



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

Austin Caperton, Cabinet Secretary
www.dep.wv.gov

Thursday, October 25, 2018
WELL WORK PERMIT
Horizontal 6A / New Drill

HG ENERGY II APPALACHIA, LLC
5260 DUPONT ROAD

PARKERSBURG, WV 26101

Re: Permit approval for STICKEL 1210 S-2H
47-033-05924-00-00

This well work permit 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 any additional specific 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 of 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.

Per 35 CSR 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- 0450.

James A. Martin
Chief

Operator's Well Number: STICKEL 1210 S-2H
Farm Name: DANNY LEE & ALCIA A. STIC
U.S. WELL NUMBER: 47-033-05924-00-00
Horizontal 6A New Drill
Date Issued: 10/25/2018



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Austin Caperton, Cabinet Secretary
dep.wv.gov

October 24, 2018

Casey C. Bowie
7500 Old Mill Rd.
Jane lew, WV 26378

Re: Water Well Owner Comments on HG Energy, LLC Well Permits API Nos 47-033-05924;
47-033-05925; 47-033-05927; 47-033-05928 and 47-33-005929 on the proposed Stickel 1210
Well Pad.

Dear Mr. Bowie,

The Office of Oil and Gas (OOG) has completed its review of the above referenced permit applications submitted by HG Energy. The Harrison County oil and gas inspector examined the site to ensure compliance with all applicable requirements. Also, your comments were sent to the applicant to ensure it is aware of your concerns. The applicant's response is enclosed for your records.

After considering your comments, the applicant's response, and the inspector's findings, the OOG has determined that the applications meet the requirements set forth in Article 6A Chapter 22 of the West Virginia Code and Legislative Rule Title 35 Series 8. Consequently, the OOG is issuing the permits today. For your information and convenience, I am including with this letter a copy of the permits as issued.

Please contact Taylor Brewer at (304) 926-0499, extension 1547 if you have questions.

Sincerely,

Laura L. Adkins
WVDEP Office of Oil and Gas
601 57th Street, SE
Charleston, WV 25304
Environmental Resource Specialist

Promoting a healthy environment.



HG Energy, LLC
5260 Dupont Road
Parkersburg, WV 26101
(304) 420-1100 - Office
(304) 863-3172 - Fax

July 3, 2018

James Martin
WV DEP - Office of Oil & Gas
601 57th Street
Charleston, WV 25304

RE: Response to a Letter from Casey Bowie - Harrison County, WV
Proposed Well Pad – Stickle 1210, (47-033-05924, 05925,05926,05927,05928, 05929)

Dear Mr. Martin,

This letter is in response to a property owner with a water well within 1500' of the Stickle 1210 well pad. Casey Bowie, who, in a letter received by the WV DEP June 29, 2018, expressed concern regarding the proximity of the proposed drilling to his surface property by HG Energy II Appalachia, LLC (HGE).

The property exceeds the 625' restriction from the center of the well pad for an occupied dwelling. Water testing has been conducted on the water sources on his property. As such HGE has met the WV DEP requirements, as they pertain to Mr. Bowie, governing the drilling of new horizontal wells and therefore HGE should be granted the drilling permits.

I trust we have adequately addressed Mr. Bowie's concerns and respectfully request the subject drilling permits be issued by the WV DEP – Office of Oil and Gas.

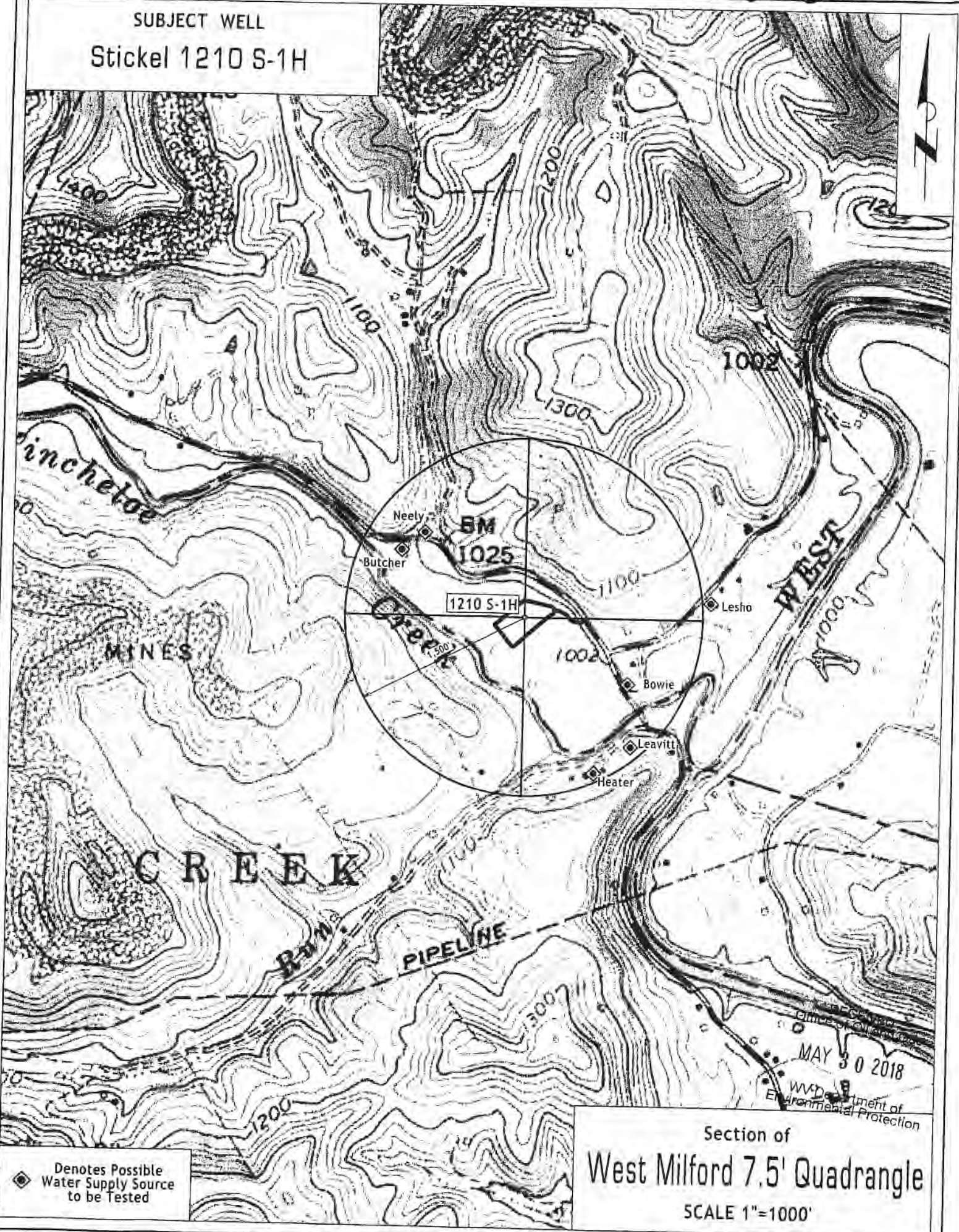
Sincerely,

Diane White

Diane White

CC: Wade Stansberry
Casey Bowie
Sam Ward – DEP Inspector

SUBJECT WELL
Stickel 1210 S-1H



◆ Denotes Possible Water Supply Source to be Tested

Section of
West Milford 7.5' Quadrangle
SCALE 1"=1000'

MAY 30 2018
WV Department of Environmental Protection

Adkins, Laura L

From: Diane White <dwhite@hgenergyllc.com>
Sent: Friday, September 21, 2018 8:27 AM
To: Adkins, Laura L
Subject: RE: WVDEP HG Energy 2nd letter.pdf Bowie Kincheloe
Attachments: 1210 ARM H&H Report.pdf

Laura,

I'm responding to the email you forwarded to me from Mr. Bowie to Marlan Zwoll, dated 9/10/18. Thank you for giving us the opportunity to provide additional information for Mr. Bowie.

Jared Stemple, HG Energy Construction Manager requested the ARM Group, Inc to research and develop a hydrologic report earlier this year. Attached is the H&H Report on the results of the hydrologic analysis for the Stickle 1210 Well Pad located in Harrison County. The ARM Group Inc., Earth Resource Engineers and Scientists, specialize in environmental research and services such as geotechnical engineering, water resources and hydrogeology. The report has been shared with Mr. Dan Hamrick, Flood Plain Coordinator of the Harrison County Planning Department. Mr. Hamrick approved the ARM findings.

The purpose of the report was to determine and quantify the effect, if any, that the well pad site might have on the 100 year flood elevation. Based on the results of ARM's H&H evaluation presented in the study, the geometry of the proposed 1210 well pad won't cause a notable increase in flooding risks to this or nearby properties as compared to the existing regulatory base flood.

Mr. Bowie's primary concern was the construction of the well pad would create a disturbance to the flood area and might cause his home and property to be flooded. Based on the ARM Study, we conclude his property is not exposed to a greater risk of flooding by the construction of the 1210 well pad.

Additionally, the engineered construction plans for the 1210 Well Pad have been designed by Penn E&R, an Engineering Firm specializing in environmentally engineered designs for Oil and Gas Field Operations, well versed in the WV DEP Rules and Regulations and the WV Erosion and Sediment Control Field Manual.

Construction of the well pad will be managed by Jared Stemple through the use of a qualified construction contractor. Sam Ward, WV State Inspector for Harrison County, will regularly review the site construction progress on behalf of the DEP and community citizens.

I trust we have addressed Mr. Bowie's concerns of flooding on his property because of the 1210 Well Pad. We respectfully request the well permit applications be approved. Please let me know if you'd like further information. We would also be happy to schedule a meeting with representatives of ARM Group, Penn E&R and HG Staff at your convenience, to discuss any concerns or questions you might have.

Sincerely,
Diane White

From: Adkins, Laura L [mailto:Laura.L.Adkins@wv.gov]
Sent: Wednesday, September 19, 2018 11:49 AM



ARM Group Inc.

Earth Resource Engineers and Consultants

July 27, 2018

Mr. Dan Hamrick
Harrison County Planning Department
301 W Main Street
Clarksburg, WV 26301

Re: Summary of Hydrologic/Hydraulic Analysis (*rev.1*)
Proposed 1210 Well Pad
Harrison County, West Virginia
ARM Project 180198

Dear Mr. Hamrick:

ARM Group Inc. (ARM) has prepared this report for HG Energy, LLC (HG) to summarize the findings and recommendations from a hydrologic and hydraulic (H&H) evaluation of the above-referenced project site in Harrison County, West Virginia. The site is bounded by Kincheloe Run Road (north) and by Kincheloe Creek (south), and is approximately 2,000 feet upstream of the confluence with West Fork River. The purpose of this work was to better determine and quantify the effect, if any, that the proposed grading activities may have on the 100-year flood elevation in the area of the site. The scope of this project included: (1) a review of available published H&H information relevant to the site; (2) a desktop hydrologic study to determine the 100-year flood event discharge; (3) the development of a HEC-RAS (Hydrologic Evaluation Center – River Analysis System, developed by the US Army Corps of Engineers) hydraulic computer model of the baseline (i.e., pre-project) conditions at the site; (4) the development of a HEC-RAS hydraulic model of the proposed well pad geometry (i.e., post-project) conditions at the site; (5) analysis of the 100-year flood event under both modelled scenarios; and (6) compilation of this summary report.

BACKGROUND

Based on information received from HG, ARM understands that the proposed activities include the establishment of a well pad at the site along with the accompanying access road off of Kincheloe Run Road (T-35) and the associated soil borrow areas and temporary topsoil stockpile. The proposed top-of-pad elevation is understood to be approximately 994 to 994.4 feet above mean sea level (AMSL), and ARM understands that an elevation 996 ft AMSL (i.e., approximately 2-ft above the adjacent pad elevation) embankment is proposed around the perimeter of the pad. The proposed development activities will be completed at least partially within the mapped Federal Emergency Management Agency (FEMA) 100-year floodplain, as shown on the available regional FEMA Flood Insurance Rate Map (FIRM) panel(s). A majority of the proposed limits of disturbance will be within an area mapped as Zone A; however, portions of the proposed Material Borrow Area 1 and the proposed access drive will be within an

area mapped as Zone AE. The general project site location is displayed on the attached Site Location and Drainage Area Delineation Map (Figure 1), following the text of this report.

REVIEW OF AVAILABLE H&H INFORMATION

ARM compiled and reviewed the following available published documents and references to develop a preliminary understanding of the H&H conditions at the site:

- Flood Insurance Study – Harrison County, West Virginia (No. 54033CV000A), effective October 2, 2012, Federal Emergency Management Agency (FEMA).
- NFIP Flood Insurance Rate Map (FIRM) (No. 54033C0239D), effective October 2, 2012, Federal Emergency Agency (FEMA).
- Flood Insurance Study – Lewis County, West Virginia (No. 54041CV000A), effective April 19, 2010, Federal Emergency Management Agency (FEMA).
- NFIP Flood Insurance Rate Map (FIRM) (No. 54041C0065E), effective April 10, 2010, Federal Emergency Agency (FEMA).
- 7.5-Minute Series Topographic Maps of West Virginia, West Virginia Geological Survey, West Milford, Big Isaac, Camden, and Weston Quadrangles, Photorevised 1976-1977.
- Construction Improvements Plan with Erosion and Sediment Controls for HG Well Pad 1210, by Penn E&R, June 28, 2018, [existing and proposed topographic contours]
- Estimation of Flood-Frequency Discharges for Rural Unregulated Streams in West Virginia (Scientific Investigations Report 2010-5033), J. B. Wiley & J. T. Atkins, Jr., U.S. Geological Survey (USGS), 2010.
- Hydrology and Floodplain Analysis (2008), P. B., Bedient, W. C. Huber, and B. E., Vieux, Prentice Hall: Upper Saddle River, NJ.

Available Hydrologic Information

Because the regulatory floodplain at the site is mapped as Zone A on the available FEMA FIRM panel(s), no detailed study was completed as part of the development of the 100-year floodplain boundary in the area of the site; furthermore, no discussion of Kincheloe Creek is provided in the available FEMA Flood Insurance Study (FIS) documents. Because there has not been a regulatory 100-year flood (i.e., base flood) discharge established for Kincheloe Creek, ARM completed a desktop hydrologic study to determine an appropriate estimate of the 100-year peak discharge at the downstream boundary of the study area.

Published regression equations have been established in Estimation of Flood-Frequency Discharges for Rural Unregulated Streams in West Virginia, which was published in 2010 by the U.S. Geological Survey. Based on a detailed review of this document, the peak 100-year flood discharge rate (i.e., Q_{100}) at the site in cubic feet per second (cfs) can be approximated as an empirically-derived convolution function of the total drainage area in square miles (i.e., DA):

$$Q_{100} = (557)(DA)^{0.674}$$

ARM reviewed the available regional 7.5-minute USGS Topographic Quadrangles and manually delineated the total drainage area based on the published contours therein, in accordance with



standard industry practices. ARM's total drainage boundary (refer to Figure 1, following the text of this report) includes approximately 21.2 square miles. Approximately 20.1 square miles of the total drainage area exists upstream of the confluence of Hollick Run, which occurs upstream of ARM's HEC-RAS cross section 0.000 (i.e., downstream boundary condition), and downstream of cross section 1.000. Therefore the peak 100-year flood discharge rate at the downstream boundary of the site is estimated as:

$$Q_{100} = (557)(21.2 \text{ sq. mi.})^{0.674} = 4,360 \text{ cfs}$$

The standard error associated with the published USGS regression equation is notably approximately 33%; therefore, as part of a sensitivity analysis of the H&H computations, ARM also considered an approximately worst case peak 100-year flood discharge rate of 5,800 cfs (i.e., 33% higher than the value computed above). These two estimated peak discharge values were incorporated into ARM's hydraulic analysis, discussed below and presented herein.

Upstream of the confluence with Hollick Run (i.e., ARM HEC-RAS cross section 1.000 through 8.000, the peak 100-year flood discharge rate is estimated as:

$$Q_{100} = (557)(20.1 \text{ sq. mi.})^{0.674} = 4,210 \text{ cfs}$$

As such, the approximate associated worst case peak 100-year flood discharge rate upstream of the Hollick Run confluence is 5,600 cfs. ARM's HEC-RAS model incorporates these estimated flow changes associated with the confluence of Hollick Run and Kincheloe Creek.

Available Hydraulic Information

Because no detailed study has been completed thus far by FEMA, there are no available regulatory cross sections or existing hydraulic models (e.g., HEC-2 or HEC-RAS) to directly tie a hydraulic model into in the immediate vicinity of the site. However, as shown on the available regulatory FIRM panel(s), FEMA has established a base flood elevation (BFE) for elevation 996 feet above mean sea level (AMSL) beginning approximately 630 feet downstream of the proposed well pad site and extending to the confluence with West Fork River; according to the regulatory FIRM panel(s), a tailwater condition at this same elevation exists between this location and the downstream confluence with the West Fork River. This published BFE was determined as part of the previous detailed study associated with West Fork River, although, as already mentioned, no additional specific information is provided in the regional FIS documents that would otherwise corroborate the regression equation derived discharge value presented in the previous section (e.g., the FIS documents do not provide information regarding the change in discharge for the West Fork River immediately upstream of the confluence with Kincheloe Creek versus immediately downstream of the confluence). Based on this information, ARM utilized the published BFE at the location of cross section 0.000 as a "known" downstream boundary condition for our hydraulic model.



HEC-RAS HYDRAULIC MODELLING, ASSESSMENT, AND CONCLUSIONS

Development of Pre-Project (Baseline) Conditions Model

ARM developed a detailed baseline hydraulic model utilizing the USACE HEC-RAS computer software program (Version 4.1.0). This model was created utilizing results of the topographic survey completed by ARM, a review of site photographs and aerial imagery, as well as relevant information from the available FEMA Flood Insurance Study (FIS) and Flood Insurance Rate Map (FIRM) panels, as discussed previously. Manning's roughness coefficients were derived from a review of the available site photographs and aerial imagery (e.g., Kincheloe Creek channel and floodplains) in conjunction with typical published values [e.g., as available in Hydrology and Floodplain Analysis (2008) and other standard textbooks].

The locations of each of ARM's HEC-RAS cross sections are shown on the attached HEC-RAS Cross Section Location Map (Figure 2), following the text of this report. Cross Section 0.000 is coincident with the existing FEMA BFE (Base flood elevation 996 ft AMSL), and represents the downstream "known" boundary of the model. The Cross Section designations increase upstream (i.e., 1.000, 2.000, etc.). Cross Sections 1.000, 2.000, and 3.000 represent typical sections of the area between the downstream boundary of the model and the proposed well pad location (this area includes the proposed Material Borrow Area 1, the proposed access road, and the proposed topsoil stockpile). Cross Sections 4.000, 5.000, and 6.000 represent transects across the downstream, central, and upstream portions of the proposed well pad, respectively. Cross Sections 6.000 and 7.000 represent transects across the proposed Material Borrow Area 2, and Cross Section 8.000 is located upstream of the proposed limits of disturbance.

Post-Project Conditions Model and 100-year Flood Comparison

ARM adjusted the baseline HEC-RAS model to represent the geometry of the proposed well pad based on the grading plan provided by HG, dated June 28, 2018. The computed steady flow analysis results associated with this "Post-Project" model are compared to results of the "Pre-Project" model in both tabular and graphical form following the text of this report. As shown on the attached HEC-RAS output table(s), water surface profiles, and cross sections, the proposed pad development activities do not alter the computed water surface profile at any of ARM's cross-sections by more than 0.05 foot.

The results of this study indicate that the proposed development pad does not increase the base flood water surface elevation within this reach by more than approximately 0.05 foot (i.e., considerably less than one foot). Furthermore, the hydraulics in the area of the proposed development are largely controlled by tailwater effects associated with the downstream West Fork River; as such, the water surface profile in the area of the site is classified as a nearly level (i.e., approximate elevation 996 ft AMSL) M1 profile. Notably, even utilizing the higher discharge estimate (i.e., 5,600 cfs) did not impact this conclusion; results from both steady flow simulations (i.e., 4,210 cfs vs. 5,600 cfs) show negligible differences because of the predominate tailwater effects associated with West Fork River.

Based on the results of ARM's H&H evaluation presented herein, the geometry of the proposed 1210 well pad provided by HG will not cause a notable increase in flooding risks to this or any



other nearby properties as compared to the existing regulatory base flood. It should be noted that the 100-year floodplain (Zone A) delineated on the regulatory FEMA FIRM panel(s) was likely generated based on a relatively lower-resolution regional digital elevation model, and the results of recent detailed site-specific topographic surveying should be considered as appropriate when estimating the lateral extent of inundation within the survey boundary.

LIMITATIONS

All conclusions and recommendations presented in this report are based on the appropriateness of available regression equations and historic data by others, the assumption that the topographic and geometric conditions do not deviate appreciably from those presented herein, and other factors presented in this report. In the event that the proposed construction and/or anticipated geometry change with respect to those currently proposed or assumed, if significant development or other activities that can increase stormwater runoff are known to occur in upstream locations, or in the event that conditions encountered during construction are different from those described herein, ARM should be notified so supplementary recommendations can be provided, if warranted.

CLOSING

Please contact either of the undersigned at 717-533-8600 if you have any questions or comments regarding this report. We appreciate your time and look forward to an efficient review.

Sincerely,
ARM Group Inc.

DRAFT

Jeremy B. Byler, P.E., P.G.
Project Engineer and Geologist

DRAFT

Tessa Antolick, P.E.
Director – Oil and Gas Services

Attachments:

- Figure 1 - Site Location and Drainage Area Delineation Map
- Figure 2 - HEC-RAS Cross Section Location Map
- Appendix A – HEC-RAS Output (Pre-Project Conditions)
- Appendix B – HEC-RAS Output (Post-Project Conditions)



Figures

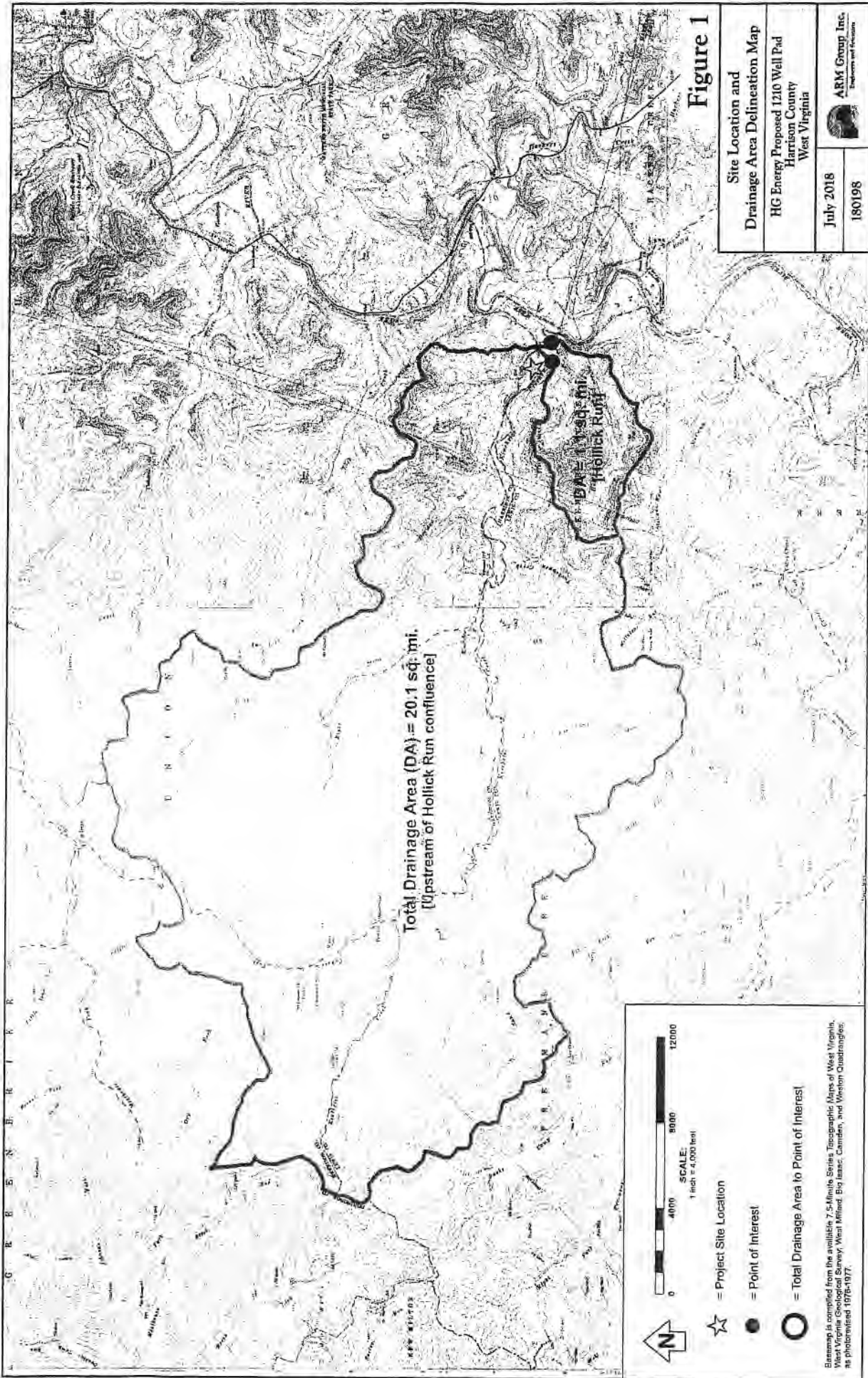








Figure 1

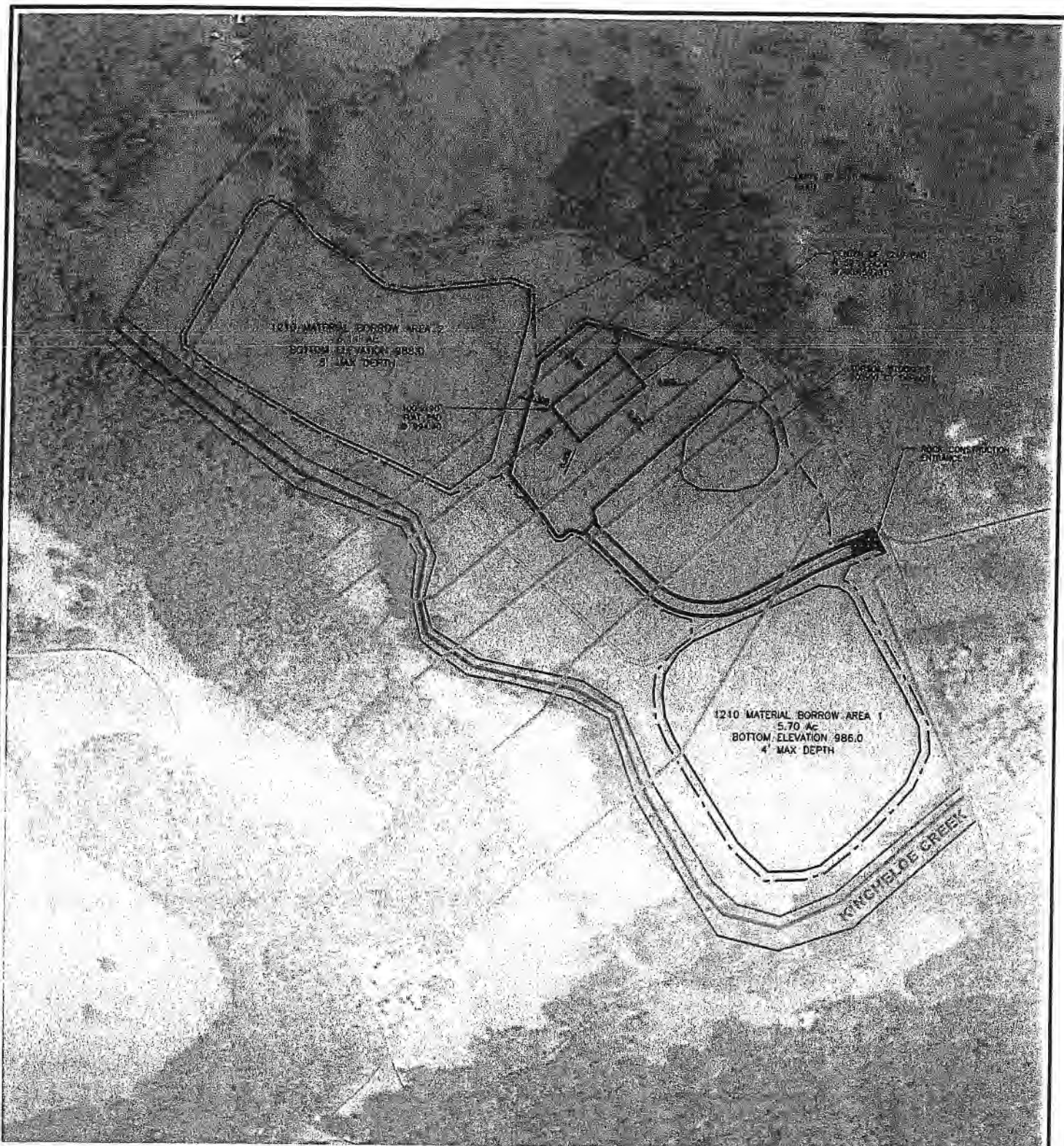
Site Location and Drainage Area Delineation Map	
HG Energy Proposed 1210 Well Pad Harrison County West Virginia	
July 2018	180198
 ARM Group Inc. Engineers and Geologists	



SCALE:
1 inch = 4,000 feet

-  = Project Site Location
-  = Point of Interest
-  = Total Drainage Area to Point of Interest

Base map is compiled from the available 7.5-Minute Series Topographic Maps of West Virginia, West Virginia Geological Survey, West Millard, Big Lassic, Cambrian, and Western Quadrangles, as photorevised 1975-1977.

P:\HG Energy\180198 PAD 1210 H+H\Documents\Engineering\H&H\Figure 2 - HEC-RAS Cross Section Location Map_rev1.dwg



Base map from available 2011 USDA NAIP aerial imagery.



HEC-RAS Cross Section Location Map

HG Energy Proposed 1210 Well Pad
Harrison County, West Virginia

July 2018	Scale: 1" = 300'	180198
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This drawing, its contents, and each component of this drawing are the property of and proprietary to ARM Group Inc. and shall not be reproduced or used in any manner except for the purpose identified on the Title Block, and only by or on behalf of this client for the identified project unless otherwise authorized by the express, written consent of ARM Group Inc.



