

Log # 28481  
HA: 10-176

GEOHERMAL WELL COMPLETION REPORT

The U.S. Geological Survey requires this form or other Supervisor approved form to be prepared and filed in duplicate with requisite attachments with the Supervisor within 30 days after completion of permitted operations.

a. WELL TYPE: PRODUCTION ( ) INJECTION ( ) DISPOSAL ( ) WATER SUPPLY ( ) OBSERVATION (X)  
COLD ( ) HEAT EXCHANGE ( ) OTHER ( )

b. COMPLETION: NEW (X) WORKOVER ( ) DEEPENED ( ) PLUGBACK ( ) REDRILL ( )  
RECOMPLETED ( ) DRILLED & ABANDONED ( ) OTHER ( )

NAME OF LESSEE/OPERATOR  
Union Oil Co. of California/Geothermal Division

ADDRESS OF LESSEE/OPERATOR  
P.O. Box 6854, Santa Rosa, CA 95406

8. LOCATION OF WELL  
At Surface: 3100'S & 2000' W of NE corner of Section 10  
At Top of Production Zone: straight hole  
At Total Depth: straight hole

9. TOTAL DEPTH  
Measured: 1075' True Vertical: 1075'

10. PLUGBACK TOTAL DEPTH  
Measured: N/A True Vertical: N/A

11. ELEVATION: ESTIMATED ( ) FINAL (X) 6151'  
REFERENCE DATUM: GR (X) MAT ( ) DP ( ) KB ( ) RT ( ) CASINGHEAD FLANGE ( ) OTHER ( )

12. DRILLING MEDIA: AIR ( ) WATER ( ) MUD (X) FOAM ( ) OTHER ( )  
List Characteristics: Gel and water

13. LOG TYPE & INTERVALS  
N/A

| Size    | Weight | Grade | CASING RECORD     |                     | Hole Size | Cementing Record (slurry volume) |
|---------|--------|-------|-------------------|---------------------|-----------|----------------------------------|
|         |        |       | Collars & Threads | Depths Set Top Shoe |           |                                  |
| 13-3/8" | 61#/ft | K-55  | Buttress Surf.    | 25'                 | 17-1/2"   | 30 ft <sup>3</sup>               |
| 9-5/8"  | 40#/ft | K-55  | Buttress Surf.    | 117'                | 12-1/4"   | 64 ft <sup>3</sup>               |
| 7"      | 26#/ft | J-55  | LT&C 8-rod Surf.  | 805'                | 8-3/4"    | 214 ft <sup>3</sup>              |

| Size | Weight | Grade | Collars & Threads | Top | Bottom | Perforated Intervals | Cementing Record (slurry volume) |
|------|--------|-------|-------------------|-----|--------|----------------------|----------------------------------|
|      |        |       |                   |     |        |                      |                                  |

| Size | Weight | Grade | Depth Set | Packer Depth | 27. CEMENT SQUEEZE, ACID, FRACTURE, ETC. (detail type, amount, intervals) |
|------|--------|-------|-----------|--------------|---|
|      |        |       |           |              |   |

| Type | Total No. | Density (No./ft) | Size | Intervals |
|------|-----------|------------------|------|-----------|
|      |           |                  |      |           |

14. ATTACHMENTS & PREVIOUS SUBMITTALS: List all reports, surveys, tests and logs, not listed in item 23, which have resulted from drilling and completion operations. List relevant previously furnished data with date of submittal referenced.

