

Cascade Drilling Program

GEO-Newberry Core Hole N-1 was spudded with a 5 5/8 tricone button bit at 9 PM, 8/23/85. Circulation was lost at 2 feet depth and never regained so no cuttings samples have been collected. Based on local stratigraphy and the hard and caving zones drilled, the hole is probably penetrating a sequence of basaltic lava flows and flow breccias with possible minor ash beds. Drilling progressed slow but uneventful to a depth of 305' by Aug. 27, then the drill rods parted leaving 9 rods, sub and bit in the hole. The hole had to be cleaned out before the fish was pulled out with a tap during the morning on Aug. 28th. The rodary hole was drilled to a depth of 470', five feet into hard rock for setting the 4.5 in. casing. Casing was set on Friday, Aug. 30th.

The temperature check at 430' was less than 100°F. Cost estimate as of Aug. 29, at a depth of 375' was \$31,472.



UNIVERSITY OF UTAH RESEARCH INSTITUTE
EARTH SCIENCE LABORATORY

CASCADES DRILLING PROGRAM
MEMO OF CONVERSATION

Project: Cascades, GEO - Newberry N-1
 Person Calling: Susan Prestwich Date: Sept. 4
 Representing: DOE, Idaho Time: ~ 1:20 PM
 Person Called: Bruce, she returned my call. Phone Number: _____
 Representing: ESL/UURI
 City: _____ Distribution: _____
 Subject: N-1, depth, BOP - Casing Cement and Cost rate DOE-ID _____
 UURI Pennis, Mike W.
 Other _____

I informed Susan P. of the current status of N-1 520' as of 9:PM. Sept. 3rd, and then told her of our concern over the BOP pressure test being run when the casing was filled to 210' with cement and the cement bond at the casing shoe, 465', was therefore not tested.

Susan's concern is will the BLM let them flow the well if a thermal-artesian condition is encountered? This is an environmental concern for both surface discharge and resource subsurface control. There was some discussion of possibilities.

I reported on the current cost figures and stated that as of Sept. 4th, at 420', total cost was \$52,783. If mob, \$3,000 and est. casing \$4,700 cost are removed footage cost average \$96/ft. This projects to \$388,000 total drilling cost. The original est. was \$260,000. Susan said the DOE celling on the hole, including Geo overhead & logging etc, was 50% of the \$395,000 total.

Costs Break out: Archeology 5,000

Drilling \$260,000	\$5,000 site preparation
\$8,942 geol. supervision of drilling.	30,000 geophy. logging
8,942 geol. analysis of core	10,000 2 chem. analysis
10,000 Travel	7,000 hole maintenance & Core store.
8,000 materials, core box, sample bags	5,000 abandonment
Signature 5,000 - Reporting, & data delivery -	8,145 Project management
	6,150 Hg survey

These numbers total \$369,179 so I'm missing something. Susan was giving some numbers as components of other figures and gave original proposed cost than the DOE reduced costs numbers for some items. So it wasn't totally clear over the phone. The first number she gave me was \$358,789 for the total thermal gradient hole project.

The \$260K Toronto drilling cost was not broke out any and Susan said she didn't care how much \$ went to drilling verses logging, only that the DOE ceiling was 50% of \$395K and if too much went to drilling, we wouldn't get what we wanted out of the hole in data.

Bruce Sibbett



CASCADES DRILLING PROGRAM
MEMO OF CONVERSATION

Project: GEO Newberry N-1
Person Calling: Mike Johnson Date: Aug 30, 85
Representing: GEO OC Time: 8:15 AM
Person Called: Bruce Sibbett Phone Number: _____
Representing: ESL/UURI
City: Bend OR. to SLC Distribution: _____
Subject: Drilling N-1 DOE-ID _____
UURI Mike W, Dennis N,
Other _____

At a depth of 400' the hole was in soft rock, drilling easy. Drilling therefore was continued to find hard rock to set the casing shoe in. The hole entered hard rock again at 465' and rodary drilling was stopped at 470', about midnight, Thursday.

The rest of the mud was pumped down the hole to condition it. Casing was run in the hole to 430' where it encountered caving or tight hole. The casing, with shoe, is being drilled down.

Last temperature check at 430' depth showed less than 100°F. The BOP equipment has arrived at La Pine, OR, a few miles from the site.

