

Blue Jay Federal #1H

30-025-42338

Sec 18-T20S-R35E

HOBBS OCD

JUL 11 2016

RECEIVED

<u>Perfs</u>	<u>7 1/2% Acid (Gal)</u>	<u>Sand (#)</u>	<u>Fluid (Gal)</u>
1	5532	236118	399996
2	3108	236966	342132
3	3012	242302	345648
4	3000	237068	343452
5	3000	234088	340680
6	3000	239673	346056
7	3000	235082	341562
8	3000	235026	340428
9	3012	235265	342120
10	3024	236075	343182
11	3024	235210	339990
12	2928	235094	340902
13	3024	235379	339990
14	3012	236196	337458
15	3108	235017	332640
16	3024	235563	336294
17	3024	216706	337512
18	3012	234320	337878
19	3054	235776	337248
20	3024	235341	336084
21	3024	235213	360990
22	3012	234006	333552
23	3024	235507	335160
24	3066	235287	333018
25	3012	234805	336534
26	3012	235154	333468
27	3024	235115	333270
28	3012	234452	333342
29	3012	234255	335568
30	3012	232915	331074
31	3012	234108	322758
32	2982	237869	289884
33	3024	230767	290514
34	3024	234303	286818
35	3066	238147	289800
Totals	108,240	8,224,168	11,707,002

(entered data to be carried to each stage)

Date 5/6/2016
 Pressure test 9500
 Well Blue Jay Federal #1H
 Name/number 5 1/2
 Casing 1 size 0.02325
 Capacity-bbls/lin. 0
 Top of Casing 15,946
 TD of casing 11396
 TVD 3261
 AFE

Shallowest Plug 11,695

Fluid Database

1	7.5 % Acid
2	Treated Water
3	FR Water
4	
5	
6	
7	
8	
9	
10	
11	
12	

Proppant Database

1	100 Mesh
2	40/70 White
3	
4	
5	
6	
7	
8	

Chemical Database

1	FDP-S1226-15
2	Scalecheck
3	CLA-WEB II
4	DCA 23003
5	Scaletrol
6	Optikleen WF
7	Parasorb
8	Chlorine Dioxide
9	
10	

	Stage 1	Distance Between Perfs	Shots	Stage 2	Distance Between Perfs	Shots	Stage 3	Distance Between Perfs	Shots	Stage 4	Distance Between Perfs	Shots	Stage 5	Distance Between Perfs	Shots
From Bottom to Top	15,754	14	14	15,670	50	14	15,555	42	14	15,432	40	14	15,311	40	14
	15,740	20	12	15,638	41	12	15,513	41	12	15,391	40	12	15,270	40	12
	15,720		10	15,597		10	15,472		10	15,351		10	15,230		10
	Plug to Plug	76	36	Plug to Plug	121	36	Plug to Plug	121	36	Plug to Plug	127	36	Plug to Plug	109	36
	Frac Plug	15,770	Total Shots	Frac Plug	15,694	Total Shots	Frac Plug	15,573	Total Shots	Frac Plug	15,452	Total Shots	Frac Plug	15,325	Total Shots

	Stage 6	Distance Between Perfs	Shots	Stage 7	Distance Between Perfs	Shots	Stage 8	Distance Between Perfs	Shots	Stage 9	Distance Between Perfs	Shots	Stage 10	Distance Between Perfs	Shots
From Bottom to Top	15,189	41	14	15,068	41	14	14,945	42	14	14,828	33	14	14,705	40	14
	15,149	40	12	15,028	41	12	14,903	42	12	14,786	41	12	14,665	41	12
	15,109		10	14,987		10	14,861		10	14,745		10	14,624		10
	Plug to Plug	128	36	Plug to Plug	121	36	Plug to Plug	121	36	Plug to Plug	121	36	Plug to Plug	121	36
	Frac Plug	15,216	Total Shots	Frac Plug	15,088	Total Shots	Frac Plug	14,967	Total Shots	Frac Plug	14,846	Total Shots	Frac Plug	14,725	Total Shots

	Stage 11	Distance Between Perfs	Shots	Stage 12	Distance Between Perfs	Shots	Stage 13	Distance Between Perfs	Shots	Stage 14	Distance Between Perfs	Shots	Stage 15	Distance Between Perfs	Shots
From Bottom to Top	14,584	40	14	14,463	40	14	14,342	40	14	14,220	41	14	14,092	48	14
	14,543	40	12	14,422	40	12	14,301	40	12	14,180	40	12	14,059	40	12
	14,503		10	14,382		10	14,261		10	14,140		10	14,019		10
	Plug to Plug	125	36	Plug to Plug	122	36	Plug to Plug	123	36	Plug to Plug	126	36	Plug to Plug	108	36
	Frac Plug	14,604	Total Shots	Frac Plug	14,479	Total Shots	Frac Plug	14,357	Total Shots	Frac Plug	14,234	Total Shots	Frac Plug	14,108	Total Shots

