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**west virginia** department of environmental protection

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

Earl Ray Tomblin, Governor  
Randy C. Huffman, Cabinet Secretary  
www.dep.wv.gov

September 16, 2014

**WELL WORK PERMIT**

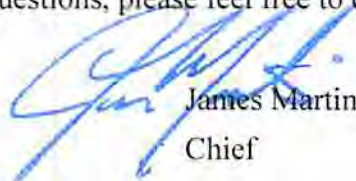
**Horizontal 6A Well**

This permit, API Well Number: 47-9703858, issued to CNX GAS COMPANY LLC , is evidence of permission granted to perform the specified well work at the location described on the attached pages and located on the attached plat, subject to the provisions of Chapter 22 of the West Virginia Code of 1931, as amended, and all rules and regulations promulgated thereunder, and to all conditions and provisions outlined in the pages attached hereto. Notification shall be given by the operator to the Oil and Gas Inspector at least 24 hours prior to the construction of roads, locations, and/or pits for any permitted work. In addition, the well operator shall notify the same inspector 24 hours before any actual well work is commenced and prior to running and cementing casing. Spills or emergency discharges must be promptly reported by the operator to 1-800-642-3074 and to the Oil and Gas inspector.

Please be advised that form WR-35, Well Operators Report of Well Work is to be submitted to this office within 90 days completion of permitted well work, as should form WR-34 Discharge Monitoring Report within 30 days of discharge of pits, if applicable. Failure to abide by all statutory and regulatory provisions governing all duties and operations hereunder may result in suspension or revocation of this permit and, in addition, may result in civil and/or criminal penalties being imposed upon the operators.

In addition to the applicable requirements of this permit, and the statutes and rules governing oil and gas activity in WV, this permit may contain specific conditions which must be followed. Permit conditions are attached to this cover letter.

Per 35CSR-4-5.2.g this permit will expire in two (2) years from the issue date unless permitted well work is commenced. If there are any questions, please feel free to contact me at (304) 926-0499 ext. 1654.



James Martin  
Chief

Operator's Well No: CENT 22 BHS  
Farm Name: CNX GAS COMPANY, LLC  
**API Well Number: 47-9703858**  
**Permit Type: Horizontal 6A Well**  
Date Issued: 09/16/2014

## PERMIT CONDITIONS

West Virginia Code § 22-6A-8(d) allows the Office of Oil and Gas to place specific conditions upon this permit. Permit conditions have the same effect as law. Failure to adhere to the specified permit conditions may result in enforcement action.

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### CONDITIONS

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1. This proposed activity may require permit coverage from the United States Army Corps of Engineers (USACE). Through this permit, you are hereby being advised to consult with USACE regarding this proposed activity.
2. If the operator encounters an unanticipated void, or an anticipated void at an unanticipated depth, the operator shall notify the inspector within 24 hours. Modifications to the casing program may be necessary to comply with W. Va. Code § 22-6A-5a (12), which requires drilling to a minimum depth of thirty feet below the bottom of the void, and installing a minimum of twenty (20) feet of casing. Under no circumstance should the operator drill more than fifty (50) feet below the bottom of the void or install less than twenty (20) feet of casing below the bottom of the void.
3. When compacting fills, each lift before compaction shall not be more than 12 inches in height, and the moisture content of the fill material shall be within limits as determined by the Standard Proctor Density test of the actual soils used in specific engineered fill, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort, to achieve 95 % compaction of the optimum density. Each lift shall be tested for compaction, with a minimum of two tests per lift per acre of fill. All test results shall be maintained on site and available for review.
4. Operator shall install signage per § 22-6A-8g (6) (B) at all source water locations included in their approved water management plan within 24 hours of water management plan activation.
5. Oil and gas water supply wells will be registered with the Office of Oil and Gas and all such wells will be constructed and plugged in accordance with the standards of the Bureau for Public Health set forth in its Legislative rule entitled *Water Well Regulations*, 64 C.S.R. 19. Operator is to contact the Bureau of Public Health regarding permit requirements. In lieu of plugging, the operator may transfer the well to the surface owner upon agreement of the parties. All drinking water wells within fifteen hundred feet of the water supply well shall be flow tested by the operator upon request of the drinking well owner prior to operating the water supply well.
6. Pursuant to the requirements pertaining to the sampling of domestic water supply wells/springs the operator shall, no later than thirty (30) days after receipt of analytical data provide a written copy to the Chief and any of the users who may have requested such analyses.
7. If any explosion or other accident causing loss of life or serious personal injury occurs in or about a well or well work on a well, the well operator or its contractor shall give notice, stating the particulars of the explosion or accident, to the oil and gas inspector and the Chief, within 24 hours of said accident.
8. During the casing and cementing process, in the event cement does not return to the surface, the oil and gas inspector shall be notified within 24 hours.
9. Operator shall provide the Office of Oil & Gas notification of the date that drilling commenced on this well. Such notice shall be provided by sending an email to DEPOOGNotify@wv.gov within 30 days of commencement of drilling.

