

OCD – HOBBS
04/16/2020
RECEIVED

NORTHERN DELAWARE BASIN

LEA COUNTY, NM

BULLDOG

BROT HELM FED COM #701H

OWB

Design: AWP

Standard Survey Report

06 November, 2019

Survey Report

Company:	NORTHERN DELAWARE BASIN	Local Co-ordinate Reference:	Well BROTH HELM FED COM #701H
Project:	LEA COUNTY, NM	TVD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Site:	BULLDOG	MD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Well:	BROTH HELM FED COM #701H	North Reference:	Grid
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	AWP	Database:	EDM_Users

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	BULLDOG		
Site Position:		Northing:	398,637.10 usft
From:	Map	Easting:	741,887.40 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 5' 36.820 N
		Longitude:	103° 33' 8.116 W
		Grid Convergence:	0.42 °

Well	BROTH HELM FED COM #701H, DB-ACTIVE		
Well Position	+N/-S	0.0 usft	Northing: 430,527.90 usft
	+E/-W	0.0 usft	Easting: 778,499.20 usft
Position Uncertainty	3.0 usft	Wellhead Elevation:	usft
		Latitude:	32° 10' 49.566 N
		Longitude:	103° 25' 59.456 W
		Ground Level:	3,420.6 usft

Wellbore	OWB				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	WMM2015	9/17/2018	6.78	60.01	47,782.99983242

Design	AWP				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	179.89	

Survey Program	Date	10/1/2019		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.0	12,048.0	GYRO-INTER (OWB)	Standard Keeper 104	Standard Wireline Keeper ver 1.0.4
12,213.0	23,035.0	MWD-CURVE/LAT (OWB)	MWD+IFR1+FDIR	OWSG MWD + IFR1 + FDIR Correction

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)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
100.0	0.44	273.91	100.0	0.0	-0.4	0.0	0.44	0.44	0.00
125.0	0.44	280.57	125.0	0.1	-0.6	-0.1	0.20	0.00	26.64
150.0	0.48	275.21	150.0	0.1	-0.8	-0.1	0.23	0.16	-21.44
175.0	0.49	273.30	175.0	0.1	-1.0	-0.1	0.08	0.04	-7.64
200.0	0.42	280.69	200.0	0.1	-1.2	-0.1	0.36	-0.28	29.56
225.0	0.41	276.12	225.0	0.1	-1.4	-0.1	0.14	-0.04	-18.28
250.0	0.33	277.58	250.0	0.2	-1.5	-0.2	0.32	-0.32	5.84
275.0	0.24	264.21	275.0	0.2	-1.6	-0.2	0.45	-0.36	-53.48
300.0	0.08	229.46	300.0	0.1	-1.7	-0.2	0.72	-0.64	-139.00

Survey Report

Company:	NORTHERN DELAWARE BASIN	Local Co-ordinate Reference:	Well BROTH HELM FED COM #701H
Project:	LEA COUNTY, NM	TVD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Site:	BULLDOG	MD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Well:	BROTH HELM FED COM #701H	North Reference:	Grid
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	AWP	Database:	EDM_Users

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)
325.0	0.04	227.80	325.0	0.1	-1.7	-0.1	0.16	-0.16	-6.64
350.0	0.14	185.77	350.0	0.1	-1.7	-0.1	0.45	0.40	-168.12
375.0	0.08	186.45	375.0	0.0	-1.7	-0.1	0.24	-0.24	2.72
400.0	0.04	180.52	400.0	0.0	-1.7	0.0	0.16	-0.16	-23.72
425.0	0.03	196.94	425.0	0.0	-1.7	0.0	0.06	-0.04	65.68
450.0	0.07	140.81	450.0	0.0	-1.7	0.0	0.24	0.16	-224.52
475.0	0.20	110.42	475.0	0.0	-1.7	0.0	0.58	0.52	-121.56
500.0	0.21	121.77	500.0	-0.1	-1.6	0.1	0.17	0.04	45.40
525.0	0.34	103.66	525.0	-0.1	-1.5	0.1	0.62	0.52	-72.44
550.0	0.41	118.72	550.0	-0.2	-1.3	0.2	0.48	0.28	60.24
575.0	0.52	119.09	575.0	-0.3	-1.2	0.3	0.44	0.44	1.48
600.0	0.51	117.20	600.0	-0.4	-1.0	0.4	0.08	-0.04	-7.56
625.0	0.54	121.41	625.0	-0.5	-0.8	0.5	0.20	0.12	16.84
650.0	0.59	128.51	650.0	-0.6	-0.6	0.6	0.34	0.20	28.40
675.0	0.58	134.47	675.0	-0.8	-0.4	0.8	0.25	-0.04	23.84
700.0	0.72	126.89	700.0	-1.0	-0.2	1.0	0.66	0.56	-30.32
725.0	0.77	139.33	725.0	-1.2	0.1	1.2	0.68	0.20	49.76
750.0	0.93	132.47	750.0	-1.5	0.3	1.5	0.76	0.64	-27.44
775.0	0.91	142.30	775.0	-1.8	0.6	1.8	0.64	-0.08	39.32
800.0	1.02	131.56	800.0	-2.1	0.9	2.1	0.84	0.44	-42.96
825.0	0.98	136.17	825.0	-2.4	1.2	2.4	0.36	-0.16	18.44
850.0	0.94	137.32	850.0	-2.7	1.5	2.7	0.18	-0.16	4.60
875.0	0.99	135.94	875.0	-3.0	1.8	3.0	0.22	0.20	-5.52
900.0	0.95	141.85	900.0	-3.3	2.1	3.3	0.43	-0.16	23.64
925.0	0.96	139.19	925.0	-3.6	2.3	3.6	0.18	0.04	-10.64
950.0	1.00	138.31	950.0	-3.9	2.6	4.0	0.17	0.16	-3.52
975.0	1.01	138.09	974.9	-4.3	2.9	4.3	0.04	0.04	-0.88
1,000.0	1.04	140.36	999.9	-4.6	3.2	4.6	0.20	0.12	9.08
1,025.0	1.04	143.52	1,024.9	-5.0	3.5	5.0	0.23	0.00	12.64
1,050.0	1.02	138.28	1,049.9	-5.3	3.8	5.3	0.39	-0.08	-20.96
1,075.0	1.07	141.72	1,074.9	-5.7	4.0	5.7	0.32	0.20	13.76
1,100.0	1.14	142.04	1,099.9	-6.0	4.3	6.1	0.28	0.28	1.28
1,125.0	1.18	138.76	1,124.9	-6.4	4.7	6.4	0.31	0.16	-13.12
1,150.0	1.25	135.00	1,149.9	-6.8	5.0	6.8	0.42	0.28	-15.04
1,175.0	1.22	136.56	1,174.9	-7.2	5.4	7.2	0.18	-0.12	6.24
1,200.0	1.23	140.42	1,199.9	-7.6	5.8	7.6	0.33	0.04	15.44
1,225.0	1.21	134.82	1,224.9	-8.0	6.1	8.0	0.48	-0.08	-22.40
1,250.0	1.24	135.54	1,249.9	-8.4	6.5	8.4	0.13	0.12	2.88
1,275.0	1.23	137.03	1,274.9	-8.8	6.9	8.8	0.13	-0.04	5.96
1,300.0	1.21	141.66	1,299.9	-9.2	7.2	9.2	0.40	-0.08	18.52
1,325.0	1.21	140.62	1,324.9	-9.6	7.5	9.6	0.09	0.00	-4.16
1,350.0	1.25	136.90	1,349.9	-10.0	7.9	10.0	0.36	0.16	-14.88
1,375.0	1.23	136.91	1,374.9	-10.4	8.3	10.4	0.08	-0.08	0.04

Survey Report

Company:	NORTHERN DELAWARE BASIN	Local Co-ordinate Reference:	Well BROTH HELM FED COM #701H
Project:	LEA COUNTY, NM	TVD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Site:	BULLDOG	MD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Well:	BROT HELM FED COM #701H	North Reference:	Grid
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	AWP	Database:	EDM_Users