	Stage 16	Distance Between Perfs	Shots	Stage 17	Distance Between Perfs	Shots	Stage 18	Distance Between Perfs	Shots	Stage 19	Distance Between Perfs	Shots	Stage 20	Distance Between Perfs	Shots
From Bottom to Top	13,978	41	14	13,857	40	14	13,736	40	14	13,615	38	14	13,494	40	14
	13,938	41	12	13,817	41	12	13,696	43	12	13,574	40	12	13,453	40	12
	13,897		10	13,776		10	13,653		10	13,534		10	13,413		10
	Plug to Plug	123	36	Plug to Plug	121	36	Plug to Plug	121	36	Plug to Plug	121	36	Plug to Plug	121	36
	Frac Plug	14,000	Total Shots	Frac Plug	13,877	Total Shots	Frac Plug	13,756	Total Shots	Frac Plug	13,635	Total Shots	Frac Plug	13,514	Total Shots

	Stage 21	Distance Between Perfs	Shots	Stage 22	Distance Between Perfs	Shots	Stage 23	Distance Between Perfs	Shots	Stage 24	Distance Between Perfs	Shots	Stage 25	Distance Between Perfs	Shots
From Bottom to Top	13,373	40	14	13,247	43	14	13,130	40	14	13,012	43	14	12,884	40	14
	13,332	42	12	13,205	35	12	13,087	32	12	12,965	41	12	12,845	38	12
	13,290		10	13,170		10	13,055		10	12,924		10	12,807		10
	Plug to Plug	121	36	Plug to Plug	122	36	Plug to Plug	121	36	Plug to Plug	121	36	Plug to Plug	121	36
	Frac Plug	13,393	Total Shots	Frac Plug	13,272	Total Shots	Frac Plug	13,150	Total Shots	Frac Plug	13,029	Total Shots	Frac Plug	12,908	Total Shots

	Stage 26	Distance Between Perfs	Shots	Stage 27	Distance Between Perfs	Shots	Stage 28	Distance Between Perfs	Shots	Stage 29	Distance Between Perfs	Shots	Stage 30	Distance Between Perfs	Shots
From Bottom to Top	12,767	40	14	12,648	43	14	12,525	40	14	12,404	40	14	12,277	46	14
	12,724	33	12	12,605	40	12	12,484	40	12	12,363	40	12	12,242	40	12
	12,691		10	12,565		10	12,444		10	12,323		10	12,202		10
	Plug to Plug	122	36	Plug to Plug	120	36	Plug to Plug	125	36	Plug to Plug	128	36	Plug to Plug	109	36
	Frac Plug	12,787	Total Shots	Frac Plug	12,665	Total Shots	Frac Plug	12,545	Total Shots	Frac Plug	12,420	Total Shots	Frac Plug	12,292	Total Shots

	Stage 31	Distance Between Perfs	Shots	Stage 32	Distance Between Perfs	Shots	Stage 33	Distance Between Perfs	Shots	Stage 34	Distance Between Perfs	Shots	Stage 35	Distance Between Perfs	Shots
From Bottom to Top	12,161	41	14	12,039	42	14	11,914	51	14	11,798	42	14	11,677	40	14
	12,121	40	12	11,998	31	12	11,880	40	12	11,758	41	12	11,636	40	12
	12,081		10	11,965		10	11,840		10	11,717		10	11,596		10
	Plug to Plug	123	36	Plug to Plug	121	36	Plug to Plug	121	36	Plug to Plug	123	36	Plug to Plug	99	36
	Frac Plug	12,183	Total Shots	Frac Plug	12,060	Total Shots	Frac Plug	11,939	Total Shots	Frac Plug	11,818	Total Shots	Frac Plug	11,695	Total Shots

**McVAY DRILLING COMPANY**

P.O. Box 2450
Hobbs, New Mexico 88241
(575) 397-3311
FAX: 39-DRILL

HOBBS OCD**JUL 11 2016****RECEIVED**

Well Name and Num: Blue Jay Federal #1H
Location: Sec 18, T20S, R35E
Operator: COG
Drilling Contractor: McVay Drilling Company

The undersigned certifies that he is an authorized representative of the drilling contractor who drilled the above described well and that he has conducted deviation tests and obtained the following results:

<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>
0.40	287	2.00	6359	62.90	11532		
0.30	670	1.70	6697	84.60	11691		
0.50	1077	2.20	7076	90.80	12180		
0.80	1487	1.10	7546	96.40	12657		
0.20	1991	1.10	7872	91.90	12940		
0.30	2180	1.00	8230	91.30	13023		
0.10	2432	1.00	8611	93.60	13403		
0.10	2686	1.80	8981	92.20	13875		
0.10	3190	0.90	9362	92.20	14159		
0.10	3410	2.50	9334	90.80	14538		
1.90	3914	1.90	10051	93.00	15013		
3.90	4410	1.50	10243	90.60	15489		
3.10	4599	1.40	10498	93.10	15932		
0.30	4976	1.10	10878				
2.80	5417	1.50	11261				
3.10	3747	1.10	11636				
2.20	5924	8.90	11056				

By: Mario G. Camacho

Subscribed and sworn to before me this 16th day of September, 2015

Tina FLEMENS
Notary Public, Lea County, New Mexico



HOBBS OCD

JUL 11 2016

RECEIVED

September 1, 2015

Concho Resources, Inc.
One Concho Center
600 W. Illinois Avenue
Midland, Texas 79701

Attn: Kanicia Castillo

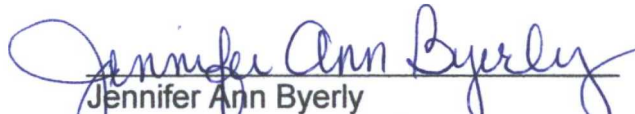
RE: **Blue Jay Federal No 001H**

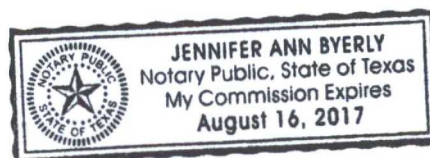
Please find enclosed a copy of the survey from 0' to 11,500' ran on the above referenced well.

