Module 15: Noncoal Underground Mines

[§§77.163/77.410/77.454]

Module 15 outlines information to be supplied when applying for a permit to operate a noncoal underground mine, the following informational requirements are supplemental to the information outlined in Modules 1 through 24. All applicable modules in this application must be completed when applying for a permit to conduct noncoal underground mining activities.

(If additional sheets are required to respond to any item below, please use 8-1/2 x 11" paper and reference with the appropriate module and section number, i.e. 15.1).

15.1 Property Interests/Right of Entry

Provide property interest information as outlined in Module 5.1 for all tracts included within the proposed underground mine boundary. Include subsurface landowner information for each parcel of land contiguous to the permit area, provide names of landowners (Key To Exhibit 6.2)

The operator has a lease agreement with the owner of properties 1, 2, 3, 4 and 5. All leases provide the rights to limestone and aggregate minerals.

Properties Within the Underground Permit Boundary		
Map Key	Type of Ownership	Name and Address
1,3,4	Surface	John Kosky Contracting, Inc., P.O. Box 136, Cuddy, PA 15031
	Minerals	Same as surface
2	Surface	Clyde Holding Inc, 17592 Route 322, Strattanville, PA 16258
	Minerals	Same as surface
5	Surface	John Alan & Stacy A. Kosky, P.O. Box 42, Cuddy, PA 15031
	Minerals	Same as surface
36,37	Surface	John Alan & Stacy A. Kosky, P.O. Box 42, Cuddy, PA 15031
	Minerals	Same as surface

Properties Contiguous to the Underground Permit Boundary		
Map Key	Type of Ownership	Name and Address
8	Surface	Kathleen Martincic & Dan Derber,182 Hull Road, Fredericktown, PA 15333
	Minerals	Unknown
9	Surface	Cathy H. & John P. Lozosky, 9 Huffman Road, Fredericktown, PA 15333
	Minerals	Unknown
15	Surface	John L. Jr. & Kim Ondrik, 277 Buckingham Road, Fredericktown, PA 15333
	Minerals	Unknown
23	Surface	East Bethlehem Church, 264 Buckingham Road, Clarksville, PA 15322
	Minerals	Unknown
27	Surface	David A. and James C. Webeck, 1899 Morey Rd, Clarksville 15322
	Minerals	Unknown
31	Surface	Southwestern PA Water Authority, P.O. Box 187, Jefferson, PA 15344
	Minerals	Unknown
35	Surface	Mark A. Yohe, 381 Buckingham Road, Fredericktown, PA 15333
	Minerals	Unknown

38	Surface	Frank G. & Margaret J. Startare, Box 54, Beallsville, PA 15313
	Minerals	Unknown
46	Surface	Harold & Kathleen Rice, PO Box 477, Clarksville, PA 15322
	Minerals	Unknown

15.2 Mine Development Map (suggested scale 1" = 400') Identify the map as Exhibit 15.2. Map must be sealed and signed by a registered professional engineer. (See 15.11 for mine map standards)

The following information must be provided for the underground portion of the mine and the 1000 ft. perimeter zone:

See attached Exhibit 15.2: Mine Development Map.

a) boundaries of the underground operation;

b) mining sequence within the underground permit area;

c) barrier pillars designed to promote post-closure inundation;
Not applicable

d) structure contours of strata to be mined or an appropriate marker unit;

e) formation contacts and coal crop lines (when applicable);

f) faults and areas where the bed, vein or deposit is unmineable;
Not Applicable

g) locations of existing and proposed mine openings, including boreholes;

h) surface bodies of water;

i) outlines of adjacent active, inactive and abandoned mines (surface, underground and auger);

j) public roads, haul roads, and access roads;

k) dwellings, public buildings, commercial buildings;

l) permit lines of surface activity associated with the operation;

m) water supplies over the underground permit area;

n) discharge points, proposed monitoring points;

o) test borings, drill holes which were used to compile geologic/hydrologic information;

p) surface contours.

q) The location of gas and oil wells within the proposed permit area.

Mining is proposed under SR 2041 (Morey Road) and near SR 2024 (Buckingham Road) as shown on Exhibit 15.2. A minimum of 100' of cover will be maintained under all roadways including right-of-way. PennDOT is awaiting approval by the Department prior to allowing mining beneath SR2041. A 100-foot no mining barrier from the ROW lines for all state-owned roadway is applicable until approval form PennDOT is secured. Also, a 100-foot offset will be maintained from the highwall for safety purposes.

It is anticipated the life of this operation will be between 30 and 35 years, depending on market conditions.

The approximate annual tonnage from the proposed mining operations will initially be approximately 250,000 tons per year. The extraction ratio will be 68% for the designed pillar length and width. The tonnage will gradually increase up to 900,000 tons due to anticipated increase in demand. However, this projection may change with market and mining conditions.

All water generated by the mine will be pumped or directed to Sediment Pond P—1 for settling and discharge.

15.6 Hydrology

This section is designed to expand on various aspects of Module 8, specifically the hydrologic impacts of the proposed underground mining activities. Address each of the following items in detail:

a) **Provide a narrative outlining expected mine drainage quality and quantity both during and after mining; include discussions of the effects of overburden chemistry, existing groundwater conditions, subsidence, mine closure procedures, adjacent mining (both surface and underground), caverns and related solutional features, adjacent mine drainage quality/quantity, and fractures/lineaments.**

The expected water quality associated with the Benwood Limestone deep mine (during and post-mining) is expected to be highly alkaline with no significant metals or other contaminants. This is substantiated by a review of Module 8, including Module 8.3(a) and the associated Module 8.1 (a) data sheets, which include current water quality information from streams, springs, etc. in the immediate area. Monitoring well MW-1 was drilled through the Benwood Limestone into the Sewickley coal horizon. Water samples collected from MW-1 from December, 2012 through May, 2014 document the pH ranged from 7.22 to 7.68, alkalinity ranged from 259.12 ppm to 376.89 ppm, negative acidity, iron content ranged from <0.10 ppm to 4.21 ppm, manganese did not exceed 0.19 ppm, aluminum ranged from <0.10 ppm to 1.01 ppm, and sulfates ranged from 33.3 ppm to 198.5 ppm. Sediment pond 001 associated with the Maggie Lynn Quarry has been sampled by G&C Lab. Dipped water sample collected from the pond documents the pH ranging from 7.39 to 8.11, alkalinity ranging from 71.81 ppm to 155.21 ppm, negative acidity, with iron content ranging from 0.15 ppm to 1.43 ppm, aluminum at 0.72 ppm, and sulfates of 444.7 ppm. Drill hole records also indicate that the Benwood Limestone is highly alkaline with moderate-strong fizz throughout. No acidic overburden will be encountered as the only material to be affected will be the Benwood Limestone. A bailed background water sample was collected from the downgradient drill hole TH-6. This sample documents the pH at 6.67, alkalinity of 227.28 ppm, acidity of -227 ppm, iron at 2.39 ppm, manganese at 0.30 ppm, aluminum at 1.67 ppm, and sulfates at 81.5 ppm. Please note that the static water level associated with this well is at 1048.9 msl (I.e. Waynesburg Horizon) and, as such, the water quality is a combination of all aquifers down to and including the Benwood Limestone. It should also be noted that the total suspended solids were somewhat elevated in the sample (i.e. 73 mg/l).

