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PROPOSAL FOR SUPPORT FOR SCIENTIFIC RESEARCH

SUBMITTED TO:

U. S. Department of Energy  
Division of Geothermal Energy

D.F.

INSTITUTION:

Board of Regents  
University of Nevada System  
Nevada Bureau of Mines and Geology  
University of Nevada - Reno  
Reno, Nevada 89557

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PRINCIPAL INVESTIGATOR:

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Nevada Bureau of Mines and Geology

TITLE OF RESEARCH:

LOW- TO MODERATE-TEMPERATURE GEOTHERMAL RESOURCE  
ASSESSMENT FOR NEVADA - SITE SPECIFIC STUDIES

SUPPORT REQUESTED FOR  
PERIOD:

May 1, 1979 to April 30, 1981

SUPPORT REQUESTED:

	Year 1	Year 2
Option I	\$140,630	\$136,469
Option II	\$205,585	\$208,704

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Nevada Bureau of Mines and Geology

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Graduate Dean,  
Research Coordinator

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## INTRODUCTION

The Nevada Bureau of Mines and Geology (NBMG) proposes to extend its investigation of low- to moderate-temperature geothermal resources by examining four sites, over a two year period, where geothermal resource development has been favorably assessed. These areas include the northern Big Smoky Valley, the Carson City area, and two areas from the following list of possibilities: Carlin, Moana, Wells, Gerlach, Wabuska, Smith Creek Valley, Crescent Valley, Golconda, and Hawthorne. All of these areas contain a significant number of hot springs and wells and were recently designated as high potential areas for geothermal resource development in the U.S.G.S. Circular 790. In addition, the areas were selected on the basis of a numerical technique, recently formulated at NBMG, that evaluates data from several distinct geothermal parameters and yields a semi-quantitative probability function. The value of the probability function is used to determine resource development favorability.

The basic program will combine geological mapping, physical measurements, geophysical surveys, and geochemical surveys to identify and place limits on the reservoir boundaries of the hydrothermal resource. An option, which involves drilling at selected sites within each of the study areas, is included.

The scope of the investigation is briefly outlined below:

### Option I

- Task 1. Review pertinent geological and geophysical literature and construct preliminary surface manifestation maps as well as subsurface cross-sections.
- Task 2. Geological field checking of stratigraphic units in hydrographic basin.
- Task 3. Fly low sun-angle photographic reconnaissance of hydrographic basin to delineate lineaments.
- Task 4. Conduct leveling survey and gravity survey at selected intervals across the hydrographic basin.
- Task 5. Conduct resistivity surveys in areas adjacent to hot springs.

- Task 6. Conduct a one-meter temperature survey in areas adjacent to hot springs.
- Task 7. Sample surface waters for chemical analysis.
- Task 8. Prepare maps, diagrams, and cross-sections of traversed areas.
- Task 9. Prepare final report and critique of scientific methods used in the investigation.
- Task 10. Submit all pertinent data to USGS GEOTHERM data file, including information gathered in the continuing State-wide Geothermal Assessment.

#### Option II

- Task 11. Select one drill site at each study area and drill approximately 600 feet for temperature gradient and reservoir confirmation.
- Task 12. Log wells during drilling.
- Task 13. Prepare detailed lithologic logs from drill chips.
- Task 14. Analyze selected intervals of drill chips both petrographically and by X-ray diffraction.
- Task 15. Measure temperature profile and collect water samples for chemical analysis.

## RATIONALE

The Rocky Mountain - Basin and Range Regional Hydrothermal Commercialization Plan has identified the "lack of adequately tested reservoirs" as one of the "most critical barriers to accelerating the development of hydrothermal resources." In addition, the Plan outlines the objectives of the State-Coupled Direct Heat program. These objectives include: assisting the U.S.G.S. data compilation of low- to moderate-temperature resources; publishing maps and reports detailing these resources; and testing the highest priority areas for reservoir confirmation. The NBMG proposes a two year, multi-task reservoir-confirmation program for four sites of high potential for direct utilization of geothermal resources.

Several factors influenced the choice of the four sites. They are all within the Battle Mountain Heat-Flow High and also contain a number of thermal springs and wells. Twenty-seven broad regions, which include the selected sites, were outlined by U.S.G.S. and NBMG personnel as areas of high potential for direct utilization and included in U.S.G.S. Circular 790. In addition, a numerical scheme has been developed at the NBMG for ranking areas with regard to potential for direct utilization. The scheme evaluates physical, chemical, and demographical parameters for specific sites. On the basis of this scheme, the Carson City, Carlin, Moana, Hawthorne, and Wells areas were rated high for development of geothermal residential space heating and the Big Smoky Valley, Gerlach, Golconda, Wabuska, Crescent Valley, and Smith Creek Valley areas rated high for the development of geothermal industrial process heat. These areas are also favored because adequate baseline data exists in the form of topographic, geologic, and regional gravity maps, as well as chemical analyses of thermal waters.

The site-specific tasks, outlined in the introduction, and discussed in the following sections, are designed to provide sub-surface information and to place limits on the boundaries of the geothermal reservoir. The need for this information is based on the premise that "a very substantial increase in direct utilization is possible by 1985 if reservoir confirmation efforts . . . are extensive enough", as outlined in the Regional Hydrothermal Commercialization Plan.

The information provided by the program will be used in many ways by several agencies (Federal, State, and local) and by the private sector (companies and individuals). The results of this proposed investigation will provide information to:

- 1) support the DOE funded Nevada Department of Energy's Operations Research and Outreach programs;
- 2) supplement and update data to the U. S. Geological Survey's GEOTHERM computer data file;
- 3) eliminate uncertainties attendant to resource exploitation by potential developers and,
- 4) define site-specific resource characteristics.

The Option II investigation will provide more detailed subsurface information that will further enhance credibility of the reservoir characteristics as determined in Option I.

The final report will include a critical evaluation of the geothermal exploration techniques used in this study and will suggest, on the basis of the developed criteria, future site-specific reservoir studies.

## PROPOSED PROGRAM

The NBMG is presently completing work on the low- to moderate-temperature geothermal assessment program for Nevada, Contract No. ET-78-S-08-1556.

During the course of this work, the NBMG identified sites where detailed geological and geophysical investigations could be carried out to delineate geothermal reservoir boundaries (fig. 1). Most of these sites are already well known because of the numerous hot springs and wells in these areas. The USGS has also broadly outlined 27 such sites, in Nevada, in Circular 790.

In the first year of the program, the investigation will focus on the northern half of the Big Smoky Valley and the Carson City area. In the second year, two other areas will be selected from the following possible sites:

Areas rated high for Industrial Process Heat Applications

1. Crescent Valley
2. Golconda
3. Gerlach
4. Smith Creek Valley
5. Wabuska

Areas rated high for Residential Space Heating Applications

6. Moana
7. Carlin
8. Wells
9. Hawthorne

The selection will be based on information gained during the first year and on availability of suitable topographic base maps.

Description of the areas

The Big Smoky Valley is one of the largest in central Nevada, encompassing nearly 3000 square miles. It extends from the city of Tonopah, north, approximately 100 miles, to the city of Austin (fig. 1). The Toiyabe Range, to the west, and the Toquima Range, to the east, rise to over 6000 feet above the valley floor. A slight structural high, near the town of Round Mountain, bisects the valley into two smaller drainage basins.

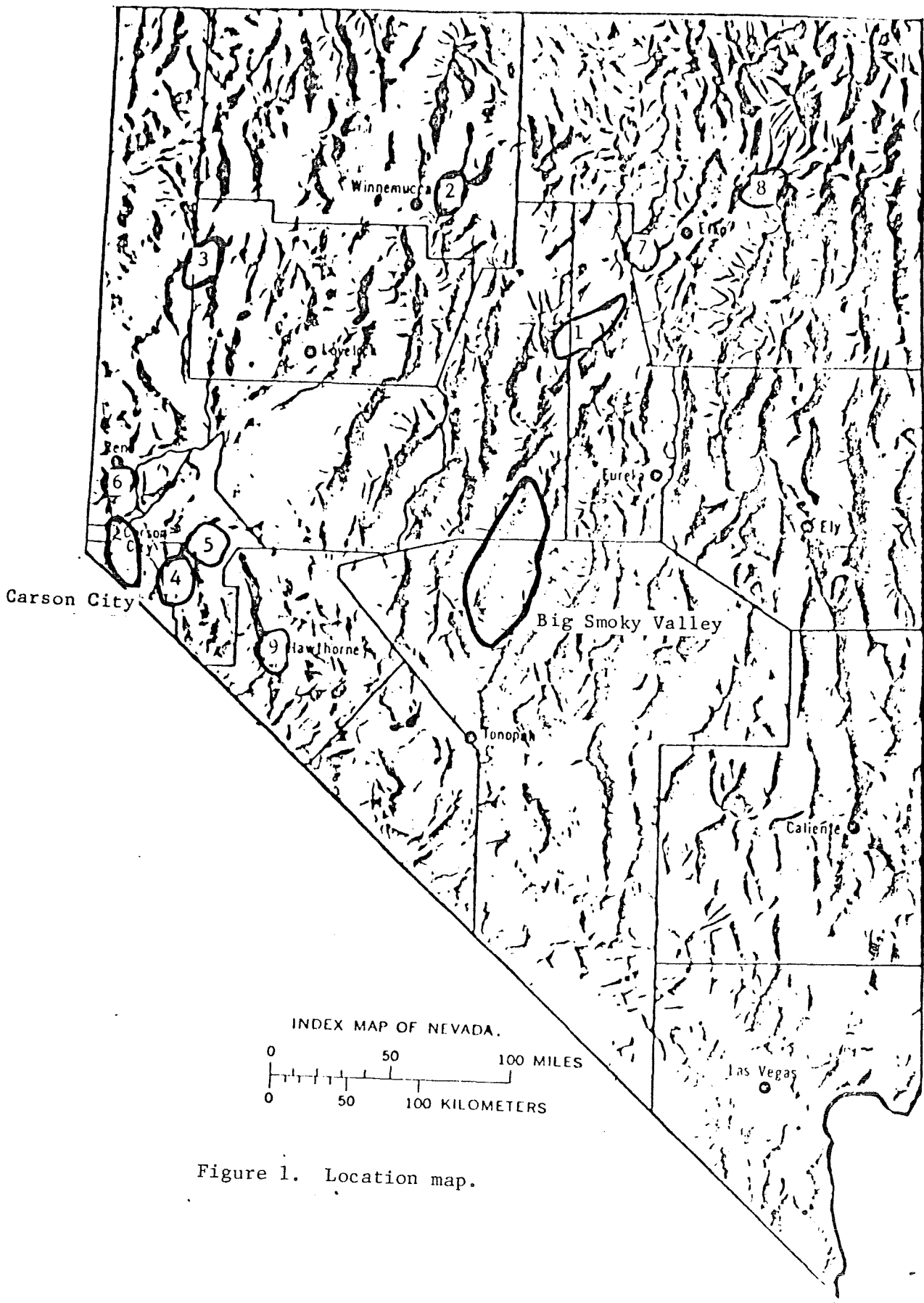


Figure 1. Location map.



