

12/21/2018



west virginia department of environmental protection

Office of Oil and Gas
601 57th Street, S.E.
Charleston, WV 25304
(304) 926-0450
fax: (304) 926-0452

Austin Caperton, Cabinet Secretary
www.dep.wv.gov

Tuesday, December 18, 2018
PERMIT MODIFICATION APPROVAL
Horizontal 6A / New Drill

NORTHEAST NATURAL ENERGY LLC
707 VIRGINIA STREET EAST
STE 1200
CHARLESTON, WV 25301

Re: Permit Modification Approval for BOGGESS 17H
47-061-01812-00-00

Lateral Extension

NORTHEAST NATURAL ENERGY LLC

The Office of Oil and Gas has reviewed the attached permit modification for the above referenced permit. The attached modification has been approved and well work may begin. Please be reminded that the oil and gas inspector is to be notified twenty-four (24) hours before permitted well work is commenced.

If there are any questions, please feel free to contact me at (304) 926- 0450.

James A. Martin
Chief

A handwritten signature in blue ink, appearing to read 'James A. Martin', is written over the printed name and title.

Operator's Well Number: BOGGESS 17H
Farm Name: BLAKE R. & PRESTON H. BOGGESS
U.S. WELL NUMBER: 47-061-01812-00-00
Horizontal 6A New Drill
Date Modification Issued: December 18 2018

Promoting a healthy environment.

WW-6B
(04/15)

API NO. 47- 001 - 0181221/2018

OPERATOR WELL NO. Boguess 17H

Well Pad Name: Boguess

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
WELL WORK PERMIT APPLICATION

1) Well Operator: Northeast Natural Energy LLC

<u>494498281</u>	<u>Monongalia</u>	<u>Clay</u>	<u>Osage, WV</u>
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Operator ID County District Quadrangle

2) Operator's Well Number: Boguess 17H Well Pad Name: Boguess

3) Farm Name/Surface Owner: Blake R. & H. Preston Boguess Public Road Access: Mason Dixon Hwy (State Rt 7)

4) Elevation, current ground: 1,280' Elevation, proposed post-construction: 1,268'

5) Well Type (a) Gas Oil Underground Storage
Other

(b) If Gas Shallow Deep
Horizontal

6) Existing Pad: Yes or No No MDK 9/26/2018

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus, 8,076.5', 103', 3,600 psi

8) Proposed Total Vertical Depth: 8,074'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 19,179'

11) Proposed Horizontal Leg Length: 9,040'

12) Approximate Fresh Water Strata Depths: 50' ; 1,209'

13) Method to Determine Fresh Water Depths: Driller's Log from Offset Wells

14) Approximate Saltwater Depths: 1,784' ; 2,435'

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15) Approximate Coal Seam Depths: 934' ; 1,207'

16) Approximate Depth to Possible Void (coal mine, karst, other): N/A

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17) Does Proposed well location contain coal seams directly overlying or adjacent to an active mine? Yes No

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(a) If Yes, provide Mine Info: Name: _____
Depth: _____
Seam: _____
Owner: _____

18) CASING AND TUBING PROGRAM

TYPE	Size (in)	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling (ft)	INTERVALS: Left in Well (ft)	CEMENT: Fill-up (Cu. Ft.)/CTS
Conductor	24"	New	NA	94.71	40'	40'	GTS
Fresh Water	13-3/8"	New	J-55	54.5	1,290'	1,260'	CTS
Coal							
Intermediate	9-5/8"	New	J-55	40	2,530'	2,500'	CTS
Production	5-1/2"	New	P-110	20	19,179'	19,149'	4552 Cu. Ft.
Tubing	2-7/8"	New	N-80	6.5	NA	8,500'	NA
Liners							

Northeast Natural Energy LLC requests the ability to drill beyond elevation for the purpose of isolating the Red Rock Formation.

MGK 9/26/2018

TYPE	Size (in)	Wellbore Diameter (in)	Wall Thickness (in)	Burst Pressure (psi)	Anticipated Max. Internal Pressure (psi)	Cement Type	Cement Yield (cu. ft./k)
Conductor	24"	30"	.375	415		4,500 pst Grout	NA
Fresh Water	13-3/8"	17 1/2"	.38"	2,760	2,000	Type 1	1.18
Coal							
Intermediate	9-5/8"	12 1/4"	.395"	3,950	3,000	Type 1	1.18
Production	5-1/2"	8 3/4"	.361"	12,530	9,700	50:50 Poz	1.21
Tubing	2-7/8"	NA	.217"	10,570	3,600	NA	NA
Liners							

PACKERS

Kind:			
Sizes:			
Depths Set:			

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19) Describe proposed well work, including the drilling and plugging back of any pilot hole:

Drilling and completion of a horizontal Marcellus well. The well will be drilled on air to an approximate depth of 5344' TVD/MD. The well will then be horizontally drilled on synthetic based mud from the KOP to approximately 8,074' TVD / 19,179' MD along a 329° azimuth.

20) Describe fracturing/stimulating methods in detail, including anticipated max pressure and max rate:

Multi-stage / high-rate slickwater fracture treatment using various size sands as proppant. First stage will be initiated via pressurization against a burst disc ran in the production casing string or perforated with coiled tubing. Subsequent stages will be perforated with pumped down guns ran on wireline. Individual stages will be isolated with composite frac plugs. Maximum pump rate during any stage will be 110 BPM with a maximum allowable surface pressure of 9,500 PSI. Composite bridge plugs will be set at the end of the last stage to isolate the treated formation.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 20.18

22) Area to be disturbed for well pad only, less access road (acres): 11.67

23) Describe centralizer placement for each casing string:

Surface and intermediate casing strings will have bow spring centralizers placed every third joint (~120') from the shoe joint to surface. Production casing will have rigid body centralizers placed at a minimum of every fourth joint (~160') from TD to surface.

24) Describe all cement additives associated with each cement type:

Surface string cement will be a Type 1 + Max 3% bwoc Calcium Chloride Fresh Water blend. Intermediate string cement will be a Type 1 Cement + Max 3% bwoc Calcium Chloride + Fresh Water. Production string cement will be (50:50) Poz (Fly Ash):Type I Cement with a gas migration additive.

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25) Proposed borehole conditioning procedures:

Surface string will use a 25.0 bbls Gel Pill + LCM + 25 lbs Cello Flake + 20 lbs/bbl Bentonite @ 8.4 ppg & 10 bbls fresh water spacer prior to cement. Intermediate string will use a 25.0 bbls Gel Pill + LCM + 25 lbs Cello Flake + 20 lbs/bbl Bentonite @ 8.4 ppg & 10 bbls fresh water spacer prior to cement. Production string will use a 50.0 bbls SealBond 25 + 1 gal/bbl US-40 + 275 lbs/bbl Barite + 1 gal/bbl SS-2 Spacer @ 13.5 ppg prior to cement.

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*Note: Attach additional sheets as needed.

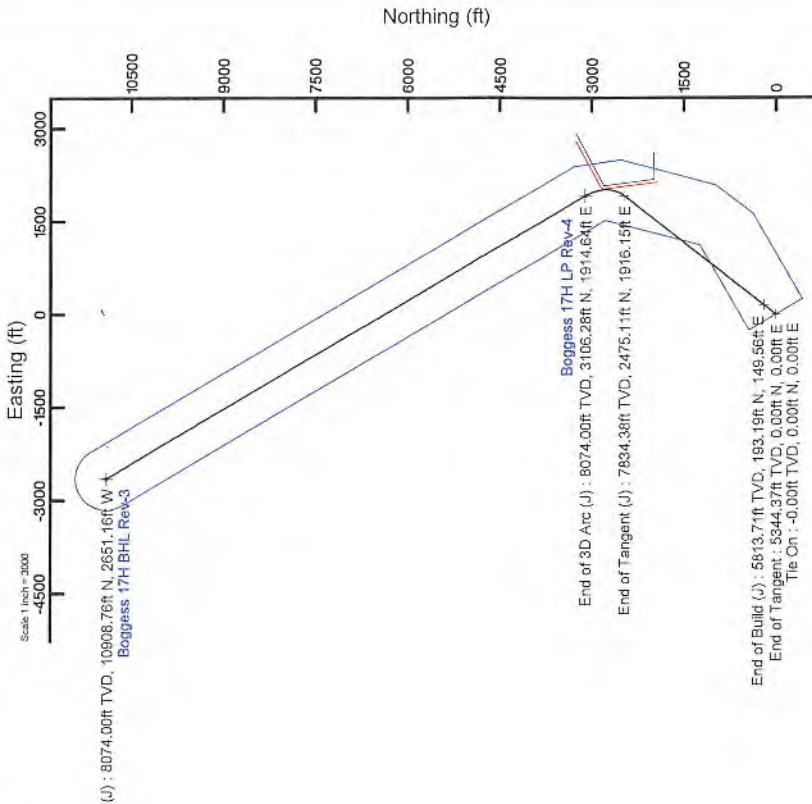
NORTHEAST NATURAL ENERGY, LLC

Location: Monongalia County, WV
 Field: Monongalia
 Facility: Boggess Pad
 Slot: Slot 17
 Well: Boggess 17H
 Wellbore: Boggess 17H.PWB

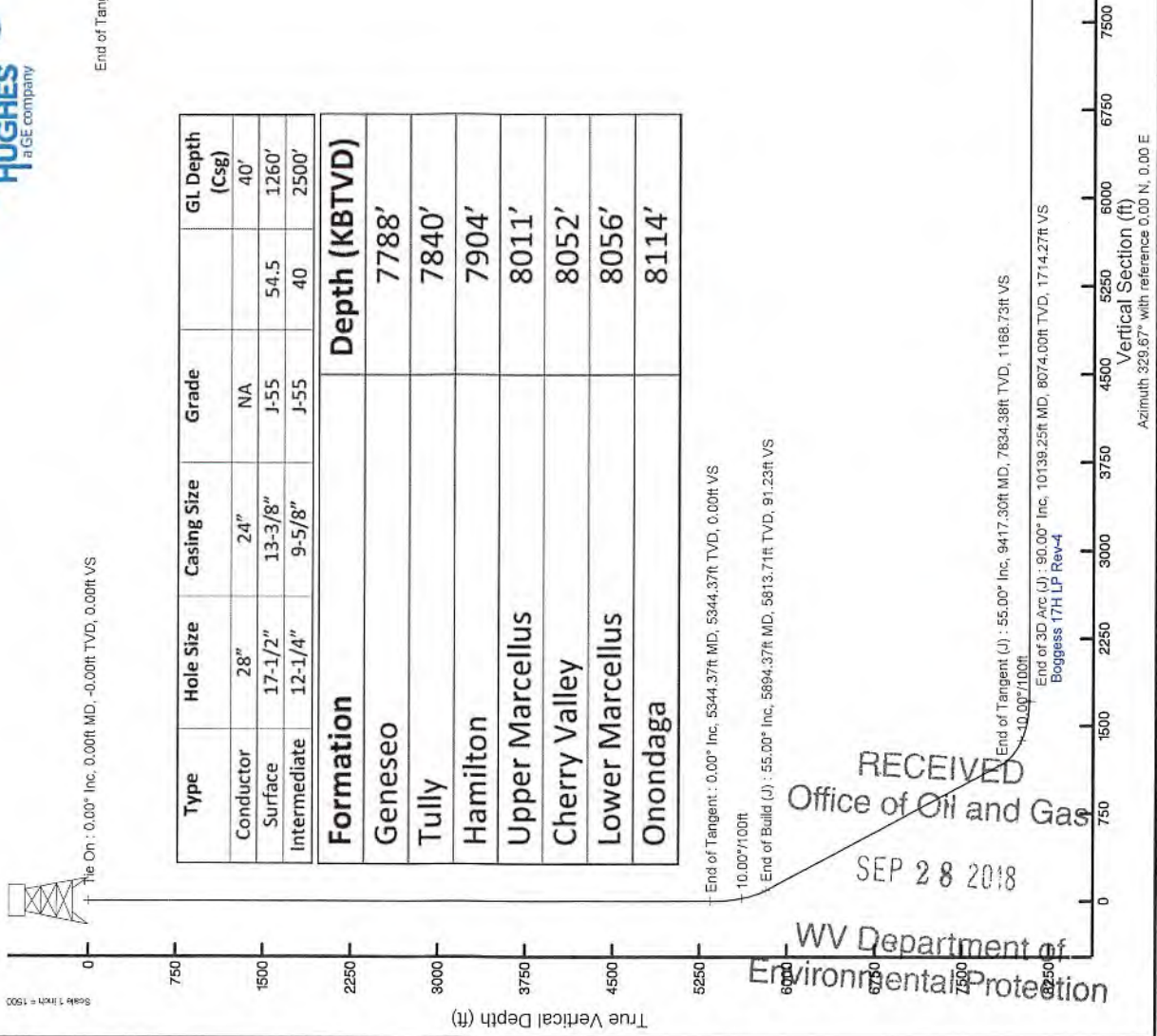


Location Information

Facility Name	Grid East (US Ft)	Grid North (US Ft)	Latitude	Longitude
Boggess Pad	1801481.800	428749.800	39°40'12.490"N	80°05'36.030"W
Local N (ft)	Local E (ft)	Grid North (US Ft)	Latitude	Longitude
80.00	79.70	428609.800	39°40'13.098"N	80°05'35.015"W
Rig on Slot 17 (RT) to Ground level (At Slot: Slot 17)				
Mean Sea Level to Ground level (At Slot: Slot 17)				
Rig on Slot 17 (RT) to Mean Sea Level				
-1268ft				
1268ft				



