

GLD1436

^{sp?}
Janson, Prilling, Portland, Or. (503)-649-5563

Have a modified Portadrill, 1977 model TLS
90,000 lbs. derrick -

22-141 50 SHEETS
22-142 100 SHEETS
22-144 200 SHEETS



Blue Lake Geo Thermal John Hook, CG Davidson
W F Coyert.
SE $\frac{1}{4}$ SW $\frac{1}{4}$ Sec 27 T 13S R 8E Jefferson Co, Oregon.
Santiam pass area

1. Blue Lake is a plain crater formed 3500 yrs ago
in deep glacial valley of High Cascades. Elev 3600',
so 4000' well rock below sea level
2. Drill to 3000' w/ rotary, then 4000' w/ $\frac{1}{2}$ core.
3. Land owners: ~~Union~~ in general area:
Union, Chew, Col Engr, Trans-Profit has
picked up Santiam's land
4. Hole would be fore runner to CSOP hole,
if drilled.
5. EWEB #1 (T 13S R 7E 32 Dc) to 1820 ft
got 25°C @ TD, 12 mi E Blue Lake \approx 32°C
K
6. Holocene volcanism along fissure vents in
Santiam Pass -- recent.
7. would drill shallow water well for rig needs.
8. Hole plan

- 16" hole to 20' w/ 12" liner
- 11 $\frac{7}{8}$ " hole to 400', cased w/ 8 $\frac{5}{8}$ " casing, cemented
to surface
- BOP installed on 8 $\frac{5}{8}$ "
- 7 $\frac{7}{8}$ " rotary to 3000', cased w/ 4 $\frac{1}{2}$ " threaded casing
- would be production casing
- 4 wireline core, 3 $\frac{25}{32}$ " hole size, to 4000', left
open hole.

9. Because artesian flow is anticipated, only a
7-day period w/ rig on site would be
available for "monitoring". This means
scientific work. Short lead time.

If no artesian flow, a 1 week operation
period would be available.

10. Rig is modified Portadrill ~~165~~ 1977 model TCS,
90k lbs diesel
11. Any hot water found would be used @ Blue Lake (Leport,
Camp Davidson, Camp Tarrach & Alpine Lake, within
 $\frac{1}{2}$ mile of well. Combined heating will 30k/yr now.

BLUE LAKE GEOTHERMAL COMPANY
519 S.W. Park, Suite 410
Portland, OR 97205

December 19, 1985

Ms. Elisabeth M. Hyster-Bowhan
Contract Specialist
Department of Energy
Idaho Operations Office
785 DOE Place
Idaho Falls, Idaho 83402

Dear Ms. Hyster-Bowhan:

In reference to your letter of November 22, 1985, we agree that the number one question to be resolved is that of openhole geophysical logging. We concur completely that gathering of scientific data about the geothermal potential of the Cascades is of paramount importance since we firmly believe that there are major geothermal fields to be found in the Cascades. We also believe that these can be discovered only by drilling. In fact, I made some of the original suggestions for this cooperative drilling program to Dr. Rod Thoms during the CRC field trip to Medicine Lake which preceded the 1983 Annual Meeting in Portland. The idea was further developed at that meeting by others from government and industry, and Mr. Davidson and I worked hard for its implementation.

This project, as originally conceived, was to explore the Cascades for geothermal energy. While recognizing the value of scientific data, we did not think this program was designed for "pure science". If we can demonstrate the validity of the Cascades as a major energy resource by making some discoveries as a result of drilling, there will be plenty of funding for the very necessary scientific studies from both government and industry. However, to date the Cascades have had more studies than drilling, and it is only the drilling which can prove the resource.

