

FILE # 1

WELL NAME: UTAH 14-2

DATA TYPE: TEMPERATURE

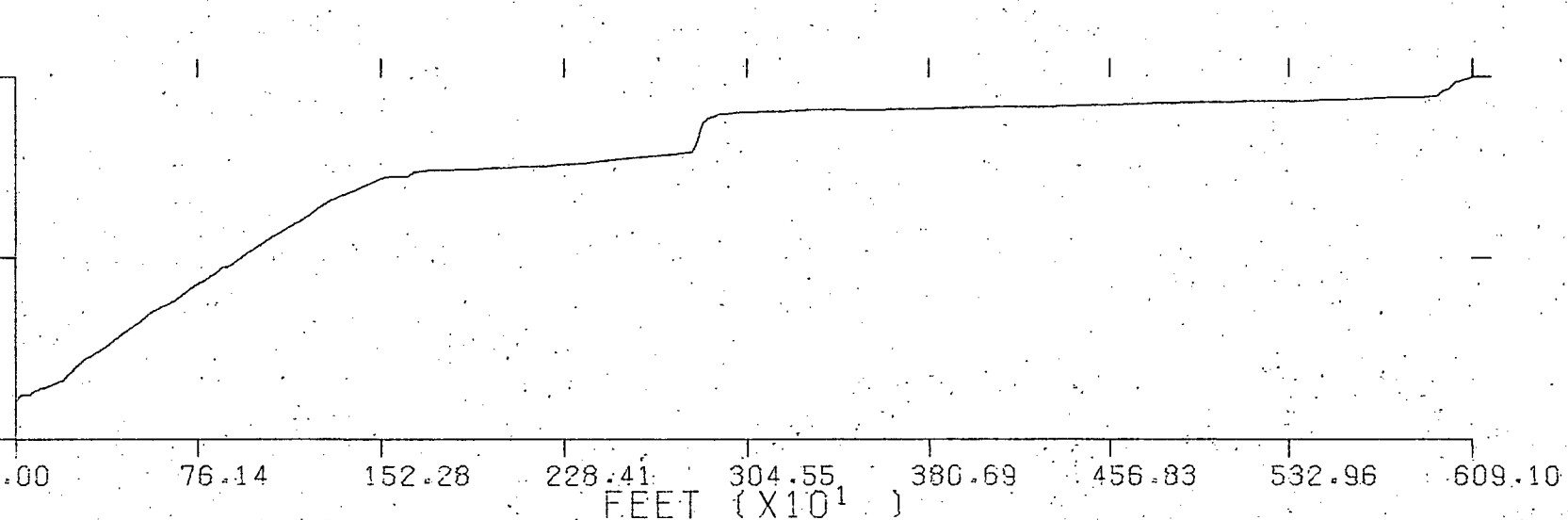
(X10<sup>1</sup>)

DEG F  
14.76  
33.10  
51.43

.00 76.14 152.28 228.41 304.55 380.69 456.83 532.96 609.10  
FEET (X10<sup>1</sup>)

