

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

API 47-051-01853 County Marshall District Liberty
Quad Glen Easton Pad Name O E Burge-MSH-Pad1 Field/Pool Name Victory
Farm name Mason Dixon Farms LLC Well Number O E Burge U MSH 501H
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 4400168.757 Easting 531564.589
Landing Point of Curve Northing 4399684.578 Easting 531139.386
Bottom Hole Northing 4401390.791 Easting 529343.659

Elevation (ft) 1342' 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 09/28/2015 Date drilling commenced 10/06/2015 Date drilling ceased 12/31/2015
Date completion activities began 08/19/2016 Date completion activities ceased 10/13/2016
Verbal plugging (Y/N) N Date permission granted n/a Granted by _____

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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 109' Open mine(s) (Y/N) depths _____
Salt water depth(s) ft 368' Void(s) encountered (Y/N) depths _____
Coal depth(s) ft 1,118' Cavern(s) encountered (Y/N) depths N

Is coal being mined in area (Y/N) _____

APPROVED
NAME: Juan Carlos
DATE: 1/25/17

Reviewed by: Jr

**O E BURGE U MSH 501
Perf Stage Summary**

STAGE	# SHOTS			
NUM	Perf Date	Perf Top MD	Perf Bottom MD	PER STG
1	8/19/2016	21,439	21,541	33
2	8/19/2016	21,289	21,391	33
3	8/20/2016	21,139	21,241	33
4	8/20/2016	20,989	21,091	33
5	8/21/2016	20,839	20,941	33
6	8/21/2016	20,639	20,791	36
7	8/22/2016	20,439	20,591	36
8	8/22/2016	20,239	20,391	36
9	8/23/2016	20,035	20,190	36
10	8/23/2016	19,831	19,986	36
11	8/24/2016	19,627	19,782	42
12	8/24/2016	19,423	19,578	42
13	8/24/2016	19,219	19,374	42
14	8/25/2016	19,015	19,170	42
15	8/25/2016	18,811	18,966	42
16	8/26/2016	18,607	18,762	42
17	8/26/2016	18,403	18,558	42
18	8/27/2016	18,199	18,354	42
19	8/28/2016	17,995	18,150	42
20	8/28/2016	17,791	17,946	42
21	8/29/2016	17,587	17,742	42
22	9/5/2016	17,383	17,538	42
23	9/6/2016	17,179	17,334	42
24	9/6/2016	16,975	17,130	42
25	9/7/2016	16,771	16,926	42
26	9/7/2016	16,567	16,722	42
27	9/8/2016	16,363	16,518	42
28	9/10/2016	16,159	16,314	42
29	9/10/2016	15,955	16,110	42
30	9/11/2016	15,751	15,906	42
31	9/11/2016	15,547	15,702	42
32	9/12/2016	15,343	15,498	42
33	9/12/2016	15,139	15,294	42
34	9/13/2016	14,935	15,090	42
35	9/13/2016	14,731	14,886	42
36	9/14/2016	14,527	14,682	42
37	9/15/2016	14,323	14,478	42
38	9/15/2016	14,119	14,274	42
39	9/16/2016	13,915	14,070	42
40	9/17/2016	13,711	13,866	42
41	9/17/2016	13,480	13,662	42

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**O E BURGE U MSH 501
Frac Stage Summary**