We object to the requirements concerning openhole geophysical logging for the following reasons:

1. ^{infers} ~~We~~, and many other prominent geothermal explorationists, do not believe that openhole geophysics are worth the costs in volcanic terranes. There is no question as to its demonstrated value in petroleum exploration in stratigraphic formations. However, such "pancake" geology cannot be expected in the volcanic piles which form the Cascades. It would be "after the fact" data for the proposed well, and it would be of dubious value to subsequent exploration.
2. The additional time a hole would have to remain open while crews are called in from California and make the run, probably a day or two, would increase the risk of losing the well. Casing should be run as quickly as possible to reduce this risk.
Temp. and Gamma-Ray could be run after casing.
3. Blue Lake's proposed program has options for as many as six reductions in the size of the well. Given the difficulties which have been encountered in previous drilling in the Cascades, we consider it prudent to keep as many options open as possible. A possible compromise might be considered in which we would start core drilling at the bottom of the surface casing and have open hole to the TD, reducing the open hole logging to one trip. However, this would seriously reduce our options for dealing with difficult portions of the well. We firmly believe that the importance of successfully completing the well far outweighs the value of the geophysics that may

Ms. Elizabeth M. Ryater-Bowhan

December 19, 1985

Page 2

be attained from it. To make as many as six runs, if we use all of our options for reduction in hole size, is simply too expensive.

4. Blue Lake Geothermal, when and if incorporated, will have limited financial resources. To avoid potential situations which would be beyond our means, we propose to handle all phases of the project on a "turn key" basis, and thus pay only the contracted amount. The risks of cost overruns will be on our contractors, not Blue Lake Geothermal, or DOE. Any compromise we negotiate concerning the openhole geophysics must have a dollar limitation on Blue Lake's obligation.

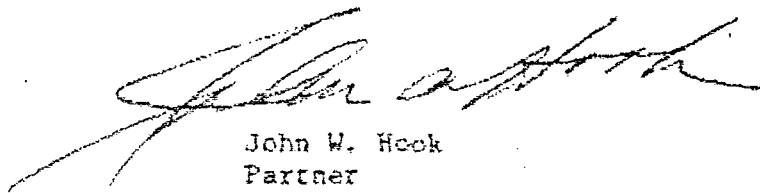
5. We are unaware of any geophysical tools capable of working in a high temperature environment which will fit in a small diameter core hole. We would be interested in knowing how this problem is being handled with the other proposers for the Cascades program. Who has such tools, and what are the costs?

While we oppose the use of openhole geophysics for the reasons stated, we are anxious to get on to the drilling. A reasonable compromise from our point of view would be to run openhole geophysics on only the lower most section of the well. If all goes as planned, this would be the bottom 1,000 feet which we plan to core. This will be the most important part of the hole and the geophysics could be correlated directly to core. But since we expect to handle the drilling on a turn key basis, a dollar limit would have to be placed on Blue Lake's share of the cost. If DOE or other groups studying the Cascades wished to do additional work, we would assist in every way we could as long as it did not put completion of the hole at risk.

In regard to your questions 2 and 3 concerning Documentation of Equity and Financial Responsibility, we will incorporate if we are awarded a contract. We do plan to use commitments from third parties, and these would be documented in writing. Financial arrangements for Blue Lake's share of the costs would also be documented. However, unless we can successfully resolve the problem of openhole geophysics, we see little point in further efforts toward incorporation and arranging the financing. Unless we can agree on an exploration plan, such efforts would be an exercise in futility.

I hope that we can discuss these matters in the near future to see if we can reach understandings which will further the very worthwhile objective of exploring the Cascades for geothermal energy.

Yours very truly,



John W. Hook
Partner

Blue Lake Geoph, Cascades Drilling

Hook's letter to Hyster, Dec. 19.

Objections?

#1. not true for selected logs. If cuttings or core are lost, the geophy. logs may be the only data out of the hole.

Logs can indicate:

- a, rock type - gamma & sonic
- b. alteration - induction log.
- c. fractioning sonic
- d. change in formation fluids - induction

#2. Temperature and Gamma-Ray could be run after the casing is set. Barry Williams for example

#3. Core drilling first would ^{not leave} options for dealing with difficult hole conditions - particularly lost circ. 6 reductions in well size is not likely to be possible.

#4. It will be very difficult to get turn key bids on rotary drilling in the Cascades.

