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MS Directional Survey Data Certification

MS Directional Job Number: DDMO-180569
Survey Type: MWD
Operating Company: Black River Water Management Co LLC
Well Name & Number: Malaga SWD 5
Location: Eddy County, NM
API Number: 30-015-44571
Tie In Depth: Surface
Surveyed Depths: 157' – 15,197' MD
Projected TD Survey: 15,250' MD
Dates Performed: 06/14/2018 – 07/30/2018

RECEIVED

AUG 17 2018

DISTRICT II-ARTESIA O.C.D.

I certify that the data is true, correct and complete and within the limitations of the tool set forth by MS Directional; that I am authorized and qualified to make this report and that I have reviewed this report and find it conforms to the principles and procedures as set forth by MS Directional.

Digitally signed by:

MWD Surveyor Name: Kevin Dueitt

Date: 08-15-2018

Email: kdueitt@msdir.com

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709.04.02

Company:		Black River Water Management Co LLC										
Well Name:		Malaga SWD 5										
Location:		Eddy County, NM										
Rig:		Patterson #810					Magnetic Declination:		6.99		REFERENCED TO GRID NORTH	
Job Number:		DDMO-180569										
API #:		30-015-44571										
Vertical Section Azimuth:			0.00			Proposed Direction:		0.00				
Survey Calculation Method:			Minimum Curvature									
PTB:	MD		INC		AZM	TVD	N/S	E/W		VS		
	15,250		6.7		136.1	15236.38	-131.06	-116.4		-131.06		
#	Depth Feet	Inc Degrees	Azm Degrees	TVD Feet	N/S Feet	E/W Feet	Surface Vert Sec	Closure Distance Azm		DLS/ 100	BUR/ 100'	
TIE IN	0	0.00	0.00	0.00	0.00	0.00		0.00				
1	157	0.36	277.32	156.90	0.06	-0.49	0.06	0.49	277.32	0.23	0.23	
2	347	0.85	275.90	347.17	0.28	-2.49	0.28	2.50	276.52	0.26	0.26	
3	537	1.25	264.25	537.42	0.22	-5.95	0.22	5.96	272.13	0.24	0.21	
4	606	1.50	266.00	605.94	0.08	-7.59	0.08	7.59	270.63	0.37	0.36	
5	787	2.30	276.20	786.84	0.31	-13.57	0.31	13.57	271.31	0.48	0.44	
6	973	1.60	304.10	972.73	2.17	-19.43	2.17	19.55	276.37	0.62	-0.38	