STAGE NUM	Stim Date	Ave Pump		Max			Amount of Proppant (lbs)	Amount of water bbls	Amount of nitrogen/other
		Rate (BPM)	Ave Treatment Pressure (PSI)	Breakdown Pressure (PSI)	ISIP (PSI)				
1	8/19/2016	2	12,864	13,598	8,228	464,560	13,671		
2	8/19/2016	2	12,776	13,498	8,205	465,060	11,013		
3	8/20/2016	2	12,590	13,500	8,714	465,580	9,641		
4	8/20/2016	2	12,361	13,477	8,782	463,720	9,785		
5	8/21/2016	2	12,713	13,422	8,520	464,860	9,655		
6	8/21/2016	2	12,511	13,461	8,500	619,900	11,607		
7	8/22/2016	2	12,592	13,435	8,322	620,820	11,642		
8	8/22/2016	2	12,305	13,485	8,369	617,880	11,431		
9	8/23/2016	2	12,265	13,430	8,665	621,540	11,278		
10	8/23/2016	2	12,264	13,342	8,412	619,120	11,084		
11	8/24/2016	2	11,781	13,841	8,670	621,300	11,502		
12	8/24/2016	2	11,539	13,569	8,347	573,760	12,467		
13	8/24/2016	2	11,852	13,169	8,442	623,960	11,239		
14	8/25/2016	2	11,982	13,406	8,456	622,820	11,833		
15	8/25/2016	2	12,047	13,386	8,467	613,640	11,609		
16	8/26/2016	2	11,687	13,448	8,489	624,680	11,546		
17	8/26/2016	2	11,834	13,467	8,696	616,730	11,806		
18	8/27/2016	2	11,704	13,161	8,374	624,640	12,025		
19	8/28/2016	2	11,558	13,529	8,456	619,940	12,011		
20	8/28/2016	2	12,213	13,377	8,552	600,740	11,118		
21	8/29/2016	2	12,012	13,311	8,495	614,600	11,943		
22	9/5/2016	2	12,348	13,088	8,330	578,000	10,415		
23	9/6/2016	2	11,893	13,202	8,783	620,480	10,850		
24	9/6/2016	2	12,369	13,135	8,412	620,960	11,092		
25	9/7/2016	2	11,692	13,597	8,494	621,400	11,101		
26	9/7/2016	2	12,435	13,549	8,740	624,220	10,193		
27	9/8/2016	2	12,314	13,180	8,494	620,240	10,436		
28	9/10/2016	2	12,092	13,236	8,461	620,600	11,195		
29	9/10/2016	2	12,371	13,328	8,288	621,520	10,615		
30	9/11/2016	2	12,367	13,261	8,330	621,840	10,528		
31	9/11/2016	2	12,278	13,252	8,370	620,820	10,335		
32	9/12/2016	2	12,264	13,189	8,412	624,640	10,350		
33	9/12/2016	2	12,176	13,217	8,206	620,660	10,379		
34	9/13/2016	2	12,351	13,235	8,330	620,840	9,782		
35	9/13/2016	2	11,693	13,606	8,351	619,560	11,026		
36	9/14/2016	2	11,768	13,614	8,350	620,720	10,933		
37	9/15/2016	2	11,470	13,688	8,456	626,020	11,101		
38	9/15/2016	2	11,161	13,519	8,331	620,620	11,260		
39	9/16/2016	2	11,258	13,472	8,456	622,080	11,130		
40	9/17/2016	2	11,352	13,438	8,227	620,900	11,411		
41	9/17/2016	2	11,461	13,908	8,555	631,840	11,112		

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O E BURGE U MSH 501H

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	N. A.	N. A.	109.00	109.00	
Top of Salt Water	368.00	368.00	N. A.	N. A.	
Pittsburgh Coal	1,118.00	931.44	1,125.00	938.49	
Big Injun (ss)	2,254.00	2,248.34	2,818.00	2,811.67	
Berea (siltstone)	2,818.00	2,811.67	6,463.00	6,456.63	
Rhinestreet (shale)	6,463.00	6,456.63	6,746.00	6,738.86	
Cashaqua (shale)	6,746.00	6,738.86	6,878.00	6,868.22	
Middlesex (shale)	6,878.00	6,868.22	6,965.00	6,951.89	
Burket (shale)	6,965.00	6,951.89	6,987.66	6,973.62	
Tully (ls)	6,987.66	6,973.62	7,009.96	6,994.89	
Mahantango (shale)	7,009.96	6,994.89	7,121.03	7,100.79	
Marcellus (shale)	7,121.03	7,100.79	7,159.67	7,137.60	
UTICA	12,176.34	11,858.91	13,239.45	12,165.68	Gas
POINT PLEASANT	13,239.45	12,165.68	Not Reached	Not Reached	

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Hydraulic Fracturing Fluid Product Component Information Disclosure



