastal Engineering capabilities.

In addition, the general goals of the ACE system were specified to be:

a. Increase reliablility of Corps coastal practices.

b. Increase accuracy of Corps coastal practices.

c. Increase cost-effectiveness of Corps coastal practices.

d. Provide new tools.

e. Increase availability and accessibility of existing tools.

f. Provide documentation and training.

g. Develop versatility in the software.

The committee also chose to adopt the general policy guidelines as stated in the recommendations of the CERC Technical Committee for ACE. The ACE system should be dedicated to:

a. Use by Corps field offices.

b. Comprehensive practical applications.

c. Continuity with respect to Corps planning, design, construction, and maintenance processes.

d. Adaptability to advances in technology.

Discussions of approach were preceded by an effort to identify a list of possible topic areas to be addressed by the ACE effort. The suggested topics are presented in Table 1. The order of the topics is not by priority, but results from the general round-table polling. Items 22 (bulletin board) and 7 (review and enhancement of MACE) were selected as initial efforts, and the establishment of Working Committees was chosen as a viable approach toward their investigation and implementation. After much discussion, the committee also agreed that the initial ACE system development would be directed toward implementation on IBM (or compatible) PC microcomputers.

7. CONSTITUENCY of WORKING COMMITTEES. The Pilot Committee chose the establishment of Working Committees as vehicles to study, recommend, and act upon addressing individual tasks. Working Committees may consist of:

a. Members of the ACE Pilot Committee.

b. Additional members of Corps Field Offices.

c. CERC staff.

d. Others.

8. RELATIONSHIP and DUTIES of PILOT COMMITTEE, WORKING COMMITTEES, and CERC. The relationships and duties of the various entities to be involved in ACE development were defined as:

a. Pilot Committee Duties.

(1) Assign tasks to Working Committees.
(2) Appoint Working Committees.
(3) Approve products.

b. Working Committee Duties.

(1) Obtain needed information.
(2) Specify I/O standards for software.
(3) Test and evaluate software.
(4) Test and evaluate documentation.
(5) Recommend approval to Pilot Committee.

c. CERC Duties.

(1) Respond to Working Committee requests.
(2) Translate Working Committee requirements into software.
(3) Provide documentation and training.

9. WORKING COMMITTEE for ESTABLISHING a COASTAL COMMUNICATIONS NETWORK. The Pilot Committee established the subject Working Committee to address what was considered the highest priority task. The members of this committee are:

John Housley (OCE), Chairman
Jay Lockhart (OCE)
Jerry Greener (WRSC)
Paul May (CERC)

Mr. Greener was appointed to the committee as a result of his activities in establishing the successful DREDGENET. His knowledge and contacts from that endeavor may be useful towards expediting the establishment of a similar network for the Corps coastal community. Several attendees at this meeting were familar with the above communications network and expressed general satisfaction and enthusiasm for a similar network. Mr. May has been involved in creating a bulletin board as part of the CEIMS system, and was a member of the CERC ACE Technical Committee. The Working Committee was tasked to provide

an implementation program and action schedule by the next Pilot Committee meeting (Jan 87), and to provide a summary of time, costs, and problems. Telephone calls conducted during this meeting revealed that a system similar to DREDGENET could potentially be implemented rapidly, and the Pilot Committee authorized the Working Committee to install such a system before the next meeting if determined to be feasible. A decision was made to report the plans and status of this item to the CERB at the October 1986 meeting.

10. WORKING COMMITTEE for INTEGRATING MACE PROGRAMS INTO ACE SYSTEM. Dr. Vincent proposed a plan for possible early development of some ACE wave-related products (Figure 2), which included the integration of the SEAS database, other forms of field wave data, numerical models, and other software into a well defined system. Some of the proposed software elements are products of the Coastal Engineering Research Program scheduled for release this fiscal year. In order to increase the chances of completing a useable product in the shortest possible time, the Pilot Committee chose to investigate a plan of similar form, but consisting of MACE-level or other readily available codes in lieu of research products at this time. It was felt that greater benefits for the long-term health of the ACE system could be obtained by a prompt release of this nature in order to promote rapid acceptance in the field. A Working Committee was created to review the existing and developing MACE software and other readily available products for integration into a system of the above form. The Working Committee consists of the following members:

Edward Fulford (NAB), Chairman
Maryann Gerber (SAJ)
George Domurat (SPD)
Thomas Bender (NCB)

The Pilot Committee also tasked the Working Committee to establish the appropriate data formats to be employed, to place primary emphasis upon designing a modular system (to allow the substitution of more sophisticated software modules), and to provide complete paths from one end to the other (i.e., software and data compatibility throughout the package). A working product is needed by July 87, and the Working Committee was directed to make status reports at each Pilot Committee meeting.

11. WORKING COMMITTEE for INVENTORY of EXISTING SOFTWARE. The Pilot Committee appointed a Working Committee of itself as a whole to conduct a survey at all Field Office elements of existing software which is related to, or in concert with the proposed list of ACE topics (Table 1), or the MACE codes. The results of the survey should be sent to Dr. Vincent by 12 December 1986.

12. GENERAL BUSINESS. Items of a general nature discussed at the meeting included the decision that special stationary with an ACE letterhead would be required for conducting ACE business, and that an Engineering Regulation (ER) would be drafted as an official charter for establishing the Pilot Committee as an entity in the Corps. Mr. Housley will write and submit the ER document for approval through the appropriate Corps channels. The time for review and approval was estimated to be at least a year. Letters soliciting

the approval for appointment of the various members of the Working Committees will be drafted by the CERC staff for the Pilot Committee chairman's signature.

13. TOPICS for NEXT MEETING. Items to be addressed at the next Pilot Committee meeting will include the review of the status of tasks assigned during this meeting, hearing reports from the Working Committees established at this meeting, and creating additional Working Committes for such items as:

a. Conducting a technical hardware review, and providing recommendations for future migration of ACE system.

b. Designing the general organization, structure and arrangement of all ACE software (user access shell).

c. Discussions should be held concerning the interaction of ACE with the Corps-wide Dredging Program.

