Mountain Valley Pipeline Project

Docket No. CP16-10-000

Attachment DR5 General 1g

April 2017

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Contingency Plan for the Proposed Crossing of the Appalachian National Scenic Trail

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1.0 Introduction

Mountain Valley Pipeline, LLC (MVP, LLC), a joint venture between EQT Midstream Partners, LP and affiliates of NextEra Energy, Inc., WGL Holdings, Inc., RGC Midstream, LLC, and Con Edison Midstream, LLC is approximately a 303-mile, 42-inch-diameter natural gas pipeline traversing 17 counties in West Virginia and Virginia. The Project will extend from the existing Equitrans, L.P. transmission system and other natural gas facilities in Wetzel County, West Virginia to Transcontinental Gas Pipe Line Company, LLC's (Transco) Zone 5 compressor station 165 in Pittsylvania County, Virginia. In addition to the pipeline, the Project will include approximately 171,600 horsepower (hp) of compression at three compressor stations currently planned along the route, as well as measurement, regulation, and other ancillary facilities required for the safe and reliable operation of the pipeline. The pipeline is designed to transport up to 2.0 million dekatherms per day of natural gas.

2.0 Purpose

Mountain Valley has proposed to cross underneath the Appalachian National Scenic Trail (ANST), located on U.S. Forest Service (USFS) lands, using conventional bore pipeline installation technology. Mountain Valley has completed a geologic analysis, more fully described in the following section, that has determined the bore path will encounter primarily solid rock within the region that the bore will encounter, which is approximately 90 feet below the ANST. Mountain Valley has consulted with its trenchless technology consultant, RK&K Engineering, with site specific information for the design and execution of installing the pipeline under the ANST through a trenchless technology, such as Conventional Boring. Mountain Valley is very confident in a successful pipeline installation at this location with trenchless technology. In the unlikely event that the conventional boring method fails; however, Mountain Valley has identified the steps to be implemented as part of a prudent contingency planning process. Selection of the correct contingency action would depend on the specific circumstances of the bore failure; however, other trenchless techniques are available and will be utilized through this contingency plan.

3.0 Geology

The ANST bore crossing is located in the folded and thrust-faulted Valley and Ridge geologic province, on the crest of Peters Mountain at the border between West Virginia and Virginia. The geologic formations that underlie the Peters Mountain ridgeline are the Silurian age Tuscarora and Rose Hill Formations that dip moderately (30-degrees) to the southeast (note that these formations generally correspond to the White Medina Formation and Red Medina Formation in West Virginia). A professional geologist visited the site to confirm the mapping and geological conditions in the area, as described in the attached January 17, 2017, memo from Draper Aden Associates.

The Tuscarora and Rose Hill Formations are found throughout the Valley and Ridge province, as thrust faulting has resulted in repeated geologic sections throughout. The Tuscarora is the dominant ridge-former in the vicinity of this bore, with the Rose Hill being somewhat less weather resistant than the Tuscarora, but nonetheless also a ridge-former as they are both hard, competent rocks. The following descriptions of these formations were taken from various sources at different locations within the Valley and Ridge province, in order to provide a comprehensive geologic description. The boring would proceed at the prescribed 2-degree angle along the bedrock formations that dip at 30-degrees, and therefore would penetrate several units of the Tuscarora and Rose Hill formations.

The Tuscarora Formation sandstone and conglomerate units consist of thin to very thick-bedded, white to light-gray, medium to coarse-grained sandstone and strongly welded quartzite. The Tuscarora quartzite is typically the most weather-resistant (aka, hardest) rock-type in this province. The Tuscarora sandstone and conglomerate units can be quite hard, particularly where it demonstrates low-grade metamorphism to a welded quartzite.

The Rose Hill Formation is composed of deep-red hematitic sandstones, brown to tan medium-grained sandstones with clay galls, and red and green sandy and micaceous shales. The shales and hematitic sandstones are distinctive and permit ready identification of the unit. The hematitic sandstone is bounded above and below by greenish-gray to red shale with thin gray sandstone interbeds, some of which have abundant brachiopod fossils. Ripple marks are common on the sandstone beds. The Rose Hill Formation is generally observed to be less weather-resistant (i.e., less hard) than the Tuscarora, with more frequent occurrences of shale and siltstone units. The hematite-cemented sandstone units of the Rose Hill are relatively hard compared to the Formation shale and siltstone units, but are generally less indurated than the Tuscarora Formation. Therefore, the Tuscarora quartzite is the dominant ridge-forming unit in the region surrounding the bore.

