TEC-3

V.S. Gen – O'Brien Reese.

AMAX EXPLORATION, INC.
A SUBSIDIARY OF AMAX INC.

GEOTHERMAL BRANCH

INTER-OFFICE MEMORANDUM

SUBJECT: Geothermal Potential of the O'Brien Resources Geothermal Prospects

DATE: February 27, 1981

TO: W. Lodder

FROM: H. D. Pilkington

Conclusions and Recommendations

Under the terms of the 1980 agreement between AMAX and O'Brien Resources, AMAX has reviewed the twelve (12) geothermal prospects acquired by O'Brien; the locations of the twelve prospects are shown on Figure 1. Six of the prospects were examined on the ground and six were given only a data review. Three of the prospects are considered to have sufficient geothermal potential to warrant action by AMAX as follows:

1. Shoshone Prospect, Nevada - I would rate the Shoshone prospect as the best prospect of the lot, and recommend that AMAX consider undertaking the necessary exploration to define a target for inclusion in the Drilling Fund if it comes through. I would plan to budget the exploration work for 1982, including geophysics, geologic mapping, and shallow and intermediate thermal gradient drilling.

2. Topaz Mountain Prospect, Utah - I would recommend that AMAX make an attempt to do a combined deal with O'Brien Resources and Brush Wellman whereby we have an option to earn an interest in their lands by doing a phased exploration program leading to a test for discovery. Such an option arrangement would be particularly attractive if during the option phase AMAX does not have to assume any of the chargeability.

3. Excelsior Prospect, Nevada - An interesting geothermal prospect which deserves some additional work. It represents a real long shot, and I would not recommend that AMAX spend any money on exploration before 1983. However, we might encourage O'Brien to some more exploration on the property themselves if they want to accelerate its movement toward targeted stage.

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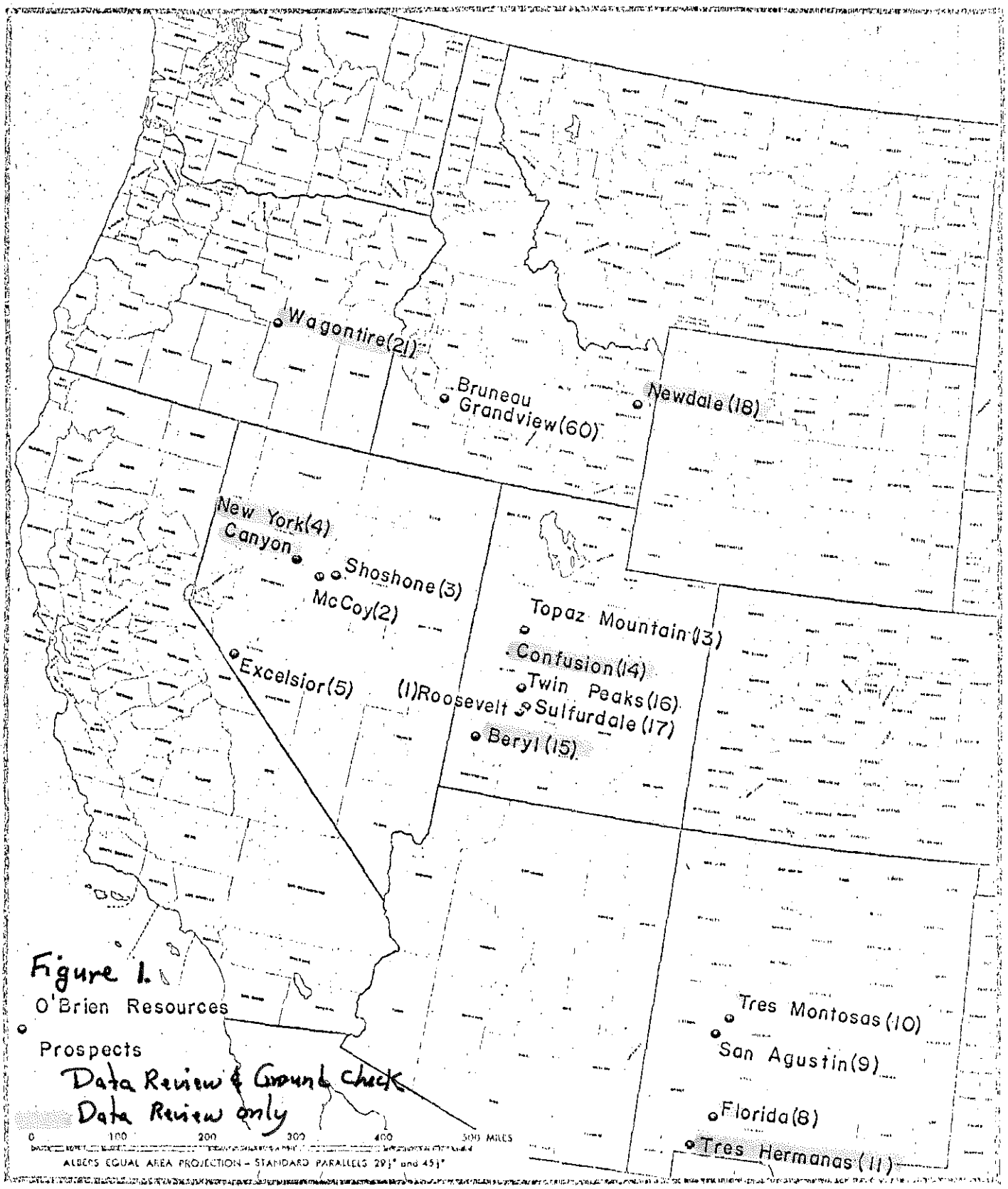

Wagontire(21)
Bruneau
Grandview(60)
Newdale (18)
New York(4)
Canyon
Shoshone(3)
McCoy(2)
Excelsior(5)
(1)Roosevelt
Topaz Mountain(13)
Confusion(14)
Twin Peaks(16)
Sulfurdale (17)
Beryl (15)
Tres Montosas (10)
San Agustin(9)
Florida(8)
Tres Hermanas (11)
O'Brien Resources
Prospects
Data Review & Ground Check
Data Review only
0 100 200 300 400 500 MILES
ALBERS EQUAL AREA PROJECTION - STANDARD PARALLELS 29½° and 45½°

Figure 1.

Prospect Reviews

Newdale Prospect, Idaho

The prospect is located in southeastern Idaho, approximately 15 miles northeast of Rexburg. The land position is small and fragmented with a total of 1,111 acres of fee and federal lease applications. O'Brien prepared a heatflow map based upon twelve (12) thermal gradient measurements in holes ranging from 50 to 180 meters. As reported by O'Brien, the heatflow varies from 7.8 to 15.0 HFU with thermal gradients ranging from 130°C/km to 250°C/km (Figure 2).

Based upon thermal gradient calculations using only the bottom hole temperatures and an assumed mean annual temperature of 15°C, I get gradients of 31°C/km to 148°C/km. Several warm water aquifers are known to exist in the area. Therefore, based upon (1) a poor land position, (2) probable convective heatflow above the aquifers, and (3) the general downgrading of the reported O'Brien gradients I recommend no further action on the prospect by AMAX.

Wagontine Prospect, Oregon

The prospect is located within the Brothers Fault Zone approximately 40 miles west of Burns, Oregon. Three separate parcels of land totalling over 17,280 acres make up the land position. The heatflow map presented by O'Brien was based upon data from twelve holes; however, on six holes they had information on depth and bottom hole temperatures. The thermal gradient reported by O'Brien range from 32°C/km to 150°C/km with a maximum heatflow of 8.3 HFU (Figure 3).

Based upon our previous experience in the Burns area, I think we can assume a mean annual temperature of 12°C. When we calculate thermal gradients based upon bottom hole temperature and mean annual temperature we find some of O'Brien's data suspect which leaves only two holes with significant gradients and/or heatflow. Therefore, based upon (1) two one point anomalies, (2) scattered land position, and (3) quality of thermal data presented, I recommend that AMAX do nothing further with the prospect.

Excelsior Prospect, Nevada

The prospect is located in southwestern Nevada approximately 15 miles south of Hawthorne and consists of six contiguous sections of federal geothermal leases. O'Brien presented a heatflow map based upon nine thermal gradient observations (Figure 4). The maximum heatflow given was 6.7 HFU with thermal gradients ranging from 11°C/km to 224°C/km.

If we assume a mean annual temperature of 15°C, then four of the reported gradient holes will have gradients above background. Two of the holes would then have bottom hole temperatures less than mean annual suggesting cold water underflow off the mountains. O'Brien drilled seven of the reported holes, those with Ex numbers (Figure 4).