15. WELL STATUS: PRODUCING ( ) SHUT-IN ( ) SUSPENDED ( ) INJECTION ( ) DISPOSAL ( ) HEAT EXCHANGE ( ) ABANDONED ( ) WATER SUPPLY ( ) OTHER (X)

16. DO YOU CONSIDER THE WELL TO BE COMMERCIAL? No. EXPLAIN: Temperature observation well.

17. I certify the information on this report and the attached information is complete and accurate according to the best of my knowledge.  
SIGNED: [Signature] TITLE: District Operations Manager DATE: \_\_\_\_\_

This report is required by law (30 U.S.C. 1023); regulations: 30 CFR 270.37, 30 CFR 270.73; Federal Geothermal Lease Terms and Stipulations and other regulatory requirements. Failure to report in a timely prescribed manner can result in shutting down operations, suspension and or recommendation of cancellation of lease (30 U.S.C. 1011, 30 CFR 270.80, 43 CFR 3244.3). The United States Criminal Code (18 U.S.C. 1001) makes it a criminal offense to make a willfully false statement or representation to any Department or Agency of the United States as to any matter within its jurisdiction.

LOG 28481

Well History  
Union Oil Company of California



TYPE WELL  
Geothermal/Temperature Gradient

|   |                   |                              |       |       |          |
|---|-------------------|------------------------------|-------|-------|----------|
| COMPANY<br>Union Oil Company of California          |                   | SEC 10                       | T 31N | R 59E | M M.D.M. |
| LEASE<br>Ruby Valley Federal                        | WELL NO.<br>65-10 | COUNTY<br>Elko               |       |       |          |
| LOCATION<br>3100' S and 2000' W of the NE corner of |                   | AREA<br>Ruby Valley Prospect |       |       |          |

Section 10, T31N, R59E, M.D.M. B&M

|  |                 |                  |                      |                      |      |         |
|--|-----------------|------------------|----------------------|----------------------|------|---------|
| ELEVATION<br>6151'                                       | SPUD<br>8-23-81 | COMP.<br>9-10-81 | ABAND.               | TOTAL DEPTH<br>1075' | PLUG | RECOMP. |
| HOLE DEVIATION<br><input type="checkbox"/> Straight hole |                 |                  | B.H.L. Straight hole |                      |      |         |

| CASING RECORD |           |       |     | WELL DATA                 |  |
|---------------|-----------|-------|-----|---------------------------|--|
| SIZE          | CEM. LDB. | DEPTH | SAX | W.S.O. - PERFS. - REMARKS |  |
| 13-3/8"       | 8"        | 25'   |     | ELEC. LOG None            |  |
| 9-5/8"        | 8"        | 117'  |     | DIPMETER                  |  |
| 7"            |           | 805'  |     | CORE RECORD               |  |
| 2-7/8"        | 8"        | 897'  |     | HISTORY - Attached        |  |
|               |           |       |     | CORE ANALYSIS             |  |
|               |           |       |     | PALEO. LETTER             |  |

| MARKERS - HORIZONS |  |
|--------------------|--|
|                    |  |
|                    |  |
|                    |  |
|                    |  |
|                    |  |

| DATE    | DEPTH | PROGRESS HISTORY   |
|---------|-------|--|
| 8-23-81 |       | Spudded well with 17-1/2" bit at 0900 hours. Drilled 17-1/2" hole from 0' to 25'. Ran 1 joint 13-3/8" 64#/ft K-55 casing with beveled bottom at 25'. Cemented through 1" pipe with 30 cu. ft. Ready-Mix cement. CIP 1100 hours. Drilled 12-1/4" hole from 25' to 60'.  |
| 8-24-81 |       | Drilled 12-1/4" hole from 60' to 120'. POH. Rigged and ran 3 joints 9-5/8" 40#/ft K-55 buttress casing with shoe at 117'. Cemented with 64 cu. ft. Ready-Mix cement. Displaced with 43 cu. ft. mud. CIP at 1100 hours. Had good returns to surface. WOC. Landed 9-5/8" casing. Installed 8"-900 BOPE. Tested CSO rams and connections to 500 psi. OK. RIH to top of cement at 100'. Tested drill pipe rams to 500 psi. OK. Cleaned out cement to shoe at 117'. |
| 8-25-81 |       | Cleaned out shoe at 117' and fill to 120'. Drilled 8-3/4" hole from 120' to 402'.  |
| 8-26-81 |       | Drilled 8-3/4" hole from 402' to 554'.   |
| 8-27-81 |       | Drilled 8-3/4" hole from 554' to 750'.   |
| 8-28-81 |       | Drilled 8-3/4" hole from 750' to 804'. Conditioned mud. POH. Rigged up and ran 20 joints of 7" 26#/ft K-55 LT&C 8-round casing (803.59' overall length) with B&W float shoe at 804'. Cemented using Ready-Mix and rig pump with 214 cu. ft. class "A" cement. Dropped 7" wiper plug.   |

08-28-81 Continued

Displaced with 175 cu. ft. mud. Bumped plug.

