

Rec'd 6/22/2020 - NMOCD

# **NORTHERN DELAWARE BASIN**

**LEA COUNTY, NM**

**BULLDOG**

**HARRIER FED COM #303H**

**OWB**

**Design: AWP**

## **Standard Survey Report**

**30 December, 2019**

## Survey Report

<b>Company:</b> NORTHERN DELAWARE BASIN	<b>Local Co-ordinate Reference:</b> Well HARRIER FED COM #303H
<b>Project:</b> LEA COUNTY, NM	<b>TVD Reference:</b> KB=25' @ 3271.8usft (PIONEER 84)
<b>Site:</b> BULLDOG	<b>MD Reference:</b> KB=25' @ 3271.8usft (PIONEER 84)
<b>Well:</b> HARRIER FED COM #303H	<b>North Reference:</b> Grid
<b>Wellbore:</b> OWB	<b>Survey Calculation Method:</b> Minimum Curvature
<b>Design:</b> AWP	<b>Database:</b> EDM_Users

<b>Project</b> LEA COUNTY, NM	
<b>Map System:</b> US State Plane 1927 (Exact solution)	<b>System Datum:</b> Mean Sea Level
<b>Geo Datum:</b> NAD 1927 (NADCON CONUS)	
<b>Map Zone:</b> New Mexico East 3001	

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

<b>Well</b> HARRIER FED COM #303H		
<b>Well Position</b> +N/-S 0.0 usft	<b>Northing:</b> 388,376.20 usft	<b>Latitude:</b> 32° 3' 57.291 N
+E/-W 0.0 usft	<b>Easting:</b> 711,970.90 usft	<b>Longitude:</b> 103° 38' 56.622 W
<b>Position Uncertainty</b> 3.0 usft	<b>Wellhead Elevation:</b> usft	<b>Ground Level:</b> 3,246.8 usft

<b>Wellbore</b> OWB	
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	WMM2015	10/18/2018	6.86	59.87	47,684.79422375

<b>Design</b> AWP	
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<b>Audit Notes:</b>		
<b>Version:</b> 1.0	<b>Phase:</b> ACTUAL	<b>Tie On Depth:</b> 0.0

Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	359.18

Survey Program		Date		
From (usft)	To (usft)	12/30/2019		
Survey (Wellbore)		Tool Name	Description	
100.0	8,265.0	GYRO (OWB)	Standard Keeper 104	Standard Wireline Keeper ver 1.0.4
8,315.0	19,261.0	MWD-CRV/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	0.25	96.07	100.0	0.0	0.2	0.0	0.25	0.25	0.00
	125.0	0.31	98.15	125.0	0.0	0.3	0.0	0.24	0.24	8.32
	150.0	0.38	70.33	150.0	0.0	0.5	0.0	0.72	0.28	-111.28
	175.0	0.59	70.97	175.0	0.0	0.7	0.0	0.84	0.84	2.56
	200.0	0.64	62.02	200.0	0.2	0.9	0.1	0.43	0.20	-35.80
	225.0	0.77	65.28	225.0	0.3	1.2	0.3	0.54	0.52	13.04
	250.0	0.88	68.45	250.0	0.4	1.5	0.4	0.48	0.44	12.68
	275.0	0.94	61.18	275.0	0.6	1.9	0.6	0.52	0.24	-29.08
	300.0	0.94	70.24	300.0	0.8	2.3	0.7	0.59	0.00	36.24

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<b>Site:</b>	BULLDOG	<b>MD Reference:</b>	KB=25' @ 3271.8usft (PIONEER 84)
<b>Well:</b>	HARRIER FED COM #303H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	OWB	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	AWP	<b>Database:</b>	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	1.04	66.02	325.0	0.9	2.7	0.9	0.49	0.40	-16.88
350.0	1.03	58.21	350.0	1.1	3.1	1.1	0.57	-0.04	-31.24
375.0	1.07	55.06	375.0	1.4	3.4	1.3	0.28	0.16	-12.60
400.0	1.13	59.87	400.0	1.7	3.9	1.6	0.44	0.24	19.24
425.0	1.34	53.75	425.0	1.9	4.3	1.9	0.99	0.84	-24.48
450.0	1.42	50.59	450.0	2.3	4.8	2.3	0.44	0.32	-12.64
475.0	1.41	53.07	474.9	2.7	5.3	2.6	0.25	-0.04	9.92
500.0	1.41	58.14	499.9	3.0	5.8	3.0	0.50	0.00	20.28
525.0	1.46	53.82	524.9	3.4	6.3	3.3	0.48	0.20	-17.28
550.0	1.38	53.20	549.9	3.8	6.8	3.7	0.33	-0.32	-2.48
575.0	1.41	60.09	574.9	4.1	7.3	4.0	0.68	0.12	27.56
600.0	1.47	55.01	599.9	4.4	7.8	4.3	0.56	0.24	-20.32
625.0	1.33	55.41	624.9	4.8	8.3	4.7	0.56	-0.56	1.60
650.0	1.24	57.83	649.9	5.1	8.8	5.0	0.42	-0.36	9.68
675.0	1.30	57.36	674.9	5.4	9.3	5.3	0.24	0.24	-1.88
700.0	1.38	57.23	699.9	5.7	9.8	5.6	0.32	0.32	-0.52
725.0	1.32	58.67	724.9	6.0	10.2	5.9	0.28	-0.24	5.76
750.0	1.35	55.57	749.9	6.3	10.7	6.2	0.31	0.12	-12.40
775.0	1.34	57.36	774.9	6.7	11.2	6.5	0.17	-0.04	7.16
800.0	1.40	54.97	799.9	7.0	11.7	6.8	0.33	0.24	-9.56
825.0	1.36	53.88	824.8	7.3	12.2	7.2	0.19	-0.16	-4.36
850.0	1.26	58.73	849.8	7.7	12.7	7.5	0.60	-0.40	19.40
875.0	1.41	54.76	874.8	8.0	13.2	7.8	0.70	0.60	-15.88
900.0	1.44	51.79	899.8	8.4	13.7	8.2	0.32	0.12	-11.88
925.0	1.40	47.02	924.8	8.8	14.1	8.6	0.50	-0.16	-19.08
950.0	1.45	42.28	949.8	9.2	14.6	9.0	0.51	0.20	-18.96
975.0	1.33	43.92	974.8	9.6	15.0	9.4	0.51	-0.48	6.56
1,000.0	1.11	12.63	999.8	10.1	15.2	9.9	2.76	-0.88	-125.16
1,025.0	1.51	315.84	1,024.8	10.6	15.1	10.3	5.18	1.60	-227.16
1,050.0	2.28	298.97	1,049.8	11.0	14.4	10.8	3.77	3.08	-67.48
1,075.0	2.72	294.14	1,074.8	11.5	13.4	11.3	1.95	1.76	-19.32
1,100.0	2.97	292.66	1,099.7	12.0	12.3	11.8	1.04	1.00	-5.92
1,125.0	3.12	291.48	1,124.7	12.5	11.1	12.4	0.65	0.60	-4.72
1,150.0	3.24	292.83	1,149.7	13.0	9.8	12.9	0.57	0.48	5.40
1,175.0	3.36	291.38	1,174.6	13.6	8.4	13.5	0.58	0.48	-5.80
1,200.0	3.54	288.76	1,199.6	14.1	7.0	14.0	0.96	0.72	-10.48
1,225.0	3.50	289.73	1,224.5	14.6	5.6	14.5	0.29	-0.16	3.88
1,250.0	3.48	288.89	1,249.5	15.1	4.1	15.0	0.22	-0.08	-3.36
1,275.0	3.33	287.11	1,274.4	15.6	2.7	15.5	0.73	-0.60	-7.12
1,300.0	3.03	279.50	1,299.4	15.9	1.4	15.9	2.07	-1.20	-30.44
1,325.0	2.81	271.51	1,324.4	16.0	0.1	16.0	1.85	-0.88	-31.96
1,350.0	2.78	270.42	1,349.3	16.0	-1.1	16.0	0.24	-0.12	-4.36
1,375.0	2.78	270.83	1,374.3	16.0	-2.3	16.1	0.08	0.00	1.64

