



Weatherford®

Drilling Services

EOW Summary



CHESAPEAKE ENERGY

WELL: TIMMY MINCH OHI 3H

OHIO COUNTY, WV

Prepared by: Dev Kumar

Submitted: APRIL 08, 2014

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FINAL SURVEYS

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CHESAPEAKE ENERGY
TIMMY MINCH 3H
OHIO CO, WV
PLAN 7 FINAL PVA

Plan data for 3H

Dogleg Severity Unit: °/100.00ft

MD (USft)	Inc (°)	Az (°)	TVD (USft)	+N/-S (USft)	+E/-W (USft)	Position offsets from Slot centre (USft)	VSec (USft)	DLS (DLSU)	Buid (DLSU)	Turn (DLSU)
14776.00	90.98	336.94	5987.87	8055.21	-3524.86	8960.18	1.94	0.91	1.72	1.72
15079.71	90.08	330.93	5984.03	8383.09	-4081.73	9323.61	2.00	0.00	-1.98	-1.98
15577.05	90.08	330.93	5983.33	8817.79	-4323.36	9820.44	0.00	0.00	0.00	0.00
15706.89	90.30	333.52	5982.90	8932.66	-4383.86	9950.23	2.00	0.17	1.99	1.99
16206.89	90.30	333.52	5980.28	9380.20	-4606.80	10450.23	0.00	0.00	0.00	0.00

Plan data for 3H

Target Set Information:
Name: TIMMY MINCH 3H TARGETS
Position offsets from Slot centre
Name TVD +N/-S +E/-W Northing Easting (USft) (USft) (USft) (USft) (USft) (USft)

3H PHBL P7 5980.28 9380.20 -4606.80 588882.30 1674583.70

Plan data for 3H

Field: CHESAPEAKE OHIO CO, WV_NAD27 (WV NORTH)
Map Unit: USFT Vertical Reference Datum (VRD): Mean Sea Level
Projected Coordinate System: NAD27 / West Virginia North

Site: TIMMY MINCH
Unit: USFEET TVD Reference: Chesapeake
Company Name: CHESAPEAKE
Position: Northing: 579502.10USft Latitude: 40°5'7.5" Easting: 1679190.50USft Longitude: -80°38'47.6" North Reference: Grid Grid Convergence: -0.73° Elevation Above VRD: 1208.00USft

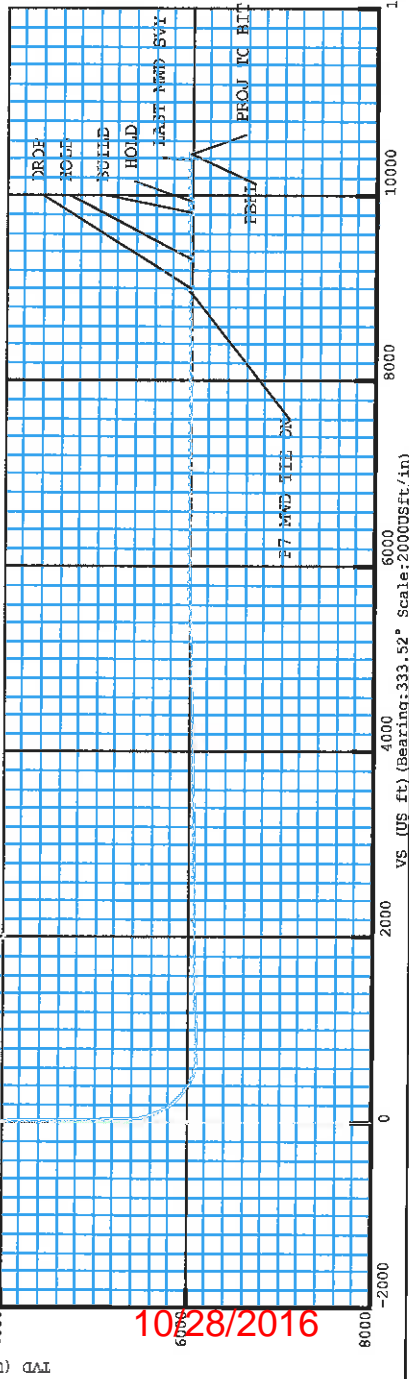
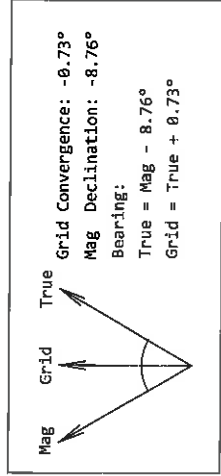
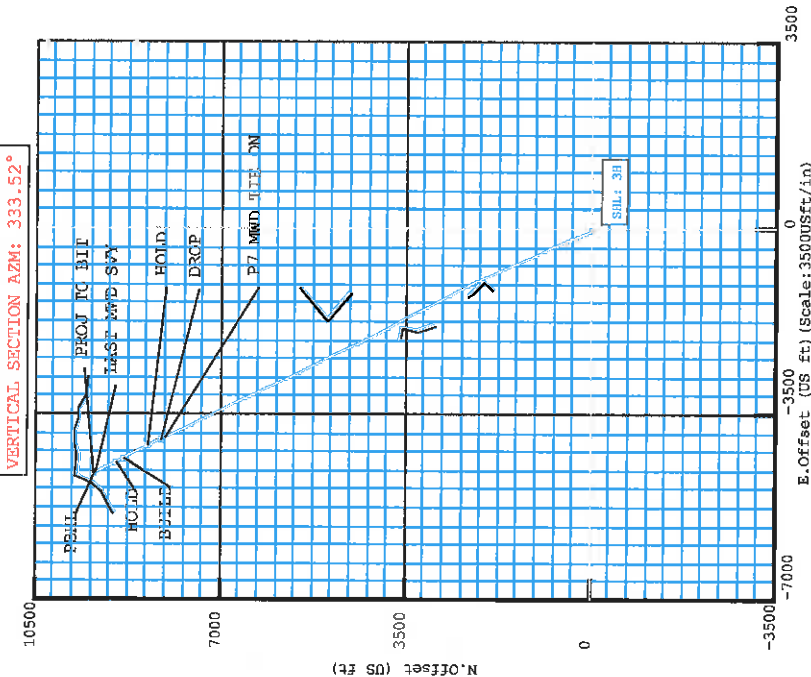
Slot: 3H
Position: Offset is from Site centre
+N/-S: 0.00USft Northing: 579502.10USft Latitude: 40°5'7.5" +E/-W: 0.00USft Easting: 1679190.50USft Longitude: -80°38'47.6" Elevation Above VRD: 1208.00USft

