Directional Survey Report

Geothermal Resource Group

Well ID: Forge 58-32 | **Well Name: 58-32**

Field: None | Sect: 26 Town: 26S Rng: 9W County: Beaver State: UT

Survey Type	Meas. Depth (ft)	Inc. (deg)	Azimuth (deg)	TVD (ft)	Coordinates N-S (ft)	Coordinates E-W (ft)	Closure (ft)	Vertical Section (ft)	Dog Leg Severity (deg/100)
Wellbore:	**Original Well Bore**			**Plane of Vertical Section: 0**					
** TieIn	0.0	0.00	0	0.0	0.0	0.0		0.0	
MSS	278.0	0.30	20.59	278.0	0.7	0.3	0.7	0.7	0.108
MSS	582.0	0.30	205.9	582.0	0.7	0.2	0.7	0.7	0.197
MSS	868.0	0.40	1	868.0	1.0	-0.1	1.0	1.0	0.239
MSS	1,185.0	1.00	346	1,185.0	4.8	-0.8	4.9	4.8	0.196
MSS	1,471.0	1.00	347	1,470.9	9.7	-1.9	9.9	9.7	0.006
MSS	1,789.0	1.30	334	1,788.9	15.6	-4.1	16.2	15.6	0.124
MSS	2,138.0	1.90	24.5	2,137.7	24.4	-3.5	24.7	24.4	0.421
MSS	2,398.0	1.20	83.8	2,397.7	28.7	1.0	28.7	28.7	0.635
MSS	2,768.0	0.70	8.7	2,767.6	31.3	5.2	31.7	31.3	0.331
MMS	3,085.0	1.20	311.6	3,084.6	35.4	3.0	35.6	35.4	0.318
MMS	3,380.0	1.20	123.4	3,379.6	35.8	3.3	35.9	35.8	0.811
MMS	3,697.0	1.70	220	3,696.5	30.4	3.0	30.5	30.4	0.691
MMS	3,976.0	3.80	253.9	3,975.2	24.6	-8.5	26.0	24.6	0.921
MMS	4,293.0	6.30	255.8	4,290.9	17.4	-35.5	39.5	17.4	0.790
MMS	4,569.0	6.80	253.8	4,565.1	9.2	-65.8	66.5	9.2	0.199
MWD	4,603.0	7.56	272.33	4,598.9	8.7	-70.0	70.5	8.7	7.132
MWD	4,667.0	6.90	275.84	4,662.3	9.3	-78.0	78.6	9.3	1.240
MWD	4,739.0	6.95	272.2	4,733.8	9.9	-86.7	87.3	9.9	0.613
MWD	4,771.0	6.90	271.98	4,765.6	10.0	-90.5	91.1	10.0	0.177
MWD	4,803.0	7.21	271.45	4,797.3	10.1	-94.5	95.0	10.1	0.990
MWD	4,833.0	7.16	274.26	4,827.1	10.3	-98.2	98.8	10.3	1.183
MWD	4,865.0	6.68	276.37	4,858.9	10.7	-102.1	102.6	10.7	1.697
MWD	4,897.0	5.85	277.34	4,890.7	11.1	-105.5	106.1	11.1	2.615
MWD	4,928.0	5.27	278.13	4,921.5	11.5	-108.5	109.1	11.5	1.887
MWD	4,960.0	4.62	273.91	4,953.4	11.8	-111.2	111.9	11.8	2.326
MWD	4,992.0	3.82	265.82	4,985.3	11.8	-113.6	114.2	11.8	3.110
MWD	5,024.0	2.99	260.37	5,017.3	11.6	-115.5	116.1	11.6	2.781
MWD	5,055.0	2.11	250.53	5,048.2	11.2	-116.8	117.4	11.2	3.160
MWD	5,087.0	1.54	251.5	5,080.2	10.9	-117.8	118.3	10.9	1.784
MWD	5,119.0	1.76	267.32	5,112.2	10.8	-118.7	119.2	10.8	1.574
MWD	5,151.0	1.76	281.9	5,144.2	10.8	-119.6	120.1	10.8	1.396
MWD	5,183.0	1.63	295.97	5,176.2	11.1	-120.5	121.1	11.1	1.359
MWD	5,214.0	1.49	295.97	5,207.2	11.5	-121.3	121.8	11.5	0.452
MWD	5,246.0	1.01	277.51	5,239.2	11.7	-122.0	122.5	11.7	1.940
MWD	5,278.0	1.01	251.7	5,271.2	11.7	-122.5	123.1	11.7	1.410
MWD	5,310.0	1.49	241.83	5,303.2	11.4	-123.1	123.7	11.4	1.639
MWD	5,341.0	1.63	243.5	5,334.1	11.0	-123.9	124.4	11.0	0.475
MWD	5,373.0	1.27	231.37	5,366.1	10.6	-124.6	125.0	10.6	1.472
MWD	5,405.0	0.62	203.24	5,398.1	10.2	-124.9	125.3	10.2	2.438
MSS	5,679.0	0.70	136.6	5,672.1	7.6	-124.3	124.6	7.6	0.266
MSS	5,872.0	1.50	316.2	5,865.1	8.6	-125.3	125.6	8.6	1.140
MSS	6,062.0	1.80	346.6	6,055.0	13.3	-127.7	128.4	13.3	0.480
MSS	6,345.0	2.40	350	6,337.8	23.4	-129.8	131.9	23.4	0.216

