

BISON OIL & GAS II

WELD COUNTY

SEC 11-T5N-61W

GROTHER 5-61 11B-14-23-1

OWB

Design: FINAL SURVEY

Standard Survey Report

15 September, 2022

Project: WELD COUNTY
Site: SEC 11-T5N-61W
Well: GROTHEER 5-61 11B-14-23-1
Wellbore: OWB
Design: FINAL SURVEY

PROJECT DETAILS: WELD COUNTY
Geodetic System: US State Plane 1983
Datum: North American Datum 1983
Ellipsoid: GRS 1980
Zone: Colorado Northern Zone
System Datum: Mean Sea Level



Azimuths to True North
Magnetic North: 7.43°
Magnetic Field
Strength: 51912.5snT
Dip Angle: 66.70°
Date: 6/23/2022
Model: IGRF2020

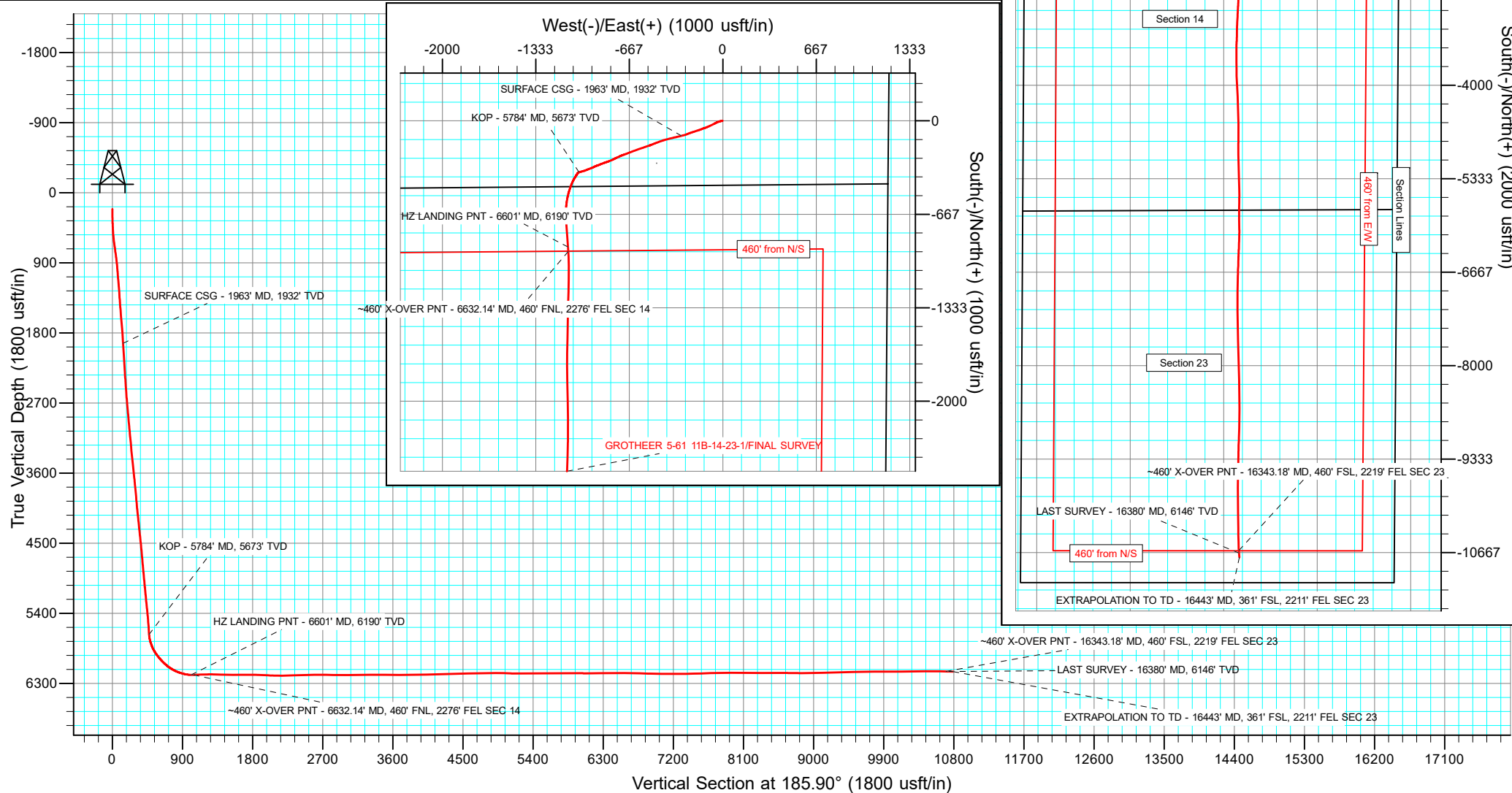
WELL DETAILS: GROTHEER 5-61 11B-14-23-1

+N/-S	+E/-W	Northing	Ground Level:	4688.70					
0.00	0.00	1394923.01	Easting	3370288.17	Latitude	40.409844°N	Longitude	104.170226°W	Slot

