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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

**PERMIT MODIFICATION APPROVAL**

January 02, 2015

EQT PRODUCTION COMPANY  
303 SAND CUT ROAD  
CLARKSBURG, WV 26301

Re: Permit Modification Approval for API Number 8510132 , Well #: 513756

**Extend Lateral**

Oil and Gas Operator:

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.

Please call James Martin at 304-926-0499, extension 1654 if you have any questions.

Sincerely,

Gene Smith  
Assistant Chief of Permitting  
Office of Oil and Gas



4708510132

October 30, 2014

Mr. Gene Smith  
West Virginia Department of Environmental Protection  
Office of Oil and Gas  
601 57th Street SE  
Charleston, WV 25304

Re: Modification of OXF163, 513756, 513757, 513759, 513760  
API#47-085-10132, 10133, 10135, 10136

Dear Mr. Smith,

Attached is a modification of the lateral length for the above 4 API numbers. Included is a new WW-6B, well schematics, WW-6A1, mylar plat and rec plan.

If you have any questions, please do not hesitate to contact me at (304) 848-0076.

Sincerely,

Vicki Roark  
Permitting Supervisor-WV

Enc.

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**CASING AND TUBING PROGRAM**

18)

| TYPE         | Size   | New or Used | Grade | Weight per ft. | FOOTAGE: for Drilling | INTERVALS: Left in Well | CEMENT: Fill- up (Cu.Ft.)                            |
|--------------|--------|-------------|-------|----------------|-----------------------|-------------------------|--|
| Conductor    | 20     | New         | MC-50 | 81             | 40                    | 40                      | 38 C.T.S.  |
| Fresh Water  | 13 3/8 | New         | MC-50 | 54             | 1,055                 | 1,055                   | 914 C.T.S.   |
| Coal         | -      | -           | -     | -              | -                     | -                       | -  |
| Intermediate | 9 5/8  | New         | MC-50 | 40             | 2,955                 | 2,955                   | 1,152 C.T.S.   |
| Production   | 5 1/2  | New         | P-110 | 20             | 14,869                | 14,869                  | See Note 1   |
| Tubing       | 2 3/8  |             | J-55  | 4.6            |                       |                         | May not be run, if run will be set 100' less than TD |
| Liners       |        |             |       |                |                       |                         |  |

| TYPE         | Size   | Wellbore Diameter | Wall Thickness | Burst Pressure | Cement Type  | Cement Yield (cu. ft./k) |
|--------------|--------|-------------------|----------------|----------------|--------------|--------------------------|
| Conductor    | 20     | 24                | 0.375          | -              | Construction | 1.18                     |
| Fresh Water  | 13 3/8 | 17 1/2            | 0.38           | 2,480          | * See Note 2 | 1.21                     |
| Coal         | -      | -                 | -              | -              | -            | -                        |
| Intermediate | 9 5/8  | 12 3/8            | 0.395          | 3,590          | * See Note 2 | 1.21                     |
| Production   | 5 1/2  | 8 1/2             | 0.361          | 12,640         | -            | 1.27/1.86                |
| Tubing       |        |                   |                |                |              |                          |
| Liners       |        |                   |                |                |              |                          |

**Packers**

|             |     |  |  |  |
|-------------|-----|--|--|--|
| Kind:       | N/A |  |  |  |
| Sizes:      | N/A |  |  |  |
| Depths Set: | N/A |  |  |  |

**Note 1:** EQT plans to bring the TOC on the production casing cement job 1,000' above kick off point, which is at least 500' above the shallowest production zone, to avoid communication.  
**Note 2:** Reference Variance 2014-17.

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 Environmental Protection  
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WW - 6B

(3/13)

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

Drill and complete a new horizontal well in the Marcellus formation. The vertical drill to go down to an approximate depth of 6657'. Tag the Onondaga not more than 100', run logs, then plug back to approximately 5123'. Then kick off the horizontal leg into the Marcellus formation using a slick water frac.

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

Hydraulic fracturing is completed in accordance with state regulations using water recycled from previously fractured wells and obtained from freshwater sources. This water is mixed with sand and a small percentage (less than 0.3%) of chemicals (including 15% Hydrochloric acid, gelling agent, gel breaker, friction reducer, biocide, and scale inhibitor), referred to in the industry as a "slickwater" completion. Maximum anticipated treating pressures are expected to average approximately 8500 psi, maximum anticipated treating rates are expected to average approximately 100 bpm. Stage lengths vary from 150 to 300 feet. Average approximately 200,000 barrels of water per stage. Sand sizes vary from 100 mesh to 20/40 mesh. Average approximately 200,000 pounds of sand per stage.

21) Total area to be disturbed, including roads, stockpile area, pits, etc, (acres): 24.6

22) Area to be disturbed for well pad only, less access road (acres): 14.6

23) Describe centralizer placement for each casing string.

- Surface: Bow spring centralizers – One at the shoe and one spaced every 500'.
- Intermediate: Bow spring centralizers– One cent at the shoe and one spaced every 500'.
- Production: One spaced every 1000' from KOP to Int csg shoe

24) Describe all cement additives associated with each cement type. Surface (Type 1 Cement): 0-3% Calcium Chloride

Used to speed the setting of cement slurries.