Directional Survey Report

Geothermal Resource Group

Well ID: Forge 58-32

Well Name: 58-32

Field: None

Sect: 26 Town: 26S Rng: 9W County: Beaver State: UT

Survey Type	Meas. Depth (ft)	Inc. (deg)	Azimuth (deg)	TVD (ft)	Coordinates N-S (ft)	Coordinates E-W (ft)	Closure (ft)	Vertical Section (ft)	Dog Leg Severity (deg/100)
MSS	6,478.0	2.50	334.9	6,470.7	28.8	-131.5	134.6	28.8	0.490
MSS	6,605.0	2.60	287.3	6,597.6	32.2	-135.4	139.2	32.2	1.622
MSS	6,730.0	3.80	274.1	6,722.4	33.3	-142.2	146.1	33.3	1.120
MWD	6,767.0	3.87	279.53	6,759.3	33.6	-144.7	148.5	33.6	0.999
MWD	6,798.0	4.18	276.37	6,790.2	33.9	-146.8	150.7	33.9	1.229
MWD	6,830.0	3.69	281.12	6,822.2	34.2	-149.0	152.9	34.2	1.838
MWD	6,862.0	3.12	280.59	6,854.1	34.6	-150.9	154.8	34.6	1.784
MWD	6,894.0	2.24	277.16	6,886.1	34.8	-152.4	156.3	34.8	2.794
MWD	6,926.0	1.58	265.03	6,918.1	34.9	-153.4	157.3	34.9	2.408
MWD	6,989.0	0.92	260.81	6,981.0	34.7	-154.8	158.6	34.7	1.057
MWD	7,021.0	1.14	281.2	7,013.0	34.7	-155.3	159.2	34.7	1.325
MWD	7,053.0	1.10	295.1	7,045.0	34.9	-155.9	159.8	34.9	0.856
MWD	7,084.0	1.19	276.11	7,076.0	35.1	-156.5	160.4	35.1	1.252
MWD	7,116.0	1.14	274.88	7,108.0	35.1	-157.2	161.1	35.1	0.175
MWD	7,357.0	1.80	274	7,348.9	35.6	-163.3	167.2	35.6	0.274
PROJ	7,530.0	2.30	273.5	7,521.8	36.0	-169.5	173.3	36.0	0.289