The basin to the north contains a number of geothermal occurrences including: Spencer's Hot Spring (73°C), McCleod Ranch Hot Springs (82°C), and Darrough Hot Springs (97°C). The average elevation of these springs is 5500 ft. The point of discharge is apparently related to permeable sands and gravels of Quaternary age.

The adjacent ranges consist of Paleozoic sediments, both clastic and carbonates, that have been intruded by Mesozoic igneous rocks. Tertiary volcanics cover many of the older rocks. The Quaternary valley fill has been estimated at 3000 to 5000 feet thick (John Erwin, 1979, personal commun.).

Access to the area includes a major north-south highway (Nevada 8A) and many additional secondary roads and trails.

Based on the numerical technique that was previously described, this area was rated very high for industrial process heat applications.

The Carson City site (fig. 1) is a moderately urbanized area, and includes the City of Carson City (population 25,000) and the community of Gardnerville-Minden (population 1500). The investigation will be limited to the northern part of the physiographic basin that is bordered on the north by the Virginia Range, on the east by the Pine Nut Mountains, on the south by the Sierra Nevada, and on the west by the Carson Range. The site encompasses approximately 300 square miles and the work will be concentrated on areas that surround the five major thermal springs: Carson Hot Springs (50°C); Nevada State Prison Springs (24°C); Saratoga Hot Springs (50°C); Hobo Hot Springs (45°C); and Wally's Hot Springs (50°C). In addition, geothermal wells, which are used for residential space heating, are common in the Pine Nut Mountains, immediately adjacent to the Carson City municipal limits.

The oldest rocks at this site consist of Jurassic and Triassic meta-volcanics. The granitic rocks of the Cretaceous Sierra Nevada Batholith are exposed in the Carson Range, to the west, and at other locations scattered

throughout the basin. An extensive sequence of Cenozoic volcanics and interbedded sedimentary rocks overlies the older metavolcanics and granites. The basin is filled with recent and Quaternary alluvium. This site lies entirely within the Basin and Range Province and the mountain ranges are bounded on one or both sides by range-bounding normal faults (Moore, 1969).

Access to this area includes a major north-south highway (U. S. 395), as well as numerous secondary roads.

Based on the numerical technique, this area was rated high for the development of geothermal space heating.

#### Detailed statement of work

The investigation for OPTION I consists of ten functionally interwoven tasks which will be applied to each area of investigation. The incorporation of these tasks into the program is derived, in part, from Goldstein (1977), in which geothermal exploration techniques for northern Nevada were semi-quantitatively evaluated on the basis of cost/benefit. The NBMG anticipates varying degrees of success as these techniques are applied to the different sites. That information will itself be valuable to future geothermal reservoir site-specific studies.

The investigation will begin with a thorough compilation of all available maps (7½' and 15' topographic maps, geologic maps, and regional gravity maps) air photos, well logs, and any additional information from the literature that may be useful in constructing the geologic baseline for each area. The USGS data file GEOTHERM will be used extensively for spring and well locations, water chemistry, and flow rates. Special attention will be given to rock type and age, range-bounding faults, and valley fill components. These baseline data will be projected onto the available topographic maps and selected cross-valley traverses. Five traverses in the Big Smoky Valley and three in

the Carson City area will be delineated for detailed geological and geophysical surveys.

The first detailed survey will consist of checking the lithology/mineralogy, stratigraphy, and structure, in the bordering ranges and, to an extent limited by the number of exposures, the valley fill. Special attention will be given to the stratigraphic units at the tops of the ranges. The presence of similar units detailed prior to the Basin and Range Faulting would likely imply the presence of that same unit in the valley subsurface. Unit correlation may also be useful in the interpretation of the geochemical data for hot springs. Chemical variations within the same drainage may be due to the effects of mineralogically different stratigraphic units.

To augment the geological investigation, low sun-angle photography (LSAP) of both sites will be flown to provide information on the spatial relationship between surface faulting and hot spring activity. Relationships between geothermal anomalies in western and north-central Nevada and geologic structures have been shown to be important in the localization of hot spring activity (Trexler and others, 1978). The surface fault patterns provide pertinent information on subsurface structural controls. Special attention will be given to the relationship between and influence of regional structural trends, in these site-specific areas, and their adherence to the patterns recognized in the Winnemucca AMS sheet (Trexler and others, 1978). The structural interpretation provided by enhancement of surface faults by low sun-angle photography (Walker and Trexler, 1977) will provide information on the subsurface controls of the reservoirs under investigation.

Regional gravity data is available for all sites (Erwin and Berg, 1977; Erwin and Bittleston, 1977; Healy, 1967; Oliver and Robbins, 1973), but only at a scale of 1:250,000. The aim of the gravity survey proposed here is to

provide more detailed information along the same transects as the geological surveys. The information derived will give a reasonable indication of the depth of the valley fill and may resolve the configuration of the basement below the fill. Elevations will be determined by the stadia-transit technique and gravity measurements will be tied to existing stations of previous surveys. Samples will be collected for density determination in the laboratory.

No shallow depth (1 meter) temperature survey information is available at the proposed sites. Heat flow measurements received high ratings (Goldstein, 1977) in both scales of geothermal exploration, 2500 and 100 square mile areas. A technique that was developed by Olmsted (1977) and used with some success in Nevada, will be applied, in a modified version, to these sites. The technique consists of the temporary installation of a 30 station expandable rectangular grid. The holes will be augered, to a depth of one meter, in the vicinity of suspected reservoirs. Temperatures will be measured periodically and the resulting isotherm configuration will be plotted on the base maps. The isotherm configuration could be useful in determining the extent of the structural controls, as determined from LSAP interpretation, on heat flow. Radial symmetry may indicate a point source for the hot water, possibly the intersection of two faults. Linear or elongate patterns, on the other hand, would almost certainly indicate a single deep fault as the responsible structure.

Since depth to the resource is an important parameter governing the economics of the direct-use of geothermal energy, an electric resistivity survey, at selected sites, has also been incorporated with the field work. The shape of the top of the water table will define the possible upper limits of the geothermal reservoir. The distribution of sediments saturated with highly conductive brines, geothermal waters, may also indicate the extent of near-surface geothermal aquifers. An example of this may be

evident in the Big Smoky Valley, where the average elevation of discharge of the springs is related to the spatial distribution of Lake Lahontan (late Quaternary) beach sands and gravels.

The final field task consists of sampling the surface waters, measuring the temperature and pH in situ, and determining the specific conductance and alkalinity at 25°C. In addition, water samples will be chemically analyzed for major anions and cations and, to a limited extent, for stable light isotopes. These data will be used to identify areas that are geochemically similar and possibly structurally related. Certain geochemical signatures may also be used to identify the source of recharge.

Option II is included here because it is field oriented. The objective of the task is to extend the surface and near-surface investigations by providing detailed lithologic, geochemical, and temperature data from several drill holes. The plan includes drilling one hole, 600 feet deep, at each site. This task constitutes reservoir confirmation and will be based wholly on data gathered from the previous tasks. Should one of the holes penetrate a significant reservoir, arrangements will be made to leave the hole open for more testing.

The final tasks include data interpretation, map and final report preparation, and submission of all pertinent information to GEOTHERM. A final report at the end of the first year of the investigation will be limited to the Carson City/Big Smoky Valley investigations. Likewise, the second year's final report will be limited to two areas. Data interpretation will be aided by the use of the NBMG's Tectronix 4014 graphic display in conjunction with PDP 11/34 and CDC 6400 computers. The final product will include a map that outlines known or suspected geothermal reservoir boundaries. Structures responsible for these boundaries will be included along with temperature

distributions, water table configuration, and chemical compositions of the water. The final report will also include a critical evaluation of the exploration techniques used in this study and a projection of those techniques that could be successfully applied to site-specific studies at the remaining high-potential areas in Nevada.

The data on the suitability of the sites for particular applications will be forwarded to the Nevada Department of Energy for use in the ongoing Outreach Program. This information will also be presented at regional technical sessions, as well as local, user-oriented meetings.

## PROPOSED SCHEDULE OF ACTIVITIES

During the first year of funding, the investigation will be limited to two sites (the Big Smoky Valley site and the Carson City site). Should OPTION I be selected, the investigation will include Tasks 1 through 10, outlined below and shown in figure 2. Should OPTION II be selected instead, the investigation will consist of Tasks 1 through 10 and will also include Tasks 11 through 16, reservoir confirmation by drilling. With the OPTION II plan, Task 11 would be staggered, pending data compilation, and would begin six months after the initiation of Task 1. All work efforts will have been completed one year after the initiation of the program and the contents of the final product will depend on the OPTION selected. The final report under OPTION I will consist of surface and near surface geological surveys. Under OPTION II, the surface and near surface survey report would be supplemented by detailed subsurface information.

The second year would employ a similar strategy in two other areas of geothermal potential. This research will expand the knowledge of reservoir properties and aid the development of direct utilization of geothermal energy.

## OPTION I (Surface and near-surface investigation)

- Task 1. Review all pertinent geological and geophysical literature sources. Construct base maps on topographic sheets by projecting stratigraphic units and geologic structures from larger scale maps. Project available geophysical data onto base maps. Construct preliminary cross-sections of valleys at delineated areas of traverse.
- Task 2. Field check stratigraphic units in both basin and range. Note especially age relations of superjacent units on each range; sample where appropriate. Estimate thickness and note sense of offset in fractures and faults.
- Task 3. Conduct a low sun-angle photographic reconnaissance of basin and range-margins. Field check lineaments, verify fault trace and sense of displacement. Plot data on base maps.

