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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 04, 2016

EQT PRODUCTION COMPANY  
120 PROFESSIONAL PLACE  
BRIDGEPORT, WV 26330

Re: Permit Modification Approval for API Number 9502278, Well #: 512890

**Adjust FW and INT. Casing**

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

Promoting a healthy environment.

01/08/2016



October 23, 2015

4709502278 MoD

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

Re: Modification of 095-02278, 02279, 02280, 02281

Dear Mr. Smith,

Enclosed are modifications of the above API numbers located on the WEU4 pad. EQT would like to adjust the casing on the Fresh water and Intermediate casing to match the others in for permit currently. Everything else remains the same.

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

Sincerely,

A handwritten signature in black ink, appearing to read 'Vicki Roark'.

Vicki Roark  
Permitting Supervisor-WV

Enc.

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

1) Well Operator: EQT Production Company  
Operator ID 306686 County 095 District 1 Quadrangle 671

2) Operator's Well Number: 512890 Well Pad Name WEU4

3) Farm Name/Surface Owner : Donna J. Peter Public Road Access: WV-18

4) Elevation, current ground: 1,092.0 Elevation, proposed post-construction: 1,079.0

5) Well Type: (a) Gas  Oil  Underground Storage   
Other \_\_\_\_\_

(b) If Gas: Shallow  Deep   
Horizontal

6) Existing Pad? Yes or No: No

*DA 17*  
*11-13-15*

7) Proposed Target Formation(s), Depth(s), Anticipated Thicknesses and Associated Pressure(s):  
Target formation is Marcellus at a depth of 6680 with the anticipated thickness to be 54 feet and anticipated target pressure of 2747 PSI  
Top of Marcellus 6649

8) Proposed Total Vertical Depth: 6680

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 11132

11) Proposed Horizontal Leg Length 3,883

12) Approximate Fresh Water Strata Depths: 132, 175, 186, 204

13) Method to Determine Fresh Water Depth: By offset wells

14) Approximate Saltwater Depths: 1128, 1219, 1222

15) Approximate Coal Seam Depths: 230, 281, 696

16) Approximate Depth to Possible Void (coal mine, karst, other): None reported

17) Does proposed well location contain coal seams directly overlying or adjacent to an active mine? Yes \_\_\_\_\_ No x

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

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CASING AND TUBING PROGRAM

18)

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.)
Conductor	20	New	MC-50	81	40	40	38 C.T.S.
Fresh Water	13 3/8	New	J-55	54.5	750	750	660 C.T.S.
Coal	-	-	-	-	-	-	-
Intermediate	9 5/8	New	A-500	40	2,865	2,865	1,126 C.T.S.
Production	5 1/2	New	P-110	20	11,132	11,132	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							

*DMH 11-13-15*

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	20	24	0.375	-	18	Construction	1.18
Fresh Water	13 3/8	17 1/2	0.38	2,730	2184	* See Note 2	1.21
Coal							
Intermediate	9 5/8	12 3/8	0.395	3,950	3160	* See Note 2	1.21
Production	5 1/2	8 1/2	0.361	12,640	10112	-	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. (Attached)

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Page 2 of 3

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4709502278 MD

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 4924'.

Then kick off the horizontal leg into the Marcellus 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 internal casing pressures is 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):

