

30-015-39473

NM OIL CONSERVATION

ARTESIA DISTRICT

MAR 17 2016

RECEIVED

COG Operating, LLC

Eddy County, NM (NAD 27)

Sec 20, T23S, R30E

Ice Dancer 30 Fed Com #2H

Wellbore #1

Survey: MWD PILOT

DDC Survey Report

29 September, 2015



The Directional Drilling Company

11390 FM 830
Willis, TX 77318
Phone: (936) 856-4332
Fax: (936) 856-8678



Survey Certification Sheet

Company	Job Number	Date
COG Operating, LLC	WT-150577	9/29/2015

Lease	Well Name	County & State
Sec20,T23S,R30E	Ice Dancer 30 Fed Com #2H	Eddy, New Mexico

API No.	Survey Depth Range	Survey Type
30-015-39473	165 feet to 10539 feet MD	MWD

Sidetrack Information	Directional Supervisor/Surveyor
9760 feet to 14670 feet MD	Shane Chandler

Certification Statement

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.

Christopher Hughes

Digitally signed by Christopher Hughes
DN: cn=Christopher Hughes, o=DDC, ou,
email=Chrish@directionaldrillers.com, c=US
Date: 2015.09.29 14:33:31 -05'00'

Christopher Hughes
MWD Compliance Manager
The Directional Drilling Company

HP Survey Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Ice Dancer 30 Fed Com #2H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	Well @ 3097.0usft (Scandriil Freedom)
Site:	Sec 20, T23S, R30E	MD Reference:	Well @ 3097.0usft (Scandriil Freedom)
Well:	Ice Dancer 30 Fed Com #2H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Project	Eddy County, NM (NAD 27)		
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 20, T23S, R30E		
Site Position:		Northing:	462,097.70 usft
From:	Map	Easting:	628,422.30 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 16' 11.064 N
		Longitude:	103° 55' 4.229 W
		Grid Convergence:	0.22 °

Well	Ice Dancer 30 Fed Com #2H		
Well Position	+N/-S	0.0 usft	Northing: 462,097.70 usft
	+E/-W	0.0 usft	Easting: 628,422.30 usft
Position Uncertainty	0.0 usft	Wellhead Elevation:	3,097.0 usft
		Latitude:	32° 16' 11.064 N
		Longitude:	103° 55' 4.229 W
		Ground Level:	3,071.0 usft

Wellbore	Wellbore #1		
Magnetics	Model Name	Sample Date	Declination
	IGRF2015	8/21/2015	(°)
			7.31
			Dip Angle (°)
			60.07
			Field Strength (nT)
			48,118

Design	Wellbore #1		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.0	0.0	0.0
			Direction (°)
			355.35

Survey Program	Date 9/29/2015		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
165.0	9,760.0	MWD PILOT (Wellbore #1)	MWD default
9,825.0	14,670.0	MWD Curve & Lateral (Wellbore #1)	MWD default
			Description
			MWD - Standard
			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)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
First Survey @ 165' MD / 165' TVD									
165.0	1.80	234.40	165.0	-1.5	-2.1	-1.3	1.09	1.09	0.00
251.0	1.90	225.20	250.9	-3.3	-4.2	-2.9	0.36	0.12	-10.70
342.0	0.40	227.90	341.9	-4.6	-5.5	-4.1	1.65	-1.65	2.97
432.0	0.00	61.80	431.9	-4.8	-5.8	-4.3	0.44	-0.44	0.00
527.0	0.30	354.60	526.9	-4.5	-5.8	-4.1	0.32	0.32	0.00
618.0	0.10	236.80	617.9	-4.3	-5.9	-3.9	0.39	-0.22	-129.45
711.0	0.10	63.90	710.9	-4.4	-5.9	-3.9	0.21	0.00	-185.91
803.0	0.20	103.40	802.9	-4.4	-5.6	-3.9	0.15	0.11	42.93

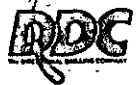
HP
Survey Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Ice Dancer 30 Fed Com #2H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	Well @ 3097.0usft (Scandril Freedom)
Site:	Sec 20, T23S, R30E	MD Reference:	Well @ 3097.0usft (Scandril Freedom)
Well:	Ice Dancer 30 Fed Com #2H	North Reference:	Grid:
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