ANNOTATIONS

MD	Inc	Azi	TVD	+N/-S	+E/-W	VSec	Departure	Annotation
1963.00	10.51	256.16	1932.30	-106.71	-295.09	136.48	314.14	SURFACE CSG - 1963' MD, 1932' TVD
5784.00	9.13	248.73	5672.86	-366.58	-1025.83	470.08	1091.85	KOP - 5784' MD, 5673' TVD
6601.00	88.25	175.80	6189.87	-899.72	-1104.16	1008.45	1647.65	HZ LANDING PNT - 6601' MD, 6190' TVD
6632.14	92.38	175.72	6189.70	-930.77	-1101.86	1039.10	1678.66	~460' X-OVER PNT - 6632.14' MD, 460' FNL, 2276' FEL SEC 14
16343.18	88.69	176.57	6145.38	-10636.37	-1116.79	10694.82	11387.68	~460' X-OVER PNT - 16343.18' MD, 460' FSL, 2219' FEL SEC 23
16380.00	88.38	175.57	6146.32	-10673.09	-1114.27	10731.09	11424.49	LAST SURVEY - 16380' MD, 6146' TVD
16443.00	88.38	175.57	6148.10	-10735.88	-1109.40	10793.04	11487.46	EXTRAPOLATION TO TD - 16443' MD, 361' FSL, 2211' FEL SEC 23

SHL:
460' FSL, 1182' FEL
Sec 11-T5N-R61W
~460' X-OVER PNT:
460' FNL, 2276' FEL
Sec 14-T5N-R61W
~460' X-OVER PNT:
460' FSL, 2219' FEL
Sec 23-T5N-R61W
BHL:
361' FSL, 2211' FEL
Sec 23-T5N-R61W



Survey Report

Company:	BISON OIL & GAS II	Local Co-ordinate Reference:	Well GROTHEER 5-61 11B-14-23-1
Project:	WELD COUNTY	TVD Reference:	KBE 24ft @ 4712.70usft
Site:	SEC 11-T5N-61W	MD Reference:	KBE 24ft @ 4712.70usft
Well:	GROTHEER 5-61 11B-14-23-1	North Reference:	True
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEY	Database:	EDT_32Bit_ODBC

Project	WELD COUNTY		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		Using geodetic scale factor

Site		SEC 11-T5N-61W			
Site Position:		Northing:	1,395,071.08 usft	Latitude:	40.410254°N
From:	Lat/Long	Easting:	3,370,200.45 usft	Longitude:	104.170533°W
Position Uncertainty:	0.00 usft	Slot Radius:	13.200 in	Grid Convergence:	0.86 °

Well	GROTHEER 5-61 11B-14-23-1					
Well Position	+N/-S	0.00 usft	Northing:	1,394,923.01 usft	Latitude:	40.409844°N
	+E/-W	0.00 usft	Easting:	3,370,288.17 usft	Longitude:	104.170226°W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	4,688.70 usft

Wellbore	OWB				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2020	6/23/2022	7.43	66.70	51,912.53365024

Design	FINAL SURVEY				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	185.90	

Survey Program	Date	9/15/2022			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
303.00	1,912.00	SURFACE SURVEY (OWB)	MWD	OWSG MWD - Standard	
2,055.00	16,443.00	FINAL SURVEY (OWB)	MWD	OWSG MWD - Standard	

Survey										
	Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
	211.00	0.70	296.90	211.00	0.56	-1.10	-0.44	0.00	0.00	0.00
	303.00	3.10	257.80	302.94	0.29	-4.03	0.13	2.82	2.61	-42.50
	377.00	5.90	261.60	376.70	-0.69	-9.75	1.69	3.80	3.78	5.14
	464.00	8.80	255.20	462.98	-3.04	-20.61	5.15	3.46	3.33	-7.36
	551.00	10.90	250.00	548.70	-7.56	-34.78	11.09	2.62	2.41	-5.98
	638.00	13.00	241.70	633.81	-15.01	-51.13	20.19	3.11	2.41	-9.54
	725.00	15.20	243.20	718.19	-24.79	-69.92	31.85	2.56	2.53	1.72
	812.00	14.60	245.10	802.26	-34.55	-90.05	43.63	0.89	-0.69	2.18
	900.00	12.90	246.70	887.74	-43.11	-109.13	54.10	1.98	-1.93	1.82
	987.00	11.60	252.30	972.76	-49.61	-126.39	62.34	2.02	-1.49	6.44