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)	
1,400.0	1.24	137.85	1,399.9	-10.8	8.6	10.8	0.09	0.04	3.76	
1,425.0	1.25	144.14	1,424.9	-11.2	9.0	11.2	0.55	0.04	25.16	
1,450.0	1.30	136.96	1,449.8	-11.6	9.3	11.6	0.67	0.20	-28.72	
1,475.0	1.29	136.30	1,474.8	-12.0	9.7	12.1	0.07	-0.04	-2.64	
1,500.0	1.24	137.74	1,499.8	-12.4	10.1	12.5	0.24	-0.20	5.76	
1,525.0	1.12	140.00	1,524.8	-12.8	10.4	12.9	0.51	-0.48	9.04	
1,550.0	0.95	135.00	1,549.8	-13.2	10.7	13.2	0.77	-0.68	-20.00	
1,575.0	0.56	125.25	1,574.8	-13.4	11.0	13.4	1.64	-1.56	-39.00	
1,600.0	0.12	106.67	1,599.8	-13.5	11.1	13.5	1.79	-1.76	-74.32	
1,625.0	0.13	27.97	1,624.8	-13.4	11.1	13.5	0.63	0.04	-314.80	
1,650.0	0.26	35.79	1,649.8	-13.4	11.2	13.4	0.53	0.52	31.28	
1,675.0	0.17	4.16	1,674.8	-13.3	11.2	13.3	0.58	-0.36	-126.52	
1,700.0	0.18	9.17	1,699.8	-13.2	11.2	13.2	0.07	0.04	20.04	
1,725.0	0.23	33.39	1,724.8	-13.1	11.3	13.2	0.40	0.20	96.88	
1,750.0	0.20	14.58	1,749.8	-13.0	11.3	13.1	0.30	-0.12	-75.24	
1,775.0	0.22	13.56	1,774.8	-13.0	11.3	13.0	0.08	0.08	-4.08	
1,800.0	0.27	12.93	1,799.8	-12.9	11.4	12.9	0.20	0.20	-2.52	
1,825.0	0.27	19.91	1,824.8	-12.7	11.4	12.8	0.13	0.00	27.92	
1,850.0	0.26	19.78	1,849.8	-12.6	11.4	12.7	0.04	-0.04	-0.52	
1,875.0	0.24	9.21	1,874.8	-12.5	11.5	12.6	0.20	-0.08	-42.28	
1,900.0	0.25	19.26	1,899.8	-12.4	11.5	12.4	0.18	0.04	40.20	
1,925.0	0.30	9.19	1,924.8	-12.3	11.5	12.3	0.28	0.20	-40.28	
1,950.0	0.32	8.09	1,949.8	-12.2	11.5	12.2	0.08	0.08	-4.40	
1,975.0	0.36	20.69	1,974.8	-12.0	11.6	12.1	0.34	0.16	50.40	
2,000.0	0.35	19.43	1,999.8	-11.9	11.6	11.9	0.05	-0.04	-5.04	
2,025.0	0.35	25.71	2,024.8	-11.7	11.7	11.8	0.15	0.00	25.12	
2,050.0	0.34	23.84	2,049.8	-11.6	11.7	11.6	0.06	-0.04	-7.48	
2,075.0	0.37	17.09	2,074.8	-11.5	11.8	11.5	0.21	0.12	-27.00	
2,100.0	0.40	20.37	2,099.8	-11.3	11.8	11.3	0.15	0.12	13.12	
2,125.0	0.41	23.42	2,124.8	-11.1	11.9	11.2	0.10	0.04	12.20	
2,150.0	0.48	24.27	2,149.8	-11.0	12.0	11.0	0.28	0.28	3.40	
2,175.0	0.45	22.71	2,174.8	-10.8	12.1	10.8	0.13	-0.12	-6.24	
2,200.0	0.41	22.26	2,199.8	-10.6	12.1	10.6	0.16	-0.16	-1.80	
2,225.0	0.42	20.83	2,224.8	-10.4	12.2	10.5	0.06	0.04	-5.72	
2,250.0	0.38	24.07	2,249.8	-10.3	12.3	10.3	0.18	-0.16	12.96	
2,275.0	0.42	29.98	2,274.8	-10.1	12.4	10.1	0.23	0.16	23.64	
2,300.0	0.46	18.69	2,299.8	-9.9	12.4	10.0	0.38	0.16	-45.16	
2,325.0	0.46	24.26	2,324.8	-9.8	12.5	9.8	0.18	0.00	22.28	
2,350.0	0.49	26.73	2,349.8	-9.6	12.6	9.6	0.15	0.12	9.88	
2,375.0	0.54	25.80	2,374.8	-9.4	12.7	9.4	0.20	0.20	-3.72	
2,400.0	0.53	14.67	2,399.8	-9.2	12.8	9.2	0.42	-0.04	-44.52	
2,425.0	0.44	17.48	2,424.8	-9.0	12.8	9.0	0.37	-0.36	11.24	
2,450.0	0.51	28.81	2,449.8	-8.8	12.9	8.8	0.47	0.28	45.32	

Survey Report

Company:	NORTHERN DELAWARE BASIN	Local Co-ordinate Reference:	Well BROTH HELM FED COM #701H
Project:	LEA COUNTY, NM	TVD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Site:	BULLDOG	MD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Well:	BROTH HELM FED COM #701H	North Reference:	Grid
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	AWP	Database:	EDM_Users

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)	
2,475.0	0.52	20.99	2,474.8	-8.6	13.0	8.6	0.28	0.04	-31.28	
2,500.0	0.55	27.96	2,499.8	-8.3	13.1	8.4	0.29	0.12	27.88	
2,525.0	0.54	27.59	2,524.8	-8.1	13.2	8.2	0.04	-0.04	-1.48	
2,550.0	0.53	22.03	2,549.8	-7.9	13.3	7.9	0.21	-0.04	-22.24	
2,575.0	0.58	28.80	2,574.8	-7.7	13.4	7.7	0.33	0.20	27.08	
2,600.0	0.54	25.60	2,599.8	-7.5	13.5	7.5	0.20	-0.16	-12.80	
2,625.0	0.54	25.96	2,624.8	-7.3	13.6	7.3	0.01	0.00	1.44	
2,650.0	0.58	31.07	2,649.8	-7.1	13.8	7.1	0.26	0.16	20.44	
2,675.0	0.62	25.61	2,674.8	-6.8	13.9	6.9	0.28	0.16	-21.84	
2,700.0	0.60	26.35	2,699.8	-6.6	14.0	6.6	0.09	-0.08	2.96	
2,725.0	0.66	28.34	2,724.8	-6.3	14.1	6.4	0.26	0.24	7.96	
2,750.0	0.66	31.66	2,749.8	-6.1	14.3	6.1	0.15	0.00	13.28	
2,775.0	0.72	30.15	2,774.8	-5.8	14.4	5.9	0.25	0.24	-6.04	
2,800.0	0.75	34.63	2,799.8	-5.6	14.6	5.6	0.26	0.12	17.92	
2,825.0	0.76	36.81	2,824.8	-5.3	14.8	5.3	0.12	0.04	8.72	
2,850.0	0.79	39.89	2,849.8	-5.0	15.0	5.1	0.21	0.12	12.32	
2,875.0	0.75	42.93	2,874.8	-4.8	15.2	4.8	0.23	-0.16	12.16	
2,900.0	0.85	41.41	2,899.8	-4.5	15.4	4.6	0.41	0.40	-6.08	
2,925.0	0.83	44.50	2,924.8	-4.3	15.7	4.3	0.20	-0.08	12.36	
2,950.0	0.85	44.38	2,949.8	-4.0	16.0	4.0	0.08	0.08	-0.48	
2,975.0	0.88	47.02	2,974.8	-3.7	16.2	3.8	0.20	0.12	10.56	
3,000.0	0.94	46.20	2,999.8	-3.5	16.5	3.5	0.25	0.24	-3.28	
3,025.0	0.96	46.60	3,024.8	-3.2	16.8	3.2	0.08	0.08	1.60	
3,050.0	0.91	47.52	3,049.8	-2.9	17.1	2.9	0.21	-0.20	3.68	
3,075.0	0.89	50.14	3,074.8	-2.6	17.4	2.7	0.18	-0.08	10.48	
3,100.0	0.92	47.96	3,099.8	-2.4	17.7	2.4	0.18	0.12	-8.72	
3,125.0	0.97	49.54	3,124.8	-2.1	18.0	2.1	0.23	0.20	6.32	
3,150.0	0.99	51.57	3,149.7	-1.8	18.3	1.9	0.16	0.08	8.12	
3,175.0	0.99	50.91	3,174.7	-1.6	18.7	1.6	0.05	0.00	-2.64	
3,200.0	1.06	53.65	3,199.7	-1.3	19.0	1.3	0.34	0.28	10.96	
3,225.0	1.11	54.54	3,224.7	-1.0	19.4	1.1	0.21	0.20	3.56	
3,250.0	1.09	54.32	3,249.7	-0.7	19.8	0.8	0.08	-0.08	-0.88	
3,275.0	1.18	55.10	3,274.7	-0.5	20.2	0.5	0.37	0.36	3.12	
3,300.0	1.27	56.24	3,299.7	-0.1	20.7	0.2	0.37	0.36	4.56	
3,325.0	1.24	57.24	3,324.7	0.2	21.1	-0.1	0.15	-0.12	4.00	
3,350.0	1.32	56.79	3,349.7	0.5	21.6	-0.4	0.32	0.32	-1.80	
3,375.0	1.41	58.78	3,374.7	0.8	22.1	-0.7	0.41	0.36	7.96	
3,400.0	1.33	58.11	3,399.7	1.1	22.6	-1.0	0.33	-0.32	-2.68	
3,425.0	1.37	55.94	3,424.7	1.4	23.1	-1.4	0.26	0.16	-8.68	
3,450.0	1.33	55.60	3,449.7	1.7	23.6	-1.7	0.16	-0.16	-1.36	
3,475.0	1.22	39.61	3,474.7	2.1	24.0	-2.1	1.48	-0.44	-63.96	
3,500.0	1.14	15.82	3,499.7	2.6	24.2	-2.5	1.97	-0.32	-95.16	
3,525.0	1.26	349.56	3,524.7	3.1	24.2	-3.0	2.23	0.48	-105.04	
3,550.0	1.51	338.20	3,549.7	3.6	24.1	-3.6	1.48	1.00	-45.44	

Survey Report

Company:	NORTHERN DELAWARE BASIN	Local Co-ordinate Reference:	Well BROTH HELM FED COM #701H
Project:	LEA COUNTY, NM	TVD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Site:	BULLDOG	MD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Well:	BROTH HELM FED COM #701H	North Reference:	Grid
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	AWP	Database:	EDM_Users