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)
895.0	0.20	123.60	894.9	-4.5	-5.3	-4.0	0.08	0.00	21.96
990.0	0.20	158.60	989.9	-4.7	-5.1	-4.3	0.13	0.00	36.84
1,082.0	0.30	152.50	1,081.9	-5.1	-5.0	-4.7	0.11	0.11	-6.63
1,174.0	0.30	186.20	1,173.9	-5.5	-4.9	-5.1	0.19	0.00	36.63
1,267.0	0.00	349.20	1,266.9	-5.8	-4.9	-5.4	0.32	-0.32	0.00
1,359.0	0.30	164.80	1,358.9	-6.0	-4.9	-5.6	0.33	0.33	0.00
1,450.0	0.30	192.20	1,449.9	-6.5	-4.8	-6.1	0.16	0.00	30.11
1,544.0	0.30	204.50	1,543.9	-6.9	-5.0	-6.5	0.07	0.00	13.09
1,637.0	0.30	214.00	1,636.9	-7.4	-5.2	-6.9	0.05	0.00	10.22
1,731.0	0.30	217.00	1,730.9	-7.8	-5.5	-7.3	0.02	0.00	3.19
1,825.0	0.30	219.30	1,824.9	-8.2	-5.8	-7.7	0.01	0.00	2.45
1,916.0	0.30	208.20	1,915.9	-8.6	-6.1	-8.0	0.06	0.00	-12.20
2,009.0	0.50	215.60	2,008.9	-9.1	-6.4	-8.5	0.22	0.22	7.96
2,103.0	0.60	198.00	2,102.9	-9.9	-6.8	-9.3	0.21	0.11	-18.72
2,198.0	1.50	176.70	2,197.9	-11.6	-6.9	-11.0	1.02	0.95	-22.42
2,293.0	1.10	314.70	2,292.9	-12.2	-7.5	-11.6	2.56	-0.42	145.26
2,387.0	1.90	338.30	2,386.8	-10.1	-8.7	-9.4	1.06	0.85	25.11
2,482.0	0.50	17.30	2,481.8	-8.3	-9.2	-7.5	1.63	-1.47	41.05
2,576.0	0.30	89.90	2,575.8	-7.9	-8.8	-7.1	0.53	-0.21	77.23
2,670.0	0.50	218.90	2,669.8	-8.2	-8.8	-7.5	0.77	0.21	137.23
2,765.0	0.30	86.20	2,764.8	-8.5	-8.8	-7.8	0.78	-0.21	-139.68
2,860.0	0.70	127.10	2,859.8	-8.8	-8.1	-8.1	0.54	0.42	43.05
2,954.0	1.10	138.90	2,953.8	-9.9	-7.1	-9.3	0.47	0.43	12.55
3,049.0	1.50	140.30	3,048.8	-11.5	-5.7	-11.0	0.42	0.42	1.47
3,143.0	1.10	197.30	3,142.7	-13.3	-5.1	-12.9	1.37	-0.43	60.64
3,237.0	0.50	259.30	3,236.7	-14.3	-5.8	-13.7	1.03	-0.64	65.96
3,278.0	0.30	297.80	3,277.7	-14.2	-6.1	-13.7	0.79	-0.49	93.90
3,351.0	0.40	289.00	3,350.7	-14.1	-6.5	-13.5	0.16	0.14	-12.05
3,414.0	0.60	298.90	3,413.7	-13.8	-7.0	-13.2	0.34	0.32	15.71
3,508.0	0.60	297.70	3,507.7	-13.4	-7.9	-12.7	0.01	0.00	-1.28
3,602.0	0.50	301.20	3,601.7	-12.9	-8.6	-12.2	0.11	-0.11	3.72
3,697.0	0.60	302.20	3,696.7	-12.4	-9.4	-11.6	0.11	0.11	1.05
3,793.0	0.70	302.80	3,792.7	-11.9	-10.3	-11.0	0.10	0.10	0.63
3,888.0	0.70	298.50	3,887.7	-11.3	-11.3	-10.3	0.06	0.00	-4.53
3,982.0	0.70	347.00	3,981.7	-10.4	-12.0	-9.4	0.61	0.00	51.60
4,078.0	1.50	276.00	4,077.7	-9.7	-13.4	-8.6	1.49	0.83	-73.96
4,172.0	0.80	39.40	4,171.7	-9.1	-14.2	-7.9	2.18	-0.74	131.28
4,266.0	0.40	9.90	4,265.7	-8.3	-13.7	-7.1	0.52	-0.43	-31.38
4,362.0	0.80	27.30	4,361.7	-7.3	-13.3	-6.2	0.45	0.42	18.13
4,456.0	0.70	22.40	4,455.6	-6.2	-12.8	-5.2	0.13	-0.11	-5.21
4,551.0	0.70	26.10	4,550.6	-5.2	-12.3	-4.2	0.05	0.00	3.89
4,646.0	0.70	28.20	4,645.6	-4.1	-11.8	-3.2	0.03	0.00	2.21
4,741.0	1.00	33.80	4,740.6	-2.9	-11.1	-2.0	0.33	0.32	5.89

