

WELL HISTORY

GEO CORE HOLE N-5

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- 5/22/87 Pad construction and sump excavation completed. Big Three Drilling mobilizes and begins rig-up.
- 5/23/87 Big Three spuds hole with 7 7/8" air hammer. Set 20' of 8" PVC conductor. Line sump. Change over to foam, lost circulation (LC) @ 50-55', drill without returns to 85'. POH.
- 5/26/87 Grout 85' to surface with 7 sack/yard Portland sand aggregate slurry (Readi-mix truck holding 3 yds + 50# calcium chloride). WOC.
- 5/27/87 Drill 0-85' cement with air hammer. LC @ 85'. Started heavier foam and regained circulation @ 105'. Drilled 105-165' with returns. Drilled to 230'. LC. Regained circulation @ 240'. Drilled to 265' with returns.
- 5/28/87 Transport additional drill steel to site. LC. POH to 125' experiencing caving. Regained circulation @ 125'. Started redrill @ 125'; hammer acts as if cave is bridging hole.
- 5/29/87 Big Three Drilling moves portable cement mixer on site. Place 15 sacks of Portland IP as plug to 120' cave zone. WOC.
- 5/30/87 Tag cement @ 120'. Drill 120-126' in cement. Collared stabilizer @ 130' with cave material. Work rods free, POH. Place 25 sack Portland IP plug to 130'. WOC.
- 5/31/87 Tag cement @ 90'. Drill 90-130' in cement. Some cave/bridging @ 140-145'. Punch through into open hole from 147-165'. Collared stabilizer @ 150' when air left air hammer to LC zone. Work rods free, POH. Open hole to 175'. Place 35 sack Portland IP plug into hole. WOC.
- 6/1/87 Weld hardfacing on back head of hammer. RIH. Tag cement @ 78'. Drill 78-105' in cement. Rig pump down but repaired in 2.45 hours. Drill out of cement @ 175'. Drilled 175-285' through cuttings (hole semi-open). Experiencing some caving @ 190-285'. Ream hole of bridging, POH. Place 3 yds of 7 sack Portland IP sand aggregate slurry + calcium chloride plug into hole. TOC @ 40'. WOC.
- 6/2/87 Drill 40-70' in cement. Cement is too green. WOC. POH with air hammer. RIH with tricone assembly (7 3/4") to 70'. Drill 70-190' in cement. Drill 190-290' and clean hole. POH to 170'.

- 6/3/87 RIH to 202' (cave/bridge). Drill through to 245' (hole blocked). Place 2 yds of 7 sack Portland IP sand aggregate slurry + 45# calcium chloride plug into hole. WOC.
- 6/4/87 Tag cement @ 188'. Drill 188-255' in cement with tricone and foam. Drill 255-285' in rubble-filled hole. Tricone 322-338'. POH to 245'.
- 6/5/87 POH with tricone to check bit for wear. RIH with tricone. Drill 245-350' with returns.
- 6/6/87 Drill 350-376' with returns.
- 6/7/87 Drill 376-400' with returns.
- 6/8/87 Drill 400-427' with returns. 420' of A-53 4 1/2" casing delivered to site. POH to 347' overnight.
- 6/9/87 RIH to 420' where cave/rubble encountered. Drilled rubble 45 minutes to get returns. POH. Place 2 yds of 22 sack/6 gallon neat cement + 100# calcium chloride plug. BLM rep. witnesses pour. WOC.
- 6/10/87 Pressure test mud pump @ 600 psi. RIH. Tace cement @ 304'. Drill 304-427' in cement.
- 6/11/87 4 1/2" O.D. A-53 casing run to 419.6' (cement shoe). Shoe suspended 6.9' off bottom. Cementing head pinned to top casing string @ 6' below ground level. 3 centralizers on casing @ 416'; 185', and 20'. Readimix truck arrives with 154 sack Portland IP/6 gallon slurry. Mix 350# bentonite in separate container. Pump bentonite to Readimix truck. Recycle slurry from truck to container and back to truck to assure good mixing. Add 300# calcium chloride to truck and mix/rotate. Pump slurry to hole until pressure gauge pegs @ 600 psi. Stop pumping and close in pressure on cement with valve on cementing head (casing filled with cement). Relieve pressure on cement head and flush pump. Tag cement @ 90'. Run slurry into annulus from top until cement is observed @ surface. BLM rep. witnesses cementation. Drillers clean up pump, etc. WOC.
- 6/12/87 Big Three Drilling releases casing string and demobilizes.
- 6/13/87 Cellar excavated and lined with cribbing planks. Supplementary sump excavated and lined. Tonto Drilling Services crew and equipment mobilization proceeding.