David A. Leenknecht

Table 1

List of Suggested Topics for ACE Development

1. Volumetric/Areal Calculations
2. Wave Transformation
3. Design of Offshore Breakwaters
4. Lack of Design Criteria for Non-ocean Shorelines
5. Sediment Budget
6. Beachfill Design
7. Review MACE --- refine and improve
8. Standardized Refraction/Diffraction (structures)
9. Design of Structures under Overtopping and Breaking Waves
10. Shoreline Response to Coastal Structures
11. Wave Runup on Structures
12. Harbor Layout and Functional Design
13. Floating Breakwater Design
14. Sediment Transport Calculations
15. Shoreline Recession from Storms
16. Design Wave Water Level Computations
17. Storm Surge/Tsunami
18. Modeling Beach Fills In Front of Seawalls
19. Rapid Dataset Construction Techniques
20. Techniques for Accessing SEAS / making datasets available
21. SEAS for Great Lakes
22. Bulletin Board
23. Shoreline Response to Water Level Change
24. Inlet Dynamics
25. Statistics of Frequency of Occurrence
26. Management Systems
27. Prediction of Shoaling in Navigation Channels
28. Bar Channel & Coastal Entrance Shoaling Characteristics (seasonal or single storm)
29. Dredged Disposal Site Fate
30. Advance Maintenance (width or depth) Effect $$$
31. Navigation Structure Effects on Adjacent Bathymetry
32. Dredging Management Data System

APPENDIX B

MEMORANDUM FOR PRESIDENT

COASTAL ENGINEERING RESEARCH BOARD

REPORT OF CERB WORKING GROUP ON THE

STATUS OF COASTAL ENGINEERING OF THE CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY
WATERWAYS EXPERIMENT STATION, CORPS OF ENGINEERS
P.O. BOX 631
VICKSBURG, MISSISSIPPI 39180-0631

REPLY TO
ATTENTION OF

WESCV-Z

12 September 1986

MEMORANDUM FOR PRESIDENT, COASTAL ENGINEERING RESEARCH BOARD (CERB)

SUBJECT: Report of CERB Working Group on the Status of Coastal Engineering in the Corps of Engineers

1. At the CERB meeting in Homer, AK, in May 1986, you appointed a Working Group to gather information and make recommendations to you on various initiatives being pursued in response to the Chief's charge to the CERB (see proceedings of 44th meeting). The working group is Mr. Herbert H. Kennon, North Pacific Division (NPD), Messrs. Jesse A. Pfeiffer, Jr., John G. Housley and John H. Lockhart, Jr. Office Chief of Engineers, and Mr. Charles C. Calhoun, Jr., Waterways Experiment Station (WES). We received invaluable assistance from Messrs. Thomas W. Richardson and Orson P. Smith (WES) and Mr. John G. Oliver (NPD).

2. The specific areas of concern or topics you asked us to address included:

a. Past, present, and future coastal engineering work load and manpower.

b. Organizational structure for coastal engineering within field offices.

c. Career development opportunities for coastal specialists.

d. Education/training opportunities for coastal specialists.

3. For purposes of these discussions, "coastal engineering" was defined as "engineering or scientific efforts related to public works development in the coastal environment." "Coastal specialists" were defined as "professionals who are specialists in technical aspects of coastal problems or coastal works conceived in response to these problems." Specialists in dredging and dredged material disposal in a coastal environment other than the purely mechanical aspects were considered coastal specialists under the definition.

WESCV-Z 12 September 1986
SUBJECT: Report of CERB Working Group on the Status of Coastal Engineering in the Corps of Engineers

4. Two parallel approaches were taken to address the areas of concern listed in paragraph 2. By your letter dated 10 June 1986 the coastal field offices were requested to provide information on work load and manpower. This letter also announced a series of six regional workshops for discussion of the topics as well as the Automated Coastal Engineering (ACE) System being developed by the Coastal Engineering Research Center at WES. The workshops were held as follows and were attended by over 100 participants:

7-8 July 1986 - Baltimore, Maryland
9-10 July 1986 - Detroit, Michigan
14-15 July 1986 - New Orleans, Louisiana
16-17 July 1986 - Jacksonville, Florida
21-22 July 1986 - Los Angeles, California
23-24 July 1986 - Portland, Oregon

5. At least one member of the Working Group attended each workshop. All members of the Working Group, plus the others mentioned in the first paragraph, met in Portland after the last workshop to discuss findings and formulate preliminary recommendations. A draft of this Memorandum was subsequently developed and reviewed by all members of the Working Group and resulting refinements incorporated. Opinions on specific topics presented below are unanimous.

SUMMARY OF RESPONSES FROM LETTER AND WORKSHOPS

PAST, PRESENT, AND FUTURE COASTAL ENGINEERING WORK LOAD AND MANPOWER

6. Data gathered in response to your letter requesting information on the Corps coastal engineering work load and manpower are presented in Tables 1, 2, and 3 (encls 1, 2 and 3). The work load was broken into two categories: coastal problems and coastal works. The manpower data are shown by internal organizational area. The four points in time (1976, 1981, 1986, and 1991), for which information is given on manpower in Table 3, are nominally five years apart, but reflect average capabilities surrounding those specific years.

ORGANIZATIONAL STRUCTURE

7. The Corps of Engineers is a highly decentralized organization resulting in a variety of organizational arrangements within districts and divisions. Two divisions have centralized significant portions of their coastal engineering responsibility at one of their coastal districts. Others have retained the full range of coastal engineering responsibility at each coastal district. At the district level the coastal engineering expertise has often been dispersed between the Planning, Engineering Construction/Operations, etc. divisions. In some districts, centralized coastal groups perform all aspects of coastal engineering work.

8. Strong feelings were expressed by many workshop participants on the subject of organizational arrangement. Centralization at the district level was generally favored as the most desirable organizational structure. There was clear consensus, if not unaminity, against regional centralization or formation of "centers of expertise" within a division. Strong opinions against this option were expressed by representatives from districts that had lost and gained the mission, this indicating there was more than simply "sour grapes" being expressed by district representatives that had lost a mission.

