

Library Reference 2.7.1

Progress towards water quality improvement: Total Phosphorus. AMP 2009 Annual Report.
(Guidance Value)

AMENDED CONSENT JUDGMENT GOAL

Achieve compliance with the applicable ambient water quality standard in the upper waters considering all watershed sources of phosphorus. Achieve phosphorus reduction sufficient to reduce the frequency and duration of nuisance algal blooms and eliminate turbidity as impairment to desired uses of the lake for water contact recreation, aesthetics, aquatic life protection and fish reproduction.

Hypotheses to be tested:	Status:
Improvements at Metro will enable the County to meet final effluent limits (as set forth in a revised TMDL on or before Dec 31, 2011)	<ul style="list-style-type: none"> TMDL is under development.
Reduced phosphorus load from Metro reduces concentration of phosphorus in Onondaga Lake	<ul style="list-style-type: none"> Phosphorus loading has been reduced from about 58 metric tons on average annually in the 1990's to 8.9 metric tons in 2009. Phosphorus concentration in the lake's upper waters (0, 1 and 3 m depths averaged) has been reduced from more than 50 µg/L in the 1990's to 17 µg/l in 2009.
Reduced phosphorus load from Metro and the nonpoint sources brings the lake into compliance with the numerical TP guidance value 20 ug/l summer average, (or alternative, such as a site-specific guidance value or EPA ecoregional criteria, appropriate for this urban lake).	<ul style="list-style-type: none"> The lake met the numerical TP guidance value of 20 µg/l summer average in 2009, with an upper waters summer average of 19 µg/l (1 m depth discrete samples collected bi-weekly from June 1 to September 30).

Current Conditions with Historical Comparison

Major Sources – Percent Contribution
(Annual Average (standard deviation);
1998 – Stage I Limit caps loading;
2005 – HRFS on-line in February)

Time Period	Metro and Bypass Effluent	Tributaries
1990-1997:	64% (13%)	36% (13%)
1998-2004:	59% (5.7%)	41% (5.7%)
2005-2008:	33% (7.5%)	67% (7.5%)
2009:	24%	76%

Upper Waters Concentration
(Annual Average (standard deviation))

Time Period	South Deep, 0-3 meters, Jun 1 – Sept 30 (µg/L)
1990-1997:	79 (23)
1998-2004:	53 (12)
2005-2009:	29 (11)
2009:	17

Compliance with NYS AWQS in Upper Waters

- o *Narrative Standard: None in amounts that will result in growths of algae, weeds, and slimes that will impair the waters for their best usages*
- o *Guidance Value: 20 µg/l summer average in upper waters*

Narrative standard met throughout 2009, as there were no nuisance algal blooms (chlorophyll- α >30 µg/l) measured in 2009.

Guidance value was met in 2009.

Factors Affecting Compliance

Hydrology, Metro performance, land use in watershed, CSO performance.

Progress towards water quality improvement: Total Phosphorus. AMP 2009 Annual Report. (Guidance Value) (continued).

Planned Load Reductions (1998 – 2012)

Metro SPDES Permit Requirement	<p>Stage I Limit: Cap on Loading</p> <ul style="list-style-type: none"> • <i>effective Jan. 1998 – April 2006 (completed)</i> <p>Stage II: effective April 2006 – Dec. 2012</p> <ul style="list-style-type: none"> • <i>Metro effluent TP 0.12 mg/l (12-month rolling average)</i> <p>Stage III: effective Dec. 2012</p> <ul style="list-style-type: none"> • <i>Metro effluent TP at 0.020 mg/l</i> • <i>Watershed nonpoint source reduction of approximately 50% (includes CSO)</i> <p>Or as modified based on revised TMDL (anticipated in 2011)</p>
--------------------------------	---

Monitoring and Assessment Program

<p>Loading Estimates <i>Annual County monitoring program</i></p>	<ul style="list-style-type: none"> • Biweekly tributary monitoring, supplemented with samples collected during high flow conditions • Storm event monitoring in tributaries • Daily measurements of Metro effluent
<p>Lake Monitoring <i>Annual County monitoring program</i></p>	<ul style="list-style-type: none"> • Biweekly profiles in Lake of P fractions (TP, SRP, TDP), April – Nov, 3-meter intervals • Chlorophyll-α, Secchi disk transparency and LiCor measurements • Winter sampling as weather allows
<p>Related Biological Monitoring</p>	<ul style="list-style-type: none"> • Annual phytoplankton and zooplankton monitoring • Macrophyte survey every five years (began in 2000)

Tools for Decision Making

Models	<ul style="list-style-type: none"> • USGS watershed model for Onondaga Lake Partnership • Onondaga Lake Water Quality Model (under development by QEA,LLC) • Mass balance TP framework and linked empirical eutrophication model (William Walker)
TMDL Allocations	NYSDEC Phase I TMDL 8/27/97; Phase II TMDL by December 2011
NYS AWQS and Guidance Value; Federal Criteria	<p>Narrative standard</p> <p>Guidance value of 20 $\mu\text{g/l}$ summer average upper waters</p> <p>Possible site-specific guidance value for TP</p> <p>EPA ecoregional criteria</p>