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- 6/14/87 Tonto CP 50, light plant, parts trailer, and fuel tanks are mobilized to site.
- 6/15/87 H&H brings BOPE and accumulator to site. Flange threaded to casing. BOPE lowered into cellar and bolted to flange. CP 50 moved over hole and leveled. Baker tanks off-loaded.
- 6/16/87 Tonto crew (2 drillers, 2 helpers, 1 mechanic, 1 water-truck driver) are continuing set-up. Rig mast up.
- 6/17/87 Guide wires to mast tensioned. Accumulator hooked to BOPE. Choke line to BOPE run. Maintenance/mechanical work proceeding. H2S safety course conducted.
- 6/18/87 H&H rep. on site with hand wheel for BOPE. Set-up for BOPE/accumulator completed and system pre-tested by Tonto. BOPE test commences with BLM and DOGAMI reps. present. Hydril pressured @ 720 psi for 30 minutes with no bleed-off. Pipe rams pressure to 740 psi for 30 minutes with 30 psi bleed-off. Blind rams pressured to 740 psi for 25 minutes with 40 psi bleed-off. Accumulator function test performed. BOPE remote test performed. Tonto drills 6-16' in cement with 3 7/8" tricone. Rig down to repair hydraulic leak on left ram at chuck.
- 6/19/87 Drill 16-30' in cement. Rig down again to repair left ram hydraulic leak. Mobile phone installed on site. Drill 30-44' in cement. Rig down again to repair left ram hydraulic leak. Drill 44-180' in cement.
- 6/20/87 Drill 180-276' in cement.
- 6/21/87 Drill 276-410' in cement. Pressure test casing @ 410'. Hydril pressure @ 700 psi with decrease to 655 psi after 30 minutes. Drill 410-420' in cement. POH tricone assembly. Mix mud in Baker tanks.
- 6/22/87 Cored 420-427' in cement. Cored 427-539'. LC @ 433'.
- 6/23/87 Cored 539-624'. Rig down to fabricate new seal for left ram. Cored 624-633'. Core tube plugged-off/stuck. POH in 60s. Bit worn out. New bit made up, RIH.
- 6/24/87 Cored 633-679' with short core runs due to inner tube plugging.
- 6/25/87 Cored 679-798'.
- 6/26/87 Cored 798-805'. Rig down 2.5 hours to repair mud.

CONFIDENTIAL

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- mixer. Cored 865-929'.
- 6/27/87 Cored 929-1018'.
- 6/28/87 Cored 1018-1126'.
- 6/29/87 Cored 1126-1220'.
- 6/30/87 Cored 1220-1309'.
- 7/1/87 Cored 1309-1374'. POH; change to new bit and shell. RIH to 430' where cave/bridge is encountered. Wash and ream cave. Rig down for 2.5 hours to change hoist cable.
- 7/2/87 Wash and ream 430-1374'. Cored 1374-1422'.
- 7/3/87 Cored 1422-1528'.
- 7/4/87 Cored 1528-1588.5'.
- 7/5/87 Cored 1588.5-1672'.
- 7/6/87 Cored 1672-1755.5'.
- 7/7/87 Cored 1755.5-1841'.
- 7/8/87 Cored 1841-1915.5'.
- 7/9/87 Cored 1915.5-2006'. POH; change to new bit and shell. Test BOPE to 700 psi. Grease rods; RIH to 810' where cave/bridge is encountered. Wash and ream 1810-1975'. Hole tight; high torque; can't keep tube free; trouble washing hole; POH to 260'. Wash and ream. Hole caving. Left ram leaking hydraulic; rig down for 1.5 hours for ram repair. Pull back, wash and ream 1940-2002'. Bit plugs off while adding single; tube stuck; make wet pull to 1500'; tube freed-up.
- 7/10/87 Wash and ream to 1980'; bit plugged; tube stuck; broke wireline; POH to 1000'. Tried unsuccessfully to fish tube. POH (wet pull). Cleaned out core barrel. Strip off old grease and cuttings. RIH; hit cave @ 550'. Wash and ream to 1910'. Tried to pull tube; pulled off H-adapter sleeve from overshot. Hooked and pulled tube. Redrill cave/bridge 1910-2006' with 800# barite mud mix. Cored 2006-2012' with no recovery. POH to 1890'. Place 15 sack Portland IP plug to 1910-2012' interval. WOC.
- 7/11/87 RIH with tricone. Washed and ream 690-1730'. Hooked up to wash to 1890' but made it only to 1770' due to

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ash plugging tricone. Unsuccessful attempt made to clear tricone with chaserod and overshot. POH (wet pull). Cleaned rod and bit.

