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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](http://www.dep.wv.gov)

February 26, 2014

**WELL WORK PERMIT**

**Horizontal 6A Well**

This permit, API Well Number: 47-9101291, issued to TRIANA ENERGY, 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: DUNHAM 4H  
Farm Name: DUNHAM, MITCHELL ET AL  
**API Well Number: 47-9101291**  
**Permit Type: Horizontal 6A Well**  
Date Issued: 02/26/2014

**Promoting a healthy environment.**

4709101291

## 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

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1. This proposed activity may require permit coverage from the United States Army Corps of Engineers (USACOE). Through this permit, you are hereby being advised to consult with USACOE 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 fill material shall be within plus or minus 2% of the optimum moisture content as determined by the standard proctor density test, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort. Each lift must meet 95 % compaction of the optimum density based on results from the standard proctor density test of the actual soils used in specific engineered fill sites. 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.

CK 11549.00  
5150-

WW - 6B  
(1/12)

**STATE OF WEST VIRGINIA**  
**DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS**  
**W.VA. CODE §22-6A - WELL WORK PERMIT APPLICATION**

91 01 588

1) Well Operator: Triana Energy, LLC 494486431 Taylor Booths Creek, Court House Rosemont, Grafton 7.5'  
Operator ID County District Quadrangle

2) Operator's Well Number: 4H Well Pad Name: Dunham

3 Elevation, current ground: 1,420 Elevation, proposed post-construction: 1,420

4) Well Type: (a) Gas  Oil   
Other   
(b) If Gas: Shallow  Deep   
Horizontal

5) Existing Pad? Yes or No: Yes (in progress)

6) Proposed Target Formation(s), Depth(s), Anticipated Thicknesses and Associated Pressure(s):  
Marcellus Shale, 7800 TVD, Thickness = 110', Anticipated Pressure = 3,500

7) Proposed Total Vertical Depth: 7,800'

8) Formation at Total Vertical Depth: Marcellus Shale

9) Proposed Total Measured Depth: 13,000'

10) Approximate Fresh Water Strata Depths: 50, 350, 530, 790

11) Method to Determine Fresh Water Depth: Well records and USGS data

12) Approximate Saltwater Depths: None indicated

13) Approximate Coal Seam Depths: 400, 455, 530, 565

14) Approximate Depth to Possible Void (coal mine, karst, other): NA

15) Does land contain coal seams tributary or adjacent to, active mine? No

16) Describe proposed well work: Drill vertical hole to kick-off point, set casing, drill deviated hole to TD and set casing.  
Complete well in Marcellus Formation.

17) Describe fracturing/stimulating methods in detail:  
Perforate the production casing and production zone with perforating guns at predetermined locations, isolate treatment zones in stages and perform high pressure slick-water fracture, introducing proppant to retain fractures.

18) Total area to be disturbed, including roads, stockpile area, pits, etc, (acres): 14.1 acres

19) Area to be disturbed for well pad only, less access road (acres): Pad and AST Area = 11.8 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"	New	LS	55#	80	80	Cement to surface
Fresh Water	13-3/8"	New	H-40	48#	995	936	C.T.S.
Coal	N/A						
Intermediate	9-5/8"	New	J-55	40#	2,450	2,450	C.T.S.
Production	5-1/2"	New	P-110	20#	13,000	13,000	Top @ 5,500'
Tubing	2-3/8"	New	N-80	4.7#	8,100		None
Liners							

*Samuel Reynolds 1-17-14*

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield
Conductor	20"	24"	0.25	340	Class A	N/A
Fresh Water	13-3/8"	17-1/2"	0.33	1,730	Class A w/additives	1.18 - 1.54
Coal	N/A					
Intermediate	9-5/8"	12-3/8" - 12-1/4"	0.395	3,950	Class A w/additives	1.18 - 1.54
Production	5-1/2"	8-3/4" - 7-7/8"	0.361	12,360	Type 1 w/additives	1.37 - 1.65
Tubing	2-3/8"	N/A	1.19	11,200	None	None
Liners						

PACKERS

Kind:				
Sizes:				
Depths Set:				

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WW - 6B  
(1/12)

21) Describe centralizer placement for each casing string. \_\_\_\_\_

Centralizers will be used as needed. The number and type is dependent on hole conditions.