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<b>Wellbore:</b>	OWB	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	AWP	<b>Database:</b>	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	2.85	270.71	1,399.3	16.1	-3.5	16.1	0.28	0.28	-0.48	
1,425.0	3.01	266.71	1,424.2	16.0	-4.8	16.1	1.04	0.64	-16.00	
1,450.0	2.99	268.16	1,449.2	16.0	-6.1	16.1	0.31	-0.08	5.80	
1,475.0	2.97	266.52	1,474.2	15.9	-7.4	16.0	0.35	-0.08	-6.56	
1,500.0	2.70	268.81	1,499.1	15.9	-8.7	16.0	1.17	-1.08	9.16	
1,525.0	2.10	264.46	1,524.1	15.8	-9.7	15.9	2.51	-2.40	-17.40	
1,550.0	1.20	254.67	1,549.1	15.7	-10.4	15.8	3.76	-3.60	-39.16	
1,575.0	0.88	241.82	1,574.1	15.5	-10.8	15.7	1.58	-1.28	-51.40	
1,600.0	0.86	243.14	1,599.1	15.4	-11.2	15.5	0.11	-0.08	5.28	
1,625.0	0.87	248.71	1,624.1	15.2	-11.5	15.4	0.34	0.04	22.28	
1,650.0	0.98	229.28	1,649.1	15.0	-11.8	15.2	1.32	0.44	-77.72	
1,675.0	0.88	242.52	1,674.1	14.8	-12.2	14.9	0.95	-0.40	52.96	
1,700.0	0.86	245.11	1,699.1	14.6	-12.5	14.8	0.18	-0.08	10.36	
1,725.0	0.96	241.42	1,724.1	14.4	-12.9	14.6	0.46	0.40	-14.76	
1,750.0	0.90	239.22	1,749.1	14.2	-13.2	14.4	0.28	-0.24	-8.80	
1,775.0	0.88	245.93	1,774.1	14.0	-13.6	14.2	0.42	-0.08	26.84	
1,800.0	0.97	248.11	1,799.1	13.9	-13.9	14.1	0.39	0.36	8.72	
1,825.0	1.16	239.18	1,824.1	13.7	-14.4	13.9	1.01	0.76	-35.72	
1,850.0	1.14	242.98	1,849.1	13.4	-14.8	13.6	0.32	-0.08	15.20	
1,875.0	1.16	243.59	1,874.1	13.2	-15.2	13.4	0.09	0.08	2.44	
1,900.0	1.22	244.55	1,899.1	13.0	-15.7	13.2	0.25	0.24	3.84	
1,925.0	1.38	239.21	1,924.0	12.7	-16.2	12.9	0.80	0.64	-21.36	
1,950.0	1.46	245.88	1,949.0	12.4	-16.8	12.7	0.73	0.32	26.68	
1,975.0	1.62	244.37	1,974.0	12.1	-17.4	12.4	0.66	0.64	-6.04	
2,000.0	1.63	243.12	1,999.0	11.8	-18.0	12.1	0.15	0.04	-5.00	
2,025.0	1.62	240.98	2,024.0	11.5	-18.6	11.8	0.25	-0.04	-8.56	
2,050.0	1.55	243.40	2,049.0	11.2	-19.2	11.4	0.39	-0.28	9.68	
2,075.0	1.28	236.60	2,074.0	10.9	-19.8	11.1	1.27	-1.08	-27.20	
2,100.0	0.98	208.32	2,099.0	10.5	-20.1	10.8	2.50	-1.20	-113.12	
2,125.0	0.84	171.44	2,124.0	10.2	-20.2	10.4	2.36	-0.56	-147.52	
2,150.0	0.90	163.34	2,149.0	9.8	-20.1	10.1	0.55	0.24	-32.40	
2,175.0	0.93	161.49	2,174.0	9.4	-20.0	9.7	0.17	0.12	-7.40	
2,200.0	0.92	163.21	2,199.0	9.0	-19.9	9.3	0.12	-0.04	6.88	
2,225.0	0.87	165.48	2,224.0	8.6	-19.8	8.9	0.25	-0.20	9.08	
2,250.0	0.92	161.04	2,249.0	8.3	-19.6	8.5	0.34	0.20	-17.76	
2,275.0	0.94	159.33	2,274.0	7.9	-19.5	8.2	0.14	0.08	-6.84	
2,300.0	0.91	160.83	2,299.0	7.5	-19.4	7.8	0.15	-0.12	6.00	
2,325.0	0.91	162.86	2,324.0	7.1	-19.2	7.4	0.13	0.00	8.12	
2,350.0	0.96	162.98	2,349.0	6.7	-19.1	7.0	0.20	0.20	0.48	
2,375.0	0.99	161.30	2,374.0	6.3	-19.0	6.6	0.17	0.12	-6.72	
2,400.0	0.87	162.17	2,398.9	6.0	-18.9	6.2	0.48	-0.48	3.48	
2,425.0	1.02	165.02	2,423.9	5.6	-18.7	5.8	0.63	0.60	11.40	
2,450.0	1.01	162.96	2,448.9	5.1	-18.6	5.4	0.15	-0.04	-8.24	

## Survey Report

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<b>Site:</b>	BULLDOG	<b>MD Reference:</b>	KB=25' @ 3271.8usft (PIONEER 84)
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<b>Wellbore:</b>	OWB	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	AWP	<b>Database:</b>	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	0.98	163.49	2,473.9	4.7	-18.5	5.0	0.13	-0.12	2.12
2,500.0	1.08	169.19	2,498.9	4.3	-18.4	4.5	0.57	0.40	22.80
2,525.0	1.05	167.05	2,523.9	3.8	-18.3	4.1	0.20	-0.12	-8.56
2,550.0	1.17	169.25	2,548.9	3.3	-18.2	3.6	0.51	0.48	8.80
2,575.0	1.21	176.02	2,573.9	2.8	-18.1	3.1	0.58	0.16	27.08
2,600.0	1.23	175.62	2,598.9	2.3	-18.1	2.6	0.09	0.08	-1.60
2,625.0	1.36	173.51	2,623.9	1.7	-18.0	2.0	0.55	0.52	-8.44
2,650.0	1.17	176.91	2,648.9	1.2	-18.0	1.4	0.82	-0.76	13.60
2,675.0	1.52	183.19	2,673.9	0.6	-18.0	0.9	1.52	1.40	25.12
2,700.0	1.67	186.73	2,698.9	-0.1	-18.1	0.2	0.72	0.60	14.16
2,725.0	1.68	189.45	2,723.9	-0.8	-18.2	-0.6	0.32	0.04	10.88
2,750.0	1.75	191.51	2,748.9	-1.5	-18.3	-1.3	0.37	0.28	8.24
2,775.0	1.81	192.65	2,773.8	-2.3	-18.5	-2.0	0.28	0.24	4.56
2,800.0	1.79	191.85	2,798.8	-3.1	-18.6	-2.8	0.13	-0.08	-3.20
2,825.0	1.84	194.36	2,823.8	-3.8	-18.8	-3.6	0.38	0.20	10.04
2,850.0	1.85	194.62	2,848.8	-4.6	-19.0	-4.4	0.05	0.04	1.04
2,875.0	1.85	191.96	2,873.8	-5.4	-19.2	-5.1	0.34	0.00	-10.64
2,900.0	1.73	194.03	2,898.8	-6.2	-19.4	-5.9	0.55	-0.48	8.28
2,925.0	0.92	192.88	2,923.8	-6.7	-19.5	-6.5	3.24	-3.24	-4.60
2,950.0	0.20	154.12	2,948.8	-7.0	-19.5	-6.7	3.10	-2.88	-155.04
2,975.0	0.32	37.03	2,973.8	-6.9	-19.5	-6.7	1.79	0.48	-468.36
3,000.0	0.45	27.21	2,998.8	-6.8	-19.4	-6.5	0.58	0.52	-39.28
3,025.0	0.55	43.82	3,023.8	-6.6	-19.3	-6.4	0.70	0.40	66.44
3,050.0	0.63	37.51	3,048.8	-6.4	-19.1	-6.2	0.41	0.32	-25.24
3,075.0	0.61	39.34	3,073.8	-6.2	-18.9	-6.0	0.11	-0.08	7.32
3,100.0	0.72	56.66	3,098.8	-6.0	-18.7	-5.8	0.91	0.44	69.28
3,125.0	0.96	58.02	3,123.8	-5.8	-18.4	-5.6	0.96	0.96	5.44
3,150.0	1.15	54.46	3,148.8	-5.6	-18.0	-5.3	0.80	0.76	-14.24
3,175.0	1.51	70.46	3,173.8	-5.3	-17.5	-5.1	2.06	1.44	64.00
3,200.0	1.81	71.06	3,198.7	-5.1	-16.8	-4.8	1.20	1.20	2.40
3,225.0	1.93	70.67	3,223.7	-4.8	-16.0	-4.6	0.48	0.48	-1.56
3,250.0	2.01	71.22	3,248.7	-4.5	-15.2	-4.3	0.33	0.32	2.20
3,275.0	2.18	74.11	3,273.7	-4.3	-14.4	-4.1	0.80	0.68	11.56
3,300.0	2.26	71.63	3,298.7	-4.0	-13.4	-3.8	0.50	0.32	-9.92
3,325.0	2.43	72.06	3,323.7	-3.7	-12.5	-3.5	0.68	0.68	1.72
3,350.0	2.61	71.54	3,348.6	-3.3	-11.4	-3.2	0.73	0.72	-2.08
3,375.0	2.68	71.01	3,373.6	-2.9	-10.3	-2.8	0.30	0.28	-2.12
3,400.0	2.58	69.24	3,398.6	-2.6	-9.3	-2.4	0.52	-0.40	-7.08
3,425.0	2.53	70.87	3,423.6	-2.2	-8.2	-2.1	0.35	-0.20	6.52
3,450.0	1.95	72.39	3,448.5	-1.9	-7.3	-1.8	2.33	-2.32	6.08
3,475.0	1.39	75.37	3,473.5	-1.7	-6.6	-1.6	2.27	-2.24	11.92
3,500.0	1.44	75.78	3,498.5	-1.5	-6.0	-1.4	0.20	0.20	1.64
3,525.0	1.41	73.16	3,523.5	-1.3	-5.4	-1.3	0.29	-0.12	-10.48
3,550.0	1.41	72.50	3,548.5	-1.2	-4.8	-1.1	0.06	0.00	-2.64

