

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

API 47-051-02040 County Marshall District Franklin
Quad Powhatan Point 7.5' Pad Name Old Crow Field/Pool Name _____
Farm name Donna Vivian Yoho (TOD) Gary Lance Yoho Well Number Old Crow S-10HM
Operator (as registered with the OOG) Tug Hill Operating, LLC
Address 380 Southpointe Boulevard, Plaza II, Suite 200 City Canonsburg State PA Zip 15317

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey
Top hole Northing 4,403,185.26 Easting 520,298.03
Landing Point of Curve Northing 4,403,820.3 Easting 520,137.9
Bottom Hole Northing 4,401,892.0 Easting 521,274.2

Elevation (ft) 1,265' 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; Base oil, osmotic inhibitor, weighting agent, viscosifier, emulsifier, hardness buffer, fluid loss additive, LCM, Shale inhibitor, de-foamer, soaping agent, coagulant, flocculant; specific additives per WSSP and Permit.

Date permit issued 6/28/2018 Date drilling commenced 7/6/2019 Date drilling ceased 11/28/2019
Date completion activities began 3/22/2021 Date completion activities ceased 4/3/2021
Verbal plugging (Y/N) N Date permission granted N/A Granted by N/A

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

Freshwater depth(s) ft 912' Open mine(s) (Y/N) depths _____
Salt water depth(s) ft 1346' Void(s) encountered (Y/N) depths N
Coal depth(s) ft 814-820', 906-912' Cavern(s) encountered (Y/N) depths N
Is coal being mined in area (Y/N) N

Reviewed by:
OS/2X/2021
8-11-21

API 47-051 - 02040 Farm name Donna Vivian Yoho (TOD) Gary Lance Yoho Well number Old Crow S-10HM

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	36"	30"	100'	NEW	94.5#	N/A	Y
Surface	17 1/2"	13 3/8"	1,014'	NEW	54.5#	N/A	Y
Coal	17 1/2"	13 3/8"	1,014'	NEW	54.5#	N/A	Y
Intermediate 1	12 1/4"	9 5/8"	2,903'	NEW	36#	N/A	Y
Intermediate 2							
Intermediate 3							
Production	8 3/4"	5 1/2"	15,049'	NEW	20#	N/A	Y
Tubing		2 3/8"	7,524'	NEW	4.7#	N/A	
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	A		15.6	1.19		0	8
Surface	A	1,073	15.6	1.19	1,296	0	8
Coal	A	1,073	15.6	1.19	1,296	0	8
Intermediate 1	A	830	15.6	1.19	1,144	0	8
Intermediate 2							
Intermediate 3							
Production	A	3,515	14.5	1.17	4,096	0	8
Tubing							

Drillers TD (ft) 15,103' Loggers TD (ft) n/a
 Deepest formation penetrated Marcellus Plug back to (ft) n/a
 Plug back procedure n/a

Kick off depth (ft) 6,263'

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 3 centralizers on surface casing at equal distance.
Intermediate - 1 centralizer every other joint.
 Production - one centralizer every other joint in lateral, one centralizer every joint through curve, one centralizer every other joint to surface.

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 _____

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**Old Crow S-10HM
PEFORATION RECORD**

Stage No.	Perforation Date	Perforated from MD ft.	Perforated to MD. Ft.	Number of Perforations	Formation(s)
1	3/22/2021	7471	7777	48	Marcellus
2	3/22/2021	7244	7391	48	Marcellus
3	3/23/2021	7439	7673	48	Marcellus
4	3/23/2021	7340	7566	48	Marcellus
5	3/23/2021	7448	7650	48	Marcellus
6	3/23/2021	7566	7996	48	Marcellus
7	3/23/2021	7424	7831	48	Marcellus
8	3/24/2021	7329	7613	48	Marcellus
9	3/24/2021	7299	7588	48	Marcellus
10	3/24/2021	7270	7557	48	Marcellus
11	3/25/2021	7288	7462	48	Marcellus
12	3/25/2021	7220	7365	48	Marcellus
13	3/25/2021	7319	7562	48	Marcellus
14	3/25/2021	7193	7406	48	Marcellus
15	3/26/2021	7321	7480	48	Marcellus
16	3/27/2021	7337	7999	48	Marcellus
17	3/27/2021	7343	7681	48	Marcellus
18	3/28/2021	7421	7712	48	Marcellus
19	3/28/2021	7261	7550	48	Marcellus
20	3/28/2021	7133	7446	48	Marcellus
21	3/28/2021	7214	7574	48	Marcellus
22	3/29/2021	7185	7630	48	Marcellus
23	3/29/2021	7046	7322	48	Marcellus
24	3/29/2021	6941	7307	48	Marcellus
25	3/29/2021	6910	7146	48	Marcellus
26	3/30/2021	6944	7171	48	Marcellus
27	3/30/2021	6881	7188	48	Marcellus
28	3/30/2021	7026	7690	48	Marcellus
29	3/30/2021	6876	7353	48	Marcellus
30	3/31/2021	6885	7067	48	Marcellus
31	3/31/2021	6687	6939	48	Marcellus
32	3/31/2021	6888	7266	48	Marcellus
33	3/31/2021	6913	7606	48	Marcellus
34	4/1/2021	6965	7319	48	Marcellus
35	4/1/2021	6806	7550	48	Marcellus
36	4/1/2021	6941	7839	48	Marcellus
37	4/2/2021	6876	7494	48	Marcellus
38	4/2/2021	6652	7085	48	Marcellus
39	4/2/2021	6543	6973	48	Marcellus
40	4/3/2021	6651	7113	48	Marcellus
41	4/3/2021	6646	7479	48	Marcellus