Rigid style centralizers will be used in the lateral and curve sections of the well bore.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

22) Describe all cement additives associated with each cement type. \_\_\_\_\_

Cement additives will be used as needed. The amount and type is dependent on hole conditions.

Possible additives may include: Lost Circulation Material - granular, flake or fibrous, depending on the situation;

Accelerant - CaCl<sub>2</sub> up to 2%

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

23) Proposed borehole conditioning procedures. \_\_\_\_\_

Proposed borehole conditioning procedures will depend on hole conditions. These may include, but are not limited to: weighted or high viscosity fluid sweeps, mud solvent fluid sweeps, surfactant sweeps, scouring sweeps, high rate or extended circulation, pipe rotation and reciprocation, short trips and other methods.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\*Note: Attach additional sheets as needed.

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

CONSTRUCTION AND RECLAMATION PLAN AND SITE REGISTRATION APPLICATION FORM  
GENERAL PERMIT FOR OIL AND GAS PIT WASTE DISCHARGE

Operator Name Triana Exploration, LLC OP Code 49486431

Watershed Tributary of Lost Run Quadrangle Rosemont, Grafton 7.5'

Elevation 1,422' County Taylor District Booths Creek, Court House

Description of anticipated Pit Waste: N/A - Closed loop system. Well waste will be stored in tanks, pending reuse or disposal.

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

Will a synthetic liner be used in the pit? No pit. Using ASTs. If so, what mil.? 30 mil, at a minimum

Proposed Disposal Method For Treated Pit Wastes:

- Land Application
- Underground Injection ( UIC Permit Number D0190460 )
- Reuse (at API Number Additional Dunham wells not yet permitted )
- Off Site Disposal (Supply form WW-9 for disposal location)
- Other (Explain \_\_\_\_\_)

Drilling medium anticipated for this well? Air, freshwater, oil based, etc. Air and oil-based drilling mud

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

Additives to be used? Soap, potassium Solution

Will closed loop system be used? Yes

Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. Solidified and transported to landfill.

-If left in pit and plan to solidify what medium will be used? Cement, lime,

-Landfill or offsite name/permit number? Waste Management Meadowfill Landfill - SWF-1032

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 *Walter C. Showen, III*

Company Official (Typed Name) Walter C. Showen, III

Company Official Title Permitting Manager

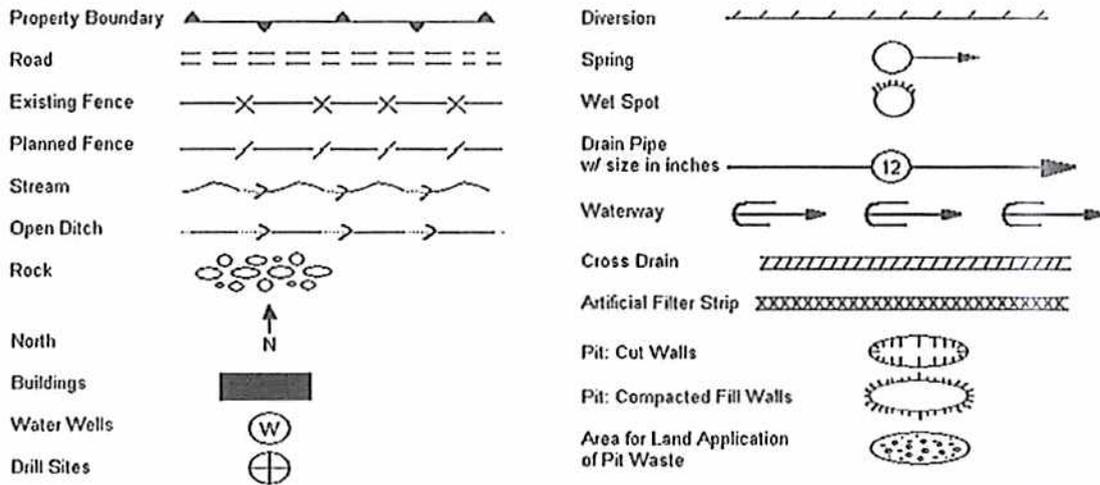
Subscribed and sworn before me this 11<sup>th</sup> day of January, 20 14

