



west virginia department of environmental protection

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

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

November 22, 2016
PERMIT MODIFICATION APPROVAL
Horizontal 6A / Horizontal 6A Well - 1

ANTERO RESOURCES CORPORATION
1615 WYNKOOP STREET

DENVER, CO 80202

Re: Permit Modification Approval for HUGLE UNIT 1H
47-017-06761-00-00

Modifying surface hole location

ANTERO RESOURCES CORPORATION

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.

If there are any questions, please feel free to contact me at (304) 926- 0450.

James A. Martin
Chief

Operator's Well Number: HUGLE UNIT 1H
Farm Name: MCCLULLOUGH, RICHARD F.
U.S. WELL NUMBER: 47-017-06761-00-00
Horizontal 6A / Horizontal 6A Well - 1
Date Issued: November 22, 2016

Promoting a healthy environment.

12/02/2016

MDD

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

1) Well Operator: Antero Resources Corporation 494507062 017- Doddridge Central West Union 7.5'
Operator ID County District Quadrangle

2) Operator's Well Number: Hugle Unit 1H Well Pad Name: Long Run Pad

3) Farm Name/Surface Owner: McCullough, Richard F. Public Road Access: Long Run & CR 26/4

4) Elevation, current ground: ~1035' Elevation, proposed post-construction: 1021'

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 Expected Pressure(s):
Marcellus Shale: 7000' TVD, Anticipated Thickness- 60 feet, Associated Pressure- 3100#

8) Proposed Total Vertical Depth: 7000' TVD

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 16500' MD

11) Proposed Horizontal Leg Length: 8035'

12) Approximate Fresh Water Strata Depths: 165', 272', 375'

13) Method to Determine Fresh Water Depths: Offset well records. Depths have been adjusted according to surface elevations.

14) Approximate Saltwater Depths: 970', 1432', 1538', 1870'

15) Approximate Coal Seam Depths: 183', 184'

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

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: _____

Office of Oil & Gas

AUG 01 2016

1107

18)

CASING AND TUBING PROGRAM

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.)/CTS
Conductor	20"	New	H-40	94#	40'	40'	CTS, 38 Cu. Ft.
Fresh Water	13-3/8"	New	J-55/H-40	54.5#/48#	425'	425' *See #19	CTS, 590 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	2450'	2450'	CTS, 998 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	20#	16500'	16500'	CTS, 4160 Cu. Ft
Tubing	2-3/8"	New	N-80	4.7#		7100'	
Liners							

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	30"	24"	0.438"	1530	50	Class A	1.18
Fresh Water	13-3/8"	17-1/2"	0.38"/0.33"	2730/1730	1000	Class A	1.18
Coal	9-5/8"	12-1/4"	0.352"	3520	1500	Class A	1.18
Intermediate							
Production	5-1/2"	8-3/4" & 8-1/2"	0.361"	12,630	2500	Lead-H/POZ & Tail - H	H/POZ-1.44 & H-1.8
Tubing	2-3/8"	4.778"	0.19"	11,200			
Liners							

PACKERS

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

Printed
Checked by: [Signature]
AUG 01 2016

WVO

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

Drill, perforate, fracture a new horizontal shallow well and complete Marcellus Shale.

*Antero will be air drilling the fresh water string which makes it difficult to determine when freshwater is encountered, therefore we have built in a buffer for the casing setting depth which helps to ensure that all fresh water zones are covered.

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

Antero plans to pump Slickwater into the Marcellus Shale formation in order to ready the well for production. The fluid will be comprised of approximately 99 percent water and sand, with less than 1 percent special-purpose additives as shown in the attached "List of Anticipated Additives Used for Fracturing or Stimulating Well."

Anticipated Max Pressure - 9300 lbs
Anticipated Max Rate - 80 bpm

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 23.29 acres

22) Area to be disturbed for well pad only, less access road (acres): 8.07 acres

23) Describe centralizer placement for each casing string:

Conductor: no centralizers
Surface Casing: one centralizer 10' above the float shoe, one on the insert float collar and one every 4th joint spaced up the hole to surface.
Intermediate Casing: one centralizer above float joint, one centralizer 5' above float collar and one every 4th collar to surface.
Production Casing: one centralizer at shoe joint and one every 3 joints to top of cement in intermediate casing.

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

Conductor: no additives, Class A cement.
Surface: Class A cement with 2-3% calcium chloride and 1/4 lb of flake
Intermediate: Class A cement with 1/4 lb of flake, 5 gallons of clay treat
Production: Lead cement- 50/50 Class H/Poz + 1.5% salt + 1% C-45 + 0.5% C-16a + 0.2% C-12 + 0.45% C-20 + 0.05% C-51
Production: Tail cement- Class H + 45 PPS Calcium Carbonate + 1.0% FL-160 + 0.2% ACGB-47 + 0.05% ACSA-51 + 0.2% ACR-20

25) Proposed borehole conditioning procedures:

Conductor: blowhole clean with air, run casing, 10 bbls fresh water.
Surface: blowhole clean with air, trip to conductor shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate pipe capacity + 40 bbls fresh water followed by 25 bbls bentonite mud, 10 bbls fresh water spacer.
Intermediate: blowhole clean with air, trip to surface casing shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate 40 bbls brine water followed by 10 bbls fresh water and 25 bbls bentonite mud, pump 10 bbls fresh water.
Production: circulate with 14 lb/gal NaCl mud, trip to middle of lateral, circulate, pump high viscosity sweep, trip to base of curve, pump high viscosity sweep, trip to top of curve, trip to bottom, circulate, pump high viscosity sweep, trip out, run casing, circulate 10 bbls fresh water, pump 48 bbls barite pill, pump 10 bbls fresh water followed by 48 bbls mud flush and 10 bbls water.

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*Note: Attach additional sheets as needed.

HUGLE UNIT 1H & 2H (LONG RUN PAD) - DATA COLLECTED ON OFFSET WELLS PER 35-8-5.11



17-0676 MOD

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47017004420000

47017034510000

47017041320000

47017005610000

47017030570000

47017039460000

47017303980000

47017039440000

47017044920000

47017045250000

47017023450000

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47017005000001

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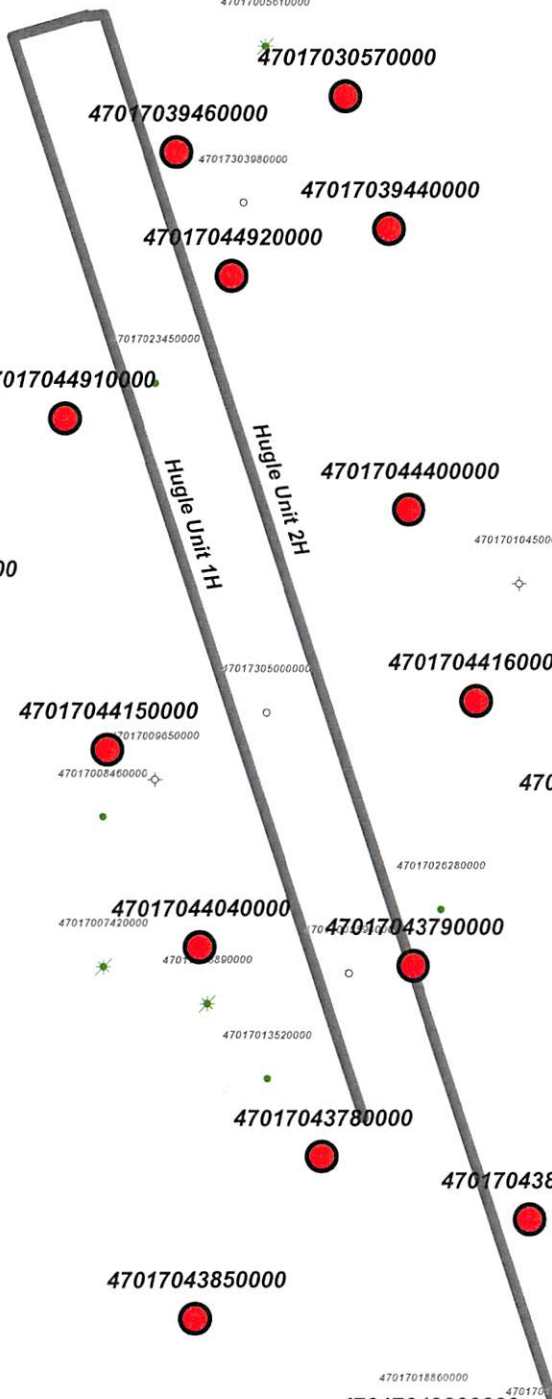
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FEET 12/02/2016



HUGLE UNIT 1H & 2H (LONG RUN PAD) - DATA COLLECTED ON OFFSET WELLS PER 35-8-5.11

UWI (APINum)	Well Name	Well Number	Operator	Hist Operator	TD	ELEV_GR	TD (SSTVD)	Perfs (shallow and deep)
47017034510000	COTTRILL VIRGINIA L	JK-1213	ENERGY CORP OF AMER	J & J ENTERPRISES	5993	965	-5028	Riley (4416-4443), Alexander (5113-5127)
47017039440000	HARRIS DANIEL R HEIRS ETAL	HARRIS3	DEVONIAN APPALACHIAN	DEVONIAN APPALACHIAN	5900	957	-4943	No perf data available
47017043330000	TOWNER GLENN ET AL	1A	PETROLEUM RESOURCES	PETROLEUM RESOURCES	5700	1151	-4549	Balltown (3496-4050), Alexander (5326-5350)
47017030570000	CAIN WILLIAM	1	ALLIANCE PETR CORP	PETROLEUM DEV CORP	5565	840	-4725	Riley (4188-4192), Alexander (4962-4984)
47017044150000	MCGILL FLOYD JR & BILLIE LEE	1	KEY OIL COMPANY	KEY OIL INCORPORATED	5549	1110	-4439	Balltown (3996-4357), Alexander (5264-5280)
47017043840000	MCGILL FRANK E & SHIRLEY M ETAL	1	KEY OIL COMPANY	KEY OIL INCORPORATED	5526	1218	-4308	Warren (3610-3625), Alexander (5442-5471)
47017045250000	DUTY A D	1	KEY OIL COMPANY	KEY OIL INCORPORATED	5492	989	-4503	Speechley (3471-3472), Alexander (5139-5155)
47017044160000	MARY H & L ET AL	3	KEY OIL COMPANY	KEY OIL INCORPORATED	5471	1155	-4316	Balltown (3901-4077), Alexander (5311-5330)
47017039460000	HARRIS DANIEL R HEIRS ETAL	HARRISS	MCCULLOUGH RICHARD F	DEVONIAN APPALACHIAN	5427	956	-4471	Big Injun (1910-1956), Alexander (5105-5110)
47017038000000	HURST CARL	2	MCCULLOUGH RICHARD F	DEVONIAN APPALACHIAN	5416	952	-4464	Salt Sands (1742-1750), Alexander (5075-5089)
47017044040000	TOWNER JAMES E ET AL	1	KEY OIL COMPANY	KEY OIL INCORPORATED	5410	1010	-4400	Balltown (3871-4288), Alexander (5190-5216)
47017043300000	MEYER JOSEPH J & MEYER VIOLET F	1	KEY OIL COMPANY	KEY OIL INCORPORATED	5391	940	-4451	Balltown (3753-4234), Alexander (5186-5209)
47017043830000	WRIGHT PATRICK	2	KEY OIL COMPANY	KEY OIL INCORPORATED	5364	882	-4482	Balltown (3826-3980), Alexander (5111-5141)
47017043850000	WRIGHT PATRICK	1	KEY OIL COMPANY	KEY OIL INCORPORATED	5362	967	-4395	Balltown (3843-4102), Alexander (5177-5216)
47017043780000	WRIGHT PATRICK	3	KEY OIL COMPANY	KEY OIL INCORPORATED	5348	1058	-4290	Balltown (3934-4165), Alexander (5153-5269)
47017044920000	STATLER	2	KEY OIL COMPANY	KEY OIL INCORPORATED	5324	967	-4357	Balltown (4225-4226), Alexander (5100-5128)
47017043790000	WRIGHT PATRICK	4	KEY OIL COMPANY	KEY OIL INCORPORATED	5323	957	-4366	Balltown (3876-3914), Alexander (5149-5173)
47017044910000	STATLER	1	KEY OIL COMPANY	KEY OIL INCORPORATED	5294	972	-4322	Warren (3283-3297), Alexander (5104-5129)
47017041320000	JAMES LAWRENCE	4	KEY OIL COMPANY	KEY OIL INCORPORATED	5283	965	-4318	Riley (4431-4441), Alexander (5118-5125)
47017044400000	MCCULLOUGH	1	KEY OIL COMPANY	KEY OIL INCORPORATED	5263	900	-4363	Riley (4352-4374), Alexander (5019-5058)
47017040850000	LAWRENCE JAMES	3	KEY OIL COMPANY	KEY OIL INCORPORATED	5207	922	-4285	Riley (4360-4386), Alexander (5051-5062)
47017305000000	U G DUCKWORTH	4051	HOPE NATURAL GAS	HOPE NATURAL GAS	2968	952	-2016	
47017005090000	O E & JANET HODGE	9	DUPKE ROGER C OIL CO	ROGERS LESLIE W	2748	953	-1795	
47017010450000	C W GARNER HRS	1	HICKMAN CHAS	HICKMAN CHAS	2638	998	-1640	
47017018860000	WILLIAM LAMM	1	SANCHO OIL & GAS	INDUSTRIAL GAS ASSOC	2507	945	-1562	
47017026280000	JACKSON R P	1	INTERSTATE PROD COMP	MAGNUM OIL & GAS CO	2449	990	-1459	
47017023450000	STATLER J A	1	DUPKE ROGER C OIL CO	INDUSTRIAL GAS ASSOC	2400	970	-1430	
47017014450000	FLESHER HEIRS	1	MICOA INCORPORATED	MICOA INCORPORATED	2285	1120	-1165	
47017014550000	FLESHER HEIRS	2	TARGA DEV INC	MICOA INCORPORATED	2270	1060	-1210	
47017017530000	W L BROWN ETAL TR 1	2	PETROLEUM RESOURCES	MOUNTAINEER OIL&GAS	2270	1015	-1255	
47017008590000	G B DAVIS	1	PETROLEUM RESOURCES	PETROLEUM PROMOTIONS	2216	1087	-1129	
47017008790000	SHERWOOD ET AL	1	PETROLEUM RESOURCES	PETROLEUM PROMOTIONS	2161	1075	-1086	
47017005550000	W L BROWN ET UX	1	HAUGHT INCORPORATED	HAUGHT INCORPORATED	2138	1018	-1120	
47017008460000	ELDRIDGE SPURGEON ETAL	1	DOMINION O&G CORP	DOMINION O&G CORP	2119	1038	-1081	
47017012220000	MORRIS AMERICA	1	PETROLEUM PROMOTIONS	PETROLEUM PROMOTIONS	2092	961	-1131	
47017007420000	GLEN M TOWNER ET AL	1	PETROLEUM PROMOTIONS	PETROLEUM PROMOTIONS	2084	977	-1107	
47017009650000	GRACIE COOPER	1	BEVER HILTON	BEVER HILTON	2075	1057	-1018	
47017018740000	ELLA GRAHAM	1	VOGT ROY E	MURVIN OIL COMPANY	2075	930	-1145	
47017013520000	R DREAMER	1-A	SOUTHRN TRIANGLE OIL	SOUTHRN TRIANGLE OIL	2060	944	-1116	
47017014370000	R H TOWNER	1	PETROLEUM PROMOTIONS	PETROLEUM PROMOTIONS	2050	939	-1111	
47017005590000	J J GRAHAM	1	BEAUTIFUL DREAMR OIL	BEAUTIFUL DREAMR OIL	2017	904	-1113	
47017006890000	J J GRAHAM	2	BEAUTIFUL DREAMR OIL	BEAUTIFUL DREAMR OIL	2008	910	-1098	
47017004420000	HARMON WEBB	1	UNKNOWN	UNKNOWN	1956	807	-1149	
47017005000001	DUTY A D	1	GLASS DEVELOPMENT CO	HICKMAN CHAS	1950	864	-1086	
47017303980000	S A POWELL	2	RENO OIL CO	RENO OIL CO	1897	931	-966	
47017005610000	LATHROP CAIN	1	UNKNOWN	UNKNOWN	1884	873	-1011	

Received
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 AUG 01 2016

17-0674/1001D

WW-9
(2/15)

API Number 47 - 017 - 06761 MOD
Operator's Well No. Hugle Unit 1H

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

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name Antero Resources Corporation OP Code 494507062

Watershed (HUC 10) Headwaters Middle Island Creek Quadrangle West Union 7.5'

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: No pit will be used at this site (Drilling and Flowback Fluids will be stored in tanks. Cuttings will be tanked and hauled off site.)