The Benwood Limestone supports a low volume water bearing zone. Please see Module 8.3a, 8.6c and 15.6 for more information. Drill holes BH-1 thru BH-3 and DH-1 thru DH-6 were drilled mostly to show the characteristics of the

Benwood Horizon. These holes indicate variable static water levels anywhere from 2.5 feet to approximately 60 feet above the base of the Benwood Limestone. However, DH-1 thru DH-3 were drilled in areas that have now been mined and the current highwall has not had any significant inflow from the Benwood Limestone horizon now or at any time since the site was activated. Additionally, Drill Hole 6 was the only hole to be drilled solely in the Benwood Limestone and only indicated 2.5 feet of water above the base of the Benwood Limestone. Finally, the Sewickley Coal Seam is present just below (approximately 2-9 feet) the Benwood Limestone and supports an aquitard much like the Waynesburg Coal Seam does on this site. As such, the static water levels indicated in the above referenced bore/drill holes are probably a result of a combination of the Sewickley aquitard and the low volume water bearing zone in the Benwood Limestone.

A further indication of the low volume Benwood Limestone water bearing zone is the low number of springs which emanate from the base of the Benwood Limestone along Tenmile Creek along the southern boundary of the proposed site. In this area, although being a regional discharge zone, the only significant spring is sample point 73. This spring is located very near to the base of the Benwood Limestone and has flows ranging from 8-25 gpm. Sample points 26 and 27 originate from the hillside along the southwestern border of the proposed site and are associated with the lower reaches of the Benwood Limestone but are also influenced from the Waynesburg Coal Seam (previously mined) as the sulfate levels are elevated (61-201 mg/l). Since the original permit application submittal these two springs have improved in both aluminum and sulfates, due to the active quarry cutting off the groundwater associated with the Waynesburg horizon. Flows from these two springs range from 2-10.3 gpm during high flow conditions to dry during low flow conditions. Wetland Discharge 25 is located near sample point 26 and is at or slightly below the Sewickley Coal Seam horizon. Flows at this point range from 1.2-4.0 gpm, has been dry during some field visits. Recent quarterly water samples collected at sample point 25, document lowered metals content and reduced sulfates.

In regard to the amount of groundwater which may be expected during mining of the Benwood Limestone, the information referenced above include evidence that only minor amounts of groundwater will be encountered. In addition, the proposed operation plan is to leave fifteen (15') feet of the Benwood Limestone in place as a competent roof support and as a confining layer which will maintain the groundwater regime above the Benwood Limestone. The proposed operations plan is similar to that used at several other underground limestone mines located within southwest Pennsylvania such as Whitney Quarry (SMP65900403), Torrance Quarry (SMP65900402), Rich Hill Quarry (26980601), Coolspring Quarries (Permits 26920401 and 26992001) and Bullskin Stone and Lime LLC (Bullskin No. 1 Mine, SMP26092001).

As mentioned in Module 8 and other locations within the application, the amount of groundwater to be expected in the Maggie Lynn Underground Mine is minimal. The most important reasoning for this statement has been, and continues to be, empirical data (i.e. observations, etc.) that show a minimal amount of groundwater from the Benwood Limestone horizon which has resulted in generally dry conditions and no need for pumping activities. As discussed in other sections of this application, the disturbed area at the Maggie Lynn Quarry which includes a substantial highwall of approximately twelve hundred (1200') feet, has limited pit water associated with the active mining. (Please refer to Modules 8.3a, 8.6c and 15.6 (especially 15.6h) for further information concerning the groundwater component from seepage in the active quarry highwall). As a final point please refer to Module 8 concerning RQD's.

Once underground mining begins, requirements will be in place to leave in the top fifteen (15') feet and the bottom five (5') feet of Benwood Limestone,

which will prevent infiltration of groundwater from perched aquifers above and below the limestone. Also mentioned in this application is the fact that there are several other underground limestone mines in southwestern Pennsylvania which exhibit mostly dry conditions. A review of one literature source (listed below) states that there are "more than 120 operating mines in the United Sates" that mine limestone/dolomite and, out of the particular study area in the report, there were 34 sites with 92 sample areas. Within that study area, it goes on to state that the "groundwater conditions were generally dry with damp or dripping conditions observed only 6 out of the 92 locations". This provides further data to substantiate our empirical data.

It is possible that the portal areas will be free draining, although as discussed above, any drainage would be minimal. This type of drainage, while minimal, would be more likely in the early years of the underground mining as the current proposal is to mine updip. Once mining is occurring downdip of the portal, the possibilities of free draining at the portals will decrease. Accordingly, with the minimal amount of groundwater inflow expected, there is low potential for groundwater to "pool" in the lower reaches of the underground mine to an extent where it would discharge from the portals as the majority will most likely be assimilated into the downdip groundwater system.

If there would be any discharge of water from the portal entries, the water quality will be alkaline with low metals and a low potential for any adverse impacts to the waters of the Commonwealth. All water will be diverted into the existing sedimentation pond P-1. As discussed above, there should be minimal amounts of water and, as such, the current volume of P-1 would be sufficient. (Literature Cited. G.S. Esterhuizen, D.R. Dolinar, J.L. Ellenberger, 2011. Pillar strength in underground stone mines in the United States, In: International Journal of Rock Mechanics and Mining Sciences, Volume 48, Issue 1, January 2011, Pages 42-50.)

As discussed in Module 8 and in Module 15.6 (b) below, the hydrologic system associated with this site includes four main areas, a perched water system associated with The Waynesburg coal seam (about 165 feet above the Benwood Limestone), an intermediate zone from the Waynesburg coal seam down to the top of the Benwood Limestone, the Benwood Limestone, and the zone from the Sewickley horizon down to and including the Pittsburgh coal seam.

In regard to (a) adjacent mine sites (surface and underground) and (b) mine drainage quality/quantity issues from previous mining, there are several surface mines (refer to Module 6.2 map and Module 7.5) which will overlay the proposed limestone deep mine and one abandoned Pittsburgh deep mine (Clyde mine) which is located below the proposed limestone deep mine. Although there are surface mine discharges present, as discussed in Module 8.3 (d), there will be little, if any, impact to the proposed limestone deep mine due to the intervening distance (I.e. average of 165 feet) between the Waynesburg coal seam and the top of the Benwood Limestone, the competent rock (Limestone, etc.) present in this intervening distance, and the fifteen (15') feet of competent Benwood Limestone which will be left in place above the actual mined section of the Benwood Limestone.

In regard to the Clyde Deep mine, approximately 34,000 acres were mined from 1920 through 1992 by LTV Steel and predecessors. LTV initiated pumping and treatment in 1997 to prevent breakouts of mine drainage and degradation of the Tenmile Creek watershed. However, when LTV declared bankruptcy, the state of Pennsylvania took over pumping and treatment in 1997 using funds through the bankruptcy settlement and, as per personnel in the California DEP District Office on March 27, 2023, the treatment should be perpetual.