Signature _____

Pruce

UNIVERSITY OF UTAH RESEARCH INSTITUTE

UURI

EARTH SCIENCE LABORATORY
391 CHIPETA WAY, SUITE C
SALT LAKE CITY, UTAH 84108-1295
TELEPHONE 801-524-3422

December 10, 1985

MEMORANDUM

TO: Susan Prestwich
FROM: Mike Wright
SUBJECT: Data Release

Chan Swanberg and the rest of the N-1 make a data release Geo-Newberry would be scooped. They seem February the core will facility, the geophys and we will issue a d

Chan indicated to us the well logs so s once, probably later DOE's split of the co sections. It will be prior to the drilling to all data and core from the drilling as soon as it is generated.

Scott Linneman 307-766-2203
Dept. Geol.
Univ. of Wyoming
Laramie, WY 82071

Wants to examine and sample the the Geo-Newberry N-1 core. Place on mailing list for open file.

Mike

PMW/jp

cc: D. L. Nielson (UURI)
B. S. Sibbett (UURI)
J. Renner (EG&G)
S. Stiger (EG&G)

Nov. 22.

To: Mike Wright:

From: Bruce Sibbett

Subject: GEO-Newberry N-1 logs.

After talking with Chan Swanberg and Mike Johnson on Nov. 21 the following estimates on the arrival of data are given.

<u>Data set</u>	<u>Approx. Date Expected</u>
Nov. 9 th T° & Gamma log (by Barry Williams)	Dec. 3, '85
Photo set of core 465-4000'	Dec. 3,
Tape logs & transparencies (11/2/85 Dresser Atlas)	Dec 16, '85
Final Report with Drilling History (GEO Rept.)	Dec 16, '85
Publications submitted to Journals	~July to Sept, 1986

I will keep you advised as soon as any of this data comes in.

Mike Bullett and Davie left Bend about noon on Thursday, on their way to Boise, Id. They should arrive in SLC today (Nov. 22) with the core.

Bruce.

Bruce

UNIVERSITY OF UTAH RESEARCH INSTITUTE

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391 CHIPETA WAY, SUITE C
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TELEPHONE 801-524-3422

November 13, 1985

MEMORANDUM

TO: Susan Prestwich
FROM: Bruce Sibbett
SUBJECT: GEO-Newberry N-1 Logs

Enclosed is one copy of each log from the Newberry N-1 hole. The temperature increase at 3260' occurs within a 120 foot thick, massive lava flow which is underlain by an ash-flow tuff. The upper few feet of the tuff at 3349 feet is clay altered and impermeable. The combination of the massive lava flow and the clay seal below appears to control the base of the rain curtain. The temperature gradient within the lower part of the rain curtain, 2300 to 3240 is $2.8^{\circ}\text{F}/100'$ ($51^{\circ}\text{C}/\text{km}$). Within the zone of pyroclastic units and lava flows, 3260 to 3440 ft the gradient is $24.7^{\circ}\text{F}/100'$ ($450^{\circ}\text{C}/\text{km}$). From 3440 to 4000 ft the gradient is $6.5^{\circ}\text{F}/100'$ ($118.7^{\circ}\text{C}/\text{km}$). These apparent gradients will change somewhat as the hole temperature equilibrates but I don't expect the overall pattern to change.

Bruce S. Sibbett

BSS/jp

enclosures

35.6
- 7.2
28.4

Oct 18th, GEO-Newberry N-1

3864' - Top - 124°, 124°, Bottom ↓137°, ↓137° ↑138°F
pump off 1:14 A.M. Thermometers out at 2:42

3917' hole Therm. at 3913'
pump off at 6:37 A.M., Therm. on bottom at 7:40 A.M.
Therm off bottom 8:10 A.M. to surface at 8:23 A.M.

Mud Temp. in tank 6°C (42.8°F) ~~28~~

Air temp -2°C ~~28~~. (28.4°F)

Instrument on bottom of core tube

↓ 140° ↑ 138° ↑ 137° all in bottom

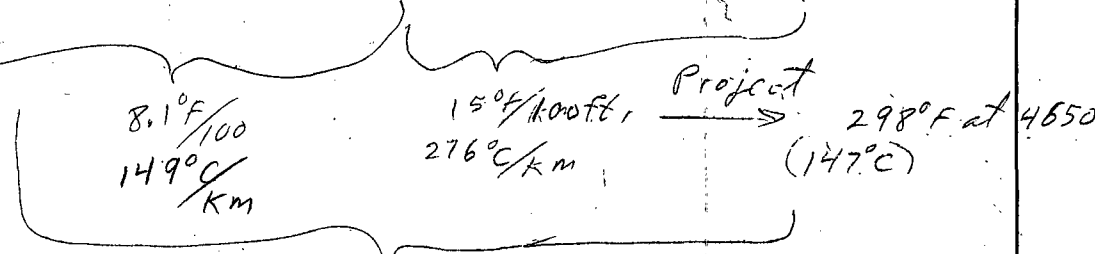
3964' 142°F

Drilling at 3988' 10:30 AM, Sat.