HP
Survey Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Ice Dancer 30 Fed Com #2H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	Well @ 3097.0usft (Scandril Freedom)
Site:	Sec 20, T23S, R30E	MD Reference:	Well @ 3097.0usft (Scandril Freedom)
Well:	Ice Dancer 30 Fed Com #2H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

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)
4,835.0	0.70	16.00	4,834.6	-1.7	-10.4	-0.8	0.42	-0.32	-18.94
4,930.0	0.70	359.40	4,929.6	-0.6	-10.3	0.3	0.21	0.00	-17.47
5,120.0	0.50	3.90	5,119.6	1.4	-10.3	2.3	0.11	-0.11	2.37
5,309.0	0.50	25.70	5,308.6	3.0	-9.8	3.8	0.10	0.00	11.53
5,498.0	0.30	356.00	5,497.6	4.2	-9.5	5.0	0.15	-0.11	-15.71
5,687.0	0.70	294.30	5,686.6	5.2	-10.6	6.0	0.33	0.21	-32.65
5,876.0	1.20	270.40	5,875.6	5.7	-13.6	6.8	0.33	0.26	-12.65
6,065.0	1.50	258.60	6,064.5	5.2	-18.0	6.7	0.22	0.16	-6.24
6,254.0	0.30	343.50	6,253.5	5.2	-20.6	6.8	0.80	-0.63	44.92
6,444.0	0.10	37.50	6,443.5	5.8	-20.6	7.5	0.13	-0.11	28.42
6,634.0	0.20	140.30	6,633.5	5.7	-20.3	7.3	0.13	0.05	54.11
6,823.0	0.30	172.50	6,822.5	4.9	-20.1	6.5	0.09	0.05	17.04
7,012.0	0.30	241.60	7,011.5	4.2	-20.4	5.9	0.18	0.00	36.56
7,202.0	0.70	193.10	7,201.5	2.8	-21.1	4.5	0.29	0.21	-25.53
7,389.0	1.40	231.70	7,388.4	0.3	-23.2	2.2	0.51	0.37	20.64
7,577.0	1.60	246.70	7,576.4	-2.1	-27.4	0.1	0.23	0.11	7.98
7,767.0	0.80	283.60	7,766.3	-2.9	-31.1	-0.4	0.57	-0.42	19.42
7,956.0	1.50	302.60	7,955.3	-1.2	-34.5	1.6	0.42	0.37	10.05
8,050.0	0.80	29.90	8,049.3	0.0	-35.2	2.8	1.77	-0.74	92.87
8,145.0	0.60	13.90	8,144.3	1.0	-34.7	3.9	0.29	-0.21	-16.84
8,335.0	0.30	336.00	8,334.3	2.5	-34.7	5.3	0.21	-0.16	-19.95
8,525.0	0.40	260.90	8,524.3	2.8	-35.6	5.7	0.23	0.05	-39.53
8,715.0	0.50	225.10	8,714.3	2.1	-36.8	5.1	0.15	0.05	-18.84
8,905.0	1.10	281.30	8,904.2	1.9	-39.2	5.1	0.48	0.32	29.58
9,095.0	1.10	209.10	9,094.2	0.7	-41.9	4.1	0.68	0.00	-38.00
9,285.0	0.90	234.90	9,284.2	-1.8	-44.0	1.8	0.26	-0.11	13.58
9,475.0	2.50	180.90	9,474.1	-6.8	-45.2	-3.1	1.11	0.84	-28.42
9,570.0	1.10	153.30	9,569.1	-9.7	-44.9	-6.0	1.69	-1.47	-29.05
9,665.0	1.20	132.10	9,664.0	-11.2	-43.7	-7.6	0.46	0.11	-22.32
9,760.0	2.70	158.40	9,759.0	-13.9	-42.2	-10.4	1.80	1.58	27.68
9,940.0	1.90	164.90	9,938.8	-20.7	-39.8	-17.4	0.47	-0.44	3.61
10,035.0	1.70	174.60	10,033.8	-23.7	-39.3	-20.4	0.38	-0.21	10.21
10,130.0	1.90	197.10	10,128.7	-26.6	-39.6	-23.3	0.77	0.21	23.68
10,225.0	1.60	200.80	10,223.7	-29.3	-40.5	-25.9	0.34	-0.32	3.89
10,320.0	1.40	202.20	10,318.7	-31.6	-41.5	-28.2	0.21	-0.21	1.47
10,415.0	1.30	203.30	10,413.6	-33.7	-42.3	-30.1	0.11	-0.11	1.16
10,510.0	1.70	209.40	10,508.6	-35.9	-43.4	-32.3	0.45	0.42	6.42
TD Pilot Hole @ 10539' MD / 10538' TVD									
10,539.0	1.70	209.40	10,537.6	-36.7	-43.9	-33.0	0.00	0.00	0.00

