Module 8: Hydrology / Baseline Biology

Instructions: A licensed professional geologist must certify the sections requiring geological and hydrological information submitted under this Module.

8.1 Hydrologic Description - Permit Area

Attach a narrative description of existing groundwater and surface water resources of the area to be affected by the proposed activity, addressing the items listed below. For underground mining operations separate descriptions should be prepared to address the underground permit area and surface activity sites where coal preparation, coal refuse disposal, coal storage, surface mining, and mine drainage treatment will take place. Information must be specific to the proposed permit area and not general statements from published regional hydrogeology reports. The narrative should include information on the following:

a. The groundwater flow conditions (confined, unconfined, perched) within the permit and adjacent areas.

Groundwater in the Rustic Ridge #1 Mine permit and proposed expansion area is discussed here in terms of shallow unconfined and semi-confined aquifers. These consist of unconsolidated soils, alluvium and weathered bedrock and deeper aquifers under unconfined and semi-confined conditions in the bedrock units. The supporting data were obtained from detailed water supply surveys conducted in the permit area, published reports on the groundwater resources of Fayette and Westmoreland Counties, a series of six piezometer clusters installed as part of this permit application process, two packer test exploration holes isolating the Lower Kittanning coal seam, and other hydrologic investigations in the region.

As described in Module 7, the primary geologic units in the area are the Conemaugh and Allegheny Groups. While these units are correlated across the mine plan area and are recognized on a regional basis, the hydrologic properties are highly variable and cannot be viewed as a continuous aquifer. Groundwater occurrence and movement within these units are controlled primarily by local permeability, lithologic variability, topography and structural features such as low amplitude folds, fractures, bedding planes, joints and cleats.

The shallow aquifer system consists of soils or weathered bedrock overlying the hilltops and the valley walls and the alluvial deposits on the valley bottoms. Secondary porosity and permeability features such as bedding plane partings, joints, cleats and other rock fractures primarily control groundwater movement in the shallow bedrock flow system. Stress release fracturing tends to enhance secondary rock openings in valley bottom and valley side wall settings. The surface of the shallow, unconfined water table roughly mirrors the surface topography. Groundwater movement consists of many local groundwater flow systems. In each system the water flows from the recharge areas located on the hilltops and valley walls and discharges into the valley bottoms.

Water infiltrating into the shallow subsurface may encounter geologic units with low permeability, consequently lateral flow may potentially result in hill side discharges such as springs and seeps. These discharges are either seasonal or perennial in nature and are primarily associated with the shallow aquifer systems. Examples of this flow pattern can be seen in the form of springs that occur on multiple properties within 1000 feet of the permit area. Refer to Form 8.13A and Exhibit 6.3 for the location and description of these springs. The headwaters of many of the streams overlying and adjacent to the permit area are a result of the discharges of the shallow water bearing zones.

The deeper bedrock aquifer systems consist of water contained primarily in secondary fracture openings and to a lesser degree in primary pore spaces in the underlying bedrock formations. Since deeper wells normally penetrate the deeper more regional flow system, they are less prone to seasonal variations in water levels.

The variation in lithology, and associated aquifer characteristics, such as permeability of the bedrock units above the coal to be mined serve to partially isolate the nearly horizontal bedrock units. The conceptual groundwater flow model is as a series of interconnected hydrostratigraphic units. Within each hydrostratigraphic unit, there is a horizontal and vertical component of groundwater flow. Where a unit with higher permeability is located above a unit with a much lower permeability, the dominant flow direction is horizontal, with the majority of the groundwater discharging as contact springs or seeps or as baseflow to upland streams. Even in units with lower permeability, the predominant component of groundwater flow can be horizontal due to secondary porosity features, such as bedding plane partings combined with topographically influenced hydraulic gradient. Deeper or regional groundwater may exhibit a preferential flow in the direction of the dip of the strata. Also, water in the deeper bedrock aquifers tend to pass under the first and second order streams as underflow and discharge to third or higher order streams.

Four piezometer locations, each consisting of a shallow, intermediate and deep well were installed to characterize the groundwater conditions within the permit boundary.

A cluster of a shallow, intermediate and deep wells is located along the western edge of the permit boundary near Champion Creek as Map ID 037. At a surface elevation of 1670.1 feet mean sea level (ft msl), PZ-1D has a depth of 241 feet. This well has a screened interval from 231 to 241 feet. The depth to groundwater ranges from 82.1 to 89.3 ft. At a surface elevation of 1670.3 ft msl, PZ-1M has a depth of 168 feet and a screened interval from 158 to 168 feet. The depth to groundwater ranges from 44.9 to 52.4 ft. At a surface elevation of 1670.1 ft msl, PZ-1S has a depth of 75 feet and a screened interval from 65 to 75 feet. The depth to groundwater ranges from 33.5 to 51.4 ft. These multiple level piezometer tubes demonstrate a downward component of flow throughout the vertical rock sequence. See Exhibit 8.2 for locations and Attachment 8.1 for construction information.

A cluster of a shallow, intermediate and deep wells is located just south of the PA Turnpike as Map ID 585. At a surface elevation of 1671.3 ft msl, PZ-2D has a depth of 379 feet. This well has a screened interval from 375 to 379 feet. The depth to groundwater ranges from 152.5 to 153.7 ft. At a surface elevation of 1671.3 ft msl, PZ-2M has a depth of 160 feet and a screened interval from 150 to 160 feet. The depth to groundwater ranges from 78.6 to 80.9 ft. At a surface elevation of 1671.6 ft msl, PZ-2S has a depth of 70 feet and a screened interval from 60 to 70 feet. The depth to groundwater ranges from 25.9 to 26.8 ft. These multiple level piezometer tubes demonstrate a downward component of flow throughout the vertical rock sequence.

A cluster of a shallow, intermediate and deep wells is located further south of the PA Turnpike as Map ID 458. At a surface elevation of 1741.9 ft msl, PZ-3D has a depth of 442 feet. This well has a screened interval from 432 to 442 feet. The depth to groundwater ranges from 230.7 to 231.9 ft. At a surface elevation of 1741.9 ft msl, PZ-3M has a depth of 374 feet and a screened interval from 364 to 374 feet. The depth to groundwater ranges from 227.7 to 228.8 ft. At a surface elevation of 1741.6 ft msl, PZ-3S has a depth of 95 feet and a screened interval from 85 to 95 feet. The depth to groundwater ranges from 44.3 to 45.2 ft. These multiple level piezometer tubes demonstrate a downward component of flow throughout the vertical rock sequence.

A cluster of a shallow, intermediate and deep wells is located in the southern portion of the permit area as Map ID 357. At a surface elevation of 1715.1 ft msl, PZ-4D has a depth of 370 feet. This well has a screened interval from 360 to 370 feet. The depth to groundwater ranges from 215.8 to 217.4 ft. At a

surface elevation of 1715.2 ft msl, PZ-4M has a depth of 216 feet and a screened interval from 206 to 216 feet. The depth to groundwater ranges from 146.5 to

147.5 ft. At a surface elevation of 1716.0 ft msl, PZ-4S has a depth of 130 feet and a screened interval from 120 to 130 feet. The depth to groundwater ranges from 108.6 to 112.9 ft. These multiple level piezometer tubes demonstrate a downward component of flow throughout the vertical rock sequence.

Permit Expansion:

Two piezometer locations, each consisting of an isolated screened zone in the Lower Kittanning coal seam were installed to further characterize the groundwater conditions surrounding the amendment area.

Piezometer PZ-7D is located approximately 4,580 feet north of the northeastern limits of the proposed expansion area and downgradient of the proposed mining area. At a surface elevation of 1640.64 ft-msl, PZ-7D has a depth of 482 feet. This well has a screened interval from 471 to 481 feet. The depth to groundwater ranges from 177.78 to 178.25 feet. Two water-bearing zones were encountered during drilling: 1 gpm at 155 feet within a sandy shale overlying the Mahoning coal seam and 2 gpm at 280 feet overlying the Upper Freeport coal seam.

Piezometer PZ-9D is located approximately 820 feet north of the northwestern limits of the proposed expansion area within the upgradient portion of the proposed mining area. At a surface elevation of 1744.06 ft-msl, PZ-7D has a depth of 343 feet. This well has a screened interval from 332 to 342 feet. The depth to groundwater ranges from 62.15 to 66.47 feet. During drilling, a 2-gpm water-bearing zone was encountered at 230 feet within a massive sandstone unit overlying the Upper Kittanning coal seam.

Following the installation of piezometers PZ-7D and PZ-9D, a 72-hour packer test was conducted in two exploration boreholes to further characterize Lower Kittanning Coal head potentials within and adjacent to the proposed expansion area. A 24-inch packer was lowered approximately two feet above the Lower Kittanning coal seam, fitted with 10-foot sections of 1-inch diameter threaded pipe to land surface, and inflated to approximately 400 PSI utilizing compressed nitrogen ensuring a watertight seal was maintained. A pressure line connected to the packer was equipped with a regulator at the surface to ensure constant pressure was maintained to prevent communication of groundwater retained within the overlying annular space. Prior to and after the installation of the packer, static water level measurements were immediately recorded from the inside of the threaded black steel standpipe and the annular space above the packer. This process was repeated every 24-hours until no water level changes were observed. In general, static water levels typically stabilized after the first 24 hours with minor fluctuation observed with the 48-hour to 72-hour interval. Each packer test lasted 72-hours to ensure water level stabilization and consistency.

Packer test exploration hole DH-2036A located within the western portion of the expansion area has a total depth of 479 feet and encountered the Lower Kittanning coal seam at 474.4 to 478.2 feet. After 72 hours the depth to groundwater was measured at 298.3 feet.

Packer test exploration hole DH-2114 located north of the north-central portion of the expansion area has a total depth of 272.3 feet and encountered the Lower Kittanning coal seam at 258.4 to 262.3 feet. After 72 hours the depth to groundwater was measured at 27.15 feet.

Drill Hole ID	Surface Elevation (ft-msl)	Lower Kittanning BOC Elevation (ft-msl)	Date of Measurement	Water Level Elevation – Below Packer (ft-msl)	Water Level Elevation – Annular Space (ft-msl)
2036A	1805.04	1326.8	11/13/2020	1715.04	1716.04
			11/14/2020	1477.04	1715.54
			11/15/2020	1505.04	1715.54
			11/16/2020	1506.74	1715.34
2114	1513.70	1251.4	6/24/2021	1502.83	1502.83
			6/25/2021	1486.43	1503.78
			6/27/2021	1486.59	1503.69
			6/28/2021	1486.55	1503.68

b. The depth to respective groundwater flow systems and seasonal fluctuations.

The depth to the groundwater flow system was determined from information obtained during the water supply survey. In shallow wells closest to the permit area with a known depth of 100 feet or less, the depth to the groundwater ranged from 1.0 foot in well W166 to 44.3 feet in well PZ-3S. In deep wells closest to the permit area with a known depth of 100 feet or greater the depth to the groundwater ranged from 3.46 feet in well W28 to 231.9 feet in well PZ-3D. The information collected during the water supply inventory is listed on Form 8.3A: Ground Water Inventory.

Seasonal fluctuations in the groundwater flow system are dependent on the amount of infiltration from precipitation with most of the recharge occurring between late fall and early spring when seasonal vegetative growth is limited. Groundwater fluctuations are influenced by sustained periods of precipitation events and/or prolonged drought. Fluctuations of groundwater may also be dependent to a large degree on topography. Water tables in the valley bottoms are closest to the ground surface and exhibit the smallest amount of variation – normally on the order of less than 5 to 10 feet. Water levels on the hilltops exhibit the greatest range of fluctuations. Where water levels are influenced by water withdrawal, fluctuations can be significantly greater.

Six piezometer sets, including those installed within the approved Rustic Ridge #1 Mine mine plan area, will be used to determine seasonal fluctuation within the permit boundary.

2021 Permit Renewal:

To date, there are no known groundwater quality issues resulting from mining activities within the approved mine plan area. Pre-mine surveys conducted in advance of underground mining have shown no evidence of groundwater degradation or diminution to developed water supplies. Groundwater quantity in terms of head potential has declined (PZ-1 S, M, D) resulting from surface site development, slope development, and mining on the Lower Kittanning coal seam as anticipated. Aside from seasonal fluctuations which are influenced by sustained periods of precipitation events and/or prolonged drought, the shallow and intermediate groundwater flow systems remain unchanged throughout the remainder of the approved mine plan area as observed in piezometer nests PZ-2, PZ-3, and PZ-4. The water level responses in the deep piezometers screened across the Lower Kittanning coal seam correlate with mining activities. A slight decline

in water level observed at piezometers PZ-2D, PZ-3D, and PZ-4D was observed during the third quarter 2019. As mine development progresses and the horizontal separation between active workings and each Lower Kittanning piezometer decreases, water levels are anticipated to decrease.

Permit Expansion:

In shallow wells closest to the expansion area with a known depth of 100 feet or less, the depth to the groundwater ranged from 4.9 feet in well W578 to 53.7 feet in well W586. In wells closest to the permit expansion area with a known depth range of 101 to 200 feet the depth to the groundwater ranged from 11.2 feet in well W594 to 92.8 feet in well W544. In deep wells closest to the permit expansion area with a known total depth of 201 feet or greater the depth to groundwater ranged from 19.6 feet in well W521 to 175.3 feet in well PZ-7D. The information collected during the water supply inventory is listed on Form 8.3A: Ground Water Inventory and depicted on Exhibit 8.3A.

c. General patterns of groundwater movement.

Groundwater from the hilltops and valley sides within the permit area moves toward the groundwater discharge zone of Minnow Run (38363), Champion Creek (38337), Indian Creek (38235), Fourmile Run (43542) and their tributaries. Most of the groundwater in the shallow flow system either discharges to these streams or moves in the fracture patterns in the shallow subsurface below these streams. Topographic relief in the area of the underground permit area ranges from a high of approximately 1950 feet above mean sea level (msl) in the northcentral part of the permit area to a low of approximately 1600 feet msl. Topographic relief in the area of the underground permit expansion area ranges from a high of approximately 1940 ft-msl in the eastern part of the permit area to a low of approximately 1600 feet msl.

In the shallow flow system groundwater flows from the recharge areas located on the hilltops and valley walls and discharges as hillside seeps and springs or into the valley bottoms. Shallow groundwater makes up the baseflow of many small streams in the upland area as well as the larger higher order streams.

Groundwater within the deeper bedrock aquifers flows from the high head recharge area in the higher elevations to low head discharge areas generally in the valley bottoms. Discharge to first order streams is primarily limited to the shallow unconfined aquifers. Water in the deeper bedrock aquifers tends to pass under the first order streams as underflow with a portion discharging to second order streams. Water that underflows second order streams discharges to third order streams.

d. Any unusual conditions that influence groundwater movement.

While not unusual, deeper groundwater across the permit area may be influenced by the Ligonier Syncline. Fold hinges may be associated with areas of increased fracturing. Since bedding-plane separations coincide with the dip of the rocks, direction of flow along these bedding-plane separations is controlled to some degree by the regional structure.

e. The relationship between groundwater discharge and surface water flow.

Groundwater in the underground permit area and proposed expansion area has a key relationship to supplying water to the surface water flow system. Groundwater flows from the recharge areas located in the topographic highs within and adjacent to the permit area towards the topographic lows, where it discharges to the surface water system. The amount of groundwater contributing to the base flow of a stream depends on and varies with the connection between the streambed elevation and the elevation of the shallow groundwater flow zone.

In a gaining stream the adjacent water table is higher than the stream bed elevation with groundwater flowing into the stream. Conversely, in a losing stream the adjacent water table is lower than the stream bed causing water to leak out of the stream into the subsurface. Streams can contain both gaining and losing segments and these segments can vary throughout the year.

2021 Permit Renewal:

Surface water flows demonstrate seasonal fluctuations with higher flows recorded during the spring and early summer as a result of snow melt, precipitation and increased surface runoff. Decreased flows are generally observed between August and October when precipitation events are less frequent and surface runoff decreases. Similarly, surface water qualities generally fall within the baseline ranges with minor variation.

Permit Expansion:

The proposed permit expansion area will not include additional surface site operations, therefore no additional surface runoff or point source discharges will occur. The proposed expansion area will utilize the existing Rustic Ridge #1 Mine surface site, with the additional acreage having underground activities only.