## Survey Report

<b>Company:</b>	NORTHERN DELAWARE BASIN	<b>Local Co-ordinate Reference:</b>	Well HARRIER FED COM #303H
<b>Project:</b>	LEA COUNTY, NM	<b>TVD Reference:</b>	KB=25' @ 3271.8usft (PIONEER 84)
<b>Site:</b>	BULLDOG	<b>MD Reference:</b>	KB=25' @ 3271.8usft (PIONEER 84)
<b>Well:</b>	HARRIER FED COM #303H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	OWB	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	AWP	<b>Database:</b>	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	1.53	70.92	3,573.5	-1.0	-4.2	-0.9	0.51	0.48	-6.32	
3,600.0	1.57	69.55	3,598.5	-0.7	-3.5	-0.7	0.22	0.16	-5.48	
3,625.0	1.54	69.60	3,623.5	-0.5	-2.9	-0.5	0.12	-0.12	0.20	
3,650.0	1.50	71.27	3,648.5	-0.3	-2.3	-0.2	0.24	-0.16	6.68	
3,675.0	1.55	68.10	3,673.5	0.0	-1.7	0.0	0.39	0.20	-12.68	
3,700.0	1.52	64.45	3,698.5	0.2	-1.1	0.2	0.41	-0.12	-14.60	
3,725.0	1.54	61.79	3,723.4	0.5	-0.5	0.5	0.30	0.08	-10.64	
3,750.0	1.57	59.81	3,748.4	0.9	0.1	0.9	0.25	0.12	-7.92	
3,775.0	1.49	60.21	3,773.4	1.2	0.7	1.2	0.32	-0.32	1.60	
3,800.0	1.53	62.02	3,798.4	1.5	1.3	1.5	0.25	0.16	7.24	
3,825.0	1.57	59.02	3,823.4	1.8	1.9	1.8	0.36	0.16	-12.00	
3,850.0	1.56	60.36	3,848.4	2.2	2.5	2.2	0.15	-0.04	5.36	
3,875.0	1.61	61.97	3,873.4	2.5	3.1	2.5	0.27	0.20	6.44	
3,900.0	1.81	63.06	3,898.4	2.9	3.7	2.8	0.81	0.80	4.36	
3,925.0	1.91	65.49	3,923.4	3.2	4.5	3.2	0.51	0.40	9.72	
3,950.0	2.16	68.26	3,948.4	3.6	5.3	3.5	1.07	1.00	11.08	
3,975.0	2.41	71.97	3,973.3	3.9	6.2	3.8	1.16	1.00	14.84	
4,000.0	2.54	76.53	3,998.3	4.2	7.3	4.1	0.94	0.52	18.24	
4,025.0	2.56	79.91	4,023.3	4.4	8.3	4.3	0.61	0.08	13.52	
4,050.0	2.59	78.28	4,048.3	4.6	9.5	4.5	0.32	0.12	-6.52	
4,075.0	2.50	80.40	4,073.2	4.8	10.5	4.7	0.52	-0.36	8.48	
4,100.0	2.20	92.92	4,098.2	4.9	11.6	4.7	2.37	-1.20	50.08	
4,125.0	2.05	105.14	4,123.2	4.8	12.5	4.6	1.90	-0.60	48.88	
4,150.0	1.98	109.62	4,148.2	4.5	13.3	4.3	0.69	-0.28	17.92	
4,175.0	2.13	112.71	4,173.2	4.2	14.1	4.0	0.75	0.60	12.36	
4,200.0	2.27	114.72	4,198.1	3.8	15.0	3.6	0.64	0.56	8.04	
4,225.0	2.39	118.04	4,223.1	3.3	15.9	3.1	0.72	0.48	13.28	
4,250.0	2.70	118.94	4,248.1	2.8	16.9	2.6	1.25	1.24	3.60	
4,275.0	3.03	121.03	4,273.1	2.2	18.0	1.9	1.38	1.32	8.36	
4,300.0	3.25	122.62	4,298.0	1.5	19.2	1.2	0.95	0.88	6.36	
4,325.0	3.47	123.00	4,323.0	0.7	20.4	0.4	0.88	0.88	1.52	
4,350.0	3.57	122.84	4,347.9	-0.2	21.7	-0.5	0.40	0.40	-0.64	
4,375.0	3.67	123.61	4,372.9	-1.0	23.0	-1.4	0.44	0.40	3.08	
4,400.0	3.55	124.23	4,397.8	-1.9	24.3	-2.3	0.50	-0.48	2.48	
4,425.0	3.24	129.84	4,422.8	-2.8	25.5	-3.2	1.82	-1.24	22.44	
4,450.0	2.73	143.68	4,447.8	-3.7	26.4	-4.1	3.52	-2.04	55.36	
4,475.0	2.53	150.91	4,472.7	-4.7	27.0	-5.1	1.55	-0.80	28.92	
4,500.0	2.38	157.26	4,497.7	-5.7	27.5	-6.0	1.24	-0.60	25.40	
4,525.0	2.39	158.25	4,522.7	-6.6	27.9	-7.0	0.17	0.04	3.96	
4,550.0	2.18	158.51	4,547.7	-7.5	28.2	-7.9	0.84	-0.84	1.04	
4,575.0	2.09	159.55	4,572.7	-8.4	28.6	-8.8	0.39	-0.36	4.16	
4,600.0	1.91	155.62	4,597.6	-9.2	28.9	-9.6	0.90	-0.72	-15.72	
4,625.0	1.78	154.26	4,622.6	-9.9	29.2	-10.4	0.55	-0.52	-5.44	

