GL019607

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

July 13, 1988

P.M. Wright
University of Utah Research Institute
Earth Science Laboratory Division
391 Chipeta Way, Suite C
Salt Lake City, Utah 84108

RE: Core Hole GEO N-3
Cooperative Agreement No. DE-FC07-851D12613
Deliverables for Phase II

Dear Mike:

Attached herewith are the following items which should satisfy our contractual agreement for Phase II deliverables. Specifically, please find:

a. Geochemical Data-fluids
b. Geochemical Data-Rocks
c. Age Data
d. Petrographic Analysis
e. Precipitation/Alteration Mineralogy
f. Dresser Atlas Temperature Log
g. Blackwell Temperature Log
h. Splits of core, cuttings, fluids, etc.
i. Plug and Abandonment Plan (to be forwarded).

Next week, GEO personnel is scheduled to meet with Bureau of Land Management (BLM) officials to finalize plans for plug and abandonment of both GEO N-1 and GEO N-3. Upon acceptance of these procedures, I will forward to you the plan for plug and abandonment for these wells. The actual work (P&A) is expected to occur this September or October.

61419 South Highway 97, Suite A, Bend, OR 97702 (503) 389-6681

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Please note that every "figure" has an accompanying "table". If you or any of your colleagues note any discrepancy, I would appreciate your bringing same to our attention so that the final report will be as accurate and consistent as possible.

Very truly yours,

Cliff Walkey

Cliff Walkey
Projects Coordinator

cc: J. Combs, w/o encl
C. Swanberg, w/encl
Santa Rosa:
B. Donaldson, w/encl

61419 South Highway 97, Suite A, Bend, OR 97702 (503) 389-6681

GEO N-3 CORE HOLE

D.O.E. phase 11 submittal

Cooperative Agreement No. DE-FC07-851D12613

Newberry Flank Unit

TABLE OF CONTENTS

FIGURE C2

GEOCHEMISTRY OF FLUIDS IN CORE HOLE GEO N-3. Fluid samples of the borehole were routinely collected from the core barrel during core retrieval. Clearly, these fluids are primarily drilling muds. However, value above background suggest the presence of aquifers which contribute formation fluids. Although Figure C2 illustrates only silica values, analyses were conducted for a variety of constituents (Table C2). Fluid samples were also collected from Baker tanks. Note that increasing silica content of fluids correlate with a conductive temperature gradient at 3700-3800 feet (see temperature profile Figure B6).

CORE HOLE GEO N-3

SILICA CONTENT

NEWBERRY VOLCANO, OREGON

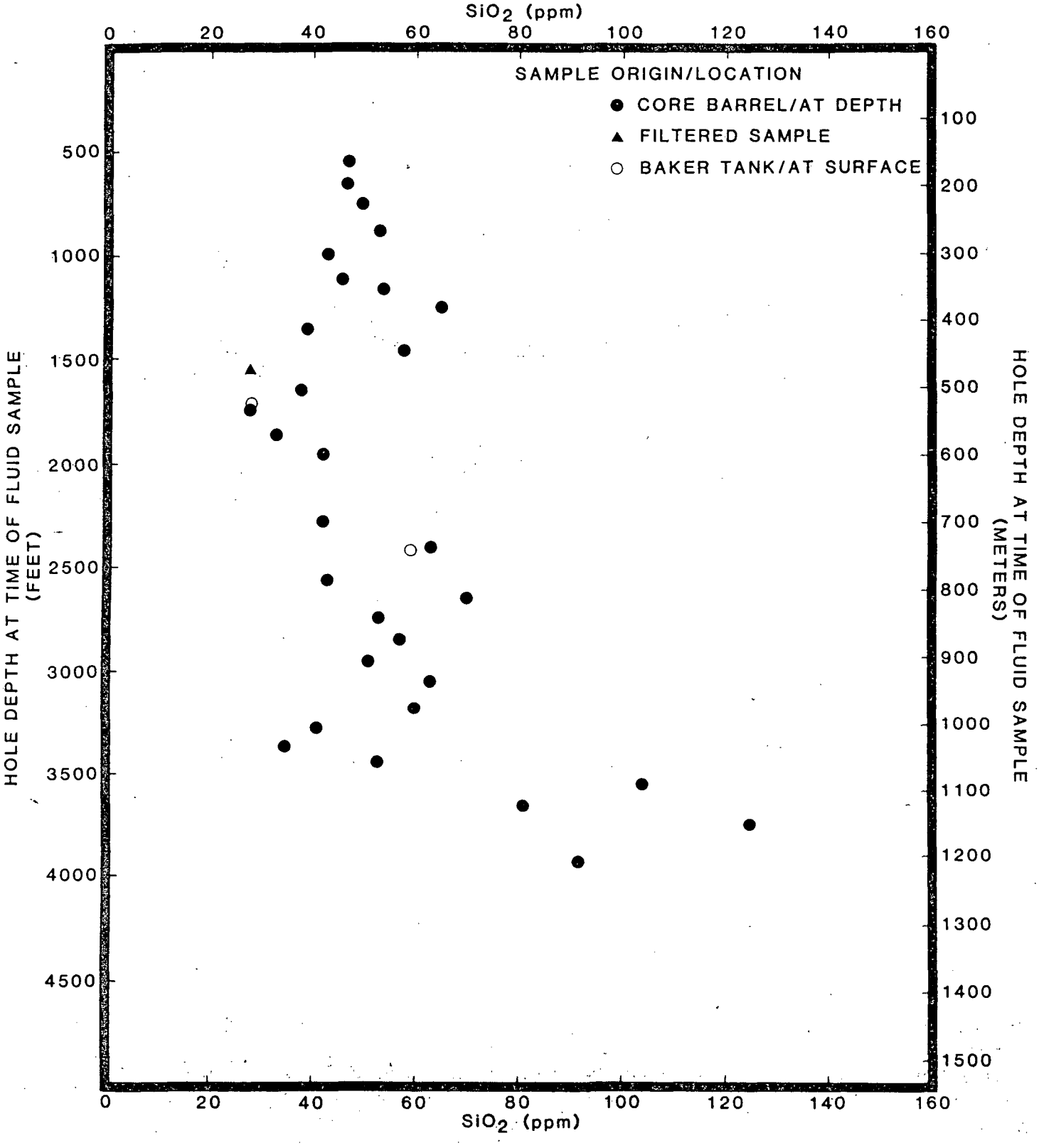


Figure C2

TABLE C2

Fluid Geochemistry for Core Hole GEO N-3

Sample #	Descriptor	ppm CL	ppb Hg	ppmw Co_2	PPM NA	K	CA	Mg	Fe	AL	Sio_2	SR
1	549'	15	-	412	143	1	0.9	-	0.1	1.3	47	0.04
2	668'	6	-	344	119	1	0.7	-	0.08	-	47	0.04
3	746'	5	-	315	221	3	4	1.0	0.93	2.5	50	0.24
4	866'	6	-	386	135	1	0.6	-	0.03	-	53	0.04
5	982'	3	-	364	122	1	1	-	0.08	1.3	43	0.05
6	1113'	3	-	371	141	1	1	-	0.12	1.4	46	0.04
7	1172'	8	-	383	144	1	0.9	-	0.02	-	54	0.04
8	1242'	3	-	367	164	1	0.6	-	0.03	0.6	65	0.04
9	1345'	4	-	257	95	1	1	0.6	0.05	0.7	39	0.03
10	1462'	3	-	223	168	1	2	0.7	0.64	1.1	58	0.04
11	*1549.5'	4	1.4	208	67	-	0.9	-	-	-	28	0.03
12	1637.5'	4	1.4	285	72	-	1.0	-	0.03	0.6	38	0.03
13	**1710'	4	1.7	306	66	-	0.5	-	-	-	28	0.01
14	1740.5'	6	1.7	246	69	-	0.5	-	-	-	28	0.01
15	1859.5'	5	1.9	199	68	-	0.6	-	-	-	33	0.01
16	1969'	4	64	293	70	-	0.9	-	0.06	-	42	0.02
17	2271'	4	1.8	255	98	-	0.6	-	-	-	42	0.02
18	2402'	5	1.7	292	119	-	1.0	-	0.21	1.0	63	0.04
19	**2409'	11	2.0	224	128	1	1	-	0.18	0.9	59	0.04
20	2557'	7	-	395	91	-	0.9	-	0.03	-	43	0.03
21	2641.5'	4	-	315	258	-	7	2	0.24	-	70	0.10
22	2742'	4	3.7	277	118	-	1	-	0.49	0.9	53	-
23	2842'	4	3.5	264	116	-	0.8	-	0.90	0.7	57	0.02
24	2948'	6	1.6	265	115	1	1	0.6	0.21	1.2	51	0.03
25	3041'	6	1.6	596	137	1	1	-	0.14	1.0	63	0.03
26	3173'	108	-	304	438	20	7	16	0.10	-	60	0.14
27	3276'	18	1.9	272	127	1	1	-	0.05	0.61	41	0.04
28	3364'	5	1.9	267	101	-	0.5	-	-	-	35	0.02
29	3440'	6	1.7	741	112	2	1	0.6	0.08	0.9	53	0.04
30	3542'	18	-	241	720	3	29	7	5.79	-	104	0.41
31	3652'	3	4.0	273	207	-	3	1	0.76	1.5	81	0.09
32	3743'	6	3.5	230	224	-	3	1	1.83	4.1	125	0.07
33	3923'	-	-	232	167	-	2	1.0	0.85	2.4	92	0.06
34	***	-	-	-	145	-	2	1	1.1	2.9	104	0.05

\- below detection limits
* filtered
** Bakertank
*** no depth reported

T E C2

Fluid Geochemistry for Core Hole GEO N-3

Sample #	Descriptor	PPM BA	V	Ag	Li	LA	CE	MN	ZN	B
1	549'	-	-	0.06	-	0.1	0.5	-	-	-
2	668'	-	-	0.07	-	0.2	0.5	-	-	-
3	746'	2.1	-	0.10	0.09	0.2	0.7	-	-	-
4	866'	-	1.0	0.08	-	0.2	0.5	-	-	-
5	982'	-	-	0.07	-	0.1	0.4	-	-	-
6	1113'	-	-	0.06	-	0.1	0.5	-	-	-
7	1172'	-	-	0.07	-	0.2	0.5	-	-	-
8	1242'	-	-	0.07	-	0.2	0.4	-	-	-
9	1345'	-	1	0.08	-	0.2	0.5	-	-	-
10	1462'	-	-	-	0.05	-	0.2	-	-	-
11	*1549.5'	-	-	0.06	-	0.1	0.4	-	-	-
12	1637.5'	-	-	0.06	-	0.1	0.4	-	-	-
13	**1710'	-	-	0.05	-	-	0.4	-	-	-
14	1740.5'	-	-	0.05	-	-	0.4	-	-	-
15	1859.5'	-	-	0.06	-	0.1	0.4	-	-	-
16	1969'	-	-	0.05	-	-	0.4	-	-	-
17	2271'	-	-	-	-	-	0.4	-	-	-
18	2402'	-	-	-	-	-	0.4	-	-	-
19	**2409'	-	-	-	-	-	0.3	-	-	-
20	2557'	-	-	-	-	-	0.3	-	-	-
21	2641.5'	-	-	-	-	-	-	0.4	-	-
22	2742'	-	-	-	-	-	0.3	-	0.2	-
23	2842'	-	-	-	-	-	0.3	-	-	-
24	2948'	-	-	-	-	-	0.3	-	-	-
25	3041'	-	-	-	-	-	0.3	-	-	-
26	3173'	-	-	-	0.19	-	-	-	-	4.9
27	3276'	-	-	-	-	-	0.3	-	-	0.3
28	3364'	-	-	-	-	-	0.4	-	-	-
29	3440'	-	1	0.08	0.05	0.2	0.6	-	-	-
30	3542'	0.9	-	-	0.07	-	-	0.8	1.1	-
31	3652'	-	-	-	-	-	-	-	-	-
32	3743'	-	-	-	-	-	-	-	0.3	-
33	3923'	-	-	-	-	-	-	-	-	0.1
34	***	-	-	-	-	-	0.3	-	-	-

- below detection limits
* filtered
** Bakertank
***no depth reported

UNIVERSITY OF UTAH RESEARCH INSTITUTE

UURI

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

October 15, 1986

Thermochem, Inc.
6119 Old Redwood Hwy., Suite A-2
Santa Rosa, CA 95401
707 575-1310
Attention: Paul Hirtz

REPORT

Sample	ppm Cl	ppb Hg	Sample	ppm Cl	ppb Hg
3340-1A	15	< .5	3340-18A	11	2.0
3340-2A	6	< .5	3340-19A	7	< 0.5
3340-3A	5	< .5	3340-20A	4	< 0.5
3340-4A	6	< .5	3340-21A	4	3.7
3340-5A	3	< .5	3340-22A	4	3.5
3340-6A	3	< .5	3340-23A	6	1.6
3340-7A	8	< .5	3340-24A	6	1.6
3340-8A	3	< .5	3340-25A	108	< 0.5
3340-9A	4	< .5	3340-26A	18	1.9
3340-10A	3	< .5	3340-27A	5	1.9
3340-11A	4	1.4	3340-28A	6	1.7
3340-12A	4	1.7	3340-29A	18	< 0.5
3340-13A	6	1.7	3340-30A	3	4.0
3340-14A	5	1.9	3340-31A	6	3.5
3340-15A	4	64	3340-32A	7	2.6
3340-16A	4	1.8	3340-33A	4	2.3
3340-17A	5	1.7			

Sample # 3340-11A was run on the ICP both filtered and unfiltered. The other two labled filtered (#3A and 29A) would not settle. Filtration was necessary in order to analyze them. The remaining samples were decanted.