The Rustic Ridge #1 Mine surface water monitoring points have been sampled on a quarterly basis since permit issuance and have observed no changes in quality, with flow remaining within background sampling limits during active operations at Rustic Ridge #1 Mine. As stated in Module 8.1b under 2021 Permit Renewal, four piezometer nests (PZ-1, PZ-2, PZ-3, and PZ4) are constructed within the Rustic Ridge #1 Mine each consisting of a shallow, intermediate, and deep well used to monitoring groundwater across the site. Quarterly monitoring of the piezometer nests PZ-2, PZ-3, and PZ-4 has exhibited no deflections aside from seasonal fluctuations in the static water level for the shallow and intermediate groundwater flow systems. The water level response in the deep piezometers screened across the Lower Kittanning coal seam correlates with mining activities within Rustic Ridge #1 Mine. Piezometer nest PZ-1 has observed a decline in head potential as expected, resulting from surface site development, slope development, and mining the Lower Kittanning coal seam. Please refer to Forms 8.13A for detailed information on the quality and quantity of monitoring points included in the approved monitoring program for the Rustic Ridge #1 Mine.

As stated in Module 8.15, the proposed permit expansion area has six (6) additional surface water monitoring points, and two (2) additional piezometers expanding the current Rustic Ridge #1 Mine monitoring plan including the acreage within the proposed permit expansion area.

f. The general quality and quantity of water in aquifers that serve as current sources of supply and those which may be used to develop alternate supplies.

The general range of quantity of water in the aquifers that serve as current sources of supply is provided in section 8.1(b). The analytical testing of groundwater quality has been evaluated for over two hundred-fifty (250) individual water supplies (refer to Form 8.13A). Generally the groundwater quality is suitable for domestic use, although some of the water supplies contain pH, iron, manganese, or aluminum concentration above Pennsylvania maximum contaminant levels (PA MCLs) for safe drinking water.

Permit Expansion:

The analytical testing of groundwater quality has been evaluated for one hundred and fifteen (115) individual water supplies inventoried for the underground expansion permit application (refer to Form 8.13A) in addition to thirty-six

(36) previously inventoried individual water supplies situated within the limits of the expansion area. Generally, the groundwater quality is suitable for domestic use, although some of the water supplies contain pH, iron, manganese, or aluminum concentration above Pennsylvania maximum contaminant levels (PA MCLs) for safe drinking water. Per property owner interviews, approximately 35% of the individually inventoried water supplies have a treatment system in use including softening, filtration, or a combination of both. Nine (9) wells were reported to have gone dry in the past, generally due to overuse. Additionally, twelve (12) springs were reported to have gone dry as a result of seasonal precipitation variations.

g. The impact of past mining activities on the quality and quantity of local water resources.

No known impacts to the quantity and quality of groundwater in the mine plan area or proposed expansion area have been identified.

h. Document the nature of water problems or peculiar conditions associated with the operation. (e.g., zones of high inflow, breached barriers, drainage conduits from other workings, etc.)

No water problems or peculiar conditions associated with past mining have been identified in the mine plan area or proposed expansion area.

8.2 Hydrologic Data Map

Provide a 7.5 minute USGS Map showing the following information:

See Exhibit 8.2: Hydrologic Data Map

a. A legend indicating map title, activity name, coal seam to be mined, company name, township, county, scale, quadrangle name, and date.
b. Permit boundaries of the proposed activity (underground permit area boundaries in the case of an underground mine).
c. Outline(s) and openings of underground mines and surface mines within 1,000 feet of the proposed permit area (show permit limits in cases where adjacent mining has not yet progressed into the review area).
d. Seeps and discharges from mines, which lie above, below, or within 1,000 feet of the permit area.
e. Proposed point source discharges.
f. Proposed groundwater and surface water background and life-of-mine monitoring points.
g. Fold axes.
h. Geologic faults.
i. Fracture traces.
j. Outcrop of coal seam to be mined.
k. Structure contours of the coal seam to be mined.
l. Lines of geologic cross section (key to Module 7.2).

8.3 Well and Spring, Inventory Information

a. Using Form 8.3A (Groundwater Inventory) provide inventory data on all wells and springs that serve as water supplies and are located within 1,000 feet of the permit area (underground permit area if application is for an underground mine).

See Form 8.3A.

b. If the application is for an underground mine and mining operations will encroach within 2,000 feet of a well or spring which serves as a significant source of public water supply, identify the horizontal and vertical extent of the aquifer which feeds it on the map in Exhibit 22.4 and the cross sections in Module 7.2. Attach a description of how this determination was made including all relevant pumping test results, water level measurements, geologic considerations, drawdown calculations, etc.

One public water supply spring, S159 (Caddie Shak PWSID 5650871), is located within 2,000 feet of the permit boundary. The horizontal and vertical extent of the aquifer which feeds it is shown on Exhibit 22.4 as well as Figure 8.3(b): Public Water Supply Aquifer Delineation. This determination was made by delineating the aerial extent of the recharge area based on topography that infiltrating precipitation would be conveyed to the spring source.

Permit Expansion:

There are no known well or springs that serve as a significant source of public water supply within 2,000 feet of the proposed permit expansion area.

8.4 Stream Inventory Information

Using Form 8.4A (General Stream Inventory), provide descriptive information on all streams that lie within 1,000 feet of the proposed permit area (underground permit area if application is for an underground mine). Show all stream segments on the Environmental Resource Map, Exhibit 6.3.

See Form 8.4A.

8.5 Adjacent Mine Discharges

Using Form 8.5A (Mine Discharge Inventory), list all discharge points from any adjacent underground, coal refuse operation, or surface mine which lies above, below or within 1,000 feet of the permit area (underground permit area if application is for an underground mine). Include the mine name, description of the discharge, elevation, contributing pool level, range of flow rates, quality, and an indication of whether or not the discharge is treated.

See Form 8.5A.

8.6 Lake, Pond, and Dam Information

Using Form 8.6A (Dam and Pond Inventory), provide information on all lakes ponds, dams and impoundments which lie within 1,000 feet of the permit area (underground permit area if application is for an underground mine).

See Form 8.6A.

8.7 Public Water Supplies (community and non-community)

a. List the names and addresses of all public water supplies that withdraw water from streams identified under Module 8.4 that are within a distance of ten (10) miles downstream from the permit area.

No streams under Module 8.4 were identified with public water supply intakes within 10 miles downstream of the mine permit area and proposed expansion area.

b. List the names and addresses of all public water supplies with groundwater or surface water sources within one (1) mile of the permit area.

Caddie Shak (PWSID 5650871)
101 Mt View Road
Donegal, PA 15628

Permit Expansion:

Bradys Restaurant (PWSID 5650325)
PO Box 196
Acme, PA 15610

c. List the names and addresses of all public water supply systems with service lines over the underground permit area.

Indian Creek Valley Water Authority
2068 Indian Head Rd
Indian Head, PA 15446

8.8 Control Stream Inventory

If control streams will be used as a base of comparison to streams within the permit area, provide the following information:

Control streams will not be used in this permit application.

a. Complete Form 8.8A (Relationship Between the Control Stream and Potentially Impacted Streams) to document parameters that make the control stream similar to the streams to which it will be compared.

b. Provide a map delineating the following features and reference their location on a topographic map of appropriate scale):

i. Riffle(s),

ii. Pool(s),

iii. Glide(s),

iv. Run(s)

v. Biologically diverse segments,

vi. Biologically variable segments,

vii. Point of first use, and

viii. Segments that were dry during the times of baseline data collection.

c. Using Form 8.8B, (Stream Delineation and Bioassessment Summary), include baseline information on macroinvertebrate communities sufficient to delineate stream segments that qualify as “biologically diverse”, “biologically variable”, and point of first use based on the criteria and procedures outlined in Appendix A of the Technical Guidance Document “563-2000-655”.

d. Using Form 8.8C (Quantitative Multi-Habitat Bioassessment Of Diverse Community) and 8.8D (Biometric And Total Biological Score Summary) provide an assessment of the condition of the macroinvertebrate community in each stream segment identified as “biologically diverse.” The baseline information should include a minimum of two total biological scores from pre-mining determined in accordance with the methodology in Appendix B of the Technical Guidance Document “563-2000-655”. The two baseline scores should not differ by more than 16 percent.

e. Provide a qualitative assessment of the fish community in each stream segment that qualifies as “biologically diverse.”

8.9 Potential Areas of Flow Loss within the Stream

The information in this section is required for all streams in the following settings:

Not applicable for this permit as room and pillar mining will not be conducted at depths less than 100 feet beneath a valley floor that is proximate to a stream and no full extraction mining will occur.

Settings where room-and-pillar mining will be conducted at depths of 100 feet or less beneath a stream or an area of a valley floor that is proximate to a stream.

Settings where full extraction mining or retreat mining will cause subsidence of a stream or an area of a valley floor that is proximate to a stream.

Settings where full extraction mining or retreat mining will cause subsidence of springs that are crucial to the maintenance of flow in a “biologically diverse” or “biologically variable” stream segment.

Information should be organized on the basis of individual streams.

a. Provide a prediction of the location, magnitude and duration of mining induced flow loss based on the comparison of the documented effects of mining at a similar post-mining stream and the relevant factors listed below:

   i. Mining height,

   ii. Overburden geology and thickness,

   iii. Streambed lithology,

   iv. Orientation of the stream with respect to underlying panels,

   v. Natural fracture zones,

   vi. Drainage / watershed area,

   vii. Extent of mining beneath the valley floor,

   viii. Any potential loss of feeder springs,

   ix. Mining induced fracturing,

   x. Aquifer dewatering, and

   xi. Interference with groundwater flow systems.

b. Using Form 8.8B, (Stream Delineation and Bioassessment Summary), include baseline information on fish and macroinvertebrate communities sufficient to delineate stream segments that qualify as “biologically diverse”, “biologically variable”, and point of first use based on the criteria and procedures outlined in Appendix A of the Technical Guidance Document “563-2000-655”.

c. Provide an assessment of the condition of the macroinvertebrate community in each stream segment identified as “biologically diverse” in item b above, using Form 8.8C (Quantitative Multi-Habitat Bioassessment Of Diverse Community) and 8.8D (Biometric And Total Biological Score Summary). Each assessment should consist of Form 8.8C documenting the results of each sampling event (minimum of two) and Form 8.8D documenting biometric calculations and calculation of the “Mean Total Biological Score.” (Additional information on performing aquatic life use assessment is found in the Technical Guidance Document 563-2000-655.)

d. Provide a qualitative assessment of the fish community in each stream segment that qualifies as “biologically diverse.”

e. Provide a flow monitoring plan that addresses the following items:

   i. Weekly measurements commencing six (6) months prior to undermining the area of concern.

   ii. Daily measurements commencing two weeks prior to undermining the area of concern and continuing until the potential for mining induced flow loss becomes negligible. (In the case of longwall mining daily measurements should continue until the longwall face has progressed a distance equal to the cover thickness beyond the area of concern.)

   iii. Detect and report all occurrences of flow loss to the district mining office within 24 hours of observation.

   iv. If flow loss occurs, daily observations or measurements commencing from the date of the observed loss and continuing until flow fully recovers or is fully restored or until underground mining operations are determined not to be the cause of the problem.

   v. Weekly measurements continuing six months after the conclusion of daily monitoring.

   vi. Corresponding measurements of flows in control streams (if applicable).

f. If the prediction indicates a potential for flow loss:

i. Provide a demonstration that the stream will recover or can be restored to establish flow to the normal range of conditions. (The demonstration should include the information described in Section IV.1.(d)(vii) of the Technical Guidance Document 563-2000-655.)

ii. Describe the procedures that will be followed in responding to the flow loss event, including

(1) Whether the response plan will involve monitoring and recovery or active intervention (grouting, installing liners). If active intervention will be used, provide detailed plans in Module 15.

(2) The augmentation measures that will be used to maintain flow in the affected stream segment until the stream is recovered or flow has been permanently restored, including the source of water that will be used and its quality.

(3) The measures that will be used to ascertain that flow has returned to the normal range of conditions and aquatic life has recovered to its pre-mining condition.

8.10 Potential Areas of Pooling within the Stream

This section applies to all streams that have gradients of 2.0% (a two (2) foot drop in elevation over a 100 foot length of stream) or less and will be subsided as a result of the proposed mining.

Not applicable for this permit as only room and pillar first mining is proposed with no planned subsidence.

a. Provide a map showing aquatic habitats (riffles, pools, glides, and runs) along segments that will be subsided and identify all locations where water depths will increase by more than 1.0 foot.

b. Using Form 8.8B, (Stream Delineation and Bioassessment Summary), include baseline information on fish and macroinvertebrate communities sufficient to delineate stream segments that qualify as “biologically diverse”, “biologically variable”, and identify the point of first use based on the criteria and procedures outlined in Appendix A of the Technical Guidance Document “563-2000-655”.

c. Using Form 8.8C (Quantitative Multi-Habitat Bioassessment Of Diverse Community) and 8.8D (Biometric And Total Biological Score Summary) provide an assessment of the condition of the macroinvertebrate community in each stream segment that qualifies as “biologically diverse.” The baseline information should include a minimum of two total biological scores from pre-mining determined in accordance with the methodology in Appendix B of the Technical Guidance Document “563-2000-655”. The two baseline scores should not differ by more than 16 percent.

d. Provide the results of the Wolman Pebble Count (Form 8.10A Wolman Pebble Count) for each site where mining induced pooling is predicted to occur. The pebble count should be made in accordance with procedures described in Technical Guidance Document “563-2000-655”.

e. Provide a qualitative assessment of the fish community in each stream segment that qualifies as “biologically diverse.”

f. Provide an assessment of the potential effects of pooling, including the potential loss of riffle and run habitat, loss of aquatic habitat due to sedimentation or stagnation, loss of riparian habitat and creation of nuisance conditions.

g. Provide a monitoring plan that provides for evaluation of the magnitude of mining induced changes, the need for mitigation and, if mitigation is planned, the effectiveness of mitigation. The plan should include:

i. Two or more Wolman Pebble Counts within the six month period following full extraction mining beneath the site for the purpose of determining trends in sediment deposition.

ii. One or more surveys conducted in accordance with the methodology in Appendix B of the Technical Guidance Document “563-2000-655” for purposes of evaluating the effects of pooling on aquatic life.

h. Underground mining operations that are likely to cause pooling of overlying stream segments should be supported by restoration plans under Module 15.6.

8*.11 Stream Delineation and Bioassessment Information*

If a stream delineation was performed for Module 8.8, 8.9, or 8.10, provide the following information:

Not applicable for this permit as only room and pillar first mining will occur and a stream delineation was not performed for Module 8.8, 8.9 or 8.10.

a. Attach a narrative describing the procedures that were used to distinguish between segments that support diverse communities of long-lived benthic macroinvertebrates (biologically diverse stream segments) and segments that support less diverse benthic macroinvertebrate communities ranging down to a lower limit of two macroscopic taxa that live at least part of their life cycles within or upon substrates associated with flowing water (biologically variable stream segments).

b. Using Form 8.11A (Biological Classification of Streams) provide information summarizing the biological attributes of streams assessed under Module 8.8 (relating to control streams), Module 8.9 (relating to potential areas of flow loss), and Module 8.10 (relating to potential areas of pooling). The extent of biologically diverse segments and biologically variable segments and the point of first use should be identified on the basis of sampling stations and keyed to the Environmental Resource Map under Module 6.3.

8.12 Information on Wetlands in Areas above Underground Mining

Permit applications should include plans and information sufficient to demonstrate that all underground mining operations proposed during the five (5)-year term of the permit will meet legal requirements regarding protection of wetlands from the effects of underground mining. The amount of information required will depend on the potential for mining related impacts on wetlands and the level of effort involved in monitoring, assessment, and mitigation. Plans that involve only room-and-pillar mining will be exempt from the detailed inventorying, monitoring and assessment procedures outlined in the following sections, unless wetlands will be undermined at depths less than 100 feet. Plans that involve full extraction mining should include a complete inventory of wetlands located in areas of planned subsidence and provisions for monitoring and assessing subsidence related impacts.

Not applicable for this permit as only room and pillar first mining is proposed at depths greater than 100 feet.

a. Describe the procedures that will be used to identify wetlands that may be susceptible to mining induced impacts. The procedures should be developed based on:

   i. A review of desktop resources including the U.S. Fish and Wildlife National Wetland Inventory (NWI) maps, Natural Resource Conservation (NRCS) soil surveys, aerial photographs/satellite imagery and local mapping (if available); and

   ii. A field survey identifying the location and limits of each vegetated wetland in accordance with the Routine Method identified in the Army Corps of Engineers (ACOE) 1987 Wetland Identifications and Delineation Manual (Technical Report Y-87-1).

b. Provide a map showing the locations and limits of each inventoried wetland. (The Environmental Resource Map required under application Module 6.3 may be used for this purpose.) The locations and limits of each wetland should be established using GPS or professional surveying equipment.

c. Complete a wetland inventory sheet (Form 8.12A Wetland Inventory) for each inventoried wetland.

d. Attach the routine method field data sheets that serve as the basis for information to each wetland inventory sheet.

e. If predictions show that one or more wetlands are likely to experience adverse effects, provide; an alternatives analysis showing why it is unfeasible to amend the mining plan to avoid the adverse effects, and include detailed mitigation plans and schedules under Module 15.5.

f. Provide a post-mining summary of mining-related effects on wetlands for the previous permit term. The summary should include:

   i. A list of all inventoried wetlands that were undermined, noting any changes in overall size, Cowardin vegetative class, Chapter 105 designation, or function of individual wetlands.

   ii. A list of all constructed replacement wetlands and new wetlands created by subsidence including their classification and function.

iii. An updated post mining wetland inventory using Form 8.12A (Wetland Inventory) documenting the conditions of each wetland identified in the aforementioned list.

iv. A calculation of the net gain or loss of wetland area.

v. If there has been a net loss of wetland area, provide plans for developing compensatory replacement wetlands under Module 15. Replacement should be, at a minimum, a 1:1 ratio for areal extent and function.