Survey Report

Company:	BISON OIL & GAS II	Local Co-ordinate Reference:	Well GROTHEER 5-61 11B-14-23-1
Project:	WELD COUNTY	TVD Reference:	KBE 24ft @ 4712.70usft
Site:	SEC 11-T5N-61W	MD Reference:	KBE 24ft @ 4712.70usft
Well:	GROTHEER 5-61 11B-14-23-1	North Reference:	True
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEY	Database:	EDT_32Bit_ODBC

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
1,074.00	9.90	249.70	1,058.23	-54.86	-141.74	69.14	2.03	-1.95	-2.99
1,161.00	11.30	247.50	1,143.74	-60.72	-156.63	76.50	1.67	1.61	-2.53
1,249.00	10.40	253.10	1,230.17	-66.33	-172.19	83.68	1.57	-1.02	6.36
1,336.00	9.30	251.80	1,315.89	-70.81	-186.38	89.59	1.29	-1.26	-1.49
1,423.00	9.70	251.20	1,401.69	-75.37	-200.00	95.53	0.47	0.46	-0.69
1,510.00	11.50	253.00	1,487.20	-80.26	-215.23	101.96	2.10	2.07	2.07
1,597.00	10.40	251.20	1,572.62	-85.33	-230.96	108.62	1.32	-1.26	-2.07
1,685.00	11.10	246.10	1,659.08	-91.32	-246.23	116.15	1.34	0.80	-5.80
1,772.00	10.40	251.00	1,744.55	-97.27	-261.31	123.62	1.32	-0.80	5.63
1,859.00	10.80	254.70	1,830.07	-101.98	-276.60	129.87	0.91	0.46	4.25
1,912.00	10.50	255.90	1,882.15	-104.47	-286.07	133.32	0.70	-0.57	2.26
1,963.00	10.51	256.16	1,932.30	-106.71	-295.09	136.48	0.10	0.03	0.52
SURFACE CSG - 1963' MD, 1932' TVD									
2,055.00	10.54	256.64	2,022.75	-110.66	-311.43	142.09	0.10	0.03	0.52
2,150.00	10.18	256.46	2,116.20	-114.64	-328.05	147.75	0.38	-0.38	-0.19
2,245.00	10.70	258.22	2,209.63	-118.40	-344.84	153.22	0.64	0.55	1.85
2,340.00	10.27	255.82	2,303.04	-122.28	-361.69	158.81	0.65	-0.45	-2.53
2,434.00	12.01	255.78	2,395.27	-126.73	-379.29	165.05	1.85	1.85	-0.04
2,529.00	11.40	255.88	2,488.29	-131.45	-397.98	171.66	0.64	-0.64	0.11
2,624.00	10.68	254.92	2,581.53	-136.03	-415.58	178.03	0.78	-0.76	-1.01
2,719.00	12.26	250.44	2,674.64	-141.70	-433.59	185.52	1.91	1.66	-4.72
2,814.00	11.53	250.23	2,767.60	-148.29	-452.03	193.97	0.77	-0.77	-0.22
2,910.00	10.58	249.42	2,861.81	-154.63	-469.31	202.05	1.00	-0.99	-0.84
3,005.00	12.22	248.29	2,954.94	-161.42	-486.82	210.60	1.74	1.73	-1.19
3,121.00	10.36	247.57	3,068.69	-169.94	-507.86	221.24	1.61	-1.60	-0.62
3,217.00	12.69	251.28	3,162.74	-176.62	-525.83	229.73	2.55	2.43	3.86
3,311.00	12.76	251.84	3,254.44	-183.17	-545.47	238.26	0.15	0.07	0.60
3,406.00	13.55	250.69	3,346.94	-190.12	-565.95	247.28	0.88	0.83	-1.21
3,501.00	13.62	251.63	3,439.28	-197.32	-587.06	256.62	0.24	0.07	0.99
3,597.00	13.97	250.56	3,532.52	-204.74	-608.72	266.23	0.45	0.36	-1.11
3,692.00	13.46	249.50	3,624.81	-212.43	-629.89	276.05	0.60	-0.54	-1.12
3,787.00	12.82	248.95	3,717.32	-220.09	-650.08	285.74	0.69	-0.67	-0.58
3,881.00	11.99	248.61	3,809.12	-227.39	-668.91	294.95	0.89	-0.88	-0.36
3,976.00	11.46	249.43	3,902.14	-234.31	-686.93	303.68	0.58	-0.56	0.86
4,071.00	10.62	250.77	3,995.38	-240.51	-704.03	311.60	0.92	-0.88	1.41
4,166.00	13.35	248.54	4,088.30	-247.40	-722.51	320.36	2.91	2.87	-2.35
4,261.00	11.07	243.90	4,181.15	-255.43	-740.91	330.24	2.61	-2.40	-4.88
4,356.00	11.99	247.46	4,274.23	-263.23	-758.21	339.77	1.22	0.97	3.75
4,450.00	10.48	240.78	4,366.43	-271.14	-774.69	349.34	2.12	-1.61	-7.11
4,545.00	12.23	247.14	4,459.57	-279.27	-791.51	359.15	2.26	1.84	6.69
4,640.00	11.20	247.28	4,552.59	-286.74	-809.29	368.41	1.08	-1.08	0.15
4,735.00	13.26	252.29	4,645.44	-293.62	-828.18	377.19	2.44	2.17	5.27
4,830.00	10.99	250.15	4,738.31	-300.01	-847.08	385.49	2.44	-2.39	-2.25