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

1) Well Operator: CNX Gas Company, LLC. 97 5 287  
Operator ID County District Quadrangle

2) Operator's Well Number: CENT22BHS Well Pad Name: CENT22HS

3 Elevation, current ground: 1581' Elevation, proposed post-construction: 1570'

4) Well Type: (a) Gas  Oil  Underground Storage \_\_\_\_\_  
Other \_\_\_\_\_  
(b) If Gas: Shallow  Deep \_\_\_\_\_  
Horizontal

5) Existing Pad? Yes or No: NO

6) Proposed Target Formation(s), Depth(s), Anticipated Thicknesses and Associated Pressure(s):  
Formation - Marcellus, Depth - 7585' (BOTTOM), Thickness - 90', Pressure - 4400#

7) Proposed Total Vertical Depth: 7685'

8) Formation at Total Vertical Depth: Huntersville Chert

9) Proposed Total Measured Depth: 11,895'

10) Approximate Fresh Water Strata Depths: 215', 285', 410'

11) Method to Determine Fresh Water Depth: Offset Wells

12) Approximate Saltwater Depths: 2275'

13) Approximate Coal Seam Depths: 215', 285'

14) Approximate Depth to Possible Void (coal mine, karst, other): None Anticipated

15) Does proposed well location contain coal seams directly overlying or adjacent to an active mine? If so, indicate name and depth of mine: No

16) Describe proposed well work: Drill & stimulate new horizontal Marcellus well. Well to be drilled to a TMD of 11,895' (7585' TVD).  
The kick off point will be ~7200' (approximate due to exact Kick off point being unknown). If an unexpected void is encountered, plan will be to set casing at a minimum of 30' past void and cement to surface with approved Class A type cement.  
Well bore will not be drilled any deeper than 100' into the Onondaga Group, nor will there be any production, perforation, or stimulation of any formations below the target formation.

17) Describe fracturing/stimulating methods in detail:  
The stimulation will be multiple stages divided over the lateral length of the well. Stage spacing is dependent upon engineering design. Slickwater fracturing technique will be utilized on each stage using sand, water, and chemicals.

18) Total area to be disturbed, including roads, stockpile area, pits, etc, (acres): 5 Acres

19) Area to be disturbed for well pad only, less access road (acres): 4.57 Acres

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20)

CASING AND TUBING PROGRAM

TYPE	Size	New or Used	Grade	Weight per ft.	FOOTAGE: For Drilling	INTERVALS: Left in Well	CEMENT: Fill -up (Cu. Ft.)
Conductor	20"	N	L.S.	81.3#	100	100	Grout to surface
Fresh Water	13 3/8"	N	J-55	54.5#	500	500 <sup>✓</sup>	CTS w/ approved Class A Type Cement
Coal							
Intermediate	9 5/8"	N	J-55	36#	4150	4150	CTS w/ approved Class A Type Cement
Production	5 1/2"	N	P-110	20#	11895	11895	Least 8 Class A Tail cemented from TD into the 9 5/8"
Tubing	2 3/8"	N	J-55	4.7#	8000	8000	
Liners							

*Bill Hatfield* 5/21/14

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield
Conductor	20"	26"	0.438	2110	Class A Type	1.18
Fresh Water	13 3/8"	17 1/2"	0.380	2730	Class A Type	1.39
Coal						
Intermediate	9 5/8"	12 1/4"	0.352	3520	Class A Type	1.18
Production	5 1/2"	8 3/4" and 8 1/2"	0.361	12640	Class A Type	1.26
Tubing	2 3/8"	5 1/2" CSG	0.190	7700	.....	.....
Liners						

PACKERS

Kind:	None			
Sizes:	None			
Depths Set:	None			

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21) Describe centralizer placement for each casing string. Conductor - No centralizers used.  
Fresh Water & Coal - Bow spring centralizers on first joint then every fourth joint to 100 feet from surface.  
Intermediate - Bow spring centralizers one on the first two joints and every fourth joint until inside surface casing.  
Production - Rigid centralizer on every casing joint lateral, every other in the curve, & every third joint in the vertical portion.  
(Note: cementing the 5 1/2" casing completely in open hole lateral/curve and 200' into the 9-5/8" casing.)