8.13 Background Sampling Requirements

a. Provide the results of water quality analyses, pumping tests, water level and flow measurements on Form 8.13A (Background or Monitoring Report) and Form 8.13B (Specific Capacity Test) sufficient to describe the groundwater and surface water resources of the permit and adjacent areas. Where information is not available from existing wells, the applicant must drill test holes, wells, or piezometers to obtain the required data. The results should meet the specifications set forth below. Background sampling points other than developed water supplies must be identified on Form 8.13A by latitude and longitude and, unless the landowner objects, clearly marked and identified in the field. The field identification scheme should correspond with the identification scheme in the application.

See attached Form 8.13A and Exhibit 8.2: Hydrologic Data Map for sampling points.

i. Sampling/measurement points - The background sampling and measurement program should address the following points.

(1) All streams listed on the General Stream Inventory (Form 8.4A) and other streams that will receive a discharge from the proposed operation (up and downstream of discharge).

(2) All wells and springs listed on the Groundwater Inventory (Form 8.3A). The inventory should include all wells and springs within 1,000 feet of the permit area (underground permit area if application is for an underground mine) which serve as water supplies.

(3) All wells and piezometers used to determine groundwater conditions in the permit (surface and underground) and adjacent areas.

(4) All discharges from adjacent surface mines, and underground mines with workings that lie beneath or within 1,000 feet of a surface mining activity site.

(5) All discharges from adjacent underground mines with workings that lie above, below, or within 1,000 feet horizontally of the underground permit area of a proposed underground mine.

(6) All impoundments within 1,000 feet of a surface mining activity site.

ii. Required parameters:

(1) Wells and piezometers should be sampled for the following minimum set of parameters: total dissolved solids or specific conductance corrected to 25°C, pH, total iron, total manganese, alkalinity, acidity, sulfates, total aluminum and water level.

(2) Springs, streams, impoundments, underground mine discharges and surface mine discharges should be sampled for the following minimum set of parameters: total dissolved solids or specific conductance corrected to 25°C, total suspended solids, pH, total iron, total manganese, total aluminum, alkalinity, acidity, sulfates, and flow.

iii. Sampling period and frequency:

(1) All points included in the background-sampling program must be sampled in a manner that provides an accurate representation of average conditions and seasonal variations. All background sampling points should be sampled a minimum of two (2) times, with one (1) sample collected during the low flow period, which typically extends from August to October and one (1) sample collected outside the low flow period.

(2) All points included in the monitoring program must be sampled at monthly intervals over a period of six (6) successive months. At least one (1) sample must be collected during the low flow period, which typically extends from August to October. An application may be accepted with a

minimum of three (3) monthly sampling reports per point; however, a permit will not be issued until at least six (6) reports are provided.

(3) In addition, all streams identified in Module 8.10(a) and all control streams identified in Module 8.8 should have flow measurements obtained at monthly intervals over a 24-month period. This information may be provided on Form 8.13A (Background or Monitoring Report) or Form 8.13C (24-Month Stream Flow Baseline Summary).

b. Special Background Sampling and Measurement Requirements for Coal Refuse Disposal –

i. In cases where a coal refuse disposal area is proposed within 100 feet of a stream, an operator will be required to submit:

(1) Descriptive information on Form 8.4A (General Stream Inventory);

(2) Flow and water quality information on Form 8.13A (Background or Monitoring Report);

(3) Biological survey results on Form 8.8B (Steam Delineation and Bioassessment Summary); and

(4) Documentation on whether the stream is capable of supporting its designated uses under 25 Pa. Code Chapter 93.

8.14 Prediction of Hydrologic Consequences/Protection of Hydrologic Balance

a. For underground mining activities:

i. Describe the quality and volume of mine drainage, which is anticipated at the end of the 5-year permit period and upon complete development of the planned mine. Describe the methodology and/or calculations used to estimate the drainage characteristics.

The Rustic Ridge #1 Mine permit area is completely below surface drainage. No point source water discharges to the land surface in the post-mining phase are predicted. Nevertheless, a discussion of the potential water make and water quality of the mine plan in the active mining phase is presented here.

The potential for the Rustic Ridge #1 Mine to impact groundwater is limited by the occurrence of groundwater in fractured rock and also by the deep cover. As the distance between the mine and the aquifer increases, the potential for mine-related dewatering decreases.

The quality and volume of water make which is anticipated is expected to be similar to the conditions which exist within other Lower Kittanning coal mines in the area. The Rustic Ridge #1 Mine will be similar to other mines as it is developed into the Lower Kittanning coal seam and is geologically situated in the same set of overlying strata. Based on the lithologies, structure, cover thickness and aquifer properties, the water make of the Rustic Ridge #1 Mine is predicted to be no more than those Lower Kittanning mines surrounding it.

Based on a published study of mine complexes in the area the average water make is approximately 0.4 gpm per acre mined (Winters et al). For the Rustic Ridge #1 Mine the total potential water make will be 1089.1 gpm. This was determined by multiplying the total acreage of the subsidence control boundary of the Rustic Ridge #1 Mine by 0.4 gpm (2722.8 acres X 0.4 gpm = 1089.1 gpm).

Water quality of the Rustic Ridge #1 Mine is expected to be similar to that of other Lower Kittanning Mines in the area. Water quality data from the adjacent Melcroft No. #3 Mine indicates that pH generally ranges between 3.5 to 5.5, acidity is greater than alkalinity, total metals are elevated and total sulfate ranges between 475 to 715.

2021 Permit Renewal:

The quality of handled water pumped from the Rustic Ridge #1 Mine was anticipated to be similar in chemistry to the adjacent Melcroft No. 3 Mine pool developed on the Lower Kittanning coal seam. However, since the Rustic Ridge #1 Mine has been operational no chemical treatment has been required in order to meet NPDES effluent standards. The raw water quality has a neutral pH, alkalinity exceeding acidity, with low metals and sulfate concentrations.

Similarly, the quantity of handled water pumped from the Rustic Ridge #1 Mine is less than anticipated. The average water make for the mine was predicted to be approximately 0.4 gpm per acre mined based on a published study of mine complexes in the area. However, mine water production has been calculated at 0.17 gpm per acre based on an average pumping rate of 94.12 gpm over a mining area and 35° angle of influence area totaling 570.6 acres.

Permit Expansion:

Based on water pumped from the underground workings and the mined area through July 2021, the Rustic Ridge #1 Mine is producing 0.17 gpm/acre. A maximum of approximately 4,280.7 acres of the underground permit area will be deep mined on the Lower Kittanning coal seam; therefore, total projected amount of water to be produced at the full extent of mining is 728 gpm or 43,663 gph.

Mine water pumping rates from the Rustic Ridge #1 mine were utilized, along with the extent of current mining, in order to calculate actual mine water production expressed in gpm/acre mined.

Parameters listed below were utilized in determining mine water production per acre mined based on July 2021 pumping rates and mined area. Refer to Module 13, Attachment 13.22: Mining Area for a visual representation of the July 2021 mining area and 35° angle of influence of underground mining utilized in the mine water production rate calculations.

Pumping rate from mine : 94.12 gpm

35° Angle of influence area: 570.6 Acres

Based on the above parameters, it is calculated that the mine water production per acre mined based on July 2021 pumping rates and mined area is 0.17 gpm/ac mined.

The handled water directed to the existing Rustic Ridge #1 Mine treatment facility (TP-1 and TP-2) has not required chemical treatment since the mine has been operational. Average water quality analysis obtained at the treatment facility outflow between January 2020 and June 2021 is presented below. No changes in raw water quality are anticipated as a result of mining within the expansion area.

pH	7.69
Alkalinity	109 mg/L
Acidity	-95 mg/L
Iron	0.07 mg/L
Manganese	0.04 mg/L
Aluminum	0.08 mg/L
Sulfate	44 mg/L

As discussed previously in Module 8.1e, the proposed permit expansion area will not include additional surface site operations, therefore no additional

surface runoff or point source discharges will occur. The proposed permit expansion area will utilize the existing Rustic Ridge #1 Mine surface site and include underground activities on the Lower Kittanning coal seam only.

The Rustic Ridge #1 Mine surface monitoring points have been sampled on a quarterly basis since permit issuance and have observed no changes in quality, with flow remaining within background sampling limits during active operations at Rustic Ridge #1 Mine. As stated in Module 8.1b under 2021 Permit Renewal, quarterly monitoring of the piezometer nests PZ-2, PZ-3, and PZ-4 has exhibited no deflections aside from seasonal fluctuations in the static water level for the shallow and intermediate groundwater flow systems. The water level response in the deep piezometers screened across the Lower Kittanning coal seam correlates with mining activities within Rustic Ridge #1 Mine. Piezometer nest PZ-1 has observed a decline in head potential as expected, resulting from surface site development, slope development, and mining the Lower Kittanning coal seam.

Refer to Module 8.15 which includes six (6) additional surface water monitoring points, and two (2) piezometers for the proposed permit expansion area to expand the current Rustic Ridge #1 Mine monitoring plan including the additional acreage in the proposed permit expansion area.

ii. Estimate the postmining pool level, and indicate the basis for this estimate.

Original and Permit Expansion:

The Rustic Ridge #1 Mine and proposed expansion area is room and pillar first mining only, with no planned subsidence. The maximum mining elevation within the amendment area is approximately 48.7 feet lower than 1468.7 ft-msl, the highest surveyed elevation within the current approved mine plan area. Mining within the amendment area will be conducted from the existing portal area of three slope entries having surveyed bottom of slope elevations ranging 1241.4 ft-msl to 1428.4 ft-msl.

The existing groundwater flow conditions in the Lower Kittanning horizon were determined through the installation of two (2) piezometers (PZ-7D and PZ-9D) north of the amendment area, two (2) packer test exploration drill holes (2036A and 2114), and four (4) piezometer clusters (PZ-1 through PZ-4) situated in the approved mine plan area. At piezometer clusters PZ-1 through PZ-4, a deep piezometer was drilled into the Lower Kittanning Coal seam. Piezometers PZ-7D, PZ-9D, and packer test exploration drill holes 2036A and 2114 were each drilled into the Lower Kittanning Coal seam. The locations of the piezometers and packer test exploration drill holes are shown on the Environmental Resource Map 6.3 and Hydrologic Data Map 8.2. The logs are included in section 7.1A of this application.

Piezometer PZ-1D is established near the highest elevation of the coal seam near the portal area. Piezometer PZ-9D is located north of the amendment area along the eastern limb of the Chestnut Ridge Anticline. Three piezometer locations were established along the Ligonier Syncline which is the lowest elevation of the coal across the mine plan (PZ-2D, PZ-3D, PZ-7D). Piezometer PZ-4D and packer test exploration drill holes (2036A and 2114) are situated at median coal elevations relative to the mine plan area.

Note: as discussed above, this proposed expansion is an amendment to the existing Rustic Ridge #1 Mine. The approved permit established the estimated postmining pool level to be lower than the up-dip water levels of 1588 ft-msl (PZ-1D) and above the down-dip water level of 1498 (PZ-4D). PZ-2D and PZ-3D had head in between PZ-1D and PZ-4D. The proposed expansion area limits have been designed to work within the established hydrologic predictions for the existing permit.

With respect to piezometric head (head) potentials in the Lower Kittanning horizon the highest head or water level was observed in piezometer PZ-9D, north and outside of the proposed expansion area. The highest stabilized groundwater level observed in PZ-9D was 1681 ft-msl; an elevation that does not fall within the established constraints of the Rustic Ridge #1 mine. Therefore, LCT has limited the encroachment of the proposed expansion in this area. In the most upgradient piezometer, PZ-1D near the western edge of the permit boundary where the portal is developed, the highest pre-mining stabilized groundwater level observed was approximately 1588 ft-msl. The lowest groundwater level of 1462 ft-msl was observed in PZ-7D; located approximately 4,500 feet north of the proposed amendment area within the synclinal basin. Piezometers PZ-2D, PZ-3D, PZ-4D, and packer test exploration drill holes 2306A and 2114 all had head in-between PZ-1D and PZ-7D.

The current accepted practice to determine post-mining mine pool elevations by the Department is to use the head from the most up-gradient piezometer developed into the coal as a basis. For this mine that level would be 1588 msl.

Darcy's Law is defined by the formula Q=PIA, where:

Q=the quantity of water moving through a permeable medium
P=Permeability of the rock mass
I=the hydraulic gradient or slope of the water table
A=the cross sectional area of the rock mass

Based on a modification of Darcy's Law it is assumed for a typical mining setting that the quantity (Q) of water entering the flow system and the cross sectional area of the rock mass (A) stays the same and permeability (P) increases substantially when mining occurs and solid coal is replaced with mine void. Given this then the hydraulic gradient (I) would decrease.

This calculation of Darcy's Law is limited by the assumptions made above. Both Q and A may increase to some degree. However, the calculation for Q can be considered a reasonable estimate. A large-scale review of existing mines and their post-closure mine pool elevations relative to pre-mining piezometer data is not available with this mine site.

For the purpose of this application and taking into account the above information, it is predicted that the amendment area will not induce additional head on the post-closure mine pool for the Rustic Ridge #1 Mine. Based on groundwater levels in PZ-1D and packer test exploration drill hole 2114 the predicted post-closure mine pool will be lower than the up-dip water levels of 1588 ft-msl and above the down-dip water level of 1462 ft-msl. As discussed below, the down-dip side of the mine will be limited to areas with a surface elevation of 1600 ft-msl and the minimum overburden of thickness is approximately 280 feet; therefore, a post-mining point source discharge of mine water is not predicted.

2021 Permit Renewal:

The predicted post-mine pool elevation is still estimated to equilibrate between 1498 ft-msl and 1588 ft-msl. No additional piezometers have been installed within the Rustic Ridge #1 mine plan area; therefore, no supplemental data is available to warrant a reevaluation of the post-mine pool elevation prediction.

iii. Describe the barrier pillars that will be left around the perimeter of the mine to promote flooding, and the basis for the barrier design. Barrier pillar design must be customized to fit site conditions. Provide data gathered at the site, which confirms assumptions regarding barrier width and integrity.

Barrier pillars will be left around the perimeter of the mine to promote flooding and eliminate the potential for point source discharges. A large barrier has been designed between the permit boundary and Indian Creek (38235). The thinnest section of this barrier is located in the southeastern portion of the permit area with an approximate barrier width of 830 feet. Additional hydraulic barriers of up to 800 feet are designed along many of the tributaries to Indian creek (38235), near the mouth of Minnow Run (38363) and along UNT #6 to Champion Creek (38366). This design leaves a minimum horizontal barrier of 1100 feet on the down-dip side. Additionally the permit boundary has been designed so there is a minimum of 200 feet of overburden below all streams.

In the area between the abandoned Melcroft No. 3 mine (mine reference D1) and the Rustic Ridge #1 mine, an 800 feet horizontal no-mining hydraulic barrier, mentioned above, was approved by the Pennsylvania Department of Environmental Protection. This barrier design is considered appropriate and sufficient to protect the hydrologic balance between the two mines, both during and after mining. However, as a result of a private settlement (January 25, 2018), between LCT Energy, L.P. and Mountain Watershed Association, an additional 600 feet of horizontal distance was applied to supplement the existing 800 feet barrier. This results in a total horizontal solid coal barrier of 1,400 feet in this location (refer to Exhibits 6.3 & 22.4).

2021 Permit Renewal:

No-mining hydraulic barriers have not changed as depicted on the Exhibit 6.3 and remain as designed per the original approved permit application.

Permit Expansion:

No specific hydrologic barriers are proposed for the proposed expansion area. As described in Section ii. above, the predicted post-closure mine pool will be lower than the up-dip water level of 1588 ft-msl as measured in piezometer PZ-1D and above the down-dip water level of 1498 ft-msl as measured in PZ-4D. The expansion area permit limit will be limited to areas with a surface elevation of 1600 ft-msl or greater.

There are no known underground mine workings adjacent to the proposed expansion area in the vicinity of the proposed expansion area.

iv. Provide a narrative description addressing the following concerns and how each will be prevented or mitigated.

(1) The potential for postmining discharges to occur from the proposed mine, with particular attention to areas with thin and/or fractured overburden.