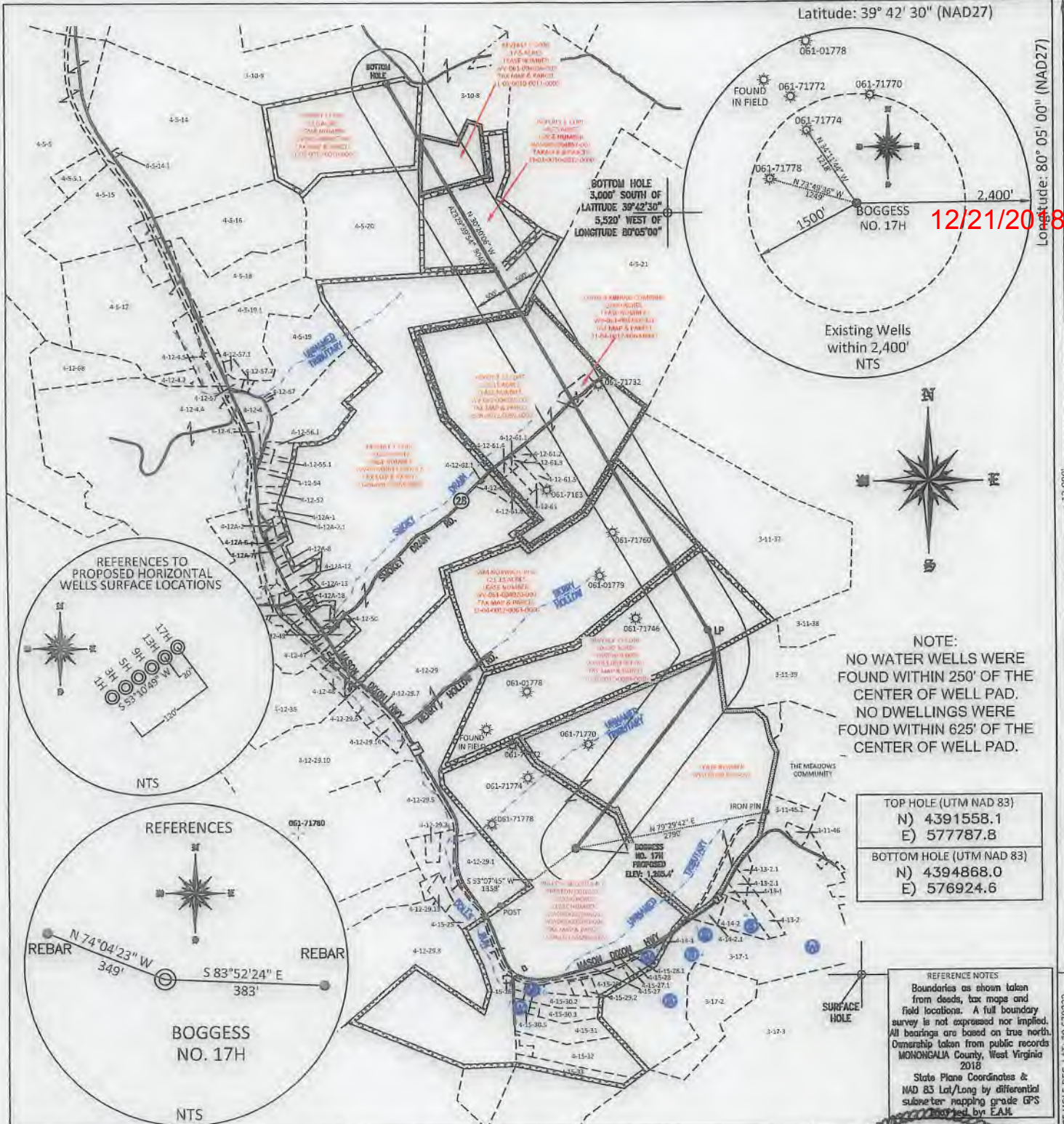
Type	Hole Size	Casing Size	Grade	GL Depth (Csg)
Conductor	28"	24"	NA	40'
Surface	17-1/2"	13-3/8"	J-55	1260'
Intermediate	12-1/4"	9-5/8"	J-55	2500'
Formation				Depth (kBTVD)
Genesee				7788'
Tully				7840'
Hamilton				7904'
Upper Marcellus				8011'
Cherry Valley				8052'
Lower Marcellus				8056'
Onondaga				8114'



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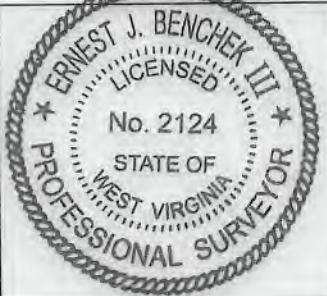
NOTE:
 NO WATER WELLS WERE FOUND WITHIN 250' OF THE CENTER OF WELL PAD.
 NO DWELLINGS WERE FOUND WITHIN 625' OF THE CENTER OF WELL PAD.

TOP HOLE (UTM NAD 83)	N) 4391558.1
	E) 577787.8
BOTTOM HOLE (UTM NAD 83)	N) 4394868.0
	E) 576924.6

REFERENCE NOTES
 Boundaries as shown taken from deeds, tax maps and field locations. A full boundary survey is not expressed nor implied. All bearings are based on true north. Ownership taken from public records MONONGALIA County, West Virginia 2018
 State Plane Coordinates & NAD 83 Lat/Long by differential submeter mapping grade GPS collected by E.A.H.

FILE #: NEE14
 DRAWING #: 2867
 SCALE: PLAT: 1" = 2000'
TICK MARK: 1" = 2000'
 MINIMUM DEGREE OF ACCURACY: 1/200
 PROVEN SOURCE OF ELEVATION: SUBMETER MAPPING GRADE GPS

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 DEPARTMENT OF ENVIRONMENTAL PROTECTION.
 Signed: [Signature]
 L.L.S. #2124 : Ernest J. Benchek III

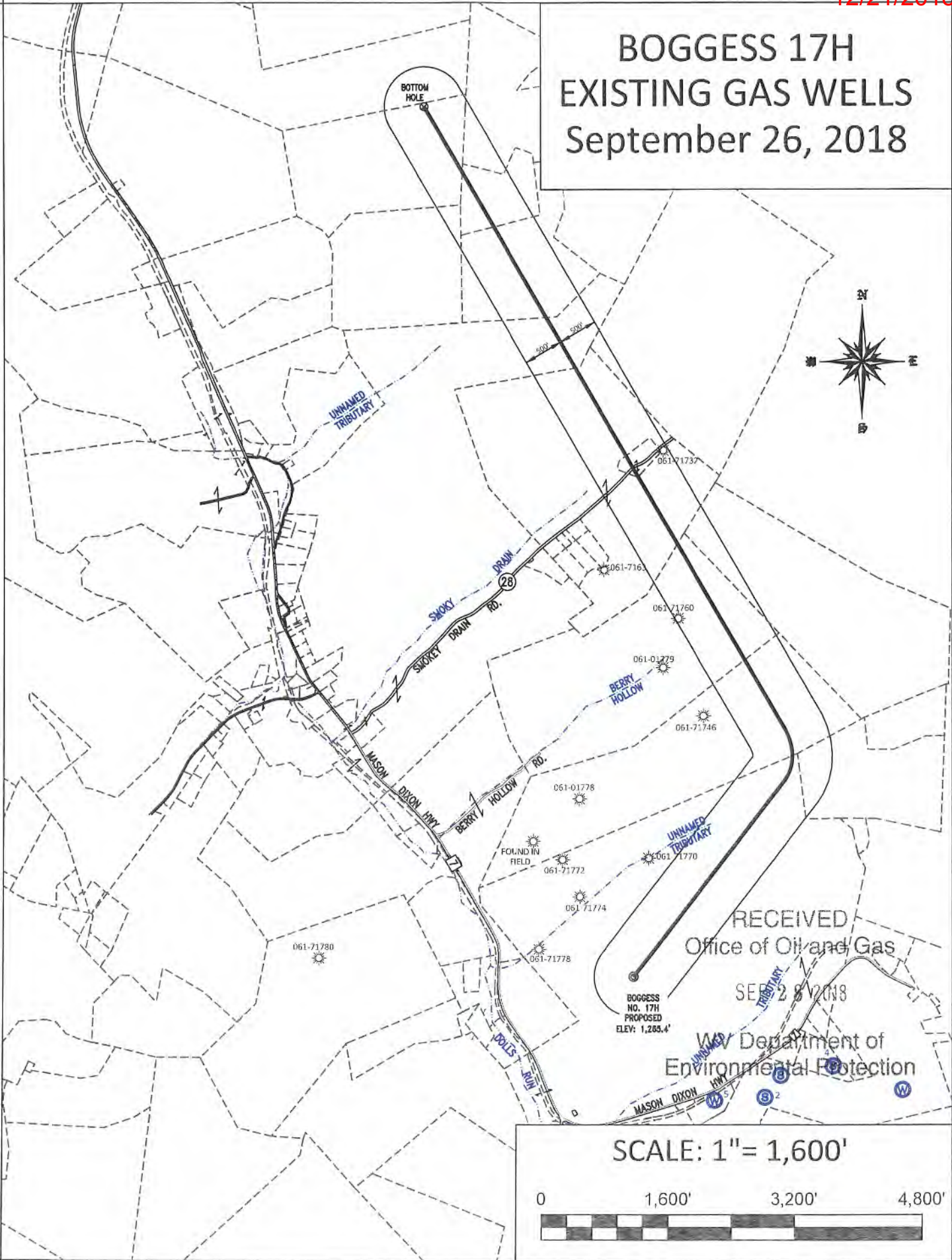


(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS WYDEP
 OFFICE OF OIL & GAS
 601 57TH STREET
 CHARLESTON, WV 25304
 Well Type: Oil Waste Disposal Production Deep
 Gas Liquid Injection Storage Shallow
 WATERSHED: DUNKARD CREEK
 COUNTY/DISTRICT: MONONGALIA / CLAY
 SURFACE OWNER: BLAKE R. & PRESTON H. BOGCESS
 OIL & GAS ROYALTY OWNER: BLAKE R. & PRESTON H. BOGCESS 'et al'
 LEASE NUMBERS: _____
 TARGET FORMATION: MARCELLUS
 WELL OPERATOR: NORTHEAST NATURAL ENERGY LLC
 ADDRESS: 707 VIRGINIA STREET EAST, SUITE 1200
 CITY: CHARLESTON STATE: WV ZIP CODE: 25301

DATE: September 26, 2018
 OPERATOR'S WELL #: BOGCESS NO. 17H
 API WELL #: 47 61 47-061-01812
 STATE COUNTY PERMIT
 PROPOSED ELEVATION: 1,265.4'
 QUADRANGLE: OSAGE, WV
 ACREAGE: 389.96 +/-
 ACREAGE: 11183.8 +/-
 DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE
 PLUG OFF FORMATION PERFORATE NEW FORMATION PLUG & ABANDON
 CLEAN OUT & REPLUG OTHER CHANGE (SPECIFY): _____
 ESTIMATED DEPTH: TVD: 8,074' TMD: 19,179'
 DESIGNATED AGENT: JOHN ADAMS
 ADDRESS: 707 VIRGINIA STREET EAST, SUITE 1200
 CITY: CHARLESTON STATE: WV ZIP CODE: 25301

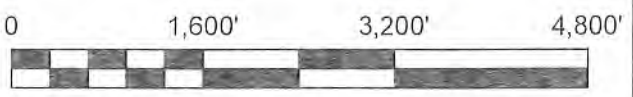
SURFACE HOLE DEC. LAT: 39.670222 SURVEYED LAT: 39° 40' 12.8"

BOGGESS 17H EXISTING GAS WELLS September 26, 2018



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SCALE: 1" = 1,600'



Bogges 17H Area of Review

API Number	Well Name	Well Number	Operator	Latitude (NAD 83)	Longitude (NAD 83)	TMP	TVD	Comments
061-71732	E Wm Core & Wm Eddy	NA	NA	39.688384	-80.091380	4-12-59	NA	pre 1929
061-71760	G W Berry	7	NA	39.682724	-80.091381	4-12-63	NA	pre 1929

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(5/13)

Operator's Well No. Bogges 17H

**INFORMATION SUPPLIED UNDER WEST VIRGINIA CODE
Chapter 22, Article 6A, Section 5(a)(5)
IN LIEU OF FILING LEASE(S) AND OTHER CONTINUING CONTRACT(S)**

Under the oath required to make the verification on page 1 of this Notice and Application, I depose and say that I am the person who signed the Notice and Application for the Applicant, and that –

- (1) the tract of land is the same tract described in this Application, partly or wholly depicted in the accompanying plat, and described in the Construction and Reclamation Plan;
- (2) the parties and recordation data (if recorded) for lease(s) or other continuing contract(s) by which the Applicant claims the right to extract, produce or market the oil or gas are as follows:

Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
See Attachment				

**Acknowledgement of Possible Permitting/Approval
In Addition to the Office of Oil and Gas**

The permit applicant for the proposed well work addressed in this application hereby acknowledges the possibility of the need for permits and/or approvals from local, state, or federal entities in addition to the Office of Oil and Gas, including but not limited to the following:

- WV Division of Water and Waste Management
- WV Division of Natural Resources WV Division of Highways
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- County Floodplain Coordinator

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The applicant further acknowledges that any Office of Oil and Gas permit in no way overrides, replaces, or nullifies the need for other permits/approvals that may be necessary and further affirms that all needed permits/approvals should be acquired from the appropriate authority before the affected activity is initiated.

Well Operator: Northeast Natural Energy LLC
 By: Hollie Medley
 Its: Regulatory Manager

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Bogges 17H

NNE LEASE NUMBER	LESSOR NAME	LESSEE NAME	ROYALTY	BOOK/	PG
WV 061 003592 001	Shuman Inc. a West Virginia Corporation	Northeast Natural Energy LLC	0.125 Or Greater	1526	462
WV 061 003269 003	Blake R. Bogges	Northeast Natural Energy LLC	0.125 Or Greater	1509	698
WV 061 003269 004	H. Preston Bogges	Northeast Natural Energy LLC	0.125 Or Greater	1510	607
WV 061 003363 002	Sanford Barrickman	South Penn Oil Co.	0.125 Or Greater	100	39
WV 061 004020 000	Mark V. Eddy and Betty A. Eddy, husband and wife	Northeast Natural Energy LLC	0.125 Or Greater	1505	572
WV 061 001364 007	J. W. Berry	Hukill, E. M.	0.125 Or Greater	25	391
WV 061 004263 001	Paula Kay Jenkins, aka Paula K. Jenkins	Northeast Natural Energy LLC	0.125 Or Greater	1574	97
WV 061 004264 001	June Core Myers	Northeast Natural Energy LLC	0.125 Or Greater	1571	548
WV 061 004265 001	Susan Beth Kish, a/k/a Susan Core Kish	Northeast Natural Energy LLC	0.125 Or Greater	1571	574
WV 061 004266 001	Kimberly Schnopp	Northeast Natural Energy LLC	0.125 Or Greater	1571	576
WV 061 004267 001	Beverly J. Core	Northeast Natural Energy LLC	0.125 Or Greater	1571	578
WV 061 004308 001	William B. Core and Neoma K. Core	Northeast Natural Energy LLC	0.125 Or Greater	1573	476
WV 061 004659 001	Charles L. Core a/k/a Charles Lawrence Core	Northeast Natural Energy LLC	0.125 Or Greater	1600	606
WV 061 001368 001	June C. Myers	CHESAPEAKE APPALACHIA, L.L.C.	0.125 Or Greater	1374	205
WV 061 001368 002	Joy S. Henderson, AKA Joy Sue Henderson	CHESAPEAKE APPALACHIA, L.L.C.	0.125 Or Greater	1377	166
WV 061 001368 003	June Core Myers, as Trustee of the June Core Myers Living Trust	Northeast Natural Energy LLC	0.125 Or Greater	1601	817
WV 061 003586 001	Charles L. Core a/k/a Charles Lawrence Core, a single man	Northeast Natural Energy LLC	0.125 Or Greater	1523	710
WV 061 003586 002	Kimberly Dawn Schnopp	Northeast Natural Energy, LLC	0.125 Or Greater	1600	590
WV 061 004404 001	Westhawk Minerals LLC	Gulfport Energy Corporation	0.125 Or Greater	1576	481
WV 061 003485 001	Harold Eugene DeGarmo, Jr., a married man dealing in his sole and separate property	Northeast Natural Energy LLC	0.125 Or Greater	1517	843
WV 061 003485 002	Wanda N. Ignance, a married woman dealing in her sole and separate property	Northeast Natural Energy LLC	0.125 Or Greater	1517	0391
WV 061 003485 003	Alan Boyd Core, a married man dealing in his sole and separate property	Northeast Natural Energy LLC	0.125 Or Greater	1517	0393
WV 061 003485 004	Karen Marlele Core, a single woman	Northeast Natural Energy LLC	0.125 Or Greater	1521	139
WV 061 003485 006	Tanis L. Domarsky, a single woman	Northeast Natural Energy LLC	0.125 Or Greater	1517	352
WV 061 003485 007	Virginia Elaine Carter, a single woman	Northeast Natural Energy LLC	0.125 Or Greater	1517	346
WV 061 003485 008	Tracey Lynne Dornberger, a single woman	Northeast Natural Energy LLC	0.125 Or Greater	1517	364
WV 061 003485 009	Denise Marie Kakascik, a married woman dealing in her sole and separate property	Northeast Natural Energy LLC	0.125 Or Greater	1521	709
WV 061 003485 010	Darlene E. Kerwood, a married woman dealing in sole and separate property	Northeast Natural Energy LLC	0.125 Or Greater	1517	0397
WV 061 003485 011	Romayne L. Grim, a married woman dealing in her sole and separate	Northeast Natural Energy LLC	0.125 Or Greater	1516	0771
WV 061 003485 012	Douglas E. Barcus, a single man	Northeast Natural Energy LLC	0.125 Or Greater	1517	358
WV 061 003485 013	Dale J. Barcus Jr. a single man	Northeast Natural Energy LLC	0.125 Or Greater	1519	820
WV 061 003485 014	Richard M. Carter Sr., a single man	Northeast Natural Energy LLC	0.125 Or Greater	1523	789
WV 061 003485 015	Marsha Lynn Core f/k/a Marsha Lynn Bobnak, a single woman	Northeast Natural Energy LLC	0.125 Or Greater	1524	321
WV 061 003485 016	Carol Ann Garcia, a married woman dealing in her sole and separate property	Northeast Natural Energy LLC	0.125 Or Greater	1524	443
WV 061 003485 017	Tyra Kay Greene, a married woman dealing in her sole and separate property	Northeast Natural Energy LLC	0.125 Or Greater	1526	94
WV 061 003485 018	Craig Bennett Core, a married man dealing in his sole and separate property	Northeast Natural Energy LLC	0.125 Or Greater	1524	340
WV 061 003485 019	Michael Bruce Hancock	Northeast Natural Energy LLC	0.125 Or Greater	1528	97
WV 061 003485 020	Donald Richard Blackburn and Linda Lou Blackburn	Northeast Natural Energy LLC	0.125 Or Greater	1541	319
WV 061 003485 021	John Wayne Blackburn	Northeast Natural Energy LLC	0.125 Or Greater	1535	714
WV 061 003485 022	Courtney L. Dalrymple	Northeast Natural Energy LLC	0.125 Or Greater	1536	275
WV 061 003485 026	Brandon Jon Dalrymple and Melinda K. Dalrymple	Northeast Natural Energy LLC	0.125 Or Greater	1565	451
WV 061 003485 027	Melva Lynn Marcum and Michael C. Marcum	Northeast Natural Energy LLC	0.125 Or Greater	1564	329
WV 061 003485 029	Terri Sue Yanda	Northeast Natural Energy LLC	0.125 Or Greater	1604	388
WV 061 003485 030	Donna J. Yanda	Northeast Natural Energy LLC	0.125 Or Greater	1604	390
WV 061 003631 001	Charles L. Core aka Charles Lawrence Core	Northeast Natural Energy LLC	0.125 Or Greater	1535	637

