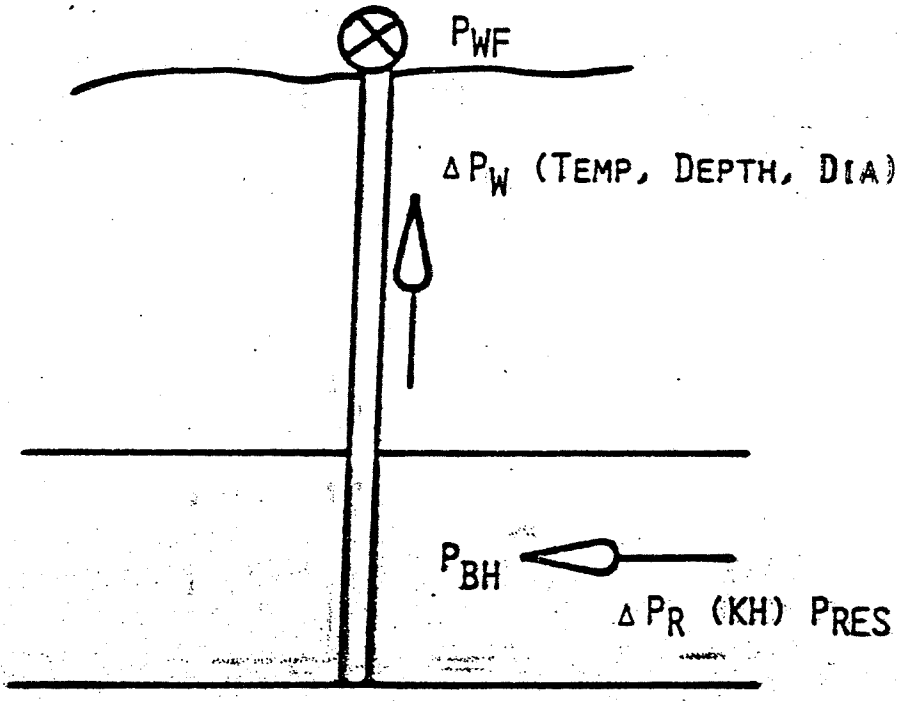
IMPORTANT PARAMETERS IN A FLOWING GEOTHERMAL WELL

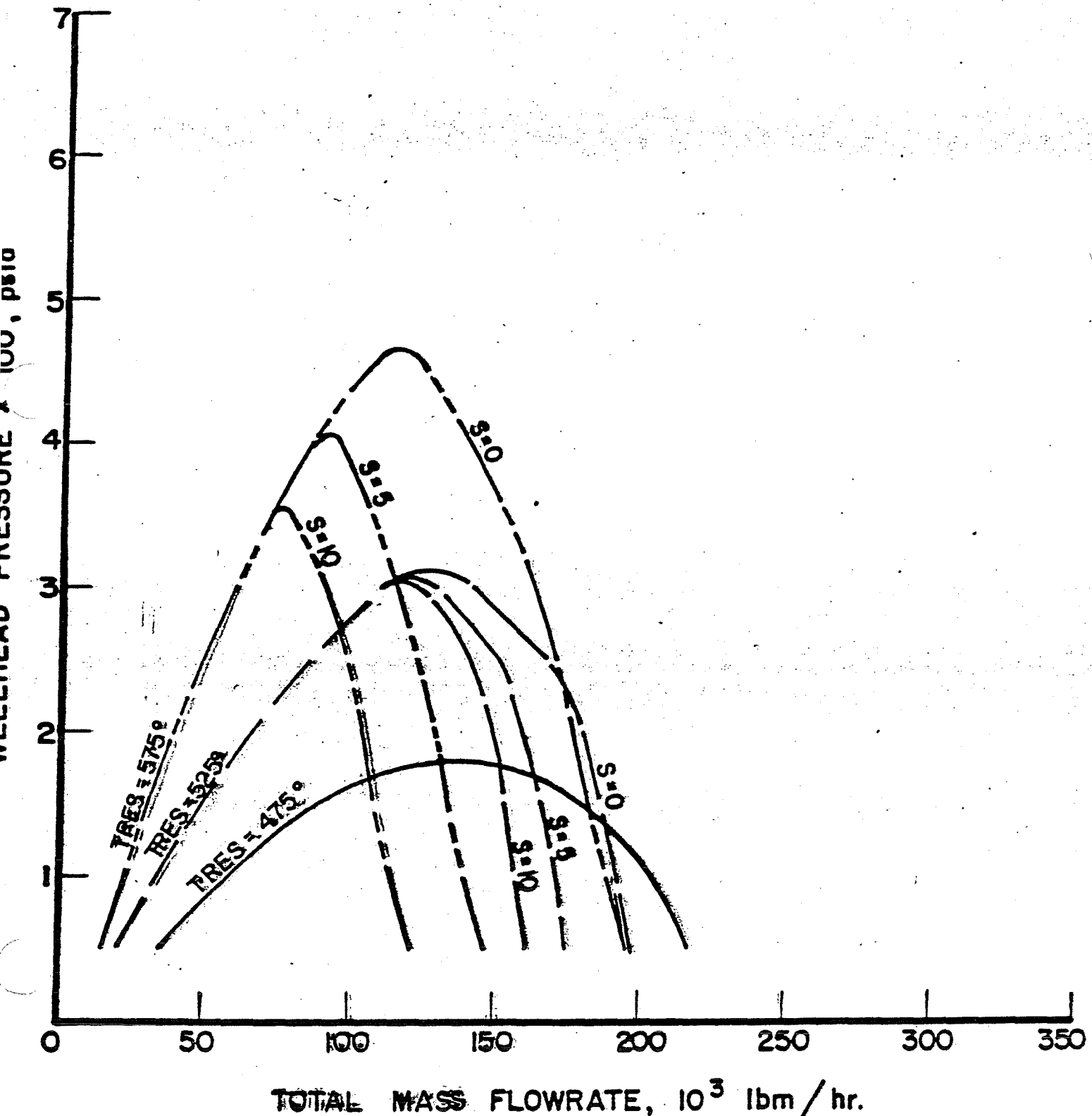


FOUR KEY PARAMETERS:

1. RESERVOIR PRESSURE
2. POROSITY-THICKNESS PRODUCT
3. PERMEABILITY-THICKNESS PRODUCT
4. TEMPERATURE

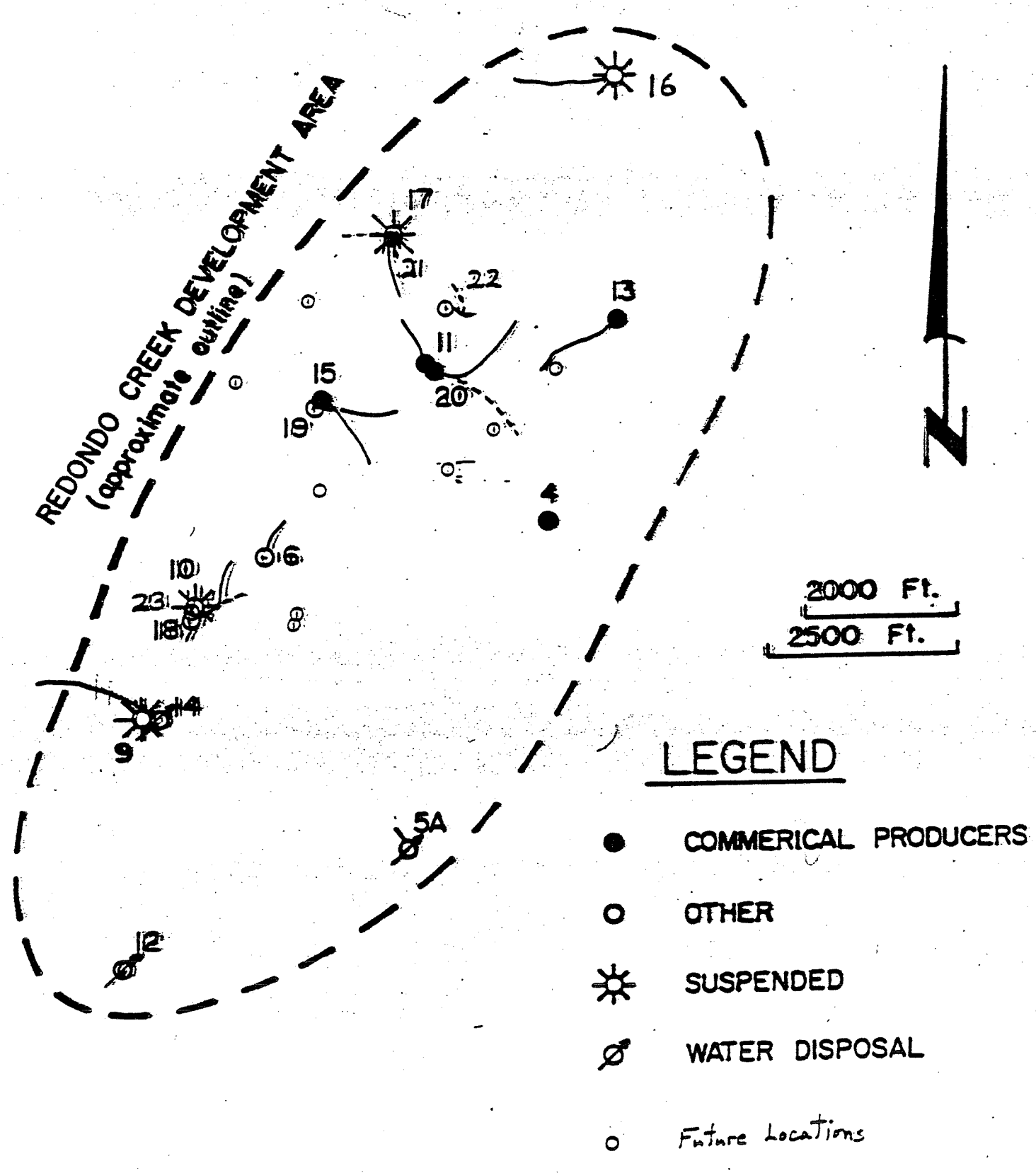
THEORETICAL DELIVERABILTY CURVES

Mechanical Configuration and Reservoir Pressure Corresponding to Baca 19
kh = 2500 md-ft.



A COMPARISON OF KEY PARAMETERS IN VARIOUS GEOTHERMAL SYSTEMS

FIELD	AVERAGE KH, MD-FT	AVERAGE ϕH, FT	INITIAL PRESSURE AT 3000' BELOW SURFACE	TEMPERATURE AT 3000' ^{0} F.
TIWI	50,000	500	1320	500 +
BULALO	20,000	250	1270	500 +
BRAWLEY	20,000	250	1300	500 +
HEBER	130,000	130	1300	360 +
GEYERS	100,000	200	500	470 +
BACA	6,000	90	610	500 +


REDONDO CREEK DEVELOPMENT AREA
(approximate outline)
16
17
21
22
13
11
15
20
19
4
10
6
23
18
8
14
9
5A
12
2000 Ft.
2500 Ft.
LEGEND
COMMERICAL PRODUCERS
OTHER
SUSPENDED
WATER DISPOSAL
Future Locations

SUMMARY OF RESERVOIR ENGINEERING AT BACA - 1978 - PRESENT

Date	Well	Test	Results
5/79	B-18 — data available (58-511) last survey 6/30/79 (514)	Injectivity (32 hr)	Injectivity increased from 0.5 to 2.2 gpm during test Pressure falloff dominated by wellbore storage
5/9/79 – 5/11/79			
10/79	Alamo Canyon #1	36 hr Flowtest and subsequent pressure buildup	kh = 1800 md-ft Skin = +12.7
2/80	Alamo Canyon #1	22 hr Injection test	Most of the liquid enters the formation below 5400'. Major fluid entry at 6500'± 100' Pressure falloff dominated by wellbore and thermal effects (kh) and skin not determined
2/80	Alamo Canyon #1	7 day Flowtest and subsequent pressure buildup	kh = 1350 md-ft Skin = +11.0 Pressure buildup behavior indicates the well is 500 to 1000' away from two perpendicular highly productive faults.

PGA/cc 3/81

Date	Well	Test	Results
11/79	B-19	12 day Flowtest - downhole wireline surveys	Production cycling due to liquid loading and unloading in wellbore
		Pressure buildup	kh = 2360 md-ft Skin = +12.6
12/79	B-19	Low rate injectivity (22 hrs)	Pressure falloff dominated by thermal effects (estimated kh = 2000 md-ft, Skin = 3.5)
		High rate injectivity (11 hrs)	
		Schlumberger spinner and temperature suveys during injection	56% of flow exiting between 5170 and 5180' 81% of flow exiting below 5000'
		Pressure falloff	Injection test terminated prematurely due to surface equipment failure. (estimated kh = 2510 md-ft, Skin = 2.0)
3/80 5/80	B-19	44 day flowtest and pressure buildup	kh = 2990 md-ft Skin = +15.8

PGA/cc 3/81

Date	Well	Test	Results
5/80	B-13	34 hr Injectivity test	Injection terminated prematurely due to lack of water. Wellbore storage dominated pressure fall-off
6/80	B-14	68 hr Injectivity test	kh = 4760 md-ft Skin = 3.8 Calculated injectivity only 50% of that in DOE proposal
9/80-1/81	B-20	102 day flowtest	Deliverability at 125 psig separator pressure = 27,000 lb/hr steam, with 54% flash Steam rate declined at an annual rate of 50-70%
1/81	B-20	Pressure buildup test	Two-phase reservoir effects mask buildup behavior.

PGA/cc 3/81

Date	Well	Test	Results
2/81-3/81	B-21	46 day Flowtest	Commercial deliverability questionable
		Pressure buildup test	In progress. First 2 days of behavior indicate linear flow near wellbore
9/80-3/81	B-4	Sperry Sun pressure interference monitoring	No clear response
1/81-3/81	B-6	Sperry Sun pressure interference monitoring	No clear response
9/80-3/81	B-13	Sperry Sun pressure interference monitoring	No clear response

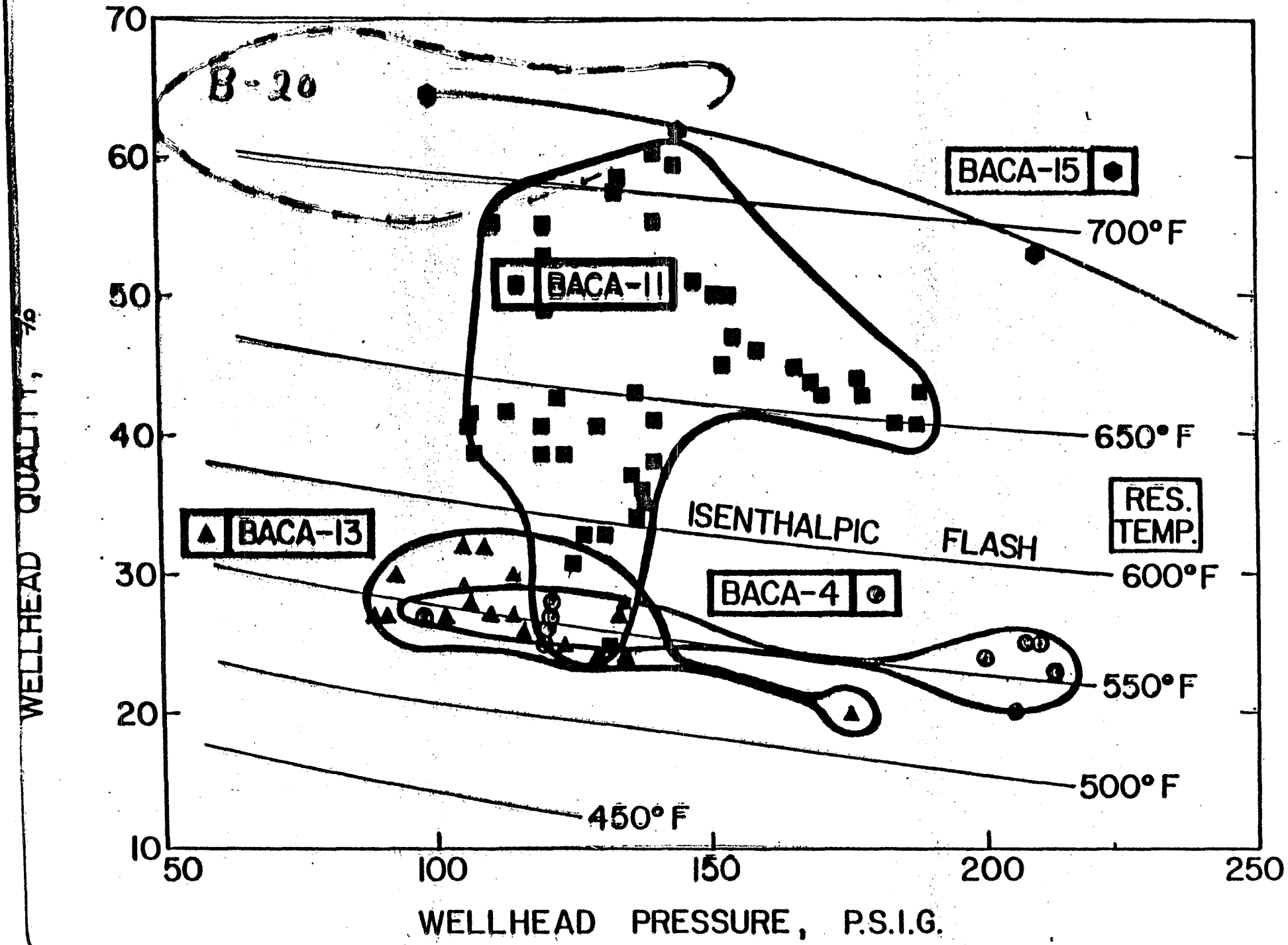
PGA/cc 3/81

PRODUCTIVITY DATA FOR BACA WELLS

WELL NO.	KH, MD-FT	SKIN	TEMP., °F	DELIVERABILITY RATE, MLB/HR TOTAL	STEAM	P_{WH} PSIG	FLASH
11	3450	- 4	550	265	117	140	44%
15	≥ 5500	- 3	510	175	105	140	60%
13	2020	+ 4	500	200	54	140	27%
4 (PREVIOUSLY)	4200	+15	550	172	45	140	27%
(CURRENT)			550	54	25	140	27%
20			540	51	27	140	50%
6 (BRIDGED)	6400	+10	510	150	33	95	22%
10	5100	+43	500	(126)	43	16	(34%)
19	2360	+ 9	490	(120)	(30)	22	(25%)
(INJECTIVITY)	2510	= 2					
A.C.#1	1850	+13	550	(130)	(65)	40	(50%)

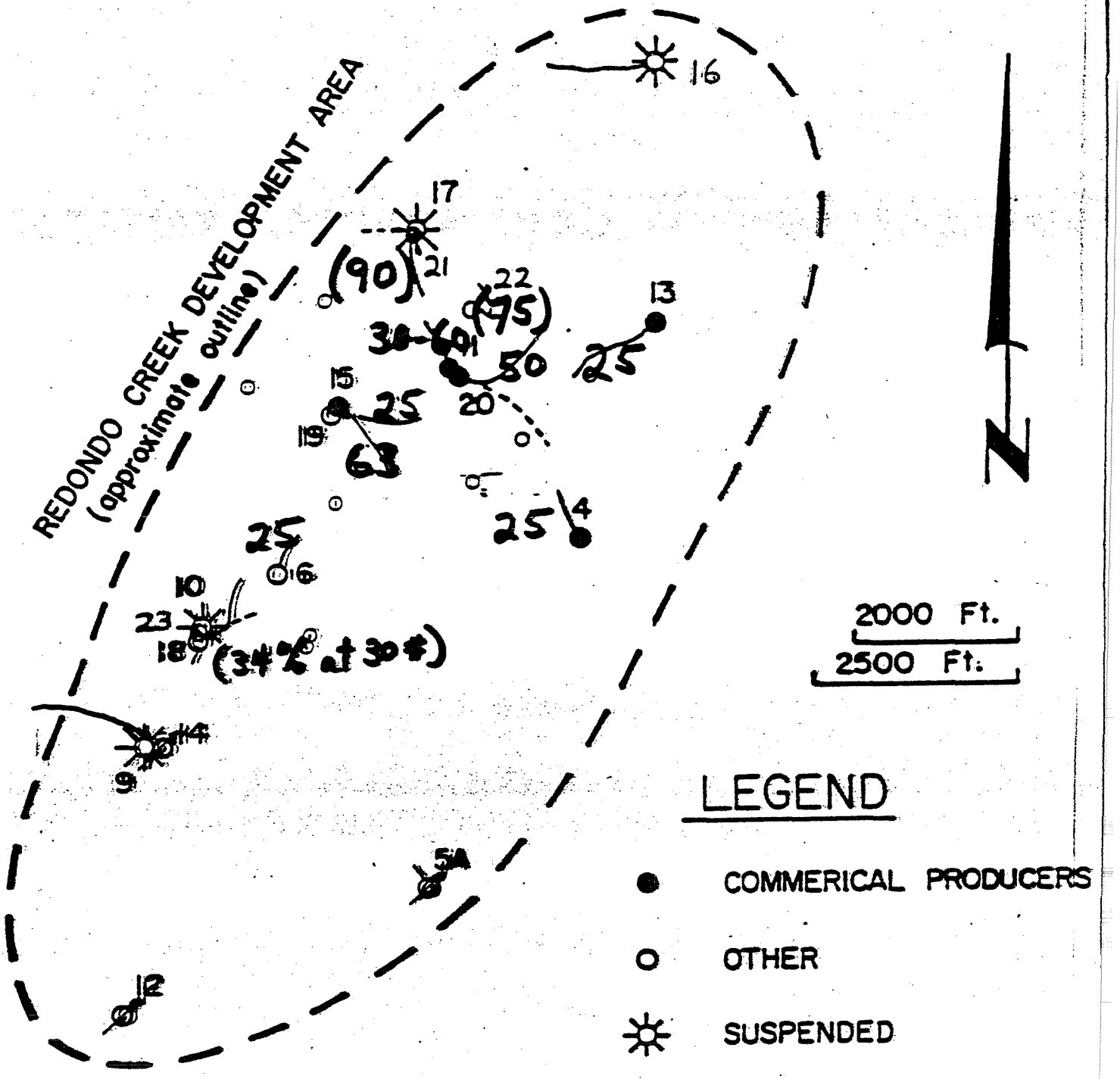
( ): ESTIMATED RATES AND FLASH

PRODUCING WELLHEAD QUALITY AT BACA



SURFACE FLASH (%) AT 150 PSI WHP

( ) : estimated

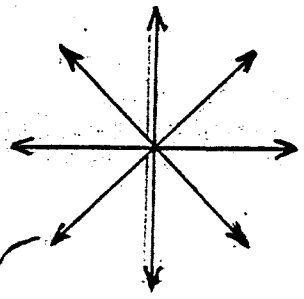


1975-76 INTERFERENCE DATA ANALYSIS

USING NEW FLOW GEOMETRIES

RADIAL-ISOTROPIC

PERMEABILITY SAME
IN EVERY DIRECTION

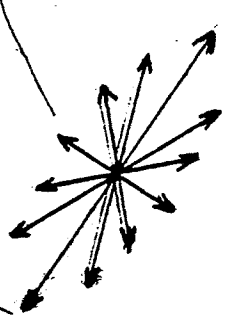


magnitude and direction of k

RADIAL-ANISOTROPIC

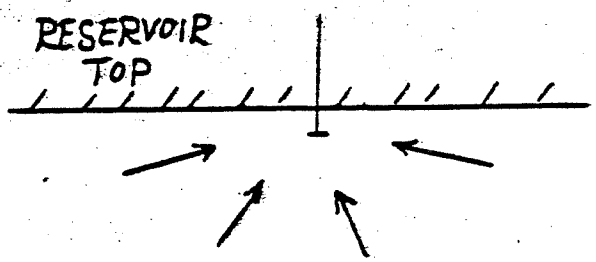
PERMEABILITY VARIES
WITH DIRECTION

MAJOR PERMEABILITY



HEMISPHERICAL

RESERVOIR HAS
NO BOTTOM



Fluid Flow Lines

BACA 10 INTERFERENCE DATA ANALYSIS

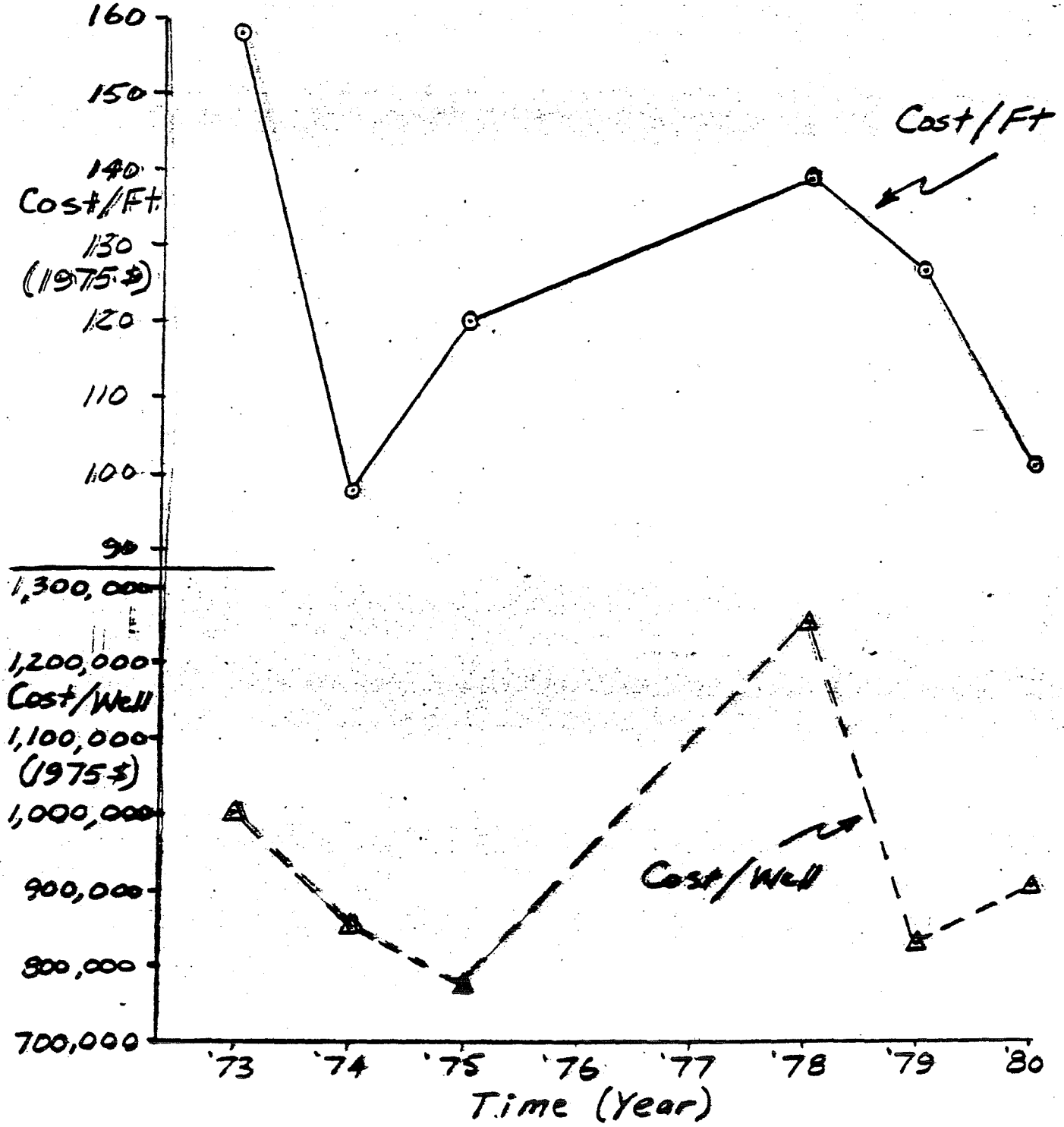
USING NEW FLOW GEOMETRIES

FLOW GEOMETRY	OPTIMUM MATCH	E_0, PSI/PT
PURE RADIAL	$(KH) = 6.4$ D-FT $\quad \phi H = 107$ FT	6.1
ANISOTROPIC RADIAL	$(KH)_{MAX} = 105$ D-FT, $(KH)_{MIN} = 1$ D-FT $(\phi H) = 15$ FT, $(KH)_{MAX}$ ORIENTED N80W(*)	4.5
	$\phi H = 100$ SPECIFIED: $(KH)_{MAX} = 20$ D-FT, $(KH)_{MIN} = 5$ D-FT $(KH)_{MAX}$ ORIENTED N80W	5.3
HEMISPHERICAL	$K = 4.9$ MD $\quad \phi = 0.05$	6.9

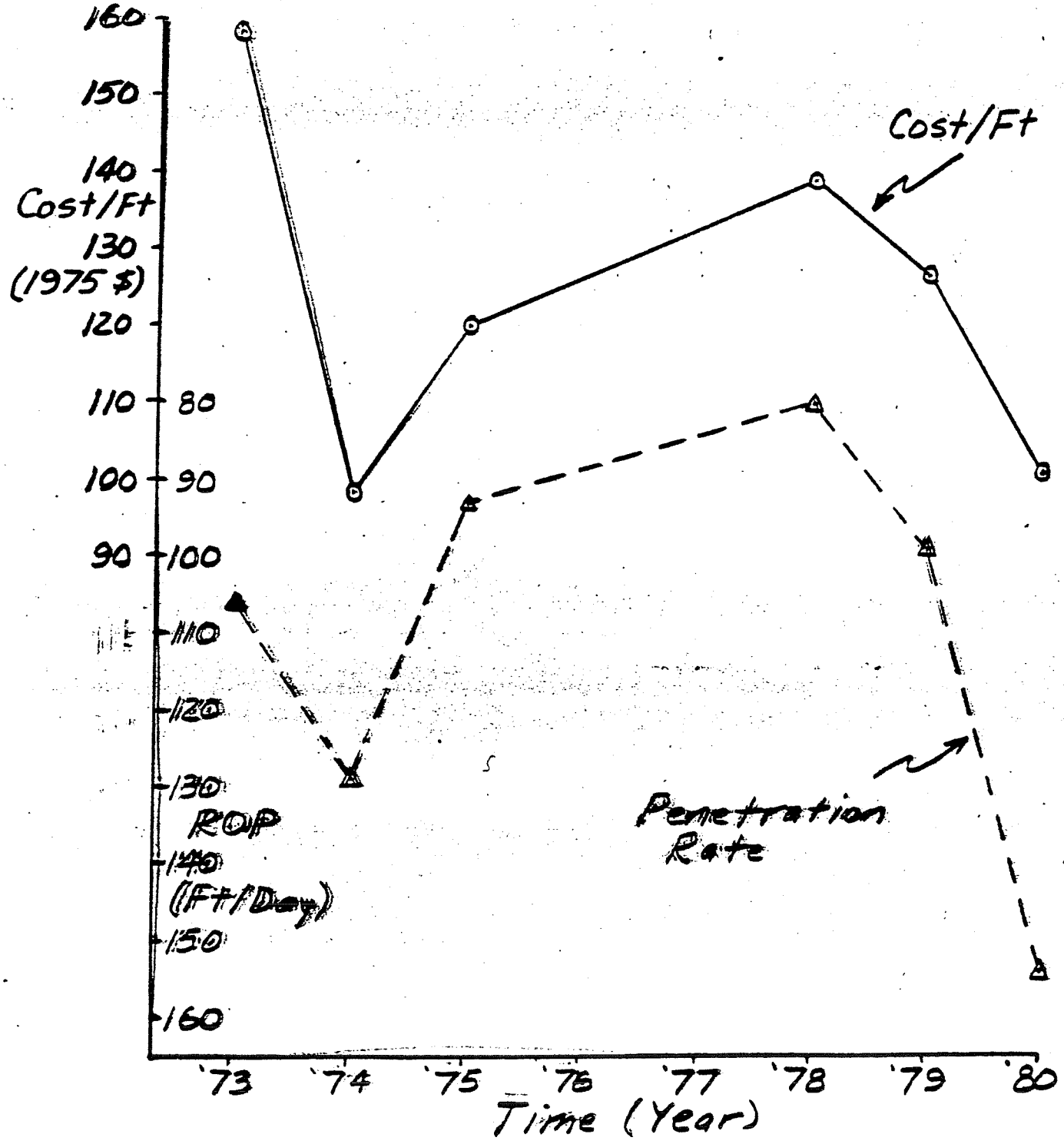
(*) N80W IS PERPENDICULAR TO REDONDO CREEK

PGA/cc 3/81

COST PER FOOT & COST PER WELL vs TIME BACA 1973 - 1980



COST PER FOOT + PENETRATION RATE vs TIME BACA 1973-1980



BACA 23 STIMULATION

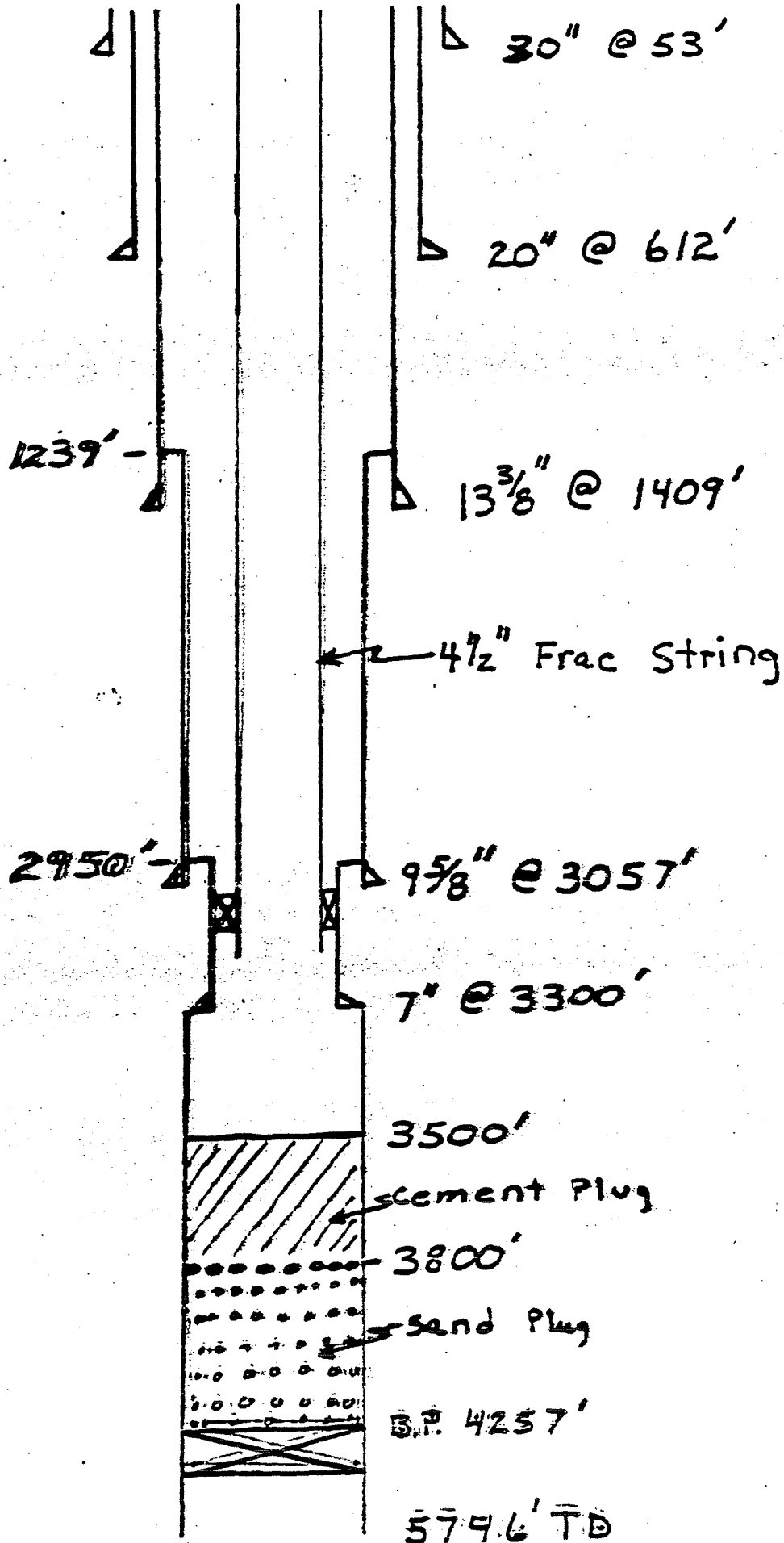
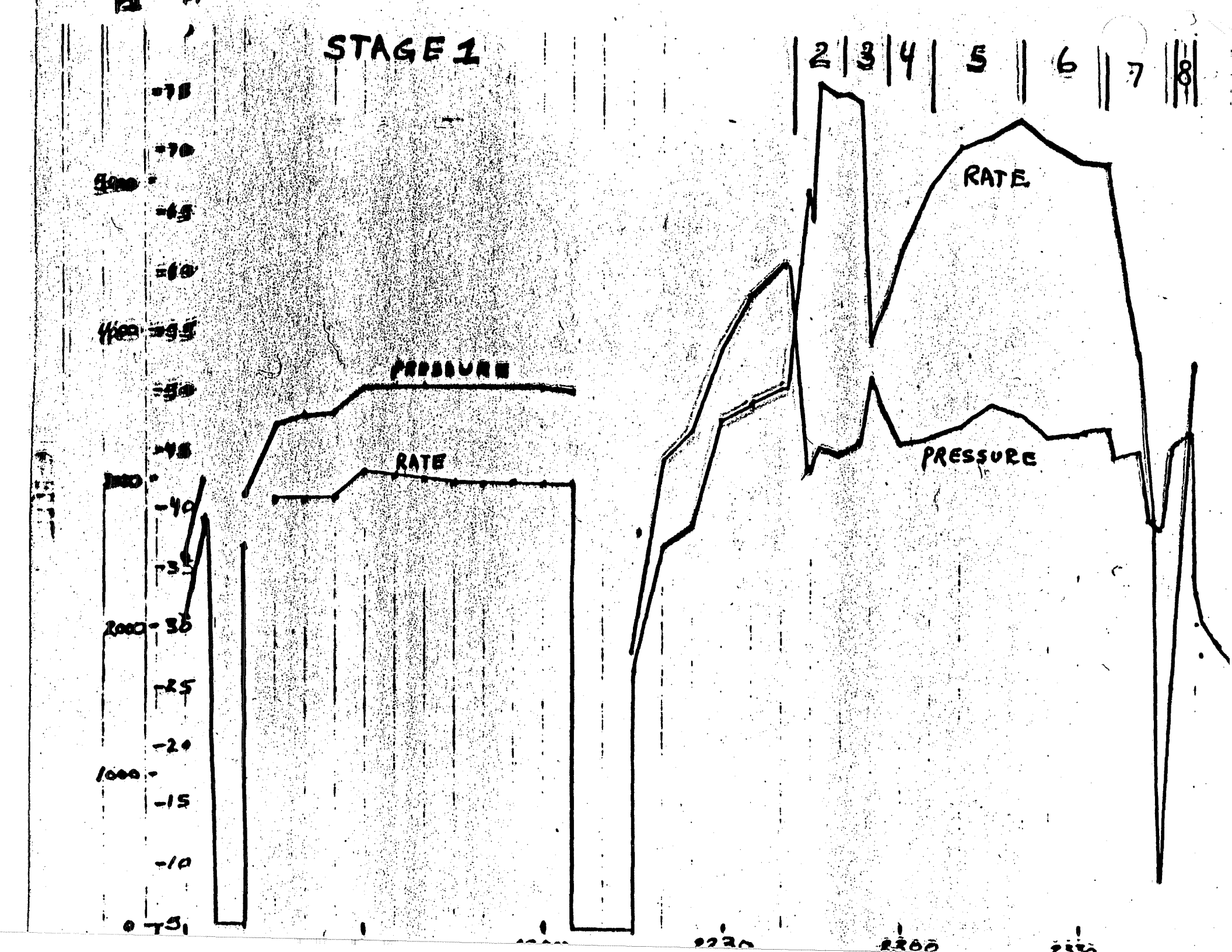


