

**1. Casing and Cementing Plan Summary**

The surface fresh water sands will be protected by setting 13-3/8" casing at 900' and circulating cement back to surface. The fresh water sands will be protected by setting 9-5/8" casing at 4,400' and circulating cement to surface. The 2<sup>nd</sup> Bone Springs intervals will be isolated by setting 5-1/2" casing to total depth and circulating cement above the base of the 9-5/8" casing. All casing is new and API approved.

**2. Casing Program:**

Hole Size	Hole Interval	Casing OD	Casing Interval	Weight	Collar	Grade
17-1/2"	0 – 900'	13-3/8"	0 – 900'	48#	STC	H-40
12-1/4"	900' - 4,400'	9-5/8"	0 - 4,400'	40#	BTC	HCK-55
8-3/4"	4,400' – 14,941'	5-1/2"	0-14,491'	17#	BTC	P-110

Maximum TVD in lateral: 10,415 ft

**3. Design Factors:**

Casing Size	Collapse Design Factor	Burst Design Factor	Tension Design Factor
13-3/8"	1.91	4.30	12.52
9-5/8"	1.85	1.73	5.26
5-1/2"	1.76	2.18	3.21

**4. Cement Program:**

Cementing Program (cement volumes based on at least 25% excess)

String	Number of sx	Weight lbs/gal	Water Volume g/sx	Yield cf/sx	Stage; Lead/Tail	Slurry Description
13-3/8" Surface	970	14.8	6.32	1.33	Tail	Class C Cement + 63.5% Fresh Water
9-5/8" Intermediate	930	12.9	9.81	1.85	Lead	(65:35) Class C Cement: Poz (Fly Ash): 6% BWOC Bentonite + 5% BWOW Sodium Chloride + 0.125 lbs/sack Poly-E-Flake + 70.9 % Fresh Water
	430	14.8	6.32	1.33	Tail	Class C Cement + 63.5% Fresh Water
5-1/2" Production Casing	670	11.0	15.23	2.71	Lead	Tuned Light Blend + 0.125 lb/sk Pol-E-Flake + 76.3% Fresh Water
	1370	14.5	5.38	1.22	Tail	(50:50) Class H Cement: Poz (Fly Ash) + 1 lb/sk Sodium Chloride + 0.5% bwoc HALAD-344 + 0.4% bwoc CFR-3 + 0.2% bwoc HR-601 + 2% bwoc Bentonite + 58.8% Fresh Water

5-1/2" Production Casing  2-Stage Option	830	12.5	10.86	1.96	Lead	(65:35) Class H Cement: Poz (Fly Ash) + 6% BWOC Bentonite + 0.25% BWOC HR-601 + 0.125 lbs/sack Poly-E-Flake + 74.1 % Fresh Water
	1370	14.5	5.31	1.2	Tail	(50:50) Class H Cement: Poz (Fly Ash) + 0.5% bwoc HALAD-344 + 0.4% bwoc CFR-3 + 0.2% bwoc HR-601 + 2% bwoc Bentonite + 58.8% Fresh Water
	DV Tool @ 4600ft					
	50	11.9	12.89	2.26	Lead	(50:50) Class H Cement: Poz (Fly Ash) + 10% BWOC Bentonite + 1 lb/sk of Kol-Seal + 0.3% BWOC HR-601 + 0.5lb/sk D-Air 5000 + 76.4% Fresh Water
	70	14.8	6.32	1.33	Tail	Class C Cement + 0.2% HR-800 + 63.5% Fresh Water

**TOC for all Strings:**

13-3/8" Surface	0ft
9-5/8" Intermediate	0ft
5-1/2" Production Single Stage	3900ft
5-1/2" Production 2-Stage	Stage #1 = 4600ft Stage #2 = 3900ft

**Notes:**

- Actual cement volumes will be adjusted based on fluid caliper and caliper log data

\*\*If lost returns are encountered while drilling through this section, Devon will run a DV tool at 4,600 ft. Cement volumes will be adjusted proportionately to the placement of the DV.

**5. Pressure Control Equipment**

A 3M 13-5/8" BOP system (Triple Ram and Annular preventer) will be installed and tested prior to drilling out the surface casing shoe. The BOP system used to drill the intermediate hole will be tested per BLM Onshore Oil and Gas Order 2.

A 3M 13-5/8" BOP system (Triple Ram and Annular preventer) will be installed and tested prior to drilling out the intermediate casing shoe. The BOP system used to drill the production hole will be tested per BLM Onshore Oil and Gas Order 2.

The pipe rams will be operated and checked each 24 hour period and each time the drill pipe is out of the hole. These tests will be logged in the daily driller's log. A 2" kill line and 3" choke line will be incorporated into the drilling spool below the ram BOP. In addition to the rams and annular preventer, additional BOP accessories include a kelly cock, floor safety valve, choke lines, and choke manifold rated at 3,000 psi WP.

Devon requests a variance to use a flexible line with flanged ends between the BOP and the choke manifold (choke line). The line will be kept as straight as possible with minimal turns.

**6. Proposed Mud Circulation System:**

<b>Depth Range</b>	<b>Mud Weight</b>	<b>Viscosity</b>	<b>Fluid Loss</b>	<b>Type System</b>
0 - 900'	8.4-8.6	30-34	NC	Fresh Water
900' - 4,400'	10.0	28	NC	Brine
4,440' - 14,941'	8.4-9.0	28-30	NC-12	Fresh Water

The necessary mud products for weight addition and fluid loss control will be on location at all times.

**7. Auxiliary Well Control and Monitoring Equipment:**

- a. A Kelly cock will be in the drill string at all times.
- b. A full opening drill pipe stabbing valve having the appropriate connections will be on the rig floor at all times.
- c. Hydrogen Sulfide detection equipment will be in operation after drilling out the 13-3/8" casing shoe until the 5-1/2" casing is cemented. Breathing equipment will be on location upon drilling the 13-3/8" shoe until total depth is reached.