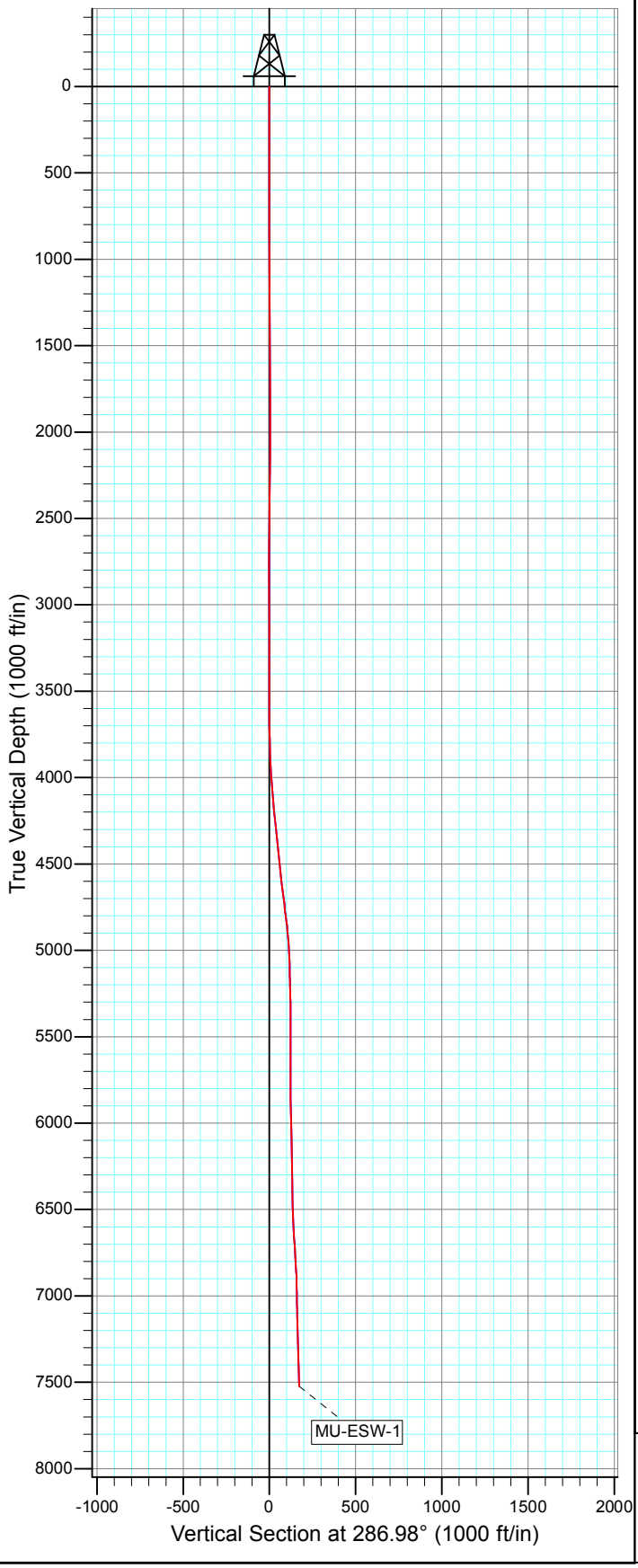
Calculations using Minimum Curvature Method

