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ENVIRONMENTAL ASSESSMENT FOR OTEC PILOT PLANTS

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ABSTRACT

Logical and orderly progression of the OTEC program from conceptual designs through component testing to the goal of commercially viable OTEC plants require that the socio-legal requirements be met and the proper operating permits be obtained and maintained. This function is accomplished in a series of activities including:

- o Development and annual revision of a published OTEC Environmental Development Plan (EDP)
- o Compliance with NEPA/EPA and other regulatory requirements;
- o Studies and research in support of the above.

The Environmental Development Plan (EDP) lists the concerns, outlines the program to consider the effects and validity of such concerns on the OTEC program, and gives the time-table to meet the schedule, integrated with that of the engineering and design programs. The schedules of compliance activities and, to a lesser degree, research also are governed by the development progress of the technology. However, because of the lead time necessary to insure proper review the appropriate regulatory agencies, the environmental assessment program for the OTEC pilot plants (initially starting with the 10/40 MWe unit) is founded on the strategy of progressive improvement of previously accepted documentation. Based on experience with OTEC-1, the procedure for pilot plants will be:

- o Produce generic Environmental Assessment (EA) at the appropriate level of technology in advance of hardware contract;
- o Produce generic Environmental Impact Statement (EIS) at approximately the same time as the hardware procurement;
- o Monitor production of site specific supplement to the generic EIS prepared by the hardware contractor;

TABLE 1. OTEC ENVIRONMENTAL ISSUES AND RESPECTIVE IMPACT AREAS

Issue	Air Quality	Water Quality	Land Use/ Solid Waste	Ecological Impacts	Health & Safety	Esthetics	Social Institutional	Resources
Redistribution of Oceanic Properties								
o Ocean Water Mixing	x	x		x			x	x
o Impingement/Entrainment		x		x			x	
o Climatic Thermal								
Chemical Pollution								
o Biocides	x	x		x	x		x	
o Working Fluid Leaks	x	x		x	x		x	
o Corrosion		x		x				
Structural Effects								
o Artificial Reefs				x			x	
o Nesting Migration				x			x	
Socio-Legal-Economic								
o Worker Safety					x		x	
o Enviro-Maritime Law	x	x	x	x	x	x	x	x
o Secondary Economic Impacts	x	x	x	x	x	x	x	x

- o Assist pilot plant operator in applying and obtaining permits by providing current research and modeling data;
- o Monitor environmental program as required by regulatory agency;
- o Use new site data for refining models for future pilot plant assessments.

ENVIRONMENTAL CONCERNS

The four major classes of environmental concerns and the key issues in these classes associated with OTEC deployment and operation as identified in the Environmental Development Plan (EDP) are:

Redistribution of Oceanic Properties

Ocean water mixing
Impingement/entrainment
Climatic/thermal

Chemical Pollution

Biocides
Working fluid leaks
Corrosion

Structural Effects

Artificial reef
Nesting/migration

Socio-Legal-Economic

Worker Safety
Enviro-maritime law
Secondary economic impacts

The resolution of these concerns is the goal guiding the planning and implementation of the environmental assessment program. Table 1 gives the interactive matrix of impacts and concerns identified for OTEC.

MASTER PLAN - OUTLINE OF CRITICAL PATH

Given a candidate site or region, the following gives a proposed outline of the ideal progression of steps to be taken in the evaluation of the environmental concerns for that site or region. It is assumed that the primary selection of sites is a policy function of OTEC headquarters. The procedures presented here are designed to be applicable to any candidate site or region to insure the quality and uniformity of information with respect to scope and kind available to regulatory agencies, policy makers, engineers, designers, concerned citizens groups, etc. However, we realize that each site or region is to some degree unique with its own characteristics not found elsewhere. Accordingly, the suggestions here are to be considered only as a minimum; with any site or region, specific information is to be included where applicable.

PHASE I - Pre Go-Ahead Decision

o LITERATURE SURVEY AND OTHER PREVIOUS WORK

Published and unpublished literature, pertinent to the selected site or region, will be compiled and searched for data of potential interest to OTEC. Experts in the area will be identified. Agencies, institutions, schools, etc., with data bases, collections, etc., will be identified and contacted with the availability of their information ascertained.

o ORGANIZATION INTO A STANDARD FORMAT

All data obtained from Step I will be collated and displayed on a uniform base. This includes base maps of appropriate scale, uniform graphics and tabular material where appropriate. Such material and non-standard material such as photographics, keys to collections, etc., will be compiled into source volumes for the candidate area or region.