*Elizabeth Walker* Notary Public

My commission expires 10-4-21



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Proposed Revegetation Treatment: Acres Disturbed 14.1 ac+/- Prevegetation pH \_\_\_\_\_

Lime 2 Tons/acre or to correct to pH approx. 7

Fertilizer (10-20-20 or equivalent) 500 lbs/acre (500 lbs minimum)

Mulch 100 bales Tons/acre

Seed Mixtures

Seed Type	Area I lbs/acre	Seed Type	Area II lbs/acre
30% Annual Ryegrass, 20% Penniate Orchard	_____	30% Annual Ryegrass, 20% Penniate Orchard	_____
10% Alsike Clover, 10% Trefoil Norcen Empire	_____	10% Alsike Clover, 10% Trefoil Norcen Empire	_____
15% Climax Timothy N.C., 15% Perennial Ryegrass	_____	15% Climax Timothy N.C., 15% Perennial Ryegrass	_____

Attach:  
Drawing(s) of road, location, pit and proposed area for land application.

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: *Shirley Sneyd*

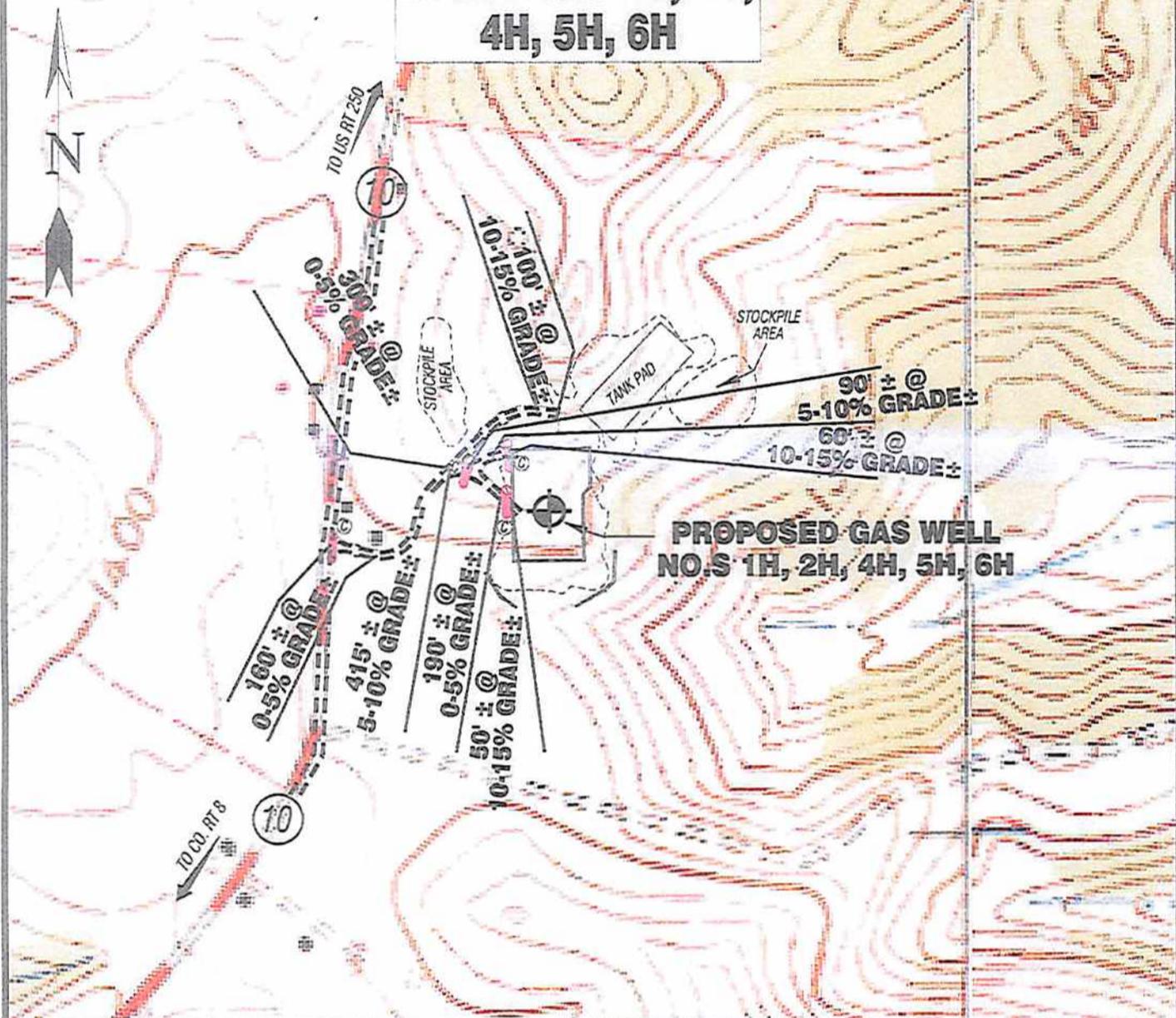
Comments: \_\_\_\_\_

Title: *OGC INSPECTOR* Date: *1-17-14*

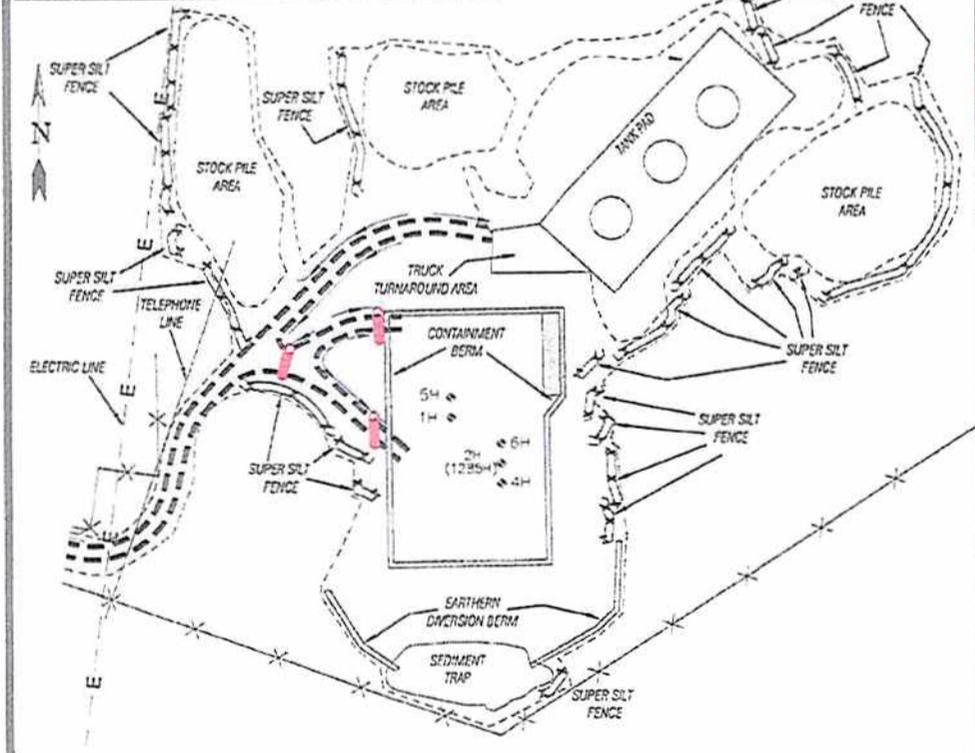
Field Reviewed? (  ) Yes (  ) No

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**DUNHAM LEASE  
WELL NO.S 1H, 2H,  
4H, 5H, 6H**