7	1,164	1.60	14.40	1163.67	6.25	-20.97	6.25	21.88	286.59	0.96	0.00	
8	1,259	1.80	49.00	1258.63	8.51	-19.52	8.51	21.29	293.56	1.08	0.21	
9	1,355	1.80	74.60	1354.59	9.90	-16.93	9.90	19.61	300.33	0.83	0.00	
10	1,450	1.90	108.60	1449.54	9.79	-13.99	9.79	17.08	304.99	1.14	0.11	
11	1,545	2.20	142.30	1544.48	7.85	-11.39	7.85	13.83	304.58	1.29	0.32	
12	1,640	1.60	176.40	1639.43	5.08	-10.19	5.08	11.39	296.51	1.32	-0.63	
13	1,735	1.40	196.70	1734.40	2.65	-10.44	2.65	10.77	284.23	0.59	-0.21	
14	1,830	1.20	196.00	1829.38	0.58	-11.05	0.58	11.06	273.01	0.21	-0.21	
15	2,021	2.60	166.30	2020.27	-5.55	-10.57	-5.55	11.94	242.29	0.87	0.73	
16	2,211	2.90	153.20	2210.05	-14.03	-7.38	-14.03	15.85	207.76	0.37	0.16	
17	2,401	4.50	132.20	2399.66	-23.33	0.31	-23.33	23.33	179.25	1.09	0.84	
18	2,497	5.30	134.90	2495.31	-28.99	6.24	-28.99	29.65	167.86	0.87	0.83	
19	2,592	4.40	137.70	2589.97	-34.78	11.80	-34.78	36.73	161.26	0.98	-0.95	
20	2,638	4.20	138.30	2635.84	-37.34	14.10	-37.34	39.92	159.31	0.45	-0.43	
21	2,683	3.90	162.60	2680.73	-40.03	15.66	-40.03	42.99	158.64	3.84	-0.67	
22	2,777	3.50	136.90	2774.54	-45.18	18.58	-45.18	48.85	157.65	1.80	-0.43	
23	2,872	2.40	123.90	2869.41	-48.41	22.21	-48.41	53.26	155.35	1.35	-1.16	
24	2,967	1.20	78.50	2964.37	-49.32	24.83	-49.32	55.22	153.27	1.87	-1.26	
25	3,062	1.30	24.60	3059.35	-48.14	26.26	-48.14	54.83	151.39	1.20	0.11	
26	3,157	0.80	343.60	3154.33	-46.52	26.52	-46.52	53.55	150.32	0.92	-0.53	
27	3,252	0.90	320.40	3249.32	-45.31	25.86	-45.31	52.17	150.29	0.37	0.11	
28	3,347	0.70	319.40	3344.31	-44.30	25.00	-44.30	50.86	150.56	0.21	-0.21	
29	3,442	0.70	333.40	3439.31	-43.34	24.37	-43.34	49.72	150.65	0.18	0.00	
30	3,537	0.90	325.20	3534.30	-42.20	23.68	-42.20	48.39	150.70	0.24	0.21	
31	3,632	0.90	326.40	3629.29	-40.97	22.84	-40.97	46.91	150.86	0.02	0.00	
32	3,728	0.80	329.80	3725.28	-39.76	22.09	-39.76	45.49	150.95	0.12	-0.10	
33	3,823	0.70	319.20	3820.27	-38.75	21.37	-38.75	44.25	151.12	0.18	-0.11	