#5 Dresser Atlas, also EG&G Mount Sopris, Hot Hole Instruments, Barry Williams, Schumberger, WelEx



John W. Hook & Associates, Inc.
Geothermal and Mineral Exploration

P.O. Box 3133
Salem, Oregon 97302
(503) 371-3901

August 12, 1985

Mr. Ronald A. King
R&D Contracts Branch
Contracts Management Division
Department of Energy
Idaho Operations Office
550 Second Street
Idaho Falls, Idaho 83401

Re: Solicitation No. DE-SC07-85ID12580

Dear Mr. King:

We received your letter of August 5, 1985, with the revisions of the Statement of Work in draft form.

We strongly object to the requirements for openhole geophysical logging in both the original and the draft of the revised Statement of Work. Such geophysical logging requires that a logging truck and crew be brought up from California prior to running any string of casing below the surface casing (revised draft--the original required openhole logging to the surface and was later amended to exclude the conductor pipe). At the Blue Lake explosion crater we will be drilling into unknown formations and have planned for as many as three reductions in the size of our rotary hole and four reductions in core if needed. This could require as many as seven trips to give openhole geophysics from the surface casing to TD. At the least, it would require a trip to log the rotary hole prior to setting the 4 1/2 inch casing and a second trip to log the core hole to the TD.

A similar logging run cost \$30,000 for Well-Ex to log the Old Maid Flat No. 1 well to 4,000 feet in 1979 when I was working for Northwest Natural Gas on the Mt. Hood Project. I don't have the costs for the logging of OMF-7A but these should be in the DOE files. In either case, the results of this very expensive electric logging were virtually meaningless except for temperature gradients which were run later in cased hole at a fraction of the expense.

Our experience at Mt. Hood has been duplicated by others in industry who have found that openhole geophysics have been of little or no value in volcanic terranes. I have permission from Richard Dondanville of Union and Tsvi Meidav of Trans-Pacific Geothermal to use them as reference to this conclusion. (In fact, Dick Dondanville told me that Union had not applied for assistance under this SCAP because the added cost of this questionable geophysics practically offset the advantages of the 50% cost share. Union preferred to pay the slight difference and keep the information to themselves.)

In addition to the costs of the logging, the rig must be put on stand-by time until the logging is completed. This would add another \$1,500 for each day used for this purpose. Furthermore, the longer the hole is left uncased, the greater the danger of losing it. We strongly object to taking this risk.

Mr. Ronald A. King

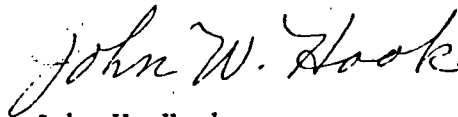
Aug. 12, 1985

Page 2

Blue Lake Geothermal Company's proposal to DOE is based on "turn key" fixed prices for each item in our proposal. Our budget simply does not allow for the unknown factors of the openhole geophysical logging which could increase the costs of the project by as much as 50% and negate any advantage of the DOE funding.

We again wish to point out that we plan to core at least the bottom 1,000 feet of the well, and probably more. This is the critical part of the well which hopefully will give a first look at Taylor's "Plio-Cascades" formations. Furthermore, the core will provide hard data on the fracturing, permeability, alteration and other factors which could only be guessed at by openhole geophysics. We are proposing to provide data which is far superior to electric logs, especially in unknown volcanic terranes. We respectfully request that the requirement for openhole geophysics be dropped from the revised Statement of Work.

Yours very truly,

A handwritten signature in cursive script that reads "John W. Hook".

John W. Hook

cc: C. Girard Davidson
Wilford F. Covert

BLUE LAKE GEOTHERMAL CO.
519 S. W. Park, Suite 410
Portland, Oregon 97205

July 5, 1985

Ms. Elizabeth M. Hyster, Contract Specialist
R&D Contracts Branch, Contracts Management Div.
Department of Energy
550 Second Street
Idaho Falls, Idaho 83401

Re: Solicitation No. DE-SC07-851D12580

Dear Ms. Hyster:

We are pleased that our proposal has been selected for further consideration. Please continue to address all correspondence to our Portland address. However, it would facilitate replies if you send a carbon to my Salem address:

John W. Hook
P. O. Box 3133
Salem, OR 97302

Our Portland telephone No. is (503) 223-3800, and my phone at Salem is (503) 371-3901.