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)
3,575.0	1.48	337.46	3,574.6	4.2	23.8	-4.2	0.14	-0.12	-2.96
3,600.0	1.48	337.11	3,599.6	4.8	23.6	-4.8	0.04	0.00	-1.40
3,625.0	1.48	335.15	3,624.6	5.4	23.3	-5.4	0.20	0.00	-7.84
3,650.0	1.53	334.86	3,649.6	6.0	23.0	-6.0	0.20	0.20	-1.16
3,675.0	1.44	334.70	3,674.6	6.6	22.8	-6.6	0.36	-0.36	-0.64
3,700.0	1.47	336.11	3,699.6	7.2	22.5	-7.1	0.19	0.12	5.64
3,725.0	1.47	336.18	3,724.6	7.8	22.2	-7.7	0.01	0.00	0.28
3,750.0	1.43	334.23	3,749.6	8.3	22.0	-8.3	0.25	-0.16	-7.80
3,775.0	1.48	335.98	3,774.6	8.9	21.7	-8.9	0.27	0.20	7.00
3,800.0	1.50	334.88	3,799.6	9.5	21.4	-9.5	0.14	0.08	-4.40
3,825.0	1.55	334.39	3,824.6	10.1	21.1	-10.1	0.21	0.20	-1.96
3,850.0	1.63	335.51	3,849.6	10.7	20.9	-10.7	0.34	0.32	4.48
3,875.0	1.70	335.17	3,874.5	11.4	20.6	-11.4	0.28	0.28	-1.36
3,900.0	1.69	335.97	3,899.5	12.1	20.2	-12.0	0.10	-0.04	3.20
3,925.0	1.69	333.84	3,924.5	12.7	19.9	-12.7	0.25	0.00	-8.52
3,950.0	1.71	336.61	3,949.5	13.4	19.6	-13.4	0.34	0.08	11.08
3,975.0	1.74	335.36	3,974.5	14.1	19.3	-14.1	0.19	0.12	-5.00
4,000.0	1.78	336.29	3,999.5	14.8	19.0	-14.8	0.20	0.16	3.72
4,025.0	1.86	336.87	4,024.5	15.5	18.7	-15.5	0.33	0.32	2.32
4,050.0	1.91	336.60	4,049.5	16.3	18.4	-16.3	0.20	0.20	-1.08
4,075.0	1.90	337.73	4,074.4	17.1	18.0	-17.0	0.16	-0.04	4.52
4,100.0	1.89	334.48	4,099.4	17.8	17.7	-17.8	0.43	-0.04	-13.00
4,125.0	1.92	333.30	4,124.4	18.6	17.3	-18.5	0.20	0.12	-4.72
4,150.0	1.97	336.44	4,149.4	19.3	17.0	-19.3	0.47	0.20	12.56
4,175.0	1.97	332.52	4,174.4	20.1	16.6	-20.1	0.54	0.00	-15.68
4,200.0	1.99	334.73	4,199.4	20.9	16.2	-20.8	0.32	0.08	8.84
4,225.0	1.99	338.07	4,224.4	21.7	15.9	-21.6	0.46	0.00	13.36
4,250.0	2.04	333.46	4,249.3	22.5	15.5	-22.4	0.68	0.20	-18.44
4,275.0	2.04	336.04	4,274.3	23.3	15.1	-23.2	0.37	0.00	10.32
4,300.0	2.02	334.34	4,299.3	24.1	14.8	-24.0	0.25	-0.08	-6.80
4,325.0	2.10	336.44	4,324.3	24.9	14.4	-24.9	0.44	0.32	8.40
4,350.0	2.02	332.89	4,349.3	25.7	14.0	-25.7	0.60	-0.32	-14.20
4,375.0	2.13	335.88	4,374.3	26.5	13.6	-26.5	0.62	0.44	11.96
4,400.0	2.05	335.59	4,399.2	27.4	13.2	-27.3	0.32	-0.32	-1.16
4,425.0	2.12	335.51	4,424.2	28.2	12.9	-28.2	0.28	0.28	-0.32
4,450.0	2.07	336.32	4,449.2	29.0	12.5	-29.0	0.23	-0.20	3.24
4,475.0	1.86	337.19	4,474.2	29.8	12.2	-29.8	0.85	-0.84	3.48
4,500.0	1.43	340.32	4,499.2	30.5	11.9	-30.4	1.76	-1.72	12.52
4,525.0	1.20	347.16	4,524.2	31.0	11.7	-31.0	1.11	-0.92	27.36
4,550.0	1.14	349.71	4,549.2	31.5	11.6	-31.5	0.32	-0.24	10.20
4,575.0	1.16	7.06	4,574.2	32.0	11.6	-32.0	1.39	0.08	69.40
4,600.0	1.15	14.80	4,599.2	32.5	11.7	-32.5	0.62	-0.04	30.96
4,625.0	1.40	22.60	4,624.2	33.0	11.9	-33.0	1.22	1.00	31.20

Survey Report

Company:	NORTHERN DELAWARE BASIN	Local Co-ordinate Reference:	Well BROTH HELM FED COM #701H
Project:	LEA COUNTY, NM	TVD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Site:	BULLDOG	MD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Well:	BROT HELM FED COM #701H	North Reference:	Grid
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	AWP	Database:	EDM_Users

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)
4,650.0	1.46	31.44	4,649.2	33.6	12.2	-33.6	0.91	0.24	35.36
4,675.0	1.69	38.79	4,674.1	34.1	12.6	-34.1	1.22	0.92	29.40
4,700.0	1.86	44.08	4,699.1	34.7	13.1	-34.7	0.94	0.68	21.16
4,725.0	1.84	44.08	4,724.1	35.3	13.6	-35.3	0.08	-0.08	0.00
4,750.0	1.79	43.90	4,749.1	35.9	14.2	-35.8	0.20	-0.20	-0.72
4,775.0	1.89	45.30	4,774.1	36.4	14.8	-36.4	0.44	0.40	5.60
4,800.0	1.69	44.06	4,799.1	37.0	15.3	-37.0	0.81	-0.80	-4.96
4,825.0	1.58	42.75	4,824.1	37.5	15.8	-37.5	0.46	-0.44	-5.24
4,850.0	1.07	36.31	4,849.1	38.0	16.2	-37.9	2.12	-2.04	-25.76
4,875.0	0.85	28.44	4,874.1	38.3	16.4	-38.3	1.02	-0.88	-31.48
4,900.0	0.97	30.59	4,899.1	38.7	16.6	-38.6	0.50	0.48	8.60
4,925.0	1.01	27.79	4,924.1	39.0	16.8	-39.0	0.25	0.16	-11.20
4,950.0	1.02	37.29	4,949.1	39.4	17.0	-39.4	0.67	0.04	38.00
4,975.0	1.12	47.01	4,974.0	39.7	17.4	-39.7	0.83	0.40	38.88
5,000.0	1.19	53.12	4,999.0	40.1	17.7	-40.0	0.57	0.28	24.44
5,025.0	1.28	58.22	5,024.0	40.4	18.2	-40.3	0.57	0.36	20.40
5,050.0	1.40	58.74	5,049.0	40.7	18.7	-40.6	0.48	0.48	2.08
5,075.0	1.45	60.23	5,074.0	41.0	19.2	-41.0	0.25	0.20	5.96
5,100.0	1.42	61.59	5,099.0	41.3	19.8	-41.3	0.18	-0.12	5.44
5,125.0	1.41	65.31	5,124.0	41.6	20.3	-41.5	0.37	-0.04	14.88
5,150.0	1.32	67.70	5,149.0	41.8	20.9	-41.8	0.43	-0.36	9.56
5,175.0	1.26	72.77	5,174.0	42.0	21.4	-42.0	0.52	-0.24	20.28
5,200.0	0.73	91.82	5,199.0	42.1	21.8	-42.0	2.47	-2.12	76.20
5,225.0	0.37	133.17	5,224.0	42.0	22.0	-42.0	2.06	-1.44	165.40
5,250.0	0.53	190.08	5,249.0	41.9	22.1	-41.8	1.81	0.64	227.64
5,275.0	0.65	193.06	5,274.0	41.6	22.0	-41.6	0.50	0.48	11.92
5,300.0	0.58	197.02	5,299.0	41.3	22.0	-41.3	0.33	-0.28	15.84
5,325.0	0.64	197.73	5,324.0	41.1	21.9	-41.0	0.24	0.24	2.84
5,350.0	0.56	193.18	5,349.0	40.8	21.8	-40.8	0.37	-0.32	-18.20
5,375.0	0.62	204.23	5,374.0	40.6	21.7	-40.5	0.51	0.24	44.20
5,400.0	0.63	197.49	5,399.0	40.3	21.6	-40.3	0.30	0.04	-26.96
5,425.0	0.68	201.86	5,424.0	40.1	21.5	-40.0	0.28	0.20	17.48
5,450.0	0.67	202.91	5,449.0	39.8	21.4	-39.8	0.06	-0.04	4.20
5,475.0	0.63	204.68	5,474.0	39.5	21.3	-39.5	0.18	-0.16	7.08
5,500.0	0.66	206.85	5,499.0	39.3	21.2	-39.2	0.15	0.12	8.68
5,525.0	0.66	208.75	5,524.0	39.0	21.0	-39.0	0.09	0.00	7.60
5,550.0	0.60	205.21	5,549.0	38.8	20.9	-38.7	0.29	-0.24	-14.16
5,575.0	0.57	218.26	5,574.0	38.6	20.8	-38.5	0.55	-0.12	52.20
5,600.0	0.58	231.31	5,599.0	38.4	20.6	-38.4	0.52	0.04	52.20
5,625.0	0.65	248.45	5,624.0	38.3	20.4	-38.2	0.78	0.28	68.56
5,650.0	0.65	254.13	5,649.0	38.2	20.1	-38.1	0.26	0.00	22.72
5,675.0	0.72	251.48	5,674.0	38.1	19.8	-38.0	0.31	0.28	-10.60
5,700.0	0.74	251.75	5,699.0	38.0	19.5	-37.9	0.08	0.08	1.08

Survey Report

Company:	NORTHERN DELAWARE BASIN	Local Co-ordinate Reference:	Well BROTH HELM FED COM #701H
Project:	LEA COUNTY, NM	TVD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Site:	BULLDOG	MD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Well:	BROTH HELM FED COM #701H	North Reference:	Grid
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	AWP	Database:	EDM_Users