19.18

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

13.17

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 % Calcuim 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 & 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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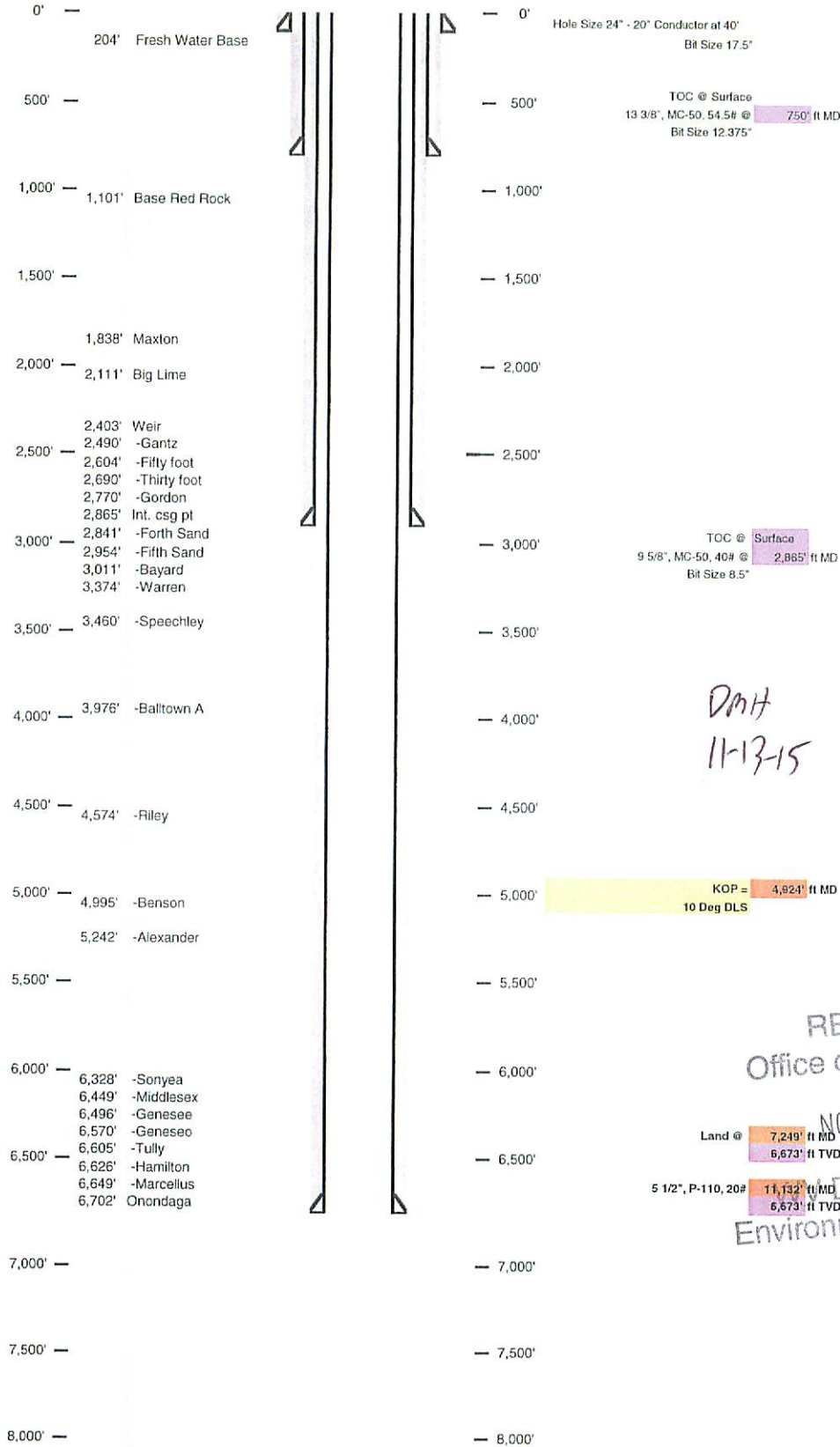
4709502278 M&P

