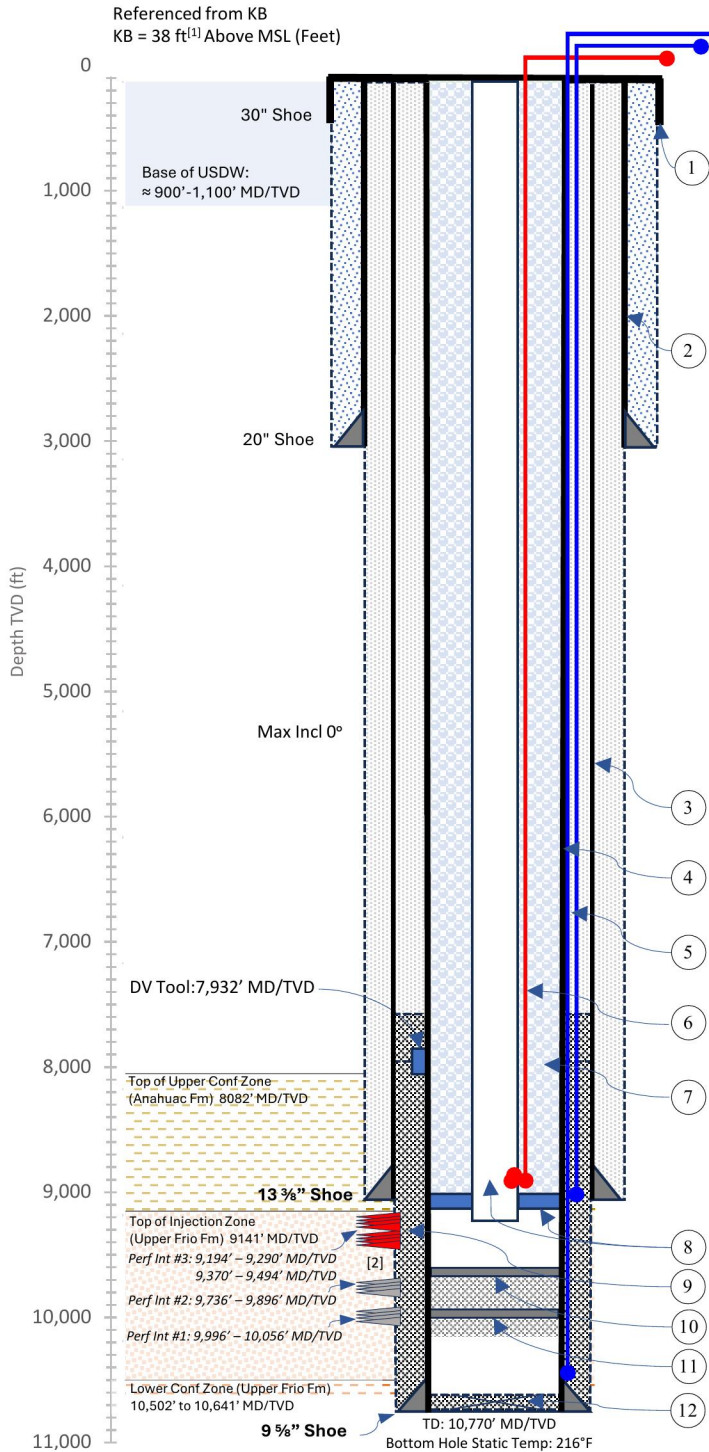




Figure E.4-1 Proposed Pre-Closure Well Schematic - Minerva South CCS Well No. 001