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 *UIC Permit # will be provided on Form WR-34)
- Reuse (at API Number Future permitted well locations when applicable. API# will be provided on Form WR-34)
- Off Site Disposal (Supply form WW-9 for disposal location) (Meadowfill Landfill Permit #SWF-1032-98)
- Other (Explain Northwestern Landfill Permit #SWF-1025/ WV0109410)

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

Drilling medium anticipated for this well (vertical and horizontal)? Air, freshwater, oil based, etc. Surface - Air/Freshwater, Intermediate - Dust/Stiff Foam, Production - Water Based Mud

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

Additives to be used in drilling medium? Please See Attachment

Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. Stored in tanks, removed offsite and taken to 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 Landfill (Permit #SWF-1032-98), Northwestern Landfill (Permit # SWF-1025/WV0109410)

Permittee shall provide written notice to the Office of Oil and Gas of any load of drill cuttings or associated waste rejected at any West Virginia solid waste facility. The notice shall be provided within 24 hours of rejection and the permittee shall also disclose where it was properly disposed.

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 

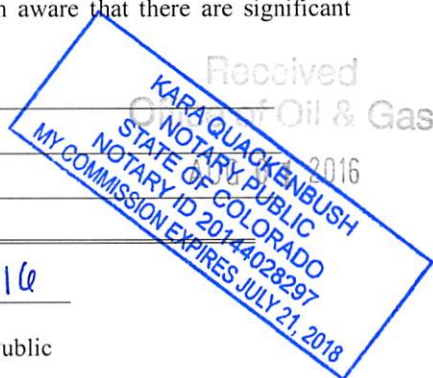
Company Official (Typed Name) Cole Kilstrom

Company Official Title Environmental & Regulatory Manager

Subscribed and sworn before me this 28 day of JULY, 20 16

 Notary Public

My commission expires July 21, 2018



12/02/2016

17-0676) MOD

Form WW-9 Additives Attachment

SURFACE INTERVAL

1. Fresh Water
2. Soap –Foamer AC
3. Air

INTERMEDIATE INTERVAL

STIFF FOAM RECIPE:

- 1) 1 ppb Soda Ash / Sodium Carbonate-Alkalinity Control Agent
- 2) 1 ppb Conqor 404 (11.76 ppg) / Corrosion Inhibitor
- 3) 4 ppb KLA-Gard (9.17 ppg) / Amine Acid Complex-Shale Stabilizer
- 4) 1ppb Mil Pac R / Sodium Carboxymethylcellulose-Filtration Control Agent
- 5) 12 ppb KCL / Potassium Chloride-inorganic Salt
- 6) Fresh Water 80 bbls
- 7) Air

PRODUCTION INTERVAL

1. Alpha 1655
Salt Inhibitor
2. Mil-Carb
Calcium Carbonate
3. Cottonseed Hulls
Cellulose-Cottonseed Pellets – LCM
4. Mil-Seal
Vegetable, Cotton & Cellulose-Based Fiber Blend – LCM
5. Clay-Trol
Amine Acid Complex – Shale Stabilizer
6. Xan-Plex
Viscosifier For Water Based Muds
7. Mil-Pac (All Grades)
Sodium Carboxymethylcellulose – Filtration Control Agent
8. New Drill
Anionic Polyacrylamide Copolymer Emulsion – Shale Stabilizer
9. Caustic Soda
Sodium Hydroxide – Alkalinity Control
10. Mil-Lime
Calcium Hydroxide – Lime
11. LD-9
Polyether Polyol – Drilling Fluid Defoamer
12. Mil Mica
Hydro-Biotite Mica – LCM

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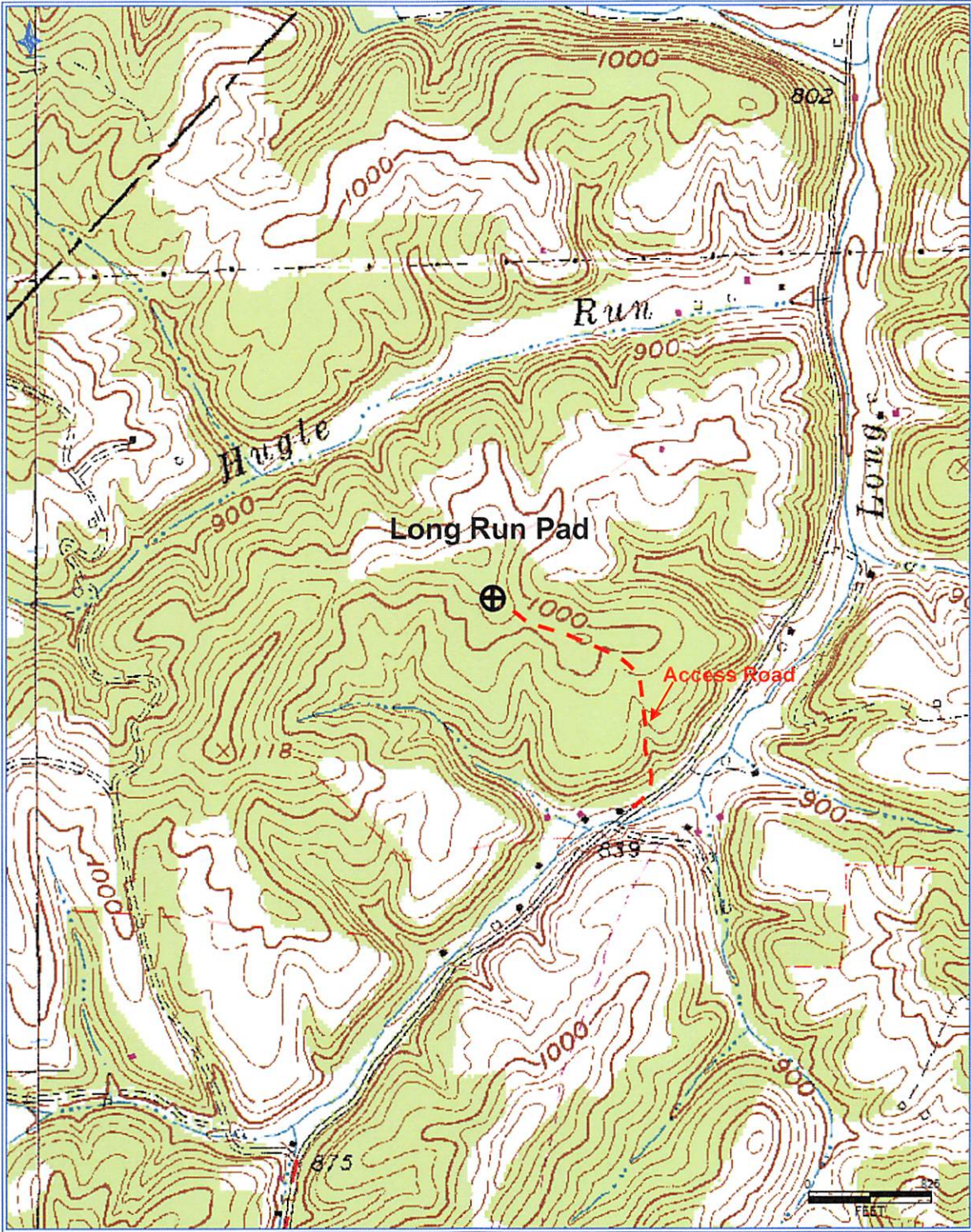
12/02/2016

13. Escaid 110
Drilling Fluid Solvent – Aliphatic Hydrocarbon
14. Ligco
Highly Oxidized Leonardite – Filtration Control Agent
15. Super Sweep
Polypropylene – Hole Cleaning Agent
16. Sulfatrol K
Drilling Fluid Additive – Sulfonated Asphalt Residuum
17. Sodium Chloride, Anhydrous
Inorganic Salt
18. D-D
Drilling Detergent – Surfactant
19. Terra-Rate
Organic Surfactant Blend
20. W.O. Defoam
Alcohol-Based Defoamer
21. Perma-Lose HT
Fluid Loss Reducer For Water-Based Muds
22. Xan-Plex D
Polysaccharide Polymer – Drilling Fluid Viscosifier
23. Walnut Shells
Ground Cellulosic Material – Ground Walnut Shells – LCM
24. Mil-Graphite
Natural Graphite – LCM
25. Mil Bar
Barite – Weighting Agent
26. X-Cide 102
Biocide
27. Soda Ash
Sodium Carbonate – Alkalinity Control Agent
28. Clay Trol
Amine Acid complex – Shale Stabilizer
29. Sulfatrol
Sulfonated Asphalt – Shale Control Additive
30. Xanvis
Viscosifier For Water-Based Muds
31. Milstarch
Starch – Fluid Loss Reducer For Water Based Muds
32. Mil-Lube
Drilling Fluid Lubricant

Printed
Office of the
Clerk of the Court

AUG 01 2016

17-06761 MOD



Antero Resources Corporation
Appalachian Basin
Hugle Unit 1H
Doddridge County
Quadrangle: West Union
Watershed: Headwaters Middle Island Creek
District: Central
Date: 9-28-2015

Received
Office of Oil & Gas
AUG 01 2016

12/02/2016

LATITUDE 39°20'00"

8,664'

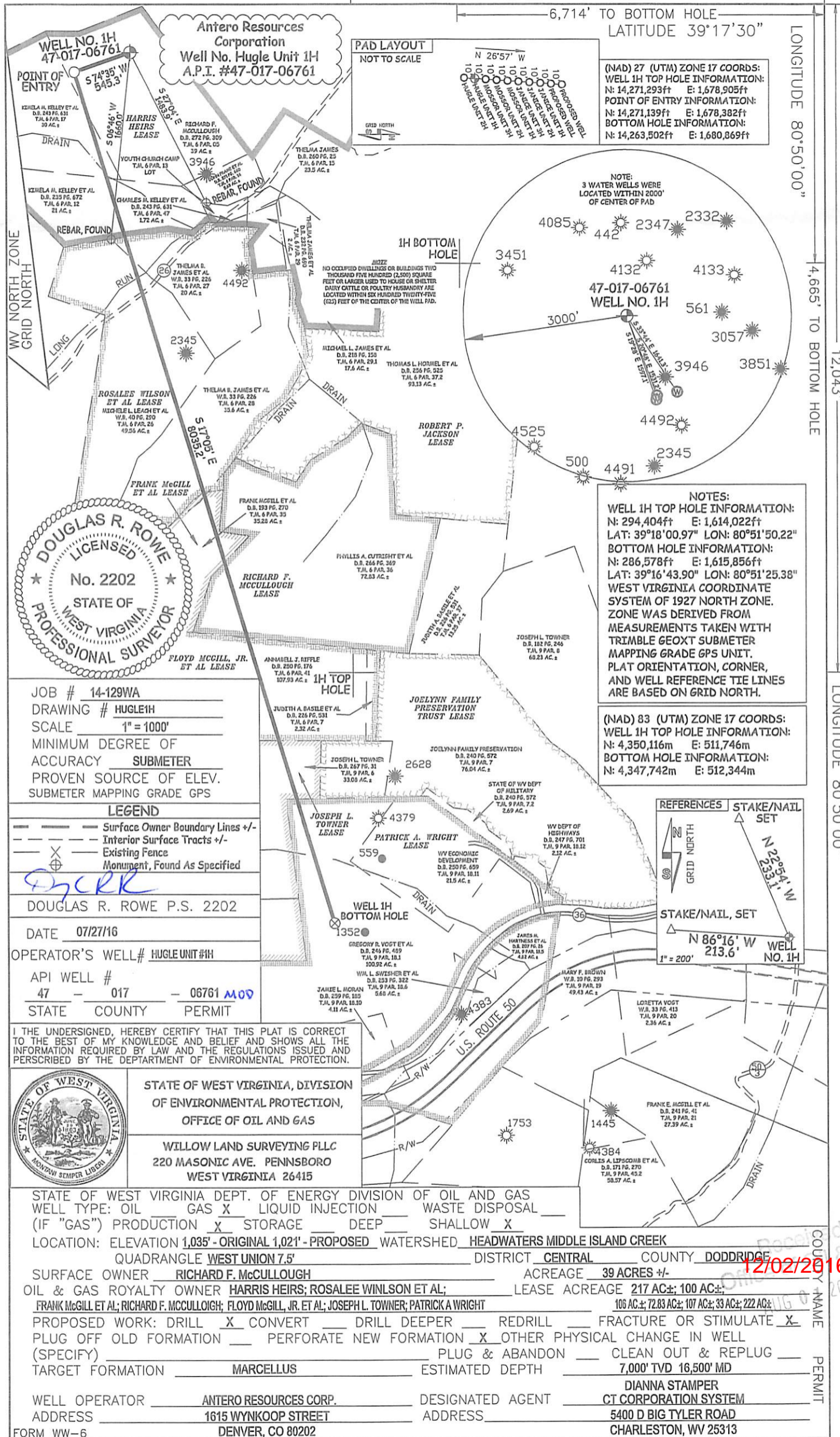
6,714' TO BOTTOM HOLE

LATITUDE 39°17'30"

LONGITUDE 80°50'00"

12,043'

LONGITUDE 80°50'00"



PAD LAYOUT NOT TO SCALE

(NAD) 27 (UTM) ZONE 17 COORDS:
 WELL 1H TOP HOLE INFORMATION:
 N: 14,271,293ft E: 1,678,905ft
 POINT OF ENTRY INFORMATION:
 N: 14,271,139ft E: 1,678,382ft
 BOTTOM HOLE INFORMATION:
 N: 14,263,502ft E: 1,680,869ft

NOTE:
 3 WATER WELLS WERE LOCATED WITHIN 2000' OF CENTER OF PAD

NOTES:
 WELL 1H TOP HOLE INFORMATION:
 N: 294,404ft E: 1,614,022ft
 LAT: 39°18'00.97" LON: 80°51'50.22"
 BOTTOM HOLE INFORMATION:
 N: 286,578ft E: 1,615,856ft
 LAT: 39°16'43.90" LON: 80°51'25.38"
 WEST VIRGINIA COORDINATE SYSTEM OF 1927 NORTH ZONE. ZONE WAS DERIVED FROM MEASUREMENTS TAKEN WITH TRIMBLE GEOXT SUBMETER MAPPING GRADE GPS UNIT. PLAT ORIENTATION, CORNER, AND WELL REFERENCE TIE LINES ARE BASED ON GRID NORTH.

