

WELL HISTORY
DIXIE FEDERAL 45-14

THERMAL POWER COMPANY

Dixie Valley Geothermal Prospect
Churchill County, Nevada

18 July 1979

Well Summary: Dixie Federal 45-14

Location: Approximate 45 Kettleman location on Section 14 T23N R35E MDB&M within Federal Geothermal Lease N-11853.

Permits: U. S. Geological Survey Permit No. 0069, approved 11-3-78
Nevada Division of Water Resources Permit No. 35792, approved 2-16-79

| | | | |
|-----------------|-----------------------|---------|-------------------------------|
| Drilling Dates: | Spudded on 4-25-79 | Casing: | 20" to 120', 13 3/8" to 1330' |
| | Suspended on 7-10-79 | | 9 5/8" 1123 to 5398' |
| | at 9022' Total Depth. | | 7" 5178' to 6290' |
| | | | 8 1/2" open hole to T.D. |

Brief of Operations

Peter Bawden Drilling Inc. (Rig 23) drilled hole and cemented 20" casing from 120-foot depth to surface. Alluvium-volcanics contact drilled at 1100 feet. Cemented 20" casing from 1330 feet to surface. Drilled ahead with 12 1/4" bits. Volcanics - metasediment contact drilled at 2525 feet. Hole continued in metasediments (predominately siltstone) to 4618 feet where rapidly increasing hole deviation, to maximum of 20°, and consistent eastward drift were found unacceptable. Plugged back 12 1/4" hole to 3604 feet, directionally drilled with Dynadrill turning to west. Both original hole and redrilled hole crossed a silica sealed fault zone at approximately 3800-3900 feet (no fluids encountered in either penetration).

Continued Dynadrilling to 4244 feet, got hole to 3° angle and N85°W direction at 4353 feet but hole deviation dropped and wellbore turned eastward again. Subordinated directional control to gain faster depth penetration; continued 12 1/4" hole in metasediments with mud drilling fluid to 5400 feet. Obtained Schlumberger DIL, CNL-FDL, GR Caliper and Temperature Log at 5405 feet. Placed and cemented 9 5/8" liner from 5398 to 1123 feet. Converted to water drilling fluid and drilled 8 1/2" hole to 8534 feet. Attempted same Schlumberger log suite plus DM, FIL and directional survey; obtained only FDL GR and Caliper (8543 to 5398 feet). Attempted to flow well by air lifting through open ended drill pipe at 5398 feet; obtained only surges, no continuous flow.

Ran Kuster recording thermometer to 8500-foot depth and obtained 385°F. maximum reading at bottom. This survey indicated water entry at 5830 feet which would mask a proper evaluation of zone below 8000 feet. Drilled 8 1/2" hole to 8912 feet with water. Ran multiple Schlumberger logs; obtained only CNL and IES (8916 to 5398 feet). Drilled to 9022 feet total depth while waiting on casing. Left 3 cones from bit on bottom. Placed and cemented 7" liner from 6290 to 5178 feet and thereby isolated the zone below 8000 feet. Attempted to flow well by air lifting through 3 1/2" drill string at 5000, 6300 and 7500 feet; obtained only surges. Filled well with water, cleaned out to 9022 feet and released rig. Well is suspended and accessible to 9022 feet for further evaluations and tests.

THERMAL POWER COMPANY

Dixie Valley Geothermal Prospect
Churchill County, Nevada

18 July 1979

Attempted Flow Tests: Dixie Federal 45-14

Attempts were made to cause well Dixie Federal 45-14 to flow by reducing the wellbore pressure opposing possible producing formation. Such pressure reduction was accomplished by using a Magcobar air compressor to lift the water column out of the wellbore. Three series of efforts using this method were performed.

The first attempt to "blow down" the well was on June 28, 1979. Open-ended drill pipe (OEDP) was run to 5398' and air was injected down the drill pipe. The well was free to "unload" its water column and (if possible) produce through a seven-inch line installed beneath the rotating head. After considerable air injection (almost one hour), drilling fluid followed by dark red water exited the well. The fluids were quite hot and mixed with the injected air, causing the water to surge at wellhead pressures to 200 psig. Such surges were short-lived (10-60 seconds) and caused compressor pressures to drop to 600-700 psig. After 20 minutes of slow build-up to compressor pressures of almost 1000 psi, the well would unload as before, with a blast of water followed by a blast of air. The compressor pressure would meanwhile fall rapidly and the cycle begin again. These blow-down attempts ended after 12 1/2 hours of such cycling.

Subsequent to drilling the well ahead to 8912', another attempt to blow down the well was made for four hours on July 2, 1979. OEDP was run to 5400' and the compressor started at noon. Compressor back pressures of 1000 psig and some help from the rig's drilling pumps were required to unload the well. After one hour of air injection, the well unloaded and continued to cycle as before between high injection pressures coupled with no flow to low injection pressures coupled with momentary surges of fluid. Maximum pressures and temperatures recorded were 62 psig and 232°F. The cycles again occurred roughly every 20 minutes.

The tests above, coupled with the knowledge gained from the IES, CNL, and temperature logs taken between them, led to the conclusion that a water entry existed at 5820 - 5870' and possibly 6208'. These entries were producing water almost as quickly as it could be emptied from the wellbore by the compressor, as evidenced by the 20-minute cycles of high-to-low-to-high compressor pressure. It was concluded that to test the possibly productive zones below 8000' would require their isolation from these shallower water entries. Consequently, a seven-inch liner was run successfully to 6290'.

Subsequent to the running and testing of the seven-inch liner, the third and last series of attempts were made to cause the well to flow. Drill pipe with a 6" bit (jets removed to permit full air passage) was run to 5048', 6281', and 7500', where at each point the air compressor, sometimes in conjunction with the rig's drilling pumps, was used to unload the well of water. The plot of air compressor pressure versus time with notes concerning the surges observed and other remarks is attached. In summary, twenty-one (21) hours of blowing the well at the various intervals was attempted. Different cycles of compressor pressure and surging flow were noted than previously. The compressor pressure dropped to 150-250 psig during the unloading stages, rather than to 600-700 psig levels during the briefer unloading periods before the seven-inch liner was run. After the well was first unloaded at each depth, it took 3-4 hours of pumping before compressor pressures were again sufficient to unload what water was coming up past the bit.

The conclusions from these last attempts to flow Dixie Federal 45-14 were:

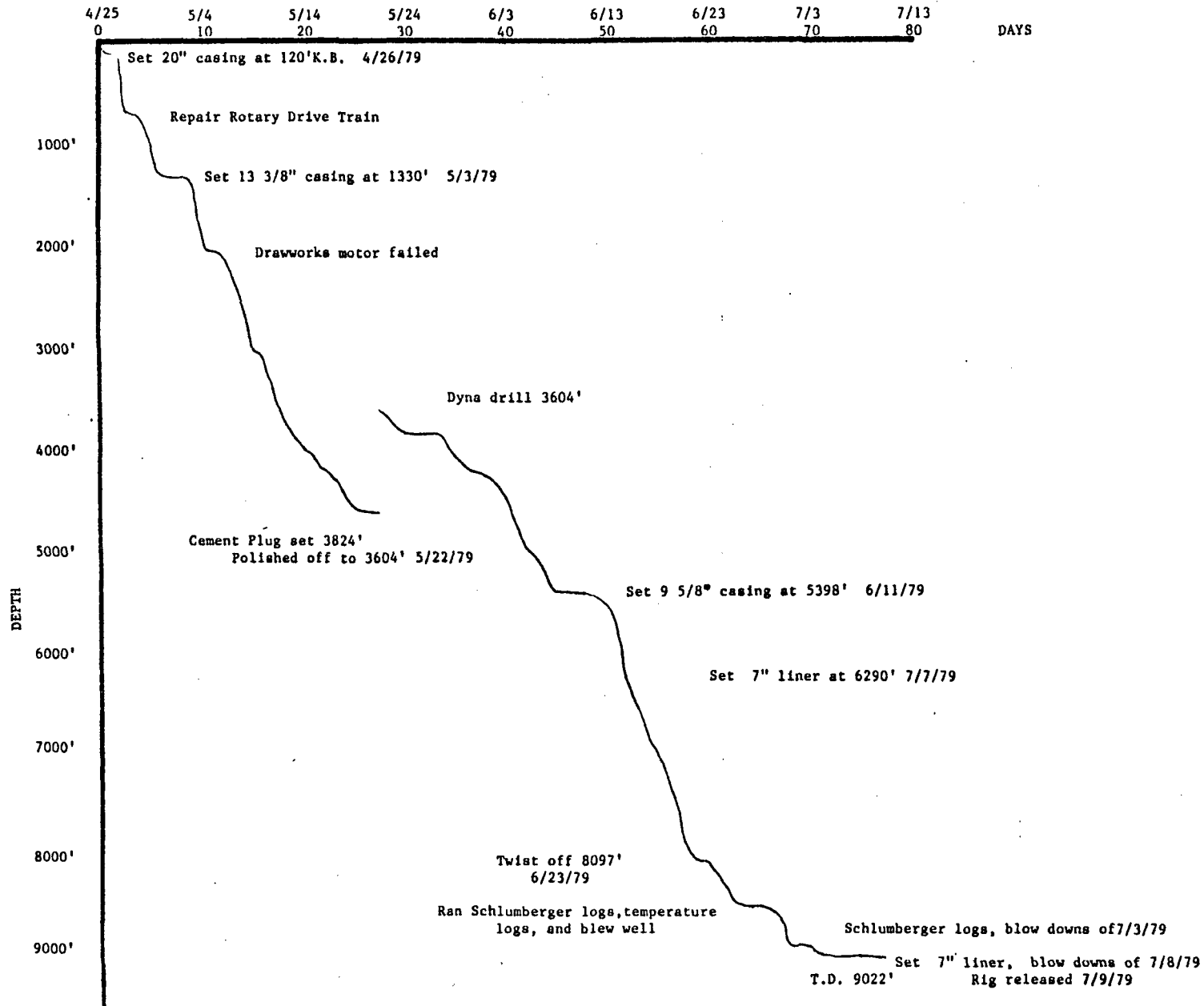
1. The massive water entry at 5820-5870' was shut off.
2. The compressor, with some help from the mud pumps, was able to virtually clear the wellbore of water above the point of air injection.
3. Despite evacuating water from the wellbore to as deep as 7500', the Dixie Federal 45-14 had insufficient permeability to commence flowing on its own as of 7-8-79. The possible benefits of temperature equilibration or other time adjustments within the prospective interval below 8000' may include eventual capacity to flow. This potential will be evaluated with future flow attempts.
4. There is some small liquid entry somewhere between 6290 and 9022 feet which caused the air compressor to go through very long (3-4 hour) cycles of unloading and slowly re-filling the wellbore.

THERMAL POWER CO. - SOUTHLAND ROYALTY CO.

Daily Drill Rate

Dixie Federal 45-14

Churchill County, Nevada



PRESSURE SURVEYS

PRESSURE SERVICE

P.O. BOX 624

ELK GROVE, CALIFORNIA, 95624

A Line of Service

SUBSURFACE PRESSURE SURVEY

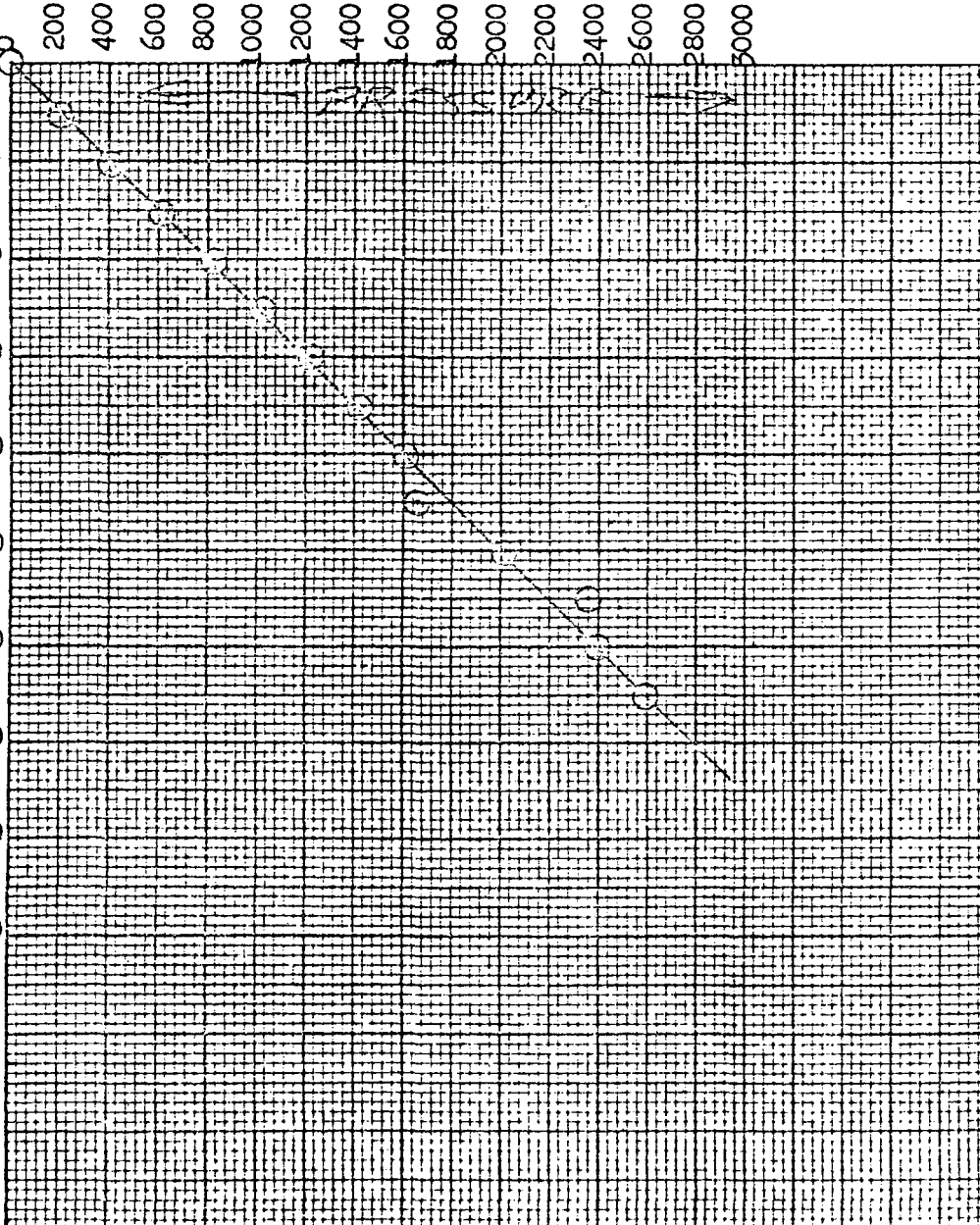
Dixie Federal

OWNER Thermal Power Co. FIELD Dixie Valley WELL NAME 45-14
 CASING 9-5/8" 1123-5398 ELEV. 3410' DATE: 6-29-79
 LINER DESCRIPTION ZERO POINT Rig Floor 22'
 TUBING DETAIL @ ZONE Meta Sediment