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Bogges 17H

NNE LEASE NUMBER	LESSOR NAME	LESSEE NAME	ROYALTY	BOOK/	PG
WV 061 004690 004	Edna M. Carmichael	Northeast Natural Energy LLC	0.125 Or Greater	1604	244
WV 061 004690 005	Daniel E. Strupe	Northeast Natural Energy LLC	0.125 Or Greater	1604	420
WV 061 004690 006	Doris J. Schayes	Northeast Natural Energy, LLC	0.125 Or Greater	1604	422
WV 061 004690 007	Brian A. Ware	Northeast Natural Energy LLC	0.125 Or Greater	1604	424
WV 061 004690 008	Danika D. Sanz	Northeast Natural Energy LLC	0.125 Or Greater	1604	426
WV 061 004690 009	Cathy L. Sahli	Northeast Natural Energy LLC	0.125 Or Greater	1606	106
WV 061 004690 010	Donna Sue Richards	Northeast Natural Energy LLC	0.125 Or Greater	1606	108
WV 061 004690 013	Della K. Strupe	Northeast Natural Energy LLC	0.125 Or Greater	1606	110
WV 061 004690 016	Kimberly A. Dombo and Robert J. Dombo Jr.,	Northeast Natural Energy LLC	0.125 Or Greater	1606	114
WV 061 004690 017	Carrie Jean Edwards	Northeast Natural Energy LLC	0.125 Or Greater	1608	40
WV 061 004690 018	Betty Joann Carmichael	Northeast Natural Energy LLC	0.125 Or Greater	1609	393
WV 061 004690 020	John P. Domarsky and Michelle L. Domarsky	Northeast Natural Energy LLC	0.125 Or Greater	1608	42
WV 061 004690 021	Connie L Cotterman f/k/a and Terry L Cotterman	Northeast Natural Energy LLC	0.125 Or Greater	1611	341
WV 061 004690 022	David E. Barcus	Northeast Natural Energy LLC	0.125 Or Greater	1612	136
WV 061 004690 025	Ralph W. Carter and Sandra K. Carter	Northeast Natural Energy LLC	0.125 Or Greater	1618	603
WV 061 004690 026	William B. Myrtle	Northeast Natural Energy LLC	0.125 Or Greater	1619	627
WV 061 004690 027	Angela S. Griesenauer, fka Angela S. Myrtle	Northeast Natural Energy LLC	0.125 Or Greater	1622	20
WV 061 004858 002	Judy Mosser	Northeast Natural Energy LLC	0.125 Or Greater	1611	831
WV 061 004858 005	Timothy J. Menke Jr.	Northeast Natural Energy LLC	0.125 Or Greater	1618	360
WV 061 004858 006	Angelique Anderson, f/k/a Angeliique Menke and Kristopher Anderson	Northeast Natural Energy LLC	0.125 Or Greater	1618	362
WV 061 004858 009	Tracey M. Keck	Northeast Natural Energy LLC	0.125 Or Greater	1618	639
WV 061 004858 011	Mary E. Kambach	Northeast Natural Energy LLC	0.125 Or Greater	1618	641
WV 061 004858 012	Keith W. Smith and Sheri L. Smith	Northeast Natural Energy LLC	0.125 Or Greater	1620	41
WV 061 004858 019	Joni Lynn Metoxen	Northeast Natural Energy LLC	0.125 Or Greater	1622	602
WV 061 004858 020	Chris Hamilton	Northeast Natural Energy LLC	0.125 Or Greater	1622	604
WV 061 004858 023	Kimberly C. Krajewski f/k/a Kimberly C. Menke	Northeast Natural Energy LLC	0.125 Or Greater	1628	456
WV 061 004810 001	Charles L. Core aka Charles Lawrence Core	Northeast Natural Energy LLC	0.125 Or Greater	1608	86
WV 061 004857 001	Paula Kay Jenkins	Northeast Natural Energy LLC	0.125 Or Greater	1612	343
WV 061 004857 002	William B Core	Northeast Natural Energy LLC	0.125 Or Greater	1613	246
WV 061 004857 003	Beverly J. Core	Northeast Natural Energy LLC	0.125 Or Greater	1615	603
WV 061 004857 004	June Core Myers Living Trust dated August 2nd, 2013, June Core Myers, acting as Trustee	Northeast Natural Energy LLC	0.125 Or Greater	1615	605
WV 061 004857 005	Kimberly Dawn Schnopp	Northeast Natural Energy LLC	0.125 Or Greater	1618	356
WV 061 004856 001	Charles L. Core, aka Charles Lawrence Core	Northeast Natural Energy, LLC	0.125 Or Greater	1612	341
WV 061 001486 006	Martha E. Fetty	Chesapeake Appalachia, L.L.C.	0.125 Or Greater	1384	398
WV 061 001486 007	William Clarence Fetty	Chesapeake Appalachia, L.L.C.	0.125 Or Greater	1385	264
WV 061 001486 008	Anna Belle Fetty, her A.I.F. Philip J. Fetty	Chesapeake Appalachia, L.L.C.	0.125 Or Greater	1385	267
WV 061 001486 011	Charles E. LaPoe	Chesapeake Appalachia, L.L.C.	0.125 Or Greater	1387	825
WV 061 001486 012	Sandra John	Chesapeake Appalachia, L.L.C.	0.125 Or Greater	1391	293
WV 061 001486 014	Joseph Robert Miller	Chesapeake Appalachia, L.L.C.	0.125 Or Greater	1391	299
WV 061 001486 015	Carol Gallion	Chesapeake Appalachia, L.L.C.	0.125 Or Greater	1391	302
WV 061 001486 016	Gregory W. Fetty, f/k/a Gregory Fetty and Nancy S. Fetty, his wife	Northeast Natural Energy, LLC	0.125 Or Greater	1511	765
WV 061 001486 017	Isaac Kenneth Fetty, aka Kenneth Fetty, a married man dealing in his sole and separate propert	Northeast Natural Energy LLC	0.125 Or Greater	1506	439
WV 061 001486 018	Viola Smith, single	Northeast Natural Energy LLC	0.125 Or Greater	1507	417
WV 061 001486 019	Clarence Harvey, widower	Northeast Natural Energy, LLC	0.125 Or Greater	1511	844
WV 061 001486 020	Eleanor Miller f/k/a Eleanor Wyatt and Hollis Miller, her husband	Northeast Natural Energy LLC	0.125 Or Greater	1507	718

WV Department of Environmental Protection
 Office of Oil and Gas
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WW-6A1

Bogges 17H

NNE LEASE NUMBER	LESSOR NAME	LESSEE NAME	ROYALTY	BOOK/	PG
WV 061 001486 021	Arthur W. Adams	Northeast Natural Energy LLC	0.125 Or Greater	1605	481
WV 061 001486 022	Nancy J. Holbert	Northeast Natural Energy LLC	0.125 Or Greater	1607	726
WV 061 001486 023	James F. Adams	Northeast Natural Energy, LLC	0.125 Or Greater	1612	15
WV 061 004807 001	Albert R. Fox., a/k/a Albert Fox and Arta S. Fox	Northeast Natural Energy LLC	0.125 Or Greater	1610	731
WV 061 004807 003	Alexis D. Howard	Northeast Natural Energy LLC	0.125 Or Greater	1628	431
WV 061 004807 013	Leslie Gail Nunez, f/k/a Leslie Gail Duncan	Northeast Natural Energy LLC	0.125 Or Greater	1628	382
WV 061 004807 018	Timothy J. Howard and Tricia Howard	Northeast Natural Energy LLC	0.125 Or Greater	1628	434
WV 061 004807 020	John R. Goodman and Letitia C. Goodman	Northeast Natural Energy LLC	0.125 Or Greater	1623	33
WV 061 004807 021	Shirley Troth f/k/a Shirley Goodman	Northeast Natural Energy LLC	0.125 Or Greater	1628	437
WV 061 000112 002 LA	EQT Production Company	Northeast Natural Energy LLC	Agreement	1623	663

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South Penn Oil Company
Assignment
DB 27/287
South Penn Oil Company

South Penn Natural Gas Company
Assignment
DB 304/457
South Penn Natural Gas Company

South Penn Oil Company
Deed
DB 580/311
Pennzoil Company

New Dunstan, Inc.
Assignment
AB 20/484
New Dunstan, Inc.

Pennzoil Company & Pennzoil Producing
Deed
DB 210/611
Pennzoil Company & Pennzoil Production

Pennzoil Products Company
Assignment
AR 23/280
Pennzoil Products Company

Eddy Brothers (Mark V. Eddy & Harry Eddy)
Assignment
DB 1063/553
Eddy Brothers (Mark V. Eddy & Harry Eddy)

NNE Resources, LLC
Assignment
AB 123/370

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12/21/2018

Chesapeake Appalachia, LLC.
And
Statoil USA Onshore Properties Inc.

Northeast Natural Energy
Assignment
BK 120/769

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Environmental Protection

J.W. Berry
Lease
DB 25/391
E.M. Hukill

E.M. Hukill
Assignment
AB 31/262
South Penn Oil Company

South Penn Oil Company
Assignment
AB 31/286
Marion Oil Company

Marion Oil Company
Assignment
AB 219/211
Washington Oil Company

Washington Oil Company
Assignment
AB 9/148
Northern United Petroleum Company

Northern United Petroleum Company
Assignment
AB 9/217
United Petroleum Corporation

Northern United Petroleum Company
Assignment
AB 9/282
United Petroleum Corporation

United Petroleum Corporation
Assignment
AB 9/329
Chill Can International, Ltd.

Chill Can International, Ltd.
Assignment
AB 9/677
Jerome Klubeck

Jerome Klubeck
Assignment
AB 65/373
N-K LLC

N-K LLC
Assignment
AB 130/840
Northeast Natural Energy, LLC

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12/21/2018

Westhawk Minerals, LLC
Lease
DB 1576/481
Gulfport Energy Corporation

Gulfport Energy Corporation
Assignment
AB 132/537
Northeast Natural Energy, LLC

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WV Department of
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12/21/2018



northeast
NATURAL ENERGY

Bogges 17H

SITE SAFETY PLAN

September 25, 2018

Howard K. ...
9/26/2018

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Environmental Protection

SITE NAME Boggess 17H

COUNTY Monongalia

ACCESS ROAD ENTRANCE N39° 39' 59.23", W-80° 05' 48.82 (NAD 83)

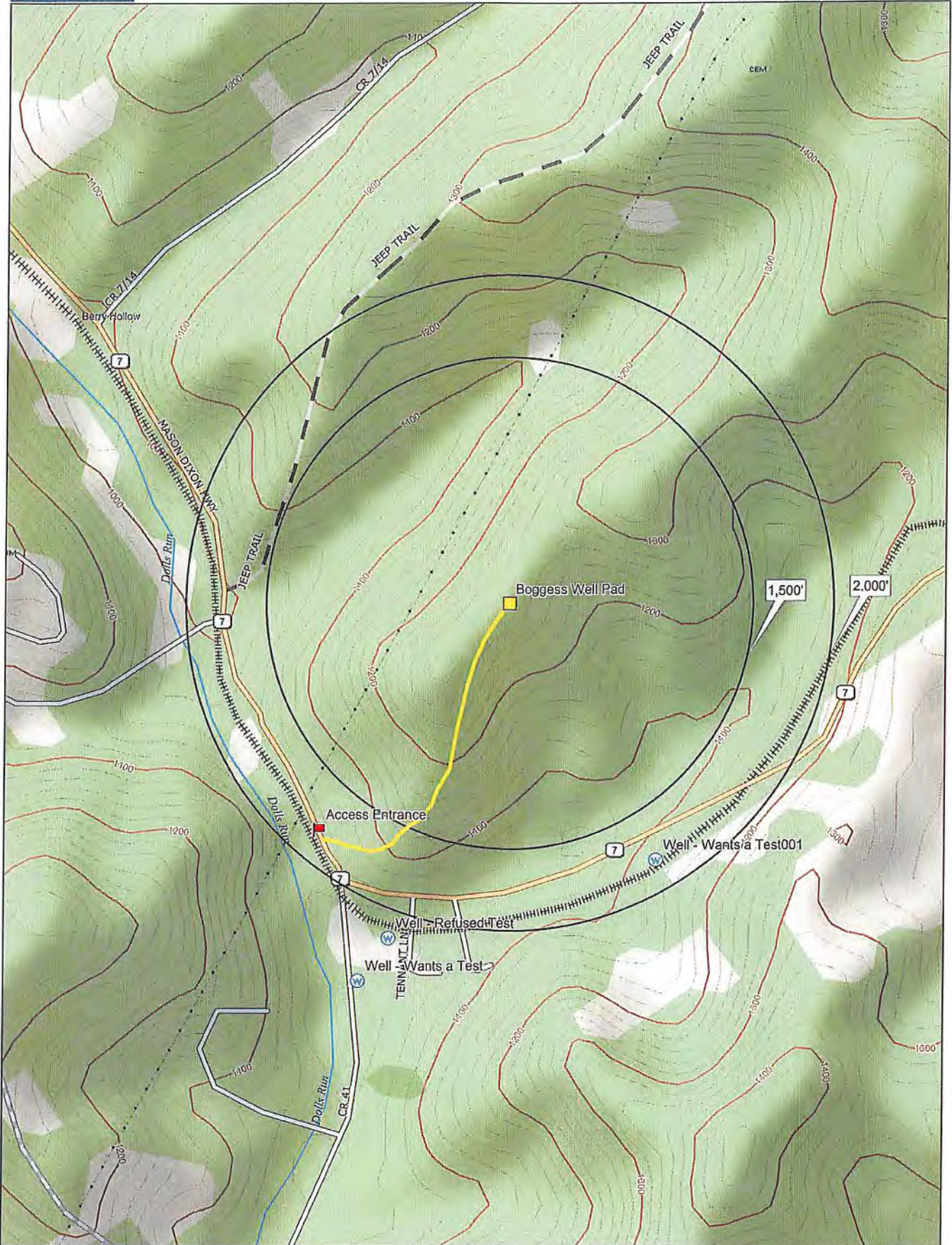
N 4391127.465, E 577463.266 (NAD 83 UTM)

DIRECTIONS TO SITE:

From I-79, take exit 155. Merge onto Chaplin Hill Road/CR-19/24N toward US-19/WV-7/Star City. If traveling from the south, this will be a right off the exit. If traveling from the north, this will be a left off the exit. After approximately 0.8 miles, turn left at light onto US-19/WV-7. Continue on US-19/WV-7 for approximately 1.7 miles. Turn left on WV-7 and continue on route for approximately 4.0 miles. The Boggess Pad Access Road Entrance will be on the right.

