

Results of Directional Survey

API number:	30-025-40943		
OGRID:		Operator:	MARSHALL & WINSTON INC
		Property:	LAGUNA DEEP UNIT 35 FEDERAL # 2H

surface	ULSTR:	P	35	T	19S	R	33E
				1140	FSL	436	FEL

BH Loc	ULSTR:	N	35	T	19S	R	33E
12385	MD	9429.0	TVD	703	FSL	1730	FWL
						3550	FEL

Top Perf/OH	ULSTR:	P	35	T	19S	R	33E
9800	MD	9407.9	TVD	886	FSL	984	FEL

Bot Perf/OH	ULSTR:	N	35	T	19S	R	33E
12280	MD	9431.4	TVD	715	FSL	1834	FWL
						3446	FEL

	MD	N/S	E/W	VD
	9789	-249.40	-538.00	9408.2
TOP PERFS/OH	9800	-253.80	-548.09	9407.87
	9852	-274.60	-595.80	9406.30
	12210	-418.60	-2940.40	9433.00
BOT PERFS/OH	12280	-424.92	-3010.17	9431.42
	12241	-421.40	-2971.30	9432.30

NEXT TO LAST	12304	-428.00	-3033.90	9430.70
LAST READING	12357	-433.90	-3086.60	9429.60
TD	12385	-437.02	-3114.44	9429.02

Surface Location	1140	FS	436	FE
Projected BHL	703	FS	3550	FE
Location of				
Top Perfs/OH	886	FS	984	FE
Bottom Perfs/OH	715	FS	3446	FE

SUMMARY of Subsurface Locations

Surface Location	P-35-19S-33E	1140	FS	436	FE	Vert. Depth
Top Perfs/OH	P-35-19S-33E	886	FS	984	FE	9407.87
Bottom Perfs/OH	N-35-19S-33E	715	FS	3446	FE	9431.42
Projected TD	N-35-19S-33E	703	FS	3550	FE	9429.02

DEC 31 2013

OPERATOR
WELL/LEASE
COUNTY

MARSHALL & WINSTON, INC.
LAGUNA DEEP UNIT 35 FEDERAL 2H
LEA

047-0107

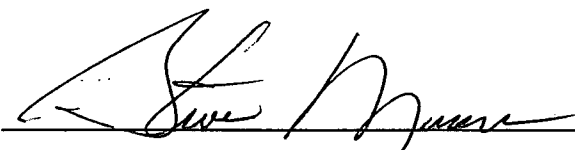
STATE OF NEW MEXICO
DEVIATION REPORT

158	0.10	2,838	2.45
466	0.78	2,902	2.28
625	0.55	2,934	1.88
784	0.18	2,965	2.22
847	0.99	3,029	1.36
911	0.54	3,061	0.72
975	1.13	3,093	0.66
1,039	0.91	3,156	1.50
1,102	0.33	3,190	1.05
1,165	0.51	3,452	0.67
1,227	0.71	3,975	1.08
1,385	0.77	4,054	0.50
1,472	0.14	4,531	1.48
1,535	0.66	4,626	1.46
1,599	0.64	4,726	1.43
1,662	0.80	4,836	0.89
1,726	0.66	5,293	1.22
1,599	0.64	5,482	1.38
1,662	0.80	5,577	0.76
1,726	0.66	5,831	0.54
1,790	0.24	6,116	0.54
1,917	0.37	6,433	1.16
1,980	0.71	6,560	0.41
2,044	0.55	6,750	0.17
2,107	0.91	6,940	0.31
2,171	0.32	7,162	0.20
2,234	0.60	7,415	0.22
2,298	0.78	7,605	0.23
2,361	0.08	8,109	0.16
2,425	0.48	8,551	0.58
2,488	1.94		
2,552	1.91		
2,616	2.31		
2,520	1.34		
2,584	1.76		
2,648	2.31		
2,679	1.87		
2,711	1.81		
2,743	1.71		
2,807	1.88		

HOBBS OCD

DEC 12 2013

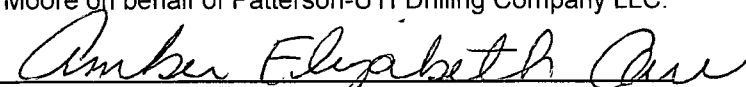
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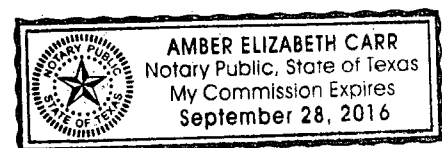
BY: 

STATE OF TEXAS

COUNTY OF MIDLAND

The foregoing instrument was acknowledged before me on
Moore on behalf of Patterson-UTI Drilling Company LLC.


Notary Public for Midland County, Texas



MARSHALL & WINSTON

Teas

Lea County, NM

Laguna Deep Unit 35 Federal #2H

VH - Job #320813-KW-785

HOBBS OCD

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Survey: Gyro

SDI Survey Report

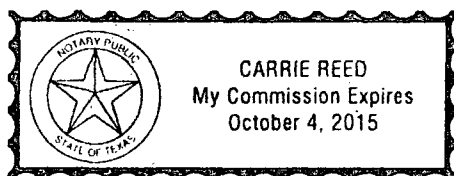
This survey is correct to the best of my knowledge and is supported by actual field data.

[Signature]

Notarized this date 15th of September, 2013.

