

# **Open File Envelope**

## **No. 2826**

**PPL 11**

**EROMANGA BASIN AND COOPER BASIN**

**BIG LAKE 14 TEST REPORTS**

Submitted by

**Delhi International Oil Corp. and Santos Ltd**  
**1994**

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## ENVELOPE 2826

**TENEMENT:** PPL 11; Eromanga and Cooper Basins

**TENEMENT HOLDER:** Delhi International Oil Corporation (operator), Santos Ltd and Vamgas Ltd

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# STATIC PRESSURE

## GRADIENT

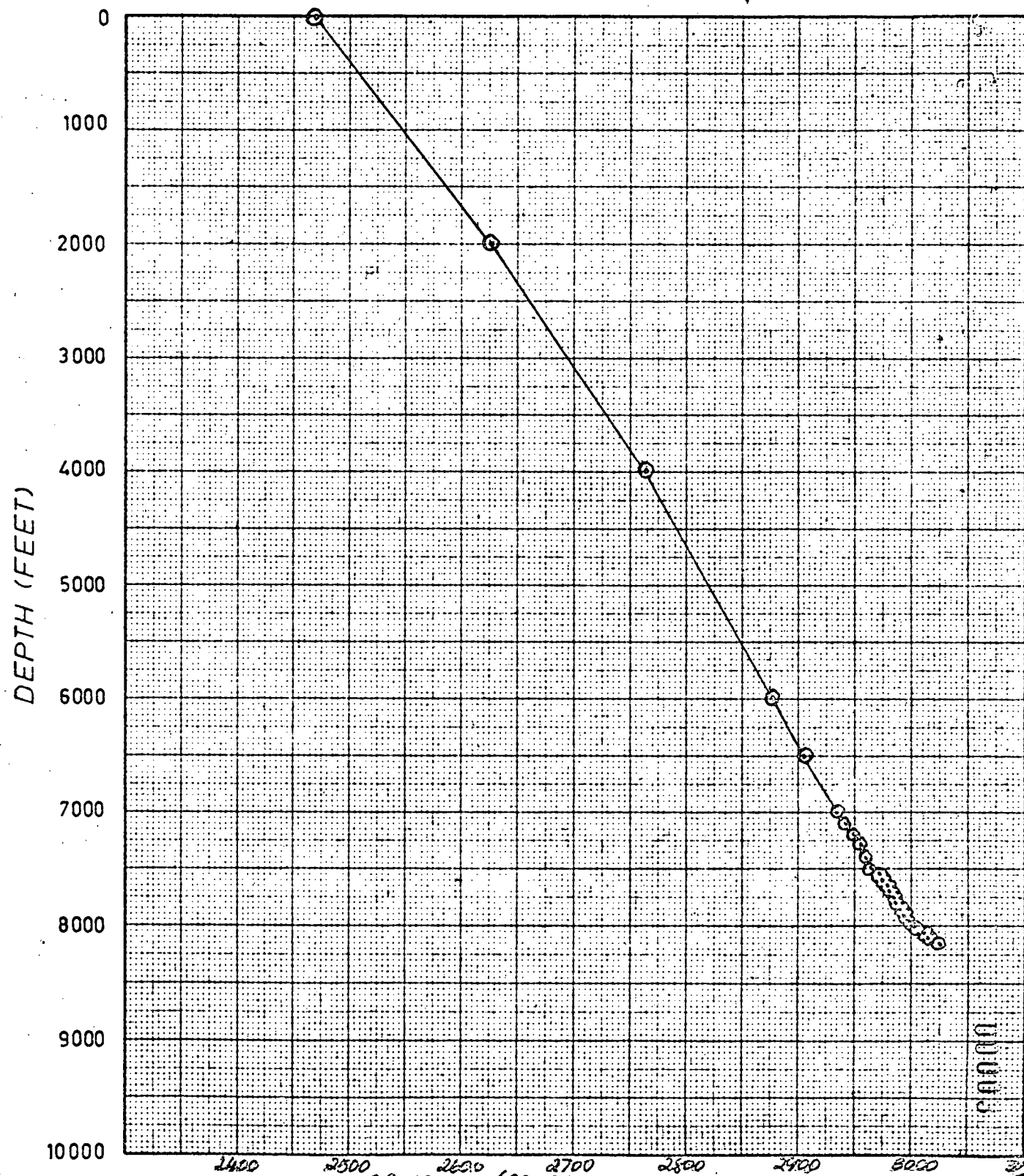
WELL BIG LAKE 14

TEST DATE 8TH MARCH 1977

| DEPTH<br>(FEET) | PRESSURE<br>(PSIG) | GRADIENT<br>PSI / FT | DEPTH<br>(METRES) | PRESSURE<br>(KPa) | GRADIENT<br>KPa / M |
|-----------------|--------------------|----------------------|-------------------|-------------------|---------------------|
| LUBRICATOR      | 2469.2             | —                    | LUBRICATOR        | 17029             | —                   |
| 2800            | 2625.7             | 0.0783               | 609.6             | 18108             | 1.7700              |
| 4000            | 2762.7             | 0.0685               | 1219.2            | 19053             | 1.5502              |
| 6000            | 2875.7             | 0.0565               | 1828.8            | 19832             | 1.2779              |
| 6494            | 2905.3             | 0.0599               | 1979.4            | 20037             | 1.3612              |
| 6944            | 2935.8             | 0.0610               | 2131.8            | 20247             | 1.3780              |
| 7094            | 2942.8             | 0.0700               | 2162.3            | 20295             | 1.5738              |
| 7194            | 2948.9             | 0.0610               | 2192.7            | 20337             | 1.3816              |
| 7294            | 2954.2             | 0.0530               | 2223.2            | 20374             | 1.2131              |
| 7394            | 2959.4             | 0.0520               | 2253.7            | 20410             | 1.1803              |
| 7494            | 2966.4             | 0.0700               | 2284.2            | 20458             | 1.5738              |
| 7544            | 2971.6             | 0.1040               | 2299.4            | 20494             | 2.3684              |
| 7594            | 2974.2             | 0.0520               | 2314.7            | 20512             | 1.1765              |
| 7644            | 2976.8             | 0.0520               | 2329.9            | 20530             | 1.1842              |
| 7694            | 2980.3             | 0.0700               | 2345.1            | 20564             | 1.5789              |
| 7744            | 2983.8             | 0.0700               | 2360.4            | 20578             | 1.5686              |
| 7794            | 2986.4             | 0.0520               | 2375.6            | 20596             | 1.1842              |
| 7844            | 2989.1             | 0.0540               | 2390.9            | 20614             | 1.1765              |
| 7894            | 2994.3             | 0.1040               | 2406.1            | 20650             | 2.3684              |
| 7944            | 2997.8             | 0.0700               | 2421.3            | 20674             | 1.5789              |
| 7994            | 3003.2             | 0.1080               | 2436.6            | 20712             | 2.4837              |
| 8044            | 3010.0             | 0.1360               | 2451.8            | 20759             | 3.0921              |
| 8094            | 3015.3             | 0.1060               | 2467.1            | 20795             | 2.3529              |
| 8144            | 3024.0             | 0.1740               | 2482.3            | 20855             | 3.9474              |

DEAD WEIGHT PRESSURE

= 2494 PSIG (17200 KPa)



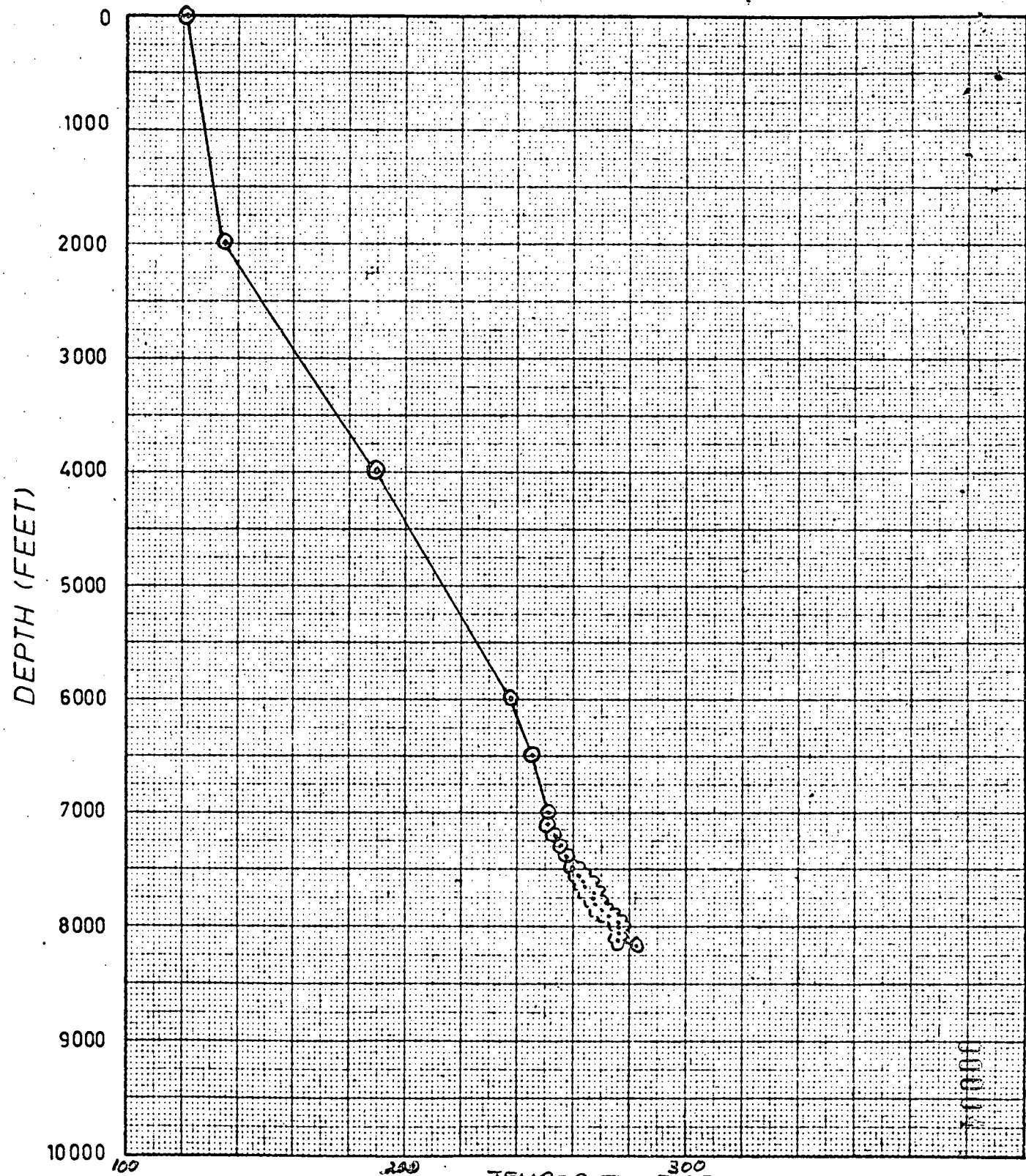
# STATIC TEMPERATURE

## GRADIENT

WELL BIG LAKE 14

TEST DATE 8TH MARCH 1977

| DEPTH<br>(FEET) | TEMP<br>°F | GRADIENT<br>/FT | DEPTH<br>(METRES) | TEMP<br>°C | GRADIENT<br>/M |
|-----------------|------------|-----------------|-------------------|------------|----------------|
| LUBRICATOR      | 121.0      |                 | LUBRICATOR        | 49.4       |                |
| 2000            | 134.8      |                 | 609.6             | 57.1       |                |
| 4000            | 189.1      |                 | 1219.2            | 87.3       |                |
| 6000            | 237.8      |                 | 1828.8            | 114.3      |                |
| 6494            | 244.7      |                 | 1979.4            | 118.2      |                |
| 6994            | 251.1      |                 | 2131.8            | 121.7      |                |
| 7094            | 250.9      |                 | 2162.3            | 121.6      |                |
| 7194            | 253.8      |                 | 2192.7            | 123.2      |                |
| 7294            | 255.8      |                 | 2223.2            | 124.3      |                |
| 7394            | 257.6      |                 | 2253.7            | 125.3      |                |
| 7494            | 259.6      |                 | 2284.2            | 126.5      |                |
| 7544            | 261.5      |                 | 2299.4            | 127.5      |                |
| 7594            | 263.2      |                 | 2314.7            | 128.5      |                |
| 7644            | 263.8      |                 | 2329.9            | 128.8      |                |
| 7694            | 267.0      |                 | 2345.1            | 130.6      |                |
| 7744            | 267.0      |                 | 2360.4            | 130.6      |                |
| 7794            | 268.0      |                 | 2375.6            | 131.1      |                |
| 7844            | 269.8      |                 | 2390.9            | 132.1      |                |
| 7894            | 271.5      |                 | 2406.1            | 133.1      |                |
| 7944            | 276.0      |                 | 2421.3            | 135.8      |                |
| 7994            | 276.3      |                 | 2436.6            | 135.7      |                |
| 8044            | 276.4      |                 | 2451.8            | 135.8      |                |
| 8094            | 276.4      |                 | 2467.1            | 135.8      |                |
| 8144            | 282.3      |                 | 2482.3            | 139.1      |                |



## WELL TEST SUMMARY PAGE 1

28° 14' 44" S

Well: Big Lake 14 Location: 140° 13' 15" E Date: 8th-12th Mch 77  
 Field: Big Lake Pool: Toolachee Daralingie Tested By GRM & A  
 Casing Size: 7" Weight: 26# & 23# Grade: N + J Producing Interval: 7576' - 7770'  
 Tubing Size: 3 1/2" Weight: 9.3# Grade: J 55 7910' - 7910', 8118' - 8134'  
 Well Blown 262.5 hours Producing through: Tubing

Gas Gravity: \_\_\_\_\_ Source: \_\_\_\_\_ Mean Annual Surface Temp \_\_\_\_\_ °F  
 Liquid Gravity: \_\_\_\_\_ Source: \_\_\_\_\_ B.H. Temp: \_\_\_\_\_ °F Source: \_\_\_\_\_  
 INITIAL SHUT-IN PERIOD Date Shut-In: 23/2/77 Time: 0808HRS Tot. Shut-In 319.87 hrs.

| Time of Observation |      |                   | Observed Pressures |        |        |        | Wellhead Temp.-of | Remarks |
|---------------------|------|-------------------|--------------------|--------|--------|--------|-------------------|---------|
| Date                | Time | Shut-In Time Hrs. | Tubing             |        | Casing |        |                   |         |
|                     |      |                   | psig               | psia   | psig   | psia   |                   |         |
| 8th March 1977      | 0858 | 312.84            | 2494               | 2508.7 |        |        |                   |         |
|                     |      |                   |                    |        |        |        |                   |         |
|                     | 1600 | 319.87            |                    |        | 1950   | 1964.7 |                   |         |
|                     |      |                   |                    |        |        |        |                   |         |

## FLOW PERIODS

Run No. 1 Duration of Run 2 hrs. Orifice Size 1.500" Meter Run 3.068"  
 High Pressure Separator - Operating Pressure \_\_\_\_\_ psig Temp. \_\_\_\_\_ °F  
 Low Pressure Separator - Operating Pressure \_\_\_\_\_ psig Temp. \_\_\_\_\_ °F  
 Flowed well on 16/64 choke

| Date           | Time | Flow Time Hours | Wellhead Readings |             |          | Meter or Prover Data |          |          | Condensate Prod. - Bbls | Water Prod. - Bbls |
|----------------|------|-----------------|-------------------|-------------|----------|----------------------|----------|----------|-------------------------|--------------------|
|                |      |                 | Tubing psig       | Casing psig | Temp. °F | Pf psia              | Hw (ins) | Temp. °F |                         |                    |
| 8th March 1977 | 1630 | 0.5             | 2408              |             | 102      | N/A                  | N/A      | N/A      |                         |                    |
|                | 1700 | 1.0             | 2402              |             | 106      | 534.7                | 124      | 72       |                         |                    |
|                | 1730 | 1.5             | 2397              |             | 107      | 534.7                | 127      | 76       |                         |                    |
|                | 1800 | 2.0             | 2390              | 2050        | 109      | 534.7                | 127      | 76       | 1.5                     | -                  |
|                |      |                 |                   |             |          |                      |          |          |                         |                    |
|                |      |                 |                   |             |          |                      |          |          |                         |                    |

## 2nd SHUT-IN PERIOD

| Date           | Time | Shut-In Time Hrs. | Tubing Pressure |        | Casing Pressure |        | Wellhead Temp. °F |
|----------------|------|-------------------|-----------------|--------|-----------------|--------|-------------------|
|                |      |                   | psig            | psia   | psig            | psia   |                   |
| 8th March 1977 | 1830 | 0.5               | 2559            | 2573.7 |                 |        | 98                |
|                | 1900 | 1.0               | 2557            | 2571.7 |                 |        | 95                |
|                | 1930 | 1.5               | 2550            | 2564.7 |                 |        | 93                |
|                | 2000 | 2.0               | 2537            | 2551.7 | 2001            | 2015.7 | 91                |
|                |      |                   |                 |        |                 |        |                   |

Run No. 2 Duration of Run 2 Hrs. Orifice Size 1.750" Meter Run or Prover Size 3.068"  
 High Pressure Separator - Operating Pressure \_\_\_\_\_ psig Temp. \_\_\_\_\_ °F  
 Low Pressure Separator - Operating Pressure \_\_\_\_\_ psig Temp. \_\_\_\_\_ °F  
 Flowed well on 20/64 choke

| Date           | Time | Flow Time Hours | Wellhead Readings |             |          | Meter or Prover Data |          |          | Condensate Prod. - Bbls | Water Prod. - Bbls |
|----------------|------|-----------------|-------------------|-------------|----------|----------------------|----------|----------|-------------------------|--------------------|
|                |      |                 | Tubing psig       | Casing psig | Temp. °F | Pf psia              | Hw (ins) | Temp. °F |                         |                    |
| 8th March 1977 | 2030 | 0.5             | 2300              |             | 109      | 554.7                | 135      | 50       |                         |                    |
|                | 2100 | 1.0             | 2339              |             | 115      | 554.7                | 120      | 65       |                         |                    |
|                | 2130 | 1.5             | 2339              |             | 116      | 549.7                | N/A*     | N/A*     |                         |                    |
|                | 2200 | 2.0             | 2341              | 2100        | 118      | 549.7                | 130      | 57       |                         |                    |
|                |      |                 |                   |             |          |                      |          |          |                         |                    |
|                |      |                 |                   |             |          |                      |          |          |                         |                    |

## WELL TEST SUMMARY PAGE 2

## For Use with Isochronal Tests

| Date      | Time | Shut-In Time<br>Hrs. | Tubing Pressure |        | Casing Pressure |        | Wellhead Temp.<br>°F |
|-----------|------|----------------------|-----------------|--------|-----------------|--------|----------------------|
|           |      |                      | psig            | psia   | psig            | psia   |                      |
| 8th March | 2230 | 0.5                  | 2556            | 2570.7 |                 |        | 98                   |
| 1977      | 2300 | 1.0                  | 2560            | 2574.7 |                 |        | 91                   |
|           | 2330 | 1.5                  | 2546            | 2560.7 |                 |        | 88                   |
|           | 2400 | 2.0                  | 2543            | 2557.7 | 2200            | 2214.7 | 86                   |

Run No. 3 Duration of Run 2 hrs. Orifice Size 2.000" Meter Run: 3.068"  
 High Pressure Separator - Operating Pressure \_\_\_\_\_ psig Temp. \_\_\_\_\_ °F  
 Low Pressure Separator - Operating Pressure \_\_\_\_\_ psig Temp. \_\_\_\_\_ °F  
 Flowed Well on 24/64 choke

| Date      | Time | Flow<br>Time<br>Hours | Wellhead Readings |                |             | Meter or Prover Data |             |             | Condensate<br>Prod-Bbls | Water<br>Prod-Bbls |
|-----------|------|-----------------------|-------------------|----------------|-------------|----------------------|-------------|-------------|-------------------------|--------------------|
|           |      |                       | Tubing<br>psig    | Casing<br>psig | Temp.<br>°F | Pf<br>psia           | Hw<br>(ins) | Temp.<br>°F |                         |                    |
| 9th March | 0030 | 0.5                   | 2265              |                | 118         | 494.7                | 148         | 60          |                         |                    |
| 1977      | 0100 | 1.0                   | 2262              |                | 122         | 534.7                | 138         | 65          |                         |                    |
|           | 0130 | 1.5                   | 2262              |                | 125         | 529.7                | 139         | 76          |                         |                    |
|           | 0200 | 2.0                   | 2264              | 2275           | 127         | 529.7                | 140         | 78          | 0.9                     | 2.0                |

## For Use with Isochronal Type Tests

| Date      | Time | Shut-In Time<br>Hrs. | Tubing Pressure |        | Casing Pressure |        | Wellhead Temp.<br>°F |
|-----------|------|----------------------|-----------------|--------|-----------------|--------|----------------------|
|           |      |                      | psig            | psia   | psig            | psia   |                      |
| 9th March | 0230 | 0.5                  | 2544            | 2558.7 |                 |        | 100                  |
| 1977      | 0300 | 1.0                  | 2555            | 2569.7 |                 |        | 89                   |
|           | 0330 | 1.5                  | 2549            | 2563.7 |                 |        | 84                   |
|           | 0400 | 2.0                  | 2536            | 2550.7 | 2000            | 2014.7 | 82                   |

Run No. 4 Duration of Run 2 hrs. Orifice Size 2.25" Meter Run or Prover  
 Size: 3.068"  
 High Pressure Separator - Operating Pressure \_\_\_\_\_ psig Temp. \_\_\_\_\_ °F  
 Low Pressure Separator - Operating Pressure \_\_\_\_\_ psig Temp. \_\_\_\_\_ °F  
 Flowed well on 28/64 choke setting

| Date      | Time | Flow<br>Time<br>Hours | Wellhead Readings |                |             | Meter or Prover Data |             |             | Condensate<br>Prod-Bbls | Water<br>Prod-Bbls |
|-----------|------|-----------------------|-------------------|----------------|-------------|----------------------|-------------|-------------|-------------------------|--------------------|
|           |      |                       | Tubing<br>psig    | Casing<br>psig | Temp.<br>°F | Pf<br>psia           | Hw<br>(ins) | Temp.<br>°F |                         |                    |
| 9th March | 0430 | 0.5                   | 2130              | -              | 127         | 564.7                | 93          | 75          |                         |                    |
| 1977      | 0500 | 1.0                   | 2128              | -              | 127         | 564.7                | 94          | 83          |                         |                    |
|           | 0530 | 1.5                   | 2128              | -              | 136         | 564.7                | 94          | 87          |                         |                    |
|           | 0600 | 2.0                   | 2130              | 2200           | 138         | 564.7                | 94          | 89          | 2.0                     | 2.5                |

## For Use with Isochronal Type Tests

| Date      | Time | Shut-In Time<br>Hrs. | Tubing Pressure |        | Casing Pressure |        | Wellhead Temp.<br>°F |
|-----------|------|----------------------|-----------------|--------|-----------------|--------|----------------------|
|           |      |                      | psig            | psia   | psig            | psia   |                      |
| 9th March | 0630 | 0.5                  | 2555            | 2569.7 |                 |        | 108                  |
| 1977      | 0700 | 1.0                  | 2559            | 2573.7 |                 |        | 95                   |
|           | 0730 | 1.5                  | 2553            | 2567.7 |                 |        | 89                   |
|           | 0800 | 2.0                  | 2545            | 2559.7 | 2010            | 2024.7 | 88                   |

Remarks :

## 00007

### FINAL STABILIZATION FLOW PERIOD

[illegible]

## 00008

FINAL BUILD-UP PERIOD

[illegible]

## 00009

FINAL BUILD-UP PERIOD, SUBSURFACE PRESSURES)

[illegible]

CALCULATION SHEET

## CASE 1: FLOW THROUGH METER RUN

(3.068" I.D.)

| Run No. | HW(in wtr) | Pf<br>(psia) | Size Orifice<br>Plate (inches) | F <sub>t</sub><br>of | b      | $\frac{H_w}{P_f}$ |
|---------|------------|--------------|--------------------------------|----------------------|--------|-------------------|
| 1       | 127        | 534.7        | 1.500                          | 76                   | 0.0436 | 0.2375            |
| 2       | 130        | 549.7        | 1.750                          | 57                   | 0.0524 | 0.2365            |
| 3       | 140        | 529.7        | 2.000                          | 78                   | 0.0624 | 0.2643            |
| 4       | 94         | 564.7        | 2.250                          | 89                   | 0.0706 | 0.1665            |
| 5       | 98         | 554.7        | 2.250                          | 110                  | 0.0706 | 0.9766            |
|         |            |              |                                |                      |        |                   |

## CASE 2: FLOW THROUGH METER RUN

(S.G. = 0.752)

| Run No. | F <sub>b</sub> | F <sub>g</sub> | F <sub>tf</sub> | F <sub>pv</sub> | F <sub>pb</sub> | F <sub>tb</sub> |
|---------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|
| 1       | 472.96         | 1.1532         | 0.9850          | 1.0383          | 1.0055          | 1.0000          |
| 2       | 663.42         | 1.1532         | 1.0029          | 1.0458          | 1.0055          | 1.0000          |
| 3       | 906.01         | 1.1532         | 0.9831          | 1.0377          | 1.0055          | 1.0000          |
| 4       | 1223.2         | 1.1532         | 0.9732          | 1.0373          | 1.0055          | 1.0000          |
| 5       | 1223.2         | 1.1532         | 0.9551          | 1.0310          | 1.0055          | 1.0000          |
|         |                |                |                 |                 |                 |                 |

## FLOW THROUGH METER RUN (Continued)

| Run No. | F <sub>r</sub> | Y      | C'       | $\sqrt{H_w P_f}$ | $\frac{Q}{\text{MCF/Hour}}$ | $\frac{Q}{\text{MCFD}}$ |
|---------|----------------|--------|----------|------------------|-----------------------------|-------------------------|
| 1       | 1.0002         | 1.0014 | 561.778  | 260.590          | 146.394                     | 3513.449                |
| 2       | 1.0002         | 1.0013 | 808.040  | 267.322          | 216.006                     | 5184.165                |
| 3       | 1.0002         | 1.0013 | 1062.128 | 272.320          | 289.239                     | 6941.729                |
| 4       | 1.0003         | 1.0007 | 1433.259 | 230.395          | 330.072                     | 7921.737                |
| 5       | 1.0003         | 1.0007 | 1398.068 | 233.154          | 325.965                     | 7823.164                |
|         |                |        |          |                  |                             |                         |

28° 14' 44" S

Well: Big Lake 14 Location: 140° 13' 15" E Field: Big Lake  
 Pool: Toolachee Daralingie Tested by: GRM + A Calculated by: CDS  
 Casing Size: 7" I.D. Tubing Size: 3½" I.D. Produced Through: Tubing  
 Perforations: Refer Page 1 Length of Flow String: \_\_\_\_\_  
 Properties of Well Effluent, Spec. Gravity \_\_\_\_\_ Pc \_\_\_\_\_ Tc \_\_\_\_\_  
 H<sub>2</sub>S \_\_\_\_\_ p.p.m.

## A. FLOW TEST DATA

| Run No. | Tubing<br>psia | Casing<br>psia | Calculated<br>Sandface Press.<br>psia | Gas Flow<br>Rate<br>MMCFD | Condensate<br>Prod-<br>Bbl/d | Total<br>Flow<br>Rate<br>MMCFD | Water<br>Prod.<br>Bbl/d |
|---------|----------------|----------------|---------------------------------------|---------------------------|------------------------------|--------------------------------|-------------------------|
| 1       | 2404.7         | 2064.7         | MEASURED                              | 3.513                     | 18                           | 3.524                          | -                       |
| 2       | 2355.7         | 2114.7         | "                                     | 5.184                     | 24                           | 5.198                          | 9.6                     |
| 3       | 2278.7         | 2289.7         | "                                     | 6.942                     | 10.8                         | 6.948                          | 24.0                    |
| 4       | 2144.7         | 2214.7         | "                                     | 7.922                     | 24.0                         | 7.936                          | 30.0                    |
| 5       | 2181.7         | 2189.7         | "                                     | 7.823                     | 10.0                         | 7.829                          | 31.5                    |

## B. BOMB MEASURED PRESSURES Datum from KB 7835'

| Flow Rate<br>No. | Date     | Time | Depth | Corr. Press. @<br>Run Depth - psia | Corr. Press. @<br>Datum - psia | Remarks |
|------------------|----------|------|-------|------------------------------------|--------------------------------|---------|
| 1                | 8th Mch  | 1800 | 7497  | 2904.7                             | 2926.5                         |         |
| 2                | 1977     | 2200 | 7497  | 2852.1                             | 7874.2                         |         |
| 3                | 9th Mch  | 0200 | 7497  | 2785.2                             | 7807.4                         |         |
| 4                | 1977     | 0600 | 7497  | 2686.9                             | 2709.3                         |         |
| 5                | 10th Mch | 1630 | 7835  | 2731.4                             | 2731.4                         |         |
|                  | 1977     |      |       |                                    |                                |         |

## C. SHUT-IN DATA

| Shut-In<br>No. | Pressure - psia |          | Shut-In<br>Time-Hrs. | Shut-In<br>No. | Pressure - psia |          | Shut-In<br>Time-hr |
|----------------|-----------------|----------|----------------------|----------------|-----------------|----------|--------------------|
|                | Wellhead        | Sandface |                      |                | Wellhead        | Sandface |                    |
| 1              | 2508.7          | 3022.4   | 319.82               |                |                 |          |                    |
| 2              | 2551.7          | 3073.0   | 2                    |                |                 |          |                    |
| 3              | 2557.7          | 3070.4   | 2                    |                |                 |          |                    |
| 4              | 2550.7          | 3066.0   | 2                    |                |                 |          |                    |
| 5              | 2559.7          | 3069.5   | 2                    |                |                 |          |                    |

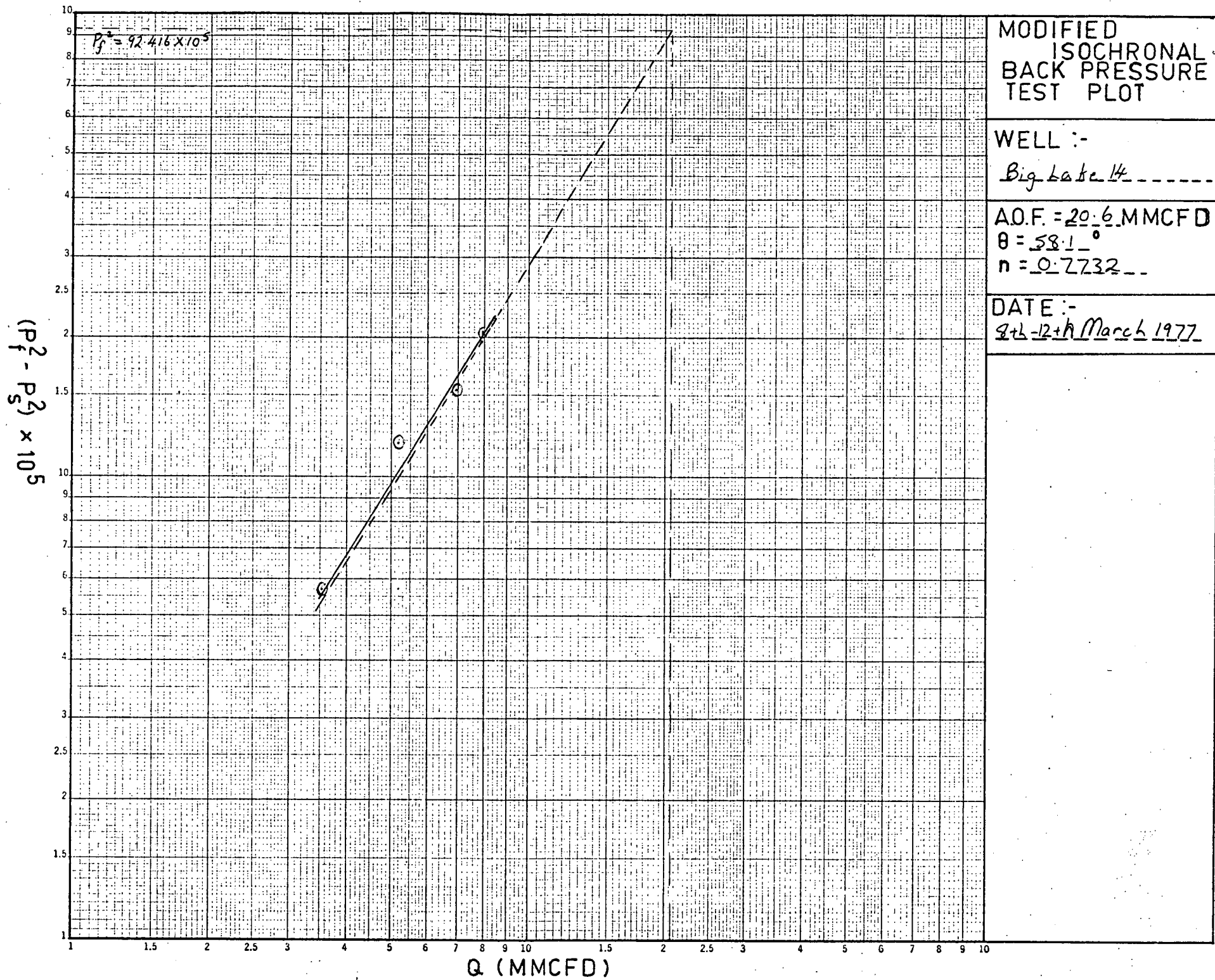
## D. PLOTTING DATA

| $P_f$  | $P_f^2 \times 10^3$ | $P_s$  | $P_s^2 \times 10^3$ | $P_f^2 - P_s^2 \times 10^3$ | Q Total-MMCFD |
|--------|---------------------|--------|---------------------|-----------------------------|---------------|
| 3022.4 | 9135                | 2926.5 | 8564                | 570                         | 3.524         |
| 3073.0 | 9443                | 2874.2 | 8261                | 1182                        | 5.198         |
| 3070.4 | 9427                | 2807.4 | 7881                | 1546                        | 6.948         |
| 3066.0 | 9400                | 2709.3 | 7340                | 2060                        | 7.936         |
| 3069.5 | 9422                | 2731.4 | 7461                | 1961                        | 7.829         |

A.O.F. 20.6 MMCFD, n 0.7732

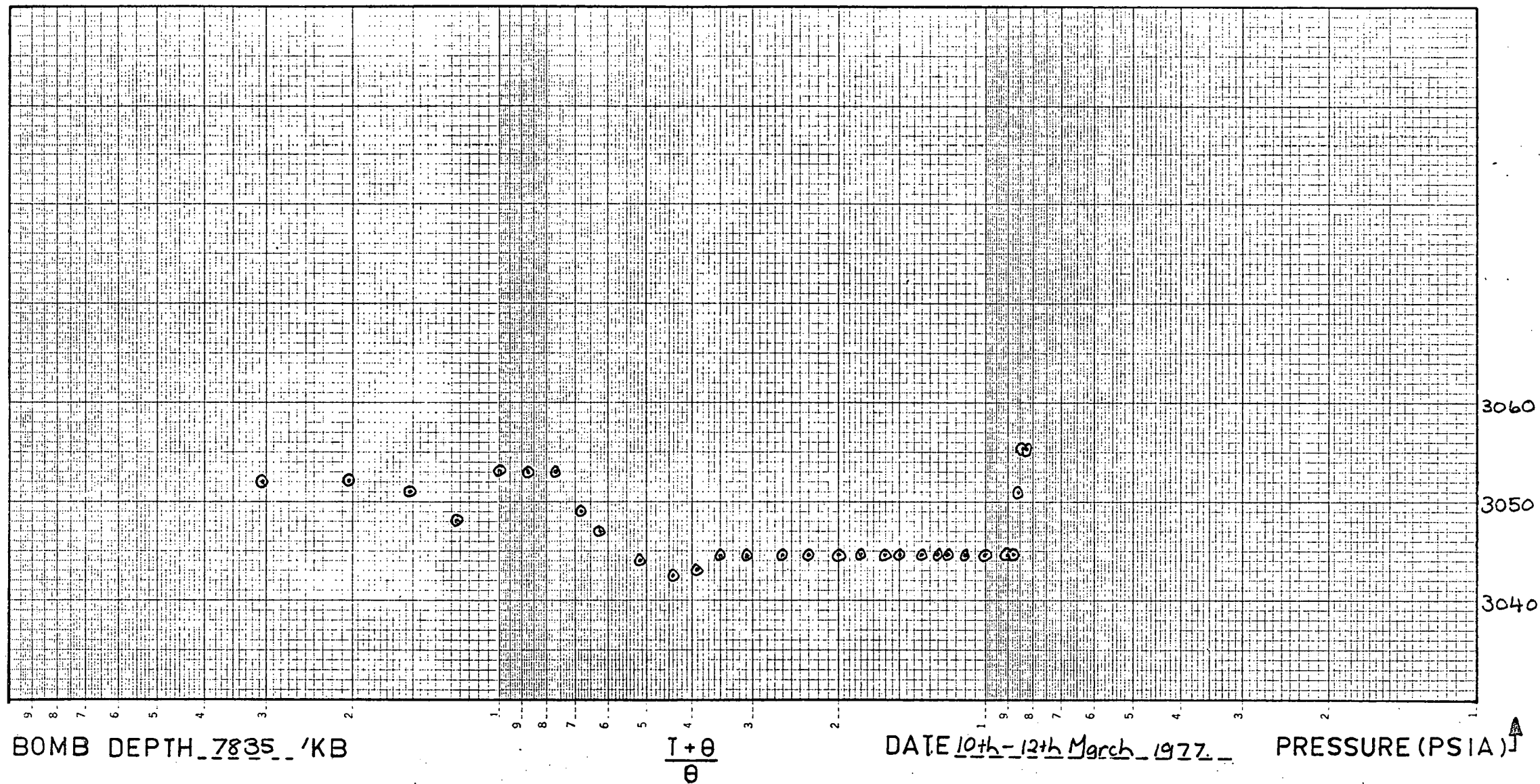
Total Volume of Gas Produced During Test 12.557 MMCF / CONDENSATE 19.942 Bbls

Remarks: \_\_\_\_\_



# HORNER PLOT OF RESERVOIR PRESSURE BUILD-UP

WELL Big Lake 14



BOMB DEPTH 7835 'KB

$$\frac{1+\theta}{\theta}$$

DATE 10th-12th March 1977

PRESSURE (PSIA) ↑

DELHI INTERNATIONAL OIL CORPORATION



CHRONOLOGY OF MODIFIED ISOCHRONAL - BIG LAKE 14

| Date       | Time | BOPD  | BWPD  | *<br>MCFPD | G.O.R.<br>Bbls/<br>MMCF | Salin-<br>ity<br>(ppm) | Choke<br>Size<br>(ins) | Wellhead<br>Pressure<br>(psig) | Separator<br>Press.<br>(psig) | Remarks                                              |
|------------|------|-------|-------|------------|-------------------------|------------------------|------------------------|--------------------------------|-------------------------------|------------------------------------------------------|
| 8th March  | 0858 |       |       |            |                         |                        |                        | 2494                           |                               | Run static pressure and temperature gradient surveys |
|            | 1114 |       |       |            |                         |                        |                        |                                |                               | Gradient surveys complete                            |
|            | 1600 |       |       |            |                         |                        |                        |                                |                               | Opened well for 1st flow rate                        |
|            | 1800 | 18    | -     | 3519       | 5.115                   |                        | 16/64                  | 2390                           | 520                           | Well shut-in                                         |
|            | 2000 |       |       |            |                         |                        |                        | 2537                           |                               | Opened well for 2nd flow rate                        |
|            | 2200 | 24.00 | 9.60  | 5220       | 4.597                   |                        | 20/64                  | 2341                           | 535                           | Well shut-in                                         |
|            | 2400 |       |       |            |                         |                        |                        | 2543                           |                               | Opened well for 3rd flow rate                        |
| 9th March  | 0200 | 10.80 | 24.00 | 7026       | 1.537                   |                        | 24/64                  | 2264                           | 515                           | Well shut-in                                         |
|            | 0400 |       |       |            |                         |                        |                        | 2536                           |                               | Opened well for 4th flow rate                        |
|            | 0600 | 24.00 | 30.00 | 7950       | 3.018                   |                        | 28/64                  | 2130                           | 550                           | Well shut-in                                         |
|            | 0800 |       |       |            |                         |                        |                        | 2545                           |                               | Well opened for stabilised flow rate                 |
| 10th March | 1200 | 10.00 | 31.5  | 7729       | 1.294                   |                        | 28/64                  | 2167                           | 540                           | End flow testing                                     |
|            | 1630 |       |       |            |                         |                        |                        | 2171                           |                               | Well shut-in for build up survey                     |
| 12th March | 1337 |       |       |            |                         |                        |                        | 2513                           |                               | Run static pressure and temperature gradient surveys |
|            | 1610 |       |       |            |                         |                        |                        |                                |                               | Test complete                                        |
|            |      |       |       |            |                         |                        |                        |                                |                               |                                                      |
|            |      |       |       |            |                         |                        |                        |                                |                               |                                                      |

00014

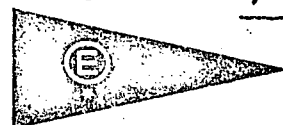


## The Australian Mineral Development Laboratories

Flemington Street, Frewville, South Australia 5063  
Phone Adelaide 79 1662, telex AA 82520

1977 MAY 3 AM 9:20

00015 *Explorer*



Winner of Award for Outstanding Export Achievement, 1975

Pilot Plant: Osman Place, Thebarton, Sth. Aust.  
Phone Adelaide 43 8053  
Branch Offices: Perth and Sydney  
Associated with: Professional Consultants Australia Pty. Ltd.

Please address all correspondence to Frewville.  
In reply quote:

AN 3/51/0 - 3219/77

### PART REPORT 1

### NATA CERTIFICATE

29 April 1977

The Director,  
Delhi International Oil Corporation,  
GPO Box 2364,  
ADELAIDE SA 5001

### REPORT AN 3219/77

YOUR REFERENCE:

Order number 28638 dated 7/4/77

IDENTIFICATION:

As listed

DATE RECEIVED:

12 April 1977

Enquiries quoting AN 3219/77 to Officer in Charge please

Officer in Charge, Analytical Section: D. K. Rowley

for F. R. Hartley  
Director



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hjj



Well tested: Big lake 14 PD 57  
Date tested: 10/2/77 11.15 hrs  
Type of test:  
Type of sample: Gas  
Source of sample: H/P Separator  
Field sampling conditions: 540 psi 110°F  
Reference: Order number A28638

RESULTS OF ANALYSIS

|                                              |                 |
|----------------------------------------------|-----------------|
| Oxygen plus argon                            | <0.01 % mol vol |
| Nitrogen                                     | 0.17            |
| Hydrogen                                     |                 |
| Helium                                       |                 |
| Carbon dioxide                               | 15.9            |
| Methane                                      | 78.2            |
| Ethane                                       | 4.19            |
| Propane                                      | 0.84            |
| i Butane                                     | 0.112           |
| n Butane                                     | 0.207           |
| i Pentane                                    | 0.058           |
| n Pentane                                    | 0.068           |
| Hexanes                                      | 0.062           |
| Heptanes                                     | 0.138           |
| Octanes and higher hydrocarbons              | 0.055           |
| Calculated Gas Density<br>(relative air = 1) | 0.752           |

REMARKS:



00017

AN 3219/77

6

Well tested: Big lake 14 PD 81  
Date tested: 10/2/77 11.30 hrs  
Type of test:  
Type of sample: Gas  
Source of sample: Ex Seperator  
Field sampling conditions: 28 psi 41°C  
Reference: Order number A28638

RESULTS OF ANALYSIS

|                                 |                 |
|---------------------------------|-----------------|
| Oxygen plus argon               | <0.01 % mol vol |
| Nitrogen                        | <0.01           |
| Hydrogen                        |                 |
| Helium                          |                 |
| Carbon dioxide                  | 34.9            |
| Methane                         | 48.9            |
| Ethane                          | 9.1             |
| Propane                         | 3.55            |
| i Butane                        | 0.56            |
| n Butane                        | 0.98            |
| i Pentane                       | 0.32            |
| n Pentane                       | 0.37            |
| Hexanes                         | 0.35            |
| Heptanes                        | 0.48            |
| Octanes and higher hydrocarbons | 0.49            |

Calculated Gas Density 1.045  
(relative air = 1)

REMARKS:



Well tested: Big lake 14  
Date tested: 10/2/77 11.30 hrs  
Type of test:  
Type of sample: Separator fluid  
Source of sample: LP Separator  
Field sampling conditions: FP 30 psig 100°F  
Reference: Order number A28638

#### RESULTS OF ANALYSIS

The sample was released to air pressure and temperature by displacement with saturated brine solution to yield gas and liquid. The relative volume of each was measured, both fractions were then analysed chromatographically and the results combined mathematically to give an analysis of the sample as submitted.

The sample yielded oil and gas in the ratio of 407 millilitres oil and 0.5 litres of gas at 17 °C and 775.4 mm pressure.

