

**TABLE 1
SUMMARY OF INFILTRATION RATES
BLOCK VALVE LOCATIONS - CONSTRUCTION SPREADS 2, 3, 4, 5, and 6
PENNSYLVANIA PIPELINE PROJECT
SUNOCO PIPELINE, LP
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Block Valve Site	County	Construction Spread	Test Type	Test ID ¹	Test Depth (bgs)	Test Infiltration Rate (in/hr)	Average Infiltration Rate (in/hr)	Geometric Mean Infiltration Rate (in/hr)	FS	Recommended Rate (in/hr)	Soil Type (USDA Class)	Seasonal High Water, Mottling, Bedrock (bgs)	Rationale for Recommended Design Rate				
SOUTHWEST REGION																	
KOONTZ ROAD EFRD	Westmoreland	2	DR	IT-A (IT-1a)	4 inches	5.91	7.13	7.02	2	3.5	sandy loam	not encountered, > 30 inches	IT-1 and IT-2 (performed in 2015) are outside BMP Area.				
			DR	IT-B (IT-1b)	4 inches	8.34					sandy loam	not encountered, > 26 inches					
BUSH ROAD VALVE	Westmoreland	2	DR	IT-A (IT-2a)	3 inches	18.6	10.60	6.95	3	2.3	silt loam	not encountered, > 25 inches	IT-1 and IT-2 (performed in 2015) are outside BMP Area.				
			DR	IT-B (IT-2b)	3 inches	2.6					silt loam	not encountered, > 26 inches					
WESTINGHOUSE ROAD EFRD	Westmoreland	2	DR	IT-A (IT-3a)	1 foot	1.1	1.86	1.70	3	0.6	silt loam	Refusal at 12 inches bgs	IT-A (IT-3a) and IT-1, IT-2 are within or near BMP Berm/Ponding Area. IT-2 data not included in determination of Recommended Rate due to highest result in group.				
			DRCH	IT-1	6 inches	2.62					SC	not encountered, > 24 inches					
			DRCH	IT-2	6 inches	3.42					SM/ML	not encountered, > 24 inches					
NEWPORT ROAD VALVE	Indiana	2	DR	IT-A (IT-4a)	2.5 inches	2.94	NA ²	NA ²	3	1.0	silt loam	Refusal at 24 inches bgs	IT-B (IT-4b), IT-D (IT-4d), IT-3 and IT-4 are outside of BMP Berms/Ponding Areas. IT-1 and IT-2 are at BMP Area 1, IT-A (IT-4a) is at BMP Area 2, and IT-C (IT-4c) is at BMP Area 3.				
			DR	IT-B (IT-4b)	2 inches	6.0	NA ²	NA ²	NA ³	NA ³	silt loam	not encountered, > 30 inches					
			DR	IT-C (IT-4c)	2.5 inches	1.63	NA ²	NA ²	3	0.5	silt loam	Refusal at 26 inches bgs					
			DR	IT-D (IT-4d)	2 inches	8.5	NA ²	NA ²	NA ³	NA ³	silt loam	not encountered, > 30 inches					
			DRCH	IT-1	6 inches	1.95	2.22	2.20	3	0.7	SM/ML	not encountered, > 15 inches					
			DRCH	IT-2	6 inches	2.49					SM/ML	not encountered, > 14 inches					
CHESTNUT RIDGE ROAD VALVE	Indiana	2	DR	IT-A (IT-5a)	2 inches	13.88	6.94	0.37	3	0.1	sandy loam	not encountered, > 13 inches	Rock at 26 inches, but likely not bedrock. Assumed sandy loam at C, data missing in upper 6 inches. Only IT-1 and IT-A (IT-5a) within or near BMP Area, all other infiltration tests performed in 2015 or 2016 are outside of BMP Area - IT-2, IT-B (IT-5b) and IT-C (IT-5c).				
			DRCH	IT-1	6 inches	0					CL	not encountered, > 36 inches					
			DR	IT-B (IT-5b)	2 inches	1.03					NA ²	NA ²		NA ³	NA ³	sandy loam	> 26 inches bgs (rock)
			DR	IT-C (IT-5c)	2 inches	2.47					NA ²	NA ²		NA ³	NA ³	sandy loam	> 26 inches bgs (rock)
GRANGE HALL ROAD EFRD	Indiana	2	DR	IT-A (IT-6a)	3 feet	0.81	0.47	0.32	3	0.1	silty clay	not encountered, > 62 inches	IT-1 and IT-2 (performed in 2015) are within BMP Area and both shallow (6 inches). IT-A (IT-6a) and IT-B (IT-6b) are near BMP Area and both deep (3 feet). Recommended rates are provided separately for shallow and deep tests.				
			DR	IT-B (IT-6b)	3 feet	0.13					silty clay	not encountered, > 62 inches					
			DRCH	IT-1	6 inches	0					CL	not encountered, > 36 inches					
			DRCH	IT-2	6 inches	0					CL	not encountered, > 38 inches					
COONEY ROAD VALVE	Cambria	2	DR	IT-A (IT-7a)	3 feet	0.41	1.68	1.10	3	0.4	silty clay loam	not encountered, > 60 inches	IT-A (IT-7a) and IT-B (IT-7b) are within or near BMP Area.				
