

VOLUME II - BUSINESS PROPOSAL
PROJECT PROPOSAL SUBMITTED TO THE
DEPARTMENT OF ENERGY
IDAHO OPERATIONS OFFICE

USER-COUPLED CONFIRMATION DRILLING PROGRAM
SCAP No. DE-SC07-80ID12139

Copy No. 10 of 10

Date of Submission 15 September, 1980

Name of Organization: Hydrothermal Energy Corporation

Organizational Classification: Small Business

Address of Organization: 210 Marsh Street, Suite 105, Reno, NV, 89509

Title of Proposed Project: MGM GRAND HOTEL GEOTHERMAL PROJECT

Maximum Funds requested from DOE \$1,714,239 Total Cost of Project
Through Flow Testing \$1,904,710

Location of Site: Reno, Nevada

Proposed Project Duration (in months): 12 months

Requested Starting Date: 1 November, 1980

Official Contact for Negotiations: Dr. David J. Atkinson

Position and Title: President, Hydrothermal Energy Corporation

Telephone: (702) 323-2306

Effective Period of Proposal: 200 days

AUTHORIZED OFFICIAL

Signature David J. Atkinson

Name Typed Dr. David J. Atkinson

Title President

Date 14 September, 1980

Please Check Small Business Disadvantaged Business Other

NOTICE

The data contained on all pages of this proposal have been submitted in confidence and contain trade secrets and/or privileged or confidential commercial or financial information, and such data shall be used or disclosed only for evaluation purposes, provided that if an agreement is made as a result of or in connection with the submission of this proposal, the Government shall have the right to use or disclose the data herein to the extent provided in the agreement. This restriction does not limit the Government's right to use or disclose data which it obtains without restriction from any source, including the proposer.

Volume 11

Table of Contents

Volume 11

Table of Contents

1. Cover Page	page 1-1 - 1-2
2. Table of Contents	page 2-1 - 2-2
3. Project Cost/Budget Summary GSA Optional Form 60's	page 3-1 page 3-2 to 3-3
4. Project Financial Plan Amount of non-DOE Funds Cost Controls, Mgt. Plans	page 4-1 page 4-2 page 4-2
5. Organizational Information Financial Information Corporate Description Current Govt. Contracts	page 5-1 page 5-2 page 5-2 page 5-3
6. Other Required Forms Representation and Certification Federal Assistance Standard Form 424	page 6-1 page 6-2 to 6-11 page 6-12 to 6-15
7. Cooperative Agreement terms & Conditions	page 7-1

CONFIDENTIAL

Project Costs

CONFIDENTIAL

Appendix I

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 29 is authorized by the contracting officer.				PAGE NO. 1	NO. OF PAGES 2
NAME OF OFFEROR Hydrothermal Energy Corporation		SUPPLIES AND/OR SERVICES TO BE FURNISHED Reference UCCDP			
HOME OFFICE ADDRESS 6525 Sunset Blvd., Suite 203 Los Angeles, CA 90028					
DIVISION(S) AND LOCATION(S) WHERE WORK IS TO BE PERFORMED Reno, NV		TOTAL AMOUNT OF PROPOSAL \$ 1,904,710		GOVT SOLICITATION NO. DE-SC07-80ID12139	
DETAIL DESCRIPTION OF COST ELEMENTS					
1. DIRECT MATERIAL (Itemize on Exhibit A)			EST COST (\$)	TOTAL EST COST*	REFER- ENCE ²
a. PURCHASED PARTS					
b. SUBCONTRACTED ITEMS			1,280,000		
c. OTHER—(1) RAW MATERIAL					
(2) YOUR STANDARD COMMERCIAL ITEMS					
(3) INTERDIVISIONAL TRANSFERS (At other than cost)					
TOTAL DIRECT MATERIAL				1,280,000	
2. MATERIAL OVERHEAD* (Rate %X'S base=)					
3. DIRECT LABOR (Specify)		ESTIMATED HOURS	RATE/HOUR	EST COST (\$)	
Project Manager		600	30.00	18,000	
Site Manager		1000	12.50	12,500	
Technician		1000	8.00	8,000	
Geologist		700	10.00	7,000	
Administrative Assistant		1400	7.50	10,500	
TOTAL DIRECT LABOR				46,000	
4. LABOR OVERHEAD (Specify Department or Cost Center) ²		O.H. RATE	X BASE =	EST COST (\$)	
		70%	46,000	32,200	
TOTAL LABOR OVERHEAD				32,200	
5. SPECIAL TESTING (Including field work at Government installations)			EST COST (\$)		
TOTAL SPECIAL TESTING					
6. SPECIAL EQUIPMENT (If direct charge) (Itemize on Exhibit A)					
7. TRAVEL (If direct charge) (Give details on attached Schedule)			EST COST (\$)		
a. TRANSPORTATION			3,600		
b. PER DIEM OR SUBSISTENCE			1,840		
TOTAL TRAVEL				5,440	
8. CONSULTANTS (Identify—purpose—rate)			EST COST (\$)		
Environmental Report			30,000		
Flow Testing			37,000		
Well Logging			30,000		
Gravity Survey			20,000		
TOTAL CONSULTANTS				117,000	
9. OTHER DIRECT COSTS (Itemize on Exhibit A)					
TOTAL DIRECT COST AND OVERHEAD				1,505,700	
11. GENERAL AND ADMINISTRATIVE EXPENSE (Rate 15 % of cost element Nos. 1-10) ¹				225,855	
12. ROYALTIES ¹				0-	
TOTAL ESTIMATED COST				1,731,555	
14. FEE OR PROFIT			10%	173,155	
TOTAL ESTIMATED COST AND FEE OR PROFIT				1,904,710	

OPTIONAL FORM 60
October 1971
General Services Administration
FPR 1-16.216

Project Financial Plan

4. Project Financial Plan

a. In the exploration and drilling phase, a total expenditure of \$1,904,710 is anticipated. This is broken down on the Optional Form 60 in the previous section.

Of this, the non-government share will be \$1,523,768.

Hydrothermal Energy Corporation has made arrangements to enter into a Joint Venture Agreement with Cabrillo Capital Corporation, in which Cabrillo will contribute the required capital in return for a portion of the profit of the venture, plus all of the investment tax credits for both the exploration/drilling phase and the construction/retrofitting phase.

The remaining portion of the cost, after our production and reinjection tests have established the adequacy of the reservoir, will be borrowed from Nevada National Bank. Reservoir insurance may or may not be required for this arrangement. In the absence of any predictable interest rates, we have used 20% in assessing financial feasibility.

b. Standard methods of cost control and related scheduling and management will be used.

Organizational Information

5. Organization Information

a. Hydrothermal Energy Corporation is a Delaware corporation formed in May, 1978. Funds for the non-government share of the exploration and drilling work will be contributed by Cabrillo Capital Corporation in a joint venture with Hydrothermal Energy Corporation.

b. Hydrothermal Energy Corporation is a privately owned small business.

Financial statements will be provided if desired.

5. c. Current Government Contracts

Hydrothermal Energy Corporation presently has one contract with the government. This is a PON managed by DOE/SAN, Contract DE-AC03-79ET27029. Phase I of this project is for \$232,339. The Contracting Officer is Mr. Steve Bonde (415-273-4182). The contract is for a PON demonstrating geothermal space and water heating in buildings in the Moana district of southwest Reno. The second phase of this project is to be negotiated shortly.

Other Required Forms

REPRESENTATIONS AND CERTIFICATIONS

[Instructions: Check or complete all appropriate boxes or blanks.]

The proposer makes the following representations and certifications:

1. CONTINGENT FEE

(a) It () has, (X) has not, employed or retained any company or person (other than a full-time bona fide employee working solely for the bidder) to solicit or secure this contract, and (b) it () has, (X) has not, paid or agreed to pay any company or person (other than a full-time bona fide employee working solely for the bidder) any fee, commission, percentage or brokerage fee, contingent upon or resulting from the award of this contract; and agrees to furnish information relating to (a) and (b) above as requested by the Contracting Officer. (For interpretation of the representation, including the term "bona fide employee," see Code of Federal Regulations, Title 41, Subpart 1-1.5.)

2. TYPE OF ORGANIZATION

It operates as an () individual, () partnership, () joint venture, (X) corporation, incorporated in State of Delaware.

3. EQUAL OPPORTUNITY

It () has, (X) has not, participated in a previous contract or sub-contract subject to the Equal Opportunity Clause herein, the clause originally contained in Section 301 of Executive Order No. 10925, or the clause contained in Section 201 of Executive Order No. 11114; it () has, (X) has not, filed all required compliance reports; and representations indicating submission or required compliance reports, signed by proposed subcontractors, will be obtained prior to subcontract awards.

4. AFFIRMATIVE ACTION COMPLIANCE PROGRAM

The offeror represents that (a) it () has developed and has on file, (X) has not developed and does not have on file, at each establishment an affirmative action program as required by the rules and regulations of the Secretary of Labor (41 CFR 60-1 and 60-2), or (b) (X) has not previously had contracts subject to written affirmative action program requirements of the rules and regulations of the Secretary of Labor because (check as applicable):

 X offeror does not have 50 or more employees

 offeror has not had a Government prime contract or subcontract of \$50,000 or more.

Representations and Certifications (Cont'd)

5. EQUAL OPPORTUNITY COMPLIANCE

[Applicable to proposals exceeding \$1,000,000]

The offeror represents -

- a. That a full compliance review of the offeror's employment practices () has, (X) has not, been conducted by an agency of the Federal Government.
- b. If a full compliance review has been conducted by an agency of the Federal Government, the most recent compliance review was conducted on _____ by _____.
(Date) (Federal Agency)
- c. The proposed first-tier subcontractors which will be awarded subcontracts of \$1,000,000 or more are none

Any offeror and his known first-tier subcontractors which will be awarded subcontracts of \$1,000,000 or more will be subject to full, preaward equal opportunity compliance reviews before the award of the contract for the purpose of determining whether the proposer and his subcontractors are able to comply with the provisions of the Equal Opportunity article.

6. CERTIFICATION OF NONSEGREGATED FACILITIES

By the submission of this proposal, the offeror, applicant, or subcontractor certifies that it does not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. It certifies further that it will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it will not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. The offeror, applicant, or subcontractor agrees that a breach of this certification is a violation of the Equal Opportunity clause in this contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise. It further agrees that (except where it

Representations and Certifications (Cont'd)

6. CERTIFICATION OF NONSEGREGATED FACILITIES (Cont'd)

has obtained identical certifications from proposed subcontractors for specific time periods) it will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause; that it will retain such certifications in its files; and that it will forward the following notice to such proposed subcontractors (except where the proposed subcontractors have submitted identical certifications for specific time periods):

NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT FOR CERTIFICATION OF NONSEGREGATED FACILITIES

A Certification of Nonsegregated Facilities must be submitted prior to the award of a subcontract exceeding \$10,000 which is not exempt from the provisions of the Equal Opportunity clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semi-annually, or annually).

7. PARENT COMPANY AND EMPLOYER IDENTIFICATION NUMBER

Each proposer shall furnish the following information by filling in the appropriate blocks:

- a. Is the proposer owned or controlled by a parent company as described below? () Yes (x) No. (For the purpose of this proposal, a parent company is defined as one which either owns or controls the activities and basic business policies of the proposer. To own another company means the parent company must own at least a majority (more than 50 percent) of the voting rights in that company. To control another company, such ownership is not required; if another company is able to formulate, determine or veto basic business policy decisions of the proposer, such other company is considered the parent company of the proposer. This control may be exercised through the use of dominant minority voting rights, use of proxy voting, contractual arrangements, or otherwise.)
- b. If the answer to a. above is "Yes", proposer shall insert in the space below the name and main office address of the parent company.

Name of Parent Company: _____

Representations and Certifications (Cont'd)

7. PARENT COMPANY AND EMPLOYER IDENTIFICATION NUMBER (Cont'd)

Main Office Address (No., Street, City, State and Zip Code)

- c. Proposer shall insert in the applicable space below, if it has no parent company, its own Employer's Identification Number (E.I. No.) (Federal Social Security Number used on Employer's Quarterly Federal Tax Return, U. S. Treasury Department Form 941), or if it has a parent company, the E.I. No. of its parent company.

