

30-025-40611

HOBBS OCD

JUN 08 2012

RECEIVED

Devon Energy Corporation

Lea County, NM (NAD 83)

Ironhouse

Ironhouse 20 State 1H

Wellbore #1

Plan: Plan #1

Sperry Drilling Services Proposal Report

29 May, 2012

Well Coordinates: 629,096.60 N, 804,279.20 E (32° 43' 35.44" N, 103° 28' 41.90" W)
Ground Level: 3,927.90 ft

Local Coordinate Origin:	Centered on Well Ironhouse 20 State 1H
Viewing Datum	GL 3927.9' + KB 25' @ 3952.90ft (H&P 223)
TVDs to System	N
North Reference	Grid
Unit System	API - US Survey Feet

Version: 2003 16 Build 431

HALLIBURTON

JUN 11 2012

HALLIBURTON**Plan Report for Ironhouse 20 State 1H - Plan #1**

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	Toolface Azimuth (°)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,600.00	0.00	0.00	1,600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,700.00	0.00	0.00	1,700.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,800.00	0.00	0.00	1,800.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,900.00	0.00	0.00	1,900.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,000.00	0.00	0.00	2,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,100.00	0.00	0.00	2,100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,200.00	0.00	0.00	2,200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,300.00	0.00	0.00	2,300.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,400.00	0.00	0.00	2,400.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,500.00	0.00	0.00	2,500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,600.00	0.00	0.00	2,600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,700.00	0.00	0.00	2,700.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,800.00	0.00	0.00	2,800.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,900.00	0.00	0.00	2,900.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3,000.00	0.00	0.00	3,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3,100.00	0.00	0.00	3,100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3,200.00	0.00	0.00	3,200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3,300.00	0.00	0.00	3,300.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3,400.00	0.00	0.00	3,400.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3,500.00	0.00	0.00	3,500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3,600.00	0.00	0.00	3,600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3,700.00	0.00	0.00	3,700.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3,800.00	0.00	0.00	3,800.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3,900.00	0.00	0.00	3,900.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4,000.00	0.00	0.00	4,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4,100.00	0.00	0.00	4,100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4,200.00	0.00	0.00	4,200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4,300.00	0.00	0.00	4,300.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4,400.00	0.00	0.00	4,400.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4,500.00	0.00	0.00	4,500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4,600.00	0.00	0.00	4,600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4,700.00	0.00	0.00	4,700.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4,800.00	0.00	0.00	4,800.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4,900.00	0.00	0.00	4,900.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5,000.00	0.00	0.00	5,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5,100.00	0.00	0.00	5,100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5,200.00	0.00	0.00	5,200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5,300.00	0.00	0.00	5,300.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5,400.00	0.00	0.00	5,400.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5,500.00	0.00	0.00	5,500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5,600.00	0.00	0.00	5,600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5,700.00	0.00	0.00	5,700.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5,800.00	0.00	0.00	5,800.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