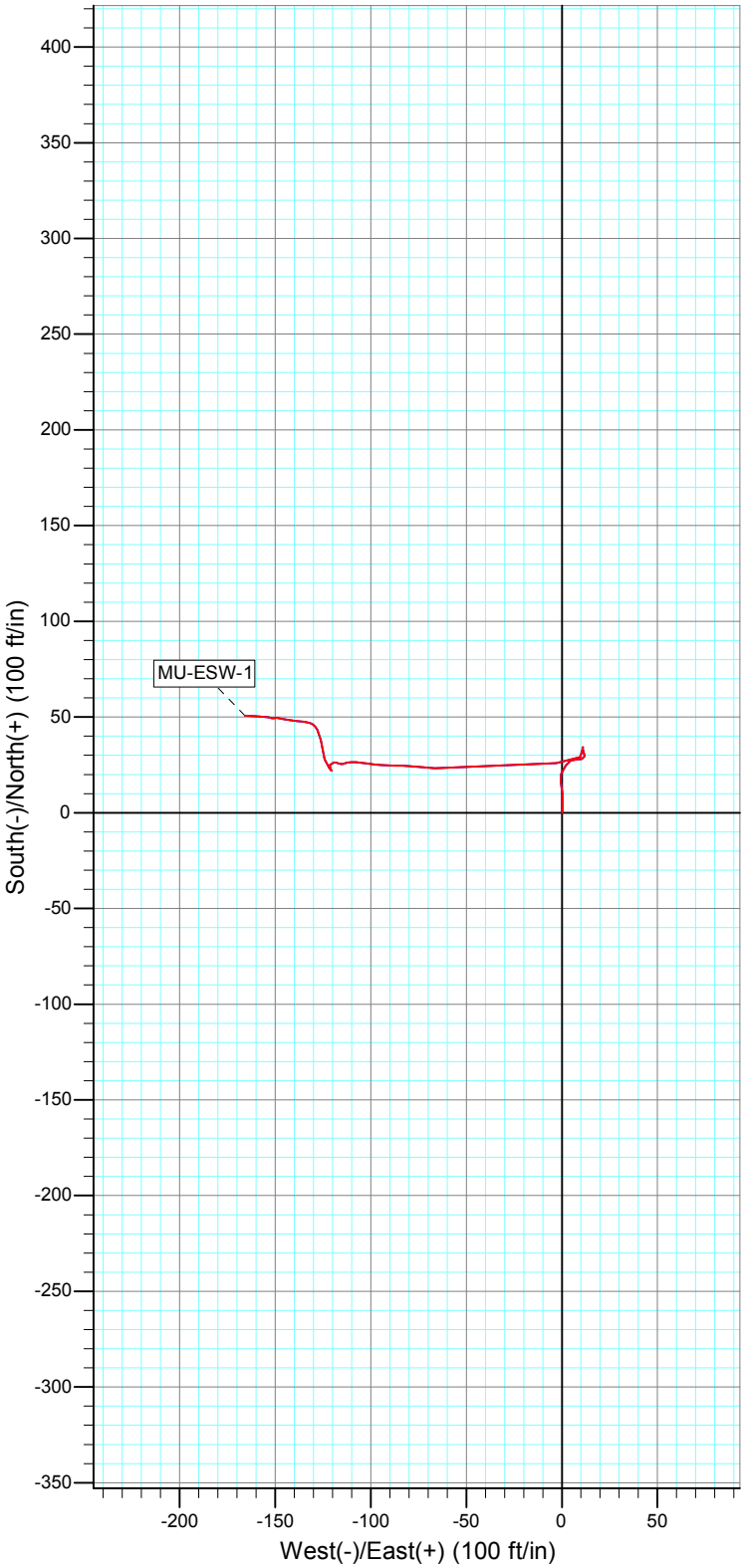
University Of Utah

Project: Beaver County, Utah
Site: North Milford
Well: MU-ESW-1
Wellpath: MU-ESW-1
Design: MU-ESW-1

Azimuths to Grid North
True North: 1.18°
Magnetic North: 12.61°

Magnetic Field
Strength: 50277.5snT
Dip Angle: 63.84°
Date: 8/16/2017
Model: IGRF2015





FINAL PLOT

University Of Utah

Beaver County, Utah
North Milford
MU-ESW-1
MU-ESW-1

Design: MU-ESW-1

FINAL SURVEY REPORT

15 September, 2017

GeoGuidance Drilling Services

FINAL SURVEY REPORT

Company:	University Of Utah	**Local Co-ordinate Reference:**	Well MU-ESW-1
Project:	Beaver County, Utah	**TVD Reference:**	MU-ESW-1 @ 5557.5ft (KENAI 10)
Site:	North Milford	**MD Reference:**	MU-ESW-1 @ 5557.5ft (KENAI 10)
Well:	MU-ESW-1	**North Reference:**	Grid
Wellbore:	MU-ESW-1	**Survey Calculation Method:**	Minimum Curvature
Design:	MU-ESW-1	**Database:**	EDM 5000.1 Single User Db

Project Beaver County, Utah

Map System:	Universal Transverse Mercator (US Survey Feet)	**System Datum:**	Mean Sea Level
Geo Datum:	NAD83 Utah - HARN		
Map Zone:	Zone 12N (114 W to 108 W)		

