



Directional Survey

HOBBS OGD

30-025-4205 9

DEC 21 2015

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Well Name GRAMMA RIDGE 14-24-34 005H		Lease Gramma Ridge 14-24-34		Field Name Red Hills North		Business Unit Mid-Continent	
Ground Elevation (ft) 3,500.00	Original RKB (ft) 3,524.50	Current RKB Elevation 3,524.50, 6/12/2015				Mud Line Elevation (ft)	Water Depth (ft)

Wellbore Name Original Hole		Parent Wellbore Original Hole		Kick Off Depth (ftKB) 8,892		Vertical Section Direction (°) 0.00					
UTM Northing (Y) (ft)			UTM Easting (X) (ft)			UTM Grid Zone					
Date 7/24/2015		Definitive? Y		Description MWD		Planned? N					
MD Tie In (ftKB)		TVD Tie In (ftKB)		Inclination Tie In (°)		Azimuth Tie In (°)		NSTie In (ft)		EWTie In (ft)	

Survey Data

MD (ftKB)	Incl (")	Azm (")	TVD (ftKB)	NS (ft)	EW (ft)	VS (ft)	DLS ("/100ft)	Method	Survey Company	Build ("/100ft)	Depart (ft)	Turn ("/100ft)	Unuse d data
293	0.20	347.60	293.00	0.50	-0.11	0.50	0.07	Magn MWD		0.07	0.51	118.63	N
373	0.50	324.90	373.00	0.92	-0.34	0.92	0.41	Magn MWD		0.38	0.98	-28.38	N
448	0.20	35.50	448.00	1.30	-0.45	1.30	0.63	Magn MWD		-0.40	1.37	-	N
542	0.40	326.10	542.00	1.70	-0.54	1.70	0.40	Magn MWD		0.21	1.79	309.15	N
726	0.60	354.80	725.99	3.19	-0.99	3.19	0.17	Magn MWD		0.11	3.34	15.60	N
815	0.60	17.80	814.98	4.10	-0.89	4.10	0.27	Magn MWD		0.00	4.20	-	N
904	0.90	21.00	903.98	5.20	-0.49	5.20	0.34	Magn MWD		0.34	5.22	378.65	N
993	0.80	30.40	992.97	6.39	0.07	6.39	0.19	Magn MWD		-0.11	6.39	3.60	N
1,082	1.00	48.80	1,081.96	7.43	0.97	7.43	0.39	Magn MWD		0.22	7.50	10.56	N
1,205	0.60	30.90	1,204.94	8.69	0.97	8.69	0.38	Magn MWD		0.22	7.50	20.67	N
1,281	0.77	351.79	1,280.94	9.54	2.24	9.54	0.64	Magn MWD		-0.33	8.95	-14.55	N
1,460	0.67	343.67	1,459.92	11.74	2.24	11.74	0.64	Magn MWD		0.22	9.80	422.22	N
1,638	0.60	343.67	1,459.92	11.74	1.77	11.74	0.08	Magn MWD		-0.06	11.87	-4.54	N
1,638	0.60	299.09	1,637.91	13.19	0.67	13.19	0.27	Magn MWD		-0.04	13.20	-25.04	N
1,817	0.50	276.00	1,816.91	13.72	-0.93	13.72	0.13	Magn MWD		-0.06	13.76	-12.90	N
1,996	0.30	262.60	1,995.90	13.75	-2.17	13.75	0.12	Magn MWD		-0.11	13.92	-7.49	N
2,175	0.50	315.60	2,174.90	14.24	-3.18	14.24	0.22	Magn MWD		-0.06	13.76	-12.90	N
2,354	0.90	328.90	2,353.88	16.01	-4.45	16.01	0.24	Magn MWD		-0.11	13.92	-7.49	N
2,533	0.90	344.90	2,532.86	18.57	-5.55	18.57	0.14	Magn MWD		0.11	14.59	29.61	N
2,713	0.95	343.93	2,712.84	21.36	-6.33	21.36	0.03	Magn MWD		0.22	16.61	7.43	N
2,892	1.11	353.81	2,891.81	24.51	-6.92	24.51	0.13	Magn MWD		0.00	19.38	8.94	N
3,071	1.21	21.77	3,070.78	27.99	-6.41	27.99	0.32	Magn MWD		0.03	22.28	-0.54	N
3,250	1.47	31.07	3,249.73	31.72	-4.52	31.72	0.19	Magn MWD		0.09	25.47	5.52	N
3,429	1.66	31.30	3,428.66	35.90	-1.99	35.90	0.11	Magn MWD		0.06	28.72	-	N
3,607	1.21	48.50	3,606.60	39.35	0.75	39.35	0.35	Magn MWD		0.15	32.04	5.20	N
3,787	0.96	57.24	3,786.57	41.42	3.45	41.42	0.17	Magn MWD		0.11	35.95	0.13	N
3,966	1.39	66.35	3,965.53	43.10	6.70	43.10	0.26	Magn MWD		-0.25	39.35	9.66	N
										-0.14	41.56	4.86	N
										0.24	43.62	5.09	N