Survey Report

Company:	BISON OIL & GAS II	Local Co-ordinate Reference:	Well GROTHEER 5-61 11B-14-23-1
Project:	WELD COUNTY	TVD Reference:	KBE 24ft @ 4712.70usft
Site:	SEC 11-T5N-61W	MD Reference:	KBE 24ft @ 4712.70usft
Well:	GROTHEER 5-61 11B-14-23-1	North Reference:	True
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEY	Database:	EDT_32Bit_ODBC

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
4,925.00	12.41	250.38	4,831.33	-306.51	-865.22	393.83	1.50	1.49	0.24	
5,021.00	10.56	245.13	4,925.41	-313.68	-882.91	402.77	2.21	-1.93	-5.47	
5,116.00	12.61	252.13	5,018.47	-320.52	-900.68	411.41	2.61	2.16	7.37	
5,211.00	10.16	240.67	5,111.61	-327.81	-917.86	420.42	3.50	-2.58	-12.06	
5,306.00	11.68	249.03	5,204.89	-335.36	-934.15	429.60	2.31	1.60	8.80	
5,401.00	13.21	249.83	5,297.66	-342.54	-953.32	438.72	1.62	1.61	0.84	
5,495.00	11.44	245.35	5,389.49	-350.13	-971.88	448.18	2.14	-1.88	-4.77	
5,589.00	12.75	254.62	5,481.41	-356.77	-990.35	456.68	2.49	1.39	9.86	
5,685.00	11.05	255.50	5,575.34	-361.89	-1,009.47	463.73	1.78	-1.77	0.92	
5,779.00	8.85	252.47	5,667.93	-366.32	-1,025.09	469.75	2.40	-2.34	-3.22	
5,784.00	9.13	248.73	5,672.86	-366.58	-1,025.83	470.08	12.98	5.68	-74.71	
KOP - 5784' MD, 5673' TVD										
5,875.00	17.96	212.76	5,761.38	-381.05	-1,040.20	485.95	12.98	9.70	-39.53	
5,969.00	27.33	211.14	5,848.04	-411.78	-1,059.25	518.47	9.99	9.97	-1.72	
6,064.00	37.47	201.44	5,928.20	-457.49	-1,081.16	566.20	11.96	10.67	-10.21	
6,158.00	42.48	195.49	6,000.24	-514.75	-1,100.11	625.10	6.70	5.33	-6.33	
6,253.00	49.87	187.83	6,066.03	-581.79	-1,113.65	693.17	9.70	7.78	-8.06	
6,348.00	60.53	180.61	6,120.22	-659.41	-1,119.06	770.94	12.83	11.22	-7.60	
6,443.00	70.77	175.19	6,159.36	-745.74	-1,115.73	856.47	11.96	10.78	-5.71	
6,538.00	79.91	175.96	6,183.38	-837.27	-1,108.66	946.79	9.65	9.62	0.81	
6,601.00	88.25	175.80	6,189.87	-899.72	-1,104.16	1,008.45	13.24	13.24	-0.25	
HZ LANDING PNT - 6601' MD, 6190' TVD										
6,632.14	92.38	175.72	6,189.70	-930.77	-1,101.86	1,039.10	13.24	13.24	-0.25	
