west virginia department of environmental protection

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

May 21, 2014

WELL WORK PERMIT

Horizontal 6A Well

This permit, API Well Number: 47-9502153, issued to TRIAD HUNTER, 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: 1403
Farm Name: WELLS, VELMA L.
API Well Number: 47-9502153
Permit Type: Horizontal 6A Well
Date Issued: 05/21/2014

Promoting a healthy environment.

API Number: 4709502153

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.

CONDITIONS

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.

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WW-6B
(9/13)

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

1) Well Operator: Triad Hunter, LLC

494494833	Tyler	Lincoln	Paden City
Operator ID	County	District	Quadrangle

2) Operator's Well Number: 1403 Well Pad Name: Wells Meckley

3) Farm Name/Surface Owner: Wells Meckley Public Road Access: SR 18

4) Elevation, current ground: 985' Elevation, proposed post-construction: 958'

5) Well Type (a) Gas ■ Oil ■ Underground Storage
Other
(b)If Gas Shallow ■ Deep
Horizontal ■

6) Existing Pad: Yes or No No

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Associated Pressure(s):
Marcellus Shale, 6197'-6256' VD, 50-55' thick, 3000 PSI BHP

8) Proposed Total Vertical Depth: 6286' TVD

9) Formation at Total Vertical Depth: Marcellus Shale

10) Proposed Total Measured Depth: 13548' MD

11) Proposed Horizontal Leg Length: 6991'

12) Approximate Fresh Water Strata Depths: 250'

13) Method to Determine Fresh Water Depths: Examine local water wells

14) Approximate Saltwater Depths: 1100-2000' all reservoirs below elevation are capable of yielding saltwater

15) Approximate Coal Seam Depths:

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

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

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

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18) **CASING AND TUBING PROGRAM**

TYPE	Size	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling	INTERVALS: Left in Well	CEMENT: Fill-up (Cu. Ft.)
Conductor	20"	New	A-52B	90lb	100'	100'	Driven/Grouted
Fresh Water	13 3/8"	New	J-55	54.5lb	400'	400'	CTS (417 cu. ft.)
Coal	13 3/8"	New	J-55	54.5lb	400'	400'	CTS (417 cu. ft)
Intermediate	9 5/8"	New	J-55	36lb	2,200'	2,200'	CTS (900 cu. ft.)
Production	5 1/2"	New	P-110	20lb	13,540'	13,540'	CTS (3950 cu.ft.)
Tubing	2 3/8"	New	J-55	4.7lb	N/A	As needed	N/A
Liners							

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield (cu. ft./k)
Conductor	20"	24"	.375"	1380 psi	Class A	1.18 cu.ft./sk
Fresh Water	13 3/8"	17 1/2"	.380"	2730 psi	Class A	1.12 cu.ft./sk
Coal	13 3/8"	17 1/2"	.380"	2730 psi	Class A	1.12 cu.ft./sk
Intermediate	9 5/8"	12 1/4"	.352"	3520 psi	Light Cement; Class A	Lead 1.70 cuft/sk;Tail 1.19 cuft/sk
Production	5 1/2"	8 3/4"	.361"	12640 psi	50/50POZ; Class H	Lead 1.44 cuft/sk;Tail 1.63 cuft/sk
Tubing	2 3/8"	N/A	.19"	7700 psi	N/A	N/A
Liners						

PACKERS

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

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

Drill and complete a new horizontal Marcellus Shale well. Will land horizontal at approximately 6225'. TVD in the Marcellus Shale at approximate MD of 6557'. Will drill lateral to a MD of 13,548'. Production casing with appropriate float equipment (ie centralizers) will be run to a total depth, 13,540' and cemented to surface. Production casing will be perforated and the Marcellus Shale will be stimulated with a multiple stage fracture treatment. Coiled tubing on service rig will drill out frac plugs and clean out well bore. The well will flow-back into frac tanks and flow rates tested at this time. Tubing will be run to an approximate depth of 6350' MD and well placed into production.