In response to your letter of June 26, 1985, I have assigned numbers to the questions for quick reference, and that information is enclosed. We hope that you will find these answers complete, but if you have further questions, please let us know.

Sincerely,

BLUE LAKE GEOTHERMAL COMPANY

By 

John W. Hook

Enclosure

cc: C. Girard Davidson
Wilford F. Covert

BLUE LAKE

1. What rationale was used to determine at what depth the switch would be made from rotary to core drilling? Please provide this rationale, including data and any input from others (e.g., Dr. Taylor).

1 and 12. The questions dealing with the rationale as to where to switch from rotary to core drilling and the problem of lost circulation are closely related and are treated together here.

First, there can be no question but that all of us prefer core over rotary cuttings. However, in the usual course of events, it is quicker and cheaper to make hole with rotary tools. The major exception to this is when problems of lost circulation or caving occur. As we discussed at the top of page 7 of our proposal, the bottom 1,000 feet of the hole is expected to intercept fractured formations associated with a fault zone. As we further discussed at the top of Page 12, core drilling is the best way to deal with fractured formations which may cause caving or lost circulation. If serious problems are encountered above 3,000 feet, we have the options of cementing, casing, or switching to core drilling. Thus we may elect to go to core drilling anywhere between the bottom of the surface casing (400 feet) and 3,000 feet. In any case, we plan to core from 3,000 feet to 4,000 feet. The drilling was bid on this basis.

2. What accuracy will the temperature tool used to log the hole have?

We plan to use a probe which reads to at least 0.1°C increments. This and will be calibrated by ice water/boiling water tests. It will be further checked in the well by attaching a maximum reading thermometer.

3. If the hole is unsuccessful from a development standpoint, does Blue Lake intend to complete the hole to meet DOE's objective for heat flow data?

Yes. This question, we believe, is fully addressed on Page 19 of our proposal under (c) Hole Completion and Maintenance.

4. Who will Blue Lake use to perform an environmental evaluation of the proposed activities? If the selection has not been made, provide the criteria on which selection will be made.

The Blue Lake Drill site is on a tract of private land within the Deschutes National Forest. It is covered by the Geothermal Leasing Environmental Assessment Report, Sisters Ranger District, Deschutes National Forest. As discussed on

Page 25, and shown on the map on Page 26 of our proposal, the adjacent National Forest land has been leased for geothermal development with only the "Standard Stipulations" applying, except for a buffer zone around the lake. In view of this existing EAR, we did not propose any additional environmental evaluation.

5. Will two on-site geologists be provided for 24-hour coverage during drilling? If not justify why not. Clarify by name who the geologist(s) on-site will be. For individual(s) identified other than Hook, specifically the student, provide educational level and experience.

John W. Hook plans to live at the Blue Lake Resort on practically a full time basis. He will be relieved from time to time by Dr. Walter Youngquist. (Dr. Youngquist is a nationally known geothermal geologist and directed the DOE-EWEB Cascades Drilling Project in 1979 with Mr. Hook's assistance--we can have Dr. Youngquist send a resume if it is needed.) Mr. Hook or Dr. Youngquist will be available on a 24-hour basis to deal with drilling problems as they arise, and to meet scheduled data gathering activities. The routine sampling of the cuttings and lay-out of the core will be directed by the driller. With this type of arrangement, we have found that one on-site geologist is adequate for projects of this type.

We plan to use a student of Dr. Taylor's for special logging as described on Page 22 of our proposal. He will not be involved in the management of the drilling. Dr. Taylor will select the student and supervise this logging when plans have been confirmed. Personal data can then be made available.

6. Will the cored section of the hole be cased if hole stability problems are encountered and in order to provide good heat flow data?