9. The training and experience value of working on projects in various stages (i.e. planning, design, construction, operations, and maintenance) was most often cited as the principal reason for district level centralization. Under district centralization, a higher degree of technical capability is possible because the specialist stays involved with the project from concept investigation through construction and operation. The opinion was expressed that dispersion of expertise among separate district elements tends to detract from career development opportunities for coastal specialists, reduces their intercommunications, and confuses the public. Inferior communications with the local public and lack of in depth familiarity with local coastal features were most often cited as reasons against regional centralization. District representatives from divisions where regional centralization exists pointed out that the contact with the local public remains a significant responsibility even in times of low project work load.

CAREER DEVELOPMENT

10. Most workshop participants expressed strong dissatisfaction with career opportunities for coastal specialists in the Corps. Promotion beyond the GS-12 level is extremely difficult since GM-13 supervisory positions in coastal specialty groups are rare and no GS-13 or above technical specialist positions currently exist in the districts. Promotion to GS-12 is suprisingly difficult for both engineering and non-engineering coastal specialists at a number of districts. The lack of obvious promotion potential, as well as the associated earning ceilings, were cited as the principal reasons for many coastal experts leaving the Corps for private industry.

EDUCATION/TRAINING

11. Application of formal education in specialized coastal subjects was generally recognized as critical to maintaining a high standard of excellence in Corps work. Though not critical at the entry level for engineers and scientists, depth and variety of experience in coastal works were consistently stated as critical to achievement of "specialist" or of "expert" status. A significant number of workshop participants were not familiar with existing long-term training and educational opportunities in the Corps. Most were not aware of the Individual Development Plans and the need for them to discuss

these plans with their supervisors. The possibility of long-term training at the Vicksburg Graduate Institute, possibly through a Delft or Planning Associates type program conducted by WES, was met with much favor. Participation in the ACE System Pilot Committee Working Groups and similar research labs/field office interchanges were also met with favor.

DISCUSSION AND CONCLUSIONS

GENERAL

12. In our discussions held after the final workshop, we decided your tasking could be rephrased as "What is the overall health of coastal engineering in the Corps and what can we do to improve the situation?" We have concluded that the overall health of coastal engineering in the Corps has the potential to be excellent. The work load necessary to provide this health appears sufficient Corps wide. It appears that local problems are the result of casual management of coastal specialists. There are strong signs that the Corps management must take some essential steps to maintain and improve the health we now enjoy.

WORK LOAD AND MANPOWER

13. Our review of Tables 1 and 2 indicates to us that there has been, and there is expected to be, growth of coastal engineering in the Corps. There has been an 18 percent growth over the past 5 years in the number of studies or projects involving coastal problems (Table 1). Over the next 10 years there is an expected increase in this area of approximately 10 percent. More modest increases have occurred and are expected to occur in the number of studies or projects involving coastal works (Table 2). It is important to note that although the increases shown in Tables 1 and 2 are not large, there has not been a decline Corps wide as some have thought.

14. Table 3 shows a small, but steady, increase in the number of coastal specialists in the districts and divisions up to the 1986 strength of 337. There have been significant increases over the past 10 years in the number of specialists in the planning and construction/operations functions while the number in engineering has declined slightly. All these elements project an increase in the number of specialists they will require to accomplish their missions in the next five years.

ORGANIZATIONAL ARRANGEMENTS

15. Coastal specialists constitute a rather small (approximately [illegible]) essential, expertise and work force within the Corps. These specialists are often invisible in the Corps' organizational structure. As [illegible] indicated by Table 3, they are often spread throughout organizations.

AD-A184 177 PROCEEDINGS OF THE MEETING OF THE COASTAL ENGINEERING RESEARCH BOARD (46T (U) COASTAL ENGINEERING RESEARCH CENTER VICKSBURG MS J R HOUSTON JUN 87 2/2

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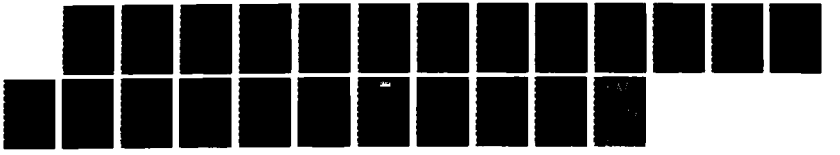

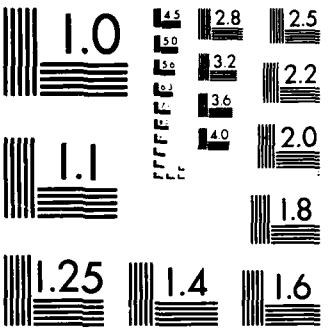

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

the district structure with no identifiable element of their own. This situation also exists at OCE where, from our review of the organizational chart, only one element even has the word "coastal" in the title.

16. Centralization of coastal specialists within the district office was highly favored by workshop participants while there was little to no support for centralizing this expertise on a regional basis. We concur with the participants in both situations. In our opinion the coastal expertise should be centralized within the district if the work load will support the element. Such centralization will provide the synergism resulting from coastal specialists working together on a day-to-day basis on all aspects of the study and project.

17. We find no technical reason to justify regional centralization of coastal expertise. Representatives from districts involved in such centralization were unanimously opposed to the concept for what we consider sound reasons. We agree with the participants that coastal engineering involves a thorough knowledge of highly site-specific factors. This knowledge can be gained only through experience within the geographical area. We also agree that such centralization can cause confusion to the public. Coastal problems associated with a permit are handled by one district, while problems associated with coastal structures are handled by another is a pertinent example. With cost sharing and other factors requiring closer coordination and contact with the public, we should avoid any actions that will add to the confusion. In order to maintain the expertise at the district level, there must be a commitment from management to hire and retain the coastal specialists necessary to accomplish the work. If good people cannot be retained, then centralization on a regional basis may be feasible by default.

CAREER DEVELOPMENT

18. The Chief made it clear to us in his charge that the Corps must grow its own coastal specialists if we are to maintain the capability to accomplish this mission and maintain our well earned place of world-wide eminence. The Corps appear to be growing professionals to a degree, but these are problems retaining them. One district with a large coastal work load noted that the average experience in the coastal group was only one to two years. This situation must be corrected if the expertise is to remain in the District.

