

**Well:** Heiby 18-8-66 1H  
**Zone of Interest:** Niobrara Shale

**1.0) Summary of Operations**

Drill 12-1/4" surface hole to section TD at 1000'.  
 Set 9-5/8" 40# J-55 casing and cement with Lead and Tail cement (see details below). Cement will be circulated to surface.  
 Install 11" x 5,000 psi BOP and test as required  
 Drill 8-3/4" hole to KOP.  
 Kick off and drill 8-3/4" curve at 10 deg/100' to end of build.  
 Drill 7-7/8" open hole to well TD  
 Acquire shuttle logs: Triple combo and image logs in open hole  
 Set 4-1/2" x 5-1/2" casing and cement as shown below.  
 Suspend well and move drilling rig out in preparation for well completion

**2.0 CASING AND CEMENTING PROGRAM**

The proposed casing program will be as follows:

<u>Purpose</u>	<u>Interval</u>		<u>Hole Size</u>	<u>Casing Size</u>	<u>Weight</u>	<u>Grade</u>	<u>Thread</u>	<u>Condition</u>
	<u>From</u>	<u>To</u>	(")	(")	<u>Lbs/Ft</u>			
Surface	0	1000	12 1/4	9 5/8	40	J-55	LTC	New
Production	0	6575	8 3/4	5 1/2	17	P-110	LTC	New
	6575	10875	8 3/4	4 1/2	11.6	P-110	LTC	New

**Casing design subject to revision based on geologic conditions encountered.**

**Casing Safety Factors:**

Interval	Casing	Burst	Collapse	Axial
Surface	9 5/8	2.03	2.03	4.78
Production	4 1/2	1.32	2.26	1.63

**Centralizer Program**

Casing	9 5/8	4 1/2
# of Bow-type spring centralizer	8	31

## Cement Program

Surface Casing	Slurry Volume			Weight	Yield	Mix H2O	TOC
	% Excess	(BBLS)	(Sacks)	(PPG)	(cuft/sk)	(GPS)	
Lead Slurry	100%	84	159	11.50	2.95	17.88	0
Tail Slurry	100%	33	163	15.80	1.15	4.96	750

	Lead	Tail
Surface Casing with TOC at surface	Rockies LT 0.2 % Versaset (Additive Material) 0.2 % D-AIR 3000 (Additive Material) 0.125 lbm/sk Poly-E-Flake (Additive Material) 0.25 lbm/sk Kwik Seal (Additive Material)	Premium Cement, 94 lbm/sk Premium Cement (Cement) 1 % Calcium Chloride, Pellet (Accelerator) 0.125 lbm/sk Poly-E-Flake (Lost Circulation Additive)

**Cement must be circulated to surface**

Production Casing Cement	Slurry Volume			Weight	Yield	Mix H2O	TOC
	% Excess	(BBLS)	(Sacks)	(PPG)	(cuft/sk)	(GPS)	
Lead Slurry	30%	208	532	12.00	2.20	12.30	2511'
Tail Slurry	30%	274	1054	14.60	1.46	6.10	

	Lead	Tail
<b>Production Casing Cement</b>	Poz Type I-II 50/50 1 % Bentonite (Light Weight Additive) 3 lbm/sk Silicalite Compacted (Additive Material) 3 % Microbond HT (Additive Material) 0.2 % Halad(R)-322 (Low Fluid Loss Control) 0.4 % Halad(R)-344 (Low Fluid Loss Control) 0.3 % HR-5 (Retarder)	50/50 Poz Premium 2 % Bentonite (Light Weight Additive) 5 lbm/sk Silicalite Compacted (Light Weight Additive) 0.5 % Versaset (Thixotropic Additive) 0.5 % Econolite (Cement Material) 0.6 % HR-7 (Retarder) 0.5 % D-AIR 3000 (Defoamer) 0.125 lbm/sk Poly-E-Flake (Lost Circulation Additive) 0.25 lbm/sk Kwik Seal (Lost Circulation Additive)

**The cement must achieve a compressive strength of at least 500 psi at the shoe prior to casing test and drilling out the shoe track. WOC time shall be recorded in the driller's log.**

**MUD PROGRAM**

<u>Purpose</u>	<u>Interval</u>		<u>Hole Size</u>	<u>Mud Type</u>	<u>Mud Weight</u>	<u>Viscosity</u>	<u>Fluid Loss</u>	<u>pH</u>
	<u>From</u>	<u>To</u>	(")	(")	<u>Lbs/Ft</u>			
Surface	0'	1000'	12 1/4	WBM	8.4 – 8.8	28 – 32	N/C	9
Production	1000'	7477'	8 3/4	WBM	8.5 – 9.5	35 – 46	4 – 6	9
	7477'	10875'	7 7/8	WBM	9.0 - 10.0	36 – 46	4 – 6	9

**WBM = Water Based Mud**