From Blacksville, take WV-7 E/Mason Dixon Highway for approximately 10.1 miles. The Boggess Pad Access Road Entrance will be on the left.

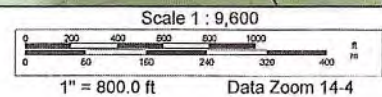
*See Attached Maps

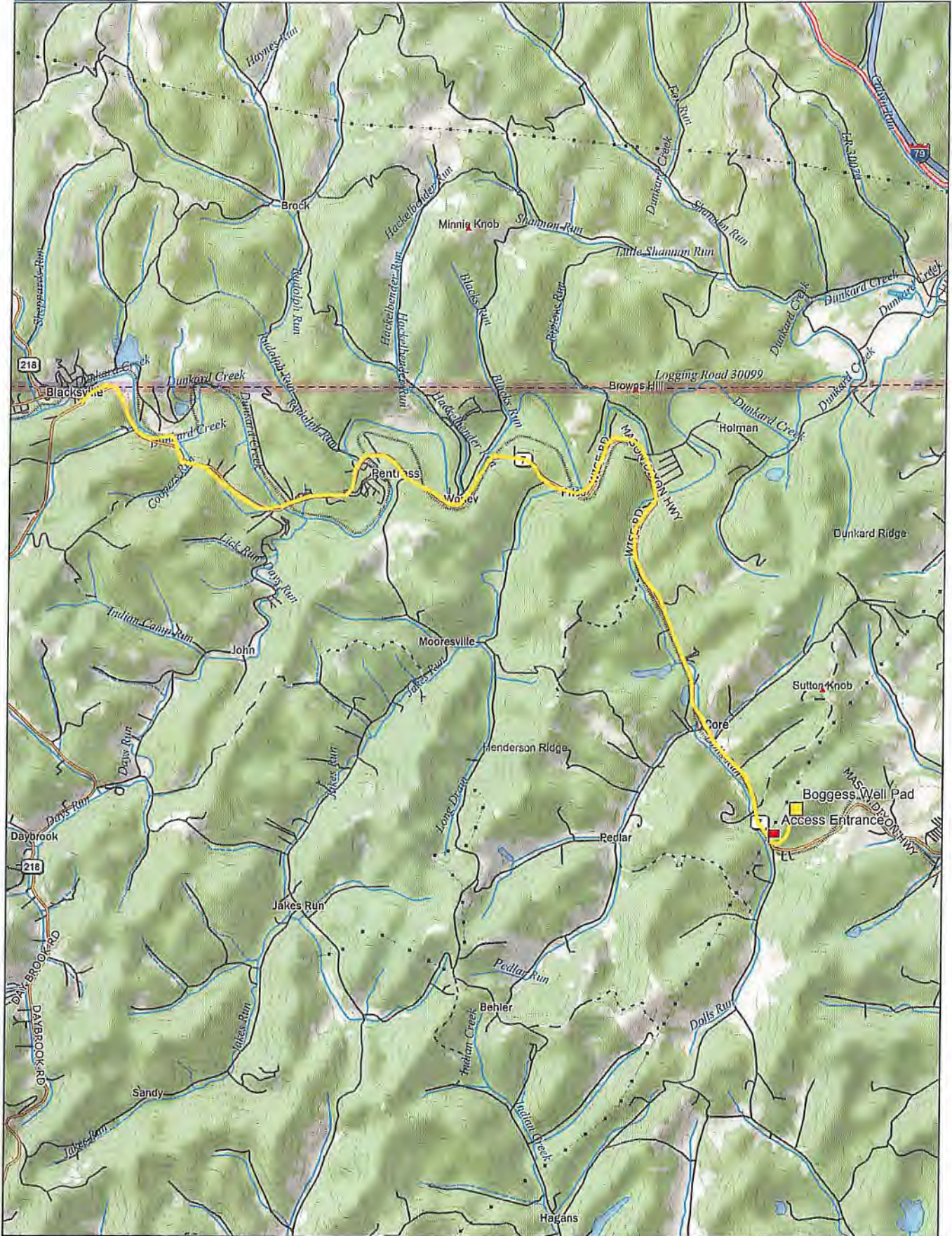


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www.delorme.com





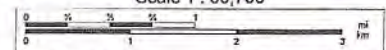
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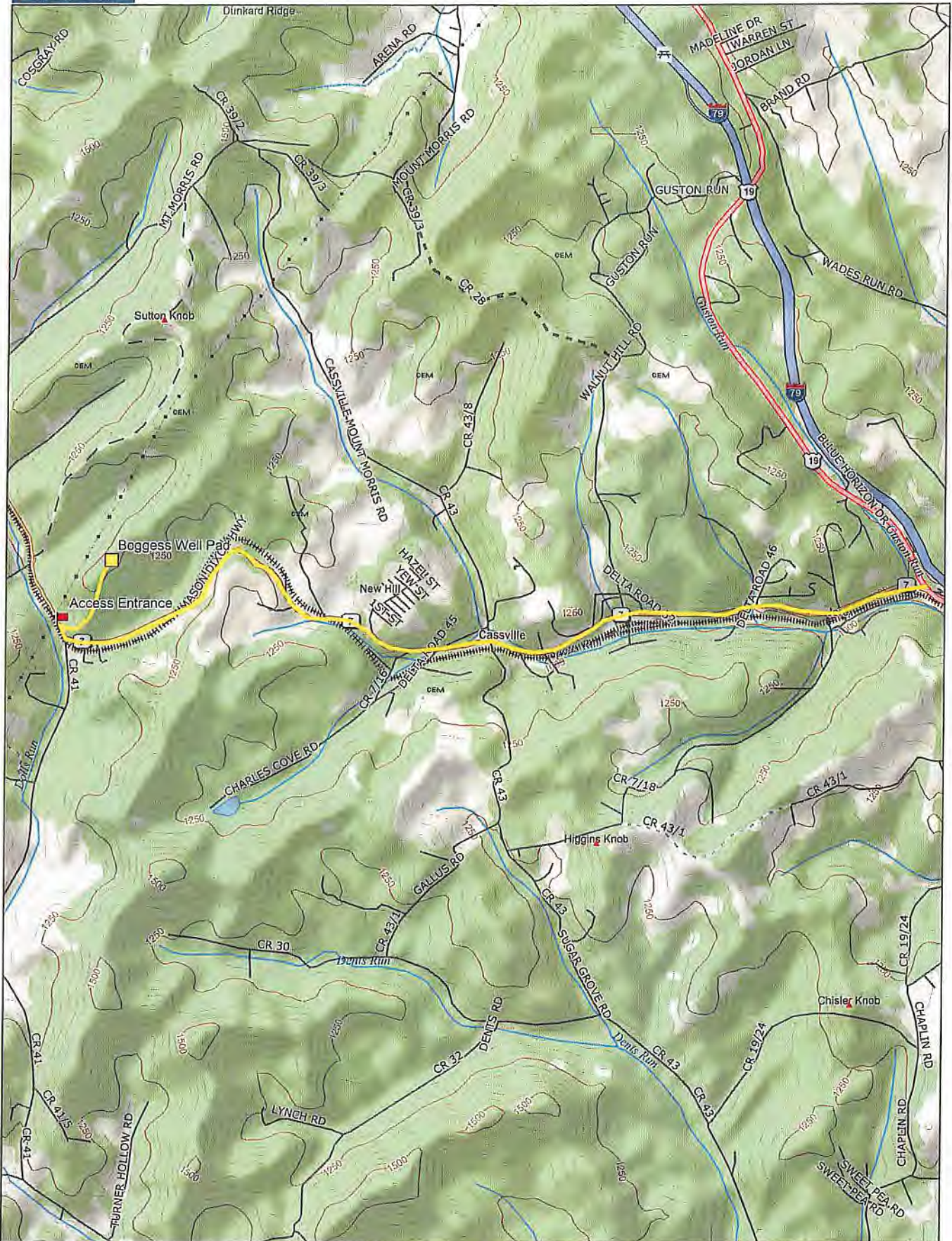


Scale 1 : 68,750



1" = 1.09 mi

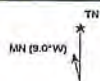
Data Zoom 11-5



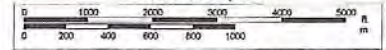
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Scale 1 : 34,375



1" = 2,864.6 ft

Data Zoom 12-5

Introduction

Northeast Natural Energy LLC (“NNE”) is an oil and gas exploration and production company with company headquarters located at the following address:

Northeast Natural Energy LLC
707 Virginia Street East, Suite 1200
Charleston, WV 25301

And a Field Operations Office located at the following address:

Northeast Natural Energy LLC
48 Donley Street, Suite 601
Morgantown, WV 26501

NNE is committed to protecting the people, property, and resources of the company and of the communities in which it works by establishing a safe and healthy work environment that is free from recognized hazards and complies with all local, state and federal regulations.

This Plan will be reviewed annually and may be subject to revision and/or update whenever any of the following occur:

- An incident occurs.
- A new chemical or process is utilized onsite.
- Existing processes are modified significantly.
- Regulations are revised significantly.
- The current Plan fails in an emergency situation.
- Changes in emergency response equipment occur.
- Changes in internal and external emergency resources occur.

TABLE OF CONTENTS

1 – Contacts, Schedules and Meetings

2 – Maps and Diagrams

3 – Well Work

4 – Chemical Inventory & MSDS

5 – BOP and Well Control

6 – Hydrogen Sulfide (H₂S)

7 – Flaring

8 – Collision Avoidance Safeguards, Practices and Standards

1

Contacts, Schedules and Meetings

A. NORTHEAST NATURAL ENERGY LLC CONTACTS:

24 hour emergency number 1-866-207-1846

Construction/Reclamation

- Mike Shreve – Construction Foreman 304.918.3050
- Dave McDougal – Manager of Civil Engineering 304.941.5033
- Brett Loflin – VP of Regulatory Affairs 304.414.7063

Drilling/Completion

- Jay Hewitt – Drilling Manager 304.382.1825
- Criss VanGilder – Completions Manager 405.757.8725
- Diane Corwin – General Manager – Operations 304.216.9959

Production

- John Landis - Production Manager 304.216.6854
- Diane Corwin – General Manager – Operations 304.216.9959

B. EMERGENCY CONTACTS :In the case of an emergency call **911****1. OPERATOR CONTACTS**

- 24 hour emergency number 1-866-207-1846

2. DRILLING CONTRACTORS

- Highlands –Vertical Drilling 304.389.5868
- Patterson Drilling – Horizontal Drilling 724.239.2812

KEY CONTRACTORS AND VENDORS

- Baker Hughes – Cement/Pumping 724.743.9208
- Halliburton – Cement/Pumping 888.223.4255
- Schlumberger – Logging/Cement 724.820.3360

3. WV DEP/ OFFICE OF OIL AND GAS

Pollution and Emergency Spills 1-800-642-3074

- James Martin – Chief 304.926.0499 Ext. 1654
- Gayne Knitoswski – Inspector 304.546.8171
- Joe McCourt– WV DEP Northern Inspector Supervisor 304.380.2467

OFFICE OF AIR QUALITY

- Kirk Powroznik – Inspector 304.368.3910
- Karl Dettinger – Inspector 304.368.3910

4. LOCAL EMERGENCY RESPONSE UNITS**MONONGALIA COUNTY OFFICE OF EMERGENCY MANAGEMENT**

- 24 Hour Emergency Number 304.599.6382
- Jimmy Smith – Director 304.598.0301
- Harold Sperringer – Deputy Director

FIRE DEPARTMENTS

- Blacksville Volunteer 304.432.8282

AMBULANCE / EMS

- MON EMS 304.599.0650
- JAN-CARE 304.296.9700

LIFE FLIGHT AMBULANCE SERVICE (HELICOPTER)

- Angel MedFlight 866.604.8307

STATE POLICE

- Morgantown Detachment 304.285.3200

COUNTY POLICE

- Monongalia Sheriff 304.291.7290

5. LOCAL ER PERSONNEL**HOSPITAL**

- Ruby Memorial (trauma 1) 304.598.4000
- Monongalia General (trauma 4) 304.598.1200

Structure	Type	Owner	Street Address	City/Zip		District	Tax Map	Parcel
1	Golf Course	Ayers and Ayers Holdings	PO Box 1310	Inwood, WV 25428	304-328-5451	Cass	11	44
2	Mining Training Site	WVU Board of Governors	2870 Little Indian Creek Road	Morgantown, WV 26501	No listed phone number	Clay	15	40
3	Business	Poffenberger Family Trust: Charlene Frances Horan	1929 Mason Dixon Highway	Maidsville, WV 26541	304-879-5020	Clay	12	29.2
29,30	Residence/Private Structure	Billy Poffenberger: Poffenberger Family Revocable Living Trust	117 Forest Drive	Morgantown, WV 26505	304-879-5368/304-599-9533	Clay	12	29.1
31,33	Residence/Private Structure	Billy Poffenberger: Poffenberger Family Revocable Living Trust	117 Forest Drive	Morgantown, WV 26505	304-879-5368/304-599-9533	Clay	12	29
4,5	Residence/Private Structure	Roy Eddy	297 Stull Road	Maidsville, WV 26541	304-879-5362	Clay	13,14	1,2
6	Residence/Private Structure	Betty Wiley	373 Dunkard Avenue	Morgantown, WV 26501	304-292-3946	Clay	14	1
7	Residence/Private Structure	Chad Forman	1543 Mason Dixon Highway	Core, WV 26541	304-708-0129	Clay	15	28
8	Residence/Private Structure	Donald Masters	1557 Mason Dixon Highway	Maidsville, WV 26541	304-879-5225: 304-594-3166	Clay	12	66
9	Residence/Private Structure	Marilyn Corbin	1581 Mason Dixon Highway/P.O. Box 278	Maidsville, WV 26541	No listed phone number	Clay	15	27.1
10,11,13,26	Residence/Private Structure	Blake Boggess	1584 Mason Dixon Highway	Maidsville, WV 26541	304-879-5379	Clay	12	65
12	Residence/Private Structure	David Fox	1605 Mason Dixon Highway	Maidsville, WV 26541	No listed phone number	Clay	15	27
14	Residence/Private Structure	Brittany Swanson	1643 Mason Dixon Highway	Maidsville, WV 26541	No listed phone number	Clay	15	29.1
15,16,17	Residence/Private Structure	Donald & Nellie Marlene Tennant	37 Tennant Lane	Maidsville, WV 26541	304-983-8262	Clay	15	30.2
18	Residence/Private Structure	Thomas Hellyer	1681 Mason Dixon Highway	Maidsville, WV 26541	304-879-5775	Clay	15	30.1
19	Residence/Private Structure	Mary Jane Walls	3230 Mason Dixon Highway	Maidsville, WV 26541	304-879-5231	Clay	15	30.6
20	Residence/Private Structure	Donna Sue and David Jones	3106 Little Indian Creek Road	Core, WV 26541	304-983-2159	Clay	15	30.9
21	Residence/Private Structure	Tyler Elliot and Katherine Brewer	3120 Little Indian Creek Road	Maidsville, WV 26541	304-879-5477	Clay	15	30.8
22	Residence/Private Structure	Laurie Cozort	30 Tennant Lane	Core, WV 26541	No listed phone number	Clay	15	30.4
23	Residence/Private Structure	Dave and Donna Sue Jones	3106 Little Indian Creek Road	Maidsville, WV 26541	304-983-2159	Clay	15	30.5
24	Residence/Private Structure	Timothy Liming	3090 Little Indian Creek Road	Maidsville, WV 26541	304-879-5591	Clay	15	31
25	Residence/Private Structure	Danny & Deanna Tennant	345 Danny T Lane	Core, WV 26541	304-879-5199	Clay	15	26
27,28	Residence/Private Structure	Darlene Klubeck	537 Pedlar Run Road	Maidsville, WV 26541	No listed phone number	Clay	15	25
32	Residence/Private Structure	Danny & Deanna S. Tennant	345 Danny T Lane	Maidsville, WV 26541	304-879-5199	Clay	12	29.4

C. NOTIFICATION OF H₂S GAS PRESENCE

Detection of H₂S shall sound an alarm which notifies personnel to shut in the well(s) and evacuate to the predetermined safe zone immediately.

