Spokane River TMDL Collaboration
Full Group Meeting
September 28, 2005

Appendix B

Workgroup Information Roll-Up: Technology Workgroup

Memorandum

To: Ryan Orth, Ross & Associates

From: Len Bramble, Technology Work Group Co-Chair
Lars Hendron, Technology Work Group Co-Chair

Subject: Submittal of Preliminary Information
Spokane River TMDL Collaboration
Technology Work Group

Date: September 14, 2005

The Spokane River TMDL Collaboration Steering Work Group and Full Group have requested each Work Group (Wastewater Flows & Loading, Technology, Re-use & Conservation, and Non-Point Source) provide its findings, recommendations, etc as of September 14, 2005. Consistent with that request, within this communication you will find a suggestion from the Technology Work Group, along with certain specific conditions pertaining to the utilization of this suggestion. Graphics supporting this suggestion and made a part of this recommendation by reference are attached as well.

The Spokane Collaboration Technology Work Group (TWG) has accumulated a variety of information and data for more than 115 wastewater treatment plants (WWTP) within the US and abroad. Of these 115+ WWTP's, we have thus far been fairly successful at accumulating average monthly total phosphorus effluent data from 43 WWTP's. The TWG stresses that this data accumulation and evaluation effort is an on-going effort, and points out that among needed future work relating to WWTP technology and phosphorus reduction efforts is the need to undertake a much more detailed and exhaustive effort at the WWTP's or WWTP technologies of most interest, including but not limited to, analyses of daily effluent phosphorus data as opposed to average monthly effluent phosphorus data, taking into consideration the actual permit limits WWTP's were working to achieve, and the seasonality aspects of permit limits and WWTP operations.

The TWG suggests at this time the Full Work Group consider utilizing 50 ug/L (micro grams per liter) as an average monthly effluent concentration for total phosphorus possibly attainable by municipal wastewater treatment plants on an average monthly basis, conditioned upon the following:

1. LIMITATIONS OF THE DATA:

a. The data and information accumulated thus far for 43 of the 115+ WWTP's under study indicates that there are 11 WWTP's in the hydraulic operating range of 0.23-2.14 MGD and 3-4 WWTP's in the range of 28.4-

42.8 MGD that are achieving, or are close to achieving, an average monthly final effluent concentration of total phosphorus of 50 ug/L or lower (see graphics).

b. Our data show that there are treatment plants performing phosphorus removal at levels significantly better than is currently achieved on the Spokane River. These levels approach, but do not reliably achieve on a sustained basis, the P removal levels necessary for the Spokane River (i.e., 10 micrograms per liter).

c. There is a difference between minimum performance levels used in writing NPDES permits and the environmentally better average performance operators like to achieve to assure they meet their permit's minimum performance level. It is these better, average performance numbers that result in the actual pounds of phosphorus removed and discharged.

d. Almost all data is based upon monthly averages of total phosphorus effluent from a limited data set. Without more detailed data, the ability to accurately understand and gauge a WWTP's efficiency of phosphorus removal is most difficult.

e. This data is based upon year-around (January through December) data, and not seasonal (April through October) data; thus seasonal aspects relating to a wastewater treatment plant's hydraulic performance are "averaged" out.

f. The 50 ug/L value is simply a reasonably predictable concentration and "place holder" for TMDL evaluation at this time.

g. The testing frequency of the data was highly variable, especially for the smaller plants that don't test every day and don't provide daily monitoring reports (DMR's) to the EPA. These variations may skew the data and make comparisons difficult.

h. The data considered thus far is generally geared to respective applicable in-place permit limits. If these permit limits are relatively high, there is no incentive to operate the WWTP to achieve a lower limit or to test at lower detection levels. Thus, some of the WWTP's currently showing total phosphorus concentrations higher than 50 ug/L might be capable of achieving lower concentrations if required to do so, therefore merit further study. For example, Frisco Sanitation WWTP in Frisco, Colorado (our ID#5) has a permit limit for total phosphorus of 500 ug/L but is actually achieving 80 ug/L; one has to wonder what they might be able to achieve with a different and lower goal.

i. Some WWTP's were not required to test for phosphorus, but were testing it anyway and getting low numbers and good results. These merit more study.

j. Many of the smaller plants appear to be getting much lower numbers but we lack information as to scalability.

k. It is important to point out that, given the data limitations, the information gathered, though useful, does not show what is attainable

but merely what is being attained at various locations under specific conditions. More information, more pilot studies, and more investigations are needed before conclusions can be drawn or recommendations made as to the appropriate phosphorus concentration for dischargers to this river.

l. This data and suggestion should be utilized to preliminarily estimate phosphorus loading (pounds) only, and not to establish permit limits. Permit limits for effluent total phosphorus should be based established only after completion of much more detailed and substantive study of applicable data and other considerations, including pilot testing.

