

GL00764

GEOHERMAL
FEDERAL BUILDING PROGRAM

PREPARED FOR THE
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IDAHO OPERATIONS OFFICE

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GEOTHERMAL FEDERAL BUILDING PROGRAM

INTRODUCTION

The Energy Security Act, Public Law 96-294, addresses many facets of the development and use of alternate energy forms in the United States. One of these facets involves the use of geothermal energy in Federal buildings, facilities and installations. Section 642, Subtitle D of PL 96-294 requires federal government agencies to consider the option of using geothermal energy in their buildings. The geothermal option is to be considered in areas of known or potential geothermal resources as designated by the Secretary of Energy. The intent of the law is to have federal agencies become aware of the geothermal option and to use this option where it proves to be economically superior to other energy alternatives available.

This document describes the Geothermal Federal Building Program. The program is designed to implement the referenced Public Law in a manner that takes advantage of existing geothermal energy programs and existing technical expertise. This plan defines the objectives and scope of the program, a breakdown of organizations involved in program implementation, and descriptions of the program elements and how they interrelate. Schedules and cost estimates for the program are also included.

Program Objective

The primary objective of the Geothermal Federal Building Program is the reduction of government expenditures for energy. The federal government owns or leases many buildings throughout the United States. The exact number of federal buildings has not yet been determined however, it is known that the GSA alone owns approximately 2500 buildings and leases approximately 4000 more. These buildings, when added with those of all other government agencies, require large amounts of energy for heating, lighting and to operate equipment. The energy bill for all these buildings is very large and continues to increase each year.

Geothermal energy can be used to reduce these costs. Figure 1 shows a 1980 comparison of the costs of energy from various sources including geothermal energy. The figure indicates a range of costs for each energy type. For geothermal energy the range delineates the difference between a shallow, artesian well, in close proximity to the user, and a deep well requiring a pump, and located approximately 1 mile from the user.

The figure shows that geothermal energy can be economically competitive and, in many cases, economically superior to other energy sources. With time, the economics of geothermal energy should improve as the cost of geothermal is relatively independent of rising fossil fuel prices.

A secondary objective of the program is to provide stimuli for the development of private sector use of geothermal energy. A Federal project to develop a geothermal resource will (1) demonstrate the existence of the reservoir and the practicality of its use, and (2) will help define well and development costs. This information may be sufficient to spur private development in the area and would be an indirect stimulus to private sector use. Direct stimulus would result when a Federal agency choose to use a private sector developer to supply the geothermal energy. Excess energy from the development could be marketed to other users further expanding the private sector involvement.

Program Scope

The major considerations on which the scope of the Geothermal Federal Building Program is based, are low program cost and maximization of program impact. To minimize operational costs, the program is limited to specific activities designed to match geothermal resources and Federal uses, and to evaluate the technical and economic feasibility of using this energy form. Other activities, such as RFP preparation or management of site development, will be offered by the program on an "at cost" basis to the agency involved.

Energy Costs

(January 1980)

