

Reservoir Development

PathFinder, a Schlumberger Company
9200 West Reno Avenue
Oklahoma City, Oklahoma 73127 USA
Phone: (405) 789-1515
Fax: (405) 789-1519



15-42487

Well Reference:

0

N 32.15177 W 104.25332

I, Ben Moore certify that; I am employed by PathFinder, a division of Schlumberger Technology Corporation; that I did on the day(s) of October 23, 2015 through October 28, 2015, conduct or supervise the taking of the SlimPulse surveys from a depth of 6611.00 feet to a depth of 12054.00 feet referenced to driller's depth; that the data is true, correct, complete and within the limitations of the tool as set forth by Drilling & Measurements, a division of Schlumberger Technology Corporation; that I am authorized and qualified to make this report; that this survey was conducted at the request of Cimarex for the Marquardt 1 Federal #16H, Well (Original Hole) API No. 30-015-42487-00 and that I have reviewed this report and find that it conforms to the principals and procedures as set forth by Drilling & Measurements, a division of Schlumberger Technology Corporation.

By
Ben Moore
MWD

Subscribed and Sworn to before me this 17th day of November (month) 2015 (yr)

My Commission expires:

September 5, 2016

Michelle Ellwood

Notary Public

Midland, TX
(County State)



Oilfield Services, Central U.S. Land

Reservoir Development

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Oklahoma City, Oklahoma 73127 USA

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PATHFINDER

A Schlumberger Company

NM OIL CONSERVATION

~~ARTESIA DISTRICT~~

November 17, 2015

MAR 08 2016

Cimarex

600 N MARIENFELD STREET SUITE 600

RECEIVED

MIDLAND, TX 79701

Re:

CLIENT: Cimarex
WELL: Marquardt I Federal #1611.
FIELD: Bone Springs
RIG: H&P 381
COUNTY: Eddy
API NO: 30-015-42487-00
JOB NO: 15MLD2229

0
N 32.15177 W 104.25332

Enclosed, please find the original copy of the survey performed on the referenced well by PathFinder, a division of Schlumberger Technology Corporation.

Other information required by your office is as follows.

<u>Name & Title of Surveyor</u>	<u>Drainhole Number</u>	<u>Surveyed Depths</u>	<u>Dates Performed</u>	<u>Type of Survey</u>
Ben Moore MWD	Marquardt I Federal #1611. Original Hole	6611.00 Ft to 12054.00 Ft	October 23, 2015 to October 28, 2015	SlimPulse

If any other information is required, please contact the undersigned at the above letterhead and phone number.

Sincerely,

Jasem Alharer
Field Service Manager

Schlumberger Survey Report

Wednesda October 21 2015 6:21 Report by MaxWell

-----General Information-----

Client : Cimarex Energy Co. Well name : Marquardt Federal 16H
Field Eastern Zc US Feet

-----Survey Calculation Methods-----

Method for positions : Minimum Curvature Method

-----Job Location & Elevation-----

Latitude : 32.1518 degrees Longitude : -104.2533degrees
Permanent Datum : MSL Log Measured From : DF
Elevation of LMF from MSL : 3335.00 ft Elevation of TIP from MSL: 3335.00 ft
Depth Source :

-----Vertical Section Origin-----

Latitude (+N/S-) : 0.00 ft Departure (+E/W-) : 0.00 ft
Target Azimuth : 1.1200 degrees

-----MWD Survey Reference Criteria-----

-----Run1-----

Geomag Model: : HDGM 2015 Calculation Date: : 22 Oct 2015
Location G : 998.82 mgn Tolerance G : 2.50 mgn
Location B : 48250.64 nT Tolerance B : 300.00 nT
Magnetic Dip : 59.92 degrees Tolerance Dip : 0.45 degrees

-----Run2-----

Geomag Model: : HDGM 2015 Calculation Date: : 24 Oct 2015
Location G : 998.82 mgn Tolerance G : 2.50 mgn
Location B : 48250.05 nT Tolerance B : 300.00 nT
Magnetic Dip : 59.92 degrees Tolerance Dip : 0.45 degrees

-----Run3-----

Geomag Model: : HDGM 2015 Calculation Date: : 26 Oct 2015
Location G : 998.82 mgn Tolerance G : 2.50 mgn
Location B : 48249.46 nT Tolerance B : 300.00 nT
Magnetic Dip : 59.92 degrees Tolerance Dip : 0.45 degrees