Sincerely, 
Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 1 day of September
A.D., 2015, by Keith Havelka.


Jennifer Ann Byerly
Notary Public, State of Texas





Company: Cog Operating LLC
Lease/Well: Blue Jay Federal No/001H

Rig Name: McVay 7
State/County: New Mexico /Lea
VS-Azi: 0.00 Degrees
Latitude: 32.56629, Longitude: -103.49504
Grid North = True North -0.45 degs (NAD 27)



Depth Reference : R.K.B = 17 Ft

HOBBS OCD

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: blue jay fed com # 1h .ut

Minimum Curvature Method

Report Date/Time: 9/1/2015 / 11:01

JUL 11 2016

RECEIVED

VES Survey International

Midland, Texas

432-563-5444

Surveyor: Javier Estrada

Blue Jay Federal No 001H / API 30-025-42338

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	****
100.00	0.52	86.16	100.00	0.03	0.45	0.03	0.45	86.16	0.52
200.00	0.14	56.82	200.00	0.13	1.00	0.13	1.01	82.72	0.40
300.00	0.18	138.96	300.00	0.08	1.21	0.08	1.22	86.40	0.22
400.00	0.20	121.40	400.00	-0.13	1.47	-0.13	1.47	95.23	0.06
500.00	0.03	163.37	500.00	-0.25	1.62	-0.25	1.64	98.68	0.18
600.00	0.12	208.64	600.00	-0.36	1.58	-0.36	1.62	102.98	0.10
700.00	0.12	289.51	700.00	-0.42	1.42	-0.42	1.48	106.44	0.16
800.00	0.30	282.76	799.99	-0.33	1.06	-0.33	1.11	107.01	0.18
900.00	0.44	283.25	899.99	-0.18	0.44	-0.18	0.47	112.40	0.14
1000.00	0.46	268.81	999.99	-0.10	-0.33	-0.10	0.35	253.02	0.11
1100.00	0.27	252.15	1099.99	-0.18	-0.96	-0.18	0.98	259.22	0.21
1200.00	0.63	296.61	1199.98	-0.01	-1.67	-0.01	1.67	269.68	0.47
1300.00	0.55	279.69	1299.98	0.32	-2.63	0.32	2.65	276.86	0.19
1400.00	0.73	257.63	1399.97	0.26	-3.73	0.26	3.74	273.99	0.31
1500.00	0.62	236.96	1499.97	-0.17	-4.80	-0.17	4.81	267.97	0.27
1600.00	0.82	252.35	1599.96	-0.68	-5.94	-0.68	5.98	263.46	0.28
1700.00	0.62	264.72	1699.95	-0.95	-7.15	-0.95	7.22	262.46	0.25
1800.00	0.26	180.71	1799.95	-1.22	-7.69	-1.22	7.79	260.97	0.64

