

Noble Energy

1625 Broadway
Denver, CO 80202

#REF!

Niobrara Horizontal

05-123-31810

#REF!

February 5-6 & 8-11, 2011

Ticket #: 7950300

Treater: **David Baldwin**
IFS: **John Clipp**
Engineer: **Noah Laraway**
Customer: **Zach Madraza**

Alpha

Pre Job Inventory

Total Water on Location		43270.0 bbls	1,817,340 gal
Total Water after Prime Up	0 Gal Prime Up	43270.0 bbls	1,817,340 gal
Bottoms		876.2 bbls	36,800 gal
Water Required for Design		43738.1 bbls	1,837,000 gal
Excess		1344.3 bbls	56,460 gal

Total	Ottawa 20/40	#REF!	#
Sand	Ottawa 40/70	#REF!	#
Proppant Hauled From		Brighton	

Pressure Test

Lines Tested To	9016 psi
Max Pressure	8000 psi
Kick-Outs	7600 psi

Volume Calculations

Total Vertical Depth	9010 ft
Wellbore Volume	15513 gal
	369.4 bbls

Event Log

Day 1 - February 05 2011

Interval 10 - WB Volume 369.4 bbl

- 0.9 Open wellhead, begin SilverStim pad @ 1:35 am
- 7.1 Formation break @ 5642 psi & 5.2 bpm
- 39.6 Begin 0.5 ppg 40/70 sand @ 5327 psi & 10.8 bpm
- 62.6 0.5 ppg sand on formaiton @ 6390 psi & 15.5 bpm
- 83.7 Pressured out, begin flowing back wellbore
- 98.4 Wellhead open, begin pumping into well with linear gel
- 111.4 Pressured out, shut down

Pressure Analysis

Interval 11		Interval 20	
ISIP	4856 psi	ISDP	4395 psi
IFG	0.972 psi/ft	FFG	0.921 psi/ft
5 min	NA psi	5 min	NA psi
Leakoff	NA psi	Leakoff	NA psi

Interval 13

ISIP	4231 psi
IFG	0.903 psi/ft
5 min	NA psi
Leakoff	NA psi

Interval 18

ISIP	4627 psi
IFG	0.947 psi/ft
5 min	NA psi
Leakoff	NA psi

Interval 20

ISIP	4336 psi
IFG	0.914 psi/ft
5 min	NA psi
Leakoff	NA psi

Day 2 - February 08, 2011

Interval 10 - WB Volume 369.4 bbl

- 3.9 Wellhead open, begin pumping into well with linear gel
- 7.2 No clear break, formation rollover at 7249 psi and 5.5 bpm
- 35.6 Begin pumping into well with 15% HCl
- 43.4 Begin pumping into well with linear gel
- 52.3 Viscosity/ Temp skid froze up
- 85.6 Begin pumping crosslinked gel
- 112.1 Begin pumping linear gel
- 123.3 Rest of stage skipped, ball dropped
- 145.8** ISIP = 4856 psi, IFG = 0.972 psi/ ft

Day 3 - February 09, 2011**Interval 11 - WB Volume 366.2 bbl**

159.5 Wellhead open, begin pumping into well with linear gel
168.6 Begin pumping into well with crosslinked gel
179.1 Begin pumping 0.25 ppg sand at 6634 psi and 32.8 bpm
188.9 0.25 ppg sand on formation at 6727 psi and 33.0 bpm
189.5 Begin pumping 0.5 ppg sand at 6709 psi and 32.8 bpm
200.5 0.5 ppg sand on formation at 5865 psi and 35.4 bpm
241.2 Begin pumping 1.0 ppg sand at 5177 psi and 35.2 bpm
251.8 1.0 ppg sand on formation at 4998 psi and 35.0 bpm
254.7 Begin pumping 2.0 ppg sand at 5001 psi and 35.1 bpm
265.7 2.0 ppg sand on formation at 4750 psi and 35.0 bpm
270.2 Begin pumping 3.0 ppg sand at 4722 psi and 35.0 bpm
280.2 3.0 ppg sand on formation at 4500 psi and 35.1 bpm
282.9 Quit pumping sand, begin pumping linear gel
287.3 Ball dropped
304.8 Did not see ball hit
313.5 2nd ball dropped, rate increased
328.1 Sleeve opened at 5804 psi