HP Survey Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Ice Dancer 30 Fed Com #2H
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Well:	Ice Dancer 30 Fed Com #2H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
165.0	165.0	-1.5	-2.1	First Survey @ 165' MD / 165' TVD
10,539.0	10,537.6	-36.7	-43.9	TD Pilot Hole @ 10539' MD / 10538' TVD

Checked By: _____ Approved By: _____ Date: _____

NM OIL CONSERVATION
ARTESIA DISTRICT

MAR 17 2016

RECEIVED

COG Operating, LLC

Eddy County, NM (NAD 27)

Sec 20, T23S, R30E

Ice Dancer 30 Fed Com #2H

Wellbore #1

Survey: MWD Curve & Lateral

DDC Survey Report

29 September, 2015



HP
Survey Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Ice Dancer 30 Fed Com #2H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	Well @ 3097.0usft (Scandrift Freedom)
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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Project	Eddy County, NM (NAD 27)		
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 20, T23S, R30E		
Site Position:		Northing:	462,097.70 usft
From:	Map	Easting:	628,422.30 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 16' 11.064 N
		Longitude:	103° 55' 4.229 W
		Grid Convergence:	0.22 °

Well	Ice Dancer 30 Fed Com #2H		
Well Position	+N/-S	0.0 usft	Northing: 462,097.70 usft
	+E/-W	0.0 usft	Easting: 628,422.30 usft
Position Uncertainty	0.0 usft	Wellhead Elevation:	3,097.0 usft
		Ground Level:	3,071.0 usft

Wellbore	Wellbore #1		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2015	8/21/2015	7.31
			Dip Angle
			(°)
			60.07
			Field Strength
			(nT)
			48,118

Design	Wellbore #1		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.0	0.0	0.0
			Direction
			(°)
			355.35

Survey Program	Date: 9/29/2015		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
165.0	9,760.0	MWD PILOT (Wellbore #1)	MWD default
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			Description
			MWD - Standard
			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 into Pilot Hole @ 9760' MD / 9759' TVD									
9,760.0	2.70	158.40	9,759.0	-13.9	-42.2	-10.4	0.00	0.00	0.00
9,825.0	1.20	167.90	9,823.9	-16.0	-41.5	-12.6	2.35	-2.31	14.62
9,857.0	1.80	315.20	9,855.9	-16.0	-41.7	-12.5	9.01	1.88	460.31
9,888.0	5.00	337.70	9,886.9	-14.4	-42.6	-10.9	10.99	10.32	72.58
9,920.0	8.40	344.40	9,918.7	-10.8	-43.8	-7.2	10.88	10.63	20.94
9,952.0	11.80	349.20	9,950.2	-5.4	-45.0	-1.7	10.94	10.63	15.00
9,983.0	15.40	352.10	9,980.3	1.8	-46.2	5.6	11.82	11.61	9.35
10,015.0	19.10	353.40	10,010.8	11.2	-47.3	15.0	11.62	11.56	4.06
10,047.0	22.70	353.70	10,040.7	22.6	-48.6	26.5	11.25	11.25	0.94

HP
Survey Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Ice Dancer 30 Fed Com #2H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	Well @ 3097.0usft (Scandril Freedom)
Site:	Sec 20, T23S, R30E	MD Reference:	Well @ 3097.0usft (Scandril Freedom)
Well:	Ice Dancer 30 Fed Com #2H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