4.0 Conventional Boring

Conventional or Auger boring is one of the most popular trenchless methods and has been used for more than 50 years. It consists of a jacking pipe that is advanced ("jacked") and a rotating cutting head that is attached to the leading edge of the auger string. The spoil is transported back by the rotation of auger flights within the steel jacking pipe. Auger boring can be used to install pipes ranging from 4 to 60 inches in diameter. Drive lengths for typical auger boring projects range from about 40 to 600 feet. Auger bores can be successfully completed in a range of soil types from dry sand to firm clay to hard rock. Boulders and cobbles up to one third of the diameter of the installed pipe can be accommodated.

Auger boring's major advantage over some other boring technologies is that the pipe is installed as the boring is advanced, leaving no unsupported hole that could potentially collapse. Auger boring requires construction of launching and receiving pits on either side of the bore, but has the least amount of areal footprint required of the trenchless technologies. The launch pit, where the jacking machine is located, will be on the Virginia side of the bore and will be 20 feet wide by 60 feet long, in plan. The receiving pit, on the West Virginia side of the bore, will be 20 feet wide by 30 feet long, in plan.

The horizontal auger bore method (utilizing the appropriate cutting head) described above is an appropriate method for penetrating the geologic formations previously described.

5.0 Alternate Trenchless Crossing Methods

Microtunneling:

Microtunneling (MT) is a pipeline installation method that consists of jacking a pipe behind a remotely-controlled, steerable, guided, articulated microtunnel boring machine (MTBM). Microtunneling projects can range in diameter from 10 to 136 inches. Drive lengths for MT installations can range from 200 to 1,500 feet in length. A wide range of soil types are suitable for installation by MT, including boulders and rock. Boulders and cobbles up to one third the diameter of the installed pipe can be accommodated by the MTBM.

An advantage of the MT methods, due to their advanced control and guidance system, is that they are capable of installing pipelines to accurate line and grade tolerances. Also, the bore hole or tunnel is continuously supported by the installed pipe. Finally, the bentonite slurry (clay and water) collection/recycling system and pressure control features at the excavation face minimize the potential for drilling fluid loss.

Primary disadvantages of the MT method are the necessary use of a slurry and also the extended lengths of pipe segments causing more workspace area to be utilized. These factors were considered for primary selection of the ANST crossing utilizing the conventional bore and subsequently caused the MT method to be an alternate installation choice.

Direct Pipe:

Direct Pipe is a trenchless installation method that combines features of Horizontal Directional Drilling (HDD) and Microtunneling (MT). Direct Pipe was developed by the HerrenKnecht Company in Germany to provide a one-step pipe jacking method that offered the advantages of both HDD and MT. Direct Pipe utilizes a Microtunnel Boring Machine (MTBM) connected to the leading edge of an assembled length of pipe and a Pipe Thruster to jack the pipeline into place, similar to, but in the opposite direction of HDD pullback operations.

Direct Pipe projects can range in diameter for 30 to 60 inches. Drilling lengths for Direct Pipe projects can range from 900 to 4,900 feet. A wide range of soil types are suitable for installation by Direct Pipe, including boulders and rock. Boulders and cobbles up to one third the diameter of the installed pipe can be accommodated by the MTBM at the front end of the pipeline.

During Direct Pipe operations, the tunnel face is excavated by an MTBM similar to the MT and pipe-jacking method. The tunnel face is slurry-supported using a bentonite (clay) suspension. The excavated material is removed via a slurry circuit with separation plant in order to separate the spoil from the slurry liquid before feed pumps transport the liquid back to the tunnel face. The MTBM is controlled from the operating container located on the surface adjacent to the pipe thruster. A gyro compass is used for steering control of the MTBM allow drill radius similar to HDD to be completed.

An advantage of Direct Pipe system is One-step jacking method, which allows the pipe to be installed in one pass. Also, the installation of the pipe directly behind the MTBM provides constant support to the bore hole. The receiving side foot print for Direct Pipe is small compared to other methods since all materials and equipment are located on the launch side. The advance control and guidance system provide high-precision target control. Finally, as with MT, the slurry collection/recycling system and pressure control features at the excavation face minimize the potential for drilling fluid loss.

One major disadvantage of Direct Pipe is that the technique requires a large work area on the launch side of a proposed crossing to accommodate the Pipe Thruster, supporting equipment and long lengths of welded product pipe. Also, this is a relatively new technology to the industry.