RECEIVED
DATE 10/22/86 TIME
BY GEO NEWBERRY
GEO OPERATOR CORP

Ruth L. Kroneman
Chemist

File: UUKI
11-5

Thermochem, Inc.
Analytical Laboratory & Consulting Service
6119 Old Redwood Hwy., Ste. A-2
Santa Rosa, CA 95401
(707) 575-1310

Report of Analysis

Lab Number	Descriptor	PPM_w CO_2
3340-1	N-3 549'	412
3340-2	N-3 668'	344
3340-3	N-3 746'	315
3340-4	N-3 866'	386
3340-5	N-3 982'	364
3340-6	N-3 1113'	371
3340-7	N-3 1172'	383
3340-8	N-3 1242'	367
3340-9	N-3 1345'	257
3340-10	N-3 1462'	223
3340-11	N-3 1549.5'	208
3340-12	N-3 1637.5'	285
3340-13	MUDTANK @ 1710'	306
3340-14	N-3 1740.5'	246
3340-15	N-3 1859.5'	199
3340-16	N-3 1969'	293
3340-17	N-3 2271'	255
3340-18	N-3 2402'	292
3340-19	MUDTANK 2409'	224
3340-20	N-3 2557'	395
3340-21	N-3 2641.5'	315
3340-22	N-3 2742'	277
3340-23	N-3 2842'	264
3340-24	N-3 2948'	265
3340-25	N-3 3041'	596
3340-26	N-3 3173'	304
3340-27	N-3 3276'	272
3340-28	N-3 3364'	267
3340-29	N-3 3440'	741
3340-30	N-3 3542'	241
3340-31	N-3 3652'	273
3340-32	N-3 3743'	230
3340-33	N-3 3923'	232

THERMOCHEM/GEO

1 1A

ELEMENT		CONCENTRATION (PPM)
NA		143
K		1
CA		0.9
MG	<	0.488
FE		0.10
AL		1.3
SIO2		47
TI	<	0.122
P	<	0.610
SR		0.04
BA	<	0.610
V	<	1.22
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG		0.06
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN		0.1
W	<	0.122
LI	<	0.049
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA		0.1
CE		0.5
TH	<	2.44

THERMOCHEM/GEO

2 2-

ELEMENT		CONCENTRATION (PPM)
NA		119
K		1
CA		0.7
MG	<	0.488
FE		0.08
AL	<	0.610
SIO2		47
TI	<	0.122
P	<	0.610
SR		0.04
BA	<	0.610
V	<	1.22
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG		0.07
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI	<	0.049
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA		0.2
CE		0.5
TH		2.44

THERMOCHEM/GEO

3 3A FILT

ELEMENT		CONCENTRATION (PPM)
NA		221
K		3
CA		4
MG		1.0
FE		0.93
AL		2.5
SIO2		50
TI	<	0.200
P	<	1.00
SR		0.24
BA		2.1
V	<	2.00
CR	<	0.080
MN	<	0.400
CO	<	0.040
NI	<	0.200
CU	<	0.100
MO	<	2.00
PB	<	0.400
ZN	<	0.200
CD	<	0.100
AG		0.10
AU	<	0.160
AS	<	1.00
SB	<	1.20
BI	<	4.00
U	<	10.0
TE	<	2.00
SN	<	0.200
W	<	0.200
LI		0.09
BE	<	0.008
B	<	0.200
ZR	<	0.200
LA		0.2
CE		0.7
TH	<	4.00

THERMOCHEM/GEO

4 4A

ELEMENT		CONCENTRATION (PPM)
NA		135
K		1
CA		0.6
MG	<	0.488
FE		0.03
AL	<	0.610
SIO2		53
TI	<	0.122
P	<	0.610
SR		0.04
BA	<	0.610
V		1
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG		0.08
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI	<	0.049
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA		0.2
CE		0.5
TH	<	2.44

THERMOCHEM/GEO

5 5A

ELEMENT		CONCENTRATION (PPM)
NA		122
K		1
CA		1
MG	<	0.488
FE		0.08
AL		1.3
SIO2		43
TI	<	0.122
P	<	0.610
SR		0.05
BA	<	0.610
V	<	1.22
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG		0.07
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI	<	0.049
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA		0.1
CE		0.4
TH	<	2.44

THERMOCHEM/GEO

6 6A

ELEMENT		CONCENTRATION (PPM)
NA		141
K		1
CA		1
MG	<	0.488
FE		0.12
AL		1.4
SIO2		46
TI	<	0.122
P	<	0.610
SR		0.04
BA	<	0.610
V	<	1.22
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG		0.06
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI	<	0.049
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA		0.1
CE		0.5
TH	<	2.44

THERMOCHEM/GEO

7 7A

ELEMENT		CONCENTRATION (PPM)
NA		144
K		1
CA		0.9
MG	<	0.488
FE		0.02
AL	<	0.610
SIO2		54
TI	<	0.122
P	<	0.610
SR		0.04
BA	<	0.610
V	<	1.22
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG		0.07
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI	<	0.049
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA		0.2
CE		0.5
TH	<	2.44

THERMOCHEM/GEO

8 8A

ELEMENT		CONCENTRATION (PPM)
NA		164
K		1
CA		0.6
MG	<	0.488
FE		0.03
AL		0.6
SIO2		65
TI	<	0.122
P	<	0.610
SR		0.04
BA	<	0.610
V	<	1.22
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG		0.07
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI	<	0.049
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA		0.2
CE		0.4
TH	<	2.44

THERMOCHEM/GEO

9 9A

ELEMENT		CONCENTRATION (PPM)
NA		95
K		1
CA		1
MG		0.6
FE		0.05
AL		0.7
SIO2		39
TI	<	0.122
P	<	0.610
SR		0.03
BA	<	0.610
V		1
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG		0.08
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI	<	0.049
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA		0.2
CE		0.5
TH	<	2.44

THERMOCHEM/GEO

10 10A

ELEMENT		CONCENTRATION (PPM)
NA		168
K		1
CA		2
MG		0.7
FE		0.64
AL		1.1
SIO2		58
TI	<	0.122
P	<	0.610
SR		0.04
BA	<	0.610
V	<	1.22
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG	<	0.049
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI		0.05
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA	<	0.122
CE		0.2
TH	<	2.44

THERMOCHEM/GEO

11 11A FILT

ELEMENT		CONCENTRATION (PPM)
NA		67
K	<	1.22
CA		0.9
MG	<	0.488
FE	<	0.024
AL	<	0.610
SIO2		28
TI	<	0.122
P	<	0.610
SR		0.03
BA	<	0.610
V	<	1.22
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG		0.06
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI	<	0.049
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA		0.1
CE		0.4
TH	<	2.44

THERMOCHEM/GEO

12 11A UNFILT

ELEMENT		CONCENTRATION (PPM)
NA		72
K	<	1.22
CA		1.0
MG	<	0.488
FE		0.03
AL		0.6
SIO2		38
TI	<	0.122
P	<	0.610
SR		0.03
BA	<	0.610
V	<	1.22
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG		0.06
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI	<	0.049
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA		0.1
CE		0.4
TH	<	2.44

THERMOCHEM/GEO

13 12A

ELEMENT		CONCENTRATION (PPM)
NA		66
K	<	1.22
CA		0.5
MG	<	0.488
FE	<	0.024
AL	<	0.610
SIO2		28
TI	<	0.122
P	<	0.610
SR		0.01
BA	<	0.610
V	<	1.22
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG		0.05
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI	<	0.049
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA	<	0.122
CE		0.4
TH	<	2.44

THERMOCHEM/GEO

14 13A

ELEMENT		CONCENTRATION (PPM)
NA		69
K	<	1.22
CA		0.5
MG	<	0.488
FE	<	0.024
AL	<	0.610
SIO2		28
TI	<	0.122
P	<	0.610
SR		0.01
BA	<	0.610
V	<	1.22
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG		0.05
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI	<	0.049
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA	<	0.122
CE		0.4
TH	<	2.44

THERMOCHEM/GEO

15 14A

ELEMENT		CONCENTRATION (PPM)
NA		68
K	<	1.22
CA		0.6
MG	<	0.488
FE	<	0.024
AL	<	0.610
SIO2		33
TI	<	0.122
P	<	0.610
SR		0.01
BA	<	0.610
V	<	1.22
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG		0.06
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI	<	0.049
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA		0.1
CE		0.4
TH	<	2.44

THERMOCHEM/GEO

16 15A

ELEMENT		CONCENTRATION (PPM)
NA		70
K	<	1.22
CA		0.9
MG	<	0.488
FE		0.06
AL	<	0.610
SIO2		42
TI	<	0.122
P	<	0.610
SR		0.02
BA	<	0.610
V	<	1.22
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG		0.05
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI	<	0.049
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA	<	0.122
CE		0.4
TH	<	2.44

THERMOCHEM/GEO

17 16A

ELEMENT		CONCENTRATION (PPM)
NA		98
K	<	1.22
CA		0.6
MG	<	0.488
FE	<	0.024
AL	<	0.610
SIO2		42
TI	<	0.122
P	<	0.610
SR		0.02
BA	<	0.610
V	<	1.22
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG	<	0.049
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI	<	0.049
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA	<	0.122
CE		0.4
TH	<	2.44

THERMOCHEM/GEO

18 17A

ELEMENT		CONCENTRATION (PPM)
NA		119
K	<	1.22
CA		1
MG	<	0.488
FE		0.21
AL		1.0
SIO2		63
TI	<	0.122
P	<	0.610
SR		0.04
BA	<	0.610
V	<	1.22
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG	<	0.049
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI	<	0.049
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA	<	0.122
CE		0.4
TH	<	2.44

THERMOCHEM/GEO

18 18A
19?

ELEMENT		CONCENTRATION (PPM)
NA		128
K		1
CA		1
MG	<	0.488
FE		0.18
AL		0.9
SIO2		59
TI	<	0.122
P	<	0.610
SR		0.04
BA	<	0.610
V	<	1.22
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG	<	0.049
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI	<	0.049
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA	<	0.122
CE		0.3
TH	<	2.44

THERMOCHEM/GEO

20 19A

ELEMENT		CONCENTRATION (PPM)
NA		91
K	<	1.22
CA		0.9
MG	<	0.488
FE		0.03
AL	<	0.610
SIO2		43
TI	<	0.122
P	<	0.610
SR		0.03
BA	<	0.610
V	<	1.22
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG	<	0.049
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI	<	0.049
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA	<	0.122
CE		0.3
TH	<	2.44

THERMOCHEM/GEO

21 20A

ELEMENT		CONCENTRATION (PPM)
NA		258
K	<	1.22
CA		7
MG		2
FE		0.24
AL	<	0.610
SIO2		70
TI	<	0.122
P	<	0.610
SR		0.10
BA	<	0.610
V	<	1.22
CR	<	0.049
MN		0.4
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG	<	0.049
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI	<	0.049
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA	<	0.122
CE	<	0.244
TH	<	2.44

THERMOCHEM/GEO

22 21A

ELEMENT		CONCENTRATION (PPM)
NA		118
K	<	1.22
CA		1
MG	<	0.488
FE		0.49
AL		0.9
SIO2		53
TI	<	0.122
P	<	0.610
SR		0.02
BA	<	0.610
V	<	1.22
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
	<	0.061
[illegible]	<	1.22
PB	<	0.244
ZN		0.2
CD	<	0.061
AG	<	0.049
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI	<	0.049
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA	<	0.122
CE		0.3
TH	<	2.44

THERMOCHEM/GEO

23 22A

ELEMENT		CONCENTRATION (PPM)
NA		116
K	<	1.22
CA		0.8
MG	<	0.488
FE		0.09
AL		0.7
SIO2		57
TI	<	0.122
P	<	0.610
SR		0.02
BA	<	0.610
V	<	1.22
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG	<	0.049
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI	<	0.049
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA	<	0.122
CE		0.3
TH	<	2.44

THERMOCHEM/GEO

24 23A

ELEMENT		CONCENTRATION (PPM)
NA		115
K		1
CA		1
MG		0.6
FE		0.21
AL		1.2
SIO2		51
TI	<	0.122
P	<	0.610
SR		0.03
BA	<	0.610
V	<	1.22
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG	<	0.049
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI	<	0.049
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA	<	0.122
CE		0.3
TH	<	2.44

THERMOCHEM/GEO

25 24A

ELEMENT		CONCENTRATION (PPM)
NA		137
K		1
CA		1
MG	<	0.488
FE		0.14
AL		1.0
SIO2		63
TI	<	0.122
P	<	0.610
SR		0.03
BA	<	0.610
V	<	1.22
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG	<	0.049
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI	<	0.049
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA	<	0.122
CE		0.3
TH	<	2.44

THERMOCHEM/GEO

26 25A

ELEMENT	CONCENTRATION (PPM)
NA	
K	438
CA	20
MG	7
FE	16
AL	0.10
SIO2	0.610
TI	60
P	0.122
SR	0.610
BA	0.14
V	0.610
CR	1.22
MN	0.049
CO	0.244
NI	0.024
	0.122
MO	0.061
PB	1.22
ZN	0.244
CD	0.122
AG	0.061
AU	0.049
AS	0.098
SB	0.610
BI	0.732
U	2.44
TE	6.10
SN	1.22
W	0.122
LI	0.122
BE	0.19
B	0.005
ZR	4.9
LA	0.122
CE	0.122
TH	0.244
	2.44

THERMOCHEM/GEO

27 26A

ELEMENT		CONCENTRATION (PPM)
NA		127
K		1
CA		1
MG	<	0.488
FE		0.05
AL	<	0.610
SIO2		41
TI	<	0.122
P	<	0.610
SR		0.04
BA	<	0.610
V	<	1.22
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG	<	0.049
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI	<	0.049
BE	<	0.005
B		0.3
ZR	<	0.122
LA	<	0.122
CE		0.3
TH	<	2.44

THERMOCHEM/GEO

28 27A

ELEMENT		CONCENTRATION (PPM)
NA		101
K	<	1.22
CA		0.5
MG	<	0.488
FE	<	0.024
AL	<	0.610
SIO2		35
TI	<	0.122
P	<	0.610
SR		0.02
BA	<	0.610
V	<	1.22
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG	<	0.049
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI	<	0.049
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA	<	0.122
CE		0.4
TH	<	2.44