[Signature]

Notary Signature
County of Midland
State of Texas



SDI
SDI Survey Report

Company:	MARSHALL & WINSTON	Local Co-ordinate Reference:	Well Laguna Deep Unit 35 Federal #2H
Project:	Teas	TVD Reference:	WELL @ 0.0usft (Original Well Elev)
Site:	Lea County, NM	MD Reference:	WELL @ 0.0usft (Original Well Elev)
Well:	Laguna Deep Unit 35 Federal #2H	North Reference:	Grid
Wellbore:	VH - Job #320813-KW-785	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #320813-KW-785	Database:	EDM-Regulatory

Project: Teas			
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	Lea County, NM				
Site Position:		Northing:	588,407.22 usft	Latitude:	32° 36' 56.315 N
From:	Lat/Long	Easting:	717,823.47 usft	Longitude:	103° 37' 33.258 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16"	Grid Convergence:	0.38 °

Well:	Laguna Deep Unit 35 Federal #2H, Directional					
Well Position	+N/-S	0.0 usft	Northing:	587,237.22 usft	Latitude:	32° 36' 44.744 N
	+E/-W	0.0 usft	Easting:	717,721.32 usft	Longitude:	103° 37' 34.543 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	0.0 usft

Wellbore	VH - Job #320813-KW-785				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	8/5/2013	7.37	60.51	48,699

Design: VH - Job #320813-KW-785				
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	263.65

Survey Program		Date 8/9/2013		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.0	8,745.0	Gyro (VH - Job #320813-KW-785)	KSRG	Keeper Gyro

Survey	MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	Closure Azimuth (°)	Closure Distance (usft)
	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.0
	100.0	0.44	8.79	100.0	0.4	0.1	8.79	0.4
	200.0	0.48	11.01	200.0	1.2	0.2	9.57	1.2
	300.0	0.13	59.83	300.0	1.6	0.4	12.91	1.7
	400.0	0.25	28.95	400.0	1.9	0.6	17.07	2.0
	500.0	0.21	21.29	500.0	2.2	0.8	18.48	2.4
	600.0	0.13	14.72	600.0	2.5	0.8	18.51	2.7
	700.0	0.04	201.25	700.0	2.6	0.9	18.32	2.7
	800.0	0.17	126.16	800.0	2.5	1.0	21.32	2.7
	900.0	0.09	164.18	900.0	2.3	1.1	25.57	2.6
	1,000.0	0.10	84.68	1,000.0	2.3	1.2	28.40	2.6
	1,100.0	0.03	2.69	1,100.0	2.3	1.3	29.73	2.6

SDI
SDI Survey Report

Company:	MARSHALL & WINSTON	Local Co-ordinate Reference:	Well Laguna Deep Unit 35 Federal #2H
Project:	Teas	TVD Reference:	WELL @ 0.0usft (Original Well Elev)
Site:	Lea County NM	MD Reference:	WELL @ 0.0usft (Original Well Elev)
Well:	Laguna Deep Unit 35 Federal #2H	North Reference:	Grid
Wellbore:	VH Job #320813-KW-785	Survey Calculation Method:	Minimum Curvature
Design:	VH Job #320813-KW-785	Database:	EDM-Regulatory

Survey									
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	EW (usft)	Closure Azimuth (°)	Closure Distance (usft)		
1,200.0	0.24	324.49	1,200.0	2.5	1.2	25.53	2.8		
1,300.0	0.35	325.42	1,300.0	2.9	0.9	17.06	3.0		
1,400.0	0.29	327.31	1,400.0	3.4	0.6	9.79	3.4		
1,500.0	0.12	353.21	1,500.0	3.7	0.4	6.69	3.7		
1,600.0	0.51	40.92	1,600.0	4.1	0.7	9.78	4.2		
1,700.0	0.57	21.41	1,700.0	4.9	1.2	13.52	5.1		
1,800.0	0.54	27.77	1,800.0	5.8	1.6	15.27	6.0		
1,900.0	0.34	33.58	1,900.0	6.5	2.0	16.93	6.8		
2,000.0	0.33	40.73	2,000.0	6.9	2.3	18.50	7.3		
2,100.0	0.35	45.34	2,100.0	7.4	2.7	20.30	7.9		
2,200.0	0.39	45.50	2,200.0	7.8	3.2	22.16	8.4		
2,300.0	0.48	41.05	2,300.0	8.4	3.7	23.85	9.2		
2,400.0	0.58	32.48	2,400.0	9.1	4.3	24.99	10.1		
2,500.0	1.15	39.39	2,499.9	10.3	5.2	26.56	11.5		
2,600.0	1.84	50.63	2,599.9	12.1	7.0	30.15	14.0		
2,700.0	1.85	52.34	2,699.9	14.1	9.6	34.09	17.1		
2,800.0	1.87	46.32	2,799.8	16.2	12.0	36.50	20.2		
2,900.0	1.97	42.69	2,899.8	18.6	14.4	37.63	23.5		
3,000.0	1.86	43.33	2,999.7	21.1	16.6	38.30	26.8		
3,100.0	1.53	38.63	3,099.7	23.3	18.6	38.59	29.8		
3,200.0	0.94	33.67	3,199.6	25.0	19.9	38.46	32.0		
3,300.0	0.79	29.90	3,299.6	26.3	20.7	38.17	33.5		
3,400.0	0.64	23.64	3,399.6	27.4	21.2	37.77	34.7		
3,500.0	0.45	8.30	3,499.6	28.3	21.5	37.24	35.6		
3,600.0	0.45	8.78	3,599.6	29.1	21.6	36.65	36.3		
3,700.0	0.54	13.39	3,699.6	29.9	21.8	36.08	37.0		
3,800.0	0.26	333.57	3,799.6	30.6	21.8	35.49	37.6		
3,900.0	0.60	266.31	3,899.6	30.8	21.2	34.56	37.4		
4,000.0	0.83	258.54	3,999.6	30.6	20.0	33.13	36.5		
4,100.0	0.98	265.75	4,099.6	30.4	18.4	31.20	35.5		
4,200.0	0.87	270.68	4,199.6	30.3	16.8	28.97	34.7		
4,300.0	0.40	222.54	4,299.6	30.1	15.8	27.70	34.0		
4,400.0	0.42	221.66	4,399.6	29.5	15.3	27.39	33.3		
4,500.0	0.50	272.32	4,499.6	29.3	14.6	26.54	32.7		
4,600.0	0.91	300.87	4,599.5	29.7	13.5	24.45	32.6		
4,700.0	1.01	307.68	4,699.5	30.7	12.1	21.59	33.0		
4,800.0	1.25	326.54	4,799.5	32.1	10.8	18.65	33.9		
4,900.0	1.35	333.05	4,899.5	34.1	9.7	15.89	35.4		
5,000.0	1.31	338.54	4,999.5	36.2	8.7	13.59	37.2		
5,100.0	1.34	342.44	5,099.4	38.4	8.0	11.75	39.2		
5,200.0	1.30	337.52	5,199.4	40.5	7.2	10.06	41.2		
5,300.0	0.85	325.27	5,299.4	42.2	6.3	8.54	42.7		
5,400.0	0.73	321.56	5,399.4	43.3	5.5	7.26	43.6		
5,500.0	0.65	330.73	5,499.4	44.3	4.8	6.24	44.5		