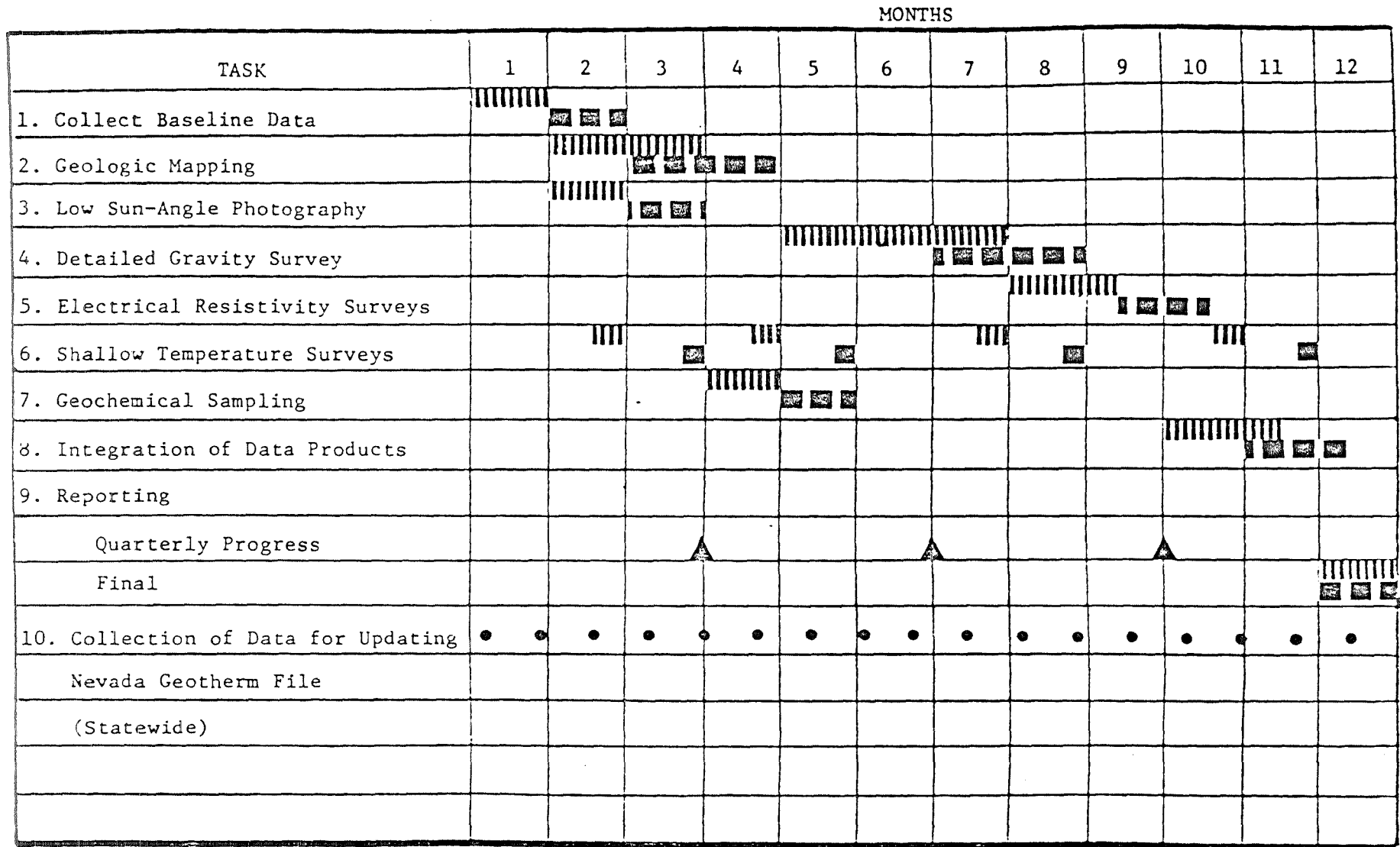


Figure 2. Tentative Program Schedule Option I

||||| Northern Big Smoky Valley

■ ■ ■ Carson City



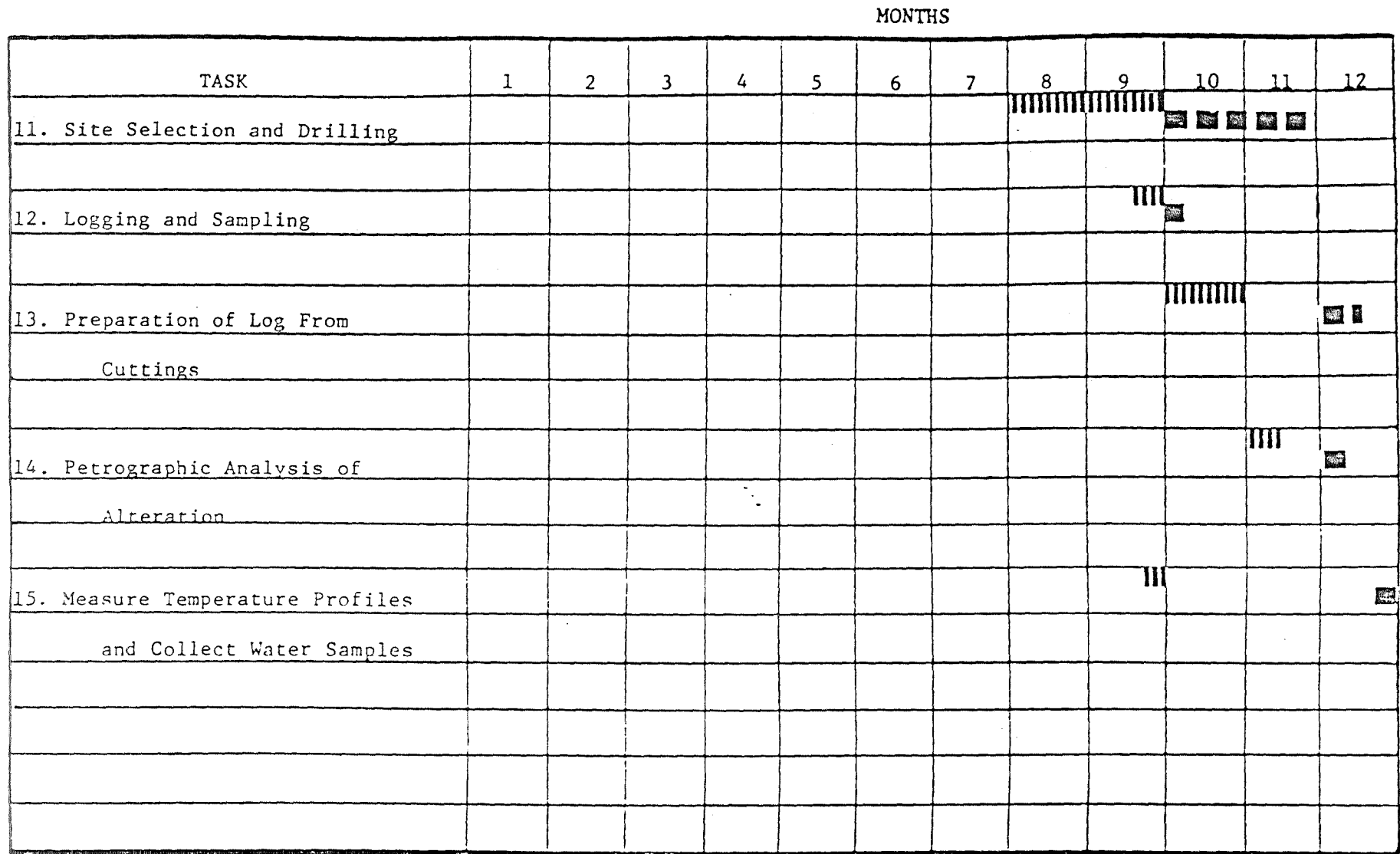


Figure 3. Tentative Program Schedule. Option II  
Reservoir Confirmation

||||| Northern Big Smoky Valley

■ ■ Carson City

- Task 4. Conduct stadia and transit leveling along the selected traverses. Set up gravity stations and conduct a detailed gravity survey along transects, with high resolution in areas of faults and hot springs. Plot data on base maps.
- Task 5. Conduct resistivity surveys in areas adjacent to hot springs along the selected traverses. Plot depth to top of ground water on base maps. Continue survey areally, if warranted.
- Task 6. Construct an expandable grid of 30 stations (one-meter holes) in the vicinity of hot springs along the line of traverse. Install thermistor probes, allow time for equilibration, measure temperature periodically. Plot isotherms on base maps; continue areally if warranted.
- Task 7. Collect water samples for bulk chemical and isotopic analysis. Measure, in field: temperature, pH, specific conductance, and carbonate/bicarbonate. Analyze appropriate samples for stable light isotopes, analyze all for major and minor anion and cation constituents.
- Task 8. Prepare maps and diagrams including: detailed geologic maps and cross-sections along the selected traverses; isotherm configuration; depth to basement; and depth to ground water.
- Task 9. Prepare final report indicating cost/benefit of the techniques used and an estimation of the probable effectiveness for other site-specific studies in Nevada.
- Task 10. Continue to collect geothermal data on a statewide basis. Submit new data to the U. S. Geological Survey's GEOTHERM data file.

#### OPTION II (Reservoir Confirmation)

Option II will include tasks 1-10 of Option I and the following tasks associated with the drilling program.

- Task 11. Drill one hole 600 feet deep at each area of investigation (total 2 holes).
- Task 12. Log well during drilling.
- Task 13. Prepare a detailed lithologic log from drill chips and selected spot cores.
- Task 14. Select intervals for X-ray and petrographic identification of unaltered mineral assemblages and alteration products.
- Task 15. Measure temperature profile in the well bore and collect water samples for chemical analysis, bulk chemistry, and stable light isotopes.
- Task 16. Integrate data derived in Tasks 11-15 with data obtained in OPTION I.

## PROJECT ORGANIZATION

The Nevada Bureau of Mines and Geology is a research and public service division of the Mackay School of Mines, one of the several colleges of the University of Nevada, Reno. Research includes all phases of Nevada's geology and mineral resources: basic geologic mapping and laboratory studies, geophysical and geochemical surveys, engineering geology, earth-environmental considerations in urban and rural planning, the preparation of educational guides and booklets, statewide investigations of mineral commodities, the geology of ore deposits, and the exploration, development, mining, processing, utilization, and conservation of metal ores, industrial minerals, fossil and nuclear fuels, geothermal power, and water.

The proposed research is a two year program, OPTION I will utilized 3 senior agency professional staff members, two on full time and one on part time. Personnel for OPTION II will include those already listed for OPTION I plus an additional part-time research associate. The principal staff members to be involved in the program are:

## First Year

## OPTION I

Dennis T. Trexler, Research Associate/Geologist - 6 months  
 Brian Koenig, Research Associate/Geologist - 12 months  
 Thomas Flynn, Research Associate/Geologist - 12 months

## OPTION II

OPTION I personnel - 30 months  
 Research Associate/Geologist - 6 months

## Second Year

## OPTION I

Dennis T. Trexler, Research Associate/Geologist - 6 months

Brian Koenig, Research Associate/Geologist - 12 months

Thomas Flynn, Research Associate/Geologist - 12 months

OPTION II

OPTION I personnel - 30 months

Research Associate/Geologist - 6 months

## FACILITIES AND EQUIPMENT

The Nevada Bureau of Mines and Geology occupies parts or all of three floors in the west wing of the Scrugham-Engineering and Mines building on the University of Nevada-Reno campus. Office, laboratory, and drafting room space for the research program will be made available by the University of Nevada-Reno. In addition, a graphite crystal monochrometer-equipped Norelco radiation diffraction unit, and International Scientific Instruments model Super IIIA scanning electron microscope/microprobe, and a fully-equipped thin-section laboratory are also available for detailed examination of drill core minerals. The Bureau maintains a Tectronix 4014 computer terminal, with hard-copy capabilities, that can access either a DEC PDP-11/34 or a Control Data Corporation 6400 computer; a high speed, large storage-capacity disc drive can interface directly with the DEC PDP-11/34.

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APPENDIX A

Resumes of Principal Staff Members

DENNIS THOMAS TREXLER

Born: August 6, 1940

Registered Geologist - State of California - #2382

Education:

B.S. Geology - University of Southern California - 1965,  
Los Angeles, California 90007

M.S. Geology - University of Southern California - 1968,  
Los Angeles, California 90007

Experience:

Dec. 1974-  
present

Nevada Bureau of Mines and Geology, University of Nevada, Reno  
Title: Research Associate

I have been involved as principle investigator or co-principle investigator in numerous research programs concerned with Earthquake Hazard Reduction (USGS), National Uranium Resource Evaluation (LLL, DOE) and Geothermal Evaluation (DOE). These projects have required both direct research participation, administrative and research direction of research assistants.