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OLD CROW S-10HM
STIMULATION INFORMATION PER STAGE

Stage No.	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 (units)
1	89	7471	5000	4,601	437060	8566	0
2	90	7244	5480	5,164	436200	8354	0
3	90	7439	5592	5,223	443920	8270	0
4	90	7340	5610	5,085	439300	8409	0
5	90	7448	5581	4,974	439680	8448	0
6	89	7566	5664	4,968	402300	7850	0
7	90	7424	5485	5,757	446820	8566	0
8	90	7329	5704	5,099	441980	8323	0
9	90	7299	5484	5,106	448600	8552	0
10	90	7270	5561	5,472	446940	8373	0
11	90	7288	5665	4,923	445820	8521	0
12	90	7220	5534	4,830	437880	8329	0
13	90	7319	5605	5,062	444060	8339	0
14	90	7193	5638	5,460	439980	8388	0
15	90	7321	5756	5,384	448340	8292	0
16	90	7337	5550	5,084	442745	8364	0
17	89	7343	5330	5,181	444280	8281	0
18	90	7421	5234	5,366	405640	7920	0
19	90	7261	5425	5,130	448140	8328	0
20	90	7133	5434	5,202	442420	8549	0
21	90	7214	5092	5,581	444540	8224	0
22	90	7185	5822	5,201	441440	8124	0
23	90	7046	5342	4,996	445800	8235	0
24	90	6941	5276	5,495	454920	8276	0
25	90	6910	5293	5,291	439460	8295	0
26	90	6944	5802	5,314	446600	8159	0
27	90	6881	5360	4,931	447420	8234	0
28	90	7026	5337	5,127	444720	8160	0
29	90	6876	5387	5,607	438860	8103	0
30	90	6885	5429	4,814	439980	8119	0
31	88	6687	5256	4,927	440060	8087	0
32	90	6888	5312	5,204	441840	8034	0

NY Department of Environmental Conservation
 Office of Oil and Gas
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Stage No.	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 (units)
33	91	6913	5361	5,153	441860	8199	0
34	89	6965	5644	5,085	448540	8139	0
35	90	6806	5228	5,030	449600	8212	0
36	90	6941	5606	4,733	432240	8068	0
37	90	6876	5784	5,436	437700	8162	0
38	90	6652	5375	5,460	438580	8031	0
39	90	6543	5698	5,487	449620	8125	0
40	89	6651	5353	5,076	443080	8253	0
41	89	6646	5345	4,922	438340	8001	0

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OLD CROW S-10HM

LITHOLOGY/FORMATION	TOP DEPTH IN FT/ Name TVD	BOTTOM DEPTH IN FT TVD	TOP DEPTH IN FT MD	BOTTOM DEPTH IN FT MD	DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID
Maxton	2014	2104	2025	2117	Sandstone
Big Lime	2104	2174	2117	2190	Limestone
Big Injun	2174	2458	2190	2492	Sandstone
Weir	2458	2653	2492	2707	Sandstone
Berea	2653	2998	2707	3128	Sandstone
Gordon	2998	3052	3128	3198	Sandstone
Fifty Foot	3052	3600	3198	3909	Sandstone
Speechley	3600	5022	3909	5686	Sandstone
Benson	5022	5397	5686	6178	Sandstone
Alexander	5397	5963	6178	6820	Siltstone
Rhinestreet	5963	6366	6820	7254	Black shale
Middlesex	6366	6441	7254	7352	Black shale
Geneseo/Burkett	6441	6470	7352	7393	Black shale
Tully	6470	6510	7393	7458	Limestone
Hamilton	6510	6554	7458	7538	Grey shale
Marcellus	6554	-	7538	-	Black shale