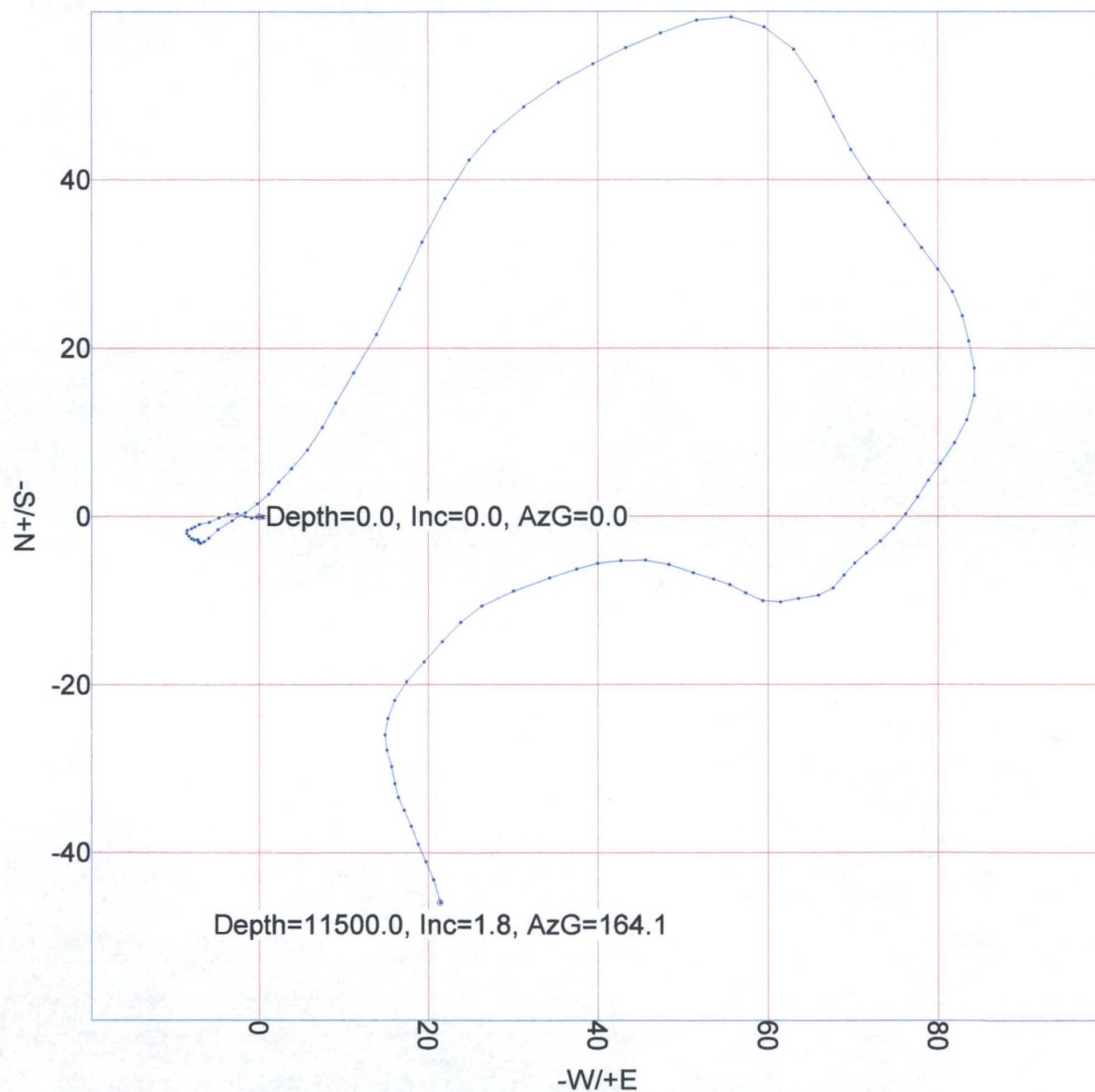
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
1900.00	0.44	269.67	1899.95	-1.45	-8.08	-1.45	8.21	259.81	0.50
2000.00	0.29	222.44	1999.95	-1.64	-8.63	-1.64	8.78	259.24	0.32
2100.00	0.25	144.56	2099.94	-2.00	-8.67	-2.00	8.90	256.98	0.34
2200.00	0.24	133.31	2199.94	-2.33	-8.39	-2.33	8.71	254.50	0.05
2300.00	0.27	137.04	2299.94	-2.64	-8.08	-2.64	8.50	251.91	0.03
2400.00	0.23	86.81	2399.94	-2.80	-7.72	-2.80	8.21	250.08	0.21
2500.00	0.21	85.48	2499.94	-2.77	-7.34	-2.77	7.85	249.30	0.01
2600.00	0.22	230.03	2599.94	-2.88	-7.30	-2.88	7.85	248.46	0.41
2700.00	0.24	96.74	2699.94	-3.03	-7.24	-3.03	7.85	247.29	0.42
2800.00	0.18	229.09	2799.94	-3.15	-7.15	-3.15	7.81	246.19	0.38
2900.00	0.31	70.99	2899.94	-3.16	-7.00	-3.16	7.69	245.68	0.48
3000.00	0.18	59.89	2999.94	-3.00	-6.61	-3.00	7.25	245.61	0.14
3100.00	0.63	52.05	3099.94	-2.58	-6.04	-2.58	6.56	246.87	0.45
3200.00	1.11	45.60	3199.92	-1.56	-4.91	-1.56	5.15	252.35	0.49
3300.00	1.19	69.26	3299.90	-0.52	-3.24	-0.52	3.29	260.97	0.48
3400.00	0.96	45.09	3399.89	0.45	-1.67	0.45	1.73	284.94	0.50
3500.00	1.10	60.24	3499.87	1.52	-0.25	1.52	1.54	350.69	0.30
3600.00	1.02	40.99	3599.85	2.66	1.17	2.66	2.91	23.67	0.36
3700.00	1.14	39.37	3699.84	4.10	2.38	4.10	4.74	30.13	0.12
3800.00	1.40	45.87	3799.81	5.72	3.88	5.72	6.91	34.19	0.30
3900.00	1.90	35.73	3899.77	7.91	5.73	7.91	9.77	35.90	0.58
4000.00	1.78	30.82	3999.72	10.60	7.50	10.60	12.98	35.27	0.20
4100.00	2.03	27.67	4099.66	13.50	9.12	13.50	16.29	34.02	0.27
4200.00	2.71	32.10	4199.58	17.07	11.19	17.07	20.42	33.25	0.70
4300.00	3.38	29.32	4299.44	21.65	13.89	21.65	25.72	32.70	0.69
4400.00	3.58	24.59	4399.25	27.06	16.64	27.06	31.77	31.59	0.35
4500.00	3.48	26.49	4499.06	32.62	19.29	32.62	37.89	30.60	0.16
4600.00	3.23	29.13	4598.89	37.79	22.02	37.79	43.74	30.22	0.29
4700.00	2.94	35.23	4698.75	42.35	24.87	42.35	49.12	30.42	0.44
4800.00	2.22	48.74	4798.64	45.73	27.81	45.73	53.52	31.31	0.94
4900.00	3.01	51.03	4898.54	48.66	31.31	48.66	57.86	32.76	0.80
5000.00	2.76	59.18	4998.41	51.54	35.41	51.54	62.53	34.49	0.48
5100.00	2.53	62.93	5098.31	53.78	39.44	53.78	66.69	36.26	0.29
5200.00	2.41	65.30	5198.21	55.66	43.31	55.66	70.53	37.89	0.15
5300.00	2.64	67.78	5298.12	57.41	47.36	57.41	74.42	39.52	0.25
5400.00	2.55	73.35	5398.01	58.92	51.63	58.92	78.34	41.23	0.27
5500.00	2.22	96.96	5497.93	59.32	55.69	59.32	81.36	43.19	1.03
5600.00	2.47	115.71	5597.85	58.15	59.55	58.15	83.23	45.68	0.80
5700.00	2.64	138.68	5697.75	55.49	63.01	55.49	83.96	48.63	1.03