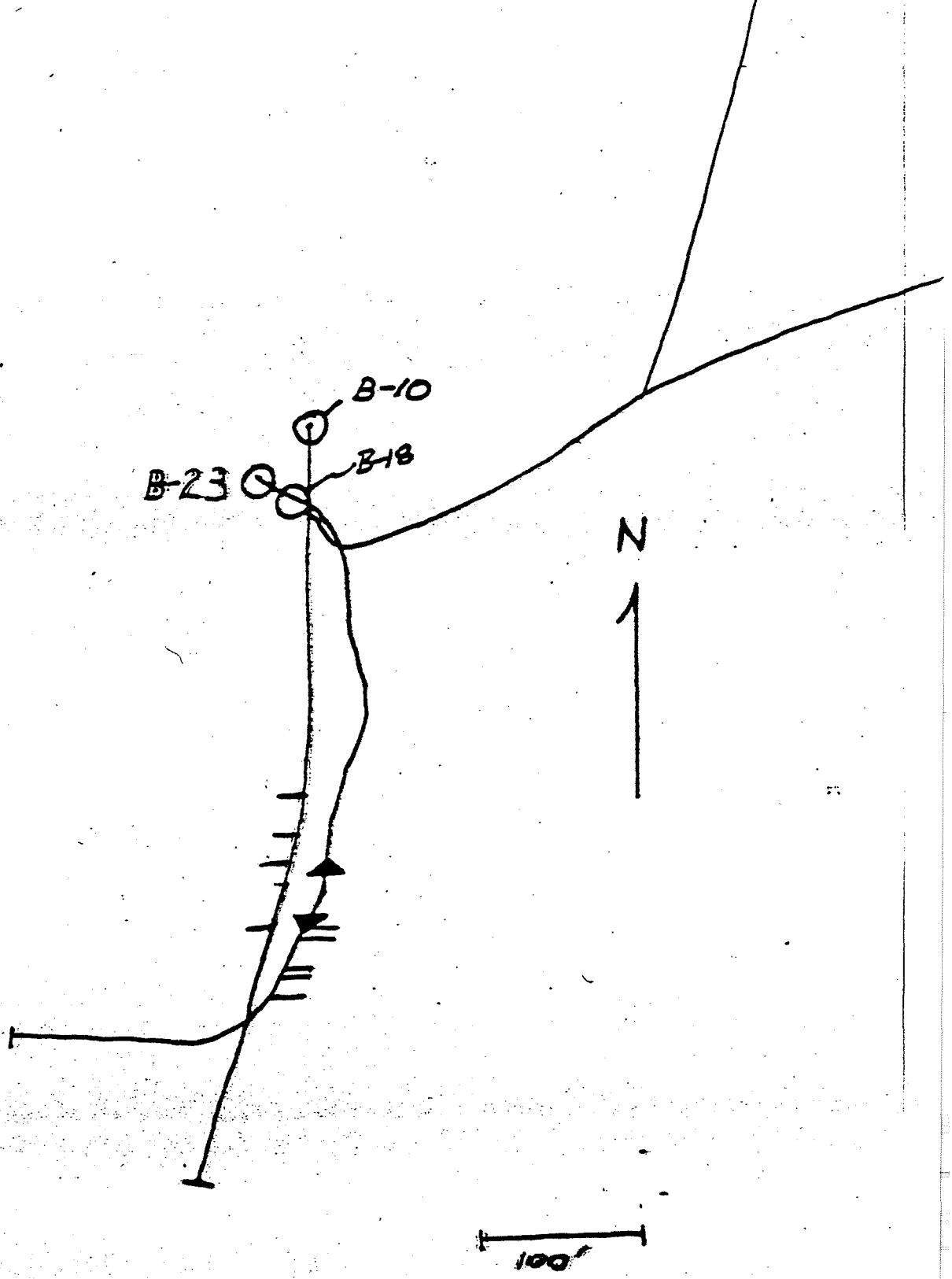
TABLE 1

PUMPING SCHEDULE FOR FRACTURE TREATMENT

RACA 18

EVENT NO.	FLUID VOLUME (bbls) INCR.	CUM.	PROPPANT lbs/gal	SIZE	FLUID
1	4,000	4,000	-	-	Prepad - water with FLA at maximum rate up to 80 BPM.
2	500	4,500	-	-	Pad - gelled water with FLA at 80 BPM
3	500	5,000	2	100	" " "
4	400	5,400	-	-	" " "
5	900	6,300	1	20/40	Proppant transport - same as Pad except no FLA. 80 BPM
6	1,000	7,300	2	20/40	" " "
7	600	7,900	3	20/40	" " "


STAGE 1
PRESSURE
RATE
RATE
PRESSURE
2
3
4
5
6
7
8
-75
-70
-65
-60
-55
-50
-45
-40
-35
-30
-25
-20
-15
-10
-5
0
1000
2000
4000
5000



PLAN VIEW

FRACTURE EXTENT

TOTAL FLUID VOLUME PUMPED	320,930 GAL 7,641 BBLS 42,867 FT^3
TOTAL PROPPANT PUMPED	197,400 LBS 12,145 GAL 289 BBLS 1,620 FT^3
TOTAL VOLUME PUMPED CONTAINING PROPPANT	102,950 GAL 2,451 BBLS 13,751 FT^3

FRACTURE	RADIAL EXTENT OF FLUID PUMPED ASSUMING PENNY SHAPED FRACTURE AND NO FLUID LOSS		MINIMUM PROPPANT EXTENT BASED ON PROPPANT VOLUME	MAX. PROPPANT EXTENT BASE ON VOL. OF FLUID CONTAINING PROPP
W (INCH)	R (FT)	A (FT^2)	R (FT)	R (FT)
1/16	1000	8.25×10^5	315	916
1/8	1000	4.12×10^6	222	648
1/4	800	2.06×10^6	157	458

PRODUCTION RESULTS

1315 PUMPED AIR AND WATER THROUGH BIT (6-1/8") IN THE 7" LINER

1325 GOT RETURNS

1544 SHUT OFF AIR AND MUD PUMP

1952 KILLED WELL

AVERAGE RATE TO PIT 135,170 LBS WATER/HR - UNABLE TO RECORD STEAM OR WATER RATE TO THE SUMP

RAN LINER

RAN DST TOOL - FLOWING INSIDE DRILL PIPE, LIFTING WITH NITROGEN THROUGH COILED TUBING AT 2500 FT, PUMPING 300 SCF

FLOWED (N_2 ASSISTED) FOR 5 HRS AT 21,580 LB/HR

SURFACE TEMPERATURE 150°F, MAXIMUM BHT - 341° F

PRESSURE DRAWDOWN 42 PSI

PI = 514 LBS/HR/PSI

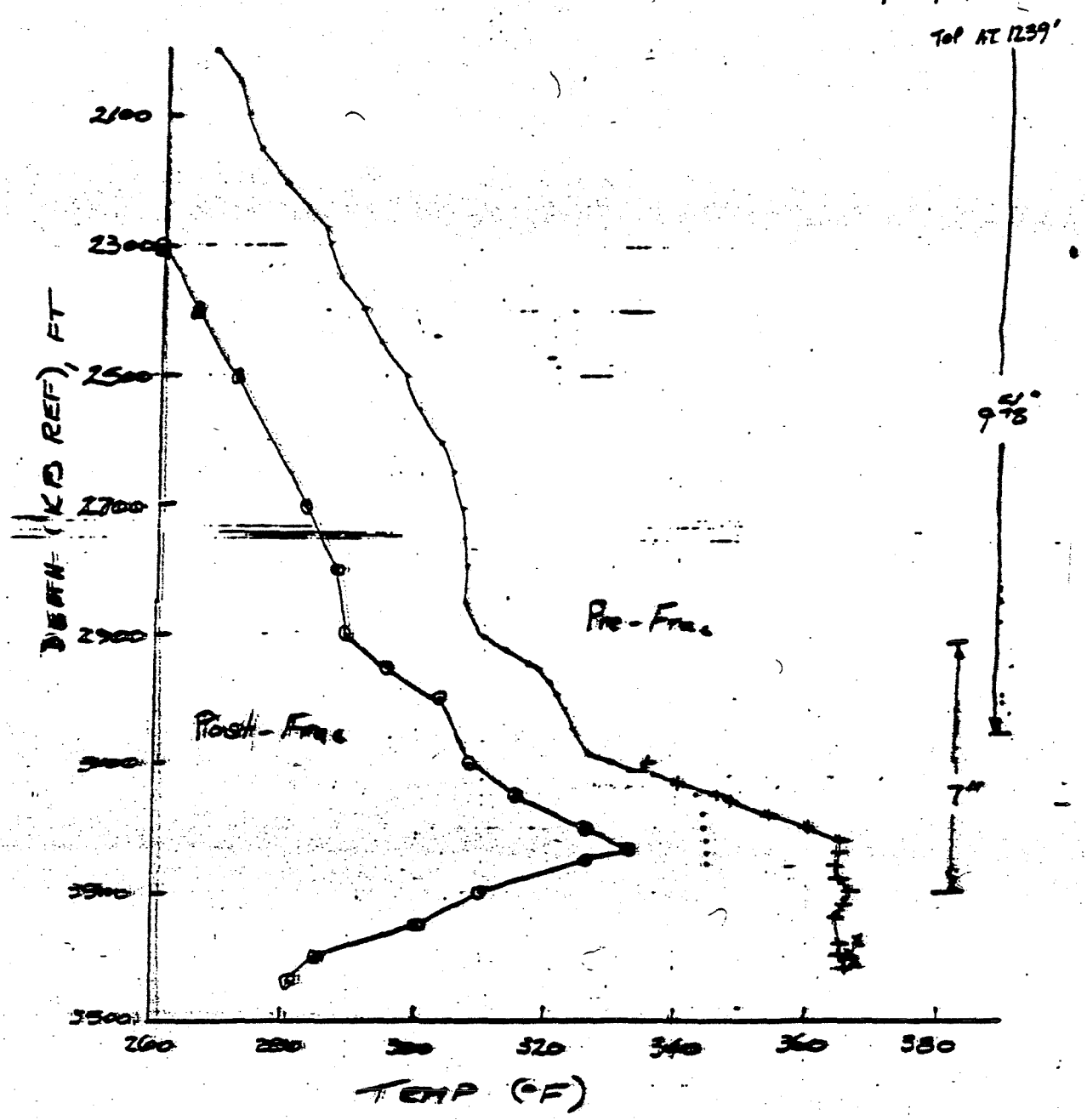
PRESSURED WELL - DID NOT FLOW

PRESSURED WELL UNTIL 8 AM SATURDAY - WELL FLOWED

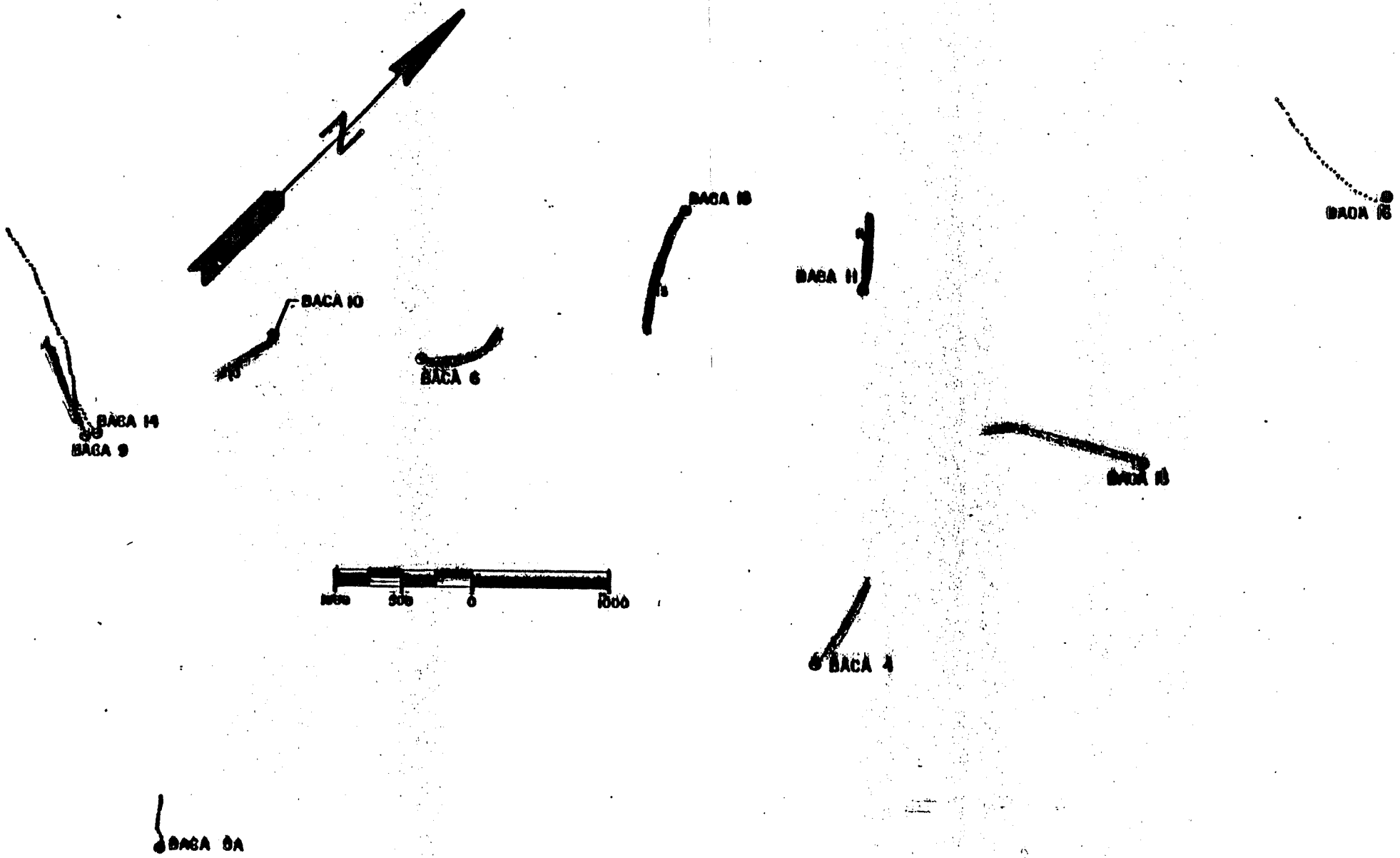
MONDAY AT 0500 HRS FLOWING 43,400 LB/HR STEAM, 120,900 LBS/HR MASS AT AN ASSUMED 40% FLASH

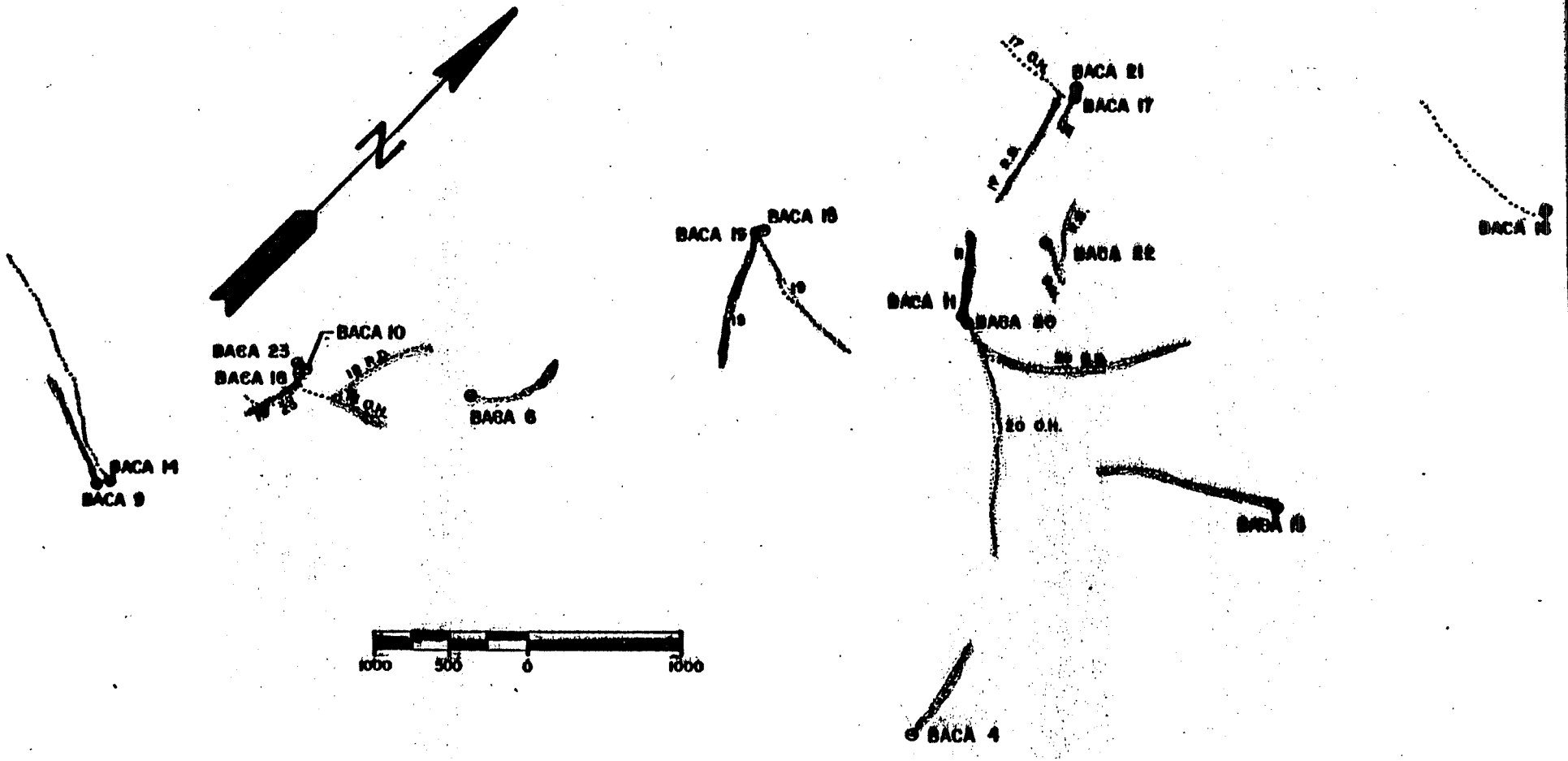
Denver Research Institute

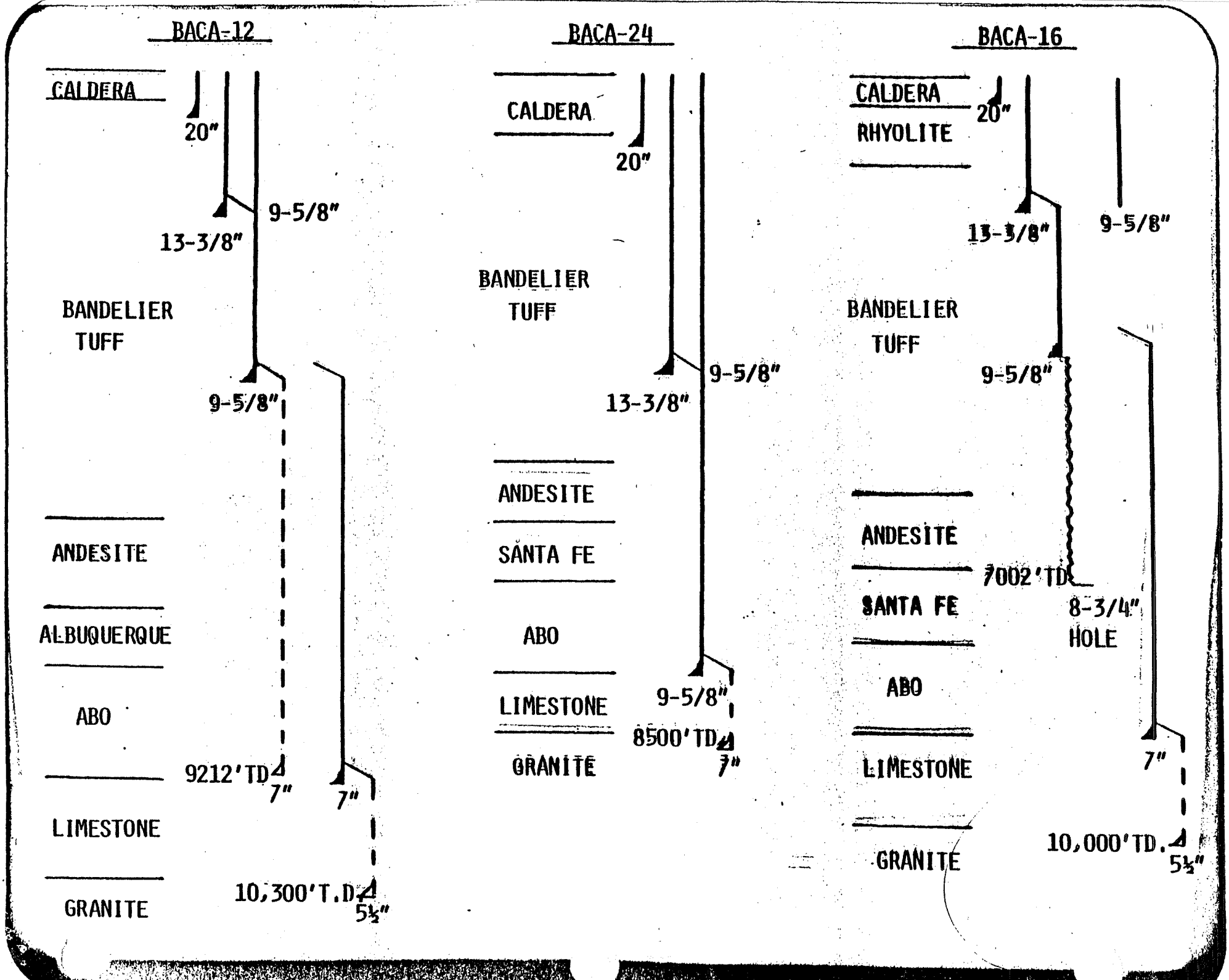
3/22/81



RB


N
BACA 10
BACA 6
BACA 14
BACA 9
BACA 11
BACA 15
BACA 16
BACA 4
BACA 8A
500
0
1000

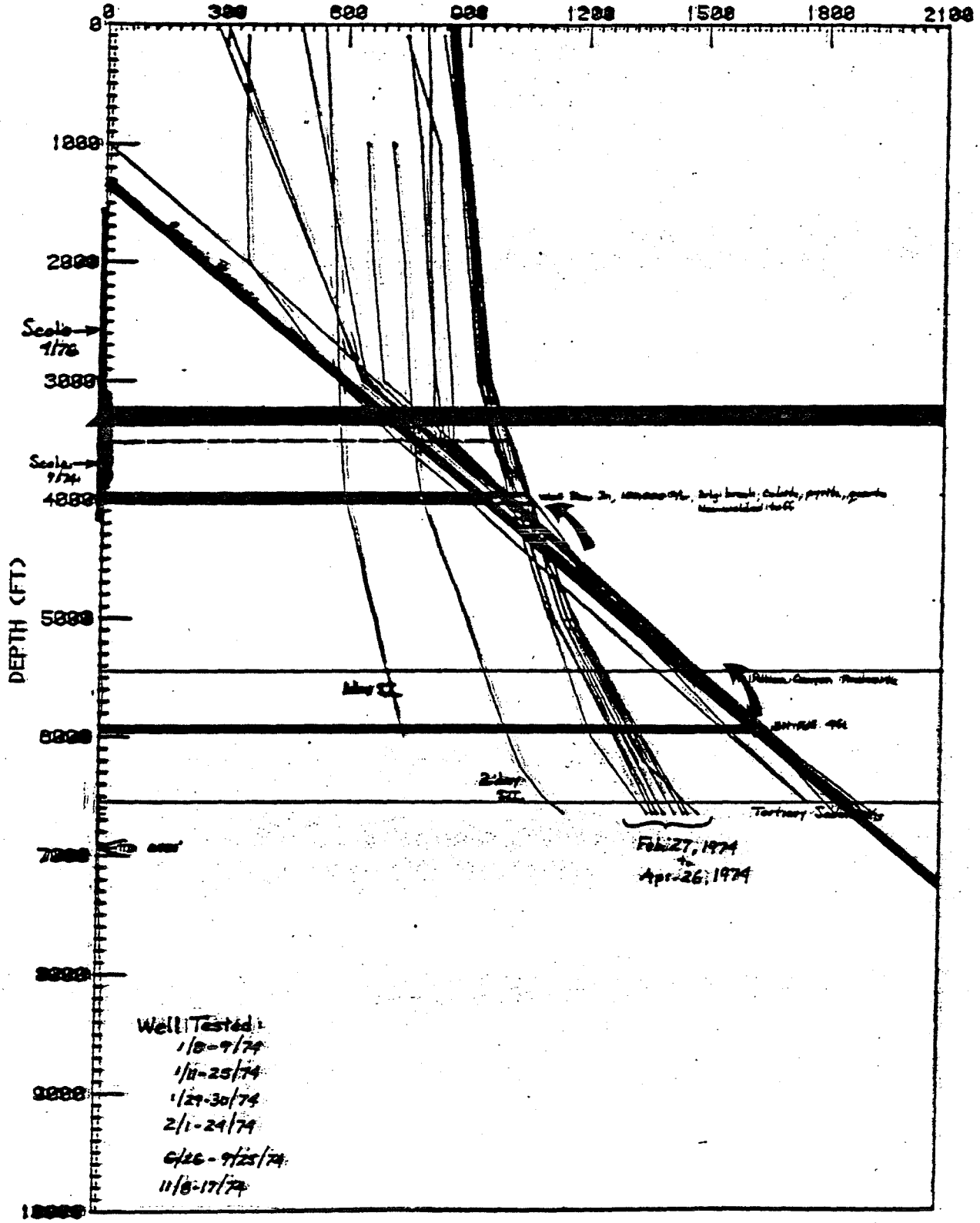

N
BACA 23
BACA 10
BACA 18
BACA 6
BACA 14
BACA 9
BACA 15
BACA 15
BACA 21
BACA 17
BACA 22
BACA 11
BACA 20
20 O.H.
BACA 19
BACA 4
BACA 5A
1000
500
0
1000


BACA-12
CALDERA
20"
13-3/8"
9-5/8"
BANDELIER TUFF
9-5/8"
ANDESITE
ALBUQUERQUE
ABO
9212'TD
7"
7"
LIMESTONE
GRANITE
10,300'T.D
5½"
BACA-24
CALDERA
20"
BANDELIER TUFF
9-5/8"
13-3/8"
ANDESITE
SANTA FE
ABO
LIMESTONE
9-5/8"
8500'TD
7"
GRANITE
BACA-16
CALDERA
RHYOLITE
20"
13-3/8"
9-5/8"
BANDELIER TUFF
9-5/8"
ANDESITE
7002'TD
SANTA FE
8-3/4" HOLE
ABO
LIMESTONE
7"
10,000'TD.
5½"
GRANITE

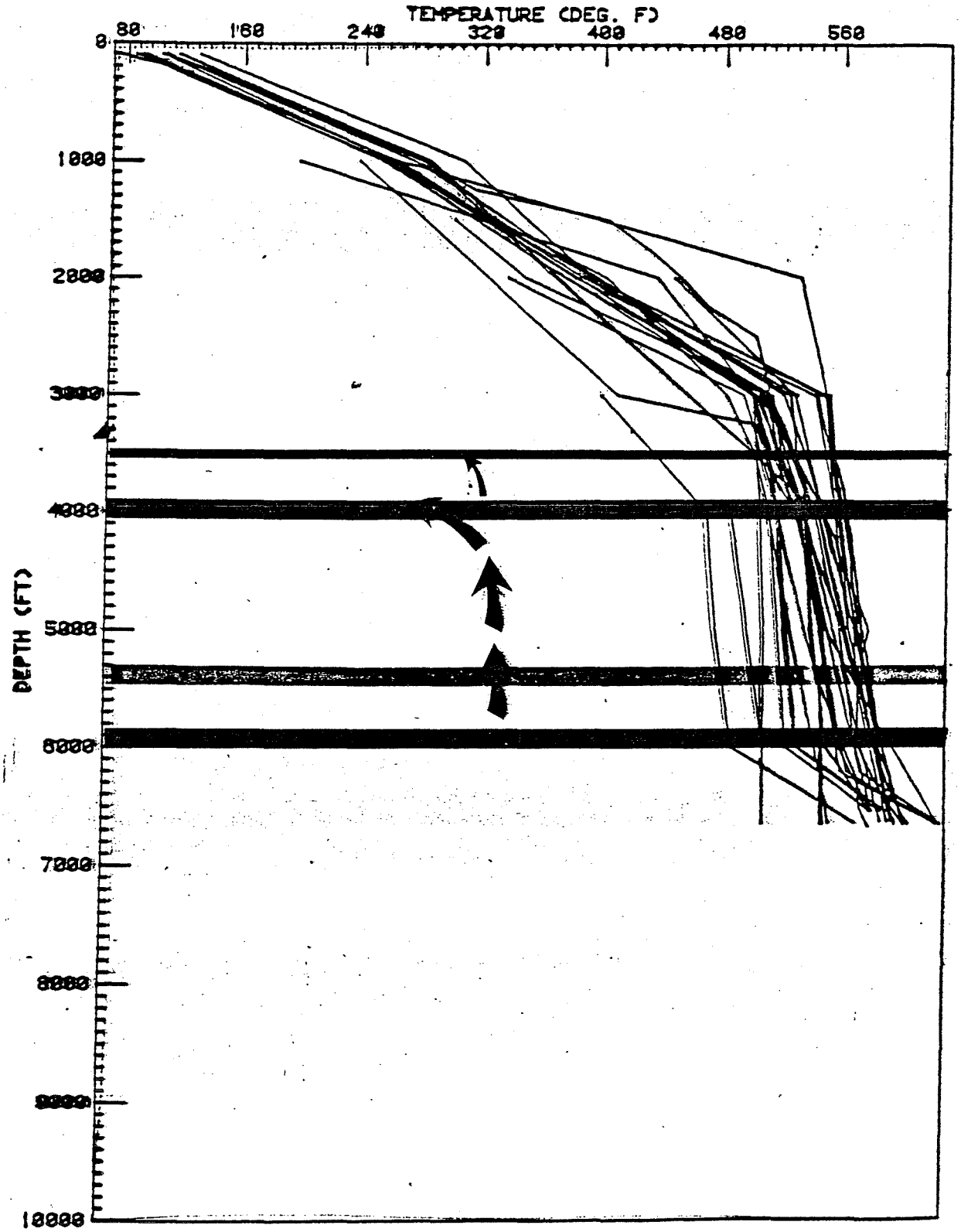
1981 PROPOSED RIG SCHEDULE

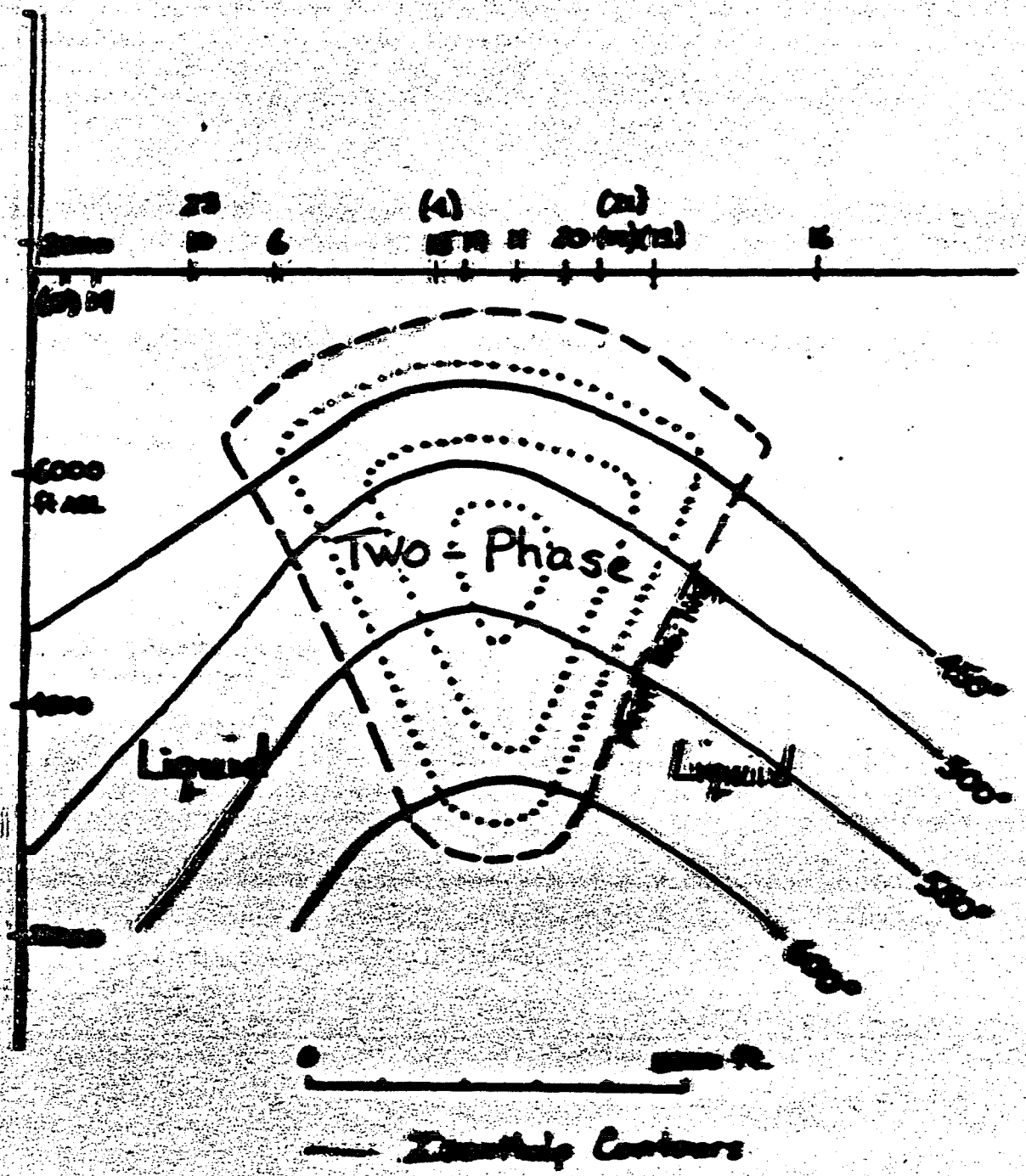
WELL	PROGRAM	TIMING	COST
BACA - 24	NEW WELL (L.S. TEST)	65 DAYS	$1,750,000
BACA - 19	FRAC BOTTOM 300'	23 DAYS	$1,100,000
BACA - 12	DEEPEN (L.S. TEST)	60 DAYS	$1,250,000
BACA - 22	FRAC 200' INTERVAL	23 DAYS	$1,100,000
BACA - 16	DEEPEN (L.S. TEST)	42 DAYS	$1,200,000
(IF SUCCESS IS INDICATED BY ABOVE RIG WORK)			
BACA - 21	DEEPEN THROUGH ANDESITE	30 DAYS	$ 500,000
1982			
BACA - 18	FRAC OR REDRILL	23-30 DAYS	$667,000 - 1,055,000
BACA - 25	NEW WELL (L.S. TEST)	65 DAYS	$1,750,000

BAGA 1-1 PRESSURE PROFILES

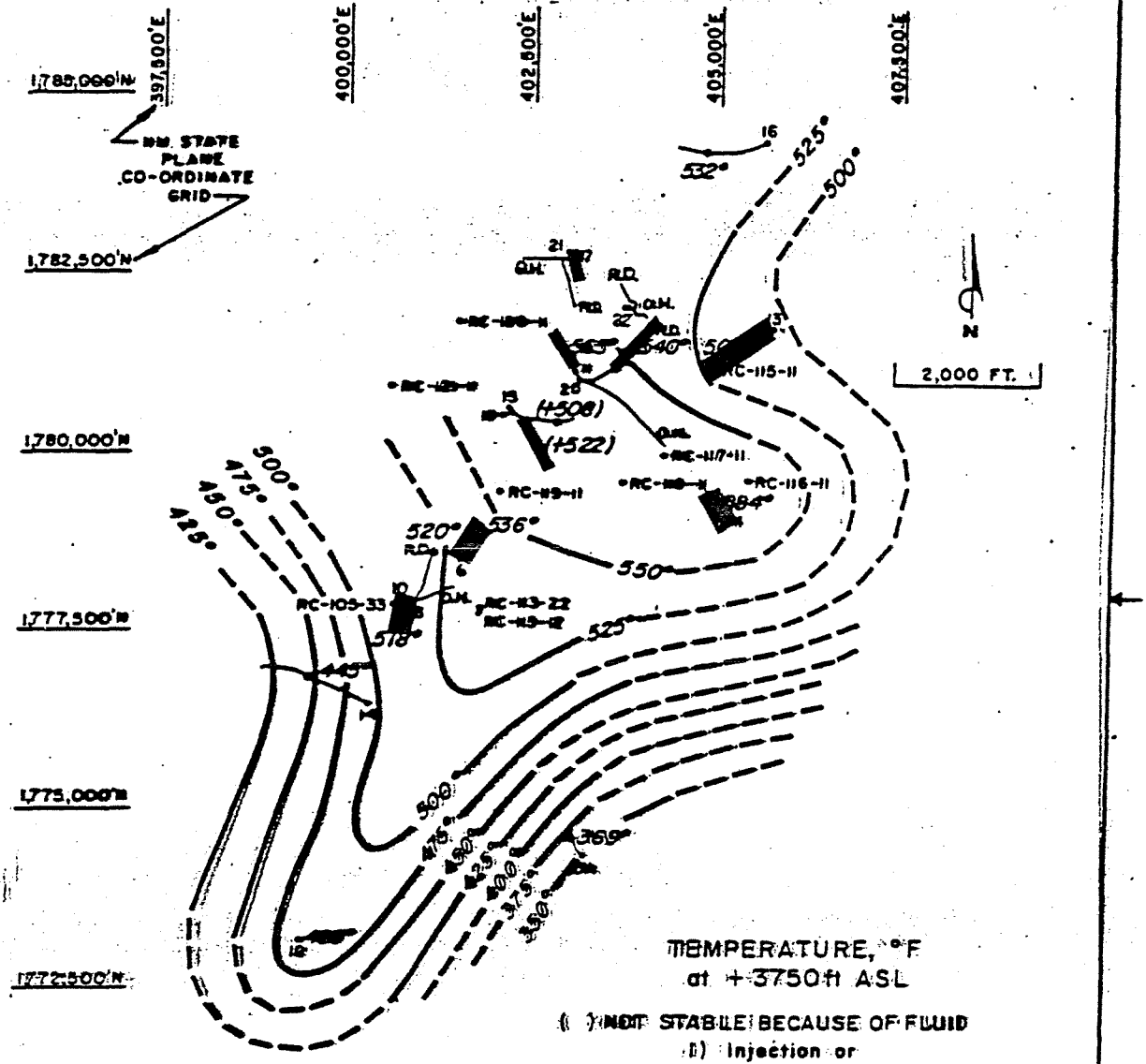


BACA 11 TEMPERATURE PROFILES




Two - Phase
Liquid
Liquid

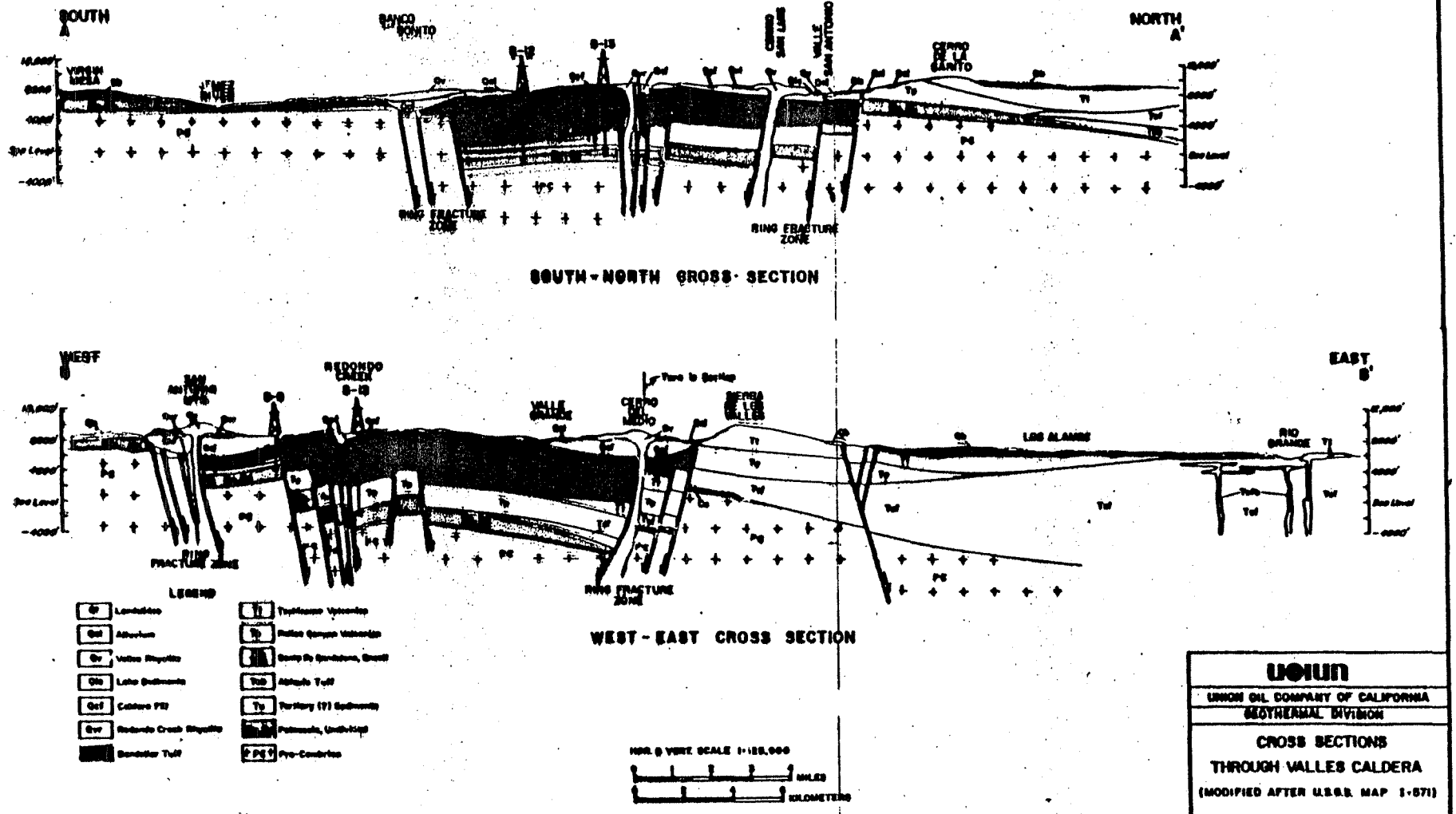
REVISIONS				
REV	DESCRIPTION	DATE	BY	APP'D
A	ISSUED	5-16-80		



TEMPERATURE, °F
at +3750ft A.S.L.