#### Flash Gas Analysis

|                                 |      |           |
|---------------------------------|------|-----------|
| Nitrogen                        | 0.16 | % mol vol |
| Carbon dioxide                  | 36.6 |           |
| Methane                         | 39.2 |           |
| Ethane                          | 13.8 |           |
| Propane                         | 5.82 |           |
| i Butane                        | 0.84 |           |
| n Butane                        | 1.46 |           |
| i Pentane                       | 0.45 |           |
| n Pentane                       | 0.49 |           |
| Hexanes                         | 0.37 |           |
| Heptanes                        | 0.55 |           |
| Octanes and higher hydrocarbons | 0.26 |           |

## Calculated Composition of Sample as Received

|                                        |       | % by Weight |
|----------------------------------------|-------|-------------|
| Nitrogen                               | <0.02 |             |
| Carbon dioxide                         | 0.11  |             |
| Methane                                | 0.04  |             |
| Ethane                                 | 0.03  |             |
| Propane                                | 0.23  |             |
| Butanes                                | 0.20  |             |
| Pentanes                               | 0.68  |             |
| Hexanes                                | 1.14  |             |
| Benzene                                | 1.10  |             |
| Heptanes                               | 3.75  |             |
| Toluene                                | 9.2   |             |
| Octanes                                | 6.2   |             |
| Xylenes plus ethyl benzene             | 10.0  |             |
| Nonanes                                | 6.45  |             |
| C <sub>9</sub> aromatics               | 6.30  |             |
| Decanes plus C <sub>10</sub> aromatics | 9.50  |             |
| Undecanes plus aromatics               | 8.7   |             |
| Dodecanes plus aromatics               | 8.35  |             |
| Tridecanes plus aromatics              | 6.75  |             |
| Tetradecanes plus aromatics            | 4.9   |             |
| Pentadecanes plus aromatics            | 3.45  |             |
| Hexadecanes plus aromatics             | 2.60  |             |
| Heptadecanes                           | 2.12  |             |
| Octadecanes & higher hydrocarbons      | 8.2   |             |

Specific Gravity of C<sub>17</sub> + (from A.S.T.M. Distillation)

= 0.83

REMARKS:

Well tested: Big Lake 14  
Date tested:  
Type of test:  
Type of sample: Condensate  
Source of sample: Stock Tank  
Field sampling conditions  
Reference: Order number A28638

RESULTS OF ANALYSIS

Kinematic Viscosity 1.19 centistokes/second at 37.8°C  
Specific Gravity at 15.6°C (60°F) 0.821 (100°F)  
A.P.I. Gravity at 15.6°C (60°F) 40.8

A.S.T.M. Distillation

|                                   |      |             |
|-----------------------------------|------|-------------|
| Initial Boiling Point             | 105  | °C          |
| 10% recovery                      | 124  |             |
| 20                                | 139  |             |
| 30                                | 151  |             |
| 40                                | 163  |             |
| 50                                | 179  |             |
| 60                                | 199  |             |
| 70                                | 224  |             |
| 80                                | 254  |             |
| 90                                | 293  |             |
| 90.5                              | 300  |             |
| Weight distillate                 | 74.3 | grams       |
| Weight residue                    | 7.45 | grams       |
| Loss                              | 0.10 | grams       |
| Recovery                          | 99.8 | %           |
| Residue after distillation        |      |             |
| Specific Gravity at 15.6°C (60°F) | 0.83 |             |
| Pour Point                        | <-5  | °C          |
| Flash Point                       | 37   | °C          |
| Aniline Point                     | 40   | °C          |
| Sulphur (X.R.F.)                  |      | % by weight |

## WATER ANALYSIS REPORT

AMDEL COMPUTER SERVICES

SAMPLE NO. BIG LAKE 14

JOB NO. 3219-77

## CHEMICAL COMPOSITION

## DERIVED AND OTHER DATA

## REMARKS

MILLIGRAMS MILLIEQUIVS.  
PER LITRE PER LITRE  
MG/L ME/L

CONDUCTIVITY (E.C.)  
MICRO-S/CM AT 25 DEG. C 2538.

## CATIONS

## TOTAL DISSOLVED SOLIDS

MILLIGRAMS  
PER LITRE  
MG/L

CALCIUM (CA) 4 .2  
MAGNESIUM (MG) 1 .1  
SODIUM (NA) 486 21.1  
POTASSIUM (K) 2 .1  
IRON (FE)

A. BASED ON E.C.  
B. CALCULATED (HC03=C03)  
C. RESIDUE ON EVAP. AT 180 DEG. C

1283.

## ANIONS

HYDROXIDE (OH)  
CARBONATE (C03)  
BICARBONATE (HC03) 79 1.3  
SULPHATE (S04) 32 .7  
CHLORIDE (CL) 713 20.1  
BROMIDE (BR)  
FLUORIDE (F)  
NITRATE (NO3) 7 .1  
PHOSPHATE (PO4)

TOTAL HARDNESS AS CAC03  
CARBONATE HARDNESS AS CAC03  
NON-CARBONATE HARDNESS AS CAC03  
TOTAL ALKALINITY AS CAC03  
FREE CARBON DIOXIDE (C02)  
SUSPENDED SOLIDS  
SILICA (SI02)  
BORON (B)

14.  
14.  
<1.  
65.

## TOTALS AND BALANCE

## UNITS

CATIONS (ME/L) 21.5  
ANIONS (ME/L) 22.2  
DIFF = .7  
SUM = 43.6

REACTION - PH 6.0  
TURBIDITY (JACKSON)  
COLOUR (HAZEN)

DIFF\*100.  
= 1.6 %  
SUM

SODIUM TO TOTAL CATION RATIO (ME/L) 98.4 %

NAME- DELHI. INTERNAT. OIL  
ADDRESS-

HUNDRED-  
SECTION-  
HOLE NO-  
SUPPLY-

WATER CUT-  
WATER LEVEL-  
DEPTH HOLE-

DATE COLLECTED  
DATE RECEIVED

SAMPLE COLLECTED BY-

00021

# STATIC PRESSURE

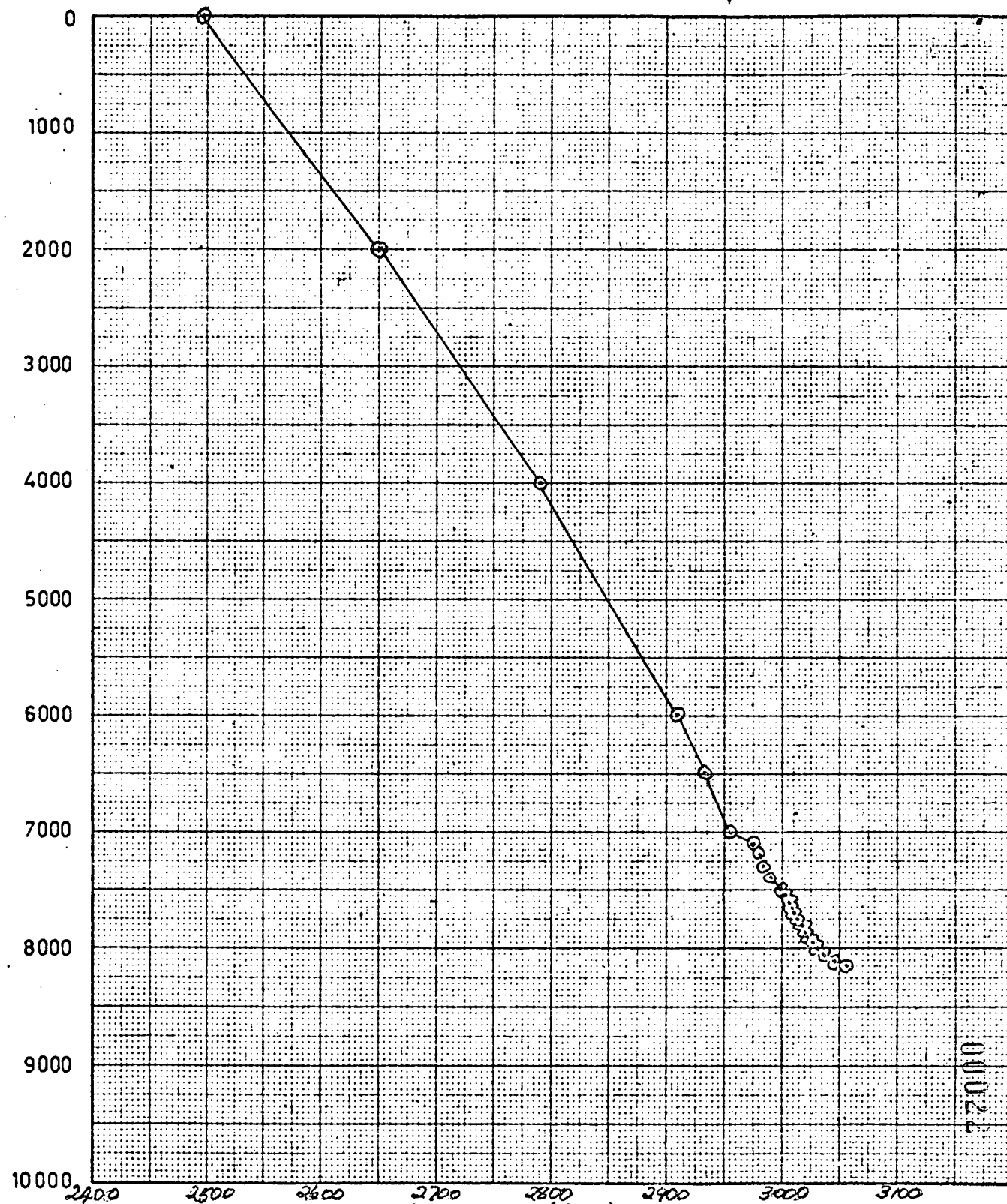
## GRADIENT

WELL BIG LAKE 14

TEST DATE 12TH MARCH 1977

| DEPTH<br>(FEET) | PRESSURE<br>(PSIG) | GRADIENT<br>PS/FT | DEPTH<br>(METRES) | PRESSURE<br>(KPa) | GRADIENT<br>KPa/M |
|-----------------|--------------------|-------------------|-------------------|-------------------|-------------------|
| LUBRICATOR      | 2497.7             | —                 | LUBRICATOR        | 17226             | —                 |
| 2000            | 2650.8             | 0.0766            | 609.6             | 18281             | 1.7306            |
| 4000            | 2790.5             | 0.0699            | 1219.2            | 19245             | 1.5814            |
| 6000            | 2908.8             | 0.0592            | 1828.8            | 20061             | 1.3386            |
| 6494            | 2936.7             | 0.0565            | 1979.4            | 20253             | 1.2749            |
| 6994            | 2966.4             | 0.0594            | 2131.8            | 20458             | 1.3451            |
| 7094            | 2973.3             | 0.0693            | 2162.3            | 20506             | 1.5738            |
| 7194            | 2979.4             | 0.0610            | 2192.7            | 20548             | 1.3770            |
| 7294            | 2984.7             | 0.0530            | 2223.2            | 20584             | 1.1803            |
| 7394            | 2990.8             | 0.0610            | 2253.7            | 20626             | 1.3770            |
| 7494            | 2997.8             | 0.0700            | 2284.2            | 20674             | 1.5738            |
| 7544            | 3003.0             | 0.1040            | 2299.4            | 20710             | 2.3684            |
| 7594            | 3005.6             | 0.0520            | 2314.7            | 20728             | 1.1765            |
| 7644            | 3007.4             | 0.0360            | 2329.9            | 20741             | 0.8563            |
| 7694            | 3010.9             | 0.0700            | 2345.1            | 20765             | 1.5789            |
| 7744            | 3013.5             | 0.0520            | 2360.4            | 20783             | 1.1765            |
| 7794            | 3017.0             | 0.0700            | 2375.6            | 20807             | 1.5789            |
| 7844            | 3018.8             | 0.0360            | 2390.9            | 20819             | 0.7843            |
| 7894            | 3022.2             | 0.0680            | 2406.1            | 20843             | 1.5789            |
| 7944            | 3025.7             | 0.0700            | 2421.3            | 20867             | 1.5789            |
| 7994            | 3032.7             | 0.1400            | 2436.6            | 20915             | 3.1373            |
| 8044            | 3038.0             | 0.1060            | 2451.8            | 20952             | 2.4342            |
| 8094            | 3045.0             | 0.1400            | 2467.1            | 21000             | 3.1373            |
| 8144            | 3055.5             | 0.2100            | 2482.3            | 21072             | 4.7368            |

DEPTH (FEET)



DEAD WEIGHT

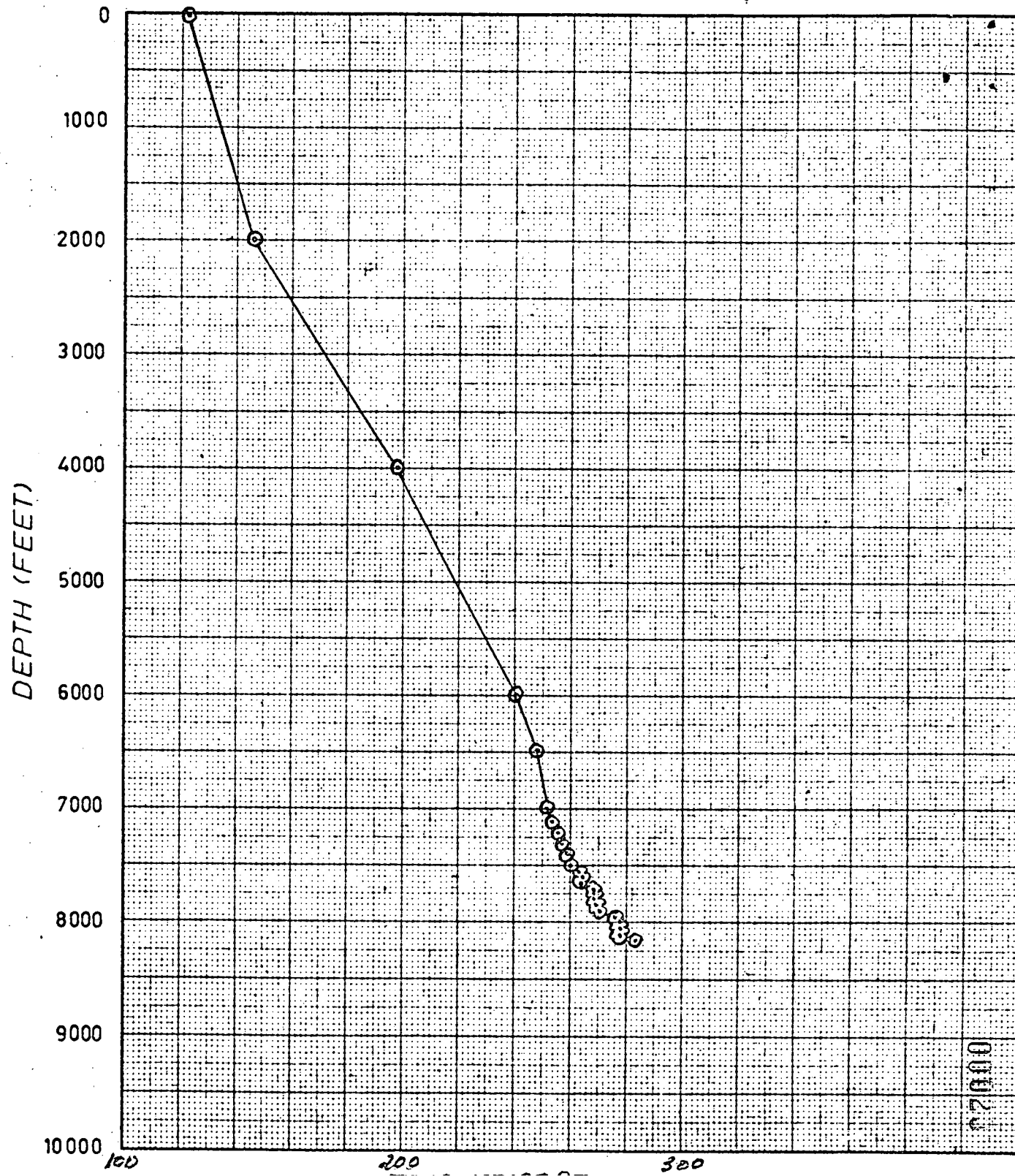
PRESSURE = 2513 PSIG  
= 17331 KPa

STATIC TEMPERATURE  
GRADIENT

WELL BIG LAKE 14

TEST DATE 12TH MARCH 1977

| DEPTH<br>(FEET) | TEMP<br>°F | GRADIENT<br>/FT | DEPTH<br>(METRES) | TEMP<br>°C | GRADIENT<br>/M |
|-----------------|------------|-----------------|-------------------|------------|----------------|
| LUBRICATOR      | 122.0      |                 | LUBRICATOR        | 50.0       |                |
| 2000            | 146.3      |                 | 609.6             | 63.5       |                |
| 4000            | 198.3      |                 | 1219.2            | 92.4       |                |
| 6000            | 240.4      |                 | 1828.8            | 115.8      |                |
| 6494            | 246.9      |                 | 1979.4            | 119.4      |                |
| 6994            | 252.2      |                 | 2131.8            | 122.3      |                |
| 7094            | 252.9      |                 | 2162.3            | 122.7      |                |
| 7194            | 255.0      |                 | 2192.7            | 123.9      |                |
| 7294            | 256.8      |                 | 2223.2            | 124.9      |                |
| 7394            | 258.6      |                 | 2253.7            | 125.9      |                |
| 7494            | 260.3      |                 | 2284.2            | 126.8      |                |
| 7544            | 262.6      |                 | 2299.4            | 128.1      |                |
| 7594            | 263.7      |                 | 2314.7            | 128.7      |                |
| 7644            | 264.2      |                 | 2329.9            | 129.0      |                |
| 7694            | 267.6      |                 | 2345.1            | 130.9      |                |
| 7744            | 267.6      |                 | 2360.4            | 130.9      |                |
| 7794            | 268.3      |                 | 2375.6            | 131.3      |                |
| 7844            | 269.4      |                 | 2390.9            | 131.9      |                |
| 7894            | 270.8      |                 | 2406.1            | 132.7      |                |
| 7944            | 276.4      |                 | 2421.3            | 135.8      |                |
| 7994            | 276.8      |                 | 2436.6            | 135.8      |                |
| 8044            | 276.8      |                 | 2451.8            | 135.8      |                |
| 8094            | 276.8      |                 | 2467.1            | 136.0      |                |
| 8144            | 283.3      |                 | 2482.3            | 139.6      |                |



1977 JUN 6 AM 10:14

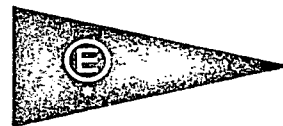
00024 DAG



**amdel**

## The Australian Mineral Development Laboratories

Flemington Street, Frewville, South Australia 5063  
Phone Adelaide 79 1662, telex AA 82520



Winner of Award for Outstanding Export Achievement, 1975

Pilot Plant: Osman Place, Thebarton, Sth. Aust.  
Phone Adelaide 43 8053

Branch Offices: Perth and Sydney  
Associated with: Professional Consultants Australia Pty. Ltd.

Please address all correspondence to Frewville.  
In reply quote: AN 3/51/0 - 3524/77

REPORT COMPLETE

### NATA CERTIFICATE

3 June 1977

Mr D. Short,  
Delhi International Oil Corporation,  
GPO Box 2364,  
ADELAIDE SA 5001

### REPORT AN 3524/77

YOUR REFERENCE:

Order number 44502

IDENTIFICATION:

As listed

DATE RECEIVED:

6 May 1977

Enquiries quoting AN 3524/77 to Officer in Charge please

Officer in Charge, Analytical Section: D. K. Rowley

*D. K. Rowley*

for Brian S. Hickman  
Acting Managing Director



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hjj

NOTE

AN 3524/77

Due to the high level of colour in these samples, determination of  $\text{NO}_3$  by our normal procedure was not possible. A less sensitive method has been used hence the higher detection limit.

With our existing equipment the accuracy of conductivity readings falls with high salinity levels. New equipment is being obtained. We hope to improve the accuracy of the conductivity reading in highly saline waters when this equipment comes into use.

## WATER ANALYSIS REPORT

AMDEL COMPUTER SERVICES

SAMPLE NO. BIG LAKE 14 DST

JOB NO. 3525-77

CHEMICAL COMPOSITION

DERIVED AND OTHER DATA

REMARKS

MILLIGRAMS MILLIEQUIVS. CONDUCTIVITY (E.C.)

PER LITRE PER LITRE

MICRO-S/CM AT 25 DEG. C 188497.

MG/L

ME/L

MILLIGRAMS

PER LITRE

## CATIONS

TOTAL DISSOLVED SOLIDS

MG/L

CALCIUM (CA) 680. 33.9

MAGNESIUM (MG) 370. 30.4

SODIUM (NA) 117000. 5089.5

POTASSIUM (K) 102. 2.6

A. BASED ON E.C.

B. CALCULATED (HCO<sub>3</sub>=CO<sub>3</sub>)

295628.

C. RESIDUE ON EVAP. AT 180 DEG. C

## ANIONS

TOTAL HARDNESS AS CaCO<sub>3</sub>

3221.

HYDROXIDE (OH) . 0

CARBONATE (CO<sub>3</sub>) . 0BICARBONATE (HCO<sub>3</sub>) 14. 2SULPHATE (SO<sub>4</sub>) 4728. 98.4CARBONATE HARDNESS AS CaCO<sub>3</sub>

12.

NON-CARBONATE HARDNESS AS CaCO<sub>3</sub>

3209.

TOTAL ALKALINITY AS CaCO<sub>3</sub>

12.

FREE CARBON DIOXIDE (CO<sub>2</sub>)

CHLORIDE (CL) 172741. 4871.3

SUSPENDED SOLIDS

SILICA (SiO<sub>2</sub>)

BORON (B)

NITRATE (NO<sub>3</sub>) 15

## TOTALS AND BALANCE

UNITS

CATIONS (ME/L) 5156.5

DIFF = 186.5

REACTION - PH

5.3

ANIONS (ME/L) 4970.0

SUM = 10126.4

TURBIDITY (JACKSON)

COLOUR (HAZEN)

DIFF\*100.

= 1.8 %

SODIUM TO TOTAL CATION RATIO (ME/L) 98.7 %

SUM

NAME- DELHI INT OIL CORP

HUNDRED-

WATER CUT-

ADDRESS-

SECTION-

WATER LEVEL-

HOLE NO-

DEPTH HOLE-

SUPPLY-

DATE COLLECTED-

SAMPLE COLLECTED BY-

DATE RECEIVED-

00026

PRESSURE BUILD UP SURVEYBIG LAKE #14

Date: October 15-18, 1977

Depth Tested: 7495' KB

Lubricator

Pressure:

In Amerada = 1328 psig (9157 KPA)  
Deadweight = 1327 psig (9149 KPA)

Out Amerada = 2396 psig (16520 KPA)

SHUT IN  
TIME HRS.

PSIG

KPA

REMARKS

-2.9

2199.4

15165

Flow

Ø

2199.4

15165

S.W.I. 1730 Hrs 15/10/77

1

2762.9

19050

2

2774.9

19133

3

2780.8

19174

4

2786.8

19215

5

2788.8

19229

6

2790.8

19243

7

2792.8

19256

8

2794.8

19270

9

2796.8

19284

10

2796.8

19284

20

2804.8

19339

40

2812.7

19394

60

2816.7

19421

62.25

2816.7

19421

POH 0745 Hrs 18/10/77

# STATIC PRESSURE

## GRADIENT

WELL BIG LAKE 14

TEST DATE 18th OCTOBER 1977

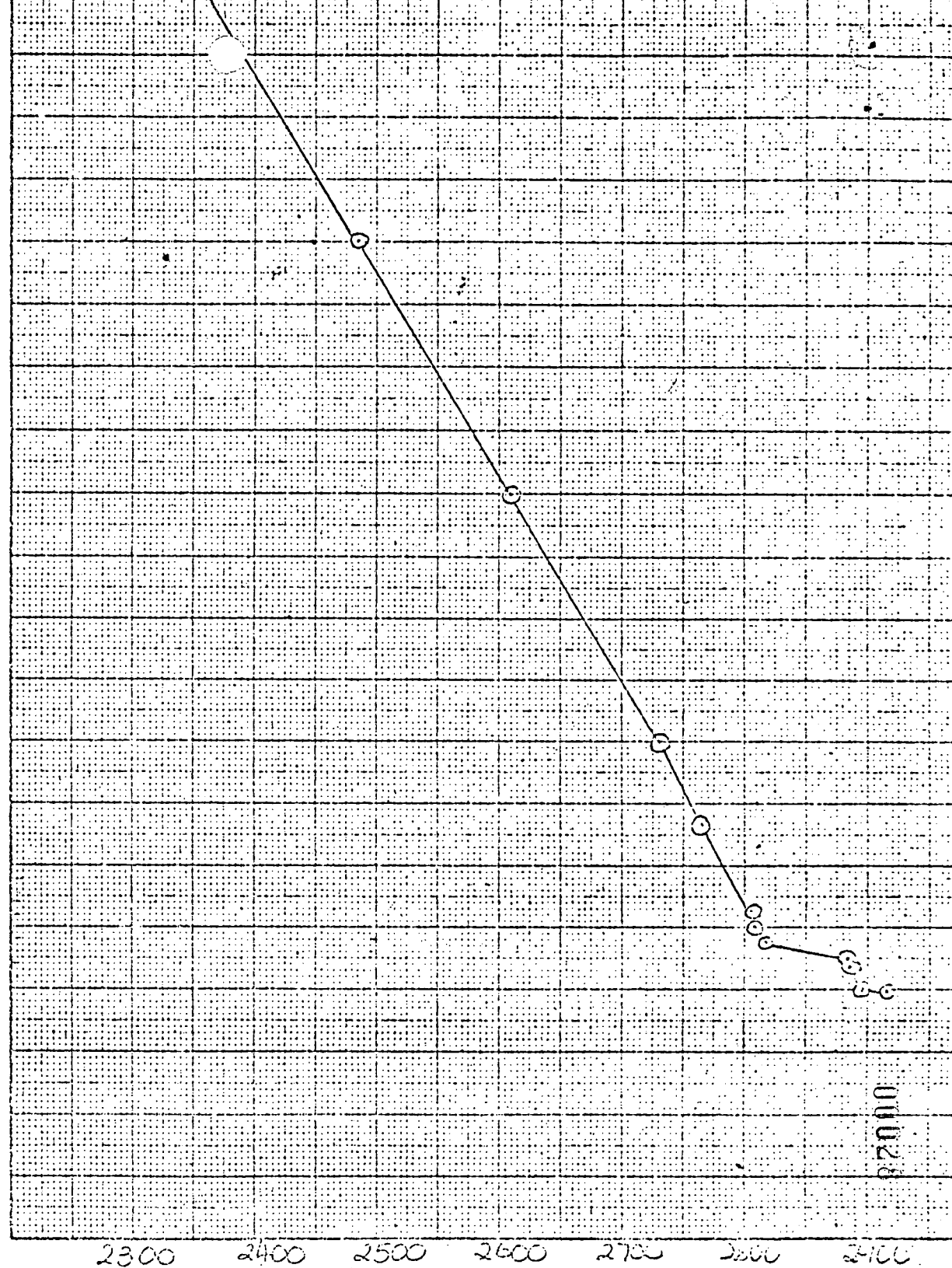
| DEPTH<br>(FEET) | PRESSURE<br>(PSIG) | GRADIENT<br>/FT | DEPTH<br>(METRES) | PRESSURE<br>(kPa) | GRADIENT<br>/M |
|-----------------|--------------------|-----------------|-------------------|-------------------|----------------|
| LUBRICATOR      | 2350.7             | —               | LUBRICATOR        | 1621.2            | —              |
| 2000            | 2484.1             | 0.0667          | 609.6             | 17132             | 1.5092         |
| 4000            | 2609.5             | 0.0627          | 1219.2            | 17997             | 1.4190         |
| 6000            | 2727.0             | 0.0588          | 1828.8            | 18807             | 1.3287         |
| 6688            | 2764.9             | 0.0551          | 2038.5            | 19068             | 1.2446         |
| 7376            | 2804.8             | 0.0580          | 2248.2            | 19343             | 1.3114         |
| 7504            | 2812.7             | 0.0617          | 2287.2            | 19398             | 1.4103         |
| 7632            | 2820.7             | 0.0625          | 2326.2            | 19453             | 1.4103         |
| 7760            | 2828.7             | 0.0625          | 2365.2            | 19508             | 1.4103         |
| 7880            | 2834.7             | 0.0500          | 2401.8            | 19550             | 1.1475         |
| 8016            | 2844.6             | 0.0728          | 2443.3            | 19618             | 1.6386         |
| 8144            | 2864.6             | 0.1563          | 2482.3            | 19756             | 3.5385         |

DEAD WEIGHT

PRESSURE = 2361 PSIG  
= 16283 kPa

DEPTH (FEET)

1000  
2000  
3000  
4000  
5000  
6000  
7000  
8000  
9000  
10000



# STATIC TEMPERATURE

## GRADIENT

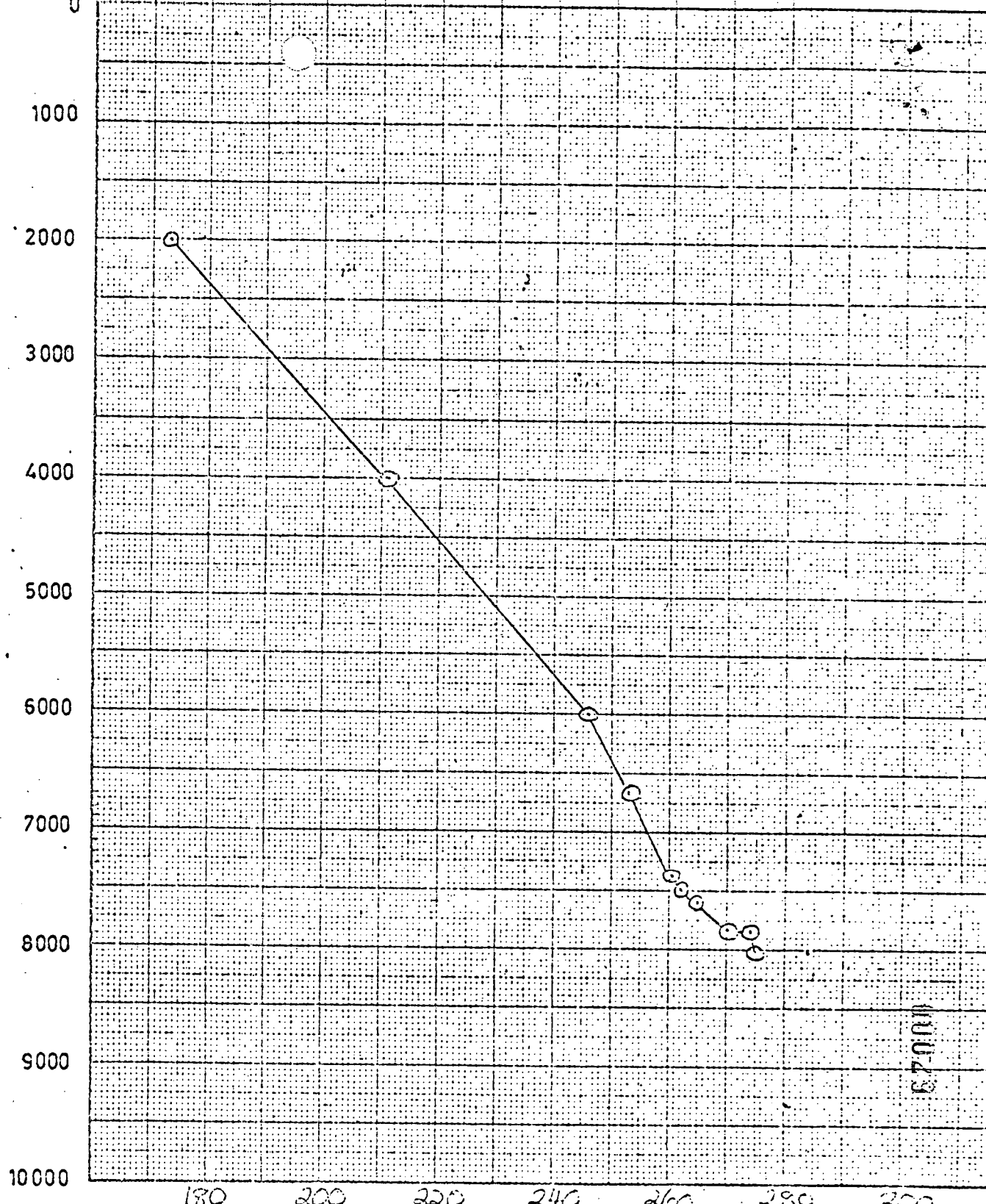
WELL BIG LAKE 14

TEST DATE 18th OCTOBER 1977

| DEPTH<br>(FEET) | TEMP<br>°F | GRADIENT<br>/FT |
|-----------------|------------|-----------------|
| LUBRICATOR      | BELOW      | RANGE           |
| 2000            | 172.6      |                 |
| 4000            | 210.9      |                 |
| 6000            | 245.8      |                 |
| 6688            | 253.3      |                 |
| 7376            | 260.3      |                 |
| 7504            | 262.3      |                 |
| 7632            | 264.4      |                 |
| 7760            | 270.3      |                 |
| 7880            | 273.6      |                 |
| 8016            | 274.5      |                 |
| 8144            | 283.5      |                 |

| DEPTH<br>(METRES) | TEMP<br>°C | GRADIENT<br>/M |
|-------------------|------------|----------------|
| LUBRICATOR        | BELOW      | RANGE          |
| 609.6             | 78.1       |                |
| 1219.2            | 99.4       |                |
| 1828.8            | 118.8      |                |
| 2038.5            | 123.0      |                |
| 2248.2            | 126.8      |                |
| 2287.2            | 128.0      |                |
| 2326.2            | 129.1      |                |
| 2365.2            | 132.4      |                |
| 2401.8            | 134.2      |                |
| 2443.3            | 134.7      |                |
| 2482.3            | 139.7      |                |

DEPTH (FEET)

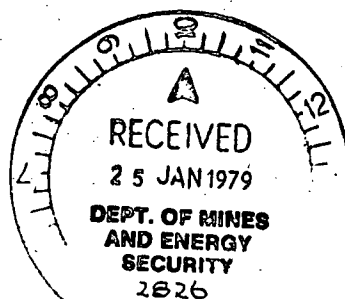


00030

BIG LAKE #14

PRODUCTION LOGGING

DECEMBER 14, 1977



Randal R. Quick  
April 17, 1978

C O N T E N T S

INTRODUCTION

RESULTS

CONCLUSIONS

DISCUSSION

FIGURES

1. Spinner Response 13.49 MMCFD
2. Production Profile
3. Production Profile/Composite Log

INTERPRETATION OF PRODUCTION LOGGING OF BIG LAKE #14  
DECEMBER 14, 1977

INTRODUCTION

A P.C.T. (Production Combination Tool) was run in Big Lake #14 on December 14, 1977 to determine the contribution of each perforated zone to the total flow from the well. Big Lake #14 was chosen because it is a high rate, water-free well producing from the Toolachee, Daralingie and Epsilon formations, and hence should serve as a good indicator for estimating production from these formations in the south western portion of the field.

The tools run were:

1. Temperature - to locate zones of gas entry and obtain bottomhole temperatures for the calculation of 1/Bg.
2. Manometer - to measure FBHP's.
3. Gradiomanometer - to measure flowing gradients and locate zones of water entry.
4. Full-bore spinner - to measure fluid velocities in the wellbore.
5. Amerada - to measure "station" pressures for 1/Bg calculations.

RESULTS

The gradiomanometer indicated fluid covering approximately the bottom 2 feet of the Epsilon perforations, with some fluid being carried up to 7940'. Since the bottom station was at 7930' (between the Daralingie and Epsilon perforations) only the distribution of gas production needed to be determined from the logs run.

The well was logged at a metered surface flow rate of 13.48 MMSCFD at 1760 psig FWHP.

|                      | Perforated Interval | Production (MMSCFD) | % of Total Flow |
|----------------------|---------------------|---------------------|-----------------|
| Toolachee Formation  | ( 7570-7592         | 0.48                | 3.6 - Assumed   |
|                      | ( 7689-7711         | 5.97                | 44.2            |
|                      | ( 7719-7727         | 0.70                | 5.2             |
|                      | ( 7733-7756         | 0.65                | 4.9             |
|                      | ( 7759-7770         | 0.37                | 2.7             |
| Daralingie Formation | 7901-7910           | 3.65                | 27.1            |
| Epsilon Formation    | 8118-8134           | 1.66                | 12.3            |

CONCLUSIONS

The main producing zone in this well is the interval 7689-7711, in the Toolachee Formation, Unit 'C'. The Daralingie Formation is producing much more gas than its counterpart in Big Lake #2 ( $\leq 0.38$  MM @ 1380 psig FWHP).

The Epsilon Formation flowed 1.66 MMCFD under logging conditions (1760 psig FWHP) which shows considerable clean-up from DST #1 (the Epsilon Formation - cased hole test) which flowed 1.5 MMCFD at a FWHP of 360 psi.

DISCUSSION

|         |     | 7640 | 7720 | 7730 | 7758 | 7800 | 7930 |
|---------|-----|------|------|------|------|------|------|
| Down -  | 61  | 17.3 | 10.2 | 9.5  | 8.9  | 8.1  | 3.9  |
|         | 125 | 19.8 | 13.0 | 12.4 | 11.4 | 10.7 | 6.6  |
|         | 171 | 21.5 | 14.8 | 14.0 | 13.2 | 12.5 | 8.5  |
|         | 246 | 24.5 | 17.9 | 17.0 | 16.3 | 15.5 | 11.5 |
| Station |     | 14.9 | 7.9  | NA   | NA   | 5.9  | 1.6  |
| Up -    | 53  | 12.9 | 5.7  | 4.8  | 4.2  | 3.7  | 0.0  |
|         | 116 | 10.3 | 3.0  | 2.3  | 1.3  | 0.0  | -2.5 |
|         | 167 | 8.3  | 0.0  | 0.0  | 0.0  | 0.0  | -4.9 |
|         | 239 | 5.2  | -1.7 | -    | -    | -3.6 | -8.0 |

Slope of the flow response line = 3.95 rps/100 FPM.

Intercept on x-axis = 10.54 FPM.

Total downhole flow from the well occurs at 7570'. However the top sets of perforations were not logged as they were too close to the tubing shoe; the G.R. log indicates that the sand is shaly (60 API units) and hence tight. Production from these perforations has been estimated at 0.48 MMCFD.

Downhole flow from the well at the uppermost point logged is thus estimated at 13.00 MMCFD. This occurs at 7640' and gives a stationary reading of 14.84 rps: this is equivalent to a tool velocity of 386.2 FPM ( $=v$ ).

$$Q \text{ MMCFD} = v \times \frac{\pi d^2}{4 \times 144} \times 1.44 \times 10^{-3} \text{ Diameter of 7", 26\# casing is 6.276"}$$

$$\therefore Q = v \times 3.094 \times 10^{-4} \text{ MMCFD at the prevailing downhole conditions}$$

$$\therefore Q = 386.2 \times 3.094 \times 10^{-4} \text{ MMCFD} = 0.1195 \text{ MMCFD. At this point, } 1/B_g = 126.79$$

∴ Calculated flow at highest station =  $0.1195 \times 126.79$   
 = 15.15 MMSCFD

But flow at this point is 13.00 MMSCFD ∴ Correction  
 factor =  $\frac{13.00}{15.15} = 0.858$

As this C.F. is within the usual range of factors  
 encountered, the estimate of 0.48 MMSCFD from the top  
 perms is assumed to be reasonably accurate.

$$Q_{sc} = v \times \frac{\pi d^2}{4 \times 144} \times 1.44 \times CF \times 1/B_g \times 10^{-3} \text{ MMSCFD}$$

$$\therefore Q_{sc} = v \times 1/B_g \times 3.094 \times 10^{-4} \times .858 \text{ MMSCFD}$$

$$= v \times 1/B_g \times 2.655 \times 10^{-4} \text{ MMSCFD}$$

$$\text{But } v = \frac{\text{station reading}}{.0395} + 10.54$$

$$\therefore Q_{sc} = \left( \frac{\text{station reading}}{.0395} + 10.54 \right) \times 1/B_g \times 2.655 \times 10^{-4} \text{ MMS}$$

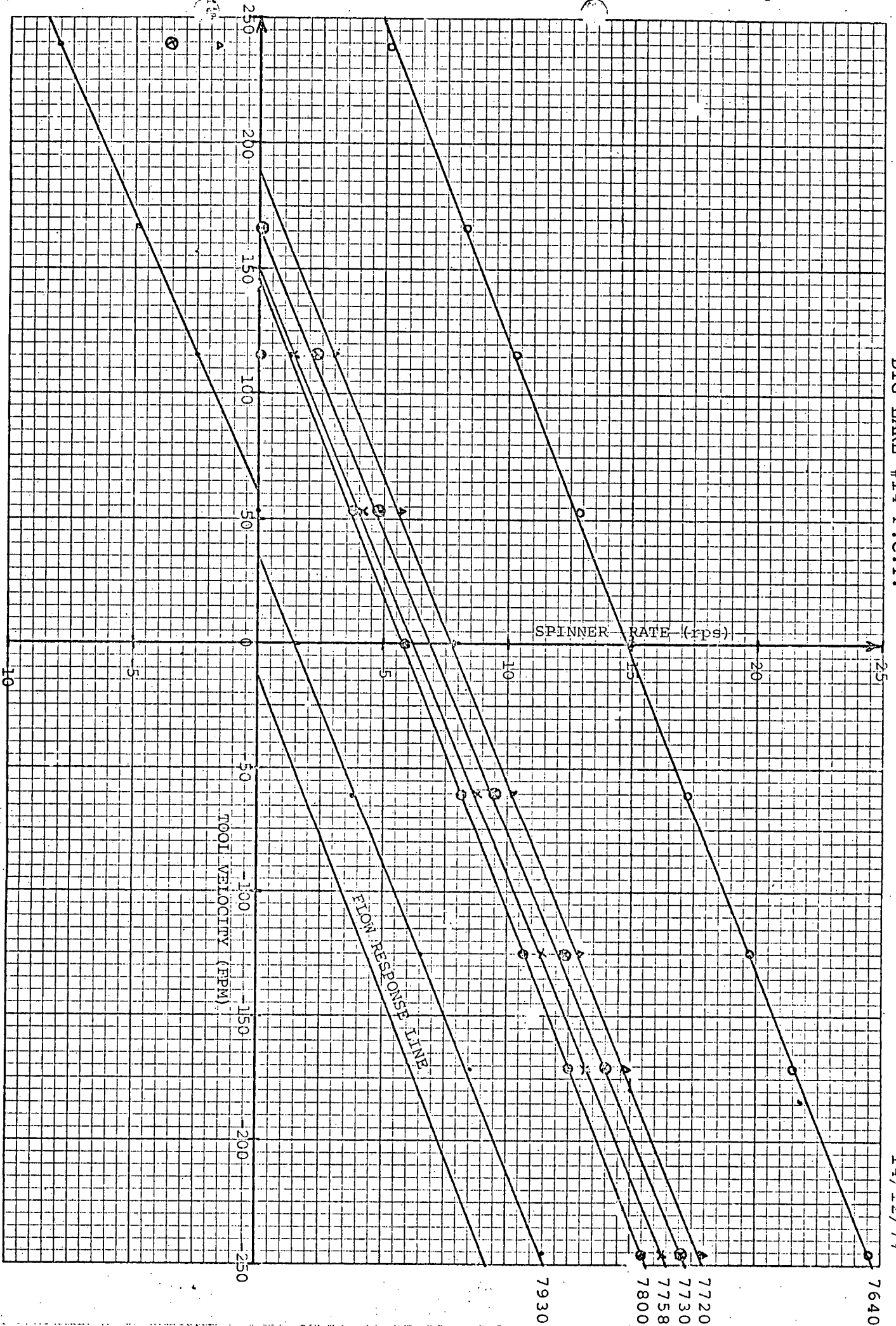
| Depth | Station Reading | 1/B <sub>g</sub> | Q     | % of 13.48 |
|-------|-----------------|------------------|-------|------------|
| 7640  | 14.84           | 126.79           | 13.00 | 96.4       |
| 7720  | 7.82            | 126.92           | 7.03  | 52.2       |
| 7730  | 7.00            | 126.92           | 6.33  | 47.0       |
| 7758  | 6.24            | 127.01           | 5.68  | 42.1       |
| 7800  | 5.80            | 127.01           | 5.31  | 39.4       |
| 7930  | 1.53            | 127.10           | 1.66  | 12.3       |

| Interval  | Production (MMSCFD) | % of Total (13.48) |
|-----------|---------------------|--------------------|
| 7570-7592 | 0.48                | 3.6 - Assumed      |
| 7640-7720 | 5.97                | 44.2               |
| 7720-7730 | 0.70                | 5.2                |
| 7730-7758 | 0.65                | 4.9                |
| 7758-7800 | 0.37                | 2.7                |
| 7800-7930 | 3.65                | 27.1               |
| 7930-     | 1.66                | 12.3               |

|            | Perforations | Production |
|------------|--------------|------------|
| Toolachee  | ( 7576-7592  | 0.48       |
|            | ( 7689-7711  | 5.97       |
|            | ( 7719-7727  | 0.70       |
|            | ( 7733-7756  | 0.65       |
|            | ( 7759-7770  | 0.37       |
| Daralingie | 7901-7910    | 3.65       |
| Epsilon    | 8118-8134    | 1.66       |

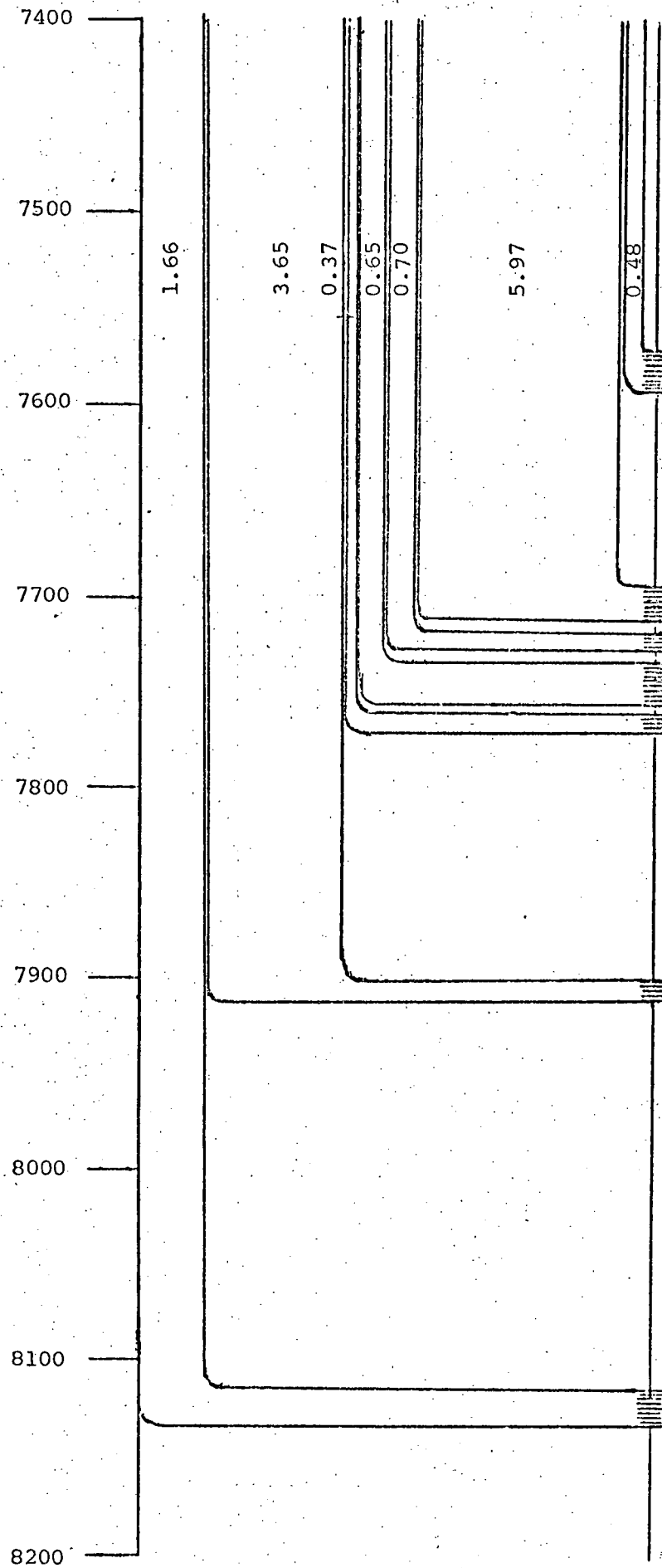
BIG LAKE #14 P.C.T.

