

DD-15

SUMMARY OF RESULTS FROM A  
THERMAL GRADIENT SURVEY OF  
THE SAN EMIDIO WELLS  
WASHOE COUNTY, NEVADA

submitted to  
CHEVRON OIL COMPANY

August, 1976

by

Allan M. Katzenstein  
Subir K. Sanyal

Project No. 76.112

GEONOMICS, INC.  
3165 Adeline Street  
Berkeley, California 94703

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## **DISCLAIMER**

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SUMMARY OF RESULTS

This summary describes the results obtained from a temperature gradient survey of the San Emidio wells drilled in Washoe County, Nevada. The temperature gradient survey was performed during the month of July, 1976, by Geonomics, Inc., for the Chevron Oil Company. The approximate location of the survey is shown in Figure 1. A total of two holes were drilled (S.E. #A and S.E. #B) with locations plotted on Figure 2.

Logging operations, which consisted of rock sampling and temperature-depth determinations, were undertaken by Geonomics, Inc. with data being presented in the following appendices:

- Appendix I - Drilling Operations Log for each Hole
- Appendix II - Sample Identification from each Hole
- Appendix III- Field Observed Temperature from each Hole
- Appendix IV - Uncorrected Temperature from each Hole
- Appendix V - Uncorrected Temperature Gradient Computer Calculations for each Hole

In addition, Table 1 presents vital statistics for each hole.

Both of the San Emidio holes were drilled in alluvial fill surrounded by relatively flat terrain; therefore, no terrain corrections were made on the temperature data and the thermal gradients remain uncorrected. A core was taken from S.E. #B, but due to the sedimentary character of the area and sample, no conductivity or density determinations were carried out, and, therefore, no heat flow is calculated for this area. Also, at the request of the Chevron Oil Company, no further interpretation is given on the data beyond this presentation of the calculated thermal gradients.

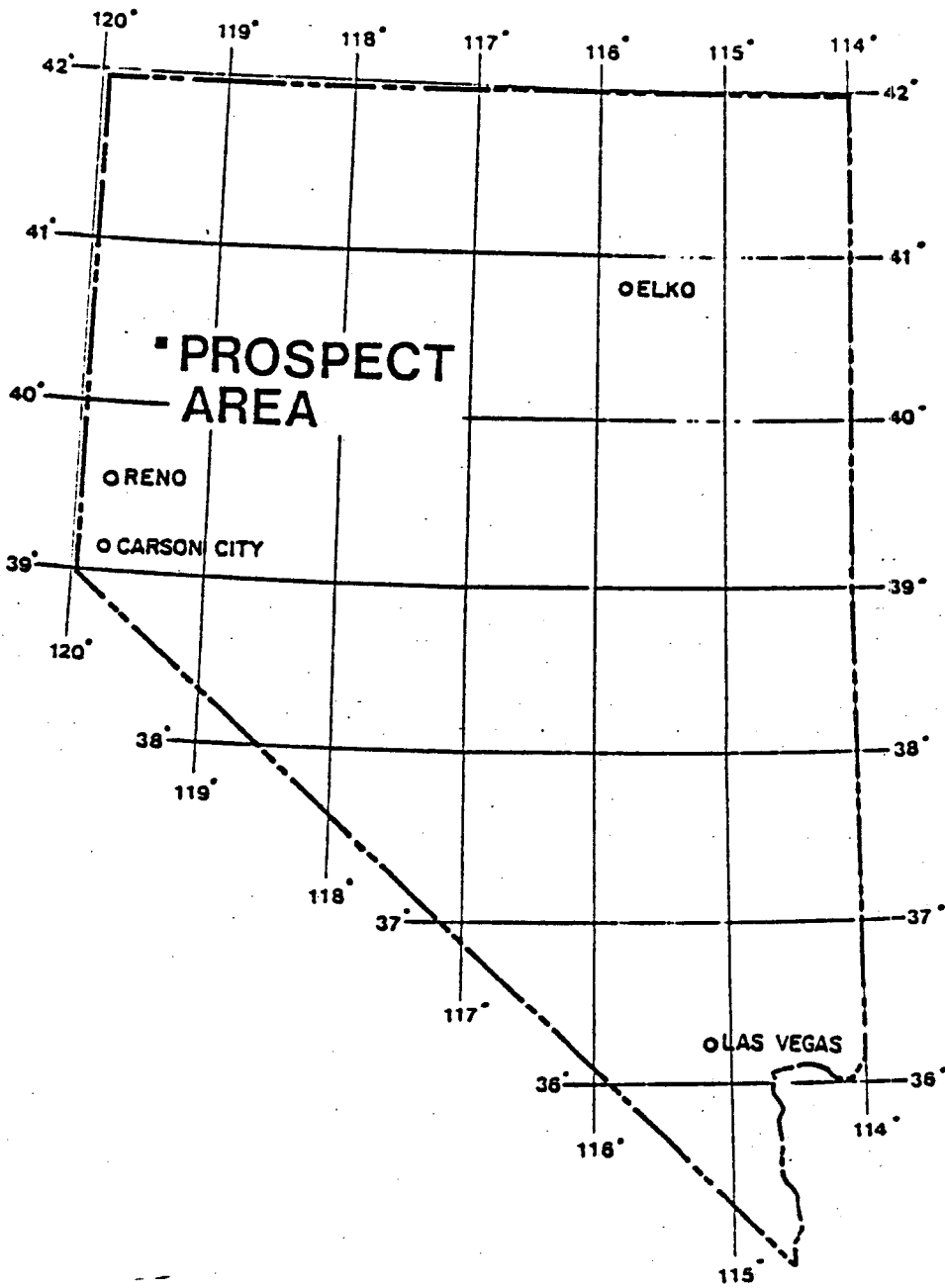


Figure 1. Location map of San Emidio Prospect.

APPENDIX III  
TEMPERATURE DATA; FIELD OBSERVATIONS

Table 1

SUMMARY OF VITAL STATISTICS

S.E. #A

Date completed: July 28, 1976  
 Bottom hole depth: 500 feet (152.4 meters)  
 Date of last temperature measurement: July 31, 1976  
 Bottom Hole Temperature: 112.3°F (44.6°C)  
 Temperature probe used: Geonomics\*  
 Uncorrect thermal gradient: 154.2°C/km  
 Uncorrect thermal gradient (depth of 50 feet and below):  
 149.1°C/km

S.E. #B

Date completed: July 29, 1976  
 Bottom hole depth: 176 feet (53.6 meters)-coring depth  
 Date of last temperature measurement: July 31, 1976  
 Bottom hole temperature: 222°F (105.6°C)  
 Temperature probe used: Geonomics\*  
 Uncorrected thermal gradient: 1134.0°C/km  
 Uncorrected thermal gradient (depth of 50 feet and below):  
 1187.0°C/km

\*Enviro-labs, Inc.  
 Model DT-101, Digital  
 Thermometer  
 Range: 0-100°C  
 Accuracy: ± 0.3°C