(NAD) 83 (UTM) ZONE 17 COORDS:
 WELL 1H TOP HOLE INFORMATION:
 N: 4,350,116m E: 511,746m
 BOTTOM HOLE INFORMATION:
 N: 4,347,742m E: 512,344m

JOB # 14-129WA
 DRAWING # HUGLE1H
 SCALE 1" = 1000'
 MINIMUM DEGREE OF ACCURACY SUBMETER
 PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS

LEGEND
 --- Surface Owner Boundary Lines +/-
 - - - Interior Surface Tracts +/-
 X Existing Fence
 Monument, Found As Specified

DOUGLAS R. ROWE P.S. 2202

DATE 07/27/16

OPERATOR'S WELL# HUGLE UNIT #1H

API WELL # 47 - 017 - 06761 MOV
 STATE COUNTY PERMIT

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 PERSCRIBED BY THE DEPARTMENT 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

STATE OF WEST VIRGINIA DEPT. OF ENERGY DIVISION OF OIL AND GAS
 WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL
 (IF "GAS") PRODUCTION STORAGE DEEP SHALLOW
 LOCATION: ELEVATION 1,035' - ORIGINAL 1,021' - PROPOSED WATERSHED HEADWATERS MIDDLE ISLAND CREEK
 QUADRANGLE WEST UNION 7.5' DISTRICT CENTRAL COUNTY DODDRIDGE
 SURFACE OWNER RICHARD F. McCULLOUGH ACREAGE 39 ACRES +/-
 OIL & GAS ROYALTY OWNER HARRIS HEIRS; ROSALEE WINLSON ET AL; LEASE ACREAGE 217 AC +/-; 100 AC +/-; 106 AC +/-; 72.83 AC +/-; 107 AC +/-; 33 AC +/-; 222 AC +/-
 FRANK MCGILL ET AL; RICHARD F. MCCULLOUGH; FLOYD MCGILL, JR. ET AL; JOSEPH L. TOWNER; PATRICK A WRIGHT
 PROPOSED WORK: DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE
 PLUG OFF OLD FORMATION PERFORATE NEW FORMATION OTHER PHYSICAL CHANGE IN WELL (SPECIFY) _____ PLUG & ABANDON CLEAN OUT & REPLUG
 TARGET FORMATION MARCELLUS ESTIMATED DEPTH 7,000' TVD 16,500' MD
 WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER
 ADDRESS 1615 WYNKOOP STREET ADDRESS 5400 D BIG TYLER ROAD
 FORM WW-6 DENVER, CO 80202 CHARLESTON, WV 25313

12/02/2016

11/16/2016

INFORMATION SUPPLIED UNDER WEST VIRGINIA CODE
Chapter 22, Article 6A, Section 5(a)(5)
IN LIEU OF FILING LEASE(S) AND OTHER CONTINUING CONTRACT(S)

Under the oath required to make the verification on page 1 of this Notice and Application, I depose and say that I am the person who signed the Notice and Application for the Applicant, and that –

(1) the tract of land is the same tract described in this Application, partly or wholly depicted in the accompanying plat, and described in the Construction and Reclamation Plan;

(2) the parties and recordation data (if recorded) for lease(s) or other continuing contract(s) by which the Applicant claims the right to extract, produce or market the oil or gas are as follows:

Grantor, lessor, etc.	Grantee, lessee, etc.	Royalty	Book/Page
<u>Harris Heirs Lease</u>			
Harris Heirs	Devonian Appalachian Co., Inc.	1/8	0161/0194
Devonian Appalachian Co., Inc.	New Freedom Energy, LLC	Deed, Assignment & Agreement	0200/0563
New Freedom Energy, LLC	Antero Resources Corporation	*Partial Assignment of Oil & Gas Leases	0336/0127
<u>Rosalee Wilson, et al Lease</u>			
Rosalee Wilson, et al	Antero Resources Appalachian Corporation	1/8+	0266/0708
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<u>Frank McGill, et al Lease</u>			
Frank McGill, et al	Petroleum Services, Inc.	1/8	0115/0563
Petroleum Services, Inc.	Magnum Oil Corporation	Assignment	0118/0555
Magnum Oil Corporation	Eger Corporation	Assignment	0146/0664
Eger Corporation	Basin Project, Inc.	Assignment	0153/0281
Basin Project, Inc.	James A. Eliopulos	Assignment	0252/0382
James A. Eliopulos	Antero Resources Appalachian Corporation	*Partial Assignment of Oil & Gas Leases	0267/0506
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<u>Richard F. McCullough Lease</u>			
Richard F. McCullough	Key Oil Company	1/8	0182/0319
Key Oil Company	Antero Resources Appalachian Corporation	*Partial Assignment of Oil & Gas Leases	0256/0285
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<u>Floyd McGill, Jr., et al Lease</u>			
Floyd McGill, Jr., et ux	Key Oil Company	1/8	0181/0563
Key Oil Company	Antero Resources Appalachian Corporation	*Partial Assignment of Oil & Gas Leases	0256/0285
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1
<u>Joseph L. Towner Lease</u>			
Joseph L. Towner, et ux	Key Oil Company	1/8	0179/0035
Key Oil Company	Antero Resources Appalachian Corporation	*Partial Assignment of Oil & Gas Leases	0256/0285
Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1

Received
Office of Oil & Gas
AUG 01 2016

*Partial Assignments to Antero Resources Corporation include 100% rights to extract, produce and market the oil and gas from the Marcellus and any other formations completed with this well.

CONTINUED ON NEXT PAGE

**INFORMATION SUPPLIED UNDER WEST VIRGINIA CODE
Chapter 22, Article 6A, Section 5(a)(5)
IN LIEU OF FILING LEASE(S) AND OTHER CONTINUING CONTRACT(S)**

Under the oath required to make the verification on page 1 of this Notice and Application, I depose and say that I am the person who signed the Notice and Application for the Applicant, and that –

- (1) the tract of land is the same tract described in this Application, partly or wholly depicted in the accompanying plat, and described in the Construction and Reclamation Plan;
- (2) the parties and recordation data (if recorded) for lease(s) or other continuing contract(s) by which the Applicant claims the right to extract, produce or market the oil or gas are as follows:

Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
<u>Patrick A. Wright Lease</u>				
	Patrick A. Wright	Key Oil Company	1/8	0179/0260
	Key Oil Company	Antero Resources Appalachian Corporation	*Partial Assignment of Oil & Gas Leases	0256/0285
	Antero Resources Appalachian Corporation	Antero Resources Corporation	Name Change	Exhibit 1

*Partial Assignments to Antero Resources Corporation include 100% rights to extract, produce and market the oil and gas from the Marcellus and any other formations completed with this well.


**Acknowledgement of Possible Permitting/Approval
In Addition to the Office of Oil and Gas**

The permit applicant for the proposed well work addressed in this application hereby acknowledges the possibility of the need for permits and/or approvals from local, state, or federal entities in addition to the DEP, Office of Oil and Gas, including but not limited to the following:

- WV Division of Water and Waste Management
- WV Division of Natural Resources WV Division of Highways
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- County Floodplain Coordinator

The applicant further acknowledges that any Office of Oil and Gas permit in no way overrides, replaces, or nullifies the need for other permits/approvals that may be necessary and further affirms that all needed permits/approvals should be acquired from the appropriate authority before the affected activity is initiated.

Received
Office of Oil & Gas
AUG 01 2016

Well Operator: Antero Resources Corporation
 By: Kevin Kilstrom 
 Its: Senior VP, Production

FORM WW-6A1
EXHIBIT 1

FILED

JUN 10 2013

Penny Barker, Manager
IN THE OFFICE OF
SECRETARY OF STATE
Tel: (304) 558-8000
Fax: (304) 558-8381
Website: www.wv.gov
E-mail: business@wv.gov



APPLICATION FOR
AMENDED CERTIFICATE
OF AUTHORITY

Office Hours: Monday - Friday
8:30 a.m. - 5:00 p.m. ET

Natalie E. Tennant
Secretary of State
1900 Kanawha Blvd E
Bldg 1, Suite 157-K
Charleston, WV 25305
FILE ONE ORIGINAL
(We'll return a filed
stamped copy to you)
FEE: \$25.00

*** In accordance with the provisions of the West Virginia Code, the undersigned corporation hereby ***
applies for an Amended Certificate of Authority and submits the following statement:

1. Name under which the corporation was authorized to transact business in WV: Antero Resources Appalachian Corporation

2. Date Certificate of Authority was issued in West Virginia: 6/26/2008

3. Corporate name has been changed to: Antero Resources Corporation
(Attach one Certified Copy of Name Change as filed in home State of Incorporation.)

4. Name the corporation elects to use in WV: Antero Resources Corporation
(due to home state name not being available)

5. Other amendments: (attach additional pages if necessary)

6. Name and phone number of contact person. (This is optional, however, if there is a problem with the filing, listing a contact person and phone number may avoid having to return or reject the document.)
Alvyn A. Schopp (303) 367-7310
Contact Name Phone Number

7. Signature Information (See below "Important Legal Notice Regarding Signature")

Print Name of Signer: Alvyn A. Schopp
Title/Capacity: Authorized Person

Signature: *[Handwritten Signature]*
Date: June 10, 2013

Important Legal Notice Regarding Signature: Per West Virginia Code §31B-1-129, Penalty for signing false document. Any person who signs a document he or she knows is false in any material respect and knows that the document is to be delivered to the secretary of state for filing is guilty of a misdemeanor and, upon conviction thereof, shall be fined not more than one thousand dollars or confined in the county or regional jail not more than one year, or both.

Received
Office of Oil & Gas
AUG 01 2013

17-06761M00

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

Date of Notice Certification: 07/29/2016

API No. 47- 017 - 06761

Operator's Well No. Hugle Unit 1H

Well Pad Name: Long Run Pad

Notice has been given:

Pursuant to the provisions in West Virginia Code § 22-6A, the Operator has provided the required parties with the Notice Forms listed below for the tract of land as follows:

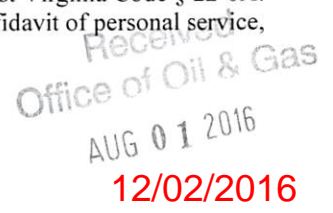
State: <u>West Virginia</u>	UTM NAD 83	Easting: <u>511746m</u>
County: <u>Doddridge</u>		Northing: <u>4350116m</u>
District: <u>Central</u>	Public Road Access: <u>Long Run & CR 26/4</u>	
Quadrangle: <u>West Union 7.5'</u>	Generally used farm name: <u>McCullough, Richard F.</u>	
Watershed: <u>Headwaters Middle Island Creek</u>		

Pursuant to West Virginia Code § 22-6A-7(b), every permit application filed under this section shall be on a form as may be prescribed by the secretary, shall be verified and shall contain the following information: (14) A certification from the operator that (i) it has provided the owners of the surface described in subdivisions (1), (2) and (4), subsection (b), section ten of this article, the information required by subsections (b) and (c), section sixteen of this article; (ii) that the requirement was deemed satisfied as a result of giving the surface owner notice of entry to survey pursuant to subsection (a), section ten of this article six-a; or (iii) the notice requirements of subsection (b), section sixteen of this article were waived in writing by the surface owner; and Pursuant to West Virginia Code § 22-6A-11(b), the applicant shall tender proof of and certify to the secretary that the notice requirements of section ten of this article have been completed by the applicant.

<p>Pursuant to West Virginia Code § 22-6A, the Operator has attached proof to this Notice Certification that the Operator has properly served the required parties with the following:</p> <p>*PLEASE CHECK ALL THAT APPLY</p> <p><input type="checkbox"/> 1. NOTICE OF SEISMIC ACTIVITY or <input checked="" type="checkbox"/> NOTICE NOT REQUIRED BECAUSE NO SEISMIC ACTIVITY WAS CONDUCTED</p> <p><input checked="" type="checkbox"/> 2. NOTICE OF ENTRY FOR PLAT SURVEY or <input type="checkbox"/> NO PLAT SURVEY WAS CONDUCTED</p> <p><input type="checkbox"/> 3. NOTICE OF INTENT TO DRILL or <input checked="" type="checkbox"/> NOTICE NOT REQUIRED BECAUSE NOTICE OF ENTRY FOR PLAT SURVEY WAS CONDUCTED or</p> <p style="padding-left: 40px;"><input type="checkbox"/> WRITTEN WAIVER BY SURFACE OWNER (PLEASE ATTACH)</p> <p><input checked="" type="checkbox"/> 4. NOTICE OF PLANNED OPERATION</p> <p><input checked="" type="checkbox"/> 5. PUBLIC NOTICE</p> <p><input checked="" type="checkbox"/> 6. NOTICE OF APPLICATION</p>	<p>OOG OFFICE USE ONLY</p> <p><input type="checkbox"/> RECEIVED/ NOT REQUIRED</p> <p><input type="checkbox"/> RECEIVED</p> <p><input type="checkbox"/> RECEIVED/ NOT REQUIRED</p> <p><input type="checkbox"/> RECEIVED</p> <p><input type="checkbox"/> RECEIVED</p> <p><input type="checkbox"/> RECEIVED</p>
---	---

Required Attachments:

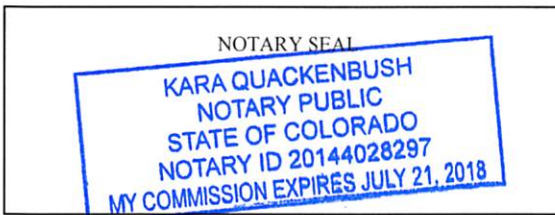
The Operator shall attach to this Notice Certification Form all Notice Forms and Certifications of Notice that have been provided to the required parties and/or any associated written waivers. For the Public Notice, the operator shall attach a copy of the Class II Legal Advertisement with publication date verification or the associated Affidavit of Publication. The attached Notice Forms and Certifications of Notice shall serve as proof that the required parties have been noticed as required under West Virginia Code § 22-6A. Pursuant to West Virginia Code § 22-6A-11(b), the Certification of Notice to the person may be made by affidavit of personal service, the return receipt card or other postal receipt for certified mailing.


 Received
 Office of Oil & Gas
 AUG 01 2016
 12/02/2016

Certification of Notice is hereby given:

THEREFORE, I Kevin Kilstrom, have read and understand the notice requirements within West Virginia Code § 22-6A. I certify that as required under West Virginia Code § 22-6A, I have served the attached copies of the Notice Forms, identified above, to the required parties through personal service, by registered mail or by any method of delivery that requires a receipt or signature confirmation. I certify under penalty of law that I have personally examined and am familiar with the information submitted in this Notice Certification and all attachments, 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 and imprisonment.

Well Operator:	<u>Antero Resources Corporation</u>	Address:	<u>1615 Wynkoop Street</u>
By:	<u>Kevin Kilstrom</u>		<u>Denver, CO 80202</u>
Its:	<u>Senior VP of Production</u>	Facsimile:	<u>303-357-7315</u>
Telephone:	<u>303-357-7310</u>	Email:	<u>kquackenbush@anteroresources.com</u>



Subscribed and sworn before me this 20 day of July 2016.
Kara Quackenbush Notary Public
 My Commission Expires July 21, 2018

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.

Received
Office of Oil & Gas
AUG 01 2016

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: 7/29/2016 Date Permit Application Filed: 7/29/2016

Notice of:

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

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 certificate of approval 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 method of delivery that requires a receipt or signature confirmation, copies of the application, the erosion and sediment control plan required by section seven of this article, and the well 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; (2) The owners of 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 be used for roads or other land disturbance as described in the erosion and sediment control plan submitted pursuant to subsection (c), section seven of this article; (3) The coal owner, operator or 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 seams; (4) The owners of 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 be used for the placement, construction, enlargement, alteration, repair, removal or abandonment of any impoundment or pit as described in section nine of this article; (5) Any surface owner or water purveyor who is known to the applicant to have a water well, spring or water supply source located within one thousand five hundred feet of the center of the well pad which is used to provide water for consumption by humans or domestic animals; and (6) The operator of any natural gas storage field within which the proposed well 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 this section hold interests in the lands, the applicant may serve the documents required upon the person described in the records of the sheriff required to be maintained pursuant to section eight, 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 notice to a landowner, 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 Safety Plan ("WSSP") to 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: PLEASE SEE ATTACHMENT
Address: _____

Name: _____
Address: _____

SURFACE OWNER(s) (Road and/or Other Disturbance)
Name: PLEASE SEE ATTACHMENT
Address: _____

Name: _____
Address: _____

SURFACE OWNER(s) (Impoundments or Pits)
Name: _____
Address: _____

COAL OWNER OR LESSEE
Name: NO DECLARATIONS ON RECORD WITH COUNTY
Address: _____

COAL OPERATOR
Name: NO DECLARATIONS ON RECORD WITH COUNTY
Address: _____

WATER PURVEYOR(s)/OWNER(s) OF WATER WELL, SPRING OR OTHER WATER SUPPLY SOURCE
Name: NONE IDENTIFIED WITH 1500'
Address: _____

* 3 additional water wells were identified but are located greater than 1500' from subject pad location

OPERATOR OF ANY NATURAL GAS STORAGE FIELD
Name: _____
Address: _____

Office of Oil & Gas

AUG 01 2016

*Please attach additional forms if necessary

Notice is hereby given:

Pursuant to West Virginia Code § 22-6A-10(b), notice is hereby given that the undersigned well operator has applied for a permit for well work or for a certificate of approval for the construction of an impoundment or pit.

This Notice Shall Include:

Pursuant to W. Va. Code § 22-6A-10(b), this notice shall include: (1) copies of the application; (2) the erosion and sediment control plan required by section seven of this article; and (3) the well plat.

Pursuant to W. Va. Code § 22-6A-10(f), this notice shall include: (1) a statement of the time limits for filing written comments; (2) who may file written comments; (3) the name and address of the secretary for the purpose of filing the comments and obtaining additional information; and (4) a statement that the persons may request, at the time of submitting written comments, notice of the permit decision and a list of persons qualified to test water.

Pursuant to W. Va. Code R. § 35-8-5.7.a, the operator shall provide the Well Site Safety Plan to the surface owner and any water purveyor or surface owner subject to notice and water testing as provided in section 15 of this rule.

Pursuant to W. Va. Code R. § 35-8-15.2.c, this notice shall: (1) contain a statement of the surface owner's and water purveyor's right to request sampling and analysis; (2) advise the surface owner and water purveyor of the rebuttable presumption for contamination or deprivation of a fresh water source or supply; advise the surface owner and water purveyor that refusal to allow the operator to conduct a pre-drilling water well test constitutes a method to rebut the presumption of liability; (3) advise the surface owner and water purveyor of his or her independent right to sample and analyze any water supply at his or her own expense; advise the surface owner and water purveyor whether or not the operator will utilize an independent laboratory to analyze any sample; and (4) advise the surface owner and or water purveyor that he or she can obtain from the Chief a list of water testing laboratories in the subject area capable of and qualified to test water supplies in accordance with standard acceptable methods.

Additional information related to horizontal drilling may be obtained from the Secretary, at the WV Department of Environmental Protection headquarters, located at 601 57th Street, SE, Charleston, WV 25304 (304-926-0450) or by visiting www.dep.wv.gov/oil-and-gas/pages/default.aspx.