Job Start Date	8/19/2016
Job End Date	9/18/2016
State	West Virginia
County	Marshall
API Number	47-051-01853-00-00
Operator Name	Southwestern Energy
Well Name and Number	O E BURGE U MSH501H
Latitude	39.73811000
Longitude	-80 63355000
Datum	NAD27
Federal Well	NO
Indian Well	NO
True Vertical Depth	12,200
Total Base Water Volume (gal)	18,738,689
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	Schlumberger	Acid Corrosion Inhibitor, Acid Breaker, Gelling Agent, Friction Reducer, Iron Control Agent, Scale Loss Additive					
			Water (Including Mix Water Supplied by Client)*	7732-18-5		92.76309	

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Items above are Trade Names with the exception of Base Water. Items below are the individual ingredients.

	Quartz, Crystalline silica	14808-60-7	97.73754	7.08295
	Hydrochloric acid	7647-01-0	1.39539	0.10112
	Ammonium sulfate	7783-20-2	0.44999	0.03261
	Acrylamide, 2-acrylamido-2-methylpropanesulfonic acid, sodium salt polymer	38193-60-1	0.33213	0.02407
	Polymer of 2-acrylamido-2-methylpropanesulfonic acid sodium salt and methyl acrylate	136793-29-8	0.03559	0.00258
	Urea	57-13-6	0.02185	0.00158
	Guar gum	9000-30-0	0.00752	0.00054
	Sodium sulfate	7757-82-6	0.00510	0.00037
	Non-crystalline silica (impurity)	7631-86-9	0.00456	0.00033
	Propan-2-ol	67-63-0	0.00306	0.00022
	Fatty acid, tall-oil reaction products with acetophenone	68188-40-9	0.00119	0.00009
	2-Propanamid (impurity)	79-06-1	0.00109	0.00008
	Alcohols, C12-C16, ethoxylated	68551-12-2	0.00099	0.00007
	Sodium erythorbate	6381-77-7	0.00082	0.00006
	Isodecanol w/6-7 Moles Ethylene Oxide	26183-52-8	0.00067	0.00005
	Tetrasodium ethylenediaminetetraacetate	64-02-8	0.00057	0.00004
	Cinnamaldehyde	104-55-2	0.00044	0.00003
	Dimethyl siloxanes and silicones	63148-62-9	0.00031	0.00002
	Diammonium peroxidisulphate	7727-54-0	0.00021	0.00002
	Amines, tallow alkyl, ethoxylated	61791-26-2	0.00013	0.00001

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			Dodecyl poly (oxyethylene) ether	9002-92-0	0.00005	
			Siloxanes and silicones, dimethyl, reaction products with silica	67762-90-7	0.00004	
			Octamethylcyclotetrasiloxane	556-67-2	0.00003	
			Copper(II) sulfate	7758-98-7	0.00001	
			Decamethyl cyclopentasiloxane	541-02-6	0.00002	
			Glycols, polyethylene, monotetradecyl ether	27306-79-2	0.00004	
			Dodecamethylcyclohexasiloxane	540-97-6	0.00001	

* Total Water Volume sources may include various types of water including fresh water, produced water, and recycled water

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

*** If you are calculating a percentage of total ingredients do not add the water volume below the green line to the water volume above the green line

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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References

Note: This cabin is the only dwelling within 625' of the center of the pad.