2. ADDITIONAL EVALUATION OF THE DATA:

a. Issues pertaining to uncertainty and reliability of analytical results, variability, methods, and procedures need to be addressed. Lab analysis at low phosphorus levels is highly variable. In order to have confidence in the data, one needs information as to lab capabilities.

b. Additional study is needed to determine if local facilities with widely varying flow rates and other design and operational characteristics could expect to achieve similar or different phosphorous removal rates with respect to those included within this study.

c. Additional consideration should be conducted to determine if some of the wastewater treatment facilities with data reflecting a concentration of effluent total phosphorus higher than 50 ug/L should not be eliminated from consideration and may be worthy of additional investigation, particularly on a seasonal (April through October) basis.

d. "Sizing" of facilities to respective flow treatment needs should also be included as a factor that needs to be considered.

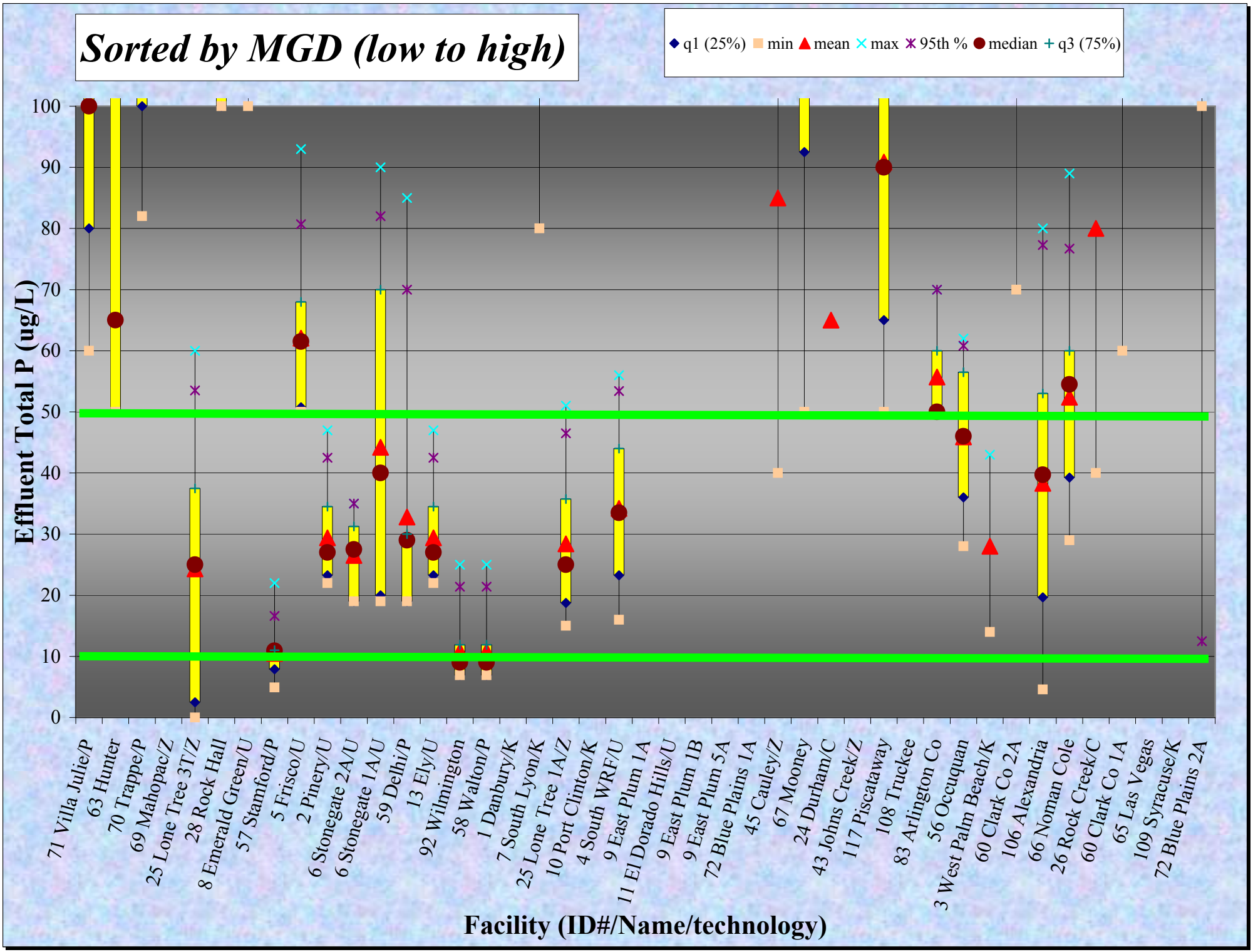
e. Additional pilot studies will be needed prior to more precisely determining final achievable total phosphorus concentrations and deciding upon applicable permit limits. The Technology Work Group is eagerly awaiting the pilot results for the testing that was recently concluded at Inland Empire Paper and has recently commenced at the City of Spokane WWTP. By the time these results are available we hope to be able to suggest effluent phosphorus concentrations that will more accurately and fully help reasonably estimate the total phosphorus discharged to the Spokane River from point sources.