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

Please see attached sheet

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 19.64 acres

22) Area to be disturbed for well pad only, less access road (acres): 5.02 acres

23) Describe centralizer placement for each casing string:

20"- no centralizers
13 3/8"- 2 centralizers- top of joint #2 and joint #10
9 5/8"- every 10th joint starting at joint #2
5 1/2"- spiral glider centralizers every 3rd joint in lateral
- bowstring or spiral glider centralizers every 10th joint in the vertical section to surface.

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

Please see attached sheet

25) Proposed borehole conditioning procedures:

Please see attached sheet

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*Note: Attach additional sheets as needed.

22.) Describe all cement additives with each cement type

VariCem: 50/50 Poz Blend; 0.01 to 1.0% bwoc Fluid Loss Additive; 1.05 to 5.0% bwoc Clay Control Additive; 0.01 to 5.0% bwoc Suspension Additive; 0.01 to 1.0% bwoc Retarder Additive; 0.01 to 1.0% bwoc Defoamer Additive.

Frac Cem: Standard Cement; 80 to 100% bwoc Acid Soluble Cement Additive; 0.01 to 1.0% bwoc Fluid Loss Additive; 0.01 to 1.0% bwoc Lightweight Additive; 0.01 to 1.0% bwoc Suspension Additive; 0.01 to 1.0 bwoc Retarder Additive; 0.01 to 1.0% Defoamer Additive

3% CaCl Surface Casing; 1/4lb flo-seal per sack for lost circulation purposes

2% CaCl Intermediate and Production Casing

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Describe fracturing/stimulation methods in detail:

In regards to the Marcellus shale, the hydraulic fracturing method is implemented to stimulate the well. Horizontal Marcellus well employs the "stage technique" where the well is hydraulically fractured multiple times at different intervals throughout the horizontal section of the well within the Marcellus shale. The first stage of the well starts at the "toe" or the end of the well where perforations are shot throughout the interval using tubing conveyed perforating. After the first stage is completed a composite frac plug is pumped down the well using a wireline truck and pump truck and installed just above the last perforation of the first stage. At this point, second stage perforations are shot above the recently installed frac plug. After the composite frac plug has been installed and the perforations have been shot, the second stage of the well has been effectively isolated from the first stage of the well. After the perforations have been installed for the second stage, the second hydraulic fracturing job is pumped on that stage. This process is repeated multiple times throughout the horizontal section of the well until the "heel" or the bottom of the curve begins and the wellbore leaves the Marcellus formation.

Hydraulic fracturing consists of pumping a mixture of mostly water and sand with a small amount of chemical additives to assist in pumping the job. Hydraulic fracturing is pumped at varying amounts of pressure and rate depending on the tolerance of the Marcellus shale. Different sizes of sand are pumped into the Marcellus shale at gradually increasing densities to create as much conductivity between the wellbore and the Marcellus shale as possible.

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Borehole Conditioning Procedures:

17 ½" hole – Generally this section of the well is drilled on air with air compressors and boosters. It's imperative through this section of the well to have sufficient air volume and pressure on the borehole during drilling to ensure hole conditions remain clean and unobstructed. If a significant volume of freshwater is encountered during drilling "stiff foam" or soap is utilized to assist in lifting drill cuttings and freshwater out of the hole. "Red Rock" is a clay-dominant strata that is sensitive to freshwater in this area. Stiff foam is applied to the borehole when freshwater is encountered to prevent the clays from swelling and sloughing into the borehole.

12 1/4" hole - Generally this section of the well is drilled on air with air compressors and boosters. It's imperative through this section of the well to have sufficient air volume and pressure on the borehole during drilling to ensure hole conditions remain clean and unobstructed. If a significant volume of saltwater is encountered during drilling "stiff foam" or soap is utilized to assist in lifting drill cuttings and freshwater out of the hole. "Red Rock" is a clay-dominant strata that is sensitive to saltwater in this area. Stiff foam is applied to the borehole when saltwater is encountered to prevent the clays from swelling and sloughing into the borehole.