Feb. 1971-  
Dec. 1974

Mackay School of Mines, University of Nevada, Reno. Title: Research Associate. Duties included coordination and interpretation of remote sensing data acquired by high altitude aircraft and Skylab in relation to natural resources in the Great Basin. Interpretation included evaluating Skylab photographic imagery for lithologic, structural and geomorphic data and the cost-benefits derived. Also performed research in applications of remote sensing techniques to the solution of geologic and natural resources problems. Techniques employed included the use of the visual, infrared and microwave portions of the electromagnetic spectrum. Computer programming for utilization of geologic parameters in interpretation techniques.

Aug. 1970-  
Feb. 1971

Microwave Sensor Systems Division of Spectran, Inc. Title: Manager Earth Resources Applications. At Microwave Sensor Systems I conducted investigations on the detection and discrimination of oil spills using multispectral photography, 8-13.5 micron infrared imagery and multifrequency microwave radiometer data.

May 1968-  
July 1970

Aerojet-General Corporation, Space Division, Azusa, California. Title: Member of the Staff, Geologist. At Aerojet I was engaged in development of passive microwave techniques for earth resources. I participated as either Project Engineer or Program Manager on the following investigations:

1. Microwave Emissions of Snowpacks (U. S. Geological Survey).
2. Passive Microwave Measurements of Snow, Ice and Oceanography (Office of Naval Research).
3. Feasibility of using Microwave Techniques as Applied to Geologic Problems (U. S. Geological Survey).

Nov. 1967-  
May 1968

Geolabs, Inc. Santa Ana, California. Title: Engineering Geologist. Duties entailed site evaluation for engineered structures and preparation of geologic reports for Los Angeles and Orange Counties, California.



- Blinn, J. C., III, Quade, J. G. and Trexler, D. T. (1975) Microwave Geothermal Exploration prepared for Jet Propulsion Laboratory, Pasadena, CA.
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TREXLER cont.

- Sept. 1966- State of California, Dept. of Water Resources Los Angeles ,  
California. Title: Engineering Geologist. While assigned to  
the planning and special investigations branch, duties included  
interpretation of ground water basin characteristics from  
exploratory drilling, preparation of ground water basin simul-  
ization by digital computer models and a survey of the impact  
of degradation of water quality on industry.
- Memberships: Geological Society of Nevada, Sigma XI, American Association of  
Petroleum Geologists, Geothermal Resources Council.

Bibliography

- Edgerton, A. T., and Trexler, D. T. (1968) Passive Microwave Measurements of  
Snow, Ice and Oceanography, (Progress Report) Aerojet-General Corp.  
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California Test Site, Aerojet-General Corporation, Final Report  
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Sensing with Passive Microwave Techniques, Proceedings of the Sixth  
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Sensing of Environment, Ann Arbor, Michigan.
- Quade, J. G. and Trexler, D. T. (1974) Geologic investigations in the Basin and  
Range of Nevada using Skylab/EREP data; final report prepared for National  
Aeronautics and Space Administration.
- Trexler, D. T. and Bingler, E. C. (1975) Landslide and Debris Flow Potential map,  
Cold Springs Valley, Nevada; prepared for the Regional Planning Commission  
of Reno, Sparks and Washoe County.
- Bingler, E. C. and Trexler, D. T. (1975) Liquefaction Potential and Quaternary  
fault map Cold Springs Valley, Nevada; prepared for the Regional Planning  
Commission of Reno, Sparks and Washoe County.
- Melhorn, W. N. and Trexler, D. T. (1975) Preliminary Stratigraphy of the Tripple  
"T" Archeological site, Nye County, Nevada; prepared for American Museum of  
Natural History.
- Melhorn, W. N. and Trexler, D. T. (1975) Stratigraphy of the Gatecliff Rock  
Shelter, Nye County, Nevada; prepared for American Museum of Natural History.

BRIAN ALFRED KOENIG

Born: December 14, 1944

Education: B.S. Geology - University of Wisconsin - 1973, Madison, Wisconsin 53706  
M.S. Geosciences - University of Arizona - 1978, Tucson, Arizona 85721

Experience:

Apr. 1978- present Nevada Bureau of Mines and Geology, University of Nevada, Reno  
Title: Research Associate  
Current project includes cataloging and examining low- to moderate-temperature geothermal resources in the State of Nevada with regard to updating the USGS file Geotherm and producing a map detailing the location and other data pertinent to the direct utilization of the resources. On site checks of specific locations for temperature and chemical data are required.

Apr. 1976- Jul. 1977 Department of Geosciences, University of Arizona, Tucson  
Title: Research Assistant  
Carried out research leading to a detailed description of mineralogical and chemical changes with depth in a weathered porphyry copper deposit. The data gathered formed the basis for an interpretation of the weathering processes and controls on these processes.

Aug. 1973- Aug. 1975 Ray-0-Vac Division of ESB Inc., Madison, Wisconsin  
Title: Chemical Technician  
Duties included routine wet chemical analyses of battery components and method development. A method I developed provides a high degree of accuracy in the analysis of mixtures of  $MnO_2$ ,  $Ag_2O$ , and graphite.

Oct. 1965- Aug. 1968 U. S. Army  
Title: Artillery Meteorological Team Chief  
Duties included the acquisition and reduction of data from radiosonde flights and the supervision of 5-7 team members.

Special training: Additional skills include: scientific computer programming with courses in FORTRAN, assembly language programming, and numerical analysis; experience with atomic absorption spectrophotometry, polarography, and x-ray diffraction; and photography.

Thesis: Oxidation-Leaching, and Enrichment Zones of a Porphyry Copper Deposit - a Mineralogic and Quantitative Chemical Study, University of Arizona, Tucson.

KOENIG - Additional Information

The contract under which I am currently employed, Assessment of Low- to Moderate-Temperature Geothermal Resources in Nevada (DOE/DGE Contract No. ET-78-S-08-1556) has provided me with the opportunity to familiarize myself with the location and nature of geothermal resources in Nevada. During field investigations I have measured parameters such as in situ pH and specific conductance, prepared samples for chemical analysis, performed field alkalinity titrations, and participated in the reduction and quality control of analytical data.

My academic background has emphasized chemical and physical chemical aspects of hydrothermal systems as well as practical experience with X-ray diffraction and whole rock geochemical analysis in altered rocks. I have used and am familiar with the computer programs used to convert input fluid chemistry to equilibrium chemical (mineralogical) assemblages. Familiarity with programming allows me to design software as needed to augment our study.

Applicable Meetings: GSA Penrose Conference, Heat Transport Processes in the Earth, Vail, CO, 1978.

Abstract submitted to GSA Cordilleran Section for April 1979 meeting:  
Compositional change and chemical mass transport as a result of supergene processes at the San Xavier north porphyry copper deposit, Arizona.

THOMAS FLYNN

Born: May 15, 1948

Education: B.S. Geology - State University College at New Paltz - 1971,  
New Paltz, New York  
M.S. Geology - State University of New York at Binghamton - 1976,  
Binghamton, New York

Experience:

May 1978- present Nevada Bureau of Mines and Geology, University of Nevada, Reno.  
Title: Research Associate/Geologist. Duties include geologic assessment and evaluation of energy-related resources in Nevada. Presently working on update and revision of U.S. DOE Geotherm Data File for geothermal resource assessment in Nevada. Additional duties include preparation of research proposals and editing of geological research manuscripts prior to publication.

Feb. 1976- May 1978 Engineering Index, Inc., United Engineering Center, 345 East 47th Street, New York, New York 10017. Title: Editor. Duties included technical evaluation of energy-related literature and preparation of the literature for input to the U.S. DOE (Oak Ridge, Tennessee) Energy Data Base. Preparation included both abstract writing and descriptive indexing; indexing based on 20K controlled vocabulary.

Sept. 1972- May 1975 S.U.N.Y.-Binghamton, Hydrothermal Laboratory. Title: Research Assistant. Duties included operation and maintenance of advanced hydrothermal laboratory for an experimental investigation of high-temperature, high-pressure metamorphism of common sedimentary rocks. Master's thesis was derived from these investigations.

Membership: American Geophysical Union

Bibliography

Flynn, T., (1977) Filter pressed partial metls: an experimental formation of migmatites, (abs.), American Geophysical Union, Spring Meeting, Washington, D.C.

Flynn, T., (1976) Filter pressed partial melts, an experimental formation of migmatites, (Master's Thesis).

Reports

Trexler, D., Flynn, T., and Koenig, B. A. (1978)  
Assessment of Low- to Moderate-Temperature Geothermal Resources of Nevada, First and Second Quarter Progress Reports; Prepared for the U. S. Department of Energy, Division of Geothermal Energy, under Contract ET-78-S-08-1556.

APPENDIX B

Cost Estimate

## EXPLANATION OF COSTS

All costs presented on Optional Form 60 are self explanatory, except the purchase of a vehicle and an explanation of the cost sharing provided by the Nevada Bureau of Mines and Geology.

The second year program costs are estimated on an 8% salary increase for professional staff members and a 10% inflationary increase for all other costs.

### Vehicle Purchase

A four-wheeled drive pickup truck with camper is included as a capitol equipment purchase for the first year of the proposed two year program. As a result of a shortage of 4-WD vehicles at the University of Nevada all funded research projects are required to provide their own vehicles. Rental costs for a 4-WD vehicle from commercial rental companies @ \$500/mo., \$.23/mi. plus fuel at an estimated \$.75/gallon are presented in tabular form below:

### Rental

First year	9 mos. @ \$500	=	\$4500
Option I	12,000 mi @ \$.23/mi	=	2760
	1,200 gal. fuel @ \$.75	=	<u>900</u>
Total first year			\$8160

Second year using same strategy as Option I

First year and allowing 10% increase total vehicle rental would be  
\$8980

Total rental for 4-WD vehicle (18 month) = \$17,140

## Purchase

If a vehicle is purchased during first year and used for a similar amount of mileage and time throughout the duration of the proposed program a savings is indicated:

### First year;

Purchase price 4-WD pickup w/camper	\$ 8800
Mileage charge first year 12,000 @ \$.20	2400

### Second year;

Monthly charge \$80/month for 9 months	720
Mileage 12,000 miles @ \$.22/mile	<u>2640</u>
Total vehicle cost for proposed two year study	\$14,560

As shown in the previous two examples (rental vs. purchase) a savings of more than \$2000 can be realized by purchase of a vehicle over the two year duration of the proposed investigation. If the Geothermal Assessment Programs extends beyond the anticipated two years, greater savings in field transportation costs will be realized.

## Cost Sharing

Materials and services to be provided by the University of Nevada through the Nevada Bureau of Mines and Geology include clerical, secretarial, and drafting services, computer time, and X-ray analytical work. These materials and services represent 5% of the total cost of OPTION I and include:

Drafts person	½ person-month at \$1500/mo.	\$ 750
X-ray analysis		400
Secretarial/clerical services	2 person-months at \$1044/mo.	2088
Computer time	50 hrs. at \$75/hr.	<u>3750</u>
Total		\$6988



## CONTRACT PRICING PROPOSAL

(RESEARCH AND DEVELOPMENT)

Office of Management and Budget  
Approval No. 29-RO184

This form is for use when (i) submission of cost or pricing data (see FPR 1-3.807-3) is required and (ii) substitution for the Optional Form 39 is authorized by the contracting officer.