Well Schematic  
EQT Production

Well Name 512890(WEU4H1)  
County Tyler  
State West Virginia

Elevation KB:  
Target  
Prospect  
Azimuth  
Vertical Section

1092
Marcellus
335
3858



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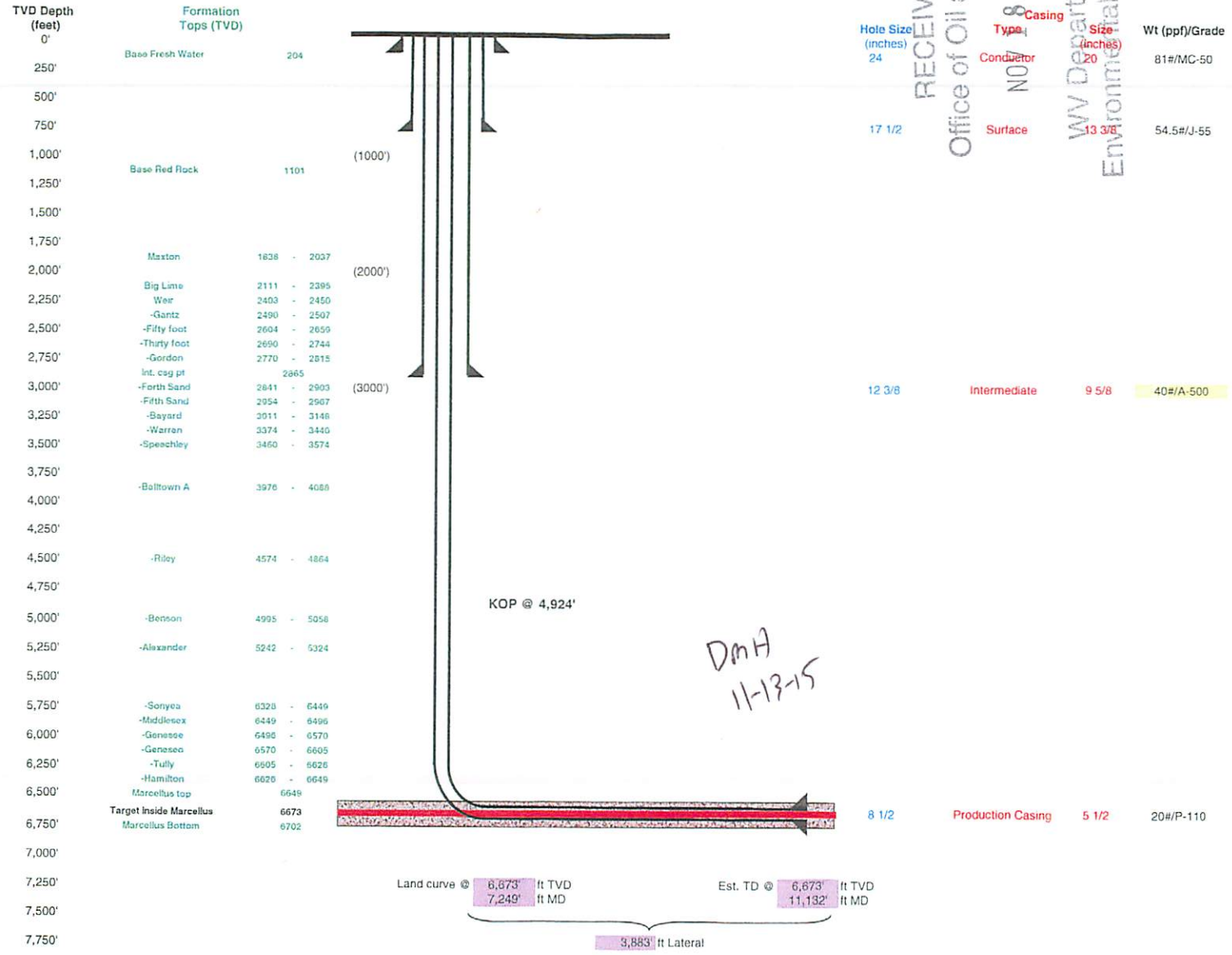
NOV 18 2015

Land @ 7,249' ft MD 6,673' ft TVD  
5 1/2", P-110, 20# 11,132' ft MD 6,673' ft TVD  
Department of Environmental Protection

4709502278 MS

Well 512890(WEU4H1)  
 EQT Production  
 West Union  
 Tyler West Virginia

Azimuth 335  
 Vertical Section 3858



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Proposed Well Work:  
 Drill and complete a new horizontal well in the Marcellus formation.  
 The vertical drill to go down to an approximate depth of 4924'.  
 Then kick off the horizontal leg into the Marcellus using a slick water frac.



4709502278 MOD

October 1, 2015

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

Re: Casing change on WEU4 (512890, 512891, 512892, 512893 )

Dear Mr. Smith,

EQT is requesting the 13 3/8" surface casing to be set at 750' KB, 50' below the coal at 696-700' KB. We will set the 9-5/8" intermediate string at 2865' KB, 50' below the base of the Gordon.

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

Sincerely,

Vicki Roark  
Permitting Supervisor-WV

DMT  
11-13-15

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4709502278 *Nov*



NOTE: SEE SITE PLAN  
 WEU4 FOR COMPLETE  
 CONSTRUCTION &  
 EROSION & SEDIMENT  
 CONTROL DETAILS.

