

BRIGHT & COMPANY
DRILLING PROGRAM



MUD PROGRAM

DEPTH

INTERVAL	TYPE	WT.	VISC.	WATER LOSS	TREATMENT
0 - 420	Gel/Lime	8.4-8.6	45-50	NC	Use gel & lime for viscosity.
420 - 4500	Water	8.4-8.5	28-30	NC	Pump polymer sweeps as needed.
4500 - 6465	KCl/Polymer	8.5-8.6	38-46	10-8	Maintain gel at 10-12 lb/bbl and Polymer at 1.5 lb/bbl KCl at 1.5 to 2.0 lb/bbl KOH to maintain pH at 9.0 Aerate mud down drill pipe.
6088 - 7911 MD	KCl/Polymer	8.4-8.6	30-35	10-8	Pump XCD polymer sweeps as needed. If an increase in mud weight is required, use salt. Do NOT use loss circulation material.

REMARKS: After setting cement plug and kicking-off in 9-7/8" hole, use Soltex,
as required by hole conditions.

GEOLOGICAL DATA

1. LOGGING:

DEPTH:

TYPE LOGS

6465' Spectral GR, DIL-Spectral Density/Dual
Spaced Neutron, Integrated Sonic, Six Arm Dipmeter

2. MUD LOGGER: Install at 3000'. Subsurface, Inc. (303/292-1414)

3. SAMPLES: None

4. CORING: None

5. DST: None

ADDITIONAL INFO: Call morning reports to office by 8:30 AM (CST). Office phone 800/929-0336.

On weekends and after 5 PM (CST), call Mike Hunt 800/929-2286 or Jack Richards at
800/929-0675

PROJECT ENGINEER B. W. G.W. Hunt DATE 12/21/92 APPROVED _____

Union No.1
Lake Canal Field
Larimer County, Colorado

Procedure

- 1) Move-in drilling rig.
- 2) Drill 14-3/4" hole to 420'. Run and cement 10-3/4" casing as per drilling program. Reciprocate casing while cementing.
- 3) Install casinghead (11", 3000# x 10-3/4" SOW). Nipple-up spacer spool, 11" 3000# double ram BOP (with pipe rams on bottom and blind rams on top) and annular preventer.
- 4) Prior to drilling out of surface casing, test BOP's, choke manifold, inside BOP, kelly cock, stand pipe valve, and kill line to rated pressure). Test annular BOP to 1500# (50% of rated pressure). Install wear ring.

Note: 1) Have a full opening valve and inside BOP on the floor for each size of tubulars being used.
2) Record BOP test on IADC report form.
- 5) Test 10-3/4" casing to 1000# (rated at 1820 psi).
- 6) The mud system will consist of water down to 4500'. Mud up at 4500'. The mud system below 4500' will be a KCl/Polymer mud.
- 7) Drill a 9-7/8" hole to 6465', using a packed hole assembly. Take surveys at 500 ft. intervals. On last bit run prior to reaching TD, run monel drill collar above bit. Run multishot survey from TD to surface casing.

Note: 1) Install mud logger at 3000' (Subsurface Inc.).
2) Prior to setting 7-5/8" casing, install the following:
 - Skimmer System
 - Centrifuge
 - Super Choke
 - Totco Visualogger
 - Air Compressors, rated at 800 SCFM (Northwestern Air Drilling Service Co.)
- 8) Log with Spectral Gamma Ray, DIL-Spectral Density/Dual Spaced Neutron, Integrated Sonic and Six Arm Dipmeter. From logs, the target interval in the Niobrara will be determined.

Note: The most likely target will be the "B" Zone from 5990' to 6005' in the Champlin Pet. Co. #1 Seedman 33-14. This projected interval in the Union #1 is from 6159' to 6174'. The formation dip is 1.4 degrees in a direction of N 90° E (downdip).
- 9) Prior to spotting cement plug, spot gelled pill from TD to 5890'. Set 350' cement plug from 5890' to 5540' with 265 sx of Prem. Cmt. + 1% CFR-3 + 3% K Cl (35% excess) (Wt. = 17.5 ppg, Yield = 0.95 cu ft/sk). Use centralizers on bottom 350' of drill pipe. Pump 500 gals mud flush ahead of cement and reciprocate drill pipe. Use caliper log to determine gelled pill volume and cement volume.
- 10) GIH with 9-7/8" bit and dress-off cement plug to 5638'.

