SUSANVILLE GEOTHERMAL ENERGY PROJECT

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CITY OF SUSANVILLE

PREPARED FOR THE U.S. ENERGY
RESEARCH AND DEVELOPMENT
ADMINISTRATION UNDER CONTRACT
AT(04-3)—1077

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SUSANVILLE GEOTHERMAL
ENERGY PROJECT

Quarterly Report
October 10, 1975

CITY OF SUSANVILLE

James C. Jeskey
City Clerk
Program Manager

Alfred B. Longyear, ~~PhD~~-CSL
Principal Investigator

PREPARED FOR THE U. S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
UNDER CONTRACT NO. AT(04-3)-1077

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SGEP PROJECT DESCRIPTION

INTRODUCTION

This is the first quarterly report on the status of the Susanville Geothermal Energy Project, (SGEP). The report has been prepared as an aid in project management and contains only that technical information required for project direction. Technical Reports will be reserved for the Workshop Proceedings and special reports. Special reports are to be filed in the Program Office, Susanville. The report is organized by task in accordance with the Work Plan in Contract AT-1077, except that Institutional Aspects have been raised to a full task level now designated as Institutional Plan. This reflects actual discipline and organizational structure.

Each active task in the report includes a description of scope; a definition of current status; an identification of key results or findings; a definition of problems and solutions being undertaken or recommended; and a highlighting of key future activities.

In order to orient those who have not reviewed the proposal or contract documents, a brief summary of the SGEP, related efforts and management structure is included in the Appendix of this report.

It may be noted that the task reports have been prepared by the task managers and hence reflect an individuality in degree of detail. Editing has been limited to establish uniform format, context and program management policy.

OVERVIEW

The slip of the program start date from February 1 to July 7, 1975 adversely affected manpower assignments early in the first quarter. Further administrative delays in contracting for the energy conversion effort, combined with the manpower assignment delays, plus an extended effort in data collection has deferred completion of Requirements and the start of Systems into the second quarter. These delays are behind us and we expect to meet the mid point mile posts.

The excellent performance of the BuRec Appraisal Study staff plus the receipt of excellent proprietary data released to the SGEP by Gulf Mineral Resources Company and other private data have combined for a Resource assessment that is excellent in quality and encouraging in opportunity for the Project. Additional funding for exploration wells is being sought.

The structuring of the Institutional task and the related discussions with pertinent State and Federal agencies indicate that this task should be elevated in importance in the overall Project effort. This is an excellent area for expanded scope.

Six communities, one each in California, Idaho, Nevada, Oregon, Utah and Washington, have been selected for membership on the Utilization Panel. The Advisory Panel is composed of representation from the Western Federal Regional Council, California League of Cities, Federal Energy Administration Henry Swift and Company (finance), D. C. Services (ecology sciences), University of California (LBL), California Energy Commission and the Mayor of Susanville. The current effort has been rescheduled within the first six months to compensate for the delays in the early weeks of the Project. Support for the demonstration phase of the Project is being discussed with Federal and State agencies.

1.0 RESEARCH PLAN

Task Manager: David A. Edson, VTN

The first quarter effort has concentrated in organizing for and initiating data collection, analysis. Administrative problems have precluded completing data collection in Requirements in accordance with the original schedule. These delays in turn have precluded initiating the Systems subtask. The revised Work Plan in Task 4.0 reflects the delays. The data exchange and iterative effort between Requirements, Resource and Systems will occur based upon data in hand so that the Systems and Modeling tasks can be initiated in a timely manner.

1.1 Requirements

Task Manager: David A. Edson, VTN

Scope - Collect and analyze data relative to current and projected energy utilization as a function of the present industrial, agricultural, and forest industry requirements in the Susanville area. Develop list of candidate job intensive industries as a function of sensitivity to varying levels of geothermal potential for use in a model to include Susanville. Investigate the feasibility of generating electrical power for local application and sale into a regional grid system. Collect and analyze land planning and economic data as a function of both current and projected need. Analyze the application of geothermal energy to the utility infrastructure.