**Professional Energy Consultants**  
 A DIVISION OF BIRKLAND SURVEY & L.L.C.  
  
 SURVEYORS  
 ENGINEERS  
 ENVIRONMENTAL  
 PROJECT MGMT.  
 (504) 482-0634 www.slsurvey.com

DRAWN BY K.D.W.	FILE NO. 7701	DATE 10-01-15	CADD FILE: 7701REZPLAN1.dwg
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TOPO SECTIONS OF WEST UNION  
 7.5' TOPO QUADRANGLE

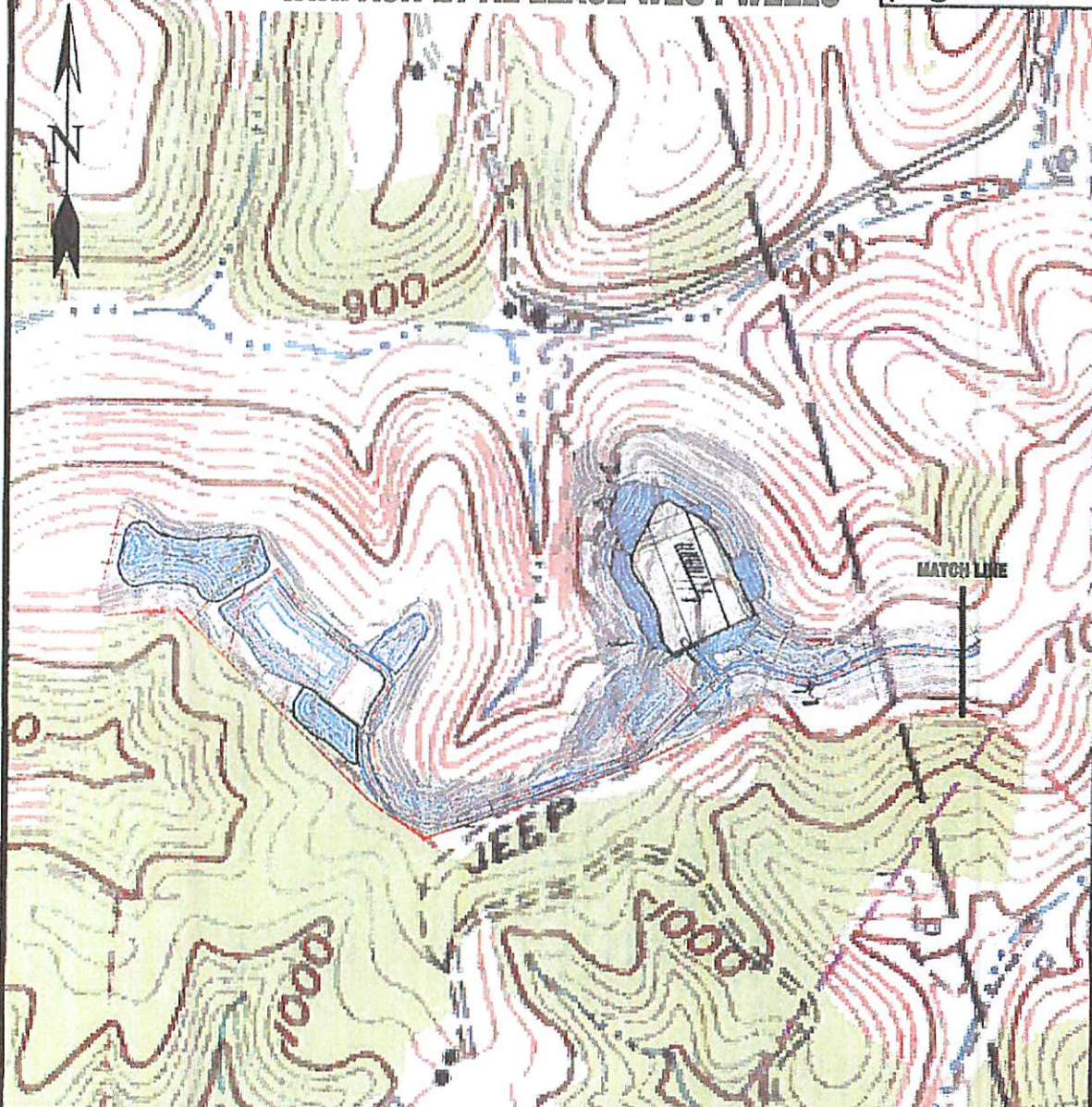
**SHEET 1 OF 2**  
**SCALE: 1"=500'**



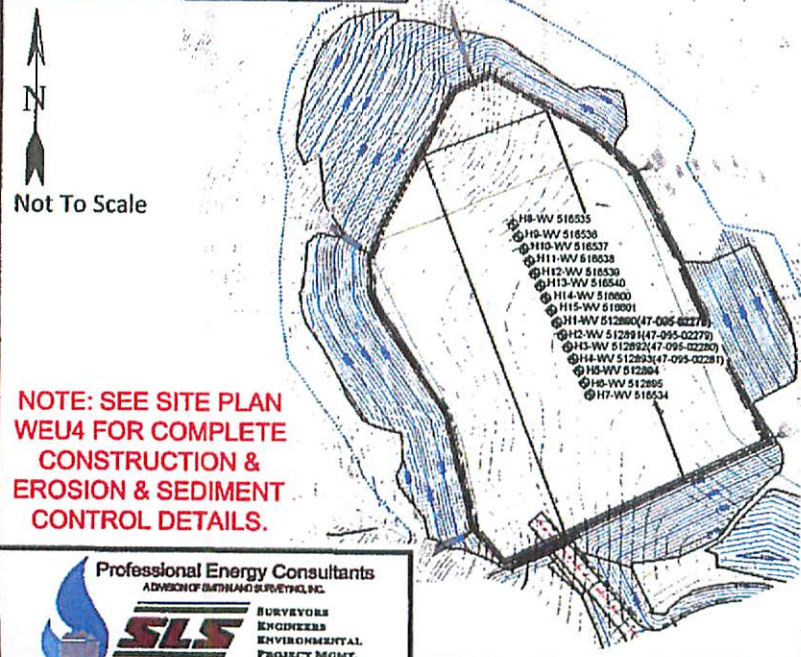
0' 500' 1000'

10/08/2016

4709502278 MW



Detail Sketch for Proposed WEU4 Wells



NOTE: SEE SITE PLAN WEU4 FOR COMPLETE CONSTRUCTION & EROSION & SEDIMENT CONTROL DETAILS.

NOTE: SEE SITE PLAN WEU4 FOR COMPLETE CONSTRUCTION & EROSION & SEDIMENT CONTROL DETAILS.

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DRAWN BY K.D.W.	FILE NO. 7701	DATE 10-01-15	CADD FILE: 7701EPLAN2.dwg
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TOPO SECTIONS OF WEST UNION  
7.5' TOPO QUADRANGLE

SHEET 2 OF 2  
SCALE: 1"=500'



10/08/2016

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Internal Protection

**Brewer, Charles T**

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**From:** Brewer, Charles T  