~460' X-OVER PNT - 6632.14' MD, 460' FNL, 2276' FEL SEC 14										
6,633.00	92.49	175.72	6,189.66	-931.62	-1,101.79	1,039.94	13.24	13.24	-0.25	
6,727.00	92.05	179.70	6,185.93	-1,025.46	-1,098.04	1,132.89	4.26	-0.47	4.23	
6,823.00	90.97	181.13	6,183.40	-1,121.42	-1,098.74	1,228.41	1.87	-1.12	1.49	
6,918.00	87.92	181.45	6,184.32	-1,216.38	-1,100.88	1,323.09	3.23	-3.21	0.34	
7,012.00	88.81	181.34	6,187.01	-1,310.31	-1,103.16	1,416.76	0.95	0.95	-0.12	
7,107.00	89.69	181.09	6,188.25	-1,405.28	-1,105.18	1,511.43	0.96	0.93	-0.26	
7,202.00	90.02	180.72	6,188.49	-1,500.27	-1,106.68	1,606.07	0.52	0.35	-0.39	
7,297.00	89.86	181.68	6,188.59	-1,595.24	-1,108.67	1,700.75	1.02	-0.17	1.01	
7,392.00	90.45	180.21	6,188.33	-1,690.23	-1,110.23	1,795.39	1.67	0.62	-1.55	
7,487.00	87.06	179.55	6,190.40	-1,785.19	-1,110.03	1,889.83	3.64	-3.57	-0.69	
7,582.00	87.29	178.72	6,195.08	-1,880.06	-1,108.60	1,984.06	0.91	0.24	-0.87	
7,676.00	89.07	178.87	6,198.06	-1,973.99	-1,106.63	2,077.28	1.90	1.89	0.16	
7,772.00	88.94	179.02	6,199.73	-2,069.96	-1,104.86	2,172.56	0.21	-0.14	0.16	
7,866.00	92.36	180.54	6,198.66	-2,163.94	-1,104.50	2,266.01	3.98	3.64	1.62	
7,961.00	92.90	179.88	6,194.31	-2,258.84	-1,104.85	2,360.44	0.90	0.57	-0.69	
8,056.00	92.27	181.79	6,190.02	-2,353.72	-1,106.23	2,454.96	2.12	-0.66	2.01	
8,152.00	89.55	181.74	6,188.50	-2,449.66	-1,109.19	2,550.69	2.83	-2.83	-0.05	
8,247.00	90.82	183.67	6,188.19	-2,544.54	-1,113.67	2,645.54	2.43	1.34	2.03	
8,341.00	88.50	182.35	6,188.75	-2,638.40	-1,118.60	2,739.41	2.84	-2.47	-1.40	
8,435.00	88.87	182.18	6,190.90	-2,732.31	-1,122.32	2,833.20	0.43	0.39	-0.18	

Survey Report

Company:	BISON OIL & GAS II	Local Co-ordinate Reference:	Well GROTHEER 5-61 11B-14-23-1
Project:	WELD COUNTY	TVD Reference:	KBE 24ft @ 4712.70usft
Site:	SEC 11-T5N-61W	MD Reference:	KBE 24ft @ 4712.70usft
Well:	GROTHEER 5-61 11B-14-23-1	North Reference:	True
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEY	Database:	EDT_32Bit_ODBC