PUMP SHOE GAS ANCHOR INTAKE
 PURPOSE Temperature and pressure survey to locate fluid entry and movement. Well producing
 REMARKS 20 GPM while running survey. Survey indicates entry 5830' flowing down hole more than
 PICKUP @ MAXIMUM TEMPERATURE °F @ to surface. Shook instruments
 Temperature instrument #39570 325° F to 550° F vigorously while going in hole
 Pressure element #42317 3000 psi calibrated @ 400° 3-6-78. below 5830'

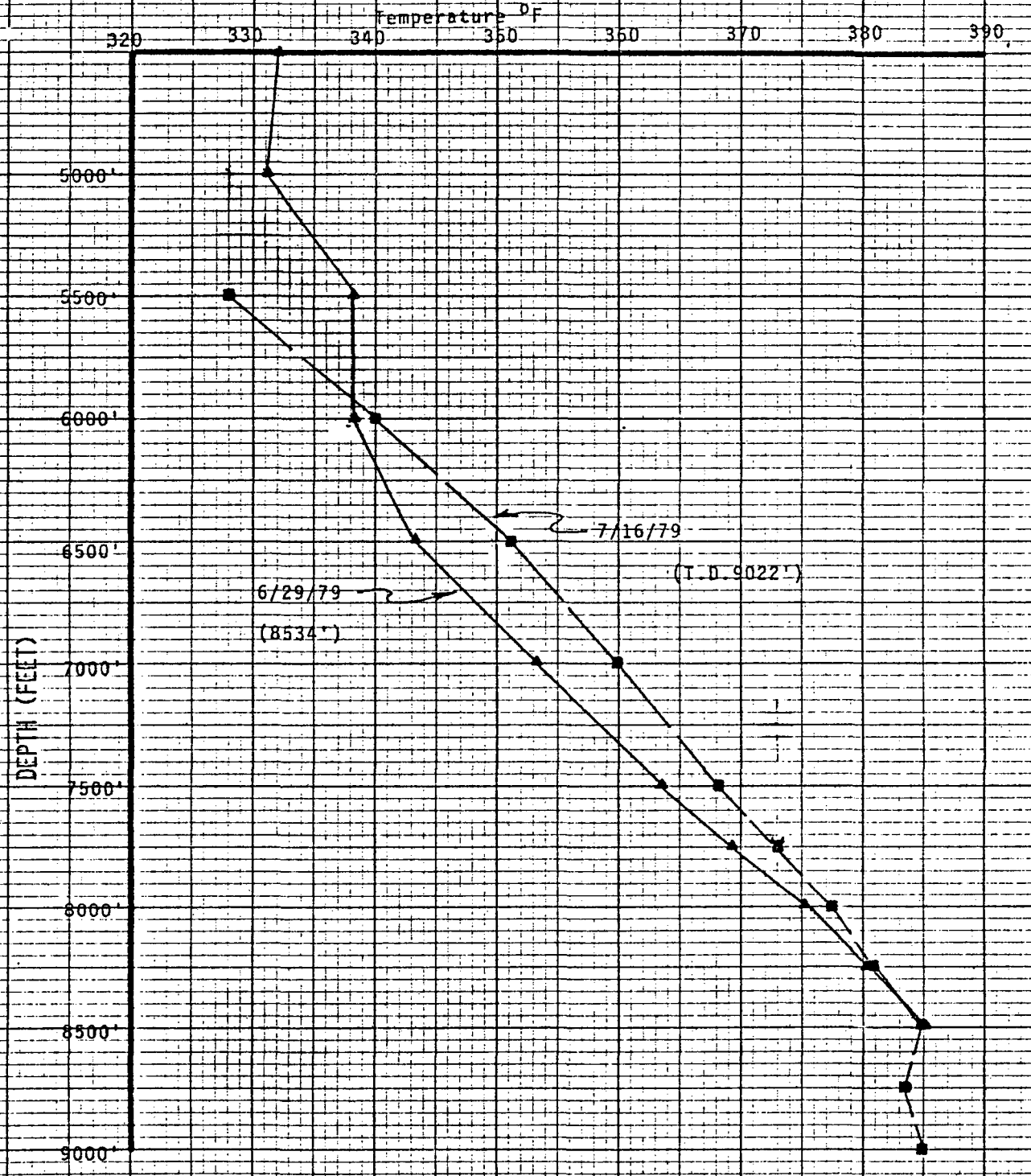
STABILIZATION PERIOD
 GROSS OIL RATE B/D
 NET OIL RATE B/D
 FORMATION GAS MCF/D
 GOR CFT/BBL
 CIRCULATED GAS MCF/D
 OIL DRY GRAVITY °API
 BEAN SIZE
 CASING PRESSURE
 TUBING PRESSURE

| DEPTH | PRESS | TEMP | GRAD. PRESS |
|-------|-------|----------|-------------|
| 0 | 0 | | |
| 500 | 204 | | .410 |
| 1000 | 412 | | .416 |
| 1500 | 617 | | .410 |
| 2000 | 824 | | .414 |
| 2500 | 1028 | | .408 |
| 3000 | 1225 | | .394 |
| 3500 | 1426 | | .402 |
| 4000 | 1618 | | .384 |
| 4500 | 1656 | 332.0° F | .076 |
| 5000 | 2008 | 331.1 | .704 |
| 5500 | 2361 | 338.1 | .706 |
| 6000 | 2402 | 338.1 | .082 |
| 6500 | 2592 | 343.3 | .360 |
| 7000 | | 353.2 | |
| 7500 | | 363.5 | |
| 7750 | | 369.3 | |
| 8000 | | 375.3 | |
| 8250 | | 380.4 | |
| 8500 | | 385.2 | |



TEMPERATURE SURVEY DATA

THERMAL POWER COMPANY SOUTHLAND ROYALTY COMPANY
 DIXIE FEDERAL 45-14 GEOTHERMAL WELL



▲ Survey taken 6/29/79 by Pressure Service Inc., Elk Grove, Ca.
 ■ Survey taken 7/16/79 by Pressure Service Inc., Elk Grove, Ca.

Well is located Sec 14 T 23 N R 35 E



Southland Royalty Company

INTER OFFICE CORRESPONDENCE

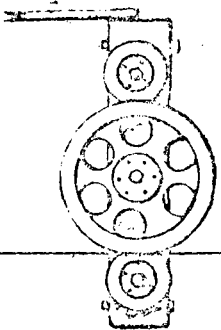
FROM: Jere Denton

DATE: July 18, 1979

TO: File

SUBJECT: TPC Dixie Valley 45-14
Temperature Survey performed on July 15, 1979

| Depth | New Bomb | Old Bomb |
|--------|--------------------|--------------------|
| 5,000' | 328 ^o | 318.9 ^o |
| 5,500' | | 323.4 ^o |
| 6,000 | 340 ^o | 329.7 ^o |
| 6,500 | 351.2 ^o | 304.6 ^o |
| 7,000 | 359.9 ^o | 348.1 ^o |
| 7,500 | 368.1 ^o | 356.4 ^o |
| 7,750 | 373 ^o | 360.7 ^o |
| 8,000 | 377.5 ^o | 365.8 ^o |
| 8,250 | 380.9 ^o | 369.6 ^o |
| 8,500 | 384.6 ^o | 373.7 ^o |
| 8,750 | 383.5 ^o | 371.6 ^o |
| 9,000 | 385.9 ^o | 373.7 ^o |
| 9,022 | 385.5 ^o | |



PRESSURE SERVICE

P.O. BOX 624

ELK GROVE, CALIFORNIA, 95624

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JUL 23 1979

IPC

A Line of Service

SUB-SURFACE SURVEY

file
Dixie Federal

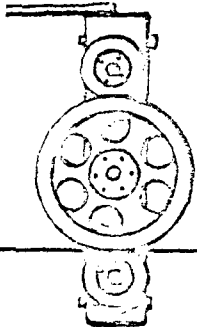
| | | |
|-------------------------|--------------------|-------------------------|
| OWNER THEMAL POWER CO. | FIELD Dixie Valley | WELL NAME 45-14 |
| CASING 9-5/8" 1123-5398 | ELEV. 3410' | DATE: 7-16-79 |
| LINER DESCRIPTION | | ZERO POINT Ground + 22' |
| | | Depth |
| TUBING DETAIL | @ | ZONE Meta Sediment |

| | | |
|--|--|--------------------------|
| PUMP SHOE | GAS ANCHOR | INTAKE |
| PURPOSE Take Bottom hole temperature and make stops as requested, try to identify fluid entry and temperature reversals. | REMARKS Possible fluid movement up hole from 8750' | |
| ELEMENT 325° - 550° F | SERIAL No. 39570 | CLOCK 3 hr 15 TURN screw |
| ENGAGE STYLUS 10:11AM | DISENGAGE STYLUS 12:45 | |
| OBS TBG. PRESS. | OBS. CSG. PRESS 150 psi | |
| COR TBG. PRESS. | COR. CSG. PRESS | |
| PICKUP @ | TIME ON BOTTOM 12:00 | TIME OFF BOTTOM 12:10 |

Stops made @ 500' intervals above 5500' not within range of instrument.

| DEPTH | TEMPERATURE |
|-------|-------------|
| 5500 | 328.9 |
| 6000 | 340.7 |
| 6500 | 351.3 |
| 7000 | 359.9 |
| 7500 | 368.1 |
| 7750 | 373.0 |
| 8000 | 377.5 |
| 8250 | 380.9 |
| 8500 | 384.6 |
| 8750 | 383.5 |
| 9000 | 384.9 |
| 9025 | 385.5 |

R. K. McAnally



PRESSURE SERVICE

P.O. BOX 624

ELK GROVE, CALIFORNIA, 95624

A Line of Service

SUB-SURFACE SURVEY

| | | |
|--|--------------------------------|--------------------------------------|
| OWNER <u>Thermal Power Co.</u> | FIELD <u>Dixie Valley</u> | WELL NAME <u>Dixie Federal 15-14</u> |
| CASING <u>9-5/8" 1123-9393</u> | ELEV. _____ | DATE <u>7-16-79</u> |
| LINER DESCRIPTION _____ | | ZERO POINT <u>Ground + 22'</u> |
| | | Depth <u>9,025</u> |
| TUBING DETAIL _____ | @ _____ | ZONE <u>Meta Sediment</u> |
| PUMP SHOE _____ | GAS ANCHOR _____ | INTAKE _____ |
| PURPOSE <u>Take Bottom hole temperature and make stops as requested, try to identify fluid entry and temperature reversals. Possible fluid entry and movement up hole from 8750'</u> | | |
| REMARKS _____ | | |
| ELEMENT <u>200° = 534° F</u> | SERIAL No. <u>KT 5356</u> | CLOCK <u>3hr 15</u> TURN |
| ENGAGE STYLUS <u>2:30PM</u> | DISENGAGE STYLUS <u>4:45PM</u> | |
| OBS TBG. PRESS. _____ | OBS. CSG. PRESS <u>150 psi</u> | |
| COR TBG. PRESS. _____ | COR. CSG. PRESS _____ | |
| PICKUP @ _____ | TIME ON BOTTOM <u>4:00PM</u> | TIME OFF BOTTOM <u>4:10PM</u> |

(This instrument last calibrated June 1966 although instrument has not been used only 3 times in this period the instrument is not accurate and reads about 11° low, the temperatures below are given as read and does not include any corrections)

| DEPTH | TEMPERATURE |
|-------|-------------|
| 4000 | 268.0 |
| 4500 | 394.7 |
| 5000 | 518.9 |
| 5500 | 323.4 |
| 6000 | 329.7 |
| 6500 | 340.6 |
| 7000 | 348.1 |
| 7500 | 356.4 |
| 7750 | 360.7 |
| 8000 | 365.8 |
| 8250 | 369.6 |
| 8500 | 373.7 |
| 8750 | 371.6 |
| 9000 | 373.7 |

R. K. McAnally

THERMAL POWER COMPANY - SOUTHLAND ROYALTY COMPANY

Dixie Federal 45-14
Temperature Survey of 7/16/79

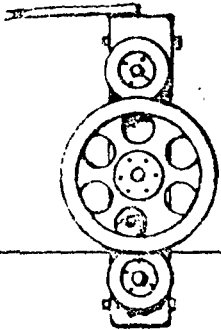
Taken by: Pressure Service, Inc., Elk Grove, CA

Total depth: 9022'

| <u>Depth</u> | <u>Temperature (°F)</u> |
|--------------|-------------------------|
| 5500' | 328.9 |
| 6000' | 340.0 |
| 6500' | 351.2 |
| 7000' | 359.9 |
| 7500' | 368.1 |
| 7750' | 373.0 |
| 8000' | 377.5 |
| 8250' | 380.9 |
| 8500' | 384.6 |
| 8750' | 383.5 |
| 9000' | 384.9 |
| 9022' (T.D.) | 385.5 |

*Instrument utilized G.R.C. (325°-550°F)

LdL/pw



PRESSURE SERVICE

P.O. BOX 624

ELK GROVE, CALIFORNIA, 95624

A Line of Service

SUB-SURFACE SURVEY

| | | | | | |
|-------------------|--|------------------|------------------|-----------------|---------------------|
| OWNER | Thermal Power Company | FIELD | Dixie Valley | WELL NAME | Dixie Federal 45-14 |
| CASING | 9-5/8" 1123-5398 | ELEV. | | DATE: | 8-8-79 |
| LINER DESCRIPTION | | | | ZERO POINT | Ground + 22' |
| | | | | Depth | 9025' |
| TUBING DETAIL | 2" Valve on top of tree. @ 2" Threaded line pipe | | ZONE | | |
| | box up. | | | | |
| PUMP SHOE | GAS ANCHOR | | INTAKE | | |
| PURPOSE | Temperature survey to check bottom hole temperature and for reversals. | | | | |
| REMARKS | Found no reversals. | | | | |
| ELEMENT | 325-550° F | SERIAL No. | 39570 | CLOCK | 3 hr. 15 TURN screw |
| ENGAGE STYLUS | 9:20AM | DISENGAGE STYLUS | 12:05PM | | |
| OBS TBG. PRESS. | | | OBS. CSG. PRESS. | | |
| COR TBG. PRESS. | | | COR. CSG. PRESS. | | |
| PICKUP @ | 9018' | TIME ON BOTTOM | 20 Min. | TIME OFF BOTTOM | |

| DEPTH | TEMPERATURE |
|-------|-------------|
| 5000 | 325.0 |
| 5200 | 328.6 |
| 5400 | 328.6 |
| 5600 | 332.0 |
| 5800 | 336.7 |
| 6000 | 341.1 |
| 6200 | 345.6 |
| 6400 | 350.0 |
| 6600 | 353.9 |
| 6800 | 357.9 |
| 7000 | 361.1 |
| 7200 | 364.0 |
| 7400 | 366.7 |
| 7600 | 370.0 |
| 7800 | 373.2 |
| 8000 | 376.3 |
| 8200 | 379.3 |
| 8400 | 381.6 |
| 8600 | 384.1 |
| 8800 | 384.9 |
| 9000 | 385.3 |
| 9018 | 386.9 |

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AUG 14 1979

TPC

R. K. McAnally

CHEMICAL ANALYSIS OF PRODUCED
GEOHERMAL FLUIDS

THERMAL POWER COMPANY - SOUTHLAND ROYALTY COMPANY

SR-2 WATER WELL
Chemical Analysis

Location: Sec. 14 T23N R35E
Performed by: Water Resources Center
Desert Research Institute
University of Nevada

ANALYSIS OF WATER WELL WATER
USED TO MAKE UP DRILLING MUD
ON WELL.