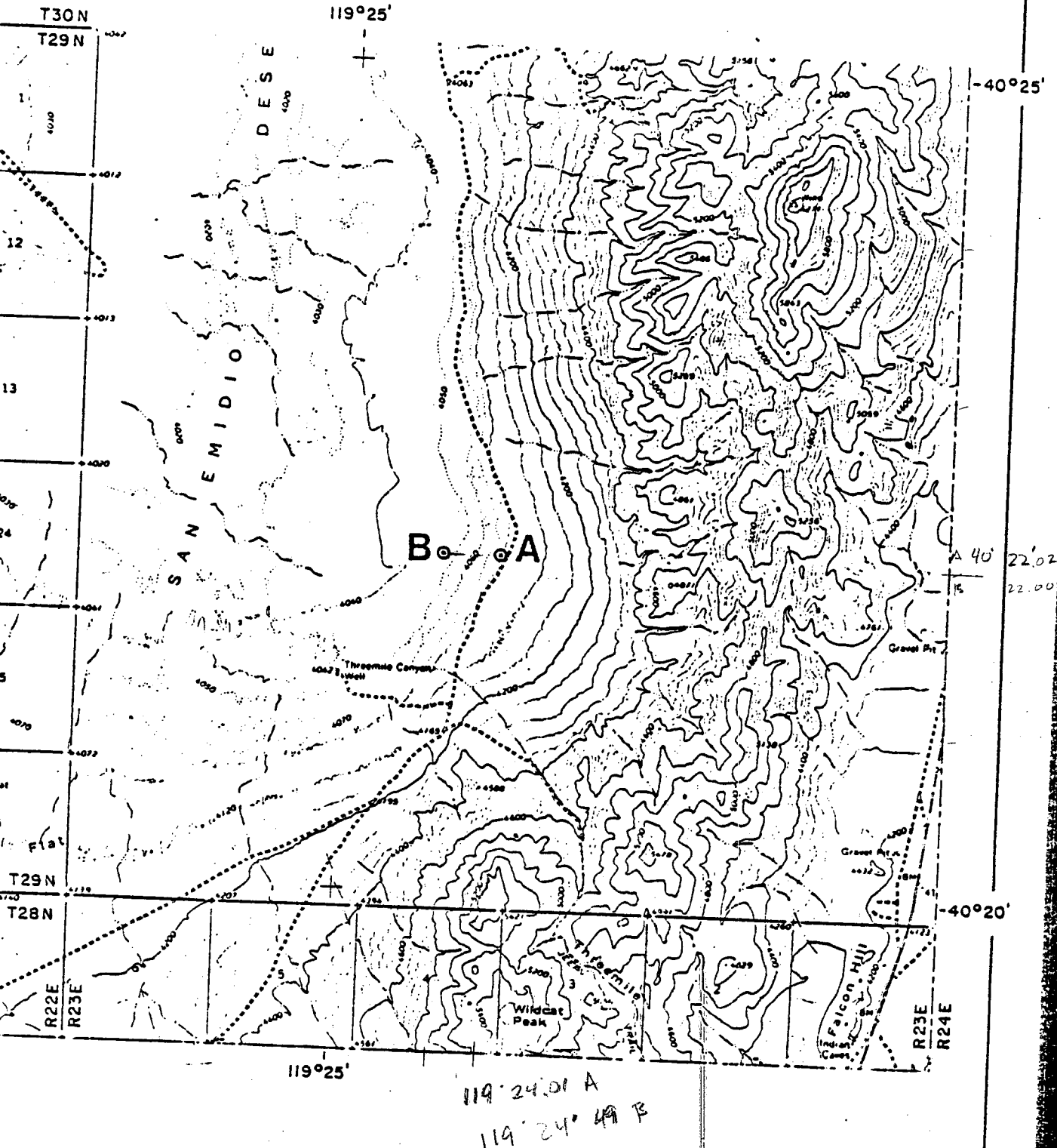


Figure 2. Location of the San Emidio drill holes.