Well: 3H
Type: Main-Well
File Number:
Vertical Section: Position offset of origin from Slot centre: +N/-S: 0.00USft Azimuth: 333.52° +E/-W: 0.00USft Magnetic Parameters: Dip: 67.46° Date: 2014-03-11
Model: BGGM Field Strength: 52672(nT) Declination: -8.76°

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NOMAC 337
KB HEIGHT: 1230'
GL: 1208'



10/28/2016

5D Survey Report

CHESAPEAKE

Field Name: CHESAPEAKE_OHIO CO, WV_NAD27 (WV NORTH)
Site Name: TIMMY MINCH
Well Name: 3H
Survey: Definitive Survey

07 April 2014

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Survey Report For 3H

Field Name
CHESAPEAKE_OHIO_CD,
WV_NAD27 (WV
NORTH)

Company Name : CHESAPEAKE

Map Units : US ft
Vertical Reference Datum (VRD) : Mean Sea Level

Projected Coordinate System : NAD27 / West Virginia North
Comment :

Site Name
TIMMY MINCH

Units : US ft
North Reference : Grid
Northing : 579502.10 US ft
Easting : 1679190.50 US ft
Convergence Angle : -0.73
Latitude : 40.085409
Longitude : -80.646543

Elevation above Mean Sea Level: 1208.00 US ft
Comment :

Slot Name
3H

+N / -S : 0.00 US ft
+E / -W : 0.00 US ft
Position (Offsets relative to Site Centre)
Northing : 579502.10 US ft
Easting : 1679190.50 US ft
Latitude : 40.085409
Longitude : -80.646543

Slot TVD Reference : Ground Elevation
Elevation above Mean Sea Level : 1208.00 US ft
Comment :

Well Name
3H

Type : Main well
Rig Height Drill Floor : 22.00 US ft
Relative to Mean Sea Level: 1230.00 US ft
Closure Distance : 10451.1 US ft
Vertical Section (Position of Origin Relative to Slot)
+N / -S : 0.00 US ft
+E / -W : 0.00 US ft
Az : 333.52°
UWI :
Comment :
Closure Azimuth : 333.952°

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Target Set

Name : TIMMY MICH 3H TARGETS **Number of Targets :** 7

Comment :

TargetName: 3HLEP.P1 Shape: Cuboid	<p>+N / -S : 597.07US ft +E / -W : -322.64 US ft</p> <p>TVD (Drill Floor) : 6103.31 US ft</p> <p>Orientation Dimensions Azimuth : 0.00° Length : 20.00 US ft</p> <p>Inclination : 0.00° Breadth : 20.00 US ft</p> <p>Height : 20.00 US ft</p> <p>Position (Relative to Slot centre) Northing : 580199.17 US ft Easting : 1678867.86US ft</p> <p>Latitude : 40°5'14.321432" Longitude : -80°38'51.821381"</p>
TargetName: 3HLEP.PA Shape: Cuboid	<p>+N / -S : 570.93US ft +E / -W : -266.23 US ft</p> <p>TVD (Drill Floor) : 6092.32 US ft</p> <p>Orientation Dimensions Azimuth : 0.00° Length : 20.00 US ft</p> <p>Inclination : 0.00° Breadth : 20.00 US ft</p> <p>Height : 20.00 US ft</p> <p>Position (Relative to Slot centre) Northing : 580073.03 US ft Easting : 1678924.27US ft</p> <p>Latitude : 40°5'13.082060" Longitude : -80°38'51.074935"</p>
TargetName: 3H.PBFL.P1 Shape: Cuboid	<p>+N / -S : 9380.20US ft +E / -W : -4606.80 US ft</p> <p>TVD (Drill Floor) : 5984.32 US ft</p> <p>Orientation Dimensions Azimuth : 0.00° Length : 20.00 US ft</p> <p>Inclination : 0.00° Breadth : 20.00 US ft</p> <p>Height : 20.00 US ft</p> <p>Position (Relative to Slot centre) Northing : 588882.30 US ft Easting : 1674583.70US ft</p> <p>Latitude : 40°6'39.581597" Longitude : -80°39'48.383829"</p>

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TargetName: 3H PBHL P3 Shape: Cuboid	+N / -S : 9380.20US ft +E / -W : -4606.80 US ft TVD (Drill Floor) : 5958.09 US ft Orientation Dimensions Azimuth : 0.00° Length : 20.00 US ft Inclination : 0.00° Breadth : 20.00 US ft Height : 20.00 US ft Position (Relative to Slot centre) Northing : 588882.30 US ft Easting : 1674583.70US ft Latitude : 40°6'39.581597" Longitude : -80°39'48.383829"
TargetName: 3H PBHL P5 Shape: Cuboid	+N / -S : 9380.20US ft +E / -W : -4606.80 US ft TVD (Drill Floor) : 5932.85 US ft Orientation Dimensions Azimuth : 0.00° Length : 20.00 US ft Inclination : 0.00° Breadth : 20.00 US ft Height : 20.00 US ft Position (Relative to Slot centre) Northing : 588882.30 US ft Easting : 1674583.70US ft Latitude : 40°6'39.581597" Longitude : -80°39'48.383829"
TargetName: 3H PBHL P6 Shape: Cuboid	+N / -S : 9380.20US ft +E / -W : -4606.80 US ft TVD (Drill Floor) : 5970.00 US ft Orientation Dimensions Azimuth : 0.00° Length : 20.00 US ft Inclination : 0.00° Breadth : 20.00 US ft Height : 20.00 US ft Position (Relative to Slot centre) Northing : 588882.30 US ft Easting : 1674583.70US ft Latitude : 40°6'39.581597" Longitude : -80°39'48.383829"
TargetName: 3H PBHL P7 Shape: Cuboid	+N / -S : 9380.20US ft +E / -W : -4606.80 US ft TVD (Drill Floor) : 5980.28 US ft Orientation Dimensions Azimuth : 0.00° Length : 20.00 US ft Inclination : 0.00° Breadth : 20.00 US ft Height : 20.00 US ft Position (Relative to Slot centre) Northing : 588882.30 US ft Easting : 1674583.70US ft Latitude : 40°6'39.581597" Longitude : -80°39'48.383829"