Status - Local interviews have been conducted with SGEP Advisory Committee members in the respective areas of energy sale and distribution (electric, oil, and LPG), agriculture, and forest products, as well as other community leaders in these fields. Questionnaires concerning energy utilization have been developed, distributed, and mostly received. Hydrology studies have been undertaken, and extensive investigation, through our consultant, is under way in agriculture and forest products.

Key Results/Conclusions - (see following reports of Barmettler and Jackson.

Problems and Solutions - The combination of a narrow economic and industrial base for sampling and the delays encountered in collecting detailed operational business information has cast some doubt as to how much more site specific data will be produced in the Susanville area alone. A greater emphasis is to be placed upon generalized data on potentially viable industrial and agricultural applications compatible with the resources and services available and projected for Susanville.

Future Activities - The collection of industrial and agricultural data on energy, labor and economics will be accelerated. Iterate with Resource and Systems for refinement leading to input for the Modeling.

1.1.1 Special Report by Dr. Edwin R. Barmettler, consultant to VTN

Scope of Current Activities The current effort is directed to the assembly of necessary resource and product cost data into two primary sectors of agriculture and forestry. The assembly process is well under way and is beginning to provide the essential data based for the S.G.E.P. and like model developments. The data base at this date is still inadequate for purposes of drawing useful recommendations.

Current Status Significant information on land use characteristics has been developed for the defined S.G.E.P. area. These data are being reduced to map overlays. Budgets have been developed for alfalfa, small grains, and meadow hay products. These budgets need to be reviewed and several factor costs need to be verified. Costs for controlled environment systems operations using fossil fuel price data literally makes greenhouse operation non-practical. A good deal more information is required before a system model is

achievable, a model that could serve at other nominative locations.

Candidate Processes and Potential Products

1. Controlled Environment Systems -- depending on geothermal resource quality.
2. Growing Medium Modification -- using geothermal heat to provide protein SCP (single cell protein) cultural growth environments.
3. Biogas Generation utilizing industrial, domestic, and agricultural organic wastes (using geothermal heat as augmentation energy).
4. Food Product Dehydration -- including concentration and other volume reducing activity, using geothermal and solar heat sources for energy.

Relevant Results From Current Efforts The more important findings to date are the product cost estimates for Lassen County agricultural activity. A significant element of these estimates is the cost for energy, particularly processing and transportation costs. Heat energy for greenhouses, feed drying, kiln operations, etc. are only now being developed. It is evident from the current cost studies that producers are finding it difficult to compete with producers in other agricultural areas.

NOTE: Apparently those firms established for long time periods, and where financing did not have to come from agricultural products, are the same ones that are operational to date.

Problem Areas Tentative information for the S.G.E.P. area seems to indicate a less than ideally adequate economical and infrastructural base. Additional evidence will need to be generated before any sound recommendations for investment and development standards can be made. Much will apparently depend upon the quality and quantity of the geothermal resources in the S.G.E.P. study area. Current trend

projections do not appear to be particularly encouraging.

Planned Activity - Future In the next several weeks the consultant will determine the factor input requirements in the S.G.E.P. areas for agricultural, forestry, fishery, and mining. Factor supply sources and costs (costs for services) alternatives will be determined for selected candidate processes or products. The consultant will also tabulate relevant economical data for use in the S.G.E.P. and alternative models. For the S.G.E.P. model, necessary information will be reduced to tabular presentation and map overlays. It is further the intention of the consultant to evaluate the multiplier effect for added investment in the agricultural, forestry, and related activities in the S.G.E.P. area.

1.1.2 Special Report by Larry Jackson, VTN

Scope As outlined in the Section II of the research grant application, the project scope relating to urban economics is composed of two distinct phases. Initial work on the project can be classified as the Data Collection and Analysis Phase and includes the following assignments:

- a) Collect and analyze existing socio-economic data on the study area including recent planning studies, census data, and other appropriate labor and migration pattern information.
- b) Review and analyze the makeup of businesses and industries currently operating in the study area. Historical and recent trends as well as anticipated expansion plans are to be noted.
- c) Analyze existing and projected transportation networks serving the local region including rail, airports and highways.

