PNE-G-71

PROJECT GASBUGGY HOLE HISTORIES
GB-E; GB-E-R; GB-1; GB-2R; GB-2RS;
GB-D; GB-10-36; GB-2

THIS DOCUMENT CONFIRMED AS UNCLASSIFIED
DIVISION OF CLASSIFICATION
BY J.H. James
DATE 3/16/71

PUBLICLY RELEASABLE
DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.
DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.
### HOLE HISTORY DATA

**DATE:** February 2, 1968  
**APPROVED:**  
**HOLE NO.:** GR-D  
**CONTRACT NO.:** AT(36-1)-335  
**USER:** LRL-EPNG  
**TYPE HOLE:** Instrument  
**LOCATION:** Rio Arriba, Farmington, New Mexico  
**SURFACE COORDINATES:** N-2,066,429.44', E-220,116.61'  
**GROUN ELEVATION:** 7207.6'  
**PAD ELEVATION:**  
**RIG ON LOCATION:** SPUDGED: 8-10-67, COMPLETED: 10-6-67  
**CIRCULATING MEDIA:** Mud  
**MAIN RIG & CONTRACTOR:** Brinkerhoff Drilling Co., Rig #21  
**NO. OF COMPRESSORS & CAPACITY:**  

### BORE HOLE RECORD

<table>
<thead>
<tr>
<th>FROM</th>
<th>TO</th>
<th>SIZE</th>
<th>I.D.</th>
<th>WT./FT.</th>
<th>WALL</th>
<th>GRADE</th>
<th>CPLG.</th>
<th>FROM</th>
<th>TO</th>
<th>CH. FT.</th>
<th>CH. FT.</th>
<th>CH. FT.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0'</td>
<td>29'</td>
<td>26''</td>
<td>20''</td>
<td>1.33</td>
<td>0.635</td>
<td>J-55</td>
<td>6.782</td>
<td>0'</td>
<td>29'</td>
<td>120</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>29''</td>
<td>182''</td>
<td>1-1/8''</td>
<td>13-3/8''</td>
<td>1.8</td>
<td>H-40</td>
<td>6.782</td>
<td>182''</td>
<td>29''</td>
<td>182''</td>
<td>650</td>
<td>650</td>
<td>650</td>
</tr>
<tr>
<td>182''</td>
<td>725''</td>
<td>12-1/4''</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>21</td>
<td>21</td>
<td>21</td>
</tr>
</tbody>
</table>

**TOTAL DEPTH:** 1725' GL  
**AVERAGE HANDRE其实 30.**

**JUNK & PLUGS LEFT IN HOLE:** None  
**SURVEYS PAGE:** 7  
**CORING PAGE:**  
**LOGGING DATA:** Page 9  
**REMARKS:** Site Prep Items  
**Drilling Completed 9-8-67, Stemming completed 10-6-67.**  

### CIRCULATING MEDIA

- Mud

### REFERENCES

- Average In & Out  
- Reference: AT(36-1)-335  
- Site Prep Rigs: *

### RIGS USED

<table>
<thead>
<tr>
<th>RIG NO.</th>
<th>NAME</th>
<th>TYPE</th>
<th>CLASS</th>
<th>DAYS OPERATING</th>
<th>SECURED W/ CREW</th>
<th>SECURED W/O CREW</th>
<th>TOTAL DAY ON LOC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>Aztec Well Service</td>
<td>180 H.P.</td>
<td>9.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**LEGAL NOTICE**

This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Atomic Energy Commission, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately owned rights.
# Time Breakdown

## Site Preparation

<table>
<thead>
<tr>
<th>DRILLING OPERATION TIME (DOT)</th>
<th>OTHER SCHEDULED TIME (OST)</th>
<th>OPERATIONAL DELAY TIME (DOT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRILL</td>
<td>MOVE</td>
<td>RIG REPAIRS</td>
</tr>
<tr>
<td>TRIPS</td>
<td>RUN Casing</td>
<td>W. O. DRILLING SUPPLIES</td>
</tr>
<tr>
<td>SURVEYS</td>
<td>CEMENT CASING</td>
<td>CLEAN OUT FILL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SECURED WITH CREWS</td>
</tr>
<tr>
<td><strong>SITE DOT</strong></td>
<td><strong>DAYS</strong></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL SITE PREP TIME</strong></td>
<td><strong>DAYS</strong></td>
<td></td>
</tr>
</tbody>
</table>

## Main Hole Construction

<table>
<thead>
<tr>
<th>DRILLING OPERATION TIME (DOT)</th>
<th>OTHER SCHEDULED TIME (OST)</th>
<th>OPERATIONAL DELAY TIME (DOT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRILL</td>
<td>MIGRATION &amp; DEMOBILIZATION</td>
<td>RIG REPAIRS</td>
</tr>
<tr>
<td>TRIPS</td>
<td>CORE</td>
<td>W. O. EQUIPMENT</td>
</tr>
<tr>
<td>DRESS DRILLING ASSEMBLY</td>
<td>LOG</td>
<td>FISH</td>
</tr>
<tr>
<td>SINGLE SHOT DEV. SURVEYS</td>
<td>CASED HOLE DIR. SURVEYS</td>
<td>CLEAN OUT FILL</td>
</tr>
<tr>
<td>OPEN HOLE DIRECTION SURVEYS</td>
<td>UNLOAD CASED HOLE</td>
<td>UNLOAD WATER INFLOW</td>
</tr>
<tr>
<td></td>
<td>RUN MANDREL</td>
<td>REAM CROOKED HOLE</td>
</tr>
<tr>
<td></td>
<td>HYDROLOGICAL TESTS</td>
<td>PLUG BACK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DRILL OUT PLUGS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SECURED WITH CREWS</td>
</tr>
<tr>
<td><strong>MAIN HOLE DOT</strong></td>
<td><strong>13.61 DAYS</strong></td>
<td>Secured w/out crews</td>
</tr>
<tr>
<td><strong>CASING OPERATION TIME (DOT)</strong></td>
<td></td>
<td>12.96</td>
</tr>
<tr>
<td>RUN 20&quot; CASING</td>
<td></td>
<td>Stemming</td>
</tr>
<tr>
<td>RUN 13-3/8&quot; CASING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CEMENT 20&quot; CASING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CEMENT 13-3/8&quot; CASING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DRILL OUT SIDE</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MAIN HOLE DOT</strong></td>
<td><strong>24.10 DAYS</strong></td>
<td><strong>Main Hole DOT</strong></td>
</tr>
<tr>
<td><strong>3.52 DAYS</strong></td>
<td><strong>44.15 DAYS</strong></td>
<td><strong>14.59 DAYS</strong></td>
</tr>
<tr>
<td><strong>TOTAL MAIN HOLE CONSTRUCTION TIME</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL SITE PREP TIME</strong></td>
<td><strong>DAYS</strong></td>
<td><strong>REMARKS</strong>: Instrumenting and Stemming Time</td>
</tr>
<tr>
<td><strong>TOTAL MAIN HOLE CONSTRUCTION TIME</strong></td>
<td></td>
<td>Mandrel Run 0.10 Days</td>
</tr>
<tr>
<td><strong>SEC W/O CREW SITE PREP</strong></td>
<td><strong>DAYS</strong></td>
<td>Stemming 5.63 Days</td>
</tr>
<tr>
<td><strong>SEC W/O CREW MAIN HOLE CONSTRUCTION</strong></td>
<td></td>
<td>Instrumenting 1.85 Days</td>
</tr>
<tr>
<td><strong>TOTAL SUSPENDED (NO RIG)</strong></td>
<td><strong>DAYS</strong></td>
<td>Waiting on Equipment 1.67</td>
</tr>
<tr>
<td><strong>TOTAL ELAPSED TIME</strong></td>
<td><strong>34.15 DAYS</strong></td>
<td><strong>Total Elapsed Time 9.23 Days</strong></td>
</tr>
</tbody>
</table>

## Total Elapsed Time

<table>
<thead>
<tr>
<th>TOTAL ELAPSED TIME</th>
<th><strong>34.15 DAYS</strong></th>
<th><strong>REMARKS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Instrumenting and Stemming Time</td>
</tr>
</tbody>
</table>

**REMARKS**

- Instrumenting and Stemming Time
- Mandrel Run: 0.10 Days
- Stemming: 5.63 Days
- Instrumenting: 1.85 Days
- Waiting on Equipment: 1.67 Days
<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-13-67</td>
<td>Two cats building location. Five loads of rig unloading today.</td>
</tr>
<tr>
<td>8-14-67</td>
<td>Eight loads of rig on location.</td>
</tr>
<tr>
<td>8-15-67</td>
<td>Eighteen loads of rig on location.</td>
</tr>
<tr>
<td>8-16-67</td>
<td>Rig up. Set sub-base, drawworks and pinned derrick.</td>
</tr>
<tr>
<td>8-17-67</td>
<td>90% rigged up. Will spud tomorrow.</td>
</tr>
<tr>
<td>8-18-67</td>
<td>Rigging up.</td>
</tr>
<tr>
<td>8-19-67</td>
<td>Drilled 12-1/4&quot; hole to 29', reamed hole to 26&quot; and set one joint (30') of 20&quot; O.D. conductor casing, set at 29' G.L. Cemented with 120 ft³ of common plus 2% calcium chloride. CIP at 1600 hours.</td>
</tr>
<tr>
<td>8-20-67</td>
<td>Nippled up to drill 17-1/2&quot; hole, started drilling at 1515 hours. Drilled 17-1/2&quot; hole to 277'.</td>
</tr>
<tr>
<td>8-21-67</td>
<td>Drilled 17-1/2&quot; hole to 391' with bit #1, made trip at 391' for bit #2. Drilled to 482' G.L. with bit #2. Ran 17 joints of 48#/ft, J-55, S.T.&amp;C. 13-3/8&quot; casing, set at 482' G.L. Halliburton guide shoe on bottom, Halliburton baffle float 30' off bottom, two centralizers 10' and 200' off bottom, cemented with 560 ft³ of common plus 2% calcium chloride, cement circulated, plug down at 2015 hours.</td>
</tr>
<tr>
<td>8-22-67</td>
<td>Waited on cement and nippled up blowout preventers to drill 12-1/4&quot; hole.</td>
</tr>
<tr>
<td>8-23-67</td>
<td>Drilling 12-1/4&quot; hole from 482' to 1323'.</td>
</tr>
<tr>
<td>8-24-67</td>
<td>Drilling 12-1/4&quot; hole from 1323' to 1839'.</td>
</tr>
<tr>
<td>8-25-67</td>
<td>Drilling 12-1/4&quot; hole from 1839' to 2202'.</td>
</tr>
<tr>
<td>8-26-67</td>
<td>Drilling 12-1/4&quot; hole from 2202' to 2330'.</td>
</tr>
<tr>
<td>8-27-67</td>
<td>Drilling 12-1/4&quot; hole from 2330' to 2763'.</td>
</tr>
<tr>
<td>8-28-67</td>
<td>Drilling 12-1/4&quot; hole from 2763' to 2922'. Hole deviation remaining 1/2º or less.</td>
</tr>
<tr>
<td>8-29-67</td>
<td>Drilling 12-1/4&quot; hole from 2922' to 3275'.</td>
</tr>
<tr>
<td>8-30-67</td>
<td>Drilling 12-1/4&quot; hole from 3275' to 3538'.</td>
</tr>
<tr>
<td>8-31-67</td>
<td>Drilling 12-1/4&quot; hole from 3538' to 3725'.</td>
</tr>
</tbody>
</table>
9-1-67  Drilling 12-1/4" hole from 3725' to 4162'.

9-2-67  Drilling 12-1/4" hole from 4162' to 4222'. Lost 150 bbl. of mud. Trip out to change bits and mix mud. Circulation regained, drilled 12-1/4" hole to 4441'.

9-3-67  Drilled 12-1/4" hole from 4441' to 4725'. Reached total contract depth at 2330 hours.

9-4-67  Circulated and conditioned hole for logs. Ran Schlumberger temperature log to 4669'. Trip to condition hole and attempt to wash out fill. Ran density log to 4686'.

9-5-67  Schlumberger Logging: Density to 4696'.
         Dual Induction to 4694'.
         Micro Sonic to 4685'.
         Bore Hole Sonic to 4685'.
         Sidewall Neutron to 4685'.

Birdwell Logging: Caliper
                 3-D

9-6-67  Completed Birdwell 3-D logs and ran Sperry-Sun multishot directional surveys on 50' stations in and out of hole in stabilizer drill collar assembly from 0' to 4668'.

9-7-67  Completed running Sperry-Sun surveys. Trip in hole to condition hole and mud prior to running mandrel. Run 1 1/4 joints (4686' of 2-3/8" "CS" Hydril tubing). Ran 8" O.D. mandrel on wire line next to tubing in hole to 4702'. Pulled mandrel, laid down tubing.

9-8-67  Laid down tubing. Rig secured at 0700 hours, 9/8/67.

9-9-67  Rig on standby secured.

9-10-67 Rig on standby secured.

9-11-67 Rig on standby secured.

9-12-67 Rig on standby secured.

9-13-67 Rig on standby secured.

9-14-67 Rig on standby secured.

9-15-67 Rig on standby secured.
<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-16-67</td>
<td>Rig on standby secured.</td>
</tr>
<tr>
<td>9-17-67</td>
<td>Rig on standby secured.</td>
</tr>
<tr>
<td>9-18-67</td>
<td>Rig on standby secured.</td>
</tr>
<tr>
<td>9-19-67</td>
<td>Rig on standby secured.</td>
</tr>
<tr>
<td>9-20-67</td>
<td>Rig on standby secured.</td>
</tr>
<tr>
<td>9-21-67</td>
<td>Rig on standby secured until 0700 hours. Activated rig at 0700 hours. Ran in hole with a 12-1/4&quot; bit. Circulated and conditioned hole. Pulled out of hole and laid down drill pipe and removed BOP's. Rigged up to run tubing.</td>
</tr>
<tr>
<td>9-22-67</td>
<td>Ran 2-3/8&quot; &quot;CS&quot; Hydri1 tubing to 4710'. Hung tubing to side of hole. Ran an 8&quot; O.D. x 20' mandrel on Lane Wells wire line to 4700'. Ran Lane Wells collar locator in tubing to 4694'. Collar locator showed tubing string to be intact. Hung tubing from strong back. Released rig at 1630 hours. Brinkerhoff Rig started demobilization at 1630 hours.</td>
</tr>
<tr>
<td>9-27-67</td>
<td>Activated hole. Aztec finished rigging up at 1500 hours, spooled messenger cable for instruments onto drawworks drum. Circulated hole through the 2-3/8&quot; tubing.</td>
</tr>
<tr>
<td>9-28-67</td>
<td>Circulated and conditioned hole. Ran 8&quot; O.D. by 20' mandrel on Lane Wells line to 4675'. Rigged up and ran Sandia instruments in hole on messenger cables. Stopped running instruments at 1630 hours with 1266' in hole. Circulated mud through tubing.</td>
</tr>
<tr>
<td>9-29-67</td>
<td>Circulated and conditioned hole until 0800 hours. Continued running instruments. Hung messenger cable from strong back with instrument #1 at 4600', #2 at 4218', #3 at 3600', and #4 at 3250'. Moved out replacement building. Rehung cables from tripod. Rigged up Halliburton, blended and pumped 172 cubic feet of grout through 2-3/8&quot; O.D. tubing. Sand in grout plugged tubing.</td>
</tr>
<tr>
<td>10-2-67</td>
<td>Picked up and ran new string of 2-3/8&quot; O.D Hydri1 tubing with 134' of aluminum tubing on bottom. Tagged top of cement stage #1 at 4569'. Circulated hole. Mixed and pumped Stage #2, 200 cubic feet of WBS designed grout. Pulled tubing up to 4214'. Circulated mud and W.O.C.</td>
</tr>
</tbody>
</table>
10-3-67 W.O.C. until 0800 hours. Tagged cement top at 4345'. Blended and pumped Stage #3, 122 cubic feet of WES designed grout. W.O.C. at 0900 hours. Pulled tubing up to 4063' and circulated.

10-4-67 Tagged cement top at 4191'. Blended and pumped Stage #4, 217 cubic feet of WES designed grout. W.O.C. at 0130. Pulled tubing to 3022'. Circulated and conditioned mud until 1700 hours.
Tagged cement top at 3914'. Blended and pumped Stage #5, 196 cubic feet of WES designed grout. W.O.C. at 1830 hours. Pulled tubing to 3574' and circulated mud.

10-5-67 W.O.C. until 0800 hours. Tagged cement top at 3689'. Blended and pumped 231 cubic feet (Stage #6) of WES designed grout.
W.O.C. at 1030 hours. Pulled tubing to 3293' and circulated.