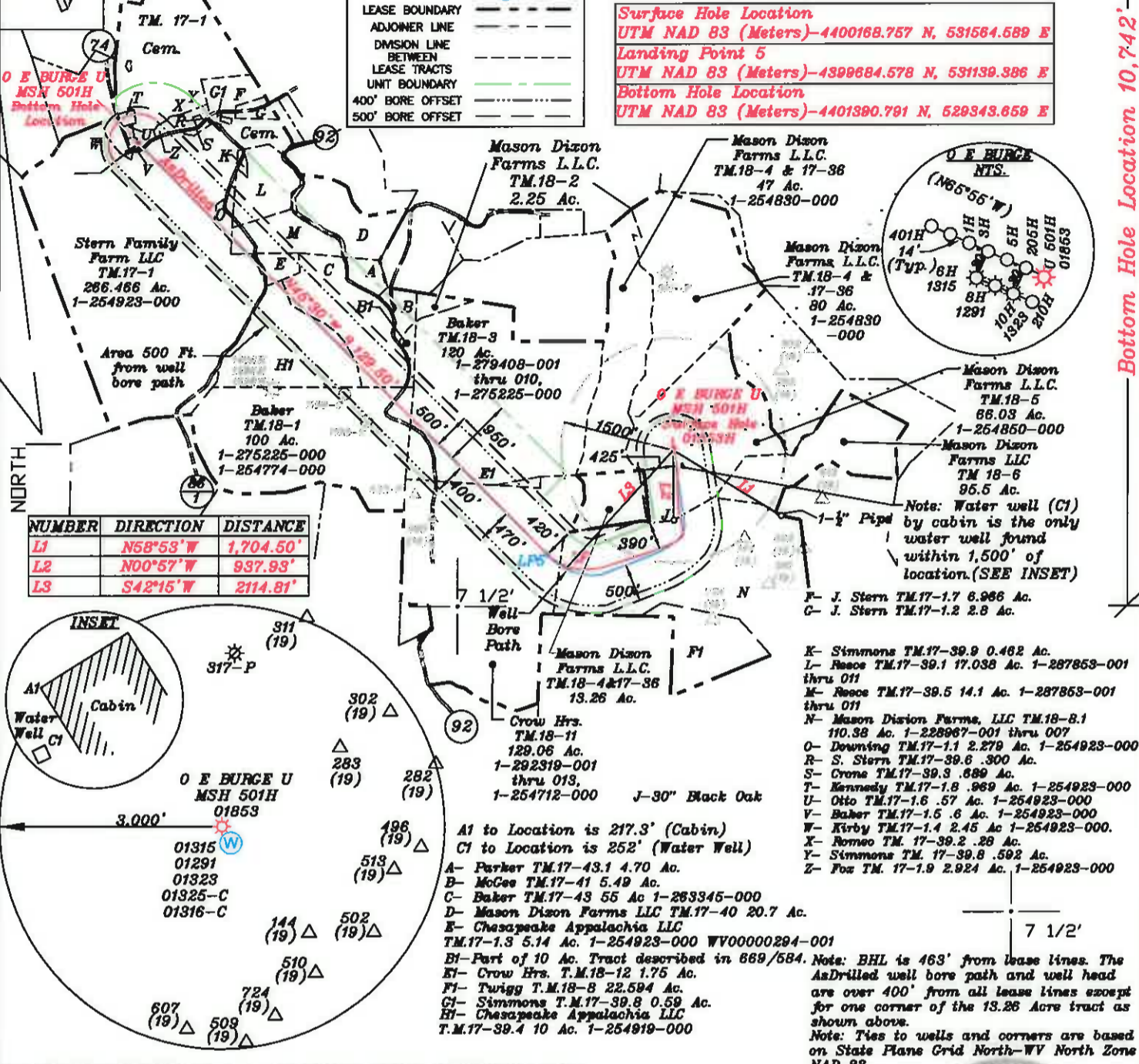
Note: All wells within 500' of the horizontal leg are shown on this plat based upon information taken from DEP mapping, well plats & aerial photos.

LEGEND

- ASDRILLED LEG (RED TEXT)
- PERMIT LEG (BLUE TEXT)
- WATERWELL (W)
- LEASE BOUNDARY
- ADJOINER LINE
- DIVISION LINE BETWEEN LEASE TRACTS
- UNIT BOUNDARY
- 400' BORE OFFSET
- 500' BORE OFFSET

Surface Hole Location
 UTM NAD 83 (Meters)-4400168.9 N, 531564.4 E
 Landing Point 5
 UTM NAD 83 (Meters)-4399734.0 N, 531055.4 E
 Bottom Hole Location
 UTM NAD 83 (Meters)-4401389.2 N, 529343.9 E