HALLIBURTON**Plan Report for Ironhouse 20 State 1H - Plan #1**

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	Tootface Azimuth (°)
5,900.00	0.00	0.00	5,900.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6,000.00	0.00	0.00	6,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6,100.00	0.00	0.00	6,100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6,200.00	0.00	0.00	6,200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6,300.00	0.00	0.00	6,300.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6,400.00	0.00	0.00	6,400.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6,500.00	0.00	0.00	6,500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6,600.00	0.00	0.00	6,600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6,700.00	0.00	0.00	6,700.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6,800.00	0.00	0.00	6,800.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6,900.00	0.00	0.00	6,900.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7,000.00	0.00	0.00	7,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7,100.00	0.00	0.00	7,100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7,200.00	0.00	0.00	7,200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7,300.00	0.00	0.00	7,300.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7,400.00	0.00	0.00	7,400.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7,500.00	0.00	0.00	7,500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7,600.00	0.00	0.00	7,600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7,700.00	0.00	0.00	7,700.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7,800.00	0.00	0.00	7,800.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7,900.00	0.00	0.00	7,900.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8,000.00	0.00	0.00	8,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8,100.00	0.00	0.00	8,100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8,200.00	0.00	0.00	8,200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8,300.00	0.00	0.00	8,300.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8,400.00	0.00	0.00	8,400.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8,500.00	0.00	0.00	8,500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8,600.00	0.00	0.00	8,600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8,700.00	0.00	0.00	8,700.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8,800.00	0.00	0.00	8,800.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8,900.00	0.00	0.00	8,900.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9,000.00	0.00	0.00	9,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9,100.00	0.00	0.00	9,100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9,200.00	0.00	0.00	9,200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9,227.04	0.00	0.00	9,227.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
KOP/Start Build @ 9227.04' MD - Build Rate = 10.00°/100'										
9,250.00	2.30	359.39	9,249.99	0.46	0.00	0.46	10.00	10.00	0.00	359.39
9,300.00	7.30	359.39	9,299.80	4.64	-0.05	4.64	10.00	10.00	0.00	0.00
9,350.00	12.30	359.39	9,349.06	13.14	-0.14	13.14	10.00	10.00	0.00	0.00
9,400.00	17.30	359.39	9,397.39	25.91	-0.28	25.91	10.00	10.00	0.00	0.00
9,450.00	22.30	359.39	9,444.42	42.83	-0.46	42.84	10.00	10.00	0.00	0.00
9,500.00	27.30	359.39	9,489.79	63.79	-0.68	63.80	10.00	10.00	0.00	0.00
9,550.00	32.30	359.39	9,533.17	88.63	-0.94	88.64	10.00	10.00	0.00	0.00
9,600.00	37.30	359.39	9,574.21	117.15	-1.25	117.16	10.00	10.00	0.00	0.00
9,650.00	42.30	359.39	9,612.62	149.14	-1.59	149.15	10.00	10.00	0.00	0.00
9,700.00	47.30	359.39	9,648.09	184.36	-1.96	184.37	10.00	10.00	0.00	0.00
9,750.00	52.30	359.39	9,680.35	222.53	-2.37	222.55	10.00	10.00	0.00	0.00
9,800.00	57.30	359.39	9,709.17	263.37	-2.80	263.39	10.00	10.00	0.00	0.00
9,850.00	62.30	359.39	9,734.32	306.57	-3.26	306.59	10.00	10.00	0.00	0.00
9,900.00	67.30	359.39	9,755.60	351.79	-3.74	351.81	10.00	10.00	0.00	0.00
9,950.00	72.30	359.39	9,772.86	398.70	-4.24	398.72	10.00	10.00	0.00	0.00
10,000.00	77.30	359.39	9,785.97	446.93	-4.76	446.95	10.00	10.00	0.00	0.00
10,019.84	79.28	359.39	9,790.00	466.35	-4.96	466.38	10.00	10.00	0.00	0.00
T/Target Line										
10,050.00	82.30	359.39	9,794.83	496.12	-5.28	496.15	10.00	10.00	0.00	0.00
10,100.00	87.30	359.39	9,799.36	545.89	-5.81	545.93	10.00	10.00	0.00	0.00
10,127.04	90.00	359.39	9,800.00	572.93	-6.10	572.96	10.00	10.00	0.00	0.00
End Build @ 10127.04' MD - Hold Angle = 90.00° - Target Line										
10,200.00	90.00	359.39	9,800.00	645.88	-6.87	645.92	0.00	0.00	0.00	0.00