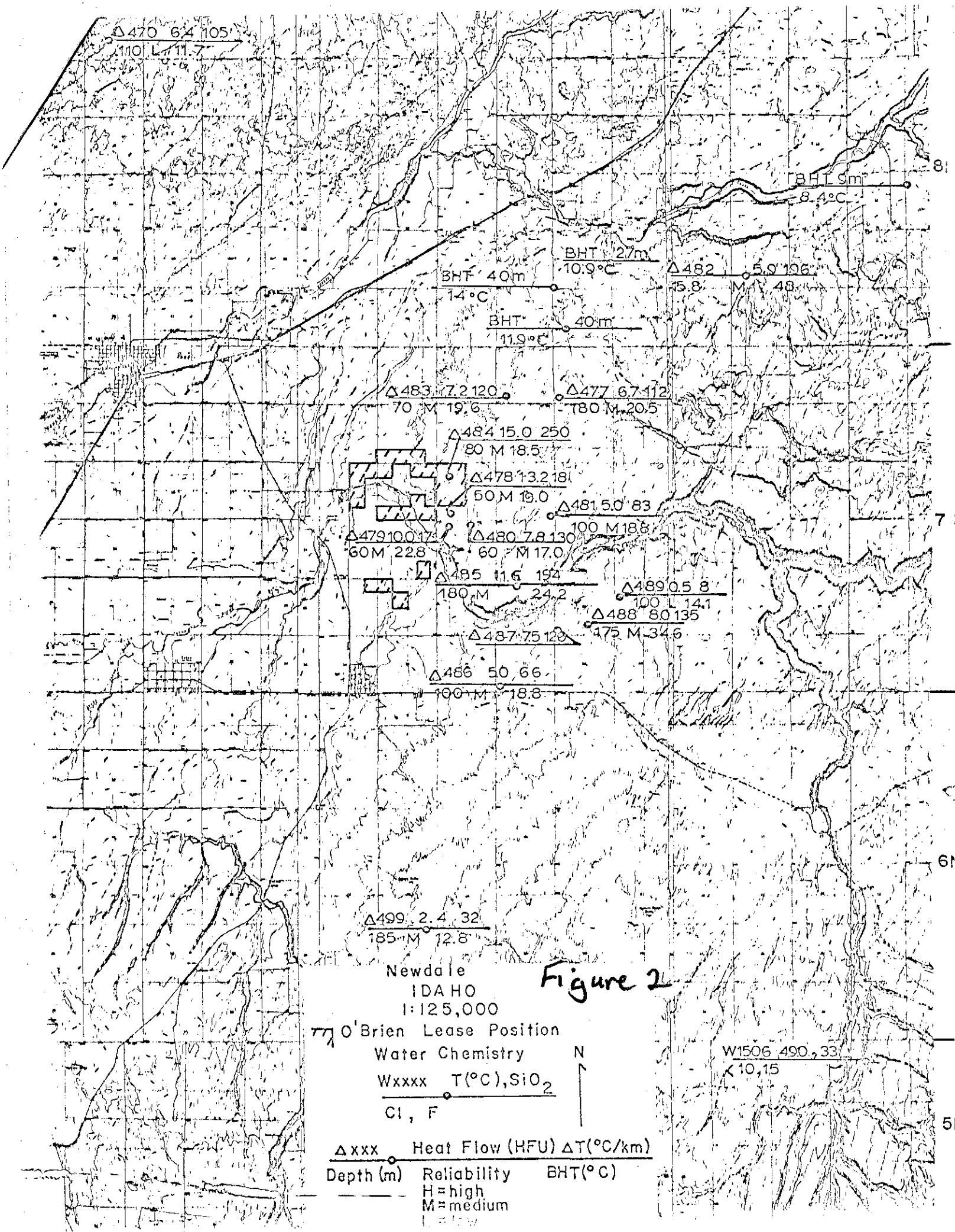

Δ470 6.4 105
110 L 11.7
BHT 9m
8.4°C
BHT 27m
10.9°C
Δ482 5.9 106
15.8 M 48
BHT 40m
14°C
BHT 40m
11.9°C
Δ483 7.2 120
70 M 19.6
Δ477 6.7 112
180 M 20.5
Δ484 15.0 250
80 M 18.5
Δ478 13.2 181
50 M 19.0
Δ481 5.0 83
100 M 18.8
Δ479 10.0 171
60 M 22.8
Δ480 7.8 130
60 M 17.0
Δ485 11.6 194
180 M 24.2
Δ489 0.5 8
100 L 14.1
Δ488 80 135
475 M 34.6
Δ487 75 128
Δ486 50 66
100 M 18.8
Δ499 2.4 32
185 M 12.8
W1506 490, 33
10,15
Newdale
IDAHO
1:125,000
O'Brien Lease Position
Water Chemistry
Wxxxx T(°C), SiO2
Cl, F
N
Δxxx Heat Flow (HFU) ΔT(°C/km)
Depth (m) Reliability BHT(°C)
H = high
M = medium