THERMOCHEM/GEO

29 28A

ELEMENT		CONCENTRATION (PPM)
NA		112
K		2
CA		1
MG		0.6
FE		0.08
AL		0.9
SIO2		53
TI	<	0.122
P	<	0.610
SR		0.04
BA	<	0.610
V		1
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG		0.08
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI		0.05
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA		0.2
CE		0.6
TH	<	2.44

THERMOCHEM/GEO

30 29A

ELEMENT		CONCENTRATION (PPM)
NA		720
K		3
CA		29
MG		7
FE		5.79
AL	<	0.610
SIO2		104
TI	<	0.122
P	<	0.610
SR		0.41
BA		0.9
V	<	1.22
CR	<	0.049
MN		0.8
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN		1.1
CD	<	0.061
AG	<	0.049
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI		0.07
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA	<	0.122
CE	<	0.244
TH	<	2.44

THERMOCHEM/GEO

31 30A

ELEMENT		CONCENTRATION (PPM)
NA		207
K	<	1.22
CA		3
MG		1
FE		0.76
AL		1.5
SIO2		81
TI	<	0.122
P	<	0.610
SR		0.09
BA	<	0.610
V	<	1.22
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG	<	0.049
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI	<	0.049
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA	<	0.122
CE	<	0.244
TH	<	2.44

THERMOCHEM/GEO

32 31A

ELEMENT		CONCENTRATION (PPM)
NA		224
K	<	1.22
CA		3
MG		1
FE		1.83
AL		4.1
SIO2		125
TI	<	0.122
P	<	0.610
SR		0.07
BA	<	0.610
V	<	1.22
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN		0.3
CD	<	0.061
AG	<	0.049
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI	<	0.049
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA	<	0.122
CE	<	0.244
TH	<	2.44

THERMOCHEM/GEO

33 32A

ELEMENT		CONCENTRATION (PPM)
NA		167
K	<	1.22
CA		2
MG		1.0
FE		0.85
AL		2.4
SIO2		92
TI	<	0.122
P	<	0.610
SR		0.06
BA	<	0.610
V	<	1.22
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG	<	0.049
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI	<	0.049
BE	<	0.005
B		0.1
ZR	<	0.122
LA	<	0.122
CE	<	0.244
TH	<	2.44

THERMOCHEM/GEO

34 33A

ELEMENT		CONCENTRATION (PPM)
NA		145
K	<	1.22
CA		2
MG		1
FE		1.10
AL		2.9
SIO2		104
TI	<	0.122
P	<	0.610
SR		0.05
BA	<	0.610
V	<	1.22
CR	<	0.049
MN	<	0.244
CO	<	0.024
NI	<	0.122
CU	<	0.061
MO	<	1.22
PB	<	0.244
ZN	<	0.122
CD	<	0.061
AG	<	0.049
AU	<	0.098
AS	<	0.610
SB	<	0.732
BI	<	2.44
U	<	6.10
TE	<	1.22
SN	<	0.122
W	<	0.122
LI	<	0.049
BE	<	0.005
B	<	0.122
ZR	<	0.122
LA	<	0.122
CE		0.3
TH	<	2.44

FIGURE C1

VOLCANIC STRATIGRAPHY AND BOTTOM HOLE TEMPERATURES DURING DRILLING FOR GEO N-3, NEWBERRY VOLCANO, OREGON. Because BHTs are generalized in this figure, the reader should refer to Table B1 for more detailed information. Note the bimodal character with more felsic units from (3200-3753) feet. The lithographic column was constructed as a result of geologic logging and comparisons to geochemical analyses. Temperature data comes from drilling reports, and GEO personnel are responsible for the stratigraphic interpretations. The whole-rock analyses are included in Tables C 1/1 and C 1/2.

TEMPERATURE GRADIENT CORE HOLE SUMMARY

Name GEO CORE HOLE N-3

Company GEO NEWBERRY Lease _____ County DESCHUTES

Location 4100 N and 500' E of SW Corner Sec 24 T 20S R. 12E

Spud Date 6-2-86 Completed 7-31-86 Depth 4002'

BOTTOM HOLE TEMPERATURES WHILE DRILLING

☒ Feet ☐ Meters ☒ °F ☐ °C

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
565.5	∠60	2767.5	< 60		
663	< 60	2864	64		
942	< 60	3061	77/78		
1177	60	3160	103/103		
1272	64	3213	103/103		
1381.5	63	3320	94/94		
1477	< 60	3377.5	92/92		
1572	< 60	3422	110/110		
1670.5	< 60	3463.5	123		
1783	< 60	3509	103/103		
1845	< 60	3612	103/101		
1947	< 60	3562	106/105		
2044	< 60	3709	105/90		
2092	< 60	3662	101/101		
2182	< 60	3763	102/103		
2288.5	< 60	3858.5	103/104		
2359.5	< 60	3812	135/136		
2461	< 60	3908.5	130/130		
2563	64	3961	118/120		
2663	60				

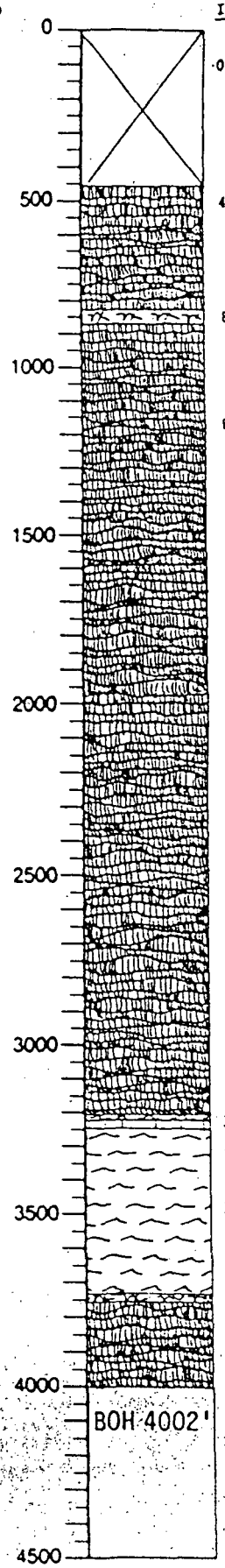
COMMENTS:

ARTESIAN FLOW ~ 3800'

WATER ENTRIES:

HOT WATER ENTERS ~3800' FLOWS UP TO ~1900'

LITHOLOGY — MINERALOGY



INTERVAL/FT.	DESCRIPTION
0-450	No sample.
450-820	Basalt flows intercalated with interflow breccias and scoria deposits.
820-862	Andesite flow.
862-3195	Basalt and basaltic andesite flow intercalated with interflow breccias and scoria deposits. Minor sporadic lithic tuffs and vitric tuffs ranging from rhyodacite to andesite in composition.
3195-3209	Rhyodacite flow.
3209-3242	Basalt flows.
3242-3729	Rhyodacite flows and rhyodacitic black glass flows.
3729-3753	Andesitic lithic tuffs.
3753-4002	Basalt flows intercalated with interflow breccias and scoria deposits.

Figure C1

TABLE C 1/1

WHOLE ROCK ANALYTICAL RESULTS OF CORE HOLE GEO N-3

Sample# GEO	Depth in ft.	Name	Reported as percentage oxides Si	Al	Fe	Mg	CA	NA	K	Ti	LOI	BA	Total
31	487	B	54.9	18.8	7.8	4.3	9.6	3.8	0.8	1.1	< 0.05	0.029	101.455
32	852	A	61.5	16.3	7.3	2.3	5.1	4.9	1.7	1.1	< 0.05	0.074	100.809
33	1062	B	52.8	19.3	8.8	4.1	9.6	3.8	0.7	1.3	< 0.05	0.029	100.787
34	1702	BA	55.1	16.7	9.3	4.8	8.6	4.0	0.9	1.4	< 0.05	0.045	101.330
35	1796	*B (T)	49.9	27.8	7.2	1.1	2.2	1.7	0.6	1.2	9.15	0.166	92.220
36	1862	B	54.0	19.5	7.4	4.0	9.2	3.5	0.9	1.0	0.09	0.033	99.842
37	1949	BA	55.7	19.5	7.1	4.0	8.7	3.9	1.0	1.0	< 0.05	0.037	101.127
38	2216	BA	56.3	17.6	9.1	4.6	7.8	4.2	1.0	1.3	< 0.05	0.039	102.179
39	2275	B	52.3	20.8	7.5	4.1	10.5	3.5	0.7	1.0	< 0.05	0.029	100.629
40	2343	B	53.9	19.9	7.4	3.9	9.6	3.8	0.9	1.1	< 0.05	0.034	100.704
41	2387	B	52.8	17.0	10.0	5.3	8.6	3.4	0.7	1.5	< 0.05	0.032	100.325
42	2441	B	52.3	16.7	10.7	5.5	9.0	3.9	0.7	1.5	< 0.05	0.031	100.910
43	2511	RD (T)	71.7	13.6	2.5	0.5	1.4	3.5	4.4	0.3	2.29	0.122	98.111
44	2538	B	48.7	16.8	10.5	8.8	10.14	3.1	0.3	1.4	< 0.05	0.011	100.116
45	2644	B	50.3	16.6	9.2	6.8	9.7	3.1	0.5	1.4	0.47	0.021	97.999
46	2799	B	50.4	16.8	10.5	6.7	9.8	3.4	0.4	1.4	< 0.05	0.018	99.663
47	2881	B	49.2	16.6	10.5	7.7	9.4	3.1	0.5	1.3	1.16	0.021	98.678
48	3098	B	51.7	17.1	10.2	5.3	8.4	4.0	0.7	1.4	0.05	0.033	99.185
49	3132	A (T)	62.8	14.8	6.4	1.5	3.2	2.1	4.2	1.1	2.35	0.084	96.539
50	3239	B	54.4	19.6	6.8	3.4	8.8	3.8	0.9	0.93	0.96	0.040	98.910
51	3262	RD	71.7	13.7	3.0	0.2	1.1	5.0	3.7	0.4	0.56	0.124	98.914
52	3311	RD	72.2	14.0	3.0	0.2	0.9	5.1	3.7	0.4	0.28	0.122	99.729
53	3365	RD	71.3	14.7	3.6	0.3	1.4	5.6	3.3	0.5	0.47	0.111	101.005
54	3472	RD	72.0	14.5	3.8	0.3	1.2	5.9	3.4	0.5	0.64	0.112	101.824
55	3608	RD	70.9	14.5	3.9	0.4	1.2	5.7	3.3	0.5	0.51	0.109	100.638
56	3741	BA (T)	58.1	14.8	10.3	2.5	5.5	4.8	1.6	1.9	< 0.05	0.061	100.217
57	3790	B	48.7	18.9	10.3	4.2	11.1	3.3	0.3	1.3	2.03	0.022	98.411
58	3961	B	49.7	17.0	10.3	6.4	9.7	3.2	0.5	1.4	1.16	0.019	98.552

* (T) denotes analysis of ash in tuff unit

Basalt	< 55%	SiO2
Basaltic andesite	55-60%	SiO2
Andesite	60-65%	SiO2
Dacite	65-70%	SiO2
Rhyodacite	70-75%	SiO2
Rhyolite	> 75%	SiO2

TABLE C 1/2

WHOLE ROCK ANALYTICAL RESULTS OF CORE HOLE GEO N-3

Reported as trace elements ppm

Sample # GEO	Depth in ft.	Name	Sr	Cr	Co	Ni	Cu	Zn	Li	Be	Zr	La	Ce	LOI	Total
31	487	B	489	129	34	42	85	71	6	1.3	87	18	ND**	<0.05	101.455
32	852	A	374	43	22	17	20	87	13	1.7	143	22	ND	<0.05	100.809
33	1062	B	499	72	36	34	59	80	7	1.4	94	18	ND	<0.05	100.787
34	1702	BA	458	141	28	46	67	86	9	1.6	134	24	ND	<0.05	101.330
35	1796	*B (T)	283	22	7	10	22	125	99	4.0	560	46	71	9.15	92.220
36	1862	B	495	133	40	69	119	69	7	1.3	92	18	ND	0.09	99.842
37	1949	BA	481	125	30	65	50	65	7	1.4	104	19	ND	<0.05	101.127
38	2216	BA	435	112	31	53	70	85	8	1.6	111	19	ND	<0.05	102.179
39	2275	B	528	118	30	49	61	62	7	1.3	83	24	16	<0.05	100.629
40	2343	B	488	115	33	41	56	71	10	1.4	99	24	14	<0.05	100.704
41	2387	B	443	117	37	48	85	83	8	1.6	103	24	13	<0.05	100.325
42	2441	B	414	160	41	56	95	91	9	1.7	111	25	15	<0.05	100.910
43	2511	RD (T)	100	8	20	5	9	44	27	2.0	176	32	42	2.29	98.111
44	2538	B	277	273	55	176	80	74	6	1.5	100	22	ND	<0.05	100.116
45	2644	B	358	171	39	108	49	72	9	1.5	103	25	17	0.47	97.999
46	2799	B	360	144	49	95	147	96	7	1.5	96	23	11	<0.05	99.663
47	2881	B	290	241	45	127	168	89	12	1.6	99	23	11	1.16	98.678
48	3098	B	475	109	38	19	27	93	8	1.6	104	25	19	0.30	99.185
49	3132	A (T)	364	8	20	7	17	109	18	2.3	252	34	46	2.35	96.539
50	3239	B	475	93	24	55	45	71	9	1.5	118	25	15	0.96	98.910
51	3262	RD	90	23	19	11	7	56	28	2.6	411	35	49	0.56	98.914
52	3311	RD	89	20	9	10	6	60	9	2.5	405	30	40	0.28	99.729
53	3365	RD	122	143	16	60	9	98	21	2.7	415	39	60	0.47	101.005
54	3472	RD	116	66	9	29	8	91	19	2.8	451	34	49	0.64	101.824
55	3608	RD	119	54	18	24	7	92	18	2.8	427	36	55	0.51	100.638
56	3741	BA (T)	272	26	26	15	22	122	10	2.4	241	31	33	<0.05	100.217
57	3790	B	436	193	41	136	89	89	20	1.5	90	23	ND	2.03	98.411
58	3961	B	338	173	42	129	72	79	8	1.4	90	20	ND	1.16	98.552

* (T) denotes analysis of ash in tuff unit

** ND = not detected

Basalt	< 55%	SiO2
Basaltic andesite	55-60%	SiO2
Andesite	60-65%	SiO2
Dacite	65-70%	SiO2
Rhyodacite	70-75%	SiO2
Rhyolite	> 75%	SiO2

FIGURE C8

K/AR AGE DATES FOR CORE HOLE GEO N-3. Samples were submitted to the University of Arizona Laboratory of Isotope Geochemistry where rocks were ground, sieved to 100-150 mesh, and the feldspar-rich fraction concentrated using magnetic and heavy-liquid separation techniques. The basic data is included in Table C8.