HALLIBURTON**Plan Report for Ironhouse 20 State 1H - Plan #1**

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	Toolface Azimuth (°)
10,300.00	90.00	359.39	9,800.00	745.87	-7.94	745.92	0.00	0.00	0.00	0.00
10,400.00	90.00	359.39	9,800.00	845.87	-9.00	845.92	0.00	0.00	0.00	0.00
10,500.00	90.00	359.39	9,800.00	945.86	-10.07	945.92	0.00	0.00	0.00	0.00
10,600.00	90.00	359.39	9,800.00	1,045.86	-11.13	1,045.92	0.00	0.00	0.00	0.00
10,700.00	90.00	359.39	9,800.00	1,145.85	-12.20	1,145.92	0.00	0.00	0.00	0.00
10,800.00	90.00	359.39	9,800.00	1,245.85	-13.26	1,245.92	0.00	0.00	0.00	0.00
10,900.00	90.00	359.39	9,800.00	1,345.84	-14.32	1,345.92	0.00	0.00	0.00	0.00
11,000.00	90.00	359.39	9,800.00	1,445.83	-15.39	1,445.92	0.00	0.00	0.00	0.00
11,100.00	90.00	359.39	9,800.00	1,545.83	-16.45	1,545.92	0.00	0.00	0.00	0.00
11,200.00	90.00	359.39	9,800.00	1,645.82	-17.52	1,645.92	0.00	0.00	0.00	0.00
11,300.00	90.00	359.39	9,800.00	1,745.82	-18.58	1,745.92	0.00	0.00	0.00	0.00
11,400.00	90.00	359.39	9,800.00	1,845.81	-19.65	1,845.92	0.00	0.00	0.00	0.00
11,500.00	90.00	359.39	9,800.00	1,945.81	-20.71	1,945.92	0.00	0.00	0.00	0.00
11,600.00	90.00	359.39	9,800.00	2,045.80	-21.77	2,045.92	0.00	0.00	0.00	0.00
11,700.00	90.00	359.39	9,800.00	2,145.79	-22.84	2,145.92	0.00	0.00	0.00	0.00
11,800.00	90.00	359.39	9,800.00	2,245.79	-23.90	2,245.92	0.00	0.00	0.00	0.00
11,900.00	90.00	359.39	9,800.00	2,345.78	-24.97	2,345.92	0.00	0.00	0.00	0.00
12,000.00	90.00	359.39	9,800.00	2,445.78	-26.03	2,445.92	0.00	0.00	0.00	0.00
12,100.00	90.00	359.39	9,800.00	2,545.77	-27.10	2,545.92	0.00	0.00	0.00	0.00
12,200.00	90.00	359.39	9,800.00	2,645.77	-28.16	2,645.92	0.00	0.00	0.00	0.00
12,300.00	90.00	359.39	9,800.00	2,745.76	-29.22	2,745.92	0.00	0.00	0.00	0.00
12,400.00	90.00	359.39	9,800.00	2,845.75	-30.29	2,845.92	0.00	0.00	0.00	0.00
12,500.00	90.00	359.39	9,800.00	2,945.75	-31.35	2,945.92	0.00	0.00	0.00	0.00
12,600.00	90.00	359.39	9,800.00	3,045.74	-32.42	3,045.92	0.00	0.00	0.00	0.00
12,700.00	90.00	359.39	9,800.00	3,145.74	-33.48	3,145.92	0.00	0.00	0.00	0.00
12,800.00	90.00	359.39	9,800.00	3,245.73	-34.55	3,245.92	0.00	0.00	0.00	0.00
12,900.00	90.00	359.39	9,800.00	3,345.73	-35.61	3,345.92	0.00	0.00	0.00	0.00
13,000.00	90.00	359.39	9,800.00	3,445.72	-36.67	3,445.92	0.00	0.00	0.00	0.00
13,100.00	90.00	359.39	9,800.00	3,545.71	-37.74	3,545.92	0.00	0.00	0.00	0.00
13,200.00	90.00	359.39	9,800.00	3,645.71	-38.80	3,645.92	0.00	0.00	0.00	0.00
13,300.00	90.00	359.39	9,800.00	3,745.70	-39.87	3,745.92	0.00	0.00	0.00	0.00
13,400.00	90.00	359.39	9,800.00	3,845.70	-40.93	3,845.92	0.00	0.00	0.00	0.00
13,500.00	90.00	359.39	9,800.00	3,945.69	-41.99	3,945.92	0.00	0.00	0.00	0.00
13,600.00	90.00	359.39	9,800.00	4,045.69	-43.06	4,045.92	0.00	0.00	0.00	0.00
13,700.00	90.00	359.39	9,800.00	4,145.68	-44.12	4,145.92	0.00	0.00	0.00	0.00
13,800.00	90.00	359.39	9,800.00	4,245.68	-45.19	4,245.92	0.00	0.00	0.00	0.00
13,900.00	90.00	359.39	9,800.00	4,345.67	-46.25	4,345.92	0.00	0.00	0.00	0.00
14,000.00	90.00	359.39	9,800.00	4,445.66	-47.32	4,445.92	0.00	0.00	0.00	0.00
14,100.00	90.00	359.39	9,800.00	4,545.66	-48.38	4,545.92	0.00	0.00	0.00	0.00
14,200.00	90.00	359.39	9,800.00	4,645.65	-49.44	4,645.92	0.00	0.00	0.00	0.00
14,308.55	90.00	359.39	9,800.00	4,754.20	-50.60	4,754.47	0.00	0.00	0.00	0.00