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)	
5,725.0	0.78	248.97	5,724.0	37.9	19.2	-37.8	0.22	0.16	-11.12	
5,750.0	0.71	249.00	5,749.0	37.8	18.9	-37.7	0.28	-0.28	0.12	
5,775.0	0.70	254.30	5,774.0	37.7	18.6	-37.6	0.26	-0.04	21.20	
5,800.0	0.66	256.26	5,799.0	37.6	18.3	-37.5	0.19	-0.16	7.84	
5,825.0	0.64	258.23	5,823.9	37.5	18.1	-37.5	0.12	-0.08	7.88	
5,850.0	0.71	254.37	5,848.9	37.4	17.8	-37.4	0.33	0.28	-15.44	
5,875.0	0.72	253.42	5,873.9	37.4	17.5	-37.3	0.06	0.04	-3.80	
5,900.0	0.74	252.81	5,898.9	37.3	17.2	-37.2	0.09	0.08	-2.44	
5,925.0	0.69	241.89	5,923.9	37.1	16.9	-37.1	0.58	-0.20	-43.68	
5,950.0	0.66	239.68	5,948.9	37.0	16.6	-37.0	0.16	-0.12	-8.84	
5,975.0	0.58	236.51	5,973.9	36.9	16.4	-36.8	0.35	-0.32	-12.68	
6,000.0	0.64	230.84	5,998.9	36.7	16.2	-36.7	0.34	0.24	-22.68	
6,025.0	0.72	232.30	6,023.9	36.5	15.9	-36.5	0.33	0.32	5.84	
6,050.0	0.66	231.08	6,048.9	36.3	15.7	-36.3	0.25	-0.24	-4.88	
6,075.0	0.63	230.86	6,073.9	36.2	15.5	-36.1	0.12	-0.12	-0.88	
6,100.0	0.69	234.63	6,098.9	36.0	15.3	-36.0	0.30	0.24	15.08	
6,125.0	0.71	232.45	6,123.9	35.8	15.0	-35.8	0.13	0.08	-8.72	
6,150.0	0.64	233.02	6,148.9	35.6	14.8	-35.6	0.28	-0.28	2.28	
6,175.0	0.65	233.24	6,173.9	35.5	14.6	-35.4	0.04	0.04	0.88	
6,200.0	0.50	241.74	6,198.9	35.3	14.3	-35.3	0.69	-0.60	34.00	
6,225.0	0.35	266.23	6,223.9	35.3	14.2	-35.2	0.93	-0.60	97.96	
6,250.0	0.42	301.10	6,248.9	35.3	14.0	-35.3	0.96	0.28	139.48	
6,275.0	0.51	312.69	6,273.9	35.4	13.9	-35.4	0.52	0.36	46.36	
6,300.0	0.51	311.58	6,298.9	35.6	13.7	-35.5	0.04	0.00	-4.44	
6,325.0	0.58	322.03	6,323.9	35.7	13.5	-35.7	0.49	0.28	41.80	
6,350.0	0.76	309.12	6,348.9	36.0	13.3	-35.9	0.94	0.72	-51.64	
6,375.0	0.88	313.25	6,373.9	36.2	13.1	-36.2	0.53	0.48	16.52	
6,400.0	1.05	315.35	6,398.9	36.5	12.8	-36.5	0.69	0.68	8.40	
6,425.0	0.99	313.11	6,423.9	36.8	12.4	-36.8	0.29	-0.24	-8.96	
6,450.0	1.05	316.84	6,448.9	37.1	12.1	-37.1	0.36	0.24	14.92	
6,475.0	1.08	316.93	6,473.9	37.4	11.8	-37.4	0.12	0.12	0.36	
6,500.0	1.08	315.40	6,498.9	37.8	11.5	-37.8	0.12	0.00	-6.12	
6,525.0	1.09	315.63	6,523.9	38.1	11.1	-38.1	0.04	0.04	0.92	
6,550.0	1.05	317.38	6,548.9	38.5	10.8	-38.4	0.21	-0.16	7.00	
6,575.0	1.10	313.96	6,573.9	38.8	10.5	-38.8	0.33	0.20	-13.68	
6,600.0	1.11	310.50	6,598.9	39.1	10.1	-39.1	0.27	0.04	-13.84	
6,625.0	1.09	316.59	6,623.9	39.5	9.8	-39.4	0.47	-0.08	24.36	
6,650.0	1.10	315.61	6,648.9	39.8	9.5	-39.8	0.08	0.04	-3.92	
6,675.0	1.10	315.79	6,673.9	40.1	9.1	-40.1	0.01	0.00	0.72	
6,700.0	1.18	317.25	6,698.9	40.5	8.8	-40.5	0.34	0.32	5.84	
6,725.0	1.21	319.94	6,723.9	40.9	8.4	-40.9	0.25	0.12	10.76	
6,750.0	1.33	319.41	6,748.8	41.3	8.1	-41.3	0.48	0.48	-2.12	
6,775.0	1.31	319.18	6,773.8	41.8	7.7	-41.7	0.08	-0.08	-0.92	
6,800.0	1.38	318.32	6,798.8	42.2	7.3	-42.2	0.29	0.28	-3.44	

Survey Report

Company:	NORTHERN DELAWARE BASIN	Local Co-ordinate Reference:	Well BROTH HELM FED COM #701H
Project:	LEA COUNTY, NM	TVD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Site:	BULLDOG	MD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Well:	BROTH HELM FED COM #701H	North Reference:	Grid
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	AWP	Database:	EDM_Users

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)
6,825.0	1.43	319.89	6,823.8	42.7	6.9	-42.6	0.25	0.20	6.28
6,850.0	1.42	318.73	6,848.8	43.1	6.5	-43.1	0.12	-0.04	-4.64
6,875.0	1.44	318.49	6,873.8	43.6	6.1	-43.6	0.08	0.08	-0.96
6,900.0	1.45	321.31	6,898.8	44.1	5.7	-44.1	0.29	0.04	11.28
6,925.0	1.54	317.32	6,923.8	44.6	5.3	-44.6	0.55	0.36	-15.96
6,950.0	1.57	319.21	6,948.8	45.1	4.8	-45.1	0.24	0.12	7.56
6,975.0	1.64	315.40	6,973.8	45.6	4.3	-45.6	0.51	0.28	-15.24
7,000.0	1.66	314.58	6,998.8	46.1	3.8	-46.1	0.12	0.08	-3.28
7,025.0	1.70	317.38	7,023.8	46.6	3.3	-46.6	0.37	0.16	11.20
7,050.0	1.64	314.71	7,048.7	47.2	2.8	-47.1	0.39	-0.24	-10.68
7,075.0	1.75	314.19	7,073.7	47.7	2.3	-47.7	0.44	0.44	-2.08
7,100.0	1.82	311.33	7,098.7	48.2	1.7	-48.2	0.45	0.28	-11.44
7,125.0	1.84	314.71	7,123.7	48.7	1.1	-48.7	0.44	0.08	13.52
7,150.0	1.85	312.37	7,148.7	49.3	0.5	-49.3	0.30	0.04	-9.36
7,175.0	1.89	314.43	7,173.7	49.9	0.0	-49.9	0.31	0.16	8.24
7,200.0	1.86	313.38	7,198.7	50.4	-0.6	-50.4	0.18	-0.12	-4.20
7,225.0	1.82	312.84	7,223.7	51.0	-1.2	-51.0	0.17	-0.16	-2.16
7,250.0	1.93	313.39	7,248.6	51.5	-1.8	-51.5	0.45	0.44	2.20
7,275.0	1.95	315.77	7,273.6	52.1	-2.4	-52.1	0.33	0.08	9.52
7,300.0	1.99	317.06	7,298.6	52.8	-3.0	-52.8	0.24	0.16	5.16
7,325.0	2.00	318.88	7,323.6	53.4	-3.6	-53.4	0.26	0.04	7.28
7,350.0	1.99	317.75	7,348.6	54.0	-4.2	-54.1	0.16	-0.04	-4.52
7,375.0	2.07	318.43	7,373.6	54.7	-4.8	-54.7	0.33	0.32	2.72
7,400.0	1.98	316.92	7,398.6	55.4	-5.4	-55.4	0.42	-0.36	-6.04
7,425.0	2.06	319.48	7,423.5	56.0	-5.9	-56.0	0.48	0.32	10.24
7,450.0	2.03	317.56	7,448.5	56.7	-6.5	-56.7	0.30	-0.12	-7.68
7,475.0	2.10	318.66	7,473.5	57.4	-7.1	-57.4	0.32	0.28	4.40
7,500.0	2.16	318.70	7,498.5	58.1	-7.8	-58.1	0.24	0.24	0.16
7,525.0	2.25	319.02	7,523.5	58.8	-8.4	-58.8	0.36	0.36	1.28
7,550.0	2.26	319.34	7,548.4	59.5	-9.0	-59.5	0.06	0.04	1.28
7,575.0	2.31	320.03	7,573.4	60.3	-9.7	-60.3	0.23	0.20	2.76
7,600.0	2.24	319.84	7,598.4	61.0	-10.3	-61.1	0.28	-0.28	-0.76
7,625.0	2.28	320.04	7,623.4	61.8	-10.9	-61.8	0.16	0.16	0.80
7,650.0	2.35	319.31	7,648.4	62.6	-11.6	-62.6	0.30	0.28	-2.92
7,675.0	2.40	319.26	7,673.3	63.4	-12.3	-63.4	0.20	0.20	-0.20
7,700.0	2.42	319.06	7,698.3	64.1	-13.0	-64.2	0.09	0.08	-0.80
7,725.0	2.38	320.22	7,723.3	64.9	-13.6	-65.0	0.25	-0.16	4.64
7,750.0	2.41	320.60	7,748.3	65.7	-14.3	-65.8	0.14	0.12	1.52
7,775.0	2.48	319.42	7,773.3	66.6	-15.0	-66.6	0.34	0.28	-4.72
7,800.0	2.48	319.02	7,798.2	67.4	-15.7	-67.4	0.07	0.00	-1.60
7,825.0	2.53	320.16	7,823.2	68.2	-16.4	-68.2	0.28	0.20	4.56
7,850.0	2.51	319.84	7,848.2	69.1	-17.1	-69.1	0.10	-0.08	-1.28
7,875.0	2.49	319.78	7,873.2	69.9	-17.8	-69.9	0.08	-0.08	-0.24

Survey Report

Company:	NORTHERN DELAWARE BASIN	Local Co-ordinate Reference:	Well BROTH HELM FED COM #701H
Project:	LEA COUNTY, NM	TVD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Site:	BULLDOG	MD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Well:	BROT HELM FED COM #701H	North Reference:	Grid
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	AWP	Database:	EDM_Users