A) Chemical Analysis

| | <u>4/23/79</u> <u>DV 15</u> | <u>5/15/79</u> <u>DV 30</u> |
|------------------|--------------------------------|--------------------------------|
| Ph | 7.63 (lab) | 6.89 (field) |
| Ca | 156 Mgl | 138 |
| Mg | 30 | 25 |
| Na | 400 | 400 |
| K | 30 | 18.6 |
| Cl | 535 | 575 |
| So ₄ | 454 | 426 |
| HCO ₃ | 200 | 211 |
| SiO ₂ | 98 | 105 |
| F | 4.39 | 4.4 |

B) Geothermometry

| | <u>1/3 Fudge</u> <u>Factor</u> | <u>4/3 Fudge</u> <u>Factor</u> |
|----------------------------|-----------------------------------|-----------------------------------|
| <u>Ca-Na-K Temperature</u> | 162°C | 92°C |
| Silica (Quartz) | 133°C | 139.9°C |
| Silica (Mixing Model) | 205°-216°C | |

LdL/pw
7/12/79

THERMAL POWER COMPANY - SOUTHLAND ROYALTY COMPANY

Dixie Federal 45-14
Chemical Analysis

Location: Sec. 14 T23N R35E
Performed by: Water Resources Center
Desert Research Institute
University of Nevada
Date Collected: July 7, 1979

The following chemical analysis is incomplete and will be completed by the university as soon as possible.

| | | | |
|------------------|--------------|----|-------------|
| ph | 9.44 | K+ | 65 mg/liter |
| HCO ₃ | 6.1 mg/liter | Ca | 22.5 " |
| CO ₃ | 117 " " | Mg | 0.01 " |
| Chloride | 700 " " | Si | 300 " |
| SO ₄ | 352 " " | Ba | 0.13 " |
| Fl | 9.5 " " | Li | 0.97 " |
| Na | 610 " " | | |

LdL/pw
7/18/79

FILE: DIXIE FED. 1/5-14



Environmental Analysis Laboratories
2030 Wright Avenue
Richmond, California 94804
(415) 235-2633
(TWX) 910-382-8132

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TPC

ANALYSIS REPORT

Customer: Thermal Power Company
601 California Street
San Francisco, California 94108

Date: August 20, 1979

Samples Received: July 13, 1979

LFE Reference No.: 05300-000-1013

Purchase Order No.: _____

| Analysis | Units | DF-45-14 6/29 | T 23N R35E 6/11 |
|---------------------|---------------------|---------------|-----------------|
| | | 615-9-1 | 615-9-2 |
| Calcium | mg/l | 88 | 150 |
| Magnesium | mg/l | 1.1 | 24 |
| Potassium | mg/l | 39 | 18 |
| Sodium | mg/l | 460 | 400 |
| Chloride | mg/l | 600 | 520 |
| Conductance, Spec. | µmhos/cm | 3000 | 3000 |
| Fluoride | mg/l | 6.4 | 4.4 |
| Nitrogen, Nitrate | mg N/l | < 0.10 | < 0.10 |
| pH | | 7.5 | 7.2 |
| Phosphate - Total | mg P/l | 0.15 | < 0.05 |
| Residue - Dissolved | mg/l | 1600 | 1200 |
| Silica - Reactive | mgSi/l | 48 | 46 |
| Sulfate | mg/l | 250 | 410 |
| Alkalinity | mgCaCO ₃ | 150 | 170 |
| Turbidity | NTU | 410 | 9 |

George E. Quater
FOR Martha Waters, Supervisor
Environmental Laboratory

Analysis are performed according to EPA or State of California recommended methods when applicable. LFE Environmental is a State of California Approved Laboratory for complete chemical, bacteriological, and bioassay.



Environmental Analysis Laboratories

2030 Wright Avenue
Richmond, California 94804
(415) 235-2633

CORPORATION (TWX) 910-382-8132

2nd REPORT

ANALYSIS REPORT

1st Report dated 8-20-79

Customer: Mr. Lou DeLeon
Thermal Power Company
601 California Street
San Francisco, CA 94108

Date: September 5, 1979

Samples Received: July 13, 1979

LFE Reference No. 05300-000-1013

Purchase Order No.: _____

| Analysis | Units | Make-up Water 615-8-1 |
|-------------|-------|--------------------------|
| Gross Alpha | pCi/l | < 5 |
| Gross Beta | pCi/l | 39 ±3 |

Total alpha based on Pu^{239}
Total beta - Cs^{137}

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SEP 7 1979

TPC

George E. Dunstan
George E. Dunstan
Chemist

FINAL DATA

DF 45-14

Point Type, Temp. °C HW 94°

Co., Twp., Rng. Co. Twp. Rng.

Sec., Qtrs., Seq. No. 5 Present

Point Description Southland Well #1

Sample Designation Code DV 90 (45-14)

pH 7.13

TDS()

Sp. Cond. Umhos/cm@25°C 2150
 mg/l epm

HCO₃⁻ 130.5 2.139

CO₃⁼

Cl⁻ 493 13.888

SO₄⁼ 215 4.476

F⁻ 7.6 0.400

NO₃⁻

H₂PO₄⁻

HPO₄⁻

HPO₄⁼

P

Total Anions 20.882

Na⁺ 410

K⁺ 40 1.023

Ca⁺⁺ 24.1 1.230

Mg⁺⁺ 0.015 0.001

 Li 1.01 0.144

 Sr 1.06 0.024

WATER ANALYSIS LABORATORY -- WATER RESOURCES CENTER
DESERT RESEARCH INSTITUTE

LABORATORY REPORT
DATE: COLLECTION 9-13-79

FINAL DATA

mg/l epm

| | |
|---------------|--------|
| Total Cations | 20.257 |
|---------------|--------|

| | |
|------------------|-------|
| Anions / Cations | 1.030 |
|------------------|-------|

| | |
|------------------|-----|
| SiO ₂ | 325 |
|------------------|-----|

DIRECTIONAL SURVEY PLOTS
MULTI & SINGLE SHOT SURVEYS

THERMAL POWER COMPANY DECL: 17 E F:148-6 ANGLE AVERAGE
WELL: DIXIE FEDERAL 45X14 JOB NO: P-0579-S0635 PITT-WALKER
DIXIE VALLEY FIELD, NEVADA MULTI-SHOT 0-3594 & 6325-9022
ELEVATION: 3437', K. B.
WELL ASSUMED VERTICAL TO 1330
STATIONS 2626' THRU 3594', DROP MULTI-SHOT SURVEY, 17 MAY 79
STATIONS 3630' THRU 6171', SINGLE SHOT SURVEY
STATIONS 6325' THRU 9000', OPEN HOLE MULTI-SHOT, 16 JUL 79
STATION AT 9022' WAS PROJECTED.

VERTICAL SECTION CALCULATED IN PLANE OF BOTTOM HOLE CLOSURE

RECORD OF SURVEY

ANGLE AVERAGING METHOD

THERMAL POWER COMPANY
 WELL: DIXIE FEDERAL 45X14
 DIXIE VALLEY FIELD, NEVADA

DECL: 17 E F:148-6 ANGLE AVERAGE
 JOB NO: P-0579-S0635 PITT-WALKER
 MULTI-SHOT 0-3594 & 6325-9022

COMPUTATION
 TIME DATE
 13:18:04 31-JUL-79

PAGE NO. 1

| MEASURED DEPTH FEET | DRIFT ANGLE D M | DRIFT DIRECTION D | COURSE LENGTH FEET | TRUE VERTICAL DEPTH FEET | VERTICAL SECTION FEET | SUBSEA TVD FEET | R E C T A N G U L A R C O O R D I N A T E S FEET | | DOGLEG SEVERITY DG/100FT |
|---------------------------|-----------------------|-------------------------|--------------------------|-----------------------------------|-----------------------------|-----------------------|--|----------|--------------------------------|
| 1330. | 0 0 | 0 | 0. | 1330.00 | 0.00 | -2107.00 | 0.00 | 0.00 | 0.00 |
| 2626. | 3 30 | S 75 E | 1296. | 2625.40 | 39.36 | -811.60 | 10.24 S | 38.23 E | 0.27 |
| 2714. | 5 15 | S 75 E | 88. | 2713.14 | 46.04 | -723.86 | 11.98 S | 44.71 E | 1.99 |
| 2802. | 6 15 | S 78 E | 88. | 2800.70 | 54.83 | -636.30 | 14.04 S | 53.29 E | 1.19 |
| 2890. | 7 0 | S 86 E | 88. | 2888.11 | 64.98 | -548.89 | 15.45 S | 63.34 E | 1.35 |
| 2978. | 7 0 | S 84 E | 88. | 2975.45 | 75.68 | -461.55 | 16.39 S | 74.02 E | 0.28 |
| 3066. | 6 45 | S 84 E | 88. | 3062.82 | 86.19 | -374.18 | 17.49 S | 84.50 E | 0.28 |
| 3154. | 6 0 | N 85 E | 88. | 3150.28 | 95.86 | -286.72 | 17.57 S | 94.27 E | 1.62 |
| 3242. | 6 0 | N 84 E | 88. | 3237.79 | 104.76 | -199.21 | 16.69 S | 103.43 E | 0.12 |
| 3330. | 7 0 | S 90 E | 88. | 3325.23 | 114.51 | -111.77 | 16.17 S | 113.38 E | 1.37 |
| 3418. | 8 0 | N 84 E | 88. | 3412.48 | 125.75 | -24.52 | 15.57 S | 124.85 E | 1.44 |
| 3506. | 9 0 | N 86 E | 88. | 3499.51 | 138.37 | 62.51 | 14.44 S | 137.80 E | 1.18 |
| 3594. | 10 30 | N 86 E | 88. | 3586.24 | 152.89 | 149.24 | 13.40 S | 152.67 E | 1.70 |
| 3630. | 10 0 | N 81 E | 36. | 3621.66 | 159.06 | 184.66 | 12.67 S | 159.03 E | 2.83 |
| 3660. | 10 0 | N 75 E | 30. | 3651.21 | 163.93 | 214.21 | 11.59 S | 164.13 E | 3.47 |
| 3692. | 10 0 | N 67 E | 32. | 3682.72 | 168.83 | 245.72 | 9.78 S | 169.38 E | 4.34 |
| 3718. | 9 0 | N 62 E | 26. | 3708.36 | 172.37 | 271.36 | 7.93 S | 173.26 E | 4.98 |
| 3762. | 8 0 | N 58 E | 44. | 3751.88 | 177.43 | 314.88 | 4.68 S | 178.89 E | 2.64 |
| 3807. | 7 0 | N 47 E | 45. | 3796.50 | 181.47 | 359.50 | 1.10 S | 183.55 E | 3.88 |
| 3851. | 7 0 | N 39 E | 44. | 3840.17 | 184.47 | 403.17 | 2.82 N | 187.21 E | 2.21 |
| 3905. | 5 45 | N 35 E | 54. | 3893.83 | 187.29 | 456.83 | 7.61 N | 190.82 E | 2.46 |
| 3948. | 4 15 | N 26 E | 43. | 3936.67 | 188.66 | 499.67 | 10.84 N | 192.72 E | 3.93 |
| 3992. | 5 15 | N 6 E | 44. | 3980.52 | 189.10 | 543.52 | 14.34 N | 193.72 E | 4.36 |
| 4037. | 7 15 | N 2 E | 45. | 4025.25 | 188.68 | 588.25 | 19.23 N | 194.06 E | 4.55 |
| 4079. | 7 30 | N 11 W | 42. | 4066.90 | 187.42 | 629.90 | 24.60 N | 193.64 E | 4.01 |
| 4124. | 7 30 | N 24 W | 45. | 4111.52 | 184.80 | 674.52 | 30.20 N | 191.87 E | 3.76 |
| 4168. | 6 15 | N 36 W | 44. | 4155.20 | 181.49 | 718.20 | 34.76 N | 189.24 E | 4.31 |
| 4200. | 5 0 | N 45 W | 32. | 4187.05 | 179.10 | 750.05 | 37.15 N | 187.20 E | 4.77 |
| 4301. | 3 0 | N 75 W | 101. | 4287.80 | 172.53 | 850.80 | 40.67 N | 181.10 E | 2.80 |
| 4353. | 3 0 | N 85 W | 52. | 4339.73 | 169.81 | 902.73 | 41.14 N | 178.42 E | 1.01 |