8 ¾" hole – Generally, this section of the well is drilled on fluid. In an effort to keep borehole conditions in good working order several mechanisms are used to condition the borehole:

- **High Viscosity Sweeps**: Sweeps are mixed and pumped after drilling every 3 joints during the drilling process. Sweeps generally run 20 cp over the active mud system viscosity for 20 bbls.
- **Clean-Up Cycle:** "Clean-Up Cycles" are utilized every 500' in the lateral section of the well. During this routine conditioning procedure drilling is halted for the amount of time it takes to circulate 2 sweeps to surface. Also, during this process the pipe is continuously rotated and reciprocated at this spot to help circulate out any "cutting beds" lying in the wellbore.
- **Short Trips:** Short trips are utilized to work out tight spots and cutting beds from the borehole which cause increased torque and drag, and pressure. Two short trips are typically run during the drilling of this section of the wellbore. The first at the half-way point of the lateral. The drill pipe is pulled out of the hole to the "kick-off" point of the well. The second short trip is utilized at total depth (TD). At this point the drill pipe is pulled out of the wellbore to the half-way point of the lateral.
- **At TOTAL DEPTH:** A clean-up cycle and short trip is utilized to condition the wellbore when total depth (TD) has been reached in preparation for running production casing.

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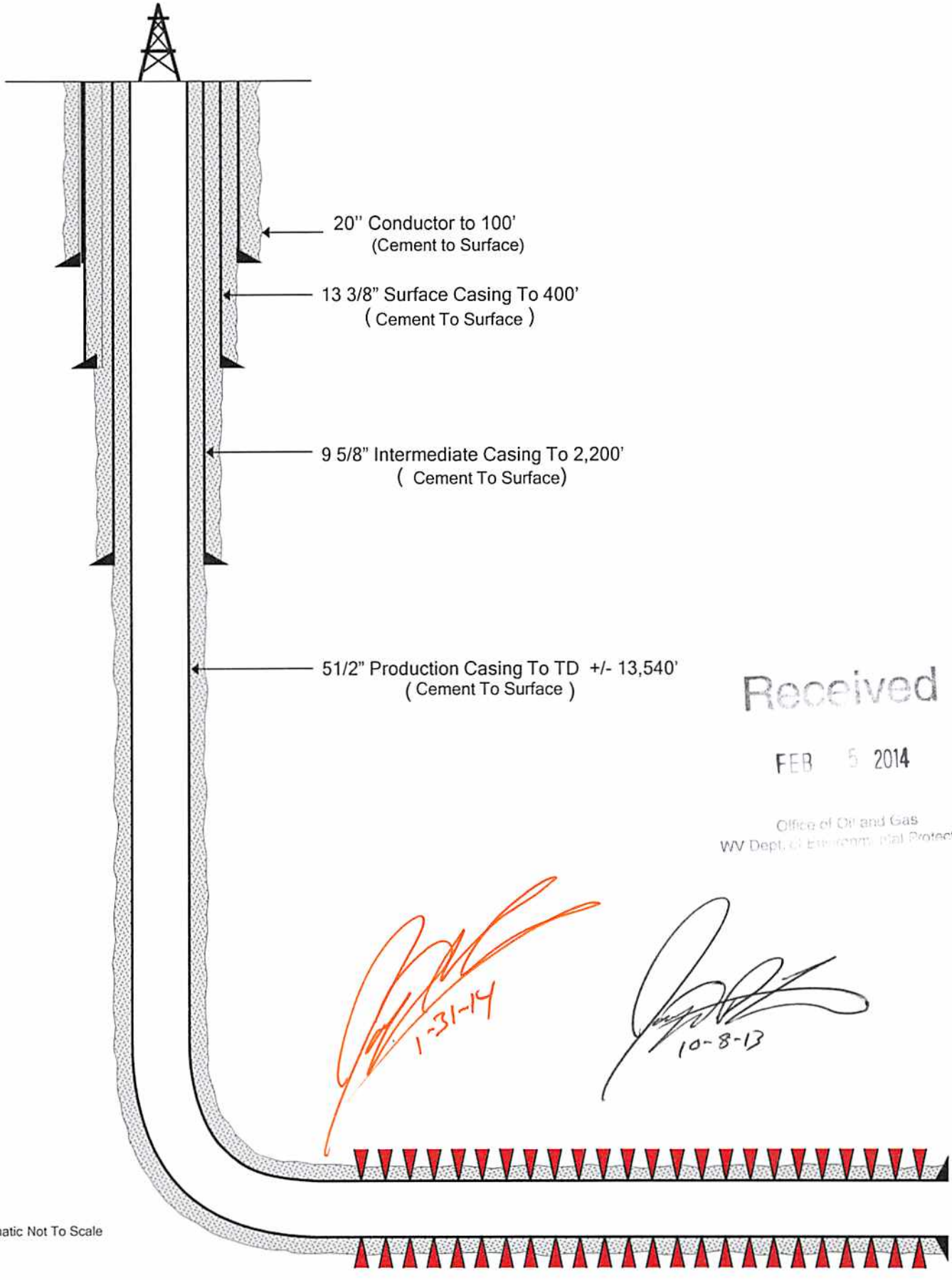
Magnum Hunter Resources