ARM Group Inc.
Engineers and Scientists

Figure
2

APPENDIX A

HEC-RAS Output
(Pre-Project Conditions)

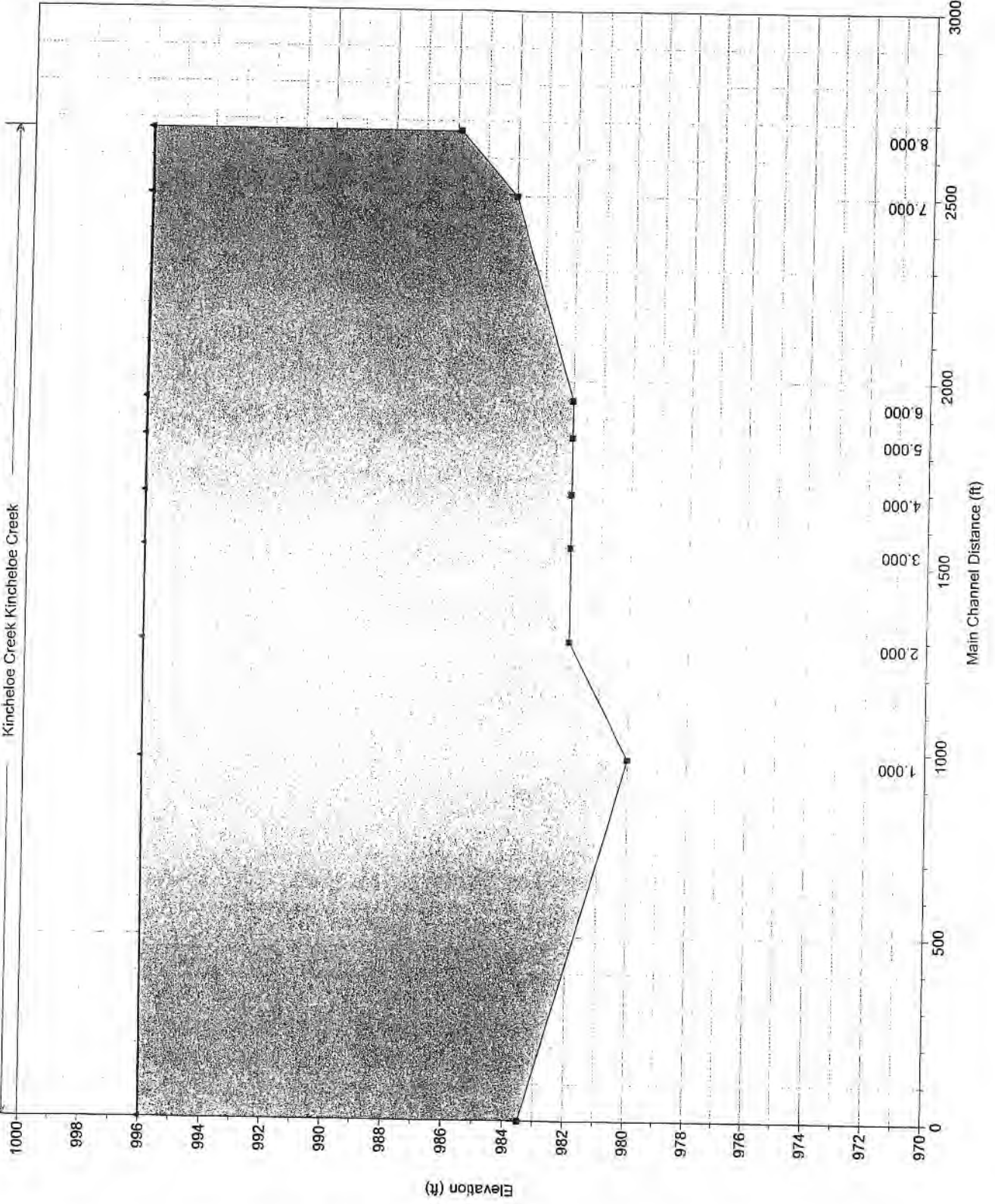
HEC-RAS Plan: Pre-Project River: Kincheloe Creek Reach: Kincheloe Creek

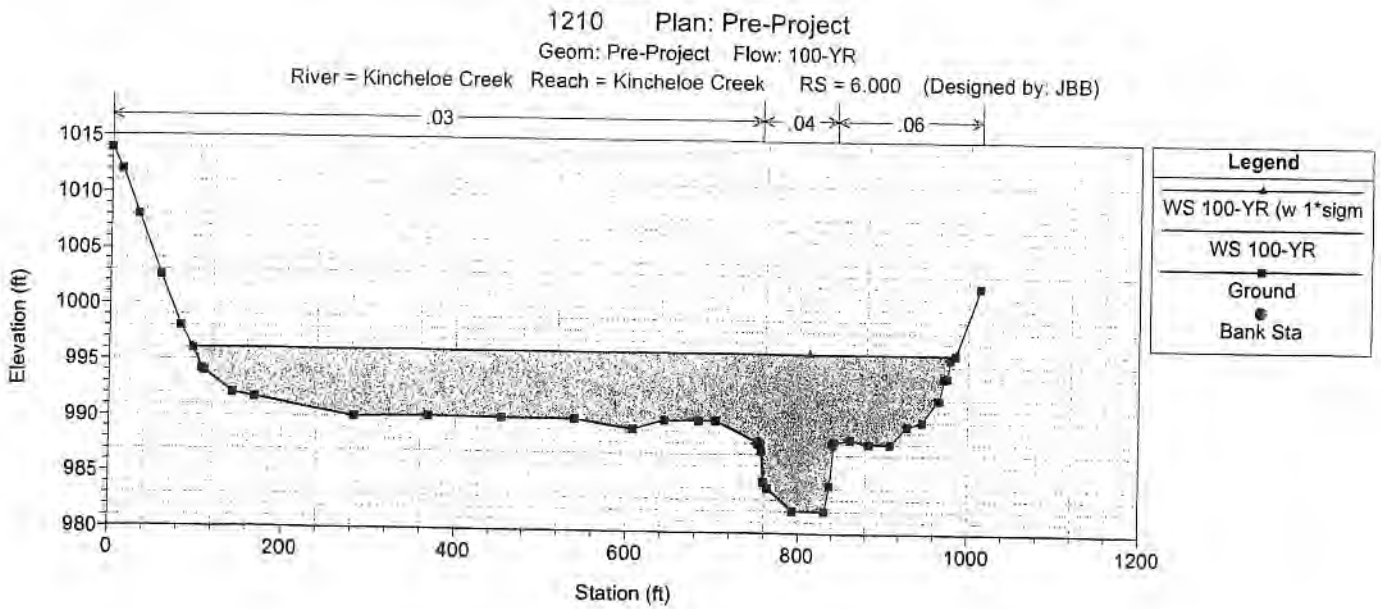
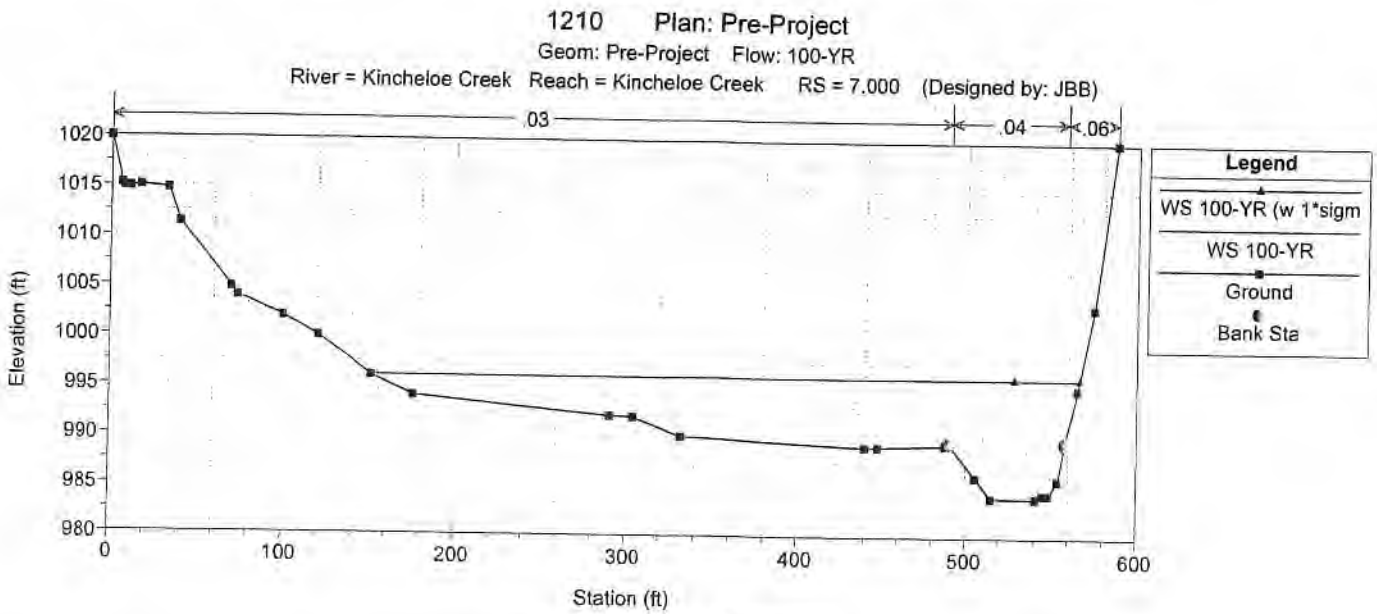
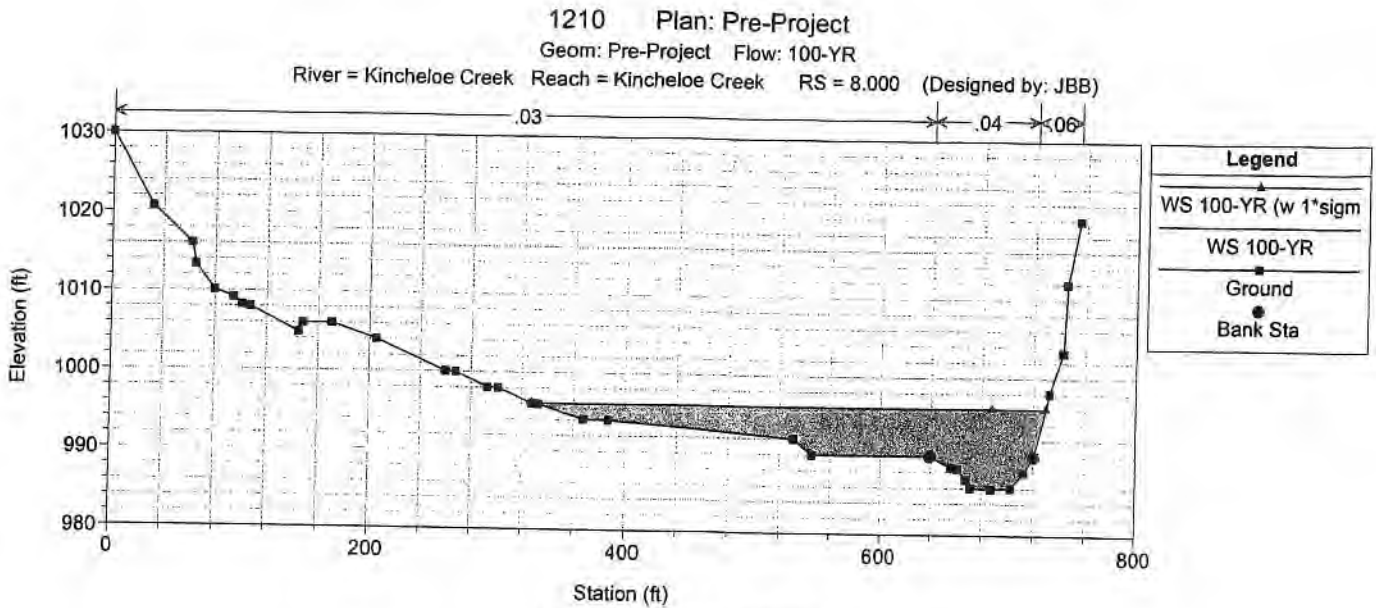
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Kincheloe Creek	8.000	100-YR	4210.00	985.87	996.04		996.13	0.000290	2.65	1883.17	401.44	0.16
Kincheloe Creek	8.000	100-YR (w 1'sigm)	5600.00	985.87	996.08		996.22	0.000502	3.49	1896.39	401.93	0.21
Kincheloe Creek	7.000	100-YR	4210.00	984.00	996.03		996.08	0.000142	2.10	2356.95	415.04	0.11
Kincheloe Creek	7.000	100-YR (w 1'sigm)	5600.00	984.00	996.05		996.14	0.000248	2.78	2366.56	415.24	0.15
Kincheloe Creek	6.000	100-YR	4210.00	982.00	996.04		996.05	0.000022	0.94	5802.51	888.30	0.05
Kincheloe Creek	6.000	100-YR (w 1'sigm)	5600.00	982.00	996.06		996.08	0.000038	1.24	5827.40	888.64	0.06
Kincheloe Creek	5.000	100-YR	4210.00	982.00	996.04		996.04	0.000022	0.88	6033.97	941.95	0.05
Kincheloe Creek	5.000	100-YR (w 1'sigm)	5600.00	982.00	996.06		996.08	0.000039	1.17	6059.22	942.23	0.06
Kincheloe Creek	4.000	100-YR	4210.00	982.00	996.03		996.04	0.000017	0.81	6102.90	934.20	0.04
Kincheloe Creek	4.000	100-YR (w 1'sigm)	5600.00	982.00	996.06		996.07	0.000029	1.07	6126.57	934.61	0.05
Kincheloe Creek	3.000	100-YR	4210.00	982.00	996.03		996.04	0.000009	0.61	7497.16	992.92	0.03
Kincheloe Creek	3.000	100-YR (w 1'sigm)	5600.00	982.00	996.06		996.07	0.000016	0.81	7522.56	993.17	0.04
Kincheloe Creek	2.000	100-YR	4210.00	982.00	996.03		996.04	0.000011	0.65	7437.12	962.44	0.03
Kincheloe Creek	2.000	100-YR (w 1'sigm)	5600.00	982.00	996.05		996.06	0.000019	0.86	7459.97	962.62	0.04
Kincheloe Creek	1.000	100-YR	4210.00	980.00	996.03		996.03	0.000009	0.57	7881.41	1034.32	0.03
Kincheloe Creek	1.000	100-YR (w 1'sigm)	5600.00	980.00	996.05		996.06	0.000016	0.76	7904.52	1034.50	0.04
Kincheloe Creek	0.000	100-YR	4360.00	983.50	996.00	986.66	996.02	0.000045	1.19	4276.69	664.36	0.06
Kincheloe Creek	0.000	100-YR (w 1'sigm)	5800.00	983.50	996.00	987.17	996.03	0.000079	1.59	4276.69	664.36	0.09

1210 Plan: Pre-Project
Geom: Pre-Project Flow: 100-YR (Designed by: JBB)

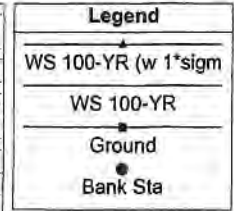
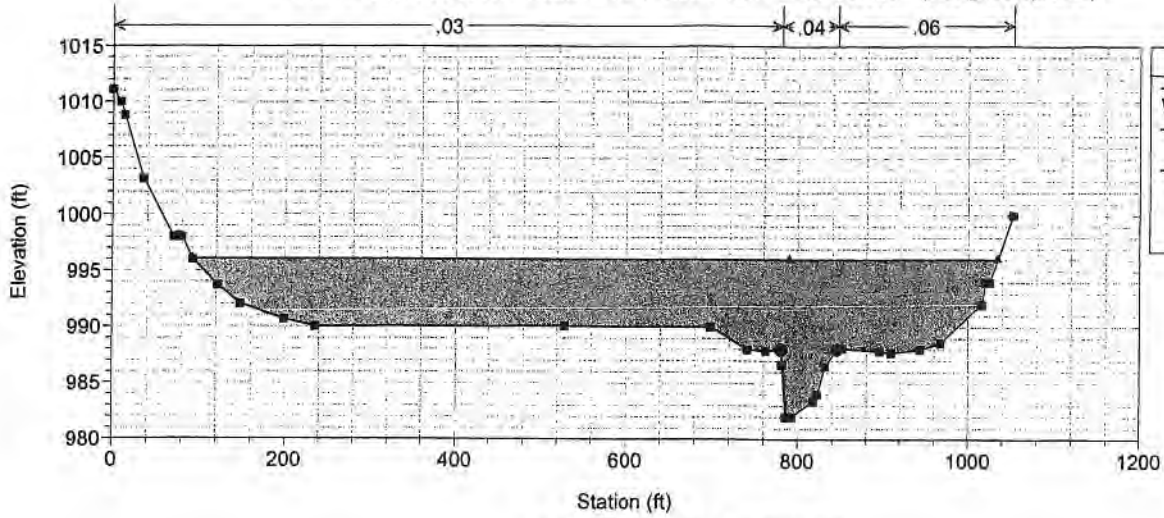
Kincheloe Creek Kincheloe Creek

Legend	
WS 100-YR	—
WS 100-YR (w 1*sigma)	—
Ground	—

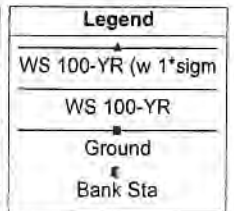
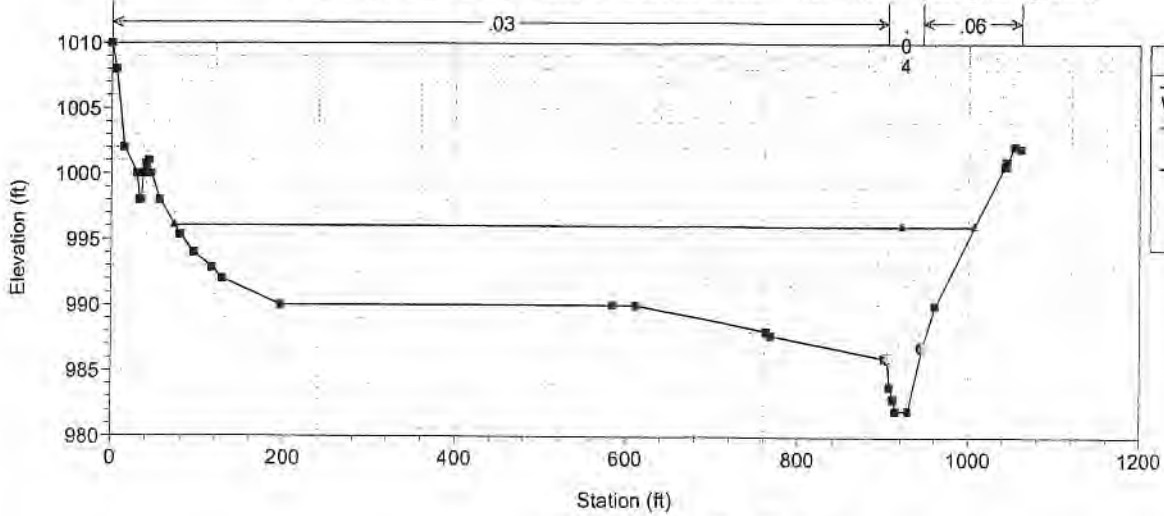




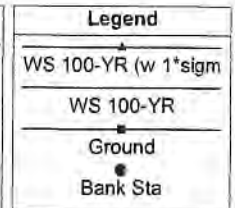
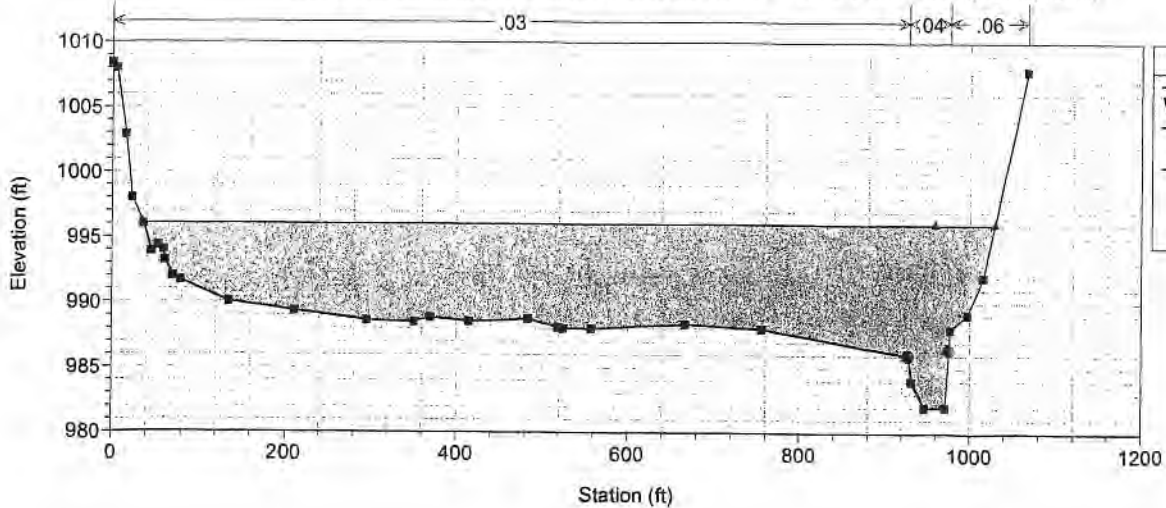
1210 Plan: Pre-Project
 Geom: Pre-Project Flow: 100-YR
 River = Kincheloe Creek Reach = Kincheloe Creek RS = 5.000 (Designed by: JBB)



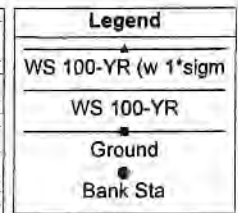
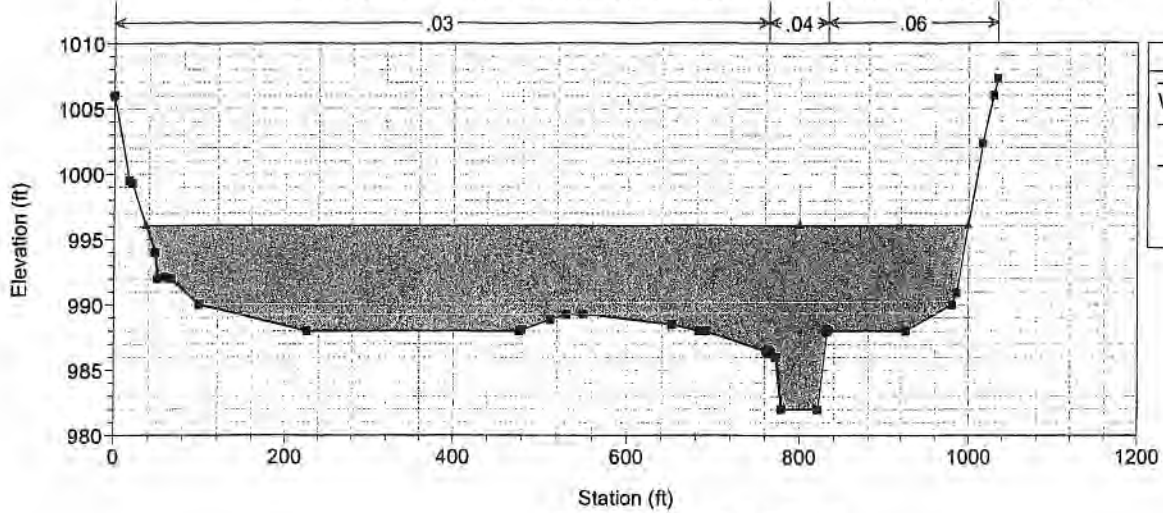
1210 Plan: Pre-Project
 Geom: Pre-Project Flow: 100-YR
 River = Kincheloe Creek Reach = Kincheloe Creek RS = 4.000 (Designed by: JBB)



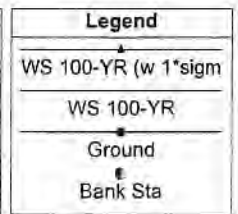
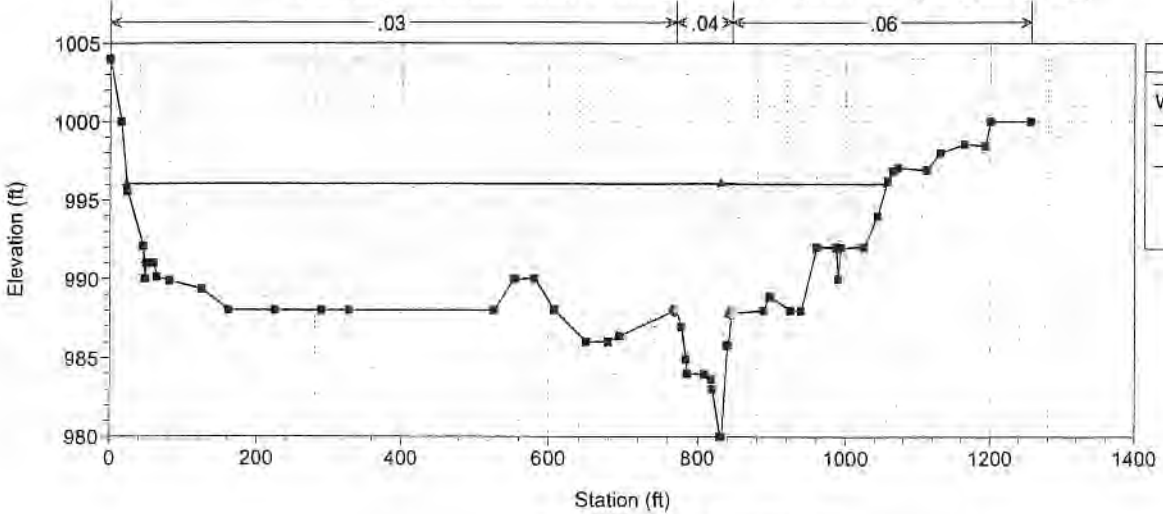
1210 Plan: Pre-Project
 Geom: Pre-Project Flow: 100-YR
 River = Kincheloe Creek Reach = Kincheloe Creek RS = 3.000 (Designed by: JBB)



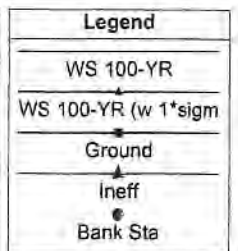
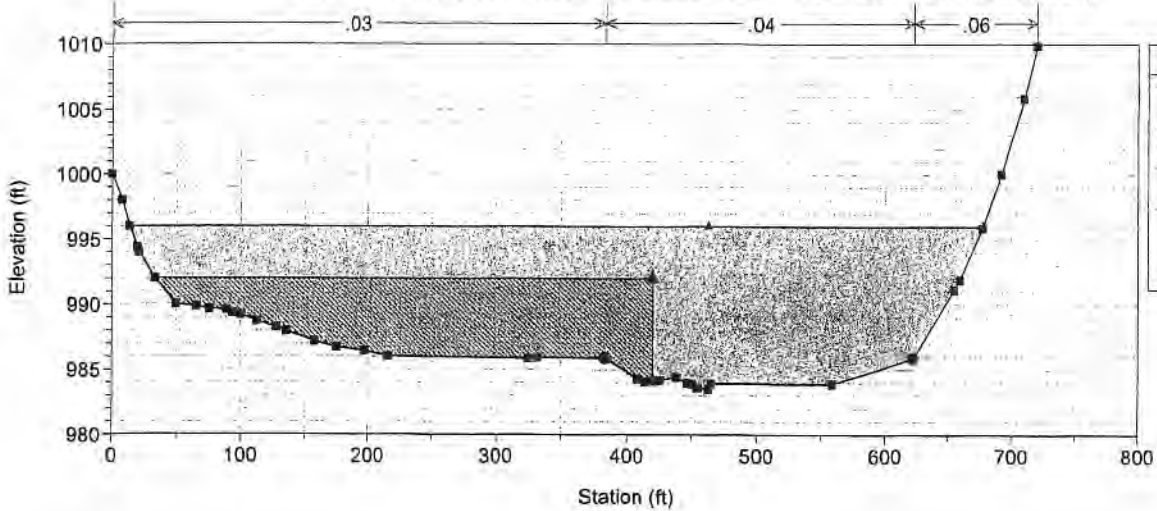
1210 Plan: Pre-Project
 Geom: Pre-Project Flow: 100-YR
 River = Kincheloe Creek Reach = Kincheloe Creek RS = 2.000 (Designed by: JBB)



1210 Plan: Pre-Project
 Geom: Pre-Project Flow: 100-YR
 River = Kincheloe Creek Reach = Kincheloe Creek RS = 1.000 (Designed by: JBB)



1210 Plan: Pre-Project
 Geom: Pre-Project Flow: 100-YR
 River = Kincheloe Creek Reach = Kincheloe Creek RS = 0.000 (Designed by: JBB)



Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 8.000 Profile: 100-YR

E.G. Elev (ft)	996.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.04	Reach Len. (ft)	175.00	175.00	175.00
Crit W.S. (ft)		Flow Area (sq ft)	1154.21	702.66	26.29
E.G. Slope (ft/ft)	0.000290	Area (sq ft)	1154.21	702.66	26.29
Q Total (cfs)	4210.00	Flow (cfs)	2329.03	1860.65	20.32
Top Width (ft)	401.44	Top Width (ft)	311.53	81.21	8.70
Vel Total (ft/s)	2.24	Avg. Vel. (ft/s)	2.02	2.65	0.77
Max Chl Dpth (ft)	10.17	Hydr. Depth (ft)	3.71	8.65	3.02
Conv. Total (cfs)	247327.6	Conv. (cfs)	136825.0	109308.9	1193.7
Length Wtd. (ft)	175.00	Wetted Per. (ft)	311.73	82.00	10.59
Min Ch El (ft)	985.87	Shear (lb/sq ft)	0.07	0.16	0.04
Alpha	1.07	Stream Power (lb/ft s)	754.55	0.00	0.00
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	195.76	73.77	42.32
C & E Loss (ft)	0.01	Cum SA (acres)	28.73	6.22	7.05

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 8.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.08	Reach Len. (ft)	175.00	175.00	175.00
Crit W.S. (ft)		Flow Area (sq ft)	1164.47	705.34	26.58
E.G. Slope (ft/ft)	0.000502	Area (sq ft)	1164.47	705.34	26.58
Q Total (cfs)	5600.00	Flow (cfs)	3108.20	2464.67	27.14
Top Width (ft)	401.93	Top Width (ft)	311.97	81.21	8.75
Vel Total (ft/s)	2.95	Avg. Vel. (ft/s)	2.67	3.49	1.02
Max Chl Dpth (ft)	10.21	Hydr. Depth (ft)	3.73	8.69	3.04
Conv. Total (cfs)	249937.8	Conv. (cfs)	138724.3	110002.4	1211.1
Length Wtd. (ft)	175.00	Wetted Per. (ft)	312.18	82.00	10.65
Min Ch El (ft)	985.87	Shear (lb/sq ft)	0.12	0.27	0.08
Alpha	1.07	Stream Power (lb/ft s)	754.55	0.00	0.00
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	196.40	73.86	42.47
C & E Loss (ft)	0.02	Cum SA (acres)	28.74	6.22	7.06

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 7.000 Profile: 100-YR

E.G. Elev (ft)	996.08	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.03	Reach Len. (ft)	500.00	550.00	650.00
Crit W.S. (ft)		Flow Area (sq ft)	1605.59	724.28	27.08
E.G. Slope (ft/ft)	0.000142	Area (sq ft)	1605.59	724.28	27.08
Q Total (cfs)	4210.00	Flow (cfs)	2674.64	1520.32	15.04
Top Width (ft)	415.04	Top Width (ft)	338.83	67.91	8.29
Vel Total (ft/s)	1.79	Avg. Vel. (ft/s)	1.67	2.10	0.56
Max Chl Dpth (ft)	12.03	Hydr. Depth (ft)	4.74	10.67	3.27
Conv. Total (cfs)	353021.2	Conv. (cfs)	224276.3	127483.8	1261.1
Length Wtd. (ft)	522.18	Wetted Per. (ft)	339.02	70.22	10.50
Min Ch El (ft)	984.00	Shear (lb/sq ft)	0.04	0.09	0.02
Alpha	1.05	Stream Power (lb/ft s)	587.40	0.00	0.00
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	190.22	70.90	42.21
C & E Loss (ft)	0.01	Cum SA (acres)	27.42	5.92	7.02

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 7.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.05	Reach Len. (ft)	500.00	550.00	650.00
Crit W.S. (ft)		Flow Area (sq ft)	1613.43	725.85	27.27
E.G. Slope (ft/ft)	0.000248	Area (sq ft)	1613.43	725.85	27.27
Q Total (cfs)	5600.00	Flow (cfs)	3563.02	2016.91	20.07
Top Width (ft)	415.24	Top Width (ft)	339.01	67.91	8.32
Vel Total (ft/s)	2.37	Avg. Vel. (ft/s)	2.21	2.78	0.74
Max Chl Dpth (ft)	12.05	Hydr. Depth (ft)	4.76	10.69	3.28
Conv. Total (cfs)	355242.8	Conv. (cfs)	226024.7	127944.9	1273.2
Length Wtd. (ft)	522.14	Wetted Per. (ft)	339.20	70.22	10.54
Min Ch El (ft)	984.00	Shear (lb/sq ft)	0.07	0.16	0.04
Alpha	1.05	Stream Power (lb/ft s)	587.40	0.00	0.00
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	190.82	70.98	42.37
C & E Loss (ft)	0.02	Cum SA (acres)	27.43	5.92	7.03

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 6.000 Profile: 100-YR

E.G. Elev (ft)	996.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.04	Reach Len. (ft)	95.00	100.00	92.00
Crit W.S. (ft)		Flow Area (sq ft)	3739.46	1148.25	914.80
E.G. Slope (ft/ft)	0.000022	Area (sq ft)	3739.46	1148.25	914.80
Q Total (cfs)	4210.00	Flow (cfs)	2768.10	1078.04	363.86
Top Width (ft)	888.30	Top Width (ft)	656.42	88.53	143.35
Vel Total (ft/s)	0.73	Avg. Vel. (ft/s)	0.74	0.94	0.40
Max Chl Dpth (ft)	14.04	Hydr. Depth (ft)	5.70	12.97	6.38
Conv. Total (cfs)	898255.8	Conv. (cfs)	590608.2	230013.6	77634.1
Length Wtd. (ft)	95.72	Wetted Per. (ft)	656.72	91.70	144.21
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.01	0.02	0.01
Alpha	1.14	Stream Power (lb/ft s)	1013.19	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	159.54	59.08	35.18
C & E Loss (ft)	0.00	Cum SA (acres)	21.71	4.94	5.89

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 6.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.08	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.06	Reach Len. (ft)	95.00	100.00	92.00
Crit W.S. (ft)		Flow Area (sq ft)	3757.85	1150.73	918.82
E.G. Slope (ft/ft)	0.000038	Area (sq ft)	3757.85	1150.73	918.82
Q Total (cfs)	5600.00	Flow (cfs)	3686.56	1429.48	483.97
Top Width (ft)	888.64	Top Width (ft)	656.63	88.53	143.48
Vel Total (ft/s)	0.96	Avg. Vel. (ft/s)	0.98	1.24	0.53
Max Chl Dpth (ft)	14.06	Hydr. Depth (ft)	5.72	13.00	6.40
Conv. Total (cfs)	904328.2	Conv. (cfs)	595331.4	230842.2	78154.6
Length Wtd. (ft)	95.72	Wetted Per. (ft)	656.93	91.70	144.35
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.01	0.03	0.02
Alpha	1.14	Stream Power (lb/ft s)	1013.19	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	159.99	59.14	35.31
C & E Loss (ft)	0.00	Cum SA (acres)	21.72	4.94	5.89