Figure 2

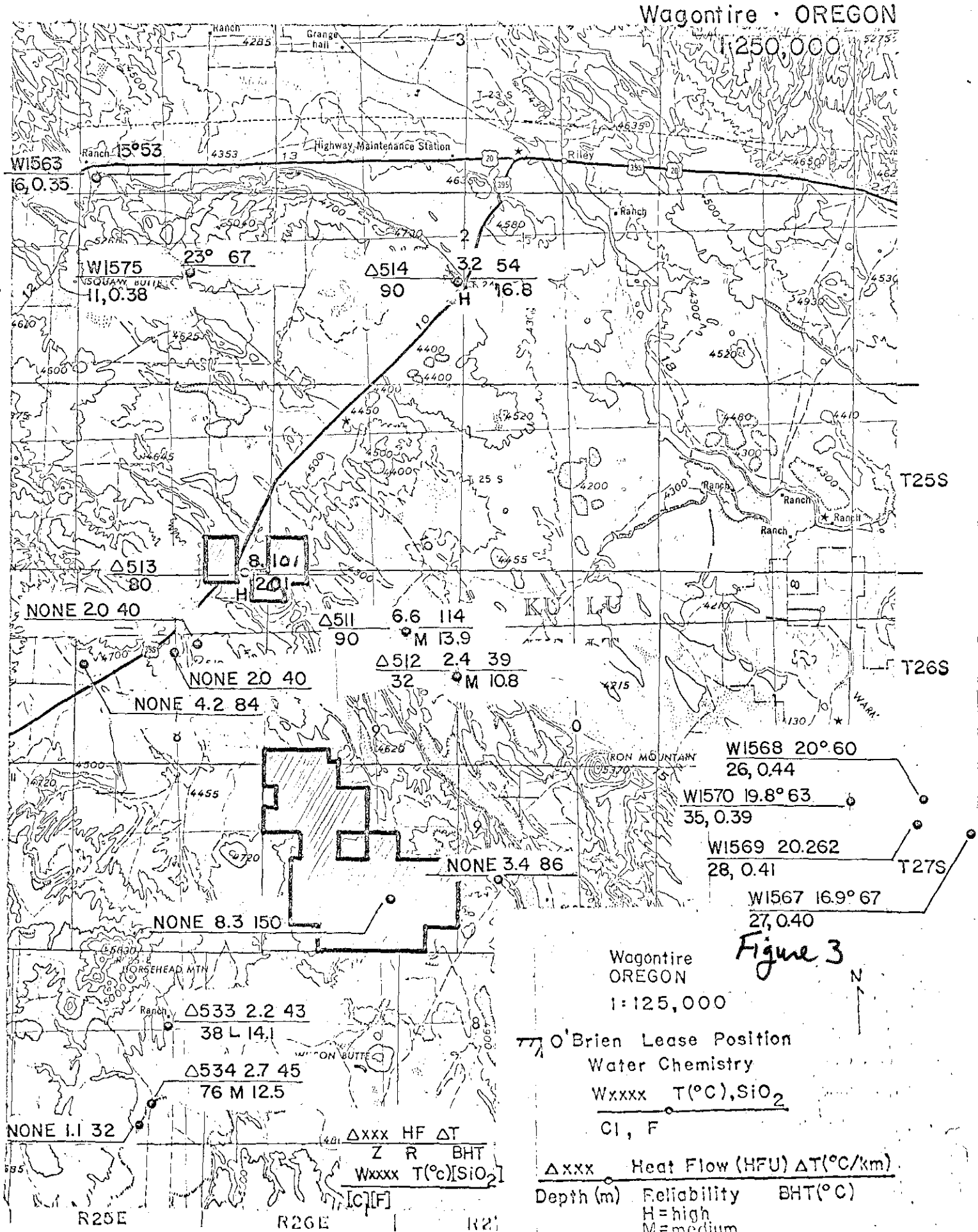


Figure 3

Wagontire
OREGON
1:125,000

N

O'Brien Lease Position
Water Chemistry
Wxxxx T(°C), SiO_2
Cl, F

Δxxx Heat Flow (HFU) ΔT(°C/km)
Depth (m) Reliability BHT(°C)
H=high
M=medium

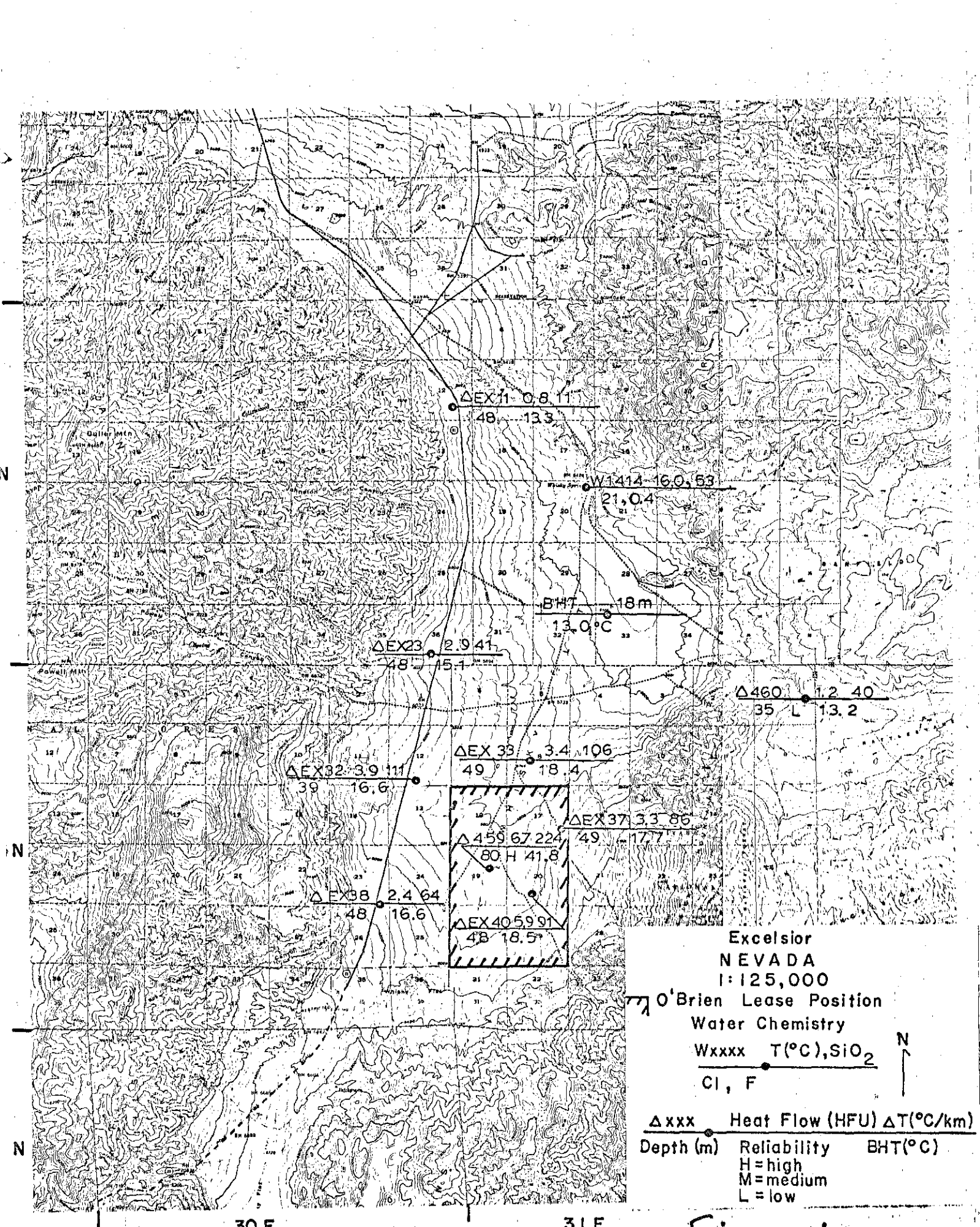

ΔEX11 0.8 11
48 13.3
W1414 16.0 63
21, 0.4
BHT 18m
13.0°C
ΔEX23 2.9 41
48 15.1
Δ460 1.2 40
35 L 13.2
ΔEX33 3.4 106
49 18.4
ΔEX32 3.9 111
39 16.6
ΔEX37 3.3 86
49 17.7
Δ459 67 224
80 H 41.8
ΔEX38 2.4 64
48 16.6
ΔEX40 5.9 91
48 18.5
Excelsior
NEVADA
1:125,000
O'Brien Lease Position
Water Chemistry
Wxxxx T(°C), SiO2
Cl, F
N
Δxxx Heat Flow (HFU) ΔT(°C/km)
Depth (m) Reliability BHT(°C)
H = high
M = medium
L = low
30 E
31 E

Figure 4

The AMAX reconnaissance program measured a windmill, Δ459 on Figure 4 and got a gradient of 213°C/km in air above water at 37°C. O'Brien reported a gradient of 224°C/km with a bottom hole temperature of 41.8°C. The Nevada Bureau of Mines reports a temperature of 43°C at a depth of 105 meters from the same hole.

Hydrogeochemical data is very sparse in the area. The Nevada Bureau of Mines reports an incomplete analysis for water from the windmill described above. The silica geothermometer for the reported silica gives a temperature of 91°C. AMAX has two analyses from the general area which give the following temperature data:

	Water Well W11068 Sec.5 T5N R31E	Whisky Spring W11069 Sec.16 T6N R31E
$TSiO_2$	106	103
TNa-K	204	262
TNa-K-Ca	123	150

The prospect is still quite raw, but I would recommend that AMAX plan to work on the property in 1983 in order to define a possible drilling fund target. If O'Brien wants to accelerate work on this project, we should encourage them to continue the exploration effort which they started, and we could come in when the intermediate depth drilling commences.

New York Canyon Prospect, Nevada

The prospect is located in west-central Nevada, approximately 30 miles east of Lovelock. The land position consists of a total of nine sections (5760 ± acres) of federal lease applications in four scattered parcels. O'Brien reported on seven thermal gradient measurements in the area surrounding the prospect (Figure 5). At least four of the holes have bottom hole temperatures at or only slightly above the mean annual temperature which suggests groundwater underflow. One hydrogeochemical site gave T_qSiO_2 of 84°C.

On the basis of the limited data available and the scattered land position of O'Brien, I recommend that AMAX do no further work on the prospect.

Shoshone Prospect, Nevada

The prospect is located in central Nevada approximately 30 miles north of Austin on State Highway 8A. The land position comprises 14 contiguous sections (8960 ± acres) of issued federal geothermal leases. O'Brien reported on a total of 18 thermal gradient measurements (Figure 6) with heatflow of 32 to over 13 HFU. Of the 18 holes reported by O'Brien, AMAX has seven of them in our reconnaissance heatflow files. The holes range in depth from 50 to 160 meters, and have thermal gradients which range from 79°C/km to 329°C/km.

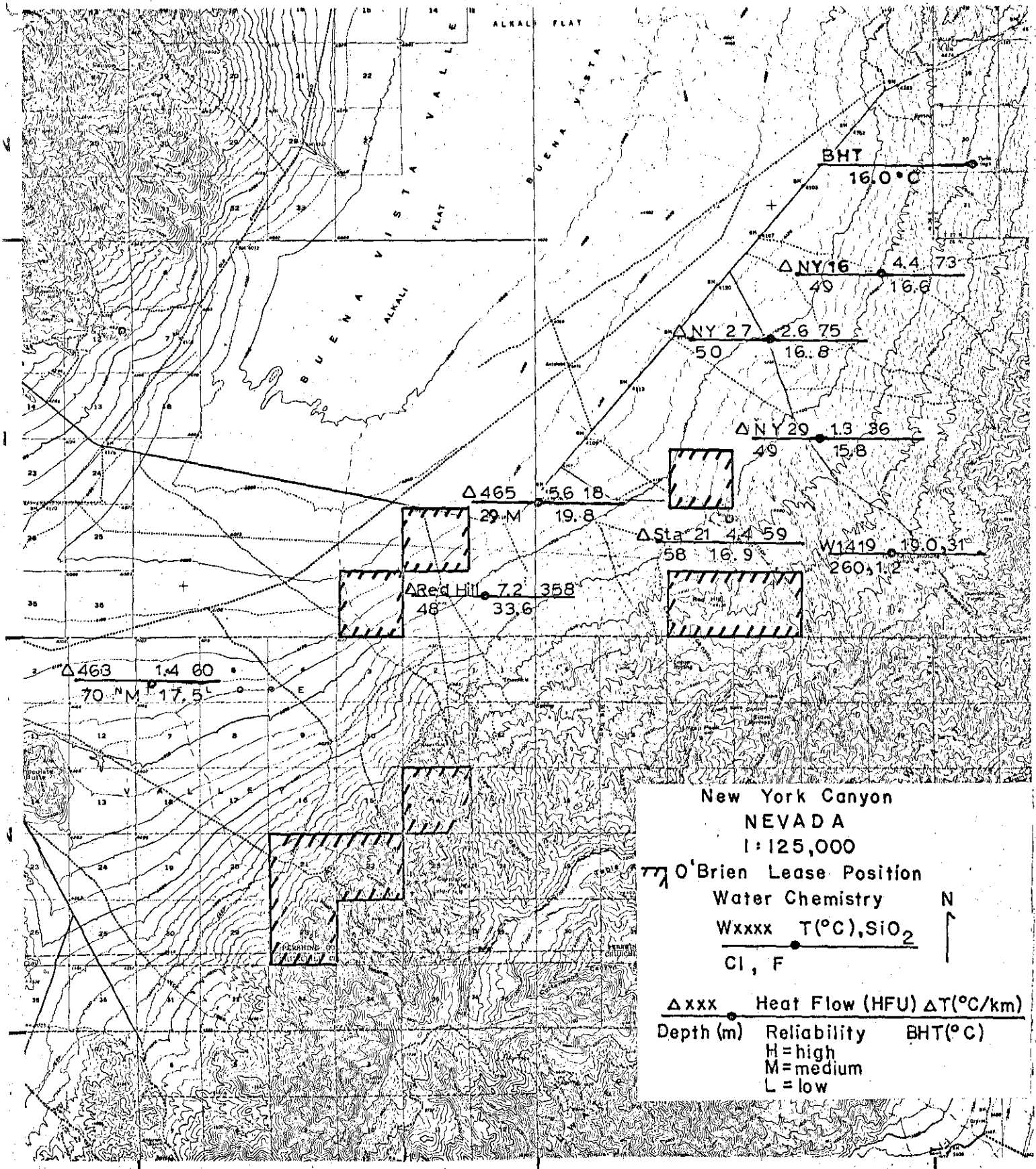

BHT
16.0°C
ΔNY16 4.4 73
40 16.6
ΔNY 27 2.6 75
50 16.8
ΔNY 29 1.3 36
40 15.8
Δ465 5.6 18
29 M 19.8
ΔSta 21 4.4 59
58 16.9
W1419 19.0 31
260 1.2
ΔRed Hill 7.2 358
48 33.6
Δ463 1.4 60
70 M 17.5
New York Canyon
NEVADA
1:125,000
O'Brien Lease Position
Water Chemistry
Wxxxx T(°C), SiO2
Cl, F
N
Δxxx Heat Flow (HFU) ΔT(°C/km)
Depth (m) Reliability BHT(°C)
H = high
M = medium
L = low
35 E
36 E