MARCELLUS SHALE – WELLS MECKLEY 1403
WELLBORE SCHEMATIC *



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* Schematic Not To Scale

WW-9
(9/13)

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API Number 47 - _____ - _____
Operator's Well No. Wells Meckley 1403

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

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name Triad Hunter, LLC OP Code 494494833

Watershed (HUC 10) Pursley Creek Quadrangle Paden City

Elevation 985' County Tyler District Ellsworth

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: NA

Will a synthetic liner be used in the pit? Yes ☐ No ☑ If so, what ml.? _____

Proposed Disposal Method For Treated Pit Wastes:

- ____ Land Application
- ■ Underground Injection (UIC Permit Number 387 Ohio Disposal Well, 34-121-3995)
- ____ Reuse (at API Number _____)
- ____ Off Site Disposal (Supply form WW-9 for disposal location)
- ____ Other (Explain _____

Will closed loop system be used? If so, describe: Yes, Cuttings, fluids, +gases are separated through a series of vessels (gas buster, centrifuges, shale shaker, ect). Cuttings are then solidified in debris boxes and hauled

Drilling medium anticipated for this well (vertical and horizontal)? Air, freshwater, oil based, etc. Air on top, synthetic based mud for lateral portion

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

Additives to be used in drilling medium? See MSDS for SBM

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) NA

-Landfill or offsite name/permit number? Wetzel County Landfill, SWPU ID 12-10-45

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.

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Company Official Signature _____

Company Official (Typed Name) Rocky Roberts

Company Official Title Senior VP of Appalachian Operations

Subscribed and sworn before me this 30th day of September, 2013

Elizabeth R. Tebay Notary Public

My commission expires 2-29-16

NOTARIAL SEAL STATE OF OHIO

ELIZABETH R. TEBAY
NOTARY PUBLIC
In and For The State of Ohio
Commission Expires
2-29-16

4709502153

Form WW-9

Operator's Well No. Wells Meckley 1403

Triad Hunter, LLC

Proposed Revegetation Treatment: Acres Disturbed 6.6 Prevegetation pH 6-7

Lime 2-5 Tons/acre or to correct to pH 6.0-7.0

Fertilizer type

Fertilizer amount 500 lbs/acre

Mulch 2 Tons/acre

Seed Mixtures

Temporary		Permanent	
Seed Type	lbs/acre	Seed Type	lbs/acre
Common Orchard Grass	30%	Common Orchard Grass	30%
Perennial Rye	35%	Perennial Rye	35%
Medium Red Clover	25%	Medium Red Clover	25%
Common Timothy	10%	Common Timothy	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:

Comments:

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Office of Oil and Gas
WV Dept. of Environmental Protection

Title: Inspector Date: 10-8-13 1-31-14

Field Reviewed? (☒) Yes ( ) No

4709502153

TRIAD HUNTER LLC.