6.0 Contingency Plan

If insurmountable issues are encountered during the conventional boring process, Mountain Valley, in consultation with RK&K and the USFS, may perform corrective actions such as selecting a new drill path, within the approved corridor or implement an alternate trenchless crossing method as outlined in this plan. The following list, although not all inclusive, provides some examples of issues that would require the implementation of this contingency plan:

- Slow or minimal penetration rate
- Excessive torqueing issues
- Poor cutting returns
- Mechanical failures of drill string or bit assembly
- Deviation from planned bore path

Open cut installation is not assumed to be an option for the pipeline installation under the ANST. Mountain Valley will notify and involve FERC inspection as well as USFS representatives prior to implementing the contingency plan or making any adjustments to the boring plans and procedures. Abandonment procedures and alternative crossing measures will be discussed with appropriate permitting, regulatory, and land managing agencies, and required approvals will be obtained prior to implementing any alternative crossing measures.

While all contingency options are viable at the ANST crossing, conventional auger bore is the simplest method. Microtunneling and Direct Pipe are more complex processes and will require larger entry and exit pits.

6.1 Initial Contingency Plan – Reattempt Bore

In the event that the bore is determined to be unsuccessful, based on encountering one or more issues identified above, Mountain Valley will shift the bore entry ten feet to the east or west of the original bore entry and attempt another bore. Should a bore failure involve stuck pipe following known engineered recovery techniques, any pipe from a failed bore will be abandoned in place and backfilled with cement. Should Mountain Valley and technical consultants determine that the horizontal auger boring is not appropriate based on the initial attempts, Mountain Valley will propose to use a different trenchless crossing method. Two alternatives are discussed below, with microtunneling being the most feasible and Mountain Valley's preferred contingency method.

6.2 Microtunneling Installation

In the event that the conventional bore reattempt is determined to be unsuccessful based on encountering one or more issues identified above, Mountain Valley will notify and involve FERC inspection as well as USFS representatives prior to making any adjustments, abandoning the process, and moving to the microtunneling method.

As stated above, microtunneling is a pipeline installation method that consists of jacking a pipe behind a remotely-controlled, steerable, guided, articulated microtunnel boring machine (MTBM). The MT method most common in the United States is the slurry method.

The equipment needed for a successful microtunnel, in addition to the microtunnel boring machine and jacking machine, is the lubricant/recycling tank and pumps, control container, and supply and storage trailers. In addition, a crane or large side boom will be needed for pipe handling and to lower the MTBM in place as well as the pipe sections.

The typical workspace footprint of microtunnel setup for this project is anticipated to be a minimum of approximately 150 feet wide by 250 feet long on the launch side. Control containers and support equipment are placed adjacent to the launch pit, and in more remote locations may require additional clearing and grading to provide suitable access.

6.3 Direct Pipe Installation

In the event that the conventional bores and the microtunneling attempts are determined to be unsuccessful in the designed location based on encountering one or more issues identified above, Mountain Valley will notify and involve FERC inspection as well as USFS representatives prior to making any adjustments abandoning the process and moving to the Direct Pipe method.

Direct Pipe is a trenchless installation method that combines features of HDD and MT. Direct pipe utilizes an MTBM connected to the leading edge of the assembled length of pipe and a Pipe Thruster to advance the MTBM and push the pipeline into place, similar to, but in the opposite direction of HDD pullback operations.

During Direct Pipe operations, the tunnel face is excavated by an MTBM similar to the MT method. The excavated material is removed via a slurry circuit with separation plant in order to separate the spoil from the slurry liquid before feed pumps transport the liquid back to the tunnel face. The MTBM is controlled from the operating container located on the surface adjacent to the Pipe Thruster. A gyro compass is used for steering control of the MTBM allowing drill radii similar to HDD.

Direct pipe typically requires a large area on the launch side. The recommended minimum work area for a direct pipe installation of this magnitude is approximately 150 feet wide and at least the length of the crossing on the launch side (over 600 feet at this site) due to need to string assembled pipe. The equipment needed for a successful direct-pipe installation is similar to MT; microtunnel boring machine and thruster, lubricant/recycling tank and pumps, control container, and supply.

Attachment A
Geologic formation descriptions at conventional bore sites on MVP Memorandum

Draper Aden Associates
Engineering • Surveying • Environmental Services

Memorandum

To:	Melissa Fontanese, EQT Midstream
From:	William D. Newcomb, P.G., Program Manager
Date:	01/17/2017
Project Name:	Mountain Valley Pipeline Project
Project Number:	B14188B-01
Subject:	Geologic formation descriptions at conventional bore sites on MVP: 1) Weston Gauley Bridge Turnpike Trail, MP 66.95; 2) Appalachian National Scenic Trail, MP 196.3.
cc:	Dave Allison, P.G., Manager, Hydrogeology, EQT Corporation

The following discussion summarizes geologic formations observed in outcrop at two (2) portions of the Mountain Valley Pipeline (MVP) that will entail a conventional boring under two separate scenic trails, the Weston Gauley Bridge Turnpike Trail (WGBTT), Braxton County, West Virginia (MVP Milepost 66.9), and the Appalachian National Scenic Trail (ANST) between Monroe County West Virginia and Giles County, Virginia (starting at MVP Milepost 196.3).