( ) NOT STABLE BECAUSE OF FLUID
1) Injection or
2) Flashing in Formation

UNION 76	Union Geothermal Company of New Mexico				
	REDONDO CREEK DEVELOPMENT AREA				
DESIGN					
DRAWN					
CHECK		SIZE A	RE NO.	DWG. NO. RC-L-245-101a	REV A
DATE		SCALE: NOTED		SHEET 1-OF-1	

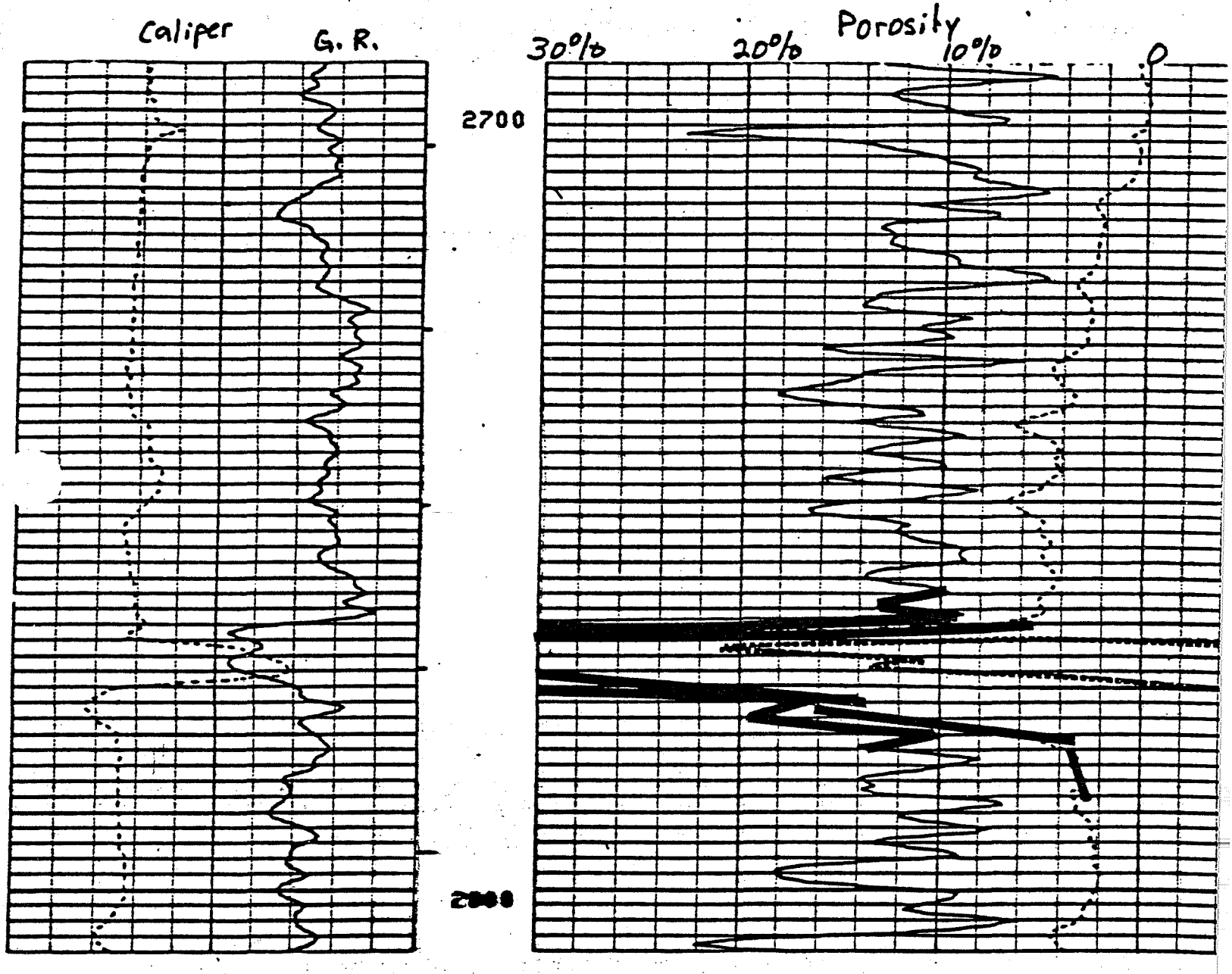


UNION OIL COMPANY OF CALIFORNIA
GEOTHERMAL DIVISION

CROSS SECTIONS THROUGH VALLES CALDERA

(MODIFIED AFTER U.S.G.S. MAP I-971)

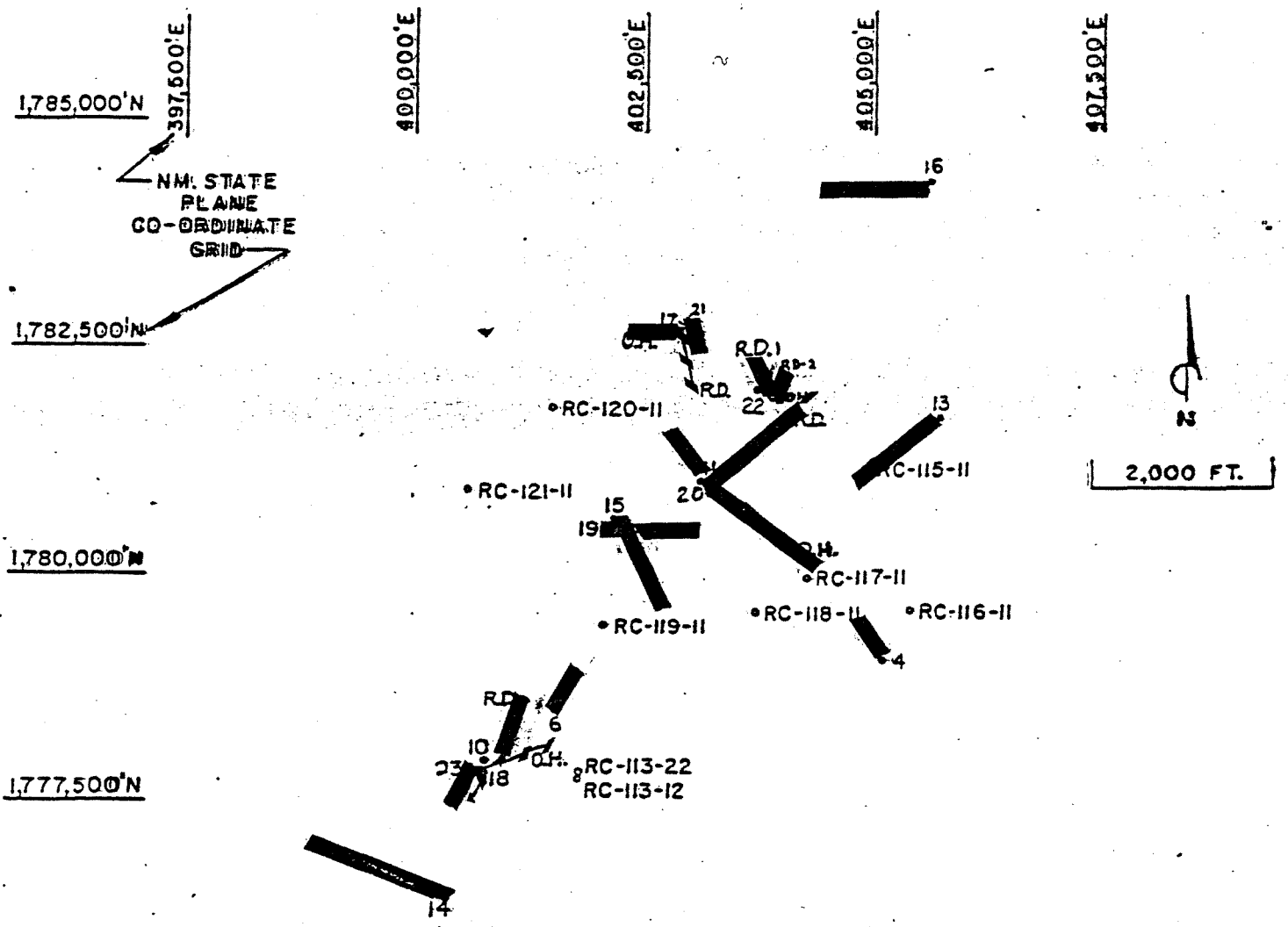
JH2



Density Porosity ———

Neutron Porosity ———

A	ISSUED	5-16-80	E.	



COMMERCIAL PRODUCERS

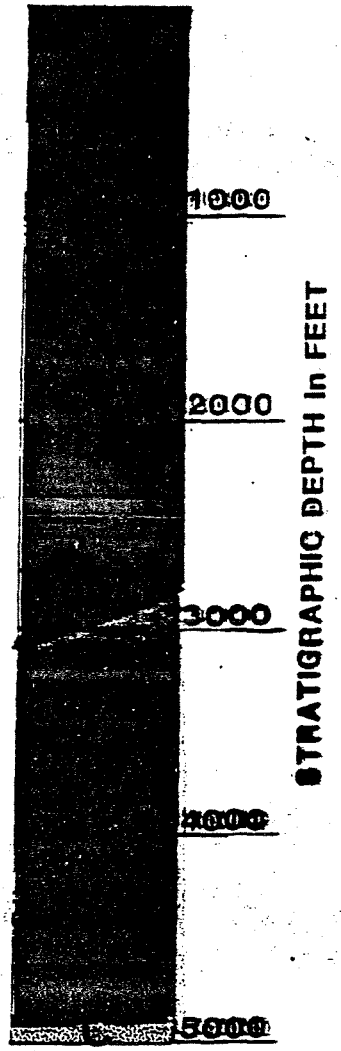
"HOT" SUBCOMMERCIAL WELLS

"COLD" SUBCOMMERCIAL WELLS

"HOT" WELLS with UNKNOWN PRODUCTIVITY

UNION 76	Union Geothermal Company of New Mexic
	REDONDO CREEK DEVELOPMENT AREA
DESIGN	E.D.
DRAWN	

PRELIMINARY STRATIGRAPHY
BANDELIER TUFF



A1 ZONE:
MODERATELY TO WEAKLY WELDED.
COMMON KAOLINITE ALTERATION.

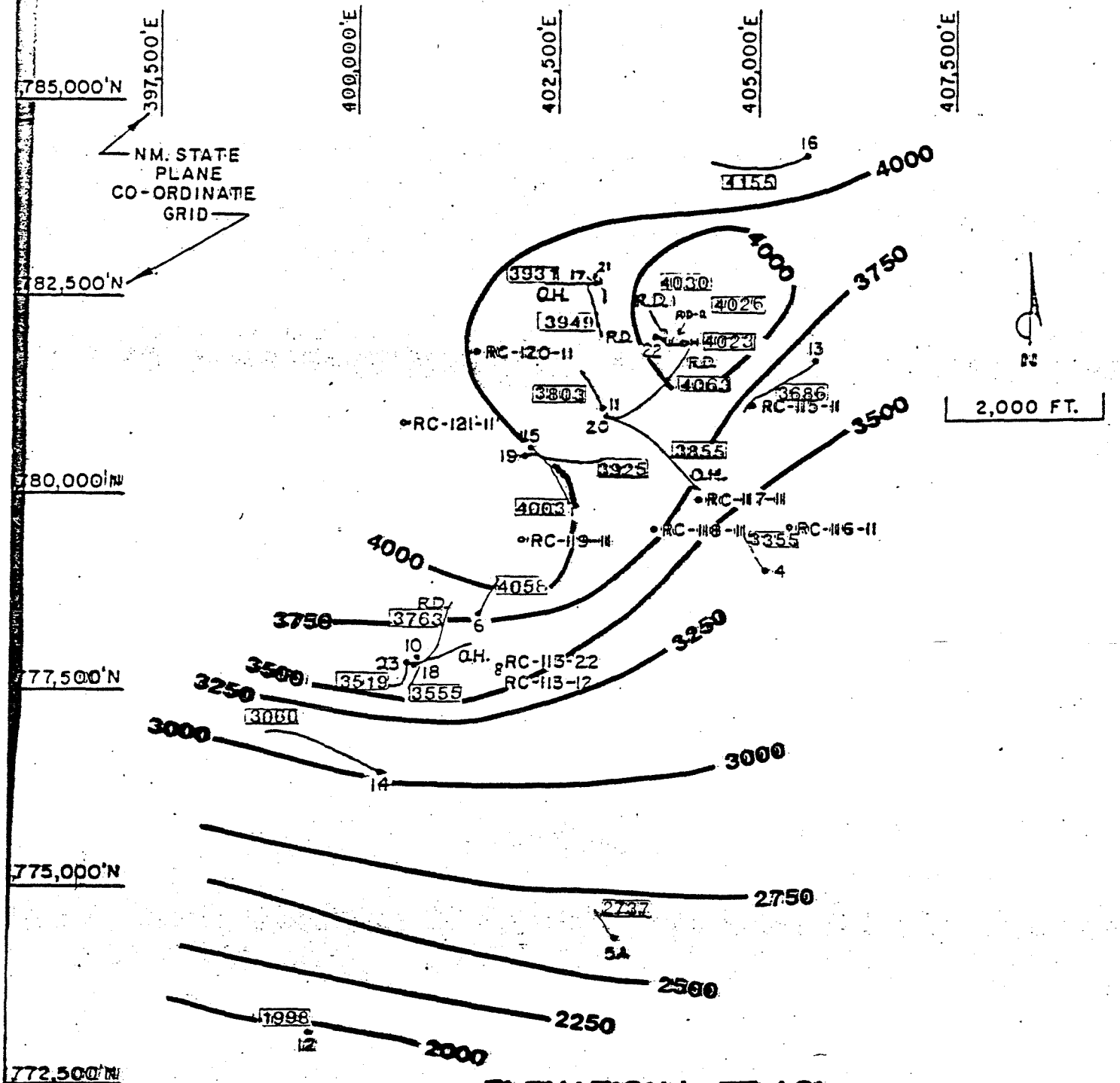
A2 ZONE:
STRONGLY WELDED.
DENSE, HARD, VITRIC

A3 ZONE
MODERATELY TO STRONGLY WELDED.
VARIABLY VITRIC AND DEVITRIFIED.
MORE ABUNDANT PHENOCRYSTS THAN IN A2

B ZONE
VISUALLY SIMILAR TO A3.
CHARACTERIZED ON LOGS BY
SIGNIFICANT INCREASES IN
POROSITY & CONDUCTIVITY

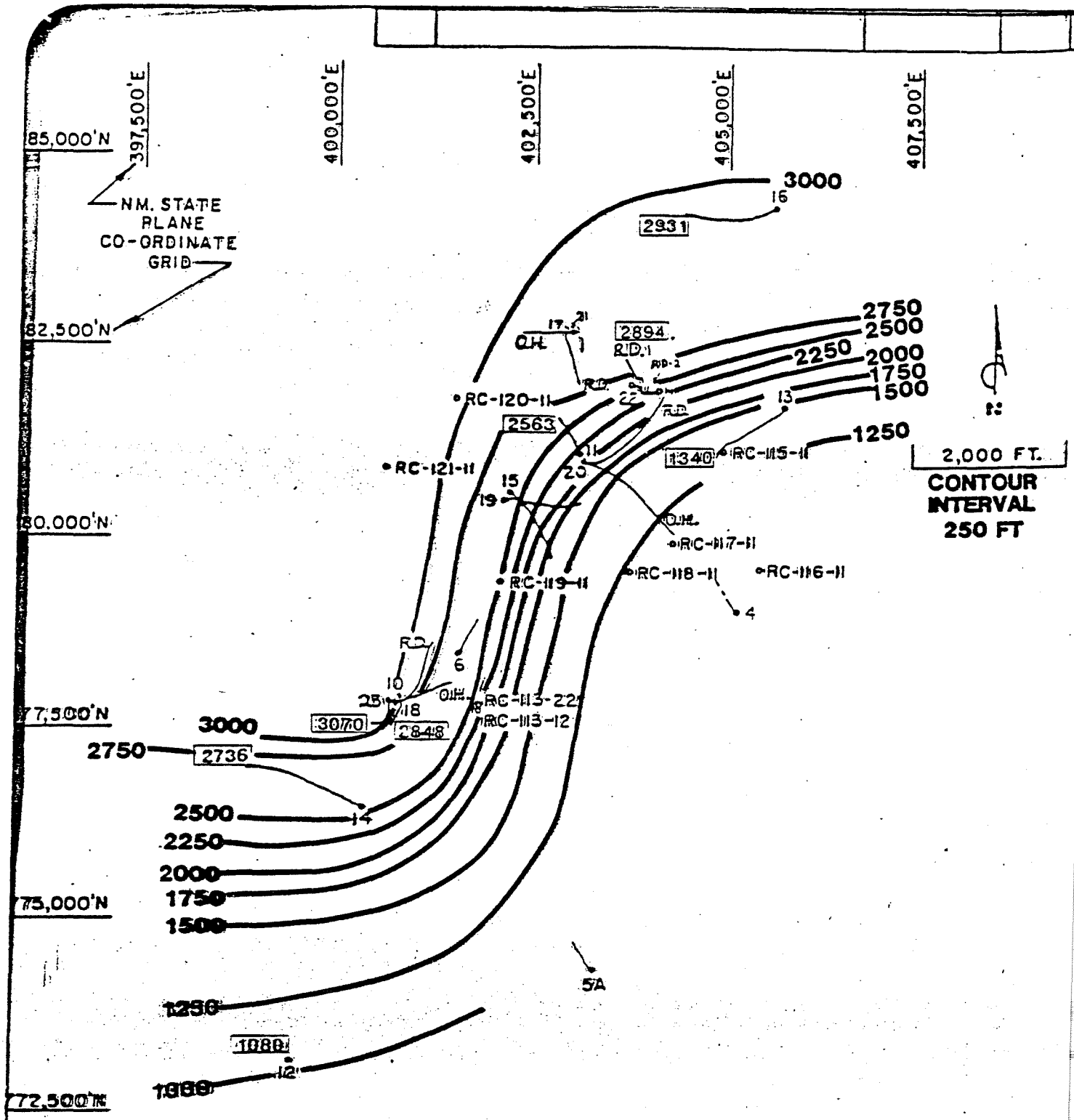
C ZONE
BASAL PUMICE.
WEAKLY WELDED.
HIGHLY ALTERED.

REV	DESCRIPTION	DATE	BY	AP
A	ISSUED	5-10-80		



BASE of BANDELIER TUFF

UNION 76	Union Geothermal Company of New Mexic
	REDONDO CREEK DEVELOPMENT AREA
DESIGN	
DRAWN	

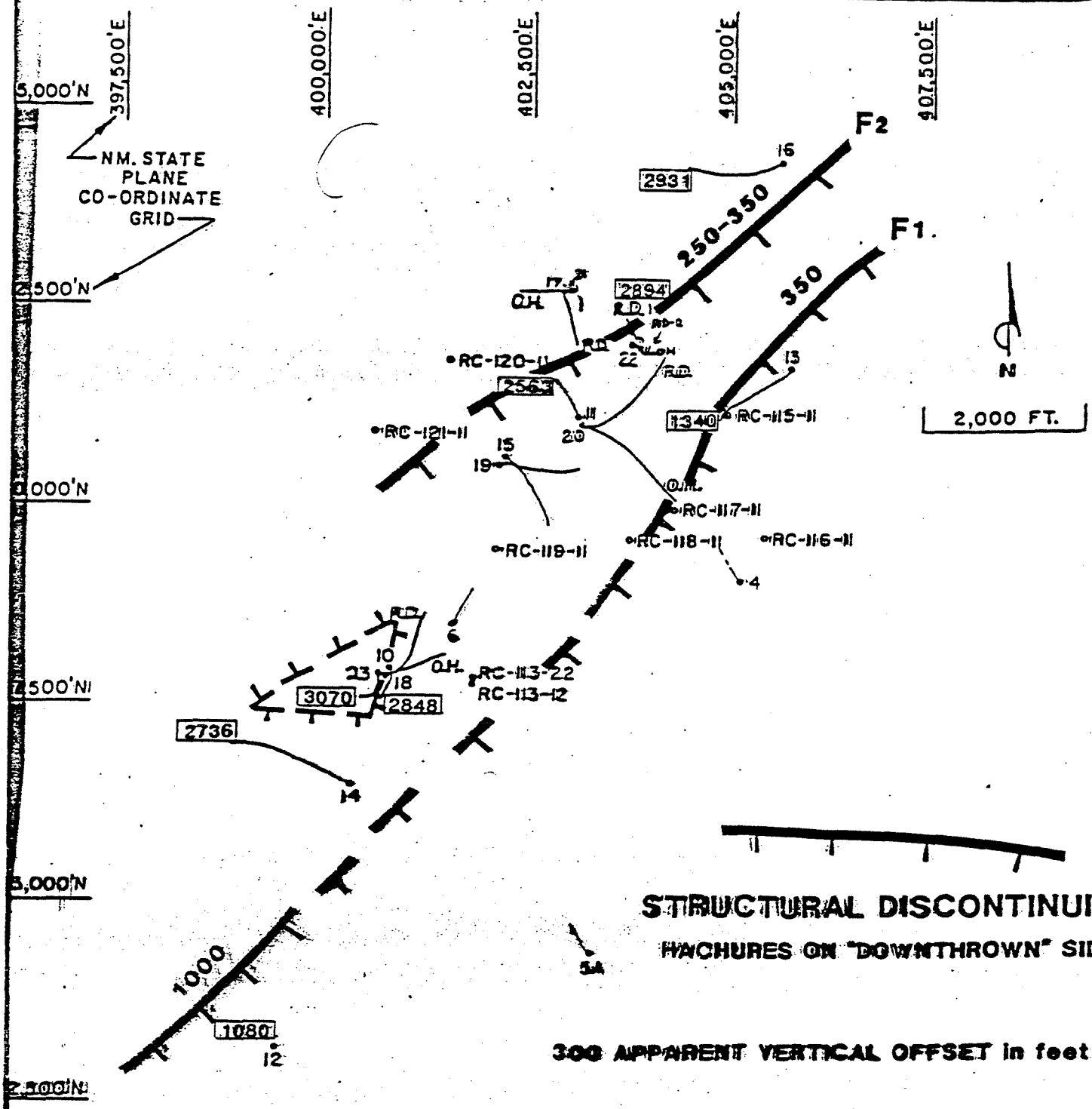


UNION 76	Union Geothermal Company of New Mex
DESIGN	
DRAWN	
CHECK	

REDONDO CREEK DEVELOPMENT AREA
ELEVATION in FT ASL
BASE of PALIZA CANYON FM

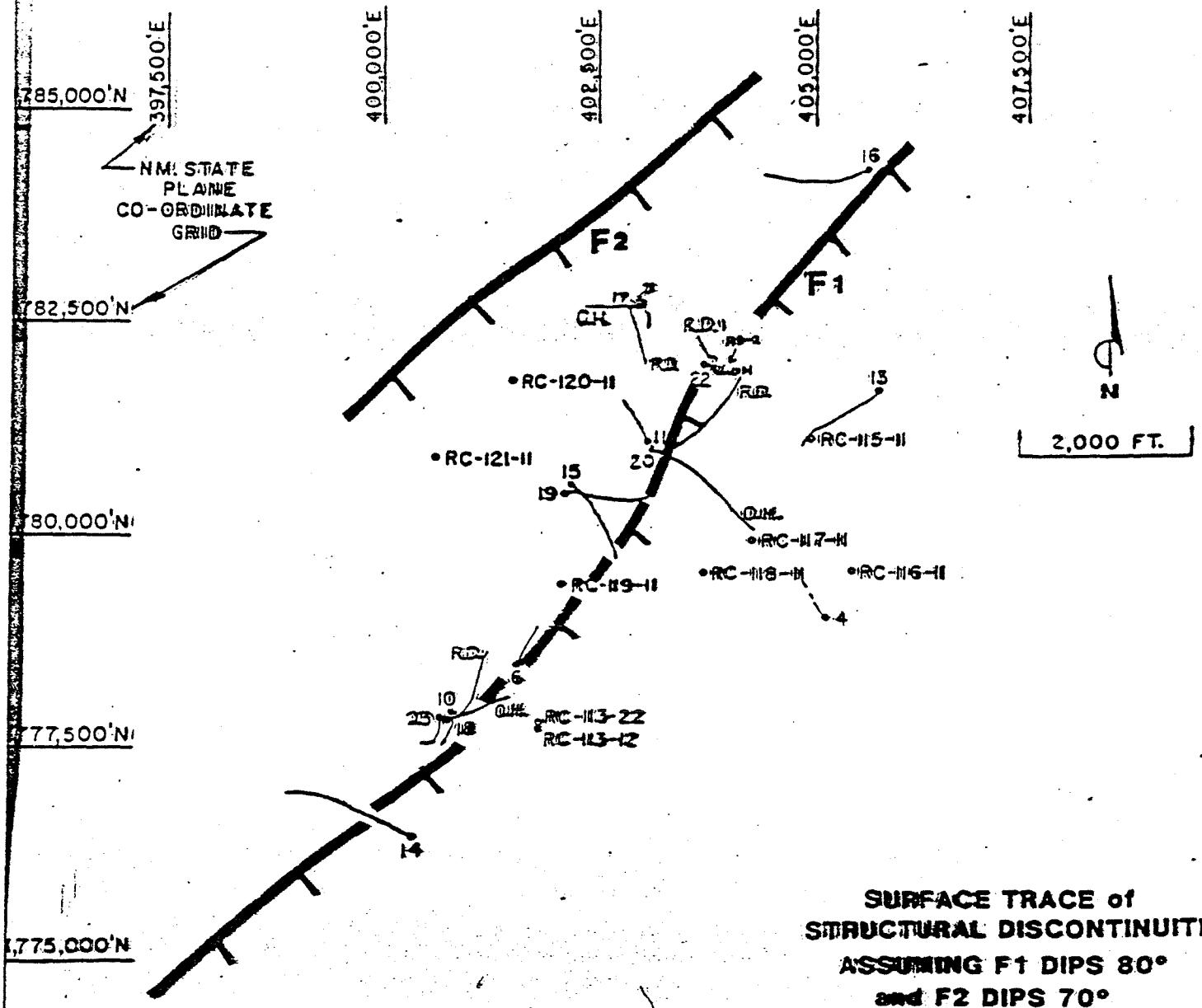
SIZE	AFE NO.	DWG. NO.
A		RC-L-24K-101a

A	ISSUED	5-16-80	L.	



union 76	Union Geothermal Company of New Mexic
DESIGN L.D.	REDONDO CREEK DEVELOPMENT AREA
DRAWN S. FELZKAR.	ELEVATION in FT ASL
	BASE of PALIZA CANYON FM
SIZE AFE NO.	DWG. NO. R

REVISIONS				
REV	DESCRIPTION	DATE	BY	AP
A	ISSUED	5-16-80		

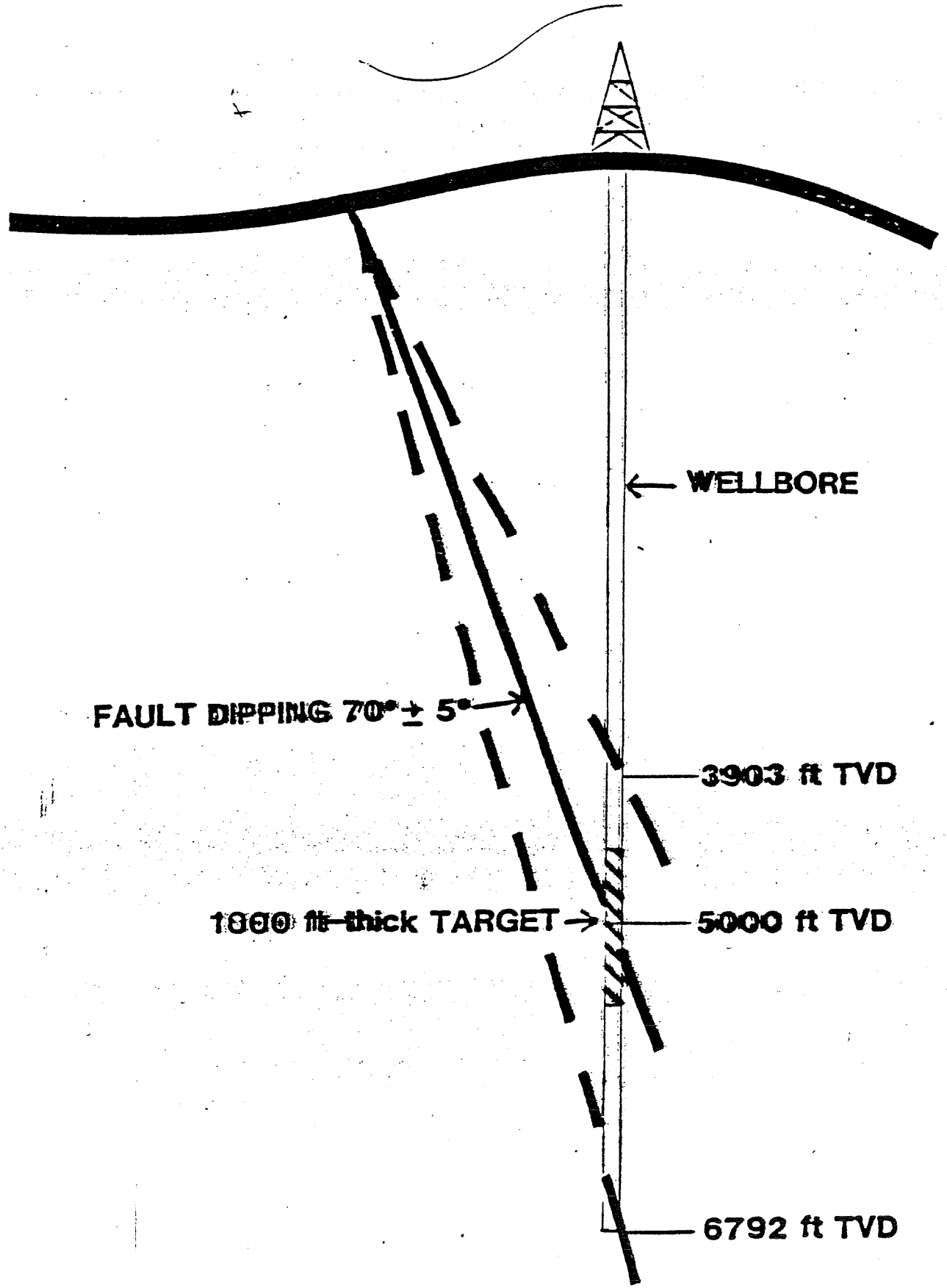


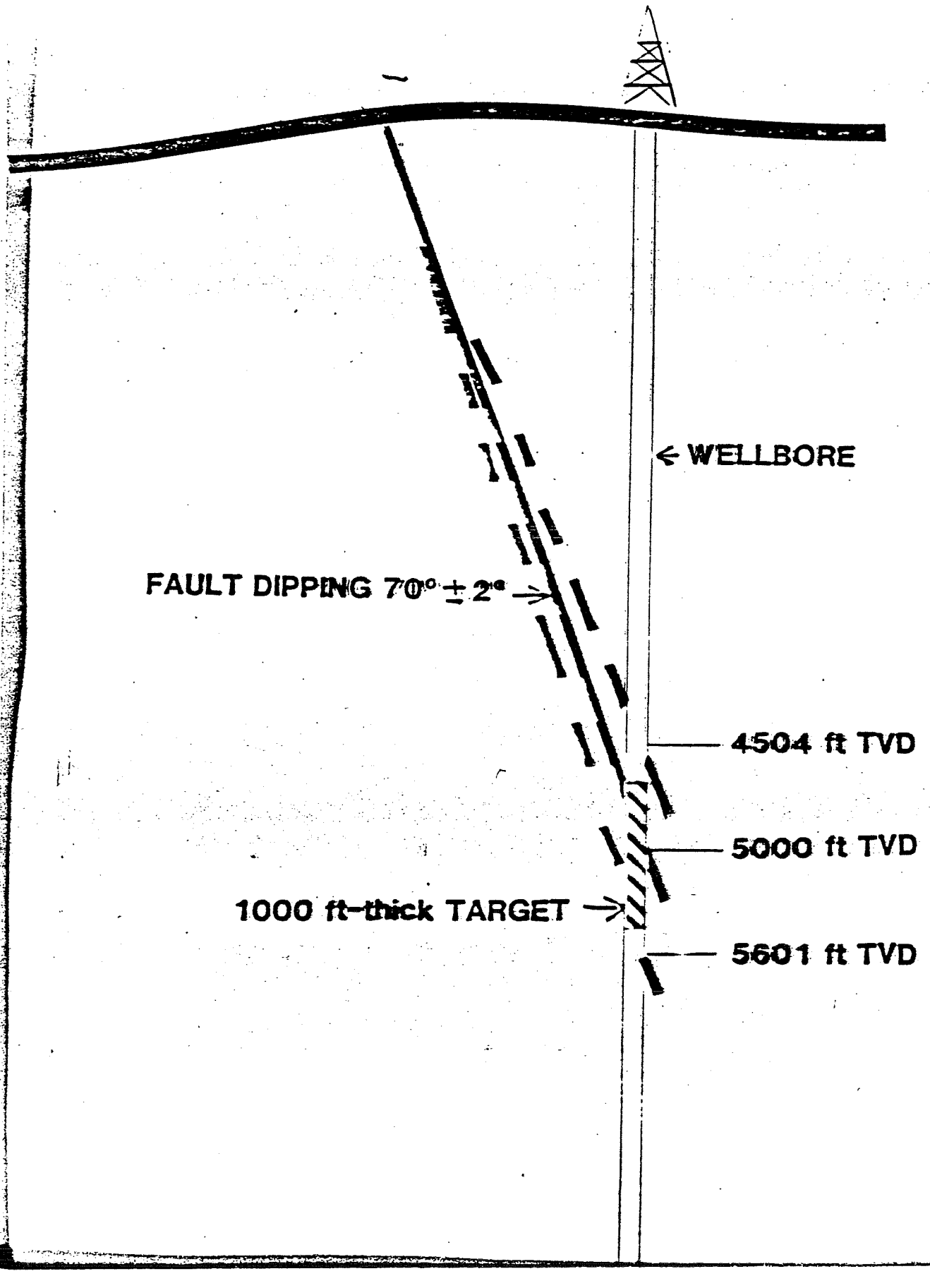
SURFACE TRACE of STRUCTURAL DISCONTINUITIE
ASSUMING F1 DIPS 80°
and F2 DIPS 70°
HACHURES ON "DOWNTHROWN" SIDE

UNION 76 Union Geothermal Company of New Mexic

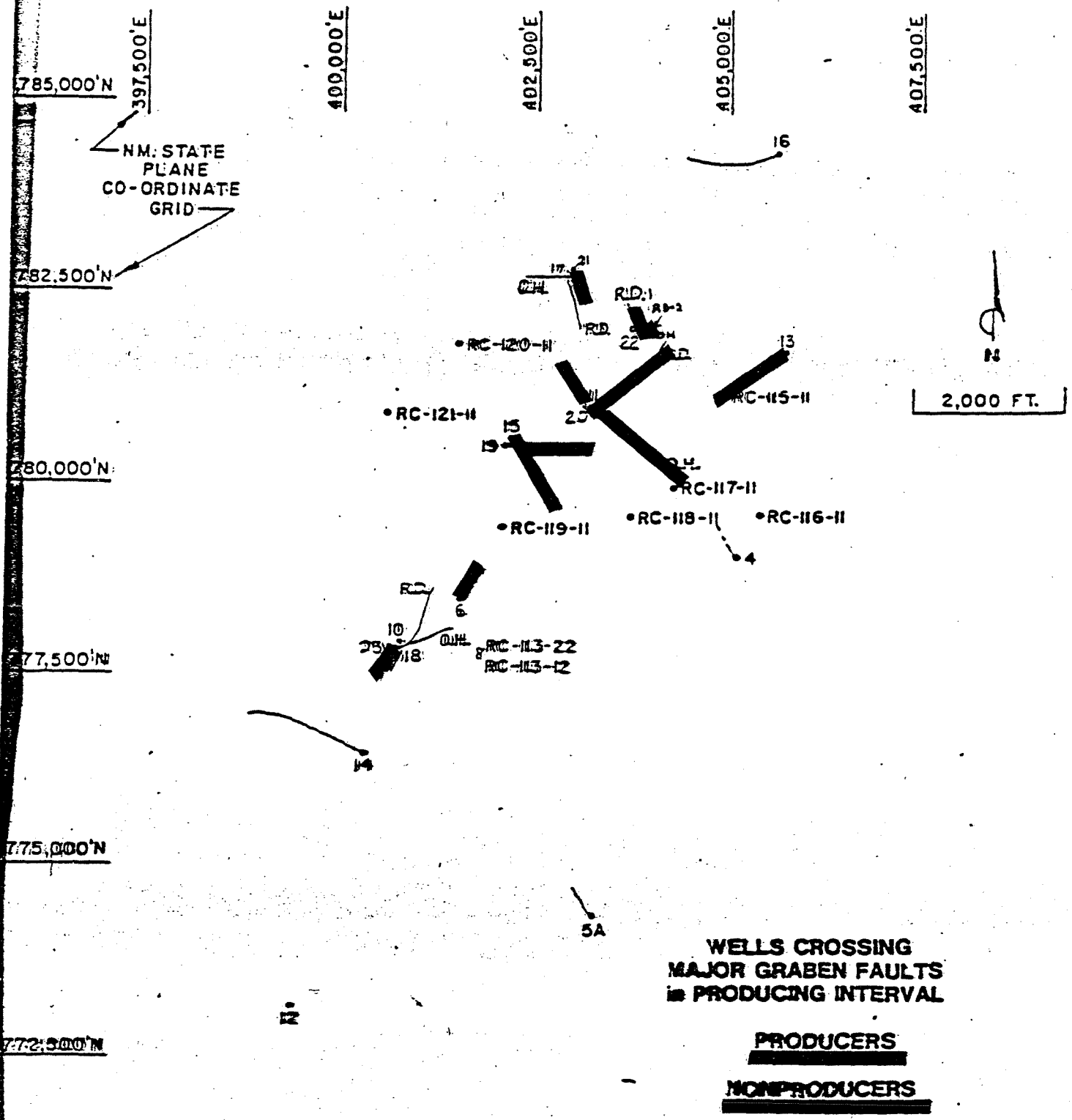
REDONDO CREEK DEVELOPMENT AREA

DESIGN AD


WELLBORE
FAULT DIPPING 70° ± 5°
3903 ft TVD
1000 ft thick TARGET
5000 ft TVD
6792 ft TVD


