

State of West Virginia
Department of Environmental Protection - Office of Oil and Gas
Well Operator's Report of Well Work

API 47 - 069 - 00216 County OHIO District RICHLAND
Quad WHEELING Pad Name EDWARD NICHOLS PAD Field/Pool Name PANHANDLE
Farm name NICHOLS, EDWARD & JUDITH Well Number EDWARD NICHOLS OHI 1H
Operator (as registered with the OOG) SWN PRODUCTION COMPANY, LLC
Address PO BOX 12359 City SPRING State TX Zip 77391-2359

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey
Top hole Northing 4439029.070 Easting 531512.869
Landing Point of Curve Northing 4439142.995 Easting 531093.945
Bottom Hole Northing 4441090.278 Easting 530288.667

Elevation (ft) 1310.4 GL Type of Well New Existing Type of Report Interim Final
Permit Type Deviated Horizontal Horizontal 6A Vertical Depth Type Deep Shallow
Type of Operation Convert Deepen Drill Plug Back Redrilling Rework Stimulate
Well Type Brine Disposal CBM Gas Oil Secondary Recovery Solution Mining Storage Other _____
Type of Completion Single Multiple Fluids Produced Brine Gas NGL Oil Other _____
Drilled with Cable Rotary

Drilling Media Surface hole Air Mud Fresh Water Intermediate hole Air Mud Fresh Water Brine
Production hole Air Mud Fresh Water Brine
Mud Type(s) and Additive(s)
SOBM

Date permit issued 04/19/2017 Date drilling commenced 07/26/2017 Date drilling ceased 09/29/2017
Date completion activities began 12/18/2017 Date completion activities ceased 01/17/2018
Verbal plugging (Y/N) N Date permission granted N/A Granted by N/A

Please note: Operator is required to submit a plugging application within 5 days of verbal permission to plug

Freshwater depth(s) ft 395 Open mine(s) (Y/N) depths N
Salt water depth(s) ft 671 Void(s) encountered (Y/N) depths N
Coal depth(s) ft 567 Cavern(s) encountered (Y/N) depths N
Is coal being mined in area (Y/N) N

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Reviewed

C. Mc 5-10-18

Reviewed by: _____

API 47-069 - 00216 Farm name NICHOLS, EDWARD & JUDITH Well number EDWARD NICHOLS OHI 1H

CASING STRINGS	Hole Size	Casing Size	Depth	New or Used	Grade wt/ft	Basket Depth(s)	Did cement circulate (Y/N) * Provide details below*
Conductor	26	20	126	NEW	J-55/94#		Y
Surface	17.5	13.375	641	NEW	J-55/54.50#	511.2'; 553.3'	Y, 33 BBLS
Coal	SEE SURFACE						
Intermediate 1	12.25	9.625	2054	NEW	J-55/36#		Y
Intermediate 2							
Intermediate 3							
Production	8.75/8.50	5.5	13700	NEW	HCP-110/20#		Y
Tubing		2.375	6659	NEW	P-110/4.7#		N
Packer type and depth set							

Comment Details _____

CEMENT DATA	Class/Type of Cement	Number of Sacks	Slurry wt (ppg)	Yield (ft ³ /sks)	Volume (ft ³)	Cement Top (MD)	WOC (hrs)
Conductor	CLASS A	GROUT TO SURFACE				SURFACE	24
Surface	CLASS A	561	15.6	1.20	673.2	SURFACE	8
Coal	SEE SURFACE						
Intermediate 1	CLASS A	788	15.6	1.18	929.84	SURFACE	8
Intermediate 2							
Intermediate 3							
Production	CLASS A	868/1571	15.6	1.21/1.19	1050.28/1869.49	SURFACE	24
Tubing							

Drillers TD (ft) 13700 Loggers TD (ft) 13700
 Deepest formation penetrated MARCELLUS Plug back to (ft) N/A
 Plug back procedure N/A

Kick off depth (ft) 5530

Check all wireline logs run caliper density deviated/directional induction
 neutron resistivity gamma ray temperature sonic

Well cored Yes No Conventional Sidewall Were cuttings collected Yes No

DESCRIBE THE CENTRALIZER PLACEMENT USED FOR EACH CASING STRING _____

SURFACE: 7 CENTRALIZERS - EVERY THIRD JOINT OF CASING
 INTERMEDIATE: 24 CENTRALIZERS - EVERY THIRD JOINT OF CASING
 PRODUCTION: 181 CENTRALIZERS - EVERY THIRD JOINT FROM SURFACE TO TOP OF CURVE, THEN EVERY JOINT UNTIL TD

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WAS WELL COMPLETED AS SHOT HOLE Yes No DETAILS _____

WAS WELL COMPLETED OPEN HOLE? Yes No DETAILS _____

WERE TRACERS USED Yes No TYPE OF TRACER(S) USED _____

API 47- 069 - 00216 Farm name NICHOLS, EDWARD & JUDITH Well number EDWARD NICHOLS OHI 1H

PERFORATION RECORD

Stage No.	Perforation date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formation(s)
	SEE	ATTACHMENT	1		

Please insert additional pages as applicable.

STIMULATION INFORMATION PER STAGE

Complete a separate record for each stimulation stage.

Stage No.	Stimulations Date	Ave Pump Rate (BPM)	Ave Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbbls)	Amount of Nitrogen/other (units)
		SEE	ATTACHMENT	2				

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Please insert additional pages as applicable.

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PRODUCING FORMATION(S)	DEPTHS	
<u>MARCELLUS</u>	<u>6176</u> TVD	<u>6634</u> MD
_____	_____	_____
_____	_____	_____

Please insert additional pages as applicable.

GAS TEST Build up Drawdown Open Flow OIL TEST Flow Pump
SHUT-IN PRESSURE Surface 1096 psi Bottom Hole _____ psi DURATION OF TEST _____ hrs

OPEN FLOW Gas 1955 mcfpd Oil 436 bpd NGL _____ bpd Water 500 bpd GAS MEASURED BY Estimated Orifice Pilot

LITHOLOGY/ FORMATION	TOP	BOTTOM	TOP	BOTTOM	DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H ₂ S, ETC)
	DEPTH IN FT NAME TVD	DEPTH IN FT TVD	DEPTH IN FT MD	DEPTH IN FT MD	
	<u>0</u>		<u>0</u>		
	<u>SEE</u>	<u>ATTACHMENT</u>	<u>3</u>		

Please insert additional pages as applicable.

Drilling Contractor SWN DRILLING COMPANY
Address PO BOX 12359 City SPRING State TX Zip 77391-2359

Logging Company KLX ENERGY SERVICES
Address 3040 POST OAK BLVD City HOUSTON State TX Zip 77056

Cementing Company SCHLUMBERGER WELL SERVICES
Address 110 SCHLUMBERGER DRIVE City SUGARLAND State TX Zip 77478

Stimulating Company US WELL SERVICES
Address 7705 POST OAK LN #405 City HOUSTON State TX Zip 77056

Please insert additional pages as applicable.

Completed by ELIZABETH GEE Telephone 832-796-7632
Signature  Title STAFF REGULATORY ANALYST Date 03/20/2018

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**EDWARD NICHOLS OHI 1H
PERFORATION SUMMARY
ATTACHMENT 1**

STAGE NUM	Perf Date	Perf Top MD	Perf Bottom MD	# SHOTS PER STG
1	11/4/2017	13,494	13,566	33
2	12/19/2017	13,389	13,461	33
3	12/19/2017	13,284	13,356	33
4	12/19/2017	13,179	13,251	33
5	12/20/2017	13,074	13,146	33
6	12/20/2017	12,969	13,041	33
7	12/20/2017	12,864	12,936	33
8	12/20/2017	12,759	12,831	33
9	12/20/2017	12,654	12,726	33
10	12/21/2017	12,549	12,621	33
11	12/21/2017	12,444	12,516	33
12	12/21/2017	12,339	12,411	33
13	12/21/2017	12,234	12,306	33
14	12/21/2017	12,129	12,201	33
15	12/22/2017	12,024	12,096	33
16	12/22/2017	11,919	11,991	33
17	12/22/2017	11,814	11,886	33
18	12/22/2017	11,709	11,781	33
19	12/22/2017	11,604	11,676	33
20	12/23/2017	11,499	11,571	33
21	12/23/2017	11,394	11,464	33
22	12/23/2017	11,289	11,361	33
23	12/23/2017	11,184	11,256	33
24	12/23/2017	11,079	11,151	33
25	12/24/2017	10,974	11,046	33
26	12/24/2017	10,869	10,941	33
27	12/24/2017	10,764	10,836	33
28	12/24/2017	10,659	10,731	33
29	12/24/2017	10,554	10,626	33
30	12/25/2017	10,449	10,521	33
31	12/25/2017	10,344	10,416	33
32	12/25/2017	10,239	10,311	33
33	12/25/2017	10,134	10,206	33
34	12/26/2017	10,029	10,101	33
35	12/26/2017	9,924	9,996	33
36	12/26/2017	9,822	9,891	33
37	12/26/2017	9,714	9,786	33
38	12/26/2017	9,609	9,681	33
39	12/27/2017	9,504	9,576	33
40	12/27/2017	9,399	9,471	33
41	12/27/2017	9,297	9,366	33
42	12/27/2017	9,189	9,261	33

