COO-2547-3

MASTER

**Planning for a Program Design for Energy
Environmental Analysis**

Progress Report

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Abstract

The work reported in this second quarterly progress report has focussed on completing the "first generation" approach to the use of operational gaming in a regional assessment study program, writing an interim report on the work accomplished, and progress on the "second generation" approach which attempts to quantify the mechanisms identified in the "first generation" approach. The interim report, provided as an addendum to this report, provides detailed descriptions of the "first generation" work. This report provides a brief summary of the initial work on the "second generation" approach as well as the "first generation" approach.

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Introduction

This investigation is directed at planning for a program design for regional energy environmental analysis. The focus of the investigation is on the use of interactive operational gaming in a regional assessment study program. The approach has been to divide the work into two phases. Phase I, called the "first generation" approach, attempts to encompass, in a highly aggregated sense, the essential elements of a regional energy environment system and its evolution while retaining the ability to enrich the elements in a subsequent generation. Phase II, called the "second generation" approach attempts to quantify the mechanisms identified in the Phase I, or "first generation" approach. The three key activities in the transition from Phase I to Phase II are to set limits on the mechanisms, to quantify them, and to particularize the mechanisms to the region under study in order to construct an adequate operational game within the time frame of the study and which is consistent with the goals of a regional assessment study program. Appendix A shows the scope of activity that is being employed.

Scope of Investigations

The work during this second quarter (April 1 - June 30, 1975) was directed at four tasks which encompass all of the six tasks of Appendix A but serve to emphasize the operational gaming approach during this time period. Toward the end of the project attention will be refocussed on attaining the balance indicated by Appendix A. The four tasks are described below.

- Task 1. Definition of scopes, purposes, goals, and objectives of a regional assessment study program (Appendix A, Task 1).
- Task 2. Definition, description, and analysis of the role of interactive operational gaming in a regional assessment study program (Appendix A, Task 2).
- Task 3. Methodology for a regional energy environment game (Appendix A, Tasks 3 & 4).

Task 4. Description of special requirements in large scale implementation of regional energy environment gaming (Appendix A, Tasks 5 & 6).

Appendix B gives the structure of the regional energy environment game and presents a time horizon chart for this portion of the study.

Results

During this second quarter (April 1 - June 30, 1975) the effort has been focussed on completing Phase I (first generation approach), writing an interim report to the results of the Phase I study, and transitioning to the Phase II (second generation approach) study.

The Phase I game has been completed with very good results which are reported in detail in the interim report (COO-2547-4) which is provided as a part of the progress report. The goals for the Phase I study, as outlined in Report COO-2547-4, have been attained and the following results of the Phase I study are being employed in constructing the Phase II game.

- A. Choice of actors, level of actor group aggregation, and principal actor objectives.
- B. Characterization of the target region and the quantification of a reference scenario (as well as future evolution of the reference scenario). The scenarios are quantified in terms of a set of state variables defined in the Phase I study.
- C. Characterization of preferred scenarios for each of the defined actors (or actor groups). These preferred scenarios are also quantified in terms of the defined set of state variables.
- D. The composite scenario resulting from the Phase I game will be compared with the Phase II results. Since both games are modeling the same decision scenario, similar results are expected.

The schematic design of the Phase II game has been completed and is shown in Figure 1. Figures 2, 3, and 4 show the contents of the modules indicated in Figure 1. Software design of the Impact Analysis Module (IAM) of the Phase II game has been completed and is now being implemented and tested. Software design

Figure 1. Schematics of Phase II Game

Figure 2. Interaction Module

T^e = T estimate
 F = Total Factor Set

Figure 3. Policy Implementation Module

Figure 4. Impact Analysis Module (IAM)

and refinement of the other two modules are now in progress. It is anticipated that the first play of a Phase II game will occur in August, 1975. The management program to be used in controlling the actual game operation is now in the design process.

For the Interaction Module (IM) the regional actors defined in Phase I are being reviewed to determine which actors are to become active players in the Phase II game and which are to become passive players. When this choice has been finalized, alternative policies, strategies, and action choices will be assigned to each active and passive player. Computer programs will be written to implement these alternatives in the Phase II game. Interactive programs will be provided only for the active players since these will be the actors who will actually be playing the game.

Level of Effort

During the second quarter the total professional manpower utilized is about 12.5 man months of which about 2 man months of the principal investigators' time was used in organizing, guiding, directing, and executing the project. The level of effort will intensify during the first two months of the third quarter as we move toward an operational Phase II game.

Appendix A

Activity to be Performed

The scope of activity is unclassified and shall consist of the Contractor's assisting BER/ERDA in program planning. In furtherance thereof, the Contractor shall prepare a final report on a regional assessment study program which shall include the following items:

1. Describe and discuss how one scopes, sets purposes, goals, and objectives for and initiates a regional assessment study program suitable for BER/ERDA.
2. Analyze, describe, and discuss whether and how operational gaming might play a key and central, and perhaps unique, role either within a regional assessment study program or in the management and direction of one.
3. Describe, discuss, and analyze how a regional assessment program with or without the methods of operational gaming might affect the achievement of a higher level of public understanding with respect to the environmental and health and safety problems of nuclear energy in the context of alternative energy systems. Note that "safety" as used here does not refer to nuclear reactor accidents.
4. Describe, discuss, and analyze how a regional assessment study program with or without the methods of operational gaming might relate to the possibly serious needs that ERDA might discover for adequately trained manpower, nuclear and nonnuclear.
5. Describe and discuss any special requirements that a regional assessment study program and possibly operational gaming places with respect to such areas as computerized information systems, computerized data management systems and file management systems; computerized display systems, including graphics systems; etc.
6. Discuss and analyze the role of computer simulation in a regional assessment program with due attention to the current state of the art.

The Contractor shall also consult with BER/ERDA within the general area of scope of work as otherwise described above, and as set forth in the Contractor's informal budget to the Administration.

Appendix B

Structure of the Regional Energy Environment Game

Phase I