22) Describe all cement additives associated with each cement type. Conductor - 2% CaCl2.  
Fresh Water/Coal - 2% CaCl2. Intermediate - 2% CaCl2. Production - 2.6% Cement extender, 0.7% Fluid loss additive, 0.5% High Temperature Retarder, 0.2% Friction Reducer

23) Proposed borehole conditioning procedures. Conductor - The hole is drilled w/ air and casing ran in air. Apart from insuring the hole is clean via air circulation at TD, there are no other conditioning procedures. Fresh Water/Coal - The hole is drilled w/ air and casing is ran in air. Once casing is on bottom, the casing shoe will be cleared with fresh water and gel prior to cementing. Intermediate - The hole is drilled w/ air and casing is ran in air. Once casing is on bottom, the casing shoe will be cleared with fresh water and gel prior to cementing. (Note: Drilling soap may be utilized if hole gets wet/damp during the drilling of all air holes with the exception of the conductor). Production - The hole will be drilled with synthetic oil base mud and once at TD the hole is circulated at a drilling pump rate until the hole is clean. Once casing is ran the hole is circulated for a minimum of one hole volume prior to pumping cement.

\*Note: Attach additional sheets as needed.

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Cement Additives

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- Conductor – 2% CaCl<sub>2</sub>
- Freshwater/Coal – 2% CaCl<sub>2</sub>
- Intermediate - 2% CaCl<sub>2</sub>
- Production -
  - 2.6% Cement extender
  - 0.7% Fluid Loss Additive
  - 0.5% High Temperature Retarder
  - 0.2% Friction Reducer

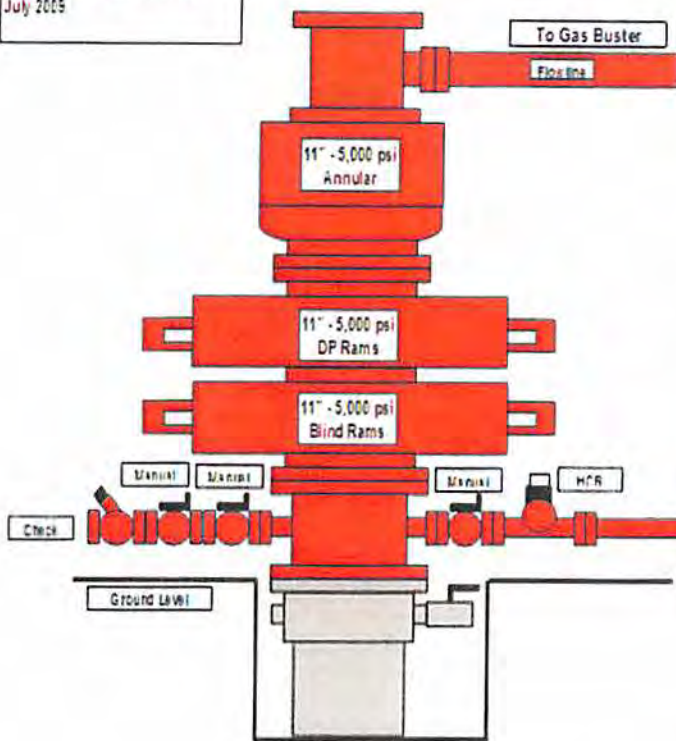
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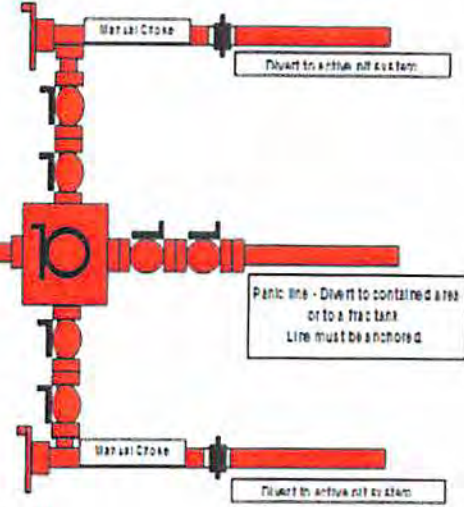
Waynesburg District  
Minimum BOP Requirements  
July 2009

HORIZONTAL RIG SETUP



BOP drills should be held as deemed necessary but no less than once per well with each drill. Note the drill and the associated time on the daily drilling report and the IADC sheet.