A wind sock and/or flags will be utilized on location to identify wind direction. A safe zone upwind and away from the well will be established at the beginning of each tour. Personnel are trained to evacuate the well and gather at this safe zone immediately at the first sound of an H₂S explosive gas alarm.

When in a historically known area, or after H₂S is first detected, operations will halt, evacuation procedures will be followed, and all personnel will be trained for detailed H₂S protocols before operations begin or resume.

After personnel are located in a safe area, the onsite supervisor will take a head count, and make the proper offsite notifications. The DEP Office of Oil and Gas will be notified by a phone call to both the local inspector and the emergency number. The local emergency responders may also be notified of the detection.

In the event that H₂S has been detected, the onsite supervisor shall use his discretion as to the severity of the event and whether the local community should be notified. NNE will make a diligent effort to identify local residents and businesses within a ½ mile radius of its unconventional well sites (*see attached). Notification of such residence may be done in the form of a phone call or a door to door visit. NNE also recognizes that in most emergency situations the local emergency responders will coordinate any notification or evacuation procedures for the community and NNE will work closely with such emergency responders in their efforts.

D. PRE-SPUD MEETINGS

Prior to drilling operations, an onsite "Pre-Spud" meeting will be held to address operations and the site safety plan. This meeting shall include the overseeing NNE Drilling/Completions Engineer, the staff or contracted site supervisor(s) ("Company Man"), any staff or contracted safety personnel, key contractors to the drilling process, the contracted rig's superintendent/tool pusher, and the local oil and gas inspector if available. Local emergency response personnel may also be invited to the pre-spud meeting. The regional DEP inspector will be notified 48-hours in advance of the meeting. All attending personnel will be documented. Contractors will be provided copy of and instructed to go over the site safety plan with their respective individual employees.

E. WELL SITE SAFETY MEETINGS

Safety Meetings will be held on-site, at a minimum, on a weekly basis and prior to the beginning of drilling, completion and work-over operations. Attendance at each safety meeting will be logged.

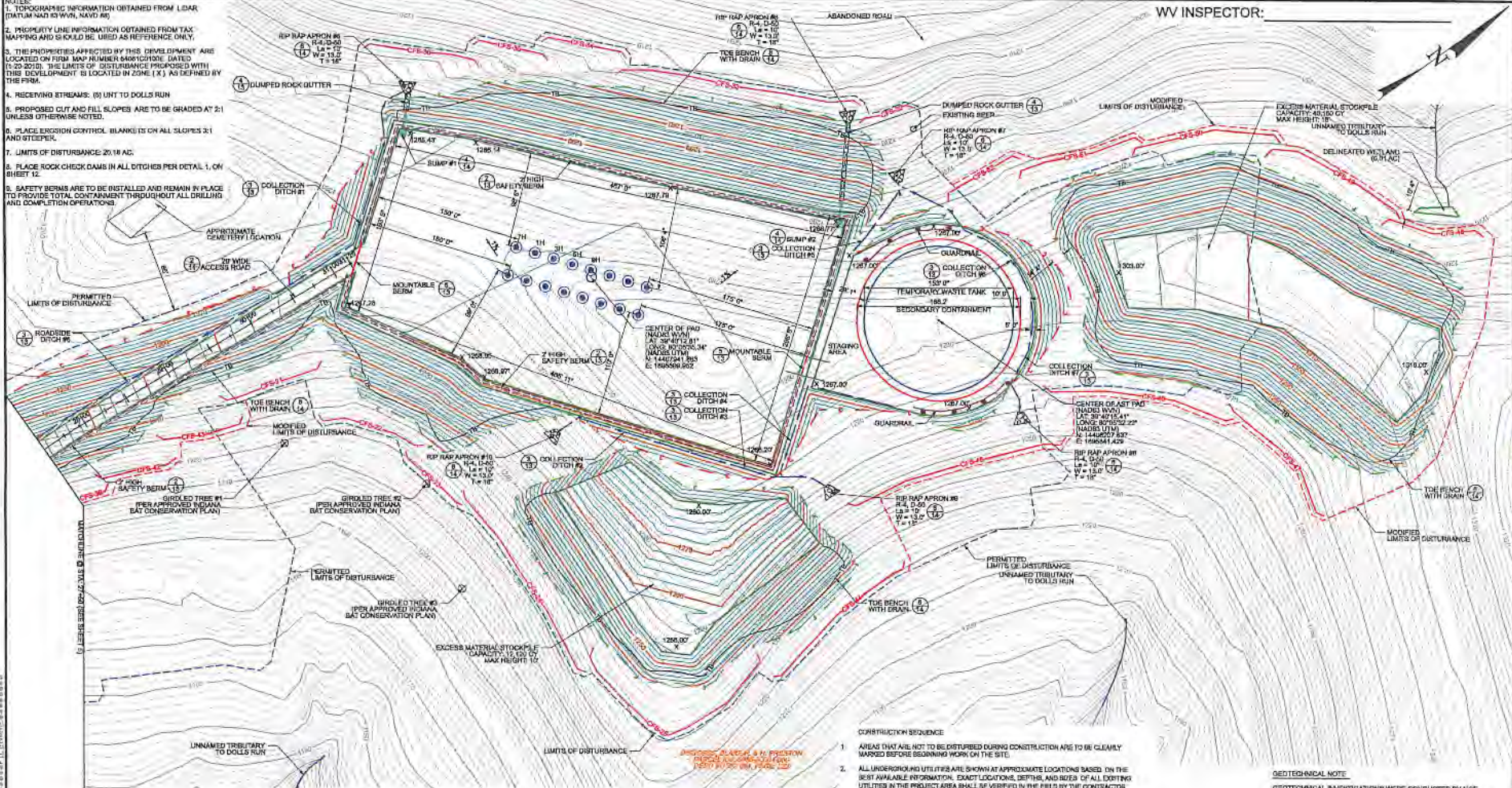
Additionally, as a means of safety and maintaining a head count in case of an incident, a check-in and check-out list of both personnel and visitors will be kept during all drilling, completion, and work over phases of operation. The rig/frac supervisor will be responsible for the checking in and out of all personnel on location. A sign will be posted at the entrance to the location directing all visitors to the company trailer.

2

Maps and Diagrams

- NOTES:**
1. TOPOGRAPHIC INFORMATION OBTAINED FROM LIDAR (DATUM NAD 83 WLN, NAVD 83)
 2. PROPERTY LINE INFORMATION OBTAINED FROM TAX MAPPING AND SHOULD BE USED AS REFERENCE ONLY.
 3. THE PROPERTIES AFFRATED BY THIS DEVELOPMENT ARE LOCATED ON FIRM MAP NUMBER BANCROFTIE, DATED (1/20/2018). THE LIMITS OF DISTURBANCE PROPOSED WITH THIS DEVELOPMENT IS LOCATED IN ZONE (X) AS DEFINED BY THE FIRM.
 4. RECEIVING STREAMS: (0) UNT TO DOLLS RUN
 5. PROPOSED CUT AND FILL SLOPES ARE TO BE GRADED AT 2:1 UNLESS OTHERWISE NOTED.
 6. PLACE EROSION CONTROL BLENKS IN ALL SLOPES 2:1 AND STEEPER.
 7. LIMITS OF DISTURBANCE 20.14 AC.
 8. PLACE ROCK CHECK DAMS IN ALL DITCHES PER DETAIL 1, ON SHEET 12.
 9. SAFETY BERMS ARE TO BE INSTALLED AND REMAIN IN PLACE TO PROVIDE TOTAL CONTAINMENT THROUGHOUT ALL DRILLING AND COMPLETION OPERATIONS.

WW INSPECTOR:



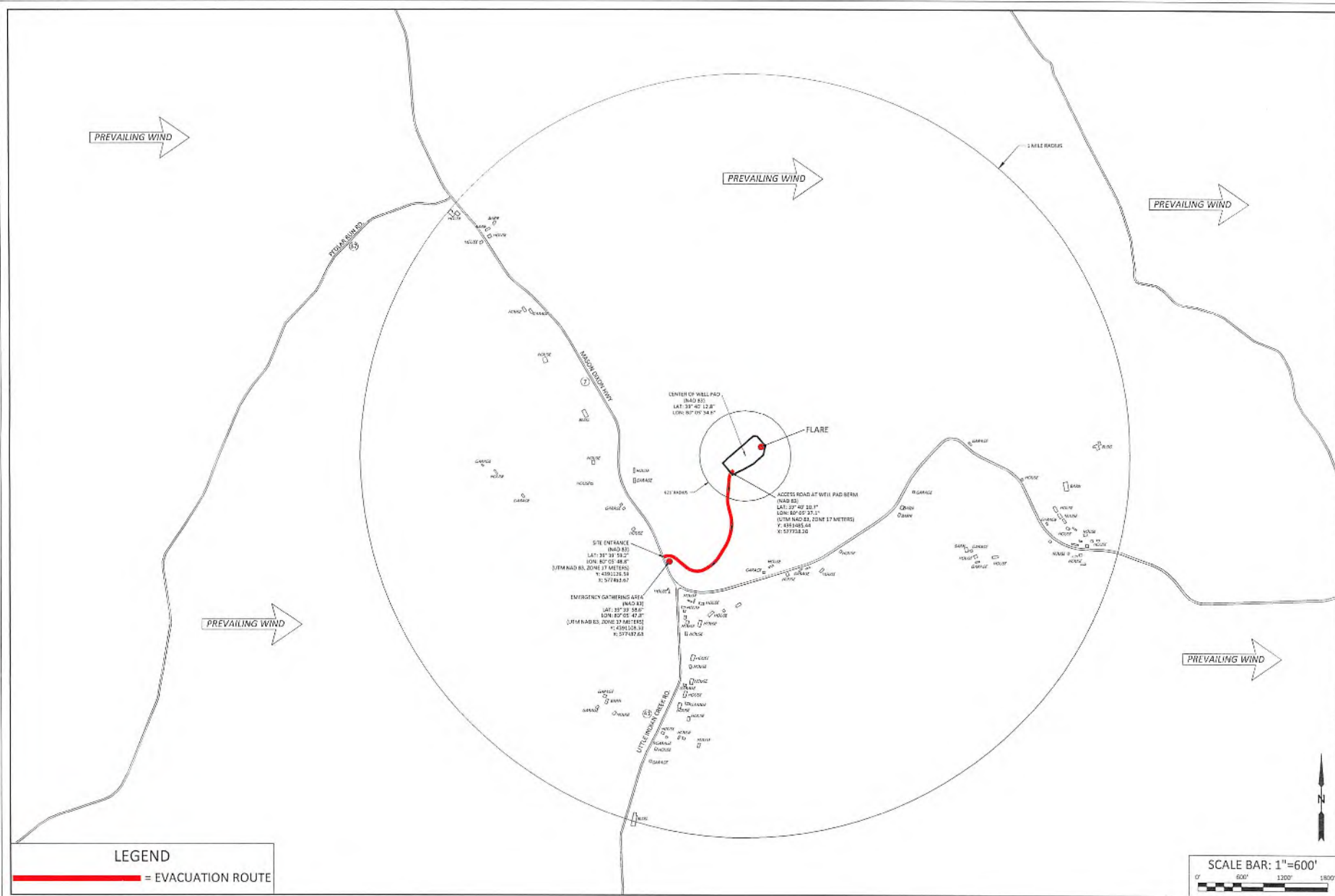
LEGEND

EXISTING TREE LINE	EXISTING INDEX CONTOUR LINE (10')	WELL HEAD COORDINATES
EXISTING ROAD	EXISTING INTERMEDIATE CONTOUR LINE	WELL SLOTT 7H (NAD83)
EXISTING RIGHT-OF-WAY	PROPOSED INDEX CONTOUR LINE (10')	LAT: 39° 42'12.37"
PROPOSED RIGHT-OF-WAY	PROPOSED INTERMEDIATE CONTOUR LINE	LONG: 80° 02'28.34"
PROPERTY LINE	CHANNEL FLOW DIRECTION	WELL SLOTT 1H (NAD83)
MUNICIPAL BOUNDARY	STREAM	LAT: 39° 42'12.42"
PROPOSED FENCE	DELIMITED STREAM	LONG: 80° 02'28.02"
EXISTING FENCE	DELIMITED WETLAND BOUNDARY	WELL SLOTT 5H (NAD83)
EXISTING ELECTRICAL LINE	FLOODWAY BOUNDARY	LAT: 39° 42'12.81"
EXISTING GAS LINE	REPAIR BUFFER	LONG: 80° 02'35.83"
PROPOSED GAS LINE	PERMITTED COMPOST FILTER SOCK (CFS)	WELL SLOTT 6H (NAD83)
PROPOSED WATER LINE	PERMITTED TRIPLE CFS AT RACK	LAT: 39° 42'12.50"
FILL LIMITS	MODIFIED COMPOST FILTER SOCK (CFS)	LONG: 80° 02'35.42"
CUT LIMITS	MODIFIED TRIPLE CFS BENCH	WELL SLOTT 8H (NAD83)
TOE BENCH WITH DRAIN	CFS SEDIMENT TRAP	LAT: 39° 42'12.52"
ROADWAY CENTERLINE	EXISTING SPOT ELEVATION	LONG: 80° 02'35.42"
SAFETY BERM	PROPOSED SPOT ELEVATION	WELL SLOTT 9H (NAD83)
PERMITTED LIMITS OF DISTURBANCE	EXISTING STRUCTURE	LAT: 39° 42'12.82"
MODIFIED LIMITS OF DISTURBANCE		LONG: 80° 02'35.42"
EXISTING UTILITY POLE		