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 5.000 Profile: 100-YR

E.G. Elev (ft)	996.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.04	Reach Len. (ft)	126.00	153.00	110.00
Crit W.S. (ft)		Flow Area (sq ft)	3970.25	771.39	1292.34
E.G. Slope (ft/ft)	0.000022	Area (sq ft)	3970.25	771.39	1292.34
Q Total (cfs)	4210.00	Flow (cfs)	2985.83	680.89	543.28
Top Width (ft)	941.95	Top Width (ft)	688.16	65.14	188.65
Vel Total (ft/s)	0.70	Avg. Vel. (ft/s)	0.75	0.88	0.42
Max Chl Dpth (ft)	14.04	Hydr. Depth (ft)	5.77	11.84	6.85
Conv. Total (cfs)	891737.1	Conv. (cfs)	632439.7	144222.2	115075.2
Length Wtd. (ft)	128.39	Wetted Per. (ft)	688.38	68.32	189.56
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.01	0.02	0.01
Alpha	1.13	Stream Power (lb/ft s)	1051.58	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	151.13	56.88	32.85
C & E Loss (ft)	0.00	Cum SA (acres)	20.25	4.76	5.54

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 5.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.08	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.06	Reach Len. (ft)	126.00	153.00	110.00
Crit W.S. (ft)		Flow Area (sq ft)	3988.69	773.13	1297.40
E.G. Slope (ft/ft)	0.000039	Area (sq ft)	3988.69	773.13	1297.40
Q Total (cfs)	5600.00	Flow (cfs)	3974.83	903.00	722.18
Top Width (ft)	942.23	Top Width (ft)	688.33	65.14	188.77
Vel Total (ft/s)	0.92	Avg. Vel. (ft/s)	1.00	1.17	0.56
Max Chl Dpth (ft)	14.06	Hydr. Depth (ft)	5.79	11.87	6.87
Conv. Total (cfs)	897780.0	Conv. (cfs)	637235.8	144766.4	115777.8
Length Wtd. (ft)	128.39	Wetted Per. (ft)	688.55	68.32	189.68
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.01	0.03	0.02
Alpha	1.13	Stream Power (lb/ft s)	1051.58	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	151.55	56.93	32.97
C & E Loss (ft)	0.00	Cum SA (acres)	20.25	4.76	5.54

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 4.000 Profile: 100-YR

E.G. Elev (ft)	996.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.03	Reach Len. (ft)	120.00	145.00	145.00
Crit W.S. (ft)		Flow Area (sq ft)	5320.61	528.98	253.31
E.G. Slope (ft/ft)	0.000017	Area (sq ft)	5320.61	528.98	253.31
Q Total (cfs)	4210.00	Flow (cfs)	3717.18	426.95	65.87
Top Width (ft)	934.20	Top Width (ft)	831.63	41.63	60.94
Vel Total (ft/s)	0.69	Avg. Vel. (ft/s)	0.70	0.81	0.26
Max Chl Dpth (ft)	14.03	Hydr. Depth (ft)	6.40	12.71	4.16
Conv. Total (cfs)	1028445.0	Conv. (cfs)	908056.1	104297.3	16091.1
Length Wtd. (ft)	122.84	Wetted Per. (ft)	831.85	43.26	61.66
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.01	0.01	0.00
Alpha	1.05	Stream Power (lb/ft s)	1060.69	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	137.69	54.60	30.90
C & E Loss (ft)	0.00	Cum SA (acres)	18.05	4.57	5.22

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 4.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.06	Reach Len. (ft)	120.00	145.00	145.00
Crit W.S. (ft)		Flow Area (sq ft)	5341.68	530.04	254.86
E.G. Slope (ft/ft)	0.000029	Area (sq ft)	5341.68	530.04	254.86
Q Total (cfs)	5600.00	Flow (cfs)	4945.89	566.32	87.79
Top Width (ft)	934.61	Top Width (ft)	831.85	41.63	61.13
Vel Total (ft/s)	0.91	Avg. Vel. (ft/s)	0.93	1.07	0.34
Max Chl Dpth (ft)	14.06	Hydr. Depth (ft)	6.42	12.73	4.17
Conv. Total (cfs)	1034758.0	Conv. (cfs)	913893.3	104644.1	16221.1
Length Wtd. (ft)	122.84	Wetted Per. (ft)	832.07	43.26	61.86
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.01	0.02	0.01
Alpha	1.05	Stream Power (lb/ft s)	1060.69	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	138.05	54.64	31.01
C & E Loss (ft)	0.00	Cum SA (acres)	18.05	4.57	5.23

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 3.000 Profile: 100-YR

E.G. Elev (ft)	996.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.03	Reach Len. (ft)	180.00	253.00	253.00
Crit W.S. (ft)		Flow Area (sq ft)	6560.08	649.64	287.45
E.G. Slope (ft/ft)	0.000009	Area (sq ft)	6560.08	649.64	287.45
Q Total (cfs)	4210.00	Flow (cfs)	3745.14	399.10	65.76
Top Width (ft)	992.92	Top Width (ft)	891.24	48.99	52.68
Vel Total (ft/s)	0.56	Avg. Vel. (ft/s)	0.57	0.61	0.23
Max Chl Dpth (ft)	14.03	Hydr. Depth (ft)	7.36	13.26	5.46
Conv. Total (cfs)	1381499.0	Conv. (cfs)	1228957.0	130961.8	21580.3
Length Wtd. (ft)	192.09	Wetted Per. (ft)	891.82	51.39	54.46
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.00	0.01	0.00
Alpha	1.04	Stream Power (lb/ft s)	1066.34	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	121.33	52.63	30.00
C & E Loss (ft)	0.00	Cum SA (acres)	15.68	4.42	5.03

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 3.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.06	Reach Len. (ft)	180.00	253.00	253.00
Crit W.S. (ft)		Flow Area (sq ft)	6582.87	650.89	288.80
E.G. Slope (ft/ft)	0.000016	Area (sq ft)	6582.87	650.89	288.80
Q Total (cfs)	5600.00	Flow (cfs)	4982.73	529.68	87.59
Top Width (ft)	993.17	Top Width (ft)	891.41	48.99	52.77
Vel Total (ft/s)	0.74	Avg. Vel. (ft/s)	0.76	0.81	0.30
Max Chl Dpth (ft)	14.06	Hydr. Depth (ft)	7.38	13.29	5.47
Conv. Total (cfs)	1389033.0	Conv. (cfs)	1235923.0	131383.1	21726.8
Length Wtd. (ft)	192.07	Wetted Per. (ft)	892.00	51.39	54.54
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.01	0.01	0.01
Alpha	1.04	Stream Power (lb/ft s)	1066.34	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	121.63	52.67	30.10
C & E Loss (ft)	0.00	Cum SA (acres)	15.68	4.42	5.04

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 2.000 Profile: 100-YR

E.G. Elev (ft)	996.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.03	Reach Len. (ft)	217.00	317.00	277.00
Crit W.S. (ft)		Flow Area (sq ft)	5357.80	879.11	1200.21
E.G. Slope (ft/ft)	0.000011	Area (sq ft)	5357.80	879.11	1200.21
Q Total (cfs)	4210.00	Flow (cfs)	3280.38	570.18	359.44
Top Width (ft)	962.44	Top Width (ft)	726.53	68.50	167.41
Vel Total (ft/s)	0.57	Avg. Vel. (ft/s)	0.61	0.65	0.30
Max Chl Dpth (ft)	14.03	Hydr. Depth (ft)	7.37	12.83	7.17
Conv. Total (cfs)	1289176.0	Conv. (cfs)	1004510.0	174600.0	110065.4
Length Wtd. (ft)	234.56	Wetted Per. (ft)	727.52	71.11	168.43
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.00	0.01	0.00
Alpha	1.11	Stream Power (lb/ft s)	1034.50	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	96.71	48.19	25.68
C & E Loss (ft)	0.00	Cum SA (acres)	12.33	4.08	4.40

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 2.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.05	Reach Len. (ft)	217.00	317.00	277.00
Crit W.S. (ft)		Flow Area (sq ft)	5375.05	880.74	1204.18
E.G. Slope (ft/ft)	0.000019	Area (sq ft)	5375.05	880.74	1204.18
Q Total (cfs)	5600.00	Flow (cfs)	4364.74	757.02	478.25
Top Width (ft)	962.62	Top Width (ft)	726.65	68.50	167.48
Vel Total (ft/s)	0.75	Avg. Vel. (ft/s)	0.81	0.86	0.40
Max Chl Dpth (ft)	14.05	Hydr. Depth (ft)	7.40	12.86	7.19
Conv. Total (cfs)	1295578.0	Conv. (cfs)	1009796.0	175138.7	110643.6
Length Wtd. (ft)	234.54	Wetted Per. (ft)	727.64	71.11	168.50
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.01	0.01	0.01
Alpha	1.11	Stream Power (lb/ft s)	1034.50	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	96.92	48.23	25.77
C & E Loss (ft)	0.00	Cum SA (acres)	12.33	4.08	4.40

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 1.000 Profile: 100-YR

E.G. Elev (ft)	996.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.03	Reach Len. (ft)	675.00	980.00	1050.00
Crit W.S. (ft)		Flow Area (sq ft)	5773.57	907.36	1200.48
E.G. Slope (ft/ft)	0.000009	Area (sq ft)	5773.57	907.36	1200.48
Q Total (cfs)	4210.00	Flow (cfs)	3402.34	519.76	287.89
Top Width (ft)	1034.32	Top Width (ft)	747.69	76.17	210.46
Vel Total (ft/s)	0.53	Avg. Vel. (ft/s)	0.59	0.57	0.24
Max Chl Dpth (ft)	16.03	Hydr. Depth (ft)	7.72	11.91	5.70
Conv. Total (cfs)	1380234.0	Conv. (cfs)	1115446.0	170402.6	94385.3
Length Wtd. (ft)	820.37	Wetted Per. (ft)	749.46	79.82	212.23
Min Ch El (ft)	980.00	Shear (lb/sq ft)	0.00	0.01	0.00
Alpha	1.14	Stream Power (lb/ft s)	1256.31	0.00	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	68.98	41.69	18.05
C & E Loss (ft)	0.00	Cum SA (acres)	8.66	3.55	3.19

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 1.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.05	Reach Len. (ft)	675.00	980.00	1050.00
Crit W.S. (ft)		Flow Area (sq ft)	5790.27	909.06	1205.19
E.G. Slope (ft/ft)	0.000016	Area (sq ft)	5790.27	909.06	1205.19
Q Total (cfs)	5600.00	Flow (cfs)	4526.20	690.31	383.49
Top Width (ft)	1034.50	Top Width (ft)	747.73	76.17	210.60
Vel Total (ft/s)	0.71	Avg. Vel. (ft/s)	0.78	0.76	0.32
Max Chl Dpth (ft)	16.05	Hydr. Depth (ft)	7.74	11.93	5.72
Conv. Total (cfs)	1386679.0	Conv. (cfs)	1120784.0	170935.5	94959.7
Length Wtd. (ft)	820.36	Wetted Per. (ft)	749.51	79.82	212.37
Min Ch El (ft)	980.00	Shear (lb/sq ft)	0.01	0.01	0.01
Alpha	1.14	Stream Power (lb/ft s)	1256.31	0.00	0.00
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	69.11	41.71	18.11
C & E Loss (ft)	0.00	Cum SA (acres)	8.66	3.55	3.20

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 0.000 Profile: 100-YR

E.G. Elev (ft)	996.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.00	Reach Len. (ft)			
Crit W.S. (ft)	986.66	Flow Area (sq ft)	1445.31	2534.30	297.07
E.G. Slope (ft/ft)	0.000045	Area (sq ft)	3129.51	2799.14	297.07
Q Total (cfs)	4360.00	Flow (cfs)	1183.68	3026.02	150.30
Top Width (ft)	664.36	Top Width (ft)	370.13	239.70	54.53
Vel Total (ft/s)	1.02	Avg. Vel. (ft/s)	0.82	1.19	0.51
Max Chl Dpth (ft)	12.50	Hydr. Depth (ft)	3.90	10.57	5.45
Conv. Total (cfs)	653161.3	Conv. (cfs)	177323.9	453320.6	22516.8
Length Wtd. (ft)		Wetted Per. (ft)	370.74	239.85	55.48
Min Ch El (ft)	983.50	Shear (lb/sq ft)	0.01	0.03	0.01
Alpha	1.14	Stream Power (lb/ft s)	720.30	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 0.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.00	Reach Len. (ft)			
Crit W.S. (ft)	987.17	Flow Area (sq ft)	1445.31	2534.30	297.07
E.G. Slope (ft/ft)	0.000079	Area (sq ft)	3129.51	2799.14	297.07
Q Total (cfs)	5800.00	Flow (cfs)	1574.62	4025.44	199.95
Top Width (ft)	664.36	Top Width (ft)	370.13	239.70	54.53
Vel Total (ft/s)	1.36	Avg. Vel. (ft/s)	1.09	1.59	0.67
Max Chl Dpth (ft)	12.50	Hydr. Depth (ft)	3.90	10.57	5.45
Conv. Total (cfs)	653161.3	Conv. (cfs)	177323.9	453320.6	22516.8
Length Wtd. (ft)		Wetted Per. (ft)	370.74	239.85	55.48
Min Ch El (ft)	983.50	Shear (lb/sq ft)	0.02	0.05	0.03
Alpha	1.14	Stream Power (lb/ft s)	720.30	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

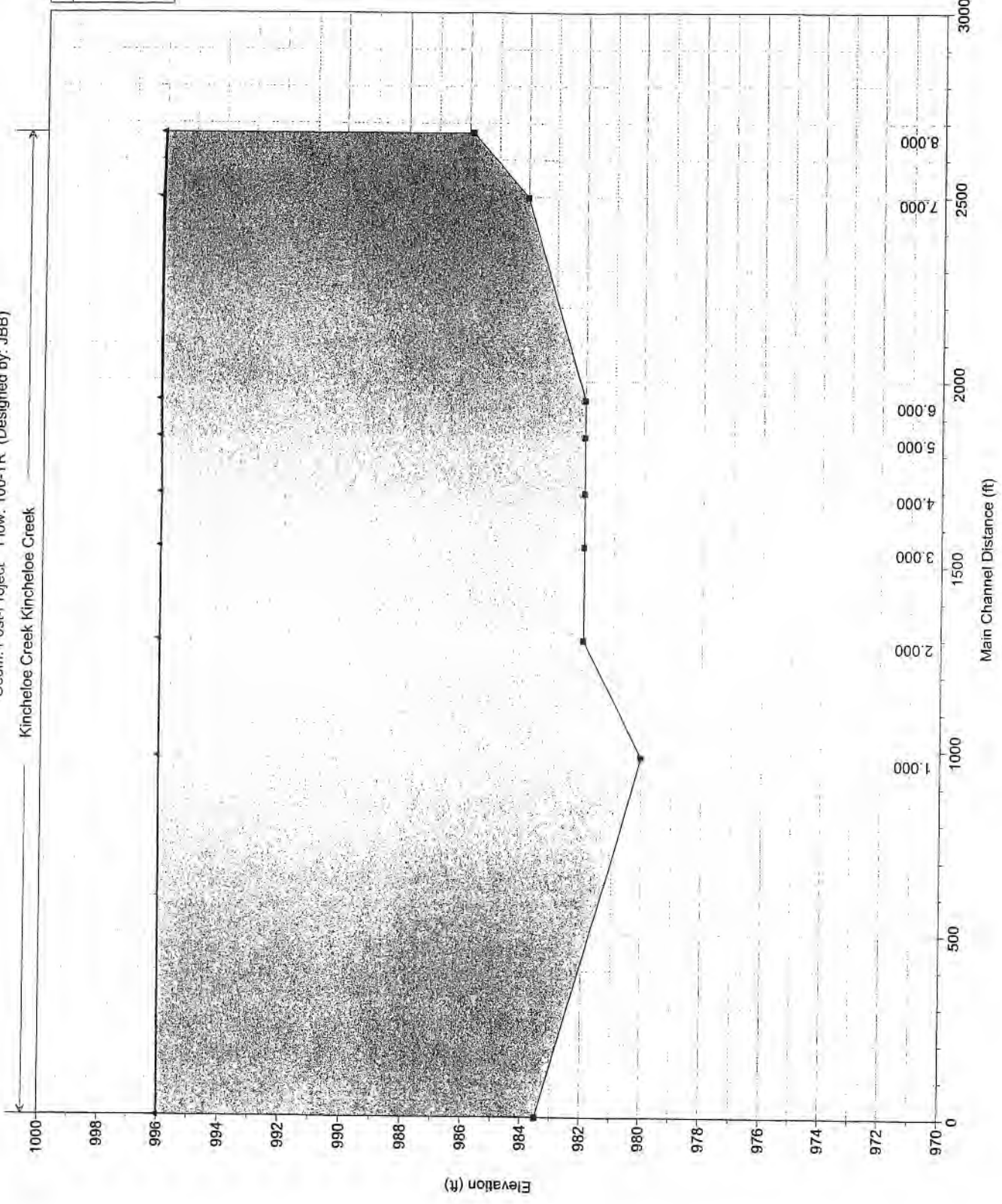
APPENDIX B

HEC-RAS Output
(Post-Project Conditions)

HEC-RAS Plan: Post-Project River: Kincheloe Creek Reach: Kincheloe Creek

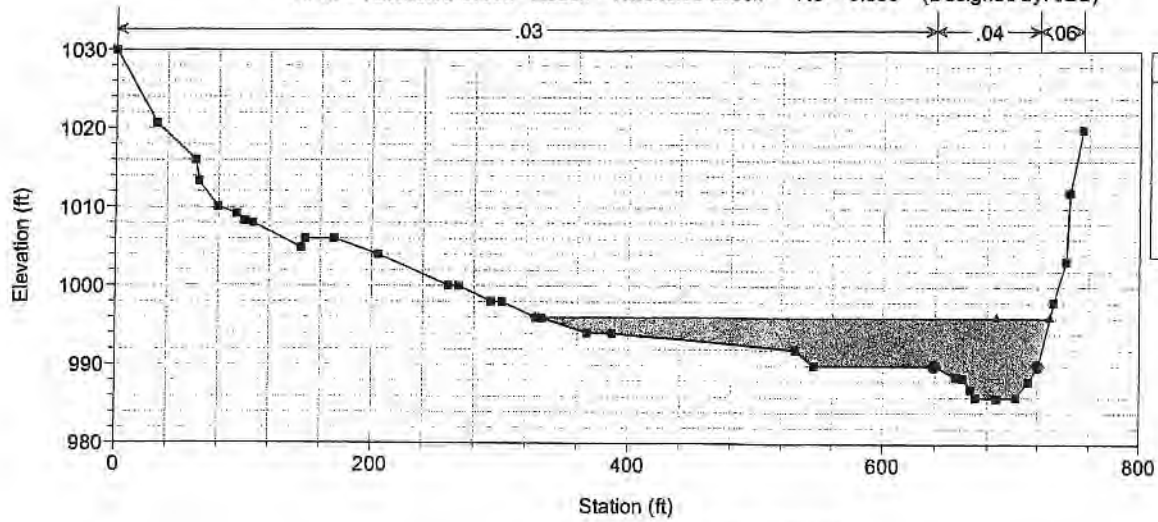
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Kincheloe Creek	8.000	100-YR	4210.00	985.87	996.03		996.11	0.000292	2.66	1877.88	401.24	0.16
Kincheloe Creek	8.000	100-YR (w 1*sigm	5600.00	985.87	996.05		996.20	0.000510	3.51	1887.00	401.58	0.21
Kincheloe Creek	7.000	100-YR	4210.00	984.00	996.06		996.08	0.000045	1.18	3539.42	477.84	0.06
Kincheloe Creek	7.000	100-YR (w 1*sigm	5600.00	984.00	996.10		996.14	0.000077	1.55	3559.90	477.97	0.08
Kincheloe Creek	6.000	100-YR	4210.00	982.00	996.05	987.10	996.06	0.000026	1.01	4934.36	635.07	0.05
Kincheloe Creek	6.000	100-YR (w 1*sigm	5600.00	982.00	996.08	989.04	996.10	0.000045	1.34	4956.58	635.23	0.07
Kincheloe Creek	5.000	100-YR	4210.00	982.00	996.03	989.50	996.05	0.000060	1.45	3756.91	524.03	0.07
Kincheloe Creek	5.000	100-YR (w 1*sigm	5600.00	982.00	996.05	990.00	996.10	0.000105	1.92	3769.07	524.13	0.10
Kincheloe Creek	4.000	100-YR	4210.00	982.00	996.02	988.98	996.05	0.000048	1.36	3325.71	433.44	0.07
Kincheloe Creek	4.000	100-YR (w 1*sigm	5600.00	982.00	996.04	989.52	996.08	0.000084	1.81	3332.35	433.55	0.09
Kincheloe Creek	3.000	100-YR	4210.00	982.00	996.03		996.04	0.000017	0.84	5696.90	807.26	0.04
Kincheloe Creek	3.000	100-YR (w 1*sigm	5600.00	982.00	996.05		996.07	0.000031	1.11	5715.04	807.61	0.05
Kincheloe Creek	2.000	100-YR	4210.00	982.00	996.03		996.03	0.000013	0.72	7034.10	962.42	0.04
Kincheloe Creek	2.000	100-YR (w 1*sigm	5600.00	982.00	996.05		996.06	0.000023	0.95	7054.95	962.59	0.05
Kincheloe Creek	1.000	100-YR	4210.00	980.00	996.03		996.03	0.000007	0.50	8477.37	1034.31	0.03
Kincheloe Creek	1.000	100-YR (w 1*sigm	5600.00	980.00	996.05		996.06	0.000012	0.66	8499.09	1034.48	0.03
Kincheloe Creek	0.000	100-YR	4360.00	983.50	996.00	986.66	996.02	0.000045	1.19	4276.69	664.36	0.06
Kincheloe Creek	0.000	100-YR (w 1*sigm	5800.00	983.50	996.00	987.17	996.03	0.000079	1.59	4276.69	664.36	0.09

1210 Plan: Post-Project
 Geom: Post-Project Flow: 100-YR (Designed by: JBB)
 Kincheloe Creek (Kincheloe Creek)



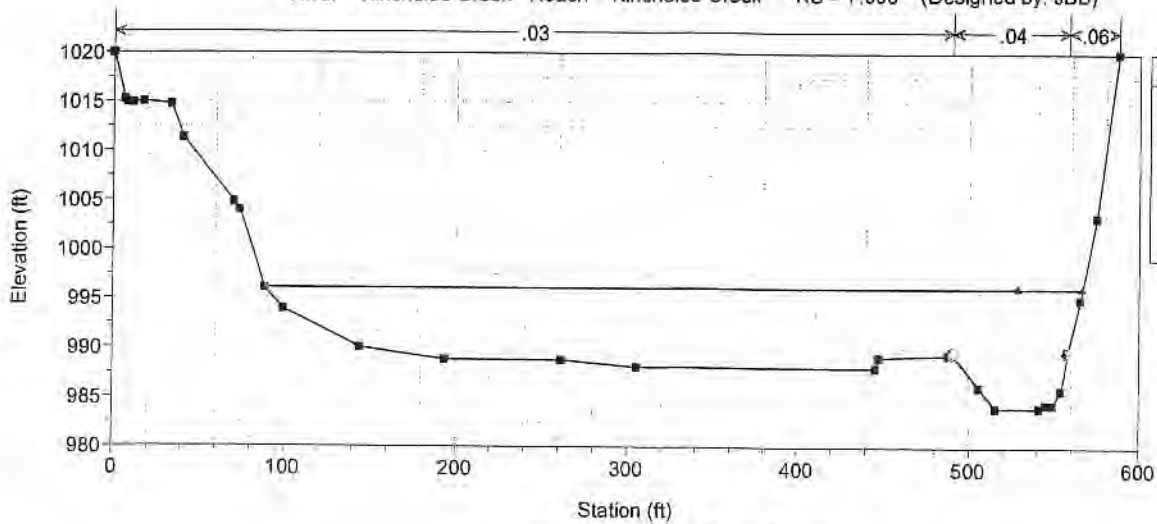
Legend	
WS 100-YR	(Symbol: Solid line with square markers)
WS 100-YR (w 1*sigma)	(Symbol: Dashed line with square markers)
Ground	(Symbol: Solid line with square markers)

1210 Plan: Post-Project
 Geom: Post-Project Flow: 100-YR
 River = Kincheloe Creek Reach = Kincheloe Creek RS = 8.000 (Designed by: JBB)



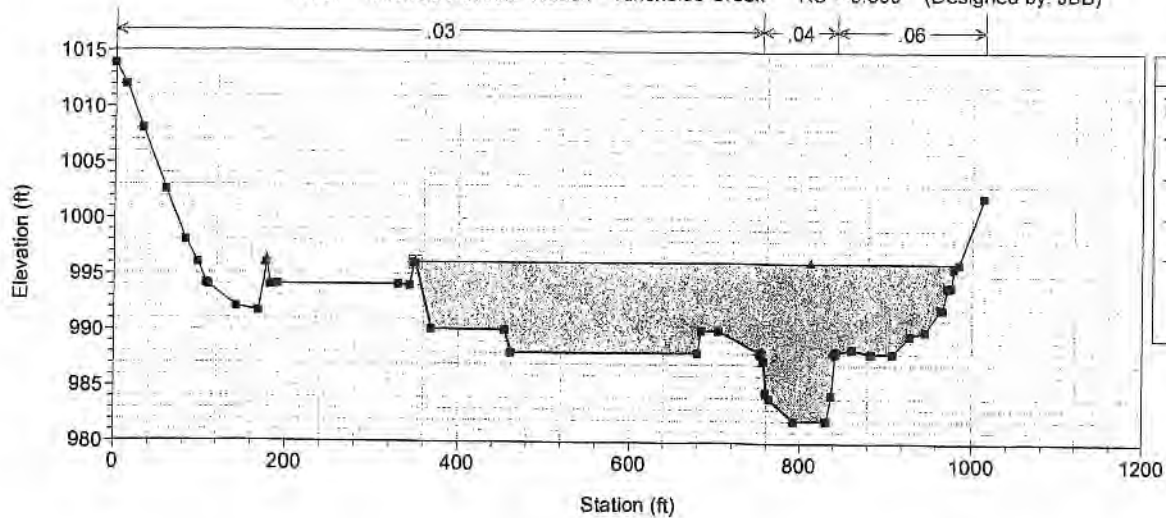
Legend	
▲	WS 100-YR (w 1*sigma)
—	WS 100-YR
■	Ground
●	Bank Sta

1210 Plan: Post-Project
 Geom: Post-Project Flow: 100-YR
 River = Kincheloe Creek Reach = Kincheloe Creek RS = 7.000 (Designed by: JBB)



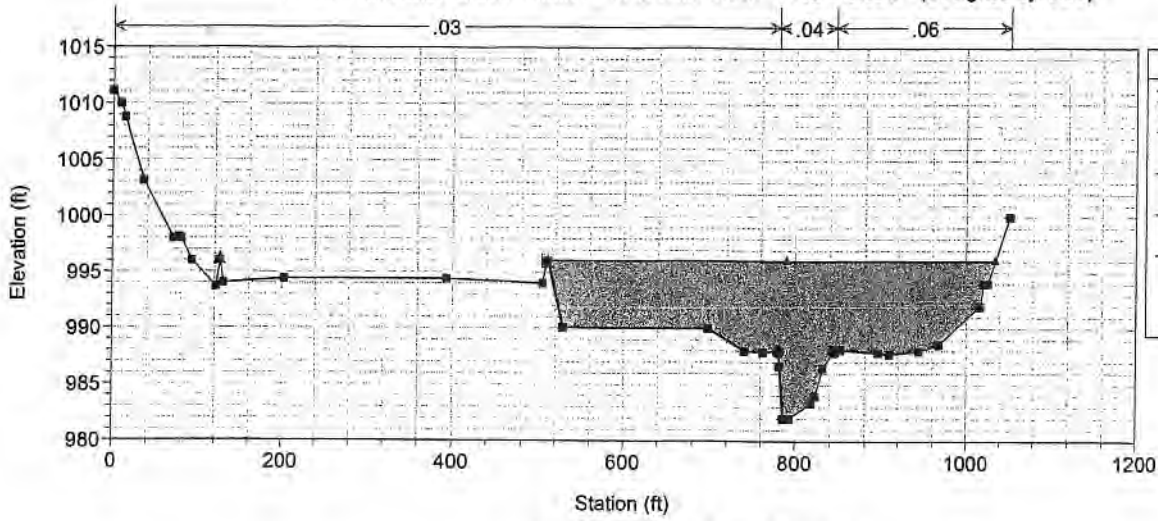
Legend	
▲	WS 100-YR (w 1*sigma)
—	WS 100-YR
■	Ground
€	Bank Sta

1210 Plan: Post-Project
 Geom: Post-Project Flow: 100-YR
 River = Kincheloe Creek Reach = Kincheloe Creek RS = 6.000 (Designed by: JBB)

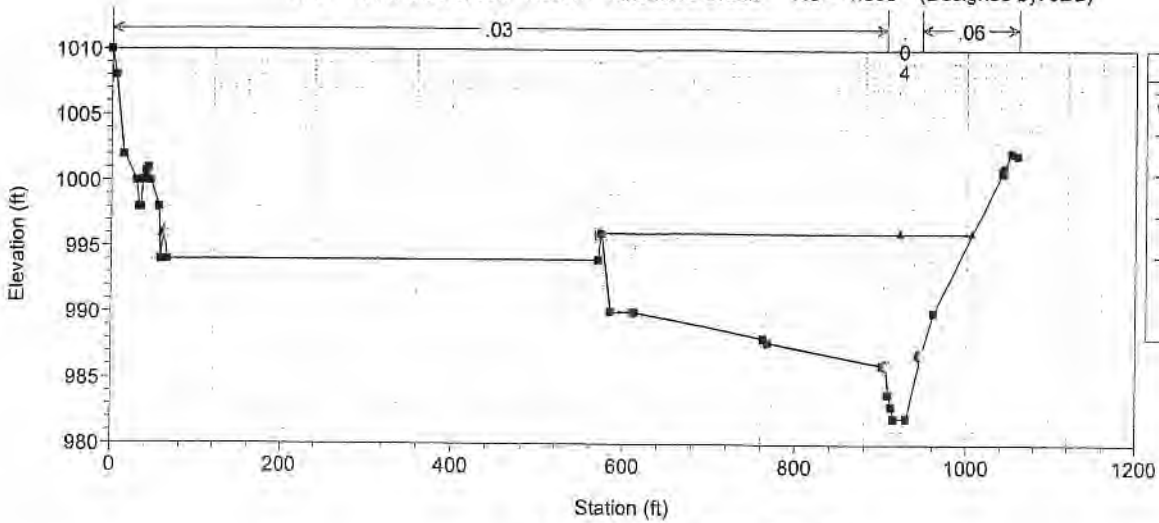


Legend	
▲	WS 100-YR (w 1*sigma)
—	WS 100-YR
■	Ground
—	Levee
▲	Ineff
●	Bank Sta

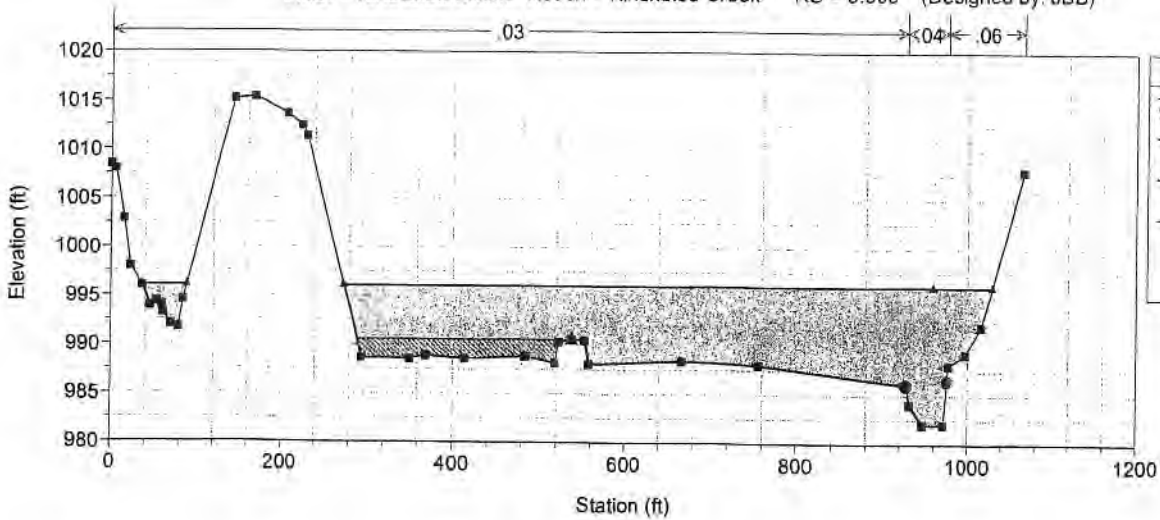
1210 Plan: Post-Project
 Geom: Post-Project Flow: 100-YR
 River = Kincheloe Creek Reach = Kincheloe Creek RS = 5.000 (Designed by: JBB)