10-6-67 Tagged top of cement Stage #6 at 3403'. Stage #7, blended and pumped 266 cubic feet of WES designed grout. W.O.C. at 0205 hours. Pulled tubing up to 2961' and circulated until 1900 hours.
Tagged top Stage #7 at 3105'. Cement top 144' above instruments. Laid down Hydrid tubing. Hung messenger cable from clamp type strong back which spanned well head. Made final electrical check on instruments, O.K. Released rig at 2400 hours.
<table>
<thead>
<tr>
<th>Depth</th>
<th>Inclination (Degrees)</th>
</tr>
</thead>
<tbody>
<tr>
<td>115</td>
<td>1/4</td>
</tr>
<tr>
<td>200</td>
<td>1/2</td>
</tr>
<tr>
<td>260</td>
<td>1/2</td>
</tr>
<tr>
<td>325</td>
<td>1/2</td>
</tr>
<tr>
<td>393</td>
<td>1/2</td>
</tr>
<tr>
<td>495</td>
<td>1/2</td>
</tr>
<tr>
<td>555</td>
<td>1/1+</td>
</tr>
<tr>
<td>650</td>
<td>1/2</td>
</tr>
<tr>
<td>765</td>
<td>1/2</td>
</tr>
<tr>
<td>859</td>
<td>1/2</td>
</tr>
<tr>
<td>953</td>
<td>1/2</td>
</tr>
<tr>
<td>1053</td>
<td>1/2</td>
</tr>
<tr>
<td>1153</td>
<td>1/4</td>
</tr>
<tr>
<td>1235</td>
<td>3/8</td>
</tr>
<tr>
<td>1360</td>
<td>1/2</td>
</tr>
<tr>
<td>1454</td>
<td>1/1+</td>
</tr>
<tr>
<td>1549</td>
<td>1/2</td>
</tr>
<tr>
<td>1642</td>
<td>3/8</td>
</tr>
<tr>
<td>1755</td>
<td>1/2+</td>
</tr>
<tr>
<td>1820</td>
<td>3/8</td>
</tr>
<tr>
<td>1923</td>
<td>3/4</td>
</tr>
<tr>
<td>2016</td>
<td>1/2</td>
</tr>
<tr>
<td>2100</td>
<td>1/2</td>
</tr>
<tr>
<td>2190</td>
<td>1/2-</td>
</tr>
<tr>
<td>2266</td>
<td>1</td>
</tr>
<tr>
<td>2348</td>
<td>1/2-</td>
</tr>
<tr>
<td>2427</td>
<td>1/4</td>
</tr>
<tr>
<td>2522</td>
<td>1/4</td>
</tr>
<tr>
<td>2622</td>
<td>1/4</td>
</tr>
<tr>
<td>2722</td>
<td>1/2</td>
</tr>
<tr>
<td>2835</td>
<td>1/2</td>
</tr>
<tr>
<td>2897</td>
<td>1/2-</td>
</tr>
<tr>
<td>2960</td>
<td>1/2</td>
</tr>
<tr>
<td>3057</td>
<td>1/2</td>
</tr>
<tr>
<td>3150</td>
<td>3/8</td>
</tr>
<tr>
<td>3244</td>
<td>1/4</td>
</tr>
<tr>
<td>3338</td>
<td>3/8</td>
</tr>
<tr>
<td>3438</td>
<td>1/2</td>
</tr>
<tr>
<td>3533</td>
<td>1/4</td>
</tr>
<tr>
<td>3669</td>
<td>1/1</td>
</tr>
<tr>
<td>3722</td>
<td>1/2+</td>
</tr>
<tr>
<td>3816</td>
<td>3/4</td>
</tr>
<tr>
<td>3910</td>
<td>1/2</td>
</tr>
<tr>
<td>4005</td>
<td>1/4+</td>
</tr>
<tr>
<td>4099</td>
<td>1/4+</td>
</tr>
<tr>
<td>4393</td>
<td>1/2</td>
</tr>
<tr>
<td>4205</td>
<td>1/2</td>
</tr>
<tr>
<td>4376</td>
<td>3/4-</td>
</tr>
<tr>
<td>4470</td>
<td>1/2</td>
</tr>
<tr>
<td>Depth</td>
<td>Inclination (Degrees)</td>
</tr>
<tr>
<td>-------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>4553</td>
<td>3/4</td>
</tr>
<tr>
<td>4582</td>
<td>1/4</td>
</tr>
<tr>
<td>4642</td>
<td>1/4</td>
</tr>
<tr>
<td>4725</td>
<td>5/8</td>
</tr>
</tbody>
</table>
Sperry-Sun Multishot Gyro Survey

This survey was run on drill pipe on 50' stations from 0' to 482' inside 13-3/8" O.D. casing and from 482' to 4668' in 12-1/4" open hole.

<table>
<thead>
<tr>
<th>MD</th>
<th>TVD</th>
<th>Latitude</th>
<th>Departure</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0'</td>
<td>0.24' S</td>
<td>0.12' E</td>
</tr>
<tr>
<td>103'</td>
<td>103.00'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>203'</td>
<td>200.00'</td>
<td>0.31' S</td>
<td>0.29' E</td>
</tr>
<tr>
<td>300'</td>
<td>300.00'</td>
<td>0.48' S</td>
<td>0.17' E</td>
</tr>
<tr>
<td>400'</td>
<td>400.00'</td>
<td>0.53' S</td>
<td>0.03' E</td>
</tr>
<tr>
<td>500'</td>
<td>500.00'</td>
<td>0.81' S</td>
<td>0.10' E</td>
</tr>
<tr>
<td>600'</td>
<td>600.00'</td>
<td>1.24' S</td>
<td>0.05' E</td>
</tr>
<tr>
<td>700'</td>
<td>700.00'</td>
<td>1.81' S</td>
<td>0.03' E</td>
</tr>
<tr>
<td>800'</td>
<td>798.33'</td>
<td>2.40' S</td>
<td>0.03' E</td>
</tr>
<tr>
<td>900'</td>
<td>893.39'</td>
<td>2.78' S</td>
<td>0.00' W</td>
</tr>
<tr>
<td>1030'</td>
<td>999.33'</td>
<td>3.14' S</td>
<td>0.14' E</td>
</tr>
<tr>
<td>1100'</td>
<td>1099.99'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1200'</td>
<td>1199.99'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1300'</td>
<td>1299.99'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1400'</td>
<td>1399.99'</td>
<td>3.96' S</td>
<td>0.90' E</td>
</tr>
<tr>
<td>1500'</td>
<td>1499.99'</td>
<td>4.16' S</td>
<td>1.42' E</td>
</tr>
<tr>
<td>1600'</td>
<td>1599.98'</td>
<td>4.22' S</td>
<td>2.09' E</td>
</tr>
<tr>
<td>1700'</td>
<td>1699.98'</td>
<td>4.13' S</td>
<td>2.85' E</td>
</tr>
<tr>
<td>1800'</td>
<td>1799.98'</td>
<td>4.03' S</td>
<td>3.63' E</td>
</tr>
<tr>
<td>1900'</td>
<td>1899.97'</td>
<td>3.97' S</td>
<td>4.37' E</td>
</tr>
<tr>
<td>2000'</td>
<td>1999.97'</td>
<td>3.78' S</td>
<td>5.11' E</td>
</tr>
<tr>
<td>2100'</td>
<td>2099.97'</td>
<td>3.49' S</td>
<td>5.70' E</td>
</tr>
<tr>
<td>2200'</td>
<td>2199.97'</td>
<td>3.09' S</td>
<td>6.39' E</td>
</tr>
<tr>
<td>2303'</td>
<td>2299.96'</td>
<td>2.71' S</td>
<td>6.99' E</td>
</tr>
<tr>
<td>2400'</td>
<td>2399.96'</td>
<td>2.36' S</td>
<td>7.58' E</td>
</tr>
<tr>
<td>2500'</td>
<td>2499.96'</td>
<td>1.33' S</td>
<td>8.01' E</td>
</tr>
<tr>
<td>2600'</td>
<td>2599.95'</td>
<td>1.64' S</td>
<td>8.40' E</td>
</tr>
<tr>
<td>2700'</td>
<td>2699.95'</td>
<td>1.29' S</td>
<td>8.90' E</td>
</tr>
<tr>
<td>2800'</td>
<td>2799.95'</td>
<td>0.85' S</td>
<td>9.50' E</td>
</tr>
<tr>
<td>2900'</td>
<td>2899.95'</td>
<td>0.29' S</td>
<td>10.07' E</td>
</tr>
<tr>
<td>3000'</td>
<td>2999.95'</td>
<td>0.20' N</td>
<td>10.76' E</td>
</tr>
<tr>
<td>3100'</td>
<td>3099.95'</td>
<td>0.33' N</td>
<td>11.49' E</td>
</tr>
<tr>
<td>3200'</td>
<td>3199.94'</td>
<td>0.66' N</td>
<td>12.27' E</td>
</tr>
<tr>
<td>3303'</td>
<td>3299.94'</td>
<td>0.76' N</td>
<td>13.00' E</td>
</tr>
<tr>
<td>3400'</td>
<td>3399.94'</td>
<td>1.16' N</td>
<td>13.44' E</td>
</tr>
<tr>
<td>3500'</td>
<td>3499.94'</td>
<td>1.64' N</td>
<td>13.70' E</td>
</tr>
<tr>
<td>3600'</td>
<td>3599.94'</td>
<td>1.93' N</td>
<td>13.71' E</td>
</tr>
<tr>
<td>3700'</td>
<td>3699.94'</td>
<td>2.09' N</td>
<td>13.89' E</td>
</tr>
<tr>
<td>3800'</td>
<td>3799.93'</td>
<td>2.10' N</td>
<td>14.39' E</td>
</tr>
<tr>
<td>3903'</td>
<td>3899.93'</td>
<td>2.56' N</td>
<td>16.05' E</td>
</tr>
<tr>
<td>MD</td>
<td>TVD</td>
<td>Latitude</td>
<td>Departure</td>
</tr>
<tr>
<td>--------</td>
<td>---------</td>
<td>----------</td>
<td>-----------</td>
</tr>
<tr>
<td>4000'</td>
<td>3999.93'</td>
<td>2.87' N</td>
<td>16.94' E</td>
</tr>
<tr>
<td>4100'</td>
<td>4099.92'</td>
<td>3.14' N</td>
<td>17.81' E</td>
</tr>
<tr>
<td>4200'</td>
<td>4199.92'</td>
<td>3.32' N</td>
<td>18.55' E</td>
</tr>
<tr>
<td>4300'</td>
<td>4299.92'</td>
<td>3.50' N</td>
<td>19.31' E</td>
</tr>
<tr>
<td>4400'</td>
<td>4399.91'</td>
<td>3.52' N</td>
<td>20.27' E</td>
</tr>
<tr>
<td>4500'</td>
<td>4499.91'</td>
<td>3.58' P</td>
<td>20.39' E</td>
</tr>
<tr>
<td>4600'</td>
<td>4599.91'</td>
<td>3.59' N</td>
<td>21.11' E</td>
</tr>
<tr>
<td>4668'</td>
<td>4667.91'</td>
<td>3.77' N</td>
<td>20.80' E</td>
</tr>
<tr>
<td>Type Log</td>
<td>Date</td>
<td>Run No.</td>
<td>Depth</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>-------</td>
<td>---------</td>
<td>-------</td>
</tr>
<tr>
<td>Schlumberger Logs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formation Density</td>
<td>9-4-67</td>
<td>1</td>
<td>4685'</td>
</tr>
<tr>
<td>Dual Induction Laterlog</td>
<td>9-4-67</td>
<td>1</td>
<td>4681'</td>
</tr>
<tr>
<td>Sidewall Neutron</td>
<td>9-4-67</td>
<td>1</td>
<td>4684'</td>
</tr>
<tr>
<td>Borehole Sonic</td>
<td>9-4-57</td>
<td>1</td>
<td>4676'</td>
</tr>
<tr>
<td>Micro Sonic</td>
<td>9-5-67</td>
<td>1</td>
<td>4684'</td>
</tr>
<tr>
<td>Temperature</td>
<td>9-11-67</td>
<td>1</td>
<td>4685'</td>
</tr>
<tr>
<td>Birdwell Logs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caliper</td>
<td>9-5-67</td>
<td>1</td>
<td>4685'</td>
</tr>
<tr>
<td>3-D</td>
<td>9-5-67</td>
<td>1</td>
<td>4685'</td>
</tr>
<tr>
<td>3-D</td>
<td>9-5-67</td>
<td>2</td>
<td>4685'</td>
</tr>
<tr>
<td>3-D</td>
<td>9-5-67</td>
<td>3</td>
<td>4685'</td>
</tr>
<tr>
<td>3-D</td>
<td>9-6-67</td>
<td>4</td>
<td>4685'</td>
</tr>
</tbody>
</table>
GB-D

Review of Hole Conditions

Spudded 8-19-67

26" hole to 29' Completed - 10-6-67

20" O.D. casing at 29' G.L. Cemented annulus to surface with 120 ft³ of cement slurry.

17-1/2" hole to 482' 13-3/8" O.D. casing at 482' G.L. Cemented annulus to surface with 660 ft³ of cement slurry.

12-1/4" hole to 4725'

I. This hole was drilled using mud as a circulating fluid. Lost returns at 4222' and regained with lost circulation materials.

II. Ran Birdwell caliper log to 4685' prior to instrumenting hole. The log indicated the hole conformed to the 12-1/4" bit size up to 3905' with erratic washout conditions up to the 13-3/8" O.D. casing at 482'.

III. After the instruments had been placed, the hole was stemmed as follows:

<table>
<thead>
<tr>
<th>Stage No.</th>
<th>Interval</th>
<th>Grout Used</th>
<th>Calculated Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>4710' - 4569'</td>
<td>172 ft³</td>
<td>115 ft³</td>
</tr>
<tr>
<td>2.</td>
<td>4569' - 4345'</td>
<td>200</td>
<td>187</td>
</tr>
<tr>
<td>3.</td>
<td>4345' - 4191'</td>
<td>122</td>
<td>129</td>
</tr>
<tr>
<td>4.</td>
<td>4191' - 3914'</td>
<td>217</td>
<td>231</td>
</tr>
<tr>
<td>5.</td>
<td>3914' - 3689'</td>
<td>196</td>
<td>207</td>
</tr>
<tr>
<td>6.</td>
<td>3689' - 3403'</td>
<td>231</td>
<td>246</td>
</tr>
<tr>
<td>7.</td>
<td>3403' - 3106'</td>
<td>266</td>
<td>284</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>1404</td>
<td>1399</td>
</tr>
</tbody>
</table>
FENIX & SCISSON, INC.
HOE HISTORY DATA

HOLE NO. 1: GB-285

CONTRACT NO.: AT(26-1)-392

USER: J.R.L. \& PART.

TYPE HOLE: Exploratory \- Re-Entry

LOCATION: Rio Arriba

COUNTY: New Mexico

SURFACE COORDINATES: 300 N, 500E of GB-E Location

GROUND ELEVATION: ---

PAD ELEVATION: ---

TOP CASING ELEVATION: ---

RIG ON LOCATION: Re-Entry Started: 6-14-68 COMPLETED: 6-25-68

CIRCULATING MEDIA: Water to 3713', gas to T.D.

MAIN RIG & CONTRACTOR: Loffland Brothers Co. #203

NO. OF COMPRESSORS & CAPACITY:

BORE HOLE RECORD

<table>
<thead>
<tr>
<th>FROM</th>
<th>TO</th>
<th>SIZE</th>
<th>I.D.</th>
<th>WT./FT.</th>
<th>WALL</th>
<th>GRADE</th>
<th>CPL'G.</th>
<th>FROM</th>
<th>TO</th>
<th>CU. FT. C.MT.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3691</td>
<td>4600</td>
<td>6-1/4&quot;</td>
<td>7&quot; O.D., XX</td>
<td></td>
<td>0'</td>
<td></td>
<td>0'</td>
<td>181</td>
<td>3905</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>9-5/8&quot; O.D.</td>
<td></td>
<td>0.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TOTAL DEPTH: 4600' GD

AVERAGE MANDREL DEPTH:

FROM REFERENCE ELEVATION &:

PLUG LEFT IN HOLE: Johnston cast iron bridge plug at 3692-1/2'.