			DR	IT-B (IT-7b)	3 feet	2.94					silty clay loam	not encountered, > 60 inches					
KOZAK ROAD VALVE	Cambria	2	DR	IT-A (IT-8a)	3 feet	0.97	0.08	0.06	2	0.0	loam	not encountered, > 54 inches	Some moisture noted at > 53 inches, all infiltration tests are deep tests (>2 feet). No infiltration test performed at IT-2 (2015). IT-A (IT-8a), IT-B (IT-8b), IT-1 and IT-2 are within or near BMP Area 1. IT-C (IT-8c) and IT-D (IT-8d) are within or near BMP Area 2. IT-A data not included in determination of Recommended Rate due to highest result in group.				
			DR	IT-B (IT-8b)	3 feet	0.03					loam	not encountered, > 56 inches					
			SRFH	IT-1	2 feet	0.12					CL	not encountered, > 24 inches					
			DR	IT-C (IT-8c)	3 feet	0.13					loam	not encountered, > 56 inches					
			DR	IT-D (IT-8d)	3 feet	0.13					loam	not encountered, > 56 inches					
SOUTH CENTRAL REGION																	
VALLEY FORGE ROAD EFRD	Blair	3	DR	IT-A	4 inches	3.66	NA ²	NA ²	2	1.8	loam	not encountered, > 25 inches	IT-B shallow stopped at 10 inches, but assumed not bedrock. IT-01 and IT-02 within BMP Area 1. IT-A near BMP Area C. IT-B is outside of BMP Areas.				
			DR	IT-B	4 inches	11.34	NA ²	NA ²	NA ³	NA ³	loam	not encountered, > 10 inches					
			DR	IT-01	6 inches	0.5	0.75	0.71	3	0.2	silt loam	not encountered, > 30 inches					
			DR	IT-02	6 inches	1.0					silt loam	not encountered, > 30 inches					
CHARGER HIGHWAY EFRD	Blair	3	DR	IT-A	1 inches	*1	NA ²	NA ²	NA ³	NA ³	silty clay loam	Bedrock at 7 inches bgs	See notes at end of table.				
			DR	IT-B	2 inches	*1	NA ²	NA ²	NA ³	NA ³	clay loam	Bedrock at 5 inches bgs					
			DR	IT-C	2 inches	*1	NA ²	NA ²	NA ³	NA ³	clay loam	Bedrock at 16 inches bgs					
			DR	IT-D	2 inches	*1	NA ²	NA ²	NA ³	NA ³	silt loam	Bedrock at 12 inches bgs					
LOCKE MOUNTAIN ROAD VALVE	Blair	3	DR	IT-A	2.5 inches	0	NA ²	NA ²	NA ³	NA ³	silt loam	not encountered, > 60 inches	Some water on shale at 60 inches. No Recommended Rate required because engineering design only shows slow release BMP areas.				
			DR	IT-A Deep	3 feet	8.72	NA ²	NA ²	NA ³	NA ³	saprolite	not encountered, > 60 inches					
			DR	IT-B	3 inches	0.13	NA ²	NA ²	NA ³	NA ³	silt loam	Water at 58 inches bgs					
			DR	IT-B Deep	3 feet	0.13	NA ²	NA ²	NA ³	NA ³	saprolite	Water at 58 inches bgs					
JUNIATA VALLEY ROAD EFRD	Blair	3	DR	IT-A	3 inches	0	NA ²	NA ²	NA ³	NA ³	loam	not encountered, > 36 inches	IT-A located outside of BMP Area (> 25 feet). IT-B, IT-C, IT-01 and IT-02 within or near (approximately 25 feet) BMP Area. IT-01 data not included in determination of Recommended Rate due to highest result in group.				
			DR	IT-B	2.5 inches	0	2.81	0.20	2	0.1	loam	not encountered, > 36 inches					
			DR	IT-C	2.5 inches	8.34					loam	not encountered, > 36 inches					
			DR	IT-01	6 inches	46.5					loam	not encountered, > 21 inches					
			DR	IT-02	6 inches	0.1					loam	not encountered, > 21 inches					
HIGH STREET VALVE	Blair	3	DR	IT-A	4 inches	1.66	NA ²	NA ²	3	0.6	silt loam	not encountered, > 60 inches	IT-A within BMP Area A at shallow depth. IT-A Deep within BMP Area at deep depth. Recommended rates are provided separately for shallow and deep tests. IT-B, IT-02 and IT-3 are outside BMP Area.				
			DR	IT-A Deep	3 feet	5.44	NA ²	NA ²	3	1.8	silty clay loam	not encountered, > 60 inches					
			DR	IT-B	5 inches	4.31	NA ²	NA ²	NA ³	NA ³	silt loam	not encountered, > 36 inches					
			DR	IT-B Deep	1 foot	5.63	NA ²	NA ²	NA ³	NA ³	silty clay loam	not encountered, > 36 inches					