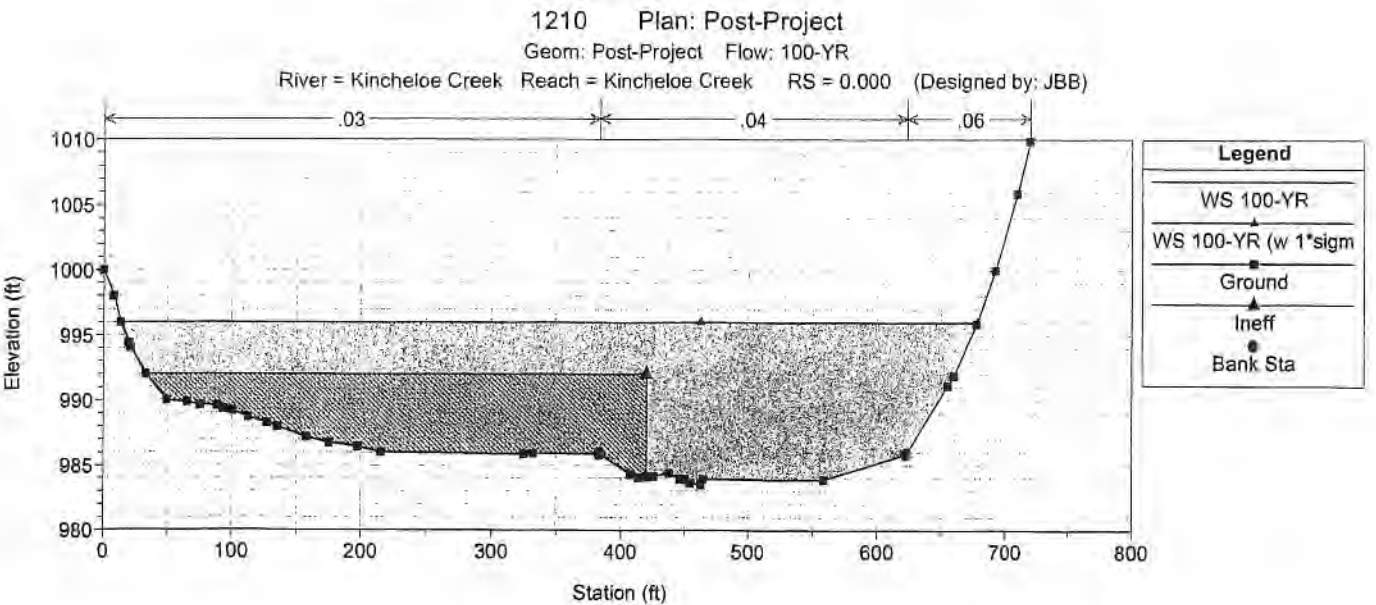
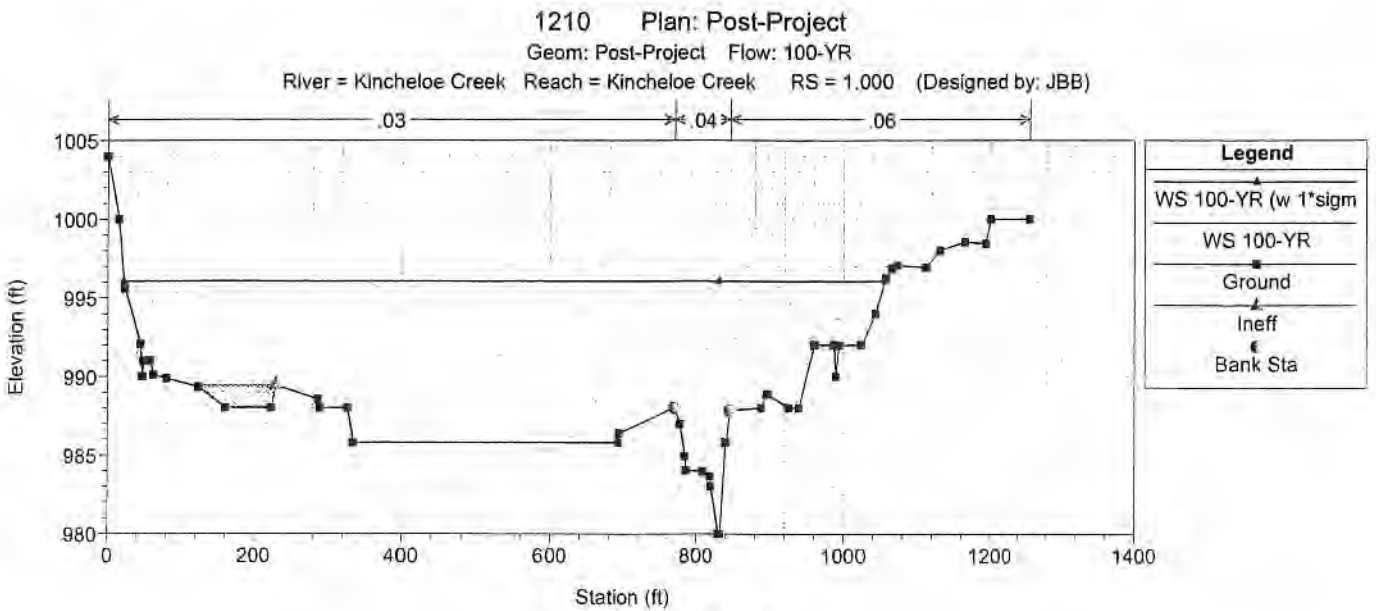
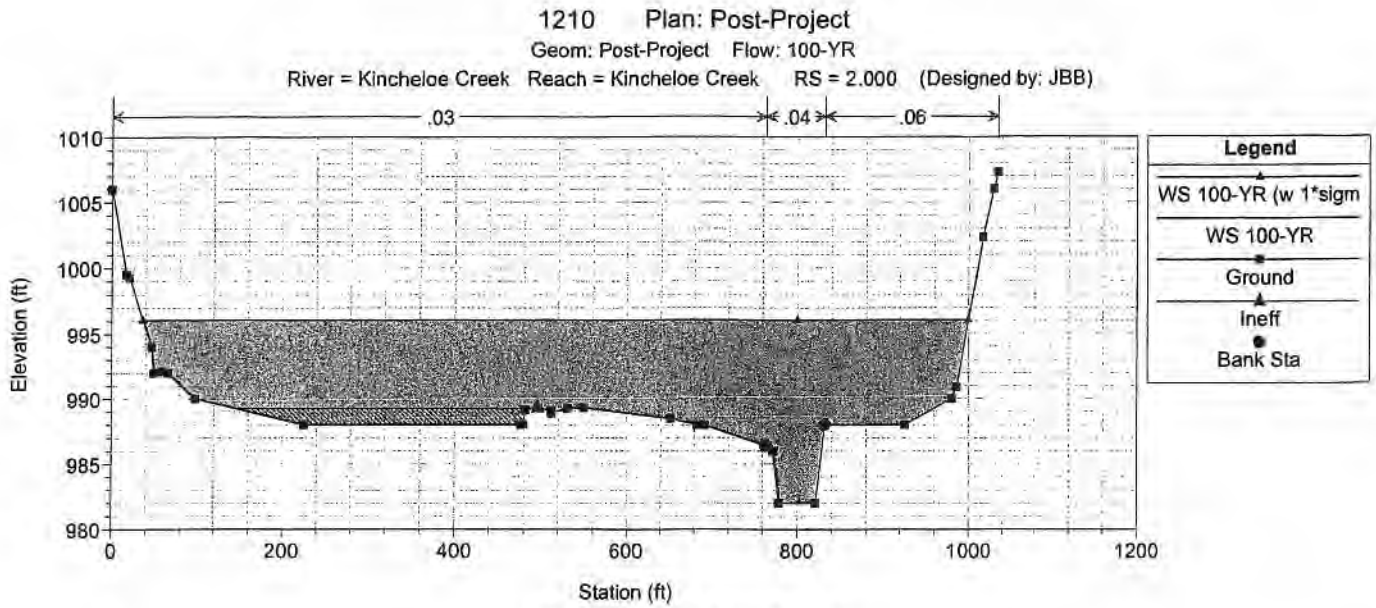


1210 Plan: Post-Project
 Geom: Post-Project Flow: 100-YR
 River = Kincheloe Creek Reach = Kincheloe Creek RS = 4.000 (Designed by: JBB)



1210 Plan: Post-Project
 Geom: Post-Project Flow: 100-YR
 River = Kincheloe Creek Reach = Kincheloe Creek RS = 3.000 (Designed by: JBB)





Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 8.000 Profile: 100-YR

E.G. Elev (ft)	996.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.03	Reach Len. (ft)	175.00	175.00	175.00
Crit W.S. (ft)		Flow Area (sq ft)	1150.11	701.59	26.18
E.G. Slope (ft/ft)	0.000292	Area (sq ft)	1150.11	701.59	26.18
Q Total (cfs)	4210.00	Flow (cfs)	2325.93	1863.78	20.29
Top Width (ft)	401.24	Top Width (ft)	311.35	81.21	8.68
Vel Total (ft/s)	2.24	Avg. Vel. (ft/s)	2.02	2.66	0.77
Max Chl Dpth (ft)	10.16	Hydr. Depth (ft)	3.69	8.64	3.01
Conv. Total (cfs)	246285.3	Conv. (cfs)	136067.1	109031.4	1186.8
Length Wtd. (ft)	175.00	Wetted Per. (ft)	311.55	82.00	10.57
Min Ch El (ft)	985.87	Shear (lb/sq ft)	0.07	0.16	0.05
Alpha	1.07	Stream Power (lb/ft s)	754.55	0.00	0.00
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	187.93	73.78	42.32
C & E Loss (ft)	0.02	Cum SA (acres)	24.37	6.22	7.05

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 8.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.20	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.05	Reach Len. (ft)	175.00	175.00	175.00
Crit W.S. (ft)		Flow Area (sq ft)	1157.18	703.44	26.38
E.G. Slope (ft/ft)	0.000510	Area (sq ft)	1157.18	703.44	26.38
Q Total (cfs)	5600.00	Flow (cfs)	3100.96	2471.98	27.06
Top Width (ft)	401.58	Top Width (ft)	311.66	81.21	8.72
Vel Total (ft/s)	2.97	Avg. Vel. (ft/s)	2.68	3.51	1.03
Max Chl Dpth (ft)	10.18	Hydr. Depth (ft)	3.71	8.66	3.03
Conv. Total (cfs)	248081.7	Conv. (cfs)	137373.5	109509.4	1198.7
Length Wtd. (ft)	175.00	Wetted Per. (ft)	311.86	82.00	10.61
Min Ch El (ft)	985.87	Shear (lb/sq ft)	0.12	0.27	0.08
Alpha	1.07	Stream Power (lb/ft s)	754.55	0.00	0.00
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	188.49	73.88	42.47
C & E Loss (ft)	0.03	Cum SA (acres)	24.38	6.22	7.06

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 7.000 Profile: 100-YR

E.G. Elev (ft)	996.08	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.06	Reach Len. (ft)	500.00	550.00	650.00
Crit W.S. (ft)		Flow Area (sq ft)	2786.05	726.07	27.30
E.G. Slope (ft/ft)	0.000045	Area (sq ft)	2786.05	726.07	27.30
Q Total (cfs)	4210.00	Flow (cfs)	3346.97	854.52	8.51
Top Width (ft)	477.84	Top Width (ft)	401.61	67.91	8.32
Vel Total (ft/s)	1.19	Avg. Vel. (ft/s)	1.20	1.18	0.31
Max Chl Dpth (ft)	12.06	Hydr. Depth (ft)	6.94	10.69	3.28
Conv. Total (cfs)	630667.6	Conv. (cfs)	501383.2	128009.5	1274.9
Length Wtd. (ft)	519.15	Wetted Per. (ft)	402.28	70.22	10.54
Min Ch El (ft)	984.00	Shear (lb/sq ft)	0.02	0.03	0.01
Alpha	1.01	Stream Power (lb/ft s)	587.40	0.00	0.00
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	180.02	70.91	42.21
C & E Loss (ft)	0.00	Cum SA (acres)	22.94	5.92	7.02

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 7.000 Profile: 100-YR (w 1*sigm)

E.G. Elev (ft)	996.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.10	Reach Len. (ft)	500.00	550.00	650.00
Crit W.S. (ft)		Flow Area (sq ft)	2803.26	728.98	27.66
E.G. Slope (ft/ft)	0.000077	Area (sq ft)	2803.26	728.98	27.66
Q Total (cfs)	5600.00	Flow (cfs)	4455.07	1133.52	11.41
Top Width (ft)	477.97	Top Width (ft)	401.69	67.91	8.37
Vel Total (ft/s)	1.57	Avg. Vel. (ft/s)	1.59	1.55	0.41
Max Chl Dpth (ft)	12.10	Hydr. Depth (ft)	6.98	10.73	3.30
Conv. Total (cfs)	636643.7	Conv. (cfs)	506480.6	128865.6	1297.4
Length Wtd. (ft)	519.13	Wetted Per. (ft)	402.37	70.22	10.61
Min Ch El (ft)	984.00	Shear (lb/sq ft)	0.03	0.05	0.01
Alpha	1.01	Stream Power (lb/ft s)	587.40	0.00	0.00
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	180.54	71.00	42.36
C & E Loss (ft)	0.00	Cum SA (acres)	22.94	5.92	7.03

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 6.000 Profile: 100-YR

E.G. Elev (ft)	996.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.05	Reach Len. (ft)	95.00	100.00	92.00
Crit W.S. (ft)	987.10	Flow Area (sq ft)	2869.18	1149.07	916.12
E.G. Slope (ft/ft)	0.000026	Area (sq ft)	2869.18	1149.07	916.12
Q Total (cfs)	4210.00	Flow (cfs)	2651.85	1164.66	393.50
Top Width (ft)	635.07	Top Width (ft)	403.14	88.53	143.40
Vel Total (ft/s)	0.85	Avg. Vel. (ft/s)	0.92	1.01	0.43
Max Chl Dpth (ft)	14.05	Hydr. Depth (ft)	7.12	12.98	6.39
Conv. Total (cfs)	832436.4	Conv. (cfs)	524345.3	230286.1	77805.1
Length Wtd. (ft)	95.90	Wetted Per. (ft)	404.83	91.70	144.26
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.01	0.02	0.01
Alpha	1.15	Stream Power (lb/ft s)	1013.19	350.14	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	147.57	59.08	35.17
C & E Loss (ft)	0.00	Cum SA (acres)	18.32	4.94	5.89

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 6.000 Profile: 100-YR (w 1*sigm)

E.G. Elev (ft)	996.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.08	Reach Len. (ft)	95.00	100.00	92.00
Crit W.S. (ft)	989.04	Flow Area (sq ft)	2883.27	1152.16	921.14
E.G. Slope (ft/ft)	0.000045	Area (sq ft)	2883.27	1152.16	921.14
Q Total (cfs)	5600.00	Flow (cfs)	3530.86	1545.10	524.04
Top Width (ft)	635.23	Top Width (ft)	403.14	88.53	143.56
Vel Total (ft/s)	1.13	Avg. Vel. (ft/s)	1.22	1.34	0.57
Max Chl Dpth (ft)	14.08	Hydr. Depth (ft)	7.15	13.01	6.42
Conv. Total (cfs)	838393.1	Conv. (cfs)	528616.3	231321.2	78455.8
Length Wtd. (ft)	95.89	Wetted Per. (ft)	404.87	91.70	144.43
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.02	0.03	0.02
Alpha	1.15	Stream Power (lb/ft s)	1013.19	350.14	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	147.90	59.13	35.29
C & E Loss (ft)	0.00	Cum SA (acres)	18.33	4.94	5.89

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 5.000 Profile: 100-YR

E.G. Elev (ft)	996.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.03	Reach Len. (ft)	126.00	153.00	110.00
Crit W.S. (ft)	989.50	Flow Area (sq ft)	1694.41	771.07	1291.43
E.G. Slope (ft/ft)	0.000060	Area (sq ft)	1694.41	771.07	1291.43
Q Total (cfs)	4210.00	Flow (cfs)	2203.96	1115.97	890.06
Top Width (ft)	524.03	Top Width (ft)	270.26	65.14	188.63
Vel Total (ft/s)	1.12	Avg. Vel. (ft/s)	1.30	1.45	0.69
Max Chl Dpth (ft)	14.03	Hydr. Depth (ft)	6.27	11.84	6.85
Conv. Total (cfs)	543708.0	Conv. (cfs)	284634.8	144124.3	114948.9
Length Wtd. (ft)	129.98	Wetted Per. (ft)	271.28	68.32	189.53
Min Ch EI (ft)	982.00	Shear (lb/sq ft)	0.02	0.04	0.03
Alpha	1.23	Stream Power (lb/ft s)	1051.58	510.25	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	142.59	56.87	32.84
C & E Loss (ft)	0.00	Cum SA (acres)	17.59	4.76	5.54

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 5.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.05	Reach Len. (ft)	126.00	153.00	110.00
Crit W.S. (ft)	990.00	Flow Area (sq ft)	1700.68	772.58	1295.81
E.G. Slope (ft/ft)	0.000105	Area (sq ft)	1700.68	772.58	1295.81
Q Total (cfs)	5600.00	Flow (cfs)	2934.35	1481.60	1184.05
Top Width (ft)	524.13	Top Width (ft)	270.26	65.14	188.73
Vel Total (ft/s)	1.49	Avg. Vel. (ft/s)	1.73	1.92	0.91
Max Chl Dpth (ft)	14.05	Hydr. Depth (ft)	6.29	11.86	6.87
Conv. Total (cfs)	546527.5	Conv. (cfs)	286375.6	144595.2	115556.7
Length Wtd. (ft)	129.97	Wetted Per. (ft)	271.31	68.32	189.64
Min Ch EI (ft)	982.00	Shear (lb/sq ft)	0.04	0.07	0.04
Alpha	1.23	Stream Power (lb/ft s)	1051.58	510.25	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	142.90	56.92	32.94
C & E Loss (ft)	0.00	Cum SA (acres)	17.59	4.76	5.54

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 4.000 Profile: 100-YR

E.G. Elev (ft)	996.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.02	Reach Len. (ft)	120.00	145.00	145.00
Crit W.S. (ft)	988.98	Flow Area (sq ft)	2544.77	528.44	252.51
E.G. Slope (ft/ft)	0.000048	Area (sq ft)	2544.77	528.44	252.51
Q Total (cfs)	4210.00	Flow (cfs)	3380.30	719.04	110.66
Top Width (ft)	433.44	Top Width (ft)	330.97	41.63	60.84
Vel Total (ft/s)	1.27	Avg. Vel. (ft/s)	1.33	1.36	0.44
Max Chl Dpth (ft)	14.02	Hydr. Depth (ft)	7.69	12.69	4.15
Conv. Total (cfs)	609611.6	Conv. (cfs)	489470.8	104117.0	16023.7
Length Wtd. (ft)	124.35	Wetted Per. (ft)	332.54	43.26	61.56
Min Ch EI (ft)	982.00	Shear (lb/sq ft)	0.02	0.04	0.01
Alpha	1.08	Stream Power (lb/ft s)	1060.69	573.37	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	136.46	54.59	30.89
C & E Loss (ft)	0.01	Cum SA (acres)	16.72	4.57	5.22

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 4.000 Profile: 100-YR (w 1*sigm)

E.G. Elev (ft)	996.08	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.04	Reach Len. (ft)	120.00	145.00	145.00
Crit W.S. (ft)	989.52	Flow Area (sq ft)	2549.84	529.07	253.44
E.G. Slope (ft/ft)	0.000084	Area (sq ft)	2549.84	529.07	253.44
Q Total (cfs)	5600.00	Flow (cfs)	4497.16	955.39	147.46
Top Width (ft)	433.55	Top Width (ft)	330.97	41.63	60.95
Vel Total (ft/s)	1.68	Avg. Vel. (ft/s)	1.76	1.81	0.58
Max Chl Dpth (ft)	14.04	Hydr. Depth (ft)	7.70	12.71	4.16
Conv. Total (cfs)	611510.9	Conv. (cfs)	491082.3	104326.5	16102.1
Length Wtd. (ft)	124.35	Wetted Per. (ft)	332.55	43.26	61.68
Min Ch EI (ft)	982.00	Shear (lb/sq ft)	0.04	0.06	0.02
Alpha	1.08	Stream Power (lb/ft s)	1060.69	573.37	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	136.75	54.63	30.99
C & E Loss (ft)	0.01	Cum SA (acres)	16.72	4.57	5.23

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 3.000 Profile: 100-YR

E.G. Elev (ft)	996.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.03	Reach Len. (ft)	180.00	253.00	253.00
Crit W.S. (ft)		Flow Area (sq ft)	4760.25	649.43	287.22
E.G. Slope (ft/ft)	0.000017	Area (sq ft)	5199.20	649.43	287.22
Q Total (cfs)	4210.00	Flow (cfs)	3573.75	546.29	89.97
Top Width (ft)	807.26	Top Width (ft)	705.60	48.99	52.67
Vel Total (ft/s)	0.74	Avg. Vel. (ft/s)	0.75	0.84	0.31
Max Chl Dpth (ft)	14.03	Hydr. Depth (ft)	6.75	13.26	5.45
Conv. Total (cfs)	1008726.0	Conv. (cfs)	856278.9	130891.5	21555.9
Length Wtd. (ft)	194.42	Wetted Per. (ft)	709.40	51.39	54.45
Min Ch EI (ft)	982.00	Shear (lb/sq ft)	0.01	0.01	0.01
Alpha	1.05	Stream Power (lb/ft s)	1066.34	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	125.79	52.63	29.99
C & E Loss (ft)	0.00	Cum SA (acres)	15.29	4.42	5.03

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 3.000 Profile: 100-YR (w 1*sigm)

E.G. Elev (ft)	996.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.05	Reach Len. (ft)	180.00	253.00	253.00
Crit W.S. (ft)		Flow Area (sq ft)	4776.11	650.53	288.41
E.G. Slope (ft/ft)	0.000031	Area (sq ft)	5215.06	650.53	288.41
Q Total (cfs)	5600.00	Flow (cfs)	4755.14	725.08	119.78
Top Width (ft)	807.61	Top Width (ft)	705.88	48.99	52.74
Vel Total (ft/s)	0.98	Avg. Vel. (ft/s)	1.00	1.11	0.42
Max Chl Dpth (ft)	14.05	Hydr. Depth (ft)	6.77	13.28	5.47
Conv. Total (cfs)	1013774.0	Conv. (cfs)	860827.8	131261.4	21684.4
Length Wtd. (ft)	194.40	Wetted Per. (ft)	709.69	51.39	54.52
Min Ch EI (ft)	982.00	Shear (lb/sq ft)	0.01	0.02	0.01
Alpha	1.05	Stream Power (lb/ft s)	1066.34	0.00	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	126.06	52.67	30.09
C & E Loss (ft)	0.00	Cum SA (acres)	15.29	4.42	5.04

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 2.000 Profile: 100-YR

E.G. Elev (ft)	996.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.03	Reach Len. (ft)	217.00	317.00	277.00
Crit W.S. (ft)		Flow Area (sq ft)	4955.46	878.91	1199.73
E.G. Slope (ft/ft)	0.000013	Area (sq ft)	5332.93	878.91	1199.73
Q Total (cfs)	4210.00	Flow (cfs)	3182.89	630.04	397.07
Top Width (ft)	962.42	Top Width (ft)	726.52	68.50	167.40
Vel Total (ft/s)	0.60	Avg. Vel. (ft/s)	0.64	0.72	0.33
Max Chl Dpth (ft)	14.03	Hydr. Depth (ft)	6.82	12.83	7.17
Conv. Total (cfs)	1166261.0	Conv. (cfs)	881730.0	174535.0	109995.7
Length Wtd. (ft)	234.50	Wetted Per. (ft)	727.81	71.11	168.43
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.01	0.01	0.01
Alpha	1.11	Stream Power (lb/ft s)	1034.50	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	104.03	48.19	25.67
C & E Loss (ft)	0.00	Cum SA (acres)	12.33	4.08	4.39

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 2.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.05	Reach Len. (ft)	217.00	317.00	277.00
Crit W.S. (ft)		Flow Area (sq ft)	4971.20	880.40	1203.36
E.G. Slope (ft/ft)	0.000023	Area (sq ft)	5348.67	880.40	1203.36
Q Total (cfs)	5600.00	Flow (cfs)	4235.44	836.40	528.16
Top Width (ft)	962.59	Top Width (ft)	726.62	68.50	167.46
Vel Total (ft/s)	0.79	Avg. Vel. (ft/s)	0.85	0.95	0.44
Max Chl Dpth (ft)	14.05	Hydr. Depth (ft)	6.84	12.85	7.19
Conv. Total (cfs)	1171865.0	Conv. (cfs)	886314.9	175026.5	110523.1
Length Wtd. (ft)	234.49	Wetted Per. (ft)	727.92	71.11	168.49
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.01	0.02	0.01
Alpha	1.11	Stream Power (lb/ft s)	1034.50	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	104.23	48.22	25.75
C & E Loss (ft)	0.00	Cum SA (acres)	12.33	4.08	4.40

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 1.000 Profile: 100-YR

E.G. Elev (ft)	996.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.03	Reach Len. (ft)	675.00	980.00	1050.00
Crit W.S. (ft)		Flow Area (sq ft)	6370.04	907.22	1200.11
E.G. Slope (ft/ft)	0.000007	Area (sq ft)	6495.12	907.22	1200.11
Q Total (cfs)	4210.00	Flow (cfs)	3503.87	454.46	251.67
Top Width (ft)	1034.31	Top Width (ft)	747.69	76.17	210.45
Vel Total (ft/s)	0.50	Avg. Vel. (ft/s)	0.55	0.50	0.21
Max Chl Dpth (ft)	16.03	Hydr. Depth (ft)	8.52	11.91	5.70
Conv. Total (cfs)	1578169.0	Conv. (cfs)	1313468.0	170360.4	94339.9
Length Wtd. (ft)	816.46	Wetted Per. (ft)	749.96	79.82	212.22
Min Ch El (ft)	980.00	Shear (lb/sq ft)	0.00	0.01	0.00
Alpha	1.14	Stream Power (lb/ft s)	1256.31	0.00	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	74.57	41.69	18.04
C & E Loss (ft)	0.00	Cum SA (acres)	8.66	3.55	3.19

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 1.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.05	Reach Len. (ft)	675.00	980.00	1050.00
Crit W.S. (ft)		Flow Area (sq ft)	6385.74	908.82	1204.53
E.G. Slope (ft/ft)	0.000012	Area (sq ft)	6510.82	908.82	1204.53
Q Total (cfs)	5600.00	Flow (cfs)	4660.84	603.84	335.31
Top Width (ft)	1034.48	Top Width (ft)	747.73	76.17	210.58
Vel Total (ft/s)	0.66	Avg. Vel. (ft/s)	0.73	0.66	0.28
Max Chl Dpth (ft)	16.05	Hydr. Depth (ft)	8.54	11.93	5.72
Conv. Total (cfs)	1584559.0	Conv. (cfs)	1318818.0	170861.2	94879.6
Length Wtd. (ft)	816.46	Wetted Per. (ft)	750.00	79.82	212.35
Min Ch El (ft)	980.00	Shear (lb/sq ft)	0.01	0.01	0.00
Alpha	1.14	Stream Power (lb/ft s)	1256.31	0.00	0.00
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	74.69	41.71	18.10
C & E Loss (ft)	0.00	Cum SA (acres)	8.66	3.55	3.20

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 0.000 Profile: 100-YR

E.G. Elev (ft)	996.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.00	Reach Len. (ft)			
Crit W.S. (ft)	986.66	Flow Area (sq ft)	1445.31	2534.30	297.07
E.G. Slope (ft/ft)	0.000045	Area (sq ft)	3129.51	2799.14	297.07
Q Total (cfs)	4360.00	Flow (cfs)	1183.68	3026.02	150.30
Top Width (ft)	664.36	Top Width (ft)	370.13	239.70	54.53
Vel Total (ft/s)	1.02	Avg. Vel. (ft/s)	0.82	1.19	0.51
Max Chl Dpth (ft)	12.50	Hydr. Depth (ft)	3.90	10.57	5.45
Conv. Total (cfs)	653161.3	Conv. (cfs)	177323.9	453320.6	22516.8
Length Wtd. (ft)		Wetted Per. (ft)	370.74	239.85	55.48
Min Ch El (ft)	983.50	Shear (lb/sq ft)	0.01	0.03	0.01
Alpha	1.14	Stream Power (lb/ft s)	720.30	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 0.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.00	Reach Len. (ft)			
Crit W.S. (ft)	987.17	Flow Area (sq ft)	1445.31	2534.30	297.07
E.G. Slope (ft/ft)	0.000079	Area (sq ft)	3129.51	2799.14	297.07
Q Total (cfs)	5800.00	Flow (cfs)	1574.62	4025.44	199.95
Top Width (ft)	664.36	Top Width (ft)	370.13	239.70	54.53
Vel Total (ft/s)	1.36	Avg. Vel. (ft/s)	1.09	1.59	0.67
Max Chl Dpth (ft)	12.50	Hydr. Depth (ft)	3.90	10.57	5.45
Conv. Total (cfs)	653161.3	Conv. (cfs)	177323.9	453320.6	22516.8
Length Wtd. (ft)		Wetted Per. (ft)	370.74	239.85	55.48
Min Ch El (ft)	983.50	Shear (lb/sq ft)	0.02	0.05	0.03
Alpha	1.14	Stream Power (lb/ft s)	720.30	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

PERMIT CONDITIONS

West Virginia Code § 22-6A-8(d) allows the Office of Oil and Gas to place specific conditions upon this permit. Permit conditions have the same effect as law. Failure to adhere to the specified permit conditions may result in enforcement action.

CONDITIONS

1. This proposed activity may require permit coverage from the United States Army Corps of Engineers (USACE). Through this permit, you are hereby being advised to consult with USACE regarding this proposed activity.
2. If the operator encounters an unanticipated void, or an anticipated void at an unanticipated depth, the operator shall notify the inspector within 24 hours. Modifications to the casing program may be necessary to comply with W. Va. Code § 22-6A-5a (12), which requires drilling to a minimum depth of thirty feet below the bottom of the void, and installing a minimum of twenty (20) feet of casing. Under no circumstance should the operator drill more than one hundred (100) feet below the bottom of the void or install less than twenty (20) feet of casing below the bottom of the void.
3. When compacting fills, each lift before compaction shall not be more than 12 inches in height, and the moisture content of the fill material shall be within limits as determined by the Standard Proctor Density test of the actual soils used in specific engineered fill, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort, to achieve 95 % compaction of the optimum density. Each lift shall be tested for compaction, with a minimum of two tests per lift per acre of fill. All test results shall be maintained on site and available for review.
4. Operator shall install signage per § 22-6A-8g (6) (B) at all source water locations included in their approved water management plan within 24 hours of water management plan activation.
5. Oil and gas water supply wells will be registered with the Office of Oil and Gas and all such wells will be constructed and plugged in accordance with the standards of the Bureau for Public Health set forth in its Legislative rule entitled *Water Well Regulations*, 64 C.S.R. 19. Operator is to contact the Bureau of Public Health regarding permit requirements. In lieu of plugging, the operator may transfer the well to the surface owner upon agreement of the parties. All drinking water wells within fifteen hundred feet of the water supply well shall be flow tested by the operator upon request of the drinking well owner prior to operating the water supply well.
6. Pursuant to the requirements pertaining to the sampling of domestic water supply wells/springs the operator shall, no later than thirty (30) days after receipt of analytical data provide a written copy to the Chief and any of the users who may have requested such analyses.
7. 24 hours prior to the initiation of the completion process the operator shall notify the Chief or his designee.
8. During the completion process the operator shall monitor annular pressures and report any anomaly noticed to the chief or his designee immediately.
9. 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.
10. 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.

PERMIT CONDITIONS

11. The operator shall provide to the Office of Oil and Gas the dates of each of the following within 30 days of their occurrence: completion of construction of the well pad, commencement of drilling, cessation of drilling, completion of any other permitted well work, and completion of the well. Such notice shall be provided by sending an email to DEPOOGNotify@wv.gov.

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

1) Well Operator: HG Energy II Appalachia, L.P.

<u>494519932</u>	<u>Harrison</u>	<u>Union</u>	<u>West Milford 7.5'</u>
Operator ID	County	District	Quadrangle

2) Operator's Well Number: Stickel 1210 S-2H Well Pad Name: Stickel 1210

3) Farm Name/Surface Owner: Danny & Alicia Stickel Public Road Access: Kincheloe Run Rd/SLS 35

4) Elevation, current ground: 989' Elevation, proposed post-construction: 994'

5) Well Type (a) Gas Oil Underground Storage
Other

(b) If Gas Shallow Deep
Horizontal

6) Existing Pad: Yes or No No

SDW
10/18/2018

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus at 6863'/6914' and 51' in thickness. Anticipated pressure at 4314#.