SDI

SDI Survey Report

Company:	MARSHALL & WINSTON	Local Co-ordinate Reference:	Well Laguna Deep Unit 35 Federal #2H
Project:	Teas	TVD Reference:	WELL @ 0.0usft (Original Well Elev)
Site:	Lea County, NM	MD Reference:	WELL @ 0.0usft (Original Well Elev)
Well:	Laguna Deep Unit 35 Federal #2H	North Reference:	Grid
Wellbore:	VH Job #320813-KW-785	Survey Calculation Method:	Minimum Curvature
Design:	VH Job #320813-KW-785	Database:	EDM-Regulatory

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	Closure Azimuth (°)	Closure Distance (usft)
5,600.0	0.51	338.72	5,599.4	45.2	4.4	5.56	45.4
5,700.0	0.54	342.71	5,699.4	46.1	4.1	5.09	46.2
5,800.0	0.64	355.88	5,799.4	47.1	3.9	4.76	47.2
5,900.0	0.83	4.15	5,899.3	48.3	3.9	4.65	48.5
6,000.0	0.75	11.06	5,999.3	49.7	4.1	4.73	49.9
6,100.0	0.66	15.83	6,099.3	50.9	4.4	4.93	51.1
6,200.0	0.68	15.46	6,199.3	52.0	4.7	5.17	52.2
6,300.0	0.56	23.88	6,299.3	53.1	5.1	5.45	53.3
6,400.0	0.67	25.25	6,399.3	54.0	5.5	5.83	54.3
6,500.0	0.63	27.22	6,499.3	55.0	6.0	6.23	55.4
6,600.0	0.44	30.28	6,599.3	55.9	6.5	6.59	56.2
6,700.0	0.29	55.32	6,699.3	56.3	6.9	6.94	56.8
6,800.0	0.27	58.62	6,799.3	56.6	7.3	7.32	57.1
6,900.0	0.19	113.34	6,899.3	56.7	7.6	7.66	57.2
7,000.0	0.25	88.32	6,999.3	56.6	8.0	8.04	57.2
7,100.0	0.15	54.79	7,099.3	56.7	8.3	8.35	57.3
7,200.0	0.14	38.32	7,199.3	56.9	8.5	8.50	57.5
7,300.0	0.17	325.52	7,299.3	57.1	8.5	8.46	57.7
7,400.0	0.12	30.61	7,399.3	57.3	8.5	8.40	57.9
7,500.0	0.31	351.51	7,499.3	57.6	8.5	8.36	58.3
7,600.0	0.31	336.74	7,599.3	58.2	8.3	8.15	58.8
7,700.0	0.27	302.19	7,699.3	58.5	8.0	7.80	59.1
7,800.0	0.38	302.23	7,799.3	58.8	7.5	7.30	59.3
7,900.0	0.41	307.00	7,899.3	59.2	7.0	6.72	59.6
8,000.0	0.45	311.45	7,999.3	59.7	6.4	6.11	60.0
8,100.0	0.45	293.18	8,099.3	60.1	5.7	5.45	60.4
8,200.0	0.49	292.23	8,199.3	60.4	5.0	4.71	60.6
8,300.0	0.42	297.40	8,299.3	60.8	4.3	4.01	60.9
8,400.0	0.48	276.94	8,399.3	61.0	3.5	3.30	61.1
8,500.0	0.35	268.17	8,499.3	61.0	2.8	2.63	61.1
8,600.0	0.22	1.59	8,599.3	61.2	2.5	2.34	61.3
8,700.0	0.14	266.37	8,699.3	61.4	2.4	2.22	61.4
8,745.0	0.65	287.84	8,744.3	61.5	2.1	1.94	61.5