125 Putnam Street
Marietta, Ohio 45750

SITE & SAFETY PLAN
Wells Meckley 1403
Tyler County
West Virginia

10-8-13

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WV Dept. of Environmental Protection

Approved:

West Virginia DEP _____ Date: _____

Triad Hunter LLC _____ Date: 9/24/13

DeLORME

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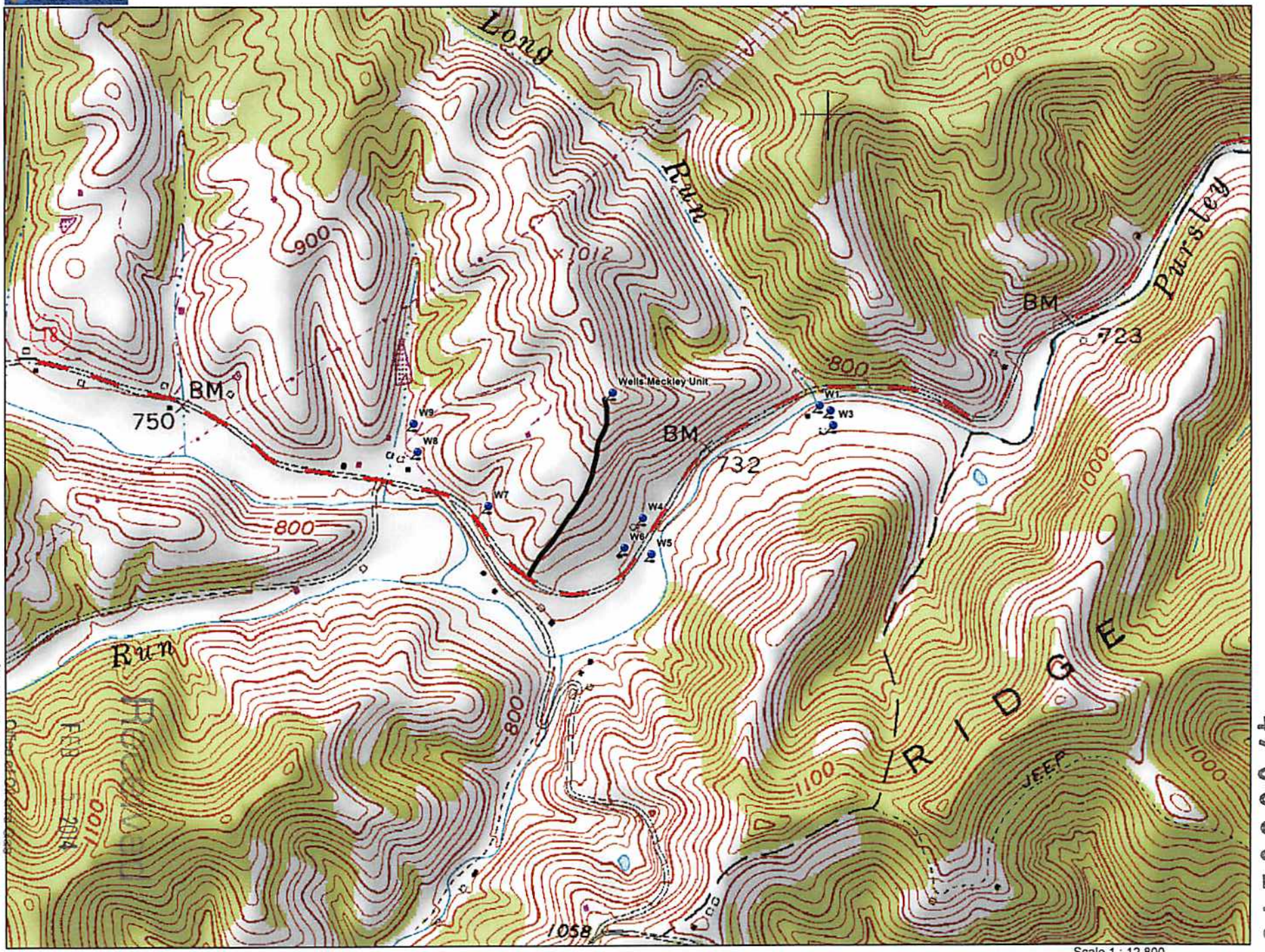