Employer Identification Number of Parent Company: _____

88-0149214

8. DISCLOSURE STATEMENT - COST ACCOUNTING PRACTICES AND CERTIFICATION

Any contract in excess of \$100,000 resulting from this solicitation except: (i) when the price negotiated is based on: (a) established catalog or market prices of commercial items sold in substantial quantities to the general public, or (b) prices set by law or regulations; (ii) contracts awarded to small business concerns (as defined in 1-701.1 of the Armed Services procurement regulations or FPR §1-1.701-1); or (iii) contracts which are otherwise exempt (see 4 CFR 331.30(b)) shall be subject to the requirements of the Cost Accounting Standards Board. Any offeror submitting a proposal, which, if accepted, will result in a contract subject to the requirements of the Cost Accounting Standards Board must, as a condition of contracting, submit a disclosure statement as required by regulations of the Board. The disclosure statement must be submitted as a part of the offeror's proposal under this solicitation (see (I), below) unless: (i) the offeror, together with all divisions, subsidiaries, and affiliates under common control, did not receive net awards exceeding the monetary exemption for disclosure as established by the Cost Accounting Standards Board (see (II), below); (ii) the offeror exceeded the monetary exemption in its cost accounting period immediately preceding the cost accounting period in which this proposal was submitted but, in accordance with the regulations of the Cost Accounting Standards Board, is not yet required to submit a disclosure statement (see (III), below); (iii) the offeror has already submitted a disclosure statement disclosing the practices used in connection with the pricing of this proposal

Representations and Certifications (Cont'd)

8. DISCLOSURE STATEMENT - COST ACCOUNTING PRACTICES AND CERTIFICATION (Cont'd)

(see (IV), below); or (iv) post-award submission has been authorized by the Contracting Officer. See 4 CFR 351.70 for submission of copy of disclosure statement to the Cost Accounting Standards Board.

CAUTION: A practice disclosed in a disclosure statement shall not, by virtue of such disclosure, be deemed to be a proper, approved, or agreed to practice for pricing proposals or accumulating and reporting contract performance cost data.

Check the appropriate box below.

() I. CERTIFICATE OF CONCURRENT SUBMISSION OF DISCLOSURE STATEMENT(S)

The offeror hereby certifies that he has submitted, as a part of his proposal under this solicitation, copies of the disclosure statement(s) as follows: (i) original and one copy to the cognizant Contracting Officer (Administrative Contracting Officer (ACO), see DOD Directory of Contract Administration Components (DOD 4105.59H)); and (ii) one copy to the cognizant contract auditor.

Date of
Disclosure Statement(s)

Name(s) and Address(es) of Cognizant
Contracting Officer(s) Where Filed

The offeror further certifies that practices used in estimating costs in pricing this proposal are consistent with the cost accounting practices disclosed in the Disclosure Statement(s).

() II. CERTIFICATE OF MONETARY EXEMPTION

The offeror hereby certifies that it, together with all divisions, subsidiaries, and affiliates under common control, did not receive net awards of negotiated national defense prime contracts and subcontracts subject to cost accounting standards totaling more than \$10 million in its cost accounting period immediately preceding the period in which this proposal was submitted. The offeror further certifies that if its status changes prior to an award resulting from this proposal it will advise the Contracting Officer immediately.

CAUTION: Offerors who submitted a Disclosure Statement under the filing requirements previously established by the Cost Accounting Standards Board may claim this exemption only if the dollar volume of CAS covered national defense prime

Representations and Certifications (Cont'd)

8. DISCLOSURE STATEMENT - COST ACCOUNTING PRACTICES AND CERTIFICATION (Cont'd)

contract and subcontract awards in their preceding cost accounting period did not exceed the \$10 million threshold and the amount of this award will be less than \$10 million. Such offerors will continue to be responsible for maintaining the disclosure statement and following the disclosed practices on CAS covered prime contracts and subcontracts awarded during the period in which a disclosure statement was required.

() III. CERTIFICATE OF INTERIM EXEMPTION

The offeror hereby certifies that: (i) it first exceeded the monetary exemption for disclosure as defined in (II) above, in its cost accounting period immediately preceding the cost accounting period in which this proposal was submitted, and (ii) in accordance with the regulations of the Cost Accounting Standards Board (4 CFR 351.40(f)), it is not yet required to submit a disclosure statement. The offeror further certifies that if an award resulting from this proposal has not been made within 90 days after the end of that period, it will immediately submit a revised certificate to the Contracting Officer, in the form specified under (I), above or (IV), below, as appropriate, to verify its submission of a completed disclosure statement.

CAUTION: Offerors may not claim this exemption if they are currently required to disclose because they were awarded a CAS covered national defense prime contract or subcontract of \$10 million or more in the current cost accounting period. Further, the exemption applies only in connection with proposals submitted prior to expiration of the 90-day period following the cost accounting period in which the monetary exemption was exceeded.

() IV. CERTIFICATE OF PREVIOUSLY SUBMITTED DISCLOSURE STATEMENT(S)

The offeror hereby certifies that the disclosure statement(s) was filed as follows:

Date of
Disclosure Statement(s)

Name(s) and Address(es) of Cognizant
Contracting Officer(s) Where Filed

The offeror further certifies that practices used in estimating costs in pricing this proposal are consistent with the cost accounting practices disclosed in the Disclosure Statement(s).

Representations and Certifications (Cont'd)

9. COST ACCOUNTING STANDARDS - EXEMPTIONS FOR CONTRACTS OF \$500,000 OR LESS

If this proposal is expected to result in the award of a contract of \$500,000 or less, the offeror shall indicate whether the exemption to the cost accounting standards clause under the provisions of 4 CFR 331.30(b)(8) is claimed. Failure to check the box below shall mean that the resultant contract is subject to the cost accounting standards clause or that the offeror elects to comply with such clause.

(X) The offeror hereby claims an exemption from the Cost Accounting Standards clause under the provisions of 4 CFR 331.30(b)(8) and certifies that it has received notification of final acceptance of all deliverable items on (i) all prime contracts or subcontracts in excess of \$500,000 which contain the Cost Accounting Standards clause, and (ii) all prime contracts or subcontracts of \$500,000 or less awarded after January 1, 1975, which contain the Cost Accounting Standards clause. The offeror further certifies it will immediately notify the Contracting Officer in writing in the event it is awarded any other contract or subcontract containing the Cost Accounting Standards clause subsequent to the date of this certificate but prior to the date of any award resulting from this proposal.

10. COST ACCOUNTING STANDARDS ELIGIBILITY FOR MODIFIED CONTRACT COVERAGE

If the offeror is eligible to use the modified provisions of 4 CFR Part 332, and elects to do so, it shall indicate by checking the box below. Checking the box below shall mean that the resultant contract is subject to the Disclosure and Consistency of Cost Accounting Practices clause in lieu of the Cost Accounting Standards clause.

(X) The offeror hereby claims an exemption from the Cost Accounting Standards clause under the provisions of 4 CFR 331.30(b)(2), and certifies that it is eligible for use of the Disclosure and Consistency of Cost Accounting Practices clause because (i) during its cost accounting period immediately preceding the period in which this proposal was submitted, it received less than \$10 million in awards of CAS covered national defense prime contracts and subcontracts, and (ii) the sum of such awards equaled less than 10 percent of his total sales during that cost accounting period. The offeror further certifies that if its status changes prior to an award resulting from this proposal, it will advise the Contracting Officer immediately.

CAUTION: Offerors may not claim the above eligibility for modified contract coverage if this proposal is expected to result in the award of a contract of \$10 million or more or if, during their current cost accounting period, they have been awarded a single CAS-covered national defense prime contract or subcontract of \$10 million or more.

Representations and Certifications (Cont'd)

11. ADDITIONAL COST ACCOUNTING STANDARDS APPLICABLE TO EXISTING CONTRACTS

The offeror shall indicate below whether award of the contemplated contract would in accordance with paragraph (a)(3) of the Cost Accounting Standards clause, require a change in its established cost accounting practices affecting existing contracts and subcontracts.

() Yes (X) No

NOTE: If the offeror has checked "yes" above, and is awarded the contemplated contract, it will be required to comply with the Administration of Cost Accounting Standards clause.

12. CLEAN AIR AND WATER CERTIFICATION

(Applicable if the bid or offer exceeds \$100,000, or the Contracting Officer has determined that orders under an indefinite quantity contract in any year will exceed \$100,000, or a facility to be used has been the subject of a conviction under the Clean Air Act (42 U.S.C. 1857c-8(c)(1)) or the Federal Water Pollution Control Act (33 U.S.C. 1319(c)) and is listed by EPA, or is not otherwise exempt.)

The bidder or offeror certifies as follows:

- (a) Any facility to be utilized in the performance of this proposed contract has (), has not (X), been listed on the Environmental Protection Agency List of Violating Facilities.
- (b) It will promptly notify the Contracting Officer, prior to award, of the receipt of any communication from the Director, Office of Federal Activities, Environmental Protection Agency, indicating that any facility which it proposes to use for the performance of the contract is under consideration to be listed on the EPA List of Violating Facilities.
- (c) It will include substantially this certification, including this paragraph (c), in every nonexempt subcontract.

13. SMALL AND SMALL DISADVANTAGED BUSINESS CERTIFICATION

- (a) The bidder or offeror certifies that it is (X) is not () a small business concern as defined in accordance with Section 3 of the Small Business Act (15 U.S.C. 632).
- (b) The bidder or offeror certifies that it is a small business [as set forth in (a) above] and is () is not (X) owned and controlled by socially and economically disadvantaged individuals. Such a firm is defined as one -

Representations and Certifications (Cont'd)

13. SMALL AND SMALL DISADVANTAGED BUSINESS CERTIFICATION (Cont'd)

- (i) which is at least 51 per centum owned by one or more such individuals or, in the case of any publicly owned business, at least 51 per centum of the stock is owned by such individuals;
 - (ii) whose management and daily business operations are controlled by one or more such individuals; and
 - (iii) which certifies concerning said ownership and control in accordance with section (c) below.
- (c) The bidder or offeror certifies that it is is not a minority individual(s) in accordance with (c)(i) below or that it is is not socially and economically disadvantaged in accord with section (c)(ii) or (c)(iii). Socially and economically disadvantaged individuals are defined as:
- (i) United States citizens who are Black Americans, Hispanic Americans, Native Americans, or other specified minorities;
 - (ii) any other individual found to be disadvantaged pursuant to section 8(a) of the Small Business Act (15 U.S.C. 637); or
 - (iii) any other individual defined as socially, and economically disadvantaged, for purposes relating to other sections of the Small Business Act.

14. WOMAN-OWNED BUSINESS

Concern is is not a woman-owned business.

A woman-owned business is a business which is, at least, 51 percent owned, controlled, and operated by a woman or women. Controlled is defined as exercising the power to make policy decisions. Operated is defined as actively involved in the day-to-day management.

For the purposes of this definition, businesses which are publicly owned, joint stock associations, and business trusts are exempted. Exempted businesses may voluntarily represent that they are, or are not, woman-owned if this information is available.

Representations and Certifications (Cont'd)

15. PERCENT OF FOREIGN CONTENT

The offeror/contractor will represent (as an estimate), immediately after the award of a contract, the percent of the foreign content of the item or service being procured expressed as a percent of the contract award price (accuracy within plus or minus 5 percent is acceptable).

NOTE: No solicitation may be properly considered without these representations and certifications, and no award may be made without this form being executed.