0.4% flake. Loss Circulation Material (LCM) is used to combat the loss of the cement slurry to a thief zone.

Intermediate (Type 1 Cement): 0-3% Calcium Chloride. Salt is used in shallow, low temperature formations to speed the setting of cement slurries. 0.4% flake. Loss Circulation Material (LCM) is used to combat the loss of whole drilling fluid or cement slurry (not filtrate) to a thief zone.

Production:Lead (Type 1 Cement): 0.2-0.7% Lignosulfonate (Retarder). Lengthens thickening time.

0.3% CFR (dispersant). Makes cement easier to mix.

Tail (Type H Cement): 0.25-0.40% Lignosulfonate (Retarder). Lengthens thickening time.

0.2-0.3% CFR (dispersant). This is to make the cement easier to mix.

60 % Calcium Carbonate. Acid solubility.

0.4-0.6% Halad (fluid loss). Reduces amount of water lost to formation.

25) Proposed borehole conditioning procedures. Surface: Circulate hole clean (Approximately 30-45 minutes) rotating & reciprocating

one full joint until cuttings diminish at surface. When cuttings returning to surface diminish, continue to circulate an additional 5

minutes. To ensure that there is no fill, short trip two stands with no circulation. If there is fill, bring compressors back on

and circulate hole clean. A constant rate of higher than expected cuttings volume likely indicates washouts that will not clean up.

Intermediate: Circulate hole clean (Approximately 30-45 minutes) rotating & reciprocating one full joint until cuttings diminish at

surface. When cuttings returning to surface diminish, continue to circulate an additional 5 minutes. If foam drilling, to enhance

hole cleaning use a soap sweep or increase injection rate &amp; foam concentration.

Production: Pump marker sweep with nut plug to determine actual hole washout. Calculate a gauge holes bottoms up volume.

Perform a cleanup cycle by pumping 3-5 bottoms up or until the shakers are clean. Check volume of cuttings coming across

the shakers every 15 minutes.

\*Note: Attach additional sheets as needed.

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Page 3 of 3

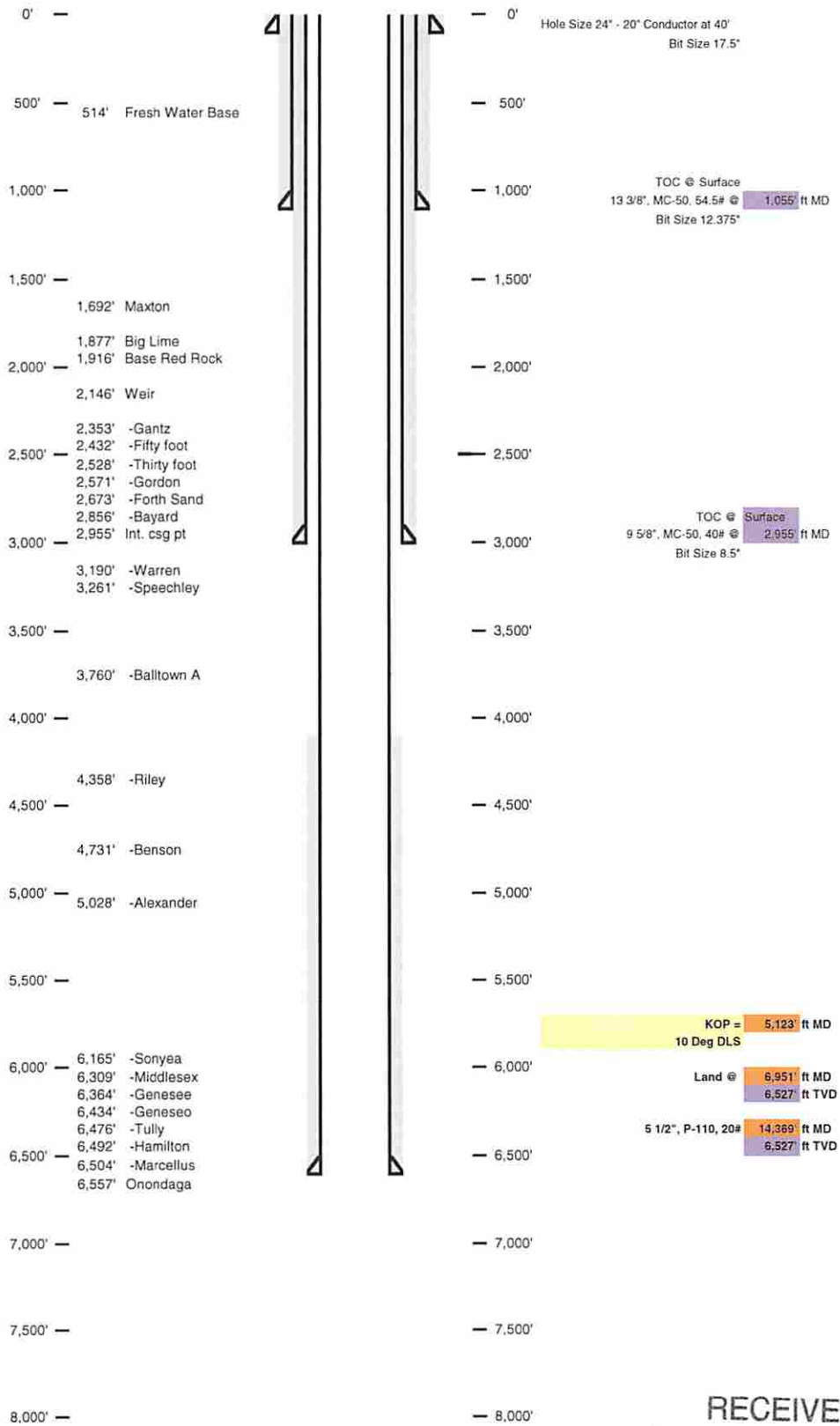
WV Department of  
Environmental Protection 01/02/2015

