POSSIBLE MODELS AND THRESHOLDS FOR CHOOSING P STANDARDS FOR WEST VIRGINIA'S RESERVOIRS AND LAKES.

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EXECUTIVE SUMMARY

Nutrient criteria for lakes may take the form of single numbers applied to large numbers of lakes, or procedures by which subsets of lakes or individual lakes are analyzed and given appropriate criteria. Various methods in this document lead to the following possible criteria (Table 6).

Summary table: Methods and implications of various standard setting models.

Method	Standard	
	TP concentration	TSI from TP
EPA reference method	8 µg/L	34
	(2.5 to 24 µg/L)[a]	(17 to 50)
25th percentile of WV lakes	15 µg/L	43
Mesotrophic/eutrophic boundary	24 µg/L	50
75th percentile of lakes in sparsely settled counties	31 µg/L	54
Cause and effect analysis	50 µg/L	61
Mid-eutrophic threshold (WVDEP practice)	68 µg/L	65

The Nutrient Criteria Committee prefers a standard based on cause and effect models rooted in West Virginia data. This report suggests that such an analysis leads to a value of 50 µg/L total phosphorus. Additional analyses may be needed to refine this criterion.

1. INTRODUCTION

1.1 Need to set standards

In late 2002, the Nutrient Criteria Committee (NCC) submitted a plan to the U.S. Environmental Protection Agency (USEPA) that outlined steps to be taken toward the development of nutrient criteria in West Virginia. This plan sets a first priority on developing criteria for lakes and reservoirs (NCC, 2002). The 108 publicly owned lakes in West Virginia cover a total of 22,373 surface acres (DEP, 2000).

1.2 Why start with P standards

Nutrients may impair the designated uses of surface waters in a number of ways.[1] A large number of possible impairment scenarios are based on the disappearance of oxygen from the hypolimnia of lakes, a result of eutrophication. Hypolimnetic oxygen depletion occurs in most lakes with even a moderate nutrient load. However, the decrease in dissolved oxygen (DO) may impair the designated uses of waters if it is too intense. Mixing of the epilimnion and the hypolimnion may cause hypoxia in surface waters of part or all of an entire lake. Strong winds or heavy rainstorms may cause such mixing, as well as the predictable cooling at the end of summer. Toxic chemicals, such as iron in the ferrous form or sulfides may accumulate in the hypolimnion and be mixed into the epilimnion or downstream waters in toxic concentrations. Too large an anoxic hypolimnion may also decreases habitat volume. Because so many of the conditions which must be prevented are linked to eutrophication, and because eutrophication is usually linked to total phosphorus (TP) concentrations, development of eutrophication and TP standards has a higher priority than development of nitrogen standards.

The central aim of the analyses in this paper is to prevent DO concentrations from falling below 5 mg/L in the epilimnion of lakes. Category A, B and C designated uses are impaired at such low concentrations (WV 46 CSR 01).[2] Later analyses may show that more stringent standards are needed to prevent dangerous accumulations of toxic chemicals in the hypolimnion. Additional analyses will also be needed for nitrogen standards. Because the effects of nitrogen will probably differ less from lakes and reservoirs to rivers and streams, we defer those analyses to a later date.

1.3 Parameters

Eutrophication is usually evaluated using one of three variables from which a trophic state index (TSI) can be derived: total phosphorus (TP), chlorophyll a (Chl-a), and Secchi depth. Secchi depth is frequently determined more by sediment loads than by algae in West Virginia. TP and Chl-a are both more tightly tied to eutrophication and may be useful for criteria development. TP has the advantage of being directly tied to a chemical that can be measured in effluents.

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[1] Christ, Hansen and Pavlick, Strawman proposal for nutrient criteria for lakes, December NCC meeting.
[2] There are certain exceptions for the main stems of the Ohio and Kanawha Rivers. DO concentrations greater than 7 mg/L are required in waters with the designated use of supporting a cold-water fish community.

2. IMPAIRMENT

2.1 Definition

The Nutrient Criteria committee has defined impairment for three of the designated uses of waters of the state.