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Survey Data													
MD (ftKB)	Incl (°)	Azm (°)	TVD (ftKB)	NS (ft)	EW (ft)	VS (ft)	DLS (°/100ft)	Method	Survey Company	Build (°/100ft)	Depart (ft)	Turn (°/100ft)	Unuse d data
4,145	1.24	60.54	4,144.49	44.93	10.37	44.93	0.11	Magn MWD		-0.08	46.11	-3.25	N
4,323	1.03	66.90	4,322.45	46.50	13.52	46.50	0.14	Magn MWD		-0.12	48.43	3.57	N
4,502	1.37	59.91	4,501.41	48.21	16.85	48.21	0.21	Magn MWD		0.19	51.07	-3.91	N
4,681	3.90	83.95	4,680.21	49.92	24.76	49.92	1.51	Magn MWD		1.41	55.72	13.43	N
4,859	3.59	98.02	4,857.84	49.78	36.29	49.78	0.54	Magn MWD		-0.17	61.61	7.90	N
5,038	4.27	103.23	5,036.41	47.47	48.33	47.47	0.43	Magn MWD		0.38	67.75	2.91	N
5,216	3.39	98.76	5,214.02	45.16	59.98	45.16	0.52	Magn MWD		-0.49	75.08	-2.51	N
5,380	3.00	95.90	5,377.76	43.98	69.04	43.98	0.26	Magn MWD		-0.24	81.86	-1.74	N
5,415	2.02	83.22	5,412.73	43.95	70.57	43.95	3.20	Magn MWD		-2.80	83.14	-36.23	N
5,594	0.42	200.50	5,591.69	43.71	73.47	43.71	1.25	Magn MWD		-0.89	85.49	65.52	N
5,773	0.28	120.38	5,770.69	42.88	73.62	42.88	0.26	Magn MWD		-0.08	85.20	-44.76	N
5,952	0.99	172.92	5,949.68	41.12	74.19	41.12	0.47	Magn MWD		0.40	84.82	29.35	N
6,131	0.92	183.09	6,128.65	38.15	74.30	38.15	0.10	Magn MWD		-0.04	83.52	5.68	N
6,309	0.86	200.71	6,306.63	35.48	73.75	35.48	0.16	Magn MWD		-0.03	81.84	9.90	N
6,488	0.78	208.66	6,485.61	33.15	72.69	33.15	0.08	Magn MWD		-0.04	79.89	4.44	N
6,667	0.62	219.97	6,664.60	31.34	71.49	31.34	0.12	Magn MWD		-0.09	78.05	6.32	N
6,846	0.65	215.10	6,843.59	29.77	70.28	29.77	0.03	Magn MWD		0.02	76.32	-2.72	N
7,026	0.61	221.31	7,023.58	28.21	69.06	28.21	0.04	Magn MWD		-0.02	74.60	3.45	N
7,204	0.68	213.01	7,201.57	26.61	67.86	26.61	0.07	Magn MWD		0.04	72.89	-4.66	N
7,384	0.73	235.51	7,381.55	25.07	66.33	25.07	0.16	Magn MWD		0.03	70.91	12.50	N
7,563	0.75	250.40	7,560.54	24.03	64.29	24.03	0.11	Magn MWD		0.01	68.63	8.32	N
7,742	0.68	257.90	7,739.53	23.41	62.15	23.41	0.07	Magn MWD		-0.04	66.41	4.19	N
7,921	0.34	248.72	7,918.52	23.00	60.61	23.00	0.19	Magn MWD		-0.19	64.83	-5.13	N
8,100	0.29	39.40	8,097.52	23.16	60.41	23.16	0.34	Magn MWD		-0.03	64.69	-	N
8,279	0.33	235.30	8,276.52	23.21	60.27	23.21	0.34	Magn MWD		0.02	64.58	109.44	N
8,458	1.19	276.71	8,455.50	23.14	58.00	23.14	0.54	Magn MWD		0.48	62.44	23.13	N
8,637	0.82	312.79	8,634.47	24.22	55.21	24.22	0.40	Magn MWD		-0.21	60.29	20.16	N
8,816	0.79	297.76	8,813.46	25.67	53.18	25.67	0.12	Magn MWD		-0.02	59.05	-8.40	N
8,911	1.78	215.66	8,908.44	24.77	51.74	24.77	1.94	Magn MWD		1.04	57.37	-86.42	N