08-29-81

Completed cement job. CIP at 0100 hours. WOC. Landed 7" casing. Nippled up BOE. Tested, BOE held OK. Test witnessed by Doug Koza of USGS. RIH with bit #7 rerun to 804'. Drilled shoe and cleaned out to 814'. Drilled 6-1/8" hole from 814' to 848'.

08-30-81

Drilled 6-1/8" hole from 848' to 996'. Lost circulation. Drilled 6-1/8" hole without returns to 1007'. POH. RIH with OEDP to 1,000'. Pumped 60 cu. ft. Ready-Mix cement with 100# Celoflex and 100# nut plug. Displaced with 25 cu. ft. mud. CIP at 2100 hours. POH. WOC.

08-31-81

RIH to top of cement at 947'. Cleaned out cement to 993'. Lost all circulation. POH. RIH with OEDP to 990'. Pumped 60 cu. ft. class "A" cement. Displaced with 25 cu. ft. mud. CIP at 1000 hours. POH. Fluid level at 110'. WOC. RIH to top of cement at 940'. Cleaned out to 1007'. Drilled 6-1/8" hole from 1007' to 1015' with full returns.

09-01-81

Drilled 6-1/8" hole from 1015' to 1020'. Lost all circulation. Drilled without returns from 1020' to 1038'. POH. RIH with OEDP to 1036'. Set plug #3 with 88 cu. ft. Ready-Mix cement. Displaced with 20 cu. ft. water. CIP at 1100 hours. POH. WOC. RIH with OEDP to 1023'. Unable to fill hole. Set plug #4 with 117 cu. ft. Ready-Mix cement. Displaced with 20 cu. ft. water. CIP at 2100 hours. POH. WOC.

- 09-02-81 WOC. Unable to fill hole with 150 bbls mud. RIH with OEDP to top of cement at 1019'. POH. Fluid level at 160'. RIH with OEDP to 1017'. Set plug #5 with 50 sacks class "A" cement, 3 sacks Gel, 1 sack Calcium chloride and 2 sacks LCM, 84 cu. ft. slurry. Displaced with 20 cu. ft. water. CIP at 0600 hours. POH. Fluid level at 110'. WOC. Unable to fill hole.
- 09-03-81 RIH with OEDP to 1015' for plug #6. Halliburton pumped 8 bbls water, followed by 10 bbls 10% Calcium Chloride water, 2 bbls fresh water, 1265 gals Flo-Chek, 2 bbls fresh water, 10 bbls Calcium Chloride water, 4 bbls fresh water, 250 cu. ft. "G" cement with 1-1 Perlite and 3% Gel. Displaced with 3 bbls water. CIP at 0430 hours. POH. Fluid level at 110'. WOC 4 hours. Unable to fill hole. RIH to 1017'. No fill from plug #6. Plug #7: HOWCO pumped 8 bbls water, followed by 10 bbls 10% Calcium Chloride, 2 bbls water, 1265 gallons Flo-Chek, 2 bbls water, 10 bbls Calcium Chloride water, 2 bbls water and 250 cu. ft. "G" cement premixed 1-1 Perlite, 3% Gel and 3% Calcium chloride. Displaced with 4 bbls water. CIP 1000 hours. POH. Fluid level at 110'. WOC 4 hours. RIH with OEDP to 1017'. No fill from plug #7. POH. Fluid level at 110'. Closed blind rams. HOWCO pumped through casing valve plug #8, consisting of 200 cu. ft. 1-1 Perlite mix with 3% Calcium Chloride, 200 cu. ft. 40#/sack Gilsonite mix, and 200 cu. ft. "G" cement with 4% Calcium Chloride. Displaced with 137 cu. ft. water. Final pressure 2350 psi. CIP at 2330 hours. WOC.
- 09-04-81 WOC. RIH with 6-1/8" bit to top of cement at 520'. Cleaned out cement to 1000'. Lost 22 bbls mud. Regained circulation. Cleaned out cement to 1008'. Lost returns. Cleaned out 1010' without returns. POH. Fluid level at 160'. RIH with OEDP to 1000'. HOWCO pumped 55 gals "Nova-Pac" mixed with 5 gallons catalyst. Displaced with 1 bbl diesel and 4 bbls water. Pump pressure increased to 4000 psi. POH. 7 joints drill pipe plugged with "Nova-Pac". RIH to 1010'. No plug. POH.