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
5800.00	2.69	152.74	5797.64	51.67	65.61	51.67	83.51	51.78	0.65
5900.00	2.66	153.97	5897.53	47.49	67.70	47.49	82.70	54.95	0.07
6000.00	2.36	150.58	5997.44	43.62	69.73	43.62	82.25	57.97	0.34
6100.00	2.25	144.00	6097.36	40.24	71.89	40.24	82.39	60.76	0.29
6200.00	1.95	141.25	6197.29	37.33	74.11	37.33	82.98	63.27	0.31
6300.00	1.88	145.88	6297.23	34.64	76.10	34.64	83.61	65.52	0.17
6400.00	1.94	141.91	6397.18	31.95	78.06	31.95	84.35	67.74	0.15
6500.00	1.73	144.79	6497.13	29.39	79.98	29.39	85.20	69.82	0.23
6600.00	1.92	149.66	6597.08	26.71	81.69	26.71	85.95	71.89	0.24
6700.00	1.67	166.85	6697.03	23.85	82.87	23.85	86.23	73.94	0.59
6800.00	1.88	165.40	6796.98	20.84	83.61	20.84	86.17	76.00	0.21
6900.00	1.88	171.67	6896.93	17.64	84.26	17.64	86.09	78.18	0.21
7000.00	1.87	188.44	6996.87	14.40	84.26	14.40	85.48	80.30	0.55
7100.00	1.66	205.90	7096.83	11.49	83.39	11.49	84.18	82.16	0.57
7200.00	1.88	210.34	7196.78	8.76	81.93	8.76	82.39	83.89	0.26
7300.00	1.54	217.20	7296.74	6.28	80.28	6.28	80.53	85.53	0.40
7400.00	1.26	212.84	7396.71	4.28	78.87	4.28	78.99	86.89	0.30
7500.00	1.40	212.86	7496.68	2.33	77.61	2.33	77.65	88.28	0.14
7600.00	1.42	216.49	7596.65	0.30	76.21	0.30	76.21	89.77	0.09
7700.00	1.15	222.94	7696.62	-1.43	74.79	-1.43	74.80	91.09	0.31
7800.00	1.37	229.67	7796.60	-2.94	73.20	-2.94	73.26	92.30	0.27
7900.00	1.14	228.75	7896.57	-4.37	71.54	-4.37	71.67	93.49	0.23
8000.00	0.94	229.73	7996.56	-5.56	70.16	-5.56	70.38	94.53	0.20
8100.00	1.26	215.68	8096.54	-6.98	68.89	-6.98	69.24	95.79	0.41
8200.00	1.01	224.28	8196.52	-8.50	67.64	-8.50	68.17	97.17	0.30
8300.00	1.33	258.31	8296.50	-9.37	65.89	-9.37	66.55	98.09	0.75
8400.00	1.38	262.80	8396.47	-9.75	63.55	-9.75	64.30	98.73	0.12
8500.00	1.10	254.65	8496.45	-10.16	61.43	-10.16	62.27	99.39	0.33
8600.00	1.37	288.36	8596.43	-10.04	59.37	-10.04	60.21	99.59	0.76
8700.00	1.21	301.40	8696.40	-9.11	57.33	-9.11	58.05	99.03	0.34
8800.00	1.21	294.01	8796.38	-8.13	55.47	-8.13	56.06	98.34	0.16
8900.00	1.12	284.03	8896.36	-7.47	53.56	-7.47	54.08	97.94	0.22
9000.00	1.75	289.79	8996.33	-6.71	51.18	-6.71	51.61	97.47	0.64
9100.00	1.69	288.37	9096.28	-5.73	48.34	-5.73	48.68	96.76	0.07
9200.00	1.57	271.39	9196.24	-5.23	45.57	-5.23	45.87	96.55	0.50
9300.00	1.71	266.83	9296.20	-5.28	42.72	-5.28	43.04	97.05	0.19
9400.00	1.44	259.91	9396.16	-5.58	40.00	-5.58	40.38	97.95	0.33
9500.00	1.51	249.83	9496.13	-6.26	37.52	-6.26	38.04	99.47	0.27
9600.00	2.33	252.56	9596.07	-7.32	34.34	-7.32	35.11	102.04	0.83

