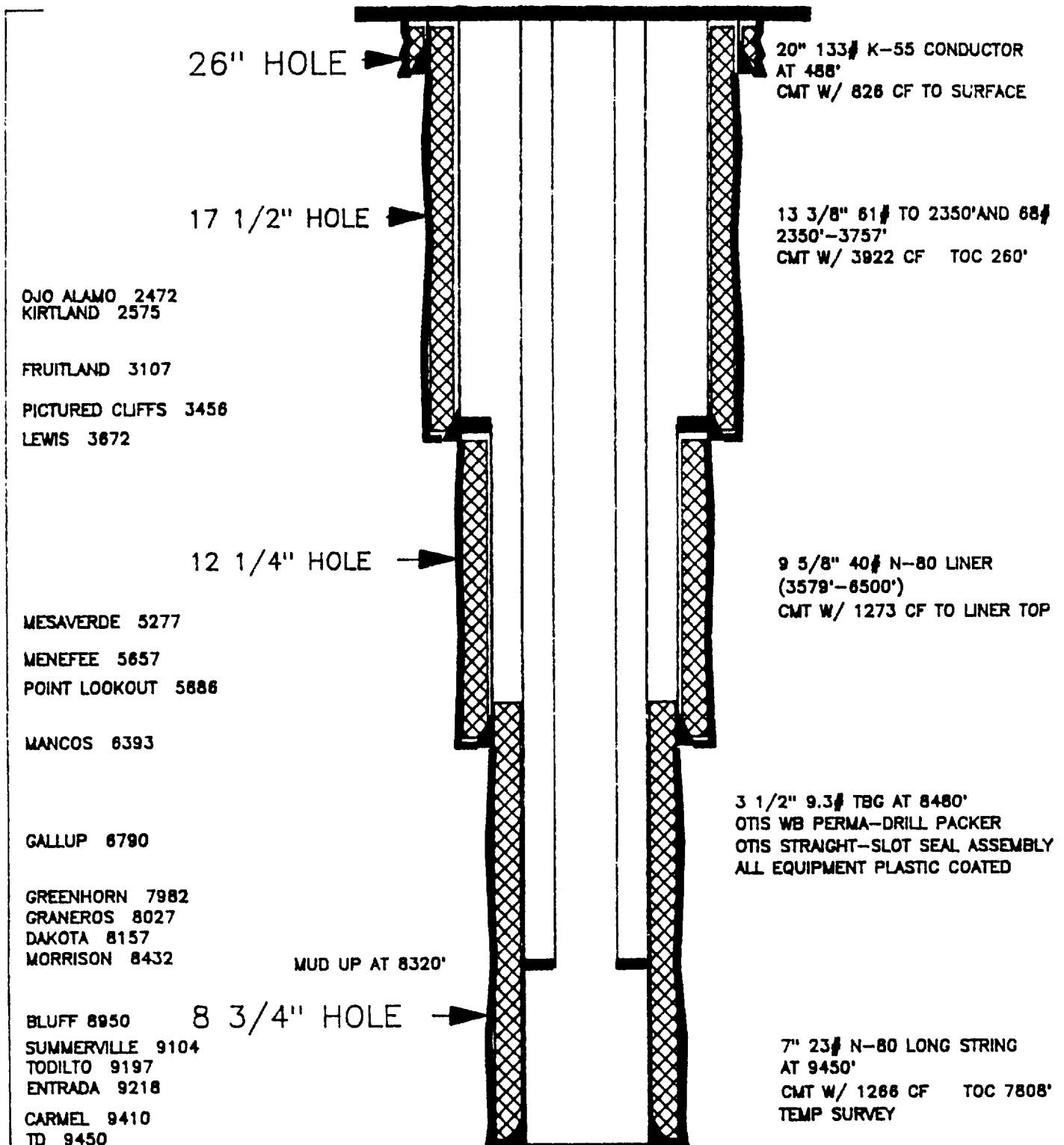


MIDDLE MESA SWD #1

WELLBORE DIAGRAM

NW/SW SECTION 25 T32N-R7W
MORRISON/ENTRADA



**Entrada Completion Procedure
Middle Mesa SWD #1**

*****NOTIFY BLM AND NMOCD THAT COMPLETION PROCEDURES ARE COMMENCING*****

1. Place 14 - 400 bbl. cleaned tanks on location. Fill with 1% KCl water filtered to 1 micron nominal and heat to 75° F.
2. MOL with completion rig, hold safety meeting, install fire and safety equipment in strategic locations. Comply with all BLM, NMOCD and MOI safety regulations. RU.
3. NU 11" x 7 1/16" 3000# adapter and 7 1/16" 5000# double BOP. Pressure test BOP.
4. TIH with 6 1/4" bit and float sub with float on 2 7/8" L-80 workstring. Clean out to 9400'. Circulate hole clean. TOOH. Pressure test casing to 800 psi.
5. RU wireline with low pressure pack-off and run GR-CCL-CBL from PBTD to 6500' or TOC. If microannulus exist, relog with 1000 psi on casing. Evaluate CBL for necessary squeezing operations across perforated interval. Pressure test casing to 5000 psi.
6. Perforate the Entrada using a 4" hollow steel carrier gun with PML-23 charges (0.5" diameter, 11.95" ECP) at 9219-9227 (2 SPF), 9231-9237 (1 SPF), 9240-9247 (2 SPF), 9251-9261 (2 SPF), 9264-9268 (1 SPF), 9271-9275 (1 SPF), 9297-9302 (1 SPF), 9317-9324 (2 SPF), and 9326-9330 (1 SPF), for a total of 87 holes.
7. TIH with 7" retrievable packer, 10' sub, and Baker model E tubing control valve in closed position. Set packer at 9185'. Pressure test annulus to 1000 psi. Open control valve with right hand rotation (6 1/2 turns at valve).