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)
10,078.0	26.70	354.80	10,068.9	35.5	-49.9	39.4	12.99	12.90	3.55
10,110.0	30.60	356.40	10,097.0	50.8	-51.1	54.7	12.42	12.19	5.00
10,142.0	34.30	354.80	10,124.0	67.9	-52.4	71.9	11.87	11.56	-5.00
10,173.0	37.80	356.90	10,149.0	86.1	-53.7	90.1	11.97	11.29	6.77
10,205.0	40.50	358.30	10,173.8	106.3	-54.5	110.3	8.88	8.44	4.38
10,237.0	43.20	356.00	10,197.7	127.6	-55.6	131.7	9.70	8.44	-7.19
10,268.0	46.20	353.90	10,219.7	149.3	-57.5	153.5	10.79	9.68	-6.77
10,298.0	49.10	352.70	10,239.9	171.3	-60.1	175.6	10.11	9.67	-4.00
10,329.0	51.80	354.30	10,259.7	195.1	-62.8	199.5	9.58	8.71	5.16
10,361.0	55.00	355.30	10,278.7	220.6	-65.2	225.2	10.31	10.00	3.13
10,392.0	58.00	353.90	10,295.8	246.4	-67.6	251.0	10.38	9.68	-4.52
10,424.0	59.60	355.10	10,312.4	273.6	-70.2	278.4	5.94	5.00	3.75
10,456.0	61.60	355.10	10,328.1	301.4	-72.6	306.3	6.25	6.25	0.00
10,487.0	64.00	355.50	10,342.3	328.9	-74.9	333.8	7.83	7.74	1.29
10,519.0	67.10	355.80	10,355.5	357.9	-77.1	363.0	9.73	9.69	0.94
10,551.0	70.00	356.20	10,367.2	387.6	-79.1	392.8	9.14	9.06	1.25
10,582.0	72.70	356.70	10,377.1	416.9	-81.0	422.1	8.84	8.71	1.61
10,614.0	74.90	356.50	10,386.1	447.6	-82.8	452.8	6.90	6.88	-0.63
10,646.0	75.50	356.90	10,394.3	478.5	-84.6	483.8	2.23	1.88	1.25
10,678.0	78.30	356.70	10,401.5	509.6	-86.3	514.9	8.77	8.75	-0.63
10,709.0	81.50	358.50	10,406.9	540.1	-87.6	545.4	11.80	10.32	5.81
10,741.0	85.40	358.50	10,410.6	571.9	-88.4	577.1	12.19	12.19	0.00
10,772.0	88.90	357.10	10,412.1	602.8	-89.6	608.1	12.16	11.29	-4.52
10,803.0	90.80	356.00	10,412.2	633.7	-91.5	639.1	7.08	6.13	-3.55
10,828.0	91.20	355.70	10,411.8	658.7	-93.3	664.1	2.00	1.60	-1.20
10,923.0	93.30	356.40	10,408.0	753.4	-99.8	759.0	2.33	2.21	0.74
11,017.0	92.20	356.70	10,403.5	847.1	-105.5	852.8	1.21	-1.17	0.32
11,111.0	90.70	355.10	10,401.2	940.8	-112.2	946.8	2.33	-1.60	-1.70
11,206.0	89.70	355.30	10,400.8	1,035.5	-120.1	1,041.8	1.07	-1.05	0.21
11,301.0	91.40	355.80	10,399.9	1,130.2	-127.5	1,136.8	1.87	1.79	0.53
11,396.0	89.70	356.00	10,399.0	1,224.9	-134.3	1,231.8	1.80	-1.79	0.21
11,490.0	88.30	356.20	10,400.6	1,318.7	-140.7	1,325.8	1.50	-1.49	0.21
11,584.0	89.80	355.70	10,402.2	1,412.4	-147.3	1,419.7	1.68	1.60	-0.53
11,677.0	88.00	355.50	10,404.0	1,505.1	-154.5	1,512.7	1.95	-1.94	-0.22
11,772.0	89.80	356.20	10,405.8	1,599.9	-161.3	1,607.7	2.03	1.89	0.74
11,866.0	91.80	357.40	10,404.5	1,693.7	-166.6	1,701.6	2.48	2.13	1.28
11,960.0	89.80	356.00	10,403.2	1,787.5	-172.0	1,795.6	2.60	-2.13	-1.49
12,054.0	87.60	354.10	10,405.3	1,881.2	-180.1	1,889.6	3.09	-2.34	-2.02
12,147.0	89.40	354.30	10,407.8	1,973.6	-189.5	1,982.5	1.95	1.94	0.22
12,241.0	91.40	354.40	10,407.1	2,067.2	-198.7	2,076.5	2.13	2.13	0.11
12,335.0	90.00	356.40	10,405.9	2,160.9	-206.3	2,170.5	2.60	-1.49	2.13
12,429.0	90.80	355.30	10,405.3	2,254.6	-213.1	2,264.5	1.45	0.85	-1.17
12,523.0	89.80	354.80	10,404.8	2,348.3	-221.2	2,358.5	1.19	-1.06	-0.53