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Survey Data													
MD (ftKB)	Incl (°)	Azm (°)	TVD (ftKB)	NS (ft)	EW (ft)	VS (ft)	DLS (°/100ft)	Method	Survey Company	Build (°/100ft)	Depart (ft)	Turn (°/100ft)	Unused data
8,956	6.80	201.53	8,953.30	21.73	50.36	21.73	11.32	Magn MWD		11.16	54.84	-31.40	N
9,001	10.96	192.07	8,997.75	15.06	48.48	15.06	9.77	Magn MWD		9.24	50.77	-21.02	N
9,045	16.79	186.35	9,040.45	4.65	46.90	4.65	13.60	Magn MWD		13.25	47.13	-13.00	N
9,090	22.40	187.81	9,082.83	-10.32	45.02	-10.32	12.51	Magn MWD		12.47	46.19	3.24	N
9,135	27.39	188.74	9,123.63	-29.06	42.28	-29.06	11.12	Magn MWD		11.09	51.30	2.07	N
9,180	31.32	189.66	9,162.85	-50.83	38.74	-50.83	8.79	Magn MWD		8.73	63.91	2.04	N
9,224	36.55	191.31	9,199.34	-74.97	34.25	-74.97	12.07	Magn MWD		11.89	82.42	3.75	N
9,269	42.17	191.72	9,234.12	-102.92	28.55	-102.92	12.50	Magn MWD		12.49	106.80	0.91	N
9,314	46.17	192.24	9,266.39	-133.58	22.04	-133.58	8.93	Magn MWD		8.89	135.39	1.16	N
9,359	49.84	190.74	9,296.50	-166.35	15.39	-166.35	8.52	Magn MWD		8.16	167.06	-3.33	N
9,403	53.53	189.80	9,323.77	-200.32	9.24	-200.32	8.55	Magn MWD		8.39	200.53	-2.14	N
9,448	57.73	187.93	9,349.17	-237.01	3.53	-237.01	9.94	Magn MWD		9.33	237.03	-4.16	N
9,493	60.70	186.22	9,372.20	-275.37	-1.22	-275.37	7.36	Magn MWD		6.60	275.37	-3.80	N
9,537	65.52	185.60	9,392.10	-314.39	-5.25	-314.39	11.03	Magn MWD		10.95	314.43	-1.41	N
9,582	71.98	185.28	9,408.40	-356.12	-9.22	-356.12	14.37	Magn MWD		14.36	356.24	-0.71	N
9,627	78.47	184.88	9,419.87	-399.44	-13.07	-399.44	14.45	Magn MWD		14.42	399.65	-0.89	N
9,671	82.93	185.92	9,426.98	-442.65	-17.16	-442.65	10.40	Magn MWD		10.14	442.99	2.36	N
9,716	83.86	186.11	9,432.15	-487.11	-21.84	-487.11	2.11	Magn MWD		2.07	487.60	0.42	N
9,761	84.42	186.27	9,436.75	-531.61	-26.67	-531.61	1.29	Magn MWD		1.24	532.28	0.36	N
9,806	86.10	186.97	9,440.46	-576.16	-31.84	-576.16	4.04	Magn MWD		3.73	577.04	1.56	N
9,895	89.05	185.71	9,444.23	-664.52	-41.66	-664.52	3.60	Magn MWD		3.31	665.83	-1.42	N
9,984	89.05	186.80	9,445.71	-752.98	-51.35	-752.98	1.22	Magn MWD		0.00	754.73	1.22	N
10,074	89.69	186.44	9,446.69	-842.37	-61.73	-842.37	0.82	Magn MWD		0.71	844.63	-0.40	N
10,164	87.51	185.90	9,448.89	-931.82	-71.40	-931.82	2.50	Magn MWD		-2.42	934.55	-0.60	N
10,253	86.50	185.31	9,453.54	-1,020.27	-80.08	-1,020.27	1.31	Magn MWD		-1.13	1,023.41	-0.66	N
10,343	85.04	185.42	9,460.18	-1,109.63	-88.47	-1,109.63	1.63	Magn MWD		-1.62	1,113.15	0.12	N
10,432	86.70	183.96	9,466.59	-1,198.10	-95.73	-1,198.10	2.48	Magn MWD		1.87	1,201.92	-1.64	N
10,522	87.34	183.02	9,471.27	-1,287.81	-101.20	-1,287.81	1.26	Magn MWD		0.71	1,291.78	-1.04	N
10,611	85.97	182.80	9,476.46	-1,376.54	-105.71	-1,376.54	1.56	Magn MWD		-1.54	1,380.59	-0.25	N