PAGE NO.  
1

NO. OF PAGES  
5

NAME OF OFFEROR  
Board of Regents  
University of Nevada System

HOME OFFICE ADDRESS  
University of Nevada, Reno  
Reno, Nevada 89557

**SUPPLIES AND/OR SERVICES TO BE FURNISHED**

Low- to Moderate-Temperature  
Geothermal Assessment for Nevada:  
Site Specific Studies - OPTION I,  
Year 1

DIVISION(S) AND LOCATION(S) WHERE WORK IS TO BE PERFORMED  
Nevada Bureau of Mines and Geology

TOTAL AMOUNT OF PROPOSAL  
\$140,630

GOVT SOLICITATION NO.

### DETAIL DESCRIPTION OF COST ELEMENTS

1. DIRECT MATERIAL (Itemize on Exhibit A)	EST COST (\$)	TOTAL EST COST <sup>1</sup>	REFER- ENCE <sup>2</sup>
a. PURCHASED PARTS			
b. SUBCONTRACTED ITEMS			
c. OTHER—(1) RAW MATERIAL			
(2) YOUR STANDARD COMMERCIAL ITEMS			
(3) INTERDIVISIONAL TRANSFERS (At other than cost)			
<b>TOTAL DIRECT MATERIAL</b>			
2. MATERIAL OVERHEAD <sup>3</sup> (Rate %X'S base=)			
3. DIRECT LABOR (Specify)	ESTIMATED HOURS	RATE/HOUR	EST COST (\$)
Trexler (Geologist)	1040	12.82	13,326
Flynn (Geologist)	2080	9.61	19,992
Koenig (Geochemist)	2080	9.61	19,992
<b>TOTAL DIRECT LABOR</b>			53,310
4. LABOR OVERHEAD (Specify Department or Cost Center) <sup>4</sup>			
Retirement	O.H. RATE	X BASE =	EST COST (\$)
Nevada Industrial Commission, Health Insurance, unemployment	8%	53,310	4,265
	4%	53,310	2,132
<b>TOTAL LABOR OVERHEAD</b>			6,397
5. SPECIAL TESTING (Including field work at Government installations)			
		EST COST (\$)	
<b>TOTAL SPECIAL TESTING</b>			
6. SPECIAL EQUIPMENT (If direct charge) (Itemize on Exhibit A)			
		EST COST (\$)	8,800 Ex. A
7. TRAVEL (If direct charge) (Give details on attached Schedule)			
a. TRANSPORTATION		5,455	
b. PER DIEM OR SUBSISTENCE		7,945	
<b>TOTAL TRAVEL</b>		13,400	Ex. A
8. CONSULTANTS (Identify—purpose—rate)			
		EST COST (\$)	
<b>TOTAL CONSULTANTS</b>			
9. OTHER DIRECT COSTS (Itemize on Exhibit A)			
		22,806	Ex. A
10. <b>TOTAL DIRECT COST AND OVERHEAD</b>			
		104,713	
11. GENERAL AND ADMINISTRATIVE EXPENSE (Rate 34.3 % of cost element Nos. 3, 4, 6, 7, 9)			
		35,917	
12. ROYALTIES <sup>5</sup>			
13. <b>TOTAL ESTIMATED COST</b>			
		140,630	
14. FEE OR PROFIT			
15. <b>TOTAL ESTIMATED COST AND FEE OR PROFIT</b>			

This proposal is submitted for use in connection with and in response to (Describe RFP, etc.)

and reflects our best estimates as of this date, in accordance with the Instructions to Offerors and the Footnotes which follow.

TYPED NAME AND TITLE

SIGNATURE

NAME OF FIRM

DATE OF SUBMISSION

**EXHIBIT A—SUPPORTING SCHEDULE (Specify, if more space is needed, use reverse)**

COST EL NO.	ITEM DESCRIPTION (See footnote 5)	EST COST (\$)
9	Equipment rental	
	Rock coring equip. rental . 10 days @ \$30/day	300
	Vehicle mounted drill 2 wks. @ \$300/wk.	600
	TOTAL	900
9	Equipment	
	Portable drilling equipment	700
	Walkie talkies 3 @ \$100	300
	20 thermistor probes @ \$48 ea.	960
	2 digital thermometers @ \$300 ea.	600
	PVC pipe 100 ft. @ 20¢/ft.	20
	2 Brunton compasses @ \$100	200
	TOTAL	2,780
9	Non-expendable supplies	
	Mylar base maps 16 @ \$34.25	548
	Existing airphotos 200 @ \$4 ea.	800
	Topo geophysical, geological maps	175
	Low sun-angle photography: Big Smoky Valley	3,276
	Carson City	1,966
	TOTAL	6,765
9	Expendable supplies	
	Film, flagging, stakes, notebooks, batteries, etc.	500
	Drafting supplies	250
	Sample bottles, chemicals, glassware	436
	TOTAL	1,186
	PAGE TOTAL	11,631

I. HAS ANY EXECUTIVE AGENCY OF THE UNITED STATES GOVERNMENT PERFORMED ANY REVIEW OF YOUR ACCOUNTS OR RECORDS IN CONNECTION WITH ANY OTHER GOVERNMENT PRIME CONTRACT OR SUBCONTRACT WITHIN THE PAST TWELVE MONTHS?

YES  NO (If yes, identify below.)

NAME AND ADDRESS OF REVIEWING OFFICE AND INDIVIDUAL

TELEPHONE NUMBER/EXTENSION

II. WILL YOU REQUIRE THE USE OF ANY GOVERNMENT PROPERTY IN THE PERFORMANCE OF THIS PROPOSED CONTRACT?

YES  NO (If yes, identify on reverse or separate page)

III. DO YOU REQUIRE GOVERNMENT CONTRACT FINANCING TO PERFORM THIS PROPOSED CONTRACT?

YES  NO (If yes, identify.):  ADVANCE PAYMENTS  PROGRESS PAYMENTS OR  GUARANTEED LOANS

IV. DO YOU NOW HOLD ANY CONTRACT (Or, do you have any independently financed (IR&D) projects) FOR THE SAME OR SIMILAR WORK CALLED FOR BY THIS PROPOSED CONTRACT?

YES  NO (If yes, identify.):

V. DOES THIS COST SUMMARY CONFORM WITH THE COST PRINCIPLES SET FORTH IN AGENCY REGULATIONS?

YES  NO (If no, explain on reverse or separate page)

See Reverse for Instructions and Footnotes

OPTIONAL FORM 60 (10-71)

This proposal is submitted for use in connection with and in response to (Describe R/P, etc.)

and reflects our best estimates as of this date, in accordance with the Instructions to Offerors and the Footnotes which follow.

TYPED NAME AND TITLE	SIGNATURE
NAME OF FIRM	DATE OF SUBMISSION

**EXHIBIT A—SUPPORTING SCHEDULE** (Specify. If more space is needed, use reverse)

COST EL NO.	ITEM DESCRIPTION (See footnote 5)	EST COST (\$)
9	Chemical analyses	
	Anal. Type                  # Samples                  \$/Anal.                  Lab.	
	Whole rock samples	
	Major-Minor                  12                  125                  Teledyne	1,500
	Sulfide Isotopes                  5                  40                  Isochron Lab.	200
	Sulfate Isotopes                  5                  60                  Isochron Lab.	300
	TOTAL	2,000
	Geothermal fluids	
	Major-Minor                  40                  125                  Amtec	5,000
	O Isotopes                  10                  75                  Hebrew Univ.	750
	H Isotopes                  10                  75                  Hebrew Univ.	750
	S Isotopes                  10                  60                  Isochron Lab.	600
	TOTAL	7,100
7	Travel	
7a	Mileage: 12,000 mi. @ \$.20/mi	2,400
7a	Air transportation	3,055
7b	Per diem 227 days @ \$35/day	7,945
	TOTAL	13,400
	PAGE TOTAL	22,500

I. HAS ANY EXECUTIVE AGENCY OF THE UNITED STATES GOVERNMENT PERFORMED ANY REVIEW OF YOUR ACCOUNTS OR RECORDS IN CONNECTION WITH ANY OTHER GOVERNMENT PRIME CONTRACT OR SUBCONTRACT WITHIN THE PAST TWELVE MONTHS?

YES     NO (If yes, identify below.)

NAME AND ADDRESS OF REVIEWING OFFICE AND INDIVIDUAL	TELEPHONE NUMBER/EXTENSION
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YES     NO (If yes, identify on reverse or separate page)

III. DO YOU REQUIRE GOVERNMENT CONTRACT FINANCING TO PERFORM THIS PROPOSED CONTRACT?

YES     NO (If yes, identify):     ADVANCE PAYMENTS     PROGRESS PAYMENTS OR     GUARANTEED LOANS

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YES     NO (If yes, identify.):

V. DOES THIS COST SUMMARY CONFORM WITH THE COST PRINCIPLES SET FORTH IN AGENCY REGULATIONS?

YES     NO (If no, explain on reverse or separate page)

See Reverse for Instructions and Footnotes

OPTIONAL FORM 60 (10-71)





**CONTRACT PRICING PROPOSAL**  
(RESEARCH AND DEVELOPMENT)

Office of Management and Budget  
Approval No. 29-RO184

This form is for use when (i) submission of cost or pricing data (see FPR 1-3.807-3) is required and (ii) substitution for the Optional Form 39 is authorized by the contracting officer.

PAGE NO.  
1

NO. OF PAGES  
5

NAME OF OFFEROR Board of Regents  
University of Nevada  
HOME OFFICE ADDRESS University of Nevada, Reno  
Reno, NEVada 89557

SUPPLIES AND/OR SERVICES TO BE FURNISHED  
Low- to Moderate-Temperature  
Geothermal Assessment for Nevada:  
Site Specific Studies - OPTION II,  
Year 1 (Reservoir Confirmation)

DIVISION(S) AND LOCATION(S) WHERE WORK IS TO BE PERFORMED  
Nevada Bureau of Mines and Geology

TOTAL AMOUNT OF PROPOSAL  
\$205,585

GOVT SOLICITATION NO.