The Second Phase is basically comprised of two distinct elements as follows:

- a) Determine potential new markets for industrial or agricultural products which may prove to be economically feasible based on the availability of inexpensive geothermal energy.
- b) Assess the potential effect these new businesses and industries will have on the local economy in terms of basic and support employment, land use patterns, population growth and overall economic well being.

Status and Results to Date Work during the first quarter of this project dealt primarily with data collection and familiarization with the local region. Along with published socio-economic information gathered during a trip to Susanville, numerous interviews were held with local merchants, lumber companies, ranchers, and utility companies. These discussions provided the consultant with a personal glimpse and feeling for conditions in the region as well as the hard data extracted from published sources. The data collection phase has been completed.

In addition, a general search was begun to uncover potential new industries which may be inclined to relocate to the area should low cost geothermal energy be readily available.

The consultant team is currently preparing a working document which spells out pertinent economic hardships and problems faced by residents of the Susanville area. It is apparent that issues such as the high rate of unemployment, out-migration of young people, low average family incomes, and inefficient transportation networks serving the area make business development extremely difficult under existing conditions.

Problems and Recommended Solutions One major problem encountered to date concerns delineation of energy intensive industries that

would find relocation to the Susanville area advantageous for future operations. However, it is anticipated that these difficulties will be overcome as additional information concerning location and quantity of geothermal energy becomes available.

Future Activities It is anticipated that the second quarter will be devoted to: (1) analysis and refinement of information collected on the local economy; (2) developing a working document on the makeup of existing and potential industries operating in the area; (3) projecting reasonable numbers and types of energy intensive industries potentially attracted to the area and; (4) estimating the impact these industries will have on the economic base of the region.

1.2 Resource

Task Manager: George Zebal, consultant to VTN

Scope - The resource assessment task will combine original geological and geophysical work to be accomplished by the Bureau of Reclamation with existing governmental and private information to evaluate the presence and physical characteristics of potential geothermal resources within the Honey Lake Valley and adjacent to the City of Susanville. A cost-effective flow of exploration activities will be developed for future utilization as follows:

- (1) Literature search for pertinent structural, stratigraphic, and geothermal information; surface geological mapping; scanning infrared photometry; and theoretical geochemical thermometry.
- (2) Regional electrical resistivity survey to discover and establish the boundaries of geothermal anomalies.
- (3) Series of shallow thermal gradient holes to identify specific sites of abnormally high heat flow.
- (4) Deep exploratory drilling to establish the depths to potential

reservoirs, reservoir and production characteristics, and the potential temperature and geochemistry of geothermal fluids.

Integration and cost accounting procedures as well as the sequence of exploration activities will be utilized for future economic modeling.

Status - The resource assessment task was initiated prior to contract approval, hence it is well advanced. The literature survey, surface mapping, infrared photometry, and water well data collection phases were concluded early. These provided data utilized to restrict electrical resistivity exploration to the northeasterly half of the Honey Lake graben. All of the resistivity lines have been run in the field and most of the data reduction has been finished. Final reports will be ready early in the next quarter. Sites for many shallow thermal gradient holes have been chosen and permits for these sites are currently being obtained. The holes will be drilled during the next quarter. Requests for funding have been initiated for drilling deep exploratory wells on several of the geothermal anomalies newly discovered by the electrical resistivity surveys. A data trade with Gulf Mineral Resources Company has been consummated and these data are available for integration into the resource assessment program.

Key Results - The literature search and surface mapping by George P. Zebal & Associates in the central and eastern areas in the graben area showed that the best presentation of structure and surface stratigraphy was work accomplished by the Department of Water Resources, State of California, in Bulletin No. 98, February 1963.

Utilizing the above data from Bulletin No. 98, the above surface mapping, infrared photometry temperature anomalies, and the known occurrences of hot springs and hot water wells; it became evident that the southwest half of the Honey Lake graben (southwest of a line drawn between the Fort Sage Mountains and Bald Mountain) was cold at depth and probably underlain

by Sierran granite. Therefore, the northeast half of the graben may be locally hot at depth and offered the best prospects for geothermal exploration. This theory was used to restrict electrical resistivity surveys to the northeast half of the valley between Susanville and the Sierra Ordnance Depot.