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)
7,900.0	2.49	319.26	7,898.1	70.7	-18.5	-70.8	0.09	0.00	-2.08
7,925.0	2.47	317.86	7,923.1	71.5	-19.2	-71.6	0.26	-0.08	-5.60
7,950.0	2.55	319.22	7,948.1	72.3	-20.0	-72.4	0.40	0.32	5.44
7,975.0	2.63	321.92	7,973.1	73.2	-20.7	-73.3	0.58	0.32	10.80
8,000.0	2.84	323.16	7,998.0	74.2	-21.4	-74.2	0.87	0.84	4.96
8,025.0	3.09	336.80	8,023.0	75.3	-22.0	-75.3	2.99	1.00	54.56
8,050.0	3.20	338.13	8,048.0	76.6	-22.6	-76.6	0.53	0.44	5.32
8,075.0	3.29	338.21	8,072.9	77.9	-23.1	-77.9	0.36	0.36	0.32
8,100.0	3.53	337.52	8,097.9	79.2	-23.7	-79.3	0.97	0.96	-2.76
8,125.0	3.32	338.36	8,122.8	80.6	-24.2	-80.7	0.86	-0.84	3.36
8,150.0	3.23	336.96	8,147.8	81.9	-24.8	-82.0	0.48	-0.36	-5.60
8,175.0	3.44	336.31	8,172.8	83.3	-25.3	-83.3	0.85	0.84	-2.60
8,200.0	3.35	336.40	8,197.7	84.6	-25.9	-84.7	0.36	-0.36	0.36
8,225.0	3.14	337.43	8,222.7	85.9	-26.5	-86.0	0.87	-0.84	4.12
8,250.0	3.17	337.57	8,247.6	87.2	-27.0	-87.3	0.12	0.12	0.56
8,275.0	3.18	337.01	8,272.6	88.5	-27.5	-88.5	0.13	0.04	-2.24
8,300.0	3.19	336.33	8,297.6	89.8	-28.1	-89.8	0.16	0.04	-2.72
8,325.0	3.15	335.98	8,322.5	91.0	-28.7	-91.1	0.18	-0.16	-1.40
8,350.0	3.16	335.38	8,347.5	92.3	-29.2	-92.3	0.14	0.04	-2.40
8,375.0	2.99	335.45	8,372.4	93.5	-29.8	-93.6	0.68	-0.68	0.28
8,400.0	3.03	335.14	8,397.4	94.7	-30.3	-94.8	0.17	0.16	-1.24
8,425.0	3.03	335.51	8,422.4	95.9	-30.9	-96.0	0.08	0.00	1.48
8,450.0	3.03	334.30	8,447.3	97.1	-31.4	-97.2	0.26	0.00	-4.84
8,475.0	2.95	335.41	8,472.3	98.3	-32.0	-98.3	0.40	-0.32	4.44
8,500.0	2.97	334.85	8,497.3	99.4	-32.5	-99.5	0.14	0.08	-2.24
8,525.0	2.93	335.25	8,522.2	100.6	-33.1	-100.7	0.18	-0.16	1.60
8,550.0	2.92	335.04	8,547.2	101.8	-33.6	-101.8	0.06	-0.04	-0.84
8,575.0	2.94	334.20	8,572.2	102.9	-34.2	-103.0	0.19	0.08	-3.36
8,600.0	2.93	333.34	8,597.1	104.1	-34.7	-104.1	0.18	-0.04	-3.44
8,625.0	2.89	333.54	8,622.1	105.2	-35.3	-105.3	0.17	-0.16	0.80
8,650.0	2.90	333.29	8,647.1	106.3	-35.9	-106.4	0.06	0.04	-1.00
8,675.0	3.00	333.84	8,672.0	107.5	-36.4	-107.6	0.42	0.40	2.20
8,700.0	3.03	332.96	8,697.0	108.7	-37.0	-108.7	0.22	0.12	-3.52
8,725.0	2.92	334.23	8,722.0	109.8	-37.6	-109.9	0.51	-0.44	5.08
8,750.0	2.90	334.90	8,746.9	111.0	-38.1	-111.0	0.16	-0.08	2.68
8,775.0	2.98	336.57	8,771.9	112.1	-38.7	-112.2	0.47	0.32	6.68
8,800.0	2.87	337.71	8,796.9	113.3	-39.2	-113.4	0.50	-0.44	4.56
8,825.0	2.99	337.80	8,821.8	114.5	-39.6	-114.6	0.48	0.48	0.36
8,850.0	2.98	337.75	8,846.8	115.7	-40.1	-115.8	0.04	-0.04	-0.20
8,875.0	3.01	338.44	8,871.8	116.9	-40.6	-117.0	0.19	0.12	2.76
8,900.0	2.92	336.70	8,896.7	118.1	-41.1	-118.2	0.51	-0.36	-6.96
8,925.0	2.95	336.91	8,921.7	119.3	-41.6	-119.4	0.13	0.12	0.84
8,950.0	3.02	336.59	8,946.7	120.5	-42.1	-120.6	0.29	0.28	-1.28

Survey Report

Company:	NORTHERN DELAWARE BASIN	Local Co-ordinate Reference:	Well BROTH HELM FED COM #701H
Project:	LEA COUNTY, NM	TVD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Site:	BULLDOG	MD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Well:	BROTH HELM FED COM #701H	North Reference:	Grid
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	AWP	Database:	EDM_Users

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)
8,975.0	2.99	337.39	8,971.6	121.7	-42.7	-121.8	0.21	-0.12	3.20
9,000.0	3.02	336.04	8,996.6	122.9	-43.2	-123.0	0.31	0.12	-5.40
9,025.0	2.97	336.17	9,021.6	124.1	-43.7	-124.2	0.20	-0.20	0.52
9,050.0	2.89	335.36	9,046.5	125.3	-44.2	-125.3	0.36	-0.32	-3.24
9,075.0	3.01	335.58	9,071.5	126.4	-44.8	-126.5	0.48	0.48	0.88
9,100.0	2.96	335.34	9,096.5	127.6	-45.3	-127.7	0.21	-0.20	-0.96
9,125.0	3.00	334.66	9,121.4	128.8	-45.8	-128.9	0.21	0.16	-2.72
9,150.0	2.97	332.95	9,146.4	130.0	-46.4	-130.0	0.38	-0.12	-6.84
9,175.0	3.04	333.20	9,171.4	131.1	-47.0	-131.2	0.28	0.28	1.00
9,200.0	2.93	331.30	9,196.3	132.3	-47.6	-132.4	0.59	-0.44	-7.60
9,225.0	3.03	329.32	9,221.3	133.4	-48.3	-133.5	0.57	0.40	-7.92
9,250.0	3.12	328.72	9,246.3	134.6	-49.0	-134.6	0.38	0.36	-2.40
9,275.0	3.04	328.76	9,271.2	135.7	-49.7	-135.8	0.32	-0.32	0.16
9,300.0	3.18	326.03	9,296.2	136.8	-50.4	-136.9	0.82	0.56	-10.92
9,325.0	3.21	323.71	9,321.2	138.0	-51.2	-138.1	0.53	0.12	-9.28
9,350.0	3.19	321.57	9,346.1	139.1	-52.0	-139.2	0.48	-0.08	-8.56
9,375.0	3.18	321.27	9,371.1	140.2	-52.9	-140.3	0.08	-0.04	-1.20
9,400.0	3.23	320.45	9,396.0	141.3	-53.8	-141.4	0.27	0.20	-3.28
9,425.0	3.38	319.17	9,421.0	142.4	-54.7	-142.5	0.67	0.60	-5.12
9,450.0	3.35	315.84	9,446.0	143.4	-55.7	-143.6	0.79	-0.12	-13.32
9,475.0	3.35	313.62	9,470.9	144.5	-56.7	-144.6	0.52	0.00	-8.88
9,500.0	3.45	313.55	9,495.9	145.5	-57.8	-145.6	0.40	0.40	-0.28
9,525.0	3.38	313.01	9,520.8	146.5	-58.9	-146.6	0.31	-0.28	-2.16
9,550.0	3.45	312.50	9,545.8	147.5	-60.0	-147.6	0.31	0.28	-2.04
9,575.0	3.45	310.67	9,570.7	148.5	-61.1	-148.6	0.44	0.00	-7.32
9,600.0	3.54	309.93	9,595.7	149.5	-62.3	-149.6	0.40	0.36	-2.96
9,625.0	3.58	307.53	9,620.6	150.5	-63.5	-150.6	0.62	0.16	-9.60
9,650.0	3.48	306.01	9,645.6	151.4	-64.7	-151.5	0.55	-0.40	-6.08
9,675.0	3.64	305.88	9,670.5	152.3	-66.0	-152.4	0.64	0.64	-0.52
9,700.0	3.58	304.14	9,695.5	153.2	-67.3	-153.3	0.50	-0.24	-6.96
9,725.0	3.57	302.29	9,720.4	154.1	-68.6	-154.2	0.46	-0.04	-7.40
9,750.0	3.55	303.16	9,745.4	154.9	-69.9	-155.0	0.23	-0.08	3.48
9,775.0	3.60	301.85	9,770.3	155.7	-71.2	-155.9	0.38	0.20	-5.24
9,800.0	3.61	301.21	9,795.3	156.6	-72.5	-156.7	0.17	0.04	-2.56
9,825.0	3.62	299.82	9,820.3	157.4	-73.9	-157.5	0.35	0.04	-5.56
9,850.0	3.52	299.70	9,845.2	158.1	-75.2	-158.3	0.40	-0.40	-0.48
9,875.0	3.47	299.54	9,870.2	158.9	-76.6	-159.0	0.20	-0.20	-0.64
9,900.0	3.35	299.27	9,895.1	159.6	-77.9	-159.8	0.48	-0.48	-1.08
9,925.0	3.35	297.41	9,920.1	160.3	-79.1	-160.5	0.43	0.00	-7.44
9,950.0	3.24	296.97	9,945.0	161.0	-80.4	-161.1	0.45	-0.44	-1.76
9,975.0	3.15	296.76	9,970.0	161.6	-81.7	-161.8	0.36	-0.36	-0.84
10,000.0	3.11	296.40	9,995.0	162.2	-82.9	-162.4	0.18	-0.16	-1.44
10,025.0	3.07	295.13	10,019.9	162.8	-84.1	-163.0	0.32	-0.16	-5.08
10,050.0	3.06	296.61	10,044.9	163.4	-85.3	-163.6	0.32	-0.04	5.92

