Module 7: Geology Information
[§77.403-404]

7.1 Stratigraphy.

a) Rock Unit: Period (e.g., Lower Ordovician) **Upper Pennsylvanian**
Formation (e.g., Rookdale Run) **Pittsburgh**

b) Attach Geologic Logs of test holes or equivalent information on attached data sheet (test holes should be drilled to the ultimate depth of mining unless waived by the Department based on acceptable equivalent information). Log description must include the surface elevation of each hole submitted, lowest elevation of proposed excavation, elevation of static groundwater (method and date of measurement), lithologic description, location and extent of voids and thickness of strata encountered. Drill holes, highwall sections, or equivalent information should be located to represent the thickness of mineral and overburden to be disturbed in areas of maximum thickness.

INTRODUCTION

The operator is proposing to underground mine the Benwood Limestone. The Benwood Limestone is stratigraphically located in the middle of the Pittsburgh Formation, closely overlying the Sewickley coal seam. The base of the Benwood Limestone lies approximately one hundred thirty (130') feet above the Pittsburgh coal seam. The Waynesburg coal seam lies approximately one hundred seventy (170') feet above the top of the Benwood Limestone. See Generalized Geologic Section, Allegheny County, by A.C. Ackenheil and Associates, Inc. included in this module.

GEOLOGIC LOGS

The initial surface mine permit provided nine (9) drill holes. Three (3) of the drill holes were continuous, wire-line core holes which were drilled in July 2010, identified as BH-1 through BH-3. Six (6) air rotary holes were drilled in June 2008. These drill holes were located by W.G. Rosner, PLS and are identified as DH-1 through DH-6.

In order to evaluate the underground mining potential for the extraction of the Benwood Limestone, two (2) test holes were drilled in March 2016 by GeoTech Engineering, Inc. In order to make the drilling more economical the upper section of the holes were air rotary drilled, 170 feet at TH-1 and 135 feet at TH-2. Continuous wire-line core drilling was conducted to below the Sewickley coal horizon after the air rotary drilling was completed. Drill hole TH-1 is located along the haulroad near the central section of the permit area. Core hole TH-2 is located in the southeastern section of the proposed underground permit area.

In January 2018, an additional five (5) air rotary test holes, identified as TH-3 through TH-7, were drilled. Four (4) of the air rotary holes were taken to the Sewickley coal seam, with the exception of test hole TH-5, which intercepted Waynesburg mine spoil. Four (4) of the drill holes are located on the Clyde Holding property in the northern section of the underground permit area and one (1) on the Kosky property located in the eastern section of the permit area.

In July 2018, two (2) test holes (labeled Hole No. 1 and Hole No. 2) were drilled in the proposed Clyde Holding revision area to provide additional information relating to the Benwood Limestone. Two (2) additional core holes were drilled in mid-October 2019, to obtain more information about the Benwood Limestone thickness, bottom elevation, RQD, and Unconfined Compressive Strength. These core holes are identified as B-1 and B-2. B-1 is located just above the proposed portal entry and B-2 is located at the most downgradient location above Tenmile Creek.

Five (5) overburden holes were obtained from the Neiswonger Construction, Bugger #1 Operation, SMP No. 63110101, located in the east central section of the proposed underground permit area. These test holes, DH-1-OB through DH-5-OB, provide information on the strata associated with the Waynesburg coal seam and were drilled in January 2009.

Located in the eastern section of the project area is the Yohe property (parcel 35). Test drilling was conducted on this property in October 2013. Drill holes Y-1 through Y-9 provide information on the strata associated with the Waynesburg coal seam in this area.

Mapping and drill hole information was obtained from the Pennsylvania DCNR Topographic and Geologic Survey. Researching the data base for the Ellsworth and Mather 7.5 minute quadrangles resulted in finding drill hole information and a log of the Thompson Shaft located almost two (2) miles north - northwest of the project area. The Thompson Shaft log documents the strata associated with the Waynesburg coal seam, the Benwood Limestone, the Sewickley coal seam, and the Pittsburgh coal. Drill hole JLF-50 is located just west of the project area and Tenmile Creek. This core hole documents the Pittsburgh coal seam and its stratigraphic location. Drill hole 3523 is located approximately 3500 feet east - southeast of the project area and provides information on the Waynesburg coal, the Benwood Limestone, the Sewickley coal seam, and the Pittsburgh coal. These test holes are shown on the Exhibit 6.1.