Interval 12 - WB Volume 362.3 bbl

328.2 Formation break at 5221 psi and 10.9 bpm
333.2 Begin pumping into well with crosslinked gel
339.2 Begin pumping 0.25 ppg sand at 5589 psi and 33.7 bpm
349.3 0.25 ppg sand on formation at 5385 psi and 34.9 bpm
350.9 Begin pumping 0.5 ppg sand at 5372 psi and 34.7 bpm
361.1 0.5 ppg sand on formation at 5045 psi and 35.0 bpm
402.0 Begin pumping 1.0 ppg sand at 4832 psi and 35.0 bpm
412.3 1.0 ppg sand on formation at 4672 psi and 35.0 bpm
416.4 Begin pumping 2.0 ppg sand at 4659 psi and 35.0 bpm
426.5 2.0 ppg sand on formation at 4425 psi and 35.0 bpm
431.1 Begin pumping 3.0 ppg sand at 4447 psi and 35.2 bpm
441.5 3.0 ppg sand on formation at 4355 psi and 35.1 bpm
443.6 Quit pumping sand, begin pumping linear gel
448.0 Ball dropped
464.8 Sleeve opened at 5500 psi

Interval 13 - WB Volume 359.3 bbl

464.9 Formation break at 5279 psi and 11.1 bpm
468.9 ISIP = 4231 psi, IFG = 0.903 psi/ft

Day 3 - February 10, 2011

517.9 Wellhead open, begin pumping into well with linear gel
541.5 Begin pumping 0.25 ppg sand at 5377 psi and 35.3 bpm
551.4 0.25 ppg sand on formation at 5335 psi and 35.1 bpm
552.2 Begin pumping 0.5 ppg sand at 5300 psi and 35.1 bpm
558.3 0.5 ppg sand on formation at 5125 psi and 35.3 bpm
603.7 Begin pumping 1.0 ppg sand at 4652 psi and 34.9 bpm
614.0 1.0 ppg sand on formation at 4570 psi and 34.9 bpm
617.8 Begin pumping 2.0 ppg sand at 4565 psi and 34.9 bpm
628.6 2.0 ppg sand on formation at 4340 psi and 34.8 bpm
632.8 Begin pumping 3.0 ppg sand at 4341 psi and 34.7 bpm
643.3 3.0 ppg sand on formation at 4171 psi and 34.8 bpm
644.6 Quit pumping sand, begin pumping linear gel
649.2 Ball dropped
661.5 Sleeve opened at 5587 psi

Interval 14 - WB Volume 355.3 bbl

661.5 Formation break at 4983 psi and 10.7 bpm
664.0 Begin pumping into well with crosslinked gel
669.3 Begin pumping 0.25 ppg sand at 5105 psi and 29.7 bpm
680.5 0.25 ppg sand on formation at 4936 psi and 34.5 bpm
681.1 Begin pumping 0.5 ppg sand at 4925 psi and 34.5 bpm
691.6 0.5 ppg sand on formation at 4668 psi and 34.7 bpm
734.4 Begin pumping 1.0 ppg sand at 4385 psi and 34.3 bpm
744.8 1.0 ppg sand on formation at 4279 psi and 34.3 bpm
748.7 Begin pumping 2.0 ppg sand at 4267 psi and 34.3 bpm
758.7 2.0 ppg sand on formation at 4098 psi and 34.4 bpm
764.1 Begin pumping 3.0 ppg sand at 4108 psi and 34.3 bpm
774.3 3.0 ppg sand on formation at 3919 psi and 34.4 bpm
775.3 Quit pumping sand, begin pumping linear gel
779.8 Ball dropped
792.5 Sleeve opened at 5682 psi

Interval 15 - WB Volume 351.5 bbl

792.6 Formation break at 4430 psi and 10.7 bpm
796.8 Begin pumping crosslinked gel
801.2 Begin pumping 0.25 ppg sand at 4900 psi and 29.3 bpm
811.9 0.25 ppg sand on formation at 4934 psi and 35.0 bpm
813.1 Begin pumping 0.5 ppg sand at 4948 psi and 34.7 bpm
823.2 0.5 ppg sand on formation at 4925 psi and 34.9 bpm
865.1 Begin pumping 1.0 ppg sand at 4748 psi and 34.5 bpm
875.9 1.0 ppg sand on formation at 4644 psi and 34.5 bpm
879.2 Begin pumping 2.0 ppg sand at 4650 psi and 34.5 bpm
889.2 2.0 ppg sand on formation at 4469 psi and 34.6 bpm
893.9 Begin pumping 3.0 ppg sand at 4501 psi and 34.6 bpm
904.1 3.0 ppg sand on formation at 4340 psi and 34.6 bpm
905.6 Quit pumping sand, begin pumping linear gel
910.6 Ball dropped
922.9 Sleeve opened at 5909 psi