WELLBORE
FAULT DIPPING 70° ± 2°
4504 ft TVD
5000 ft TVD
1000 ft-thick TARGET
5601 ft TVD

A	ISSUED	5-15-80		



WELLS CROSSING MAJOR GRABEN FAULTS in PRODUCING INTERVAL

PRODUCERS

NONPRODUCERS

Union 76

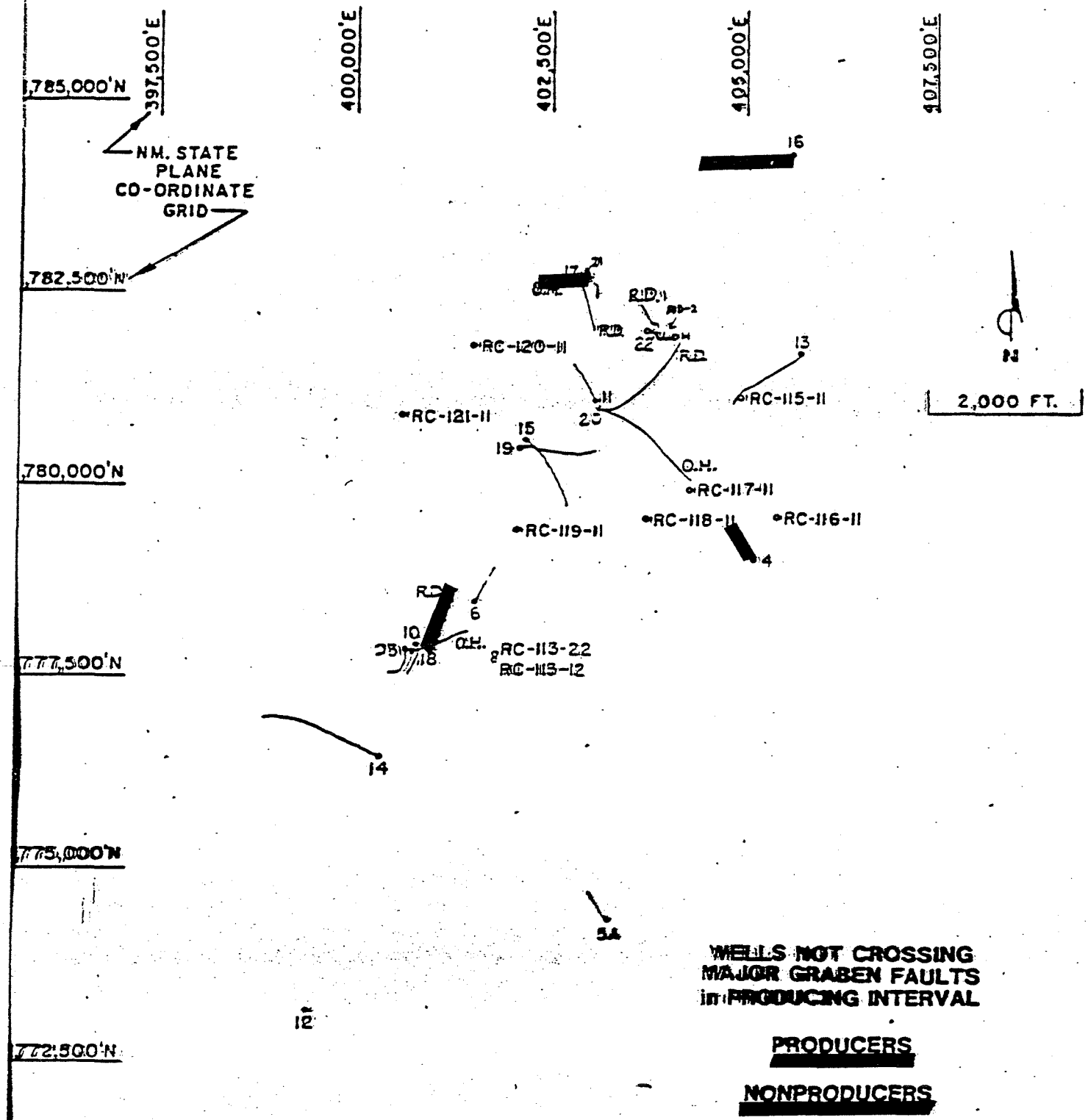
Union Geothermal Company of New Mexi

REDONDO CREEK DEVELOPMENT AREA

DESIGN	E.O
DRAWN	S.FELZAKER
CHECK	

SIZE	AFE NO.	DWG. NO.
A		RC-L-24K-101a

A	ISSUED	5-16-80		

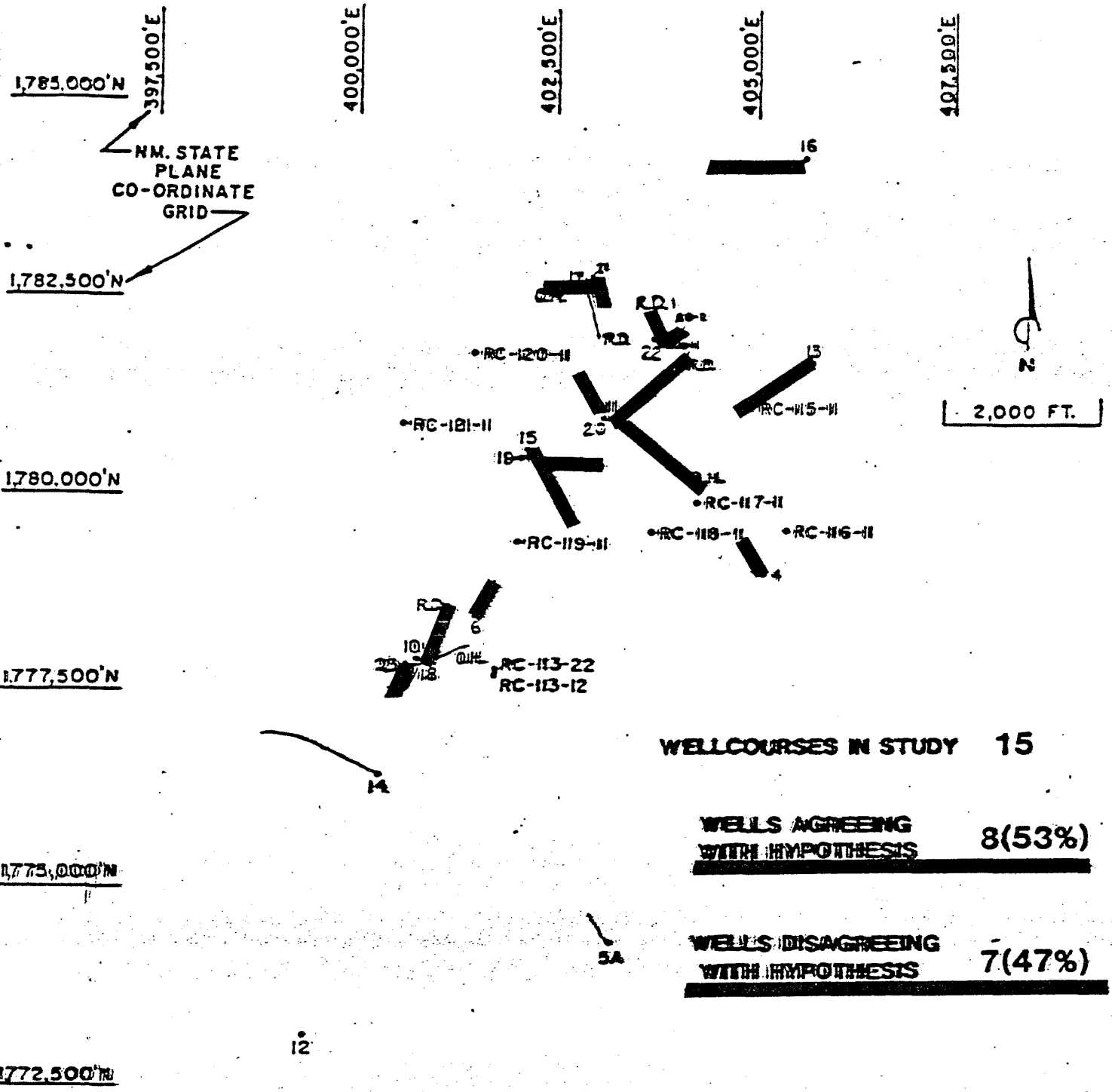


Union Geothermal Company of New Mexic

REDONDO CREEK DEVELOPMENT AREA

DESIGN	R.D.
DRAWN	S. FELZAK-R.
CHECK	

SIZE	AFE NO.	DWG. NO.	R
A		RC-L-24K-101a	

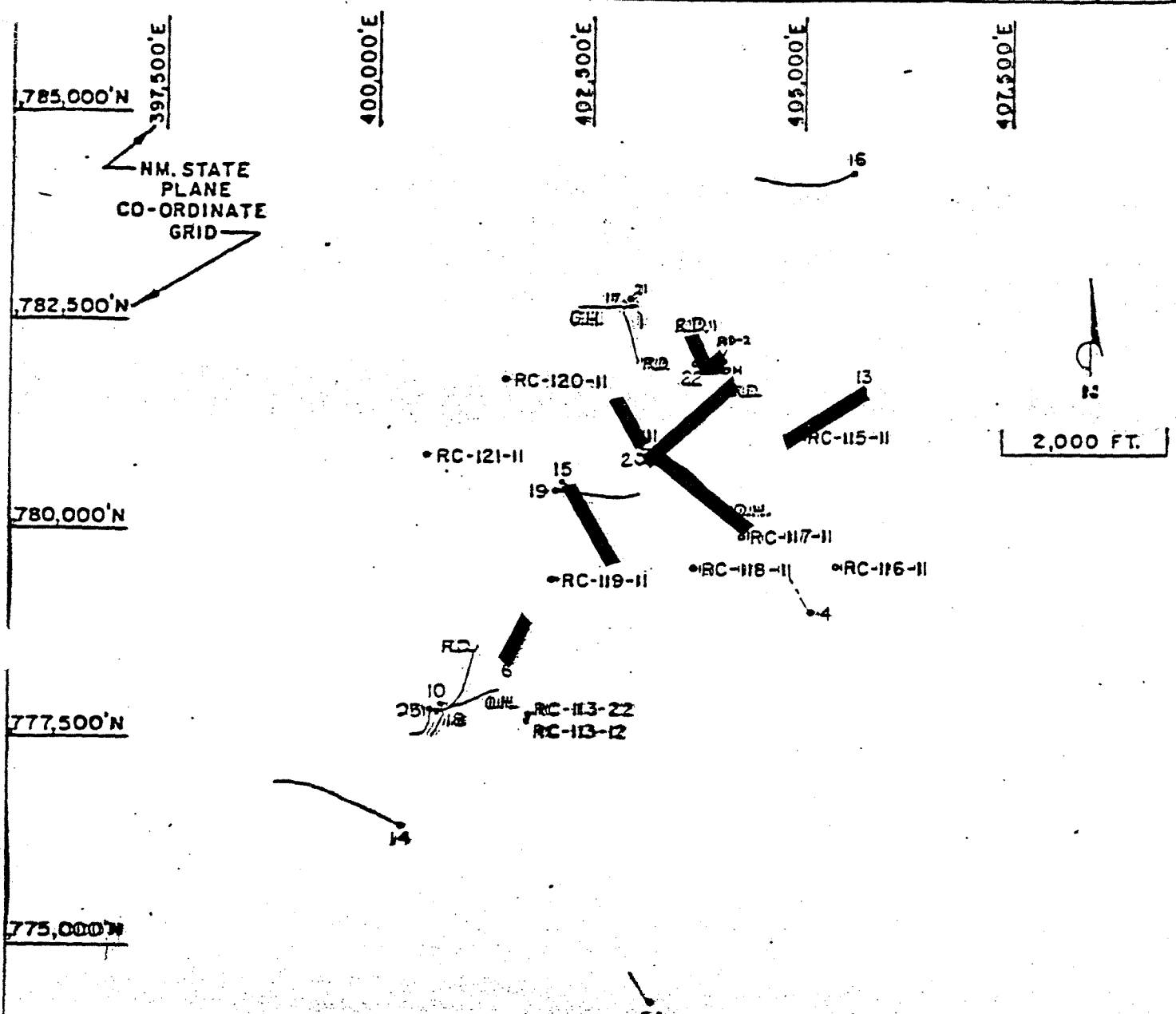


Union Geothermal Company of New Mexico

REDONDO CREEK DEVELOPMENT AREA

DESIGN	A.D.
DRAWN	S. PEUZAKER
SIZE	AFE NO.
DWG. NO.	

A	ISSUED		5-10-80	



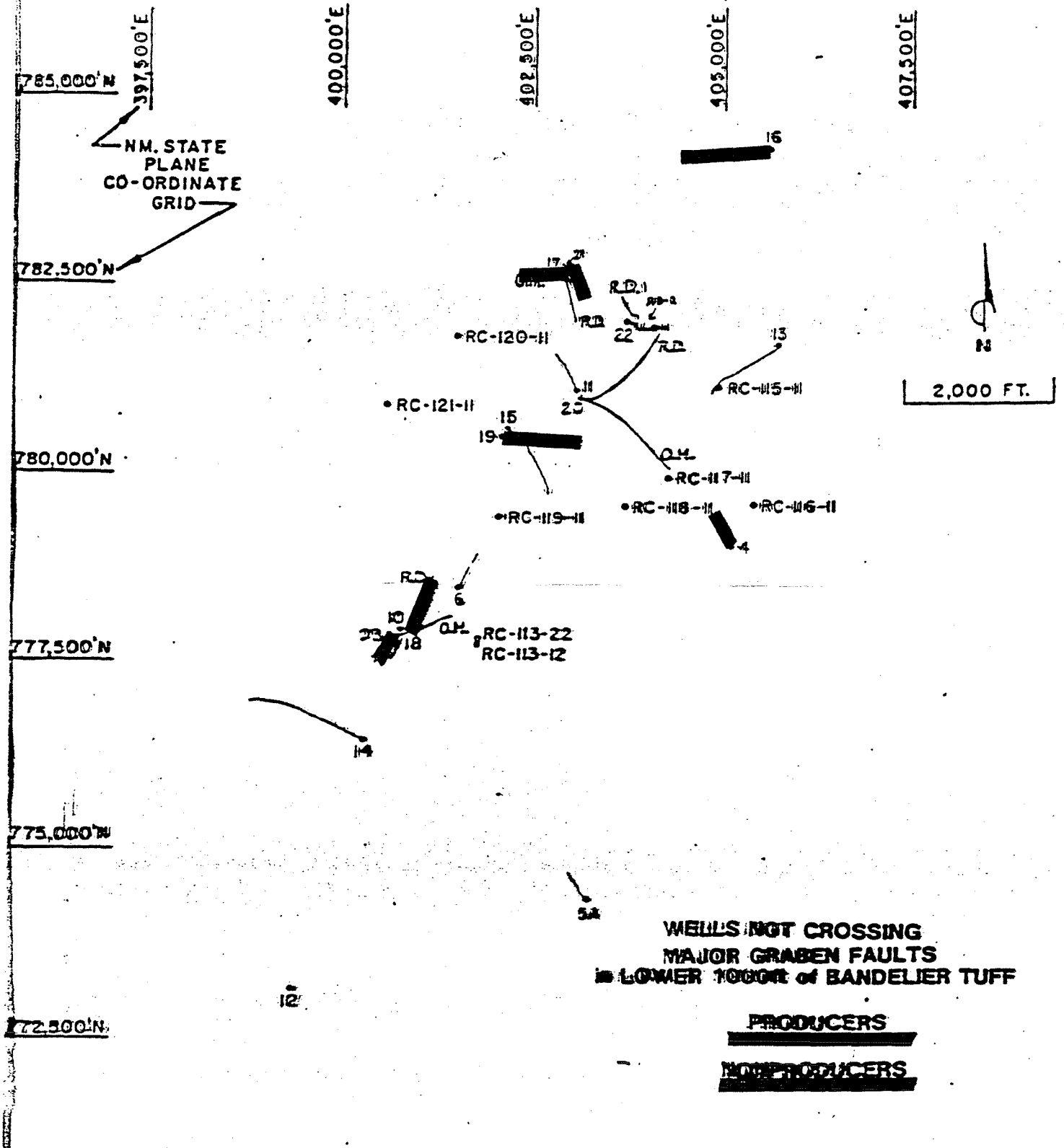
WELLS CROSSING
MAJOR GRABEN FAULTS
in LOWER 1000ft of BANDELIER TUFF

PRODUCERS

NONPRODUCERS

union 76	Union Geothermal Company of New Mexico		
	REDONDO CREEK DEVELOPMENT AREA		
DESIGN			
DRAWN	S. FELZAKER	SIZE A	AFE NO.
CHECK		DWG: NO.	RC-L-24K-101a

REV	DESCRIPTION	DATE	BY	AP
A	ISSUED	5-10-80	[illegible]	

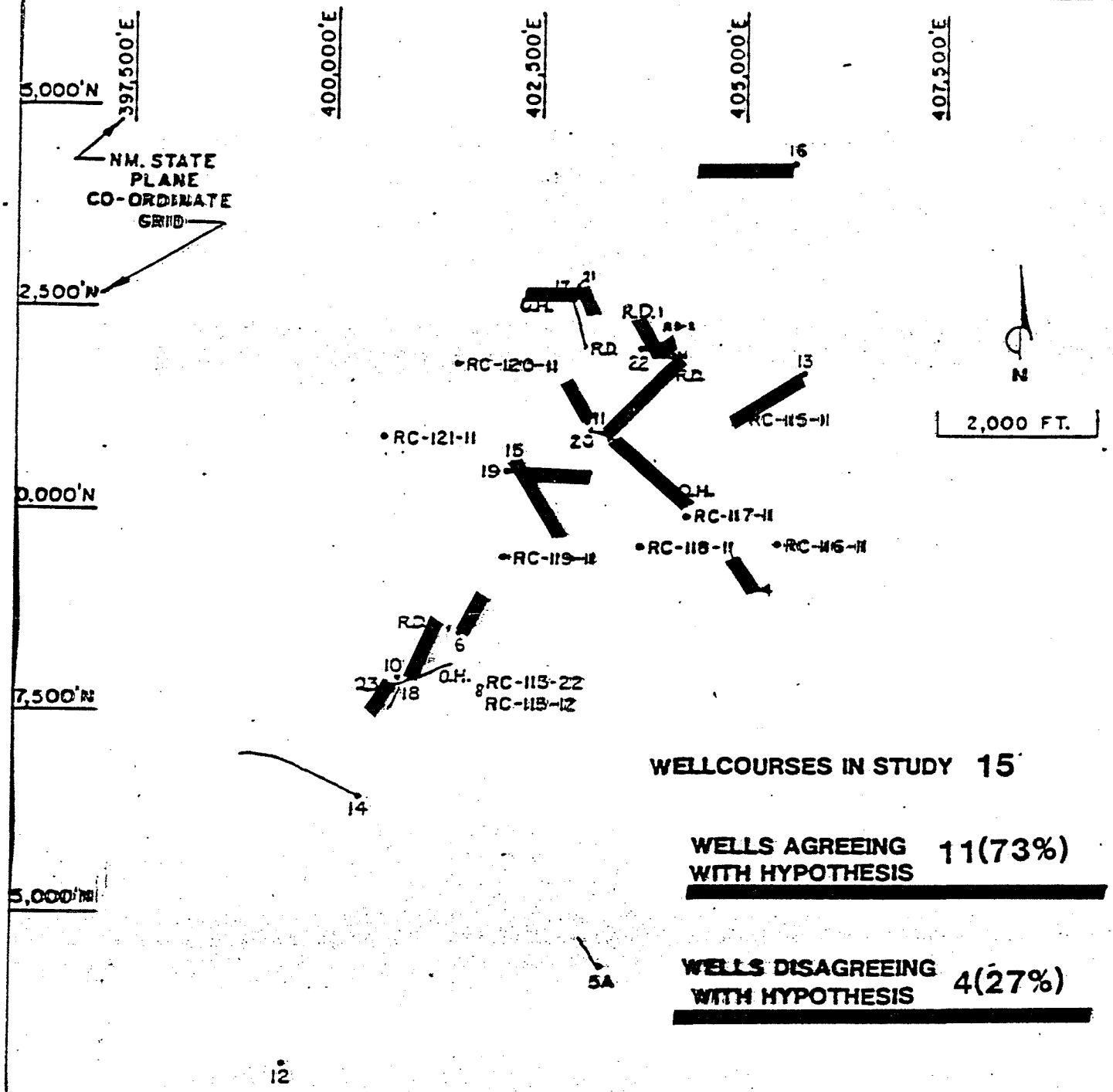


Union Geothermal Company of New Mexi

REDONDO CREEK DEVELOPMENT AREA

DESIGN . [illegible]

REV	DESCRIPTION	DATE	BY	APP
A	ISSUED	5-10-80	[illegible]	[illegible]



WELLCOURSES IN STUDY 15

WELLS AGREEING WITH HYPOTHESIS 11(73%)

WELLS DISAGREEING WITH HYPOTHESIS 4(27%)

UNION 76

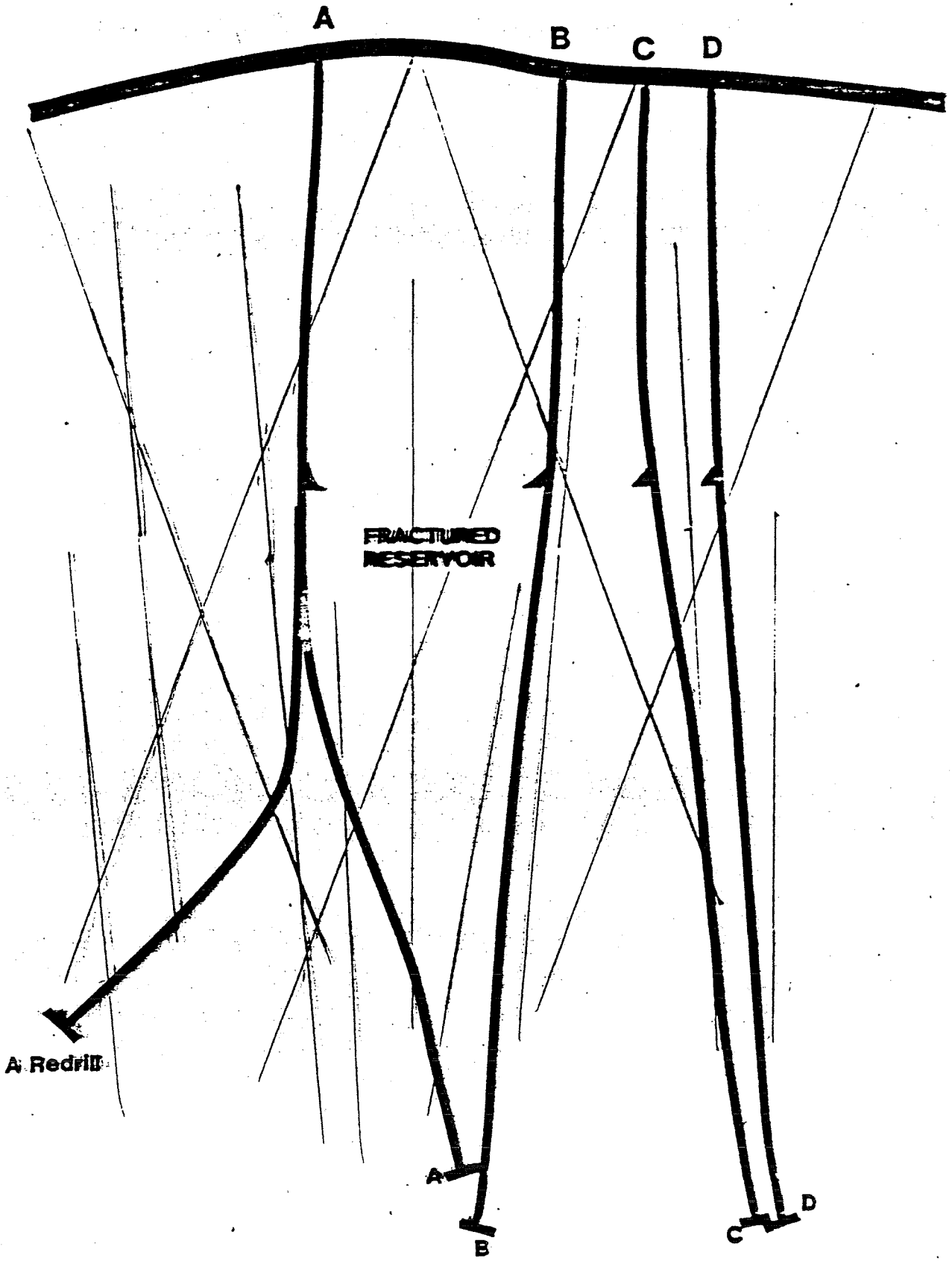
Union Geothermal Company of New Mexico

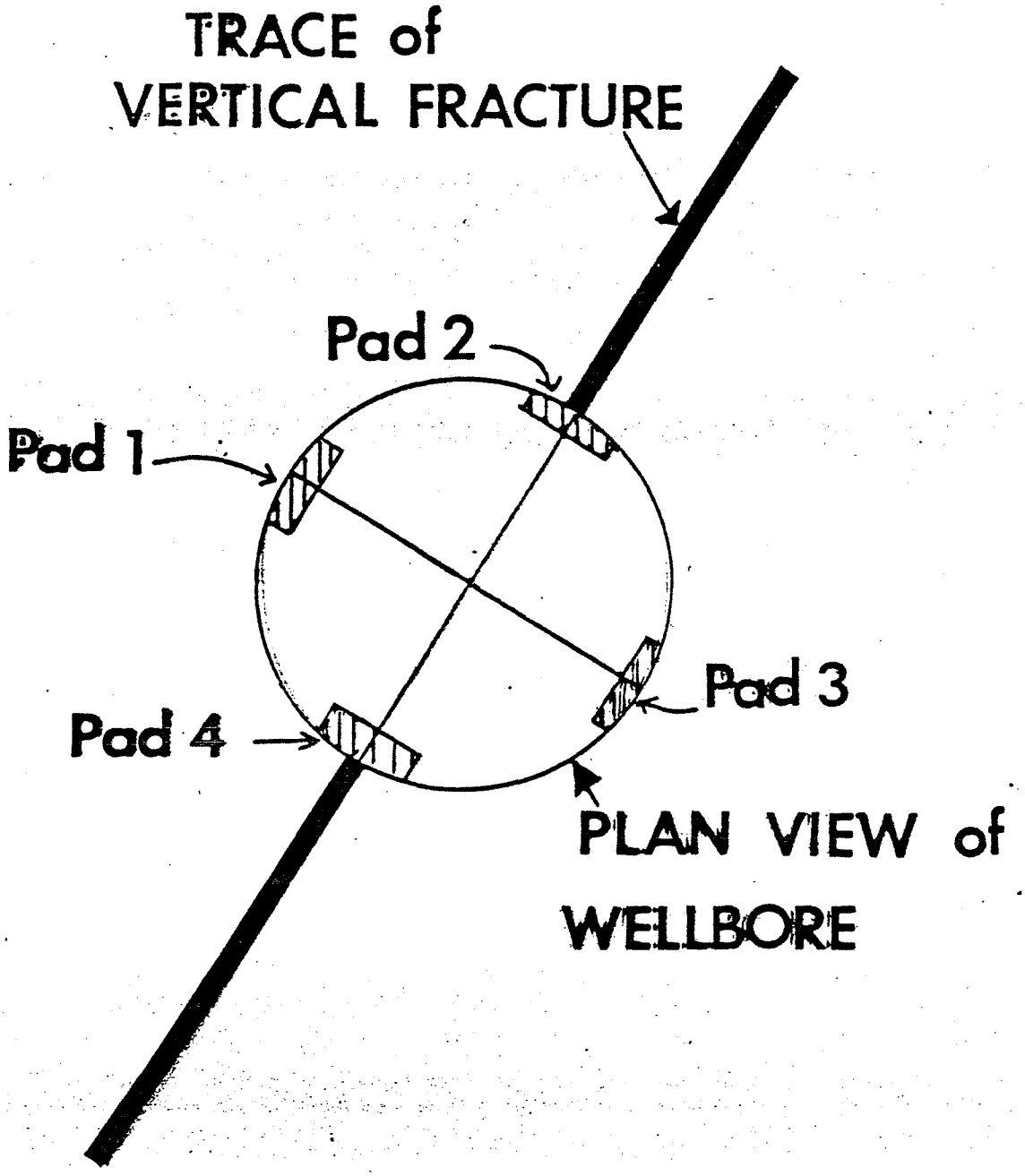
REDONDO CREEK DEVELOPMENT AREA

DESIGN	A.D.
DRAWN	E. FEUZALIDA

SIZE | AFE NO. | DWG. NO. | REV

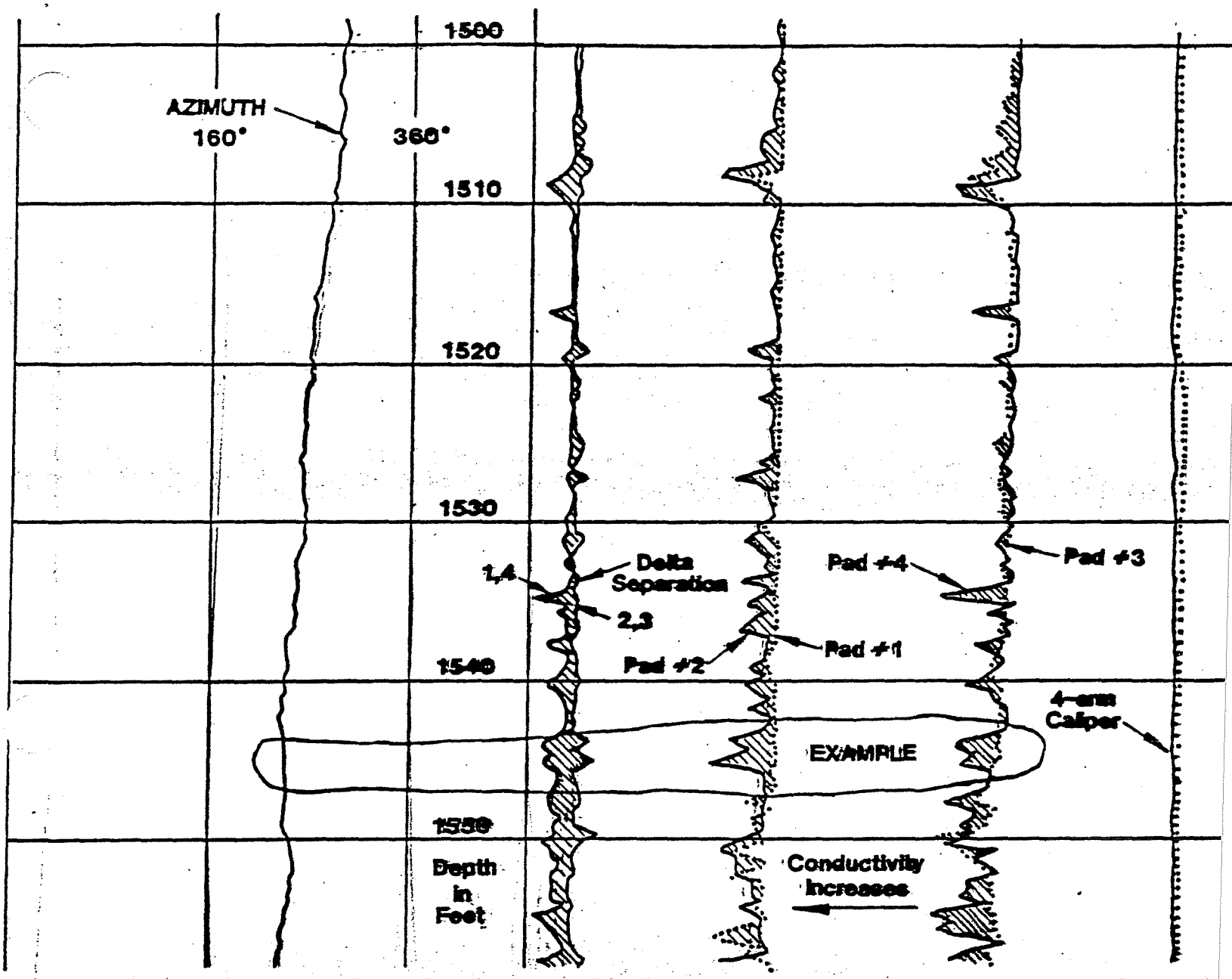
CROSS SECTIONAL VIEW





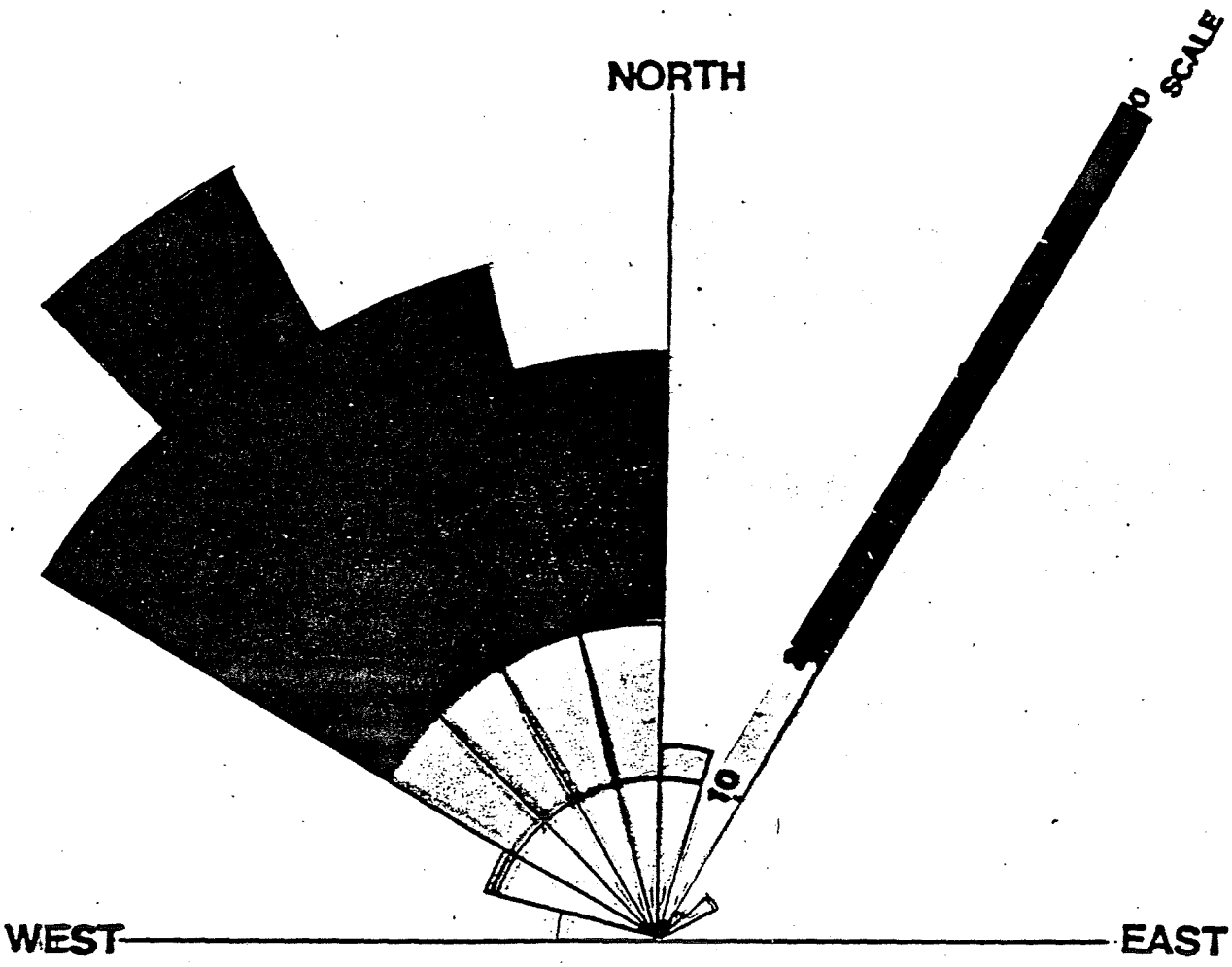
PADS 2 & 4 SEE FRACTURE

PADS 1&3 (at 90° to fracture) DO NOT



FRACTURE IDENTIFICATION LOG BACA 18

Depth 1,545 ft.
Observed azimuth 248° Magnetic Declination 12° E
True azimuth & position of Pad 1: 252 or S 72 W
Pads Observing Fracture : 2 and 4
Fracture Strike : 342 or N 18 W