Figure 5

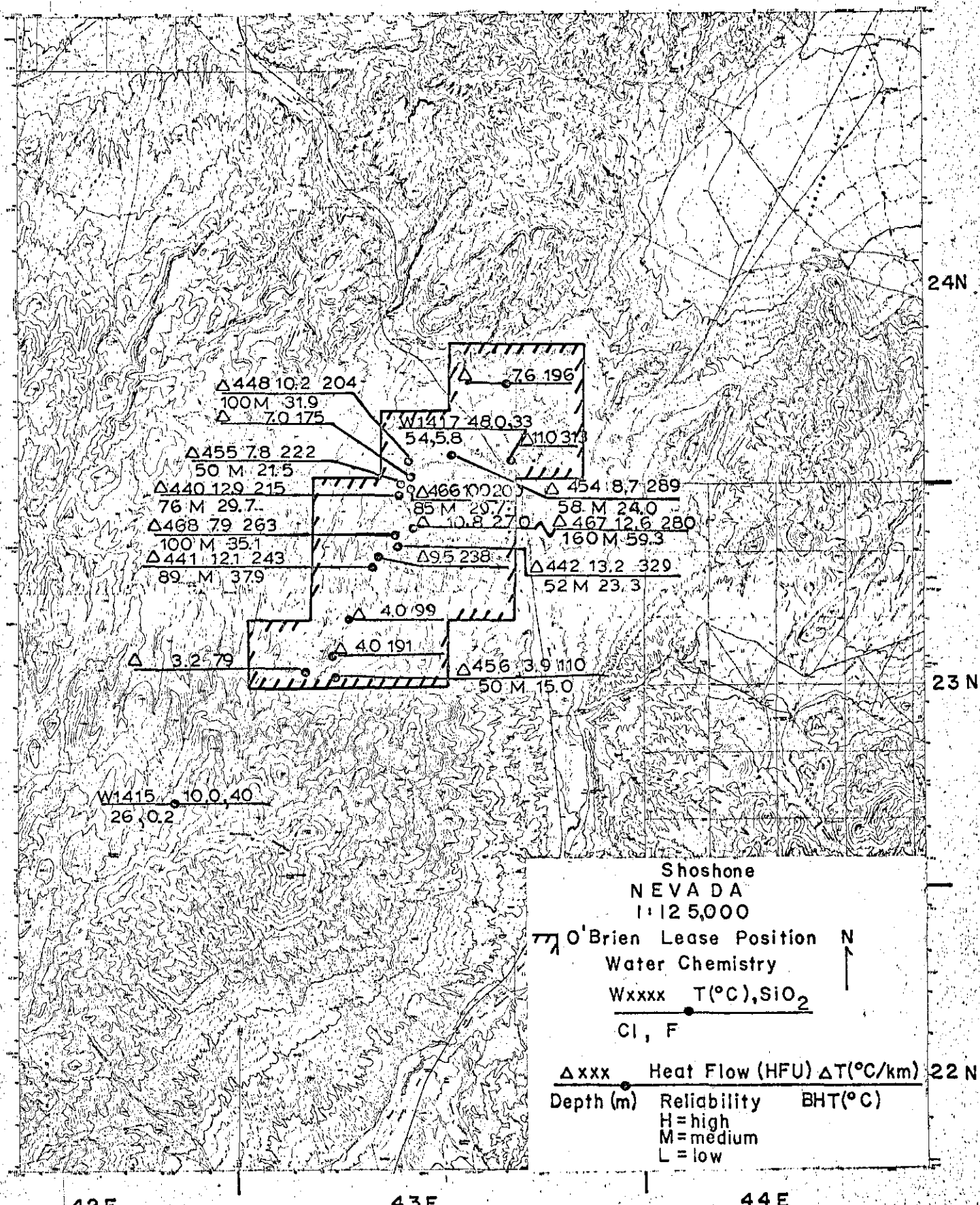

Δ448 10.2 204
100M 31.9
Δ 7.0 175
Δ455 7.8 222
50 M 21.5
Δ440 12.9 215
76 M 29.7
Δ468 7.9 263
100 M 35.1
Δ441 12.1 243
89 M 37.9
Δ 3.2 79
W1415 10.0,40
26, 0.2
Δ 76 196
W1417 48.0,33
54,5.8
Δ110 313
Δ466 10.0 20
85 M 29.7
Δ 10.8 270
Δ95 238
Δ 4.0 99
Δ 4.0 191
Δ456 3.9 110
50 M 15.0
Δ 454 8.7 289
58 M 24.0
Δ467 12.6 280
160 M 59.3
Δ442 13.2 329
52 M 23.3
24N
23 N
22 N
42E
43E
44E
Shoshone
NEVADA
1:125,000
O'Brien Lease Position
N
Water Chemistry
Wxxxx T(°C), SiO2
Cl, F
Δxxx Heat Flow (HFU) ΔT(°C/km)
Depth (m) Reliability BHT(°C)
H = high
M = medium
L = low

Figure 6

The prospect is underlain by Tertiary tuffaceous sediments which are thought to be 12 my old and ash-flow tuffs of the Bates Mountain Formation (23-24my). The holes were drilled in 1955 and 1976 as a part of a uranium exploration program.

Based upon the size and continuity of the thermal anomaly, the geologic setting and the presence of a warm water well, 48°C, along the Reese River this prospect may have considerable geothermal potential. Therefore, I recommend that AMAX undertake the necessary exploration in 1982 to bring the prospect to a point where it could be included in the drilling fund if warranted.

Florida Prospect, New Mexico

The Florida Prospect is located in southwestern New Mexico, approximately 14 miles northeast of Deming. O'Brien measured gradients in five wells in the area (Figure 7) and reported gradients ranging from 25°C/km to 308°C/km. Ten water samples were collected by O'Brien and the field determinations are shown on Figure 7.

Based upon our previous experience in the area, I feel that thermal gradients measured in air above standing water are often suspect. Therefore, I recalculated all the gradients based upon the bottom hole temperatures and mean annual temperature, which reduces the anomaly to one point.

The AMAX reconnaissance program sampled several of the same sites and consistently came up with low thermal gradients. Our hydrogeochemistry suggests that while the waters are anomalous, they certainly do not signal anything spectacular. Therefore, I would recommend that AMAX do nothing more on this property.

San Agustin Prospect, New Mexico

The prospect is located in west-central New Mexico, approximately 50 miles west of Socorro. The land package consists of two separate lease parcels which total 21 sections (13,440 ±acres) of federal lease applications and some state lands.

The O'Brien data package consisted of thermal gradients from ten wells in the area (Figure 8). The thermal gradients range from 27°C/km to 177°C/km. Field determinations on six water samples were also presented which suggest some elevated values for SiO_2 and F.

AMAX reconnaissance in the general area confirms that it is an area of elevated heatflow and known warm water wells. At least two linear trends of thermal features are known, one is north-south which may be related to the Rio Grande rift system and the second is a northwest trending lineament. Until we know more about the regional thermal features and geology I feel it would be premature for AMAX to do any more work on this prospect.