19. At present a coastal specialist in a district can advance above GS-12 only by entering the supervisory chain. In some instances specialists find it extremely difficult, if not impossible, to even advance to the GS-12 level. This appears to be true for both engineer and non-engineer coastal specialists. In our opinion each district should have at least one technical expert at the GS-13 or above level. This non-supervisory position would be filled by a true expert who would normally have a sound formal educational

background and extensive experience in the field. We believe these experts could be retained within the Corps at grades of GS-13 and above, and the position itself would provide hope of career advancement to coastal specialists who want to, and should, remain on the technical career ladder. This concept had tremendous support at the workshops by both division and district personnel.

20. We have discussed the grade situation further with a representative of the Office of Personnel at OCE. There appears to be nothing in personnel regulations limiting the grades of non-supervisory coastal specialists in districts to GS-12 or below. If the work the individual is doing meets the standards of a GS-12 or above, that individual can be promoted. Our reading of the position evaluation guide indicates that the nature of work coastal specialists perform would in many cases support the higher grades.

21. There is certainly precedent for higher grades in other organizations. Attached as encl 4 is a brochure distributed by Bonneville Power Administration (BPA), an operating arm of the U.S. Department of Energy. You will note from the brochure there is a clear path for technical experts to follow. From discussions and correspondence one of our members has had with BPA, we learned that BPA has technical grades up to GS-15. Technical specialists in the Corps laboratory system can also advance to the GS-15 position. At WES, technical specialists advancing past GS-12 must have their credentials scrutinized and evaluated by a panel which considers many specifically defined factors before they are considered for promotion. It appears to us that systems such as those existing at BPA and the R & D labs could be established at district level. A coastal specialist would know exactly what was expected and what "tickets needed to be punched" to be considered for the higher grades. We believe actions should be taken immediately toward creating a technical career ladder for coastal specialists. There are relatively few coastal specialists in the Corps, and unlike most other disciplines, they cannot be readily replaced. Actions taken on behalf of the coastal specialists could serve as a pilot program to later evaluate specialist positions in other disciplines within the Corps.

22. The discussion of grade dominated the session on career development. However, other topics were discussed as well. In general, the participants felt their specialty was recognized and, in fact, sought out by specialists in other fields. There was concern, however, that the Corps personnel system does not recognize the coastal specialists. For example, the coastal engineering specialty does not appear on the SKAP form and must be written in. Representatives from several districts said they received very little support from supervisors when they wanted to participate in professional activities (many others said they did get support).

EDUCATION/TRAINING

23. As we expected, there was no consensus on the exact level of formal education required by an individual before he or she could be considered a coastal specialist. Specific on-the-job or other training and experience could also not be pinpointed. Because of the broad definition of coastal specialist, a precise curriculum or academic major could not be agreed upon. By our definition, coastal specialists include engineers and non-engineers. Therefore, we have coastal specialists with scientific degrees such as oceanography and geology. Since there are few professionals with degrees in coastal engineering, most engineering specialists have a civil engineering background. This variation in academic training and the complexity of coastal engineering points us to the conclusion that the Corps must carefully consider these widely varying factors when establishing requirements for a coastal specialist and in developing a career ladder that would include educational and training requirements.

24. As General Heiberg said in his charge to the CERB, we are considering needs for specialists in a mission area where we essentially "stand alone." Therefore, we must consider providing more education and specialized training to these specialists. Because of limited programs in universities, we will probably have to develop our own curriculum and facilities. The precedence for this has been set by the Planning Associates program. Steps already taken by WES to develop the Vicksburg Graduate Institute will aid us in solving this problem. An excellent training and educational facility can be developed for coastal specialists at WES that would lead to a degree. In our opinion this approach is superior to the Planning Associates approach, which does not lead to a degree.

25. In addition to formal education and training, on the job training and experience is absolutely essential to the development of coastal specialist. This training and experience must be under the tutorial of a senior coastal specialists if the individual is to grow professionally. A coastal specialist at the GS-13 and above position within the district could serve as the tutor or mentor and be instrumental in establishing career development requirements. Combining the education and training with the experience gained from working under a true expert will move us well along in the right direction.

26. Dredging is one of the most high cost, visible, and controversial missions we have in the Corps. The dredging process itself places constraints on designs of coastal facilities. Several participants pointed out that before any individual can be considered a coastal specialist, they must have a good understanding of dredging operations. We totally agree with this and believe any education and training program must include dredging since dredging and coastal engineering are interrelated and inseparable disciplines.

27. We were surprised by the large number of participants that were not aware of long-term educational and training opportunities the Corps now offers. Also many participants had never even heard of Individual Development Plans. This situation must be corrected.

RECOMMENDATIONS

ORGANIZATIONAL ARRANGEMENTS

1. As a general rule, and when the work load allows, coastal specialists should be centralized into a single identifiable unit within the organizational structure. This applies to all levels within the Corps hierarchy.

2. As a general rule, and when the work load allows, each coastal district should maintain its own coastal expertise and only under extremely extenuating circumstances should this expertise be centralized on a regional basis.

CAREER DEVELOPMENT

1. Immediate action is needed to establish in field offices well-defined technical specialist career ladders leading to grades GS-13 and above. This is the single most important recommendation we have.

2. SKAP packages should be revised to show the coastal engineering specialist and more generally any other procedural obstructions to career advancement for coastal specialists should be removed.

3. Supervisors should encourage and emphasize participation in professional activities.

EDUCATION AND TRAINING

1. A Planning Associates type program offering graduate credit should be established for coastal specialists. Such a program could be established at WES to take advantage of their physical facilities, expert staff, and the Vicksburg Graduate Institute. Any curriculum must include dredging.

2. On-the-job training leading to the experience needed by a coastal specialist should be under the guidance of a high level, experienced coastal specialist. This should be a job requirement of the expert at grade GS-13 or above.

3. Coastal specialists should be provided and trained in the use of the state-of-the-art technology or "tools" such as the ACE System.