The purpose for completing the conventional bores at these locations is to preserve the viewshed at both scenic features. The purpose for presenting the information included herein is to provide descriptive details of the rock type observed in outcrop at the two (2) bore sites, in order to assist Mountain Valley in design specifications of the bores.

William D. Newcomb, P.G., a registered professional geologist in Virginia (number 2801000924; expires August 31, 2017) with more than 27 years of experience in geology, geotechnical assessments and hydrogeology, visited the ANST site on December 7, 2016 and the WGBTT site on January 12, 2017, to observe bedrock characteristics in outcrop at the ground surface. No subsurface invasive sampling was permitted at these locations by the U.S. Army Corps of Engineers (WGBTT site) or the U.S. Forest Service (ANST site).

Weston Gauley Bridge Turnpike Trail (WGBTT), Braxton County, West Virginia

Mountain Valley seeks a permit from the U.S. Army Corps of Engineers (USACE) in order to complete a conventional boring under the WGBTT at approximately Milepost 66.9 of the October 2016 Proposed Alignment for the MVP. See Figure 1 for the proposed alignment, and location of WGBTT crossing at MP 66.9.

The WGBTT bore crossing is located on west-dipping bedrock of the Appalachian Plateau geologic province (www.wvgs.wvnet.edu/www/maps/pprovinces.htm). Geologic mapping of the

Braxton County, West Virginia area, specifically the Burnsville and Orlando quadrangles, has not been completed (see status of geologic quadrangle completion in West Virginia as of April 2016: http://www.wvgs.wvnet.edu/www/statemap/statemap.htm). The state-wide geologic map for West Virginia is interpreted to indicate that the Pennsylvanian-age Monongahela Formation is the ridge-forming sandstone at the WGBTT bore site (http://www.wvgs.wvnet.edu/www/maps/geomap.htm).

The following description of the Monongahela Formation summarizes pertinent rock description. See Figure 2 for photographs of the bedrock in the vicinity of the WGBTT bore site.

The Upper Pennsylvanian-aged Monongahela Formation consists of non-marine cyclic sequences of sandstone, siltstone, red and gray shale, limestone, and coal. The Formation extends from the top of the Waynesburg coal to the base of the Pittsburgh coal and includes the Uniontown, Sewickley, and Redstone coals. In West Virginia, the thickness of the Formation generally ranges from 170 feet to 300 feet. Sandstone in the Formation is described as medium-light-gray, very fine- to coarse-grained, conglomeratic with rounded quartz pebbles; thin-bedded to massive. Siltstone and shale in the Formation are described as medium- dark-gray to grayish-red, thin to poorly bedded, slightly fissile, silty, carbonaceous, and slightly calcareous. The shales and siltstones of the Formation, commonly known as red beds, are associated with landslides. Coal beds are also found in the Monongahela Formation and are often underlain by underclay, flint clay, or semi-flint clay. These clays are described as medium-gray, grayish-yellow, grayish-red, poorly bedded and brecciated with concoidal fracture and containing fossil root prints. (https://mrdata.usgs.gov/geology/state/sgmc-unit.php?unit=WVPAm%3B0).

There are no readily available geotechnical data on the Monongahela Formation. However, it is noted that this geologic rock-type is commonly found capping ridges throughout central-northern West Virginia and southwestern Pennsylvania, and Mountain Valley's personnel have pre-existing experience with pipeline installation in this formation. It is not anticipated that the Monongahela Formation at the WGBTT will present a particularly challenging bore project, particularly given that the approximate bore length is 125 feet, relatively minor in nature.

The Momentum Midstream 36-inch-diameter Stonewall Pipeline crosses under the WGBTT via a conventional bore approximately ¼-mile from the proposed MVP crossing. The Momentum bore was apparently successful as the pipeline is installed and currently operating.

Therefore in conclusion, based on rock description, Mountain Valley's experience with this type of geology for other pipeline installations, the relatively limited bore length and the completed nearby Momentum-Stonewall bore, the proposed MVP conventional bore under the WGBTT does not appear to present Mountain Valley with a significant risk for completion.

Appalachian National Scenic Trail (ANST), Monroe County, West Virginia and Giles County, Virginia.

Mountain Valley seeks a permit from the U.S. National Forest Service (NFS), which maintains the right-of-way for the ANST, in order to complete a conventional boring under the ANST at approximately Milepost 196.3 of the October 2016 Proposed Alignment for the MVP (Figure 3).