Well Location Restrictions

Pursuant to W. Va. Code § 22-6A-12, Wells may not be drilled within two hundred fifty feet measured horizontally from any existing water well or developed spring used for human or domestic animal consumption. The center of well pads may not be located within six hundred twenty-five feet of an occupied dwelling structure, or a building two thousand five hundred square feet or larger used to house or shelter dairy cattle or poultry husbandry. This limitation is applicable to those wells, developed springs, dwellings or agricultural buildings that existed on the date a notice to the surface owner of planned entry for surveying or staking as provided in section ten of this article or a notice of intent to drill a horizontal well as provided in subsection (b), section sixteen of this article was provided, whichever occurs first, and to any dwelling under construction prior to that date. This limitation may be waived by written consent of the surface owner transmitted to the department and recorded in the real property records maintained by the clerk of the county commission for the county in which such property is located. Furthermore, the well operator may be granted a variance by the secretary from these distance restrictions upon submission of a plan which identifies the sufficient measures, facilities or practices to be employed during well site construction, drilling and operations. The variance, if granted, shall include terms and conditions the department requires to ensure the safety and protection of affected persons and property. The terms and conditions may include insurance, bonding and indemnification, as well as technical requirements. (b) No well pad may be prepared or well drilled within one hundred feet measured horizontally from any perennial stream, natural or artificial lake, pond or reservoir, or a wetland, or within three hundred feet of a naturally reproducing trout stream. No well pad may be located within one thousand feet of a surface or ground water intake of a public water supply. The distance from the public water supply as identified by the department shall be measured as follows: (1) For a surface water intake on a lake or reservoir, the distance shall be measured from the boundary of the lake or reservoir. (2) For a surface water intake on a flowing stream, the distance shall be measured from a semicircular radius extending upstream of the surface water intake. (3) For a groundwater source, the distance shall be measured from the wellhead or spring. The department may, in its discretion, waive these distance restrictions upon submission of a plan identifying sufficient measures, facilities or practices to be employed during well site construction, drilling and operations to protect the waters of the state. A waiver, if granted, shall impose any permit conditions as the secretary considers necessary. (c) Notwithstanding the foregoing provisions of this section, nothing contained in this section prevents an operator from conducting the activities permitted or authorized by a Clean Water Act Section 404 permit or other approval from the United States Army Corps of Engineers within any waters of the state or within the restricted areas referenced in this section. (d) The well location restrictions set forth in this section shall not apply to any well on a multiple well pad if at least one of the wells was permitted prior to the effective date of this article. (e) The secretary shall, by December 31, 2012, report to the Legislature on the noise, light, dust and volatile organic compounds generated by the drilling of horizontal wells as they relate to the well location restrictions regarding occupied dwelling structures pursuant to this section. Upon a finding, if any, by the secretary that the well location restrictions regarding occupied dwelling structures are inadequate or otherwise require alteration to address the items

examined in the study required by this subsection, the secretary shall have the authority to propose for promulgation legislative rules establishing guidelines and procedures regarding reasonable levels of noise, light, dust and volatile organic compounds relating to drilling horizontal wells, including reasonable means of mitigating such factors, if necessary.

Water Well Testing:

Pursuant to West Virginia Code § 22-6A-10(d), notification shall be made, with respect to surface landowners identified in subsection (b) or water purveyors identified in subdivision (5), subsection (b) of this section, of the opportunity for testing their water well. The operator shall provide an analysis to such surface landowner or water purveyor at their request.

Water Testing Laboratories:

Pursuant to West Virginia Code § 22-6A-10(i), persons entitled to notice pursuant to subsection (b) of this section may contact the department to ascertain the names and locations of water testing laboratories in the subject area capable and qualified to test water supplies in accordance with standard accepted methods. In compiling that list of names the department shall consult with the state Bureau for Public Health and local health departments. A surface owner and water purveyor has an independent right to sample and analyze any water supply at his or her own expense. The laboratory utilized by the operator shall be approved by the agency as being certified and capable of performing sample analyses in accordance with this section.

Rebuttable Presumption for Contamination or Deprivation of a Fresh Water Source or Supply:

W. Va. Code § 22-6A-18 requires that (b) unless rebutted by one of the defenses established in subsection (c) of this section, in any action for contamination or deprivation of a fresh water source or supply within one thousand five hundred feet of the center of the well pad for horizontal well, there is a rebuttable presumption that the drilling and the oil or gas well or either was the proximate cause of the contamination or deprivation of the fresh water source or supply. (c) In order to rebut the presumption of liability established in subsection (b) of this section, the operator must prove by a preponderance of the evidence one of the following defenses: (1) The pollution existed prior to the drilling or alteration activity as determined by a predrilling or prealteration water well test. (2) The landowner or water purveyor refused to allow the operator access to the property to conduct a predrilling or prealteration water well test. (3) The water supply is not within one thousand five hundred feet of the well. (4) The pollution occurred more than six months after completion of drilling or alteration activities. (5) The pollution occurred as the result of some cause other than the drilling or alteration activity. (d) Any operator electing to preserve its defenses under subdivision (1), subsection (c) of this section shall retain the services of an independent certified laboratory to conduct the predrilling or prealteration water well test. A copy of the results of the test shall be submitted to the department and the surface owner or water purveyor in a manner prescribed by the secretary. (e) Any operator shall replace the water supply of an owner of interest in real property who obtains all or part of that owner's supply of water for domestic, agricultural, industrial or other legitimate use from an underground or surface source with a comparable water supply where the secretary determines that the water supply has been affected by contamination, diminution or interruption proximately caused by the oil or gas operation, unless waived in writing by that owner. (f) The secretary may order the operator conducting the oil or gas operation to: (1) Provide an emergency drinking water supply within twenty-four hours; (2) Provide temporary water supply within seventy-two hours; (3) Within thirty days begin activities to establish a permanent water supply or submit a proposal to the secretary outlining the measures and timetables to be used in establishing a permanent supply. The total time in providing a permanent water supply may not exceed two years. If the operator demonstrates that providing a permanent replacement water supply cannot be completed within two years, the secretary may extend the time frame on case-by-case basis; and (4) Pay all reasonable costs incurred by the real property owner in securing a water supply. (g) A person as described in subsection (b) of this section aggrieved under the provisions of subsections (b), (e) or (f) of this section may seek relief in court... (i) Notwithstanding the denial of the operator of responsibility for the damage to the real property owner's water supply or the status of any appeal on determination of liability for the damage to the real property owner's water supply, the operator may not discontinue providing the required water service until authorized to do so by the secretary or a court of competent jurisdiction.

Written Comment:

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. All persons described in West Virginia Code § 22-6A-10(b) may file written comments as to the location or construction of the applicant's proposed well work to the Secretary at:

Chief, Office of Oil and Gas
Department of Environmental Protection
601 57th St. SE
Charleston, WV 25304
(304) 926-0450

Such persons may request, at the time of submitting written comments, notice of the permit decision and a list of persons qualified to test water. **NOTE: YOU ARE NOT REQUIRED TO FILE ANY COMMENT.**

DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF OIL AND GAS

AUG 07 2016

Time Limits and Methods for Filing Comments.

The law requires these materials to be served on or before the date the operator files its Application. You have **THIRTY (30) DAYS** after the filing date to file your comments. Comments must be filed in person or received in the mail by the Chief's office by the time stated above. You may call the Chief's office to be sure of the date. Check with your postmaster to ensure adequate delivery time or to arrange special expedited handling. If you have been contacted by the well operator and you have signed a "voluntary statement of no objection" to the planned work described in these materials, then the permit may be issued at any time.

Pursuant to West Virginia Code § 22-6A-11(c)(2), Any objections of the affected coal operators and coal seam owners and lessees shall be addressed through the processes and procedures that exist under sections fifteen, seventeen and forty, article six of this chapter, as applicable and as incorporated into this article by section five of this article. The written comments filed by the parties entitled to notice under subdivisions (1), (2), (4), (5) and (6), subsection (b), section ten of this article shall be considered by the secretary in the permit issuance process, but the parties are not entitled to participate in the processes and proceedings that exist under sections fifteen, seventeen or forty, article six of this chapter, as applicable and as incorporated into this article by section five of this article.

Comment Requirements

Your comments must be in writing and include your name, address and telephone number, the well operator's name and well number and the approximate location of the proposed well site including district and county from the application. You may add other documents, such as sketches, maps or photographs to support your comments.

Disclaimer: All comments received will be placed on our web site <http://www.dep.wv.gov/oil-and-gas/Horizontal-Permits/Pages/default.aspx> and the applicant will automatically be forwarded an email notice that such comments have been submitted. The applicant will be expected to provide a response to comments submitted by any surface owner, water purveyor or natural gas storage operator noticed within the application.

Permit Denial or Condition

The Chief has the power to deny or condition a well work permit. Pursuant to West Virginia Code § 22-6A-8(d), the permit may not be issued or be conditioned, including conditions with respect to the location of the well and access roads prior to issuance if the director determines that:

- (1) The proposed well work will constitute a hazard to the safety of persons;
- (2) The plan for soil erosion and sediment control is not adequate or effective;
- (3) Damage would occur to publicly owned lands or resources; or
- (4) The proposed well work fails to protect fresh water sources or supplies.

A permit may also be denied under West Virginia Code § 22-6A-7(k), the secretary shall deny the issuance of a permit if the secretary determines that the applicant has committed a substantial violation of a previously issued permit for a horizontal well, including the applicable erosion and sediment control plan associated with the previously issued permit, or a substantial violation of one or more of the rules promulgated under this article, and in each instance has failed to abate or seek review of the violation within the time prescribed by the secretary pursuant to the provisions of subdivisions (1) and (2), subsection (a), section five of this article and the rules promulgated hereunder, which time may not be unreasonable.

Pursuant to West Virginia Code § 22-6A-10(g), any person entitled to submit written comments to the secretary pursuant to subsection (a), section eleven of this article, shall also be entitled to receive from the secretary a copy of the permit as issued or a copy of the order modifying or denying the permit if the person requests receipt of them as a part of the written comments submitted concerning the permit application. Such persons may request, at the time of submitting written comments, notice of the permit decision and a list of persons qualified to test water.

Received
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12/02/2016

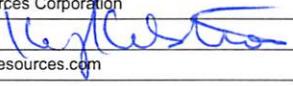
WW-6A
(8-13)

API# 47-017-06761 SHL PERMIT MODIFICATION

API NO. 47-017 - 06761 mob
OPERATOR WELL NO. Hugle Unit 1H
Well Pad Name: Long Run Pad

Notice is hereby given by:

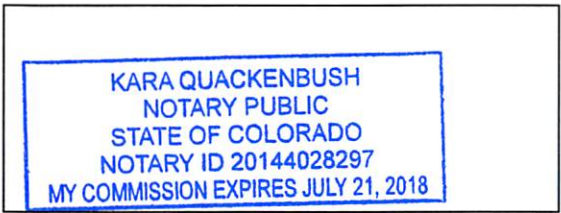
Well Operator: Antero Resources Corporation
Telephone: (303) 357-7310
Email: kquackenbush@anteroresources.com



Address: 1615 Wynkoop Street
Denver, CO 80202
Facsimile: 303-357-7315

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 depprivacyofficer@wv.gov.



Subscribed and sworn before me this 29 day of JULY, 2016.
Kara Quackenbush Notary Public
My Commission Expires JULY 21, 2018

Received
Office of Oil & Gas
AUG 01 2016

12/02/2016

WW-6A Notice of Application Attachment (LONG RUN PAD):**List of Surface Owner(s) with Proposed Disturbance associated with Long Run Well Pad:**

WELL PAD – This owner was notified of all well work permit applications, and has executed signed Surface Use Agreements with Antero Resources Corporation.

TM 6 PCLS 5

Owner: Richard F. McCullough
Address: RR 1 Box 770
 Greenwood, WV 26415

Owner: Richard F. McCullough (2nd Address)
Address: 159 McCullough Farm Dr.
 Greenwood, WV 26415

ROAD AND/OR OTHER DISTURBANCE – These owners has executed a signed Agreement with Antero Resources Corporation. However, they were only notified if their tract is overlying the oil and gas leasehold being developed by the proposed well work as outlined in WV Code 22-6A-10(b)(2).

TM 6 PCL 47

Owner: Charles M. & Kimela M. Kelley
Address: 2657 Long Run Rd.
 Greenwood, WV 26415

Owner: Charles M. & Kimela M. Kelley
 (2nd Address)
Address: 1661 Worthington Rd. STE 100
 Miami, FL 33109

TM 6 PCL 14

Owner: John Frame & Carroll R., Gary D. &
 Michael D. Harris
Address: 320 Pennsylvania Ave.
 Bridgeport, WV 26330

TM 6 PCL 6.3

Owner: Antero Resources Corporation
Address: 1615 Wynkoop St.
 Denver, CO 80202

Received
 Office of Oil & Gas
 AUG 01 2016

17-06761 Map

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

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

Date of Notice: 07/29/2016 **Date Permit Application Filed:** 07/29/2016

Delivery method pursuant to West Virginia Code § 22-6A-16(c)

- CERTIFIED MAIL HAND
- RETURN RECEIPT REQUESTED DELIVERY

Pursuant to W. Va. Code § 22-6A-16(c), no later than the date for filing the permit application, an operator shall, by certified mail return receipt requested or hand delivery, give the surface owner whose land will be used for the drilling of a horizontal well notice of the planned operation. The notice required by this subsection shall include: (1) A copy of this code section; (2) The information required to be provided by subsection (b), section ten of this article to a surface owner whose land will be used in conjunction with the drilling of a horizontal well; and (3) A proposed surface use and compensation agreement containing an offer of compensation for damages to the surface affected by oil and gas operations to the extent the damages are compensable under article six-b of this chapter. (d) The notices required by this section shall be given to the surface owner at the address listed in the records of the sheriff at the time of notice.

Notice is hereby provided to the SURFACE OWNER(s)

(at the address listed in the records of the sheriff at the time of notice):

Name: Richard F. McCullough
Address: RR 1 Box 770
Greenwood, WV 26415

Name: Richard F. McCullough (2nd Address)
Address: 159 McCullough Farm Drive
Greenwood, WV 26415

Notice is hereby given:

Pursuant to West Virginia Code § 22-6A-16(c), notice is hereby given that the undersigned well operator has developed a planned operation on the surface owner's land for the purpose of drilling a horizontal well on the tract of land as follows:

State:	<u>West Virginia</u>	UTM NAD 83	Easting:	<u>511746m</u>
County:	<u>Doddridge</u>		Northing:	<u>4350116m</u>
District:	<u>Central</u>	Public Road Access:	<u>Long Run & CR 26/4</u>	
Quadrangle:	<u>West Union 7.5'</u>	Generally used farm name:	<u>McCullough, Richard F.</u>	
Watershed:	<u>Headwaters Middle Island Creek</u>			

This Notice Shall Include:

Pursuant to West Virginia Code § 22-6A-16(c), this notice shall include: (1) A copy of this code section; (2) The information required to be provided by **W. Va. Code § 22-6A-10(b)** to a surface owner whose land will be used in conjunction with the drilling of a horizontal well; and (3) A proposed surface use and compensation agreement containing an offer of compensation for damages to the surface affected by oil and gas operations to the extent the damages are compensable under article six-b of this chapter. Additional information related to horizontal drilling may be obtained from the Secretary, at the WV Department of Environmental Protection headquarters, located at 601 57th Street, SE, Charleston, WV 25304 (304-926-0450) or by visiting www.dep.wv.gov/oil-and-gas/pages/default.aspx.

Well Operator: Antero Resources Corporation
Telephone: (303) 357-7310
Email: kquackenbush@anteroresources.com

Address: 1615 Wynkoop Street
Denver, CO 80202
Facsimile: 303-357-7315

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.

LOCATION COORDINATES:

ACCESS ROAD ENTRANCE
LATITUDE: 39.296500 LONGITUDE: -80.860639 (NAD 83)
N 4349689.59 E 512016.96 (UTM ZONE 17 METERS)

CENTER OF TANK
LATITUDE: 39.299591 LONGITUDE: -80.860272 (NAD 83)
N 4350032.64 E 512048.14 (UTM ZONE 17 METERS)

CENTROID OF PAD
LATITUDE: 39.300391 LONGITUDE: -80.863915 (NAD 83)
N 4350121.00 E 511733.82 (UTM ZONE 17 METERS)

GENERAL DESCRIPTION:

THE ACCESS ROAD(S), WATER CONTAINMENT PAD, AND WELL PAD ARE BEING CONSTRUCTED TO AID IN THE DEVELOPMENT OF INDIVIDUAL MARCELLUS SHALE GAS WELLS.

FLOODPLAIN NOTES:

THE PROPOSED SITE IS LOCATED IN FLOOD ZONE "X" PER FEMA MAP NUMBER #54017C0115C.