Signed by

James J. Detwiler

President

(Title)

FEDERAL ASSISTANCE		2. APPLICANT'S APPLICATION	a. NUMBER	3. STATE APPLICATION IDENTIFIER	a. NUMBER																								
1. TYPE OF ACTION <input checked="" type="checkbox"/> PREAPPLICATION <input type="checkbox"/> APPLICATION <small>(Mark appropriate box)</small> <input type="checkbox"/> NOTIFICATION OF INTENT (Opt.) <input type="checkbox"/> REPORT OF FEDERAL ACTION		b. DATE Year month day 19			b. DATE ASSIGNED Year month day 19																								
4. LEGAL APPLICANT/RECIPIENT a. Applicant Name : b. Organization Unit : SEE BACK c. Street/P.O. Box : d. City : e. State : f. Contact Person (Name & telephone No.) :		5. FEDERAL EMPLOYER IDENTIFICATION NO. 88-0149214		6. PRO. GRAM (From Federal Catalog) a. NUMBER : b. TITLE :																									
7. TITLE AND DESCRIPTION OF APPLICANT'S PROJECT MGM Grand Hotel Geothermal Project		8. TYPE OF APPLICANT/RECIPIENT A-State B-Interstate C-Substate D-District E-City F-School District G-Special Purpose District H-Community Action Agency I-Higher Educational Institution J-Indian Tribe K-Other (Specify):		9. TYPE OF ASSISTANCE A-Basis Grant B-Supplemental Grant C-Loan D-Insurance E-Other Enter appropriate letter(s)																									
10. AREA OF PROJECT IMPACT (Names of cities, counties, States, etc.)		11. ESTIMATED NUMBER OF PERSONS BENEFITING		12. TYPE OF APPLICATION A-New B-Renewal C-Revision D-Continuation E-Augmentation Enter appropriate letter																									
13. PROPOSED FUNDING		14. CONGRESSIONAL DISTRICTS OF:		15. TYPE OF CHANGE (For 18a or 18b) A-Increase Dollars B-Decrease Dollars C-Increase Duration D-Decrease Duration E-Cancellation F-Other (Specify): Enter appropriate letter(s)																									
<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td>a. FEDERAL</td> <td>\$</td> <td>.00</td> </tr> <tr> <td>b. APPLICANT</td> <td></td> <td>.00</td> </tr> <tr> <td>c. STATE</td> <td></td> <td>.00</td> </tr> <tr> <td>d. LOCAL</td> <td></td> <td>.00</td> </tr> <tr> <td>e. OTHER</td> <td></td> <td>.00</td> </tr> <tr> <td>f. TOTAL</td> <td>\$</td> <td>.00</td> </tr> </table>		a. FEDERAL	\$.00	b. APPLICANT		.00	c. STATE		.00	d. LOCAL		.00	e. OTHER		.00	f. TOTAL	\$.00	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td>a. APPLICANT</td> <td>b. PROJECT</td> </tr> <tr> <td>16. PROJECT START DATE Year month day 19</td> <td>17. PROJECT DURATION Months</td> </tr> <tr> <td colspan="2">18. ESTIMATED DATE TO BE SUBMITTED TO FEDERAL AGENCY Year month day 19</td> </tr> </table>		a. APPLICANT	b. PROJECT	16. PROJECT START DATE Year month day 19	17. PROJECT DURATION Months	18. ESTIMATED DATE TO BE SUBMITTED TO FEDERAL AGENCY Year month day 19		19. EXISTING FEDERAL IDENTIFICATION NUMBER	
a. FEDERAL	\$.00																											
b. APPLICANT		.00																											
c. STATE		.00																											
d. LOCAL		.00																											
e. OTHER		.00																											
f. TOTAL	\$.00																											
a. APPLICANT	b. PROJECT																												
16. PROJECT START DATE Year month day 19	17. PROJECT DURATION Months																												
18. ESTIMATED DATE TO BE SUBMITTED TO FEDERAL AGENCY Year month day 19																													
20. FEDERAL AGENCY TO RECEIVE REQUEST (Name, City, State, ZIP code)					21. REMARKS ADDED <input type="checkbox"/> Yes <input type="checkbox"/> No																								
22. THE APPLICANT CERTIFIES THAT		a. To the best of my knowledge and belief, data in this preapplication/application are true and correct, the document has been duly authorized by the governing body of the applicant and the applicant will comply with the attached assurances if the assistance is approved.		b. If required by OMB Circular A-95 this application was submitted, pursuant to instructions therein, to appropriate clearinghouses and all responses are attached:																									
		(1) <input type="checkbox"/> (2) <input type="checkbox"/> (3) <input type="checkbox"/>		No response <input type="checkbox"/> Response attached <input type="checkbox"/>																									
23. CERTIFYING REPRESENTATIVE		a. TYPED NAME AND TITLE		b. SIGNATURE																									
				c. DATE SIGNED Year month day 19																									
24. AGENCY NAME		25. ORGANIZATIONAL UNIT		26. ADMINISTRATIVE OFFICE																									
27. ADDRESS		28. FEDERAL AGENCY A-95 ACTION		29. FEDERAL GRANT IDENTIFICATION																									
30. ACTION TAKEN		31. FUNDING		32. ACTION DATE Year month day 19																									
<input type="checkbox"/> a. AWARDED <input type="checkbox"/> b. REJECTED <input type="checkbox"/> c. RETURNED FOR AMENDMENT <input type="checkbox"/> d. DEFERRED <input type="checkbox"/> e. WITHDRAWN		<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td>a. FEDERAL</td> <td>\$</td> <td>.00</td> </tr> <tr> <td>b. APPLICANT</td> <td></td> <td>.00</td> </tr> <tr> <td>c. STATE</td> <td></td> <td>.00</td> </tr> <tr> <td>d. LOCAL</td> <td></td> <td>.00</td> </tr> <tr> <td>e. OTHER</td> <td></td> <td>.00</td> </tr> <tr> <td>f. TOTAL</td> <td>\$</td> <td>.00</td> </tr> </table>		a. FEDERAL	\$.00	b. APPLICANT		.00	c. STATE		.00	d. LOCAL		.00	e. OTHER		.00	f. TOTAL	\$.00	33. CONTACT FOR ADDITIONAL INFORMATION (Name and telephone number)							
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37. FEDERAL AGENCY A-95 ACTION		a. In taking above action, any comments received from clearinghouses were considered. If agency response is due under provisions of Part I, OMB Circular A-95, it has been or is being made.		b. FEDERAL AGENCY A-95 OFFICIAL (Name and telephone no.)																									

SECTION IV-REMARKS *(Please reference the proper item number from Sections I, II or III, if applicable)*

WE UNDERSTAND THIS FORM WILL BE REQUIRED BEFORE THE COOPERATIVE AGREEMENT CAN BE SIGNED. WE HAVE FILLED OUT WHAT APPEARS TO BE APPROPRIATE AT THIS TIME..

GENERAL INSTRUCTIONS

This is a multi-purpose standard form. First, it will be used by applicants as a required facesheet for pre-applications and applications submitted in accordance with Federal Management Circular 74-7. Second, it will be used by Federal agencies to report to Clearinghouses on major actions taken on applications reviewed by clearinghouses in accordance with OMB Circular A-95. Third, it will be used by Federal agencies to notify States of grants-in-aid awarded in accordance with Treasury Circular 1082. Fourth, it may be used, on an optional basis, as a notification of intent from applicants to clearinghouses, as an early initial notice that Federal assistance is to be applied for (clearinghouse procedures will govern).

APPLICANT PROCEDURES FOR SECTION I

Applicant will complete all items in Section I. If an item is not applicable, write "NA". If additional space is needed, insert an asterisk "*", and use the remarks section on the back of the form. An explanation follows for each item:

- | Item | Item |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. Mark appropriate box. Pre-application and application guidance is in FMC 74-7 and Federal agency program instructions. Notification of intent guidance is in Circular A-95 and procedures from clearinghouse. Applicant will not use "Report of Federal Action" box.</p> <p>2a. Applicant's own control number, if desired.</p> <p>2b. Date Section I is prepared.</p> <p>3a. Number assigned by State clearinghouse, or if delegated by State, by areawide clearinghouse. All requests to Federal agencies must contain this identifier if the program is covered by Circular A-95 and required by applicable State/areawide clearinghouse procedures. If in doubt, consult your clearinghouse.</p> <p>3b. Date applicant notified of clearinghouse identifier.</p> <p>4a-4h. Legal name of applicant/recipient, name of primary organizational unit which will undertake the assistance activity, complete address of applicant, and name and telephone number of person who can provide further information about this request.</p> <p>5. Employer identification number of applicant as assigned by Internal Revenue Service.</p> <p>6a. Use Catalog of Federal Domestic Assistance number assigned to program under which assistance is requested. If more than one program (e.g., joint-funding) write "multiple" and explain in remarks. If unknown, cite Public Law or U.S. Code.</p> <p>6b. Program title from Federal Catalog. Abbreviate if necessary.</p> <p>7. Brief title and appropriate description of project. For notification of intent, continue in remarks section if necessary to convey proper description.</p> <p>8. Mostly self-explanatory. "City" includes town, township or other municipality.</p> <p>Check the type(s) of assistance requested. The definitions of the terms are:</p> <p>A. Basic Grant. An original request for Federal funds. This would not include any contribution provided under a supplemental grant.</p> <p>B. Supplemental Grant. A request to increase a basic grant in certain cases where the eligible applicant cannot supply the required matching share of the basic Federal program (e.g., grants awarded by the Appalachian Regional Commission to provide the applicant a matching share).</p> <p>C. Loan. Self explanatory.</p> | <p>D. Insurance. Self explanatory.</p> <p>E. Other. Explain on remarks page.</p> <p>10. Governmental unit where significant and meaningful impact could be observed. List only largest unit or units affected, such as State, county, or city. If entire unit affected, list it rather than subunits.</p> <p>11. Estimated number of persons directly benefiting from project.</p> <p>12. Use appropriate code letter. Definitions are:</p> <p>A. New. A submittal for the first time for a new project.</p> <p>B. Renewal. An extension for an additional funding/budget period for a project having no projected completion date, but for which Federal support must be renewed each year.</p> <p>C. Revision. A modification to project nature or scope which may result in funding change (increase or decrease).</p> <p>D. Continuation. An extension for an additional funding/budget period for a project the agency initially agreed to fund for a definite number of years.</p> <p>E. Augmentation. A requirement for additional funds for a project previously awarded funds in the same funding/budget period. Project nature and scope unchanged.</p> <p>13. Amount requested or to be contributed during the first funding/budget period by each contributor. Value of in-kind contributions will be included. If the action is a change in dollar amount of an existing grant (a revision or augmentation), indicate only the amount of the change. For decreases enclose the amount in parentheses. If both basic and supplemental amounts are included, breakout in remarks. For multiple program funding, use totals and show program breakouts in remarks. Item definitions: 13a, amount requested from Federal Government; 13b, amount applicant will contribute; 13c, amount from State, if applicant is not a State; 13d, amount from local government, if applicant is not a local government; 13e, amount from any other sources, explain in remarks.</p> <p>14a. Self explanatory.</p> <p>14b. The district(s) where most of actual work will be accomplished. If city-wide or State-wide, covering several districts, write "city-wide" or "State-wide."</p> <p>15. Complete only for revisions (item 12c), or augmentations (item 12e).</p> |

- | Item | Item |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| 16. Approximate date project expected to begin (usually associated with estimated date of availability of funding). | 19. Existing Federal identification number if this is not a new request and directly relates to a previous Federal action. Otherwise write "NA". |
| 17. Estimated number of months to complete project after Federal funds are available. | 20. Indicate Federal agency to which this request is addressed. Street address not required, but do use ZIP. |
| 18. Estimated date preapplication/application will be submitted to Federal agency if this project requires clearinghouse review. If review not required, this date would usually be same as date in item 2b. | 21. Check appropriate box as to whether Section IV of form contains remarks and/or additional remarks are attached. |

APPLICANT PROCEDURES FOR SECTION II

Applicants will always complete items 23a, 23b, and 23c. If clearinghouse review is required, item 22b must be fully completed. An explanation follows for each item:

- | Item | Item |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| 22b. List clearinghouses to which submitted and show in appropriate blocks the status of their responses. For more than three clearinghouses, continue in remarks section. All written comments submitted by or through clearinghouses must be attached. | 23b. Self-explanatory. |
| 23a. Name and title of authorized representative of legal applicant. | 23c. Self-explanatory. |
| | Note: Applicant completes only Sections I and II. Section III is completed by Federal agencies. |

FEDERAL AGENCY PROCEDURES FOR SECTION III

If applicant-supplied information in Sections I and II needs no updating or adjustment to fit the final Federal action, the Federal agency will complete Section III only. An explanation for each item follows:

- | Item | Item |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 24. Executive department or independent agency having program administration responsibility. | 35. Name and telephone no. of agency person who can provide more information regarding this assistance. |
| 25. Self explanatory. | 36. Date after which funds will no longer be available. |
| 26. Primary organizational unit below department level having direct program management responsibility. | 37. Check appropriate box as to whether Section IV of form contains Federal remarks and/or attachment of additional remarks. |
| 27. Office directly monitoring the program. | 38. For use with A-95 action notices only. Name and telephone of person who can assure that appropriate A-95 action has been taken—if same as person shown in item 35, write "same". If not applicable, write "NA". |
| 28. Use to identify non-award actions where Federal grant identifier in item 30 is not applicable or will not suffice. | |
| 29. Complete address of administering office shown in item 26. | |
| 30. Use to identify award actions where different from Federal application identifier in item 28. | |
| 31. Self explanatory. Use remarks section to amplify where appropriate. | |
| 32. Amount to be contributed during the first funding/budget period by each contributor. Value of in-kind contributions will be included. If the action is a change in dollar amount of an existing grant (a revision or augmentation), indicate only the amount of change. For decreases, enclose the amount in parentheses. If both basic and supplemental amounts are included, breakout in remarks. For multiple program funding, use totals and show program breakouts in remarks. Item definitions: 32a, amount awarded by Federal Government; 32b, amount applicant will contribute; 32c, amount from State, if applicant is not a State; 32d, amount from local government if applicant is not a local government; 32e, amount from any other sources, explain in remarks. | |
| 33. Date action was taken on this request. | |
| 34. Date funds will become available. | |

Federal Agency Procedures—special considerations

- A. *Treasury Circular 1082 compliance.* Federal agency will assure proper completion of Sections I and III. If Section I is being completed by Federal agency, all applicable items must be filled in. Addresses of State Information Reception Agencies (SCIRA's) are provided by Treasury Department to each agency. This form replaces SF 240, which will no longer be used.
- B. *OMB Circular A-95 compliance.* Federal agency will assure proper completion of Sections I, II, and III. This form is required for notifying all reviewing clearinghouses of major actions on all programs reviewed under A-95. Addresses of State and areawide clearinghouses are provided by OMB to each agency. Substantive differences between applicant's request and/or clearinghouse recommendations, and the project as finally awarded will be explained in A-95 notifications to clearinghouses.
- C. *Special note.* In most, but not all States, the A-95 State clearinghouse and the (TC 1082) SCIRA are the same office. In such cases, the A-95 award notice to the State clearinghouse will fulfill the TC 1082 award notice requirement to the State SCIRA. Duplicate notification should be avoided.