- 09-05-81      Dropped cinder blocks in hole. RIH. Found bridge at 175'. Pushed bridge to bottom. POH. Fluid level at 160'. Plug #9: Closed blind rams. HOWCO pumped 400 cu. ft. "G" cement, premixed with 25# Gilsonite/sack, 1/4#/sack Flo-Cele and 2% Calcium Chloride. Followed by 200 cu. ft. "G" cement with 1/4 lb/sack Flo-Cele and 2% Calcium Chloride. Displaced with 20 bbls water. CIP at 1200 hours. WOC 5 hours. Unable to fill hole. RIH to 1010' with OEDP. No fill from plug #9.
  
- 09-06-81      RIH with 7" RTTS packer with 7 joints 2-7/8" tubing stinger. Set packer at 736' with bottom of tubing at 980'. HOWCO pumped 275 cu. ft. "Gunk" (diesel, gel, and cement). Displaced with 5 bbls diesel. CIP at 0430 hours. POH. WOC 4 hours. RIH with bit #8 to top of cement at 990. Cleaned out cement to 1038'. Lost returns. Drilled 6-1/8" hole from 1038' to 1040' without returns. Twisted off drill pipe. POH. Top of fish at 110'. RIH with die-collar. Engaged fish. Worked free. POH. Recovered fish. Drilled 6-1/8" hole without returns from 1040' to 1055'.
  
- 09-07-81      Drilled 6-1/8" hole with no returns from 1055' to 1075'. Pump pressure increased. Pipe stuck. Worked pipe. Pin twisted out of collar, with top of fish at 470'. Laid down bent drill pipe.
  
- 09-08-81      Made up fishing tools. RIH with die collar to top of drill pipe box at 470'. Unable to work over tool joint. RIH with 5-3/4" overshot with 3-3/4" grapple and mill control. Milled 1 hour with no success. RIH with Midway 6" concave junk mill. Milled 3" off box. POH. RIH with 5-3/4" overshot with 3-3/4" grapple. Engaged fish at 470'. Attempted back-off, drill pipe unscrewed. Released from fish. POH. Tightened all connections. Repeated back off attempts an additional two times with no success. Changed two joints drill pipe. RIH. Engaged fish. Attempted back-off at 896'. Shot failed (4 attempts) due to faulty caps.

- 09-09-81 RIH with overshot, jars and bumper sub. Jarred on fish. Moved fish up hole approximately 6". Ran Free Point. Indicated drill collars free at 933'. Attempted back-off with no success. Shot failed. POH. Ran back-off to 933'. Backed off high. Made up pipe. Jarred on fish. Jars parted. Screwed jars together. Jarred on fish. Ran collar locator; stopped at 470', stuck.
- 09-10-81 Disengaged overshot from fish at 470'. POH - laid down faulty jars. RIH with overshot. Engaged drill pipe fish at 470'. Backed off at top of crossover sub on 4-3/4" drill collars at 894'. POH with all drill pipe. fabricated a 6" O.D., 5" I.D. 4' long washover pipe, welded to the bottom joint of 2-7/8" tubing. Ran washover pipe on 2-7/8" tubing and slipped over top of 4-3/4" drill collars approximately 3'. Bottom of 2-7/8" tubing at top of washover pipe centered above drill collar crossover sub, 1' above top of crossover sub. Landed tubing in donut hanger (28 joints plus 1 cut off 2-7/8" 6.5#/ft J-55 EUE tubing) with adapter flange with 3" WKM valve on top for wire line use. 2" side outlet on tubing head. Note: Bit sub on bottom of drill collars contains a float valve. Released rig at 2400 hours. Checked drill collar fish with GO wire line - found open to the bit with 1-5/8" sinker bar to 1074'. With tubing wash pipe adapter, temperature tools can be run to 1074'.