-----MWD Survey Azimuth Correction-----

-----Run1-----

Magnetic dec (+E/W-) : 7.6616 degrees
Grid convergence (+E/W-) : 0.0426 degrees
GTotal az corr (+E/W-) : 7.6190 degrees

-----Run2-----

Magnetic dec (+E/W-) : 7.6611 degrees
Grid convergence (+E/W-) : 0.0426 degrees
GTotal az corr (+E/W-) : 7.6185 degrees

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----Run3----

Magnetic dec (+E/W-) : 7.6605 degrees
Grid convergence (+E/W-) : 0.0426 degrees
GTotal az corr (+E/W-) : 7.6179 degrees

-----Survey Quality Index Description-----
0 : Long Survey passed all criteria 2 : Long Survey failed mag criteria
9 : Manual 28 : Tie-In Point

-----Survey Correction Index Description-----
0 : No Correction

-----Survey Description Index Description-----
0 : Not Flagged Survey 7 : Projection to Bit

===== Survey List =====												
MD	Incl	Azim	TVD	V Sec	N/-S	E/-W	DLS	Run	Tool	QI	CI	ID
(ft)	(deg)	(deg)	(ft)	(ft)	(ft)	(ft)	(deg)					
			/100ft)									
0	0	0	0	0	0	0	0	0	Other	28	0	0
195	2.29	199.89	194.95	-3.69	-3.66	-1.33	1.17	1	EPulse	9	0	0
270	1.89	200.77	269.9	-6.27	-6.23	-2.27	0.54	1	EPulse	9	0	0
367	1.8	211.98	366.85	-9.09	-9.02	-3.65	0.38	1	EPulse	9	0	0
460	2.11	207.1	459.79	-11.88	-11.78	-5.2	0.38	1	EPulse	9	0	0
521	2.02	216.29	520.75	-13.77	-13.65	-6.35	0.56	1	EPulse	9	0	0
613	2.02	207.67	612.7	-16.54	-16.39	-8.06	0.33	1	EPulse	9	0	0
675	2.11	204.68	674.66	-18.57	-18.39	-9.05	0.23	1	EPulse	9	0	0
765	2.11	203.67	764.6	-21.62	-21.42	-10.4	0.04	1	EPulse	9	0	0
856	2.2	212.9	855.53	-24.65	-24.42	-12.02	0.39	1	EPulse	9	0	0
947	2.2	215.41	946.47	-27.58	-27.31	-13.99	0.11	1	EPulse	9	0	0
1038	1.89	212.51	1037.41	-30.3	-30	-15.8	0.36	1	EPulse	9	0	0
1128	2.29	224.37	1127.35	-32.88	-32.53	-17.86	0.65	1	EPulse	9	0	0
1219	2.29	223.49	1218.27	-35.54	-35.15	-20.38	0.04	1	EPulse	9	0	0
1311	1.8	209.87	1310.22	-38.17	-37.74	-22.37	0.75	1	EPulse	9	0	0
1402	1.58	174.89	1401.18	-40.67	-40.23	-22.97	1.14	1	EPulse	9	0	0
1497	1.32	176.19	1496.15	-43.06	-42.62	-22.78	0.28	1	EPulse	9	0	0
1592	1.71	143.6	1591.12	-45.28	-44.86	-21.86	0.98	1	EPulse	9	0	0
1687	2.68	131.78	1686.05	-47.85	-47.48	-19.37	1.12	1	EPulse	9	0	0
1782	3.12	124.48	1780.93	-50.72	-50.42	-15.58	0.6	1	EPulse	9	0	0
1888	1.58	168.08	1886.84	-53.73	-53.48	-12.9	2.13	1	EPulse	9	0	0
2063	1.32	201.48	2061.79	-57.97	-57.72	-13.14	0.5	1	EPulse	9	0	0
2158	1.32	203.59	2156.76	-60	-59.74	-13.98	0.05	1	EPulse	9	0	0
2253	1.32	198.01	2251.74	-62.06	-61.79	-14.75	0.14	1	EPulse	9	0	0
2347	1.19	209.78	2345.71	-63.95	-63.66	-15.57	0.31	1	EPulse	9	0	0
2442	1.49	216.77	2440.69	-65.82	-65.51	-16.8	0.36	1	EPulse	9	0	0
2536	1.41	217.21	2534.66	-67.75	-67.41	-18.23	0.09	1	EPulse	9	0	0
2631	1.41	214.09	2629.63	-69.68	-69.31	-19.59	0.08	1	EPulse	9	0	0
2726	1.41	225.38	2724.6	-71.49	-71.1	-21.08	0.29	1	EPulse	9	0	0
2820	1.49	217.3	2818.57	-73.31	-72.88	-22.65	0.23	1	EPulse	9	0	0
2915	1.49	226.09	2913.54	-75.18	-74.72	-24.28	0.24	1	EPulse	9	0	0
3009	1.8	221.69	3007.5	-77.16	-76.67	-26.15	0.36	1	EPulse	9	0	0
3104	1.58	224.81	3102.46	-79.25	-78.71	-28.06	0.25	1	EPulse	9	0	0
3199	1.71	219.58	3197.42	-81.3	-80.73	-29.89	0.21	1	EPulse	9	0	0
3294	1.58	221.78	3292.38	-83.41	-82.8	-31.66	0.15	1	EPulse	9	0	0