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Block Valve Site	County	Construction Spread	Test Type	Test ID ¹	Test Depth (bgs)	Test Infiltration Rate (in/hr)	Average Infiltration Rate (in/hr)	Geometric Mean Infiltration Rate (in/hr)	FS	Recommended Rate (in/hr)	Soil Type (USDA Class)	Seasonal High Water, Mottling, Bedrock (bgs)	Rationale for Recommended Design Rate
RAYSTOWN ROAD EFRD	Huntingdon	3	DR	IT-A	4 inches	20.06	NA ²	NA ²	2	10.0	loamy sand	Mottling at 37 inches	IT-1 and IT-2 (performed in 2015) are outside BMP Area. IT-A Deep, IT-B Deep and IT-C Deep are not applicable for determining Recommended Rate because mottling was observed within 24 inches of infiltration testing. IT-A within BMP Area A, IT-C and IT-D within or near BMP Area B.
			DR	IT-A Deep	2 feet	4.97	NA ²	NA ²	NA ³	NA ³	loamy sand	Mottling at 37 inches	
			DR	IT-B	4 inches	0.41	NA ²	NA ²	NA ³	NA ³	silty clay	Mottling at 38 inches	
			DR	IT-B Deep	3 feet	0.31	NA ²	NA ²	NA ³	NA ³	silty clay	Mottling at 38 inches	
			DR	IT-C	4 inches	0	1.97	0.20	3	0.1	silty clay	Mottling at 38 inches	
			DR	IT-D	4 inches	3.94	1.97	0.20	3	0.1	silty clay	Mottling at 38 inches	
			DR	IT-C Deep	3 feet	0	NA ²	NA ²	NA ³	NA ³	silty clay	Mottling at 38 inches	
SEVEN POINTS LOOP EFRD	Huntingdon	3	DR	IT-A	2 inches	0.63	NA ²	NA ²	NA ³	NA ³	silty clay loam	not encountered, > 25 inches	*Did not perform infiltration test at IT-A Deep due to access issue. Weathered rock depth estimated to be center of C horizon (24 to 62 inches). Post-Construction Stormwater Management Plan does not indicate a BMP design, therefore, no Recommended Rates were determined.
			DR	IT-A Deep	NA ¹	*	NA ²	NA ²	NA ³	NA ³	NA ⁴	not encountered, > 25 inches	
			DR	IT-B	2 inches	3.75	NA ²	NA ²	NA ³	NA ³	loam	not encountered, > 44 inches	
HAPPY HILLS ROAD VALVE	Huntingdon	3	DR	IT-A	3 inches	13.5	11.35	11.14	3	3.7	sandy loam	not encountered, > 27 inches	IT-02 and IT-03 appear to be > 25 feet of BMP Area A. IT-A and IT-01 are both outside BMP Area A but approximately 25 feet.
			DR	IT-1	6 inches	9.2	11.35	11.14	3	3.7	silt loam	not encountered, > 36 inches	
HARES VALLEY ROAD VALVE	Huntingdon	3	DR	IT-A	2 inches	8.2	NA ²	NA ²	3	2.7	silt loam	not encountered, > 30 inches	IT-01 outside BMP Area A (> 25 feet). IT-02 within BMP Area B. IT-03 near BMP Area D. IT-A near (<25 feet) BMP Area E.
			DR	IT-02	6 inches	2.6	NA ²	NA ²	3	0.9	silty clay loam	not encountered, > 40 inches	
			DR	IT-03	6 inches	0.4	NA ²	NA ²	3	0.1	silty clay loam	not encountered, > 40 inches	
SHADE VALLEY ROAD VALVE	Huntingdon	3	DR	IT-A	3 inches	3.56	4.88	4.70	2	2.3	loam	not encountered, > 27 inches	IT-A and IT-02 are within or near BMP Area A, IT-B and IT-01 are within or near BMP Area B. IT-D is within BMP Area D. IT-C and IT-D are outside of BMP areas. Soil types are consistent between 2015 and 2016.
			DR	IT-02	6 inches	6.2	4.88	4.70	2	2.3	sandy loam	not encountered, > 19 inches	
			DR	IT-B	3 inches	1.06	2.13	1.84	2	0.9	loam	not encountered, > 27 inches	
			DR	IT-01	6 inches	3.2	2.13	1.84	2	0.9	sandy loam	not encountered, > 19 inches	
			DR	IT-C	4 inches	9.56	NA ²	NA ²	NA ³	NA ³	loam	not encountered, > 27 inches	
			DR	IT-D	3 inches	5.72	NA ²	NA ²	2	2.9	loam	not encountered, > 26 inches	
