SUNOCO PIPELINE
An ENERGY TRANSFER Company

535 Fritztown Road
Sinking Spring, PA 19608

August 30, 2019

Via Electronic Mail
Mr. Scott R. Williamson
Program Manager, Waterways & Wetlands Program
Pennsylvania Department of Environmental Protection
Southcentral Regional Office
909 Elmerton Avenue
Harrisburg, PA 17110-8200

Re: Supplemental Analysis
DEP School House Rd. HDD Re-Evaluation Report
School House Road Crossing 16" Horizontal Directional Drill (S3-0091-16)
Permit No. E38-194
South Londonderry Township, Lebanon County

Dear Mr. Williamson:

In compliance with the Corrected Stipulated Order dated August 10, 2017, a Reevaluation Report on the above-referenced horizontal directional drill (HDD) was submitted to the Department on February 20, 2019. In a letter dated March 28, 2019, the Department requested further information. SPLP responded to this request on May 20, 2019. In response to a conference call on August 15, 2019 discussing the Re-Evaluation report, and "punch out IR", SPLP submits the following analysis of the IR event for your consideration.

The IR occurred on July 8, 2017, with the appearance of drilling fluids at the ground surface 70 foot (ft) before the exit point, and 20 ft south of the HDD centerline. SPLP's analysis of the IR utilized review of the progress reports for the pilot phase drilling tracked on the depth of the profile, and known depth to bedrock in that area of the profile as drilling proceeded towards the exit point. The following is a summary and discussion of drilling activity leading up to the punch out IR:

- The drilling report for July 6, 2017 recorded the pilot tool at 892 ft on the profile and beginning depth of 75 ft, ending the day at 1,140 ft and a tool depth of 63 ft. This rate of progress against actual drilling time results in a rate of progress of 1.5 hours per joint (approximately 31 ft in 1.5 hours).

- The drilling report for July 7, 2017 recorded the pilot tool progressing 290 ft, with an ending tool depth of 25 ft below ground surface. The rate of pilot drilling progress increased to approximately 1-hour per joint.

- The drilling report for July 8, 2019 recorded 2 hours and 5 minutes of drilling time with 62 ft of progress when the IR was discovered and drilling halted.

Based upon recorded observations by SPLP drilling specialists monitoring multiple HDD's completed on the Mariner 2/2X project, a pilot phase drilling time of 1.5 hours per joint is indicative of

moderately high strength and competent bedrock. A drilling time of 1-hour per joint is still indicative of competent bedrock but having less strength; therefore, immediately prior to the IR event, the pilot tool was progressing through competent bedrock with lower compressive strength.

Tracking the pilot tool progress as discussed above on the "as-drilled" profile, relative to the known depth to bedrock, reveals that the IR occurred immediately upon the pilot tool exiting bedrock at approximately HDD Station 14+92.

SPLP notes the IR surfaced approximately 70 ft in front of the tool location at the edge of a cleared field. It's possible the presence of woody vegetation and root zone of this land cover type overlying the HDD, in combination with non-saturated soil conditions suppressed the appearance of the drilling fluids as an IR closer to the actual tool location.

Based on the time/progress pilot tool drilling data, the near surface bedrock appears moderately competent.

The drilling data indicates that the SPLP drilling inspectors and Professional Geologists monitoring this drill will need to coordinate with the driller and closely observe the actual tool location relative to the depth of bedrock while progressing towards the exit point. The inspectors and driller should be prepared to immediately stop drilling when tool face pressure drops at the overburden/bedrock interface. Once the tool is above bedrock, then the driller should be able to push the pilot tool through the overburden to the exit point using little to no fluids.

Lastly, this HDD occurred before SPLP mandated the use of an annular pressure monitoring (APM) tool during pilot phase drilling and implementation of enhanced monitoring and other drilling Best Management Practices as listed in the Re-evaluation report. It is quite possible the use of an APM tool and shut down of the HDD immediately upon pressure loss during drilling of the 20-inch pipeline could have prevented the IR occurrence.

SPLP submits that we have been, and are, in complete compliance with the agreed terms and analysis requirements of the Order, as agreed to by the Department, and that no further analysis is required for the Department to consent to the start of this HDD. SPLP requests that the Department approve the Reevaluation Report for the School House Road Crossing Horizontal Directional Drill (S3-0091) as soon as possible.

Sincerely,

Larry J. Gremminger, CWB
Vice-President – Environmental, Health & Safety
Energy Transfer Partners
Mariner East 2 Pipeline Project