No post-mining point source discharges are predicted based on the barrier and overburden designs above. RQD data for several drill holes located across the permit area are provided on Form 7.1A. RQD data at depths greater than 100 feet, generally indicates fair to excellent rock quality. Additionally, slug testing was conducted on the four piezometer nests located within the project area. The response to the slug testing indicated relatively low hydraulic conductivity within the intermediate and deep wells. A letter report summarizing the slug testing can be found in Attachment 8.14.

Permit Expansion:

No post-mining point source discharges are predicted based on piezometric data, cover depths, and RQD data. The post-closure mine pool is predicted to rise to a maximum elevation of 1588 ft-msl based on the most upgradient piezometer developed in the Lower Kittanning Coal. Nowhere in the proposed permit expansion area is mining proposed at an elevation below the 1600 ft-msl surface contour.

No mining is proposed within stream-cut valleys of the proposed expansion area having cover depths less than approximately 280 feet. Four main streams traverse the proposed underground expansion area with cover ranging from approximately 270 feet to 690 feet based on topographic and structural control.

In general, exploration drilling conducted within the stream valleys displays generally fair to excellent RQD at depths greater than 200 feet below land surface. Four exploration drill holes (1904, 1947, 2012, 2015) located within stream valleys traversing the permit expansion area displayed good to excellent RQD (average 81% to 100%) for the 30 feet of strata immediately above the Lower Kittanning Coal. The strata immediately above the coal seam consists of shale, sandy shale, and sandstone. The RQD indicates that the geologic strata present in the underground expansion area is competent and not highly fractured; therefore, no post-mining point source discharges are predicted.

Refer to Form 7.1A: Geologic Drill Log for RQD data obtained for exploration drill holes located across the permit expansion area.

(2) The potential for the post closure mine pool to cause or contribute to discharges from adjacent mines.

The post closure mine pool is not anticipated to contribute to discharges from adjacent mines. The closest underground mine is the Melcroft No. 3 Mine. A no mining zone of approximately 800 feet has been established between the Melcroft No. 3 Mine and the Rustic Ridge #1 Mine.

In the area between the abandoned Melcroft No. 3 mine (mine reference D1) and the Rustic Ridge #1 mine, an 800 feet horizontal no-mining hydraulic barrier, mentioned above, was approved by the Pennsylvania Department of Environmental Protection. This barrier design is considered appropriate and sufficient to protect the hydrologic balance between the two mines, both during and after mining. However, as a result of a private settlement (January 25, 2018), between LCT Energy, L.P. and Mountain Watershed Association, an additional 600 feet of horizontal distance was applied to supplement the existing 800 feet barrier. This results in a total horizontal solid coal barrier of 1,400 feet in this location (refer to Exhibits 6.3 & 22.4).

Permit Expansion:

No underground mines have been identified proximal to the proposed underground expansion area.

The closest underground mine is the Melcroft No. 3 Mine located south of the approved mine plan area. Refer to the above detailed discussion for the approved mine barrier design established between the Melcroft No. 3 Mine and the Rustic Ridge #1 Mine.

(3) The potential for seepage along down gradient outcrops of the mined seam and adjacent aquifers.

The Lower Kittanning coal seam is entirely below drainage and does not outcrop within the underground mine plan area. Thus, no seepage or discharge will occur along downgradient outcrops.

(4) Water quality impacts on streams that will receive mine drainage and runoff from surface activity sites.

The maximum predicted post mining pool level is less than 1588 feet msl and greater than 1498 feet msl. The lowest surface elevation at the mine entry is 1625 feet msl. Thus, no mine water discharges are predicted from the surface activities at the mine opening. The overburden excavated at the portal area has a net alkaline composition and will be selectively handled in a manner that surface water will not form acid generating runoff. Therefore, no water quality impacts on streams that receive runoff from the surface activity are anticipated.

2021 Permit Renewal:

A review of Hydrologic Monitoring Data obtained within the renewal period illustrates that there have been no impacts to the hydrologic balance due to mining activities. Quality and quantity of surface waters traversing the approved mine plan area have remained within the limits of baseline data obtained between 2012 and 2013.

Permit Expansion:

Not applicable to this application. The permit expansion will include no additional surface activities.

(5) The potential for altering the hydrology of dams, ponds, and impoundments, which overlie the underground, permit area.

Due to the thickness of the overburden and method of mining, no ponds which overlie the permit area or proposed expansion area are anticipated to be affected. Room and pillar mining only will occur in the permit area. As such, no subsidence is predicted and no adverse impacts to overlying dams, ponds, or impoundments are predicted. Coal pillars will be designed to support the overlying rock overburden and left in place without retreat mining.

(6) Groundwater contamination and effects on water supplies at surface sites where coal or spoil will be stored or treatment ponds will be located and near shafts, slopes and drift openings.

No private water supplies are located within the excavation area of the portal site. Three private water supplies (S2, S160 and W149) are located within 1,000 feet of the portal site. All three of these private water supplies are topographically situated upgradient of excavation. Therefore, groundwater contamination is not anticipated.

2021 Permit Renewal:

To date, there are no known groundwater quality issues resulting from mining activities within the surface site area. Groundwater quantity in terms of head potential has declined (PZ-1 S, M, D) resulting from surface site development, slope development, and mining on the Lower Kittanning coal seam as anticipated. Piezometric elevation changes at PZ-1 correlate with surface site construction activities, including

slope development. Piezometer nest PZ-1 has shown the largest deflection since underground mining activities have initiated due to proximity to slope development. It is assumed that the remaining piezometers developed within the Lower Kittanning coal seam will display similar responses as horizontal separation between the piezometers and the mining advancement decreases.

Permit Expansion:

Not applicable to this application. The underground permit expansion will include no additional surface activities.

(7) Postmining discharges from areas which will be surface mined and/or reclaimed under this permit

The Lower Kittanning Coal does not outcrop and is below gradient at the portal site which eliminates the potential for a discharge from the coal to be mined. In order to access the coal, slopes were excavated to the Lower Kittanning Seam. Any coal encountered during the slope excavation was hauled off site to be disposed of at an approved refuse disposal site.

Associated surface support facilities are constructed surrounding the slope. All surface runoff from the portal area will be collected through erosion and sedimentation (E&S) controls and directed to retention ponds for settling prior to discharge. There will not be any uncontrolled discharge to any streams adjacent to the proposed surface site. Post mining reclamation activities will include regarding the surface site to approximate original contour, seeding and establishing vegetation. Upon reclamation, the surface site will be returned to its premining condition and is not expected to have a post mining discharge.

Permit expansion:

No additional surface mining activities are proposed as part of the permit expansion application. No significant bodies of water or wetlands are situated within the underground permit expansion area. Several small ponds exist over the proposed mine area. The hydrology of these impoundments will not be altered as room and pillar first mining only at depths exceeding 200 feet is proposed within the proposed expansion area.

v. Identify private water supplies that are likely to be contaminated, diminished, or interrupted by underground mining operations and describe the measures that will be used to restore or replace those supplies. For larger operations, water supplies may be identified in groups based on common means of restoration or replacement (e.g., “affected water supplies along Washington Road will be replaced by connections to a public water system” or “affected water supplies above the F-series longwall panels will be replaced by drilling deeper wells”). If the means of restoration or replacement does not involve connection to a public water system, the description of the replacement measures should include a demonstration that water of sufficient quality and quantity is available to satisfy the existing and reasonably foreseeable needs of the affected water users.

Due to the thickness of cover in the underground permit area and the method of mining (room and pillar), no long-term impacts to most wells and springs are predicted. Some wells and springs in upland areas could experience temporary declines in static water levels and/or reduced flow. Wells and springs in lower topographic settings may experience increased static water levels or flows. These changes are not predicted to be universal across the mine plan area and where they do occur will be temporary in nature. Five private water supply wells located within the permit boundary are drilled to depths that either intersect or may intersect the Lower Kittanning coal. These wells (W178, W183, W222, W415, and W593) have been

designed with a well protection barrier and will not be directly undermined. The well protection barriers will be situated in pillars of solid coal to prevent the disruption of water supply. In the unlikely event an individual well or spring is adversely impacted, LCT will follow the following water replacement strategy:

A. LCT will provide within 24 hours temporary potable water or information documenting that LCT was denied access to the supply to conduct a pre-mining or post-mining survey.

B. If access was not denied, LCT will provide a water tank and fill it with potable water to meet the needs of the surface owner for up to three years or until the primary water supply recovers or is restored or a new water supply is provided. Bottled water may be supplied immediately as preparations are made to deliver and install the tank.

C. To restore or replace a water supply that does not recover, LCT will do one of the following:
   a) Deepen the existing well.
   b) Drill a new well.
   c) Redevelop an existing spring.
   d) Develop a new spring.
   e) Provide for tap-in to an existing public water system where available.

      Refer to the attached correspondence from Indian Creek Valley Water Authority dated June 4, 2014.

   f) Other amicable agreement with surface owner as provided for under Sections 5.1, 5.2 and 5.3 of Act 54 of BMSLCA.

The replacement supply as listed above, shall be one "which adequately services in quantity and quality the premining uses of the affected supply or any reasonable foreseeable uses of the supply". A restored or replacement water supply shall be deemed adequate if it meets drinking water standards under the Pennsylvania State Safe Drinking Water Act, or if the quality of the affected supply did not meet Safe Drinking Water Act standards, if the replacement supply is comparable to the premining supply.

The above measures have been successfully used to replace water supplies in southwestern and central Pennsylvania by various coal mine operators. Also, LCT may connect a surface property owner to a public water supply system and utilize this option as public water becomes available in the area. LCT reserves the right to utilize any of the methods specified above or combination thereof to provide a replacement water supply. The selection of a permanent water supply replacement will be determined based upon field conditions.

D. LCT reserves the right to discontinue the temporary water source, with the concurrence of the Department if one of the following occurs:

   a) The water supply problem abates on its own.
   b) LCT permanently corrects the problem or replaces the supply with an alternate source.
   c) LCT affirmatively proves that the water supply problem existed prior to mining based on a pre mining survey.
   d) LCT affirmatively proves that the water supply problem developed more than 3 years after mining took place.

e) LCT affirmatively proves that the water supply problem is due to some cause other than mining.
f) LCT affirmatively proves that the water supply problem existed for more than 2 years before the supply owner reported it to LCT or to the DEP.
g) LCT produces an agreement between LCT and the supply owner describing the manner in which the water supply problem is to be handled.

Two properties within the permit area contain geothermal wells.

The Terretti property (Map ID 051) reportedly has two (2) geothermal wells which are 300 feet deep. These wells were located using GPS. The bottoms of these wells are approximately 150 feet above the Lower Kittanning coal seam.

The Hawk property (Map ID 067) reportedly has seven (7) geothermal wells which are 85 feet deep. The bottoms of these wells are approximately 370 feet above the Lower Kittanning coal seam.

Permit Expansion:

Five properties within the permit expansion area contain geothermal wells.

The Brown property (Tax ID 46-08-00-0-009) reportedly has three (3) geothermal wells which are 300 feet deep. These wells were located using GPS. The bottoms of these wells are approximately 215 feet above the Lower Kittanning coal seam. This parcel is located within the 1,000-foot permit boundary offset area.

The Zuckett property (Tax ID 46-12-00-0-056) reportedly has four (4) geothermal wells which are 150 feet deep. The bottoms of these wells are approximately 495 feet above the Lower Kittanning coal seam. This parcel is located within the 1,000-foot permit boundary offset area.

The Steele property (Tax ID 46-11-00-0-043) reportedly has one (1) geothermal well which is 80 feet deep. The bottom of this well is approximately 165 feet above the Lower Kittanning coal seam. This parcel is located within the 1,000-foot permit boundary offset area.

The Shaffer property (Tax ID 46-11-00-0-005) reportedly has six (6) geothermal well which are 120 feet deep. The bottom of these wells are approximately 270 feet above the Lower Kittanning coal seam. This parcel is located within the 1,000-foot permit boundary offset area.

The Hoffer property (Tax ID 46-10-00-0-062) reportedly has an unknown number of geothermal wells having unknown total depths. Lower Kittanning Coal cover depth at this location is approximately 390 feet.

Impacts to these wells are not anticipated; however, mining in the area of these wells will maintain a 2.0 coal pillar stability safety factor as an added precaution.

vi. Address the potential for mining-induced material damage to public water supply aquifers and bodies of water, which are sources for public water supplies. If there is a significant potential for damage, describe the measures, which will be employed to minimize the potential impacts.

No mining-induced material damage to public water supply aquifers are anticipated. One public water supply spring, Caddie Shak, is located within 2,000 feet of the permit boundary. Refer to section 8.3(b) for details on

the zone of influence determination of this supply. Room and pillar first mining only will be conducted beneath the supply at depths ranging between

385 to 452 vertical feet of the aquifer supplying this spring. Therefore, the support area will be mined in a manner which ensures stable roof conditions, thus providing the required protection regarding recharge to the public water supply.

Permit Expansion:

Not applicable. There are no known sources of public water located in the area of the expansion.

b. For Coal Preparation Activities:

Not applicable. No coal preparation activities are proposed in this permit application.

i. Describe the manner in which process water from the coal preparation circuit will be handled and the circumstances under which it may be discharged.

ii. Provide a narrative description addressing the following concerns and how each will be prevented or mitigated.

(1) Water quality impacts on streams that will receive discharges from site activities.

(2) Groundwater contamination resulting from treatment pond leakage or infiltration of water contaminated by surface activities.

(3) Restoration / replacement of water supplies that are contaminated, diminished or interrupted by site activities. Include a demonstration that the proposed replacement supply will meet the quantity and quality needs of the current water supply user.

c. For Coal Refuse Disposal Activities:

Not applicable. No coal refuse disposal activities are proposed in this permit application.

i. Describe the nature and anticipated quality of all discharges, which will emanate from the refuse pile and underdrains.

ii. Provide a narrative description addressing the following concerns and how each will be prevented or mitigated.

(1) Water quality impacts on streams and wetlands, which will receive discharges from site activities.

(2) Groundwater contamination resulting from treatment pond leakage or infiltration of water that has come into contact with coal refuse or coal ash.

(3) Restoration / replacement of water supplies that are contaminated, diminished or interrupted by site activities. Include a demonstration that the proposed replacement supply will meet the quantity and quality needs of the current water supply user.

(4) Contaminated seepage or underdrain discharges following site closure.

8.15 Hydrologic Monitoring Plan

Note: Monitoring points other than developed water supplies must be identified on Form 8.13A by latitude and longitude and, unless the landowner objects, clearly marked and identified in the field. The field identification scheme should correspond with the identification scheme in the application.

a. Complete Form 8.15A (Monitoring Program Summary) identifying the points which will be used in the monitoring program, the parameters to be measured at each point, and the period and frequency of sampling at each point.

Refer to the attached Form 8.15A.

b. Attach a narrative describing how the proposed monitoring points relate to the detection and mitigation of impacts discussed under Modules 8.9, 8.10 and 8.14.

There are fourteen (14) stream monitoring stations that are used to monitor the quality and quantity of streams. These stations monitor the quality and quantity of representative streams that flow over the permit area. Champion Creek and Indian Creek are monitored in three locations along the permit boundary including an upstream, downstream and mid point. Minnow Run (38363), UNT #9 to Champion Creek, UNT #13 to Indian Creek (38394), UNT #10 to Indian Creek (38393) and UNT #5 to Indian Creek (38390) are monitored at the mouth. UNT #23 to Indian Creek (38403) is monitored at the edge of the permit area. UNT #10 of Fourmile Run (43610) and UNT #9 of Fourmile Run (43609) are monitored downstream of the permit area.

Four (4) monitoring well locations consisting of a cluster of three piezometer tubes each (shallow, intermediate and deep) will be used to measure the groundwater system across the permit area.

Permit Expansion:

There are six (6) stream monitoring stations that will be used to monitor the quality and quantity of streams within the permit expansion area. These stations will monitor the quality and quantity of representative streams that flow over the permit area. Fourmile Run (43542), UNT #43610 to Fourmile Run (43610), and UNT #8 to Fourmile Run (43605) are monitored downstream of the permit expansion area. UNT #31 to Indian Creek is monitored at the mouth, near the edge of the permit expansion boundary.

Three (3) existing stream monitoring stations will continue to be used to monitor the quality and quantity of streams within the permit expansion area: UNT #10 to Fourmile Run (43611) via stream existing stream monitoring station 28013-01, Trib #43610 to Fourmile Run via existing stream monitoring station 50550-01, and UNT #11 to Champion Creek (38369) via existing stream monitoring station ChpCr-US.

Two (2) piezometers each developed within the Lower Kittanning coal seam will be used to measure the groundwater system as part of the permit expansion hydrologic monitoring plan. The four (4) existing monitoring well locations consisting of a cluster of three piezometer tubes each (shallow, intermediate and deep) will continue to be used to measure the groundwater system across the Rustic Ridge #1 permit area.

c. Provide plans and describe procedures to compute accurate discharge flow rates from springs, streams, drains, pipes, sediment/treatment ponds, and mine discharge points. The field system as well as the calculation method must be usable by monitoring personnel and PADEP mine inspectors.

