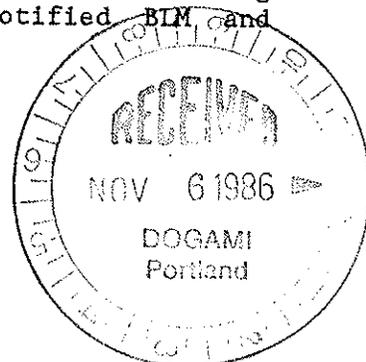


Clackamas Thermal Gradient Hole CTGH-1
DRILLING AND COMPLETION HISTORY

DATE	ACTIVITY
7 June 1986	Spudded 1030 hours with Boyles Bros. rotary rig. Drilled 12-1/4" hole to 35' but could not run a 10-3/4" conductor below 12'.
8 June 1986	Moved rig 6' and drilled a 8-3/4" hole to 35'; opened hole to 12-1/4". Ran 10-3/4", 40.5 lbs K-55 conductor to 28'.
9 June 1986	Completed running conductor to 35'. Cemented conductor with 16 sacks Portland cement, 16 sacks construction cement and 3% CaCl ₂ . Cement in place at 1430 hours. Waiting on cement.
10 - 12 June 1986	Drilled 8-3/4" hole from 35 - 517'. Lost 50% (+1000 gals) of drilling mud at 400 - 410' and 60 barrels at 425'.
13 June 1986	Geophysical borehole logging conducted. Circulated hole clean in preparation for running 7", 26 lbs K-55 buttress casing. Ran casing which became stuck at 488'; unable to circulate casing to bottom or pull up. Rigged up Halliburton cementers. Pumped 5 barrels of water ahead of 13.5 pound per gallon slurry of 122 cubic feet of Class G cement, mixed 1:1 with perlite plus 40% silica flour and 2% gel. Followed with 15.5 pound per gallon tail slurry of 32 cubic feet of Class G cement plus 40% silica flour. Displaced slurries with 19 barrels of water. Obtained good cement returns at surface. Plug bumped at 4000 psig and held. Cement level dropped in 7" to 10-3/4" annulus. Cement operation witnessed and approved by BLM.
14 June 1986	Outside cement job completed with four barrels of Class G cement mixed 1:1 with perlite; filled 7" to 10-3/4" annulus to surface. Released rotary rig. Dug cellar.
15 June 1986	Completed cellar construction. Welded LARKIN casing head to 7" casing. Set up BOPE and notified BLM and DOGAMI for BOP test.



- 16 June 1986 Leak in 8-5/8" x 6" Series 900 flange in 7" Larkin casing head precluded successful BOPE test. Waiting on air delivery of replacement flange.
- 17 June 1986 Reworked threads on 8-5/8" x 6" 900-series flange but would not seat properly. Air delivered flange seated and sealed in Larkin head. Rugged BOPE including Hydril MSP 2000 unit, Shaffer dougale gate with blind and rod rams, remote hydraulic controls.
- 18 June 1986 BOPE tested and approved by BLM.
- 19 June 1986 Stabilized Boyles Bros. core rig over BOPE and cellar; built rig floor.
- 20 June 1986 Drilled float collar at 466' and cement to 488' with 6" bit. Cleaned out hole to 517' and drilled to 527'. Circulated 30 minutes and pulled out of hole (POH). Left fish (6" bit and 4.5' joint) on bottom. Called for an overshot.
- 21 June 1986 Recovered fish. Ran 4.5" core guide string to 526' and hung string from 7" casing head.
- 22 - 24 June 1986 Cored ahead with 3.937" diamond corehead (HX size) from 527 - 744' with full core recovery. Lost total fluid return at 530' (22 June). Attempted to plug LCZ from shoe of 7" (488') with LCM and mud on 24 June with no success.
- 25 - 30 June 1986 Cored from 854' to 1316' with no fluid returns. Tripped out of hole for new HX bit at 1271'. Experienced mud thinning due to water inflow on 25 June; greased rods on 27th. Core recovery virtually 100%.
- 1 - 5 July 1986 Cored from 1316' to 1775' with no fluid returns where tripped for new bit. Core recovery 100%.
- 6 - 12 July 1986 Cored from 1775' to 2336' with no fluid returns and 100% core recovery. Wireline broke pulling core at 2336'; POH for repair and new bit. H₂S detection equipment installed and operating on 8 July. All three crews trained in H₂S safety and equipment. Electronic failure of H₂S detection equipment on 9 July (2083'). Repaired and operating by 2500'. Maximum recording thermometer temperatures (MRT) at 2130' and 2243' were 75° and 69°F respectively.
- 13 - 14 July 1986 Cored from 2366' to 2466' with no fluid returns and 100% core recovery.