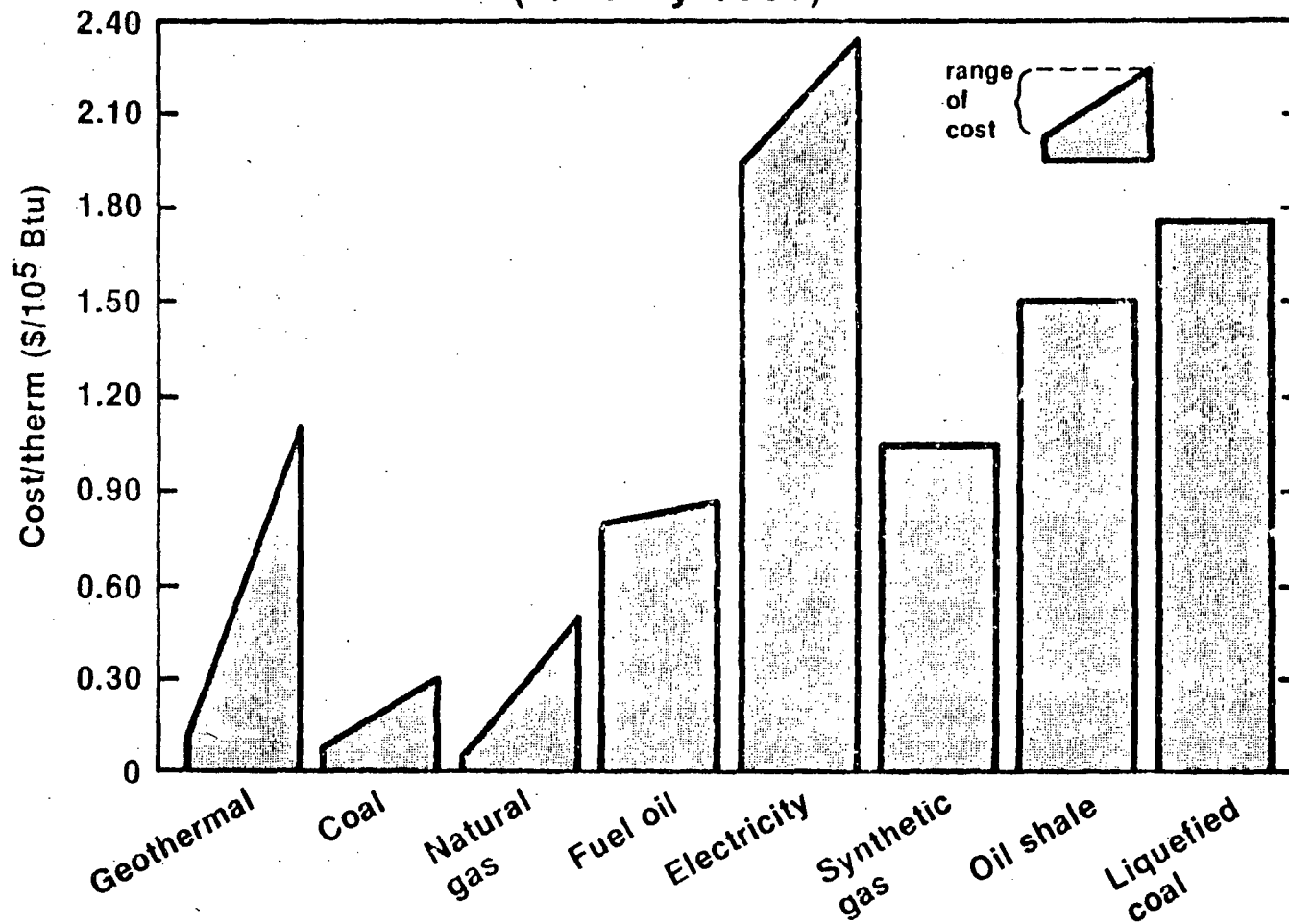


Figure 1. Energy Cost Comparison

Program impact will be measured in the number of government facilities which use geothermal energy as a result of the program and any private sector development resulting directly or indirectly from the program. To maximize the impact of the program, the number of sites evaluated for feasibility of geothermal energy use will be as large as possible and national in scale. It will be necessary to obtain information from all Federal agencies for this effort. This information will consist of the location and description (floor space, heat load, etc.) of all existing buildings and all buildings which are in the planning stage. The building information will be cross-matched with all known or potential geothermal resource information to determine which sites should be evaluated further for feasibility.

The various services offered by the program will be publicized (among Federal agencies) to ensure that new facility planning includes consideration of the program.

Financing of geothermal system development is outside the scope of this program. For any Federal building project where the geothermal option is chosen as most economical, the agency controlling the project will have to fund the resource development and all other aspects of the project.

The costs involved in well drilling, water delivery lines and other energy supply system components can be quite high. To forego these high initial costs, the agency involved may want to consider a private sector developer/supplier as an alternative. Use of this method of system development has several advantages. Obviously the initial cost to the agency is much lower. This method is less cumbersome for the agency as it would not have to worry about operating or maintaining the system. This method would also promote private sector geothermal development.

It should also be pointed out that agencies which will be leasing buildings or facilities can be in a situation similar to that just

described. By requiring (in the lease) that geothermal energy is to be used in the facilities, the government places the development and the high initial costs in the private sector.