PLAINFIELD	Cumberland	4	DR	IT-A	6 inches	3.13	NA ²	NA ²	NA ³	NA ³	clay/clay loam	not encountered, > 26 inches	Post-Construction Stormwater Management Plan does not indicate a BMP design, therefore, no Recommended Rate was determined.
			DR	IT-A (36A)	6 inches	*	NA ²	NA ²	NA ³	NA ³	silt loam/silty clay loam	not encountered, > 16 inches	
CREEK ROAD EFRD	Cumberland	4	DR	IT-B (36B)	6 inches	5.91	NA ²	NA ²	3	2.0	clay loam	not encountered, > 18 inches	* Infiltration testing not performed at IT-A (36A) and IT-C (36C) due to excessive water level drop during pre-test. Based on previous work (Percolation testing in 2015), bedrock likely very shallow. IT-B (36B) near BMP Area (<25 feet).
			DR	IT-C (36C)	6 inches	*	NA ²	NA ²	NA ³	NA ³	silt loam	not encountered, > 16 inches	
			DR	IT-A	NA ¹	*	NA ²	NA ²	NA ³	NA ³	loam	not encountered, > 21 inches	
WOLF BRIDGE ROAD VALVE	Cumberland	4	DR	IT-A	NA ¹	*	NA ²	NA ²	NA ³	NA ³	loam	not encountered, > 21 inches	No test due to thin soil cover. Post-Construction Stormwater Management Plan does not indicate a BMP design, therefore, no Recommended Rates were determined.
			DR	IT-A (19A)	2.5 inches	12.0	4.87	0.68	3	0.2	silt loam	not encountered, > 24 inches	
			DR	IT-B (19B)	2 inches	0	4.87	0.68	3	0.2	silty clay	Mottling at 12 inches bgs	
			DR	IT-04	6 inches	13.5	4.87	0.68	3	0.2	silt loam	not encountered, > 90 inches	
			DR	IT-05	6 inches	2.6	4.87	0.68	3	0.2	silt loam	not encountered, > 90 inches	
			DR	IT-01	3 feet	0.1	0.10	0.10	3	0.0	silt loam	not encountered, > 88 inches	
			DR	IT-02	3 feet	1.9	0.10	0.10	3	0.0	silt loam	not encountered, > 88 inches	
ARCONA ROAD VALVE	Cumberland	4	DR	IT-03	3 feet	0.1	0.10	0.10	3	0.0	silt loam	not encountered, > 90 inches	IT-A (20A) within BMP Area and IT-B (20B), IT-01, and IT-02 near the BMP Area (approximately 25 feet or less). IT-B (20B) data not included in determination of Recommended Rate due to highest result in group. Recommended rates are provided separately for shallow and deep tests.
			DR	IT-A (20A)	2 inches	7.88	6.59	6.52	3	2.2	silt loam	not encountered, > 59 inches	
			DR	IT-B (20B)	2 inches	12.36	6.59	6.52	3	2.2	silt loam	not encountered, > 60 inches	
			DR	IT-01	6 inches	5.4	6.59	6.52	3	2.2	silty clay loam	not encountered, > 42 inches	
			DR	IT-02	6 inches	6.5	6.59	6.52	3	2.2	silty clay loam	not encountered, > 42 inches	
			DR	IT-A Deep (20A)	3 feet	5.25	2.72	1.00	3	0.3	silty clay	not encountered, > 59 inches	
OLD YORK ROAD EFRD	York	4	DR	IT-B Deep (20B)	3 feet	0.19	2.72	1.00	3	0.3	clay	not encountered, > 60 inches	* Test was suspended early due to Landowner dispute w/ Sunoco. Post-Construction Stormwater Management Plan does not indicate a BMP design, therefore, no Recommended Rates were determined.
			DR	IT-A (21A)	3 inches	*	NA ²	NA ²	NA ³	NA ³	silt loam	Mottling at 16 inches	
			DR	IT-A Deep (21A)	3 feet	*	NA ²	NA ²	NA ³	NA ³	sand	not encountered, > 36 inches	
			DR	IT-B (21B)	3 inches	*	NA ²	NA ²	NA ³	NA ³	silt loam	not encountered, > 59 inches	
OLD YORK ROAD EFRD	York	4	DR	IT-B Deep (21B)	3 feet	*	NA ²	NA ²	NA ³	NA ³	clay	not encountered, > 59 inches	* Test was suspended early due to Landowner dispute w/ Sunoco. Post-Construction Stormwater Management Plan does not indicate a BMP design, therefore, no Recommended Rates were determined.