Survey Report

Company:	NORTHERN DELAWARE BASIN	Local Co-ordinate Reference:	Well BROTH HELM FED COM #701H
Project:	LEA COUNTY, NM	TVD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Site:	BULLDOG	MD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Well:	BROTH HELM FED COM #701H	North Reference:	Grid
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	AWP	Database:	EDM_Users

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)
10,075.0	3.09	296.48	10,069.8	164.0	-86.5	-164.2	0.12	0.12	-0.52
10,100.0	3.00	295.28	10,094.8	164.6	-87.7	-164.7	0.44	-0.36	-4.80
10,125.0	2.95	294.31	10,119.8	165.1	-88.9	-165.3	0.28	-0.20	-3.88
10,150.0	2.98	295.74	10,144.7	165.7	-90.1	-165.8	0.32	0.12	5.72
10,175.0	3.03	294.02	10,169.7	166.2	-91.2	-166.4	0.41	0.20	-6.88
10,200.0	2.96	293.91	10,194.7	166.7	-92.4	-166.9	0.28	-0.28	-0.44
10,225.0	2.89	294.10	10,219.6	167.3	-93.6	-167.4	0.28	-0.28	0.76
10,250.0	2.92	294.40	10,244.6	167.8	-94.8	-168.0	0.13	0.12	1.20
10,275.0	2.99	294.98	10,269.6	168.3	-95.9	-168.5	0.30	0.28	2.32
10,300.0	3.02	294.04	10,294.5	168.9	-97.1	-169.0	0.23	0.12	-3.76
10,325.0	3.04	295.37	10,319.5	169.4	-98.3	-169.6	0.29	0.08	5.32
10,350.0	3.05	293.17	10,344.5	170.0	-99.5	-170.2	0.47	0.04	-8.80
10,375.0	3.10	295.07	10,369.4	170.5	-100.8	-170.7	0.45	0.20	7.60
10,400.0	3.07	292.89	10,394.4	171.1	-102.0	-171.3	0.48	-0.12	-8.72
10,425.0	3.08	293.61	10,419.4	171.6	-103.2	-171.8	0.16	0.04	2.88
10,450.0	2.89	291.36	10,444.3	172.1	-104.4	-172.3	0.89	-0.76	-9.00
10,475.0	2.96	290.18	10,469.3	172.5	-105.6	-172.7	0.37	0.28	-4.72
10,500.0	2.99	291.93	10,494.3	173.0	-106.8	-173.2	0.38	0.12	7.00
10,525.0	2.88	292.19	10,519.2	173.5	-108.0	-173.7	0.44	-0.44	1.04
10,550.0	2.87	293.79	10,544.2	174.0	-109.2	-174.2	0.32	-0.04	6.40
10,575.0	2.71	292.42	10,569.2	174.4	-110.3	-174.7	0.69	-0.64	-5.48
10,600.0	2.76	293.09	10,594.1	174.9	-111.4	-175.1	0.24	0.20	2.68
10,625.0	2.83	293.70	10,619.1	175.4	-112.5	-175.6	0.30	0.28	2.44
10,650.0	2.82	295.08	10,644.1	175.9	-113.6	-176.1	0.27	-0.04	5.52
10,675.0	2.82	295.33	10,669.0	176.4	-114.7	-176.6	0.05	0.00	1.00
10,700.0	2.83	295.24	10,694.0	176.9	-115.8	-177.2	0.04	0.04	-0.36
10,725.0	2.84	295.31	10,719.0	177.5	-117.0	-177.7	0.04	0.04	0.28
10,750.0	2.75	295.25	10,744.0	178.0	-118.1	-178.2	0.36	-0.36	-0.24
10,775.0	2.66	297.44	10,768.9	178.5	-119.1	-178.8	0.55	-0.36	8.76
10,800.0	2.68	299.91	10,793.9	179.1	-120.1	-179.3	0.47	0.08	9.88
10,825.0	2.52	302.07	10,818.9	179.7	-121.1	-179.9	0.75	-0.64	8.64
10,850.0	2.51	300.72	10,843.9	180.2	-122.1	-180.5	0.24	-0.04	-5.40
10,875.0	2.48	302.97	10,868.8	180.8	-123.0	-181.1	0.41	-0.12	9.00
10,900.0	2.42	301.01	10,893.8	181.4	-123.9	-181.6	0.41	-0.24	-7.84
10,925.0	2.39	298.58	10,918.8	181.9	-124.8	-182.1	0.43	-0.12	-9.72
10,950.0	2.30	297.86	10,943.8	182.4	-125.7	-182.6	0.38	-0.36	-2.88
10,975.0	2.25	296.41	10,968.7	182.8	-126.6	-183.1	0.30	-0.20	-5.80
11,000.0	2.13	295.61	10,993.7	183.3	-127.4	-183.5	0.50	-0.48	-3.20
11,025.0	1.86	295.78	11,018.7	183.6	-128.2	-183.9	1.08	-1.08	0.68
11,050.0	1.79	294.37	11,043.7	184.0	-128.9	-184.2	0.33	-0.28	-5.64
11,075.0	1.81	299.98	11,068.7	184.3	-129.6	-184.6	0.71	0.08	22.44
11,100.0	1.53	301.18	11,093.7	184.7	-130.3	-185.0	1.13	-1.12	4.80
11,125.0	1.48	302.94	11,118.7	185.0	-130.8	-185.3	0.27	-0.20	7.04

Survey Report

Company:	NORTHERN DELAWARE BASIN	Local Co-ordinate Reference:	Well BROTH HELM FED COM #701H
Project:	LEA COUNTY, NM	TVD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Site:	BULLDOG	MD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Well:	BROTH HELM FED COM #701H	North Reference:	Grid
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	AWP	Database:	EDM_Users

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)
11,150.0	1.44	305.84	11,143.7	185.4	-131.3	-185.7	0.34	-0.16	11.60
11,175.0	1.47	304.21	11,168.6	185.8	-131.9	-186.0	0.20	0.12	-6.52
11,200.0	1.45	303.83	11,193.6	186.1	-132.4	-186.4	0.09	-0.08	-1.52
11,225.0	1.45	301.00	11,218.6	186.5	-132.9	-186.7	0.29	0.00	-11.32
11,250.0	1.48	296.96	11,243.6	186.8	-133.5	-187.0	0.43	0.12	-16.16
11,275.0	1.45	294.69	11,268.6	187.1	-134.1	-187.3	0.26	-0.12	-9.08
11,300.0	1.33	289.53	11,293.6	187.3	-134.6	-187.5	0.69	-0.48	-20.64
11,325.0	1.28	285.93	11,318.6	187.5	-135.2	-187.7	0.38	-0.20	-14.40
11,350.0	1.30	285.27	11,343.6	187.6	-135.7	-187.9	0.10	0.08	-2.64
11,375.0	1.34	287.23	11,368.6	187.8	-136.3	-188.0	0.24	0.16	7.84
11,400.0	1.18	284.74	11,393.6	187.9	-136.8	-188.2	0.68	-0.64	-9.96
11,425.0	1.18	281.16	11,418.6	188.0	-137.3	-188.3	0.29	0.00	-14.32
11,450.0	1.14	285.04	11,443.6	188.1	-137.8	-188.4	0.35	-0.16	15.52
11,475.0	1.10	280.52	11,468.6	188.3	-138.3	-188.5	0.39	-0.16	-18.08
11,500.0	1.06	280.02	11,493.6	188.3	-138.7	-188.6	0.16	-0.16	-2.00
11,525.0	1.13	280.85	11,518.6	188.4	-139.2	-188.7	0.29	0.28	3.32
11,550.0	1.18	278.31	11,543.6	188.5	-139.7	-188.8	0.29	0.20	-10.16
11,575.0	1.13	279.17	11,568.5	188.6	-140.2	-188.9	0.21	-0.20	3.44
11,600.0	1.22	277.97	11,593.5	188.7	-140.7	-188.9	0.37	0.36	-4.80
11,625.0	1.25	280.91	11,618.5	188.8	-141.2	-189.0	0.28	0.12	11.76
11,650.0	1.20	282.82	11,643.5	188.9	-141.8	-189.1	0.26	-0.20	7.64
11,675.0	1.41	273.08	11,668.5	188.9	-142.3	-189.2	1.22	0.84	-38.96
11,700.0	1.47	272.53	11,693.5	189.0	-142.9	-189.2	0.25	0.24	-2.20
11,725.0	1.54	273.98	11,718.5	189.0	-143.6	-189.3	0.32	0.28	5.80
11,750.0	1.63	273.98	11,743.5	189.1	-144.3	-189.3	0.36	0.36	0.00
11,775.0	1.55	269.85	11,768.5	189.1	-145.0	-189.4	0.56	-0.32	-16.52
11,800.0	1.66	272.42	11,793.5	189.1	-145.7	-189.4	0.53	0.44	10.28
11,825.0	1.66	271.41	11,818.5	189.1	-146.4	-189.4	0.12	0.00	-4.04
11,850.0	1.66	267.05	11,843.5	189.1	-147.1	-189.4	0.51	0.00	-17.44
11,875.0	1.63	267.20	11,868.4	189.1	-147.8	-189.4	0.12	-0.12	0.60
11,900.0	1.61	268.02	11,893.4	189.0	-148.5	-189.3	0.12	-0.08	3.28
11,925.0	1.57	266.48	11,918.4	189.0	-149.2	-189.3	0.23	-0.16	-6.16
11,950.0	1.48	263.93	11,943.4	189.0	-149.9	-189.2	0.45	-0.36	-10.20
11,975.0	1.70	270.26	11,968.4	188.9	-150.6	-189.2	1.12	0.88	25.32
12,000.0	1.60	268.66	11,993.4	188.9	-151.3	-189.2	0.44	-0.40	-6.40
12,025.0	1.57	265.28	12,018.4	188.9	-152.0	-189.2	0.39	-0.12	-13.52
12,048.0	1.58	262.46	12,041.4	188.8	-152.6	-189.1	0.34	0.04	-12.26
12,213.0	1.75	266.31	12,206.3	188.3	-157.4	-188.7	0.12	0.10	2.33
12,244.0	1.66	265.93	12,237.3	188.3	-158.3	-188.6	0.29	-0.29	-1.23
12,275.0	0.82	195.06	12,268.3	188.0	-158.8	-188.4	5.14	-2.71	-228.61
12,307.0	4.37	154.99	12,300.3	186.7	-158.4	-187.0	11.81	11.09	-125.22
12,338.0	9.40	155.27	12,331.0	183.3	-156.8	-183.6	16.23	16.23	0.90
12,369.0	14.03	153.37	12,361.4	177.7	-154.1	-178.0	14.99	14.94	-6.13