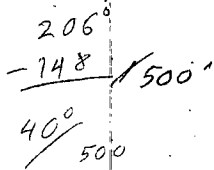
22-141 50 SHEETS
22-142 100 SHEETS
22-144 200 SHEETS
AMRAD



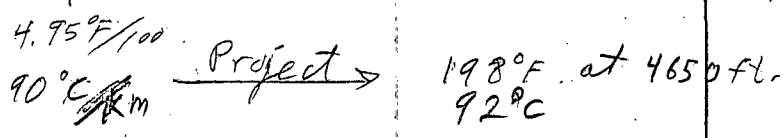
	(1.5 hr)		Projected → 305°F at 4650'		149 14 hr
Temp	64°F	82°	95	117	137°F (10 hr)
Depth	2891	3312	3518	3540	3672'
				9.3°F/100	



Graphically



15°F/100
278°C/km



Depths 2,996' to 3545' } \$76.48/ft. ave. 78'/day
Costs \$196,111 238,098 }

Depths 3545 to 3672 } \$127.61/ft. X 650' → \$82,946 ave 47'/day
Costs \$238,098 - 254,305 }

3468 - 3672 } \$109.40/ft. X 650' → \$71,114
231,986 - 254,305 }

Est. at 4000' \$296,161

from 3,545' to 24,059' costs were \$53,619

ave. \$104/ft. ave 51.4 ft/day

3 day

3 hr

La Pine hole ^{from Larry Chitwood.}

Groundwater Hydrologist

Century West Eng - Ralf Patt Bend Or.

1458' TD

1362' of sediments

1362' first lava - water table down ~43'

4200' elev. regional ground water under
Newberry

elev. water table

4287 ± 5 SW flank of China Hat - water table

853' hole. T.D.

783' to water table

Larry Chitwood has cuttings from hole.

elev. 5070 ± 5 from topo, Jan 1985, 8" casing
gravel packed.

1300-1500'

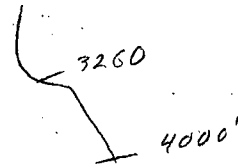
22-141 50 SHEETS
22-142 100 SHEETS
22-144 200 SHEETS



Data for Weekly Newberry N-1 High lights

2-3°/100'

T° kiks up at 3260'



~ 8°/100' down to 4000'

water level 1300'

$152^{\circ}\text{F} - 3900'$
 $155^{\circ}\text{F} - 4000'$
 $138^{\circ} - 3700'$
 $146^{\circ} - 3800'$

} 4.5°/100' 82°C/km.

{ 2" to 100' scale logs? what do we need.
5" to 100'

open file. 30 copies

$1^{\circ}\text{F}/100' = 18.227^{\circ}\text{C}/\text{km}$

A#R Freight - Garrett

Need blocks

Box - 40#/box

$20^{\text{th}} \times 360 \text{ box} = 7200 \text{ lb.}$

GEO will send:

- (1) 5 copies of field logs directly
- (2) transparency of logs (all but sonic at 2"/100')
in 4-5 weeks
- (3) Tapes of logs - 4-5 weeks

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





Geothermal Resources International, Inc.

NEWS RELEASE

FOR RELEASE AFTER 9:00 A.M. EST ON TUESDAY, NOVEMBER 26, 1985
Menlo Park, California, November 25, 1985

Geothermal Resources International, Inc. ("GEO") has completed drilling an exploratory corehole on the Company's Federal Geothermal Resource Unit around the Newberry Crater in Oregon, according to Chief Executive Officer, Ronald P. Baldwin.

Baldwin said the Company and the United States Department of Energy ("DOE") are engaged in a cost-sharing Cascades Thermal Gradient Drilling Program which will provide important geological information about the area, including temperatures at various depths to evaluate what geothermal resources may be available.

"This first test hole, a heat flow corehole, is essentially isothermal through the "rain curtain" which was penetrated between 3260 feet and 3320 feet where the temperature rose from 62 degrees Fahrenheit to 113 degrees Fahrenheit," he said.

"The preliminary temperature at 4000 feet is 161 degrees Fahrenheit and the geothermal gradient between 3920 feet and 4000 feet is 4.6 degrees Fahrenheit per hundred feet."