- 1. 30" Conductor Pipe:** 1.0" WT, 28" ID, 310.3 lb/ft, X56 Welded, plain-end, beveled conductor with drive shoe driven to refusal at 150' MD/TVD
- 2. 20" Surface Casing:** 133 lb/ft, L80, ER at 3,000' MD/TVD. 26" Hole. Expected MW 9.00 ppg WBM. Cemented with Type-1 cement up to the surface; Lead slurry 11.80 ppg (2,618 sacks, 2.71 cuft/sack); Tail slurry 14.8 ppg (1,427 sacks, 1.33 cuft/sack). Assumed 100% excess volume.
- 3. 13 3/8" Intermediate Casing:** 13 3/8", 68 lb/ft, L80 BTC from section TD to surface. 17 1/2" Hole at 8,991' MD/TVD. Expected MW 10.00 ppg SBM. Cemented with Class H cement (with additive) up to surface; Lead slurry 12.80 ppg (3,354 sacks; 2.10 cuft/sack); Tail slurry 14.8 ppg (1,437 sacks; 1.33 cuft/sack). Assumed 50% excess volume in open hole section.
- 4. 9 5/8" Injection Casing:** 9 5/8", 53.5 lb/ft, 25CRW-125 VAM-21, Prem Connection from 10,770' MD/TVD (Well TD) to 7,932' MD/TVD (150' above Top of Confining zone) & 53.5 lb/ft, L80 VAM-21, Premium connection from 7,932' MD/TVD to surface. 12 1/4" Hole to 10,770' MD/TVD. Expected MW 13.50 ppg SBM.
 Cemented in two stages:
 Stage #1: Specialized CO₂ compatible cement slurry (PermaSet or equivalent), 14.8 ppg (1,011 sacks; 1.12 cuft/sack). Expected TOC at 7,932' MD/TVD. (DV tool). Assumed 20% excess.
 Stage #2: 12.5 ppg (2,053 sacks; 1.24 cuft/sack) Class H cement (with additives) lead slurry + 14.8 ppg (100 sacks; 1.12 cuft/sack) specialized CO₂ compatible cement slurry (PermaSet or equivalent) tail. Cement up to the surface. No volume excess is assumed.
- 5. DTS/DAS Fiber Optic Cable:** Downhole cable with a 150 °C temperature rating, 2 single-mode fiber acrylate clamped outside the 9 5/8" casing from surface to TD.
 Back-up fiber optic cable will be set up from surface to the depth of the intermediate casing shoe.
- 6. TEC (Electrical Cables):** Downhole cable attached outside of the tubing, with pressure/temperature gauge carriers. Downhole measurements in two locations – annulus and tubing; minimum pressure and temperature ratings of 10k psi and 150°C.
- 7. Annular Fluid:** 9.3 ppg CaCl₂ inhibited brine with corrosion control (98% MgO, magnesium oxide).
- 8. Tubing and Packer:** 4 1/2" Tubing, 15.1 lb/ft, 25CRW-125, VAM-21. End of tail at 9,100' MD/TVD; Removable Production packer at 9,050' MD/TVD; Tubing hanger at ground level.
- 9. Upside Perforations Interval #3:** 9,194' – 9,290' MD/TVD and 9,370 – 9,494' MD/TVD. Oriented perforation system.
P&A Perforation Interval #2 (9,736' MD/TVD – 9,896' MD/TVD)
- 10. Plug #2:** 9 5/8" Squeeze Packer assumed at ≈ 9,734' MD/TVD. 14.88 ppg specialized CO₂ compatible cement slurry (PermaSet or equivalent) squeezed below packer to isolate Interval #2; 81.2 cuft/14.5 bbls/73 sacks. Squeeze cement above Packer, 27.8 cuft/5 bbls/25 sacks. TOC ≈ 9,664' MD/TVD
P&A Perforation Interval #1 (9,996' MD/TVD – 10,056' MD/TVD)
- 11. Plug #1:** 9 5/8" Squeeze Packer assumed at ≈ 9,994' MD/TVD. 14.88 ppg specialized CO₂ compatible cement slurry (PermaSet or equivalent) squeezed below packer to isolate Interval #1; 41.5 cuft/7.4 bbls/37 sacks. Sting out of Squeeze Packer. Squeeze specialized CO₂ compatible cement slurry (PermaSet or equivalent) above Packer, 27.8 cuft/5 bbls/25 sacks. TOC ≈ 9,924' MD/TVD
- 12. Plug back TD:** From 10,770' MD/TVD (Shoe Depth) to 10,690' MD/TVD (Float Collar). Shoe Track