# TEMPERATURE DATA



## GEONOMICS, INC.

3165 Adeline Street, Berkeley, CA 94703

JOB No. 76.112

PROSPECT SAN EMIDIO

DATE 7-31-76

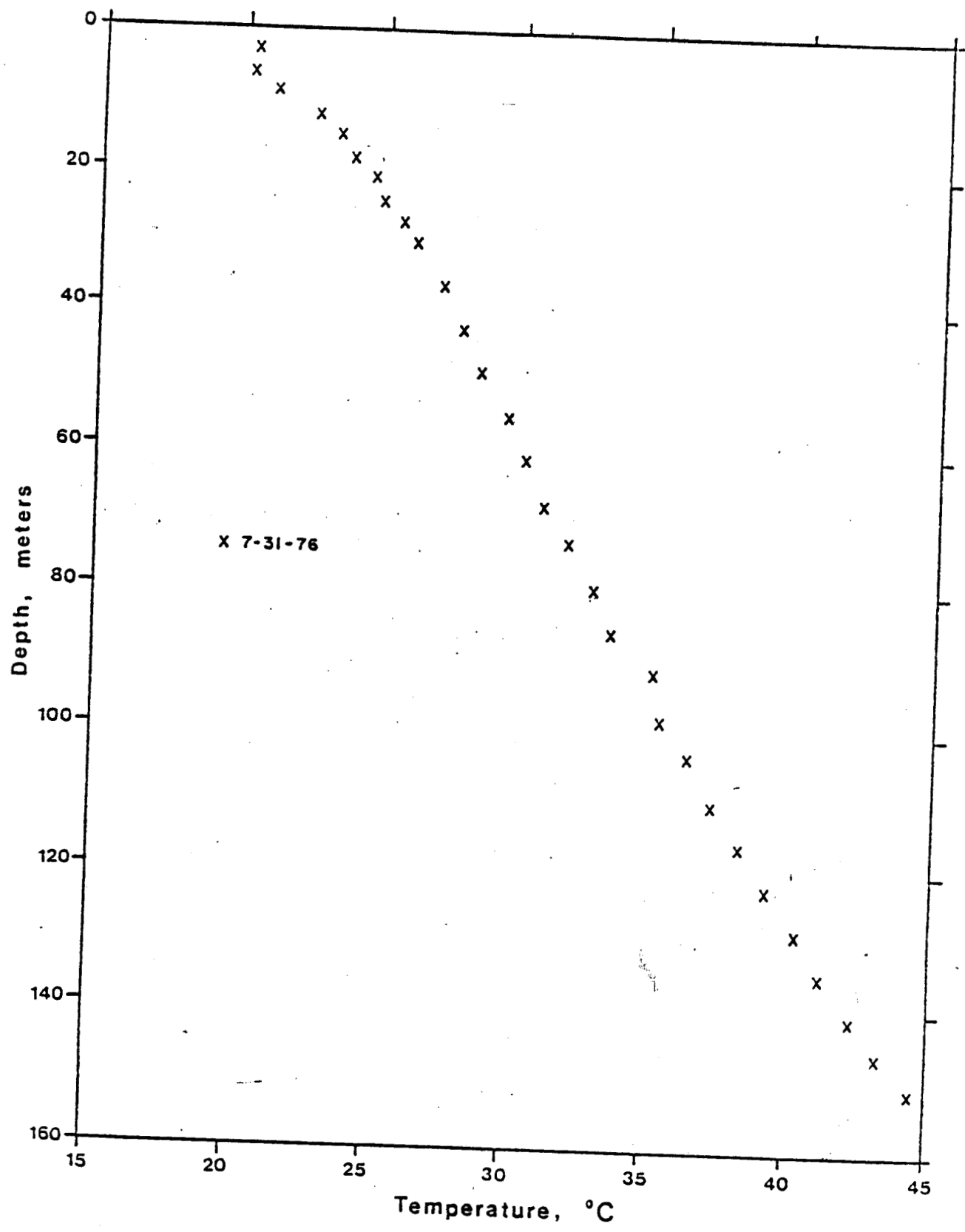
LOCATION S.E. # A

TIME	OBSERVATION DEPTH	TEMPERATURE °C	INSTRUMENT No.	COMMENTS
1300	10'	20.38	1	IN AIR
1302	20'	20.29	"	" "
1304	30'	21.03	"	" 1400
1306	40'	22.50	"	
1308	50'	23.22	"	
1310	60'	23.81	"	
1312	70'	24.44	"	
1314	80'	24.97	"	
1316	90'	25.62	"	
1318	100'	26.12	"	
1320	120'	27.02	"	
1322	140'	27.85	"	
1324	160'	28.52	"	
1326	180'	29.42	"	
1328	200'	30.30	"	
1330	220'	30.91	"	
1332	240'	31.68	"	
1334	260'	32.74	"	
1336	280'	33.53	"	
1338	300'	34.97	"	
1340	320'	35.27	"	
1342	340'	36.23	"	
1346	360'	37.18	"	
1349	380'	38.14	"	
1352	400'	39.25	"	
1355	420'	40.39	"	
1358	440'	41.28	"	
1401	460'	42.31	"	
1404	480'	43.38	"	
1408	495'	44.59	"	

RECEIVED

AUG 6 1976

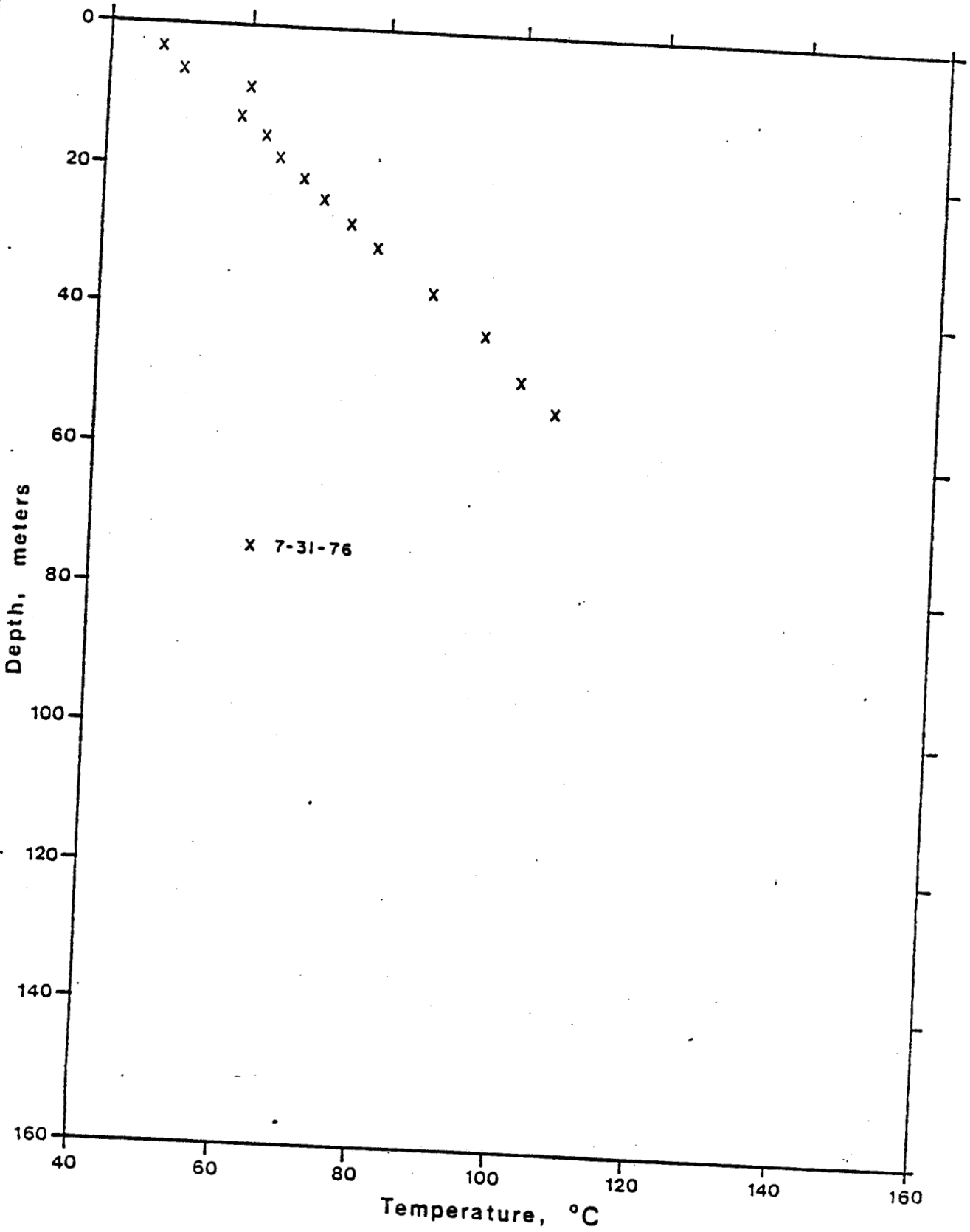




S.E. #A

APPENDIX IV

UNCORRECTED TEMPERATURE VERSUS DEPTH PLOTS



S.E #B

APPENDIX V

UNCORRECTED TEMPERATURE GRADIENT COMPUTER CALCULATIONS

COMPUTER TEMPERATURE GRADIENT/HEAT FLOW CALCULATIONS

## Computer Output Format:

- Depth = Depth in meters to position in borehole.  
For uncorrected case, depths are in accordance with raw data. For steady state case, depths are from a computed function due to topographic and geologic corrections.
- Temperature = Corresponding temperature at given depth in °C.
- Smooth = Machine generated smoothed temperature in °C.
- Residual = Difference between temperature and smoothed temperature in °C.
- Grad = Calculated temperature gradient in °C/km.
- Ster = Value of two student T-tests for 95% confidence limit.
- 95CL = 95% confidence limit.

Note: Ster and 95CL = 0 when only one value is used.