Program Methodology

The Geothermal Federal Building Program will use two categories of methods to meet its objectives; education and active assistance. Education encompasses a number of activities designed to increase awareness of geothermal energy potential to government agencies and to make the agencies cognizant of the services available through the program. The activities to transfer this information include; the preparation and distribution of literature on geothermal energy and the Geothermal Federal Building Program, regional workshops for planners and facility managers, and personnel contact with upper level agency management.

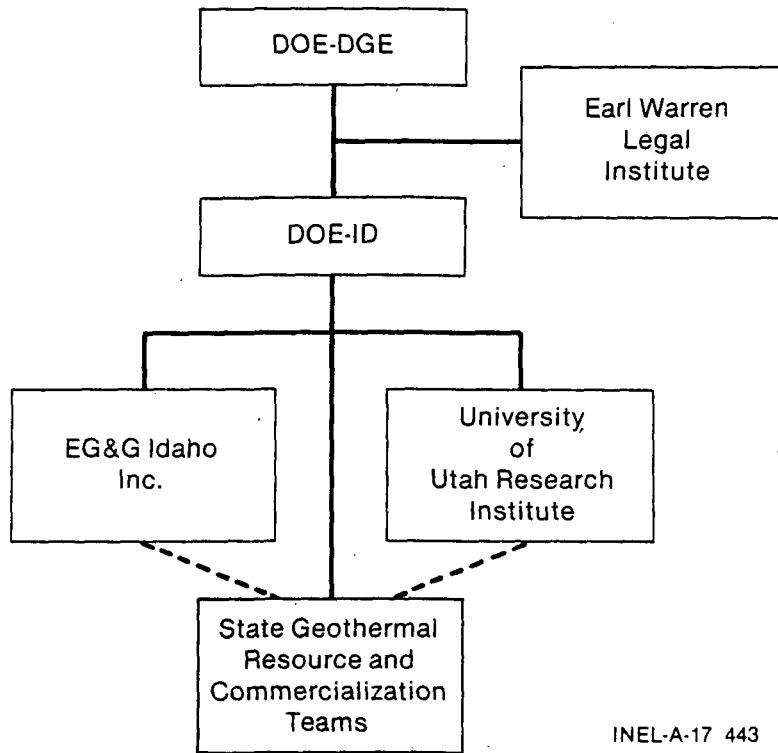
Active assistance under the program includes three areas of work. The first area includes the matching of existing and planned Federal building locations with the locations of known or potential geothermal resources. The second area of work will be specific to locations that show high potential for building-resource match-ups. For these locations, site specific technical and economic feasibility studies will be performed. The results of these studies will be forwarded to the agency manager along with recommendations as to how to proceed.

The third work area encompasses program assistance to agencies who decide to use geothermal energy. Program expertise will be made available, at cost, to assist in contracting and monitoring development of the resource and the energy delivery system.

Organization and Responsibilities

Figure 2 shows the organizational breakdown of the program. Primary responsibility for the overall Geothermal Federal Building Program is with the Division of Geothermal Energy (DGE) of the Department of Energy (DOE)

Geothermal
Federal Building Program
Organization



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Figure 2.

in Washington, D.C. DGE will be responsible for establishing program direction. This office will also be responsible for initiating contact with Federal agencies at the Washington, D.C. level to introduce the program and to solicit agency cooperation. DGE will also sponsor all workshops and other outreach efforts associated with the program.

DGE will assist the Secretary of Energy in determining which locations within the United States will be designated as 'resource areas'; those areas where the program is applicable.

Responsibility for program management and coordination will be with the Idaho Operations Office (ID) of DOE. ID will be responsible for implementation of the program in the field and will coordinate all technical support under the program. DOE-ID will serve as the program contact point for inquiries from the field. ID will conduct the workshops and other outreach activities.

EG&G Idaho, Inc., will provide program technical support in resource engineering, geothermal energy utilization, and economic evaluations. EG&G will prepare all outreach materials (literature, slides, etc.) and will participate in all workshops. Further, EG&G, along with UURI, will provide technical and project management expertise for any project that reaches the site development stage. EG&G will provide direction to the State Commercialization Team (Rocky Mountain Basin Region) in their efforts under the program.