- 11) GIH with 9-7/8" bit, 6-1/2" AKO mud motor, 2 non mag DC's, 5 jts of drill pipe and 6-1/2" DC's. Build angle at 10 degrees per 100 ft to 45 degrees at 6088 MD (6045 TVD) in a direction of N 90 degrees E. The casing seat will be at the top of the Niobrara "A" formation.

Note: Eastman's retrievable MWD will be used.

- 12) Lay down 4-1/2" drill pipe and drill collars.
- 13) Run and cement 7-5/8" casing as per drilling program.
- 14) Install tubinghead (11" 3000# x 7-1/16" 3000#).
- 15) Nipple-up 11" 3000# BOP's, annular preventer and rotating head.
- 16) Prior to drilling out of 7-5/8" casing, test BOP's, choke manifold, inside BOP, kelly cock, stand pipe valve and kill line to 3000 psig. Test annular preventer to 1500 psig. Install wear ring.

Note:

- 1) BOP's to have pipe rams on bottom and blind rams on top.
 - 2) Have a full opening valve and inside BOP on the floor for each size of tubulars being used.
 - 3) Record BOP test on IADC report form.
- 17) Test 7-5/8" casing to 1500# (rated at 4140#).
 - 18) The mud system will be an aerated 2% KCl/Polymer system. Maintain the solids in the mud as low as possible using Flo Line Cleaner and Centrifuge. Inject sufficient air down drill pipe to maintain a hydrostatic head equivalent to 6.0 ppg at TVD. The formation pressure of the Niobrara is approximately 7.9 ppg.
 - 19) Circulate through skimmer system. Inject defoamer and demulsifier upstream of mud gas separator, as needed.
 - 20) GIH with 6-3/4" rock bit, float sub, 1 - 4-3/4" non mag drill collar, 20 jts of 3-1/2", 13.30#, S-135 DP, 45 jts of 3-1/2" HWDP with 3-1/2" IF tool jts, and 3-1/2", 13.30#, S-135 drill pipe with 3-1/2" IF tool jts. Install wear ring. Drill casing shoe and tangent section.
- Note:
- 1) The 3-1/2", S-135 drill pipe will be run in the curve and horizontal portion of the hole.
 - 2) The 45 jts of HWDP will provide 27,000 lbs of effective bit weight.
 - 3) Drill pipe design will provide 300,000 lbs of overpull.
- 21) GIH with 6-3/4" rock bit, AKO mud motor, float sub, Geoservices MWD (with GR), 1 - non mag DC, isolation sub, wear sub, 20 jts of 3-1/2", S-135 DP, jet sub, string float, 45 jts of 3-1/2" HWDP, and 3-1/2", S-135 DP.
 - 22) Build angle at 16 degrees per 100 ft to 88.6 degrees at 6401 MD (6177 TVD).
 - 23) GIH with 6-1/2" PDC bit, AKO mud motor, float sub, Geoservices MWD, 1 - non mag DC, wear sub, 115 jts of 3-1/2", S-135 DP, jet sub, string float, 19 jts of 3-1/2" HWDP, and 3-1/2" S-135 DP. Hold the 88.6 degree angle and azimuth of N 90 degrees E (dip is 1.4 degrees in a direction of N 90 degrees E) until a displacement of 3750 ft is obtained. The estimated TD is 9711 MD (6258 TVD). The mud log samples and Gamma Ray on the MWD will be used to determine the change in hole angle needed to stay in the target.

Note: The bottom hole location will be 660' FWL and 150' ⁵⁰
FSL FNE of Section 24, T 6 N, R 68 W. The horizontal ³⁴⁰⁶
displacement will be 3750' with an azimuth of N-90°-E. ^{N 86.62° E}

- 24) If the well indicates to be commercially productive, a 4-1/2" slotted liner will be run. The holes in the liner will be drilled with two 3/4" holes per ft with 90 degree phasing. Leave 3 ft from each end blank.
- 25) Run 4-1/2" liner on TIW "L" setting collar. A TIW packoff bushing will be run one joint above guide shoe. After picking up 4-1/2" liner, hang-off liner in slips. GIH with TIW polish jt (15 ft), 2-3/8" tubing, pup jts as required to space out, and TIW "LN" setting tool.
- 26) After setting liner, displace drilling fluid from behind liner with lease crude mixed with emulsion breaker. To release setting tool from setting collar, turn to right and POOH.
- 27) To test well, GIH with 2-7/8" tubing (install seating nipple on bottom of tubing). Hang off tubing 10 ft above top of liner. Swab test well.
- 28) Based on the results of the swab test, a pump will be sized and installed with a workover rig.

46 2290

1 MONTH BY DAYS X 110 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