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	3/22/2021
Job End Date:	4/3/2021
State:	West Virginia
County:	Marshall
API Number:	47-051-02040-00-00
Operator Name:	Tug Hill Operating, LLC
Well Name and Number:	Old Crow S 10HM
Latitude:	39.77836520
Longitude:	-80.76297063
Datum:	NAD27
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	6,617
Total Base Water Volume (gal):	14,207,004
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	Tug Hill Operating	Carrier/Base Fluid	Water	7732-18-5	100.00000	86.41339	None
Sand (40/70 White Proppant)	ProFrac	Proppant	Silica Substrate	14808-60-7	100.00000	8.88242	None
Sand (100 Mesh Proppant)	ProFrac	Proppant	Silica Substrate	14808-60-7	100.00000	3.10575	None
Sand (30/50 White Proppant)	ProFrac	Proppant	Silica Substrate	14808-60-7	100.00000	1.19519	None
Hydrochloric Acid (7.5%)	PWS	Acidizing	Water	7732-18-5	85.00000	0.23675	None
			Hydrochloric Acid (Hydrogen Chloride)	7647-01-0	37.00000	0.10306	None
StimStream FR 9800	ChemStream	Friction Reducer	Butene, homopolymer	9003-29-6	25.00000	0.01948	None
			Alkanes, C16-20-iso-	90622-59-6	25.00000	0.01948	None
			Ethoxylated alcohols (C12-18)	68213-23-0	3.00000	0.00234	None

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MC MX 9-4743	Multi-Chem	Biocide					
			Sodium Nitrate	7631-99-4	60.00000	0.02195	None
LD-7750W	Multi-Chem	Scale Inhibitor					
			Methanol	67-56-1	60.00000	0.00500	None
			Phosphonic Acid Salt	Proprietary	5.00000	0.00042	None
ProFE 105	ProFrac	Iron Control					
			Citric Acid	77-92-9	100.00000	0.00101	None
ProHib 100	ProFrac	Acid Inhibitor					
			2-Propyn-1-ol compound w/ methyloxirane	38172-91-7	15.00000	0.00013	None
Ingredients shown above are subject to 29 CFR 1910.1200(i) and appear on Material Safety Data Sheets (MSDS). Ingredients shown below are Non-MSDS.							
Other Chemical(s)	Listed Above	See Trade Name(s) List					
			Water	7732-18-5	85.00000	0.23675	
			Butene, homopolymer	9003-29-6	25.00000	0.01948	
			Ethoxylated alcohols (C12-18)	68213-23-0	3.00000	0.00234	
			Phosphonic Acid Salt	Proprietary	5.00000	0.00042	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

Note: For Field Development Products (products that begin with FDP), MSDS level only information has been provided.

Ingredient information for chemicals subject to 29 CFR 1910.1200(i) and Appendix D are obtained from suppliers Material Safety Data Sheets (MSDS)

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← 3,645' T.H. A.D. → 453' B.H. A.D. →

**OLD CROW S LEASE
WELL 10HM
TUG HILL OPERATING**

T.H. LATITUDE 39°47'30"
B.H. LATITUDE 39°47'30"

(S.P.C. NORTH ZONE) (UTM(M) ZONE 17 NORTH)		
NAD'83 S.P.C.(FT)	N. 468,115.27	E. 1,613,552.50
NAD'83 GEO.	LAT-(N) 39.778365	LONG-(W) 80.762971
NAD'83 UTM (M)	N. 4,403,185.26	E. 520,298.03
<u>LANDING POINT</u>		
NAD'83 S.P.C.(FT)	N. 470,148.3	E. 1,613,111.9
NAD'83 GEO.	LAT-(N) 39.783929	LONG-(W) 80.764640
NAD'83 UTM (M)	N. 4,403,802.4	E. 520,153.4
<u>BOTTOM HOLE</u>		
NAD'83 S.P.C.(FT)	N. 463,813.2	E. 1,616,679.2
NAD'83 GEO.	LAT-(N) 39.766676	LONG-(W) 80.751633
NAD'83 UTM (M)	N. 4,401,890.5	E. 521,272.5