MISS UTILITY STATEMENT:

ANTERO RESOURCES CORPORATION WILL NOTIFY MISS UTILITY OF WEST VIRGINIA FOR THE LOCATING OF UTILITIES PRIOR TO THIS PROJECT DESIGN; TICKET #1603311914. IN ADDITION, MISS UTILITY WILL BE CONTACTED BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION FOR THIS PROJECT.

ENTRANCE PERMIT:

ANTERO RESOURCES CORPORATION WILL OBTAIN AN ENCROACHMENT PERMIT (FORM MM-109) FROM THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS, PRIOR TO COMMENCEMENT OF CONSTRUCTION ACTIVITIES.

ENVIRONMENTAL NOTES:

STREAM AND WETLAND DELINEATIONS WERE PERFORMED IN JANUARY 2013, MARCH 2013, APRIL 2013, JULY 2014 AND DECEMBER 2015 BY ALLSTAR ECOLOGY TO REVIEW THE SITE FOR WATERS AND WETLANDS THAT ARE MOST LIKELY WITHIN THE REGULATORY PURVIEW OF THE U.S. ARMY CORPS OF ENGINEERS (USACE) AND/OR THE WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION (WVDEP). THE JANUARY 4, 2016 JURISDICTIONAL STREAMS AND WETLANDS INDEX MAP WAS PREPARED BY ALLSTAR ECOLOGY AND SUMMARIZES THE RESULTS OF THE FIELD DELINEATION. THE MAP DOES NOT, IN ANY WAY, REPRESENT A JURISDICTIONAL DETERMINATION OF THE LANDWARD LIMITS OF WATERS AND WETLANDS WHICH MAY BE REGULATED BY THE USACE OR THE WVDEP. IT IS STRONGLY RECOMMENDED THAT THE AFOREMENTIONED AGENCIES BE CONSULTED IN AN EFFORT TO GAIN WRITTEN CONFIRMATION OF THE DELINEATION SHOWN ON THIS EXHIBIT PRIOR TO ENGAGING CONSTRUCTION ON THE PROPERTY DESCRIBED HEREIN. THE DEVELOPER SHALL OBTAIN THE APPROPRIATE PERMITS FROM THE FEDERAL AND/OR STATE REGULATORY AGENCIES PRIOR TO ANY PROPOSED IMPACTS TO WATERS OF THE U.S., INCLUDING WETLAND FILLS AND STREAM CROSSINGS.

GEOTECHNICAL NOTES:

THE PROPOSED ACCESS ROAD CUT SLOPE (1.5:1) SHALL BE FIELD VERIFIED BY A CERTIFIED GEOTECHNICAL ENGINEER TO ENSURE THE PROPOSED SLOPES ARE ADEQUATE PRIOR TO CONSTRUCTION. ACCESS ROAD CONSTRUCTION SHALL BE MONITORED BY A REPRESENTATIVE OF THE GEOTECHNICAL ENGINEER OR PROJECT DESIGN ENGINEER DURING CONSTRUCTION.

A SUBSURFACE INVESTIGATION OF THE PROPOSED SITE WAS PERFORMED BY KLEINFELDER ON THE FOLLOWING DATES: JUNE 18-21, 2013, MAY 1-8, 2014, & JUNE 24-26, 2014 AND REVISITED BY PENNSYLVANIA SOIL & ROCK, INC. ON MARCH 14-16, 2016. THE REPORT PREPARED BY PENNSYLVANIA SOIL & ROCK, INC., DATED APRIL 28, 2016, REFLECTS THE RESULTS OF THE SUBSURFACE INVESTIGATION. THE INFORMATION AND RECOMMENDATIONS CONTAINED IN THIS REPORT WAS USED IN THE PREPARATION OF THESE PLANS. PLEASE REFER TO THE SUBSURFACE INVESTIGATION REPORT BY PENNSYLVANIA SOIL & ROCK, INC. FOR ADDITIONAL INFORMATION, AS NEEDED.

PROJECT CONTACTS:

OPERATOR:

ANTERO RESOURCES CORPORATION
535 WHITE OAKS BLVD.
BRIDGEPORT, WV 26330
PHONE: (304) 842-4100
FAX: (304) 842-4102

ELI WAGONER - ENVIRONMENTAL ENGINEER
OFFICE: (304) 842-4068 CELL: (304) 476-9770

JON McEVERS - OPERATIONS SUPERINTENDENT
OFFICE: (303) 357-6799 CELL: (303) 808-2423

AARON KUNZLER - CONSTRUCTION SUPERVISOR
CELL: (405) 227-8344

ANTHONY SMITH - FIELD ENGINEER
OFFICE: (304) 842-4208 CELL: (304) 673-6196

CHARLES E. COMPTON, III - SURVEYING COORDINATOR
CELL: (304) 719-6449

DAVID PATSY - LAND AGENT
CELL: (304) 476-6090

ENGINEER/SURVEYOR:

NAVITUS ENGINEERING, INC.
CYRUS S. KUMP, PE - PROJECT MANAGER/ENGINEER
OFFICE: (888) 662-4185 CELL: (540) 686-6747

ENVIRONMENTAL:

ALLSTAR ECOLOGY, LLC
RYAN L. WARD - ENVIRONMENTAL SCIENTIST
(866) 213-2666 CELL: (304) 692-7477

GEOTECHNICAL:

PENNSYLVANIA SOIL & ROCK, INC.
CHRISTOPHER W. SAMIOS - PROJECT ENGINEER
OFFICE: (412) 372-4000 CELL: (412) 589-0662

RESTRICTIONS NOTES:

1. THERE ARE NO LAKES, PONDS, OR RESERVOIRS WITHIN 100 FEET OF THE WELL PAD AND LOD. THERE IS A PERENNIAL STREAM ADJACENT TO THE ACCESS ROAD "A" ENTRANCE THAT WILL REMAIN UNDISTURBED. THERE IS A WETLAND IMPACT THAT WILL NEED TO BE PERMITTED BY THE APPROPRIATE AGENCIES.
2. THERE ARE NO NATURALLY PRODUCING TROUT STREAMS WITHIN 300 FEET OF THE WELL PAD AND LOD.
3. THERE ARE NO GROUNDWATER INTAKE OR PUBLIC WATER SUPPLY FACILITIES WITHIN 1000 FEET OF THE WELL PAD AND LOD.
4. THERE ARE NO APPARENT EXISTING WATER WELLS OR DEVELOPED SPRINGS WITHIN 250 FEET OF THE WELL(S) BEING DRILLED.
5. THERE ARE NO OCCUPIED DWELLING STRUCTURES WITHIN 625 FEET OF THE CENTER OF THE WELL PAD.
6. THERE ARE NO AGRICULTURAL BUILDINGS LARGER THAN 2,500 SQUARE FEET WITHIN 625 FEET OF THE CENTER OF THE WELL PAD.

REPRODUCTION NOTE

THESE PLANS WERE CREATED TO BE PLOTTED ON 22"x34" (ANSI D) PAPER. HALF SCALE DRAWINGS ARE ON 11"x17" (ANSI B) PAPER.

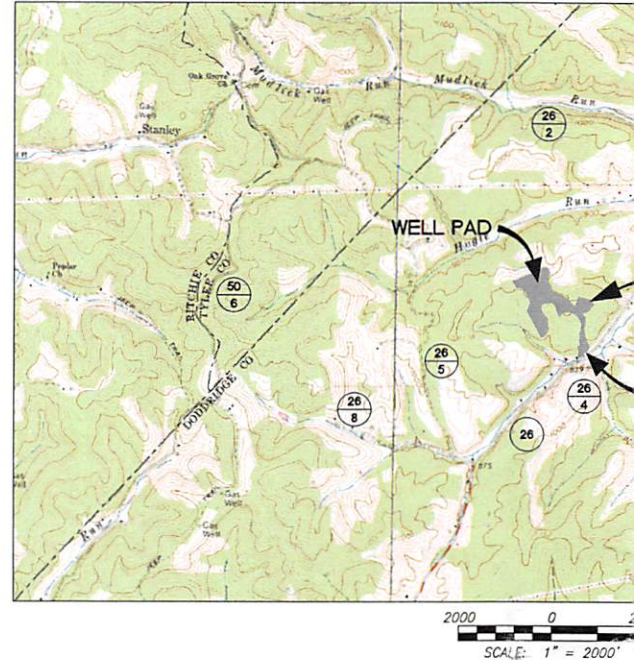
THESE PLANS WERE CREATED FOR COLOR PLOTTING AND ANY REPRODUCTIONS IN GRAY SCALE OR COLOR MAY RESULT IN A LOSS OF INFORMATION AND SHOULD NOT BE USED FOR CONSTRUCTION PURPOSES.

LONG RUN WELL PAD & WATER CONTAINMENT PAD SITE DESIGN & CONSTRUCTION EROSION & SEDIMENT CONTROL

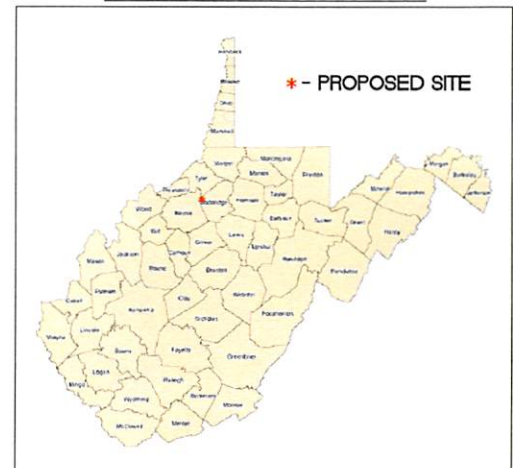
CENTRAL DISTRICT, DODDRIDGE COUNTY
ARNOLD CREEK WATERSHED



USGS 7.5 PENNSBORO & WEST VIRGINIA



WEST VIRGINIA COUNTY MAP



(NOT TO SCALE)

DESIGN CERTIFICATION:

THE DRAWINGS, CONSTRUCTION NOTES, AND REFERENCE DIAGRAMS ATTACHED HERETO HAVE BEEN PREPARED IN ACCORDANCE WITH THE WEST VIRGINIA CODE OF STATE RULES, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS CRS 35-8.

12/02/2016

Received
Office of Oil & Gas
AUG 01 2016

12/02/2016

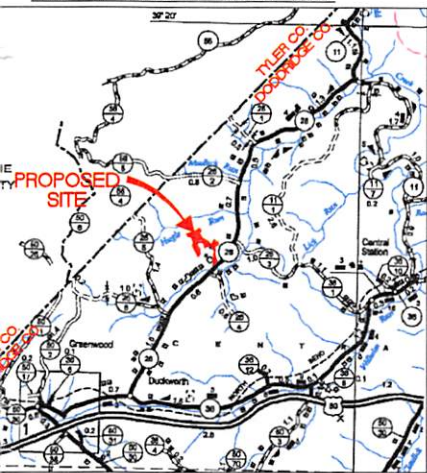
WATER CONTAINMENT PAD CONSTRUCTION PLAN, CONTROL PLANS

WVDOH COUNTY, WEST VIRGINIA
UNDRERSHED

SECTION QUAD MAPS



WVDOH COUNTY ROAD MAP



MISS Utility of West Virginia
1-800-245-4848
West Virginia State Law
(Section XIV: Chapter 24-C)
Requires that you call two
business days before you dig in
the state of West Virginia.
IT'S THE LAW!!

WEST VIRGINIA STATE PLANE COORDINATE SYSTEM
NORTH ZONE, NAD83
ELEVATION BASED ON NAVD83
ESTABLISHED BY SURVEY GRADE GPS & OPUS
POST-PROCESSING

SHEET INDEX:

- 1 - COVER SHEET
- 2 - CONSTRUCTION AND E&S CONTROL NOTES
- 3 - LEGEND
- 4 - MATERIAL QUANTITIES
- 5 - STORM DRAINAGE COMPUTATIONS
- 6 - EXISTING CONDITIONS
- 7 - EXISTING STRUCTURES & FEATURES
- 8 - OVERALL PLAN SHEET INDEX & VOLUMES
- 9 - ACCESS ROAD & WATER CONTAINMENT PAD PLAN
- 10 - ACCESS ROAD & WELL PAD PLAN
- 11 - WELL PAD GRADING PLAN
- 12 - WATER CONTAINMENT PAD GRADING PLAN
- 13-14 - ACCESS ROAD PROFILES
- 15-16 - ACCESS ROAD SECTIONS
- 17 - WELL PAD, WATER CONTAINMENT PAD & STOCKPILE SECTIONS
- 18 - WELL PAD SECTIONS
- 19 - STREAM CROSSING "A" DETAILS
- 20-27 - CONSTRUCTION DETAILS
- 28 - ACCESS ROAD & WATER CONTAINMENT PAD RECLAMATION PLAN
- 29 - ACCESS ROAD & WELL PAD RECLAMATION PLAN
- 30 - FIRM EXHIBIT
- GE500-GE506 - GEOTECHNICAL DETAILS

LONG RUN LIMITS OF DISTURBANCE AREA (AC)			
Total Site	Permitted	Modification	Total
Access Road "A" (2,261' Perm.) (1,773' Mod.)	5.61	1.64	7.25
Access Road "B" (402' Perm.)	1.30	-1.30	0.00
Access Road "C" (417')	0.00	1.65	1.65
Access Road "D" (109')	0.00	0.20	0.20
Well Pad	5.99	2.08	8.07
Water Containment Pad	2.63	-2.63	0.00
Water Containment Pad "B"	0.00	1.97	1.97
Excess/Topsoil Material Stockpiles	4.08	0.07	4.15
Total Affected Area	19.61	3.68	23.29
Total Wooded Acres Disturbed	12.69	0.63	13.32
Impacts to Richard F. McCullough TM 6-5			
Access Road "A" (1,653' Perm.) (788' Mod.)	2.67	1.67	4.34
Access Road "B" (402' Perm.)	1.30	-1.30	0.00
Access Road "C" (339')	0.00	0.68	0.68
Well Pad	5.99	2.08	8.07
Water Containment Pad	2.63	-2.63	0.00
Excess/Topsoil Material Stockpiles	4.08	0.07	4.15
Total Affected Area	16.67	0.57	17.24
Total Wooded Acres Disturbed	11.44	0.51	11.95
Impacts to Charles M. & Kimela M. Kelley TM 6-47			
Access Road "A" (54' Perm.) (54' Mod.)	0.15	0.00	0.15
Total Affected Area	0.15	0.00	0.15
Total Wooded Acres Disturbed	0.01	0.00	0.01
Impacts to John Frame & Carroll R., Gary D. & Michael D. Harris, SR TM 6-14			
Access Road "A" (474' Perm.) (474' Mod.)	1.63	0.00	1.63
Total Affected Area	1.63	0.00	1.63
Total Wooded Acres Disturbed	0.99	0.00	0.99
Impacts to Antero Midstream, LLC TM 6-6.3			
Access Road "A" (440' Perm.) (457' Mod.)	1.16	-0.03	1.13
Access Road "C" (78')	0.00	0.97	0.97
Access Road "D" (109')	0.00	0.20	0.20
Water Containment Pad "B"	0.00	1.97	1.97
Total Affected Area	1.16	3.11	4.27
Total Wooded Acres Disturbed	0.25	0.12	0.37

Proposed Well Name	WV North NAD 27	WV North NAD 83	UTM (METERS) Zone 17	NAD 83 Lat & Long
Unnamed 1H	N 294475.43 E 1613985.54	N 294510.13 E 1582544.42	N 4350138.03 E 511734.31	LAT 39-18-01.9607 LONG -80-51-50.0739
Unnamed 2H	N 294466.51 E 1613990.07	N 294501.22 E 1582548.94	N 4350135.34 E 511735.73	LAT 39-18-01.8733 LONG -80-51-50.0146
Janice Unit 1H	N 294457.59 E 1613994.59	N 294492.30 E 1582553.46	N 4350132.65 E 511737.16	LAT 39-18-01.7858 LONG -80-51-49.9553
Janice Unit 2H	N 294448.67 E 1613996.12	N 294483.38 E 1582557.99	N 4350129.95 E 511738.58	LAT 39-18-01.6984 LONG -80-51-49.8960
Janice Unit 3H	N 294439.76 E 1614003.64	N 294474.46 E 1582562.51	N 4350127.26 E 511740.00	LAT 39-18-01.6109 LONG -80-51-49.8367
Mossor Unit 1H	N 294430.84 E 1614008.17	N 294465.55 E 1582567.04	N 4350124.57 E 511741.43	LAT 39-18-01.5235 LONG -80-51-49.7775
Mossor Unit 2H	N 294421.92 E 1614012.69	N 294456.63 E 1582571.56	N 4350121.87 E 511742.85	LAT 39-18-01.4360 LONG -80-51-49.7182
Mossor Unit 3H	N 294413.00 E 1614017.22	N 294447.71 E 1582576.09	N 4350119.18 E 511744.28	LAT 39-18-01.3485 LONG -80-51-49.6589
Hugle Unit 1H	N 294404.09 E 1614021.74	N 294438.79 E 1582580.61	N 4350116.48 E 511745.70	LAT 39-18-01.2611 LONG -80-51-49.5996
Hugle Unit 2H	N 294395.17 E 1614026.27	N 294429.88 E 1582585.14	N 4350113.79 E 511747.12	LAT 39-18-01.1736 LONG -80-51-49.5404
Well Pad Elevation	1,021.0			