SURVEYS PAGE: 5

CORING PAGE: Page 4

LOGGING DATA:

RIG NO. | NAME               | TYPE                | CLASS | DAYS OPERATING | SECURED W/Crew | SECURED W/O Crew | TOTAL DAYS ON LOC. |
-------|--------------------|---------------------|-------|----------------|----------------|------------------|---------------------|
203    | Loffland Brothers  | Unit Rig & Power    | Company Model 15 | 11.23          |                |                  | 11.23               |

RIGS USED:

REMARKS:

* Includes GB-285

** Window cut in 7" O.D. casing from 3678' to 3621'.

PREPARED BY:

TIME BREAKDOWN ON NEXT PAGE.
## TIME BREAKDOWN

### SITE PREPARATION

<table>
<thead>
<tr>
<th>DRILLING OPERATION TIME (DOT)</th>
<th>OTHER SCHEDULED TIME (OST)</th>
<th>OPERATIONAL DELAY TIME (ODT)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DRILL</strong></td>
<td><strong>MOVE</strong></td>
<td><strong>RIG REPAIRS</strong></td>
</tr>
<tr>
<td><strong>TRIPS</strong></td>
<td><strong>RUN CASING</strong></td>
<td><strong>M. O. DRILLING SUPPLIES</strong></td>
</tr>
<tr>
<td><strong>SURVEYS</strong></td>
<td><strong>CEMENT CASING</strong></td>
<td><strong>CLEAN OUT FILL</strong></td>
</tr>
<tr>
<td><em>SITE DOT</em></td>
<td><em>SITE OST</em></td>
<td><em>SECURED WITH CREWS</em></td>
</tr>
<tr>
<td><em>DAYS</em></td>
<td><em>DAYS</em></td>
<td><em>DAYS</em></td>
</tr>
</tbody>
</table>

**TOTAL SITE PREP TIME**

### MAIN HOLE CONSTRUCTION

<table>
<thead>
<tr>
<th>DRILLING OPERATION TIME (DOT)</th>
<th>OTHER SCHEDULED TIME (OST)</th>
<th>OPERATIONAL DELAY TIME (ODT)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DRILL</strong></td>
<td><strong>MOBILIZATION &amp; DEMOBILIZATION</strong></td>
<td><strong>RIG REPAIRS</strong></td>
</tr>
<tr>
<td><strong>TRIPS</strong></td>
<td><strong>CORE</strong></td>
<td><strong>M. O. EQUIPMENT</strong></td>
</tr>
<tr>
<td><strong>DRESS DRILLING ASSEMBLY</strong></td>
<td><strong>LOG</strong></td>
<td><strong>FISH</strong></td>
</tr>
<tr>
<td><strong>SINGLE SHOT DRY, SURVEYS</strong></td>
<td><strong>CASED HOLE DIR. SURVEYS</strong></td>
<td><strong>CLEAN OUT FILL</strong></td>
</tr>
<tr>
<td><strong>OPEN HOLE DIRECTION SURVEYS</strong></td>
<td><strong>UNLOAD CASED HOLE</strong></td>
<td><strong>UNLOAD WATER INFLOW</strong></td>
</tr>
<tr>
<td></td>
<td><strong>RUN MACHINE</strong></td>
<td><strong>REAM CROOKED HOLE</strong></td>
</tr>
<tr>
<td></td>
<td><strong>HYDROLOGICAL TESTS</strong></td>
<td><strong>PLUG BACK</strong></td>
</tr>
<tr>
<td></td>
<td><strong>FLOW RATE TESTS</strong></td>
<td><strong>DRILL OUT PLUGS</strong></td>
</tr>
<tr>
<td></td>
<td><strong>DRILL CEMENT PLUG</strong></td>
<td><strong>SECURED WITH CREWS</strong></td>
</tr>
<tr>
<td></td>
<td><strong>RIG UP BLOW OUT</strong></td>
<td><strong>Pressure Test Casing</strong></td>
</tr>
<tr>
<td></td>
<td><strong>CONTAINMENT</strong></td>
<td><strong>Mill Casing</strong></td>
</tr>
<tr>
<td></td>
<td><strong>CAMERA RUN</strong></td>
<td><strong>Whipstock Operations</strong></td>
</tr>
<tr>
<td></td>
<td><em>MAIN HOLE DOT</em></td>
<td><strong>Standby Ready</strong></td>
</tr>
<tr>
<td></td>
<td><em>2.32 DAYS</em></td>
<td><em>0.54</em></td>
</tr>
</tbody>
</table>

**TOTAL MAIN HOLE CONST. TIME**

### TOTAL ELAPSED TIME

<table>
<thead>
<tr>
<th><strong>TOTAL SITE PREP TIME</strong></th>
<th><strong>DAYS</strong></th>
<th><strong>TOTAL MAIN HOLE CONST. TIME</strong></th>
<th><strong>DAYS</strong></th>
<th><strong>REMARDS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SEC. W/O CREW SITE PREP</strong></td>
<td><strong>DAYS</strong></td>
<td><strong>SEC. W/O CREW MAIN HOLE CONST.</strong></td>
<td><strong>DAYS</strong></td>
<td><strong>TOTAL SUSPENDED (NO RIG)</strong></td>
</tr>
<tr>
<td><strong>TOTAL ELAPSED TIME</strong></td>
<td><strong>DAYS</strong></td>
<td></td>
<td><strong>DAYS</strong></td>
<td></td>
</tr>
</tbody>
</table>

*11.23 DAYS*
HOE HISTORY

GB-2R 3RS

Moved in Loolland Brothers Company Rig #203 on 6-12-68 and started rigging up.

6-14-68 Rigged up Shafter blow out containment stack and tested up to 2000 psi.

6-15-68 Picked up 6-1/4" bit, ran in hole circulating out mud with water. Tagged top of cement plug at 2980' inside 7" O.D. casing. Drilled cement from 2980' to 3180' using water. Pressure tested 7" O.D. casing to 1000 psi for 10 minutes.

6-16-68 Drilled out cement with 6-1/4" bit from 3180' to 3704' and tested 7" O.D. casing to 1000 psi for 10 minutes at 3280', 3380', 3480', 3580', and 3680'. Bit began to torque up and run rough at 3692'. Pulled bit and found teeth broken off, indicating collapsed casing or junk in the hole. Pressure tested casing to 1000 psi for 30 minutes, no bleed back.

6-17-68 Ran 4-3/4" bit, drilled and worked by bad place in casing from 3704' to 3713'. Pressured up to 1000 psi for 10 minutes. Ran impression block, showed ledge at 3704' sticking out 5/8" with bit teeth marks. Rigged up blowie line and started unloading hole with gas in stages. Unloaded to 2778'.

6-18-68 Unloaded hole and drilled cement with 4-3/4" bit from 3713' to 3812' using gas, hole dusting. At 3812' had good indication that casing had collapsed or shifted.

GB-2RS

6-18-68 Ran Schlumberger cement bond log. Ran gauge ring and set top of Johnston cast iron bridge plug at 3699-1/2'. Marks or ring gauge showed casing offset. Ran 2.5° whipstock with 6-1/4" O.D. mill in hole, tagged top of bridge plug at 3699.92'. Set bottom of whipstock at 3697.92', top at 3678.52' and started cutting window in 7" O.D. casing from 3678' to 3679' using water for a circulating fluid.


6-20-68 Drilled 6-1/4" hole from 3716' to 4128' with gas at 125 psi to 160 psi. Made gas flow tests as follows:
<table>
<thead>
<tr>
<th>Test No.</th>
<th>Depth of Hole</th>
<th>Flow Rate - Mefd</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3880'</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>3914'</td>
<td>121.0</td>
</tr>
<tr>
<td>3</td>
<td>3992'</td>
<td>66.5</td>
</tr>
<tr>
<td>4</td>
<td>3973'</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>4004'</td>
<td>93.1</td>
</tr>
<tr>
<td>6</td>
<td>4034'</td>
<td>117.6</td>
</tr>
<tr>
<td>7</td>
<td>4066'</td>
<td>112.6</td>
</tr>
<tr>
<td>8</td>
<td>4097'</td>
<td>105.0</td>
</tr>
<tr>
<td>9</td>
<td>4128'</td>
<td>270.0</td>
</tr>
<tr>
<td>10</td>
<td>4159'</td>
<td>219.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>230.0</td>
</tr>
</tbody>
</table>

6-21-68 Drilled 6-1/4" hole from 4128' to 4600' with gas and made flow tests as follows:

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Depth of Hole</th>
<th>Flow Rate - Mefd</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>4190'</td>
<td>197.0</td>
</tr>
<tr>
<td>12</td>
<td>4221'</td>
<td>220.0</td>
</tr>
<tr>
<td>13</td>
<td>4252'</td>
<td>230.0</td>
</tr>
<tr>
<td>14</td>
<td>4283'</td>
<td>175.0</td>
</tr>
<tr>
<td>15</td>
<td>4313'</td>
<td>167.0</td>
</tr>
<tr>
<td>16</td>
<td>4343'</td>
<td>158.0</td>
</tr>
<tr>
<td>17</td>
<td>4377'</td>
<td>149.0</td>
</tr>
<tr>
<td>18</td>
<td>4407'</td>
<td>149.0</td>
</tr>
<tr>
<td>19</td>
<td>4438'</td>
<td>139.2</td>
</tr>
<tr>
<td>20</td>
<td>4469'</td>
<td>139.0</td>
</tr>
<tr>
<td>21</td>
<td>4499'</td>
<td>139.0</td>
</tr>
<tr>
<td>22</td>
<td>4531'</td>
<td>134.0</td>
</tr>
<tr>
<td>23</td>
<td>4561'</td>
<td>134.0</td>
</tr>
<tr>
<td>24</td>
<td>4600'</td>
<td>123.6</td>
</tr>
</tbody>
</table>


6-23-63 Completed Sperry-Sun gyroscopic multishot survey, ran in and out of hole on 50' stations from 3550' to 4528'.

Ran Birdwell temperature and caliper logs, top of fill at 4520'. Ran 6-1/2" O.D. x 15'4" long mandrel in hole to 4307'. Ran 12L flow spinner tool on Birdwell wireline to 4434' and ran flow tests. Ran 6-1/4" bit to top of fill at 4441', reamed and cleaned out fill to 4527' with gas at 200 psi.
6-24-68 Ran Laval camera on Birdwell wireline to a maximum depth of 3902'. Riggged down blowout preventer stack.

### Schlumberger Logs

<table>
<thead>
<tr>
<th>Type Logs</th>
<th>Date</th>
<th>Run No</th>
<th>Log Depth</th>
<th>Drillers Depth</th>
<th>Interval Logged</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement Bond</td>
<td>6-22-68</td>
<td>2</td>
<td>4,595'</td>
<td>4,600'</td>
<td>3,690'-4,594'</td>
</tr>
<tr>
<td>Formation Density</td>
<td>6-22-68</td>
<td>2</td>
<td>4,597'</td>
<td>4,600'</td>
<td>3,690'-4,589'</td>
</tr>
<tr>
<td>Induction</td>
<td>6-22-68</td>
<td>2</td>
<td>4,589'</td>
<td>4,600'</td>
<td>3,690'-4,588'</td>
</tr>
<tr>
<td>Sidewall Neutron</td>
<td>6-22-68</td>
<td>2</td>
<td>4,589'</td>
<td>4,600'</td>
<td>2,530'-4,588'</td>
</tr>
<tr>
<td>Porosity</td>
<td>6-22-68</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>6-22-68</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Birkwell Logs

<table>
<thead>
<tr>
<th>Type Logs</th>
<th>Date</th>
<th>Run No</th>
<th>Log Depth</th>
<th>Drillers Depth</th>
<th>Interval Logged</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caliper</td>
<td>6-23-68</td>
<td>1</td>
<td>4,520'</td>
<td>4,600'</td>
<td>3,600'-4,516'</td>
</tr>
<tr>
<td>Flowmeter</td>
<td>6-23-68</td>
<td>1</td>
<td>4,520'</td>
<td>4,600'</td>
<td>50'-4,434'</td>
</tr>
<tr>
<td>Temperature</td>
<td>6-23-68</td>
<td>1</td>
<td>4,520'</td>
<td>4,600'</td>
<td>3,700'-4,520'</td>
</tr>
<tr>
<td>ND</td>
<td>TVD</td>
<td>Latitude</td>
<td>Departure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>----------</td>
<td>----------</td>
<td>-----------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3550'</td>
<td>3550.00'</td>
<td>14.02' N</td>
<td>16.47' E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3650'</td>
<td>3649.99'</td>
<td>15.44' N</td>
<td>17.29' E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3750'</td>
<td>3749.96'</td>
<td>13.81' N</td>
<td>16.20' E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3850'</td>
<td>3849.87'</td>
<td>10.70' N</td>
<td>13.61' E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3950'</td>
<td>3949.64'</td>
<td>9.44' N</td>
<td>7.18' E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4050'</td>
<td>4049.30'</td>
<td>8.93' N</td>
<td>0.93' W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4150'</td>
<td>4148.87'</td>
<td>7.36' N</td>
<td>10.12' W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4250'</td>
<td>4248.24'</td>
<td>2.16' N</td>
<td>19.65' W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4350'</td>
<td>4347.34'</td>
<td>5.69' S</td>
<td>30.67' W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4450'</td>
<td>4445.73'</td>
<td>16.30' S</td>
<td>44.76' W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4528'</td>
<td>4521.30'</td>
<td>27.61' S</td>
<td>60.31' W</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
GB-2R, ZRS

REVIEW OF HOLE CONDITIONS

Operations Started: 6-14-68

Operations Completed: 6-25-68

GB-2 Hole Conditions

9-5/8" O.D. casing at 481'.

7" O.D. casing at 3903'.

6" open hole to 4248'.

Cement plug left at 2983'.

GB-2RS Hole Conditions

Cut window in 7" O.D. casing from 3678' to 3691'.

6-1/4" sidetrack hole from 3691' to 4600'.

I. The cement plug was drilled out from 2980' to 3713' with water and with gas to 3812'. The 7" O.D. casing was found to be parted at 3704' and the hole sidetracked. A window was cut in the 7" O.D. casing from 3678' to 3691'. The hole was dried up and drilled from 3691' to 4600' using gas as a circulating fluid. Johnston cast iron bridge plug at 3699-1/2'.

II. Flow tests were run each time a joint of drill pipe was picked up from 3830' to 4600'. The rate at 3880' was zero mcf/d and varied from 66.5 mcf/d to 270 mcf/d.
**FENIX & SCISSON, INC.**

**HOLE HISTORY DATA**

**DATE:** February 2, 1968  
**APPROVED:**

**HOLE NO.:** GB-1  
**CONTRACT NO.:** AT(261)-338

**USER:** LRL-EPNG  
**TYPE HOLE:** Exploratory - Instrument

**LOCATION:**
- **COUNTY:** Rio Arriba  
- **AREA:** New Mexico

**SURFACE COORDINATES:** 188.4' N 55° 45' W of CB-E Location

**GROUND ELEVATION:**  
**PAD ELEVATION:**  
**TOP CASING ELEVATION:**

**RIG ON LOCATION:**  
**SPUDDED:** **

**COMPLETED:** 10-18-67

**CIRCULATING MEDIA:**

<table>
<thead>
<tr>
<th><strong>MAIN RIG &amp; CONTRACTOR</strong></th>
<th><strong>NG. OF COMPRESSORS &amp; CAPACITY:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BORE HOLE RECORD**

<table>
<thead>
<tr>
<th>FROM</th>
<th>TO</th>
<th>SIZE</th>
<th>I.D.</th>
<th>WT./FT.</th>
<th>WALL</th>
<th>GRADE</th>
<th>CPLG.</th>
<th>FROM</th>
<th>TO</th>
<th>CU. FT.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>13-3/8&quot; OD</td>
<td></td>
<td></td>
<td>9-5/8&quot; OD</td>
<td>8-3/4&quot; OD</td>
<td>0'</td>
<td>633'</td>
<td>0'</td>
<td>3742'</td>
</tr>
<tr>
<td>3742'</td>
<td>4313'</td>
<td>8-3/4&quot; OD</td>
<td></td>
<td></td>
<td>2-3/8&quot; OD</td>
<td>0'</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CASING RECORD**

**TOTAL DEPTH:** 4313'GL  
**AVERAGE HANDREL DEPTH:**  
**FROM REFERENCE ELEVATION:**

**JUNK & PLUGS LEFT IN HOLE:** None

<table>
<thead>
<tr>
<th><strong>SURVEYS PAGE:</strong></th>
<th><strong>CORING PAGE:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**LOGGING DATA:** Page 2

**BOTTOM HOLE COORDINATES:**

<table>
<thead>
<tr>
<th><strong>RIG NO.</strong></th>
<th><strong>NAME</strong></th>
<th><strong>TYPE</strong></th>
<th><strong>CLASS</strong></th>
<th><strong>DAYS OPERATING</strong></th>
<th><strong>SECURED W CREW</strong></th>
<th><strong>SECURED W/O CREW</strong></th>
<th><strong>TOTAL LOC ON LO</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>Aztec Well Service Co.</td>
<td>180 HP Double-Drum Unit</td>
<td>2,13</td>
<td>0,35</td>
<td></td>
<td>2,48</td>
<td></td>
</tr>
</tbody>
</table>

**REMARKS:** * Site Prep Items

**Prior to stemming and instrumenting, this hole had been drilled and cased by others.*
Prior to stemming and instrumenting hole, EPNG had drilled out a bridge plug at 4230' and cleaned out to 4313'.

Moved in Aztec Well Service Rig #50 and rigged up.

10-10-67 Completed rigging up at 1800 hours, prepared to run 2-3/8" O.D. tubing.

10-11-67 Ran 50 joint and subs (1515.69') of 2-3/8" O.D. fiberglass tubing with attached instruments and cables as directed by LRL. Standby ready at 1630 hours.

10-12-67 Standby ready until 0800 hours. Ran 87 joints of 2-3/8" O.D. tubing on top of the fiberglass tubing, temporarily landed at 4166'. Standby ready at 1500 hours.