The cored section of the hole will be cased with a slotted liner for hot water production if hole stability problems are encountered. While the rig is on site, the hole will be stabilized by the wire-line drill rods for the initial data gathering.

7. How does BLGC plan to deal with any environmental issues which could result from private landowners' concerns about the project to the state or county?

7. BLGC is working in cooperation with the private landowners to develop a geothermal resource for their use. They are sharing financially in this venture and have a say in the management of the project. The timing to start after Labor Day, is at their request for both financial and environmental reasons to coincide with their off-season.

8. Is access to the site available on public roads or does Blue Lake need to coordinate access with the Forest Service?

The access road from the paved public road to the drill site is entirely on private land owned by the Lovgrens, the Blue Lake Resort owners. The Forest Service also has the right to use this road to reach their land. The road will, of course, be kept clear for all valid users. No timber is scheduled for harvesting along this road during the project, so there is no need to coordinate access with Forestry. This road is normally closed to unauthorized vehicle use by both the Blue Lake people and Forestry.

9. Will the 4 1/2" casing be cemented and pressure tested?

The 4 1/2" casing will be set in jell for drilling the core hole. It will not be cemented or pressure tested. It may be desirable to cement it later if we complete the hole for hot water production, but this is not part of our proposal to DOE.

10. Do the State of Oregon regulations require pressure testing of the well head, casing and BOPE at 500 psi or 1000 psi for this hole?

The State of Oregon requires that the surface casing and B.O.P. be tested to 500 psi for a 4,000 foot well.

11. Will daily hydraulic head measurements be made during drilling when possible?

Yes.

12. Explain fully how anticipated lost circulation problems in the upper part of the hole will be handled.

Answered with Question 1.

13. Will BLGC box the core samples and store them in a secure manner until the samples can be transferred to DOE? Explain the manner in which the samples will be secured. Identify the category in which the associated costs have been proposed.

Under the section labeled 4. Methods starting on Page 17 of our proposal, it is explained that we plan to place the core on corrugated fiberglass in a protected core garden. We will log the core and have Dr. Taylor's student log the core. It will be available to DOE and other scientists at the site. We may take a limited number of samples for ourselves and Dr. Taylor, but this will probably be considerably less than the 50% permitted us by the SCAP. We do not plan to box our part of the core. If DOE wishes its half boxed, we would be pleased to do the boxing and labeling, but would expect DOE to furnish its own boxes.

14. The proposal indicates that the access period for data gathering will be a minimum of one month. What is the maximum amount of time the hole will be available to DOE for additional data gathering?

The one month minimum period discussed in Hole Completion and Maintenance was chosen because it is generally recognized in the industry that full temperature stabilization is reached within that time. We expect the observation time to be much longer. However, the expected completion date is mid-November, and if the well has discovered a useable resource, the Blue Lake Resort will wish to start using it as soon as they can get their heating system ready. This is likely to be considerably in excess of one month. Even if the well goes into production, we will wish to continue monitoring flow, temperature and water quality. It is likely that other geophysical measurements could be continued, if coordinated with the production needs. Temperature gradients are, of course, highly disturbed in flowing wells.

If the well fails to find a useable resource, it could remain available for observation for a year or more. With permission from the State of Oregon, it could remain available much longer, but BLGC would expect the requesting organization to accept responsibility for the well after the first year.

In brief BLGC wishes to cooperate fully with any scientific group which is studying the Cascades. However, our financial resources are limited, and other than the data gathering outlined in our proposal, these additional studies must be separately financed.

15. Provide the details of the proposed amount estimated for travel, including origins and destination, number and duration of trips, estimated travel and per diem amounts by location.

The estimate of \$100 per day for Travel and Per Diem was a conservative estimate to cover \$45 for a cabin at the Blue Lake Resort, \$30 for food, and \$25 average for transportation for each day spent in the field. The transportation will be quite variable, requiring trips to Portland, Salem and Bend which are round trips of 300, 200 and 80 miles respectively. Over the life of the project, the mileage is expected to average over 100 miles per day.