TD @ 14308.55' MD - Ironhouse 20 State 1H / BHL

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
9,227.04	9,227.04	0.00	0.00	KOP/Start Build @ 9227.04' MD
9,227.04	9,227.04	0.00	0.00	Build Rate = 10.00°/100'
10,127.04	9,800.00	572.92	-6.10	End Build @ 10127.04' MD
10,127.04	9,800.00	572.93	-6.10	Hold Angle = 90.00°
14,308.55	9,800.00	4,754.20	-50.60	TD @ 14308.55' MD

Plan Report for Ironhouse 20 State 1H - Plan #1

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/-S (ft)	Origin +E/-W (ft)	Start TVD (ft)
User	No Target (Freehand)	359 39	Slot	0 00	0.00	0 00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
0 00	14,308.55	Plan #1	MWD

Formation Details

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
	9,810.00	B/Target Line		0.00	359 39
10,019 84	9,790.00	T/Target Line		0.00	359 39
10,127 04	9,800.00	Target Line		0.00	359 39

Targets associated with this wellbore

Target Name	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Shape
Ironhouse 20 State 1H / BHL	9,800.00	4,754 20	-50.60	Point

HALLIBURTON**North Reference Sheet for Ironhouse - Ironhouse 20 State 1H - Wellbore #1**

All data is in US Feet unless otherwise stated Directions and Coordinates are relative to Gnd North Reference

Vertical Depths are relative to GL 3927 9' + KB 25' @ 3952 90ft (H&P 223) Northing and Easting are relative to Ironhouse 20 State 1H

Coordinate System is US State Plane 1983, New Mexico Eastern Zone using datum North American Datum 1983, ellipsoid GRS 1980

Projection method is Transverse Mercator (Gauss-Kruger)

Central Meridian is -104 33°, Longitude Origin 0° 0' 0.000 E°, Latitude Origin 0° 0' 0.000 N°

False Easting: 541,337 50ft, False Northing: 0 00ft, Scale Reduction 0.99998826

Grid Coordinates of Well 629,096.60 ft N, 804,279 20 ft E

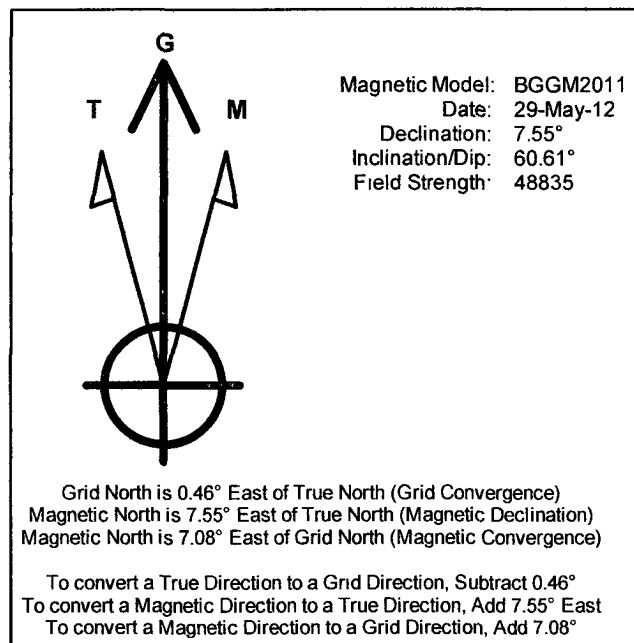
Geographical Coordinates of Well. 32° 43' 35 44" N, 103° 28' 41 90" W

Grid Convergence at Surface is 0.46°

Based upon Minimum Curvature type calculations, at a Measured Depth of 14,308.55ft

the Bottom Hole Displacement is 4,754.47ft in the Direction of 359 39° (Grid)

Magnetic Convergence at surface is: -7 08° (29 May 2012, , BGGM2011)



Ironhouse 20 State Com 1H- APD DRILLING PLAN
KKS 5-28-12

Casing Program

<u>Hole Size</u>	<u>Hole Interval</u>	<u>OD Csg</u>	<u>Casing Interval</u>	<u>Weight</u>	<u>Collar</u>	<u>Grade</u>
17-1/2"	0 – 1,825	13-3/8"	0 – 1,825	48#	STC	H-40
12-1/4"	1,825 – 3,200	9-5/8"	0 – 3,200	40#	LTC	J-55
8-3/4"	3,200 – 9,000	5-1/2"	0 – 9,000	17#	LTC	HCP-110
8-3/4"	9,000 – 14,308	5-1/2"	9,000 – 14,308	17#	BTC	HCP-110