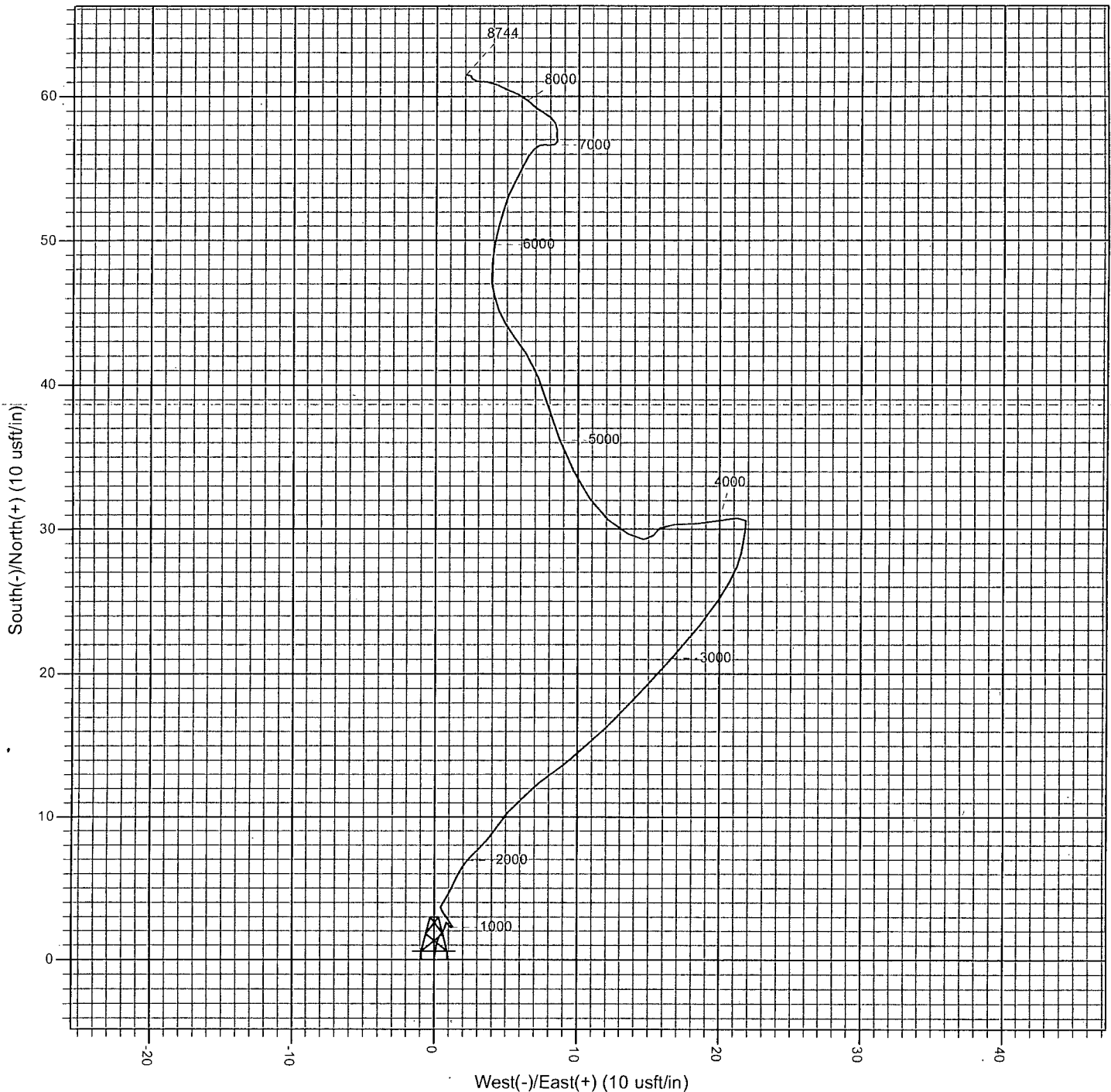
Scientific Drilling

Project: Teas
Lea County, NM
Well: Laguna Deep Unit 35 Federal #2H
Wellbore: VH - Job #320813-KW-785
Design: VH - Job #320813-KW-785

WELL DETAILS: Laguna Deep Unit 35 Federal #2H
WELL @ 0.0usft (Original Well Elev)

Ground Level: 0.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	587237.22	717721.32	32° 36' 44.744 N	103° 37' 34.543 W	



PROJECT DETAILS: Teas	SITE DETAILS: Lea County, NM
Geodetic System: US State Plane 1927 (Exact solution)	Site Centre Latitude: 32° 36' 56.315 N
Datum: NAD 1927 (NADCON CONUS)	Longitude: 103° 37' 33.258 W
Ellipsoid: Clarke 1866	Positional Uncertainty: 0.0
Zone: New Mexico East 3001	Convergence: 0.38
System Datum: Mean Sea Level	Local North: Grid



Marshall & Winston, Inc

Lea County, NM

Sec 35,19S,33E

Laguna Deep Unit Fed 35-2H

Wellbore #1

HOBBS OCD

Survey: DDC MWD

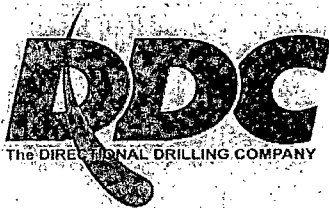
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DDC Survey Report

11 September, 2013





HOBBBS OCD

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Survey Certification Sheet

Marshall & Winston Inc.
Company

WT-13554
Job Number

9/11/13
Date

Sec35, T19S, R33E
Lease

Laguna Deep Unit Fed 35-2H
Well Name

Lea, NM
County & State

API: 30-025-40943

Surveyed from a depth of: 8745 feet to 13788 feet MD
Surveyed from a depth of: 10930 feet to 12357 feet MD

Type of Survey: MWD

Directional Supervisor/Surveyor: George Sample

The data and calculations for this survey have been checked by me and conform to the standards and procedures set forth by **The Directional Drilling Company (DDC)**. This report represents a true and correct Directional survey of this well based on the original data obtained at the well site. Wellbore Coordinates are calculated using minimum curvature.