Detail Sketch for Proposed Dunham Wells



**SCALE: 1"=500'**



ALL ROADS SHOWN HEREON ARE EXISTING UNLESS OTHERWISE NOTED AND SHALL BE MAINTAINED IN ACCORDANCE WITH W.V.D.E.P. OIL AND GAS BMP MANUAL ENTRANCES AT COUNTY/STATE ROADS SHALL BE MAINTAINED IN ACCORDANCE WITH W.V.D.O.T. REGULATION. SEPARATE PERMITS MAY BE REQUIRED BY THE D.O.T.

SEDIMENT BASINS (TRAPS) AND APPROPRIATE EROSION CONTROL BARRIERS ARE TO BE CONSTRUCTED AT ALL CULVERT AND CROSS DRAIN INLETS AND OUTLETS AS REQUIRED IN THE W.V.D.E.P. OIL AND GAS BMP MANUAL. FIELD CONDITIONS (ROCK OUTCROPS AND BEDROCK) MAY PROHIBIT INLET TRAPS BEING INSTALLED. WHEN THESE CONDITIONS EXIST ADDITIONAL EROSION CONTROL MEASURES SHALL BE EVALUATED AND UTILIZED AS NEEDED.

EARTHWORK CONTRACTORS ARE RESPONSIBLE FOR NOTIFICATION TO THE OPERATOR AND INSPECTOR PRIOR TO ANY DEVIATION FROM THIS PLAN.

TEMPORARY SEED & MULCH ALL SLOPES AFTER CONSTRUCTION OF LOCATION.

CUT & STACK ALL MARKETABLE TIMBER.

STACKED BRUSH MAY BE USED FOR SEDIMENT CONTROL.

APPLICATIONS FOR SEPARATE PLC PERMITS ON THE ACCESS ROAD STREAM CROSSINGS HAVE BEEN PREPARED (IF APPLIES).

*126 1-7-14*

- EXISTING CULVERT
- PROPOSED CULVERT 15' MIN. UNLESS OTHERWISE NOTED
- PROPOSED STREAM CROSSING
- APPROXIMATE LIMITS OF DISTURBANCE

