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OTEC SUPPORT SERVICES
QUARTERLY TECHNICAL PROGRESS REPORT #17

15 May 1982 - 14 August 1982

OCEAN ENERGY TECHNOLOGY DIVISION
OFFICE OF SOLAR ELECTRIC TECHNOLOGIES
DEPARTMENT OF ENERGY

MASTER

Contract Number DE-AC02-78ET21002

VSE CORPORATION

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Project Manager

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1.0 INTRODUCTION

VSE Corporation (VSE), under contract DE-AC02-78ET21002 with the Department of Energy (DOE) is to provide technical engineering and management support services for the Ocean Thermal Energy Conversion (OTEC) Program of the Ocean Energy Technology Division, Office of Solar Electric Technologies. This seventeenth Quarterly Technical Progress Report covers the period from 15 May 1982 through 14 August 1982.

2.0 BACKGROUND

The OTEC Program is a research and development effort by DOE to achieve an economically viable ocean thermal power system. The investigation of OTEC has progressed systematically from university studies to baseline platform/plant conceptual and preliminary design studies, and component development and testing. Significant system integration and support services are essential to help DOE bring the OTEC Program to full potential.

To assist in this effort, VSE has assembled a team consisting of:

- o VSE Corporation
- o Alexander Systems Company
- o Deep Oil Technology, Incorporated
- o Evans-Hamilton, Incorporated
- o Santa Fe Corporation
- o Giannotti and Associates, Incorporated

Subcontractors or consultants are:

- o Energy Research and Development International, Incorporated
- o V. J. Ciccone & Associates, Incorporated
- o John J. McMullen Associates, Incorporated
- o Det norske Veritas
- o Dr. C. L. Cochran
- o Science Applications, Incorporated

This team, under the leadership of J. N. Obradovich, is performing system integration, system engineering, and management services for the Ocean Energy Technology Division of the DOE.

3.0 OBJECTIVES

These system integration, system engineering, and management services are provided by VSE under seven general task areas. The task objectives are described below in general terms. Specific detailed work assignments are issued in subtask orders by the DOE Technical Manager, Mr. Eugene S. Burcher, of the Ocean Energy Technology Division.

Task 1 - Survey, Analysis, and Evaluation

This task is for technical analyses and support of current program efforts as an aid in evaluating technical program status. It encompasses the technical assessments of current contracts

Task 2 - Program Technical Monitoring

This task is to maintain technical program monitoring to reduce or eliminate negative impacts on cost, schedule, and technical performance. The task includes the technical monitoring function and the integration of independent technical developments.

Task 3 - Development and Implementation of Methodology

This task is to provide methodology to permit the logical and systematic identification, evaluation, and trade-off for such items as the ocean hull positioning control, cold-water pipe, energy transfer, heat exchangers, pumps, turbines, system controls, power-conditioning equipment, biofouling and corrosion countermeasures, environmental factors, and other major subsystem configurations. This task also includes the implementation of the methodology using inputs from Tasks 1 and 2.

Task 4 - Technical Assessments

As the technical consultant for ocean engineering aspects of the OTEC Program, the OTEC Project Team is called upon under this task to perform a variety of technical assessments in areas such as the following:

- o Ocean engineering system requirements and the development program
- o Model tests
- o Platform trade-off studies
- o Reliability monitoring and assessment
- o Interface requirements of vessel and OTEC-related systems
- o OTEC-I and Pilot Plant facilities requirements and test programs
- o Configuration management of the vessel and all major subsystems
- o Operational and logistical support requirements for the vessel

Task 5 - OTEC System Integration

Under this task, the OTEC Project Team is called upon to monitor and evaluate the output of studies pertinent to the OTEC power plant, corrosion, and biofouling; and to assure consistency of both performance and cost trade-offs through supporting studies and coordination.

Task 6 - Environment and Siting Considerations

This task provides for technical assistance to DOE in its preparation of the essential environmental and siting data packages in a form amenable to logical site selection(s) and environmental assessments. The task includes assistance in:

- o Management support in the environmental and siting sub-program element
- o Evaluation of environmental and siting program efforts
- o Integration of technical developments

Task 7 - Transmission Subsystem Considerations

Provide technical assistance to DOE in the analysis of the ocean engineering aspects of OTEC power transmission subsystem development. This task includes assistance in:

- o Development of a methodology for quantifying transmission cable mechanical loads
- o Definition of the developmental testing program necessary to validate cable designs

4.0 TECHNICAL PROGRESS

Technical assistance and management support was provided to DOE in the form of development, guidance, and evaluation of technical programs. Project personnel planned, attended and/or participated in a number of conferences and meetings with representatives of DOE and other agencies and contractor personnel. Such meetings served as the primary means whereby support was provided. A large portion of the program support was applied in the review of program documentation such as plans, budgets, schedules, presentations, literature, and reports. A united team approach towards analysis of tasks and provision of support to meet the needs of the OTEC program has been established at VSE OTEC-team progress-and-evaluation meetings.