14/12/77



00036

BIG LAKE #14  
PRODUCTION PROFILE  
13.48 MMCFD 1760 PSIG FWHP



(UPPER PERMIAN)

00037-

7576'  
7582'  
7585'  
7592'

During clean up the well flowed at approx. 10-5 MMCFD through a 1/2" choke with surface flowing pressure 2010psi.

Samples between 7634' - 7658' not circulated due to burst seal in kelly

7689'

7711'  
7719'  
7727'  
7733'

All perforations 4 shots per foot with 4" hyper jets

7756'  
7759'  
7770'

DARALINGIE BEDS 7789' (-7852')  
(LOWER PERMIAN)

Single completion through 3 1/2" tubing in 7" casing from Toolache, Daralingie and Epsilon Formation.

7901'

7910'

ROSENEATH SHALE 7934' (-7817')  
(LOWER PERMIAN)

8100'

EPSILON FORMATION  
(LOWER PERMIAN)

8116' (-7900')

Gas Delivered  
14.1 MMCFD

TOOLACHE FORMATION  
(UPPER PERMIAN)

00038

7576'  
7582'  
7585'  
7592'

During clean up the well flowed at approx. 10-5 MMCFD through a 1/2" choke with surface flowing pressure 2010psi.

Samples between 7634' - 7658' not circulated due to burst seal in hole

7689'

7711'  
7719'  
7727'  
7733'

All perforations 4 shots per foot with 4" hyper jets

7756'  
7759'  
7770'

DARLINGIE BEDS 7769' (-7852')  
(LOWER PERMIAN)

Single completion through 3 1/2" tubing in 7" casing from Toolache, Darlingie and Epsilon Formation.

7901'

7910'

ROSENEATH SHALE 7934' (-7817')  
(LOWER PERMIAN)

8100'

EPSILON FORMATION

8116' (-7920')

Env. 2826

.3.

PHASE 2Well - Moomba #28Reason for Workover

The well had a damage ratio of 5 which was believed to be due to plugging in the perforations. To clean out and acid wash the perforations.

Work Carried Out

Washed hole clean to P.B.T.D. of 8144' (K.B.). Unable to run back down through "No Go" nipple, could not dyna drill through "No Go". Deferred the acid wash.

Results

Well bore cleaned out. No production increase achieved.

Well - Moomba #25Reason for Workover

The well had a damage ratio of 1.9 which was probably due to plugging in the perforations. To clean out and acid wash the perforations.

Work Carried Out

Washed hole clean to P.B.T.D. of 8100' (K.B.). Acid washed the perforations with 18.8 bbls of 15% HCL mix.

Results

A production increase of 3.5 mmscf/d was achieved.

Well - Big Lake #14Reason for Workover

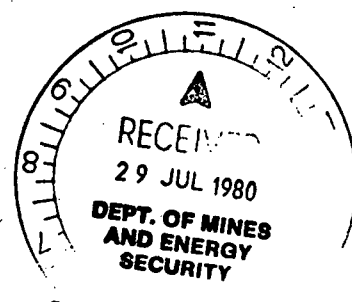
This well had a damage ratio of 2.95 believed due to plugging in the perforations.

Work Carried Out

Washed hole clean to P.B.T.D. of 8201' (K.B.) and acid washed the perforations with 27.2 bbls of 15% HCL mix.

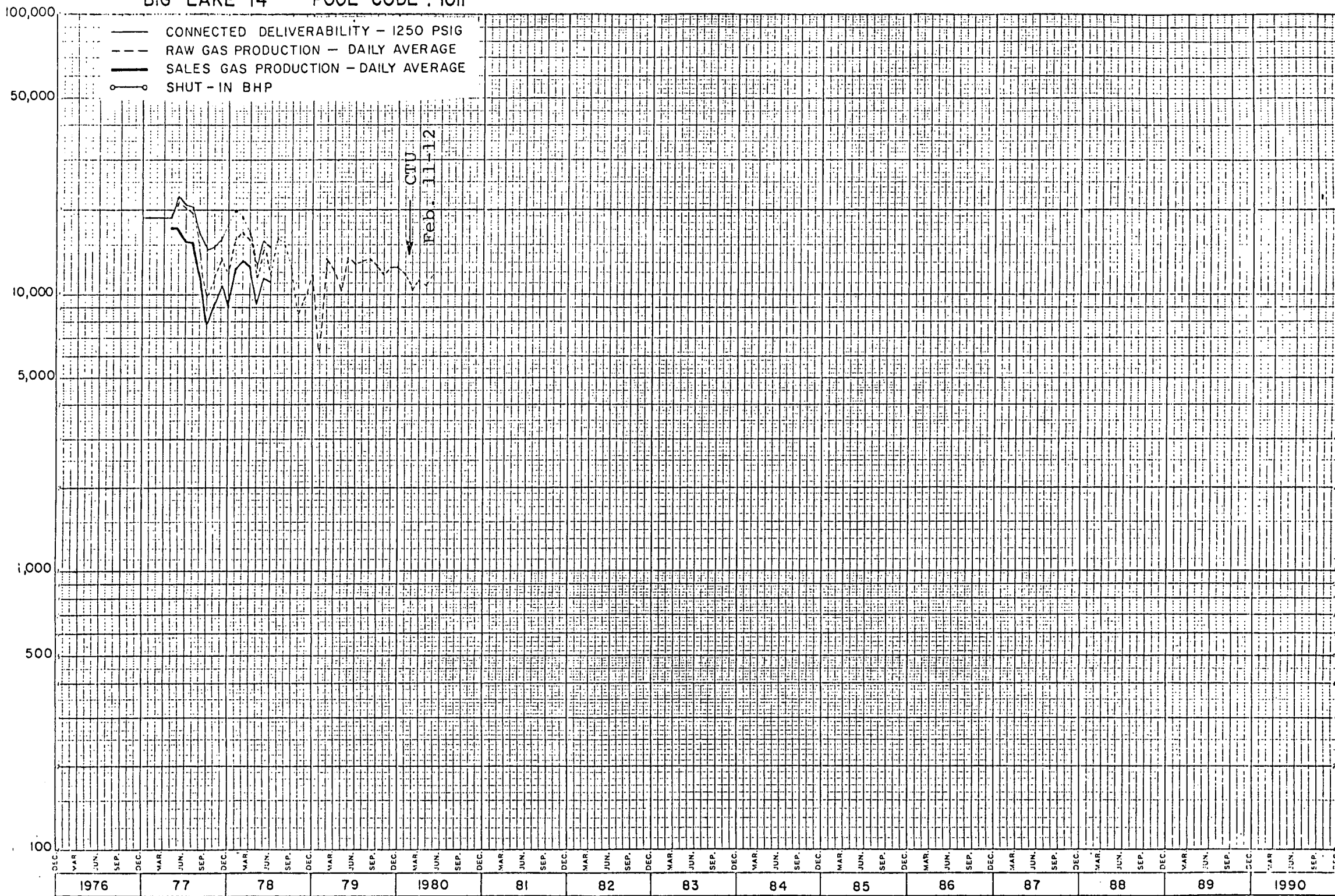
Results

No production increase was achieved.



# BIG LAKE 14 POOL CODE : 1011

MCF/DAY



00000

00041

WP:2825N

SANTOS LIMITED  
RESERVOIR ENGINEERING DEPARTMENT  
BIG LAKE #14  
PRODUCTION LOGGING SURVEY, 24/11/81

Report No: RE: 030/83 WP: 2825N  
Date: 3/6/83.

Author: . J. Segar

C O N T E N T S

|                                     | <u>Page No.</u> |
|-------------------------------------|-----------------|
| 1. INTRODUCTION                     | 1               |
| 2. SUMMARY OF RESULTS               | 2               |
| 3. CONCLUSIONS                      | 3               |
| 4. RECOMMENDATION                   | 4               |
| 5. LOGS RUN                         | 5               |
| 6. DISCUSSION                       |                 |
| 6.1 Method                          | 6               |
| 6.2 Calculations and Interpretation | 7               |
| 6.3 Comparison with 1977 PCT        | 8               |

TABLES

FIGURES

T A B L E S

1. FLOW METER DATA - RATE 1
2. FLOW METER DATA - RATE 2
3. FLOW METER DATA - WELL SHUT IN
4.  $B_g$ ,  $V$ ,  $Q$
5. BUILDUP DATA
6. RESERVOIR PARAMETERS
7. FLOW RATE COMPARISON.

F I G U R E S

1. PLT SURVEY - RATE 1
2. PLT SURVEY - RATE 2
3. PLT SURVEY - WELL SHUT IN
4. FLOW DIAGRAM
5. PRESSURE BUILDUP.

1. INTRODUCTION

Big Lake #14 is perforated over several sands in the Toolachee Formation, Daralingie Beds and Epsilon Formation. On November 24, 1981 a P.L.T. (Production Logging Tool) was run to determine the flow contribution from each of these sands.

2. SUMMARY OF RESULTS

This well was logged during flowing conditions and while shutin. The following results were obtained.

| <u>SAND</u>      | <u>FLOW RATE</u>                                 |                                                  |                                                  |
|------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|
|                  | <u>RATE 1</u><br>$P_{tf} = 1200$ psig<br>(MMCFD) | <u>RATE 2</u><br>$P_{tf} = 1350$ psig<br>(MMCFD) | <u>SHUTIN</u><br>$P_{ws} = 1880$ psig<br>(MMCFD) |
| Toolachee        |                                                  |                                                  |                                                  |
| 74-5             | 0.16                                             | 0.17                                             | 0.26 <sup>(1)</sup>                              |
| 75-5             | 1.90                                             | 0.40                                             | -1.03                                            |
| 76-0             | 0.17                                             | 0                                                | 0.06                                             |
| 76-0             | 0.64                                             | 0.40                                             | -0.26                                            |
| 76-0             | 0.58                                             | 0.37                                             | -0.20                                            |
| Sub Total        | _____                                            | _____                                            | _____                                            |
| Toolachee        | 3.45                                             | 1.34                                             | -1.17                                            |
| Lower Daralingie |                                                  |                                                  |                                                  |
| 77-3             | 4.24                                             | 3.00                                             | 0.83                                             |
| Epsilon          |                                                  |                                                  |                                                  |
| 79-0             | <u>0.72</u>                                      | <u>0.65</u>                                      | <u>0.34</u>                                      |
| Total            | 8.41                                             | 4.99                                             | 0.00                                             |

(1) Positive value means flowing into well bore.

The apparent skin of 6.6 and the flow capacity of 1612 md ft derived by analysing the buildup between the rate change is comparable to that from the 1980 and 1981 Pressure Surveys.

3. CONCLUSIONS

1. The Lower Daralingie Beds are the major producing sands in the well whereas in 1977 the Toolachee Formation was the major producing zone.
2. The Toolachee Formation is being drained adequately which is consistent with the current knowledge of the field's drainage status.
3. The 77-3 sand of the Lower Daralingie Beds is the most permeable sand and the 79-0 sand of the Epsilon Formation is the least permeable sand in the well.
4. After 15 hours shut-in, crossflow rates up to 1 MMCFD are occurring downhole.
5. There is strong evidence that indicates the existence of significant additional GIP in the Lower Daralingie Beds outside the known field limits.

4. RECOMMENDATION

1. It is probable that gas produced from the Lower Daralingie Beds is originating from outside the known field limit. An update of the 1981 PLT survey could confirm the greater extent of Lower Daralingie gas-in-place in Big Lake.

5. LOGS RUN

The PLT tool string comprised:

1. Gamma Ray
2. Thermometer
3. (RFT) Strain Gauge
4. Casing Collar Locator
5. Gradiomanometer
6. Fullbore spinner

## 6. DISCUSSION

### 6.1 Method

The well was assumed to have flowed at a stabilized rate and was temporarily shutin while the tools were run in. The well was then returned to 100% choke and flowed at an average rate of 8.41 MMCFD (Rate 1) @  $P_{tf}$  of 1200 psig.

Eight logging passes were completed (4 up and 4 down) while the well was on 100% choke. Four stationary readings were also taken under flowing conditions.

The well was then choked back to an average rate of 4.99 MMCFD @  $P_{tf}$  of 1350 psig. During this time period 5 logging passes were run (3 up and 2 down).

The well was then shutin and the pressure allowed to buildup to a  $P_{ws}$  of 1880 psig for approximately 15 hours. Five logging passes were completed while the well was shut in (2 up and 3 down).

## 6.2 Calculations and Interpretation

Plots of spinner speed vs logging speed were constructed from information obtained from the PLT log for Rate 1, Rate 2 and while the well was shutin. (Figures 1, 2 and 3). Readings were taken at locations above and below each set of perforations and are shown in Tables 1, 2 and 3.

The velocity for each reading was obtained from the plots of spinner speed vs logging speed. The Bg values were calculated from pressure and temperature data read off the PLT logs. The flow rates for each sand were calculated using the above information and are shown in Table 4. A graphical representation of this is shown in Figure 4.

During the shutin period cross flow occurred in the well. The gas from both the Epsilon Formation and Lower Daralingie Beds flowed upwards into the Toolachee Formation. Gas from one of the 76-0 sands (7719 to 7727) and the 74-5 sand (7576 to 7582 and 7585 to 7592) also flowed into the well bore and was absorbed by the other Toolachee sands (see Figure 4).

A pressure buildup was recorded while the well was shutin. This information was plotted but any reasonable interpretation was prohibited due to fluid and early time affects as well as the erratic nature of the data.

The flowing buildup, recorded when the well was choked back to Rate 2, was then analysed using the Principle of Superposition and assuming that flow rate 1 was in pseudo steady state and rate 2 in transient state.

A plot of  $\psi_{wf2}$  vs  $\Delta t$  was constructed from the flowing buildup. (See Table 5 and Figure 5). Using this method the apparent skin ( $s'$ ) and flow capacity ( $kh$ ) could be calculated.

- 8 -

Using the slope from Figure 5, of  $2.59 \times 10^6$  psia<sup>2</sup>/cp/cycle, the apparent skin (s') and flow capacity (kh) for this well was calculated. The values calculated are shown in Table 6. The apparent skin value of 6.6 and the flow capacity of 1612 md-ft is comparable with that interpreted from the 1980 and 1981 pressure surveys.

The gamma ray from this PLT was overlaid on the open hole log to identify any change in character however no change was evident.

### 6.3 Comparison with 1977 PCT

A Production Combination Tool was run in this well in December, 1977. The comparison between that log and the November 1981 log is shown in Table 7.

During that period, i.e. from December 1977 to November 1981, the field average reservoir pressure had declined from 2600 psia to 1700 psia and 234 BCF or 27% of the 860 BCF initially in place had been produced from the Toolachee, Daralingie and Epsilon formations in the Big Lake Field. The average reservoir pressure for Big Lake #14's drainage area had declined from 2800 psia to 1900 psia whilst 15.6 BCF of gas had been produced.

The monthly average production rate from Big Lake #14 had declined from 11 MMCFD to 8 MMCFD which is comparable to the tested flow rates of 13.5 MMCFD ( $P_{tf} = 1760$  psi) and 8.4 MMCFD ( $P_{tf} = 1200$  psi) respectively. On a formation basis the production from the Toolachee and Epsilon had declined from 8.2 MMCFD to 3.5 MMCFD and from 1.7 MMCFD to 0.7 MMCFD respectively whilst that from the Lower Daralingie had risen from 3.7 MMCFD to 4.2 MMCFD.

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Upon analysing the PLT interpretation and the data presented above it is concluded that the Toolachee is being drained adequately which is consistent with the current knowledge of field drainage patterns. Since the reservoir pressure of the Lower Daralingie and Epsilon is higher than the Toolachee it is concluded that these formations are not being drained as efficiently as the Toolachee. The flow characteristics of the Epsilon indicate that there may be reasonable depletion, however the low permeability of this sand in Big Lake #14 could be masking that interpretation and it is probable that the Epsilon in this well does not truly represent the field. As the flow rate of the Lower Daralingie had increased, whereas the flowing wellhead pressure had decreased by 600 psi compared to a 900 psi depletion in the average reservoir pressure, it is obvious, ignoring changes in skin, that the depletion of the Lower Daralingie is somewhat less than half that of the Toolachee. This is probably due to inadequate drainage and/or existence of reserves outside the known field limits.

The Lower Daralingie Beds in the south west of the field are mapped to initially contain 13.3 BCF. Including Big Lake #14 there are 9 wells producing from this formation. Analysing the production logging data one may conclude that approximately 5.8 BCF was produced from the Lower Daralingie via the Big Lake #14 wellbore in the four year period December 1977 to November 1981. Including the 8 other wells it is likely that well over 50% of the 13.3 BCF initially in place would have been produced in that period however the 1981 PLT indicates that the reservoir depletion is significantly less than 50%. Thus reserves must exist outside the presently known field limits.

TABLES & FIGURES

WP: 2825N

TABLE 1FLOWMETER DATA

Rate 1 - 8.41 MMCFD @ Ptf = 1200 psig

Spinner Speed recorded in revolutions per second.

| <u>Cable Speed</u> | <u>Depth</u> |      |      |      |      |      |      |      |
|--------------------|--------------|------|------|------|------|------|------|------|
|                    | 7570         | 7650 | 7714 | 7730 | 7758 | 7800 | 7930 | 8140 |
| Down at 31 ft/min  | 15.4         | 15.2 | 12.0 | 11.5 | 10.3 | 9.6  | 0    | -0.9 |
| Down at 50 ft/min  | NL           | 15.7 | 12.7 | 12.4 | 11.3 | 10.3 | 2.0  | NL   |
| Down at 101 ft/min | NL           | 17.6 | 14.7 | 14.4 | 13.4 | 12.3 | 4.6  | NL   |
| Down at 170 ft/min | NL           | NI   | 17.8 | 17.7 | 16.8 | 15.4 | 8.0  | NL   |
| Stationary         | 14.0         | 13.0 | NL   | NL   | NL   | 8.4  | 0    | NL   |
| Up at 30 ft/min    | NL           | 12.6 | 9.1  | 8.7  | 7.5  | 6.8  | 0    | -0.1 |
| Up at 51 ft/min    | NL           | 11.8 | 8.4  | 8.2  | 6.8  | 6.2  | 0    | NL   |
| Up at 100 ft/min   | NL           | 9.3  | 6.6  | 6.4  | 5.3  | 4.2  | 0    | NL   |
| Up at 195 ft/min   | NL           | 5.9  | 2.4  | 2.2  | 1.0  | 0    | -5.8 | NL   |

NL - not logged

NI - not interpretable

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TABLE 2FLOWMETER DATA

Rate 2 - 4.99 MMCFD @ Ptf = 1350 psig

Spinner Speed recorded in revolutions per second.

| <u>Cable Speed</u> | <u>Depth</u> |      |      |      |      |      |      |      |
|--------------------|--------------|------|------|------|------|------|------|------|
|                    | 7570         | 7650 | 7714 | 7730 | 7758 | 7800 | 7930 | 8140 |
| Down at 53 ft/min  | 9.0          | 9.6  | 8.9  | 8.8  | 8.2  | 7.6  | 3.0  | 2.0  |
| Down at 243 ft/min | 8.2          | 17.0 | 16.5 | 16.0 | 15.3 | 15.0 | 10.1 | 8.8  |
| Up at 50 ft/min    | NL           | 5.2  | 4.6  | 4.6  | 4.0  | 3.3  | NL   | NL   |
| Up at 51 ft/min    | NL           | NL   | 4.8  | 4.7  | 4.2  | 3.6  | 0.5  | -1.9 |
| Up at 101 ft/min   | NL           | 3.3  | 2.6  | 2.6  | 2.2  | 1.2  | -2.7 | -3.9 |

NL - not logged

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TABLE 3FLOWMETER DATA

Well Shutin Pws = 1880 psig

Spinner Speed recorded in revolutions per second.

| <u>Cable Speed</u> | <u>Depth</u> |      |      |      |      |      |      |      |
|--------------------|--------------|------|------|------|------|------|------|------|
|                    | 7570         | 7650 | 7714 | 7730 | 7758 | 7800 | 7930 | 8140 |
| Down at 36 ft/min  | 0            | 0.4  | 2.3  | 2.2  | 2.6  | 2.8  | 1.4  | 1.2  |
| Down at 95 ft/min  | 3.8          | 3.1  | 4.7  | 4.7  | 5.0  | 5.2  | 4.0  | NL   |
| Down at 130 ft/min | 5.2          | 4.5  | 6.0  | 6.0  | 6.2  | 6.6  | 5.2  | NL   |
| Up at 67 ft/min    | NL           | 2.7  | 1.0  | 1.2  | 0.2  | 0    | 1.7  | NL   |
| Up at 122 ft/min   | NL           | 4.6  | 3.2  | 3.3  | 3.2  | 3.0  | 4.0  | NL   |

NL - not logged

TABLE 4  
Bg, V, Q

| Depth<br>(ft) | Rate 1 - 8.41 MMCFD            |                      |                 |           | Rate 2 - 4.99 MMCFD            |                      |                 |           | Well Shutin                    |                      |                      |
|---------------|--------------------------------|----------------------|-----------------|-----------|--------------------------------|----------------------|-----------------|-----------|--------------------------------|----------------------|----------------------|
|               | 1/Bg<br>(scf/ft <sup>3</sup> ) | Velocity<br>(ft/min) | Flow<br>(MMCFD) | % of Flow | 1/Bg<br>(scf/ft <sup>3</sup> ) | Velocity<br>(ft/min) | Flow<br>(MMCFD) | % of Flow | 1/Bg<br>(scf/ft <sup>3</sup> ) | Velocity<br>(ft/min) | Flow<br>(MMCFD)      |
| 7570          | 80.0                           | 349                  | 0.16            | 1.9       | 87.0                           | 198                  | 0.17            | 3.4       | 97.7                           | 0                    | 0                    |
| 7650          | 79.9                           |                      | 1.90            | 22.6      | 86.8                           | 193                  | 0.40            | 8.0       | 98.0                           | -9                   | -0.26 <sup>(1)</sup> |
| 7714          | 79.9                           | 264                  | 0.17            | 2.0       | 86.8                           | 177                  | 0               | 0         | 97.0                           | 27                   | 0.77                 |
| 7730          | 79.9                           |                      | 0.64            | 7.6       | 86.9                           | 177                  | 0.40            | 8.0       | 96.9                           | 25                   | 0.71                 |
| 7758          | 79.8                           |                      | 0.58            | 6.9       | 86.8                           | 161                  | 0.37            | 7.4       | 96.8                           | 34                   | 0.97                 |
| 7800          | 79.8                           | 207                  | 4.24            | 50.4      | 86.9                           | 146                  | 3.00            | 60.2      | 96.8                           | 41                   | 1.17                 |
| 7930          | 79.7                           | 30                   | 0.72            | 8.6       | 86.9                           | 26                   | 0.65            | 13.0      | 97.0                           | 12                   | 0.34                 |
| 8140          | 79.7                           | 0                    | 0               | 0         | 86.9                           | 0                    | 0               | 0         | 97.1                           | 0                    | 0                    |

(1) Negative - downward flow

Equation:

$$Q = V \text{ (ft/min)} * \text{Cross Sectional Area (ft}^2\text{)} * 60 \text{ (min/hr)} * 24 \text{ (hr/day)} * 1/Bg \text{ (scf/ft}^3\text{)}$$

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TABLE 5BUILDUP DATA

| Time<br>(hrs) | Pws<br>(psig) | Pws<br>(psia) | $\psi$<br>(psia <sup>2</sup> /cp<br>$\times 10^6$ ) | $\Delta t$<br>(hrs) |
|---------------|---------------|---------------|-----------------------------------------------------|---------------------|
| 13.12         | 1539.75 (pwf) | 1554.4        | 162.22                                              | 0                   |
| 13.28         | 1568.36       | 1583.01       | 167.98                                              | 0.16                |
| 13.32         | 1661.23       | 1675.88       | 187.48                                              | 0.20                |
| 13.33         | 1662.19       | 1676.84       | 187.69                                              | 0.21                |
| 13.35         | 1663.145      | 1677.80       | 187.89                                              | 0.23                |
| 13.37         | 1663.14       | 1677.79       | 187.89                                              | 0.25                |
| 13.38         | 1665.06       | 1679.71       | 188.30                                              | 0.26                |
| 13.40         | 1666.00       | 1680.65       | 188.50                                              | 0.28                |
| 13.42         | 1666.01       | 1680.66       | 188.50                                              | 0.30                |
| 13.43         | 1666.93       | 1681.58       | 188.69                                              | 0.31                |
| 13.45         | 1667.93       | 1682.58       | 188.91                                              | 0.33                |
| 13.47         | 1667.93       | 1682.58       | 188.91                                              | 0.35                |
| 13.48         | 1668.88       | 1683.53       | 189.11                                              | 0.36                |
| 13.50         | 1668.88       | 1683.53       | 189.11                                              | 0.38                |
| 13.53         | 1668.88       | 1683.53       | 189.11                                              | 0.41                |
| 13.57         | 1669.84       | 1684.49       | 189.31                                              | 0.45                |
| 13.60         | 1670.80       | 1685.45       | 189.51                                              | 0.48                |
| 13.63         | 1671.75       | 1686.40       | 189.72                                              | 0.51                |
| 13.67         | 1671.75       | 1686.40       | 189.72                                              | 0.55                |
| 13.75         | 1671.75       | 1686.40       | 189.72                                              | 0.63                |
| 14.10         | 1674.62       | 1689.27       | 190.32                                              | 0.98                |
| 14.17         | 1674.62       | 1689.27       | 190.32                                              | 1.05                |
| 14.33         | 1675.50       | 1690.15       | 190.51                                              | 1.21                |
| 14.50         | 1674.62       | 1689.27       | 190.32                                              | 1.38                |
| 14.75         | 1676.54       | 1691.19       | 190.73                                              | 1.63                |
| 15.00         | 1677.49       | 1692.14       | 190.93                                              | 1.88                |
| 16.35         | 1679.41       | 1694.06       | 191.34                                              | 3.23                |

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TABLE 6  
RESERVOIR PARAMETERS

Skin (s) 6.6

Flow Capacity (kh) 1612 md.ft.

Individual Flow Capacity

| Sand             | Perforations<br>(feet) | kh<br>(md.ft) | k<br>(md) |
|------------------|------------------------|---------------|-----------|
| Toolachee        |                        |               |           |
| 74-5             | 7576-7582<br>7585-7592 | N.A.          | N.A.      |
| 75-5             | 7689-7711              | 707           | 32        |
| 76-0             | 7719-7727              | 80            | 10        |
| 76-0             | 7733-7756              | 113           | 5         |
| 76-0             | 7759-7770              | 99            | 9         |
| Lower Daralingie |                        |               |           |
| 77-3             | 7901-7910              | 584           | 65        |
| Epsilon          |                        |               |           |
| 79-0             | 8118-8134              | 33            | 2         |

## Equations

$$s' = 1.151 \left[ \frac{(\psi_{wf\ 2,0} - \psi_{wf\ 2,1})}{m} - \log \frac{k}{\phi \mu C_t r_w^2} + 3.23 \right]$$

(1)  $\psi_{wf\ 2,0}$  = flowing sandface pseudo pressure at time of changing flows.

(2)  $\psi_{wf\ 2,1}$  = flowing sandface pseudo pressure at  $t = 1$  on the straight line portion of the plot.

Based on Principle of Superposition.

$$kh = \frac{1.632 \times 10^6 (q_1 - q_2) T}{m}$$

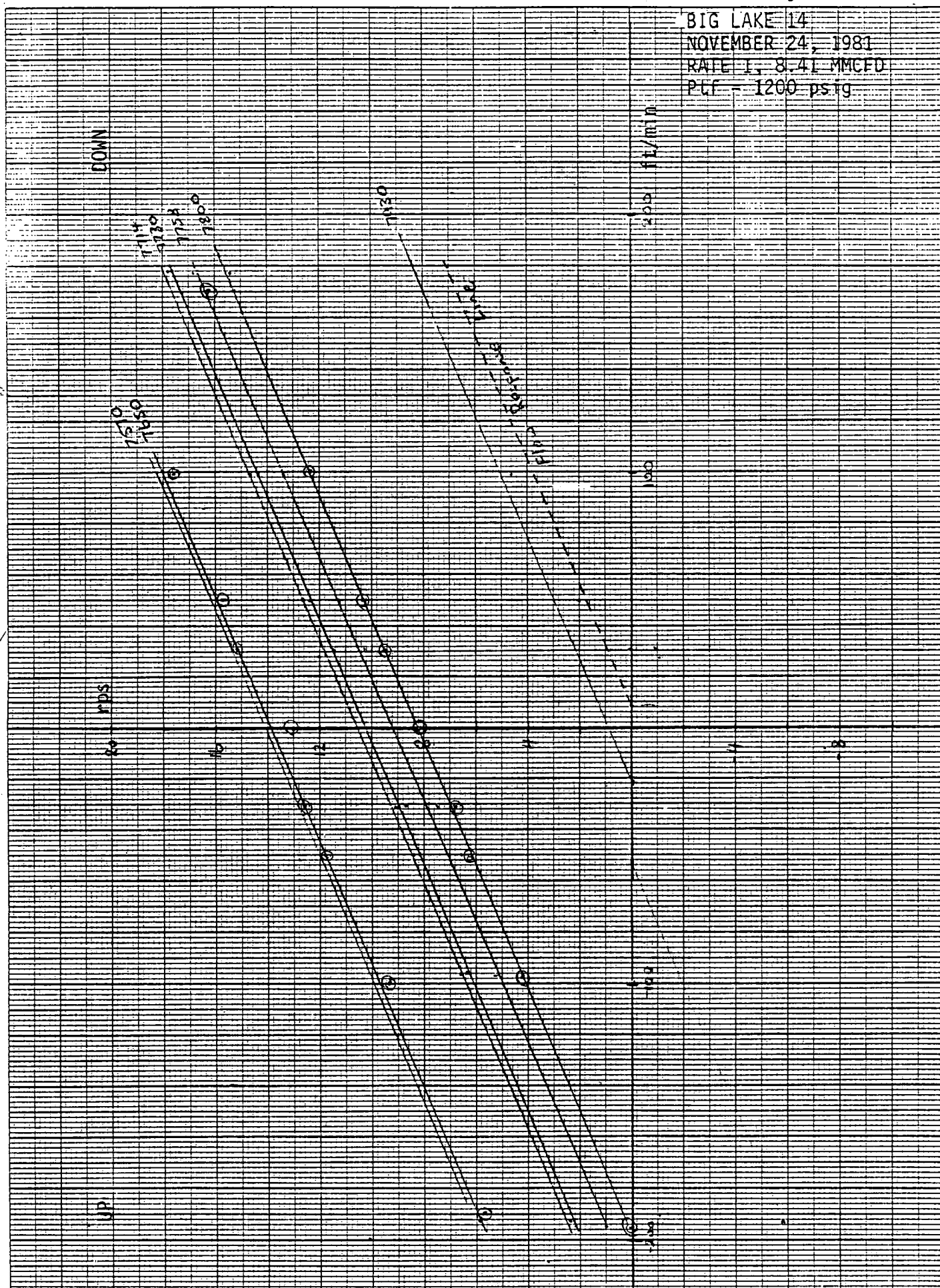
WP:2825N

TABLE 7  
FLOW RATE COMPARISON

| <u>Interval</u>   | <u>Dec. 1977</u> |            | <u>Nov. 1981, Rate 1</u> |            | <u>Nov. 1981, Rate 2</u> |            |
|-------------------|------------------|------------|--------------------------|------------|--------------------------|------------|
|                   | <u>Q(MMCFD)</u>  | <u>%</u>   | <u>Q(MMCFD)</u>          | <u>%</u>   | <u>Q(MMCFD)</u>          | <u>%</u>   |
| Toolachee:        |                  |            |                          |            |                          |            |
| (74-5) 7576-7592  | 0.48             | 3.6        | 0.16                     | 1.9        | 0.17                     | 3.4        |
| (75-5) 7689-7711  | 5.97             | 44.2       | 1.90                     | 22.6       | 0.40                     | 8.0        |
| (76-0) 7719-7727  | 0.70             | 5.2        | 0.17                     | 2.0        | 0                        | 0          |
| (76-0) 7733-7756  | 0.65             | 4.9        | 0.64                     | 7.6        | 0.40                     | 8.0        |
| (76-0) 7759-7770  | <u>0.37</u>      | <u>2.7</u> | <u>0.58</u>              | <u>6.9</u> | <u>0.37</u>              | <u>7.4</u> |
| Toolachee Total   | 8.17             | 60.6       | 3.45                     | 41.0       | 1.34                     | 26.8       |
| Lower Daralingie: |                  |            |                          |            |                          |            |
| (77-3) 7901-7910  | 3.65             | 27.1       | 4.24                     | 50.4       | 3.00                     | 60.2       |
| Epsilon:          |                  |            |                          |            |                          |            |
| (79-0) 8118-8134  | 1.66             | 12.3       | 0.72                     | 8.6        | 0.65                     | 13.0       |
|                   | 13.48 MMCFD      |            | 8.41 MMCFD               |            | 4.99 MMCFD               |            |
|                   | 1760 psig FWHP   |            | 1200 psig FWHP           |            | 1350 psig FWHP           |            |

Figure 1  
PLT Survey

BIG LAKE 14  
NOVEMBER 24, 1981  
RATE 1, 8.41 MMCFD  
PLF - 1200 psig



BIG LAKE 14  
NOVEMBER 24, 1981  
RATE 2, 4.99 MMCFD  
PLF = 1350 psig

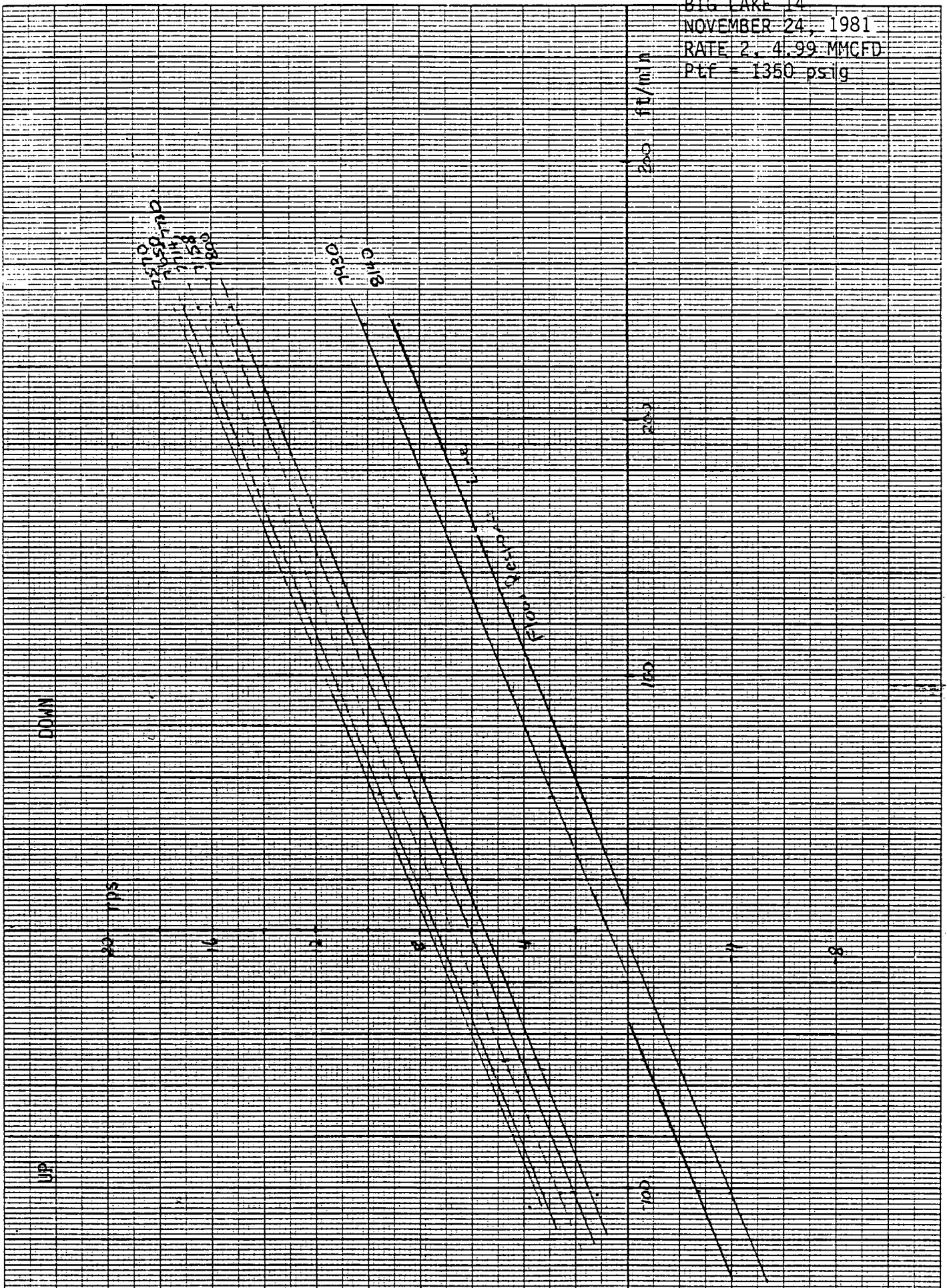


Figure 3 00063

PLT Survey

BIG LAKE 14

NOVEMBER 25, 1981

WELL SHUT IN - 15 HRS.

Pws - 1880 psig

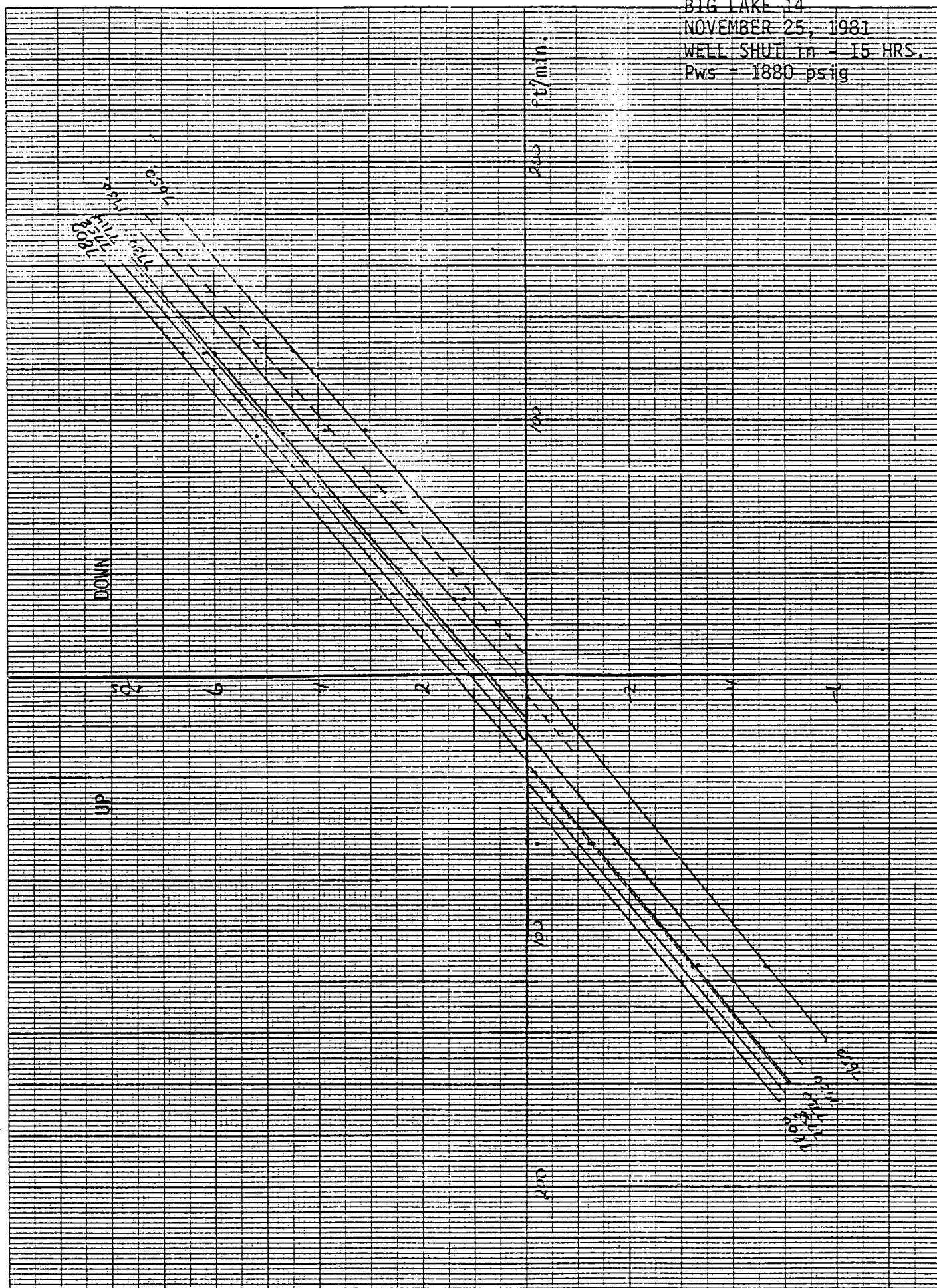


Figure 5  
Big Lake 14  
Buildup from Rate 2

48-3490  
KIEHL & ESSER CO. MICH. U.S.A.