Not To Scale

TOPO SECTION OF ROSEMONT 7.5'  
USGS TOPO QUADRANGLE

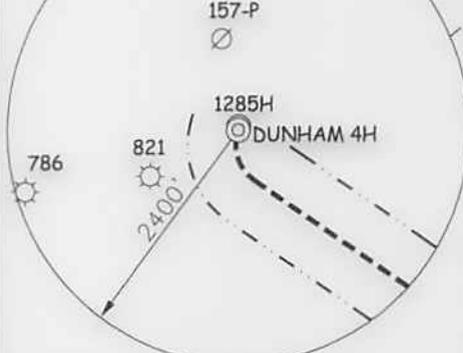
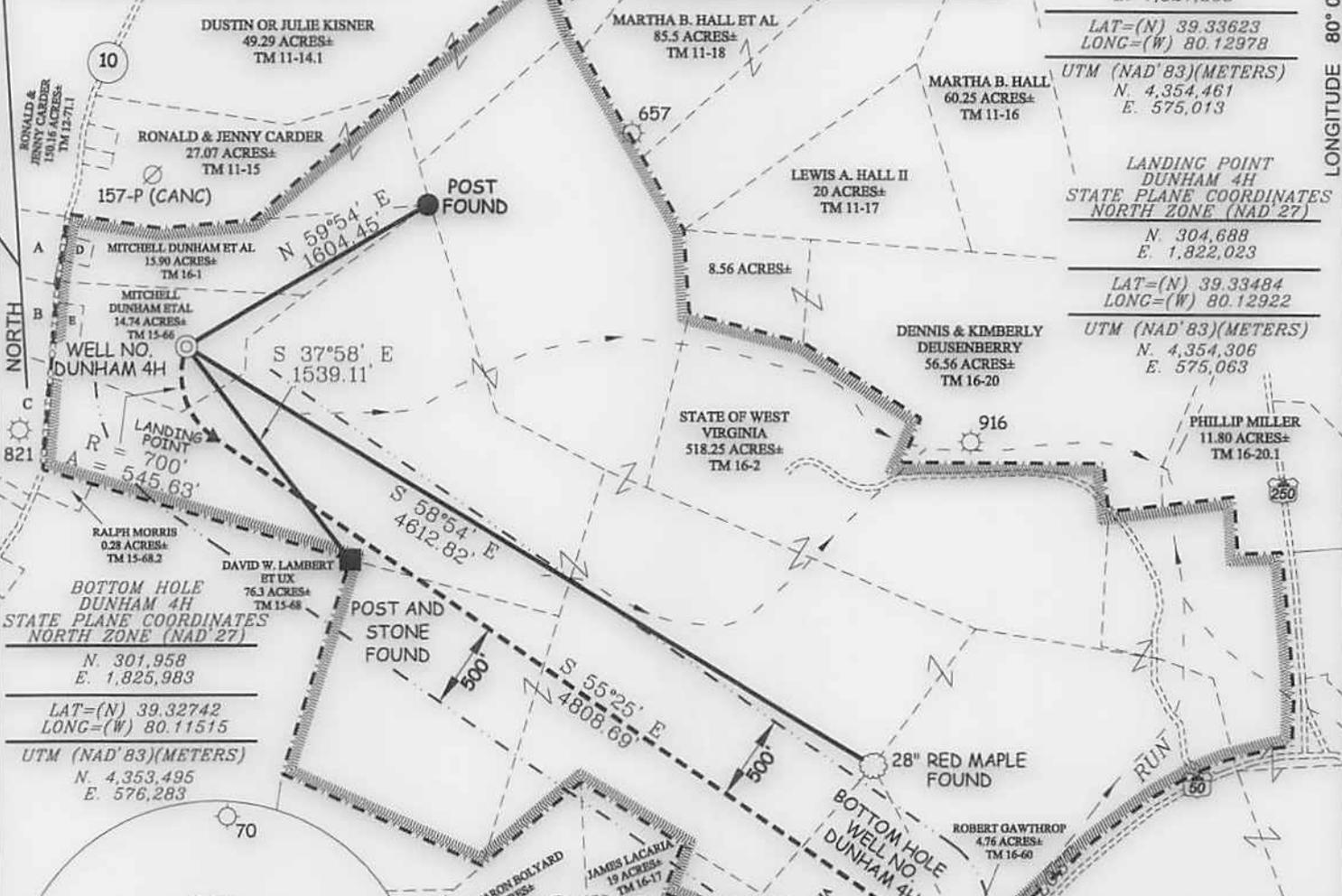
**Professional Energy Consultants**  
A DIVISION OF SMITH LAND SURVEYING, INC.  
**SLS**  
SURVEYORS  
ENGINEERS  
ENVIRONMENTAL  
PROJECT MGMT.

DRAWN BY K.D.W.	FILE NO. 7754	DATE 01/14/14	CADD FILE: 7754REC01_ANS.dwg
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# DUNHAM LEASE DUNHAM 4H

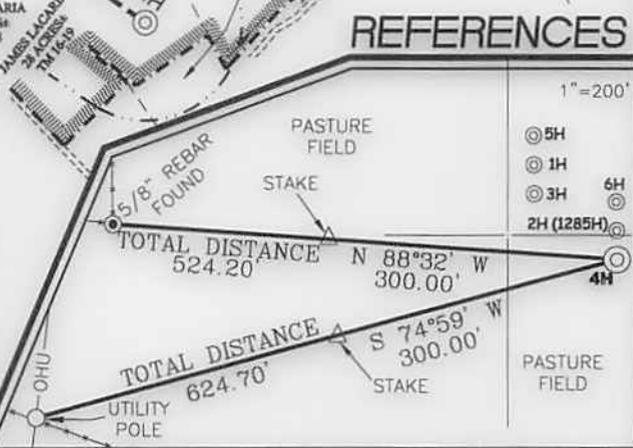
A	JAMES P. HARR JR.	15.99 ACRES±	TM 15-65
B	JAMES P. HARR JR.	17.49 ACRES±	TM 15-64
C	JAMES P. HARR JR.	13.33 ACRES±	TM 15-63
D	MITCHELL DUNHAM	0.40 ACRES±	TM 15-81
E	RICHARD N. GLASPELL	1.26 ACRES±	TM 15-66.1