The Clyde Deep Mine is located approximately 125 feet below the base of the Benwood Limestone and is entirely flooded under the proposed Maggie Lynn Benwood Limestone deep mine. The mine pool elevation is controlled by the Clyde Mine Treatment Plant (in Clarksville, PA) at an elevation of below 770 feet (msl) as per information from AMD Industries Inc. AMD Industries Inc. is the entity who is responsible for the level of the mine pool and the pumping/treatment of the discharge. Daily static water level measurements are mandatory and will continue in perpetuity.

The proposed Limestone Deep Mine will not impact the Clyde deep mine as there will be minimal groundwater encountered in the proposed Limestone deep mine and minimal infiltration into the Clyde Mine due to five (5') feet of limestone left in place at the bottom of the proposed underground mine. This will result in a low probability of much, if any, downward migration of water and is further substantiated by dry conditions in other limestone deep mines in southwest Pennsylvania as included earlier in this section of Module 15.6a).

Also, since the proposed lowest mining elevation of the Benwood Limestone deep mine will be 820 feet (msl), there will no impact of the Clyde Mine on the proposed Limestone Deep Mine as the mine pool elevation is controlled (as per contract) to an elevation below 770 msl at the Clyde Mine Treatment Plant. The Clyde Mine pool elevation at the Clyde Mine Treatment Plant was at 758.15 feet (msl) on March 12, 2018 (see Clyde Mine pool data sheets) while the Clyde Mine pool was measured at 757.70 msl at Discharge Bore Hole No. 1 (H-BH-1) on the "PA Coal Reclamation Inc., Hawkins" site on the same date (March 12, 2018). (NOTE: The static water level elevation was 144.3 feet from the surface). The Hawkins bore holes are shown on the Exhibits 6.2 & 15.2 Maps as H-BH-1 through H-BH-4. Please note that H-BH-1 is no longer available. Added to the monitoring plan is the Wash Plant Well, MW-WPW which is drilled into the Clyde deep mine. A static water level of 749.3 feet (msl)was taken on May 8, 2023. Clyde Mine pool elevations for 2017 and 2018 (see attached) indicate a range from 757.65 -765.45 msl. A review of the Clyde Mine pool elevations from 2017 to May 2023 (see attached documentation at the end of Module 8) indicate a range from 750.45 - 766.25 msl. While there are some minor gaps in the data, this submission includes all available data from 2017 to 2023. All data was obtained from the California District Office personnel, from their files. Please note that the elevation of 802.15 msl when shown on the data sheets is the surface elevation of the pumping wells and is on the spreadsheet only because no water level was entered. Additional data from previous years is available through the Clyde Mine Treatment Plant.

In the event of a "worst case" scenario where the Clyde Mine treatment plant were to fail or pumping to be suspended, the Clyde Mine pool would begin increasing and eventually discharge into Tenmile Creek in the vicinity of the treatment plant at an elevation close to the level of Tenmile Creek at that location which is approximately 785 msl. This has occurred on one occasion in recent memory (early 2013) when there was a temporary cessation of pumping. It is also possible that, due to a direct conduit to the mine pool, that a discharge could be seen at the level of the surface elevation of the current pumping wells, which is 805.06 msl. However, as mentioned above, there would still be no effect on the proposed Benwood Limestone Underground mining as the lowest elevation to be mined is at 820 msl.

The potentiometric surface of the Clyde Mine Pool is closely tied into the elevation where the mine pool would discharge if the pumping and treating were not ongoing. There was substantial updip mining within the Clyde Mine. As such, the mine pool would build up to a level where there is some form of surface outlet. In this case, that outlet is the lower elevations near Tenmile Creek and the Monongahela River. For the most part, the Clyde Mine

pool is within a confined aquifer, however, there is some downdip groundwater movement through other Pittsburgh deep mines to the south. It should be noted that the current pumping and treatment of the Clyde Deep Mine pool is resulting in an artificial potentiometric level/elevation.

No subsidence features were found within 1,000 feet of the proposed permit. No caverns or other karst features were found within 1,000 feet of the proposed permit. Also, the California DEP Office was contacted and responded (via email on March 14, 2018) that there were no supported claims of subsidence from the Clyde deep mine within 1.5 miles of the proposed Benwood Limestone Deep Mine. Please see Module 15.6 (b) below which discusses the potential of stress relief fracturing and the operational procedures to be implemented to ensure that the proposed Benwood Limestone Mining will not adversely impact Tenmile Creek.

b) **Describe the probable hydrologic consequences of the proposed underground activities on the groundwater and surface water systems (address both the permit and adjacent areas). Address the potential for post-mining discharge and discuss expected quality and quantity changes and impacts.**

There will be no significant effects to the surface and ground water systems in the vicinity of the proposed underground mining of the Benwood Limestone. As referenced earlier within Module 8 and other locations, the Pittsburgh Coal Seam has been deep mined (I.e. Clyde Mine (~1920-1992)) under the entire proposed site and adjacent areas. As with most Pittsburgh Coal Seam deep mines, there is some dewatering effects to overlying stratigraphy immediately above the Pittsburgh Coal Seam, however, there is no evidence of any adverse impacts to the Benwood Limestone or overlying stratigraphic units within or in close proximity to the proposed Maggie Lynn underground mine. Currently, the Clyde mine is completely flooded under the proposed Benwood Limestone Deep Mine with the mine pool elevation controlled to an elevation of about 760 msl via pumping at the Clyde Mine Treatment Plant located at Clarksville, PA (about 2 miles south). Please see the Clyde Mine Pool elevation information attached to this permit application. As mentioned in Module 15.6 (a) above, in the event that the Clyde Mine pool pumping were to fail or be discontinued, the mine pool would increase to an elevation of approximately 785-805 msl and flow into Tenmile Creek in close proximity to the treatment plant (as it has in the past). Considering that the proposed limestone mining will not go below the 815′ msl elevation, except for 18-acre area in the northwestern portion of the site where the pit floor will be no lower than 820′ msl, there would be no impact from the proposed Benwood Limestone deep mine on Tenmile Creek.

As also discussed in Modules 8, there are many springs located within and adjacent to the proposed permit that originate from the Waynesburg coal seam. The perched aquifer associated with the Waynesburg coal seam will not be affected by the proposed Benwood Limestone deep mining activities as the confining aquitard (i.e. Waynesburg underclays) will not be physically affected and is vertically above the Benwood Limestone by an average of 165 feet as shown in test holes TH-1 through TH-7, with the exception of TH-5. In addition, there are several layers of competent rock (I.e. limestone, etc.) located in the intervening distance between the Benwood Limestone and the Waynesburg underclay horizon. Finally, the top fifteen (15′) feet of Benwood Limestone will be left in place to prohibit groundwater infiltration into the proposed limestone deep mine and provide a competent roof for the underground portion of the Benwood Limestone deep mine. This is an operational strategy which has been used by other Limestone deep mines in southwest Pennsylvania

In regard to the unnamed tributaries associated with the springs mentioned above, there will be minor, if any, impacts from the proposed underground mining of the Benwood Limestone. The proposed operational plan includes a prohibition for any limestone deep mining in less than 100 feet of cover. This includes unnamed tributaries D and E.