4708510132 MOD

Well Schematic  
EQT Production

Well Name 513756 (OXF163H1)  
County Ritchie  
State West Virginia

Elevation KB: 1169  
Target Marcellus  
Prospect  
Azimuth 162  
Vertical Section 7659



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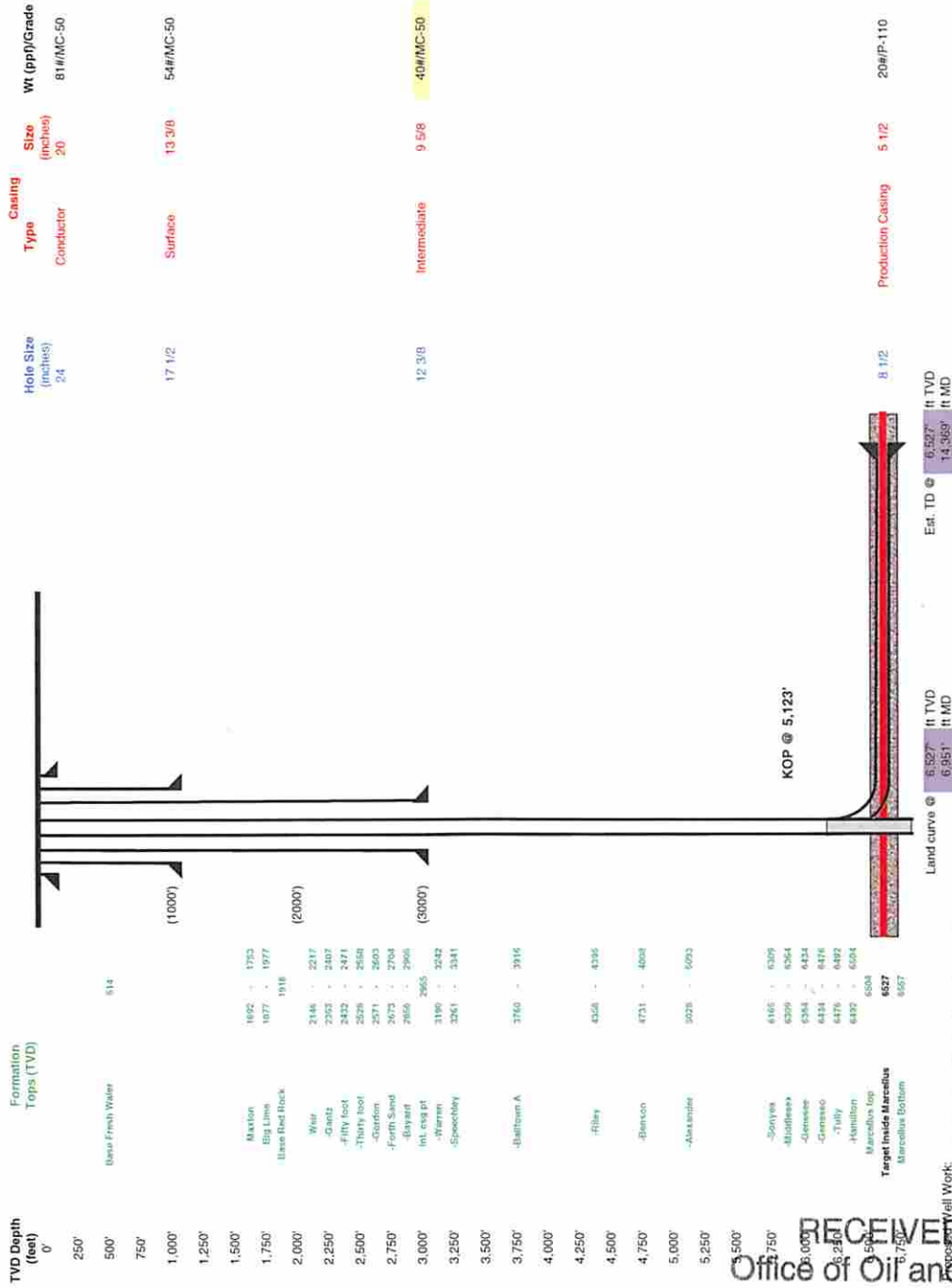
WV Department of Environmental Protection 01/02/2015