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Survey Data													
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10,701	86.28	182.47	9,482.55	-1,466.24	-109.84	-1,466.24	0.50	Magn MWD		0.34	1,470. 35	-0.37	N
10,790	90.50	184.13	9,485.05	-1,555.03	-114.96	-1,555.03	5.09	Magn MWD		4.74	1,559. 28	1.87	N
10,880	91.01	184.73	9,483.86	-1,644.75	-121.91	-1,644.75	0.87	Magn MWD		0.57	1,649. 27	0.67	N
10,969	86.25	186.13	9,485.99	-1,733.30	-130.32	-1,733.30	5.57	Magn MWD		-5.35	1,738. 19	1.57	N
11,059	86.42	185.73	9,491.74	-1,822.64	-139.60	-1,822.64	0.48	Magn MWD		0.19	1,827. 98	-0.44	N
11,148	86.98	185.03	9,496.86	-1,911.10	-147.93	-1,911.10	1.01	Magn MWD		0.63	1,916. 81	-0.79	N
11,238	87.73	184.45	9,501.02	-2,000.69	-155.36	-2,000.69	1.05	Magn MWD		0.83	2,006. 72	-0.64	N
11,327	89.64	183.86	9,503.06	-2,089.43	-161.81	-2,089.43	2.25	Magn MWD		2.15	2,095. 69	-0.66	N
11,417	85.83	181.36	9,506.62	-2,179.24	-165.91	-2,179.24	5.06	Magn MWD		-4.23	2,185. 55	-2.78	N
11,505	87.98	181.55	9,511.37	-2,267.08	-168.14	-2,267.08	2.45	Magn MWD		2.44	2,273. 31	0.22	N
11,595	89.83	181.07	9,513.09	-2,357.04	-170.19	-2,357.04	2.12	Magn MWD		2.06	2,363. 17	-0.53	N
11,684	92.50	181.20	9,511.28	-2,445.99	-171.96	-2,445.99	3.00	Magn MWD		3.00	2,452. 03	0.15	N
11,774	92.30	181.42	9,507.51	-2,535.89	-174.01	-2,535.89	0.33	Magn MWD		-0.22	2,541. 85	0.24	N
11,863	89.94	183.11	9,505.77	-2,624.80	-177.53	-2,624.80	3.26	Magn MWD		-2.65	2,630. 79	1.90	N
11,953	87.87	183.02	9,507.49	-2,714.65	-182.34	-2,714.65	2.30	Magn MWD		-2.30	2,720. 76	-0.10	N
12,042	88.15	183.30	9,510.58	-2,803.46	-187.24	-2,803.46	0.44	Magn MWD		0.31	2,809. 70	0.31	N
12,132	88.35	182.99	9,513.33	-2,893.28	-192.18	-2,893.28	0.41	Magn MWD		0.22	2,899. 65	-0.34	N
12,221	88.54	184.04	9,515.74	-2,982.08	-197.63	-2,982.08	1.20	Magn MWD		0.21	2,988. 62	1.18	N
12,310	88.10	183.38	9,518.35	-3,070.85	-203.39	-3,070.85	0.89	Magn MWD		-0.49	3,077. 58	-0.74	N
12,400	89.33	184.31	9,520.37	-3,160.62	-209.42	-3,160.62	1.71	Magn MWD		1.37	3,167. 55	1.03	N
12,489	86.16	183.26	9,523.87	-3,249.35	-215.29	-3,249.35	3.75	Magn MWD		-3.56	3,256. 47	-1.18	N
12,579	86.39	184.10	9,529.72	-3,338.97	-221.06	-3,338.97	0.97	Magn MWD		0.26	3,346. 28	0.93	N
12,668	86.53	184.45	9,535.21	-3,427.56	-227.68	-3,427.56	0.42	Magn MWD		0.16	3,435. 11	0.39	N
12,758	87.81	184.54	9,539.66	-3,517.17	-234.73	-3,517.17	1.43	Magn MWD		1.42	3,524. 99	0.10	N
12,847	89.89	186.42	9,541.44	-3,605.73	-243.22	-3,605.73	3.15	Magn MWD		2.34	3,613. 93	2.11	N
12,937	89.05	185.78	9,542.28	-3,695.22	-252.79	-3,695.22	1.17	Magn MWD		-0.93	3,703. 86	-0.71	N
13,027	88.15	184.27	9,544.48	-3,784.84	-260.67	-3,784.84	1.95	Magn MWD		-1.00	3,793. 81	-1.68	N
13,116	89.97	185.68	9,545.94	-3,873.49	-268.38	-3,873.49	2.59	Magn MWD		2.04	3,882. 78	1.58	N
13,205	90.87	185.30	9,545.28	-3,962.08	-276.90	-3,962.08	1.10	Magn MWD		1.01	3,971. 74	-0.43	N