Surface Hole Location
 UTM NAD 83 (Meters)-4400168.757 N, 531564.589 E
 Landing Point 5
 UTM NAD 83 (Meters)-4399684.578 N, 531139.386 E
 Bottom Hole Location
 UTM NAD 83 (Meters)-4401390.791 N, 529343.659 E



Bottom Hole Location 10,742'

Surface Hole Location 14,873'

LONGITUDE 80-37-30 W

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

FILE NO. _____
 DRAWING NO. 1
 SCALE 1" = 2000'
 MINIMUM DEGREE OF ACCURACY 1 in 200
 PROVEN SOURCE OF ELEVATION GPS
submeter unit

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 RULES ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

(SIGNED) _____
 R.P.E. _____ P.S. 708



STATE OF WEST VIRGINIA
 Division of Environmental Protection
 OFFICE OF OIL AND GAS

DATE January 04, 2014
 OPERATOR'S WELL NO. O E BURGE U MSH 501H
 API WELL NO. AsDrilled
47 - 051 - 01853
 STATE COUNTY PERMIT

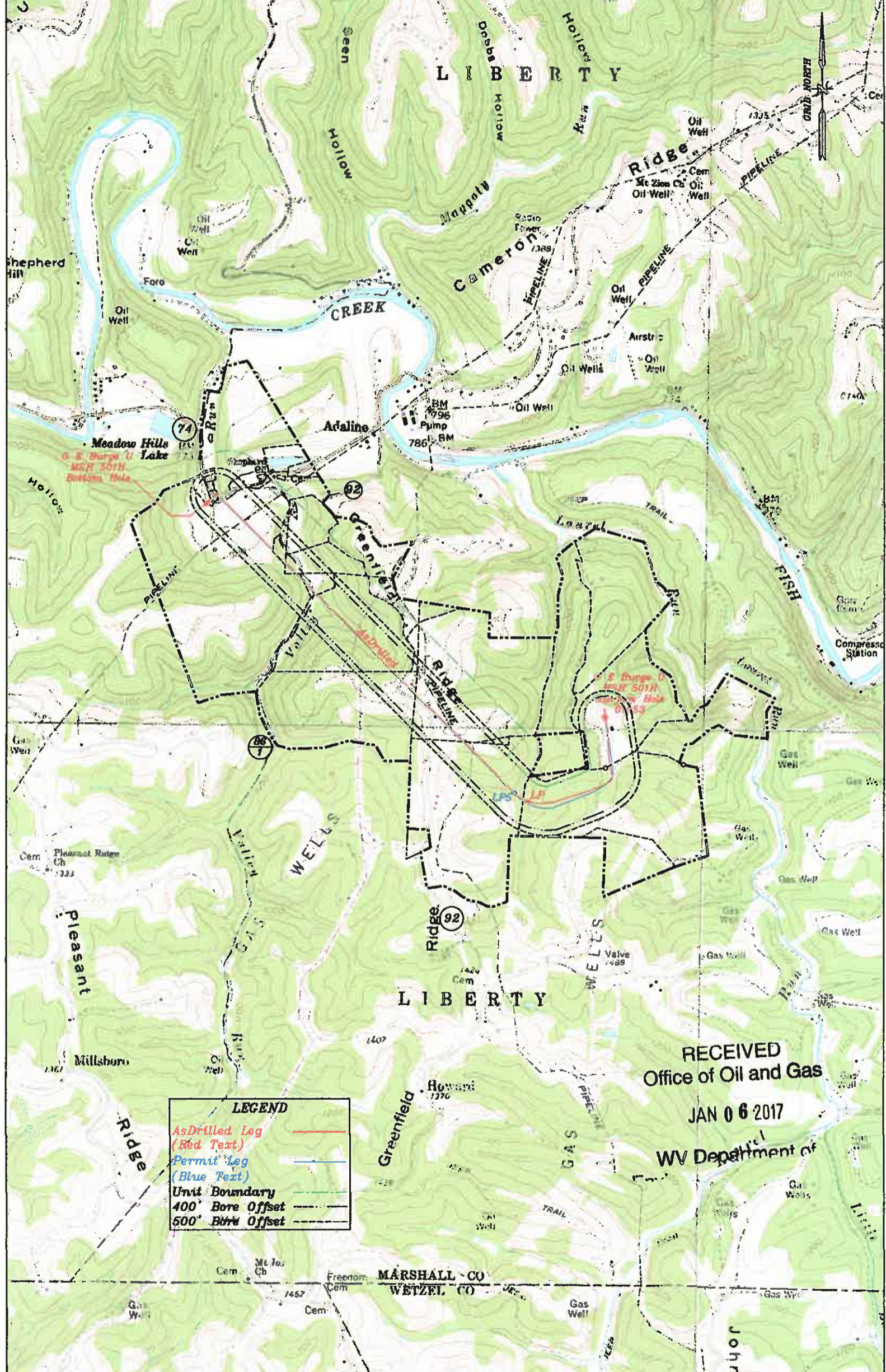
WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL
 (IF 'GAS') PRODUCTION X STORAGE DEEP X SHALLOW