**DETAIL DESCRIPTION OF COST ELEMENTS**

1. DIRECT MATERIAL (Itemize on Exhibit A)				EST COST (\$)	TOTAL EST COST <sup>1</sup>	REFER- ENCE <sup>2</sup>
a. PURCHASED PARTS						
b. SUBCONTRACTED ITEMS						
c. OTHER—(1) RAW MATERIAL						
(2) YOUR STANDARD COMMERCIAL ITEMS						
(3) INTERDIVISIONAL TRANSFERS (At other than cost)						
<b>TOTAL DIRECT MATERIAL</b>						
2. MATERIAL OVERHEAD <sup>1</sup> (Rate % X \$ base =)						
3. DIRECT LABOR (Specify)				ESTIMATED HOURS	RATE/HOUR	EST COST (\$)
Trexler (Geologist, P.I.)				1040	12.82	13,326
Flynn (Geologist)				2080	9.61	19,992
Koenig (Geochemist)				2080	9.61	19,992
Unnamed (Geologist)				1040	9.61	9,996
<b>TOTAL DIRECT LABOR</b>						63,306
4. LABOR OVERHEAD (Specify Department or Cost Center) <sup>1</sup>				O.H. RATE	X BASE =	EST COST (\$)
Retirement				8%	63,306	5,065
Nevada Industrial Commission, Health Insurance, unemployment				4%	63,306	2,532
<b>TOTAL LABOR OVERHEAD</b>						7,597
5. SPECIAL TESTING (Including field work at Government installations)				EST COST (\$)		
<b>TOTAL SPECIAL TESTING</b>						
6. SPECIAL EQUIPMENT (If direct charge) (Itemize on Exhibit A)					8,800	Ex. A
7. TRAVEL (If direct charge) (Give details on attached Schedule)				EST COST (\$)		
a. TRANSPORTATION					6,055	
b. PER DIEM OR SUBSISTENCE					8,820	
<b>TOTAL TRAVEL</b>					14,875	Ex. A
8. CONSULTANTS (Identify—purpose—rate)				EST COST (\$)		
<b>TOTAL CONSULTANTS</b>						
9. OTHER DIRECT COSTS (Itemize on Exhibit A)					58,501	Ex. A
<b>TOTAL DIRECT COST AND OVERHEAD</b>					153,079	
11. GENERAL AND ADMINISTRATIVE EXPENSE (Rate 34.3 % of cost element Nos. 3, 4, 6, 7, 9)					52,506	
12. ROYALTIES <sup>1</sup>						
<b>TOTAL ESTIMATED COST</b>					205,585	
14. FEE OR PROFIT						
<b>TOTAL ESTIMATED COST AND FEE OR PROFIT</b>						

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and reflects our best estimates as of this date, in accordance with the Instructions to Offerors and the Footnotes which follow.

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NAME OF FIRM	DATE OF SUBMISSION

**EXHIBIT A—SUPPORTING SCHEDULE (Specify. If more space is needed, use reverse)**

COST EL NO.	ITEM DESCRIPTION (See footnote 5)	EST COST (\$)
9	Equipment rental	
	Rock coring equip. rental 10 days @ \$30/day	300
	Vehicle mounted drill 2 wks @ \$300/wk.	600
	TOTAL	900
9	Equipment	
	Portable drilling equipment	700
	Walkie talkies 3 @ \$100	300
	20 thermistor probes @ \$48 ea.	960
	2 digital thermometers @ \$300 ea.	600
	PVC pipe 100 Ft. @ 20¢/ft.	20
	2 Brunton compasses @ \$100	200
	TOTAL	2,780
9	Non-expendable supplies	
	Mylar base maps 16 @ \$34.25	548
	Existing airphotos 200 @ \$4 ea.	800
	Topo geophysical, geological maps	175
	Low sun-angle photography: Big Smoky Valley	3,276
	Carson City	1,966
	TOTAL	6,765
9	Expendable supplies	
	Film, flagging, stakes, notebooks, batteries, etc.	500
	Drafting supplies	250
	Sample bottles, chemicals, glassware	436
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PAGE TOTAL		11,631

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NAME AND ADDRESS OF REVIEWING OFFICE AND INDIVIDUAL	TELEPHONE NUMBER/EXTENSION
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YES  NO (If yes, identify.):

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OPTIONAL FORM 60 (10-71)

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TYPED NAME AND TITLE

SIGNATURE

NAME OF FIRM

DATE OF SUBMISSION

EXHIBIT A—SUPPORTING SCHEDULE (Specify. If more space is needed, use reverse)

COST EL NO.	ITEM DESCRIPTION (See footnote 5)				EST COST (\$)
9	Chemical analyses				
	Anal. Type	# Samples	\$/Anal.	Lab.	
	Whole rock samples				
	Major-Minor	12	125	Teledyne	1,500
	Sulfide Isotopes	5	40	Isochron Lab.	200
	Sulfur Isotopes	5	60	Isochron Lab.	300
	TOTAL				2,000
	Geothermal fluids				
	Major-Minor	40	125	Amtec	5,000
	O Isotopes	10	75	Hebrew Univ.	750
	H Isotopes	10	75	Hebrew Univ.	750
	S Isotopes	10	60	Isochron Lab.	600
	TOTAL				7,100
	Travel				
7a	Mileage 12,000 mi. @ \$.20/mi.				2,400
7a	Air transportation				3,055
7b	Per Diem 227 days @ \$35/day				7,945
	TOTAL				13,400

I. HAS ANY EXECUTIVE AGENCY OF THE UNITED STATES GOVERNMENT PERFORMED ANY REVIEW OF YOUR ACCOUNTS OR RECORDS IN CONNECTION WITH ANY OTHER GOVERNMENT PRIME CONTRACT OR SUBCONTRACT WITHIN THE PAST TWELVE MONTHS?

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TELEPHONE NUMBER/EXTENSION

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III. DO YOU REQUIRE GOVERNMENT CONTRACT FINANCING TO PERFORM THIS PROPOSED CONTRACT?

YES  NO (If yes, identify):  ADVANCE PAYMENTS  PROGRESS PAYMENTS OR  GUARANTEED LOANS

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YES  NO (If yes, identify.)

V. DOES THIS COST SUMMARY CONFORM WITH THE COST PRINCIPLES SET FORTH IN AGENCY REGULATIONS?

YES  NO (If no, explain on reverse or separate page)

See Reverse for Instructions and Footnotes

OPTIONAL FORM 60 (10-71)



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and reflects our best estimates as of this date, in accordance with the Instructions to Offerors and the Footnotes which follow.

TYPED NAME AND TITLE	SIGNATURE
----------------------	-----------

NAME OF FIRM	DATE OF SUBMISSION
--------------	--------------------

**EXHIBIT A—SUPPORTING SCHEDULE (Specify. If more space is needed, use reverse)**

COST EL NO.	ITEM DESCRIPTION (See footnote 3)	EST COST (\$)
6	Special equipment	
	3/4 ton SWB 4 WD pickup truck with following:	
	Heavy duty suspension	
	Extra fuel tank	
	Power steering	
	A/C	
	AM Radio	
	Rear barden bumper	
	4 speed transmission	
	Locking hubs	
	Phone quote Jones-West Ford Reno 1 Mar 79	8,000
	Camper for above vehicle	800
	<b>TOTAL</b>	<b>8,800</b>

I. HAS ANY EXECUTIVE AGENCY OF THE UNITED STATES GOVERNMENT PERFORMED ANY REVIEW OF YOUR ACCOUNTS OR RECORDS IN CONNECTION WITH ANY OTHER GOVERNMENT PRIME CONTRACT OR SUBCONTRACT WITHIN THE PAST TWELVE MONTHS?

YES  NO (If yes, identify below.)

NAME AND ADDRESS OF REVIEWING OFFICE AND INDIVIDUAL	TELEPHONE NUMBER/EXTENSION
---	----------------------------

II. WILL YOU REQUIRE THE USE OF ANY GOVERNMENT PROPERTY IN THE PERFORMANCE OF THIS PROPOSED CONTRACT?

YES  NO (If yes, identify on reverse or separate page)

III. DO YOU REQUIRE GOVERNMENT CONTRACT FINANCING TO PERFORM THIS PROPOSED CONTRACT?

YES  NO (If yes, identify)  ADVANCE PAYMENTS  PROGRESS PAYMENTS OR  GUARANTEED LOANS

IV. DO YOU NOW HOLD ANY CONTRACT (Or, do you have any independently financed (IRGD) projects) FOR THE SAME OR SIMILAR WORK CALLED FOR BY THIS PROPOSED CONTRACT?

YES  NO (If yes, identify.)

V. DOES THIS COST SUMMARY CONFORM WITH THE COST PRINCIPLES SET FORTH IN AGENCY REGULATIONS?

YES  NO (If no, explain on reverse or separate page)

See Reverse for Instructions and Footnotes

OPTIONAL FORM 60 (10-71)

This proposal is submitted for use in connection with and in response to (Describe RFP, etc.)

and reflects our best estimates as of this date, in accordance with the Instructions to Offerors and the Footnotes which follow.

TYPED NAME AND TITLE

SIGNATURE

NAME OF FIRM

DATE OF SUBMISSION

**EXHIBIT A—SUPPORTING SCHEDULE (Specify. If more space is needed, use reverse)**

COST EL NO.	ITEM DESCRIPTION (See footnote 5)	EST COST (\$)
<b>OPTION II</b>		
9	<b>Drilling costs</b>	
	2 holes total footage 1300 @ \$26/ft.	33,800
	<b>TOTAL</b>	<b>33,800</b>
9	<b>Chemical analyses</b>	
	Major-Minor 10 @ \$125	1,250
	O Isotopes 2 @ \$75	150
	H Isotopes 2 @ \$75	150
	S Isotopes 2 @ \$60	120
	<b>TOTAL</b>	<b>1,670</b>
9	<b>Miscellaneous</b>	
	Sample bags 500 @ \$15/100	75
	Thin sections 30 @ \$5.00	150
	<b>TOTAL</b>	<b>225</b>
<b>Travel</b>		
7a	Mileage 3000 mi. @ \$.20/mi.	600
7b	Per diem 25 days @ \$35/day	875
	<b>TOTAL</b>	<b>1,475</b>

I. HAS ANY EXECUTIVE AGENCY OF THE UNITED STATES GOVERNMENT PERFORMED ANY REVIEW OF YOUR ACCOUNTS OR RECORDS IN CONNECTION WITH ANY OTHER GOVERNMENT PRIME CONTRACT OR SUBCONTRACT WITHIN THE PAST TWELVE MONTHS?

YES  NO (If yes, identify below.)

NAME AND ADDRESS OF REVIEWING OFFICE AND INDIVIDUAL

TELEPHONE NUMBER/EXTENSION

II. WILL YOU REQUIRE THE USE OF ANY GOVERNMENT PROPERTY IN THE PERFORMANCE OF THIS PROPOSED CONTRACT?

YES  NO (If yes, identify on reverse or separate page)

III. DO YOU REQUIRE GOVERNMENT CONTRACT FINANCING TO PERFORM THIS PROPOSED CONTRACT?

YES  NO (If yes, identify.):  ADVANCE PAYMENTS  PROGRESS PAYMENTS OR  GUARANTEED LOANS

IV. DO YOU NOW HOLD ANY CONTRACT (Or, do you have any independently financed (IRGD) projects) FOR THE SAME OR SIMILAR WORK CALLED FOR BY THIS PROPOSED CONTRACT?

YES  NO (If yes, identify.):

V. DOES THIS COST SUMMARY CONFORM WITH THE COST PRINCIPLES SET FORTH IN AGENCY REGULATIONS?

YES  NO (If no, explain on reverse or separate page)

See Reverse for Instructions and Footnotes

OPTIONAL FORM 60 (10-71)



**CONTRACT PRICING PROPOSAL**  
**(RESEARCH AND DEVELOPMENT)**

Office of Management and Budget  
Approval No. 29-RO184

This form is for use when (i) submission of cost or pricing data (see FPR 1-3.807-3) is required and (ii) substitution for the Optional Form 39 is authorized by the contracting officer.