7.1(B) GEOLOGIC LOG DRILL HOLES/OVERBURDEN ANALYSIS DATA

Hole No.: **Y-4**
Surface Elevation: **1182.3'**
Bottom Elevations: **Waynesburg Rider - 1133.3'**
Waynesburg - 1129.3'

Groundwater Elevations and Date Measured:

Surveyed by: **Hiser Eng.** Method: **EDM**
Remarks:

Operation Name: **Maggie Lynn Underground Mine**
Method of Drilling: **Air Rotary**
Date Drilled: **10/07/13**
Drilled By: **Senex Drilling**
Logged By: **Hiser Engineering**
Township: **Deemston Borough**
County: **Washington**
Quadrangle: **Ellsworth & Mather**
Laboratory:
Latitude: **40° 00' 22.43"** Longitude: **80° 01' 24.62"**
Grid Coordinates: **N 253324.9 E 1331683**

Depth	Thickness	Scale	Graphic Log	Lithologic Description: rock type, weathering, color, fossils, carbonate, mineral concentrations, pyrite, etc.	Water Conditions	Overburden Analysis Logs (When requested by the Department)					
						Munsell Color Code	OBA Sample No.	Log Interval	% Total Sulfur	Fizz Rating	NP
8'	8'			Clay		5YR4/4					
19'	11'	10		Sandstone		10YR7/4					
26'	7'	20		Sandstone		N7					
29'	3'			Sandstone		10YR7/4					
47'	18'	30 40		Sandstone		N7					
49'	2'			Waynesburg Rider - 24" (1133.3')		N1					
51'	2'	50		Shale		N5					
53'	2'			Waynesburg - 24" (1129.3')		N1					
58'	5'			Clay		N6					
		60									

7.1(B) GEOLOGIC LOG DRILL HOLES/OVERBURDEN ANALYSIS DATA

Hole No.: **Y-5**
Surface Elevation: **1134'**
Bottom Elevations: **Waynesburg - 1125.5'**

Groundwater Elevations and Date Measured:

Surveyed by: **Hiser Eng.** Method: **EDM**
Remarks:

Operation Name: **Maggie Lynn Underground Mine**
Method of Drilling: **Air Rotary**
Date Drilled: **10/07/13**
Drilled By: **Senex Drilling**
Logged By: **Hiser Engineering**
Township: **Deemston Borough**
County: **Washington**
Quadrangle: **Ellsworth & Mather**
Laboratory:
Latitude: **40° 00' 17.40"** Longitude: **80° 01' 23.38"**
Grid Coordinates: **N 252813.4 E 1331766.6**

Depth	Thickness	Scale	Graphic Log	Lithologic Description: rock type, weathering, color, fossils, carbonate, mineral concentrations, pyrite, etc.	Water Conditions	Overburden Analysis Logs (When requested by the Department)					
						Munsell Color Code	OBA Sample No.	Log Interval	% Total Sulfur	Fizz Rating	NP
2'	2'			Topsoil		Brown					
8'	6'			Sandstone		Gray					
8'6"	6"			Waynesburg - 6" (1125.5')		Black					
49'	40'6"	10, 20, 30, 40, 50, 60		Sandstone, Shale & Limestone		Gray					

7.1(B) GEOLOGIC LOG DRILL HOLES/OVERBURDEN ANALYSIS DATA

Hole No.: **Ondrik Drilled Well**
Surface Elevation: **1073'**
Bottom Elevations: _____

Groundwater Elevations and Date Measured: _____

Surveyed by: _____ Method: _____
Remarks: **20ft. of 8 in. pvc casing, grouted**

Operation Name: **Maggie Lynn Underground Mine**
Method of Drilling: **Air Rotary**
Date Drilled: **08/22/1998**
Drilled By: **Wright's Well Service**
Logged By: **Victor Wright**
Township: **Deemston Borough**
County: **Washington**
Quadrangle: **Ellsworth & Mather**
Laboratory: _____
Latitude: **40° 00' 33.85"** Longitude: **80° 02' 10.14"**
Grid Coordinates: **N 254571 E 1328171**