Cooperative Agreements

Terms and Conditions

Cooperative Agreement Terms
and Conditions.

At this time there appear to be no terms and conditions in the sample Cooperative agreement to which we would wish to make exception.

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VOLUME I - TECHNICAL PROPOSAL
SUBMITTED TO THE
DEPARTMENT OF ENERGY
IDAHO OPERATIONS OFFICE

USER-COUPLED CONFIRMATION DRILLING PROGRAM
SCAP No. DE-SC07-80ID12139

Copy No. 6 of 10

Date of Submission 15 September, 1980

Name of Organization: Hydrothermal Energy Corporation

Organizational Classification: Small Business

Address of Organization: 210 Marsh Street, Suite 105, Reno, NV 89509

Title of Proposed Project: MGM GRAND HOTEL GEOTHERMAL PROJECT

Maximum Funds requested from DOE \$1,714,239 Total Cost of Project
Through Flow Testing \$1,904,710

Location of Site: Reno, Nevada

Proposed Project Duration (in months): 12 months

Proposed Starting Date: 1 November, 1980

Project Manager: Dr. David J. Atkinson

Position and Title: President, Hydrothermal Energy Corporation

Telephone: (702) 323-2306 or (213) 464-6446

Permission for Outside Evaluation: YES

This Proposal is for Drilling: a Production Well and an Injection Well

Flow Testing is Referenced on Page: 7-8

Variable Cost-Share Plan is Referenced on Page: 8-1

Statement of Intent is Referenced on Page: 2-1

NOTICE

The data contained on all pages of this proposal have been submitted in confidence and contain trade secrets and/or privileged or confidential commercial or financial information, and such data shall be used or disclosed only for evaluation purposes, provided that if an agreement is made as a result of or in connection with the submission of this proposal, the

Government shall have the right to use or disclose the data herein to the extent provided in the agreement. This restriction does not limit the Government's right to use or disclose data which it obtains without restriction from any source, including the proposer.

Note: Financing arrangements for the non-government share of this project appeared impossible until very shortly before the deadline for submission of proposals. Accordingly, this response to the Solicitation had to be prepared in a brief period of time.

We trust that it contains all the material required for evaluation and appologize for any lack of elegance and clarity in presentation.


If additional information is needed to amplify any of the points, we shall be happy to supply it.

Statement of Intent

Statement of Intent

The end use of the geothermal resource is for space heating, air conditioning, domestic hot water, snow melting and pool heating needed by the MGM Grand Hotel in Reno, Nevada which consists of 1,100 hotel rooms (expansion is currently underway for another 984 rooms) and a casino and business arcade area of over 1,200,000 square feet. Location of the facility is in the eastern section of Reno. We shall not be selling the resource to other users.

Attached is a letter of intent from Mr. Fred Benninger, Vice Chairman of the Board of MGM Grand Hotel, expressing agreement with the proposal to install a geothermal system for the hotel. This agreement has been reaffirmed in recent discussion with Mr. Benninger.



Dr. David J. Atkinson
President
Hydrothermal Energy Corporation

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July 17, 1978

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Dr. David J. Atkinson
President
Hydrothermal Energy Corporation
2519 Horseshoe Canyon Road
Los Angeles, California 90046

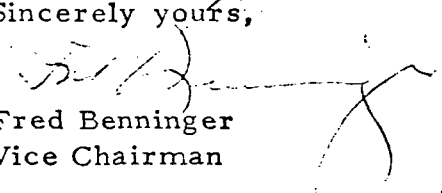
Dear Dr. Atkinson:

We are interested in utilizing a geothermal system at our hotel in Reno for heating and, if possible, for cooling. It is our understanding that the Department of Energy may wish to support this project as a demonstration of commercial use of geothermal resources.

Provided our engineers approve the project design and other terms of the agreement are acceptable to us, we would be willing to take the role of energy user in the demonstration by purchasing heat at below prevailing natural gas prices from the energy supplier, Hydrothermal Energy Corporation (HEC).

Subject to the above conditions, we would consider allowing HEC to drill on our property, install pipes to bring geothermal fluids to and from our boiler facilities, and install heat exchangers to transfer heat to our existing system which we would maintain as a back-up facility to handle any temporary interruption in heat supply from the geothermal system.

Sincerely yours,


Fred Benninger
Vice Chairman

FB:if

Summary

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3. Summary

A geothermal resource underlies much of the city of Reno. It is shallowest in the Moana district, where the heat has been used on a small scale for over fifty years. At the MGM Grand Hotel the reservoir is deeper, partially concealed by large lateral flows of cold ground water below the Truckee River channel. However, temperature gradient data in deep wells there confirm its existence, and the important NE-trending fault and fracture systems of the Moana area of the reservoir extend directly to and across the MGM site.

The hotel constitutes an extremely attractive site for geothermal retrofitting for several reasons.

First, it is a landmark, known nationally. A geothermal system there would have an extraordinary impact.

Second, the economics are unusually favorable. It is a very large, single, user complex requiring an extremely high amount of energy (over 300,000,000,000 BTU annually). The load factor is unusually high, even more so if cooling is handled geothermally.

Retrofit is relatively simple, as the boiler/chiller units are centralized in a single area adjacent to the building, with circulating water and steam systems originating and returning there.

Consequently, for the capital required, the geothermal energy put on line will be unusually high, and the payback period short.

The hotel is currently in an expansion that will give a total of 2100 rooms on 24 floors, with 1,200,000 square feet of casino and arcade space, two theatres (one with the largest casino stage in the world), seven restaurants (two running 24 hours a day), a Jai Alai stadium, a 50 lane bowling alley, a health club and spa, a very large pool, full laundry facilities, meeting rooms and a convention center, and extensive office space. There is even a snow melting system.

The MGM Grand Hotel Corporation began discussions with us about our providing a geothermal system for the hotel three years ago, and was part of the team that proposed a PON demonstration there two years ago. That agreement has been reaffirmed for this proposal.

Accordingly, we intend in this project to develop geothermal energy for direct use at the MGM Grand Hotel in Reno.

First we shall analyze existing geotechnical data on the site and its surroundings. Gravity work will be used to refine our understanding of the subsurface structure and, along with interpretation of air photos and geologic maps, help locate the fault zones that should provide maximum permeability.

The 4,500 ft. production well site will be picked on that basis, but we shall first drill one or two temperature gradient holes to 3,000 feet to confirm temperature, and gradient, below the influence of the cold groundwater flows in the sediments of the Truckee River channel.

Then the production and reinjection wells will be drilled, logged, and completed to provide optimum performance.

The UCCDP project will end then, but we shall proceed to link the wells to the boiler/chiller area by pipes buried under the parking lots. We shall install heat exchangers to retrofit the various systems in the hotel for heating domestic hot water and pools, space heating, snow melting, laundry and kitchen, and for cooling if the wellhead temperature is high enough.

The energy systems require a series of different wellhead temperatures (100°F, 160°F, 200°F, 260°F) and cascading will be used extensively to reduce the geothermal flow rates required.

CONFIDENTIAL

Table of Contents

Volume 1

Table of Contents

1. Cover Page	Page 1-1 to 1-2
2. Statement of Intent Letter of Intent	Page 2-1 to 2-2
3. Summary	Page 3-1 thru 3-
4. Table of Contents	Page 4-1 to 4-2
5. Resource Potential	Page 5-1
Description of Geothermal Project	Page 5-2 to 5-3
Resource Description	page 5-4 to 5-4a
End Use Description	page 5-5 to 5-8
Financial Feasibility	page 5-9 to 5-14
6. Project Management	Page 6-1
Statement of Work	page 6-2 to 6-8
Planned Organization	page 6-9
Consultants and Contractors	page 6-9
Work Schedule	page 6-10 to 6-11
Organization Experience	page 6-12
Personnel Experience	page 6-13 to 6-15
7. Technical Planning	Page 7-1
Exploration Plan	page 7-2 to 7-6
Preliminary Drilling Plan	page 7-7
Test Plan	page 7-8
8. Variable Cost Share Plan	Page 8-1 to 8-4
9. Institutional Considerations	Page 9-1 to 9-4
10. Program Policy and Preference Factors	Page 10-1 to 10-2

Resource Potential

5. a. General Description of the Total Geothermal Project.

Replacing conventional fuels with geothermal energy at the MGM Grand Hotel, Reno will provide a very visible example of the viability and significance of geothermal direct use.

The hotel itself represents a fine example of a single, concentrated user of very large quantities of energy and is an excellent target, in both economic and engineering terms, for geothermal retrofit.

There is strong evidence that the geothermal reservoir, so obvious in southwest Reno, extends under the MGM site. Confirming that will provide an enormous increase in the established geothermal potential in the Reno area, and establish the possibility of geothermal applications over a much larger area of the city than has generally been recognized.

We have already reviewed the existing data and reached a preliminary picture of the geothermal system in the MGM area: the resource that is well known in the southwest part of the city (the Moana district) extends northeastward below the Truckee river channel and reappears on the other side of it. In the river channel a thick sequence of alluvial clays, sands and gravels carry a large flow of cold groundwater that partly obscures the existence of the geothermal system below it. However the temperature gradient data clearly show the extension of the reservoir at depth below MGM in spite of the blanketing effect of this near surface flow of large volumes of cold water. At four to five thousand feet, temperatures should exceed 220°F and may reach 260°F.

This target concept is the basis for our program

Work under this SCAP will begin with a more detailed analysis of the available geotechnical information, and further work at the surface to refine the details of the target. Gravity work, along with more detailed photo-interpretation will be used to pick out a primary and an alternate well location on or very close to the MGM site.

Two temperature gradient tests will then be drilled to 3,000 ft. to confirm the geologic/hydrologic/geothermal model of the target.

Integrating the results of these confirmatory stratigraphic and gradient holes with the previous data will lead to the selection of the site for the production well, and the site for the reinjection well.

The production well will be drilled to 4,500 ft. and then logged, so that the completion program will result in maximum heat production.

Completion will be followed by full-scale test pumping.

Based on the information then available, the reinjection well* will be drilled to a depth of 3,000 ft., logged, and completed for maximum injectivity. ReInjection testing will follow.

Final testing of the wells will determine the percentage success of the project, and the government and Hydrothermal Energy shares of the project cost.

After the SCAP project, we shall install buried, insulated piping from the production well to the boiler rooms of the hotel, install heat exchangers for the various heating systems, and install absorption chillers if the wellhead temperatures are high enough. The existing natural gas boilers will remain as back-up, along with the electric air conditioning units.

Disposal piping (buried but not insulated) will be run from the boiler rooms to the reinjection well.

*Note: prior to drilling the reinjection well, we shall attempt to obtain approval for disposal or sale of demineralized water, using a system installed on the main disposal line that reduces to acceptable levels the concentration of two or three problem elements we expect to have. We feel we have an excellent chance of succeeding with this alternative to reinjection, and may even be able to generate a small profit from sales of water. However, our economic projections all assume reinjection, as we are sure that will be acceptable if permission for less expensive alternatives cannot be obtained.

5. b. (1) Geologic Description of the Geothermal Resource

The best known geothermal area of Reno is the Moana KGRA, which underlies the southern portion of the City of Reno in the Truckee Meadows basin. However, extensive areas of hydrothermal alteration are visible in the hills surrounding the city, indicating that geothermal activity has been widespread over a large area, and that the area developed to date is only the shallow, central zone of a larger resource.

This is confirmed by the fact that warm water wells occur over a large region outside the Moana area itself, even though most direct use applications to date have centered on Moana. The Moana KGRA, as originally defined by USGS (February 24, 1971) extended to within 600 feet of the MGM site. Furthermore, there are hot wells north and east of MGM.

About eight miles south of Moana is the Steamboat Springs KGRA. Both KGRAs have been extensively investigated, and there is considerable literature, especially on Steamboat. The most detailed discussions are by Bateman and Scheibach (1975), and by White (1968).