The above estimate was for the purpose of calculating the total amount to be paid to consultants for each stage of the project. On Pages 1 and 2 of Volume II of our proposal, the Consultants, like the driller, will be paid on a turn-key basis as each stage of the work is completed, regardless of his actual time and costs needed to perform his task.

16. Are the individuals proposed as "Consultants" (Project Manager and Project Engineer) subcontracted or employees of the company? If employees, identify their annual salary rates.

The Project Manager and the Project Engineer are to be subcontracted on a turn-key basis for each stage of the project.

17. Identify the total number of hours proposed for each, the Project Manager and the Project Engineer.

Because the Project Manager and the Project Engineer will be on call at all hours of the day or night, their estimated time has been computed at a daily rate of \$500. The Project Manager will be at the site on practically a full time basis while drilling or data-gathering is in progress. The Project Engineer will visit the project for planning sessions while the work is in progress and be on call at all times to discuss drilling problems, and if necessary, make unscheduled

trips to the site. In all, it is anticipated that the Project Manager/Geologist will spend about 88 days on the project, and the Project Engineer will spend 16 days. These times and costs are summarized in the Task Budget on Page 8 of Volume II.

18. Provide the basis for the proposed Material Overhead cost rate and for the proposed G&A cost rate using the following format for each.

The Blue Lake Geothermal Company is a general partnership formed to coordinate efforts to drill a deep test at the Blue Lake explosion crater. As explained in Volume II of our proposal, we are prepared to incorporate the company if our proposal is accepted. However, at the moment it is a good-faith agreement between the Coverts, Davidsons and the Hooks who have similar arrangements on other geothermal prospects. As such, Blue Lake Geothermal has no past financial record.

If our proposal is approved, the corporation will be formed and assigned a 75% working interest in 13,600 acres of Federal government leases and lease applications, a \$20,000 commitment in lodging fees, site preparation and restoration, and casing costs from the Blue Lake Resort, a yet to be determined amount of financial support from Camp Tamarack, and the sale of 1/6 interests in the project for \$100,000 each, not to exceed three such sales.

At the present time we have enough commitment to do the project as proposed. If this proposal is acceptable, we will proceed to incorporate the company and set accounting procedures acceptable to DOE.

19. Provide the details of the amount proposed for plug and abandon costs and for stand-by costs.

The plug and abandon costs and the stand-by costs were verbal bids by the driller which were added as Items E and F to his bid (see Page 7 of Volume II). These additions were made and initialed by John W. Hook.

20. Define the activities anticipated for site restoration.

The activities anticipated for site restoration are described on Page 13 of Volume I:

"9. Site restoration

Site restoration will consist of filling the sump and grading the site back to its nearly level original contours. Given the gravel-like nature of the Blue Lake explosion debris which is the surface formation, this will be a simple and inexpensive task.

It is probable that the owners of the Blue Lake Lodge will wish to have the entire geothermal distribution system buried, including a man-hole cover over the well. This, however, will be their decision and done at their expense. The work proposed under this SCAP is to be limited to the general cleanup and leveling of the drill pad."

To further define this activity, this work will be done with a back-hoe by Gary Lovegren, son of the owner of the tract of land where the hole will actually be drilled, and a co-owner of the Blue Lake Resort. The spoil piles of Blue Lake cinder (the surface formation) which Gary will have placed to one side of the pits during site preparation will be used to refill the pits. Since the pits at this time will have been partially filled with waste cuttings from the well, there will be a surplus of cinder which will be graded over the relatively flat working area. The general clean-up of the area of the well will include taking down the fence around the "core garden" once the core has been removed. The wellhead will be left accessible for logging, testing and completion for production or P & A, as the case may be.

As will be noted in Photo 5 on Page 9a of Volume I, the site is practically clear of vegetation except for a few manzanitta bushes. No revegetation is planned. However, we will leave as much of the existing vegetation, especially the root-stock, as possible to aid the natural reproduction.

If a production well is developed, it will be done by the resort owners in a responsible manner in keeping with the high quality of their other facilities.