Max TVD in lateral: 9,800'

An 8-3/4" pilot hole will be drilled to 10,800 ft and plugged back to KOP with 670 sxs, Class H, 15.6 ppg, 1.18 cf/sk cement

Mud Program:

<u>Depth</u>	<u>Mud Wt.</u>	<u>Visc.</u>	<u>Fluid Loss</u>	<u>Type System</u>
0 – 1,825	8.4 – 9.0	30 – 34	N/C	FW
1,825 – 3,200	9.6 – 10.0	28 – 32	N/C	Brine
3,200 – 14,308	8.6 – 9.0	28 – 32	N/C-12	FW

Pressure Control Equipment:

The BOP system used to drill the intermediate hole will consist of a 13-5/8" 3M Triple Ram and Annular preventer. The BOP system will be tested as a 3M system prior to drilling out the surface casing shoe.

The BOP system used to drill the production hole will consist of a 13-5/8" 3M Triple Ram and Annular preventer. The BOP system will be tested as a 3M system prior to drilling out the intermediate casing shoe.

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.

Cementing Program

13-3/8" Surface Casing

FLUID SPECIFICATIONS

Spacer

20.0 bbls Fresh Water @ 8.34 ppg

<u>FLUID</u>	<u>VOLUME CU-FT</u>	<u>VOLUME FACTOR</u>	<u>AMOUNT AND TYPE OF CEMENT</u>
Lead Slurry	2036	/ 1.97	= 1035 sacks (35:65) Poz (Fly Ash):Class C Cement + 5% bwow Sodium Chloride ÷ 0.125 lbs/sack Cello Flake ÷ 4% bwoc Bentonite ÷ 1% bwoc Sodium Metasilicate ÷ 5% bwoc MPA-5 ÷ 101.3% Fresh Water
Tail Slurry	534	/ 1.34	= 400 sacks Class C Cement ÷ 1% bwoc Calcium Chloride ÷ 0.125 lbs/sack Cello Flake ÷ 56.2% Fresh Water
Displacement			280.3 bbls Mud @ 9 ppg

CEMENT PROPERTIES

	<u>SLURRY NO.1</u>	<u>SLURRY NO.2</u>
Slurry Weight (ppg)	12.80	14.80
Slurry Yield (cf/sack)	1.97	1.34
Amount of Mix Water (gps)	10.56	6.34
Estimated Pumping Time - 70 BC (HH:MM)	3:30	2:30

COMPRESSIVE STRENGTH

72 hrs @ 80 ° F (psi)		2700
7 hrs @ 93 ° F (psi)		500
12 hrs @ 93 ° F (psi)	350	1000
17 hrs @ 93 ° F (psi)	500	
24 hrs @ 93 ° F (psi)	750	1600

ACTUAL CEMENT VOLUMES MAY VARY BASED ON FLUID CALIPER.

9-5/8" Intermediate

FLUID SPECIFICATIONS

Spacer

20.0 bbls Fresh Water @ 8.34 ppg

<u>FLUID</u>	<u>VOLUME CU-FT</u>	<u>VOLUME FACTOR</u>	<u>AMOUNT AND TYPE OF CEMENT</u>
Lead Slurry	1239	/ 1.73	= 715 sacks (60:40) Poz (Fly Ash):Class C Cement + 5% bwow Sodium Chloride ÷ 0.125 lbs/sack Cello Flake ÷ 3 lbs/sack LCM-1 ÷ 1% bwoc Sodium Metasilicate ÷ 89.7% Fresh Water
Tail Slurry	413	/ 1.38	= 300 sacks (60:40) Poz (Fly Ash):Class C Cement + 5% bwow Sodium Chloride ÷ 0.125 lbs/sack Cello Flake ÷ 0.4% bwoc Sodium Metasilicate ÷ 4% bwoc MPA-5 ÷ 65.5% Fresh Water

Displacement

239.6 bbls Mud @ 10 ppg

CEMENT PROPERTIES

	SLURRY NO.1	SLURRY NO.2
Slurry Weight (ppg)	12.60	13.80
Slurry Yield (cf/sack)	1.73	1.38
Amount of Mix Water (gps)	8.82	6.44
Estimated Pumping Time - 70 BC (HH:MM)	3:30	2:30
COMPRESSIVE STRENGTH		
12 hrs @ 90 ° F (psi)	275	
24 hrs @ 90 ° F (psi)	875	
72 hrs @ 90 ° F (psi)	1600	
8 hrs @ 112 ° F (psi)		500
12 hrs @ 112 ° F (psi)		1400
24 hrs @ 112 ° F (psi)		2400

ACTUAL CEMENT VOLUMES MAY VARY BASED ON CALIPER.