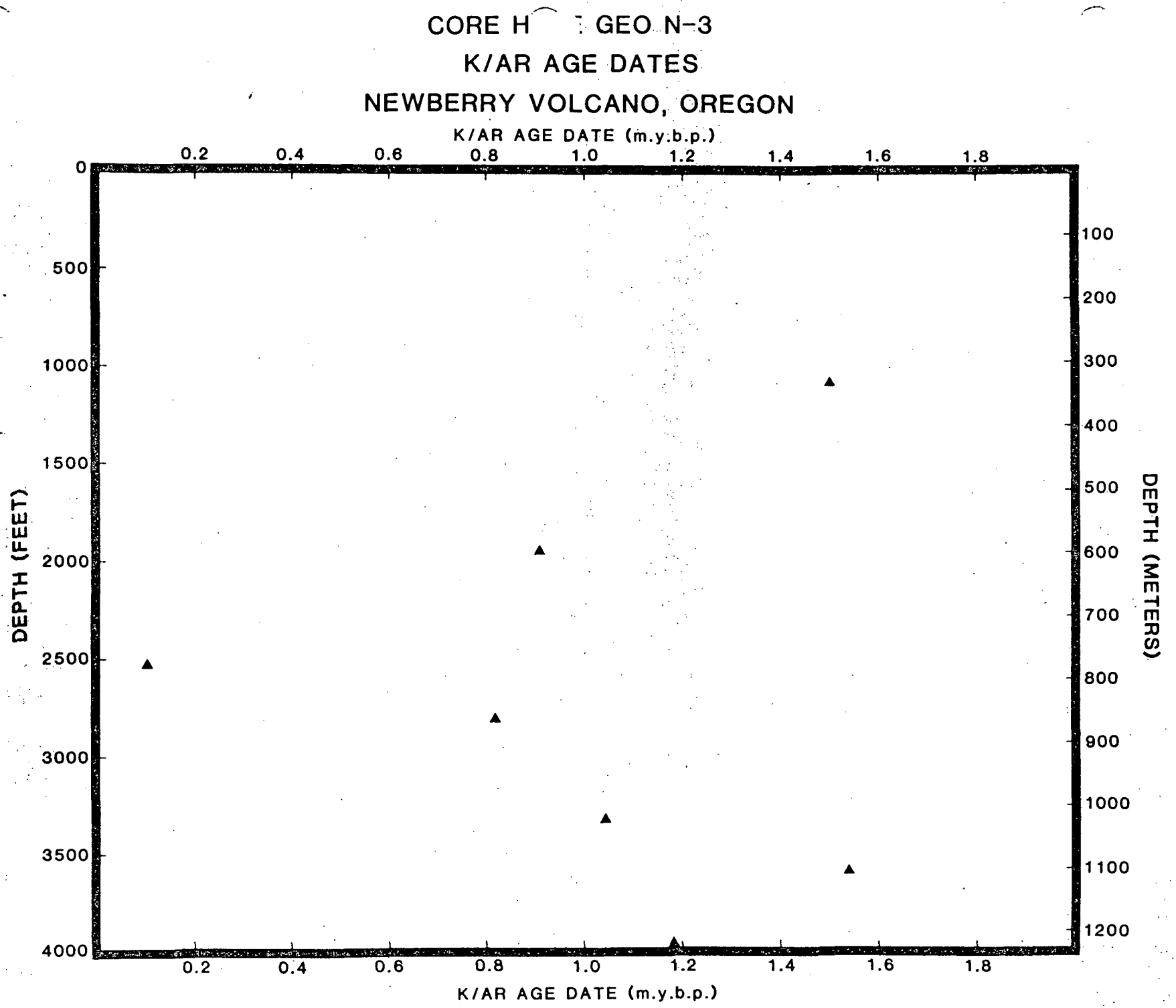

CORE H[illegible] GEO N-3
K/AR AGE DATES
NEWBERRY VOLCANO, OREGON
K/AR AGE DATE (m.y.b.p.)
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
0
500
1000
1500
2000
2500
3000
3500
4000
DEPTH (FEET)
100
200
300
400
500
600
700
800
900
1000
1100
1200
DEPTH (METERS)

Figure C8

TABLE C8

K/AR AGE DATES: CORE HOLE GEO N-3

Newberry Volcano, Oregon

Sample # GEO	Sample # U.A.*	Depth/ft.	Description	Age (mybp)
1	86-207	1062	phyric basalt	1.50 + 0.63
2	86-208	1949	phyric basaltic andesite	0.911 + 0.188
3	86-209	2524	lithic tuff	0.109 + 0.081
4	86-210	2799	basalt	0.819 + 0.113
5	86-211	3312	rhyodacitic flow	1.04 + 0.03
6	86-212	3608	rhyodacitic flow	1.54 + 0.05
7	86-213	3961	basalt	1.18 + 0.30

* University of Arizona Isotope Laboratory

University of Arizona
Isotope Geochemistry Laboratory
Date of Report: 9 Feb 1987

Project: GEO-NEWBERRY Crater Inc
Cliff Walkey
Walter Randall

Sample Number
UAKA 86-207 Originator's - N-3 #1

Sample Information
Basalt, groundmass feldspar concentrate,
Newberry Volcano, east of High Cascade axis, Oregon

Analytical Data

Potassium Data	Potassium Mean	Radiogenic Ar pm/g Data	Radiogenic Ar pm/g Mean	% Atm. Ar Data	% Atm. Ar Mean	Reported Date + Err
0.471	0.472	1.376	1.232	99.0	98.8	1.50 + 0.63
0.472		1.136		98.7		
0.472		1.171		99.0		
0.474		1.209		99.0		
		1.270		98.6		

Sample Number
UAKA 86-208 Originator's - N-3 # 2

Sample Information
Basalt, groundmass feldspar concentrate,
Newberry Volcano, east of High Cascade axis, Oregon

Analytical Data

Potassium Data	Potassium Mean	Radiogenic Ar pm/g Data	Radiogenic Ar pm/g Mean	% Atm. Ar Data	% Atm. Ar Mean	Reported Date + Err
0.727	0.728	1.249	1.151	95.9	96.3	0.911 +0.188
0.728		1.173		96.2		
0.730		1.117		96.4		
		1.066		96.8		

University of Arizona
Isotope Geochemistry Laboratory
Date of Report: 9 Feb 1987

Project: GEO-NEWBERRY Crater Inc
Cliff Walkey
Walter Randall

Sample Number
UAKA 86-209 Originator's - N-3 #3

Sample Information
Lithic tuff, feldspar concentrate with some glass,
Newberry Volcano, east of High Cascade axis, Oregon

Analytical Data

Potassium Data	Potassium Mean	Radiogenic Ar pm/g Data	Radiogenic Ar pm/g Mean	% Atm. Ar Data	% Atm. Ar Mean	Reported Date + Err
3.604	3.614	0.696	0.686	99.7	99.4	0.109 +0.081
3.626		0.777		99.6		
3.648		0.404		99.8		
3.577		0.868		98.7		

Sample Number
UAKA 86-210 Originator's - N-3 #4

Sample Information
Basalt, groundmass feldspar concentrate,
Newberry Volcano, east of High Cascade axis, Oregon

Analytical Data

Potassium Data	Potassium Mean	Radiogenic Ar pm/g Data	Radiogenic Ar pm/g Mean	% Atm. Ar Data	% Atm. Ar Mean	Reported Date + Err
0.388	0.387	0.487	0.550	95.1	94.5	0.819 +0.113
0.383		0.605		94.0		
0.384		0.5		95.4		
0.398		0.607		93.7		
0.386						
0.381						

RECEIVED
DATE 3/9/87 TIME Mail
BY GEO NEWBERRY
GEO OPERATOR CORP

File: Univ. of Arizona N-3

University of Arizona
Isotope Geochemistry Laboratory
Date of Report: 9 Feb 1987

Project: GEO-NEWBERRY Crater Inc
Cliff Walkey
Walter Randall

Sample Number
UAKA 86-211 Originator's - N-3 # 5

Sample Information
Rhyodacite, groundmass feldspar concentrate,
Newberry Volcano, east of High Cascade axis, Oregon

Analytical Data

Potassium Data	Potassium Mean	Radiogenic Ar pm/g Data	Radiogenic Ar pm/g Mean	% Atm. Ar Data	% Atm. Ar Mean	Reported Date + Err
2.892	2.906	5.400	5.241	64.0	65.7	1.04 + 0.03
2.906		5.272		65.7		
2.919		5.050		67.1		
		5.241		65.9		

Sample Number
UAKA 86-212 Originator's - N 3 # 6

Sample Information
Rhyodacite, groundmass feldspar concentrate,
Newberry Volcano, east of High Cascade axis, Oregon

Analytical Data

Potassium Data	Potassium Mean	Radiogenic Ar pm/g Data	Radiogenic Ar pm/g Mean	% Atm. Ar Data	% Atm. Ar Mean	Reported Date + Err
2.549	2.574	6.896	6.882	58.3	59.0	1.54 + 0.05
2.578		6.917		59.1		
2.594		6.855		59.4		
		6.860		59.3		

Sample Number
UAKA 86-213 Originator's - N-3 #7

Sample Information
Basalt, groundmass feldspar concentrate,
Newberry Volcano, east of High Cascade axis, Oregon

Analytical Data

Potassium Data	Potassium Mean	Radiogenic Ar pm/g Data	Radiogenic Ar pm/g Mean	% Atm. Ar Data	% Atm. Ar Mean	Reported Date + Err
0.351	0.354	0.762	0.722	97.6	97.8	1.18 + 0.30
0.354		0.773		97.6		
0.357		0.631		98.1		

Thin Section Descriptions
Newberry Crater Core Hole N-3

Depth: 487'

Rock Type: (from whole rock geochemistry) Basaltic Andesite

Description: Holocrystalline, seriate-glomeroporphyritic; Phenocrysts of subhedral to euhedral labradorite plagioclase laths up to 2.1mm, minor subhedral to euhedral olivine crystals up to 0.9mm and trace rounded to subhedral augite crystals up to 0.6mm in an intergranular matrix of labradorite microlaths, granular clinopyroxene <.01mm and granular iron ore <.01mm.

Depth: 848'

Rock Type: Andesite

Description: Holocrystalline, very fine grained equigranular, pilotaxitic. Flow banded euhedral laths and microlaths of labradorite plagioclase up to 0.4mm in an intergranular matrix of granular clinopyroxene <.01mm and granular iron ore.

Depth: 1062'

Rock Type: Basaltic Andesite

Description: Holocrystalline, seriate-glomeroporphyritic, locally subophitic; Euhedral laths of labradorite plagioclase, 0.1 to 2.6mm, and trace phenocrysts of subhedral to rounded olivine up to 0.8mm in a subophitic to granular matrix of clinopyroxene with very rare granular iron ore <.01mm.

Depth: 1266'

Rock Type: N/A

Description: Hypohyaline, crystal lapilli tuff, unwelded; Globular to arcuate lapilli of phenocryst-bearing glass and pumice up to 6.0mm and minor (10%) lapilli of basaltic cinder scoria, 0.1 to 3.0mm, in a frothy vitroclastic glass groundmass. Phenocrysts consist of euhedral to subhedral labradorite laths, <.01 to 0.4mm, and rare euhedral columnar augite, <0.1 to 0.2mm. Glass and pumice has been altered to a yellow brown to red brown palagonite.

Depth: 1353'

Rock Type: Basaltic Andesite

Description: Holocrystalline, seriate-glomeroporphyritic, vesicular; Euhedral laths of labradorite, .01 to 1.8mm, and subhedral to rounded

grains of olivine up to 0.8mm in an intergranular matrix of rounded to anhedral grains of clinopyroxene, 0.005 to 0.2mm, and rare iron ores <.01mm. Vesicles are elongate, generally rounded cavities up to 2.5mm in length; diktytaxitic.

Depth: 1702'

Rock Type: Basaltic Andesite

Description: Holocrystalline, fine grained equigranular, weakly pilotaxitic, vesicular. Euhedral laths of labradorite plagioclase, <0.01 to 0.6mm, and minor subhedral to rounded grains of olivine and augite, up to 0.3mm, in an intergranular matrix of granular clinopyroxene, olivine and trace iron oxides <.01mm. Vesicles are subrounded bubble cavities up to 0.4mm; diktytaxitic.

Depth: 1791'

Rock Type: N/A

Description: Hypohyaline, crystal lapilli tuff, unwelded; Crystal-bearing glassy lapilli and rare pumiceous fragments up to 7.0mm rounded fragments of cinder scoria and basalt up to 6.0mm in a crystal-rich ashy matrix. Abundant euhedral laths of plagioclase (labradorite?), <0.1 to 0.6mm, very minor columnar to anhedral phenocrysts of augite up to 0.5mm and very rare olivine crystals up to 0.4mm. Glass material has been altered to yellow brown palagonite.