3101511

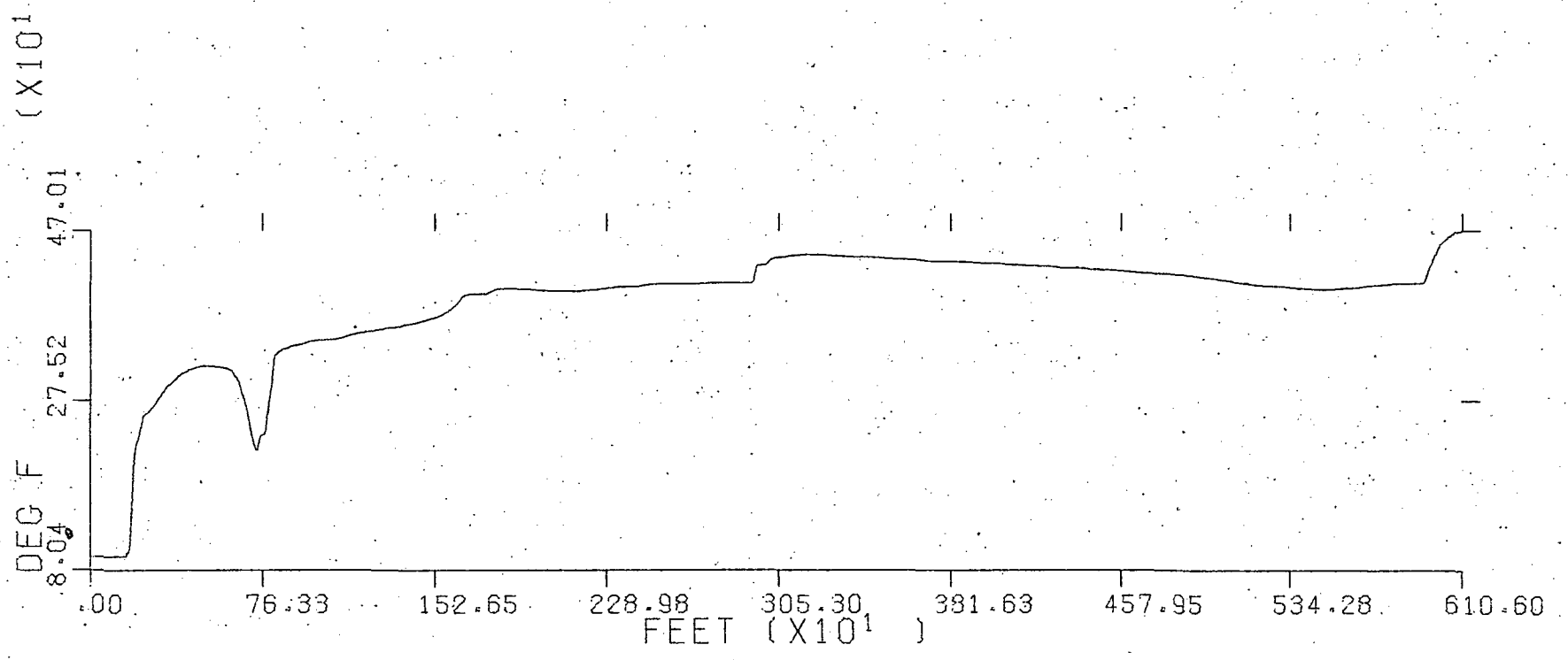
✓



FILE # 2

WELL NAME: UTAH 14-2

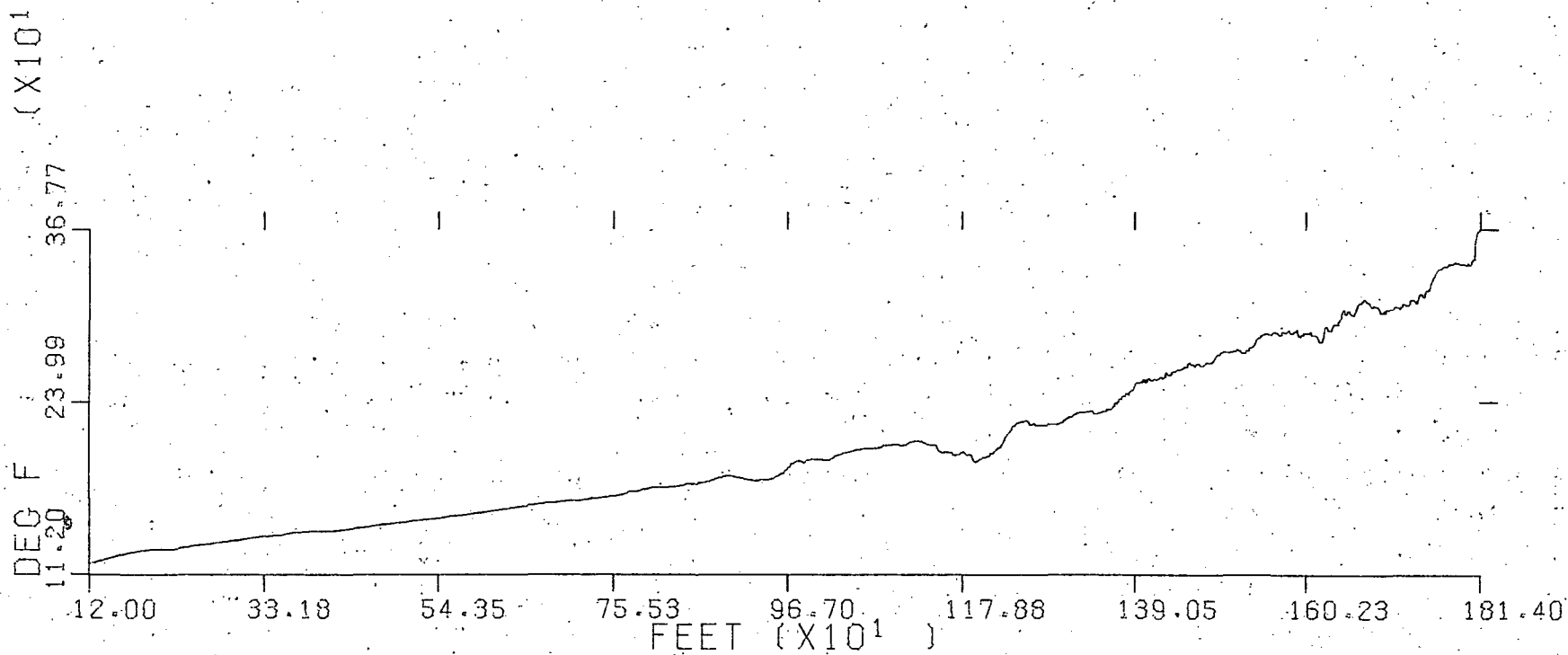
DATA TYPE: TEMPERATURE



FILE # 3

WELL NAME: UTAH STATE 14-2

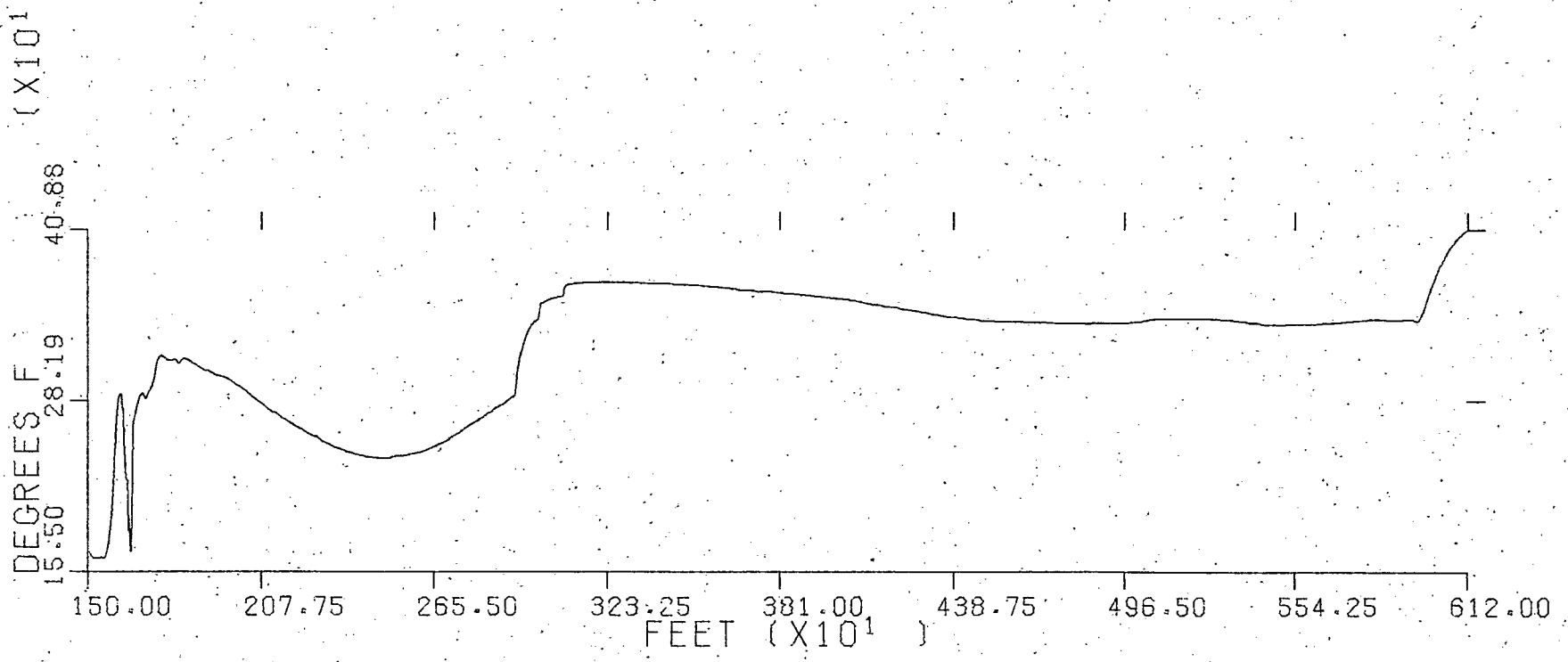
DATA TYPE: TEMPERATURE



FILE # 4

WELL NAME: UTAH NO: 14-2

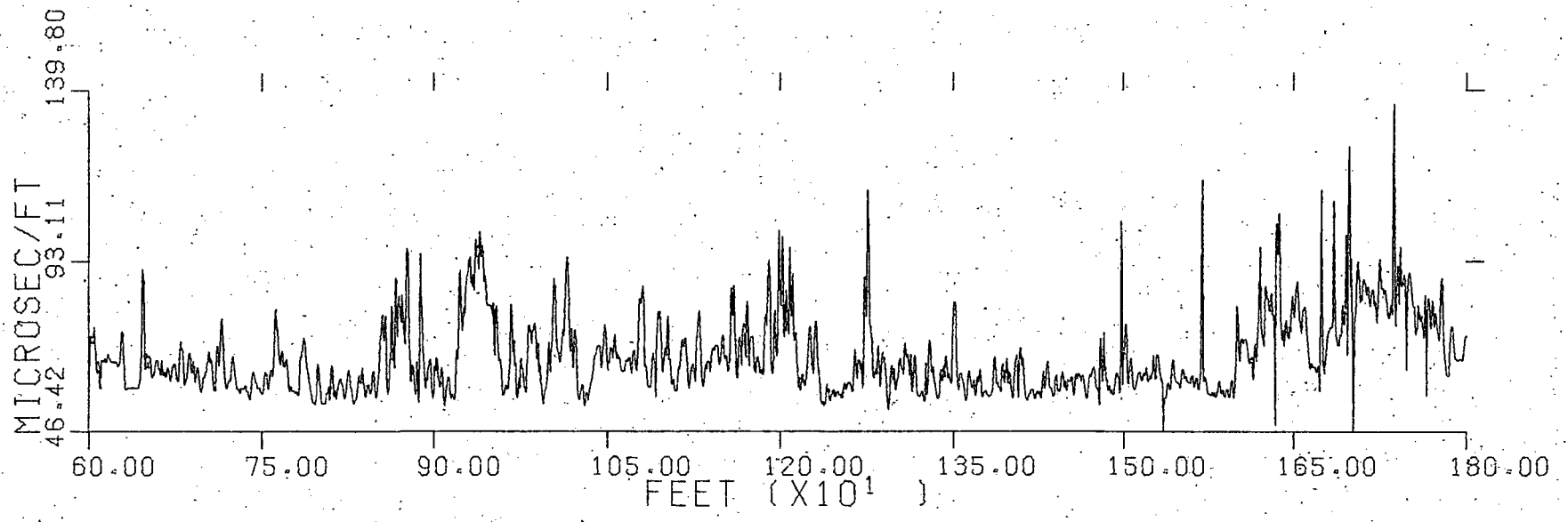
DATA TYPE: TEMPERATURE



FILE # 5

WELL NAME: UTAH 14-2

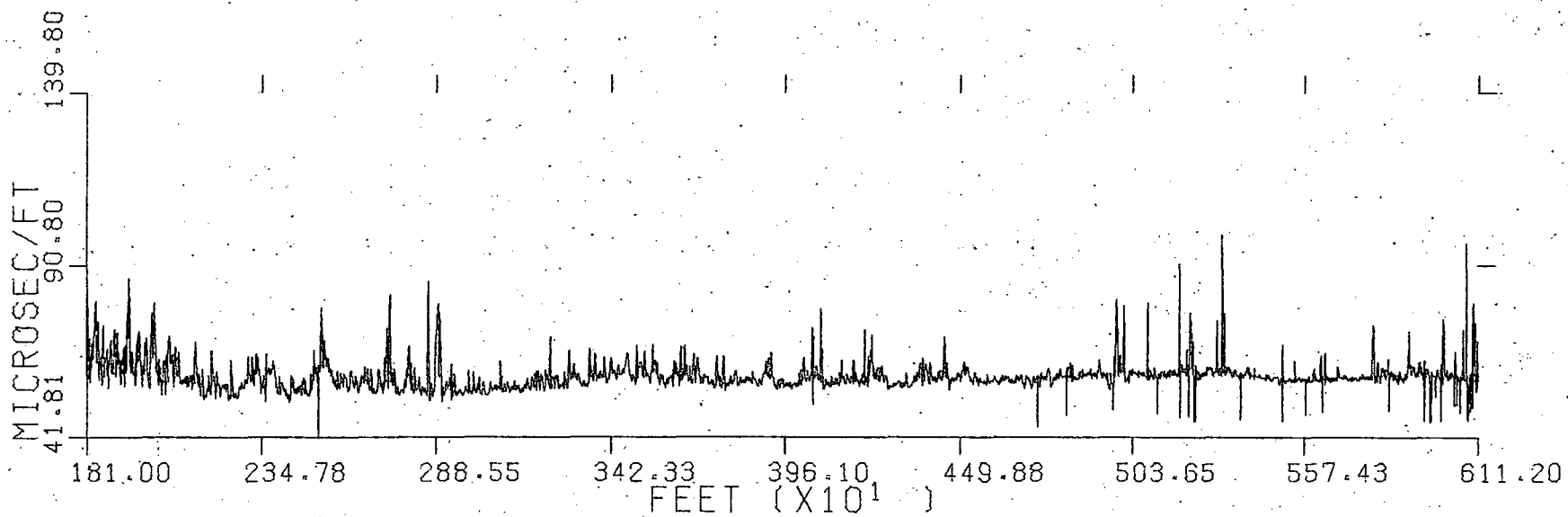
DATA TYPE: INTERV TRANS TIME



FILE # 6

WELL NAME: UTAH 14-2

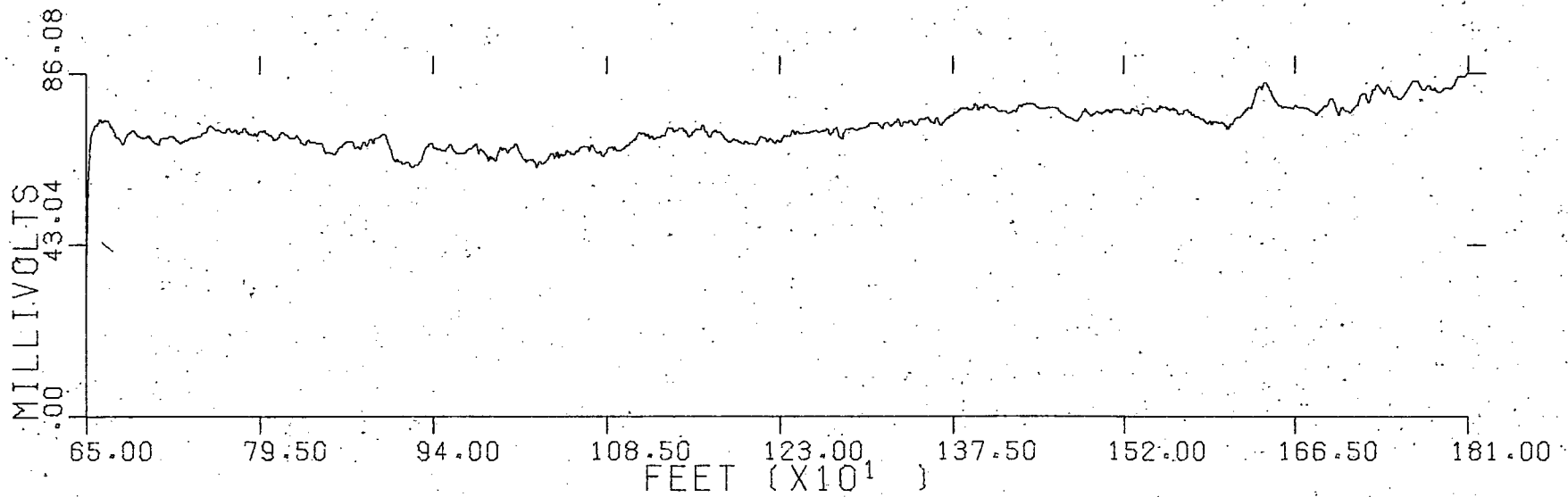
DATA TYPE: INTERV TRANS TIME



FILE # 7

WELL NAME: UTAH 14-2

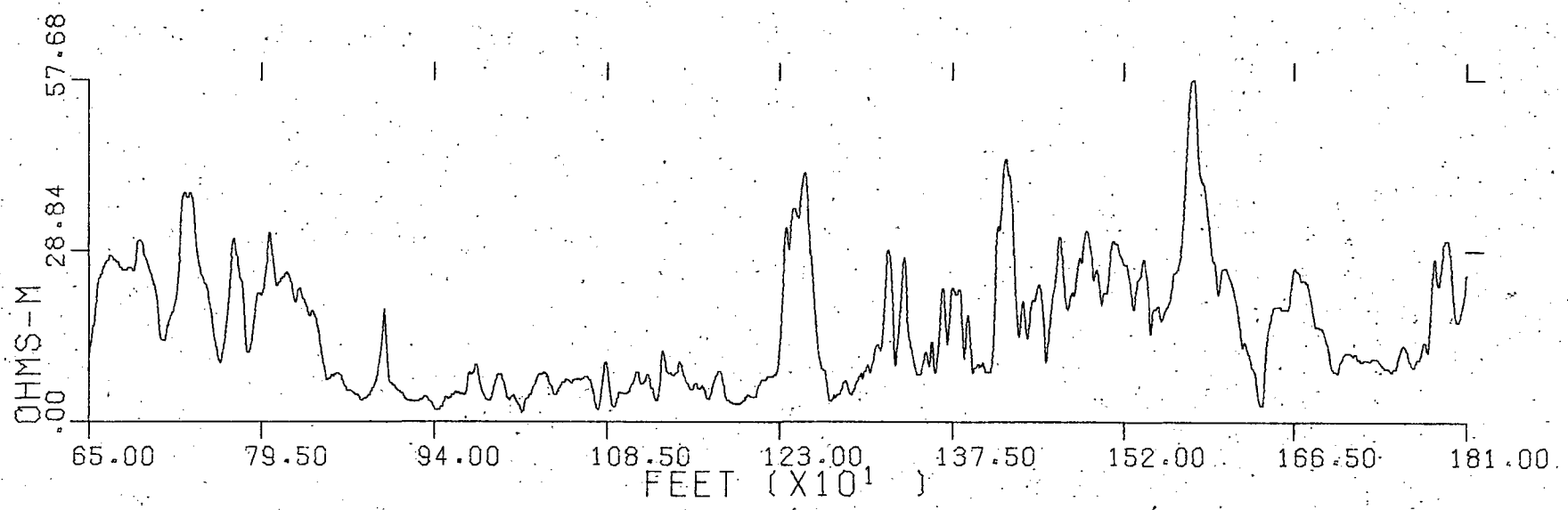
DATA TYPE: SPONTANEOUS POTENT



FILE # 8

WELL NAME: UTAH 14-2

DATA TYPE: SHORT NORMAL RESIS

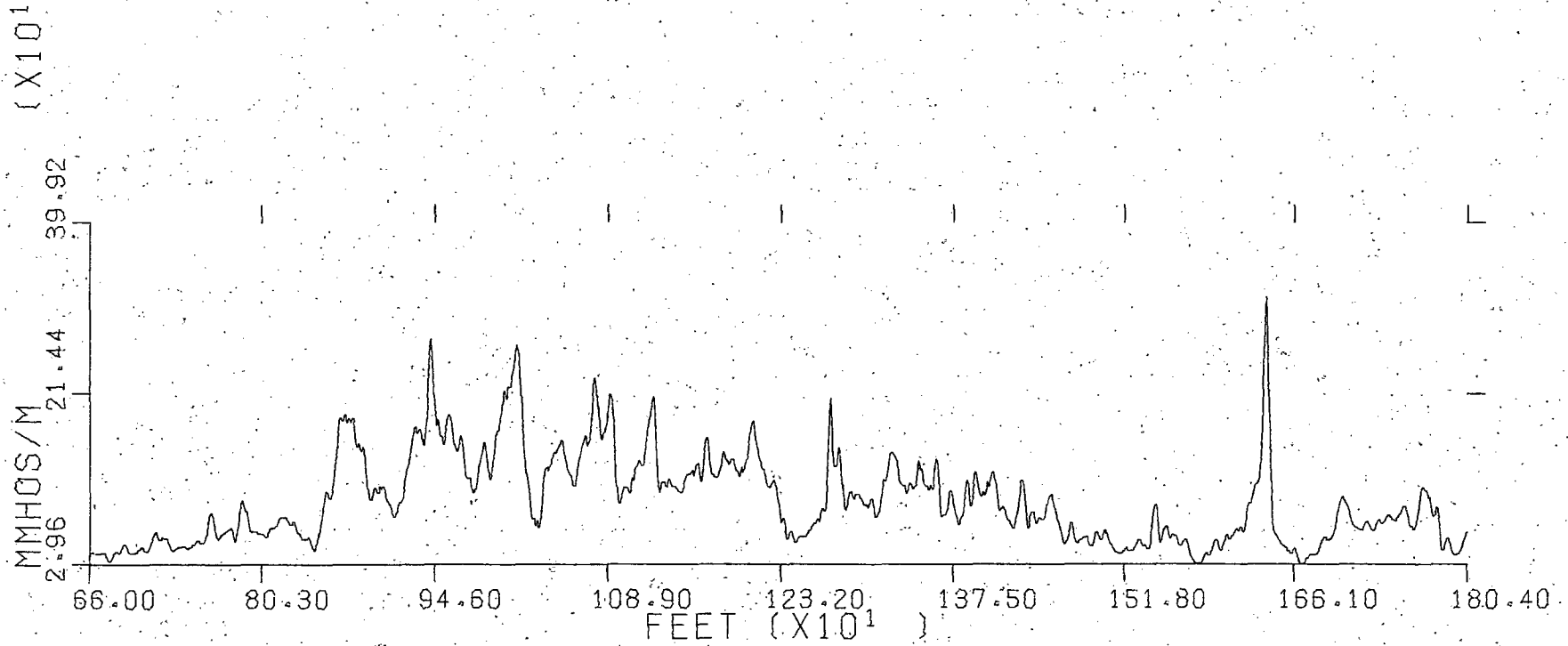




FILE # 9

WELL NAME: UTAH 14-2

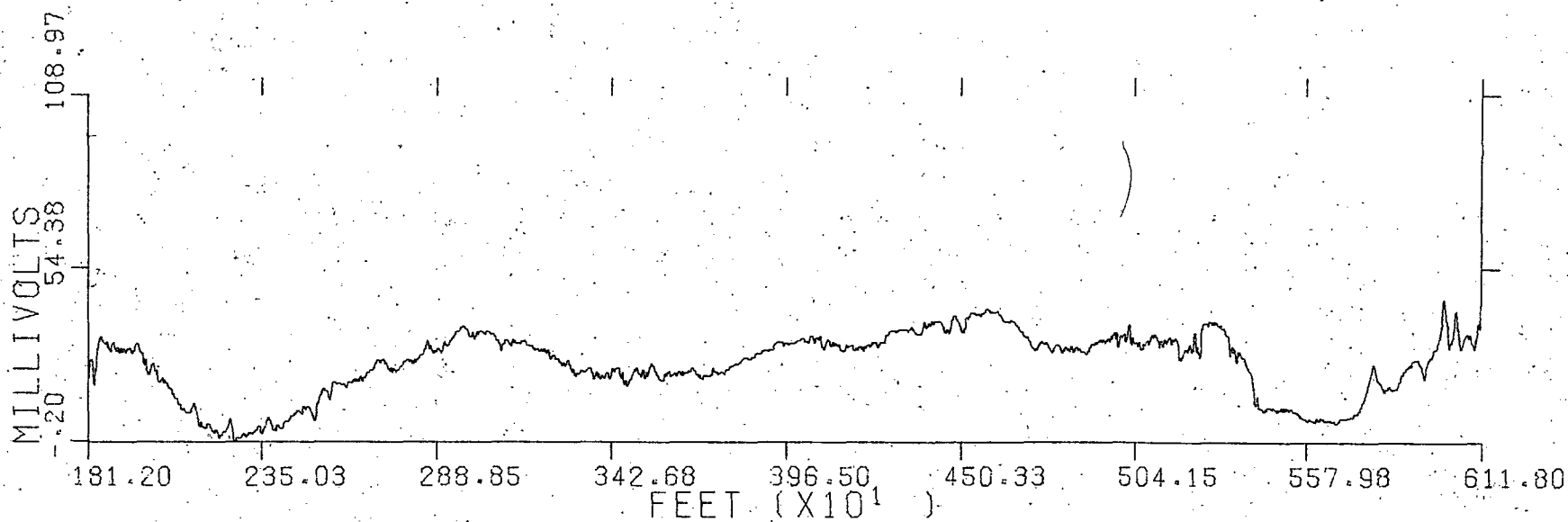
DATA TYPE: CONDUCTIVITY



FILE # 10

WELL NAME: UTAH 14-2

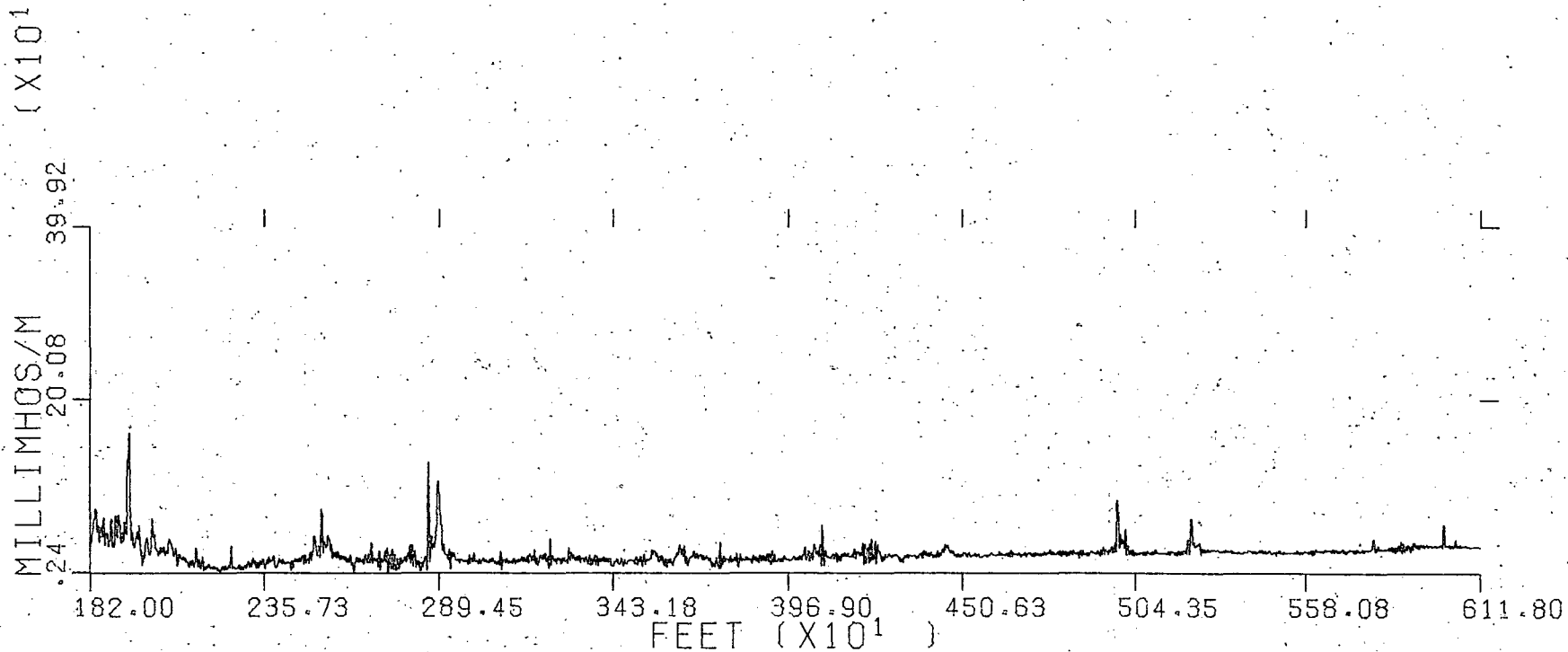
DATA TYPE: SPONTANEOUS POTENT



FILE # 11

WELL NAME: UTAH 14-2

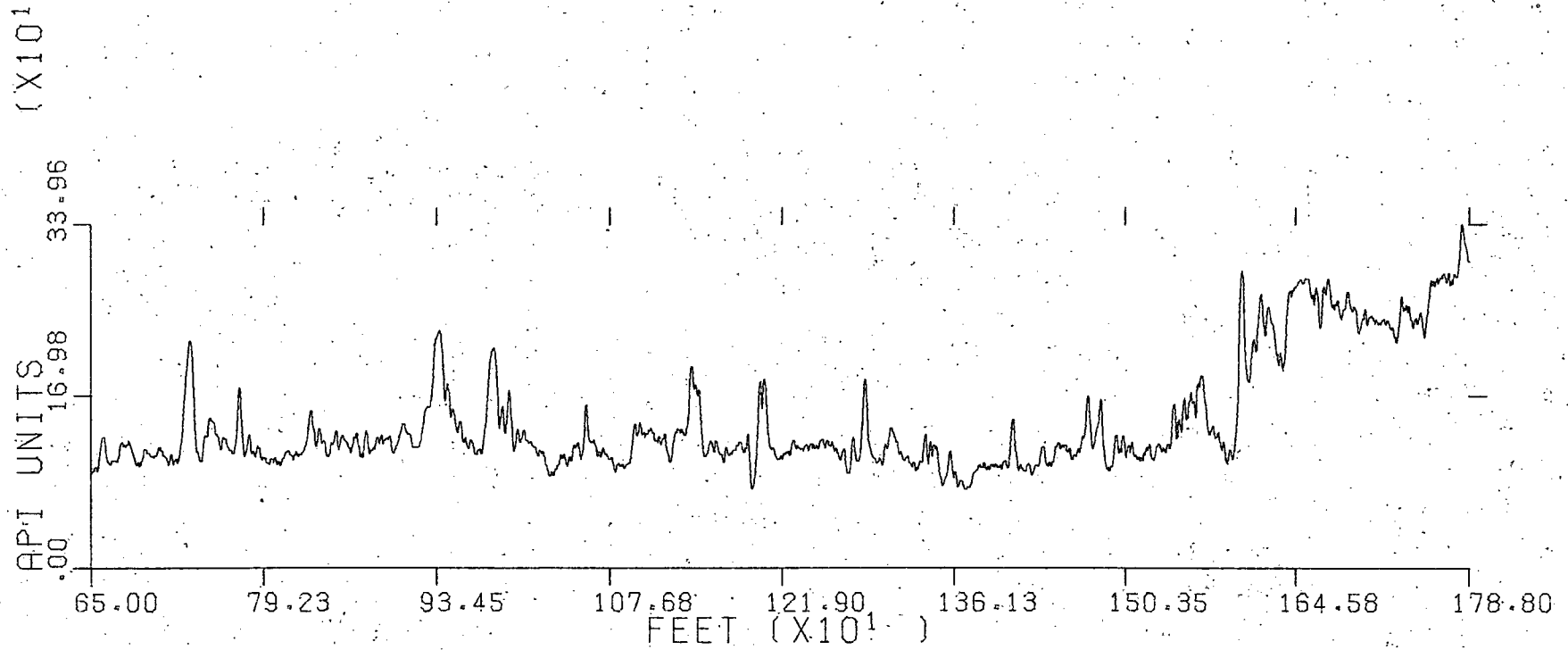
DATA TYPE: CONDUCTIVITY



FILE # 12

WELL NAME: UTAH 14-2

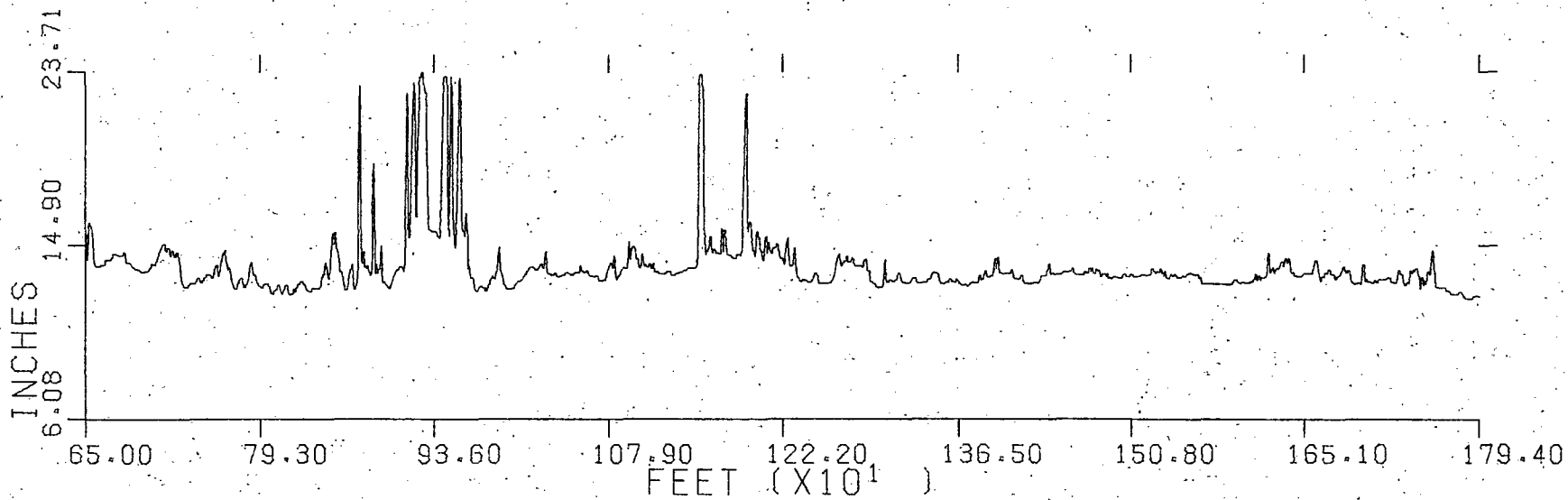
DATA TYPE: GAMMA RAY



FILE # 13

WELL NAME: UTAH 14-2

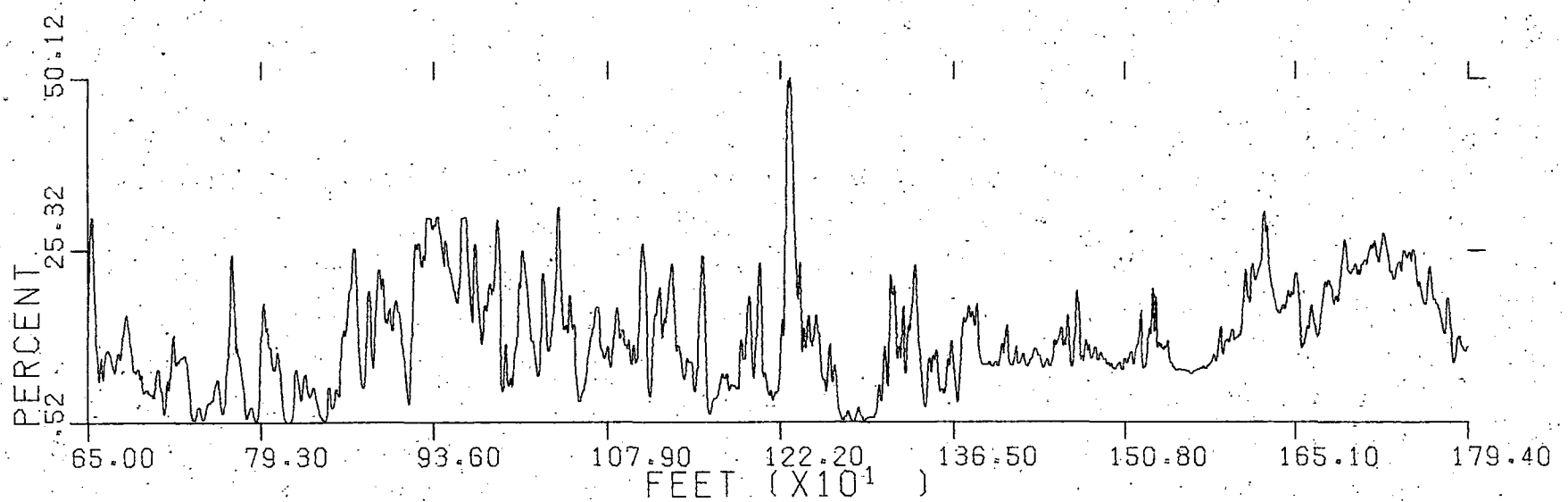
DATA TYPE: CALIPER



FILE # 14

WELL NAME: UTAH 14-2

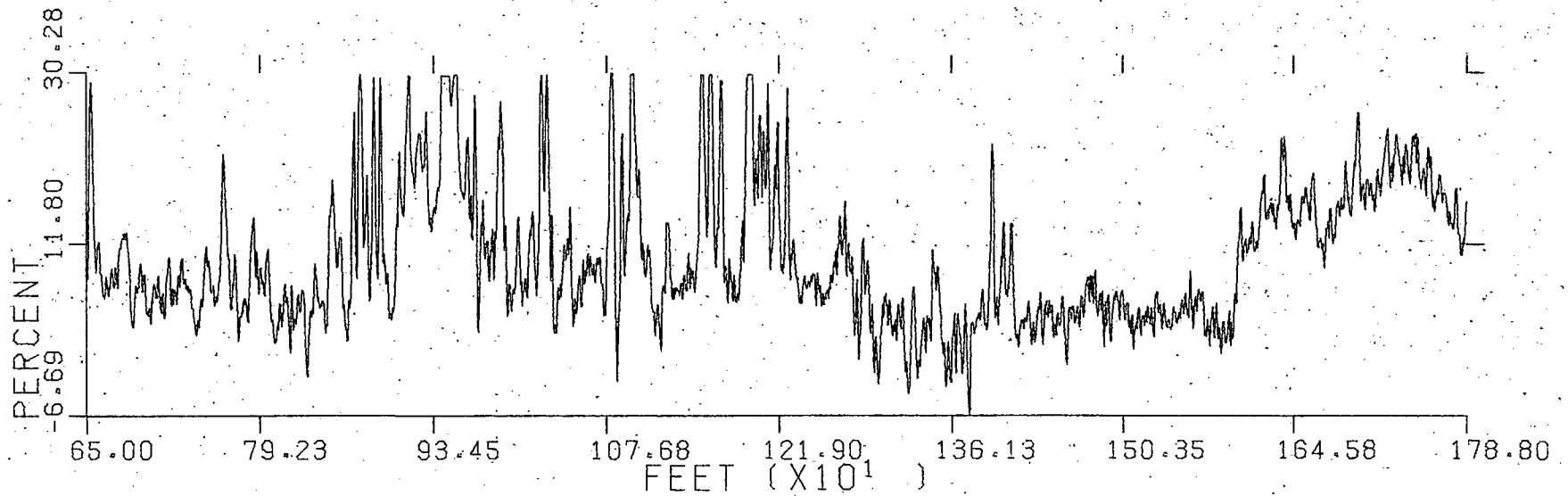
DATA TYPE: NEUTRON POROSITY



FILE # 15

WELL NAME: UTAH 14-2

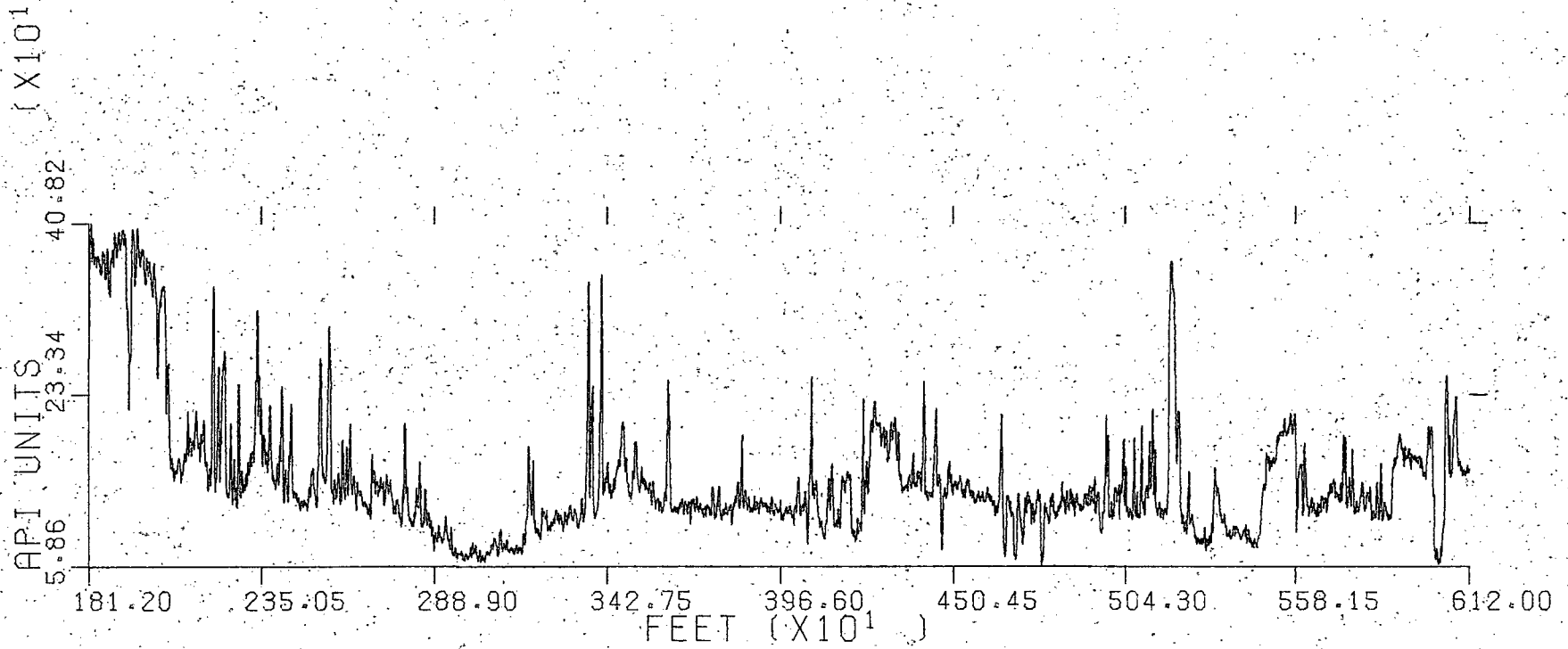
DATA TYPE: *Density*  
~~NEUTRON~~ POROSITY