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**EDWARD NICHOLS OHI 1H
PERFORATION SUMMARY
ATTACHMENT 1**

STAGE NUM	Perf Date	Perf Top MD	Perf Bottom MD	# SHOTS PER STG
43	12/27/2017	9,084	9,156	33
44	12/28/2017	8,979	9,051	33
45	12/28/2017	8,874	8,946	33
46	12/28/2017	8,769	8,838	33
47	12/28/2017	8,664	8,736	33
48	12/28/2017	8,559	8,631	33
49	12/29/2017	8,454	8,526	33
50	12/29/2017	8,349	8,421	33
51	12/29/2017	8,244	8,318	33
52	12/29/2017	8,139	8,211	33
53	12/29/2017	8,034	8,106	33
54	12/30/2017	7,929	8,001	33
55	12/30/2017	7,820	7,896	33
56	12/30/2017	7,719	7,791	33
57	12/30/2017	7,614	7,686	33
58	12/31/2017	7,509	7,581	33
59	12/31/2017	7,404	7,476	33
60	12/31/2017	7,295	7,371	33
61	12/31/2017	7,194	7,266	33
62	12/31/2017	7,089	7,161	33
63	1/1/2018	6,984	7,056	33
64	1/1/2018	6,879	6,951	33
65	1/1/2018	6,774	6,849	33
66	1/1/2018	6,669	6,741	33

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**EDWARD NICHOLS OHI 1H
STIMULATION SUMMARY
ATTACHMENT 2**

STAGE NUM	Stim Date	Ave Pump Rate (BPM)	Ave Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of water bbls	Amount of nitrogen/other
1	12/19/2017	89	7,336	7,953	3,974	384,050	7,628	
2	12/19/2017	90	7,984	8,916	4,141	388,420	7,439	
3	12/19/2017	88	7,477	7,887	4,469	386,010	6,499	
4	12/20/2017	88	7,635	8,216	4,878	383,700	6,320	
5	12/20/2017	90	7,652	7,942	5,369	383,100	6,387	
6	12/20/2017	91	7,426	7,790	4,582	386,700	6,525	
7	12/20/2017	90	7,694	8,009	4,684	386,620	6,645	
8	12/20/2017	88	7,626	8,398	4,958	383,950	6,367	
9	12/21/2017	89	7,564	8,133	4,936	384,140	6,371	
10	12/21/2017	89	7,578	8,176	5,337	383,820	6,471	
11	12/21/2017	91	7,773	8,117	4,758	384,580	6,494	
12	12/21/2017	90	7,787	8,162	4,602	383,880	6,641	
13	12/21/2017	90	7,720	8,240	4,848	382,320	6,673	
14	12/21/2017	91	7,580	8,053	4,869	382,950	6,780	
15	12/22/2017	91	7,770	8,221	5,243	382,520	6,681	
16	12/22/2017	91	7,467	8,125	4,804	381,480	6,520	
17	12/22/2017	91	7,626	8,086	4,652	381,020	6,415	
18	12/22/2017	90	7,630	8,173	5,200	379,850	6,569	
19	12/23/2017	88	7,834	8,434	5,039	317,000	6,030	
20	12/23/2017	91	6,454	8,552	4,634	386,100	6,323	
21	12/23/2017	91	7,542	8,809	4,636	385,280	6,312	
22	12/23/2017	88	8,173	8,570	4,671	386,420	6,307	
23	12/23/2017	91	7,307	7,735	4,546	382,300	6,519	
24	12/24/2017	91	7,388	8,328	4,663	382,750	6,498	
25	12/24/2017	91	7,186	7,576	4,685	384,120	6,571	
26	12/24/2017	91	7,181	7,906	4,748	388,180	6,368	
27	12/24/2017	91	7,190	7,598	4,665	385,460	6,329	
28	12/24/2017	91	7,149	7,632	4,999	382,860	6,471	
29	12/25/2017	91	7,328	7,972	4,958	379,610	6,422	
30	12/25/2017	92	7,180	8,032	4,983	386,630	6,326	
31	12/25/2017	90	7,255	7,826	5,047	384,640	6,233	
32	12/25/2017	91	7,296	7,632	4,781	383,620	6,445	
33	12/26/2017	92	7,623	8,192	4,833	385,730	6,358	
34	12/26/2017	91	7,172	7,782	4,702	380,760	6,332	
35	12/26/2017	91	7,137	8,675	4,491	384,775	6,964	
36	12/26/2017	91	6,997	7,424	4,774	383,610	6,239	
37	12/26/2017	91	6,951	7,527	5,313	382,830	6,322	
38	12/26/2017	91	7,079	7,681	5,191	383,160	6,167	
39	12/27/2017	91	7,146	7,576	4,753	386,210	6,378	
40	12/27/2017	90	6,778	7,511	4,667	385,585	6,280	
41	12/27/2017	91	6,953	7,355	4,693	385,425	6,138	
42	12/27/2017	92	6,970	7,975	4,904	383,800	6,101	
43	12/27/2017	89	6,766	7,208	4,965	383,310	6,134	
44	12/28/2017	89	6,687	7,113	4,855	382,980	6,096	
45	12/28/2017	88	6,848	7,288	4,651	386,400	6,303	
46	12/28/2017	89	6,719	6,966	4,722	385,775	6,003	

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**EDWARD NICHOLS OHI 1H
STIMULATION SUMMARY
ATTACHMENT 2**

STAGE NUM	Stim Date	Ave Pump Rate (BPM)	Ave Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of water bbls	Amount of nitrogen/other
47	12/28/2017	91	6,814	7,458	4,904	384,050	6,275	
48	12/29/2017	90	6,845	7,579	4,836	384,140	6,325	
49	12/29/2017	90	6,750	7,509	4,890	384,050	6,323	
50	12/29/2017	86	6,592	6,865	4,797	386,820	6,052	
51	12/29/2017	88	6,543	6,784	4,631	385,910	5,949	
52	12/29/2017	90	6,729	7,105	4,844	382,510	6,088	
53	12/30/2017	91	6,715	7,376	4,897	382,180	5,983	
54	12/30/2017	89	6,471	6,757	4,998	383,360	6,633	
55	12/30/2017	90	6,709	6,964	4,843	382,790	6,271	
56	12/30/2017	87	6,559	6,770	5,024	383,030	6,166	
57	12/31/2017	91	6,671	6,997	4,957	382,550	6,051	
58	12/31/2017	89	6,643	6,940	5,008	381,420	5,973	
59	12/31/2017	90	6,595	6,926	4,582	381,900	5,943	
60	12/31/2017	90	6,573	6,999	4,792	383,100	5,949	
61	12/31/2017	90	6,658	6,985	4,851	382,020	5,927	
62	12/31/2017	91	6,544	6,979	4,881	381,830	5,892	
63	1/1/2018	92	6,538	7,142	4,929	378,600	5,862	
64	1/1/2018	90	6,681	6,986	4,665	382,900	6,109	
65	1/1/2018	90	6,449	6,714	5,061	379,160	5,810	
66	1/2/2018	90	6,481	6,866	4,358	373,620	5,848	

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EDWARD NICHOLS OHI 1H

API: 47-069-00216

ATTACHMENT 3

LITHOLOGY/FORMATION	TOP DEPTH, MD (FT)	TOP DEPTH, TVD (FT)	BOTTOM DEPTH, MD (FT)	BOTTOM DEPTH, TVD (FT)	QUANTITY AND TYPE OF FLUID
Base of Fresh Water	NA	NA	395.00	395.00	
Top of Salt Water	671.0000	671.0000	NA	NA	
Pittsburgh Coal	567.00	567.00	572.00	572.00	
Big Injun (ss)	1718.00	1717.00	1898.00	1897.00	
Berea (siltstone)	2168.00	2167.00	5767.00	5633.00	
Rhinestreet (shale)	5767.00	5633.00	6063.00	5882.00	
Cashaqua (shale)	6063.0000	5882.0000	6134.0000	5932.0000	
Middlesex (shale)	6134.0000	5932.0000	6242.0000	6002.0000	
Burket (shale)	6242.00	6002.00	6271.00	6019.00	
Tully (ls)	6271.00	6019.00	6359.00	6067.00	
Mahantango (shale)	6359.00	6067.00	6634.00	6176.00	
Marcellus (shale)	6634.00	6176.00	NA	NA	GAS

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Hydraulic Fracturing Fluid Product Component Information Disclosure



Job Start Date:	12/19/2017
Job End Date:	1/2/2018
State:	West Virginia
County:	Ohio
API Number:	47-069-00216-00-00
Operator Name:	Southwestern Energy
Well Name and Number:	Edward Nichols OHI 1H
Latitude:	40.10100062
Longitude:	-80.63020490
Datum:	NAD83
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	6,221
Total Base Water Volume (gal):	17,341,572
Total Base Non Water Volume:	0