Flow from high volume discharging water locations such as streams will be determined by measurement of cross section of flow and flow velocity using a digital flow meter. Where appropriate and possible, springs, drains, pipes, overflow from sediment/treatment pond, mine discharge points and stream flows may be measured by using a container of known volume and stopwatch. As necessary springs and mine discharge will be dammed and piped, or weirs installed to obtain a repeatable accurate flow measurement.

d. Describe how samples will be taken, preserved, and shipped to the laboratory.

Stream samples will be collected at the point that stream flow is measured. All samples will be collected in bottles provided by the analytical laboratory. Field pH and temperature will be determined using an electronic measuring device. Samples will be placed in a cooler, chain of custody prepared and delivered to the analytical laboratory by LCT or another agent of LCT.

e. Indicate the name and address of the laboratory that will perform analyses.

The following PA certified laboratory will be used for water analyses:

Geochemical Testing
2005 N. Center Avenue
Somerset, PA 15501

f. Provide the name and credentials of individual(s) performing well pumping tests.

All sampling and testing will be performed by LCT or contractor PADEP registered field testers.

g. Address the scope, location, and frequency of postmining monitoring (e.g., mine pool level monitoring).

The mine pool will be common throughout the Rustic Ridge #1 Mine over time. One borehole (PZ-4D) has been selected to be left open to monitor the mine pool after closure. The mine pool will be monitored monthly following closure.

8.16 Water Supply Premining Surveys

Permittees are required to conduct pre-mining surveys of all water supplies that may be affected by the mining activities prior to the time they are susceptible to mine-related effects. In general, water supplies typically are considered susceptible to mine-related if they lie within 1,000 feet of a coal refuse disposal site, coal preparation activity site or other surface activity site, or if they lie within 1,000 feet of a site where coal will be extracted in an underground mine. For underground mines, surveys must be completed for all water supplies within 1,000 feet of the area depicted on a 6-month mining map prior to the date the map is submitted to the Department. The completed surveys should be included with the submission of the 6-month mine map.

Pre-mining surveys will be supplied for all water supplies which may be affected by mining activities prior to the extraction of coal underground within 1,000 feet of the supply. The data outlined below will be supplied.

a. Pre-mining survey information should include:

   i. Location and type of water supply;

   ii. Chemical and physical characteristics of the water, including, at a minimum, total dissolved solids or specific conductance corrected to 25°C, pH, total iron, total manganese, total aluminum hardness, total coliform, acidity, alkalinity, sulfate and total suspended solids[1];

   iii. Water quantity (well yield or spring flow) (use Form 8.13B to supply well data);

   iv. Physical description of the water supply, including the depth and diameter of the well, length of casing, static water level, and description of any treatment or distribution system.

b. Existing and planned future uses of the water supply.

c. Quality sampling should consist of at least four (4) distinct samples preferably taken during wet and dry times. (Samples obtained for background information under 8.13 (a)iii) may be credited toward this requirement.)

d. Spring flow data should consist of a minimum of four (4) flow measurements representing average conditions and seasonal variations. (Samples obtained for background information under 8.13 (a)iii) may be credited toward this requirement.)

e. Well yield data should be gathered through a standardized, reproducible pumping exercise. This will allow for meaningful premining/postmining survey comparisons. Please contact the appropriate District Mining Office prior to conducting the yield test to avoid wasting resources on unacceptable test methods. (The Department's Technical Guidance Document 563-2112-605, *Water Supply Replacement and Permitting* is available on the Department's web site and provides guidelines for determination of well yield.)

[1] Premining sampling should also address other regulated safe drinking parameters that are likely to be present in the water supply. Note also that, decisions to sample for specific conductance versus total dissolved solids should be made with the understanding that the safe drinking standard is based on total dissolved solids.

FORM 8.3A
GROUNDWATER INVENTORY

Mine Name: Rustic Ridge #1 Expansion

Date: 9/30/2021

Sample Point No.	Well / Spring	Owner	Use	Surface Elevation (MSL)	Depth of Well	Diameter of Well	Depth of Casing	Static Water Elevation (MSL) or Flow, Date of Measurement	Type of Treatment if Any (iron filter, etc.)
W52	Well	Donegal Christ Miss. Alliance Ch.	Domestic	1848	170 ft	6 in	Unknown	92.3 ft	In-line sed filter
W93	Well	Marlene & Gerald Kalp	Domestic	1790	100 ft	Unknown	Unknown	Buried	Softener
W193	Well	William Jr. & Paula Aldom	Domestic	1851	100 ft	6 in	Unknown	20.4 ft	In line sed filter
W198	Well	Judith Shaffer Trustee	Domestic	1827	300 ft	6 in	Unknown	47.8 ft	In-line sed filter
W202	Well	Jay & Pamela Corl	Domestic	1813	Unknown	Unknown	Unknown	Buried	In-line sed filter
W209	Well	Jack & Sandra Shaffer	Dom/Com.	1796	Unknown	30 in	50 ft	16.1 ft	None
S210	Spring	Jack & Sandra Shaffer	None	1780	N/A	N/A	N/A	Not measurable	None
W211	Well	Bruno Family Trust	Abandoned	1719	Unknown	Unknown	Unknown	Buried	None
W213	Well	Bruno Family Trust	Abandoned	1710	Unknown	6 in	Unknown	Not measurable	None
W214	Well	Bruno Family Trust	Abandoned	1711	Unknown	Unknown	Unknown	Not measurable	None
W215	Well	Bruno Family Trust	Abandoned	1671	Unknown	Unknown	Unknown	Buried	None
S241	Spring	Justina & Patrick Cunningham	Domestic	1734	N/A	N/A	N/A	33 gpm	None
S250	Spring	Bruce Snyder	Domestic	1798	N/A	N/A	N/A	Not measurable	None
S251	Spring	Bruce Snyder	Animals	1792	N/A	N/A	N/A	1 gpm	None
W260	Well	Ronald Donitzen	Outdoor Use	1845	200 ft	Unknown	200 ft	Not measurable	Softener
W265	Well	Terry Donitzen	Abandoned	1846	100 ft	Unknown	Unknown	Buried	None
W339	Well	Roy & Loretta King	Domestic	1812	180 ft	6 in	Unknown	24.8 ft	None
W340	Well	Roy & Loretta King	None	1818	Unknown	6 in	Unknown	Not measurable	None
W344	Well	Ray May	Domestic	1742	150 ft	Unknown	Unknown	Not measurable	None
S348	Spring	Gerald & Vicki Morton	Domestic	1714	N/A	N/A	N/A	Not measurable	None
W350	Well	Dale & Anna Mae Kern	Domestic	1696	205 ft	6 in	Unknown	Not measurable	Clorox
W361	Well	Christopher & Jenna Hixson	None	1816	Unknown	6 in	Unknown	34.0 ft	In-line sed filter
W409	Well	Roy Snyder	Garage	1823	22 ft	3.5 ft	22 ft	8.1 ft	None

FORM 8.3A
GROUNDWATER INVENTORY

Mine Name: Rustic Ridge #1 Expansion

Date: 9/30/2021

Sample Point No.	Well / Spring	Owner	Use	Surface Elevation (MSL)	Depth of Well	Diameter of Well	Depth of Casing	Static Water Elevation (MSL) or Flow, Date of Measurement	Type of Treatment if Any (iron filter, etc.)
W410	Well	Roy Snyder	None	1812	Unknown	Unknown	Unknown	Not measurable	None
S443	Spring	Mark Archer	Domestic	1814	N/A	N/A	N/A	Not measurable	None
W446	Well	Gregory Bader	Domestic	1825	180 ft	Unknown	Unknown	Not measurable	Soft./Sed Filter/UV
W451	Well	Nicholas Hoffer	None	1825	Unknown	Unknown	Unknown	Not measurable	None
W454	Well	Lury Shaffer III	None	1852	150 ft	Unknown	Unknown	Not measurable	None
S459	Spring	Mark & Amy Snyder	Domestic	1616	N/A	N/A	N/A	4 gpm	Soft./Rev. Osmosis
S460	Spring	Tom Firestone Jr.	Domestic	1828	N/A	N/A	N/A	4 gpm	None
W463	Well	John & Joan Hastings	Domestic	1675	100 ft	Unknown	100 ft	Not measurable	Softener
W477	Well	Tom Firestone Jr.	Back-up	1821	Unknown	3 ft	Unknown	5.4 ft	None
W478	Well	Tom Firestone Jr.	Back-up	1818	Unknown	3 ft	Unknown	11.7 ft	None
W479	Well	Tom Firestone Jr.	None	1814	Unknown	Unknown	Unknown	Not measurable	None
W480	Well	Joy Brady Trustee	None	1820	200 ft	6 in	Unknown	12.5 ft	None
W481	Well	Tom Firestone Jr.	None	1812	Unknown	6 in	Unknown	Not measurable	None
W516	Well	John Shaffer	Domestic	1839	~100 ft	Unknown	Unknown	Buried	None
W517	Well	Thomas Porter	Domestic	1924	100 ft	Unknown	60 ft	49.7- 5/4/2021	Softener
W518	Well	Thomas Porter	Industrial	1919	120 ft	Unknown	~20 ft	25.5- 5/4/2021	None
W519	Well	Thomas Porter	Husbandry	1849	100 ft	Unknown	20 ft	39.4- 5/4/2021	None
W520	Well	R B Kimiko	Not Used	1871	350 ft	Unknown	Unknown	No Access	None
W521	Well	R B Kimiko	Domestic	1874	250-350 ft	Unknown	Unknown	19.6- 5/4/2021	None
W523	Well	Shearer Farms Holding, LLC	Domestic	1755	250 ft	Unknown	Unknown	39- 5/4/2021	None
S524	Spring	Shearer Honey House Parcel, LLC	Domestic	1687	N/A	N/A	N/A	Unknown	UV Light
S525	Spring	Holly Battellino	Domestic/ Industrial	1822	N/A	N/A	N/A	No Access	In-line Sediment Filter
W526	Well	Russ Marker	Domestic	1476	~50 ft	Unknown	Unknown	No Access	None

FORM 8.3A
GROUNDWATER INVENTORY

Mine Name: Rustic Ridge #1 Expansion

Date: 9/30/2021

Sample Point No.	Well / Spring	Owner	Use	Surface Elevation (MSL)	Depth of Well	Diameter of Well	Depth of Casing	Static Water Elevation (MSL) or Flow, Date of Measurement	Type of Treatment if Any (iron filter, etc.)
W527	Well	Henry Hoffer	Domestic	1837	176 ft	Unknown	Unknown	No Access	None
W528	Well	Katie Steele	Domestic/ Husbandry	1528	Unknown	Unknown	Unknown	No Access	Softener/ UV Light
W530	Well	Robert Rosswog	Domestic	1721	240 ft	Unknown	Unknown	Not Measured	None
W531	Well	Denise Temple	Domestic	1838	Unknown	Unknown	Unknown	Not Measured	None
W532	Well	Tim Pisula	Domestic	1943	398 ft	Unknown	20 ft	73- 5/15/2021	Particle Filtration/ UV Light
S534	Spring	Vicki Snyder	Domestic	1554	N/A	N/A	N/A	6 gpm- 5/19/2021	None
W535	Well	Richard Gross	Domestic	1687	100 ft	Unknown	80 ft	47.1- No SU listed 5/19/2021	Softener/ Chlorination
W536	Well	Beverly Dillow	Domestic	1628	200 ft	Unknown	Unknown	78.1- No SU listed 5/19/2021	Softener/ In-line Sediment Filter/ Charcoal Filter
W538	Well	Fred Kalp	Domestic	1845	90 ft	Unknown	Unknown	No Access	None
W539	Well	Lori Nudo	Domestic	1849	Unknown	8 in	Unknown	No Access	None
W540	Well	Lori Nudo	Domestic	1852	Unknown	8 in	Unknown	No Access	None
W541	Well	Lori Nudo	Domestic	1864	232 ft	8 in	20-30 ft	38.0- 1/23/2023	None
S542	Spring	Lori Nudo	None	1819	N/A	N/A	N/A	No Flow	None
W543	Well	George and Marget Paulik	Domestic	1817	120-130 ft	Unknown	120 ft	Not Measurable	In-line Sediment Filter
W544	Well	Mike Gerhart	Domestic/ Husbandry	1818	137 ft	8 in	Unknown	92.8- 5/20/2021	None
S545	Spring	Mike Gerhart	None	1786	N/A	N/A	N/A	3 gpm- 5/20/2021	None
W547	Well	Richard Horwat	Domestic	1901	~130 ft	Unknown	Unknown	67.3- No SU listed 5/20/2021	None
S548	Spring	Susan Kimmel	Domestic/ Husbandry	1695	N/A	N/A	N/A	0.8 gpm- 5/20/2021	None
W549	Well	Lang Jacqueline Barbara Trust	Domestic	1574	130 ft	Unknown	Unknown	Buried	Softener
S552	Spring	Dave Brown	Domestic	1730	N/A	N/A	N/A	7-10 gpm- 5/20/2021	None
S554	Spring	Sara Brown	None	1783	N/A	N/A	N/A	No Access	None
W555	Well	Sara Brown	Domestic	1783	Unknown	Unknown	Unknown	No Access	Softener
W557	Well	Anthony Quadro	Not Listed	1794	92 ft	Unknown	Unknown	8.6- No SU listed 5/21/2021	None

FORM 8.3A
GROUNDWATER INVENTORY

Mine Name: Rustic Ridge #1 Expansion

Date: 9/30/2021

Sample Point No.	Well / Spring	Owner	Use	Surface Elevation (MSL)	Depth of Well	Diameter of Well	Depth of Casing	Static Water Elevation (MSL) or Flow, Date of Measurement	Type of Treatment if Any (iron filter, etc.)
W558	Well	Elaine Muman	Domestic	1670	160 ft	Unknown	Unknown	Not Measurable	In-line Sediment Filter
W560	Well	Mike Zuckett	Domestic	1774	120.4 ft	8 in	Unknown	53.7- 5/21/2021	In-line Sediment Filter
S561	Spring	Nicole Thom	Husbandry	1845	N/A	N/A	N/A	No Flow	None
S562	Spring	Nicole Thom	Husbandry	1845	N/A	N/A	N/A	<1 gpm- 5/21/2021	None
W563	Well	Nicole Thom	Domestic	1858	Unknown	Unknown	Unknown	22.8- 5/21/2021	Softener/ In-line Sediment Filter/ Charcoal Filter
W565	Well	Dorcas Brown	Domestic	1548	92 ft	8 in	Unknown	42.7- No SU listed 5/24/2021	None
W566	Well	Kathleen Summersgill	Domestic	1743	Unknown	Unknown	Unknown	No Access	UV Light
S567	Spring	Caroyln Columbo	Domestic	1706	N/A	N/A	N/A	No Access	Softener/ Chlorination
W568	Well	Amanda Stouffer	Domestic	1641	Unknown	Unknown	Unknown	No Access	Softener
S569	Spring	Amanda Stouffer	None	1633	N/A	N/A	N/A	~5 gpm- 5/24/2021	None
W570	Well	Dianne Proctor	Domestic	1925	Unknown	Unknown	Unknown	No Access	Softener/ Charcoal Filter
S572	Spring	Don Wiltrout	Domestic/ Husbandry	1720	N/A	N/A	N/A	0.8 gpm- 5/24/2021	None
S573	Spring	Don Wiltrout	Domestic/ Husbandry	1746	N/A	N/A	N/A	No Flow	None
W574	Well	Tim Moore	Domestic	1784	169 ft	Unknown	Unknown	No Access	None
S575	Spring	Tim Moore	Domestic	1806	N/A	N/A	N/A	<1 gpm- 5/24/2021	None
W577	Well	Brian Hall	Domestic	1910	Unknown	8 in	Unknown	63.3- 5/24/2021	None
W578	Well	Jenn Brown	Domestic	1493	30 ft	Unknown	Unknown	4.9- No SU listed 5/26/2021	Softener/UV Light
W579	Well	Mark Nista	Not Listed	1479	Unknown	Unknown	Unknown	No Access	Softener/Charcoal Filter/ UV Light
W581	Well	Stephan Cesario	Domestic	1834	125 ft	Unknown	Unknown	No Access	Unknown
W582	Well	Stephan Cesario	None	1829	Unknown	Unknown	Unknown	Not Measurable	None
W583	Well	Chelsea Wettgen	Domestic	1910	233 ft	8 in	Unknown	98.5- 5/26/2021	None
W584	Well	Virginia Jones	Domestic	1724	200 ft	8 in	Unknown	26.8- 6/4/2021	None
W585	Well	Randy Ciboroski	Secondary Domestic	1893	125 ft	Unknown	Unknown	22.4- No SU listed 6/4/2021	None