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
8,529.00	89.18	182.22	6,192.50	-2,826.22	-1,125.93	2,926.99	0.33	0.33	0.04
8,623.00	91.49	183.68	6,191.95	-2,920.09	-1,130.76	3,020.85	2.91	2.46	1.55
8,719.00	90.61	182.45	6,190.20	-3,015.93	-1,135.90	3,116.71	1.58	-0.92	-1.28
8,813.00	91.42	182.86	6,188.53	-3,109.82	-1,140.25	3,210.55	0.97	0.86	0.44
8,907.00	90.29	181.66	6,187.13	-3,203.73	-1,143.95	3,304.35	1.75	-1.20	-1.28
9,000.00	89.43	180.55	6,187.35	-3,296.71	-1,145.75	3,397.02	1.51	-0.92	-1.19
9,096.00	90.61	183.30	6,187.32	-3,392.64	-1,148.97	3,492.78	3.12	1.23	2.86
9,190.00	88.95	179.83	6,187.68	-3,486.59	-1,151.54	3,586.49	4.09	-1.77	-3.69
9,284.00	89.00	180.00	6,189.36	-3,580.58	-1,151.40	3,679.96	0.19	0.05	0.18
9,379.00	90.08	178.68	6,190.13	-3,675.56	-1,150.31	3,774.33	1.80	1.14	-1.39
9,475.00	90.61	180.36	6,189.55	-3,771.55	-1,149.50	3,869.73	1.83	0.55	1.75
9,570.00	90.80	177.90	6,188.38	-3,866.53	-1,148.06	3,964.06	2.60	0.20	-2.59
9,663.00	91.40	178.06	6,186.59	-3,959.45	-1,144.78	4,056.15	0.67	0.65	0.17
9,760.00	91.72	177.47	6,183.95	-4,056.34	-1,141.00	4,152.14	0.69	0.33	-0.61
9,855.00	91.79	176.31	6,181.04	-4,151.16	-1,135.85	4,245.92	1.22	0.07	-1.22
9,949.00	91.74	178.23	6,178.15	-4,245.00	-1,131.37	4,338.81	2.04	-0.05	2.04
10,044.00	92.67	177.39	6,174.49	-4,339.86	-1,127.75	4,432.79	1.32	0.98	-0.88
10,140.00	90.70	179.17	6,171.67	-4,435.77	-1,124.87	4,527.89	2.77	-2.05	1.85
10,234.00	92.21	178.89	6,169.28	-4,529.72	-1,123.28	4,621.19	1.63	1.61	-0.30
10,329.00	90.45	179.92	6,167.08	-4,624.68	-1,122.29	4,715.55	2.15	-1.85	1.08
10,424.00	89.94	180.44	6,166.75	-4,719.68	-1,122.59	4,810.07	0.77	-0.54	0.55
10,518.00	90.72	181.04	6,166.21	-4,813.67	-1,123.80	4,903.69	1.05	0.83	0.64
10,612.00	88.29	179.34	6,167.03	-4,907.66	-1,124.12	4,997.21	3.15	-2.59	-1.81
10,708.00	88.14	179.17	6,170.02	-5,003.60	-1,122.87	5,092.52	0.24	-0.16	-0.18
10,803.00	90.27	179.26	6,171.33	-5,098.58	-1,121.57	5,186.86	2.24	2.24	0.09
10,898.00	90.63	178.86	6,170.59	-5,193.56	-1,120.01	5,281.18	0.57	0.38	-0.42
10,993.00	90.34	177.76	6,169.78	-5,288.52	-1,117.21	5,375.34	1.20	-0.31	-1.16
11,089.00	89.70	178.39	6,169.75	-5,384.46	-1,113.98	5,470.45	0.94	-0.67	0.66
11,183.00	90.75	178.04	6,169.38	-5,478.41	-1,111.05	5,563.60	1.18	1.12	-0.37
11,278.00	89.68	180.46	6,169.02	-5,573.40	-1,109.81	5,657.95	2.79	-1.13	2.55
11,373.00	90.46	181.37	6,168.91	-5,668.38	-1,111.33	5,752.59	1.26	0.82	0.96
11,467.00	89.79	180.32	6,168.70	-5,762.37	-1,112.71	5,846.22	1.33	-0.71	-1.12
11,562.00	90.36	179.87	6,168.58	-5,857.37	-1,112.87	5,940.73	0.76	0.60	-0.47
11,658.00	89.17	179.28	6,168.97	-5,953.36	-1,112.16	6,036.15	1.38	-1.24	-0.61
11,753.00	89.97	178.49	6,169.69	-6,048.34	-1,110.31	6,130.43	1.18	0.84	-0.83
11,847.00	91.53	182.01	6,168.45	-6,142.31	-1,110.72	6,223.95	4.10	1.66	3.74
11,943.00	90.02	182.14	6,167.16	-6,238.24	-1,114.20	6,319.72	1.58	-1.57	0.14
12,038.00	89.66	181.92	6,167.42	-6,333.18	-1,117.56	6,414.51	0.44	-0.38	-0.23
12,133.00	91.60	182.64	6,166.38	-6,428.09	-1,121.34	6,509.31	2.18	2.04	0.76
12,228.00	88.82	181.53	6,166.03	-6,523.02	-1,124.80	6,604.08	3.15	-2.93	-1.17
12,323.00	88.76	181.84	6,168.04	-6,617.96	-1,127.59	6,698.81	0.33	-0.06	0.33
12,417.00	88.20	181.48	6,170.53	-6,711.88	-1,130.31	6,792.52	0.71	-0.60	-0.38
12,513.00	88.76	181.41	6,173.08	-6,807.82	-1,132.73	6,888.19	0.59	0.58	-0.07