8) Proposed Total Vertical Depth: 6900'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 20,688'

11) Proposed Horizontal Leg Length: 12,939'

12) Approximate Fresh Water Strata Depths: 135', 500'

13) Method to Determine Fresh Water Depths: Nearest offset well data

14) Approximate Saltwater Depths: None noted in offsets

15) Approximate Coal Seam Depths: 660' to 665'

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

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: _____

WW-6B
(04/15)

API NO. 47-033 - 05924
 OPERATOR WELL NO. Stickel 1210 S-2H
 Well Pad Name: Stickel 1210

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	30"	New	LS	157.5	100'	100'	Drilled In
Fresh Water	20"	NEW	J-55	94	600'	600'	CTS 30% excess yield = 1.20, CTS
Coal	13 3/8"	NEW	J-55	54.5	1635'	1635'	40% excess yield = 1.20, CTS
Intermediate	9 5/8"	NEW	J-55	40	2500'	2500'	40% excess yield Lead/ 0% Excess Lead
Production	5 1/2"	NEW	P-110	23	20687'	20687'	20% excess yield = 1.19, tail yield = 1.19
Tubing							
Liners							

SDW
10/18/2018

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"	30"	.500				CTS
Fresh Water	20"	24"	.438	2110	1200	Type 1, Class A	30 % excess yield = 1.20, CTS
Coal	13 3/8"	17 1/2"	.380	2730		Type 1/Class A	40% excess yield = 1.20, CTS
Intermediate	9 5/8"	12 1/4"	.395	3950		Type 1/Class A	40% excess yield = 0% Excess Lead
Production	5 1/2"	8 1/2"	.415	14520	11500	Type 1/Class A	20% excess yield = 1.19, tail yield = 1.19
Tubing							
Liners							

PACKERS

Kind:				
Sizes:				
Depths Set:				

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

1) Well Operator: HG Energy II Appalachia, L.P. 494519932 Harrison Union West Milford 7.5'
Operator ID County District Quadrangle

2) Operator's Well Number: Stickel 1210 S-2H Well Pad Name: Stickel 1210

3) Farm Name/Surface Owner: Danny & Alicia Stickel Public Road Access: Kincheloe Run Rd/SLS 35

4) Elevation, current ground: 989' Elevation, proposed post-construction: 994'

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 at 6863'/6914' and 51' in thickness. Anticipated pressure at 4314#.

8) Proposed Total Vertical Depth: 6900'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 20,688'

11) Proposed Horizontal Leg Length: 12,939'

12) Approximate Fresh Water Strata Depths: 135', 500'

13) Method to Determine Fresh Water Depths: Nearest offset well data

14) Approximate Saltwater Depths: None noted in offsets

15) Approximate Coal Seam Depths: 660' to 665'

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

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: _____

WW-6B
(04/15)

API NO. 47- _____ - _____
OPERATOR WELL NO. Stickel 1210 S-2H
Well Pad Name: Stickel 1210

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	30"	New	LS	157.5	100'	100'	Drilled In
Fresh Water	20"	NEW	J-55	94	500'	500'	CTS 30% excess yield = 1.20, CTS
Coal	13 3/8"	NEW	J-55	54.5	1635'	1635'	40% excess yield = 1.20, CTS
Intermediate	9 5/8"	NEW	J-55	40	2500'	2500'	40% excess yield Lead/ 0% Excess Tail
Production	5 1/2"	NEW	P-110	23	20687'	20687'	20% excess yield = 1.19, tail yield = 1.19
Tubing							
Liners							

SPO
4/25/2018

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"	30"	.500				CTS
Fresh Water	20"	24"	.438	2110	1200	Type 1, Class A	30 % excess yield = 1.20, CTS
Coal	13 3/8"	17 1/2"	.380	2730		Type 1/Class A	40% excess yield = 1.20, CTS
Intermediate	9 5/8"	12 1/4"	.395	3950		Type 1/Class A	40% excess yield = 0% Excess Lead
Production	5 1/2"	8 1/2"	.415	14520	12500	Type 1/Class A	20% excess yield = 1.19, tail yield = 1.19
Tubing							
Liners							

PACKERS

Kind:				
Sizes:				
Depths Set:				

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WW-6B
(10/14)

API NO. 47- _____ - _____
OPERATOR WELL NO. Stickel 1210 S-2H
Well Pad Name: Stickel 1210

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

Drill the vertical depth to the Marcellus at an estimated total vertical depth of approximately 6900 feet. Drill horizontal leg to estimated 20,688 TMD, stimulate and be capable of producing from the Marcellus Formation. Should we encounter an unanticipated void in the coal, we will install a minimum of 20' of casing below the void but not more than 100' below the void, set a basket and grout to surface.

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

The stimulation will be completed with multiple stages divided over the lateral length of the well. Stage spacing is dependent upon engineering design. Slickwater fracturing technique will be utilized on each stage using sand, water, and chemicals. See attached list. Maximum pressure not to exceed 12,500 psi.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 3.456 acres

22) Area to be disturbed for well pad only, less access road (acres): 3.0 acres

23) Describe centralizer placement for each casing string:

No centralizers will be used with conductor casing. Freshwater every 3 joints to surface. Coal - Bow Spring on first 2 joints then every third joint to 100' from surface. Intermediate - Bow Spring on first 2 joints then every third joint to 100' from surface. Production - Run 1 spiral centralizer every 5 joints from the top of the curve to surface. Run 1 spiral centralizer every 3 joints from the 1st 5.5' long joint to the top of the curve.

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

Conductor - N/A, Casing to be drilled in w/ Dual Rotary Rig.
Fresh Water - *15.6 ppg PNE-1 + 3% bwoc CaCl₂, 40% Excess Yield = 1.20 / CTS*
Coal - *Lead: 15.4 ppg PNE-1 + 2.5% bwoc CaCl₂ 40% Excess / Tail: 15.9 ppg PNE-1 + 2.5% bwoc CaCl₂ zero% Excess. CTS*
Intermediate - *Lead: 15.4 ppg PNE-1 + 2.5% bwoc CaCl₂ 40% Excess / Tail: 15.9 ppg PNE-1 + 2.5% bwoc CaCl₂ zero% Excess. CTS*
Production - *Lead: 14.5 ppg POZ-PNE-1 + 0.3% bwoc R3 + 1% bwoc EC1 + 0.75 gal/sk FP13L + 0.3% bwoc MPA170Tail: 14.8 ppg PNE-1 + 0.35% bwoc R3 + 0.75 gal/sk FP13L + 50% bwoc ASCA1 + 0.5% bwoc MPA17020% ExcessLead Yield=1.19Tail Yield=1.94CTS*

25) Proposed borehole conditioning procedures:

Conductor - Ensure the hole is clean at TD.
Fresh Water - Once casing is at setting depth, circulate a minimum of one hole volume with Fresh Water prior to pumping cement.
Coal - Once casing is at setting depth, Circulate and condition at TD. Circulate a minimum of one hole volume prior to pumping cement.
Intermediate - Once casing is at setting depth, Circulate and condition mud at TD. Circulate a minimum of one hole volume prior to pumping cement.
Production - Once on bottom/TD with casing, circulate at max allowable pump rate for at least 2x bottoms up, or until returns and pump pressures indicate the hole is clean. Circulate a minimum of one hole volume prior to pumping cement.

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*Note: Attach additional sheets as needed.

Stickel 1210 S Well Pad (1H, 2H, 3H, 4H, 5H, 6H)
Cement Additives

Material Name	Material Type	Material Description	CAS #																		
Premium NE-1	Portland Cement	Premium NE-1 is a portland cement with early compressive strength properties.	<table border="1"> <thead> <tr> <th>Ingredient name</th> <th>%</th> <th>CAS number</th> </tr> </thead> <tbody> <tr> <td>Portland cement</td> <td>90 - 100</td> <td>65997-15-1</td> </tr> <tr> <td>Calcium oxide</td> <td>1 - 5</td> <td>1305-78-8</td> </tr> <tr> <td>Magnesium oxide</td> <td>1 - 5</td> <td>1309-48-4</td> </tr> <tr> <td>Crystalline silica: Quartz (SiO2)</td> <td>0.1 - 1</td> <td>14808-60-7</td> </tr> </tbody> </table>	Ingredient name	%	CAS number	Portland cement	90 - 100	65997-15-1	Calcium oxide	1 - 5	1305-78-8	Magnesium oxide	1 - 5	1309-48-4	Crystalline silica: Quartz (SiO2)	0.1 - 1	14808-60-7			
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Bentonite	Extender	Commonly called gel, it is a clay material used as a cement extender and to control excessive free water.	<table border="1"> <thead> <tr> <th>Ingredient name</th> <th>%</th> <th>CAS number</th> </tr> </thead> <tbody> <tr> <td>bentonite</td> <td>90 - 100</td> <td>1302-78-9</td> </tr> <tr> <td>Crystalline silica: Quartz (SiO2)</td> <td>5 - 10</td> <td>14808-60-7</td> </tr> </tbody> </table>	Ingredient name	%	CAS number	bentonite	90 - 100	1302-78-9	Crystalline silica: Quartz (SiO2)	5 - 10	14808-60-7									
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Calcium Chloride	Accelerator	A powdered, flaked or pelletized material used to decrease thickening time and increase the rate of strength development	<table border="1"> <thead> <tr> <th>Ingredient name</th> <th>%</th> <th>CAS number</th> </tr> </thead> <tbody> <tr> <td>Calcium chloride</td> <td>90 - 100</td> <td>10043-52-4</td> </tr> </tbody> </table>	Ingredient name	%	CAS number	Calcium chloride	90 - 100	10043-52-4												
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Cello Flake	Lost Circulation	Graded (3/8 to 3/4 inch) cellophane flakes used as a lost circulation material.	<table border="1"> <thead> <tr> <th>Ingredient name</th> <th>%</th> <th>CAS number</th> </tr> </thead> <tbody> <tr> <td>No hazardous ingredient</td> <td></td> <td></td> </tr> </tbody> </table>	Ingredient name	%	CAS number	No hazardous ingredient														
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FP-13L	Foam Preventer	FP-13L is a clear liquid organic phosphate antifoaming agent used in cementing operations. It is very effective minimizing air entrapment and preventing foaming tendencies of latex systems.	<table border="1"> <thead> <tr> <th>Ingredient name</th> <th>%</th> <th>CAS number</th> </tr> </thead> <tbody> <tr> <td>Tributyl phosphate</td> <td>90 - 100</td> <td>126-73-8</td> </tr> </tbody> </table>	Ingredient name	%	CAS number	Tributyl phosphate	90 - 100	126-73-8												
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Granulated Sugar	Retarder	Used to retard cement returns at surface. A proprietary product that provides expansive properties and improves bonding at low to moderate temperatures.	<table border="1"> <thead> <tr> <th>Ingredient name</th> <th>%</th> <th>CAS number</th> </tr> </thead> <tbody> <tr> <td>Sucrose</td> <td>90 - 100</td> <td>57-50-1</td> </tr> </tbody> </table>	Ingredient name	%	CAS number	Sucrose	90 - 100	57-50-1												
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EC-1			<table border="1"> <thead> <tr> <th>Ingredient name</th> <th>%</th> <th>CAS number</th> </tr> </thead> <tbody> <tr> <td>Calcium magnesium oxide</td> <td>90 - 100</td> <td>37247-91-9</td> </tr> </tbody> </table>	Ingredient name	%	CAS number	Calcium magnesium oxide	90 - 100	37247-91-9												
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MPA-170	Gas Migration	Multi-purpose polymer additive used to control free fluid, fluid loss, rheology, and gas migration.	<table border="1"> <thead> <tr> <th>Ingredient name</th> <th>%</th> <th>CAS number</th> </tr> </thead> <tbody> <tr> <td>No hazardous ingredient</td> <td></td> <td></td> </tr> </tbody> </table>	Ingredient name	%	CAS number	No hazardous ingredient														
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Poz (Fly Ash)	Base	A synthetic pozzolan, (primarily Silicon Dioxide). When blended with cement, Pozzolan can be used to create lightweight cement slurries used as either a filler slurry or a sulfate resistant completion cement.	<table border="1"> <thead> <tr> <th>Ingredient name</th> <th>%</th> <th>CAS number</th> </tr> </thead> <tbody> <tr> <td>Crystalline silica: Quartz (SiO2)</td> <td>5 - 10</td> <td>14808-60-7</td> </tr> <tr> <td>Calcium oxide</td> <td>1 - 5</td> <td>1305-78-8</td> </tr> </tbody> </table>	Ingredient name	%	CAS number	Crystalline silica: Quartz (SiO2)	5 - 10	14808-60-7	Calcium oxide	1 - 5	1305-78-8									
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R-3	Retarder	A low temperature retarder used in a wide range of slurry formulations to extend the slurry thickening time.	<table border="1"> <thead> <tr> <th>Ingredient name</th> <th>%</th> <th>CAS number</th> </tr> </thead> <tbody> <tr> <td>Organic acid salt</td> <td>40 - 50</td> <td>Trade secret.</td> </tr> </tbody> </table>	Ingredient name	%	CAS number	Organic acid salt	40 - 50	Trade secret.												
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S-5	Surfactant	Used to water wet casing and formation to facilitate cement bonding.	<table border="1"> <thead> <tr> <th>Ingredient name</th> <th>%</th> <th>CAS number</th> </tr> </thead> <tbody> <tr> <td>2-Butoxyethanol</td> <td>20 - 30</td> <td>111-76-2</td> </tr> <tr> <td>Proprietary surfactant</td> <td>10 - 20</td> <td>Trade secret.</td> </tr> <tr> <td>D-Glucopyranose, oligomeric, C10-16-alkyl glycosides</td> <td>5 - 10</td> <td>110615-47-9</td> </tr> <tr> <td>Alkylarylsulfonate amine salt</td> <td>1 - 5</td> <td>Trade secret.</td> </tr> <tr> <td>Polyoxyalkylenes</td> <td>0.1 - 1</td> <td>Trade secret.</td> </tr> </tbody> </table>	Ingredient name	%	CAS number	2-Butoxyethanol	20 - 30	111-76-2	Proprietary surfactant	10 - 20	Trade secret.	D-Glucopyranose, oligomeric, C10-16-alkyl glycosides	5 - 10	110615-47-9	Alkylarylsulfonate amine salt	1 - 5	Trade secret.	Polyoxyalkylenes	0.1 - 1	Trade secret.
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**Stickel 1210 S-2H
Macellus Shale Horizontal
Harrison County, WV**

Ground Elevation			Stickel 1210 S-2H SHL				235401.19N 1727681.39E			
Azm			Stickel 1210 S-2H LP				234280.39N 1726139.57E			
WELLBORE DIAGRAM			Stickel 1210 S-2H BHL				222010.55N 1730246.83E			
HOLE	CASING	GEOLOGY	TOP	BASE	MUD	CEMENT	CENTRALIZERS	CONDITIONING	COMMENTS	
30"	30" 157.5# LS	Conductor	0	100	AIR	N/A, Casing to be drilled in w/ Dual Rotary Rig	N/A	Ensure the hole is clean at TD.	Conductor casing = 0.5" wall thickness	
		Fresh Water	0	135	AIR	15.6 ppg PNE-1 + 3% bwoc CaCl 40% Excess Yield=1.20 / CTS	Centralized every 3 joints to surface	Once casing is at setting depth, circulate a minimum of one hole volume with Fresh Water prior to pumping cement.	Surface casing = 0.438" wall thickness Burst=2110 psi	
Fresh Water	0	500								
17.5"	13-3/8" 54.5# J-55 BTC	Kittaning Coal	660	665	AIR / KCL Salt Polymer	Lead: 15.4 ppg PNE-1 + 2.5% bwoc CaCl 40% Excess / Tail: 15.9 ppg PNE-1 + 2.5% bwoc CaCl zero% Excess. CTS	Bow Spring on every joint	Once casing is at setting depth, Circulate and condition at TD. Circulate a minimum of one hole volume prior to pumping cement.	Intermediate casing = 0.380" wall thickness Burst=2730 psi	
		Little/Big Lime	1126 / 1167	1151 / 1243						
		Injun / Gantz (Storage)	1243 / 1535	1349 / 1585						
		Intermediate 1 (Shoe 50' below storage)	0	1635						
12.25"	9-5/8" 40# J-55 BTC	Fifty / Thirty Foot	1650 / 1730	1697 / 1742	AIR / KCL Salt Polymer	Lead: 15.4 ppg PNE-1 + 2.5% bwoc CaCl 40% Excess / Tail: 15.9 ppg PNE-1 + 2.5% bwoc CaCl zero% Excess. CTS	Bow Spring on first 2 joints then every third joint to 100' form surface	Once casing is at setting depth, Circulate and condition mud at TD. Circulate a minimum of one hole volume prior to pumping cement.	Intermediate casing = 0.395" wall thickness Burst=3950 psi	
		Gordon Stray / Gordon	1785 / 1850	1850 / 1940						
		5th Sand	2035	2070						
		Bayard Sand	2125	2160						
		Intermediate 2	0	2500						
8.5" Vertical	5-1/2" 23# P-110 HC CDC HTQ	Speechley	2745	2763	9.0ppg SOBM	Lead: 14.5 ppg POZ:PNE-1 + 0.3% bwoc R3 + 1% bwoc EC1 + 0.75 gal/sk FP13L + 0.3% bwoc MPA170 Tail: 14.8 ppg PNE-1 + 0.35% bwoc R3 + 0.75 gal/sk FP13L + 50% bwoc ASCA1 + 0.5% bwoc MPA170 20% Excess Lead Yield=1.19 Tail Yield=1.94 CTS	Run 1 spiral centralizer every 5 joints from the top of the curve to surface.	Once on bottom/TD with casing, circulate at max allowable pump rate for at least 2x bottoms up, or until returns and pump pressures indicate the hole is clean. Circulate a minimum of one hole volume prior to pumping cement.	Production casing = 0.415" wall thickness Burst=14520 psi Note:Actual centralizer schedules may be changed due to hole conditions	
		Balltown	2965	3005						
		Benson	4050	4083						
		West Falls	4620	5865						
		Rhinestreet	5865	6140	11.5ppg-12.5ppg SOBM		Run 1 spiral centralizer every 3 joints from the 1st 5.5" long joint to the top of the curve.			
		Cashaqua	6140	6341						
		Middlesex	6341	6421						
		West River	6421	6514						
		Burkett	6514	6540						
		Tully Limestone	6540	6644						
8.5" Curve	5-1/2" 23# P-110 HC CDC HTQ	Hamilton	6644	6863	11.5ppg-12.5ppg SOBM	Run 1 spiral centralizer every 3 joints from the 1st 5.5" long joint to the top of the curve.				
		Marcellus	6863	6914						
		Onondaga	6914							
8.5" Lateral	5-1/2" 23# P-110 HC CDC HTQ	TMD / TVD (Production)	20687	6900						

LP @ 6900' TVD / 7748 MD

8.5" Hole - Cemented Long String
5-1/2" 23# P-110 HC CDC HTQ

+/-12939' ft Lateral

TD @ +/-6900' TVD
+/-20687' MD

X=centralizers

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4703305924



HG Energy, LLC
5260 Dupont Road
Parkersburg, WV 26101
(304) 420-1100 - Office
(304) 863-3172 - Fax

4703305924

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May 4, 2018

Dominion Energy Transmission, Inc.
Attn: Charles Cunningham
2397 Davisson Run Road
Clarksburg, WV 26301

RE: Area of Review – Stickel 1210 Well Pad – 1210 S-2H
Hydraulic Fracturing Notice

Dear Mr. Cunningham:

HG Energy II Appalachia, LLC, has developed a Marcellus pad (Stickel 1210 pad) located in Harrison County, WV. As an owner or operator of a conventional natural gas well in this area, we are requesting your assistance in this matter.

Due to the apparent presence of unique geological conditions, the potential for communication between deep geologic zones exists in this area. This potential communication, via natural gas, water or both, may occur between hydraulically fractured wells in the Marcellus formation (approximately 6900' TVD) and existing conventional natural gas wells.

HG Energy anticipates conducting hydraulic fracturing of the Stickel 1210 Pad during the fourth quarter of 2018. We have identified conventional natural gas wells operated by your company within 500' of one of the newly planned laterals (Stickel 1210 S-2H). A plat for the well is attached.

We recommend conventional well operators conduct the following activities before, during and after the fracturing operation.

1. Inspect surface equipment prior to fracturing to establish integrity and well conditions.
2. Observe wells closely during and after fracturing and monitor for abnormal increases in gas, water or pressure.
3. Inspect or install master valves rated at 3,000 psi or other necessary equipment for wellhead integrity.
4. Notify the OOG and HG Energy if any changes in water, gas production, pressure or other anomalies are identified.

Should you have any questions or desire further information, please contact me at 304-420-1119 or dwhite@hgenergyllc.com. You may also contact the WV Office of Oil and Gas at 304-926-044.

Sincerely,

Diane White

Diane White

Enclosure



HG Energy, LLC
5260 Dupont Road
Parkersburg, WV 26101
(304) 420-1100 - Office
(304) 863-3172 - Fax

33-05924

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Office of Oil and Gas

May 4, 2018

Ross & Wharton Gas Company
29 Morton Avenue
Buckhannon, WV 26201

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5260 Dupont Road
Parkersburg, WV 26101
(304) 420-1100 - Office
(304) 863-3172 - Fax

33-05924

WV Department of
Environmental Protection

MAY 10 2018

May 4, 2018

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Office of Oil and Gas

Diversified Resources, Inc.
210 Grande Mdws
Bridgeport, WV 26330

RE: Area of Review – Stickel 1210 Well Pad – 1210 S-2H
Hydraulic Fracturing Notice

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Sincerely,

Diane White

Diane White

Enclosure



HG Energy, LLC
5260 Dupont Road
Parkersburg, WV 26101
(304) 420-1100 - Office
(304) 863-3172 - Fax

33-05924

May 4, 2018

WV Department of
Environmental Protection

Bowie, Inc.
RR 1, P. O. Box 559
Clarksburg, WV 26301

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Office of Oil and Gas
MAY 10 2018

RE: Area of Review – Stickel 1210 Well Pad – 1210 S-2H
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2. Observe wells closely during and after fracturing and monitor for abnormal increases in gas, water or pressure.
3. Inspect or install master valves rated at 3,000 psi or other necessary equipment for wellhead integrity.
4. Notify the OOG and HG Energy if any changes in water, gas production, pressure or other anomalies are identified.

Should you have any questions or desire further information, please contact me at 304-420-1119 or dwhite@hgenergyllc.com. You may also contact the WV Office of Oil and Gas at 304-926-044.

Sincerely,

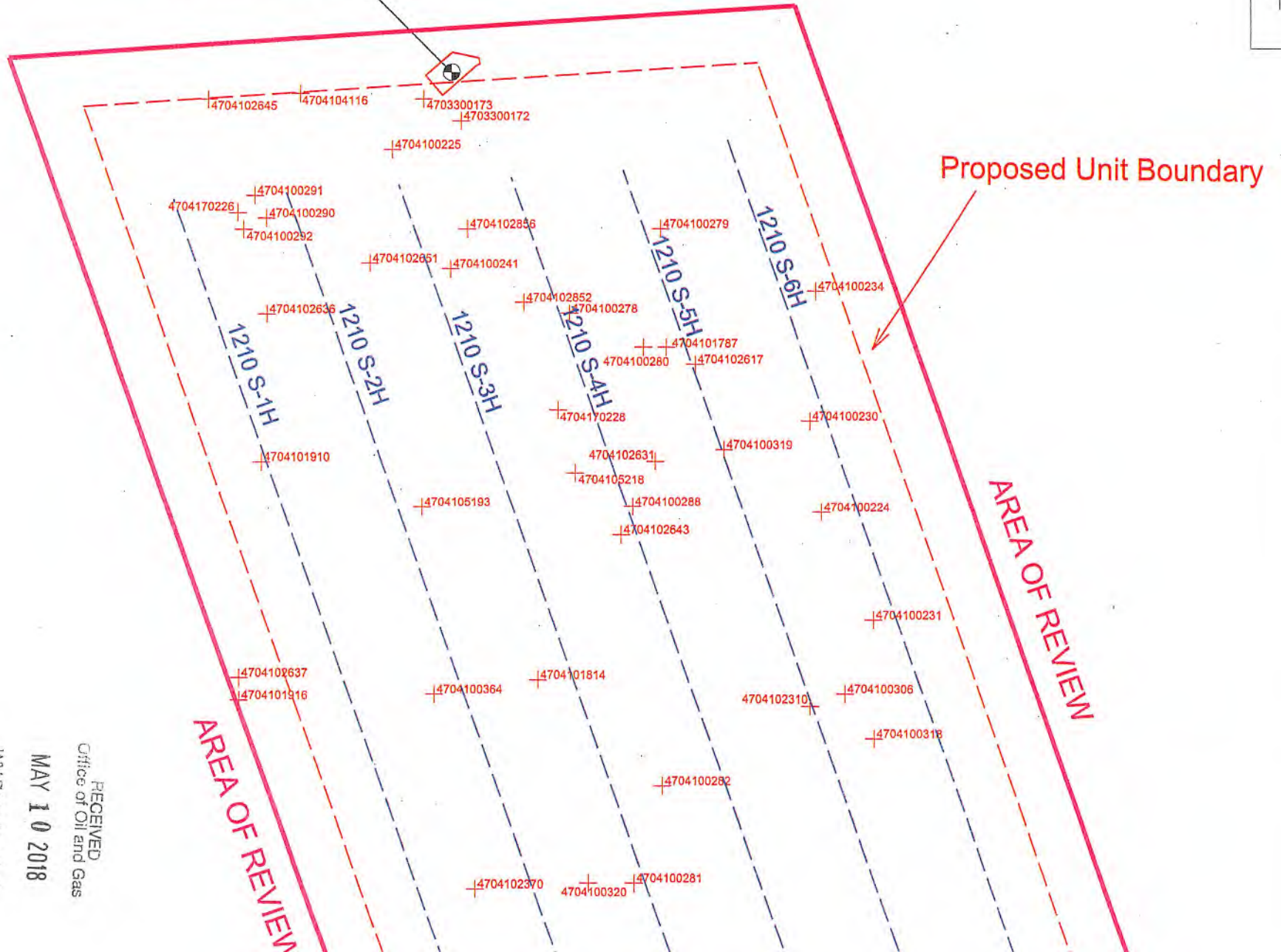
Diane White

Diane White

Enclosure

33-05824


STICKEL 1210 PAD




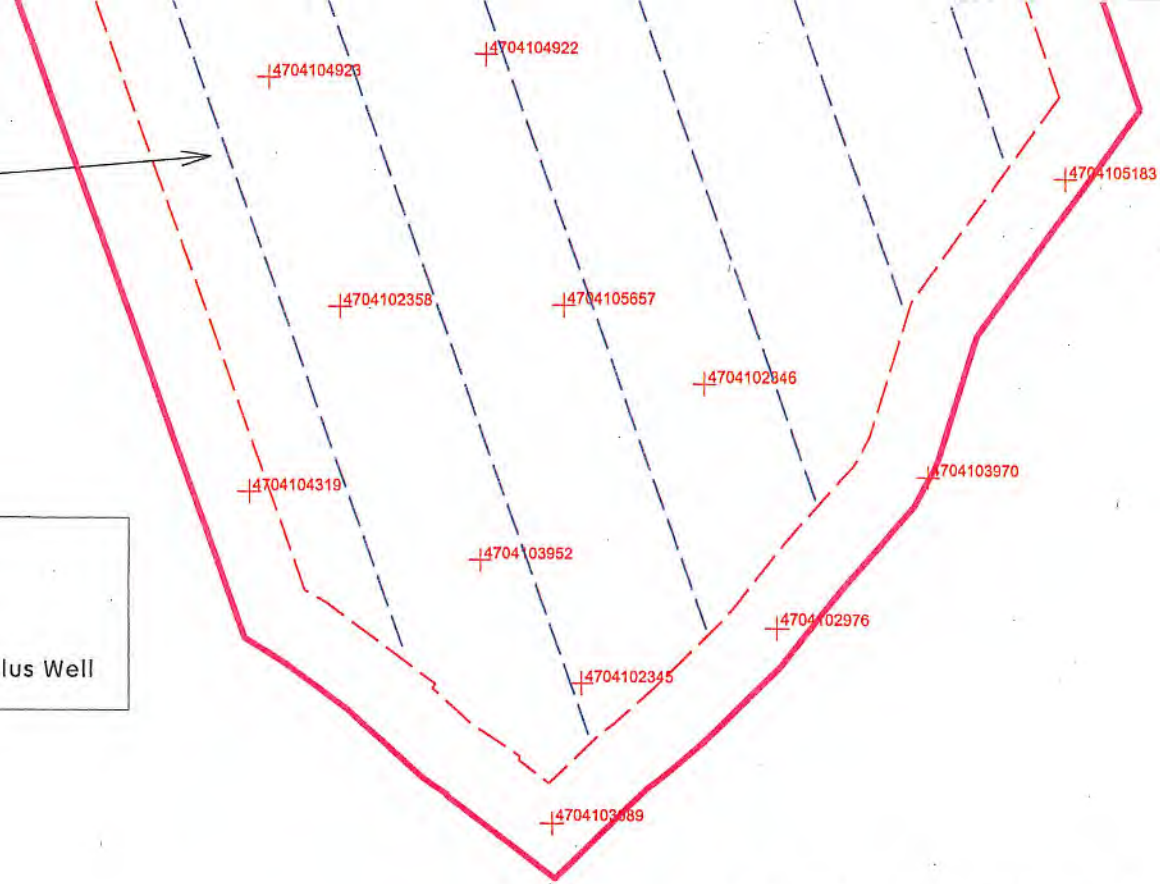
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Proposed Wellbores →

Well Key

 Conventional Vertical Well

 Proposed Horizontal Marcellus Well



NOTE:
See Attached Spreadsheet for Well Data

HG ENERGY, II APPALACHIA, LLC
5260 DuPont Road, Parkersburg, WV 26101

Area of Review for:

STICKEL 1210 PAD

- Proposed 1210 S-1H
- Proposed 1210 S-2H
- Proposed 1210 S-3H
- Proposed 1210 S-4H
- Proposed 1210 S-5H
- Proposed 1210 S-6H

Union District, Harrison County, W.Va.
Freeman's Creek District, Lewis County, W.Va.