Forty-nine useable electrical resistivity lines using a Wenner array electrode setup with line lengths varying from 0.3 mile to 1.0 mile (depending on obstacles and lithology of surface formations) were run across the above described area by the Bureau of Reclamation. Preliminary reduction of the filed data disclosed the locations and approximate areas of four geothermal anomalies located in the Susanville, Honey Lake and mid-valley areas.

The Susanville, Wendel, and Amedee anomalies were previously known because of hot surface manifestations. The mid valley anomalies were discovered during the course of exploration for this program.

Reduction of the scanning infrared photometry survey data, flown by the Forest Service, served to augment the locations of the above electrical resistivity anomalies through indications of higher than normal ground temperatures. A small infrared anomaly was defined in the central valley and geothermal heating of water in the northwestern portion of Honey Lake was evident.

The Bureau of Reclamation has collected water composition data from 194 water wells within the area covered by the electrical resistivity and infrared imagery surveys. Silica percentage and calcium-sodium (Ca-Na) ratios have been plotted as a function of geographic location. The silica percentage plot showed such a spread of apparent temperatures that the thermometric data was useless. The Ca-Na ratio plots from wells grouped geographically provided a smooth curve. Therefore, selected water wells within and

adjacent to resistivity anomalies will be utilized to demonstrate "last solution" or probable reservoir temperatures of geothermal fluids beneath each anomaly.

A total of 16 shallow thermal gradient holes were selected to investigate sites of high heat flow on the resistivity anomalies. Plans include drilling each hole to a depth of 150 feet using a Bureau of Reclamation Failing 1500 rig. These 6-inch diameter holes will be cased with 2-inch PVC tubing containing a bottom plug so that convection currents will not be set up and temperature measurements can be made after the hole regains thermal equilibrium. The thermal gradient holes were specifically located at county road intersections to expedite obtaining permits. Permits from Lassen County are in the process of being validated; Division of Oil and Gas, State of California, permits are not required because the drilling is being conducted by the Bureau of Reclamation.

A significant aspect of the SGEP is to meld data from private sources into the overall program. Because of costs, most of the exploration data obtained by private corporations is held proprietary in perpetuity. Despite this factor, Gulf Mineral Resources Company (major lease holder in the Wendel-Amedee KGRA) was approached regarding an exchange of data. To their great credit, Gulf Mineral Resources acquiesced to this request by submitting the following geological, geophysical, and well history information in the Wendel-Amedee area:

Geological and Geophysical Maps:

1. Land map (showing Gulf leases)
2. Geological Map
3. Apparent Resistivity Map
4. Microseismic Anomaly Map
5. Shallow Ground Temperature Map

Well Information from Two Deep Wells Drilled in 1973 at Wendel and at Amedee:

1. Lithology Logs

2. Electric Logs

Various Schlumberger and Welex Logs that were run to verify stratigraphy and designate porous or fractured intervals.

3. Temperature Surveys

Various surveys taken immediately after drilling, following the passage of time, and statically and dynamically.

4. Summary Outlines of Locating, Drilling, Casing, Logging and Testing Wells

5. Drilling Histories

Miscellaneous Data:

1. Geochemical Analysis of Water from a well near Amedee Hot Springs

These data are to be held confidential and anyone not directly associated with SGEP may not see or use said data.

The importance to the overall program of the above information lies in the fact that it is very detailed and offers the most comprehensive analysis of the geothermal geology of the Wendel-Amedee area that is currently available. Therefore, these data can be substituted for future Bureau of Reclamation activities in this specific area. The Gulf data can be intergrated into the resource assessment task without violating the spirit of confidentiality and future Bureau of Reclamation efforts can be directed toward the less well-known anomalies.

Sincere appreciation is accorded the Gulf Mineral Resources Company for their significant contribution to the SGEP. This company has truly demonstrated an interest in the economic well-being of the Honey Lake Valley.

Problems and Solutions The flow of exploration activities and the gathering of resource data has been remarkably free of problems. Three factors are instrumental in achieving this status, as follows:

- (1) The quality of field work and the overall resources provided by the Sacramento office of the Bureau of Reclamation has been outstanding.
- (2) Geophysical data reduction and geochemical studies provided by the Geophysical Division of the Bureau of Reclamation has been unique and excellent.
- (3) The data trade agreement with the Gulf Mineral Resources Company has provided information that could not be obtained elsewhere.