4. Coastal specialists and their supervisors should become more aware of existing opportunities for advanced education and training. Desired or required training should be shown in the individual development plans.

FOR THE WORKING GROUP:

4 Encls

CHARLES C. CALHOUN, JR., PE
Member

TABLE 1

NUMBER OF STUDIES/PROJECTS INVOLVING

COASTAL PROBLEMS[a]

	5 Years Ago	Now Under Way	Within 5 Years	Within 10 Years
Coastal Flooding	62	88	98	102
Coastal Erosion	126	172	176	193
Coastal Navigation	221	232	221	214
Dredged Material Disposal	110	118	136	130
Waves in Ports/Harbors	75	92	96	128
Circulation	30	34	39	37
Tsunamis	4	4	5	7
Total	628	740	771	811

[a] A summary for all districts.

TABLE 2

NUMBER OF STUDIES/PROJECTS INVOLVING COASTAL WORKS

	5 Years Ago	Now Under Way	Within 5 Years	Within 10 Years
Breakwaters, Fixed	104	118	98	98
Breakwaters, Floating	14	14	20	23
Jetties	56	49	54	57
Revetments	79	68	102	103
Beach Groins	53	40	56	53
Bulkheads	34	22	26	27
Seawalls	25	19	20	16
Sea Dikes/Dunes	45	53	66	47
Dredged Channels	233	250	221	222
Dredged Material Disposal Works	117	126	120	118
Beach Fills	85	100	108	104
Sand Bypassing	40	38	54	52
Piling Supported Structures	24	21	21	25
Total	909	918	966	945

TABLE 3

NUMBER OF COASTAL SPECIALISTS IN

COASTAL DISTRICTS AND DIVISIONS

Year	Planning	Engineering	Construction/Operations	Total
1976	97	132	64	293
1981	123	131	75	329
1986	131	128	78	337
1991	135	132	95	362

APPENDIX C

SUMMARY OF COMMENTS AND RECOMMENDATIONS RELATIVE TO COASTAL FIELD DATA COLLECTION PROGRAM FROM PAST CERB MEETINGS

SUMMARY OF COMMENTS AND RECOMMENDATIONS RELATIVE TO COASTAL FIELD DATA COLLECTION PROGRAM (CFDCP) FROM PAST CERB MEETINGS

39th CERB: MAY 1983, WILMINGTON, NC

Dr. LeMehaute (general discussion): We do not have enough information on wave statistics. The wave statistics today are given in a manner too coarse to be used for developing a mathematical tool for shoreline prediction.

Prof. Weigel (CERB recommendations): Acquire NOAA wave buoy data and publish as part of the monthly report when they would augment the existing wave program. Establish standby funds and panel of experts to investigate rapidly the effects of a coastal storm.
BG Edgar: Agree with comment on NOAA wave gages; should look into this.

40th CERB: OCTOBER 1983, NEW FALMOUTH, MA

Dr. LeMehaute (letter following meeting): It appears that even in deep water, there is little information on long-term wave statistics except for the work done at CERC based on hindcasting. For lack of an appropriate national program, a local wave measurement program will be useful.

Mr. Blake (presentation of NED research needs): NED's most urgent need is for New England area wave data, especially in shallow embayments and bays.
Dr. Whalin: Every effort will be made to expand the Coastal Data Collection Program and wave gaging efforts in New England to provide the basic data urgently needed by NED. Similar needs occur along other stretches of the east coast and in the Gulf of Mexico.

41st CERB: JUNE 1984, SEATTLE, WA

Dr. Whalin (presentation on CFDCP): Tasks being performed this year include wave data collection, LEO, wave hindcasts, and, of course, work on the data base management system so all of these data can be accessed easily by Corps field offices. The data base management system includes wave data in addition to all coastal engineering data of the Corps. Proposals for FY 86 CFDCP: We have proposed, through Jay Lockhart and the R&D Directorate, an increase in funding for the FY 86 budget for a number of items in this program. We propose continuation and expansion of our wave data collection area. We must keep our wave hindcast funding level going for the next several years. We need to get all the hindcast data input into our data base management system. We should also have our Hurricane Surge Data Collection work unit in this program. Professor Weigel impressed upon us the need for having the ability to rapidly acquire data from storms. We propose to include a rapid deployment of field teams as an integral part of this program. We would like to continue our shoreline change maps, which we are producing in cooperation with the National Ocean Service of NOAA as a part of this program. The last item we propose to include in this program is the consolidation of beach profile data which are scattered throughout the Corps of Engineers. We will not be able to initiate any of the new proposed work in FY 85 because we are essentially level-funded.

COASTAL FIELD DATA COLLECTION PROGRAM
PROPOSED FOR FISCAL YEAR 1986

@ WAVE DATA COLLECTION
@ WAVE HINDCASTS
@ DATA BASE MANAGEMENT SYSTEM
@ HURRICANE SURGE
@ RAPID DEPLOYMENT
@ SHORE AND BEACH DATA
  - SHORELINE CHANGE MAPS
  - LEO
  - PROFILES

Prof. Wiegel (comment on Dr. Whalin's presentation): Again, I want to congratulate the Corps, Dick Seymour, and the state of California on the way in which the measured data are presented and the speed with which they are made available. This is quite contrary to my opinion of NOAA. I presently consider NOAA's wave data largely a waste of taxpayer's money, especially the way in which the data are packaged. If the Corps has any influence with NOAA, I would like to see the Corps try to get NOAA to present its data resource in the same manner the Corps does.

Dr. LeMehaute (comment on WIS presentation): In terms of defining wave climatology, it will be a very useful product. On the other hand, I believe it is only a stopgap. It should not be considered the ultimate; it will not replace measurements. I do not foresee any improvement in wave hindcasting which will be good enough to replace a good measurement program. Measurement programs cost money, but they have to be done, and they have to be done on a very long-term basis. This was advocated years ago by Dean O'Brien, when he was on this board, I believe, and it is still true today. The national program of wave measurement which was advocated at that time is still as good now as it was 10 years ago; nothing will replace it.

Mr. Oliver (research needs in NPD): We certainly need expansion of the National Data Collection Program and a transfusion of some of those funds into the Alaska area. This is a very immediate need.