FILE # 16

WELL NAME: UTAH 14-2

DATA TYPE: NATURAL GAMMA

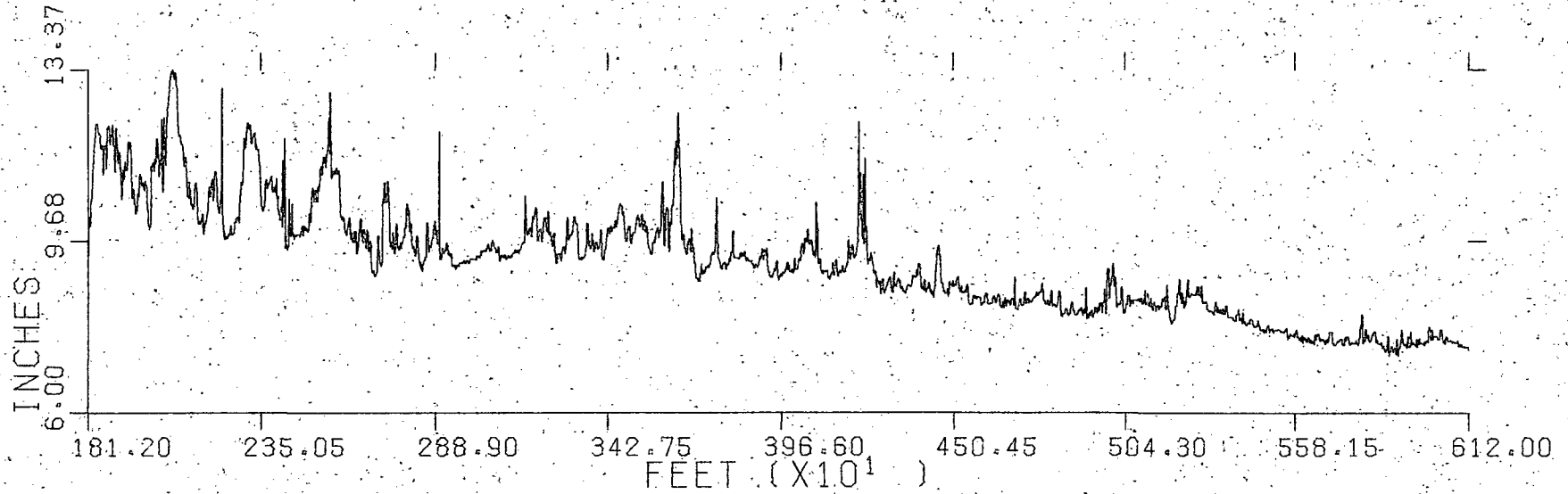




FILE # 17

WELL NAME: UTAH 14-2

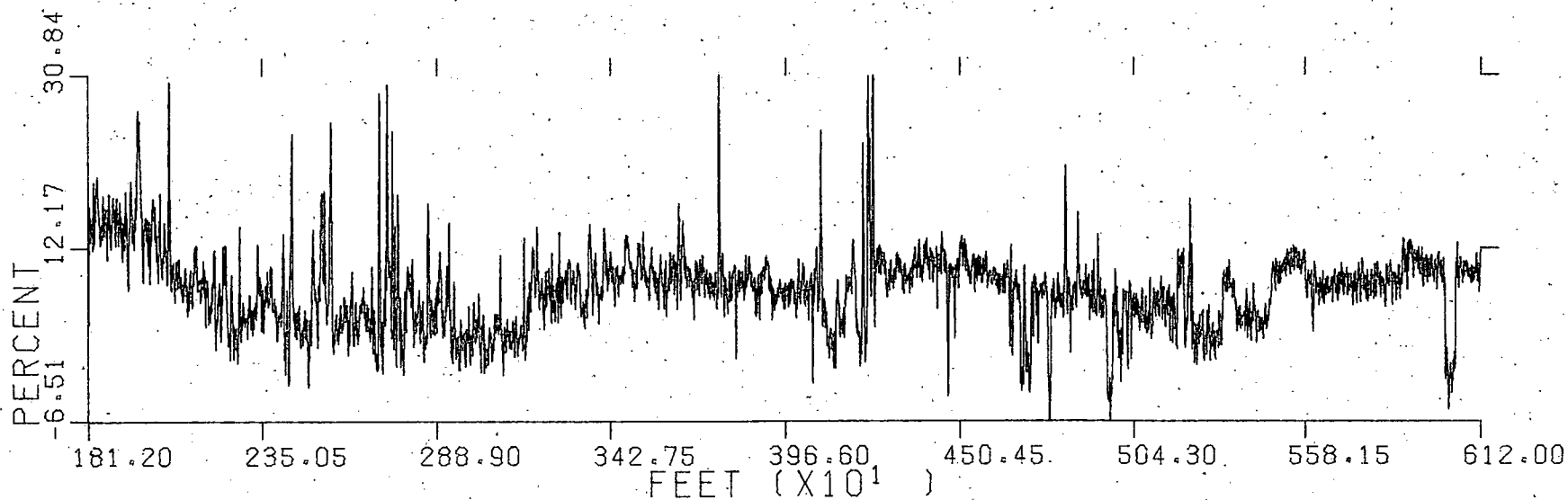
DATA TYPE: CALIPER



FILE # 18

WELL NAME: UTAH 14-2

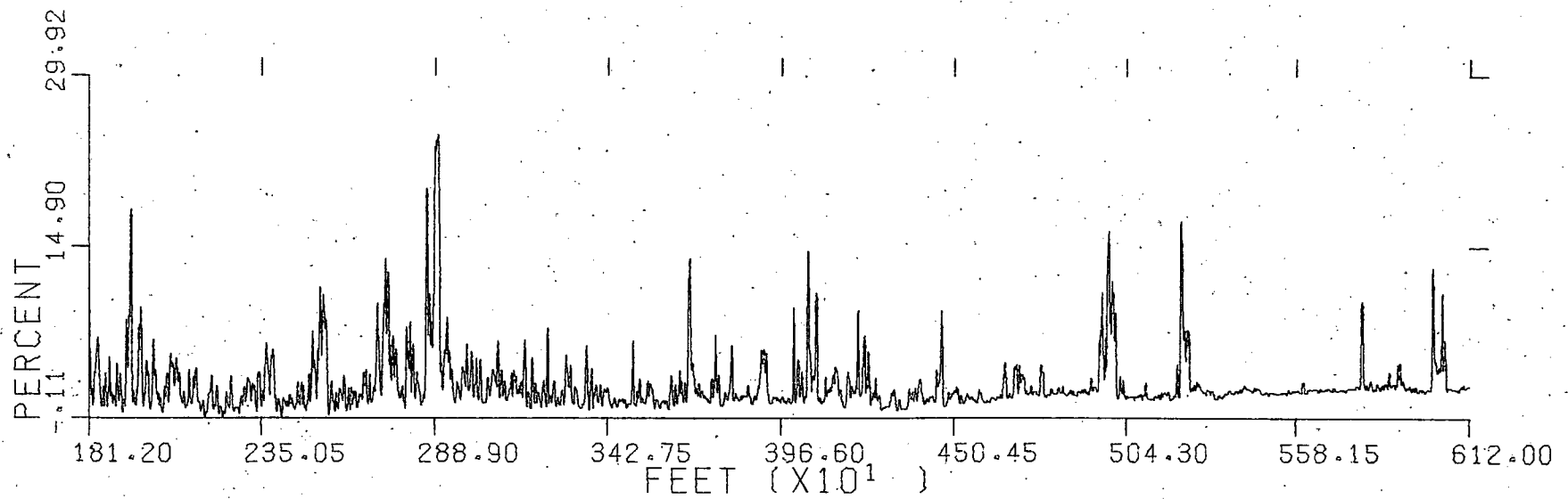
DATA TYPE: DENSITY POROSITY



FILE # 19

WELL NAME: UTAH 14-2

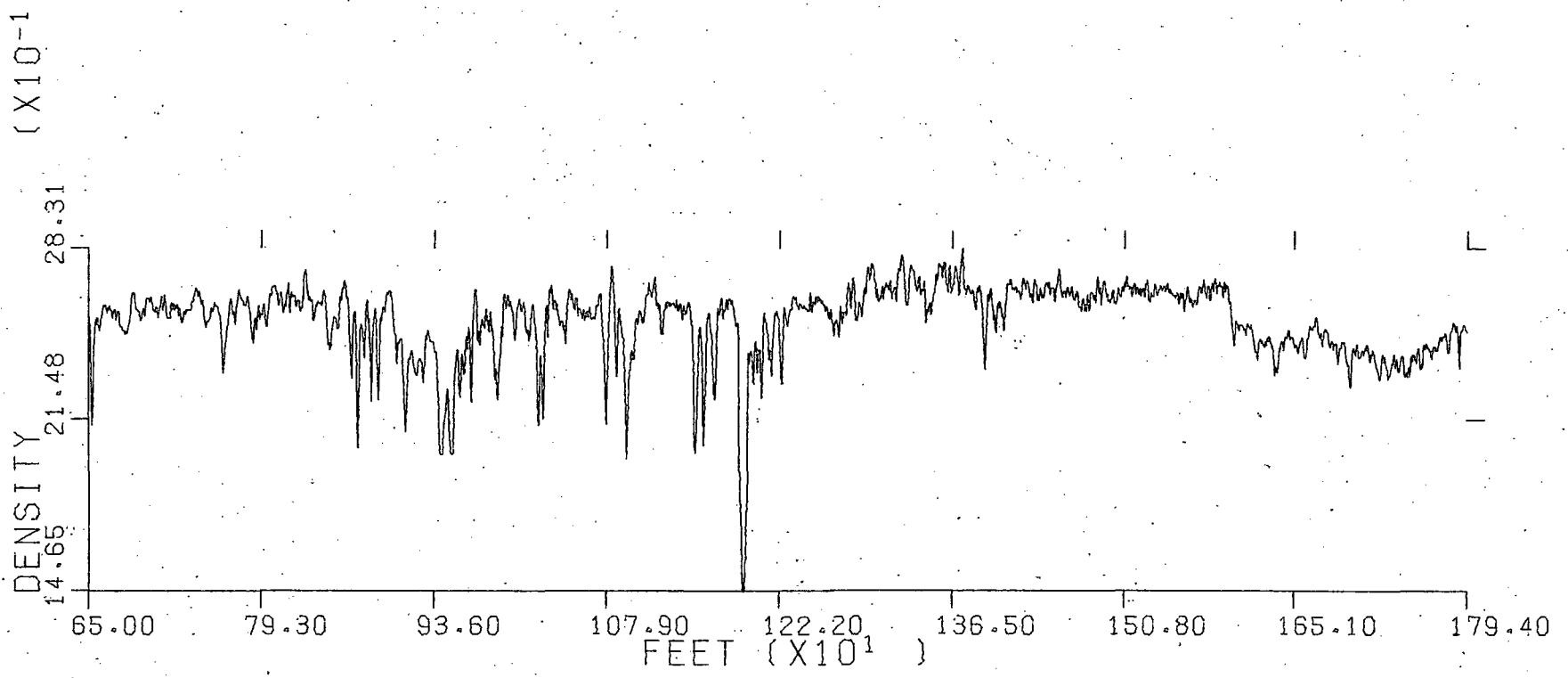
DATA TYPE: NEUTRON POROSITY



FILE # 20

WELL NAME: UTAH 14-2

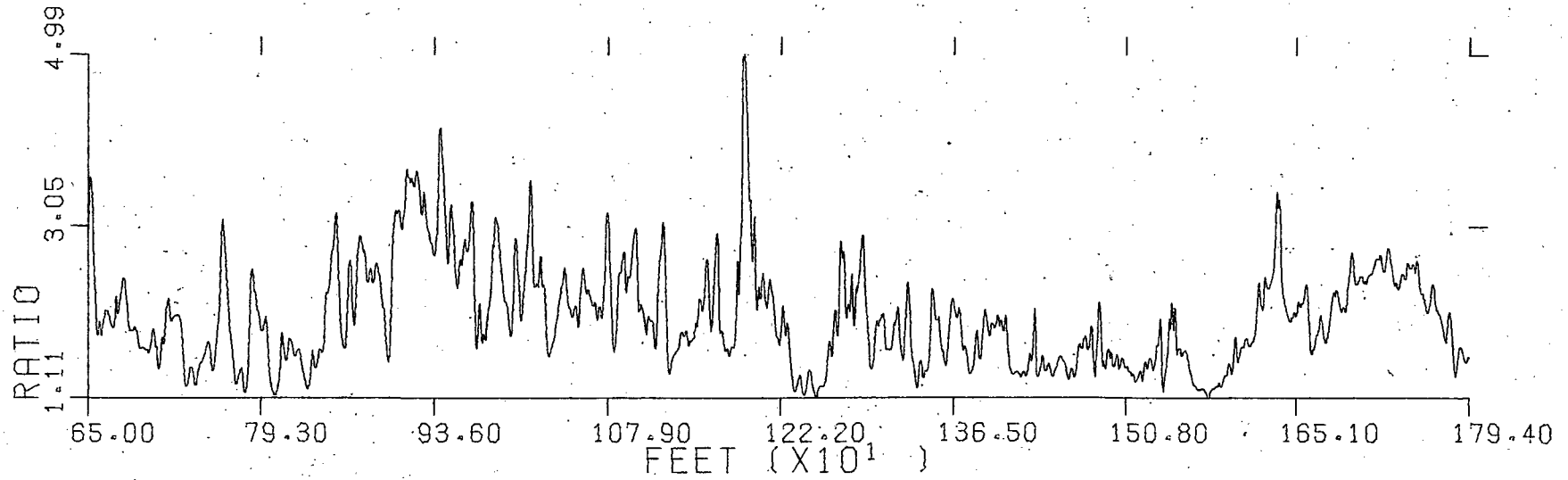
DATA TYPE: BULK DENSITY



FILE # 21

WELL NAME: UTAH 14-2

DATA TYPE: CNL RATIO

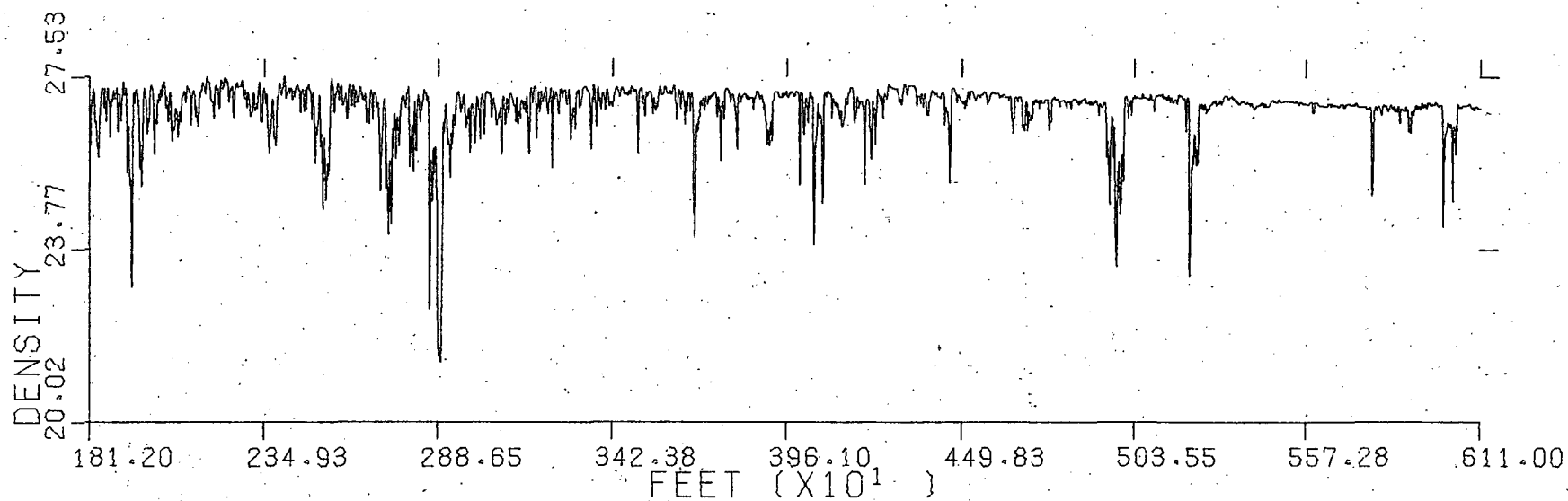


FILE # 22

WELL NAME: UTAH 14-2

DATA TYPE: BULK DENSITY

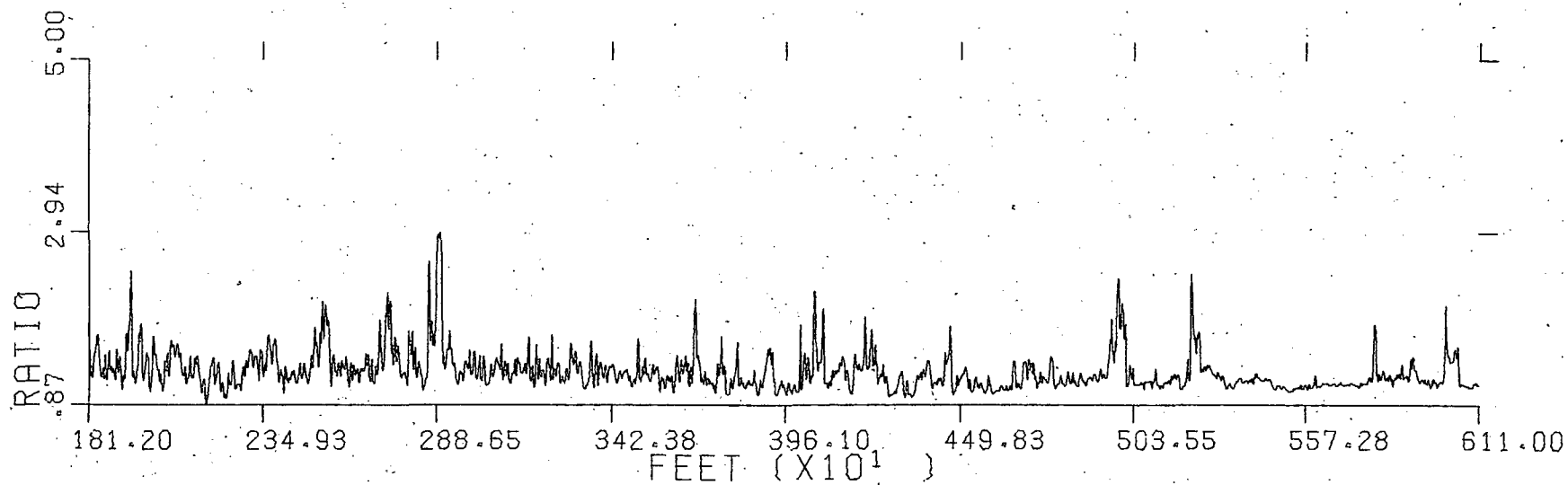
(X10<sup>-1</sup>)



FILE # 23

WELL NAME: UTAH 14-2

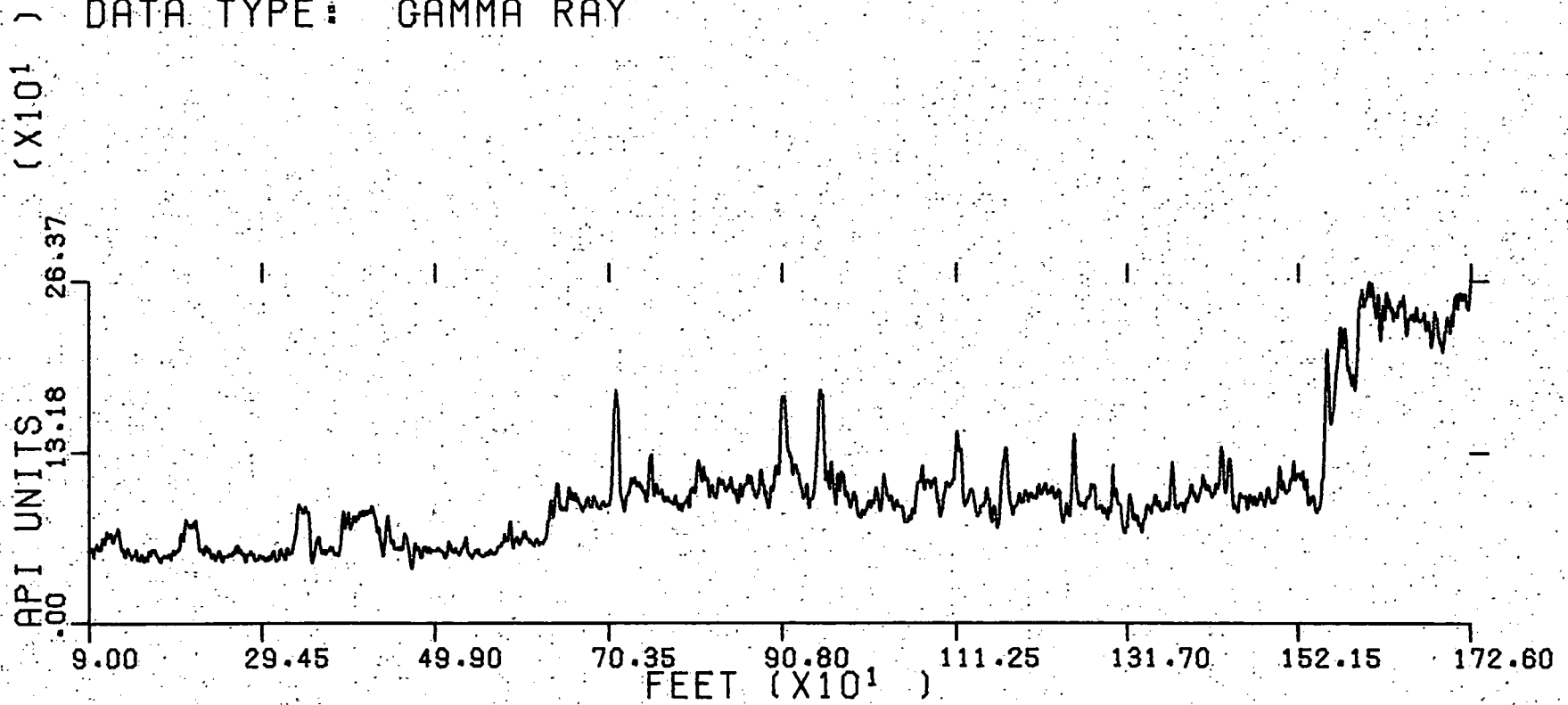
DATA TYPE: CNL RATIO



FILE # 24

WELL NAME: KGRA 14-2

DATA TYPE: GAMMA RAY







UNITED STATES  
DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

14-2  
FILE

Geologic Division  
Branch of Experimental Geochemistry and Mineralogy  
345 Middlefield Road, Menlo Park, California 94025

March 21, 1977

Jake Rudisill  
Thermal Power Co.  
601 California Street  
San Francisco, CA 94108

RECEIVED

MAR 22 1977

TPC

Dear Jake,

Here are the chemical analyses of the Utah State 14-2 well fluids. The tritium, deuterium, H<sub>2</sub>S, and SO<sub>4</sub> sulfur isotopes and SO<sub>4</sub> oxygen isotopes will be a few months more. The small cyclone separator worked well - only 1-2 ppm Cl in the steam condensate and a liquid-vapor <sup>18</sup>O fractionation of 2.5‰ vs. 2.6‰ from experiments. Earlier collections with a large separator showed steam in the water and water in the steam. The special port for the calorimeter collected a fluid with δ<sup>18</sup>O = -13.5 indicating that it contained almost all water (δ<sup>18</sup>O = -13.27, -13.46) and little steam (δ<sup>18</sup>O = -15.82, -15.87).

It appears now that Emanuel Mazor and John Bowman will come along for the collection on March 30. We will drive down from SLC on the 29th and connect our separator before you open up on the 30th. If we can sample upstream and downstream of your orifice plate we would like to do so. This would allow us to make an independent estimate of the total fluid enthalpy. For this we would need valves on both sampling points with 1/2" (or some other agreed upon size) female NPT connections.

Keep me informed of your plans as they develop.

Best wishes,

ALFRED H. TRUESDELL

Enclosure

cc: Stan Ward



UNITED STATES  
DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

Branch of Experimental Geochemistry and Mineralogy  
345 Middlefield Road, Menlo Park, California 94025

August 15, 1977

Jake Rudisill  
Thermal Power Company  
601 California St  
San Francisco, CA 94108

Dear Jake:

The following tritium analyses have been completed on the Utah State 14-2 well at Roosevelt Hot Springs, Utah.

| <u>Sample #</u> | <u>Type</u> | <u>Date Collected</u> | <u>TU±1σ</u> |
|-----------------|-------------|-----------------------|--------------|
| ROT-76-18       | Brine       | 16 Nov 76             | 0.2±0.2      |
| ROT-76-20       | Brine       | 17 Nov 76             | 0.4±0.2      |
| ROT-76-21       | Steam       | 17 Nov 76             | 7.6±0.4      |

Condensate

Analyses were done by F.J. Pearson, Jr. of the USGS in Reston, VA.

Sincerely,

*Nancy Nehring*  
Nancy Nehring

RECEIVED

AUG 17 1977

TPC

U.S. Geological Survey, Water Resources Division  
Quality of Water Branch, Menlo Park, California

$\delta^{18}O = -13.46$

ANALYTICAL STATEMENT

Source: Thermal Power Company Well  
ROT-76-18 Roosevelt, Utah

Lab. No. GT293AT76

Location: \_\_\_\_\_  
\_\_\_\_\_ 1/4 Sec. \_\_\_\_\_, T. \_\_\_\_\_, R. \_\_\_\_\_

Point of coll: Water separate after  
2 1/2 hours; 374°F.

WHP 177 psia, Temp. 14°C  
Date of coll.: November 1976  
Collected by: A. Truesdell

Analysr: Barnes group  
Date completed: 3/77  
Checked by: \_\_\_\_\_  
Field Filter: None.  
Lab Filter: 0.1 µm.  
1:10 silica field dilution  
F denotes field determination.

|                  | mg/l | me/l | mg/l             | me/l |
|------------------|------|------|------------------|------|
| SiO <sub>2</sub> | 640  |      | HCO <sub>3</sub> |      |
| Al               |      |      | CO <sub>3</sub>  |      |
| Fe               |      |      | OH <sup>-</sup>  |      |
| Mn               |      |      |                  |      |
| As               | 3.0  |      | SO <sub>4</sub>  | 78   |
|                  |      |      | Cl <sup>-</sup>  | 3650 |
|                  |      |      | F                | 5.2  |
|                  |      |      | Br               |      |
|                  |      |      | I                |      |
| Ca               | 9.2  |      | NO <sub>2</sub>  |      |
| Mg               | 0.6  |      | NO <sub>3</sub>  |      |
| Sr               |      |      | PO <sub>4</sub>  |      |
| Ba               |      |      | B                | 29   |
| Na               | 2150 |      |                  |      |
| K                | 390  |      |                  |      |
| Li               |      |      |                  |      |
| NH <sub>4</sub>  |      |      |                  |      |

Cation totals:

Anion totals:

Dissolved solids:  
Calculated (mg/l) \_\_\_\_\_  
Residue (180°C) (mg/l) \_\_\_\_\_  
Hardness as CaCO<sub>3</sub> (mg/l) \_\_\_\_\_  
N. C. Hardness as CaCO<sub>3</sub> (mg/l) \_\_\_\_\_

Specific conductance (micromhos at 25°C) 9900  
pH 5.9 (paper); Density at 20°C (g/ml) \_\_\_\_\_  
Sulfides as H<sub>2</sub>S (mg/l) \_\_\_\_\_  
(Unpublished records, subject to revision. Copied  
from original record.)

U.S. Geological Survey, Water Resources Division  
Quality of Water Branch, Menlo Park, California

818.0 = -13.27

ANALYTICAL STATEMENT

Source: Utah State Well #14-2  
ROT-76-20

Lab. No. GT295AT76

Location: Roosevelt, Utah

1/4 Sec. \_\_\_\_\_, T. \_\_\_\_\_, R. \_\_\_\_\_

Point of coll: Water separate.

Collection  
WHP 177 psia, Temp. 9°C  
Date of coll.: November, 1976  
Collected by: A. Truesdell

Analyst: Barnes group  
Date completed: 3/77  
Checked by: \_\_\_\_\_  
Field Filter: None.  
Acid: HCl, HNO<sub>3</sub>.  
1:10 silica field dilution.  
F denotes field determination.  
Lab Filter: 0.1 μm.

|                  | mg/l | me/l | mg/l             | me/l |
|------------------|------|------|------------------|------|
| SiO <sub>2</sub> | 820  |      | HCO <sub>3</sub> |      |
| Al               |      |      | CO <sub>3</sub>  |      |
| Fe               |      |      | OH <sup>3</sup>  |      |
| Mn               |      |      | SO <sub>4</sub>  | 60   |
| As               | 2.2  |      | Cl <sup>4</sup>  | 3650 |
|                  |      |      | F                | 4.8  |
|                  |      |      | Br               |      |
|                  |      |      | I                |      |
| Ca               | 6.9  |      | NO <sub>2</sub>  |      |
| Mg               | 0.08 |      | NO <sub>3</sub>  |      |
| Sr               |      |      | PO <sub>4</sub>  |      |
| Ba               |      |      | B                | 28   |
| Na               | 2200 |      |                  |      |
| K                | 410  |      |                  |      |
| Li               |      |      |                  |      |
| NH <sub>4</sub>  |      |      |                  |      |

Dissolved solids:  
Calculated (mg/l) \_\_\_\_\_  
Residue (180°C) (mg/l) \_\_\_\_\_  
Hardness as CaCO<sub>3</sub> (mg/l) \_\_\_\_\_  
N. C. Hardness as CaCO<sub>3</sub> (mg/l) \_\_\_\_\_

Cation totals: \_\_\_\_\_ Anion totals: \_\_\_\_\_  
Specific conductance (micromhos at 25°C) 10,000  
pH 6.2 (paper); Density at 20°C (g/ml) \_\_\_\_\_  
Sulfides as H<sub>2</sub>S (mg/l) \_\_\_\_\_  
(Unpublished records, subject to revision. Copied from original record.)

U.S. Geological Survey, Water Resources Division  
Quality of Water Branch, Menlo Park, California

$\delta^{18}O = -15.87$

ANALYTICAL STATEMENT

Source: Utah State Well #14-2  
ROT-76-21

Lab. No. GT296AT76

Location: Roosevelt, Utah  
1/4 Sec. \_\_\_\_\_, T. \_\_\_\_\_, R. \_\_\_\_\_

|  | mg/l | me/l | mg/l | me/l |
|--|------|------|------|------|
|--|------|------|------|------|

Point of coll: Steam condensate

Collection \_\_\_\_\_, Temp. 9°C

Date of coll.: November, 1976

Collected by: A. Truesdell

Analyst: Barnes group

Date completed: 3/77

Checked by: \_\_\_\_\_

Field Filter: None.

Acid: HCl, HNO<sub>3</sub>.

Lab Filter: 0.1 μm.

F denotes field determination.

|                  |       |       |                  |       |
|------------------|-------|-------|------------------|-------|
| SiO <sub>2</sub> | <1    | ---   | HCO <sub>3</sub> | _____ |
| Al               | _____ | _____ | CO <sub>3</sub>  | _____ |
| Fe               | _____ | _____ | OH               | _____ |
| Mn               | _____ | _____ | SO <sub>4</sub>  | 3     |
| As               | <0.01 | _____ | Cl               | 2     |
|                  | _____ | _____ | F                | <0.1  |
|                  | _____ | _____ | Br               | _____ |
|                  | _____ | _____ | I                | _____ |
| Ca               | 6.6   | _____ | NO <sub>2</sub>  | _____ |
| Mg               | <0.05 | _____ | NO <sub>3</sub>  | _____ |
| Sr               | _____ | _____ | PO <sub>4</sub>  | _____ |
| Ba               | _____ | _____ | B                | 0.55  |
| Na               | <0.5  | _____ |                  | ---   |
| K                | <0.1  | _____ |                  | _____ |
| Li               | _____ | _____ |                  | _____ |
| NH <sub>4</sub>  | _____ | _____ |                  | _____ |

Cation totals:

Anion totals:

Dissolved solids:  
Calculated (mg/l) \_\_\_\_\_  
Residue (180°C) (mg/l) \_\_\_\_\_  
Hardness as CaCO<sub>3</sub> (mg/l) \_\_\_\_\_  
N. C. Hardness as CaCO<sub>3</sub> (mg/l) \_\_\_\_\_

Specific conductance (micromhos at 25°C) 185  
pH 4.5 (paper); Density at 20°C (g/ml) \_\_\_\_\_  
Sulfides as H<sub>2</sub>S (mg/l) \_\_\_\_\_  
(Unpublished records, subject to revision. Copied from original record.)

U.S. Geological Survey, Water Resources Division  
Quality of Water Branch, Menlo Park, California

$\delta^{18}O = -15.82 \text{ ‰}$

ANALYTICAL STATEMENT

Source: Thermal Power Company Well  
ROT-76-19 Roosevelt, Utah

Lab. No. GT294AT76

Location:

1/4 Sec. \_\_\_\_\_, T. \_\_\_\_\_, R. \_\_\_\_\_

Point of coll: Steam condensate.

Collection \_\_\_\_\_, Temp. 15°C

Date of coll.: November, 1976

Collected by: A. Truesdell

Analyst: Barnes group

Date completed: 3/77

Checked by: \_\_\_\_\_

Field Filter: None. Acid: HCl, HNO<sub>3</sub>.

Lab Filter: 0.1 μm.

F denotes field determination.

|                  | mg/l        | me/l  | mg/l             | me/l       |
|------------------|-------------|-------|------------------|------------|
| SiO <sub>2</sub> | <1          | ---   | HCO <sub>3</sub> | _____      |
| Al               | _____       | _____ | CO <sub>3</sub>  | _____      |
| Fe               | _____       | _____ | OH <sup>-</sup>  | _____      |
| Mn               | _____       | _____ | SO <sub>4</sub>  | <u>2</u>   |
| As               | <u>0.02</u> | _____ | Cl <sup>-</sup>  | <u>1</u>   |
|                  | _____       | _____ | F                | <0.1       |
|                  | _____       | _____ | Br               | _____      |
|                  | _____       | _____ | I                | _____      |
| Ca               | <u>52</u>   | _____ | NO <sub>2</sub>  | _____      |
| Mg               | <0.05       | _____ | NO <sub>3</sub>  | _____      |
| Sr               | _____       | _____ | PO <sub>4</sub>  | _____      |
| Ba               | _____       | _____ | B                | <u>0.6</u> |
| Na               | <1          | _____ |                  | _____      |
| K                | <0.1        | _____ |                  | _____      |
| Li               | _____       | _____ |                  | _____      |
| NH <sub>4</sub>  | _____       | _____ |                  | _____      |

Cation totals:

Anion totals:

Dissolved solids:  
Calculated (mg/l) \_\_\_\_\_  
Residue (180°C) (mg/l) \_\_\_\_\_  
Hardness as CaCO<sub>3</sub> (mg/l) \_\_\_\_\_  
N. C. Hardness as CaCO<sub>3</sub> (mg/l) \_\_\_\_\_

Specific conductance (micromhos at 25°C) 220  
pH 4.9 (paper); Density at 20°C (g/ml) \_\_\_\_\_  
Sulfides as H<sub>2</sub>S (mg/l) \_\_\_\_\_  
(Unpublished records, subject to revision. Copied from original record.)

COPIES to  
HPR  
Ted

May 16, 1979

TRIP REPORT 14-2 FLOW TEST MAY 1979

KIP SMITH

From Sunday April 29 to Friday May 4, 1979, the Denver Research Inst. (DRI) prepared and conducted a series of tests of Thermal Power Co.'s well 14-2 to determine the flow regime within the well at several different flow rates.

Personnel on site were:

Jake Rudisill and Roy, Thermal Power Co.

Jim Butz, P.I., DRI

Larry & John, DRI Technicians

Scott Keys, USGS WRD

Dick & Al, USGS WRD

Dick Eifert, Sandia Labs

Kip Smith, ESL

DRI has designed two tools for logging temperature and pressure in geothermal wells. The newer tool has an impeller to measure flow rate and a magnetostrictor device that indirectly measures density. DRI has no cable and no digital recording system. The USGS WRD has a logging truck with a new 7 - conductor cable 15,555 feet long. They also have several acoustic televiwer tools that 'see' fractures in the hole. The DRI/USGS combination allows DRI to get its tool into geothermal wells and provides well-owners with the opportunity to receive free televiwer logs. Thermal Power Co. agreed to allow DRI to log 14-2 because they wanted additional televiwer data. The televiwer data were to be gathered

Saturday May 5, 1979. I left the site before any televiwer data were gathered.

Talked to Jake 5/17 - televiwer did not work - USGS  
Gunned out

THE SEQUENCE OF EVENTS

MONDAY APRIL 30, 1979

Well-head risers were rigged and a static temperature log attempted with a USGS tool. This log was run because it is the simplest to set up and can be used to diagnose electrical or mechanical problems with the cable head, cable, or recording equipment. The cable head shorted out many times Monday through Thursday.

No logs were run successfully on Monday, so I gathered water-level data on several shallow stock-water wells.

TUESDAY MAY 1, 1979

Several failures with televiwer in static hole. I went around Mineral Mountains to check out the Paleozoic section and access to the eastern extension of Negro Mag Wash. Can't get there yet; will be able to soon, by June.

WEDNESDAY MAY 2, 1979

More cable-head failures; did SP with Bill Sill and Dennis Buzzell.

THURSDAY MAY 3, 1979

As the DRI tool was tripping downhole, the flimsy-looking impeller crapped out at about 400 ft. DRI must improve the design of their flow-meter.

With the tool at 1700 ft., Jake and Roy started flow for the 1st time at a low rate to allow the well to warm up. At wellhead: 456<sup>0</sup>F, 450 psi; at 1700 ft.:



485<sup>0</sup>, 800 psi. Therefore, no flashing above 1700 ft. at this (low) rate. Tripped down to 3000 ft. with magnetostrictor device indicating one-phase flow.

Log 1 Logging up from 3000 ft. at a mass flow rate (Q) = 280,000 lbm/hr determined by James method.  
455<sup>0</sup>F at surface, 460<sup>0</sup>F at 2300 ft.; no flashing in well. At about 1900 ft., 7:00 PM, another electronic failure terminated data acquisition.

FRIDAY MAY 4, 1979

Log 2 Wellhead T = 455<sup>0</sup>F, 440 psi; Q = 300,000 lbm/hr. Logging down, flash zone at 2,300 ft. 13.5 psi. lip pressure. Logged to 3,000 ft.  
Q increased to 500,000 lbm/hr and flash zone zoomed below 3000 ft. Tripped down to 4800 ft., logged up in single phase zone T = 496<sup>0</sup>F. The flash point may have been at 3400 ft. Then at 1:00 PM electronic trouble at 2800 ft. ended log. A successful run because Q constant and flash zone seen.  
Picked up SP lines; Bill and Dennis left feeling that results were inconclusive.

Log 3 Lip pressure 32 psi, wellhead pressure 155 psi, wellhead T = 370<sup>0</sup>F, Q = 7 - 800,000 lbm/hr: maximum flow rate possible with the present valve system. Logged from 400 ft. to 6060 ft. Q constant. Bottom hole temperature 488<sup>0</sup>F. Flashzone at 5900 ft. It sure looks like there's a water entry below 5900 ft. Apparently there is flashing in the formation at the known water entry near 2900 ft. 7:00 PM.

Log 4 Tripped up to 5000 ft., lowered flow rate,  $Q = 400,000 \text{ lbm/hr (?)}$ ,  
Lip pressure 25 psi, wellhead pressure 225 psi. Too dark to read  
thermometer or thermocouple at wellhead. Excellent log to 455 ft.  
Well shut down at 9:15 PM. Everyone made for the Dung Ho in Milford  
and got there in time for cheeseburgers.

SATURDAY MAY 5, 1979

DRI assembly and tool removed and televiewer to start in. I left.

The four logs should give us a good picture of how 14-2 responds to  
different flow-rates and should assist Thermal Power's assessment of the energy  
potential of the well. They may also provide information that can be used to  
design additional wells at Roosevelt to be as efficient as possible.

Jim Butz should be sending us his analyses of the tests by June 30, 1979.