Site North Milford

Site Position:		**Northing:**	4,263,043.00 m	**Latitude:**	38° 30' 2.024 N
From:	Map	**Easting:**	335,450.00 m	**Longitude:**	112° 53' 13.288 W
Position Uncertainty:	0.0 ft	**Slot Radius:**	13.200 in	**Grid Convergence:**	-1.18 °

Well MU-ESW-1, SUR. N 4263043 E 335450

Well Position	**+N/-S**	0.0 ft	**Northing:**	4,263,043.00 m	**Latitude:**	38° 30' 2.024 N
	+E/-W	0.0 ft	**Easting:**	335,450.00 m	**Longitude:**	112° 53' 13.288 W
Position Uncertainty		0.0 ft	**Wellhead Elevation:**	5,557.5 ft	**Ground Level:**	5,536.0 ft

Wellbore MU-ESW-1

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	8/16/2017	11.44	63.84	50,278

Design MU-ESW-1

Audit Notes:

Version:	1.0	**Phase:**	ACTUAL	**Tie On Depth:**	0.0

Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.0	0.0	0.0	286.98

Survey Program **Date** 9/15/2017

From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
278.0	7,530.0	Survey #1 (MU-ESW-1)	EMS+IGRF	OWSG EMS + IGRF or WMM

Company:	University Of Utah	**Local Co-ordinate Reference:**	Well MU-ESW-1
Project:	Beaver County, Utah	**TVD Reference:**	MU-ESW-1 @ 5557.5ft (KENAI 10)
Site:	North Milford	**MD Reference:**	MU-ESW-1 @ 5557.5ft (KENAI 10)
Well:	MU-ESW-1	**North Reference:**	Grid
Wellbore:	MU-ESW-1	**Survey Calculation Method:**	Minimum Curvature
Design:	MU-ESW-1	**Database:**	EDM 5000.1 Single User Db

Survey

MD (ft)	Inc (°)	Azi (azimuth) (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	Northing (m)	Easting (m)	DLeg (°/100ft)	V. Sec (ft)
0.0	0.00	0.00	0.0	-5,557.5	0.0	0.0	4,263,043.00	335,450.00	0.00	0.00
278.0	0.30	33.20	278.0	-5,279.5	0.6	0.4	4,263,043.19	335,450.12	0.11	-0.20
582.0	0.30	218.51	582.0	-4,975.5	0.7	0.3	4,263,043.20	335,450.10	0.20	-0.13
868.0	0.40	13.61	868.0	-4,689.5	1.0	0.1	4,263,043.32	335,450.03	0.24	0.20
1,185.0	1.00	358.61	1,185.0	-4,372.5	4.9	0.3	4,263,044.49	335,450.09	0.20	1.14
1,471.0	1.00	359.61	1,470.9	-4,086.6	9.9	0.2	4,263,046.01	335,450.07	0.01	2.67
1,789.0	1.30	346.61	1,788.9	-3,768.6	16.2	-0.6	4,263,047.92	335,449.81	0.12	5.32
2,138.0	1.90	37.11	2,137.7	-3,419.8	24.6	1.9	4,263,050.50	335,450.59	0.42	5.33
2,398.0	1.20	96.41	2,397.7	-3,159.8	27.8	7.2	4,263,051.46	335,452.21	0.63	1.17
2,768.0	0.70	21.31	2,767.6	-2,789.9	29.4	11.9	4,263,051.97	335,453.63	0.33	-2.81
3,085.0	1.20	324.21	3,084.6	-2,472.9	33.9	10.7	4,263,053.34	335,453.26	0.32	-0.31
3,380.0	1.20	136.01	3,379.6	-2,177.9	34.2	11.0	4,263,053.43	335,453.36	0.81	-0.55
3,697.0	1.70	232.61	3,696.5	-1,861.0	29.0	9.6	4,263,051.83	335,452.92	0.69	-0.72
3,976.0	3.80	266.51	3,975.2	-1,582.3	25.9	-2.9	4,263,050.89	335,449.11	0.92	10.36
4,293.0	6.30	268.41	4,290.9	-1,266.6	24.8	-30.8	4,263,050.55	335,440.61	0.79	36.69
4,569.0	6.80	266.41	4,565.1	-992.4	23.3	-62.2	4,263,050.11	335,431.03	0.20	66.34
4,603.0	7.56	272.33	4,598.9	-958.6	23.3	-66.5	4,263,050.10	335,429.73	3.12	70.39
4,667.0	6.90	275.84	4,662.3	-895.2	23.8	-74.5	4,263,050.27	335,427.29	1.24	78.24
4,739.0	6.95	272.20	4,733.8	-823.7	24.5	-83.2	4,263,050.45	335,424.65	0.61	86.69
4,771.0	6.90	271.98	4,765.6	-791.9	24.6	-87.0	4,263,050.50	335,423.47	0.18	90.42
4,803.0	7.21	271.45	4,797.3	-760.2	24.7	-91.0	4,263,050.53	335,422.27	0.99	94.21
4,833.0	7.16	274.26	4,827.1	-730.4	24.9	-94.7	4,263,050.59	335,421.13	1.18	97.85
4,865.0	6.68	276.37	4,858.9	-698.6	25.3	-98.5	4,263,050.70	335,419.96	1.70	101.63
4,897.0	5.85	277.34	4,890.7	-666.8	25.7	-102.0	4,263,050.82	335,418.91	2.61	105.06
4,928.0	5.27	278.13	4,921.5	-636.0	26.1	-105.0	4,263,050.95	335,418.00	1.89	108.03
4,960.0	4.62	273.91	4,953.4	-604.1	26.4	-107.7	4,263,051.04	335,417.16	2.33	110.73
4,992.0	3.82	265.82	4,985.3	-572.2	26.4	-110.1	4,263,051.04	335,416.45	3.11	112.98