> "Proposed Definition of Nutrient Impairment"
>
> A water body is impaired by nutrients if nitrogen, phosphorus, or a resulting water quality characteristic prevents attainment of a designated or existing use. In particular:
>
> - For Category A, Public Water Supply, a water body fails to achieve this use if nutrients directly or indirectly threaten human health ,produce unacceptable taste or odor of the water, or unreasonably impact conventional treatment (i.e.: settling and disinfection).
> - For Category B, Propagation and maintenance of fish and other aquatic life, a water body fails to attain this use if nutrients directly or indirectly cause a shift in community integrity. A shift in community integrity includes, among other things, increasing or decreasing the negative impact on the abundance or diversity of indigenous populations of fish or other aquatic life.
> - For Category C, Water contact recreation, a water body is impaired if nutrients directly or indirectly cause nuisance algae, unacceptable water clarity, unacceptable odor, or unacceptable microbial growth.

2.2 Documented impairment among WV lakes

Clean Lakes Program identifies eutrophic lakes

WVDEP has established a practice by which it determines whether lakes are impaired by nutrients, especially via eutrophication. This practice was described in a presentation by Mike Arcuri, and recorded in a previous document.[3] Briefly, TSIs were calculated for a sample of West Virginia's lakes. The TSI scores of lakes considered by best professional judgement to be impaired were noted, and the TSI threshold of 65 was set (Table 1).

Table 1: Lakes evaluated for impairment by the West Virginia DEP

Status	Lake[a]	---Total P--- Conc (µg/L)	TSI	---Chl-a--- Conc. (µg/L)	TSI	---Secchi--- Depth (m)	TSI	Ave. TSI	Trophic State
Impaired	Hurricane Creek	Data unavailable							
Impaired	Ridenour	50	61	32	65	0.4	75	67	Eutrophic
Impaired	Turkey Run	40	57	74	73	0.5	71	67	Eutrophic
Impaired	Burches Run	50	61	80	74	0.8	62	66	Eutrophic
Impaired	Bear	50	61	67	72	1.2	57	63	Eutrophic
Impaired	Castleman Run	40	57	67	72	0.9	62	64	Eutrophic
Impaired[b]	Tomlinson Run	50	61	164	81	0.6	67	70	Eutrophic
	Saltlick Pond #9	20	47	59	70	1.9	51	56	Eutrophic
	Laurel	20	47	41	67	0.8	62	59	Eutrophic
	Moncove	11	39	4.8	46	1.7	53	46	Mesotrophic
	Cheat	30	53	9.5	53	0.3	76	61	Eutrophic
	Kanawha State Forest	23	49	8.6	52	1.2	57	53	Eutrophic
	O'Brien	21	48	2.5	39	2.3	48	45	Mesotrophic
	Summit	20	47	6.6	49	2.2	49	48	Mesotrophic
	Boley	10	37	1	30	2.7	46	38	Oligotrophic
	Spruce Knob	24	50	24	62	1.8	51	54	Eutrophic

[a]Measurements and TSIs in this table are from the 1996, via the 2000 305b report.
[b]Tomlinson Run Lake was listed as impaired in the 1998 305b report, but was drained and dredged according to the 2000 305b report.

[3]Hansen, Christ and Pavlick, Suggested next steps to develop nutrient criteria for lakes and reservoirs in West Virginia, September, 2003.

USACE data indicates some whole lake hypoxia

The US Army Corps of Engineers (USACE) has collected data for dissolved oxygen profiles in several lakes that they manage. These data indicate that dissolved oxygen concentrations at the surface of the lake dropped below the state standard in 1 (?) lake, and approached that value (DO<6 mg/L) in 3 (?) other lakes. (Appendix 1: Summary of US Army Corps of Engineers Lake Data).

WVRC report

WVRC is submitting a report[4] summarizing cases of impairment or possible impairment to WV surface waters. Although the cases described in the previous two sections are contained in that report, there are additional possible cases of nutrient-caused impairment . . .