Sample points 25, 26, 27, and 73 are in the proximity of the Benwood Limestone/Sewickley horizon and are found along the southwest boundary of the proposed permit. All of these are springs except for sample point 25, which is a small wetland discharge along Tenmile Creek. The source for these (26, 27, 73) includes a combination of the Benwood Limestone (alkalinity between 241-436 mg/l) and the Waynesburg coal seam (increased sulfate levels between 28-404 mg/l). Sample points 26 and 27 will likely dry up as the recharge for these points is cut off. However, there is no defined purpose for either point. Sample point 73 is located near the bottom of the Benwood Limestone and is not expected to be significantly impacted due to the no mining barriers being established for the Benwood Limestone. No underground mining activities will occur within 150 +\- feet of this sample point.

In regard to sample point 25, it appears that it is sourced by the Benwood Limestone (alkalinity between 229-366 mg/l) but has some Sewickley/Waynesburg Coal Seam influence as evidenced by (a) an increase in the sulfate levels (196-539 mg/l) and (b) its location/elevation in relation to the active Maggie Lynn surface quarry. This low flow wetland discharge is, most likely, a result of (1) a combination of some surface flow (from the quarry) and (2) groundwater associated with the Sewickley Coal Seam aquitard. The combination of flows migrate down-dip and down-gradient through weathered (incompetent) material to emanate as a small wetland along the bank of Tenmile Creek. Except for some increased sulfate levels, the water quality exhibits a pH in the range of 7.47 to 8.56, alkalinity ranging from 229 ppm to 366 ppm, iron ranged from 0.55 ppm to 3.93 ppm, manganese ranged from <0.05 ppm to 0.48 ppm, aluminum ranged from 0.61 ppm to 3.73 ppm, and sulfates ranged from 196.3 ppm to 539 ppm. A PVC pipe was installed at sample point 25 in February 2018, as previous samples indicated some increases in iron and aluminum, most likely due to increased suspended solids (TSS). While the TSS is still elevated in some of the samples, the quality results indicate that, while some minor amount of surface/groundwater flow (from the current and proposed limestone deep mine) may infiltrate into the Sewickley Horizon during or postmining, the quality of any potential discharge (s) would be similar to sample point 25 and not result in any significant water quality issues.

In regard to any effects on Tenmile Creek, the stratigraphic dip is such that the "lowest" section of the mine will be located at the extreme northwestern portion of the proposed site as shown on Exhibit 6.2 (See Benwood Limestone structural contours). Please also see the Exhibit 15.2 map which shows the proposed limits of the underground section of the proposed Benwood Limestone mine. As can be seen, there will be no limestone removal operations below the 820 foot (msl) contour elevation in the western section of the permit area. This prohibition was included to ensure that there will be no adverse quantitative impacts to Tenmile Creek (NOTE: Tenmile Creek elevations are between 820 feet and 815 feet (msl) in the area adjacent to the proposed lowest section of the mine. (I.e. 820 msl is the elevation of sample point 31 (Upstream Tenmile Creek) while 815 msl is the elevation of sample point 1 (Midpoint Tenmile Creek)). As such, all underground mining activities will be above the normal pool elevations of Tenmile Creek.

In addition, please refer to Exhibits 6.2, 9, and 15.2 along with Module 10.1, which include information on the 100-year flood plain elevations along Tenmile Creek in the area of the Maggie Lynn Underground Mine. In the event that any flooding occurs which would increase the level of Tenmile Creek to 820 msl or higher in the downdip section of the underground mine, Neiswonger Construction, Inc. will review the situation and take appropriate actions to ensure safety of all personnel until the flooding event is over.

Please note that, although the structure contours for the Benwood Limestone on the Exhibit 6.2 map show the base of the Benwood Limestone to be in the vicinity of 810 +/- at the extreme western (I.e. downdip) section of the proposed permit, the proposed operations plan states that that the bottom five (5) feet of the Benwood Limestone will remain intact to provide a buffer of intact limestone to prohibit downward migration of any minor amounts of groundwater encountered in the deep mine. Therefore, in order to compute the bottom elevation of actual limestone deep mining, one will have to add five (5') feet to the elevations as shown on Exhibits 6.2 and 15.2.

In addition, as shown on Exhibits 9 and 15.2, a 150 foot "no underground mining" barrier will be placed along Tenmile Creek from a location starting 100 feet northwest of the farthest upstream section of the surface Limestone Quarry highwall and will extend upstream to the end of the Limestone deep mine permit. This was included due to the potential of stress relief fracturing along the steep portion of the hill side above Tenmile Creek. The barrier will mitigate the potential for (a) surface and groundwater infiltration into the proposed limestone deep mine and (b) any encountered groundwater (in the proposed limestone deep mine) to migrate into Tenmile Creek.

c) **Describe measures taken to ensure the return of the hydrologic system to its premining condition.**

The mining will be room and pillar with adequate pillar size maintained to prevent mine subsidence. As discussed in previous sections of this module, measures are proposed to protect the hydrologic system of the project area. The proposed mining will include maintaining a fifteen (15') foot "cap rock" roof above the mine to protect from subsidence fractures to develop that would drain water bearing zones above the proposed underground mine. Also proposed is a five (5') foot limestone floor that will impede groundwater from migrating downward into the Sewickley horizon or lower.

No mining is proposed below one hundred (100') feet of cover below any streams within the underground permit area. This will ensure that no streams are dewatered as a result of mining.

A one hundred fifty (150') foot barrier will be maintained along Tenmile Creek to prevent water from impacting Tenmile Creek from the underground mining due to stress fracturing. The one hundred fifty (150') foot barrier was derived from a review of published sources as listed below along with actual hydrologic conditions present along the steep are along Tenmile Creek within the hundred fifty (150') foot barrier area. The references state, among other items, that where stress relief fractures are present, the "greatest frequency and degree of weathering" occurs within two hundred (200') feet laterally of the outcrop area and the effects gradually disappear as you move further from the outcrop and gain more cover.

In regard to the hydrologic conditions in the steep area above Tenmile Creek, there is a general lack of groundwater discharges (except for sample point 73) along the steep area of the hillside. As such, while there is no confirmed evidence that stress relief fractures are present, it is prudent to include measures to minimize any adverse impacts should they be present.

As such, the operations plan includes a prohibition of any deep mining within one hundred fifty (150') feet in the area shown on the Exhibit 15.2

Literature cited: Rose et al. 1998. Coal Mine Drainage Prediction and Pollution in Pennsylvania, predominately Chapter 2, Callahan, T., Fleeger, G.M., Barnes, S., Dalberto, A., Pennsylvania Department of Environmental Protection, Harrisburg, PA., pp 2-7 and 2-8 along with pp 2-14 to 2-18, 2-21,

2-27, to 2-28. (NOTE: Other literature sources in Chapter 2 were reviewed and are included in the "Literature Cited" section at the end of Chapter 2.

d) Address the potential impacts of the underground mining on public and private water supplies.