FORM 8.3A
GROUNDWATER INVENTORY

Mine Name: Rustic Ridge #1 Expansion

Date: 9/30/2021

Sample Point No.	Well / Spring	Owner	Use	Surface Elevation (MSL)	Depth of Well	Diameter of Well	Depth of Casing	Static Water Elevation (MSL) or Flow, Date of Measurement	Type of Treatment if Any (iron filter, etc.)
W586	Well	Rebecca Heide	Domestic	1924	105 ft	8 in	Unknown	53.0- 6/4/2021	Softener
W587	Well	Mark Nedrow	Domestic	1563	Unknown	Unknown	Unknown	53.8- 6/6/2021	Softener
S588	Spring	Mark Nedrow	Husbandry	1653	N/A	N/A	N/A	<1 gpm- 6/6/2021	None
S589	Spring	Mark Nedrow	Husbandry	1643	N/A	N/A	N/A	<1 gpm- 6/6/2021	None
W590	Well	Gregory O'Connor	Domestic	1620	200 ft	Unknown	Unknown	20.5- 6/8/2021	Softener/ In-line Sediment Filter
S592	Spring	Jody Solomon	None	1640	N/A	N/A	N/A	25 gpm- 6/9/2021	None
W593	Well	Betty Shaffer	Domestic	1636	300 ft	8 in	Unknown	67.7- 7/16/2021	In-line Sediment Filter
W594	Well	Vicki Ungerleider	Unknown	1479	175 ft	Unknown	Unknown	11.2- No SU listed 6/11/2021	None
W595	Well	Jim Paynor	Domestic	1665	Unknown	Unknown	Unknown	Buried	None
W596	Well	Robert Nedrow	Domestic	1528	110 ft	Unknown	Unknown	27.2- 6/17/2021	In-line Sediment Filter
W597	Well	Keith Caldwell	Unknown	1932	177 ft	Unknown	Unknown	73.4- 6/18/2021	Softener/ In-line Sediment Filter
W599	Well	Kyle Olinger	Domestic	1927	180 ft	6 in	Unknown	74.5- 3/13/2024	Iron Removal/In-line Sediment Filter
W605	Well	Ron Donitzen Jr.	Domestic	1623	200 ft	Unknown	Unknown	No Access	In-line Sediment Filter
W606	Well	Eric Nedrow	Domestic	1621	Unknown	Unknown	Unknown	Buried	None
W607	Well	Tammy Shawley	Domestic	1490	80 ft	Unknown	Unknown	37.8- 7/1/2021	None
S609	Spring	Donald Braugher	Domestic	1824	N/A	N/A	N/A	<1 gpm- 7/8/2021	None
W610	Well	Drew Plevelich	Domestic/ Husbandry	1926	Unknown	6 in	Unknown	No Access	In-line Sediment Filter
W611	Well	Sam Haseltine	Domestic	1670	300 ft	6 in	Unknown	83.2- 8/10/2021	In-line Sediment Filter
W612	Well	Judith Grimes	None	1874	Unknown	Unknown	Unknown	No Access	None
W613	Well	Judith Grimes	Commercial	1874	Unknown	Unknown	Unknown	No Access	None
W614	Well	John Demarchi, Jr.	Domestic	1772	Unknown	6 in	Unknown	163.0- 8/10/2021	None
W615	Well	John Demarchi, Jr.	Domestic	1802	Unknown	6 in	Unknown	24.3- 8/10/2021	None
W616A	Well	John Demarchi, Jr.	Domestic	1906	Unknown	6.25 in	Unknown	72.9- 12/15/2021	None

FORM 8.3A
GROUNDWATER INVENTORY

Mine Name: Rustic Ridge #1 Expansion

Date: 9/30/2021

Sample Point No.	Well / Spring	Owner	Use	Surface Elevation (MSL)	Depth of Well	Diameter of Well	Depth of Casing	Static Water Elevation (MSL) or Flow, Date of Measurement	Type of Treatment if Any (iron filter, etc.)
W617	Well	Craig Crownover	Domestic	1513	97 ft	6 in	Unknown	No Access	None
W618	Well	Chris Shaffer	Domestic	1553	120 ft	Unknown	Unknown	No Access	None
S619	Spring	Chris Shaffer	Domestic	1551	N/A	N/A	N/A	No flow- 8/12/2021	None
W622	Well	Judith Gallagher	Domestic	1866	Unknown	Unknown	Unknown	No Access	In-line Sediment Filter
W623	Well	Robert Rosswog	None	1670	Unknown	6 in	Unknown	6.8- 8/13/2021	None
W624	Well	Robert Rosswog (Well located on neighboring property owned by Sam Haseltine)	Domestic	1646	Unknown	Unknown	Unknown	136.8- 8/13/2021	None
S628	Spring	Don Mulhollem	Husbandry	1664	N/A	N/A	N/A	<1 gpm- 8/13/2021	None
S629	Spring	Don Mulhollem	Husbandry	1670	N/A	N/A	N/A	<1 gpm- 8/13/2021	None
W632	Well	Darlene Klein	Domestic	1933	130 ft	6 in	Unknown	56.1- 8/16/2021	In-line Sediment Filter, UV light
S634	Spring	Rodney Gerhart	Domestic	1802	N/A	N/A	N/A	3 gpm- 8/20/2021	In-line Sediment Filter
S635	Spring	Stanley & Madeline Gross	Domestic	1789	N/A	N/A	N/A	<1 gpm- 12/14/2021	None
S636	Spring	Stanley & Madeline Gross	Domestic	1788	N/A	N/A	N/A	<1 gpm- 12/14/2021	None
W637	Well	John & Ethel Hissem	Domestic	1546	191	Unknown	Unknown	No Access	None
W638	Well	David & Kellie Hegeman	Domestic	1589	Unknown	6 in	Unknown	No Access	Softener
S640	Spring	Ellen & Margaret Clair	Domestic	1684	N/A	N/A	N/A	<1 gpm- 12/16/2021	None
S641	Spring	Ellen & Margaret Clair	None	1683	N/A	N/A	N/A	No Flow- 12/16/2021	None
W642	Well	Marvin & Dolly Coffman	Domestic	1532	400 ft	6 in	Unknown	17.0- 8/27/2021	None
W643	Well	William Ritenour	Domestic	1741	Unknown	Unknown	Unknown	No Access	None
S646	Spring	Ralph & Grace Shawley	Domestic	1681	N/A	N/A	N/A	<1 gpm- 12/14/2021	In-line Sediment Filter, UV light
S647	Spring	Ralph & Grace Shawley	Domestic	1684	N/A	N/A	N/A	No Access	In-line Sediment Filter, UV light
W652	Well	Michael & Linda Gerhart	Domestic	1843	Unknown	6 in	Unknown	15.4- 1/5/2022	None
W653	Well	Larry & Marian Bitner	Domestic	1487	Unknown	Unknown	Unknown	No Access	Softener
W654	Well	Nathan & Catherine Carlson	Domestic	1509	Unknown	6 in	Unknown	29.7- 9/3/2021	In-line Sediment Filter

FORM 8.3A
GROUNDWATER INVENTORY

Mine Name: Rustic Ridge #1 Expansion

Date: 9/30/2021

Sample Point No.	Well / Spring	Owner	Use	Surface Elevation (MSL)	Depth of Well	Diameter of Well	Depth of Casing	Static Water Elevation (MSL) or Flow, Date of Measurement	Type of Treatment if Any (iron filter, etc.)
S656	Spring	Nathan & Catherine Carlson	Husbandry	1511	N/A	N/A	N/A	2 gpm- 9/3/2021	None
W657	Well	John Laird & Kathleen Fenk	Domestic	1691	175 ft	6 in	Unknown	45.3- 9/3/2021	None
W658	Well	Chad & Erin Clark	Domestic	1915	280 ft	6 in	30 ft	25.8- 12/8/2021	Softener
W660	Well	Eric Nedrow	Domestic	1612	200 ft	6″	Unknown	45.6- 12/7/2023	None
S664	Spring	Patricia Obrien-Smith	Domestic	1777	N/A	N/A	N/A	37 gpm- 11/30/2023	None
W665	Well	Bruce Snyder	Domestic	1657	150 ft	6 in	Unknown	27.7- 11/30/2023	None
W666	Well	Rondey & Marsha White	Domestic	1735	200 ft	6 in	Unknown	58.4- 12/14/2023	None
W667	Well	Ronald Rega	None	1754	100 ft	6 in	Unknown	34.8- 01/20/2024	None
S668	Spring	Ronald Rega	Domestic	1774	N/A	N/A	N/A	1.6 gpm- 01/20/2024	None
W669	Well	John & Deborah McCain	Husbandry	1725	80 ft	6 in	Unknown	32.6- 03/4/2024	Softener
W670	Well	Kevin Trout	Domestic	1928	145 ft	6 in	Unknown	95.1- 08/22/2022	Softener
W671	Well	Nicholas Hoffer	None	1836	Unknown	6 in	Unknown	73.6- 03/14/2024	None
W672	Well	Nicholas Hoffer	None	1838	Uknown	6 in	Unknown	74.2- 03/14/2024	None

Source of above information _____

FORM 8.4A
GENERAL STREAM INVENTORY

Mine Name: Rustic Ridge #1 Expansion

Date: 9/30/2021

Stream Name	Segment (Identify by station or geographic reference point)	Flow Status ------- Basis	*Average / Annual Flow (CFS/GPM)	General Quality Characteristics	Use(s)	Use Attainment Status	If impaired, sources of impairment
Champion Creek (38337)	ChpCr-M1	P / 2	1500	See Form 8.13A	1	Attaining	
UNT #11 to Champion Creek (38369)	ChpCr-US	P / 2	107 gpm	See Form 8.13A	1	Attaining	
UNT #12 to Champion Creek (38370)		P / 2		See Note	1	Attaining	
Fourmile Run (43542)	SW512	P / 2	2806 gpm	See Form 8.13A	2	Attaining	
UNT #10 to Fourmile Run (43611)	28013-01	P / 2	118 gpm	See Form 8.31A	2	Attaining	
UNT #9 to Fourmile Run (43609)		P / 2	635 gpm	See Form 8.13A	2	Attaining	
UNT #8 to Fourmile Run (43605)	SW513	P / 2	1346 gpm	See Form 8.13A's	2	Attaining	
UNT #8 to Fourmile Run (43605)	SW514	P / 2	604 gpm	See Form 8.13A's	2	Attaining	
UNT #6 to Fourmile Run				See Note		Undetermined	
UNT #5 to Fourmile Run				See Note		Undetermined	
UNT #4 to Fourmile Run				See Note		Undetermined	
Trib #43613 to Fourmile Run				See Note	2	Attaining	
Trib #43612 to Fourmile Run				See Note	2	Attaining	
Trib #43610 to Fourmile Run	50550-01, SW511	P / 2	89 gpm	See Note	2	Attaining	
Trib #43608 to Fourmile Run				See Note	2	Attaining	
Trib #43607 to Fourmile Run				See Note	2	Attaining	
Trib #43606 to Fourmile Run				See Note	2	Attaining	

Flow Status / Basis

P = Perennial according to 89.5 or 90.5, as applicable.
PCF = Continuously flowing according to 89.141(b)

1 = by joint inspection with DEP staff
2 = by flow measurements
3 = by g/w level measurements
4 = by aquatic survey

Uses

1 = Cold Water
2 = Trout Stocked Fishery
3 = Warm Water Fishery
4 = Potable Water Supply
5 = Industrial Water Supply
6 = Wildlife water Supply
7 = Livestock Water Supply
8 = Boating, Navigation
9 = Swimming
10 = Irrigation
11 = Recreational Fishery
12 = Waterfowl habitat

Average/Annual Flow

(*) For streams of "PCF" status, describe method used to compute the average/annual flow.

Note: Quality expected to be similar to other streams in area - See Form 8.13A

FORM 8.4A
GENERAL STREAM INVENTORY

Mine Name: Rustic Ridge #1 Expansion

Date: 9/30/2021

Stream Name	Segment (Identify by station or geographic reference point)	Flow Status ------- Basis	*Average / Annual Flow (CFS/GPM)	General Quality Characteristics	Use(s)	Use Attainment Status	If impaired, sources of impairment
Trib #43602 to Fourmile Run				See Note	2	Attaining	
Trib #43595 to Fourmile Run				See Note	2	Attaining	
Trib #43592 to Fourmile Run	SW509	142 gpm	P / 2	See Form 8.13A	2	Attaining	
Trib #33 to Indian Creek				See Note		Undetermined	
Trib #31 to Indian Creek	SW510	113 gpm	P / 2	See Form 8.13A		Undetermined	
Trib #30 to Indian Creek				See Note		Undetermined	
Trib #29 to Indian Creek (38408)				See Note	1	Attaining	
Trib #38407 to Indian Creek				See Note	1	Attaining	
UNT #7 to Minnow Creek				See Note		Undetermined	

Flow Status / Basis

P = Perennial according to 89.5 or 90.5, as applicable.
PCF = Continuously flowing according to 89.141(b)

1 = by joint inspection with DEP staff
2 = by flow measurements
3 = by g/w level measurements
4 = by aquatic survey

Uses

1 = Cold Water
2 = Trout Stocked Fishery
3 = Warm Water Fishery
4 = Potable Water Supply
5 = Industrial Water Supply
6 = Wildlife water Supply
7 = Livestock Water Supply
8 = Boating, Navigation
9 = Swimming
10 = Irrigation
11 = Recreational Fishery
12 = Waterfowl habitat

Average/Annual Flow

(*) For streams of “PCF” status, describe method used to compute the average/annual flow.

Note: Quality expected to be similar to other streams in area - See Form 8.13A

FORM 8.5A
MINE DISCHARGE INVENTORY

Mine Name: Rustic Ridge #1 Expansion

Date: 9/30/2021

No Mine discharges are located within 1,000 feet of the permit boundary.

Map Reference	Mine Name	Type of Mine	Nature of Discharge (flow from opening, seep from refuse pile, etc.)	Surface Elevation	Pool Level (if known)	Discharge Volume (Range)	General Quality Characteristics	Type of Treatment

FORM 8.6A
DAM AND POND INVENTORY

Mine Name: Rustic Ridge #1 Expansion

Date: 9/30/2021

Map Reference	Owner	Use	Width	Length	Depth	Source of Water	General Quality Characteristics
P253	John Rossmiller	None	83 ft	72 ft	Unknown	Surface runoff	See Form 8.13A
P421	Robert & Janet Ritenour	Recreational	66 ft	70 ft	Unknown	Surface runoff	See Form 8.13A
P550	Mike Sibal	Recreational	255 ft	175 ft	10 ft	Spring	See Form 8.13A
P551	Mike Sibal	None	60 ft	55 ft	Unknown	Spring/Precipitation	See Form 8.13A
P553	Dave Brown	None	110 ft	110 ft	Unknown	Spring/Precipitation	See Form 8.13A
P556	Sara Brown	None	125 ft	50 ft	6 ft	Spring	See Form 8.13A
P564	Nicole Thom	Husbandry	140 ft	75 ft	6 ft	Spring	See Form 8.13A
P576	Tim Moore	Husbandry	100 ft	35 ft	8 ft	Spring	See Form 8.13A
P591	Jody Solomon	None	450 ft	310 ft	10 ft	Surface runoff	See Form 8.13A
P608	Donald Brougher	None	220 ft	130 ft	8 ft	Surface runoff	See Form 8.13A
P616	J. Demarchi	None	75 ft	50 ft	Unknown	Spring/Precipitation	See Form 8.13A
P620	C. Shaffer	None	225 ft	140 ft	8 ft	Surface runoff	See Form 8.13A
P621	C. Shaffer	None	155 ft	55 ft	Unknown	Spring/Precipitation	See Form 8.13A
P639	David & Kellie Hegeman	Recreational	100 ft	189 ft	Unknown	Spring/Precipitation	See Form 8.13A
P655	Nathan & Catherine Carlson	Husbandry	12ft	27ft	Unknown	Spring/Precipitation	See Form 8.13A

JLB- CME - 11/29/01

7.1A GEOLOGIC DRILL LOG

Hole No.	PZ-7D
Surface Elev.	1640.64
Surveyed by:	LCT
Survey Method:	GPS

Measured Static Water Levels

Date Measured	Depth (ft)	Elevation (MSL)	Notes
8/17/2020	177.95	1465.27	

SWL measured by: LCT

Coal Seam ID	Bottom Depth (ft)	Bottom Elevation (MSL)
Upper Freeport	330.0	1310.6
Upper Kittanning	371.0	1269.6
Upper Kittanning	375.0	1265.6
Upper Kittanning	389.0	1251.6
Middle Kittanning	408.0	1232.6
Middle Kittanning	433.0	1207.6
Lower Kittanning	481.0	1159.6