- 15 July 1986 Cored to 2476'. Core barrel jammed in core rods at +500' depth upon core retrieval. Wireline broke, POH 17 stands and retrieved core barrel. Laid down one joint of bad core rod. Ran in hole (RIH) and washed bridge from 1776' to 1780' and 5' of fill on bottom. Cored to 2535' with no fluid returns and 100% core recovery. MRT at 2544' was 96°F.
- 16 July 1986 Cored to 2594' with no fluid returns and 100% core recovery. Upon core retrieval at 2584', barrel became stuck at 400' and wireline broke. POH; laid down one bad joint of core rod. MRT at 2584' was 99°F.
- 17 - 28 July 1986 Cored from 2594' to 3721' with no fluid returns and 100% core recovery. POH to change bit after 1385' and 340 hours; only one-third worn. MRT data as follows: 3059' = 119°F; 3159' = 124°F; 3254' = 131°F; 3641' = 138°F and 3711' = 137°F.
- 29 July - August 1986 Cored from 3721' to 4203' with no fluid returns and 100% core recovery. HX core rods parted while coring at 4203'. Waiting on NX rods to run fishing spear.
- 5 - 7 August, 1986 Waiting on NX rods. RIH with NX open ended and found HX rods parted at 823'. RIH to retrieve core barrel at 4193'.
- 8 - 10 August 1986 Recovered core barrel after two attempts. RIH with 2.875" diamond corehead (NX size) and NCC rods. Milled out HX bit at 4203' and cored ahead to 4226'. POH to replace bit. MRT at 4216' was 177°F.
- 11 - 17 August 1986 Cored from 4226' to 4780' with no fluid returns and 100% core recovery. Received a U. S. Forest Service order for complete shutdown of rig operations because of a Class E fire risk. MRT data as follows: 4296' = 178°F; 4383' = 183°F; and 4540' = 182°F.
- 18 August 1986 Cored from 4780' to 4800' with no fluid returns and 100% core recovery. Could not obtain exception to shutdown order in spite of about 900 barrels water supply on the drillsite which is located in a clear-cut. POH to 4150'. Closed blind rams and Hydril on NCC rods; closed Kelly valve and shutdown operations at 1200 hrs.
- 27 August 1986 Ran a Pruett wireline temperature/pressure survey after nine-day shutdown with U. S. Forest Service approval. Recorded maximum hole temperature of 210°F at total depth.

30 August 1986 Class E fire risk condition lifted. Drillsite operations scheduled to resume 2 September.

2 September 1986 Started operations at 2000 hours. Ran NCC rods and NX bit string from 4250' to 4800'. Hole clear to bottom. Initiated hole cooling for geophysical logging operation. MRT at 4800' is 204°F.

3 September 1986 Cooled borehole with 8 hour circulation to about 153°F. NCC rods POH.

4 September 1986 Ran gamma-gamma density/caliper, sonic and spontaneous potential/16'-64' resistivity logs. Temperature in hole rebounded quickly, to over 185°F which caused the density and sonic tools to fail. Found erratic readings from resistivity tool; cablehead problem. POH, ran NCC rods into hole to initiate cooling again.

5 - 7 September 1986 Completed borehole geophysical logging. Laid down NCC rods, pumped out cellar and removed BOPE. Bolted 1-1/4" plate flange to Larkin casing head. Flange includes a 3" full opening gate to allow logging tool access. Rigged down, cleaned cellar and pits. Released rig on 1300 hours, 7 September 1986.

JLI/ma
October 28, 1986

JLI092