Depth: 1796'

Rock Type: Basalt

Description: Hypohyaline, vitric tuff, densely welded. Agglomerated lapilli and fiamme of yellow brown glass up to 1cm in length in a matrix of yellow brown to reddish brown crystal-rich ash and vitroclastic material. Fluidal banding well developed. Phenocrysts include plagioclase, clinopyroxene and iron ore. Also contains lithic fragments of cinder scoria, basalt and rhyodacite(?).

Depth: 1827'

Rock Type: N/A (Basaltic Andesite?)

Description: Hypohyaline, porphyritic, vesicular; Euhedral laths of labradorite plagioclase, <0.01 to 1.0mm, with trace subhedral to rounded grains of clinopyroxene and very rare olivine <0.1mm in a frothy, vesicular green glass groundmass. Round bubble-shaped vesicles up to 0.5mm are also present.

Depth: 1861'

Rock Type: Basaltic Andesite

Description: Hypocrystalline, seriate-glomeroporphyritic; Euhedral laths of labradorite plagioclase, <0.01 to 3.4mm, with minor subhedral, embayed olivine, <0.01 to 1.2mm, and trace subhedral to granular augite, <0.01mm to 0.6mm, in an intersertal dark green glassy groundmass. Groundmass contains abundant microlites and cryptolites of plagioclase, clinopyroxene and iron ore.

Depth: 1949'

Rock Type: Basaltic Andesite

Description: Holocrystalline, seriate-glomeroporphyritic; Euhedral laths of labradorite plagioclase, 0.02 to 4.0mm, with rare subhedral, embayed crystals of olivine up to 1.1mm and very rare subhedral columnar augite up to 0.35mm, in an intergranular matrix of plagioclase microlites, granular clinopyroxene and granular iron ore. Olivine is partially altered to iddingsite.

Depth: 2102'

Rock Type: N/A (Basaltic Andesite?)

Description: Holocrystalline, seriate glomeroporphyritic; Euhedral laths of labradorite plagioclase, 0.02 to 3.0mm, with rare subhedral to rounded grains up to 0.3mm of olivine and augite in an intergranular matrix of plagioclase microlites and granular clinopyroxene and iron ore <0.01mm. Olivines are partially altered to iddingsite.

Depth: 2216'

Rock Type: Basaltic Andesite

Description: Holocrystalline, seriate, pilotaxitic. Euhedral and embayed and sieve-textured bytownite plagioclase laths (approximately 5% of total rock) up to 2.3mm and rare embayed grains of olivine up to 0.3mm in an intergranular matrix of labradorite plagioclase laths, granular clinopyroxene and granular iron ore. Microlites display subparallel orientations.

Depth: 2275'

Rock Type: Basaltic Andesite

Description: Holocrystalline, seriate-glomeroporphyritic, vesicular; Euhedral laths of labradorite plagioclase, 0.2 to 4.0mm, with minor subhedral to rounded grains of augite, up to 0.4mm, and rare subhedral, embayed grains of olivine, up to 0.7mm, in an intergranular matrix of plagioclase microlites, granular clinopyroxene and granular iron oxides. Vesicles are rounded to elongate cavities, 0.2 to 0.8mm; diktytaxitic.

Depth: 2343'

Rock Type: Basaltic Andesite

Description: Holocrystalline, seriate-glomeroporphyritic, Euhedral laths of labradorite plagioclase, 0.1 to 3.2mm, with rare subhedral, embayed olivine grains up to 0.3mm and subhedral, embayed augite grains up to 0.4mm in an intergranular matrix of plagioclase microlites, granular clinopyroxene and granular iron ore.

Depth: 2387'

Rock Type: Basaltic Andesite

Description: Holocrystalline, very fine grained equigranular, ophimottled, pilotaxitic, vesicular; Euhedral labradorite plagioclase laths, 0.1 to 0.3mm with rare phenocrysts up to 0.6mm in an intergranular matrix that grades from granular clinopyroxene with subordinant granular iron ore to subophitic clinopyroxene to intermeshed ophimottle plates of clinopyroxene up to 0.4mm. Vesicles are irregular to rounded cavities up to 0.75mm; diktytaxitic. Plagioclase microlaths display subparallel orientations.

Depth: 2441'

Rock Type: Basaltic Andesite

Description: Holocrystalline, very fine grained equigranular, pilotaxitic; Euhedral laths of labradorite plagioclase, <.01mm to 0.2mm, in an intergranular matrix of granular clinopyroxene and granular iron oxides. Very minor, <5%, intersertal green glass.

Depth: 2511'

Rock Type: Rhyodacite

Description: Holohyaline, pumice lapilli tuff, poorly welded; Rounded to irregularly-shaped pumice fragments up to 3mm and trace cinder and basaltic clasts up to 0.8mm in a vitroclastic matrix of glass shards and ash. Rare embayed plagioclase phenocrysts up to 0.2mm.

Depth: 2524'

Rock Type: N/A (Rhyodacite?)

Description: Holohyaline, pumice lapilli tuff, poorly welded. Pumice lapilli up to 5mm, and lithic fragments of cinders and basalt up to 4mm, in a vitroclastic matrix of glass shards and ash. Similar to 2511' but has a higher percentage of lithics and larger pumice lapilli.

Depth: 2538'

Rock Type: Tholeiitic Basalt

Description: Holohyaline, seriate; Euhedral laths of labradorite plagioclase, 0.1 to 0.7mm, with abundant rounded grains of olivine, 0.1 to 0.4mm, infilled by subophitic (locally granular) clinopyroxene. Very rare granules of iron ore <0.1mm. Sample has a microdiabasic texture. Olivines are commonly rimmed by iddingsite.

Depth: 2644'

Rock Type: Tholeiitic Basalt

Description: Holocrystalline, seriate, vesicular; Euhedral laths of labradorite plagioclase, 0.1 to 1.8mm, with minor amounts of rounded to subhedral olivine grains, <0.1 to 0.2mm, infilled by subophitic clinopyroxene and granular iron ore. Very minor amount (<2%) of intersertal brown glass. Vesicles are rounded cavities which are commonly lined with brown glass; diktytaxitic. Very similar to 2538'.

Depth: 2799'

Rock Type: Tholeiitic Basalt

Description: Hypocrystalline, fine grained equigranular; Euhedral laths of labradorite plagioclase, <0.1 to 0.5mm, and rare subhedral to rounded grains of olivine, <0.1mm, infilled by subophitic to weakly ophimottled clinopyroxene. Minor amount, approximately 5%, of intersertal dark brown opaque devitrified glass.

Depth: 2881'

Rock Type: Tholeiitic Basalt

Description: Hypocrystalline, fine grained equigranular; ophimottled; Euhedral laths of Labradorite plagioclase, <0.1 to 0.6mm, and very rare subhedral, embayed olivine up to 0.4mm, infilled partially by ophitic crystals of clinopyroxene up to 1.4mm across and partially by intersertal brownish green glass. Clinopyroxene to glass ratio is approximately 2:1. Very rare granular iron ore.

Depth: 3020'

Rock Type: N/A (Tholeiitic Basalt)

Description: Hypocrystalline, very fine grained equigranular, vesicular; Euhedral microlaths of Labradorite plagioclase, up to 0.4mm but generally <0.1mm, with very minor granular clinopyroxene and iron ore, ≤0.01mm, in a highly vesicular intersertal groundmass of dark brown opaque devitrified glass. Vesicles are small, <0.2mm, and round.

Depth: 3087'

Rock Type: N/A (Tholeiitic Basalt?)

Description: Holocrystalline, very fine grained equigranular; Euhedral laths of labradorite plagioclase, <0.1 to 0.3mm, with rare phenocrysts up to 0.9mm, in an intergranular matrix of granular clinopyroxene <0.01mm and granular iron ore <0.01mm.

Depth: 3098'

Rock Type: Tholeiitic Basalt

Description: Holocrystalline, fine grained equigranular, pilotaxitic; Euhedral laths of labradorite plagioclase, <0.1mm to 0.2mm with rare phenocrysts up to 4.0mm, and minor amounts of rounded to subhedral olivine, <0.1mm to 0.2mm, in an intergranular matrix of granular clinopyroxene <0.01mm and granular iron ore <0.01mm. Olivine crystals are pervasively to completed replaced by iddingsite and iron oxides.

Depth: 3122'

Rock Type: Dacite

Description: Hypohyaline, lithic lapilli crystal tuff, welded; Globular to spindle-shaped lapilli and fiamme of crystal-bearing devitrified glass up to 15mm in length in a crystal-rich vitroclastic matrix of arcuate glass shards, ash and glass dust. Phenocrysts in the glass lapilli and matrix are identical consisting of andesine plagioclase laths, <0.05 to 0.8mm, and rare columnar crystals of augite, <0.01 to 0.15mm. Tuff also contains approximately 20% lithic fragments ranging up to 6.0mm in length. Lithics are basalt, cinders, rhyodacite(?) and pumice. Glass and matrix are brown to yellow brown.

Depth: 3143'

Rock Type: N/A (Dacite or Andesite)

Description: Hypohyaline, lithic vitric tuff, welded. Subangular to rounded lithic fragments, <0.1 to 10mm, in a crystal-bearing dusky red brown glassy matrix. Lithic fragments are extremely varied: several basalts, basaltic cinder scoria, pumice, rhyodacite and frothy red brown glassy material (pre-existing tuff?). Phenocrysts includes euhedral, partially embayed labradite plagioclase laths up to 1.1mm in length and subhedral to euhedral columnar augite up to 0.4mm in length.

Depth: 3204'

Rock Type: N/A (Basaltic Andesite)

Description: Hypocrystalline, very fine grained equigranular; Microlites and microlaths of labradorite plagioclase up to 0.3mm in length, rare subhedral, embayed crystals of clinopyroxene up to 0.2mm and rare polygonal iron ore up to 0.1mm in an intersertal matrix of pale green glass. Basaltic cinder scoria inclusions, <0.1 to 1.4mm are also incorporated in the glassy matrix.

Depth: 3239'

Rock Type: Basaltic Andesite

Description: Hypocrystalline, seriate-glomeroporphyritic, vesicular. Euhedral labradorite plagioclase laths, 0.1 to 5mm, in an intergranular matrix of plagioclase microlites, granular clinopyroxene <0.05mm and opaque iron ore <0.01mm. Approximately 20% of the groundmass is intersertal dark greenish gray dust-filled, devitrified glass. Vesicles, <0.1 to 1.5mm, comprise approximately 15% of total area. Cavities range from irregular arcuate to rounded geometries. Vesicles are partially to completely filled with greenish to greenish brown clays. There is also very minor replacement of plagioclase by greenish brown clays.

Depth: 3263'

Rock Type: N/A (Rhyolite?)

Description: Holohyaline, glass flow; Agglomerate of rounded, arcuate and spindle-shaped pale green glassy fragments up to 5mm. Glass displays flow banding and contains abundant crystalline of plagioclase. Individual glass fragments have devitrified rims and open into irregular arcuate void spaces partly filled by black opaque material, yellow brown clays and spherical crystals of cristobalite up to .125mm.

Depth: 3311'

Rock Type: Rhyolite

Description: Hypocrystalline, cryptocrystalline, pilotaxitic; Microlites of plagioclase, <0.1mm, in a cryptocrystalline groundmass with abundant crystallites of plagioclase and iron ore with some very pale green glass. Rock composed of planar bands ranging from approximately 0.075 to 0.15mm. Platy fractures well developed along planar lamina with red brown opaque iron oxides and intergrowths of euhedral trydymite and cristobalite crystals lining open voids.

Depth: 3352'

Rock Type: N/A (Basalt?)

Description: Hypocrystalline, seriate, fine grained equigranular, pilotaxitic, vesicular; Microlaths of labradorite plagioclase, 0.1 to 0.2mm, with rare phenocrysts up to 0.75mm in an intergranular matrix of clinopyroxene and iron ore granules <.05mm grading into an intersertal groundmass of pale green glass. Glass constitutes approximately 20% of groundmass. Very rare of olivine up to 1.1mm in length completely replaced by a fine grained mixture of iddingsite, iron oxides and sphene. Vesicles, up to 0.6mm in length, are rounded elongate cavities partially filled by greenish clays; diktytaxitic.

Depth: 3365'

Rock Type: Rhyodacite

Description: Hypocrystalline, porphyritic; Embayed laths of andesine plagioclase up to 0.8mm, subhedral embayed columnar augite up to 0.3mm, and polygonal iron ore grains up to 0.1mm, in a cryptofelsic groundmass. Rock is flow banded, characterized by irregular lamina of holocrystalline cryptofelsic material alternating with cryptofelsic material grading into dark opaque green glass. Sporadic fractures parallel to the flow banding, <0.2mm, partially infilled with very fine grained cristobalite and calcite crystals.

Depth: 3472'

Rock Type: Rhyodacite

Description: Holocrystalline, porphyritic; Subhedral embayed andesine plagioclase, laths up to 2.1mm, subhedral embayed columnar clinopyroxene up to 0.7mm and polygonal to granular iron ore up to 0.1mm in a cryptofelsic groundmass. Rare fractures, <0.1mm, are partially infilled by cristobalite and yellow brown clays.

Depth: 3541'

Rock Type: Rhyodacite

Description: Holocrystalline, porphyritic, pilotaxitic; Subhedral embayed andesine plagioclase, laths up to 1.95mm, rare subhedral embayed columnar augite up to 0.3mm, and very rare iron ore up to 0.1mm, in a cryptofelsic groundmass. Flow banded with minor fractures subparallel to flow banding up to 0.95mm in width. Fractures contain drusy crystals of tridymite with interstitial calcite and iron oxides and also layers of yellow brown clays.

Depth: 3608'

Rock Type: Rhyodacite

Description: Holocrystalline, porphyritic; Trace amounts of phenocrysts consisting of subhedral embayed andesine laths up to 1.0mm, subhedral embayed augite crystals up to 0.2mm and granular iron ore <0.05mm in a cryptofelsic groundmass.