LONG RUN EPHEMERAL STREAM IMPACT (LINEAR FEET)					
Stream and Impact Cause	Permanent Impacts		Temp. Impacts	Temp. Disturb.	Total Disturbance (LF)
	Culvert / Fill (LF)	Inlets/Outlets Structures (LF)	Cofferdam/ E&S Controls (LF)	Distance to L.O.D. (LF)	
Stream 11 (Access Road "A")	0	0	0	25	25

LONG RUN INTERMITTENT STREAM IMPACT (LINEAR FEET)					
Stream and Impact Cause	Permanent Impacts		Temp. Impacts	Temp. Disturb.	Total Disturbance (LF)
	Culvert / Fill (LF)	Inlets/Outlets Structures (LF)	Cofferdam/ E&S Controls (LF)	Distance to L.O.D. (LF)	
Stream 08 (Access Road "A")	79	10	23	26	138

LONG RUN WETLAND IMPACT (SQUARE FEET)			
Wetland and Impact Cause	Fill (SF)	Total Impact (SF)	Total Impact (AC)
Wetland 3 (Access Road "A")	438	438	0.01

17-06761

MOD

NAVITUS
ENERGY ENGINEERING
Telephone: (888) 662-4185 | www.NavitusEng.com

DATE	REVISION
11/17/2014	REVISED SURFACE CONFIGURATION
02/11/2015	REVISED PER CLIENTS REQUEST
02/23/2015	REVISED PER WETLAND DELINEATION
04/02/2015	REVISED PER CLIENTS REQUEST
05/27/2015	REVISED PER WETLAND DELINEATION
11/19/2015	REVISED PER WDEP COMMENTS
04/29/2016	REVISED PER CLIENT REQUEST
05/19/2016	REVISED PER CLIENT REQUEST

Antero Resources
THIS DOCUMENT WAS PREPARED FOR:
ANTERO RESOURCES CORPORATION

COVER SHEET
LONG RUN
WELL PAD & WATER CONTAINMENT PAD
CENTRAL DISTRICT
DODDRIDGE COUNTY, WEST VIRGINIA

REGISTERED PROFESSIONAL ENGINEER
STATE OF WEST VIRGINIA
05/19/2016

DATE: 10/27/2014
SCALE: AS SHOWN
SHEET 1 OF 30

12/02/2016

OVERALL PLAN SHEET 10

GRID NORTH AND ELEVATIONS SHOWN HEREON WERE ESTABLISHED BY SURVEY GRADE GPS

TM 6-6.1
ANTERO RESOURCES
APPALACHIAN CORPORATION

TM 6-6
WILLIAM P. JAMES

TM 3-15
JEFFREY A. JAMES

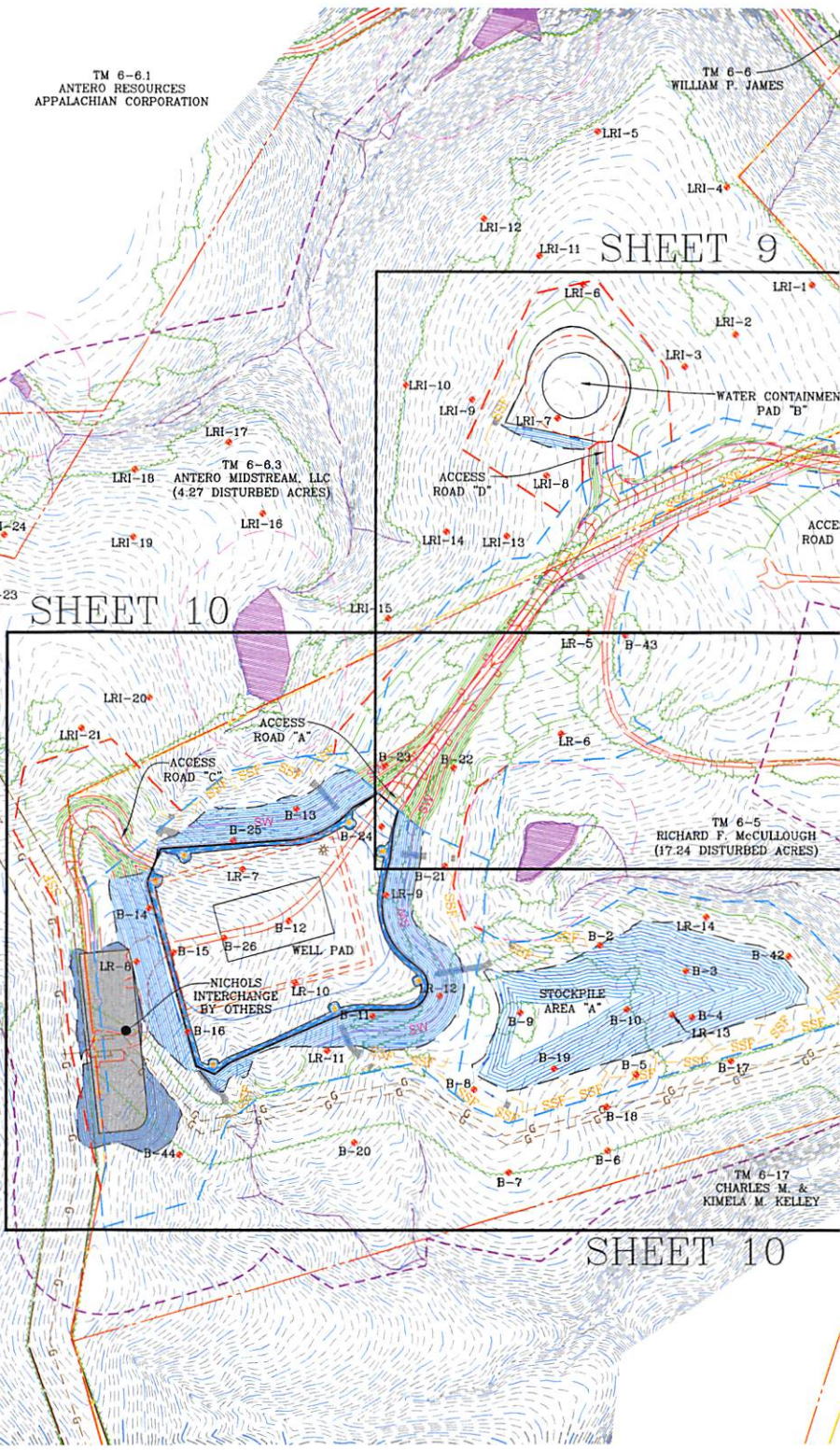
TM 6-6.2
ANTERO RESOURCES
CORPORATION

TM 6-6.3
ANTERO MIDSTREAM, LLC
(4.27 DISTURBED ACRES)

TM 6-5
RICHARD F. McCULLOUGH
(17.24 DISTURBED ACRES)

TM 6-6.3
ANTERO MIDSTREAM, LLC
(4.27 DISTURBED ACRES)

TM 6-17
CHARLES M. &
KIMELA M. KELLEY



NOTES:

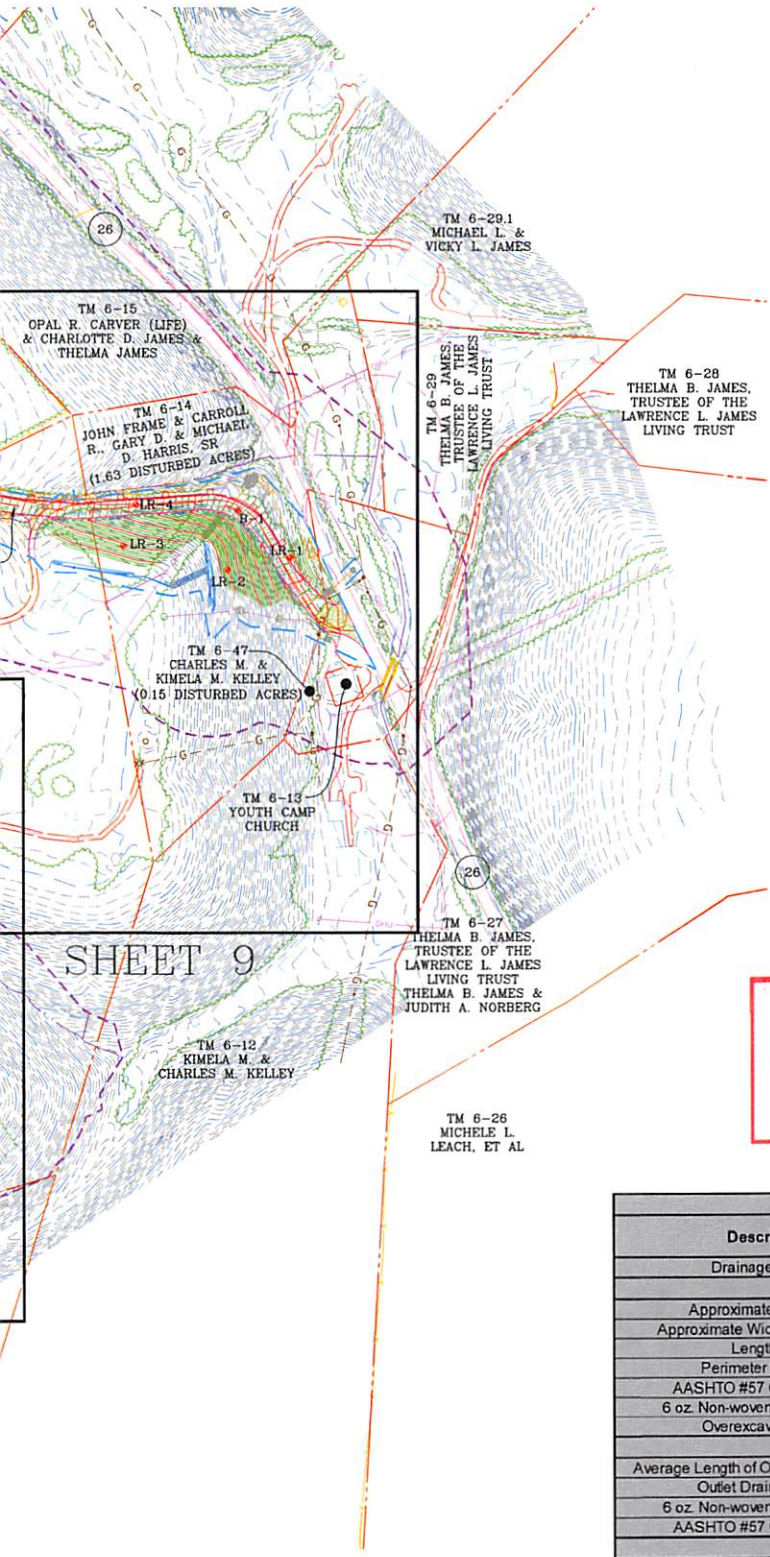
1. THE EARTHWORK QUANTITIES PROVIDED ARE AN ESTIMATE FOR CONSIDERATION. THE QUANTITIES SHOWN ARE CALCULATED USING A 1:1 CUT/SWELL & FILL SHRINK FACTOR. THE EXCESS MATERIAL & TOPSOIL STOCKPILES ARE SIZED TO ACCOMMODATE A CUT/SWELL FACTOR OF 1.1:1. THIS ADDITIONAL MATERIAL IS REFLECTED IN THE TOTAL SPOIL SHOWN ON THE MATERIAL QUANTITIES TABLE. IF THE CALCULATED SWELL IS LESS THAN 1.1:1, THE STOCKPILES SIZES CAN BE REDUCED DURING CONSTRUCTION. THE QUANTITIES SHOWN MAY BE GREATER OR LESSER THAN ACTUALLY EXCAVATED. THE ENGINEER IS NOT RESPONSIBLE FOR VARIANCES FROM THE ESTIMATED QUANTITIES AND DOES NOT CERTIFY THEIR ACCURACY.
2. THE TOE BENCH DEPTHS AND QUANTITIES PROVIDED IN THE TABLE ARE AN ESTIMATE, CALCULATED FROM THE RECOMMENDATIONS PROVIDED IN THE GEOTECHNICAL REPORT PREPARED BY PENNSYLVANIA SOIL & ROCK, INC. SEE PAGES GE500-GE506 & GEOTECHNICAL INVESTIGATION REPORT PROVIDED BY PENNSYLVANIA SOIL & ROCK, INC. FOR TOE BENCH DETAILS, VOLUMES, AND SPECIFICATIONS.

LONG RUN WELL PAD & WATER CONTAINMENT PAD					
Description	Cut (CY)	Fill (CY)	Spoil (CY)	Borrow (CY)	Max. Slope (%)
Access Road "A"	8,001.3	12,995.2	0.0	4,993.9	20.0
Access Road "D"	410.7	14.8	395.9	0.0	2.9
Access Road "C"	812.1	1,365.9	0.0	553.8	15.0
Well Pad	47,556.8	44,795.0	2,761.8	0.0	n/a
Water Containment Pad "B"	3,982.6	52.4	3,930.2	0.0	n/a
Stripped Topsoil (12")	14,595.7	0.0	14,595.7	0.0	n/a
Material Stockpiles	0.0	35,240.0	0.0	35,240.0	n/a
Totals	75,359.2	94,463.3	21,683.6	40,787.7	n/a
		Total Spoil (CY)=	-19,104.1		

12/02/2016

17-0676120

INDEX & VOLUMES



SHEET 9

APPROVED
WVDEP OOG
WJS Modification
 6/2/2016



Length of Slope (FT)
225.0
96.5
125.0
n/a
n/a
n/a
n/a
n/a

MATERIAL STOCKPILES		
Name	Excess	Topsoil
3" Topsoil Respread	N/A	1,230
A	13,400	20,610
TOTAL	13,400	21,840

LONG RUN TOE BENCH QUANTITIES					
Description	Keyway #1A	Keyway #1B	Keyway #1C	Keyway #1D	Total
Drainage Method	D2	D1	D1	D2	N/A
Toe Bench					
Approximate Depth (LF)	6	9	7	6	N/A
Approximate Width (15' min.) (LF)	15	15	15	15	N/A
Length (LF)	100	740	1,000	1,360	3,200
Perimeter Drain (LF)	100	740	1,000	1,360	3,200
AASHTO #57 Gravel (TONS)	15	1,352	1,591	206	3,164
6 oz Non-woven Geotextile (SF)	644	26,552	31,638	8,758	67,592
Overexcavation (CY)	998	10,807	11,438	13,572	36,814
Toe Bench Outlet Drain					
Average Length of Outlet Drain Pipe (LF)	35	50	65	60	N/A
Outlet Drain Pipe (LF)	35	400	650	840	1,925
6 oz Non-woven Geotextile (SF)	245	2,800	4,550	5,880	13,475
AASHTO #57 Gravel (TONS)	4	44	72	93	214
Bonding Bench					
Approximate Depth (LF)	0	0	0	0	N/A
Approximate Width (LF)	0	10	10	0	N/A
Number of Benches (EA)	0	2	1	0	N/A
Length (LF)	0	400	650	0	1,050
Perimeter Drain (LF)	0	800	650	0	1,450
AASHTO #57 Gravel (TONS)	0	666	541	0	1,207
6 oz Non-woven Geotextile (SF)	0	14,384	11,687	0	26,071
Overexcavation (CY)	0	2,840	2,224	0	5,064
Bonding Bench Outlet Drain					
Average Length of Outlet Drain Pipe (LF)	0	55	50	0	N/A
Outlet Drain Pipe (LF)	0	440	350	0	790
6 oz Non-woven Geotextile (SF)	0	3,080	2,450	0	5,530
AASHTO #57 Gravel (TONS)	0	49	39	0	88
Additional Excavation					
Colluvium Material Rework (CY)	N/A	N/A	N/A	N/A	0

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DATE	REVISION
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05/19/2016	REVISED PER CLIENT REQUEST

THIS DOCUMENT WAS PREPARED FOR: ANTERO RESOURCES CORPORATION

OVERALL PLAN SHEET INDEX & VOLUMES

LONG RUN

WELL PAD & WATER CONTAINMENT PAD

CENTRAL DISTRICT
DODDRIDGE COUNTY, WEST VIRGINIA

DATE: 10/27/2014

SCALE: 1" = 150'

SHEET 8 OF 30

12/02/2016

ACCESS ROAD & WATER COM

GRID NORTH AND ELEVATIONS SHOWN HEREON WERE ESTABLISHED BY SURVEY

CENTER OF TANK
LAT: 39.299591
LON: -80.860272
(NAD 83)

ABOVE GROUND FRESHWATER CONTAINMENT TANK (EPIC 360 - 22,000 BBL.)