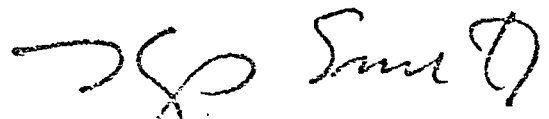
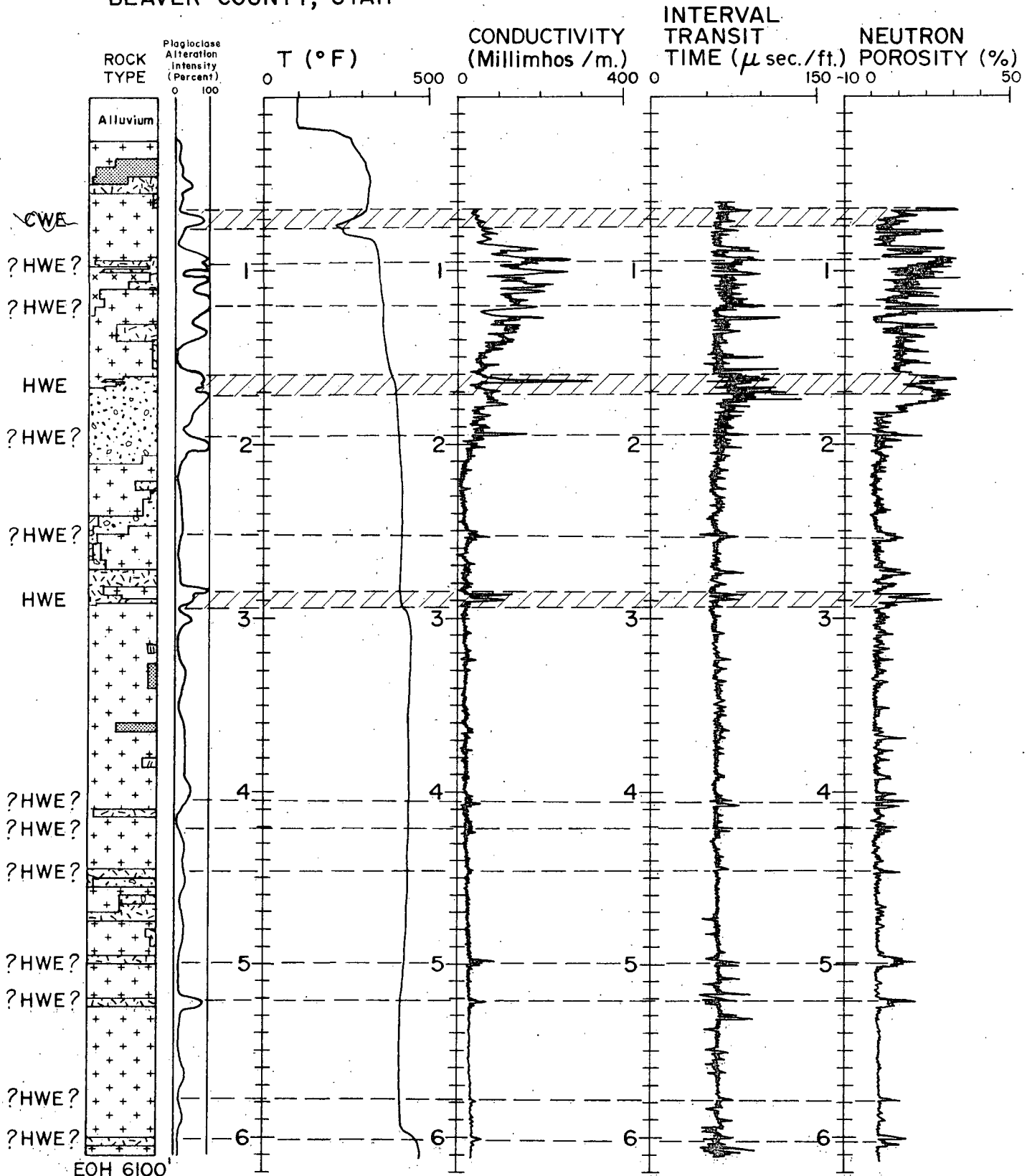
  
Kip Smith

FIGURE 1/14-2

DH 14-2

ROOSEVELT KGRA  
BEAVER COUNTY, UTAH

GENERALIZED GEOLOGY AND  
SELECTED GEOPHYSICAL LOGS  
VERT. SCALE: 800 FT./IN.



HWE = Hot Water Entry Zone      CWE = Cold Water Entry Zone

- |                              |                                      |                                   |
|------------------------------|--------------------------------------|-----------------------------------|
| Biotite Hornblende Monzonite | Biotite Aplite Porphyry              | Biotite Hornblende Apatite Dacite |
| Microgranite                 | Biotite Hornblende Microgranodiorite | Andesite                          |



UNITED STATES  
DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

Branch of Experimental Geochemistry and Mineralogy  
345 Middlefield Road, Menlo Park, California 94025

August 15, 1977

Jake Rudisill  
Thermal Power Company  
601 California St  
San Francisco, CA 94108

Dear Jake:

The following tritium analyses have been completed on the Utah State 14-2 well at Roosevelt Hot Springs, Utah.

| <u>Sample #</u> | <u>Type</u> | <u>Date Collected</u> | <u>TU±1σ</u> |
|-----------------|-------------|-----------------------|--------------|
| ROT-76-18       | Brine       | 16 Nov 76             | 0.2±0.2      |
| ROT-76-20       | Brine       | 17 Nov 76             | 0.4±0.2      |
| ROT-76-21       | Steam       | 17 Nov 76             | 7.6±0.4      |

Condensate

Analyses were done by F.J. Pearson, Jr. of the USGS in Reston, VA.

Sincerely,

*Nancy Nehring*  
Nancy Nehring

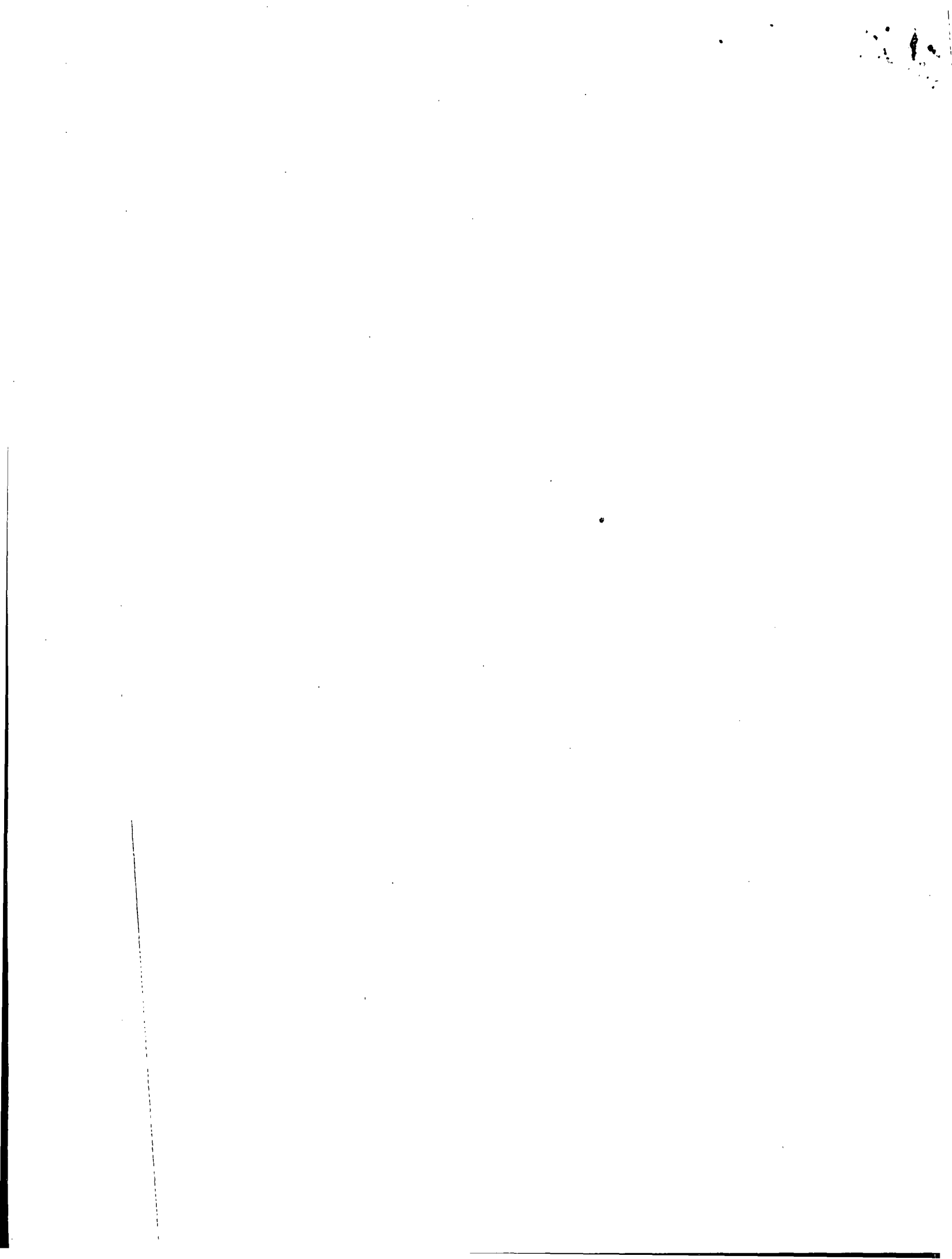
RECEIVED

AUG 17 1977

TPC

14-2

*duplicate copy*





UNITED STATES  
DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

Geologic Division  
Branch of Experimental Geochemistry and Mineralogy  
345 Middlefield Road, Menlo Park, California 94025

14-2  
FILE

March 21, 1977

Jake Rudisill  
Thermal Power Co.  
601 California Street  
San Francisco, CA 94108

RECEIVED

MAR 22 1977

TPC

Dear Jake,

Here are the chemical analyses of the Utah State 14-2 well fluids. The tritium, deuterium, H<sub>2</sub>S, and SO<sub>4</sub> sulfur isotopes and SO<sub>4</sub> oxygen isotopes will be a few months more. The small cyclone separator worked well - only 1-2 ppm Cl in the steam condensate and a liquid-vapor <sup>18</sup>O fractionation of 2.5‰ vs. 2.6‰ from experiments. Earlier collections with a large separator showed steam in the water and water in the steam. The special port for the calorimeter collected a fluid with δ<sup>18</sup>O = -13.5 indicating that it contained almost all water (δ<sup>18</sup>O = -13.27, -13.46) and little steam (δ<sup>18</sup>O = -15.82, -15.87).

It appears now that Emanuel Mazar and John Bowman will come along for the collection on March 30. We will drive down from SLC on the 29th and connect our separator before you open up on the 30th. If we can sample upstream and downstream of your orifice plate we would like to do so. This would allow us to make an independent estimate of the total fluid enthalpy. For this we would need valves on both sampling points with 1/2" (or some other agreed upon size) female NPT connections.

Keep me informed of your plans as they develop.

Best wishes,

ALFRED H. TRUESDELL

Enclosure

cc: Stan Ward

U.S. Geological Survey, Water Resources Division  
Quality of Water Branch, Menlo Park, California

$\delta^{18}O = -13.46$

ANALYTICAL STATEMENT

Source: Thermal Power Company Well  
ROT-76-18 Roosevelt, Utah

Lab. No. GT293AT76

Location:         $\frac{1}{4}$  Sec.       , T.       , R.       

|  |      |      |      |      |
|--|------|------|------|------|
|  | mg/l | me/l | mg/l | me/l |
|--|------|------|------|------|

Point of coll: Water separate after  
2 1/2 hours; 374°F.

WHP 177 psia, Temp. 14°C  
Date of coll.: November 1976  
Collected by: A. Truesdell

|                  |               |               |                  |               |               |
|------------------|---------------|---------------|------------------|---------------|---------------|
| SiO <sub>2</sub> | <u>640</u>    | <u>      </u> | HCO <sub>3</sub> | <u>      </u> | <u>      </u> |
| Al               | <u>      </u> | <u>      </u> | CO <sub>3</sub>  | <u>      </u> | <u>      </u> |
| Fe               | <u>      </u> | <u>      </u> | OH               | <u>      </u> | <u>      </u> |
| Mn               | <u>      </u> | <u>      </u> | SO <sub>4</sub>  | <u>78</u>     | <u>      </u> |
| As               | <u>3.0</u>    | <u>      </u> | Cl               | <u>3650</u>   | <u>      </u> |
|                  | <u>      </u> | <u>      </u> | F                | <u>5.2</u>    | <u>      </u> |
|                  | <u>      </u> | <u>      </u> | Br               | <u>      </u> | <u>      </u> |
|                  | <u>      </u> | <u>      </u> | I                | <u>      </u> | <u>      </u> |
| Ca               | <u>9.2</u>    | <u>      </u> | NO <sub>2</sub>  | <u>      </u> | <u>      </u> |
| Mg               | <u>0.6</u>    | <u>      </u> | NO <sub>3</sub>  | <u>      </u> | <u>      </u> |
| Sr               | <u>      </u> | <u>      </u> | PO <sub>4</sub>  | <u>      </u> | <u>      </u> |
| Ba               | <u>      </u> | <u>      </u> | B                | <u>29</u>     | <u>      </u> |
| Na               | <u>2150</u>   | <u>      </u> |                  | <u>      </u> | <u>      </u> |
| K                | <u>390</u>    | <u>      </u> |                  | <u>      </u> | <u>      </u> |
| Li               | <u>      </u> | <u>      </u> |                  | <u>      </u> | <u>      </u> |
| NH <sub>4</sub>  | <u>      </u> | <u>      </u> |                  | <u>      </u> | <u>      </u> |

Analyst: Barnes group  
Date completed: 3/77  
Checked by:         
Field Filter: None.  
Lab Filter: 0.1  $\mu$ m.  
1:10 silica field dilution  
F denotes field determination.

Cation totals:        Anion totals:       

Dissolved solids:  
Calculated (mg/l)         
Residue (180°C) (mg/l)         
Hardness as CaCO<sub>3</sub> (mg/l)         
N. C. Hardness as CaCO<sub>3</sub> (mg/l)       

Specific conductance (micromhos at 25°C) 9900  
pH 5.9 (paper); Density at 20°C (g/ml)         
Sulfides as H<sub>2</sub>S (mg/l)         
(Unpublished records, subject to revision. Copied  
from original record.)

U.S. Geological Survey, Water Resources Division  
Quality of Water Branch, Menlo Park, California

$\delta^{18}O = -13.27$

ANALYTICAL STATEMENT

Source: Utah State Well #14-2  
ROT-76-20

Lab. No. GT295AT76

Location: Roosevelt, Utah

       1/4 Sec.       , T.       , R.       

Point of coll: Water separate.

Collection  
WHP 177 psia, Temp. 9°C  
Date of coll.: November, 1976  
Collected by: A. Truesdell

Analyst: Barnes group  
Date completed: 3/77  
Checked by:                       
Field Filter: None  
Acid: HCl, HNO<sub>3</sub>  
1:10 silica field dilution.  
F denotes field determination.  
Lab Filter: 0.1  $\mu$ m.

|                              | mg/l | me/l | mg/l             | me/l |
|------------------------------|------|------|------------------|------|
| SiO <sub>2</sub>             | 820  |      | HCO <sub>3</sub> |      |
| Al                           |      |      | CO <sub>3</sub>  |      |
| Fe                           |      |      | OH <sup>-</sup>  |      |
| Mn                           |      |      | SO <sub>4</sub>  | 60   |
| As                           | 2.2  |      | Cl <sup>-</sup>  | 3650 |
|                              |      |      | F                | 4.8  |
|                              |      |      | Br               |      |
|                              |      |      | I                |      |
| Ca                           | 6.9  |      | NO <sub>2</sub>  |      |
| Mg                           | 0.08 |      | NO <sub>3</sub>  |      |
| Sr                           |      |      | PO <sub>4</sub>  |      |
| Ba                           |      |      | B                | 28   |
| Na                           | 2200 |      |                  |      |
| K                            | 410  |      |                  |      |
| Li                           |      |      |                  |      |
| NH <sub>4</sub> <sup>+</sup> |      |      |                  |      |

Dissolved solids:  
Calculated (mg/l)             
Residue (180°C) (mg/l)             
Hardness as CaCO<sub>3</sub> (mg/l)             
N. C. Hardness as CaCO<sub>3</sub> (mg/l)           

Cation totals:                      Anion totals:                       
Specific conductance (micromhos at 25°C) 10,000  
pH 6.2 (paper); Density at 20°C (g/ml)             
Sulfides as H<sub>2</sub>S (mg/l)             
(Unpublished records, subject to revision. Copied  
from original record.)



U.S. Geological Survey, Water Resources Division  
 Quality of Water Branch, Menlo Park, California  
**ANALYTICAL STATEMENT**

$\delta^{18}O = -15.87$

Source: Utah State Well #14-2  
 ROT-76-21

Lab. No. GT296ATZ6

Location: Roosevelt, Utah  
 1/4 Sec. \_\_\_\_\_, T. \_\_\_\_\_, R. \_\_\_\_\_

Point of coll: Steam condensate

Collection \_\_\_\_\_, Temp. 9°C

Date of coll.: November, 1976

Collected by: A. Truesdell

Analyst: Barnes group

Date completed: 3/77

Checked by: \_\_\_\_\_

Field Filter: None.

Acid: HCl, HNO<sub>3</sub>.

Lab Filter: 0.1 µm.

F denotes field determination.

|                  | mg/l  | me/l  | mg/l             | me/l  |
|------------------|-------|-------|------------------|-------|
| SiO <sub>2</sub> | <1    | ---   | HCO <sub>3</sub> | _____ |
| Al               | _____ | _____ | CO <sub>3</sub>  | _____ |
| Fe               | _____ | _____ | OH <sup>-</sup>  | _____ |
| Mn               | _____ | _____ | SO <sub>4</sub>  | 3     |
| As               | <0.01 | _____ | Cl               | 2     |
|                  | _____ | _____ | F                | <0.1  |
|                  | _____ | _____ | Br               | _____ |
|                  | _____ | _____ | I                | _____ |
| Ca               | 6.6   | _____ | NO <sub>2</sub>  | _____ |
| Mg               | <0.05 | _____ | NO <sub>3</sub>  | _____ |
| Sr               | _____ | _____ | PO <sub>4</sub>  | _____ |
| Ba               | _____ | _____ | B                | 0.55  |
| Na               | <0.5  | _____ |                  | ---   |
| K                | <0.1  | _____ |                  | _____ |
| Li               | _____ | _____ |                  | _____ |
| NH <sub>4</sub>  | _____ | _____ |                  | _____ |

Cation totals:

Anion totals:

Dissolved solids:  
 Calculated (mg/l) \_\_\_\_\_  
 Residue (180°C) (mg/l) \_\_\_\_\_  
 Hardness as CaCO<sub>3</sub> (mg/l) \_\_\_\_\_  
 N. C. Hardness as CaCO<sub>3</sub> (mg/l) \_\_\_\_\_

Specific conductance (micromhos at 25°C) 185  
 pH 4.5 (paper); Density at 20°C (g/ml) \_\_\_\_\_  
 Sulfides as H<sub>2</sub>S (mg/l) \_\_\_\_\_  
 (Unpublished records, subject to revision. Copied  
 from original record.)

U.S. Geological Survey, Water Resources Division  
Quality of Water Branch, Menlo Park, California

$\delta^{18}O = -15.82 \text{ ‰}$

ANALYTICAL STATEMENT

Source: Thermal Power Company Well  
ROT-76-19 Roosevelt, Utah

Lab. No. GT294AT76

Location: \_\_\_\_\_  
\_\_\_\_\_ 1/4 Sec. \_\_\_\_\_, T. \_\_\_\_\_, R. \_\_\_\_\_

Point of coll: Steam condensate.

Collection \_\_\_\_\_  
\_\_\_\_\_, Temp. 15°C

Date of coll.: November, 1976

Collected by: A. Truesdell

Analyst: Barnes group

Date completed: 3/77

Checked by: \_\_\_\_\_

Field Filter: None. Acid: HCl, HNO<sub>3</sub>.

Lab Filter: 0.1  $\mu$ m.

F denotes field determination.

|                  | mg/l  | me/l  | mg/l             | me/l  |
|------------------|-------|-------|------------------|-------|
| SiO <sub>2</sub> | <1    | ---   | HCO <sub>3</sub> | _____ |
| Al               | _____ | _____ | CO <sub>3</sub>  | _____ |
| Fe               | _____ | _____ | OH               | _____ |
| Mn               | _____ | _____ | SO <sub>4</sub>  | 2     |
| As               | 0.02  | _____ | Cl               | 1     |
|                  | _____ | _____ | F                | <0.1  |
|                  | _____ | _____ | Br               | _____ |
|                  | _____ | _____ | I                | _____ |
| Ca               | 52    | _____ | NO <sub>2</sub>  | _____ |
| Mg               | <0.05 | _____ | NO <sub>3</sub>  | _____ |
| Sr               | _____ | _____ | PO <sub>4</sub>  | _____ |
| Ba               | _____ | _____ | B                | 0.6   |
| Na               | <1    | _____ |                  | _____ |
| K                | <0.1  | _____ |                  | _____ |
| Li               | _____ | _____ |                  | _____ |
| NH <sub>4</sub>  | _____ | _____ |                  | _____ |

Cation totals:

Anion totals:

Dissolved solids:  
Calculated (mg/l) \_\_\_\_\_  
Residue (180°C) (mg/l) \_\_\_\_\_  
Hardness as CaCO<sub>3</sub> (mg/l) \_\_\_\_\_  
N. C. Hardness as CaCO<sub>3</sub> (mg/l) \_\_\_\_\_

Specific conductance (micromhos at 25°C) 220  
F pH 4.9 (paper); Density at 20°C (g/ml) \_\_\_\_\_  
Sulfides as H<sub>2</sub>S (mg/l) \_\_\_\_\_  
(Unpublished records, subject to revision. Copied  
from original record.)

*Same as previous page*

U.S. Geological Survey, Water Resources Division  
Quality of Water Branch, Menlo Park, California

$\delta^{18}O = -15.82 \text{ ‰}$

ANALYTICAL STATEMENT

Source: Thermal Power Company Well  
ROT-76-19 Roosevelt, Utah

Lab. No. GT294AT76

Location: \_\_\_\_\_  
\_\_\_\_\_ 1/4 Sec. \_\_\_\_\_, T. \_\_\_\_\_, R. \_\_\_\_\_

Point of coll: Steam condensate.

Collection \_\_\_\_\_, Temp. 15°C

Date of coll.: November, 1976

Collected by: A. Truesdell

Analyst: Barnes group

Date completed: 3/77

Checked by: \_\_\_\_\_

Field Filter: None. Acid: HCl, HNO<sub>3</sub>.

Lab Filter: 0.1 μm.

F denotes field determination.

|                  | mg/l  | me/l  | mg/l             | me/l  |
|------------------|-------|-------|------------------|-------|
| SiO <sub>2</sub> | <1    | ---   | HCO <sub>3</sub> | _____ |
| Al               | _____ | _____ | CO <sub>3</sub>  | _____ |
| Fe               | _____ | _____ | OH <sup>-</sup>  | _____ |
| Mn               | _____ | _____ | SO <sub>4</sub>  | 2     |
| As               | 0.02  | _____ | Cl <sup>-</sup>  | 1     |
|                  | _____ | _____ | F                | <0.1  |
|                  | _____ | _____ | Br               | _____ |
|                  | _____ | _____ | I                | _____ |
| Ca               | 52    | _____ | NO <sub>2</sub>  | _____ |
| Mg               | <0.05 | _____ | NO <sub>3</sub>  | _____ |
| Sr               | _____ | _____ | PO <sub>4</sub>  | _____ |
| Ba               | _____ | _____ | B                | 0.6   |
| Na               | <1    | _____ |                  | _____ |
| K                | <0.1  | _____ |                  | _____ |
| Li               | _____ | _____ |                  | _____ |
| NH <sub>4</sub>  | _____ | _____ |                  | _____ |

Dissolved solids:  
Calculated (mg/l) \_\_\_\_\_  
Residue (180°C) (mg/l) \_\_\_\_\_  
Hardness as CaCO<sub>3</sub> (mg/l) \_\_\_\_\_  
N. C. Hardness as CaCO<sub>3</sub> (mg/l) \_\_\_\_\_

Cation totals: \_\_\_\_\_ Anion totals: \_\_\_\_\_  
Specific conductance (micromhos at 25°C) 220  
pH 4.9 (paper); Density at 20°C (g/ml) \_\_\_\_\_  
Sulfides as H<sub>2</sub>S (mg/l) \_\_\_\_\_  
(Unpublished records, subject to revision. Copied from original record.)

Utah State 14-2 well logs

All well logs per Utah State 52-21 submitted to ESI by Thermal Power Company are listed in Table 3. These logs were digitized and deposited in Plate 3. Other information such as hole (if)

and casing size, log date and lithology are also included in Plate 3. A brief description of each log follows.

Temperature - Four temperature logs were submitted by Thermal Power Company and all have an alarm in Plate III. No information ~~is~~ on circulation history other than given on the log headings was submitted. The three above circulations are ~~not~~ with in Plate III and Table 3.

Caliper - The borehole caliper log is obviously inaccurate but it does qualitatively reflect borehole wall irregularities. The hole (log) size and casing I.D.'s are checked with the caliper log for comparison. The data the showing was set in also indicated.

Interval Transit Time (some velocity) - The change in ~~the~~ spike events in the log are due to cycle skipping.

**Neutron Porosity** - This log is a compensated neutron porosity <sup>which</sup> ~~and~~ assumes a limestone matrix. ~~grain density equal to 2.71 and~~ is assumed and corrections for borehole ~~size~~ <sup>was</sup> made.

**Compensated Formation Density Porosity** - This log was recorded, assuming a limestone matrix with a grain density of 2.71 gm/cc. Bulk density was also recorded. ~~with this log.~~

**Induction & Electrical Log** - A short normal ~~and~~ a GFF40 Induction log ~~and an SP~~ (Schlumberger) logs were recorded simultaneously. Note the borehole fluid change between the 9/19/76 and 10/15/76 logs. The short normal log was not recorded below 1800 feet.

**Spontaneous Potential** - As noted, the SP log was recorded with the electric logs. The discontinuity in the SP log at 1800 feet is due to the change in borehole fluid conductivity. ~~between~~

**Gamma Ray** - Gamma ray logs were recorded with ~~the~~ <sup>the</sup> BHC and FDC/CNL logs. The GR log was ~~was~~ obtained only above 1800 feet with the BHC log. Both GR logs are plotted above 1800 feet to permit a comparison to be made.

**Lithologic Log** - The lithology was determined from chip samples and correlated with mapped surface units. An attempt

A KGRA 14-12 Thermal Power Co.

Agnew & Sweet Temp. 10-16-76 flow 10 min 11: am  
0-6105' " 15 min 1 p.m.  
20'/min logged 7 p.m.