4708510132 MOD

Well 513756 (OXF163H1)  
 EQT Production  
 Oxford  
 Ritchie

Azimuth 162  
 Vertical Section 7659

West Virginia



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

March 18, 2014

Nabors Completion & Production Services Company  
1380 Route 286 Hwy E #121  
Indiana PA 15701

Re: Cement Variance Request

Dear Sir or Madam,

This agency is approving a variance request for the cement blend listed below to be used on surface and coal protection strings for the drilling of oil and gas wells in the state of West Virginia. The variance cannot be used without requesting its use on a permit application and approval by this agency:

- Type 1 (2% Calcium Chloride-Accelerator, 0.25% Super Flake-Lost Circulation, 5.2% Water, 94% Type "1" Cement)

If you have any questions regarding this matter feel free to contact me at 304-926-0499, ext. 1653.

Sincerely,

James Peterson  
Environmental Resources Specialist / Permitting

Promoting a healthy environment.

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west virginia department of environmental protection

Office of Oil and Gas  
601 57<sup>th</sup> Street, SE  
Charleston, WV 25304  
(304) 926-0450  
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Earl Ray Tomblin, Governor  
Randy C. Huffman, Cabinet Secretary  
dep.wv.gov

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

**IN THE MATTER OF A VARIANCE FROM ) ORDER NO. 2014 - 17**  
**REGULATION 35 CSR § 4-11.4/11.5/14.1 )**  
**AND 35 CSR § 8-9.2.h. 4/5/6/8 OF THE )**  
**THE OPERATIONAL )**  
**REGULATIONS OF CEMENTING OIL )**  
**AND GAS WELLS )**

**REPORT OF THE OFFICE**

Nabors Completion & Production Services Co. requests approval of a different cement blend for use in cementing surface and coal protection casing of oil and gas wells.

**FINDINGS OF FACT**

- 1.) Nabors Completion & Production Services Co. proposes the following cement blend:
- 2% Calcium Chloride (Accelerator)
  - 0.25 % Super Flake (Lost Circulation)
  - 94% Type "1" Cement
  - 5.20 % Water
- 2.) Laboratory testing results indicate that the blend listed in Fact No.1 will achieve a 500 psi compressive strength within 6 hours and a 2,435 psi compressive strength within 24 hours.

Promoting a healthy environment.

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**NOV 03 2014**

**WV Department of**  
**Environmental Protection** 04/02/2015

**CONCLUSIONS OF LAW**

Pursuant to Articles 6 and 6A, Chapter 22 of the Code of West Virginia, the Office of Oil and Gas has jurisdiction over the subject matter embraced in said notice, and the persons interested therein, and jurisdiction to promulgate the hereinafter prescribed Order.

Pursuant to 35 CSR § 4-11.5 and 35 CSR § 8-9.2.h.8 the Chief of the Office of Oil and Gas may approve different cement blends upon the well operator providing satisfactory proof that different cement types are adequate.


**ORDER**

It is ordered that Nabors Completion & Production Services Co. may use the cement blend listed in Findings of Fact No.1 for the cementing of surface and coal protection casing of oil and gas wells in the State as may be requested by oil and gas operators. The waiting time on the cement blend shall be 8 hours. The cement blend shall be mixed in strict accordance with the specifications for each blend and weight measurements made on-site to assure the cement slurries meet the minimum weight specifications. A sample shall be collected and, if after 8 hours the cement is not set up, additional time will be required. Nabors Completion & Production Services Co. shall keep a record of cement blend jobs in which the cement blend approved under this order is to be used and made available to the Office of Oil and Gas upon request.

Dated this, the 18th day of March, 2014.