LOCATION: ELEVATION 1,342' WATER SHED Laurel Run
 DISTRICT Liberty COUNTY Marshall
 QUADRANGLE Glen Easton 7 1/2'

SURFACE OWNER Mason Dixon Farms L.L.C. ACREAGE 66.03 ac.
 OIL & GAS ROYALTY OWNER O. E. Burge et al LEASE ACREAGE 869.055 ac
 LEASE NO. See Above

PROPOSED WORK: DRILL X CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE X PLUG OFF OLD FORMATION PERFORATE NEW FORMATION X OTHER PHYSICAL CHANGE IN WELL (SPECIFY) AsDrilled

PLUG AND ABANDON CLEAN OUT AND REPLUG
 TARGET FORMATION Utica ESTIMATED DEPTH TMD= 21,660'; TVD= 12,209'
 WELL OPERATOR SWN Production Co. LLC DESIGNATED AGENT Dee Southall
 ADDRESS P.O. Box 1300 Jane Lew, WV 26378 ADDRESS P.O. Box 1300 Jane Lew, WV 26378

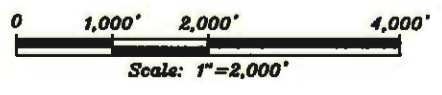


LEGEND

- As Drilled Leg (Red Text) —
- Permit Leg (Blue Text) —
- Unit Boundary —
- 400' Bore Offset - - - -
- 500' Bore Offset - - - -

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Well: O. E. Burge MSH U 501H
Quad: Glen Easton 7 1/2'
District: Liberty
County: Marshall