Digitally signed by Larry Wright
DN: cn=Larry Wright, o=The
Directional Drilling Company, ou=GM
of Guidance Services,
email=larryw@directionaldrillers.com,
c=US
Date: 2013.09.12 16:32:55 -05'00'

Larry Wright
MWD General Manager

• 11390 FM 830 • Willis, Texas 77318 •
• PH 936-856-4332 • FAX 936-856-8678 •

Company:	Marshall & Winston, Inc.	Local Co-ordinate Reference:	Well: Laguna Deep Unit Fed 35-2H
Project:	Lea County, NM	TVD Reference:	WELL @ 3593.0usft (Original Well Elev)
Site:	Sec 35, 19S, 33E	MD Reference:	WELL @ 3593.0usft (Original Well Elev)
Well:	Laguna Deep Unit Fed 35-2H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

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		Sec 35, 19S, 33E			
Site Position:		Northing:	587,237.10 usft	Latitude:	32° 36' 44.743 N
From:	Map	Easting:	717,721.30 usft	Longitude:	103° 37' 34.543 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.38 °

Well:	Laguna Deep Unit Fed 35-2H					
Well Position	+N-S	0.0 usft	Northing:	587,237.10 usft	Latitude:	32° 36' 44.743 N
	+E-W	0.0 usft	Easting:	717,721.30 usft	Longitude:	103° 37' 34.543 W
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft	Ground Level:	3,593.0 usft	

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	7/25/2013	7.38	60.48	48.632

Design:	Wellbore #1
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Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0

Vertical Section:	Depth From (TVD)	+N-S	+E-W	Direction
	(usft)	(usft)	(usft)	(°)
	0.0	0.0	0.0	242.93

Survey Program		Date	9/6/2013	
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.0	8,745.0	Gyro (Wellbore #1)	MWD default	MWD - Standard
8,865.0	13,788.0	DDC MWD (Wellbore #1)	MWD default	MWD - Standard

Survey:									
Measured Depth	Inclination	Azimuth	Vertical Depth	+N-S	+E-W	Vertical Section	Dogleg Rate	Build Rate	Turn Rate
(usft)	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(°/100usft)	(°/100usft)	(°/100usft)

TIE IN @ 8745.0 MD / 8744.3 TVD

8,745.0	0.65	287.84	8,744.3	61.3	2.1	-29.7	0.00	0.00	0.00
8,865.0	1.00	312.90	8,864.3	62.2	0.6	-28.9	0.41	0.29	20.88
8,897.0	2.70	259.10	8,896.2	62.2	-0.3	-28.0	7.06	5.31	-168.13
8,929.0	6.50	244.00	8,928.1	61.3	-2.7	-25.5	12.36	11.88	-47.19
8,960.0	10.80	240.60	8,958.8	59.1	-6.8	-20.9	13.96	13.87	-10.97
8,991.0	14.90	240.60	8,989.0	55.7	-12.8	-14.0	13.23	13.23	0.00
9,023.0	19.20	240.10	9,019.6	51.1	-20.9	-4.6	13.45	13.44	-1.56
9,054.0	23.00	238.00	9,048.5	45.3	-30.5	6.5	12.50	12.26	-6.77
9,086.0	26.00	236.20	9,077.6	38.1	-41.6	19.7	9.66	9.38	-5.63

Company:	Marshall & Winston, Inc.	Local Co-ordinate Reference:	Well Laguna Deep Unit Fed 35-2H
Project:	Lea County, NM	TVD Reference:	WELL @ 3593.0usft (Original Well Elev)
Site:	Sec 35 19S 33E	MD Reference:	WELL @ 3593.0usft (Original Well Elev)
Well:	Laguna Deep Unit Fed 35-2H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