DATA SOURCE
WVGES Data Set - 2017; WVDEP Website



SCALE: 1" = 1,320'



**EXISTING WELLS LOCATED WITHIN THE AREA OF REVIEW FOR:
STICKEL 1210 PAD AND PROPOSED WELLS S-1H, S-2H, S-3H, S-4H, S-5H & S-6H**

CT	API	COUNTY	FARM	OPERATOR NAME	FORMATION NAME	WELL TYPE	TVD	STATUS	LATITUDE	LONGITUDE
1	4703300172	Harrison	A W Rhodes	Dominion Energy Transmission Inc.	Hampshire Grp	Storage	1,575	ACTIVE WELL	39.141090	-80.459637
2	4703300173	Harrison	A W Rhodes	Dominion Energy Transmission Inc.	not available	NA	NA	ACTIVE WELL	39.141665	-80.460845
3	4703370343	Harrison	Arthur Rhodes 2	Hope Natural Gas Company	not available	NA	NA	UNKNOWN	39.141795	-80.458407
4	4703373743	Harrison	R A Beeghley	Hope Natural Gas Company	not available	NA	NA	UNKNOWN	39.139328	-80.453002
5	4703373744	Harrison	J K Musser	----- unknown -----	not available	NA	NA	UNKNOWN	39.141214	-80.449835
6	4703373745	Harrison	Arthur Rhodes	----- unknown -----	not available	NA	NA	UNKNOWN	39.143391	-80.450953
7	4704100224	Gilmer	J R Riffie	Hope Natural Gas Company	Gantz	Storage	1560	ABANDONED	39.131084	-80.447947
8	4704100225	Gilmer	W E Beeghley	Columbia Natural Resources, LLC	Gantz	Gas	1714	ABANDONED	39.140365	-80.461872
9	4704100230	Gilmer	W W Wymer	Reserve Gas Co.	Greenland Gap Fm	Gas	2962	PLUGGED	39.133404	-80.448320
10	4704100231	Gilmer	W W Wymer	Dominion Energy Transmission Inc.	Up Devonian	Storage	1545	ACTIVE WELL	39.133404	-80.448320
11	4704100234	Gilmer	R A Beeghley	Dominion Energy Transmission Inc.	Gantz	Storage	1742	ACTIVE WELL	39.136739	-80.448136
12	4704100241	Gilmer	William E Beeghley	Dominion Energy Transmission Inc.	Gantz	Storage	1730	ACTIVE WELL	39.137319	-80.460010
13	4704100278	Gilmer	Peter Bond	Dominion Energy Transmission Inc.	Hampshire Grp	Storage	2043	ACTIVE WELL	39.136159	-80.456142
14	4704100279	Gilmer	Peter Bond 2	Hope Natural Gas Company	Thirty-foot	Storage	1795	PLUGGED	39.138334	-80.453164
15	4704100280	Gilmer	Richard Beeghley	Dominion Energy Transmission Inc.	not available	Storage	-	ACTIVE WELL	39.135289	-80.453721
16	4704100281	Gilmer	Jacob Funk	Hope Natural Gas Company	Gantz	Storage	1940	ABANDONED	39.121612	-80.454086
17	4704100282	Gilmer	S G Hall	Hope Natural Gas Company	Gordon	Storage	1709	PLUGGED	39.124077	-80.453157
18	4704100288	Gilmer	Sarah J Musser	Hope Natural Gas Company	Gantz	Storage	1759	PLUGGED	39.131229	-80.454091
19	4704100290	Gilmer	W E Beeghley	Hope Natural Gas Company	not available	not available	-	PLUGGED	39.138624	-80.465969
20	4704100291	Gilmer	Wm Beeghley	Reserve Exploration Co.	not available	not available	-	PLUGGED	39.139204	-80.466341
21	4704100292	Gilmer	George W Neely	Hope Natural Gas Company	Gordon	Storage	2040	PLUGGED	39.138334	-80.466713
22	4704100306	Gilmer	Ida M Smith	Spenser Enterprises	not available	not available	-	PLUGGED	39.126443	-80.4472
23	4704100318	Gilmer	R L Smith	Dominion Energy Transmission Inc.	Up Devonian	Dry w/ Gas Show	1770	PLUGGED	39.125283	-80.446268
24	4704100319	Gilmer	J M Beeghley	Dominion Energy Transmission Inc.	Hampshire Grp	Storage	1812	PLUGGED	39.132679	-80.451113
25	4704100320	Gilmer	J A Barb	Hope Natural Gas Company	Gordon	Storage	1817	PLUGGED	39.121612	-80.455575
26	4704100364	Gilmer	T P Barb 1	Dominion Energy Transmission Inc.	Up Devonian	Storage	2173	ACTIVE WELL	39.126443	-80.460568
27	4704101787	Gilmer	R A Beeghley	Dominion Energy Transmission Inc.	Benson	Gas	4180	ACTIVE WELL	39.135289	-80.452976
28	4704101814	Gilmer	T P Barb	Dominion Energy Transmission Inc.	Balltown	Gas	3320	ACTIVE WELL	39.12681	-80.457203
29	4704101910	Gilmer	John J Oldaker	Dominion Energy Transmission Inc.	Greenland Gap Fm	Gas	4320	ACTIVE WELL	39.132389	-80.466154
30	4704101916	Gilmer	Kelvin G Williston	Dominion Energy Transmission Inc.	Greenland Gap Fm	Gas	4320	ACTIVE WELL	39.126298	-80.466898
31	4704102310	Gilmer	Charles Knicely	Dominion Energy Transmission Inc.	not available	Gas	2023	ACTIVE WELL	39.12612	-80.448344
32	4704102345	Gilmer	N L Allman	Dominion Energy Transmission Inc.	Hampshire Grp	Gas	2075	ACTIVE WELL	39.106675	-80.450541

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33	4704102346	Gilmer	N Allman	Dominion Energy Transmission Inc.	not available	Gas	-	ACTIVE WELL	39.112331	-80.447566
34	4704102358	Gilmer	C Smith	Dominion Energy Transmission Inc.	not available	Gas	-	ACTIVE WELL	39.113781	-80.456316
35	4704102370	Gilmer	John Barb	Dominion Energy Transmission Inc.	Greenland Gap Fm	Gas w/ Oil Show	3175	ACTIVE WELL	39.121467	-80.459264
36	4704102617	Gilmer	R A Beeghley	Consolidated Gas Supply Corp.	not available	not available	-	ABANDONED	39.134854	-80.452045
37	4704102631	Gilmer	Anna C Barb	Dominion Energy Transmission Inc.	not available	Storage	-	ACTIVE WELL	39.132389	-80.453347
38	4704102636	Gilmer	George W Neely	Dominion Energy Transmission Inc.	not available	Storage	-	ACTIVE WELL	39.136159	-80.465968
39	4704102637	Gilmer	Mckinley & Barb	Dominion Energy Transmission Inc.	not available	Storage	-	ACTIVE WELL	39.126878	-80.466898
40	4704102643	Gilmer	Caroline Beeghley	Dominion Energy Transmission Inc.	not available	Storage	-	ACTIVE WELL	39.130503	-80.454463
41	4704102645	Gilmer	W M Beeghley	Dominion Energy Transmission Inc.	not available	Storage	-	ACTIVE WELL	39.14167	-80.467831
42	4704102651	Gilmer	W E Beeghley	Dominion Energy Transmission Inc.	not available	Storage	-	ACTIVE WELL	39.137464	-80.462617
43	4704102852	Gilmer	Mollie Smith/Hinzman	Dominion Energy Transmission Inc.	not available	Gas	2124	PLUGGED	39.136449	-80.457632
44	4704102856	Gilmer	Sarah E Hinzman	Dominion Energy Transmission Inc.	Greenland Gap Fm	Storage	2828	ACTIVE WELL	39.138335	-80.459452
45	4704102976	Gilmer	J J Marks 3	Ross & Wharton Gas Co.	Elk	Gas	4726	ACTIVE WELL	39.107712	-80.445831
46	4704103970	Gilmer	James J Marks	Diversified Resources, Inc.	not available	Gas	-	ACTIVE WELL	39.110591	-80.442167
47	4704104116	Gilmer	James W Miller	Dominion Energy Transmission Inc.	Greenland Gap Fm	Gas	4493	ACTIVE WELL	39.141815	-80.464852
48	4704104319	Gilmer	M A Jerden/J V Garton 1	Dominion Energy Transmission Inc.	Greenland Gap Fm	Gas	4365	ACTIVE WELL	39.110300	-80.458519
49	4704104922	Gilmer	H Maxwell Eakin	Dominion Energy Transmission Inc.	Greenland Gap Fm	Gas	4321	ACTIVE WELL	39.118566	-80.452781
50	4704104923	Gilmer	Ellsworth L Wolfe	Dominion Energy Transmission Inc.	Greenland Gap Fm	Gas	4232	ACTIVE WELL	39.118131	-80.457994
51	4704105183	Gilmer	Todd Linger	Bowie, Inc.	Greenland Gap Fm	Gas	4463	ACTIVE WELL	39.116246	-80.438818
52	4704105193	Gilmer	John & Melissa Oldaker	Dominion Energy Transmission Inc.	Weir	Gas	1620	ACTIVE WELL	39.131228	-80.460940
53	4704105218	Gilmer	John & Judith Stutler	Dominion Energy Transmission Inc.	Price Fm & equivs	Gas	1470	ACTIVE WELL	39.132099	-80.455954
54	4704105657	Gilmer	Allen M & Diane Jerden	Dominion Energy Transmission Inc.	not available	Gas	-	ACTIVE WELL	39.113811	-80.450941
55										

SOURCE: WVGES DATASET (2017) and WVDEP WEBSITE

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33-05924

WW-9
(4/16)

4703305924

API Number 47 - _____ - _____
Operator's Well No. Stickel 1210 S-2H

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

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name HG Energy II Appalachia, LLC OP Code 494501907

Watershed (HUC 10) West Fork Quadrangle West Milford 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: NA

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

Proposed Disposal Method For Treated Pit Wastes:

- Land Application
- Underground Injection (UIC Permit Number _____)
- Reuse (at API Number TBD - At next anticipated well)
- Off Site Disposal (Supply form WW-9 for disposal location)
- Other (Explain _____)

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

Drilling medium anticipated for this well (vertical and horizontal)? Air, freshwater, oil based, etc. Air, Freshwater and SOB M

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

Additives to be used in drilling medium? Water, Soap, KCl, Barite, Base Oil, Wetting Agents

Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. Approved Landfill

-If left in pit and plan to solidify what medium will be used? (cement, lime, sawdust) NA

-Landfill or offsite name/permit number? See Attached

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 Diane White

Company Official (Typed Name) Diane White

Company Official Title Agent

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Subscribed and sworn before me this 19th day of April, 20 18

WV Department of
Environmental Protection

Cassidy A. Boardman Notary Public

My commission expires 7/31/2022



HG Energy II Appalachia, LLC

Proposed Revegetation Treatment: Acres Disturbed 3.456 Prevegetation pH _____

Lime 3 Tons/acre or to correct to pH 6.5

Fertilizer type 10-20-20

Fertilizer amount 500 lbs/acre

Mulch Hay 2 Tons/acre

Seed Mixtures

Temporary		Permanent	
Seed Type	lbs/acre	Seed Type	lbs/acre
Tall Fescue	40	Tall Fescue	40
Ladino Clover	5	Ladino Clover	5

Maintain E&S controls through the drilling and completion process

Attach:

Maps(s) of road, location, pit and proposed area for land application (unless engineered plans including this info have been provided). If water from the pit will be land applied, include dimensions (L x W x D) of the pit, and dimensions (L x W), and area in acreage, of the land application area.

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: S.P. Woodward

Comments: Pre-Seed/Mulch all disturbed areas as soon as reasonably possible per regulation. Upgrade ETS if needed per WV DEP ETS manual

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Title: OOG Inspector

Date: 4/25/2018

Field Reviewed? Yes No

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Cuttings Disposal/Site Water

Cuttings -Haul off Company:

Eap Industries, Inc. DOT # 0876278
1575 Smith Two State Rd. Atlasburg, PA 15004
1-888-294-5227

Waste Management
200 Rangos Lane
Washington, PA 15301
724-222-3272

Environmental Coordination Services & Recycling (ECS&R)
3237 US Highway 19
Cochranon, PA 16314
814-425-7773

Disposal Locations:

Apex Environmental, LLC Permit # 06-08438
11 County Road 78
Amsterdam, OH 43903
740-543-4389

Westmoreland Waste, LLC Permit # 100277
111 Conner Lane
Belle Vernon, PA 15012
724-929-7694

Sycamore Landfill Inc. Permit #R30-079001 05-2010
4301 Sycamore Ridge Road
Hurricane, WV 25526
304-562-2611

Max Environmental Technologies, Inc. Facility Permit # PAD004835146 / 301071
233 Max Lane
Yukon, PA 25968
724-722-3500

Max Environmental Technologies, Inc. Facility Permit # PAD05087072 / 301359
200 Max Drive
Bulger, PA 15019
724-796-1571

Waste Management Kelly Run Permit # 100663
1901 Park Side Drive
Elizabeth, PA 15037
412-384-7569

Waste Management South Hills (Arnoni) Permit # 100592
3100 Hill Road
Library, PA 15129
724-348-7013
412-384-7569

Waste Management Arden Permit # 100172
200 Rangos Lane
Washington, PA 15301
724-222-3272

Waste Management Meadowfill Permit # 1032
1488 Dawson Drive
Bridgeport, WV 26330

Brooke County Landfill Permit # SWF-103-97 / WV 0109029
Rd 2 Box 410
Collfers, WV 26035
304-748-0014

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Wetzel County Landfill Permit # SWF-1021-97 / WV 0109185
 Rt 1 Box 156A
 New Martinsville, WV 26035
 304-455-3800

Energy Solutions, LLC Permit # UT 2300249
 423 West 300 South
 Suite 200
 Salt Lake City, UT 84101

Energy Solutions Services, Inc. Permit # R-73006-L24
 1560 Bear Creek Road
 Oak Ridge, TN 37830

Northern A-1 Environmental Services Permit ID MID020906814
 3947 US 131 North, PO Box 1030
 Kalkaska, MI 49646
 231-258-9961

Water Haul off Companies:

Dynamic Structures, Clear Creek DOT # 720485
 3790 State Route 7
 New Waterford, OH 44445
 330-892-0164

Nabors Completion & Production Services Co.
 PO Box 975682
 Dallas, TX 75397-5682

Select Energy Services, LLC
 PO Box 203997
 Dallas, TX 75320-3997

Nuverra Environmental Solutions
 11942 Veterans Memorial Highway
 Masontown, WV 26542

Mustang Oilfield Services LLC
 PO Box 739
 St. Clairsville, OH 43950

Wilson's Outdoor Services, LLC
 456 Cracraft Road
 Washington, PA 15301

Disposal Locations:

Solidification
 Waste Management, Arden Landfill Permit # 100172
 200 Rangos Lane
 Washington, PA 15301
 724-225-1589

Solidification/Incineration
 Soil Remediation, Inc. Permit # 02-20753
 6065 Arrel-Smith Road
 Lowellville, OH 44436
 330-536-6825

Adams #1 (Buckeye Brine, LLC)
 Permit # 34-031-2-7177
 23986 Airport Road
 Coshocton, OH 43812
 740-575-4484
 512-478-6545

CMS of Delaware Inc. DBA CMS Oilfield Serv
 301 Commerce Drive
 Moorestown, NJ 08057

Force, Inc.
 1380 Rte. 286 Hwy. E, Suite 303
 Indiana, PA 15701

Solo Construction
 P.O. Box 544
 St. Mary's, WV 26170

Equipment Transport
 1 Tyler Court
 Carlisle, PA 17015

Myers Well Service,
 2001 Ballpark Court
 Export, PA 15632

Burns Drilling & Excavating
 618 Crabapple Road P.O. Box
 Wind Ridge, PA 15380

Nichlos 1-A (SWIW #13)
 Permit # 3862
 300 Cherrington Pkwy, Suite 200
 Coraopolis, PA 15108
 412-829-7275

Groselle (SWIW #34)
 Permit # 4096
 Rt. 88
 Garrettsville, OH
 713-275-4816

Kemble 1-D Well
 Permit # 8780
 7675 East Pike
 Norwich, Oh 43767
 614-648-8898
 740-796-6495

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Adams #2 (Buckeye Brine, LLC)
2205 Westover Road
Austin Tx 78703
Permit # 34-031-2-7178
740-575-4484
512-478-6545

Adams #3 (Buckeye Brine, LLC)
Permit #34-031-2-7241-00-00
2630 Exposition, Suite 117
Austin, TX 78703
512-478-6545

Mozena #1 Well (SWIW # 13)
Permit # 34-157-2-5511-00-00
5367 E. State Street
Newcomerstown, OH 43832
740-763-3966

Goff SWD #1 (SWIW # 27)
Permit # 34-119-2-8776-000
300 Cherrington Pkwy, Suite 200
Coraopolis, PA 15108
412-329-7275

SOS D#1 (SWIW #12)
Permit # 34-059-2-4202-00-00
Silcor Oilfield Services, Inc.
2939 Hubbard Road
Youngstown, OH 44505

Dudley #1 UIC (SWIW #1)
Permit # 34-121-2-2459-00-00
Select Energy Services, LLC
7994 S. Pleasants Hwy
St. Marys, WV 26170
304-665-2652

OH UIC #1 Buckeye UIC Barnesville 1 & 2
CNX Gas Company, LLC
1000 Consol Energy Drive
Permit # 34-013-2-0609-00-00
Permit # 34-013-2-0614-00-00
304-323-6568

US Steele 11385
Permit # 47-001-00561
200 Evergreen Drive
Waynesburg, PA 15730
304-323-6568

Chapin #7 UIC (SWIW #7)
Permit # 34-083-2-4137-00-00
Elkhead Gas & Oil Company
12163 Marne Rd. NE
Newark, OH 43055
740-763-3966

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HG Energy II Appalachia, LLC

Site Safety Plan

**Stickle 1210 Well Pad
Jane Lew, Harrison County, WV**

April 2018: Version 1

**For Submission to
West Virginia Department of Environmental Protection,
Office of Oil and Gas**

*SDW
4/25/2018*

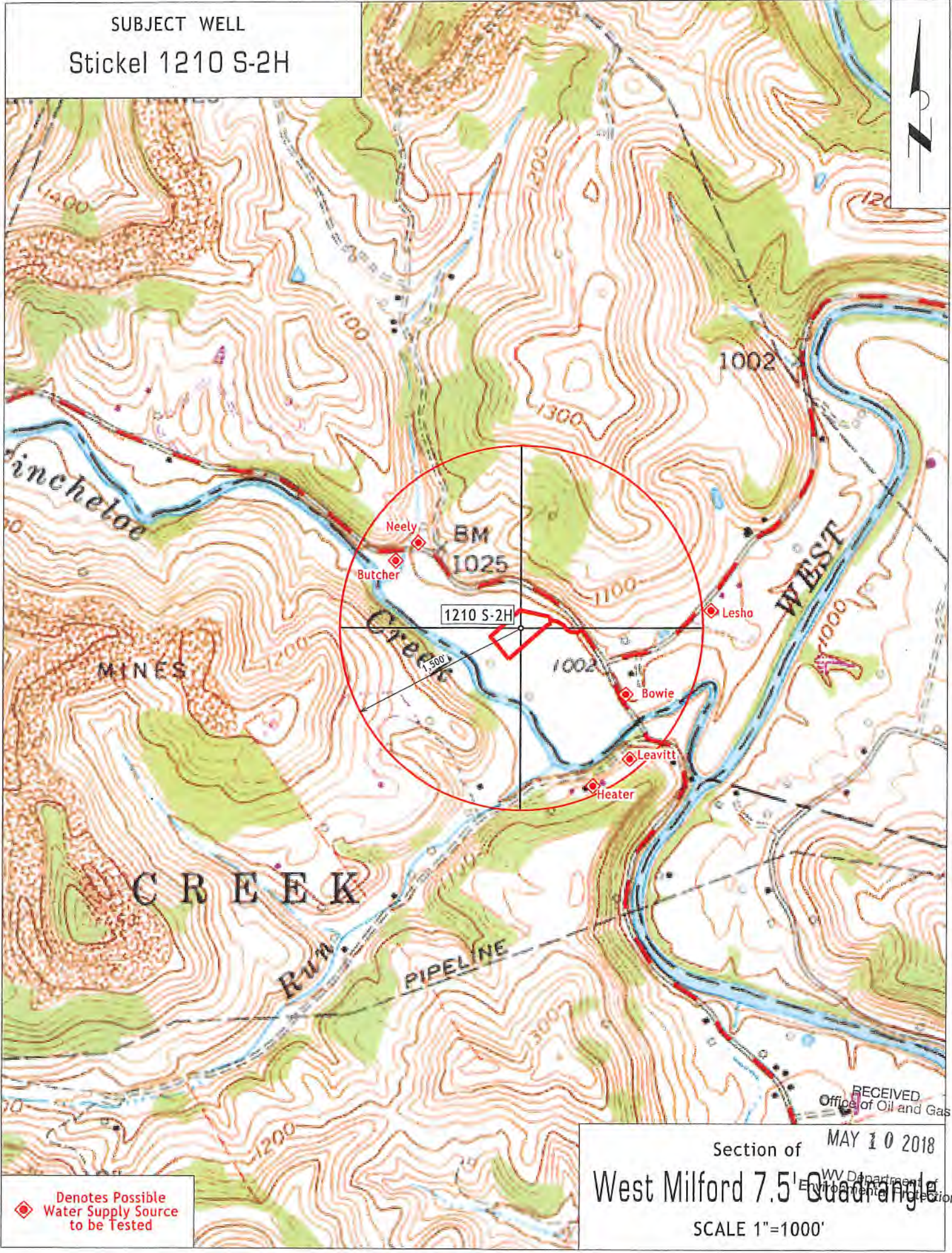
HG Energy II Appalachia, LLC

5260 Dupont Road

Parkersburg, WV 26101

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SUBJECT WELL
Stickel 1210 S-2H



◆ Denotes Possible Water Supply Source to be Tested

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Section of MAY 10 2018
West Milford 7.5' Quadrangle
SCALE 1"=1000'

Reclamation Plan For: Stickel 1210 PAD

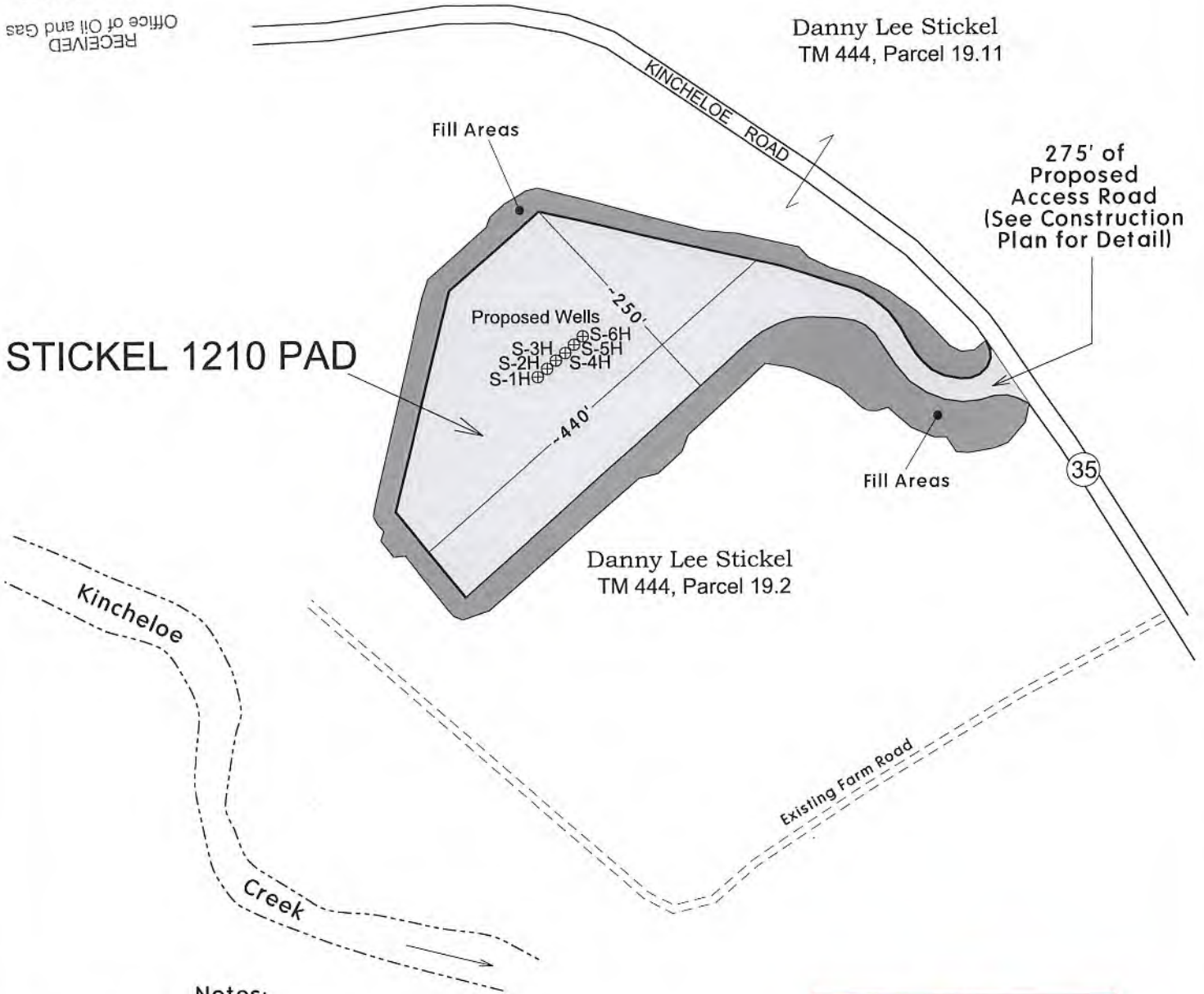
PROPOSED WELLS

1210 S-1H	1210 S-2H
1210 S-3H	1210 S-4H
1210 S-5H	1210 S-6H

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Notes:

- REQUESTED PERMIT IS FOR DRILLING NEW HORIZONTAL WELL.
- LOCATION AND ACCESS ROADS WILL BE CONSTRUCTED AS SHOWN ON THE ENGINEERED DRAWINGS WHICH ACCOMPANY THIS PERMIT APPLICATION. REFERENCE IS HEREBY MADE TO THOSE PLANS FOR MORE DETAIL ON E&S MEASURES TO BE TAKEN TO ENSURE COMPLIANCE WITH WVDEP RECLAMATION STANDARDS.
- ALL DISTURBED AREAS WILL BE RE-VEGETATED AS OUTLINED ON FORM WW-9.
- MAINTAIN SEDIMENT BARRIERS AND DRAINAGE STRUCTURES.
- NO DRILL PIT WILL BE CONSTRUCTED AND A CLOSED LOOP SYSTEM WILL BE UTILIZED TO HANDLE DRILL CUTTINGS.
- DRAWING NOT TO SCALE.

NOTE
REFER TO THE WVDEP
EROSION AND SEDIMENT CONTROL
FIELD MANUAL VER. MAY 2012 FOR
BMPs CONTROLLING EROSION AND
SEDIMENT FROM SOIL-DISTURBING
OPERATIONS.

BHL is located on topo map 7,021 feet south of Latitude: 39°07'30"
 SHL is located on topo map 8,834 feet south of Latitude: 39°10'00"

SEE PAGE 2 FOR PLAT DUE TO LENGTH OF LATERAL

BHL is located on topo map 9,568 feet west of Longitude: 80°25'00"
 SHL is located on topo map 452 feet west of Longitude: 80°27'30"

	LESSOR	DIST-TM/PAR
A	A. W. RHODES ET UX	20-444/19.2
B	W. E. BEEGHLEY ET AL	3-7B/23
C	W. E. BEEGHLEY ET AL	3-7B/23 3-7B/23.2 3-7B/23.1
D	GEORGE W. NEELY ET AL	3-7B/21
E	CAROLINE BEEGHLEY ET AL	3-7B/31
F	MAUDIE BARB ET AL	3-7B/18 3-7B/19 3-7B/32.1
G	JOHN S. BARB ET UX	3-7C/61
H	MAE BARBE ET AL	3-7C/60
J	DELBERT WILLIAMS ET AL	3-7C/63 3-7C/65 3-7C/58
K	C. W. SMITH & ET AL	3-7C/57
L	E. C. STROTHER & ET AL	3-7C/66 3-7C/66.2 3-7C/66.1
M	N. L. ALLMAN ET VIR	3-7C/69.1 3-7C/68 3-7C/68.1

SURFACE HOLE LOCATION (SHL)
 UTM 17-NAD83
 N:4332719.147
 E:546672.052
 NAD27, WV NORTH
 N:235401.194
 E:1727681.386
 LAT/LON DATUM-NAD83
 LAT:39.142411
 LON:-80.459928

APPROX. LANDING POINT
 UTM 17-NAD83
 N:4332369.872
 E:546208.020
 NAD27, WV NORTH
 N:234280.395
 E:1726139.574
 LAT/LON DATUM-NAD83
 LAT:39.139289
 LON:-80.465321

BOTTOM HOLE LOCATION (BHL)
 UTM 17-NAD83
 N:4328652.690
 E:547521.530
 NAD27, WV NORTH
 N:222010.551
 E:1730246.832
 LAT/LON DATUM-NAD83
 LAT:39.105722
 LON:-80.450383

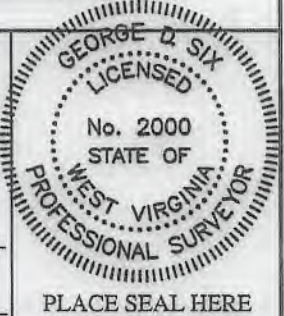


	SURFACE OWNER	DIST-TM/PAR
1	DANNY LEE & ALICIA A. STICKEL	20-444/19.2
2	ATLANTIC COAST PIPELINE, LLC	3-7B/23
3	GARY LEE & PATRICIA S. HEATER	3-7B/23.2
4	DEBRA J. HEATER	3-7B/23.1
5	JOHN J. OLDAKER, JR.	3-7B/21
6	JOHN J. OLDAKER, JR.	3-7B/31
7	JOHN J. OLDAKER, JR.	3-7B/18
8	JOHN J. OLDAKER, JR.	3-7B/19
9	TIMOTHY L. WOLFE	3-7B/32.1
10	LYNWOOD L. & DONNA S. WOLFE	3-7C/61
11	GERALD F. POSTLETHWAIT	3-7C/60
12	VALLERIE A. SNOW	3-7C/62
13	HARRY MAXWELL EAKIN	3-7C/63
14	ROBERT GARTON, JR.	3-7C/65
15	RANDALL D. & THELMA M. SHAFFER	3-7C/59
16	MARINDA M. SKINNER	3-7C/58.1
17	MARINDA M. SKINNER	3-7C/58.2
18	ELIZABETH D. & JOHN M. GRIFFITH	3-7C/58
19	JERRY L. WOLFE	3-7C/57
20	JOSHUA V. & MARSHA T. GARTON	3-7C/66
21	WESLEY A. & KATELYN M. GARTON	3-7C/66.2
22	JOSHUA V. & MARSHA T. GARTON	3-7C/66.1
23	RONDEL R. JEFFERIES	3-7C/69.1
24	JOSEPH K. & NORMA J. LUZADER	3-7C/68
25	JOSHUA V. GARTON & MARSHA TAYLOR	3-7C/68.1



FILE #: STICKEL 2H
 DRAWING #: STICKEL 2H
 SCALE: 1" = 2000'
 MINIMUM DEGREE OF ACCURACY: 1/2500
 PROVEN SOURCE OF ELEVATION: U.S.G.S. MONUMENT THOMAS 1498.81'

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 DEPARTMENT OF ENVIRONMENTAL PROTECTION.
 Signed: *George D. Six*
 R.P.E.: _____ L.L.S.: P.S. No. 2000



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS WVDEP
 OFFICE OF OIL & GAS
 601 57TH STREET
 CHARLESTON, WV 25304



DATE: APRIL 9, 2018
 OPERATOR'S WELL #: STICKEL 2H
 API WELL #: 47 33 05924
 STATE COUNTY PERMIT

Well Type: Oil Waste Disposal Production Deep
 Gas Liquid Injection Storage Shallow

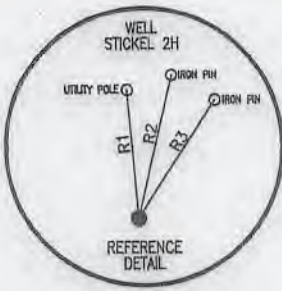
WATERSHED: MIDDLE WEST FORK CREEK ELEVATION: 994'±
 COUNTY/DISTRICT: HARRISON / UNION QUADRANGLE: WEST MILFORD, WV 7.5'

SURFACE OWNER: DANNY LEE & ALICIA A. STICKEL ACREAGE: 35.00±
 OIL & GAS ROYALTY OWNER: A. W. RHODES ET UX ACREAGE: 851.409±

DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE
 PLUG OFF OLD FORMATION PERFORATE NEW FORMATION PLUG & ABANDON
 CLEAN OUT & REPLUG OTHER CHANGE (SPECIFY): _____

TARGET FORMATION: MARCELLUS ESTIMATED DEPTH: TVD: 6,900'± TMD: 20,688'±
 WELL OPERATOR HG ENERGY II APPALACHIA, LLC DESIGNATED AGENT DIANE C. WHITE
 Address 5260 DUPONT ROAD Address 5260 DUPONT ROAD
 City PARKERSBURG State WV Zip Code 26101 City PARKERSBURG State WV Zip Code 26101

BHL is located on topo map 7,021 feet south of Latitude: 39° 07' 30"
 SHL is located on topo map 8,834 feet south of Latitude: 39° 10' 00"



STICKEL 2H PAGE 2 OF 2

47-033-05924 *HGA*

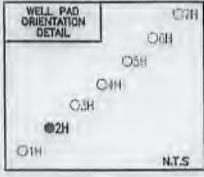
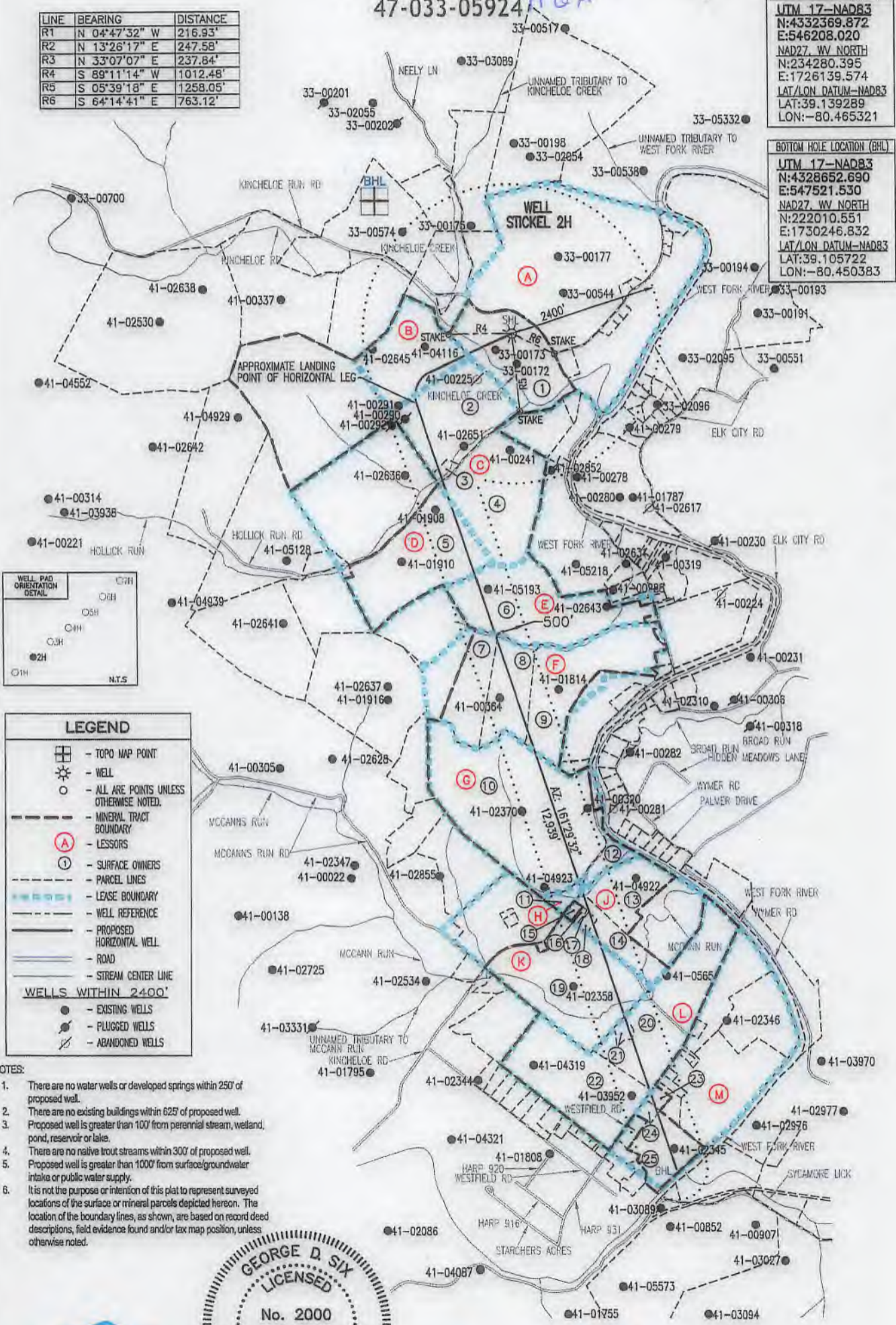
SURFACE HOLE LOCATION (SHL)
 UTM 17-NAD83
 N:4332719.147
 E:546672.052
 NAD27, WV NORTH
 N:235401.194
 E:1727681.386
 LAT/LON DATUM-NAD83
 LAT:39.142411
 LON:-80.459928

APPROX. LANDING POINT
 UTM 17-NAD83
 N:4332369.872
 E:546208.020
 NAD27, WV NORTH
 N:234280.395
 E:1726139.574
 LAT/LON DATUM-NAD83
 LAT:39.139289
 LON:-80.465321

BOTTOM HOLE LOCATION (BHL)
 UTM 17-NAD83
 N:4328652.690
 E:547521.530
 NAD27, WV NORTH
 N:222010.551
 E:1730246.832
 LAT/LON DATUM-NAD83
 LAT:39.105722
 LON:-80.450383

BHL is located on topo map 9,568 feet west of
 SHL is located on topo map 452 feet west of
 Longitude: 80° 25' 00"
 Longitude: 80° 27' 30"

LINE	BEARING	DISTANCE
R1	N 04°47'32" W	216.93'
R2	N 13°26'17" E	247.58'
R3	N 33°07'07" E	237.84'
R4	S 89°11'14" W	1012.48'
R5	S 05°39'18" E	1258.05'
R6	S 64°14'41" E	763.12'



LEGEND

- TOPO MAP POINT
- WELL
- ALL ARE POINTS UNLESS OTHERWISE NOTED.
- MINERAL TRACT BOUNDARY
- LESSORS
- SURFACE OWNERS
- PARCEL LINES
- LEASE BOUNDARY
- WELL REFERENCE
- PROPOSED HORIZONTAL WELL
- ROAD
- STREAM CENTER LINE

WELLS WITHIN 2400'

- EXISTING WELLS
- PLUGGED WELLS
- ABANDONED WELLS

- NOTES:**
- There are no water wells or developed springs within 250' of proposed well.
 - There are no existing buildings within 625' of proposed well.
 - Proposed well is greater than 100' from perennial stream, wetland, pond, reservoir or lake.
 - There are no native trout streams within 300' of proposed well.
 - Proposed well is greater than 1000' from surface/groundwater intake or public water supply.
 - It is not the purpose or intention of this plat to represent surveyed locations of the surface or mineral parcels depicted hereon. The location of the boundary lines, as shown, are based on record deed descriptions, field evidence found and/or tax map position, unless otherwise noted.