The known geothermal manifestations at Moana, mostly warm to hot water wells, are concentrated in the southeast quarter of township T.19N., R.19E. The wells are exploited on a rather small scale, mostly for space-heating one-family homes. Bateman and Scheibach (1975) reported 35 such systems in operation. Many more have been installed in the last few years as natural gas prices have risen. We are presently executing a larger-scale space-heating project there, as a DOE PON.

The usual scheme involves a shallow well (100-300 feet) with a downhole loop exchanger. In a few cases hot water from the well is circulated directly through baseboard radiators and disposed (often via a swimming pool) to the storm sewers. The wells tap the top of the geothermal reservoir, in shallow aquifers in the alluvial sequence of sands, gravels and clays.

Observed temperatures locally approach boiling point, but are more generally in the 180-190°F range.

Some elements of structural control of the reservoir have been noted. For example, areas with an anomalous geothermal gradient in the vicinity of Reno were defined by Bateman and Scheibach (1975). Their Figure 3 (attached) delineates the anomaly by a sixth-degree polynomial surface based on a random network of borehole temperature measurements in 324 wells at various depths. Although the method is general, it gives a general idea of the qualitative distribution of the geothermal anomaly. The center of the anomaly shown is in the Moana area, but there is a clear NE trend, which indicates the extension of the geothermal anomaly below the MGM site.

Low values of geothermal gradient along the channel of the Truckee River correspond to an area where lateral flows of large volumes of cold, near-surface groundwater effectively prevent expression of the thermal regime at greater depth.

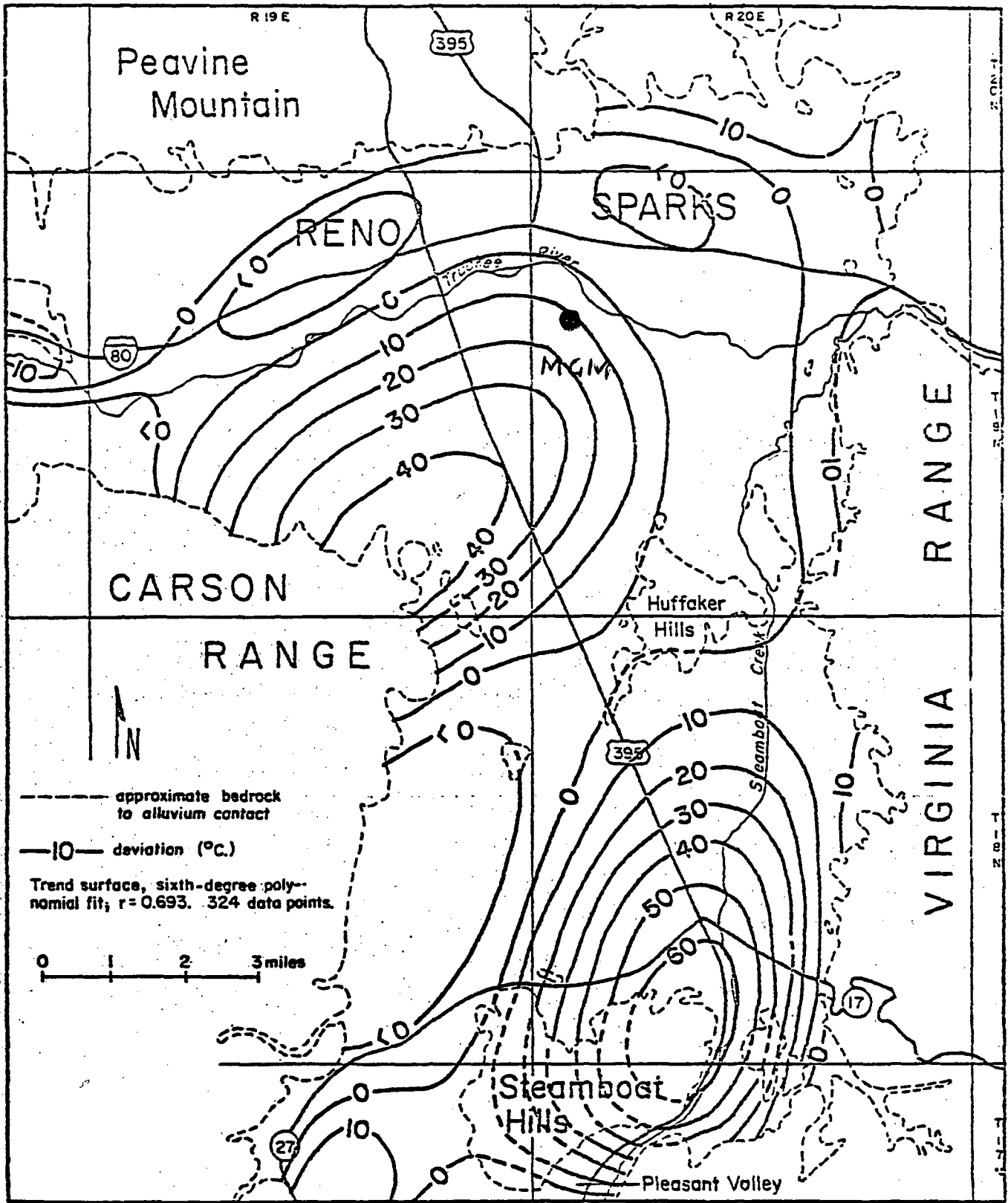


FIGURE 3. Deviation from normal thermal gradient in the Truckee Meadows.

End Use Description

The central heating plant of the MGM Grand Hotel in Reno, Nevada consists of 4 medium pressure steam boilers. Each boiler produces 24,150 pounds per hour of 125 PSIG steam by either using natural gas, or no. 2 fuel oil. These 4 boilers produce all the heating energy used throughout the hotel.

Domestic hot water is produced separately for the casino/arcade floors, the lower portion of the hotel tower and the upper portion. Each of ten converters uses 125 PSIG steam as the energy source and heats the domestic water from 40 degrees F., to 140 degrees F. Through the use of a plate type heat exchanger, the geothermal fluid would produce domestic hot water at these same temperatures. The domestic water load is a substantial part of the total building load and is approximately uniform throughout the year. The existing converters would be saved for back-up use.

Space heating for the casino/arcade level is handled through use of 3 converters producing hot water for use in the variable air volume reheat boxes. Each converter uses 125 PSIG steam to produce hot water at 180 degrees F. Geothermal fluid would be used in a plate type heat exchanger to produce water of the same temperatures. The space heating load fluctuates throughout the year from a peak in January, to virtually no load in July. The existing converters would be saved for back-up use.

Space heating for the tower is handled through the use of 2 converters producing 200 degrees hot water for use in the fan coil unit in each guest room. Geothermal fluid would be used in a plate type heat exchanger to produce water of the same temperature. Present converters would be saved for back-up use.

The present central cooling plant produces 6,000 tons of refrigeration through use of electric driven centrifugal chillers. In order to use geothermal fluid, absorption chillers would have to be installed. Absorption chillers would require 5250 GPM at 240 degrees F. inlet water, and 200 degrees F. outlet water, or 3,500 GPM at 260 degrees F. inlet water and 200 degrees F. outlet water. The existing chillers would be saved for back-up use.

The kitchens use 25 PSIG steam for cooking and water heating. Geothermal fluid would be used to produce the 25 PSIG steam piped to the kitchen, with augmentation.

Make up air is heated with steam coils in the outside air stream. These coils use steam at 125 PSIG and are located throughout the building. It is doubtful that the geothermal fluid could produce steam in this pressure range. It is therefore only worth considering if the geothermal fluid is found to be considerably hotter than the anticipated 260 degrees F.

The laundry uses 125 PSIG steam in the ironers, dryers and tumblers, and unless hotter than the anticipated 260 degrees F. geothermal fluid is encountered, this form of utilization will not be considered.

BTUs/Year

The predicted gross BTUs/year to be met with hydrothermal fluids is approximately 300,000 million to 325,000 million BTUs/year.

This range is due to fluctuation of hotel space heating demands and cooling demands during seasons.

If this amount of energy were supplied at current natural gas prices of 78¢/therm, the cost would be \$2,340,000.00 to \$2,535,000.00.

Fluid Disposal

The current plan is to pipe the reduced temperature geothermal fluids to a reinjection well, 3,000 feet deep. This will entail the piping and pressurizing pumps and system controls standard to reinjection systems.)

Energy Requirements and Costs

	<u>BTUs/hour</u>	<u>Temp/GPM</u>
Domestic Hot Water System	50 million	200 F-100 F/1,000
Space Heating System	33.3 million	200 F-140 F/1,666
Cooling System	105 million	260-200 F/3,500-5,250
Kitchen Systems	6.1 million	180-140 F/305
Pool and Snow Melting	5.1 million	120-90 F/345

5. b. (3) Financial Feasibility

Cost of the entire project (1980 dollars throughout) will total \$3,531,710, if 260°F water is produced and the cooling system is retrofitted. Gross income would then be \$1,872,000 annually, heat being sold at a 20% discount below present natural gas price (a pending 15% rate increase is ignored). Annual operating costs would be \$527,000 plus financing costs totalling \$477,777 per year (made up of \$152,377 for use of capital for the non-government share of the exploration and drilling costs, plus \$325,400 for interest at 20% on \$1,627,000, borrowed to cover the retrofitting, pipeline, design and construction costs). This would provide a net (pre-tax) of \$867,223 annually.

If only 200°F water is found, the cooling load would be dropped. Cost of the project would be reduced by \$910,000 to \$2,621,710. Gross income would be \$936,000 annually. Operating costs would be \$289,500 per year plus combined financing costs of \$295,777. This would produce a pre-tax net of \$350,723 annually.

The capital outlay for 80% (or 50%) of the exploration drilling phase could thus be recovered by the venture in two to three years. Capital recovery and retirement of debt could both be accomplished in about five years.

These conclusions are based on the following:

Exploration/drilling phase	\$1,904,710
Transmission/utilization system	1,627,000
Ditto, with cooling units omitted	717,000

Annual operating costs:

Electricity for pumping	\$ 425,000
Hook-up fees	50,000
Servicing and supervision	20,000
Maintenance/replacements	32,000
	<hr/>
	\$ 527,000

5. b. (3) c.

The project will provide a welcome reduction in the local use of energy derived from fossil fuels. During a thirty year life, over 9,000,000,000,000 BTU could be replaced by geothermal energy.

Currently, the local utility is having difficulty supplying the energy needs of this rapidly growing area.

Annual Projected Costs

Electrical Pumping Costs	\$475,000.00
Maintenance	\$32,000.00
Replacements	\$20,000.00
	<hr/>
Total Projected Annual Operating and Maintenance Costs	\$527,000.00

Projected Replacement Costs

Replacement cost due to wear should be low.

The pumps can be figured to last 5.5 to 7 years. The plate heat exchangers should only need replacement every 15-20 years, or when damaged by servicing and cleaning. Controls and valves should also have a service life of 10-15 years. Pipe lines should have a 30 year life. Well service life is unpredictable, although as yet in the Moana area, there are wells with a service life of over 50 years and still going fine.

Retro-Fit Costs

2 Pumps @ \$45,000	\$90,000.00
Heat Exchangers	\$364,000.00
2,000 feet of Pipe Line @ \$55.00/foot	\$110,000.00
Absorption Units	\$910,000.00
Instrumentation and Controls	\$28,000.00
Design, Construction and Testing	\$75,000.00
Electric Hookup and wiring	\$50,000.00
Total	<u>\$1,627,000.00</u>

The utilization factor is difficult to assess at this time, but appears likely to be unusually high, since several of the systems are run on a more or less continuous basis year 'round.

Projected Replacement Schedule

<u>Item</u>	<u>When</u>	<u>Costs</u>
Pump	5.5 years	\$45,000
Pump	11 years	\$45,000
Controls & Valves	11 years	\$28,000
Heat Exchanger Plates	12 years	\$73,000
Pump	16.5 years	\$45,000
Pump	22 years	\$45,000
Controls & Valves	22 years	\$28,000
Heat Exchanger Plates	24 years	\$72,000

24 year total = 380,000 "1980 dollars", or \$15,830/year. So for a replacement budget (a \$20,000/year "set aside") will handle anticipated replacements with 30% contingency.

Federal and State Taxes

In the absence of final figures from income and expenses, we have only estimated pre-tax returns on this project.

Nevada taxes will be less than those in any other state.

Federal taxes will follow the normal schedules, though investment tax credits in tangible drilling costs, depletion allowance, depreciation etc. will improve the economic viability of the venture.