IN THE NAME OF THE STATE OF WEST VIRGINIA

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



James Martin, Chief  
Office of Oil and Gas

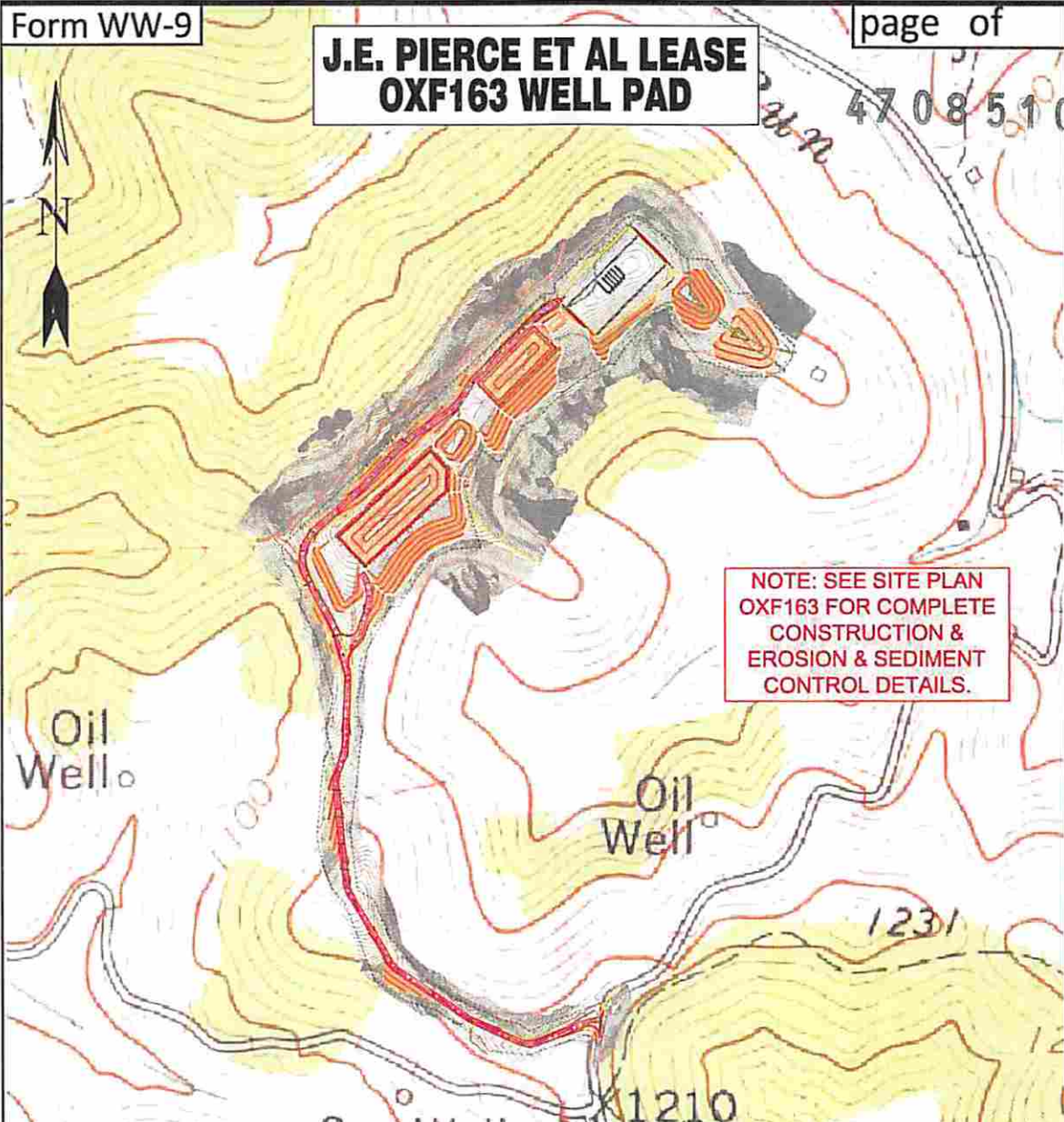
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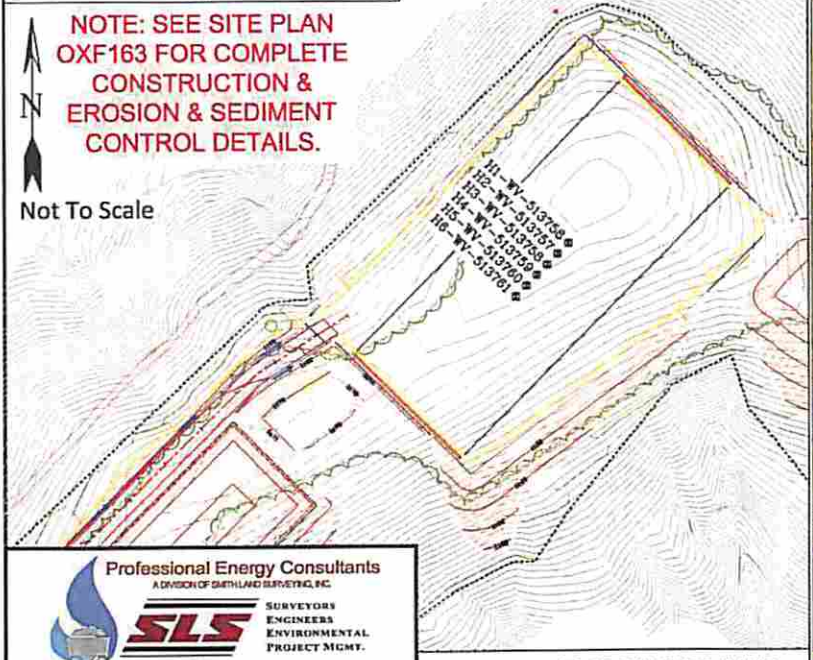
WV Department of  
Environmental Protection 11/02/2015

# J.E. PIERCE ET AL LEASE OXF163 WELL PAD

4708510132 MOD



Detail Sketch for Proposed OXF163 Wells



OXFORD QUAD  
AUBURN QUAD

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SCALE: 1"=500'



Professional Energy Consultants  
A DIVISION OF SMITHLAND SURVEYING, INC.

SURVEYORS  
ENGINEERS  
ENVIRONMENTAL  
PROJECT MGMT.