5-1/2" Production-Single Stage

FLUID SPECIFICATIONS

Spacer	50.0 bbls Fresh Water @ 8.34 ppg
Spacer	1,500.0 gals Mud Clean II @ 8.45 ppg
Spacer	10.0 bbls Fresh Water @ 8.34 ppg
Spacer	40.0 bbls SealBond @ 8.75 ppg

<u>FLUID</u>	<u>VOLUME CU-FT</u>	<u>VOLUME FACTOR</u>	<u>AMOUNT AND TYPE OF CEMENT</u>
1st Lead Slurry	1798	/ 2.3	= 785 sacks (50:50) Poz (Fly Ash):Class H Cement ÷ 0.5% bwoc FL-52 ÷ 0.3% bwoc ASA-301 ÷ 10% bwoc Bentonite ÷ 0.1% bwoc R-21 ÷ 130.7% Fresh Water
Lead Slurry	1377	/ 2	= 690 sacks (35:65) Poz (Fly Ash):Class H Cement ÷ 3% bwow Sodium Chloride ÷ 0.125 lbs/sack Cello Flake ÷ 0.7% bwoc FL-52 ÷ 6% bwoc Bentonite ÷ 105.4% Fresh Water
Tail Slurry	1674	/ 1.28	= 1310 sacks (50:50) Poz (Fly Ash):Class H Cement ÷ 5% bwow Sodium Chloride ÷ 0.3% bwoc CD-32 ÷ 0.5% bwoc FL-25 ÷ 0.5% bwoc FL-52 ÷ 0.4% bwoc Sodium Metasilicate ÷ 57.2% Fresh Water
Displacement			331.7 bbls Displacement Fluid

CEMENT PROPERTIES

	<u>SLURRY NO.1</u>	<u>SLURRY NO.2</u>	<u>SLURRY NO.3</u>
Slurry Weight (ppg)	11.80	12.50	14.20
Slurry Yield (cf/sack)	2.30	2.00	1.28
Amount of Mix Water (gps)	13.16	10.99	5.76
Estimated Pumping Time - 70 BC (HH:MM)	4:00	5:00	3:30
Free Water (mls) @ ° F @ 90 ° Angle			0.0
Fluid Loss (cc/30min) at 1000 psi and ° F			50.0

COMPRESSIVE STRENGTH

12 hrs @ 130 ° F (psi)	150		
24 hrs @ 130 ° F (psi)	250		
72 hrs @ 130 ° F (psi)	350		
12 hrs @ 140 ° F (psi)		175	
24 hrs @ 140 ° F (psi)		250	
72 hrs @ 140 ° F (psi)		700	
12 hrs @ 150 ° F (psi)			250
24 hrs @ 150 ° F (psi)			1500
72 hrs @ 150 ° F (psi)			2000

TOC for All Strings:

Surface:	0'
Intermediate:	0'
Production:	2,700'

ACTUAL CEMENT VOLUMES WILL BE ADJUSTED BASED ON FLUID CALIPER AND CALIPER LOG DATA.

Pilot Hole Plug Back Cement

FLUID SPECIFICATIONS

Spacer = 15.0 bbls Mud Clean II

<u>PLUG NO.</u>	<u>VOLUME CU-FT</u>	<u>VOLUME FACTOR</u>	<u>AMOUNT AND TYPE OF CEMENT</u>
1	791	/ 1.18	= 670 sacks Class H Cement + 0.2% bwoc R-3 + 46.4% Fresh Water