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 10/28/2016

5D Survey Report

Survey Name : Definitive Survey		Survey Tool :		Company :	
Date : 11/Mar/2014		Comment :			
Geometric Model					
Model Name : BGGM	Date : 11/Mar/2014	Field Strength : 52672.6 nT	Declination : -8.76°	Dip : 67.46°	
Survey Tool Ranges					
Name	Start MD (us n)	End MD (us n)	Source Survey		
NSG Cont	0.00	5284.00	GPR05		
MWD	5284.00	16207.00	MWD		

Well path created using minimum curvature

Survey Points (Relative to Slot centre, TVD relative to Drill Floor)														
MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	N. Offset (US ft)	E. Offset (US ft)	VS (US ft)	Northing (US ft)	Easting (US ft)	DLS (°/100 US ft)	B. Rate (°/100 US ft)	T. Rate (°/100 US ft)	High to Plan (US ft)	Right to Plan (US ft)	Comment
0.00	0.00	0.00	0.00	0.00	0.00	0.00	579502.10	1679190.50	0.00	0.00	0.00	0.00	0.00	0.00
22.00	0.00	0.00	22.00	0.00	0.00	0.00	579502.10	1679190.50	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.32	184.95	100.00	-0.22	-0.02	-0.19	579501.88	1679190.48	0.41	0.41	0.00	-0.00	0.00	0.00
200.00	0.30	219.94	200.00	-0.70	-0.21	-0.53	579501.40	1679190.29	0.19	-0.02	34.99	-0.00	0.00	0.00
300.00	0.23	192.31	300.00	-1.09	-0.42	-0.79	579501.01	1679190.08	0.14	-0.07	-27.63	-0.00	0.00	0.00
400.00	0.09	87.28	400.00	-1.29	-0.39	-0.98	579500.81	1679190.11	0.27	-0.14	-105.03	-0.00	0.00	0.00
500.00	0.16	140.46	500.00	-1.39	-0.22	-1.15	579500.71	1679190.28	0.13	0.07	53.18	-0.00	0.00	0.00
600.00	0.06	119.84	600.00	-1.52	-0.08	-1.33	579500.58	1679190.42	0.11	-0.10	-20.62	-0.00	0.00	0.00
700.00	0.08	39.43	700.00	-1.49	0.01	-1.34	579500.61	1679190.51	0.09	0.02	-80.41	-0.00	0.00	0.00
800.00	0.45	44.83	800.00	-1.16	0.33	-1.19	579500.94	1679190.83	0.37	0.37	5.40	-0.00	0.00	0.00
900.00	0.28	1.50	899.99	-0.64	0.61	-0.84	579501.46	1679191.11	0.31	-0.17	-43.33	-0.00	0.00	0.00
1000.00	0.19	76.39	999.99	-0.36	0.78	-0.67	579501.74	1679191.28	0.29	-0.09	74.89	-0.00	0.00	0.00
1100.00	0.31	52.75	1099.99	-0.15	1.15	-0.65	579501.95	1679191.65	0.16	0.12	-23.64	-0.00	0.00	0.00

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SD Survey Report

Survey Points (Relative to Sibt centre, TVD relative to Drill Floor)														
MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	N.Offset (US ft)	E.Offset (US ft)	VS (US ft)	Northing (US ft)	Eastng (US ft)	DLS (+/100 US ft)	B.Rate (+/100 US ft)	T.Rate (+/100 US ft)	High to Plan (US ft)	Right to Plan (US ft)	Comment
1200.00	0.25	6.80	1199.99	0.23	1.39	-0.42	579502.33	1679191.8 ₉	0.23	-0.06	-45.95	-0.00	0.00	
1300.00	0.06	258.40	1299.99	0.43	1.37	-0.22	579502.53	1679191.8 ₇	0.27	-0.19	-108.40	-0.00	0.00	
1400.00	0.22	6.36	1399.99	0.61	1.34	-0.05	579502.71	1679191.8 ₄	0.25	0.16	107.96	-0.00	0.00	
1500.00	0.20	21.46	1499.99	0.97	1.42	0.23	579503.07	1679191.9 ₂	0.06	-0.02	15.10	-0.00	0.00	
1600.00	0.24	71.07	1599.99	1.20	1.69	0.32	579503.30	1679192.1 ₉	0.19	0.04	49.61	-0.00	0.00	
1700.00	0.21	145.61	1699.99	1.11	1.99	0.11	579503.21	1679192.4 ₉	0.27	-0.03	74.54	-0.00	0.00	
1800.00	0.16	36.60	1799.99	1.07	2.17	-0.01	579503.17	1679192.6 ₇	0.30	-0.05	-109.01	-0.00	0.00	
1900.00	0.13	174.87	1899.99	1.07	2.27	-0.05	579503.17	1679192.7 ₇	0.27	-0.03	138.27	-0.00	0.00	
2000.00	0.31	276.35	1999.99	0.99	2.01	-0.01	579503.09	1679192.5 ₁	0.36	0.18	101.48	-0.00	0.00	
2100.00	0.29	318.94	2099.99	1.21	1.57	0.38	579503.31	1679192.0 ₇	0.22	-0.02	42.59	-0.00	0.00	
2200.00	0.40	305.66	2199.98	1.61	1.12	0.94	579503.71	1679191.6 ₂	0.14	0.11	-13.28	-0.00	0.00	
2300.00	0.81	312.86	2299.98	2.29	0.32	1.91	579504.39	1679190.8 ₂	0.42	0.41	7.20	-0.00	0.00	
2400.00	0.75	294.63	2399.97	3.04	-0.79	3.08	579505.14	1679189.7 ₁	0.25	-0.06	-18.23	-0.00	0.00	
2500.00	0.96	306.98	2499.96	3.82	-2.05	4.34	579505.92	1679188.4 ₅	0.28	0.21	12.35	-0.00	0.00	
2600.00	0.96	295.46	2599.94	4.68	-3.48	5.74	579506.78	1679187.0 ₂	0.19	0.00	-11.52	-0.00	0.00	
2700.00	0.82	291.29	2699.93	5.30	-4.90	6.93	579507.40	1679185.6 ₀	0.15	-0.14	-4.17	-0.00	0.00	
2800.00	0.98	302.96	2799.92	6.03	-6.29	8.20	579508.13	1679184.2 ₁	0.24	0.16	11.67	-0.00	0.00	
2900.00	0.71	313.88	2899.91	6.92	-7.45	9.52	579509.02	1679183.0 ₅	0.31	-0.27	10.92	-0.00	0.00	
3000.00	1.07	303.09	2999.90	7.86	-8.68	10.91	579509.96	1679181.8 ₂	0.40	0.36	-10.79	-0.00	0.00	