The University of Utah Research Institute (UURI) will provide technical support for geothermal reservoir evaluations. UURI will be responsible for building and maintaining data bases of geothermal resources and Federal buildings. UURI will assist in the preparation of resource outreach materials and will participate in all workshops. The Research Institute will provide resource expertise for projects that reach the development stage. UURI will provide direction to the State Resource Teams in their efforts under the program.

The Earl Warren Legal Institute will assist by preparing draft regulations for the program and by providing support to DOE-DGE in the regulation approval process. The Earl Warren Legal Institute will also review the regulations of other related Federal building and/or energy programs. Where feasible, the institute will propose to DGE how the Geothermal Federal Building Program might integrate efforts with these programs. Earl Warren will also supply any assistance needed in working with other programs toward integration or cooperation.

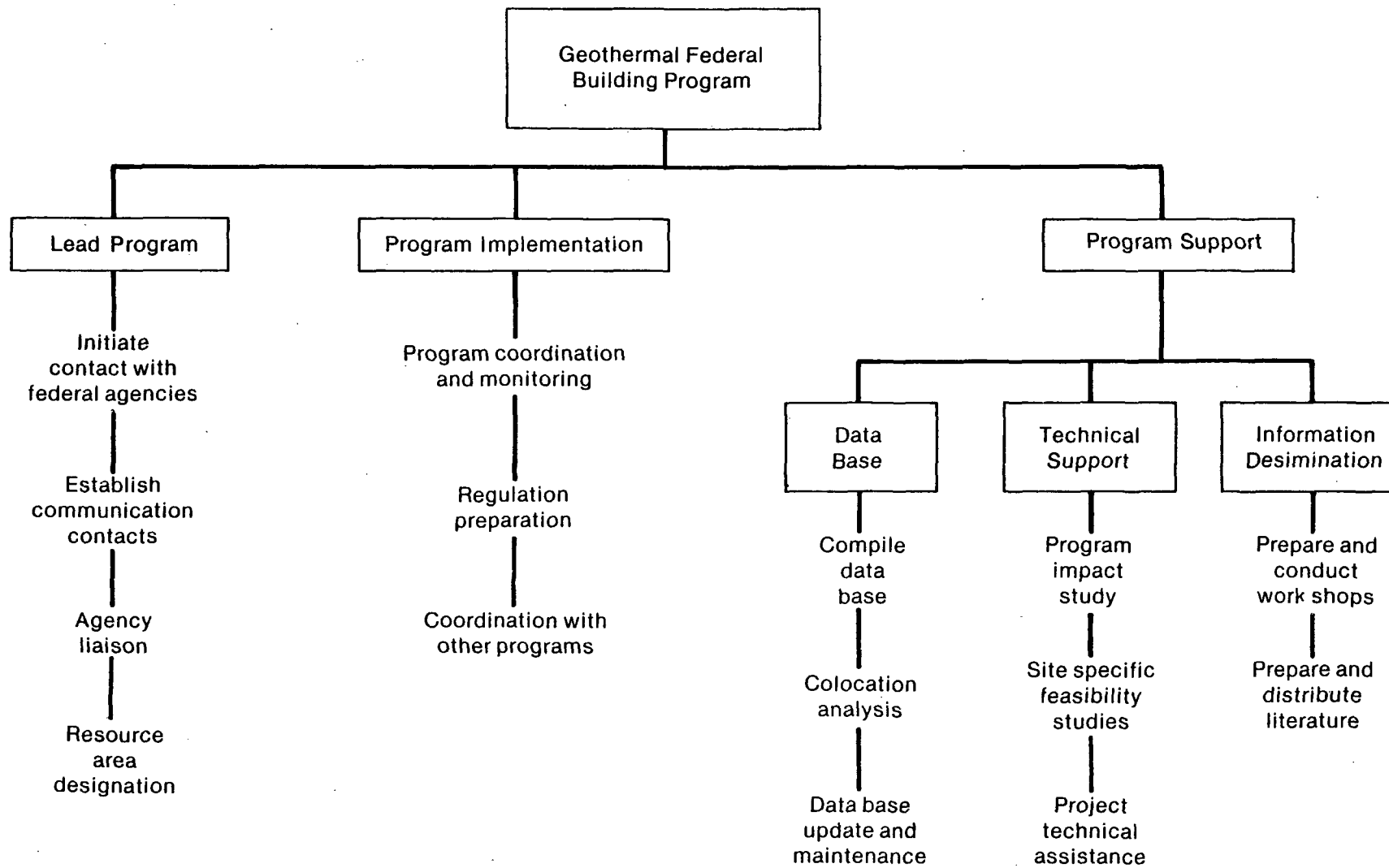
Regional DOE Office, and State Geothermal Resource and Planning Teams will be utilized as sources of information on geothermal energy resources and utilization potential in their areas.