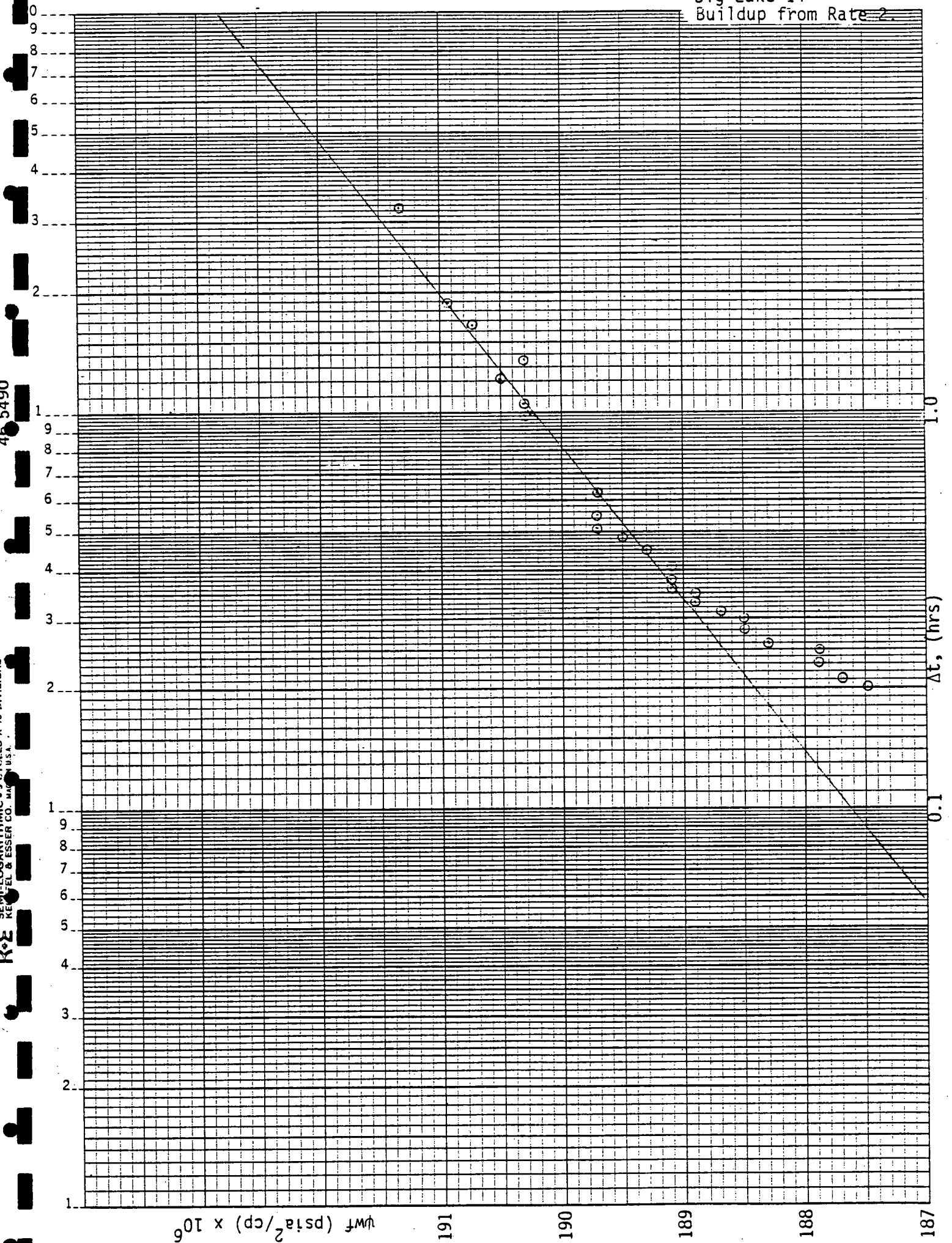
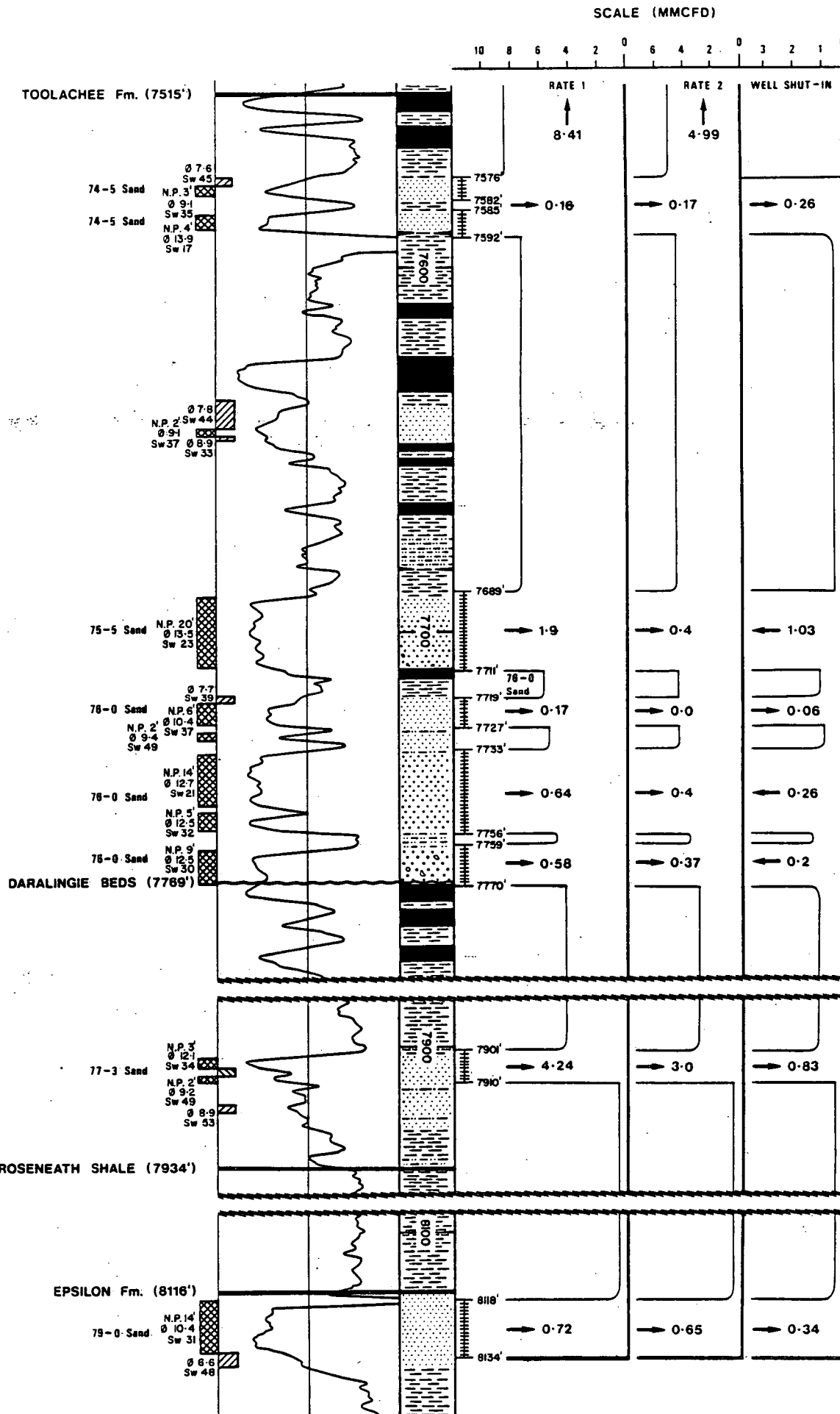


Figure 4  
Flow Diagram

BIG LAKE 14

PLT SURVEY 24 NOVEMBER 1981

00065



WP:3656N

SANTOS LIMITED  
RESERVOIR ENGINEERING  
BIG LAKE 14

PRODUCTION LOGGING SURVEY 27 FEBRUARY, 1984

REPORT NO: RE:178/84

AUTHOR: M.D. EVANS

DATE: 14/8/84

*OK*

1. INTRODUCTION

Big Lake #14, located in the south western portion of the Big Lake field, is perforated over several sands in the Toolachee Formation, Daralingie Beds and Epsilon Formation. A PLT (production logging tool) was run on 27 February 1984 to determine the relative flow contribution from each sand.

2. SUMMARY OF RESULTS

The well was logged at two different flow rates. This allowed the relative flow contribution of each sand under so called high and low rates of deliverability to be determined. As was the case in the 1981 PLT Survey the Lower Daralingie Beds and Epsilon Formation are the major producing sands. The production from each sand and the contribution to the total flow under the two flow rates are illustrated below.

| <u>Sand</u>         |      | <u>High Flow</u><br><u>Rate</u> | <u>% of</u><br><u>Total Flow</u> | <u>Low Flow</u><br><u>Rate</u> | <u>% of</u><br><u>Total Flow</u> |
|---------------------|------|---------------------------------|----------------------------------|--------------------------------|----------------------------------|
| TOOLACHEE           | 74-5 | 0.50                            | 7                                | 0.43                           | 7                                |
|                     | 75-5 | 0.63                            | 9                                | 0.86                           | 14                               |
|                     | 76-0 | <u>0.66</u>                     | <u>9</u>                         | <u>0.61</u>                    | <u>10</u>                        |
| Sub Total Toolachee |      | 1.79                            | 25                               | 1.90                           | 31                               |
|                     |      |                                 |                                  |                                |                                  |
| LOWER DARALINGIE    |      |                                 |                                  |                                |                                  |
| BEDS                | 77-3 | 4.16                            | 58                               | 3.40                           | 57                               |
|                     |      |                                 |                                  |                                |                                  |
| EPSILON             | 79-0 | <u>1.23</u>                     | <u>17</u>                        | <u>0.65</u>                    | <u>12</u>                        |
| Total               |      | 7.18                            | 100                              | 5.95                           | 100                              |

Additionally a buildup analysis was performed on the pressure transient resulting from the rate change. From this analysis a flow capacity of 1432 md-ft was derived which is consistent with the value of 1612 md-ft from the November 1981 PLT survey.

3. CONCLUSIONS

1. The Lower Daralingie Beds are the major gas producing sand in the well contributing 50 percent plus of the well's total flow rate. Comparison with the 1981 PLT and 1977 PLT indicates that the Daralingie Beds continue to deliver an ever increasing percentage of the well's production. While the Toolachee contribution has decreased, Epsilon production has stayed essentially constant at about 15% of the total.
2. The P/Z plot indicates that the well is accessing substantially more gas than in 1981. This additional GIP is in the Lower Daralingie Beds and Epsilon Formation outside the known field limits.
3. When the well is shut in to enable the liquids rich fields to come on stream substantial cross flow will occur donwhole from the Lower Daralingie Beds into the Toolachee formation.

4. RECOMMENDATIONS

1. An appraisal well to the south west of the Big Lake #24 should be drilled to determine the extent of the Epsilon Formation and Daralingie Beds beyond the presently mapped field limits.
2. A static gradient survey should be run in Big Lake #14 at two month intervals while the field is cut back for liquids rich gas production. This may allow qualitative estimates of the Lower Daralingie Beds and Epsilon Formation GIP which may exist outside the presently mapped field limits to be made.

5. TOOL CONFIGURATION

The PLT tool string was comprised of the following:

1. Gamma Ray - for depth control.
2. Thermometer - To locate zones of gas entry and obtain bottomhole temperatures for the calculation of  $1/B_g$ .
3. Strain Gauge - To measure pressures for  $1/B_g$  calculations.
4. Gradiomanometer - To measure fluid densities to determine gas and water entry.
5. Full bore spinner - To measure fluid velocities in the wellbore.

## 6. DISCUSSION

### 6.1 Survey Method

The well was assumed to have flowed at a stabilized rate and was temporarily shutin while the PLT tools were run in the hole. After the tool string was run below the perforations, the well was returned to 100% choke and flowed at an average rate of 7.4 MMSCFD as measured at the separator. This corresponded to a PLT measured value of 7.2 MMSCFD. Associated liquid rate was 21.5 bbls/day of water and condensate.

Six logging passes (three up and three down) were completed with the well on 100% choke. The well was then choked back to 5.95 MMSCFD as measured by the PLT string, 5.5 MMscfd as measured at the separator. Six logging passes were then made at this flow rate (three up and three down).

When the well was choked back to the second rate the resultant pressure transient was monitored by the PLT string at a depth of 7626.5 ft KB for 1.36 hours. Interpretation of this buildup allowed values of flow capacity, skin and turbulence to be calculated.

The buildup after the second flow rate was also monitored. No interpretation of this pressure transient was possible as the resultant buildup was affected by wellbore storage.

## 6.2 Calculations and Interpretation

Readings of spinner speed vs logging speed were obtained from the PLT survey at depths above and below each set of perforations for the two flow rates as shown in Tables 1 and 2. This data was then used to construct plots of spinner speed (revolutions per second) vs tool velocity (feet per minute) which are presented in Figures 1 and 2.

Using these plots an equation was determined to represent the gas velocity at various depths across the perforations. The  $B_g$  values were calculated from pressure and temperature data read off the PLT logs. The flow rates at various depths in the well were determined using the above information and are shown in Table 3. A graphical representation of the contribution of each sand under the two flow rates is shown in Figure 3. As the well was not logged under shut in conditions no determination of possible cross flow between the sands is possible.

At the end of the first flow rate the PLT was positioned at a depth of 7626.5' KB to monitor the pressure buildup created when the well was choked back to the second flow rate. The interpretation associated with this pressure transient analysis is presented in the Appendix.

The initial stages of the pressure buildup resulting from the well being shut in at the end of the survey was recorded. This data however, was subject to wellbore storage effects and no interpretation was possible.

No survey was performed while the well was shut in. The 1981 PLT however, showed gas crossflowing from the Lower Daralingie Beds into the Toolachee Formations at rates up to 1 MMscfd. Under dynamic conditions the relative flow contributions of the Lower Daralingie Beds has increased while the Toolachee Formation has decreased since the 1981 survey. Thus under shutin conditions crossflow rates would be expected to be larger than those recorded in 1981.

### 6.3 Comparison with 1977 PCT and 1981 PLT Surveys

Comparison of the 1984 PLT Survey with the two previous production surveys indicates the Lower Daralingie Beds are contributing an ever increasing percentage of Big Lake #14 gas production. These data are shown on Table 5.

In the 1977 Survey the Lower Daralingie Beds represented 27% of production. By the 1981 survey it had climbed to 50% and in the 1984 survey had reached 57% of the well's total production.

Coincident with the percentage increase in flow of the Lower Daralingie Beds has been the decrease in Toolachee production. The flow contribution of the Toolachee Formation fell from 60% in 1977 to 25% in 1984. During the period 1977 to 1984 gas production from the Epsilon Formation has been relatively constant at about 15% of the total.

The large reversal in relative production rates of the Toolachee Formation and Lower Daralingie Beds is a direct function of reservoir pressure. This in turn is an indication of the relative size of the two reservoirs. While the volumetrics of the Toolachee reservoir are controlled by gas water contacts, both the Epsilon Formation and Lower Daralingie Beds are mapped

based on lowest known gas. Thus, significant gas reserves may lie outside the presently defined field boundaries. The existence of this additional gas is in fact indicated by the relative flow rates of these two formations.

Volumetrically mapped reserves for the Lower Daralingie Beds initially totalled 13.3 BCF. Big Lake #14 production to the end of February 1984 was 25.4 BCF. Approximately 50% of the well's production can be attributed to the Lower Daralingie Beds. Thus, 12.7 BCF of Lower Daralingie Beds volumetric gas has been produced without a matching decline in reservoir pressure. This additional pressure support must therefore be from additional gas outside mapped field boundaries.

WP: 3656N(8)

TABLE 1FLOWMETER DATA

Rate #1 - 7.4 MMSCFD @ Ptf = 673 psig as measured at separator.

PLT measured rate of 7.18 MMscfd.

Spinner Speed Recorded in Revolutions per Minute

| <u>Cable Speed</u> | <u>Depth - KB</u> |      |      |      |      |      |      |
|--------------------|-------------------|------|------|------|------|------|------|
|                    | 7650              | 7714 | 7730 | 7758 | 7800 | 7930 | 8140 |
| Down at 33 ft/min  | 28.2              | 23.3 | 22.7 | 20.2 | 20.4 | 4.8  | 2.1  |
| 66 ft/min          | 30.0              | 25.3 | 24.2 | 22.0 | 22.2 | 6.8  | 4.0  |
| 100 ft/min         | 32.2              | 27.2 | 26.5 | 24.2 | 24.2 | 9.0  | 6.2  |
| Up at 33 ft/min.   | 23.8              | 18.8 | 18.2 | 15.6 | 16.4 | 0.0  | -2.3 |
| 66 ft/min          | 21.5              | 16.8 | 16.0 | 13.6 | 14.2 | -1.3 | -4.6 |
| 100 ft/min         | 20.0              | 14.7 | 14.2 | 12.2 | 12.3 | -3.0 | -6.5 |

WP: 365Q(8)

TABLE 2FLOWMETER DATA

Rate #2 - 5.5 MMSCFD @ Pft = 950 psig as measured at separator.

PLT measured rate of 5.95 MMscfd.

Spinner Speed Recorded in Revolutions Per Minute

| <u>Cable Speed</u> | <u>Depth - KB</u> |      |      |      |      |      |      |       |
|--------------------|-------------------|------|------|------|------|------|------|-------|
|                    | 7572              | 7650 | 7714 | 7730 | 7758 | 7800 | 7930 | 8140  |
| Down at 33 ft/min  | NL                | 18.6 | 16.3 | 15.8 | 14.2 | 14.5 | 3.8  | 2.2   |
| Down at 66 ft/min  | NL                | 21.7 | 18.4 | 18.0 | 16.3 | 16.4 | 5.7  | 4.0   |
| Down at 106 ft/min | NL                | 24.5 | 20.8 | 20.5 | 19.2 | 18.7 | 8.4  | 6.5   |
| Tool Stationary    | 18.4              | 16.7 | NL   | NL   | NL   | NL   | NL   | NL    |
| Up at 33 ft/min.   | NL                | 14.5 | 12.0 | 11.5 | 10.2 | 10.4 | 0.0  | -2.4  |
| Up at 69 ft/min    | NL                | 12.2 | 10.0 | 9.7  | 8.0  | 7.8  | -2.2 | -4.6  |
| Up at 125 ft/min   | NL                | 8.8  | 6.1  | 5.5  | 4.2  | 4.3  | -6.1 | -10.3 |

WP: 3656N (12)

TABLE 3  
Bg, V, Q

| Depth<br>(ft) | 1/Bg<br>(SCF/ft <sup>3</sup> ) | Velocity<br>(ft/min) | Cumulative<br>Flow<br>(MMSCFD) | Interval<br>Flow<br>(MMSCFD) | % Flow<br>of Total | 1/Bg<br>(SCF/ft <sup>3</sup> ) | Velocity<br>(ft/min) | Cumulative<br>Flow<br>(MMSCFD) | Interval<br>Flow<br>(MMSCFD) | % Flow<br>of Total |
|---------------|--------------------------------|----------------------|--------------------------------|------------------------------|--------------------|--------------------------------|----------------------|--------------------------------|------------------------------|--------------------|
| 7572          | NL                             | NL                   | 7.18                           | 0.50*                        | 7                  | 65.4                           | 294.3                | 5.95                           | 0.43                         | 7                  |
| 7650          | 52.0                           | 415.5                | 6.68                           | 0.63                         | 9                  | 65.7                           | 271.6                | 5.52                           | 0.86                         | 14                 |
| 7714          | 57.4                           | 340.9                | 6.05                           | 0.17                         | 2                  | 66.3                           | 227.1                | 4.66                           | 0.18                         | 3                  |
| 7730          | 57.4                           | 331.4                | 5.88                           | 0.49                         | 7                  | 66.3                           | 218.5                | 4.48                           | 0.43                         | 7                  |
| 7758          | 57.5                           | 302.8                | 5.39                           | 0.0                          | 0                  | 66.3                           | 197.4                | 4.05                           | 0                            | 0                  |
| 7800          | 57.5                           | 302.8                | 5.39                           | 4.16                         | 58                 | 66.4                           | 197.4                | 4.05                           | 3.40                         | 57                 |
| 7930          | 57.3                           | 69.5                 | 1.23                           | 1.23                         | 17                 | 66.5                           | 31.4                 | 0.65                           | 0.65                         | 12                 |
| 8140          | 58.5                           | 0                    | 0                              | 0                            | 0                  | 66.4                           | 0                    | 0                              | 0                            | 0                  |

\* Estimated value as well not logged at 7570' KB on first flow rate

Rate 1:  $V = (RPS/6.3) * 100 + 6.0$  ) V in feet per minute

Rate 2:  $V = (RPS/6.4) * 100 + 6.0$  )

$Q = V \text{ ft/min.} * \text{casing cross sectional area} * 60 \text{ Min/Hour} * 24 \text{ Hours/Day} * 1/Bg \text{ for } Q \text{ in MMSCFD}$

For 7", 26 # casing inside diameter is 6.276"

$\therefore \text{Cross sectional area} = \frac{\pi (6.276)^2}{4 * 144} = 0.2148 \text{ ft}^2$

00075

WP: 3656N(13)

T A B L E 4

BIG LAKE #14  
INDIVIDUAL SAND FLOW RATES

| FLOW RATE                    |                               |                           |                            |
|------------------------------|-------------------------------|---------------------------|----------------------------|
| Sand                         | Perforated<br>Interval<br>'KB | Rate 1                    | Rate 2                     |
|                              |                               | Ptf =673 psig<br>(MMSCFD) | Ptf = 950 psig<br>(MMSCFD) |
| <u>Toolachee</u>             |                               |                           |                            |
| 74-5                         | 7576'-7582'<br>7585'-7592'    | * 0.50                    | 0.43                       |
| 75-5                         | 7689'-7711'                   | 0.63                      | 0.86                       |
| 76-0                         | 7719'-7727'                   | 0.17                      | 0.18                       |
| 76-0                         | 7733'-7756'                   | 0.49                      | 0.43                       |
| 76-0                         | 7759'-7770'                   | <u>0.00</u>               | <u>0.00</u>                |
| Sub Total Toolachee          |                               | 1.79                      | 1.90                       |
| <u>Lower Daralingie Beds</u> |                               |                           |                            |
| 77-3                         | 7901'-7910'                   | 4.16                      | 3.40                       |
| <u>Epsilon</u>               |                               |                           |                            |
| 79-0                         | 8118'-8134'                   | <u>1.23</u>               | <u>0.65</u>                |
| Total Flow                   |                               | 7.18                      | 5.95                       |

\* Estimated Flow rate based on stationary reading from second flow as these perforations not logged under first flow.

WP:3656N(15)

TABLE 5  
FLOW RATE COMPARISON

| Interval          | Dec. 1977      |            | Nov. 1981, Rate 1 |            | Nov. 1981, Rate 2 |            | Feb. 1984 Rate 1 |            | Feb. 1984, Rate 2 |            |
|-------------------|----------------|------------|-------------------|------------|-------------------|------------|------------------|------------|-------------------|------------|
|                   | Q (MMCFD)      | %          | Q (MMCFD)         | %          | Q (MMCFD)         | %          | Q (MMCFD)        | %          | Q (MMCFD)         | %          |
| Toolachee:        |                |            |                   |            |                   |            |                  |            |                   |            |
| (74-5) 7576-7592  | 0.48           | 3.6        | 0.16              | 1.9        | 0.17              | 3.4        | 0.50             | 7.0        | 0.43              | 7.2        |
| (75-5) 7689-7711  | 5.97           | 44.2       | 1.90              | 22.6       | 0.40              | 8.0        | 0.63             | 8.8        | 0.86              | 14.5       |
| (76-0) 7719-7727  | 0.70           | 5.2        | 0.17              | 2.0        | 0                 | 0          | 0.17             | 2.4        | 0.18              | 3.0        |
| (76-0) 7733-7756  | 0.65           | 4.9        | 0.64              | 7.6        | 0.40              | 8.0        | 0.49             | 6.8        | 0.43              | 7.2        |
| (76-0) 7759-7770  | <u>0.37</u>    | <u>2.7</u> | <u>0.58</u>       | <u>6.9</u> | <u>0.37</u>       | <u>7.4</u> | <u>0.00</u>      | <u>0.0</u> | <u>0.00</u>       | <u>0.0</u> |
| Toolachee Total   | 8.17           | 60.6       | 3.45              | 41.0       | 1.34              | 26.8       | 1.79             | 25.0       | 1.90              | 31.9       |
| Lower Daralingie: |                |            |                   |            |                   |            |                  |            |                   |            |
| (77-3) 7901-7910  | 3.65           | 27.1       | 4.24              | 50.4       | 3.00              | 60.2       | 4.16             | 57.9       | 3.40              | 57.2       |
| Epsilon:          |                |            |                   |            |                   |            |                  |            |                   |            |
| (79-0) 8118-8134  | 1.66           | 12.3       | 0.72              | 8.6        | 0.65              | 13.0       | 1.23             | 17.1       | 0.65              | 10.9       |
|                   | 13.48 MMCFD    |            | 8.41 MMCFD        |            | 4.99 MMCFD        |            | 7.18 MMCFD       |            | 5.95 MMCFD        |            |
|                   | 1760 PSIG FWIP |            | 1200 PSIG FWIP    |            | 1350 PSIG FWIP    |            | 673 PSIG FWIP    |            | 950 PSIG FWIP     |            |

MDE/sc  
3/8/84

00077

# BIG LAKE 14 PLT SURVEY

27 FEBRUARY 1984

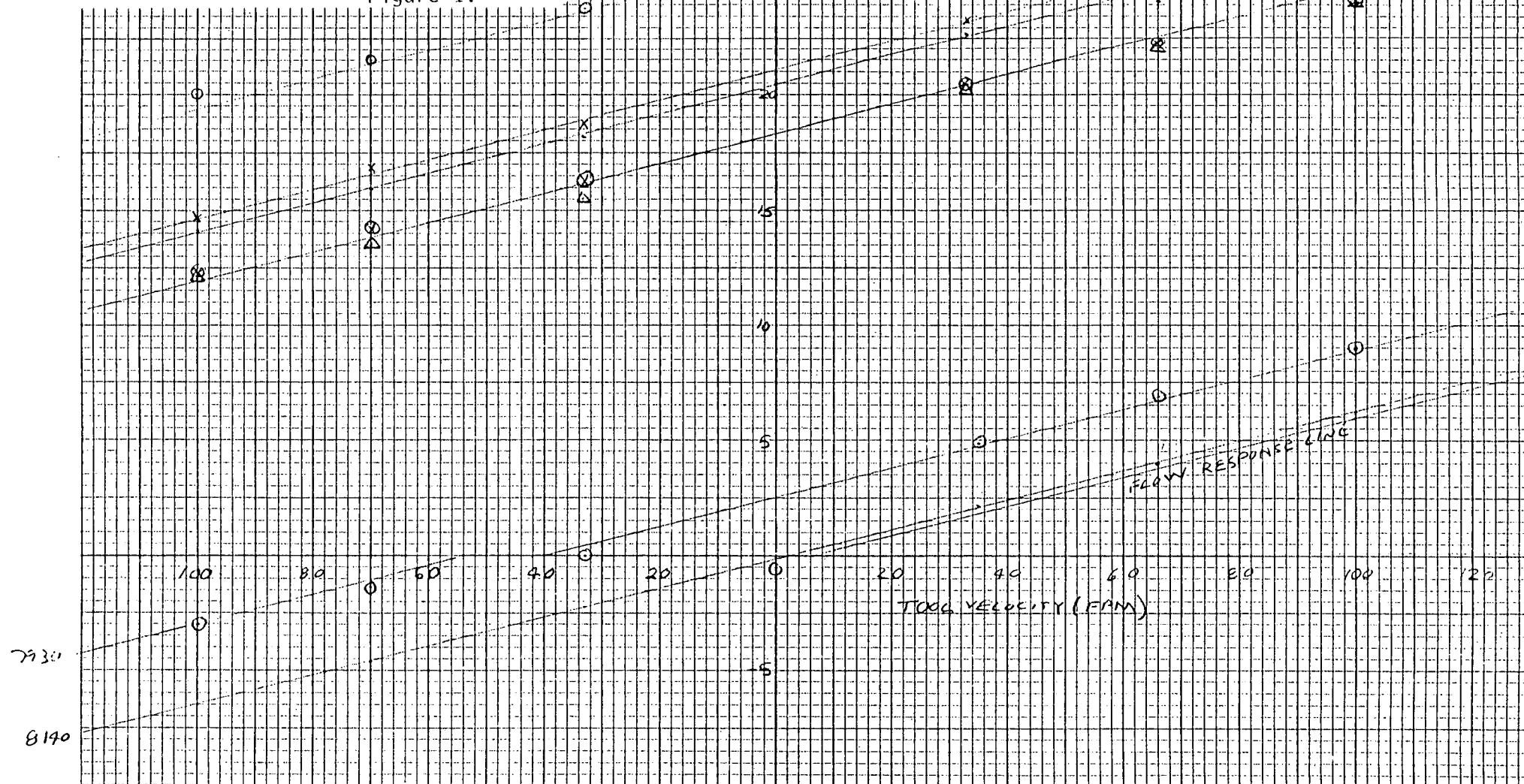
RATE ONE - 7.18 MMSCFD

FLOW RESPONSE LINE SLOPE

6.3 RPS/100 PPM

X-Axis intercept 6.0

Figure 1.



7650

7714

7730

7758, 7800

7930

00078

# BIG LAKE 14 PLT SURVEY

27 FEBRUARY 1984

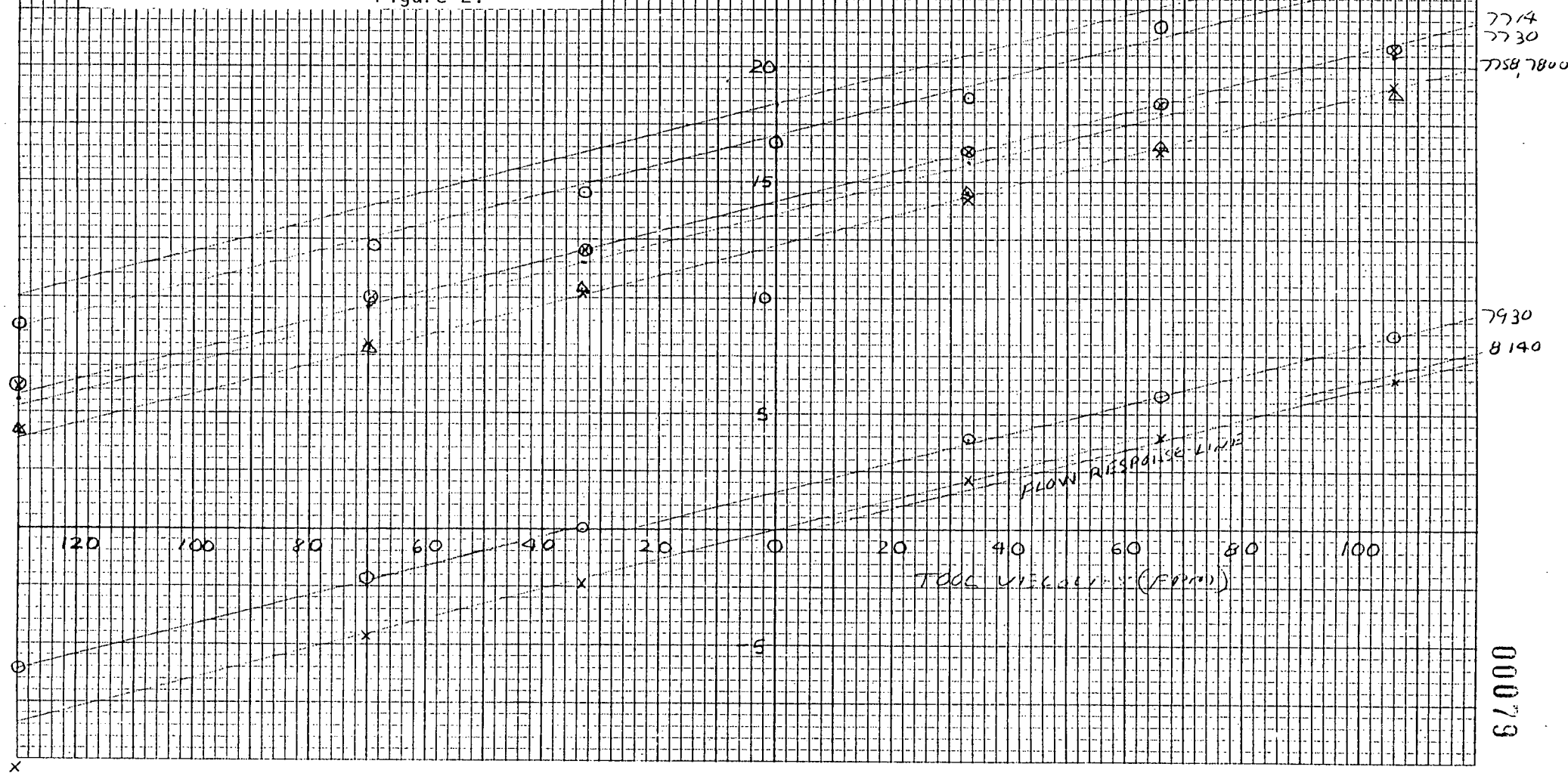
RATE TWO - 5.95 MMSCFD

FLOW RESPONSE LINE SLOPE

6.4 rps/100 FPM

X-Axis intercept 6.0

Figure 2.



00079

## BIG LAKE 14

## PLT SURVEY

27 FEBRUARY 1984

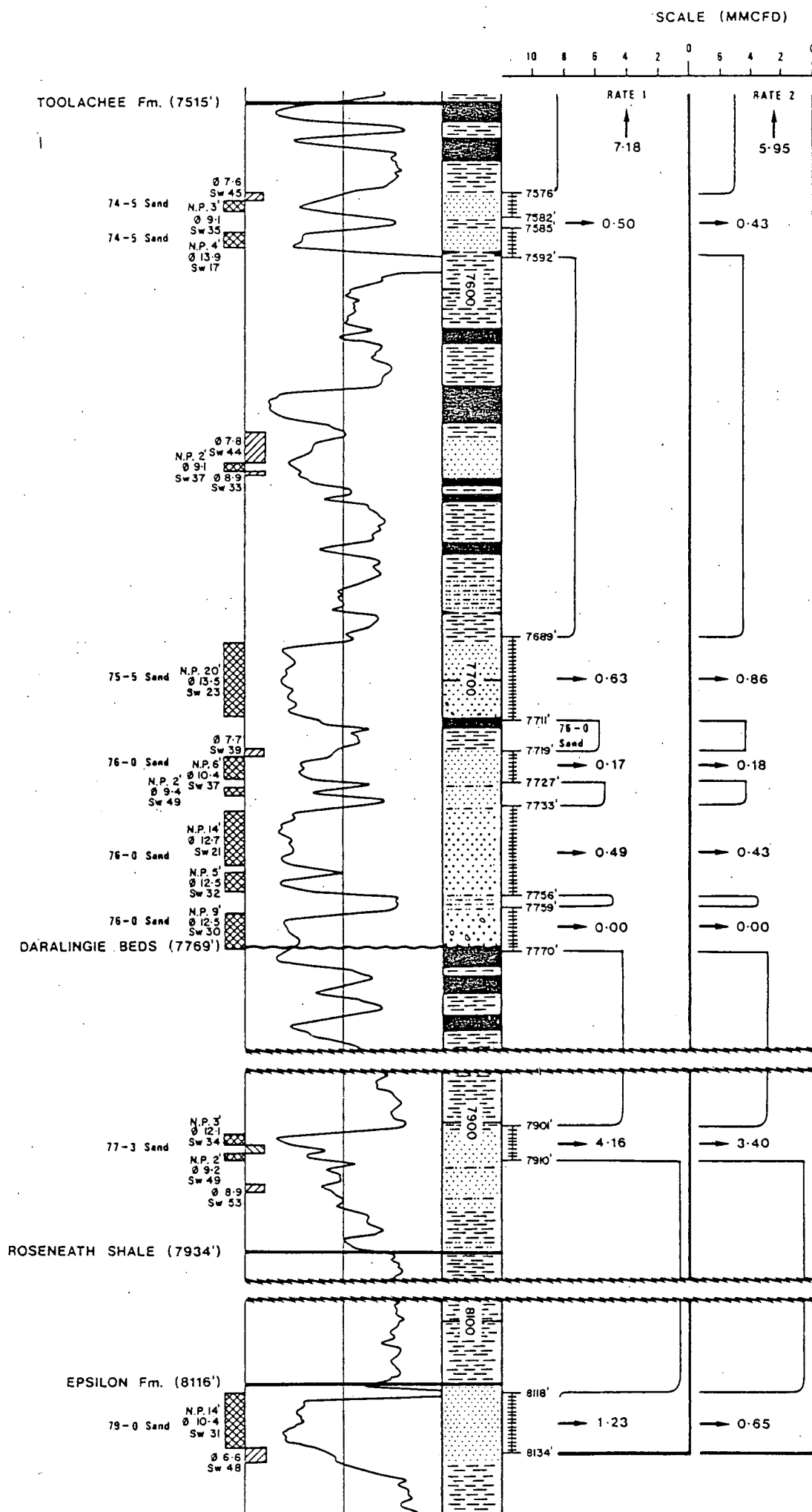


Fig. 3

APPENDIX

PRESSURE TRANSIENT ANALYSIS OF BUILDUP  
BETWEEN TWO FLOW RATES

WP: 3656N (10)

BIG LAKE 14ANALYSIS OF PRESSURE BUILDUP BETWEEN TWO FLOW RATES

As well was producing before PLT survey assume  $t$  is time to stabilization.

Thus  $t = 1600 \phi \mu \frac{re^2}{K P_R}$  for an estimate assume

$t = 734$  hours

$\phi = 0.122$   
 $\mu = 0.016$  cp  
 $P_R = 1800$  psia  
 $re = 3680$   
 $k = 20$   
 $q_1 = 7.18$  MSCFD  
 $q_2 = 4.95$  MSCFD

On arithmetic co-ordinates plot

$$\Delta \psi_{wf} \text{ vs } \log \frac{(t + \Delta t)}{(\Delta t)} + \frac{q_2}{q_1} \log \Delta t$$

| $\Delta t$<br>hrs | $P_{wf}$<br>psia | $\psi_{wf}$<br>$10^6$ psia <sup>2</sup> /cp | "LOG TERM" |
|-------------------|------------------|---------------------------------------------|------------|
| .02               | 1149             | 90.0                                        | 3.16       |
| .05               | 1149             | 90.0                                        | 3.09       |
| .07               | 1150             | 90.2                                        | 3.06       |
| .12               | 1209             | 99.4                                        | 3.02       |
| .15               | 1259             | 107.7                                       | 3.01       |
| .21               | 1286             | 112.1                                       | 2.98       |
| .26               | 1294             | 113.5                                       | 2.97       |
| .29               | 1297             | 114.0                                       | 2.96       |
| .35               | 1299             | 114.3                                       | 2.94       |
| .45               | 1301             | 114.9                                       | 2.93       |
| .52               | 1303             | 115.3                                       | 2.91       |
| .59               | 1304             | 115.4                                       | 2.91       |
| .67               | 1304             | 115.4                                       | 2.90       |
| .85               | 1305             | 115.6                                       | 2.88       |
| .95               | 1307             | 116.0                                       | 2.87       |
| 1.00              | 1307             | 116.0                                       | 2.87       |
| 1.10              | 1307             | 116.0                                       | 2.86       |
| 1.25              | 1307             | 116.10                                      | 2.85       |
| 1.35              | 1308             | 116.14                                      | 2.84       |

$$kh = \frac{1.632 \times 10^6 q_1 T}{m}$$

$$= 1432 \text{ md-ft.}$$

$$m = 6.0 \times 10^6 \text{ psia}^2/\text{cp}$$

$$T = 733^\circ\text{R}$$

$$K = \frac{kh}{h} = 17.9 \text{ md}$$

$$h = 80'$$

#### Calculation of Skin and Turbulence

|             |                             |                                                       |                                                       |
|-------------|-----------------------------|-------------------------------------------------------|-------------------------------------------------------|
| <u>Data</u> | $T = 733^\circ\text{R}$     | $P_i = 1837 \text{ psia}$                             | $\psi_i = 233.6 \times 10^6 \text{ psia}^2/\text{cp}$ |
|             | $K = 17.9 \text{ md}$       | $\psi_{wf} = 90 \times 10^6 \text{ psia}^2/\text{cp}$ |                                                       |
|             | $\phi = 0.122$              | $\mu_i = 0.016$                                       |                                                       |
|             | $r_w = 0.354 \text{ ft}$    | $C_i = 4.12 \times 10^{-4}$                           |                                                       |
|             | $q_1 = 7.18 \text{ MMSCFD}$ | $q_2 = 5.95 \text{ MMSCFD}$                           |                                                       |

#### Before Rate Change

$$\psi_i - \psi_{wf} = \frac{1.632 \times 10^6 q_1 T}{kh} \left[ \log t + \log \left( \frac{k}{\phi \mu_i C_i r_w^2} \right) - 3.23 + 0.869 S_1' \right]$$

$$\text{From which } S_1' = 16.55$$

#### After Rate Change

$$\text{As } \frac{t+1}{t} = \frac{734+1}{734} \approx 1 \text{ the following may be used:}$$

$$q_1 S_1' - q_2 S_2' = \frac{(\psi_{wf1} - \psi_{wf})}{0.869 m} q_1 - \frac{(q_1 - q_2)}{0.869} \left[ \log \left( \frac{k}{\phi \mu_i C_i r_w^2} \right) - 3.23 \right]$$

$$\text{From plot } \psi_{wf1} = 116.0$$

$$\text{Thus solving above } S_2' = 15.14$$

There as  $S' = S + S_q$ . The following two equations and two unknown result.

$$1. \quad 16.55 = S + 7.18 D$$

$$2. \quad 15.14 = S + 5.95 D$$

Solving above simultaneously.

$$S = 8.32$$

$$D = 1.14$$

$\psi_{wf} \times 10^6$

116

114

112

110

108

106

104

102

100

2.8

2.9

3.0

3.1

3.2

3.3

"LOG TERM"

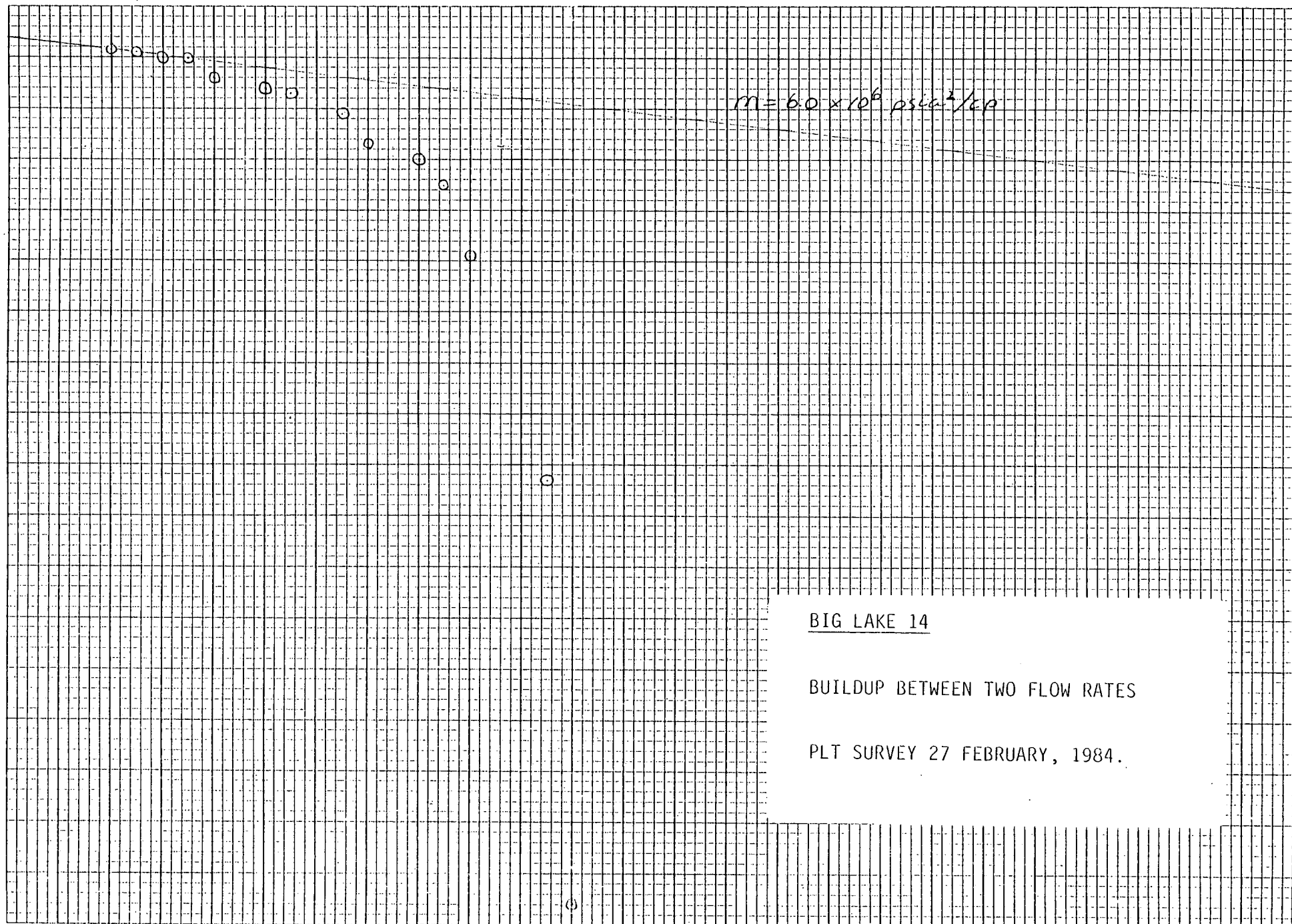
$m = 6.0 \times 10^6 \text{ psia}^2/\text{cp}$

BIG LAKE 14

BUILDUP BETWEEN TWO FLOW RATES

PLT SURVEY 27 FEBRUARY, 1984.

00084



00085

## SANTOS EXPLORATION DATA BASE

## WATER ANALYSIS

WELL: BIG LAKE

15

LAB: AMDEL

TEST: PROD

DATE: 00/11/1984

SAMPLE: .

DEPTH: - FT (KB)

- FT (SUBSEA)

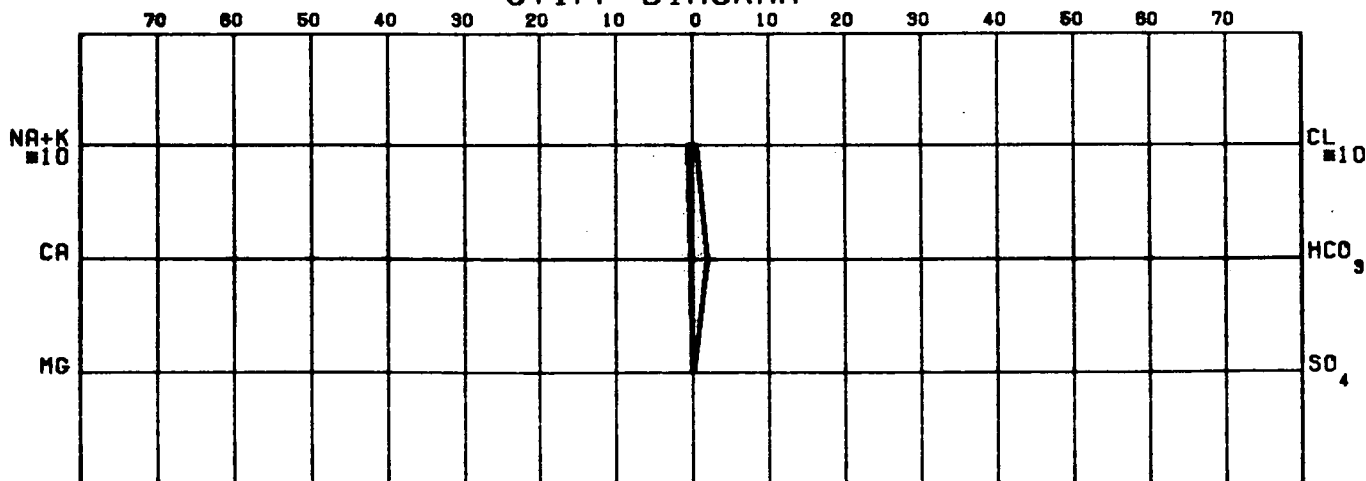
FORMATION:

COMMENT: IMBALANCE DUE TO PRESENCE OF AMMONIA; TOOLACHEE

| CATIONS       | MG/L  | MEQ/L | ANIONS       | MG/L  | MEQ/L |
|---------------|-------|-------|--------------|-------|-------|
| SODIUM        | 190.0 | 5.7   | CHLORIDE     | 188.0 | 5.3   |
| POTASSIUM     | 2.0   | 0.1   | BICARBONATE  | 118.0 | 2.0   |
| CALCIUM       | 3.5   | 0.2   | CARBONATE    |       |       |
| MAGNESIUM     | 0.3   | 0.0   | SULPHATE     | 7.9   | 0.2   |
| IRON          |       |       | NITRATE      | 4.0   | 0.1   |
|               |       |       | HYDROXIDE    |       |       |
| TOTAL CATIONS | 135.8 | 5.9   | TOTAL ANIONS | 318.9 | 7.5   |

ION BALANCE: -11.8 %  
 TOTAL DISSOLVED SOLIDS: 394.0 MG/L  
 MEASURED RESISTIVITY: 11.800 OHM-M AT TEMP 77. F 25. C  
 SODIUM TO TOTAL CATION RATIO: 95.8 %  
 PH: 6.6  
 SODIUM CHLORIDE EQUIVALENT: 374.  
 EQUIVALENT RW AT 75 F: 13.40

## STIFF DIAGRAM





# WIRELINE REPORT

00086

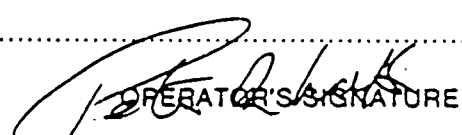
WELL: BIG LAKE #14

DATE: 6/11/84

PROGRAM: RUN. 1.750 BLIND BOX.