BG van Loben Sels (discussion of paper on Port Lions, AK, small boat harbor): It points up our need in Alaska for information on winds and waves, and this is our plea for more effort in that area.

Mr. Stormer (Alaskan design needs); The most common design concerns are limited and/or no site-specific data from which to develop designs. Available wind records are pushed far beyond their statistical limitations to generate design winds to forecast waves and design structures at 50-year projected lives. Basic data collection has to rank highest among the many coastal engineering related needs of the Alaska District.
Dr. LeMehaute; Your recommendation for data acquisition is well received and should be highly supported.

Prof. Wiegel (discussion of presentation on Alaska Coastal Data Collection Program): Data get lost very easily. Who gets these data reports?
Mr. Bales: We have a listing of individuals to whom they are distributed, in and out of the state. We will be storing our raw data with CERC for historical purposes, but the published reports are available to anyone who wants them at this point.
BG van Loben Sels: It would be useful to integrate our data collection system as resources permit into the hierarchy of Corps reporting.

Dr. LeMehaute (discussion of presentation on Alaska Coastal Data Collection Program): The national program of wave measurements should be done in deep water because it is of general interest that does not vary much from place to place and can be used by anyone locally by performing statistics for deep water or shallow water. These shallow water wave measurement programs should not be part of any national program but should be project-by-project depending upon which non-federal interests are involved.

BG Edgar (CERB recommendations); The CERB must emphasize the importance of recording episodic events.

Prof. Wiegel (CERB recommendations): We have just got to start obtaining data someplace on the directional characteristics of waves. I would like to recommend that the people at CERC explore, perhaps they already have, what they can do to obtain detailed information on the directional spectrum.
Letter following CERB: It would be very useful to design, install, and operate a system that would be able to resolve peak mean directions which are as little as 10 degrees apart.

42nd CERB; DECEMBER 1984, CHICAGO, IL

Dr. Whalin (review of CERB business): The wave program that NOAA had for measuring waves offshore, that Lee Baer started up, is not operational anymore. The decision was made at NOAA to move the responsibility - the operational responsibility - for any buoy wave measurements that NOAA might make to the NOAA Data Buoy Center in Bay St. Louis, Mississippi. I think it is time for us, in the next couple of months, to write another letter to NOAA, as we discussed at the last meeting, giving Corps support for a deepwater wave measurement program. Paul Wolfe, Associate Administrator for NOS, has pointed them toward producing information that is of use to the Nation and the public in a timely fashion; and they have deemphasized within NOS some of their deeper ocean work. NOS is in the process of automating all of its tide gages around the United States coastlines and changing them to digital output so that they can record over a computer terminal. Their emphasis is on real-time data - instantaneous real-time data - and that is where the whole NOS is heading at the moment. And with respect to the Wave Measurement Program, there will not be any more NOAA reports (that were difficult to get in a timely manner) in the near future because they are not making those Waverider measurements that Lee Baer's group was making.
Dr. LeMehaute: Whether NOAA has produced or not produced the result that you need is not what should be involved here. What I would like to stress is the quality and importance of that program which is of national necessity for every coastal project in and around the United States. I personally think it is a tragedy that NOAA only paid lip service to that program.

Mr. Lockhart (discussion following Dr. Whalin): One of the other efforts that I am trying to bring into this thing at the same time is to start bringing some type of standardization to the Corps' efforts so (episodic event) data collected on the East Coast are compatible - and used as well in the analysis program - with the data collected in programs on the West Coast.

Dr. Whalin (overview of FY 85 R&D program): Our longer term problem in the Coastal Field Data Collection Program is having adequate dollars to do what we want. The first three items in Table 1 (see table listed for previous CERB) show the things being done under this program: wave data collection, wave hindcast, and our data base management system. We would like to put our hurricane surge measurements in this program also. We would like to include also the measurement of episodic events under this program, as Mr. Lockhart mentioned earlier. And we have our shore and beach data, shoreline change maps, littoral environment observations, and profiles. This program really needs to increase badly. It is in the FY 86 budget budget submitted to Congress at a slightly higher level.

Mr. Nakashima (POD R&D needs): A network of wave monitoring buoys, with appropriate telemetering capabilities to a control station, is highly desirable to ascertain typhoon/hurricane and storm-generated waves and to determine frequency and duration characteristics of the various natural phenomena that impact these various island states (American Samoa, Guam, Northwest Marianas, Trust Territories). The Pacific Basin is recognized as a strategically sensitive arena with respect to the defense posture of the United States, and, more recently with respect to EPS's hazardous waste disposal program. A Pacific-wide wave gaging network is an essential element not only in support of these activities but also in support of the various island states' coastal planning efforts.

43rd CERB; MAY 1985, VICKSBURG, MS

BG Edgar (discussion of presentation of CFDCP): If there is no source (of funds) from Alaska, as there apparently is not, what are we going to do?
Mr. Hemsley: For this next fiscal year, we are looking at trying to sustain a minimum system - keep a couple of the gages that we have got in place operating - and scurrying to try to find some additional funds.
BG Edgar: I think Bob's comment a moment ago about seeking out around the coast of our country to see if there can be some cost-sharing partners in this regard is very important. It seems to me our coastal Districts and Divisions ought to press on with universities or with state Governments to see if we can work out some kind of an arrangement that can be mutually beneficial because those data certainly are important. Maybe we ought to get out some letters from the Board or from the Center, Robert, to the coastal Divisions, and see if we can get something going.

Dr. LeMehaute (discussion of presentation of CFDCP): What is the status of the NOAA program and the cooperation with NOAA?
Mr. Hemsley: Using the needs of the Coast of California study we pressed ahead to start collecting data from NOAA's specific buoys. Right now we are collecting all the data from their buoys with the exception of those around Hawaii, and we are working on those. We hope to have those data put into our monthly reports fairly soon.

Prof. Wiegel (general discussion): The expansion of data collection by the Corps of Engineers installing wave recorders is good. The encouragement of other agencies and companies to put in the hardware and then have the analysis and data promulgation be of the Corps' existing method of doing it I think is the best way of trying to share the money and get more of this done.