Operation Name :	Rustic Ridge #1 Mine-Expansion
Method Drilling:	Air Rotary
Date Drilled:	1/7/2020-1/8/2020
Drilled By:	Holt Drilling
Logged By:	
Municipality:	Donegal
County, State:	Westmoreland, PA
Quadrangle:	Stahlstown, PA
Laboratory:	Geochemical
Northing:	300222.623
Easting:	1522059.262
Grid Coordinates:	

Depth (ft)	Thickness (ft)	Graphic Log	Scale (feet)	Lithologic Description: rock type, weathering, color, fossils, carbonate, minerals, concentrations, pyrite, etc.	Water Conditions	% Recovery	% RQD
6.0	6.0			Unconsolidated			
27.0	21.0		10 20	Sandstone, brown			
35.0	8.0		30	Sand, brown, weathered			
50.0	15.0		40 50	Sandy Shale, gray			
72.0	22.0		60 70	Sandstone, gray			
			80	Sandy Shale, gray			

JLB- CME - 10/01

7.1A GEOLOGIC DRILL LOG

Hole No.	PZ-7D
Surface Elev.	1640.64
Surveyed by:	LCT
Survey Method:	GPS

Measured Static Water Levels

Date Measured	Depth (ft)	Elevation (MSL)	Notes
8/17/2020	177.95	1465.27	

SWL measured by: LCT

Coal Seam ID	Bottom Depth (ft)	Bottom Elevation (MSL)
Upper Freeport	330.0	1310.6
Upper Kittanning	371.0	1269.6
Upper Kittanning	375.0	1265.6
Upper Kittanning	389.0	1251.6
Middle Kittanning	408.0	1232.6
Middle Kittanning	433.0	1207.6
Lower Kittanning	481.0	1159.6

Operation Name :	Rustic Ridge #1 Mine-Expansion
Method Drilling:	Air Rotary
Date Drilled:	1/7/2020-1/8/2020
Drilled By:	Holt Drilling
Logged By:	
Municipality:	Donegal
County, State:	Westmoreland, PA
Quadrangle:	Stahlstown, PA
Laboratory:	Geochemical
Northing:	300222.623
Easting:	1522059.262
Grid Coordinates:	

Depth (ft)	Thickness (ft)	Graphic Log	Scale (feet)	Lithologic Description: rock type, weathering, color, fossils, carbonate, minerals, concentrations, pyrite, etc.	Water Conditions	% Recovery	% RQD
100.0	28.0		90 100	Sandy Shale, gray			
110.0	10.0		110	Sandstone, gray			
125.0	15.0		120	Shale, red			
128.0	3.0			Sandy Shale, gray			
135.0	7.0		130	Shale, red			
			140 150 160	Sandy Shale, gray			

JLB- CME - 10/01

7.1A GEOLOGIC DRILL LOG

Hole No. PZ-7D
Surface Elev. 1640.64
Surveyed by: LCT
Survey Method: GPS

Measured Static Water Levels

Date Measured	Depth (ft)	Elevation (MSL)	Notes
8/17/2020	177.95	1465.27	

SWL measured by: LCT

Coal Seam ID	Bottom Depth (ft)	Bottom Elevation (MSL)
Upper Freeport	330.0	1310.6
Upper Kittanning	371.0	1269.6
Upper Kittanning	375.0	1265.6
Upper Kittanning	389.0	1251.6
Middle Kittanning	408.0	1232.6
Middle Kittanning	433.0	1207.6
Lower Kittanning	481.0	1159.6

Operation Name : Rustic Ridge #1 Mine-Expansion
Method Drilling: Air Rotary
Date Drilled: 1/7/2020-1/8/2020
Drilled By: Holt Drilling
Logged By:
Municipality: Donegal
County, State: Westmoreland, PA
Quadrangle: Stahlstown, PA
Laboratory: Geochemical
Northing: 300222.623
Easting: 1522059.262
Grid Coordinates:

Depth (ft)	Thickness (ft)	Graphic Log	Scale (feet)	Lithologic Description: rock type, weathering, color, fossils, carbonate, minerals, concentrations, pyrite, etc.	Water Conditions	% Recovery	% RQD
200.0	65.0		170 180 190 200	Sandy Shale, gray	▼		
240.0	40.0		210 220 230 240	Shale, gray			

JLB- CME - 10/01

7.1A GEOLOGIC DRILL LOG

Hole No.	PZ-7D
Surface Elev.	1640.64
Surveyed by:	LCT
Survey Method:	GPS

Measured Static Water Levels

Date Measured	Depth (ft)	Elevation (MSL)	Notes
8/17/2020	177.95	1465.27	

SWL measured by: LCT

Coal Seam ID	Bottom Depth (ft)	Bottom Elevation (MSL)
Upper Freeport	330.0	1310.6
Upper Kittanning	371.0	1269.6
Upper Kittanning	375.0	1265.6
Upper Kittanning	389.0	1251.6
Middle Kittanning	408.0	1232.6
Middle Kittanning	433.0	1207.6
Lower Kittanning	481.0	1159.6

Operation Name :	Rustic Ridge #1 Mine-Expansion
Method Drilling:	Air Rotary
Date Drilled:	1/7/2020-1/8/2020
Drilled By:	Holt Drilling
Logged By:	
Municipality:	Donegal
County, State:	Westmoreland, PA
Quadrangle:	Stahlstown, PA
Laboratory:	Geochemical
Northing:	300222.623
Easting:	1522059.262
Grid Coordinates:	

Depth (ft)	Thickness (ft)	Graphic Log	Scale (feet)	Lithologic Description: rock type, weathering, color, fossils, carbonate, minerals, concentrations, pyrite, etc.	Water Conditions	% Recovery	% RQD
241.0	1.0			Coal			
250.0	9.0		250	Sandy Shale, gray			
275.0	25.0		260 270	Sandstone, gray			
300.0	25.0		280 290 300	Shale, medium dark			
315.0	15.0		310	Shale, gray			
			320	Sandstone, gray			

JLB- CME - 10/01

7.1A GEOLOGIC DRILL LOG

Hole No. PZ-7D
Surface Elev. 1640.64
Surveyed by: LCT
Survey Method: GPS

Measured Static Water Levels

Date Measured	Depth (ft)	Elevation (MSL)	Notes
8/17/2020	177.95	1465.27	

SWL measured by: LCT

Coal Seam ID	Bottom Depth (ft)	Bottom Elevation (MSL)
Upper Freeport	330.0	1310.6
Upper Kittanning	371.0	1269.6
Upper Kittanning	375.0	1265.6
Upper Kittanning	389.0	1251.6
Middle Kittanning	408.0	1232.6
Middle Kittanning	433.0	1207.6
Lower Kittanning	481.0	1159.6

Operation Name : Rustic Ridge #1 Mine-Expansion
Method Drilling: Air Rotary
Date Drilled: 1/7/2020-1/8/2020
Drilled By: Holt Drilling
Logged By:
Municipality: Donegal
County, State: Westmoreland, PA
Quadrangle: Stahlstown, PA
Laboratory: Geochemical
Northing: 300222.623
Easting: 1522059.262
Grid Coordinates:

Depth (ft)	Thickness (ft)	Graphic Log	Scale (feet)	Lithologic Description: rock type, weathering, color, fossils, carbonate, minerals, concentrations, pyrite, etc.	Water Conditions	% Recovery	% RQD
325.0	10.0			Sandstone, gray			
327.0	2.0			Shale, gray			
330.0	3.0		330	Upper Freeport Coal			
340.0	10.0		340	Shale, gray			
365.0	25.0		350 360	Sandstone, gray			
370.0	5.0		370	Shale, dark gray			
371.0	1.0			Upper Kittanning Coal			
373.0	2.0			Shale, dark gray			
375.0	2.0			Upper Kittanning Coal			
380.0	5.0		380	Shale, dark gray			
387.0	7.0						
389.0	2.0			Upper Kittanning Coal			
			390 400	Sandstone, gray			

JLB- CME - 10/01

7.1A GEOLOGIC DRILL LOG

Hole No. PZ-7D
Surface Elev. 1640.64
Surveyed by: LCT
Survey Method: GPS

Measured Static Water Levels

Date Measured	Depth (ft)	Elevation (MSL)	Notes
8/17/2020	177.95	1465.27	

SWL measured by: LCT

Coal Seam ID	Bottom Depth (ft)	Bottom Elevation (MSL)
Upper Freeport	330.0	1310.6
Upper Kittanning	371.0	1269.6
Upper Kittanning	375.0	1265.6
Upper Kittanning	389.0	1251.6
Middle Kittanning	408.0	1232.6
Middle Kittanning	433.0	1207.6
Lower Kittanning	481.0	1159.6

Operation Name : Rustic Ridge #1 Mine-Expansion
Method Drilling: Air Rotary
Date Drilled: 1/7/2020-1/8/2020
Drilled By: Holt Drilling
Logged By:
Municipality: Donegal
County, State: Westmoreland, PA
Quadrangle: Stahlstown, PA
Laboratory: Geochemical
Northing: 300222.623
Easting: 1522059.262
Grid Coordinates:

Depth (ft)	Thickness (ft)	Graphic Log	Scale (feet)	Lithologic Description: rock type, weathering, color, fossils, carbonate, minerals, concentrations, pyrite, etc.	Water Conditions	% Recovery	% RQD
406.0	17.0			Sandstone, gray			
408.0	2.0			Middle Kittanning Coal			
			410				
			420	Sandstone, gray			
			430				
432.0	24.0						
433.0	1.0			Middle Kittanning Coal			
440.0	7.0		440	Sandy Shale, gray			
			450				
			460	Sandstone, gray			
465.0	25.0						
			470				
477.0	12.0			Shale, dark gray			
			480	Lower Kittanning Coal			

JLB- CME - 10/01

7.1A GEOLOGIC DRILL LOG

Hole No.	PZ-7D
Surface Elev.	1640.64
Surveyed by:	LCT
Survey Method:	GPS

Measured Static Water Levels

Date Measured	Depth (ft)	Elevation (MSL)	Notes
8/17/2020	177.95	1465.27	

SWL measured by: LCT

Coal Seam ID	Bottom Depth (ft)	Bottom Elevation (MSL)			
Upper Freeport	330.0	1310.6	Middle Kittanning	408.0	1232.6
Upper Kittanning	371.0	1269.6	Middle Kittanning	433.0	1207.6
Upper Kittanning	375.0	1265.6	Lower Kittanning	481.0	1159.6
Upper Kittanning	389.0	1251.6			

Operation Name :	Rustic Ridge #1 Mine-Expansion
Method Drilling:	Air Rotary
Date Drilled:	1/7/2020-1/8/2020
Drilled By:	Holt Drilling
Logged By:	
Municipality:	Donegal
County, State:	Westmoreland, PA
Quadrangle:	Stahlstown, PA
Laboratory:	Geochemical
Northing:	300222.623
Easting:	1522059.262
Grid Coordinates:	

Depth (ft)	Thickness (ft)	Graphic Log	Scale (feet)	Lithologic Description: rock type, weathering, color, fossils, carbonate, minerals, concentrations, pyrite, etc.	Water Conditions	% Recovery	% RQD
481.0	4.0			Lower Kittanning Coal			
482.0	1.0			Sandy Shale, gray			
				Bottom of Hole PZ-7D Depth 482 feet			
			490				
			500				
			510				
			520				
			530				
			540				
			550				
			560				

N: 300222.6230
E: 1512059.2620
Z: 1640.69

HARD ROCK	
H1	VERY HARD
H2	HARD
H3	MEDIUM HARD
H4	SOFT

FIZZ ROCK	
F1	VERY GOOD
F2	GOOD
F3	MEDIUM FIZZ
F4	LITTLE FIZZ

HOLT DRILLING

P.O. BOX 53
Brockway , PA 15824
Toll Free: 1-877-987-8981 • (814) 265-8981
PUMPS • TANKS • TREATMENT

TOC: 1643.22
SWL: 1465.27

DATE 1-7-2020 1-8-2020
JOB NAME LLT Rustic Ridge North
HOLE # P2-7D

42" Steel

DEPTH	MATERIALS PENETRATED
0 - 6	Brown Sand
6 - 27	Brown Sandstone (H3)
27 - 35	Brown Sand
35 - 60	Gray Sandy Shale
50 - 72	Gray Sandstone (H2)
72 - 100	Gray Sandy Shale
100 - 110	Gray Sandstone (H2)
110 - 125	Red Shale
125 - 128	Gray Sandy Shale
128 - 135	Red Shale
135 - 200	Gray Sandy Shale
200 - 240	Gray Shale
240 - 241	★ 12" Coal
241 - 250	Gray Sandy Shale
250 - 275	Gray Sandstone (H2)
275 - 300	Med Dark Shale
300 - 315	Gray Shale
315 - 325	Gray Sandstone (H2)
325 - 327	Gray Shale
327 - 330	★ 36" Coal
330 - 340	Gray Shale

HD-401

Page 1 of 2

HARD ROCK
H1 VERY HARD
H2 HARD
H3 MEDIUM HARD
H4 SOFT

FIZZ ROCK
F1 VERY GOOD
F2 GOOD
F3 MEDIUM FIZZ
F4 LITTLE FIZZ

HOLT DRILLING

P.O. BOX 53
Brockway , PA 15824
Toll Free: 1-877-987-8981 • (814) 265-8981
PUMPS • TANKS • TREATMENT

DATE 1-7-2020 1-8-2020
JOB NAME LCT Rustic Ridge North
HOLE # PZ-7D
Page 2 of 2

DEPTH	MATERIALS PENETRATED
340 - 365	Gray Sandstone (H2)
365 - 370	Dark Gray Shale
370 - 371	★12" COAL
371 - 373	Dark Gray Shale
373 - 375	★ 24" COAL
375 - 380	Dark Gray Shale
380 - 387	Gray Sandstone (H2)
387 - 389	★ 18" COAL
389 - 406	Gray Sandstone (H2)
406 - 408	★ 24" COAL
408 - 432	Gray Sandstone (H2)
432 - 433	★ 12" COAL 6' Bentonite Plug
433 - 440	Gray Sandy Shale
440 - 465	Gray Sandstone (H2)
465 - 477	Dark Gray Shale 11'
477 - 481	★ 52" COAL Gravel
481 - 482	Gray Sandy Shale
	WATER @ 155 (1)
	280 (2) 10' Screen OD
★	Top of Gravel 470½'

HD-401 ★ Top of Bentonite Plug 463'

HARD ROCK
H1 VERY HARD
H2 HARD
H3 MEDIUM HARD
H4 SOFT

FIZZ ROCK
F1 VERY GOOD
F2 GOOD
F3 MEDIUM FIZZ
F4 LITTLE FIZZ

HOLT DRILLING

P.O. BOX 53
Brockway , PA 15824
Toll Free: 1-877-987-8981 • (814) 265-8981
PUMPS • TANKS • TREATMENT

DATE 1-7-2020 1-8-2020 1-9-2020
JOB NAME Rustic Ridge North LCT
HOLE # PZ-7D

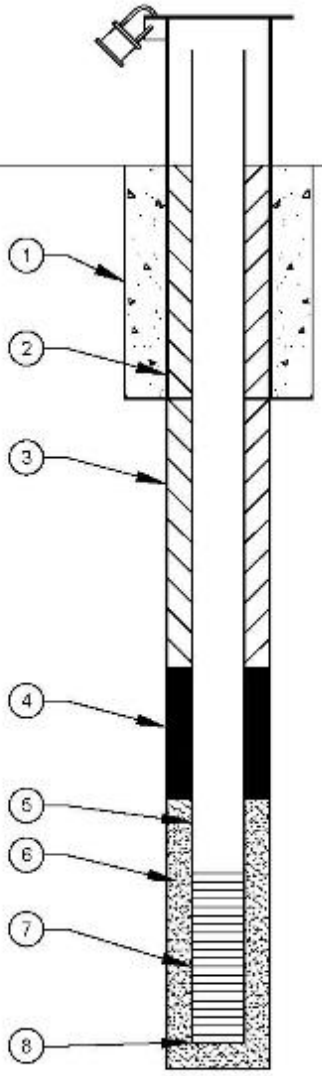
DEPTH	MATERIALS PENETRATED
	MATERIAL
42'	6¼ Steel CASING
10'	2" SCREEN .020
473'	2" DROP PIPE
1	2" CAP
6	½ x ¼ GRAVEL
1	BUCKET PAL PLUG
1	LOCKING CAP
	GROUT 1-9-2020
45	94# CEMENT
4½	50# Bentonite FINE
1	50# Bentonite ¾"
500	¾" TREMMIE LINE
	BAIL 1-13-2020
	STATIC 180'
	Bails 40-45
	DROPPED STATIC TO 455'
	AFTER BAILING