SE = A

HEAT FLOW BY LINEAR FITTING OF UNCORRECTED DATA

DEPTH	TEMPERATURE	SMOOTH	RESIDUAL
3.05	20.300	21.148	-.768
6.10	20.290	21.610	-1.320
9.14	21.030	22.087	-1.057
12.19	22.500	22.558	-.058
15.24	23.220	23.028	.192
18.29	23.810	23.498	.312
21.34	24.440	23.969	.471
24.38	24.970	24.436	.532
27.43	25.620	24.908	.712
30.48	26.120	25.378	.742
36.58	27.020	26.319	.701
42.67	27.850	27.258	.592
48.77	28.520	28.199	.321
54.86	29.420	29.138	.282
60.96	30.300	30.079	.221
67.06	30.910	31.020	-.110
73.15	31.600	31.959	-.279
79.25	32.740	32.899	-.159
85.35	33.530	33.840	-.310
91.44	34.970	34.779	.191
97.54	35.270	35.720	-.450
103.63	36.230	36.659	-.429
109.73	37.180	37.600	-.420
115.83	38.190	38.541	-.351
121.92	39.250	39.480	-.230
128.02	40.390	40.421	-.031
134.11	41.280	41.360	-.080
140.21	42.310	42.301	.009
146.31	43.300	43.241	.139
150.88	44.590	43.906	.644

GRAD = 154.218 DEG/KM

STER = 2.05 DEG/KM

95CL = 4.72 DEG/KM



SE #8

HEAT FLOW BY LINEAR FITTING OF UNCORRECTED DATA

DEPTH	TEMPERATURE	SMOOTH	RESIDUAL
3.05	47.340	48.366	-1.026
6.10	50.580	51.824	-1.244
9.14	59.700	55.272	4.428
12.19	59.490	58.730	.760
15.24	62.530	62.189	.341
18.29	64.190	65.648	-1.458
21.34	68.000	69.106	-1.106
24.38	71.220	72.554	-1.334
27.43	75.230	76.012	-.782
30.48	78.850	79.471	-.611
36.58	87.180	86.388	.792
42.67	94.910	93.294	1.616
48.77	100.020	100.211	-.191
53.65	105.560	105.745	-.185

GRAD= 1133.987 DEG/KM

STER= 28.67 DEG/KM

95CL= 66.17 DEG/KM

APPENDIX I  
DRILLING OPERATIONS LOG

# WELL LOG

IG. 75-192



JOB No. 76.112 PROSPECT SAN EMIDIO  
 DATE 7-26-76 LOCATION SAN EMIDIO DESERT, NEV  
 WELL No. SE1 #A

DRILLING TIME	TIME	DEPTH	COMMENTS
	0428		LEFT S.F FOR RENO.
	0907		ARRIVE RENO, NEV. & MET AL NETT AT TRUCK STOP.
	1358		DRILLER ARRIVED AT TRUCK STOP WITH RIG.
	1417		LEFT FOR SAN EMIDIO
	1643		AL NETT & FLEINER WENT TO LOCATE SITE #A.
	1723		RIG LEFT HIGHWAY FOR SITE #A.
	1742		RIG ARRIVED SITE #A & BEGAN SETTING UP. COULD NOT FIND A H <sub>2</sub> O SOURCE IN AREA TO ENABLE FILLING H <sub>2</sub> O TRUCK.
	1810		POSITIONED MUD PIT. HAD TROUBLE POSITIONING RIG JACKS, BECAUSE OF SOFTNESS OF GROUND.
	1815		A GREAT DEAL OF CALCAREOUS TUFFA PRESENT AT SURFACE OF SITA #A AREA.
1 HR 2 MINS	1844		SHUT DOWN FOR NIGHT

# WELL LOG

IC. 75-192

**GEONOMICS, INC.**  
 3163 Adeline Street, Berkeley, CA 94703

JOB No. 76.112

PROSPECT SAN EMIDIO

DATE 7-27-76

LOCATION SAN EMIDIO  
DESERT, NEV'

WELL No. SE. #A

DRILLING TIME	TIME	DEPTH	COMMENTS
	0730		LEFT GARLACK TO LOCATE H <sub>2</sub> O SOURCE
	0707		START FILLING H <sub>2</sub> O TROUGH AT HOT SPRINGS OUTSIDE OF GARLACK
	0737		LEFT FOR SITE #A
	0843		DRILLERS ARRIVED SITE #A + BEGAN SETTING UP.
	0918		BEGAN FILLING MUD PIT. ADD 1-SACK QUIK-GEL TO PIT.
	0929	0'	START SPUDDING. MUD TEMP = 96°F
	0952	15'-16'	RX SMP #1. MUD TEMP = 96°F
	0954	20'	END SPUDDING. END ROD #1
	0958	20'	START ROD #1
	1003	25'-28'	RX SMP #2. MUD TEMP = 96°F
	1009	40'	END ROD #1
	1012	40'	START ROD #2
	1014	45'-48'	RX SMP #3. MUD TEMP = 97°F (H <sub>2</sub> O TABLE?)
	1018	60'	END ROD #2. DRILL RATE ≈ 3'/MIN.
	1023	60'	START ROD #3
	1023	60'-62'	RX SMP #4. MUD TEMP = 93°F

# WELL LOG

IC 75-192

**GEONOMICS, INC.**  
 3165 Adeline Street, Berkeley, CA 94703

JOB No. **76.112**

PROSPECT **SAN EMIDIO**

DATE **7-27-76**

LOCATION **SAN. EMIDIO DESERT, NEV.**

WELL No. **SE # A**

DRILLING TIME	TIME	DEPTH	COMMENTS
	1033	74'-76'	RX SMP #5 MUD TEMP = 93°F LOSING H <sub>2</sub> O AT LESS THAN 0.5 GALS/MIN
	1035	780'	END ROD #3
	1040	80'	START ROD #4 BIT "CHATTERING" FREQUENTLY
2.000 RPM RATE (≈ 0.1' / MIN)	1049	90'-92'	RX SMP #6 MUD TEMP = 94°F BIT "CHATTERING" ALMOST CONSTANTLY
	1057	93'	SMALL WASHOUT AT NECK OF MUD PIT. PACKED WITH QUIK-GEL
	1106	93'	RESUME DRILLING ADD 1-SACK OF QUIK-GEL
DRILL RATE INCREASE (≈ 1' / MIN)	1202	99'	BIT CEASED "CHATTERING"
	1203	100'	END ROD #4
	1207	100'	START ROD #5
	1209	101'	BIT "CHATTERING" OCCASIONALLY
	1212	105'-107'	RX SMP #7 MUD TEMP = 98°F
≈ 1' / MIN	1228	120'	END ROD #5
	1232	120'	START ROD #6
	1233	120'-123'	RX SMP #8 MUD TEMP = 98°F SLOW LOSS OF H <sub>2</sub> O FROM MUD PIT CONTINUES; ADD 1-BAG QUIK-GEL + 1-SACK OF KWIK-SEAL + ½ BAG QUIK-TROL.
	1254	137'-139'	RX SMP #9 MUD TEMP = 98°F CIRCULATION LOSS HAS CEASED