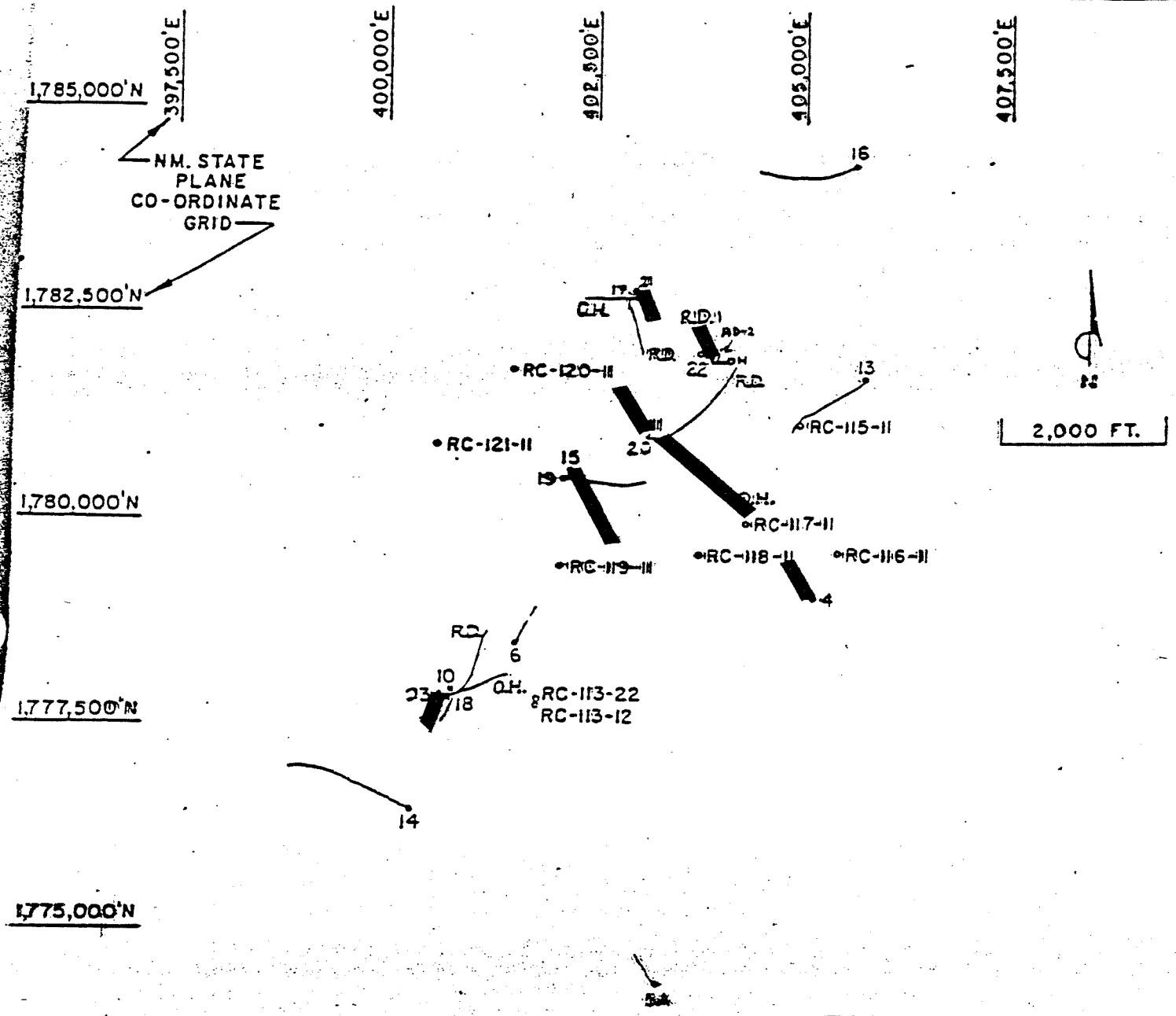


FRACTURE STRIKES

ALL WELLS

NUMBER of FRACTURES	220
MEAN DIRECTION	N 31 W
STD DEV	27 deg

A	ISSUED	5-15-80		



WELLS PARALLEL to FRACTURE TREND

PRODUCERS

NONPRODUCERS

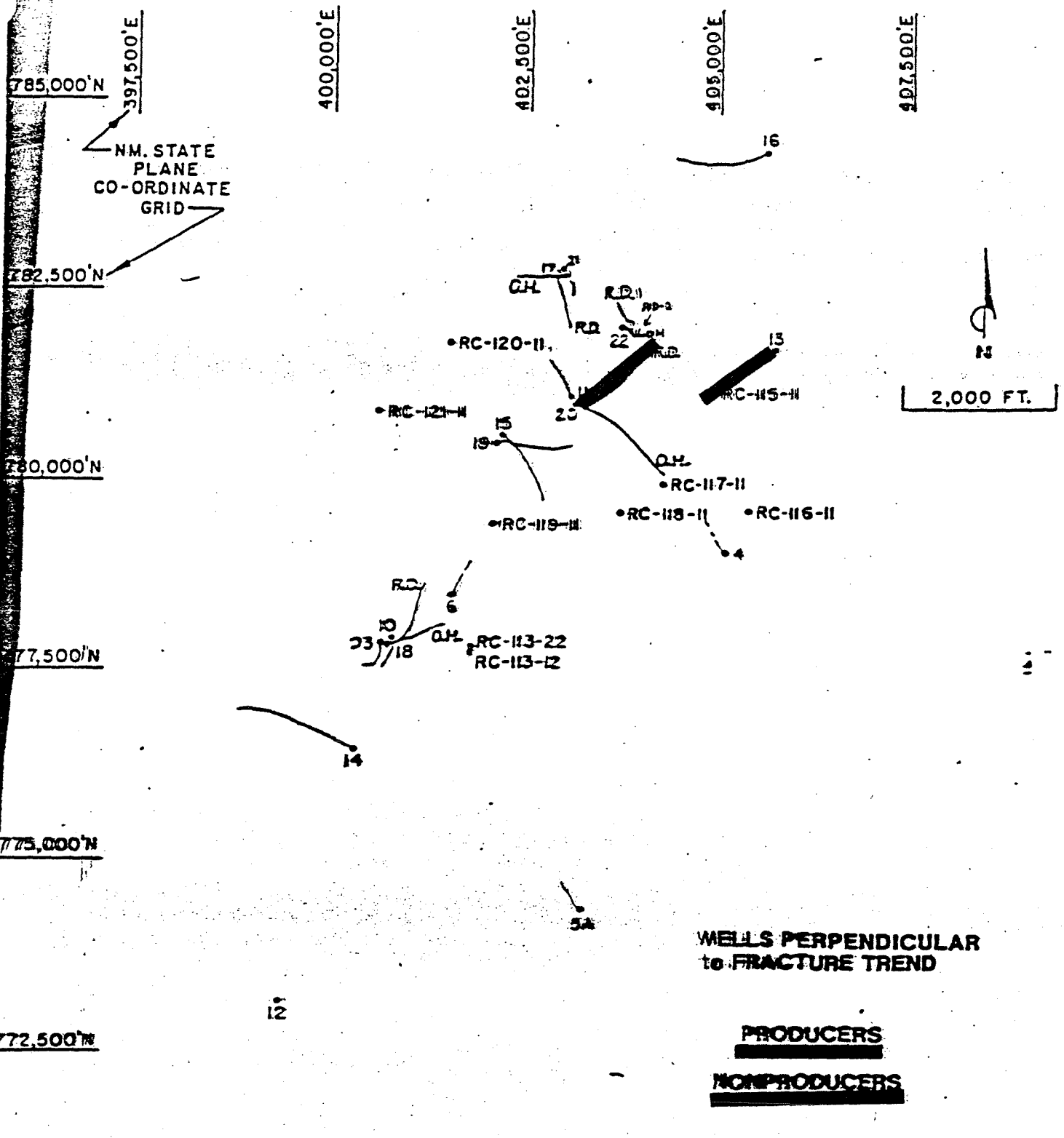
UNION 76

Union Geothermal Company of New Mexico

REDONDO CREEK DEVELOPMENT AREA

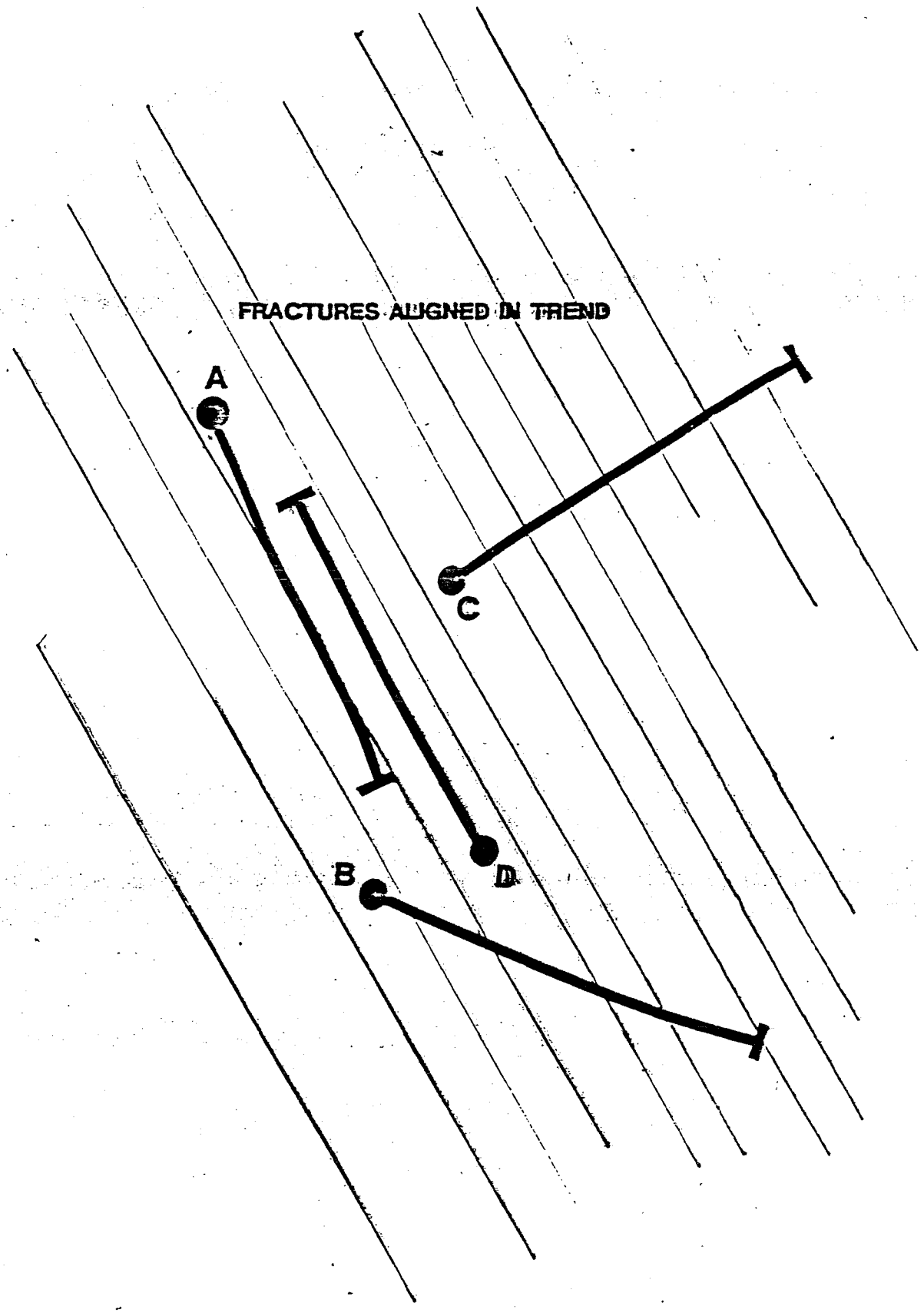
DESIGN

A	ISSUED	5-16-80	E.	

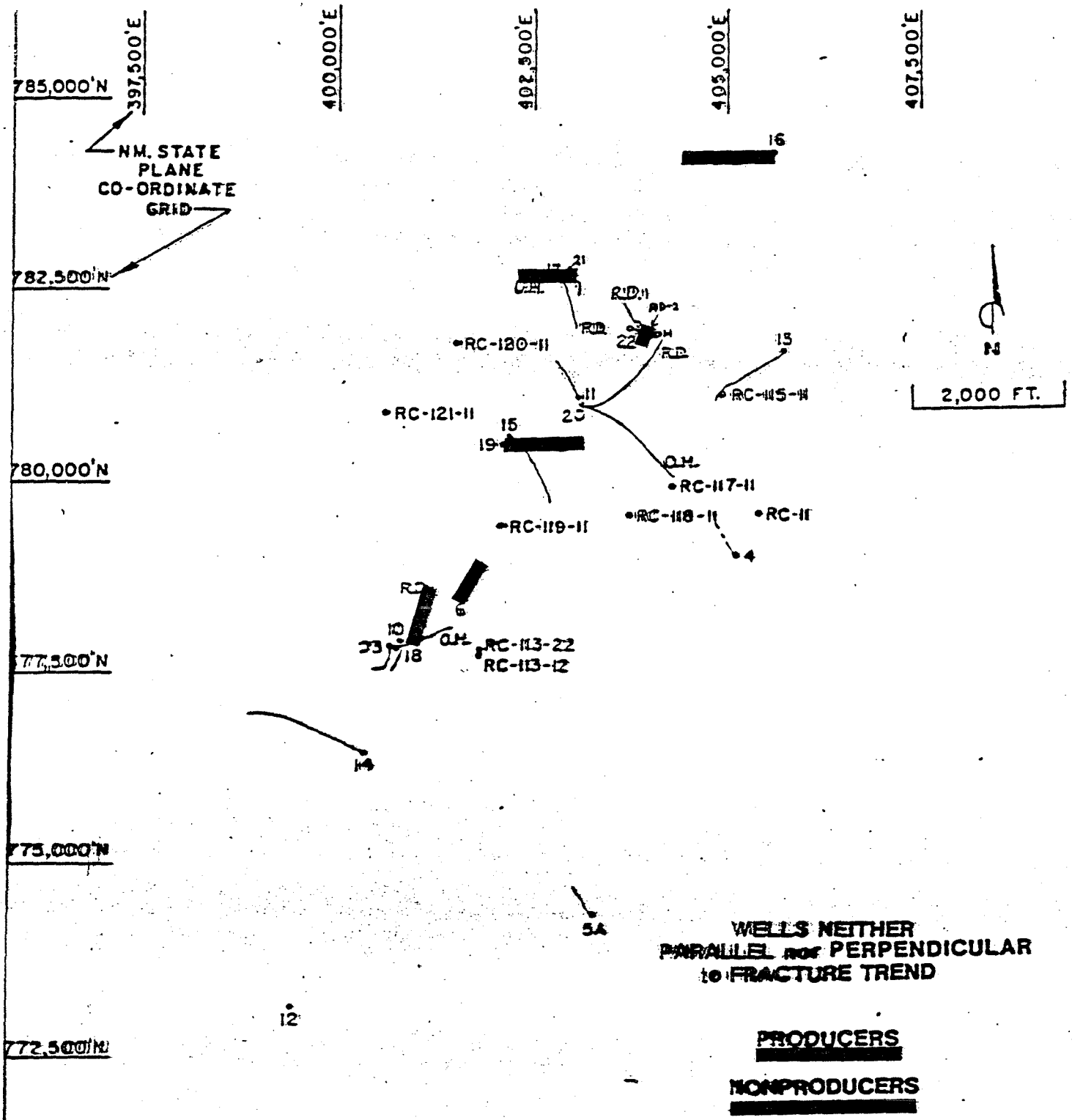


UNION 76	Union Geothermal Company of New Mexico			
	REDONDO CREEK DEVELOPMENT AREA			
DESIGN	E.D.			
DRAWN	S. FELZKAR.	SIZE A	AFE NO.	DWG. NO. RC-L-24K-101a
CHECK				

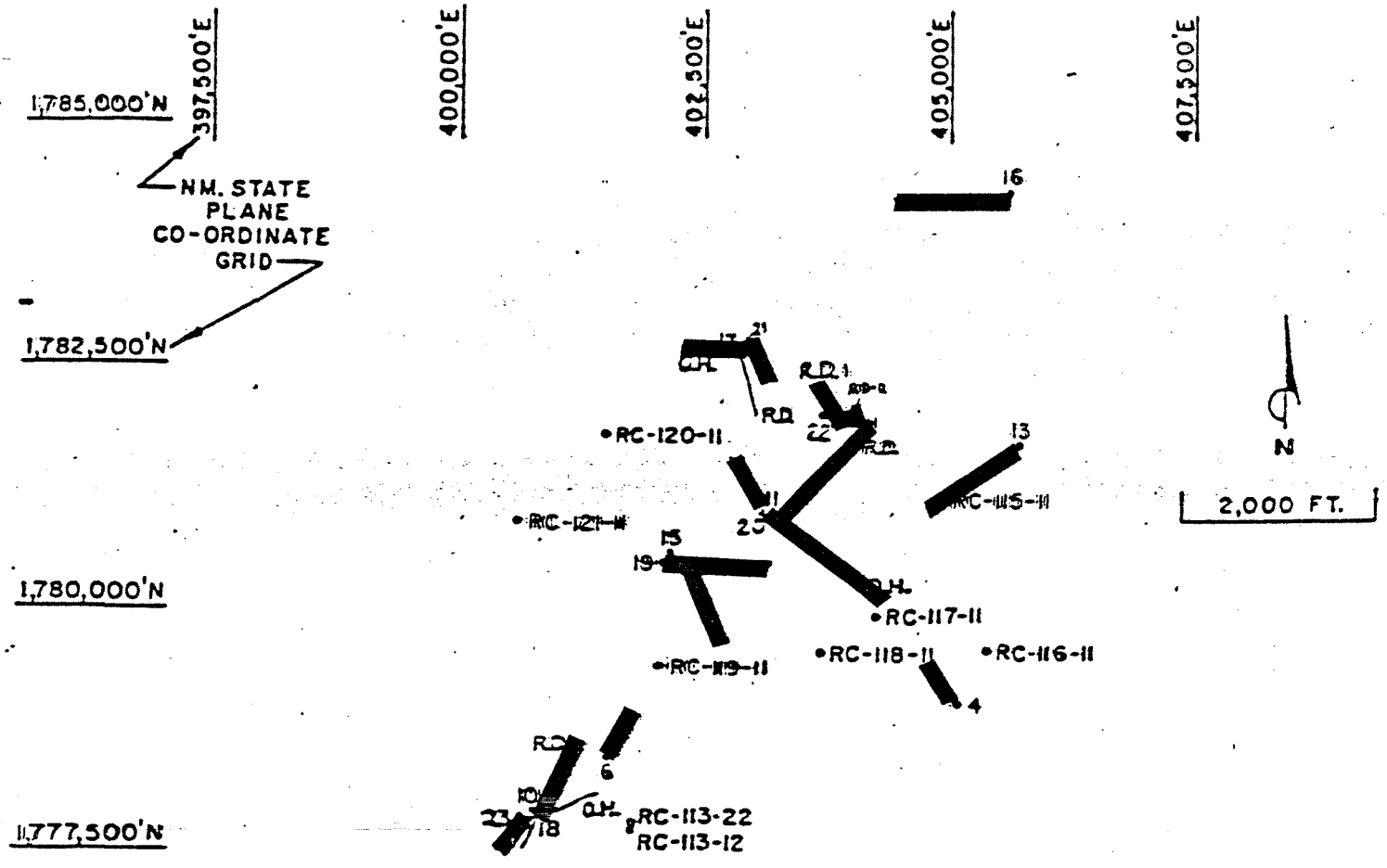
MAP VIEW



A	ISSUED		5-10-80	



UNION 76	Union Geothermal Company of New Mexico			
	REDONDO CREEK DEVELOPMENT AREA			
DESIGN				
DRAWN	S. PENZAK-R.	SIZE A	AFE NO.	DWG. NO. RC-L-24K-101a
CHECK				



WELLCOURSES IN STUDY 15

WELLS AGREEING WITH HYPOTHESIS 14(93%)

WELLS DISAGREEING WITH HYPOTHESIS 1(7%)

UNION 76	Union Geothermal Company of New Mexic		
	REDONDO CREEK DEVELOPMENT AREA		
DESIGN E.D			
DRAWN E.FELDKAMP	SIZE	AFE NO.	DWG. NO. RC-1-24K-101a

	Initials	Date
Prepared By		
Approved By		

NATIONAL

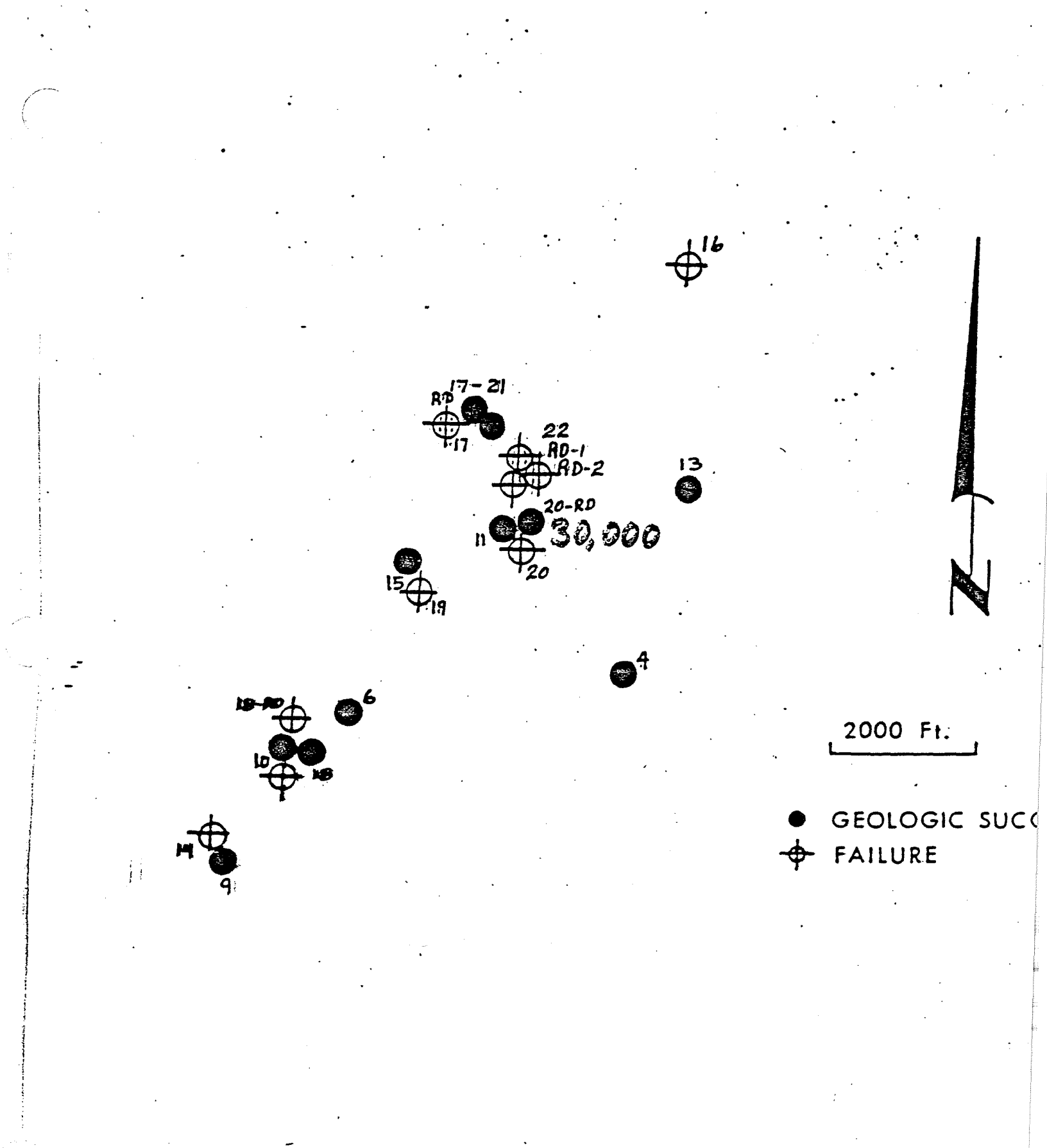
Well	Date Start	Date Finish	Total Depth (ft)	Cost ($000)	Union Presentation to Review Team & Union Dec'76 Proposal	Steam	d/hr.
4			6378			45,000	
5A			6973				
6 RD			4810				
7	7-26-72	8-15-72	5532				
8	8-16-72	9-13-72	4384				
9	9-15-72	10-13-72	5303	333			
10	7-5-73	9-18-73	6001	635			
11	9-26-73	11-13-73	6931	425		116,000	
12	6-19-74	8-19-74	9212	542			
13	8-23-74	10-27-74	8228	718		54,000	
14	11-15-74	2-24-75	6824	908			
15	4-20-75	6-12-75	5505	610		105,000	
16	6-19-75	8-21-75	7002	557			
17	8-13-78	10-15-78	5791	914	1812		
17 RD	10-18-78	12-4-78	6254	733			
18	12-16-78	2-4-79	4597	996	1586		
18 RD	?		5250	447			
19	9-24-80	11-3-80	5610	999	1039		
20	6-27-80	8-2-80	6863	905	1698		
20 RD	8-3-80	8-20-80	6374	791		30,000	
21			3000	875	876		
22			6017	1263			
22 RD1			6485	400			
22 RD2			6006	531			
23			5746	1261			
23 RD			3515	602			

PRE - DOE WELLS

WELL	T.D.	COST ($000)	STATUS	STEAM (AT LINE PRESSURE)
BACA 4	6378'		COMMERCIAL	45,000 LBS/HR
BACA 5A	6973'		WATER INJECTOR	
BACA 6	4810' (3455' BRIDGE)		INITIALLY COMMERCIAL NOW BRIDGED @ 9-5/8" COLLAPSED	(33,000)
BACA 9	5303'	333	P&A	
BACA 10	6001'	635	MECHANICAL PROBLEMS	
BACA 11	6931'	425	COMMERCIAL	116,000 LBS/HR
BACA 12	9212'	542	WATER INJECTOR	
BACA 13	8228'	718	COMMERCIAL	54,000 LBS/HR
BACA 14	6824' (5780' CMT.)	908	WATER INJECTOR	
BACA 15	5505'	610	COMMERCIAL	105,000 LBS/HR
BACA 16	7002'	557	NON-PRODUCTIVE	----------
			TOTAL:	320,000 LBS/HR

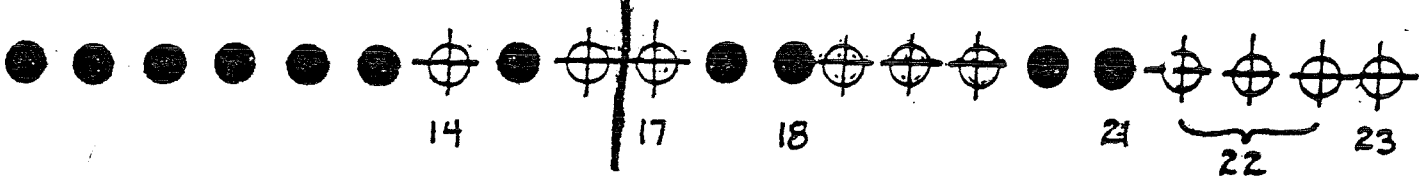
POST - DRILLING WELLS

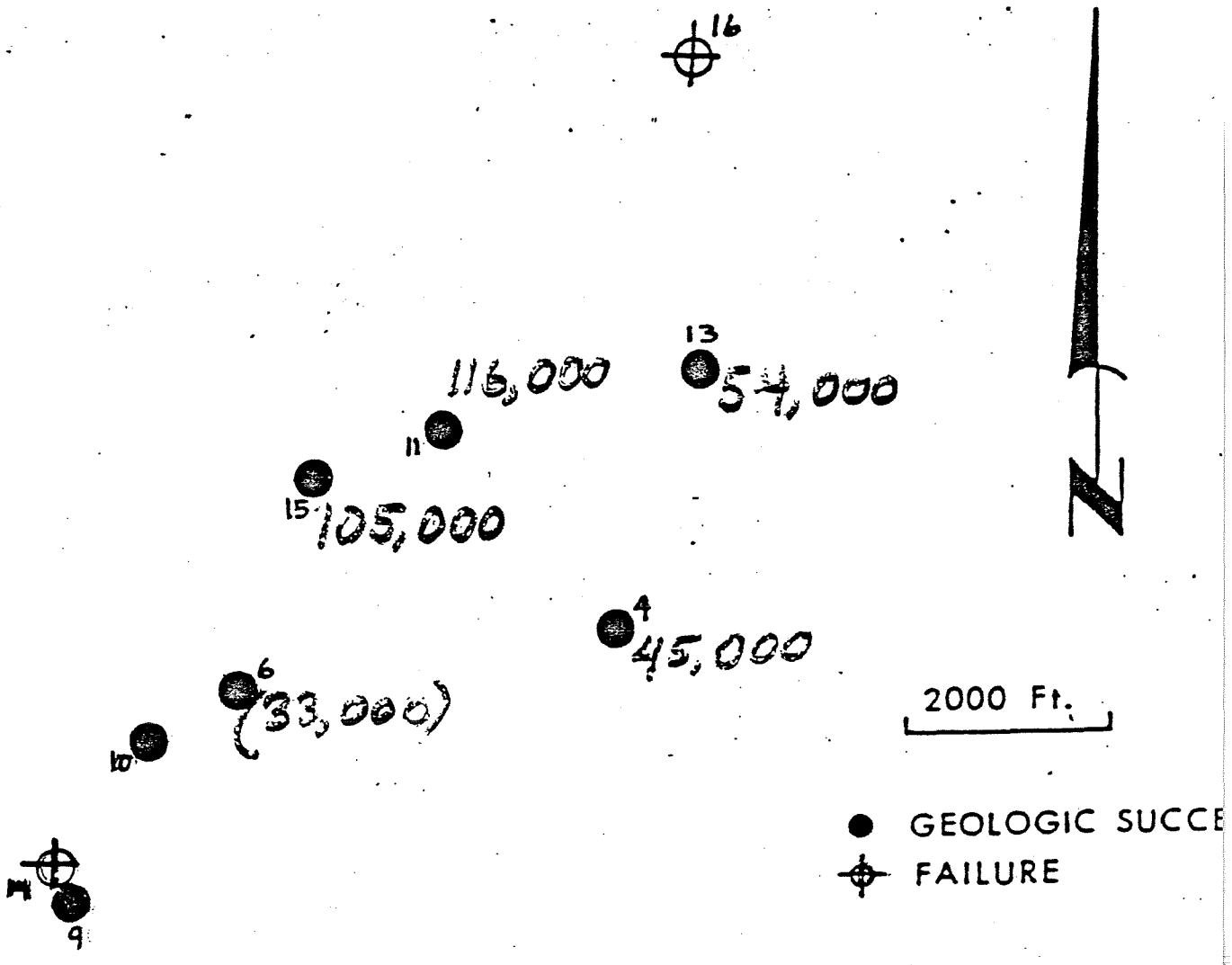
WELL	T.D.	COST ($000)	STATUS	STEAM
BACA 17	OH 5791'	914	NON-PRODUCTIVE	
	RD 6254'	733	INITIALLY PRODUCTIVE, MECHANICAL PROBLEMS	
		$1,647		
BACA 18	OH 4597'	996	POT. PRODUCTIVE, LOST HOLE	
	RD 5250'	477	NON-PRODUCTIVE	
		$1,473		
BACA 19	5610'	$ 999	SUB-COMMERCIAL	(32,000 @ 10 PSI)
BACA 20	OH 6863'	905	NON-PRODUCTIVE	
		791	COMMERCIAL	30,000 LBS/HR
		$1,696		
BACA 21	3090'	$ 875	SUB-COMMERCIAL	(34,000 @ 75 PSI)
BACA 22	OH 6017'	1,263	POT. PRODUCTIVE, LOST HOLE	
	RD1 6485'	400	SUB-COMMERCIAL	(41,000 @ 45 PSI)
	RD2 6006'	531	SUB-COMMERCIAL	(20,000 @ 8 PSI)
		$2,194		
BACA 23	TD 5746'	1,261	NON-PRODUCTIVE	
	RECPL. 3515'	602	POSSIBLY COMMERCIAL	(48,000 @ 51 PSI)
		$1,863		
			TOTAL:	30,000 LBS/HR



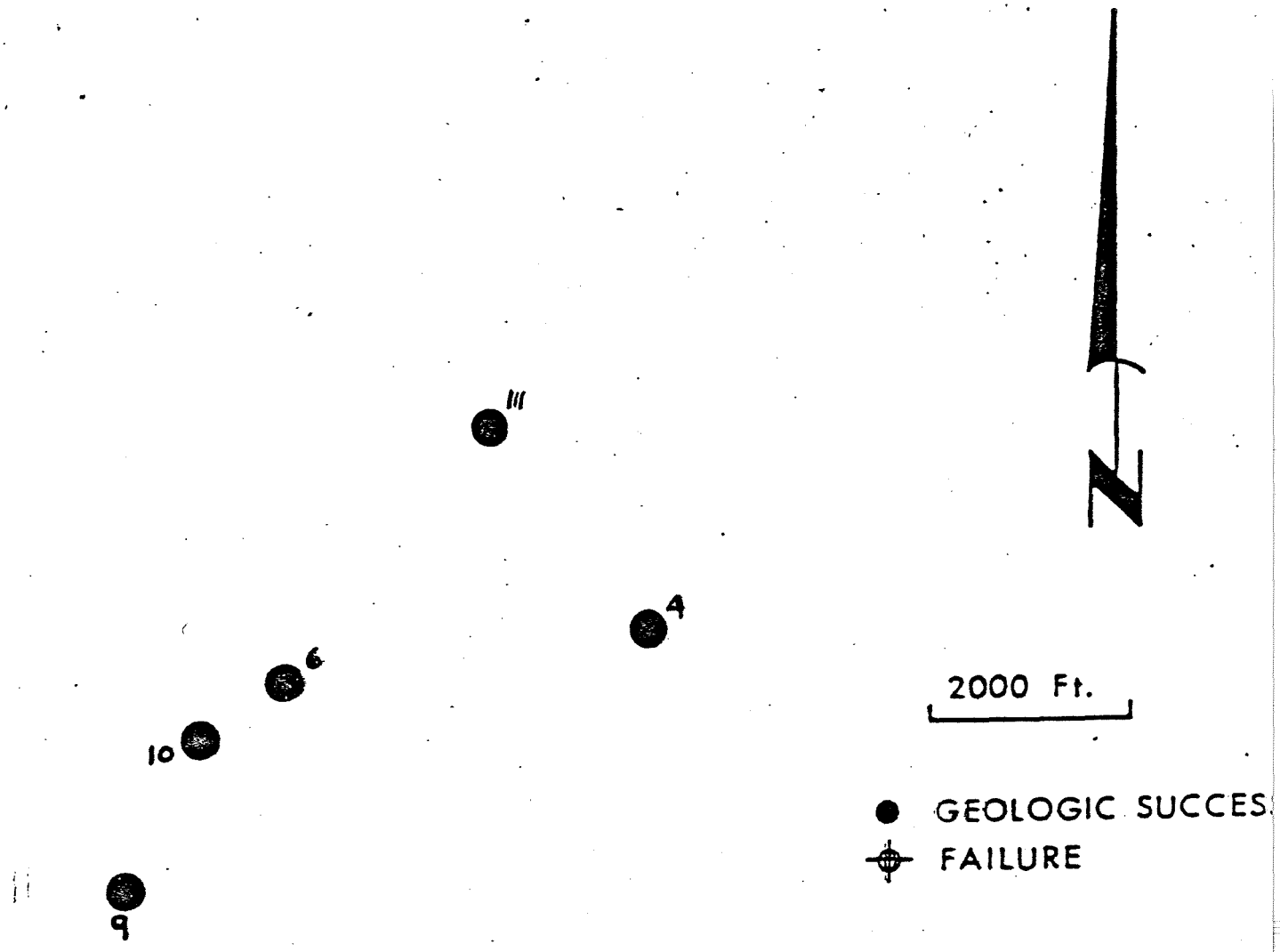
PRE DOE | POST DOE

SEQUENCE




16
13
116,000
54,000
11
15
105,000
4
45,000
6
(33,000)
10
14
9
N
2000 Ft.
GEOLOGIC SUCCE
FAILURE

SEQUENCE



SEQUENCE

4

6

2000 Ft.

● GEOLOGIC SUCCES

⊕ FAILURIE

SEQUENCE

● ●

4

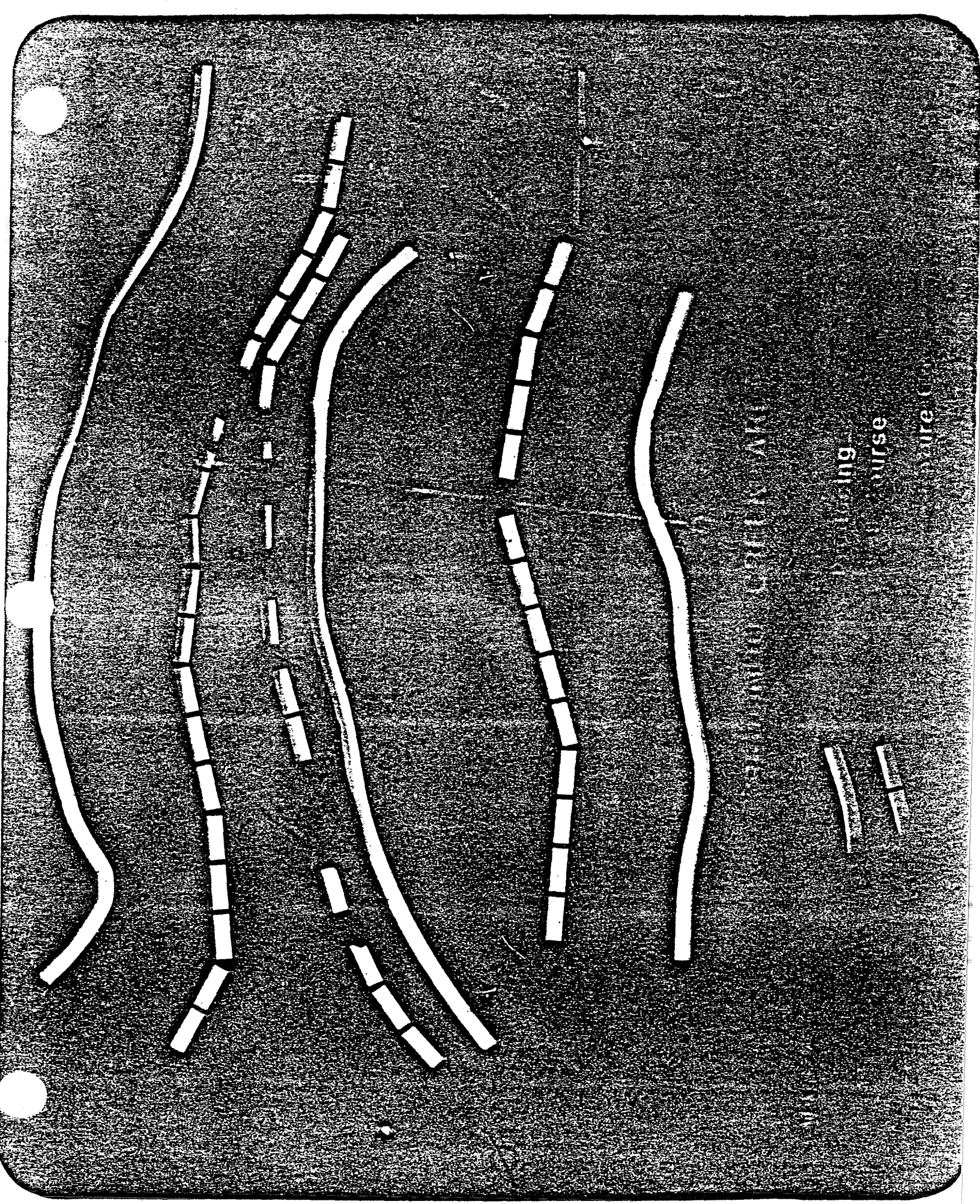
2000 Ft.

