Appendix H.

Chardon WWTP *E. coli* Decay Calculations

The die-off of *E. coli* in Big Creek that is derived from effluent from the Chardon WWTP was calculated using the following equation[1]:

$$\mathbf{C = C_0 \exp(-KX/U)}$$

where: C = concentration of *E. coli* (in counts/day)
K = decay coefficient
X = distance of flow
U = velocity

The decay rate (K) was assumed to be one-half day (0.5). The concentration at the headwaters was assumed to be the PCR Class B geometric mean, which is 161 counts per 100 milliliters. Chardon WWTP has a permitted discharge limit of 2.797 cubic feet per second. The results of the calculations by segment are presented in Table H-1.

Table H-1. Calculation of exponential decay of *E. coli* counts

Reach	Description	Start river mile	End river mile	coefficient of velocity	exp velocity	Flow (cfs)	Velocity (ft/sec)	Velocity (mi/day)	*E. coli* (counts/100 mL)
1	HW/Cutts	16.4	15.6	0.137	0.4	2.797	0.21	3.38	161
2	Cutts/Woodin Rd	15.6	14.2	0.069	0.4	2.797	0.10	1.70	143
3	Woodin/Robinson	14.2	10.8	0.116	0.4	2.797	0.18	2.86	95
4	Robinson/Rt608	10.8	10	0.144	0.4	2.797	0.22	3.56	52
5	Rt 608/Girdled	10	8	0.103	0.4	2.797	0.16	2.54	47
6	Girdled/Williams	8	5.6	0.089	0.4	2.797	0.13	2.20	32
7	Williams	5.6	2	0.213	0.4	2.797	0.32	5.26	18

cfs = cubic feet per second; ft/sec = feet per second; mi/d = miles per day.

Blue shading indicates information obtained from 1996 QUAL2 model of Big Creek completed by Ohio EPA. Ohio EPA measured velocity, depths, and widths during the summer of 1995 at "near 7Q10" conditions (e.g., flow at river mile 14.2 was 1.92 cubic feet per second).

[1] U.S. Environmental Protection Agency. 2001. *Protocol for Developing Pathogen TMDLs.* EPA 841-R-00-002. Office of Water (4503F), United States Environmental Protection Agency, Washington, DC. 132 pp.