The ANST bore crossing is located in the folded and thrust-faulted Valley and Ridge geologic province, on the crest of Peters Mountain at the border between West Virginia and Virginia. The geologic formations that underlie the Peters Mountain ridgeline are the Silurian age Tuscarora and Rose Hill Formations that dip moderately (30-degrees) to the southeast (the Juniata Formation conformably underlies the Tuscarora Formation in this area).

The proposed boring would proceed at a 2-degree upward angle from southeast to northwest (i.e., from Virginia into West Virginia). The bore would likely begin in the Rose Hill Formation on the southeast flank of Peters Mountain, penetrate the Tuscarora and then enter the Juniata Formation with the receiving pit likely encountering the Juniata Formation on the northwest slope of Peters Mountain (see Figure 4 for site-photographs of the bedrock formations near the ANST bore site at the ridgeline of Peters Mountain; downslope exposures of bedrock are covered by colluvial deposits). The boring would proceed at the prescribed 2-degree angle along the bedrock formations that dip at 30-degrees. The proposed bore is slated to be approximately 600 feet in length between the bore pit and receiving pit, with a maximum depth of approximately 92 feet below ground at the ridgeline.

The Tuscarora, Rose Hill and Juniata Formations are found throughout the Valley and Ridge province, as thrust faulting has resulted in repeated geologic sections throughout. The Tuscarora and Rose Hill Formations are ridge forming units on Peters Mountain. The following general descriptions of these formations provide a fairly comprehensive geologic description of the bedrock units likely to be encountered by the proposed boring.

The Juniata Formation is composed mainly of fine-grained gray-red commonly crossbedded sandstone, with minor red shale interbeds in the lower part of the unit and minor gray-red fissile siltstone and silty shale in the upper part. It generally occupies steep outcrop slopes below ridgelines commonly formed by the comformably overlying Tuscarora sandstone.

The Tuscarora Formation sandstone and conglomerate units consist of thin- to thick-bedded, white to light-gray, medium to coarse-grained sandstone (some areas strongly welded quartzite are observed). Thin beds of quartz-pebble conglomerate occur in the lower half of the formation. The Tuscarora displays cross-bedding and clay rip-ups. The Tuscarora quartzite is typically the most weather-resistant (aka, hardest) rock-type in the Valley and Ridge province of southern West Virginia and southwestern Virginia. As a result, it plays a prominent role in the shaping of the local topography and is well exposed in numerous mountain outcrops.

The Tuscarora is comformably overlain by the Rose Hill Formation (and Keefer sandstone unit) at the top of the last quartz arenite of the Tuscarora. The Rose Hill Formation is composed of deep-red hematitic sandstones, brown to tan medium-grained sandstones with clay galls, and red and green sandy and micaceous shales. The shales and hematitic sandstones are distinctive and permit ready identification of the unit. The hematitic sandstone is bounded above and below by greenish-gray to red shale with thin gray sandstone interbeds, some of which have abundant brachiopod fossils. Ripple marks are common on the sandstone beds.

The Tuscarora sandstone and conglomerate units can be quite hard, particularly where it demonstrates low-grade metamorphism to a welded quartzite. Figure 5 provides a link to several photographs of a rock core through the Tuscarora Formation in West Virginia (depth ranges from 6,775 to 6,819 feet below ground). Figure 6 shows specific close-up photographs of the sandstone and conglomerate units of the Tuscarora. Figure 7 is a descriptive log of the Tuscarora core that is presented at the link provided in Figure 5.

Review of the Tuscarora Formation core (Figure 5) shows intervals of white and gray well-cemented sandstone and conglomerate layers, which form the most weather-resistant (i.e., ridge forming) units in the formation in the Appalachian basin, including the vicinity of the MVP bore at MP 196.3. However, silt and shale partings, joints and fractures are also common to the Tuscarora, which would reduce the overall resistance to boring through the Formation. The photographs of the core sandstone and conglomerate units show a tightly cemented fine to medium-grained sandstone and conglomerate (Figure 6). The data log (Figure 7) does not provide specific information on hardness, but gives a good overall description of the Tuscarora Formation, which is consistent with what is observed in southwestern Virginia, near the bore pits at Peters Mountain.

The Rose Hill and Juniata Formations are generally observed to be less weather-resistant (i.e., less hard) than the Tuscarora, with more frequent occurrences of shale and siltstone units. The hematite-cemented sandstone units of the Rose Hill are relatively hard compared to the shale and siltstone units, but are generally less indurated than the Tuscarora Formation.

In summary, the primary risk for the bore site is penetrating the Tuscarora quartzite, in terms of hardness of the formation. There is also a complication given the 30-degree southeast dip of the formation underlying Peters Mountain, in terms of bore deflection. The length of the bore (approximately 600 feet) also presents a risk to completing the bore at the prescribed receiving pit.