PAGE NO.  
1

NO. OF PAGES  
4

NAME OF OFFEROR Board of Regents  
University of Nevada System

HOME OFFICE ADDRESS  
University of Nevada, Reno  
Reno, NV 89557

SUPPLIES AND/OR SERVICES TO BE FURNISHED  
Low- to Moderate-Temperature  
Geothermal Assessment for Nevada:  
Site Specific Studies OPTION I,  
Year 2

DIVISION(S) AND LOCATION(S) WHERE WORK IS TO BE PERFORMED  
Nevada Bureau of Mines and Geology

TOTAL AMOUNT OF PROPOSAL  
\$ 136,469

GOVT SOLICITATION NO.

**DETAIL DESCRIPTION OF COST ELEMENTS**

1. DIRECT MATERIAL (Itemize on Exhibit A)				EST COST (\$)	TOTAL EST COST <sup>1</sup>	REFER- ENCE <sup>2</sup>
a. PURCHASED PARTS						
b. SUBCONTRACTED ITEMS						
c. OTHER—(1) RAW MATERIAL						
(2) YOUR STANDARD COMMERCIAL ITEMS						
(3) INTERDIVISIONAL TRANSFERS (At other than cost)						
<b>TOTAL DIRECT MATERIAL</b>						
2. MATERIAL OVERHEAD <sup>1</sup> (Rate % X \$ base =)						
3. DIRECT LABOR (Specify)			ESTIMATED HOURS	RATE/ HOUR	EST COST (\$)	
Trexler (Geologist, P.I.)			1040	13.67	14,214	
Flynn (Geologist)			2080	10.25	21,325	
Koenig (Geochemist)			2080	10.25	21,325	
<b>TOTAL DIRECT LABOR</b>					56,864	
4. LABOR OVERHEAD (Specify Department or Cost Center) <sup>1</sup>						
			O.H. RATE	X BASE =	EST COST (\$)	
Retirement			8%	56,864	4,549	
Nevada Industrial Insur. Health and unemployment			4%	56,864	2,275	
<b>TOTAL LABOR OVERHEAD</b>					6,824	
5. SPECIAL TESTING (Including field work at Government installations)						
				EST COST (\$)		
<b>TOTAL SPECIAL TESTING</b>						
6. SPECIAL EQUIPMENT (If direct charge) (Itemize on Exhibit A)						
7. TRAVEL (If direct charge) (Give details on attached Schedule)						
				EST COST (\$)		
a. TRANSPORTATION					7,715	
b. PER DIEM OR SUBSISTENCE					7,975	
<b>TOTAL TRAVEL</b>					15,690	Ex. A
8. CONSULTANTS (Identify—purpose—rate)						
				EST COST (\$)		
<b>TOTAL CONSULTANTS</b>						
9. OTHER DIRECT COSTS (Itemize on Exhibit A)						
					22,237	Ex. A
<b>TOTAL DIRECT COST AND OVERHEAD</b>					101,615	
10. GENERAL AND ADMINISTRATIVE EXPENSE (Rate 34.3 % of cost element Nos. 3, 4, 7, 9) <sup>1</sup>						
					34,854	
11. ROYALTIES <sup>4</sup>						
<b>TOTAL ESTIMATED COST</b>					136,469	
12. FEE OR PROFIT						
<b>TOTAL ESTIMATED COST AND FEE OR PROFIT</b>						

This proposal is submitted for use in connection with and in response to (Describe RFP, etc.)

and reflects our best estimates as of this date, in accordance with the Instructions to Offerors and the Footnotes which follow.

TYPED NAME AND TITLE	SIGNATURE
NAME OF FIRM	DATE OF SUBMISSION

**EXHIBIT A—SUPPORTING SCHEDULE (Specify. If more space is needed, use reverse)**

COST EL NO.	ITEM DESCRIPTION (See footnote 5)	EST COST (\$)
9	Chemical Analyses	
	Anal. Type          # Samples          \$/Anal.          Lab.	
Whole	Rock Samples	
	Maj-Minor                      12                      137.50                      Teledyne	1,650
	Sulfide Isotopes                      5                      44.00                      Isochron	220
	Sulfate Isotopes                      5                      66.00                      Isochron	330
	TOTAL	2,200
	Geothermal Fluids	
	Maj-Minor                      40                      137.50                      Amtec	5,500
	O Isotopes                      10                      82.50                      Hebrew Univ.	825
	H Isotopes                      10                      82.50                      Hebrew Univ.	825
	S Isotopes                      10                      82.50                      Isochron	825
	TOTAL	7,975
7a	Travel	
	4-WD vehicle (UNR) 12 mos. @ \$80/mo.	960
	15,000 miles @ \$.22/mile	3,300
	Air fares	3,455
7b	Per diem	
	227 days @ \$35/day	7,975
	TOTAL	15,690

I. HAS ANY EXECUTIVE AGENCY OF THE UNITED STATES GOVERNMENT PERFORMED ANY REVIEW OF YOUR ACCOUNTS OR RECORDS IN CONNECTION WITH ANY OTHER GOVERNMENT PRIME CONTRACT OR SUBCONTRACT WITHIN THE PAST TWELVE MONTHS?

YES    NO (If yes, identify below.)

NAME AND ADDRESS OF REVIEWING OFFICE AND INDIVIDUAL	TELEPHONE NUMBER/EXTENSION
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II. WILL YOU REQUIRE THE USE OF ANY GOVERNMENT PROPERTY IN THE PERFORMANCE OF THIS PROPOSED CONTRACT?

YES    NO (If yes, identify on reverse or separate page)

III. DO YOU REQUIRE GOVERNMENT CONTRACT FINANCING TO PERFORM THIS PROPOSED CONTRACT?

YES    NO (If yes, identify):    ADVANCE PAYMENTS    PROGRESS PAYMENTS OR    GUARANTEED LOANS

IV. DO YOU NOW HOLD ANY CONTRACT (Or, do you have any independently financed (IR&D) projects) FOR THE SAME OR SIMILAR WORK CALLED FOR BY THIS PROPOSED CONTRACT?

YES    NO (If yes, identify):

V. DOES THIS COST SUMMARY CONFORM WITH THE COST PRINCIPLES SET FORTH IN AGENCY REGULATIONS?

YES    NO (If no, explain on reverse or separate page)

See Reverse for Instructions and Footnotes

OPTIONAL FORM 60 (10-71)

This proposal is submitted for use in connection with and in response to (Describe R.I.P. etc.)

and reflects our best estimates as of this date, in accordance with the Instructions to Offerors and the Footnotes which follow.

TYPED NAME AND TITLE	SIGNATURE
NAME OF FIRM	DATE OF SUBMISSION

EXHIBIT A—SUPPORTING SCHEDULE (Specify, if more space is needed, use reverse)

COST EL NO.	ITEM DESCRIPTION (See footnote 5)	EST COST (\$)
9	Equipment Rental	
	Rock coring equipment 10 days @ \$33/day	330
	Vehicle mounted drill 2 wks. @ \$330/wk.	660
	TOTAL	990
9	Equipment	
	2 thermistor probes @ \$53.00	106
	PVC pipe 100 ft. @ \$.22/ft.	22
	TOTAL	128
9	Non-expendable equipment	
	Mylar topo bases	500
	Existing airphotos 200 photos @ \$4.40 ea.	880
	Topo, geophysical and geological maps	193
	Low sun-angle photography: Site 1	3,500
	Site 2	2,300
	TOTAL	7,373
9	Expendable supplies	
	Film, flagging, stake, notebooks, batteries, etc.	550
	Drafting supplies	275
	Sample bottles, chemicals, glassware	463
	TOTAL	1,288

I. HAS ANY EXECUTIVE AGENCY OF THE UNITED STATES GOVERNMENT PERFORMED ANY REVIEW OF YOUR ACCOUNTS OR RECORDS IN CONNECTION WITH ANY OTHER GOVERNMENT PRIME CONTRACT OR SUBCONTRACT WITHIN THE PAST TWELVE MONTHS?

YES  NO (If yes, identify below.)

NAME AND ADDRESS OF REVIEWING OFFICE AND INDIVIDUAL	TELEPHONE NUMBER/EXTENSION
---	----------------------------

II. WILL YOU REQUIRE THE USE OF ANY GOVERNMENT PROPERTY IN THE PERFORMANCE OF THIS PROPOSED CONTRACT?

YES  NO (If yes, identify on reverse or separate page)

III. DO YOU REQUIRE GOVERNMENT CONTRACT FINANCING TO PERFORM THIS PROPOSED CONTRACT?

YES  NO (If yes, identify.):  ADVANCE PAYMENTS  PROGRESS PAYMENTS OR  GUARANTEED LOANS

IV. DO YOU NOW HOLD ANY CONTRACT (Or, do you have any independently financed (IRGD) projects) FOR THE SAME OR SIMILAR WORK CALLED FOR BY THIS PROPOSED CONTRACT?

YES  NO (If yes, identify.):

V. DOES THIS COST SUMMARY CONFORM WITH THE COST PRINCIPLES SET FORTH IN AGENCY REGULATIONS?

YES  NO (If no, explain on reverse or separate page)

See Reverse for Instructions and Footnotes

OPTIONAL FORM 60 (10-71)



# CONTRACT PRICING PROPOSAL

(RESEARCH AND DEVELOPMENT)

Office of Management and Budget  
Approval No. 29-RO184

This form is for use when (i) submission of cost or pricing data (see FPR 1-3.807-3) is required and (ii) substitution for the Optional Form 59 is authorized by the contracting officer.

PAGE NO.

1

NO. OF PAGES

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<p><b>NAME OF OFFEROR</b> Board of Regents University of Nevada System</p> <p><b>HOME OFFICE ADDRESS</b> University of Nevada, Reno Reno, NV 89557</p>	<p><b>SUPPLIES AND/OR SERVICES TO BE FURNISHED</b> Low- to Moderate-Temperature Geothermal Assessment for Nevada: Site Specific Studies OPTION II, Year 2</p>
<p><b>DIVISION(S) AND LOCATION(S) WHERE WORK IS TO BE PERFORMED</b> Nevada Bureau of Mines and Geology</p>	<p><b>TOTAL AMOUNT OF PROPOSAL</b> \$ 208,704</p>

GOV'T SOLICITATION NO.