● GEOLOGIC SUCCESS

⊕ FAILURE

SEQUENCE

●



00-0015-1006-4

Visual Products Division/3M
St. Paul, MN 55101 Made in USA

union 76

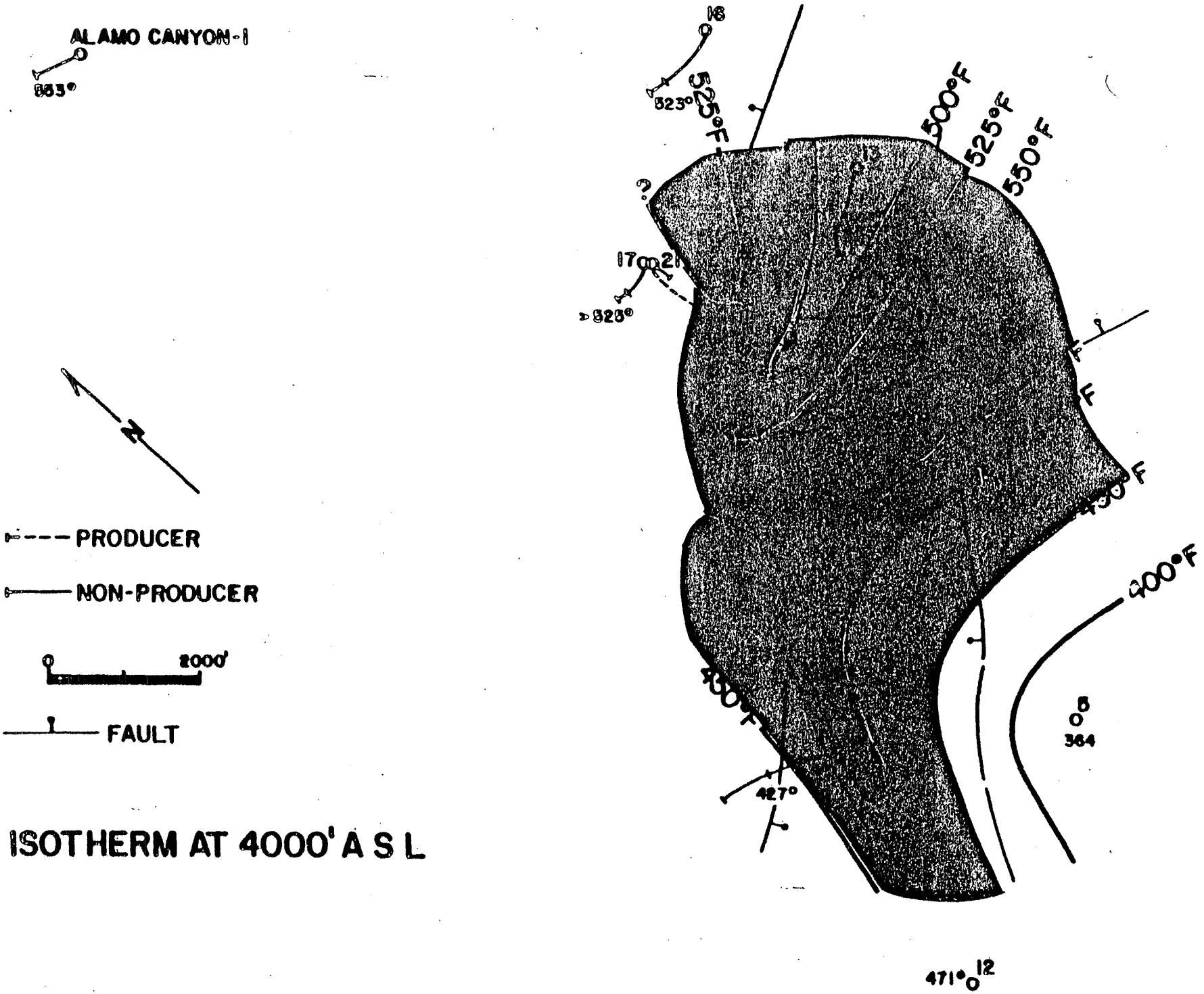
GEOTHERMAL DIVISION

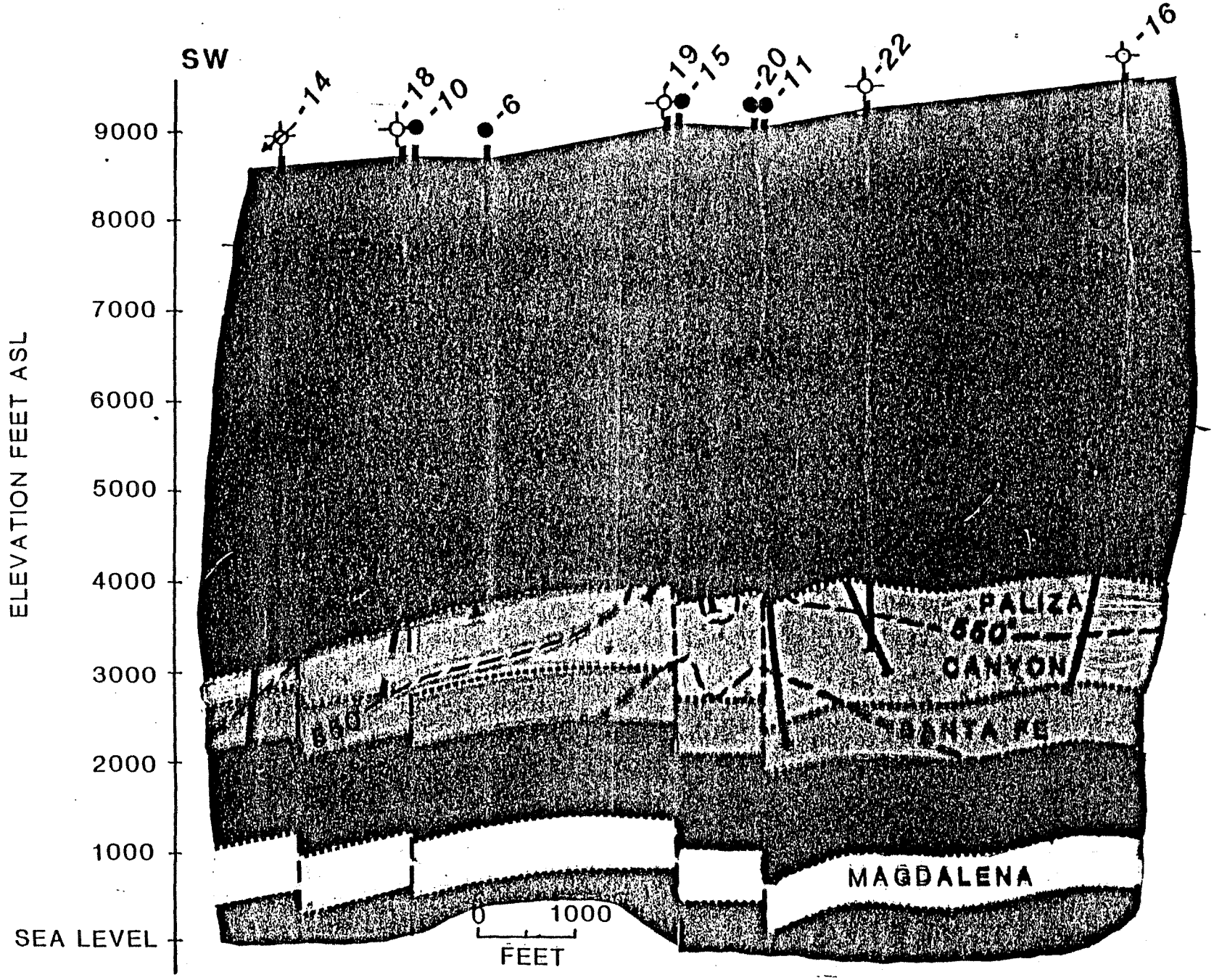
BACA PROSPECT

BRINE ANALYSIS

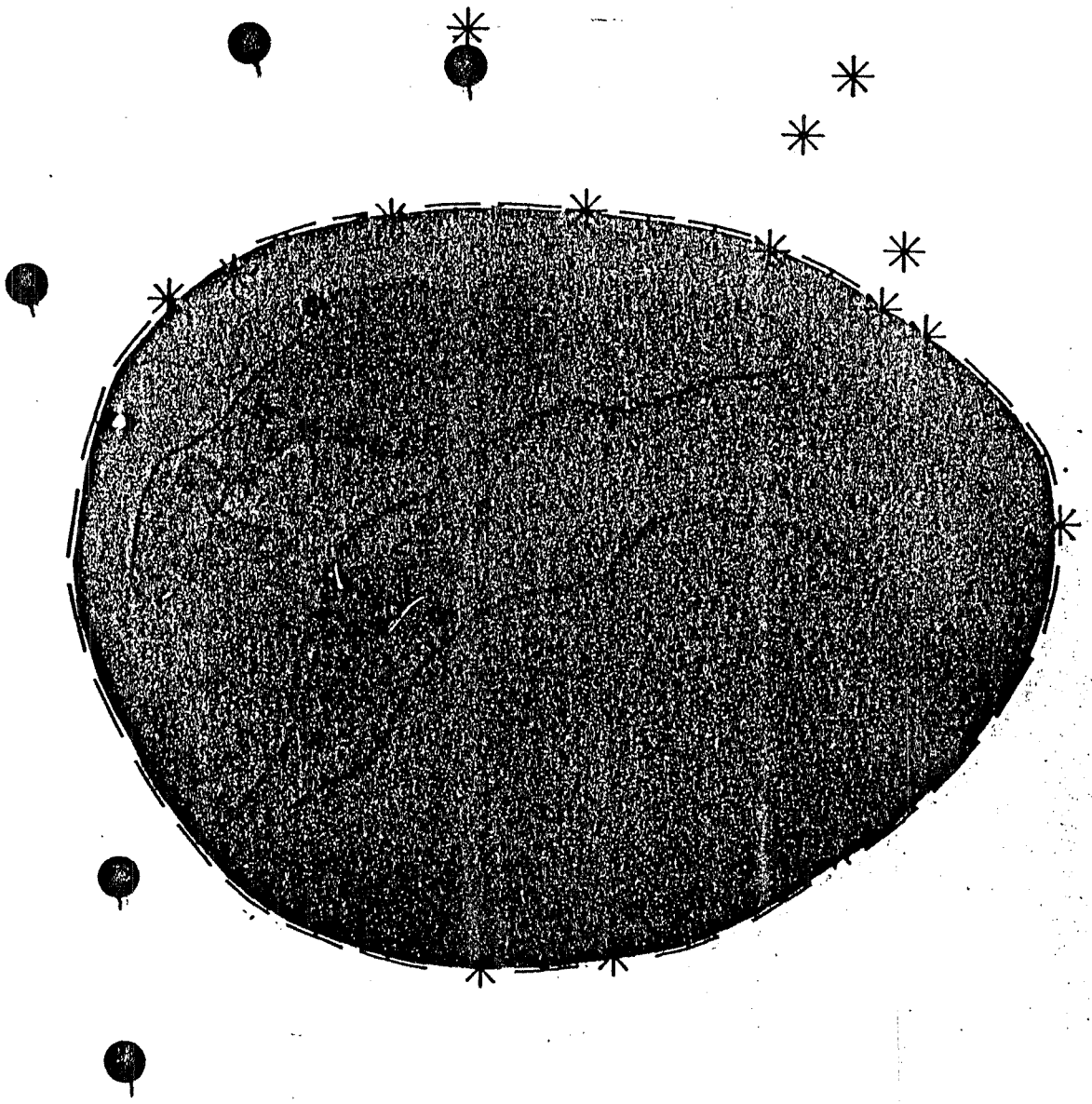
(UNCORRECTED FOR FLASH)

pH	7.2	
T.D.S.	6093	Mg/l
SiO_2	599	
CO_3	19	
HCO_3	127	
SO_4	64	
Cl	3061	
Na	1749	
K	370	
Ca	15	
Mg	0.3	
Ba	0.05	
B	23	
F	6	
As	3	


ALAMO CANYON-1
863°
N
PRODUCER
NON-PRODUCER
2000'
FAULT
ISOTHERM AT 4000' A S L
16
523°
525°F
500°F
525°F
550°F
13
?
17
>828°
400°F
400°F
427°
364
471°
12



GEOLOGIC & ISOTHERMAL CROSS SECTION of REDONDO CREEK BACA, NEW MEXICO



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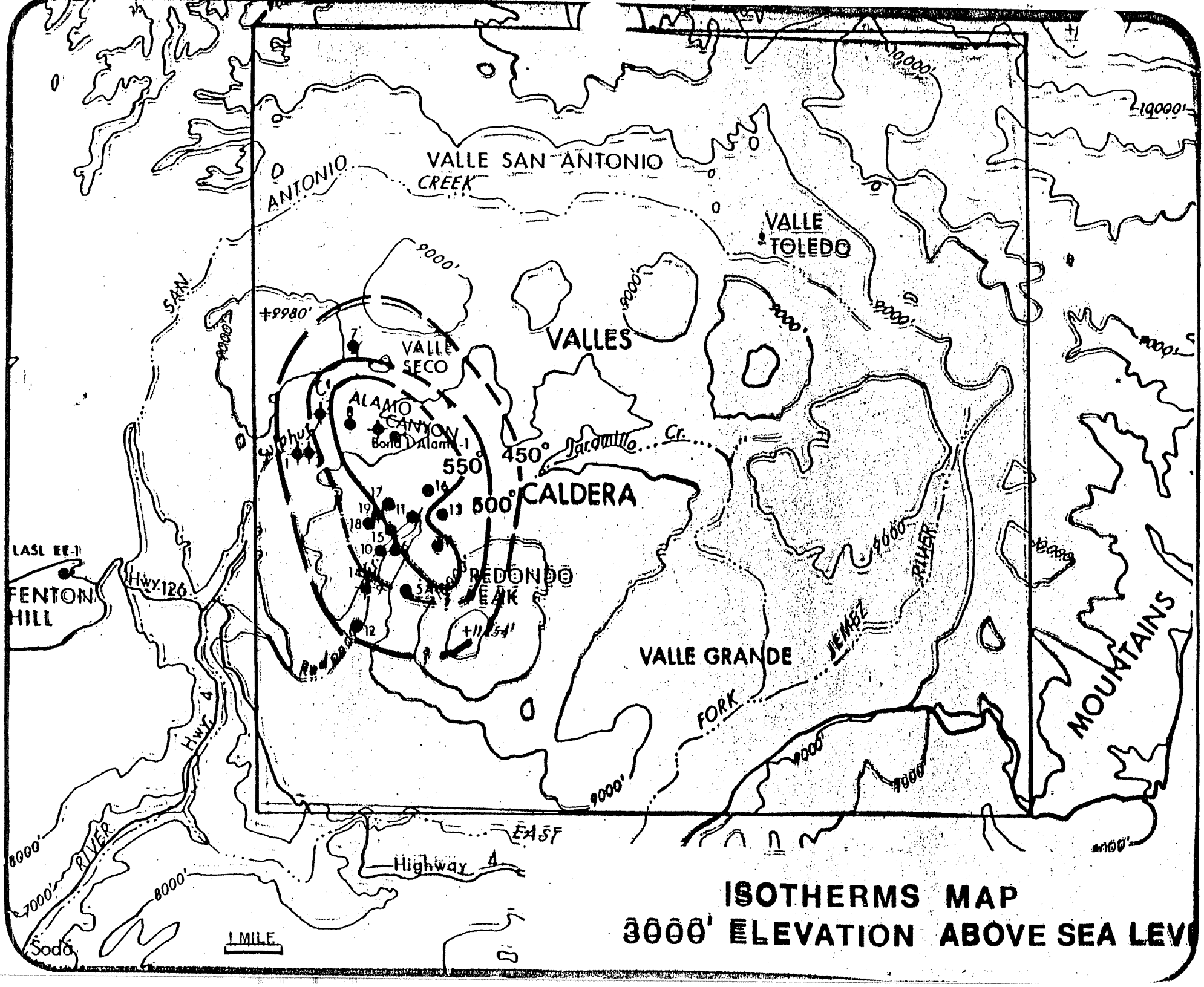
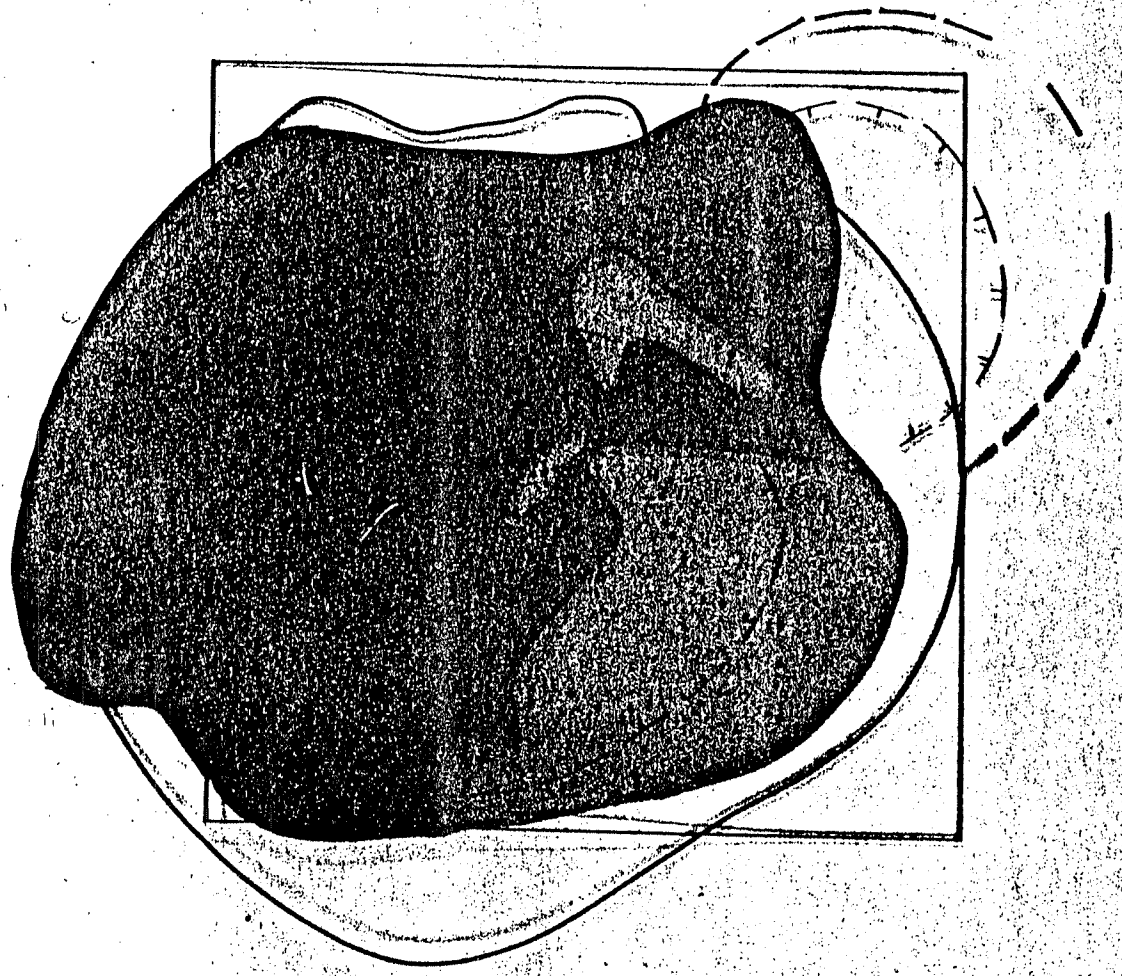
GEOTHERMAL DIVISION
BACA PROSPECT

WELL LOCATIONS

- OPEN WELL
- ABANDONED WELL
- ACTIVE ALTERATION
- HOT SPRING
- RHYOLITE DOME
- LONGITUDINAL GRABEN

MILES
KILOMETERS


VALLE SAN ANTONIO
ANTONIO CREEK
VALLE TOLEDO
VALLES
VALLE SECO
ALAMO CANYON
Sulphur
Bore 1 Alamo-1
550°
450°
500°
CALDERA
Jaramillo Cr.
REDONDO PEAK
+11,254'
+9980'
9000'
10000'
LASL EE-1
FENTON HILL
Hwy 126
Hwy 4
VALLE GRANDE
JEMEZ
FORK
RIVER
MOUNTAINS
EAST
Highway 4
8000'
7000'
1 MILE
Soda
ISOTHERMS MAP
3000' ELEVATION ABOVE SEA LEV



Union

GEOTHERMAL DIVISION

BACA PROSPECT

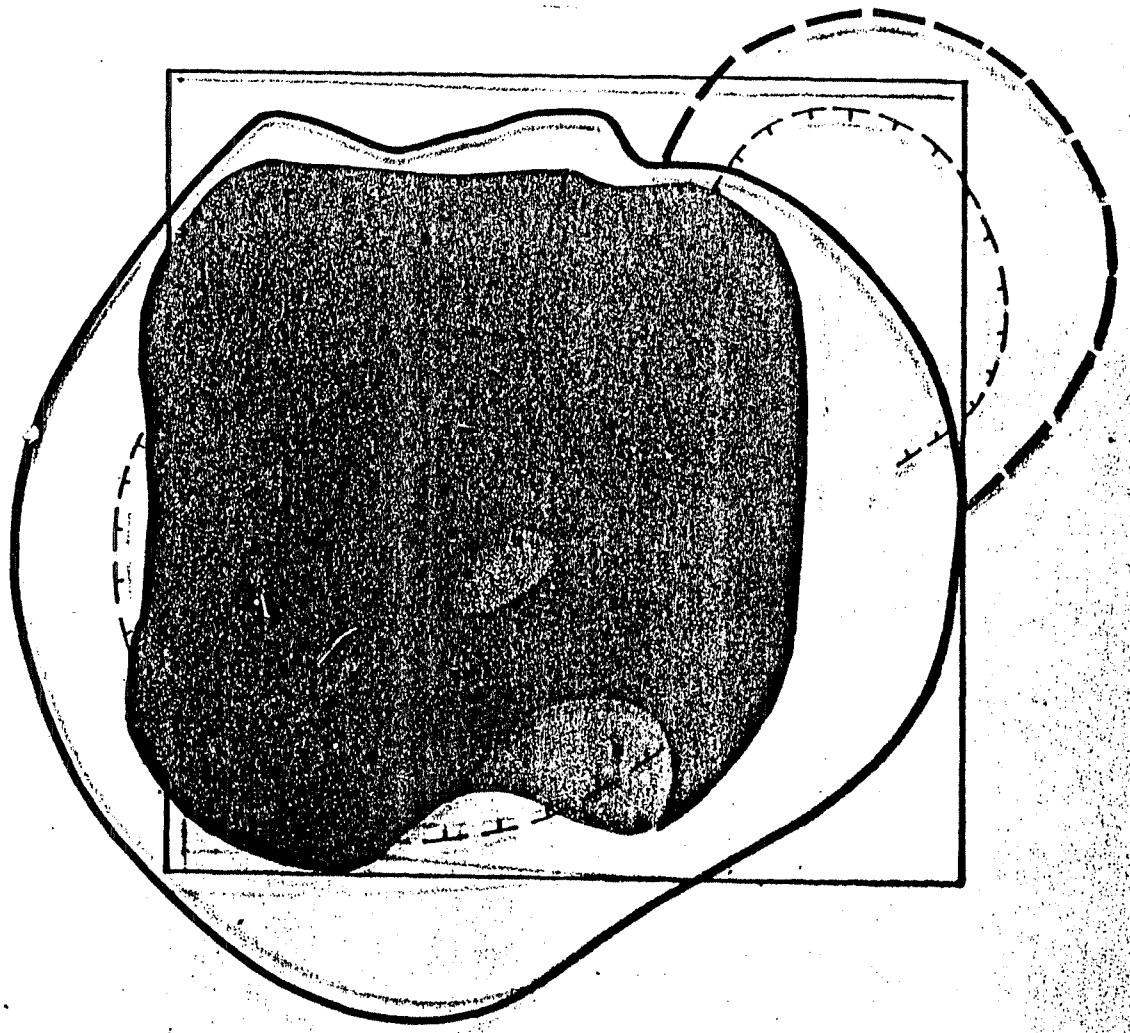
CONDUCTANCE

- <25 MHOS
- 25-50 MHOS
- 50-100 MHOS
- 100-200 MHOS
- >200 MHOS

MILES
KILOMETERS

Union 76

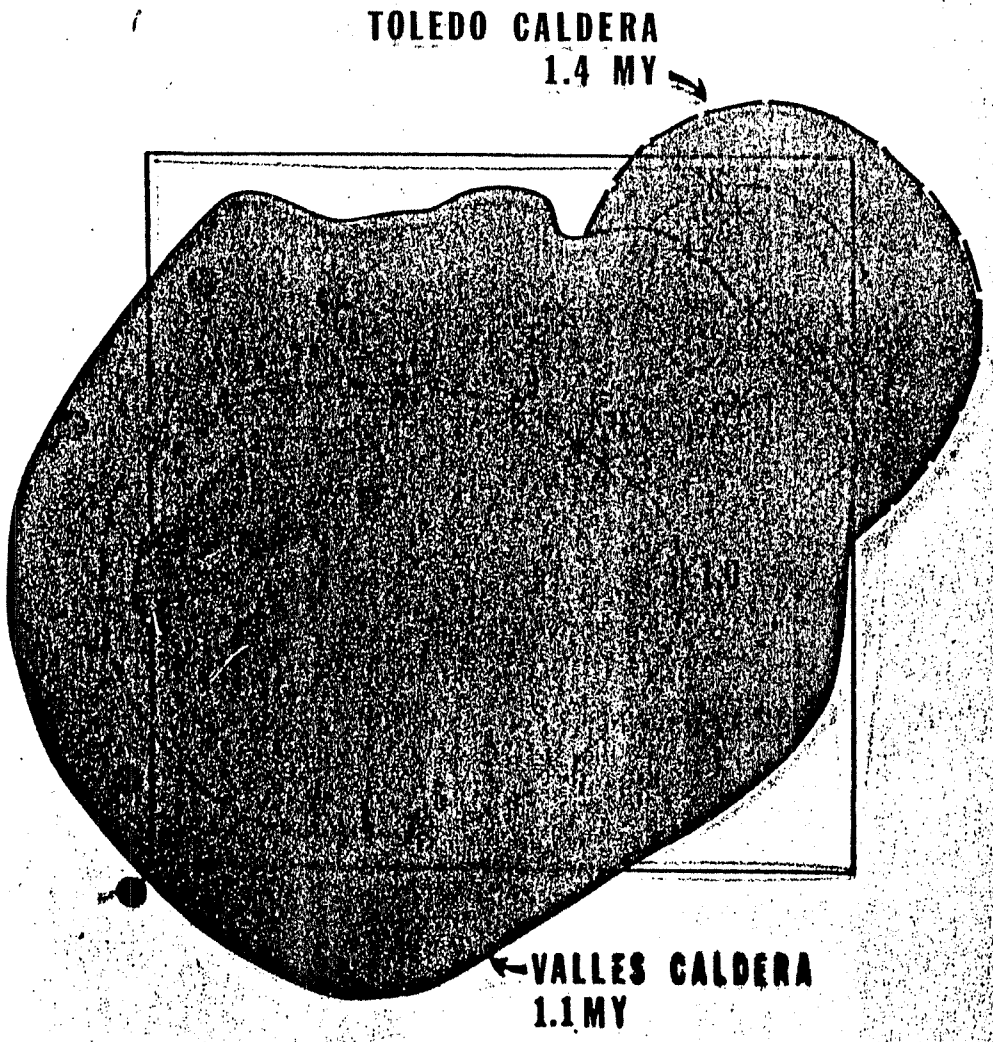
GEOTHERMAL DIVISION
BACA PROSPECT



TEMPERATURE GRADIENT FROM 150' - 250' IN F°/100'

- Data Point
- < 5°
- 5° - 10°
- 10° - 15°
- 15° - 20°
- > 20°

GEMINI

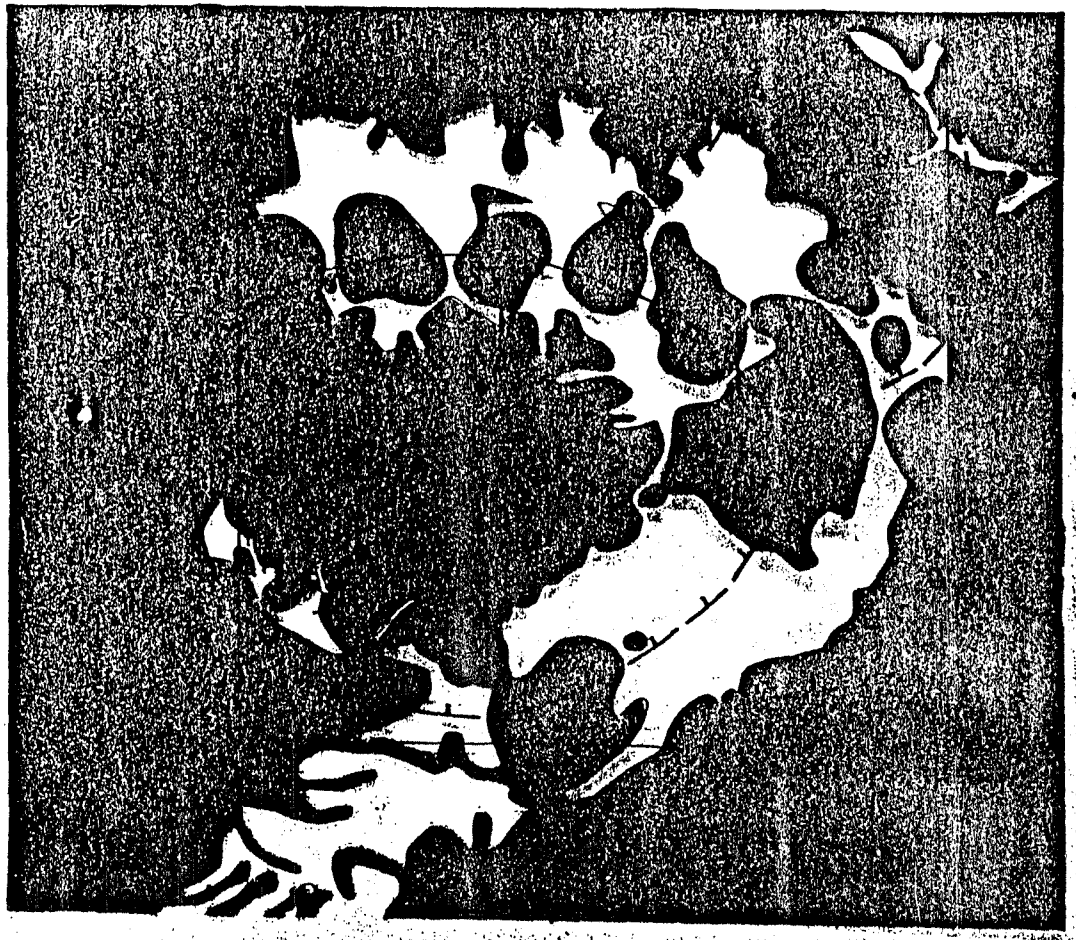


UNION
GEOTHERMAL DIVISION
BACA PROSPECT

GEOTHERMAL FEATURES

- ACTIVE ALTERATION
- *.7 RHYOLITE DOME, AGE (Million Years)
- HOT SPRING
- GAS SEEP
- RING FAULT

MILES
KILOMETERS



union

GEOTHERMAL DIVISION

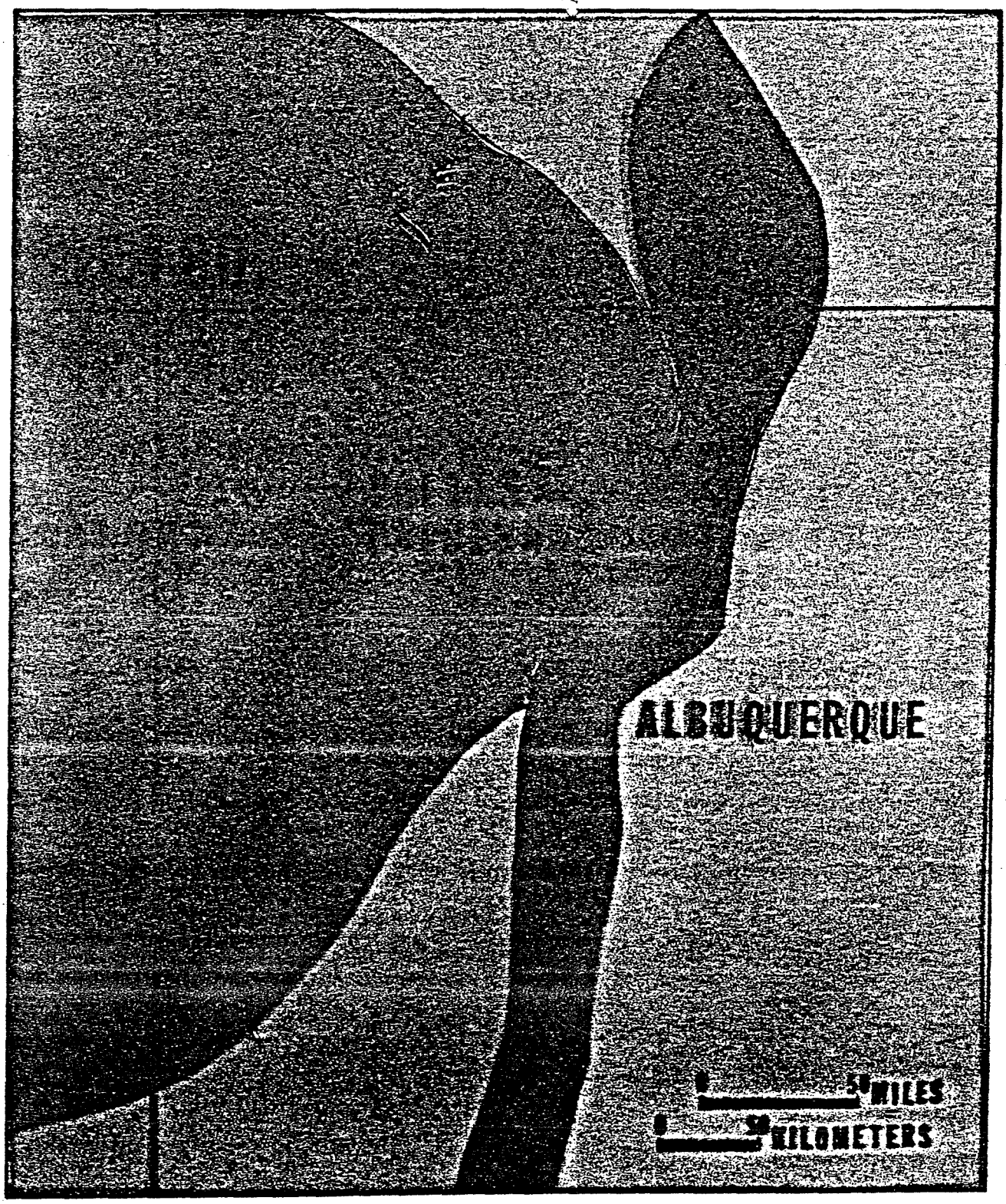
BACA PROSPECT

VALLES CALDERA GEOLOGIC MAP

- UNDIVIDED RECENT SEDIMENTS
- LATE STAGE RHYOLITE
- CALDERA FILL
- BANDELIER TUFF
- TOLEDO VOLCANICS
- UNDIVIDED PRE-CALDERA ROCKS
- FAULT

MILES
KILOMETERS

GEMINI



UNION 76

GEOTHERMAL DIVISION

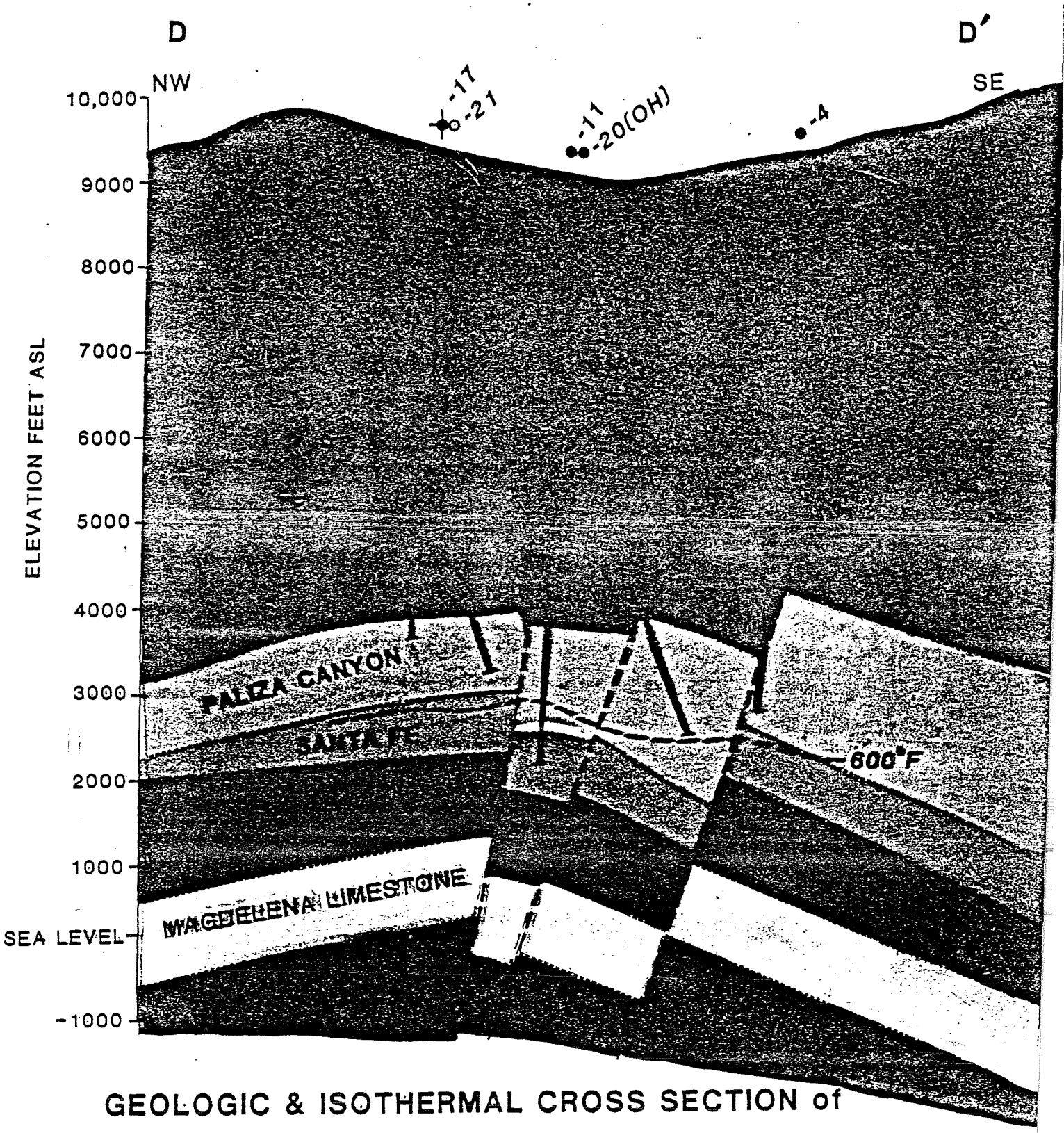
SUMMARY OF REDONDO CREEK

TOTAL WELLS 18

TOTAL HOLES 24

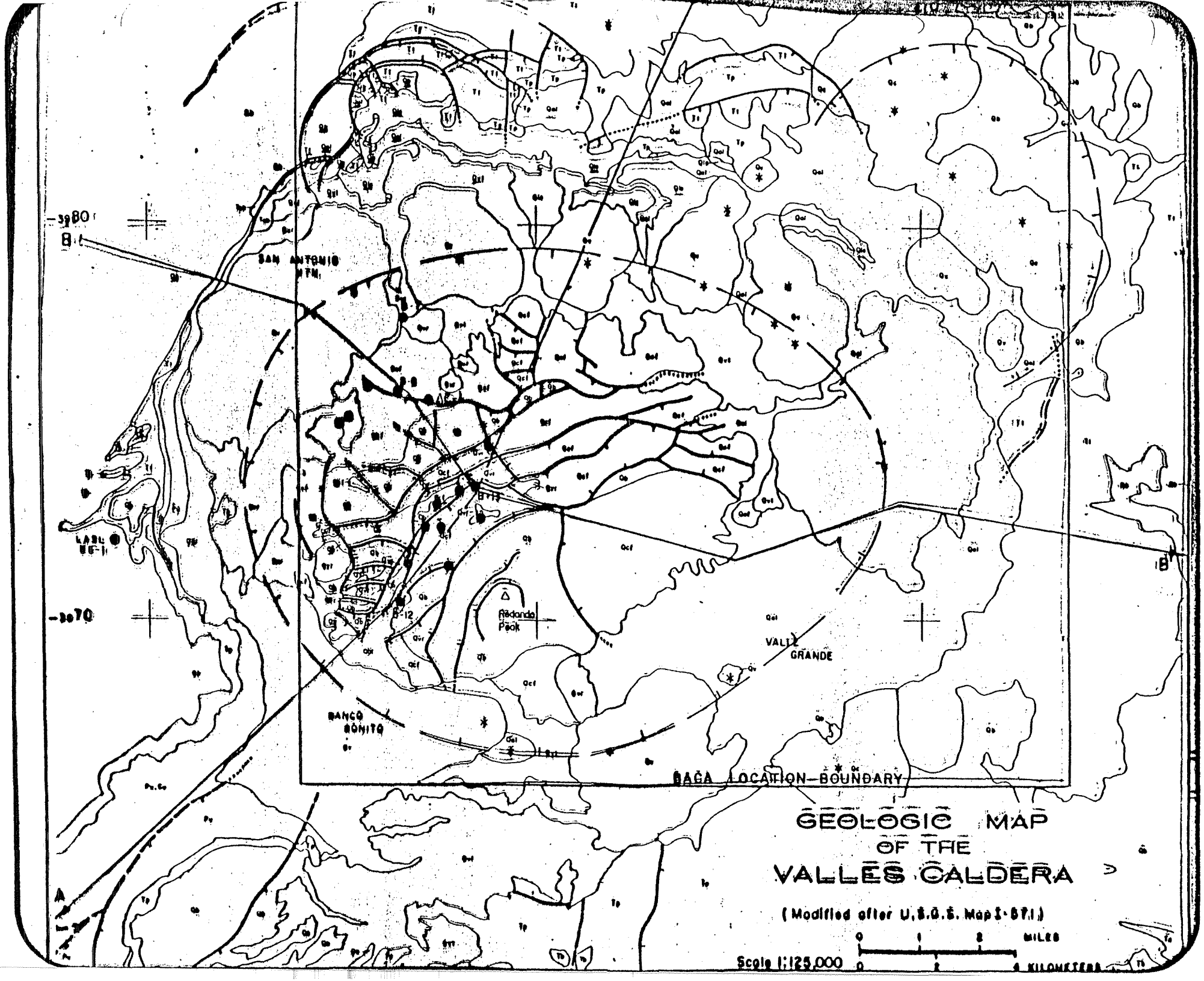
WELL STATUS

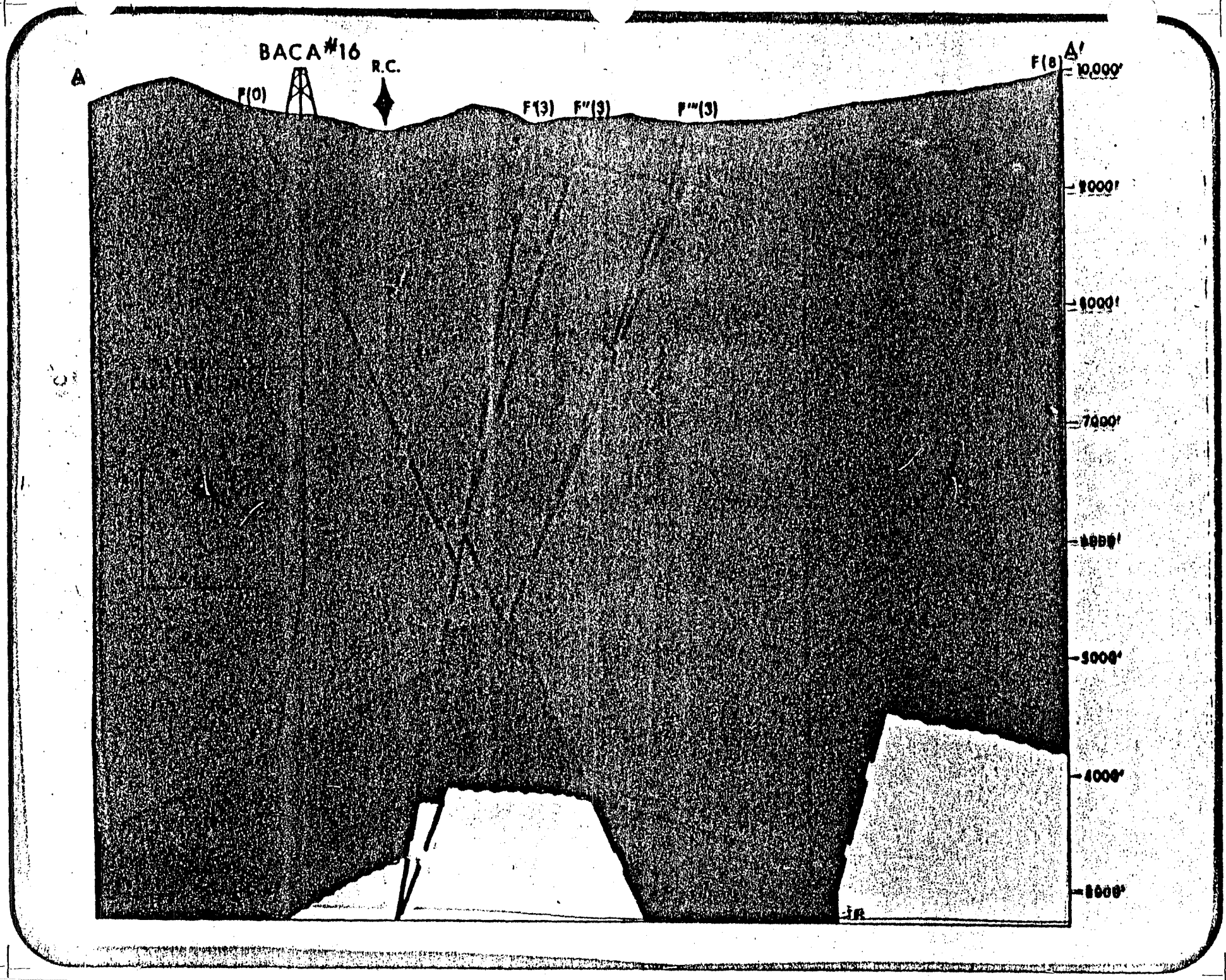
5	COMMERCIAL PRODUCERS	(350,000 LBS/HR STEAM)
1	ON TEST	
3	INJECTORS	
8	SUSPENDED	
1	ABANDONED	
18		