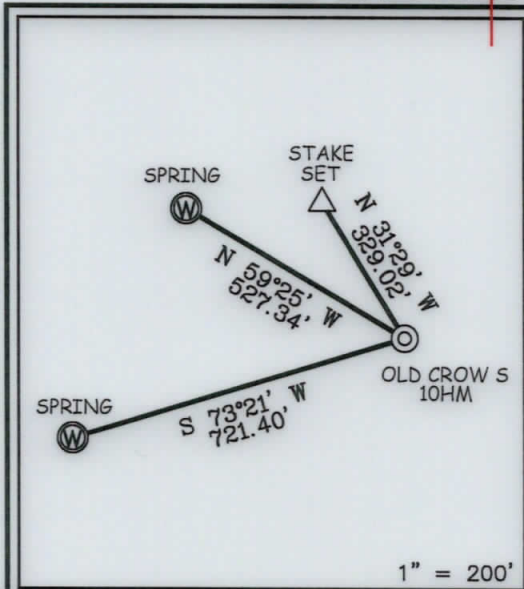
T.H. LONGITUDE 80°45'00"
B.H. LONGITUDE 80°45'00"
4,846' T.H. A.D.
9,098' B.H. A.D.

NOTES ON SURVEY

1. NO WATER WELLS WERE FOUND WITHIN 250' OF PROPOSED GAS WELL. NO AGRICULTURAL BUILDINGS ≥ 2500 SQ. FT. OR DWELLINGS WERE FOUND WITHIN 625' OF THE CENTER OF PROPOSED WELL PAD.
2. WELL SPOT CIRCLE & TOPO MARK SCALE IS 1"=2000'
3. AS-DRILLED DATA PROVIDED BY TUG HILL OPERATING, LLC.
4. PLAT UPDATED TO SHOW AS-DRILLED PATH.

B.H. A.D.

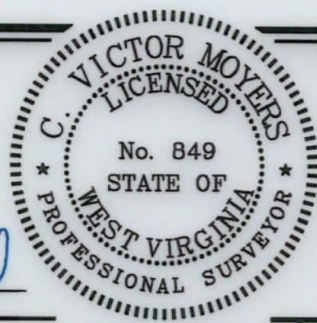
REFERENCES



12 Vanhorn Drive | P.O. Box 150 | Glenville, WV 26351 | 304.462.5634
1412 Kanawha Boulevard, East | Charleston, WV 25301 | 304.346.3952
254 East Beckley Bypass | Beckley, WV 25801 | 304.255.5296
sllsv.com

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 THE REGULATIONS ISSUED AND PRESCRIBED BY THE DIVISION OF ENVIRONMENTAL PROTECTION.

P.S. 849 *C. Victor Moyers*



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.
DATE JUNE 10, 20 20
REVISED _____, 20 ____
OPERATORS WELL NO. OLD CROW S-10HM
API WELL NO. 47 - 051 - 2040
STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1 / 2500 FILE NO. 8796P10HMAD.dwg
HORIZONTAL & VERTICAL CONTROL DETERMINED BY DGPS (SURVEY GRADE TIE TO CORS NETWORK) SCALE 1" = 2000'

STATE OF WEST VIRGINIA
DIVISION OF ENVIRONMENTAL PROTECTION
OFFICE OF OIL AND GAS



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

LOCATION: ELEVATION 1,265' WATERSHED TRIBUTARY OF FISH CREEK (HUC-10)
DISTRICT FRANKLIN COUNTY MARSHALL QUADRANGLE POWHATAN POINT 7.5'

SURFACE OWNER DONNA VIVIAN YOHO (TOD) GARY LANCE YOHO ACREAGE 71.205±
ROYALTY OWNER DONNA VIVIAN YOHO, ET AL ACREAGE 08/27/2021

PROPOSED WORK: DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE PLUG OFF OLD FORMATION PERFORATE NEW FORMATION PLUG AND ABANDON CLEAN OUT AND REPLUG OTHER

PHYSICAL CHANGE IN WELL (SPECIFY) _____ TARGET FORMATION MARCELLUS
ESTIMATED DEPTH TVD: 6,689' / TMD: 15,008'

WELL OPERATOR TUG HILL OPERATING, LLC ADDRESS 1320 SOUTH UNIVERSITY DRIVE, SUITE 500 FORT WORTH, TX 76107
DESIGNATED AGENT DIANNA STAMPER CT CORPORATION SYSTEM ADDRESS 5400 D BIG TYLER ROAD CHARLESTON, WV 25313