According to Baldwin, the entire hole was cored and splits of the core, a full suite of geophysical logs, plus additional information, will be available for examination from University of Utah Research Institute, 391 Chipeta Way #A, Salt Lake City, Utah 84108. (801) 524-3422.

GEO is one of the limited number of companies in the United States that produces and supplies steam to power plants for electricity generation. In addition to 49,000 gross acres in The Geysers area of Northern California, GEO has leases outside The Geysers on 270,000 gross acres in Oregon, California, New Mexico, Utah and Nevada.

For further information contact Steven E. Morris, Vice President-Administration, 545 Middlefield Road, Suite 200, Menlo Park, California 94025. (415) 326-5470.

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Bruce

UNIVERSITY OF UTAH RESEARCH INSTITUTE

UURI

EARTH SCIENCE LABORATORY
391 CHIPETA WAY, SUITE C
SALT LAKE CITY, UTAH 84108-1295
TELEPHONE 801-524-3422

February 5, 1986

Mr. Steve Millener
Rocky Mountain Well Log Service
P.O. Box 3150
Denver, CO 80201

Dear Mr. Millener:

Enclosed are the geophysical logs for the GEO-Newberry N-1 geothermal gradient hole to be placed on file with Rocky Mountain Well Log as I discussed with you by phone on February 4, 1986. We would appreciate the complimentary reduced scale log copies you mentioned. If there are any questions concerning these logs, please call me.

Thank you,

Bruce Sibbett (G.P.)

Bruce S. Sibbett
Geologist

BSS/jp

enclosure

UURI

EARTH SCIENCE LABORATORY
391 CHIPETA WAY, SUITE C
SALT LAKE CITY, UTAH 84108-1295
TELEPHONE 801-524-3422

M E M O R A N D U M

TO: Susan Prestwich, DOE/ID
FROM: Mike Wright, UURI *MWR*
SUBJECT: Sampling of GEO Newberry N-1 Core by
University of Wyoming
DATE: July 9, 1986

On July 9, 1986, I was visited by Dr. James Myers, professor of geology at the University of Wyoming and by Scott Linneman, his graduate student. The purpose of their visit was to discuss data from the GEO Newberry N-1 corehole and to examine the core and take selected samples of it. Myers has available funding for work on the core and he expects further funding from the NSF. Linneman will be doing a field geologic mapping project at Newberry as part of his PhD work, and will also work on the core. They plan to do petrologic, isotope, probe and bulk chemical analyses of the core samples. The results of this work should start to be available as abstracts and talks by next spring.

I emphasized the need that DOE has to get the maximum amount of scientific results from study of the samples and that they should restrict their sampling to the minimum necessary. I also asked that before they took a one of a kind sample they get this okayed by UURI. They have agreed to these stipulations.

Attached is a list of the samples that they took and for which we can expect research results.

cc: J. Myers
M. Reed
D. Nielson
B. Sibbett

UURI

EARTH SCIENCE LABORATORY
391 CHIPETA WAY, SUITE C
SALT LAKE CITY, UTAH 84108-1295
TELEPHONE 801-524-3422

M E M O R A N D U M

TO: Dr. J. Myers
University of Wyoming
Dept. of Geology
Laramie, Wyoming 82071

FROM: P. M. Wright *PMW*

RE: Samples taken for study at the University of Wyoming (sample number refers to feet) pieces taken average 4" in length.

DATE: July 10, 1986

3992	2690	1574
3957	2628	1532
3922	2602	1503
3893	2572	1491
3825	2489	1441
3788	2450	1392
3739	2402	1348
3685	2377	1277
3643	2333	1239
3590	2306	1206
3564	2274	1180
3511	2206	1151
3485	2168	1122
3407	2142	1055
3324	2096	1011
3248	2065	976
3220	1997	949
3120	1979	912
3085	1940	897
3063	1904	893
3035	1859	888
3028	1825	775
2993	1798	721
2908	1759	683
2854	1672	626
2778	1631	595
		492

Mike Johnson (707) 523-4272
~~(415) 349-3232~~

Dresser Atlas

0 -
 Total \$25,474

Logs:

x Gamma Ray Log 4546'
 x Temperature 4540'
 Caliper log 2,965' (462-3427)
 x Induction Electric 3,530' (1780-4540)
 x BHC Acoustilog 2,750' (1788-4538)
 BHC Acoustic Fraclog 2,750' (1788-4538)

Barry Williams
 Geotech Data
 (619) 748-8341
 Poway, Calif.