3388	1.41	229.78	3386.35	-85.15	-84.52	-33.41	0.29	1 EPulse	9	0	0
3483	1.49	232.68	3481.32	-86.69	-86.02	-35.28	0.11	1 EPulse	9	0	0
3578	1.58	228.81	3576.28	-88.34	-87.63	-37.25	0.14	1 EPulse	9	0	0
3673	1.58	236.19	3671.25	-89.97	-89.22	-39.33	0.21	1 EPulse	9	0	0
3767	1.49	228.9	3765.21	-91.54	-90.75	-41.32	0.23	1 EPulse	9	0	0
3862	1.8	235.01	3860.17	-93.25	-92.41	-43.48	0.37	1 EPulse	9	0	0
3957	1.71	235.58	3955.13	-94.95	-94.07	-45.87	0.1	1 EPulse	9	0	0
4051	1.32	222.88	4049.1	-96.57	-95.66	-47.76	0.55	1 EPulse	9	0	0
4146	1.19	212.2	4144.07	-98.23	-97.29	-49.03	0.28	1 EPulse	9	0	0
4241	1.1	218.4	4239.06	-99.8	-98.84	-50.12	0.16	1 EPulse	9	0	0
4336	1.1	205.7	4334.04	-101.36	-100.38	-51.09	0.26	1 EPulse	9	0	0
4430	1.1	209.21	4428.02	-102.97	-101.98	-51.92	0.07	1 EPulse	9	0	0
4525	1.01	211.67	4523.01	-104.5	-103.49	-52.8	0.11	1 EPulse	9	0	0
4620	1.01	209.87	4617.99	-105.95	-104.93	-53.66	0.03	1 EPulse	9	0	0
4715	1.19	214	4712.97	-107.52	-106.47	-54.63	0.21	1 EPulse	9	0	0
4809	1.32	210.79	4806.95	-109.28	-108.21	-55.73	0.16	1 EPulse	9	0	0
4904	1.32	200.2	4901.93	-111.26	-110.18	-56.67	0.26	1 EPulse	9	0	0
4999	1.41	203.89	4996.9	-113.37	-112.27	-57.52	0.13	1 EPulse	9	0	0
5094	1.32	201.39	5091.87	-115.48	-114.36	-58.39	0.11	1 EPulse	9	0	0
5189	1.49	191.28	5186.84	-117.72	-116.59	-59.03	0.32	1 EPulse	9	0	0
5283	1.58	189.48	5280.81	-120.21	-119.07	-59.48	0.11	1 EPulse	9	0	0
5378	1.89	201.78	5375.77	-122.97	-121.81	-60.28	0.51	1 EPulse	9	0	0
5473	2.02	200.99	5470.71	-126.01	-124.83	-61.46	0.14	1 EPulse	9	0	0
5568	1.49	182.49	5565.67	-128.82	-127.63	-62.11	0.81	1 EPulse	9	0	0
5662	1.32	194.18	5659.64	-131.09	-129.9	-62.43	0.35	1 EPulse	9	0	0
5757	1.1	195.68	5754.62	-133.04	-131.84	-62.95	0.23	1 EPulse	9	0	0
5852	1.1	211.89	5849.6	-134.71	-133.49	-63.67	0.33	1 EPulse	9	0	0
5947	1.49	189.08	5944.58	-136.71	-135.48	-64.35	0.67	1 EPulse	9	0	0
6041	1.8	155.38	6038.54	-139.26	-138.03	-63.93	1.06	1 EPulse	9	0	0
6136	1.58	150.59	6133.5	-141.73	-140.53	-62.66	0.28	1 EPulse	9	0	0
6231	1.89	152.79	6228.45	-144.23	-143.07	-61.31	0.33	1 EPulse	9	0	0