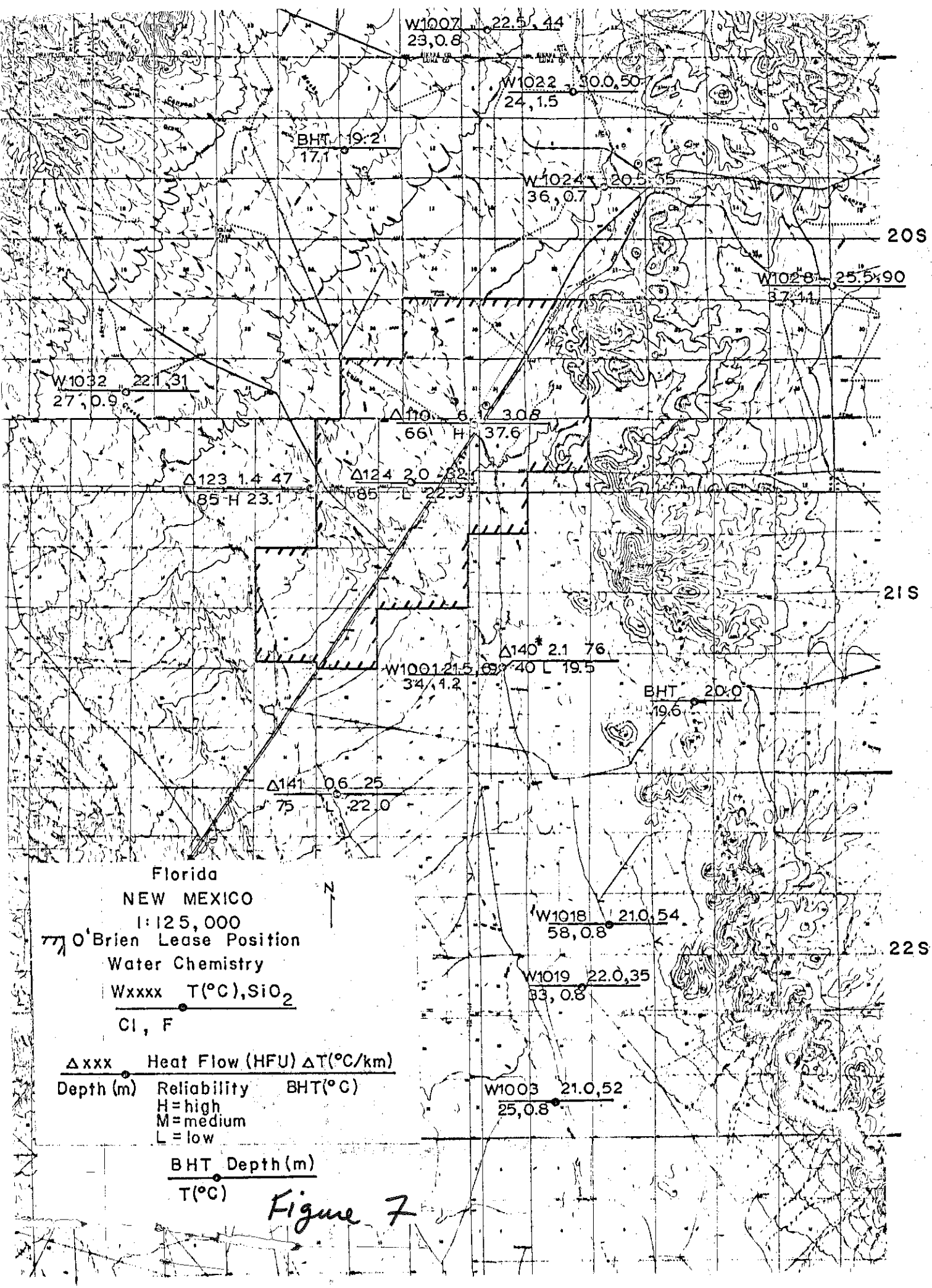

W1007 22.5, 44
23, 0.8
W1022 30.0, 50
24, 1.5
BHT 19.2
17.1
W1024 20.5, 55
36, 0.7
20S
W1028 25.5, 90
37, 1.1
W1032 22.1, 31
27, 0.9
Δ110 6.1 308
66 H 37.6
Δ123 1.4 47
85 H 23.1
Δ124 2.0 62
85 L 22.3
21S
Δ140* 2.1 76
40 L 19.5
W1001 21.5, 69
34, 1.2
BHT 20.0
19.6
Δ141 0.6 25
75 L 22.0
W1018 21.0, 54
58, 0.8
22S
W1019 22.0, 35
33, 0.8
W1003 21.0, 52
25, 0.8
Florida
NEW MEXICO
1:125,000
O'Brien Lease Position
Water Chemistry
Wxxxx T(°C), SiO2
Cl, F
Δxxx Heat Flow (HFU) ΔT(°C/km)
Depth (m) Reliability BHT(°C)
H = high
M = medium
L = low
BHT Depth (m)
T(°C)
N

Figure 7

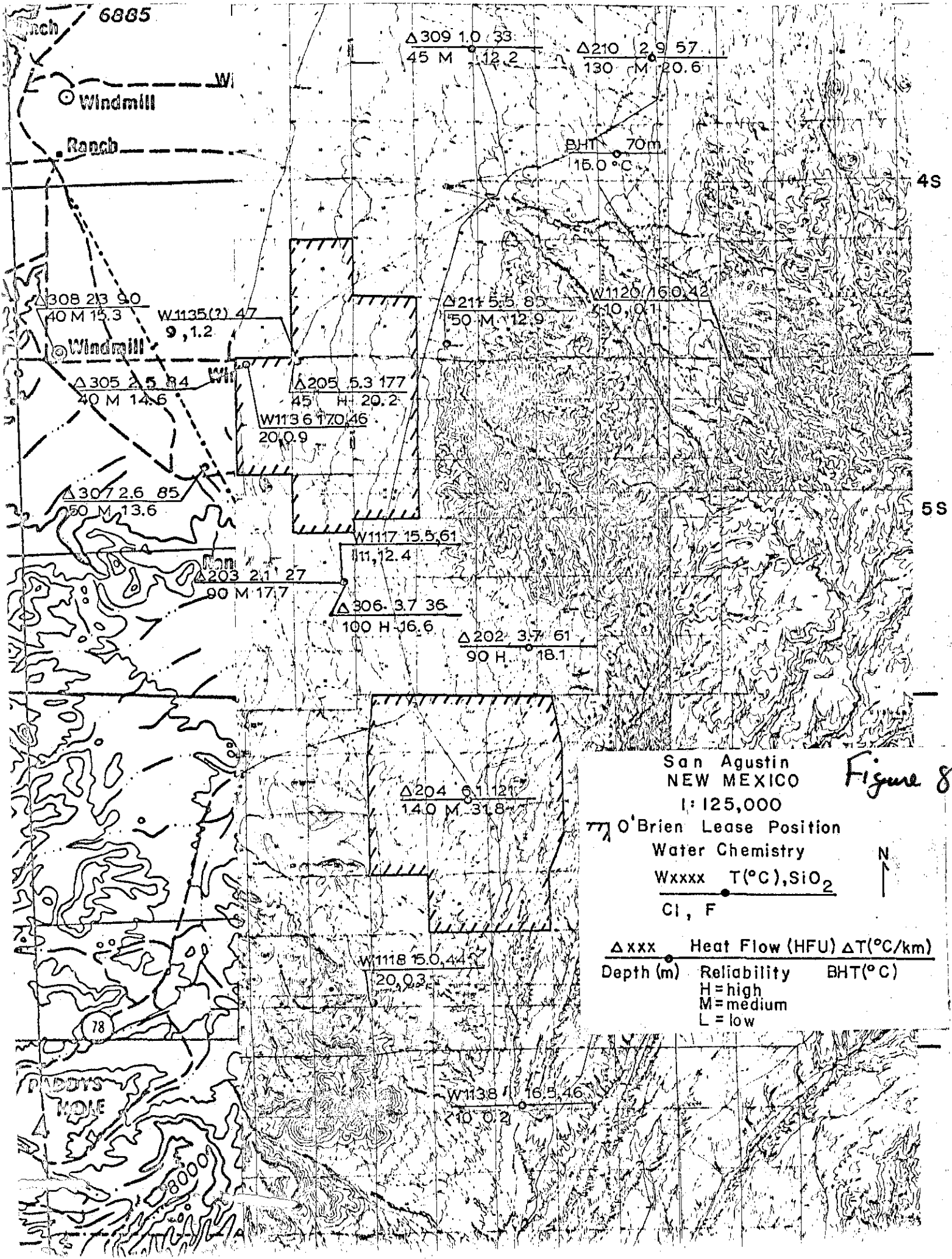

6885
Windmill
Ranch
Δ309 1.0 33
45 M 12.2
Δ210 2.9 57
130 M 20.6
BHT 70m
15.0 °C
4S
Δ308 2.3 90
40 M 15.3
W1135(?) 47
9, 1.2
Windmill
Δ305 2.5 84
40 M 14.6
Δ205 5.3 177
45 H 20.2
W1136 170,46
20,0.9
Δ211 5.5 85
50 M 12.9
W1120 160,42
10, 0.1
Δ307 2.6 85
50 M 13.6
5S
W1117 15.5,61
11, 12.4
Δ203 2.1 27
90 M 17.7
Δ306 3.7 36
100 H 16.6
Δ202 3.7 61
90 H 18.1
Δ204 6.1 121
140 M 31.8
W1118 15.0,44
20,0.3
78
W1138 16.5,46
10 0.2
8000'
San Agustin
NEW MEXICO
1:125,000
O'Brien Lease Position
Water Chemistry
Wxxxx T(°C), SiO2
Cl, F
N
Δxxx Heat Flow (HFU) ΔT(°C/km)
Depth (m) Reliability BHT(°C)
H = high
M = medium
L = low

Figure 8

Tres Hermanas Prospect, New Mexico

The prospect is located in southwestern New Mexico, approximately 25 miles south of Deming. The land position consists of eight sections (5120 ± acres) of federal lease applications. O'Brien is attempting to get the state to offer the state lands but has not been successful to date.

The technical package presented by O'Brien consisted of our thermal gradient measurements and one hydrogeochemical site (Figure 9). The lease position had to be based solely upon the warm water well sampled. AMAX also sampled the same well and the results are shown below:

	Sample #	TH_2O	T_qSiO_2	TNa-Ca-K	Li	B	F	Cl	Ca	Na	K	Si
O'Brien	W1031	29	100	119	0.3	0.5	4.9	95	66	280	20	47
AMAX	W14163	29	103	137	0.3	0.3	5.2	70	56	290	19	50

AMAX has chemical data for many other wells in the area; and although the above geochemistry is interesting, other wells support the same or better geochemistry. Therefore, I would recommend that AMAX not pursue this particular prospect.

Tres Montosas Prospect, New Mexico

The prospect is located in west-central New Mexico, approximately 35 miles west of Socorro. The lease position consists of thirteen contiguous sections under federal geothermal lease applications.

The O'Brien data package consisted of nine thermal gradient measurements and three hydrogeochemical sites (Figure 10). Only one well (ΔT 220) has a gradient above background. The water chemistry is indicative of normal groundwater.