**Sent:** Tuesday, December 01, 2015 9:46 AM  
**To:** 'Roark, Vicki'  
**Subject:** WEU 4 Mods

4709502270

Hey Vicki,

I just took a look at the mods you have in for WEU 4, in which you have asked to change the FW and intermediate casing strings to match the apps that recently came in. This will be fine, but you will need to re-notify the coal folks because a different string will now be covering the coal seams that you have (all covered by 13 3/8's now). Originally one seam was covered by your intermediate which is now being shortened as well. Anyways, you know the routine, I will need the certified mail receipts and either the waivers from them or we can wait the 30 days.

Thanks,

Taylor

**Taylor Brewer, B.S., M.S.**

Environmental Resource Specialist 3  
Permit Review  
WVDEP Office of Oil and Gas  
601 57<sup>th</sup> Street, SE  
Charleston, WV 25304  
304-926-0499 ext. 1547

THE ITEMS REQUESTED IN THIS EMAIL WILL NEED TO BE RECEIVED BY THE OFFICE OF OIL AND GAS WITHIN **20 DAYS** TO AVOID THE PERMIT APPLICATION BEING RETURNED. IF AN OPERATOR WISHES TO RESUBMIT AN APPLICATION THAT HAS BEEN RETURNED, THE OPERATOR IS REQUIRED TO COMPLETE AND SUBMIT NEW FORMS, MYLAR PLAT AND ASSOCIATED FEES.