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www.delorme.com

TN

MN (8.3°W)

Scale 1 : 12,800

1" = 1,066.7 ft

Data Zoom 14-2

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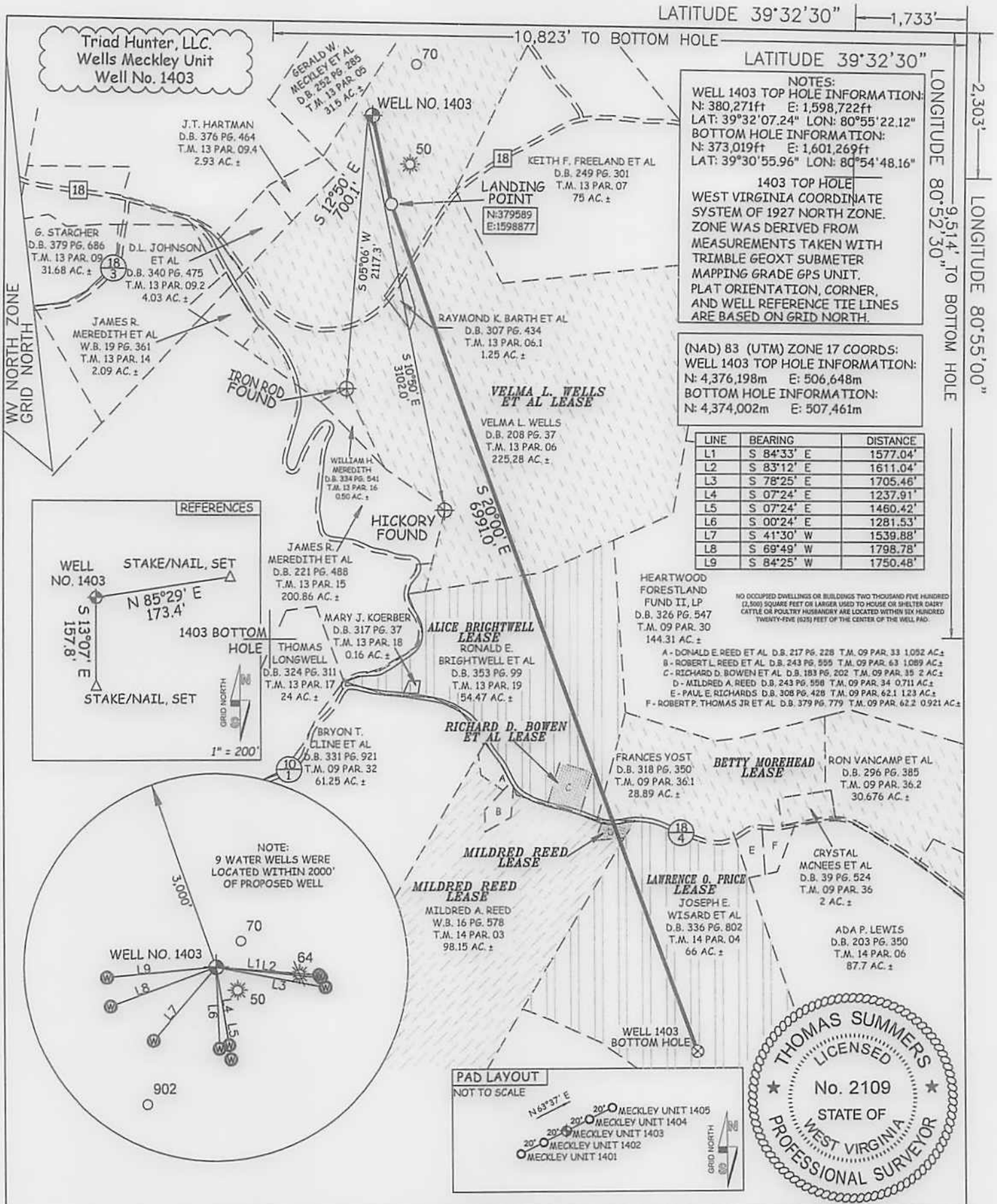