3. POSSIBLE MODELS

3.1 EPA

Rationale of EPA's method

USEPA has recommended nutrient criteria for lakes and reservoirs in Nutrient Ecoregion XI, based on the reference approach (USEPA, 2000). If adopted, these criteria would apply to the state of West Virginia, which sits entirely within this ecoregion.

Objections within NCC

NCC members have expressed skepticism about adopting these criteria for several reasons, including the following:

- A reference approach, by definition, labels a certain percentage of streams as impaired, whether or not this is actually true.
- Questions were raised regarding the method detection limits for total phosphorus, and whether nondetect data are handled correctly in the criteria-setting process.
- Questions were raised regarding how well the dataset represents the range of conditions found across West Virginia, and whether or not a single criterion is acceptable for the entire state.

3.2 EPA method on WV lakes

What is the 25th percentile using the entire population?

If EPA's approach were adopted, data are available for the evaluation of a population of 28 lakes (Table 2). A TP concentration of 0.015 mg/L (15 µg/L) exceeds 25% of the average concentrations. In contrast to EPA, TP concentrations are not averaged by season. Testing percentiles of seasonal average concentrations may be done in an additional step.

[4] Pavlick, Christ, Hansen, An inventory of impairments to WV waters that may be caused by nutrients. February, 2004, NCC meeting.

Table 2: Ranking of lakes by average TP concentrations, and identification of percentiles.

Lake	Data source[a]	Average[b] TP (mg/L)	Rank (low to high)	Percentile
Mt. Storm	CLP	0.007	1	0%
Summit	CLP	0.008	2	4%
Boley	CLP	0.009	3	7%
Sutton	USACE	0.010	4	11%
Burnsville	USACE	0.010	5	14%
Summersville	USACE	0.010	6	18%
Moncove	CLP	0.014	7	21%
Laurel	CLP	0.015	8	25%
Warden	CLP	0.015	9	29%
RD Bailey	USACE	0.015	10	32%
Cheat Lake	CLP	0.019	11	36%
O'brien	CLP	0.024	12	39%
Pennsboro WS Reservoir	CLP	0.025	13	43%
Kanawha State Forest	CLP	0.027	14	46%
Miletree	CLP	0.029	15	50%
Saltlick Pond 9	CLP	0.030	16	54%
Bluestone	USACE	0.031	17	57%
Spruce Knob	CLP	0.032	18	61%
East Lynn	USACE	0.033	19	64%
Huey	CLP	0.037	20	68%
Tomlinson Run	CLP	0.045	21	71%
Edwards Run	CLP	0.052	22	75%
Ridenour	CLP	0.054	23	79%
Castleman	CLP	0.055	24	82%
Bear Lake	CLP	0.062	25	86%
Burches Run	CLP	0.064	26	89%
Hurricane WS Reservoir	CLP	0.067	27	93%
Turkey Run	CLP	0.076	28	96%

[a]Data is from the Clean Lakes Program (CLP) or the US Army Corps of Engineers (USACE)
[b]Averages determined for water at (USACE) or near (CLP) the surface. Values of ½ the detection limit were used if detection limits were <= 0.02 mg/L. Beech Fork lake is omitted because of high (1 mg/L) detection limits for TP

Can reference lakes be identified, and what is the 75th percentile among them?

EPA offers a second method for calculating nutrient criteria from populations of data: the 75th percentile concentration may be determined from a population of reference bodies of water. Reference waters are defined as "those lakes believed to be minimally impacted by human activity (e.g., with little or no riparian or watershed development)" (USEPA, 2000). There may be a number of ways to identify reference lakes without extensive research. First, lakes from relatively sparsely populated counties might be selected. McDowell County, with 51.1 people per square mile, has the median population density among West Virginia counties (data available from US Census website[5]). Table 3 shows statistics for lakes contained in or mostly abutting counties with less than median population densities. This analysis suggests a TP criterion of 0.031 mg/L.

