



SWD Test Procedure

Well: NVega 23-424

Dan Fouts

February 15, 2019

WELL INFORMATION:

Well: NVega 23-424
API #: 05-077-09505-00
Pad: North Vega 5B
County, State: Mesa, Colorado
Surface Hole: 1592' FSL & 252' FWL NWSW S24 T09S R93W 6PM
Surface Coordinates: 39.257667, -107.728897
Bottom Hole: 2538' FNL & 368' FEL S23 T09S R93W 6PM

Elevation: RKB: 7640'
KB: 21'
GL: 7619'

PBTD: 8020'
TD: 8393' MD / 8106' TVD

Casing: Conductor: 16" @ 60'
Surface: 8-5/8" 32# J55 @ 2204' (TOC @ surface)
Production: 4-1/2" 11.6# N80 @ 9252' (TOC @ 3735' / Top Good Bond @ 4008')

Perforations & Plugs: Ohio Creek 5177'-5340' (Squeezed)
Williams Fork 6366'-7509'
Rollins 8086'-8250'
Cozzette 8643'-8714'
Corcoran 8815'-8881'

Tubing: 246 jts 2-3/8" 4.7# J55 EUE 8rd @ 7791', XN Nipple @ 7759'

Geology: Ohio Creek 5142'
Williams Fork 5477'
Cameo 7756'

CONTACTS:

Health & Safety Coordinator	Laura Lancaster	970 644 1259
Production Coordinator	TJ Cordova	970 250 9519
Production Coordinator	Rory Mortensen	970 778 5161
Wellsite Consultant	Dan Hacking	970 778 1063
Wellsite Consultant	Troy Roehm	970 852 1806
Production Engineer	Dan Fouts	970 852 1170
Completions Manager	John Grubich	970 589 9496
Production Manager	Milt Johnson	970 230 1011
Senior Regulatory Manager	Wayne Bankert	970 985 5383
Operations Manager	Chris Clark	970 462 8375

DIRECTIONS: From Collbran:
East on Hwy 330 East 12.3 miles
Right / south on Harrison Creek Road .9 miles
Left / south at Y on lease road .9 miles
Left / east at Y on lease road .4 miles to location

PROCEDURE:

1. Abandon Production Perforations:

2. Hold pre-job safety meeting with all personnel involved in each operation.
3. MIRU service rig, pump, and 400-500 bbl water tank.
4. Kill well with lease water.
5. ND production tree.
6. NU and test Class III BOPE to 2500 psi for 10 minutes.
7. Unland tubing hanger.
8. POOH standing back tubing.
9. MIRU wireline unit.
10. Run wireline gauge ring to 6325'.
11. Wireline set 4-1/2" 10K CIBP @ 6300'.
12. Fill well with production water to ensure CIBP holds fluid column.
13. Dump 50 LF (4 sx) neat Class G cement plug on top of CIBP @ 6250'-6300'.
14. Allow cement to set for at least 24 hours.

Pressure Test Wellbore:

15. Set RBP @ 5105' +/- (between collars @ 5082' and 5126').
16. Perform charted pressure test of casing to 2,000 psi for 30'.
17. Retrieve RBP.

Prep for Wireline Operations:

18. MIRU nitrogen unit.
19. RIH open ended tubing and blow well dry down to top of plug @ 6250'.
20. RDMO nitrogen unit.
21. POOH laying down tubing.
22. RDMO workover rig.
23. Shoot fluid level and submit to engineering.

Perforate Injection Formations:

24. MIRU wireline.
25. NU and test wireline BOPE.
26. Run gauge ring to fluid level.
27. Set 4-1/2" 10K CIBP @ 100' above fluid level. Note: CIBP must be set no higher than 5600'.
28. Correlate to Halliburton CBL dated "21JUL08" (COGCC Document # 1285355).

NOTE: There are two logs with the same date.

The correct CBL shows short joints @ 6165'-6186+' and 7614+'-7636'.

29. Perforate the following intervals with 3-1/8" HSC guns loaded 3 spf 120 deg with Owen 19g HERO SGH-3119-330 charges:
 - a. 5428'-5448' (20')
 - b. 5370'-5400' (30')
 - c. 5305'-5345' (40')
 - d. 5250'-5290' (40')
 - e. 5190'-5220' (30')
 - f. 5144'-5154' (10')

Collect Injection Formations Water Samples for Analysis:

30. Hold pre-job safety meeting with all personnel involved in this operation.
31. Collect (3) x 1 quart samples of formation water using wireline bailer.
32. RDMO wireline.
33. Send water samples to lab for analysis.

Pump Step Rate Test:

34. Hold pre-job safety meeting with all personnel involved in this operation.
35. Manifold tanks in (2) parallel trains with a central take-point to ensure adequate deliverability.
36. Fill portable tanks with lease water.
37. Install flow meter at wellhead. Reconfigure tubing transducer to record bradenhead pressure.
38. Verify automation and telemetry are functioning and recording data.
39. Install company owned memory pressure gauges on casing and bradenhead for redundancy.
40. MIRU charge pump, filter pod unit with 10 micron filters, and 500 hp triplex pump.
41. Pump step rate test as per attached "Step Rate Test Schedule."
42. Shut in well upstream of casing pressure gauges immediately at end of pumping.
43. Continue collecting data until surface gauge reads 0 psi for 24 hours.
44. Shut in and secure well.
45. Engineering to analyze step rate test to determine frac gradient.

Pump Injectivity Test:

46. Pump produced water up to maximum pressure and rate determined from step rate test data analysis for up to 30 days to determine viability of well for long term SWD purposes.
47. Shut in and secure well.

Step Rate Test Schedule

Step Number	Notes	Step Time Duration (minutes)	Step Time Duration (hours)	Time Cumulative (minutes)	Time Cumulative (hours)	Pump Rate (GPM)	Pump Rate (BPM)	Step Volume (BBLs)	Volume Cumulative (BBLs)
1	Zero Rate	60	1	60	1	0	0.00	0	0
2	Min Rate	60	1	120	2	21	0.50	30	30
3		60	1	180	3	31.5	0.75	45	75
4		60	1	240	4	42	1.00	60	135
5		60	1	300	5	56	1.33	80	215
6		60	1	360	6	70	1.67	100	315
7		60	1	420	7	84	2.00	120	435
8		60	1	480	8	105	2.50	150	585
9		60	1	540	9	126	3.00	180	765
10		60	1	600	10	168	4.00	240	1005
11		60	1	660	11	210	5.00	300	1305
12		60	1	720	12	252	6.00	360	1665
13		60	1	780	13	294	7.00	420	2085
14		60	1	840	14	336	8.00	480	2565
15		60	1	900	15	378	9.00	540	3105
16	Max Rate	60	1	960	16	420	10.00	600	3705
17	Fall Off	4320	72	5280	88		0.00	0	3705
TOTAL		5100	88	5280	88				3705