A warning should be issued at this point. Resource assessment exploration has identified two geothermal anomalies that were previously unknown. This information should be kept confidential until such time as the City of Susanville decides how best to exploit these newly discovered anomalies.

Future Activities Future activities planned for the resource assessment task concern the following:

- (1) Obtain final Lassen County permits for sites of thermal gradient holes.
- (2) Drill shallow thermal gradient holes.
- (3) Record thermal gradient and maximum temperature data.
- (4) Receive final geochemical analysis report.
- (5) Receive final electrical resistivity survey report.
- (6) Initiate program for funding of deep exploratory wells.

Final permits from Lassen County validating drilling sites for the thermal gradient hole drilling program should be obtained on or about 21 October 1975. Therefore, drilling will commence on or about 22 October. The Bureau of Reclamation will supply the drilling rig, crews, and casing. The drilling rig will be available for one month; it is estimated that 16 holes can be drilled in that time. The 2-inch PVC tubing is on hand

in the Bureau yard in Sacramento. Receipt of the Ground Temperature Map from Gulf (resulting from a shallow drilling program in the Wendel-Amedee area) eliminates the necessity of drilling temperature gradient holes in this area. Therefore, an adjustment in the drilling program is warranted which will probably result in more holes on the mid-valley anomalies. After casing is set in the holes, it will take at least one month to attain thermal equilibrium. Therefore, temperature measurements to obtain thermal gradients will take place after this interval of time. Data reduction and computer programming of electrical resistivity and geochemical field surveys are time consuming efforts. However, it is expected that the final reports on these activities will be obtained from the Geophysical Division of the Bureau of Reclamation in Denver early in the next quarter. Integrating the data from these reports with that obtained from Gulf Mineral Resources Company will supply a resource assessment potential superior to that existing for any comparable area in the Western United States. In addition, it will integrate public and private information to solve a problem and develop an economic resource assessment model that is greatly enhanced over that originally envisioned for this program. The next quarter will see a continuing effort to obtain funds for the purpose of drilling deep exploratory wells on the anomalies other than Wendel-Amedee.

1.3 Systems

Task Manager: David A. Edson, VTN

Scope Analysis and definition of system design shall be conducted for the production, control, conversion and distribution of thermal and electric geothermal energy. This effort is primarily parametric in nature with emphasis on that design effort required to prepared parametric

costs for the Economic Modeling. The mix of thermal vs. electric energy needs shall be analyzed in support of the subsystem and system parametric design. The requirements for system integration into the community infrastructure (existing utilities) shall be defined. Life maintenance and operational considerations shall be evaluated for economic influence on the modeling.

Status Lateness in acquiring Requirements data and administrative delays in completing contractual agreements with Aerojet precluded the start of meaningful systems effort. This effort will be started in October.

1.3.1 Thermal Energy Utility Systems (see above)

1.3.2 Energy Conversion Systems

Task Manager: Barry Breindal, Aerojet Energy Conversion Company

Scope The Aerojet Energy Conversion Company will perform the studies associated with the conversion of geothermal energy to useful power. Candidate electrical generating systems will be modeled parametrically, considering a range of possible geothermal water resource characteristics, cooling water features, hot water distribution system requirements and community energy needs. The existing state-of-the-art in energy conversion hardware forms the basis for the study.

A mathematical model will be constructed which determines the capital and operating costs of applicable geothermal electrical generating power plants. The output from this model will be used in conjunction with the overall geothermal system model to determine the optimum mix between direct thermal energy utilization and electrical power generation. This will contribute to establishing the most economically beneficial approach to applying the geothermal resources in a community typified by the City of Susanville.

A candidate energy conversion subsystem will be selected in consort with the overall requirements. This subsystem will be used for program planning for the demonstration phase.