LATITUDE 39° 22' 30"  
 DUNHAM 4H  
 STATE PLANE COORDINATES  
 NORTH ZONE (NAD'27)  
 N. 305,196  
 E. 1,821,868  
 LAT=(N) 39.33623  
 LONG=(W) 80.12978  
 UTM (NAD'83)(METERS)  
 N. 4,354,461  
 E. 575,013  
 LANDING POINT  
 DUNHAM 4H  
 STATE PLANE COORDINATES  
 NORTH ZONE (NAD'27)  
 N. 304,688  
 E. 1,822,023  
 LAT=(N) 39.33484  
 LONG=(W) 80.12922  
 UTM (NAD'83)(METERS)  
 N. 4,354,306  
 E. 575,063



**NOTES ON SURVEY**

- TIES TO WELLS, REFERENCES AND CORNERS ARE BASED ON GRID NORTH FOR THE WV STATE PLANE COORDINATE SYSTEM NORTH ZONE NAD '27.
- LEASE BOUNDARY SHOWN HEREON TAKEN FROM MULTIPLE DEEDS PROVIDED BY TRIANA ENERGY LLC AND VARIOUS WELL PLATS.
- SURFACE OWNER AND ADJOINER INFORMATION TAKEN FROM THE ASSESSOR AND COUNTY CLERK RECORDS OF TAYLOR COUNTY IN JULY, 2013.
- WELL LAT./LONG. (NAD'27) ESTABLISHED BY DGPS(SURVEY GRADE).
- NO DWELLINGS OR AGRICULTURAL BUILDINGS WITHIN 825 FEET OF CENTER OF PAD. NO WATER WELLS OR DEVELOPED SPRINGS WITHIN 250 FEET OF PROPOSED WELL. NO PERENNIAL STREAMS, LAKES, PONDS, RESERVOIRS OR WETLANDS WITHIN 100 FEET OF THE PAD LIMITS OF DISTURBANCE.



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. 677 *Gregory A. Smith*



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.  
 DATE DECEMBER 17, 20 13  
 OPERATORS WELL NO. DUNHAM 4H  
 API WELL NO. 47 - 091 - 01291  
 STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1 / 200 FILE NO. 7754P4H (391-20)  
 PROVEN SOURCE OF ELEVATION DGPS (SURVEY GRADE GPS TIES TO COORS) SCALE 1" = 1000'

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 1,420' WATERSHED TRIBUTARY OF LOST RUN  
 DISTRICT BOOTH'S CREEK COUNTY TAYLOR QUADRANGLE ROSEMONT 7.5'

SURFACE OWNER MITCHELL DUNHAM ET AL ACREAGE 14.74±  
 ROYALTY OWNER MITCHELL DUNHAM ET AL (14.74 & 15.90 AC.±) AND W.V. DEPT. OF AGRICULTURAL (518.25 AC.±) MITCHELL CARL DUNHAM (0.4 AC.±)

PROPOSED WORK: LEASE NO. \_\_\_\_\_  
 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 7,800' / TMD

WELL OPERATOR TRIANA ENERGY, L.L.C. DESIGNATED AGENT RACHELLE A. KING  
 ADDRESS 900 VIRGINIA STREET EAST, SUITE 400 ADDRESS 900 VIRGINIA STREET EAST, SUITE 400  
CHARLESTON, WV 25301 CHARLESTON, WV 25301