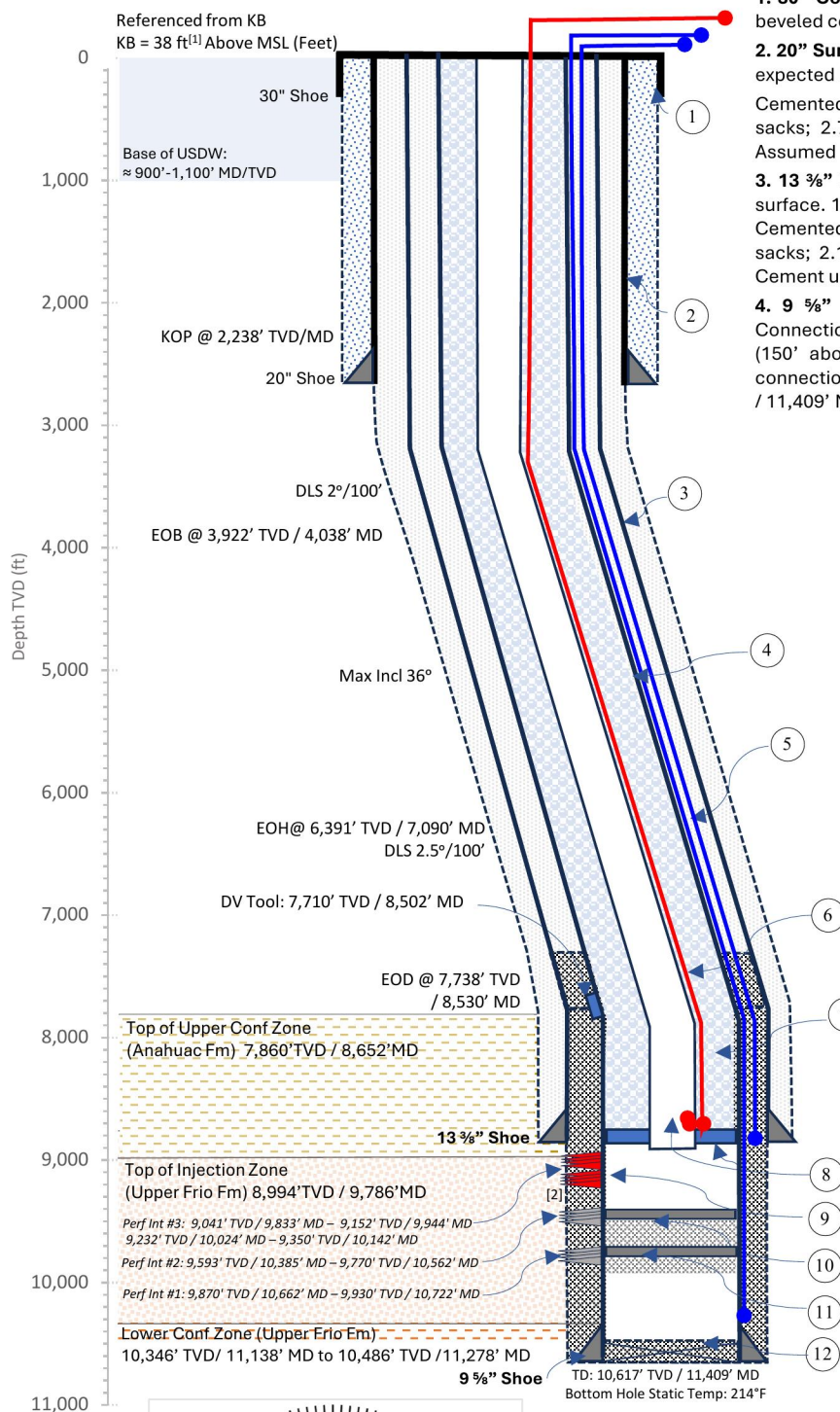
LEGEND

	USDW		Type 1 Cement
	Upper Confining Zone (Anahuac Fm)		Class H Cement with additives
	Injection Zone (Upper Frio Fm)		CO ₂ compatible cement
	Lower Confining Zone (Upper Frio Fm)		CaCl ₂ Inhibited Brine with Corrosion Control

[1] Assumed KB height of 38' above MSL, value will be updated when rig is selected
 [2] Exact perforation locations TBD