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13,295	92.18	185.66	9,542.89	-4,051.63	-285.49	-4,051.63	1.51	Magn MWD		1.46	4,061. 68	0.40	N
13,384	87.62	183.39	9,543.04	-4,140.33	-292.51	-4,140.33	5.72	Magn MWD		-5.12	4,150. 65	-2.55	N
13,474	87.45	182.83	9,546.91	-4,230.11	-297.39	-4,230.11	0.65	Magn MWD		-0.19	4,240. 55	-0.62	N
13,563	88.71	183.30	9,549.90	-4,318.93	-302.14	-4,318.93	1.51	Magn MWD		1.42	4,329. 49	0.53	N
13,653	97.71	183.11	9,544.86	-4,408.56	-307.16	-4,408.56	10.00	Magn MWD		10.00	4,419. 24	-0.21	N
13,742	88.88	183.61	9,539.75	-4,497.17	-312.37	-4,497.17	9.94	Magn MWD		-9.92	4,508. 00	0.56	N
13,832	88.15	182.73	9,542.08	-4,587.00	-317.34	-4,587.00	1.27	Magn MWD		-0.81	4,597. 96	-0.98	N
13,922	85.63	180.79	9,546.97	-4,676.81	-320.10	-4,676.81	3.53	Magn MWD		-2.80	4,687. 75	-2.16	N
13,995	85.63	180.79	9,552.53	-4,749.59	-321.11	-4,749.59	0.00	Magn MWD		0.00	4,760. 44	0.00	N

280's 2640' W
1989 W