Tool Temp range 96 - 514°F

" " Temp 11/15/76 no flow noted  
0 - 6091'  
20'/min 90 - 660°F

Schlumberger Induction fluid  
9-19-76 650-1809 FGM  
10/15/76 1812-6118 water

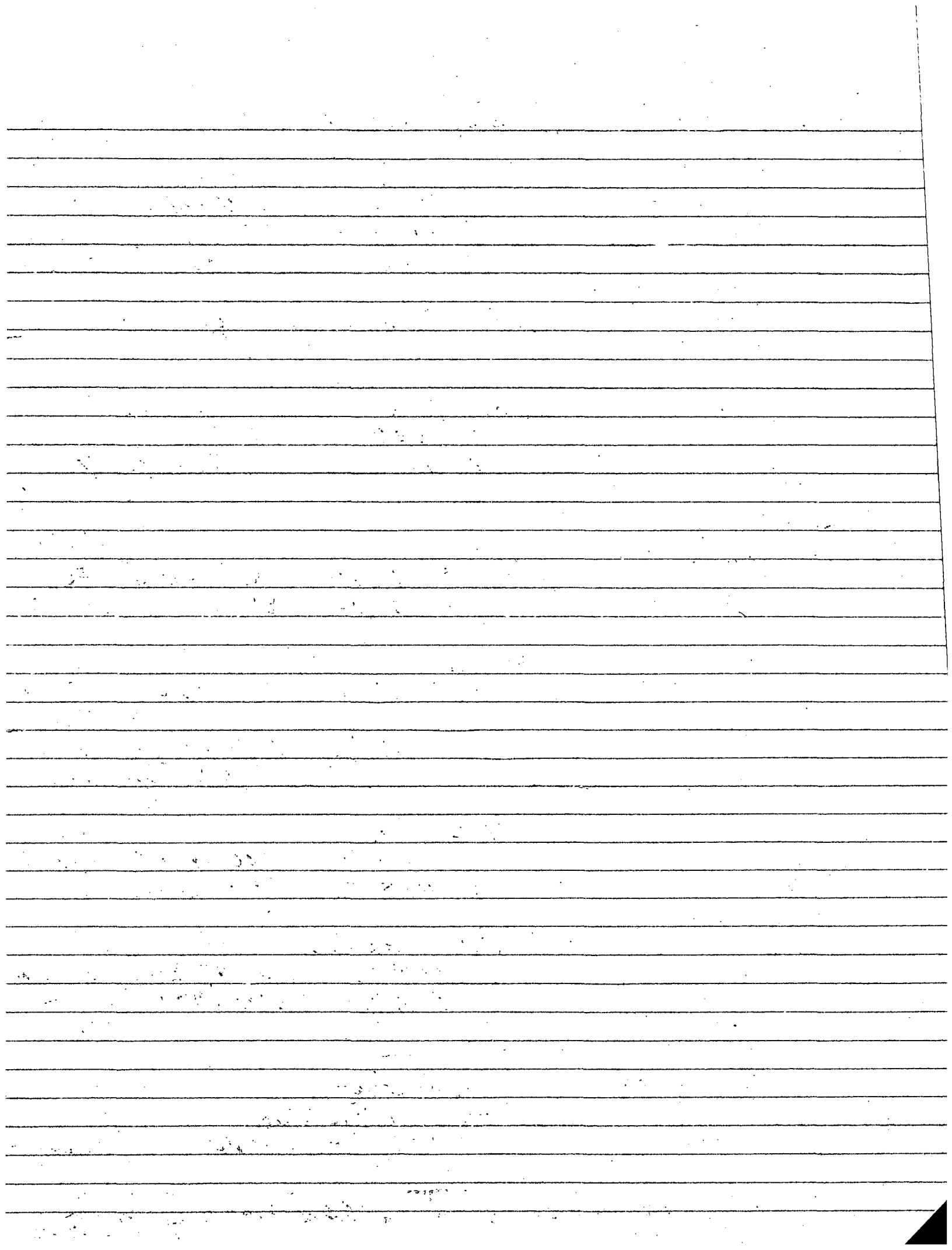
" Temp 9/19/76 100-1810 FGM  
20 hrs after circ.  
10/15/76 1500-6121 water  
14 hrs after circ

" BHC / GR  
9/19/76 600-1799 7 1/2 hrs circ  
no GR 10/15/76 1812-6112

" CNL / GR / CAL  
9/19/76 600-1794 FGM  
10/15/76 1812-6121 water

USGS / ORI Telurium  
Gamma Spectra  
Pd T - did not work satisfactorily

Thermal Power saw Eastman Directional Drilling  
1805 - 1820



Thermal Power Company 14-2  
Beaver County, Utah  
Sec. 21, T27S, R9W  
(See Fig. 1)

Chip Samples - Set #2 A  
Samples washed and split

| Footage Interval | Weight in Grams           | Footage Interval      | Weight in Grams      | Footage Interval            | Weight in Grams                  |
|------------------|---------------------------|-----------------------|----------------------|-----------------------------|----------------------------------|
| 77-100           | 425.2 <sup>-30gr</sup>    | 640-650               | 302.2 <sub>30</sub>  | 1310-1320                   | 278.8 <sub>30</sub>              |
| 90-100           | 260.7 <sup>-30gr</sup>    | 660-670               | 248.2 <sub>30</sub>  | 1320-1330                   | 271.2 <sub>30</sub>              |
| 110-120          | 178.4 <sup>-30gr</sup>    | 670-680               | 307.0 <sub>30</sub>  | 1330-1340                   | 288.2 <sub>30</sub>              |
| 120-130          | 271.1 <sub>30</sub>       | 680-690               | 220.2 <sub>30</sub>  | 1340-1350                   | 233.7 <sub>30</sub>              |
| 130-140          | 231.1 <sub>30.0</sub>     | 690-700               | 240.5 <sub>30</sub>  | 1350-1360 <sup>360-20</sup> | 240.9 <sub>30</sub>              |
| 140-150          | 223.0 <sub>30</sub>       | 710-720               | 168.0 <sub>30</sub>  | 1370-1380                   | 238.4 <sub>30</sub>              |
| 160-170          | 274.7 <sub>30</sub>       | 720-730               | 114.6 <sub>30</sub>  | 1380-1390                   | 237.5 <sub>30</sub>              |
| 170-180          | 334.7 <sub>30</sub>       | 730-740               | 213.1 <sub>30</sub>  | 1390-1400                   | 18.1 <sup>-No sample taken</sup> |
| 180-190          | 375.3 <sub>30</sub>       | 740-750               | 230.0 <sub>30</sub>  | 1410-1420                   | 354.4 <sub>30</sub>              |
| 190-200          | 413.3 <sub>30</sub>       | 760-770               | 263.3 <sub>30</sub>  | 1420-1430                   | 283.5 <sub>30</sub>              |
| 210-220          | 389.4 <sub>30</sub>       | 770-780               | 222.4 <sub>30</sub>  | 1430-1440                   | 304.0 <sub>30</sub>              |
| 220-230          | 262.5 <sub>30</sub>       | 780-790               | 254.1 <sub>30</sub>  | 1440-1450                   | 294.3 <sub>30</sub>              |
| 230-240          | 311.9 <sub>30</sub>       | 790-800               | 203.7 <sub>30</sub>  | 1460-1470                   | 273.3 <sub>30</sub>              |
| 240-250          | 335.6 <sub>30</sub>       | 810-820               | 243.7 <sub>30</sub>  | 1470-1480                   | 279.2 <sub>30</sub>              |
| 260-270          | 300.2 <sub>30</sub>       | <sup>60</sup> 820-830 | 215.3 <sub>30</sub>  | 1480-1490                   | 253.0 <sub>30</sub>              |
| 270-280          | 389.9 <sub>30</sub>       | 830-840               | 270.4 <sub>30</sub>  | 1490-1500                   | 295.9 <sub>30</sub>              |
| 280-290          | 359.5 <sub>30</sub>       | 840-850               | 231.0 <sub>30</sub>  | 1510-1520                   | 103.6 <sub>25</sub>              |
| 290-300          | 316.1 <sub>30</sub>       | 860-870               | 260.3 <sub>30</sub>  | ✓ 1520-1530                 | 277.1 <sub>30</sub>              |
| 310-320          | 308.8 <sub>30</sub>       | 870-880               | 261.1 <sub>30</sub>  | ✓ 1530-1540                 | 300.8 <sub>30</sub>              |
| 320-330          | 332.6 <sub>30</sub>       | 880-890               | 261.1 <sub>30</sub>  | ✓ 1540-1550                 | 282.2 <sub>30</sub>              |
| 330-340          | 294.9 <sub>30</sub>       | 890-900               | 227.1 <sub>30</sub>  | ✓ 1560-1570                 | 325.3 <sub>30</sub>              |
| 340-350          | 250.7 <sub>30</sub>       | 1010-1020             | 285.3 <sub>30</sub>  | ✓ 1570-1580                 | 380.8 <sub>30</sub>              |
| 360-370          | 297.1 <sub>30</sub>       | 1020-1030             | 250.1 <sub>-30</sub> | ✓ 1580-1590                 | 320.7 <sub>30</sub>              |
| 370-380          | 25.0 <sup>No sample</sup> | 1030-1040             | 268.4 <sub>30</sub>  | ✓ 1590-1600                 | 308.9 <sub>30</sub>              |
| 380-390          | 279.2 <sub>30</sub>       | 1040-1050             | 217.7 <sub>30</sub>  | ✓ 1710-1720                 | 279.6 <sub>30</sub>              |
| 390-400          | 209.0 <sub>30</sub>       | 1060-1070             | 275.8 <sub>30</sub>  | ✓ 1720-1730                 | 268.5 <sub>30</sub>              |
| 410-420          | 125.7 <sub>30</sub>       | 1070-1080             | 149.8 <sub>30</sub>  | ✓ 1730-1740                 | 268.2 <sub>30</sub>              |
| 420-430          | 219.8 <sub>30</sub>       | 1080-1090             | 263.4 <sub>30</sub>  | ✓ 1740-1750                 | 243.6 <sub>30</sub>              |
| 430-440          | 218.4 <sub>30</sub>       | 1090-1100             | 245.2 <sub>30</sub>  | ✓ 1760-1770                 | 277.7 <sub>30</sub>              |
| 440-450          | 304.1 <sub>30</sub>       | 1110-1120             | 246.8 <sub>30</sub>  | ✓ 1770-1780                 | 283.0 <sub>30</sub>              |
| 460-470          | 289.5 <sub>30</sub>       | 1120-1130             | 244.0 <sub>30</sub>  | ✓ 1780-1790                 | 249.9 <sub>30</sub>              |
| 470-480          | 364.4 <sub>30</sub>       | 1130-1140             | 254.6 <sub>30</sub>  | ✓ 1790-1800                 | 259.2 <sub>30</sub>              |
| 480-490          | 340.9 <sub>30</sub>       | 1140-1150             | 73.2 <sub>20</sub>   | 1805-1810                   | 74.0 <sub>23.1</sub>             |
| 490-500          | 340.0 <sub>30</sub>       | 1160-1170             | 324.4 <sub>30</sub>  | 1810-1815                   | 117.8 <sub>30</sub>              |
| 510-520          | 325.2 <sub>30</sub>       | 1170-1180             | 273.6 <sub>30</sub>  | - 1815-1820                 | 83.4 <sub>27.6</sub>             |
| 520-530          | 309.2 <sub>30</sub>       | 1180-1190             | 297.6 <sub>30</sub>  | 1820-1825                   | 270.7                            |
| 530-540          | 301.5 <sub>30</sub>       | 1190-1200             | 273.4 <sub>30</sub>  | 1825-1830                   | 118.0 <sub>30</sub>              |
| 540-550          | 308.4 <sub>30</sub>       | 1210-1220             | 294.3 <sub>30</sub>  | 1830-1835                   | 193.6                            |
| 560-570          | 333.8 <sub>30</sub>       | 1220-1230             | 138.2 <sub>30</sub>  | 1835-1840                   | 214.4 <sub>30</sub>              |
| 570-580          | 303.8 <sub>30</sub>       | 1230-1240             | 344.7 <sub>30</sub>  | 1840-1845                   | 266.9                            |
| 580-590          | 292.5 <sub>30</sub>       | 1240-1250             | 258.5 <sub>30</sub>  | 1845-1850                   | 271.1 <sub>30</sub>              |
| 590-600          | 223.1 <sub>30</sub>       | 1260-1270             | 314.1 <sub>30</sub>  | 1855-1860                   | 34.7 <sup>No sample given</sup>  |
| 610-620          | 250.5 <sub>30</sub>       | 1270-1280             | 292.8 <sub>30</sub>  | 1860-1865                   | 125.9 <sub>✓</sub>               |
| 620-630          | 218.2 <sub>30</sub>       | 1280-1290             | 336.2 <sub>30</sub>  | 1865-1870                   | 298.2 <sub>30</sub>              |
| 630-640          | 220.4 <sub>30</sub>       | 1290-1300             | 309.6 <sub>30</sub>  | 1870-1875                   | 110.0 <sub>✓</sub>               |



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| <u>Footage Interval</u> | <u>Weight in Grams</u> | <u>Footage Interval</u> | <u>Weight In Grams</u> | <u>Footage Interval</u> | <u>Weight in Grams</u> |
|-------------------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|
| 1880-1885               | 155.2                  | 2130-2135               | 287.0                  | 2380-2385               | 86.4                   |
| 1885-1890 <sup>30</sup> | 323.6 <sup>30</sup>    | 2135-2140               | 308.8                  | 2385-2390               | 31.7                   |
| 1890-1895 ✓             | 123.4                  | 2140-2145               | 321.8                  | 2390-2395               | 53.8                   |
| 1895-1900               | 307.2 <sup>30</sup>    | 2145-2150               | 315.3                  | 2395-2400               | N/S                    |
| 1905-1910               | 296.1 <sup>30</sup>    | 2155-2160               | 199.6                  | 2405-2410               | 225.5                  |
| 1910-1915               | 274.3 —                | 2160-2165               | 308.2                  | 2410-2415               | 240.5                  |
| 1915-1920               | 265.8 <sup>30</sup>    | 2165-2170               | 159.5                  | 2415-2420               | 113.4                  |
| 1920-1925               | 274.9 ~                | 2170-2175               | 265.1                  | 2420-2425               | 321.6                  |
| 1925-1930               | 92.3 <sup>29</sup>     | 2175-2180               | 303.8                  | 2425-2430               | 320.4                  |
| 1930-1935               | 81.0 -                 | 2180-2185               | 298.6                  | 2430-2435               | 318.5                  |
| 1935-1940               | 222.5 <sup>30</sup>    | 2185-2190               | 199.0                  | 2435-2440               | 331.4                  |
| 1940-1945               | 287.0 —                | 2190-2195               | 322.7                  | 2440-2445               | 263.6                  |
| 1945-1950               | 154.1 <sup>30</sup>    | 2195-2200               | 315.2                  | 2445-2450               | 310.7                  |
| 1955-1960               | 171.8 <sup>30</sup>    | 2205-2210               | 269.0                  | 2455-2460               | 316.8                  |
| 1960-1965               | 220.3 -                | 2210-2215               | 338.5                  | 2460-2465               | 306.0                  |
| 1965-1970               | 271.1 <sup>30</sup>    | 2215-2220               | 299.7                  | 2465-2470               | 303.2                  |
| 1970-1975               | 292.6 —                | 2220-2225               | 322.2                  | 2470-2475               | 267.3                  |
| 1975-1980               | 108.3                  | 2225-2230               | 255.2                  | 2475-2480               | 302.6                  |
| 1980-1985               | 244.9                  | 2230-2235               | 354.1                  | 2480-2485               | 304.8                  |
| 1985-1990               | 172.5                  | 2235-2240               | 280.6                  | 2485-2490               | 333.4                  |
| 1990-1995               | 237.1                  | 2240-2245               | 266.5                  | 2490-2495               | 307.1                  |
| 1995-2000               | 141.8                  | 2245-2250               | 301.1                  | 2495-2500               | 329.1                  |
| 2005-2010               | 251.3                  | 2250-2260               | 322.2                  | 2505-2510               | 314.6                  |
| 2010-2015               | 268.8                  | 2260-2265               | 329.5                  | 2510-2515               | 318.2                  |
| 2015-2020               | 253.9                  | 2265-2270               | 337.9                  | 2515-2520               | 309.6                  |
| 2020-2025               | 253.9                  | 2270-2275               | 355.3                  | 2520-2525               | 290.5                  |
| 2025-2030               | 213.6                  | 2275-2280               | 311.4                  | 2525-2530               | 267.1                  |
| 2030-2035               | 278.3                  | 2280-2285               | 288.0                  | 2535-2540               | 312.3                  |
| 2035-2040               | 271.0                  | 2285-2290               | 278.7                  | 2540-2545               | 221.8                  |
| 2040-2045               | 272.7                  | 2290-2295               | 274.2                  | 2545-2550               | 274.4                  |
| 2045-2050               | 270.1                  | 2295-2300               | 256.2                  | 2555-2560               | 84.6                   |
| 2055-2060               | 261.8                  | 2305-2310               | 271.1                  | 2560-2565               | 323.4                  |
| 2060-2065               | 256.9                  | 2310-2315               | 264.5                  | 2565-2570               | 316.2                  |
| 2065-2070               | 313.5                  | 2315-2320               | 336.3                  | 2570-2575               | 288.8                  |
| 2070-2075               | 282.5                  | 2320-2325               | 253.0                  | 2575-2580               | 122.1                  |
| 2075-2080               | 273.7                  | 2325-2330               | 335.1                  | 2580-2585               | 295.7                  |
| 2080-2085               | 263.2                  | 2330-2335               | 284.0                  | 2585-2590               | 286.5                  |
| 2085-2090               | 260.7                  | 2335-2340               | 282.1                  | 2590-2595               | 279.7                  |
| 2090-2095               | 277.6                  | 2340-2345               | 292.6                  | 2595-2600               | 212.8                  |
| 2095-2100               | 276.7                  | 2345-2350               | 270.6                  | 2610-2615               | 256.1                  |
| 2105-2110               | 218.5                  | 2355-2360               | 316.1                  | 2615-2620               | 290.7                  |
| 2110-2115               | 272.3                  | 2360-2365               | 189.4                  | 2620-2625               | 213.1                  |
| 2115-2120               | 269.5                  | 2365-2370               | 203.0                  | 2625-2630               | N/S                    |
| 2120-2125               | 260.0                  | 2370-2375               | 82.8                   | 2630-2635               | 278.4                  |
| 2125-2130               | 293.6                  | 2375-2380               | 61.4                   | 2635-2640               | 207.1                  |

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|-------------------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|
| 2640-2645               | 266.5                  | 2990-2995               | 281.9                  | 3240-3245               | 200.0                  |
| 2645-2650               | 275.3                  | 2995-3000               | 305.9                  | 3245-3250               | 224.2                  |
| 2655-2660               | 294.0                  | 3005-3010               | 283.2                  | 3255-3260               | 207.8                  |
| 2660-2665               | 292.3                  | 3010-3015               | 306.2                  | 3260-3265               | 230.3                  |
| 2665-2670               | 265.1                  | 3015-3020               | 295.1                  | 3265-3270               | 213.0                  |
| 2670-2675               | 318.4                  | 3020-3025               | 301.5                  | 3270-3275               | 199.4                  |
| 2675-2680               | 301.2                  | 3025-3030               | 268.6                  | 3275-3280               | 222.6                  |
| 2680-2685               | 296.5                  | 3030-3035               | 297.4                  | 3280-3285               | 200.1                  |
| 2685-2690               | 298.9                  | 3035-3040               | 195.4                  | 3285-3290               | 189.4                  |
| 2690-2695               | 306.3                  | 3040-3045               | 275.2                  | 3295-3300               | 173.8                  |
| 2695-2700               | 352.3                  | 3045-3050               | 275.7                  | 3305-3310               | 73.3                   |
| 2705-2710               | 271.0                  | 3055-3060               | 308.1                  | 3310-3315               | 226.4                  |
| 2710-2715               | 338.0                  | 3060-3065               | 265.7                  | 3315-3320               | 192.6                  |
| 2715-2720               | 308.0                  | 3065-3070               | 260.7                  | 3320-3325               | 175.4                  |
| 2720-2725               | 238.7                  | 3070-3075               | 249.2                  | 3325-3330               | 175.4                  |
| 2725-2730               | 296.7                  | 3075-3080               | 296.6                  | 3330-3335               | 192.2                  |
| 2730-2735               | 332.0                  | 3080-3085               | 247.8                  | 3335-3340               | 182.5                  |
| 2735-2740               | 298.4                  | 3085-3090               | 252.7                  | 3340-3345               | 162.9                  |
| 2740-2745               | 301.6                  | 3090-3095               | 262.3                  | 3345-3350               | 201.9                  |
| 2745-2750               | 287.8                  | 3095-3100               | 276.6                  | 3355-3360               | 191.0                  |
| 2755-2760               | 270.9                  | 3105-3110               | 259.3                  | 3360-3365               | 140.9                  |
| 2760-2765               | 332.6                  | 3110-3115               | 225.8                  | 3365-3370               | 115.8                  |
| 2765-2770               | 242.4                  | 3115-3120               | 242.7                  | 3370-3375               | 128.0                  |
| 2770-2775               | 306.5                  | 3120-3125               | 261.8                  | 3375-3380               | 97.1                   |
| 2775-2780               | 276.1                  | 3125-3130               | 212.4                  | 3380-3385               | 66.8                   |
| 2780-2785               | N/S                    | 3130-3135               | 256.2                  | 3385-3390               | 108.0                  |
| 2785-2790               | 257.5                  | 3135-3140               | 250.6                  | 3390-3395               | 141.4                  |
| 2790-2795               | 311.0                  | 3140-3145               | 177.4                  | 3395-3400               | 143.7                  |
| 2795-2800               | 312.8                  | 3145-3150               | 185.0                  | 3405-3410               | 134.6                  |
| 2805-2810               | N/S                    | 3155-3160               | 193.2                  | 3410-3415               | 93.2                   |
| 2810-2815               | 300.9                  | 3160-3165               | 179.4                  | 3415-3420               | 156.1                  |
| 2815-2820               | 279.9                  | 3165-3170               | 174.7                  | 3420-3425               | 145.6                  |
| 2820-2825               | 305.8                  | 3170-3175               | 221.4                  | 3425-3430               | 161.4                  |
| 2825-2830               | 318.7                  | 3175-3180               | 240.8                  | 3430-3435               | 167.4                  |
| 2830-2835               | 149.8                  | 3180-3185               | 212.8                  | 3435-3440               | 161.6                  |
| 2835-2840               | 248.1                  | 3185-3190               | 213.7                  | 3440-3445               | 178.1                  |
| — 2840-2845             | 239.4                  | 3190-3195               | 217.8                  | 3445-3450               | 161.0                  |
| <u>2845-2850</u>        | 296.7                  | 3195-3200               | 235.1                  | 3455-3460               | 88.1                   |
| <u>2955-2960</u>        | 301.4                  | 3205-3210               | 112.4                  | 3460-3465               | 144.5                  |
| 2960-2965               | 101.8                  | 3210-3215               | 199.8                  | 3465-3470               | 137.8                  |
| 2965-2970               | 294.9                  | 3215-3220               | 251.4                  | 3475-3480               | 131.1                  |
| 2970-2975               | 295.7                  | 3220-3225               | 211.9                  | 3480-3485               | 163.6                  |
| 2975-2980               | 247.4                  | 3225-3230               | 68.1                   | 3485-3490               | 193.7                  |
| 2980-2985               | 269.6                  | 3230-3235               | 105.5                  | 3490-3495               | 163.3                  |
| 2985-2990               | 291.4                  | 3235-3240               | 218.7                  | 3495-3500               | 174.2                  |

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| <u>Footage Interval</u> | <u>Weight in Grams</u> | <u>Footage Interval</u> | <u>Weight in Grams</u> | <u>Footage Interval</u> | <u>Weight in Grams</u> |
|-------------------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|
| 3505-3510               | 169.6                  | 3755-3760               | 173.7                  | 4005-4010               | 202.3                  |
| 3510-3515               | 180.3                  | 3760-3765               | 75.1                   | 4010-4015               | 225.2                  |
| 3515-3520               | 202.8                  | 3765-3770               | 63.2                   | 4015-4020               | 220.1                  |
| 3520-3525               | 178.1                  | 3770-3775               | 103.1                  | 4020-4025               | 166.7                  |
| 3525-3530               | 128.3                  | 3775-3780               | 24.7                   | 4025-4030               | 179.4                  |
| 3530-3535               | 180.1                  | 3780-3785               | 109.1                  | 4030-4035               | 201.0                  |
| 3535-3540               | 178.9                  | 3785-3790               | 189.5                  | 4035-4040               | 203.3                  |
| 3540-3545               | 177.0                  | 3790-3795               | 182.7                  | 4040-4045               | 214.4                  |
| 3545-3550               | 182.5                  | 3795-3800               | 183.2                  | 4045-4050               | 211.9                  |
| 3555-3560               | 180.7                  | 3805-3810               | 213.5                  | 4055-4060               | 178.1                  |
| 3560-3565               | 171.8                  | 3810-3815               | 46.2                   | 4060-4065               | 195.6                  |
| 3565-3570               | 198.6                  | 3815-3820               | 60.0                   | 4065-4070               | 152.5                  |
| 3570-3575               | 176.4                  | 3820-3825               | 67.2                   | 4070-4075               | 175.3                  |
| 3575-3580               | 79.6                   | 3825-3830               | 150.1                  | 4075-4080               | 168.6                  |
| 3580-3585               | 167.1                  | 3830-3835               | 42.4                   | 4080-4085               | 184.4                  |
| 3585-3590               | 212.3                  | 3835-3840               | 189.3                  | 4085-4090               | 112.1                  |
| 3590-3595               | 94.9                   | 3840-3845               | 140.6                  | 4090-4095               | 188.2                  |
| 3595-3600               | 212.9                  | 3845-3850               | 185.9                  | 4095-4100               | 231.9                  |
| 3605-3610               | 54.1                   | 3855-3860               | 163.2                  | 4105-4110               | 182.0                  |
| 3610-3615               | 224.1                  | 3860-3865               | 87.4                   | 4110-4115               | 192.2                  |
| 3615-3620               | 214.9                  | 3865-3870               | 128.7                  | 4115-4120               | 194.4                  |
| 3620-3625               | 201.7                  | 3870-3875               | 112.1                  | 4120-4125               | 183.4                  |
| 3625-3630               | 186.4                  | 3875-3880               | 177.8                  | 4125-4130               | 203.4                  |
| 3630-3635               | 224.6                  | 3880-3885               | 188.1                  | 4130-4135               | 208.0                  |
| 3635-3640               | 213.7                  | 3885-3890               | 199.0                  | 4135-4140               | 197.7                  |
| 3640-3645               | 205.2                  | 3890-3895               | 227.9                  | 4140-4145               | 191.2                  |
| 3645-3650               | 226.8                  | 3895-3900               | 236.0                  | 4145-4150               | 192.1                  |
| 3655-3660               | 162.2                  | 3905-3910               | 218.3                  | 4150-4155               | N/S                    |
| 3660-3665               | 189.1                  | 3910-3915               | 159.5                  | 4155-4160               | 175.5                  |
| 3665-3670               | 191.2                  | 3915-3920               | 201.8                  | 4160-4165               | 224.7                  |
| 3670-3675               | 217.9                  | 3920-3925               | 200.2                  | 4165-4170               | 190.9                  |
| 3675-3680               | 185.6                  | 3925-3930               | 188.5                  | 4170-4175               | 213.2                  |
| 3680-3685               | 227.7                  | 3930-3935               | 228.7                  | 4175-4180               | 230.5                  |
| 3685-3690               | 141.8                  | 3935-3940               | 209.2                  | 4180-4185               | 196.1                  |
| 3690-3695               | 113.4                  | 3940-3945               | 213.7                  | 4185-4190               | 192.4                  |
| 3695-3700               | 21.9                   | 3945-3950               | 230.9                  | 4190-4195               | 201.8                  |
| 3705-3710               | 194.1                  | 3955-3960               | 159.7                  | 4195-4200               | 239.9                  |
| 3710-3715               | 165.5                  | 3960-3965               | 188.6                  | 4200-4205               | N/S                    |
| 3715-3720               | 52.5                   | 3965-3970               | 194.6                  | 4205-4210               | 194.3                  |
| 3720-3725               | 166.9                  | 3970-3975               | 168.7                  | 4210-4215               | 231.4                  |
| 3725-3730               | 110.2                  | 3975-3980               | 180.2                  | 4215-4220               | 178.4                  |
| 3730-3735               | 87.7                   | 3980-3985               | 168.2                  | 4220-4225               | 195.8                  |
| 3735-3740               | 143.7                  | 3985-3990               | 183.6                  | 4225-4230               | 188.7                  |
| 3740-3745               | 148.8                  | 3990-3995               | 218.3                  | 4230-4235               | 203.2                  |
| 3745-3750               | 127.1                  | 3995-4000               | 222.1                  | 4235-4240               | 177.9                  |

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| <u>Footage Interval</u> | <u>Weight in Grams</u> | <u>Footage Interval</u> | <u>Weight in Grams</u> | <u>Footage Interval</u> | <u>Weight in Grams</u> |
|-------------------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|
| 4240-4245               | 178.0                  | 4490-4495               | 26.4                   | 4740-4745               | 122.9                  |
| 4245-4250               | 178.5                  | 4495-4500               | 148.4                  | 4745-4750               | 225.3                  |
| 4250-4255               | N/S                    | 4505-4510               | 185.7                  | 4755-4760               | 256.9                  |
| 4255-4260               | 23.3                   | 4510-4515               | 166.8                  | 4760-4765               | 201.1                  |
| 4260-4265               | 114.6                  | 4515-4520               | 159.1                  | 4765-4770               | 198.5                  |
| 4265-4270               | 20.5                   | 4520-4525               | 175.2                  | 4770-4775               | 266.1                  |
| 4270-4275               | 176.9                  | 4525-4530               | 169.5                  | 4775-4780               | 219.4                  |
| 4275-4280               | 185.0                  | 4530-4535               | 153.5                  | 4780-4785               | 147.5                  |
| 4280-4285               | 131.1                  | 4535-4540               | 150.6                  | 4785-4790               | 212.0                  |
| 4285-4290               | 137.1                  | 4540-4545               | 144.9                  | 4790-4795               | 258.1                  |
| 4290-4295               | 160.9                  | 4545-4550               | 175.1                  | 4795-4800               | 137.6                  |
| 4295-4300               | 178.2                  | 4555-4560               | 152.5                  | 4805-4810               | 301.4                  |
| 4300-4305               | N/S                    | 4560-4565               | 153.8                  | 4810-4815               | 277.7                  |
| 4305-4310               | 182.1                  | 4565-4570               | 162.1                  | 4815-4820               | 294.5                  |
| 4310-4315               | 198.7                  | 4570-4575               | 164.0                  | 4820-4825               | 291.4                  |
| 4315-4320               | 189.4                  | 4575-4580               | 122.2                  | 4825-4830               | 252.7                  |
| 4320-4325               | 196.4                  | 4580-4585               | 132.9                  | 4830-4835               | 240.1                  |
| 4330-4335               | 157.0                  | 4585-4590               | 48.8                   | 4835-4840               | 236.8                  |
| 4335-4340               | 166.7                  | 4590-4595               | 137.8                  | 4840-4845               | 203.0                  |
| 4340-4345               | 191.9                  | 4595-4600               | 134.5                  | 4845-4850               | 253.6                  |
| 4345-4350               | 175.6                  | 4605-4610               | 134.5                  | 4855-4860               | 271.5                  |
| 4355-4360               | 211.7                  | 4610-4615               | 128.8                  | 4860-4865               | 278.7                  |
| 4360-4365               | 196.2                  | 4615-4620               | 149.2                  | 4865-4870               | 295.5                  |
| 4365-4370               | 208.9                  | 4620-4625               | 141.5                  | 4870-4875               | 269.5                  |
| 4370-4375               | 193.9                  | 4625-4630               | 122.5                  | 4875-4880               | 267.4                  |
| 4375-4380               | 198.4                  | 4630-4635               | 138.1                  | 4880-4885               | 255.5                  |
| 4380-4385               | 228.0                  | 4635-4640               | 121.4                  | 4885-4890               | 226.3                  |
| 4385-4390               | 137.2                  | 4640-4645               | 139.2                  | 4890-4895               | 255.4                  |
| 4390-4395               | 104.5                  | 4645-4650               | 126.4                  | 4895-4900               | 320.7                  |
| 4405-4410               | 173.1                  | 4655-4660               | 67.4                   | 4905-4910               | 206.8                  |
| 4410-4415               | 162.6                  | 4660-4665               | 222.8                  | 4910-4915               | 242.5                  |
| 4415-4420               | 163.7                  | 4665-4670               | 190.6                  | 4915-4920               | 151.7                  |
| 4420-4425               | 108.9                  | 4670-4675               | 249.1                  | 4920-4925               | 122.9                  |
| 4425-4430               | 155.0                  | 4675-4680               | 135.2                  | 4925-4930               | 299.3                  |
| 4430-4435               | 200.5                  | 4680-4685               | 249.5                  | 4930-4935               | 262.8                  |
| 4435-4440               | 194.2                  | 4685-4690               | 218.6                  | 4935-4940               | 234.3                  |
| 4440-4445               | 162.5                  | 4690-4695               | 200.7                  | 4940-4945               | 204.0                  |
| 4445-4450               | 195.3                  | 4695-4700               | 207.1                  | 4945-4950               | 154.1                  |
| 4455-4460               | 176.7                  | 4705-4710               | 279.1                  | 4955-4960               | 172.4                  |
| 4460-4465               | 205.4                  | 4710-4715               | 227.8                  | 4960-4965               | 88.5                   |
| 4465-4470               | 15.9                   | 4715-4720               | 200.3                  | 4965-4970               | 105.8                  |
| 4470-4475               | 157.5                  | 4720-4725               | 325.4                  | 4970-4975               | 254.8                  |
| 4475-4480               | 203.4                  | 4725-4730               | 230.8                  | 4975-4980               | 249.0                  |
| 4480-4485               | 182.0                  | 4730-4735               | 221.6                  | 4980-4985               | 254.4                  |
| 4485-4490               | 161.0                  | 4735-4740               | 251.0                  | 4985-4990               | 229.5                  |