BG Edgar (CERB recommendations): I think we need to look for new ways in terms of financing for gathering of wave data.....whether it be work in kind or whether it be dollars. We ought to look for innovative ways to get the states, private enterprise, the universities, and whomever to become involved in the process.

44th CERB; NOVEMBER 1985, SAUSALITO, CA

COL Grum (Review of CERB Business): Another topic at the last meeting was the Coastal Field Data Collection Program. I guess BG Edgar at that time said the current rate of funding was insufficient for development of the program and recommended we investigate some cost sharing agreements with state agencies. We currently attempt to make maximum use of wave gages supported by others, such as the Navy and the State of Florida. We had a 2-day workshop in August at Fort Belvoir. We had ..... some recommendations on which way we ought to go. The prominent recommendations were to redirect or expand the Field Wave Gaging Program to other US coasts, and add hindcasting to the Wave Information Study for 1975 through 1985, and to get a collection of long-term deepwater directional wave data as soon as reliable, affordable technology is available.

Mr. Wanket (R&D Needs for South Pacific Division): We recognize that the limited funding support currently available for many programs such as the Coastal Field Data Collection Program makes across-the-board progress in many different research areas more difficult. This means that expeditious completion of previously undertaken work assumes even greater importance and, if necessary, priorities should be examined accordingly to assure that past efforts are completed. Current R&D-Related Projects Involving SPD: Continuance and, indeed, expansion to all of the Nation's coastline of the Coastal Data Information Program are desirable goals. The monthly and yearly statistical reports produced by Scripps are of considerable value to SPD coastal planners and engineers and others including the National Weather Service (NWS) which uses 3- and 6-hr reports on a daily basis in its broadcasts to mariners. We are also aware of the value of long-term wave data to numerous work units within CERC's coastal programs. Discussion of Specific Recommendations: In the technical area of wave data and other environmental information, we fully support continued expansion and strengthening of the programs, within necessary funds constraints, with the goal of improving the basic environmental information (primarily consisting of a statistically significant wave data base) needed by our design engineers. In early August the coastal Districts and Divisions met with CERC and OCE ..... To discuss and make specific recommendations for the Coastal Field Data Collection Program and related wave projects of the Corps. .....there are some recommendations of particular interest to SPD which bear repeating:

Directional Gages - Where possible, upgrade index gages to provide added deepwater directional information.

Hindcasts - Extend WIS hindcasts through 1985.

Compilations - Prepare statistical compilations from gage sites after 10 years of data have been collected.

Storm Hindcasts - Develop ability to hindcast storm events in near-real-time.

Regional and National Wave Gaging Networks - Promote incremental expansion of existing network so that present capabilities are not neglected. Investigate developing a more synergistic relationship with National Weather Service gaging activities as a means of network expansion.

BG Palladino (Open Discussion by CERB): Are the Division presentations of research needs worthwhile? If so, do we structure our R&D program accordingly?
Dr. Whalin: The presentations are worthwhile, but the reaction is not clear. For example, every presentation for the last 3 years has stressed the need for continued and expanded wave data acquisition. Despite this, the Corps has not been successful in increasing the wave data collection budget. Continued level funding means that in a few years we will be at a decision point for the whole program.

APPENDIX D

RECOMMENDATION LETTERS FROM CERB MEMBERS

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November 23, 1986

MG Henry J. Hatch
President, Coastal Engineering Research Board
Director of Civil Works
US Army Corps of Engineers
20, Massachusetts Ave, N.W.
Washington, D.C. 20314-1000

Dear General Hatch

May I first express my appreciation for having the opportunity to take part in the 46th CERB meeting in Vicksburg. It was great to see the broad range of CERC activities the excellence of which was made abundantly clear during the extra day of reviews the CERB members were privileged to hear.

As the the Corps shoulders the primary responsibility of preserving the Nation's coastline, it is indeed important to attract and to keep capable engineers to carry out the tasks in various districts. In this meeting Mr. Calhoun reported that the career ladder for a coastal specialist rises no higher than GS 12. I fully support his proposal that higher grades must be establised or else the Corps will have a hard time recruiting or keeping good engineers in the field of coastal engineering. Without a higher grade other incentives are not likely going to be adequate. For example the Vicksburg Graduate Center may train coastal engineers who will be quickly lost by the Corps to the private industry.

It is exciting to see that prospects of initiating research in the area of dredging are getting better. We owe much to Mr. W. Murdom's dedicated efforts over the years and in many workshops on the topic. His outline of the future plans and research focus was most thoughtful and comprehensive. I know this initiative will rejuvenate an age-old technology which is at the heart of coastal engineering. As this important area requires the combined efforts of engineers and scientists with diverse expertise, I would like to reiterate my suggestion that participation from industries and academia be sought at the earliest to formulate as well as to advise the research program on a regular basis. The Corps' success in bringing HR 6 through the Congress is a most promising event which could certainly help launch the dredging program.

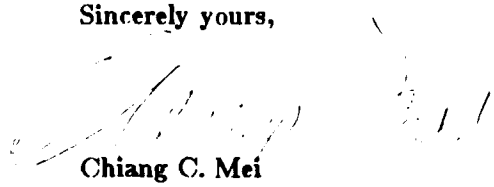
At the meeting I expressed my personal opinion that while CERC has excelled in many important areas of coastal research, further emphasis in theoretical research with dual aims of advancing our understanding of coastal processes and devising efficient ways of engineering predictions is extremely important. Numerical modeling, in which CERC has rightly built up considerable strength is only a part of theoretical research. A complete research center should have a thriving theoretical group to complement laboratory and field studies. Obviously any expansion of CERC's present

scope requires increase of its budget in the Coastal Engineering Research Program (CERP). It was therefore alarming to hear Dr. Houston's report that the research dollar for CERP is actually shrinking steadily. Continuation of this decline would surely lead to the departure of the brightest in CERC and consequently diminish Corps' effectiveness to carry out its coastal tasks. Of immediate importance is of course for the Chief's Office to fight for the $ 6 million budget originally proposed. From a long range point of view, CERP must be emphasized as a core part of CERC's mission indispensable for its ability to serve the districts .