10-13-67 Standby ready until 0800 hours. Completed running 50 joints and subs (1515.69') of fiberglass tubing and 87 joints (2739.34') of 2-3/8" O.D. BUE, 6.70", J-55 tubing with crossover and subs. Landed at 4233.53' C.L. in 9-5/8" x 2-3/8" special tubing hanger spool. Instruments and cables were attached as directed by LRL. Centralizers were run on tubing collars at 90' intervals with Kellen grips attached to the cables and centralizers at 130' intervals. Baker circulating sub at 3699'. Circulated approximately 28 barrels of mud, installed grout-line and released rig at 1130 hours. Hole suspended.

10-17-67 Hole suspended from 1130 hours on 10-13-67 to 0700 hours on 10-17-67. Rigged up Halliburton, circulated and stemmed hole with 403 ft³ of W.E.S. special grout cement. Opened Baker circulating sub and circulated out 140 ft³ of grout leaving 263 ft³ in the hole. CIP at 1115 hours. Waited on cement and circulated hole.

10-18-67 Cemented stage #2 with 361 ft³ of W.E.S. special filler grout out the circulating sub at 3699'. CIP at 1145 hours. Rigged down Halliburton at 1230 hours. Top of cement inside the 2-3/8" O.D. tubing was tagged at 2612'. Hole suspended.
### GB-1
#### Log Index Sheet

<table>
<thead>
<tr>
<th>Type Log</th>
<th>Date</th>
<th>Run No.</th>
<th>Log Depth</th>
<th>Driller's Depth</th>
<th>Interval Logged</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCTL</td>
<td>8-28-67</td>
<td>1</td>
<td>3756'</td>
<td>4320'</td>
<td>2300' - 3756'</td>
</tr>
<tr>
<td>NCTL</td>
<td>9-6-67</td>
<td>2</td>
<td>3000'</td>
<td>4320'</td>
<td>0' - 3000'</td>
</tr>
<tr>
<td>3-D</td>
<td>9-6-67</td>
<td>5</td>
<td>3790'</td>
<td>4320'</td>
<td>0' - 3790'</td>
</tr>
</tbody>
</table>

**Note:** These Birdwell logs were run for the AEC with no rig on the hole.
Operations started 10-10-67  Operations completed 10-18-67

Casing Record

13-3/8" at 488'  
9-5/8" at 3742'  
8-3/4" open hole to 4313'

I. Prior to instrumenting and stemming, this hole was drilled and cased by others.

II. A total of 1515.69' of 2-3/8" O.D. fiberglass tubing was run in the hole with 2739.34' of 2-3/8" O.D. steel tubing on top. The tubing was landed at 4253' G.L. with instruments attached as directed.

III. The 2-3/8" O.D. tubing and instruments were stemmed with 604 ft$^3$ of W.E.S. grout in two stages from 4254' up to 2612'.
**DATE:** February 2, 1963
**APPROVED:**

<table>
<thead>
<tr>
<th>HOLE NO.</th>
<th>CB-2</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>USER</th>
<th>LRL-HNG</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>COUNTY: Rio Arriba</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>SURFACE COORDINATES: 300' N 90° E of CB-5 location</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>GROUND ELEVATION:</th>
<th>PAD ELEVATION:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>CIRCULATING MEDIA:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>MAIN RIG &amp; CONTRACTOR</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>BORE HOLE RECORD</th>
<th>CASING RECORD</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM</td>
<td>TO</td>
</tr>
<tr>
<td>------</td>
<td>----</td>
</tr>
<tr>
<td>9-5/8''</td>
<td>OD</td>
</tr>
<tr>
<td>7''</td>
<td>OD</td>
</tr>
<tr>
<td><strong>TOTAL DEPTH: 4248' GL</strong></td>
<td></td>
</tr>
<tr>
<td><strong>AVERAGE HANDHOLE DEPTH:</strong>*</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>JUNK &amp; PLUGS LEFT IN HOLE: Cement plug from 4197' to 2817'</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>SURVEYS PAGE:</th>
<th>CORING PAGE:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>LOGGING DATA:</th>
<th>Page 2</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>BOTTOM HOLE COORDINATES:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>RIG NO.</th>
<th>NAME</th>
<th>TYPE</th>
<th>CLASS</th>
<th>DAYS OPERATING</th>
<th>SECURED W/Crew</th>
<th>SECURED W/O Crew</th>
<th>TOTAL DAYS ON LOC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>Aztec Well Service Co.</td>
<td>120 HP double-drum unit.</td>
<td>1.25</td>
<td>1.25</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RIGS USED</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>REFERENCE:</th>
<th>(Site Prep Rigs *)</th>
</tr>
</thead>
</table>

**REMARKS:**

**Site Prep Items**

**Prior to plugging back, this hole had been drilled and cased by others.**
Moved in Aztec Well Service Company Rig 650 and rigged up.

10-17-67 Completed rigging up at 1500 hours. Ran 2-3/8" tubing and tagged top of fill at 4197.08'. Set cement plug #1 from 4196' using Halliburton with 308 ft³ of 60-40 Posmiz plus 6% gel. CIP at 2045 hours, Pulled tubing to 2551' and waited on cement.

10-18-67 Waited on cement until 0600 hours and tagged top of cement at 2817'. Pulled tubing and ran 6-1/4" bit on tubing and drilled cement from 2817' to 2998' to the top of hard cement. Filled hole with mud, installed well-head equipment and released rig at 2100 hours.
<table>
<thead>
<tr>
<th>Type Log</th>
<th>Date</th>
<th>Run No.</th>
<th>Log Depth</th>
<th>Drillers Depth</th>
<th>Interval Logged</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCTL</td>
<td>8-29-67</td>
<td>1</td>
<td>3900'</td>
<td>4260'</td>
<td>0' - 3900'</td>
</tr>
<tr>
<td>3-D</td>
<td>8-29-67</td>
<td>11</td>
<td>4260'</td>
<td>4001'</td>
<td>50' - 3990'</td>
</tr>
</tbody>
</table>

Note: These Birdwell logs were run for the AEC with no rig on the hole.
Operations started: 10-17-67

Operations Completed: 10-18-67

Casing Record

9-5/8" O.D. casing at: 481'
7" O.D. casing at: 3903'
6" open hole 3903' to 4248'.

Tubing was run in the hole to the top of the fill which was encountered in the open hole at 4197'. A 308 cu. ft. cement plug of 60-40 pozmiX cement with 6% gel was placed in the hole with tubing at 4196'. The cement plug was drilled down to 2938'.
**HOLE HISTORY DATA**

**DATE:** February 2, 1969

**HOLE NO.:** GR-E-41  
**CONTRACT NO.:** AT(25-1)-338

**USER:** LRL-EPNC  
**TYPE HOLE:** Post shot re-entry of emplacement hole.

**LOCATION:**  
**COUNTY:** Rio Arriba  
**AREA:** New Mexico

**SURFACE COORDINATES:** 1218' FSL, 1770' FUL, Section 36, T29N, R4W

**GROUND ELEVATION:** 7204'  
**PAD ELEVATION:**  
**TOP CASING ELEVATION:**

**RIG ON LOCATION:** Spudded: Re-entry 12-13-67  
**COMPLETED:** 1-15-67

**CIRCULATING MEDIA:**

**MAIN RIG & CONTRACTOR**

**BORE HOLE RECORD**

<table>
<thead>
<tr>
<th>FROM</th>
<th>TO</th>
<th>SIZE</th>
<th>I.D.</th>
<th>WT./FT.</th>
<th>WALL</th>
<th>GRADE</th>
<th>CPLNG.</th>
<th>FROM</th>
<th>TO</th>
<th>CU. FT./CFT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0'</td>
<td>49'</td>
<td>39''</td>
<td>30''</td>
<td>0.10</td>
<td>1/2''</td>
<td>A.36</td>
<td>Held</td>
<td>0'</td>
<td>49'</td>
<td>263</td>
</tr>
<tr>
<td>49'</td>
<td>4350'</td>
<td>28''</td>
<td>20''</td>
<td>0.15</td>
<td>6.50''</td>
<td>SSIC</td>
<td>Held</td>
<td>0'</td>
<td>4324'</td>
<td>11,133</td>
</tr>
</tbody>
</table>

**TOTAL DEPTH:** 4350' GL  
**AVERAGE HANDRED DEPTH:**  
**FROM REFERENCE ELEVATION:**

**JUNK & PLUGS LEFT IN HOLE:**

**SURVEYS PAGER:**

**CORING PAGER:**

**LOGGING DATA:** Page 5

**BOTTOM HOLE COORDINATES:**

**RIGS USED**

<table>
<thead>
<tr>
<th>RIG NO.</th>
<th>NAME</th>
<th>TYPE</th>
<th>CLASS</th>
<th>DAYS OPERATING</th>
<th>SECURED V/CREW</th>
<th>SECURED N/O CREW</th>
<th>TOTAL DAYS ON LOC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>Brinkerhoff Drilling Co.</td>
<td>EMS CO-500</td>
<td></td>
<td>31,17</td>
<td>4.29</td>
<td></td>
<td>35.46</td>
</tr>
</tbody>
</table>

**REMARKS:** * Site Prep Items
Moved in Brinkerhoff Drilling Company Rig #21 on 12-12-67 and started rigging up.

12-13-67 Hole suspended from 1600 hours on 12-9-67 to 2300 hours on 12-13-67. Completed rigging up at 2300 hours. Started removing blind flanges.

12-14-67 Removed surface equipment from hole. Top of sand inside the 7" O.D. casing at 20.6'. Installed and tested blowout containment stack. Ran open end drill pipe and de-stemmed hole to 874' using natural gas as a circulating fluid.

12-15-67 De-stemmed hole to 956' with open end drill pipe. Pulled drill pipe and ran 6-1/8" bit, tagged fill at 922'. Cleaned out fill to 951', sand is falling back thru slots in the 7" O.D. casing when gas is shut off. Pulled bit from hole to cement slots. Set plug #1 at 929' using Halliburton with 207 ft³ of neat cement plus 3% calcium chloride. CIP at 1845 hours. Set Halliburton Rfts. packer at 5' and tested blowout equipment to 1200 psi, recovered packer.

12-16-67 Ran 6-1/8" bit and tagged top of cement at 814' at 0245 hours. Dried up hole and started drilling cement at 0415 hours. Drilled out cement to 917' and cleaned out sand to 956'. Set plug #2 at 958' with 70 ft³ of neat cement plus 3% calcium chloride. CIP at 1037 hours. Waited on cement. Tagged top of plug #2 at 692' at 1930 hours and blew hole dry. Drilled cement with 6-1/8" bit from 692' to 779'.

12-17-67 Waited on cement until 0600 hours, drilled cement from 779' to 954' and cleaned out sand to 1474'. Drilled cement plug from 1474' to 1583'. Dried up hole.

12-18-67 Drilled cement with 6-1/8" bit from 1583' to 1779', had to ream hole from 290' to 434'.

12-19-67 Hole dried up. Drilled cement with 6-1/8" bit from 1779' to 2536' and de-stemmed sand to 2910'.

12-20-67 De-stemmed sand from 2910' to 3029', sand in the 20" annulus falling thru slots in the 7" casing. Set plug #3 at 3023' with 106 ft³ of neat cement plus 1-1/2% calcium chloride. Pump pressure built to 2100 psi, pulled cement plugged pipe. Ran drill pipe in hole open ended to 3010' and circulated with gas, no fill. Set plug #4 at 3010 with 106 ft³ of neat cement plus 1-1/2% calcium chloride. Pump pressure increased to 1600 psi. Worked drill pipe up to 2976' with no further movement.

12-21-67 Halliburton spotted 250 gallons of 15% hydrochloric acid down the 7" O.D. casing, could not work pipe free. Backed off drill pipe leaving 8 joints inside the 7" O.D. casing, approximately 249' of fish. Top of fish at 2776.95'. Ran in hole with a set of 4-5/8" O.D. Feven oil jars and bumper sub, screwed into fish. Jettred on fish with no results until jars parted, leaving lower section of jars and bumper sub in hole.
12-22-67 Ran in hole with 5-3/4" O.D. Bowen overshot with 4-3/4" grapple, caught fish at 2717'. Ran McCullough string shot to back off at 2820', drill pipe backed off up the hole, screwed back together. Ran string shot at 2758' and backed off, recovered Bowen jars, sub and one joint of drill pipe. Ran drill pipe and screwed into fish. Ran string shot and backed off at 2622', recovered 2 joints of drill pipe, no fill on top of fish at 2621.67'. Unloaded hole with gas.

12-23-67 Ran drill pipe and screwed into fish. Ran 1.6" O.D. tubing inside the 3-1/2" O.D. drill pipe and cleaned out pockets of cement from 2831' to 2965'. Pulled tubing.

12-24-67 Ran McCullough free point indicator, could not get below 2692'. Ran 1.6" O.D. tubing inside drill pipe and washed from 2692' to 2965' with no returns below 2795'. Pulled tubing.

12-25-67 Ran McCullough string shot and backed off drill pipe at 2821', 52' above back-off point, leaving 5 joints of drill pipe in hole. Ran 6-1/8" bit to 2821' and blew hole dry with gas. Rigged up mud pump and mud tanks.

12-26-67 Mixed and loaded hole with mud. Ran open end drill pipe and screwed into fish, could not circulate. Ran 1.6" O.D. tubing inside drill pipe, washed from 2795' to 2945' with no mud returns. Regained circulation and cleaned out to 2890'.

12-27-67 Pulled 1.6" O.D. tubing, could not work fish or circulate. Ran McCullough string shot and backed off drill pipe at 2852', recovered one joint of drill pipe. Ran 6-1/8" bit, reamed and washed to top of fish at 2852'. Ran 6" O.D. wash pipe, washer shoe and a set of 5-3/4" O.D. Bowen jars. Washed over fish to 2896'.

12-28-67 Circulated sand out of hole, washed over fish to 2913', fish dropped to 2943'. Pulled wash pipe, ran in hole with 5-3/4" O.D. Bowen jars and recovered fish. Ran 6-1/8" bit and washed from 2882' to 3031'. Pulled out of hole to 972' to evacuate mud from hole.

12-29-67 Jetted mud from hole in stages down to 3031'. Ran 2-3/8" O.D. tubing to 2939' for plug §5, used 201 ft³ of neat cement plus 4% gel. CIP at 1105 hours.

12-30-67 Ran 6-1/8" bit and unloaded hole with gas in stages down to the top of plug §5 at 2491', could not dry up hole. Loaded hole with mud and drilled cement from 2491' to 3102'. Cement had void spaces from 2570' to 2625' and 2991' to 3031'.

12-31-67 Displaced mud with water and unloaded hole with gas down to 3102'. Could not dry up hole, some mud returning to surface. Ran Schlumberger Density Log.
1-1-68 Ran 6-1/8" bit unloading fluid from hole and drilled cement from 3102' to 3165'. Could not dry up hole. Started running Schlumberger Density Log.

1-2-68 Completed Density log and perforated 7" O.D. casing with 4 shots from 2796' to 2797'. Left junk from perforating gun, 2 steel plates 3" x 1-1/2', 2 lead weights and 2 cables 3' long. Ran water probe, tool would not work. Perforated 7" O.D. casing from 2858' to 2860' with 8 holes to drain annulus. Ran 6-1/8" bit to 3162' and unloaded hole. Ran Schlumberger Density Log. Ran 6-1/8" bit to 3165', drying up hole.

1-3-68 Dried up hole at 3165'. Ran 5-7/8" O.D. globe basket and milled on junk from 3165' to 3167', recovered 2-1/2' of wireline and lead weights. Ran 6-1/8" bit and drilled out to 3177', attempted to dry up hole. Repaired and tested blowout preventer stack, rotating head and installed high pressure circulating system.

1-4-68 Continued repairs and testing. Drilled cement with 6-1/3" bit to 3181'.

1-5-68 High pressure circulating system failed to function, changed back to El Paso gas system. Drilled cement with 6-1/8" bit from 3181' to 3205' with no returns. Pulled bit and found 7" O.D. casing plastered with cuttings from 3401' to surface, pressured up annulus and blow cuttings from hole. Ran bit to bottom and had 15' of fill, cleaned out fill and drilled from 3205' to 3260', cement drilled wet. Pulled bit.

1-6-68 Rigged up to drill with mud. Drilled cement with 6-1/8" bit from 3260' to 3600'.

1-7-68 Displaced mud with water and unloaded hole in stages with gas to 3600'. Ran Baker packer and set at 3440'. Ran Schlumberger water locater, fluid level at 3538' (1725 hours) raised to 3523' (1900 hours). Took water samples on a wireline. Misrun on Temperature Survey.

1-8-68 Ran Schlumberger Density and Temperature Logs. Pulled packer from hole. Filled hole with mud, ran 6-1/8" bit and drilled cement from 3600' to 3556', lost circulation, fell into a cavity. Tagged top of rubble or bottom of void at 3552'. Pressure was 8 psi at 2445 hours and 0 psi at 2335 hours. Pulled bit.