V09.04.02

Company:		Black River Water Management Co LLC									
Well Name:		Malaga SWD 5									
Location:		Eddy County, NM									
Rig:		Patterson #810				Magnetic Declination:		6.99		REFERENCED TO GRID NORTH ▼	
Job Number:		DDMO-180569									
API #:		30-015-44571									
Vertical Section Azimuth:				0.00		Proposed Direction:		0.00			
Survey Calculation Method:				Minimum Curvature							
PTB:	MD		INC		AZM	TVD	N/S	E/W		VS	
	15,250		6.7		136.1	15236.38	-131.06	-116.4		-131.06	
#	Depth Feet	Inc Degrees	Azm Degrees	TVD Feet	N/S Feet	E/W Feet	Surface Vert Sec	Closure Distance Azm		DLS/ 100	BUR/ 100'
34	3,918	0.60	324.50	3915.26	-37.91	20.71	-37.91	43.19	151.36	0.12	-0.11
35	4,013	0.60	298.30	4010.26	-37.27	19.98	-37.27	42.28	151.80	0.29	0.00
36	4,108	0.60	296.50	4105.25	-36.81	19.10	-36.81	41.47	152.58	0.02	0.00
37	4,298	0.50	284.20	4295.24	-36.16	17.40	-36.16	40.13	154.30	0.08	-0.05
38	4,489	0.50	275.50	4486.24	-35.88	15.76	-35.88	39.19	156.28	0.04	0.00
39	4,680	0.50	290.90	4677.23	-35.50	14.16	-35.50	38.22	158.26	0.07	0.00
40	4,870	0.30	260.30	4867.22	-35.29	12.89	-35.29	37.57	159.93	0.15	-0.11
41	5,060	0.30	249.00	5057.22	-35.55	11.94	-35.55	37.50	161.44	0.03	0.00
42	5,250	0.50	243.60	5247.22	-36.10	10.73	-36.10	37.66	163.44	0.11	0.11
43	5,441	0.50	224.60	5438.21	-37.06	9.40	-37.06	38.23	165.77	0.09	0.00
44	5,631	0.60	198.90	5628.20	-38.59	8.49	-38.59	39.52	167.59	0.14	0.05
45	5,821	0.50	201.70	5818.19	-40.30	7.87	-40.30	41.06	168.96	0.05	-0.05
46	6,011	0.70	184.90	6008.18	-42.23	7.46	-42.23	42.88	169.98	0.14	0.11
47	6,198	0.50	240.20	6195.17	-43.77	6.65	-43.77	44.28	171.36	0.31	-0.11
48	6,389	0.30	336.40	6386.17	-43.73	5.73	-43.73	44.10	172.53	0.32	-0.10
49	6,579	0.50	335.00	6576.16	-42.52	5.18	-42.52	42.84	173.05	0.11	0.11
50	6,770	0.80	274.50	6767.15	-41.66	3.50	-41.66	41.81	175.20	0.37	0.16
51	6,960	2.10	304.70	6957.09	-39.58	-0.69	-39.58	39.58	180.99	0.77	0.68
52	7,151	2.90	304.50	7147.91	-34.85	-7.54	-34.85	35.65	192.22	0.42	0.42
53	7,341	2.60	308.10	7337.69	-29.47	-14.90	-29.47	33.02	206.82	0.18	-0.16
54	7,531	1.90	282.40	7527.55	-26.13	-21.36	-26.13	33.75	219.27	0.64	-0.37
55	7,722	2.40	250.60	7718.42	-26.78	-28.23	-26.78	38.91	226.51	0.67	0.26
56	7,912	3.70	288.70	7908.16	-26.13	-37.79	-26.13	45.95	235.33	1.23	0.68
57	8,099	4.50	284.10	8094.68	-22.41	-50.62	-22.41	55.36	246.12	0.46	0.43
58	8,289	3.40	284.20	8284.23	-19.21	-63.31	-19.21	66.16	253.12	0.58	-0.58
59	8,479	3.60	285.40	8473.87	-16.25	-74.52	-16.25	76.28	257.70	0.11	0.11
60	8,671	3.60	287.80	8665.50	-12.81	-86.08	-12.81	87.02	261.54	0.08	0.00
61	8,859	3.60	276.90	8853.13	-10.29	-97.55	-10.29	98.10	263.98	0.36	0.00
62	9,050	4.00	272.40	9043.71	-9.29	-110.16	-9.29	110.55	265.18	0.26	0.21
63	9,239	4.20	269.30	9232.22	-9.10	-123.67	-9.10	124.00	265.79	0.16	0.11
64	9,432	3.70	261.60	9424.77	-10.10	-136.90	-10.10	137.27	265.78	0.38	-0.26
65	9,622	3.30	248.20	9614.41	-13.02	-148.04	-13.02	148.61	264.97	0.48	-0.21
66	9,809	2.80	244.30	9801.15	-17.00	-157.15	-17.00	158.07	263.82	0.29	-0.27
67	9,999	2.70	238.10	9990.93	-21.38	-165.13	-21.38	166.51	262.62	0.17	-0.05