Program Description

The organization of the Geothermal Federal Building Program is shown in Figure 3. The program is comprised of three major work elements: Lead Program, Program Implementation, and Program Support. This organization is based on functional responsibilities. The Lead Program's function is to establish early contact with all Federal agencies. This function will serve to educate the federal agency management concerning this program and to establish communication lines within the agencies. The Lead Program element will act as Liaison with Federal Agency management throughout the program.

The Program Implementation function is to provide the program with overall management and to perform the necessary administrative activities required. Included in administration tasks is the preparation of program regulations and coordination with other related programs.

The Program Support function is one of providing the technical expertise needed to run the program. Expertise in the areas of geothermal resources, geothermal energy utilization, project management and outreach activities will be supplied under the element.



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Program Elements
Geothermal Federal Building Program

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Figure 3.

The activities under each of the functional program elements are discussed below.

Lead Program

The objective of the Lead Program element is to establish contact, communications, and an appropriate interface with all government agencies which own or control buildings. Contact will be with agency upper management at the headquarters level.

Tasks:

- o Initiate contact with Federal Agencies--DGE, supported by project team technical personnel, will contact management staff in each government agency. The purpose of the contact will be to introduce the agencies to the program, to offer the services available through the program, and to solicit agency assistance in collecting information on their buildings and facilities. The introduction to the program will include an explanation of the program goals and how these goals will be met as well as answers to any general questions concerning geothermal energy. The technical services of the program will also be made to the agency. These services consist of technical and economic evaluations of geothermal energy feasibility and the availability of expertise in project management for project development.
- o Establish Communication Contacts--The most effective means of compiling agency building data will also be discussed. Contacts needed by the Technical Support Function for obtaining building information will be established.
- o Agency Liaison--DGE will maintain contact with agency management to provide a two-way communication interface. DGE will keep the agencies informed about program progress, particularly when

program activities involve a specific agency. DGE will discuss the results of feasibility studies with the appropriate agency. Questions concerning the program or requests to study specific locations will be received through DGE.

- o Resource Area Designation--DGE will work closely with the Secretary of Energy to assist in the designation of 'resource areas.' The Energy Security Act stipulates that the government will consider the use of geothermal energy in areas that may be designated by the Secretary of Energy. Based on data base information compiled under the Program Support effort, DGE will advise the Secretary of Energy as to which areas should be designated as resource areas.

Program Implementation

The Program Implementation element encompasses management and administration of program operations. DOE-ID will have prime responsibility for this element. Efforts under this function will consist of coordinating and monitoring ongoing projects, interfacing with Federal agency personnel at specific sites, and administrative functions for the overall program.

Tasks:

- o Program coordination and monitoring--ID will establish project priorities and coordinate the work of the teams in the Program Support Element for specific site evaluations. DOE-ID will interface between the Geothermal Federal Building Program teams and personnel at sites being studied. Under this task, ID will also serve as the point-of-contact for the program for inquiries from the field. Project monitoring functions and coordination of special project technical assistance (i.e., RFP preparation) will be performed under this task.

- o Regulation Preparation--Regulations for the existing Geothermal Federal Building Law (PL 96-294) will be prepared in draft form for review and comment by government agencies and the public sector. The draft regulations will be prepared by the Earl Warren Legal Institute. The draft regulations will be issued for review and comments. Comments received will be evaluated, incorporated where appropriate, and final regulations will be prepared and issued.

- o Coordination with Other Programs--Regulations and operating procedures for other, possibly related, federal programs will be reviewed for possible integration of efforts with the Geothermal Federal Building Program. Where such integration appears feasible and advantageous to both programs, suggestions as to how the integration might take place will be prepared for DGE consideration.