## Survey Report

<b>Company:</b>	NORTHERN DELAWARE BASIN	<b>Local Co-ordinate Reference:</b>	Well HARRIER FED COM #303H
<b>Project:</b>	LEA COUNTY, NM	<b>TVD Reference:</b>	KB=25' @ 3271.8usft (PIONEER 84)
<b>Site:</b>	BULLDOG	<b>MD Reference:</b>	KB=25' @ 3271.8usft (PIONEER 84)
<b>Well:</b>	HARRIER FED COM #303H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	OWB	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	AWP	<b>Database:</b>	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	1.71	151.76	4,647.6	-10.6	29.6	-11.0	0.41	-0.28	-10.00	
4,675.0	1.67	150.28	4,672.6	-11.3	29.9	-11.7	0.24	-0.16	-5.92	
4,700.0	1.75	154.36	4,697.6	-11.9	30.3	-12.4	0.58	0.32	16.32	
4,725.0	1.79	152.06	4,722.6	-12.6	30.6	-13.1	0.33	0.16	-9.20	
4,750.0	1.67	152.66	4,747.6	-13.3	31.0	-13.7	0.49	-0.48	2.40	
4,775.0	1.75	153.21	4,772.6	-14.0	31.3	-14.4	0.33	0.32	2.20	
4,800.0	1.71	150.59	4,797.5	-14.6	31.7	-15.1	0.35	-0.16	-10.48	
4,825.0	1.67	152.48	4,822.5	-15.3	32.0	-15.7	0.27	-0.16	7.56	
4,850.0	1.78	150.95	4,847.5	-15.9	32.4	-16.4	0.48	0.44	-6.12	
4,875.0	1.84	150.25	4,872.5	-16.6	32.8	-17.1	0.26	0.24	-2.80	
4,900.0	1.91	151.00	4,897.5	-17.3	33.2	-17.8	0.30	0.28	3.00	
4,925.0	1.76	147.22	4,922.5	-18.0	33.6	-18.5	0.77	-0.60	-15.12	
4,950.0	1.91	148.75	4,947.5	-18.7	34.0	-19.2	0.63	0.60	6.12	
4,975.0	1.99	150.47	4,972.5	-19.4	34.4	-19.9	0.40	0.32	6.88	
5,000.0	2.03	148.51	4,997.4	-20.2	34.9	-20.7	0.32	0.16	-7.84	
5,025.0	2.14	150.11	5,022.4	-21.0	35.3	-21.5	0.50	0.44	6.40	
5,050.0	2.03	150.56	5,047.4	-21.8	35.8	-22.3	0.44	-0.44	1.80	
5,075.0	2.20	150.51	5,072.4	-22.6	36.2	-23.1	0.68	0.68	-0.20	
5,100.0	2.72	168.21	5,097.4	-23.6	36.6	-24.1	3.66	2.08	70.80	
5,125.0	3.45	179.40	5,122.3	-24.9	36.7	-25.4	3.77	2.92	44.76	
5,150.0	3.61	181.10	5,147.3	-26.4	36.7	-27.0	0.76	0.64	6.80	
5,175.0	3.67	185.07	5,172.2	-28.0	36.6	-28.5	1.04	0.24	15.88	
5,200.0	3.64	188.69	5,197.2	-29.6	36.5	-30.1	0.93	-0.12	14.48	
5,225.0	3.69	191.39	5,222.1	-31.2	36.2	-31.7	0.72	0.20	10.80	
5,250.0	3.79	190.92	5,247.1	-32.8	35.9	-33.3	0.42	0.40	-1.88	
5,275.0	3.88	194.50	5,272.0	-34.4	35.5	-34.9	1.02	0.36	14.32	
5,300.0	4.28	209.94	5,297.0	-36.0	34.8	-36.5	4.66	1.60	61.76	
5,325.0	4.57	214.86	5,321.9	-37.7	33.8	-38.1	1.91	1.16	19.68	
5,350.0	4.74	216.60	5,346.8	-39.3	32.6	-39.8	0.88	0.68	6.96	
5,375.0	5.09	217.42	5,371.7	-41.0	31.3	-41.5	1.43	1.40	3.28	
5,400.0	5.89	219.65	5,396.6	-42.9	29.8	-43.3	3.31	3.20	8.92	
5,425.0	6.23	218.26	5,421.5	-44.9	28.1	-45.3	1.48	1.36	-5.56	
5,450.0	6.58	217.73	5,446.3	-47.1	26.4	-47.5	1.42	1.40	-2.12	
5,475.0	7.41	216.79	5,471.1	-49.6	24.6	-49.9	3.35	3.32	-3.76	
5,500.0	8.12	217.32	5,495.9	-52.2	22.6	-52.6	2.85	2.84	2.12	
5,525.0	8.50	216.66	5,520.6	-55.1	20.4	-55.4	1.57	1.52	-2.64	
5,550.0	8.47	216.66	5,545.4	-58.1	18.2	-58.3	0.12	-0.12	0.00	
5,575.0	8.51	216.59	5,570.1	-61.1	16.0	-61.3	0.17	0.16	-0.28	
5,600.0	8.57	216.07	5,594.8	-64.0	13.8	-64.2	0.39	0.24	-2.08	
5,625.0	8.51	216.39	5,619.5	-67.0	11.6	-67.2	0.31	-0.24	1.28	
5,650.0	8.48	216.50	5,644.3	-70.0	9.4	-70.1	0.14	-0.12	0.44	
5,675.0	8.36	215.70	5,669.0	-73.0	7.2	-73.1	0.67	-0.48	-3.20	
5,700.0	8.37	214.92	5,693.7	-75.9	5.1	-76.0	0.46	0.04	-3.12	

