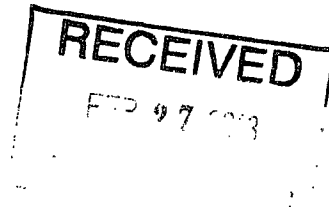
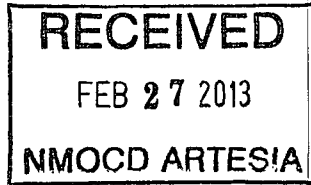


30-015-31349



COG OPERATING

Loco Hills Paddock
Eddy County, NM
Harper State #4Y
VH - Job #320113-KW-033

Survey: Gyro

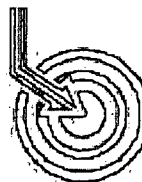
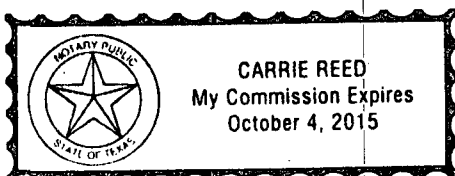
SDI Standard Survey Report

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

Notarized this date 11th of February, 2013.

Carrie Reed

Notary Signature
County of Midland
State of Texas



Scientific Drilling

Scientific Drilling International, Inc.
SDI Standard Survey Report



Company:	COG OPERATING	Local Co-ordinate Reference:	Well Harper State #4Y
Project:	Loco Hills Paddock	TVD Reference:	WELL @ 0.00usft (Original Well Elev)
Site:	Eddy County, NM	MD Reference:	WELL @ 0.00usft (Original Well Elev)
Well:	Harper State #4Y	North Reference:	True
Wellbore:	VH - Job #320113-KW-033	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #320113-KW-033	Database:	EDM-Regulatory

Project	Loco Hills Paddock		
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		Eddy County, NM			
Site Position:		Northing:	667,685.64 usft	Latitude:	32° 50' 6.000 N
From:	Lat/Long	Easting:	614,363.49 usft	Longitude:	103° 57' 39.600 W
Position Uncertainty:	0.00 usft	Slot Radius:	0"	Grid Convergence:	0.20 °

Well	Harper State #4Y, Vertical					
Well Position	+N/-S	0.00 usft	Northing:	666,583.54 usft	Latitude:	32° 49' 55.200 N
	+E/-W	0.00 usft	Easting:	611,295.68 usft	Longitude:	103° 58' 15.600 W
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft	Ground Level:	0.00 usft	

Wellbore	VH - Job #320113-KW-033				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	01/09/13	7.63	60.64	48,807

Design		VH - Job #320113-KW-033		
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth: 0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	345.48

Survey Program		Date	01/21/13		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	5,875.00	Gyro (VH - Job #320113-KW-033)	Keeper	Keeper Gyro	

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.35	14.35	100.00	0.30	0.08	14.35	0.31
200.00	0.69	17.71	200.00	1.17	0.33	16.02	1.21
300.00	0.99	22.70	299.98	2.54	0.85	18.55	2.67
400.00	1.04	25.46	399.97	4.15	1.57	20.77	4.44
500.00	1.04	23.32	499.95	5.81	2.32	21.82	6.25
600.00	0.88	21.56	599.94	7.35	2.97	21.97	7.93
700.00	1.13	23.72	699.92	8.97	3.64	22.11	9.68
800.00	1.19	15.37	799.90	10.87	4.32	21.65	11.70
900.00	1.58	43.76	899.87	12.87	5.54	23.31	14.01
1,000.00	2.02	55.98	999.82	14.85	7.96	28.19	16.85
1,100.00	2.10	55.53	1,099.76	16.88	10.93	32.93	20.11

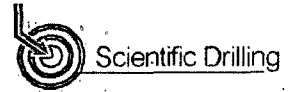
Scientific Drilling International, Inc.
SDI Standard Survey Report



Company:	COG OPERATING	Local Co-ordinate Reference:	Well Harper State #4Y
Project:	Loco Hills Paddock	TVD Reference:	WELL @ 0.00usft (Original Well Elev)
Site:	Eddy County, NM	MD Reference:	WELL @ 0.00usft (Original Well Elev)
Well:	Harper State #4Y	North Reference:	True
Wellbore:	VH - Job #320113-KW-033	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #320113-KW-033	Database:	EDM-Regulatory