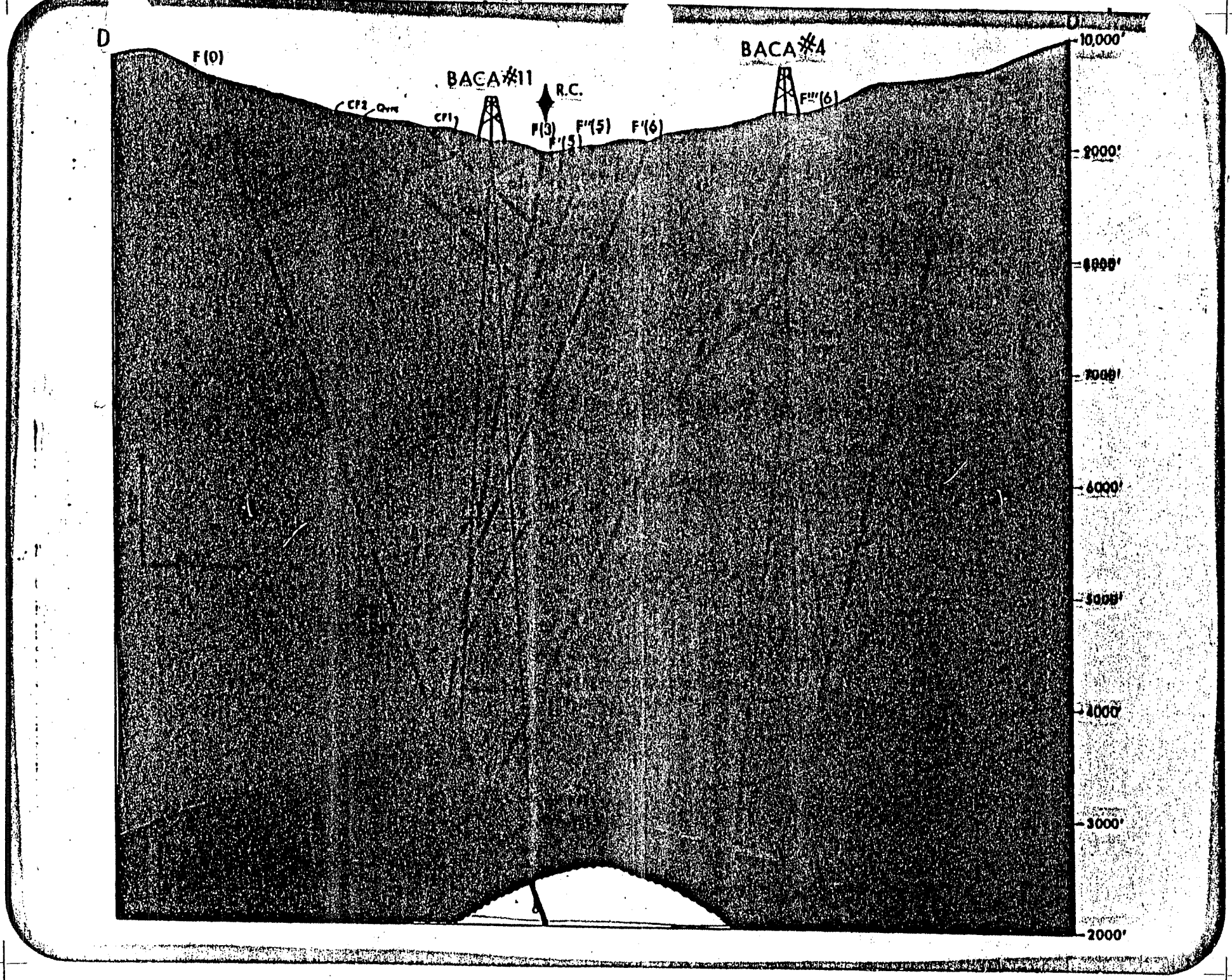


GEOLOGIC & ISOTHERMAL CROSS SECTION of

REDONDO CREEK BACA, NEW MEXICO




BACA #16
R.C.
A
A'
F(0)
F(3)
F''(3)
F'''(3)
F(8)
10,000'
9000'
8000'
7000'
6000'
5000'
4000'
3000'


D
F (0)
BACA #11
R.C.
BACA #4
F'''(6)
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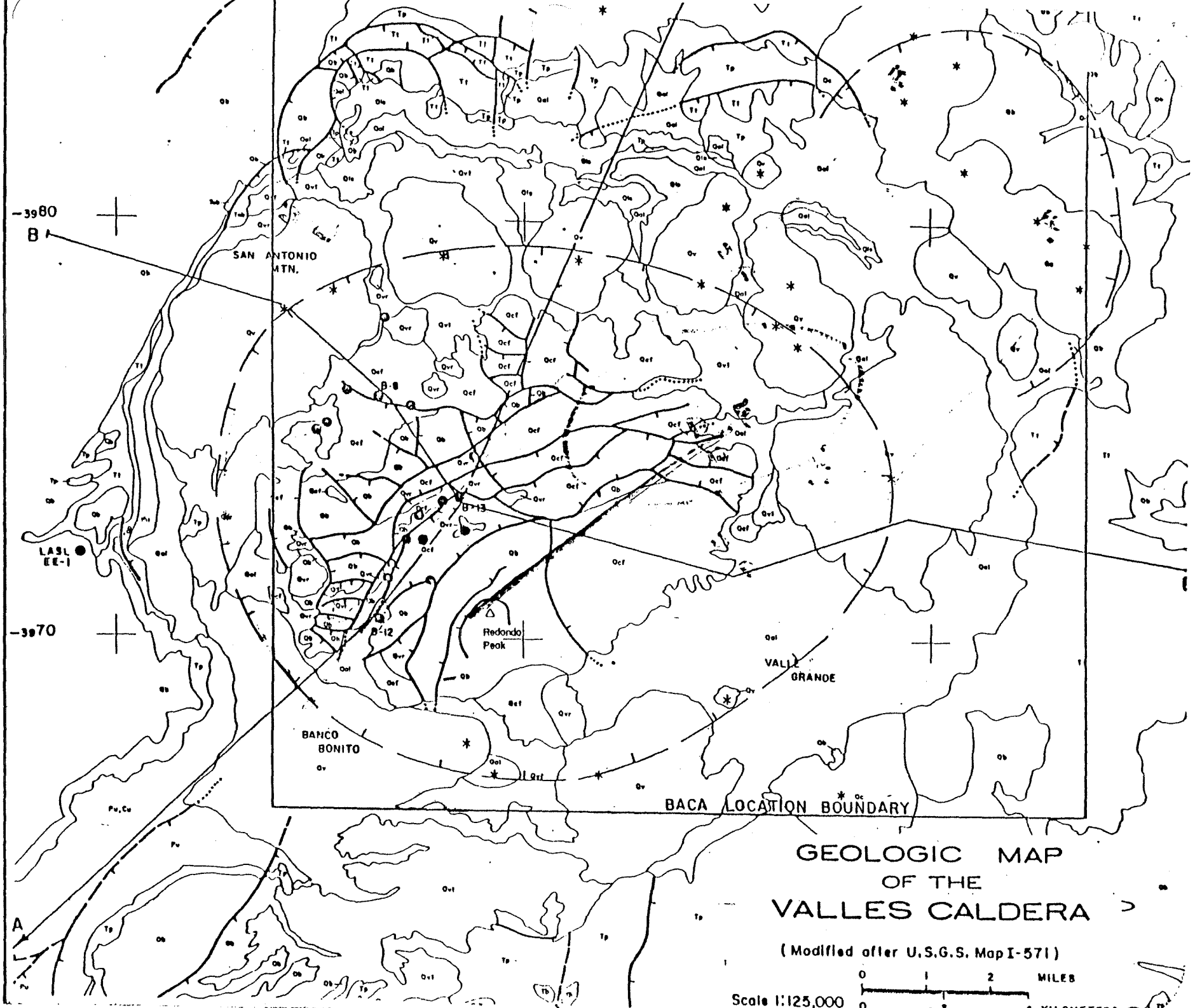
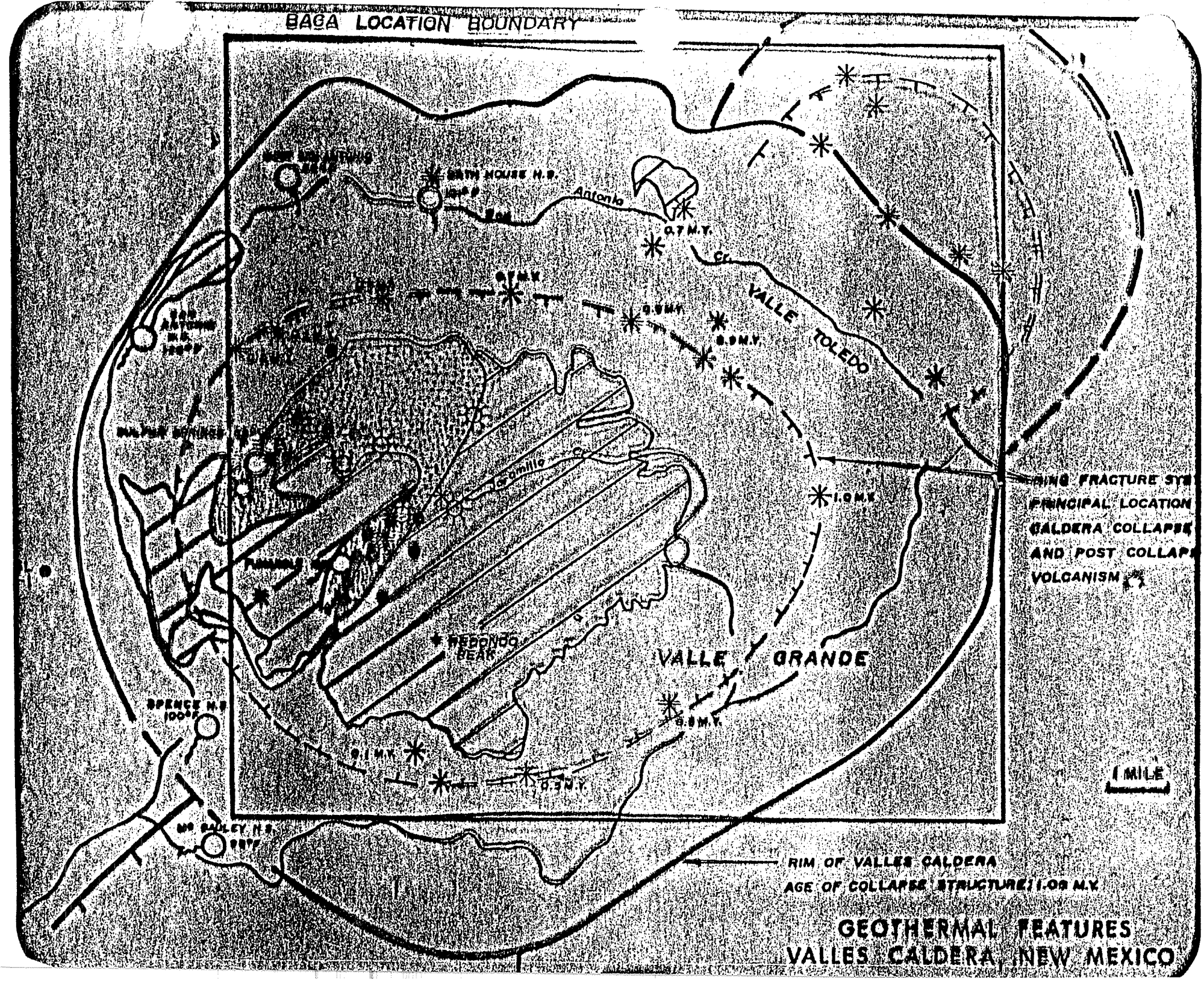
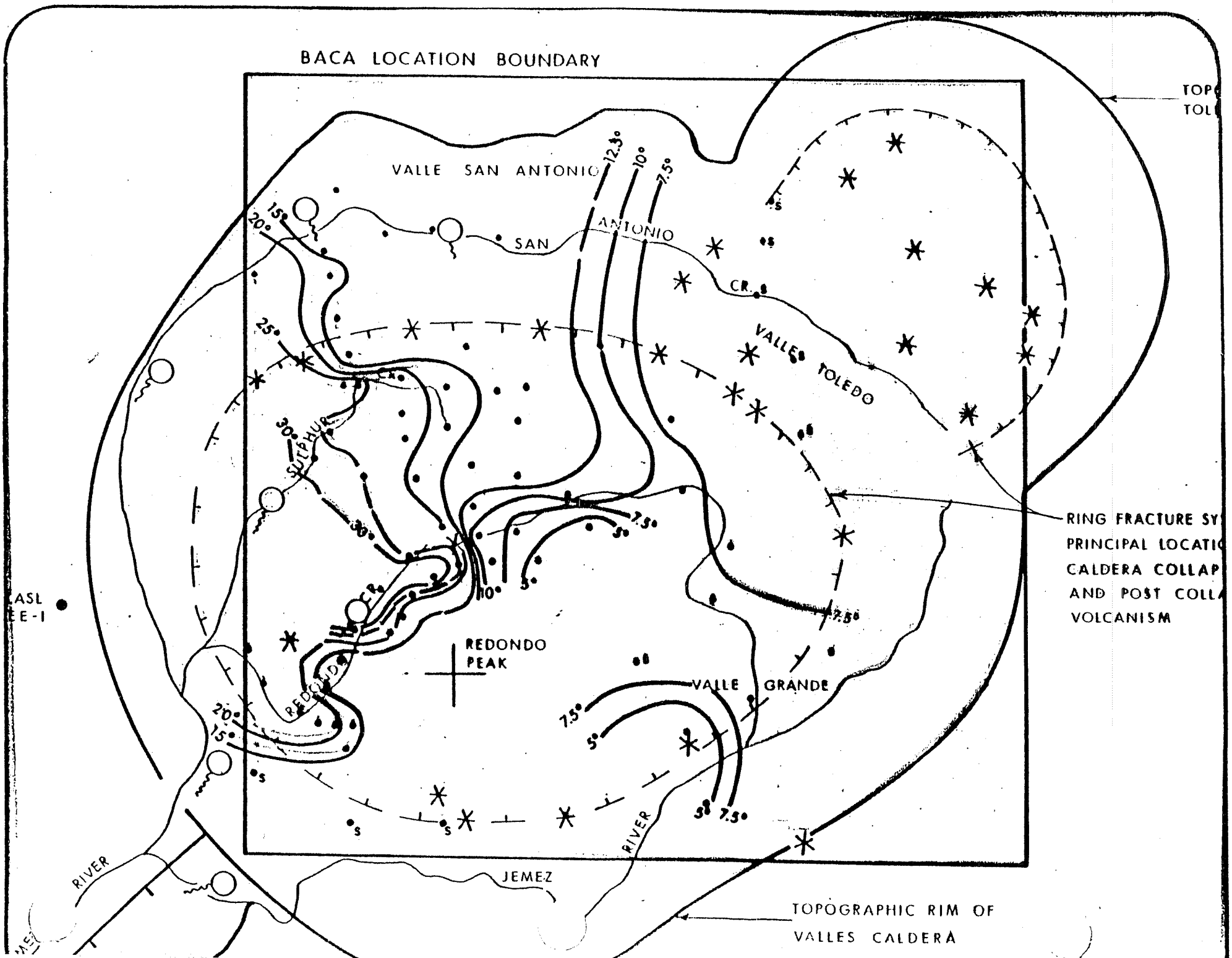
F''(5)
F'(6)
F'(5)
10,000'
2000'
6000'
3000'
2000'


-3980
B
SAN ANTONIO MTN.
LASL EE-1
-3970
A
B-8
B-13
B-12
Redondo Peak
VALLE GRANDE
BANCO BONITO
BACA LOCATION BOUNDARY
GEOLOGIC MAP
OF THE
VALLES CALDERA
(Modified after U.S.G.S. Map I-571)
Scale 1:125,000
0 1 2 MILES
0 2 4 KILOMETERS



GEOTHERMAL FEATURES
VALLES CALDERA, NEW MEXICO


BACA LOCATION BOUNDARY
VALLE SAN ANTONIO
SAN ANTONIO
CR.
VALLES TOLEDO
SULPHUR
REDONDO PEAK
VALLE GRANDE
RIVER
JEMEZ
RING FRACTURE SY
PRINCIPAL LOCATI
CALDERA COLLAP
AND POST COLL
VOLCANISM
TOPOGRAPHIC RIM OF
VALLES CALDERA
12.5°
10°
7.5°
5°
15°
20°
25°
30°
35°
40°

AVERAGE PRODUCED FLUID CHEMISTRY

	BRINE	CONDENSATE
pH	7.2	4.5
TDS mg/l	6093	29
SiO2	599	29
$CO_3^{=}$	19	0
HCO_3^{-}	127	6.6
S^{-}	2	8.6
$SO_4^{=}$	64	1.8
Cl^{-}	3061	17
Na	1749	9
K	370	1.4
Ca	15	0.4
Mg	0.3	0.2
Ba	0.05	0.04
B	23	0.8
F	6	<0.2

FLUID CHEMISTRY SUMMARY

Well BACA NO. 4

	BRINE		
	Avg. Conc.	Range	No. of Samples
pH	6.7	6.5-7.2	3
Suspended Solids, mg/l			0
Total Dissolved Solids, mg/l	5100		1
SiO_2 mg/l	302	167-701	15
$CO_3^=$ "	0		2
HCO_3^- "	182	175-188	2
S^- "			0
$SO_4^=$ "	42	30-53	2
Cl^- "	2495	1560-2660	15
Na "	1473	950-1580	16
K "	300	198-311	16
Ca "	6.3	4.1-7.0	16
Mg "	0.3		1
Ba "			0
B "	20	19-21	2
F "	<0.02		1
Total Mass Flow, #/hr	171,400	160,300-176,100	
Steam Fraction, %	26.8	24.4-29.4	
Pressure, psig	119.7	111-173.5	

NONCONDENSIBLE GASES

% by wt. 3.16 Avg. _____ Range 1 No. of Samples

% by Vol. _____ Avg. _____ Range 0 No. of Samples

	ppm by weight		ppm by volume		
	Avg.	Range	Avg.	Range	No. of Samples
CO_2	30,390		12,430		1
H_2S	165	117-213	87	62-112	2
N_2	0		0		2
H_2	1.4		12.5		2
CH_4	2.8	2.2-3.4	3.2	2.5-3.8	2

NOTE: Left out values obtained from diluted samples. CO_2 and H_2S concentrations are from total steam samples.

FLUID CHEMISTRY SUMMARY

Well BACA NO. 6

	BRINE		
	Avg. Conc.	Range	No. of Samples
pH	7.4		1
Suspended Solids, mg/l	26		1
Total Dissolved Solids, mg/l	6018	5800-6230	5
SiO_2 mg/l	453	160-600	3
$CO_3^=$ "	58	0 -93	3
HCO_3^- "	84	68.8-99	2
S^- "	1		1
$SO_4^=$ "	30	29-32	4
Cl^- "	3082	2860-3400	6
Na "	1721	1640-1780	5
K "	322	290-370	5
Ca "	8.5	0.1-12	4
Mg "	0.08		1
Ba "			0
B "	20	17-21	3
F "	6.7		1
Total Mass Flow, #/hr	163,700	148,500-181,600	
Steam Fraction, %	27.8	23.7-31.5	
Pressure, psig	60.4	38 - 96	

NONCONDENSIBLE GASES

% by wt.	1.33 Avg.	1.27-1.38 Range	2 No. of Samples		
% by Vol.	0.78 Avg.	0.52-1.06 Range	5 No. of Samples		

	ppm by weight		ppm by volume		
	Avg.	Range	Avg.	Range	No. of Samples
CO_2	11,140	9,000-15,775	6450	(1 sample)	7
H_2S	99	69-257	136	(1 sample)	7
N_2	2.5	0-5	1.5	0 - 3	2
H_2	0.5	0.4-0.6	4.5	3.7-5.2	2
CH_4	0		0		2

NOTE: CO_2 and H_2S concentrations are from total steam samples.

FLUID CHEMISTRY SUMMARY

Well BACA NO. 11

	BRINE		
	Avg. Conc.	Range	No. of Samples
pH	7.2	6.6-8.4	8
Suspended Solids, mg/l	616	522-688	3
Total Dissolved Solids, mg/l	6895	6056-7593	4
SiO_2 mg/l	740	640-835	7
$CO_3^=$ "	11	0 - 48	8
HCO_3^- "	99	24-150	8
S^- "	4.1	1.5-6.5	4
$SO_4^=$ "	68	50-84	6
Cl^- "	3453	2590-4400	8
Na "	1959	1810-2200	8
K "	456	340-550	8
Ca "	30	17-46	8
Mg "	0.14	0.07-0.2	7
Ba "			0
B "	28	24-35	7
F "	6.6	5-7.6	3
Total Mass Flow, #/hr	227,100	122,700-347,400	
Steam Fraction, %	39.7	24.2-50.3	
Pressure, psig	123.7	96-171	

NONCONDENSIBLE GASES

% by wt.	3.76	Avg.	2.30-5.94	Range	8 No. of Samples
% by Vol.	1.60	Avg.	0.96-2.54	Range	7 No. of Samples

	ppm by weight		ppm by volume		
	Avg.	Range	Avg.	Range	No. of Samples
CO_2	49,250	33,700-89,100	20,220	13,775-36,450	6
H_2S	477	290-867	255	153-474	7
N_2	132	0-381	86	0-245	8
H_2	3.8	1.4-7.4	34.5	13-69	8
CH_4	1.2	0-5.8	1.4	0-6.6	8

NOTE: CO_2 and H_2S concentrations are from total steam samples.

FLUID CHEMISTRY SUMMARY

Well BACA NO. 13

	BRINE		
	Avg. Conc.	Range	No. of Samples
pH	7.6	6.9-8.5	8
Suspended Solids, mg/l	360	5.5-734	3
Total Dissolved Solids, mg/l	6477	5500-8684	8
SiO_2 mg/l	786	556-963	10
$CO_3^=$ "	28	0-97	8
HCO_3^- "	214	163-281	8
S^- "	2.2	1-4	5
$SO_4^=$ "	164	50-344	7
Cl^- "	2783	2320-3300	8
Na "	1733	1500-2030	8
K "	329	278-394	8
Ca "	6.8	5-11	8
Mg "	0.49	0.04-1.5	6
Ba "			0
B "	22	19-24	8
F "	10.2	8-11.6	7
Total Mass Flow, #/hr	284,600	195,500-507,000	
Steam Fraction, %	28.4	26.8-30.2	
Pressure, psig	89.4	64-118	

NONCONDENSIBLE GASES

% by wt.	2.93	Avg.	1.93-3.94	Range	12 No. of Samples
% by Vol.	1.23	Avg.	0.80-1.64	Range	12 No. of Samples

	ppm by weight		ppm by volume		
	Avg.	Range	Avg.	Range	No. of Samples
CO_2	38,520	30,040-45,200	15,830	12,300-18,900	5
H_2S	149	86.3-205	79	45.6-108	6
N_2	33	0-122	24	0-114	14
H_2	0.22	0-0.9	2.1	0-8.4	10
CH_4	1.7	0-10	1.9	0-11	9

NOTE: CO_2 and H_2S concentrations are from total steam samples.

Left out values obtained from low rate of two-rate test.

FLUID CHEMISTRY SUMMARY

Well BACA #15

	BRINE		
	Avg. Conc.	Range	No. of Samples
pH	6.9	6.5-7.3	6
Suspended Solids, mg/l	274	3-566	6
Total Dissolved Solids, mg/l	5,974	5390-6670	6
SiO_2 mg/l	715	600-792	5
$CO_3^=$ "	0	0	6
HCO_3^- "	54	37-67	6
S^- "	.9	.1-1.6	5
$SO_4^=$ "	18	12-28	4
Cl^- "	3,493	3220-3700	6
Na "	1,860	1730-1970	6
K "	445	407-481	6
Ca "	22	18-27	6
Mg "	.5	.07-.9	
Ba "	.05	.02-.09	6
B "	26	24-27	6
F "	6.7	5.9-7.9	9
Total Mass Flow, #/hr (Avg.)	150,000		
Steam Fraction, % (Avg.)	61		
Pressure, psig	73-202'		

NONCONDENSIBLE GASES

% by wt. of steam phase: 1.35 Avg. 1.15-1.53 Range 6 No. of Samples

% by Vol.: .56 Avg. .48-.64 Range 6 No. of Samples

	ppm by weight of N.C. gases		ppm by volume		
	Avg.	Range	Avg.	Range	No. of Samples
CO_2	11,971	9030-15,150	4,933	3650-6250	9
H_2S	131	107-162	70	57-86	9
N_2	0		0		
H_2	1.9	1.4-2.6	17	13-22	9
CH_4	0		0		

TABLE 5

Baca #20 10/23/80

Composition of Condensate, Brine and Two Phase System

	Condensate	Brine	2-Phase
Physical Properties			
Specific Gravity @60°F	1.000	1.00050	1.0027
Conductivity, μ mhos/cm		7500	3700
Turbidity, NTU	-	0.6	-
Solids			
Settleable, ml/l	-	0.1	-
Suspended, mg/l	<2.0	8	<2.0
Total, mg/l	-	7487	-
Total Dissolved, mg/l	37	7068	3208
Metals and Silicon			
Arsenic, mg/l	nd<1.0	4.0	-
Aluminum, mg/l	-	0.1	-
Barium, mg/l	0.03	0.6	<.02
Beryllium, mg/l	-	<.01	-
Boron, mg/l	<1	33	15
Cadmium, mg/l	-	<.01	-
Calcium, mg/l	0.4	46	10
Chromium (Total), mg/l	-	<.002	-
Chromium VI, mg/l	-	nd<.002	-
Cobalt, mg/l	-	<.02	-
Copper, mg/l	-	0.04	-
Iron, mg/l	0.4	0.4	1.9
Lithium, mg/l	-	3.2	-
Lead, mg/l	-	0.7	-
Magnesium, mg/l	<0.5	<0.5	<0.5
Manganese, mg/l	-	0.5	-
Mercury, mg/l	-	<.0005	-
Molybdenum, mg/l	-	0.1	-
Nickel, mg/l	-	0.22	-
Potassium, mg/l	4.5	455	192
Selenium, mg/l	-	33	-
Silicon, mg/l	1.6	220	180
Silver, mg/l	-	0.03	-
Sodium, mg/l	11	2300	930
Vanadium, mg/l	-	<.03	-
Zinc, mg/l	-	0.7	-

TABLE 5 (cont.)

	Condensate	Brine	2-Phase
Anions and pH			
pH	3.9	6.0	4.9
Bicarbonate, mg/l	3	49	-
Carbonate, mg/l	0	0	0
Chloride, mg/l	12.3	3820	1650
Cyanide, mg/l	-	.01	-
Fluoride, mg/l	0.2	7.2	3.1
Nitrite (as N), mg/l	-	1	-
Phosphate, mg/l	-	0.03	-
Sulfide, mg/l	-	0.1	-
Sulfate, mg/l	1	89	27
Ammonia, mg/l	-	2	-
Demand			
BOD_5, mg/l	-	4.7	-
COD, mg/l	-	12	-
TOC, mg/l	-	7.3	-

TABLE 5

Composition of Condensate, Brine & Two-Phase System
Baca #22, 2/9/81

		Condensate	Brine	2-Phase
Physical Properties				
Specific Gravity @60°F		1.000	1.0125	1.0020
Conductivity, μ mhos/cm		-	22,000	-
Turbidity, NTU		-	110	-
Solids				
Suspended, mg/l		<0.1	34	<0.1
Total, mg/l		-	14,690	-
Total Dissolved, mg/l		37	14,300	2.1
Metals & Silicon				
Arsenic,	mg/l	0.13	4.54	-
Aluminum,	"	-	0.3	-
Barium,	"	0.01	0.04	0.05
Beryllium,	"	-	0.01	-
Boron,	"	0.2	68	0.1
Cadmium,	"	-	nd<.01	-
Calcium,	"	0.3	29	0.5
Chromium (Total),	"	-	nd<.02	-
Chromium VI,	"	-	nd<.002	-
Cobalt,	"	-	nd<.03	-
Copper,	"	-	0.03	-
Iron,	"	0.30	0.25	0.4
Lithium,	"	-	50	-
Lead,	"	-	nd<.05	-
Magnesium,	"	nd<.05	0.4	nd<.05
Manganese,	"	-	0.03	-
Mercury,	"	-	0.0005	-
Molybdenum,	"	-	<0.1	-
Nickel,	"	-	<.01	-
Potassium,	"	1.3	770	1.7
Selenium,	"	-	0.5	-
Silicon,	"	<1	314	<10
Silver,	"	-	<.02	-
Sodium,	"	1.0	4,810	0.9
Vanadium,	"	-	0.06	-
Zinc,	"	-	1.3	-

TABLE 5 (cont.)

	Condensate	Brine	2-Phase
Anions and pH			
pH	5.2	8.2	5.2
Bicarbonate, mg/l	83	418	82
Carbonate, "	0	77	0
Chloride, "	2.1	7,880	5.1
Cyanide, "	-	<.01	-
Fluoride, "	<0.2	22	<0.2
Nitrite (as N),"	-	<.001	-
Phosphate (as P),"	-	0.22	-
Sulfide, "	-	12.6	28
Sulfate, "	56	170	2
Ammonia, mg/l	-	2.0	-
Demand			
BOD_5, mg/l	-	>324	-
COD, "	-	1,570	-
TOC, "	-	61	-

IUM AND POTASSIUM CONCENTRATIONS IN WA

WELL	TD AT TIME OF SAMPLING	SAMPLE TYPE	DATE REPORTED	Na PPM	K PPM	Na/K ATOMIC RATIO	AVG Na/K MULTIPLE SAMPLES	STD. DEV
Baca 1	2560'	Flashed H_2O	06-24-63	400	37	18.39		
	2560'	Stm. Condensate	06-13-63	83	27	5.23*	4.89(2)	0.48
	2560'	Stm. Condensate	06-18-63	83	31	4.55*		
Baca 2	No data available							
Baca 3	2200'	Flashed H_2O	07-24-64	1959	300	11.11		
Baca 4	1892'	Flashed H_2O	10-21-70	633	50	21.53*	24.21(2)	3.79
	2408'	Flashed H_2O	10-21-70	917	58	26.89*		
	5048'	Flashed H_2O	11-16-70	2100	777	4.60*		
	6376'	Flashed H_2O	08-22-73	1500	300	8.50		
	6376'	Flashed H_2O	Sept., Oct. 1973	1515**	309**	8.34**	8.40(15)	0.19
	6376'	Flashed H_2O	09-18-73	1580	300	8.96		
Baca 5A	2705'	Flashed H_2O	11-08-71	1832	210	14.84		
	5684'	Flashed H_2O	11-08-71	1020	80	21.69		
	6022'	Flashed H_2O	11-08-71	1100	115	16.27	16.71(5)	2.83
	6107'	Flashed H_2O	11-08-71	1000	110	15.46		
	6793'	Flashed H_2O	11-08-71	1080	120	15.31		
Baca 6	2100'	Flashed H_2O	10-20-72	1680	280	10.21		
	2431'	Flashed H_2O	10-20-72	1890	325	9.89		
	3225'	Flashed H_2O	10-20-72	2220	395	9.56	9.41(5)	0.93
	3715'	Flashed H_2O	10-20-72	1630	355	7.81		
	3715'	Flashed H_2O	02-13-73	535	95	9.58		

* Data not used in this study

** Average of 13 analyses taken during this period

IUM AND POTASSIUM CONCENTRATIONS IN WA

WELL	TD AT TIME OF SAMPLING	SAMPLE TYPE	DATE REPORTED	Na PPM	K PPM	Na/K ATOMIC RATIO	AVG Na/K MULTIPLE SAMPLES	STD. DEV
Baca 7	No data available							
Baca 8	2995'	2-Phase Flow	10-20-72	2170	565	6.53	6.33(2)	0.29
	4380'	Flashed H_2O	10-20-72	2160	600	6.12		
Baca 9, 10	No data available							
Baca 11	6924'	Flashed H_2O	Jan. 1976	2000	463	7.35	6.95(6)	0.41
	6924'	2-Phase Flow	Jan. 1976	1950	455	7.29		
	6924'	Flashed H_2O	Feb. 1976	1810	430	7.16		
	6924'	2-Phase Flow	Feb. 1976	1240	302	6.98		
	6924'	Flashed H_2O	Apr. 1976	2010	541	6.32		
	6924'	2-Phase Flow	Apr. 1976	2080	535	6.61		
Baca 12, 14, 16	No data available							
Baca 13	8228'	Flashed H_2O	Jan. 1976	1700	338	8.55	8.77(6)	0.30
	8228'	2-Phase Flow	Jan. 1976	1575	300	8.93		
	8228'	Flashed H_2O	Feb. 1976	1620	328	8.40		
	8228'	2-Phase Flow	Feb. 1976	1550	306	8.62		
	8228'	Flashed H_2O	Apr. 1976	1550	296	8.91		
	8228'	2-Phase Flow	Apr. 1976	1600	295	9.22		
Baca 15	5505'	Flashed H_2O	10-24-76	1950	470	7.06	7.10(2)	0.05
	5505'	2-Phase Flow	10-24-76	1900	453	7.13		

	Na (ppm)	K (ppm)	Na/K atomic ratio
BACA 20			
BRINE	2300	455	8.60
CONDENSATE	2300	4.5	4.16
BACA 22			
BRINE	4800	770	10.62
CONDENSATE	1.0	1.3	1.31

TABLE 1

Na-K-Ca Geothermometer Indicated Temperatures

Well	Date	Concentrations (ppm) Na	K	Ca	Indicated Temperature (°F)
Baca 4	9/18/73	1580	300	7.0	615
	9/21/73	1500	305	6.8	626
	9/24/73	1500	307	6.7	627
	9/28/73	1500	307	6.6	628
	10/01/73	1525	310	6.4	628
	10/05/73	1525	310	7.0	626
	10/08/73	1500	307	6.4	629
	10/12/73	950	198	4.1	632
	10/15/73	1525	311	6.4	629
	10/19/73	1450	307	6.2	635
	10/22/73	1525	310	6.3	629
	10/26/73	1525	305	6.2	626
	10/29/73	1525	311	6.4	629
	11/02/73	1550	310	6.4	626
	11/05/73	1550	311	6.4	626
	11/09/73	1330	292	5.4	643
Baca 5	8/24/71	1832	210	19.2	515
Baca 6	10/11/72	1640	370	0.1	789
	11/09/72	259	25	1.0	515
	10/27/72	1770	319	11	597
	11/07/72	1780	331	11	602
	6/13/75	1900	363	17	596
	11/09/75	1700	300	12	590
Baca 11	12/22/73	1920	360	32	577
	12/22/73	1930	340	32	567
	9/16/74	1900	483	23	636
	9/20/74	1900	483	25	634
	11/08/75	2200	550	46	618
	1/12/76	2000	463	27	617
	2/24/76	1810	430	17	632
	4/08/76	2010	541	36	635
Baca 13	12/07/74	2000	278	5	579
	12/07/74	2030	394	11	613
	12/07/74	1890	377	11	616
	10/15/75	1570	317	5	635
	11/07/75	1500	305	5	635
	1/11/76	1700	338	6	629
	2/26/76	1620	328	6	631
	4/07/76	1550	296	5	625

% wt in total mass flow

TABLE 7

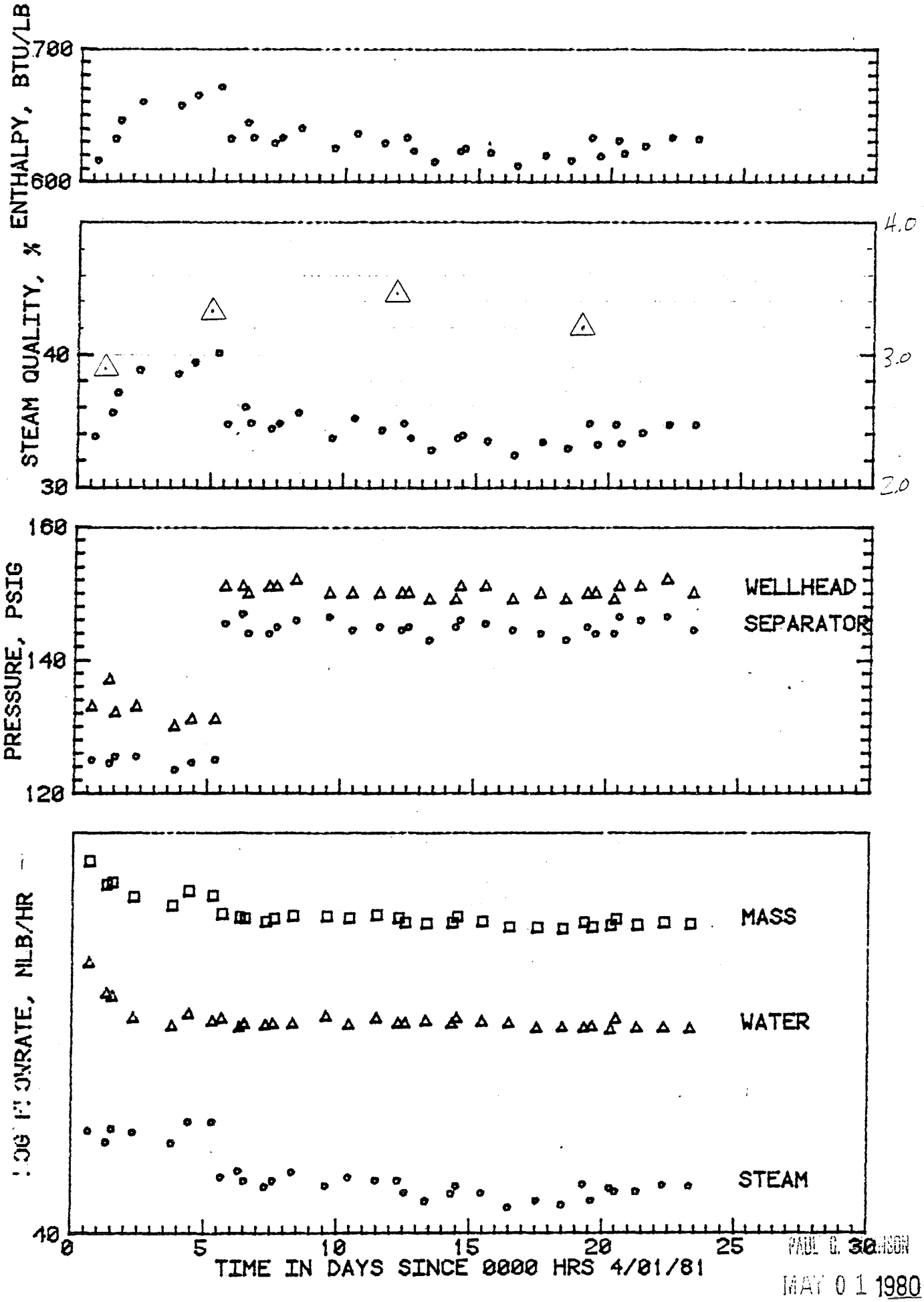
Average Concentrations of Various Chemical Constituents in Well Effluents

Well	Avg. TDS In Brine	Avg. TDS In Condensate	Silica (ppm) In Brine	Noncondensible Gas % by Wt. of Steam Phase		H_2S Concentration (ppm)		Average	
						Noncondensible	Total Steam	Flash %	Flowrate lbs/hr Total
Baca 4	5100	28	302 (167-701)	3.16	.85	165 (150-180)	165 (117-213)	26.8	171,400
				3.22	1.10			34.0	
Baca 6	6018 (5800-6230)	23 (3-65)	453 (160-600)	1.33 (1.27-1.38)	.37	61 (60-61)	99 (69-257)	27.8	163,700
Baca 11	6895 (6056-7593)	59 (7-105)	740 (640-835)	3.76 (2.30-5.94)	1.5	365 (222-564)	477 (290-867)	39.7	227,100
Baca 13	6477 (5500-8684)	13 (7-25)	786 (556-963)	2.93 (1.93-3.94)	.83	81 (57-96)	149 (86.3-205)	28.4	284,600
				3.9	1.07			27.5	
Baca 20				2.54	1.47		135	58.0	

NOTE: 1. Some samples from Baca 4 were diluted prior to analysis. The results from these analyses are not included in the above.