Table 3: Calculation of 75th percentile TP concentration from lakes in sparsely populated counties.

Lake	Average TP (mg/L)	TP percentile	County	Population density (cap./sq. mile)
Lakes from less densely populated counties				
Mt. Storm	0.007	0%	Grant	24
Summit	0.008	8%	Greenbrier	34
Summersville	0.010	15%	Nicholas	41
Sutton	0.010	23%	Braxton	29
Burnsville	0.010	31%	Braxton	29
Moncove	0.014	38%	Monroe	31
Warden	0.015	46%	Hardy	22
Pennsboro WS Reservoir	0.025	54%	Ritchie	23
Miletree	0.029	62%	Roane	32
Saltlick Pond 9	0.030	69%	Braxton	29
Bluestone	0.031	77%	Summers	36
Spruce Knob	0.032	85%	Randolph	27
Edwards Run	0.052	92%	Hampshire	32
Lakes from more densely populated counties				
Bear Lake	0.062		Ohio	447
Boley	0.009		Fayette	72
Burches Run	0.064		Marshall	116
Castleman	0.055		Brooke and Ohio	367
Cheat Lake	0.019		Monongalia and Preston[a]	136
East Lynn	0.033		Wayne	85
Huey	0.037		Marion	183
Hurricane WS Reservoir	0.067		Putnam	149
Kanawha State Forest	0.027		Kanawha	222
Laurel	0.015		Mingo	67
O'brien	0.024		Jackson	60
RD Bailey	0.015		Wyoming and Mingo	59
Ridenour	0.054		Kanawha	222
Tomlinson Run	0.045		Hancock	394
Turkey Run	0.076		Marshall	116

[a]For lakes straddling two counties, the average of the two population densities was used.

[5] http://factfinder.census.gov/servlet/GCTTable?_bm=y&-geo_id=04000US54&-ds_name=DEC_2000_SF1_U&-_lang=en&-redoLog=false&-format=ST-2&-mt_name=DEC_2000_SF1_U_GCTPH1_ST2&-CONTEXT=gct

3.3 WVDEP practice

<u>Based on Trophic State Index with professional judgement</u>

As reviewed earlier (see page 3), WVDEP's practice is to identify those lakes with an average TSI (average of TSIs based on TP, Chl-a and Secchi depth) greater than 65 as impaired.

3.4 WVRC proposal

<u>Based on more strict TSI</u>

WVRC has proposed that lakes with a TSI greater than 50 (as determined by TP concentrations) are impaired. This proposal acknowledges that little information is available concerning WV lakes, and it is therefore reasonable to use a model with wide application in lakes literature. The choice of threshold as the mesotrophic/eutrophic boundary rather than a value in the mid-to-upper eutrophic range provides protection against excessive hypolimnetic anoxia and the accumulation of redox byproducts.

3.5 Cause and effect relationships

The NCC has expressed a preference for cause and effect models for setting standards. The WV lakes data set has enough information on DO and TP to conduct a preliminary analysis of the relationship between the two variables. We compiled the following dataset for the analysis of the relationship between total phosphorus and dissolved oxygen (Table 4). In most cases, detection limits for phosphorus were lower than the average for the population. If these samples with below-average phosphorus show below-average impact on dissolved oxygen, they may be contributing information to the analysis. Beech Fork lake, however, was excluded, because the detection limits reported were as high as 1 mg/L.

We divided the group into short- and long-residence time groups (cutoff = <=14 days), and analyzed linear regressions (Table 5). The best relationships were between the maximum TP concentrations and the minimum DO concentrations:

Short RT:	Min DO =7.84 – 11.22 (Max TP)	R^2=0.39
Long RT:	Min DO =7.40 – 11.50 (Max TP)	R^2=0.50
Pooled:	Min DO=7.52 – 10.48 (Max TP)	R^2=0.41

According to this analysis, to prevent a dissolved oxygen concentration below 5 mg/L, excursions in total P to concentrations greater than 0.25 mg/L must be avoided. Prevention of excursions to 0.16 mg/L would prevent DO concentrations as low as 6 mg/L. Relationships between average TP and average and minimum DO were also strong, although they did not attain the traditional threshold p value of 0.05.