Survey Report

Company:	NORTHERN DELAWARE BASIN	Local Co-ordinate Reference:	Well BROTH HELM FED COM #701H
Project:	LEA COUNTY, NM	TVD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Site:	BULLDOG	MD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Well:	BROT HELM FED COM #701H	North Reference:	Grid
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	AWP	Database:	EDM_Users

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)
12,400.0	17.91	154.53	12,391.2	170.0	-150.3	-170.3	12.56	12.52	3.74
12,432.0	20.08	158.35	12,421.4	160.5	-146.2	-160.8	7.81	6.78	11.94
12,463.0	22.36	164.66	12,450.3	149.8	-142.7	-150.1	10.40	7.35	20.35
12,463.8	22.44	164.78	12,451.1	149.5	-142.6	-149.8	12.08	10.55	15.42
FTP @ 12463.76									
12,495.0	25.80	168.99	12,479.5	137.1	-139.7	-137.4	12.08	10.76	13.48
12,526.0	28.80	169.37	12,507.1	123.2	-137.1	-123.4	9.69	9.68	1.23
12,557.0	32.08	168.19	12,533.8	107.8	-134.0	-108.0	10.75	10.58	-3.81
12,589.0	36.41	169.09	12,560.3	90.1	-130.5	-90.4	13.62	13.53	2.81
12,620.0	39.28	169.58	12,584.7	71.4	-126.9	-71.7	9.31	9.26	1.58
12,651.0	40.50	168.95	12,608.5	51.9	-123.2	-52.1	4.15	3.94	-2.03
12,683.0	43.23	170.94	12,632.3	30.9	-119.5	-31.1	9.49	8.53	6.22
12,714.0	45.96	173.02	12,654.4	9.3	-116.5	-9.5	9.99	8.81	6.71
12,745.0	47.85	172.62	12,675.6	-13.2	-113.7	12.9	6.17	6.10	-1.29
12,776.0	51.40	172.53	12,695.7	-36.6	-110.6	36.3	11.45	11.45	-0.29
12,807.0	55.35	171.95	12,714.2	-61.2	-107.2	61.0	12.83	12.74	-1.87
12,839.0	57.16	171.77	12,731.9	-87.6	-103.5	87.3	5.68	5.66	-0.56
12,871.0	60.82	172.56	12,748.4	-114.7	-99.7	114.5	11.63	11.44	2.47
12,902.0	64.91	172.32	12,762.6	-142.1	-96.1	141.9	13.21	13.19	-0.77
12,933.0	66.07	171.80	12,775.4	-170.0	-92.2	169.8	4.04	3.74	-1.68
12,964.0	68.74	172.32	12,787.3	-198.3	-88.3	198.2	8.75	8.61	1.68
12,995.0	71.39	171.97	12,797.9	-227.2	-84.3	227.0	8.61	8.55	-1.13
13,027.0	71.79	171.79	12,808.0	-257.3	-80.0	257.1	1.36	1.25	-0.56
13,058.0	74.28	171.90	12,817.0	-286.6	-75.8	286.5	8.04	8.03	0.35
13,089.0	76.39	171.31	12,824.9	-316.3	-71.4	316.1	7.05	6.81	-1.90
13,121.0	76.11	170.93	12,832.5	-347.0	-66.6	346.9	1.45	-0.88	-1.19
13,152.0	79.35	172.50	12,839.1	-377.0	-62.3	376.8	11.56	10.45	5.06
13,183.0	83.39	174.09	12,843.7	-407.4	-58.7	407.3	13.98	13.03	5.13
13,214.0	84.89	175.86	12,846.9	-438.1	-56.0	438.0	7.46	4.84	5.71
13,245.0	88.25	178.90	12,848.8	-469.0	-54.6	468.9	14.60	10.84	9.81
13,340.0	88.77	179.02	12,851.2	-564.0	-52.8	563.9	0.56	0.55	0.13
13,434.0	89.95	179.29	12,852.3	-657.9	-51.5	657.8	1.29	1.26	0.29
13,527.0	90.72	178.81	12,851.7	-750.9	-49.9	750.8	0.98	0.83	-0.52
13,621.0	90.05	178.92	12,851.1	-844.9	-48.0	844.8	0.72	-0.71	0.12
13,718.0	90.28	179.60	12,850.8	-941.9	-46.8	941.8	0.74	0.24	0.70
13,812.0	90.59	179.59	12,850.1	-1,035.9	-46.1	1,035.8	0.33	0.33	-0.01
13,907.0	89.76	180.16	12,849.8	-1,130.9	-45.9	1,130.8	1.06	-0.87	0.60
14,001.0	88.76	180.46	12,851.0	-1,224.9	-46.4	1,224.8	1.11	-1.06	0.32
14,095.0	88.21	179.80	12,853.5	-1,318.9	-46.6	1,318.8	0.91	-0.59	-0.70
14,190.0	88.15	180.32	12,856.5	-1,413.8	-46.7	1,413.7	0.55	-0.06	0.55
14,284.0	87.21	180.82	12,860.3	-1,507.7	-47.7	1,507.6	1.13	-1.00	0.53
14,379.0	86.32	180.64	12,865.7	-1,602.6	-48.9	1,602.5	0.96	-0.94	-0.19
14,473.0	87.87	180.68	12,870.5	-1,696.4	-50.0	1,696.3	1.65	1.65	0.04
14,566.0	88.79	180.13	12,873.2	-1,789.4	-50.6	1,789.3	1.15	0.99	-0.59

Survey Report

Company:	NORTHERN DELAWARE BASIN	Local Co-ordinate Reference:	Well BROTH HELM FED COM #701H
Project:	LEA COUNTY, NM	TVD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Site:	BULLDOG	MD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Well:	BROTH HELM FED COM #701H	North Reference:	Grid
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	AWP	Database:	EDM_Users

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)	
14,661.0	88.58	180.31	12,875.4	-1,884.4	-51.0	1,884.3	0.29	-0.22	0.19	
14,756.0	87.64	180.20	12,878.5	-1,979.3	-51.4	1,979.2	1.00	-0.99	-0.12	
14,850.0	87.87	180.90	12,882.2	-2,073.2	-52.3	2,073.1	0.78	0.24	0.74	
14,944.0	89.65	181.68	12,884.2	-2,167.2	-54.4	2,167.1	2.07	1.89	0.83	
15,038.0	91.34	181.79	12,883.4	-2,261.1	-57.3	2,261.0	1.80	1.80	0.12	
15,132.0	90.25	180.73	12,882.1	-2,355.1	-59.3	2,355.0	1.62	-1.16	-1.13	
15,226.0	89.04	180.34	12,882.7	-2,449.1	-60.2	2,449.0	1.35	-1.29	-0.41	
15,320.0	91.30	179.72	12,882.4	-2,543.1	-60.3	2,543.0	2.49	2.40	-0.66	
15,414.0	89.72	178.53	12,881.6	-2,637.1	-58.8	2,636.9	2.10	-1.68	-1.27	
15,508.0	88.14	176.55	12,883.3	-2,731.0	-54.8	2,730.8	2.69	-1.68	-2.11	
15,602.0	88.89	178.69	12,885.8	-2,824.8	-50.9	2,824.7	2.41	0.80	2.28	
15,697.0	87.94	178.19	12,888.4	-2,919.8	-48.3	2,919.7	1.13	-1.00	-0.53	
15,791.0	88.34	178.29	12,891.4	-3,013.7	-45.4	3,013.6	0.44	0.43	0.11	
15,885.0	87.39	177.88	12,894.9	-3,107.5	-42.3	3,107.5	1.10	-1.01	-0.44	
15,980.0	86.90	178.05	12,899.7	-3,202.4	-38.9	3,202.3	0.55	-0.52	0.18	
16,074.0	87.88	179.22	12,903.9	-3,296.2	-36.7	3,296.2	1.62	1.04	1.24	
16,168.0	88.05	179.29	12,907.3	-3,390.2	-35.5	3,390.1	0.20	0.18	0.07	
16,261.0	87.59	179.39	12,910.8	-3,483.1	-34.4	3,483.0	0.51	-0.49	0.11	
16,355.0	87.71	179.27	12,914.7	-3,577.0	-33.3	3,576.9	0.18	0.13	-0.13	
16,449.0	87.13	179.19	12,918.9	-3,670.9	-32.0	3,670.8	0.62	-0.62	-0.09	
16,543.0	90.64	179.97	12,920.7	-3,764.9	-31.3	3,764.8	3.83	3.73	0.83	
16,637.0	90.78	179.60	12,919.6	-3,858.9	-31.0	3,858.8	0.42	0.15	-0.39	
16,731.0	88.88	178.52	12,919.8	-3,952.8	-29.4	3,952.8	2.32	-2.02	-1.15	
16,825.0	87.62	177.65	12,922.7	-4,046.7	-26.3	4,046.7	1.63	-1.34	-0.93	
16,920.0	89.60	178.99	12,925.0	-4,141.7	-23.5	4,141.6	2.52	2.08	1.41	
17,013.0	88.77	178.62	12,926.3	-4,234.6	-21.6	4,234.6	0.98	-0.89	-0.40	
17,107.0	88.91	178.69	12,928.2	-4,328.6	-19.4	4,328.6	0.17	0.15	0.07	
17,201.0	89.63	179.47	12,929.4	-4,422.6	-17.9	4,422.5	1.13	0.77	0.83	
17,296.0	90.06	179.87	12,929.7	-4,517.6	-17.3	4,517.5	0.62	0.45	0.42	
17,389.0	89.60	179.43	12,930.0	-4,610.6	-16.8	4,610.5	0.68	-0.49	-0.47	
17,484.0	89.09	179.18	12,931.1	-4,705.6	-15.6	4,705.5	0.60	-0.54	-0.26	
17,578.0	89.34	179.26	12,932.4	-4,799.5	-14.3	4,799.5	0.28	0.27	0.09	
17,672.0	89.32	179.09	12,933.5	-4,893.5	-13.0	4,893.5	0.18	-0.02	-0.18	
17,767.0	88.88	178.75	12,934.9	-4,988.5	-11.2	4,988.5	0.59	-0.46	-0.36	
17,860.0	91.41	179.95	12,934.7	-5,081.5	-10.1	5,081.4	3.01	2.72	1.29	
17,954.0	90.67	179.17	12,933.0	-5,175.5	-9.4	5,175.4	1.14	-0.79	-0.83	
18,049.0	90.95	179.54	12,931.7	-5,270.4	-8.3	5,270.4	0.49	0.29	0.39	
18,143.0	90.92	179.86	12,930.1	-5,364.4	-7.8	5,364.4	0.34	-0.03	0.34	
18,237.0	91.30	179.88	12,928.3	-5,458.4	-7.6	5,458.4	0.40	0.40	0.02	
18,331.0	91.24	180.20	12,926.2	-5,552.4	-7.7	5,552.4	0.35	-0.06	0.34	
18,425.0	91.27	179.63	12,924.2	-5,646.4	-7.6	5,646.3	0.61	0.03	-0.61	
18,518.0	90.95	179.42	12,922.4	-5,739.3	-6.8	5,739.3	0.41	-0.34	-0.23	
18,612.0	90.55	178.71	12,921.1	-5,833.3	-5.3	5,833.3	0.87	-0.43	-0.76	