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Southwestern Energy	Carrier/Base Fluid					
Sand	J.S. Well Services, LLC	Proppant					
HCL Acid (12.6%-17.5%)	J.S. Well Services, LLC	Bulk Acid	Crystalline Silica, quartz	14808-60-7	100.00000	14.64703	
CPS 500	J.S. Well Services, LLC	Fluid Loss Additive	Water	7732-18-5	87.40000	0.85536	
WFRA-2000	J.S. Well Services, LLC	Friction Reducer	Hydrogen Chloride	7647-01-0	17.50000	0.19887	
			Ceramic Microspheres	66402-68-4	65.00000	0.28754	
			Glutaraldehyde	111-30-8	1.00000	0.00309	
			Water	7732-18-5	60.00000	0.05181	
			2-Propanoic acid, polymer with 2-propanamide	29003-06-9	30.00000	0.02590	
			Hydrated light distillate (petroleum)	64742-47-8	30.00000	0.02124	
BIOC11	Champion	Anti-Bacterial Agent					

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Edward Nichols OHI 1H Ohio County, WV Quail 9

Plan Data for Edward Nichols OHI 1H

Field: SOUTHWESTERN OHIO CO, WV UTM NAD 83 (17N)
Vertical Reference Datum (VRD): Mean Sea Level
Projected Coordinate System: NAD83 / UTM zone 17N

Map Unit: USft
Site: Edward Nichols Pad
Unit: USfeet TVD Reference:
Company Name: SOUTHWESTERN ENERGY
Position: Northing: 14563684.96USft Latitude: 40.100966°
Easting: 1743803.84USft Longitude: -80.630277°
North Reference: Grid Grid Convergence: 0.24°
Elevation Above VRD: 1310.00USft

Slot: Edward Nichols OHI 1H
Position:
Offset is from Site centre
+N/-S: 29.57USft Northing: 14563714.54USft Latitude: 40.100966°
+E/-W: 1.47USft Easting: 1743805.31USft Longitude: -80.630277°
Elevation Above VRD: 1310.00USft

Well: Edward Nichols OHI 1H
Type: Main-Well
File Number:

Plan Folder: P2 Plan: P2:V2
Vertical Section: Position offset of origin from Slot centre:
+N/-S: 0.00USft Azimuth: 329.40°
+E/-W: 0.00USft

Magnetic Parameters:
Model: Field Strength: Declination: Dip: Date:
bggm2017 52368(N1) -8.79° 67.17° 2017-09-22

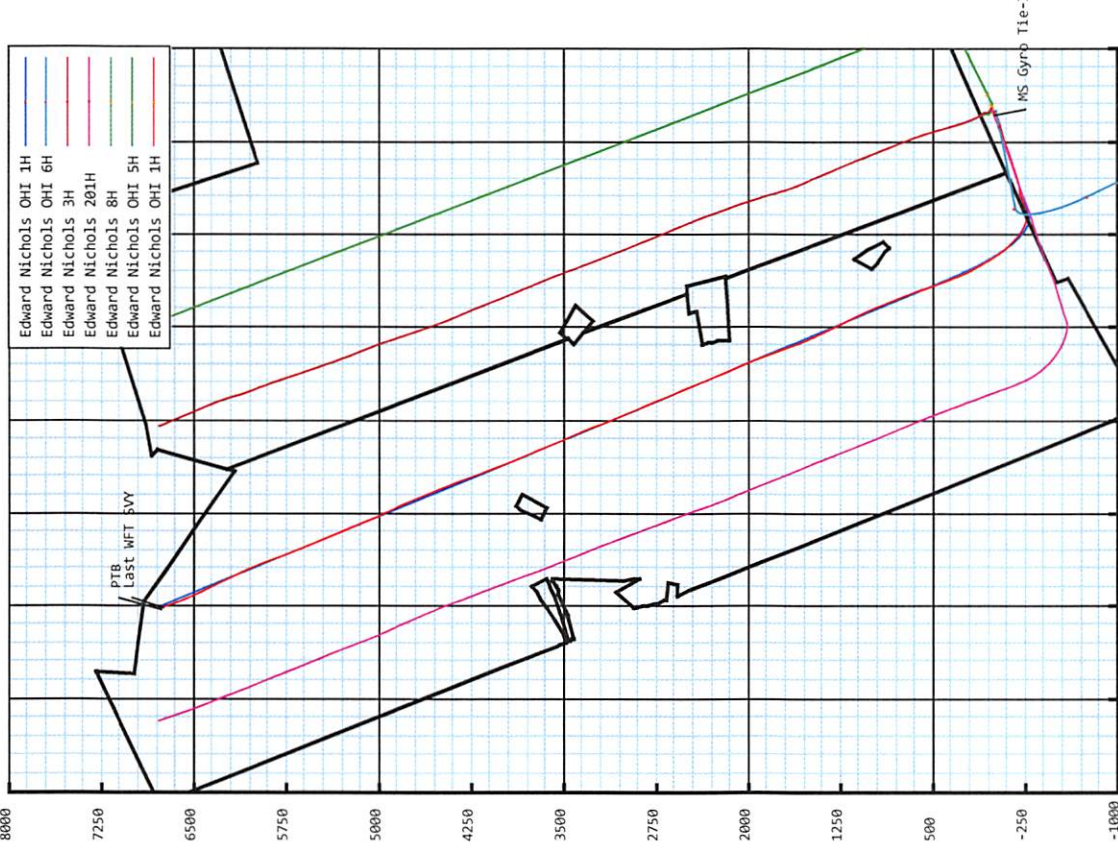
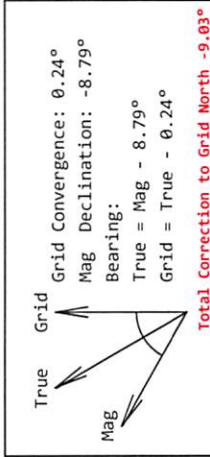
Plan Data for Edward Nichols OHI 1H

Plan Point Information:

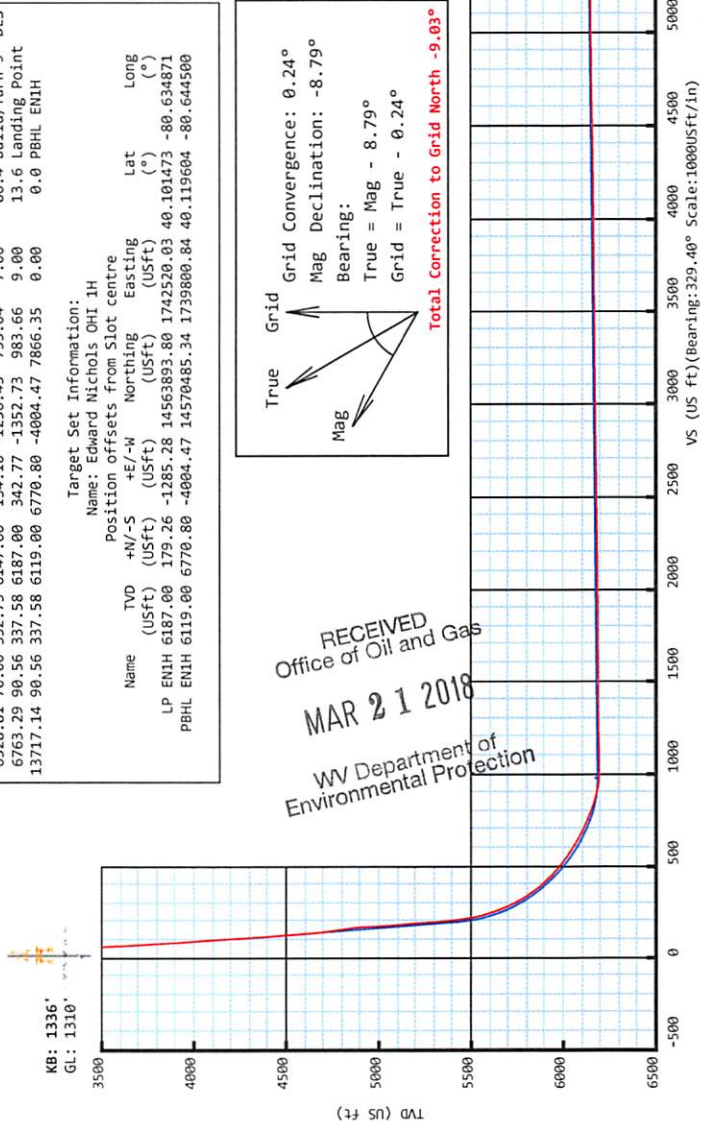
Dogleg Severity (USft)	MD Inc (USft)	Az (°)	TVD (USft)	+N/-S (USft)	+E/-W (USft)	VSec (USft)	Position offsets from Slot centre (USft)	DLS Tool-face Comments
4502.00	17.04	253.52	4430.74	-181.30	-541.43	119.57	1.41	356.2 Last WFT SVY
4585.00	18.12	253.29	4509.86	-188.46	-565.46	125.64	1.30	356.2 PTB
5560.93	18.12	253.29	5437.39	-275.74	-856.17	198.51	0.00	0.0 Curve KOP 7° DLS
6528.81	70.00	332.73	6147.00	134.10	-1256.45	755.04	7.00	86.4 Build/Turn 9° DLS
6763.29	90.56	337.58	6187.00	342.77	-1352.73	983.66	9.00	13.6 Landing Point
13717.14	90.56	337.58	6119.00	6770.80	-4804.47	7866.35	0.00	0.0 PBHL ENIH