All Choke Manifold Components Require a Minimum Pressure Rating of 5,000 psi



Note - Lower BOP outlet can be used in place of mud cross if necessary  
Choke manifold configuration may vary but must have 2 manual chokes and 5,000 psi rating  
The use of Coflex is acceptable

Remote Controls

Remote controls shall be readily accessible to the driller. Remote controls for all systems shall be capable of closing the preventer. Remote controls systems shall be capable of both opening and closing the preventer.

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WW-9  
(9/13)

API Number 47 - 097

Operator's Well No. CENT22BHS

**4709703858**

**STATE OF WEST VIRGINIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
OFFICE OF OIL AND GAS**

**FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN**

Operator Name CNX Gas Company LLC OP Code 494458046

Watershed (HUC 10) Pecks Run Quadrangle Century 7.5

Elevation 1581' County Upshur District Warren

Do you anticipate using more than 5,000 bbls of water to complete the proposed well work? Yes  No

Will a pit be used? Yes  No

If so, please describe anticipated pit waste: N/A

Will a synthetic liner be used in the pit? Yes  No  If so, what ml.? N/A

Proposed Disposal Method For Treated Pit Wastes:

- Land Application
- Underground Injection ( UIC Permit Number \_\_\_\_\_ )
- Reuse (at API Number \_\_\_\_\_ )
- Off Site Disposal (Supply form WW-9 for disposal location)
- Other (Explain Recycle on other well on same pad of adjacent pads)

Will closed loop system be used? If so, describe: Yes

Drilling medium anticipated for this well (vertical and horizontal)? Air, freshwater, oil based, etc. Air and water based mud

-If oil based, what type? Synthetic, petroleum, etc. Synthetic

Additives to be used in drilling medium? Bactericide, Polymers, and Weighting Agents

Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. Landfill

-If left in pit and plan to solidify what medium will be used? (cement, lime, sawdust) N/A

-Landfill or offsite name/permit number? MeadowFill, Northwestern Landfill, Mas Environmental Yukon Landfill & Bulger Landfill

I certify that I understand and agree to the terms and conditions of the GENERAL WATER POLLUTION PERMIT issued on August 1, 2005, by the Office of Oil and Gas of the West Virginia Department of Environmental Protection. I understand that the provisions of the permit are enforceable by law. Violations of any term or condition of the general permit and/or other applicable law or regulation can lead to enforcement action.

I certify under penalty of law that I have personally examined and am familiar with the information submitted on this application form and all attachments thereto and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment.

Company Official Signature *Jeremy Jones*

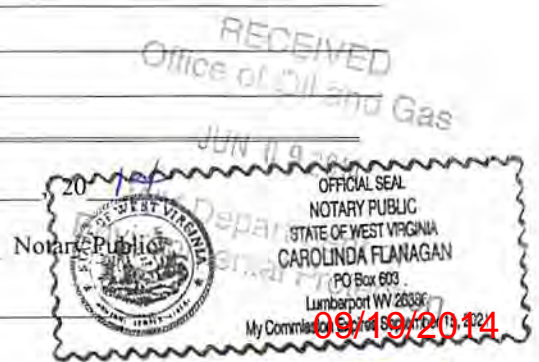
Company Official (Typed Name) Jeremy Jones

Company Official Title Designated Agent - General Manager WV Gas Operations

Subscribed and sworn before me this 21<sup>ST</sup> day of MAY

*Carolinda Flanagan*

My commission expires 09/15/2021





CNX Gas Company LLC

Proposed Revegetation Treatment: Acres Disturbed 8.6 Prevegetation pH 6.5

Lime according to pH test Tons/acre or to correct to pH 7.0

Fertilizer type 10-20-20

Fertilizer amount 500 lbs/acre

Mulch Hay or Straw @ 2 Tons/acre

Seed Mixtures

Temporary

Permanent

Seed Type	lbs/acre
Orchardgrass	25
Birdsfoot Trefoil	15
Landino Clover	10

Seed Type	lbs/acre
Orchardgrass	25
Birdsfoot Trefoil	15
Landino Clover	10

Attach:

Drawing(s) of road, location, pit and proposed area for land application (unless engineered plans including this info have been provided)

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by:

Bill Hatfield

Comments:

Title:

oil & gas inspector

Date:

5/21/14

Field Reviewed?