Survey Report

Company:	BISON OIL & GAS II	Local Co-ordinate Reference:	Well GROTHEER 5-61 11B-14-23-1
Project:	WELD COUNTY	TVD Reference:	KBE 24ft @ 4712.70usft
Site:	SEC 11-T5N-61W	MD Reference:	KBE 24ft @ 4712.70usft
Well:	GROTHEER 5-61 11B-14-23-1	North Reference:	True
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEY	Database:	EDT_32Bit_ODBC

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
12,608.00	88.38	180.99	6,175.45	-6,902.77	-1,134.72	6,982.84	0.60	-0.40	-0.44	
12,702.00	90.10	180.88	6,176.69	-6,996.74	-1,136.25	7,076.48	1.83	1.83	-0.12	
12,797.00	89.59	180.20	6,176.95	-7,091.74	-1,137.15	7,171.06	0.89	-0.54	-0.72	
12,893.00	89.86	180.43	6,177.41	-7,187.74	-1,137.68	7,266.60	0.37	0.28	0.24	
12,988.00	91.32	179.14	6,176.43	-7,282.73	-1,137.32	7,361.05	2.05	1.54	-1.36	
13,083.00	91.16	178.24	6,174.38	-7,377.68	-1,135.15	7,455.28	0.96	-0.17	-0.95	
13,177.00	92.25	178.79	6,171.58	-7,471.60	-1,132.71	7,548.46	1.30	1.16	0.59	
13,271.00	92.56	177.97	6,167.63	-7,565.48	-1,130.06	7,641.57	0.93	0.33	-0.87	
13,366.00	90.63	178.40	6,164.99	-7,660.39	-1,127.05	7,735.66	2.08	-2.03	0.45	
13,461.00	90.81	178.73	6,163.80	-7,755.35	-1,124.67	7,829.88	0.40	0.19	0.35	
13,555.00	90.25	178.86	6,162.93	-7,849.33	-1,122.70	7,923.15	0.61	-0.60	0.14	
13,650.00	89.85	178.89	6,162.84	-7,944.31	-1,120.83	8,017.44	0.42	-0.42	0.03	
13,746.00	89.65	178.64	6,163.26	-8,040.29	-1,118.76	8,112.70	0.33	-0.21	-0.26	
13,840.00	89.10	179.15	6,164.29	-8,134.26	-1,116.95	8,205.99	0.80	-0.59	0.54	
13,935.00	89.81	179.04	6,165.19	-8,229.25	-1,115.45	8,300.31	0.76	0.75	-0.12	
14,030.00	90.19	178.23	6,165.19	-8,324.22	-1,113.18	8,394.55	0.94	0.40	-0.85	
14,125.00	89.87	178.17	6,165.14	-8,419.17	-1,110.20	8,488.69	0.34	-0.34	-0.06	
14,219.00	90.27	178.18	6,165.03	-8,513.12	-1,107.21	8,581.84	0.43	0.43	0.01	
14,315.00	89.13	180.76	6,165.53	-8,609.11	-1,106.32	8,677.23	2.94	-1.19	2.69	
14,410.00	89.28	180.70	6,166.85	-8,704.09	-1,107.53	8,771.83	0.17	0.16	-0.06	
14,505.00	89.84	181.42	6,167.58	-8,799.07	-1,109.29	8,866.49	0.96	0.59	0.76	
14,600.00	90.27	181.78	6,167.49	-8,894.03	-1,111.94	8,961.22	0.59	0.45	0.38	
14,791.00	92.58	181.95	6,162.74	-9,084.86	-1,118.15	9,151.67	1.21	1.21	0.09	
14,887.00	92.94	181.50	6,158.11	-9,180.71	-1,121.04	9,247.31	0.60	0.37	-0.47	
14,981.00	90.34	181.26	6,155.42	-9,274.63	-1,123.30	9,340.97	2.78	-2.77	-0.26	
15,076.00	90.67	181.38	6,154.59	-9,369.60	-1,125.49	9,435.66	0.37	0.35	0.13	
15,171.00	91.42	180.97	6,152.85	-9,464.57	-1,127.44	9,530.32	0.90	0.79	-0.43	
15,266.00	91.70	180.63	6,150.27	-9,559.52	-1,128.76	9,624.91	0.46	0.29	-0.36	
15,362.00	90.64	181.03	6,148.31	-9,655.49	-1,130.15	9,720.51	1.18	-1.10	0.42	
15,457.00	90.18	180.01	6,147.63	-9,750.48	-1,131.02	9,815.09	1.18	-0.48	-1.07	
15,551.00	88.91	178.81	6,148.38	-9,844.47	-1,130.05	9,908.48	1.86	-1.35	-1.28	
15,646.00	90.55	180.23	6,148.82	-9,939.46	-1,129.25	10,002.89	2.28	1.73	1.49	
15,740.00	90.82	179.33	6,147.70	-10,033.45	-1,128.89	10,096.34	1.00	0.29	-0.96	
15,836.00	92.15	178.80	6,145.21	-10,129.41	-1,127.33	10,191.63	1.49	1.39	-0.55	
15,931.00	89.48	180.02	6,143.86	-10,224.38	-1,126.35	10,286.00	3.09	-2.81	1.28	
16,026.00	90.25	179.48	6,144.08	-10,319.38	-1,125.93	10,380.45	0.99	0.81	-0.57	
16,121.00	91.14	178.53	6,142.93	-10,414.35	-1,124.28	10,474.76	1.37	0.94	-1.00	
16,216.00	88.88	178.51	6,142.91	-10,509.32	-1,121.83	10,568.96	2.38	-2.38	-0.02	
16,312.00	88.95	177.42	6,144.73	-10,605.24	-1,118.42	10,664.02	1.14	0.07	-1.14	
16,343.18	88.69	176.57	6,145.38	-10,636.37	-1,116.79	10,694.82	2.85	-0.84	-2.72	
~460' X-OVER PNT - 16343.18' MD, 460' FSL, 2219' FEL SEC 23										
16,380.00	88.38	175.57	6,146.32	-10,673.09	-1,114.27	10,731.09	2.85	-0.84	-2.72	
LAST SURVEY - 16380' MD, 6146' TVD										
16,443.00	88.38	175.57	6,148.10	-10,735.88	-1,109.40	10,793.04	0.00	0.00	0.00	