HP
Survey Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Ice Dancer 30 Fed Com #2H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	Well @ 3097.0usft (Scandrift Freedom)
Site:	Sec 20, T23S, R30E	MD Reference:	Well @ 3097.0usft (Scandrift Freedom)
Well:	Ice Dancer 30 Fed Com #2H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

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)
12,617.0	91.30	354.30	10,403.9	2,441.8	-230.1	2,452.4	1.68	1.60	-0.53
12,711.0	89.70	356.00	10,403.1	2,535.5	-238.1	2,546.4	2.48	-1.70	1.81
12,806.0	91.70	356.40	10,401.9	2,630.3	-244.4	2,641.4	2.15	2.11	0.42
12,900.0	89.30	356.00	10,401.1	2,724.0	-250.6	2,735.4	2.59	-2.55	-0.43
12,995.0	91.20	356.20	10,400.7	2,818.8	-257.1	2,830.4	2.01	2.00	0.21
13,089.0	89.00	357.30	10,400.5	2,912.7	-262.4	2,924.3	2.62	-2.34	1.17
13,184.0	91.20	357.60	10,400.4	3,007.6	-266.6	3,019.3	2.34	2.32	0.32
13,278.0	89.70	356.90	10,399.6	3,101.4	-271.1	3,113.2	1.76	-1.60	-0.74
13,373.0	91.90	356.50	10,398.3	3,196.3	-276.6	3,208.2	2.35	2.32	-0.42
13,467.0	90.50	356.00	10,396.3	3,290.0	-282.7	3,302.1	1.58	-1.49	-0.53
13,562.0	89.40	355.70	10,396.4	3,384.8	-289.6	3,397.1	1.20	-1.16	-0.32
13,656.0	90.20	355.30	10,396.7	3,478.5	-297.0	3,491.1	0.95	0.85	-0.43
13,750.0	91.50	353.70	10,395.3	3,572.1	-306.0	3,585.1	2.19	1.38	-1.70
13,845.0	90.80	353.90	10,393.4	3,666.5	-316.2	3,680.1	0.77	-0.74	0.21
13,939.0	89.10	354.60	10,393.5	3,760.0	-325.7	3,774.0	1.96	-1.81	0.74
14,034.0	90.50	351.60	10,393.8	3,854.3	-337.1	3,868.9	3.48	1.47	-3.16
14,128.0	90.30	352.00	10,393.2	3,947.3	-350.5	3,962.8	0.48	-0.21	0.43
14,223.0	90.60	354.60	10,392.4	4,041.7	-361.6	4,057.7	2.75	0.32	2.74
14,318.0	90.40	356.70	10,391.6	4,136.4	-368.8	4,152.7	2.22	-0.21	2.21
14,413.0	89.00	355.80	10,392.1	4,231.2	-375.0	4,247.7	1.75	-1.47	-0.95
14,507.0	90.30	355.80	10,392.7	4,324.9	-381.9	4,341.7	1.38	1.38	0.00
14,617.0	92.40	356.50	10,390.1	4,434.6	-389.3	4,451.6	2.01	1.91	0.64
TD @ 14670' MD / 10388' TVD									
14,670.0	92.40	356.50	10,387.9	4,487.5	-392.5	4,504.5	0.00	0.00	0.00

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
9,760.0	9,759.0	-13.9	-42.2	Tie into Pilot Hole @ 9760' MD / 9759' TVD
14,670.0	10,387.9	4,487.5	-392.5	TD @ 14670' MD / 10388' TVD

Checked By: _____ Approved By: _____ Date: _____