(checked) Yes

( ) No

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WV Department of Environmental Protection

# Safety Plan for Well # CENT22BHS

## CNX Gas Company LLC

*Bill Hatfield 5/21/14*



# HOY MURPHY LEASE CENT 22 WELL NO.S AHS-JHS

4709703858

## Murphy

### Run

260' ± @  
10-15% GRADE ±

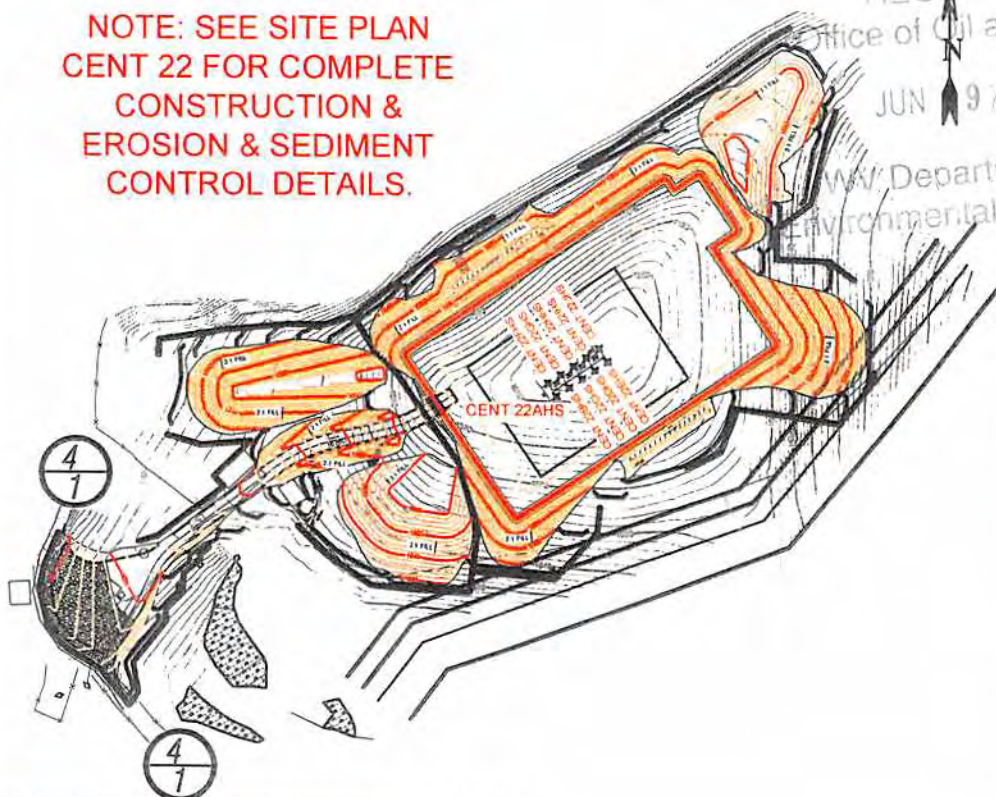
325' ± @  
5-10% GRADE ±

NOTE: SEE SITE PLAN  
CENT 22 FOR COMPLETE  
CONSTRUCTION &  
EROSION & SEDIMENT  
CONTROL DETAILS.

*Bill Hatfield*  
5/21/14

Detail Sketch for Proposed AHS-JHS Wells

NOTE: SEE SITE PLAN  
CENT 22 FOR COMPLETE  
CONSTRUCTION &  
EROSION & SEDIMENT  
CONTROL DETAILS.