PURPOSE OF WORK: T.D. + DUMMY RUN TUBING.

REPORT OF WORK PERFORMED: Rig up BOP's. - 100% HOLD ON  
TEST. RUN 1.750 BLIND BOX TO 8201, SAT  
DOWN, P.U. JBS OPEN @ 8199, Pull to 8100 AND  
REPEAT. - P.O.H. Rig DOWN

  
OPERATOR'S SIGNATURE

WORK PERFORMED BY: P. R. Watts OF EXPERT

## WELL DATA:

Tubing Size: 3 1/2 / 2 7/8 FWHP: NA SIWHP: 1379

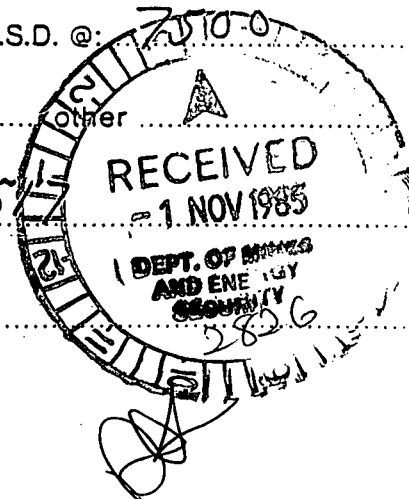
Sub Surface S.V./Landing Nipple @ ..... S.S.D. @: 7510.0

"X" Nipple @ ..... "N"/"XN" Nipple @ 7527

Min I.D. 2.205 " @ 7527 Packer @ 7527

Perforated Interval: 7576 - 8134

Forward to: Petroleum Engineering - Adelaide  
Production Department - Moomba





**\*\* BIG LAKE 14 \*\***

**STATIC PRESSURE GRADIENT**

TEST DATE: 6/11/84

| DEPTH<br>(FT.) | TOP PRESSURE ELEMENT<br>28515/3000 |                    |                      | BOTTOM PRESSURE ELEMENT<br>62044/3000 |                    |                      |
|----------------|------------------------------------|--------------------|----------------------|---------------------------------------|--------------------|----------------------|
|                | DEFLECTION<br>(INCHES)             | PRESSURE<br>(PSIG) | GRADIENT<br>(PSI/FT) | DEFLECTION<br>(INCHES)                | PRESSURE<br>(PSIG) | GRADIENT<br>(PSI/FT) |
| LUB            | 0.8890                             | 1372.1             | ----                 | 0.8800                                | 1375.7             | ----                 |
| 1000           | 0.9150                             | 1412.6             | 0.0405               | 0.9050                                | 1414.7             | 0.0391               |
| 2000           | 0.9400                             | 1451.6             | 0.0390               | 0.9300                                | 1453.8             | 0.0391               |
| 3000           | 0.9630                             | 1487.4             | 0.0358               | 0.9540                                | 1491.3             | 0.0375               |
| 4000           | 0.9860                             | 1523.3             | 0.0359               | 0.9770                                | 1527.3             | 0.0360               |
| 5000           | 1.0070                             | 1556.0             | 0.0327               | 0.9990                                | 1561.7             | 0.0344               |
| 6000           | 1.0280                             | 1588.8             | 0.0327               | 1.0210                                | 1596.1             | 0.0344               |
| 7000           | 1.0470                             | 1618.4             | 0.0296               | 1.0430                                | 1630.5             | 0.0344               |
| 7500           | 1.0590                             | 1637.1             | 0.0374               | 1.0530                                | 1646.2             | 0.0313               |
| 7855           | 1.0670                             | 1649.6             | 0.0352               | 1.0620                                | 1660.3             | 0.0397               |
| LUB            | 0.8870                             | 1369.0             | ----                 | 0.8830                                | 1380.3             | ----                 |

Element 28515/3000 calibrated 6/10/84.

Element 62044/3000 calibrated 6/10/84

B H T 284 F

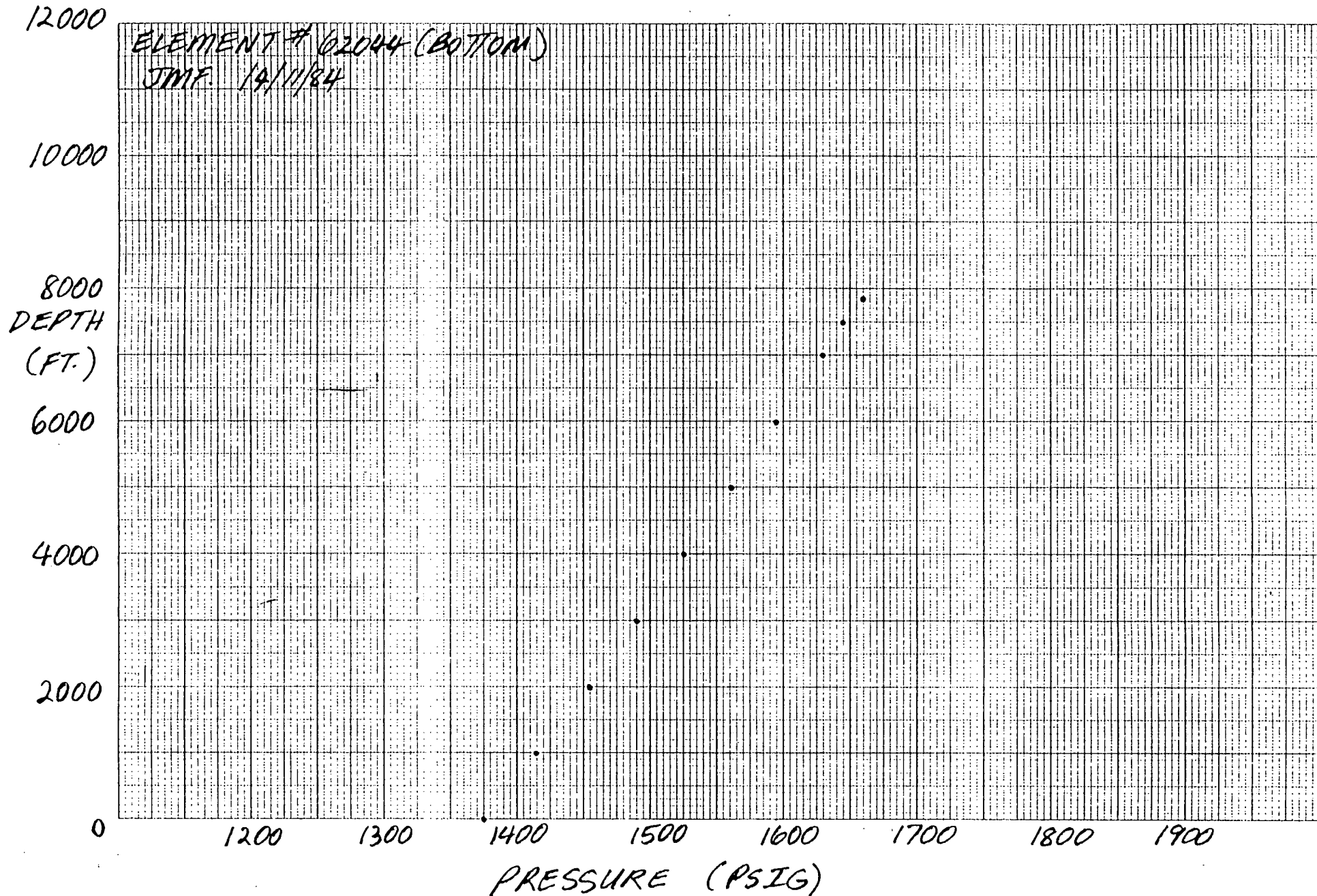
LUBRICATOR PRESSURE SUMMARY

| TYPE OF MEASUREMENT | ON ENTRY | ON EXIT |
|---------------------|----------|---------|
| Deadweight Tester   | 1377     | 1379    |
| Element 28515/3000  | 1372.1   | 1369.0  |
| Element 62044/3000  | 1375.7   | 1380.3  |

BIG LAKE #14

STATIC PRESSURE GRADIENT

6/11/84



00088



**\*\* BIG LAKE 14 \*\***

**STATIC PRESSURE GRADIENT**

TEST DATE: 7/12/84

| DEPTH<br>(FT.) | TOP PRESSURE ELEMENT<br>56431/3000 |                    |                      | BOTTOM PRESSURE ELEMENT<br>62039/3000 |                    |                      |
|----------------|------------------------------------|--------------------|----------------------|---------------------------------------|--------------------|----------------------|
|                | DEFLECTION<br>(INCHES)             | PRESSURE<br>(PSIG) | GRADIENT<br>(PSI/FT) | DEFLECTION<br>(INCHES)                | PRESSURE<br>(PSIG) | GRADIENT<br>(PSI/FT) |
| LUB            | 0.8970                             | 1396.2             | ----                 | 0.8630                                | 1385.4             | ----                 |
| 1000           | 0.9230                             | 1436.8             | 0.0406               | 0.8880                                | 1425.8             | 0.0404               |
| 2000           | 0.9480                             | 1475.8             | 0.0390               | 0.9120                                | 1464.6             | 0.0388               |
| 3000           | 0.9730                             | 1514.8             | 0.0390               | 0.9350                                | 1501.7             | 0.0372               |
| 4000           | 0.9980                             | 1553.9             | 0.0390               | 0.9590                                | 1540.5             | 0.0388               |
| 5000           | 1.0200                             | 1588.2             | 0.0344               | 0.9810                                | 1576.1             | 0.0356               |
| 6000           | 1.0420                             | 1622.6             | 0.0344               | 1.0020                                | 1610.0             | 0.0339               |
| 7000           | 1.0650                             | 1658.5             | 0.0359               | 1.0230                                | 1644.0             | 0.0339               |
| 7855           | 1.0840                             | 1688.2             | 0.0347               | 1.0410                                | 1673.1             | 0.0340               |
| LUB            | 0.8990                             | 1399.3             | ----                 | 0.8600                                | 1380.6             | ----                 |

GENERAL REMARKS:

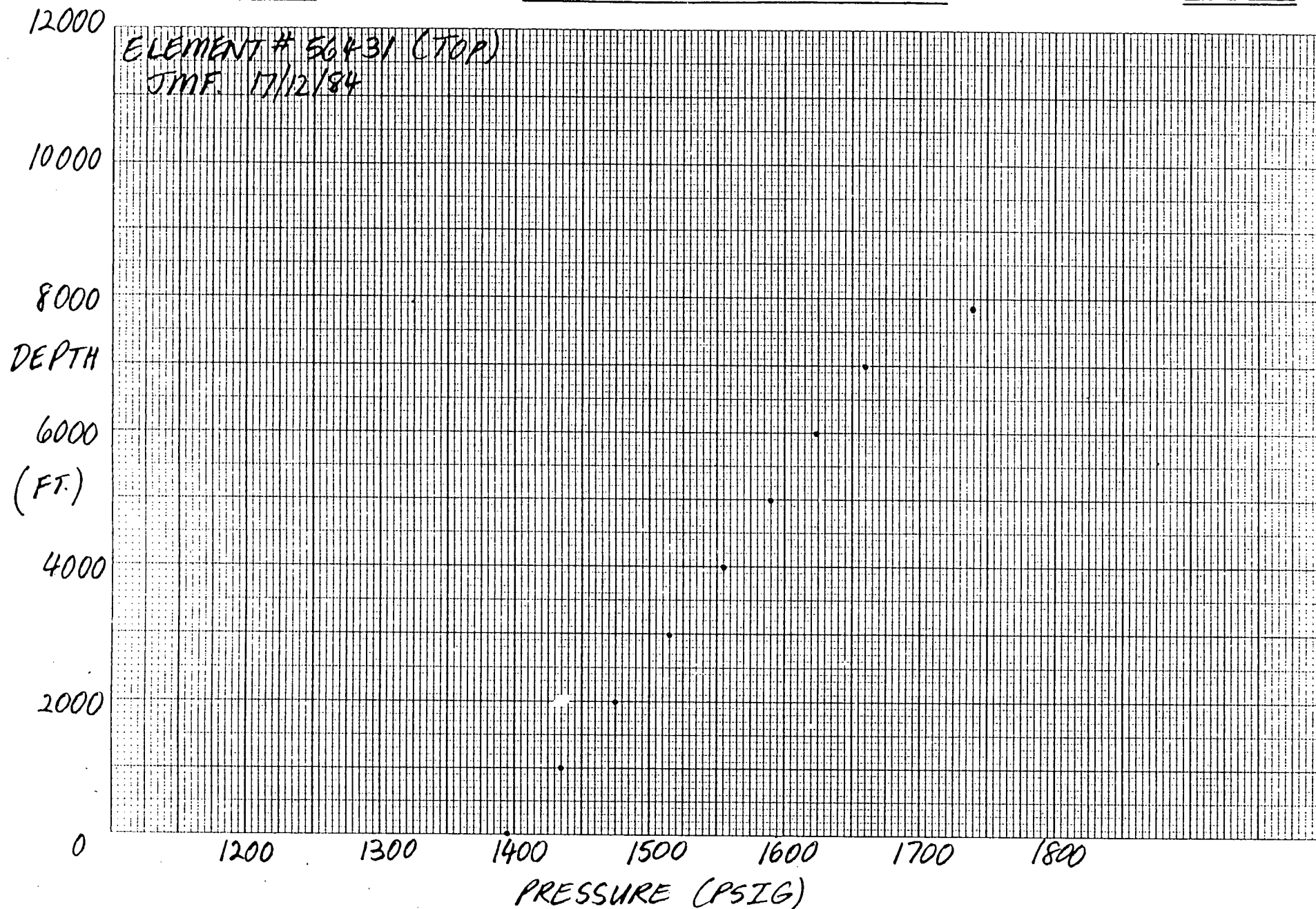
DWT IN: 1401  
DWT OUT: 1401  
MAX BHT: 282 F

ELEMENT 56431/3000 CALIBRATED 30/11/84  
ELEMENT 62039/3000 CALIBRATED 30/11/84

BIG LAKE #14

STATIC PRESSURE GRADIENT

7/12/84



00000



# WIRELINE REPORT

00091

WELL: Big Lake 14

DATE: 15/1/85

PROGRAM: Blind Box Run

PURPOSE OF WORK: To tag bottom + clear tubing of obstructions

REPORT OF WORK PERFORMED: Rig up R.I.H. with 1.75" blind box. Tag bottom @ 8222' K.B. P.O.C.H. No obstructions encountered.

Paul J. Douglas

OPERATOR'S SIGNATURE

WORK PERFORMED BY: Douglas / Bowyer OF Expertest

## WELL DATA:

Tubing Size: 3 1/2" - 2 7/8" FWHP: — SIWHP: 1424 psi

Sub Surface S.V./Landing Nipple @ 7527' S.S.D. @ 7500'

"X" Nipple @ — "N"/"XN" Nipple @ — other —

Min I.D. 2.205 " @ 7527' Packer @ 7517'

Perforated Interval: 7576' - 7770' ; 7901' - 7910' ; 8118' - 8134'

Forward to: Petroleum Engineering — Adelaide  
Production Department — Moomba



**\*\* BIG LAKE14 \*\***

**STATIC PRESSURE GRADIENT**

TEST DATE: 15/1/85

| DEPTH<br>(FT.) | TOP PRESSURE ELEMENT<br>22418/4000 |                    |                      | BOTTOM PRESSURE ELEMENT<br>29321/4000 |                    |                      |
|----------------|------------------------------------|--------------------|----------------------|---------------------------------------|--------------------|----------------------|
|                | DEFLECTION<br>(INCHES)             | PRESSURE<br>(PSIG) | GRADIENT<br>(PSI/FT) | DEFLECTION<br>(INCHES)                | PRESSURE<br>(PSIG) | GRADIENT<br>(PSI/FT) |
| LUB            | 0.7010                             | 1393.6             | ----                 | 0.6980                                | 1409.9             | ----                 |
| 1000           | 0.7230                             | 1437.7             | 0.0441               | 0.7200                                | 1454.4             | 0.0444               |
| 2000           | 0.7450                             | 1481.8             | 0.0441               | 0.7420                                | 1498.8             | 0.0444               |
| 3000           | 0.7660                             | 1523.9             | 0.0421               | 0.7620                                | 1539.2             | 0.0404               |
| 4000           | 0.7860                             | 1564.0             | 0.0401               | 0.7810                                | 1577.6             | 0.0384               |
| 5000           | 0.8050                             | 1602.2             | 0.0381               | 0.7990                                | 1613.9             | 0.0364               |
| 6000           | 0.8230                             | 1638.3             | 0.0361               | 0.8160                                | 1648.3             | 0.0343               |
| 7000           | 0.8410                             | 1674.5             | 0.0362               | 0.8310                                | 1678.6             | 0.0303               |
| 7690           | 0.8540                             | 1700.6             | 0.0379               | 0.8420                                | 1700.8             | 0.0322               |
| 7920           | 0.8580                             | 1708.6             | 0.0349               | 0.8460                                | 1708.9             | 0.0351               |
| 8' )           | 0.8690                             | 1730.7             | 0.1005               | 0.8580                                | 1733.1             | 0.1101               |
| LUB            | 0.7060                             | 1403.6             | ----                 | 0.7000                                | 1414.0             | ----                 |

GENERAL REMARKS:

OPERATOR PAUL J DOUGLAS

DWT IN: 1423  
DWT OUT: 1424  
MAX BHT: 310

↑  
NOTE - E.T BELIEVES GRADIENT  
ELEMENT 22418/4000 CALIBRATED 6.1.85  
ELEMENT 29321/4000 CALIBRATED 6.1.85  
GOES DOWN BECAUSE  
TEMP DOES NOT STABILIZE  
DURING STOPS  
→ INCREASE STOP TIME

BIG LAKE #14

STATIC PRESSURE GRADIENT

15/1/85

12000

ELEMENT # 29321 (BOTTOM)

JME. 30/1/85

10000

8000  
DEPTH  
(FT.)

6000

4000

2000

0

1300

1400

1500

1600

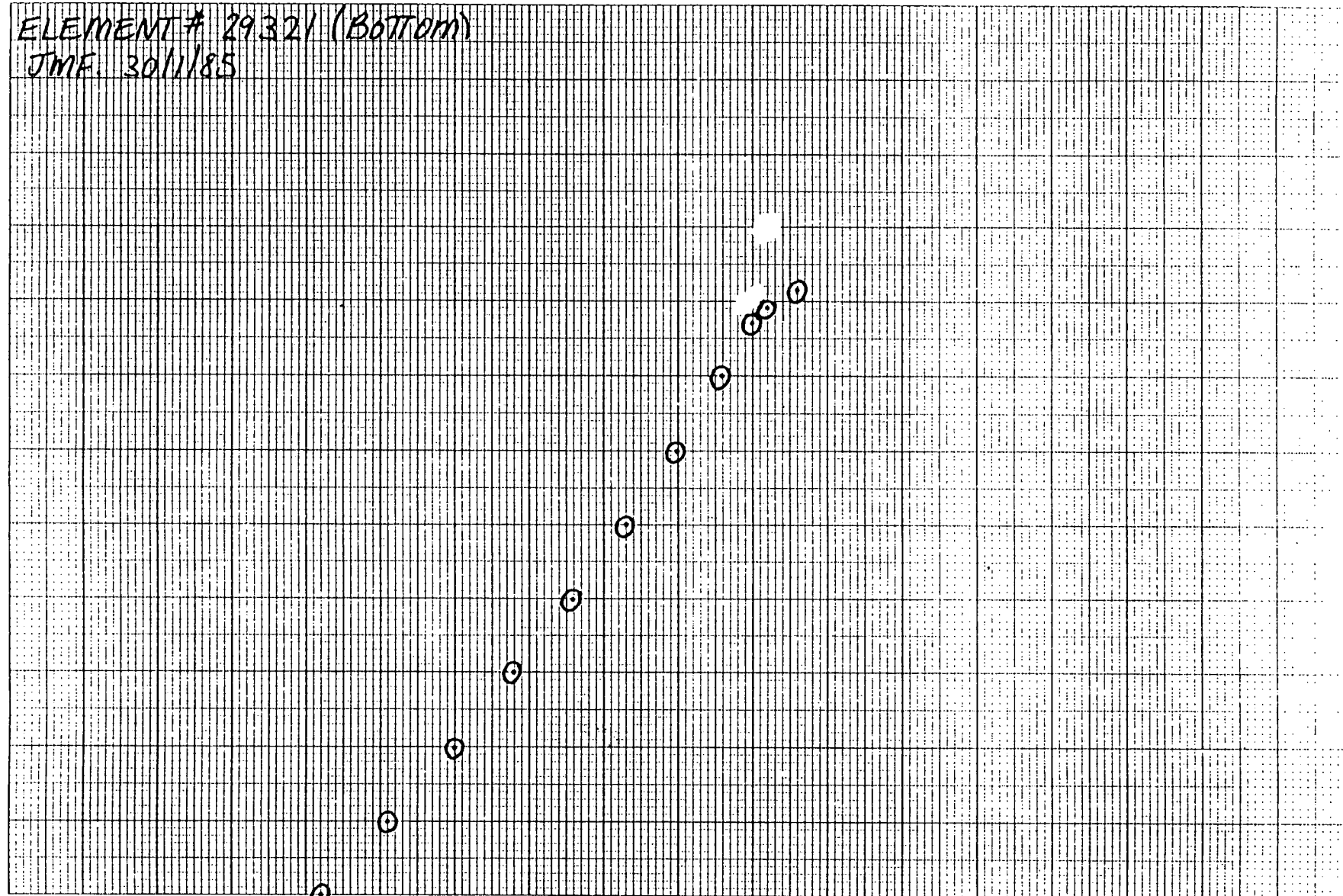
1700

1800

1900

2000

PRESSURE (PSIG)



00093

00094



**\*\* BIG LAKE 14 \*\***

**STATIC PRESSURE GRADIENT**

TEST DATE: 12/2/85

| DEPTH<br>(FT.) | TOP PRESSURE ELEMENT<br>22316/4075 |                    |                      | BOTTOM PRESSURE ELEMENT<br>22410/4100 |                    |                      |
|----------------|------------------------------------|--------------------|----------------------|---------------------------------------|--------------------|----------------------|
|                | DEFLECTION<br>(INCHES)             | PRESSURE<br>(PSIG) | GRADIENT<br>(PSI/FT) | DEFLECTION<br>(INCHES)                | PRESSURE<br>(PSIG) | GRADIENT<br>(PSI/FT) |
| LUB            | 0.6840                             | 1420.6             | ----                 | 0.6930                                | 1410.4             | ----                 |
| 1000           | 0.7050                             | 1464.2             | 0.0436               | 0.7140                                | 1453.5             | 0.0431               |
| 2000           | 0.7260                             | 1507.8             | 0.0436               | 0.7360                                | 1498.7             | 0.0452               |
| 3000           | 0.7460                             | 1549.4             | 0.0415               | 0.7550                                | 1537.8             | 0.0391               |
| 4000           | 0.7640                             | 1586.8             | 0.0374               | 0.7740                                | 1576.9             | 0.0391               |
| 5000           | 0.7820                             | 1624.2             | 0.0374               | 0.7930                                | 1616.0             | 0.0391               |
| 6000           | 0.7980                             | 1657.4             | 0.0332               | 0.8100                                | 1651.0             | 0.0350               |
| 7000           | 0.8140                             | 1690.6             | 0.0332               | 0.8280                                | 1688.1             | 0.0371               |
| 7690           | 0.8260                             | 1715.6             | 0.0361               | 0.8410                                | 1714.9             | 0.0388               |
| 8140           | 0.8290                             | 1721.8             | 0.0271               | 0.8450                                | 1723.1             | 0.0359               |
| 8140           | 0.8360                             | 1736.3             | 0.0661               | 0.8530                                | 1739.6             | 0.0750               |
| LUB            | 0.6800                             | 1412.3             | ----                 | 0.6970                                | 1418.6             | ----                 |

GENERAL REMARKS:

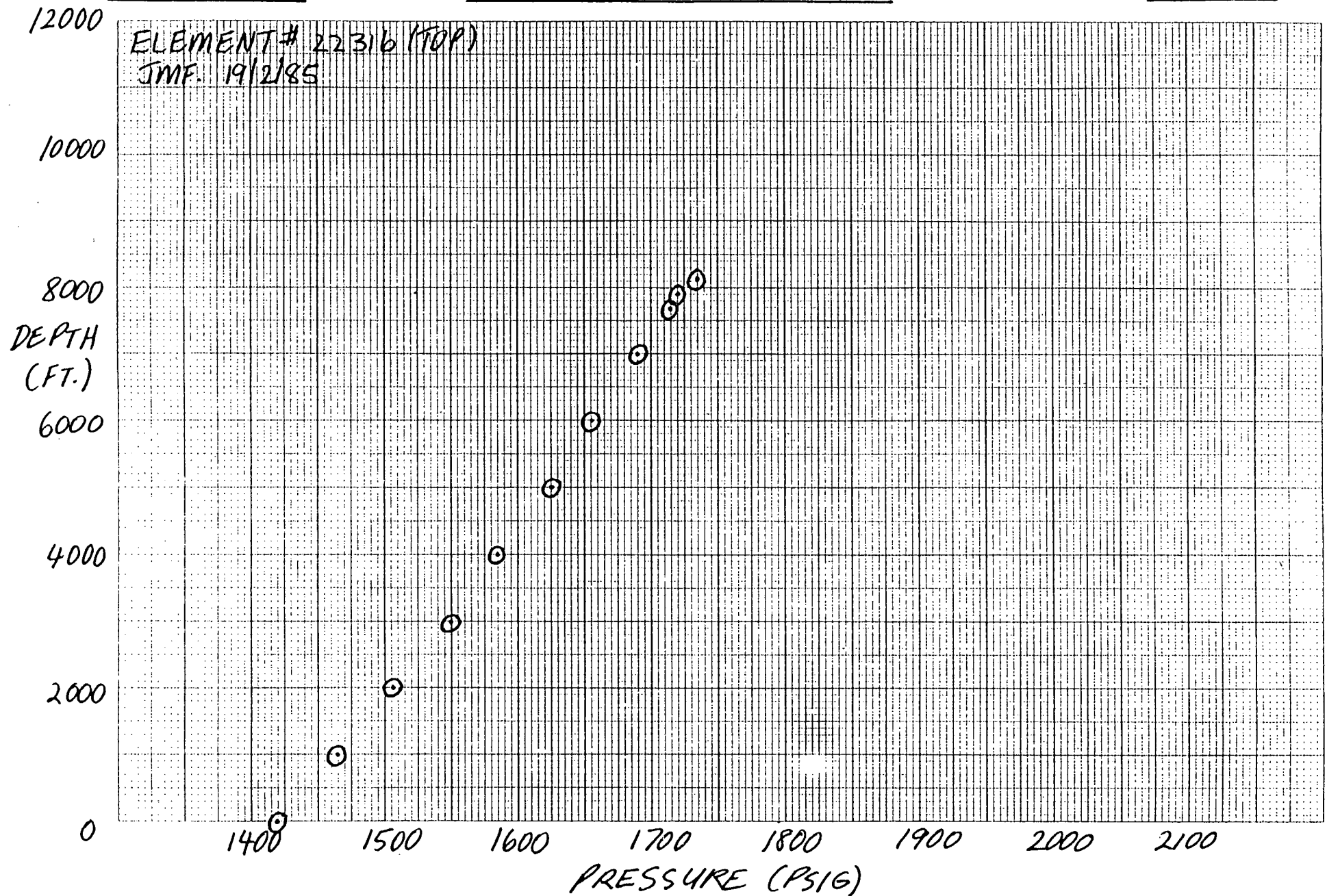
DWT IN: 1420  
DWT OUT: 1420  
MAX BHT: N/A

ELEMENT 22316/4075 CALIBRATED 5/2/85  
ELEMENT 22410/4100 CALIBRATED 5/2/85

BIG LAKE #14

STATIC PRESSURE GRADIENT

12/2/85



00093



# WIRELINE REPORT

00096

WELL: BIG LAKE # 14

DATE: 8/3/1985

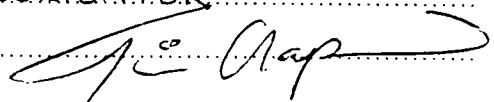
PROGRAM: DUMMY RUN / STATIC GRADIENT

PURPOSE OF WORK: TO ENSURE THE TUBING IS CLEAR OF OBSTRUCTION

## REPORT OF WORK PERFORMED:

7/3/85 - ARRIVE ON LOCATION AT 1530 HRS  
RIG UP 082 WIRE LINE UNIT AND LUBRICATOR  
RUN IN HOLE WITH 1.75" BLIND BOX AND TAG BOTTOM AT 8222' KB  
PULL OUT OF HOLE AND SECURE WELL  
RETURN TO MOOMBA

8/3/85 - ARRIVE ON LOCATION AND PREPARE TO RUN STATIC GRADIENT  
RUN IN HOLE WITH TANDEM 3000 PSI PRESSURE ELEMENTS  
TO A MAXIMUM DEPTH OF 8134' KB AS PER INSTRUCTED  
PULL OUT OF HOLE - CHARTS GOOD  
RIG DOWN 082 WIRE LINE UNIT AND LUBRICATOR  
MOVE TO NEXT LOCATION

  
OPERATOR'S SIGNATURE

WORK PERFORMED BY: TIM CHAPMAN OF EXPERTEST

## WELL DATA:

Tubing Size: 3 1/2" FWHP: SIWHP: 1436 psi

Sub Surface S.V./Landing Nipple @ S.S.D. @ 7500'

"X" Nipple @ "N"/"X" Nipple @ 7527' other

Min I.D. 2.205" @ 7527' Packer @ 7515'

Perforated Interval: 7576' - 8134'  
TOOLACHIE 7576 - 7700, ORALINGIE 7901 - 7910, EPSILON 8118 - 8134

Forward to: Petroleum Engineering - Adelaide  
Production Department - Moomba

00097



\*\* BIG LAKE 14 \*\*

## STATIC PRESSURE GRADIENT

TEST DATE: 8/3/85

| DEPTH<br>(FT.) | TOP PRESSURE ELEMENT<br>29385/3000 |                    |                      | BOTTOM PRESSURE ELEMENT<br>29388/3000 |                    |                      |
|----------------|------------------------------------|--------------------|----------------------|---------------------------------------|--------------------|----------------------|
|                | DEFLECTION<br>(INCHES)             | PRESSURE<br>(PSIG) | GRADIENT<br>(PSI/FT) | DEFLECTION<br>(INCHES)                | PRESSURE<br>(PSIG) | GRADIENT<br>(PSI/FT) |
| LUB            | 0.9460                             | 1430.1             | ----                 | 0.9460                                | 1434.3             | ----                 |
| 1000           | 0.9780                             | 1478.7             | 0.0486               | 0.9770                                | 1481.6             | 0.0473               |
| 2000           | 1.0060                             | 1521.3             | 0.0426               | 1.0040                                | 1522.8             | 0.0412               |
| 3000           | 1.0320                             | 1560.8             | 0.0395               | 1.0300                                | 1562.5             | 0.0397               |
| 4000           | 1.0560                             | 1597.3             | 0.0365               | 1.0550                                | 1600.6             | 0.0381               |
| 5000           | 1.0810                             | 1635.3             | 0.0380               | 1.0790                                | 1637.3             | 0.0366               |
| 6000           | 1.1050                             | 1671.8             | 0.0365               | 1.1010                                | 1670.8             | 0.0336               |
| 7000           | 1.1270                             | 1705.2             | 0.0334               | 1.1220                                | 1702.9             | 0.0321               |
| 7500           | 1.1370                             | 1720.4             | 0.0304               | 1.1330                                | 1719.7             | 0.0336               |
| 7855           | 1.1450                             | 1732.6             | 0.0343               | 1.1410                                | 1731.9             | 0.0344               |
| 8134           | 1.1580                             | 1752.3             | 0.0708               | 1.1560                                | 1754.8             | 0.0821               |
| LUB            | 0.9510                             | 1437.7             | ----                 | 0.9500                                | 1440.4             | ----                 |

## GENERAL REMARKS:

INHIBITOR WAS FOUND ON THE BELLOWS

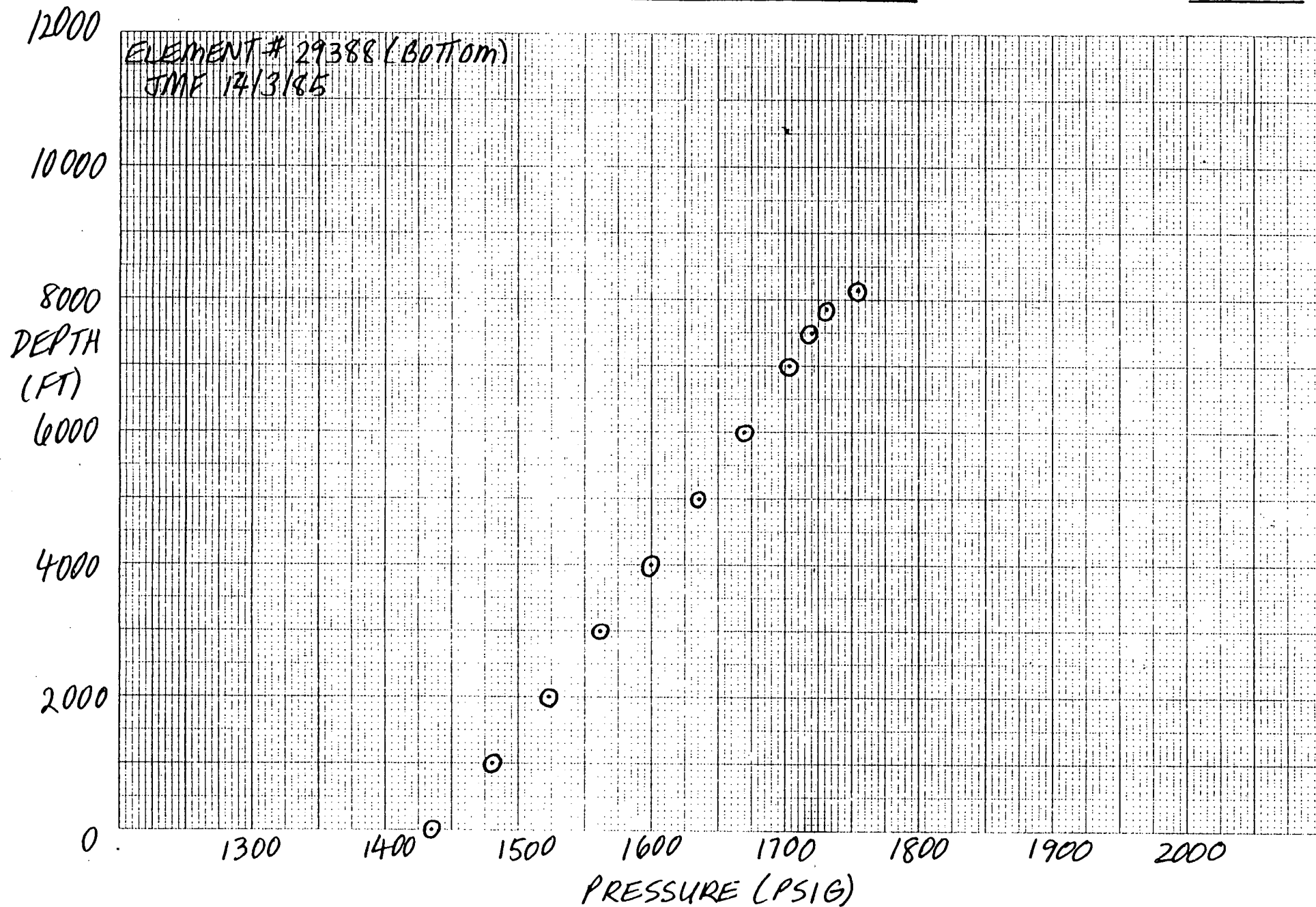
DWT IN: 1436  
 DWT OUT: 1436  
 MAX BHT: 289 F

ELEMENT 29385/3000 CALIBRATED 2.3.85  
 ELEMENT 29388/3000 CALIBRATED 2.3.85

BIG LAKE #14

STATIC PRESSURE GRADIENT

8/3/85



86000



## WIRELINE REPORT

00099

WELL: BIG LAKE # 14

DATE: 17<sup>TH</sup> MAY '85

PROGRAM: STATIC GRADIENT SURVEY

PURPOSE OF WORK: TO ENSURE TUBING IS CLEAR

## REPORT OF WORK PERFORMED:

RIG UP W/LINE UNIT (4)  
P.I.H. WITH 175 B/Box  
PICK UP @ 8218' KB  
NO OBSTRUCTIONS P.O.H.  
PREPARE AMGRADAS

*Paul M. Hankinson*

OPERATOR'S SIGNATURE

WORK PERFORMED BY: P. HANKINSON OF EXPERTEST

## WELL DATA:

Tubing Size: 2 7/8 FWHP: SIWHP: 1448 PSI

Sub Surface S.V./Landing Nipple @ S.S.D. @:

"X" Nipple @ "N"/"XN" Nipple @ 7527' other

Min I.D. 2.205 " @ 7527' Packer @ 7515'

Perforated Interval: 7576' - 8134'

Forward to: Petroleum Engineering — Adelaide  
Production Department — Moomba



\*\* BIG LAKE #14 \*\*

# STATIC PRESSURE GRADIENT

TEST DATE: 17/5/85

| DEPTH<br>(FT.) | TOP PRESSURE ELEMENT<br>18687/2200 |                    |                      | BOTTOM PRESSURE ELEMENT<br>18696/2200 |                    |                      |
|----------------|------------------------------------|--------------------|----------------------|---------------------------------------|--------------------|----------------------|
|                | DEFLECTION<br>(INCHES)             | PRESSURE<br>(PSIG) | GRADIENT<br>(PSI/FT) | DEFLECTION<br>(INCHES)                | PRESSURE<br>(PSIG) | GRADIENT<br>(PSI/FT) |
| LUB            | 1.2990                             | 1444.7             | ----                 | 1.3140                                | 1443.8             | ----                 |
| 1000           | 1.3390                             | 1489.4             | 0.0447               | 1.3540                                | 1488.0             | 0.0442               |
| 2000           | 1.3770                             | 1531.9             | 0.0425               | 1.3930                                | 1531.2             | 0.0432               |
| 3000           | 1.4120                             | 1571.0             | 0.0391               | 1.4280                                | 1569.9             | 0.0388               |
| 4000           | 1.4470                             | 1610.1             | 0.0391               | 1.4640                                | 1609.8             | 0.0399               |
| 5000           | 1.4800                             | 1647.0             | 0.0369               | 1.4970                                | 1646.4             | 0.0366               |
| 6000           | 1.5130                             | 1684.0             | 0.0369               | 1.5300                                | 1683.1             | 0.0366               |
| 7000           | 1.5450                             | 1719.8             | 0.0358               | 1.5630                                | 1719.7             | 0.0367               |
| 7500           | 1.5600                             | 1736.6             | 0.0336               | 1.5790                                | 1737.5             | 0.0356               |
| 7600           | 1.5640                             | 1741.1             | 0.0448               | 1.5840                                | 1743.1             | 0.0556               |
| 7700           | 1.5670                             | 1744.4             | 0.0336               | 1.5870                                | 1746.4             | 0.0334               |
| 7855           | 1.5710                             | 1748.9             | 0.0289               | 1.5910                                | 1750.8             | 0.0287               |
| LUB            | 1.3020                             | 1448.0             | ----                 | 1.3200                                | 1450.4             | ----                 |

## GENERAL REMARKS:

DWT IN: 1448  
DWT OUT: 1448  
MAX BHT: na

ELEMENT 18687/2200 CALIBRATED 13.5.85  
ELEMENT 18696/2200 CALIBRATED 13.5.85

BIG LAKE #14

STATIC PRESSURE GRADIENT

17/5/85

12000

Element # 18687 (Top)  
JmF. 27/5/85

10000

8000  
DEPTH  
(FT.)

6000

4000

2000

0

1300

1400

1500

1600

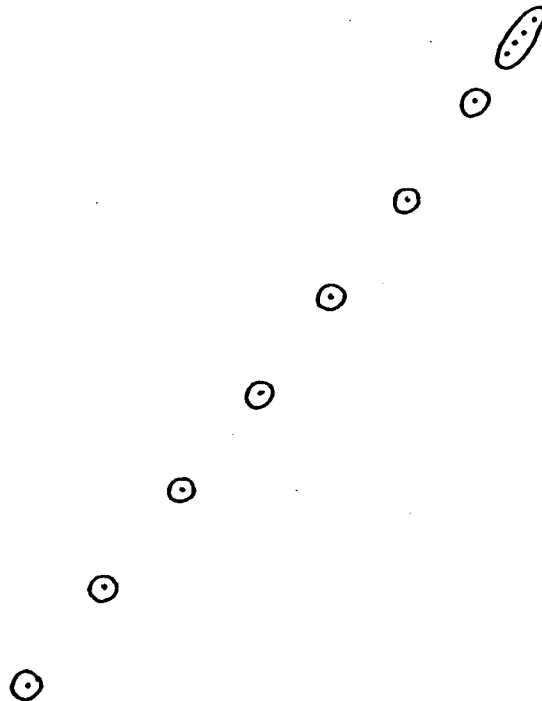
1700

1800

1900

2000

PRESSURE (PSIG)



00101



## WIRELINE REPORT

00102

WELL: BIG LAKE #14DATE: MAY 29/73PROGRAM: B.N.P. SURVEYPURPOSE OF WORK: TAG P.B.T.D. AND RUN STATIC GRADIENT

REPORT OF WORK PERFORMED: RIG UP W/E UNIT AND RUN  
1.75 BLIND BOX TO TAG P.B.T.D. AT 8221' K.B.  
P.O.H. RUN TANDEM STATIC GRADIENT WITH 3000  
P.S.I. RECORDERS AND TEMPERATURE ELEMENT  
MAKING 15 MIN SEP AT SURF AND 5 MIN STEPS  
AT 1000, 2000, 3000, 4000, 5000, 6000, 7000, 7500, 7600, 7700  
7855 AND 8134' K.B. P.O.H. 15 MIN AT SURF.  
CHARTS GOOD RIG OUT MOVE TO BIG LAKE #23.

Dale Boyko

OPERATOR'S SIGNATURE

WORK PERFORMED BY: DALE BOYKO OF EXPERTEST

## WELL DATA:

Tubing Size: 3 1/2 FWHP: SIWHP: 1450 PSISub Surface S.V./Landing Nipple @ S.S.D. @: 7500' K.B."X" Nipple @ (N)"XN" Nipple @ 7527' K.B. otherMin I.D. 2.205 " @ 7527' K.B. Packer @ 7515' K.B.Perforated Interval: 7576' K.B. - 8134' K.B.