TEMPORARY WASTE TANK CAPACITY
TOTAL STORAGE VOLUME = 40,000 HBL3
STORAGE VOLUME WITH = 33,781 HBL3
± OF FREEBOARD
EARTHWORK SUMMARY (WITH PAD)
TOTAL RAW PAD CUT = 54,022 CY
TOTAL RAW ROAD CUT = 21,485 CY
TOTAL RAW FILL = 75,418 CY
TOTAL SWELLED CUT = 94,069 CY*
TOTAL FILL = 32,016 CY*
TOTAL TOPSOIL = 11,881 CY*
* ASSUMED 15% SWELL
** ASSUMED 10' DEPTH ROCK TOPSOIL
LIMITS OF DISTURBANCE SUMMARY
PERMITTED LIMITS OF DISTURBANCE = 19.98 AC
MODIFIED LIMITS OF DISTURBANCE = 20.18 AC
DIFFERENCE IN LIMITS OF DISTURBANCE = +0.20 AC

- CONSTRUCTION SEQUENCE**
1. AREAS THAT ARE NOT TO BE DISTURBED DURING CONSTRUCTION ARE TO BE CLEARLY MARKED BEFORE BEGINNING WORK ON THE SITE.
 2. ALL UNDERGROUND UTILITIES ARE SHOWN AT APPROXIMATE LOCATIONS BASED ON THE BEST AVAILABLE INFORMATION. EXACT LOCATIONS, DEPTHS, AND SIZES OF ALL EXISTING UTILITIES IN THE PROJECT AREA SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR WITH A REPRESENTATIVE FROM THE APPROPRIATE UTILITY COMPANY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING ALL UTILITY COMPANIES AT LEAST SEVENTY-TWO (72) HOURS BEFORE ANY WORK IS COMMENCED ON THIS PROJECT.
 3. EROSION AND SEDIMENT CONTROL DEVICES, AS REQUIRED BY THE EROSION AND SEDIMENT CONTROL PLAN AND DICTATED BY FIELD CONDITIONS, ARE TO BE INSTALLED PRIOR TO CONDUCTING ANY CONSTRUCTION ACTIVITY ON THE SITE.
 4. CONSTRUCTION ACTIVITY WILL BEGIN WITH THE CLEANING AND GRUBBING OF THE ACCESS ROAD FROM THE SITE POINT OF ACCESS TO THE DRILL PAD AND PIT LOCATIONS.
 5. TEMPORARY AND/OR PERMANENT SEEDING AND MULCHING SHALL FOLLOW EARTHMOVING ACTIVITY AS CLOSELY AS POSSIBLE AND SHOULD BE STABILIZED WITHIN 4 DAYS OF ANCESSION OF EARTHMOVING ACTIVITIES.
 6. THE REMAINING PROJECT AREA WILL THEN BE CLEARED AND GRUBBER FOLLOWING INSTALLATION OF THE EROSION & SEDIMENT CONTROL DEVICES AT THE DRILL PAD AND PIT LOCATIONS.
 7. THE DRILL PAD AND ANY PIT LOCATIONS WILL THEN BE CONSTRUCTED FINAL GRADING COMPLETED. GRAVEL WILL BE PLACED ON THE PIT AREA AND ACCESS ROAD AND SOIL AREAS WILL BE FERTILIZED AND PERMANENTLY SEEDING AND MULCHED.
 8. FOLLOWING COMPLETION OF OPERATIONS, THE GRASS PAD SURFACE WILL BE REMOVED, SOIL WILL BE REAPPLIED, TOPSOIL REPLACED AND SEEDS.
 9. TEMPORARY EROSION CONTROLS SHALL REMAIN IN PLACE UNTIL PLANT TO PERCENT VEGETATIVE COVER IS ESTABLISHED.

- GEOTECHNICAL NOTE**
- GEOTECHNICAL INVESTIGATIONS WERE CONDUCTED BY NCE, LLC AS PART OF THE SITE DESIGN. REFER TO ACE GEOTECHNICAL INVESTIGATION REPORT (DATE DATED OCTOBER 2014, FOR DETAILED DATA. ADJUSTMENTS TO CUT AND FILL SLOPES SHOULD NOT BE MADE UNLESS REVIEWED BY NCE, LLC AND DIFFENBAUGH & HRTZ, LLC.
- COMPACTION SPECIFICATIONS**
1. SOIL FILL SHOULD BE PLACED IN MAXIMUM 10CM THICK LIFTS. EACH LIFT OF SOIL SHOULD BE COMPACTED TO AT LEAST 90% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY THE STANDARD PROCTOR LABORATORY TEST (ASTM D998). ALL SOIL FILL SHOULD BE MOISTURE CONDITION TO WITHIN THREE PERCENTAGE POINTS OF THE MATERIAL'S OPTIMUM MOISTURE CONTENT AS DETERMINED BY THE STANDARD PROCTOR TEST. COMPACTOR OF SLAVY SOIL FILL SHOULD BE ACCOMPLISHED USING A MINIMUM 10-TON STATIC WHEEL ROLLER OR ROLLER COMPACTOR OF QUANTUM FILL SHOULD BE PERFORMED USING A VIBRATORY STEEL CYLINDER ROLLER. A SUFFICIENT NUMBER OF FIELD MOISTURE DENSITY TESTS SHOULD BE PERFORMED ON EACH LIFT OF SOIL FILL TO VERIFY AND DOCUMENT THAT THE REQUIRED FILL DENSITY IS ACHIEVED.
 2. EARTHEN FILLS SHALL NOT INCLUDE ANY FROZEN OR ORGANIC MATERIAL.



PREVAILING WIND

PREVAILING WIND

PREVAILING WIND

PREVAILING WIND

PREVAILING WIND

LEGEND
 = EVACUATION ROUTE

BOORD, BENCHEK and ASSOC., INC.
 Engineering, Surveying, Construction,
 and Mining Services
 Southpoints PA 15317 Phone: 724-746-1055

EVACUATION ROUTE/PREVAILING WIND

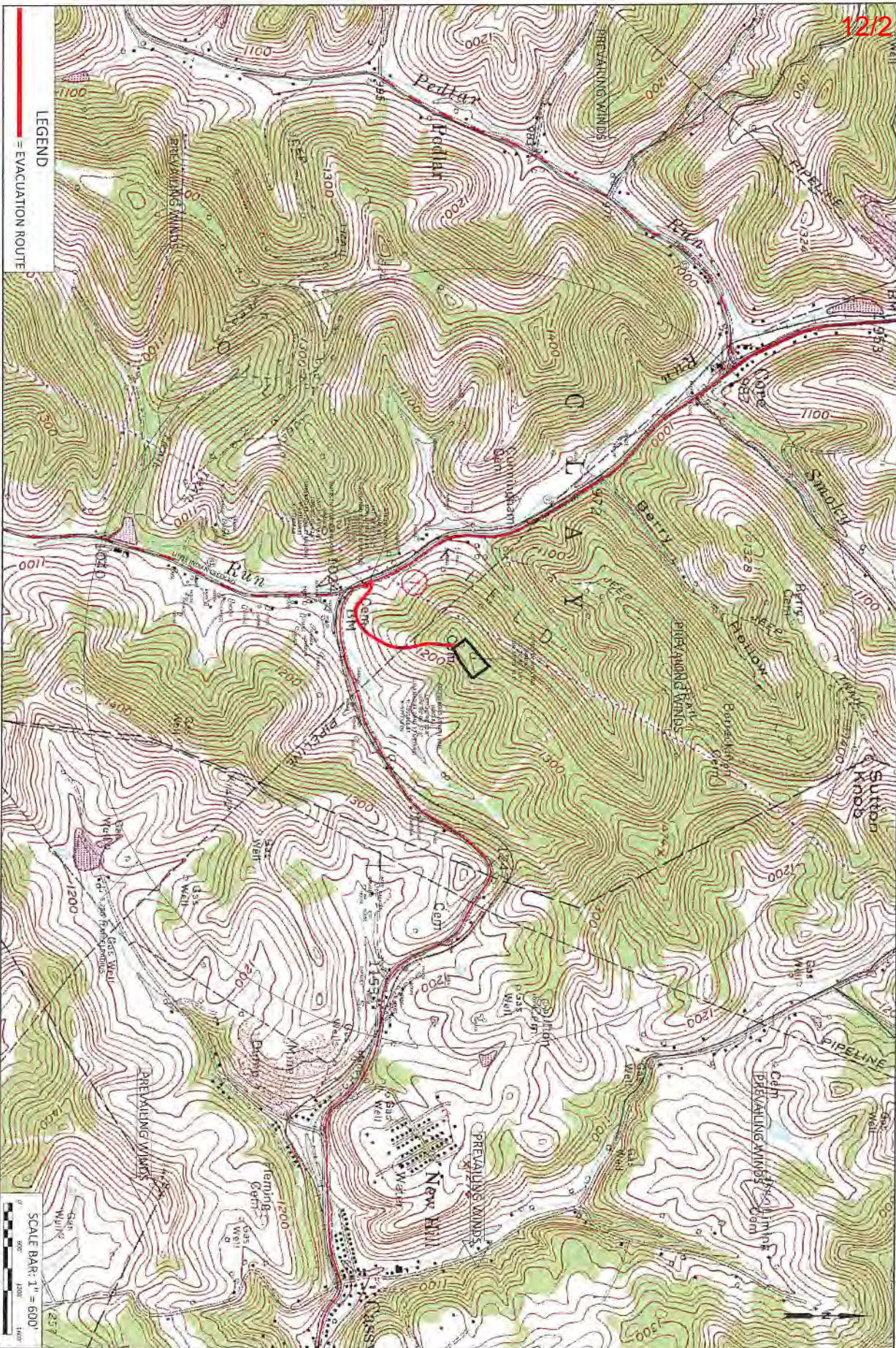
THIS DOCUMENT WAS PREPARED BY:
 BOORD, BENCHEK AND ASSOC., INC.
 FOR: NORTHEAST NATURAL ENERGY, LLC.

DATE:
 AUGUST 2018
 BOGGS
 WELL PAD
 CLAY DISTRICT,
 MONONGALIA
 COUNTY, WV

NO.	DATE	REVISIONS	DESCRIPTION

SCALE BAR: 1"=600'
 0' 600' 1200' 1800'





LEGEND
 — = EVACUATION ROUTE



SHEET 2



NO.	DESCRIPTION	DATE

JUNE 2015
 BOARDS
 WELL PAC
 CLAY DISTRICT
 WASHINGTON
 COUNTY, WV

**EVACUATION ROUTE/
 PREVAILING WINDS**
 THIS DOCUMENT WAS PREPARED BY:
 BOORD, BENCHEK AND ASSOC., INC.
 FOR: NORTHEAST NATURAL ENERGY LLC

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Well Work

A(1.0) Description of Drilling Operations

The Boggess 17H well will be drilled on air to an approximate depth of 5,344' TVD/MD. The well will then be horizontally drilled on synthetic based mud from the KOP to approximately 8,074' TVD / 19,179' MD along a 329° azimuth.

A(1.1) Anticipated Equipment/Materials

During the drilling of a horizontal Marcellus gas well the following equipment and materials could be on the drilling location:

Equipment / Materials	Potential Hazard
Double Stand Drilling Rig	Medical, Fire/Explosion, Spill/Release
Mud Pumps	Medical, Fire/Explosion, Spill/Release
Mud Tanks	Medical, Fire/Explosion, Spill/Release
Fork Lift	Medical, Fire/Explosion, Spill/Release
Excavator	Medical, Fire/Explosion, Spill/Release
Diesel Tank	Medical, Fire/Explosion, Spill/Release
Diesel Fuel	Medical, Fire/Explosion, Spill/Release
Generators	Medical, Fire/Explosion, Spill/Release
Air Compressor	Medical, Fire/Explosion
Light Tower	Medical, Fire/Explosion, Spill/Release
Frac Tanks (mud, cement additives,	Medical, Fire/Explosion, Spill/Release
Drilling Mud Additives	Medical, Fire/Explosion, Spill/Release

A(2.0) Description of Completions Operations

The Boggess 17H well will be completed using a multi-stage / high-rate slickwater fracture treatment using sand as a proppant. The First Stage will be initiated via pressurization against a burst disc ran in the production casing string and perforated by pumping down guns on wireline. Subsequent stages will also be perforated with pumped down guns ran on wireline. Individual stages will be isolated with composite frac plugs. Maximum pump rate during any stage will be 110 BPM with a maximum allowable surface pressure of 9,500 PSI. Composite bridge plugs will be set at the end of the last stage to isolate the treated formation. After the fracture treatment, composite frac plugs will be drilled out using a service rig and/or snubbing unit.

A(2.1) Anticipated Equipment/Materials

During the completion of a horizontal Marcellus gas well the following equipment and materials could be on the drilling location:

Equipment / Materials	Potential Hazard
Approximately 10 - 15 Pump Trucks	Medical, Fire/Explosion, Spill/Release
2 Blender Trucks	Medical, Fire/Explosion, Spill/Release
Belt Truck	Medical, Fire/Explosion, Spill/Release
Perforation Truck	Medical, Fire/Explosion, Spill/Release
Crane	Medical, Fire/Explosion, Spill/Release
Sand Tanks	Medical, Fire/Explosion, Spill/Release
Frac Tanks	Medical, Fire/Explosion, Spill/Release
Man Lift	Medical, Fire/Explosion, Spill/Release
Acid Truck	Medical, Fire/Explosion, Spill/Release
Fork Lift	Medical, Fire/Explosion, Spill/Release

Gel Truck	Medical, Fire/Explosion, Spill/Release
Communications Truck	Medical, Fire/Explosion, Spill/Release
Diesel Truck	Medical, Fire/Explosion, Spill/Release
Diesel Fuel	
80/90 wt gear oil	Medical, Fire/Explosion, Spill/Release
5/40 motor oil	Medical, Fire/Explosion, Spill/Release
Antifreeze	Medical, Fire/Explosion, Spill/Release
Ethylene Glycol	Medical, Fire/Explosion, Spill/Release
Tri-Ethylene Glycol	Medical, Fire/Explosion, Spill/Release
Frac Sand	Medical, Fire/Explosion, Spill/Release
Hydrochloric Acid (HCl)	Medical, Fire/Explosion, Spill/Release
Friction Reducer	Medical, Fire/Explosion, Spill/Release
Gelling Agents	Medical, Fire/Explosion, Spill/Release
Biocide	Medical, Fire/Explosion, Spill/Release
Scale Inhibitor	Medical, Fire/Explosion, Spill/Release
Iron Control	Medical, Fire/Explosion, Spill/Release
Gel Breaker Agent	Medical, Fire/Explosion, Spill/Release
Corrosion Inhibitor	Medical, Fire/Explosion, Spill/Release

A(3.0) Description of Production Operations

During the production phase, the well stream will flow through buried, welded piping to Gas Production Units. At this point, the gas will be separated from the water and sent through a meter to a sales pipeline. The water will be piped and stored in above ground tanks on the well site. Well pressures and flow rates will be monitored and recorded to ensure proper facility operation. All facilities will be installed according to industry standards and will have appropriate safety systems in place.