References:

Appalachian Basin Tight Gas Reservoirs Project, West Virginia Geological and Economic Survey, 2008. http://www.wvgs.wvnet.edu/atg/

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Schultz, A. P. and Stanley, C. B. (2001). Geologic map of the Virginia portion of the Lindside Quadrangle, Virginia. Publication 160 Virginia Division of Mineral Resources; Cooperative Geological Mapping Program, U.S. Geological Survey.

Wilkes, G. P. (2001; revised 2013). Geology of the Monterey Quadrangle, Virginia. Publication 178, Virginia Division of Geology and Mineral Resources, Department of Mines, Mineral and Energy.

Figure 1 – MVP Bore Site at WGBTT - October 2016 Proposed Alignment, Milepost 66.95

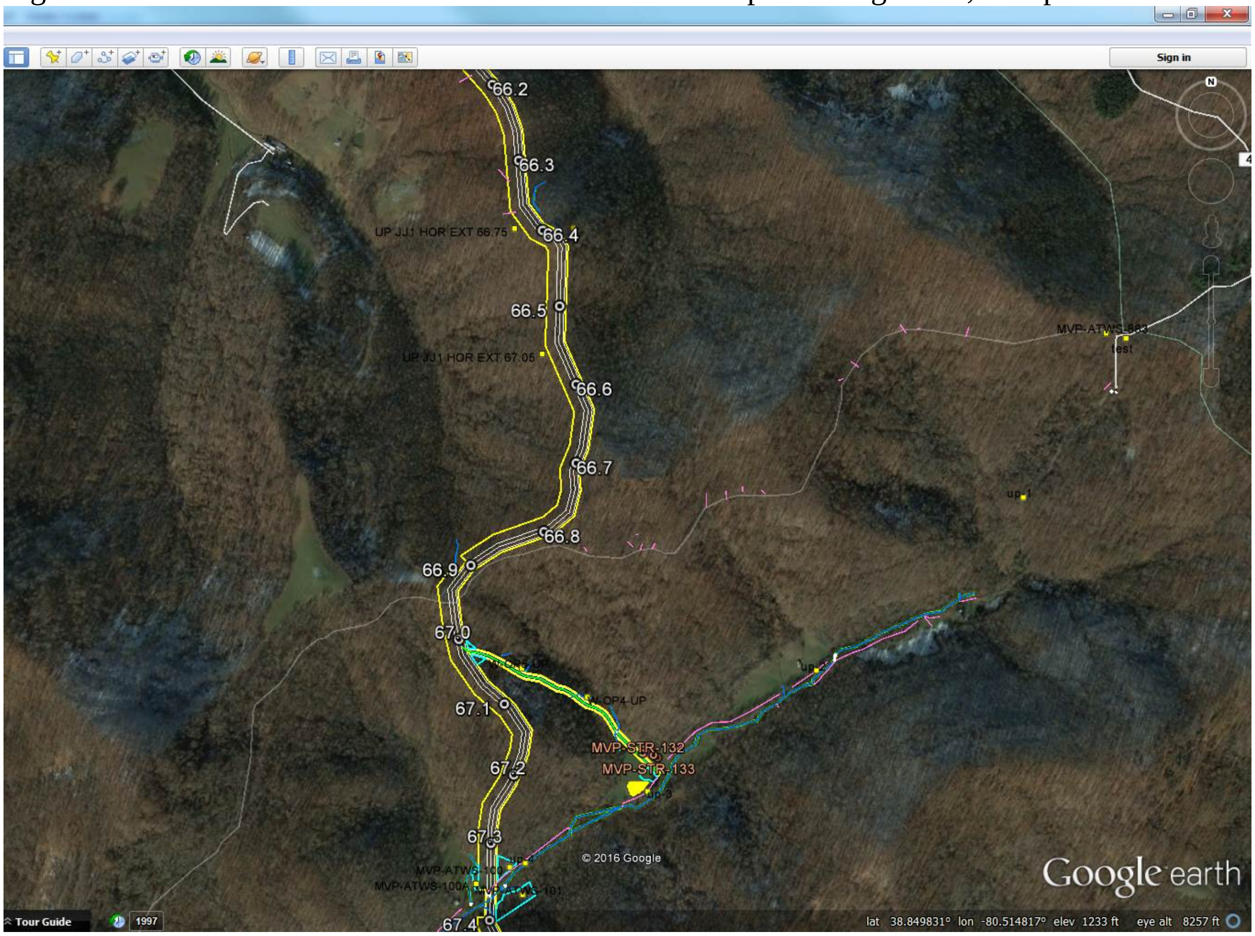

Figure 2 – Site Photographs of Monongahela Bedrock Outcrop near WGBTT Bore Site (MVP Milepost 66.9)