Forward to: Petroleum Engineering — Adelaide  
Production Department — Moomba



\*\*\* BIG LAKE 14 \*\*\*

# STATIC PRESSURE GRADIENT

TEST DATE: 29/05/85

| TOP PRESSURE ELEMENT<br>56428/3000 |                        |                    |                      | BOTTOM PRESSURE ELEMENT<br>56429/3000 |                    |                      |
|------------------------------------|------------------------|--------------------|----------------------|---------------------------------------|--------------------|----------------------|
| DEPTH<br>(FT.)                     | DEFLECTION<br>(INCHES) | PRESSURE<br>(PSIG) | GRADIENT<br>(PSI/FT) | DEFLECTION<br>(INCHES)                | PRESSURE<br>(PSIG) | GRADIENT<br>(PSI/FT) |
| LUB                                | 0.9250                 | 1446.7             | ----                 | 0.9320                                | 1442.3             | ----                 |
| 1000                               | 0.9530                 | 1490.4             | 0.0437               | 0.9610                                | 1487.4             | 0.0450               |
| 2000                               | 0.9810                 | 1534.1             | 0.0437               | 0.9880                                | 1529.3             | 0.0419               |
| 3000                               | 1.0070                 | 1574.7             | 0.0406               | 1.0150                                | 1571.3             | 0.0419               |
| 4000                               | 1.0310                 | 1612.1             | 0.0375               | 1.0390                                | 1608.5             | 0.0373               |
| 5000                               | 1.0560                 | 1651.2             | 0.0390               | 1.0640                                | 1647.4             | 0.0388               |
| 6000                               | 1.0800                 | 1688.6             | 0.0375               | 1.0880                                | 1684.7             | 0.0373               |
| 7000                               | 1.1030                 | 1724.5             | 0.0359               | 1.1110                                | 1720.4             | 0.0357               |
| 7500                               | 1.1140                 | 1741.7             | 0.0343               | 1.1220                                | 1737.5             | 0.0342               |
| 7600                               | 1.1160                 | 1744.8             | 0.0312               | 1.1250                                | 1742.1             | 0.0466               |
| 7700                               | 1.1190                 | 1749.5             | 0.0468               | 1.1280                                | 1746.8             | 0.0466               |
| 355                                | 1.1220                 | 1754.2             | 0.0302               | 1.1310                                | 1751.4             | 0.0301               |
| 8134                               | 1.1280                 | 1763.6             | 0.0336               | 1.1400                                | 1765.4             | 0.0501               |
| LUB                                | 0.9310                 | 1456.1             | ----                 | 0.9360                                | 1448.6             | ----                 |

## GENERAL REMARKS:

IL

DWT IN: 1450  
DWT OUT: 1451  
MAX BHT: RAN TEMP. ELEMENT

ELEMENT 56428/3000 CALIBRATED 13/5/85  
ELEMENT 56429/3000 CALIBRATED 13/5/85

BIG LAKE #14

STATIC PRESSURE GRADIENT

29/5/85

12000

Element #56428 (Top)

JMF 3/6/85

10000

8000  
DEPTH  
(FT.)

6000

4000

2000

0 1420

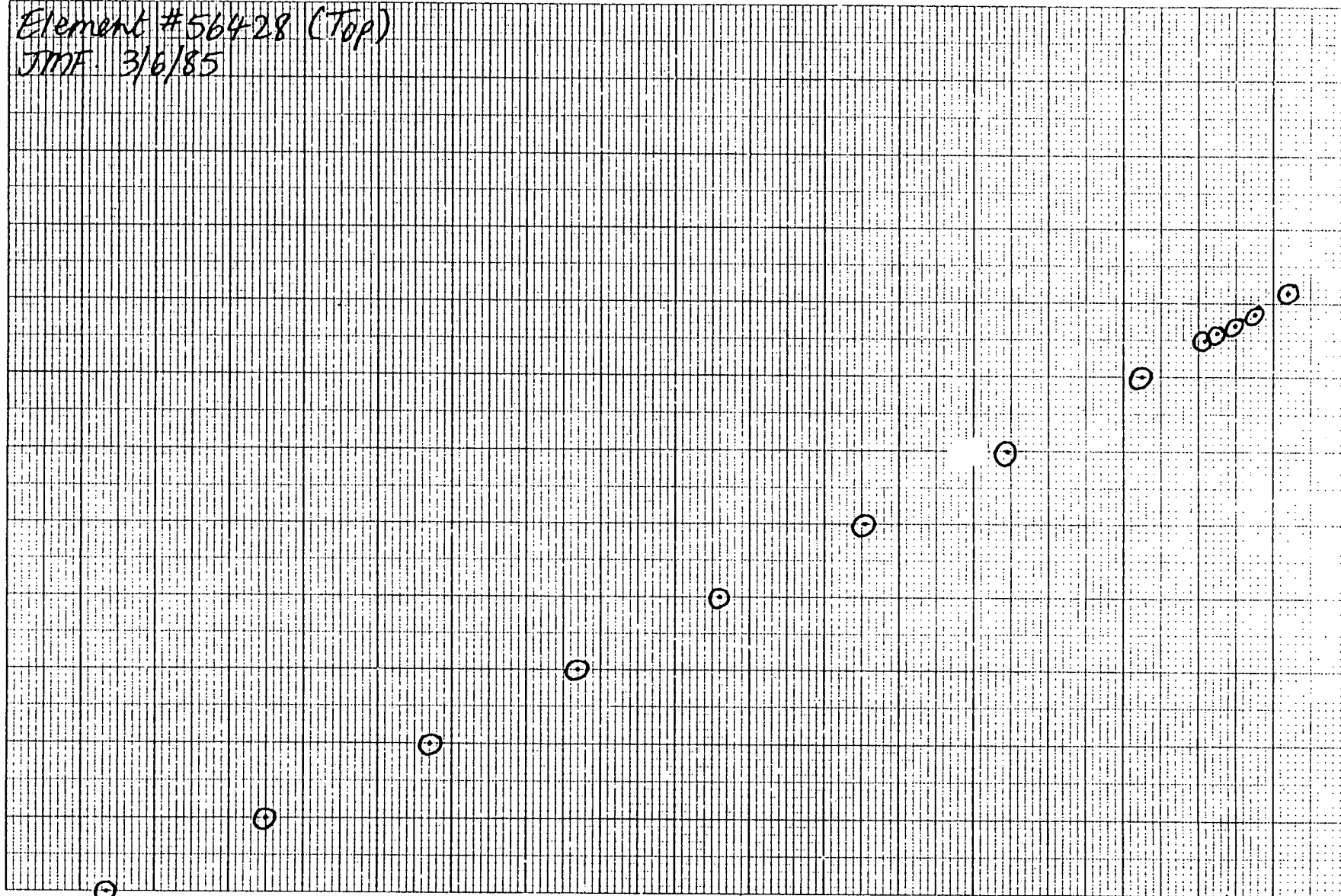
1500

1600

1700

1780

PRESSURE (PSIG)



00104

## SANTOS EXPLORATION DATA BASE

## WATER ANALYSIS

WELL: BIG LAKE

14

LAB: AMDEL

TEST: PROD

DATE: 12/05/1986

SAMPLE:

DEPTH:

FT (K6)

FT (SUBSEA)

FORMATION:

COMMENT: IMBALANCE DUE TO PRESENCE OF AMMONIA (NESSLER REAGENT SPO1 TEST)

| CATIONS       | MG/L | MEQ/L | ANIONS       | MG/L  | MEQ/L |
|---------------|------|-------|--------------|-------|-------|
| SODIUM        | 52.0 | 2.3   | CHLORIDE     | 57.2  | 1.6   |
| POTASSIUM     | 2.5  | 0.1   | BICARBONATE  | 113.0 | 1.9   |
| CALCIUM       | 3.2  | 0.2   | CARBONATE    |       |       |
| MAGNESIUM     | 0.4  | 0.0   | SULPHATE     | 1.2   | 0.0   |
| IRON          |      |       | NITRATE      | 4.0   | 0.1   |
|               |      |       | HYDROXIDE    |       |       |
| TOTAL CATIONS | 58.1 | 2.5   | TOTAL ANIONS | 175.4 | 3.6   |

ION BALANCE: -17.1 %

TOTAL DISSOLVED SOLIDS: 176.0 MG/L

MEASURED RESISTIVITY: 20.400 OHM-M AT TEMP 77. F 25. C

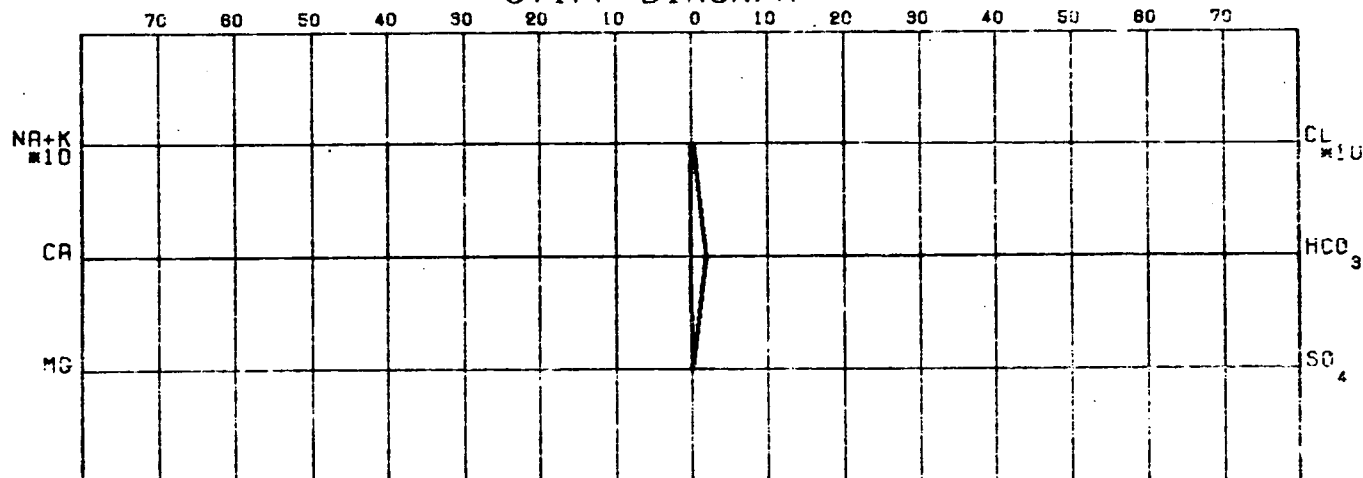
SODIUM TO TOTAL CATION RATIO: 89.8 %

PH: 5.6

SODIUM CHLORIDE EQUIVALENT: 159.

EQUIVALENT RW AT 75 F: 16.60

## STIFF DIAGRAM



## SANTOS EXPLORATION DATA BASE

## WATER ANALYSIS

WELL: BIG LAKE

15

LAB: AMDEL

TEST: PROD

DATE: 16/06/1986

SAMPLE: .

DEPTH: - FT (KB)

- FT (SUBSEA)

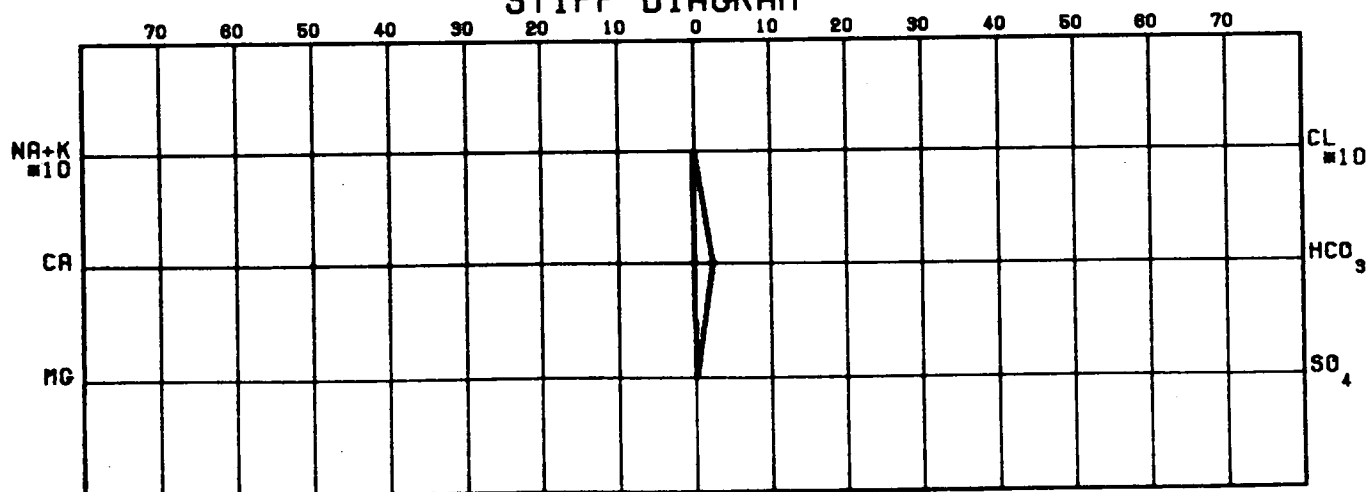
FORMATION:

COMMENT: IMBALANCE DUE TO PRESENCE OF AMMONIA (NESSLER REAGENT SPOT TEST)

| CATIONS       | MG/L | MEQ/L | ANIONS       | MG/L  | MEQ/L |
|---------------|------|-------|--------------|-------|-------|
| SODIUM        | 44.0 | 1.9   | CHLORIDE     | 23.0  | 0.6   |
| POTASSIUM     | 21.0 | 0.5   | BICARBONATE  | 139.0 | 2.3   |
| CALCIUM       | 1.1  | 0.1   | CARBONATE    |       |       |
| MAGNESIUM     | 0.1  | 0.0   | SULPHATE     | 9.0   | 0.2   |
| IRON          |      |       | NITRATE      | 4.0   | 0.1   |
|               |      |       | HYDROXIDE    |       |       |
| TOTAL CATIONS | 66.2 | 2.5   | TOTAL ANIONS | 175.0 | 3.2   |

ION BALANCE: -11.7 %  
 TOTAL DISSOLVED SOLIDS: 170.0 MG/L  
 MEASURED RESISTIVITY: 25.600 OHM-M AT TEMP 77. F 25. C  
 SODIUM TO TOTAL CATION RATIO: 76.1 %  
 PH: 5.7  
 SODIUM CHLORIDE EQUIVALENT: 146.  
 EQUIVALENT RM AT 75 F: 16.60

## STIFF DIAGRAM



Build-up data enclosed

00107

WELL : Big Lake # 14

$P_f = 4600$  Kpa

ORIFICE SIZE : 76.200 mm 3.000 "

$T = 87$  °C

LINE SIZE : 146.329 mm 5.761 "

Diff = 9.9 Kpa

Cumulative Production to end of September =  $824.413 \text{ m}^3 \times 10^6$

Number of hours online in September = 449

Production in September =  $3.913 \text{ m}^3 \times 10^6$

$\therefore$  Average flow rate in September =  $(3.913 / 449) \times 24 = 0.209 \text{ m}^3 \times 10^6 / \text{d}$

Number of days online in September before Shut In 0830 hrs 25 / 9 / 86

= Total days on line in Sept., as well remained s/i for rest of Sept. after 25 / 9.

$\therefore$  Production upto 0830 hrs 25 / 9 / 86 = September Cumulative Production.

$\Rightarrow$  Total cumulative Production =

=  $824.413 \text{ m}^3 \times 10^6$

=  $29261.715 \text{ mmscf}$  ✓

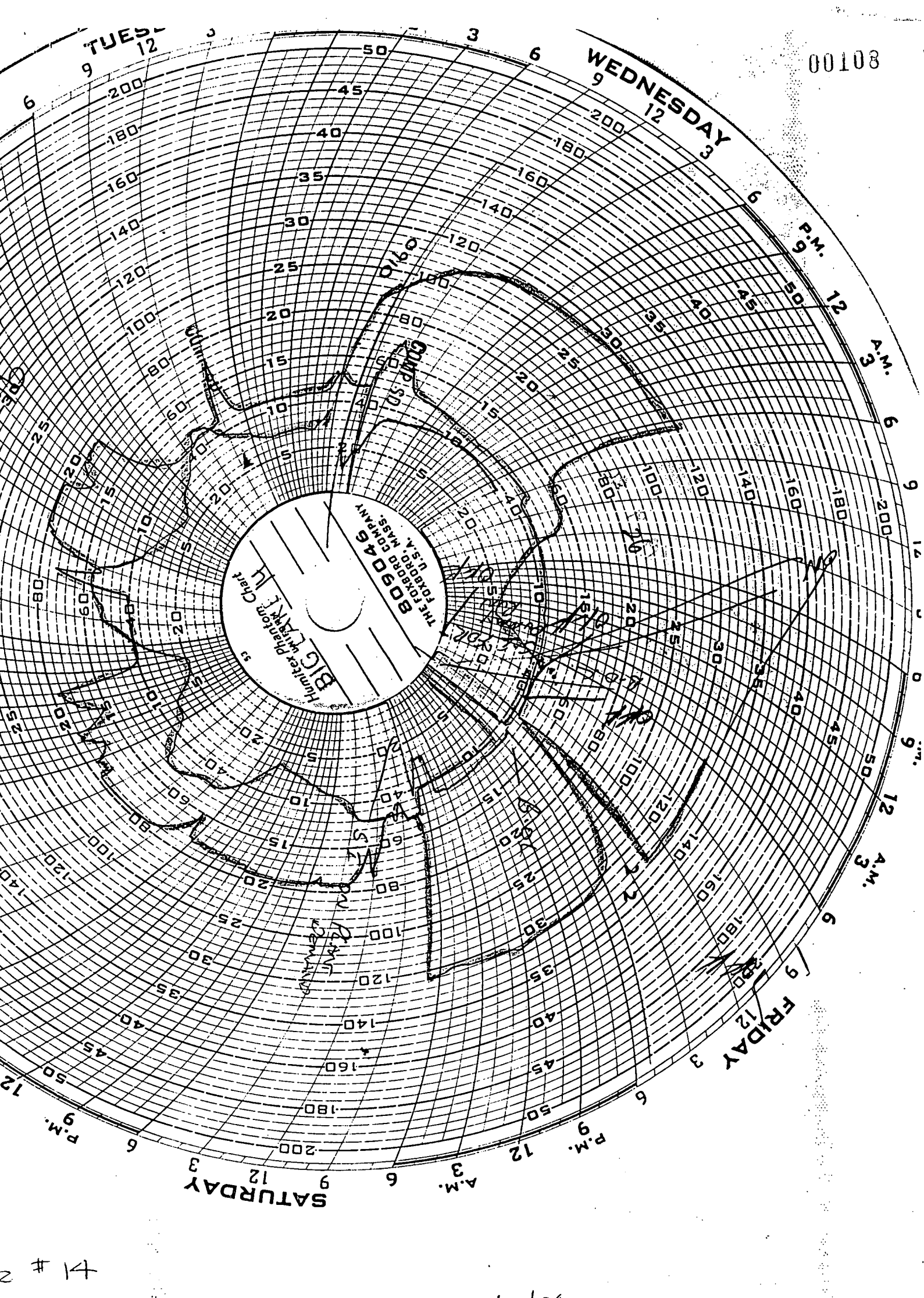
Flow Rate just prior to Shut In =  $0.224 \text{ m}^3 \times 10^6 / \text{d}$  ✓

=  $7.961 \text{ mmscf / d}$  ✓

2826

MMMD  
9-12-86

00108



2 # 14

SANTOS LTD  
39 GRENELL ST  
ADELAIDE

# SUB-SURFACE PRESSURE SURVEY

|                  |                        |                      |
|------------------|------------------------|----------------------|
| CO. SANTOS       | RUN 01 FIELD BIG LAKE  | WELL 14              |
| EFF DEPTH        | WELL STAT              | TOOL HUNG 7843'      |
| CASING 7"        | CASING PRESS           | ON BOTTOM 1315 24/9  |
| LINER            | TUBING PRESS           | OFF BOTTOM 0755 29/9 |
| DATE 860929      | ELEMENT RANGE 0 - 3125 | ZERO POINT           |
| ELEVATION        | ZONE                   | SHUT-IN 0830 25/9    |
| MAX TEMP         | PICK-UP                | ON-PROD              |
| PERF 7576'-8134' | CAL SER NO. 57413      | MPP 7855'            |
| TUBING 3-1/2"    |                        |                      |
| UNITS ENGLISH    | PURPOSE BUILD-UP       |                      |

## SURVEY DATA

| CO. SANTOS |        |       |       | RUN 01 FIELD BIG LAKE |        |       |       | WELL 14 |     |       |       |
|------------|--------|-------|-------|-----------------------|--------|-------|-------|---------|-----|-------|-------|
| TIME       | P-T    | DP-DT | DTIME | TIME                  | P-T    | DP-DT | DTIME | TIME    | P-T | DP-DT | DTIME |
| 8:30       | 1103.2 | 0.0   | 0.0   | 9:10                  | 1572.4 | 469.2 | .7    |         |     |       |       |
| 8:30       | 1147.6 | 44.4  | 0.0   | 9:16                  | 1576.9 | 473.7 | .8    |         |     |       |       |
| 8:32       | 1239.9 | 136.7 | .0    | 9:27                  | 1581.4 | 478.2 | .9    |         |     |       |       |
| 8:33       | 1331.3 | 228.1 | .1    | 9:37                  | 1584.0 | 480.8 | 1.1   |         |     |       |       |
| 8:35       | 1425.2 | 321.9 | .1    | 9:49                  | 1587.3 | 484.1 | 1.3   |         |     |       |       |
| 8:38       | 1471.8 | 368.6 | .1    | 10:10                 | 1591.8 | 488.6 | 1.7   |         |     |       |       |
| 8:40       | 1502.9 | 399.7 | .2    | 10:55                 | 1596.9 | 493.7 | 2.4   |         |     |       |       |
| 8:43       | 1528.4 | 425.2 | .2    | 11:50                 | 1600.6 | 497.4 | 3.3   |         |     |       |       |
| 8:44       | 1535.5 | 432.2 | .2    | 13:15                 | 1608.4 | 505.2 | 4.7   |         |     |       |       |
| 8:46       | 1539.8 | 436.6 | .3    | 15:47                 | 1614.7 | 511.5 | 7.3   |         |     |       |       |
| 8:48       | 1543.6 | 440.3 | .3    | 20:02                 | 1619.8 | 516.6 | 11.5  |         |     |       |       |
| 8:50       | 1549.5 | 446.2 | .3    | 1:04                  | 1624.4 | 521.2 | 16.6  |         |     |       |       |
| 8:52       | 1553.0 | 449.8 | .4    | 6:47                  | 1627.7 | 524.5 | 22.3  |         |     |       |       |
| 8:55       | 1556.8 | 453.6 | .4    | 13:47                 | 1631.4 | 528.2 | 29.3  |         |     |       |       |
| 8:57       | 1560.2 | 457.0 | .4    | 23:19                 | 1634.8 | 531.6 | 38.8  |         |     |       |       |
| 8:59       | 1562.3 | 459.1 | .5    | 11:23                 | 1639.9 | 536.7 | 50.9  |         |     |       |       |
| 9:02       | 1565.3 | 462.1 | .5    | 1:29                  | 1643.8 | 540.6 | 65.0  |         |     |       |       |
| 9:04       | 1568.1 | 464.9 | .6    | 15:44                 | 1647.1 | 543.8 | 79.2  |         |     |       |       |
| 9:08       | 1570.2 | 467.0 | .6    | 7:55                  | 1649.2 | 546.0 | 95.4  |         |     |       |       |

LUB IN DWT = 782 PSI / OUT = 1358 PSI  
LUB IN AMERADA = 777 PSI / OUT = 1368 PSI

SANTOS LTD  
39 GRENELL ST  
ADELAIDE

PAGE 1

SUB-SURFACE PRESSURE SURVEY

|                  |   |                        |  |                      |
|------------------|---|------------------------|--|----------------------|
| CO. SANTOS       |   | RUN 02 FIELD BIG LAKE  |  | WELL 14              |
| EFF DEPTH        |   | WELL STAT              |  | TOOL HUNG 7849'      |
| CASING 7"        | - | CASING PRESS           |  | ON BOTTOM 1315 24/9  |
| LINER            | - | TUBING PRESS           |  | OFF BOTTOM 0755 29/9 |
| DATE 860929      |   | ELEMENT RANGE 0 - 3101 |  | ZERO POINT           |
| ELEVATION        |   | ZONE                   |  | SHUT-IN 0830 25/9    |
| MAX TEMP         |   | PICK-UP                |  | ON-PROD              |
| PERF 7576'-8134' |   | CAL SER NO. 57414      |  | MPP 7855'            |
| TUBING 3-1/2"    |   |                        |  |                      |
| UNITS ENGLISH    |   | PURPOSE BUILD-UP       |  |                      |

SURVEY DATA

| CO. SANTOS |        |       | RUN 02 FIELD BIG LAKE |       |        | WELL 14 |       |  |
|------------|--------|-------|-----------------------|-------|--------|---------|-------|--|
| TIME       | P-T    | DP-DT | DTIME                 | TIME  | P-T    | DP-DT   | DTIME |  |
| 8:30       | 1075.2 | 0.0   | 0.0                   | 9:16  | 1550.3 | 475.0   | .8    |  |
| 8:31       | 1118.2 | 42.9  | .0                    | 9:20  | 1553.2 | 478.0   | .8    |  |
| 8:32       | 1174.2 | 98.9  | .0                    | 9:30  | 1558.6 | 483.3   | 1.0   |  |
| 8:33       | 1221.4 | 146.2 | .1                    | 9:37  | 1562.3 | 487.0   | 1.1   |  |
| 8:35       | 1320.6 | 245.4 | .1                    | 9:45  | 1567.3 | 492.0   | 1.2   |  |
| 8:38       | 1416.7 | 341.4 | .1                    | 10:01 | 1572.4 | 497.2   | 1.5   |  |
| 8:40       | 1442.5 | 367.2 | .2                    | 10:34 | 1577.8 | 502.5   | 2.1   |  |
| 8:41       | 1461.8 | 386.6 | .2                    | 11:28 | 1585.9 | 510.6   | 3.0   |  |
| 8:43       | 1473.7 | 398.4 | .2                    | 12:53 | 1592.8 | 517.6   | 4.4   |  |
| 8:44       | 1491.7 | 416.4 | .2                    | 15:25 | 1602.5 | 527.2   | 6.9   |  |
| 8:47       | 1505.0 | 429.8 | .3                    | 18:44 | 1609.8 | 534.5   | 10.2  |  |
| 8:49       | 1512.3 | 437.1 | .3                    | 0:30  | 1615.6 | 540.3   | 16.0  |  |
| 8:52       | 1520.4 | 445.2 | .4                    | 11:35 | 1624.2 | 549.0   | 27.1  |  |
| 8:55       | 1525.9 | 450.7 | .4                    | 21:32 | 1629.8 | 554.5   | 37.0  |  |
| 8:58       | 1530.0 | 454.7 | .5                    | 8:22  | 1633.7 | 558.4   | 47.9  |  |
| 9:00       | 1533.7 | 458.4 | .5                    | 22:50 | 1638.9 | 563.7   | 62.3  |  |
| 9:03       | 1537.9 | 462.7 | .6                    | 11:58 | 1642.0 | 566.8   | 75.5  |  |
| 9:05       | 1542.0 | 466.7 | .6                    | 4:45  | 1645.6 | 570.3   | 92.2  |  |
| 9:10       | 1546.6 | 471.4 | .7                    | 7:55  | 1650.7 | 575.4   | 95.4  |  |

LUB IN DWT = 782 PSI / OUT = 1358 PSI  
LUB IN AMERADA = 805 PSI / OUT = 1337 PSI



POSTAL ADDRESS: PO BOX 354 COWANDILLA 5035

BIG LAKE # 14

Date: 24<sup>TH</sup> SEPT. '86

① 777  
② 805

1368  
1337

P. HANKINSON

782

**Out**

1358

10.50 24.9.86

## Time Depressed

10:19

12:50

Time off Bottom

07.55

### Bomb No. 2 Data

Remarks: TEMP EL 2821 x 148-441°  
12977 x 157LS  
Max 3.14 H. Temp= 260.5°F 24703 x 120 HR

[illegible]

WELL: BIG LAKE #14  
 OPERATOR: P. HANKINSON



**SANTOS LTD**  
**WELL TEST DATA**  
**METRIC SUMMARY SHEET**

DATE: 24TH SEPTEMBER 86  
 PAGE No: ONE

| DATE<br>TIME      | WELLHEAD      |               |               |               |            |            | FLUID PRODUCTION                             |                              |                            |                         | GAS PRODUCTION |       |                        |                 |
|-------------------|---------------|---------------|---------------|---------------|------------|------------|----------------------------------------------|------------------------------|----------------------------|-------------------------|----------------|-------|------------------------|-----------------|
|                   | CASING<br>PSI | CASING<br>KPA | TUBING<br>PSI | TUBING<br>KPA | TEMP<br>°F | TEMP<br>°C | FLOWRATE<br>OIL-COND<br>BBL'S/D              | FLOWRATE<br>OIL-COND<br>M3/D | FLOWRATE<br>H2O<br>BBL'S/D | FLOWRATE<br>H2O<br>M3/D | MMSCF/D        | Mm3/D | G.O.R.<br>Cu/FT<br>BBL | G.O.R.<br>M3/M3 |
| 24TH SEPTEMBER 86 |               |               |               |               |            |            |                                              |                              |                            |                         |                |       |                        |                 |
| 0800              |               |               |               |               |            |            | ARRIVE ON LOCATION RIG UP                    |                              |                            |                         | SWAB VALVE &   |       |                        |                 |
|                   |               |               |               |               |            |            | W/LINE UNIT.                                 |                              |                            |                         |                |       |                        |                 |
| 1050              |               |               |               |               |            |            | PRESSURE LUBRICATOR                          |                              |                            |                         |                |       |                        |                 |
| 1250              | 1180          | 1             | 782           |               |            |            | R.I.H. WITH PRESSURE ELEMENT HANG @ 7855' KB |                              |                            |                         |                |       |                        |                 |
| 1315              |               |               |               |               |            |            | ON BOTTOM                                    |                              |                            |                         |                |       |                        |                 |
| 1400              | 1125          | 7756          | 693           | 4777          |            |            |                                              |                              |                            |                         |                |       |                        |                 |
| 1500              | 1125          | 7756          | 689           | 4750          | 136        | 58°        |                                              |                              |                            |                         |                |       |                        |                 |
| 1900              | 1125          | 7756          | 668           | 4605          | 172        | 77°        |                                              |                              |                            |                         |                |       |                        |                 |
| 2300              | 1100          | 7583          | 654           | 4509          | 169        | 76°        |                                              |                              |                            |                         |                |       |                        |                 |
| 25TH SEPTEMBER 86 |               |               |               |               |            |            |                                              |                              |                            |                         |                |       |                        |                 |
| 0300              | 1050          | 7239          | 661           | 4557          | 172        | 77°        |                                              |                              |                            |                         |                |       |                        |                 |

**CONVERSION FACTORS:**

• BBL'S. x 0.15899 = M<sup>3</sup>

• MMSCF x 28.174 = 10<sup>3</sup> M<sup>3</sup>

• Cu/FT PER BBL x 0.1773 = M<sup>3</sup>/M<sup>3</sup>

• PSI x 6.895 = KPA

• °C x 9 ÷ 5 + 32 = °F

WELL: SIG. LAKE...14  
 OPERATOR: A. GILLIES



**SANTOS LTD**  
**WELL TEST DATA**  
**METRIC SUMMARY SHEET**

DATE: 25<sup>TH</sup> Sep 86  
 PAGE No: TWO

| DATE<br>TIME | WELLHEAD                   |               |               |               |            |            | FLUID PRODUCTION                |                              |                            |                         | GAS PRODUCTION |       |                        |                 |
|--------------|----------------------------|---------------|---------------|---------------|------------|------------|---------------------------------|------------------------------|----------------------------|-------------------------|----------------|-------|------------------------|-----------------|
|              | CASING<br>PSI              | CASING<br>KPA | TUBING<br>PSI | TUBING<br>KPA | TEMP<br>°F | TEMP<br>°C | FLOWRATE<br>OIL-COND<br>BBL'S/D | FLOWRATE<br>OIL-COND<br>M3/D | FLOWRATE<br>H2O<br>BBL'S/D | FLOWRATE<br>H2O<br>M3/D | MMSCF/D        | Mm3/D | G.O.R.<br>Cu/FT<br>BBL | G.O.R.<br>M3/M3 |
| 25/9         |                            |               |               |               |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 0700         | 1050                       | 7239          | 661           | 4557          | 174        | 79°        |                                 |                              |                            |                         |                |       |                        |                 |
| 0800         | 1050                       | 7239          | 668           | 4605          | 174        | 79°        |                                 |                              |                            |                         |                |       |                        |                 |
| 0830         | 1050                       | 7239          | 668           | 4605          | 176        | 80°        |                                 |                              |                            |                         |                |       |                        |                 |
| 0830         | SHUT IN WELL FOR BUILD UP. |               |               |               |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 0845         | 1040                       | 7170          | 1290          | 8893          |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 0900         | 1025                       | 7066          | 1303          | 8983          |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 0915         | 1020                       | 7032          | 1310          | 9031          |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 0930         | 1010                       | 6963          | 1319          | 9093          |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 0945         | 1005                       | 6928          | 1317          | 9080          |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 1000         | 1005                       | 6928          | 1319          | 9093          |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 1015         | 1005                       | 6928          | 1321          | 9107          |            |            |                                 |                              |                            |                         |                |       |                        |                 |

**CONVERSION FACTORS:**

• BBL'S. x 0.15899 = M<sup>3</sup>

• MMSCF x 28.174 = 10<sup>3</sup> M<sup>3</sup>

• Cu/FT PER BBL x 0.1773 = M<sup>3</sup>/M<sup>3</sup>

• PSI x 6.895 = KPA

• °C x 9 ÷ 5 + 32 = °F

WELL: SIG... LAKE... 14#

OPERATOR: A. GILLIES.....



# SANTOS LTD WELL TEST DATA

## METRIC SUMMARY SHEET

DATE: 25<sup>TH</sup> SEP... 86...

PAGE No: THREE.....

| DATE<br>TIME     | WELLHEAD      |               |               |               |            |            | FLUID PRODUCTION                |                                           |                                         |                                                   | GAS PRODUCTION |                    |                        |                                          |
|------------------|---------------|---------------|---------------|---------------|------------|------------|---------------------------------|-------------------------------------------|-----------------------------------------|---------------------------------------------------|----------------|--------------------|------------------------|------------------------------------------|
|                  | CASING<br>PSI | CASING<br>KPA | TUBING<br>PSI | TUBING<br>KPA | TEMP<br>°F | TEMP<br>°C | FLOWRATE<br>OIL-COND<br>BBL'S/D | FLOWRATE<br>OIL-COND<br>M <sup>3</sup> /D | FLOWRATE<br>H <sub>2</sub> O<br>BBL'S/D | FLOWRATE<br>H <sub>2</sub> O<br>M <sup>3</sup> /D | MMSCF/D        | Mm <sup>3</sup> /D | G.O.R.<br>Cu/FT<br>BBL | G.O.R.<br>M <sup>3</sup> /M <sup>3</sup> |
| 1030             | 1000          | 6894          | 1321          | 9107          |            |            |                                 |                                           |                                         |                                                   |                |                    |                        |                                          |
| 1100             | 1000          | 6894          | 1329          | 9162          |            |            |                                 |                                           |                                         |                                                   |                |                    |                        |                                          |
| 1130             | 1000          | 6894          | 1328          | 9155          |            |            |                                 |                                           |                                         |                                                   |                |                    |                        |                                          |
| 1200             | 1000          | 6894          | 1328          | 9155          |            |            |                                 |                                           |                                         |                                                   |                |                    |                        |                                          |
| 1230             | 1000          | 6894          | 1329          | 9162          |            |            |                                 |                                           |                                         |                                                   |                |                    |                        |                                          |
| 1330             | 1000          | 6894          | 1331          | 9176          |            |            |                                 |                                           |                                         |                                                   |                |                    |                        |                                          |
| 1430             | 1000          | 6894          | 1333          | 9190          |            |            |                                 |                                           |                                         |                                                   |                |                    |                        |                                          |
| 1830             | 1000          | 6894          | 1338          | 9224          |            |            |                                 |                                           |                                         |                                                   |                |                    |                        |                                          |
| 2230             | 1000          | 6894          | 1340          | 9238          |            |            |                                 |                                           |                                         |                                                   |                |                    |                        |                                          |
| 26 <sup>TH</sup> | SEPT          |               | 86            |               |            |            |                                 |                                           |                                         |                                                   |                |                    |                        |                                          |
| 0230             | 1000          | 6894          | 1341          | 9245          |            |            |                                 |                                           |                                         |                                                   |                |                    |                        |                                          |
| 0630             | 1000          | 6894          | 1342          | 9252          |            |            |                                 |                                           |                                         |                                                   |                |                    |                        |                                          |

### CONVERSION FACTORS:

• BBL'S. x 0.15899 = M<sup>3</sup>

• MMSCF x 28.174 = 10<sup>3</sup> M<sup>3</sup>

• Cu/FT PER BBL x 0.1773 = M<sup>3</sup>/M<sup>3</sup>

• PSI x 6.895 = KPA

• °C x 9 ÷ 5 + 32 = °F

WELL: BIG LAKE...14#

OPERATOR: A. GILLIES.....



# SANTOS LTD WELL TEST DATA

## METRIC SUMMARY SHEET

DATE: 26<sup>TH</sup> SEPT 96...

PAGE No: FOUR.....

| DATE<br>TIME          | WELLHEAD      |               |               |               |            |            | FLUID PRODUCTION                |                              |                            |                         | GAS PRODUCTION |       |                        |                 |
|-----------------------|---------------|---------------|---------------|---------------|------------|------------|---------------------------------|------------------------------|----------------------------|-------------------------|----------------|-------|------------------------|-----------------|
|                       | CASING<br>PSI | CASING<br>KPA | TUBING<br>PSI | TUBING<br>KPA | TEMP<br>°F | TEMP<br>°C | FLOWRATE<br>OIL-COND<br>BBL'S/D | FLOWRATE<br>OIL-COND<br>M3/D | FLOWRATE<br>H2O<br>BBL'S/D | FLOWRATE<br>H2O<br>M3/D | MMSCF/D        | Mm3/D | G.O.R.<br>Cu/FT<br>BBL | G.O.R.<br>M3/M3 |
| 26 <sup>TH</sup> SEPT |               |               | 86            |               |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 1030                  | 1025          | 7066          | 1344          | 9266          |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 1430                  | 1050          | 7239          | 1347          | 9286          |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 1830                  | 1050          | 7239          | 1348          | 9293          |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 2230                  | 1050          | 7239          | 1349          | 9300          |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 27 <sup>TH</sup> SEPT |               |               | 86            |               |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 0230                  | 1050          | 7239          | 1348          | 9293          |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 0630                  | 1075          | 7411          | 1349          | 9300          |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 1030                  | 1075          | 7411          | 1350          | 9307          |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 1430                  | 1100          | 7583          | 1352          | 9321          |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 1830                  | 1100          | 7583          | 1353          | 9328          |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 1030                  | 1100          | 7583          | 1353          | 9328          |            |            |                                 |                              |                            |                         |                |       |                        |                 |

### CONVERSION FACTORS:

$$\bullet \text{BBL'S.} \times 0.15899 = \text{M}^3$$

$$\bullet \text{MMSCF} \times 28.174 = 10^3 \text{M}^3$$

$$\bullet \text{Cu/FT PER BBL} \times 0.1773 = \text{M}^3/\text{M}^3$$

$$\bullet \text{PSI} \times 6.895 = \text{KPA}$$

$$\bullet ^\circ\text{C} \times 9 \div 5 + 32 = ^\circ\text{F}$$

WELL: SIG LAKE 14  
 OPERATOR: A. GILLIES



**SANTOS LTD**  
**WELL TEST DATA**  
**METRIC SUMMARY SHEET**

DATE: 28/1/86  
 PAGE No: FIVE

| DATE<br>TIME | WELLHEAD         |               |               |               |            |            | FLUID PRODUCTION                |                              |                            |                         | GAS PRODUCTION |       |                        |                 |
|--------------|------------------|---------------|---------------|---------------|------------|------------|---------------------------------|------------------------------|----------------------------|-------------------------|----------------|-------|------------------------|-----------------|
|              | CASING<br>PSI    | CASING<br>KPA | TUBING<br>PSI | TUBING<br>KPA | TEMP<br>°F | TEMP<br>°C | FLOWRATE<br>OIL-COND<br>BBL'S/D | FLOWRATE<br>OIL-COND<br>M3/D | FLOWRATE<br>H2O<br>BBL'S/D | FLOWRATE<br>H2O<br>M3/D | MMSCF/D        | Mm3/D | G.O.R.<br>Cu/FT<br>BBL | G.O.R.<br>M3/M3 |
| 28/1         |                  |               |               |               |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 0230         | 1100             | 7583          | 1353          | 9328          |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 0630         | 1100             | 7583          | 1353          | 9328          |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 1030         | 1125             | 7756          | 1354          | 9335          |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 1430         | 1150             | 7928          | 1359          | 9369          |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 1830         | 1150             | 7928          | 1354          | 9335          |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 2230         | 1150             | 7928          | 1357          | 9355          |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 29/1         |                  |               |               |               |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 0230         | 1150             | 7928          | 1358          | 9362          |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 0630         | 1160             | 7997          | 1357          | 9362          |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 0755         | PULL OUT OF HOLE |               |               |               |            |            |                                 |                              |                            |                         |                |       |                        |                 |
| 0819         | IN LOG           |               |               |               |            |            |                                 |                              |                            |                         |                |       |                        |                 |

**CONVERSION FACTORS:**

• BBL'S. x 0.15899 = M<sup>3</sup>

• MMSCF x 28.174 = 10<sup>3</sup> M<sup>3</sup>

• Cu/FT PER BBL x 0.1773 = M<sup>3</sup>/M<sup>3</sup>

• PSI x 6.895 = KPA

• °C x 9 ÷ 5 + 32 = °F

WELL: BIG LAKE 14#  
 OPERATOR: A. GILLIES



**SANTOS LTD**  
**WELL TEST DATA**  
**METRIC SUMMARY SHEET**

DATE: 29/9/86  
 PAGE No: Six

| DATE<br>TIME  | WELLHEAD      |               |               |               |            |            | FLUID PRODUCTION                |                              |                            |                         | GAS PRODUCTION |       |                        |                 |
|---------------|---------------|---------------|---------------|---------------|------------|------------|---------------------------------|------------------------------|----------------------------|-------------------------|----------------|-------|------------------------|-----------------|
|               | CASING<br>PSI | CASING<br>KPA | TUBING<br>PSI | TUBING<br>KPA | TEMP<br>°F | TEMP<br>°C | FLOWRATE<br>OIL-COND<br>BBL'S/D | FLOWRATE<br>OIL-COND<br>M3/D | FLOWRATE<br>H2O<br>BBL'S/D | FLOWRATE<br>H2O<br>M3/D | MMSCF/D        | Mm3/D | G.O.R.<br>Cu/FT<br>BBL | G.O.R.<br>M3/M3 |
| 29/9<br>10:19 | 1175          | 8101          | 1358          | 9362          |            |            | DE-PRESSURE                     | LUB                          | CHART'S                    |                         | O.K.           |       |                        |                 |
| 11:51         | 1175          | 8066          | 1358          | 9362          |            |            | R.I.H                           | TO                           | PERFORM                    | STATIC                  | GRADIENT       |       |                        |                 |
| 12:59         |               |               |               |               |            |            | ON                              | BOTTOM                       |                            |                         |                |       |                        |                 |
| 13:09         |               |               |               |               |            |            | P.O.H.                          |                              |                            |                         |                |       |                        |                 |
| 13:27         |               |               |               |               |            |            | IN                              | LUB                          |                            |                         |                |       |                        |                 |
| 13:37         | 1175          | 8101          | 1359          | 9369          |            |            | DE-PRESSURE                     | LUB                          | CHART'S                    |                         | O.K.           |       |                        |                 |
|               |               |               |               |               |            |            | RIG                             | DOWN                         | END                        | TEST.                   |                |       |                        |                 |
|               |               |               |               |               |            |            |                                 |                              |                            |                         |                |       |                        |                 |
|               |               |               |               |               |            |            |                                 |                              |                            |                         |                |       |                        |                 |
|               |               |               |               |               |            |            |                                 |                              |                            |                         |                |       |                        |                 |
|               |               |               |               |               |            |            |                                 |                              |                            |                         |                |       |                        |                 |
|               |               |               |               |               |            |            |                                 |                              |                            |                         |                |       |                        |                 |
|               |               |               |               |               |            |            |                                 |                              |                            |                         |                |       |                        |                 |
|               |               |               |               |               |            |            |                                 |                              |                            |                         |                |       |                        |                 |

**CONVERSION FACTORS:**

• BBL'S. x 0.15899 = M<sup>3</sup>

• MMSCF x 28.174 = 10<sup>3</sup> M<sup>3</sup>

• Cu/FT PER BBL x 0.1773 = M<sup>3</sup>/M<sup>3</sup>

• PSI x 6.895 = KPA

• °C x 9 ÷ 5 + 32 = °F



**\*\* BIG LAKE 14# \*\***

**STATIC PRESSURE GRADIENT**

TEST DATE: 29-9-86

| DEPTH<br>(FT.) | TOP PRESSURE ELEMENT<br>57413/3000 |                    |                      | BOTTOM PRESSURE ELEMENT<br>57414/3000 |                    |                      |
|----------------|------------------------------------|--------------------|----------------------|---------------------------------------|--------------------|----------------------|
|                | DEFLECTION<br>(INCHES)             | PRESSURE<br>(PSIG) | GRADIENT<br>(PSI/FT) | DEFLECTION<br>(INCHES)                | PRESSURE<br>(PSIG) | GRADIENT<br>(PSI/FT) |
| LUB            | 0.8725                             | 1361.8             | ----                 | 0.8725                                | 1355.1             | ----                 |
| 1000           | 0.8993                             | 1403.6             | 0.0418               | 0.9000                                | 1397.7             | 0.0426               |
| 2000           | 0.9230                             | 1440.8             | 0.0371               | 0.9250                                | 1436.5             | 0.0387               |
| 3000           | 0.9473                             | 1478.7             | 0.0379               | 0.9500                                | 1475.2             | 0.0387               |
| 4000           | 0.9705                             | 1515.0             | 0.0364               | 0.9725                                | 1510.1             | 0.0349               |
| 5000           | 0.9920                             | 1548.7             | 0.0336               | 0.9950                                | 1544.9             | 0.0349               |
| 6000           | 1.0145                             | 1583.8             | 0.0352               | 1.0170                                | 1579.0             | 0.0341               |
| 7000           | 1.0360                             | 1617.5             | 0.0336               | 1.0383                                | 1612.0             | 0.0329               |
| 7500           | 1.0468                             | 1634.3             | 0.0336               | 1.0485                                | 1627.8             | 0.0318               |
| 7855           | 1.0528                             | 1643.7             | 0.0264               | 1.0565                                | 1640.2             | 0.0349               |
| LUB            | 0.8750                             | 1365.7             | ----                 | 0.8775                                | 1362.9             | ----                 |

GENERAL REMARKS:

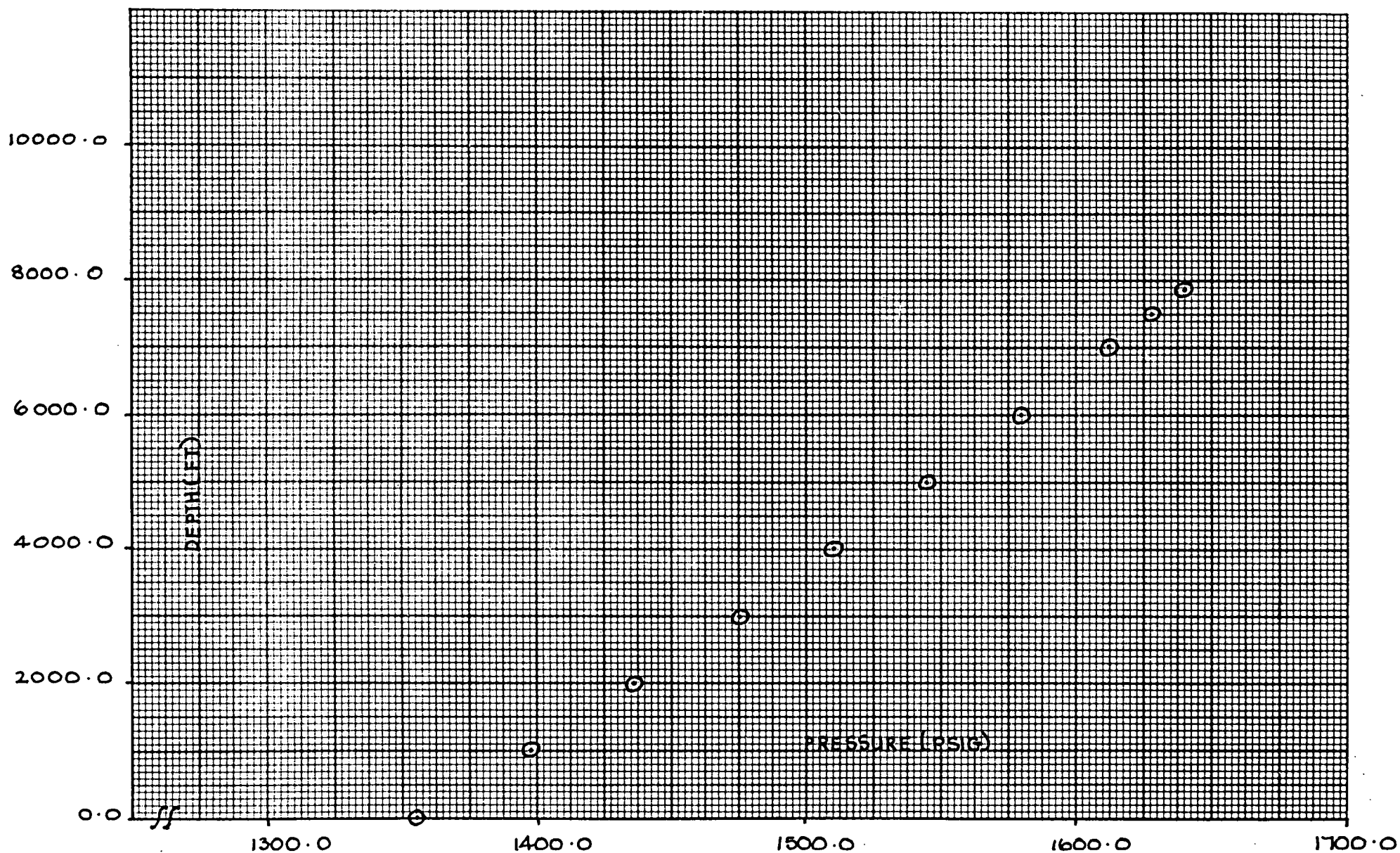
NIL

DWT IN: 1358  
DWT OUT: 1359  
MAX BHT: TEMP ELEMENT USED  
256.1°F

ELEMENT 57413/3000 CALIBRATED 14.9.86  
ELEMENT 57414/3000 CALIBRATED 14.9.86

BIG LAKE # 14 - STATIC PRESSURE GRADIENT - 29/9/86

ELEMENT # 57414/3000 (BOT)



00113

WELL NAME: BIG LAKE 14#

STATIC GRADIENT SURVEY

DATE: 29/9/86

BOMB No. 1 DATA

ELEMENT No. 57413  
ELEMENT RANGE: 3000 PSI  
RECORDER No. 61127 x 15 T.L.S.  
CLOCK DATA: 2402 x 3 HR  
ENGAGE STYLUS: 11:29  
DISENGAGE: 13:52

BOMB No. 2 DATA

ELEMENT No. 57414  
ELEMENT RANGE: 3000 PSI  
RECORDER No. 12959  
CLOCK DATA: 2180 x 3 HR  
ENGAGE STYLUS: 11:29  
DISENGAGE: 13:52

LUBRICATOR DATA

PRESSURE WITH D.W.T. IN 1358 PSI OUT 1359  
TIME PRESSURED: 11:41 AM  
TIME DEPRESSURED: 13:37

| DATE    | TIME  | DEPTH | DEFLECTION | PRESSURE TEMP. | GRADIENT ps/VL | DEPTH | DEFLECTION | PRESSURE TEMP. | GRADIENT ps/VL | REMARKS           |
|---------|-------|-------|------------|----------------|----------------|-------|------------|----------------|----------------|-------------------|
| 29/9/86 |       | LUG   | 0.8725     |                |                |       | 0.8725     |                |                |                   |
|         | 11:51 | RIH   |            |                |                |       |            |                |                | TEMP ELEMENT USED |
|         | 11:56 | 1000  | 0.8993     |                |                |       | 0.9000     |                |                |                   |
|         | 12:04 | 2000  | 0.9230     |                |                |       | 0.9250     |                |                |                   |
|         | 12:12 | 3000  | 0.9473     |                |                |       | 0.9500     |                |                |                   |
|         | 12:20 | 4000  | 0.9705     |                |                |       | 0.9725     |                |                |                   |
|         | 12:28 | 5000  | 0.9920     |                |                |       | 0.9950     |                |                |                   |
|         | 12:37 | 6000  | 1.0145     |                |                |       | 1.0170     |                |                |                   |
|         | 12:45 | 7000  | 1.0360     |                |                |       | 1.0383     |                |                |                   |
|         | 12:52 | 7500  | 1.0468     |                |                |       | 1.0485     |                |                |                   |
|         | 12:59 | 7855  | 1.0528     |                |                |       | 1.0565     |                |                |                   |
|         | 13:09 | P.O.H |            |                |                |       |            |                |                |                   |
|         | 13:27 | LUG   | 0.8750     |                |                |       | 0.8775     |                |                |                   |

General Comments:

00120

## SANTOS EXPLORATION DATA BASE

## WATER ANALYSIS

WELL: BIG LAKE

14

LAB: AMDEL

TEST: PROD

DATE: 03/06/1987

SAMPLE: .