AMAX reconnaissance work measured two of the windmills which O'Brien measured with quite different results:

O'Brien ΔT 220	AMAX 80-72
BHT 36.0°C	BHT 36.9°C
D 65m	D 70m
ΔT 163°C/km	ΔT 138°C/km

O'Brien ΔT 221	AMAX 80-73
BHT 14.4°C	BHT 16.0°C
D 55m	D 60m
ΔT 105°C/km	ΔT 56°C/km

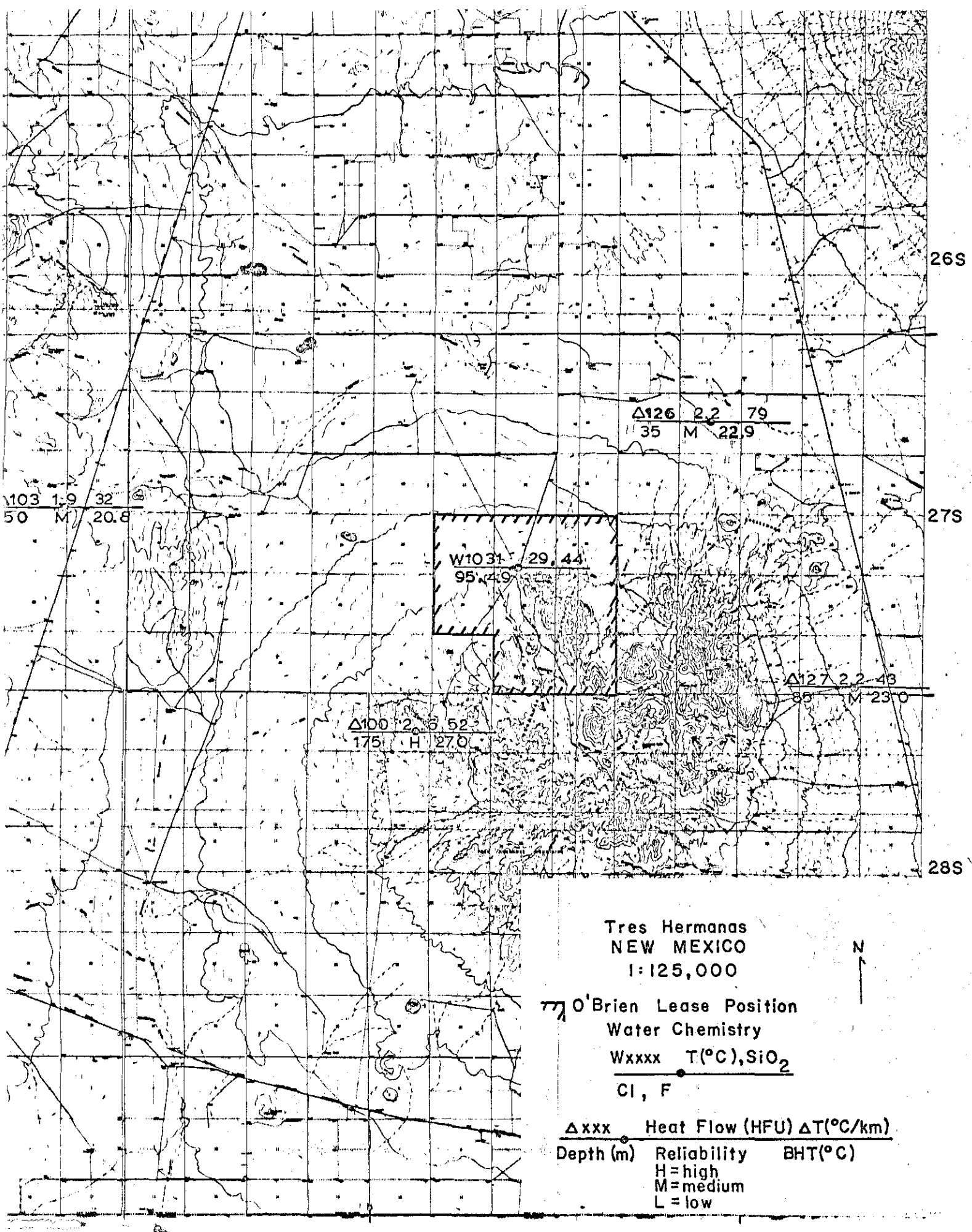

26S
27S
28S
9W
8W
Δ126 2.2 79
35 M 22.9
103 1.9 32
50 M 20.8
W1031 29.44
95 4.9
Δ127 2.2 43
85 M 23.0
Δ100 2.5 52
175 H 27.0
Tres Hermanas
NEW MEXICO
1:125,000
N
O'Brien Lease Position
Water Chemistry
Wxxxx T(°C), SiO2
Cl, F
Δxxx Heat Flow (HFU) ΔT(°C/km)
Depth (m) Reliability BHT(°C)
H = high
M = medium
L = low

Figure 9

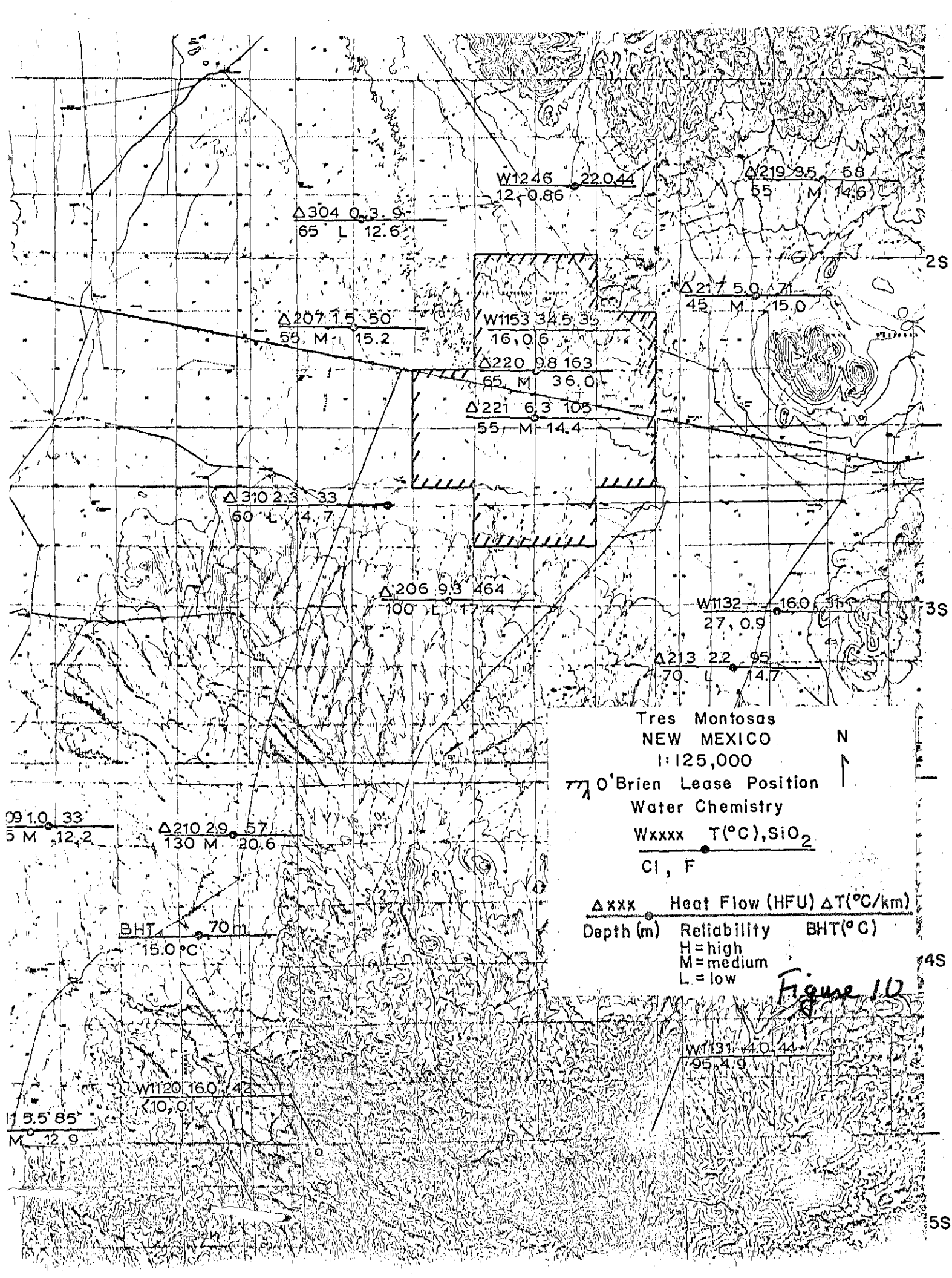

W1246 22.0 44
12, 0.86
Δ219 3.5 68
55 M 14.6
Δ304 0.3 9
65 L 12.6
2S
Δ217 5.0 71
45 M 15.0
Δ207 1.5 50
55 M 15.2
W1153 34.5 36
16, 0.6
Δ220 9.8 163
65 M 36.0
Δ221 6.3 105
55 M 14.4
Δ310 2.3 33
60 L 14.7
Δ206 9.3 464
100 L 17.4
W1132 16.0 36
27, 0.9
3S
Δ213 2.2 95
70 L 14.7
Tres Montosas
NEW MEXICO
1:125,000
N
O'Brien Lease Position
Water Chemistry
Wxxxx T(°C), SiO2
Cl , F
Δxxx Heat Flow (HFU) ΔT(°C/km)
Depth (m) Reliability BHT(°C)
H = high
M = medium
L = low
09 1.0 33
5 M 12.2
Δ210 2.9 57
130 M 20.6
BHT 70 m
15.0 °C
4S
W1131 4.0 44
95, 4.9
W1120 16.0 42
<10, 0.1
15.5 85
M 12.9
5S

Figure 10

The water chemistry of the O'Brien sample is limited to the field determinations; however, it compares reasonably well with the USGS:

	Sample #	TH_2O	T_qSiO_2	TNa-Ca-K	Ca	Na	K	F	Cl	SiO_2
O'Brien	W1153	36	89					0.6	16	35
USGS		36	106	137	8.4	82	1.2	3.2	24	54

The area is underlain by rocks of the Datil volcanic field and thus are too old to provide a heat source. It would appear that the warm water sample represents deep circulation. Therefore, I recommend that AMAX do no further work on the prospect.