## Survey Report

<b>Company:</b>	NORTHERN DELAWARE BASIN	<b>Local Co-ordinate Reference:</b>	Well HARRIER FED COM #303H
<b>Project:</b>	LEA COUNTY, NM	<b>TVD Reference:</b>	KB=25' @ 3271.8usft (PIONEER 84)
<b>Site:</b>	BULLDOG	<b>MD Reference:</b>	KB=25' @ 3271.8usft (PIONEER 84)
<b>Well:</b>	HARRIER FED COM #303H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	OWB	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	AWP	<b>Database:</b>	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	8.39	215.02	5,718.4	-78.9	3.0	-79.0	0.10	0.08	0.40
5,750.0	8.51	214.98	5,743.2	-81.9	0.9	-81.9	0.48	0.48	-0.16
5,775.0	8.52	215.01	5,767.9	-85.0	-1.2	-84.9	0.04	0.04	0.12
5,800.0	8.63	214.50	5,792.6	-88.0	-3.3	-88.0	0.53	0.44	-2.04
5,825.0	8.57	214.46	5,817.3	-91.1	-5.4	-91.0	0.24	-0.24	-0.16
5,850.0	8.32	214.22	5,842.1	-94.1	-7.5	-94.0	1.01	-1.00	-0.96
5,875.0	8.35	213.88	5,866.8	-97.1	-9.5	-97.0	0.23	0.12	-1.36
5,900.0	8.33	213.95	5,891.5	-100.2	-11.6	-100.0	0.09	-0.08	0.28
5,925.0	8.48	213.71	5,916.3	-103.2	-13.6	-103.0	0.62	0.60	-0.96
5,950.0	8.48	213.84	5,941.0	-106.3	-15.6	-106.0	0.08	0.00	0.52
5,975.0	8.51	213.11	5,965.7	-109.3	-17.7	-109.1	0.45	0.12	-2.92
6,000.0	8.55	213.57	5,990.4	-112.4	-19.7	-112.1	0.32	0.16	1.84
6,025.0	8.67	213.87	6,015.2	-115.5	-21.8	-115.2	0.51	0.48	1.20
6,050.0	8.82	213.84	6,039.9	-118.7	-23.9	-118.3	0.60	0.60	-0.12
6,075.0	8.82	212.84	6,064.6	-121.9	-26.0	-121.5	0.61	0.00	-4.00
6,100.0	9.02	212.58	6,089.3	-125.2	-28.1	-124.8	0.82	0.80	-1.04
6,125.0	9.09	212.02	6,114.0	-128.5	-30.2	-128.0	0.45	0.28	-2.24
6,150.0	9.19	211.76	6,138.6	-131.9	-32.3	-131.4	0.43	0.40	-1.04
6,175.0	9.19	211.61	6,163.3	-135.3	-34.4	-134.8	0.10	0.00	-0.60
6,200.0	9.29	211.16	6,188.0	-138.7	-36.5	-138.2	0.49	0.40	-1.80
6,225.0	9.33	211.72	6,212.7	-142.1	-38.6	-141.6	0.40	0.16	2.24
6,250.0	9.27	211.37	6,237.3	-145.6	-40.7	-145.0	0.33	-0.24	-1.40
6,275.0	9.44	210.32	6,262.0	-149.1	-42.8	-148.4	0.96	0.68	-4.20
6,300.0	9.40	210.92	6,286.7	-152.6	-44.9	-151.9	0.42	-0.16	2.40
6,325.0	9.56	210.46	6,311.3	-156.1	-47.0	-155.4	0.71	0.64	-1.84
6,350.0	9.50	211.05	6,336.0	-159.7	-49.1	-159.0	0.46	-0.24	2.36
6,375.0	9.35	211.57	6,360.7	-163.2	-51.2	-162.4	0.69	-0.60	2.08
6,400.0	9.07	212.87	6,385.3	-166.6	-53.4	-165.8	1.40	-1.12	5.20
6,425.0	8.84	214.15	6,410.0	-169.8	-55.5	-169.0	1.22	-0.92	5.12
6,450.0	8.62	213.42	6,434.7	-173.0	-57.6	-172.1	0.99	-0.88	-2.92
6,475.0	8.47	214.35	6,459.5	-176.1	-59.7	-175.2	0.82	-0.60	3.72
6,500.0	8.40	214.55	6,484.2	-179.1	-61.8	-178.2	0.30	-0.28	0.80
6,525.0	8.31	215.79	6,508.9	-182.0	-63.9	-181.1	0.81	-0.36	4.96
6,550.0	8.20	216.50	6,533.7	-184.9	-66.0	-184.0	0.60	-0.44	2.84
6,575.0	8.17	216.66	6,558.4	-187.8	-68.1	-186.8	0.15	-0.12	0.64
6,600.0	7.48	218.68	6,583.2	-190.5	-70.2	-189.5	2.97	-2.76	8.08
6,625.0	7.11	220.05	6,608.0	-193.0	-72.2	-191.9	1.64	-1.48	5.48
6,650.0	6.98	221.84	6,632.8	-195.3	-74.2	-194.2	1.02	-0.52	7.16
6,675.0	6.69	223.82	6,657.6	-197.5	-76.2	-196.3	1.49	-1.16	7.92
6,700.0	5.82	226.26	6,682.5	-199.4	-78.1	-198.2	3.64	-3.48	9.76
6,725.0	5.41	229.03	6,707.3	-201.0	-79.9	-199.9	1.97	-1.64	11.08
6,750.0	5.27	230.74	6,732.2	-202.5	-81.7	-201.3	0.85	-0.56	6.84
6,775.0	5.15	231.54	6,757.1	-204.0	-83.5	-202.7	0.56	-0.48	3.20
6,800.0	4.80	234.15	6,782.0	-205.3	-85.2	-204.0	1.67	-1.40	10.44

## Survey Report

<b>Company:</b>	NORTHERN DELAWARE BASIN	<b>Local Co-ordinate Reference:</b>	Well HARRIER FED COM #303H
<b>Project:</b>	LEA COUNTY, NM	<b>TVD Reference:</b>	KB=25' @ 3271.8usft (PIONEER 84)
<b>Site:</b>	BULLDOG	<b>MD Reference:</b>	KB=25' @ 3271.8usft (PIONEER 84)
<b>Well:</b>	HARRIER FED COM #303H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	OWB	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	AWP	<b>Database:</b>	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	4.31	239.76	6,807.0	-206.3	-86.9	-205.1	2.65	-1.96	22.44
6,850.0	3.39	247.63	6,831.9	-207.1	-88.4	-205.8	4.24	-3.68	31.48
6,875.0	2.75	253.94	6,856.9	-207.6	-89.6	-206.3	2.89	-2.56	25.24
6,900.0	2.71	253.59	6,881.8	-207.9	-90.8	-206.6	0.17	-0.16	-1.40
6,925.0	2.57	250.56	6,906.8	-208.2	-91.9	-206.9	0.79	-0.56	-12.12
6,950.0	2.02	239.01	6,931.8	-208.7	-92.8	-207.3	2.86	-2.20	-46.20
6,975.0	1.74	229.42	6,956.8	-209.1	-93.4	-207.8	1.68	-1.12	-38.36
7,000.0	1.71	226.53	6,981.8	-209.6	-94.0	-208.3	0.37	-0.12	-11.56
7,025.0	1.69	227.84	7,006.8	-210.1	-94.5	-208.8	0.17	-0.08	5.24
7,050.0	1.65	225.08	7,031.7	-210.6	-95.1	-209.3	0.36	-0.16	-11.04
7,075.0	1.74	226.82	7,056.7	-211.1	-95.6	-209.8	0.41	0.36	6.96
7,100.0	1.71	231.01	7,081.7	-211.6	-96.2	-210.2	0.52	-0.12	16.76
7,125.0	1.71	225.18	7,106.7	-212.1	-96.7	-210.7	0.70	0.00	-23.32
7,150.0	1.32	238.58	7,131.7	-212.6	-97.2	-211.1	2.10	-1.56	53.60
7,175.0	0.81	273.00	7,156.7	-212.7	-97.7	-211.3	3.19	-2.04	137.68
7,200.0	0.81	288.15	7,181.7	-212.6	-98.0	-211.2	0.85	0.00	60.60
7,225.0	0.85	283.62	7,206.7	-212.5	-98.4	-211.1	0.31	0.16	-18.12
7,250.0	0.82	285.79	7,231.7	-212.4	-98.7	-211.0	0.17	-0.12	8.68
7,275.0	0.86	286.78	7,256.7	-212.3	-99.1	-210.9	0.17	0.16	3.96
7,300.0	0.90	277.82	7,281.7	-212.3	-99.4	-210.8	0.57	0.16	-35.84
7,325.0	0.94	272.23	7,306.7	-212.2	-99.8	-210.8	0.39	0.16	-22.36
7,350.0	0.99	273.31	7,331.7	-212.2	-100.3	-210.7	0.21	0.20	4.32
7,375.0	1.00	272.26	7,356.7	-212.2	-100.7	-210.7	0.08	0.04	-4.20
7,400.0	1.03	269.43	7,381.7	-212.2	-101.1	-210.7	0.23	0.12	-11.32
7,425.0	1.04	268.01	7,406.7	-212.2	-101.6	-210.7	0.11	0.04	-5.68
7,450.0	1.04	270.72	7,431.7	-212.2	-102.0	-210.7	0.20	0.00	10.84
7,475.0	1.11	266.63	7,456.7	-212.2	-102.5	-210.7	0.42	0.28	-16.36
7,500.0	0.99	267.64	7,481.6	-212.2	-103.0	-210.7	0.49	-0.48	4.04
7,525.0	0.92	266.07	7,506.6	-212.2	-103.4	-210.7	0.30	-0.28	-6.28
7,550.0	0.86	259.26	7,531.6	-212.3	-103.8	-210.8	0.49	-0.24	-27.24
7,575.0	0.86	264.15	7,556.6	-212.3	-104.1	-210.8	0.29	0.00	19.56
7,600.0	0.83	264.13	7,581.6	-212.4	-104.5	-210.9	0.12	-0.12	-0.08
7,625.0	0.79	259.88	7,606.6	-212.4	-104.8	-210.9	0.29	-0.16	-17.00
7,650.0	0.73	264.99	7,631.6	-212.5	-105.2	-211.0	0.36	-0.24	20.44
7,675.0	0.64	261.48	7,656.6	-212.5	-105.5	-211.0	0.40	-0.36	-14.04
7,700.0	0.71	257.50	7,681.6	-212.6	-105.8	-211.0	0.34	0.28	-15.92
7,725.0	0.60	264.13	7,706.6	-212.6	-106.0	-211.1	0.53	-0.44	26.52
7,750.0	0.38	334.27	7,731.6	-212.6	-106.2	-211.0	2.36	-0.88	280.56
7,775.0	0.93	36.23	7,756.6	-212.3	-106.1	-210.8	3.29	2.20	247.84
7,800.0	1.29	37.21	7,781.6	-211.9	-105.8	-210.4	1.44	1.44	3.92
7,825.0	1.39	37.57	7,806.6	-211.5	-105.5	-209.9	0.40	0.40	1.44
7,850.0	1.24	39.36	7,831.6	-211.0	-105.1	-209.5	0.62	-0.60	7.16
7,875.0	1.20	39.28	7,856.6	-210.6	-104.8	-209.1	0.16	-0.16	-0.32