MUD & AIR TEMPERATURES

| <u>DEPTH</u>  | <u>MUD</u>              | <u>AIR</u> |
|---------------|-------------------------|------------|
| 540' - 560'   | 150°                    | 124°       |
| 560' - 580'   | 150                     | 126        |
| 580' - 600'   | 160                     | 130        |
| 600' - 620'   | 160                     | 110        |
| 620' - 640'   | 162                     | 116        |
| 640' - 660'   | 161                     | 122        |
| 660' - 680'   | 154                     | 123        |
| 680' - 700'   | 122                     | 118        |
| 700' - 720'   | 126                     | 122        |
| 720' - 740'   | 132                     | 126        |
| 740' - 760'   | 140                     | 138        |
| 760' - 780'   | 148                     | 147        |
| 780' - 800'   | 148                     | 144        |
| 800' - 820'   | 154                     | 150        |
| 820' - 840'   | 140                     | 126        |
| 840' - 870'   | 152                     | 127        |
| 870' - 890'   | 152                     | 126        |
| 890' - 910'   | 157                     | 130        |
| 910' - 930'   | 148                     | 142        |
| 930' - 950'   | 144                     | 143        |
| 950' - 970'   | 148                     | 141        |
| 970' - 1000'  | <u>Lost circulation</u> |            |
| 1000' - 1030' | <u>Lost circulation</u> |            |

CASING DETAIL

| <u>NO.</u><br><u>JTS.</u> | <u>DESCRIPTION</u>                                | <u>LENGTH</u> | <u>FEET</u> |               |
|---------------------------|---|---------------|-------------|---------------|
|                           |   |               | <u>TOP</u>  | <u>BOTTOM</u> |
| <u>13-3/8" CASING</u>     |   |               |             |               |
| 1                         | 13-3/8" 61#/ft K-55<br>Buttress Casing            | 41.50         | Rot. Tbl.   | 25.00         |
| <u>9-5/8" CASING</u>      |   |               |             |               |
| 1                         | B&W Float Shoe                                    | 1.60          | 115.40      | 117.00        |
| 3                         | 9-5/8" 40#/ft K-55<br>Buttress Casing             | 115.35        | Surf.       | 115.40        |
| <u>7" CASING</u>          |   |               |             |               |
| 1                         | 7" B&W Float Shoe                                 | 1.40          | 802.60      | 804.00        |
| 20                        | 7" 26#/ft K-55<br>8-round Casing                  | 803.59        | Surf.       | 802.60        |
| <u>2-7/8" TUBING</u>      |   |               |             |               |
| 1                         | 2-7/8" 6.5#/ft J-55<br>EUE 8-round Tubing Cut-Off | 14.55         | 878.03      | 892.58        |
| 28                        | 2-7/8" 6.5#/ft J-55<br>EUE 8-round LT&C Tubing    | 870.73        | 7.30        | 878.03        |
| 1                         | 2-7/8" Donut-Type<br>Tubing Hanger                | 0.80          | 6.50        | 7.30          |
|                           | Base Tubing Head to Rotary<br>Table               | 6.50          | 0.00        | 6.50          |
| 1                         | 6" O.D. 0.5" Wall Wash Pipe<br>Shoe               | 3.68          | 892.58      | 896.26        |