1-9-68 Surface pressure was 0 psi until 0400 hours, gradually built to 45 psi at 0700 hours. Ran Schlumberger Gamma Ray Log. Ran fluid locater, fluid level at 1748', added 30 barrels of water inside the 7" O.D. casing and fluid level raised 9'. Ran Schlumberger Density Log.

1-10-68 Ran 6-1/8" bit and drilled from 3526' to 3916' using drilling mud with no return circulation. Encountered chimney from 3907' to 3916'. Drilled into chimney at 0054 hours and had fluid to surface at 0118 hours. Closed in hole at 0120 hours, pressure built to 431 psi at 0400 hours when gauge line froze. At 0800 hours, pressure was 673.5 psi. Stripped part of drill pipe from hole and rigged up Otis high pressure stripping equipment. Pressure at 2000 hours was 800 psi. Standby ready.
1-11-68 Standby ready until 0800 hours. Pressure on outside of drill pipe 820 psi. Stripped balance of drill pipe from hole. Rigged up Schlumberger lubricator and started logging.

1-12-68 Ran Schlumberger Caliper, water locator, gamma-ray, density and formation tester to take gas sample. Ran Laval camera on Schlumberger wireline. Ran formation tester.

1-13-68 Ran flow rate test for 1-1/2 hours, rate was 1050 cfm at 825 psi. Shut in at 0100 hours. Reran formation tester and Laval camera. Ran Baker Model "D" wireline packer and set at 3786' inside the 7' O.D. casing.

1-14-68 Removed Otis equipment and rigged up 2-7/8" O.D. tubing hanger spool and blow out preventer stack. Ran 119 joints of 2-7/8" O.D., 2UE, 8 round, 6.50" tubing, spaced out with pup joints and landed in packer at 3786'. Set down with 3000 lb weight in tubing hanger. Removed blow-out equipment, and installed permanent well head equipment. Loaded 7" annulus with 295 barrels of water and pumped 22.5 barrels of water down the tubing to rupture plug. Closed in valves.

1-15-68 Rig released at 0300 hours. Hole suspended.
<table>
<thead>
<tr>
<th>Type Log</th>
<th>Date</th>
<th>Run No.</th>
<th>Log Depth</th>
<th>Drillers Depth</th>
<th>Interval Logged</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formation Density</td>
<td>12-31-67</td>
<td>12</td>
<td>3103'</td>
<td>3102'</td>
<td>0' - 3102'</td>
</tr>
<tr>
<td>Formation Density</td>
<td>1-2-65</td>
<td>13</td>
<td>3159'</td>
<td>3165'</td>
<td>?' - 3158'</td>
</tr>
<tr>
<td>Formation Density</td>
<td>1-2-63</td>
<td>14</td>
<td>3031</td>
<td>3165'</td>
<td>2500' - 3030'</td>
</tr>
<tr>
<td>Formation Density</td>
<td>1-8-68</td>
<td>15</td>
<td>3857'</td>
<td>3600'</td>
<td>2350' - 3856'</td>
</tr>
<tr>
<td>Formation Density</td>
<td>1-9-68</td>
<td>16</td>
<td>3601'</td>
<td>3656'</td>
<td>2100' - 3600'</td>
</tr>
<tr>
<td>Formation Density</td>
<td>1-12-68</td>
<td>17</td>
<td>3883'</td>
<td>3910'</td>
<td>0' - 3887'</td>
</tr>
<tr>
<td>Gamma Ray</td>
<td>1-9-68</td>
<td>1</td>
<td></td>
<td>3916'</td>
<td>0' - 3898'</td>
</tr>
<tr>
<td>Gamma Ray Caliper</td>
<td>1-12-68</td>
<td>2</td>
<td>3897'</td>
<td>3916'</td>
<td>0' - 3898'</td>
</tr>
<tr>
<td>Temperature</td>
<td>1-8-68</td>
<td>4</td>
<td></td>
<td></td>
<td>3600'</td>
</tr>
</tbody>
</table>
GB-E-R
Review of Hole Conditions

39" hole to 49'

30" O.D. casing cemented to surface with 263 ft of cement slurry.

28" hole to 4350'

20" O.D. casing cemented to surface with 11,138 ft of cement slurry.

I. This hole was destemmed using natural gas and mud. The drill pipe was stuck caused by sand and cement falling thru the slots in the 7" O.D. emplacement casing and was recovered.

II. Drilled into a void space from 3856' to 3862' and lost circulation. Encountered chimney from 3907' to 3916'.

III. A packer was set at 3786' inside the 7" O.D. emplacement casing at 3786', 2-7/8" tubing was run and permanent well head equipment was installed for testing.
## HOLE HISTORY DATA

**DATE:** February 2, 1968

**HOLE NO.:** CR-E

**CONTRACT NO.:** AT(26-1)-318

**USER:** TPL-FPIC

**TYPE HOLE:** Emplacement

**LOCATION:** County: Rio Arriba, Area: New Mexico

**SURFACE COORDINATES:** E118', FSL 1770', FML Section 36, T29N, R4W

**GROUND ELEVATION:** 7204.1

**PAD ELEVATION:**

**RIG OR LOCATION:**

**SPUDDED:** 6-25-67

**COMPLETED:** 11-12-67

**CIRCULATING MEDIUM:** Mud

**MAIN RIG & CONTRACTOR:** Signal Drilling Company #16

**NO. OF COMPRESSORS & CAPACITY:**

### DORE HOLE RECORD

<table>
<thead>
<tr>
<th>FROM</th>
<th>TO</th>
<th>SIZE</th>
<th>I.D.</th>
<th>WT./FT.</th>
<th>WALL</th>
<th>GRADE</th>
<th>CFLG'G.</th>
<th>FROM</th>
<th>TO</th>
<th>CU. FT. CAT.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0'</td>
<td>49'</td>
<td>39&quot;</td>
<td>30&quot; O.D.</td>
<td>157#</td>
<td>1/2&quot;</td>
<td>A-36</td>
<td>0&quot;</td>
<td>49'</td>
<td></td>
<td>263</td>
</tr>
<tr>
<td>49'</td>
<td>1350'</td>
<td>26&quot;</td>
<td>20&quot; O.D.</td>
<td>133#</td>
<td>635'</td>
<td>H-36</td>
<td>0&quot;</td>
<td>1350'</td>
<td></td>
<td>11.136</td>
</tr>
</tbody>
</table>

**TOTAL DEPTH:** 1350' GL

**AVERAGE HANDREL DEPTH:** 4282.51

**FROM REFERENCE ELEVATION:** 7204.1

**JUNK & PLUGS LEFT IN HOLE:** Bit cones pushed to 1350'

**SURVEYS PAGE:** 17

**CORING PAGE:**

**CU. FT. CAT. TOTAL IN PLUGS, ETC.:**

**LOGGING DATA:** Page 14

**BOTTOM HOLE COORDINATES:** 178' N and 20.94' from surface location

**REFERENCE:** run 332-SH-3-092

### Casing Record

### RIGS USED

<table>
<thead>
<tr>
<th>RIG NO.</th>
<th>NAME</th>
<th>TYPE</th>
<th>CLASS</th>
<th>DAYS OPERATING</th>
<th>SECURED W/ CHEW</th>
<th>SECURED W/O CHEW</th>
<th>TOTAL DAY ON LOC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>*</td>
<td>Dry Hole Digger</td>
<td></td>
<td></td>
<td>1.05</td>
<td></td>
<td></td>
<td>1.05</td>
</tr>
<tr>
<td>16</td>
<td>Signal Drilling Co.</td>
<td></td>
<td></td>
<td>136.61</td>
<td></td>
<td></td>
<td>136.61</td>
</tr>
</tbody>
</table>

**REMARKS:** * Site Prep Items

**TIME BREAKDOWN ON NEXT PAGE**
<table>
<thead>
<tr>
<th>TIME BREAKDOWN</th>
</tr>
</thead>
<tbody>
<tr>
<td>SITE PREPARATION</td>
</tr>
<tr>
<td>DRILLING OPERATION TIME (DOT)</td>
</tr>
<tr>
<td>DRILL</td>
</tr>
<tr>
<td>TRIPS</td>
</tr>
<tr>
<td>SURVEYS</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>SITE DOT</td>
</tr>
<tr>
<td>TOTAL SITE PREP TIME</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MAIN HOLE CONSTRUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRILLING OPERATION TIME (DOT)</td>
</tr>
<tr>
<td>DRILL</td>
</tr>
<tr>
<td>TRIPS</td>
</tr>
<tr>
<td>DRESS DRILLING ASSEMBLY</td>
</tr>
<tr>
<td>SINGLE SHOT DEV. SURVEYS</td>
</tr>
<tr>
<td>OPEN HOLE DIRECTION SURVEYS</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>MAIN HOLE DOT</td>
</tr>
<tr>
<td>CASING OPERATION TIME (COT)</td>
</tr>
<tr>
<td>RUN</td>
</tr>
<tr>
<td>RUN</td>
</tr>
<tr>
<td>CEMENT</td>
</tr>
<tr>
<td>CEMENT</td>
</tr>
<tr>
<td>DRILL OUT SHOE</td>
</tr>
<tr>
<td>MAIN HOLE COT</td>
</tr>
<tr>
<td>MAIN HOLE OST</td>
</tr>
<tr>
<td>TOTAL MAIN HOLE CONST. TIME</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Moved in Signal Drilling Company Rig #16 and started rigging up on 06-21-67. Prior to moving in, a dry hole digger had drilled a 39-inch hole to 49 feet and a 2½-inch hole to 51 feet. Two joints of 30-inch O.D., 1/2 inch wall, Grade A-35 casing were run and landed at 49' G.L. The casing was cemented with 263 ft.3 of neat cement plus 35 calcium chloride.

06-25-67 Spudded hole at 0230 hours with 13-3/4" bit, drilled out cement inside the 30" O.D. casing and new formation from 51' to 250' using mud as a drilling fluid.

06-26-67 Drilled 13-3/4" hole from 250' to 530'.

06-27-67 Drilled 13-3/4" hole from 330' to 998'.

06-28-67 Drilled 13-3/4" hole from 998' to 1587'.

06-29-67 Drilled 13-3/4" hole from 1587' to 2160', had to wash 160' to bottom after trip.

06-30-67 Drilled 13-3/4" hole from 2160' to 2520', had to wash 200' to bottom after trip.

07-01-67 Drilled 13-3/4" hole from 2520' to 2665'. Made two trips, one to recover the survey instrument, and one to unplug the bit.

07-02-67 Drilled 13-3/4" hole from 2665' to 2999', had to wash 120' to bottom after trip.

07-03-67 Drilled 13-3/4" hole from 2999' to 3299', had to wash 70' of fill.

07-04-67 Drilled 13-3/4" hole from 3299' to 3490', had 12' of fill. Measured out of hole, no correction.

07-05-67 Drilled 13-3/4" hole from 3490' to 3699'.

07-06-67 Drilled 13-3/4" hole from 3699' to 4008', reamed 200' of tight hole.

07-07-67 Drilled 13-3/4" hole from 4008' to 4222', had 100' of fill. Hole taking mud.

07-08-67 Drilled 13-3/4" hole from 4222' to 4300', had 90' of fill. Hole taking mud.

07-09-67 Drilled 13-3/4" hole from 4300' to 4350'. Lost approximately 400 bbl. of drilling mud from 4100' to 4350'.

07-10-67 Reamed 13-3/4" hole to 28" from 49' to 320'.
07-11-67  Reamed 13-3/4" hole to 28" from 320' to 615'.
07-12-67  Reamed 13-3/4" hole to 28" from 615' to 794'.
07-13-67  Reamed 13-3/4" hole to 28" from 794' to 1065'.
07-14-67  Reamed 13-3/4" hole to 28" from 1065' to 1227'. Lost one cutter off hole opener #2, had 100' of fill and tight hole.
07-15-67  Reamed 13-3/4" hole to 28" from 1227' to 1418'.
07-16-67  Reamed 13-3/4" hole to 28" from 1418' to 1536'.
07-17-67  Reamed 13-3/4" hole to 28" from 1536' to 1675'.
07-18-67  Reamed 13-3/4" hole to 28" from 1675' to 1814'.
07-19-67  Reamed 13-3/4" hole to 28" from 1814' to 1960'.
07-20-67  Reamed 13-3/4" hole to 28" from 1960' to 2121'. Hole out of gauge.
07-21-67  Reamed 13-3/4" hole to 28" from 2121' to 2334'.
07-22-67  Reamed 13-3/4" hole to 28" from 2334' to 2382', had 260' of out-of-gauge hole.
07-23-67  Reamed 13-3/4" hole to 28" from 2382' to 2558'.
07-24-67  Reamed 13-3/4" hole to 28" from 2558' to 2602'. Ran 13-3/4" bit, found fish at 2603', washed to bottom.
07-25-67  Completed washing junk in 13-3/4" hole to 4350'. Lost and estimated 400 bbl. of drilling mud.
07-26-67  Reamed 240' of out-of-gauge hole. Reamed 13-3/4" hole to 28" from 2602' to 2649'.
07-27-67  Reamed 118' of out-of-gauge hole. Reamed 13-3/4" hole to 28" from 2649' to 2764'.
07-28-67  Reamed 13-3/4" hole to 28" from 2764' to 2841', had 200' of out-of-gauge hole.
07-29-67  Reamed 13-3/4" hole to 28" from 2841' to 2850'. Lost one cutter off hole opener.
07-30-67  Reamed 460' of out-of-gauge hole. Reamed 13-3/4" hole to 28" from 2850' to 2896'.
07-31-57  Lost, one cutter off hole opener at 2826'. Ran 13-3/4" bit. Drilled on junk, could not wash to bottom. Ran 13-3/4" globe-type junk basket, did not recover junk.

06-01-67  Ran 13-3/4" bit, trashed junk to bottom of pilot hole and drilled 13-3/4" hole from 4350' to 4355'.

08-02-67  Reamed out-of-gauge hole from 2600' to 2664' with 28" hole opener.

08-03-67  Reamed 13-3/4" hole to 20' from 2886' to 3025'.

08-04-67  Reamed 13-3/4" hole to 20' from 3025' to 3181', washed fill from 2886' to 3181'.

08-05-67  Reamed 13-3/4" hole to 20" from 3181' to 3420'.

08-06-67  Reamed 13-3/4" hole to 20" from 3420' to 3474'. Shut down for repairs.

08-07-67  Ran 28" hole opener, hit out-of-gauge hole at 1011'. Reamed out-of-gauge hole to 1936'.

08-08-67  Reamed out-of-gauge hole with 28" hole opener from 1936' to 2675'.

08-09-67  Reamed out-of-gauge 28" hole from 2675' to 2865'.

08-10-67  Reamed out-of-gauge 28" hole from 2865' to 2885' and reamed 20" hole to 28" from 2886' to 2947'.

08-11-67  Reamed 20" hole to 23" from 2947' to 2972', lost 20" Hughes tri-cone pilot bit. Ran in with taper tap, twisted pin off bit.

08-12-67  Pulled taper tap, no recovery. Ran 24" O.D. x 23" I.D. magnet, no recovery. Ran 20" bit and washed to top of fish at 2979'.

08-13-67  Made three trips with 24" magnet, recovered one cone and one shank from 20" bit.

08-14-67  Ran 24" magnet and milled on junk, no recovery. Ran 28" hole opener, reamed out-of-gauge hole from 2934' to 2987' to top of fish. Ran junk basket and washed over fish, no recovery.

08-15-67  Completed third run with junk basket with no recovery. Ran 24" bit and reamed out-of-gauge hole to top of fish at 2971'. Ran 24" O.D. magnet, no recovery, ran junk basket, no recovery. Ran 20" bit, drilled and pushed junk from 2971' to 3250'.

08-16-67  Drilled and pushed junk from 3250' to 3474' with 20" bit. Ran 24" bit and reamed 20" hole to 28" from 2972' to 3067'.
08-17-67  Reamed 20" hole to 28" from 3057' to 3113'. Lost one cutter off of hole opener and four cones, three pins and frog from four-cone Smith K29 pilot bit. Ran 13-3/4" bit and washed junk to 3282'.

08-18-67  Made three trips with junk basket and one trip with 20" O.D. magnet, washed to 3290', no recovery.

08-19-67  Ran 20" O.D. magnet, hit bridge at 3113'; cleaned out and conditioned hole with 20" bit to 3394'. Ran 20" O.D. magnet to 3401', no recovery. Ran 18" O.D. junk basket and washing over junk.

08-20-67  Washed junk to 3747' with junk basket, no recovery. Ran 20" O.D. magnet and recovered one cone and shank from 20" Hughes tri-cone bit.

08-21-67  Ran 20" O.D. magnet, washed over junk and twisted off leaving five 8" O.D. drill collars, two joints (32') of 5-9/16" O.D. drill pipe and 20" O.D. magnet in the hole. Ran overshot and recovered pipe and magnet also two cones and two pins from the four-cone Smith bit. Ran 20" O.D. magnet and recovered one Smith cone.