THERMAL POWER COMPANY
 WELL: DIXIE FEDERAL 45X14
 DIXIE VALLEY FIELD, NEVADA

DECL: 17 E F:148-6 ANGLE AVERAGE
 JOB NO: P-0579-S0635 PITT-WALKER
 MULTI-SHOT 0-3594 & 6325-9022

COMPUTATION
 TIME DATE
 13:18:04 31-JUL-79

PAGE NO. 2

| MEASURED DEPTH FEET | DRIFT ANGLE D M | DRIFT DIRECTION D | COURSE LENGTH FEET | TRUE VERTICAL DEPTH FEET | VERTICAL SECTION FEET | SUBSEA TVD FEET | R E C T A N G U L A R C O O R D I N A T E S FEET | | DOGLEG SEVERITY DG/100FT |
|---------------------------|-----------------------|-------------------------|--------------------------|-----------------------------------|-----------------------------|-----------------------|--|----------|--------------------------------|
| 4398. | 2 30 | N 84 W | 45. | 4384.68 | 167.65 | 947.68 | 41.35 N | 176.27 E | 1.12 |
| 4503. | 1 0 | N 82 W | 105. | 4489.63 | 164.45 | 1052.63 | 41.74 N | 173.09 E | 1.43 |
| 4631. | 0 30 | N 46 E | 128. | 4617.62 | 163.69 | 1180.62 | 43.33 N | 172.57 E | 1.07 |
| 4775. | 2 30 | N 81 E | 144. | 4761.57 | 166.76 | 1324.57 | 45.02 N | 175.95 E | 1.47 |
| 4861. | 3 45 | N 81 E | 86. | 4847.44 | 171.21 | 1410.44 | 45.75 N | 180.58 E | 1.45 |
| 5045. | 4 45 | N 86 E | 184. | 5030.94 | 184.36 | 1593.94 | 47.29 N | 194.12 E | 0.58 |
| 5250. | 4 0 | S 81 E | 205. | 5235.34 | 199.89 | 1798.34 | 46.61 N | 209.75 E | 0.60 |
| 5405. | 4 30 | S 88 E | 155. | 5389.91 | 211.36 | 1952.91 | 45.51 N | 221.18 E | 0.46 |
| 5560. | 4 0 | S 86 E | 155. | 5544.49 | 222.78 | 2107.49 | 44.91 N | 232.65 E | 0.34 |
| 5815. | 4 30 | S 84 E | 255. | 5798.79 | 241.64 | 2361.79 | 43.26 N | 251.48 E | 0.20 |
| 6038. | 5 45 | S 82 E | 223. | 6020.89 | 261.54 | 2583.89 | 40.83 N | 271.25 E | 0.57 |
| 6171. | 9 15 | S 81 E | 133. | 6152.76 | 278.90 | 2715.76 | 38.27 N | 288.42 E | 2.63 |
| 6325. | 8 30 | S 80 E | 154. | 6304.91 | 302.66 | 2867.91 | 34.35 N | 311.85 E | 0.50 |
| 6400. | 9 0 | S 78 E | 75. | 6379.04 | 314.06 | 2942.04 | 32.17 N | 323.05 E | 0.78 |
| 6500. | 8 30 | S 75 E | 100. | 6477.88 | 329.23 | 3040.88 | 28.62 N | 337.85 E | 0.68 |
| 6600. | 9 30 | S 80 E | 100. | 6576.65 | 344.84 | 3139.65 | 25.23 N | 353.12 E | 1.27 |
| 6700. | 10 30 | S 81 E | 100. | 6675.13 | 362.21 | 3238.13 | 22.37 N | 370.24 E | 1.01 |
| 6800. | 10 30 | S 79 E | 100. | 6773.45 | 380.43 | 3336.45 | 19.20 N | 388.19 E | 0.36 |
| 6900. | 10 30 | S 76 E | 100. | 6871.78 | 398.62 | 3434.78 | 15.26 N | 405.98 E | 0.55 |
| 7000. | 10 0 | S 73 E | 100. | 6970.18 | 416.30 | 3533.18 | 10.50 N | 423.13 E | 0.73 |
| 7100. | 10 30 | S 69 E | 100. | 7068.59 | 433.82 | 3631.59 | 4.71 N | 439.95 E | 0.87 |
| 7200. | 12 0 | S 71 E | 100. | 7166.66 | 452.97 | 3729.66 | 1.96 S | 458.29 E | 1.55 |
| 7300. | 11 30 | S 70 E | 100. | 7264.57 | 472.99 | 3827.57 | 8.76 S | 477.48 E | 0.54 |
| 7400. | 12 0 | S 69 E | 100. | 7362.47 | 492.95 | 3925.47 | 15.89 S | 496.56 E | 0.54 |
| 7500. | 12 0 | S 71 E | 100. | 7460.29 | 513.35 | 4023.29 | 23.00 S | 516.10 E | 0.42 |
| 7600. | 11 45 | S 70 E | 100. | 7558.15 | 533.59 | 4121.15 | 29.87 S | 535.49 E | 0.32 |
| 7700. | 11 45 | S 68 E | 100. | 7656.05 | 553.50 | 4219.05 | 37.17 S | 554.50 E | 0.41 |
| 7800. | 12 0 | S 67 E | 100. | 7753.91 | 573.51 | 4316.91 | 45.04 S | 573.52 E | 0.32 |
| 7900. | 12 30 | S 67 E | 100. | 7851.64 | 594.10 | 4414.64 | 53.34 S | 593.05 E | 0.50 |
| 8000. | 12 0 | S 65 E | 100. | 7949.36 | 614.59 | 4512.36 | 61.97 S | 612.43 E | 0.66 |

THERMAL POWER COMPANY
 WELL: DIXIE FEDERAL 45X14
 DIXIE VALLEY FIELD, NEVADA

DECL: 17 E F:148-6 ANGLE AVERAGE
 JOB NO: F-0579-S0635 PITT-WALKER
 MULTI-SHOT 0-3594 & 6325-9022

COMPUTATION
 TIME DATE
 13:18:04 31-JUL-79

PAGE NO. 3

| MEASURED DEPTH FEET | DRIFT ANGLE D M | DRIFT DIRECTION D | COURSE LENGTH FEET | TRUE VERTICAL DEPTH FEET | VERTICAL SECTION FEET | SUBSEA TVD FEET | R E C T A N G U L A R C O O R D I N A T E S FEET | | DOGLEG SEVERITY DG/100FT |
|---------------------------|-----------------------|-------------------------|--------------------------|-----------------------------------|-----------------------------|-----------------------|--|----------|--------------------------------|
| 8100. | 12 0 | S 68 E | 100. | 8047.17 | 634.72 | 4610.17 | 70.26 S | 631.50 E | 0.62 |
| 8200. | 12 15 | S 70 E | 100. | 8144.94 | 655.26 | 4707.94 | 77.78 S | 651.11 E | 0.49 |
| 8300. | 12 0 | S 70 E | 100. | 8242.71 | 675.88 | 4805.71 | 84.97 S | 670.84 E | 0.25 |
| 8400. | 11 30 | S 65 E | 100. | 8340.62 | 695.68 | 4903.62 | 92.76 S | 689.66 E | 1.13 |
| 8500. | 11 45 | S 73 E | 100. | 8438.57 | 715.39 | 5001.57 | 99.98 S | 708.47 E | 1.63 |
| 8600. | 11 30 | S 74 E | 100. | 8536.52 | 735.37 | 5099.52 | 105.70 S | 727.79 E | 0.32 |
| 8700. | 11 0 | S 76 E | 100. | 8634.59 | 754.77 | 5197.59 | 110.75 S | 746.64 E | 0.63 |
| 8800. | 10 0 | S 73 E | 100. | 8732.92 | 772.88 | 5295.92 | 115.62 S | 764.20 E | 1.14 |
| 8900. | 10 0 | S 73 E | 100. | 8831.40 | 790.07 | 5394.40 | 120.70 S | 780.80 E | 0.00 |
| 9000. | 10 0 | S 74 E | 100. | 8929.88 | 807.29 | 5492.88 | 125.63 S | 797.45 E | 0.17 |
| 9022. | 10 0 | S 74 E | 22. | 8951.55 | 811.08 | 5514.55 | 126.69 S | 801.12 E | 0.00 |

ASSUMED VERT TO 1330; 9022 PROJ'D; DIR ASSUMED 5560 THRU 6171

FINAL CLOSURE - DIRECTION: S 81 DEGS 1 MINS E
 DISTANCE: 811.08 FEET

THERMAL POWER COMPANY
 STATE FEDERAL 45X14 (ORIG HOLE)
 BLAKE VALLEY, NEVADA

DECL: 17 E F:17-14
 JOB NO: S0635
 MULTI-SHOT SURVEY

AVE ANGLE
 PITT

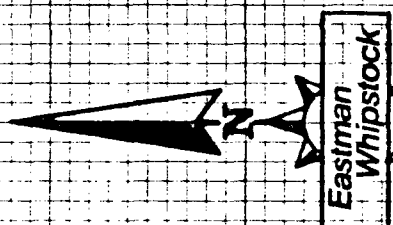
COMPUTATION
 TIME DATE
 10:11:38 00--00

PAGE NO. 1

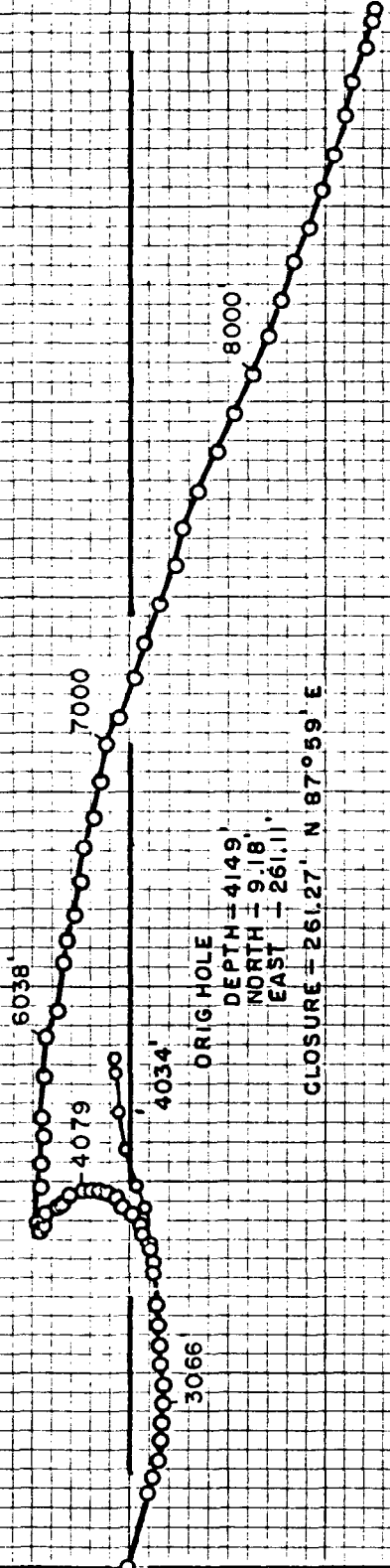
| MEASURED DEPTH FEET | DRIFT ANGLE D M | DRIFT DIRECTION D | COURSE LENGTH FEET | TRUE VERTICAL DEPTH FEET | VERTICAL SECTION FEET | SUBSEA TVD FEET | R E C T A N G U L A R C O O R D I N A T E S FEET | | DOGLEG SEVERITY IG/100FT |
|---------------------------|-----------------------|-------------------------|--------------------------|-----------------------------------|-----------------------------|-----------------------|--|----------|--------------------------------|
| 1330. | 0 0 | 0 | 0. | 1330.00 | 0.00 | -2107.00 | 0.00 | 0.00 | 0.00 |
| 2626. | 3 30 | S 75 E | 1296. | 2625.40 | 37.85 | -811.60 | 10.24 S | 38.23 E | 0.27 |
| 2714. | 5 15 | S 75 E | 88. | 2713.14 | 44.26 | -723.86 | 11.98 S | 44.71 E | 1.99 |
| 2802. | 6 15 | S 78 E | 88. | 2800.70 | 52.76 | -636.30 | 14.04 S | 53.29 E | 1.19 |
| 2890. | 7 0 | S 86 E | 88. | 2888.11 | 62.76 | -548.89 | 15.45 S | 63.34 E | 1.35 |
| 2978. | 7 0 | S 84 E | 88. | 2975.45 | 73.40 | -461.55 | 16.39 S | 74.02 E | 0.28 |
| 3066. | 6 45 | S 84 E | 88. | 3062.82 | 83.83 | -374.18 | 17.49 S | 84.50 E | 0.28 |
| 3154. | 6 0 | N 85 E | 88. | 3150.28 | 93.59 | -286.72 | 17.57 S | 94.27 E | 1.62 |
| 3242. | 6 0 | N 84 E | 88. | 3237.79 | 102.78 | -199.21 | 16.69 S | 103.43 E | 0.12 |
| 3330. | 7 0 | N 90 E | 88. | 3325.23 | 112.74 | -111.77 | 16.17 S | 113.38 E | 1.37 |
| 3418. | 8 0 | N 84 E | 88. | 3412.48 | 124.22 | -24.52 | 15.57 S | 124.85 E | 1.44 |
| 3506. | 9 0 | N 86 E | 88. | 3499.51 | 137.21 | 62.51 | 14.44 S | 137.80 E | 1.18 |
| 3594. | 10 30 | N 86 E | 88. | 3586.24 | 152.10 | 149.24 | 13.40 S | 152.67 E | 1.70 |
| 3682. | 10 45 | N 80 E | 88. | 3672.73 | 168.27 | 235.73 | 11.42 S | 168.77 E | 1.29 |
| 3770. | 10 15 | N 76 E | 88. | 3759.26 | 184.06 | 322.26 | 8.08 S | 184.46 E | 1.00 |
| 3858. | 10 45 | N 74 E | 88. | 3845.78 | 199.69 | 408.78 | 3.93 S | 199.95 E | 0.70 |
| 3946. | 11 45 | N 74 E | 88. | 3932.09 | 216.35 | 495.09 | 0.80 N | 216.45 E | 1.14 |
| 4034. | 13 30 | N 79 E | 88. | 4017.96 | 235.20 | 580.96 | 5.29 N | 235.16 E | 2.34 |
| 4122. | 13 0 | N 83 E | 88. | 4103.62 | 255.22 | 666.62 | 8.44 N | 255.08 E | 1.19 |
| 4149. | 13 0 | N 83 E | 27. | 4129.93 | 261.27 | 692.93 | 9.18 N | 261.11 E | 0.00 |