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| <u>Footage Interval</u> | <u>Weight in Grams</u> | <u>Footage Interval</u> | <u>Weight in Grams</u> | <u>Footage Interval</u> | <u>Weight in Grams</u> |
|-------------------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|
| 4990-4995               | 228.8                  | 5240-5245               | 249.1                  | 5465-5470               | 259.4                  |
| 4995-5000               | 266.5                  | 5245-5250               | 275.3                  | 5470-5475               | 265.6                  |
| 5000-5010               | 205.7                  | 5250-5255               | N/S                    | 5475-5480               | 279.6                  |
| 5010-5015               | 247.9                  | 5255-5260               | 239.9                  | 5480-5485               | 209.7                  |
| 5015-5020               | 210.1                  | 5260-5265               | 206.6                  | 5485-5490               | 285.3                  |
| 5020-5025               | 289.4                  | 5265-5270               | 245.8                  | 5490-5495               | 280.8                  |
| 5025-5030               | 245.6                  | 5270-5275               | 249.4                  | 5495-5500               | 316.7                  |
| 5030-5035               | 235.1                  | 5275-5280               | 242.7                  | 5505-5510               | 272.1                  |
| 5035-5040               | 213.1                  | 5280-5285               | 291.8                  | 5510-5515               | 248.3                  |
| 5040-5045               | 265.3                  | 5285-5290               | 318.3                  | 5515-5520               | 264.9                  |
| 5045-5050               | 260.6                  | 5290-5295               | 301.3                  | 5520-5525               | 254.1                  |
| 5055-5060               | 278.8                  | 5295-5300               | 272.6                  | 5525-5530               | 289.7                  |
| 5060-5065               | 252.5                  | 5300-5305               | N/S                    | 5530-5535               | 264.1                  |
| 5065-5070               | 251.0                  | 5305-5310               | 245.2                  | 5535-5540               | 267.4                  |
| 5070-5075               | 256.5                  | 5310-5315               | 290.0                  | 5540-5545               | 266.4                  |
| 5075-5080               | 272.5                  | 5315-5320               | 288.0                  | 5545-5550               | 225.7                  |
| 5080-5085               | 280.8                  | 5320-5325               | 112.5                  | 5550-5555               | N/S                    |
| 5085-5090               | 268.7                  | 5325-5330               | 181.2                  | 5555-5560               | 277.1                  |
| 5090-5095               | 301.7                  | 5330-5335               | 279.0                  | 5560-5565               | 225.5                  |
| 5095-5100               | 230.6                  | 5335-5340               | N/S                    | 5565-5570               | 254.2                  |
| 5105-5110               | 261.0                  | 5340-5345               | 55.3                   | 5570-5575               | 252.4                  |
| 5110-5115               | 217.3                  | 5345-5350               | 226.9                  | 5575-5580               | 267.2                  |
| 5115-5120               | 266.9                  | 5350-5355               | N/S                    | 5580-5585               | 288.5                  |
| 5120-5125               | 253.7                  | 5355-5360               | 231.1                  | 5585-5590               | 264.6                  |
| 5125-5130               | 266.3                  | 5360-5365               | 230.4                  | 5590-5595               | 235.7                  |
| 5130-5135               | 296.8                  | 5365-5370               | 202.2                  | 5595-5600               | 289.8                  |
| 5135-5140               | 292.9                  | 5370-5375               | 223.5                  | 5600-5605               | N/S                    |
| 5140-5145               | 309.2                  | 5375-5380               | 252.3                  | 5605-5610               | 295.1                  |
| 5145-5150               | 275.7                  | 5380-5385               | 216.0                  | 5610-5615               | 239.8                  |
| 5155-5160               | 318.7                  | 5385-5390               | 220.5                  | 5615-5620               | 282.4                  |
| 5160-5165               | 311.3                  | 5390-5395               | 235.5                  | 5620-5625               | 269.5                  |
| 5165-5170               | 298.1                  | 5395-5400               | 197.0                  | 5625-5630               | 215.5                  |
| 5170-5175               | 69.0                   | 5400-5405               | N/S                    | 5630-5635               | 262.8                  |
| 5175-5180               | 221.8                  | 5405-5410               | 213.6                  | 5635-5640               | 294.2                  |
| 5180-5185               | 321.5                  | 5410-5415               | 180.4                  | 5640-5645               | 311.6                  |
| 5185-5190               | 318.8                  | 5415-5420               | 239.4                  | 5645-5650               | 233.4                  |
| 5190-5195               | 287.7                  | 5420-5425               | 100.1                  | 5650-5655               | N/S                    |
| 5195-5200               | 254.9                  | 5425-5430               | 102.8                  | 5655-5660               | 243.8                  |
| 5205-5210               | 249.2                  | 5430-5435               | 224.8                  | 5660-5665               | 252.8                  |
| 5210-5215               | 283.6                  | 5435-5440               | 194.5                  | 5665-5670               | 267.7                  |
| 5215-5220               | 260.1                  | 5440-5445               | 232.6                  | 5670-5675               | 275.5                  |
| 5220-5225               | 289.0                  | 5445-5450               | 241.6                  | 5675-5680               | 258.6                  |
| 5225-5230               | 265.7                  | 5450-5455               | N/S                    | 5680-5685               | 260.4                  |
| 5230-5235               | 287.8                  | 5455-5460               | 248.9                  | 5685-5690               | 224.0                  |
| 5235-5240               | N/S                    | 5460-5465               | 291.0                  | 5690-5695               | 245.2                  |

359.8

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| <u>Footage Interval</u> | <u>Weight in Grams</u> | <u>Footage Interval</u> | <u>Weight in Grams</u> |
|-------------------------|------------------------|-------------------------|------------------------|
| 5695-5700               | 212.1                  | 5925-5930               | 284.9                  |
| 5700-5705               | N/S                    | 5930-5935               | 262.3                  |
| 5705-5710               | 228.8                  | 5935-5940               | 254.2                  |
| 5710-5715               | 259.5                  | 5940-5945               | 254.9                  |
| 5715-5720               | 245.4                  | 5945-5950               | 232.6                  |
| 5720-5725               | 236.9                  | 5950-5955               | N/S                    |
| 5725-5730               | 232.9                  | 5955-5960               | 282.3                  |
| 5730-5735               | 261.5                  | 5960-5965               | 282.5                  |
| 5735-5740               | 253.9                  | 5965-5970               | 279.6                  |
| 5740-5745               | 285.7                  | 5970-5975               | 296.0                  |
| 5745-5750               | 184.7                  | 5975-5980               | 235.4                  |
| 5750-5755               | N/S                    | 5980-5985               | 231.9                  |
| 5755-5760               | 265.8                  | 5985-5990               | 12.2                   |
| 5760-5765               | 233.3                  | 5990-5995               | 283.0                  |
| 5765-5770               | 80.9                   | 5995-6000               | 37.3                   |
| 5770-5775               | 272.9                  | 6000-6005               | N/S                    |
| 5775-5780               | 282.5                  | 6005-6010               | 200.8                  |
| 5780-5785               | 293.9                  | 6010-6015               | 154.3                  |
| 5785-5790               | 314.4                  | 6015-6020               | 206.2                  |
| 5790-5795               | 313.6                  | 6020-6025               | 179.0                  |
| 5795-5805               | N/S                    | 6025-6030               | 205.6                  |
| 5805-5810               | 222.3                  | 6030-6035               | 185.9                  |
| 5810-5815               | 161.0                  | 6035-6040               | 182.3                  |
| 5815-5820               | 201.5                  | 6040-6045               | 191.8                  |
| 5820-5825               | 202.5                  | 6045-6050               | 209.1                  |
| 5825-5830               | 202.7                  | 6050-6055               | N/S                    |
| 5830-5835               | 203.6                  | 6055-6060               | 147.8                  |
| 5835-5840               | 251.0                  | 6060-6065               | 161.2                  |
| 5840-5845               | 62.4                   | 6065-6070               | 174.7                  |
| 5845-5850               | 154.4                  | 6070-6075               | 179.0                  |
| 5850-5855               | N/S                    | 6075-6080               | 197.5                  |
| 5855-5860               | 267.8                  | 6080-6085               | 165.6                  |
| 5860-5865               | 194.4                  | 6085-6090               | 277.8                  |
| 5865-5870               | 235.9                  | 6090-6095               | 210.7                  |
| 5870-5875               | 247.0                  |                         |                        |
| 5875-5880               | 260.3                  |                         |                        |
| 5880-5885               | 278.7                  |                         |                        |
| 5885-5890               | 241.0                  |                         |                        |
| 5890-5895               | 288.3                  |                         |                        |
| 5895-5900               | 286.7                  |                         |                        |
| 5900-5905               | N/S                    |                         |                        |
| 5905-5910               | 267.7                  |                         |                        |
| 5910-5915               | 300.4                  |                         |                        |
| 5915-5920               | 287.1                  |                         |                        |
| 5920-5925               | 258.6                  |                         |                        |

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 (See Fig. 1)

Chip Samples - Set #1 B  
 Chip boards completed  
 . Samples were washed, split and made ready for chemical testing

| <u>Footage Interval</u> | <u>Weight in Grams</u> | <u>Footage Interval</u> | <u>Weight in Grams</u> | <u>Footage Interval</u> | <u>Weight in Grams</u> |
|-------------------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|
| 77-100                  | 445.4                  | 530-540                 | 357.2                  | 980-990                 | 373.0                  |
| 90-100                  | 285.6                  | 540-550                 | 377.4                  | 990-1000                | 270.5                  |
| 100-110                 | 229.6                  | 550-560                 | 349.5                  | 1000-1010               | 328.1                  |
| 110-120                 | 238.5                  | 560-570                 | 399.4                  | 1010-1020               | 341.9                  |
| 120-130                 | 329.1                  | 570-580                 | 386.6                  | 1020-1030               | 309.2                  |
| 130-140                 | 289.0                  | 580-590                 | 344.8                  | 1030-1040               | 326.6                  |
| 140-150                 | 277.1                  | 590-600                 | 304.6                  | 1040-1050               | 271.4                  |
| 150-160                 | 276.2                  | 600-610                 | 338.0                  | 1050-1060               | 330.0                  |
| 160-170                 | 329.1                  | 610-620                 | 314.3                  | 1060-1070               | 331.9                  |
| 170-180                 | 416.6                  | 620-630                 | 296.1                  | 1070-1080               | 207.6                  |
| 180-190                 | 429.5                  | 630-640                 | 289.1                  | 1080-1090               | 325.7                  |
| 190-200                 | 471.8                  | 640-650                 | 364.2                  | 1090-1100               | 301.3                  |
| 200-210                 | 351.1                  | 650-660                 | 372.0                  | 1100-1110               | 299.0                  |
| 210-220                 | 385.0                  | 660-670                 | 315.4                  | 1110-1120               | 300.5                  |
| 220-230                 | 329.5                  | 670-680                 | 369.0                  | 1120-1130               | 294.1                  |
| 230-240                 | 411.3                  | 680-690                 | 289.6                  | 1130-1140               | 301.8                  |
| 240-250                 | 458.9                  | 690-700                 | 286.1                  | 1140-1150               | 129.6                  |
| 250-260                 | 409.2                  | 700-710                 | 318.8                  | 1150-1160               | 363.1                  |
| 260-270                 | 360.8                  | 710-720                 | 221.5                  | 1160-1170               | 384.6                  |
| 270-280                 | 435.3                  | 720-730                 | 168.1                  | 1170-1180               | 326.8                  |
| 280-290                 | 417.2                  | 730-740                 | 265.7                  | 1180-1190               | 357.7                  |
| 290-300                 | 389.1                  | 740-750                 | 287.9                  | 1190-1200               | 331.3                  |
| 300-310                 | 398.2                  | 750-760                 | 193.6                  | 1200-1210               | 368.8                  |
| 310-320                 | 371.7                  | 760-770                 | 323.9                  | 1210-1220               | 353.7                  |
| 320-330                 | 402.7                  | 770-780                 | 281.2                  | 1220-1230               | 191.1                  |
| 330-340                 | 355.9                  | 780-790                 | 316.6                  | 1230-1240               | 398.4                  |
| 340-350                 | 311.1                  | 790-800                 | 264.1                  | 1240-1250               | 373.1                  |
| 350-360                 | 336.5                  | 800-810                 | 310.6                  | 1250-1260               | 363.0                  |
| 360-370                 | 363.8                  | 810-820                 | 299.9                  | 1260-1270               | 369.2                  |
| 370-380                 | 75.2                   | 820-830                 | 276.2                  | 1270-1280               | 343.8                  |
| 380-390                 | 349.2                  | 830-840                 | 321.3                  | 1280-1290               | 373.7                  |
| 390-400                 | 260.4                  | 840-850                 | 302.8                  | 1290-1300               | 375.3                  |
| 400-410                 | 315.3                  | 850-860                 | 323.1                  | 1300-1310               | 260.3                  |
| 410-420                 | 179.1                  | 860-870                 | 316.5                  | 1310-1320               | 319.2                  |
| 420-430                 | 284.8                  | 870-880                 | 318.6                  | 1320-1330               | 315.0                  |
| 430-440                 | 275.3                  | 880-890                 | 320.8                  | 1330-1340               | 281.2                  |
| 440-450                 | 365.5                  | 890-900                 | 283.0                  | 1340-1350               | 293.0                  |
| 450-460                 | 379.7                  | 900-910                 | 329.1                  | 1350-1360               | 256.6                  |
| 460-470                 | 353.9                  | 910-920                 | 355.1                  | 1360-1370               | 296.1                  |
| 470-480                 | 423.8                  | 920-930                 | 329.0                  | 1370-1380               | 291.9                  |
| 480-490                 | 407.6                  | 930-940                 | 341.0                  | 1380-1390               | 309.1                  |
| 490-500                 | 406.5                  | 940-950                 | 347.3                  | 1390-1400               | 22.8                   |
| 500-510                 | 373.8                  | 950-960                 | 319.1                  | 1400-1410               | 309.8                  |
| 510-520                 | 390.6                  | 960-970                 | 367.4                  | 1410-1420               | 342.4                  |
| 520-530                 | 366.1                  | 970-980                 | 364.1                  | 1420-1430               | 337.2                  |

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| <u>Footage Interval</u> | <u>Weight in Grams</u> | <u>Footage Interval</u> | <u>Weight in Grams</u> | <u>Footage Interval</u> | <u>Weight in Grams</u> |
|-------------------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|
| 1430-1440               | 341.3                  | 1840-1845               | 302.1                  | 2075-2080               | 305.9                  |
| 1440-1450               | 340.3                  | 1845-1850               | 298.8                  | 2080-2085               | 292.1                  |
| 1450-1460               | 368.3                  | 1850-1855               | 190.9                  | 2085-2090               | 289.8                  |
| 1460-1470               | 326.2                  | 1855-1860               | 62.1                   | 2090-2095               | 298.0                  |
| 1470-1480               | 323.2                  | 1860-1865               | 121.4                  | 2095-2100               | 308.6                  |
| 1480-1490               | 302.8                  | 1865-1870               | 319.5                  | 2100-2105               | 292.7                  |
| 1490-1500               | 355.3                  | 1870-1875               | 155.4                  | 2105-2110               | 246.9                  |
| 1500-1510               | 257.0                  | 1880-1885               | 196.6                  | 2110-2115               | 304.5                  |
| 1510-1520               | 157.7                  | 1885-1890               | 292.3                  | 2115-2120               | 291.0                  |
| 1520-1530               | 334.8                  | 1890-1895               | 151.4                  | 2120-2125               | 289.9                  |
| 1530-1540               | 282.2                  | 1895-1900               | 339.3                  | 2125-2130               | 321.7                  |
| 1540-1550               | 354.2                  | 1900-1905               | 207.4                  | 2130-2135               | 318.5                  |
| 1550-1560               | 345.9                  | 1905-1910               | 326.3                  | 2135-2140               | 341.5                  |
| 1560-1570               | 408.4                  | 1910-1915               | 303.5                  | 2140-2145               | 356.8                  |
| 1570-1580               | 358.8                  | 1915-1920               | 292.8                  | 2145-2150               | 333.3                  |
| 1580-1590               | 379.1                  | 1920-1925               | 302.0                  | 2150-2155               | 371.0                  |
| 1590-1600               | 365.1                  | 1925-1930               | 121.1                  | 2155-2160               | 220.2                  |
| 1600-1610               | 242.0                  | 1930-1935               | 109.9                  | 2160-2165               | 338.7                  |
| 1610-1614               | 254.8                  | 1935-1940               | 252.5                  | 2165-2170               | 185.0                  |
| 1624-1630               | 31.5                   | 1940-1945               | 314.9                  | 2170-2175               | 295.4                  |
| 1630-1640               | 259.2                  | 1945-1950               | 183.0                  | 2180-2185               | 328.1                  |
| 1640-1650               | 212.4                  | 1950-1955               | 303.8                  | 2185-2190               | 226.8                  |
| 1650-1660               | 314.9                  | 1955-1960               | 199.8                  | 2190-2195               | 354.2                  |
| 1660-1670               | 351.2                  | 1960-1965               | 289.8                  | 2195-2200               | 347.5                  |
| 1670-1680               | 345.5                  | 1965-1970               | 289.7                  | 2200-2005               | 384.7                  |
| 1680-1690               | 360.6                  | 1970-1975               | 324.3                  | 2205-2210               | 301.2                  |
| 1690-1700               | 325.5                  | 1975-1980               | 122.8                  | 2210-2215               | 390.0                  |
| 1700-1710               | 362.9                  | 1980-1985               | 186.0                  | 2215-2220               | 342.0                  |
| 1710-1720               | 329.9                  | 1990-1995               | 269.1                  | 2220-2225               | 360.6                  |
| 1720-1730               | 319.2                  | 1995-2000               | 170.1                  | 2225-2230               | 285.0                  |
| 1730-1740               | 309.2                  | 2000-2005               | 299.3                  | 2230-2235               | 354.4                  |
| 1740-1750               | 314.4                  | 2005-2010               | 278.7                  | 2235-2240               | 311.0                  |
| 1750-1760               | 349.0                  | 2010-2015               | 298.1                  | 2240-2245               | 290.7                  |
| 1760-1770               | 349.4                  | 2015-2020               | 284.0                  | 2245-2250               | 349.7                  |
| 1770-1780               | 314.0                  | 2020-2025               | 217.3                  | 2250-2255               | 334.1                  |
| 1780-1790               | 314.6                  | 2025-2030               | 256.9                  | 2255-2260               | 353.3                  |
| 1790-1800               | 324.9                  | 2030-2035               | 309.8                  | 2260-2265               | 356.2                  |
| 1800-1805               | 350.0                  | 2035-2040               | 298.2                  | 2265-2270               | 365.4                  |
| 1805-1810               | 99.9                   | 2040-2045               | 303.6                  | 2270-2275               | 385.3                  |
| 1810-1815               | 148.1                  | 2045-2050               | 301.6                  | 2275-2280               | 343.5                  |
| 1815-1820               | 102.3                  | 2050-2055               | 323.5                  | 2280-2285               | 318.2                  |
| 1820-1825               | 291.6                  | 2055-2060               | 293.8                  | 2285-2290               | 313.5                  |
| 1825-1830               | 146.6                  | 2060-2065               | 284.0                  | 2290-2295               | 321.8                  |
| 1830-1835               | 227.1                  | 2065-2070               | 340.2                  | 2295-2300               | 310.9                  |
| 1835-1840               | 252.4                  | 2070-2075               | 311.5                  | 2300-2305               | 327.3                  |



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| <u>Footage Interval</u> | <u>Weight in Grams</u> | <u>Footage Interval</u> | <u>Weight in Grams</u> | <u>Footage Interval</u> | <u>Width in Grams</u> |
|-------------------------|------------------------|-------------------------|------------------------|-------------------------|-----------------------|
| 2305-2310               | 300.7                  | 2530-2535               | 342.9                  | 2770-2775               | 335.8                 |
| 2310-2315               | 312.7                  | 2540-2545               | 254.7                  | 2775-2780               | 333.6                 |
| 2315-2320               | 366.2                  | 2545-2550               | 309.9                  | 2780-2785               | 21.4                  |
| 2320-2325               | 304.4                  | 2550-2555               | 307.1                  | 2785-2790               | 288.4                 |
| 2325-2330               | 362.7                  | 2555-2560               | 111.7                  | 2790-2795               | 339.8                 |
| 2330-2335               | 316.3                  | 2560-2565               | 357.7                  | 2795-2800               | 340.1                 |
| 2335-2340               | 308.7                  | 2565-2570               | 342.7                  | 2800-2805               | 316.5                 |
| 2340-2345               | 316.3                  | 2570-2575               | 321.2                  | 2805-2810               | 16.4                  |
| 2345-2350               | 320.1                  | 2575-2580               | 153.2                  | 2810-2815               | 332.1                 |
| 2350-2355               | 349.9                  | 2580-2585               | 320.0                  | 2815-2820               | 304.9                 |
| 2355-2360               | 367.7                  | 2585-2590               | 318.7                  | 2820-2825               | 333.5                 |
| 2360-2365               | 219.8                  | 2590-2595               | 377.7                  | 2825-2830               | 350.6                 |
| 2365-2370               | 220.7                  | 2595-2600               | 244.8                  | 2830-2835               | 209.9                 |
| 2370-2375               | 114.5                  | 2610-2615               | 299.4                  | 2835-2840               | 282.5                 |
| 2375-2380               | 92.2                   | 2615-2620               | 321.6                  | 2840-2845               | 288.2                 |
| 2380-2385               | 116.3                  | 2620-2625               | 226.5                  | 2845-2850               | 328.5                 |
| 2385-2390               | 60.5                   | 2625-2630               | 36.5                   | 2850-2855               | 324.4                 |
| 2390-2395               | 81.6                   | 2630-2635               | 320.2                  | 2855-2860               | 289.7                 |
| 2395-2400               | 37.4                   | 2635-2640               | 211.6                  | 2860-2865               | 306.9                 |
| 2400-2405               | 139.8                  | 2640-2645               | 300.0                  | 2865-2870               | 283.8                 |
| 2405-2410               | 264.1                  | 2645-2650               | 303.1                  | 2870-2875               | 384.2                 |
| 2410-2415               | 268.5                  | 2650-2655               | 236.0                  | 2875-2880               | 335.1                 |
| 2415-2420               | 140.5                  | 2655-2660               | 331.6                  | 2880-2885               | 381.5                 |
| 2420-2425               | 348.5                  | 2660-2665               | 290.3                  | 2885-2890               | 368.8                 |
| 2425-2430               | 349.7                  | 2665-2670               | 294.9                  | 2890-2895               | 306.9                 |
| 2430-2435               | 348.7                  | 2670-2675               | 368.4                  | 2895-2900               | 306.2                 |
| 2435-2440               | 342.8                  | 2675-2680               | 332.4                  | 2900-2905               | 358.3                 |
| 2440-2445               | 304.5                  | 2680-2685               | 354.7                  | 2905-2910               | 349.5                 |
| 2445-2450               | 350.7                  | 2685-2690               | 293.8                  | 2910-2915               | 367.4                 |
| 2450-2455               | 148.1                  | 2690-2695               | 351.8                  | 2915-2920               | 346.8                 |
| 2455-2460               | 348.3                  | 2695-2700               | 380.2                  | 2920-2925               | 366.4                 |
| 2460-2465               | 347.9                  | 2700-2705               | 184.4                  | 2925-2930               | 386.8                 |
| 2465-2470               | 356.2                  | 2705-2710               | 302.8                  | 2930-2935               | 288.8                 |
| 2470-2475               | 300.2                  | 2710-2715               | 365.8                  | 2935-2940               | 344.9                 |
| 2475-2480               | 333.6                  | 2715-2720               | 334.2                  | 2940-2945               | 319.2                 |
| 2480-2485               | 347.0                  | 2720-2725               | 259.8                  | 2945-2950               | 325.9                 |
| 2485-2490               | 361.9                  | 2725-2730               | 321.9                  | 2950-2955               | 326.6                 |
| 2490-2495               | 337.0                  | 2730-2735               | 368.1                  | 2955-2960               | 329.6                 |
| 2490-2500               | 357.3                  | 2735-2740               | 315.7                  | 2960-2965               | 133.1                 |
| 2500-2505               | 275.2                  | 2740-2745               | 319.3                  | 2965-2970               | 318.4                 |
| 2505-2510               | 346.4                  | 2745-2750               | 309.3                  | 2970-2975               | 331.5                 |
| 2510-2515               | 350.0                  | 2750-2755               | 366.0                  | 2975-2980               | 295.7                 |
| 2515-2520               | 338.4                  | 2755-2760               | 301.8                  | 2980-2985               | 318.7                 |
| 2520-2525               | 320.5                  | 2760-2765               | 362.9                  | 2985-2990               | 329.7                 |
| 2525-2530               | 296.3                  | 2765-2770               | 271.0                  | 2990-2995               | 314.4                 |

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| <u>Footage Interval</u> | <u>Weight in Grams</u> | <u>Footage Interval</u> | <u>Weight in Grams</u> | <u>Footage Interval</u> | <u>Weight in Grams</u> |
|-------------------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|
| 2995-3000               | 332.5                  | 3220-3225               | 241.8                  | 3445-3450               | 186.7                  |
| 3000-3005               | 317.0                  | 3225-3230               | 93.9                   | 3450-3455               | 212.6                  |
| 3005-3010               | 311.5                  | 3230-3235               | 131.1                  | 3455-3460               | 116.1                  |
| 3010-3015               | 322.5                  | 3235-3240               | 244.1                  | 3460-3465               | 175.5                  |
| 3015-3020               | 326.0                  | 3240-3245               | 234.0                  | 3465-3470               | 183.6                  |
| 3020-3025               | 345.7                  | 3245-3250               | 254.9                  | 3470-3475               | 204.4                  |
| 3025-3030               | 299.9                  | 3250-3255               | 237.6                  | 3475-3480               | 153.1                  |
| 3030-3035               | 326.2                  | 3255-3260               | 245.4                  | 3480-3485               | 186.8                  |
| 3035-3040               | 224.9                  | 3260-3265               | 262.4                  | 3485-3490               | 226.3                  |
| 3040-3045               | 320.0                  | 3265-3270               | 242.4                  | 3490-3495               | 227.9                  |
| 3045-3050               | 316.5                  | 3270-3275               | 228.7                  | 3495-3500               | 199.3                  |
| 3050-3055               | 315.5                  | 3275-3280               | 252.0                  | 3500-3505               | 226.7                  |
| 3055-3060               | 330.6                  | 3280-3285               | 229.4                  | 3505-3510               | 193.0                  |
| 3060-3065               | 292.8                  | 3285-3290               | 210.4                  | 3510-3515               | 214.2                  |
| 3065-3070               | 290.3                  | 3290-3295               | 175.2                  | 3515-3520               | 229.3                  |
| 3070-3075               | 275.9                  | 3295-3300               | 199.2                  | 3520-3525               | 216.2                  |
| 3075-3080               | 333.8                  | 3300-3305               | 175.3                  | 3525-3530               | 147.2                  |
| 3080-3085               | 266.0                  | 3305-3310               | 102.1                  | 3530-3535               | 208.4                  |
| 3085-3090               | 276.3                  | 3310-3315               | 255.6                  | 3535-3540               | 200.4                  |
| 3090-3095               | 294.1                  | 3315-3320               | 211.5                  | 3540-3545               | 206.1                  |
| 3095-3100               | 303.0                  | 3320-3325               | 206.7                  | 3545-3550               | 208.2                  |
| 3100-3105               | 274.3                  | 3325-3330               | 196.2                  | 3550-3555               | 124.5                  |
| 3105-3110               | 255.7                  | 3330-3335               | 207.2                  | 3555-3560               | 210.6                  |
| 3110-3115               | 289.9                  | 3335-3340               | 213.7                  | 3560-3565               | 190.4                  |
| 3115-3120               | 273.9                  | 3340-3345               | 196.0                  | 3565-3470               | 208.3                  |
| 3120-3125               | 292.8                  | 3345-3350               | 232.6                  | 3570-3575               | 219.4                  |
| 3125-3130               | 244.8                  | 3350-3355               | 208.9                  | 3575-3580               | 96.9                   |
| 3130-3135               | 281.8                  | 3355-3360               | 219.0                  | 3580-3585               | 190.5                  |
| 3135-3140               | 258.4                  | 3360-3365               | 184.1                  | 3585-3590               | 233.1                  |
| 3140-3145               | 201.5                  | 3365-3370               | 148.0                  | 3590-3595               | 125.0                  |
| 3145-3150               | 217.4                  | 3370-3375               | 159.7                  | 3595-3600               | 290.6                  |
| 3150-3155               | 220.4                  | 3375-3380               | 128.0                  | 3600-3605               | 233.0                  |
| 3155-3160               | 222.3                  | 3380-3385               | 101.8                  | 3605-3610               | 84.6                   |
| 3160-3165               | 210.1                  | 3385-3390               | 141.2                  | 3610-3615               | 248.9                  |
| 3165-3170               | 200.7                  | 3390-3395               | 179.3                  | 3615-3620               | 201.4                  |
| 3170-3175               | 255.4                  | 3395-3400               | 177.0                  | 3620-3625               | 231.1                  |
| 3175-3180               | 273.8                  | 3400-3405               | 169.3                  | 3625-3630               | 218.1                  |
| 3180-3185               | 245.3                  | 3405-3410               | 145.6                  | 3630-3635               | 252.3                  |
| 3185-3190               | 242.5                  | 3410-3415               | 121.2                  | 3635-3640               | 249.9                  |
| 3190-3195               | 245.0                  | 3415-3420               | 191.3                  | 3640-3645               | 241.4                  |
| 3195-3200               | 251.6                  | 3420-3425               | 175.1                  | 3645-3650               | 252.2                  |
| 3200-3205               | 156.4                  | 3425-3430               | 194.2                  | 3650-3655               | 64.9                   |
| 3205-3210               | 138.8                  | 3430-3435               | 188.3                  | 3655-3660               | 186.8                  |
| 3210-3215               | 231.7                  | 3435-3440               | 194.8                  | 3660-3665               | 215.4                  |
| 3215-3220               | 293.6                  | 3440-3445               | 204.7                  | 3665-3670               | 221.7                  |