Target Set Information:

Name: Edward Nichols OHI 1H
Position offsets from Slot centre
+N/-S (USft) +E/-W (USft) Northing (USft) Easting (USft) Lat (°) Long (°)
LP ENIH 6187.00 179.26 -1285.28 14563893.80 1742520.03 40.101473 -80.634871
PBHL ENIH 6119.00 6770.80 -4804.47 14570485.34 1739800.84 40.119604 -80.644500



Drawing By: Gary Rhodes Date: 23 September 2017
Office Name: MicCon DS
Address: 7725 W. Reno Ave, Ste. #220
Oklahoma City, OK 73127
Phone: +1.405.720.4257



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**5D Survey Report**

SOUTHWESTERN ENERGY

Field Name: *SOUTHWESTERN_OHIO CO, WV UTM NAD 83 (17N)*
Site Name: *Edward Nichols Pad*
Well Name: *Edward Nichols OHI 1H*
Survey: *Definitive survey*

29 September 2017

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Edward Nichols OHI 1H

Field Name: SOUTHWESTER N_OHIO CO, WV UTM NAD 83 (17N)	Map Units: US ft	Company Name: SOUTHWESTERN ENERGY
	Vertical Reference Datum (VRD): Mean Sea Level	
	Projected Coordinate System: NAD83 / UTM zone 17N	
	Comment:	

Site: Edward Nichols Pad	Units: US ft	North Reference: Grid	Convergence Angle: 0.24
	Position:	Northing: 14563684.97 US ft	Latitude: 40° 6' 3.19"
		Easting: 1743803.84 US ft	Longitude: -80° 37' 49.02"
	Elevation above MSL: 1310.00 US ft		
Comment:			

Slot: Edward Nichols OHI 1H	Position (Relative to Site Centre)		
	+N/-S: 29.57 US ft	Northing: 14563714.54 US ft	Latitude: 40°6'3.48"
	+E/-W: 1.47 US ft	Easting: 1743805.31 US ft	Longitude: -80°37'49.00"
	Elevation above MSL: 1310.00 US ft		
Comment:			

Well: Edward Nichols OHI 1H	Type: Main well	UWI:
	File Number:	Comment:
	Closure Distance: 7865.27 US ft	Closure Azimuth: 329.29°
	Vertical Section: Position of Origin (Relative to Slot centre)	
	+N/-S: -0.00 US ft	+E/-W: 0.00 US ft Az: 329.40°

Drill floor:	Survey Name: Definitive Survey		
Rig Height (Well TVD Reference): 26.00 US ft	Elevation above MSL: 1336.00 US ft	Inclination: 0.00°	Azimuth: 0.00°

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Survey Name: Definitive Survey

Date: 06/Jul/2017	Survey Tool: See Survey Tool Ranges below.	Comment:	Company:
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Magnetic Model:

Model Name: bggm2017	Date: 22/Sep/2017	Field Strength: 52368.4 nT	Declination: -8.79°	Dip: 67.17°
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Tie Point:

MD: 0.00 US ft	Inclination: 0.00°	Azimuth: 0.00°	TVD: 0.00 US ft	North Offset: -0.00 US ft	East Offset: 0.00 US ft
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Survey Tool Ranges:

Name	Start MD(USft)	End MD(USft)	Source Survey
GYRO-NS_OW	0.00	1242.00	Gyro_02
MFAC_US_V2	1242.00	2174.00	WFT MWD_02-MFAC2
MWD	2174.00	4502.00	WFT MWD_02-MWD2
MWD	4502.00	13700.00	WFT MWD_03

5D Survey Report

Wellpath created using minimum curvature.

Survey Points: (Relative to Slot centre)(TVD relative to Well TVD Reference)										
MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	VS (US ft)	N.Offset (US ft)	E.Offset (US ft)	Northing (US ft)	Easting (US ft)	DLS (°/100US ft)	Comment
0.00	0.00	0.00	0.00	0.00	-0.00	0.00	14563714.54	1743805.31	0.00	
113.00	0.48	289.93	113.00	0.37	0.16	-0.44	14563714.70	1743804.86	0.42	
213.00	0.53	294.64	212.99	1.07	0.50	-1.26	14563715.04	1743804.05	0.06	
313.00	0.53	295.98	312.99	1.83	0.89	-2.10	14563715.43	1743803.21	0.01	
413.00	0.57	294.58	412.99	2.63	1.30	-2.96	14563715.84	1743802.35	0.04	
513.00	0.79	291.44	512.98	3.58	1.76	-4.06	14563716.30	1743801.25	0.22	
566.99	0.87	291.32	566.96	4.20	2.05	-4.79	14563716.59	1743800.52	0.15	Pittsburgh Coal :
613.00	0.94	291.23	612.97	4.77	2.31	-5.46	14563716.85	1743799.85	0.15	
671.00	1.58	277.97	670.95	5.64	2.59	-6.70	14563717.13	1743798.61	1.21	Top of Salt Water :
713.00	2.07	273.64	712.93	6.43	2.72	-8.03	14563717.26	1743797.28	1.21	
813.00	3.44	259.57	812.81	8.48	2.29	-12.78	14563716.83	1743792.53	1.52	
913.00	4.77	253.79	912.56	10.55	0.59	-19.73	14563715.13	1743785.58	1.39	
1013.00	3.50	230.62	1012.30	11.12	-2.51	-26.08	14563712.03	1743779.23	2.07	
1113.00	2.65	194.99	1112.16	9.03	-6.68	-29.04	14563707.86	1743776.27	2.05	
1213.00	1.14	190.48	1212.11	6.67	-9.89	-29.82	14563704.65	1743775.49	1.52	
1242.00	1.09	184.31	1241.10	6.22	-10.45	-29.89	14563704.09	1743775.42	0.45	MS Gyro Tie- In
1298.00	0.66	207.86	1297.10	5.62	-11.27	-30.08	14563703.27	1743775.23	0.99	
1342.00	0.69	200.48	1341.09	5.32	-11.74	-30.29	14563702.80	1743775.02	0.21	
1387.00	0.67	203.16	1386.09	4.99	-12.23	-30.49	14563702.31	1743774.82	0.08	
1430.00	0.64	199.92	1429.09	4.69	-12.69	-30.67	14563701.85	1743774.64	0.11	
1474.00	0.75	191.53	1473.08	4.32	-13.20	-30.81	14563701.34	1743774.50	0.34	
1518.00	0.69	200.43	1517.08	3.94	-13.73	-30.96	14563700.81	1743774.35	0.29	
1562.00	0.70	212.61	1561.08	3.65	-14.21	-31.20	14563700.33	1743774.11	0.34	
1606.00	0.79	210.56	1605.07	3.39	-14.70	-31.50	14563699.84	1743773.81	0.21	
1650.00	0.83	219.87	1649.07	3.13	-15.20	-31.86	14563699.34	1743773.45	0.31	
1739.00	0.80	221.12	1738.06	2.72	-16.16	-32.68	14563698.38	1743772.63	0.04	
1825.00	0.51	224.75	1824.05	2.44	-16.89	-33.34	14563697.65	1743771.97	0.34	
1901.98	0.67	226.45	1901.03	2.25	-17.44	-33.91	14563697.10	1743771.40	0.21	Base Big Injun :
1912.00	0.69	226.61	1911.05	2.22	-17.52	-34.00	14563697.02	1743771.31	0.21	
1973.00	0.87	233.30	1972.04	2.09	-18.05	-34.63	14563696.49	1743770.68	0.33	
2085.00	1.18	235.03	2084.03	1.91	-19.22	-36.26	14563695.32	1743769.05	0.28	
2130.00	0.99	237.06	2129.02	1.86	-19.70	-36.97	14563694.84	1743768.34	0.43	
2174.00	1.05	243.74	2173.01	1.88	-20.08	-37.65	14563694.46	1743767.66	0.30	
2246.05	1.80	258.06	2245.04	2.29	-20.61	-39.34	14563693.93	1743765.96	1.14	
2262.00	1.97	259.73	2260.98	2.47	-20.71	-39.86	14563693.83	1743765.45	1.14	Berea Office of Oil and Gas
2350.00	3.44	253.12	2348.88	3.62	-21.75	-43.87	14563692.79	1743761.44	1.70	
2438.00	4.67	251.66	2436.66	5.00	-23.64	-49.80	14563690.90	1743755.51	1.40	
2528.00	6.08	248.22	2526.26	6.51	-26.56	-57.71	14563687.98	1743747.60	1.61	
2615.00	7.43	252.40	2612.65	8.49	-29.97	-67.35	14563684.57	1743737.96	1.65	
2702.00	8.66	253.20	2698.80	11.31	-33.57	-78.98	14563680.97	1743726.33	1.42	
2791.00	10.48	253.13	2786.55	14.83	-37.85	-93.14	14563676.69	1743712.17	2.04	
2879.00	11.78	253.28	2872.90	18.89	-42.76	-109.40	14563671.78	1743695.91	1.48	
2965.00	13.63	253.94	2956.79	23.54	-48.09	-127.55	14563666.45	1743677.76	2.16	
3053.00	15.58	255.28	3041.94	29.38	-53.96	-148.95	14563660.58	1743656.36	2.25	
3142.00	16.86	256.58	3127.40	36.46	-59.99	-173.06	14563654.55	1743632.25	1.49	
3230.00	16.20	255.12	3211.76	43.56	-66.11	-197.34	14563648.43	1743607.97	0.89	
3317.00	16.65	254.04	3295.21	50.00	-72.65	-221.05	14563641.89	1743584.26	0.63	
3404.00	16.94	250.56	3378.50	55.60	-80.30	-244.99	14563634.24	1743560.32	1.20	
3492.00	17.03	248.45	3462.66	60.11	-89.30	-269.06	14563625.24	1743536.25	0.71	
3578.00	16.82	248.33	3544.94	64.02	-98.52	-292.34	14563616.02	1743512.97	0.25	
3666.00	16.74	249.47	3629.19	68.21	-107.66	-316.04	14563606.88	1743489.27	0.38	
3753.00	16.42	250.57	3712.57	72.79	-116.15	-339.37	14563598.39	1743465.94	0.52	
3841.00	16.20	251.42	3797.03	77.75	-124.20	-362.73	14563590.34	1743442.58	0.37	
3928.00	15.98	250.99	3880.62	82.69	-131.96	-385.56	14563582.58	1743419.75	0.29	