Only six (6) private water supplies, along with the one cistern on parcel 11 which collects rainwater, were identified. None of these supplies lie within the proposed underground mine permit area.

Spring supply, sample point 34, is used for outside purposes. This spring lies just within 1000 feet north of the proposed underground portion of the permit area. This water supply occurs from the local flow system below the Waynesburg horizon. The recharge area for this spring is with topography to the east and northeast, which is located north of the proposed mining. This spring will not be affected.

Also located on the same property is drilled well supply 35, which is used for outdoor purposes including filling the swimming pool. The depth of the well is not known. Recharge to this well supply is with topography and the structural orientation of confined beds. This recharge area is to the east with Unnamed Tributary "G" to Tenmile Creek lying between the proposed mining area and the well. This well will not be impacted. The pump for this well is currently not functioning and may not be repaired.

Private well supply 58 is the primary source of water for the home on parcel 12. The depth of the well is unknown, but more than likely intercepts the intermediate groundwater flow system which is recharged with both topography and the structural orientation of confined beds. The recharge area for this well lies to the east which will not be affected by the proposed mining.

A hand dug well, identified as sample point 76, is located north of the eastern section of the underground permit area. The pump is currently not functioning. A recent interview with the property owner stated that she has no plans on using the well and has public water. The well is recharged by topography in an area that will not be impacted by the proposed mining.

Two (2) additional water supplies have been identified north of the proposed permit area. Dug well sample point 77 is twelve (12') feet deep, intercepting the local water table. Recharge to this well is with topography to the north and will not be affected. Private well sample point 78 is located just north of Unnamed Tributary "G", its depth is not known. The well lies above the top of the Benwood Limestone and should remain unaffected.

Tri-County Joint Municipal Authority has a surface water intake on the Monongahela River, 6.6 miles downstream from the site. The proposed underground mine plan has been designed to prevent any discharges from occurring during and after completion of the mining of the Benwood Limestone. Surface water from the entry and open pit area will be controlled, with erosion and sedimentation facilities installed to ensure that any water flowing into Tenmile Creek meets all effluent standards established by the Department.

e) Design and outline a monitoring program specific to the potential impacts (the monitoring program must specifically address areas where post-mining discharges may develop and where water supplies may be adversely impacted). Include a representative number of existing groundwater supplies in the monitoring plan to demonstrate quantity and quality impacts during the life of the mine (background sampling and monitoring data should be collected as per Module 8.2).

The monitoring program for Tenmile Creek includes an intermediate sample point number 1, downstream monitoring points MP-4, and 29; and upstream monitoring point 31. Spring sample points 26 and 27 and wetland discharge 25 will monitor water from the quarry pit area and entry area. Spring sample point 73 will monitor the base of the Benwood Limestone downgradient of the proposed underground permit area.

Located along the eastern and southeastern section of the permit area is Unnamed Tributary "D" to Tenmile Creek which is monitored upstream at sample points 9 and 11. An intermediate point is located at 13, with the downstream monitoring point 28.

Unnamed Tributary "E" is located in the central section of the permit area with the headwaters originating above the haulroad. The stream flows through the adjacent Hawkins site until reaching the reconstructed stream channel before flowing into Tenmile Creek. The upstream monitoring points on the Western Branch of Unnamed Tributary "E" are points 17 (monthly flow only), 21 (monthly flow only), C (monthly flow and quarterly water sample), E (monthly flow only), and F (monthly flow only). On the Eastern Branch of Unnamed Tributary "E" is the upstream monitoring point 5 (monthly flow and quarterly water sample), D (monthly flow only), G (monthly flow only), and H (monthly flow only). Below the confluence of the Eastern and Western Branches of Unnamed Tributary "E" is monthly flow measurement station B, spring point 15 (monthly flow only) and monthly flow station A. The intermediate point is 14 (monthly flow and quarterly water sample), with the downstream point of 42, within the reconstructed stream channel.

Originating north of the permit area is Unnamed Tributary "G" to Tenmile Creek, which will be monitored upstream at sample point 61. The stream then flows through a portion of the northern section of the permit area and then will be monitored at intermediate sample point 41. The downstream monitoring point is 30.

Located northwest and downgradient of the underground permit area is an unnamed tributary that flows into Unnamed Tributary "G". A monitoring point 54 has been established at the downstream location of this stream.

Located east of the proposed underground permit area is ephemeral Unnamed Tributary "A" to Black Dog Hollow. This stream is upgradient of the mine site. Upstream monitoring points are 32 and 66, with the downstream monitoring point designated sample point 67.

Unnamed Tributary "B" to Black Dog Hollow is also located east of the permit area and upgradient. The upstream monitoring point is 33, with the downstream monitoring point designated sample number 68.

No private well supply is threatened. Most of the homes in the area are utilizing public water. Spring sample point 73 is the proposed downgradient monitoring point.

Monitoring well MW-TH-2 will monitor the static water level in the upgradient section of the proposed deep mine, MW-TH-4 the intermediate section, and MW-TH-6 downgradient. The Wash Plant Well, MW-WPW will monitor the Clyde mine pool elevation.

f) **Include information regarding depth to groundwater, uses of groundwater and any known groundwater problems over the proposed underground mine.**

Test holes TH-1 through TH-7 were drilled within the proposed underground permit area. TH-1 is located in the east - central section of the permit area just north of the haulroad. The first one hundred seventy (170') feet of the drill hole was air rotary drilled and did not encounter any measurable groundwater. The rest of the test hole was continuously cored. The measured static water level was found just above the Waynesburg coal seam at a depth of forty nine (49') feet from the surface.

Located near the southeastern section of the permit area is test hole TH-2. The first one hundred thirty five (135') feet of the drill hole was air rotary, with no measurable groundwater encountered. The remaining portion of the drill hole was continuously cored. The measured static water level was found to be 70.3 feet deep from the surface.

Test hole TH-3 is in the northeastern section of the permit area. Water was encountered at forty (40') feet where 1 gpm was measured. Two (2) static water levels were obtained. In January 2018 the water level was found to be 61.8 feet in depth. In February 2018 the water level was measured at 57.2 feet.

Located in the northcentral section of the permit area is drill hole TH-4. Cuttings were wet at a shallow depth of thirteen (13') feet at this location. One gallon per minute (1 gpm) was found at a depth of seventy five (75') feet, just above the Waynesburg coal seam. The January 2018 static water level was measured at a depth of 69.1 feet, and February 2018 it was measured at 67.75 feet.

Test hole TH-5 encountered the Waynesburg coal seam pit floor at a depth of fifty five (55') feet. No groundwater was found at this drill hole location.

Located in the northwestern section of the permit area is drill hole TH-6. At a depth of two hundred (200') feet 1 gpm of water was encountered. The static water measured in January 2018 was found at a depth of 153.7 feet, and in February 2018 it was found at a depth of 143.7 feet.