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3D Survey Report

Survey Points (Relative to Slot centre, TVD relative to Drill Floor)														
MD (US ft)	Inc (%)	Az (°)	TVD (US ft)	N. Offset (US ft)	E. Offset (US ft)	V5 (US ft)	Northing (US ft)	Easting (US ft)	DLS (#/100 US ft)	B. Rate (#/100 US ft)	T. Rate (#/100 US ft)	High to Plan (US ft)	Right to Plan (US ft)	Comment
3100.00	1.02	300.93	3099.88	8.83	-10.23	12.46	579510.93	1679180.2 ₇	0.06	-0.05	-2.16	-0.00	0.00	
3200.00	1.08	298.44	3199.86	9.74	-11.82	13.98	579511.84	1679178.6 ₈	0.08	0.06	-2.49	-0.00	0.00	
3300.00	0.69	301.50	3299.85	10.50	-13.16	15.27	579512.60	1679177.3 ₄	0.39	-0.39	3.06	-0.00	0.00	
3400.00	0.81	299.94	3399.84	11.17	-14.29	16.37	579513.27	1679176.2 ₁	0.12	0.12	-1.56	-0.00	0.00	
3500.00	0.68	315.87	3499.83	11.95	-15.31	17.52	579514.05	1679175.1 ₉	0.24	-0.13	15.93	-0.00	0.00	
3600.00	0.92	318.44	3599.82	12.97	-16.26	18.86	579515.07	1679174.2 ₄	0.24	0.24	2.57	-0.00	0.00	
3700.00	0.62	300.27	3699.82	13.85	-17.26	20.09	579515.95	1679173.2 ₄	0.38	-0.30	-18.17	-0.00	0.00	
3800.00	0.92	311.30	3799.81	14.65	-18.33	21.28	579516.75	1679172.1 ₇	0.33	0.30	11.03	-0.00	0.00	
3900.00	0.98	300.15	3899.79	15.61	-19.67	22.74	579517.71	1679170.8 ₃	0.19	0.06	-11.15	-0.00	0.00	
4000.00	1.35	306.31	3999.77	16.74	-21.36	24.50	579518.84	1679169.1 ₄	0.39	0.37	6.16	-0.00	0.00	
4100.00	1.15	298.86	4099.75	17.92	-23.19	26.38	579520.02	1679167.3 ₁	0.26	-0.20	-7.45	-0.00	0.00	
4200.00	0.90	309.39	4199.73	18.90	-24.67	27.92	579521.00	1679165.8 ₃	0.31	-0.25	10.53	-0.00	0.00	
4300.00	0.70	293.35	4299.72	19.64	-25.84	29.10	579521.74	1679164.6 ₆	0.30	-0.20	-16.04	-0.00	0.00	
4400.00	0.71	289.86	4399.71	20.09	-26.98	30.02	579522.19	1679163.5 ₂	0.04	0.01	-3.49	-0.00	0.00	
4500.00	1.15	282.92	4499.70	20.53	-28.55	31.10	579522.63	1679161.9 ₅	0.45	0.44	-6.94	-0.00	0.00	
4600.00	1.12	280.52	4599.68	20.93	-30.48	32.33	579523.03	1679160.0 ₂	0.06	-0.03	-2.40	-0.00	0.00	
4700.00	1.30	277.94	4699.66	21.27	-32.57	33.56	579523.37	1679157.9 ₃	0.19	0.18	-2.58	-0.00	0.00	
4800.00	1.08	294.11	4799.64	21.81	-34.55	34.93	579523.91	1679155.9 ₅	0.40	-0.22	16.17	-0.00	0.00	
4900.00	1.20	294.01	4899.62	22.62	-36.37	36.46	579524.72	1679154.1 ₃	0.12	0.12	-0.10	-0.00	0.00	

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 5D 7.5.17 : 7 April 2016 16:11:46 EDT

5D Survey Report

Survey Points (Relative to Slot centre, TVD relative to Drill Floor)														
MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	N.Offset (US ft)	E.Offset (US ft)	VS (US ft)	Northing (US ft)	Easting (US ft)	DLS (/100 US ft)	S.Rate (/100 US ft)	T.Rate (/100 US ft)	High to Plan (US ft)	Right to Plan (US ft)	Comment
5000.00	1.47	295.14	4999.59	23.59	-38.49	38.28	579525.69	1679152.0 ₁	0.27	0.27	1.13	-0.00	0.00	
5100.00	1.74	282.22	5099.55	24.46	-41.13	40.23	579526.56	1679149.3 ₇	0.45	0.27	-12.92	-0.00	0.00	
5200.00	0.87	290.25	5199.53	25.04	-43.33	41.73	579527.14	1679147.1 ₇	0.89	-0.87	8.03	-0.00	0.00	
5284.00	0.87	276.83	5283.52	25.34	-44.56	42.55	579527.44	1679145.9 ₄	0.24	0.00	-15.98	-0.00	0.00	MWD TIE ON
5360.00	1.37	288.13	5359.50	25.69	-46.00	43.50	579527.79	1679144.5 ₀	0.72	0.66	14.87	-0.00	0.00	
5382.00	1.40	288.57	5381.49	25.86	-46.50	43.88	579527.96	1679144.0 ₀	0.14	0.14	2.00	-0.00	-0.00	
5413.00	1.97	312.30	5412.48	26.33	-47.25	44.64	579528.43	1679143.2 ₅	2.87	1.84	76.55	-0.00	-0.00	
5445.00	5.09	330.42	5444.42	27.94	-48.36	46.57	579530.04	1679142.1 ₄	10.24	9.75	56.63	-0.00	-0.00	
5476.00	8.95	332.55	5475.18	31.28	-50.15	50.36	579533.38	1679140.3 ₅	12.48	12.45	6.87	-0.00	-0.00	
5508.00	12.38	331.97	5506.62	36.51	-52.91	56.28	579538.61	1679137.5 ₉	10.72	10.72	-1.81	-0.00	-0.00	
5539.00	16.06	331.60	5536.67	43.22	-56.52	63.89	579545.32	1679133.9 ₈	11.87	11.87	-1.19	0.00	-0.00	
5570.00	18.99	335.57	5566.23	51.59	-60.64	73.22	579553.69	1679129.8 ₆	10.20	9.45	12.81	0.00	-0.00	
5602.00	20.88	338.22	5596.31	61.63	-64.91	84.10	579563.73	1679125.5 ₉	6.55	5.91	8.28	0.00	-0.00	
5634.00	22.19	337.85	5626.07	72.52	-69.31	95.81	579574.62	1679121.1 ₉	4.12	4.09	-1.16	-0.00	-0.00	
5665.00	23.06	337.24	5654.69	83.54	-73.86	107.71	579585.64	1679116.6 ₄	2.91	2.81	-1.97	-0.00	-0.00	
5697.00	23.75	337.85	5684.05	95.29	-78.72	120.39	579597.39	1679111.7 ₈	2.29	2.16	1.91	-0.00	-0.00	
5728.00	24.38	338.22	5712.36	107.01	-83.44	132.99	579609.11	1679107.0 ₆	2.09	2.03	1.19	-0.00	0.00	
5760.00	25.64	339.86	5741.36	119.64	-88.28	146.45	579621.74	1679102.2 ₂	4.49	3.94	5.13	-0.00	0.00	
5791.00	28.00	341.10	5769.02	132.83	-92.95	160.34	579634.93	1679097.5 ₅	7.82	7.61	4.00	-0.00	0.00	