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N UNION ST EFRD	Dauphin	4	DR	IT-A (22A)	4 inches	2.0	NA ²	NA ²	3	0.7	silt loam	not encountered, > 25 inches	IT-B (22B) within BMP Area A and IT-01 and IT-02 are near BMP Area A (< 25 feet). IT-A (22A) and IT-04 are within or near BMP Area B but at different depths. Recommended rates are provided separately for shallow and deep tests.				
			SRFH	IT-04	14 inches	1.32	NA ²	NA ²	2	0.7	SM	not encountered, > 24 inches					
			DR	IT-B (22B)	2 inches	16.0	NA ²	NA ²	3	5.3	silt loam	not encountered, > 25 inches					
			SRFH	IT-01	42 inches	1.44	1.56	1.56	2	0.8	SM	not encountered, > 43 inches					
			SRFH	IT-02	3 feet	1.68					SM	not encountered, > 46 inches					
GATES ROAD VALVE	Dauphin	4	DR	IT-A	4 inches	6.0	NA ²	NA ²	NA ³	NA ³	sandy loam	not encountered, > 27 inches	IT-A appears to be outside BMP Area (not provided on Figure). IT-01 and IT-02 are within BMP Area. Lithologies consistent with 2015.				
			DRCH	IT-01	6 inches	0.1	0.90	0.41	3	0.1	CL	not encountered, > 48 inches					
			DRCH	IT-02	6 inches	1.69					SC	not encountered, > 48 inches					
SCHAEFFER ROAD VALVE	Lebanon	5	DR	IT-A	1 foot	15.19	12.19	11.82	3	3.9	silty clay loam	not encountered, > 37 inches	IT-A and IT-B within or near BMP Area. IT-04 and IT-05 outside (>25 feet) from BMP Area. IT-01 through IT-03 not on Figure, >500 feet from BMP Area.				
			DR	IT-B	1 foot	9.19					silty clay loam	not encountered, > 39 inches					
SINCLAIR ROAD VALVE	Lebanon	5	DR	IT-A	4 inches	15.19	NA ²	NA ²	NA ³	NA ³	loamy sand	not encountered, > 60 inches	IT-01 and IT-02 within BMP Area B. IT-A within soil ammdments area - outside of BMP Area, no Recommended Rate determined.				
			DR	IT-A Deep	3 feet	12.94	NA ²	NA ²	NA ³	NA ³	sandy loam	not encountered, > 60 inches					
			DRCH	IT-01	5 inches	5.51	4.74	4.68	2	2.3	SM	not encountered, > 40 inches					
			DRCH	IT-02	5 inches	3.97					SM	not encountered, > 43 inches					
HOPELAND ROAD VALVE	Lebanon	5	DR	IT-A	2 inches	1.1	NA ²	NA ²	NA ³	NA ³	silt loam	not encountered, > 28 inches	IT-01 and IT-02 within or near BMP Area. IT-A outside BMP Area (> 25 feet).				
			DRCH	IT-01	6 inches	2.62	1.35	0.43	3	0.1	SM	not encountered, > 42 inches					
			DRCH	IT-02	6 inches	0.07					CL	not encountered, > 36 inches					
BLAINSPORT	Lancaster	5	DR	IT-A	2 feet	0	NA ²	NA ²	NA ³	NA ³	sandy loam	not encountered, > 49 inches	Post-Construction Stormwater Management Plan does not indicate a BMP design, therefore, no Recommended Rates were determined.				
			DR	IT-B	2 feet	0	NA ²	NA ²	NA ³	NA ³	sandy loam	not encountered, > 49 inches					
			DR	IT-C	2 feet	0	NA ²	NA ²	NA ³	NA ³	sandy loam	not encountered, > 49 inches					
MONTELLO	Berks	5	DR	IT-A	3 inches	6.84	NA ²	NA ²	NA ³	NA ³	silty clay loam	not encountered, > 27 inches	IT-A outside of BMP Area A (> 25 feet). IT-01 and IT-02 are near (< 25 feet) BMP Area A. IT-03 in 2-foot deep V trench. IT-4 within 25 feet of BMP Area B. IT-B within 25 feet of 3-foot wide infiltration trench.				