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SCALE: 1"=500'

500' 1000'

Not To Scale

TOPO SECTION OF CENTURY 7.5'  
USGS TOPO QUADRANGLE



Professional Energy Consultants  
A DIVISION OF SMITH LAND SURVEYING

SURVEYORS PROJECT MOUNT **SLS** ENGINEERS ENVIRONMENTAL

226 West Main St.  
P.O. Box 150  
Grafton, WV 26351  
(304) 412-5634

56055 Dixie Bottom Road  
Sharysboro, OH 43147  
(740) 471-9911

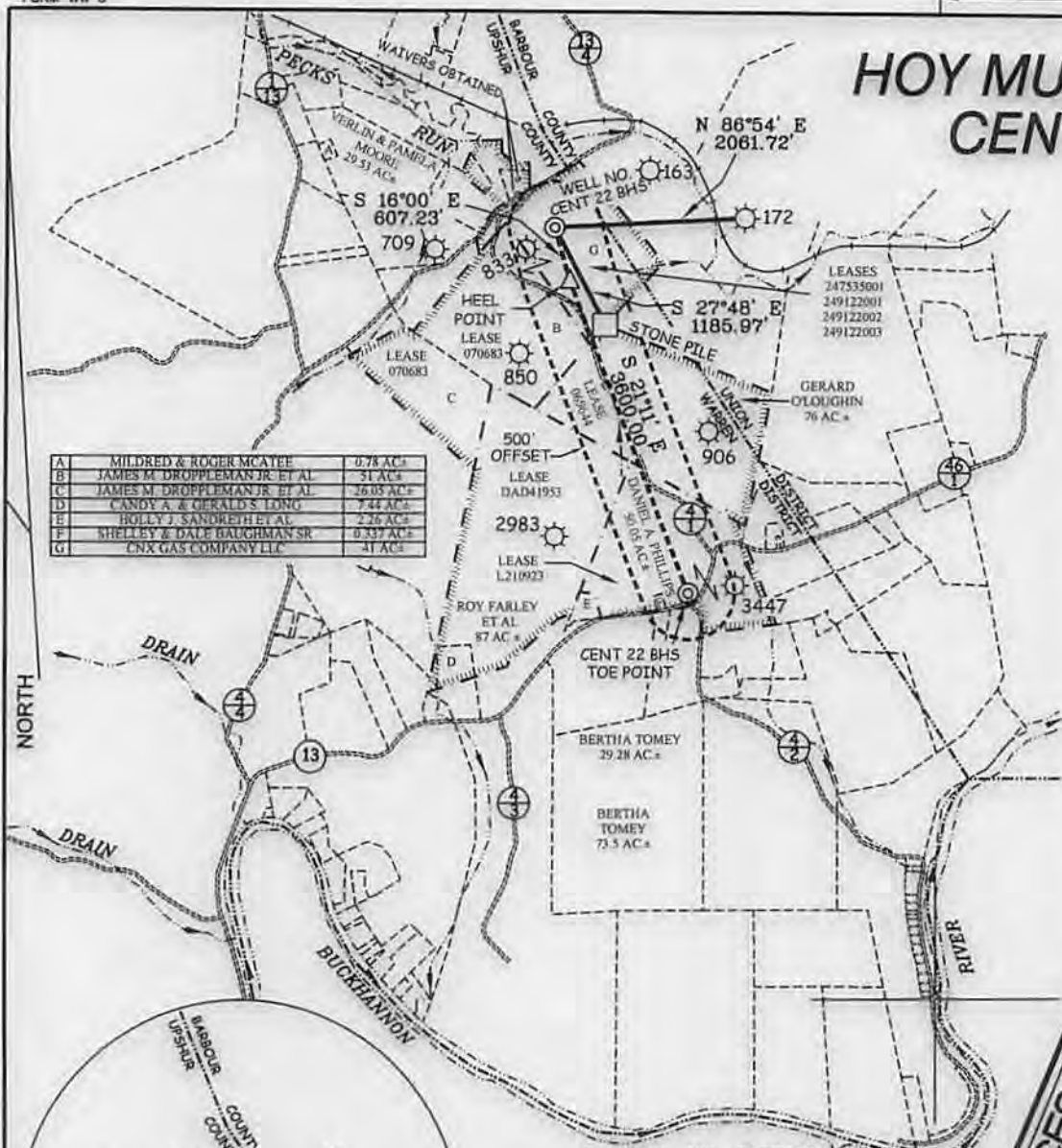
HONESTY. INTEGRITY. QUALITY.