## Survey Report

<b>Company:</b>	NORTHERN DELAWARE BASIN	<b>Local Co-ordinate Reference:</b>	Well HARRIER FED COM #303H
<b>Project:</b>	LEA COUNTY, NM	<b>TVD Reference:</b>	KB=25' @ 3271.8usft (PIONEER 84)
<b>Site:</b>	BULLDOG	<b>MD Reference:</b>	KB=25' @ 3271.8usft (PIONEER 84)
<b>Well:</b>	HARRIER FED COM #303H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	OWB	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	AWP	<b>Database:</b>	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	1.04	47.76	7,881.6	-210.2	-104.5	-208.7	0.92	-0.64	33.92
7,925.0	1.00	47.76	7,906.6	-209.9	-104.1	-208.4	0.16	-0.16	0.00
7,950.0	0.94	49.85	7,931.6	-209.7	-103.8	-208.2	0.28	-0.24	8.36
7,975.0	0.85	49.37	7,956.6	-209.4	-103.5	-207.9	0.36	-0.36	-1.92
8,000.0	0.86	51.09	7,981.6	-209.2	-103.2	-207.7	0.11	0.04	6.88
8,025.0	0.82	50.66	8,006.6	-208.9	-102.9	-207.5	0.16	-0.16	-1.72
8,050.0	0.77	50.89	8,031.6	-208.7	-102.7	-207.2	0.20	-0.20	0.92
8,075.0	0.78	51.28	8,056.6	-208.5	-102.4	-207.0	0.05	0.04	1.56
8,100.0	0.76	51.36	8,081.6	-208.3	-102.1	-206.8	0.08	-0.08	0.32
8,125.0	0.70	50.98	8,106.6	-208.1	-101.9	-206.6	0.24	-0.24	-1.52
8,150.0	0.60	50.12	8,131.6	-207.9	-101.7	-206.5	0.40	-0.40	-3.44
8,175.0	0.58	55.37	8,156.6	-207.8	-101.5	-206.3	0.23	-0.08	21.00
8,200.0	0.45	76.77	8,181.6	-207.7	-101.3	-206.2	0.92	-0.52	85.60
8,225.0	0.50	78.09	8,206.6	-207.6	-101.1	-206.2	0.20	0.20	5.28
8,250.0	0.39	95.86	8,231.6	-207.6	-100.9	-206.2	0.70	-0.44	71.08
8,265.0	0.42	80.12	8,246.6	-207.6	-100.8	-206.1	0.77	0.20	-104.93
8,315.0	0.39	93.42	8,296.6	-207.6	-100.4	-206.1	0.20	-0.06	26.60

### First MWD Survey @ 8315'MD

8,326.0	0.49	87.79	8,307.6	-207.6	-100.3	-206.1	0.99	0.91	-51.18
8,421.0	0.35	152.50	8,402.6	-207.8	-99.8	-206.4	0.49	-0.15	68.12
8,468.0	0.60	358.76	8,449.6	-207.7	-99.7	-206.3	1.97	0.53	-327.11
8,515.0	4.74	11.69	8,496.5	-205.6	-99.3	-204.1	8.85	8.81	27.51
8,562.0	9.48	8.97	8,543.1	-199.8	-98.4	-198.4	10.11	10.09	-5.79
8,610.0	14.26	6.19	8,590.1	-190.0	-97.1	-188.6	10.03	9.96	-5.79
8,657.0	18.34	7.19	8,635.2	-176.9	-95.5	-175.6	8.70	8.68	2.13
8,706.0	23.43	7.96	8,681.0	-159.6	-93.2	-158.3	10.40	10.39	1.57
8,753.0	28.88	7.92	8,723.1	-139.1	-90.4	-137.8	11.60	11.60	-0.09
8,800.0	32.35	4.51	8,763.6	-115.3	-87.8	-114.1	8.25	7.38	-7.26
8,847.0	35.59	359.51	8,802.6	-89.1	-86.9	-87.9	9.10	6.89	-10.64
8,895.0	37.77	358.87	8,841.0	-60.5	-87.4	-59.2	4.61	4.54	-1.33
8,942.0	41.13	359.52	8,877.3	-30.6	-87.8	-29.3	7.20	7.15	1.38
8,990.0	44.34	358.98	8,912.6	2.0	-88.2	3.2	6.73	6.69	-1.13
9,037.0	48.08	357.48	8,945.1	35.9	-89.3	37.1	8.28	7.96	-3.19
9,084.0	51.47	357.96	8,975.5	71.7	-90.7	73.0	7.25	7.21	1.02
9,131.0	56.15	358.95	9,003.2	109.6	-91.7	110.9	10.10	9.96	2.11
9,179.0	59.43	358.95	9,028.8	150.2	-92.4	151.5	6.83	6.83	0.00
9,226.0	64.83	358.69	9,050.7	191.8	-93.3	193.1	11.50	11.49	-0.55
9,274.0	70.06	359.01	9,069.1	236.1	-94.2	237.4	10.91	10.90	0.67
9,321.0	75.91	1.69	9,082.9	281.0	-93.9	282.3	13.59	12.45	5.70
9,369.0	79.38	3.65	9,093.2	327.8	-91.7	329.1	8.26	7.23	4.08
9,416.0	79.88	3.13	9,101.6	374.0	-89.0	375.2	1.52	1.06	-1.11
9,464.0	79.12	3.00	9,110.4	421.1	-86.4	422.3	1.61	-1.58	-0.27
9,511.0	80.39	3.84	9,118.7	467.3	-83.7	468.4	3.22	2.70	1.79