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)
9,117.0	29.00	235.30	9,105.1	30.0	-53.5	33.9	9.77	9.68	-2.90
9,149.0	32.40	236.40	9,132.6	20.9	-67.0	50.1	10.77	10.63	3.44
9,180.0	35.10	238.30	9,158.4	11.6	-81.5	67.3	9.35	8.71	6.13
9,212.0	37.80	240.30	9,184.1	1.9	-97.8	86.3	9.22	8.44	6.25
9,243.0	40.60	240.30	9,208.2	-7.8	-114.8	105.8	9.03	9.03	0.00
9,275.0	43.60	239.20	9,231.9	-18.6	-133.4	127.2	9.65	9.38	-3.44
9,306.0	47.00	238.70	9,253.7	-30.0	-152.2	149.2	11.03	10.97	-1.61
9,338.0	50.10	238.90	9,274.9	-42.4	-172.8	173.1	9.70	9.69	0.63
9,370.0	53.50	239.00	9,294.7	-55.4	-194.3	198.2	10.63	10.63	0.31
9,401.0	57.00	239.60	9,312.3	-68.4	-216.2	223.6	11.40	11.29	1.94
9,433.0	60.10	240.30	9,329.0	-82.0	-239.8	250.9	9.87	9.69	2.19
9,464.0	62.80	241.00	9,343.8	-95.4	-263.6	278.1	8.93	8.71	2.26
9,496.0	66.60	240.40	9,357.5	-109.5	-288.8	307.0	12.00	11.88	-1.88
9,528.0	69.60	239.40	9,369.4	-124.4	-314.5	336.6	9.81	9.38	-3.13
9,560.0	72.50	238.90	9,379.8	-140.0	-340.4	366.8	9.18	9.06	-1.56
9,591.0	75.30	239.70	9,388.4	-155.2	-366.1	396.6	9.37	9.03	2.58
9,630.0	78.30	240.10	9,397.3	-174.2	-398.9	434.5	7.76	7.69	1.03
9,662.0	81.70	240.30	9,402.9	-189.9	-426.2	466.0	10.64	10.63	0.63
9,694.0	84.90	240.60	9,406.6	-205.5	-453.9	497.7	10.04	10.00	0.94
9,725.0	88.40	241.30	9,408.4	-220.6	-480.9	528.6	11.51	11.29	2.26
9,757.0	90.60	243.40	9,408.7	-235.4	-509.3	560.6	9.50	6.88	6.56
9,789.0	91.20	244.70	9,408.2	-249.4	-538.0	592.6	4.47	1.88	4.06
9,852.0	92.20	248.20	9,406.3	-274.6	-595.8	655.4	5.78	1.59	5.56
9,915.0	92.40	251.70	9,403.8	-296.1	-654.9	717.9	5.56	0.32	5.56
9,979.0	91.10	255.00	9,401.9	-314.5	-716.2	780.8	5.54	-2.03	5.16
10,042.0	90.00	258.70	9,401.3	-328.8	-777.5	842.0	6.13	-1.75	5.87
10,106.0	89.70	262.20	9,401.4	-339.4	-840.6	903.0	5.49	-0.47	5.47
10,169.0	90.30	265.80	9,401.4	-346.0	-903.2	961.8	5.79	0.95	5.71
10,233.0	90.00	268.00	9,401.3	-349.5	-967.2	1,020.2	3.47	-0.47	3.44
10,297.0	90.60	268.40	9,400.9	-351.5	-1,031.1	1,078.1	1.13	0.94	0.63
10,328.0	89.10	268.70	9,401.0	-352.2	-1,062.1	1,106.1	4.93	-4.84	0.97
10,360.0	88.50	268.70	9,401.7	-353.0	-1,094.1	1,134.9	1.88	-1.88	0.00
10,391.0	88.80	268.90	9,402.4	-353.6	-1,125.1	1,162.8	1.16	0.97	0.65
10,423.0	89.20	269.10	9,403.0	-354.2	-1,157.1	1,191.5	1.40	1.25	0.63
10,455.0	89.30	269.30	9,403.4	-354.6	-1,189.1	1,220.2	0.70	0.31	0.63
10,486.0	89.30	269.30	9,403.8	-355.0	-1,220.1	1,248.0	0.00	0.00	0.00
10,518.0	89.40	267.90	9,404.1	-355.8	-1,252.0	1,276.8	4.39	0.31	-4.38
10,550.0	89.90	267.50	9,404.3	-357.1	-1,284.0	1,305.9	2.00	1.56	-1.25
10,581.0	90.70	266.60	9,404.2	-358.7	-1,315.0	1,334.2	3.88	2.58	-2.90
10,613.0	91.00	266.30	9,403.7	-360.7	-1,346.9	1,363.5	1.33	0.94	-0.94
10,645.0	91.30	265.90	9,403.0	-362.8	-1,378.8	1,392.9	1.56	0.94	-1.25
10,677.0	91.50	265.90	9,402.3	-365.1	-1,410.7	1,422.4	0.63	0.63	0.00
10,708.0	91.80	267.00	9,401.4	-367.0	-1,441.7	1,450.8	3.68	0.97	3.55

Company:	Marshall & Winston, Inc.	Local Co-ordinate Reference:	Well Laguna Deep Unit Fed 35-2H
Project:	Lea County, NM	TVD Reference:	WELL @ 3593.0usft (Original Well Elev)
Site:	Sec 35, 19S, 33E	MD Reference:	WELL @ 3593.0usft (Original Well Elev)
Well:	Laguna Deep Unit Fed 35-2H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

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)
10,740.0	92.10	267.30	9,400.3	-368.6	-1,473.6	1,479.9	1.33	0.94	0.94
10,772.0	91.00	268.60	9,399.4	-369.8	-1,505.6	1,508.9	5.32	-3.44	4.06
10,803.0	90.80	268.60	9,398.9	-370.5	-1,536.6	1,536.9	0.65	-0.65	0.00
10,835.0	91.30	268.90	9,398.3	-371.2	-1,568.5	1,565.7	1.82	1.56	0.94
10,867.0	91.50	268.70	9,397.6	-371.9	-1,600.5	1,594.5	0.88	0.63	-0.63
10,930.0	92.00	268.20	9,395.6	-373.6	-1,663.5	1,651.3	1.12	0.79	-0.79
10,994.0	92.50	267.90	9,393.1	-375.8	-1,727.4	1,709.2	0.91	0.78	-0.47
11,057.0	91.40	267.70	9,391.0	-378.2	-1,790.3	1,766.3	1.77	-1.75	-0.32
11,120.0	91.00	267.30	9,389.7	-380.9	-1,853.2	1,823.6	0.90	-0.63	-0.63
11,184.0	91.60	267.00	9,388.2	-384.1	-1,917.1	1,882.0	1.05	0.94	-0.47
11,247.0	92.20	266.80	9,386.1	-387.5	-1,980.0	1,939.5	1.00	0.95	-0.32
11,310.0	91.50	267.30	9,384.1	-390.8	-2,042.9	1,997.0	1.37	-1.11	0.79
11,374.0	91.10	267.50	9,382.6	-393.7	-2,106.8	2,055.2	0.70	-0.63	0.31
11,437.0	91.00	267.20	9,381.5	-396.6	-2,169.7	2,112.6	0.50	-0.16	-0.48
11,501.0	91.40	267.00	9,380.1	-399.8	-2,233.6	2,170.9	0.70	0.63	-0.31
11,564.0	92.50	267.50	9,378.0	-402.8	-2,296.5	2,228.3	1.92	1.75	0.79
11,627.0	93.70	267.50	9,374.6	-405.6	-2,359.4	2,285.5	1.90	1.90	0.00
11,690.0	94.80	267.50	9,369.9	-408.3	-2,422.1	2,342.7	1.75	1.75	0.00
11,753.0	97.10	269.10	9,363.4	-410.2	-2,484.8	2,399.3	4.44	3.65	2.54
11,785.0	97.60	268.70	9,359.3	-410.8	-2,516.5	2,427.8	1.99	1.56	-1.25
11,817.0	98.20	269.40	9,354.9	-411.3	-2,548.2	2,456.3	2.87	1.88	2.19
11,849.0	98.90	269.80	9,350.1	-411.5	-2,579.8	2,484.5	2.51	2.19	1.25
11,902.0	98.90	269.80	9,341.9	-411.7	-2,632.2	2,531.3	0.00	0.00	0.00
TD @ 13788' MD / 9325.5' TVD									
13,788.0	82.10	264.70	9,325.5	-502.0	-4,508.6	4,243.2	0.93	-0.89	-0.27