2. Left out values obtained from low rate of two-rate test on Baca 13.

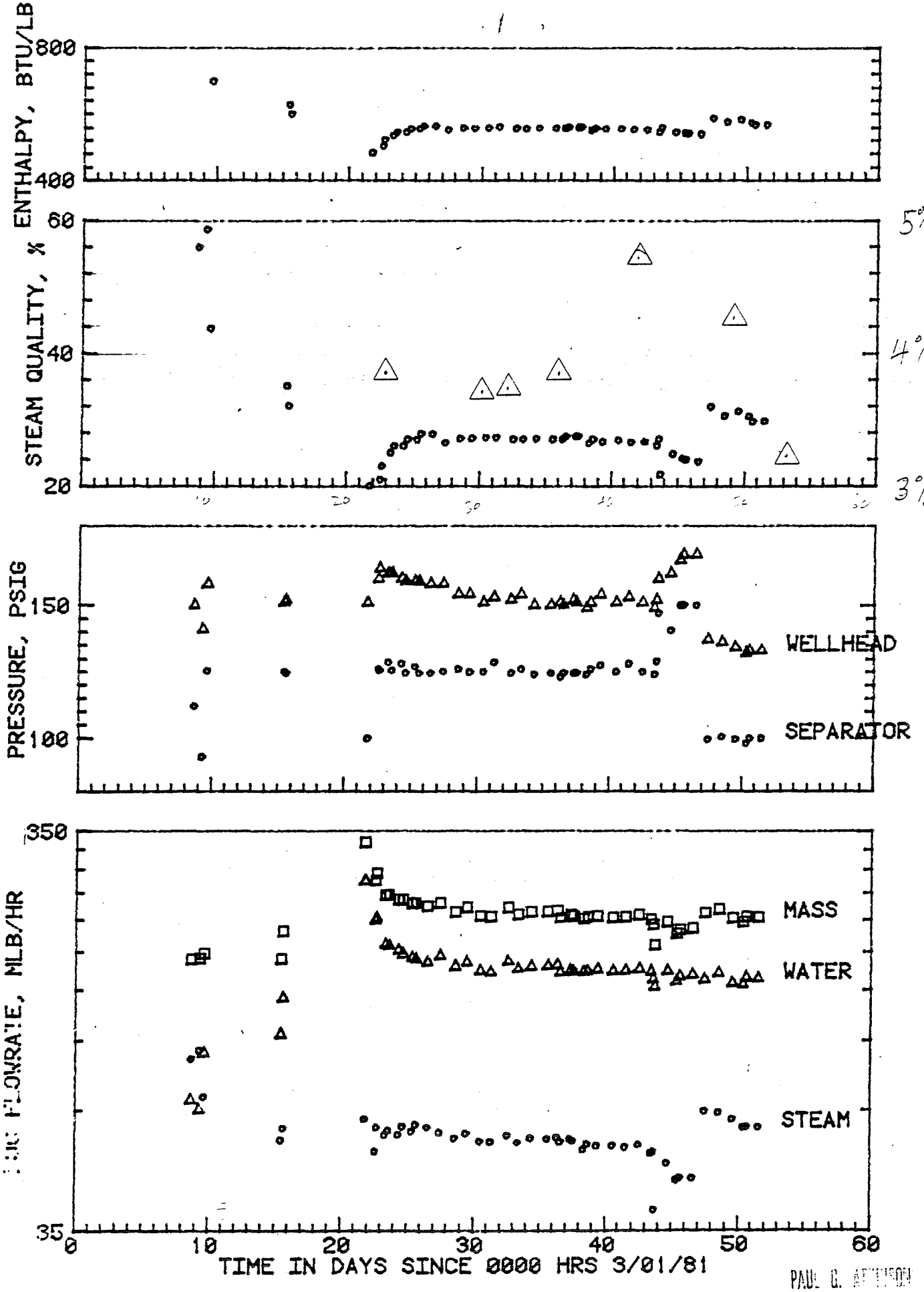
BACA 4 FLOWTEST # 3 - 4/01/81 TO 4/24/81



PAUL C. JOHNSON

MAY 0 1 1980

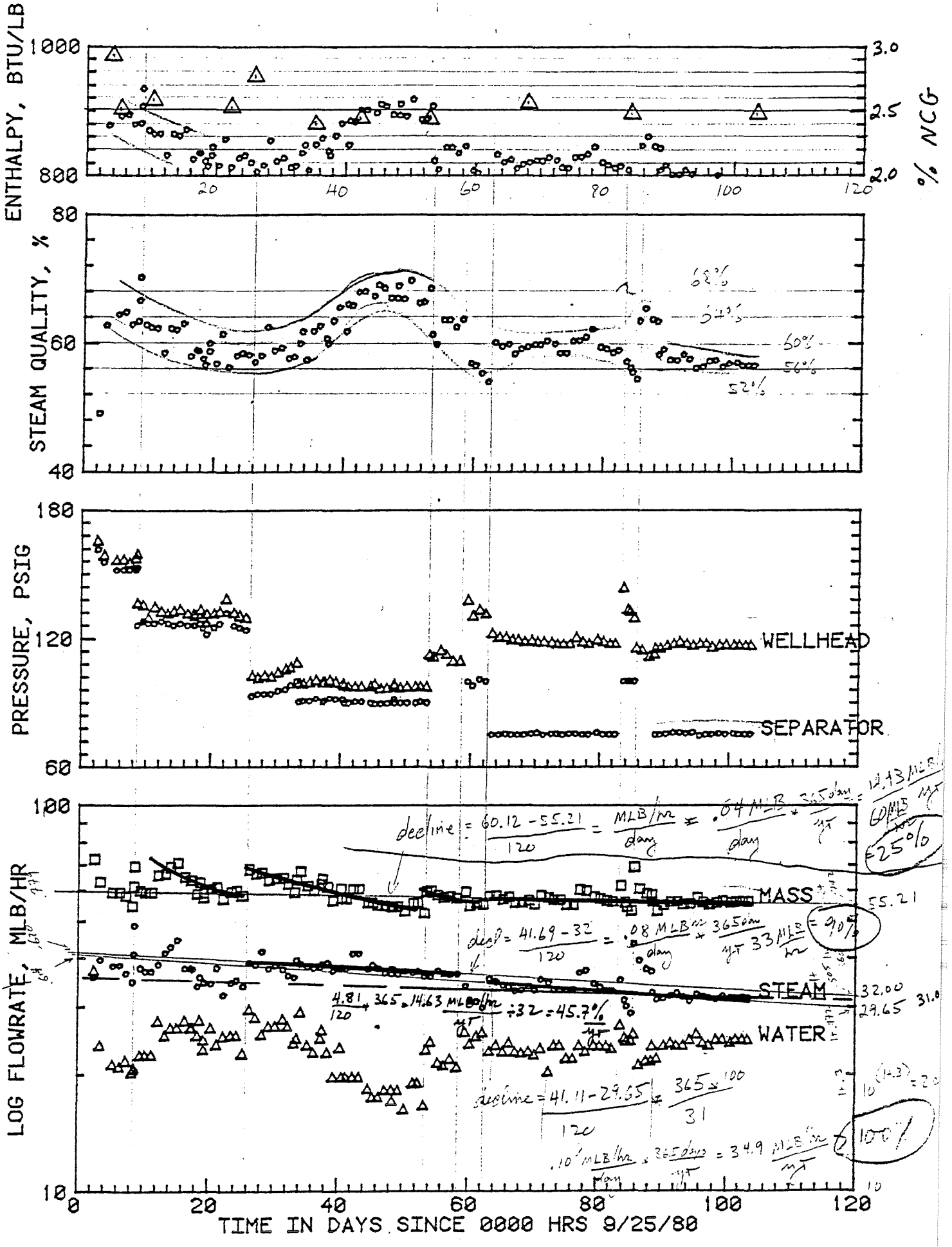
BACA 13 FLOWTEST # 5 - 3/05/81 TO 4/21/81

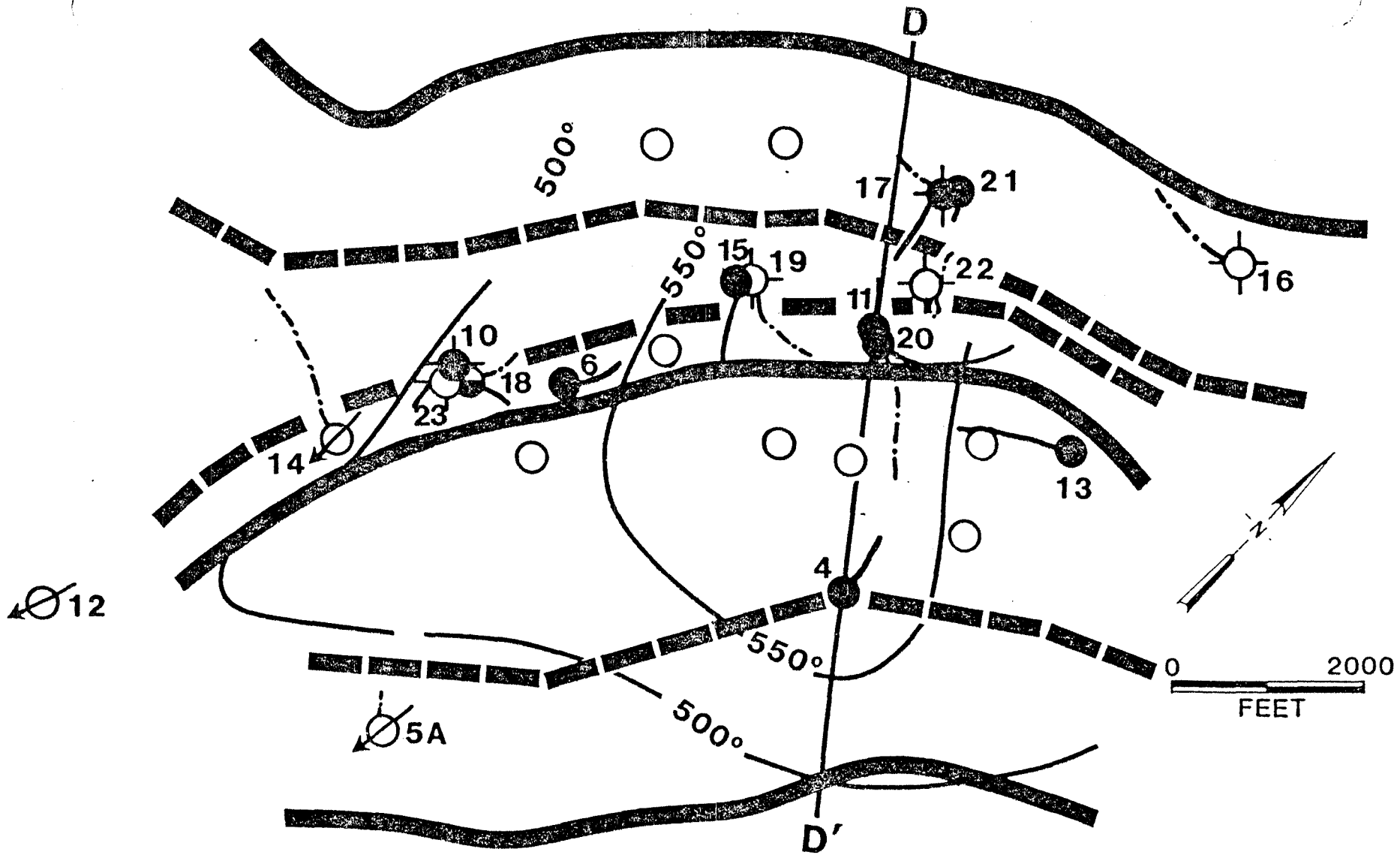


PAUL G. ATTESON

MAY 0 1 1980

BACA 20 FLOWTEST #4: 9/26/80 - 1/06/81





REDONDO CREEK AREA

MAJOR FAULT

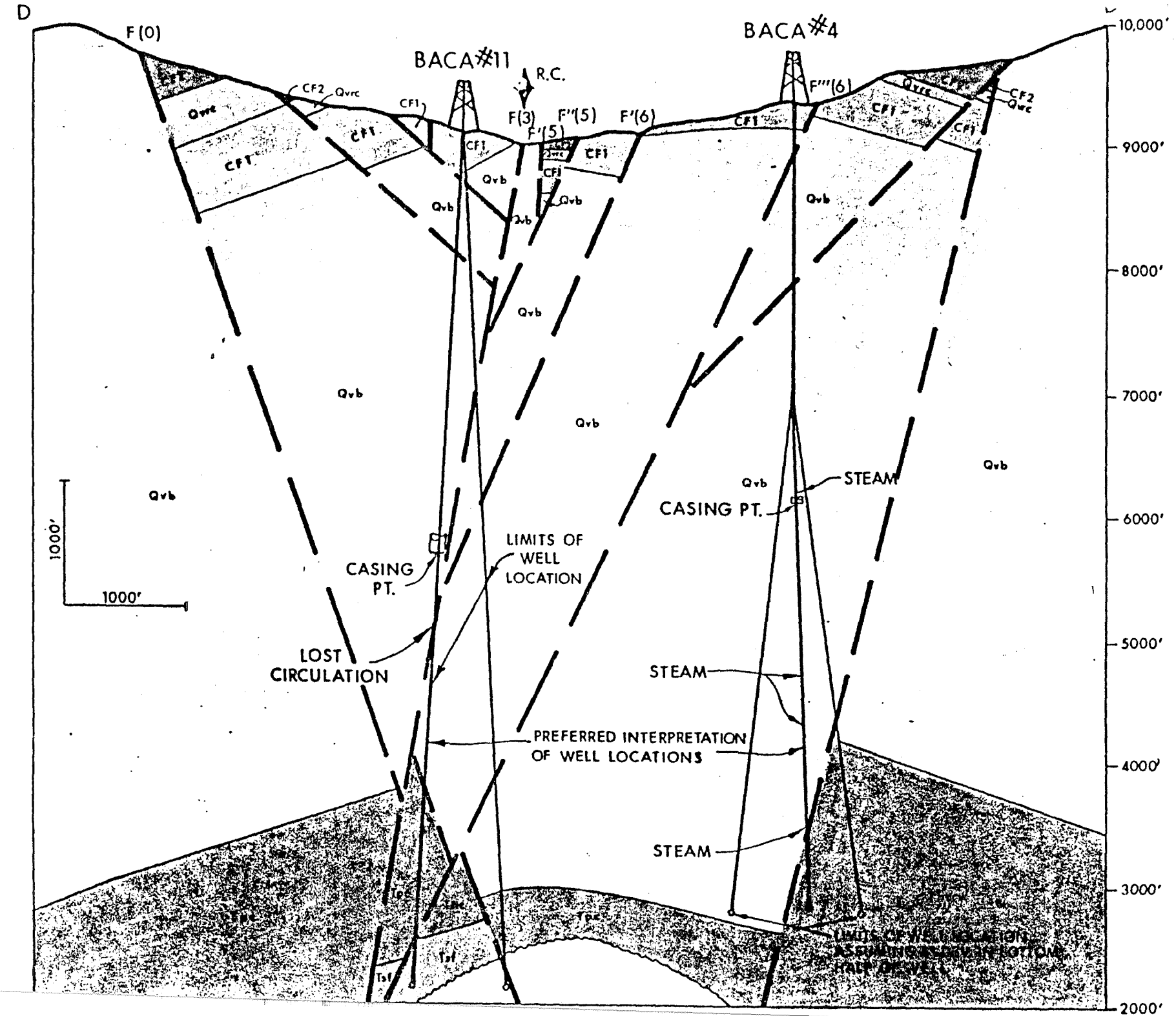
Trace at Surface

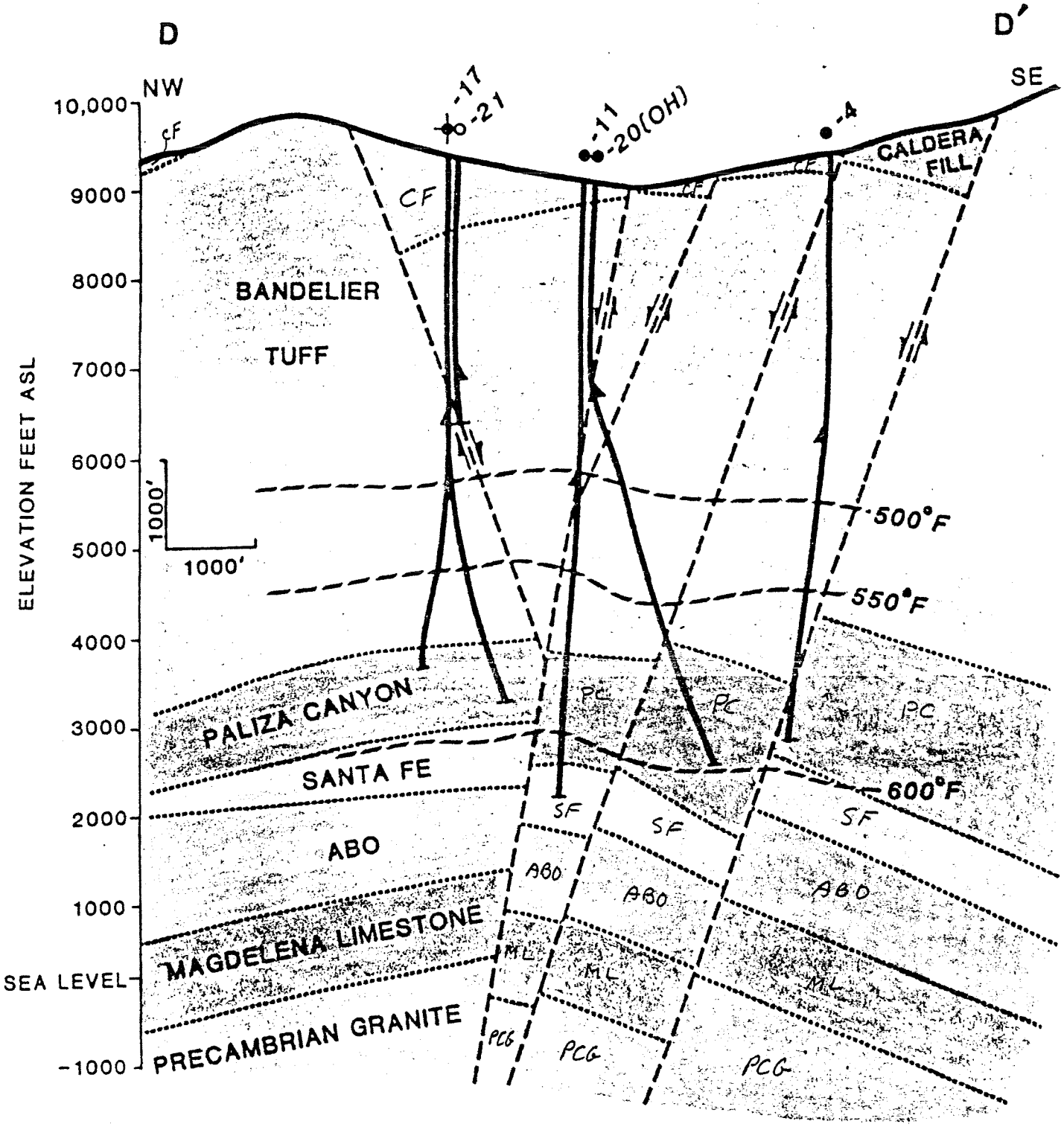
Trace at 3750'ASL

Producing Well Course

Dry Well Course

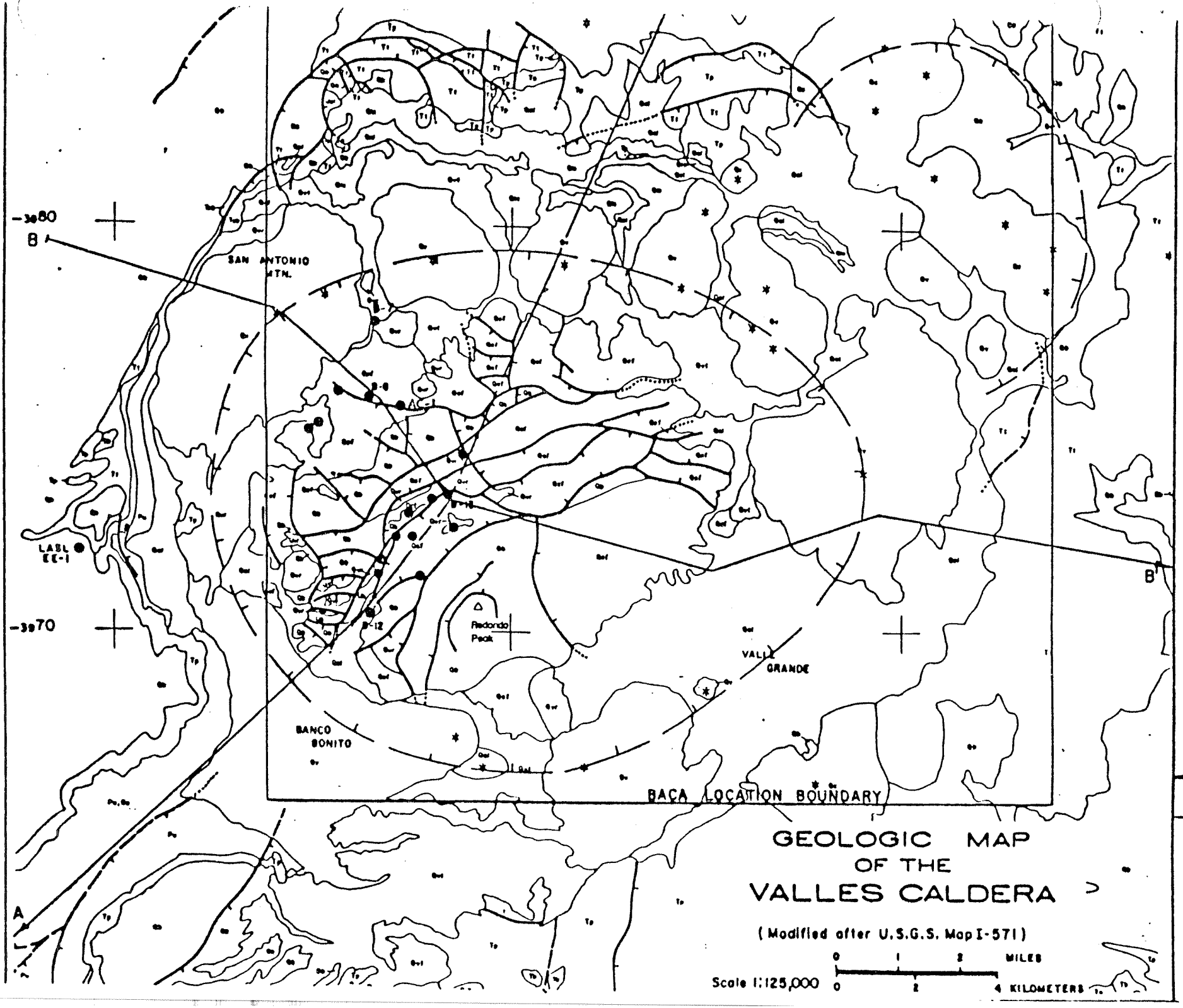
Temperature Contours at 3750' ASL

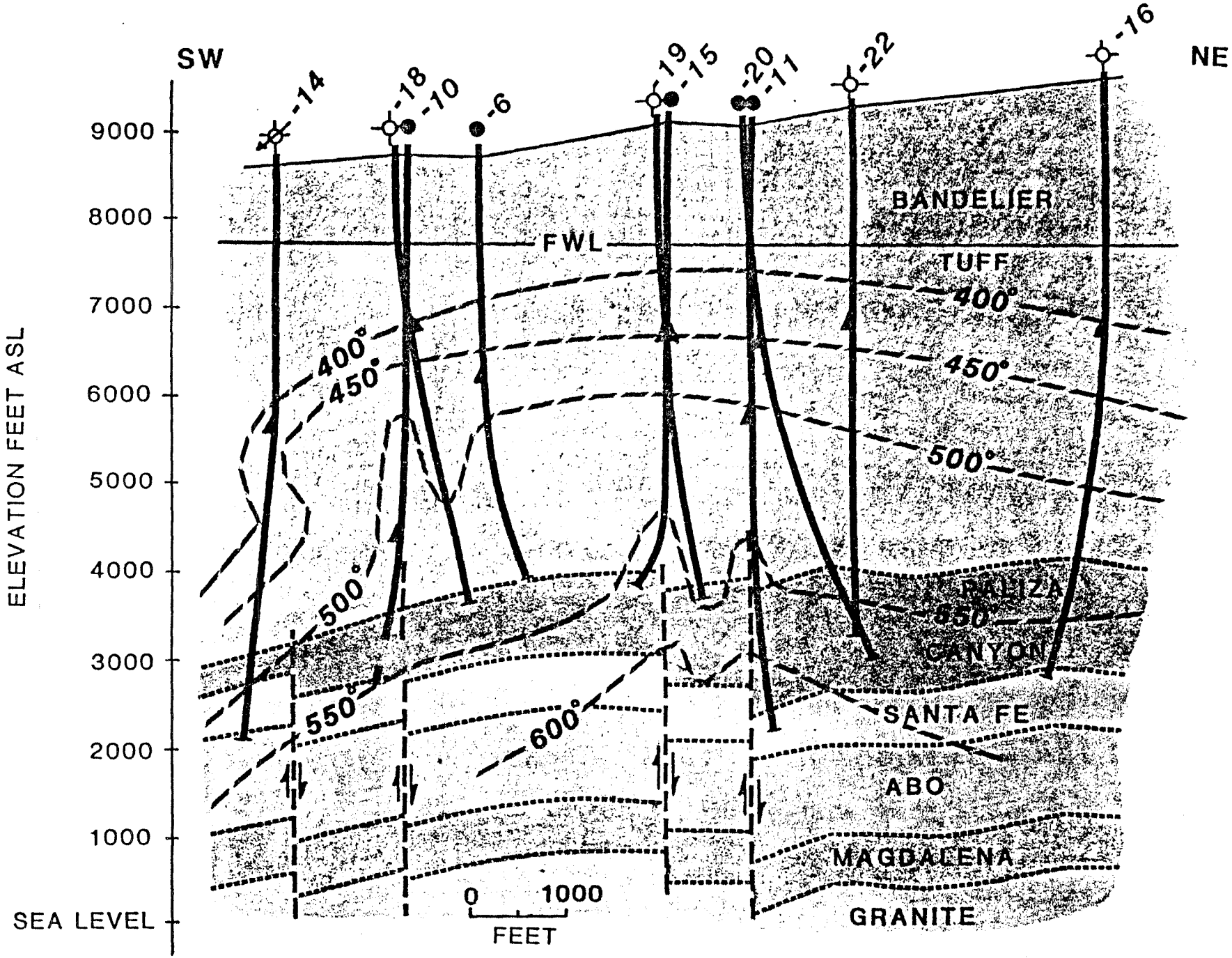

D
F(0)
BACA#11
R.C.
BACA#4
F(3)
F''(5)
F'(6)
F'(5)
F'''(6)
CF2
Qvrc
CF1
CFT
Qvb
10,000'
9000'
8000'
7000'
6000'
5000'
4000'
3000'
2000'
1000'
1000'
CASING PT.
LIMITS OF WELL LOCATION
LOST CIRCULATION
STEAM
CASING PT.
STEAM
PREFERRED INTERPRETATION OF WELL LOCATIONS
STEAM
Tpc
Tsl



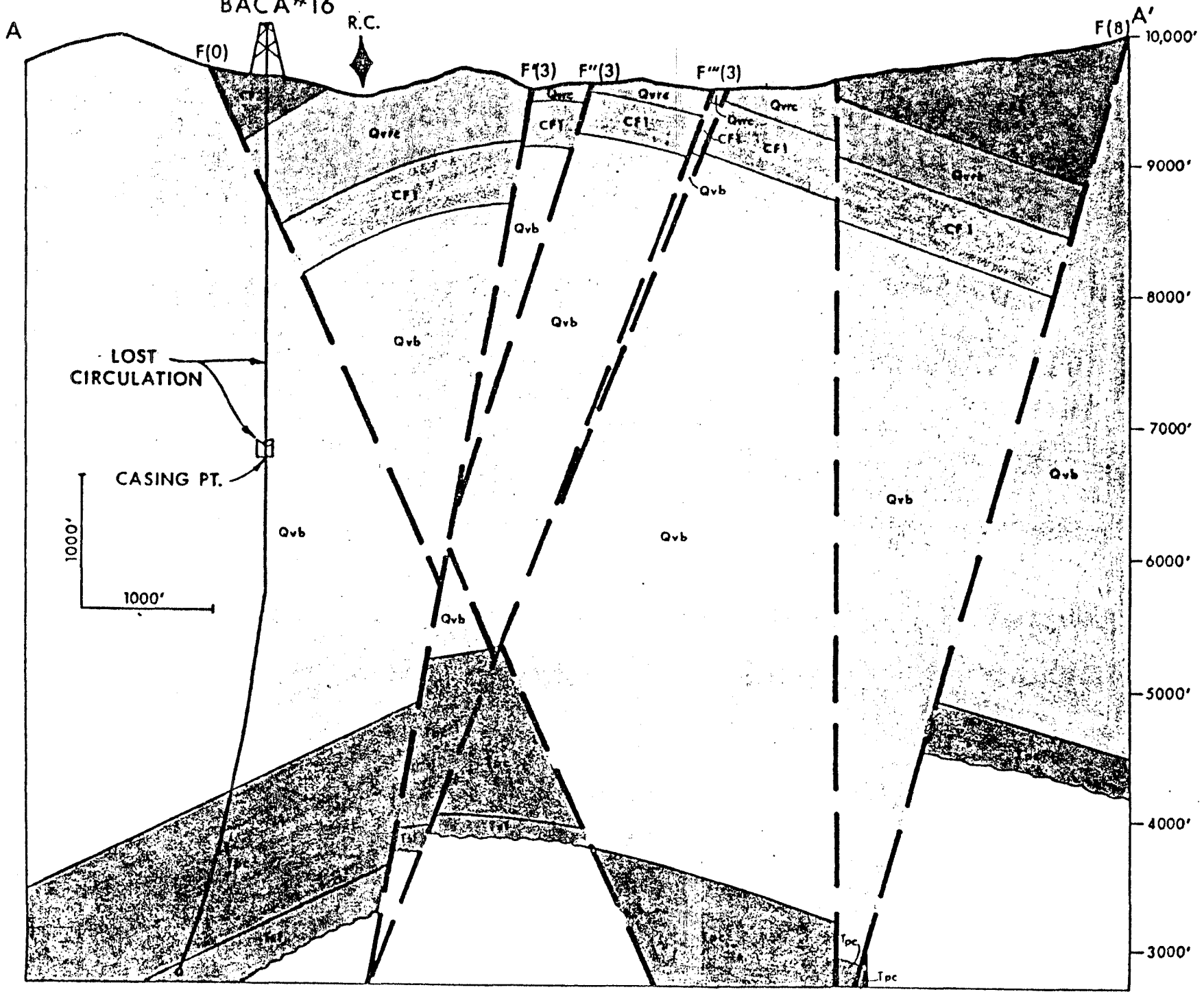
GEOLOGIC & ISOTHERMAL CROSS SECTION of

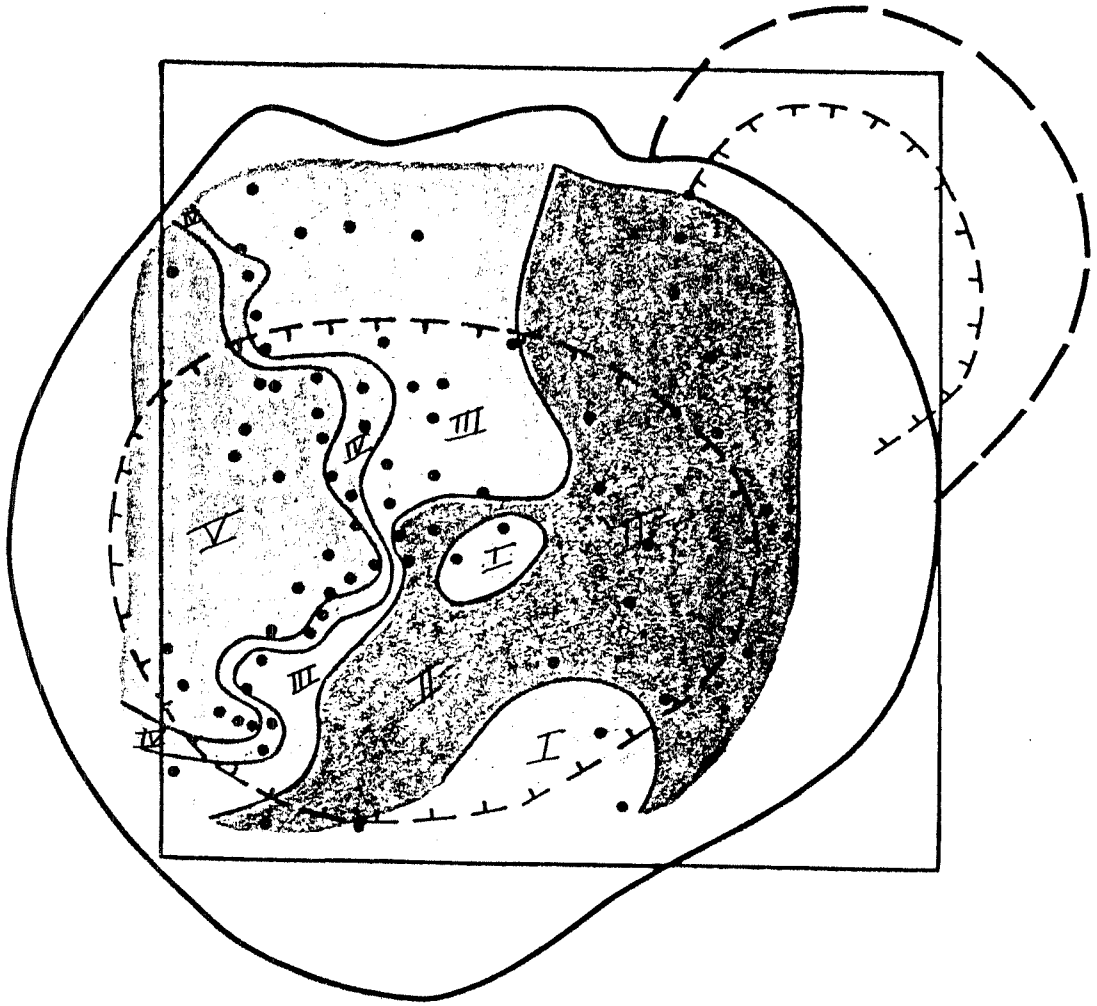
REDONDO CREEK BACA, NEW MEXICO


-3980
B
SAN ANTONIO MTN.
LASL EE-1
-3970
Redondo Peak
VALLE GRANDE
BANCO BONITO
B'
A
A'
BACA LOCATION BOUNDARY
GEOLOGIC MAP
OF THE
VALLES CALDERA
(Modified after U.S.G.S. Map I-571)
0 1 2 MILES
Scale 1:125,000
0 2 4 KILOMETERS



GEOLOGIC & ISOTHERMAL CROSS SECTION of REDONDO CREEK BACA, NEW MEXICO


BACA #16
R.C.
A
A'
F(0)
F'(3)
F''(3)
F'''(3)
F(8)
10,000'
9000'
8000'
7000'
6000'
5000'
4000'
3000'
LOST CIRCULATION
CASING PT.
1000'
1000'
Qvb
Qvrc
CF1
Tpc
Tsl



union 76

GEOTHERMAL DIVISION
BACA PROSPECT

TEMPERATURE GRADIENT FROM 150'-250' IN F°/100'

• Data Point

I		< 5°
II		5°-10°
III		10°-15°
IV		15°-20°
V		> 20°