Project Management

Statement of Work

Task #1 Financial

Delineate and finalize agreements required to execute the project. Provide D.O.E. with evidence that the fiscal and legal requirements of above have been met, and is sufficient to ensure project completion. This entails milestone #1.

Task #2 Environmental

The participant shall prepare and submit an Environmental Report within 120 days of contract award. The Environmental Report will be prepared in accordance with guidelines provided by D.O.E. and will address "site-specific" information relating to the project. 1 x

D.O.E. shall determine if an Environmental Assessment is required based on the submitted Environmental Report. D.O.E. shall prepare the Environmental Assessment with input from the participant if an assessment is required.

The Environmental Report must be approved by D.O.E. prior to the conduct of ground disruptive activity such as active seismic surveys, thermal gradient drilling, and/or production well drilling.

The participant shall coordinate with and provide information to local, state, and federal agencies, as necessary, to insure compliance with all other environmental requirements. Completion of this task constitutes completion of milestone #2.

Task #3 Institutional

The participant is responsible for obtaining all permits, and other documentation in order to complete the geothermal project. At the request of D.O.E., the participant shall provide D.O.E. copies of documentation pertaining to the acquisition of the rights to the geothermal resource. Completion of this task constitutes completion of milestone #3.

Task #4 Exploration

The participant, with support from appropriate consultants, shall:

- 1) Conduct the following exploration work:
 - a) Assemble and analyze all available published and unpublished reports on the geology, geochemistry, geophysics and hydro-geology of the area.
 - b) Utilize air photographs for detailed structural interpretation of site and immediate surrounding area.
 - c) Review of the local well logs and chemical analyses to interpret hydro-geology of the site area.
 - d) Integrate all available geophysical information with the other data to formulate a program of temperature gradient drilling.
- 2) Analyze and interpret exploration data as outlined in the proposal and present both the data and the results and recommendations to D.O.E. Completion of this task constitutes completion of milestone #4.

Task #5 Thermal Test Holes

- 1) Select 2 thermal gradient drill sites.
- 2) Prepare bid specifications and select a drilling subcontractor to drill the thermal gradient wells. The bid specifications and drilling subcontracts shall be submitted for D.O.E. review and approval prior to award.
- 3) Obtain bids for the drilling of the thermal gradient wells.
- 4) Review the bids submitted, and award a subcontract to the successful bidder.
- 5) Drill 2-3,000 foot thermal gradient wells in accordance with the bid specifications.
- 6) Obtain thermal gradient and lithology logs during drilling and continue gradient monitoring during the period of temperature stabilization subsequent to drilling. Completion of this task constitutes completion of milestone #5.

Task #6 Evaluations

The participant, with the support of appropriate consultants, shall:

- 1) Evaluate the data obtained in Tasks 4 and 5 and other available assessment data, in order to define the hydrological and geological features of the re-

source with emphasis on resource location and depth. These data shall be provided to D.O.E. as soon as it is acquired during Task 4-5 in order to minimize the time required for D.O.E. review.

- 2) Within 30 working days of the completion of Task 6-1, D.O.E. and the participant shall discuss and review the data. A mutual written agreement between D.O.E. and the participant will be reached concerning the adequacy of the exploration data for selecting a resource confirmation drill site and the potential need for additional data prior to proceeding with the next task. The completion of this task constitutes completion of milestone #6.
- 3) Concurrently with Task 6-2, or within 30 working days of the completion of this task, the participant shall discuss and review with D.O.E. the selection of a production well drill site. A mutual written agreement between D.O.E. and the participant will be reached concerning the location of the drill site. Completion of this task constitutes completion of milestone #7.

Task #7 Drilling and Logging Production Well

- 1) The participant, with support from appropriate consultants, shall:
 - a) Provide for necessary drilling supervision services.
 - b) Update the preliminary drilling program which will include well location, drilling techniques, well and wellhead design, anticipated rig type, drilling fluid program, logging requirements, etc. Temporary requirements, such as reserve pits, mud pits, equipment storage areas, noise abatement, blowout prevention, utility services, and other standard well drilling practices, shall be considered and addressed in the drilling plan. D.O.E. shall be advised of the contents of the drilling program during its preparation.
 - c) Prepare the bid specifications and submit the drilling program and specification to D.O.E. for review and approval. Within 15 working days, D.O.E. shall indicate concurrence or request modifications to the specification and/or program.
- 2) The participant, with support from appropriate consultants, shall:
 - a) Issue the drilling specification to drilling companies for bid.

- b) Review the well bids and inspect (if necessary) the bidder's drilling equipment. The participant shall select a drilling subcontractor, with D.O.E. concurrence. The proposed drilling subcontract shall be submitted for D.O.E. review and approval. Within 15 working days, D.O.E. shall indicate approval or request modifications to the subcontract.
- c) Supervise the drilling of the production well, in accordance with the detailed drilling program and specifications. Periodically, the participant or his designated representative and D.O.E. shall confer, so that decisions concerning the drilling operation can be made in a timely manner.
- d) Collect fluid samples, cutting samples, well logs, bottom hole and gradient temperature data and perform all other tests consistent with industry practice and the drilling program. Strata suitable for reinjection will be noted during drilling.
- e) All data concerning the well shall be forwarded to D.O.E. as soon as they are acquired in order to minimize the time required for D.O.E. review.
- f) Within 30 working days of the completion of the well, D.O.E. and the participant shall discuss and review the data. A mutual written agreement between D.O.E. and the participant must be reached prior to proceeding with the next task. Completion of this task constitutes completion of milestone #8.

Task #8 Flow Testing

- 1) The participant, with support from appropriate consultants, shall:
 - a) Provide necessary flow testing services.
 - b) Update the Flow Test Plan. The plan shall be submitted to D.O.E. for review and approval. Within 15 working days, D.O.E. shall indicate concurrence or request modifications to the plan.
 - c) Carry out a comprehensive well and reservoir test program, in general accordance with the Flow Test Plan.
 - d) Assimilate the test data taken during the well test and estimate reservoir yield and production life. The well testing and other available data, shall be prepared and presented to D.O.E. Within 15 working days, D.O.E. and the participant shall discuss and review the well test results. A mutual, written agreement be-

tween D.O.E. and the participant must be reached to determine a future course of action. This agreement constitutes project milestone #9.

Task #9 Drilling and Logging Re-injection Well

- 1) The participant, with support from appropriate consultants, shall:
 - a) Provide for necessary drilling supervision services.
 - b) Update the preliminary drilling program which will include well location, drilling techniques, well and wellhead design, anticipated rig type, drilling fluid program, logging requirements, etc. Temporary requirements, such as reserve pits, mud pits, equipment storage areas, noise abatement, blowout prevention, utility services, and other standard well drilling practices, shall be considered and addressed in the drilling plan. D.O.E. shall be advised of the contents of the drilling program during its preparation.
 - c) Prepare the bid specifications and submit the drilling program and specification to D.O.E. for review and approval. Within 15 working days, D.O.E. shall indicate concurrence or request modifications to the specification and/or program.

- 2) The participant, with support from appropriate consultants, shall:
 - a) Issue the drilling specification to drilling companies for bid.
 - b) Review the well bids and inspect (if necessary) the bidder's drilling equipment. The participant shall select a drilling subcontractor, with D.O.E. concurrence. The proposed drilling subcontract shall be submitted for D.O.E. review and approval. Within 15 working days, D.O.E. shall indicate approval or request modifications to the subcontract.
 - c) Supervise the drilling of the production well, in accordance with the detailed drilling program and specifications. Periodically, the participant or his designated representative and D.O.E. shall confer, so that decisions concerning the drilling operation can be made in a timely manner.

- d) Collect fluid samples, cutting samples, well logs, bottom hole and gradient temperature data and perform all other tests consistent with industry practice and the drilling program.
- e) All data concerning the well shall be forwarded to D.O.E. as soon as they are acquired in order to minimize the time required for D.O.E. review. Completion of this task constitutes completion of milestone #10.

Task #10 Determination of Cost Share

D.O.E. and the participant shall review all test results and costs and determine the D.O.E. and participant cost shares. The basis for the determination of the cost shares shall be the variable cost share plan contained in section 8 of the cooperative agreement. Modifications to the cost share plan may be negotiated if necessary. Determination of the cost share constitutes project milestone #11.

Task #11 Project Management

The participant shall manage the project in a prudent manner consistent with successfully completing the statement of work. Management controls shall include technical assessment, budget assessment, and schedule assessment, as described in the participant's proposal.

In addition to close general coordination with D.O.E., immediate and full disclosure of problem areas to D.O.E. is required, so that timely corrective action may be taken with D.O.E. support, if necessary.

Task #12 Reporting

The reports identified on the attached D.O.E. Form CR-537, Reporting Requirements Checklist, are required to be submitted as indicated.

Task #13 Dissemination of Information

Throughout the project, the participant may prepare press releases, business, and technical articles for

trade journals.

The participant shall design and erect a sign in good taste and of appropriate construction at the facility, which will define the project objective and parties to the project.

With regard to written and oral public information, the participant is expected to:

- 1) Include appropriate recognition of the roles of the principal parties involved in work performed under this agreement.
- 2) Avoid statements or implications that the Department of Energy endorses any process or product arising out of the contract, without advance approval of the Contracting Officer.
- 3) Provide D.O.E. one copy of news releases, information folders, brochures, advertisements, technical papers, and magazine or newspaper articles pertaining to work performed under the agreement.
- 4) Advise the Contracting Officer of news media or public reactions to work performed under the agreement.

Task #14 D.O.E. Conferences

Occasionally, the participant or its representative may attend geothermal technology conferences at D.O.E.'s request. Participation in these conferences shall be reimbursed by D.O.E., if prior written approval is obtained from the Contracting Office.

6. a. (2) Planned Organizational Elements

Hydrothermal Energy Corporation will plan and execute the project, which will be managed by Dr. David J. Atkinson.

For various parts of the program, subcontractors will be used as follows:

- i) Gravity survey: Terraphysics (Dr. Aldo Mazzella).
- ii) Final drilling, completion, and testing plans; testing: Otis Day and Ian Jamieson.
- iii) Drilling and completion: subcontractor not yet selected.
- iv) Engineering design and supervision: Architectural Engineering Associates, Inc. (R. Gregory Martino, P. Eng.).

The groups mentioned above will be led by the people named, who will work directly with the Project Manager.

6. a. (3) Consultants and Contractors

These have been named in the preceding section, with the exception of the drilling subcontractor.

This subcontract will be let on the basis of competitive bidding as soon as the exploration program provides data on which the drilling and completion plan can be drawn up in final form.

Schedule and Cost Summary

<u>Task</u>	<u>Cost</u>	<u>Schedule</u>	
		<u>Start</u>	<u>Complete</u>
1. Financial	\$5,000	11/1/80	12/30/80
2. Environmental Report	\$30,000	12/1/80	3/30/81
3. Institutional	\$12,000	11/1/80	1/31/81
4. Exploration	\$68,000	12/1/81	2/15/81
5. Thermal Gradient Holes	\$180,000	2/21/81	4/15/81
6. Evaluation	\$12,000	4/15/81	4/30/81
7. Drilling and Logging	\$680,000	4/30/81	6/15/81
8. Flow Testing	\$37,000	6/15/81	6/30/81
9. Injection Well	\$450,000	6/21/81	8/15/81
10. Determine Cost Share	\$2,000	8/15/81	8/30/81
11. Project Management	\$32,000	11/1/80	8/30/81
12. Reporting	\$4,000	(as required per Form CR-537)	
13. Dissemination and Information	\$10,000	N/A	N/A
14. D.O.E. Conferences	(Reimbursable as requested)		

Milestone Summary

<u>Milestone Number</u>	<u>Completion Date</u>
1. Financial	12/30/80
2. Environmental Report	3/30/81
3. Institutional	1/31/81
4. Exploration	2/15/81
5. Thermal Gradient Holes	4/15/81
6. & 7. Evaluations	4/30/81
8. Drilling and Logging	6/15/81
9. Flow Testing	6/30/81
10. Injection Well	8/15/81
11. Determine Cost Share	8/30/81

6. b. (1) Experience

Hydrothermal Energy Corporation's staff has been involved with work on this reservoir since 1975, and the company is presently executing a PON demonstration in the Moana area of the resource.

The plan for geothermal development at the MGM Grand Hotel has been worked on for three years, and was the subject of a proposal to DOE for a PON two years ago.

Hydrothermal Energy Corporation works entirely concerned in geothermal consulting and development, and has sufficient experience in this field, and in managing projects of this type and size, to successfully execute this project.