1.4 Modeling

Task Manager: David A. Edson, VTN

Scope An overall economic model and appropriate submodels will be developed to evaluate the overall economic advantages and disadvantages of a community utilizing geothermal energy to build an economic base. The system and subsystem modeling will be conducted to define economic sensitivity parameters such as impacts on cost of sales, employment and revenue. The range of input parameters will be selected to accommodate the requirements and projected resource capabilities of the communities whose representatives form the Utilization Panel.

Status This task is not scheduled to start before the end of November. However, current thinking indicates that structuring of the modeling should be initiated at the end of October. It is important to review other related modeling recently completed and under way elsewhere. This recommended revision is incorporated in the revised Work Plan, Task 4.0.

such as utility districts, joint powers agencies, economic development entities (public and semi-private), private companies, joint ventures, and combinations thereof are being explored within the scope of the project.

Preliminary assessment of the statutory environmental constraints have been undertaken including close observation of the conduct of applicable Federal and State agencies with a conflicting measure of jurisdiction over the development of geothermal energy resources. Project staff have made very preliminary inquiries into clarification of procedures for environmental clearance for geothermal development and ascertained a glimpse at the complexity and duplications of present statutory requirements. In fact, a significant delay has been encountered in obtaining environmental clearance for the drilling of the sixteen (16) shallow observation wells (temperature profile holes) in Honey Lake Valley. In the event that these excavations could have been termed "domestic wells" no environmental clearance would have been necessary.

In addressing Interagency Coordination, the Project has coordinated efforts between the ERDA funded Project and the Bureau of Reclamations resource assessment efforts. This has created a mutually complimentary circumstance and enhanced the entire Project.

Two working sessions with the Geothermal Advisory Committee have taken place, one on May 30 before the Project actually began and the other on July 15th. The first meeting was an orientation meeting for the Project while the second established a working committee to gather data on the community and have it submitted to Mr. Edson to fulfill a significant part of the Susanville specific data necessary for the Requirements Definition. This task has been completed.

The Institutional Development effort has coordinated and assessed the progress of the other major tasks, all of which significantly impact

the Institutional Plan. The City's function in Project administration has been carried within the Institutional Plan.

Key Results/Conclusions Mr. Cady's Office has carried on a concentrated effort to locate data on the legal definition of geothermal energy utility systems. After having contacted a number of other key communities, including: Boise, Idaho; Lakeport, California; El Centro, California; Imperial County, California; Burbank, California; Klamath Falls, Oregon; and the League of California Cities; with regard to available legal definition of geothermal energy utility systems a preliminary determination has been made that such legal definition is without precedence.

Problems & Recommended Solutions Of major concern to the Project is the statutory requirements for environmental consideration that appears to be iterative and not clearly defined. Within the scope of the Resource Assessment task in the Project the Task Manager anticipates the necessity to seek clarification of procedures to comply with environmental law. The Project is interested in the State of California effort to establish a state geothermal energy policy.

Co-equal with the apparent complexity of environmental law on geothermal development is the high cost of front end development of geothermal resources, including resource assessment, acquisition of mineral/water rights and geothermal energy hardware. From preliminary legal investigation it appears that Revenue Bonds and General Obligation Bonds are unsatisfactory for frontend financing and more suited to the financing of actual development of the energy resources. The Susanville Geothermal Energy Project has been very fortunate to have access to the services of the Bureau of Reclamation for resource assessment, but problems in front end financing for the Replicable Communities do exist.

An institutional mechanism must be developed to preserve the resource for the economic benefit of the community. There is a time period between the identification of the resource and the control of the use of that resource. This time period is one of jeopardy for the misuse of the resource. The institutional mechanism must be developed as one short of condemnation and as one which permits and encourages the participation of private industry.

Future Activities The area of concentration of effort will be defining and selecting an institutional administrative vehicle for a demonstration model. A schedule of subtasks has been prepared which will time frame future activities. (see chart) This vehicle will be assessed and planning completed for the extension of this vehicle for use in the operational phase of the Susanville Geothermal Utility System.

INSTITUTIONAL ADMINISTRATIVE VEHICLE OPTIONS & FINANCIAL OPTIONS

3.0 UTILIZATION PLAN

Task Manager: Alfred B. Longyear, CSL

Scope The Utilization Plan will be implemented to assure timely transfer of the technical and institutional findings of the Project to other interested communities and to assure that the scope of the parameters used in the prototype Susanville Model are broad enough to be of use to other similar communities. If system optimization can be made to reflect applicability to a large number of communities, the engineering and development costs can be spread over a broader market for the hardware.