Because peak concentrations may not occur at the exact time in which monitoring activities are taking place, we examined the data to determine whether there is a relationship between average TP concentrations and maximum TP concentrations. There was no relationship between average and maximum TP concentrations in short RT lakes (p=0.30). However, there was a significant relationship between average and maximum TP concentrations in long RT lakes (Figure x). This regression indicates that, in long RT lakes, maintaining an average concentration of less than 0.05 mg/L should prevent excursions of P to the 0.16 mg/L level, which should, in turn, prevent DO from dropping to 6 mg/L.

Table 4: TP and DO concentration data and retention times for WV lakes.

Data Source	Lake	N	Detection Limit		P concentration (mg/L)		Dissolved oxygen (mg/L)		Retention time	
			#	Range	Ave.	Max.	Ave.	Min.	Annual	Summer
CLP	Bear Lake	14	0		0.062	0.220	9.8	3.6	25	64
USACE	Beech Fork***	8	6	0.02-1	0.020	0.030	7.2	3.9	32	81
USACE	Bluestone	24	13	0.01	0.031	0.258	8.1	5.3	2	6
CLP	Boley	8	1	0.02	0.009	0.012	8.5	7.4	119	297
CLP	Burches Run	13	0		0.064	0.232	9.7	5.8	9	23
USACE	Burnsville	4	4	0.02	0.010	0.010	8.8	7.6	26	65
CLP	Castleman	14	0		0.055	0.122	10.4	5.7	8	19
CLP	Cheat Lake	15	1	0.01	0.019	0.170	9.1	6.0	9	21
USACE	East Lynn	17	12	0.01-0.02	0.033	0.240	7.8	5.2	36	91
CLP	Edwards Run	2	0		0.052	0.053	8.5	8.1	0	0
CLP	Huey	2	0		0.037	0.048	8.3	7.8	6	16
CLP	Hurricane WS Reservoir	9	0		0.067	0.103	8.0	5.5	3	7
CLP	Kanawha State Forest	7	0		0.027	0.040	7.5	5.0		
CLP	Laurel	13	2	0.02	0.015	0.043	8.5	6.9	10	26
CLP	Miletree	2	0		0.029	0.045	9.3	8.2	28	70
CLP	Moncove	7	2	0.02	0.014	0.024	8.3	7.3	88	222
CLP	Mt. Storm	10	1	0.001	0.007	0.022	7.4	6.2	405	1017
CLP	O'brien	7	0		0.024	0.043	7.7	6.6	18	46
CLP	Pennsboro WS Reservoir	2	0		0.025	0.033	7.8	7.0	34	
USACE	RD Bailey	8	7	0.02	0.015	0.050	8.7	5.1	18	45
CLP	Ridenour	14	0		0.054	0.128	8.6	6.6	25	62
CLP	Saltlick Pond 9	12	1	0.02	0.030	0.053	8.7	5.0	3	7
CLP	Spruce Knob	8	0		0.032	0.080	9.0	7.9	91	230
USACE	Summersville	2	2	0.02	0.010	0.010	8.4	7.4	66	166
CLP	Summit	6	1	0.02	0.008	0.010	8.4	6.8	69	173
USACE	Sutton	3	3	0.02	0.010	0.010	8.5	7.3	31	78
CLP	Tomlinson Run	8	0		0.045	0.070	10.3	8.3	4	11
CLP	Turkey Run	13	0		0.076	0.130	8.3	5.9	6	16
CLP	Warden	3	0		0.015	0.018	9.5	9.2	10	26

Table 5: Significance of linear regressions between TP and DO variables[a]

Group	Independent variable	Dependent variable	P value
Short RT	Average TP	Average DO	0.98
		Minimum DO	0.33
	Maximum TP	Average DO	0.97
		Minimum DO	0.03
Long RT	Average TP	Average DO	0.08
		Minimum DO	0.06
	Maximum TP	Average DO	0.38
		Minimum DO	0.003

[a]Significance is assessed using P values, which is the probability of finding an equally strong relationship using random numbers. Smaller values indicate greater significance.