Company:	University Of Utah	**Local Co-ordinate Reference:**	Well MU-ESW-1
Project:	Beaver County, Utah	**TVD Reference:**	MU-ESW-1 @ 5557.5ft (KENAI 10)
Site:	North Milford	**MD Reference:**	MU-ESW-1 @ 5557.5ft (KENAI 10)
Well:	MU-ESW-1	**North Reference:**	Grid
Wellbore:	MU-ESW-1	**Survey Calculation Method:**	Minimum Curvature
Design:	MU-ESW-1	**Database:**	EDM 5000.1 Single User Db

Survey

MD (ft)	Inc (°)	Azi (azimuth) (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	Northing (m)	Easting (m)	DLeg (°/100ft)	V. Sec (ft)
5,024.0	2.99	260.37	5,017.3	-540.2	26.2	-112.0	4,263,050.97	335,415.87	2.78	114.72
5,055.0	2.11	250.53	5,048.2	-509.3	25.8	-113.3	4,263,050.87	335,415.47	3.16	115.91
5,087.0	1.54	251.50	5,080.2	-477.3	25.5	-114.3	4,263,050.77	335,415.17	1.78	116.73
5,119.0	1.76	267.32	5,112.2	-445.3	25.3	-115.2	4,263,050.72	335,414.90	1.57	117.54
5,151.0	1.76	281.90	5,144.2	-413.3	25.4	-116.1	4,263,050.75	335,414.60	1.40	118.50
5,183.0	1.63	295.97	5,176.2	-381.3	25.7	-117.0	4,263,050.84	335,414.33	1.36	119.43
5,214.0	1.49	295.97	5,207.2	-350.3	26.1	-117.8	4,263,050.95	335,414.10	0.45	120.27
5,246.0	1.01	277.51	5,239.2	-318.3	26.3	-118.4	4,263,051.02	335,413.90	1.94	120.96
5,278.0	1.01	251.70	5,271.2	-286.3	26.3	-119.0	4,263,051.00	335,413.73	1.41	121.47
5,310.0	1.49	241.83	5,303.2	-254.3	26.0	-119.6	4,263,050.92	335,413.54	1.64	121.99
5,341.0	1.63	243.50	5,334.1	-223.4	25.6	-120.4	4,263,050.80	335,413.31	0.47	122.59
5,373.0	1.27	231.37	5,366.1	-191.4	25.2	-121.1	4,263,050.67	335,413.10	1.47	123.12
5,405.0	0.62	203.24	5,398.1	-159.4	24.8	-121.4	4,263,050.55	335,413.00	2.44	123.34
5,679.0	0.70	136.60	5,672.1	114.6	22.2	-120.8	4,263,049.77	335,413.17	0.27	122.05
5,872.0	1.50	316.20	5,865.1	307.6	23.2	-121.8	4,263,050.06	335,412.88	1.14	123.23
6,062.0	1.80	346.60	6,055.0	497.5	27.9	-124.2	4,263,051.49	335,412.15	0.48	126.91
6,345.0	2.40	350.00	6,337.8	780.3	38.0	-126.2	4,263,054.59	335,411.52	0.22	131.85
6,478.0	2.50	334.90	6,470.7	913.2	43.4	-128.0	4,263,056.23	335,411.00	0.49	135.05
6,605.0	2.60	287.30	6,597.6	1,040.1	46.8	-131.9	4,263,057.25	335,409.80	1.62	139.79