Program Support

The Program Support Element consists of three areas of work: (1) data base, (2) Technical Support, and; (3) information dissemination. Project teams from the support organizations will be used to perform the work in these areas.

Data Base--In order to determine where geothermal reservoirs are collocated with existing or planned Federal buildings, it is necessary to establish a computer oriented data base. The data base will consist of two files, one containing the location and characteristics of known or potential geothermal resources, and the other containing the locations and descriptions of existing or planned Federal buildings. The files will contain sufficient information to allow for cross matching and determination of high potential sites. These potential sites will be subjected to more detailed, site specific feasibility evaluation.

UURI will be responsible for compiling the two data base files and for performing the colocation matchups. UURI will also maintain and update the data base as new resource or building information is obtained.

Technical Support--The technical support teams will serve three functions. These teams will (1) perform a program impact study, (2) perform site specific technical and economic feasibility studies, and (3) they will supply special project technical assistance.

The program impact study will be completed early in the program. The purpose of the impact study is to establish the information requirements and analytical procedures necessary to perform the site specific studies and to provide an estimate of the total anticipated impact of the program. The study will consist of a detailed technical and economic analysis of a particular site (either "actual" or "typical") and will compare several energy types. The study should be oriented toward demonstrating the economic feasibility of using geothermal energy. The study should carefully point out all information needed and the analytical procedures used.

The results of this portion of the impact will be combined with an early colocation matchup from the data base. The results of this effort will be an estimate of the total potential impact of the program. Program management decisions on expansion or contraction of program scope will be based on this study.

The impact study will be used as a guide to the analysis teams and will be used in information dissemination activities. The study will be conducted jointly by UURI and EG&G Idaho, Inc.

The second function of the technical support teams is the evaluation of specific building sites. Where the data base effort indicates a possible match up of a resource and building, or where an agency has a specific request, the support teams will conduct a detailed technical and

economic analysis of the site. Additional resource and building information required for the analysis will be collected as necessary for the study. The result of the analysis will be documented and formally presented to the Federal agency involved. The presentation will include the results of the study, recommendations on how to proceed with development (if appropriate) and what kind of assistance will be available through the Geothermal Federal Building Program.

The third function of the technical support teams is to provide technical assistance to agencies involved in geothermal development. This assistance will be provided at the expense of the requesting agency. The intent of this function is to make existing technical expertise available to the agencies. The types of assistance anticipated are RFP preparation, developer proposal evaluation and development project monitoring.

Information Dissemination--Information dissemination will take two forms, workshops and information sheets. One workshop will be presented early in the program with the intended audience being Federal agency managers (Washington level) in charge of buildings and facilities. Additional workshops will be conducted on a regional basis for agency building personnel in the field. The format of the workshops will be:

- o What is geothermal energy?
- o Where is it found?
- o Utilization of geothermal energy
- o Economics of geothermal energy
- o Example Projects
- o The Geothermal Federal Building Program.

The example projects in the outline will be actual projects such as Williams Air Force Base or China Lake. The number and locations of the regional workshops will be specified by DOE-ID.

Two types of information sheets will be prepared and distributed to all Federal agencies, both in Washington and across the country. The first sheet will describe the Geothermal Federal Building Program, its objectives, operating procedures, services available and persons to contact. This information sheet will closely follow the workshop format and will also include maps showing the locations of known or potential resources. The maps should be regional in nature so locations across the country would receive only the maps for their region.

PROGRAM BUDGET

The budget required for the first 12 months of operation of the Geothermal Federal Program is \$434.3K. This figure includes preparation of the workshop and distribution of literature. Since the precise number of workshops is not known, five were assumed for the first year. The cost of each workshop is estimated to be \$5K.

The budget figure includes the costs of seven site specific feasibility studies. These studies are estimated to be \$14K per project including necessary travel.

Figure 4 shows a detailed breakdown of the budget by task and organization or expense. The assumptions made in arriving at these figures are presented in the following pages.