Test hole TH-7 is located in the southeastern section of the permit. At a depth of forty three (43') feet 1 gpm of water was encountered. The January 2018 static water level was found to be 46.4 feet, and in February 2018 the water level was measured at 43.2 feet.

Hole No. 1 and 2 were drilled in the proposed revision area on the west-central section of the permit area. Hole No. 1 was damp at an elevation of 824.4, which correlates to the bottom of the Benwood Limestone. The static water level measured for Hole No. 2 was found at a depth of 18.6 feet and was associated with a substantial clay unit.

g) **Provide a surface/groundwater inventory including elevation and flow rate of springs, seeps and mine discharges located over the proposed mine and within 1,000 ft. of the permit area. Include information regarding static water levels for inventoried wells throughout the permit area.**

See each individual Module 8.1A for flow rates of springs, seeps and mine discharges. As discussed in Module 8, access to private well supply, sample point 35, to obtain a water level would not be easy. The owner of this supply is hesitant to allow access to the well.

A static water level was obtained at private well supply, sample point 58, on September 24, 2019. The water level was found to be 1066.3' (msl). The projected base of the Benwood limestone is at 835 feet (msl).

h) If water will be used in the underground mine complex (for dust control, etc.), describe the source of water and approximate daily usage rate in gallons. If groundwater wells will be employed, describe the target aquifer and any potential adverse hydrologic impacts from pumping the wells.

The operator will obtain water from Pond P-1 as needed.

April 2024 Revision. As per additional Department concerns, there is a separate groundwater component associated with the existing pits. As of April 2024, there are two separate pits associated with previous Benwood Limestone mining associated with surface mine permit 63100401. This main pit has existed for many years and will remain throughout the proposed Benwood Limestone deep mining. This main pit is approximately 200 feet in height and consists of about 10-12 acres. The other pit is smaller and will be backfilled prior to the opening of the proposed deep mine. Both pits act as pseudo "cones of depression" as groundwater seepage zones from the highwall exist. The seepage ends up in the pit and is utilized for haul road watering, etc. The seepage zones have been noted previously and will likely be present throughout the life of the proposed deep mine. On March 21, 2024, personnel from GeoTech Engineering Inc. noted three separate areas of groundwater seepage associated with stratigraphy in the main highwall. A review of core hole B-1 (located just above the highwall) indicates areas of fractured and broken up material located at elevations at depths of 25, 35-50, and 100-110 feet from the surface. This correlates well with visual observations and photographs on March 21, 2024. It is noted that there was some pit water noted on March 21, 2024.

It is difficult to estimate the amount of groundwater emanating from the highwall due to seasonal fluctuations etc, however, if one uses 0.5-1.0 gpm per acre of water to be expected from the highwall, a value of about 5-10 gpm could be expected. NOTE: This is using the same formula that is in Module 8.3(a) and an estimated recharge of 10 acres.

In regard to concerns about sufficient water being available for dust suppression, please refer to Module 17.

15.7 Geology

Provide (at a minimum) 2 geologic cross sections- covering the proposed underground mining area: one section perpendicular to strike and the other parallel to strike. Show all stratigraphic units down to and including the first aquifer system that may be affected below the lowest mineral extraction level (key location of cross section- to Exhibit 6.2 map). Include borehole locations over the extent of the deep mine permit area. Describe the local geologic structure in the area of the proposed underground mine and relate it to the regional geologic structure.

Two (2) geologic cross sections were developed for the proposed underground mining of the Benwood Limestone.

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

Cross Section C - D is drawn from one thousand (1000') feet southeast of the permit area, intercepts Arnold Road, Tenmile Creek, sediment pond 001, test hole DH-6, the haulroad, test hole TH-1, test hole TH-3, Leonard Road, Morey Road, SR 2024, to one thousand (1000') feet north - northeast of the permit area. This cross section is constructed generally along the strike of the Benwood Limestone. The proposed mining within the Maggie Lynn Underground Mine permit area is situated in the Appalachian Plateaus Province. The sedimentary strata, in this area of the Province, have been folded to varying degrees by a series of anticlines and synclines. Included in this module are two (2) published regional geologic structure maps. The general orientation of the fold axes are in the southwest - northeast direction. This anticline - syncline series extends throughout most of the region from Ohio eastward to the Allegheny Front in central Pennsylvania, where the Valley and Ridge Province begins. Low magnitude and broad folds dominate the immediate area. The Maggie Lynn Mine is situated on the western flank of the Belle Vernon Anticline, approximately six hundred (600')

feet northwest of the axis of the anticline. The underground permit area lies east of the axis of the Waynesburg Syncline which lies approximately 2.0 miles to the west - northwest.

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

15.8 Sealing Plan

Provide a plan regarding the sealing/closure of all underground openings (drifts, shafts, slopes, boreholes, etc.). Include drawings, schematics showing bulkhead/seal designs and justify design vs. expected hydraulic head. All plans and maps must be sealed by a registered professional engineer.

The long term plan for this site, after the limestone mining activities have ceased, will be to convert the underground mine site into a long term storage facility. Waste rock from the deep mine and stored spoil material removed during the initial excavation of the pit will be utilized for backfilling as much as the highwall entry area as possible, without restricting access to the underground storage area, but if sealing of the portals is deemed necessary a sealing plan is shown on page 15-21.

15.9 Bonding for Underground Openings

Provide a breakdown of the projected costs needed to seal all openings (labor, material, etc.) and complete the attached FORM 15.9 Openings/Mine Seals.

The cost to seal four portal openings of pit #1 are shown on page 15-20.

15.10 Underground Disposal

This section is to be completed if water, wastes, or backfill material will be placed in underground mine voids. As a general rule, the disposal or placement of materials underground will be restricted to processing waste associated with mineral being mined, underground mine development waste, mine drainage treatment sludge, fly ash, flue gas desulfurization sludge and inert materials for mine stabilization projects.

a) Identify the nature and source(s) of the waste to be disposed of underground.

Waste from processing the limestone material being mined at this site may be disposed of in the inactive sections of the underground mine that no longer need to be accessed. The location of the disposal areas will be in updip inactive sections of the deep mine to ensure that they will not be inundated with any possible flooding event. Also, there will be no processing waste located in the flow path of any updip water that would flow downdip through the deep mine.

b) Provide maps and drawings illustrating the facilities and operations involved in transporting the waste from its point of origin to the final repository (Describe the design and operation of the waste disposal system).

On-site mine equipment will be used to haul the processing waste from the surface processing area to the inactive underground mine sections for final placement. It is difficult to provide any maps or drawings currently as the surface footprint is likely to be different from the current configuration.

c) Attach excerpts of mine maps illustrating the area of the workings to be filled, show flow paths of hydraulically transported materials, underground retention structures, discharge points, and monitoring points.