FINAL CLOSURE - DIRECTION: N 87 DEGS 59 MINS E
 DISTANCE: 261.27 FEET

GRAFTS OF WELL TESTING
BLOW-DOWN ATTEMPTS



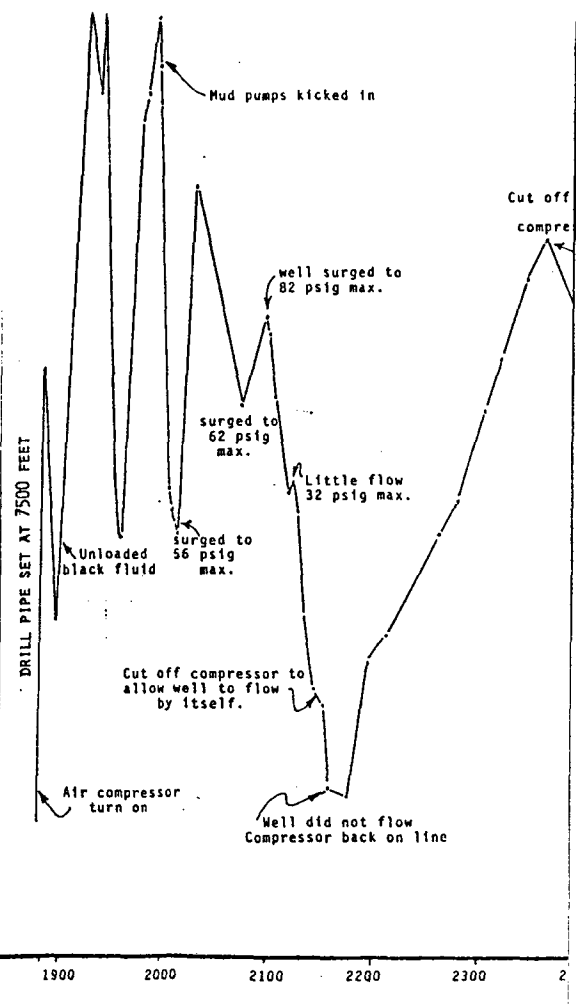
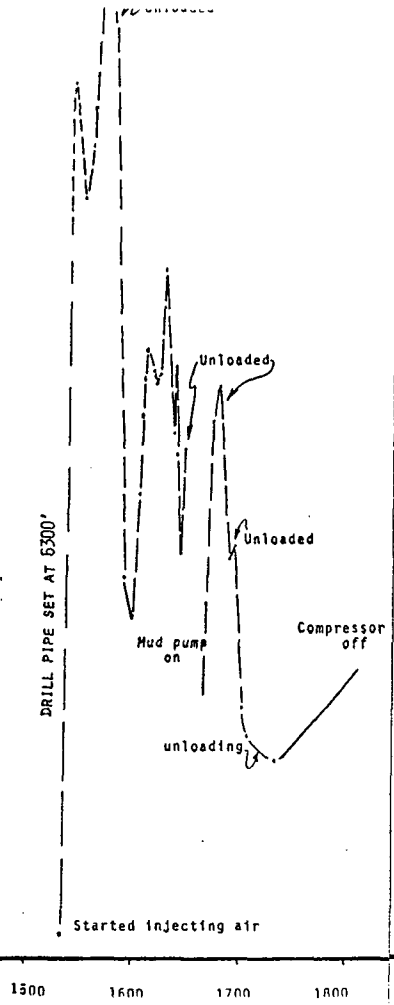
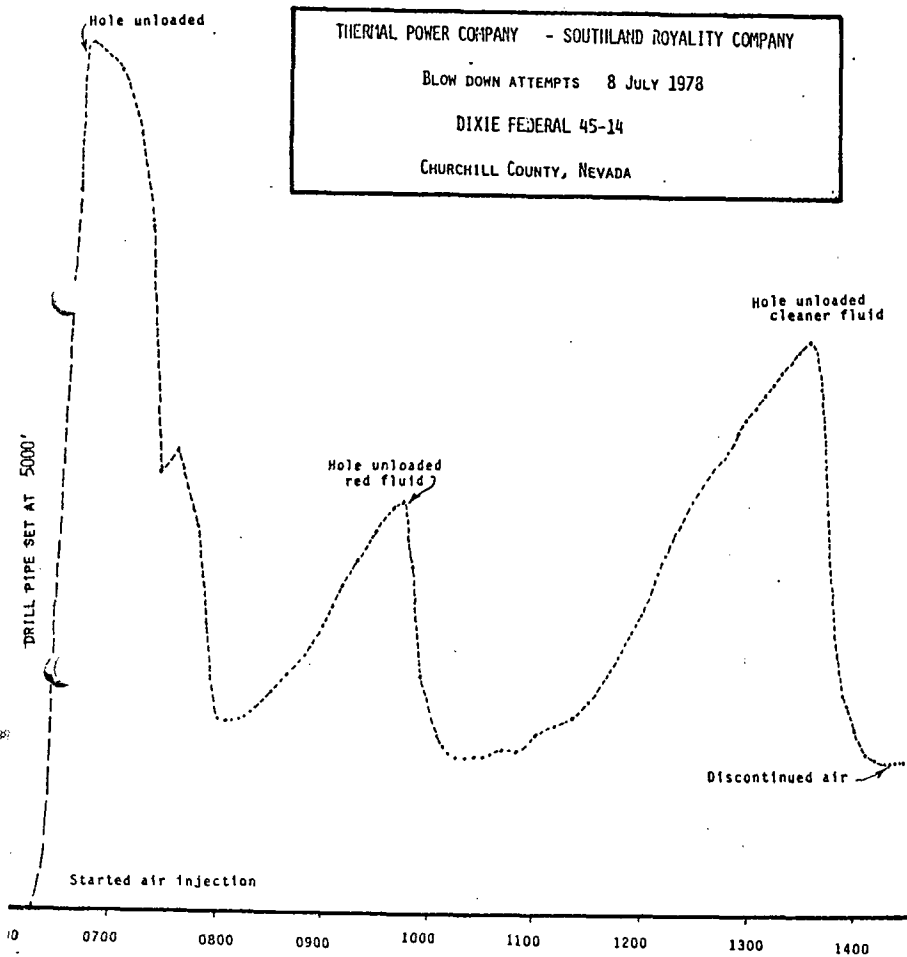
SCALE
1"=100'



ORIG HOLE
DEPTH = 4149'
NORTH = 9.18'
EAST = 261.11'
CLOSURE = 261.27' N 87° 59' E

DEPTH = 9022'
SOUTH = 126.69'
EAST = 801.12'
CLOSURE = 801.12' S 81° 01' E

THERMAL POWER COMPANY - SOUTHLAND ROYALTY COMPANY
 BLOW DOWN ATTEMPTS 8 JULY 1978
 DIXIE FEDERAL 45-14
 CHURCHILL COUNTY, NEVADA



AGNEW
AND
SWEET

WIRESERVICE

SUBSURFACE SURVEY

AGNEW AND SWEET

24 HOUR PHONE 805-327-2267

4205 ATLAS COURT

BAKERSFIELD, CALIFORNIA

93308

OWNER SOUTHLAND ROYALTIES COMPANY FIELD DIXIE VALLEY WELL NAME DIXIE FEDERAL 45-1
CASING 9-5/8" @ 4500' - 4700' ELEV. DATE September 27, 1979

LINER DESCRIPTION: ZERO POINT Mat + 20'

PERFORATIONS: MPP

TUBING DETAIL: open hole beyond 4700' DEPTH 9022' ZONE

WELL STATUS Static PUMP SHOE

SURVEYED TUB. ANN. open casing(X) ENGAGE STYLUS 11:53 am DISENGAGE STYLUS 2:39 pm

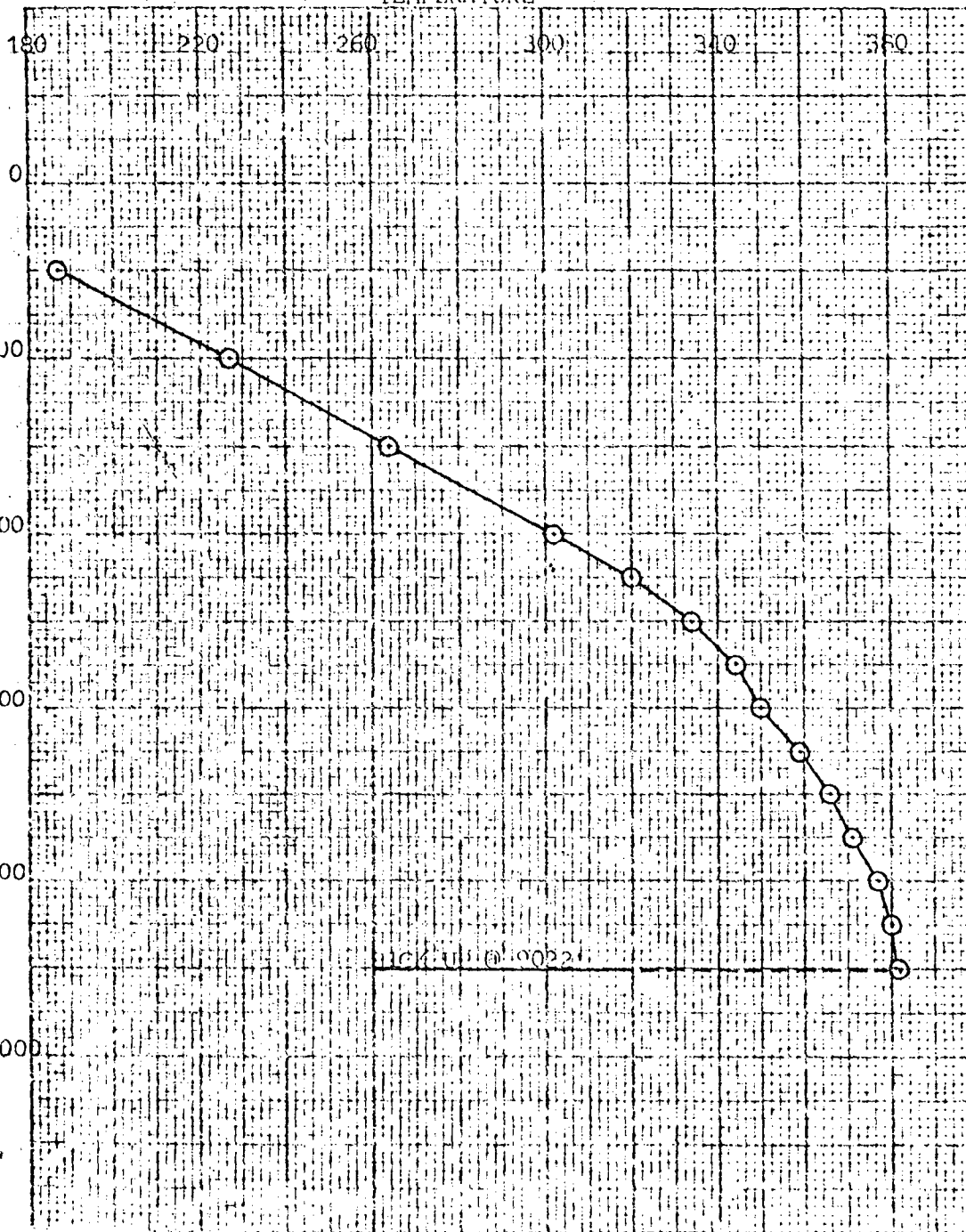
PICK UP @ 9022' TIME ON BOTTOM 2:04 pm TIME OFF BOTTOM 2:09 pm

ELEMENT RANGE 99-517 SERIAL NO 10286 CLOCK 3 hr. TURN 15

PURPOSE STATIC TEMPERATURE GRADIENT SURVEY MAX. °F 382.2 @ 9022'

REMARKS: STABILIZATION PERIOD

TEMPERATURE

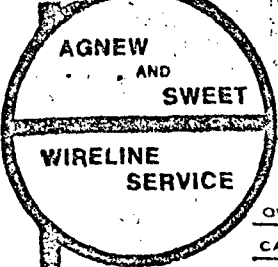


| PRESSURES: | START | FINISH |
|-------------------|--------|--------|
| DATE | 9/27 | |
| CASING PSI OBS | 150 | |
| CASING PSI COR | 160 | |
| TUBING PSI OBS | | |
| TUBING PSI COR | | |
| PRESS. STATUS | static | |
| INSTRUMENT HUNG @ | | |

| DEPTH | TEMP. |
|-------|-------|
| 0 | - |
| 1000 | 187.1 |
| 2000 | 227.5 |
| 3000 | 264.0 |
| 4000 | 302.8 |
| 4500 | 320.5 |
| 5000 | 334.6 |
| 5500 | 344.3 |
| 6000 | 350.4 |
| 6500 | 359.2 |
| 7000 | 366.2 |
| 7500 | 371.5 |
| 8000 | 377.2 |
| 8500 | 380.8 |
| 9000 | 381.0 |
| 9022 | 382.2 |