Depth: 3741'

Rock Type: Basaltic Andesite

Description: Hypocrystalline, seriate, vesicular; Euhedral laths of labradorite plagioclase, <0.1mm to 2.45mm, and minor rounded to subhedral columnar augite, <0.1mm to 0.5mm, in an intersertal matrix of dark gray green glass with abundant crystallites of clinopyroxene and iron ore. Approximately 20% of slide composed of lithic inclusions ranging from 1.2mm to 8.0mm in length. Lithics include rhyodacite, basaltic cinder scoria and flow basalts of widely varying textures. Rims of some inclusions, especially rhyodacite, show evidence of partial melting. Vesicles range from <.1mm to 2.2mm in length characterized by rounded to elongate geometries. Vesicles are partially to completely filled with massive to euhedral saucer-shaped siderite crystals and red to yellow brown clays. Minor patchy replacement of glassy groundmass by siderite is also present adjacent to siderite-bearing vesicles.

Depth: 3790'

Rock Type: Tholeiitic Basalt

Description: Hypocrystalline, seriate-fine grained equigranular, pilotaxitic, vesicular; Euhedral laths of labradorite plagioclase, 0.05 to 0.35mm, with rare rounded grains of augite less than 0.2mm in an intersertal matrix of black opaque devitrified glass with minor inclusions of granular clinopyroxene and iron ore <.01mm. Pseudomorphs of olivine completely replaced by red brown clays and carbonate are also present. Large round vesicles constitute approximately 5% of total area and range in size from 0.5 to 8mm. Vesicles are partially to completely infilled by botryoidal masses of clays (opaque black, dusky reddish brown, greenish brown, dark green), euhedral saucer-shaped siderite, and drusy aggregates of colorless calcite crystals.

Depth: 3961'

Rock Type: Tholeiitic Basalt

Description: Hypocrystalline, seriate-microdiabasic, vesicular; Euhedral laths of labradorite plagioclase, <0.1mm to 0.9mm, surrounded by subophitic platlets of augite up to 0.3mm and partially by intersertal devitrified, altered glass with minor granules of iron ore <0.05mm. Glass is pervasively altered to red brown to brown clays. Vesicles are rare and consist of rounded cavities up to 0.6mm which are partially to completely infilled by greenish brown clays, radiating spherical crystals of siderite and very fine-grained mosaic aggregates of carbonate.

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N-3

Amygdaloidal and Fracture-Filling Secondary Mineral Assemblages in Samples from a Geothermal Field

by
Lori A. Bettison, M.S.

SUMMARY

Ten samples from various drill hole depths were examined with X-ray diffraction and secondary electron imaging on the scanning electron microscope. The following fracture and vesicle filling secondary minerals were identified: calcite, aragonite, siderite, marcasite, pyrite, tridymite, and magnesite. Table 1 lists the secondary phases identified at the depth represented by each sample.

	calcite	aragonite	siderite	marcasite	pyrite	tridymite	magnesite
2882'		X					
3412'				X	X	X	
3470'			X			X	
3540'			X	X	X	X	
3580'			X	X	X	X	
3705'			X	X	X	X	
3770'	X					X	
3948'	X	X	X			?	
3970'			X				X
3980'			X				X

Table 1

labeled "area" indicate the realtive abundance of a particular element within the area analyzed. However, these numbers cannot be used to estimate a quantitative analysis of a specimen. Not also that the X-ray anaysis cannot detect the presence of elements lighter (i.e., with atomic numbers less) than magnesium. Thus, the carbon in the carbonate analyses is not identified in the EDS print out. In addition, Cu and Fe characteristic X-ray lines can be excited from the objective lens pole pieces of the SEM.

RESULTS

Ten specimens from various drill hole depths were examined. Table 1 presents a summary of the fracture and vesicle mineralogy of each sample.

2882 feet: Clear, elongate, vesicle filling crystals were identified as aragonite with XRD.

3412 feet: X-ray diffraction indicates the presence of two sulfides on the surface of fractures: marcasite and pyrite. Interpretation of the XRD pattern suggests that marcasite is predominant. Qualitative analysis presented in Table 2A and s.e.i. confirms the presence of an Fe-sulfide (see s.e.i. photo 1). The presence of tridymite is also suggested by the XRD and EDS data.

3470 feet: Greenish-brown "balls: on the surface of fractures were identified as siderite using XRD. Qualitative analysis presented in Table 2B indicates that the phase is not pure (substitution of Ca and Mn for Fe^{2+}). The botryoidal or "ball" form of siderite, characteristic of samples in this study, is shown in photo 2. Tridymite identified from the XRD pattern is also shown in the s.e.i. photo.

3540 feet, 3580 feet, and 3705 feet: Materials scraped off the fracture surfaces of these three samples show similar X-ray diffraction patterns. The presence of tridymite (milky white crystals), marcasite and pyrite (green material), and minor siderite is indicated. Quantitative analyses presented in Tables 2C and 2D confirm the presence of these minerals. The presence of minor amounts of a phyllosilicate (smectite or illite) is suggested by EDS results; however, this is not confirmed by XRD.

3770 feet: The white blocky crystals were identified as calcite and the green "balls" as siderite from the XRD pattern.

3948 feet: Three forms of minerals were examined individually with XRD: 1) clear crystals, 2) milky white crystals, and 3) cream colored balls. The

minerals were identified as: 1) aragonite, 2) calcite + aragonite, and 3) siderite. Siderite forms balls of webby textured crystals (photo 3), unlike the platy form from 3470 feet shown in photo 2 or columnar stacks which form the acicular needles shown in the sample from 3970 feet.

3970 feet: The blue amygdule-lining material and balls were identified as magnesite with XRD. SEM qualitative analysis presented in Table 2E confirms the presence of Mg and Ca. The acicular green crystals radiating outward from amygdule walls were identified as siderite with XRD and confirmed with qualitative analysis presented in Table 2F. Photo 4 is an s.e.i. picture of the relationship between these two phases.

3980 feet: The amygdule filling minerals in this sample are the same as those at 3970 feet: magnesite and siderite. S.e.i. photo 5 shows siderite in balls of platy crystals and in the webby texture described at 3948 feet.

QUALITATIVE ANALYSES

TABLE 2A: Fe-sulfide, tridymite

QUALITATIVE ELEMENT IDENTIFICATION

SAMPLE ID:3412

POSSIBLE IDENTIFICATION
FE KA KB
SI KA OR RB LA
S KA OR MO LA OR TL MA?
AU LA
CU KA

PEAK LISTING

	ENERGY	AREA	EL. AND LINE
1	1.740	855	SI KA
2	2.294	271	S KA OR TL MA?
3	6.387	2099	FE KA
4	7.039	367	FE KB
5	8.024	137	CU KA
6	9.693	174	AU LA

TABLE 2B: siderite

QUALITATIVE ELEMENT IDENTIFICATION

SAMPLE ID:3470

POSSIBLE IDENTIFICATION
FE KA KB
CA KA
MN KA OR SU LA
NB LA OR AU LA MA

PEAK LISTING

	ENERGY	AREA	EL. AND LINE
1	2.144	198	AU MA
2	3.689	617	CA KA
3	5.891	341	MN KA
4	6.390	2055	FE KA
5	7.030	253	FE KB
6	9.684	198	AU LA

TABLE 2C: Fe-sulfide

QUALITATIVE ELEMENT IDENTIFICATION

SAMPLE ID:3540

POSSIBLE IDENTIFICATION
S KA OR MO LA OR TL MA? MZ1
FE KA KB
AU LA
CL KB OR PD LA
CU KA
ZN KA OR RE LA

PEAK LISTING

	ENERGY	AREA	EL. AND LINE
1	1.729	728	TL MZ1
2	2.304	20586	S KA OR TL MA?
3	2.841	720	PD LA
4	6.385	15138	FE KA
5	7.039	2040	FE KB
6	8.027	394	CU KA
7	8.590	282	RE LA
8	9.674	1238	AU LA

TABLE 2D: siderite, tridymite

QUALITATIVE ELEMENT IDENTIFICATION

SAMPLE ID:3540

POSSIBLE IDENTIFICATION
FE KA KB
CA KA KB
MN KA OR EU LA
NB LA OR AU LA MA
SI KA OR RB LA
CL KB OR PD LA
CU KA
MG KA OR AS LA?

PEAK LISTING

	ENERGY	AREA	EL. AND LINE
1	1.264	226	MG KA OR AS LA?
2	1.734	738	SI KA
3	2.150	1749	AU MA
4	2.843	358	PD LA
5	3.690	2103	CA KA
6	4.021	285	CA KB
7	5.887	1845	MN KA
8	6.389	15060	FE KA
9	7.035	1855	FE KB
10	8.027	374	CU KA
11	9.70	677	EU LA

TABLE 2E: magnesite

QUALITATIVE ELEMENT IDENTIFICATION

SAMPLE ID:3978

POSSIBLE IDENTIFICATION
CA KA KB
FE KA
NB LA OR AU LA MA
SI KA OR RB LA
MG KA OR AS LA?

PEAK LISTING

	ENERGY	AREA	EL. AND LINE
1	1.251	89	MG KA OR AS LA?
2	1.736	160	SI KA
3	2.164	435	AU MA
4	3.690	3978	CA KA
5	4.014	562	CA KB
6	6.389	680	FE KA
7	9.671	224	AU LA

TABLE 2F: siderite

QUALITATIVE ELEMENT IDENTIFICATION

SAMPLE ID:3978

POSSIBLE IDENTIFICATION
FE KA KB
CA KA
SI KA OR RB LA
CU KA

PEAK LISTING

	ENERGY	AREA	EL. AND LINE
1	1.740	210	SI KA
2	3.686	621	CA KA
3	6.389	3767	FE KA
4	7.032	496	FE KB
5	8.038	135	CU KA

FIGURE B2

DRESSER ATLAS TEMPERATURE LOG OF 7-28-86 FOR GEO N-3, NEWBERRY VOLCANO, OREGON. This profile was constructed by GEO personnel from data taken from a continuous temperature log (see Table B2) which began 4 hours after last circulation of the core hole. Note the conductive slope for the last 100 plus feet.

TABLE B2

GEO CORE HOLE N-3

Temperature (F°) Log from Dresser Atlas of 7/28/86

Depth	0	10	20	30	40	50	60	70	80	90
0						52	52	52	52	52
100	52	52	52	52	52	51	51	51	51	51
200 to 690 = 51°										
700	51	51	50	50	50	50	50	50	50	50
800 to 1590 = 50°										
1600	50	50	51	52	53	53	53	53	54	53
1700	53	53	53	53	53	53	53	53	53	54
1800	54	54	54	54	54	55	55	55	55	55
1900	55	56	56	57	57	58	58	62	76	98
2000	101	103	104	105	106	106	106	107	107	107
2100	107	107	107	107	108	108	108	108	108	109
2200	109	109	109	109	109	109	110	110	110	110
2300	110	110	110	111	111	111	111	111	111	111
2400	112	112	112	112	112	112	113	113	113	113
2500	113	113	113	113	113	114	114	114	114	114
2600	114	114	114	115	115	115	115	115	115	115
2700	115	115	115	115	116	116	116	116	116	116
2800	116	116	116	117	117	117	117	117	117	117
2900	117	117	117	117	117	117	117	117	118	118
3000	118	118	118	118	118	118	118	118	119	119
3100	119	119	119	119	119	119	119	119	119	119
3200	119	119	119	119	119	119	120	120	120	120
3300	120	120	120	120	120	120	120	120	120	120
3400	120	121	121	121	121	121	121	121	121	121
3500 to 3690 = 121°										
3700	121	121	121	121	121	121	121	122	122	122
3800	122	122	122	121	121	121	121	121	121	122
3900	122	122	122	122	123	123	124	125	126	126
4000	125									
4002 BHT = 126°										

Note: this table was compiled from an analog record and was rounded to the nearest degree.

Logging operations begin 4 hours after last circulation of core hole.

Spud date: 6/2/86
Date TD reached: 7/29/86

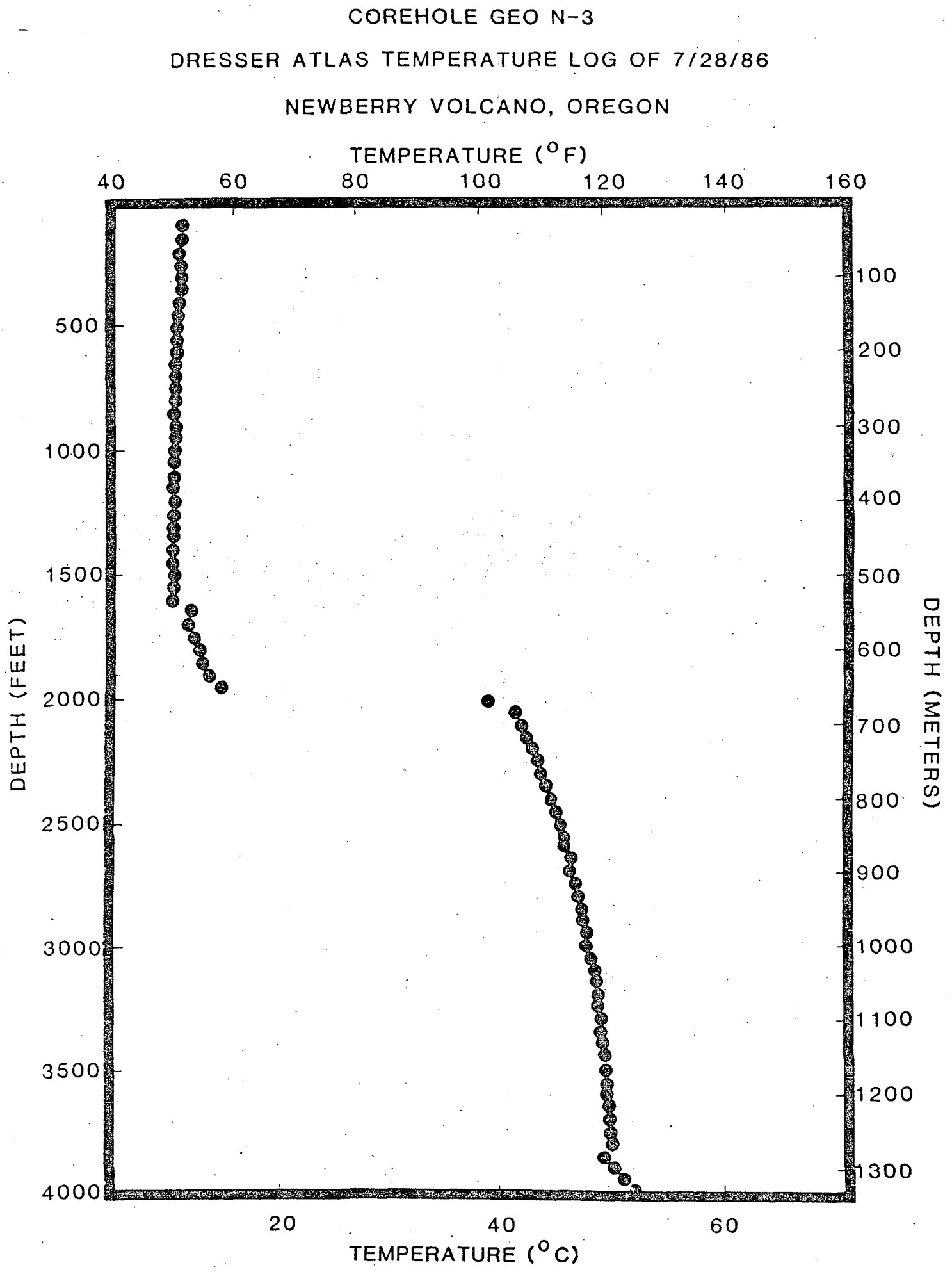
COREHOLE GEO N-3
DRESSER ATLAS TEMPERATURE LOG OF 7/28/86
NEWBERRY VOLCANO, OREGON
TEMPERATURE (°F)
40
60
80
100
120
140
160
500
1000
1500
2000
2500
3000
3500
4000
DEPTH (FEET)
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
DEPTH (METERS)
20
40
60
TEMPERATURE (°C)