GEOTHERMAL FEDERAL BUILDING PROGRAM
BUDGET SUMMARY (Thousands of dollars)

TASK	EG&G IDAHO	UURI	EARL WARREN INSTITUTE	COMPUTER	TRAVEL	OTHER	TOTAL
Initial Contact	4.0	-	-	-	3.0	0	7.0
Program Coordination and Monitoring	65.0	4.0	-	-	.2	-	65.0 <i>65.2</i>
Regulation and Other Program Work	-	-	65.0	-	-	-	65.0
Data Base	6.2	86.2	-	12.0	-	-	104.4
Program Impact Study	10.2	7.5	-	-	0.6	-	18.1
Specific Studies (per project) <i>omit</i>	35.0	35.0	-	-	28.0	-	98.0*
Workshop and Literature	44.5	29.9	-	-	-	2.4	76.8**
Totals:	164.7	158.6	65.0	12.0	31.6	2.4	434.3
		<i>162.4</i>					<i>438.5</i>

*7 projects assumed
**5 Workshops @ \$5K

Figure 4. Budget Summary

BUDGET ASSUMPTIONS

The following are assumptions made to establish the budget for the Geothermal Federal Building Program.

LEAD PROGRAM

Initial Contact:

DGE's Initial Contact with Federal agencies will require the support of one technical person with a geothermal energy background. This person will be supplied by EG&G Idaho.

EG&G	\$4K
Two trips	\$3K

PROGRAM IMPLEMENTATION

Coordination & Monitoring:

EG&G Idaho will supply one man year of effort to support DOE-ID in the coordination and monitoring effort.

EG&G Idaho	\$65K
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Regulation Preparation and Coordination with other Program:

It is anticipated that the Earl Warren Legal Institute will expend approximately one man year of effort in the preparation of program regulations and in activities to review and coordinate with other programs.

Earl Warren Legal Institute	\$65K
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PROGRAM SUPPORT

Data Base:

UURI will devote two people full time for six months to compile the resource and building data files. Additionally this task will require approximately \$10K for computer time. Definition of the basis for the colocation analyses and the colocation analyses for the first year will involve EG&G Idaho and UURI personnel (~ five man weeks each) and approximately \$2,000 in computer time. Maintenance of the data files for the remainder of the first year is anticipated to be a three man month effort supplied by UURI.

Data file update and maintenance and the colocation analysis for future years will require approximately 1/2 man year's effort and \$5,000 for computer time. The labor requirement will be shared equally between EG&G and UURI.

	<u>1st Year</u>	<u>Subsequent Years</u>
UURI	\$86.2K	\$30K
EG&G Idaho	\$ 6.2K	\$30K
Computer	\$12.0K	\$ 5K

Technical Support:

The program impact study will require approximately six man weeks effort on the part of UURI and approximately eight man weeks effort for EG&G (EG&G will prepare the post study documentation) and \$600 for travel between Idaho and Utah (two trips).

Each site specific feasibility study will require approximately four man weeks effort each from both UURI and EG&G Idaho. Additionally, one information gathering trip (two people) to the site and one trip to report results to the site (two people) will be required.

Special project technical assistance will be paid for by the agency requesting the assistance. The cost of the assistance is dependent on the work required.

	<u>Impact Study</u>	<u>Per Project</u>
UURI	\$ 7.5K	\$5K
EG&G Idaho	\$10.0K	\$5K
Travel	\$ 0.6K	\$4K

Information Dissemination:

Preparation of the Workshop format and materials will require approximately ten man weeks of effort from EG&G Idaho and approximately three man weeks from UURI. Assuming seven workshops will be presented and that participants in the workshop will pay their own expenses, the cost per workshop is estimated to be \$5,000. This amount covers travel for presenters and expendable materials. Five workshops are outlined below.

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Preparation of program description information sheets will require approximately eight man weeks at EG&G Idaho and approximately three man weeks of support from UURI. Postage and envelopes for distribution to the federal agencies will cost ~ \$1,200.00.