STATE OF WEST VIRGINIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS  
**VOLUNTARY STATEMENT OF NO OBJECTION**

Instructions to Persons Named on Page WW-6A

The well operator named on page WW-6A is applying for a permit from the State of West Virginia to conduct oil or gas well work. Well work permits are valid for twenty-four (24) months. Please contact the listed well operator and the Office of Oil and Gas if you do not own any interest in the listed surface tract.

Comment and Waiver Provisions

Pursuant to West Virginia Code § 22-6A-11(a), all persons described in subsection (b), section ten of this article may file written comments with the secretary as to the location or construction of the applicant's proposed well work within thirty days after the application is filed with the secretary.

Pursuant to West Virginia Code § 22-6A-8(b) No permit may be issued less than thirty days after the filing date of the application for any well work except plugging or replugging; and no permit for plugging or replugging may be issued less than five days after the filing date of the application except a permit for plugging or replugging a dry hole: Provided, That if the applicant certifies that all persons entitled to notice of the application under the provisions of subsection (b), section ten of this article have been served in person or by certified mail, return receipt requested, with a copy of the well work application, including the erosion and sediment control plan, if required, and the well plat, and further files written statements of no objection by all such persons, the secretary may issue the well work permit at any time.

**VOLUNTARY STATEMENT OF NO OBJECTION**

I, Rosemary Brandon hereby state that I have read the Instructions to Persons Named on Page WW-6A and the associated provisions listed above, and that I have received copies of a Notice of Application, an Application for a Well Work Permit on Form WW-6A and attachments consisting of pages one (1) through \_\_\_\_\_, including the erosion and sediment control plan, if required, and the well plat, all for proposed well work on the tract of land as follows:

State:	<u>WV</u>	UTM NAD 83 Easting:	<u>515,448.20</u>
County:	<u>Tyler</u>	UTM NAD 83 Northing:	<u>4,357,691.62</u>
District:	<u>Centerville</u>	Public Road Access:	<u>WV-18</u>
Quadrangle:	<u>West Union 7.5'</u>	Generally used farm name:	<u>Donna J. Peter</u>
Watershed:	<u>Tributary of Camp Mistake Run</u>		

I further state that I have no objection to the planned work described in these materials, and I have no objection to a permit being issued on those materials.

\*Please check the box that applies

- SURFACE OWNER
- SURFACE OWNER (Road and/or Other Disturbance)
- SURFACE OWNER (IMPOUNDMENTS/PITS)
- COAL OWNER OR LESSEE
- COAL OPERATOR
- WATER PURVEYOR
- OPERATOR OF ANY NATURAL GAS STORAGE FIELD

**FOR EXECUTION BY A NATURAL PERSON**

Signature: Rosemary Brandon  
Print Name: ROSEMARY BRANDON  
Date: 12-13-2015

**FOR EXECUTION BY A CORPORATION, ETC.**

Company: \_\_\_\_\_  
By: \_\_\_\_\_  
Its: \_\_\_\_\_  
Signature: \_\_\_\_\_  
Date: \_\_\_\_\_

**Oil and Gas Privacy Notice:**

The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our office will appropriately secure your personal information. If you have any questions about our use or your personal information, please contact DEP's Chief Privacy Officer at deprivacyofficer@wv.gov

WW-6A  
(9-13)

API NO. 47 - 095 - 02278  
OPERATOR WELL NO. 512890  
Well Pad Name: WEU4

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

Notice Time Requirement: notice shall be provided no later than the filing date of permit application.