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5D Survey Report

Survey Points: (Relative to Slot centre)(TVD relative to Well TVD Reference)										
MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	VS (US ft)	N.Offset (US ft)	E.Offset (US ft)	Northing (US ft)	Easting (US ft)	DLS (°/100US ft)	Comment
4018.00	16.79	252.96	3966.97	88.23	-139.81	-409.70	14563574.73	1743395.61	1.09	
4106.00	18.48	253.15	4050.83	94.52	-147.58	-435.20	14563566.96	1743370.11	1.92	
4193.00	17.65	251.87	4133.54	100.65	-155.68	-460.94	14563558.86	1743344.37	1.06	
4282.00	15.22	251.02	4218.90	105.92	-163.68	-484.81	14563550.86	1743320.50	2.74	
4370.00	14.92	252.56	4303.87	110.82	-170.83	-506.54	14563543.71	1743298.77	0.57	
4458.00	16.42	253.66	4388.60	116.47	-177.72	-529.28	14563536.82	1743276.02	1.74	
4502.00	17.04	253.52	4430.74	119.57	-181.30	-541.43	14563533.24	1743263.88	1.41	
4625.00	15.72	254.50	4548.74	128.31	-190.87	-574.77	14563523.67	1743230.54	1.10	
4721.00	15.35	259.49	4641.24	136.06	-196.66	-599.80	14563517.88	1743205.51	1.44	
4817.00	17.98	263.17	4733.20	146.40	-200.74	-627.01	14563513.80	1743178.30	2.95	
4913.00	19.47	265.81	4824.12	159.49	-203.67	-657.68	14563510.87	1743147.63	1.79	
5009.00	17.40	251.28	4915.24	169.57	-209.45	-687.25	14563505.09	1743118.06	5.23	
5105.00	18.17	245.90	5006.65	174.22	-220.17	-714.51	14563494.37	1743090.80	1.89	
5201.00	19.71	257.03	5097.48	180.82	-229.92	-743.96	14563484.62	1743061.35	4.08	
5296.00	18.14	251.48	5187.35	188.77	-238.22	-773.60	14563476.32	1743031.71	2.51	
5391.00	17.60	250.61	5277.77	194.66	-247.68	-801.17	14563466.86	1743004.14	0.63	
5486.00	17.96	257.24	5368.24	201.94	-255.69	-829.01	14563458.85	1742976.30	2.16	
5582.00	17.83	266.10	5459.61	213.08	-259.96	-858.11	14563454.58	1742947.20	2.84	
5630.00	19.40	276.26	5505.11	221.17	-259.59	-873.37	14563454.95	1742931.94	7.49	
5678.00	20.63	284.58	5550.22	231.95	-256.59	-889.48	14563457.95	1742915.83	6.46	
5726.00	22.71	289.08	5594.83	245.02	-251.43	-906.43	14563463.11	1742898.88	5.54	
5766.28	24.10	291.96	5631.80	257.47	-245.81	-921.40	14563468.73	1742883.91	4.47	Upper Thinestreet :
5774.00	24.37	292.48	5638.84	260.00	-244.61	-924.34	14563469.93	1742880.97	4.47	
5822.00	26.73	295.38	5682.14	276.87	-236.20	-943.24	14563478.34	1742862.07	5.56	
5870.00	29.44	298.23	5724.49	295.91	-225.99	-963.39	14563488.55	1742841.92	6.30	
5904.62	31.47	301.62	5754.33	311.19	-217.23	-978.59	14563497.31	1742826.72	7.67	Lower Rhinstreet :
5918.00	32.27	302.83	5765.70	317.47	-213.46	-984.56	14563501.08	1742820.75	7.67	
5966.00	35.53	307.13	5805.54	341.85	-198.09	-1006.46	14563516.45	1742798.85	8.43	
5982.62	36.56	308.35	5818.98	350.94	-192.10	-1014.19	14563522.44	1742791.12	7.54	Basal Rhinstreet :
6014.00	38.53	310.50	5843.86	368.91	-179.95	-1028.95	14563534.59	1742776.36	7.54	
6062.00	41.21	312.68	5880.69	398.21	-159.52	-1051.95	14563555.02	1742753.36	6.30	
6071.08	41.81	313.13	5887.49	403.97	-155.42	-1056.36	14563559.12	1742748.95	7.39	Cashaqu :
6110.00	44.41	314.94	5915.90	429.62	-136.93	-1075.47	14563577.61	1742729.84	7.39	
6148.88	47.20	316.36	5943.00	456.70	-116.99	-1094.95	14563597.54	1742710.36	7.64	Middlesex :
6158.00	47.86	316.67	5949.16	463.26	-112.11	-1099.58	14563602.43	1742705.73	7.64	
6192.42	50.32	318.96	5971.71	488.74	-92.83	-1117.04	14563621.71	1742688.27	8.73	Lower Middlesex :
6206.00	51.30	319.82	5980.29	499.10	-84.84	-1123.89	14563629.69	1742681.42	8.73	
6250.29	53.58	322.97	6007.28	533.86	-57.41	-1145.77	14563657.13	1742659.54	7.65	Burket :
6254.00	53.78	323.23	6009.48	536.83	-55.01	-1147.57	14563659.53	1742657.74	7.65	
6289.49	55.66	325.50	6029.98	565.69	-31.47	-1164.44	14563683.07	1742640.87	7.43	Tully :
6302.00	56.33	326.27	6036.98	576.04	-22.88	-1170.26	14563691.66	1742635.05	7.43	
6350.00	58.71	327.43	6062.75	616.49	11.02	-1192.39	14563725.56	1742612.92	5.36	
6378.71	60.58	328.39	6077.26	641.25	32.01	-1205.55	14563746.55	1742599.76	7.13	
6398.00	61.84	329.02	6086.55	658.16	46.45	-1214.33	14563760.99	1742590.98	7.13	
6446.00	64.17	329.72	6108.34	700.92	83.25	-1236.12	14563797.79	1742569.19	5.03	
6494.00	66.49	330.54	6128.37	744.53	121.08	-1257.84	14563835.62	1742547.47	5.08	
6542.00	68.79	331.37	6146.63	788.91	159.88	-1279.39	14563874.42	1742525.92	5.05	
6590.00	71.50	332.11	6162.93	834.01	199.65	-1300.76	14563914.19	1742504.55	5.83	
6638.58	74.93	334.35	6176.96	880.41	241.17	-1321.69	14563955.71	1742483.61	8.33	Levanna :
6639.00	74.96	334.37	6177.07	880.81	241.53	-1321.87	14563956.07	1742483.44	8.33	
6687.00	80.08	338.36	6187.44	927.30	284.45	-1340.63	14563998.99	1742464.68	13.40	
6687.34	80.11	338.37	6187.50	927.63	284.76	-1340.76	14563999.30	1742464.55	10.24	Upper Marcellus :
6735.00	84.81	339.71	6193.75	974.20	328.87	-1357.65	14564043.41	1742447.66	10.24	
6783.00	89.88	339.34	6195.98	1021.38	373.77	-1374.42	14564088.31	1742430.89	10.59	
6831.00	90.31	339.54	6195.90	1068.65	418.72	-1391.27	14564133.26	1742414.04	0.99	