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5D Survey Report

Survey Points (Relative to Slot centre, TVD relative to Drill Floor)														
MD (US ft)	Inc (%)	Az (°)	TVD (US ft)	N.Offset (US ft)	E.Offset (US ft)	VS (US ft)	Northing (US ft)	Easting (US ft)	DLS (%/100 US ft)	B.Rate (%/100 US ft)	T.Rate (%/100 US ft)	High to Plan (US ft)	Right to Plan (US ft)	Comment
5823.00	31.88	340.47	5796.75	147.90	-98.21	176.18	579650.00	1679092.2 ₉	12.16	12.12	-1.97	-0.00	0.00	
5855.00	35.78	338.96	5823.32	164.61	-104.39	193.88	579666.71	1679086.1 ₁	12.47	12.19	-4.72	-0.00	0.00	
5886.00	40.44	338.35	5847.71	182.42	-111.36	212.93	579684.52	1679079.1 ₄	15.08	15.03	-1.97	0.00	-0.00	
5918.00	43.63	337.85	5871.47	202.30	-119.35	234.29	579704.40	1679071.1 ₅	10.02	9.97	-1.56	0.00	-0.00	
5949.00	46.13	338.13	5893.44	222.57	-127.55	256.10	579724.67	1679062.9 ₅	8.09	8.06	0.90	0.00	-0.00	
5981.00	48.63	339.60	5915.11	244.54	-136.03	279.54	579746.64	1679054.4 ₇	8.51	7.81	4.59	0.00	-0.00	
6013.00	51.63	339.60	5935.62	267.55	-144.59	303.96	579769.65	1679045.9 ₁	9.38	9.38	0.00	0.00	-0.00	
6045.00	54.47	340.96	5954.85	291.63	-153.21	329.35	579793.73	1679037.2 ₉	9.50	8.87	4.25	0.00	-0.00	
6076.00	55.63	340.97	5972.61	315.65	-161.50	354.54	579817.75	1679029.0 ₀	3.74	3.74	0.03	0.00	-0.00	
6108.00	55.63	339.97	5990.68	340.54	-170.33	380.76	579842.64	1679020.1 ₇	2.58	0.00	-3.12	0.00	-0.00	
6140.00	57.19	339.66	6008.38	365.56	-179.53	407.26	579867.66	1679010.9 ₇	4.94	4.88	-0.97	0.00	-0.00	
6171.00	60.69	338.47	6024.37	390.35	-189.02	433.68	579892.45	1679001.4 ₈	11.76	11.29	-3.84	0.00	-0.00	
6202.00	64.06	337.97	6038.74	415.85	-199.21	461.05	579917.95	1678991.2 ₉	10.96	10.87	-1.61	0.00	-0.00	
6234.00	67.67	336.99	6051.83	442.82	-210.40	490.18	579944.92	1678980.1 ₀	11.62	11.28	-3.06	-0.00	-0.00	
6265.00	71.06	337.22	6062.75	469.55	-221.68	519.13	579971.65	1678968.8 ₂	10.96	10.94	0.74	-0.00	-0.00	
6297.00	74.13	336.10	6072.32	497.58	-233.78	549.62	579999.68	1678956.7 ₂	10.16	9.59	-3.50	-0.00	0.00	
6328.00	77.73	336.24	6079.85	525.08	-245.93	579.65	580027.18	1678944.5 ₇	11.62	11.61	0.45	-0.00	-0.00	
6359.00	81.01	335.62	6085.57	552.89	-258.35	610.09	580054.99	1678932.1 ₅	10.76	10.58	-2.00	-0.00	-0.00	
6391.00	84.44	335.47	6089.62	581.78	-271.49	641.80	580083.88	1678919.0 ₁	10.73	10.72	-0.47	-0.00	-0.00	

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West Virginia Geological and Mineral Survey