(204) 452-3634 WWW.SLSURVEYS.COM

DRAWN BY: K.G.M. FILE NO.: 7698 DATE: 05-23-14 CADD FILE: 7698REC163.dwg

TOPO SECTION OF OXFORD 7.5' AND AUBURN 7.5' USGS TOPO QUADRANGLE

WV Department of Environmental Protection

01/02/2015

| ROYALTY OWNERS                                |           |                  |
|---|-----------|------------------|
| B.M. PIERCE ET UX                             | 84.50 AC± | LEASE NO. 118210 |
| SHIRLEY & RUTH RIDDLE<br>HEIRS AND/OR ASSIGNS | 272 AC±   | LEASE NO. 988181 |

LATITUDE 39°10'00"

**EQT PRODUCTION COMPANY  
J.E. PIERCE ET AL LEASE  
108(98.73±) ACRES±  
WELL NO. WV 513756**

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

|                   |                   |                    |
|-------------------|-------------------|--------------------|
| NAD'27 S.P.C.(FT) | N. 234,498.6      | E. 1,619,128.2     |
| NAD'27 GEO.       | LAT-(N) 39.136021 | LONG-(W) 80.842743 |
| NAD'83 UTM (M)    | N. 4,331,892.5    | E. 513,606.0       |

**LANDING POINT**

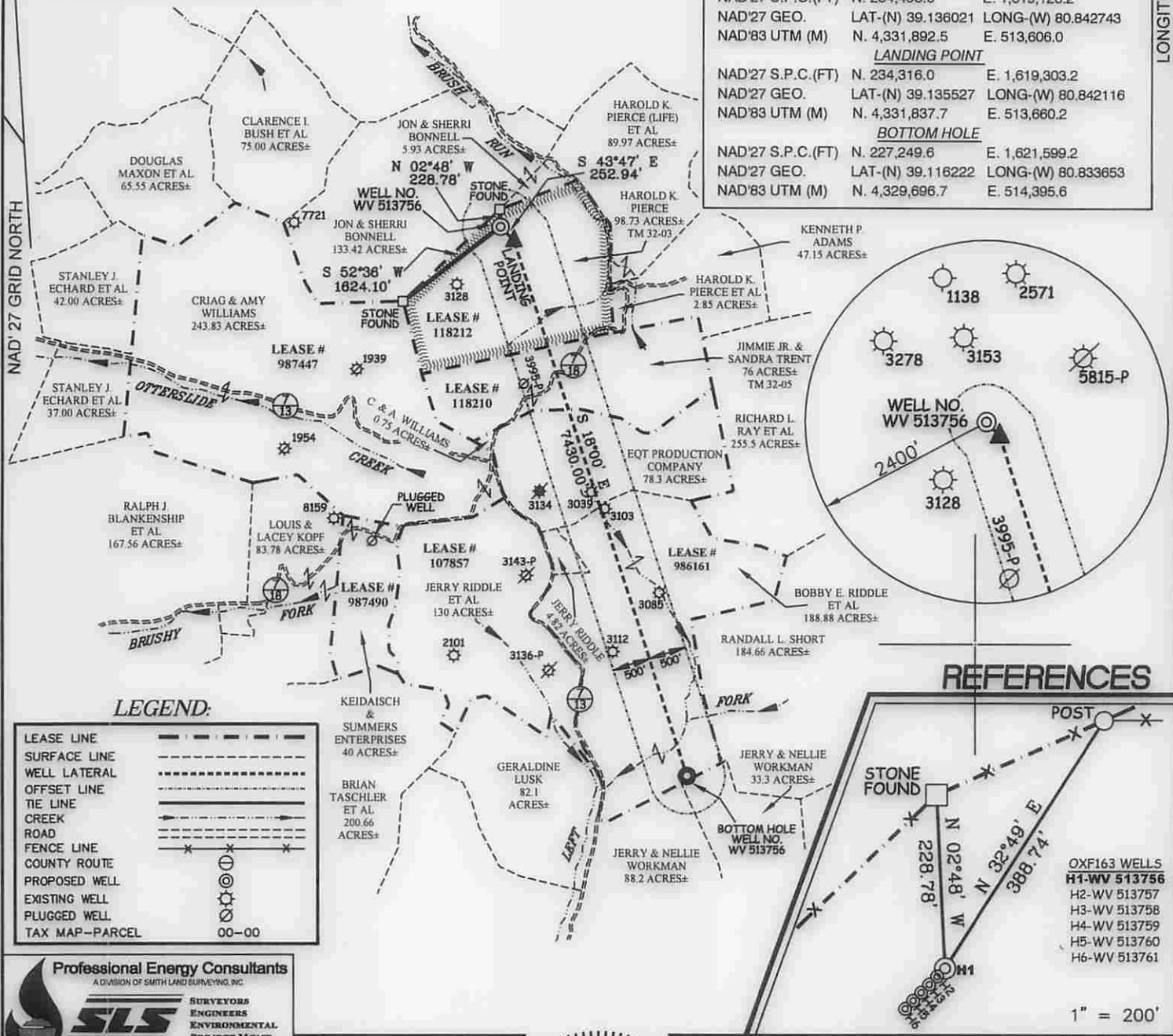
|                   |                   |                    |
|-------------------|-------------------|--------------------|
| NAD'27 S.P.C.(FT) | N. 234,316.0      | E. 1,619,303.2     |
| NAD'27 GEO.       | LAT-(N) 39.135527 | LONG-(W) 80.842116 |
| NAD'83 UTM (M)    | N. 4,331,837.7    | E. 513,660.2       |