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5D Survey Report

Survey Points: (Relative to Slot centre)(TVD relative to Well TVD Reference)										
MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	VS (US ft)	N.Offset (US ft)	E.Offset (US ft)	Northing (US ft)	Easting (US ft)	DLS (°/100US ft)	Comment
6927.00	91.66	339.97	6194.25	1163.07	508.77	-1424.49	14564223.31	1742380.82	1.48	
7022.00	90.86	342.07	6192.16	1256.09	598.58	-1455.38	14564313.12	1742349.93	2.36	
7118.00	90.86	339.27	6190.72	1350.22	689.15	-1487.15	14564403.69	1742318.16	2.92	
7214.00	90.55	337.26	6189.53	1445.06	778.31	-1522.69	14564492.85	1742282.62	2.12	
7310.00	90.12	338.95	6188.97	1539.95	867.38	-1558.49	14564581.92	1742246.82	1.82	
7406.00	90.37	337.55	6188.56	1634.80	956.54	-1594.06	14564671.08	1742211.25	1.48	
7502.00	90.31	336.19	6187.99	1729.98	1044.82	-1631.77	14564759.36	1742173.54	1.42	
7599.00	90.37	333.98	6187.42	1826.50	1132.79	-1672.63	14564847.33	1742132.68	2.28	
7695.00	90.18	333.63	6186.96	1922.21	1218.93	-1715.01	14564933.47	1742090.30	0.41	
7791.00	90.49	334.27	6186.40	2017.91	1305.17	-1757.16	14565019.71	1742048.15	0.74	
7887.00	90.25	335.21	6185.78	2113.49	1391.99	-1798.13	14565106.53	1742007.18	1.01	
7983.00	90.62	336.58	6185.05	2208.87	1479.62	-1837.33	14565194.16	1741967.98	1.48	
8079.00	90.74	337.80	6183.91	2303.97	1568.10	-1874.55	14565282.64	1741930.76	1.28	
8175.00	90.62	340.18	6182.77	2398.62	1657.71	-1908.96	14565372.25	1741896.35	2.48	
8272.00	90.74	339.94	6181.62	2493.94	1748.88	-1942.04	14565463.42	1741863.27	0.28	
8368.00	90.86	339.26	6180.28	2588.41	1838.85	-1975.50	14565553.39	1741829.81	0.72	
8464.00	90.99	339.43	6178.73	2682.95	1928.67	-2009.36	14565643.21	1741795.95	0.22	
8560.00	90.56	336.93	6177.43	2777.81	2017.78	-2045.03	14565732.32	1741760.28	2.64	
8656.00	90.37	337.74	6176.65	2872.89	2106.36	-2082.02	14565820.90	1741723.28	0.87	
8753.00	90.43	338.12	6175.97	2968.81	2196.25	-2118.47	14565910.79	1741686.84	0.40	
8849.00	90.62	338.48	6175.09	3063.65	2285.44	-2153.97	14565999.98	1741651.34	0.42	
8945.00	90.56	338.43	6174.10	3158.45	2374.73	-2189.22	14566089.27	1741616.09	0.08	
9041.00	90.31	337.15	6173.37	3253.42	2463.60	-2225.50	14566178.14	1741579.81	1.36	
9137.00	90.62	337.11	6172.60	3348.54	2552.05	-2262.81	14566266.59	1741542.50	0.33	
9234.00	90.68	338.82	6171.49	3444.45	2641.96	-2299.20	14566356.50	1741506.11	1.76	
9330.00	90.68	337.79	6170.36	3539.28	2731.15	-2334.69	14566445.69	1741470.62	1.07	
9425.00	90.56	337.34	6169.33	3633.32	2818.96	-2370.94	14566533.50	1741434.37	0.49	
9521.00	90.43	336.86	6168.50	3728.45	2907.39	-2408.29	14566621.93	1741397.02	0.52	
9617.00	90.31	337.55	6167.88	3823.55	2995.89	-2445.49	14566710.43	1741359.82	0.73	
9714.00	90.31	337.55	6167.35	3919.57	3085.53	-2482.53	14566800.07	1741322.78	0.00	
9810.00	90.49	337.77	6166.68	4014.57	3174.33	-2519.02	14566888.87	1741286.29	0.30	
9906.00	90.49	339.65	6165.86	4109.30	3263.77	-2553.87	14566978.31	1741251.44	1.96	
10003.00	90.55	336.81	6164.98	4205.14	3353.84	-2589.84	14567068.38	1741215.47	2.93	
10099.00	90.55	336.05	6164.06	4300.41	3441.82	-2628.23	14567156.36	1741177.08	0.79	
10195.00	91.23	337.59	6162.57	4395.59	3530.06	-2666.01	14567244.60	1741139.30	1.75	
10291.00	91.29	338.02	6160.46	4490.54	3618.92	-2702.26	14567333.46	1741103.05	0.45	
10387.00	90.92	337.28	6158.61	4585.52	3707.69	-2738.76	14567422.23	1741066.55	0.86	
10484.00	90.80	337.74	6157.15	4681.54	3797.31	-2775.86	14567511.85	1741029.45	0.49	
10580.00	90.68	337.86	6155.91	4776.50	3886.18	-2812.13	14567600.72	1740993.18	0.18	
10676.00	90.80	338.16	6154.67	4871.41	3975.19	-2848.08	14567689.73	1740957.23	0.34	
10773.00	90.62	338.33	6153.47	4967.25	4065.28	-2884.02	14567779.82	1740921.29	0.26	
10869.00	90.43	339.34	6152.59	5061.95	4154.80	-2918.68	14567869.33	1740886.63	1.07	
10965.00	90.25	340.11	6152.02	5156.39	4244.84	-2951.95	14567959.38	1740853.36	0.82	
11060.00	90.62	339.72	6151.30	5249.79	4334.06	-2984.57	14568048.60	1740820.74	0.57	
11156.00	90.37	337.55	6150.47	5344.54	4423.46	-3019.54	14568138.00	1740785.77	2.28	
11253.00	90.18	337.65	6150.00	5440.54	4513.14	-3056.51	14568227.68	1740748.80	0.22	
11349.00	90.25	337.67	6149.64	5535.55	4601.93	-3093.00	14568316.47	1740712.31	0.08	
11445.00	90.00	337.47	6149.43	5630.57	4690.67	-3129.62	14568405.21	1740675.68	0.33	
11542.00	90.25	336.48	6149.22	5726.72	4779.94	-3167.56	14568494.48	1740637.75	1.05	
11638.00	90.00	335.09	6149.01	5822.13	4867.49	-3206.94	14568582.03	1740598.37	1.47	
11735.00	90.25	333.98	6148.80	5918.73	4955.07	-3248.64	14568669.61	1740556.67	1.17	
11831.00	90.12	336.72	6148.49	6014.21	5042.31	-3288.68	14568756.85	1740516.63	2.86	
11927.00	90.25	338.45	6148.18	6109.22	5131.05	-3325.28	14568845.59	1740480.03	1.81	
12023.00	90.25	336.07	6147.76	6204.31	5219.58	-3362.39	14568934.12	1740442.92	2.48	
12120.00	90.37	336.84	6147.24	6300.58	5308.50	-3401.14	14569023.04	1740404.17	0.80	
12215.00	90.06	337.70	6146.88	6394.68	5396.12	-3437.84	14569110.66	1740367.47	0.96	
12312.00	90.74	338.33	6146.20	6490.58	5486.07	-3474.16	14569200.61	1740331.15	0.96	
12408.00	90.43	336.72	6145.22	6585.61	5574.77	-3510.85	14569289.31	1740294.46	1.71	
12504.00	90.43	337.39	6144.50	6680.75	5663.17	-3548.28	14569377.71	1740257.03	0.70	

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WV Department of
Environmental Protection

5D Survey Report

Survey Points: (Relative to Slot centre)(TVD relative to Well TVD Reference)										
MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	VS (US ft)	N.Offset (US ft)	E.Offset (US ft)	Northing (US ft)	Easting (US ft)	DLS (°/100US ft)	Comment
12601.00	90.92	338.62	6143.36	6776.65	5753.10	-3584.60	14569467.64	1740220.71	1.36	
12697.00	90.86	339.04	6141.87	6871.34	5842.61	-3619.27	14569557.15	1740186.04	0.44	
12794.00	90.62	339.02	6140.62	6966.97	5933.18	-3653.98	14569647.72	1740151.33	0.25	
12890.00	90.62	337.74	6139.58	7061.78	6022.42	-3689.35	14569736.96	1740115.96	1.33	
12986.00	90.18	334.29	6138.91	7157.13	6110.11	-3728.36	14569824.65	1740076.95	3.62	
13082.00	90.49	334.55	6138.35	7252.75	6196.70	-3769.81	14569911.24	1740035.50	0.42	
13178.00	90.55	333.61	6137.47	7348.43	6283.04	-3811.77	14569997.58	1739993.54	0.98	
13274.00	90.80	333.11	6136.34	7444.19	6368.84	-3854.81	14570083.38	1739950.50	0.58	
13371.00	89.82	335.38	6135.82	7540.84	6456.20	-3896.96	14570170.74	1739908.35	2.55	
13467.00	90.31	336.22	6135.71	7636.24	6543.76	-3936.31	14570258.30	1739869.00	1.01	
13563.00	90.18	340.50	6135.30	7731.04	6632.97	-3971.70	14570347.51	1739833.61	4.46	
13660.00	89.94	341.12	6135.20	7826.12	6724.58	-4003.59	14570439.12	1739801.72	0.69	
13677.00	90.25	341.38	6135.17	7842.76	6740.68	-4009.05	14570455.22	1739796.26	2.38	Last WFT SVY
13700.00	90.25	341.38	6135.07	7865.26	6762.48	-4016.40	14570477.02	1739788.91	0.00	PTB