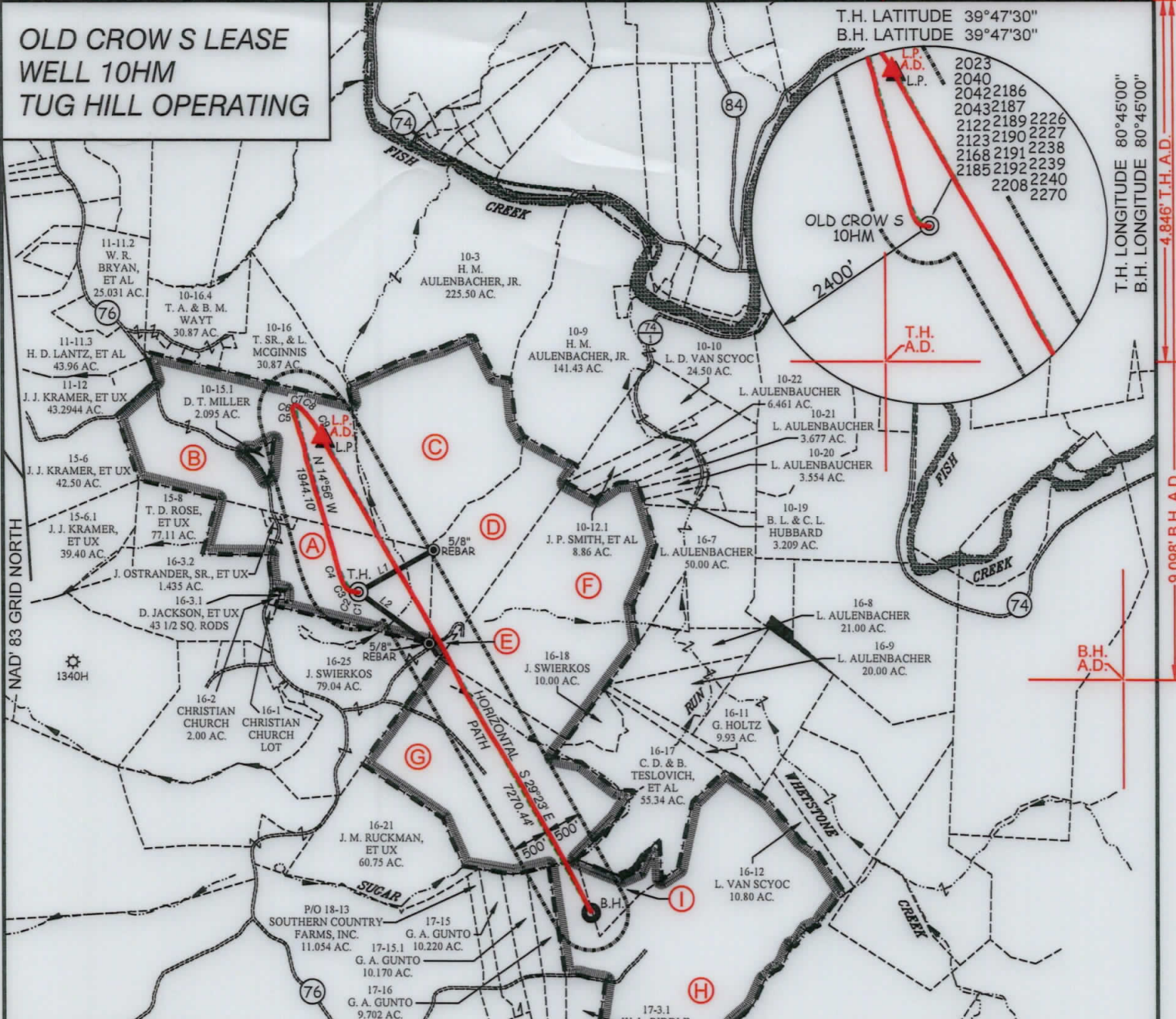
COUNTY NAME
PERMIT

← 3,645' T.H. A.D. → 453' B.H. A.D. →

**OLD CROW S LEASE
WELL 10HM
TUG HILL OPERATING**

T.H. LATITUDE 39°47'30"
B.H. LATITUDE 39°47'30"

T.H. LONGITUDE 80°45'00"
B.H. LONGITUDE 80°45'00"



LINE	BEARING	DISTANCE
L1	N 60°48' E	1158.38'
L2	S 54°04' E	1170.16'