8. RU swabbing unit, recover a total fluid volume of 50 bbls. Obtain and analyze fluid samples at 20, 30, 40 and 50 bbls to ensure formation fluid is recovered. RD swabbing unit. TOOH with packer.
9. ~~NU tree saver. Open tubinghead valve.~~
RU frac crew. Test frac lines to 6000 psi. Breakdown formation and establish rate. Record ISIP. Ball off formation with 3275 gal. of 15% HCL, 2% CIA-1 inhibitor, and 130 7/8" RCN ball sealers. Maximum treating pressure is 5000 psi. Ball schedule will be determined by number of holes initially open. Run junk basket to knock balls off perfs and retrieve balls.

Entrada Completion Procedure
Middle Mesa SWD #1
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10. Fracture stimulate Entrada formation using 40# low residual gel (mix on fly) and 160,000# 20/40 Brady proppant at a fluid rate of 75 BPM using the following schedule:

Stage	Stage Vol (Gals)	Slurry Vol (Bbls)	Cum Vol (Bbls)	Stage Sand (Lbs)	Total Sand (Lbs)	Remarks
Prepad	10,000	238	238	---	---	Slickwater
Pad	20,000	476	714	---	---	40# HPG Gel
1/2 PPG	7,500	183	897	3,750	3,750	IR 192 @ .4 mcr/1000#
1 PPG	10,000	249	1,146	10,000	13,750	IR 192 @ .4 mcr/1000#
1 1/2 PPG	10,000	254	1,400	15,000	28,750	IR 192 @ .4 mcr/1000#
2 PPG	10,000	260	1,660	20,000	48,750	IR 192 @ .4 mcr/1000#
2 1/2 PPG	10,000	265	1,925	25,000	73,750	IR 192 @ .4 mcr/1000#
3 PPG	10,000	270	2,195	30,000	103,750	IR 192 @ .4 mcr/1000#
3 1/2 PPG	7,500	207	2,402	26,250	130,000	IR 192 @ .4 mcr/1000#
4 PPG	7,500	211	2,613	30,000	160,000	IR 192 @ .4 mcr/1000#
Flush	15,245	363	2,976	---	---	Slickwater

All water - 1% KCL All gel w/0.25 lb/1000 gal. WCB-1 breaker.