# WELL LOG

IC 75-192

**GEONOMICS, INC.**  
 3165 Adeline Street, Berkeley, CA 94703

JOB No. 76112 PROSPECT SAN EMIDIO  
 DATE 7-27-76 LOCATION SAN EMIDIO DESERT, NEV.  
 WELL No. SE #A

DRILLING TIME	TIME	DEPTH	COMMENTS
	1254	140'	END ROD #6
	1256	140'	START ROD #7
	1258	141'	BIT "CHATTERING" HAS CEASED.
	1307	150'-157'	R x SMP # 10 MUD TEMP = 98°F
	1309	160'	END ROD #7
	1310	160'	BEGAN PULLING OUT OF HOLE, TO ALLOW <sup>LOSS</sup> ANCHOR IN UPPER HOLE, WHICH HAS BEEN JAMMING ITSELF IN HOLE, TO FALL INTO HOLE & THEN DRILL THROUGH IT
	1324	160'	PULLED BIT OUT; BIT WORK REPLACED WITH NEW BIT
	1329	160'	START RE-ENTERING HOLE.
	1336	160'	START ROD # 8
	1343	165'-170'	R x SMP # 11 MUD TEMP = 96°F
	1354	180'	END ROD # 8
	1356	180'	START ROD # 9
	1401	180'-190'	R x SMP # 12 MUD TEMP = 96°F
	1406	195'-197'	R x SMP # 13 MUD TEMP = 96°F.
	1410	200'	END ROD # 9
	1413	200'	START ROD # 10

## WELL LOG

IC 75-192

ECONOMICS, INC.

Adeline Street, Berkeley, CA 94703

JOB No.

76.112

PROSPECT

SAN EMIDIO

DATE

7-27-76

LOCATION

SAN EMIDIO  
DESERT, NEW

WELL No.

SE #A

DRIILLING TIME	TIME	DEPTH	COMMENTS
	1421	210'-215'	RX SMP #14 MUD TEMP = 97°F
	1424	220'	END ROD #10
	1427	220'	START ROD #11
	1431	225'-227'	RX SMP #15 MUD TEMP = 97°F
	1440	240'	END ROD #11
	1443	240'	START ROD #12
	1445	240'-246'	RX SMP #16 MUD TEMP = 97°F
	1453	255'-259'	RX SMP #17 MUD TEMP = 97°F
	1456	260'	END ROD #12
	1459	260'	START ROD #13
	1506	270'-276'	RX SMP #18 MUD TEMP = 98°F
	1513	280'	END ROD #13
	1516	280'	START ROD #14
	1523	285'-290'	RX SMP #19
	1525	292'	ADD 1/2-GAL BANA-FOS TO MUD PIT TO SETTLE OUT SAND
	1530	300'	END ROD #14
	1532	300'	START ROD #15

# WELL LOG

IC 75-192

**GEONOMICS, INC.**  
 5 Adeline Street, Berkeley, CA 94703

JOB No. 76.112 PROSPECT SAN EMIDIO  
 DATE 7-27-76 LOCATION SAN EMIDIO DESERT, NEV.  
 WELL No. SE.#A

DRILLING TIME	TIME	DEPTH	COMMENTS
	1535	<del>300'-306'</del> 280'-286'	RX SMP #20 MUD TEMP = 99°F.
	1545	317'-320'	RX SMP #21 MUD TEMP = 99°F
	1545	330'	END ROD #15
	1546		H <sub>2</sub> O TRUCK EMPTY; LEFT FOR H <sub>2</sub> O HOLE.
	1547		PULLED BIT UP 20' & SHUT OFF RIG.
	1749		H <sub>2</sub> O TRUCK ARRIVED; CLEANED OUT MUD PIT.
	1803		BEGAN PULLING BIT UP.
	1810		PULLED BIT UP 120' FROM BOTTOM.
	<sup>4</sup> 1813 <del>1813</del>		SHUT DOWN FOR NIGHT



# WELL LOG

IC 75-192

**ECONOMICS, INC.**

Adeline Street, Berkeley, CA 94703

JOB No. 76,117 PROSPECT SAN EMIDIO  
 DATE 7-28-76 LOCATION SAN EMIDIO DESERT, NEV.  
 WELL No. S.E.#A

DRILLING TIME	TIME	DEPTH	COMMENTS
	0749		DRILLERS ARRIVED + BEGAN RIG MAINT. + PREPS FOR DRILLING
	0817		REPOSITIONED RIG JACKS, BECAUSE OF RIG SETTLING INTO SOFT GROUND.
	0827		START LOWERING BIT TO BOTTOM OF HOLE
	0833		START FILLING MUD PIT
	0846	320'	START ROD #16
	0851	330'-335'	R X SMP #22 MUD TEMP = 80°F
	0901	340'	END ROD #16
	0905	340'	START ROD #17
	0912	345'-350'	R X SMP #23 MUD TEMP = 82°F CLEAN SAND FROM MUD PIT
	0917	360'	END ROD #17
	0932	360'	START ROD #18
	0938	360'-364'	R X SMP #24 MUD TEMP = 83°F
	0944	375'-380'	R X SMP #25 MUD TEMP = 84°F
	0947	380'	END ROD #18
	0947	380'	START ROD #19
	0952	391'	LITHOLOGY CHANGE; GREEN CLAY
	0957	395'-399'	R X SMP #26 MUD TEMP = 85°F
	0959	400'	END ROD #19

# WELL LOG

IC 75-192

**GEONOMICS, INC.**  
 3165 Adeline Street, Berkeley, CA 94703

JOB No. 76112

PROSPECT SAN EMIDIO

DATE 7-28-76

LOCATION SAN EMIDIO  
DESERT, NEV.

WELL No. SF # A

DRILLING TIME	TIME	DEPTH	COMMENTS
	1002	400'	START ROD #25
			BIT "CHATTERING" CONSTANTLY.
	1007	410'-418'	R X SMP #26 MUD TEMP = 86°F
	1009	420'	END ROD #20
	1014	420'	START ROD #21
	1018	425'-435'	R X SMP #27 MUD TEMP = 87°F
	1023	440'	END ROD #21
	1027	440'	START ROD #22
		440'-451'	R X SMP #28 MUD TEMP = 87°F
	1035	455'-460'	R X SMP #29 MUD TEMP = 88°F
	1035	460'	END ROD #22
	1038	460'	START ROD #23
	1046	470'-480'	R X SMP #30 MUD TEMP = 89°F
	1046	480'	END ROD #23
	1050	480'	START ROD #24
			BIT NOT "CHATTERING" AT ALL
	1056	485'-495'	R X SMP #31 MUD TEMP = 89°F
			NO CORE POSSIBLE DUE TO CLAY COMPOSITION OF LITHOLOGY.
	1058	500'	END ROD #24 CONTINUE CIRCULATING TO CLEAN HOLE.
	1112		BEGAN UNLOADING & MAKING VD TEMP. PROBE PIPE