6325	1.58	161.09	6322.41	-146.82	-145.67	-60.18	0.42	1 EPulse	9	0	0
6420	1.32	186.18	6417.38	-149.14	-148	-59.87	0.71	1 EPulse	9	0	0
6515	1.01	195.81	6512.36	-151.04	-149.89	-60.22	0.38	1 EPulse	9	0	0
6561	0.79	215.1	6558.36	-151.69	-150.54	-60.51	0.81	1 EPulse	9	0	0
6611	0.9	293.99	6608.35	-151.83	-150.66	-61.06	2.15	1 SlimPulse	0	0	0
6641	3.91	349.7	6638.32	-150.73	-149.56	-61.46	11.61	1 SlimPulse	0	0	0
6689	6.99	0.01	6686.1	-146.21	-145.03	-61.75	6.71	1 SlimPulse	0	0	0
6737	11.54	0.36	6733.46	-138.48	-137.3	-61.72	9.47	1 SlimPulse	0	0	0
6784	16.1	358.18	6779.09	-127.27	-126.09	-61.9	9.76	1 SlimPulse	0	0	0
6832	22.64	358.98	6824.35	-111.38	-110.18	-62.28	13.64	1 SlimPulse	0	0	0
6879	29.1	2.03	6866.62	-90.89	-89.7	-62.03	14.03	1 SlimPulse	0	0	0
6927	36.36	4.3	6906.98	-64.98	-63.81	-60.55	15.34	1 SlimPulse	0	0	0
6974	43.03	3.16	6943.12	-35.01	-33.87	-58.62	14.27	1 SlimPulse	0	0	0
7021	47.76	3.54	6976.12	-1.58	-0.48	-56.66	10.1	1 SlimPulse	0	0	0
7068	53.38	3.86	7005.96	34.67	35.74	-54.32	11.96	1 SlimPulse	0	0	0
7116	60.47	3.39	7032.14	74.83	75.85	-51.78	14.79	1 SlimPulse	0	0	0
7163	68.08	2.08	7052.52	117.12	118.11	-49.78	16.4	1 SlimPulse	0	0	0
7211	75.78	359.87	7067.4	162.72	163.7	-49.02	16.62	1 SlimPulse	0	0	0
7259	80.95	359	7077.08	209.69	210.7	-49.49	10.92	1 SlimPulse	0	0	0
7306	84.66	358.23	7082.96	256.27	257.31	-50.62	8.06	1 SlimPulse	0	0	0
7353	87.21	357.53	7086.29	303.07	304.15	-52.35	5.63	1 SlimPulse	0	0	0
7374	87.8	357.56	7087.2	324.01	325.11	-53.25	2.79	1 SlimPulse	0	0	0
7438	89.38	358.21	7088.78	387.89	389.05	-55.61	2.67	2 SlimPulse	0	0	0
7533	89.17	0.23	7089.98	482.82	484.03	-56.9	2.14	2 SlimPulse	2	0	0
7628	89.31	1.12	7091.23	577.81	579.01	-55.78	0.94	2 SlimPulse	2	0	0
7722	88.07	0.93	7093.38	671.79	672.97	-54.1	1.33	2 SlimPulse	2	0	0
7817	84.59	1.5	7099.45	766.58	767.74	-52.09	3.71	2 SlimPulse	0	0	0
7912	80.59	1.77	7111.7	860.76	861.89	-49.4	4.22	2 SlimPulse	2	0	0
8006	82.82	1.9	7125.26	953.76	954.85	-46.41	2.37	2 SlimPulse	2	0	0
8101	84.97	2.42	7135.36	1048.2	1049.24	-42.85	2.33	2 SlimPulse	2	0	0