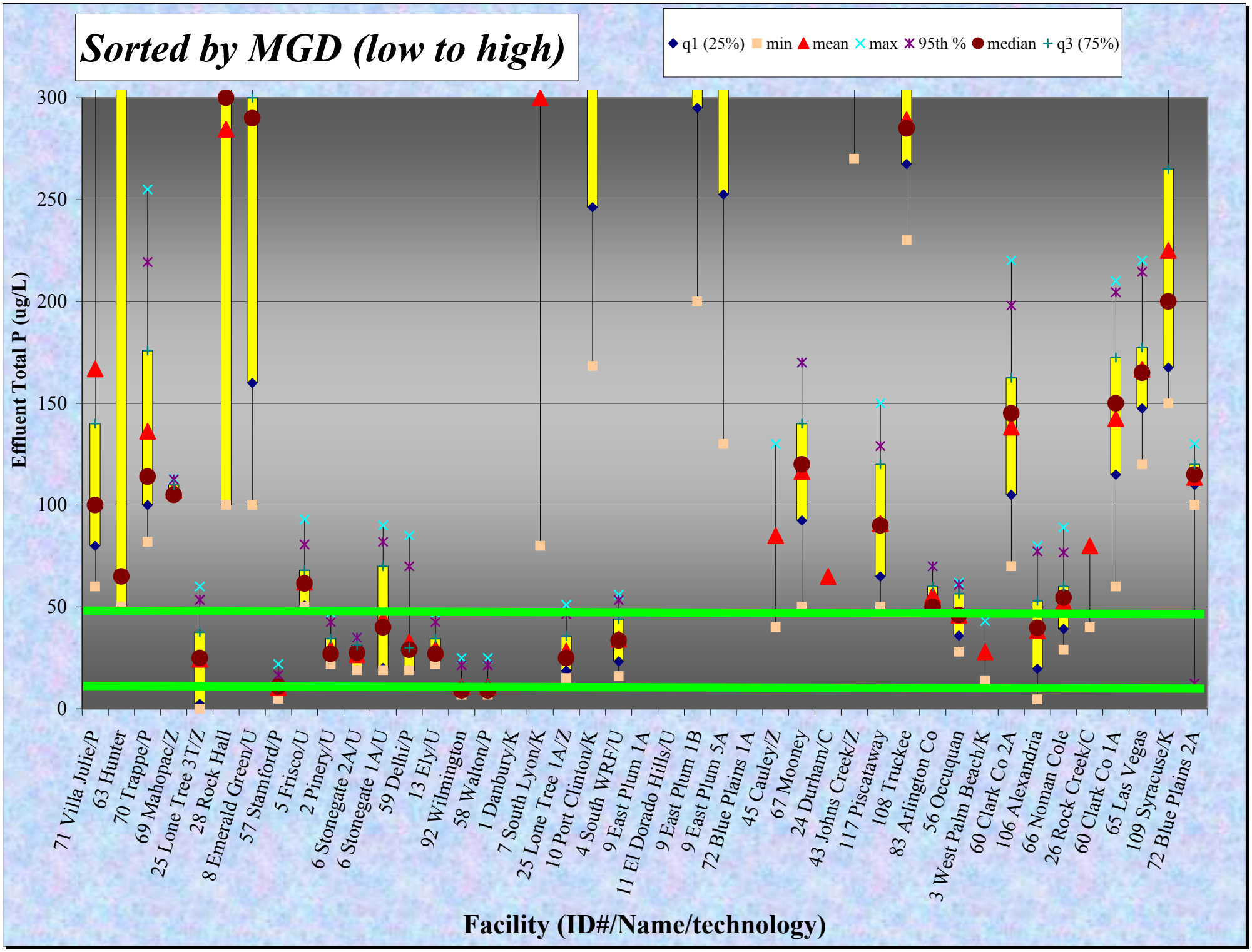
f. Future studies and technology improvements will likely result in changes in predictable phosphorus removal.