**BOTTOM HOLE**

|                   |                   |                    |
|-------------------|-------------------|--------------------|
| NAD'27 S.P.C.(FT) | N. 227,249.6      | E. 1,621,599.2     |
| NAD'27 GEO.       | LAT-(N) 39.116222 | LONG-(W) 80.833653 |
| NAD'83 UTM (M)    | N. 4,329,696.7    | E. 514,395.6       |

**NOTES ON SURVEY**

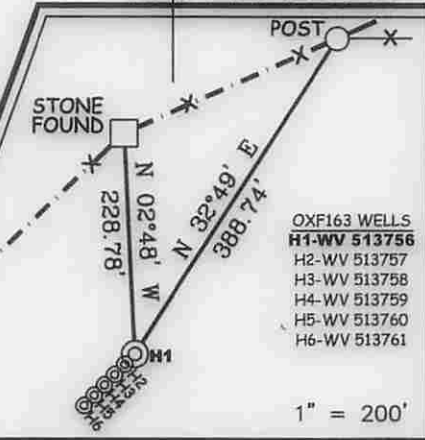
- NO WATER WELLS WERE FOUND WITHIN 250' OF PROPOSED GAS WELL. NO AGRICULTURAL BUILDINGS ≥ 2500 SQ. FT. OR DWELLINGS WERE FOUND WITHIN 625' OF THE CENTER OF PROPOSED WELL PAD.



**LEGEND:**

|                |       |
|----------------|-------|
| LEASE LINE     | ---   |
| SURFACE LINE   | ----  |
| WELL LATERAL   | ----- |
| OFFSET LINE    | ----- |
| TIE LINE       | ----- |
| CREEK          | ~~~~~ |
| ROAD           | ----- |
| FENCE LINE     | ----- |
| COUNTY ROUTE   | ----- |
| PROPOSED WELL  | ☉     |
| EXISTING WELL  | ☼     |
| PLUGGED WELL   | ⊗     |
| TAX MAP-PARCEL | 00-00 |

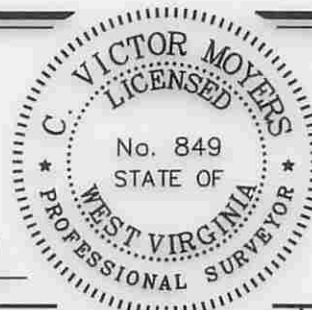
**REFERENCES**



**Professional Energy Consultants**  
A DIVISION OF SMITH LAND SURVEYING, INC.

**SLS**  
SURVEYORS  
ENGINEERS  
ENVIRONMENTAL  
PROJECT MGMT.

(304) 462-8824 WWW.SLSURVEYS.COM



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

P.S. 849 *C. Victor Moyers*

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.  
DATE MAY 27, 20 14  
REVISED 07/30/14 & 10/27/14  
OPERATORS WELL NO. WV 513756  
API WELL NO. 47-085-10132 MOD  
STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1 / 2500 FILE NO. 7698P513756R2  
HORIZONTAL & VERTICAL CONTROL DETERMINED BY DGPS (SURVEY GRADE TIE TO CORS NETWORK) SCALE 1" = 2000'

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

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

LOCATION: ELEVATION 1,175(GROUND)1,158.5(PROPOSED) WATERSHED BRUSH RUN OF MIDDLE FORK  
DISTRICT UNION COUNTY RITCHIE QUADRANGLE OXFORD 7.5'  
SURFACE OWNER HAROLD K. PIERCE ACREAGE 98.73±  
ROYALTY OWNER J.E. PIERCE ET AL ACREAGE 108± (98.73±)  
PROPOSED WORK: LEASE NO. 118212  
DRILL X CONVERT \_\_\_ DRILL DEEPER \_\_\_ REDRILL \_\_\_ FRACTURE OR STIMULATE X 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 6495'

WELL OPERATOR EQT PRODUCTION COMPANY DESIGNATED AGENT REX C. RAY  
ADDRESS 115 PROFESSIONAL PLACE P.O. BOX 280 BRIDGEPORT, WV 26330 ADDRESS 115 PROFESSIONAL PLACE P.O. BOX 280 BRIDGEPORT, WV 26330