8196	87.73	1.96	7141.4	1142.98	1143.97	-39.23	2.94	2 SlimPulse	0	0	0
8291	90.31	2.27	7143.03	1237.95	1238.88	-35.73	2.74	2 SlimPulse	2	0	0
8386	91.89	0.6	7141.21	1332.92	1333.83	-33.35	2.42	2 SlimPulse	0	0	0
8480	92.76	358.11	7137.39	1426.79	1427.74	-34.41	2.8	2 SlimPulse	2	0	0
8575	92.92	355.91	7132.69	1521.43	1522.48	-39.35	2.32	2 SlimPulse	2	0	0
8670	93	353.85	7127.78	1615.73	1616.97	-47.82	2.17	2 SlimPulse	2	0	0
8765	92.17	353.18	7123.5	1709.8	1711.27	-58.53	1.12	2 SlimPulse	0	0	0
8859	91.38	354.08	7120.59	1802.95	1804.64	-68.95	1.27	2 SlimPulse	2	0	0
8954	91.2	355.06	7118.45	1897.31	1899.19	-77.94	1.04	2 SlimPulse	2	0	0
9049	90.96	355.76	7116.66	1991.82	1993.87	-85.54	0.78	2 SlimPulse	2	0	0
9144	91.27	356.45	7114.8	2086.44	2088.63	-91.99	0.79	2 SlimPulse	2	0	0
9238	91.24	357.08	7112.74	2180.15	2182.46	-97.3	0.67	2 SlimPulse	2	0	0
9333	91.1	357.9	7110.8	2274.93	2277.35	-101.46	0.87	2 SlimPulse	2	0	0
9428	91.58	358.91	7108.58	2369.8	2372.28	-104.11	1.18	2 SlimPulse	2	0	0
9523	93.55	358.59	7104.33	2464.62	2467.16	-106.17	2.09	2 SlimPulse	2	0	0
9656	93.2	358	7096.5	2597.23	2599.87	-110.11	0.51	3 SlimPulse	0	0	0
9751	92.03	357.78	7092.17	2691.98	2694.71	-113.6	1.25	3 SlimPulse	0	0	0
9846	91.14	358.04	7089.54	2786.79	2789.61	-117.07	0.98	3 SlimPulse	0	0	0
9940	90.48	357.98	7088.22	2880.64	2883.54	-120.32	0.7	3 SlimPulse	0	0	0
10035	89.79	358.22	7087.99	2975.51	2978.49	-123.46	0.77	3 SlimPulse	0	0	0
10130	89.31	358.43	7088.73	3070.39	3073.44	-126.24	0.55	3 SlimPulse	0	0	0
10225	88.38	358.5	7090.64	3165.27	3168.39	-128.79	0.98	3 SlimPulse	0	0	0
10320	88.07	358.75	7093.58	3260.14	3263.31	-131.07	0.42	3 SlimPulse	0	0	0
10414	87.52	359.63	7097.19	3354.01	3357.23	-132.39	1.1	3 SlimPulse	0	0	0
10509	87.18	0.15	7101.58	3448.89	3452.13	-132.57	0.65	3 SlimPulse	0	0	0
10604	86.97	0.31	7106.42	3543.75	3547.01	-132.2	0.27	3 SlimPulse	0	0	0
10699	86.77	1.13	7111.61	3638.61	3641.86	-131.01	0.89	3 SlimPulse	0	0	0
10794	87.38	1.07	7116.46	3733.48	3736.72	-129.18	0.65	3 SlimPulse	0	0	0
10888	87.87	0.81	7120.35	3827.4	3830.62	-127.65	0.58	3 SlimPulse	0	0	0
10983	87.87	1.3	7123.88	3922.34	3925.54	-125.89	0.52	3 SlimPulse	0	0	0
11078	87.38	0.82	7127.82	4017.25	4020.44	-124.14	0.72	3 SlimPulse	0	0	0
11173	86.9	1.94	7132.56	4112.13	4115.29	-121.86	1.28	3 SlimPulse	0	0	0
11267	86.8	2.84	7137.72	4205.97	4209.07	-117.94	0.97	3 SlimPulse	0	0	0
11362	85.7	2.7	7143.94	4300.72	4303.75	-113.36	1.17	3 SlimPulse	0	0	0
11457	86.24	2.67	7150.62	4395.45	4398.42	-108.93	0.58	3 SlimPulse	0	0	0
11552	88.25	2.67	7155.18	4490.3	4493.2	-104.51	2.11	3 SlimPulse	0	0	0
11646	88.21	2.67	7158.09	4584.22	4587.05	-100.14	0.04	3 SlimPulse	0	0	0
11741	88.83	2.25	7160.54	4679.17	4681.93	-96.07	0.79	3 SlimPulse	0	0	0
11836	89.48	1.82	7161.94	4774.14	4776.86	-92.69	0.82	3 SlimPulse	0	0	0
11931	90.41	1.59	7162.02	4869.14	4871.82	-89.86	1.01	3 SlimPulse	0	0	0
12022	91.13	0.59	7160.79	4960.13	4962.79	-88.13	1.36	3 SlimPulse	0	0	0
12054	91.13	0.59	7160.16	4992.12	4994.78	-87.8	0.01	3 Other	9	0	7