HD-401

PIEZOMETER PZ-7D

PROJECT: RUSTIC RIDGE #1 EXPANSION
COORDINATES: N 40° 08' 47.01"
E 79° 20' 49.37"
DATE 1-8-2020
GEOLOGIST Benjamin J. Stuffl, P.G.
ELEV. OF BEDROCK 1634.64'
DEPTH TO WATER
FROM TOP OF CASING 1465.27'

WELL NO. PZ-7D
ORIG. GND. ELEV. 1640.64'



1. 8" HOLE
2. 6-1/4" STEEL CASING
3. 5-7/8" HOLE GROUTED TO SURFACE
4. BENTONITE SEAL
5. 2" DIA. SCH. 40 FLUSH THREADED
6. SILICA SAND, 1/2 x 1/4 INCH
7. WELL SCREEN, 2" DIA. X 5 FT. LONG PVC SCH. 40 - 0.02" MANUFACTURED PIPE
8. PLUG - PVC SCH. 40

	DEPTH/ STICK-UP	ELEVATION
TOP STEEL CASING	+2.61'	1643.25'
TOP OF PVC STANDPIPE	+2.58'	1643.22'
SURFACE	0.0'	1640.64'
BOTTOM OF STEEL CASING	39.4'	1601.24'
TOP OF BENTONITE SEAL	463.0'	1177.64'
TOP OF SAND	470.5'	1170.14'
TOP OF SCREEN	471.0'	1169.64'
BOTTOM OF SCREEN	481.0'	1159.64'
BOTTOM OF BOREHOLE	482.0'	1158.64'

NOT TO SCALE

CME ENGINEERING
CME ENGINEERING LP
975 Georges Station Rd, Ste 100, Greensburg, PA 15601
724-532-4800 FAX: 724-532-4801

PIEZOMETER CONSTRUCTION DETAIL
for
LCT ENERGY, LP
RUSTIC RIDGE #1 EXPANSION
CMAP # 65131301
Donegal & Saltlick Townships
Westmoreland & Fayette County, Pennsylvania

Drawn By:	KGM
Checked By:	BJS
Date:	08-10-2021
Scale:	N.T.S
Project No.:	721-S164
File Name:	Piezometer Detail.dwg

JLB- CME - 11/29/01

7.1A GEOLOGIC DRILL LOG

Hole No.	PZ-9D
Surface Elev.	1744.06
Surveyed by:	LCT
Survey Method:	GPS

Measured Static Water Levels

Date Measured	Depth (ft)	Elevation (MSL)	Notes
8/17/2020	65.6	1678.5	

SWL measured by: LCT

Coal Seam ID	Bottom Depth (ft)	Bottom Elevation (MSL)	Coal Seam ID	Bottom Depth (ft)	Bottom Elevation (MSL)
Mahoning	138.0	1606.1	Lower Freeport	220.0	1524.1
Upper Freeport	170.0	1574.1	Upper Kittanning	253.0	1491.1
Lower Freeport	210.0	1534.1	Middle Kittanning	279.0	1465.1
Lower Freeport	213.0	1531.1	Lower Kittanning	342.0	1402.1

Operation Name :	Rustic Ridge #1 Mine-Expansion
Method Drilling:	Air Rotary
Date Drilled:	4/21/2020-4/22/2020
Drilled By:	Holt Drilling
Logged By:	
Municipality:	Donegal
County, State:	Westmoreland, PA
Quadrangle:	Stahlstown, PA
Laboratory:	Geochemical
Northing:	290839.098
Easting:	1507885.325
Grid Coordinates:	

Depth (ft)	Thickness (ft)	Graphic Log	Scale (feet)	Lithologic Description: rock type, weathering, color, fossils, carbonate, minerals, concentrations, pyrite, etc.	Water Conditions	% Recovery	% RQD
32.0	32.0	##########	10, 20, 30	Clay, brown, sandy			
50.0	18.0	-=-=-=-=-=	40, 50	Sandy Shale, gray			
		.....	60, 70, 80	Sandstone, Gray	▼		

JLB- CME - 10/01

7.1A GEOLOGIC DRILL LOG

Hole No. PZ-9D
Surface Elev. 1744.06
Surveyed by: LCT
Survey Method: GPS

Measured Static Water Levels

Date Measured	Depth (ft)	Elevation (MSL)	Notes
8/17/2020	65.6	1678.5	

SWL measured by: LCT

Coal Seam ID	Bottom Depth (ft)	Bottom Elevation (MSL)	Coal Seam ID	Bottom Depth (ft)	Bottom Elevation (MSL)
Mahoning	138.0	1606.1	Lower Freeport	220.0	1524.1
Upper Freeport	170.0	1574.1	Upper Kittanning	253.0	1491.1
Lower Freeport	210.0	1534.1	Middle Kittanning	279.0	1465.1
Lower Freeport	213.0	1531.1	Lower Kittanning	342.0	1402.1

Operation Name : Rustic Ridge #1 Mine-Expansion
Method Drilling: Air Rotary
Date Drilled: 4/21/2020-4/22/2020
Drilled By: Holt Drilling
Logged By:
Municipality: Donegal
County, State: Westmoreland, PA
Quadrangle: Stahlstown, PA
Laboratory: Geochemical
Northing: 290839.098
Easting: 1507885.325
Grid Coordinates:

Depth (ft)	Thickness (ft)	Graphic Log	Scale (feet)	Lithologic Description: rock type, weathering, color, fossils, carbonate, minerals, concentrations, pyrite, etc.	Water Conditions	% Recovery	% RQD
			90				
			100				
				Sandstone, Gray			
			110				
			120				
130.0	80.0		130				
		==========		Shale, gray			
135.0	5.0	==========					
				Mahoning Coal			
138.0	3.0						
		##########	140	Clay, gray			
142.0	4.0	##########					
			150				
				Sandstone, Gray			
			160				

JLB- CME - 10/01

7.1A GEOLOGIC DRILL LOG

Hole No. PZ-9D
Surface Elev. 1744.06
Surveyed by: LCT
Survey Method: GPS

Measured Static Water Levels

Date Measured	Depth (ft)	Elevation (MSL)	Notes
8/17/2020	65.6	1678.5	

SWL measured by: LCT

Coal Seam ID	Bottom Depth (ft)	Bottom Elevation (MSL)
Mahoning	138.0	1606.1
Upper Freeport	170.0	1574.1
Lower Freeport	210.0	1534.1
Lower Freeport	213.0	1531.1
Lower Freeport	220.0	1524.1
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Middle Kittanning	279.0	1465.1
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Operation Name : Rustic Ridge #1 Mine-Expansion
Method Drilling: Air Rotary
Date Drilled: 4/21/2020-4/22/2020
Drilled By: Holt Drilling
Logged By:
Municipality: Donegal
County, State: Westmoreland, PA
Quadrangle: Stahlstown, PA
Laboratory: Geochemical
Northing: 290839.098
Easting: 1507885.325
Grid Coordinates:

Depth (ft)	Thickness (ft)	Graphic Log	Scale (feet)	Lithologic Description: rock type, weathering, color, fossils, carbonate, minerals, concentrations, pyrite, etc.	Water Conditions	% Recovery	% RQD
168.0	26.0			Sandstone, Gray			
170.0	2.0		170	Upper Freeport Coal			
			180	Sandstone, Gray			
			190				
			200				
204.0	34.0						
209.0	5.0			Sandy Shale, gray			
210.0	1.0		210	Lower Freeport Coal			
212.0	2.0			Shale, dark gray			
213.0	1.0			Lower Freeport Coal			
219.0	6.0			Sandy Shale, gray			
220.0	1.0		220	Lower Freeport Coal			
			230	Sandstone, Gray			
			240				

JLB- CME - 10/01

7.1A GEOLOGIC DRILL LOG

Hole No. PZ-9D
Surface Elev. 1744.06
Surveyed by: LCT
Survey Method: GPS

Measured Static Water Levels

Date Measured	Depth (ft)	Elevation (MSL)	Notes
8/17/2020	65.6	1678.5	

SWL measured by: LCT

Coal Seam ID	Bottom Depth (ft)	Bottom Elevation (MSL)
Mahoning	138.0	1606.1
Upper Freeport	170.0	1574.1
Lower Freeport	210.0	1534.1
Lower Freeport	213.0	1531.1
Lower Freeport	220.0	1524.1
Upper Kittanning	253.0	1491.1
Middle Kittanning	279.0	1465.1
Lower Kittanning	342.0	1402.1

Operation Name : Rustic Ridge #1 Mine-Expansion
Method Drilling: Air Rotary
Date Drilled: 4/21/2020-4/22/2020
Drilled By: Holt Drilling
Logged By:
Municipality: Donegal
County, State: Westmoreland, PA
Quadrangle: Stahlstown, PA
Laboratory: Geochemical
Northing: 290839.098
Easting: 1507885.325
Grid Coordinates:

Depth (ft)	Thickness (ft)	Graphic Log	Scale (feet)	Lithologic Description: rock type, weathering, color, fossils, carbonate, minerals, concentrations, pyrite, etc.	Water Conditions	% Recovery	% RQD
			250	Sandstone, Gray			
252.0	32.0						
253.0	1.0			Upper Kittanning Coal			
			260	Sandstone, Gray			
			270				
275.0	22.0						
279.0	4.0			Middle Kittanning Coal			
			280	Sandstone, Gray			
290.0	11.0		290				
			300	Limestone (Middle Kittanning LS)			
310.0	20.0		310				
				Sandstone, Gray			
316.0	6.0						
			320	Sandy Shale, gray			

JLB- CME - 10/01

7.1A GEOLOGIC DRILL LOG

Hole No. PZ-9D
Surface Elev. 1744.06
Surveyed by: LCT
Survey Method: GPS

Measured Static Water Levels

Date Measured	Depth (ft)	Elevation (MSL)	Notes
8/17/2020	65.6	1678.5	

SWL measured by: LCT

Coal Seam ID	Bottom Depth (ft)	Bottom Elevation (MSL)
Mahoning	138.0	1606.1
Upper Freeport	170.0	1574.1
Lower Freeport	210.0	1534.1
Lower Freeport	213.0	1531.1
Lower Freeport	220.0	1524.1
Upper Kittanning	253.0	1491.1
Middle Kittanning	279.0	1465.1
Lower Kittanning	342.0	1402.1

Operation Name : Rustic Ridge #1 Mine-Expansion
Method Drilling: Air Rotary
Date Drilled: 4/21/2020-4/22/2020
Drilled By: Holt Drilling
Logged By:
Municipality: Donegal
County, State: Westmoreland, PA
Quadrangle: Stahlstown, PA
Laboratory: Geochemical
Northing: 290839.098
Easting: 1507885.325
Grid Coordinates:

Depth (ft)	Thickness (ft)	Graphic Log	Scale (feet)	Lithologic Description: rock type, weathering, color, fossils, carbonate, minerals, concentrations, pyrite, etc.	Water Conditions	% Recovery	% RQD
338.0	22.0		330	Sandy Shale, gray			
342.0	4.0		340	Lower Kittanning Coal			
343.0	1.0	##########		Clay, gray			
			350	Bottom of Hole PZ-9 Depth 343 feet			
			360				
			370				
			380				
			390				
			400				

N: 290839.098 TOC: 1744.06
E: 1507885.325 SWL: 1678.51
E: 1744.06

HARD ROCK	
H1	VERY HARD
H2	HARD
H3	MEDIUM HARD
H4	SOFT

FIZZ ROCK	
F1	VERY GOOD
F2	GOOD
F3	MEDIUM FIZZ
F4	LITTLE FIZZ

HOLT DRILLING

P.O. BOX 53
Brockway , PA 15824
Toll Free: 1-877-987-8981 • (814) 265-8981
PUMPS • TANKS • TREATMENT

DATE 4-21-2020 4-22-2020
JOB NAME LCT Rustic Ridge North
HOLE # PZ-9
Page 1 of 3 42' steel

DEPTH	MATERIALS PENETRATED
0 - 32	Brown Sandy Clay
32 - 50	Gray Sandy Shale
50 - 130	Gray Sandstone (H2)
130 - 135	Gray Shale
135 - 138	★ 36" COAL
138 - 142	Gray Clay
142 - 168	Gray Sandstone (H2)
168 - 170	★ 20" COAL
170 - 204	Gray Sandstone (H2)
204 - 209	Gray Sandy Shale
209 - 210	★ 12" COAL
210 - 212	Dark Gray Shale
212 - 213	★ 15" COAL
213 - 219	Gray Sandy Shale
219 - 220	★ 12" COAL
220 - 252	Gray Sandstone H2
252 - 253	★ 16" COAL
253 - 275	Gray Sandstone (H2)
275 - 279	★ 24" COAL
279 - 290	Gray Sandstone H2

HD-401

HARD ROCK
H1 VERY HARD
H2 HARD
H3 MEDIUM HARD
H4 SOFT

FIZZ ROCK
F1 VERY GOOD
F2 GOOD
F3 MEDIUM FIZZ
F4 LITTLE FIZZ

HOLT DRILLING

P.O. BOX 53
Brockway , PA 15824
Toll Free: 1-877-987-8981 • (814) 265-8981
PUMPS • TANKS • TREATMENT

DATE 4-22-2020
JOB NAME LCT Rustic Ridge North
HOLE # V2-9
Page 2 of 3

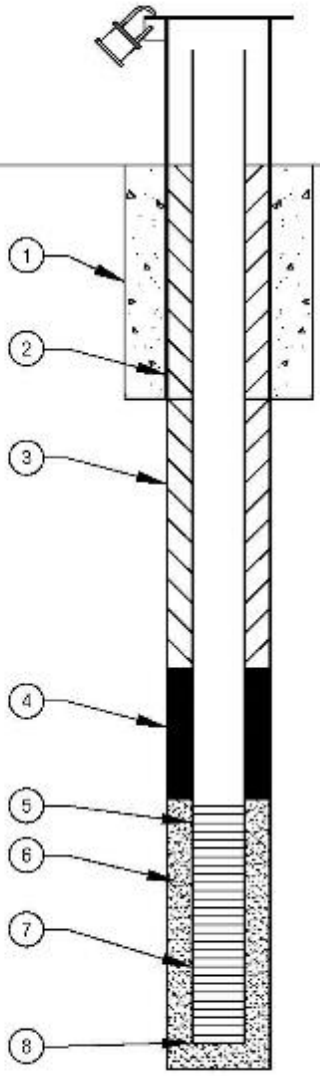
DEPTH	MATERIALS PENETRATED
290 310	Limestone F2
310 316	Gray Sandstone (H2)
316 338	Gray Sandy Shale
338 342	★ 4B COAL 10 Screen
342 343	Gray Clay
★	Bentonite Plug @ 432' to 428'
★	11' Gravel
★	10' 2" Screen .020
	42' Steel Pipe
	Water @ 230' 2 GPM

HD-401

PIEZOMETER PZ-9D

PROJECT: RUSTIC RIDGE #1 EXPANSION
COORDINATES: N40° 07' 11.72"
E 79° 23' 49.61"
DATE 4-22-2020
GEOLOGIST Benjamin J. Stufft, P.G.
ELEV. OF BEDROCK 1712.06'
DEPTH TO WATER
FROM TOP OF CASING 1678.51'

WELL NO. PZ-9D
ORIG. GND. ELEV. 1744.06'



1. 8" HOLE
2. 6-1/4" STEEL CASING
3. 5-7/8" HOLE GROUTED TO SURFACE
4. BENTONITE SEAL
5. 2" DIA. SCH. 40 FLUSH THREADED
6. SILICA SAND, 1/2 x 1/4 INCH
7. WELL SCREEN, 2" DIA. X 5 FT. LONG PVC SCH. 40 - 0.02" MANUFACTURED PIPE
8. PLUG - PVC SCH. 40

	DEPTH/ STICK-UP	ELEVATION
TOP STEEL CASING TOP OF PVC STANDPIPE	+2.30'	1746.36'
SURFACE	0.0'	1744.06'
BOTTOM OF STEEL CASING	39.7'	1704.36'
TOP OF BENTONITE SEAL	328.0'	1416.06'
TOP OF SAND TOP OF SCREEN	332.0'	1412.06'
BOTTOM OF SCREEN	342.0'	1402.06'
BOTTOM OF BOREHOLE	343.0'	1401.06'

NOT TO SCALE

CME ENGINEERING
CME ENGINEERING LP
975 Georges Station Rd, Ste 100, Greensburg, PA 15601
724-532-4800 FAX: 724-532-4801

PIEZOMETER CONSTRUCTION DETAIL
for
LCT ENERGY, LP
RUSTIC RIDGE #1 EXPANSION
CMAP # 65131301
Donegal & Saltlick Townships
Westmoreland & Fayette County, Pennsylvania

Drawn By:	KGM
Checked By:	BJS
Date:	08-10-2021
Scale:	N.T.S
Project No.:	721-S164
File Name:	Piezometer Detail.dwg