\$2,400 To T.D. estimate at time
 4546' of logging

Bruce

UNIVERSITY OF UTAH RESEARCH INSTITUTE

UURI

EARTH SCIENCE LABORATORY
391 CHIPETA WAY, SUITE C
SALT LAKE CITY, UTAH 84108-1295
TELEPHONE 801-524-3422

September 30, 1985

MEMORANDUM

TO: Susan Prestwich
FROM: Bruce Sibbett
SUBJECT: Site Visit to the GEO-Newberry Corehole N-1

Drilling of the GEO-Newberry Corehole N-1 is going smoothly. Tonto Drilling cored an average of 91 ft per day with 96 percent core recovery during last week. The total costs to September 29th of \$175,538 equates to \$64.44 per foot which is within the DOE cost estimate. BHT at 2712 feet is less than 60°F. The drillers think the hole is in good condition, and they should be able to drill to 4000 feet with HQ rods.

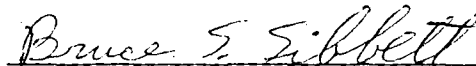
The GEO personnel are doing a good job curating and logging the core. Arrows pointing downhole are marked on the core and each box of core is photographed under controlled lighting. Mike Johnson, the project geologist, is logging the core with help and training from Gene Ciancanelli. The core log has a good format and reasonable detail. I spent a day checking the log with the core and found the quality of the log generally good.

Most of the rocks penetrated are basalt and possibly basaltic andesite lava flows with a few percent 2 mm plagioclase and olivine phenocrysts. A few thin (less than 20 feet thick) pyroclastic flow units are present. Some of these tuffs or lapilli flows are welded. These beds are significant because they could provide a sealed zone and they indicate pyroclastic non-basaltic eruptions. Pyroclastic flows are located at depths of 1180, 1860 and 2167 feet. Geologic data from the hole is confidential at the present time.

GEO is splitting the core except for a few samples set aside for possible further studies, such as paleomagnetism.

The bottom hole temperature is still less than 100°F and the only alteration is minor hematite and calcite which probably doesn't have any thermal significance. The drilling fluid is standing at about 1600 feet depth in the hole.

Chan Swanberg and Mike Johnson seem to be quite amiable about cooperating with DOE within the framework of the program.



Bruce S. Sibbett

BSS/jp



ID F-203
 Ref: E&T
 (Rev. 12-80)

Cascades
 UNITED STATES DEPARTMENT OF ENERGY
 IDAHO OPERATIONS OFFICE

~~USER-COUPLED CONFIRMATION~~ DRILLING PROGRAM

MEMO OF CONVERSATION

Project: Southern Newberry Hole
 Person Calling: Chan Swanberg (returned my call) Date 12 Aug, 85
 Representing: GEO Time 11:45 AM
 Person Called: Bruce Sibbett Phone Number _____
 Representing: ESL / UURI
 City: _____
 Subject: DOE Contract and Water samples

Distribution
 DOE-NV _____
 DOE-ID _____
 UURI Dennis, Mike W.
 EG&G Reservoir _____
 EG&G Environmental _____
 Monitor Team Secretary _____
 Other _____

Chan Swanberg said that he would be my official contact point with GEO. Tonto drilling is handling the Newberry hole and the mud program has been left to Tonto's discretion. Chan estimates 45 to 65 day to drill the 4,000 foot hole and plans just the first one for this year.

GEO still plans to start drilling on the 19th, of Aug. and is trying to obtain a letter of intent from DOE-Id. to clear funding. On about the 20th, Aug, Mike Johnson, the well site geologist, will start sending in morning reports. A copy of the report will be telexed to ESL and DOE-Id. Chan has finalized arrangements to borrow the U.S.G.S. down-hole water sampler.

Chan said that he would send me a copy of their drilling contract with Tonto to provide us with the specifications on the drill hole.