Anticipated surface treating pressure of 1185 psi.
Record ISIP 5, 10, and 15 minute shut-in pressures.

11. Wait 4 hours for gel to break. TIH with 2 7/8" tubing and clean out to 9400'. TOOH. Run after-frac gamma ray across treated interval.
12. Prepare to run step rate test. Preset recorder to every 30 seconds for 5 hours, then every minute for the remainder of the test. Set pressure bomb at ± 9265 .
13. Rig up pump trucks and treater van. Inject as follows:
- Load hole with 1% KCL water.
 - Start pumping at 1/2 BPM for 15 minutes. Then increase by 1/2 BPM increments every 15 minutes.
 - Using surface pressures and calculated bottom hole pressures, plot pressure vs rate until parting pressure observed.
 - Recover bomb.
14. If step rate indicates injection greater than 7500 BPD possible, continue procedure. Otherwise; implement Morrison stimulation procedure.
15. Perform squeezing operations as necessary for cement top below 6500'.
16. Rig up wireline. Run 7" Otis Perma-drill WB packer with reentry guide and 4" bore. Set at 9165'.

Entrada Completion Procedure
Middle Mesa SWD #1
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17. PU 2.97" ID sealing unit with extension (total 8' of seals) and X nipple. Run sealing unit in hole on 3 1/2" 9.3# J-55 8RD plastic coated tubing. Sting into packer and land tubing with 30,000# on packer. Test backside to 750 psi for 10 minutes. Have BLM and NMOCD witness pressure test. Add corrosion inhibitor to backside. RD BOP. RU wellhead. Release rig.
18. Prepare to run injectivity test. Set bomb to record every 30 seconds for 5 hours and every minute for the rest of the test. Set pressure bomb at ± 9265 . Have BLM and NMOCD witness step rate test.
19. Rig up pump truck and treater van. Pressure test lines to 3000 psi. Inject produced coal water (1 micron nominal) as follows:

Stage	Rate(BPM)	Volume (BBLS)	Start at 2 BPM	20 MB/s
1	3	.45 20		
2	4	.65 40		
3	5	.70 50		
4	5.5	55		
5	6	60		
6	6.5	65		
7	7	70		
8	7.5	75		
9	8	80		
10	8.5	85		
TOTAL		670 BBLS		

After step rate test, rig down pumps. Recover bomb after 24 hours to obtain fall-off data.

Approved: A.C. Walker by J. H. H.
D. C. Walker

**Morrison Completion Procedure
Middle Mesa SWD #1**

15. RU wireline. Run gauge ring to 9150'. Set retrievable bridge plug at 9150'. Pressure test plug to 5000 psi. TIH with dump bailer and place 100# of 20/40 sand on top of bridge plug for a sand plug of 4'.
16. Perforate the Bluff using a 4" hollow steel carrier gun with PML-23 charges for 1 SPF at 8959' - 8966', 8981' - 8999', 9005' - 9013', 9021' - 9037', 9050' - 9058', 9069' - 9079', and 9089' - 9101' for a total of 79 holes.
17. TIH with 7" retrievable packer, 10' sub, and Baker Model E tubing control valve in closed position. Set packer at 8930'. Pressure test annulus to 1000 psi. Open control valve.
18. RU swabbing unit, recover a total fluid volume of 50 bbls. Obtain and analyze fluid samples at 20, 30, 40 and 50 bbls. to ensure that formation fluid is recovered. RD swabbing unit. TOOH with packer.
19. ~~NA treesaver. Open tubinghead valve.~~ RU frac crew. Test frac lines to 6000 psi. Break down formation and establish rate. Record ISIP. Ball off formation with 2980 gal. 15% HCl, 2% CIA-1 inhibitor, and 120 7/8" RCN ball sealers. Maximum treating pressure 5000 psi. Run junk basket to knock balls off perfs and retrieve balls.
20. Fracture stimulate Bluff formation using 40# low residual gel and 222,500# 20/40 Brady proppant at a fluid rate of 80 BPM using the following schedule:

<u>Stage</u>	<u>Stage Volume (Gal.)</u>	<u>Slurry Volume (Bbls.)</u>	<u>Cum Vol. (Bbls.)</u>	<u>Stage Sand (Lbs.)</u>	<u>Total Sand (Lbs.)</u>	<u>Remarks</u>
Prepad	12,500	298	298	---	---	Slickwater
Pad	27,500	655	952	---	---	40-# HPG Gel
1/2 PPG	7,500	183	1,135	3,750	3,750	IR 192 @ .4 mcr/1000#
1 PPG	10,000	249	1,384	10,000	13,750	IR 192 @ .4 mcr/1000#
1½ PPG	10,000	254	1,638	15,000	28,750	IR 192 @ .4 mcr/1000#
2 PPG	12,500	325	1,963	25,000	53,750	IR 192 @ .4 mcr/1000#
2½ PPG	12,500	331	2,294	31,250	85,000	IR 192 @ .4 mcr/1000#
3 PPG	15,000	406	2,700	45,000	130,000	IR 192 @ .4 mcr/1000#
3½ PPG	15,000	414	3,113	52,500	182,500	IR 192 @ .4 mcr/1000#
4 PPG	10,000	281	3,387	40,000	222,500	IR 192 @ .4 mcr/1000#
Flush	14,815	353	3,740	---	---	Slickwater

All water 1% KCl; All gel w/0.25 lb./1000 gal. WCB-1 breaker.

Anticipated surface treating pressure of 1590 psi. Record ISIP, 5, 10, and 15 minute shut-in pressures.

Morrison Completion Procedure
Middle Mesa SWD #1
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21. Wait 4 hours for gel to break. TIH and clean to bridge plug set at 9150'. TOOH.
22. Run after-frac gamma ray. Prepare to run step rate test on Bluff formation. Preset pressure bomb to every 30 seconds for 5 hours. Then one minute intervals for remainder of test. Set bomb at $\pm 9030'$.
23. RU pump truck and treater van. Pressure test lines to 3000 psi.
 - Load hole with 1% KCL water.
 - Start pumping at 1/2 BPM for 15 minutes. Then increase by 1/2 BPM increments every 15 minutes.
 - Using surface pressures and calculated bottom hole pressures, plot pressure vs rate until parting pressure observed.
 - Recover bomb.
24. RU wireline. Run gauge ring to 8950'. Set retrievable bridge plug at $\pm 8950'$. Pressure test bridge plug to 5000 psi. TIH with dump bailer and place 100# of 20/40 on top of bridge plug for sand plug of 4'.
25. Perforate the Upper Morrison using a 4" hollow steel carrier gun with PML 23 charges for 1 SPF at 8533-8542, 8626-8628, 8636-8641, 8705-8709, 8724-8728, 8738-8742, 8775-8792, 8804-8814, 8820-8824, 8828-8831, 8841-8847, 8859-8866, 8880-8886, 8888-8900, and 8924 to 8934 for a total of 103 holes.
26. TIH with 7" retrievable packer, 10' sub, and Baker Model E tubing control valve in closed position. Set packer at 8500'. Pressure test annulus to 1000 psi. Open control valve.
27. RU swabbing unit, recover a total fluid volume of 50 bbls. Obtain and analyze fluid samples at 20, 30, 40, and 50 bbls to ensure formation fluid is recovered. RD swabbing unit. TOOH with packer.
28. NU treesaver. Open tubing head valve.
RU frac crew. Test frac lines to 6000 psi. Breakdown formation and establish rate. Record ISIP. Ball off formation with 3865 gal. 15% HCL, 2% CIA-1 inhibitor and 155 7/8" RCN ball sealers. Maximum treating pressure is 5000 psi. Run junk basket to knock balls off perfs and retrieve balls.
29. Fracture stimulate Upper Morrison formation using 40# low residual gel and 201,250# 20/40 Brady proppant at a fluid rate of 80 BPM using the following schedule:

Morrison Completion Procedure
Middle Mesa SWD #1
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Stage	Stage Vol (gels)	Slurry Vol (bbls)	CUM Vol (bbls)	Stage Sand (lbs)	Total Sand (lbs)	Remarks
Prepad	12,500	298	298	---	---	Slickwater
Pad	27,500	655	952	---	---	40# HPG Gel
1/2 PPG	7,500	183	1,135	3,750	3,750	IR 192 @ .4 mcr/1000#
1 PPG	15,000	373	1,508	15,000	18,750	IR 192 @ .4 mcr/1000#
1 1/2 PPG	15,000	381	1,890	22,500	41,250	IR 192 @ .4 mcr/1000#
2 PPG	22,500	584	2,474	45,000	86,250	IR 192 @ .4 mcr/1000#
2 1/2 PPG	25,000	663	3,136	62,500	148,750	IR 192 @ .4 mcr/1000#
3 PPG	17,500	473	3,610	52,500	201,250	IR 192 @ .4 mcr/1000#
Flush	14,112	336	3,946	---	---	Slickwater

All water 1% KCL All gel w/0.25 lb/1000 gal WCB-1 Breaker

Anticipated surface treating pressure 1800 psi.

Record ISIP, 5, 10 and 15 minute shut-in pressures.

30. Wait 4 hours for gel to break. TIH with 2 7/8" tubing. Clean to bridge plug set at 8950. TOOH.
31. Run after-frac gamma ray. Prepare to run step rate test on Upper Morrison formation. Preset pressure bomb to every 30 seconds for 5 hours. Then one minute intervals for remainder of test. Set bomb at ±8792.
32. RU pump truck and treater van. Pressure test lines to 3000 psi.
 - Load hole with 1% KCL water.
 - Start pumping at 1/2 BPM for 15 minutes. Then increase by 1/2 BPM increments every 15 minutes.
 - Using surface pressures and calculated bottom hole pressures, plot pressure vs rate until parting pressure observed.
 - Recover bomb.
33. TIH to bridge plug at 8950'. Latch and retrieve bridge plug. TOOH.
34. TIH to bridge plug at 9150'. Latch and retrieve bridge plug. TOOH.
35. Perform squeezing operations as necessary for cement top below 6500'.
36. Rig up wireline. Run 7" Otis Perma-drill WB packer with reentry guide and 4" bore. Set at 8480'.
37. PU 2.97" ID sealing unit with extension (total 8' of seals) and X nipple. Run sealing unit in hole on 3 1/2" 9.3# J-55 8RD plastic coated tubing. Sting into packer and land tubing with 30,000# on packer. Test backside to 750 psi for 10 minutes. Have BLM and NMOCD witness pressure test. Add corrosion inhibitor to backside. Rd BOP. RU wellhead. Release rig.

Morrison Completion Procedure
Middle Mesa SWD #1
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38. Prepare to run injectivity test. Set bomb to record every 30 seconds for 5 hours and every minute for the rest of the test. Set pressure bomb at $\pm 9030'$. Have BLM and NMOCD witness step rate test.
39. Rig up pump truck and treater van. Pressure test lines to 3000 psi. Inject produced coal water (1 micron minimal) as follows:

Stage	Rate(BFM)	Volume (BBLS)
1	3	45
2	4	65
3	5	70
4	5.5	55
5	6	60
6	6.5	65
7	7	70
8	7.5	75
9	8	80
10	8.5	85

TOTAL 670 BBLS.

After step rate test, rig down pumps. Recover bomb after 24 hours to obtain fall-off data.

Approved: D.C. Walker by J.A.H.
D. C. Walker