08-22-67  Ran 19" O.D. junk basket, washed to 3496' and twisted off leaving junk basket in the hole. Ran 28" hole opener, washed from 3380' to 3113' and reamed 20" hole to 28" from 3113' to 3164'.

08-23-67  Reamed 20" hole to 28" from 3164' to 3220', washed out 200' of fill.

08-24-67  Left 28" Reed hole opener on bottom. Ran overshot and recovered same.

08-25-67  Reamed 20" hole to 28" from 3220' to 3259'.

08-26-67  Reamed 20" hole to 28" from 3259' to 3372'.

08-27-67  Reamed 20" hole to 28" from 3372' to 3435'. Ran 20" bit to 3469' at top of fish. Ran 17-5/16" O.D. die nipple tapered mill fishing tool.


08-29-67  Ran 20" bit, washed junk to 3458'. Made two trips with 20" magnet, recovered small pieces of iron from junk basket and wire line. Ran 20" bit reamed 13-3/4" hole to 3486'.

08-30-67  Reamed 13-3/4" hole to 20" from 3466' to 3487'. Ran 18" O.D. magnet, no recovery. Ran 13-3/4" bit and washed junk to 3544'. Ran 20" bit and reamed 13-3/4" hole from 3487' to 3525'.
Reamed 13-3/4" hole to 20" from 3525' to 3544'. Ran 18" O.D. magnet with tungsten carbide shoe, milled on junk from 3500' to 3544', recovered one 20" cone and shank and miscellaneous small pieces of iron. Ran 13-3/4" bit, washed and reamed from 3544' to 3818'.

Washed and reamed with 13-3/4" bit from 3818' to 4065'. Started losing mud below 3900', lost approximately 400 bbl.

Ran 20" hole opener and washed to 3535', unable to ream. Pulled out of hole and left hole opener. Ran 11-3/4" O.D. Bowen overshot with 7-5/8" grapple.

Recovered fish. Ran 20" bit, reamed out-of-gauge hole and 13-3/4" hole from 3533' to 3625'.

Reamed 13-3/4" hole to 20" from 3625' to 3711'.

Reamed 13-3/4" hole to 20" from 3711' to 3950'. No fluid loss.

Reamed 13-3/4" hole to 20" from 3950' to 3993'.

Reamed 20" hole to 28" from 3415' to 3506'. Out-of-gauge hole from 3295' to 3415'.

Reamed 20" hole opener and 20" tri-cone pilot bit. Reamed 20" hole to 29" from 3506' to 3618'.

Reamed 20" hole to 28" from 3618' to 3650'. Twisted off drilling string leaving 6 drill collars, 28" stabilizer and 28" reamer in hole. Ran Bowen overshot, recovered fish.

Reamed 20" hole to 28" from 3650' to 3718'. Out-of-gauge hole from 3620' to 3630'.

Reamed 20" hole to 28" from 3718' to 3766'. Reamed out-of-gauge hole from 3001' to 3061' and fill from 3675' to 3727'.

Reamed 20" hole to 28" from 3766' to 3812'. Out-of-gauge hole from 3552' to 3612'.

Reamed 20" hole to 28" from 3812' to 3951'.

Reamed 20" hole to 28" from 3961' to 3987'. Ran 13-3/4" bit, washed down from 3987' to 4229'. Started losing fluid below 4000' and lost returns completely at 4229'. Pulled bit from hole.

Reamed 20" hole to 26" from 3987' to 3993', and 13-3/4" pilot hole from 3993' to 4018'.

Reamed 13-3/4" hole to 28" from 4048' to 4094'.

...
09-17-67  Reamed 13-3/4" hole to 28" from 4091' to 4112'. Hit bridge at 2700' and cleaned out fill from 4031' to 4034'.


09-19-67  Completed laying down fish. Reamed 13-3/4" hole to 28" from 4205' to 4232'.

09-20-67  Reamed 13-3/4" hole from 4225' to 4229'. Shut down for repairs and changing drilling assembly.

09-21-67  Reamed 13-3/4" hole to 28" from 4229' to 4304', fill from 4199' to 4229'.

09-22-67  Reamed 13-3/4" hole to 28" from 4304' to 4365' or 4350' G.I.

09-23-67  Ran Schlumberger caliper, density, and temperature logs. Bottom hole temperature 129.5°F.

09-24-67  Ran Walex caliper log and waited on Sperry-Sun.

09-25-67  Waited on Sperry-Sun.

09-26-67  Ran 28" bit, cleaned out bridge at 3000' and 20' of fill on bottom. Started running Sperry-Sun.

09-27-67  Ran Sperry-Sun Gyroscopic multishot survey in and out of hole on 50' stations from 0' to 4350'. Ran 28" tandem reaming assembly, reamed and washed from 198' to 587'.

09-28-67  Reamed 28" hole from 597' to 3098'.

09-29-67  Reamed 28" hole from 3098' to 4170'.

09-30-67  Reamed 28" hole from 4170' to 4350'.


10-02-67  Ran 20" O.D. casing

10-03-67  Ran 20" O.D. casing.

10-04-67  Ran 20" O.D. casing.


10-06-67  Completed running 20" O.D. casing. See Casing Data Record at end of history. Cemented stage ½ with 3000 ft.³ of 50-50- Pozmix leaving 2420 ft.³ in the annulus. CIP at 1812 hours. Waited on cement for 30 minutes and opened lower DV tool at 3550' and circulated mud through the ports.
10-07-67 Waited on cement until 1800 hours circulating mud through the DV tool. Cemented stage #2 with 7500 ft.3 of 50-50 Pozmix plus 2% gel and 0.3 of 1% of HR-4 Retarder, leaving 5340 ft.3 in annulus.

Dropped DV closing plug at 1935 hours and started displacing cement with mud. The 20" O.D. casing parted at 2015 hours while displacing. Pulled casing from hole and found it parted in a collar 12 joints from surface at 258' G.L.

10-08-67 Ran Welex caliper and temperature logs. Ran 17-1/2" bit to 1770' inside the 20" O.D. casing and conditioned mud.

10-09-67 Ran Schlumberger caliper log. Ran 17-1/2" underreamer to 2719'.

10-10-67 Checked for casing collapse with 17-1/2" underreamer from 2325' to 2679'. Standby ready waiting on 20" O.D. casing patch tool.

10-11-67 Standby ready, waiting on 20" O.D. casing patch tool.

10-12-67 Standby ready, waiting on 20" O.D. casing patch tool.


10-16-67 Cemented stage #3 with 8400 ft.3 of 50-50 Pozmix plus 2% gel, leaving 2778 ft.3 in the annulus. CIP at 2035 hours. Cement circulated to surface. Waited on cement.

10-17-67 Waited on cement until 2000 hours. Ran Schlumberger temperature log to 1767'.

10-18-67 Nipped up on 20" O.D. casing. Tagged top of cement plug with 17-1/2" bit at 1779.59'. Drilled out cement to 1795'.

10-19-67 Drilled cement with 17-1/2" bit from 1795' to 1802'. Drilled out DV tool from 1802' to 1804'. Drilled opening bomb from upper DV tool and cement from 2713.67' to 2842'.

10-20-67 Drilled cement with 17-1/2" bit from 2842' to 3547.57' and DV tool at 3547.57' to 3549.57'. Circulated out to 4278'. Drilled baffle at 4227', 2nd cement to 4289'. Void from 4227' to 4251'.

10-21-67 Ran 18" Drilco 3 point smooth roller reamer to 1770', washed and reamed to 1610'. Washed and reamed from 2664' to 4289'. Started displacing mud with water.
GB-E Well History
Page 8

10-22-67

10-23-67

10-24-67
Bailed 20" O.D. casing to 2706'.

10-25-67
Bailed hole to 2752'. Ran Schlumberger water probe. Water level at 2621', fluid rose to 2418' in 4 hours. Ran temperature log. Monitored fluid rise with Schlumberger from 2418' to 1722'. Caught water samples with bailer.

10-26-67
Ran Birdwell Salinometer log. Ran 18" O.D. x 24' mandrel in and out of hole to 4250'. Started running 18" TII packer in 20" O.D. casing.

10-27-67
Filled casing with water. Attempted to set packer from 3390' to 3392' with 5-1/2" O.D. casing stringer below packer at 3411'; packer would not set. Pulled out of hole and reran to 1000'; packer would not set. Pulled out of hole for repairs.

10-28-67
Dressed packer, ran in hole and set at 3401' with 5-1/2" O.D. stinger at 3415'. Pressured up below packer to 600 psi, bled back to 250 psi. Pulled and reset packer at 3371', pressured up to 600 psi and bled back to 250 psi in 9 minutes. Pulled out of hole. Ran drill pipe in hole for pressure test to 3500' and found 3 bad joints. Ran Birdwell water sampler and took samples at 3450', 3550' and 3650'. Started running NCA log.

10-29-67
Completed calibration run on the NCA log. Started running 18" TII packer.

10-30-67
Set packer at 3395' to 3397', pressured up to 600 psi. Reset at several intervals and indications were a drill pipe or packer leak. Pulled out of hole and left packing element. Ran 18" bit and reamer in hole and washed element to bottom. Filled 20" O.D. casing with water and monitored fluid level. Dropped 8,31' in 2 hours 57 minutes.

10-31-67
Monitored fluid level, hole taking approximately 1 barrel per hour.

11-01-67
Monitored fluid level, hole taking approximately 1 barrel per hour. Layed down drill pipe and bailed 20" O.D. casing to 800'.

11-02-67
Bailed casing to 1002'. Rig on standby ready.

11-03-67
Rig on standby ready, released at 2400 hours. Hole suspended.

11-06-67
Completed moving out Signal Drilling Company Rig. Hole suspended from 2400 hours, 11-03-67, to 0700 hours, 11-06-67. Calibrated Birdwell 3 probe NCA log in 20" O.D. 160 and 133 pounds per foot casing in water, carbon tetrachloride and zinc chloride fluids. Installed Sperry-Sun gyroscopic instrument on bottom of NCA tool and oriented gyro's to arms. Running log.
11-07-67    Calibrating and logging with NCA - Gyro instrument.
11-08-67    Calibrating and logging with NCA - Gyro instrument.
11-09-67    Calibrating and logging with NCA - Gyro instrument, shut down operations at 2200 hours.
11-10-67    Shut down until 1130 hours. Resumed calibrating and logging with NCA - Gyro instrument.
11-11-67    Calibrating and logging with NCA - Gyro instrument, shut down at 2130 hours.
11-12-67    Shut down until 1400 hours, rigged down Birdwell and Sperry-Sun. Hole suspended at 1700 hours.
Moved in Brinkerhoff Drilling Company Rig #21 on 11-17-67 and rigged up. Prior to moving in Western States had dug a cellar 7' x 7' x 6' and boxed it in with plywood.

11-18-67
Hole suspended from 1700 hours on 11-12-67 to 0800 hours on 11-18-67. Completed rigging up at 1500 hours. Ran Schlumberger temperature log, maximum temperature 130°F. Ran 18" O.D. x 20' mandrel on 4-1/2" drill pipe to 4282' G.I.

11-19-67
Made inrun #2 with 18" O.D. x 20' mandrel to 4222.46' G.I. Started bailing hole.

11-20-67
Made 55 runs with bailer, fluid level at 852'. Cut 20" O.D. casing off 4' below surface and welded on 20" flange. Skidded rig 10' from hole and prepared for downhole operations.

11-21-57
Ran canister in hole with crane on one joint of 7" O.D. casing, landed on spider and slips. Skidded rig back over hole and rigged up for downhole emplacement.

11-22-57
Pulled canister from hole and checked out. Ran device in hole on 7" O.D., 26" x 80, 8 round thread, long thread and collar casing. 17-1/2" O.D. centralizers were placed at approximately 80' intervals around the casing collars with kellon grips placed on the cables and secured to the centralizers. Electrical cables were also taped to the outside of the casing. Ran 21 joints of casing (887') and suspended operations at 2000 hours. 7" O.D. slotted joints of the casing were run in the string as directed.

11-23-57
Resumed operations at 0800 hours with downhole emplacement. Safety checks were made at 0830 hours, 1200 hours and 1600 hours. Ran a total of 77 joints (3258'). Operations suspended at 2000 hours.

11-24-57
Resumed operations at 0800 hours, IRL checked out instruments. Ran 100 joints and installed WES strain gauge in string. Completed running casing with Joint #101. Ran a total of 4227' of 7" O.D. casing to TOP of device. Slotted perforations in the 7" O.D. casing are as follows: 861' to 949', 1536' to 1578', 1914' to 1956', 2149' to 2511', 2891' to 2976', 3187' to 3562', 4112' to 4145', 4195' to 4227'. Pulled and threaded cables through "Y" hanger spool, bolted spool on 20' flange. Bolted on casing head, set 7" slips and packed off around 7" O.D. casing.

11-25-57
Ran 131 joints of 2-3/8" O.D., HUE, 4.70/F, tubing inside 7" O.D. casing to 4419'23' with pin collar on bottom. Installed "AT" closing spool on the "Y" spool and placed sealing materials around the cables inside of the "AT" spool as directed by IRL.
11-26-67 Ran 4 joints of 2-3/8" O.D. tubing (total of 135 joints) and landed at 428' G.L. Rigged up Halliburton to steam with grout. Stage #1 pumped 175 ft. 3 of 13.2#/gallon WES special grout mix down the 2-3/8" O.D. tubing. CIP at 1135 hours. Pulled tubing and ran Reda pump to 2573' on 2-3/8" O.D. tubing. Started pumping at 60 rpm, while waiting on cement. Fluid to surface at 2234 hours.

11-27-67 Continued pumping, fluid level pumped down at 1115 hours. Pulled pump from hole and tagged top of stage #1 at 4136' at 1400 hours with 2-3/8" O.D. grout string. Hung tubing at 4133.50' and pumped stage #2 down the tubing using 1023 ft. 3 of 13.2 #/gallon, WES filler grout. CIP at 1538 hours. Pulled tubing and ran Reda pump on 2-3/8" tubing to 2590.69' while waiting on cement. Pulled fluid from hole to control water level.

11-28-67 Continued pumping water, fluid level down to 2573' at 2028 hours. Shut down waiting on fluid entry until 2315 hours, resumed pumping.

11-29-67 Pumped fluid until 0400 hours at 30 rpm to 22 rpm and pulled pump from hole. At 0700 hours, tagged top of stage #2 at 3526.21' with 2-3/8" O.D. grout string. Ran Schlumberger water locator, top of fluid at 2236'. Pumped stage #3 down the tubing using 1000 ft. 3 of 13.2 #/gallon WES filler grout. CIP at 1140 hours. Pulled up tubing and ran Schlumberger water locator, fluid level at 1210'. Completed pulling tubing from hole and waited on cement.

11-30-67 Ran Reda pump on 2-3/8" tubing and tagged top of cement at 3029.44' at 1115 hours. Started pumping fluid level down at 1115 hours with pump inlet at 3013'. Pump failed at 2105 hours.

12-01-67 Pulled Reda pump from hole, motor burnt out. Tagged top of stage #3 with 2-3/8" O.D. grout string at 3030.32'. Ran Schlumberger water locator, fluid level at 2552' also tagged top of cement at 3032'. Rigged up swabbing unit and started swabbing at 2000 hours through the 2-3/8" O.D. tubing.

12-02-67 Swabbed water from hole.

12-03-67 Swabbed hole dry at 0230 hours, recovered approximately 5176 gallons of water. Shut down for 3 hours and found no additional fluid entry. Landed tubing at 3027.67' and packed off in tubinghead. Rigged up air compressor and started blowing air down 20" annulus to dry up hole. Used one Joy 750 compressor at 350 cfm and 40 psi, air returns wet.

12-04-67 Drying up hole with air down the 20" annulus.
12-05-67  Drying up hole with air, shut down compressor at 13:15 hours. Pulled 2-3/8" O.D. tubing from hole and secured area for LRL.

12-06-67  Ran Schlumberger density log to 3032', fluid level 2973'. Dumped 15 ft. of sand inside of the 7" O.D. casing and 135 ft. in the 20" annulus. Ran Schlumberger water locator, top of fill at 2902'. Rigged up sand chute and stemmed inside 7" O.D. casing with 8,300# of sand and inside the 20" annulus with 61,700# of sand. Monitored fillup with Schlumberger density log. Top of sand inside the 7" O.D. casing at 2523' and in the 20" annulus 2528'.

12-07-67  Ran 2-3/8" O.D. grout string to 2525'. Pumped stage #4 down the tubing using 1850 ft. of 13.2 #/gallon U.S. filler grout, tubing was pulled to 1998' for the final 143 barrels of grout. CIP at 1115 hours. Pulled 2-3/8" O.D. tubing and ran Schlumberger density log, found top of cement inside the 7" O.D. casing at 1646'. Ran 2-3/8" O.D. grout string to 1589'. Pumped stage #5 down tubing using 246 ft. of grout. Pulled tubing and ran Schlumberger density log, top of cement at 1474'. Started stemming the hole with sand and checking fill with Schlumberger density tool.