References

22" Sycamore



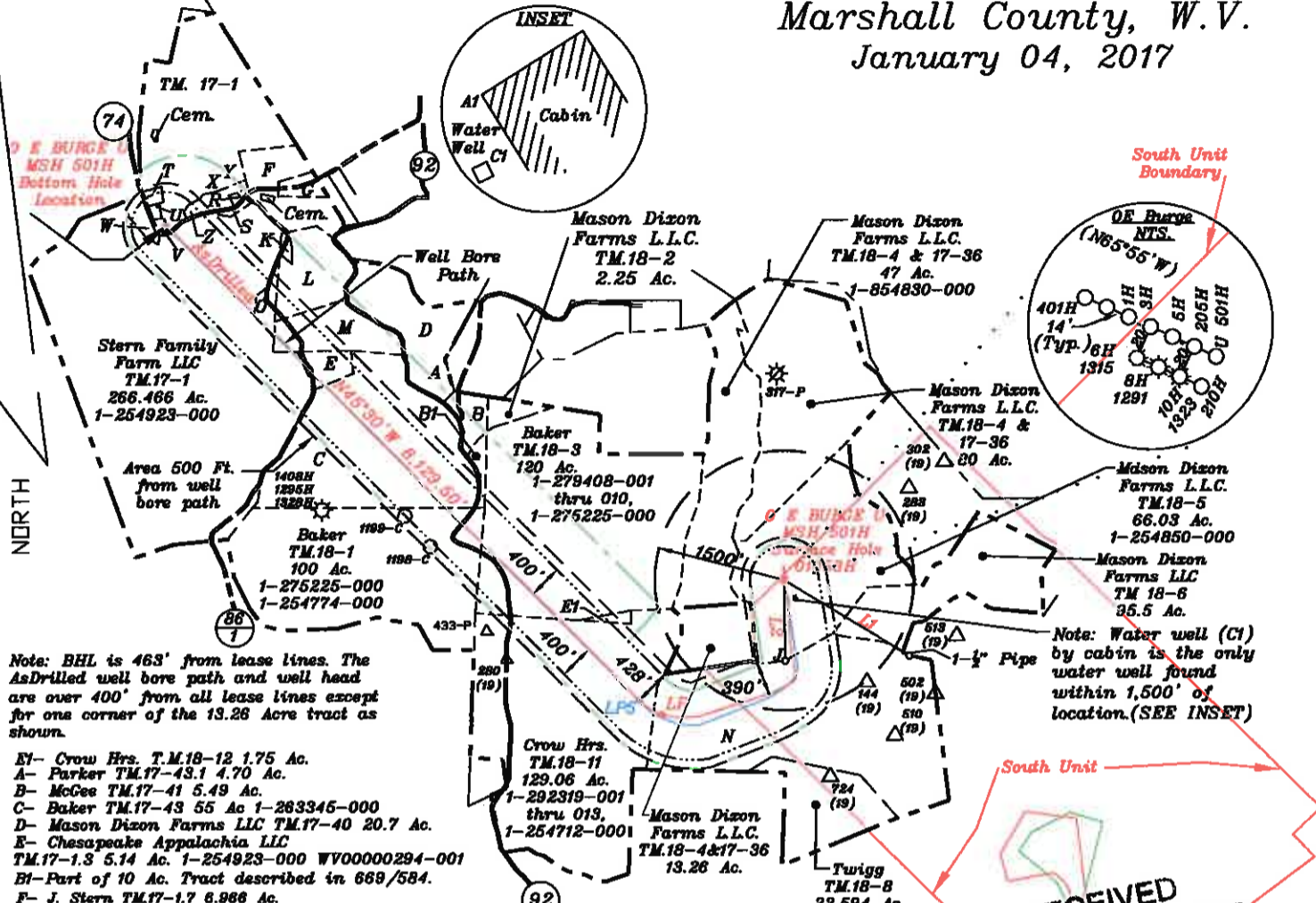
Note: This cabin is the only dwelling within 625' of the center of the pad.

Note: All wells within 500' of the horizontal leg are shown on this plat based upon information taken from DEP mapping, well plats & aerial photos.

A1 to Location is 217.3' (Cabin)
C1 to Location is 252' (Water Well)

SWN Production Co. LLC

O.E. Burge U MSH 501H
Liberty District
Marshall County, W.V.
January 04, 2017



Note: BHL is 463' from lease lines. The AsDrilled well bore path and well head are over 400' from all lease lines except for one corner of the 13.26 Acre tract as shown.

- E1- Crow Hrs. T.M.18-12 1.75 Ac.
- A- Parker TM.17-43.1 4.70 Ac.
- B- McGee TM.17-41 5.49 Ac.
- C- Baker TM.17-43 55 Ac 1-263346-000
- D- Mason Dixon Farms LLC TM.17-40 20.7 Ac.
- E- Chesapeake Appalachia LLC TM.17-1.3 5.14 Ac. 1-254923-000 WV00000294-001
- B1- Part of 10 Ac. Tract described in 669/584.
- F- J. Stern TM.17-1.7 6.966 Ac.
- G- J. Stern TM.17-1.2 2.8 Ac.