Figure B2

FIGURE B5

BLACKWELL TEMPERATURE LOG OF 9/26/86 FOR CORE HOLE GEO N-3. This profile was constructed by GEO personnel from selected data in Table B5. The precision and accuracy of the temperature measurements are 0.01°F and 1°F. Temperatures were measured at 6.6 foot intervals. Note the conductive slope for the last 100 feet.

BLACKWELL TEMPERATURE LOG OF 9/26/86

NEWBERRY VOLCANO, OREGON

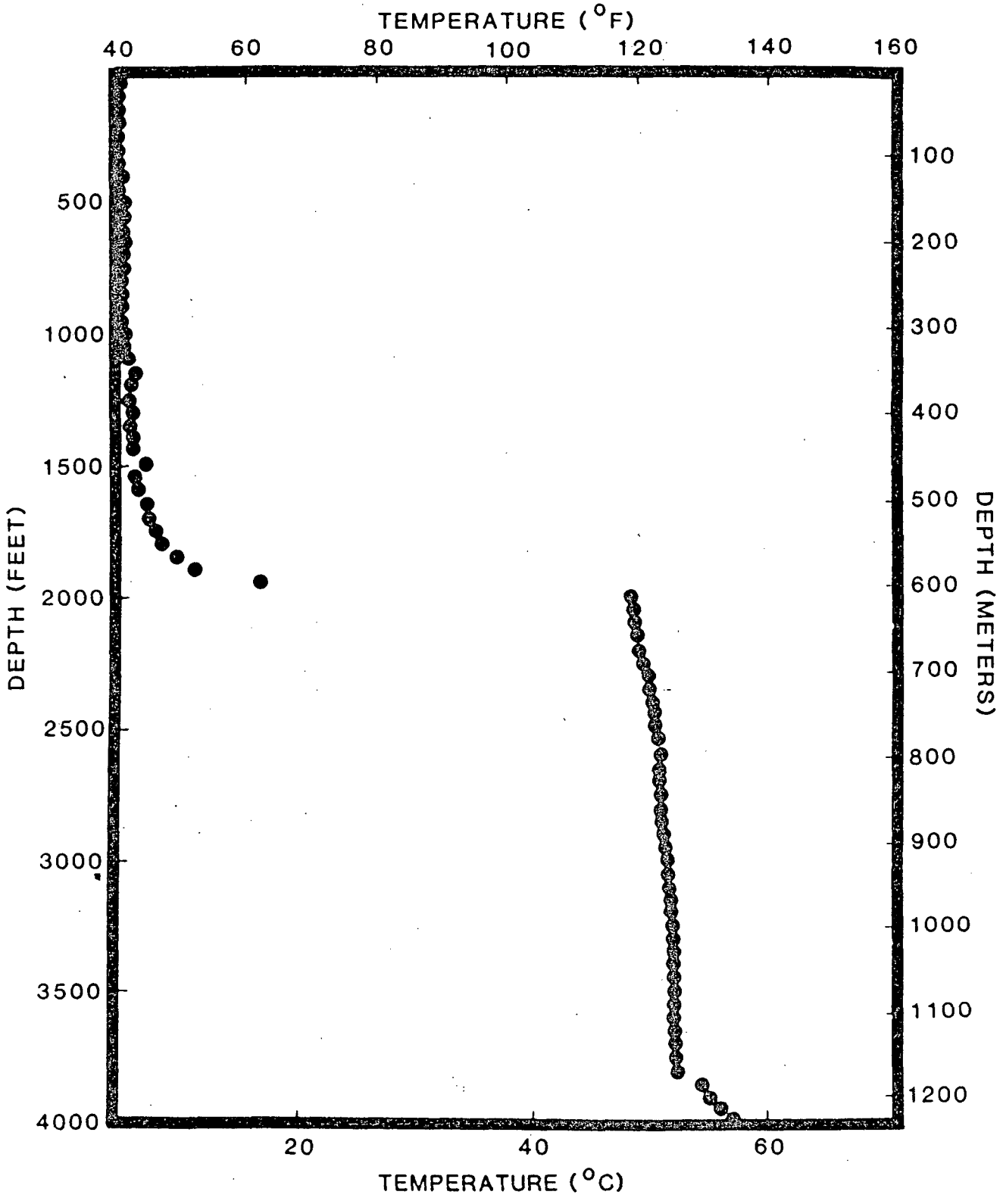

TABLE B5

GEO N-3

Temperature/Depth Data

Blackwell: 9/26/86

Depth Feet	Temperature Deg. F	Gradient Deg.F/100 Ft	Depth Feet	Temperature Deg. F	Gradient Deg.F/100 Ft
13.1	40.54	0.0	282.2	40.12	-1.0
19.7	40.77	3.5	288.7	40.24	1.7
26.2	40.93	2.4	295.3	40.47	3.5
32.8	41.06	2.1	301.8	40.64	2.7
39.4	41.18	1.8	308.4	40.94	4.6
45.9	41.29	1.6	315.0	41.22	4.2
52.5	41.39	1.7	321.5	41.27	0.8
59.1	41.67	4.2	328.1	41.18	-1.4
65.6	41.85	2.7	334.6	41.11	-1.2
72.2	41.80	-0.8	341.2	41.08	-0.4
78.7	41.71	-1.3	347.8	41.08	0.0
85.3	41.37	-5.2	354.3	41.07	-0.1
91.9	41.13	-3.6	360.9	41.02	-0.7
98.4	41.09	-0.6	367.5	40.99	-0.4
105.0	41.21	1.7	374.0	41.03	0.5
111.5	41.53	5.0	380.6	41.07	0.7
118.1	42.03	7.6	387.1	41.11	0.5
124.7	41.95	-1.3	393.7	41.21	1.5
131.2	41.48	-7.1	400.3	41.63	6.5
137.8	41.10	-5.8	406.8	42.20	8.6
144.4	40.88	-3.4	413.4	42.14	-0.9
150.9	40.96	1.3	419.9	41.96	-2.7
157.5	41.34	5.7	426.5	41.70	-4.0
164.0	41.51	2.6	433.1	41.46	-3.7
170.6	41.36	-2.2	439.6	41.21	-3.8
177.2	40.95	-6.3	446.2	40.98	-3.6
183.7	40.80	-2.3	452.8	40.87	-1.6
190.3	40.76	-0.7	459.3	40.82	-0.8
196.9	40.74	-0.2	465.9	40.83	0.2
203.4	40.79	0.7	472.4	40.87	0.6
210.0	40.96	2.6	479.0	40.92	0.7
216.5	41.38	6.5	485.6	40.97	0.8
223.1	42.20	12.4	492.1	41.05	1.2
229.7	42.11	-1.3	498.7	41.16	1.7
236.2	41.55	-8.7	505.2	41.30	2.2
242.8	41.14	-6.2	511.8	41.47	2.6
249.3	40.93	-3.1	518.4	41.66	2.9
255.9	40.83	-1.6	524.9	41.67	0.1
262.5	40.83	0.0	531.5	41.56	-1.8
269.0	40.73	-1.5	538.1	41.51	-0.7
275.6	40.19	-8.2	544.6	41.52	0.1

TABLE B5

GEO N-3

Temperature/Depth Data

Blackwell: 9/26/86

Depth Feet	Temperature Deg. F	Gradient Deg.F/100 Ft	Depth Feet	Temperature Deg. F	Gradient Deg.F/100 Ft
551.2	41.53	0.2	820.2	42.29	-0.8
557.7	41.52	-0.2	826.8	41.93	-5.5
564.3	41.51	-0.1	833.3	41.64	-4.4
570.9	41.50	-0.2	839.9	41.41	-3.5
577.4	41.50	0.1	846.5	41.28	-2.0
584.0	41.49	-0.2	853.0	41.23	-0.7
590.6	41.47	-0.3	859.6	41.24	0.2
597.1	41.45	-0.2	866.1	41.38	2.1
603.7	41.43	-0.3	872.7	41.57	2.8
610.2	41.41	-0.3	879.3	41.58	0.1
616.8	41.40	-0.2	885.8	41.56	-0.3
623.4	41.38	-0.3	892.4	41.52	-0.5
629.9	41.42	0.6	899.0	41.46	-1.0
636.5	41.55	2.0	905.5	41.39	-1.1
643.0	41.68	2.0	912.1	41.39	0.1
649.6	41.68	0.0	918.6	41.40	0.2
656.2	41.58	-1.5	925.2	41.41	0.2
662.7	41.53	-0.8	931.8	41.43	0.2
669.3	41.48	-0.7	938.3	41.43	0.0
675.9	41.51	0.4	944.9	41.40	-0.4
682.4	41.67	2.4	951.4	41.37	-0.6
689.0	41.79	1.8	958.0	41.36	-0.1
695.5	41.73	-0.9	964.6	41.41	0.8
702.1	41.63	-1.5	971.1	41.47	0.8
708.7	41.55	-1.3	977.7	41.52	0.8
715.2	41.52	-0.4	984.3	41.57	0.7
721.8	41.69	2.7	990.8	41.58	0.2
728.3	41.70	0.1	997.4	41.70	1.8
734.9	41.67	-0.4	1003.9	41.73	0.5
741.5	41.74	1.1	1010.5	41.65	-1.3
748.0	41.93	2.8	1017.1	41.53	-1.8
754.6	42.27	5.2	1023.6	41.47	-0.9
761.2	42.48	3.2	1030.2	41.47	0.0
767.7	42.20	-4.3	1036.7	41.56	1.3
774.3	41.52	-10.4	1043.3	41.75	3.0
780.8	41.31	-3.2	1049.9	41.82	1.1
787.4	41.26	-0.7	1056.4	41.77	-0.7
794.0	41.29	0.4	1063.0	41.77	-0.1
800.5	41.44	2.3	1069.6	41.81	0.6
807.1	41.90	7.1	1076.1	41.87	0.9
813.6	42.34	6.6	1082.7	41.91	0.7

TABLE B5

GEO N-3

Temperature/Depth Data

Blackwell: 9/26/86

Depth Feet	Temperature Deg. F	Gradient Deg.F/100 Ft	Depth Feet	Temperature Deg. F	Gradient Deg.F/100 Ft
1089.2	41.97	0.8	1358.3	42.40	1.6
1095.8	42.06	1.4	1364.8	42.51	1.6
1102.4	42.10	0.6	1371.4	42.59	1.3
1108.9	42.09	-0.2	1378.0	42.65	0.8
1115.5	42.32	3.5	1384.5	42.71	0.9
1122.0	42.88	8.6	1391.1	42.80	1.4
1128.6	43.34	6.9	1397.6	42.92	1.8
1135.2	43.31	-0.3	1404.2	43.06	2.2
1141.7	43.20	-1.8	1410.8	43.17	1.6
1148.3	43.03	-2.5	1417.3	43.20	0.5
1154.9	42.54	-7.6	1423.9	43.17	-0.5
1161.4	42.14	-6.1	1430.4	43.10	-1.1
1168.0	41.99	-2.3	1437.0	43.00	-1.5
1174.5	42.02	0.5	1443.6	42.90	-1.5
1181.1	42.31	4.4	1450.1	42.79	-1.6
1187.7	42.60	4.5	1456.7	42.73	-0.9
1194.2	42.67	1.0	1463.3	42.73	0.0
1200.8	42.54	-2.0	1469.8	42.81	1.3
1207.3	42.39	-2.3	1476.4	42.98	2.6
1213.9	42.27	-1.7	1482.9	43.21	3.4
1220.5	42.27	-0.1	1489.5	43.51	4.7
1227.0	42.25	-0.3	1496.1	43.90	5.9
1233.4	42.24	-0.1	1502.6	44.34	6.6
1240.2	42.20	-0.6	1509.2	44.70	5.5
1246.7	42.19	-0.2	1515.7	44.62	-1.1
1253.3	42.19	0.1	1522.3	44.09	-8.1
1259.8	42.04	-2.3	1528.9	43.61	-7.4
1266.4	41.82	-3.4	1535.4	43.35	-3.9
1273.0	42.20	5.9	1542.0	43.27	-1.2
1279.5	42.34	2.0	1548.6	43.27	0.1
1286.1	42.48	2.1	1555.1	43.30	0.4
1292.7	42.55	1.1	1561.7	43.32	0.3
1299.2	42.48	-1.0	1568.2	43.36	0.6
1305.8	42.35	-1.9	1574.8	43.43	1.1
1312.3	42.23	-1.9	1581.4	43.53	1.6
1318.9	42.15	-1.2	1587.9	43.59	0.9
1325.5	42.11	-0.6	1594.5	43.66	1.1
1332.0	42.12	0.2	1601.0	43.74	1.2
1338.6	42.17	0.7	1607.6	43.89	2.2
1345.1	42.23	0.9	1614.2	44.07	2.8
1351.7	42.30	1.1	1620.7	44.23	2.5