Figure E.4-2 Proposed Pre-Closure Well Schematic - Minerva South CCS Well No. 002



- 1. 30" Conductor Pipe:** 1.0" WT, 28" ID, 310.3 lb/ft, X56 Welded, plain-end, beveled conductor with drive shoe driven to refusal at 150' MD/TVD.
- 2. 20" Surface Casing:** 133 lb/ft, L80, ER at 2,991' TVD / 3,000' MD. 26" Hole, expected MW 9.00 ppg WBM. Cemented with Type-1 cement up to the surface. Lead slurry 11.80 ppg (2,618 sacks; 2.71 cuft/sack); Tail slurry 14.8 ppg (1,427 sacks; 1.33 cuft/sack). Assumed 100% volume excess.
- 3. 13 3/8" Intermediate Casing:** 13 3/8", 68 lb/ft, L80 BTC from section TD to surface. 17 1/2" Hole at 8,844' TVD / 9,636' MD. Expected MW 10.00 ppg SBM. Cemented with Class H cement (with additives). Lead slurry 12.80 ppg (3,608 sacks; 2.10 cuft/sack) + Tail slurry 14.8 ppg (1,542 sacks; 1.33 cuft/sack). Cement up to the surface. Assumed 50% excess volume in open hole section.
- 4. 9 5/8" Injection Casing:** 9 5/8", 53.5 lb/ft, 25CRW-125 VAM-21, Prem Connection from 10,617' TVD / 11,409' MD (Well TD) to 7,710' TVD / 8,502' MD (150' above Top of Confining zone) & 53.5 lb/ft, L80 VAM-21, Premium connection from 7,710' TVD / 8,502' MD to surface. 12 1/4" Hole to 10,617' TVD / 11,409' MD. Expected MW 13.50 ppg SBM.

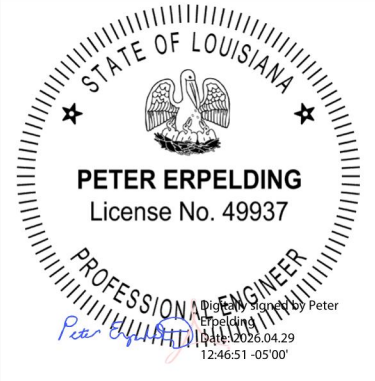
Cemented in two stages:
 Stage #1: Specialized CO₂ compatible cement slurry (PermaSet or equivalent) 14.8 ppg (1,027 sacks; 1.12 cuft/sack). Expected TOC at 7,710' TVD / 8,502' MD. (DV tool). Assumed 20% excess volume in open hole section.
 Stage #2: 12.5 ppg (2,207 sacks; 1.24 cuft/sack) Class H cement (with additives) lead slurry + 14.8 ppg (100 sacks; 1.12 cuft/sack) specialized CO₂ compatible cement slurry (PermaSet or equivalent) tail. Cement up to the surface. No excess volume was considered.

- 5. DTS/DAS Fiber Optic Cable:** Downhole cable with a 150 °C temperature rating, 2 single-mode fiber acrylate clamped outside the 9 5/8" casing from surface to TD. Back-up fiber optic cable will be set up from the surface to the depth of the intermediate casing shoe.
- 6. TEC (Electrical Cables):** Downhole cable attached outside of the tubing, with pressure/temperature gauge carriers. Downhole measurements in two locations - annulus and tubing; minimum pressure and temperature ratings of 10k psi and 150° C.
- 7. Annular Fluid:** 9.3 ppg CaCl₂ inhibited brine with corrosion control (98% MgO, magnesium oxide).
- 8. Tubing and Packer:** 4 1/2" Tubing, 15.1 lb/ft, 25CRW-125, VAM-21, End of tail at 8,938' TVD / 9,730' MD; Removable Production packer at 8,888' TVD / 9,680' MD; Tubing hanger at ground level.