A Utilization Panel shall be formed with representatives outside of Lassen County, California. This Panel will exchange data on community and resource characteristics with the Project. A newsletter shall be prepared for distribution to interested local governments after each quarterly meeting.

Evaluation and planning will be conducted to determine the value of establishing a geothermal laboratory for use by industry to evaluate the economics of use of geothermal energy.

A Workshop shall be held at the end of the 12 month study. All task managers shall present papers covering their scope of effort. The Proceedings, containing these papers shall be published in lieu of a final technical report. The Utilization Panel will be convened to describe and discuss their participation in the Project. After the Workshop, a Summary Report covering conclusions drawn from the Workshop and final administrative information shall be published.

Status From a list of 160 communities in the thirteen most Western states, seventeen communities were selected for further evaluation.

These were selected on the basis of having at least reasonable hydro-thermal resources available in the county of each community and the community having a recognized socio-economic need. Through contacts in six state offices of energy or economic development the seventeen communities were surveyed and evaluated against socio-economic and geological criteria. The following six communities have been invited to membership on the Utilization Panel:

Boise City, Ada County, Idaho

Carson River Basin Council of Governments, Nevada

Fillmore City, Millard County, Utah

Lakeport City, Lake County, California

Skamania County, Washington

Union County, Oregon

The remaining twelve communities surveyed have been invited to participate on an ad hoc basis. The first meeting of the Panel will be held concurrent with the quarterly review on October 15, 1975.

Key Results/Conclusions There is almost a unanimous desire to participate in the SGEP amongst all communities contacted in the Replicable Communities Study conducted by VTN-CSL, (November 1974) and in the formation of the Utilization Panel. The participation of the Panel can benefit many communities and the City of Susanville.

Problems and Solutions There is no identified field action agency or established funding defined for the early phases of resource assessment. Most communities indigenous to projected geothermal resources are small and hence do not have the finances required to assess their resources to the extent required to justify the risk of commercial, private or Federal assisted funds. Discussions have been initiated with ERDA, the Department of Interior and cognizant Congressional members and their

staffs to determine an organizational and financial approach to this problem.

Future Activities The Utilization Panel member communities and ad hoc members will be requested to furnish additional information on the characteristics of their communities and their geothermal resources. These data will be used to establish boundaries around the parameters of the system design and modeling tasks.

4.0 PROGRAM PLAN

Task Manager: Alfred B. Longyear, CSL

Scope Planning will be conducted so that, through the application of appropriate resources, the tasks of the Project and their inter-related efforts will be accomplished according to the SGEP Work Plan. Through coordination with the BuRec Appraisal Study, planning shall be conducted to assure timely exchange of data between the two projects. Planning for the development/demonstration phase will be conducted based upon a candidate geothermal energy utility system selected from the Research Plan. This planning will include a definition of the system, a work plan including program schedule and a funding plan. The funding plan shall include definition of funding sources evaluated and selected. Both private and public fund sources shall be evaluated.

Status The current contracted scope is adequately defined. Unforeseen administrative delays have caused a stretch out in the definition of Requirements. Added scope in terms of temperature profile holes in the BuRec Study calls for an extension of completion of the first quarter assessment of Resource. Administrative delays in contracting for the energy conversion subsystem effort plus delays in collecting Requirements data calls for a delay in system effort.

Discussion on current and future program phases were held with state, regional and national officers of ERDA, FEA, EDA, HUD, Interior, Agriculture and appropriate members of Congress and their staffs. Similar discussions have been held with the California Department of Housing and Community Development and the California Energy Commission.

Key Results/Conclusions The time required to establish administrative procedures for this prototype project were underestimated. The assignment of additional people and an interim exchange of data between tasks

early in the second quarter will permit the initiation of systems and the early initiation of modeling. This early start of modeling will permit a more thorough screening of current modeling work elsewhere and a more orderly structuring of the elements of the modeling. It is programmatically important to structure the posture of the overall project by January 1976. The revised Work Plan will permit meeting this schedule.