Survey								
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)	
1,200.00	2.09	56.03	1,199.69	18.93	13.95	36.39	23.52	
1,300.00	1.88	53.65	1,299.63	20.92	16.79	38.74	26.82	
1,400.00	1.38	60.47	1,399.59	22.49	19.16	40.42	29.54	
1,500.00	1.32	62.32	1,499.56	23.62	21.22	41.94	31.75	
1,600.00	0.85	62.47	1,599.55	24.49	22.90	43.07	33.53	
1,700.00	0.83	55.03	1,699.54	25.25	24.15	43.72	34.94	
1,800.00	0.43	47.22	1,799.53	25.92	25.02	43.99	36.03	
1,900.00	0.37	46.64	1,899.53	26.40	25.53	44.04	36.73	
2,000.00	0.08	67.73	1,999.53	26.65	25.83	44.11	37.11	
2,100.00	0.18	194.35	2,099.53	26.52	25.86	44.27	37.04	
2,200.00	0.33	294.57	2,199.53	26.49	25.56	43.97	36.81	
2,300.00	0.43	247.67	2,299.52	26.47	24.95	43.31	36.37	
2,400.00	0.39	283.12	2,399.52	26.40	24.27	42.59	35.86	
2,500.00	0.45	289.16	2,499.52	26.61	23.57	41.53	35.54	
2,600.00	0.67	291.18	2,599.51	26.95	22.65	40.05	35.20	
2,700.00	0.35	276.02	2,699.51	27.19	21.80	38.72	34.85	
2,800.00	0.32	257.96	2,799.51	27.16	21.22	38.00	34.47	
2,900.00	0.31	249.04	2,899.51	27.01	20.70	37.46	34.03	
3,000.00	0.18	276.95	2,999.51	26.93	20.29	36.99	33.72	
3,100.00	0.14	238.16	3,099.51	26.89	20.03	36.69	33.53	
3,200.00	0.26	286.69	3,199.50	26.89	19.71	36.24	33.34	
3,300.00	0.22	294.07	3,299.50	27.03	19.32	35.55	33.22	
3,400.00	0.62	264.14	3,399.50	27.05	18.60	34.51	32.83	
3,500.00	0.55	269.65	3,499.50	27.00	17.58	33.08	32.22	
3,600.00	0.80	265.17	3,599.49	26.93	16.41	31.35	31.54	
3,700.00	0.81	280.89	3,699.48	27.01	15.02	29.08	30.90	
3,800.00	0.69	280.74	3,799.47	27.25	13.73	26.74	30.52	
3,900.00	0.74	275.54	3,899.46	27.43	12.50	24.50	30.14	
4,000.00	0.84	284.41	3,999.45	27.67	11.15	21.94	29.83	
4,100.00	0.52	289.83	4,099.45	28.01	10.01	19.66	29.74	
4,200.00	0.51	298.48	4,199.44	28.38	9.19	17.95	29.83	
4,300.00	0.73	326.03	4,299.44	29.12	8.44	16.17	30.32	
4,400.00	0.61	320.47	4,399.43	30.06	7.75	14.46	31.04	
4,500.00	0.85	287.80	4,499.42	30.69	6.70	12.32	31.42	
4,600.00	1.01	292.14	4,599.41	31.25	5.18	9.41	31.68	
4,700.00	0.84	288.84	4,699.40	31.82	3.67	6.58	32.03	
4,800.00	0.69	283.64	4,799.39	32.20	2.39	4.25	32.29	
4,900.00	0.81	276.72	4,899.38	32.42	1.11	1.95	32.44	
5,000.00	0.71	277.49	4,999.37	32.59	-0.21	359.63	32.59	
5,100.00	0.61	270.18	5,099.36	32.67	-1.36	357.62	32.70	
5,200.00	0.45	303.72	5,199.36	32.89	-2.22	356.15	32.96	
5,300.00	0.67	295.26	5,299.35	33.36	-3.07	354.74	33.50	
5,400.00	0.76	301.96	5,399.35	33.96	-4.16	353.01	34.21	
5,500.00	0.77	307.87	5,499.34	34.72	-5.26	351.39	35.12	

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SDI Standard Survey Report



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Site:	Eddy County, NM	MD Reference:	WELL @ 0.00usft (Original Well Elev)
Well:	Harper State #4Y	North Reference:	True
Wellbore:	VH - Job #320113-KW-033	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #320113-KW-033	Database:	EDM-Regulatory

Survey								
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)	
5,600.00	0.67	307.09	5,599.33	35.49	-6.25	350.01	36.03	
5,700.00	0.95	299.93	5,699.32	36.25	-7.44	348.41	37.01	
5,800.00	0.80	298.22	5,799.31	37.00	-8.77	346.66	38.02	
5,875.00	0.67	279.09	5,874.30	37.31	-9.67	345.48	38.54	