Depth	Thickness	Scale	Graphic Log	Lithologic Description: rock type, weathering, color, fossils, carbonate, mineral concentrations, pyrite, etc.	Water Conditions	Overburden Analysis Logs (When requested by the Department) Munsell Color Code	OBA Sample No.	Log Interval	% Total Sulfur	Fizz Rating	NP
3'	3'			Topsoil: Sand							
10'	7'	10		Clayshale							
12'	2'			Limestone: Broken							
15'	3'			Clay							
18'	3'			Shale							
		20		---- 20 ft. - 8 in. pvc casing, grouted							
25'	7'			Sandstone							
30'	5'	30		Clayshale	--- Encountered water at 30 ft.						
		40									
		50									
		60		Limestone							

7.1(B) GEOLOGIC LOG DRILL HOLES/OVERBURDEN ANALYSIS DATA - CONTINUED

Hole No.: **Ondrik Drilled Well**
Surface Elevation: **1073'**
Date Drilled: **08/22/1998**
Remarks:

Operation Name: **Maggie Lynn Underground Mine**
Township: **Deemston Borough**
County: **Washington**

Depth	Thickness	Scale	Graphic Log	Lithologic Description: rock type, weathering, color, fossils, carbonate, mineral concentrations, pyrite, etc.	Water Conditions	Overburden Analysis Logs (When requested by the Department)					
						Munsell Color Code	OBA Sample No.	Log Interval	% Total Sulfur	Fizz Rating	NP
65'	35'			Limestone							
70'	5'	70		Shale							
80'	10'	80		Clay & Limestone							
97'	17'	90		Limestone: Hard							
		100									
		110									
		120									

Four (4) bore holes, H-BH-1 through H-BH-4, are located on the adjacent PA Coal Reclamation, Hawkins permit (SMP No. 63813210). A drill log is provided for borehole H-BH-2.

A drilled well log was obtained from the Pennsylvania Groundwater Information System. Identified as the Ondrik well with the approximate location identified as 277 Buckingham Road. The physical location of this well is not known. The house on the property has burned and is currently vacant.

A section of the Mon Valley Steel Company, Inc., Clyde Mine, is included in this module. This mapping shows the extensive underground mine workings within the Pittsburgh coal seam.

c) Provide stratigraphic correlation of the strata by geologic cross sections or fence diagrams to include lithology, stratigraphy, existing ground surface, proposed mining limits, proposed benching, final reclamation slopes, postmining water table, aquifers to be encountered or affected, directions of groundwater movement and underground mines and cave systems. [Horizontal scale shall not be smaller than the scale of Exhibit 6.2 (i.e. not less than 1 inch: 400 feet, or 1 inch: 200 feet), larger scales are acceptable (e.g. 1 inch: 100 feet)]

Two (2) geologic cross sections were developed for the proposed underground mining of the Benwood Limestone. Cross Section A – B is drawn from one thousand (1000') feet west-northwest of the permit area, intercepts the Unnamed Tributary "G" to Tenmile Creek, test holes TH-6, TH-4, TH-3, Morey Road, the eastern boundary of the permit area, test hole Y-7, test hole Y-6, and Ephemeral Tributary "A" to Black Dog Hollow, east of the permit area. This cross section is drawn generally along the dip of the Benwood Limestone.

Cross Section C – D is drawn from one thousand (1000') feet southeast of the permit area, intercepts Arnold Road, Tenmile Creek, sediment pond 001, test hole DH-6, the haulroad, test hole TH-1, test hole TH-3, Leonard Road, Morey Road, SR 2024, to one thousand (1000') feet north – northeast of the permit area. This cross section is constructed generally along the strike of the Benwood Limestone. Both cross sections show information projected from a distance from the proposed mine site that show the consistency of the geologic formations.