BY: SUNDBERG & CRAWFORD

/kh

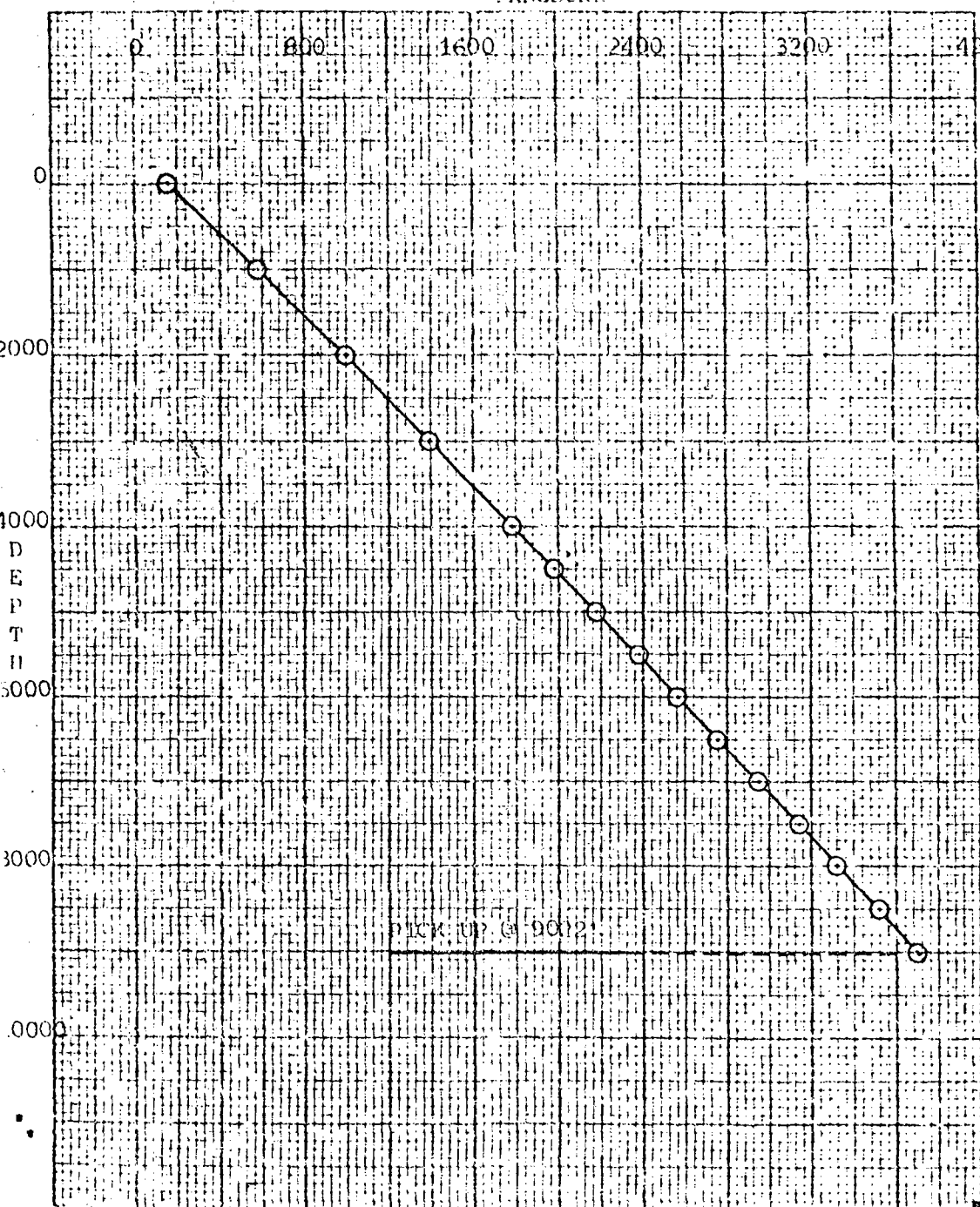


AGNEW AND SWEET
 24 HOUR PHONE 805-327-2267
 4205 ATLAS COURT
 BAKERSFIELD, CALIFORNIA
 93308

SUBSURFACE SURVEY

| | | | | | | |
|-------------------|---------------------------------|------------------------------|----------------|----------------------|---------------------|---------|
| OWNER | SOUTHLAND ROYALTIES CO. | FIELD | DIXIE VALLEY | WELL NAME | DIXIE FEDERAL 45-14 | |
| CASING | 9-5/8" @ 4500' - 4700' | ELEV. | | DATE: | September 27, 1979 | |
| LINER DESCRIPTION | | | | ZERO POINT | Mat +20' | |
| PERFORATIONS: | | | | MFP | | |
| TUBING DETAIL: | Open hole beyond 4700' | | | DEPTH | 9022' ZONE | |
| WELL STATUS | Static | | PUMP SHOE | SHUT IN | ON PRODUCTION | |
| SURVEYED | TUB. <input type="checkbox"/> | ANN <input type="checkbox"/> | open casing(X) | ENGAGE SYLUS | 11:53 am | |
| PICK UP @ | 9022' | | TIME ON BOTTOM | 2:01 pm | DISENGAGE SYLUS | 2:39 am |
| ELEMENT RANGE | 6050# | | SERIAL NO | 22885 | TIME OFF BOTTOM | 2:09 pm |
| PURPOSE | STATIC PRESSURE GRADIENT SURVEY | | | CLOCK | 3 hr. TURN 15 | |
| REMARKS. | | | | MAX. PF | 382.2 @ 9022' | |
| | | | | STABILIZATION PERIOD | | |

PRESSURE



| PRESSURES: | START | FINISH |
|----------------|--------|--------|
| DATE | 9/27 | |
| CASING PSI OBS | 150 | |
| CASING PSI COR | 160 | |
| TUBING PSI OBS | | |
| TUBING PSI COR | | |
| PRESS. STATUS | Static | |

| DEPTH | PRESS. | GRAD. |
|-------|--------|-------|
| 0 | 160 | |
| 1000 | 577 | .417 |
| 2000 | 994 | .417 |
| 3000 | 1391 | .397 |
| 4000 | 1785 | .394 |
| 4500 | 1975 | .380 |
| 5000 | 2174 | .398 |
| 5500 | 2376 | .404 |
| 6000 | 2569 | .386 |
| 6500 | 2759 | .378 |
| 7000 | 2954 | .392 |
| 7500 | 3138 | .368 |
| 8000 | 3324 | .372 |
| 8500 | 3520 | .392 |
| 9000 | 3697 | .354 |
| 9022 | 3705 | .363 |

BY: SUNDBERG & CRAWFORD /kh

THERMAL POWER COMPANY

DIXIE FEDERAL 45-14

Daily Drilling History
Dixie Valley, Churchill County, Nevada

DATE DEPTH

Installed 70.62 cm (30") conductor pipe at 5.79m (19') prior to drill rig moving in.

| | | |
|---------|-----------------|---|
| 4/25/79 | 37.80m(124') | Moved in and rigged up Peter Bawden Rig #23. Spudded well at 1600 hours. Picked up kelley, 44.45 cm (17½") bit and bottom hole assembly, drilled to 37.80m (124') w/bit #1 and 2 reamers. Picked up 67.31cm (26½") hole opener. R.I.H. and opened 44.45cm (17½") hole to 67.31cm (26½") from 12.19m (40') to 37.80m (124'). |
| 4/26/79 | 44.51m(146') | P.O.H. Ran 3 joints of 50.80 cm (20") 139.87 kg/m (94#/ft) H-40 buttress casing, total length 37.80m(124'). Landed shoe at 36.58m (120'KB). Halliburton cement service pumped 320 sacks Class "B" cement as slurry with 2% CaCl ₂ . Good returns to surface. CIP @ 0830 W.O.C. 12¼ hours. Cut off 50.80cm (20") casing and welded on 50.80 cm (20") bradenhead. Nippled up 50.80 cm (20") Hydril. Tested Hydril with 49.2Kg/cm ² (700 psig) for 15 minutes. Held O.K. Drilled cement from 36.58m (120') to 37.80m (124'). Drilled 6.7m (22') of 44.45 cm (17½") hole to 44.51m (146') with mud in hole. |
| 4/27/79 | 217.93m (715') | Drilled 173.43m (569') of 44.45 cm (17½") hole to 217.93m (715') with water in hole. |
| 4/28/79 | 225.86m (741') | Drilled 7.92m (26') of 44.45 cm (17½") hole to 225.86m (741') with water in hole. P.O.H. Repaired rotary drive train for 20 hours. |
| 4/29/79 | 298.70m (980') | Continued to repair drive train for 13 hours. R.I.H. with Bit #2 and B.H.A. Drilled 42.37m (139') of 44.45 cm (17½") hole to 298.70m (980') with water in hole. |
| 4/30/79 | 402.95m (1322') | Drilled 62.79m (206') of 44.45 cm (17½") hole to 361.49m (1186') with mud in hole. P.O.H. R.I.H. with Bit #3 and B.H.A. and drilled 41.45m (136') of 44.45 cm (17½") hole to 402.95m (1322') with water in hole. |
| 5/1/79 | 405.38m (1330') | Drilled 2.43m (8') of 44.45 cm (17½") hole to 405.38m (1330') with mud in hole. P.O.H. Rigged up and ran Schlumberger logging service. (Dual Induction Log) Rigged up to run casing. Ran 34 joints 33.97 cm (13 3/8"), 90.89 Kg/m (54.5 lb/ft) H-40 buttress casing. Total length 406m (1332'). Casing set 405.38m (1330') K.B. Rigged up Halliburton and circulated through casing prior to cementing. Pumped in 2.12m ³ (75 ft ³) of water followed by 940 sacks of Class "G" cement mixed with 1:1 perlite, 40% SiO ₂ , 3% gel and 5% CFR ₂ of slurry density of 1858.3Kg/m ³ (116 lb/ft ³) followed with 150 sacks of Class "G" cement with 40% SiO ₂ and 5% CFR ₂ . Had returns throughout but no cement to surface. C.I.P. 1430 hrs. W.O.C. 9½ hours while running 2.54 cm (1") tubing to locate top of cement. |

| | | |
|---------|-----------------|---|
| 5/2/79 | 405.38m (1330') | Ran 2.54 cm (1") tubing in 33.97 cm (13 3/8") casing to 50.80 cm (20") annulus to 163.4m (536'). Pumped 400 sacks class "G" cement mixed with 1:1 perlite plus 40% SiO ₂ and 5% CFR ₂ . Slurry density 1569.9Kg/m ³ (98 lb/ft ³). Followed with 150 sacks class "G" neat cement. Slurry density 1890.4Kg/cm ³ (118 lb/ft ³). 4 bbls clean cement to surface. C.I.P. 2200 hours. Pulled out 2.54 cm (1") tubing...17 joints. |
| 5/3/79 | 405.38m (1330') | W.O.C. Nipped up B.O.P. Tested blind rams with 70.3Kg/m ² (1000 psi) for 30 min. Held OK. Tested Hydrill with 49.21 Kg/cm ² (700 psi) for 30 min. Held O.K. Picked up 33.97cm (12 3/4") bit and B.H.A. and found plug at 381.91m (1253'). Drilled plug and baffle seat from 381.91m (1253') to 385.88m (1266') |
| 5/4/79 | 542.24m(1779') | Drilled out cement from 385.88m (1266') to shoe of 33.97cm (13 3/8") casing at 405.38m (1330'). Drilled with bit #4 for 48.46m (159') from 405.38m (1330') to 453.85m (1489') with water in hole. P.O.H. Changed bits & B.H.A. R.I.H. and drilled 118.87m (290') from 453.85m (1489') to 542.24m (1779') with water in hole. |
| 5/5/79 | 632.77m (2076') | Drilled 90.53m (297') of 31.12 cm (12 1/2") hole to 632.77m (2076') with water. |
| 5/6/79 | 632.77m(2076') | Changed out electric motor on draw works. |
| 5/7/79 | 676.05m (2218') | Completed installation of replacement electric motor on drawworks. Drilled 13.72m (45') of 31.12 (12 1/4") hole from 632.77m (2076') to 646.48m (2121') with mud in hole. P.O.H. R.I.H. with bit #6 and drilled 28.35m (93') of 31.13 cm (12 1/4") hole from 646.48m (2121') to 676.05m (2218') with mud. |
| 5/8/79 | 769.62m(2525') | Drilled 93.58m (307') of 31.12 cm (12 1/4") hole to 769.62m (2525') with mud. |
| 5/9/79 | 890.63m (2922') | Drilled 121.01m(397') of 31.12 cm (12 1/4") hole to 890.63m (2922') with mud. |
| 5/10/79 | 936.96m (3074') | Drilled 34.14m (112') of 33.12cm (12 1/4") hole to 924.76m (3034') P.O.H. Changed out B.H.A. and bit. R.I.H. with bit #7 and drilled 12.2m (40') of 33.12 cm (12 1/4") hole to 936.96m (3074') with mud. |
| 5/11/79 | 1017.11m(3337') | P.O.H. changed out B.H.A. and add new bit. R.I.H. with new bit and drilled 80.16m (263') of 33.12 cm (12 1/4") hole to 1017.11m (3337') with mud. |
| 5/12/79 | 1161.90m(3812') | Drilled 51.21m (168') of 33.12 cm (12 1/4") hole to 1154.58m (3788') with mud in hole. P.O.H. changed bits R.I.H. and drilled 7.32m (24') of 33.12 cm (12 1/4") hole to 1161.90m (3812') with mud. |

- 5/14/79 1212.19m (3977') Drilled 50.30m (165') of 33.12 cm (12 $\frac{1}{4}$ " hole to 1212.19m (3977') with mud.
- 5/15/79 1236.6m (4057') Drilled 24.38m (80') of 33.12 cm (12 $\frac{1}{4}$ " hole to 1236.60m (4057') with mud. Reamed from 1067.7m (3503') to 1236.58m (4057')
- 5/16/79 1279.25m (4197') Drilled 42.68m (140') of 33.12 cm (12 $\frac{1}{4}$ " hole to 1279.25m (4197') with mud.
- 5/17/79 1298.76m (4261') P.O.H. R.I.H. with Bit #12, reamed from 1251.82m (4107') to 1279.25m (4197'). Drilled m (64') of 33.12 cm (12 $\frac{1}{4}$ " hole to 1298.76m (4261') with mud.
- 5/18/79 1339.30m (4394') Drilled 40.54m (133') of 33.12 cm (12 $\frac{1}{4}$ " hole to 1339.30m (4394') with mud.
- 5/19/79 1381.96m (4534') Drilled 42.68m (140') of 33.12 cm (12 $\frac{1}{4}$ " hole to 1381.96m (4534') with mud.
- 5/20/79 1407.57m (4618') P.O.H. Changed bits R.I.H. with bit #13. Reamed from 1374.95m (4511') to 1381.96m (4534'). Drilled 25.6m (84') of 33.12cm (12 $\frac{1}{4}$ " hole to 1407.57m (4618') with mud.
- 5/21/79 1407.57m (4618") P.O.H. layed down Monel D.C. R.I.H. with O.E.D.P. to 373.99m (1227'). Ran McNally Temperature survey to 1392.3m (4568'). R.I.H. to 1165.56m (3824'). Circulated mud to cool hole. Halliburton mixed and pumped thru 12.7cm (5") O.E.D.P @ 1165.56m (3824'), 8.5m³ (300 ft³) Class "G" cement, premixed with 45% silica flour, 0.75% CFR₂ and displaced with 9.77m (345 ft³) mud, cement in place at 1435 hours. P.O.H. and W.O.C. for 6 hours.
- 5/22/79 1099.72m (3608') R.I.H. with bit #14 and B.H.A. Tagged cement at 1093.62m (3588') and polished plug 4.88m (16') to 1094.5m (3604'). Circulated and W.O.C. for 9 hours. P.O.H. made up B.H.A. and bit #15. R.I.H. Drilled 1.23m (4') of 33.12cm (12 $\frac{1}{4}$ " hole with Dynadrill to 1407.6m (4618') with mud in hole.
- 5/23/79 1130.81m (3710') Dynadrilled 31.09m (102') of 33.12 cm (12 $\frac{1}{4}$ " hole to 1130.81m (3710') with mud in hole. P.O.H.
- 5/24/79 1164.64m (3821') P.O.H. Changed to bit #16 R.I.H. Dynadrilled 33.83m (111') of 33.12 cm (12 $\frac{1}{4}$ " hole to 1164.64m (3821') with mud in hole. P.O.H.
- 5/25/79 1187.20m (3895') P.O.H. Changed to bit #17 R.I.H. Dynadrilled 22.56m (74') of 33.12 cm (12 $\frac{1}{4}$ " hole to 1187.20m (3895') with mud in hole.
- 5/26/79 1187.20m (3895') P.O.H. Looked for D.P. washout. Layed down 6 19.05cm (7 $\frac{1}{2}$ ") D.C. Left 1.21m (4') of Dynadrill drive shaft and bit on bottom.