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| <u>Footage Interval</u> | <u>Weight in Grams</u> | <u>Footage Interval</u> | <u>Weight in Grams</u> | <u>Footage Interval</u> | <u>Weight in Grams</u> |
|-------------------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|
| 3670-3675               | 285.9                  | 3895-3900               | 221.7                  | 4120-4125               | 102.8                  |
| 3675-3680               | 217.2                  | 3900-3905               | 213.7                  | 4125-4130               | 228.7                  |
| 3680-3685               | 242.2                  | 3905-3910               | 265.8                  | 4130-4135               | 231.7                  |
| 3685-3690               | 165.2                  | 3910-3915               | 191.2                  | 4135-4140               | 217.6                  |
| 3690-3695               | 154.4                  | 3915-3920               | 251.0                  | 4140-4145               | 234.6                  |
| 3695-3700               | 24.1                   | 3920-3925               | 212.2                  | 4145-4150               | 217.5                  |
| 3700-3705               | 75.4                   | 3925-3930               | 219.5                  | 4150-4155               | 229.3                  |
| 3705-3710               | 222.8                  | 3930-3935               | 256.9                  | 4155-4160               | 209.3                  |
| 3710-3715               | 191.8                  | 3935-3940               | 239.0                  | 4160-4165               | 258.8                  |
| 3715-3720               | 87.4                   | 3940-3945               | 215.0                  | 4165-4170               | 231.2                  |
| 3720-3725               | 184.8                  | 3945-3950               | 262.1                  | 4170-4175               | 231.6                  |
| 3725-3730               | 132.1                  | 3950-3955               | 212.2                  | 4175-4180               | 259.2                  |
| 3730-3735               | 106.9                  | 3955-3960               | 192.1                  | 4180-4185               | 221.9                  |
| 3735-3740               | 173.2                  | 3960-3965               | 212.5                  | 4185-4190               | 224.1                  |
| 3740-3745               | 171.5                  | 3965-3970               | 215.0                  | 4190-4195               | 239.7                  |
| 3745-3750               | 152.0                  | 3970-3975               | 189.0                  | 4195-4200               | 269.2                  |
| 3750-3755               | 123.9                  | 3975-3980               | 205.1                  | 4200-4205               | 246.0                  |
| 3755-3760               | 190.2                  | 3980-3985               | 215.7                  | 4205-4210               | 228.8                  |
| 3760-3765               | 110.5                  | 3985-3990               | 213.0                  | 4210-4215               | 262.1                  |
| 3765-3770               | 89.7                   | 3990-3995               | 243.6                  | 4215-4220               | 196.5                  |
| 3770-3775               | 127.5                  | 3995-4000               | 254.5                  | 4220-4225               | 208.3                  |
| 3775-3780               | 54.3                   | 4000-4005               | 239.0                  | 4225-4230               | 207.7                  |
| 3780-3785               | 134.5                  | 4005-4010               | 239.2                  | 4230-4235               | 233.9                  |
| 3785-3790               | 217.7                  | 4010-4015               | 244.7                  | 4235-4240               | 209.6                  |
| 3790-3795               | 218.0                  | 4015-4020               | 263.6                  | 4240-4245               | 211.6                  |
| 3795-3800               | 216.2                  | 4020-4025               | 190.3                  | 4245-4250               | 218.8                  |
| 3800-3805               | 200.8                  | 4025-4030               | 207.0                  | 4250-4255               | 183.3                  |
| 3805-3810               | 237.2                  | 4030-4035               | 230.1                  | 4255-4260               | 51.5                   |
| 3810-3815               | 73.1                   | 4035-4040               | 234.8                  | 4260-4265               | 145.3                  |
| 3815-3820               | 89.2                   | 4040-4045               | 236.1                  | 4265-4270               | 52.4                   |
| 3820-3825               | 94.5                   | 4045-4050               | 238.6                  | 4270-4275               | 208.2                  |
| 3825-3830               | 189.8                  | 4050-4055               | 191.6                  | 4275-4280               | 227.7                  |
| 3830-3835               | 71.8                   | 4055-4060               | 208.5                  | 4280-4285               | 157.0                  |
| 3835-3840               | 219.9                  | 4060-4065               | 227.5                  | 4285-4290               | 164.8                  |
| 3840-3845               | 170.3                  | 4065-4070               | 181.7                  | 4290-4295               | 175.2                  |
| 3845-3850               | 218.5                  | 4070-4075               | 202.1                  | 4295-4300               | 206.3                  |
| 3850-3855               | 168.6                  | 4075-4080               | 196.4                  | 4300-4305               | 211.9                  |
| 3855-3860               | 191.6                  | 4080-4085               | 202.6                  | 4305-4310               | 210.2                  |
| 3860-3865               | 117.2                  | 4085-4090               | 138.1                  | 4310-4315               | 215.2                  |
| 3865-3870               | 157.8                  | 4090-4095               | 215.8                  | 4315-4320               | 224.1                  |
| 3870-3875               | 141.5                  | 4095-4100               | 264.4                  | 4320-4325               | 232.2                  |
| 3875-3880               | 213.6                  | 4100-4105               | 231.1                  | 4325-4330               | 214.8                  |
| 3880-3885               | 203.4                  | 4105-4110               | 210.1                  | 4330-4335               | 187.1                  |
| 3885-3890               | 237.3                  | 4110-4115               | 220.9                  | 4335-4340               | 189.4                  |
| 3890-3895               | 243.5                  | 4115-4120               | 226.0                  | 4340-4345               | 229.1                  |

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| <u>Footage Interval</u> | <u>Weight in Grams</u> | <u>Footage Interval</u> | <u>Weight in Grams</u> | <u>Footage Interval</u> | <u>Weight in Grams</u> |
|-------------------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|
| 4345-4350               | 200.7                  | 4570-4575               | 188.9                  | 4795-4800               | 166.1                  |
| 4350-4355               | 229.2                  | 4575-4580               | 132.2                  | 4800-4805               | 245.4                  |
| 4355-4360               | 247.5                  | 4580-4585               | 198.5                  | 4805-4810               | 327.1                  |
| 4360-4365               | 217.0                  | 4585-4590               | 74.5                   | 4810-4815               | 318.0                  |
| 4365-4370               | 222.2                  | 4590-4595               | 204.5                  | 4815-4820               | 330.5                  |
| 4370-4375               | 232.2                  | 4595-4600               | 206.4                  | 4820-4825               | 329.8                  |
| 4375-4380               | 210.9                  | 4600-4605               | 263.2                  | 4825-4830               | 276.3                  |
| 4380-4385               | 254.8                  | 4605-4610               | 214.4                  | 4830-4835               | 261.5                  |
| 4385-4390               | 180.0                  | 4610-4615               | 195.2                  | 4835-4840               | 261.4                  |
| 4390-4395               | 132.0                  | 4615-4620               | 213.6                  | 4840-4845               | 233.2                  |
| 4395-4400               | 38.9                   | 4620-4625               | 175.9                  | 4845-4850               | 278.2                  |
| 4400-4405               | 33.8                   | 4625-4630               | 174.6                  | 4850-4855               | 262.7                  |
| 4405-4410               | 214.1                  | 4630-4635               | 211.6                  | 4855-4860               | 301.6                  |
| 4410-4415               | 189.4                  | 4635-4640               | 217.2                  | 4860-4865               | 306.3                  |
| 4415-4420               | 189.1                  | 4640-4645               | 203.6                  | 4865-4870               | 337.3                  |
| 4420-4425               | 135.5                  | 4645-4650               | 209.0                  | 4870-4875               | 291.4                  |
| 4425-4430               | 178.1                  | 4650-4655               | 289.3                  | 4875-4880               | 308.8                  |
| 4430-4435               | 228.4                  | 4655-4660               | 94.9                   | 4880-4885               | 289.4                  |
| 4435-4440               | 231.6                  | 4660-4665               | 273.6                  | 4885-4890               | 284.7                  |
| 4440-4445               | 190.5                  | 4665-4670               | 250.0                  | 4890-4895               | 285.2                  |
| 4445-4450               | 224.7                  | 4670-4675               | 284.2                  | 4895-4900               | 347.5                  |
| 4450-4455               | 206.7                  | 4675-4680               | 164.1                  | 4900-4905               | 264.7                  |
| 4455-4460               | 207.5                  | 4680-4685               | 301.4                  | 4905-4910               | 238.7                  |
| 4460-4465               | 228.0                  | 4685-4690               | 245.5                  | 4910-4915               | 280.9                  |
| 4465-4470               | 41.2                   | 4690-4695               | 230.5                  | 4915-4920               | 179.2                  |
| 4470-4475               | 186.3                  | 4695-4700               | 233.0                  | 4920-4925               | 148.3                  |
| 4475-4480               | 234.0                  | 4700-4705               | 222.1                  | 4925-4930               | 319.0                  |
| 4480-4485               | 200.4                  | 4705-4710               | 305.9                  | 4930-4935               | 290.5                  |
| 4485-4490               | 191.0                  | 4710-4715               | 244.8                  | 4935-4940               | 304.6                  |
| 4490-4495               | 54.0                   | 4715-4720               | 220.7                  | 4940-4945               | 226.5                  |
| 4495-4500               | 178.5                  | 4720-4725               | 352.4                  | 4945-4950               | 181.2                  |
| 4500-4505               | 187.8                  | 4725-4730               | 257.1                  | 4950-4955               | 297.4                  |
| 4405-4510               | 205.9                  | 4730-4735               | 250.1                  | 4955-4960               | 203.9                  |
| 4510-4515               | 199.4                  | 4735-4740               | 295.7                  | 4960-4965               | 118.2                  |
| 4515-4520               | 188.1                  | 4740-4745               | 147.9                  | 4965-4970               | 137.7                  |
| 4520-4525               | 202.9                  | 4745-4750               | 257.5                  | 4970-4975               | 283.5                  |
| 4525-4530               | 201.5                  | 4750-4755               | 253.9                  | 4975-4980               | 275.0                  |
| 4530-4535               | 196.4                  | 4755-4760               | 288.7                  | 4980-4985               | 278.5                  |
| 4535-4540               | 182.2                  | 4760-4765               | 225.6                  | 4985-4990               | 256.1                  |
| 4540-4545               | 179.3                  | 4765-4770               | 230.1                  | 4990-4995               | 258.1                  |
| 4545-4550               | 202.5                  | 4770-4775               | 296.3                  | 4995-5000               | 289.6                  |
| 4550-4555               | 176.8                  | 4775-4780               | 246.5                  | 5000-5005               | 276.7                  |
| 4555-4560               | 190.6                  | 4780-4785               | 171.4                  | 5005-5010               | 235.8                  |
| 4560-4565               | 184.0                  | 4785-4790               | 242.6                  | 5010-5015               | 273.0                  |
| 4565-4570               | 183.1                  | 4790-4795               | 288.8                  | 5015-5020               | 236.2                  |

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| <u>Footage Interval</u> | <u>Weight in Grams</u> | <u>Footage Interval</u> | <u>Weight in Grams</u> | <u>Footage Interval</u> | <u>Weight in Grams</u> |
|-------------------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|
| 5020-5025               | 302.0                  | 5240-5245               | 268.4                  | 5465-5470               | 283.8                  |
| 5025-5030               | 279.6                  | 5245-5250               | 292.5                  | 5470-5475               | 296.2                  |
| 5030-5035               | 264.0                  | 5250-5255               | 318.2                  | 5475-5480               | 307.2                  |
| 5035-5040               | 239.0                  | 5255-5260               | 267.9                  | 5480-5485               | 266.9                  |
| 5040-5045               | 297.5                  | 5260-5265               | 233.4                  | 5485-5490               | 318.7                  |
| 5045-5050               | 290.3                  | 5265-5270               | 267.3                  | 5490-5495               | 309.1                  |
| 5050-5055               | 232.7                  | 5270-5275               | 278.2                  | 5495-5500               | 295.8                  |
| 5055-5060               | 303.6                  | 5275-5280               | 270.1                  | 5500-5505               | 328.8                  |
| 5060-5065               | 276.1                  | 5280-5285               | 317.7                  | 5505-5510               | 306.0                  |
| 5065-5070               | 286.1                  | 5285-5290               | 346.5                  | 5510-5515               | 261.3                  |
| 5070-5075               | 295.6                  | 5290-5295               | 333.7                  | 5515-5520               | 294.0                  |
| 5075-5080               | 305.0                  | 5295-5300               | 299.7                  | 5520-5525               | 282.0                  |
| 5080-5085               | 307.5                  | 5300-5305               | 301.2                  | 5525-5530               | 318.1                  |
| 5085-5090               | 292.4                  | 5305-5310               | 270.7                  | 5530-5535               | 295.5                  |
| 5090-5095               | 281.6                  | 5310-5315               | 324.2                  | 5535-5540               | 296.4                  |
| 5095-5100               | 267.7                  | 5315-5320               | 311.7                  | 5540-5545               | 292.1                  |
| 5100-5105               | 278.4                  | 5320-5325               | 140.2                  | 5545-5550               | 261.5                  |
| 5105-5110               | 274.0                  | 5325-5330               | 312.8                  | 5550-5555               | 275.6                  |
| 5110-5115               | 224.0                  | 5330-5335               | 302.6                  | 5555-5560               | 303.3                  |
| 5115-5120               | 302.1                  | 5335-5340               | N/S                    | 5560-5565               | 272.3                  |
| 5120-5125               | 279.9                  | 5340-5345               | 91.6                   | 5565-5570               | 281.3                  |
| 5125-5130               | 244.1                  | 5345-5350               | 259.7                  | 5570-5575               | 279.7                  |
| 5130-5135               | 321.3                  | 5350-5355               | 289.9                  | 5575-5580               | 302.1                  |
| 5135-5140               | 329.1                  | 5355-5360               | 259.0                  | 5580-5585               | 322.7                  |
| 5140-5145               | 340.8                  | 5360-5365               | 258.3                  | 5585-5590               | 300.5                  |
| 5145-5150               | 298.6                  | 5365-5370               | 231.7                  | 5590-5595               | 288.0                  |
| 5150-5155               | 278.0                  | 5370-5375               | 257.0                  | 5595-5600               | 322.1                  |
| 5155-5160               | 341.6                  | 5375-5380               | 281.7                  | 5600-5605               | 271.4                  |
| 5160-5165               | 345.1                  | 5380-5385               | 248.6                  | 5605-5610               | 330.2                  |
| 5165-5170               | 337.7                  | 5385-5390               | 253.8                  | 5610-5615               | 266.6                  |
| 5170-5175               | 98.0                   | 5390-5395               | 262.3                  | 5615-5620               | 329.9                  |
| 5175-5180               | 253.1                  | 5395-5400               | 210.1                  | 5620-5625               | 292.8                  |
| 5180-5185               | 338.4                  | 5400-5405               | 270.8                  | 5625-5630               | 248.5                  |
| 5185-5190               | 349.5                  | 5405-5410               | 236.7                  | 5630-5635               | 278.2                  |
| 5190-5195               | 294.0                  | 5410-5415               | 208.4                  | 5635-5640               | 319.3                  |
| 5195-5200               | 276.8                  | 5415-5420               | 259.3                  | 5640-5645               | 328.4                  |
| 5200-5205               | 331.7                  | 5420-5425               | 129.0                  | 5645-5650               | 262.6                  |
| 5205-5210               | 275.7                  | 5425-5430               | 146.8                  | 5650-5655               | 266.4                  |
| 5210-5215               | 299.8                  | 5430-5435               | 269.9                  | 5655-5660               | 274.4                  |
| 5215-5220               | 286.4                  | 5435-5440               | 243.3                  | 5660-5665               | 286.4                  |
| 5220-5225               | 311.2                  | 5440-5445               | 258.8                  | 5665-5670               | 298.4                  |
| 5225-5230               | 288.4                  | 5445-5450               | 270.4                  | 5670-5675               | 297.2                  |
| 5230-5235               | 314.7                  | 5450-5455               | 231.3                  | 5675-5680               | 308.1                  |
| 5235-5240               | 308.4                  | 5455-5460               | 270.1                  | 5680-5685               | 293.6                  |
| set 2 —                 | 359.8                  | 5460-5465               | 327.0                  | 5685-5690               | 268.0                  |

5235-5240

Thermal Power Company 14-2  
Beaver County, Utah  
Sec. 2, T27S, R9W

| <u>Footage<br/>Interval</u> | <u>Weight<br/>in Grams</u> | <u>Footage<br/>Interval</u> | <u>Weight<br/>in Grams</u> |
|-----------------------------|----------------------------|-----------------------------|----------------------------|
| 5690-5695                   | 286.0                      | 5915-5920                   | 310.5                      |
| 5695-5700                   | 242.9                      | 5920-5925                   | 287.1                      |
| 5700-5705                   | 254.7                      | 5925-5930                   | 318.2                      |
| 5705-5710                   | 261.0                      | 5930-5935                   | 291.8                      |
| 5710-5715                   | 291.5                      | 5935-5940                   | 285.6                      |
| 5715-5720                   | 276.4                      | 5940-5945                   | 288.3                      |
| 5720-5725                   | 266.2                      | 5945-5950                   | 252.0                      |
| 5725-5730                   | 264.1                      | 5950-5955                   | 345.6                      |
| 5730-5735                   | 288.6                      | 5955-5960                   | 310.8                      |
| 5735-5740                   | 287.5                      | 5960-5965                   | 303.1                      |
| 5740-5745                   | 352.7                      | 5965-5970                   | 307.0                      |
| 5745-5750                   | 206.5                      | 5970-5975                   | 327.2                      |
| 5750-5755                   | 308.4                      | 5975-5980                   | 298.8                      |
| 5755-5760                   | 297.4                      | 5980-5985                   | 273.8                      |
| 5760-5765                   | 264.9                      | 5985-5990                   | 15.9                       |
| 5765-5770                   | 114.0                      | 5990-5995                   | 314.4                      |
| 5770-5775                   | 289.4                      | 5995-6000                   | 67.8                       |
| 5775-5780                   | 312.8                      | 6000-6005                   | 204.7                      |
| 5780-5785                   | 330.4                      | 6005-6010                   | 230.8                      |
| 5785-5790                   | 347.7                      | 6010-6015                   | 182.7                      |
| 5790-5795                   | 335.2                      | 6015-6020                   | 239.8                      |
| 5795-5800                   | 354.7                      | 6020-6025                   | 212.4                      |
| 5800-5805                   | 172.1                      | 6025-6030                   | 230.8                      |
| 5805-5810                   | 250.9                      | 6030-6035                   | 239.4                      |
| 5810-5815                   | 192.6                      | 6035-6040                   | 214.2                      |
| 5815-5820                   | 235.7                      | 6040-6045                   | 218.7                      |
| 5820-5825                   | 227.2                      | 6045-6050                   | 234.2                      |
| 5825-5830                   | 260.4                      | 6050-6055                   | 244.8                      |
| 5830-5835                   | 220.6                      | 6055-6060                   | 199.4                      |
| 5835-5840                   | 297.0                      | 6060-6065                   | 194.1                      |
| 5840-5845                   | 94.8                       | 6065-6070                   | 207.3                      |
| 5845-5850                   | 196.5                      | 6070-6075                   | 223.3                      |
| 5850-5855                   | 250.7                      | 6075-6080                   | 231.0                      |
| 5855-5860                   | 290.7                      | 6080-6085                   | 193.2                      |
| 5860-5865                   | 217.4                      | 6085-6090                   | 304.3                      |
| 5865-5870                   | 262.3                      | 6090-6095                   | 237.8                      |
| 5870-5875                   | 325.9                      | 6095-6100                   | 322.2                      |
| 5875-5880                   | 291.2                      |                             |                            |
| 5880-5885                   | 304.8                      |                             |                            |
| 5885-5890                   | 269.8                      |                             |                            |
| 5890-5895                   | 312.7                      |                             |                            |
| 5895-5900                   | 311.9                      |                             |                            |
| 5900-5905                   | 329.8                      |                             |                            |
| 5905-5910                   | 309.0                      |                             |                            |
| 5910-5915                   | 321.6                      |                             |                            |

TAPE #

FILE#

DATE DIGITIZED

BY WHOM *Phyl RUBINSTEIN*

DATE PLACED IN I/O

DATE RETRIEVED

DATE PLOTTED

DID DATA PLOT CORRECTLY

CAN TAPE BE OVERWRITTEN

DATE OVERWRITTEN

DRILLING COMPANY (2) ~~ALPHA BETA GAMMA Associates Inc.~~

DRILL HOLE NAME (3) *UTAH STATE 14-2 (ML 27536)*

AREA (4): FIELD

COUNTY *BEAVER*

STATE *UTAH*

PROJECT NAME (5)

LOCATION (6): LONGITUDE SECTION *2*

LATITUDE TOWNSHIP *27S*

RANGE *9W*

LOGGING COMPANY (7) ~~ALPHA BETA GAMMA ASSOCIATES INC~~

LOG NAME (8)

LOG DATE (9) *9-12-76 - 10-16-76*

DATA TYPE (10) *Drilling RATE*

DATA UNITS (11) *min/ft*

Y-ORIGIN (12) *0*

Y-UNITS PER INCH (13) *49<sup>ft</sup> / inch*

DATA STARTING FOOTAGE (14) *80<sup>ft</sup>*

ENDING FOOTAGE (15)

DRILLING MEASURED FROM (16)

ELEVATION (ASK TED ~ ELEV.) (ABOVE P.D.) (17)

LOG MEASURED FROM (18)

ELEVATION (ABOVE P.D.) (19)

PERMANENT DATUM (20)

ELEVATION (21)

CASING DEPTH (22): DRILLER  
LOGGER

BIT SIZE (23)

FLUID TYPE IN HOLE (24)

TIME SINCE CIRCULATION (25)

MAXIMUM RECORDED TEMPERATURE (26)

COMMENTS (27):

Table 2. Geothermal Wells Drilled at Roosevelt Hot Springs, Utah

*Feb*

|                            | <u>Location</u>         | <u>Date Drilled</u>  | <u>Depth, ft.</u> | <u>Casing</u>         | <u>Results and Status</u>   |
|----------------------------|-------------------------|----------------------|-------------------|-----------------------|---|
| Phillips Petroleum Company |                         |                      |                   |                       |   |
| OH-2                       | SW/4 NW/4,<br>10-27S-9W | 2/2/75-<br>2/15/75   | 2,250             | N.D.                  | Deep temperature-gradient hole; reportedly high gradient  |
| OH-1<br>(also 17-1)        | SE/4 NE/4,<br>17-27S-9W | 3/3/75-<br>3/12/75   | 2,321             | N.D.                  | Deep temperature-gradient hole; "high" temperature; low permeability  |
| 9-1                        | NE/4 NW/4,<br>9-27S-9W  | 3/13/75-<br>4/8/75   | 6,885             | N.D.                  | "High" temperature; poor permeability   |
| 3-1 well<br>(also 55-3)    | NW/4 SE/4,<br>3-27S-9W  | 4/20/75-<br>5/24/75  | 2,728             | N.D.                  | Tested at 1.2 million #/hr of hot water   |
| 54-3                       | SW/4 NE/4,<br>3-27S-9W  | 7/5/75-<br>8/28/75   | 2,882             | N.D.                  | ~1 million #/hr of hot water at >500°F and >500 BTU/#; rated as "best" well                                     |
| 12-35                      | NW/4 NW/4,<br>35-26S-9W | 8/6/75-<br>10/1/75   | 7,324             | 7" liner to<br>4,500' | Suspect shallow-zone cool-water contamination; ~440°F thermal aquifer now lined off; cannot test satisfactorily |
| 13-10                      | SW/4 NW/4,<br>10-27S-9W | 10/2/75-<br>11/4/74  | 5,351             | N.D.                  | Tested above 1 million #/hr of hot water at 75-125 psig   |
| 82-33                      | NE/4 NE/4,<br>33-26S-9W | 11/5/75-<br>12/23/75 | 6,028             | 13-3/8" to<br>575'    | >300°F, <350°F; possible future injection well  |
| 25-15                      | NW/4 SW/4,<br>15-27S-9W | 8/26/76-<br>11/12/76 | ~7,500            | 9-5/8" at<br>~2,500'  | Shallow-zone cool-water contamination; less satisfactory than wells to north                                    |

*Not a  
producer  
distinct*

X

X

X

*Not a  
well*

(Note: All Phillips' wells are on Federal lease blocks)

Thermal Power Company (Natomas Company)

|                                    |                         |                      |       |                     |  |
|------------------------------------|-------------------------|----------------------|-------|---------------------|--|
| Utah State<br>X 14-2<br>(ML27536)  | SW/4 NW/4,<br>2-27S-9W  | 9/11/76-<br>10/21/76 | 6,108 | 9-5/8" at<br>1,805' | Reported >400°F hot water at ~4,000'                       |
| Utah State<br>X 72-16<br>(ML25128) | NW/4 NE/4,<br>16-27S-9W | 10/22/76-<br>1/5/77  | 1,254 | N.D.                | Reported 1 million #/hr of hot water at 432°F and 355 psig |

*6,000  
1,800  
2,400  
2,100  
2,000  
4,000  
1,800  
5,800*





## UNIVERSITY OF DENVER

An Independent University

University Park, Denver, Colorado 80208

Denver Research Institute

Laboratories for Applied Mechanics / 303•753-2616

3 August 1978

### Summary of Data Acquisition by the Denver Research Institute at Geothermal Well "Utah State" 14-2

In cooperation with Thermal Power Company, AMAX Corp., and the United States Geological Survey (USGS), personnel from the Laboratories for Applied Mechanics of the Denver Research Institute logged geothermal well "Utah State" 14-2 in the Roosevelt Hot Springs KGRA during May 1978. The tool used measures pressure and temperature in real time, and was developed by DRI under contract to the Division of Geothermal Energy, Department of Energy. This research was undertaken as part of the DOE/DGE Industry-Coupled Program, administered by the Nevada Operations Office.

During the tests, problems were encountered with the seven-conductor logging cable on the USGS rig. Under high temperature operation (greater than 450°F), the insulation between conductors in the cable experienced catastrophic degradation. The phenomenon was shown to be completely reversible when the cable was cooled to ambient temperatures. This definitely affected performance of the logging, and resulted in the loss of all temperature data.

Pressure data was successfully recovered due to the design of the transducer unit. It employs a Bourdon tube to operate a 1000 ohm potentiometer wound with 330 turns of wire. The transducer range is 0 to 2000 pounds per square inch, absolute, resulting in a resolution of 6.06 psi per turn of the pot. Although it was not possible to measure the specific resistance of the transducer when operating down hole, data was acquired by counting the jumps in signal which are characteristic of the change for an incremental turn of the pot.

The data acquired and reduced using the above technique are presented on the accompanying sheets. The flowrate measurements were made using a modified James method, since there was a problem measuring pressure drop at the orifice used to determine enthalpy. Therefore the flowrates shown are approximate.

Plans are being made to repeat these measurements in an additional test to be made in October 1978. Improved equipment is expected to result in successful acquisition of pressure and temperature data. Further information on the May tests are available from the Denver Research Institute, P. O. Box 10127, Denver, Colorado 80208; Attention: Mr. Jim Butz, Geothermal Programs.

## MONTHLY REPORT FOR MAY, 1978

### ACTIVITIES

The flow test of TPC/AMAX well "Utah State" 14-2 was conducted during May 7-13, and all tasks performed for the month were directly related to the test, either in preparation, at the site, or work with the resultant data.