7.2 Structure.

a) Describe the local geologic structure and its relationship to the regional structure. Use diagrams and regional structural relief maps where applicable.

The proposed mining within the Maggie Lynn Underground Mine permit area is situated in the Appalachian Plateaus Province. The sedimentary strata, in this area of the Province, has been folded to varying degrees by a series of anticlines and synclines. Included in this module are two (2) published regional geologic structure maps. The general orientation of the fold axes is in the southwest – northeast direction. This anticline – syncline series extends throughout most of the region from Ohio eastward to the Allegheny Front in central Pennsylvania, where the Valley and Ridge Province begins. Low magnitude and broad folds dominate the immediate area. The Maggie Lynn Mine is situated on the western flank of the Belle Vernon Anticline, approximately 4,500 feet northwest of the axis of the anticline. The underground permit area lies east of the axis of the Waynesburg Syncline which lies approximately 2.0 miles to the west – northwest. Both axis are shown on the Exhibit 6.1 USGS map.

The local geologic structure contours of the base of the Benwood Limestone, shown on the Exhibit 6.2 Map, has been developed based on drill hole information and published geologic mapping. The limestone proposed to be mined reaches a maximum elevation of over 890 feet (msl) east of the permit area and a minimum of less than 810 feet (msl) west of the permit area. Based on drill holes TH-2, TH-3, and TH-6 the strike of the Benwood Limestone is N35°E and dipping the west – northwest at 1.2%. The local geology agrees well with the regional structural trend.

A portion of the Clyde Mine, which underground mined the Pittsburgh coal seam is included in this module. The mapping shows the room and pillar mining of the coal, as well, as structure contours of the base of the Pittsburgh coal.

7.4 Mine Workings and Solid Waste Sites.

Submit the following data on all active, completed and abandoned underground and surface mines and coal refuse disposal sites which are in or within 1000 feet of the permit area: (Key location to Modules 6.2, 9 and 18.)

Surface and Underground Mines

Operator	*Permit No.*	*Map Key*	*Status*	*Mineral*	*Water Sample No.(s)*
Neiswonger Construction, Inc. (Maggie Lynn Quarry)	63100401	I	Active	Benwood Limestone	1, 5, 9, 11, 13, 14, 18, MP4, MDF, C, 31
Neiswonger Construction, Inc. (Bugger #1)	63110101	II	Completed	Waynesburg Coal	1, 5, 9, 11, 13, 14, 18, 19, Bugger 25, MP-4
PA Coal Reclamation, Inc. (Hawkins)	63813210	III	Active	Coal Refuse Reprocessing	MP2, MP4, MDF
Twilight Industries, Division of U.S. Natural Resources, Inc. (LOS)	32A77SM3 3274SM29	IV	Completed	Waynesburg Coal	4
Boyle Land & Fuel Co. (Fitzwater)	63860106	V	Completed	Waynesburg Coal	5, 21, 72
Boyle Land & Fuel Co. (Huffman)	63823036	VA	Completed	Waynesburg Coal	None
BCNR Mining Corp.	63743703	VI	Abandoned	Coal Refuse Disposal	None
Nardei Contracting Co. Inc. (Fitzwater)	32B75SM30	VIII	Completed	Waynesburg Coal	17
Westmont Coal Company, Inc. (Deemston)	6376144	IX	Completed	Waynesburg Coal	None
TRAM Resources, Inc. (Fargo)	32A77SM6	A	Abandoned	Waynesburg Coal	None
B.L.F. Corp. (Bushta)	32B76SM8	B	Completed	Waynesburg Coal	None
Dragan & Son (Belle No. 11)	32B76SM2	C	Completed	Waynesburg Coal	None
Underground Mine					
MonValley Steel Company, Inc. (Clyde Mine)	63891301	Underlie the entire site	Completed	Pittsburgh Coal Underground	None
Unknown	Unknown	A	Completed	Waynesburg Coal Underground	5, 6, 7, 8, 72

List the operator permit number, and type of any solid waste disposal sites in or within 1000 feet of the permit area.

No solid waste disposal sites lie in or within 1000 feet of the proposed permit area.