Signature Bruce



ID F-203
 Ref: E&T
 (Rev. 12-80)

Cascades Drilling,
 UNITED STATES DEPARTMENT OF ENERGY
 IDAHO OPERATIONS OFFICE

~~USER-COUPLED CONFIRMATION~~ DRILLING PROGRAM

MEMO OF CONVERSATION

Project: Southern New berry Hole
 Person Calling: Bruce Sibbett - Returning call Date 8-7-85
 Representing: ESL/UURI Time 11:15
 Person Called: Chan Swanberg Phone Number (415) 321-5662
 Representing: GRI, Geothermal
 City: Santa Rosa
 Subject: Water Sampling

Distribution
 DOE-NV _____
 DOE-ID _____
 UURI Dennis, Mike
 EG&G Reservoir _____
 EG&G Environmental _____
 Monitor Team Secretary _____
 Other _____

Chan Swanberg said that according to DOE, UURI would be responsible for water sampling at each bit change and at significant fluid entries. This would require the sampler to be on site continually. Chan offered to collect (his crew) the samples if he could barrow a sampler and be checked out on collecting samples. Chan said he may be able to get a sampler from the USGS, which would work at temperatures up to 280°C, but wanted to know if they could barrow out sampler and it's capabilities. I replied that I would have to check with Dennis Nielson, who is in Yellowstone, about the sampler.

Chan said they planned to spud the southern hole on Aug 18th. Also the drill site geologist will call in a morning report to the GRI office and they can telex us a copy of that report each day.

Signature _____

(Continue on reverse side)

To Bruce

Date 8-6 Time 12:12

WHILE YOU WERE OUT

Mr. Chas Swanberg

of _____

Phone (415) 321-5662

- | | |
|--|---|
| <input checked="" type="checkbox"/> TELEPHONED | <input checked="" type="checkbox"/> PLEASE CALL HIM |
| <input type="checkbox"/> CALLED TO SEE YOU | <input type="checkbox"/> PLEASE CALL HER |
| <input type="checkbox"/> WANTS TO SEE YOU | <input type="checkbox"/> WILL CALL AGAIN |

Message _____

Carolyn
Operator

Weststates Graphics & Printing Co.

2362 South Main • Salt Lake City, Utah 84115 • (801) 486-9533



GEO-Newberry Crater, Inc.
A Subsidiary of Geothermal Resources International, Inc.

Sept. 7, 1985

Bruce Sibbett
Univ. of Utah Research Inst.
391 Chipeta Way, Suite C
Salt Lake City, Utah
84108

Dear Bruce:

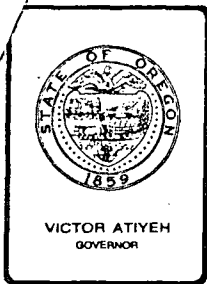
With respect to your Cascade Newsletter, the first release that you telecopied to me last week and which bears the date of September 1985 is acceptable to us as written. For future editions, we would appreciate your treating our data in the same manner as the Petroleum Information Geothermal Newsletter: that is the location, spud date, projected depth, drilling status, contractor, rig #, and similar information. As for temperature and geological data, we will be episodically be sending you news releases which contain such information and which you may edit as you see fit. We would also appreciate the opportunity to review any release prior to publication.

Very truly yours,

Chandler A. Swanberg, President

CAS/rs

cc: C. Chandler
J. Combs



Department of Geology and Mineral Industries
ADMINISTRATIVE OFFICE

1005 STATE OFFICE BLDG., PORTLAND, OREGON 97201 PHONE (503) 229-5580

June 6, 1986

Mr. Bruce Sibbett
University of Utah
Research Institute
391 Chipeta Way, Suite 8
Salt Lake City, UT 84108

Mr. Chan Swanberg
GEO Operator Corporation
2300 County Center Dr., Suite 250
Santa Rosa, CA 95401

Dear Bruce and Chan:

I understand you have each agreed to supply for our sample repository half of the 1985 samples from well N-1 at Newberry Crater. This sounds like a good answer to the problem and below I propose how this should be done. I don't know the availability of cuttings from the rotary drilled portion of the well (0' to 470'), but these samples are included in the proposed list.

The core samples to be submitted should be approximately 6 inches in length (or a split 6 inches in length) from the named depths.

DOE/UURI to submit:

- (1) cuttings samples at 30 ft intervals 0' to 450'
- (2) core samples from:

500'	900'	1180'	1350'	1600'
695'	960'	1230'	1375'	1750'
750'	1100'	1275'	1460'	1870'

GEO Operator to submit:

- (1) core samples from:

2000'	2530'	3100'	3600'	4000'
2230'	2600'	3200'	3700'	4100'
2400'	2750'	3300'	3800'	4300'
2500'	2930'	3430'	3900'	4500'

I hope this works as an equitable method of dividing the task of supplying us with the cuttings and cores. Thank you both for your efforts.

Sincerely,


Dennis L. Olmstead
Petroleum Engineer

DLO:ak

cc: Phillip M. Wright, UURI
Michael J. Cale, GEO Operator