An adapter to permit use of the LASL downhole sampler on the USGS 7-conductor cable was fabricated in the DRI Machine Shop. Jim Butz made a trip to LASL to check the fit of the close tolerances on the adapter, to finalize plans for LASL participation, and confirm the wiring configuration to be used.

The DRI tool was checked on the USGS cable system to ensure proper operation in the field. All DRI equipment that was used in the field test was taken to the USGS logging truck for transport to the well site. The Data Agreement between USGS and the well owners was OK'd by the government and subsequently signed.

Site preparation at Well 14-2 near Milford, Utah was completed. Work included the following tasks: (1) rebuilding of the sump pit to contain a volume equivalent to 48 hours flow; (2) a six inch valve, mating flange, and associated hardware were rented, delivered, and installed on the wellhead; and (3) the flowline, throttle valve and surface pressure measurement system were moved from well 72-16 to the site, assembled, and anchored into position for the flow tests. Part of the costs for this site work will be covered by DRI as outlined in the contract.

The USGS logging truck left Denver on 6 May and arrived at the site on 7 May. The mast service truck provided by Sandia Labs' Geothermal group was already on site. The process of rigging up the wellhead to accommodate the USGS/DRI riser assembly was begun, and it was discovered that the Sandia mast did not have capability to tilt far enough to position the upper sheave directly over the wellhead. After some discussion, we decided to order a mast service truck from OTIS Engineering in Vernal, Utah, to support the tests. The OTIS truck arrived early Monday morning and was immediately put to use in completing the rigging for the test.

The first survey to be run was a USGS temperature log of the shut-in well. There was a definite degradation of the signal with depth, so the tool was removed from the well and the cablehead and cable examined. The elastomer boot used to seal the individual conductors from each other at the cablehead solder connection had

failed as indicated by distortion, discoloration, and splitting. The cablehead was repaired, but the signal degradation persisted on subsequent runs. The extreme high temperature of the well was thought to be the cause of the problem.

Improvements in the performance of the cablehead were made through the use of a silicone high temperature grease and revised soldering procedures; however, intermittent high temperature failure of cable head boots occurred throughout the tests.

To run the USGS Borehole Televier tool, the well was cooled by the injection of 500 barrels of ambient temperature water. The BHTV has downhole electronics in the probe, so that some type of protection from high temperatures is necessary. The downhole electronics package is also enclosed in a vacuum dewar to minimize heat transfer rates. The televier worked quite well in the cooled borehole, and some excellent data was taken. This information will be published by the USGS as part of a study of the geophysics of geothermal boreholes.

The USGS also ran their Gamma-spectral tool at several stations in the borehole, while it was still cooled due to the water injection. All USGS logs were run with the well shut in.

On Friday, 12 May, we began the flow tests. The DRI tool was assembled with three, 40-pound sinker bars to the USGS cable. It was also necessary to add another length of riser pipe to the riser assembly to accommodate the sinkers. A log under shut-in conditions was made to check operation of the transducers in the probe. A grounding problem in the pressure transducer was identified during the check-out run; so that the probe was disassembled and the transducer repaired.

The well was then opened to initiate flow. Once flow had stabilized at an estimated rate of 300,000 lbs/hour (total flow), we began to run a pressure/temperature log from the top down into the well. A point was quickly reached at which the indicated temperature (the resistance of the RTD element) began to fall. Since this is an impossible condition in a flowing well, we suspected a problem with the conductor insulation: degradation with increased length of cable exposed to temperatures above 450°F. In fact, it appeared that the parallel resistance through the insulation was falling so fast that the data was indicating a negative temperature gradient (decreasing temperature with increasing depth) in the flowing well. Thus, early in the flow test we knew that no reliable temperature data could be obtained. An interesting note on the high temperature degradation phenomenon should be made: the effect was completely reversible upon cooling of the cable as the tool was brought back up the well. When the riser was disassembled and the cablehead checked with an ohmmeter at the surface, the insulation between conductors was found to be in the megohm range.

The nature of the pressure transducer used in the DRI probe saved the flow test data from being totally useless. The unit uses a Bourdon Tube to operate a 1000 ohm potentiometer. There are 330 turns in the pot, so that as the wiper moves from one turn to the next, a three ohm jump in resistance is seen. These jumps are clearly visible on the strip chart record, in spite of a general decline in the resistance value during the period that the wiper remains in contact with a particular turn of the pot. The wiper will remain in contact until sufficient additional pressure to move it to the next turn is encountered. This differential pressure has been measured in the laboratory to range from 4 to 7 psi. As the probe is lowered into the flowing well, the pressure on the Bourdon tube element increases until the above-specified differential is reached, at which time the wiper advances to the next turn.

Figure 1 is a sample section of the data chart, showing the (apparent) negative temperature gradient and a total of 5 wiper steps of three ohms each (although due to parallel resistance effects, each step shows as about two ohms). The pressure reading can be found by reference to the value with the probe at the wellhead, which, in turn, is determined from a calibration curve, since there is no cable immersed in the flowing fluid. Each step is then considered to be  $2000 \text{ psi}/330 \text{ turns} = 6.06 \text{ pounds per square inch}$ . The pressure reading at any step can now be determined by adding the product of the number of steps and the per-step increase to the wellhead reference pressure.

Using this described technique, a total of five logs were run under flow conditions. Two of those logs were made at the same flowrate, because we did not have a stabilized condition during the first run at the flowrate. The conditions are summarized below:

| <u>Log No.</u> | <u>Wellhead (Reference)<br/>Pressure, PSIA</u> | <u>Flowrate, lbs/hr</u> |
|----------------|--|-------------------------|
| 1              | (no-flow checkout run)                         |                         |
| 2              | 385  | 357,000                 |
| 3              | 355  | 447,500                 |
| 4              | 435  | 255,000                 |
| 5              | 441  | 255,000                 |
| 6              | 391  | 368,800                 |

Flowrates were determined using a modified James method. This was necessary due to the lack of an orifice meter to measure the differential

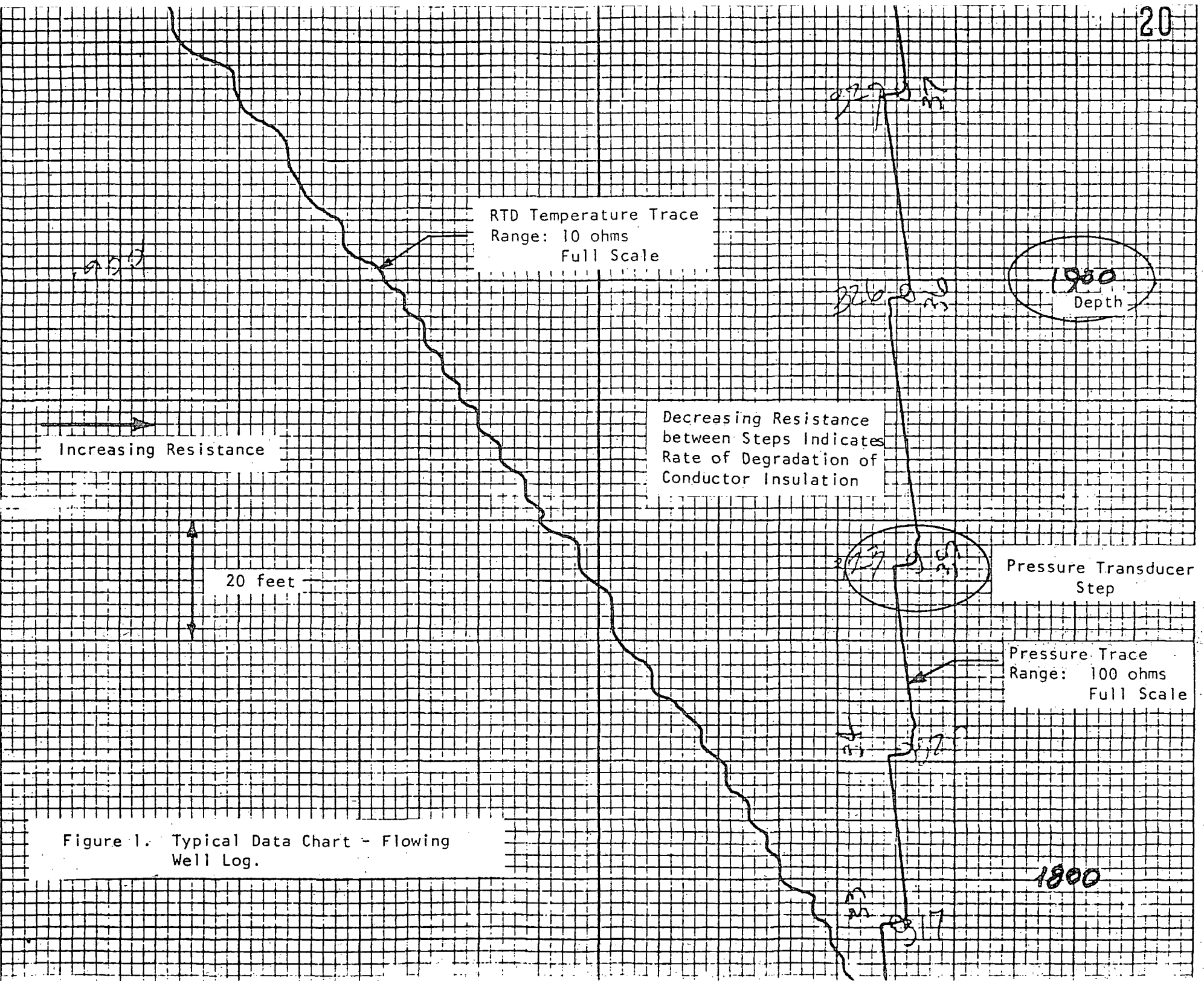


Figure 1. Typical Data Chart - Flowing Well Log.

pressure at the mixing orifice. Therefore the enthalpy value used was that given for the fluid at the flash horizon, less 3 Btu/lb considered lost to the wellbore and wellhead piping; the net enthalpy used was 485 Btu/lb.

The logs were taken at a speed of about 100 feet per minute. Since there was no way to obtain useful temperature data it was not necessary to log more slowly to allow for response time of the RTD.

After completing the flow logs, the well was shut in and we attempted to run the LASL downhole sampler. The tool was installed on the cable and operations checked at the surface. The tool was quickly run down the hole to the depth desired for the first sample, and the power supply was switched on. Due to the insulation degradation effect, the current was almost totally shorted across the conductor leads, and the motor which operated the sampling valves would not run. The sampler was raised 1000 feet up the wellbore and another attempt was made to operate the motor, but the result was the same as the first.

Surface samples had been taken during flow by personnel of the University of Utah Research Institute and from Battelle-Pacific Northwest Labs. This data will be examined to determine its utility in the computer analysis to be done by DRI.

The USGS is conducting an extensive investigation of the failures in the 7-conductor cable insulation and cablehead components. They are planning to issue a Technical Note on the problems and their probable causes.

Data reduction and analysis were begun immediately upon return to Denver from the wellsite. The technique described previously was used to make tables of pressure readings at various depths for each of the five flow logs. Orthogonal polynomials were used to determine the optimal degree of least-squares polynomial to which to curve-fit the data. The results indicated that a least-squares quadratic would be quite adequate. The data was then curve-fitted, with correlation coefficients ranging from 0.985 to over 0.999. The self-consistency of the data was thus confirmed, and our confidence in the utility of the test data was strengthened.

The data has shown a pressure gradient in the single phase flow regime that is depressed from that normally encountered at the downhole conditions. We are investigating possible reasons for this, and will present further details in the next monthly report.

Before leaving the test site, informal discussions were held on the possibility of returning to run additional well tests. The USGS is in the process of purchasing a new 7-conductor cable from Vector Cable Corporation which is performance rated to 550°F.

This cable uses a different conductor insulation material than the present cable. It is very likely that the DRI probe could perform as designed when used with the new cable.

DRI has initiated efforts to secure permission from the well owners to repeat the flow tests after the USGS has obtained its new 7-conductor cable. Our formal request has been submitted to Thermal Power Company, who is considering it at this time. If the request is granted, arrangements will be made with the USGS on available dates. We will then formally request an extension of the present contract and possibly additional funds to cover some of the expense of the testing. The amount of additional funds is not yet known, because all expenses for the May tests have not yet been billed to DRI. We would hope to complete any additional tests before the end of 1978.

#### FINANCIAL STATUS

For the month of May the following expenditures were made:

|                             |                 |
|-----------------------------|-----------------|
| Balance Forward             | \$55,913.58     |
| Direct Salaries and Fringe  | 2,578.12        |
| Overhead                    | 2,217.18        |
| Travel                      | 707.61          |
| Supplies and Expenses       | <u>3,483.16</u> |
| Remaining Uncommitted Funds | \$46,927.51     |

Note: As of 1 June, all invoices for field test expenses have not been received or paid by DRI.

#### PROBLEMS AND PROPOSED SOLUTIONS

A problem with the acquisition of temperature data was encountered in the field test, as described in the "Activities" section. We hope to be able to propose to DOE a return to the well to run tests with improved equipment. If this is not possible, analysis of the well potential will be made using the pressure data only. We expect to be able to make a decision when Thermal Power Company acts on our request for further testing.

DRI will also request a redistribution of funds within budget categories. These funds are included in the total budget approved for the present contract. An amount was originally marked for permanent equipment purchases. The needed equipment was either rented or borrowed and we wish to transfer the permanent equipment funds to salaries and supplies budgets to cover the time and costs expended to arrange the rentals. This action will be undertaken through DRI Contracts and Grants during the month of June.



## PLANNED ACTIVITIES

DRI will continue to reduce and analyze the test data during June. The work begun on securing permission for additional tests will be continued, along with a budget analysis to determine what additional funds will be needed, if any. The data from the May well tests will be distributed, as required by the present contract.

Log No. 2Flow Rate 357,000 lbs/hr. (?)

TPC/AMAX Well 14-2

| Depth<br>(ft) | Transducer<br>Count<br>(No. of Steps) | Pressure<br>(psia) | Depth<br>(ft) | Transducer<br>Count<br>(No. of Steps) | Pressure<br>(psia) |
|---------------|---------------------------------------|--------------------|---------------|---------------------------------------|--------------------|
| 49            |                                       | 379                | 1713          | 31                                    | 573                |
| 118           | 0 (reference)                         | 385                | 1752          | 32                                    | 579                |
| 178           | 1                                     | 391                | 1793          | 33                                    | 585                |
| 237           | 2                                     | 397                | 1821          | 34                                    | 591                |
| 314           | 3                                     | 403                | 1853          | 35                                    | 597                |
| 382           | 4                                     | 409                | 1898          | 36                                    | 603                |
| 409           | 5                                     | 415                | 1932          | 37                                    | 609                |
| 430           | 6                                     | 421                | 1966          | 38                                    | 615                |
| 486           | 7                                     | 427                | 2001          | 39                                    | 621                |
| 608           | 8                                     | 433                | 2028          | 40                                    | 627                |
| 663           | 9                                     | 440                | 2059          | 41                                    | 633                |
| 728           | 10                                    | 446                | 2090          | 42                                    | 640                |
| 779           | 11                                    | 452                | 2129          | 43                                    | 646                |
| 832           | 12                                    | 458                | 2163          | 44                                    | 652                |
| 878           | 13                                    | 464                | 2188          | 45                                    | 658                |
| 939           | 14                                    | 470                | 2223          | 46                                    | 664                |
| 990           | 15                                    | 476                | 2250          | 47                                    | 670                |
| 1036          | 16                                    | 482                | 2280          | 48                                    | 675                |
| 1086          | 17                                    | 488                | 2313          | 49                                    | 681                |
| 1140          | 18                                    | 494                | 2342          | 50                                    | 686                |
| 1178          | 19                                    | 500                | 2359          | 51                                    | 694                |
| 1229          | 20                                    | 506                | 2386          | 52                                    | 700                |
| 1283          | 21                                    | 512                |               |                                       |                    |
| 1329          | 22                                    | 518                |               |                                       |                    |
| 1370          | 23                                    | 524                |               |                                       |                    |
| 1412          | 24                                    | 530                |               |                                       |                    |
| 1459          | 25                                    | 537                |               |                                       |                    |
| 1508          | 26                                    | 543                |               |                                       |                    |
| 1545          | 27                                    | 549                |               |                                       |                    |
| 1594          | 28                                    | 555                |               |                                       |                    |
| 1634          | 29                                    | 561                |               |                                       |                    |
| 1676          | 30                                    | 567                |               |                                       |                    |

## Comments:

Suspect Flash Horizon at ~ 2450'  
Flowrate value seems low for given wellhead pressure and level  
of flash horizon.

✓ Log No. 3

Flow Rate 447,500 lbs/hr.

TPC/AMAX Well 14-2

| Depth (ft) | Transducer Count (No. of Steps) | Pressure (psia) | Depth (ft) | Transducer Count (No. of Steps) | Pressure (psia) |
|------------|---------------------------------|-----------------|------------|---------------------------------|-----------------|
| 50         | 0 (reference)                   | 355             | 2032       | 32                              | 549             |
| 134        | 1                               | 361             | 2076       | 33                              | 555             |
| 239        | 2                               | 367             | 2122       | 34                              | 561             |
| 324        | 3                               | 373             | 2167       | 35                              | 567             |
| 380        | 4                               | 379             | 2213       | 36                              | 573             |
| 452        | 5                               | 385             | 2255       | 37                              | 579             |
| 529        | 6                               | 391             | 2283       | 38                              | 585             |
| 597        | 7                               | 397             | 2337       | 39                              | 591             |
| 615        | 8                               | 403             | 2374       | 40                              | 597             |
| 641        | 9                               | 410             | 2415       | 41                              | 603             |
| 702        | 10                              | 416             | 2455       | 42                              | 610             |
| 846        | 11                              | 422             | 2490       | 43                              | 616             |
| 913        | 12                              | 428             | 2525       | 44                              | 622             |
| 978        | 13                              | 434             | 2560       | 45                              | 628             |
| 1063       | 14                              | 440             | 2606       | 46                              | 634             |
| 1125       | 15                              | 446             | 2643       | 47                              | 640             |
| 1180       | 16                              | 452             | 2672       | 48                              | 646             |
| 1249       | 17                              | 458             | 2711       | 49                              | 652             |
| 1300       | 18                              | 464             | 2746       | 50                              | 658             |
| 1353       | 19                              | 470             | 2781       | 51                              | 664             |
| 1410       | 20                              | 476             | 2820       | 52                              | 670             |
| 1470       | 21                              | 482             | 2855       | 53                              | 676             |
| 1515       | 22                              | 488             | 2873       | 54                              | 682             |
| 1568       | 23                              | 494             | 2901       | 55                              | 688             |
| 1634       | 24                              | 500             | 2950       | 56                              | 694             |
| 1686       | 25                              | 507             | 2964       | 57                              | 700             |
| 1733       | 26                              | 513             | 2990       | 58                              | 707             |
| 1784       | 27                              | 519             |            |                                 |                 |
| 1834       | 28                              | 525             |            |                                 |                 |
| 1883       | 29                              | 531             |            |                                 |                 |
| 1933       | 30                              | 536             |            |                                 |                 |
| 1982       | 31                              | 543             |            |                                 |                 |

Comments: Suspect flashing information.

## TPC/AMAX Well 14-2

| Depth<br>(ft) | Transducer<br>Count<br>(No. of Steps) | Pressure<br>(psia) | Depth<br>(ft) | Transducer<br>Count<br>(No. of Steps) | Pressure<br>(psia) |
|---------------|---------------------------------------|--------------------|---------------|---------------------------------------|--------------------|
| 12            | 0 (reference)                         | 435                | 1575          | 33                                    | 635                |
| 70            | 1                                     | 441                | 1610          | 34                                    | 641                |
| 118           | 2                                     | 447                | 1642          | 35                                    | 647                |
| 162           | 3                                     | 453                | 1686          | 36                                    | 653                |
| 216           | 4                                     | 459                | 1721          | 37                                    | 659                |
| 264           | 5                                     | 465                | 1748          | 38                                    | 665                |
| 312           | 6                                     | 471                | 1786          | 39                                    | 671                |
| 360           | 7                                     | 477                | 1822          | 40                                    | 677                |
| 414           | 8                                     | 483                | 1862          | 41                                    | 683                |
| 457           | 9                                     | 490                | 1897          | 42                                    | 690                |
| 515           | 10                                    | 496                | 1937          | 43                                    | 696                |
| 558           | 11                                    | 502                | 1959          | 44                                    | 702                |
| 606           | 12                                    | 508                | 1994          | 45                                    | 708                |
| 664           | 13                                    | 514                | 2042          | 46                                    | 714                |
| 716           | 14                                    | 520                | 2065          | 47                                    | 720                |
| 769           | 15                                    | 526                | 2095          | 48                                    | 726                |
| 820           | 16                                    | 532                | 2131          | 49                                    | 732                |
| 861           | 17                                    | 538                | 2170          | 50                                    | 738                |
| 922           | 18                                    | 544                | 2205          | 51                                    | 744                |
| 974           | 19                                    | 550                | 2245          | 52                                    | 750                |
| 1015          | 20                                    | 556                | 2274          | 53                                    | 756                |
| 1067          | 21                                    | 562                | 2322          | 54                                    | 762                |
| 1118          | 22                                    | 568                | 2366          | 55                                    | 768                |
| 1163          | 23                                    | 574                | 2398          | 56                                    | 774                |
| 1213          | 24                                    | 580                | 2446          | 57                                    | 780                |
| 1258          | 25                                    | 587                | 2489          | 58                                    | 787                |
| 1300          | 26                                    | 593                | 2540          | 59                                    | 793                |
| 1328          | 27                                    | 599                | 2577          | 60                                    | 799                |
| 1374          | 28                                    | 605                | 2634          | 61                                    | 805                |
| 1421          | 29                                    | 611                | 2688          | 62                                    | 811                |
| 1464          | 30                                    | 617                | 2770          | 63                                    | 817                |
| 1505          | 31                                    | 623                | 2932          | 64                                    | 823                |
| 1544          | 32                                    | 629                | 2994          | 65                                    | 829                |

Comments: Log taken before flow completely stabilized. Values in lower part of wellbore are particularly suspect. Log made from 3000' level upward.

Log No. 5

Flow Rate 255,000 lbs/hr.

TPC/AMAX Well 14-2

| Depth (ft) | Transducer Count (No. of Steps) | Pressure (psia) | Depth (ft) | Transducer Count (No. of Steps) | Pressure (psia) |
|------------|---------------------------------|-----------------|------------|---------------------------------|-----------------|
| 52         | 0 (reference)                   | 441             | 1473       | 33                              | 641             |
| 98         | 1                               | 447             | 1502       | 34                              | 647             |
| 142        | 2                               | 453             | 1542       | 35                              | 653             |
| 208        | 3                               | 459             | 1572       | 36                              | 659             |
| 259        | 4                               | 465             | 1596       | 37                              | 665             |
| 297        | 5                               | 471             | 1634       | 38                              | 671             |
| 350        | 6                               | 477             | 1660       | 39                              | 677             |
| 410        | 7                               | 483             | 1693       | 40                              | 683             |
| 444        | 8                               | 489             | 1723       | 41                              | 689             |
| 494        | 9                               | 496             | 1758       | 42                              | 696             |
| 549        | 10                              | 502             | 1775       | 43                              | 702             |
| 583        | 11                              | 508             | 1804       | 44                              | 708             |
| 633        | 12                              | 514             | 1844       | 45                              | 714             |
| 687        | 13                              | 520             | 1858       | 46                              | 720             |
| 738        | 14                              | 526             | 1878       | 47                              | 726             |
| 777        | 15                              | 532             | 1908       | 48                              | 732             |
| 822        | 16                              | 538             | 1933       | 49                              | 738             |
| 866        | 17                              | 544             | 1962       | 50                              | 744             |
| 911        | 18                              | 550             | 1983       | 51                              | 750             |
| 960        | 19                              | 556             | 2008       | 52                              | 756             |
| 1004       | 20                              | 562             | 2032       | 53                              | 762             |
| 1043       | 21                              | 568             | 2057       | 54                              | 768             |
| 1088       | 22                              | 574             |            |                                 |                 |
| 1122       | 23                              | 580             |            |                                 |                 |
| 1162       | 24                              | 586             |            |                                 |                 |
| 1205       | 25                              | 593             |            |                                 |                 |
| 1235       | 26                              | 599             |            |                                 |                 |
| 1265       | 27                              | 605             |            |                                 |                 |
| 1306       | 28                              | 611             |            |                                 |                 |
| 1340       | 29                              | 617             |            |                                 |                 |
| 1376       | 30                              | 623             |            |                                 |                 |
| 1410       | 31                              | 629             |            |                                 |                 |
| 1442       | 32                              | 635             |            |                                 |                 |

Comments:

Flash Horizon at about 1850'  
 Indicated single phase pressure gradient is low.

✓ Log No. 6Flow Rate 368,800 lbs/hr.

## TPC/AMAX Well 14-2

| Depth<br>(ft) | Transducer<br>Count<br>(No. of Steps) | Pressure<br>(psia) | Depth<br>(ft) | Transducer<br>Count<br>(No. of Steps) | Pressure<br>(psia) |
|---------------|---------------------------------------|--------------------|---------------|---------------------------------------|--------------------|
| 32            | 0 (reference)                         | 391                | 1624          | 32                                    | 585                |
| 70            | 1                                     | 397                | 1657          | 33                                    | 591                |
| 134           | 2                                     | 403                | 1694          | 34                                    | 597                |
| 188           | 3                                     | 409                | 1736          | 35                                    | 603                |
| 222           | 4                                     | 415                | 1769          | 36                                    | 609                |
| 230           | 5                                     | 421                | 1809          | 37                                    | 615                |
| 280           | 6                                     | 427                | 1844          | 38                                    | 621                |
| 400           | 7                                     | 433                | 1880          | 39                                    | 627                |
| 456           | 8                                     | 439                | 1913          | 40                                    | 633                |
| 505           | 9                                     | 446                | 1946          | 41                                    | 639                |
| 554           | 10                                    | 452                | 1986          | 42                                    | 646                |
| 610           | 11                                    | 458                | 2020          | 43                                    | 652                |
| 654           | 12                                    | 464                | 2048          | 44                                    | 658                |
| 718           | 13                                    | 470                | 2087          | 45                                    | 664                |
| 764           | 14                                    | 476                | 2116          | 46                                    | 670                |
| 812           | 15                                    | 482                | 2149          | 47                                    | 676                |
| 867           | 16                                    | 488                | 2187          | 48                                    | 682                |
| 924           | 17                                    | 494                | 2215          | 49                                    | 688                |
| 972           | 18                                    | 500                | 2237          | 50                                    | 694                |
| 1016          | 19                                    | 506                | 2267          | 51                                    | 700                |
| 1078          | 20                                    | 512                | 2301          | 52                                    | 706                |
| 1129          | 21                                    | 518                | 2320          | 53                                    | 712                |
| 1177          | 22                                    | 524                | 2348          | 54                                    | 718                |
| 1221          | 23                                    | 530                | 2380          | 55                                    | 724                |
| 1272          | 24                                    | 536                | 2408          | 56                                    | 730                |
| 1320          | 25                                    | 543                | 2430          | 57                                    | 736                |
| 1378          | 26                                    | 549                | 2450          | 58                                    | 743                |
| 1412          | 27                                    | 555                | 2478          | 59                                    | 749                |
| 1460          | 28                                    | 561                | 2512          | 60                                    | 755                |
| 1500          | 29                                    | 567                | 2534          | 61                                    | 761                |
| 1539          | 30                                    | 573                | 2552          | 62                                    | 767                |
| 1584          | 31                                    | 579                | 2580          | 63                                    | 773                |

Comments:

Log No. 6Flow Rate 368,800 lbs/hr.

TPC/AMAX Well 14-2

| Depth<br>(ft) | Transducer<br>Count<br>(No. of Steps) | Pressure<br>(psia) | Depth<br>(ft) | Transducer<br>Count<br>(No. of Steps) | Pressure<br>(psia) |
|---------------|---------------------------------------|--------------------|---------------|---------------------------------------|--------------------|
| 2601          | 64                                    | 779                |               |                                       |                    |
| 2624          | 65                                    | 785                |               |                                       |                    |
| 2647          | 66                                    | 791                |               |                                       |                    |
| 2670          | 67                                    | 797                |               |                                       |                    |
| 2690          | 68                                    | 803                |               |                                       |                    |
| 2715          | 69                                    | 809                |               |                                       |                    |
| 2732          | 70                                    | 815                |               |                                       |                    |
| 2754          | 71                                    | 821                |               |                                       |                    |
| 2774          | 72                                    | 827                |               |                                       |                    |
| 2804          | 73                                    | 833                |               |                                       |                    |
| 2814          | 74                                    | 839                |               |                                       |                    |
| 2832          | 75                                    | 846                |               |                                       |                    |
| 2855          | 76                                    | 852                |               |                                       |                    |
| 2878          | 77                                    | 858                |               |                                       |                    |
| 2899          | 78                                    | 864                |               |                                       |                    |
| 2922          | 79                                    | 870                |               |                                       |                    |
| 2936          | 80                                    | 876                |               |                                       |                    |
| 2955          | 81                                    | 882                |               |                                       |                    |
| 2979          | 82                                    | 888                |               |                                       |                    |
| 2996          | 83                                    | 894                |               |                                       |                    |

## Comments:

Flash Horizon at about 2350'  
Indicated single phase pressure gradient is low.