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
9700.00	2.85	247.58	9695.97	-8.88	30.10	-8.88	31.39	106.44	0.56
9800.00	1.90	240.79	9795.88	-10.64	26.36	-10.64	28.43	111.97	0.99
9900.00	1.80	223.49	9895.83	-12.59	23.83	-12.59	26.95	117.84	0.56
10000.00	1.79	224.01	9995.78	-14.85	21.67	-14.85	26.27	124.42	0.02
10100.00	1.92	219.31	10095.73	-17.27	19.52	-17.27	26.06	131.49	0.20
10200.00	1.66	223.78	10195.68	-19.61	17.46	-19.61	26.26	138.33	0.29
10300.00	1.44	199.16	10295.65	-21.85	16.04	-21.85	27.10	143.72	0.70
10400.00	1.19	201.01	10395.62	-24.00	15.25	-24.00	28.44	147.57	0.26
10500.00	1.12	179.10	10495.60	-25.95	14.90	-25.95	29.92	150.14	0.44
10600.00	1.00	164.69	10595.58	-27.77	15.14	-27.77	31.63	151.40	0.29
10700.00	1.31	164.70	10695.56	-29.72	15.68	-29.72	33.60	152.19	0.31
10800.00	1.07	173.88	10795.54	-31.75	16.08	-31.75	35.59	153.14	0.31
10900.00	0.88	155.32	10895.53	-33.38	16.50	-33.38	37.24	153.70	0.37
11000.00	1.01	157.90	10995.51	-34.90	17.15	-34.90	38.89	153.83	0.13
11100.00	1.37	155.52	11095.49	-36.81	17.98	-36.81	40.96	153.96	0.36
11200.00	1.31	162.15	11195.46	-38.98	18.83	-38.98	43.29	154.22	0.16
11300.00	1.31	151.61	11295.44	-41.08	19.72	-41.08	45.57	154.35	0.24
11400.00	1.39	161.63	11395.41	-43.23	20.65	-43.23	47.91	154.47	0.25
11500.00	1.82	164.15	11495.37	-45.92	21.46	-45.92	50.68	154.95	0.44



VES Survey International
Midland, Texas
432-563-5444
Surveyor: Javier Estrada
Blue Jay Federal No 001H / API 30-025-42338



V.E.S. Survey Date: 8/26/2015



HOBBS OCD

JUL 11 2016

RECEIVED

I JAVIER ESTRADA certify that I am employed by Vaughn Energy Services. That I did on the day(s) of 08/27/15 through 08/27/15 conduct or supervise the taking of a RATE GYRO survey from a depth of 0 feet to a depth of 11500 feet; that the data is true, correct, complete and within the limitations of the tool as set forth by Vaughn Energy Services, that I am authorized and qualified to make this report; that this survey was conducted at the request of COG OPERATING LLC for the Blue Jay Fed Com N/O Well # 001H API # 30-025-42338 in Lea County / Parish New Mexico; and that I have reviewed this report and find that it conforms to the principles and procedures as set forth by Vaughn Energy Services


JAVIER ESTRADA
Service Technician
Vaughn Energy Services



COG Operating, LLC

Lea County, NM

Sec 18, T20S, R35E

Blue Jay Federal #1H

Wellbore #1

Survey: MWD

DDC Survey Report

23 September, 2015

HOBBS OCD

JUL 11 2016

RECEIVED



The Directional Drilling Company

11390 FM 830
Willis, TX 77318
Phone: (936) 856-4332
Fax: (936) 856-8678

HOBBS OCD

JUL 11 2016

RECEIVED

**Survey Certification Sheet**

Company	Job Number	Date
COG Operating, LLC	WT-150585	9/18/2015

Lease	Well Name	County & State
Sec18,T20S,R35E	Blue Jay Federal 1H	Lea, NM

API No.	Survey Depth Range	Survey Type
30-025-42338	10900' feet to 15976' feet MD	MWD

Sidetrack Information	Directional Supervisor/Surveyor
N/A	Tuffy Hudson

Certification Statement

The data and calculations for this survey have been checked by me and conform to the standards and procedures set forth by The Directional Drilling Company (DDC). This report represents a true and correct directional survey of this well based on the original data obtained at the well site.

Wellbore coordinates are calculated using minimum curvature.

Christopher Hughes

Digitally signed by Christopher Hughes
DN: cn=Christopher Hughes, o=DDC, ou,
email=Chrish@directionaldrillers.com, c=US
Date: 2015.09.23 10:07:45 -05'00'

A handwritten signature in black ink, appearing to read "Christopher Hughes", is written over a horizontal line.

Christopher Hughes
MWD Compliance Manager
The Directional Drilling Company

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Blue Jay Federal #1H
Project:	Lea County, NM	TVD Reference:	well @ 3689.0usft (Mcvay #7)
Site:	Sec 18, T20S, R35E	MD Reference:	well @ 3689.0usft (Mcvay #7)
Well:	Blue Jay Federal #1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Project	Lea County, NM		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site	Sec 18, T20S, R35E		
Site Position:		Northing:	570,747.00 usft
From:	Map	Easting:	758,261.00 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 33' 58.661 N
		Longitude:	103° 29' 42.139 W
		Grid Convergence:	0.45 °