A(3.1) Anticipated Equipment/Materials**Production**

Equipment / Materials	Potential Hazard
Well Head	Medical, Fire/Explosion, Spill/Release
Buried Flow Line	Medical, Fire/Explosion, Spill/Release
Sand Separator	Medical, Fire/Explosion, Spill/Release
Gas Processing Unit	Medical, Fire/Explosion, Spill/Release
Water Tanks	Medical, Fire/Explosion, Spill/Release
Condensate Tank	Medical, Fire/Explosion, Spill/Release
Water Truck Hauling & Hook Up Equipment	Medical, Fire/Explosion, Spill/Release
Pig Launcher	Medical, Fire/Explosion, Spill/Release

M & R Station

Equipment / Materials	Potential Hazard
Flowline	Medical, Fire/Explosion, Spill/Release
Pig Receiver	Medical, Fire/Explosion, Spill/Release
Two Phase Separator	Medical, Fire/Explosion, Spill/Release
Filter Units	Medical, Fire/Explosion, Spill/Release
Heater Unit	Medical, Fire/Explosion, Spill/Release
Dehydration Tower	Medical, Fire/Explosion, Spill/Release
50 – 100 Barrel Water Tank	Medical, Fire/Explosion, Spill/Release
Meter House	Medical, Fire/Explosion, Spill/Release
Meter Skid	Medical, Fire/Explosion, Spill/Release

B DISTRIBUTION OF THE SITE SAFETY PLAN

Copies of this Plan will be located at NNE's corporate office building in Charleston, West Virginia, its field office in Morgantown, West Virginia, with the Designated Response Coordinators and field operation sites when applicable. This Plan may be accessed electronically by all NNE employees on the company's shared drive/share point. All NNE employees are to abide by the provisions of this Plan and are required to participate in its implementation. This Plan will also be shared with external entities such as the Monongalia County Office of Emergency Management within at least seven (7) days prior to earth disturbance and/or well work.

Efforts will be made to familiarize police, fire departments, emergency response teams and the County Emergency Management Coordinator with the layout of the well site, the properties and dangers associated with the equipment and materials that are on site, places where personnel would normally be working, and the possible evacuation routes should an emergency occur.

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Chemical Inventory & Material Safety Data Sheets ("MSDS")

A Material Safety Data Sheets (“MSDS”)

MSDS Sheets will be provided upon request on a CD or USB drive.

B Location of MSDS

MSDS sheets will be kept in the company trailer during the drilling and completion phases of operation. Any Contractors that bring hazardous materials on site will provide MSDS for such. The onsite supervisor will be responsible for ensuring that all MSDS sheets are obtained and are easily accessible in case of an emergency.

C DRILLING MUD

1,500 bbl of 12.9 ppg synthetic drilling mud will be used along with the below listed chemicals. The mud will be kept in an open top above ground mud pit and circulated by nozzles and paddles.

Material	Unit	Amount
Barite	4000lb	9
Calcium Chloride Powder	50lb	200
Carbo Gel	50lb	60
Base Oil	1 gal	1440
Lime	50lb	69
Mil Sorb	50lb	87

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Blow Out Preventer ("BOP") and Well Control

A BOP EQUIPMENT – DRILLING PHASE

From the shoe of the intermediate casing string (9-5/8") to KOP, the well will continue to be drilled on air. For this section, at a minimum, an 11" 3,000 PSI annular-type BOP will be utilized as a means of well control. Installation of this equipment will be dependent upon two different conditions...

- Should the top-hole drilling rig have a substructure large enough to sit upon a cellar, an 11" 5,000 PSI API flanged casing head will be welded onto the top of the intermediate casing string (9-5/8") below grade after it has been set and cement has cured for a minimum of 8 hours. It is upon this casing head that the annular-type BOP will be bolted and torqued to specification as a means of well control for the section.
- Should the top-hole drilling rig have a substructure too small to sit upon a cellar, the intermediate casing string (9-5/8") will be landed at surface and a screw-on or weld flange annular-type BOP will be used as a means of well control for the section. Under this scenario, a cellar will be installed around the wellbore after the top-hole rig is released from the pad. Once installed, an 11" 5,000 PSI API flanged casing head will then be welded onto the top of the intermediate casing string (9-5/8") below grade.

For the remainder of the drilling of the well on fluid; at a minimum and from bottom to top; an 11" 5,000 PSI kill spool, an 11" 5,000 PSI blind ram-type BOP, an 11" 5,000 PSI pipe ram-type BOP, and an 11" 5,000 PSI annular-type BOP will be bolted and torqued to specification upon the 11" 5,000 PSI casing head.

B PROCEDURE AND SCHEDULE FOR TESTING BOP

For the bottom and horizontal wellbore drilling phase, function testing of BOP equipment shall occur upon initial installation, weekly, and after each trip. Pressure testing of all BOP equipment shall occur upon initial installation and every twenty-one (21) days thereafter, should the well not be completed within that time. Annular preventers are to be tested to seventy percent (70%) of the rated capacity and ram preventers should be tested to eighty percent (80%) of the rated capacity according to the following procedure;

- The WV DEP Regional Oil and Gas Inspector will be notified 24 hrs. in advance of the pressure testing of all BOP equipment.
- For the testing of the 3,000 PSI annular-type BOP before drilling through the shoe of the intermediate casing string to KOP, a cup-type tester will be lowered into the intermediate casing (9-5/8") or a plug-type tester will be inserted into the

casing head if installed. After a successful function test, the annular BOP will be closed around drill pipe and the void between the cup or plug will be pressurized using fluid as a medium. This shall consist of a minimum five minute low pressure (300 PSI maximum) test, and a thirty minute high pressure (2,100 PSI minimum) test. Annular preventer and valves shall be tested from the direction they are exposed to wellbore pressure. A successful test shall consist of less than a 10% bleed off after buildup over the entire duration of the low/high test period.

- For the testing of the BOP stack from KOP to TD of the well, a plug-type tester will be placed into the bowl of the 11" 5M x 9-5/8" casing head. After a successful functional test, all rams, valves, TIW valves, chokes, and annular preventers will be pressure tested from the direction they are subjected to wellbore pressure. The annular preventer will be tested by pressurization around drill pipe using water as a medium and subject to a minimum five minute low pressure (300 PSI maximum) test, and a minimum thirty minute high pressure (2,100 PSI minimum for 3M equipment, 3,500 PSI minimum for 5M equipment) test. Rams, valves, TIW, and choke components shall be tested using water as a medium and subject to a minimum five minute low pressure (300 PSI maximum) test, and a minimum thirty minute high pressure (2,400 PSI minimum for 3M equipment, 4,000 PSI minimum for 5M equipment) test. Each individual component must pass its respective test before drilling may commence. A successful test shall consist of less than a 10% bleed off after buildup over the entire duration of the low/high test period.

C ASSEMBLY INSTALLATION SCHEDULE

- During top hole operations a 11" 5,000 PSI API flanged casing head will be welded onto the top of the intermediate casing string (9-5/8") below grade and an 11" 3,000 PSI annular-type BOP will be used to KOP
- From curve to TD the following will be added to the flanged casing;
11" 5,000 PSI kill spool, 11" 5,000 PSI blind ram-type BOP, 11" 5,000 PSI pipe ram-type BOP, and 11" 5,000 PSI annular-type BOP 11" 5,000 PSI casing head.

D PERSONNEL WITH WELL CONTROL TRAINING

Throughout operations, the following Northeast Natural Energy representatives shall have and maintain IADC well control certification:

- Jay Hewitt – Drilling Manager
- Criss VanGilder – Completions Manager
- Any onsite consultant hired to oversee drilling or completions operations

E SYSTEM OF MAINTAINING DETAILED RECORDS

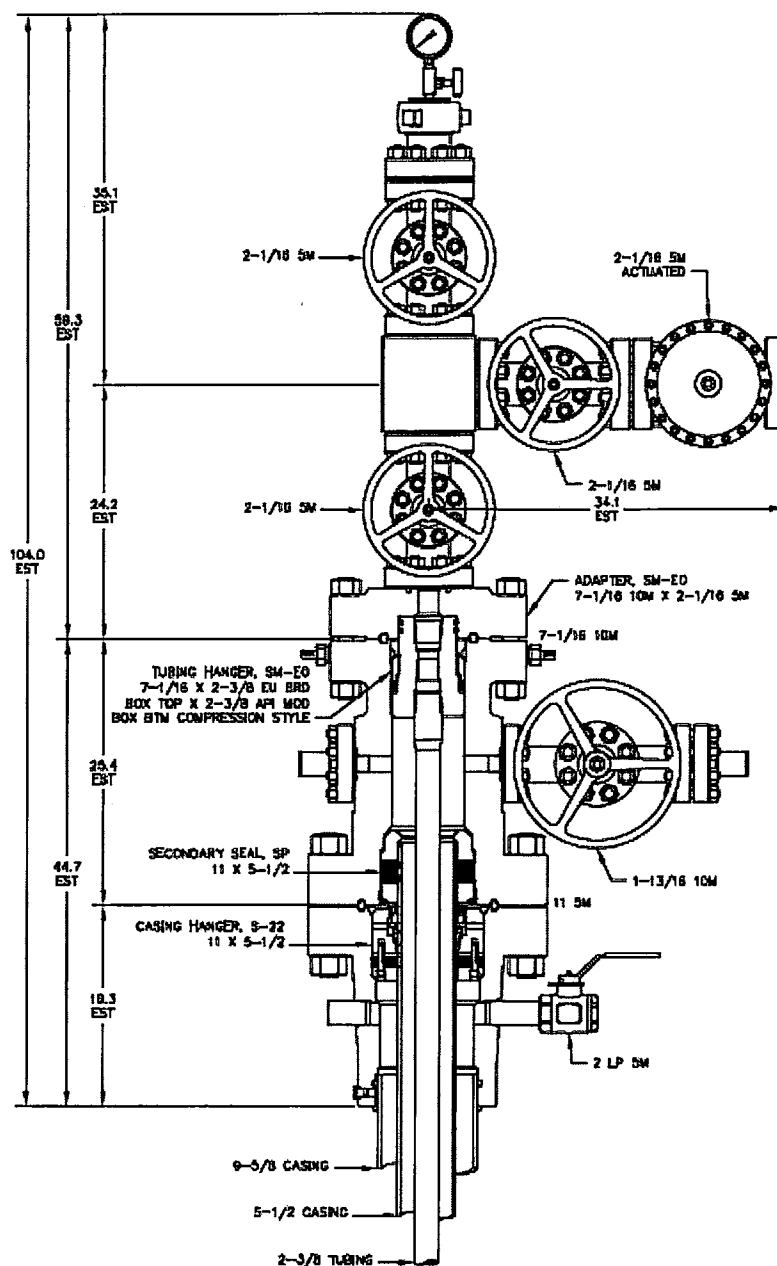
A detailed Driller's Log shall be maintained, including but not limited to, lost circulation, the presence of hydrogen sulfide gas, fluid entry, kicks, and abnormal pressures.

F NOTIFICATION OF THE OFFICE OF OIL AND GAS

The WV DEP Office of Oil and Gas will be immediately notified of the presence of hydrogen sulfide gas above 10 ppm, significant kicks, or blow-out events.

G WELL HEAD ASSEMBLY

A 5,000 PSI production tree will be placed upon the tubing spool after the drill out process. This unit will consist of, at a minimum and from bottom to top; one flanged 2-1/16" 5,000 PSI gated master valve, a studed three-way tee, a flanged 2-1/16" 5,000 PSI gated swab valve, and a 5,000 PSI flanged tree cap. The side outlet of the studed three-way tee shall include a flanged 2-1/16" 5,000 PSI gated wing valve. A schematic of the proposed wellhead and tree assembly is attached for reference.



H WELL KILLING PROCEDURE

An oil-based synthetic drilling fluid will be utilized for the bottom and horizontal sections of the well. A total onsite volume of 1,600 Bbls (1.5 times the hole volume) will be maintained at 12.5 ppg. Enough weighting material, in the form of barite, will be kept onsite to increase the density of the entire volume of drilling mud by 1.0 ppg. This constitutes enough weighting material to initiate a 16 ppg slug, should a kick be encountered.

Dual-purpose paddle style mixing/reserve tanks will be used for the blending of mud additives and weighting material. A minimum of two units will be employed, with the final number based upon the drilling contractor selected.

The well will be drilled in an overbalanced manner to maintain control over formation fluids. Should a kick be detected, the well will be killed by either the IADC approved "Driller's Method" or "Wait and Weight" method. Bottomhole pressure will be calculated from SIDPP obtained post-kick, and the drilling fluid density will be increased by adding barite to the system and circulated throughout the wellbore when using the "Wait and Weight" method. After circulation with either method, the well will then be checked for flow, and if none is detected, then drilling operations will resume.

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**Hydrogen
Sulfide
("H₂S")**

A DETECTION, MONITORING AND WARNING EQUIPMENT

Based upon previous experience and history in the area, no H₂S is expected to be encountered during the drilling or completion activities of the Boggess 17H. As a means of additional protection, mud loggers will be utilized during the drilling process to monitor any gas stream from the well through the flowline during the bottom and horizontal sections. Additional portable detection equipment shall be available on or near potential sources of explosive or hydrogen sulfide gases on the pad throughout all operations. Monitoring equipment shall be calibrated by and in accordance with the supplying contractor's guidelines. Detection of either shall sound an alarm which notifies personnel to shut in the well(s) and evacuate to the predetermined safe zone immediately.

B H₂S TRAINING

A safe zone upwind and away from the well will be established at the beginning of each tour. Personnel are trained to evacuate the well and gather at this safe zone immediately at the first sound of an H₂S explosive gas alarm.

When in a historically known area, or after H₂S is first detected, operations will halt, evacuation procedures will be followed, and all personnel will be trained for detailed H₂S protocols before operations begin or resume.

C NOTIFYING THE OFFICE OF OIL AND GAS

In the event that H₂S is encountered, after all personnel have gathered in the safe zone, the onsite supervisor will take a head count, and then proper offsite notifications shall be made. The DEP Office of Oil and Gas will be notified by a phone call to both the local inspector and the emergency number.

D PROTECTION ZONES

A wind sock and/or flags will be utilized on location to identify wind direction, and safe zone upwind and away from the well will be established at the beginning of each tour. Personnel are trained to evacuate the well and gather at this safe zone immediately at the first sound of an H₂S explosive gas alarm.

E LIST OF PERSONAL PROTECTIVE EQUIPMENT (“PPE”)

Since drilling in a historically known area to not contain H₂S through the intervals drilled, H₂S specific PPE will not be kept on site. Centralized H₂S alarms, and supplemental personal alarms, will be maintained and used throughout the drilling and completion process. Personnel on site will be notified to cease the current operation safely, shut-in all wells on the pad, and evacuate all personnel to the pre-determined safe zone at the first signal of H₂S from these alarms. It is at this time that NNE personnel would assess the hazards, and bring in H₂S specialists and PPE to mitigate the situation. Normal work would return to the pad after all personnel passed a specific H₂S training and were equipped with the proper PPE.

7

Flaring

A FLARING PLAN

Post frac, a system of 2" and 3" Figure 1502 integrated-hammer pup joints will be assembled from the wellhead to a 5,000 PSI plug catcher and choke manifold. The choke manifold shall consist of two parallel adjustable chokes to control the initial flow of the well. Using the same construction iron, from the choke manifold, flow will enter a high capacity temporary production unit. The liquid fraction from the well will be diverted to gas buster equipped frac- tanks on location. All or part of the gas fraction from the well will be diverted to a thirty foot flare stack approximately 150' downwind of the wellhead. Any gas not diverted to a flare line shall be diverted to sales.