o COMPARISON WITH ACCEPTABILITY MATRIX

Information in the source volumes will be scrutinized parameter by parameter with respect to its validity, accuracy, and precision so generalities will be drawn from data of similar quality.

o CONSTRUCTION OF ADEQUACY MATRIX

Data of comparable quality will be examined as a function of quantity of measurement, frequency and time history of sampling by a panel of experts to determine for each critical area whether sufficient data exists for a preliminary decision on the acceptability of the site or region. In this step data gaps will be identified.

o PRELIMINARY DECISION

On site/region as a candidate for OTEC operations. Options: a) Definite no-- overriding negative factors; b) Qualified No-- negative factors present which may be mitigated by design strategies; c) Ambiguous-- potential negative factors or conflicting data which cannot be resolved by information to date; d) Neutral; e) Qualified Yes-- positive factors with ambiguous unknowns.

o POLICY DECISION

Yes/No on continuation of consideration of site/region as candidate for OTEC operations. If yes - proceed.

PHASE II - Pre-Operational

o INITIATE EA/EIS FOR SITE/REGION

Based on the current level of technological development of OTEC. Begin fulfilling the legal requirements for eventual permitting of the site.

o DESIGN CORRECTION STRATEGIES

Based on the adequacy matrix design a measurement and assessment program which eventually will provide information to reduce the level of uncertainty about site/region.

o DESIGN SERIAL PRE-PLANT MONITORING STRATEGIES

In conjunction with correction strategies, design a measurement and assessment program which will augment existing or begin serial data collections required to provide sufficient background information to assess impact of any future OTEC operations at the site.

o INITIATE ONE YEAR PILOT PROGRAM

At site to ascertain environmental variability. As it is unlikely that sufficient data exists on annual and seasonal variability at any given site, the initial sampling frequencies must be estimated for most parameters. The intent of this program is to sample at high enough frequencies to justify the choices used in the long-term monitoring program. This program also will be used to test new or improved methods of sampling and to verify the utility of other parameters to assess the environmental concerns.

o DESIGN LONG-TERM MONITORING/ASSESSMENT PROGRAM

As a result of the previous work and the one-year variability study, develop a long-range monitoring/assessment program which will lead to compliance with regulatory requirements and facilitate production of the appropriate EIA/EIS.

o DESIGN LONG-TERM MONITORING/ASSESSMENT PROGRAM FOR OTEC PLANT

This program is a companion to the one above except that it is designed to be operated from the actual plant. The primary purpose of this program is to monitor the intakes and outputs of the plant as well as the near-plant environmental conditions.

o POLICY DECISION

Request OTEC operations at site/region.

o OBTAIN COMMENCEMENT PERMITS

Submit final EIA/EIS for action by appropriate regulatory group.

SUMMARY

Major compliance activities based on investigation of the environmental concerns as listed in the EDP by following the master plan and revising or modifying their potential impacts as a function of the developing OTEC technology have proceeded in an orderly fashion and are summarized below:

Table 2 Compliance activity summary

ACTIVITY	STATUS
o Generic Environmental Assessment OTEC-1	Completed March 1979
o Site specific supplement to OTEC-1 Generic (EA)	Completed April 1979
o Programmatic Environmental Assessment	In Review May 1980
o Generic Environmental Assessment-OTEC pilot plant	Contract let projected completion Fall 1980
o Generic Environmental Impact Statement OTEC pilot plant	If required - projected contract let - Fall 1980

BIBLIOGRAPHY OF OTEC COMPLIANCE DOCUMENTS

- (1) Environmental Development Plan (EDP) 1977. Ocean Thermal Energy Conversion. U.S. Department of Energy. DOE-EDP-0006. March 1978.
- (2) Environmental Development Plan (EDP) Ocean Thermal Energy Conversion. U.S. Department of Energy. DOE-EDP-0034. March 1979.
- (3) Sands, M.D., and others Environmental Impact Assessment Ocean Thermal Energy Conversion (OTEC). Preoperational Test Platform, Department of Energy, Division of Solar Technology. DOE-EA-0062. October 1978.
- (4) Sinay-Friedman, L., and others Supplement to the Draft Environmental Impact Assessment: Ocean Thermal Energy Conversion (OTEC), Preoperational Ocean Test Platform. Two Volumes, TRW Defense and Space Systems Group. Contract #55-00601. April 1979.
- (5) Sands, M.D., Draft OTEC Programmatic Environmental Assessment: Product report for subcontract 4501010 between Interstate Electronics Corporation and the University of California, Lawrence Berkeley Laboratory 10511, 1980.

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