Well	Blue Jay Federal #1H		
Well Position	+N/-S	0.0 usft	Northing:
	+E/-W	0.0 usft	Easting:
Position Uncertainty	0.0 usft	Wellhead Elevation:	0.0 usft
		Latitude:	32° 33' 58.661 N
		Longitude:	103° 29' 42.139 W
		Ground Level:	3,672.0 usft

Wellbore	Wellbore #1		
Magnetics	Model Name	Sample Date	Declination (°)
	IGRF2015	8/31/2015	7.14
			Dip Angle (°)
			60.41
			Field Strength (nT)
			48,334

Design	Wellbore #1		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)
	0.0	0.0	0.0
			Direction (°)
			0.12

Survey Program	Date 9/12/2015		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name
100.0	10,900.0	Gyro (Wellbore #1)	Good_gyro
10,961.0	15,976.0	MWD (Wellbore #1)	MWD default
			Description
			Good Gyro
			MWD - Standard

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
Gyro Tie-in @ 10900' MD / 10896' TVD									
10,900.0	0.88	155.32	10,895.5	-33.4	16.5	-33.4	0.00	0.00	0.00
10,961.0	1.20	168.40	10,956.5	-34.4	16.8	-34.4	0.65	0.52	21.44
10,992.0	0.20	50.50	10,987.5	-34.7	16.9	-34.7	4.21	-3.23	-380.32
11,024.0	4.50	352.10	11,019.5	-33.5	16.8	-33.4	13.75	13.44	-182.50
11,056.0	8.90	354.40	11,051.3	-29.7	16.3	-29.7	13.77	13.75	7.19
11,088.0	13.40	356.50	11,082.6	-23.6	15.9	-23.5	14.12	14.06	6.56
11,119.0	17.80	354.40	11,112.5	-15.3	15.2	-15.2	14.31	14.19	-6.77
11,149.0	21.50	353.10	11,140.7	-5.2	14.1	-5.2	12.42	12.33	-4.33
11,181.0	25.10	355.60	11,170.1	7.3	12.9	7.4	11.66	11.25	7.81

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Blue Jay Federal #1H
Project:	Lea County, NM	TVD Reference:	well @ 3689.0usft (Mcvay #7)
Site:	Sec 18, T20S, R35E	MD Reference:	well @ 3689.0usft (Mcvay #7)
Well:	Blue Jay Federal #1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
11,213.0	29.20	355.10	11,198.6	21.9	11.7	21.9	12.83	12.81	-1.56	
11,245.0	32.30	354.20	11,226.1	38.2	10.1	38.2	9.79	9.69	-2.81	
11,277.0	35.50	354.70	11,252.7	55.9	8.4	56.0	10.04	10.00	1.56	
11,309.0	38.90	355.60	11,278.1	75.2	6.8	75.2	10.76	10.63	2.81	
11,341.0	42.40	357.20	11,302.4	96.0	5.5	96.0	11.41	10.94	5.00	
11,373.0	45.90	358.30	11,325.4	118.3	4.6	118.3	11.20	10.94	3.44	
11,405.0	48.00	0.20	11,347.2	141.7	4.3	141.7	7.87	6.56	5.94	
11,436.0	50.70	3.00	11,367.4	165.2	5.0	165.2	11.08	8.71	9.03	
11,468.0	54.80	5.10	11,386.8	190.6	6.8	190.6	13.84	12.81	6.56	
11,500.0	58.80	6.90	11,404.3	217.2	9.6	217.2	13.36	12.50	5.63	
11,532.0	62.90	7.70	11,419.9	244.9	13.2	244.9	13.00	12.81	2.50	
11,564.0	66.70	6.90	11,433.5	273.6	16.8	273.7	12.09	11.88	-2.50	
11,596.0	71.40	6.30	11,444.9	303.3	20.3	303.3	14.79	14.69	-1.88	
11,628.0	76.20	5.60	11,453.9	333.9	23.5	333.9	15.15	15.00	-2.19	
11,660.0	80.90	4.10	11,460.2	365.1	26.1	365.2	15.39	14.69	-4.69	
11,691.0	84.60	2.70	11,464.1	395.8	27.9	395.8	12.75	11.94	-4.52	
11,733.0	88.60	0.90	11,466.6	437.7	29.2	437.7	10.44	9.52	-4.29	
11,765.0	90.00	0.40	11,467.0	469.7	29.6	469.7	4.65	4.38	-1.56	
11,797.0	92.10	0.70	11,466.4	501.7	29.9	501.7	6.63	6.56	0.94	
11,893.0	95.10	1.20	11,460.4	597.5	31.5	597.5	3.17	3.13	0.52	
11,989.0	93.10	2.50	11,453.5	693.2	34.6	693.2	2.48	-2.08	1.35	
12,084.0	91.70	1.20	11,449.6	788.0	37.7	788.1	2.01	-1.47	-1.37	
12,180.0	90.80	0.00	11,447.5	884.0	38.7	884.1	1.56	-0.94	-1.25	
12,276.0	87.80	0.20	11,448.6	980.0	38.8	980.0	3.13	-3.13	0.21	
12,372.0	90.00	0.40	11,450.5	1,075.9	39.3	1,076.0	2.30	2.29	0.21	
12,466.0	90.60	0.00	11,450.0	1,169.9	39.7	1,170.0	0.77	0.64	-0.43	
12,561.0	93.10	0.00	11,446.9	1,264.9	39.7	1,265.0	2.63	2.63	0.00	
12,657.0	91.40	0.20	11,443.1	1,360.8	39.8	1,360.9	1.78	-1.77	0.21	
12,751.0	92.80	0.00	11,439.7	1,454.7	40.0	1,454.8	1.50	1.49	-0.21	
12,846.0	92.10	0.20	11,435.6	1,549.7	40.2	1,549.7	0.77	-0.74	0.21	
12,940.0	91.90	359.70	11,432.4	1,643.6	40.1	1,643.7	0.57	-0.21	-0.53	
13,023.0	91.30	359.30	11,430.0	1,726.6	39.3	1,726.6	0.87	-0.72	-0.48	
13,118.0	92.30	359.10	11,427.1	1,821.5	38.0	1,821.6	1.07	1.05	-0.21	
13,213.0	91.40	359.10	11,424.0	1,916.4	36.5	1,916.5	0.95	-0.95	0.00	
13,308.0	92.10	359.80	11,421.1	2,011.4	35.6	2,011.5	1.04	0.74	0.74	
13,403.0	93.60	359.50	11,416.4	2,106.3	35.0	2,106.3	1.61	1.58	-0.32	
13,498.0	92.50	358.60	11,411.3	2,201.1	33.5	2,201.2	1.50	-1.16	-0.95	
13,592.0	91.50	359.00	11,408.0	2,295.0	31.5	2,295.1	1.15	-1.06	0.43	
13,686.0	91.30	359.00	11,405.7	2,389.0	29.9	2,389.1	0.21	-0.21	0.00	
13,781.0	92.50	358.60	11,402.6	2,483.9	27.9	2,484.0	1.33	1.26	-0.42	
13,875.0	92.20	359.00	11,398.7	2,577.8	25.9	2,577.9	0.53	-0.32	0.43	
13,970.0	91.30	359.10	11,395.8	2,672.8	24.3	2,672.8	0.95	-0.95	0.11	
14,064.0	93.00	358.80	11,392.3	2,766.7	22.6	2,766.7	1.84	1.81	-0.32	