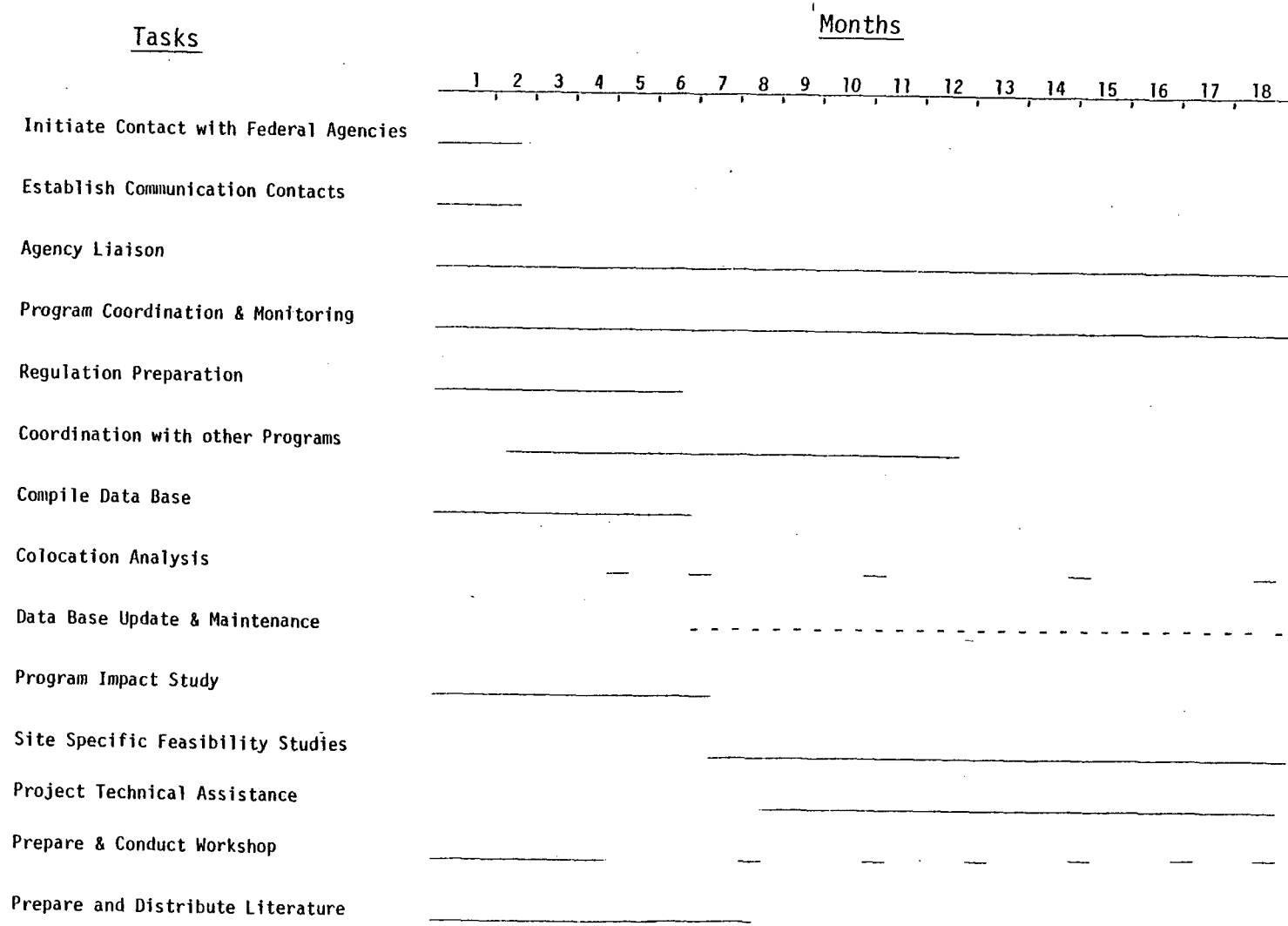
Preparation of the regionalized information sheets will require an additional eight man weeks from EG&G Idaho. Preparation of the regional resource maps will be done by UURI and will require approximately eight man weeks. Distribution costs will be approximately the same as above.

UURI	\$29.9K
EG&G Idaho	\$44.5K
Postage	\$ 2.4K

PROGRAM TASK SCHEDULE

Figure 5 shows the task schedule for the Geothermal Federal Building Program for the first 18 months of operation. Dashed lines indicate periodic or part time activities where solid lines represent concentrated effort by the responsible organization.

GEOTHERMAL FEDERAL BUILDING PROGRAM TASK SCHEDULE



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Figure 5. Task Schedule