LINE	BEARING	DISTANCE
L1	S 84°33' E	1577.04'
L2	S 83°12' E	1611.04'
L3	S 78°25' E	1705.46'
L4	S 07°24' E	1237.91'
L5	S 07°24' E	1460.42'
L6	S 00°24' E	1281.53'
L7	S 41°30' W	1539.88'
L8	S 69°49' W	1798.78'
L9	S 84°25' W	1750.48'

JOB # 12-104WT
DRAWING # MECKLEY1403
SCALE 1" = 1000'
MINIMUM DEGREE OF ACCURACY SUBMETER
PROVEN SOURCE OF ELEV. 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 RULES ISSUED AND PERSCRIBED BY THE DEPTARTMENT OF ENVIRONMENTAL PROTECTION.

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

WILLOW LAND SURVEYING PLLC
220 MASONIC AVE. PENNSBORO
WEST VIRGINIA 26415

LEGEND
Surface Owner Boundary Lines +/-
Interior Surface Tracts +/-
Existing Fence
Found monument, as noted

Thos Sums
THOMAS SUMMERS P.S. 2109

DATE 07/23/13
OPERATOR'S WELL# WELLS MECKLEY UNIT #1403

STATE OF WEST VIRGINIA
DEPARTMENT OF ENERGY
DIVISION OF OIL AND GAS

API WELL # 47 – 095 – 02153 H6A
STATE COUNTY PERMIT

WELL TYPE: OIL ___ GAS X LIQUID INJECTION ___ WASTE DISPOSAL ___
(IF "GAS") PRODUCTION X STORAGE ___ DEEP ___ SHALLOW X
LOCATION: ELEVATION 958' WATERSHED PURSLEY CREEK
QUADRANGLE PADEN CITY 7.5' DISTRICT LINCOLN COUNTY TYLER
SURFACE OWNER VELMA L. WELLS ACREAGE 225.28 ACRES +/-
OIL & GAS ROYALTY OWNER VELMA L. WELLS ET AL; GWENDOLYN L. STARCHER; ALICE BRIGHTWELL; BETTY MOREHEAD; MILDRED REED; MILDRED REED; LAWRENCE O. PRICE
LEASE ACREAGE 225.28 ACRES±; 2.93 ACRES±; 54.47 ACRES±; 73.62 ACRES±; 0.711 ACRES±; 98.15 ACRES±; 66 ACRES±
PROPOSED WORK: DRILL X CONVERT ___ DRILL DEEPER ___ REDRILL ___ FRACTURE OR STIMULATE X
PLUG OFF OLD FORMATION ___ PERFORATE NEW FORMATION X OTHER PHYSICAL CHANGE IN WELL (SPECIFY) ___ PLUG & ABANDON CLEAN OUT & REPLUG
TARGET FORMATION MARCELLUS ESTIMATED DEPTH 6,225' TVD 13,548' MD

WELL OPERATOR TRIAD HUNTER, LLC. DESIGNATED AGENT KIMBERLY ARNOLD
ADDRESS 777 POST OAK BLVD., SUITE 910 ADDRESS P.O. BOX 154
HOUSTON, TX 77056 WAVERLY, WV 26184

COUNTY NAME PERMIT

FORM WW-6