George D. Six
APRIL 9, 2018

Blue Mountain
 11023 MASON DIXON HIGHWAY
 BURTON, WV 26562
 PHONE: (304) 662-6486

WW-6A1
(5/13)

Operator's Well No. Stickel 1210 S-2H

**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
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**** See Attached ****

**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.

Well Operator: HG Energy II Appalachia, LLC
 By: Diane White *Diane White*
 Its: Agent

RECEIVED
Office of Oil and Gas
MAY 10 2018
WV Department of Environmental Protection

Legacy Lease Number	HG ENERGY II APALACHIA LEASE NUMBER	MPID	Original Lessor	Original Lessee	Agreement Type	Royalty	Book	Page
FK013939	Q100459000	HARRISON COUNTY: 20-444-19; 20-444-19.1; 20-444-19.2; 20-444-19.3; 20-444-19.4; 20-444-19.5; 20-444-19.6; 20-444-19.7; 20-444-19.8; 20-19.9; 20-444-19.10; 20-444-19.11; 20-444-19.12; 20-444-19.13	A.W. Rhodes and Mary Rhodes, his wife	Hope Natural Gas Company	Oil And Gas Lease	NOT LESS THAN 1/8	DB 175	162
			Hope Natural Gas Company	Consolidated Gas Supply Corporation	Merger/Name Change		DB 903	179
			Consolidated Gas Supply Corporation	Consolidated Gas Transmission Corporation	Assignment		DB 1136	250
			Consolidated Gas Transmission Corporation	CNG Transmission Corporation	Merger/Name Change		WV SOS	
			CNG Transmission Corporation	Dominion Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Transmission, Inc.	CNX Gas Company LLC	Memorandum of Farmout		DB 1522	33
			Dominion Transmission, Inc.	CNX Gas Company LLC	Farmout Amendment		DB 1524	491
			CNX Gas Company LLC	Noble Energy, Inc.	Limited Partial Assignment (50%)		DB 1543	1235
			Dominion Transmission, Inc.	CNX Gas Company LLC and Noble Energy, Inc.	Partial Assignment (32%)		DB 1576	125
			CNX Gas Company LLC	Noble Energy, Inc.	Assignment		DB 1584	942
			Noble Energy, Inc.	HG Energy II Appalachia LLC	Assignment		DB 1600	660
			Noble Energy, Inc.	HG Energy II Appalachia LLC	Assignment		DB 1600	692
			Dominion Energy Transmission, Inc.	Dominion Energy Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Farmout Amendment		DB 1601	581
FK053259	Q100674000	21-03-007B-0003-0000, 21-03-007B-0004-0000	WILLIAM E BEEGHLEY AND HARRIET BEEGHLEY	RESERVE GAS COMPANY	Oil And Gas Lease	NOT LESS THAN 1/8	68	302
			RESERVE GAS COMPANY	HOPE NATURAL GAS COMPANY	FEE COVEYANCE		155	202
			HOPE NATURAL GAS COMPANY	CONSOLIDATED GAS SUPPLY CORPERATION	MERGER/NAME CHANGE		294	89
			CONSOLIDATED GAS SUPPLY CORPERATION	CONSOLIDATED GAS TRANSMISSION CORPERATION	ASSIGNMENT		425	127
			CONSOLIDATED GAS TRANSMISSION CORPERATION	CNG GAS TRANSMISSION CORPERATION	MERGER/NAME CHANGE			SEC. OF STATE WEBSITE
			CNG GAS TRANSMISSION CORPERATION	DOMINION TRANSMISSION, INC	MERGER/NAME CHANGE			SEC. OF STATE WEBSITE
			DOMINION TRANSMISSION, INC	CONSOL ENERGY HOLDINGS LLC	ASSIGNMENT		651	318
			DOMINION TRANSMISSION, INC	CNX GAS COMPANY, LLC	FARMOUT AGREEMENT		672	154
			CNX GAS COMPANY, LLC	NOBLE ENERGY, INC	LIMITED PARTIAL ASSIGNMENT OF FARMOUT		684	57
			CNX GAS COMPANY, LLC	NOBLE ENERGY, INC	ASSIGNMENT		717	1
			NOBLE ENERGY, INC	HG ENERGY II APPALACHIA, LLC	ASSIGNMENT		722	170

33-05924

Legacy Lease Number	HG ENERGY II APALACHIA LEASE NUMBER	MPID	Original Lessor	Original Lessee	Agreement Type	Royalty	Book	Page
FK053278	Q100388000	 LEWIS COUNTY: 03-007B-0023-0000; 03-007B-023-0001 AND 03-007B-0023-0002	W.E. Beeghley and Harriet Beeghley, his wife	Lloyd Beeghley and Lloyd Rinehart	Oil And Gas Lease	NOT LESS THAN 1/8	DB 65	404
			Lloyd Beeghley and Lloyd Rinehart	Lloyd Rinehart	Assignment		DB 66	578
			Lloyd Rinehart	Reserve Gas Company	Assignment		DB 66	576
			Reserve Gas Company	Hope Natural Gas Company	Merger/Name Change		DB 155	202
			Hope Natural Gas Company	Consolidated Gas Supply Corporation	Merger/Name Change		DB 294	89
			Consolidated Gas Supply Corporation	Consolidated Gas Transmission Corporation	Assignment		DB 425	127
			Consolidated Gas Transmission Corporation	CNG Transmission Corporation	Merger/Name Change		WV SOS	
			CNG Transmission Corporation	Dominion Transmission, Inc.	Merger/Name Change		CORP 9	628
			Dominion Transmission, Inc.	CNX Gas Company LLC	Memorandum of Farmout		DB 672	154
			CNX Gas Company LLC	Noble Energy, Inc.	Limited Partial Assignment (50%)		DB 684	57
			Dominion Transmission, Inc.	CNX Gas Company LLC and Noble Energy, Inc.	Partial Assignment (32%)		DB 712	848
			CNX Gas Company LLC	Noble Energy, Inc.	Assignment		DB 717	1
			Noble Energy, Inc.	HG Energy II Appalachia LLC	Assignment		DB 722	139
			Dominion Transmission, Inc.	Dominion Energy Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Amended and Restated Partial Assignment		DB 723	527
Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Second Amendment to Farmout		DB 723	499			
			Geo M. Neely and M.G. Neely, his wife; and Nelson Reed and B.J. Reed, his wife	Reserve Gas Company	Oil And Gas Lease	NOT LESS THAN 1/8	DB 68	235
			Reserve Gas Company	Hope Natural Gas Company	Merger/Name Change		DB 155	202
			Hope Natural Gas Company	Consolidated Gas Supply Corporation	Merger/Name Change		DB 294	89
			Consolidated Gas Supply Corporation	Consolidated Gas Transmission Corporation	Assignment		DB 425	127
			Consolidated Gas Transmission Corporation	CNG Transmission Corporation	Merger/Name Change		WV SOS	
			CNG Transmission Corporation	Dominion Transmission, Inc.	Merger/Name Change		CORP 9	628
			Dominion Transmission, Inc.	CNX Gas Company LLC	Memorandum of Farmout		DB 672	154
			CNX Gas Company LLC	Noble Energy, Inc.	Limited Partial Assignment (50%)		DB 684	57


33-05924

Legacy Lease Number	HG ENERGY II APALACHIA LEASE NUMBER	MPID	Original Lessor	Original Lessee	Agreement Type	Royalty	Book	Page
FK053242 FK108141	Q100279000	LEWIS COUNTY: 03-007B-0021-0000; 03-007B-0021-0000; 03-007B-0022-0000 and p/o 03-007b-0010-0001	Dominion Transmission, Inc.	CNX Gas Company LLC and Noble Energy Inc.	Partial Assignment (32%)		DB 712	848
			CNX Gas Company LLC	Noble Energy, Inc.	Assignment		DB 717	1
			Noble Energy, Inc.	HG Energy II Appalachia LLC	Assignment		DB 722	139
			Dominion Transmission, Inc.	Dominion Energy Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Second Amendment to Farmout		DB 723	499
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Amended and Restated Partial Assignment		DB 723	527
			South Penn Oil Company	South Penn Natural Gas Company	Assignment		DB 79	136
			South Penn Natural Gas Company	South Penn Oil Company	Assignment		DB 234	323
			South Penn Natural Gas Company	South Penn Oil Company	Conveyance		DB 260	87
			South Penn Oil Company	Pennzoil Company	Merger/Name Change		WVSOS	
			Pennzoil Company	Pennzoil United	Conveyance		DB 307	359
			Pennzoil Company	Pennzoil Products Company	Conveyance		DB 454	34
			Pennzoil Company	Pennzoil Productions Company	Assignment		DB 460	139
			Pennzoil Products Company	Pennzoil Exploration and Production Company	Assignment		DB 551	627
			Pennzoil Exploration and Production Company	Pennzenergy Exploration and Production Company LLC	Merger/Name Change		CORP 8	343
			Pennzenergy Exploration and Production Company	Devon Energy Production Company, LP	Merger/Name Change		CORP 8	442
			Devon Energy Production Company, LP	East Resources, Inc.	Assignment		DB 566	368
			East Resources, Inc.	HG Energy LLC	Assignment		DB 652	294
E✓		LEWIS COUNTY: 03-007B-0031-0000, 03-	Caroline Beeghley, Lloyd Beeghley and Hattie Beeghley, his wife, Charles Beeghley and Maude Beeghley, his wife, Cora Beeghley, Mary Swisher and Wirt Swisher, her husband, and Louisa Beeghley	Reserve Gas Company	Oil And Gas Lease	NOT LESS THAN 1/8	DB 65	338
			Reserve Gas Company	Hope Natural Gas Company	Merger/Name Change		DB 155	202
			Hope Natural Gas Company	Consolidated Gas Supply Corporation	Merger/Name Change		DB 294	89
			Consolidated Gas Supply Corporation	Consolidated Gas Transmission Corporation	Assignment		DB 425	127
			Consolidated Gas Transmission Corporation	CNG Transmission Corporation	Merger/Name Change		WV SOS	
			CNG Transmission Corporation	Dominion Transmission, Inc.	Merger/Name Change		CORP 9	628
			Dominion Transmission, Inc.	CNX Gas Company LLC	Memorandum of Farmout		DB 672	154
			CNX Gas Company LLC	Noble Energy, Inc.	Limited Partial Assignment (50%)		DB 684	57
			Dominion Transmission, Inc.	CNX Gas Company LLC and Noble Energy Inc.	Partial Assignment (32%)		DB 712	848
			CNX Gas Company LLC	Noble Energy, Inc.	Assignment		DB 717	1
			Noble Energy, Inc.	HG Energy II Appalachia LLC	Assignment		DB 722	139

33-05924

Legacy Lease Number	HG ENERGY II APALACHIA LEASE NUMBER	MPID	Original Lessor	Original Lessee	Agreement Type	Royalty	Book	Page
FK053256	Q100337000	007B-0031-0002, 03-007B-0031-0003 and 03-007B	Dominion Transmission, Inc.	Dominion Energy Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Second Amendment to Farmout		DB 723	499
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Amended and Restated Partial Assignment		DB 723	527
			South Penn Oil Company	South Penn Natural Gas Company	Assignment		DB 79	136
			South Penn Natural Gas Company	South Penn Oil Company	Assignment		DB 234	323
			South Penn Natural Gas Company	South Penn Oil Company	Conveyance		DB 260	87
			South Penn Oil Company	Pennzoil Company	Merger/Name Change		WVSOS	
			Pennzoil Company	Pennzoil United	Conveyance		DB 307	359
			Pennzoil Company	Pennzoil Products Company	Conveyance		DB 454	34
			Pennzoil Company	Pennzoil Productions Company	Assignment		DB 460	139
			Pennzoil Products Company	Pennzoil Exploration and Production Company	Assignment		DB 551	627
			Pennzoil Exploration and Production Company	Pennzenergy Exploration and Production Company LLC	Merger/Name Change		CORP 8	343
			Pennzenergy Exploration and Production Company	Devon Energy Production Company, LP	Merger/Name Change		CORP 8	442
			Devon Energy Production Company, LP	East Resources, Inc.	Assignment		DB 566	368
			East Resources, Inc.	HG Energy LLC	Assignment		DB 652	294
FK 064783 M208276	Q100558000	<p style="text-align: center;">FV</p> <p>LEWIS COUNTY: 03-007B-0017-0000; 03-007B-0018-0000; 03-007B-0019-0000; 03-007B-0032-0001; 03-007B-0031-0001; AND 03-</p>	<p>Maudie Barb, widow; James Barb, single; Francis W. Smith and Wavelene Smith, his wife; George H. Smith and Virginia L. Smith, his wife; Ida Musser Post, single; Lummie E. Nicholson, widow; Versie M. Kelly and O.W. Kelly, her husband; Lloyd Minter and Addie V. Minter, his wife; Bertha Brinkley and Allman Brinkley, her husband; Ann Patton, single; Geraldine Wolverton and Harold G. Wolverton, her husband; Fred C. Nicholson and Elizabeth Nicholson, his wife; Helen Ehase and Michael Ehase, her husband; Harold J. Plunkett, a married woman, living separate and apart from her husband; Mary Katherine Kearney and James J. Kearney, her husband; Orval L. Musser, single; Herbert H. Post and Nelly D. Post, his wife; W.G. Post and Effie Post, his wife; Bessie A. Horne and C.S. Horne, her husband; Lacy Barbe and Cusie Barbe, his wife; Myrtle Barbe, wife of Clarence Barbe; Mary R. Minter, single; Zella B. Barbe, single</p>	Hope Natural Gas Company	Oil And Gas Lease	NOT LESS THAN 1/8	DB 223	169
			Hope Natural Gas Company	Consolidated Gas Supply Corporation	Merger/Name Change		DB 294	89

33-05924

Legacy Lease Number	HG ENERGY II APALACHIA LEASE NUMBER	MPID	Original Lessor	Original Lessee	Agreement Type	Royalty	Book	Page
		007B-0035-0000	Consolidated Gas Supply Corporation	Consolidated Gas Transmission Corporation	Assignment		DB 425	127
			Consolidated Gas Transmission Corporation	CNG Transmission Corporation	Merger/Name Change		WV SOS	
			CNG Transmission Corporation	Dominion Transmission, Inc.	Merger/Name Change		CORP 9	628
			Dominion Transmission, Inc.	CNX Gas Company LLC	Memo of Farmout		DB 672	154
			CNX Gas Company LLC	Noble Energy, Inc.	Limited Partial Assignment (50%)		DB 684	57
			Dominion Transmission, Inc.	CNX Gas Company LLC and Noble Energy, Inc.	Partial Assignment (32%)		DB 712	848
			CNX Gas Company LLC	Noble Energy, Inc.	Assignment		DB 717	1
			CNX Gas Company LLC	Noble Energy, Inc.	Assignment		752	784
			Noble Energy, Inc.	HG Energy II Appalachia LLC	Assignment		DB 722	139
			Dominion Transmission, Inc.	Dominion Energy Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Amended and Restated Partial Assignment		DB 723	527
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Second Amendment to Farmout		DB 723	499
FK053273	Q100770000	 LEWIS COUNTY: 03-007C-0061-000; 030-007C-0062-000; and 03-007C-0062-0001	John S. Barb and Minnie A. Barb, his wife	Reserve Gas Company	Oil And Gas Lease	NOT LESS THAN 1/8	DB 71	538
			Reserve Gas Company	Hope Natural Gas Company	Merger/Name Change		DB 155	202
			Hope Natural Gas Company	Consolidated Gas Supply Corporation	Merger/Name Change		DB 294	89
			Consolidated Gas Supply Corporation	Consolidated Gas Transmission Corporation	Assignment		DB 425	127
			Consolidated Gas Transmission Corporation	CNG Transmission Corporation	Merger/Name Change		WV SOS	
			CNG Transmission Corporation	Dominion Transmission, Inc.	Merger/Name Change		CORP 9	628
			Dominion Transmission, Inc.	CNX Gas Company LLC	Memorandum of Farmout		DB 672	154
			CNX Gas Company LLC	Noble Energy, Inc.	Limited Partial Assignment (50%)		DB 684	57
			Dominion Transmission, Inc.	CNX Gas Company LLC and Noble Energy, Inc.	Partial Assignment (32%)		DB 712	848
			CNX Gas Company LLC	Noble Energy, Inc.	Assignment		DB 717	1
			Noble Energy, Inc.	HG Energy II Appalachia LLC	Assignment		DB 722	139
			Dominion Transmission, Inc.	Dominion Energy Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Amended and Restated Partial Assignment		DB 723	527
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Second Amendment to Farmout		DB 723	499

33-05924

Legacy Lease Number	HG ENERGY II APALACHIA LEASE NUMBER	MPID	Original Lessor	Original Lessee	Agreement Type	Royalty	Book	Page
FK062101	Q100692000	LEWIS COUNTY: 03-007C-0060-0000 <i>H ✓</i>	Mae Barbe, widow, Vieva Prince and Denzel Prince, her husband	Hope Natural Gas Company	Oil And Gas Lease	NOT LESS THAN 1/8	DB 211	244
			Hope Natural Gas Company	Consolidated Gas Supply Corporation	Merger/Name Change		DB 294	89
			Consolidated Gas Supply Corporation	Consolidated Gas Transmission Corporation	Assignment		DB 425	127
			Consolidated Gas Transmission Corporation	CNG Transmission Corporation	Merger/Name Change		WV SOS	
			CNG Transmission Corporation	Dominion Transmission, Inc.	Merger/Name Change		CORP 9	628
			Dominion Transmission, Inc.	CNX Gas Company LLC	Memo of Farmout		DB 672	154
			CNX Gas Company LLC	Noble Energy, Inc.	Limited Partial Assignment (50%)		DB 684	57
			Dominion Transmission, Inc.	CNX Gas Company LLC and Noble Energy, Inc.	Partial Assignment (32%)		DB 712	848
			CNX Gas Company LLC	Noble Energy, Inc.	Assignment		DB 717	1
			CNX Gas Company LLC	Noble Energy, Inc.	Corrective Assignment		DB 725	784
			Noble Energy, Inc.	HG Energy II Appalachia LLC	Assignment		DB 722	139
			Dominion Transmission, Inc.	Dominion Energy Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Second Amendment to Farmout		DB 723	499
Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Amended and Restated Partial Assignment		DB 723	527			
FK062097	Q098895000	LEWIS COUNTY: 03-007C-0063-0000; 03-007C-0064-0000; 03-007C-0065-0000; 03-007C-0058-0000; 03-007C-0058-0001; 03-007C-0058-0002; 03-007C-0059-0000 <i>S ✓</i>	Delbert Williams and Pauline Williams, his wife; Ethel Williams, single; Lillie M. Allman, widow; Abraham G. Barb and Cornelia Barb, his wife; Mae Barb, widow; Vieva Prince and Denzel Prince, her husband; Rev. Raymond Barbe and Ada B. Barbe, his wife, and W.S. Barbe, Jr., widower	Hope Natural Gas Company	Oil And Gas Lease	NOT LESS THAN 1/8	DB 211	257
			Hope Natural Gas Company	Consolidated Gas Supply Corporation	Merger/Name Change		DB 294	89
			Consolidated Gas Supply Corporation	Consolidated Gas Transmission Corporation	Assignment		DB 425	127
			Consolidated Gas Transmission Corporation	CNG Transmission Corporation	Merger/Name Change		WV SOS	
			CNG Transmission Corporation	Dominion Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Transmission, Inc.	CNX Gas Company LLC	Memorandum of Farmout		DB 672	154
			CNX Gas Company LLC	Noble Energy, Inc.	Limited Partial Assignment (50%)		DB 684	57
			Dominion Transmission, Inc.	CNX Gas Company LLC and Noble Energy, Inc.	Partial Assignment (32%)		DB 712	848
			CNX Gas Company LLC	Noble Energy, Inc.	Assignment		DB 717	1
			CNX Gas Company LLC	Noble Energy, Inc.	Corrective Assignment		DB 725	784
			Noble Energy, Inc.	HG Energy II Appalachia LLC	Assignment		DB 722	139

33-05924

Legacy Lease Number	HG ENERGY II APALACHIA LEASE NUMBER	MPID	Original Lessor	Original Lessee	Agreement Type	Royalty	Book	Page
			Dominion Transmission, Inc.	Dominion Energy Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Second Amendment to Farmout		DB 723	499
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Amended and Restated Partial Assignment		DB 723	527
FK053232	Q100900000	LEWIS COUNTY: 03-007C-0057-000; 03-0007C-0057-0001; 03-0007C-0057-0002 and p/o 03-0007C-0041-0000	C.W. Smith and S.A. Smith, his wife	Reserve Gas Company	Oil And Gas Lease	NOT LESS THAN 1/8	DB 68	136
			Reserve Gas Company	Hope Natural Gas Company	Merger/Name Change		DB 155	202
			Hope Natural Gas Company	Consolidated Gas Supply Corporation	Merger/Name Change		DB 294	89
			Consolidated Gas Supply Corporation	Consolidated Gas Transmission Corporation	Assignment		DB 425	127
			Consolidated Gas Transmission Corporation	CNG Transmission Corporation	Merger/Name Change		WV SOS	
			CNG Transmission Corporation	Dominion Transmission, Inc.	Merger/Name Change		CORP 9	628
			Dominion Transmission, Inc.	CNX Gas Company LLC	Memorandum of Farmout		DB 672	154
			CNX Gas Company LLC	Noble Energy, Inc.	Limited Partial Assignment (50%)		DB 684	57
			Dominion Transmission, Inc.	CNX Gas Company LLC and Noble Energy Inc.	Partial Assignment (32%)		DB 712	848
			CNX Gas Company LLC	Noble Energy, Inc.	Assignment		DB 717	1
			Noble Energy, Inc.	HG Energy II Appalachia LLC	Assignment		DB 722	139
			Dominion Transmission, Inc.	Dominion Energy Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Second Amendment to Farmout		DB 723	499
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Amended and Restated Partial Assignment		DB 723	527
			Elbert C. Strother and Delora Strother, his wife; Lucinda S. Dawson and N.B. Dawson, her husband; Effie M. Strother	Hope Natural Gas Company	Oil And Gas Lease	NOT LESS THAN 1/8	DB 230	20
			Hope Natural Gas Company	Consolidated Gas Supply Corporation	Merger/Name Change		DB 294	89
			Consolidated Gas Supply Corporation	Consolidated Gas Transmission Corporation	Assignment		DB 425	127
			Consolidated Gas Transmission Corporation	CNG Transmission Corporation	Merger/Name Change		WV SOS	
			Dominion Transmission, Inc.	CNX Gas Company LLC	Memorandum of Farmout		DB 672	154

Legacy Lease Number	HG ENERGY II APALACHIA LEASE NUMBER	MPID	Original Lessor	Original Lessee	Agreement Type	Royalty	Book	Page
FK065412	Q101062000	LEWIS COUNTY: 03-007C-0066-0000 and 03-007C-0066-0001	CNG Transmission Corporation	Dominion Transmission, Inc.	Merger/Name Change		CORP 9	628
			CNX Gas Company LLC	Noble Energy, Inc.	Limited Partial Assignment (50%)		DB 684	57
			Dominion Transmission, Inc.	CNX Gas Company LLC and Noble Energy Inc.	Partial Assignment (32%)		DB 712	848
			CNX Gas Company LLC	Noble Energy, Inc.	Assignment		DB 717	1
			Noble Energy, Inc.	HG Energy II Appalachia LLC	Assignment		DB 722	139
			Dominion Transmission, Inc.	Dominion Energy Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Amended and Restated Partial Assignment		DB 723	527
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Second Amendment to Farmout		DB 723	499
FK053192	Q101144000	<p>M ✓</p> <p>LEWIS COUNTY: 03-7C-0068-0000; 03-7C-0068-0001; 03-7C-0068-0002; 03-7C-0068-0003; 03-7C-0068-0004; 03-7C-0069-0001; 03-7C-0070-0000; 03-7C-0070-0001; 03-7C-0070-0002; 03-7C-0070-0003; 03-7C-0071-0001; 03-7C-0071-0002; 03-7C-0072-0000; 03-7C-0072-0001; 03-7C-0072-0002 AND PART OF 03-01-0069-0000</p>	N.L. Allman and L.M. Allman, her husband	South Penn Oil Company	Oil And Gas Lease	NOT LESS THAN 1/8	DB 42	20
			South Penn Oil Company	Hope Natural Gas Company	Assignment		DB 85	127
			Hope Natural Gas Company	Reserve Gas Company	Assignment		DB 79	370
			South Penn Oil Company	Reserve Gas Company	Assignment		DB 79	237
			Reserve Gas Company	Hope Natural Gas Company	Merger/Name Change		DB 155	202
			Hope Natural Gas Company	Consolidated Gas Supply Corporation	Merger/Name Change		DB 294	89
			Consolidated Gas Supply Corporation	Consolidated Gas Transmission Corporation	Assignment		DB 425	127
			Consolidated Gas Transmission Corporation	CNG Transmission Corporation	Merger/Name Change		WV SOS	
			CNG Transmission Corporation	Dominion Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Transmission, Inc.	CNX Gas Company, LLC	Memorandum of Farmout		DB 672	154
			CNG Transmission Corporation	Dominion Transmission, Inc.	Merger/Name Change		CORP 9	628
			CNG Gas Company LLC	Noble Energy, Inc.	Limited Partial Assignment (50%)		DB 684	57
			Dominion Transmission, Inc.	CNX Gas Company, LLC and Noble Energy, Inc.	Partial Assignment (32%)		DB 712	848
			CNX Gas Company LLC	Noble Energy, Inc.	Assignment		DB 717	1
			CNX Gas Company LLC	Noble Energy, Inc.	Corrective Assignment		DB 725	784
			Noble Energy, Inc.	HG Energy II Appalachia LLC	Assignment		DB 722	139
			Dominion Transmission, Inc.	Dominion Energy Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Second Amendment to Farmout		DB 723	499
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Amended and Restated Partial Assignment		DB 723	527



HG Energy, LLC
5260 Dupont Road
Parkersburg, WV 26101
(304) 420-1100 - Office
(304) 863-3172 - Fax

4703305924

May 4, 2018

Laura Adkins
WV DEP
Division of Oil & Gas
601 57th Street
Charleston, WV 25304

RE: Drilling Under Roads – Stickel 1210 S-2H
Union District, Harrison County
West Virginia

Dear Ms. Adkins:

HG Energy II Appalachia, LLC, has the right to drill, stimulate and produce wells that are drilled under the County and State Roads as designated on the plats.

Should you have any questions or desire further information, please contact me at dwhite@hgenergyllc.com or 304-420-1119.

Very truly yours,

Diane White

Diane C. White

Enclosures

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WV Department of
Environmental Protection

WW-6AW
(1-12)

API NO. 47- _____
OPERATOR WELL NO. Stickel 1210 S-2H
Well Pad Name: Stickel 1210

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

Instructions to Persons Named on Page WW-6A

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

Comment and Waiver Provisions

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

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

VOLUNTARY STATEMENT OF NO OBJECTION

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

State: West Virginia UTM NAD 83 Easting: 546872.1
County: Harrison Northing: 4332719.1
District: Union Public Road Access: Kincheloe Run Road / SLS35
Quadrangle: West Millford 7.5' Generally used farm name: Denny and Alicia Stickel
Watershed: West Fork

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

<p>*Please check the box that applies</p> <p><input type="checkbox"/> SURFACE OWNER</p> <p><input type="checkbox"/> SURFACE OWNER (Road and/or Other Disturbance)</p> <p><input type="checkbox"/> SURFACE OWNER (Impoundments/Pits)</p> <p><input type="checkbox"/> COAL OWNER OR LESSEE</p> <p><input type="checkbox"/> COAL OPERATOR</p> <p><input type="checkbox"/> WATER PURVEYOR</p> <p><input checked="" type="checkbox"/> OPERATOR OF ANY NATURAL GAS STORAGE FIELD</p>	<p>FOR EXECUTION BY A NATURAL PERSON</p> <p>Signature: _____</p> <p>Print Name: _____</p> <p>Date: _____</p> <p>FOR EXECUTION BY A CORPORATION, ETC.</p> <p>Company: <u>DOMINION ENERGY TRANSMISSION, INC.</u></p> <p>By: <u>RONALD WALDEN</u></p> <p>Its: <u>SUPERVISOR, GEOLOGIC SERVICES</u></p> <p>Signature: <u>Ronald I Walden</u></p> <p>Date: <u>AUGUST 2, 2018</u></p>
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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.