An item associated with CERP and discussed in many CERB meetings in the past is the further strengthening of ties between CERC and universities. Benefits of one existing tie in the joint use of the Duck Pier by people from many universities are already evident. I understand that in addition to project-oriented contracts, a few contracts are also given to some universities for basic topics recognized as being most pertinent to CERC's own research. Up to ten years ago CERC sponsored research in many leading universities through *unsolicited* proposals. From these proposals there were often good ideas which resulted in long range benefits. I therefore consider the expansion of contractural ties with academia to be a very desirable element in maintaining the high level of CERP.

With best wishes for a happy thankgiving,

Sincerely yours,



Chiang C. Mei

Professor of Civil Engineering

Member, CERB

UNIVERSITY OF
Miami

27 October 1986

MG. Henry J. Hatch
Director of Civil Works
U.S. Army Corps of Engineers
20 Massachussetts Ave., N.W.
Washington, D.C. 20314-1000

Sir:

It was a pleasure to get acquainted with our new president. I was impressed by your rapid grasp of the issues, and I am convinced that CERC is going to keep moving ahead under your tenure.

I feel great satisfaction to see implemented so many of our recommendations. CERB provides us with a good feeling of achievement, which has not been always the case with some other advisory boards. The response of OCE and CERC personnel is extraordinary. CERC, with the young blood brought to WES, is well on its way to becoming a shining center of excellence in coastal engineering, under the leadership of Dr. J. Houston. The reopening of CERC to academic through research contracts and organized courses, and the addition of the dredging program will keep the momentum going. Effort towards professional and academic recognition, will foster pride, esprit the Corps, and an elitist attitude, which prevent the departure of the best elements and attract young talents.

However, this will not be achieved if the R and D program keeps decreasing. Technical leadership is achievable only through R and D. I am wondering whether it is not possible to reconsider the R and D budget? This is my main source of concern, at a time when one feels that one is on the verge of a real breakthrough in the understanding of coastal processes, thanks to super Duck, as well as in many other subjects.

I also feel that CERC should be allowed to serve as a national center of coastal engineering by accepting, on a pilot basis, studies which are not necessarily in response to the needs of the Corps.

I will keep requesting consideration for allotment to build a major unique experimental facilities, most probably within the framework of the dredging program because of its cost effectiveness. This facility will be a catalyst for attracting talents and reinforce CERC as a world-wide leading institution leading institution in coastal engineering.

Rosenstiel School of Marine and Atmospheric Science
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MG. Henry J. Hatch
27 October 1986

Following the CERB meeting, the civilian members of the board had an opportunity of reviewing the research program. It is a very fine program, well balanced, and the P.I. are enthusiastic. However, it has to be said that the present approach through work units does not encourage imagination and creativity on the part of the researchers (For example, how many patents have been issued at CERC in the past?) Therefore, I suggest that every researcher be given the opportunity to initiate original proposals within the framework of the charter, rather than working on assigned tasks only. The civilian members of the board will certainly be very pleased to assist the Corps in reviewing these proposals, if appropriate.

If I can be of any further help, please do not hesitate to call.

Sincerely,

Bernard Le Mehaute

BLM:s
cc: J. Houston

DEPARTMENT OF GEOLOGY
LOUISIANA STATE UNIVERSITY
BATON ROUGE, LA, 70803-4101

Nov. [illegible], 198[illegible]

Mr. Henry J. Hatch
President, Coastal Engineering Research Board
US Army Corps of Engineers
20 Massachusetts Avenue, N.W.
Washington, DC 20314-1000

Dear General Hatch,

The [illegible] meeting of the Coastal Engineering Research Board at WES (October 21-2[illegible]) proved to be one of the most stimulating CERB meetings during my tenure as a board member [illegible] because of the ample time that provided for an in-depth discussion of the Chief's initiatives and other fundamental policy issues. These initiatives address some of the key questions which the Corps' coastal engineering community must come to grips with in order to provide effective response to the new challenges being brought about by increased international competition and by the many new projects just authorized by Congress in the recently passed House Resolution No. 6.

Because the Chief's initiatives were discussed exhaustively [illegible] and all board observations and recommendations will be recorded in the proceedings I will not repeat my thoughts on these issues here. There are, however, two related issues which must be addressed: one of great urgency; and another, regarding the Board's fundamental role

Coastal [illegible] are currently suffering from [illegible] research and development funding. It was very clear in the [illegible]

[illegible]

[illegible] (b) the [illegible] from the [illegible] [illegible] [illegible] [illegible] (stressed by many participants at the April [illegible] meeting), the fundamental research program of CERC is the "brain" of the organization that drives their [illegible] of effective and [illegible] in project design of [illegible] districts. It is imperative that we recognize the [illegible] research does not [illegible] research [illegible] has been documented repeatedly that fundamental research yields a higher return per dollar invested than just about any other activity (perhaps with the exception of a good California vinyard).

[illegible] the present efforts within the R&D directorate, I [illegible] that the CERB board be given the opportunity to [illegible] interact with the committees making the budgetary [illegible] on CERC's research effort.

[illegible] inability to effectively stem the decline in CERC's fundamental research program, even at a time of [illegible] mandated expansion of the Corps' Civil Works [illegible] is forcing me to begin questioning the effectiveness of a board that has no statutory role in the budget process. We talk a lot, we teach each other a great deal, but it is becoming increasingly clear that decisions that really matter are made entirely without any input from the board. CERB's role within the Corps is rather insignificant compared to the boards of Regents at state university systems, or boards of directors at private corporations. I believe I speak for all members of the board, civilian as well as military, when I [illegible] my concern that we are increasingly becoming "window dressing" rather than a decision-making body. To the extent possible within the present statutes of CERB, we should make every effort to reverse this trend. The current budget crisis in fundamental engineering research would appear to be the best possible reason for the board to become more active in helping direct funds towards high pay-off research efforts.

I would greatly appreciate hearing your views on these issues.

Sincerely,

[illegible]
[illegible] of Geology
[illegible] Engineering Research Board

END

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