6. b. (2) Key Personnel

Dr. David J. Atkinson

Born and educated in England. Specialized in geology, chemistry, mathematics and physics. Royal Dutch Shell Scholarship, Imperial College, London: geology, physical chemistry and surveying. B.Sc. in geology with First Class Honors; Wheeler Prize in economic geology. Ph.D. and the Diploma of Imperial College. President of the college Geological Society. Additional later courses: aqueous geochemistry from R. M. Garrels; thermodynamics and phase equilibria from J. B. Thompson.

Organized and led four Arctic expeditions, supported by the Scott Polar Research Institute, London University, and the Department of Scientific and Industrial Research. Given the Watkins Award of the Royal Geographical Society for this work.

Then worked in metals exploration in Africa and Canada. Correlated ore-forming conditions in the two producing areas of northern Angola and reprogrammed the company's search for ore on this new basis. Developed new methods of geochemical prospecting using surface water chemistry.

In Canada, developed and executed exploration programs in Quebec, Ontario, Manitoba and Saskatchewan; supervised exploration and drilling of a nickel orebody, handling a mining camp with a dozen drilling crews and three groups of geologists. Worked on development and testing of new geochemical and geophysical methods of airborne and ground search for metal deposits.

Other field work was done in Iceland, Spitsbergen, Norway, Sweden, Austria, Switzerland and various parts of the United States. Demonstrated a method to delineate in three dimensions the magnetic field associated with a Tennessee orebody, using a tethered balloon.

Taught economic and structural geology at Florida State University for a year, and gave seminars in geochemistry and metamorphism. Then taught at Harvard for three years: structural geology, and a new kind of course in introductory geology designed to pirate good students from other disciplines. This involved coordinating a dozen guest lecturers and ten teaching assistants, and making the whole program work.

Offered a teaching post in soils engineering at M.I.T. Joined Shell Development Company to create and manage a project in structural geology. This led to theoretical, experimental and field studies of rock deformation, with extensive use of computers. Disseminated the results to the company's exploration and production staffs in a series of seminars on rock fracture

and flow. Spent some time in the Geophysics Department, in charge of the interface between scientists and systems development. Reconnoitered California, Oregon and Washington to formulate a program on crustal dynamics relating crustal structure with recent structural history.

Was one of fourteen Ph.D.s selected by the National Academy of Sciences to be a Scientist-Astronaut. Spent a year working with the Astrogeology Branch of the U.S. Geological Survey. Became disenchanted with the space program, and the fact that only Pilot-Astronauts were being selected for the moon landings. By then, earth orbit seemed too anticlimatic.

Managed computer operations and systems development for a company providing financial and management information services. Within a year this expanded to include supervising the legal work for a public stock offering, negotiating an acquisition, handling a private placement, and becoming President.

In 1971 became a consultant in geology, hydrogeology and soils, mostly in environmental and development work. In 1972 opened a new office in Dallas for a Los Angeles firm, and headed the group that did the ecologic analysis for a New Town. Carried out similar studies for a variety of other projects, mostly in California, including surface and ground-water and water quality work.

Involved exclusively with geothermal consulting and development since 1974, with emphasis on structural geology, geochemistry, hydrogeology, economics and engineering; all phases of exploration and development, from regional studies to generate new prospects, through land acquisition, permitting, and exploration programs including geology, geophysics, geochemistry, temperature gradient and strat tests, on into deep testing. Created and ran, from 1974 to 1978, the geothermal program of Southern Union Production Company; currently their senior geothermal advisor.

Experience includes exploration programs in Nevada, California, Oregon, Utah, New Mexico and Idaho, and work and field visits in Larderello, Greece, Turkey, the Paris Basin, Mexico and Iceland. Work has been on prospects targeted for power production, and on the economics, engineering, and geotechnical aspects of various direct uses of geothermal heat. Currently managing a cost-shared project with DOE for a direct use field demonstration in Reno.

Presently on the Advisory Panel of the DOE commercialization study of geothermal development in the Rocky Mountain/Basin and Range region.

President of Hydrothermal Energy Corporation.

6. b. (2) cont.:

Architectural Engineering Associates, Inc. of Greeley, Colorado is a privately owned small business, licensed in Nevada for electrical and mechanical engineering. They designed the mechanical systems for the original construction at the MGM Grand Hotel, and are currently acting as a subcontractor on the additional construction for the enlargement of the hotel. They have extensive experience in industrial and commercial mechanical and engineering systems of this kind. Their intimate knowledge of the existing system will be invaluable in designing and supervising the retrofit for geothermal use. This is also important because of MGM's specification that the retrofit be approved by their own engineering consultants.

They will be led by Mr. Gregory Martino, P.Eng., who has himself worked on all their systems.

Otis Day, Ian Jamieson, and their affiliates, have long experience in the design of drilling, completion and testing programs, and are well able to handle the testing and analysis of the wells.

Technical Planning

7. Technical Planning

a. Exploration Plan

Our target concept is that the Reno geothermal system, dominated by NE-trending faults and fracture zones in the volcanic basement, passes below Moana and MGM. At Moana the reservoir leaks into shallow aquifers that have been known and tapped for over 50 years. At MGM the basement is deeper, and whatever upward leakage occurs is masked by large flows of near-surface cold water in the alluvial valley fill of the Truckee River channel.

Our exploration program is therefore planned in two stages. The first involves the planning and execution of temperature gradient drilling to penetrate below the cool flows of the river channel and confirm the target concept. The second stage is to select the site for the production well, aiming to reach maximum desired temperatures, and to hit a (structurally controlled) zone of maximum permeability and maximum flow rates.

We shall begin by assembling and analyzing all the available data on the geology, geochemistry, geophysics and hydrology of the area. Almost all of this we have in hand in connection with our work on the Moana PON.

The analysis will focus particularly on well log data in the MGM area to unravel the lithology and hydrology of the near-surface cold water system; on the geochemistry of the deep wells, to understand any mixing with geothermal waters; and on the structure of that section of the Truckee Meadows basin, in order to predict zones of maximum permeability associated with faults and fracture zones below the MGM site.

Based on this analysis, a detailed gravity survey around MGM will be planned and executed to clarify the shape and depth of the contact between the light alluvial valley fill materials and the more dense volcanics below them. This survey will be interpreted in conjunction with the structural data derived earlier from geologic maps and air photos. (New geologic mapping will probably be unnecessary.)

The results will lead to a site selection for the production well, which will be about 4,500 ft. TD.

First, two 3,000 ft. temperature gradient holes will be drilled. (The second of these may be unnecessary.) These will further refine our understanding of the subsurface geometry, lithology and hydrology, confirming the model target concept and particularly the temperature at 3,000 ft.

Results, integrated with the previous data may or may not require a change in the planned site for the production well, which will be drilled next.

Following that, the reinjection system will be designed and the reinjection well site chosen.

The MGM Grand Hotel is close to the present Truckee River channel. The site is underlain by a thick fluvial sequence of Truckee channel deposits. Two drill holes over 600' deep have been drilled at a distance of less than one mile from the MGM Hotel site by Sierra Pacific Power Company. Each passed through a sequence of clastic sediments, ranging from clay and fine silt to thick gravel and boulder layers. The sequence of aquifers, aquitards, and aquicludes under an active river channel presents a hydrologic system characterized by increasing potential for artesian conditions with depth. An aquifer underlying an aquiclude will as a rule have higher hydraulic potential than the aquifer overlying the same aquiclude. Flow of groundwater, at least in the upper two hundred feet follows the general direction of the river channel. Groundwater in deeper horizons may be more or less stagnant, or in very slow movement, governed rather by various structural elements, like the joint and fracture network in the basement, rather than the fluvial subsurface morphology. Similarly the thermal properties of the deeper subsurface may be camouflaged by the surficial and shallow hydrologic system.

The Moana geothermal region extends in a NE direction, pointing by extrapolation exactly to the site of the MGM Hotel. However, the geothermal manifestations, in the form of abnormally high geothermal gradients in shallow bore holes "fade away" as the broad zone of river channel deposits is entered.

The Moana geothermal anomaly appears to coincide with a basement horst structure and with NE-trending faults. On air photos these fault systems can be clearly seen in the Moana area, and can be predicted with a high level of confidence to continue across the MGM site, for they reappear with the same trend and alignment on the other side of the Truckee River channel.

At Moana it seems clear that the known geothermal resources in the shallow alluvial aquifers a few hundred feet deep, are fed from such major fracture and fault zones in the underlying "basement" of volcanic rocks. Toward the MGM site, the basement surface gets deeper but the same feeder fault systems are present, and the temperature gradient data clearly suggest that the same mechanism is occurring there, though at greater depth, in the northeastward extension of the geothermal reservoir so well known at Moana itself.

Chemical analyses from a large number of springs and wells from Truckee Meadows are presented by Bateman and Scheibach (1975). Most of the analyses are more or less complete, and some include values for the B, Li, F, and As content.

On the basis of the chemical composition of ground waters, three very distinctive groups can be defined within the basin.

1. The sodium-potassium chloride geothermal waters from the Steamboat KGRA area were defined and described extensively by White (1968). They

are characterized by very high silica content and significant concentrations of Li. Although such a composition suggests a juvenile origin, the isotopic evidence indicates up to 5% of direct volcanic input (White, 1957). Chemical equilibration takes place at a temperature over 180°C, and probably as high as 210°C. Geographical distribution of these waters is limited to the immediate vicinity of Steamboat Springs, but their influence is traceable well into the subsurface of Steamboat Creek, south-east of Huffaker Hills.

2. Waters associated with the Truckee River and fresh recharge from the surrounding ranges are of the calcium bicarbonate types, grading into the calcium sulphate type. Whereas ubiquity of the bicarbonate anion in the surface and in fresh recharge ground waters is natural, the abundance of the sulphate was attributed by Cohen (1962) to bleaching and alteration of the surrounding rocks, mainly andesites of the Kate Peak Formation.
3. The waters grade further to the sodium-potassium sulphate type, which characterize the geothermal reservoir of Reno. Generally the concentrations of B, Li, and As are lower than in Steamboat. The general similarity in chemical composition between the thermal and non-thermal waters of the area suggest perhaps a simple one-member circulation system, whereby cool recharge waters from the Carson range penetrate to considerable depths through fractures and fault systems, reach elevated temperatures, and convect upwards along similar fault and fracture zones into the Moana-MGM area, as described earlier. The temperature of equilibration as indicated by ionic ratios is between 220°F and 260°F in different parts of the area.

Ground-water hydrology and hydrogeology were treated by Cohen and Loeltz (1964), and thermal ground waters in particular by White (1968), Scheibach (1974) and Bateman and Scheibach (1975). Recharge rates to the ground-water reservoirs are quite substantial from the surrounding ranges, and were estimated by Cohen and Loeltz (1964) to be larger than 35,000 acre-feet per year. Scheibach (1974) suggested that part of the cold-recharge waters infiltrate to substantial depths through some "permeable structures" (possibly joint and fault zones), and after coming in contact with a natural heat source, decrease in density and are forced upwards, producing a convective system.

Shallow aquifers in the basin lie within the Quaternary clastic fill, consisting of varied sequences of sand, gravel and clay. Thickness of the shallow aquiferic complex is extremely irregular, but in general does not exceed 100 feet. It is underlain by an easily identified sequence of blue clay in most parts of the basin, up to 200 feet thick. The clay is sometimes intercalated with coarser sands. Altered andesite, which underlies the blue clay is the "basement" of the basin. Yet, in terms of hydrogeology, an extensive joint and fault system within the andesite is the major aquifer of geothermal ground waters, with NE- and N-trending

faults being most important. Apparently the blue clay acts as a low thermal conductivity "cap rock", preventing rapid diffusion of the heat and geothermal waters within the alluvium. Consequently the key to the distribution of the geothermally anomalous ground waters is the distribution of the joint and fault systems in the andesites, and the more subdued evidence of the geothermal reservoir in the MGM area is simply the result of the greater thickness of alluvial valley fill above the andesites, and the effect of the extremely large flows of cold river channel water within this overlying valley fill.

The data lead us to a geothermal target located below the MGM site. In the upper 2,500 ft we expect the valley fill sequence to be alluvial gravels, sands and clays of the Truckee River channel, carrying large flows of cold ground water. Below that we expect the influence of the deeper, geothermal system to emerge, at the base of the valley fill, or in the underlying basement. At about 4,500 ft. we anticipate a temperature around 260°F in faults and fractures of the same NE-trending set that feeds the shallow aquifers of Moana.

This target concept comes from temperature data from existing wells near MGM and in the surrounding area, from geochemistry of the wells, and from structural interpretation of the feeding fault systems of the Reno geothermal system.

Caution leads us to propose drilling confirmatory 3,000' temperature gradient tests on or near the site, to penetrate below the strong influence of the Truckee River channel and enable us to confirm the gradient below the cold, blanketing effect of that channel.