TABLE B5

GEO N-3

Temperature/Depth Data

Blackwell: 9/26/86

Depth Feet	Temperature Deg. F	Gradient Deg.F/100 Ft	Depth Feet	Temperature Deg. F	Gradient Deg.F/100 Ft
1627.3	44.38	2.3	1896.3	52.36	7.9
1633.9	44.54	2.4	1902.9	52.79	6.5
1640.4	44.71	2.5	1909.4	53.35	8.6
1647.0	44.90	3.0	1916.0	54.17	12.5
1653.5	45.22	4.8	1922.6	54.87	10.6
1660.1	45.70	7.3	1929.1	56.18	19.9
1666.7	46.14	6.7	1935.7	56.90	11.0
1673.2	46.41	4.0	1942.3	58.66	26.9
1679.8	46.24	-2.6	1948.8	62.91	64.7
1686.4	45.91	-4.9	1955.4	70.02	108.5
1692.9	45.64	-4.2	1961.9	81.01	167.6
1699.5	45.51	-2.0	1968.5	93.25	186.6
1706.0	45.46	-0.8	1975.1	107.00	209.6
1712.6	45.46	0.0	1981.6	116.80	149.4
1719.2	45.51	0.8	1988.2	119.28	37.8
1725.7	45.58	1.1	1994.8	119.44	2.4
1732.3	45.72	2.2	2001.3	119.47	0.5
1738.8	46.01	4.4	2007.9	119.52	0.7
1745.4	46.26	3.8	2014.4	119.55	0.4
1752.0	46.53	4.0	2021.0	119.58	0.6
1758.5	46.82	4.5	2027.6	119.59	0.1
1765.1	47.11	4.5	2034.1	119.60	0.1
1771.7	47.39	4.3	2040.7	119.61	0.1
1778.2	47.57	2.7	2047.2	119.63	0.3
1784.8	47.68	1.7	2053.8	119.69	1.0
1791.3	47.63	-0.7	2060.4	119.77	1.3
1797.9	47.67	0.5	2066.9	119.85	1.2
1804.5	47.82	2.3	2073.5	119.91	0.9
1811.0	48.03	3.2	2080.1	119.98	1.1
1817.6	48.28	3.8	2086.6	120.06	1.1
1824.1	48.54	4.0	2093.2	120.14	1.2
1830.7	48.82	4.2	2099.7	120.20	0.9
1837.3	49.06	3.7	2106.3	120.22	0.3
1843.8	49.29	3.5	2112.9	120.23	0.1
1850.4	49.47	2.6	2119.4	120.24	0.2
1857.0	49.57	1.6	2126.0	120.25	0.2
1863.5	50.04	7.1	2132.5	120.27	0.3
1870.1	50.52	7.4	2139.1	120.31	0.7
1876.6	50.90	5.8	2145.7	120.38	1.0
1883.2	51.46	8.5	2152.2	120.44	1.0
1889.8	51.85	5.9	2158.8	120.52	1.2

TABLE B5

GEO N-3

Temperature/Depth Data

Blackwell: 9/26/86

Depth Feet	Temperature Deg. F	Gradient Deg.F/100 Ft	Depth Feet	Temperature Deg. F	Gradient Deg.F/100 Ft
2165.4	120.60	1.2	2434.4	122.84	0.8
2171.9	120.66	0.9	2440.9	122.90	0.9
2178.5	120.73	1.1	2447.5	122.94	0.7
2185.0	120.81	1.1	2454.1	123.00	0.8
2191.6	120.88	1.2	2460.6	123.04	0.7
2198.2	120.95	1.1	2467.2	123.09	0.7
2204.7	121.01	0.9	2473.8	123.13	0.7
2211.3	121.05	0.5	2480.3	123.18	0.6
2217.8	121.09	0.7	2486.9	123.16	-0.2
2224.4	121.13	0.5	2493.4	123.16	-0.1
2231.0	121.14	0.1	2500.0	123.19	0.5
2237.5	121.14	0.1	2506.6	123.29	1.6
2244.1	121.16	0.2	2513.1	123.35	0.9
2250.7	121.25	1.4	2519.7	123.39	0.6
2257.2	121.30	0.8	2526.2	123.42	0.4
2263.8	121.36	1.0	2532.8	123.44	0.3
2270.3	121.42	0.8	2539.4	123.47	0.4
2276.9	121.47	0.8	2545.9	123.53	1.0
2283.5	121.53	0.9	2552.5	123.57	0.6
2290.0	121.58	0.7	2559.1	123.61	0.6
2296.6	121.63	0.8	2565.6	123.62	0.1
2303.1	121.68	0.7	2572.2	123.62	0.0
2309.7	121.74	1.0	2578.7	123.63	0.2
2316.3	121.79	0.7	2585.3	123.66	0.4
2322.8	121.83	0.7	2591.9	123.69	0.5
2329.4	121.92	1.3	2598.4	123.71	0.3
2336.0	121.99	1.1	2605.0	123.75	0.7
2342.5	122.06	1.1	2611.5	123.77	0.3
2349.1	122.11	0.8	2618.1	123.80	0.4
2355.6	122.19	1.2	2624.7	123.81	0.3
2362.2	122.26	1.0	2631.2	123.83	0.3
2368.8	122.31	0.8	2637.8	123.84	0.0
2375.3	122.38	1.0	2644.4	123.84	0.1
2381.9	122.41	0.5	2650.9	123.86	0.2
2388.5	122.51	1.5	2657.5	123.86	0.1
2395.0	122.57	1.0	2664.0	123.87	0.0
2401.6	122.62	0.8	2670.6	123.87	0.0
2408.1	122.67	0.8	2677.2	123.88	0.1
2414.7	122.71	0.5	2683.7	123.90	0.3
2421.3	122.76	0.8	2690.3	123.91	0.2
2427.8	122.79	0.4	2696.9	123.97	0.8

TABLE B5

GEO N-3

Temperature/Depth Data

Blackwell: 9/26/86

Depth Feet	Temperature Deg. F	Gradient Deg.F/100 Ft	Depth Feet	Temperature Deg. F	Gradient Deg.F/100 Ft
2703.4	123.99	0.4	2972.4	124.93	0.5
2710.0	124.01	0.3	2979.0	124.95	0.4
2716.5	124.01	0.0	2985.6	124.98	0.4
2723.1	124.01	0.0	2992.1	125.00	0.4
2729.7	124.04	0.4	2998.7	125.03	0.5
2736.2	124.05	0.2	3005.2	125.06	0.3
2742.8	124.06	0.0	3011.8	125.08	0.3
2749.3	124.06	0.1	3018.4	125.09	0.2
2755.9	124.06	0.0	3024.9	125.11	0.3
2762.5	124.06	-0.1	3031.5	125.14	0.4
2769.0	124.08	0.4	3038.1	125.16	0.4
2775.6	124.11	0.5	3044.6	125.19	0.3
2782.2	124.14	0.4	3051.2	125.21	0.4
2788.7	124.17	0.5	3057.7	125.24	0.5
2795.3	124.20	0.4	3064.3	125.26	0.2
2801.8	124.23	0.5	3070.9	125.28	0.3
2808.4	124.26	0.5	3077.4	125.31	0.6
2815.0	124.29	0.4	3084.0	125.33	0.2
2821.5	124.30	0.2	3090.6	125.35	0.4
2828.1	124.26	-0.7	3097.1	125.37	0.3
2834.6	124.36	1.6	3103.7	125.40	0.4
2841.2	124.40	0.6	3110.2	125.42	0.3
2847.8	124.42	0.3	3116.8	125.44	0.3
2854.3	124.45	0.5	3123.4	125.45	0.2
2860.9	124.48	0.4	3129.9	125.47	0.3
2867.5	124.51	0.5	3136.5	125.49	0.2
2874.0	124.53	0.2	3143.0	125.50	0.2
2880.6	124.57	0.6	3149.6	125.52	0.3
2887.1	124.60	0.4	3156.2	125.54	0.3
2893.7	124.63	0.5	3162.7	125.54	0.1
2900.3	124.66	0.4	3169.3	125.56	0.2
2906.8	124.67	0.2	3175.9	125.56	0.0
2913.4	124.70	0.4	3182.4	125.58	0.2
2919.9	124.72	0.3	3189.0	125.59	0.2
2926.5	124.75	0.4	3195.5	125.60	0.2
2933.1	124.77	0.3	3202.1	125.62	0.2
2939.6	124.79	0.3	3208.7	125.63	0.2
2946.2	124.82	0.3	3215.2	125.64	0.1
2952.8	124.84	0.4	3221.8	125.65	0.2
2959.3	124.87	0.4	3228.3	125.67	0.3
2965.9	124.89	0.3	3234.9	125.69	0.3

TABLE B5

GEO N-3

Temperature/Depth Data

Blackwell: 9/26/86

Depth Feet	Temperature Deg. F	Gradient Deg.F/100 Ft	Depth Feet	Temperature Deg. F	Gradient Deg.F/100 Ft
3241.5	125.69	0.1	3510.5	126.13	0.0
3248.0	125.67	-0.3	3517.1	126.13	0.0
3254.6	125.73	0.8	3523.6	126.14	0.2
3261.2	125.75	0.3	3530.2	126.14	0.0
3267.7	125.76	0.2	3536.7	126.15	0.1
3274.3	125.78	0.3	3543.3	126.15	0.0
3280.8	125.78	0.1	3549.9	126.16	0.1
3287.4	125.80	0.2	3556.4	126.16	0.0
3294.0	125.82	0.3	3563.0	126.15	-0.2
3300.5	125.83	0.2	3569.6	126.19	0.6
3307.1	125.84	0.1	3576.1	126.20	0.1
3313.6	125.82	-0.2	3582.7	126.20	0.0
3320.2	125.88	0.8	3589.2	126.18	-0.2
3326.8	125.89	0.2	3595.8	126.20	0.4
3333.3	125.90	0.1	3602.4	126.21	0.1
3339.9	125.90	0.0	3608.9	126.22	0.1
3346.5	125.88	-0.3	3615.5	126.20	-0.3
3353.0	125.93	0.8	3622.0	126.23	0.4
3359.6	125.94	0.1	3628.6	126.24	0.1
3366.1	125.95	0.2	3635.2	126.25	0.1
3372.7	125.96	0.1	3641.7	126.25	0.0
3379.3	125.97	0.1	3648.3	126.24	-0.1
3385.8	125.98	0.2	3654.9	126.25	0.2
3392.4	125.98	0.0	3661.4	126.27	0.3
3399.0	125.99	0.2	3668.0	126.28	0.1
3405.5	126.00	0.1	3674.5	126.28	0.1
3412.1	126.01	0.1	3681.1	126.27	-0.1
3418.6	126.02	0.2	3687.7	126.29	0.3
3425.2	126.03	0.1	3694.2	126.30	0.2
3431.8	126.03	0.1	3700.8	126.31	0.1
3438.3	126.04	0.1	3707.3	126.31	0.0
3444.9	126.05	0.2	3713.9	126.30	-0.1
3451.4	126.05	0.1	3720.5	126.32	0.4
3458.0	126.07	0.2	3727.0	126.32	0.1
3464.6	126.06	-0.1	3733.6	126.33	0.0
3471.1	126.09	0.4	3740.2	126.32	-0.1
3477.7	126.09	0.1	3746.7	126.33	0.2
3484.3	126.10	0.1	3753.3	126.35	0.2
3490.8	126.11	0.1	3759.8	126.34	0.0
3494.4	126.11	0.1	3766.4	126.36	0.2
3503.9	126.13	0.2	3773.0	126.37	0.1

TABLE B5

GEO N-3

Temperature/Depth Data

Blackwell: 9/26/86

Depth Feet	Temperature Deg. F	Gradient Deg.F/100 Ft	Depth Feet	Temperature Deg. F	Gradient Deg.F/100 Ft
3779.5	126.43	1.0	3897.6	131.34	1.1
3786.1	126.43	0.0	3904.2	131.36	0.3
3792.7	126.44	0.2	3910.8	131.52	2.5
3799.2	126.44	0.0	3917.3	132.47	14.5
3805.8	126.43	-0.2	3923.9	132.49	0.4
3812.3	126.45	0.4	3930.4	132.69	3.0
3818.9	126.55	1.5	3937.0	132.92	3.5
3825.5	126.75	3.1	3943.6	133.10	2.7
3832.0	126.71	-0.7	3950.1	133.34	3.7
3838.6	128.58	28.5	3956.7	133.47	2.1
3845.1	130.16	24.2	3963.3	133.63	2.3
3851.7	130.46	4.6	3969.8	133.71	1.3
3858.3	130.71	3.7	3976.4	133.90	2.8
3864.8	130.71	0.0	3982.9	134.09	2.9
3871.4	130.77	1.0	3989.5	134.25	2.4
3878.0	130.96	2.9	3996.1	134.64	6.1
3884.5	131.07	1.7	4002.6	134.76	1.7
3891.1	131.27	3.0			

Spud date: 6/2/86
Date TD reached: 7/29/86

Half-splits of core from GEO N-3 of 0-4000 feet were provided to the University of Utah Research Institute (UURI) personnel on August 20, 1986 in Bend, Oregon.