Date of Notice: 6/24/15 Date Permit Application Filed: 6/24/15

Notice of:

- PERMIT FOR ANY WELL WORK
- CERTIFICATE OF APPROVAL FOR THE CONSTRUCTION OF AN IMPOUNDMENT OR PIT

02502278 MOD

Delivery method pursuant to West Virginia Code § 22-6A-10(b)

- PERSONAL SERVICE
- REGISTERED MAIL
- METHOD OF DELIVERY THAT REQUIRES A RECEIPT OR SIGNATURE CONFIRMATION

Pursuant to W. Va. Code § 22-6A-10(b) no later than the filing date of the application, the applicant for a permit for any well work or for a for the construction of an impoundment or pit as required by this article shall deliver, by personal service or by registered mail or by any requires a receipt or signature confirmation, copies of the application, the erosion and sediment control plan required by section seven of plat to each of the following persons: (1) The owners of record of the surface of the tract on which the well is or is proposed to be located; the surface tract or tracts overlying the oil and gas leasehold being developed by the proposed well work, if the surface tract is to be used disturbance as described in the erosion and sediment control plan submitted pursuant to subsection (c), section seven of this article; (3) The lessee, in the event the tract of land on which the well proposed to be drilled is located [sic] is known to be underlain by one or more coal record of the surface tract or tracts overlying the oil and gas leasehold being developed by the proposed well work, if the surface tract is to construction, enlargement, alteration, repair, removal or abandonment of any impoundment or pit as described in section nine of this water purveyor who is known to the applicant to have a water well, spring or water supply source located within one thousand five which is used to provide water for consumption by humans or domestic animals; and (6) The operator of any natural gas storage field work activity is to take place. (c)(1) If more than three tenants in common or other co-owners of interests described in subsection (b) of in the lands, the applicant may serve the documents required upon the person described in the records of the sheriff required to be article one, chapter eleven-a of this code. (2) Notwithstanding any provision of this article to the contrary, notice to a lien holder is not unless the lien holder is the landowner. W. Va. Code R. § 35-8-5.7.a requires, in part, that the operator shall also provide the Well Site the surface owner and any water purveyor or surface owner subject to notice and water testing as provided in section 15 of this rule.

- Application Notice
- WSSP Notice
- E&S Plan Notice
- Well Plat Notice is hereby provided to:

SURFACE OWNER(s)  
Name: Donna J Peter  
Address: 733 Ridge Rd  
Wilbur WV 26320

COAL OWNER OR LESSEE  
Name: see attached  
Address: \_\_\_\_\_

Name: \_\_\_\_\_  
Address: \_\_\_\_\_

COAL OPERATOR  
Name: \_\_\_\_\_  
Address: \_\_\_\_\_

SURFACE OWNERS(s) (Road and/or Other Disturbance)  
Name: Donna J Peter  
Address: 733 Ridge Rd  
Wilbur WV 26320

SURFACE OWNER OF WATER WELL AND/OR WATER PURVEYOR(s)  
Name: Donna J Peter  
Address: 733 Ridge Rd  
Wilbur WV 26320  
See Attached for additional water.

Name: L. Bruce and Sandra Jean Stoneking  
Address: RR1 Box 304-BB  
Elkins WV 26241

See Attached for additional surface (roads/ disturbance)

SURFACE OWNER(s) (Impoundments/Pits)  
Name: Donna J Peter  
Address: 733 Ridge Rd  
Wilbur WV 26320

OPERATOR OF ANY NATURAL GAS STORAGE FIELD  
Name: \_\_\_\_\_  
Address: \_\_\_\_\_

\*Please attach additional forms if necessary

01/08/2016

095-02278

**WW6-A  
Additional Coal Owners**

Rosemary Brandon  
3013 Delaware Avenue  
Kenner, LA 70065

**Surface Owners(road or other disturbance):**

James B. and Brenda J. Stoneking  
2 Deerhaven Drive  
Wheeling WV 26241

Diane L. Morgan and Glenn W. Morgan  
590 Isner Creek Road  
Elkins WV 26241

Richard and Yvonne Metcalf  
128 Village Drive  
Bridgeport WV 26330

**Surface Owners(Pits or impoundments):**

Richard and Yvonne Metcalf  
128 Village Drive  
Bridgeport WV 26330

**Additional Water Purveyors**

Bruce Stoneking  
R.D. 1 Box BB  
Elkins WV 26241

Frank and Elizabeth Abruzzino  
91 Springhill Chapel Road  
Clarksburg, WV 26301

4709502270 MSD

01/08/2016