Figure 3 – MVP bore under ANST at Approximate Milepost 196.3 (geologic basemap from Schultz and Stanley, 2001)

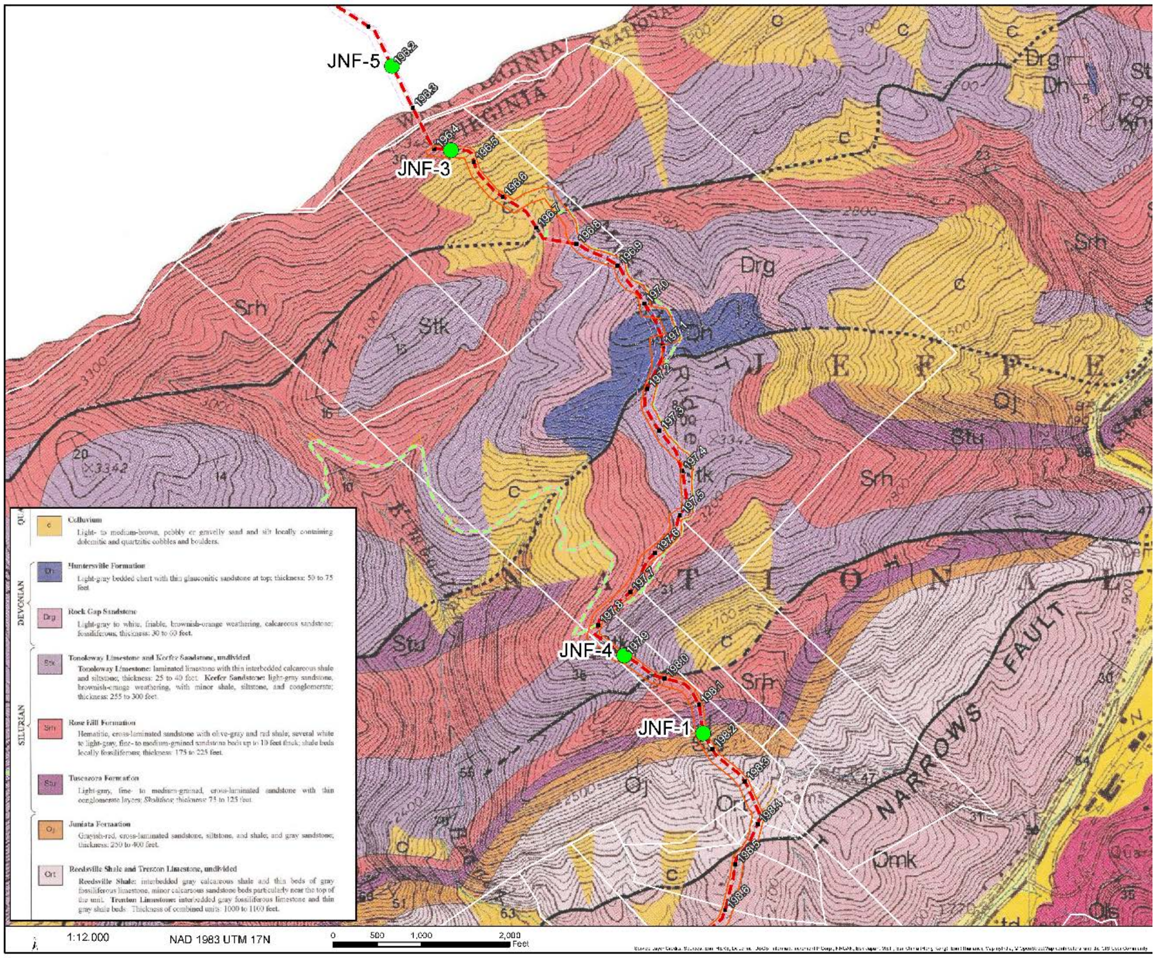

Figure 4 – Representative Site Photographs of Peters Mountain where Rose Hill Formation outcrops at the ridge line and Tuscarora Formation outcrops to the northwest and downslope from the ridge line in the vicinity of the ANST bore (the Juniata Formation underlies the Tuscarora). The bore would likely begin in the Rose Hill Formation on the southeast flank, penetrate the Tuscarora and then enter the Juniata with the receiving pit likely encountering the Juniata Formation on the northwest slope of Peters Mountain.

Figure 5 – This link provides photographs of Tuscarora Formation core from tight-gas exploration in West Virginia (core depth ranges from 6,775 to 6,819 feet below ground.

http://www.wvgs.wvnet.edu/atg/CoreViewer.aspx?RO=4&PN=1&api=4703902751

Figure 6 – Photographs of Tuscarora sandstone and conglomerate units from core provided at the link in Figure 5

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Differential cementation in the Tuscarora Sandstone

FIG. 25a— Tightly-cemented layers alternating with poorly-cemented layers. Depth in feet.