SURVEY CALCULATION PROGRAM

8/15/18 13:38

Company:		Black River Water Management Co LLC										
Well Name:		Malaga SWD 5										
Location:		Eddy County, NM										
Rig:		Patterson #810					Magnetic Declination:		6.99		REFERENCED TO GRID NORTH	
Job Number:		DDMO-180569										
API #:		30-015-44571										
Vertical Section Azimuth:					0.00		Proposed Direction:		0.00			
Survey Calculation Method:					Minimum Curvature							
PTB:	MD	INC	AZM	TVD	N/S	E/W	VS					
	15,250	6.7	136.1	15236.38	-131.06	-116.4	-131.06					
#	Depth Feet	Inc Degrees	Azm Degrees	TVD Feet	N/S Feet	E/W Feet	Surface Vert Sec	Closure Distance	Azm	DLS/ 100	BUR/ 100'	
68	10,190	2.40	240.30	10181.74	-25.74	-172.43	-25.74	174.34	261.51	0.17	-0.16	
69	10,378	2.80	239.20	10369.55	-30.04	-179.79	-30.04	182.28	260.51	0.21	0.21	
70	10,569	2.20	235.10	10560.37	-34.53	-186.80	-34.53	189.97	259.53	0.33	-0.31	
71	10,759	2.10	233.70	10750.23	-38.67	-192.60	-38.67	196.45	258.65	0.06	-0.05	
72	10,798	1.90	229.50	10789.21	-39.52	-193.67	-39.52	197.66	258.47	0.64	-0.51	
73	10,955	1.60	220.70	10946.13	-42.87	-197.08	-42.87	201.69	257.73	0.26	-0.19	
74	11,146	1.40	180.50	11137.07	-47.22	-198.84	-47.22	204.37	256.64	0.55	-0.10	
75	11,336	1.00	172.00	11327.03	-51.19	-198.63	-51.19	205.12	255.55	0.23	-0.21	
76	11,527	0.90	146.00	11518.01	-54.08	-197.56	-54.08	204.82	254.69	0.23	-0.05	
77	11,718	1.20	141.00	11708.97	-56.88	-195.46	-56.88	203.57	253.77	0.16	0.16	
78	11,909	0.90	156.00	11899.94	-59.80	-193.59	-59.80	202.62	252.83	0.21	-0.16	
79	12,099	1.10	118.10	12089.92	-62.03	-191.37	-62.03	201.17	252.04	0.36	0.11	
80	12,290	1.00	121.30	12280.88	-63.76	-188.33	-63.76	198.83	251.30	0.06	-0.05	
81	12,479	1.00	124.50	12469.85	-65.55	-185.56	-65.55	196.80	250.55	0.03	0.00	
82	12,670	0.80	131.40	12660.83	-67.37	-183.19	-67.37	195.19	249.81	0.12	-0.10	
83	12,860	0.70	93.50	12850.82	-68.32	-181.04	-68.32	193.50	249.32	0.26	-0.05	
84	13,050	0.60	103.60	13040.80	-68.62	-178.91	-68.62	191.62	249.01	0.08	-0.05	
85	13,241	0.10	121.40	13231.80	-68.95	-177.80	-68.95	190.70	248.80	0.26	-0.26	
86	13,432	0.20	63.10	13422.80	-68.88	-177.36	-68.88	190.26	248.77	0.09	0.05	
87	13,622	0.30	52.50	13612.80	-68.43	-176.67	-68.43	189.46	248.83	0.06	0.05	
88	13,812	0.20	80.60	13802.80	-68.07	-175.95	-68.07	188.65	248.85	0.08	-0.05	
89	14,003	0.30	60.30	13993.79	-67.77	-175.18	-67.77	187.83	248.85	0.07	0.05	
90	14,098	0.40	61.20	14088.79	-67.49	-174.68	-67.49	187.26	248.88	0.11	0.11	
91	14,199	0.40	109.00	14189.79	-67.43	-174.03	-67.43	186.64	248.82	0.32	0.00	
92	14,321	0.10	196.70	14311.79	-67.67	-173.66	-67.67	186.38	248.71	0.33	-0.25	
93	14,509	4.40	155.80	14499.60	-74.41	-170.75	-74.41	186.26	246.45	2.30	2.29	
94	14,603	5.80	141.02	14593.23	-81.39	-166.28	-81.39	185.14	243.92	2.03	1.49	
95	14,698	5.70	133.70	14687.75	-88.38	-159.85	-88.38	182.66	241.06	0.78	-0.11	
96	14,792	6.40	132.50	14781.23	-95.15	-152.62	-95.15	179.85	238.06	0.76	0.74	
97	14,887	6.10	134.50	14875.66	-102.26	-145.11	-102.26	177.53	234.83	0.39	-0.32	
98	14,981	6.50	134.90	14969.10	-109.52	-137.78	-109.52	176.01	231.52	0.43	0.43	
99	15,075	6.30	134.40	15062.51	-116.88	-130.33	-116.88	175.06	228.11	0.22	-0.21	
100	15,170	6.50	135.70	15156.92	-124.38	-122.85	-124.38	174.82	224.65	0.26	0.21	
101	15,197	6.70	136.10	15183.74	-126.61	-120.69	-126.61	174.92	223.63	0.76	0.74	

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Job Number:		DDMO-180569									
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Survey Calculation Method:				Minimum Curvature							
PTB:	MD	INC	AZM	TVD	N/S	E/W	VS				
	15,250	6.7	136.1	15236.38	-131.06	-116.4	-131.06				
#	Depth Feet	Inc Degrees	Azm Degrees	TVD Feet	N/S Feet	E/W Feet	Surface Vert Sec	Closure Distance	Azm	DLS/ 100	BUR/ 100'
PTB:	15,250	6.70	136.10	15236.38	-131.06	-116.40	-131.06	175.29	221.61	0.00	0.00