			SRFH	IT-01	9.75 inches	4.08	4.92	4.85	3	1.6	ML/SM	not encountered, > 48 inches					
			SRFH	IT-02	9.1 inches	5.76					ML/SM	not encountered, > 48 inches					
			DRCH	IT-03	9 inches	1.14	NA ²	NA ²	3	0.4	ML	not encountered, > 48 inches					
			DRCH	IT-04	9 inches	0.13	NA ²	NA ²	3	0.0	ML/SM	not encountered, > 48 inches					
			DR	IT-B	3 feet	0.38	NA ²	NA ²	3	0.1	silty clay	not encountered, > 62 inches					
WYOMISSING ROAD VALVE	Berks	5	DR	IT-A	7 inches	3.19	NA ²	NA ²	NA ³	NA ³	silt loam	not encountered, > 28 inches	Post-Construction Stormwater Management Plan does not indicate a BMP design, therefore, no Recommended Rates were determined.				
			DR	IT-B	8 inches	3.5	NA ²	NA ²	NA ³	NA ³	loam	not encountered, > 28 inches					
			DR	IT-C	2 inches	10.31	NA ²	NA ²	NA ³	NA ³	silty clay loam	not encountered, > 27 inches					
MORGANTOWN ROAD VALVE	Berks	5	DR	IT-A	3 inches	28.31	NA ²	NA ²	2	14.2	silty sand	not encountered, > 27 inches	IT-A within/near BMP Area A, IT-C within/near BMP Area B. IT-C and IT-D between BMP Areas A and B, but >25 feet from either.				
			DR	IT-B	4 inches	24.94	NA ²	NA ²	NA ³	NA ³	silty sand	not encountered, > 27 inches					
			DR	IT-C	4 inches	15.66	NA ²	NA ²	2	7.8	silty sand	not encountered, > 27 inches					
			DR	IT-D	3 inches	17.63	NA ²	NA ²	NA ³	NA ³	silty sand	not encountered, > 27 inches					
SOUTHEAST REGION																	
FAIRVIEW ROAD ME2 EFRD	Chester	6	DR	IT-A	6 inches	0.5	NA ²	NA ²	3	0.2	silty clay	not encountered, > 24 inches	IT-2 (performed in 2015) within BMP Area A. IT-01 within BMP Area A, but not performed (2015). IT-A within BMP Area B.				
			SRFH	IT-2	6 inches	0.6	NA ²	NA ²	3	0.2	CL/SC	not encountered, > 6 inches					
EAST LINCOLN HIGHWAY VALVE	Chester	6	DR	IT-A	4 inches	5.25	1.14	0.84	2	0.4	loamy sand	not encountered, > 27 inches	IT-A and IT-01 through IT-03 are within or near (< 25 feet) of BMP Area A. IT-A data not included in determination of Recommended Rate due to highest result in group.				
			DRCH	IT-01	6 inches	0.51					ML	not encountered, > 36 inches					
			DRCH	IT-02	6 inches	2.45					SM	not encountered, > 48 inches					
			DRCH	IT-03	6 inches	0.47					ML	not encountered, > 36 inches					
BOOT ROAD EFRD	Chester	6	DR	IT-A (IT-3a)	2 inches	0.2	0.17	0.12	3	0.0	loam	Bedrock at 48 inches	* No deep test conducted at IT-B Deep due to presence of bedrock within 2 feet of Infiltration Test depth. IT-A (IT-3a), IT-B (IT-3b), IT-01 and IT-02 within or near (within 25 feet) of BMP Area. IT-B (IT-3b) data not included in determination of Recommended Rate due to highest result in group. Recommended rates are provided separately for shallow and deep tests.				
			DR	IT-B (IT-3b)	2 inches	1.0					loam	Bedrock at 30 inches					
			DRCH	IT-01	6 inches	0.27					CL	not encountered, > 18 inches					
			DRCH	IT-02	6 inches	0.03					SC	not encountered, > 19 inches					
			DR	IT-A Deep (IT-3a)	2 feet	0.2					NA ²	NA ²		2	0.1	loam	Bedrock at 48 inches
			DR	IT-B Deep (IT-3b)	NA ¹	*					NA ²	NA ²		NA ³	NA ³	bedrock	Bedrock at 30 inches