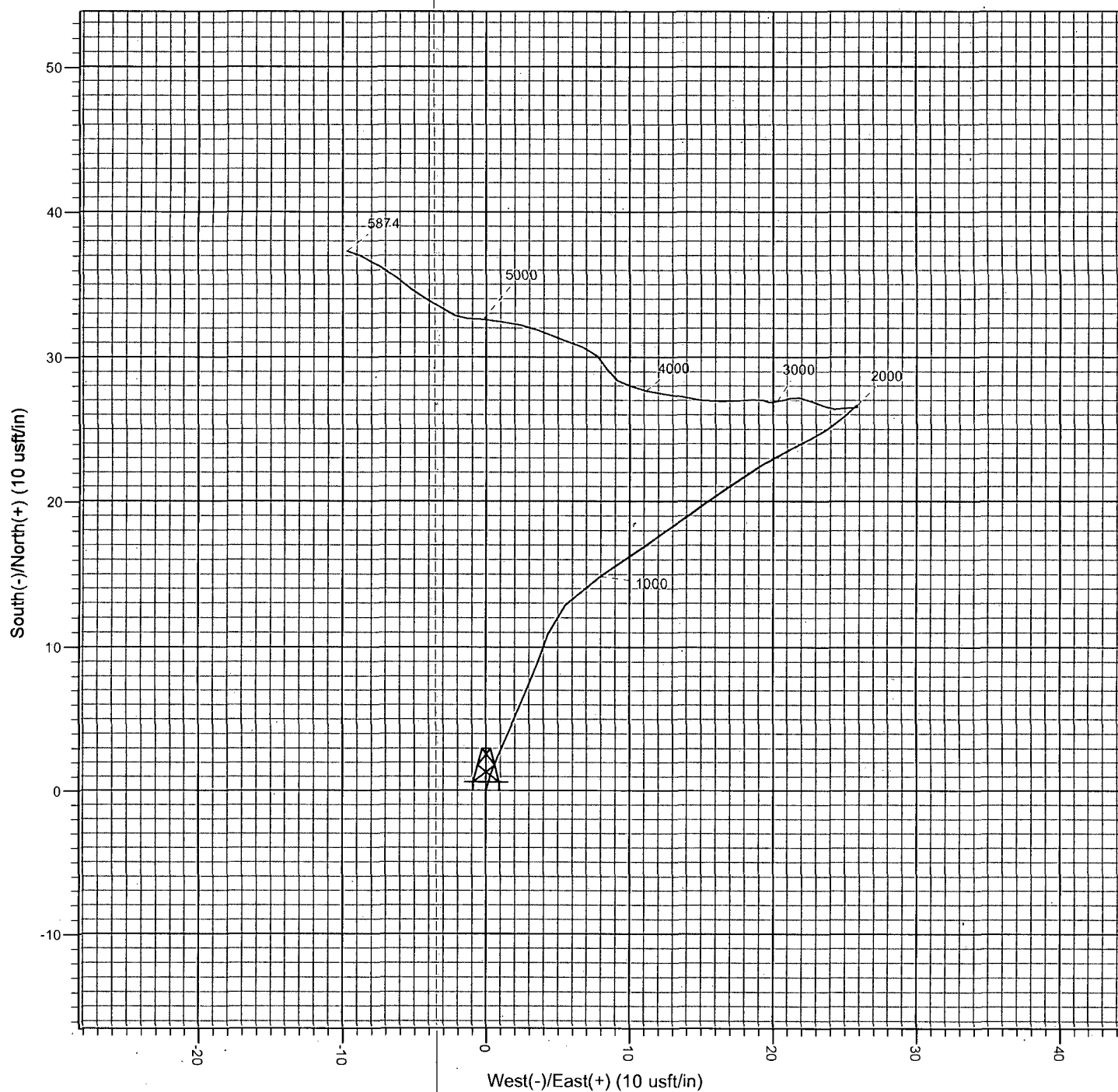


Scientific Drilling

Project: Loco Hills Paddock
Eddy County, NM
Well: Harper State #4Y
Wellbore: VH - Job #320113-KW-033
Design: VH - Job #320113-KW-033

WELL DETAILS: Harper State #4Y
WELL @ 0.00usft (Original Well Elev)
Ground Level: 0.00

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.00	0.00	666583.54	611295.68	32° 49' 55.200 N	103° 58' 15.600 W	



PROJECT DETAILS: Loco Hills Paddock	SITE DETAILS: Eddy County, NM
Geodetic System: US State Plane 1927 (Exact solution)	Site Centre Latitude: 32° 50' 6.000 N
Datum: NAD 1927 (NADCON CONUS)	Longitude: 103° 57' 39.600 W
Ellipsoid: Clarke 1866	Positional Uncertainty: 0.00
Zone: New Mexico East 3001	Convergence: 0.20
System Datum: Mean Sea Level	Local North: True