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3D Survey Report

Survey Points (Relative to Slot centre, TVD relative to Drill Floor)														
MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	N. Offset (US ft)	E. Offset (US ft)	VS (US ft)	Northing (US ft)	Easting (US ft)	DLS (#/100 US ft)	B. Rate (#/100 US ft)	T. Rate (%/100 US ft)	High to Plan (US ft)	Right to Plan (US ft)	Comment
6423.00	87.46	335.51	6091.88	610.82	-284.73	673.70	580112.92	1678905.7 ₇	9.44	9.44	0.12	-0.00	0.00	
6452.00	88.69	335.60	6092.86	637.21	-296.73	702.67	580139.31	1678893.7 ₇	4.25	4.24	0.31	-0.00	0.00	
6515.00	88.88	335.16	6094.19	694.47	-322.97	765.62	580196.57	1678867.5 ₃	0.76	0.30	-0.70	-0.00	-0.00	
6609.00	92.43	335.50	6093.12	779.87	-362.19	859.55	580281.97	1678828.3 ₁	3.79	3.78	0.36	-0.00	-0.00	
6704.00	91.92	334.44	6089.51	865.88	-402.36	954.45	580367.98	1678788.1 ₄	1.24	-0.54	-1.12	-0.00	-0.00	
6799.00	90.45	329.37	6087.55	949.64	-447.07	1049.36	580451.74	1678743.4 ₃	5.56	-1.55	-5.34	-0.00	0.00	
6893.00	92.41	333.89	6085.20	1032.30	-491.71	1143.25	580534.40	1678698.7 ₉	5.24	2.09	4.81	-0.00	-0.00	
6988.00	93.32	335.76	6080.45	1118.16	-532.07	1238.10	580620.26	1678658.4 ₃	2.19	0.96	1.97	-0.00	-0.00	
7082.00	93.32	336.37	6075.01	1203.94	-570.14	1331.85	580706.04	1678620.3 ₆	0.65	0.00	0.65	-0.00	-0.00	
7176.00	90.70	336.74	6071.71	1290.12	-607.51	1425.65	580792.22	1678582.9 ₉	2.81	-2.79	0.39	-0.00	-0.00	
7269.00	90.33	337.79	6070.88	1375.88	-643.45	1518.45	580877.98	1678547.0 ₅	1.20	-0.40	1.13	-0.00	-0.00	
7363.00	90.16	338.10	6070.47	1463.01	-678.75	1612.17	580965.11	1678511.7 ₅	0.38	-0.18	0.33	-0.00	-0.00	
7458.00	92.01	337.06	6068.67	1550.80	-714.97	1706.90	581052.90	1678475.5 ₃	2.23	1.95	-1.09	-0.00	-0.00	
7552.00	91.22	335.02	6066.03	1636.66	-753.13	1800.77	581138.76	1678437.3 ₇	2.33	-0.84	-2.17	-0.00	-0.00	
7646.00	90.33	333.14	6064.75	1721.20	-794.21	1894.75	581223.30	1678396.2 ₉	2.21	-0.95	-2.00	-0.00	-0.00	
7741.00	89.93	335.01	6064.54	1806.63	-835.74	1989.74	581308.73	1678354.7 ₆	2.01	-0.42	1.97	-0.00	-0.00	
7835.00	91.85	338.66	6063.08	1893.02	-872.71	2083.55	581395.12	1678317.7 ₉	4.39	2.04	3.88	-0.00	-0.00	
7930.00	89.41	338.82	6062.03	1981.55	-907.15	2178.15	581483.65	1678283.3 ₅	2.57	-2.57	0.17	-0.00	-0.00	
8023.00	88.86	338.67	6063.44	2068.21	-940.86	2270.75	581570.31	1678249.6 ₄	0.61	-0.59	-0.16	-0.00	-0.00	

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3D Survey Report

Survey Points (Relative to Slot centre, TVD relative to Drill Floor)														
MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	N.Offset (US ft)	E.Offset (US ft)	VS (US ft)	Northing (US ft)	Easting (US ft)	DLS (%/100 US ft)	B.Rate (%/100 US ft)	T.Rate (%/100 US ft)	High to Plan (US ft)	Right to Plan (US ft)	Comment
8118.00	89.32	335.94	6064.95	2155.83	-977.51	2365.52	581657.93	1678212.9 ₉	2.91	0.48	-2.87	-0.00	-0.00	
8212.00	89.60	332.37	6065.83	2240.41	-1018.48	2459.50	581742.51	1678172.0 ₂	3.81	0.30	-3.80	-0.00	-0.00	
8306.00	91.87	332.32	6064.63	2323.66	-1062.10	2553.46	581825.76	1678128.4 ₀	2.42	2.41	-0.05	-0.01	-0.00	
8401.00	92.01	332.44	6061.41	2407.79	-1106.12	2648.39	581909.89	1678084.3 ₈	0.19	0.15	0.13	-0.02	-0.00	
8496.00	91.01	331.86	6058.91	2491.76	-1150.48	2743.33	581993.86	1678040.0 ₂	1.22	-1.05	-0.61	-0.02	0.00	
8589.00	90.65	330.95	6057.56	2573.40	-1194.99	2836.25	582075.50	1677995.5 ₁	1.05	-0.39	-0.98	-0.02	0.00	
8682.00	90.17	331.39	6056.89	2654.87	-1239.83	2929.17	582156.97	1677950.6 ₇	0.70	-0.52	0.47	-0.02	0.00	
8777.00	90.19	331.38	6056.60	2738.27	-1285.33	3024.11	582240.37	1677905.1 ₇	0.02	0.02	-0.01	-0.02	0.00	
8871.00	90.14	332.27	6056.33	2821.13	-1329.71	3118.06	582323.23	1677860.7 ₉	0.95	-0.05	0.95	-0.03	-0.00	
8966.00	91.43	331.62	6055.02	2904.96	-1374.39	3213.02	582407.06	1677816.1 ₁	1.52	1.36	-0.68	-0.03	0.00	
9061.00	91.42	331.69	6052.66	2988.54	-1419.48	3307.94	582490.64	1677771.0 ₂	0.07	-0.01	0.07	-0.03	0.00	
9155.00	91.70	333.13	6050.10	3071.82	-1463.00	3401.88	582573.92	1677727.5 ₀	1.56	0.30	1.53	-0.03	-0.00	
9250.00	91.80	333.45	6047.20	3156.64	-1505.68	3496.84	582658.74	1677684.8 ₂	0.35	0.11	0.34	-0.03	-0.00	
9345.00	91.78	333.75	6044.23	3241.69	-1547.90	3591.79	582743.79	1677642.6 ₀	0.32	-0.02	0.32	-0.03	-0.00	
9438.00	91.57	332.72	6041.52	3324.69	-1589.76	3684.75	582826.79	1677600.7 ₄	1.13	-0.23	-1.11	-0.03	-0.00	
9533.00	91.07	333.43	6039.33	3409.37	-1632.76	3779.72	582911.47	1677557.7 ₄	0.91	-0.53	0.75	-0.03	-0.00	
9627.00	90.26	331.17	6038.24	3492.59	-1676.45	3873.68	582994.69	1677514.0 ₅	2.55	-0.86	-2.40	-0.03	0.00	
9721.00	91.21	331.39	6037.03	3575.01	-1721.62	3967.60	583077.11	1677468.8 ₈	1.04	1.01	0.23	-0.03	0.00	
9816.00	91.21	332.20	6035.02	3658.71	-1766.51	4062.54	583160.81	1677423.9 ₉	0.85	0.00	0.85	-0.03	0.00	