2.06 ACRES ADDED TO PERMITTED LOD
MODIFICATION LIMITS OF DISTURBANCE



TM 6-6.3
ANTERO MIDSTREAM, LLC
DB 330 PG 704
70.6 ACRES

PROPOSED 25' ACCESS ROAD "A" W/ 4% NORMAL CROWN

PROPOSED 25' ACCESS ROAD "D" W/ 4% IN-SLOPE

MODIFICATION LIMITS OF DISTURBANCE

0.14 ACRES ADDED TO PERMITTED LOD

EX. ACCESS ROAD TO HAVE STONE ADDED PER TYPICAL ROAD CROSS-SECTION

PERMITTED LIMITS OF DISTURBANCE

PROPOSED 25' ACCESS ROAD "A" W/ 4% NORMAL CROWN

PROPOSED GUARDRAIL

PERMITTED LIMITS OF DISTURBANCE

WATER WELL 1

WATER WELL 3

MATCHLINE "A"
SEE SHEET "10"

MODIFICATION LIMITS OF DISTURBANCE

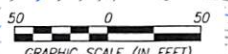
0.29 SUBTRACTED FROM PERMITTED LOD

PERMITTED LIMITS OF DISTURBANCE

100' WETLAND BUFFER

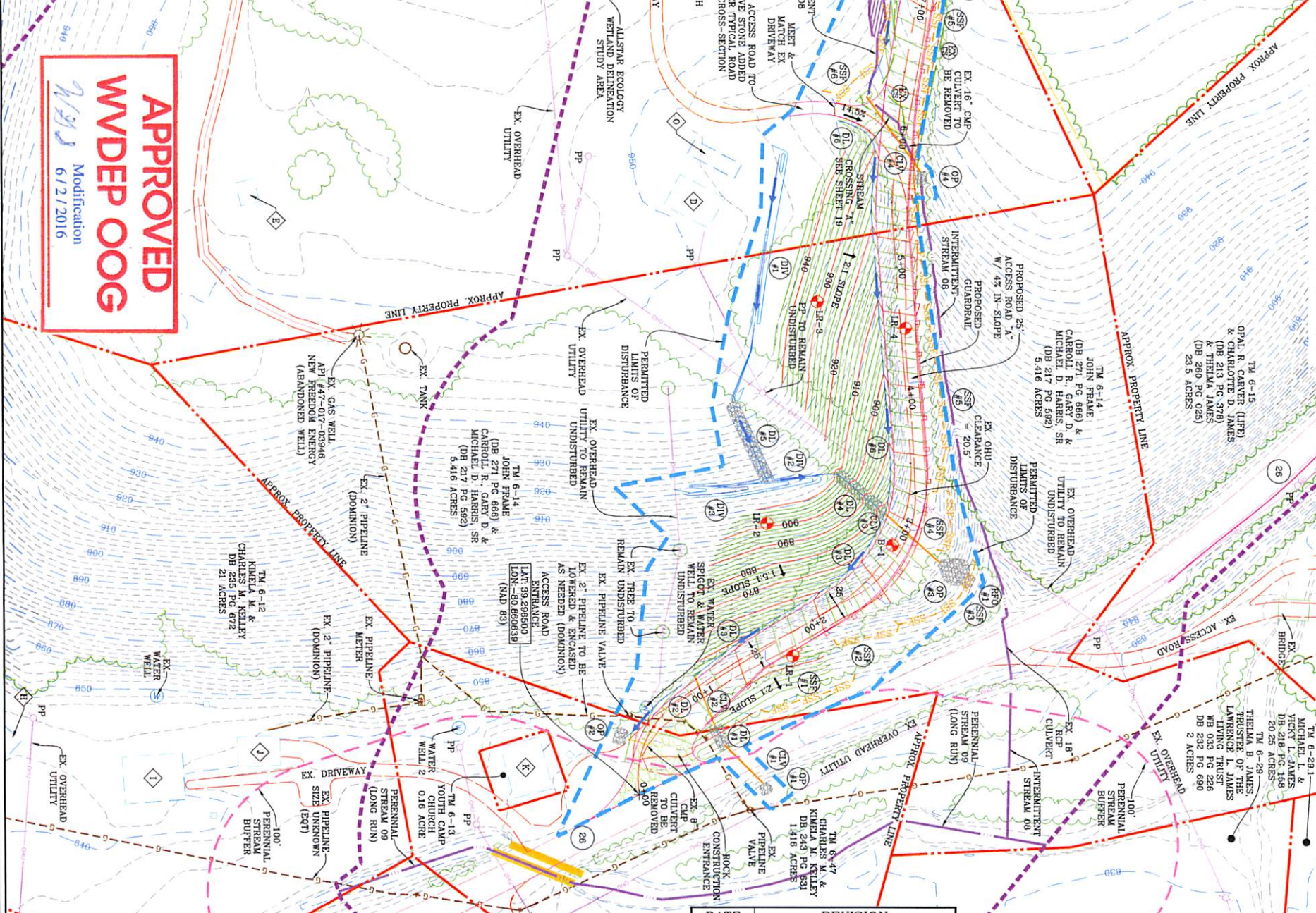
TM 6-5
RICHARD F. McCULLOUGH
DB 272 PG 309
39 ACRES

ALLSTAR ECOLOGY
WETLAND DELINEATION
STUDY AREA



12/02/2016

WATER CONTAINMENT PAD PLAN



APPROVED
WVDEP OOG

1/21/16

Modification
6/2/2016

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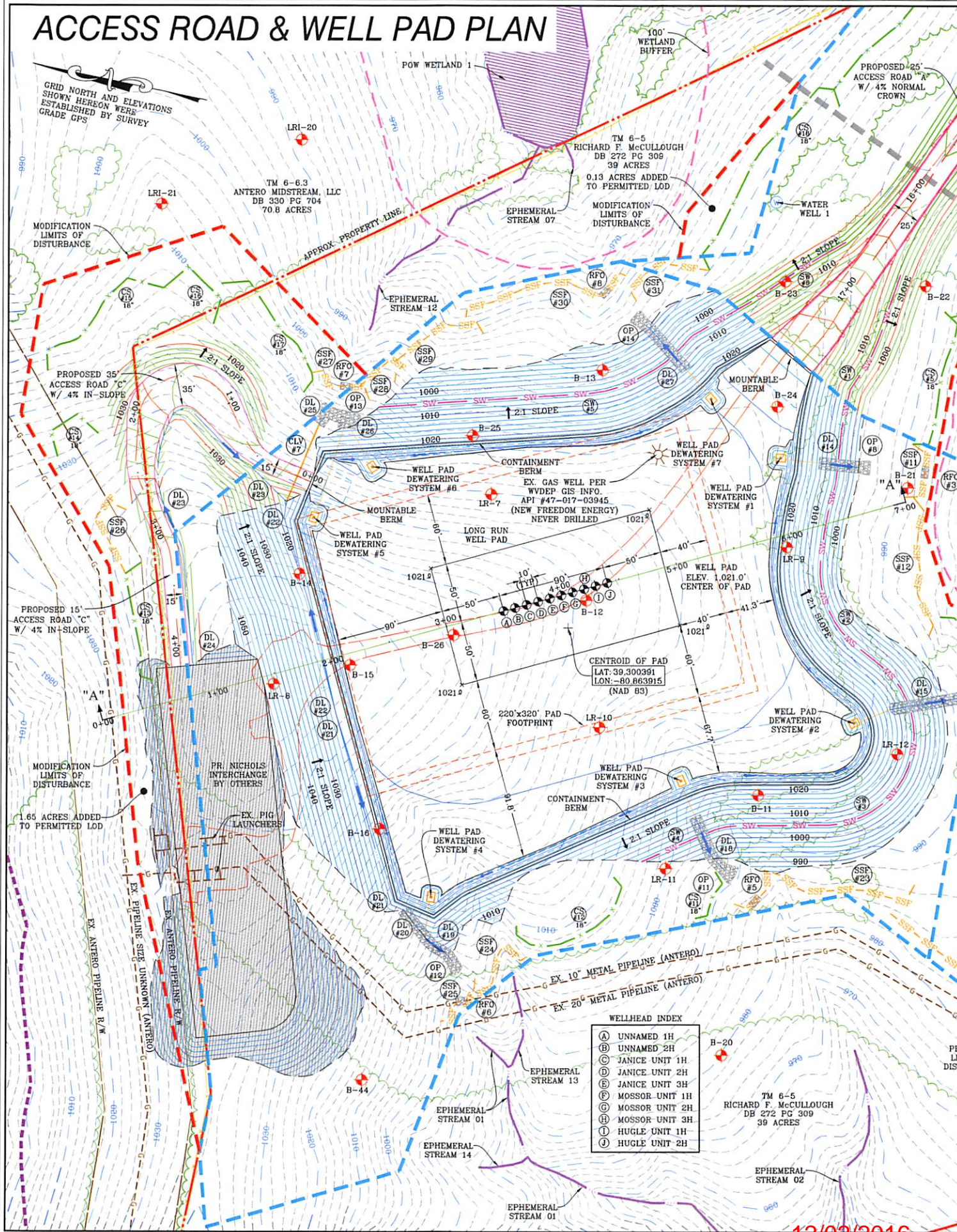
ACCESS ROAD &
WATER CONTAINMENT PAD PLAN
LONG RUN
WELL PAD & WATER CONTAINMENT PAD
CENTRAL DISTRICT
DODDRIDGE COUNTY, WEST VIRGINIA



DATE: 10/27/2014
SCALE: 1" = 50'
SHEET 9 OF 30

ACCESS ROAD & WELL PAD PLAN

GRID NORTH AND ELEVATIONS SHOWN HEREON WERE ESTABLISHED BY SURVEY GRADE GPS



WELLHEAD INDEX

(A)	UNNAMED 1H
(B)	UNNAMED 2H
(C)	JANICE UNIT 1H
(D)	JANICE UNIT 2H
(E)	JANICE UNIT 3H
(F)	MOSSOR UNIT 1H
(G)	MOSSOR UNIT 2H
(H)	MOSSOR UNIT 3H
(I)	HUGLE UNIT 1H
(J)	HUGLE UNIT 2H

**APPROVED
WVDEP OOG**

Modification
6/2/2016

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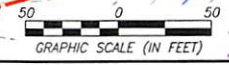
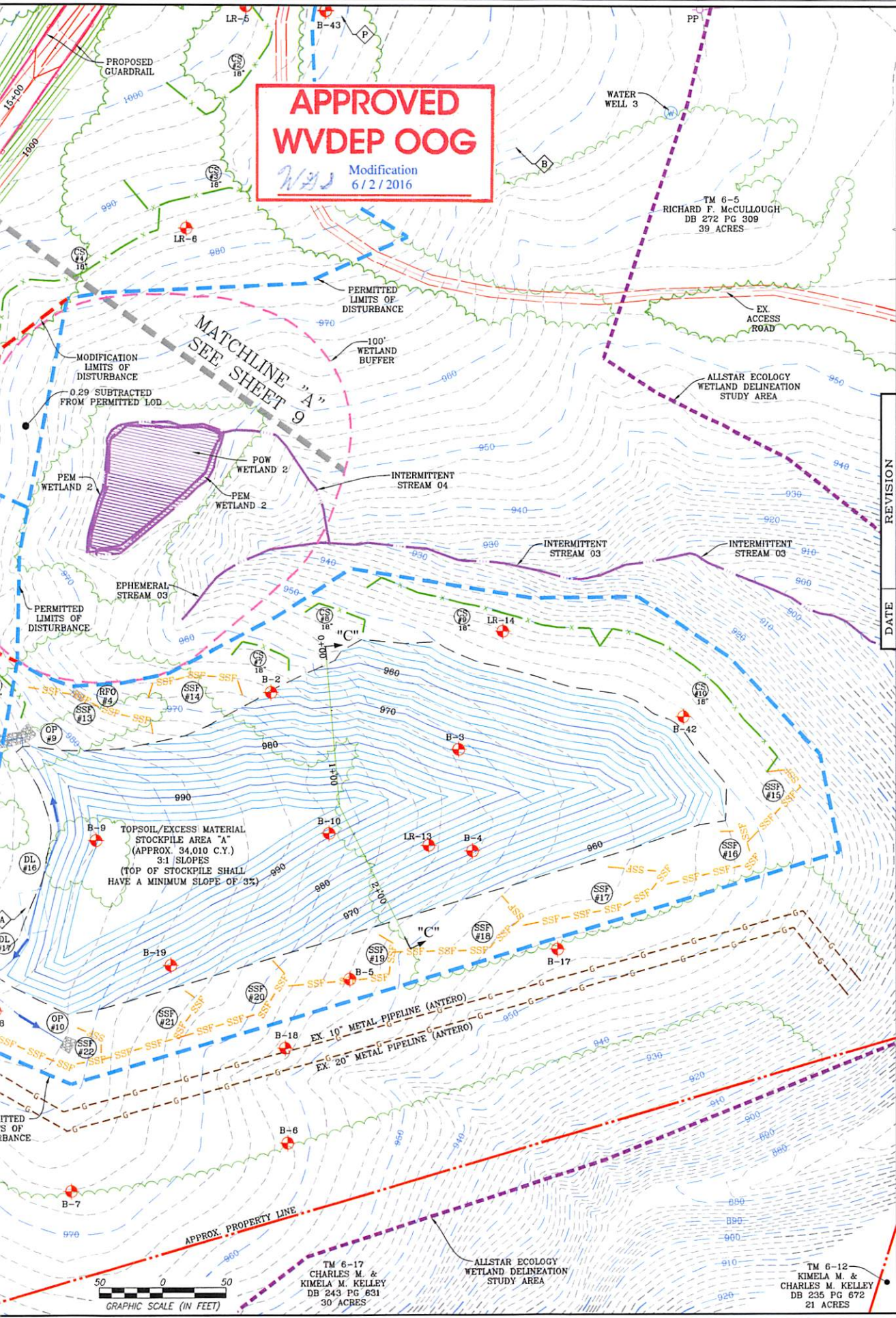


THIS DOCUMENT
WAS PREPARED FOR:
ANTERO RESOURCES
CORPORATION

ACCESS ROAD & WELL PAD PLAN
LONG RUN
WELL PAD & WATER CONTAINMENT PAD
CENTRAL DISTRICT
DODDRIDGE COUNTY, WEST VIRGINIA



DATE: 10/27/2014
SCALE: 1" = 50'
SHEET 10 OF 30



12/02/2016

WELL PAD

GRID NORTH AND ELEVATIONS SHOWN HEREON WERE ESTABLISHED BY SURVEY

COLLECTION CHANNEL HIGH POINT= 1019.1

COLLECTION CHANNEL HIGH POINT= 1019.6

15' ACCESS ROAD

MOUNTABLE BERM

WELL PAD DEWATERING SYSTEM #6

WELL PAD DEWATERING SYSTEM #5

WELL PAD CENTER OF PAD ELEV.=1021.0'

ALL TOP OF SUMP ELEV.=1017.0
ALL COLLECTION CHANNEL ENTER SUMP 1.0' ABOVE TOP OF SUMP ELEV.