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Blue Jay Federal #1H
Project:	Lea County, NM	TVD Reference:	well @ 3689.0usft (Mcvay #7)
Site:	Sec 18, T20S, R35E	MD Reference:	well @ 3689.0usft (Mcvay #7)
Well:	Blue Jay Federal #1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
14,159.0	92.20	359.00	11,388.0	2,861.6	20.8	2,861.6	0.87	-0.84	0.21
14,253.0	91.30	0.00	11,385.1	2,955.5	20.0	2,955.5	1.43	-0.96	1.06
14,347.0	92.80	0.20	11,381.8	3,049.4	20.1	3,049.5	1.61	1.60	0.21
14,442.0	92.10	359.80	11,377.7	3,144.4	20.1	3,144.4	0.85	-0.74	-0.42
14,538.0	91.80	359.50	11,374.4	3,240.3	19.5	3,240.3	0.44	-0.31	-0.31
14,633.0	93.00	359.30	11,370.5	3,335.2	18.5	3,335.2	1.28	1.26	-0.21
14,728.0	92.60	359.50	11,365.8	3,430.1	17.6	3,430.1	0.47	-0.42	0.21
14,823.0	92.20	358.60	11,361.8	3,525.0	16.0	3,525.0	1.04	-0.42	-0.95
14,918.0	91.30	358.60	11,358.9	3,619.9	13.7	3,619.9	0.95	-0.95	0.00
15,013.0	93.00	358.40	11,355.4	3,714.8	11.2	3,714.8	1.80	1.79	-0.21
15,108.0	92.20	358.80	11,351.1	3,809.7	8.9	3,809.7	0.94	-0.84	0.42
15,203.0	91.40	0.00	11,348.1	3,904.6	7.9	3,904.6	1.52	-0.84	1.26
15,299.0	91.10	0.40	11,346.0	4,000.6	8.2	4,000.6	0.52	-0.31	0.42
15,394.0	92.30	0.90	11,343.2	4,095.6	9.3	4,095.6	1.37	1.26	0.53
15,489.0	90.60	1.80	11,340.8	4,190.5	11.5	4,190.5	2.02	-1.79	0.95
15,584.0	92.10	1.90	11,338.5	4,285.4	14.6	4,285.4	1.58	1.58	0.11
15,678.0	91.00	1.90	11,336.0	4,379.3	17.7	4,379.4	1.17	-1.17	0.00
15,773.0	92.90	2.30	11,332.8	4,474.2	21.2	4,474.2	2.04	2.00	0.42
15,869.0	92.30	1.20	11,328.4	4,570.1	24.1	4,570.1	1.30	-0.63	-1.15
15,932.0	93.10	0.70	11,325.4	4,633.0	25.1	4,633.0	1.50	1.27	-0.79
TD @ 15976' MD / 11323' TVD									
15,976.0	93.10	0.70	11,323.0	4,676.9	25.7	4,677.0	0.00	0.00	0.00

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
10,900.0	10,895.5	-33.4	16.5	Gyro Tie-in @ 10900' MD / 10896' TVD
15,976.0	11,323.0	4,676.9	25.7	TD @ 15976' MD / 11323' TVD

Checked By: _____	Approved By: _____	Date: _____
-------------------	--------------------	-------------