DEPTH: - FT (KB)

- FT (SUBSEA)

FORMATION:

COMMENT: LET 26/5/87: IMBALANCE DUE TO NHS &amp; FE

| CATIONS       | MG/L | MEQ/L | ANIONS       | MG/L  | MEQ/L |
|---------------|------|-------|--------------|-------|-------|
| SODIUM        | 51.0 | 2.2   | CHLORIDE     | 84.0  | 2.4   |
| POTASSIUM     | 0.5  | 0.0   | BICARBONATE  | 91.9  | 1.5   |
| CALCIUM       | 0.6  | 0.0   | CARBONATE    |       |       |
| MAGNESIUM     | 0.8  | 0.1   | SULPHATE     | 18.0  | 0.4   |
| IRON          |      |       | NITRATE      | 0.1   | 0.0   |
|               |      |       | HYDROXIDE    |       |       |
| TOTAL CATIONS | 52.9 | 2.3   | TOTAL ANIONS | 194.0 | 4.2   |

ION BALANCE: -29.3 %

TOTAL DISSOLVED SOLIDS: 200.0 MG/L

MEASURED RESISTIVITY: 18.520 OHM-M AT TEMP 77. F 25. C

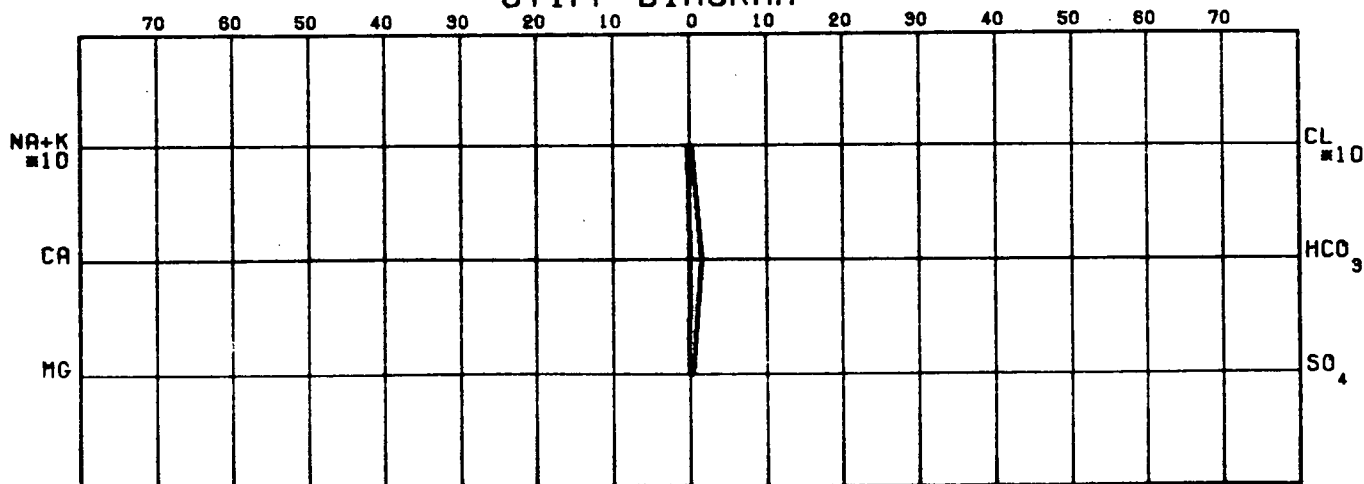
SODIUM TO TOTAL CATION RATIO: 95.3 %

PH: 5.5

SODIUM CHLORIDE EQUIVALENT: 183.

EQUIVALENT RM AT 75 F: 16.60

## STIFF DIAGRAM



## SANTOS EXPLORATION DATA BASE

## WATER ANALYSIS

WELL: BIG LAKE

14

LAB: AMDEL

TEST: PROD

DATE: 03/06/1987

SAMPLE: .

DEPTH: - FT (KB)

- FT (SUBSEA)

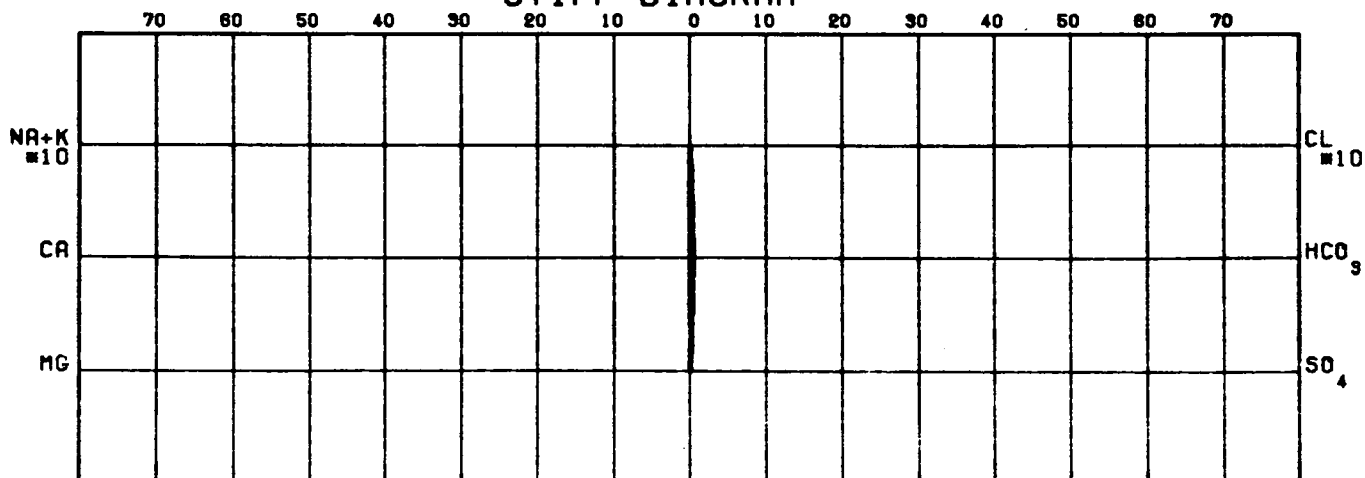
FORMATION:

COMMENT: METER RUN 24/5/87: IMBALANCE DUE TO NH3

| CATIONS       | MG/L | MEQ/L | ANIONS       | MG/L | MEQ/L |
|---------------|------|-------|--------------|------|-------|
| SODIUM        | 13.0 | 0.6   | CHLORIDE     | 18.0 | 0.5   |
| POTASSIUM     | 0.5  | 0.0   | BICARBONATE  | 27.0 | 0.4   |
| CALCIUM       | 0.2  | 0.0   | CARBONATE    |      |       |
| MAGNESIUM     | 0.3  | 0.0   | SULPHATE     | 3.1  | 0.1   |
| IRON          |      |       | NITRATE      | 0.1  | 0.0   |
|               |      |       | HYDROXIDE    |      |       |
| TOTAL CATIONS | 14.0 | 0.6   | TOTAL ANIONS | 48.2 | 1.0   |

ION BALANCE: -24.8 %  
 TOTAL DISSOLVED SOLIDS: 48.0 MG/L  
 MEASURED RESISTIVITY: 62.500 OHM-M AT TEMP 77. F 25. C  
 SODIUM TO TOTAL CATION RATIO: 92.3 %  
 PH: 5.1  
 SODIUM CHLORIDE EQUIVALENT: 44.  
 EQUIVALENT RM AT 75 F: 16.60

## STIFF DIAGRAM





00123

## WIRELINE REPORT

WELL: BIG LAKE #14

DATE: 22/4/87

PROGRAM: Bottom Hole Pressure Survey

PURPOSE OF WORK: B/Box run

## REPORT OF WORK PERFORMED:

0750 : Arrive on location, spot wireline unit and commence rigging up.  
0803 : Pressure test equipment, O.K.  
0805 : R.I.H. with 1.75' B/Box to tag P.B.T.D.  
0825 : Tag bottom @ 8204' KB & P.O.O.H.  
0845 : Arrive in lub, depressure, remove tool string & prepare to run amerada's.  
0900 : Pressure lub for static Gradient.  
0910 : R.I.H. with amerada's, stops as per programme.  
1027 : P.O.O.H.  
1057 : Arrive in lub.  
1107 : Depressure lub, remove amerada's, charts O.K. Rig down, end of gradient.

OPERATOR'S SIGNATURE

WORK PERFORMED BY: N. Hay / P. Bowyer of Expertest

## WELL DATA:

Tubing Size: 3 1/2" FWHP: SIWHP: 1384 PSI

Sub Surface S.V./Landing Nipple @ S.S.D. @ 7500' 23'

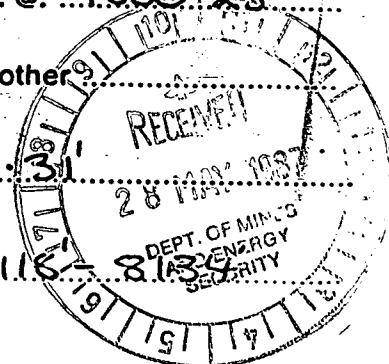
"X" Nipple @ "N"/"XN" Nipple @ 7527' 28' other:

Min I.D. 2.205" @ 7527' 28' Packer @ 7515' 31'

Perforated Interval: 7576-7770', 7901-7910 &amp; 8118-8139

Forward to: Petroleum Engineering - Adelaide  
Production Department - Moomba

2826





**\*\* BIG LAKE 14 \*\***

**STATIC PRESSURE GRADIENT**

TEST DATE: 22/4/87

| DEPTH<br>(FT.) | TOP PRESSURE ELEMENT<br>56431/3000 |                    |                      | BOTTOM PRESSURE ELEMENT<br>56428/3000 |                    |                      |
|----------------|------------------------------------|--------------------|----------------------|---------------------------------------|--------------------|----------------------|
|                | DEFLECTION<br>(INCHES)             | PRESSURE<br>(PSIG) | GRADIENT<br>(PSI/FT) | DEFLECTION<br>(INCHES)                | PRESSURE<br>(PSIG) | GRADIENT<br>(PSI/FT) |
| LUB            | 0.8900                             | 1389.5             | ----                 | 0.8860                                | 1386.9             | ----                 |
| 1000           | 0.9160                             | 1430.2             | 0.0407               | 0.9120                                | 1427.7             | 0.0408               |
| 2000           | 0.9400                             | 1467.8             | 0.0376               | 0.9360                                | 1465.4             | 0.0377               |
| 3000           | 0.9640                             | 1505.4             | 0.0376               | 0.9600                                | 1503.0             | 0.0376               |
| 4000           | 0.9870                             | 1541.4             | 0.0360               | 0.9830                                | 1539.1             | 0.0361               |
| 5000           | 1.0080                             | 1574.3             | 0.0329               | 1.0050                                | 1573.6             | 0.0345               |
| 6000           | 1.0300                             | 1608.7             | 0.0344               | 1.0270                                | 1608.1             | 0.0345               |
| 7000           | 1.0520                             | 1643.1             | 0.0344               | 1.0490                                | 1642.6             | 0.0345               |
| 7500           | 1.0630                             | 1660.4             | 0.0344               | 1.0600                                | 1659.8             | 0.0345               |
| 7855           | 1.0700                             | 1671.3             | 0.0309               | 1.0680                                | 1672.3             | 0.0353               |
| 8134           | 1.0900                             | 1702.6             | 0.1122               | 1.0890                                | 1705.3             | 0.1180               |
| LUB            | 0.8920                             | 1392.6             | ----                 | 0.8995                                | 1408.1             | ----                 |

**GENERAL REMARKS:**

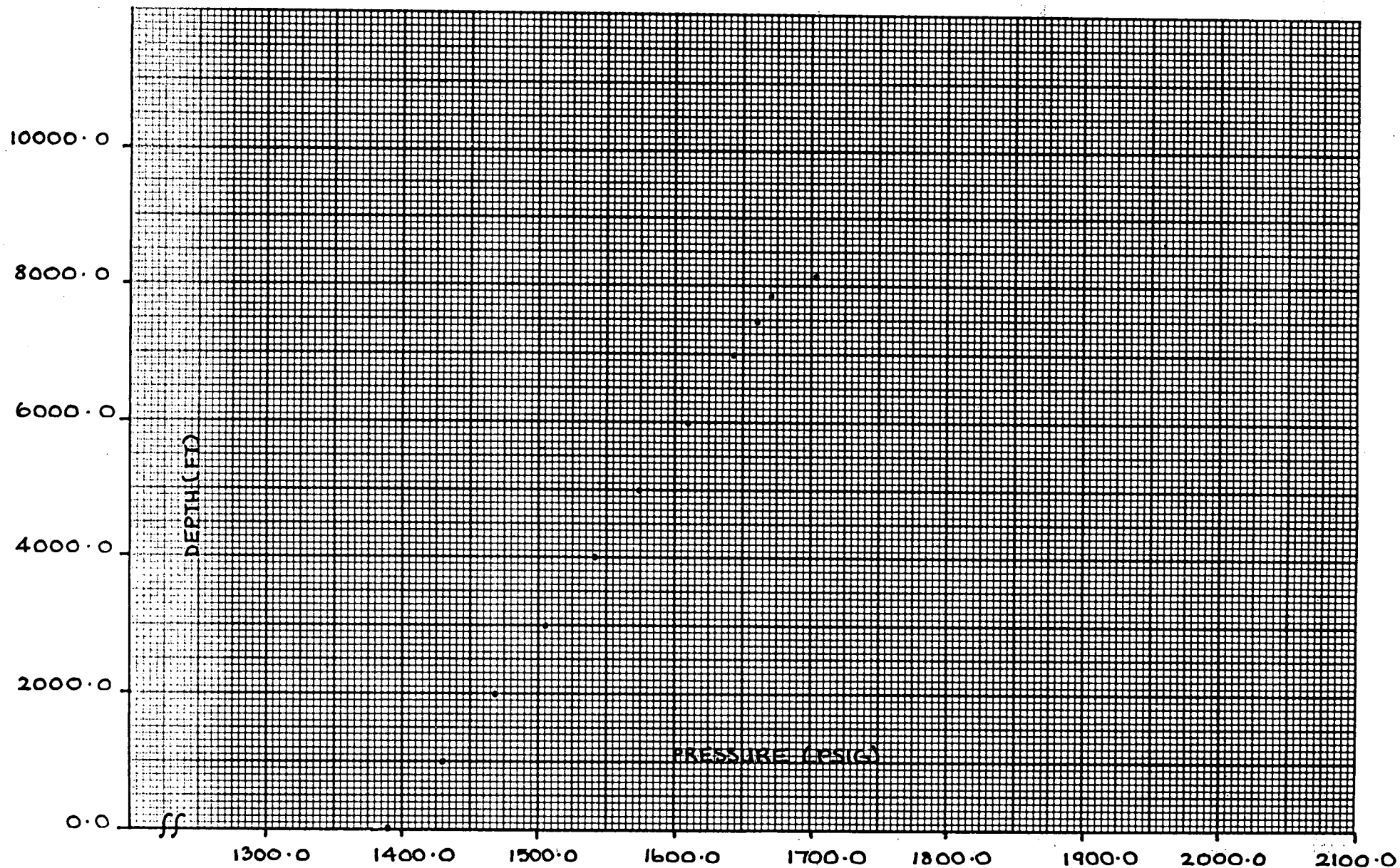
M B H T 304 F

DWT IN: 1382  
DWT OUT: 1384  
MAX BHT: 304 F

ELEMENT 56431/3000 CALIBRATED 22.1.87  
ELEMENT 56428/3000 CALIBRATED 22.1.87

BIG LAKE # 14 - STATIC PRESSURE GRADIENT - 22/4/87

ELEMENT # 56431/3000 (TOP)



WELL NAME: BIG LAMIE #14

## STATIC GRADIENT SURVEY

DATE: 22-4-87

**BOMB No. 1 DATA**

ELEMENT No. 56431 ELEMENT RANGE: 3000 P81  
CORDER No. 14292 X15 TLS CLOCK DATA: 2509 X3 HR  
GAGE STYLUS: 0854 DISENGAGE: 11.13

**BOMB No. 2 DATA**

ELEMENT No. 56428 ELEMENT RANGE: 3000  
RECORDER No. 14620 CLOCK DATA: 2489  
ENGAGE SYLUS: 0854 DISENGAGE: 1113

## LUBRICATOR DATA

PRESSURE WITH D.W.T.: 1N1382 04T1384  
TIME PRESSURED: 0900  
TIME DEPRESSURED: 1107

[illegible]

General Comments:

27-10

ROLLING BOTTOMHOLE PRESSURE SURVEY GAS CALCULATION SHEET

WELL: Big Lake # 14 Pf = 5000 kPa  
 ORIFICE SIZE: 60.000 mm 2.362 " T = 89 °C  
 LINE SIZE: 146.329 mm 5.761 " Diff = 11 kPa

Cumulative Production to end of August =  $934.590 \text{ m}^3 \times 10^6$  ✓

Number of hours online in August = 742 ✓

Production in August =  $4.299 \text{ m}^3 \times 10^6$  ✓

.. Average flow rate in August =  $(4.299 / 742) \times 24 = 0.139 \text{ m}^3 \times 10^6 / \text{d}$  ✓

Number of days online in September before Shut In 0800 hrs 5 / 9 / 89  
 = 4.333

.. Production up to 0800hrs 5 / 9 / 89 =  $0.139 \times 4.333 = 0.602 \text{ m}^3 \times 10^6$

Total cumulative production =  $934.590 + 0.602$   
 =  $935.192 \text{ m}^3 \times 10^6$   
 =  $33193.715 \text{ mmscf}$  ✓

Flow rate just prior to Shut In =  $0.148 \text{ m}^3 \times 10^6$  ✓  
 =  $5.263 \text{ mmscf/d}$

2826

✓ 6/4/90  
 RMD

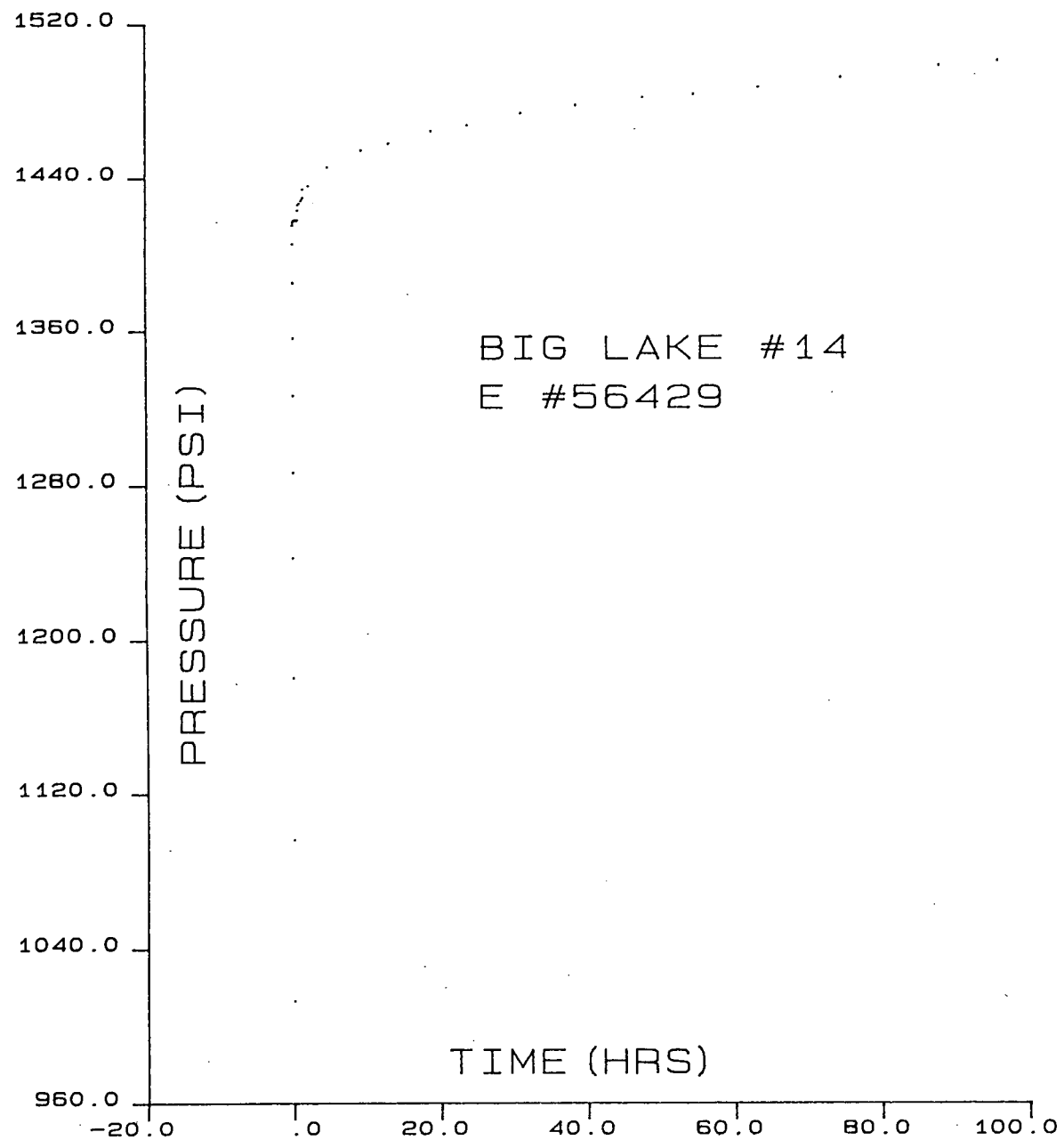
SUB-SURFACE PRESSURE SURVEY

|           |         |                        |                     |
|-----------|---------|------------------------|---------------------|
| CO.       |         | RUN 01 FIELD BIG LAKE  | WELL 14             |
| EFF DEPTH |         | WELL STAT              | TOOL HUNG 7843'     |
| CASING    | -       | CASING PRESS           | ON BOTTOM 1800 4/9  |
| LINER     | -       | TUBING PRESS           | OFF BOTTOM 0800 9/9 |
| DATE      | 890909  | ELEMENT RANGE 0 - 3095 | ZERO POINT          |
| ELEVATION |         | ZONE                   | SHUT-IN 0800 5/9    |
| MAX TEMP  |         | PICK-UP                | ON-PROD             |
| PERF      | -       | CAL SER NO. 56429      | MPP                 |
| TUBING    | -       |                        |                     |
| UNITS     | ENGLISH | PURPOSE                | BUILD-UP            |

SURVEY DATA

| CO. | TIME | P-T    | DP-DT  | DTIME | TIME  | P-T    | DP-DT  | DTIME |
|-----|------|--------|--------|-------|-------|--------|--------|-------|
|     | 8:00 | 1013.4 | 1013.4 | .0    | 9:18  | 1428.3 | 1428.3 | 1.3   |
|     | 8:01 | 1096.4 | 1096.4 | .0    | 9:31  | 1429.7 | 1429.7 | 1.5   |
|     | 8:02 | 1180.3 | 1180.3 | .0    | 9:31  | 1434.0 | 1434.0 | 1.5   |
|     | 8:03 | 1242.6 | 1242.6 | .1    | 10:16 | 1435.8 | 1435.8 | 2.3   |
|     | 8:05 | 1286.7 | 1286.7 | .1    | 12:55 | 1446.0 | 1446.0 | 4.9   |
|     | 8:06 | 1326.5 | 1326.5 | .1    | 17:29 | 1455.1 | 1455.1 | 9.5   |
|     | 8:07 | 1356.3 | 1356.3 | .1    | 21:15 | 1458.7 | 1458.7 | 13.2  |
|     | 8:07 | 1385.7 | 1385.7 | .1    | 3:01  | 1464.9 | 1464.9 | 19.0  |
|     | 8:08 | 1405.8 | 1405.8 | .1    | 7:54  | 1467.7 | 1467.7 | 23.9  |
|     | 8:08 | 1415.5 | 1415.5 | .1    | 15:12 | 1473.9 | 1473.9 | 31.2  |
|     | 8:09 | 1417.4 | 1417.4 | .2    | 22:42 | 1477.9 | 1477.9 | 38.7  |
|     | 8:16 | 1418.3 | 1418.3 | .3    | 7:46  | 1481.8 | 1481.8 | 47.8  |
|     | 8:26 | 1418.3 | 1418.3 | .4    | 14:42 | 1483.3 | 1483.3 | 54.7  |
|     | 8:41 | 1418.3 | 1418.3 | .7    | 23:29 | 1486.8 | 1486.8 | 63.5  |
|     | 8:48 | 1418.3 | 1418.3 | .8    | 10:45 | 1491.7 | 1491.7 | 74.7  |
|     | 8:50 | 1423.4 | 1423.4 | .8    | 0:04  | 1497.6 | 1497.6 | 88.1  |
|     | 8:50 | 1426.1 | 1426.1 | .8    | 8:00  | 1499.8 | 1499.8 | 96.0  |
|     | 9:01 | 1426.8 | 1426.8 | 1.0   | 0:00  | .0     | .0     | .0    |

LUB IN DWT = 743 PSI / OUT = 1266 PSI  
 LUB IN AMERADA = 729 PSI / OUT = 1259 PSI



BIG LAKE #14  
E #56429

00129

SUB-SURFACE PRESSURE SURVEY

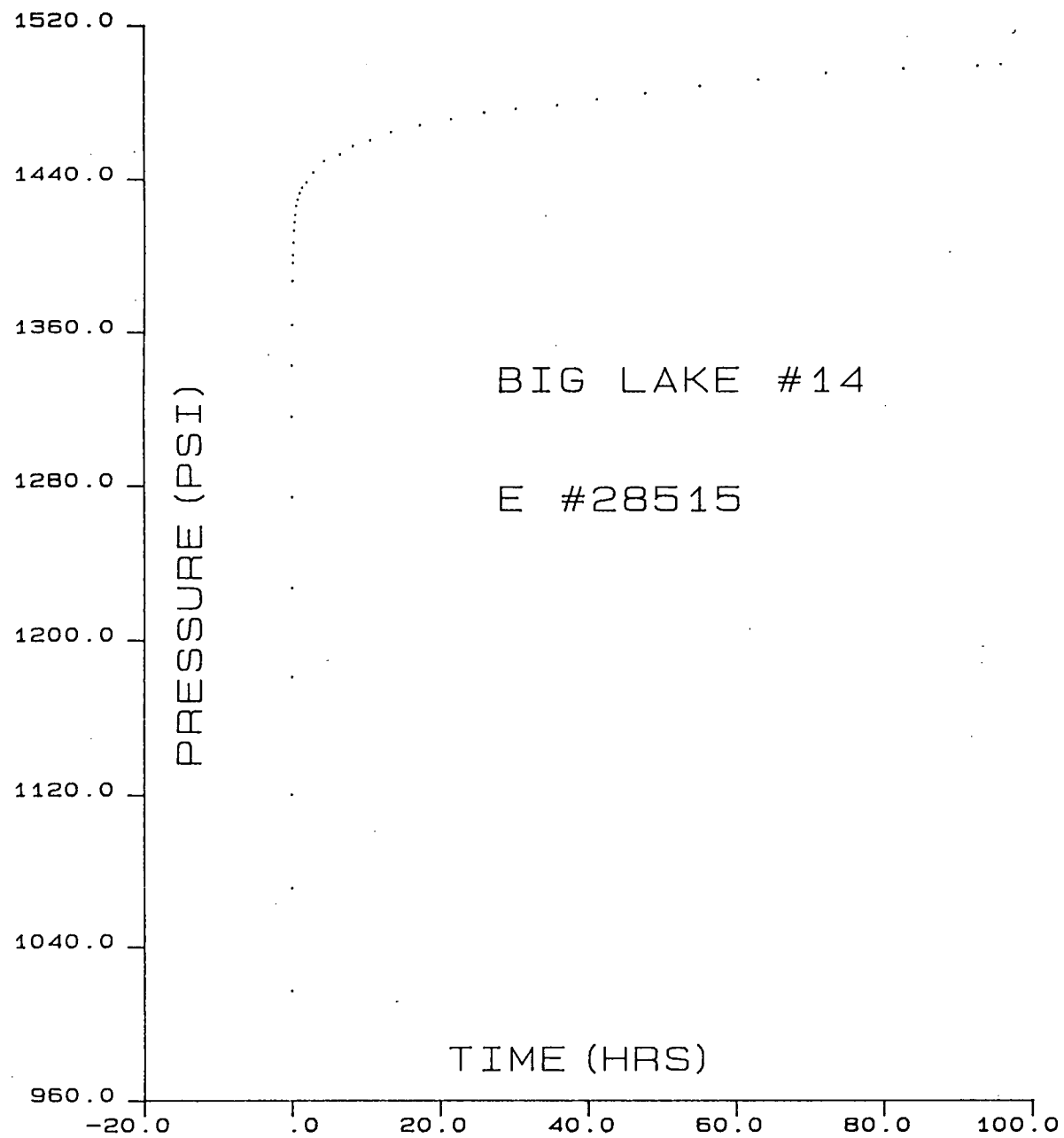
|           |         |                        |                     |
|-----------|---------|------------------------|---------------------|
| CO.       |         | RUN 02 FIELD BIG LAKE  | WELL 14             |
| EFF DEPTH |         | WELL STAT              | TOOL HUNG 7849'     |
| CASING    | -       | CASING PRESS           | ON BOTTOM 1800 4/9  |
| LINER     | -       | TUBING PRESS           | OFF BOTTOM 0800 9/9 |
| DATE      | 890909  | ELEMENT RANGE 0 - 3113 | ZERO POINT          |
| ELEVATION |         | ZONE                   | SHUT-IN 0800 5/9    |
| MAX TEMP  |         | PICK-UP                | ON-PROD             |
| PERF      | -       | CAL SER NO. 28515      | MPP                 |
| TUBING    | -       |                        |                     |
| UNITS     | ENGLISH | PURPOSE                | BUILD-UP            |

SURVEY DATA

| CO. | TIME | P-T    | DP-DT  | DTIME | TIME  | P-T    | DP-DT  | DTIME |
|-----|------|--------|--------|-------|-------|--------|--------|-------|
|     | 8:00 | 1017.4 | 1017.4 | .0    | 10:03 | 1438.4 | 1438.4 | 2.0   |
|     | 8:01 | 1071.4 | 1071.4 | .0    | 11:01 | 1443.7 | 1443.7 | 3.0   |
|     | 8:02 | 1120.4 | 1120.4 | .0    | 12:29 | 1449.6 | 1449.6 | 4.5   |
|     | 8:03 | 1180.9 | 1180.9 | .1    | 14:39 | 1453.3 | 1453.3 | 6.6   |
|     | 8:04 | 1227.1 | 1227.1 | .1    | 16:22 | 1457.6 | 1457.6 | 8.4   |
|     | 8:05 | 1274.3 | 1274.3 | .1    | 18:42 | 1460.8 | 1460.8 | 10.7  |
|     | 8:06 | 1315.9 | 1315.9 | .1    | 21:32 | 1464.9 | 1464.9 | 13.5  |
|     | 8:06 | 1342.4 | 1342.4 | .1    | 1:27  | 1468.3 | 1468.3 | 17.5  |
|     | 8:08 | 1364.2 | 1364.2 | .1    | 5:38  | 1471.6 | 1471.6 | 21.6  |
|     | 8:11 | 1387.3 | 1387.3 | .2    | 10:07 | 1474.9 | 1474.9 | 26.1  |
|     | 8:13 | 1396.6 | 1396.6 | .2    | 14:23 | 1476.8 | 1476.8 | 30.4  |
|     | 8:16 | 1400.5 | 1400.5 | .3    | 19:58 | 1478.6 | 1478.6 | 36.0  |
|     | 8:20 | 1407.0 | 1407.0 | .3    | 1:23  | 1481.7 | 1481.7 | 41.4  |
|     | 8:24 | 1413.2 | 1413.2 | .4    | 7:53  | 1484.8 | 1484.8 | 47.9  |
|     | 8:28 | 1417.4 | 1417.4 | .5    | 15:17 | 1488.5 | 1488.5 | 55.3  |
|     | 8:35 | 1421.3 | 1421.3 | .6    | 23:13 | 1491.8 | 1491.8 | 63.2  |
|     | 8:42 | 1425.9 | 1425.9 | .7    | 8:20  | 1495.3 | 1495.3 | 72.3  |
|     | 8:54 | 1429.3 | 1429.3 | .9    | 18:52 | 1497.7 | 1497.7 | 82.9  |
|     | 9:10 | 1432.7 | 1432.7 | 1.2   | 4:51  | 1499.3 | 1499.3 | 92.9  |
|     | 9:30 | 1435.4 | 1435.4 | 1.5   | 8:00  | 1500.1 | 1500.1 | 96.0  |

LUB IN DWT = 743 PSI / OUT = 1266 PSI

LUB IN AMERADA = 732 PSI / OUT = 1259 PSI



BIG LAKE #14

E #28515

00131

**EXPERTEST** PTY. LTD.

WIRELINE &amp; WELL TESTING SERVICE

PO BOX 354 COWANDILLA 5033

PH. (08) 354 0488 TELEX AAS7183

FAX (08) 43 7408

138 RICHMOND ROAD MARLESTON  
SOUTH AUSTRALIA 5033

Tested Saturday, 9th September 1989.

| CLIENT      | LOCATION    | FORMATION |
|-------------|-------------|-----------|
| Santos Ltd. | BIG LAKE 14 | 0         |

**STATIC PRESSURE GRADIENT REPORT**

| PRESSURE ELEMENT DATA |           |       |             |
|-----------------------|-----------|-------|-------------|
| POSITION              | SERIAL NO | RANGE | CALIBERATED |
| Top                   | 56429     | 3000  | 10/ 8/89    |
| Bottom                | 28515     | 3000  | 10/ 8/89    |

| WELL DATA |          |
|-----------|----------|
| PARAMETER | VALUE    |
| DWT In    | 8729 KPA |
| DWT Out   | 8729 KPA |
| Max BHT   | TEMP ELE |

300.6 °F

| TOP ELEMENT    |                      |                  |                    | BOTTOM ELEMENT       |                  |                    |
|----------------|----------------------|------------------|--------------------|----------------------|------------------|--------------------|
| DEPTH<br>FT KB | DEFLECTION<br>INCHES | PRESSURE<br>PSIG | GRADIENT<br>PSI/FT | DEFLECTION<br>INCHES | PRESSURE<br>PSIG | GRADIENT<br>PSI/FT |
| LUB.           | 0.8090               | 1249.4           | -----              | 0.8060               | 1247.8           | -----              |
| 1000           | 0.8320               | 1284.9           | 0.036              | 0.8280               | 1282.0           | 0.034              |
| 2000           | 0.8540               | 1318.9           | 0.034              | 0.8500               | 1316.2           | 0.034              |
| 3000           | 0.8750               | 1351.3           | 0.032              | 0.8720               | 1350.4           | 0.034              |
| 4000           | 0.8960               | 1383.8           | 0.032              | 0.8910               | 1380.0           | 0.030              |
| 5000           | 0.9160               | 1414.7           | 0.031              | 0.9100               | 1409.5           | 0.030              |
| 6000           | 0.9360               | 1445.6           | 0.031              | 0.9280               | 1437.5           | 0.028              |
| 6500           | 0.9460               | 1461.1           | 0.031              | 0.9380               | 1453.1           | 0.031              |
| 7000           | 0.9560               | 1476.5           | 0.031              | 0.9480               | 1468.7           | 0.031              |
| 7500           | 0.9660               | 1492.0           | 0.031              | 0.9580               | 1484.2           | 0.031              |
| 7855           | 0.9730               | 1502.8           | 0.031              | 0.9660               | 1496.7           | 0.035              |
| LUB.           | 0.8130               | 1255.6           | -----              | 0.8090               | 1252.4           | -----              |

**GENERAL REMARKS**

CASING 8694 KPA

BIG LAKE # 14 — STATIC PRESSURE GRADIENT — 9/9/89  
ELEMENT # 56429 / 3000 (TOP)

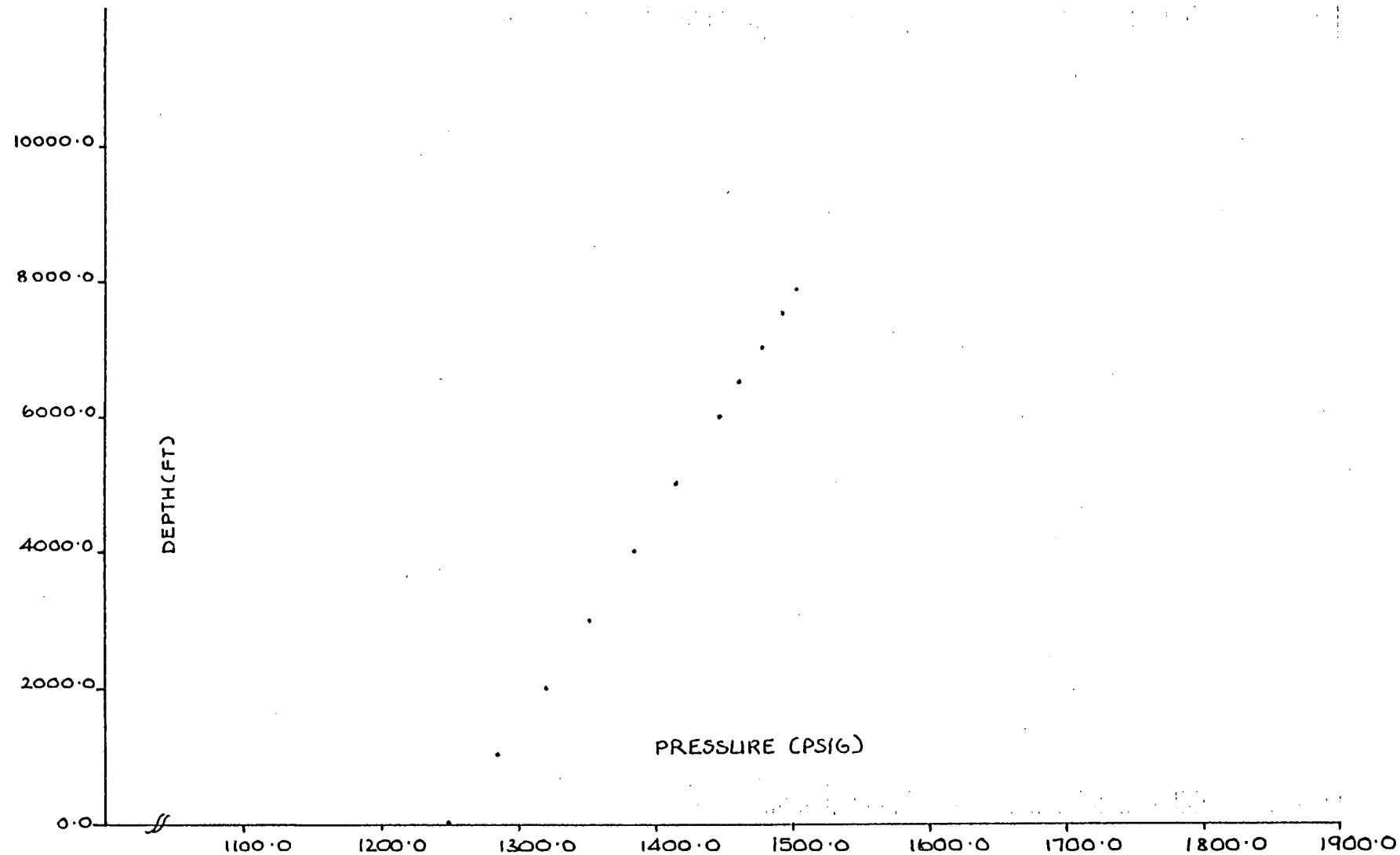


FIG 5030

00133

00134



# WIRELINE REPORT

CLIENT SANTOS WELL BIG LAKE # 14

DATE 4TH SEPTEMBER;

PROGRAMME BOTTOMHOLE PRESSURE SURVEY 1989

PURPOSE OF WORK BLIND BOX RUN - TO ENSURE TUBING IS CLEAR OF OBSTRUCTIONS PRIOR TO RUNNING AMERACAS

## REPORT OF WORK PERFORMED

13:52 ARRIVE @ LOCATION ; STANDBY FOR FIELD OPS TO SWI.  
 14:30 SWI, RIG UP SWAB VALVE AND W/L UNIT.  
 14:40 R.I.H WITH 1.75" BLIND BOX  
 15:00 TAG P.B.T.D @ 8203' KB - P.O.O.H.  
 15:20 @ SURFACE, DEPRESSURE LUBRICATOR  
 PREPARE GAUGES FOR BOTTOMHOLE PRESSURE SURVEY  
 (TWO PRESSURE ELEMENTS ; 1 TEMPERATURE ELEMENT)  
 15:40 PRESSURE LUBRICATOR  
 17:40 RUN IN HOLE WITH 2 PRESSURE ELEMENTS ; 1 TEMP ELEMENT.  
 18:00 HANG GAUGES @ 7855' KB  
 9.9.89  
 0800: PULL BOMBS OFF BOTTOM. END BUILD UP.  
 1102: RUN STATIC GRADIENT SEE ATTACHED GRADIENT REPORT.  
 1300: RIG DOWN END SURVEY.