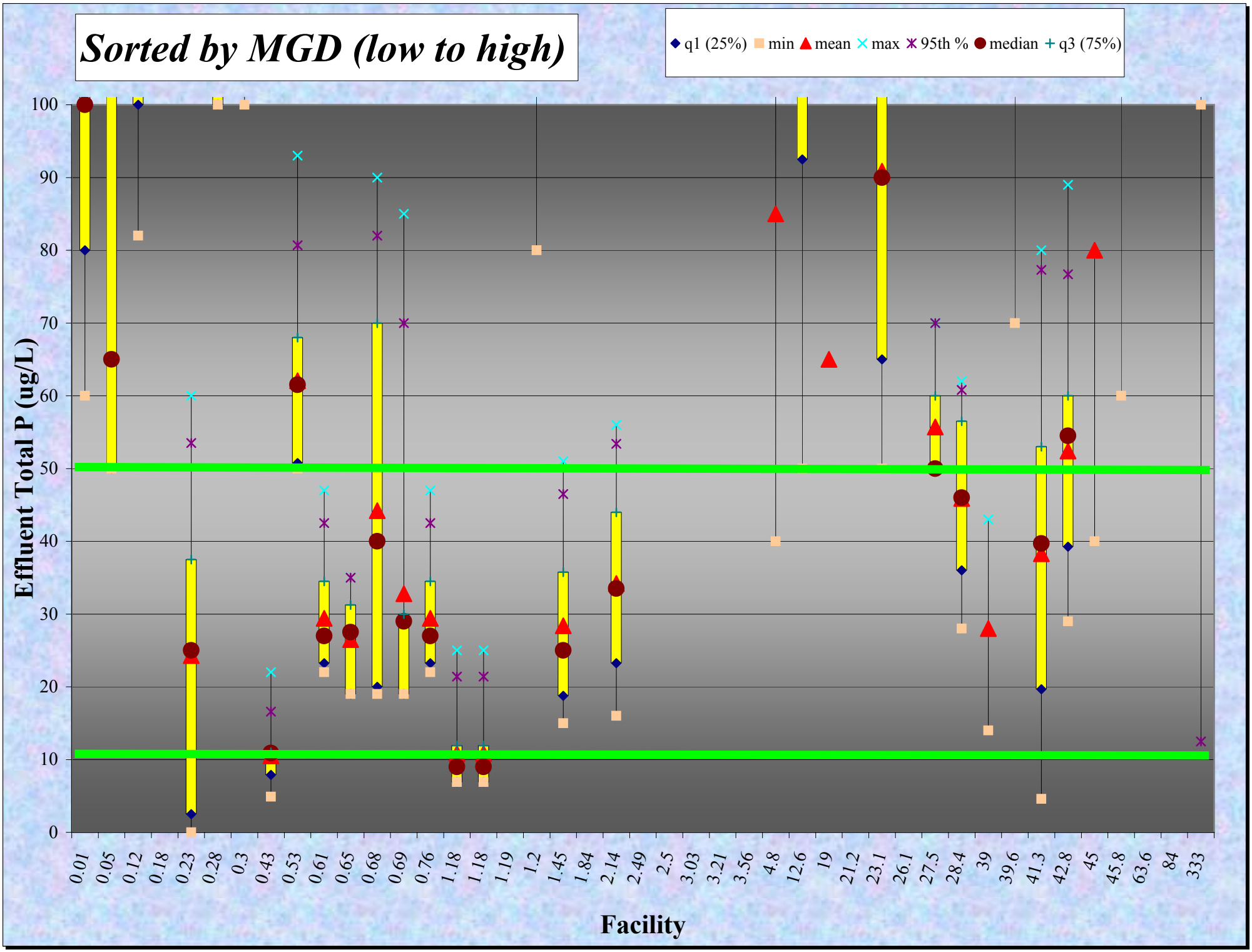
g. How well a plant is operated and maintained can have a significant impact upon achieving phosphorus reduction, but this aspect is not included in our considerations.