# WELL LOG

10-75-192

**ECONOMICS, INC.**  
 3165 Adeline Street, Berkeley, CA 94703

JOB No. 76.112 PROSPECT SAN EMIDIO  
 DATE 7-28-76 LOCATION SAN EMIDIO DESERT, NEV.  
 WELL No. SE#A

DRILLING TIME	TIME	DEPTH	COMMENTS
	12 14		BEGAN PULLING OUT OF HOLE
	12 49		PULLED BIT OUT OF HOLE.
	12 54		MOVED MUD PIT FROM HOLE
	12 56		START INSTALLING TEMP. PIPE
	13 32		START FILLING 1ST 252' OF TEMP. PIPE WITH H <sub>2</sub> O.
	13 52		RESUMED INSTALLING TEMP. PIPE.
	14 50		FILLED NEXT 231' OF PIPE WITH H <sub>2</sub> O
	15 13		ADD 178' PIECE OF PIPE, TOTAL LENGTH OF TEMP PIPE 495'
	15 30		MOVED RIG OFF OF HOLE.
	15 33		BEGAN FILLING HOLE WITH CUTTINGS + QUIK-GEL.
	16 30		HOLE FILLED TO WITHIN 11" OF SURFACE WITH CUTTINGS + 1-SACK OF QUIK-GEL. HAD DIFFICULTY CAUSED BY CUTTINGS JAMMING AT CLAMP 3' BELOW SURFACE (TO SUPPORT PIPE IN CEMENT), NEEDED TO BLEAT UP BLOCKAGES ALMOST CONSTANTLY
	16 34		PACKED FOR MOVE TO SITE # B
8 HRS 51 MINS	16 40		RIG LEFT FOR SITE # B
TOTAL = 18	HRS 21 MINS		

# VELL LOG

**GEONOMICS, INC.**  
 65 Adeline Street, Berkeley, CA 94703

JOB No.

76.112

PROSPECT

SAN EMIDIO

DATE

7-28-76

LOCATION

SAN EMIDIO  
DESERT, NEW

WELL No.

SE.#B

DRILLING TIME	TIME	DEPTH	COMMENTS
	1701		RIG ARRIVED AT SE.#B & BEGAN SETTING UP
	1735		FUELED RIG
	1738		MUD PIT POSITIONED
	1743		FILLED MUD PIT
	1744		ADD 1-SACK QUIK-GEL TO MUD PIT
	1755		H <sub>2</sub> O TRUCK LEFT FOR H <sub>2</sub> O SOURCE; WILL LEAVE TRUCK OVERNIGHT & PICK UP FULL TRUCK IN MORNING
	1810		SHUT DOWN RIG & LEFT TO PICK UP H <sub>2</sub> O TRUCK DRIVER AT H <sub>2</sub> O SOURCE
AL	1847		DRILLER ARRIVED AT H <sub>2</sub> O SOURCE & PICKED UP H <sub>2</sub> O TRUCK DRIVER.
TOTAL =			

ECONOMICS, INC.

ine Street, Berkeley, CA 94703

JOB No. 76.112

PROSPECT SAN EMIDIO

DATE 7-29-76

LOCATION SAN EMIDIO DESERT, NEW

WELL No. S.E. # B

TIME	DEPTH	COMMENTS
0744		DRILLER ARRIVED AT H2O SOURCE + DROPPED OFF H2O TRUCK DRIVER
0821		DRILLER ARRIVED AT SE. # B + BEGAN CREPS FOR DRILLING
0838		H2O TRUCK ARRIVED AT SE. # B
0854	0'	START SPUDDING MUD TEMP = 76°F.
0920	15'-16'	RX SMP #1 MUD TEMP = 78°F
0924	20'	END SPUDDING
0926	20'	START ROD #1
0929	30'-33'	RX SMP #2 MUD TEMP = 83°F
0934	40'	END ROD #1
0938	40'	START ROD #2
0940	45'-48'	RX SMP #3 MUD TEMP = 86°F
0943	55'-57'	RX SMP #4 MUD TEMP = 90°F
0945	60'	END ROD #2
0946	60'	START ROD #3
0947	64'	LITHOLOGY CHANGE
0949	68'-78'	RX SMP #5 MUD TEMP = 92°F
0950	80'	END ROD #3
0954	80'	START ROD #4

DYNAMICS, INC.

Berkeley, CA 94703

JOB No. 76-112 PROSPECT SAN EMIDIO  
 DATE 7-29-76 LOCATION SAN EMIDIO DESERT, NEV  
 WELL No. SE.#13

TIME	DEPTH	COMMENTS
0959	85'-90'	RX SMP #6 MUD TEMP = 96°F DRILLER SLOWED DRILL RATE, TO AVOID PACKING CLAY AROUND DRILL PIPE + CAUSE LOSS OF CIRCULATION
1002	100'	END ROD #4
1005	100'	START ROD #5
1006	100'-108'	RX SMP #7 MUD TEMP = 101°F
1013	120'	END ROD #5
1017	120'	START ROD #6
1017	120'-122'	RX SMP #8 (SLIGHT SULEUR CON-R) MUD TEMP = 107°F
1023	124'-126'	RX SMP #9 (WHITE FLAKE) MUD TEMP = 108°F
1037	135'	BIT "CHATTERING"
1039	136'-138'	RX SMP #10 MUD TEMP = 113°F
1045	140'	END ROD #6
1049	140'	START ROD #7
1057	142'	BIT "CHATTERING" INTENSELY. + INTENSELY CONSTANTLY.
1106	142'-144'	RX SMP #11 (SMP GROUND (1-3/4) TO SAND SIZE) MUD TEMP = 112°F ADD 1/2 GAL OF BARA-FOS.
1116	148'-149.5'	BIT "CHATTER" CEASED
1117	149.5'	BIT "CHATTERING" RESUMED

# WELL LOG

10/75-192

**GEONOMICS, INC.**  
 3165 Adeline Street, Berkeley, CA 94703

JOB No. **76.112**

PROSPECT **SAN EMIGIO**

DATE **7-27-76**

LOCATION **SAN EMIGIO  
DESERT, NEV**

WELL No. **S.E. #B**

DRILLING TIME	TIME	DEPTH	COMMENTS
	1130	156'	MUD TEMP = 119°F
	1145	160'	END ROD #7 MUD TEMP = 120°F
	1148	160'	START ROD #8
	1152	160'-163'	R 3 SMP #12 MUD TEMP = 120°F
	1155	168'	BIT "CHATTER" CEASED MUD TEMP = 122°F
	1157	170'-172'	R 4 SMP #13 MUD TEMP = 123°F BIT "CHATTERING" INTERMITTENTLY
	1159	175'	CEASED DRILLING, BEGAN CIRCULATING IN PREP. FOR CORING. MUD TEMP = 124°F ADD 1-BAG GULK-TAGL TO MUD PIT
	1212	175'	START PULLING OUT OF HOLE
	1215		TEMP PIPE + CEMENT ARRIVED
	1218		TEMP. PIPE DELIVERY MAN KEPT 14±21' SECTIONS (315') TO BE KEPT AT LASING CO. YARD FOR CHEVRON. PIPE WAS NOT NEEDED, DUE TO SHALLOWNESS OF S.E. #B (212') ± NO ROOM AVAILABLE ON DRILLER'S TRUCKS TO CARRY MORE PIPE
	1218		SECURED 500' OF TEMP. PIPE ON TOP OF H <sub>2</sub> O TRUCK
	1235		RESUMED PULLING OUT OF HOLE