DRAWN BY C.P.M.	FILE NO. 7912	DATE 08-15-13	CADD FILE: 7912REC-AHS.dwg
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# HOY MURPHY LEASE CENT 22 BHS

LONGITUDE 80°07'30"

10,636'



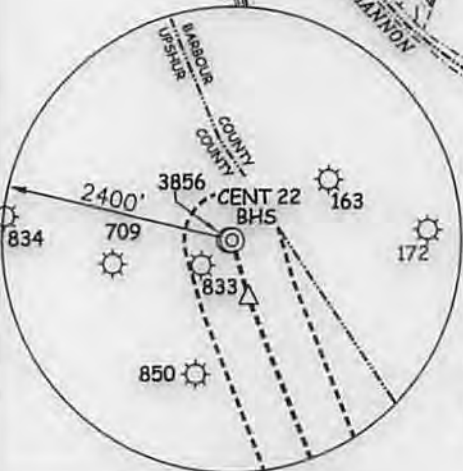
A	MILDRED & ROGER MCATEE	0.78 AC±
B	JAMES M. DROPPLEMAN JR ET AL	31 AC±
C	JAMES M. DROPPLEMAN JR ET AL	26.05 AC±
D	CANDY A & GERALD S LONG	7.44 AC±
E	HOLLY J SANDREJH ET AL	2.26 AC±
F	SHELLEY & DALE BAUGHMAN SR	0.337 AC±
G	CNX GAS COMPANY LLC	41 AC±

<b>CENT 22 BHS STATE PLANE COORDINATES SOUTH ZONE (NAD'27)</b>	
N. 749,132.7	E. 2,243,060.5
LAT=(N) 39.054136 LONG=(W) 80.144168	
UTM (NAD'83)(METERS)	
N. 4,323,143.6	E. 574,068.9
<b>CENT 22 BHS HEEL POINT STATE PLANE COORDINATES SOUTH ZONE (NAD'27)</b>	
N. 748,549.0	E. 2,243,228.0
LAT=(N) 39.052529 LONG=(W) 80.143597	
UTM (NAD'83)(METERS)	
N. 4,322,865.8	E. 574,120.0
<b>CENT 22 BHS TOE POINT STATE PLANE COORDINATES SOUTH ZONE (NAD'27)</b>	
N. 745,192.4	E. 2,244,529.0
LAT=(N) 39.043280 LONG=(W) 80.139126	
UTM (NAD'83)(METERS)	
N. 4,321,943.2	E. 574,516.6

**NOTES ON SURVEY**

1. TIES TO WELLS, REFERENCES AND CORNERS ARE BASED ON GRID NORTH FOR THE WV STATE PLANE COORDINATE SYSTEM SOUTH ZONE NAD '27.
2. LEASE BOUNDARY SHOWN HEREON TAKEN FROM DEED BOOK 118 AT PAGE 126 & ADJOINING DEEDS.
3. SURFACE OWNER AND ADJOINER INFORMATION TAKEN FROM THE ASSESSOR AND COUNTY CLERK RECORDS OF UPSHUR COUNTY IN JULY, 2012.
4. WELL LAT./LONG. (NAD'27) ESTABLISHED BY DGPS(SURVEY GRADE).
5. NO WATER WELLS OR DEVELOPED SPRINGS WITHIN 250'. WAIVERS OBTAINED FOR TWO HOUSES WITHIN 625'.

**REFERENCES**



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

P.S. 2266 *[Signature]*



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.  
 DATE MARCH 10, 20 14  
 OPERATORS WELL NO. CENT 22 BHS  
 API WELL NO. 47 - 97 - 038584  
 STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1/200 FILE NO. 7912BHS(457-79)  
 PROVEN SOURCE OF ELEVATION DGPS (SURVEY GRADE) SCALE 1" = 2000'

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

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

LOCATION: ELEVATION 1,581' WATERSHED PECKS RUN  
 DISTRICT WARREN COUNTY UPSHUR QUADRANGLE CENTURY 7.5'

SURFACE OWNER CNX GAS COMPANY, LLC AGREAGE 41±  
 ROYALTY OWNER HOY RUSSELL MURPHY, ETAL LEASE ACREAGE 41±, 79±, 87±, 76±, & 50±

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

PHYSICAL CHANGE IN WELL (SPECIFY) \_\_\_\_\_ TARGET FORMATION MARCELLUS  
 ESTIMATED DEPTH TVD 7,685' / TMD 11,895'

WELL OPERATOR CNX GAS COMPANY, LLC. DESIGNATED AGENT JEREMY JONES  
 ADDRESS P.O. BOX 1248 ADDRESS P.O. BOX 1248  
JANE LEW, WV 26378 JANE LEW, WV 26378

09/19/2014

COUNTY NAME PERMIT