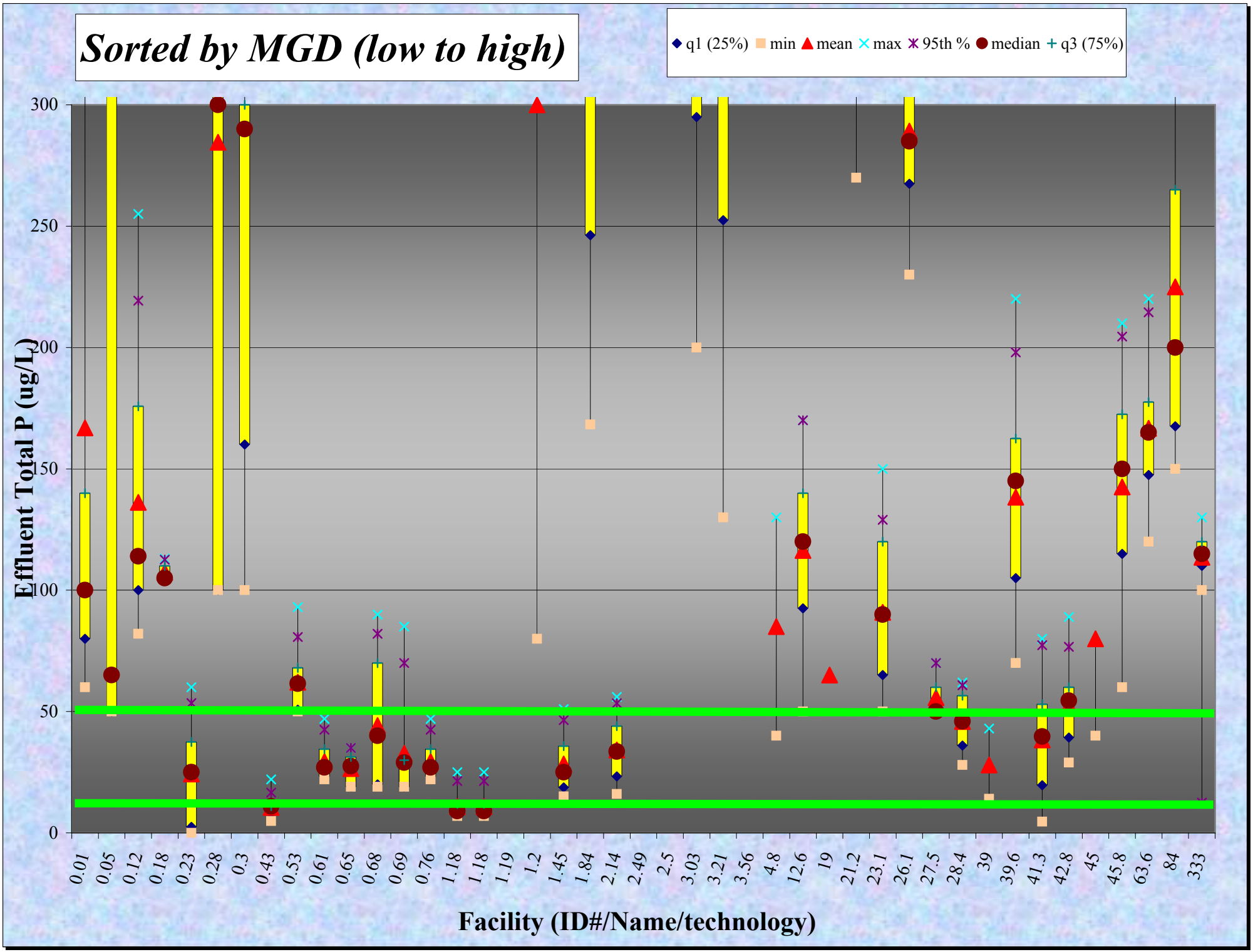
Attachments (4 pdf files named):