Beryl Prospect, Utah

The prospect is located in southwestern Utah, approximately 40 miles west of Cedar City. The land position comprises two lease blocks which total twelve sections of fee and federal lease applications.

The technical data package includes eight thermal gradient observations and eight hydrogeochemical sites (Figure 11). Three anomalous thermal gradient wells lie along an east-west line between the two lease blocks. All the remaining holes have gradients equal to background except for ΔT 379 which probably is influenced by either vertical or lateral moving groundwaters. The water chemistry suggests somewhat elevated Cl values.

Based upon previous experience in the area, character of the thermal anomaly and location of the lease parcels with respect to the anomaly, I recommend that AMAX do no further work on the prospect.

Confusion Prospect, Utah

The prospect is located in west-central Utah, approximately 50 miles west of Delta. The land position consists of two lease blocks, one made up of 10 sections and the other of 5 sections. All the land is under federal lease applications.

O'Brien reported on twelve ΔT holes which range from 35 to 30 meters (Figure 12) with gradients of $5^oC/km$ to $319^oC/km$. Five of the holes have bottom hole temperatures at or near mean annual temperature which suggests considerable cold water underflow. Six water sample sites were reported, of which four were greater than 20^oC.

Geologically the area is underlain by rocks of the Lower Paleozoic. A Tertiary granite body is exposed in the House Range southeast of the property. The prospect appears to lie at the intersection of a Basin and Range fault and a northwest trending right lateral fault. Based upon the warm springs in the area, the lack of young volcanic rocks to indicate a magnetic heat source, and the nature of the water chemistry I believe the thermal anomaly is related to convective heatflow above a warm water aquifer. Therefore, I would not recommend any additional work by AMAX.

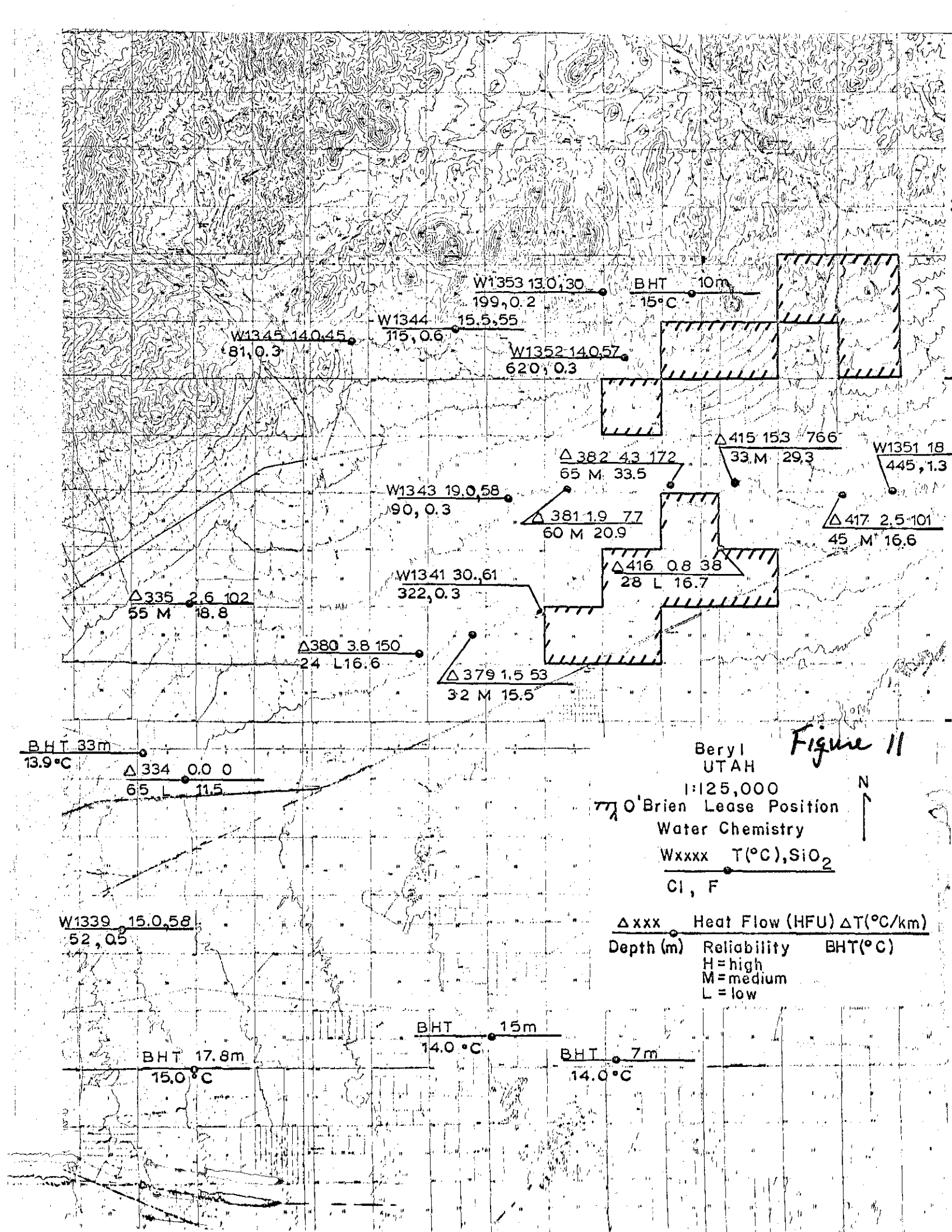

W1353 13.0,30
199,0.2
BHT 10m
15°C
W1344 15.5,55
115,0.6
W1345 14.0,45
81,0.3
W1352 14.0,57
620,0.3
Δ415 15.3 766
33 M 29.3
W1351 18
445,1.3
Δ382 4.3 172
65 M 33.5
W1343 19.0,58
90,0.3
Δ381 1.9 77
60 M 20.9
Δ417 2.5 101
45 M 16.6
Δ416 0.8 38
28 L 16.7
W1341 30.,61
322,0.3
Δ335 2.6 102
55 M 18.8
Δ380 3.8 150
24 L16.6
Δ379 1.5 53
32 M 15.5
BHT 33m
13.9°C
Δ334 0.0 0
65 L 11.5
W1339 15.0,58
52,0.5
BHT 15m
14.0°C
BHT 17.8m
15.0°C
BHT 7m
14.0°C
Beryl
UTAH
1:125,000
O'Brien Lease Position
Water Chemistry
Wxxxx T(°C),SiO2
Cl, F
Δxxx Heat Flow (HFU) ΔT(°C/km)
Depth (m) Reliability BHT(°C)
H = high
M = medium
L = low
N