12-08-67  Continued stemming hole with sand used a total of 253,700# of sand in the annulus and 28,200# inside the 7" O.D. casing. Top of sand in the 20" annulus at 50' and inside the 7" O.D. casing at 27'. Released rig at 07:15 hours to move off of location.

12-09-67  Rig off of hole. Pumped stage #5 with Halliburton in the 20" annulus using 650 gallons of chemical seal grout. Grout to surface. Installed blind flanges on "Y" spool and 7" casinghead. Filled cellar with sand and secured hole for event. Hole suspended at 1600 hours.
### 20-INCH O.D. CASING RECORD

<table>
<thead>
<tr>
<th>No. of Joints</th>
<th>Wall Thickness</th>
<th>Weight Per Ft.</th>
<th>Grade</th>
<th>Depth From</th>
<th>To</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>63</td>
<td>0.635&quot;</td>
<td>133#/</td>
<td>J-55</td>
<td>0'</td>
<td>1799.48'</td>
<td>ST&amp;G, 3rd.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1799.48'</td>
<td>1801.60'</td>
<td>HOCO DV cement tool</td>
</tr>
<tr>
<td>20</td>
<td>0.635&quot;</td>
<td>133#/</td>
<td>J-55</td>
<td>1801.80'</td>
<td>2391.45'</td>
<td>ST&amp;G, 3rd.</td>
</tr>
<tr>
<td>15</td>
<td>0.770&quot;</td>
<td>160#/</td>
<td>J-55</td>
<td>2391.45'</td>
<td>2863.26'</td>
<td>ST&amp;G, 3rd. no stiffener</td>
</tr>
<tr>
<td>11</td>
<td>0.770&quot;</td>
<td>160#/</td>
<td>5-55</td>
<td>2863.26'</td>
<td>3548.42'</td>
<td>Butt welded casing with stiffeners on 6' spacing, HOCO DV cement tool</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3548.42'</td>
<td>3550.76'</td>
<td>Butt welded casing with stiffeners on 6' spacing</td>
</tr>
<tr>
<td>8</td>
<td>0.770&quot;</td>
<td>160#/</td>
<td>J-55</td>
<td>3550.76'</td>
<td>4050.61'</td>
<td>ST&amp;G, 8rd. with stiffeners on 5' spacing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4050.61'</td>
<td>4283.55'</td>
<td>Baker float collar, welding type.</td>
</tr>
<tr>
<td>8</td>
<td>0.770&quot;</td>
<td>160#/</td>
<td>J-55</td>
<td>4283.55'</td>
<td>4290.56'</td>
<td>Plain end, stiffeners on 5' spacing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4290.56'</td>
<td>4322.53'</td>
<td>Baker float shoe, welding type.</td>
</tr>
<tr>
<td>1</td>
<td>0.770&quot;</td>
<td>160#/</td>
<td>J-55</td>
<td>4322.53'</td>
<td>4324.00'</td>
<td></td>
</tr>
<tr>
<td>Type Log</td>
<td>Date</td>
<td>Run No.</td>
<td>Log Depth</td>
<td>Drillers Depth</td>
<td>Interval Logged</td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>---------</td>
<td>---------</td>
<td>-----------</td>
<td>----------------</td>
<td>----------------</td>
<td></td>
</tr>
<tr>
<td>Caliper</td>
<td>09-23-67</td>
<td>1</td>
<td>4353'</td>
<td>4353'</td>
<td>50' - 4352'</td>
<td></td>
</tr>
<tr>
<td>Caliper</td>
<td>10-09-67</td>
<td>2</td>
<td>2724'</td>
<td>2740'</td>
<td>10' - 2724'</td>
<td></td>
</tr>
<tr>
<td>Density</td>
<td>09-23-67</td>
<td>1</td>
<td>4353'</td>
<td>4350'</td>
<td>0' - 4352'</td>
<td></td>
</tr>
<tr>
<td>Formation Density</td>
<td>12-06-67</td>
<td>1</td>
<td></td>
<td></td>
<td>0' - 3026'</td>
<td></td>
</tr>
<tr>
<td>Formation Density</td>
<td>12-06-67</td>
<td>2</td>
<td></td>
<td></td>
<td>2713' - 2882'</td>
<td></td>
</tr>
<tr>
<td>Formation Density</td>
<td>12-06-67</td>
<td>3</td>
<td></td>
<td></td>
<td>2579' - 2869'</td>
<td></td>
</tr>
<tr>
<td>Formation Density</td>
<td>12-06-67</td>
<td>4</td>
<td></td>
<td></td>
<td>2535' - 2867'</td>
<td></td>
</tr>
<tr>
<td>Formation Density</td>
<td>12-07-67</td>
<td>5</td>
<td></td>
<td></td>
<td>2523' - 2643'</td>
<td></td>
</tr>
<tr>
<td>Formation Density</td>
<td>12-07-67</td>
<td>6</td>
<td></td>
<td></td>
<td>1348' - 1444'</td>
<td></td>
</tr>
<tr>
<td>Formation Density</td>
<td>12-08-67</td>
<td>7</td>
<td></td>
<td></td>
<td>1175' - 1360'</td>
<td></td>
</tr>
<tr>
<td>Formation Density</td>
<td>12-08-67</td>
<td>8</td>
<td></td>
<td></td>
<td>960' - 1192'</td>
<td></td>
</tr>
<tr>
<td>Formation Density</td>
<td>12-08-67</td>
<td>9</td>
<td></td>
<td></td>
<td>572' - 869'</td>
<td></td>
</tr>
<tr>
<td>Formation Density</td>
<td>12-08-67</td>
<td>10</td>
<td></td>
<td></td>
<td>182' - 589'</td>
<td></td>
</tr>
<tr>
<td>Formation Density</td>
<td>12-08-67</td>
<td>11</td>
<td></td>
<td></td>
<td>148' - 200'</td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>09-23-57</td>
<td>1</td>
<td>4348'</td>
<td>4350'</td>
<td>60' - 4348'</td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>10-17-57</td>
<td>2</td>
<td>1770'</td>
<td>1795'</td>
<td>100' - 1770'</td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>11-18-57</td>
<td>3</td>
<td>3279'</td>
<td>1382'</td>
<td>1000' - 3279'</td>
<td></td>
</tr>
</tbody>
</table>
GB-E

MELEX LOG INDEX SHEET

<table>
<thead>
<tr>
<th>Type Log</th>
<th>Date</th>
<th>Run No.</th>
<th>Log Depth</th>
<th>Drillers Depth</th>
<th>Interval Logged</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caliper</td>
<td>09-24-67</td>
<td>1</td>
<td>4315'</td>
<td>4350'</td>
<td>0' - 4314'</td>
</tr>
<tr>
<td>Caliper</td>
<td>10-08-67</td>
<td>2</td>
<td>2726'</td>
<td>2730'</td>
<td>0' - 2725'</td>
</tr>
<tr>
<td>Micro-Seismogram</td>
<td>10-22-67</td>
<td>1</td>
<td>4282'</td>
<td>4282'</td>
<td>20' - 4279'</td>
</tr>
<tr>
<td>Temperature</td>
<td>10-08-67</td>
<td>2</td>
<td>2729'</td>
<td>2730'</td>
<td>50' - 2729'</td>
</tr>
</tbody>
</table>
## BIRDSELL LOG INDEX SHEET

<table>
<thead>
<tr>
<th>Type Log</th>
<th>Date</th>
<th>Run No</th>
<th>Log Depth</th>
<th>Drillers Depth</th>
<th>Interval Logged</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCTL</td>
<td>10-14-67</td>
<td>1</td>
<td>2300'</td>
<td>4350'</td>
<td>0' - 2300'</td>
</tr>
<tr>
<td>NCTL</td>
<td>10-14-57</td>
<td>2</td>
<td>2600'</td>
<td>4350'</td>
<td>0' - 2600'</td>
</tr>
<tr>
<td>NCTL</td>
<td>10-22-67</td>
<td>3</td>
<td>4282'</td>
<td>4350'</td>
<td>0' - 4281'</td>
</tr>
<tr>
<td>NCTL</td>
<td>10-22-67</td>
<td>4</td>
<td>4282'</td>
<td>4350'</td>
<td>0' - 4281'</td>
</tr>
<tr>
<td>NCA</td>
<td>10-28-67</td>
<td>1</td>
<td>4350'</td>
<td>0' - 4270'</td>
<td></td>
</tr>
<tr>
<td>NCA-Gyro</td>
<td>11-6/7-67</td>
<td>2</td>
<td>4350'</td>
<td>0' - 4230'</td>
<td></td>
</tr>
<tr>
<td>NCA-Gyro</td>
<td>11-07-67</td>
<td>3</td>
<td>4350'</td>
<td>0' - 4000'</td>
<td></td>
</tr>
<tr>
<td>NCA-Gyro</td>
<td>11-07-57</td>
<td>4</td>
<td>4350'</td>
<td>0' - 4000'</td>
<td></td>
</tr>
<tr>
<td>NCA-Gyro</td>
<td>11-09-67</td>
<td>5</td>
<td>4350'</td>
<td>0' - 4100'</td>
<td></td>
</tr>
<tr>
<td>NCA-Gyro</td>
<td>11-10-67</td>
<td>6</td>
<td>4350'</td>
<td>1800' - 4100'</td>
<td></td>
</tr>
<tr>
<td>NCA-Gyro</td>
<td>11-11-67</td>
<td>7</td>
<td>4350'</td>
<td>1800' - 4100'</td>
<td></td>
</tr>
<tr>
<td>Salinometer</td>
<td>10-26-67</td>
<td>1</td>
<td>4279'</td>
<td>4350'</td>
<td>1800' - 4275'</td>
</tr>
<tr>
<td>kiter ` Locator</td>
<td>10-27-67</td>
<td>1-11</td>
<td>1750'</td>
<td>4350'</td>
<td>1550' - 1750'</td>
</tr>
<tr>
<td>3D Bond</td>
<td>10-22-67</td>
<td>1</td>
<td>4282'</td>
<td>4350'</td>
<td>0' - 4274'</td>
</tr>
</tbody>
</table>
This survey was run inside stabilized drill pipe.

<table>
<thead>
<tr>
<th>MD</th>
<th>TVD</th>
<th>Latitude</th>
<th>Departure</th>
</tr>
</thead>
<tbody>
<tr>
<td>0'</td>
<td>0'</td>
<td>0'</td>
<td>0'</td>
</tr>
<tr>
<td>100'</td>
<td>100.00'</td>
<td>0.03'S</td>
<td>0.40W</td>
</tr>
<tr>
<td>200'</td>
<td>200.00'</td>
<td>0.24'S</td>
<td>0.78W</td>
</tr>
<tr>
<td>300'</td>
<td>300.00'</td>
<td>0.40'S</td>
<td>1.23W</td>
</tr>
<tr>
<td>400'</td>
<td>400.00'</td>
<td>0.50'S</td>
<td>1.75W</td>
</tr>
<tr>
<td>500'</td>
<td>499.99'</td>
<td>0.84'S</td>
<td>2.38W</td>
</tr>
<tr>
<td>600'</td>
<td>599.99'</td>
<td>0.65'S</td>
<td>2.94W</td>
</tr>
<tr>
<td>700'</td>
<td>693.99'</td>
<td>0.56'S</td>
<td>3.67W</td>
</tr>
<tr>
<td>800'</td>
<td>799.99'</td>
<td>0.48'S</td>
<td>3.73W</td>
</tr>
<tr>
<td>900'</td>
<td>899.99'</td>
<td>0.59'S</td>
<td>3.60W</td>
</tr>
<tr>
<td>1000'</td>
<td>999.99'</td>
<td>0.82'S</td>
<td>4.02W</td>
</tr>
<tr>
<td>1100'</td>
<td>1099.98'</td>
<td>0.92'S</td>
<td>4.58W</td>
</tr>
<tr>
<td>1200'</td>
<td>1199.98'</td>
<td>1.02'S</td>
<td>5.19W</td>
</tr>
<tr>
<td>1300'</td>
<td>1299.98'</td>
<td>1.04'S</td>
<td>5.82W</td>
</tr>
<tr>
<td>1400'</td>
<td>1399.98'</td>
<td>0.73'S</td>
<td>6.12W</td>
</tr>
<tr>
<td>1500'</td>
<td>1499.98'</td>
<td>0.33'S</td>
<td>6.12W</td>
</tr>
<tr>
<td>1600'</td>
<td>1599.98'</td>
<td>0.03'S</td>
<td>6.63W</td>
</tr>
<tr>
<td>1700'</td>
<td>1699.98'</td>
<td>0.10'N</td>
<td>6.94W</td>
</tr>
<tr>
<td>1800'</td>
<td>1799.97'</td>
<td>0.24'N</td>
<td>7.35W</td>
</tr>
<tr>
<td>1900'</td>
<td>1899.97'</td>
<td>0.60'N</td>
<td>7.95W</td>
</tr>
<tr>
<td>2000'</td>
<td>1999.97'</td>
<td>1.05'N</td>
<td>8.62W</td>
</tr>
<tr>
<td>2100'</td>
<td>2099.97'</td>
<td>1.35'N</td>
<td>9.28W</td>
</tr>
<tr>
<td>2200'</td>
<td>2199.96'</td>
<td>1.64'N</td>
<td>9.83W</td>
</tr>
<tr>
<td>2300'</td>
<td>2299.96'</td>
<td>2.23'N</td>
<td>10.12W</td>
</tr>
<tr>
<td>2400'</td>
<td>2399.96'</td>
<td>2.67'N</td>
<td>10.62W</td>
</tr>
<tr>
<td>2500'</td>
<td>2499.96'</td>
<td>2.97'N</td>
<td>11.10W</td>
</tr>
<tr>
<td>2600'</td>
<td>2599.95'</td>
<td>3.03'N</td>
<td>11.74W</td>
</tr>
<tr>
<td>2700'</td>
<td>2699.95'</td>
<td>3.11'N</td>
<td>12.26W</td>
</tr>
<tr>
<td>2800'</td>
<td>2799.95'</td>
<td>3.34'N</td>
<td>12.63W</td>
</tr>
<tr>
<td>2900'</td>
<td>2899.95'</td>
<td>3.22'N</td>
<td>13.51W</td>
</tr>
<tr>
<td>3000'</td>
<td>2999.94'</td>
<td>3.26'N</td>
<td>14.32W</td>
</tr>
<tr>
<td>3100'</td>
<td>3099.94'</td>
<td>3.47'N</td>
<td>14.94W</td>
</tr>
<tr>
<td>3200'</td>
<td>3199.94'</td>
<td>3.01'N</td>
<td>15.64W</td>
</tr>
<tr>
<td>3300'</td>
<td>3299.93'</td>
<td>2.68'N</td>
<td>16.52W</td>
</tr>
<tr>
<td>3400'</td>
<td>3399.93'</td>
<td>2.47''</td>
<td>17.44W</td>
</tr>
<tr>
<td>3500'</td>
<td>3499.92'</td>
<td>2.25'N</td>
<td>18.22W</td>
</tr>
<tr>
<td>3600'</td>
<td>3599.92'</td>
<td>1.50'N</td>
<td>18.94W</td>
</tr>
<tr>
<td>3700'</td>
<td>3699.92'</td>
<td>1.31'N</td>
<td>19.30W</td>
</tr>
<tr>
<td>3800'</td>
<td>3799.91'</td>
<td>1.03'N</td>
<td>19.82W</td>
</tr>
<tr>
<td>3900'</td>
<td>3899.91'</td>
<td>0.69'N</td>
<td>20.53W</td>
</tr>
<tr>
<td>4000'</td>
<td>3999.91'</td>
<td>0.44'N</td>
<td>21.06W</td>
</tr>
<tr>
<td>4100'</td>
<td>4099.91'</td>
<td>0.16'N</td>
<td>21.29W</td>
</tr>
<tr>
<td>4200'</td>
<td>4199.91'</td>
<td>0.01'S</td>
<td>21.35W</td>
</tr>
<tr>
<td>4300'</td>
<td>4299.91'</td>
<td>0.22'S</td>
<td>21.29W</td>
</tr>
<tr>
<td>4350'</td>
<td>4349.91'</td>
<td>0.38'S</td>
<td>21.31W</td>
</tr>
</tbody>
</table>
REVIEW OF HOLE CONDITIONS

Spudded 6-25-57
39" hole to 49'
28" hole to 4,350'

Completed 11-12-67
30" O.D. casing at 401 G.I.
Cemented annulus to surface with 263 ft. of cement slurry.

20" O.D. casing set at 4,324' G.I.
Cemented annulus to surface with 11,138 ft. of cement slurry.

I. This hole was drilled using mud as a circulating fluid. Sloughing of the hole was noted at 3,018 feet. The hole lost some fluid to the formation in the interval 4,003 feet to 4,035 feet while a 13-3/4 inch pilot hole was being drilled. Several bit cones were lost in the hole during the operations of reaming the 13-3/4 inch pilot hole to 28-inch diameter. These bit cones were either fished from the hole or pushed to the bottom of the hole at 4,350 feet. The repeated loss of bit and reamer cones in the hole and the problems of recovering them contributed greatly to the time required to drill the hole. During the process of reaming and pushing loose junk to the bottom of the hole, fluid was lost to the formation in the interval 4,000 feet to 4,100 feet.