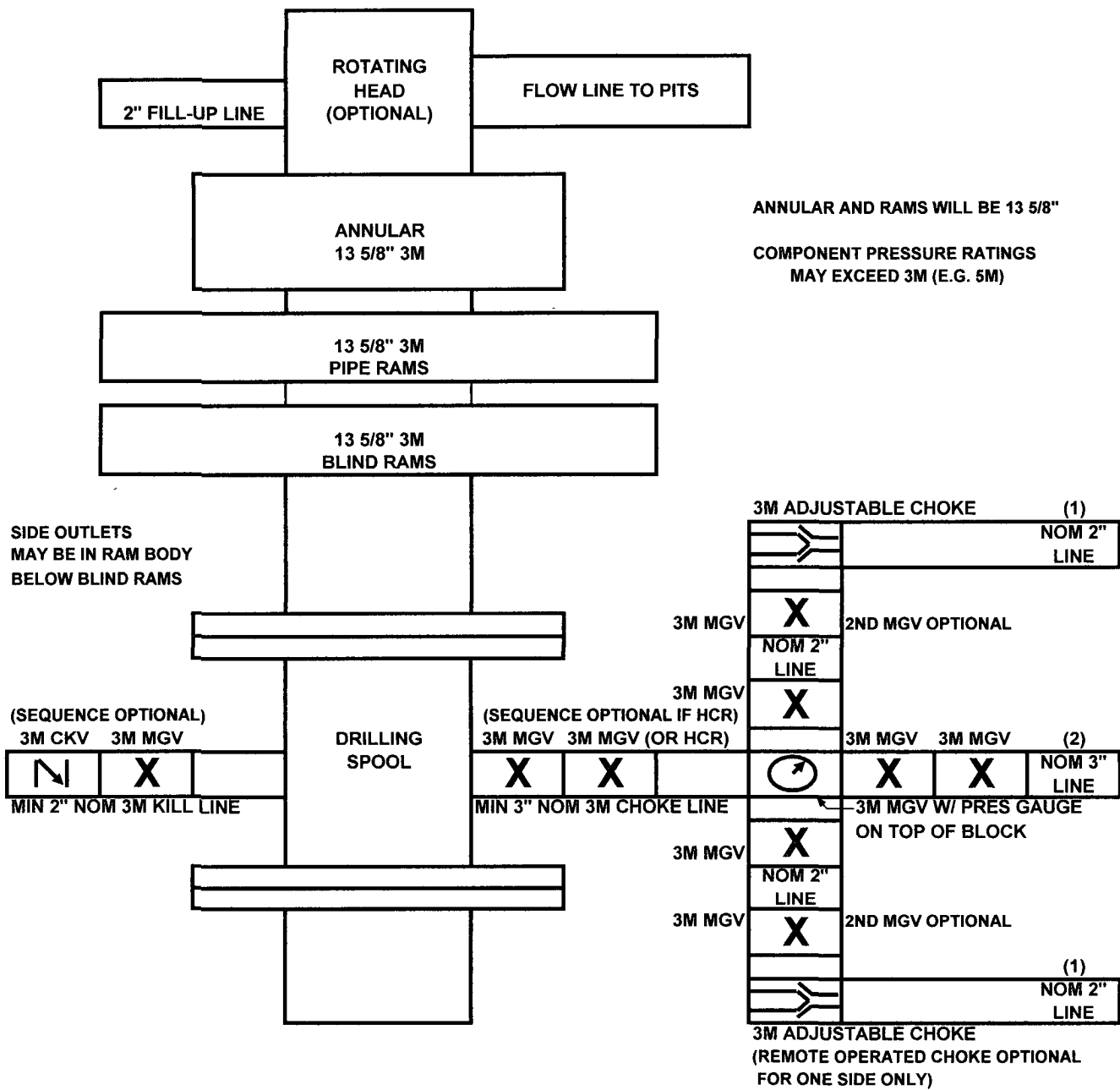
CEMENT PROPERTIES

	PLUG NO.1
Slurry Weight (ppg)	15.60
Slurry Yield (cf/sack)	1.18
Amount of Mix Water (gps)	5.22
Estimated Pumping Time - 70 BC (HH:MM)	2:15
COMPRESSIVE STRENGTH	
12 hrs @ 143 ° F (psi)	4850
24 hrs @ 143 ° F (psi)	7100

PLUG GEOMETRY

	PLUG TOP		PLUG BOTTOM	
1	9227 ft	to	10800 ft	with 8.75 inch Open Hole PDSqT = 143 ° F PDST = 166.4 ° F

3M BOP SCHEMATIC



- (1) Line to mud gas separator and/or pit
(2) Bleed line to pit

MGV - Manual Gate Valve
CKV - Check Valve
HCR - Hydraulically Controlled Remote Valve