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	+E/-W (usft)	Comment
8,745.0	8,744.3	61.3	2.1	TIE IN @ 8745' MD / 8744.3' TVD
13,788.0	9,325.5	-502.0	-4,508.6	TD @ 13788' MD / 9325.5' TVD

Checked By: _____ Approved By: _____ Date: _____



Marshall & Winston, Inc

Lea County, NM

Sec 35, 19S, 33E

Laguna Deep Unit Fed 35-2H

Side-Track # 1

Survey: MWD

HOBBS OCD

DEC 12 2013

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DDC Survey Report

11 September, 2013



Company:	Marshall & Winston, Inc.	Local Co-ordinate Reference:	Well Laguna Deep Unit Fed 35-2H
Project:	Lea County, NM	TVD Reference:	WELL @ 3593.0usft (Original Well Elev)
Site:	Sec 35.19S.33E	MD Reference:	WELL @ 3593.0usft (Original Well Elev)
Well:	Laguna Deep Unit Fed 35-2H	North Reference:	Grid
Wellbore:	Side-Track # 1	Survey Calculation Method:	Minimum Curvature
Design:	Side-Track #1	Database:	EDM 5000.1 Single User Db

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:	Sec 35.19S.33E				
Site Position:		Northing:	587,237.10 usft	Latitude:	32° 36' 44.743 N
From:	Map	Easting:	717,721.30 usft	Longitude:	103° 37' 34.543 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.38 °

Well:	Laguna Deep Unit Fed 35-2H					
Well Position	+N/-S	0.0 usft	Northing:	587,237.10 usft	Latitude:	32° 36' 44.743 N
	+E/-W	0.0 usft	Easting:	717,721.30 usft	Longitude:	103° 37' 34.543 W
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft	Ground Level:	3,593.0 usft	

Wellbore	Side-Track # 1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	8/19/2013	7.37	60.48	48,625

Design:	Side-Track # 1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	10,930.0

Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(usft)	(usft)	(usft)	(°)
	0.0	0.0	0.0	263.65

Survey Program		Date	9/6/2013		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	8,745.0	Gyro (Wellbore #1)	MWD default	MWD - Standard	
8,865.0	10,930.0	DDC MWD (Wellbore #1)	MWD default	MWD - Standard	
10,941.0	12,357.0	MWD (Side-Track # 1)	MWD default	MWD - Standard	

Survey	Measured Depth	Inclination	Azimuth	Vertical Depth	+N/-S	+E/-W	Vertical Section	Dogleg Rate	Build Rate	Turn Rate
	(usft)	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(°/100usft)	(°/100usft)	(°/100usft)
	Tie In @ 10930' MD / 9396' TVD									
	10,930.0	92.00	268.20	9,395.6	-373.6	-1,663.5	1,694.6	0.00	0.00	0.00
	10,941.0	90.90	268.40	9,395.3	-373.9	-1,674.5	1,705.6	10.16	-10.00	1.82
	10,973.0	87.60	270.50	9,395.8	-374.2	-1,706.5	1,737.4	12.22	-10.31	6.56
	11,005.0	86.10	271.60	9,397.5	-373.6	-1,738.4	1,769.1	5.81	-4.69	3.44
	11,036.0	85.70	271.40	9,399.7	-372.8	-1,769.3	1,799.7	1.44	-1.29	-0.65
	11,068.0	85.80	271.40	9,402.1	-372.1	-1,801.2	1,831.3	0.31	0.31	0.00
	11,100.0	85.90	271.70	9,404.4	-371.2	-1,833.1	1,862.9	0.99	0.31	0.94
	11,132.0	85.90	271.70	9,406.7	-370.2	-1,865.0	1,894.5	0.00	0.00	0.00

Company:	Marshall & Winston, Inc.	Local Co-ordinate Reference:	Well Laguna Deep Unit Fed 35-2H
Project:	Lea County, NM	TVD Reference:	WELL @ 3593.0usft (Original Well Elev)
Site:	Sec 35, 19S, 33E	MD Reference:	WELL @ 3593.0usft (Original Well Elev)
Well:	Laguna Deep Unit Fed 35-2H	North Reference:	Grid
Wellbore:	Side Track #.1	Survey Calculation Method:	Minimum Curvature
Design:	Side Track #.1	Database:	EDM 5000.1 Single User Db