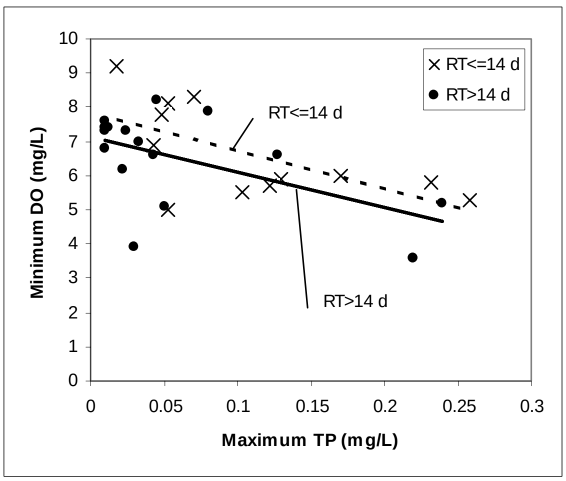

Figure 1: Regressions between minimum DO and maximum TP in long and short retention time lakes.

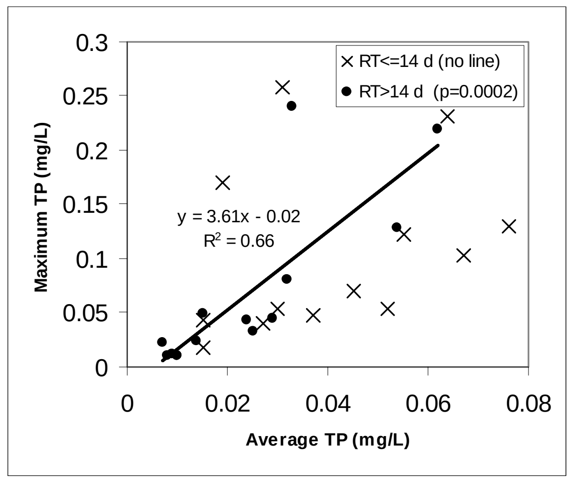

Figure 2 Relationship between average and maximum total phosphorus concentrations in the surface waters of lakes.

3.6 Lake by lake standards using eutrophication models

Intensive data efforts may produce lake-by-lake standards.

A number of models are available that predict nutrient effects based on more particular information about lakes. Hansen, Christ and Pavlick[2] presented some of these models earlier. A phosphorus loading plot developed by Chapra (1997) adjusts TP load thresholds between oligotrophic and mesotrophic lakes and between mesotrophic and eutrophic lakes based on mean lake depth. Chapra (1997) also introduces a method to take water flow into account.

Gertrud Nürnberg has developed methods for quantifying anoxia in lakes other than using concentrations of DO (Nürnberg, manuscript). She defines the anoxic factor (AF) as the number of days an area of the lake bottom equal to the area of the lake would be anoxic during a season or a year. For example, if water over half of the area of the bottom of the lake were anoxic for one half the year, the AF would be 91 days. Several publications present relationships predicting AF based on average TP and the morphometric factor (mean depth divided by square root of surface area). Additional equations predict the number of fish species present in a lake with a given AF.

The BATHTUB model was developed by USACE. This model is actually one of a three models used by USACE for understanding lake and reservoir water quality. The entire suite of models includes models named FLUX, PROFILE and BATHTUB. FLUX simplifies information about riverine nutrient loads. PROFILE calculates steady state biological and chemical processes in a lake of a given shape with given water quality characteristics. BATHTUB then predicts how a lake with water moving through it according to the FLUX model would interact with the body of water described in PROFILE.

The suite can be used in diagnostic or predictive modes. In diagnostic mode, the models support interpretation of monitoring data. In predictive mode, the model can describe conditions that might ensue from various changes in the data describing water input and nutrient loads. For the sake of setting nutrient criteria, the model might be used to predict some measure of anoxia given phosphorus loads.