*[Signature]*  
 Operator's Signature

WORKED PERFORMED BY D. JOHNS / W. BOND OF EXPERTEST

## WELL DATA:

Tubing Size 3 1/2" FWHP 5123 kpa SIWHP 8308 kpa  
 Subsurface S.V./Landing Nipple @ - S.S.D. @ 7500.23'  
 'X' Nipple @ - 'N' ~~NIPPLE~~ Nipple @ 7527.28 Other @ -  
 Min. I.D. 2.205" @ 7527.28' Packer @ 7515.31'  
 Perforated Interval: 7576' - 8134'



CLIENT SANTOS

WELL BIG LAKE #14

## STATIC GRADIENT SURVEY

OPERATOR M. Mueller

DATE 9.9.89

| BOMB No. 1 DATA     |              |               |                    |                  |                 | BOMB No 2 DATA |                 |                |                 | DWT IN<br>8729 KPA<br>DWT OUT<br>8729 KPA |                    |
|---------------------|--------------|---------------|--------------------|------------------|-----------------|----------------|-----------------|----------------|-----------------|-------------------------------------------|--------------------|
| ELEMENT No.         | <u>56429</u> | ELEMENT RANGE | <u>3000 PSI</u>    | ELEMENT No.      | <u>28515</u>    | ELEMENT RANGE  | <u>3000 PSI</u> | RECORDING No   | <u>13027</u>    | CLOCK DATA                                | <u>2533 - 3 HR</u> |
| RECORDING No        | <u>14628</u> | CLOCK DATA    | <u>2509 - 3 HR</u> | ENGAGE STYLUS    | <u>1040</u>     | DISENGAGE      | <u>1300</u>     | ENGAGE STYLUS  | <u>1040</u>     | DISENGAGE                                 | <u>1300</u>        |
| ENGAGE STYLUS       | <u>1040</u>  | DISENGAGE     | <u>1300</u>        | BLEED LUBRICATOR | <u>1251</u>     |                |                 |                |                 |                                           |                    |
| PRESSURE LUBRICATOR | <u>1047</u>  |               |                    |                  |                 |                |                 |                |                 |                                           |                    |
| DATE                | TIME         | DEPTH'        | DEFLEC-TION        | PRESSURE TEMP.   | GRADIENT psi/ft | DEPTH'         | DEFLEC-TION     | PRESSURE TEMP. | GRADIENT psi/ft | REMARKS                                   |                    |
|                     | <u>1047</u>  | <u>LUB</u>    |                    |                  |                 |                |                 |                |                 |                                           |                    |
|                     | <u>1102</u>  | <u>RIH</u>    |                    |                  |                 |                |                 |                |                 | <u>TEMP ELE RUN.</u>                      |                    |
|                     | <u>1106</u>  | <u>1000</u>   |                    |                  |                 |                |                 |                |                 | <u>CASING 8695 KPA</u>                    |                    |
|                     | <u>1113</u>  | <u>2000</u>   |                    |                  |                 |                |                 |                |                 |                                           |                    |
|                     | <u>1120</u>  | <u>3000</u>   |                    |                  |                 |                |                 |                |                 |                                           |                    |
|                     | <u>1127</u>  | <u>4000</u>   |                    |                  |                 |                |                 |                |                 |                                           |                    |
|                     | <u>1134</u>  | <u>5000</u>   |                    |                  |                 |                |                 |                |                 |                                           |                    |
|                     | <u>1141</u>  | <u>6000</u>   |                    |                  |                 |                |                 |                |                 |                                           |                    |
|                     | <u>1147</u>  | <u>6500</u>   |                    |                  |                 |                |                 |                |                 |                                           |                    |
|                     | <u>1153</u>  | <u>7000</u>   |                    |                  |                 |                |                 |                |                 |                                           |                    |
|                     | <u>1159</u>  | <u>7500</u>   |                    |                  |                 |                |                 |                |                 |                                           |                    |
|                     | <u>1205</u>  | <u>7855</u>   |                    |                  |                 |                |                 |                |                 | <u>DWT @ BOTTOM STOP 8729 KPA</u>         |                    |
|                     | <u>1220</u>  | <u>FOOH</u>   |                    |                  |                 |                |                 |                |                 |                                           |                    |
|                     | <u>1236</u>  | <u>LUB</u>    |                    |                  |                 |                |                 |                |                 |                                           |                    |
|                     |              |               |                    |                  |                 |                |                 |                |                 |                                           |                    |
|                     |              |               |                    |                  |                 |                |                 |                |                 |                                           |                    |
|                     |              |               |                    |                  |                 |                |                 |                |                 |                                           |                    |

GENERAL REMARKS:



00136

Well: BIG LAKE # 14 Date: 4TH SEPTEMBER 1989

Lubricator Data: ① 729 / 1259 Operator: W. BONO  
② 732 / 1259

Pressure with D.W.T. In: 5123 kpa<sup>(743)</sup> Out: 8729 kpa (1266)

Time Pressured: 15:40 —" — Time Depressed: 10:17 9.9.89

Time Run in Hole: 17:40 —" — Time off Bottom: 0800 9.9.89

## Bomb No. 1 Data

## Bomb No. 2 Data

|                           |                                        |                                        |
|---------------------------|----------------------------------------|----------------------------------------|
| Element No. and Range     | <u>56429 x 3000 PSI</u>                | <u>28515 x 3000 PSI</u>                |
| Recorder No.              | <u>14628 x 15 TLS</u>                  | <u>13027 x 15 TLS</u>                  |
| Clock and Lead Screw Data | <u>24724 x 120 HR</u>                  | <u>F-15296 x 120 HR</u>                |
| Engage Stylus             | Date: <u>4/9/89</u> Time: <u>15:31</u> | Date: <u>4/9/89</u> Time: <u>15:31</u> |
| Disengage                 | Date: <u>9.9.89</u> Time: <u>10:30</u> | Date: <u>9.9.89</u> Time: <u>10:30</u> |

Remarks: TEMPERATURE ELEMENT RUN: EL 22821 x 139 - 395°F  
REC 28298 x 15 TLS  
MS18A Temp = 311.6°F CLOCK 24711 x 120 HR

## Well-Head Data for Final Build-up

| Date | Time           | Hours shut-in Time | Wellhead Kpa | Casing Kpa | Wellhead Temp. °C | Remarks                            |
|------|----------------|--------------------|--------------|------------|-------------------|------------------------------------|
| 4TH  | SEPTEMBER 1989 |                    |              |            |                   |                                    |
|      | 15:40          |                    | 5123         | 5500       | 75                | PRESSURE LUB                       |
|      | 17:40          |                    | 5137         | 5500       | 75                | RUN IN HOLE                        |
|      | 18:00          |                    | 5130         | 5500       | 72                | HANG GAUGES @ 7855' <sup>149</sup> |
|      | 22:00          |                    | 5013         | 5500       | 72                | CONTINUE TO                        |
| 5TH  | SEPTEMBER 1989 |                    |              |            |                   | MONITOR STABLE FLOW                |
|      | 02:00          |                    | 4951         | 5400       | 78                |                                    |
|      | 06:00          |                    | 4958         | 5400       | 73°               |                                    |
|      | 06:30          |                    | 4958         | 5400       | 74                |                                    |
|      | 07:00          |                    | 4958         | 5300       | 71                |                                    |
|      | 07:30          |                    | 4965         | 5300       | 70                |                                    |
|      | 08:00          |                    | 4972         | 5300       | 75                | S.W.I - COMMENCE                   |
|      | 08:05          |                    | 7895         | 5400       |                   | 96 HOUR BUILD-UP                   |
|      | 08:10          |                    | 8143         | 5400       |                   |                                    |
|      | 08:15          |                    | 8191         | 5400       |                   |                                    |
|      | 08:30          |                    | 8281         | 5300       |                   |                                    |
|      | 08:45          |                    | 8322         | 5400       |                   |                                    |
|      | 09:00          | 1 Hour             | 8350         | 5400       |                   |                                    |
|      | 09:15          |                    | 8364         | 5400       |                   |                                    |
|      | 09:30          |                    | 8377         | 5400       |                   |                                    |
|      | 09:45          |                    | 8391         | 5400       |                   |                                    |
|      | 10:00          | 2 Hours            | 8398         | 5400       |                   |                                    |
|      | 10:15          |                    | 8405         | 5400       |                   |                                    |



Page Two of 3

00137

Well: BIG LAKE #14 Date: 5TH SEPTEMBER 1989

Lubricator Data:

Operator W. BOND

Pressure with D.W.T. In 5123 kpa 4/9/89 Out 8729 kpa

Time Pressured 15:40 - " - Time Depressed 10:17 9.9.89

Time Run in Hole 17:40 - " - Time off Bottom 0800 9.9.89

Bomb No. 1 Data

Bomb No. 2 Data

|                           |                                        |                                        |
|---------------------------|----------------------------------------|----------------------------------------|
| Element No. and Range     | <u>56429 x 3000 Psi</u>                | <u>28515 x 3000 Psi</u>                |
| Recorder No.              | <u>14628 x 15 TLS</u>                  | <u>13027 x 15 TLS</u>                  |
| Clock and Lead Screw Data | <u>24724 x 120HR</u>                   | <u>F.15296 x 120hr</u>                 |
| Engage Stylus             | Date: <u>4/9/89</u> Time: <u>15:31</u> | Date: <u>4/9/89</u> Time: <u>15:31</u> |
| Disengage                 | Date: <u>9.9.89</u> Time: <u>1030</u>  | Date: <u>9.9.89</u> Time: <u>1030</u>  |

Remarks: TEMPERATURE ELEMENT RUN: EL\* 22821 x 139-395°F  
REC\* 28298 x 15 TLS  
CLOCK\* 24711 x 120 HR

Well-Head Data for Final Build-up

| Date       | Time                  | Hours shut-in Time | Wellhead Kpa | Casing Kpa  | Wellhead Temp. | Remarks                     |
|------------|-----------------------|--------------------|--------------|-------------|----------------|-----------------------------|
| <u>5TH</u> | <u>SEPTEMBER 1989</u> |                    |              |             |                |                             |
|            | <u>10:30</u>          |                    | <u>8412</u>  | <u>5400</u> |                | <u>CONTINUE TO MONITOR</u>  |
|            | <u>10:45</u>          |                    | <u>8419</u>  | <u>5500</u> |                | <u>BUILD-UP</u>             |
|            | <u>11:00</u>          | <u>3 HOURS</u>     | <u>8426</u>  | <u>5500</u> |                |                             |
|            | <u>11:15</u>          |                    | <u>8433</u>  | <u>5600</u> |                |                             |
|            | <u>11:30</u>          |                    | <u>8440</u>  | <u>5600</u> |                |                             |
|            | <u>11:45</u>          |                    | <u>8447</u>  | <u>5700</u> |                |                             |
|            | <u>12:00</u>          | <u>4 HOURS</u>     | <u>8453</u>  | <u>5700</u> |                | <u>COMMENCE 4HRLY</u>       |
|            | <u>14:00</u>          | <u>6</u>           | <u>8474</u>  | <u>6100</u> |                | <u>READINGS</u>             |
|            | <u>18:00</u>          | <u>10</u>          | <u>8508</u>  |             |                | <u>TAKEN OFF W.H. CHART</u> |
|            | <u>22:00</u>          | <u>14</u>          | <u>8522</u>  | <u>7000</u> |                |                             |
| <u>6TH</u> | <u>SEPTEMBER 1989</u> |                    |              |             |                |                             |
|            | <u>02:00</u>          | <u>18</u>          | <u>8529</u>  | <u>7600</u> |                |                             |
|            | <u>06:00</u>          | <u>22</u>          | <u>8543</u>  | <u>8000</u> |                |                             |
|            | <u>10:00</u>          | <u>26</u>          | <u>8577</u>  | <u>8100</u> |                |                             |
|            | <u>1400</u>           | <u>30</u>          | <u>8591</u>  | <u>8300</u> |                |                             |
|            | <u>1800</u>           | <u>34</u>          | <u>8605</u>  | <u>8500</u> |                |                             |
|            | <u>2200</u>           | <u>38</u>          | <u>8605</u>  | <u>8800</u> |                |                             |
| <u>7TH</u> | <u>SEPTEMBER 1989</u> |                    |              |             |                |                             |
|            | <u>0200</u>           | <u>42</u>          | <u>8605</u>  | <u>8900</u> |                |                             |
|            | <u>0600</u>           | <u>46</u>          | <u>8598</u>  | <u>8900</u> |                |                             |
|            | <u>1000</u>           | <u>50</u>          | <u>8639</u>  | <u>9000</u> |                |                             |
|            | <u>1400</u>           | <u>54</u>          | <u>8667</u>  | <u>9000</u> |                |                             |
|            | <u>1800</u>           | <u>58</u>          | <u>8660</u>  | <u>9000</u> |                |                             |

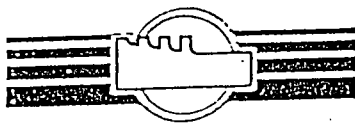


Time Run in Hole..... 17:40 4.9.89 Time off Bottom..... 0800 9.9.89

### Bomb No. 2 Data

Remarks:.....

[illegible]



## SEQUENCE OF EVENTS

CUSTOMER : SANTOS LTD

PERFORATIONS: 7576' - 8134' KB

PAGE: 1 OF 2

WELL NAME: BIG LAKE # 14

FORMATION : (TOOLACHEE / DARALINGIE

DATE: 16-9-90

TEST TYPE : L.E.T. + F.G.S.

EPSILON)

OPR : A. GRINDLAY

| DATE/TIME | DESCRIPTION OF EVENTS                                                                                                                                        |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 16-9-90   |                                                                                                                                                              |
| 1140      | ARRIVE ON LOCATION. SHUT WELL IN. RIG INTO TEST FLANGES.                                                                                                     |
| 1250      | RIG UP SWAB VALVE ON WELLHEAD.                                                                                                                               |
| 1320      | PRESSURE UP TO SWAB VALVE. 3" SWAGE LEAKS. REMOVE AND APPLY PIPE THREAD TAPE RETIGHTEN.                                                                      |
| 1330      | OPEN WELL PRESSURE TEST VALVE AND FLANGES. BYPASS VESSEL.                                                                                                    |
|           | CONTINUE TO RIG UP SEPARATOR AND SURFACE LINES.                                                                                                              |
| 1410      | RIG UP WIRELINE UNIT AND TOOLSTRING.                                                                                                                         |
| 1515      | R.I.H WITH A 1.75" BLIND BOX.                                                                                                                                |
| 1538      | P.B.T.D AT 8204' KB TUBING AND PERFORATIONS CLEAR.                                                                                                           |
| 1540      | P.O.O.H.                                                                                                                                                     |
| 1553      | AT SURFACE. CLOSE SWAB VALVE. DEPRESSURE LUBRICATOR.                                                                                                         |
| 1600      | TURN FLOW THROUGH SEPARATOR. START TEST. FIELD OPERATOR ADVISED THAT COMPRESSORS IN SATELLITE WERE BACKED OFF. SO LINE PRESSURE WOULD BE HIGHER THAN NORMAL. |
| 2005      | LINE PRESSURE INCREASE DUE TO COMPRESSORS IN SATELLITE SHUT DOWN.                                                                                            |
| 17-9-90   |                                                                                                                                                              |
| 0740      | LINE PRESSURE DECREASING. CONTINUE TO MONITOR FLOW.                                                                                                          |
| 18-9-90   |                                                                                                                                                              |
| 0830      | PREPARE AMERADAS FOR A F.G.S.                                                                                                                                |
| 0924      | PRESSURE UP LUBRICATOR.                                                                                                                                      |
| 0939      | R.I.H WITH 2x 3000 PSI ELEMENTS AND 1 x TEMP. ELEMENT TO PERFORM A FLOWING GRADIENT SURVEY.                                                                  |

## SEQUENCE OF EVENTS

CUSTOMER : SANTOS LYS

PERFORATIONS: 7576' - 8134' KB

PAGE: 2 OF 2

WELL NAME: B<sub>1</sub>C LAKE # 14

FORMATION : COOLACHEE / DARLINGIE.

DATE: 18-9-90

TEST TYPE : L.E.T + F.Q.S.

100% CHOKED (Epsilon).

OPR : A. GRINDLAY.

[illegible]

Tested Tuesday, 18th September 1990.

| CLIENT      | LOCATION      | FORMATION       |
|-------------|---------------|-----------------|
| Santos Ltd. | BIG LAKE # 14 | TOOL/DARA/EPSI. |

**FLOWING PRESSURE GRADIENT REPORT**

| PRESSURE ELEMENT DATA |            |       |            |
|-----------------------|------------|-------|------------|
| POSITION              | SERIAL NO. | RANGE | CALIBRATED |
| Top                   | 28515      | 3000  | 29/ 8/90   |
| Bottom                | 56429      | 3000  | 29/ 8/90   |

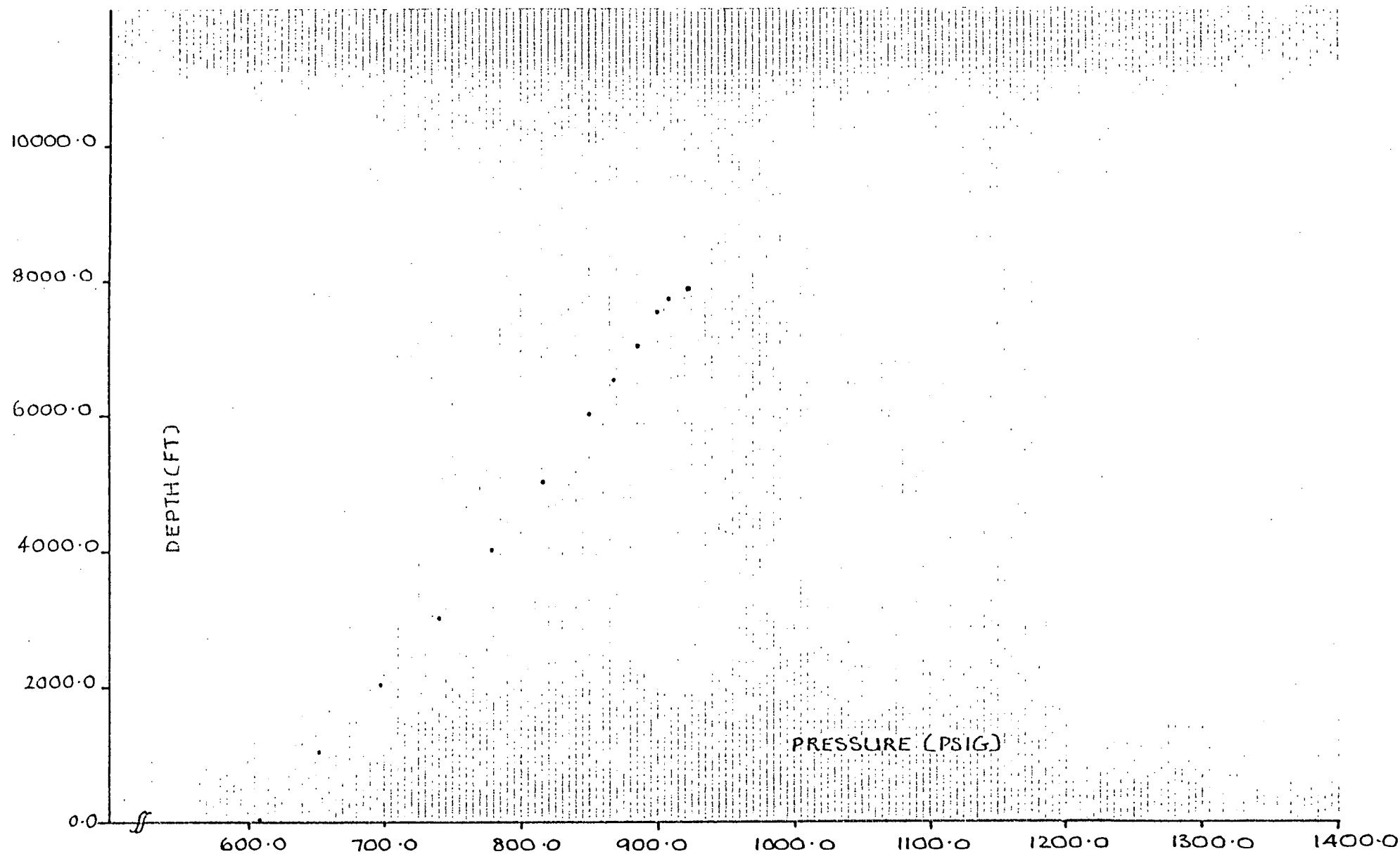
| WELL DATA |          |
|-----------|----------|
| PARAMETER | VALUE    |
| DWT In    | 615 PSIG |
| DWT Out   | 621 PSIG |
| Max BHT   | TEMP EL. |

| TOP ELEMENT    |                      |                  |                    | BOTTOM ELEMENT       |                  |                    |
|----------------|----------------------|------------------|--------------------|----------------------|------------------|--------------------|
| DEPTH<br>FT KB | DEFLECTION<br>INCHES | PRESSURE<br>PSIG | GRADIENT<br>PSI/FT | DEFLECTION<br>INCHES | PRESSURE<br>PSIG | GRADIENT<br>PSI/FT |
| LUB.           | 0.3970               | 608.3            | -----              | 0.3970               | 609.2            | -----              |
| 1000           | 0.4270               | 655.0            | 0.047              | 0.4250               | 652.4            | 0.043              |
| 2000           | 0.4560               | 700.1            | 0.045              | 0.4540               | 697.0            | 0.045              |
| 3000           | 0.4830               | 742.1            | 0.042              | 0.4820               | 740.2            | 0.043              |
| 4000           | 0.5080               | 781.0            | 0.039              | 0.5070               | 778.7            | 0.039              |
| 5000           | 0.5320               | 818.2            | 0.037              | 0.5310               | 815.7            | 0.037              |
| 6000           | 0.5540               | 852.4            | 0.034              | 0.5535               | 850.4            | 0.035              |
| 6500           | 0.5650               | 869.5            | 0.034              | 0.5650               | 858.1            | 0.036              |
| 7000           | 0.5760               | 886.6            | 0.034              | 0.5760               | 885.1            | 0.034              |
| 7500           | 0.5860               | 902.1            | 0.031              | 0.5860               | 900.5            | 0.031              |
| 7700           | 0.5910               | 909.9            | 0.039              | 0.5910               | 908.2            | 0.039              |
| 7855           | 0.6980               | 1076.0           | 1.072              | 0.6975               | 1072.5           | 1.060              |
| LUB.           | 0.4130               | 633.2            | -----              | 0.4110               | 630.8            | -----              |

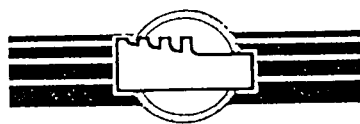
**GENERAL REMARKS**

 WELL FLOWING ON 100% CHOKE.  
TEMPERATURE ELEMENT ALSO RUN.

BIG LAKE # 14 — FLOWING PRESSURE GRADIENT — 18/9/90  
ELEMENT # 56429/3000 (BOT)



### BHP/BHT GAUGE RUN DATA



CUSTOMER : SANTOS LTD

PERFORATIONS: 7576' - 8134' KB

PAGE: 1 OF 1

WELL NAME: BIG LAKE # 14

FORMATION : (TOOLACHEE) DARALINGIE

DATE: 18-9-90

TEST TYPE : Flowing Gradient

100% CHOKE (EPSILON)

OPR : A. GRINDLAY

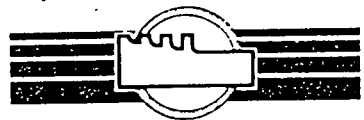
| GAUGE DATA                   |                        | UPPER<br>PRESSURE<br>GAUGE | LOWER<br>PRESSURE<br>GAUGE | TEMPERATURE<br>GAUGE | RUN DATA                                       | TIME<br>(HOURS) | TUBING<br>PRESSURE<br>(PSI/KPa) | ANNULUS<br>PRESSURE<br>(PSI/KPa) |
|------------------------------|------------------------|----------------------------|----------------------------|----------------------|------------------------------------------------|-----------------|---------------------------------|----------------------------------|
| ELEMENT SERIAL NO.           |                        | 28515                      | 56429                      | 29217                | DATE : 18-9-90                                 |                 |                                 |                                  |
| ELEMENT RANGE                |                        | 3000 PSI                   | 3000 PSI                   | 141°-334°F           | PRESSURE LUBRICATOR :                          | 0924            | 4240                            | 4433                             |
| RECORDING SECTION SERIAL NO. |                        | 13027                      | 14628                      | 70546                | RUN IN HOLE :                                  | 0939            | 4240                            | 4433                             |
| DATE OF CALIBRATION:         |                        | 29-8-90                    | 29-8-90                    |                      | ON DEPTH AT : 7855 FT/M                        | 1048            | 4282                            | 4454                             |
|                              |                        |                            |                            |                      |                                                |                 |                                 |                                  |
| CLOCK SERIAL NO.             |                        | A16086                     | A16080                     | N°1                  | DATE : 18-9-90                                 |                 |                                 |                                  |
| CLOCK RANGE                  |                        | 3HRS                       | 3HRS                       | 3HRS                 | PULL OUT OF HOLE :                             | 1103            | 4289                            | 4461                             |
| LEAD SCREW TYPE              |                        | 15TLS                      | 15TLS                      | 15TLS                | AT SURFACE :                                   | 1119            | 4351                            | 4461                             |
|                              |                        |                            |                            |                      | DEPRESSURE LUBRICATOR :                        | 1134            | 4371                            | 4475                             |
| ENGAGE STYLUS                | DATE 18-9-90 TIME 0909 | 0909                       | 0909                       | 0909                 | MAXIMUM BHT AT 7855 FT/M = °F/R TEMP. ELEMENT. |                 |                                 |                                  |
| DISENGAGE STYLUS             | DATE 18-9-90 TIME 1148 | 1148                       | 1148                       | 1148                 | N.B. ALL DEPTHS ARE MEASURED FROM K.B.         |                 |                                 |                                  |

[illegible]

0123

OPR : B. HOLL

ET 102



## SEQUENCE OF EVENTS

CUSTOMER : SANTOS LTD.

PERFORATIONS: 7576' - 8134'

PAGE: 1 OF

WELL NAME: BIG LAKE #14

FORMATION : TOOLACHEE

DATE: 24/1/94

TEST TYPE : BHP

DARLINGIE - EPSILON

OPR : P. HAHN

DATE/TIME

DESCRIPTION OF EVENTS

TRAVEL MOOMBA TO BIG LAKE

ARRIVE LOCATION &amp; HOLD SAFETY MEETING.

RIG UP SWAB VALVE, LUBRICATOR &amp; BOP'S.

1500 PRESSURE UP LUBRICATOR &amp; CONDUCT BUILD UP SURVEY AS PER PROGRAM.

25/1 0715 DEPART MOOMBA FOR BIG LAKE #14

0800 SHUT-IN WELL &amp; MONITOR BUILD UP

1000 DEPART LEASE FOR MOOMBA

Note :- TUBING 367 PSI  
CASING N/A.

## SEQUENCE OF EVENTS

CUSTOMER : SANTOS LTD

PERFORATIONS: 7576' - 8134'

PAGE: OF

WELL NAME: B, & LAKE #14

FORMATION : TOOLACHEE

DATE: 29 / 1 / 94

TEST TYPE : PLUG INSTALLATION

## DARALINCIE - EPSILON

OPR : P. HANN

BMP

[illegible]



## BHP/BHT GAUGE RUN DATA

CUSTOMER : SANTOS Ltd.

PERFORATIONS: 7576' - 8134' KB

PAGE: 1 OF 1

WELL NAME: Big Lake # 14

FORMATION : Todolachee - Daralingie  
Epsilon.

DATE: 24 - 29. 1. 94

TEST TYPE : BHPs.

OPR :

## GAUGE DATA

UPPER  
PRESSURE  
GAUGELOWER  
PRESSURE  
GAUGETEMPERATURE  
GAUGE

## RUN DATA

TIME  
(HOURS)TUBING  
PRESSURE  
(PSI/KPa)ANNULUS  
PRESSURE  
(PSI/KPa)

ELEMENT SERIAL NO.

28904

27617

DATE : 24.01.94

ELEMENT RANGE

5200 PSI

5100 PSI

PRESSURE LUBRICATOR :

1500

2530

N/A

RECORDING SECTION SERIAL NO.

12979

14620

RUN IN HOLE :

17 00

2503

N/A

DATE OF CALIBRATION:

8.12.93

8.12.93

ON DEPTH AT :

7556 FT/M

1725

2461

N/A

CLOCK/BATTERY SERIAL NO.

F 7761

F 15691

DATE : 29. 1. 94

CLOCK/BATTERY RANGE

120 hrs

120 hrs

PULL OUT OF HOLE :

0800

7639

N/A

LEAD SCREW/BATTERY TYPE

15 TLS

15 TLS

AT SURFACE :

0820

7646

N/A

DEPRESSURE LUBRICATOR :

1030

7681

N/A

ENGAGE STYLUS/BATTERY DATE 24.01.94 TIME

1437 hrs

1437 hrs

MAXIMUM BHT AT 7556 FT/M = 755268 OFIX

DISENGAGE STYLUS/BATTERY DATE 29.01.94 TIME

1040 hrs

1040 hrs

N.B. ALL DEPTHS ARE MEASURED FROM K.B.

DATE

TIME

REMARKS

24.1.94

1500

Pressure up lubricator.

1600

Depressure lubricator.

1700

Pressure up and run in hole.

29.1.94

0830

Arrive in lubricator and depressure.

0930

Pressure up lubricator.

1030

Depressure lubricator.

# SUB-SURFACE PRESSURE SURVEY

|            |         |                        |                      |
|------------|---------|------------------------|----------------------|
| CO. SANTOS |         | RUN 01 FIELD BIG LAKE  | WELL 14              |
| EFF DEPTH  |         | WELL STAT              | TOOL HUNG 7550'KB    |
| CASING     | -       | CASING PRESS           | ON BOTTOM 1725 24/1  |
| LINER      | -       | TUBING PRESS           | OFF BOTTOM 0800 29/1 |
| DATE       | 940125  | ELEMENT RANGE 0 - 5194 | ZERO POINT           |
| ELEVATION  |         | ZONE                   | SHUT-IN 0800 25/1    |
| MAX TEMP   | 268     | PICK-UP                | ON-PROD              |
| PERF       | -       | CAL SER NO. 28904      | MPP                  |
| TUBING     | -       |                        |                      |
| UNITS      | ENGLISH | PURPOSE                | BHP                  |

## SURVEY DATA

| CO. SANTOS             |       |        |        | RUN 01 FIELD BIG LAKE |   |       |        | WELL 14 |       |            |            |
|------------------------|-------|--------|--------|-----------------------|---|-------|--------|---------|-------|------------|------------|
|                        | TIME  | P-T    | DP-DT  | DTIME                 |   | TIME  | P-T    | DP-DT   | DTIME |            |            |
| <u>START</u> <i>EL</i> | 8:00  | 713.8  | 713.8  | .0                    |   | 5:58  | 1303.2 | 1303.2  | 22.0  |            |            |
|                        | 8:01  | 758.7  | 758.7  | .0                    |   | 8:55  | 1306.1 | 1306.1  | 24.9  |            |            |
|                        | 8:02  | 829.1  | 829.1  | .0                    |   | 11:35 | 1303.6 | 1303.6  | 27.6  |            |            |
|                        | 8:03  | 916.7  | 916.7  | .0                    |   | 14:09 | 1302.7 | 1302.7  | 30.2  |            |            |
|                        | 8:04  | 980.7  | 980.7  | .1                    |   | 17:08 | 1300.9 | 1300.9  | 33.1  |            |            |
|                        | 8:06  | 1046.8 | 1046.8 | .1                    |   | 19:35 | 1299.0 | 1299.0  | 35.6  |            |            |
|                        | 8:07  | 1097.3 | 1097.3 | .1                    |   | 22:03 | 1294.8 | 1294.8  | 38.0  |            |            |
|                        | 8:09  | 1145.9 | 1145.9 | .2                    |   | 0:21  | 1301.5 | 1301.5  | 40.3  |            |            |
|                        | 8:11  | 1188.2 | 1188.2 | .2                    |   | 2:54  | 1301.6 | 1301.6  | 42.9  |            |            |
|                        | 8:14  | 1214.0 | 1214.0 | .2                    |   | 5:46  | 1302.6 | 1302.6  | 45.8  |            |            |
|                        | 8:16  | 1229.7 | 1229.7 | .3                    |   | 9:07  | 1304.8 | 1304.8  | 49.1  |            |            |
|                        | 8:21  | 1245.2 | 1245.2 | .3                    |   | 12:26 | 1306.0 | 1306.0  | 52.4  |            |            |
|                        | 8:25  | 1253.9 | 1253.9 | .4                    |   | 15:39 | 1306.5 | 1306.5  | 55.6  |            |            |
|                        | 8:32  | 1264.4 | 1264.4 | .5                    |   | 19:11 | 1308.6 | 1308.6  | 59.2  |            |            |
|                        | 8:43  | 1270.8 | 1270.8 | .7                    |   | 22:50 | 1308.9 | 1308.9  | 62.8  |            |            |
|                        | 8:58  | 1278.4 | 1278.4 | 1.0                   |   | 3:19  | 1310.2 | 1310.2  | 67.3  |            |            |
|                        | 9:24  | 1279.7 | 1279.7 | 1.4                   |   | 6:44  | 1312.9 | 1312.9  | 70.7  |            |            |
|                        | 10:14 | 1283.9 | 1283.9 | 2.2                   |   | 9:56  | 1311.1 | 1311.1  | 73.9  |            |            |
|                        | 11:00 | 1287.3 | 1287.3 | 3.0                   |   | 12:51 | 1315.9 | 1315.9  | 76.9  |            |            |
|                        | 12:08 | 1289.5 | 1289.5 | 4.1                   |   | 16:37 | 1313.8 | 1313.8  | 80.6  |            |            |
|                        | 13:33 | 1292.3 | 1292.3 | 5.6                   |   | 20:06 | 1315.9 | 1315.9  | 84.1  |            |            |
|                        | 14:58 | 1293.8 | 1293.8 | 7.0                   |   | 0:28  | 1318.6 | 1318.6  | 88.5  |            |            |
|                        | 16:17 | 1295.4 | 1295.4 | 8.3                   |   | 4:14  | 1319.6 | 1319.6  | 92.2  |            |            |
|                        | 18:23 | 1297.9 | 1297.9 | 10.4                  |   | 8:00  | 1320.3 | 1320.3  | 96.0  | <i>EWA</i> | <i>ELU</i> |
|                        | 20:41 | 1299.4 | 1299.4 | 12.7                  | - | 4:56  | 738.5  | 738.5   | -12.9 |            |            |
|                        | 23:07 | 1300.6 | 1300.6 | 15.1                  | - | 2:19  | 733.7  | 733.7   | -10.3 |            |            |
|                        | 1:11  | 1302.8 | 1302.8 | 17.2                  |   | 0:54  | 726.3  | 726.3   | -7.1  |            |            |
|                        | 3:27  | 1302.8 | 1302.8 | 19.4                  |   | 4:41  | 717.9  | 717.9   | -3.3  |            |            |

LUBRICATOR; DWT: IN: 367 psig / OUT: 1114 psig  
 AMERADA: IN: 372 psig / OUT: 1118 psig

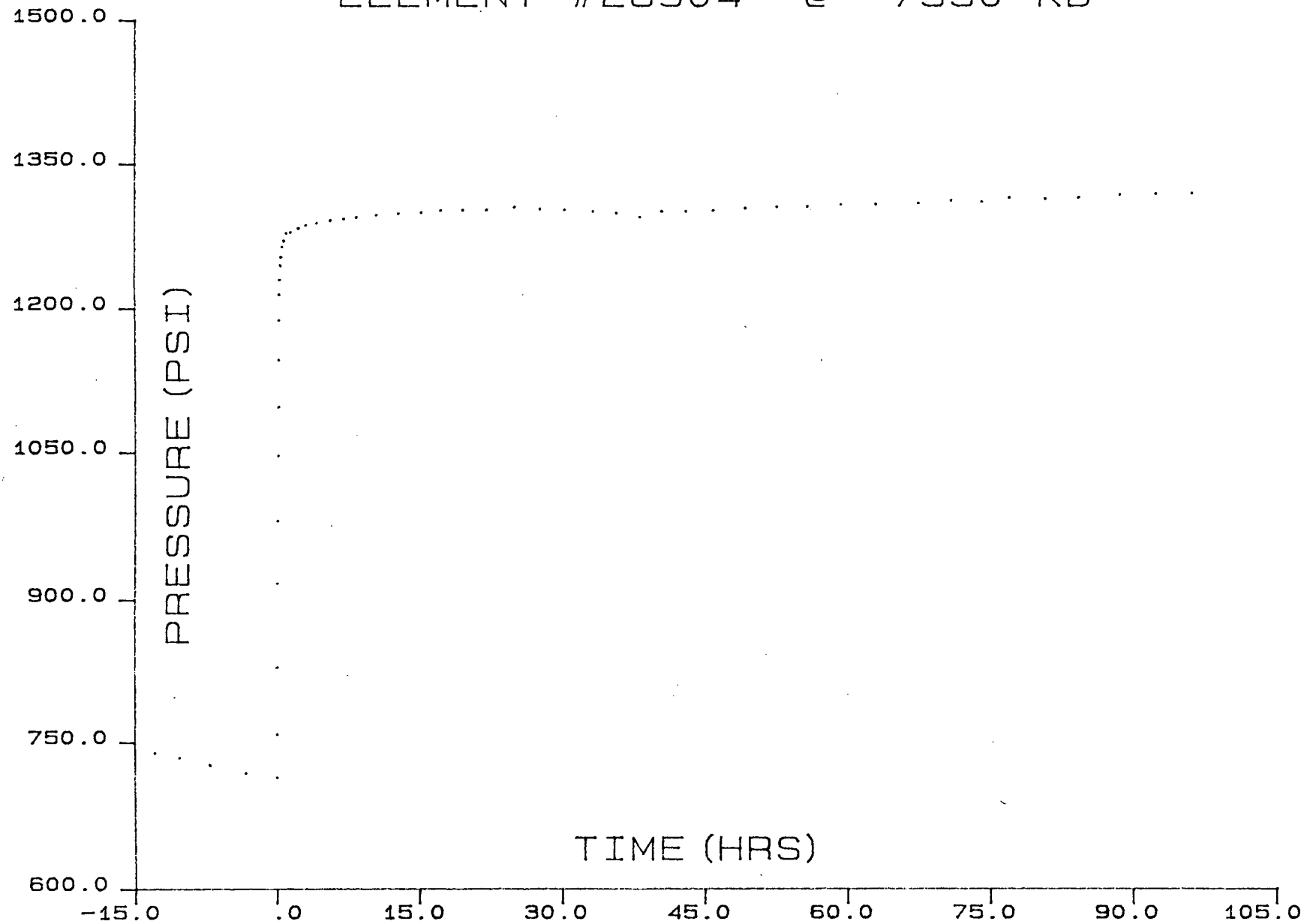
ELEMENT #27617 was also run.

BIG LAKE #14

BHP

JANUARY 1994

ELEMENT #28904 @ 7550'KB



EXPERTEST PTY. LTD.



## BHP/BHT GAUGE RUN DATA

CUSTOMER : SANTOS Ltd.

PERFORATIONS: 7576' - 8134' KB

PAGE: 1 OF 1

WELL NAME: Big Lake # 14

FORMATION : Toolachee - Davelingie  
Epsilon.

DATE: 29.01.94

TEST TYPE : Static Gradient Survey.

OPR :

## GAUGE DATA

UPPER  
PRESSURE  
GAUGELOWER  
PRESSURE  
GAUGETEMPERATURE  
GAUGE

## RUN DATA

TIME  
(HOURS)TUBING  
PRESSURE  
(PSI/KPa)ANNULUS  
PRESSURE  
(PSI/KPa)

ELEMENT SERIAL NO.

28904

27617

DATE : 29.01.94

ELEMENT RANGE

5200 PSI

5100 PSI

PRESSURE LUBRICATOR :

1102

7239

N/A

RECORDING SECTION SERIAL NO.

12979

14620

RUN IN HOLE :

1117

7681

N/A

DATE OF CALIBRATION:

8.12.93

8.12.93

ON DEPTH AT : 7840 FT

1215

7667

N/A

CLOCK/BATTERY SERIAL NO.

K1838

K3054

DATE : 29.01.94

CLOCK/BATTERY RANGE

3 hrs

3 hrs

PULL OUT OF HOLE :

1230

7667

N/A

LEAD SCREW/BATTERY TYPE

15 TUS

15 TUS

AT SURFACE :

1248

7667

N/A

DEPRESSURE LUBRICATOR :

1330

7667

N/A

ENGAGE STYLUS/BATTERY DATE 29.01.94 TIME

1055 hrs

1055 hrs

MAXIMUM BHT AT 7840 FT/M = 280 OF

DISENGAGE STYLUS/BATTERY DATE 29.01.94 TIME

1332 hrs

1332 hrs

N.B. ALL DEPTHS ARE MEASURED FROM K.B.

DATE

TIME

REMARKS

24.01.94

1102

Pressure up lubricator.

1117

Run in hole.

1248

Arrive in lubricator.

1307

Depressure lubricator.

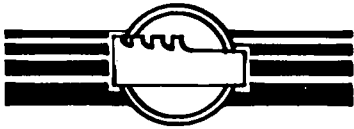
1315

Pressure up lubricator.

1330

Depressure lubricator.

EXPERTEST PTY. LTD.



## STATIC PRESSURE GRADIENT SURVEY

Location: BIG LAKE # 14

Tested: 29th January 1994.

Formation: TOOLACHEE

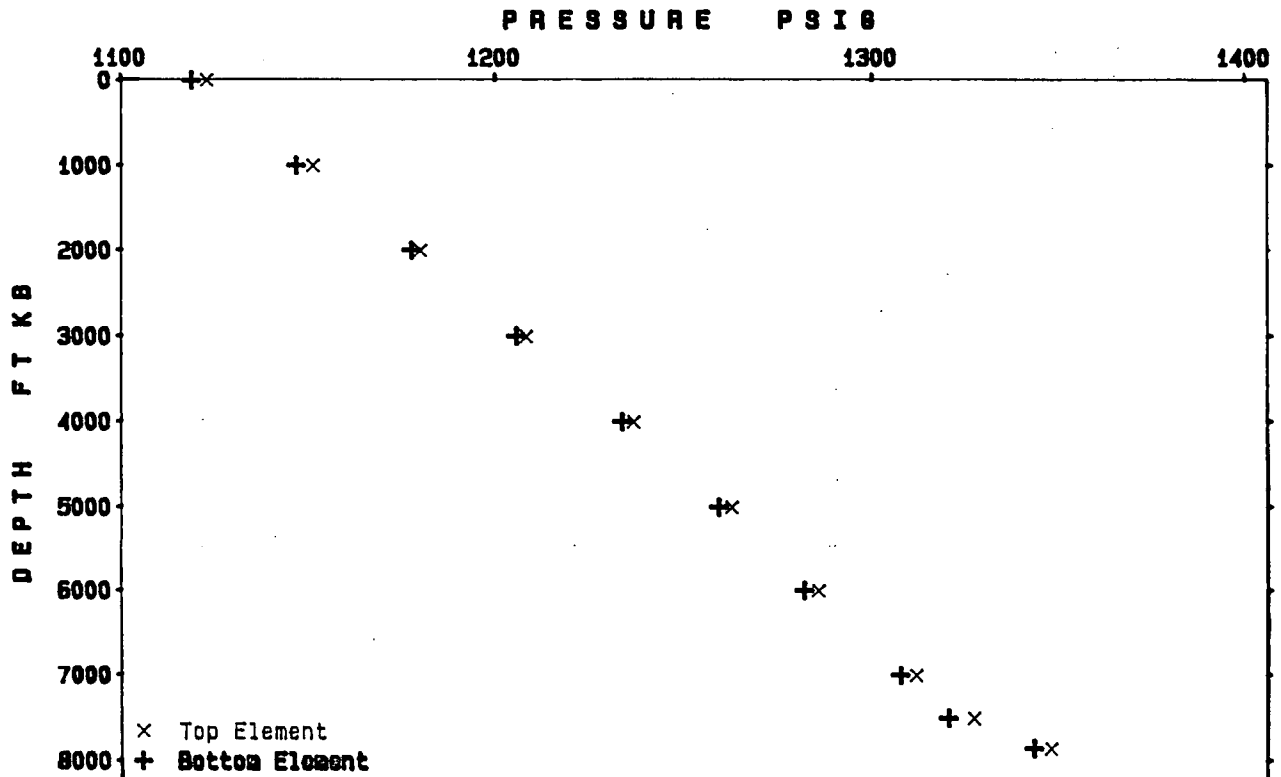
Client: SANTOS LTD.

## PRESSURE ELEMENT DATA

| Position | Serial No | Range | Calibrated |
|----------|-----------|-------|------------|
| Top      | 28904     | 5200  | 8/12/93    |
| Bottom   | 27617     | 5100  | 8/12/93    |

## WELL DATA

|         |           |
|---------|-----------|
| DWT In  | 1114 PSIG |
| DWT Out | 1112 PSIG |
| Max BHT | 280 F     |



## TOP ELEMENT

## BOTTOM ELEMENT

| Depth<br>FT KB | Deflection<br>Inches | Pressure<br>PSIG | Gradient<br>PSI/FT | Deflection<br>Inches | Pressure<br>PSIG | Gradient<br>PSI/FT |
|----------------|----------------------|------------------|--------------------|----------------------|------------------|--------------------|
| LUB.           | 0.4320               | 1123.3           | -                  | 0.4400               | 1119.2           | -                  |
| 1000           | 0.4430               | 1151.7           | 0.029              | 0.4510               | 1147.3           | 0.028              |
| 2000           | 0.4540               | 1180.2           | 0.029              | 0.4630               | 1177.9           | 0.031              |
| 3000           | 0.4650               | 1208.6           | 0.028              | 0.4740               | 1206.0           | 0.028              |
| 4000           | 0.4760               | 1237.1           | 0.028              | 0.4850               | 1234.0           | 0.028              |
| 5000           | 0.4860               | 1263.0           | 0.026              | 0.4950               | 1259.6           | 0.025              |
| 6000           | 0.4950               | 1286.2           | 0.023              | 0.5040               | 1282.5           | 0.023              |
| 7000           | 0.5050               | 1312.1           | 0.026              | 0.5140               | 1308.0           | 0.025              |
| 7500           | 0.5110               | 1327.6           | 0.031              | 0.5190               | 1320.8           | 0.025              |
| 7854           | 0.5190               | 1348.3           | 0.058              | 0.5280               | 1343.8           | 0.065              |
| LUB.           | 0.4320               | 1123.3           | -                  | 0.4410               | 1121.8           | -                  |

## GENERAL REMARKS

CHARTS OK.