- 9. Upside Perforations Interval #3:** 9,041' TVD / 9,833' MD - 9,152' TVD / 9,944' MD and 9,232' TVD / 10,024' MD - 9,350' TVD / 10,142' MD. Oriented perforation system.
- P&A Perforation Interval #2**
(9,593' TVD / 10,385' MD - 9,770' TVD / 10,562' MD)
- 10. Plug #2:** 9 5/8" Squeeze Packer assumed at ≈ 9,591' TVD/10,383' MD. 14.88 ppg specialized CO₂ compatible cement slurry (PermaSet or equivalent) squeezed below packer to isolate Interval #2; 88.0 cuft/15.7 bbls/79 sacks. Squeeze cement above Packer, 28.1 cuft/5.0 bbls/25 sacks. TOC ≈ 9,521' TVD / 10,313' MD.
- P&A Perforation Interval #1**
(9,870' TVD / 10,662' MD - 9,930' TVD / 10,722' MD)
- 11. Plug #1:** 9 5/8" Squeeze Packer assumed at ≈ 9,868' TVD/10,660' MD. 14.88 ppg specialized CO₂ compatible cement slurry (PermaSet or equivalent) squeezed below packer to isolate Interval #1; 41.5 cuft/7.4 bbls/37 sacks. Sting out of Squeeze Packer. Squeeze specialized CO₂ compatible cement slurry (PermaSet or equivalent) above packer, 28.1 cuft/5.0 bbls/25 sacks. TOC ≈ 9,798' TVD / 10,590' MD.

- 12. Plug back TD:** From 11,409' MD / 10,617' TVD (Shoe Depth) to 11,329' MD / 10,537' TVD (Float Collar). Shoe Track

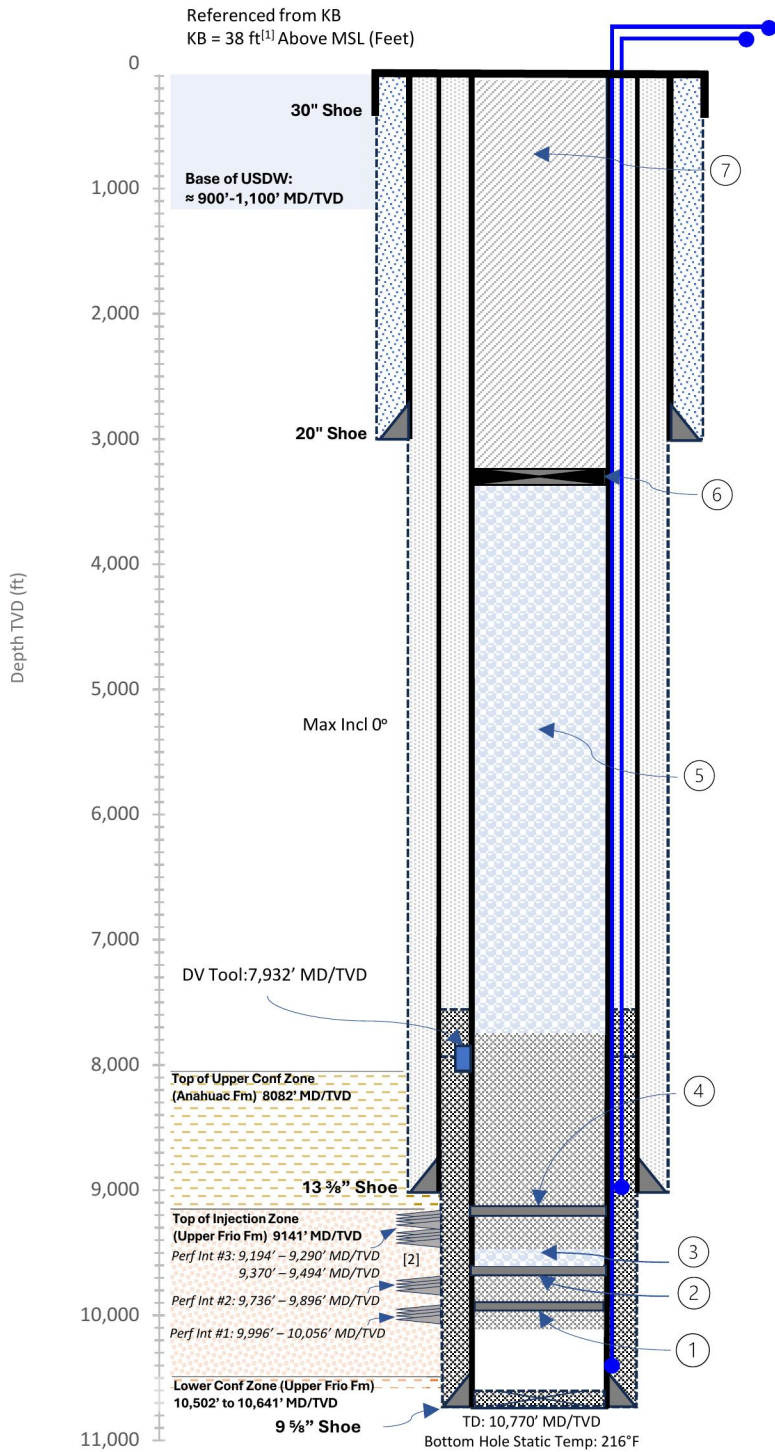
^[1] Assumed KB height of 38' above MSL, value will be updated when rig is selected
^[2] Exact perforation locations TBD