Ran temperature survey. R.I.H. with overshot socket to top of fish.

5/27/79 1187.81m (3897') P.O.H. Recovered 16.81cm (6 5/8") diameter bearing race with Midway socket. Two additional runs made. Recovered shaft and bit at 2330 hr.

5/28/79 1187.81m (3897') R.I.H. with Monel D.C. and Dynadrill. Reamed from 1160.68m (3808') to 1180m (3871'), Dynadrilled 0.61m (2') of 33.12cm (12 1/4") hole to 1187.81m (3897') with mud in hole. P.O.H. R.I.H. with magnet. P.O.H. Recovered metal. R.I.H. with dynadrill bit #19.

5/29/79 1241.15m (4072') Dynadrilled 53.34m (175') of 33.12cm (12 1/4") hole to 1241.15m (4072') with mud in hole. P.O.H. Changed to bit #20. R.I.H.

5/30/79 1267.36m (4158') Dynadrilled 26.22m (86') of 33.12cm (12 1/4") hole to 1267.36m (4158') with mud.

5/31/79 1293.57m (4244') Dynadrilled 25.91m (85') of 33.12cm (12 1/4") hole to 1293.57m (4244') with mud in hole. P.O.H. Changed to bit #21.

6/1/79 1293.57m (4244') R.I.H. Reamed from 1120.14m (3675') to 1273.76m (4179')

6/2/79 1315.22m (4315') Continued reaming to 1293.57m (4244'). Dynadrilled 21.64m (71') of 33.12cm (12 1/4") hole to 1315.2m (4315') with mud.

6/3/79 1350.26m (4430') Dynadrilled 35.05m (115') of 31.12cm (12 1/4") hole to 1350.26m (4430') with mud in hole. P.O.H. Breakdown B.H.A. Change to bit #23.

6/4/79 1436.52m (4713') R.I.H. reamed from 1173.78m (3851') to 1189.94m (3904'). Dynadrilled 86.26m (283') of 31.12cm (12 1/4") hole to 1436.52m (4713') with mud.

6/5/79 1519.43m (4985') Dynadrilled 82.91m (272') of 31.12cm (12 1/4") hole to 1519.43m (4895') with mud.

6/6/79 1546.86m (5075') Dynadrilled 19.51m (64') of 31.12cm (12 1/4") hole to 1538.94m (5049') with mud in hole. P.O.H. R.I.H. with bit 22RR. Dynadrilled 7.92m (26') of 31.12cm (12 1/4") hole to 1546.86m (5075') with mud.

6/7/79 1595.32m (5234') Dynadrilled 48.46m (159') of 31.12cm (12 1/4") hole to 1595.32m (5234') with mud.

6/8/79 1647.44m (5405') Dynadrilled 52.12m (171') of 31.12cm (12 1/4") hole to 1647.44m (5405') with mud in hole. P.O.H. Preparing to run Schlumberger.

6/9/79 1647.44m (5405') Ran Schlumberger logs. R.I.H. Circulated and conditioned mud to run casing.

- 6/10/79 1647.44m (5405') Ran 33 joints of 24.45 cm (9 5/8"), 59.60 Kg/m (40 lb/ft), N-80 buttress casing followed by 70 joints, 59.60 Kg/m (40 lb/ft), K-55 buttress casing. Shoe at 1645.31m (5398') KB; float collar 1619.10m (5312') KB; D.V. collar 769.62m (2525') KB; top of liner 342.29m (1123') KB. Ran 14 centralizers and 2 cement baskets approximately every 10 joints with 3 on bottom joint and 3 on top joint. C.B.'s on joint #21 and 78. Circulated in casing for one hour before running cement. Ran 2.83m³ (100 ft³) flush of silica flour and gel ahead of 611 sacks of Class "G" cement mixed 1:1 with Perlite and 40% silica flour, 3% gel, 0.5% CFR₂. Cement slurry weight 14.1 ppg. Displaced with 49.84m³ (1760 ft³) of 9.1 ppg mud. Lost returns before job completed. CIP. @ 1400 hours. Waited 2 hours and pressured to 3000 psi. Ports failed to open. Waited for RTTS packer.
- 6/11/79 1647.44m (5405') P.O.H. Laid down 31.11cm(12 1/4") D.A. and picked up 16cm (6 1/4") drill collars and 9cm (8") D.C. Tagged DV collar at 769.01m (2523'). Opened D.V. ports with 27,216Kg (60,000 lb) weight. Set packer at 765.05m 2510' and broke circulation and circulated for 1/2 hour. P.O.H. R.I.H. with E.Z.S.V. plug, set same at 767.18m (2517'). Circulated to cool hole for one hour. Pumped 2.83m³ (100 ft³) water ahead of 2.83m³ (100 ft³) silica flour -gel flush. Mixed 361 sacks class "G" cement mixed 1:1 perlite 40% silica flour 3% gel 0.5% CFR₂; 60% excess over hole volume or 21.66m³ (765 ft³) total volume. Cement slurry weight 13.7 ppg. Displaced with 6.85m³ (242 ft³) 9.1 ppg mud. CIP 1145. Good returns throughout job. Got 1.69m³ (60 ft³) excess cement to surface.
- 6/12/79 1647.44m (5405') W.O.C. 11 hours. Closed blind rams, tested liner lap and rams 35.15Kg/cm²(500 psi), 15 minutes. Held o.k. R.I.H. with bit #24 to 769.62m (2525'). Tested blind rams with 35.15Kg/cm²(500 psi). Held o.k. Drilled E.Z.S.V. plug and DV collar. R.I.H. to 1463.04m (4800'). Pressured to 35.15Kg/cm²(500 psi) with pipe rams closed. Held o.k. Drilled cement from float collar and guideshoe C.O. to 1647.44m (5405').
- 6/13/79 1730.65m (5678') Drilled 4.87m (16') of 21.59cm (8 1/2") hole to 1652.32m (5421') with water. P.O.H. Changed to bit #25 and B.H.A. Drilled 78.33m (257') of 21.59cm (8 1/2") hole to 1730.65m (5678') with water.
- 6/14/79 1856.85m (6092') Drilled 126.19m (414') of 21.59cm (8 1/2") hole to 1856.84m (6092') with water.
- 6/15/79 1912.62m (6275') Drilled 24.08m (79') of 21.59cm (8 1/2") hole to 1880.92m (6171') with water. P.O.H. Change to bit #26. Drilled 31.69m (104') of 21.59cm (8 1/2") hole to 1912.62m (6275') with water.

- 6/16/79 2005.58m (6580') Drilled 92.97m (305') of 21.59cm (8½") hole to 2005.58m (6580') with water.
- 6/17/79 2088.79m(6853') Drilled 82.30m (270') of 21.59cm (8½") hole to 2088.79m (6853') with water.
- 6/18/79 2138.17m (7015') Drilled 25.29m (83') of 21.59cm (8½") hole to 2113.79m (6935') with water. P.O.H. Changed to bit #27 and N.B. reamer. R.I.H. reamed from 2025.7m (6646') to 2113.79m (6935'). Drilled 24.08m (79') of 21.59cm (8½") hole to 2138.17m (7015') with water.
- 6/19/79 2220.47m (7285') Drilled 82.30m (270') of 21.59cm (8½") hole to 2220.47m (7285') with water.
- 6/20/79 2312.52m (7587') Drilled 12.19m (40') of 21.59cm (8½") hole to 2232.66m (7325') with water. P.O.H. changed bits (#28) and B.H.A. R.I.H. Drilled 79.86m (262') of 21.59cm (8½") hole to 2312.52m (7587').
- 6/21/79 2435.35m (7990') Drilled 122.83m (403') of 21.59cm (8½") hole to 2435.35m (7990') with water.
- 6/22/79 2467.97m (8097') Drilled 11.28m (37') of 21.59cm (8½") hole to 2446.63m (8027') with water. P.O.H. Repaired broken rotary chain. R.I.H. with new bit (#29). Drilled 21.34m (70') of 21.59cm (8½") hole to 2467.97m (8097').
- 6/23/79 2467.97m (8097') Twisted off at 2467.97m (8097'). P.O.H. Left entire drilling assembly in hole. Top of fish at 2326.54m (7633'). Dressed overshot and grapple. Picked up same, bumper sub and jars. Ran in hole to 2325.63m (7630'). Latched on fish; worked it free. P.O. slowly, recovered all of drilling assembly. Magna glowed all D.C.'s; laid down 2 w/cracked pins or boxes.
- 6/24/79 2512.47m (8243') Drilled 44.51m (146') of 21.59cm (8½") hole to 2512.47m (8243') with water.
- 6/25/79 2559.41m (8397') Drilled 28.65m (94') of 21.59cm (8½") hole to 2541.12m (8337') with water. P.O.H. R.I.H. with new bit #30. Drilled 15.24m (50') of 21.59cm (8½") hole to 2559.41m (8397') with water.
- 6/26/79 2601.16m (8534') Drilled 44.81m (147') of 21.59cm (8½") hole to 2601.16m (8534') with water. P.O.H. Stood back B.H.A. Rigged up loggers. Running logs.
- 6/27/79 2601.16m (8534') Running Schlumberger logs.
- 6/28/79 2601.16m (8534') Completed Schlumberger logging. R.I.H. with O.E.D.P. to 1748/96m (5398'). Installed rotating head and 17.78cm (7") flow line to sump. Blowing well with air compressor. Repeated surges of hot water with pressure as high as 14.13Kg/cm(201 psig)
- 6/29/79 2601.16m (8534') Continue to blow well. P.O.H. with O.E.D.P. Ran McInally Temperature Survey. Layed down 30 joints of bent drill pipe and slipped drilling line. R.I.H. with bit #31.

- 6/30/79 2624.33m (8610') Could not circulate thru bit #31. Pulled out with plugged bit. Laid down monel collar, plugged with scale from D.P. Cleaned collar. Laid down two D.C. with cracked pin and box. Picked up 6 replacement D.C.s. R.I.H. circulating each 20 stands. Reamed from 2609.1m (8560') to 2615.18m (8580'). Drilled 26.23m (86') of 12.59cm (8½") hole to 2624.33m (8610') with water.
- 7/1/79 2716.38m (8912') Drilled 92.05m (302') of 21.59cm (8½") hole to 2716.38m (8912') with water.
- 7/2/79 2716.38m (8912') P.O.H. Installed rotating head. Hooked up 17.78cm (7") blow down line. R.I.H. with O.E.D.P. to 2286.0m (7500'). Blew well for 4 hours with 70.3Kg/cm² (1000 psig) air injection. R.I.H. with O.E.D.P. to 2716.38m (8912'). Circulating. P.O.H. Rigged up Schlumberger.
- 7/3/79 2716.38m (8912') Logging with Schlumberger. Completed logging after 18 hours. Laid down reamer and stabilizer. Picked up 21.59cm (8½") bit. R.I.H. slick, circulated 10 minutes at each 20 stands.
- 7/4/79 2749.91m (9022') Drilled 33.53m (110') of 21.59cm (8½") hole to 2749.91m (9022') with water. Circulated at 2749.91m (9022'). Set rotating rubber in place. P.O.H. left 3 cones in hole. R.I. with E.Z.S.V. Set at 1932.43m (6340'). Sheared off with 40,000 pound pull.
- 7/5/79 2749.91m (9022') P.O. laid down, R.I.H. with O.E.D.P. tagged at 1932.43m (6340'). Circulated 1 hour to cool well. Pumped 5.66m³ (200 ft³) water then 62 sacks class "G" cement mixed with 40% SiO₂, 0.75% CFR₂ and 0.2% HR7. Filled hole with 2.83m² (100 ft³) slurry 76.3m (250') linear fill. Slurry weight = 15.5 lb/gal. Displaced with 16.99m³ (600 ft³) water. C.I.P. 0615. P.O.H. W.O.C. for 8 hours. Laid down 16.51cm (6½") D.C. R.I.H. tagged top cement at 1866.6m (6124'). Drilled cement to 1923.29m (6310'). Circulated at 1923.29m (6310'). Put 6804Kg (15,000 lb) on plug - held firm. P.O.H.
- 7/6/79 2749.91m (9022') P.O.H. Made up liner hanger. Ran 28 joints 17.78cm (7") 10.4Kg (23 lb.) N-80 LT&C with guide shoe and float collar. Total length 340.36m (1116.68'). Five centralizers used; 1 each on 1, 2, 3, 26 and 27th collar. Hung 17.78cm (7") liner at 1917.2m (6290') top at 1576.70m (5173'). Circulated 1 hour. Pumped 11.33m³ (400 ft³) of water ahead of 205 sacks class "G" cement with 40% SiO₂, 0.75% CFR₂, 0.2% HR7. 9.4m³ (332 ft³) total slurry volume. Displaced with 21.01m³ (742 ft³) water at 70.3-140.6Kg/cm² (1000-2000 psig). C.I.P. at 1400 hours. W.O.C. for 10 hours. P.O. laid down hanger. Ran 21.59cm (8½") bit to 1576.73m (5173'); circulated out 15.24m³ (50 ft³) cement. P.O. laying down 12.17cm (5") D.P.