Survey Report

Company:	NORTHERN DELAWARE BASIN	Local Co-ordinate Reference:	Well BROTH HELM FED COM #701H
Project:	LEA COUNTY, NM	TVD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Site:	BULLDOG	MD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Well:	BROTH HELM FED COM #701H	North Reference:	Grid
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	AWP	Database:	EDM_Users

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)
18,706.0	88.86	177.75	12,921.6	-5,927.3	-2.3	5,927.3	2.07	-1.80	-1.02
18,800.0	88.88	178.07	12,923.5	-6,021.2	1.1	6,021.2	0.34	0.02	0.34
18,894.0	88.94	177.67	12,925.3	-6,115.1	4.6	6,115.1	0.43	0.06	-0.43
18,988.0	88.25	180.00	12,927.6	-6,209.1	6.5	6,209.1	2.58	-0.73	2.48
19,082.0	87.82	179.80	12,930.8	-6,303.0	6.6	6,303.0	0.50	-0.46	-0.21
19,176.0	89.20	180.59	12,933.2	-6,397.0	6.3	6,397.0	1.69	1.47	0.84
19,271.0	89.37	180.46	12,934.4	-6,492.0	5.5	6,492.0	0.23	0.18	-0.14
19,365.0	88.14	181.00	12,936.5	-6,585.9	4.3	6,585.9	1.43	-1.31	0.57
19,459.0	87.59	180.62	12,940.0	-6,679.8	2.9	6,679.8	0.71	-0.59	-0.40
19,553.0	88.28	181.18	12,943.3	-6,773.8	1.5	6,773.8	0.95	0.73	0.60
19,648.0	88.28	181.11	12,946.2	-6,868.7	-0.4	6,868.7	0.07	0.00	-0.07
19,742.0	88.22	179.51	12,949.1	-6,962.7	-1.0	6,962.6	1.70	-0.06	-1.70
19,837.0	88.31	178.12	12,951.9	-7,057.6	1.0	7,057.6	1.47	0.09	-1.46
19,931.0	88.63	176.88	12,954.5	-7,151.5	5.1	7,151.5	1.36	0.34	-1.32
20,026.0	88.68	176.80	12,956.7	-7,246.3	10.3	7,246.3	0.10	0.05	-0.08
20,120.0	89.72	177.85	12,958.0	-7,340.2	14.7	7,340.2	1.57	1.11	1.12
20,213.0	90.29	178.54	12,958.0	-7,433.1	17.7	7,433.2	0.96	0.61	0.74
20,308.0	88.71	178.38	12,958.8	-7,528.1	20.2	7,528.1	1.67	-1.66	-0.17
20,402.0	88.08	178.31	12,961.5	-7,622.0	22.9	7,622.1	0.67	-0.67	-0.07
20,496.0	91.18	180.67	12,962.1	-7,716.0	23.8	7,716.0	4.14	3.30	2.51
20,590.0	91.24	180.86	12,960.1	-7,810.0	22.5	7,810.0	0.21	0.06	0.20
20,684.0	90.61	180.75	12,958.6	-7,903.9	21.2	7,904.0	0.68	-0.67	-0.12
20,778.0	90.69	180.57	12,957.5	-7,997.9	20.1	7,998.0	0.21	0.09	-0.19
20,872.0	90.29	180.06	12,956.7	-8,091.9	19.6	8,092.0	0.69	-0.43	-0.54
20,967.0	91.04	180.05	12,955.6	-8,186.9	19.5	8,186.9	0.79	0.79	-0.01
21,061.0	90.29	180.31	12,954.5	-8,280.9	19.2	8,280.9	0.84	-0.80	0.28
21,156.0	90.84	180.65	12,953.6	-8,375.9	18.4	8,375.9	0.68	0.58	0.36
21,250.0	89.95	180.77	12,952.9	-8,469.9	17.2	8,469.9	0.96	-0.95	0.13
21,344.0	88.28	180.61	12,954.4	-8,563.9	16.1	8,563.9	1.78	-1.78	-0.17
21,438.0	86.38	179.96	12,958.7	-8,657.8	15.6	8,657.8	2.14	-2.02	-0.69
21,531.0	89.98	180.75	12,961.7	-8,750.7	15.1	8,750.7	3.96	3.87	0.85
21,625.0	90.52	180.39	12,961.3	-8,844.7	14.1	8,844.7	0.69	0.57	-0.38
21,719.0	88.37	179.73	12,962.2	-8,938.7	14.0	8,938.7	2.39	-2.29	-0.70
21,814.0	91.44	179.98	12,962.3	-9,033.7	14.3	9,033.7	3.24	3.23	0.26
21,908.0	91.21	179.94	12,960.2	-9,127.6	14.3	9,127.7	0.25	-0.24	-0.04
22,002.0	91.04	180.61	12,958.3	-9,221.6	13.9	9,221.6	0.74	-0.18	0.71
22,097.0	90.49	180.58	12,957.1	-9,316.6	12.9	9,316.6	0.58	-0.58	-0.03
22,191.0	90.12	179.92	12,956.6	-9,410.6	12.5	9,410.6	0.80	-0.39	-0.70
22,285.0	87.39	179.25	12,958.6	-9,504.6	13.2	9,504.6	2.99	-2.90	-0.71
22,379.0	87.04	179.19	12,963.2	-9,598.5	14.5	9,598.5	0.38	-0.37	-0.06
22,474.0	89.17	179.25	12,966.3	-9,693.4	15.7	9,693.4	2.24	2.24	0.06
22,569.0	91.33	179.06	12,965.9	-9,788.4	17.1	9,788.4	2.28	2.27	-0.20
22,663.0	90.26	178.92	12,964.6	-9,882.3	18.8	9,882.4	1.15	-1.14	-0.15

Survey Report

Company:	NORTHERN DELAWARE BASIN	Local Co-ordinate Reference:	Well BROT HELM FED COM #701H
Project:	LEA COUNTY, NM	TVD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Site:	BULLDOG	MD Reference:	RKB= 3420' + 27' @ 3447.6usft (Nabors 893)
Well:	BROT HELM FED COM #701H	North Reference:	Grid
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	AWP	Database:	EDM_Users

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)
22,757.0	88.42	179.08	12,965.7	-9,976.3	20.4	9,976.3	1.96	-1.96	0.17
22,851.0	88.17	179.57	12,968.5	-10,070.3	21.5	10,070.3	0.58	-0.27	0.52
22,945.0	88.71	179.27	12,971.0	-10,164.2	22.5	10,164.3	0.66	0.57	-0.32
22,965.0	88.74	178.87	12,971.5	-10,184.2	22.8	10,184.3	2.01	0.15	-2.00
FINAL MWD @ 22965'MD									
22,986.8	88.74	178.87	12,972.0	-10,206.0	23.3	10,206.0	0.00	0.00	0.00
LTP @ 22986.78									
23,035.0	88.74	178.87	12,973.0	-10,254.2	24.2	10,254.2	0.00	0.00	0.00
PTD @ 23035'MD									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
12,463.8	12,451.1	149.5	-142.6	FTP @ 12463.76
22,965.0	12,971.5	-10,184.2	22.8	FINAL MWD @ 22965'MD
22,986.8	12,972.0	-10,206.0	23.3	LTP @ 22986.78
23,035.0	12,973.0	-10,254.2	24.2	PTD @ 23035'MD

Checked By: _____ Approved By: _____ Date: _____