LEGEND			
	USDW		Type 1 Cement
	Upper Confining Zone (Anahuac Fm)		Class H Cement with additives
	Injection Zone (Upper Frio Fm)		CO ₂ compatible cement
	Lower Confining Zone (Upper Frio Fm)		CaCl ₂ Inhibited Brine with Corrosion Control



Figure E.4-3 Proposed Post-Closure Well Schematic - Minerva South CCS Well No. 001



P&A Perforation Interval #1
(9,996' MD/TVD – 10,056' MD/TVD)

1. Plug #1: 9 5/8" Squeeze Packer assumed at ≈ 9,994' MD/TVD. 14.88 ppg specialized CO₂ compatible cement slurry (PermaSet or equivalent) squeezed below packer to isolate Interval #1; 41.5 cuft/7.4 bbls/37 sacks. Sting out of Squeeze Packer. Squeeze cement above Packer, 27.8 cuft/5 bbls/25 sacks. TOC ≈ 9,924' MD/TVD

P&A Perforation Interval #2
(9,736' MD/TVD – 9,896' MD/TVD)

2. Plug #2: 9 5/8" Squeeze Packer assumed at ≈ 9,734' MD/TVD. 14.88 ppg specialized CO₂ compatible cement slurry (PermaSet or equivalent) squeezed below packer to isolate Interval #2; 81.2 cuft/14.5 bbls/73 sacks. Squeeze cement above Packer, 27.8 cuft/5 bbls/25 sacks. TOC ≈ 9,664' MD/TVD

3. Kill Weight Fluid: > 9 ppg^[3] CaCl₂ inhibited brine with corrosion control (98% MgO, magnesium oxide).

P&A Perforation Interval #3
(9,194' MD/TVD – 9,290' MD/TVD and 9,370' MD/TVD – 9,494' MD/TVD)

4. Plug #3: 9 5/8" Squeeze Packer assumed at ≈ 9,192' MD/TVD. 14.88 ppg specialized CO₂ compatible cement slurry (PermaSet or equivalent) squeezed below packer to isolate Interval #3; 153.7 cuft/27.4 bbls/137 sacks. Sting out of Squeeze Packer. Squeeze specialized CO₂ compatible cement slurry (PermaSet or equivalent) above Packer, 544.7 cuft/97.0 bbls/486 sacks. TOC ≈ 7,821' MD/TVD

5. Kill Weight Fluid: > 9 ppg^[3] CaCl₂ inhibited brine with corrosion control (98% MgO, magnesium oxide).

Surface Casing Shoe/USDW Isolation
(50' MD/TVD – 3,100' MD/TVD)

6. Plug #4: 9 5/8" Cast Iron Bridge Plug (CIBP) assumed at ≈ 3,100' MD/TVD, 100' below the surface casing depth. ≈ 1,600' of 16.4 ppg Class H Cement (with additives) spotted above the CIBP, 635.8 cuft/ 113.2 bbls/ 568 sacks. TOC ≈ 1,500' MD/TVD