## Survey Report

<b>Company:</b>	NORTHERN DELAWARE BASIN	<b>Local Co-ordinate Reference:</b>	Well HARRIER FED COM #303H
<b>Project:</b>	LEA COUNTY, NM	<b>TVD Reference:</b>	KB=25' @ 3271.8usft (PIONEER 84)
<b>Site:</b>	BULLDOG	<b>MD Reference:</b>	KB=25' @ 3271.8usft (PIONEER 84)
<b>Well:</b>	HARRIER FED COM #303H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	OWB	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	AWP	<b>Database:</b>	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)	
9,559.0	83.19	3.66	9,125.6	514.7	-80.6	515.8	5.85	5.83	-0.38	
9,606.0	85.69	3.73	9,130.1	561.3	-77.6	562.4	5.32	5.32	0.15	
9,653.0	88.57	2.64	9,132.5	608.2	-75.0	609.2	6.55	6.13	-2.32	
9,748.0	88.96	2.87	9,134.5	703.1	-70.4	704.0	0.48	0.41	0.24	
9,843.0	87.41	1.92	9,137.5	797.9	-66.4	798.8	1.91	-1.63	-1.00	
9,938.0	88.93	359.39	9,140.6	892.9	-65.3	893.7	3.11	1.60	-2.66	
10,033.0	93.12	359.63	9,138.9	987.8	-66.2	988.7	4.42	4.41	0.25	
10,128.0	92.46	0.34	9,134.3	1,082.7	-66.2	1,083.5	1.02	-0.69	0.75	
10,223.0	92.20	1.17	9,130.4	1,177.6	-64.9	1,178.4	0.91	-0.27	0.87	
10,317.0	89.40	359.84	9,129.1	1,271.6	-64.1	1,272.4	3.30	-2.98	-1.41	
10,412.0	90.82	1.05	9,128.9	1,366.6	-63.4	1,367.4	1.96	1.49	1.27	
10,507.0	88.97	359.29	9,129.1	1,461.6	-63.1	1,462.3	2.69	-1.95	-1.85	
10,602.0	88.42	359.06	9,131.2	1,556.5	-64.4	1,557.3	0.63	-0.58	-0.24	
10,696.0	87.94	359.17	9,134.2	1,650.5	-65.9	1,651.3	0.52	-0.51	0.12	
10,791.0	87.45	359.09	9,138.0	1,745.4	-67.3	1,746.2	0.52	-0.52	-0.08	
10,886.0	90.01	357.79	9,140.2	1,840.3	-69.9	1,841.1	3.02	2.69	-1.37	
10,981.0	90.10	357.20	9,140.1	1,935.2	-74.1	1,936.1	0.63	0.09	-0.62	
11,076.0	92.61	357.42	9,137.8	2,030.1	-78.5	2,031.0	2.65	2.64	0.23	
11,170.0	92.09	357.84	9,134.0	2,123.9	-82.4	2,124.9	0.71	-0.55	0.45	
11,265.0	89.45	358.04	9,132.7	2,218.9	-85.8	2,219.9	2.79	-2.78	0.21	
11,360.0	89.43	357.55	9,133.6	2,313.8	-89.5	2,314.8	0.52	-0.02	-0.52	
11,454.0	91.11	357.86	9,133.2	2,407.7	-93.3	2,408.8	1.82	1.79	0.33	
11,549.0	90.75	358.84	9,131.6	2,502.7	-96.0	2,503.8	1.10	-0.38	1.03	
11,644.0	89.35	359.07	9,131.5	2,597.6	-97.7	2,598.8	1.49	-1.47	0.24	
11,739.0	89.40	359.53	9,132.6	2,692.6	-98.9	2,693.8	0.49	0.05	0.48	
11,834.0	89.80	0.04	9,133.2	2,787.6	-99.2	2,788.8	0.68	0.42	0.54	
11,929.0	91.02	0.66	9,132.6	2,882.6	-98.7	2,883.7	1.44	1.28	0.65	
12,024.0	92.83	1.49	9,129.4	2,977.5	-96.9	2,978.6	2.10	1.91	0.87	
12,119.0	90.84	0.24	9,126.3	3,072.5	-95.4	3,073.5	2.47	-2.09	-1.32	
12,213.0	90.73	0.47	9,125.0	3,166.5	-94.9	3,167.5	0.27	-0.12	0.24	
12,308.0	90.78	359.45	9,123.8	3,261.5	-94.9	3,262.5	1.07	0.05	-1.07	
12,403.0	91.62	359.10	9,121.8	3,356.4	-96.1	3,357.5	0.96	0.88	-0.37	
12,498.0	89.35	359.66	9,121.0	3,451.4	-97.2	3,452.4	2.46	-2.39	0.59	
12,592.0	89.34	359.90	9,122.1	3,545.4	-97.5	3,546.4	0.26	-0.01	0.26	
12,687.0	91.89	359.00	9,121.1	3,640.4	-98.4	3,641.4	2.85	2.68	-0.95	
12,782.0	92.99	359.33	9,117.0	3,735.3	-99.8	3,736.3	1.21	1.16	0.35	
12,876.0	92.84	359.23	9,112.2	3,829.2	-101.0	3,830.2	0.19	-0.16	-0.11	
12,971.0	92.86	359.98	9,107.5	3,924.0	-101.6	3,925.1	0.79	0.02	0.79	
13,066.0	91.82	359.42	9,103.6	4,019.0	-102.1	4,020.0	1.24	-1.09	-0.59	
13,161.0	90.74	358.59	9,101.5	4,113.9	-103.8	4,115.0	1.43	-1.14	-0.87	
13,256.0	92.23	358.90	9,099.0	4,208.9	-105.9	4,209.9	1.60	1.57	0.33	
13,351.0	91.60	358.97	9,095.9	4,303.8	-107.6	4,304.9	0.67	-0.66	0.07	
13,446.0	88.38	359.55	9,095.9	4,398.8	-108.9	4,399.9	3.44	-3.39	0.61	
13,540.0	89.87	359.98	9,097.3	4,492.7	-109.3	4,493.8	1.65	1.59	0.46	

## Survey Report

<b>Company:</b>	NORTHERN DELAWARE BASIN	<b>Local Co-ordinate Reference:</b>	Well HARRIER FED COM #303H
<b>Project:</b>	LEA COUNTY, NM	<b>TVD Reference:</b>	KB=25' @ 3271.8usft (PIONEER 84)
<b>Site:</b>	BULLDOG	<b>MD Reference:</b>	KB=25' @ 3271.8usft (PIONEER 84)
<b>Well:</b>	HARRIER FED COM #303H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	OWB	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	AWP	<b>Database:</b>	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)	
13,635.0	89.29	359.73	9,098.0	4,587.7	-109.5	4,588.8	0.66	-0.61	-0.26	
13,730.0	87.21	359.29	9,100.9	4,682.7	-110.3	4,683.8	2.24	-2.19	-0.46	
13,825.0	87.84	359.86	9,105.0	4,777.6	-111.0	4,778.7	0.89	0.66	0.60	
13,920.0	87.90	0.31	9,108.5	4,872.5	-110.9	4,873.6	0.48	0.06	0.47	
14,015.0	89.38	1.07	9,110.8	4,967.5	-109.7	4,968.6	1.75	1.56	0.80	
14,109.0	90.54	1.34	9,110.9	5,061.5	-107.7	5,062.5	1.27	1.23	0.29	
14,204.0	89.82	0.09	9,110.6	5,156.5	-106.6	5,157.5	1.52	-0.76	-1.32	
14,299.0	90.29	359.48	9,110.5	5,251.5	-106.9	5,252.5	0.81	0.49	-0.64	
14,394.0	91.76	0.70	9,108.8	5,346.4	-106.8	5,347.4	2.01	1.55	1.28	
14,489.0	91.75	0.44	9,105.9	5,441.4	-105.8	5,442.3	0.27	-0.01	-0.27	
14,584.0	90.90	0.71	9,103.7	5,536.4	-104.9	5,537.3	0.94	-0.89	0.28	
14,679.0	89.58	0.00	9,103.3	5,631.4	-104.3	5,632.3	1.58	-1.39	-0.75	
14,774.0	88.10	359.62	9,105.2	5,726.3	-104.6	5,727.2	1.61	-1.56	-0.40	
14,869.0	89.33	0.18	9,107.3	5,821.3	-104.8	5,822.2	1.42	1.29	0.59	
14,964.0	89.97	0.23	9,107.9	5,916.3	-104.4	5,917.2	0.68	0.67	0.05	
15,058.0	90.71	0.83	9,107.4	6,010.3	-103.6	6,011.2	1.01	0.79	0.64	
15,153.0	91.98	2.25	9,105.1	6,105.2	-101.0	6,106.1	2.01	1.34	1.49	
15,248.0	91.17	1.36	9,102.5	6,200.1	-98.0	6,200.9	1.27	-0.85	-0.94	
15,343.0	90.68	1.27	9,101.0	6,295.1	-95.8	6,295.8	0.52	-0.52	-0.09	
15,437.0	88.20	358.95	9,101.9	6,389.1	-95.6	6,389.8	3.61	-2.64	-2.47	
15,532.0	88.61	358.09	9,104.5	6,484.0	-98.1	6,484.8	1.00	0.43	-0.91	
15,627.0	89.15	358.15	9,106.4	6,579.0	-101.2	6,579.7	0.57	0.57	0.06	
15,722.0	89.78	358.07	9,107.3	6,673.9	-104.4	6,674.7	0.67	0.66	-0.08	
15,817.0	89.91	358.58	9,107.5	6,768.9	-107.1	6,769.7	0.55	0.14	0.54	
15,912.0	89.72	358.71	9,107.8	6,863.8	-109.4	6,864.7	0.24	-0.20	0.14	
16,006.0	91.36	358.91	9,107.0	6,957.8	-111.3	6,958.7	1.76	1.74	0.21	
16,101.0	91.77	359.06	9,104.4	7,052.8	-113.0	7,053.6	0.46	0.43	0.16	
16,196.0	93.33	359.26	9,100.1	7,147.6	-114.4	7,148.5	1.66	1.64	0.21	
16,291.0	92.97	0.24	9,094.9	7,242.5	-114.8	7,243.4	1.10	-0.38	1.03	
16,386.0	92.03	0.78	9,090.8	7,337.4	-114.0	7,338.3	1.14	-0.99	0.57	
16,480.0	91.44	1.09	9,087.9	7,431.3	-112.4	7,432.2	0.71	-0.63	0.33	
16,575.0	90.60	0.89	9,086.2	7,526.3	-110.8	7,527.1	0.91	-0.88	-0.21	
16,670.0	91.28	1.17	9,084.7	7,621.3	-109.1	7,622.1	0.77	0.72	0.29	
16,765.0	89.41	0.39	9,084.1	7,716.3	-107.8	7,717.0	2.13	-1.97	-0.82	
16,860.0	88.79	0.27	9,085.6	7,811.3	-107.2	7,812.0	0.66	-0.65	-0.13	
16,955.0	89.34	0.45	9,087.2	7,906.2	-106.7	7,907.0	0.61	0.58	0.19	
17,049.0	89.97	0.65	9,087.7	8,000.2	-105.7	8,000.9	0.70	0.67	0.21	
17,144.0	88.62	359.69	9,088.9	8,095.2	-105.5	8,095.9	1.74	-1.42	-1.01	
17,239.0	88.31	359.15	9,091.4	8,190.2	-106.4	8,190.9	0.66	-0.33	-0.57	
17,334.0	88.68	359.17	9,093.9	8,285.1	-107.8	8,285.8	0.39	0.39	0.02	
17,429.0	89.17	359.53	9,095.7	8,380.1	-108.9	8,380.8	0.64	0.52	0.38	
17,524.0	89.69	359.98	9,096.7	8,475.1	-109.3	8,475.8	0.72	0.55	0.47	
17,618.0	90.25	0.54	9,096.7	8,569.1	-108.9	8,569.8	0.84	0.60	0.60	

