

## Appendix D

### Maximum Daily Loads For Triadelphia Reservoir and Rocky Gorge Reservoir

This appendix documents the technical approach used to define the maximum daily loads of total phosphorus (TP) and sediment consistent with the average annual TMDLs for total phosphorus in Triadelphia Reservoir and Rocky Gorge Reservoir and sediment in Triadelphia Reservoir. The approach builds upon the modeling framework used to determine the TMDLs described in the main report.

EPA (2007) has drafted guidance on developing daily loads for load-based TMDLs. This guidance provides options for defining maximum daily loads when using TMDL approaches that generate daily output. Valid options can be characterized in terms of (1) the level of resolution in specifying the maximum daily load and (2) the probability level, which characterizes the frequency and duration with which loads can exceed the given level, or, in other words, the variability in loads permitted by level which is still compatible with meeting water quality standards.

The total phosphorus loads to Triadelphia and Rocky Gorge Reservoir, as well as the sediment loads to Triadelphia Reservoir, are primarily the result of nonpoint sources and stormwater runoff regulated by county MS4 permits. There are no traditional point sources contributing to loads in Triadelphia Reservoir and only one 0.01 MGD WWTP contributing to phosphorus loads in Rocky Gorge Reservoir. Phosphorus and sediment loads from nonpoint sources are highly dependent on flow conditions. Generally loads increase under storm flow conditions, although the relation is subject to considerable variability. Because phosphorus and sediment loads are a function of flow, flow-variable daily loads represent the most useful level of resolution for maximum daily loads for Triadelphia and Rocky Gorge Reservoirs.

The maximum daily load is an appropriate measure of the probability level that is compatible with meeting water quality standards. Using the maximum daily loads also takes into account the variability inherent in the relation between loads and flow.

For the total phosphorus TMDLs in Triadelphia and Rocky Gorge Reservoirs, and for the sediment TMDL in Triadelphia Reservoir, maximum daily loads were determined as flow-based maximum daily loads, i.e., the maximum daily load under two flow regimes, representing low flows and high flows. The flow regimes approximately correspond to the dominance of base flow or storm flow conditions.

Specifically, the following procedure was used to calculate maximum daily loads and the maximum average waste load allocation (WLA), load allocation (LA), and margin of safety (MOS) for each flow quintile:

1. For each reservoir, inflows from all sources and associated total phosphorus loads were calculated on a daily basis from the Patuxent Watershed HSPF model (sediment loads were also calculated for Triadelphia Reservoir).
2. Daily loads were also calculated for the sources under the WLA and LA.
3. Total daily inflows into each reservoir were also calculated, based on the flows generated by the HSPF model for the simulation period 1998-2003.
4. The inflows were divided into high flows and low flows, based on the inflection of the flow duration curve and change in range and variability of constituent loads with flows.
5. For each flow regime, the maximum TMDL, and WLA loads were calculated, as well as a 5% MOS for total phosphorus loads (the MOS for the sediment TMDL is implicit).
6. The LA maximum daily load was set to equal TMDL – WLA – MOS.

Tables D.1, D.2, and D.3 show the maximum daily loads for phosphorus in Triadelphia Reservoir, phosphorus in Rocky Gorge Reservoir, and sediment in Triadelphia Reservoir, respectively.

**Table D.1 Maximum Daily Loads of Total Phosphorus By Flow Regime, Triadelphia Reservoir**

Flow Regime (cfs)	TMDL (lbs/day)	WLA (lbs/day)	LA (lbs/day)	MOS (lbs/day)
<326	852	356	453	43
>326	17,003	1,504	14,649	850

**Table D.2 Maximum Daily Loads of Total Phosphorus By Flow Regime, Rocky Gorge Reservoir**

Flow Regime (cfs)	TMDL (lbs/day)	WLA (lbs/day)	LA (lbs/day)	MOS (lbs/day)
<291	770	314	418	39
>291	4,003	1,102	2,701	200

**Table D.3 Maximum Daily Loads of Sediment By Flow Regime, Triadelphia Reservoir**

Flow Regime (cfs)	TMDL (lbs/day)	WLA (lbs/day)	LA (lbs/day)	MOS (lbs/day)
<326	662	40	621	Implicit
>326	25,468	157	25,311	Implicit