API# 4703902751

FIG. 25b— Narrow horizontal and vertical bands of tightly-cemented sandstone forming a lattice pattern (arrows). Depth in feet.

(Bruner, 1983)

Figure 6 – Continued

FIG. 25c— Irregular lower digitate boundary, similar to the lower boundaries in poorly cemented disk-shaped lenses found in outcrop. Depth in feet.

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FIG. 25d— Poorly-cemented patches over pebbles and clay clasts (arrows). Depth in feet.

(Bruner, 1983)

Figure 7 – Descriptive data on the Tuscarora core provided in Figure 5

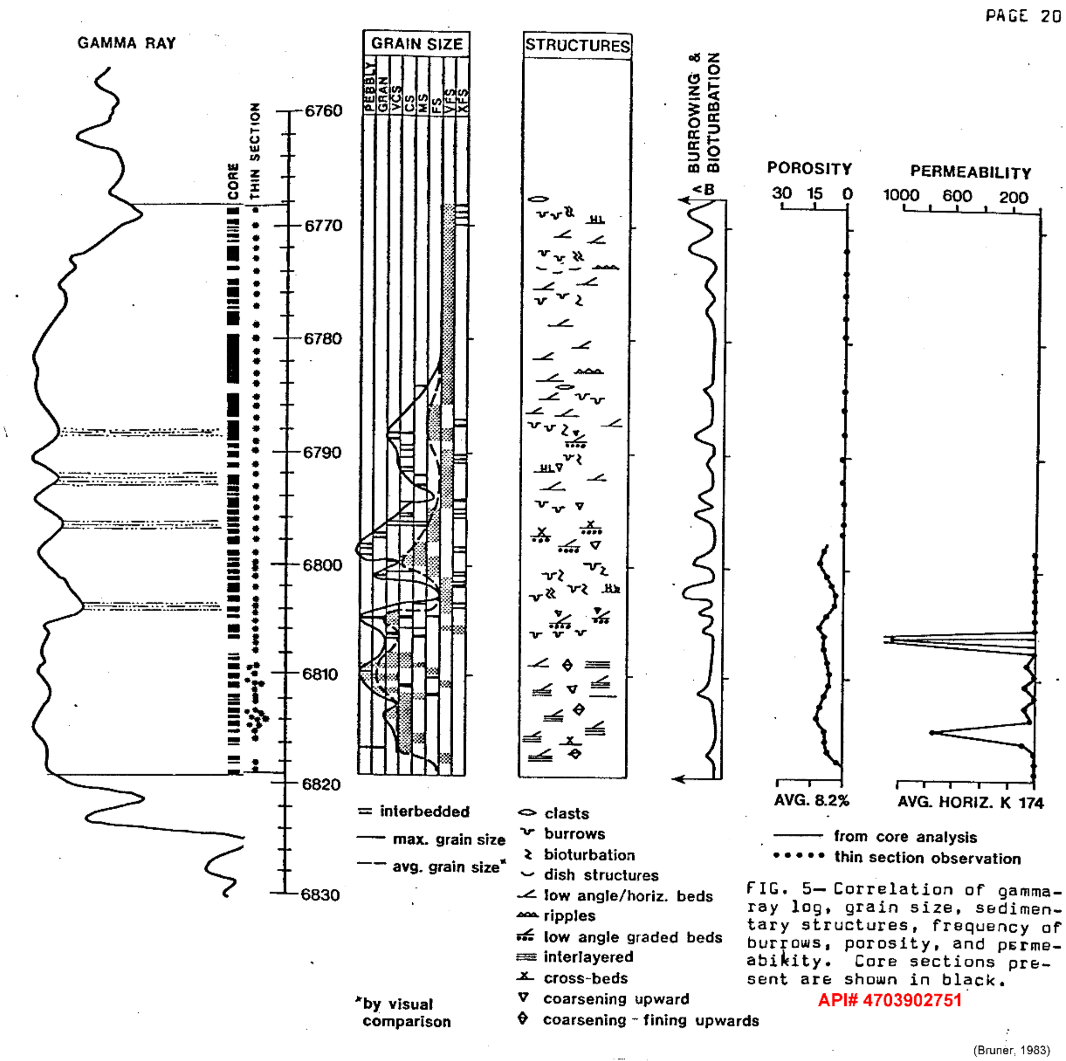

FIG. 5— Correlation of gamma-ray log, grain size, sedimentary structures, frequency of burrows, porosity, and permeability. Core sections present are shown in black.

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(Bruner, 1983)