**TABLE 1
SUMMARY OF INFILTRATION RATES
BLOCK VALVE LOCATIONS - CONSTRUCTION SPREADS 2, 3, 4, 5, and 6
PENNSYLVANIA PIPELINE PROJECT
SUNOCO PIPELINE, LP
PAGE 4 OF 4**

Block Valve Site	County	Construction Spread	Test Type	Test ID ¹	Test Depth (bgs)	Test Infiltration Rate (in/hr)	Average Infiltration Rate (in/hr)	Geometric Mean Infiltration Rate (in/hr)	FS	Recommended Rate (in/hr)	Soil Type (USDA Class)	Seasonal High Water, Mottling, Bedrock (bgs)	Rationale for Recommended Design Rate
MIDDLETOWN ROAD EFRD (S.Chester Road)	Delaware	6	DR	IT-A	4 inches	3.34	NA ²	NA ²	NA ³	NA ³	sandy loam	not encountered, > 60 inches	* "Sensitive" site near residential development. IT-C, IT-D, IT-E and IT-F were not completed at direction of project engineers (due to sensitive nature of site). Post-Construction Stormwater Management Plan does not indicate a BMP design, therefore, no Recommended Rates were determined.
			DR	IT-A Deep	3 feet	0.13	NA ²	NA ²	NA ³	NA ³	loamy sand	not encountered, > 60 inches	
			DR	IT-B	3 inches	0.97	NA ²	NA ²	NA ³	NA ³	sandy loam	not encountered, > 60 inches	
			DR	IT-B Deep	3 feet	2.81	NA ²	NA ²	NA ³	NA ³	loamy sand	not encountered, > 60 inches	
			DR	IT-C	NA ¹	*	NA ²	NA ²	NA ³	NA ³	NA ⁴	NA ⁴	
			DR	IT-D	NA ¹	*	NA ²	NA ²	NA ³	NA ³	NA ⁴	NA ⁴	
			DR	IT-E	NA ¹	*	NA ²	NA ²	NA ³	NA ³	NA ⁴	NA ⁴	
S PENNELL RD EFRD	Delaware	6	DR	IT-F	NA ¹	*	NA ²	NA ²	NA ³	NA ³	NA ⁴	NA ⁴	* Gary Wisniewski (Percheron Field Services Right of Way Agent) told field crew to only do Infiltration Tests for Locations IT-C (IT-05c) and IT-D. IT-C (IT-05c) outside of BMP Area (> 25 feet). IT-D (IT-5d), IT-01 and IT-02 are within or near BMP Area 1 (IT-02 is closer to BMP Area 2). IT-1 data not included in determination of Recommended Rate due to highest result in group.
			DR	IT-A	NA ¹	*	NA ²	NA ²	NA ³	NA ³	NA ⁴	NA ⁴	
			DR	IT-B	NA ¹	*	NA ²	NA ²	NA ³	NA ³	NA ⁴	NA ⁴	
			DR	IT-C (IT-5c)	2 inches	3.6	NA ²	NA ²	NA ³	NA ³	loam	not encountered, > 24 inches	
			DR	IT-D (IT-5d)	2 inches	0.1	0.20	0.17	3	0.1	silt loam	not encountered, > 13 inches	
			DR	IT-1	6 inches	1.9					silt loam	not encountered, > 53 inches	
DR	IT-2	6 inches	0.3					silt loam	not encountered, > 53 inches				