## Survey Report

<b>Company:</b>	NORTHERN DELAWARE BASIN	<b>Local Co-ordinate Reference:</b>	Well HARRIER FED COM #303H
<b>Project:</b>	LEA COUNTY, NM	<b>TVD Reference:</b>	KB=25' @ 3271.8usft (PIONEER 84)
<b>Site:</b>	BULLDOG	<b>MD Reference:</b>	KB=25' @ 3271.8usft (PIONEER 84)
<b>Well:</b>	HARRIER FED COM #303H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	OWB	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	AWP	<b>Database:</b>	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)
17,713.0	90.85	0.87	9,095.8	8,664.1	-107.7	8,664.8	0.72	0.63	0.35
17,808.0	91.35	359.58	9,094.0	8,759.1	-107.3	8,759.7	1.46	0.53	-1.36
17,903.0	91.61	359.12	9,091.5	8,854.0	-108.4	8,854.7	0.56	0.27	-0.48
17,997.0	91.45	359.37	9,089.0	8,948.0	-109.7	8,948.7	0.32	-0.17	0.27
18,092.0	92.21	359.56	9,086.0	9,042.9	-110.5	9,043.6	0.82	0.80	0.20
18,187.0	89.14	359.47	9,084.9	9,137.9	-111.3	9,138.6	3.23	-3.23	-0.09
18,282.0	88.54	359.68	9,086.8	9,232.9	-112.0	9,233.6	0.67	-0.63	0.22
18,377.0	89.81	0.37	9,088.1	9,327.9	-112.0	9,328.5	1.52	1.34	0.73
18,471.0	90.68	1.43	9,087.7	9,421.9	-110.5	9,422.5	1.46	0.93	1.13
18,566.0	90.90	2.12	9,086.4	9,516.8	-107.6	9,517.4	0.76	0.23	0.73
18,661.0	91.34	1.68	9,084.6	9,611.7	-104.4	9,612.3	0.65	0.46	-0.46
18,756.0	91.67	1.06	9,082.1	9,706.7	-102.2	9,707.2	0.74	0.35	-0.65
18,851.0	91.97	359.54	9,079.1	9,801.6	-101.7	9,802.1	1.63	0.32	-1.60
18,946.0	90.48	358.95	9,077.0	9,896.6	-102.9	9,897.1	1.69	-1.57	-0.62
19,041.0	91.61	358.90	9,075.3	9,991.6	-104.7	9,992.0	1.19	1.19	-0.05
19,136.0	91.37	359.22	9,072.8	10,086.5	-106.3	10,087.0	0.42	-0.25	0.34
19,194.0	91.49	359.37	9,071.4	10,144.5	-107.0	10,145.0	0.33	0.21	0.26
<b>Final MWD Survey @ 19194'MD</b>									
19,212.0	91.49	359.37	9,070.9	10,162.5	-107.2	10,163.0	0.00	0.00	0.00
<b>LTP @ 19212'MD</b>									
19,261.0	91.49	359.37	9,069.6	10,211.5	-107.7	10,212.0	0.00	0.00	0.00
<b>PTD @ 19261'MD</b>									

### Design Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
PBHL-HARRIER FED - hit/miss target - Shape	0.00	179.73	9,083.0	10,212.2	-145.7	398,588.40	711,825.20	32° 5' 38.359 N	103° 38' 57.563 W
- actual wellpath misses target center by 40.3usft at 19261.0usft MD (9069.6 TVD, 10211.5 N, -107.7 E)									
- Rectangle (sides W100.0 H10,488.1 D20.0)									
FTP-HARRIER FED C - hit/miss target - Shape	0.00	0.00	9,596.8	-275.4	-97.1	388,100.76	711,873.75	32° 3' 54.571 N	103° 38' 57.771 W
- actual wellpath misses target center by 707.6usft at 9131.0usft MD (9003.2 TVD, 109.6 N, -91.7 E)									
- Circle (radius 50.0)									
LTP-HARRIER FED C - hit/miss target - Shape	0.00	0.00	9,596.8	10,162.1	-160.6	398,538.32	711,810.28	32° 5' 37.865 N	103° 38' 57.740 W
- actual wellpath misses target center by 528.4usft at 19198.5usft MD (9071.3 TVD, 10149.0 N, -107.0 E)									
- Point									

## Survey Report

<b>Company:</b>	NORTHERN DELAWARE BASIN	<b>Local Co-ordinate Reference:</b>	Well HARRIER FED COM #303H
<b>Project:</b>	LEA COUNTY, NM	<b>TVD Reference:</b>	KB=25' @ 3271.8usft (PIONEER 84)
<b>Site:</b>	BULLDOG	<b>MD Reference:</b>	KB=25' @ 3271.8usft (PIONEER 84)
<b>Well:</b>	HARRIER FED COM #303H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	OWB	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	AWP	<b>Database:</b>	EDM_Users

### Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
8,315.0	8,296.6	-207.6	-100.4	First MWD Survey @ 8315'MD
19,194.0	9,071.4	10,144.5	-107.0	Final MWD Survey @ 19194'MD
19,212.0	9,070.9	10,162.5	-107.2	LTP @ 19212'MD
19,261.0	9,069.6	10,211.5	-107.7	PTD @ 19261'MD

Checked By: _____	Approved By: _____	Date: _____
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