WW-6A
(9-13)

API NO. 47- _____
OPERATOR WELL NO. Stickel 1210 S-2H
Well Pad Name: Stickel 1210

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: 4/23/18 **Date Permit Application Filed:** 4/27/18

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: Danny & Alicia Stickel
Address: 1404 Kincheloe Road
Jane Lew, WV 26378

COAL OWNER OR LESSEE
Name: NA
Address: _____

Name: _____
Address: _____

COAL OPERATOR
Name: NA
Address: _____

SURFACE OWNER(s) (Road and/or Other Disturbance)
Name: See Above
Address: _____

SURFACE OWNER OF WATER WELL AND/OR WATER PURVEYOR(s)
Name: **See Attached Sheet**
Address: _____

Name: _____
Address: _____

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

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

*Please attach additional forms if necessary

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WW-6A
(8-13)

Stickel 1210 S-2H

Page 1 Continued

Surface Owner of Water Well and/or Water Purveyors to be Noticed:

BUTCHER AND A L. ET AL /
523 KINCHELOE RD
JANE LEW , WV 26378

NEELY MATTHEW M & DIANE K /
478 KINCHELOE RD
JANE LEW , WV 26378

LESHO NANCY C /
RR 2 BOX 77-1
JANE LEW , WV 26378

BOWIE, CASEY C & KELLY J /
7500 OLD MILL RD
JANE LEW , WV 26378

HEATER, DEBRA JO /
441 HOLICK RUN RD
JANE LEW , WV 26378

LEAVITT PATRICIA A & RAY BASIL WALKER /
7337 OLD MILL RD
JANE LEW , WV 26378

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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.

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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

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API NO. 47- 33-05924
OPERATOR WELL NO. Stickel 1210 S-2H
Well Pad Name: Stickel 1210

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

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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.**

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.

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Environmental Protection

WW-6A
(8-13)

API NO. 47- 33-05924
OPERATOR WELL NO. Stickel 1210 S-2H
Well Pad Name: Stickel 1210

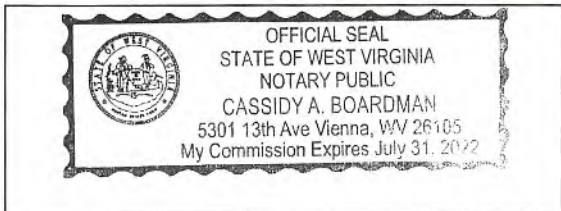
Notice is hereby given by:

Well Operator: HG Energy II Appalachia, LLC
Telephone: 304-420-1119
Email: dwhite@hgenergyllc.com Diane White

Address: 5260 Dupont Road
Parkersburg, WV 26101
Facsimile: 304-863-3172

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.



Subscribed and sworn before me this 23rd day of April, 2018.

Cassidy A. Boardman Notary Public

My Commission Expires JULY 31, 2022

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Environmental Protection

**STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
NOTICE OF INTENT TO DRILL**

Pursuant to W. Va. Code § 22-6A-16(b), the Notice of Intent to Drill is only required if the notice requirements of W. Va. Code § 22-6A-10(a) have NOT been met or if the Notice of Intent to Drill requirement has NOT been waived in writing by the surface owner.

Notice Time Requirement: Notice shall be provided at least **TEN (10)** days prior to filing a permit application.

Date of Notice: 04/19/2018 **Date Permit Application Filed:** 04/29/2018

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

- HAND DELIVERY
- CERTIFIED MAIL RETURN RECEIPT REQUESTED

Pursuant to W. Va. Code § 22-6A-16(b), at least ten days prior to filing a permit application, an operator shall, by certified mail return receipt requested or hand delivery, give the surface owner notice of its intent to enter upon the surface owner's land for the purpose of drilling a horizontal well: *Provided*, That notice given pursuant to subsection (a), section ten of this article satisfies the requirements of this subsection as of the date the notice was provided to the surface owner: *Provided, however*, That the notice requirements of this subsection may be waived in writing by the surface owner. The notice, if required, shall include the name, address, telephone number, and if available, facsimile number and electronic mail address of the operator and the operator's authorized representative.

Notice is hereby provided to the SURFACE OWNER(s):

Name: Danny & Alicia Stickel
 Address: 1404 Kincheloe Road
Jane Lew, WV 26378

Name: _____
 Address: _____

Notice is hereby given:

Pursuant to West Virginia Code § 22-6A-16(b), notice is hereby given that the undersigned well operator has an intent to enter upon 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>546668.470</u>
County: <u>Harrison</u>	Northing: <u>4332716.044</u>
District: <u>Union - Outside</u>	Public Road Access: <u>Kincheloe Run Rd / SLS 35</u>
Quadrangle: <u>West Milford 7.5'</u>	Generally used farm name: <u>Danny & Alicia Stickel</u>
Watershed: <u>West Fork</u>	

This Notice Shall Include:

Pursuant to West Virginia Code § 22-6A-16(b), this notice shall include the name, address, telephone number, and if available, facsimile number and electronic mail address of the operator and the operator's authorized representative. 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.

Notice is hereby given by:

Well Operator: HG Energy II Appalachia, LLC
 Address: 5260 Dupont Road
Parkersburg, WV 26101
 Telephone: 304-420-1119
 Email: dwhite@hgenergyllc.com
 Facsimile: 304-863-3172

Authorized Representative: Diane White *Diane White*
 Address: 5260 Dupont Road
Parkersburg, WV 26101
 Telephone: 304-420-1119
 Email: dwhite@hgenergyllc.com
 Facsimile: 304-863-3172

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.

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WW-6A5
(1/12)

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: 04/20/2018 **Date Permit Application Filed:** 04/30/2018

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: Danny & Alicia Stickel

Name: _____

Address: 1404 Kincheloe Road

Address: _____

Jane Lew, WV 26378

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>546668.470</u>
County:	<u>Harrison</u>	UTM NAD 83 Northing:	<u>4332716.044</u>
District:	<u>Union - Outside</u>	Public Road Access:	<u>Kincheloe Run Road / SLS 35</u>
Quadrangle:	<u>West Milford 7.5'</u>	Generally used farm name:	<u>Danny & Alicia Stickel</u>
Watershed:	<u>West Fork</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: HG Energy II Appalachia, LLC Diane White
Telephone: 304-420-1119
Email: dwhite@hgenergyllc.com

Address: 5260 Dupont Road
Parkersburg, WV 26101
Facsimile: 304-863-3172

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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.

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WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

Division of Highways

1900 Kanawha Boulevard East • Building Five • Room 110
 Charleston, West Virginia 25305-0430 • (304) 558-3505

Thomas J. Smith, P. E.
 Secretary of Transportation/
 Commissioner of Highways

May 1, 2018

Jill M. Newman
 Deputy Commissioner

James A. Martin, Chief
 Office of Oil and Gas
 Department of Environmental Protection
 601 57th Street, SE
 Charleston, WV 25304

Subject: DOH Permit for the Stickel 1210 Well Pad, Harrison County
 S-2H Well Site

Dear Mr. Martin,

This well site will be accessed from Permit #06-2018-0517 issued to HG Energy II Appalachia for access to the State Road for a well site located off of Harrison County 35 SLS.

The operator has signed a STATEWIDE OIL AND GAS ROAD MAINTENANCE BONDING AGREEMENT and provided the required Bond. This operator is currently in compliance with the DOH OIL AND GAS POLICY dated January 3, 2012.

Very Truly Yours,

A handwritten signature in blue ink that reads "Gary K. Clayton".

Gary K. Clayton, P.E.
 Regional Maintenance Engineer
 Central Office O&G Coordinator

Cc: Diane C. White
 HG Energy II, LLC
 CH, OM, D-4
 File

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List of Frac Additives by Chemical Name and CAS #**Stickel 1210 S Well Pad (S-1H, S-2H, S-3H, S-4H, S-5H, S-6H)**

Chemical Name	CAS #	Multiple CAS #'s
Pro Shale Slik 405	Mixture	68551-12-2 7647-14-5 12125-02-9 64742-47-8
Pro Hib II	Mixture	68412-54-4 68607-28-3 107-21-1 111-76-2 67-56-1 107-19-7
Silica Sand and Ground Sand	Mixture	14808-60-7 1344-28-1 1309-37-1 13463-67-7
Hydrochloric Acid 22 DEG BE	7647-01-0	
PROGEL - 4.5	64742-96-7	
BIO CLEAR 2000	Mixture	25322-68-3 10222-01-2
SCALE CLEAR SI 112	107-21-1	
PROBREAK 4	Mixture	57-50-1 107-21-1
Sulfamic Acid	5329-14-6	
PRO - Flow - 102-N	Mixture	67-63-0 68439-45-2 2687-96-9
PROGEL - 4	9000-30-0	

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WV Department of
Environmental Protection



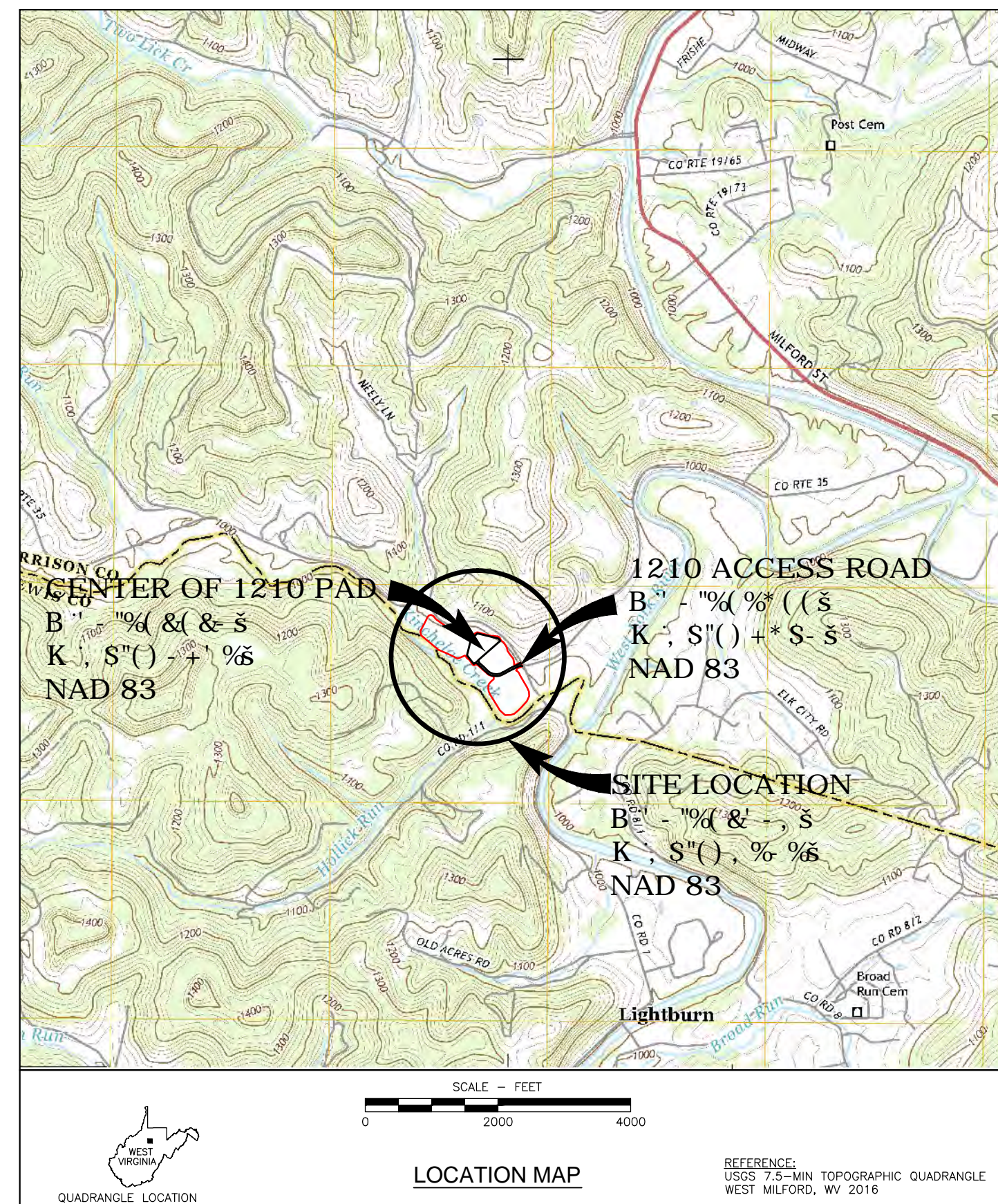
CONSTRUCTION IMPROVEMENT PLANS WITH EROSION AND SEDIMENT CONTROLS HG WELL PAD 1210

API# 47-033-05924
API# 47-033-05925
API# 47-033-05926
API# 47-033-05927
API# 47-033-05928
API# 47-033-05929

UNION DISTRICT HARRISON COUNTY WEST VIRGINIA

CONSTRUCTION SEQUENCE

- Prior to commencement of any earth disturbance activity including clearing and grubbing, the registrant shall call West Virginia 811 by dialing 811 or 1-800-245-4848 to identify all utility lines. The registrant also must clearly delineate sensitive areas, riparian forest buffer boundaries, the limits of clearing, and trees that are to be conserved within the project site, and shall install appropriate barriers where equipment may not be parked, staged, operated or located for any purpose.
- Site access - This is the first land-disturbance activity to take place at the site and should provide BMPs to minimize accelerated erosion and sedimentation from the following areas: entrance to the site, construction routes, and areas designated for equipment or other use at the site including parking, stockpiles.
- Sediment Barriers - Install perimeter BMPs after the construction site is accessed, keeping associated clearing and grubbing limited to only that amount required for installing perimeter BMPs.
- Land Clearing and Grading - Implement clearing and grading only after all downslope E&S BMPs have been constructed and stabilized.
- Surface Stabilization - Apply temporary or permanent stabilization measures immediately to any disturbed areas where work has reached final grade, has been delayed or otherwise temporarily suspended.
- Construction of Buildings, Utilities, and Paving - During construction, install and maintain any additional erosion and sediment control BMPs, and implement any structural post construction stormwater BMPs that may be required.
- Upon completion of pad grading, compact the pad to grade and begin placement of pad soil cement.
- Final Stabilization, Topsoiling, Trees and Shrubs - After construction is completed, install stabilization BMPs including: permanent seeding, mulching and riprap, and complete implementation of stormwater BMPs in this last construction phase. Stabilize all open areas, including borrow and spoil areas, and remove all temporary BMPs and stabilize any disturbances associated with the removal of the BMP.



PREPARED FOR
HG ENERGY II APPALACHIA, LLC

5260 DUPONT ROAD
PARKERSBURG, WEST VIRGINIA 26101
(304) 420-1100

PREPARED BY
PENN ENVIRONMENTAL & REMEDIATION, INC.

111 RYAN COURT
PITTSBURGH, PA 15205
(412) 722-1222

Estimated Gross Material Balance (CY)			
Final Development - Gravel Option			
	Cut	Fill	Stockpile
1210 Pad	175	20,712	-20,537
Access Road	-0-	1,755	-1,755
Borrow Area 1	9,635	-0-	9,635
Borrow Area 2	12,906	-0-	12,906
Total	22,716	22,467	249
Soil Adjustment for Aggregate Import:			
Pad			-0-
Total Site Balance:			249 Cut
Stripped Topsoil (Limit of Disturbance)			17,123
Est. Swell Factor (20%)			3,424
Est. Topsoil Stockpile Volume (Loose CY)			20,547
Minimum Total Stockpile Capacity Required (C.Y.)			20,796

Notes:
1. Material balance for est. gross earthwork quantities only.
2. Topsoil est. volume based on 6 inches average depth.
3. Material balance and aggregate quantities based on estimates and may not be representative of actual quantities.
4. Estimates do not reflect contractor pay volumes.

Estimated Gravel Quantities (Placed CY)			
	Access Road	Pad	TOTAL
Gravel Quantities			
8" Soil Cement	545	2,854	3,399
3" Crusher Run	--	1,070	1,070
Top Coat Chip & Seal (Placed SY)	2,452 sy.	--	2,452
		8'	18'
Estimated Total Compost Filter Sock Length (LF)		553	2,794
Estimated Well Pad Compost Filter Sock Length (LF)		243	517
Estimated Access Road & Stockpile Compost Filter Sock Length (LF)		310	330
Estimated Borrow Area 1 Compost Filter Sock Length (LF)		--	1,125
Estimated Borrow Area 2 Compost Filter Sock Length (LF)		--	822
Estimated Total Limit of Disturbance (Acres)			21,227
Estimated Well Pad Limit of Disturbance (Acres)			3,539
Estimated Access Road & Stockpile Limit of Disturbance (Acres)			4,298
Estimated Borrow Area 1 Limit of Disturbance (Acres)			6,553
Estimated Borrow Area 2 Limit of Disturbance (Acres)			6,837
Well Pad Peak Pre-Construction Elevation (Ft)			996.7

See sheets 8&9 for addendum to berm

SHT. NO.	SHEET TITLE
1	TITLE SHEET
2A-2C	SITE LAYOUT PLAN
3-4	PAD & ACCESS ROAD SECTIONS
5A-5B	GENERAL NOTES
5C-5F	DETAILS
6	RESTORATION PLAN
7	PROPERTY MAP

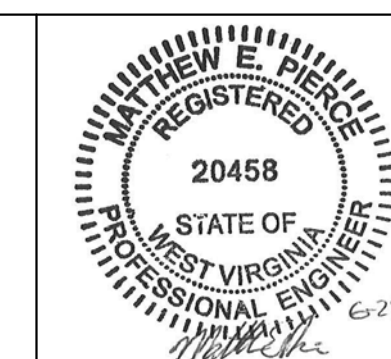
RECORD OWNER	RECORD LOT #	RECORD AREA OF LOT	AREA WITHIN LOD
HG ENERGY II APPALACHIA, LLC	20-444-19.2	35.0 AC.	21.227 AC.
TOTAL LIMIT OF DISTURBANCE			21.227 AC.

WELL #	LATITUDE	LONGITUDE
S-6H	N 39.142519	W 80.459769
S-5H	N 39.142492	W 80.459808
S-4H	N 39.142464	W 80.459847
S-3H	N 39.142439	W 80.459889
S-2H	N 39.142411	W 80.459928
S-1H	N 39.142383	W 80.459969

	LATITUDE	LONGITUDE
ACCESS ROAD ENTRANCE	N 39.141644	W 80.457609

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REVISION	DATE	DESCRIPTION



TITLE SHEET
HG WELL PAD 1210
UNION DISTRICT
HARRISON COUNTY, WEST VIRGINIA

PREPARED FOR
HG ENERGY II APPALACHIA, LLC
PARKERSBURG, WEST VIRGINIA

APPROVED MEP 06/28/2018
CHECKED MEP 06/28/2018
DRAWN DJA 06/21/2018
PROJECT No. 4000-PA007639
DRAWING NUMBER
PA007639-001
SHEET 1



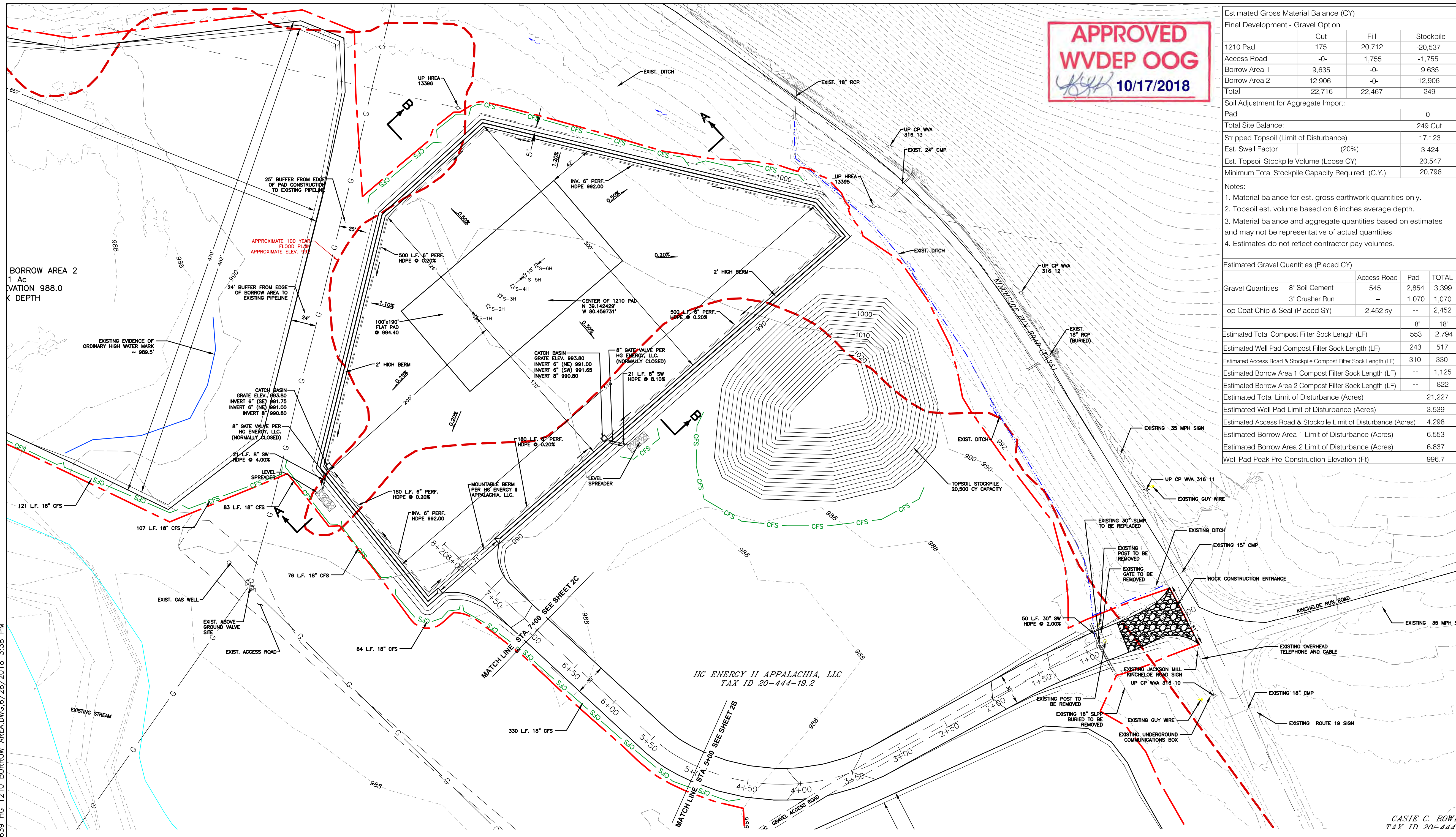
CALL BEFORE YOU DIG!

Dial 811 or 800.245.4848
Miss Utility of West Virginia

1. SERVICE UTILITY LINES ARE NOT SHOWN ON THE PLANS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING, MAINTAINING, AND REPLACING AS NECESSARY TO ENSURE CONTINUAL SERVICE.

S:\PROJECT FILES\4000-PA007639 HG 1210 BORROW AREA.DWG,6/28/2018 3:38 PM

APPROVED WVDEP OOG
10/17/2018



Estimated Gross Material Balance (CY)
Final Development - Gravel Option

	Cut	Fill	Stockpile
1210 Pad	175	20,712	-20,537
Access Road	-0-	1,755	-1,755
Borrow Area 1	9,635	-0-	9,635
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Est. Topsoil Stockpile Volume (Loose CY) 20,547
Minimum Total Stockpile Capacity Required (C.Y.) 20,796

- Notes:
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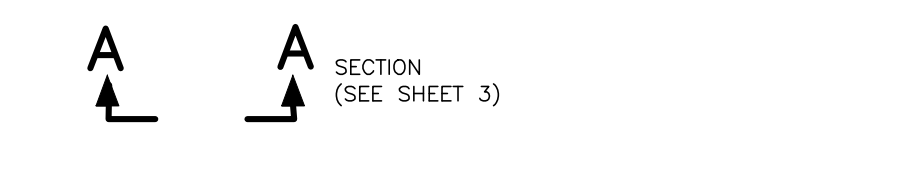
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Well Pad Peak Pre-Construction Elevation (Ft)	996.7	

- LEGEND
- LEVEL SPREADER
 - CFS COMPOST FILTER SOCK 8" UNLESS OTHERWISE NOTED
 - 3CFS STACKED COMPOST FILTER SOCK 8"
 - APPROXIMATE LIMITS OF DISTURBANCE
 - APPROXIMATE PROPERTY LINE
 - EXISTING OVERHEAD ELECTRIC LINE
 - G EXISTING DOMINION GAS TRANSMISSION LINE
 - EXISTING INDEX CONTOUR
 - EXISTING INTERMEDIATE CONTOUR
 - PROPOSED FINAL GRADE INDEX CONTOUR
 - PROPOSED FINAL GRADE INTERMEDIATE CONTOUR
 - APPROXIMATE 100 YR FLOOD PLAIN BOUNDARY

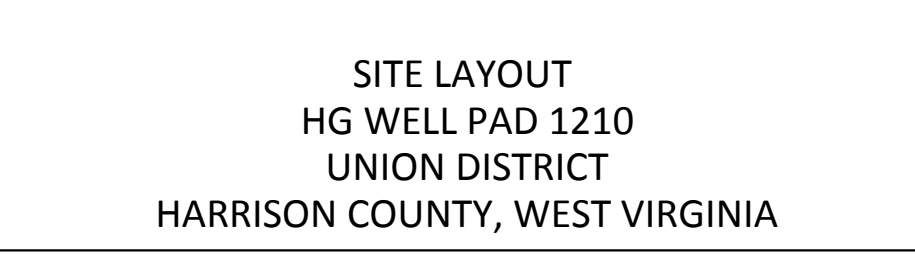


- WEST VIRGINIA GENERAL NOTES:
1. REFERENCE THIS SHEET WITH THE CONSTRUCTION NOTES AND DETAILS.
 2. CONTRACTOR SHALL CONTACT WEST VIRGINIA UTILITIES PROTECTION SERVICES (811) A MINIMUM OF 3 DAYS PRIOR TO EXCAVATION WORK. UTILITIES MUST BE IDENTIFIED AND EITHER RELOCATED OR PROTECTED BY CONTRACTOR PRIOR TO BEGINNING WORK AT THE SITE.
 3. SITE SHALL BE CONSTRUCTED IN ACCORDANCE WITH WELL DRILLING PERMIT. CONTRACTOR RESPONSIBLE TO OBTAIN ALL OTHER ANCIILARY PERMITS/APPROVALS REQUIRED TO CONSTRUCT SITE INCLUDING BUT NOT LIMITED TO FEDERAL, STATE, AND LOCAL REQUIREMENTS.
 4. NO GEOTECHNICAL OR SOPE STABILITY ANALYSIS WAS PERFORMED FOR THIS SITE. CONTRACTOR IS RESPONSIBLE TO CONSTRUCT PROPER TOE AND BONDING BENCHES BASED ON FIELD CONDITIONS TO PREPARE SURFACES FOR FILL PLACEMENT ON STEEP SLOPES. PENN E&R IS NOT RESPONSIBLE FOR SLIPS, SLIDES, OR EARTH MOVEMENT RESULTING FROM CONSTRUCTION.
 5. ESTABLISH EROSION AND SEDIMENTATION CONTROL BMPs PRIOR TO EARTHWORK. SITE CONSTRUCTION SHALL FOLLOW WEST VIRGINIA EROSION AND SEDIMENT CONTROL FIELD MANUAL, DATED MAY 2012.
 6. CLEAR AND GRUB WORK AREA, REMOVE AND STOCKPILE AVAILABLE TOPSOIL FROM LIMIT OF DISTURBANCE TO A LOCATION DESIGNATED BY HG ENERGY, LLC.
 7. NO EMBANKMENT FILL SHALL BE PLACED ON FROZEN MATERIAL. FILL MATERIAL SHALL BE FREE OF ORGANICS, LARGE ROCKS, FROZEN SOIL OR OTHER OBJECTIONABLE MATERIAL.
 8. CUT/FILL SLOPES SHALL BE CONSTRUCTED TO A MAXIMUM SLOPE OF 2H:1V UNLESS NOTED OTHERWISE.
 9. FILL MATERIAL SHALL BE PLACED IN LIFTS OR LAYERS OVER THE LENGTH OF THE FILL. LIFT THICKNESS OF THE SOIL SHALL BE AS THIN AS THE SUITABLE RANDOM EXCAVATED MATERIAL WILL PERMIT, TYPICALLY, 6-12 INCHES THICK. THE SIZE OF ROCK LIFTS SHALL NOT EXCEED 36 INCHES. THE ROCK SHALL NOT BE GREATER IN ANY DIMENSION THAN 36 INCHES. COMPACTION SHALL BE OBTAINED BY COMPACTION EQUIPMENT, SHEEP'S FOOT OR PAD ROLLER, DEPENDING ON MATERIAL, WITH COMPACTION TO VISIBLE NON-MOVEMENT OF THE EMBANKMENT MATERIAL. COMPACTION EFFORT SHALL NOT EXCEED OPTIMUM MOISTURE LIMITS. EACH LIFT SHALL BE COMPACTED TO A STANDARD PROCTOR DENSITY OF AT LEAST 90% BEFORE BEGINNING THE NEXT LIFT. QC TESTING SHALL BE PERFORMED AT A RATE OF 2 TESTS/ACRE/LIFT.
 10. CONTRACTOR SHALL CONSTRUCT ACCESS ROAD IN ACCORDANCE WITH DETAILS PROVIDED. ADDITIONAL COVER MATERIAL PLACEMENT REQUIRED IN AREA OF UTILITY LINES.
 11. CONTRACTOR SHALL COORDINATE MATERIAL MANAGEMENT (EXCESS CUT/FILL, TOPSOIL STOCKPILES, GRAVEL SOURCING) WITH HG ENERGY, LLC PRIOR TO MOBILIZATION. CONTRACTOR SHALL BE RESPONSIBLE FOR PROPER EROSION AND SEDIMENT CONTROLS, BOTH ON SITE AND OFF SITE.
 12. ALL SEDIMENT CONTROL MEASURES SHALL REMAIN IN PLACE UNTIL DISTURBED AREAS ARE STABILIZED AND THE VEGETATIVE GROUND COVER HAS ACHIEVED A UNIFORM 70% GROWTH. ANY AREAS NOT ACHIEVING A 70% VEGETATIVE COVER SHALL BE RESEEDED AND MULCHED WITHIN 24 HOURS OF DETECTION.
 13. SECONDARY CONTAMINANT SHALL BE PROVIDED DURING DRILLING PROCESS. A LINER AND MAT SYSTEM WITH BERM SHALL BE INSTALLED PRIOR TO DRILLING AND WATER INSIDE SECONDARY CONTAMINANT SHALL BE DISPOSED OFFSITE IN ACCORDANCE WITH WV REGULATIONS.

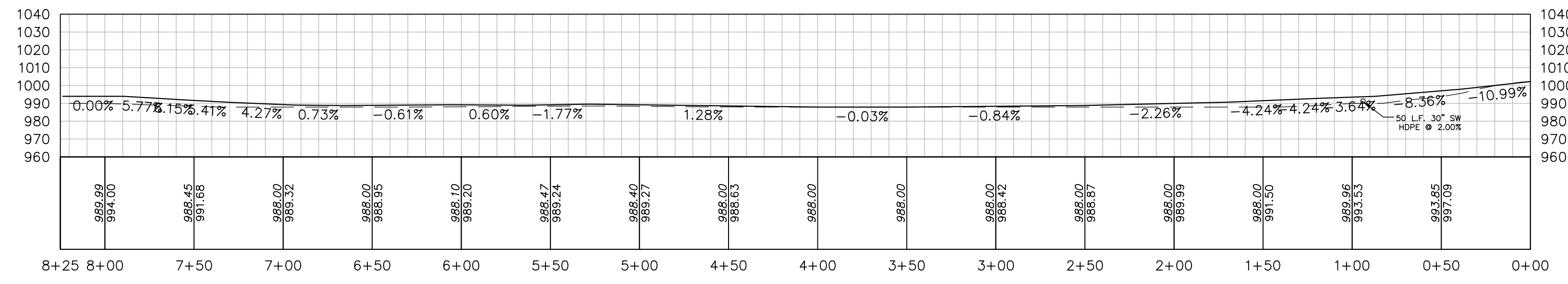
- REFERENCE:
1. TOPOGRAPHY PROVIDED BY HG ENERGY, LLC. ON 02/23/2018 & 6/16/2018
 2. WETLANDS AND STREAMS ARE SHOWN BASED ON FIELD LOCATIONS PROVIDED BY HG ENERGY, LLC. ON 04/09/2018.
 3. GAS LINE FIELD LOCATED ON 05/21/2018 WITH DOMINION ENERGY.
 4. FLOODPLAIN BOUNDARY OBTAINED FROM FEMA NATIONAL FLOOD HAZARD LAYER.

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1. SERVICE UTILITY LINES ARE NOT SHOWN ON THE PLANS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING, MAINTAINING, AND REPLACING AS NECESSARY TO ENSURE CONTINUAL SERVICE.

PREPARED FOR
HG ENERGY II APPALACHIA, LLC
PARKERSBURG, WEST VIRGINIA

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