Notes:

DR = Double Ring Infiltrometer Test - consistent with pages 6 to 7 of Appendix C of Pennsylvania Stormwater Best Management Practices Manual, December 30, 2006

DRCH = Double Ring Constant Head Infiltration Test - ASTM D3385

PCSM = Post-Construction Stormwater Management

SRFH = Single Ring Falling Head Infiltration Test - ASTM D5126

bgs = below ground surface

in = inch

hr = hour

FS = Factor of Safety. Assumed 2 for soils coarser than loam, and 3 for finer-grained soils,

in accordance with Appendix C of Pennsylvania Stormwater Best Management Practices Manual, December 30, 2006

¹ Test ID is consistent with Site Trip Reports. ID provided in parentheses is Test ID as shown on PCSM Figures.

NA¹ - Infiltration Test not conducted (see Rationale for Recommended Design Rate column)

NA² - Insufficient data to perform calculation (i.e. single data point)

NA³ - Safety Factor and Recommended Rate not determined because Infiltration Test performed outside of BMP Area.

NA⁴ - Not applicable or data not available

*¹ No tests conducted due to rapid infiltration rate and/or bedrock within 24 inches of test depth (e.g. 2 foot soil separation not present).

* No test conducted - for details, refer to Rationale for Recommended Design Rate

General Notes applicable to whole Table -

Blue shading signifies positive detection/observation of bedrock, seasonal high groundwater or mottling.

Only 2015 Infiltration Test Results provided in Table 1 if relevant to determination of Recommended Rate.

2015 Infiltration Tests designated with sequential numbers (e.g. IT-1, IT-2, etc.).

2016 Infiltration Tests designated with sequential letters (e.g. IT-A, IT-B, etc.).

Recommend Rate determined by dividing Geometric Mean by Factor of Safety

Seasonal High Water, Mottling, and Bedrock determined based on 2016 Trip Report Soil Boring Logs.

LICENSED PROFESSIONAL CERTIFICATION

By affixing my seal to this table, I certify that the geologic data and interpretations stated in this table, *Summary of Infiltration Test Rates, Block Valve Locations - Construction Spreads 2, 3, 4, 5, and 6, Pennsylvania Pipeline Project*, prepared by Tetra Tech, Inc., and dated December 2, 2016, are true and accurate to the best of my knowledge. I further certify that I am licensed to practice geology in the Commonwealth of Pennsylvania and that it is within my professional expertise to verify the correctness of this information.

Jeffrey P. Orient

**Jeffrey P. Orient, P.G.
PG-000068-G**



12/2/2016

Date