7. Plug #5: ≈ 1,500' 16.4 ppg Class H Cement (with additives) up to surface, 576.2 cuft/ 102.6 bbls/ 514 sacks. TOC ≈ 50' MD/TVD (WH to be cut off 5' below GL)

^[1] Assumed KB height of 38' above MSL, value will be updated when rig is selected

^[2] Exact perforation locations TBD

^[3] Final fluid density will be selected based on the well kill weight fluid

LEGEND

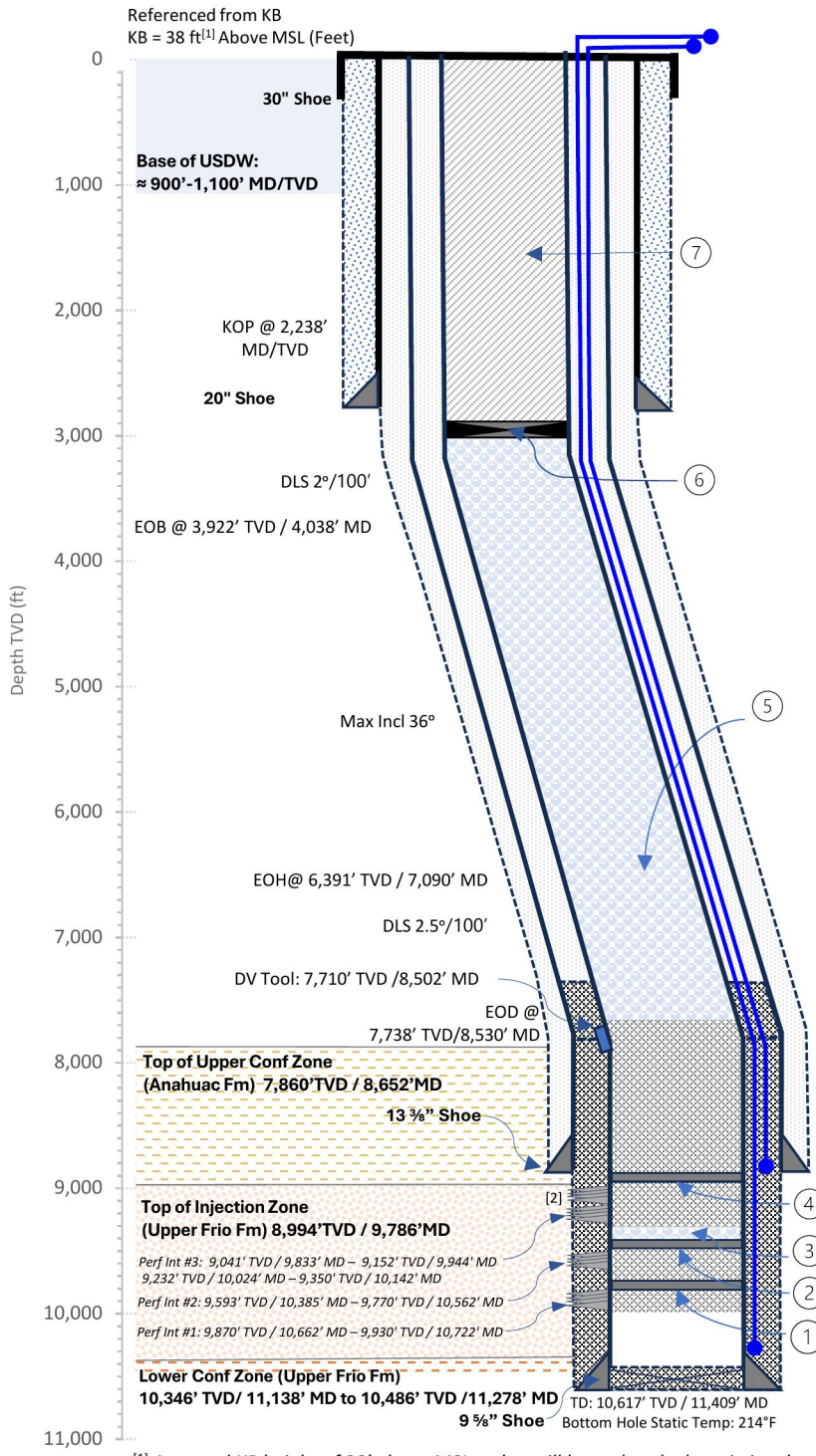
	USDW		Type 1 Cement
	Upper Confining Zone (Anahuac Fm)		Class H Cement with additives
	Injection Zone (Upper Frio Fm)		CO ₂ compatible cement
	Lower Confining Zone (Upper Frio Fm)		CaCl ₂ Inhibited Brine with Corrosion Control