Interval 16 - WB Volume 347.6 bbl

922.9 Formation break at 5235 psi and 10.7 bpm
927.0 Begin pumping into well with crosslinked gel
932.5 Begin pumping 0.25 ppg sand at 5254 psi and 30.0 bpm
942.0 0.25 ppg sand on formation at 5253 psi and 35.7 bpm
942.7 Begin pumping 0.5 ppg sand at 5252 psi and 35.7 bpm
952.4 0.5 ppg sand on formation at 5183 psi and 36.1 bpm
993.1 Begin pumping 1.0 ppg sand at 4923 psi and 35.6 bpm
1003.0 1.0 ppg sand on formation at 4705 psi and 35.7 bpm
1007.0 Begin pumping 2.0 ppg sand at 4680 psi and 35.8 bpm
1017.0 2.0 ppg sand on formation at 4446 psi and 35.7 bpm
1022.0 Begin pumping 3.0 ppg sand at 4407 psi and 36.0 bpm
1031.0 3.0 ppg sand on formation at 4264 psi and 35.8 bpm
1033.0 Quit pumping sand, begin pumping linear gel
1049.0 Sleeve opened at 5926 psi

Interval 17 - WB Volume 342.4 bbl

1049.0 Formation break at 5676 psi and 10.7 bpm
1054.0 Begin pumping crosslinked gel
1058.0 Begin pumping 0.25 ppg sand at 5575 psi and 30.0 bpm
1068.0 0.25 ppg sand on formation at 5546 psi and 36.0 bpm
1068.0 Begin pumping 0.5 ppg sand at 5632 psi and 36.0 bpm
1079.0 0.5 ppg sand on formation at 5355 psi and 36.1 bpm
1119.0 Begin pumping 1.0 ppg sand at 4902 psi and 35.6 bpm
1129.0 1.0 ppg sand on formation at 4748 psi and 35.7 bpm
1134.0 Begin pumping 2.0 ppg sand at 4728 psi and 35.6 bpm
1143.0 2.0 ppg sand on formation at 4485 psi and 35.8 bpm
1148.0 Begin pumping 3.0 ppg sand at 4476 psi and 35.8 bpm
1157.0 3.0 ppg sand on formation at 4284 psi and 35.8 bpm

1160.0 Quit pumping sand, begin pumping linear gel
1164.0 Ball dropped
1176.0 Sleeve opened at 6101 psi

Interval 18 - WB Volume 338.7 bbl

1176.0 Formation break at 5664 psi and 11.0 bpm
1179.0 ISIP = 4627 psi, IFG = 0.947 psi/ft

Day 4 - February 11, 2011

Interval 18 - WB Volume 338.7 bbl

1205.0 Wellhead open, begin pumping into well with linear gel
1212.0 Begin pumping crosslinked gel
1219.0 Begin pumping 0.25 ppg sand at 5398 psi and 24.9 bpm
1230.0 0.25 ppg sand on formation at 5608 psi and 35.9 bpm
1231.0 Begin pumping 0.5 ppg sand at 5581 psi and 35.8 bpm
1252.0 0.5 ppg sand on formation at 4987 psi and 36.0 bpm
1282.0 Begin pumping 1.0 ppg sand at 4694 psi and 35.7 bpm
1291.0 1.0 ppg sand on formation at 4543 psi and 35.7 bpm
1295.0 Begin pumping 2.0 ppg sand at 4542 psi and 35.6 bpm
1305.0 2.0 ppg sand on formation at 4291 psi and 35.7 bpm
1310.0 Begin pumping 3.0 ppg sand at 4301 psi and 35.6 bpm
1320.0 3.0 ppg sand on formation at 4111 psi and 35.6 bpm
1322.0 Quit pumping sand, begin pumping linear gel
1326.0 Ball dropped
1339.0 Sleeve opened at 5739 psi

Interval 19 - WB Volume 335.6 bbl

1339.0 Formation break at 5520 psi and 10.7 bpm
1343.0 Begin pumping crosslinked gel
1347.0 Begin pumping 0.25 ppg sand at 5120 psi and 28.7 bpm
1357.0 0.25 ppg sand on formation at 4896 psi and 34.6 bpm
1358.0 Begin pumping 0.5 ppg sand at 4841 psi and 34.6 bpm
1368.0 0.5 ppg sand on formation at 4633 psi and 34.7 bpm
1410.0 Begin pumping 1.0 ppg sand at 4352 psi and 35.1 bpm
1420.0 1.0 ppg sand on formation at 4210 psi and 35.1 bpm
1425.0 Begin pumping 2.0 ppg sand at 4187 psi and 35.1 bpm
1435.0 2.0 ppg sand on formation at 3975 psi and 35.1 bpm
1440.0 Begin pumping 3.0 ppg sand at 3985 psi and 35.0 bpm
1449.0 3.0 ppg sand on formation at 3711 psi and 34.3 bpm
1451.0 Quit pumping sand, begin pumping linear gel
1456.0 Ball dropped
1467.0 Sleeve opened at 5823 psi