CURVE	ARC LENGTH	RADIUS	CHORD BEARING	CHORD LENGTH
C1	34.69'	88.26'	S 88°32' W	34.47'
C2	64.11'	124.62'	N 68°05' W	63.40'
C3	174.41'	432.97'	N 37°13' W	173.23'
C4	332.27'	1833.54'	N 21°10' W	331.82'
C5	91.28'	300.07'	N 06°17' W	90.93'
C6	35.87'	43.25'	N 27°20' E	34.85'
C7	21.83'	32.93'	N 85°23' E	21.43'
C8	106.35'	234.08'	S 54°22' E	105.44'
C9	462.17'	1950.28'	S 35°07' E	461.09'

AS DRILLED COORDINATES FOR WELL NO. 10HM

(S.P.C. NORTH ZONE) (UTM(M) ZONE 17 NORTH)

NAD'83 S.P.C.(FT)	N. 468,115.27	E. 1,613,552.50
NAD'83 GEO.	LAT-(N) 39.778365	LONG-(W) 80.762971
NAD'83 UTM (M)	N. 4,403,185.26	E. 520,298.03

LANDING POINT

NAD'83 S.P.C.(FT)	N. 470,207.8	E. 1,613,061.7
NAD'83 GEO.	LAT-(N) 39.784090	LONG-(W) 80.764822
NAD'83 UTM (M)	N. 4,403,820.3	E. 520,137.9

BOTTOM HOLE

NAD'83 S.P.C.(FT)	N. 463,818.1	E. 1,616,685.0
NAD'83 GEO.	LAT-(N) 39.766689	LONG-(W) 80.751633
NAD'83 UTM (M)	N. 4,401,892.0	E. 521,274.2

TAG	SURFACE OWNER	PARCEL	ACRES
A	DONNA VIVIAN YOHO (TOD) GARY LANCE YOHO	5-16-3	71.205
B	PAUL ANDREW & DEBRA A. RINE	5-10-15	120.805
C	JOHN SWIERKOS	5-10-14	100.00
D	JOHN SWIERKOS	5-16-5	52.07
E	JOHN SWIERKOS	5-16-4	153 SQ. RODS
F	JOHN SWIERKOS	5-16-6	134.05
G	BETHANY A. REDO & ROBERT W. RAHM	5-16-19	129.16
H	SOUTHERN COUNTRY FARMS, INC.	5-17-3	190.132
I	SOUTHERN COUNTRY FARMS, INC.	5-16-16	9.75



12 Vanhorn Drive | P.O. Box 150 | Glenview, WV 26351 | 304.462.5634
 1412 Kanawha Boulevard, East | Charleston, WV 25301 | 304.346.3952
 254 East Beckley Bypass | Beckley, WV 25801 | 304.255.5296
 slsww.com

LEGEND

AS DRILLED ——— (Red line)

PROPOSED - - - - - (Green dashed line)



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.

P.S. 849 *C. Victor Moyers*

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NAD'83 S.P.C.(FT)	N. 463,813.2	E. 1,616,679.2
NAD'83 GEO.	LAT-(N) 39.766676	LONG-(W) 80.751633
NAD'83 UTM (M)	N. 4,401,890.5	E. 521,272.5

LEGEND

- LEASE LINE ———
- SURFACE LINE ———
- WELL LATERAL ———
- OFFSET LINE - - - - -
- TIE LINE ———
- CREEK ———
- ROAD ———
- COUNTY ROUTE ———
- PROPOSED WELL ———
- EXISTING WELL ———
- PERMITTED WELL ———
- TAX MAP-PARCEL ———
- SURFACE OWNER (SEE TABLE) ———
- LEASE # (SEE WW-6A1) ———

08/27/2021

SCALE 1" = 2000' FILE NO. 8796P10HMAD.dwg

DATE JUNE 10, 20 20

REVISED _____, 20 _____

OPERATORS WELL NO. OLD CROW S-10HM

API WELL NO. 47 — 051 — 2040

NO. STATE COUNTY PERMIT

STATE OF WEST VIRGINIA
 DIVISION OF ENVIRONMENTAL PROTECTION
 OFFICE OF OIL AND GAS

WELL OPERATOR TUG HILL OPERATING, LLC DESIGNATED AGENT DIANNA STAMPER
 ADDRESS 1320 SOUTH UNIVERSITY DRIVE, SUITE 500 ADDRESS 5400 D BIG TYLER ROAD
 FORT WORTH, TX 76107 CHARLESTON, WV 25313