6,730.0	3.80	274.10	6,722.4	1,164.9	47.9	-138.7	4,263,057.60	335,407.72	1.12	146.66
6,767.0	3.87	279.53	6,759.3	1,201.8	48.2	-141.2	4,263,057.69	335,406.97	1.00	149.10
6,798.0	4.18	276.37	6,790.3	1,232.8	48.5	-143.3	4,263,057.78	335,406.31	1.23	151.24
6,830.0	3.69	281.12	6,822.2	1,264.7	48.8	-145.5	4,263,057.88	335,405.65	1.84	153.42
6,862.0	3.12	280.59	6,854.1	1,296.6	49.2	-147.4	4,263,057.99	335,405.08	1.78	155.30
6,894.0	2.24	277.16	6,886.1	1,328.6	49.4	-148.8	4,263,058.06	335,404.63	2.79	156.79
6,926.0	1.58	265.03	6,918.1	1,360.6	49.5	-149.9	4,263,058.07	335,404.31	2.41	157.81
6,957.0	1.05	266.26	6,949.1	1,391.6	49.4	-150.6	4,263,058.06	335,404.09	1.71	158.47

GeoGuidance Drilling Services

FINAL SURVEY REPORT

Company:	University Of Utah	**Local Co-ordinate Reference:**	Well MU-ESW-1
Project:	Beaver County, Utah	**TVD Reference:**	MU-ESW-1 @ 5557.5ft (KENAI 10)
Site:	North Milford	**MD Reference:**	MU-ESW-1 @ 5557.5ft (KENAI 10)
Well:	MU-ESW-1	**North Reference:**	Grid
Wellbore:	MU-ESW-1	**Survey Calculation Method:**	Minimum Curvature
Design:	MU-ESW-1	**Database:**	EDM 5000.1 Single User Db

Survey

MD (ft)	Inc (°)	Azi (azimuth) (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	Northing (m)	Easting (m)	DLeg (°/100ft)	V. Sec (ft)
6,989.0	0.92	260.81	6,981.1	1,423.6	49.3	-151.2	4,263,058.04	335,403.93	0.50	158.98
7,021.0	1.14	281.20	7,013.0	1,455.5	49.4	-151.7	4,263,058.05	335,403.75	1.33	159.53
7,053.0	1.10	295.10	7,045.0	1,487.5	49.6	-152.3	4,263,058.10	335,403.57	0.86	160.15
7,084.0	1.19	276.11	7,076.0	1,518.5	49.7	-152.9	4,263,058.15	335,403.39	1.25	160.76
7,116.0	1.14	274.88	7,108.0	1,550.5	49.8	-153.6	4,263,058.17	335,403.20	0.17	161.40
7,358.0	1.80	274.00	7,349.9	1,792.4	50.2	-159.7	4,263,058.32	335,401.31	0.27	167.45
7,530.0	2.30	273.50	7,521.8	1,964.3	50.6	-165.9	4,263,058.44	335,399.44	0.29	173.44
Trend Projection to Bit										

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	Local Coordinates +E/-W (ft)	Comment
7,530.0	7,521.8	50.6	-165.9	Trend Projection to Bit

Checked By: _____ Approved By: _____ Date: _____