Problems and Solutions The problem of delays in data collection can be compensated for through schedule modification for this next quarter. The total scope of the Susanville Geothermal Energy Project is broader than any existing organizational element in ERDA. It is not clear as to where the funding for exploration wells can be obtained in a timely manner. Such wells are required before private, commercial or Federal loan funding can be risked. The wells should be drilled as soon as possible in the Spring of 1976. Cognizant personnel in ERDA and Interior have been briefed on this item. Resolution is required in order to achieve continuity and timely demonstration of the SGEP.

Future Activities

- ° Respond to Congressman M. McCormack's request for comment on the Federal loan program. (Due October 20, 1975)
- ° Resolve near term funding for exploration wells by January 1976.
- ° Present Project status and posture at ERDA headquarters and Congressional.
- ° Develop the Project posture and present to industrial firms to survey for private investment opportunities. (Spring 1976)

7/7/75

SUSANVILLE GEOTHERMAL ENERGY PROJECT WORK PLAN

Revised 10/10/75

APPENDIX

SUSANVILLE GEOTHERMAL ENERGY PROJECT

October 1975

In response to an unemployment rate exceeding 25% and other related community needs, the City of Susanville, California, has embarked on a comprehensive effort in community and economic development. In order to improve the local job market, an effort is underway to improve the competitive position of the local commerce and industry. This effort is directed at the development of local geothermal resources in the form of an energy utility system to furnish low-cost energy to our job-intensive industry.

The Susanville Geothermal Energy Project (SGEP) encompasses the research and development for the energy system. A team composed of key citizens, elected officials, city management and industry have developed the Project since late 1973. The U. S. Bureau of Reclamation has been conducting an assessment of our geothermal resources since the Fall of 1974. The Energy Research and Development Administration has contracted for a research program to define the economics of a community building an economic base through the utilization of geothermal energy. The ERDA effort will define the economic model, specific energy systems and a program plan for the development of a demonstration geothermal utility system. An essential part of this effort will be the development of the institutional tools (policy, planning, organizational, financing, legal and environmental) as required for a community to implement such a development and utilization of its natural resources.

It is important that the Federally-funded effort in Susanville be of benefit to, and be replicable by, many other communities. To this end, a Utilization Panel has been formed with members representing other communities outside of Lassen County, California. The member communities of this Panel will have direct access to the SGEP as it progresses and will

contribute data on their individual communities to assure that the results of the Project will directly benefit their own communities.

In the early summer of 1976, a Workshop is scheduled in Susanville to present and discuss the results of the Project as of that time. As well as Utilization Panel members, other interested communities will be invited to participate at that time. The SGEP Work Plan and schedule are summarized on the enclosed chart.

The ERDA effort is being performed by the City under Contract AT(04-3)-1077, administered by ERDA-SAN, Oakland, California. The contracted effort in the City is under the direction of the Executive Officer, Mayor Daniel P. Sanchez. Responsibility for carrying out the program is the City Clerk and Finance Officer, James C. Jeskey, designated as Program Manager. Mr. Jerome Garza, Assistant for Community Development assists Mr. Jeskey in overall project administration and participates in the Institutional Plan. The Principal Investigator is Alfred B. Longyear of VTN-CSL, a joint venture between VTN Consolidated Inc. and CSL Associates, Inc. VTN-CSL was formed and is under subcontract with the City to perform the professional services required for the Project. Aerojet Energy Conversion Company is under subcontract with VTN-CSL for studies in energy conversion. George Zebal, (Geology), and Dr. E. R. Barmettler (Agriculture) are under contract with VTN for studies in their disciplines.

The U. S. Bureau of Reclamation is conducting an Appraisal Study of the geothermal resources in the Susanville-Honey Lake Area. The Study is directed by Lyle Tomlin, Special Studies, BuRec, Sacramento, and is supported by the BuRec Engineering and Research Center, Denver.

The development of the project has been supported by VTN, CSL and Aerojet. Gulf Mineral Resources and VTN have furnished proprietary data of significant value to the project and the community.

7/7/75