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5D Survey Report

Survey Points (Relative to Slot centre, TVD relative to Drill Floor)														
MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	N. Offset (US ft)	E. Offset (US ft)	VS (US ft)	Northing (US ft)	Easting (US ft)	DLS (°/100 US ft)	B.Rate (°/100 US ft)	T.Rate (°/100 US ft)	High to Plan (US ft)	Right to Plan (US ft)	Comment
9908.00	89.16	328.62	6034.73	3738.70	-1811.93	4154.38	583240.80	1677378.5 ⁷	4.48	-2.23	-3.89	-0.03	0.00	
10002.00	92.33	330.32	6033.50	3819.65	-1859.67	4248.12	583321.75	1677330.8 ³	3.83	3.37	1.81	-0.03	0.00	
10097.00	91.92	333.42	6029.98	3903.36	-1904.42	4343.01	583405.46	1677286.0 ⁸	3.29	-0.43	3.26	-0.03	-0.00	
10190.00	91.85	334.02	6026.92	3986.70	-1945.57	4435.96	583488.80	1677244.9 ³	0.65	-0.08	0.65	-0.03	-0.00	
10284.00	91.49	332.93	6024.18	4070.77	-1987.53	4529.92	583572.87	1677202.9 ⁷	1.22	-0.38	-1.16	-0.03	-0.00	
10378.00	91.75	332.60	6021.52	4154.31	-2030.54	4623.87	583656.41	1677159.9 ⁶	0.45	0.28	-0.35	-0.03	-0.00	
10473.00	90.52	334.05	6019.64	4239.18	-2073.17	4718.85	583741.28	1677117.3 ³	2.00	-1.29	1.53	-0.03	-0.00	
10568.00	90.37	330.49	6018.91	4323.25	-2117.37	4813.81	583825.35	1677073.1 ³	3.75	-0.16	-3.75	-0.03	0.00	
10662.00	91.28	333.75	6017.55	4406.32	-2161.31	4907.75	583908.42	1677029.1 ⁹	3.60	0.97	3.47	-0.03	-0.00	
10756.00	91.98	336.00	6014.88	4491.39	-2201.21	5001.68	583993.49	1676989.2 ⁹	2.51	0.74	2.39	-0.03	-0.00	
10850.00	91.70	335.54	6011.86	4577.06	-2239.77	5095.56	584079.16	1676950.7 ³	0.57	-0.30	-0.49	-0.03	-0.00	
10945.00	91.63	334.93	6009.10	4663.29	-2279.54	5190.48	584165.39	1676910.9 ⁶	0.65	-0.07	-0.64	-0.03	-0.00	
11039.00	91.33	334.86	6006.67	4748.38	-2319.41	5284.42	584250.48	1676871.0 ⁹	0.33	-0.32	-0.07	-0.03	-0.00	
11134.00	91.22	334.16	6004.56	4834.11	-2360.29	5379.38	584336.21	1676830.2 ¹	0.75	-0.12	-0.74	-0.03	-0.00	
11228.00	91.01	333.57	6002.73	4918.48	-2401.68	5473.36	584420.58	1676788.8 ²	0.67	-0.22	-0.63	-0.03	-0.00	
11319.00	90.98	333.60	6001.15	4999.97	-2442.16	5564.35	584502.07	1676748.3 ⁴	0.05	-0.03	0.03	-0.03	-0.00	
11414.00	90.72	333.52	5999.74	5085.02	-2484.46	5659.34	584587.12	1676706.0 ⁴	0.29	-0.27	-0.08	-0.03	-0.00	
11508.00	91.00	332.93	5998.33	5168.94	-2526.80	5753.32	584671.04	1676663.7 ⁰	0.69	0.30	-0.63	-0.03	-0.00	
11602.00	90.70	330.60	5996.93	5251.74	-2571.26	584726	584753.84	1676619.2 ⁴	2.50	-0.32	-2.48	-0.03	0.00	

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5D Survey Report

Survey Points (Relative to Slot centre, TVD relative to Drill Floor)													
MD (US ft)	Inc (°)	Ac (°)	TVD (US ft)	VS (US ft)	Northing (US ft)	Easting (US ft)	DLS (%/100 US ft)	B. Rate (%/100 US ft)	T. Rate (%/100 US ft)	High to Plan (US ft)	Right to Plan (US ft)	Comment	
11697.00	90.58	331.92	5995.87	5335.03	5942.18	584837.13	1676573.5	1.40	-0.13	1.39	-0.03	0.00	
11791.00	90.80	332.65	5994.74	5418.24	6036.15	584920.34	1676529.8	0.81	0.23	0.78	-0.03	-0.00	
11886.00	91.22	335.40	5993.06	5503.62	6131.12	585005.72	1676488.2	2.93	0.44	2.89	-0.03	-0.00	
11979.00	90.59	334.01	5991.60	5587.69	6224.09	585089.79	1676448.5	1.64	-0.68	-1.49	-0.03	-0.00	
12073.00	90.86	335.05	5990.41	5672.54	6318.07	585174.64	1676408.1	1.14	0.29	1.11	-0.03	-0.00	
12168.00	89.51	335.00	5990.10	5758.66	6413.03	585260.76	1676367.9	1.42	-1.42	-0.05	-0.03	-0.00	
12262.00	90.05	335.02	5990.46	5843.86	6507.00	585345.96	1676328.2	0.57	0.57	0.02	-0.03	-0.00	
12357.00	90.35	334.03	5990.13	5929.62	6601.98	585431.72	1676287.4	1.09	0.32	-1.04	-0.03	-0.00	
12452.00	88.90	335.25	5990.75	6015.46	6696.96	585517.56	1676246.7	1.99	-1.53	1.28	-0.03	-0.00	
12546.00	88.27	334.96	5993.07	6100.70	6790.89	585602.80	1676207.1	0.74	-0.67	-0.31	-0.03	-0.00	
12639.00	90.54	334.42	5994.04	6184.76	6883.86	585686.86	1676167.4	2.51	2.44	-0.58	-0.03	-0.00	
12733.00	90.31	334.84	5993.34	6269.69	6977.84	585771.79	1676127.1	0.51	-0.24	0.45	-0.03	-0.00	
12828.00	90.03	334.33	5993.06	6355.50	7072.82	585857.60	1676086.3	0.61	-0.29	-0.54	-0.03	-0.00	
12922.00	89.65	334.57	5993.32	6440.30	7166.81	585942.40	1676045.8	0.48	-0.40	0.26	-0.03	-0.00	
13015.00	89.90	335.10	5993.69	6524.48	7259.79	586026.58	1676006.2	0.63	0.27	0.57	-0.03	-0.00	
13110.00	89.23	334.98	5994.41	6610.60	7354.75	586112.70	1675966.2	0.72	-0.71	-0.13	-0.03	-0.00	
13205.00	89.39	336.21	5995.55	6697.10	7449.68	586199.20	1675926.9	1.31	0.17	1.29	-0.03	-0.00	
13300.00	88.78	331.10	5997.07	6782.20	7544.63	586284.30	1675884.8	5.42	-0.64	-5.38	-0.03	0.00	
13394.00	90.52	332.76	5997.64	6865.13	7638.59	586367.23	1675840.5	2.56	1.85	1.77	-0.03	-0.00	