# WELL LOG

10/75-192

**GEONOMICS, INC.**

165 Adeline Street, Berkeley, CA 94703

JOB No. **76-112**

PROSPECT **SAN EMIDIO**

DATE **7-29-76**

LOCATION **SAN EMIDIO DESERT, NSV**

WELL No. **S.E. #B**

DRILLING TIME	TIME	DEPTH	COMMENTS
	1339		PULLED BIT OUT OF HOLE.
	1348		START CORING RUN
	1418	175'	BEGAN CORING MVA TEMP = 1200F
	1435	176'	MVA TEMP = 1250F CEASED CORING. TEMP. FINALLY REACHED 129°F
	1436	176'	BEGAN PULLING CORING TOOL OUT OF HOLE.
			PULLED CORING TOOL OUT OF HOLE.
			RECOVERED ~ 6.5" OF CORE WT OF 1' CORED BRECCIA WITH GREEN APHANITIC GROUND MASS WITH PURPLE Y-L'S, SARGONITE PARTICLES + CARBONATE VEINING.
	1516		BEGAN EMPTYING MVA BIT.
	1523		START MAKING UP TEMP PIPE
	1545		START INSTALLING TEMP. PIPE.
	1629		BEGAN FILLING 1ST 168' OF PIPE WITH H <sub>2</sub> O.
	1632		INSTALLED 8' PIECE OF PIPE, TOTAL = 176' OF TEMP PIPE
	1706		MOVED RIG FROM HOLE
	1717		BEGAN PACKING-UP FOR MOVE TO SE #C
	1728		LEFT TO ELEMENT SE #A





# WELL LOG

10/75-192

**GEONOMICS, INC.**  
 3165 Adeline Street, Berkeley, CA 94703

JOB No. 76112 PROSPECT SAN EMIDIO  
 DATE 7-20-76 LOCATION SAN EMIDIO DESERT, NEV.  
 WELL No. S.E. #C

DRILLING TIME	TIME	DEPTH	COMMENTS
	0707		H <sub>2</sub> O TRUCK LEFT GARLECH FOR H <sub>2</sub> O SOURCE ON EDGE OF TOWN.
	0733		H <sub>2</sub> O TRUCK LEFT FOR S.E. #A.
	0839		H <sub>2</sub> O TRUCK ARRIVED S.E. #A + FILLED HOLE WITH AN ADDITIONAL $\approx$ 1/2 SACK OF CEMENT + AGGREGATE. CEMENT WAS DIFFICULT TO FORCE INTO HOLE DUE TO BLOCKAGES.
	0923		LEFT S.E. #A TO PICK UP RIG AT S.E. #B, IN PREP FOR MOVEMENT TO S.E. #C.
	0935		ARRIVE S.E. #B + BEGIN SERVICING RIG.
	0945		LEAVE S.E. #B FOR S.E. #C
	0957		CROSSED WASH, PROCEEDED $\approx$ 50', RIG SUNK INTO SOFT GROUND, UP TO <del>WHEELS</del> AXLES.
	1010		FLINER + DRILLER LEFT TO CALL CHEVRON + THEN HIRE A CAT.
	1107		CALLD CHEVRON + REPORTED RIG BEING STUCK + THEN STARTED OUT WITH CAT FOR S.E. #B + THEN TO RIG.
	1248		CAT ARRIVED AT RIG.
	1402		RIG PULLED FREE OF SOFT GROUND AREA.

# WELL LOG

10/75-192

**ECONOMICS, INC.**  
 Adeline Street, Berkeley, CA 94703

JOB No. 76.112 PROSPECT SAN EMIDIO  
 DATE 7-30-76 LOCATION SAN EMIDIO DESERT, NEV.  
 WELL No. 4E#C

ILLING TIME	TIME	DEPTH	COMMENTS
	1407		ELEINER + DRILLER STARTED OFF TO RETURN CAT.
	1437		FLAT-BED TRUCK ARRIVED WHILE RETURNING CAT TO RANCH + PICKED UP CAT
	1449		ARRIVED AT SITE #A
	1456		BOTTOM HOLE TEMP. OF S.E. #B IS 100°C + (176°F); 166' TEMP = 98.7°C 156' TEMP = 97.4°C
	1618		CEMENTED 2" UPPER 13' OF HOLE WITH 2 1/2 BAGS OF CEMENT + ALSO FINISHED DISTRIBUTING CUTTINGS AROUND DRILL SITE AREA
	1623		LEFT WITH VEH. FOR SITE #4
	1635		RIG ARRIVED SITE #A + BEGAN DISTRIBUTING CUTTINGS AROUND AREA
	1712		FINISHED CLEANING UP S.E. #A. DRILLER + ELEINER CHECKED ON ANY OTHER POSSIBLE ACCESS TO S.E. #A. CLOSEST APPROACH TO S.E. #A SITE WAS 2200' TO THE EAST, BEFORE SOFT GROUND ENCOUNTERED
	1725		SHUT DOWN FOR NIGHT

# WELL LOG

10/75-192

**GEONOMICS, INC.**  
3165 Adeline Street, Berkeley, CA 94703

JOB No.  PROSPECT   
 DATE  LOCATION   
 WELL No.

DRILLING TIME	TIME	DEPTH	COMMENTS
	0732		BEGAN PACKING FOR MOVE TO ROOSEVELT HOT SPRS. UTAH.
	0834		LEFT GERLACH FOR SAN EMIDIO DESERT
	0939		ARRIVED SAN EMIDIO RANCH & MADE ARRANGEMENTS TO STORE ≈ 450' TEMP PIPE & 80' OF 6" CASING.
	1046		BEGAN MEASURING SE #19 & LOADING TEMP. PIPE FOR TRANSPORT TO RANCH.
	1300		BEGAN MEASURING SE. #A
	1357		BEGAN LOADING ≈ 1000' OF TEMP PIPE ON H <sub>2</sub> O TRUCK. TRADED 9-SACKS OF CEMENT TO PEOPLE AT SAN EMIDIO RANCH IN PAYMENT FOR 3-TRUCK LOADS OF H <sub>2</sub> O, ≈ 3 HRS. USE OF CAT, FIRED TO PULL DRILL RIG OUT OF SOFT GROUND ON THE PREVIOUS DAY & STORAGE OF TEMP PIPE & CASING.
	1410		RAIN BEGAN IN SAN EMIDIO DESERT
	1450		LEFT SE #19 FOR UTAH
	1916		ARRIVED FRENCHMAN STATION NEV. & STOPPED FOR NIGHT



APPENDIX II  
SAMPLE IDENTIFICATION FROM DRILL HOLES

# WELL LOG

10/75-192

**ECONOMICS, INC.**

3165 Adeline Street, Berkeley, CA 94703

JOB No. **76.112**

PROSPECT **SAN EMIDIO**

DATE

LOCATION **2620'S & 500'W  
NE cor Sec 21  
T 29N, R 23E**

WELL No. **S.E.#A**

DRILLING TIME	TIME	DEPTH	COMMENTS
		15-16'	SMP #1 - Large ang. frags of calcareous tuffa; blue-grey slate; dacite? or andesite; unconsolidated brown silt + clay; ang - sub-ang; fine - coarse sand
		25-28'	Smp #2 - ang. frags of calcareous tuffa; blue-grey slate; + dacite? or andesite?; unconsolidated brown clay + silt
		45-48'	Smp #3 - ang. frags of blue-grey slate; and dacite? or andesite?; unconsolidated brown clay + silt
		60-62'	Smp #4 - ang. frags of blue-grey slate; + dacite? or andesite?; unconsolidated brown clay + silt; weathered looking white carbonate
		74-76'	Smp #5 - Small ang. frags. of blue-grey slate; and dacite? or andesite?; ang. to sub-ang; fine coarse sand
		90-92'	Smp #6 - Large, ang. frags of blue-grey slate; quartz; and dacite? or andesite; Brown clay + silt + carbonate; ang. to sub-ang; fine - coarse sand