Figure 11

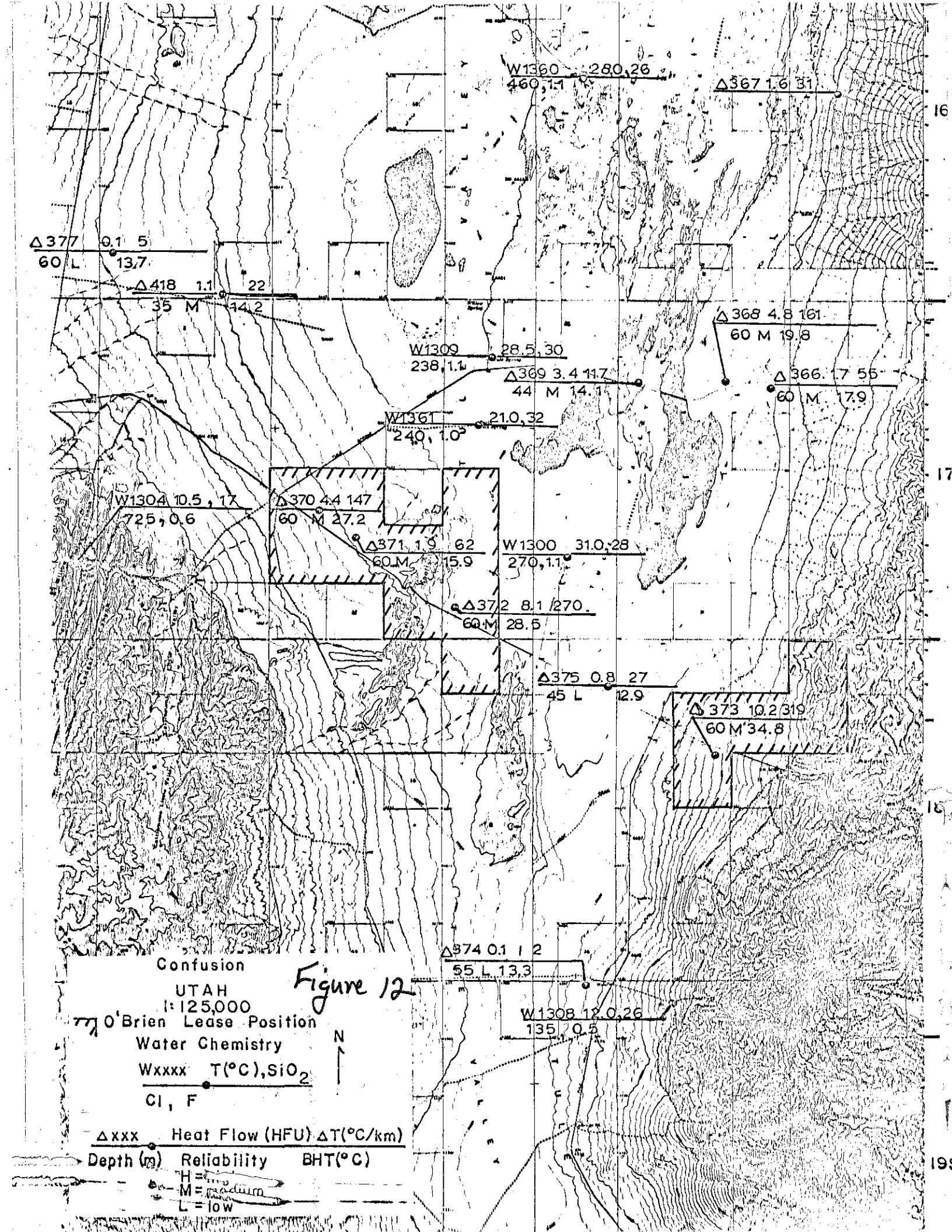

W1360 280,26
460, 1.1
Δ367 1.6 31
Δ377 0.1 5
60 L 13.7
Δ418 1.1 22
35 M 14.2
Δ368 4.8 161
60 M 19.8
W1309 28.5, 30
238, 1.1
Δ369 3.4 117
44 M 14.1
Δ366. 1.7 55
60 M 17.9
W1361 21.0, 32
240, 1.0
W1304 10.5, 17
725, 0.6
Δ370 4.4 147
60 M 27.2
Δ371 1.9 62
60 M 15.9
W1300 31.0, 28
270, 1.1
Δ372 8.1 270
60 M 28.6
Δ375 0.8 27
45 L 12.9
Δ373 10.2 319
60 M 34.8
Δ374 0.1 1 2
55 L 13.3
W1308 12 0,26
135 0.5
Confusion
UTAH
1:125,000
O'Brien Lease Position
Water Chemistry
Wxxxx T(°C), SiO2
Cl, F
Δxxx Heat Flow (HFU) ΔT(°C/km)
Depth (m) Reliability BHT(°C)
H =
M = medium
L = low
N

Figure 12

Topaz Mountain Prospect, Utah

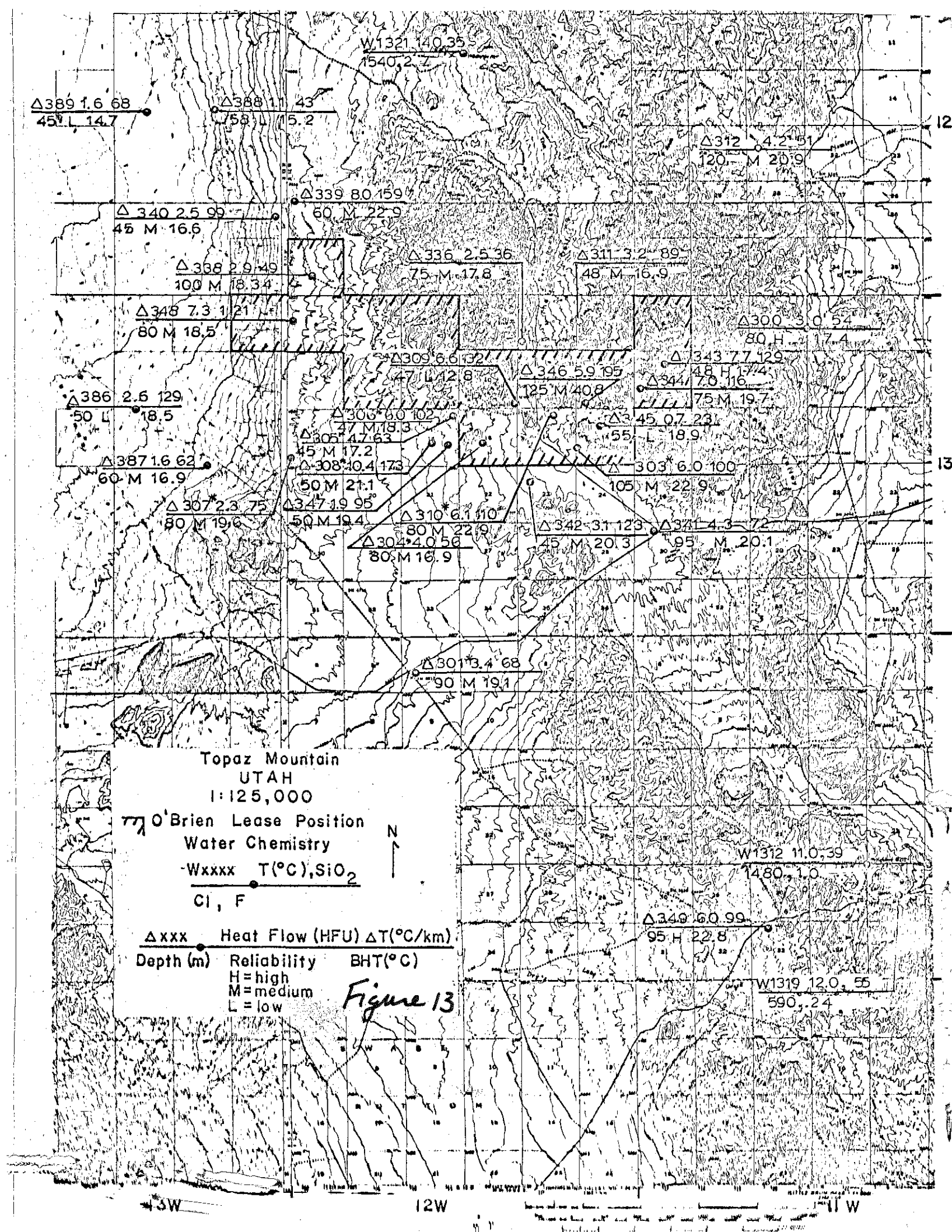
The prospect is located in west-central Utah, approximately 45 miles northwest of Delta. The land package consists of 15 continguous sections under federal lease applications. The O'Brien lease applications abut the Brush Wellman geothermal leases.

The technical package included thermal gradient measurements from 28 holes which range from 45 to 120 meters deep. The reported gradients range from 35°C/km to 195°C/km (Figure 13). The seven holes greater than 90 meters deep have an average ΔT of 91°C/km. The three hydrogeochemical sites collected by O'Brien give $T_q SiO_2$ in the 89°C-106°C range and the chloride contents range from 600-1500 ppm.

Geologically the area lies in an area of extensive mineralization associated with young volcanic rocks. The prospect lies along a circular fracture related to the Thomas Caldera. The area is characterized by above normal heatflow over an area of more than four townships which deserves more exploration. Therefore, I would recommend that AMAX attempt to work out a combined deal on the O'Brien and Brush Wellman lands. An option arrangement where AMAX would earn an interest in the properties by conducting a phased exploration program lending to a test for discovery. Brush Wellman has indicated that they would accept a deal whereby they kept the leases under their name to alleviate chargeability problems. Perhaps O'Brien would also be amenable to such an arrangement.

H. D. Pilkington

HDP/c


W1321 14.0 35
1540 2
Δ389 1.6 68
45 L 14.7
Δ388 1.1 43
58 L 15.2
Δ312 4.2 51
120 M 20.9
Δ339 8.0 159
60 M 22.9
Δ340 2.5 99
45 M 16.6
Δ336 2.5 36
75 M 17.8
Δ311 3.2 89
48 M 16.9
Δ338 2.9 49
100 M 18.3
Δ348 7.3 121
80 M 18.5
Δ300 3.0 54
80 H 17.4
Δ343 7.7 129
48 H 17.4
Δ309 6.6 32
47 L 12.8
Δ346 5.9 195
125 M 40.8
Δ344 7.0 116
75 M 19.7
Δ386 2.6 129
50 L 18.5
Δ306 6.0 102
47 M 18.3
Δ345 0.7 23
55 L 18.9
Δ305 4.7 63
45 M 17.2
Δ387 1.6 62
60 M 16.9
Δ308 10.4 173
50 M 21.1
Δ303 6.0 100
105 M 22.9
Δ307 2.3 75
80 M 19.6
Δ347 1.9 95
50 M 19.4
Δ310 6.1 110
80 M 22.9
Δ342 3.1 123
45 M 20.3
Δ341 4.3 72
95 M 20.1
Δ304 4.0 56
80 M 16.9
Δ301 3.4 68
90 M 19.1
Topaz Mountain
UTAH
1:125,000
O'Brien Lease Position
Water Chemistry
Wxxxx T(°C), SiO2
Cl, F
N
W1312 11.0 39
1480 1.0
Δ349 6.0 99
95 H 22.8
W1319 12.0 55
590 2.4
Δxxx Heat Flow (HFU) ΔT(°C/km)
Depth (m) Reliability BHT(°C)
H = high
M = medium
L = low
Figure 13
12
13
13W
12W
11W