Formation Points: (Relative to Slot centre)(TVD relative to Well TVD Reference)										
MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	N.Offset (US ft)	E.Offset (US ft)	Northing (US ft)	Easting (US ft)	Name	Comment	
N/A	0.69	201.30	6238.00	-11.68	-30.27	14563702.86	1743775.04	Onondaga Limestone		
566.99	0.87	291.32	566.96	2.05	-4.79	14563716.59	1743800.52	Pittsburgh Coal		
671.00	1.58	277.97	670.95	2.59	-6.70	14563717.13	1743798.61	Top of Salt Water		
1901.98	0.67	226.45	1901.03	-17.44	-33.91	14563697.10	1743771.40	Base Big Injun		
2246.05	1.80	258.06	2245.04	-20.61	-39.34	14563693.93	1743765.96	Berea		
5766.28	24.10	291.96	5631.80	-245.81	-921.40	14563468.73	1742883.91	Upper Thinestreet		
5904.62	31.47	301.62	5754.33	-217.23	-978.59	14563497.31	1742826.72	Lower Rhinstreet		
5982.62	36.56	308.35	5818.98	-192.10	-1014.19	14563522.44	1742791.12	Basal Rhinstreet		
6071.08	41.81	313.13	5887.49	-155.42	-1056.36	14563559.12	1742748.95	Cashaqu		
6148.88	47.20	316.36	5943.00	-116.99	-1094.95	14563597.54	1742710.36	Middlesex		
6192.42	50.32	318.96	5971.71	-92.83	-1117.04	14563621.71	1742688.27	Lower Middlesex		
6250.29	53.58	322.97	6007.28	-57.41	-1145.77	14563657.13	1742659.54	Burket		
6289.49	55.66	325.50	6029.98	-31.47	-1164.44	14563683.07	1742640.87	Tully		
6378.71	60.58	328.39	6077.26	32.01	-1205.55	14563746.55	1742599.76	Mahantango		
6638.58	74.93	334.35	6176.96	241.17	-1321.69	14563955.71	1742483.61	Levanna		
6687.34	80.11	338.37	6187.50	284.76	-1340.76	14563999.30	1742464.55	Upper Marcellus		

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WV Department of
Environmental Protection

Latitude: 40°07'30" SURFACE HOLE 1476'

Latitude: 40°07'30" BOTTOM HOLE 5465'

JACKSON SURVEYING INC.

P.O. Box 1460
677 W. Main St.
Clarksburg, WV 26302
304-623-5851

GRID NORTH
UTM, NAD83 DATUM, ZONE 17, US FT

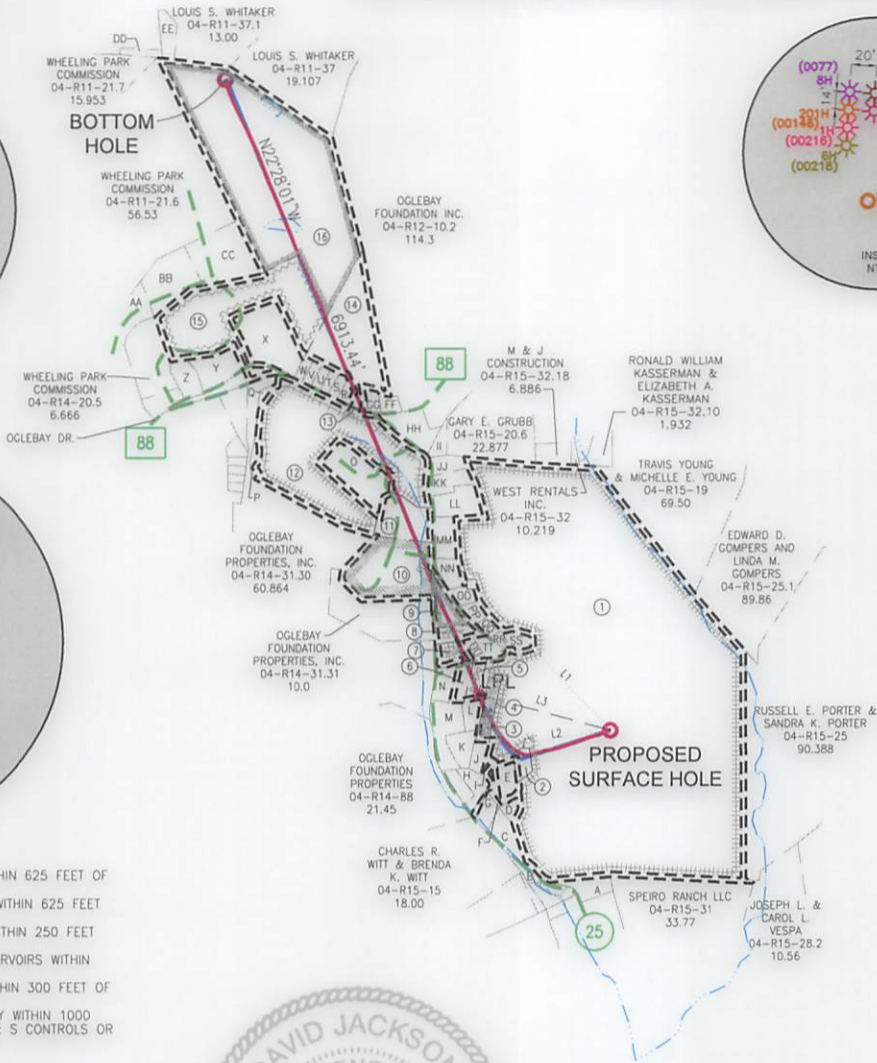
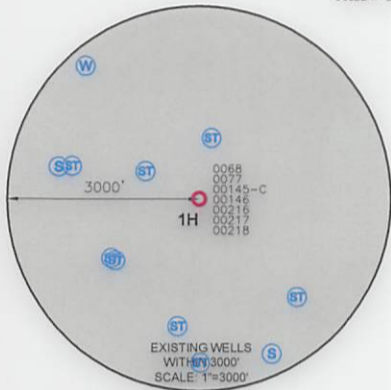
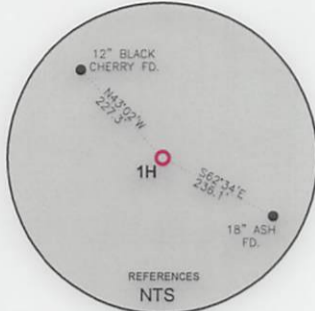
SURFACE HOLE LOCATION (SHL):	
UTM (NAD83, ZONE 17, METERS):	
NORTHING: 4,439,029.061	
EASTING: 531,512.922	
LANDING POINT (LPL):	
UTM (NAD83, ZONE 17, METERS):	
NORTHING: 4,439,083.699	
EASTING: 531,121.167	
BOTTOM HOLE LOCATION (BHL):	
UTM (NAD83, ZONE 17, METERS):	
NORTHING: 4,441,092.805	
EASTING: 530,292.357	



SURFACE HOLE LOCATION (SHL):	
UTM (NAD83, ZONE 17, METERS):	
NORTHING: 4,439,029.070	
EASTING: 531,512.869	
LANDING POINT (LPL):	
UTM (NAD83, ZONE 17, METERS):	
NORTHING: 4,439,142.995	
EASTING: 531,093.945	
BOTTOM HOLE LOCATION (BHL):	
UTM (NAD83, ZONE 17, METERS):	
NORTHING: 4,441,090.278	
EASTING: 530,288.667	

LINE	BEARING	DISTANCE	DESCRIPTION	MONUMENT
L1	N 43°28'00" W	2099.34'	SHL TO LANDMARK	2" IRON PIPE FD.
L2	S 81°00'09" W	861.68'	SHL TO LANDMARK	5/8" REBAR FD.
LINE	BEARING	DISTANCE	CURVE LENGTH	DESCRIPTION
L3	N 74°47'11" W	1424.34'	1757.37'	SHL TO LP

BOTTOM HOLE 1974'
SURFACE HOLE 8755'
Longitude: 80°37'30"



WELL RESTRICTIONS

- NO OCCUPIED DWELLINGS > 2500 SQ FT. WITHIN 625 FEET OF CENTER OF PAD.
- NO AGRICULTURE BUILDINGS > 2500 SQ FT. WITHIN 625 FEET OF CENTER OF PAD.
- WATER WELLS OR DEVELOPED SPRINGS ARE WITHIN 250 FEET OF PROPOSED WELL.
- PERENNIAL STREAMS, LAKES, PONDS, OR RESERVOIRS WITHIN 100 FEET OF THE LIMITS OF DISTURBANCE.
- NO NATURALLY PRODUCING TROUT STREAM WITHIN 300 FEET OF LIMITS OF DISTURBANCE.
- NO GROUND INTAKE OR PUBLIC WATER SUPPLY WITHIN 1000 FEET OF WELL PAD, LIMITS OF DISTURBANCE, E & S CONTROLS OR PUBLIC WATER SUPPLY.

NOTES ON SURVEY

- SURFACE AND ROYALTY OWNER INFORMATION AND THEIR BOUNDARIES SHOWN HEREON WERE PLOTTED FROM DEEDS AND/OR TAX PARCEL MAPS PROVIDED BY CLIENT AND/OR FIELD LOCATIONS.
- THIS PLAN DOES NOT REPRESENT A BOUNDARY SURVEY OF THE PARCELS SHOWN HEREON.
- ALL INSETS ARE GRID NORTH UNLESS OTHERWISE DEPICTED.

I, THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND REGULATIONS ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

P.S. 708

David L. Jackson



COMPANY: **SWN** Production Company, LLC **SWN** Production Company™

	(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS	MINIMUM DEGREE OF ACCURACY: 1/200	EDWARD NICHOLS OHI			
	WVDEP OFFICE OF OIL & GAS 601 57TH STREET CHARLESTON, WV 25034	PROVEN SOURCE OF ELEVATION: SURVEY GRADE GPS (NAVD 88, US FT)	OPERATOR'S WELL #:	1H		
			API WELL #:	47	069	00216
				STATE	COUNTY	PERMIT

WELL TYPE: OIL WASTE DISPOSAL PRODUCTION DEEP GAS LIQUID INJECTION STORAGE SHALLOW

WATERSHED: PETERS RUN OF LITTLE WHEELING CREEK ELEVATION: 1310.4'

DISTRICT: RICHLAND COUNTY: OHIO QUADRANGLE: WHEELING, WV

SURFACE OWNER: EDWARD NICHOLS & JUDITH NICHOLS ACREAGE: ±240.064

OIL & GAS ROYALTY OWNER: EDWARD NICHOLS & JUDITH NICHOLS ACREAGE: ±240.064

DRILL DRILL DEEPER REDRILL FRACTURE OR STIMULATE PLUG OFF OLD FORMATION PERFORATE NEW FORMATION

CONVERT PLUG & ABANDON CLEAN OUT & REPLUG OTHER CHANGE (SPECIFY) ASDRILLED

TARGET FORMATION: MARCELLUS ESTIMATED DEPTH: 6,196 TVD 13,700 TMD



WELL OPERATOR: SWN PRODUCTION COMPANY, LLC	DESIGNATED AGENT: DEE SOUTHALL
ADDRESS: P.O. BOX 1300	ADDRESS: P.O. BOX 1300
CITY: JANE LEW STATE: WV ZIP CODE: 26378	CITY: JANE LEW STATE: WV ZIP CODE: 26378

LEGEND:	REVISIONS:	DATE:
PROPOSED SURFACE HOLE / BOTTOM HOLE	SURVEYED BOUNDARY	02-06-2018
EXISTING / PRODUCING WELLHEAD	DRILLING UNIT	
LPL* LANDING POINT LOCATION	LEASE BOUNDARY	
EXISTING WATER WELL	ASDRILLED PATH	
EXISTING SPRING	PROPOSED PATH	
		DRAWN BY: N. MANO
		SCALE: 1" = 2000'
		DRAWING NO:
		WELL LOCATION PLAT

**JACKSON SURVEYING
INC.**
P.O. Box 1460
677 W. Main St.
Clarksburg, WV 26302
304-623-5851

WELL BORE TABLE FOR SURFACE / ROYALTY OWNERS			
TRACT	SURFACE OWNER (S) / ROYALTY OWNER (R)	TAX PARCEL	ACRES
1	EDWARD NICHOLS & JUDITH NICHOLS (S/R)	04-R15-16	240.064
TRACT	SURFACE OWNER	TAX PARCEL	ACRES
2	BRIAN R. MENGEU & LISA M. MENGEU	04-R15-16.29	1.262
3	CECIL CHIPLINSKI & TAMMY K. CHIPLINSKI	04-R15-16.23	1.023
4	PATTY M. JEWETT & JAMES A. JEWETT	04-R15-16.24	1.01
5	OLDGA V. RINE & DENISE E. RINE	04-R15-16.4	1.049
6	CURTIS WILLIAMS & GERDA WILLIAMS	04-R15-16.1	1.047
7	LEWIS R. HOPKINS & ROSEMARY HOPKINS	04-R15-16.6	2.376
8	JEANNINE DIERKES & GLENN W. DIERKES	04-R15-16.8	1.77
9	CHRISTOPHER G. KARPINSKI & HOLLY M. KARPINSKI	04-R15-16.9	1.98
10	WHEELING STATION LTD	04-R14-31.3	11.069
11	OGLEBAY VILLAGE LTD	04-R14-31.4	8.25
12	GEORGE J. KONTOGIANNIS	04-R14-31	39.027
13	WEST VIRGINIA DEPARTMENT OF TRANSPORTATION(S)	WV STATE ROUTE 88	
14	ANTIOCH SURVIVORS TRUST	04-R14-94	18.00
15	WHEELING PARK COMMISSION	04-R11-20.3	26.386
16	WHEELING PARK COMMISSION	04-R11-38	59.60

ADJOINING OWNERS TABLE			
TRACT	SURFACE OWNER	TAX PARCEL	ACRES
A	CRAIG E. STEPHEN & JENNIFER L. GILES	04-R15-10	1.74
B	LARRY TRANK & PATRICIA TRANK	04-R15-16.17	0.62
C	VENEIDA K. BAKER	04-R15-16.15	2.16
D	VENEIDA K. BAKER	04-R15-16.28	0.576
E	CHRISTOPHER J. NORMAN	04-R15-16.25	1.21
F	VENEIDA K. BAKER	04-R15-16.30	0.232
G	VENEIDA K. BAKER	04-R15-16.16	1.09
H	JEFFREY W. PFISTER & JENNIFER J. PFISTER	04-R15-16.33	1.36
I	JEFFREY W. PFISTER & JENNIFER J. PFISTER	04-R15-16.34	0.0419
J	RICHARD L. BRAK	04-R15-16.21	1.173
K	LESLIE DAVID LEWIS	04-R15-16.22	1.484
L	GREGORY FUNARI & DEANNA L. FUNARI	04-R15-16.20	1.000
M	JAMES COSMO & KATHLEEN COSMO	04-R15-16.2	3.477
N	BRUCE A. ARCHER & SHEILA M. ARCHER	04-R15-17	1.073
O	OGLEBAY VILLAGE LTD	04-R14-31.5	1.03
P	OGLEBAY FOUNDATION PROPERTIES INC.	04-R14-31.7	0.448
Q	OGLEBAY FOUNDATION PROPERTIES INC.	04-R14-31.6	0.255
R	JOHN GONGOLA & BERTHA GONGOLA	04-R14-92	0.38
S	TERRY P. SMITH & STACEY L. POPICG	04-R14-25	0.517
T	H. DOUGLAS HAIGWOOD	04-R14-24	0.515
U	TERRY P. SMITH & SCOTT P. SMITH	04-R14-23	0.46
V	ANITA L. TRISCHLER	04-R14-22	0.51
W	NANCY L. HERRIGAN TRUST	04-R14-21	0.46
X	WHEELING PARK COMMISSION	04-R14-20.4	7.368
Y	WHEELING PARK COMMISSION	04-R14-20	4.513
Z	WHEELING PARK COMMISSION	04-R14-20.6	2.166
AA	WHEELING PARK COMMISSION	04-R14-20.2	12.962
BB	WHEELING PARK COMMISSION	04-R11-21.2	5.660
CC	WHEELING PARK COMMISSION	04-R11-21.37	7.38
DD	J. ROBERT BLANKENSHIP	04-R11-24.1	1.00
EE	ROBERT R. CUSTER & K.A. CUSTER	04-R11-24.2	1.41
FF	JAMES E. SPARGO & SUSAN P. SPARGO	04-R14-26	0.92
GG	ROBERT E. SCHERICH & DOLORES M. SCHERICH	04-R14-93	0.674
HH	GENE C. VALENTINE TRUST	04-R14-30	2.88
II	JOHNNY L. PIERSON JR. & COURTNEY PIERSON	04-R14-30.4	1.29
JJ	HAROLD L. PICKENS & DEBORAH A. MCCLELLAND	04-R15-16.13	1.59
KK	LINDA H. ROSS	04-R15-16.12	1.62
LL	BOARD OF COMMISSION OHIO COUNTY	04-R15-16.11	3.09
MM	TAMILA LYNN WADE	04-R15-16.10	2.73
NN	ANDREW S. GAUDINO	04-R15-18	1.37
OO	LAWRENCE R. DIXON & JAMES M. DIXON	04-R15-16.7	0.875
PP	LAWRENCE D. BOLE & J.L. BOLE	04-R15-16.14	0.772
QQ	EDWARD J. NICHOLS, MAJORIE C. NICHOLS & JUDY C. NICHOLS	04-R15-16.19	0.219
SS	JUDITH C. NICHOLS	04-R15-16.32	0.953
RR	EDWARD J. NICHOLS, MAJORIE C. NICHOLS & JUDY C. NICHOLS	04-R15-16.31	0.192
TT	EDWARD E. NICHOLS & MARJORIE C. NICHOLS	04-R15-16.18	1.91
UU	CHARLES L. HODGSON & K.P. HODGSON	04-R15-16.3	0.766

REVISIONS:	COMPANY:	 	
	OPERATOR'S	EDWARD NICHOLS OHI	
	WELL #:	1H	
	DISTRICT:	COUNTY:	STATE:
	RICHLAND	OHIO	WV
			DATE: 02-06-2018
			DRAWN BY: N. MANO
			SCALE: N/A
			DRAWING NO:
			WELL LOCATION PLAT 2