- 7/7/79 2749.91m (9022') W.O.C. Laid down 12.7cm (5") drill pipe, picked up 11.43cm (4½") D.C. and 125 joints of 8.89cm (3½") drill pipe. R.I.H. to 1863.3m (6113'); tested 17.78cm (7") liner lap with 35.15 (500 psi) pressure at wellhead. Held o.k. for 15 minutes. Drilled cement below 1876.96m (6158'). Guide shoe at 1917.2m (6290') and E.Z.S.V. plug at 1932.43m (6340'). Pushed E.Z.S.V. to bottom at 2749.91m (9022').
- 7/8/79 2749.91m (9022') P.O.H. to 1538.63m (5048'). Installed rotating rubber. Blew well with air compressors at 1538.63m (5048') for 7½ hours. Trying to get well to unload. R.I.H. to 1914.45m (6281'). Blew well for 2½ hours. R.I.H. to 2286m (7500'). Unloaded hole with air compressor at 2286.00m (7500').
- 7/9/79 2749.91m (9022') P.O. from 2286m (7500') to 1914.45m (6281'). Waited for well to heat up for 7½ hours. Blew well for 6½ hours. Filled hole with water through D.P. and bit at 1914.48m (6281'). R.I.H. to 2749.91m (9022') tagged bottom P.O.H. Layed down D.P. and D.C.
- 7/10/79 2749.91m (9022') Removed B.O.P.; installed wellhead plate with 5.08cm (2") gate outlet on 33.96cm (13 3/8") bradenhead. Cleaned out pits. Released rig at 0800.

THERMAL POWER COMPANY/SOUTHLAND ROYALTY COMPANY

Dixie Federal 45-14

Drilling Fluid Daily Temperatures*

| Date | Depth | | °F | °C |
|---------|-------|---------|------------------------|------|
| | Feet | Meters | | |
| 4-25-79 | 124' | 37.80 | - | - |
| 4-26-79 | 146' | 44.51 | 84 | 29.4 |
| 4-27-79 | 715' | 217.93 | 111 | 43.9 |
| 4-28-79 | 741' | 225.86 | - | - |
| 4-29-79 | 980' | 298.70 | 113 | 45.0 |
| 4-30-79 | 1322' | 402.95 | 126 | 52.2 |
| 5-1-79 | 1330 | 405.39 | 126 | 52.2 |
| 5-2-79 | 1330' | 405.39 | Running 13 3/8" casing | |
| 5-3-79 | 1330' | 405.39 | " | " |
| 5-4-79 | 1779' | 542.24 | 118 | 47.8 |
| 5-5-79 | 2076' | 632.76 | 118 | 47.8 |
| 5-6-79 | 2076' | 632.76 | 115 | 46.1 |
| 5-7-79 | 2218' | 676.05 | 127 | 52.8 |
| 5-8-79 | 2525' | 769.62 | 136 | 57.8 |
| 5-9-79 | 2922' | 890.63 | 146 | 63.3 |
| 5-10-79 | 3074' | 936.96 | 138 | 58.9 |
| 5-11-79 | 3337' | 1017.12 | 159 | 70.6 |
| 5-12-79 | 3620' | 1103.38 | 160 | 71.1 |
| 5-13-79 | 3812' | 1161.90 | 161 | 71.7 |
| 5-14-79 | 3977' | 1212.19 | 165 | 73.9 |
| 5-15-79 | 4057' | 1236.57 | - | - |
| 5-16-79 | 4197' | 1279.25 | 166 | 74.4 |
| 5-17-79 | 4261' | 1298.75 | 166 | 74.4 |
| 5-18-79 | 4394' | 1339.29 | 167 | 75.0 |
| 5-19-79 | 4534' | 1381.96 | 166 | 74.4 |
| 5-20-79 | 4618' | 1407.57 | 164 | 73.3 |
| 5-21-79 | 4618' | 1407.57 | 146 (Sidetrack) | 63.3 |
| 5-22-79 | 3608' | 1099.72 | 146 | 63.3 |
| 5-23-79 | 3710' | 1130.81 | 148 | 64.4 |
| 5-24-79 | 3821' | 1164.64 | 143 | 61.7 |
| 5-25-79 | 3895' | 1187.20 | 156 | 68.9 |
| 5-26-79 | 3895' | 1187.20 | Fishing | - |
| 5-27-79 | 3895' | 1187.20 | Fishing | - |
| 5-28-79 | 3897' | 1187.81 | 135 | 57.2 |
| 5-29-79 | 4072' | 1241.15 | 152 | 66.7 |
| 5-30-79 | 4158' | 1267.36 | 152 | 66.7 |
| 5-31-79 | 4244' | 1293.57 | 154 | 67.8 |
| 6-1-79 | 4244' | 1293.57 | 164 | 73.3 |
| 6-2-79 | 4315' | 1315.21 | 162 | 72.2 |
| 6-3-79 | 4430' | 1350.26 | 159 | 70.6 |
| 6-4-79 | 4713' | 1436.52 | 164 | 73.3 |
| 6-5-79 | 4985' | 1519.43 | 168 | 75.6 |

*Wellhead exit temperatures

| | | | | |
|---------|------------|---------------------------|-----------------------------|------|
| 6-6-79 | 5075' | 1546.86 | 156 | 68.9 |
| 6-7-79 | 5234' | 1595.33 | 170 | 76.7 |
| 6-8-79 | 5405' | 1647.44 | 175 | 79.4 |
| 6-9-79 | 5405' | 1647.44 | Run logs | - |
| 6-10-79 | 5405' | 1647.44 | Running 9-5/8" liner | |
| 6-11-79 | 5405' | 1647.44 | Running 9-5/8" liner | |
| 6-12-79 | 5405' | 1647.44 | " " " | |
| 6-13-79 | 5678' | 1730.65 | 150 | 65.6 |
| 6-14-79 | 6092' | 1856.85 | 142 | 61.1 |
| 6-15-79 | 6275' | 1912.62 | 139 | 59.4 |
| 6-16-79 | 6580' | 2005.59 | 130 | 54.4 |
| 6-17-79 | 6853' | 2088.79 | 157 | 69.4 |
| 6-18-79 | 7015' | 2138.17 | 160 | 71.1 |
| 6-19-79 | 7285' | 2220.47 | 162 | 72.2 |
| 6-20-79 | 7587' | 2312.52 | 152 | 66.7 |
| 6-21-79 | 7990' | 2435.35 | 167 | 75.0 |
| 6-22-79 | 8097' | 2467.97 | 159 | 70.6 |
| 6-23-79 | 8097' | 2467.97 | Fishing | - |
| 6-24-79 | 8243' | 2512.47 | 151 | 66.1 |
| 6-25-79 | 8387' | 2556.36 | 151 | 66.1 |
| 6-26-79 | 8534' | 2601.17 | 155 | 68.3 |
| 6-27-79 | 8534' | 2601.17 | Running logs | - |
| 6-28-79 | 8534' | 2601.17 | Running logs 7 testing well | - |
| 6-29-79 | 8534' | 2601.17 | Testing well | - |
| 6-30-79 | 8610' | 2624.33 | 157 | 69.4 |
| 7-1-79 | 8912' | 2716.38 | 155 | 68.3 |
| 7-2-79 | 8912' | 2716.38 | Testing well | - |
| 7-3-79 | 8912' | 2716.38 | Running logs | - |
| 7-4-79 | 9022' | 2749.91 | 160 | 71.1 |
| 7-5-79 | 9022' | 2749.91 | Setting plug | - |
| 7-6-79 | 9022' | 2749.91 | Running 7" liner | - |
| 7-7-79 | 9022' | 2749.91 | Running 7" liner | - |
| 7-8-79 | 9022' | 2749.91 | Testing well | - |
| 7-9-79 | 9022' | 2749.91 | Testing well | - |
| 7-10-79 | 9022' T.D. | Testing well/Released Rig | | - |

LdL:pw

THERMAL POWER COMPANY/SOUTHLAND ROYALTY COMPANY

DIXIE FEDERAL 45-14

Bit Record

| Bit # | Size | Make/Type | In | Out | Total Drilled |
|---------|----------------|---|------------------|------------------|----------------|
| 1 | 44.45cm (17½") | Security S3J | 37.80m (124') | 225.86m (741') | 187.76m (616') |
| 2 | 44.45cm (17½") | H.T.C. DSC | 225.86m (741') | 361.49m (1186') | 132.59m (435') |
| 3 | 44.45cm (17½") | Security S83 | 361.49m (1186') | 405.38m (1330') | 43.89m (144') |
| 4 | 31.12cm (12¼") | Smith SJ | 405.38m (1330') | 453.85m (1489') | 48.46m (159') |
| 5 | 31.12cm (12¼") | Security S86 | 453.85m (1489') | 646.48m (2121') | 192.63m (632') |
| 6 | 31.12cm (12¼") | Smith F-3 | 646.48m (2121') | 924.76m (3034') | 278.28m (913') |
| 7 | 31.12cm (12¼") | H.T.C. X-44 | 924.76m (3034') | 936.96m (3074') | 12.19m (40') |
| 8 | 31.12cm (12¼") | Smith F-3 | 936.96m (3074') | 1154.58m (3788') | 217.63m (714') |
| 9 | 31.12cm (12¼") | H.T.C. S-88 | 1154.58m (3788') | 1236.58m (4057') | 81.69m (268') |
| 10 | 31.12cm (12¼") | H.T.C. J-44 | 1236.58m (4057') | 1279.25m (4197') | 42.67m (140') |
| 11 | 31.12cm (12¼") | Smith F-4 | 1279.25m (4197') | 1339.30m (4394') | 60.05m (197') |
| 12 | 31.12cm (12¼") | H.T.C. X-33 | 1339.30m (4394') | 1387.96m (4534') | 42.67m (140') |
| 13 | 31.12cm (12¼") | Smith F-5 | 1381.96m (4534') | 1407.57m (4618') | 25.60m (84') |
| Redrill | | | | | |
| 14 | 31.12cm (12¼") | Smith SC-8 | 1093.62m (3588') | 1098.5m (3604') | 4.88m (16') |
| 15 | 31.12cm (12¼") | H.T.C. X-33 | 1098.50m (3604') | 1130.81m (3710') | 32.31m (106') |
| 16 | 31.12cm (12¼") | Smith F-5 | 1130.81m (3710') | 1165.10m (3821') | 33.83m (111') |
| 17 | 31.12cm (12¼") | H.T.C. X-33 | 1165.10m (3821') | 1187.2m (3895') | 22.56m (74') |
| 18 | 31.12cm (12¼") | Reed F.P. 52 | 1187.20m (3895') | 1187.81m (3897') | 0.61m (2') |
| 19 | 31.12cm (12¼") | Smith F-5 | 1187.81m (3897') | 1241.15m (4072') | 53.34m (175') |
| 20 | 31.12cm (12¼") | Smith F-5 | 1241.15m (4072') | 1293.57m (4244') | 52.43m (172') |
| 21 | 31.12cm (12¼") | H.T.C. J-44 Used to ream/1120.14m (3677') | 1293.57m (4244') | 1293.57m (4244') | 173.43m (569') |
| 22 | 31.12cm (12¼") | H.T.C. X-44 | 1293.57m (4244') | 1350.34m (4430') | 56.69m (186') |
| 23 | 31.12cm (12¼") | Smith F-4 | 1350.39m (4430') | 1539.94m (5049') | 188.67m (619') |
| 22R | 31.12cm (12¼") | H.T.C. X-44 | 1539.94m (5049') | 1647.4m (5405') | 113.08m (371') |
| 24 | 21.59cm (8½) | Security S4T | 1647.4m (5405') | 1652.3m (5421') | 4.88m (16') |
| 25 | 21.59cm (8½) | H.T.C. X-44 | 1652.3m (5421') | 1880.1m (6171') | 228.60m (750') |
| 26 | 21.59cm (8½) | H.T.C. J-44 | 1880.1m (6171') | 2113.79m (6935') | 232.87m (764') |
| 27 | 21.59cm (8½) | Security S86F | 2113.79m (6935') | 2232.0m (7325') | 118.57m (389') |
| 28 | 21.59cm (8½) | Smith S-4 | 2232m (7325') | 2520.7m (8027') | 213.97m (702') |
| 29 | 21.59cm (8½) | Smith F-5 | 2520.7m (8027') | 2540m (8337') | 94.50m (310') |
| 30 | 21.59cm (8½) | Reed FP 63 | 2540m (8337') | 2601.2m (8534') | 60.05m (197') |
| 31 | 21.59cm (8½) | Reed FP 62 | 2601.16m (8534') | 2523m (8912') | 87.78m (288') |
| 32 | 21.59cm (8½) | Smith F-5 | 2523m (8912') | 2749.9m (9022') | 33.53m (110') |

LdL:pw

WELL DATA SHEET

Field: Dixie Valley, Churchill Nevada
 Well: Dixie Federal 45-14
 Date: September 1, 1979

| Casing String | Hole Size (in) | Casing Specifications | | | Jt. | Setting Depth (ft) | | | Total Wt. (lbs) | Cementing | | Sks. of Cement w/o add. | Mud wt. at Csg. Pt. (lbm/gal) | Minimum Tension | Calculated Factor Collapse | Safety Burst (psi basis) |
|------------------|----------------|-----------------------|------------|------|------|--------------------|------|--------------|-----------------|--------------------|----------|-------------------------|-------------------------------|-----------------|----------------------------|--------------------------|
| | | Size (in) | Wt. (#/ft) | Gr. | | From | To | Total Length | | Slurry Volume (ft) | % Excess | | | | | |
| Conductor | 26 | 20 | 94 | H-40 | Butt | 0 | 124 | 124 | 11,656 | 370 | 60 | 320 | 9.1 | 127.00 | 8.87 | 2.43 (629) |
| Surface | 17½ | 13 3/8 | 54.5 | K-55 | Butt | 0 | 1332 | 1332 | 72,594 | 2309 | 100 | 1090 | 9.1 | 11.75 | 1.80 | 4.34 (629) |
| Production liner | 12¾ | 9 5/8 | 40 | K-55 | Butt | 1123 | 4012 | 2889 | 115,560 | -- | -- | -- | 9.1 | 3.28 | 1.36 | 2.08 |
| | 12¾ | 9 5/8 | 40 | N-80 | Butt | 4012 | 5398 | 1386 | 55,440 | -- | -- | -- | 9.1 | 13.29 | 1.21 | 2.25 |
| Total Liner | 12¾ | 9 5/8 | -- | -- | Butt | 1123 | 5398 | 4275 | 171,000 | 2060 | 60 | 972 | 9.1 | 3.28 | 1.21 | 2.08 (2551) |
| 7" Liner | 8¾ | 7" | 23 | N-80 | LT&C | 5173 | 6290 | 1117 | 25,691 | 332 | 100 | 205 | 9.1 | 17.20 | 1.29 | 2.13 (2972) |

JMR:pw
 10/10/79

THERMAL POWER COMPANY - SOUTHLAND ROYALTY COMPANY
 BLOW DOWN ATTEMPTS 8 JULY 1978
 DIXIE FEDERAL 45-14
 CHURCHILL COUNTY, NEVADA