^[2] Oriented Perforation System, included to avoid damage to fiber optic cable





Figure E.4-4 Proposed Post-Closure Well Schematic - Minerva South CCS Well No. 002



P&A Perforation Interval #1

(9,870' TVD / 10,662' MD – 9,930' TVD / 10,722' MD)

1. Plug #1: 9 5/8" Squeeze Packer assumed at ≈ 9,868' TVD / 10,660' MD. 14.88 ppg specialized CO₂ compatible cement slurry (PermaSet or equivalent) squeezed below packer to isolate Interval #1; 41.5 cuft/7.4 bbls/37 sacks. Sting out of Squeeze Packer. Squeeze cement above Packer, 28.1 cuft/5.0 bbls/25 sacks. TOC ≈ 9,798' TVD / 10,590' MD

P&A Perforation Interval #2

(9,593' TVD / 10,385' MD – 9,770' TVD / 10,562' MD)

2. Plug #2: 9 5/8" Squeeze Packer assumed at ≈ 9,591' TVD / 10,383' MD. 14.88 ppg specialized CO₂ compatible cement slurry (PermaSet or equivalent) squeezed below Packer to isolate Interval #2; 88.0 cuft/15.7 bbls/79 sacks. Squeeze cement above Packer, 28.1 cuft/ 5.0 bbls/ 25 sacks. TOC ≈ 9,521' TVD / 10,313' MD.

3. Kill Weight Fluid: > 9 ppg^[3] CaCl₂ inhibited brine with corrosion control (98% MgO, magnesium oxide).

P&A Perforation Interval #3

(9,232' TVD / 10,024' MD – 9,350' TVD / 10,142' MD) and (9,041' TVD / 9,833' MD – 9,152' TVD / 9,944' MD)

4. Plug #3: 9 5/8" Squeeze Packer assumed at ≈ 9,038' TVD / 9,831' MD. 14.88 ppg specialized CO₂ compatible cement slurry (PermaSet or equivalent) squeezed below packer to isolate Interval #3; 157.3 cuft/28.0 bbls/140 sacks. Sting out of Squeeze Packer. Squeeze specialized CO₂ compatible cement slurry (PermaSet or equivalent) above Packer, 567.1 cuft/101.0 bbls/506 sacks. TOC ≈ 7,612' TVD / 8,404' MD.

5. Kill Weight Fluid: > 9 ppg^[3] CaCl₂ inhibited brine with corrosion control (98% MgO, magnesium oxide).

Surface Casing Shoe/USDW Isolation

(50' TVD / MD – 3,087' TVD / 3,100' MD)

6. Plug #4: 9 5/8" Cast Iron Bridge Plug (CIBP) assumed at ≈ 3,100' MD/TVD, 100' below the surface casing depth. ≈ 1,600' of 16.4 ppg Class H Cement (with additives) spotted above the CIBP, 635.8 cuft/113.2 bbls/568 sacks. TOC ≈ 1,500' MD/TVD

7. Plug #5: ≈ 1,500' 16.4 ppg Class H Cement (with additives) to surface, 576.2 cuft/102.6 bbls/514 sacks. TOC ≈ 50' MD/TVD (WH to be cut off 5' below GL).

^[1] Assumed KB height of 38' above MSL, value will be updated when rig is selected

^[2] Exact perforation locations TBD

^[3] Final fluid density will be selected based on the well kill weight fluid

LEGEND

	USDW		Type 1 Cement
	Upper Confining Zone (Anahuac Fm)		Class H Cement with additives
	Injection Zone (Upper Frio Fm)		CO ₂ compatible cement
	Lower Confining Zone (Upper Frio Fm)		CaCl ₂ Inhibited Brine with Corrosion Control