The current Exhibit 15.2 references the processing waste may be placed in inactive sections of the Maggie Lynn deep mine. Maps detailing the areas of processing waste placement will be provided to the Department prior to underground disposal of the material. Please refer to the notation on Module 15.2 which references the potential for the disposal of limestone processing waste within the Maggie Lynn Deep Mine.

d) Address possible adverse hydrologic impacts of the operation and the measures and monitoring which will be employed to prevent or mitigate their occurrence.

As the waste produced from processing the limestone should be alkaline in nature with minimal amounts of metals (i.e. iron, manganese and aluminum), there should be negligible hydrologic impacts to the waters of the commonwealth based on the proposed underground disposal.

e) Describe the lithology, thickness and attitude of the strata which comprise the floor of the repository area.

The floor of the repository area would consist of the 5 feet of Benwood Limestone that will remain after mining. Please refer to the Module 7.2 for the geologic description of the floor strata.

f) Describe the ownership rights which allow the repository to be used for waste disposal.

Neiswonger Construction, Inc. has the right to utilize the site for the placement of processing waste based on landowner lease agreements.

g) Provide a chemical analysis of the mine pool in which water, wastes or other materials will be placed.

The water sample results reported in Module 8.1(A) for monitoring well MW-1 and sample point MP73 reflect the water quality of the potential mine pool. If and when processing waste is disposed and a mine pool develops, sampling of the mine pool will be obtained to ensure adequate water quality is present.

h) Provide documentation that the Mine Safety and Health Administration has approved the underground disposal.

Prior to conducting underground disposal of any materials, a plan for disposal will be submitted to both BMS and Mine and Safety and Health Administration (MSHA) for evaluation. BMS/MSHA approval must be obtained prior to underground disposal activity.

15.11 Mine Map Standards

It is extremely important for all mining operations in a given area to be tied into the same standardized coordinate system. This minimizes problems along boundaries and at mine connections. Additionally, this system must be tied into and made part of the state grid system. Therefore, the following minimum standards should be adhered to for mine maps:

When Exhibit 15.3: Operational Mine Maps are submitted, the minimum standards of the below listed items a) through f) will be adhered to.

a) Minimum angular and coordinate ties for raw data would be an angular tie of less than 00°01'00" (1 minute) and a coordinate tie of less than 1:10,000 (1 foot in 10,000 feet) for any given closed loop survey.

b) A closed loop survey is required to be at the next to last open crosscut of the mining section, but not more than 100 feet from the final face of a mining section.

c) Elevation closure of +/- 1.0 foot per 5,000 feet.

d) Vertical elevation shall be based on mean sea level (USGS elevation).

e) Preferred datum is the Pennsylvania State Plan coordinate system (NAD83 Datum).

f) Where applicable, appropriate coordinate transformation equation(s) should be placed on the map.

15.12 Adjacent Mine Workings

Utilize any and all sources necessary to accurately determine the full extent and location of adjacent abandoned mine workings. Document the types of sources used on the attached Form 15.12 which provides a check list of potential sources. Document any additional sources utilized in the form's blank spaces.

Provide a narrative summary of all information used and the steps taken to obtain that information. At a minimum, the summary should address the following types of information:

See the attached Form 15.12.

a) Identification of all data sources used to verify and validate mine maps as documented on Form 15.12;

b) Listing of all mine map repositories searched during the research process;

c) Procedures used to orient and locate nearby abandoned mine workings with respect to the proposed mine;

d) A description of and results of field reconnaissance used to delineate mine workings;

e) Identification of all maps found in the search and relied upon to map abandoned mine workings, including ID or catalog numbers, archive location, scale, and condition;

f) Local gas well or water well drill logs that may indicate the presence of absence of mine voids;

g) Underground mine inspection records:

h) Annual coal production report data, including mine opening date and last coal extraction;

i) Permit information cross-checks with the Bureau of Mining and Reclamation;

j) Mechanical, geologic, or geophysical testing used to verify the mine workings, such as vertical or horizontal drilling or geophysical surveying;

k) An operational history of each adjacent abandoned mine including all ownership changes, dates of operation, dates when the mine was idle, date of mine closure, mine name changes, coal company name changes, and all permit identification numbers including an explanation showing that the map corresponds to the data found in the history;

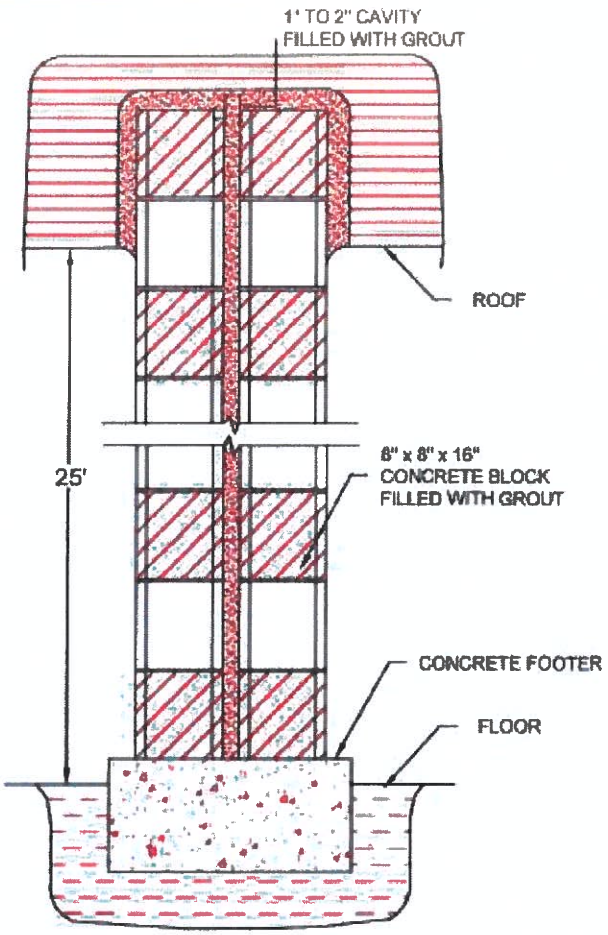
l) An explanation of how mine pool elevation data for each abandoned mine was determined;