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)
11,163.0	85.90	271.60	9,408.9	-369.4	-1,895.9	1,925.2	0.32	0.00	-0.32
11,195.0	85.50	271.00	9,411.3	-368.6	-1,927.8	1,956.8	2.25	-1.25	-1.88
11,227.0	85.50	270.70	9,413.8	-368.2	-1,959.7	1,988.4	0.93	0.00	-0.94
11,259.0	86.80	270.00	9,416.0	-368.0	-1,991.7	2,020.1	4.61	4.06	-2.19
11,291.0	86.80	270.00	9,417.8	-368.0	-2,023.6	2,051.9	0.00	0.00	0.00
11,323.0	86.90	270.00	9,419.5	-368.0	-2,055.6	2,083.6	0.31	0.31	0.00
11,354.0	87.00	269.60	9,421.2	-368.1	-2,086.5	2,114.4	1.33	0.32	-1.29
11,386.0	87.10	268.90	9,422.8	-368.5	-2,118.5	2,146.2	2.21	0.31	-2.19
11,418.0	87.90	268.70	9,424.2	-369.2	-2,150.4	2,178.1	2.58	2.50	-0.63
11,450.0	87.50	268.60	9,425.5	-369.9	-2,182.4	2,209.9	1.29	-1.25	-0.31
11,481.0	87.90	269.40	9,426.8	-370.5	-2,213.4	2,240.8	2.88	1.29	2.58
11,513.0	88.30	269.30	9,427.8	-370.8	-2,245.3	2,272.6	1.29	1.25	-0.31
11,545.0	88.70	269.30	9,428.7	-371.2	-2,277.3	2,304.4	1.25	1.25	0.00
11,577.0	89.00	268.20	9,429.3	-371.9	-2,309.3	2,336.3	3.56	0.94	-3.44
11,608.0	88.70	267.50	9,429.9	-373.1	-2,340.3	2,367.2	2.46	-0.97	-2.26
11,640.0	88.20	266.80	9,430.8	-374.7	-2,372.2	2,399.1	2.69	-1.56	-2.19
11,672.0	89.10	266.80	9,431.5	-376.4	-2,404.2	2,431.1	2.81	2.81	0.00
11,704.0	89.30	266.30	9,432.0	-378.4	-2,436.1	2,463.0	1.68	0.63	-1.56
11,735.0	90.30	266.30	9,432.1	-380.4	-2,467.1	2,494.0	3.23	3.23	0.00
11,766.0	90.90	266.30	9,431.8	-382.4	-2,498.0	2,525.0	1.94	1.94	0.00
11,798.0	91.20	266.50	9,431.2	-384.4	-2,529.9	2,556.9	1.13	0.94	0.63
11,830.0	89.90	265.60	9,430.9	-386.6	-2,561.8	2,588.9	4.94	-4.06	-2.81
11,862.0	88.00	265.20	9,431.5	-389.1	-2,593.7	2,620.9	6.07	-5.94	-1.25
11,894.0	87.80	265.00	9,432.6	-391.9	-2,625.6	2,652.8	0.88	-0.63	-0.63
11,925.0	88.50	265.20	9,433.6	-394.5	-2,656.5	2,683.8	2.35	2.26	0.65
11,957.0	88.60	265.60	9,434.4	-397.1	-2,688.3	2,715.8	1.29	0.31	1.25
11,989.0	89.00	265.40	9,435.1	-399.6	-2,720.2	2,747.8	1.40	1.25	-0.63
12,020.0	90.10	265.20	9,435.4	-402.1	-2,751.1	2,778.7	3.61	3.55	-0.65
12,052.0	90.50	265.20	9,435.2	-404.8	-2,783.0	2,810.7	1.25	1.25	0.00
12,083.0	90.60	265.20	9,434.9	-407.4	-2,813.9	2,841.7	0.32	0.32	0.00
12,115.0	90.90	265.00	9,434.5	-410.1	-2,845.8	2,873.7	1.13	0.94	-0.63
12,147.0	90.90	265.00	9,434.0	-412.9	-2,877.7	2,905.7	0.00	0.00	0.00
12,178.0	90.70	265.00	9,433.5	-415.6	-2,908.5	2,936.7	0.65	-0.65	0.00
12,210.0	91.10	264.50	9,433.0	-418.6	-2,940.4	2,968.7	2.00	1.25	-1.56
12,241.0	91.60	264.90	9,432.3	-421.4	-2,971.3	2,999.7	2.07	1.61	1.29
12,273.0	91.50	263.80	9,431.4	-424.6	-3,003.1	3,031.6	3.45	-0.31	-3.44
12,304.0	91.20	263.60	9,430.7	-428.0	-3,033.9	3,062.6	1.16	-0.97	-0.65
TD @ 12357' MD / 9429.6' TVD									
12,357.0	91.20	263.60	9,429.6	-433.9	-3,086.6	3,115.6	0.00	0.00	0.00

Company:	Marshall & Winston, Inc.	Local Co-ordinate Reference:	Well: Laguna Deep Unit Fed 35-2H
Project:	Lea County, NM	TVD Reference:	WELL @ 3593.0usft (Original Well Elev)
Site:	Sec 35.19S-33E	MD Reference:	WELL @ 3593.0usft (Original Well Elev)
Well:	Laguna Deep Unit Fed 35-2H	North Reference:	Grid
Wellbore:	Side Track # 1	Survey Calculation Method:	Minimum Curvature
Design:	Side Track # 1	Database:	EDM 5000.1 Single User Db.

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
10,930.0	9,395.6	-373.6	-1,663.5	Tie In @ 10930' MD / 9396' TVD
12,357.0	9,429.6	-433.9	-3,086.6	TD @ 12357' MD / 9429.6' TVD

Checked By: _____ Approved By: _____ Date: _____