Survey Report

Company:	BISON OIL & GAS II	Local Co-ordinate Reference:	Well GROTHEER 5-61 11B-14-23-1
Project:	WELD COUNTY	TVD Reference:	KBE 24ft @ 4712.70usft
Site:	SEC 11-T5N-61W	MD Reference:	KBE 24ft @ 4712.70usft
Well:	GROTHEER 5-61 11B-14-23-1	North Reference:	True
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	FINAL SURVEY	Database:	EDT_32Bit_ODBC

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
EXTRAPOLATION TO TD - 16443' MD, 361' FSL, 2211' FEL SEC 23									

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
PBHL- GROTHEER 5-6	0.00	0.00	6,145.00	-10,736.56	-1,131.83	1,384,171.11	3,369,317.50	40.380373°N	104.174289°W
- hit/miss target									
- Shape									
- Point									
EPI- GROTHEER 5-61 1	0.00	0.00	6,145.00	-10,636.37	-1,131.26	1,384,271.29	3,369,316.57	40.380648°N	104.174287°W
- actual wellpath misses target center by 22.62usft at 16441.86usft MD (6148.07 TVD, -10734.74 N, -1109.49 E)									
- Point									
LP- GROTHEER 5-61 1'	0.00	0.00	6,200.00	-930.77	-1,119.09	1,393,975.60	3,369,183.21	40.407289°N	104.174245°W
- actual wellpath misses target center by 20.01usft at 6630.81usft MD (6189.75 TVD, -929.44 N, -1101.96 E)									
- Point									

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
1,963.00	1,932.30	-106.71	-295.09	SURFACE CSG - 1963' MD, 1932' TVD	
5,784.00	5,672.86	-366.58	-1,025.83	KOP - 5784' MD, 5673' TVD	
6,601.00	6,189.87	-899.72	-1,104.16	HZ LANDING PNT - 6601' MD, 6190' TVD	
6,632.14	6,189.70	-930.77	-1,101.86	~460' X-OVER PNT - 6632.14' MD, 460' FNL, 2276' FEL SEC 14	
16,343.18	6,145.38	-10,636.37	-1,116.79	~460' X-OVER PNT - 16343.18' MD, 460' FSL, 2219' FEL SEC 23	
16,380.00	6,146.32	-10,673.09	-1,114.27	LAST SURVEY - 16380' MD, 6146' TVD	
16,443.00	6,148.10	-10,735.88	-1,109.40	EXTRAPOLATION TO TD - 16443' MD, 361' FSL, 2211' FEL SEC 23	

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