COLLECTION CHANNEL HIGH POINT= 1019.4

WELL PAD DEWATERING SYSTEM #4

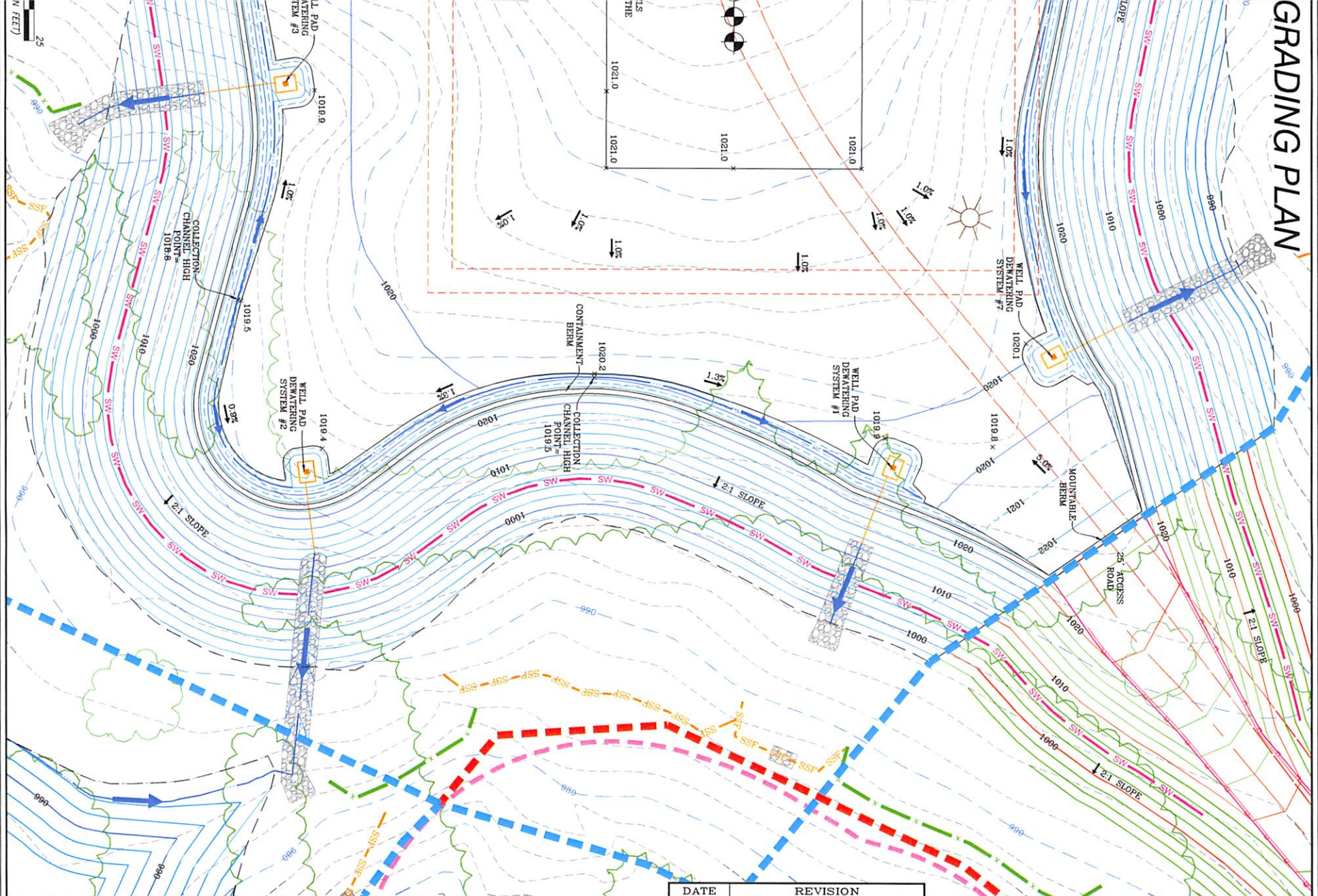
COLLECTION CHANNEL HIGH POINT= 1018.8

APPROVED
WVDEP OOG
W/S Modification
6/2/2016



12/02/2016

GRADING PLAN



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DATE: 10/27/2014
 SCALE: 1" = 25'
 SHEET 11 OF 30

WELL PAD GRADING PLAN

LONG RUN

WELL PAD & WATER CONTAINMENT PAD
 CENTRAL DISTRICT
 DODDRIDGE COUNTY, WEST VIRGINIA

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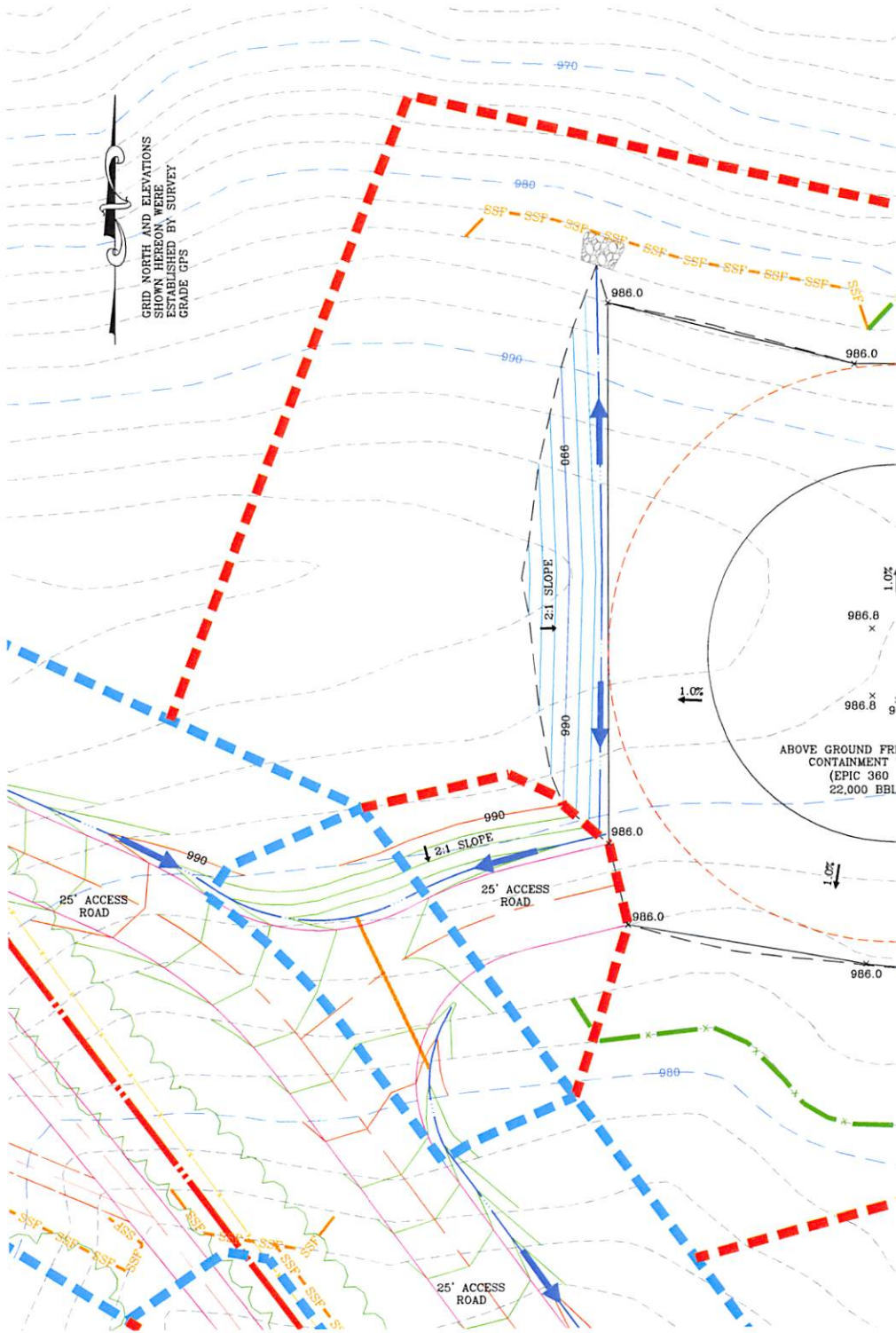
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WATER CONTAINMENT PA

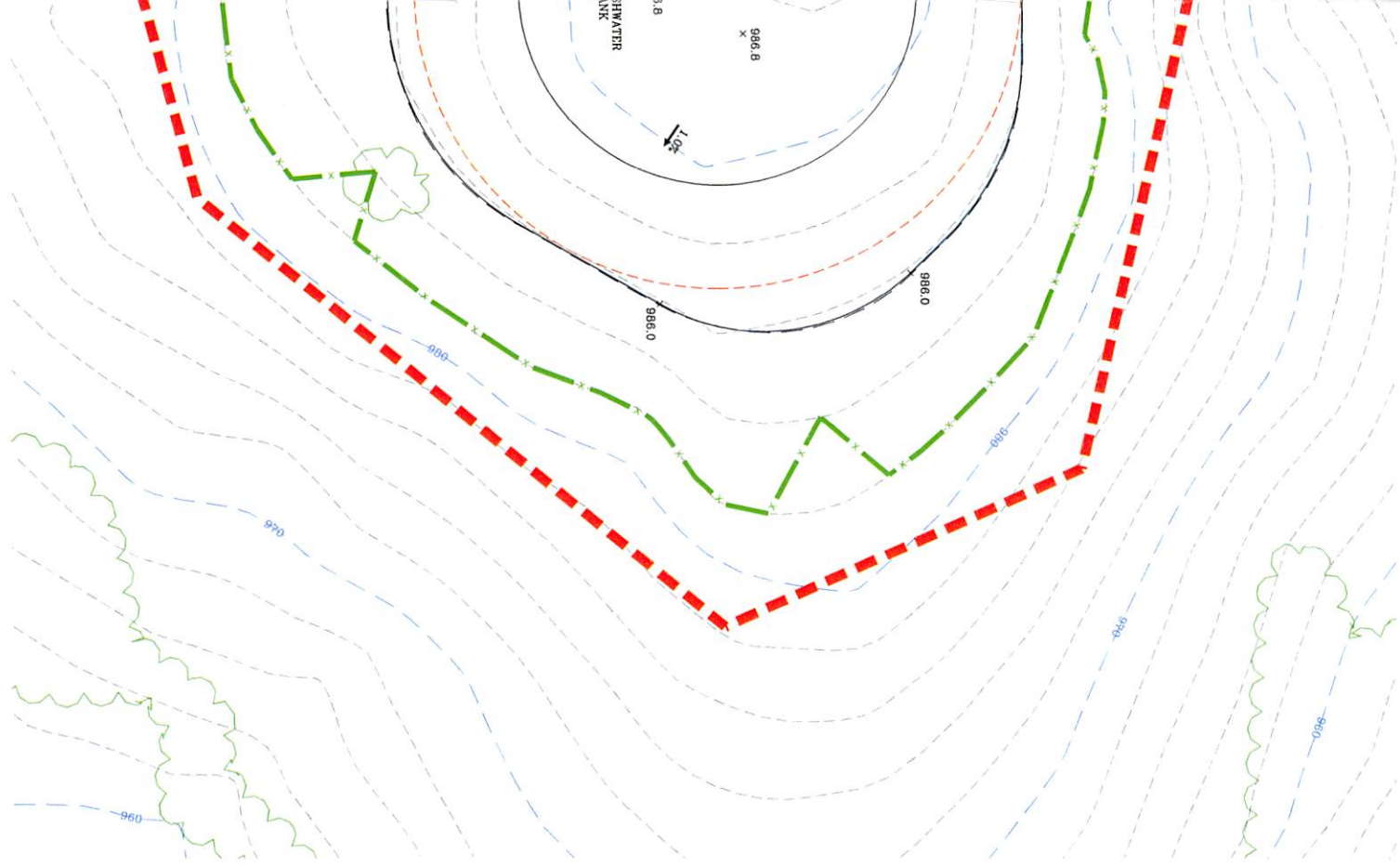
APPROVED
WVDEP OOG

WAS Modification
6/2/2016

GRID NORTH AND ELEVATIONS
SHOWN HEREON WERE
ESTABLISHED BY SURVEY
GRADE GPS



D GRADING PLAN



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WATER CONTAINMENT PAD GRADING PLAN
LONG RUN
WELL PAD & WATER CONTAINMENT PAD
CENTRAL DISTRICT
DODDRIDGE COUNTY, WEST VIRGINIA

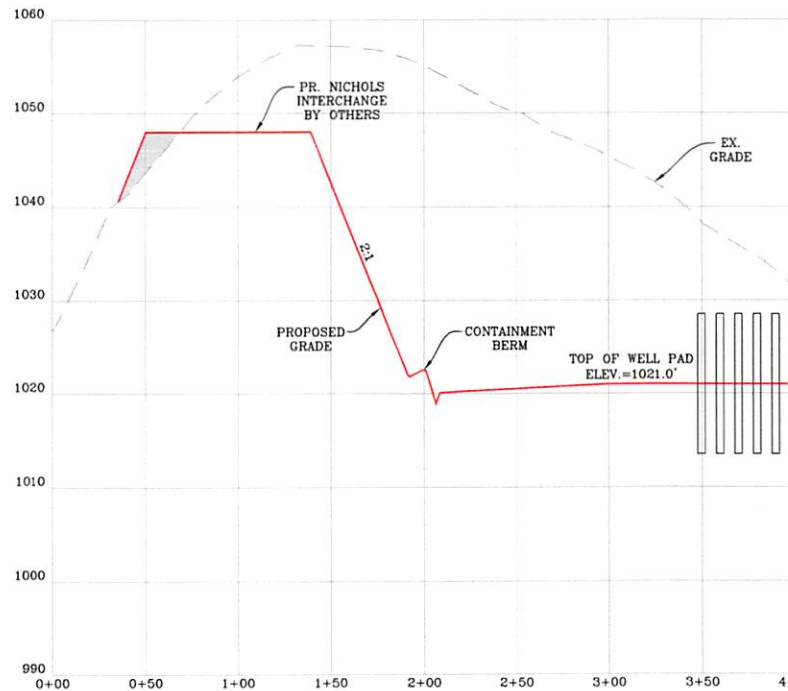


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SCALE: 1" = 25'
SHEET 12 OF 30

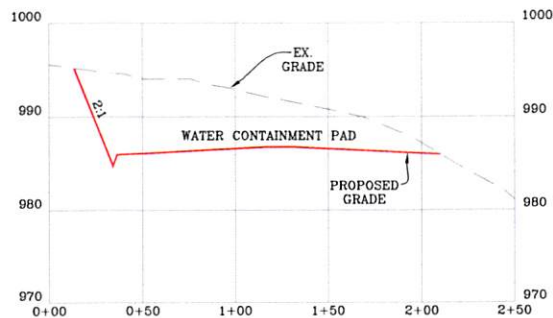
25
SCALE (IN FEET)

WELL PAD, WATER CONTAINMENT

APPROVED
WVDEP OOG
WAS Modification
 6/2/2016



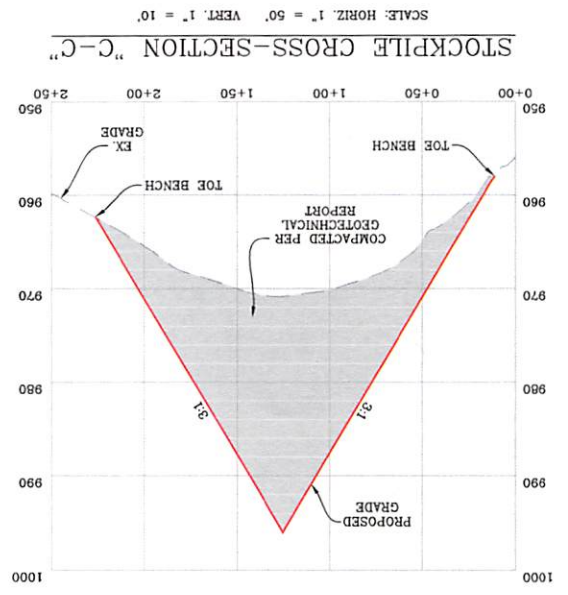
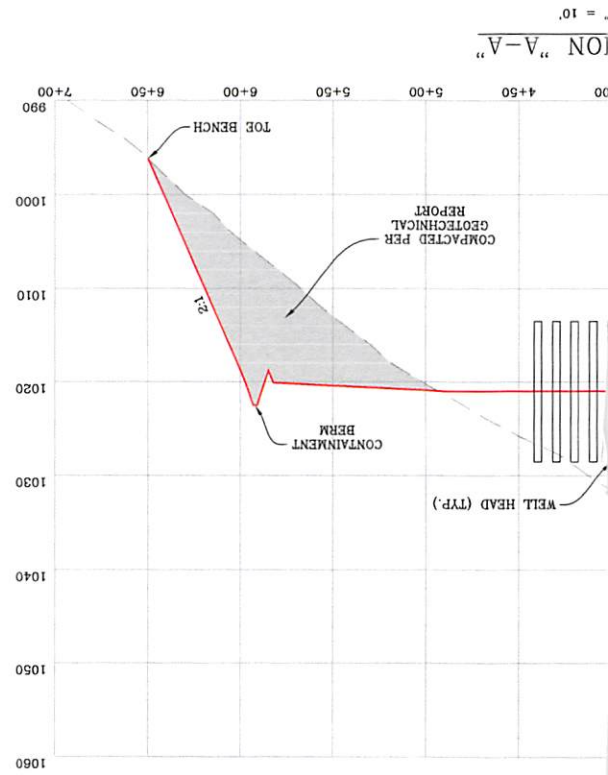
WELL PAD CROSS-SECTION
 SCALE: HORIZ. 1" = 50' VERT. 1" = 10'



WATER CONTAINMENT PAD "B" CROSS-SECTION "B-B"
 SCALE: HORIZ. 1" = 50' VERT. 1" = 10'

12/02/2016

PAD & STOCKPILE SECTIONS



SHEET 17 OF 30

SCALE: AS SHOWN

DATE: 10/27/2014



WELL PAD, WATER CONTAINMENT PAD
& STOCKPILE SECTIONS
LONG RUN
WELL PAD & WATER CONTAINMENT PAD
CENTRAL DISTRICT
DODDRIDGE COUNTY, WEST VIRGINIA



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