4.1 Task 1 - Survey, Analysis, Evaluation, and Recommendation Concerning Program Performance

Subtask 102 - OTEC Commercialization Support

The principal contributions made in this area are as follows:

- o Relative to accomplishments; project personnel --

prepared and proofread the covers, credits, and end plates of the 8th Ocean Energy Conference Proceedings. The Proceedings were printed and made available for distribution by the end of June.

investigated approaches to writing a programmatic history of OTEC.

reviewed material and performance on a contract with Carnegie-Mellon University and recommended that the contract be closed out.

made a final review of the Jack Faucett study entitled, "Study of Domestic, Social, and Economic Impacts of Ocean Thermal Energy Conversion (OTEC) Commercial Development" and recommended that the contract be closed out.

completed efforts on a manuscript on the Law of the Sea and OTEC implications. The preparations for publication in the October 1982 issue of Shipmate have begun.

began efforts to reconstruct the 8th Ocean Energy Conference Proceedings, which were lost en route to the Government Printing Office.

o Relative to meetings, conferences, etc., project personnel --

consulted with representatives of International Affairs with regard to the Law of the Sea Treaty negotiations and the implications for various OTEC commercialization scenarios.

met with representatives of the Trade and Development Agency concerning energy development scenarios for OTEC in developing countries. The manner of packaging proposals by developing countries for possible funding by that agency was discussed.

met with representatives of National Oceanic and Atmospheric Administration (NOAA) to discuss corporate management concerns regarding investment in OTEC plants.

briefed the Department of Energy (DOE) staff on the status of the international program and market development contracts for the ocean program.

met with representatives of the Department of Energy OTEC staff, printing and procurement to discuss efforts involved in recreating and publishing the 8th Ocean Energy Conference Proceedings.

Subtask 103 - Program Technical Engineering and Instrumentation Analysis

The principal contributions made in this area are as follows:

o Relative to accomplishments, project personnel --

reviewed a technical paper entitled, "Pneumatic Wave Energy Conversion," by Professor M.E. McCormick and E.S. Burcher to be presented at an International Symposium. The paper describes a new counter rotating turbine installed in a wave power generating device for producing electrical energy. The bibliography, graphics, and additional information will be developed for a formal presentation to DOE staff, and preparations will be made for publication.

examined twenty-four technical papers presented at the Second International Symposium on Wave Energy Utilization held in Frondheim, Norway, June 22-24, 1982, and prepared a summary of the reports to be submitted to the Marine Board, National Research Council.

reviewed monthly progress reports for the Argonne National Laboratory/OTEC program with regard to the activities at the Seacoast Test Facility and power system development.

evaluated the Solar Energy Research Institute (SERI) Program Report for the month of April 1982 and the Open Cycle/OTEC Program.

Task 2 - Program Technical Monitoring

Subtask 201 - Technical and Management Services

- o Relative to accomplishments, project personnel --

helped prepare and assemble information for an Energy Research and Advisory Board (ERAB) presentation.

helped prepare and assemble information for the program milestones reflecting FY83 zero funding.

organized and developed an enlarged index for technical material.

assisted in the preparation of presentation materials for the Ocean Energy Technology Program Quarterly Review to be presented to the Deputy Assistant Secretary for Renewable Energy.

TASK 5 - OTEC System Integration

Subtask 502 - Systems Integration

The principal contributions made in this area are as follows:

- o Relative to accomplishments, project personnel --

prepared and assembled information briefly describing open-cycle development. (June)

TASK 7 - Transmission Subsystem Considerations

Subtask 701 - Transmission Subsystem

The principal contributions made in this area are as follows:

- o Relative to accomplishments, project personnel --

prepared for the Simplex Wire and Cable Company presentation.

completed the draft report "OTEC Riser Cable Structural Analysis."

completed the draft report "Proposed Test Plan to Validate the KNAPP SAC Computer Code."

helped prepare a report on the analytical and computational method for predicting the stress in OTEC cable components.

provided assistance in the preparation of a report documenting the instrumentation for planning the cable tests that will subject it to axial and bending loads to determine if the analytical methods predict the stresses.

are searching for facilities where cable testing can be conducted. Estimates of costs will be prepared for the testing phase and will be submitted to DOE staff for approval.

- o Relative to meetings, conferences, etc.; project personnel --

evaluated the Simplex Wire and Cable Company presentation of progress. A discussion was held with DOE representatives regarding plans for program completion.

3.0 TECHNICAL APPROACH OF WORK PLAN CHANGES

None.

4.0 VARIANCES/PROBLEMS

None.

5.0 OPEN ITEMS

None.

6.0 PLANNED ACHIEVEMENTS

Continue investigation of the ocean technology program history.

Complete reconstruction of the 8th Ocean Energy Conference Proceedings and proceed with publication of the document.

VSE CORPORATION