## DETAIL DESCRIPTION OF COST ELEMENTS

1. DIRECT MATERIAL (Itemize on Exhibit A)	EST COST (\$)	TOTAL EST COST'	REFER-ENCE'
a. PURCHASED PARTS			
b. SUBCONTRACTED ITEMS			
c. OTHER—(1) RAW MATERIAL			
(2) YOUR STANDARD COMMERCIAL ITEMS			
(3) INTERDIVISIONAL TRANSFERS (At other than cost)			
<b>TOTAL DIRECT MATERIAL</b>			
2. MATERIAL OVERHEAD' (Rate % X'S base=)			
3. DIRECT LABOR (Specify)	ESTIMATED HOURS	RATE/HOUR	EST COST (\$)
Trexler (Geologist, P.I.)	1040	13.67	14,214
Flynn (Geologist)	2080	10.25	21,325
Koenig (Geochemist)	2080	10.25	21,325
Research Associate (unnamed)	1040'	10.51	10,932
<b>TOTAL DIRECT LABOR</b>			<b>67,796</b>
4. LABOR OVERHEAD (Specify Department or Cost Center)'	O.H. RATE	X BASE =	EST COST (\$)
Retirement	8%	67,796	5,424
Nevada Industrial Commission, Health Insurance, unemployment	4%	67,796	2,712
<b>TOTAL LABOR OVERHEAD</b>			<b>8,136</b>
5. SPECIAL TESTING (Including field work at Government installations)		EST COST (\$)	
<b>TOTAL SPECIAL TESTING</b>			
6. SPECIAL EQUIPMENT (If direct charge) (Itemize on Exhibit A)			
7. TRAVEL (If direct charge) (Give details on attached Schedule)		EST COST (\$)	
a. TRANSPORTATION		8,595	
b. PER DIEM OR SUBSISTENCE		8,850	
<b>TOTAL TRAVEL</b>		<b>17,445</b>	Ex. A
8. CONSULTANTS (Identify—purpose—rate)		EST COST (\$)	
<b>TOTAL CONSULTANTS</b>			
9. OTHER DIRECT COSTS (Itemize on Exhibit A)			62,024 Ex. A
10. <b>TOTAL DIRECT COST AND OVERHEAD</b>			<b>155,401</b>
11. GENERAL AND ADMINISTRATIVE EXPENSE (Rate 34.3 % of cost element Nos. 3, 4, 7, 9)'			53,303
12. ROYALTIES'			
13. <b>TOTAL ESTIMATED COST</b>		<b>208,704</b>	
14. FEE OR PROFIT			
15. <b>TOTAL ESTIMATED COST AND FEE OR PROFIT</b>			



This proposal is submitted for use in connection with and in response to (Describe RFP, etc.)

and reflects our best estimates as of this date, in accordance with the Instructions to Offerors and the Footnotes which follow.

TYPED NAME AND TITLE	SIGNATURE
NAME OF FIRM	DATE OF SUBMISSION

**EXHIBIT A—SUPPORTING SCHEDULE (Specify. If more space is needed, use reverse)**

COST EL NO.	ITEM DESCRIPTION (See footnote 5)				EST COST (\$)
9	Chemical Analyses				
	Anal. Type	# Samples	\$/Anal.	Lab.	
Whole	Rock Samples				
	Maj-Minor	12	137.50	Teledyne	1,650
	Sulfide Isotopes	5	44.00	Isochron	220
	Sulfate Isotopes	5	66.00	Isochron	330
	TOTAL				2,200
	Geothermal Fluids				
	Maj-Minor	40	137.50	Amtec	5,500
	O Isotopes	10	82.50	Hebrew Univ.	825
	H Isotopes	10	82.50	Hebrew Univ.	825
	S Isotopes	10	82.50	Isochron	825
	TOTAL				7,975
7a					
Travel	4-WD vehicle (UNR) 12 mos. @ \$80/mo.				960
	15,000 miles @ \$.22/mile				3,300
	Air fares				3,455
7b					
Per diem	227 days @ \$35/day				7,975
	TOTAL				15,690

I. HAS ANY EXECUTIVE AGENCY OF THE UNITED STATES GOVERNMENT PERFORMED ANY REVIEW OF YOUR ACCOUNTS OR RECORDS IN CONNECTION WITH ANY OTHER GOVERNMENT PRIME CONTRACT OR SUBCONTRACT WITHIN THE PAST TWELVE MONTHS?

YES  NO (If yes, identify below.)

NAME AND ADDRESS OF REVIEWING OFFICE AND INDIVIDUAL	TELEPHONE NUMBER/EXTENSION
---	----------------------------

II. WILL YOU REQUIRE THE USE OF ANY GOVERNMENT PROPERTY IN THE PERFORMANCE OF THIS PROPOSED CONTRACT?

YES  NO (If yes, identify on reverse or separate page)

III. DO YOU REQUIRE GOVERNMENT CONTRACT FINANCING TO PERFORM THIS PROPOSED CONTRACT?

YES  NO (If yes, identify.):  ADVANCE PAYMENTS  PROGRESS PAYMENTS OR  GUARANTEED LOANS

IV. DO YOU NOW HOLD ANY CONTRACT (Or, do you have any independently financed (IR&D) projects) FOR THE SAME OR SIMILAR WORK CALLED FOR BY THIS PROPOSED CONTRACT?

YES  NO (If yes, identify.):

V. DOES THIS COST SUMMARY CONFORM WITH THE COST PRINCIPLES SET FORTH IN AGENCY REGULATIONS?

YES  NO (If no, explain on reverse or separate page)

See Reverse for Instructions and Footnotes

OPTIONAL FORM 60 (10-71)

This proposal is submitted for use in connection with and in response to (Describe RFP, etc.)

and reflects our best estimates as of this date, in accordance with the Instructions to Offerors and the Footnotes which follow.

TYPED NAME AND TITLE	SIGNATURE
NAME OF FIRM	DATE OF SUBMISSION

**EXHIBIT A—SUPPORTING SCHEDULE (Specify. If more space is needed, use reverse)**

COST EL NO.	ITEM DESCRIPTION (See footnote 5)	EST COST (\$)
9	Equipment Rental	
	Rock coring equipment 10 days @ \$33/day	330
	Vehicle mounted drill 2 wks. @ \$330/wk.	660
	TOTAL	990
9	Equipment	
	2 thermistor probes @ \$53.00	106
	PVC pipe 100 ft. @ \$.22/ft.	22
	TOTAL	128
9	Non-expendable equipment	
	Mylar topo bases	500
	Existing airphotos 200 photos @ \$4.40 ea.	880
	Topo, geophysical and geological maps	193
	Low sun-angle photography: Site 1	3,500
	Site 2	2,300
	TOTAL	7,373
9	Expendable supplies	
	Film, flagging, stake, notebooks, batteries, etc.	550
	Drafting supplies	275
	Sample bottles, chemicals, glassware	463
	TOTAL	1,288

I. HAS ANY EXECUTIVE AGENCY OF THE UNITED STATES GOVERNMENT PERFORMED ANY REVIEW OF YOUR ACCOUNTS OR RECORDS IN CONNECTION WITH ANY OTHER GOVERNMENT PRIME CONTRACT OR SUBCONTRACT WITHIN THE PAST TWELVE MONTHS?

YES  NO (If yes, identify below.)

NAME AND ADDRESS OF REVIEWING OFFICE AND INDIVIDUAL	TELEPHONE NUMBER/EXTENSION
---	----------------------------

II. WILL YOU REQUIRE THE USE OF ANY GOVERNMENT PROPERTY IN THE PERFORMANCE OF THIS PROPOSED CONTRACT?

YES  NO (If yes, identify on reverse or separate page)

III. DO YOU REQUIRE GOVERNMENT CONTRACT FINANCING TO PERFORM THIS PROPOSED CONTRACT?

YES  NO (If yes, identify.):  ADVANCE PAYMENTS  PROGRESS PAYMENTS OR  GUARANTEED LOANS

IV. DO YOU NOW HOLD ANY CONTRACT (Or, do you have any independently financed (IRGD) projects) FOR THE SAME OR SIMILAR WORK CALLED FOR BY THIS PROPOSED CONTRACT?

YES  NO (If yes, identify.):

V. DOES THIS COST SUMMARY CONFORM WITH THE COST PRINCIPLES SET FORTH IN AGENCY REGULATIONS?

YES  NO (If no, explain on reverse or separate page)

See Reverse for Instructions and Footnotes

OPTIONAL FORM 60 (10-71)



This proposal is submitted for use in connection with and in response to (Describe RFP, etc.)

Low- to Moderate Temperature Geothermal Assessment for Nevada: Site Specific Studies - OPTION II (Reservoir Confirmation)

and reflects our best estimates as of this date, in accordance with the Instructions to Offerors and the Footnotes which follow.

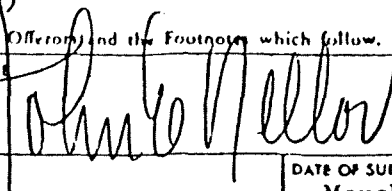
TYPED NAME AND TITLE John E. Nellor Graduate Dean and Research Coordinator	SIGNATURE 
NAME OF FIRM University of Nevada System University of Nevada, Reno	DATE OF SUBMISSION March 3, 1979

EXHIBIT A—SUPPORTING SCHEDULE (Specify. If more space is needed, use reverse)

COST EL NO.	ITEM DESCRIPTION (See footnote 5)	EST COST (\$)
	OPTION II	
9	Drilling costs 2 holes total footage 1300 ft. @ \$29/ft.	37,700
	TOTAL	37,700
9	Chemical analyses Major-Minor 10 @ \$137.50 O Isotope 2 @ \$82.50 H Isotope 2 @ \$82.50 S Isotope 2 @ \$66.00	1,380 165 165 132
	TOTAL	1,842
9	Miscellaneous Sample bags 500 @ \$16/100 Thin sections 30 @ \$5.50	80 165
	TOTAL	245
	Travel	
7a	Mileage: 4000 mi @ \$0.22/mi.	880
7b	Per Diem 25 days @ \$35/day	875
	TOTAL	1,755

I. HAS ANY EXECUTIVE AGENCY OF THE UNITED STATES GOVERNMENT PERFORMED ANY REVIEW OF YOUR ACCOUNTS OR RECORDS IN CONNECTION WITH ANY OTHER GOVERNMENT PRIME CONTRACT OR SUBCONTRACT WITHIN THE PAST TWELVE MONTHS?

YES  NO (If yes, identify below.)

NAME AND ADDRESS OF REVIEWING OFFICE AND INDIVIDUAL Department HEW Wallace Chan	TELEPHONE NUMBER/EXTENSION (415) 556-8343
--	--

II. WILL YOU REQUIRE THE USE OF ANY GOVERNMENT PROPERTY IN THE PERFORMANCE OF THIS PROPOSED CONTRACT?

YES  NO (If yes, identify on reverse or separate page)

III. DO YOU REQUIRE GOVERNMENT CONTRACT FINANCING TO PERFORM THIS PROPOSED CONTRACT?

YES  NO (If yes, identify.):  ADVANCE PAYMENTS  PROGRESS PAYMENTS OR  GUARANTEED LOANS

IV. DO YOU NOW HOLD ANY CONTRACT (Or, do you have any independently financed (IR&D) projects) FOR THE SAME OR SIMILAR WORK CALLED FOR BY THIS PROPOSED CONTRACT?

YES  NO (If yes, identify.):

V. DOES THIS COST SUMMARY CONFORM WITH THE COST PRINCIPLES SET FORTH IN AGENCY REGULATIONS?

YES  NO (If no, explain on reverse or separate page)

See Reverse for Instructions and Footnotes

OPTIONAL FORM 60 (10-71)