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5D Survey Report

Survey Points (Relative to Slot centre, TVD relative to Drill Floor)														
MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	N. Offset (US ft)	E. Offset (US ft)	VS (US ft)	Northing (US ft)	Easting (US ft)	DLS (%/100 US ft)	B. Rate (%/100 US ft)	T. Rate (%/100 US ft)	High to Plan (US ft)	Right to Plan (US ft)	Comment
13489.00	90.59	332.94	5996.72	6949.66	-3393.26	7733.58	586451.76	1675797.2 ⁴	0.20	0.07	0.19	-0.03	-0.00	
13583.00	90.17	332.66	5996.10	7033.26	-3436.22	7827.57	586535.36	1675754.2 ⁸	0.54	-0.45	-0.30	-0.03	-0.00	
13678.00	90.33	333.07	5995.69	7117.81	-3479.55	7922.56	586619.91	1675710.9 ⁵	0.46	0.17	0.43	-0.03	-0.00	
13772.00	90.72	335.15	5994.82	7202.36	-3520.59	8016.55	586704.46	1675669.9 ¹	2.25	0.41	2.21	-0.03	-0.00	
13863.00	91.14	335.66	5993.35	7285.10	-3558.46	8107.48	586787.20	1675632.0 ⁴	0.73	0.46	0.56	-0.03	-0.00	
13958.00	90.24	333.73	5992.20	7370.97	-3599.06	8202.45	586873.07	1675591.4 ⁴	2.24	-0.95	-2.03	-0.03	-0.00	
14053.00	90.19	333.43	5991.85	7456.05	-3641.33	8297.45	586958.15	1675549.1 ⁷	0.32	-0.05	-0.32	-0.03	-0.00	
14148.00	89.88	333.23	5991.79	7540.94	-3683.97	8392.45	587043.04	1675506.5 ³	0.39	-0.33	-0.21	-0.03	-0.00	
14242.00	89.76	333.26	5992.08	7624.88	-3726.29	8486.45	587126.98	1675464.2 ¹	0.13	-0.13	0.03	-0.03	-0.00	
14337.00	90.82	334.92	5991.60	7710.32	-3767.80	8581.44	587212.42	1675422.7 ⁰	2.07	1.12	1.75	-0.03	-0.00	
14432.00	90.77	335.70	5990.28	7796.63	-3807.48	8676.38	587298.73	1675383.0 ²	0.82	-0.05	0.82	-0.03	-0.00	
14526.00	90.49	335.12	5989.25	7882.10	-3846.59	8770.32	587384.20	1675343.9 ¹	0.69	-0.30	-0.62	-0.03	-0.00	
14621.00	90.12	335.31	5988.75	7968.34	-3886.41	8865.28	587470.44	1675304.0 ⁹	0.44	-0.39	0.20	-0.03	-0.00	
14716.00	90.98	336.94	5987.83	8055.21	-3924.86	8960.18	587557.31	1675265.6 ⁴	1.94	0.91	1.72	-0.03	-0.00	
14811.00	91.50	334.93	5985.78	8141.93	-3963.59	9055.06	587644.03	1675226.9 ¹	2.18	0.55	-2.12	-0.49	1.45	
14905.00	90.91	332.61	5983.80	8226.22	-4005.12	9149.03	587728.32	1675185.3 ⁸	2.55	-0.63	-2.47	-1.26	3.99	
15001.00	90.56	332.59	5982.57	8311.44	-4049.30	9245.01	587813.54	1675141.2 ⁰	0.37	-0.36	-0.02	-1.73	5.39	
15096.00	90.58	332.79	5981.62	8395.85	-4092.88	9340.00	587897.95	1675097.6 ²	0.21	0.02	0.21	-2.38	3.54	
15099.00	90.54	333.13	5980.71	8479.57	-4135.61	9433.99	587981.67	1675054.8 ⁹	0.36	-0.04	0.36	-3.17	0.22	

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5D Survey Report

Survey Points (Relative to Slot centre, TVD relative to Drill Floor)														
MD (US ft)	Inc (°)	AZ (°)	TVD (US ft)	N.Offset (US ft)	E.Offset (US ft)	VS (US ft)	Northing (US ft)	Easting (US ft)	DLS (\$/100 US ft)	B.Rate (°/100 US ft)	T.Rate (°/100 US ft)	High to Plan (US ft)	Right to Plan (US ft)	Comment
15284.00	90.47	333.88	5979.88	8563.70	-4177.55	9527.99	588065.80	1675012.9	0.80	-0.07	0.80	-3.86	-4.00	
15379.00	90.51	334.16	5979.06	8649.09	-4219.16	9622.98	588151.19	1674971.3	0.30	0.04	0.29	-4.54	-9.10	
15472.00	90.59	334.50	5978.17	8732.91	-4259.45	9715.97	588235.01	1674931.0	0.38	0.09	0.37	-5.29	-14.60	
15567.00	90.40	332.86	5977.35	8818.06	-4301.56	9810.96	588320.16	1674888.9	1.74	-0.20	-1.73	-5.99	-19.17	
15663.00	90.38	332.42	5976.70	8903.31	-4345.68	9906.94	588405.41	1674844.8	0.46	-0.02	-0.46	-6.40	-20.76	
15757.00	90.14	332.09	5976.27	8986.51	-4389.44	10000.92	588488.61	1674801.0	0.43	-0.26	-0.35	-6.36	-19.01	
15852.00	90.00	332.98	5976.15	9070.80	-4433.26	10095.91	588572.90	1674757.2	0.95	-0.15	0.94	-5.98	-17.38	
15947.00	89.69	333.35	5976.41	9155.57	-4476.14	10190.90	588657.67	1674714.3	0.51	-0.33	0.39	-5.22	-16.79	
16042.00	88.90	333.30	5977.58	9240.45	-4518.79	10285.89	588742.55	1674671.7	0.83	-0.83	-0.05	-3.56	-16.47	
16147.00	89.70	335.34	5978.86	9335.06	-4564.28	10390.87	588837.16	1674626.2	2.09	0.76	1.94	-1.73	-17.92	LAST MWD SVY
16207.00	89.70	335.34	5979.18	9389.59	-4589.31	10450.84	588891.69	1674601.1	0.00	0.00	0.00	-1.11	-19.81	PROJ TO BIT

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