Accufacts Inc.
"Clear Knowledge in the Over Information Age"

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Karyn Yordy, Executive Assistant, Office of Programs
Commonwealth of Pennsylvania
Department of Environmental Protection
Rachel Carson State Office Building
400 Market Street, 9th Floor
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Re: Accufacts Technical Review of Reevaluation of the New Proposed Horizontal Direction Drill Installation of the 20-inch Pipeline within West Goshen Township (SPL HDD No. S3-0421)

Accufacts Inc. ("Accufacts") was asked to assist West Goshen Township ("WGT") in reviewing the proposed horizontal directional drill ("HDD) file and plan for the Mariner East 2, 20-inch pipeline under West Goshen Township ("Analysis").[1] The original HDD design was modified based on negative impacts associated with a HDD of the 16-inch pipeline within WGT in 2019 that is located in the same general right-of-way. Some of the Mariner East HDD installations experienced problems such as well water quality issues, discharges to waters of the Commonwealth, subsidence such as sinkholes, and excessive vibrations with damage to nearby structures in other nearby eastern Pennsylvania Townships.

Accufacts concurs with the Analysis findings that HDD of the 20-inch, as newly proposed, is the best alternative for crossing WGT provided additional conditions beyond those listed in the Analysis are imposed by PA DEP and implemented by SPLP.[2]

Given the unknown schedule and length of time the HDD may take, WGT should be notified of the following during the HDD activities to install the 20-inch pipeline:

1. when the pilot bore phase starts and when it ends;
2. when the reaming phase starts and ends;

[1] Horizontal Directional Drill Analysis Phoenixville Pike Road PADEP Section 105 Permit No.: E15-862 PA-CH-0290.0000-RD (SPLP HDD No. S3-0421), at website http://files.dep.state.pa.us/ProgramIntegration/PA%20Pipeline%20Portal/MarinerEastII/HDD_Reevaluation_Reports/PhoenixvillePikeRoad/Phoenixville%20Pike%20Road%20-%20S3-0421%20-%20E15-862%20-%20PA-CH-0290.0000-RD.pdf

[2] *Ibid*, unnumbered page 10 of 110 in file.

3. when the final pipe pull starts and ends;
4. indications of possible frac outs (IRs or LOCs) during HDD.

In addition, SPLP should establish monitoring stations to continuously measure and record vibration forces in the general location of the HDD activities, and make those records available for inspection by WGT personnel and consultants throughout the HDD activities.

Given the vibration forces that are associated with larger diameter pipe, long HDDs, especially during reaming activities, it is important to set up vibration monitoring stations along the pipeline right-of way to gauge possible impacts from this activity. Vibrations, both intensity and velocity, should be measured and recorded at the surface at locations where residential structures are in close proximity to the pipeline right-of-way.

The 16-inch pipeline HDD within WGT in 2019 experienced two of what the Analysis identified as inadvertent returns ("IRs), closer to the HDD entrance and exit points where the drill depth was not as great, as well as a loss of drilling fluid circulation ("LOC") event. While the right procedure upon the LOC was apparently observed (stopping the HDD activity pending investigation), the details of this event, such as possible volume and possible duration, were not reported in the Analysis. LOC events imply drilling fluids used in the HDD activity were being lost somewhere, but the release of drilling fluids, which probably occurred deeper in the HDD activity, didn't reach the surface, where it might be observed and mitigated.

A detailed review of the Analysis indicates that SPLP is proposing within WGT to HDD the 20-inch along the same general pipeline right-of-way as the 16-inch installation. The new proposed 20-inch HDD compared to the original 20-inch HDD scheme will be different in several ways. The newly proposed 20-inch HDD will be slighter longer (by about 60 feet), drilled deeper (lowered 98 feet below the design depth originally permitted), generally placed lower than the nearby 16-inch, and utilize intercept drilling. Intercept drilling using more than one drill entry will shorten the actual bore path and should lower the drilling fluid pressure that is associated with longer one entry HDDs that led to frac outs, also called blowouts (either IRs or LOCs).

A critical consideration when reviewing the proposed new 20-inch HDD was the statement "There are no known or mapped sinkholes or other karst features in the area of HDD S3-0421."[3] While the exact subsurface conditions cannot be completely predicted to avoid frac outs that are associated with IRs or LOCs, the identification of possible sensitive water wells and their distance from the HDD activity serves as an important parameter to try and avoid

[3] *Ibid*, subreport from Groundwater & Environmental Services, Inc., "HDD Hydrogeologic Reevaluation Report prepared for Sunoco Pipeline, L.P.," December 2019, p. 5.

well contamination from possible HDD drilling fluids. By design the drilling fluids are nontoxic but nobody wants muddy drinking water should their water be provided by a well and a frac out reaches the well. Distance of the two nearby identified water wells (one cited at about 462 feet and the other at 620 feet from the HDD) would suggest a low risks of HDD frac out contamination from drilling fluids, but the wells should be closely monitored throughout the HDD[4] With the exception of the two water wells, it is reported the rest of the landowners within a 450 foot zone on either side of the proposed HDD are on public water supply.[5]

Accufacts conditionally supports the Analysis' conclusion that the HDD effort for the 20-inch pipeline is the best method to cross WGT with this pipeline, provided the additional precautions identified above are incorporated (i.e. notice to the Township of the key HDD activities and continuous vibration monitoring). It is worth noting that sometimes the effort to comply with an HDD deadline can rush or accelerate the process to the point where such efforts drive IR and frac outs. It is therefore important that the HDD process not be rushed, but focus on doing it right while ensuring the pipe is installed properly underground. The HDD driller should be allowed to take the necessary time to evaluate issues that will unexpectedly occur during the actual HDD activities. This is especially important given the depth of this particular HDD, its proximity to residential structures, and the associated unknowns regarding the geology, even though best efforts may have been completed to limit the unknowns and prevent possible water well contamination and damage to nearby structures. Lastly, I must note that while many efforts have been incorporated to assure a successful HDD of the 20-inch pipeline within WGT, there are always unknowns that can arise during HDD activities that could cause the attempt to be aborted. Not all HDDs are successful for various reasons, usually associated with subsurface geology anomalies.

Richard B. Kuprewicz,
President, Accufacts Inc.

Cc/ Casey LaLonde, Township Manager
David J. Brooman, Special Counsel

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[4] *Ibid*, subreport from Groundwater & Environmental Services, Inc., "HDD Hydrogeologic Reevaluation Report prepared for Sunoco Pipeline, L.P., Figure 5 -Well Search Map – Properties within 450 feet of HDD Alignment," December 2019, p. 11.

[5] Horizontal Directional Drill Analysis Phoenixville Pike Road PADEP Section 105 Permit No.: E15-862 PA-CH-0290.0000-RD (SPLP HDD No. S3-0421), unnumbered but appears to be p. 5. of 110 in file.