The model requires a substantial amount of data, including water quality and fluxes of inputs and outputs, temperature regimes, and lake morphometry.

4. SUMMARY

Nutrient criteria for lakes may take the form of single numbers applied to large numbers of lakes, or procedures by which subsets of lakes or individual lakes are analyzed and given appropriate criteria. Various methods in this document lead to the following possible criteria (Table 6).

Table 6: Methods and implications of various standard setting models.

Method	Standard	
	TP concentration	TSI from TP
EPA reference method	8 µg/L	34
	(2.5 to 24 µg/L)[a]	(17 to 50)
25th percentile of WV lakes	15 µg/L	43
Mesotrophic/eutrophic boundary	24 µg/L	50
75th percentile of lakes in sparsely settled counties	31 µg/L	54
Cause and effect analysis	50 µg/L	61
Mid-eutrophic threshold (WVDEP practice)	68 µg/L	65

[a]Depending on region within WV (Level 3 ecoregions)

Actual compliance with the 8, 24 and 68 µg/L candidate criteria is provided in Table 7. Those data support a number of observations:

- Only four of 29 lakes meet the 8 µg/L standard at least half the time.
- 18 of 29 lakes meet the 24 µg/L standard at least half the time.
- 26 of 29 lakes meet the 68 µg/L standard at least half the time.
- USACE data had higher detection limits (DLs) than did Clean Lakes data. Were DLs lower for USACE data, lakes may have met the lower standards. High DLs make it impossible to determine whether these lakes meet a standard of 8 µg/L.
- The only USACE impoundment to fail to meet the two higher P standards more than half the time did so because of some measurements with very high detection limits.

Table 7: Number of TP observations for WV lakes, and percent of observations meeting various possible TP standards.

		8 µg/L			24 µg/L			64 µg/L		
Lake	N	≤	>	DL >	≤	>	DL >	≤	>	DL >
--------Clean Lake Data--------										
Bear Lake	14	0	100	0	7	93	0	71	29	0
Boley	8	63	25	13	100	0	0	100	0	0
Burches Run	13	0	100	0	0	100	0	77	23	0
Castleman	14	0	100	0	0	100	0	79	21	0
Cheat Lake	15	60	33	7	87	13	0	93	7	0
Edwards Run	2	0	100	0	0	100	0	100	0	0
Huey	2	0	100	0	0	100	0	100	0	0
Hurricane WS Reservoir	9	0	100	0	0	100	0	33	67	0
Kanawha State Forest	7	0	100	0	57	43	0	100	0	0
Laurel	13	23	62	15	85	15	0	100	0	0
Miletree	2	0	100	0	50	50	0	100	0	0
Moncove	7	0	71	29	100	0	0	100	0	0
Mt. Storm	10	80	20	0	100	0	0	100	0	0
O'brien	7	0	100	0	71	29	0	100	0	0
Pennsboro WS Reservoir	2	0	100	0	50	50	0	100	0	0
Ridenour	14	0	100	0	21	79	0	71	29	0
Saltlick Pond 9	12	0	92	8	33	67	0	100	0	0
Spruce Knob	8	0	100	0	50	50	0	88	13	0
Summit	6	50	33	17	100	0	0	100	0	0
Tomlinson Run	8	0	100	0	0	100	0	88	13	0
Turkey Run	13	0	100	0	0	100	0	31	69	0
Warden	3	0	100	0	100	0	0	100	0	0
--------US Army Corps Data--------										
Beech Fork	8	0	25	75	25	13	63	38	0	63
Bluestone	24	0	46	54	67	33	0	88	13	0
Burnsville	4	0	0	100	100	0	0	100	0	0
East Lynn	17	0	29	71	76	24	0	88	12	0
RD Bailey	8	0	13	88	88	13	0	100	0	0
Summersville	2	0	0	100	100	0	0	100	0	0
Sutton	3	0	0	100	100	0	0	100	0	0