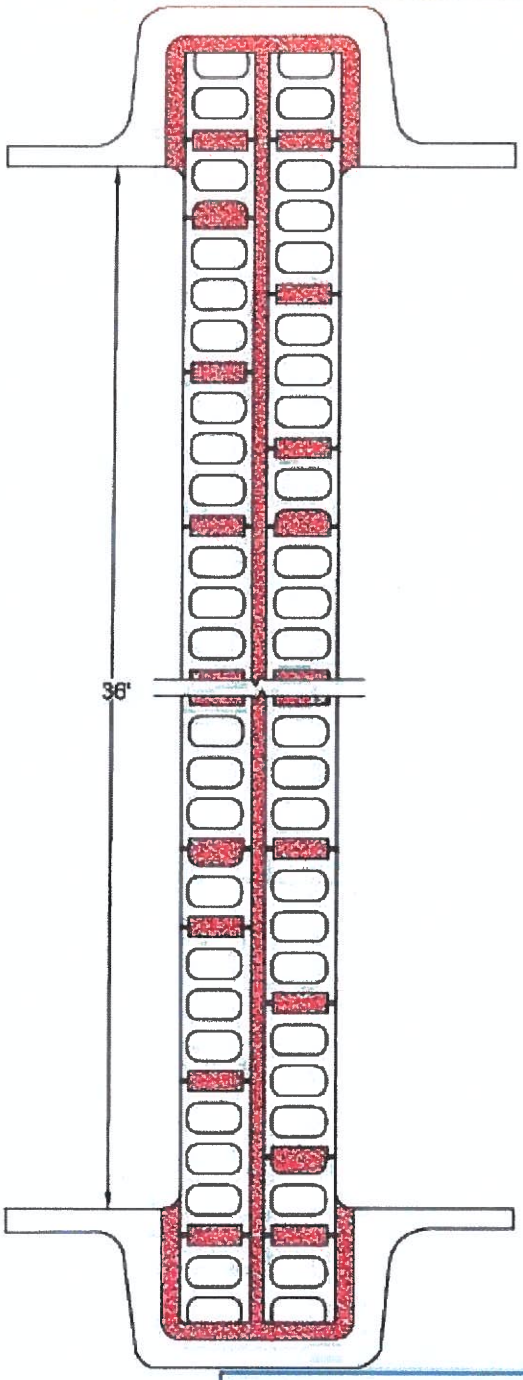
m) A discussion of any disparities between sources of information including site-specific details provided by local residents.

FORM 15.9
OPENINGS / MINE SEALS

Opening Name/No.	Type of Seal	Sealing Date *	Estimate of Sealing Costs
Portal 1	Non Hydraulic Concrete Block	P(2055)	$44,696
Portal 2	Non Hydraulic Concrete Block	P(2055)	$44,696
Portal 3	Non Hydraulic Concrete Block	P(2055)	$44,696
Portal 4	Non Hydraulic Concrete Block	P(2055)	$44,696
Portal 5 (Alternative)	Non Hydraulic Concrete Block	P(2055)	**
Portal 6 (Alternative)	Non Hydraulic Concrete Block	P(2055)	**
Portal 7 (Alternative)	Non Hydraulic Concrete Block	P(2055)	**
			** - Not proposed to be constructed at this time

*Indicate (P) for proposed, (A) for actual





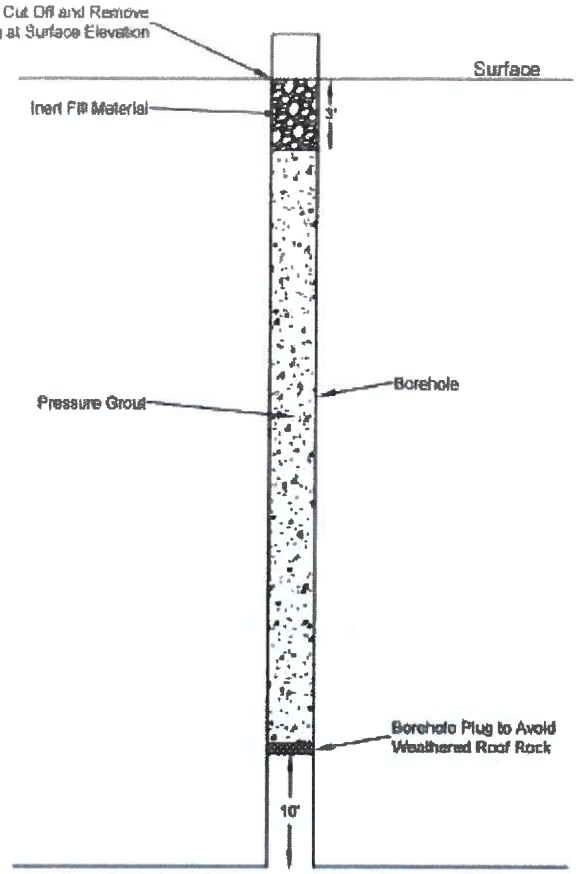
BLOCK SEAL DETAIL

NOTE: OMEGA 443 BLOCKS, AS MANUFACTURED BY BURRELL MINING INTERNATIONAL, 2400 LEECHBURG ROAD, SUITE 216, NEW KENSINGTON, PA 15068, TEL: 800-541-1575, MAY BE SUBSTITUTED FOR CONCRETE BLOCKS.

INSTALLATION OF OMEGA BLOCKS SHALL CONFORM TO THE MANUFACTURERS SPECIFICATIONS.

Seal:

Neiswonger Construction, Inc. 17592 Route 322, Strattanville, PA 16258	Date: December, 2023 Revisions:	Prepared By GEI GEOTECH ENGINEERING, INC.
Maggie Lynn Underground Mine Exhibit 15.8: Mine Sealing Plan		
Deemston Borough Washington County		



BOREHOLE SEALING PLAN

CONSTRUCTION OF BOREHOLE SEALS

1. The borehole should be pressure grouted using a tremie tube to prevent bridging. Grout or a grout-bentonite mixture will be used as the sealing agent.
2. If the borehole is to the deep mine workings, a borehole plug will be installed 10 feet above the mine roof. The borehole plug will secure the sealed borehole bottom from any weathered roof rock.
3. The borehole will be grouted up to 3 feet from the surface. Inert material used to backfill the final 3 feet.
4. Any casing material above the ground surface will be cut off and removed.

Seal:

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
CHRISTOPHER CARL PETERSON
ENGINEER
PE044032E

Neiswonger Construction, Inc. 17592 Route 322, Strattanville, PA 16258	Date June, 2023 Revisions:	Prepared By: GEI GEOTECH ENGINEERING, INC.
Maggie Lynn Underground Mine Exhibit 15.8: Borehole Sealing Plan		
Deemston Borough Washington County		

Added: June 2023
Revised April 2024

Form 15.12
Recommended Sources of Mine Map Information

In order to validate mine void location information provided to the Department, an applicant for an underground mine permit should use all sources necessary to accurately ascertain the full extent and location of adjacent abandoned mine workings. Potential sources of useful information are listed on the following checklist. Additional space is provided to add additional sources as needed.

Information Source	Place a check (√) next to each information source relied upon to validate location of mine workings	Date that Source Review was Completed	Reviewer's Initials
Coal production records	☐		
Tax records	☐		
Local Driller's logs (gas and water)	☒	2016-2017	MFB
Worker's compensation records	☐		
County property records	☐		
Employment records	☐		
Newspaper accounts	☐		
Public mine map archives (Pennsylvania Geologic Survey, OSM, Pa. Deep Mine Safety, Pa. District Mining Operations)	☒	2017	MFB
Private mine map archives (local coal companies, museums and universities)	☐		
Museums	☐		
Local citizens	☐		
Field reconnaissance	☒	2016-2017	MFB
Universities	☐		
Libraries	☐		
State Mine Inspector's records	☐		
Federal Mine Inspector's records	☐		
Operational histories of local mining companies	☐		
Survey data – notes, traverse books, sheets, etc...	☐		

Applicant's Signature_____ Date_____