Our exploration program therefore begins with surface work to refine our understanding of the details of the target and to select sites for confirmatory temperature gradient tests. Based on results of those, the sites for the production and the reinjection well will be picked.

REFERENCES:

1. Bateman, R.L. and R.B. Scheibach, 1975. Evaluation of geothermal activity in the Truckee Meadows, Washoe County, Nevada. Nevada Bureau of Mines and Geology, Report 25.
2. Cohen, P. and Q.J. Loeltz, 1964, Evaluation of Hydrogeology and Hydrogeochemistry of Truckee Meadows Area, Washoe County, Nevada: USGS Water Supply Paper 1779-S.
3. Cooley, R.L., J.W. Fordham and J.A. Westphal, 1971, Hydrology of Truckee Meadows, Nevada; Ctr. for Water Resources Res., Desert Research Institute, University Nevada, Reno, Proj. Report No. 15.
4. Scheibach, R.B., 1974, Sulphate Relation to Thermal Waters of Moana Hot Springs, Reno, Nevada; Univ. Nevada Reno unpublished Report.

5. White, D.E., 1968, Hydrology, activity and heat flow of the Steamboat Springs thermal system, Washoe County, Nevada. U.S. Geological Survey Professional Paper 458-C.
6. White, D.E., 1957, Thermal Waters of Volcanic Origin; Geological Society of America Bulletin, Vol. 68, No. 12.

Preliminary Drilling Program

This proposal includes the necessity of drilling at least two thermal gradient holes which means this program at this time must be general and preliminary in nature.

The test holes are to be 4" in diameter and 3,000 feet deep which can be done on one of the local truck mounted drilling rigs. The possible temperature range means we will have to encase the top 50 feet in concrete to ensure blow-out prevention. For the thermal gradient hole a mud-mix fluid will suffice.

The drilling evaluation on the thermal gradient holes will entail full evaluation of drill cuttings and a progressive logging of temperatures and post drilling temperature probes.

The drilling program will be further detailed as directed by results of Task 4 "Exploration", and Task 5 "Thermal Test Holes", and Task 6 "Assessments", and presented for review and approval as outlined in milestone Task #7.

7. c. Well Testing Plan

A detailed testing plan cannot be formulated at this stage. This will be prepared later, for approval by DOE, by the project staff in conjunction with our consultants Otis Day and Ian Jamieson and their affiliates.

must be negotiated

Variable Cost Share Plan

Variable Cost Schedule

The largest process demand is the air conditioning which needs the higher temperatures of 260-200 degrees F. and greatest volume (3300 gpm). If this is not possible due to low volume, or low temperature, the percentage of success falls and the total use drops to below 60%. The absorption air conditioners quickly become too large when the temperature falls much below 260 degrees F.

If temperature is only 200 degrees F., it is still possible to handle a major part of the hotel's energy needs, which consists of the domestic hot water, the space heating systems, the pool heating and snow melting systems, and the kitchen water systems. The above systems call for a total design load of 88 million BTUs/hour.

Attached is the plot showing the process energy requirements and also a chart showing the percentages of success represented by various combinations of flow rates and wellhead temperatures.

Gallons Per Minute

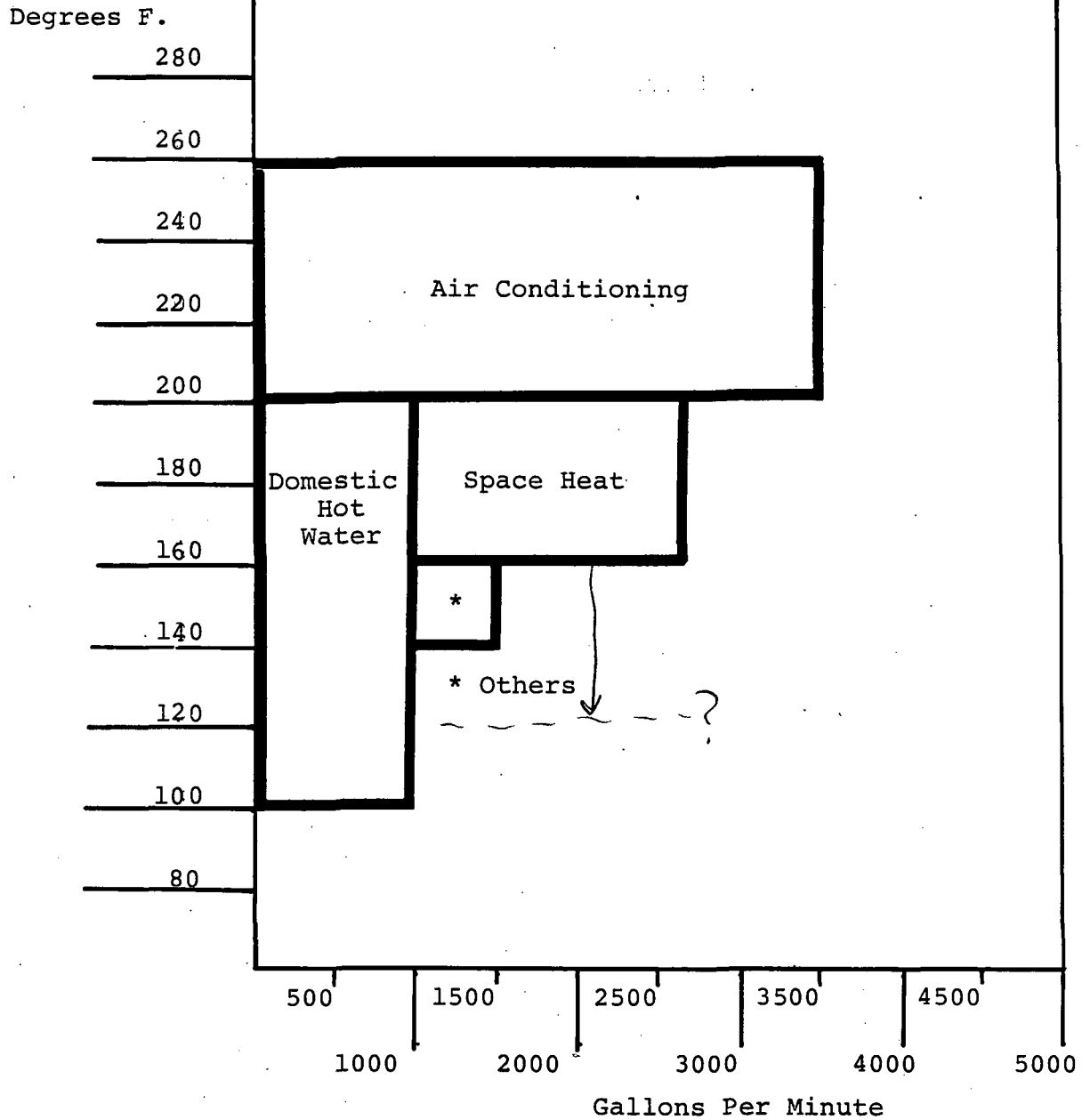
less than 500 500-1,000 1,000-1,600 1,600-2,660 2,660-2,800 2,800-3,300 3,300-3,500

degrees Fahrenheit

100	10%	10%	10%	10%	10%	10%	10%
140	10%	15%	15%	15%	15%	15%	15%
160	10%	15%	20%	20%	20%	20%	20%
180	10%	20%	25%	25%	40%	40%	40%
200	10%	20%	25%	40%	50%	50%	50%
220	10%	25%	30%	50%	60%	60%	60%
240	10%	25%	30%	50%	60%	70%*	70%*
260	10%	25%	30%	50%	60%	70%*	80%*

Proposal's cost share in per-cents for the condition shown
 Water quality less than 1,500 PPM. TDS
 Pumping depth less than 400 feet
 * Desired flow and temperature conditions

Process Energy Requirement Plot



Institutional Considerations

Site and Access

The land is privately owned and is shown in figure 9-1, and with the agreement of the owner as outlined in the letter from the President of the MGM Grand Hotel, the access right is there. The right to the resource is obtainable by water rights application for which a use that reinjects is considered non-consumptive use and is easily granted by the State Engineer. We have gotten 8 of these in the past in that area, and know this process and the requirements quite well.

Due to the fact that the site is out of the normal geothermal area, there are no other wells that we would be conflicting with, and since the target area for the producing zones is 2,000 feet to 3,000 feet deeper than any present well, we shouldn't be having any other wells even affected by our use. As in our Moana KGRA PON program, we know and have shown the ability to delineate and handle those existing environmental and institutional barriers and have these as milestone #3 in this proposal.

For a brief summary of these concerns as related to this proposal, note the following:

- 1) Air Quality- Since the only impact will be while drilling (and this is of short duration), and since no well in this resource has ever been analyzed as having H₂S, the only impact will be the drilling rig diesel and only during drilling hours.
- 2) Noise- The drilling sites are in the midst of one of the largest parking lots in the area and approximately 500-1,000 feet from any buildings and approximately ½ mile to the closest residential area. Drilling will be the only noise as the system, when done, will be totally underground.
- 3) Water Quality- The Drilling Program when done will address these points with due consideration of impact while drilling (the procedures for deep drilling in Nevada have been well defined and are available and will be followed).

- 4) Water Supply- As mentioned in the first paragraph, the water rights and system design are based on re-injection and are thus a non-consumptive use of the water and in our case are from an as yet untapped level. The deepest wells to date are 1,000 feet and we are going approximately 3,000-4,500 feet.
- 5) Land- The wellheads and pumping stations are to be installed in below-ground-level vaults, with concrete and steel top opening level with and able to be a part of the parking lot area. Pipelines are all buried and insulated with only short term land disturbance. The land of the site is level, so there is no chance of erosion or landslides.
- 6) Subsidence and Seismicity Reno is in seismic zone #3 which will entail designs of the wellhead to ensure continued well control in any foreseeable seismic occurrence. Due to the non-consumptive use with reinjection of fluids into the same aquifer, there is a very slight chance of any subsidence. But to monitor this, the project team will, prior to pumping, take the project area's base line measurements and establish a bi-yearly measuring schedule to monitor any long term subsidence.
- 7) Ecology- As shown in our current Environmental Assessment of S.W. Reno, there is no impact on any species of the area where a reinjection is used. And as there are no tall trees in the MGM Grand Hotel parking lot, this project won't be affecting the nesting of the Black Crowned Night Heron (the only possible problem in the S.W. Reno area).
- 8) Socio-Economics- Other than the drilling rig crew, there will be no long term socio-economics as the system will entail only one operator on hand which is already a job filled as a part of the MGM maintenance staff.
- 9) Heritage Resources- The area has been cleared by the state for the original building. A new verification of this is a part of milestone #3, "Institutional Problems".
- 10) Safety- The Reno Building Codes and OSHA Construction Codes will be fully complied with in the detailed Drilling Program. The drilling safety procedures program can be drawn up once the actual target area and depth is known and the size of the rig required is determined. Again regarding H₂S safety, there is no well in the area that has yet had H₂S, so none is expected. But monitoring devices will be on hand to warn us if

any is encountered.

- 11) Fluid Disposal- Fluid disposal during drilling will be by 8,000 gallon tank trucks which will deliver the fluids to the state approved disposal site. After drilling, all well fluids will be reinjected.
- 12) Drill Site Restoration- The area of probable siting of the wells is currently parking lots and after drilling, will be returned to parking lot use.

66

Program Policy and Preference Factors

This proposal for a DOE User-Coupled Confirmation Drilling Program to assist the MGM Grand Hotel in Reno achieves the DOE objectives in these ways:

As the project entails the whole variety of possible uses of direct heat, space heating, air conditioning, domestic hot water, laundry, restaurant and pool heating, and a snow melting system, in one very visible and extremely well known location.

These wells will prove the resource extends beyond the previously known boundary and closer to the central business district of Reno. This will encourage others to develop this resource who have previously considered themselves outside the available geothermal area.

Since we are able to use the fluids for various processes requiring temperatures of 90 degrees F. to 260 degrees F. (and within certain parameters can utilize heat pumps if flow rates are high enough), we have a wide variety of options if we encounter temperatures and flows that are less than the required values.

As shown in Section 5-2, where the end use is described in detail, cascaded and extensive multiple uses are entailed in our proposal.

As stated above, the end uses cover almost all possible categories of direct use except Aqua-Culture.

As this project entails the heating of over 1,200,000 square feet of casino/arcade space with 2,100 hotel rooms requiring heating/air conditioning, and domestic hot water, the proposed investment provides an extremely large number of "BTUs-on-line" for the DOE funds at risk.

The average load will be about 40 million BTUs/hour.

The combination of this unusually high energy requirement and the large public awareness of the MGM Grand Hotel (occupancy has been 98% since opening) is unique and significant in terms of geothermal energy's commercialization.