- 7/12/87 RIH with coring assembly. Wash and ream cave zones, pulling tube after each zone. Flush rod prior to dropping each tube. Wash and chop 120' of soft cement. Cored 2012-2030'.
- 7/13/87 Cored 2030-2082'.
- 7/14/87 Cored 2082-2128.5'.
- 7/15/87 Cored 2128.5-2165'. POH to examine bit (still good). Rough stones on bit. Lower and grease rods to 710' wash and ream 710-1800'. Finish lowering/washing out rods; drill cave; pull tube. Cored 2165-2177.5'.
- 7/16/87 Cored 2177.5-2217.5'.
- 7/17/87 Cored 2217.5-2295.5'.
- 7/18/87 Cored 2295-2374.5'.
- 7/19/87 Cored 2374.5-2452'.
- 7/20/87 Cored 2452-2526.5'.
- 7/21/87 Cored 2226.5-2578'. POH for grease as a result of high torque @ 2578'. Test BOPE to 700 psi; lost 20 psi on hydril. RIH with new bit (softer matrix) and new shell.
- 7/22/87 RIH with greased rods to 1610'. Wash and ream cave zones to 2060'. Pull tube, wash and ream to 2578'. Cored 2578-2609'.
- 7/23/87 Cored 2609-2680'.
- 7/24/87 Cored 2680-2740'.
- 7/25/87 Cored 2740-2808'. Trouble hooking overshot due to surge of cuttings after pump is shut off. Flush hole with pump in high gear. Repair wireline.
- 7/26/87 Cored 2808-2859'.
- 7/27/87 Cored 2859-2936'.
- 7/28/87 Cored 2936-2997'. Discontinue coring for CP 50 engine repair (i.e., losing oil). POH, pressure test BOPE (bag, pipe ram, blind ram). Less than 30 psi lost from

700 psi in 30 minutes. Close in blind rams.

- 7/29/87 Rig down for mechanical work. Engine repaired. RIH.
- 7/30/87 Cored 2997-3012'.
- 7/31/87 Cored 3012-3082'.
- 8/1/87 Cored 3082-3142'.
- 8/2/87 Cored 3142-3192'.
- 8/3/87 Made core run/temperature test (20 minute) @ 3242' with rod rotation @ beginning and end of core retrieval. After temperature test HQ rods were stuck with no rotation. Try to free up with fuel (unsuccessful). Continue to circulate hole and work rods. Approximately 18" of stretch in rods during pull back. Contact DIALOG to arrange for mobilization to Oregon. 10 PM DIALOG on location at N-5. DIALOG rigged up to CP 50 and free point tool assembled by 11 PM. Free point survey indentifies free point by 12:05 AM (i.e., 2750'). TOH with free point tool. Assemble jet cutter (3 1/2") and RIH to 2754'. Detonate charge and TOH with jet cutter at 12:40 AM. Work HQ rods while DIALOG RIH with free point tool to monitor collar locations. Although collar locator indicates rod separation, the drill string does not free up. Work rods up and down/try to rotate (no success @ 2:30 AM). DIALOG RIH with additional jet cutter (4 1/2"). Detonate charge/rods freed up at 4 AM. Rotate and work up only HQ rods.
- 8/4/87 Tonto back-reams 120'. POH in 60s. Decision made to suspend hole. Contact Dresser Atlas to arrange for mobilization to Oregon. Tonto will remain out of the hole until geophysical logging begins. 2741' of HQ rods are retrieved; 482' of HQ rods + core barrel assembly + bit are left in hole (i.e., bit @ 10' off bottom).
- 8/5/87 Tonto cleaning site; mucking cellar; preparing for arrival of Dresser Atlas. Fabrication of 1.9" short to move through bit left in hole. Dresser Atlas arrives on site and begins rig up. Dresser Atlas runs temperature, IEL, Caliper, BHC acoustic/fraclog.
- 8/6/87 Dresser Atlas completes logging operations and demobilizes. Tonto RIH with 500' NQ rods + bit subbed to HQ rods and wash and ream 2740-3221'. POH with HQ rods in 60s. POH with NQ rods in 10s. RIH with HQ rods to 2740'. Take fluid samples via Kuster sampling tool @ selected interval.

CONFIDENTIAL

7

- 8/7/87 Start pumping Shur Gel to 3221' interval through drill steel with BLM reps present. Pump 5400 gallons Shur Gel (50 #/100 gal). POH HQ rods in 10s.
- 8/8/87 Lower 1.9" O.D. J-55 liner pipe (filled with water) through Shur Gel to 3225' and land on flange @ well head. Tonto proceeds with demobilization.
- 8/9/87 Tonto demob. continues. Rig released.
- 8/10/87 Tonto fabricates and installs well head on top of flange (includes 2" valve for gauge mount).

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