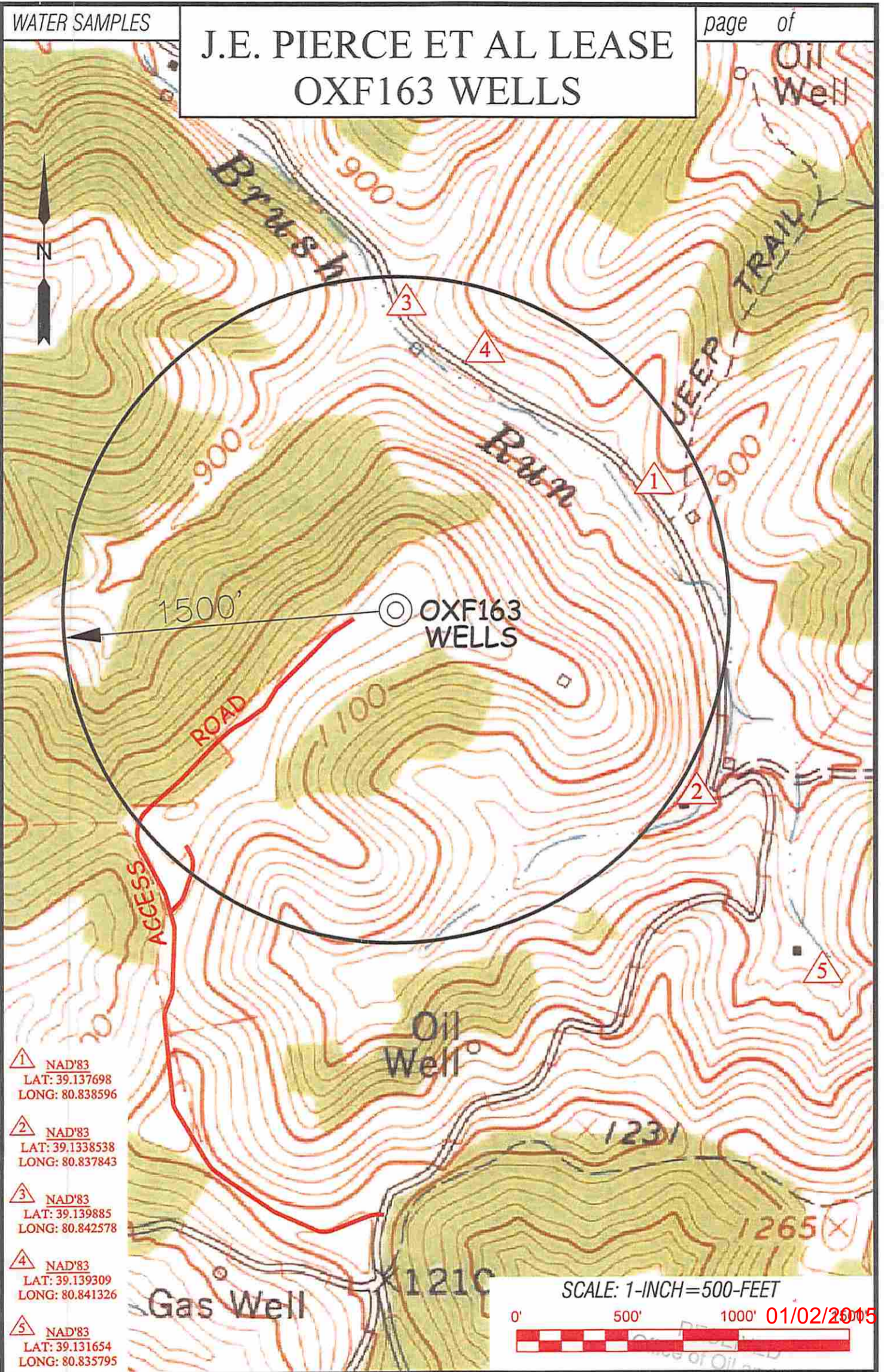
10/02/2014

COUNTY NAME PERMIT

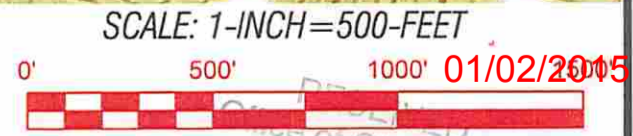
WATER SAMPLES

# J.E. PIERCE ET AL LEASE OXF163 WELLS

page of



- 1 NAD'83  
LAT: 39.137698  
LONG: 80.838596
- 2 NAD'83  
LAT: 39.1338538  
LONG: 80.837843
- 3 NAD'83  
LAT: 39.139885  
LONG: 80.842578
- 4 NAD'83  
LAT: 39.139309  
LONG: 80.841326
- 5 NAD'83  
LAT: 39.131654  
LONG: 80.835795



01/02/2015

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DRAWN BY: K.D.W.  
FILE NO.: 7698  
DATE: 06/10/14  
CADD FILE: 7698WSOXF163A.dwg

TOPO SECTIONS OF:  
OXFORD, WV 7.5' QUAD

| DISTRICT | COUNTY  | TAX MAP-PARCEL NO. |
|----------|---------|--------------------|
| UNION    | RITCHIE | 32-03              |

OPERATOR:  
EQT PRODUCTION COMPANY  
115 PROFESSIONAL PLACE  
P.O. BOX 280  
BRIDGEPORT, WV 26330