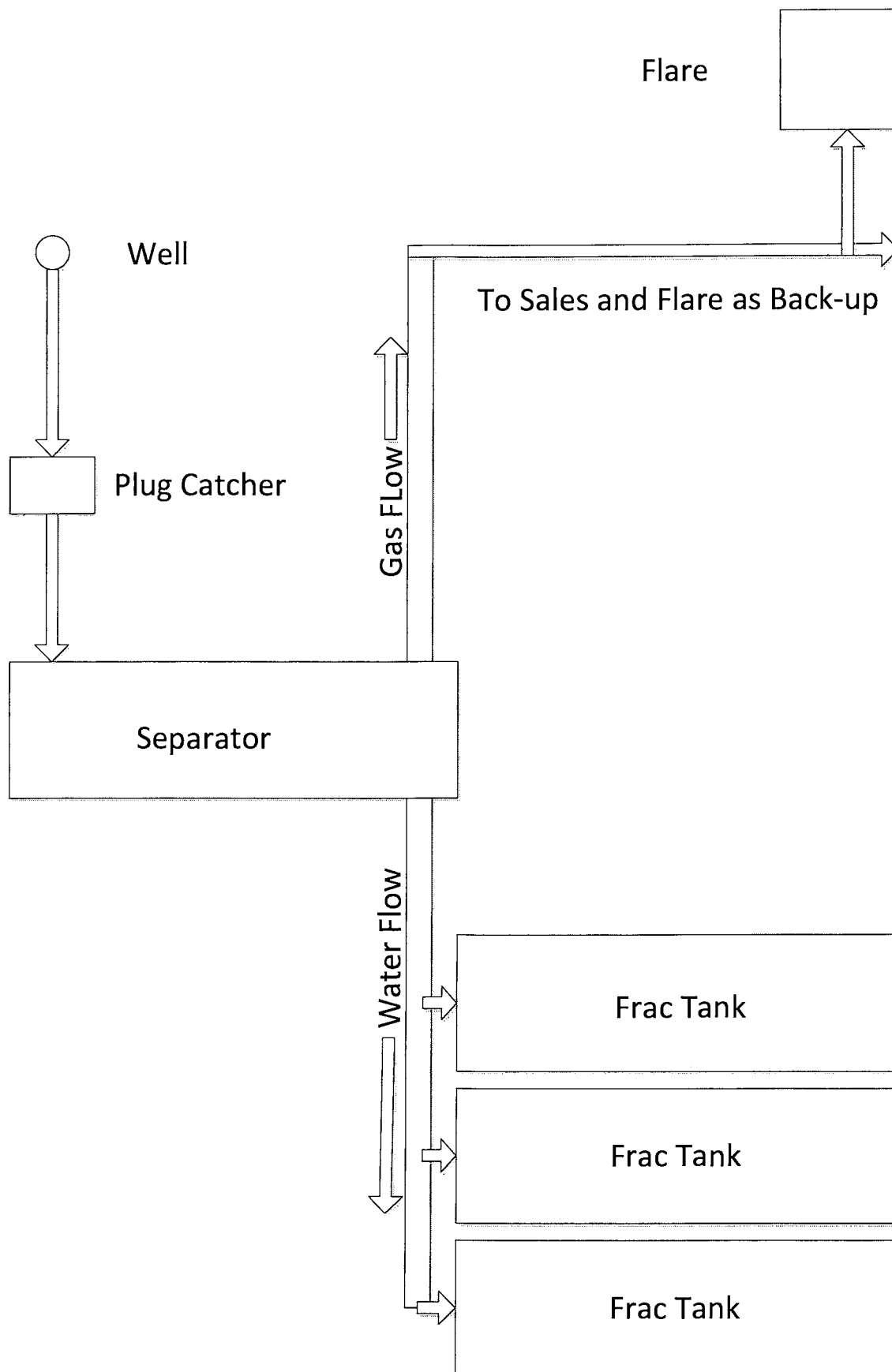
Iron pipe used in the flow/flare line assembly shall be banded at the joints with chain or steel cable. The flow/flare assembly shall be anchored in place by attachment to concrete blocks at vendor recommended intervals.

The flare stack will be equipped with an electronic ignition system, and a minimum of two backup ignition sticks will be kept on location at all times.

All gas diverted through the choke manifold shall either be burned through the flare stack or sent to sales. The local fire department will be given prior notice of the window in which gas flaring is to occur. They will also be notified immediately prior to lighting the flare, if possible, otherwise, as soon after lighting the flare as possible.

A 50' circumference shall be maintained around the flare stack which is to be kept free of flammable materials at all times prior to and during the flaring of any gas.

It is expected to flare the gas fraction of the well stream for a one week period.



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Collision Avoidance Safeguards, Practices and Standards

Scope of Work:

To ensure that wells are drilled in a safe manner that mitigates the risk of underground collisions on multi-well pads. Key portions of work will be described including roles, responsibilities and steps taken when returning to pads with existing producing or stimulated wells.

Definitions:

- 1) Proposed Wellbore- Involves sections of the vertical top-hole, the KOP, the lateral landing, and the lateral drilling to the total measured depth (TMD).
- 2) Nudge- Technique generally used in the vertical top-hole section. The well path is nudged from vertical to pass areas of possible magnetic interferences and to reduce the risk of collision by maintaining separation with other wellbores.
- 3) KOP- Kick off Point. Diverting a well path from one trajectory to another
- 4) MWD- Measurement While Drilling
- 5) LWD- Logging While Drilling
- 6) EM - Electromagnetic Telemetry
- 7) SF- Separation Factor or Clearance Factor:

$$SF^* = CC \div [UR_{ref} + UR_{off}]$$

CC - Well separation distance (center to center of wellbores)
UR_{ref} – radius ellipse of uncertainty on reference well
UR_{off} – radius ellipse of uncertainty on offset well

Note: ellipses are half-axes or radii.

*Calculation options may be considered
- 8) TMD- Total Measured Depth
- 9) Gyro – High accuracy well bore survey instrument unaffected by magnetic interference.
- 10) QC / QA – Quality Control and Quality Assurance
- 11) HSE – Health Safety and the Environment
- 12) UBHO Sub – Universal Bottom Hole Orientation Sub

Established descriptions of risk:

- | | | |
|--------------------|---------|--------------------------|
| 1) SF ≤ 1.0 | Level 1 | Extreme collision risk |
| 2) SF = 1.0 to 1.5 | Level 2 | High collision risk |
| 3) SF = 1.5 to 2.0 | Level 3 | Moderate collision risk |
| 4) SF > 2.0 | Level 4 | Low to no collision risk |

Well Planning:

Prior to drilling any well, a directional plan will be developed to ensure that the well is properly placed with consideration to permits, lease limitations and future drilling plans. The well will be planned to maintain a SF of ≥ 2.0 whenever possible. If a SF of <2.0 is encountered, additional risk mitigation steps may be required such as increased survey frequency, wellbore steering or installing downhole mechanical barriers.

Survey Protocol:

When drilling wells on a pad without producing or stimulated wells, surveys will be taken every 30' - 500' in the vertical portion of the wellbore depending on wellbore trajectory, hole walk and risk of collision.

When drilling wells on a pad with producing or stimulated wells, surveys will be taken every 30' - 250' in the vertical portion of the wellbore depending on wellbore trajectory, hole walk and risk of collision.

Tool Alignment Procedure:

Tool alignment is critical in eliminating wellbore collision risks. In all wells, north seeking gyro tools, MWD/EM tools and anti-collision processes are utilized to mitigate the risk of downhole collisions. All work groups responsible for the placement of the wellbore share responsibility in ensuring accuracy. The Company Representative, Directional Drilling Supervisor and Gyro Supervisor are all responsible for the alignment of the UBHO Sub and the motor to ensure that azimuthal directional is correct. All parties should visually verify the orientation of the shoe and agree upon a coordinate system and reference point. When possible, MWD tools will be used to minimize risk of incorrect orientation.

Directional Planning and Controls – Vertical Wellbore:**Drilling Without Stimulated Wellbores:**

When drilling on pads without producing or stimulated wells, all wells will be planned with a minimum SF ≥ 1.5 . Surveys will be taken at intervals of 500' to record the well path as it is drilled, but the frequency can be increased if needed. Drilling parameters should be held constant for the vertical portions of all wells to ensure the natural drilling path is similar for all wells on the pad. If two wells come within 10' of each other or a SF

of ≤ 1.5 is reached, each survey is monitored closely and anti-collision is run after each survey until the wells are clear of a collision risk.

Following the drilling of the vertical section of the wellbore, a gyro survey will be taken. Anti-collision software will be used to analyze this data to ensure safe wellbore spacing. Internally, the directional company will utilize their own software to monitor and model wellbores for collision risks; but, as a redundancy, NNE will utilize Hawkeye software to validate their results.

Drilling With Stimulated Wellbores:

If a rig is returning to a pad with producing or stimulated wellbores, additional steps are required to mitigate risks. Prior to commencing drilling, gyro data from existing wells is analyzed to determine normal hole walk. If a well does not have gyro data, a gyro survey will be run. Once all gyro data is gathered, a preliminary well path is planned to identify collision risks. That plan will be used to identify points of concern where additional risk mitigation steps are needed

NNE may choose to drill wells on a pad with active production; however, additional well path management practices will be employed. During this scenario, if two wells come within 14' or a SF ≤ 2.0 , each survey is monitored closely and anti-collision re-run after reach survey until the wells are clear of a potential collision. The Survey frequency can vary from 30'-250' depending on wellbore trajectory, hole walk and risk of collision.

Directional Planning and Controls – Curve and Lateral Wellbore:

While drilling the curve and lateral portions of the wellbores, MWD technology will be used to ensure the well path is drilled according to the drilling plan and the state permit. Azimuth, gamma ray and other data will be collected and transmitted to surface. The information will be analyzed by the Directional Drilling Contractor, Company Representative, Drilling Manager and Geologist to ensure the quality of the data and proper interpretation.

Gyro data and/or MWD/EM data will be evaluated in anti-collision software to monitor the path of the well being drilled in relationship to all adjacent wells to ensure an adequate SF is maintained during the vertical, curve and horizontal portions of the wellbore. Survey frequency is to be a minimum of 100' while MWD/EM tools are being utilized. Each survey is analyzed and certified as accurate by the directional company before it can be used for any modeling or directional planning.

Other Data:

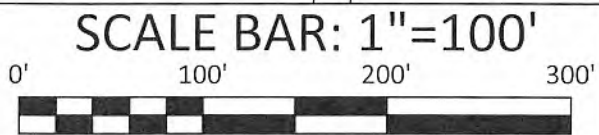
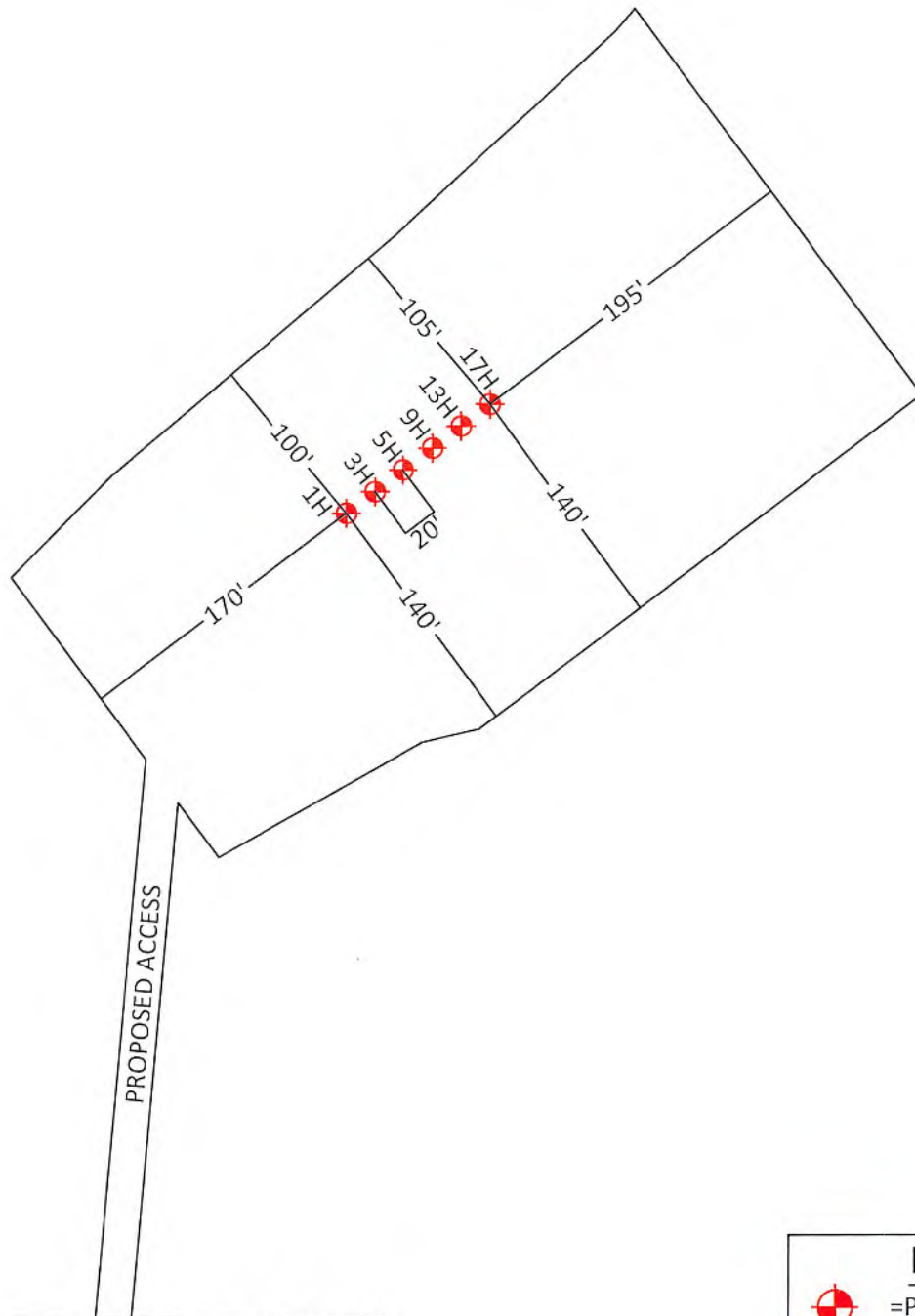
Prior to drilling new wells on a pad, a site overview with the wellhead arrangement will be developed. Among the information that will be included is API number, surface footage separation and wellbore status. Additionally, all survey data for each existing well will be compiled for use in well planning.

Contingency Plans:

The wellbore being drilled will be monitored in relation to existing wellbores. Should the active well approach an existing well and the SF be < 1.5 , drilling will be suspended until risks are mitigated by adjusting the directional plan, increasing survey frequency and verifying any necessary mechanical barriers are present in the adjacent wells. If a SF ≤ 1 is experienced or two wellbores are within 5' of one another, the WV DEP Office of Oil and Gas Regional Inspector will be immediately contacted.

If the wellbore trajectories reach a point where a collision is unavoidable, NNE will properly secure each well and evaluate the most prudent path forward while openly communicating with the WV DEP Oil and Gas Regional Inspector.

Should a collision occur, the WV DEP Office of Oil and Gas Regional Inspector will be immediately contacted, drilling will be suspended and all existing wells will be monitored for integrity. If a loss of pressure control in any well is experienced, Wild Well Control, or another professional well control company, will be contracted for technical support and services. If there is not a loss of pressure control, a separate well work procedure will be developed to repair or plug and abandon the affected wells.



LEGEND

=PROPOSED WELL

WELL NUMBER	API NUMBER	STATUS
BOGCESS 1H		PROPOSED
BOGCESS 3H		PROPOSED
BOGCESS 5H		PROPOSED
BOGCESS 9H		PROPOSED
BOGCESS 13H		PROPOSED
BOGCESS 17H		PROPOSED

PREPARED FOR
NORTHEAST NATURAL ENERGY LLC
 BOGCESS WELL PAD
 CLAY DISTRICT, MONONGALIA COUNTY, WV

PREPARED BY
BOORD BENCHEK & ASSOC., INC.
 ENGINEERING, SURVEYING, CONSTRUCTION AND
 MINING SERVICES
 SOUTHPOINTE, PA 15317 PHONE: 724-746-1055
 DATE: 1-31-2018



NORTHEAST NATURAL ENERGY, LLC
Location: Monongalia County, WV Slot: Slot 01
Field: Monongalia Well: Boggess 1H
Facility: Boggess Pad Wellbore: Boggess 1H PWB



Scale 1 inch = 1500