- K- Simmons TM.17-39.9 0.462 Ac.
- L- Reese TM.17-39.1 17.038 Ac. 1-254919-000, WV 00000295-001
- M- Reese TM.17-39.5 14.1 Ac. 1-287853-001 thru 011
- N- Mason Dixon Farms, LLC TM.18-8.1 110.38 Ac. 1-228967-001 thru 007
- O- Downing TM.17-1.1 2.279 Ac. 1-254923-000
- R- S. Stern TM.17-39.6 .300 Ac.
- S- Crone TM.17-39.3 .889 Ac.
- T- Kennedy TM.17-1.8 .969 Ac. 1-254923-000
- U- Otto TM.17-1.6 .57 Ac. 1-254923-000
- V- Baker TM.17-1.5 .6 Ac. 1-254923-000
- W- Kirby TM.17-1.4 2.45 Ac 1-254923-000.
- X- Romeo TM. 17-39.2 .28 Ac.
- Y- Simmons TM. 17-39.8 .592 Ac.
- Z- Fox TM. 17-1.9 2.924 Ac. 1-254923-000

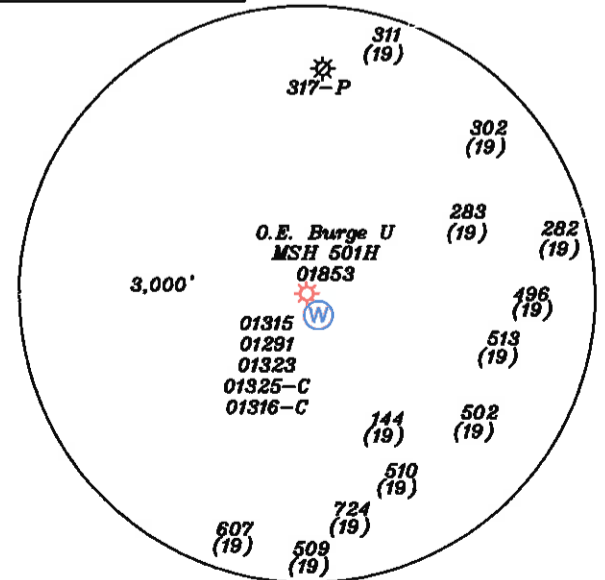
NUMBER	DIRECTION	DISTANCE
L1	N68°53'W	1,704.50'
L2	N00°57'W	937.93'
L3	S42°15'W	2114.81'

LEGEND	
ASDRILLED LEG (RED TEXT)	—
PERMIT LEG (BLUE TEXT)	—
WATERWELL	(W)
LEASE BOUNDARY	---
ADJOINER LINE	---
DIVISION LINE BETWEEN LEASE TRACTS	---
UNIT BOUNDARY	---
400' BORE OFFSET	---
500' BORE OFFSET	---

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J-30" Black Oak

Notes: Ties to wells and corners are based on State Plane Grid North-WV North Zone NAD 83.

NAD 83	
Surface Hole	UTM NAD 83(meters)-4400168.757 N, 531564.589 E Geo. NAD 83-39.750843 N, 80.631553 W UTM NAD 83(feet)-14436220.329 N, 1743974.821 E
LP	UTM NAD 83(meters)-4399684.578 N, 531139.386 E Geo. NAD 83-39.746496 N, 80.636539 W UTM NAD 83(feet)-14434631.819 N, 1742579.801 E
Bottom Hole	UTM NAD 83(meters)-4401390.791 N, 529343.659 E Geo. NAD 83-39.761933 N, 80.657422 W UTM NAD 83(feet)-14440229.619 N, 1736688.321 E
NAD 83	
Surface Hole Location	UTM NAD 83(Meters)-4400168.9 N, 531564.4 E Geo. NAD 83-39.750845 N, 80.631555 W UTM NAD 83(Feet)-14436220.9 N, 1743974.2 E
Landing Point 5	UTM NAD 83(Meters)-4399734.0 N, 531055.4 E Geo. NAD 83-39.746945 N, 80.637517 W UTM NAD 83(Feet)-14434794.1 N, 1742304.2 E
Bottom Hole Location	UTM NAD 83(Meters)-4401389.2 N, 529343.9 E Geo. NAD 83-39.761919 N, 80.657419 W UTM NAD 83(Feet)-14440224.5 N, 1736689.3 E



Jackson Surveying, Inc.
677 West Main Street
Clarksburg, WV 26301