Twenty-inch casing was run to a depth of 4,324 feet and cemented in place in three stages. Two cement stage collars, one positioned at 1,799 feet and one at 3,548 feet, were utilized to cement the casing to hole wall annular space from 4,324 feet to the surface.

The volume of cement used to cement the casing in place was based on a Welex hole diameter caliper log which was later found to be inaccurate. The inaccuracy was verified by the fact that the logging tool had a maximum diameter capability of 32-1/2 inches, but the printed log registered hole diameters in excess of the tool capability. The log has limited use in determining hole volumes but has some value in showing hole contour.

After the discovery of the inaccuracy of the Welex log and subsequent to the cementing of 20-inch O.D. casing, a Schlumberger engineer volunteered the information that the Schlumberger logging tool used to obtain a caliper log of the 28-inch drilled hole was partially inoperative for a portion of the time it was used to caliper the hole diameter. When the logging tool was pulled from the hole, it was not expanding to its full capability. An examination of the log indicates that possibly some of the peaks of the printed log, which should show washed out and enlarged sections of the hole, are truncated. This is possibly due to the logging tool not expanding beyond a fixed diameter.
Having established that neither print out was reliable by itself, it was concluded that since the Schlumberger tool appeared to malfunction at its outer limits because of a physical limitation, and the Welex log appeared to malfunction for electronic reasons where it was increasing a constant diameter, that the most reliable volume calculation would result from using the Schlumberger printout to identify gauge or near gauge sections of the hole and the Welex log to record the diameters at the washed out sections.

The resulting annulus volume calculation used herein for purpose of establishing the material balance is considered to be within the tolerances that are attainable for other quantities used in the material balance.

Cement Stage No. 1, which consisted of 3,000 cubic feet of cement slurry mixed, was emplaced by pumping it out through the casing shoe and up the annulus. At the conclusion of the cement emplacement, the ports in the stage collar located at 3,548 feet were opened and an estimated 4,00 cubic feet of cement was circulated out of the hole. A total of 180 cubic feet of cement was left inside the 20-inch casing below the stop for the cement displacement plug. If, at the conclusion of Cement Stage No. 1, all of the cement that was above the lower stage collar was circulated out of the hole, the volume of cement left in the annular space between 1,324 feet and 3,548 feet (2,420 cubic feet of slurry weighing 13.2 lbs./gal.) is 137.3% of the annular space arrived at by a combined calculation of both the Schlumberger and Welex caliper logs.

Cement Stage No. 2 was emplaced in the annulus through ports in the cement stage collar set at 3,548 feet. A total of 7,500 cubic feet of cement slurry which weighed an average of 13.2 lbs./gal. was mixed. The 20-inch casing parted before all of the cement had been placed in the annulus through the stage collar. Based on the volume of cement encountered inside the 20-inch casing when it was drilled out, the cement placed in the annulus during Cement Stage No. 2 was 5,940 cubic feet.

Cement Stage No. 3 was emplaced in the annulus through the cement stage collar set at 1,799 feet, after the parted casing had been reconnected. A total of 8,400 cubic feet of cement slurry which weighed an average of 13.2 lbs./gal was mixed for Cement Stage No. 3. When 6,250 feet of cement slurry had been mixed, cement started flowing from the annulus at the surface. If it is assumed an equal volume of cement flowed from the annulus as was pumped into it, after cement returns from the annulus were first sighted, the volume of cement emplaced in the annulus during Stage No. 3 was 2,778 cubic feet.
REvised MATERIal BALANCE

Hole Volume to Cement Volume for Cementing 20-Inch O.D. Casing

Calculated from Schlumberger and Welex Caliper Logs

Gross hole volume \((4,324' \text{ to surface})\) \hspace{1cm} 19,850.5 ft.\(^3\)

Casing volume of 20" O.D. casing \((4,324' \text{ to surface})\) \hspace{1cm} 9,441.5 ft.\(^3\)

Annular volume = gross less casing volume \hspace{1cm} 10,409 ft.\(^3\)

Total cement placed in annulus \hspace{1cm} 11,138 ft.\(^3\)

Percent of emplaced cement greater than theoretical volume \hspace{1cm} 7.0%
## PROJECT GASBUGGY
### CH-2

### CEMENTING MATERIAL BALANCE

<table>
<thead>
<tr>
<th>Stage No.</th>
<th>Interval</th>
<th>Calculated Annular Volume*</th>
<th>Cubic Feet of Cement Mixed Drilled or Circulated out</th>
<th>Actual Placed</th>
<th>% Difference of Actual Placed to Calculated Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>4324' - 3550'</td>
<td>1762 C.F.</td>
<td>3000</td>
<td>2420</td>
<td>+37.3</td>
</tr>
<tr>
<td>2.</td>
<td>3550' - 1000'</td>
<td>4272 C.F.</td>
<td>1750</td>
<td>5940</td>
<td>+39.0</td>
</tr>
<tr>
<td>3.</td>
<td>1000' - 0'</td>
<td>4375 C.F.</td>
<td>8400</td>
<td>2778</td>
<td>-36.5</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>10409 C.F.</td>
<td>18900</td>
<td>11138</td>
<td>+7.0</td>
</tr>
</tbody>
</table>

* Based upon use of the acceptable portions of both the Schlumberger and Welax caliper logs.
Accumulated Volume in Thousand Cubic Feet

Stage - Top

1000 ft
2000 ft
3000 ft
4000 ft

Cubic Foot per Vertical Foot per Stage

Cement Used

Total Cement Used = 11,132 ft³
Total Calculated = 10,409
Difference = +723

Cementing Graph GB-E
FENIX & SCISSON, INC.

HOLE HISTORY DATA

DATE: February 2, 1965

HOLE NO.: CB 10-36

CONTRACT NO.: AT(26-1)-238

USER: 131-EPNG

TYPE HOLE: Production Test

LOCATION

COUNTY: Rio Arriba

AREA: New Mexico

SURFACE COORDINATES: 43° 5' N 96° 30' W of GB-E location.

GROUND ELEVATION: -

PAD ELEVATION: -

TOTAL CASING ELEVATION:

RIG ON LOCATION: 

SPUNNED: * *

COMPLETED: 10-17-65

CIRCULATING MEDIA:

MAIN RIG & CONTRACTOR:

NO. OF COMPRESSORS & CAPACITY:

BORE HOLE RECORD

FROM | TO | SIZE | I.D. | WT./FT. | WALL | GRADE | CPL'G. | FROM | TO | CU. FT. CNT.

9-5/8" | 0,1. | 
5-1/2" | 0,1. | 

TOTAL DEPTH: 

AVG. HANDREL DEPTH:

FROM REFERENCE ELEVATION:

JUNK & PLUGS LEFT IN HOLE: Sand 4170'-3877', bridge plug at 3880', cement 3880'-2941'.

SURVEYS PAGE: 3

CORING PAGE:

CU. FT. CNT. TOTAL IN PLUS, ETC.: 197

LOGGING DATA: Page 2

BOTTOM HOLE COORDINATES: 8.77' E & 44.23' E of surface location

REFERENCE: 3321-3113-002

Average In and Out (Site Prep Rigs *)

RIGS USED

RIG NO. | NAME | TYPE | CLASS | DAYS OPERATING | SECURED W/CREW | SECURED W/O CREW | TOTAL DAYS ON LOC.

50 | Aztec Well Service Co., 180 HP double-drum | unit | 3.35 | 0.54 | 

REMARKS: * Site Prep Items

** Prior to plugging back, this hole had been drilled and cased by others.

Note: The 5" O.D. casing was perforated: 4066' - 4166', 3901' - 4012', and 4201'.
GB 10-36
Hole History

Moved in Aztec Well Service Company Rig #50 and started rigging up.

10-13-67
Completed rigging up at 1500 hours. Ran 2-3/8" O.D. tubing in hole 2nd tagged bottom at 4170' G.L. Pulled tubing from hole and closed in. Standby ready at 1900 hours.

10-14-67
Standby ready until 0800 hours. Ran Schlumberger collar locator and water locator. Top of fluid in hole at 4050'. Plugged back 5-1/2" O.D. casing from 4170' to 3837' with 45 ft^3 of sand. Set 5-1/2" Baker bridge plug on Schlumberger wireline at 3830'.

10-15-67
Filled hole with mud and pressure tested to 300 psi. Ran Birdwell 3-D Bond and NCT L logs. Ran Sperry-Sun Gyroscopic Multishot Survey in and out of the hole on 50' stations from 0' to 3830' inside the 5-1/2" O.D. casing. Ran 2-3/8" O.D. tubing and stemmed hole using Halliburton with 112 ft^3 of 40-60 Pozmix plus 6% gel, CIP at 2355 hours.

10-16-67
Waited on cement until 1200 hours, tagged top of Stage #1 at 3205'. Cemented stage #2 with 40 ft^3 of 60-40 Pozmix plus 6% gel. CIP at 1340 hours. Perforated 5-1/2" O.D. casing at 120' with 4 holes using Schlumberger. Circulated the 9-5/8" x 5-1/2" annulus with mud thru the perforations. Cemented the annulus using 56 ft^3 of neat cement, cement circulated to surface. CIP at 1600 hours. Waited on cement.

10-17-67
Waited on cement until 0500 hours, tagged top of cement at 120'. Drilled out 2' of cement plug at 0700 hours and tagged top of stage #2 at 2941'. Pressured up on casing to 503 psi, had no bleed-off of pressure in 15 minutes. Installed well head equipment and released rig at 1230 hours. Mud was left in the hole.
<table>
<thead>
<tr>
<th>Type Log</th>
<th>Date</th>
<th>Run No.</th>
<th>Log Depth</th>
<th>Drillers Depth</th>
<th>Interval Logged</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cas. Insp.</td>
<td>10-14-67</td>
<td>1</td>
<td>4165'</td>
<td>4170'</td>
<td>50' - 4150'</td>
</tr>
<tr>
<td>NCTL</td>
<td>10-15-67</td>
<td>1</td>
<td>3880'</td>
<td>3880'</td>
<td>0' - 3880'</td>
</tr>
<tr>
<td>NCTL</td>
<td>10-15-67</td>
<td>2</td>
<td>3880'</td>
<td>3880'</td>
<td>2000' - 3880'</td>
</tr>
<tr>
<td>3-D Bond</td>
<td>10-15-67</td>
<td>1</td>
<td>3850'</td>
<td>3880'</td>
<td>0' - 3572'</td>
</tr>
</tbody>
</table>
This survey was run inside 5-1/2" O.D. casing on a Birdwell wireline.

<table>
<thead>
<tr>
<th>ND</th>
<th>TVD</th>
<th>Latitude</th>
<th>Departure</th>
</tr>
</thead>
<tbody>
<tr>
<td>0'</td>
<td>0'</td>
<td>0'</td>
<td>0'</td>
</tr>
<tr>
<td>100'</td>
<td>100.00'</td>
<td>0.19' N</td>
<td>-0.38' E</td>
</tr>
<tr>
<td>200'</td>
<td>200.00'</td>
<td>0.34' N</td>
<td>0.95' E</td>
</tr>
<tr>
<td>300'</td>
<td>300.00'</td>
<td>0.30' N</td>
<td>1.46' E</td>
</tr>
<tr>
<td>400'</td>
<td>399.99'</td>
<td>0.25' N</td>
<td>1.93' E</td>
</tr>
<tr>
<td>500'</td>
<td>499.93'</td>
<td>0.18' N</td>
<td>2.55' E</td>
</tr>
<tr>
<td>600'</td>
<td>599.99'</td>
<td>0.26' N</td>
<td>3.46' E</td>
</tr>
<tr>
<td>700'</td>
<td>699.98'</td>
<td>0.35' N</td>
<td>4.47' E</td>
</tr>
<tr>
<td>800'</td>
<td>799.93'</td>
<td>0.35' N</td>
<td>5.63' E</td>
</tr>
<tr>
<td>900'</td>
<td>899.96'</td>
<td>0.48' N</td>
<td>7.18' E</td>
</tr>
<tr>
<td>1000'</td>
<td>999.95</td>
<td>0.64' N</td>
<td>8.72' E</td>
</tr>
<tr>
<td>1100'</td>
<td>1099.94'</td>
<td>0.60' N</td>
<td>10.17' E</td>
</tr>
<tr>
<td>1200'</td>
<td>1199.93'</td>
<td>0.97' N</td>
<td>11.41' E</td>
</tr>
<tr>
<td>1300'</td>
<td>1299.93'</td>
<td>0.82' N</td>
<td>12.65' E</td>
</tr>
<tr>
<td>1400'</td>
<td>1399.92'</td>
<td>0.50' N</td>
<td>13.35' E</td>
</tr>
<tr>
<td>1500'</td>
<td>1499.92'</td>
<td>1.43' N</td>
<td>13.73' E</td>
</tr>
<tr>
<td>1600'</td>
<td>1599.92'</td>
<td>2.15' N</td>
<td>13.91' E</td>
</tr>
<tr>
<td>1700'</td>
<td>1699.92'</td>
<td>2.46' N</td>
<td>14.10' E</td>
</tr>
<tr>
<td>1800'</td>
<td>1799.91'</td>
<td>2.74' N</td>
<td>14.47' E</td>
</tr>
<tr>
<td>1900'</td>
<td>1899.91'</td>
<td>2.81' N</td>
<td>15.02' E</td>
</tr>
<tr>
<td>2030'</td>
<td>1999.91'</td>
<td>2.93' N</td>
<td>15.76' E</td>
</tr>
<tr>
<td>2100'</td>
<td>2099.91'</td>
<td>3.18' N</td>
<td>16.67' E</td>
</tr>
<tr>
<td>2200'</td>
<td>2199.90'</td>
<td>3.31' N</td>
<td>18.09' E</td>
</tr>
<tr>
<td>2300'</td>
<td>2299.68'</td>
<td>3.27' N</td>
<td>19.56' E</td>
</tr>
<tr>
<td>2400'</td>
<td>2399.68'</td>
<td>3.03' N</td>
<td>20.89' E</td>
</tr>
<tr>
<td>2500'</td>
<td>2499.85'</td>
<td>2.75' N</td>
<td>22.45' E</td>
</tr>
<tr>
<td>2600'</td>
<td>2599.84'</td>
<td>1.36' N</td>
<td>24.30' E</td>
</tr>
<tr>
<td>2700'</td>
<td>2699.82'</td>
<td>1.16' N</td>
<td>26.25' E</td>
</tr>
<tr>
<td>2800'</td>
<td>2799.80'</td>
<td>0.35' N</td>
<td>22.06' E</td>
</tr>
<tr>
<td>2900'</td>
<td>2899.78'</td>
<td>0.35' S</td>
<td>29.93' E</td>
</tr>
<tr>
<td>3030'</td>
<td>2999.76'</td>
<td>0.40' S</td>
<td>31.37' E</td>
</tr>
<tr>
<td>3100'</td>
<td>3039.74'</td>
<td>0.74' S</td>
<td>33.61' E</td>
</tr>
<tr>
<td>3203'</td>
<td>3199.73'</td>
<td>1.48' S</td>
<td>35.02' E</td>
</tr>
<tr>
<td>3300'</td>
<td>3299.72'</td>
<td>2.00' S</td>
<td>36.44' E</td>
</tr>
<tr>
<td>3400'</td>
<td>3390.70'</td>
<td>3.79' S</td>
<td>37.84' E</td>
</tr>
<tr>
<td>3500'</td>
<td>3499.68'</td>
<td>5.29' S</td>
<td>39.14' E</td>
</tr>
<tr>
<td>3500'</td>
<td>3599.66'</td>
<td>6.62' S</td>
<td>40.25' E</td>
</tr>
<tr>
<td>3700'</td>
<td>3699.65'</td>
<td>7.61' S</td>
<td>41.41' E</td>
</tr>
<tr>
<td>3800'</td>
<td>3793.64'</td>
<td>8.36' S</td>
<td>42.79' E</td>
</tr>
<tr>
<td>3830'</td>
<td>3879.62'</td>
<td>8.89' S</td>
<td>44.31' E</td>
</tr>
</tbody>
</table>
Operations started 10-13-67

Casing Record
9-5/8" O.D. at 124'
5-1/2" O.D. at 4200'

Operations completed 10-17-67

Perforation Record
4046' - 4166'
3901' - 4012'
120'

I. Prior to stemming operations, this hole had been drilled and cased by others.

II. This hole was plugged back with sand from 4170' up to 3287'. A bridge plug was set at 3280' and plugged back to 2941' with 152 ft$^3$ of cement slurry. The 9-5/8" x 5-1/2" casing annulus was perforated and cemented to surface from 120' with 56 ft$^3$ of cement slurry. The hole was cleaned out to 2941' and filled with mud.