Interval 20 - WB Volume 332.4 bbl

1467.0 Formation break at 4709 psi and 11.1 bpm
1470.0 ISIP = 4336 psi, IFG = 0.914 psi/ft
1470.0 Shut down to let water haulers offload
1491.0 Begin pumping crosslinked gel
1496.0 Begin pumping 0.25 ppg sand at 4943 psi and 27.7 bpm
1506.0 0.25 ppg sand on formation at 5003 psi and 35.0 bpm
1508.0 Begin pumping 0.5 ppg sand at 5037 psi and 34.8 bpm
1517.0 0.5 ppg sand on formation at 5022 psi and 36.1 bpm
1558.0 Begin pumping 1.5 ppg sand at 4501 psi and 35.8 bpm
1568.0 1.5 ppg sand on formation at 4226 psi and 35.9 bpm
1573.0 Begin pumping 2.5 ppg sand at 4165 psi and 35.8 bpm
1582.0 2.5 ppg sand on formation at 3960 psi and 35.8 bpm
1587.0 Begin pumping 3.0 ppg sand at 3980 psi and 35.6 bpm
1596.0 3.0 ppg sand on formation at 3947 psi and 35.8 bpm
1599.0 Mark flush, begin pumping linear gel
1608.0 ISDP = 4395 psi, FFG = 0.921 psi/ft

Average Pressure	4876 psi
Rate	31.3 bpm
Viscosity	23.8 cP
Temperature	61.1 °F

pH 10.10

Maximum Pressure 7785 psi
Rate 37.1 bpm

Fluid Totals

SilverStim	37450.1 bbls	1,572,906 Gal
15% HCl Acid	47.6 bbls	2,000 Gal
Linear Gel	7459.9 bbls	313,314 Gal
SLF	35198.0 bbls	1,478,318 Gal
Load to Recover	44957.6 bbls	1,888,220 Gal

HALLIBURTON

#REF!

Niobrara Horizontal

February 5-6 & 8-11, 2011

Stage	Ball Hit	Average					Maximum		SilverStim		15% HCl Acid		Linear Gel		SLF		Total Fluid		Sand Weights		
		Pressure	Rate	Visc	Temp	pH	Pressure	Rate	gal	bbl	gal	bbl	gal	bbl	gal	bbl	gal	bbl	40/70	20/40	Total
10 Day1	N/A	4189	11.7	25.0	46.3	9.98	7785	17.2	32032	762.7	0	0.0	1651	39.3	14992	357.0	33683	802.0	12000	0	12000
10 Day2	N/A	6510	12.4	22.9	53.3	10.14	7655	27.5	13550	322.6	2000	47.6	58044	1382.0	0	0.0	73594	1752.2	0	0	0
11	Yes	5517	34.3	24.1	58.1	10.17	6780	35.7	158140	3765.2	0	0.0	10677	254.2	147113	3502.7	168817	4019.5	28887	117594	146481
12	Yes	4852	35.0	24.8	85.4	9.95	5676	35.4	154474	3678.0	0	0.0	45797	1090.4	146902	3497.7	200271	4768.4	28887	117594	146481
13	Yes	4782	35.0	23.8	73.8	10.04	5444	35.4	161229	3838.8	0	0.0	28784	685.3	145953	3475.1	190013	4524.1	28887	117594	146481
14	Yes	4424	34.4	24.0	61.6	10.13	5111	34.9	150982	3594.8	0	0.0	22431	534.1	145736	3469.9	173413	4128.9	28887	117594	146481
15	Yes	4740	34.7	24.0	60.4	10.07	5227	35.7	150490	3583.1	0	0.0	23215	552.7	146387	3485.4	173705	4135.8	28887	117594	146481
16	Yes	4882	35.8	23.6	57.0	10.10	5392	36.2	151417	3605.2	0	0.0	22246	529.7	146206	3481.1	173663	4134.8	28887	117594	146481
17	Yes	4962	35.9	23.6	44.3	10.24	5727	36.3	150866	3592.0	0	0.0	22675	539.9	146539	3489.0	173541	4131.9	28887	117594	146481
18	Yes	4753	35.8	23.6	78.2	10.00	5755	37.1	150935	3593.7	0	0.0	23991	571.2	146733	3493.6	174926	4164.9	28887	117594	146481
19	Yes	4383	34.8	21.9	66.4	10.14	5183	35.3	149329	3555.5	0	0.0	22496	535.6	145460	3463.3	171825	4091.1	28887	117594	146481
20	Yes	4514	35.8	24.3	48.3	10.23	5115	36.5	149462	3558.6	0	0.0	31307	745.4	146297	3483.3	180769	4304.0	28887	137594	166481
Total		4876	31.3	23.8	61.1	10.10	7785	37.1	1572906	37450	2000	48	313314	7460	1478318	35198	1888220	44958	300870	1195940	1496810