(1)

10/75-192

## WELL LOG

**GEONOMICS, INC.**  
3165 Adeline Street, Berkeley, CA 94703

JOB No. 76.112

PROSPECT SAN EMIDIO

DATE

LOCATION

WELL No. SE#4

DRILLING TIME	TIME	DEPTH	COMMENTS
		105'-107'	Sample #7 - Large, arg. frags of blue-grey slate, quartz and dacite? or andesite? Brown clay + silt + carbonate arg. to sub-arg., fine coarse sand.
		120'-123'	Sample #8 - Arg. frags of blue-grey slate, quartz and dacite? or andesite? with spots of pyrite in slate. Brown clay + silt + carbonate arg. to sub-arg., fine coarse sand.
		137'-139' <del>130'-137'</del>	Sample #9 - Arg. frags of blue-grey slate and dacite? or andesite? Soft, brown clay or silt arg. to sub-arg., fine coarse sand.
		150'-157'	Sample #10 - 90% soft, brown clay + silt. arg. to sub-arg., fine coarse sand.
		165'-170'	Sample #11 - 90% soft, brown clay + silt + some carbonate arg. to sub-arg., fine coarse sand. arg. frags of blue-grey slate + dacite? or andesite?
		180'-190'	Sample #12 - 90% soft, brown clay + silt + some carbonate arg. to sub-arg., fine coarse sand and frags of blue-grey slate + dacite? or andesite?.



10/75-192

# WELL LOG

**GEONOMICS, INC.**  
 3165 Adeline Street, Berkeley, CA 94703

JOB No. **76.112**

PROSPECT **SAN EMIDIO**

DATE

LOCATION

WELL No. **SE.#A**

DRILLING TIME	TIME	DEPTH	COMMENTS
		195'-197'	Surp #13 - 90% soft, brown clay + silt + some carbonate arg. to sub-arg, fine coarse sand.
			arg. frags. of blue-grey slate + dacite? or andesite?
		210'-215'	Surp #14 - 90% soft, brown clay + silt + some carbonate arg. to sub-arg, fine coarse sand.
			arg. frags. of blue-grey slate + dacite? or andesite?
		225'-227'	Surp #15 - soft, brown clay + silt.
		240'-246'	Surp #16 - soft, brown clay + silt.
		255'-259'	Surp #17 - 90% soft, brown clay + silt.
			arg. to sub-arg, fine coarse sand.
		270'-276'	#18 - 90% soft, brown clay + silt.
			arg. to sub-arg, fine coarse sand.
		285'-290'	#19 - 90% soft, brown clay + silt.
			arg. to sub-arg, fine coarse sand.
		300'-306'	#20 - 90% soft, brown clay + silt.
			arg. to sub-arg, fine coarse sand.

# WELL LOG

10/75-192

**GEONOMICS, INC.**  
 3165 Adeline Street, Berkeley, CA 94703

JOB No. 76-112

PROSPECT SAN EMIDIO

DATE

LOCATION

WELL No. SE #A

DRILLING TIME	TIME	DEPTH	COMMENTS
		317'-320'	#21 - 90% soft, brown clay + silt. arg. to sub-arg, fine coarse sand.
		330'-335'	#22 - 90% soft, brown clay + large amount of silt. arg. to sub-arg, fine med. sand.
		345'-350'	#23 - 95% soft, brown clay + large amount of silt. arg. to sub-arg, fine med. sand.
		360'-369'	#24 - 90% soft, brown clay + large amount of silt. sub-arg. to sub-rounded, fine coarse sand.
		<del>375'-379'</del>	<del>#25 - soft, green clay + silt + carbonate</del>
		360'-369'	#25 - 90% soft, brown clay + large amount of silt. sub-arg. to sub-rounded, fine - coarse sand.
		395'-399'	#26 - soft, green clay + silt + carbonate
		410'-418'	#27 - soft, green clay + silt + carbonate
		425'-435'	#28 - soft, green clay + silt + carbonate



# WELL LOG

10/75-192

**ECONOMICS, INC.**

Adeline Street, Berkeley, CA 94703

JOB No. **76.112**

PROSPECT **SAN EMIDIO**

DATE

LOCATION **2620'S & 2640'W  
4. NE cor Sec 21**

WELL No. **S.E.#B**

**T 29 N. R 23 E**

LOGGING TIME	TIME	DEPTH.	COMMENTS
		15'-16'	#1 - ANG FRAGS OF DARK-GREY, FRIABLE SILTSTONE?, CONTAINING CARBONATE. SOFT, GREY CLAY & SILT,
		30'-33'	#2 - Unconsolidated grey clay + silt + carbonate ang, fine - coarse sand ang, frags of friable grey siltstone?
		45'-48'	#3 - Dark-grey clay + silt + carbonate ang, fine - coarse sand ang, frags of dark grey friable siltstone?
		55'-57'	#4 - Soft grey clay + silt + carbonate ang, fine - coarse sand
		68'-78'	#5 - Soft grey clay + silt + carbonate ang frags of grey friable siltstone? ang fine - coarse sand.
		85'-90'	#6 - Finer grey-green clay + silt + carbonate ang to sub-ang fine coarse sand. ang frags of dark-green sh? + large amount of pyrite.
		100'-108'	#7 - Hard green clay + silt + carbonate + pyrite ang to sub-ang fine coarse sand

LL LOG

**Y**  
**ECONOMICS, INC.**  
 1000 Lakeside Street, Berkeley, CA 94703

JOB No. **76.112** PROSPECT **SAN EMIDIO**  
 DATE  LOCATION   
 WELL No. **SE.#10**

LOGGING DEPTH	TIME	DEPTH	COMMENTS
		120'-122'	#8 - Hard, grey-green clay + silt + carbonate + pyrite. ang. to sub-ang. fine coarse sand.
		134'-136'	#9 - Firm dark-green clay + silt + carbonate + pyrite. ang. to sub-rounded. fine coarse sand.
		136'-138'	#10 - Firm, grey-green clay + silt + carbonate. ang. frags of dark green rx? + large amount of pyrite.
		142'-144'	#11 - Poorly consolidated grey clay + silt. ang. frags of grey friable siltstone? + carbonate + pyrite.
		160'-163'	#12 - Poorly consolidated grey-green clay + silt + carbonate. ang. frags of grey friable siltstone? ang. fine coarse sand.
		170'-172'	#13 - Soft, grey clay + silt + carbonate + pyrite. ang. fine coarse sand. ang. frags of grey friable siltstone?