1 Eff P by Flow Name 0-100.pdf
2 Eff P by Flow Name 0-300.pdf
3 Eff P by Flow 0-100.pdf
4 Eff P by Flow 0-300.pdf


Sorted by MGD (low to high)
q1 (25%)
min
mean
max
95th %
median
q3 (75%)
Effluent Total P (ug/L)
0
10
20
30
40
50
60
70
80
90
100
71 Villa Julie/P
63 Hunter
70 Trappe/P
69 Mahopac/Z
25 Lone Tree 3T/Z
28 Rock Hall
8 Emerald Green/U
57 Stamford/P
5 Frisco/U
2 Pinery/U
6 Stonegate 2A/U
6 Stonegate 1A/U
59 Delhi/P
13 Ely/U
92 Wilmington
58 Walton/P
1 Danbury/K
7 South Lyon/K
25 Lone Tree 1A/Z
10 Port Clinton/K
4 South WRF/U
9 East Plum 1A
11 El Dorado Hills/U
9 East Plum 1B
9 East Plum 5A
72 Blue Plains 1A
45 Cauley/Z
67 Mooney
24 Durham/C
43 Johns Creek/Z
117 Piscataway
108 Truckee
83 Arlington Co
56 Occuquan
3 West Palm Beach/K
60 Clark Co 2A
106 Alexandria
66 Noman Cole
26 Rock Creek/C
60 Clark Co 1A
65 Las Vegas
109 Syracuse/K
72 Blue Plains 2A
Facility (ID#/Name/technology)


Sorted by MGD (low to high)
q1 (25%)
min
mean
max
95th %
median
q3 (75%)
Effluent Total P (ug/L)
300
250
200
150
100
50
0
71 Villa Julie/P
63 Hunter
70 Trappe/P
69 Mahopac/Z
25 Lone Tree 3T/Z
28 Rock Hall
8 Emerald Green/U
57 Stamford/P
5 Frisco/U
2 Pinery/U
6 Stonegate 2A/U
6 Stonegate 1A/U
59 Delhi/P
13 Ely/U
92 Wilmington
58 Walton/P
1 Danbury/K
7 South Lyon/K
25 Lone Tree 1A/Z
10 Port Clinton/K
4 South WRF/U
9 East Plum 1A
11 El Dorado Hills/U
9 East Plum 1B
9 East Plum 5A
72 Blue Plains 1A
45 Cauley/Z
67 Mooney
24 Durham/C
43 Johns Creek/Z
117 Piscataway
108 Truckee
83 Arlington Co
56 Occuquan
3 West Palm Beach/K
60 Clark Co 2A
106 Alexandria
66 Noman Cole
26 Rock Creek/C
60 Clark Co 1A
65 Las Vegas
109 Syracuse/K
72 Blue Plains 2A
Facility (ID#/Name/technology)


Sorted by MGD (low to high)
q1 (25%)
min
mean
max
95th %
median
q3 (75%)
Effluent Total P (ug/L)
100
90
80
70
60
50
40
30
20
10
0
0.01
0.05
0.12
0.18
0.23
0.28
0.3
0.43
0.53
0.61
0.65
0.68
0.69
0.76
1.18
1.18
1.19
1.2
1.45
1.84
2.14
2.49
2.5
3.03
3.21
3.56
4.8
12.6
19
21.2
23.1
26.1
27.5
28.4
39
39.6
41.3
42.8
45
45.8
63.6
84
333
Facility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q1 (25%)
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Effluent Total P (ug/L)
300
250
200
150
100
50
0
0.01
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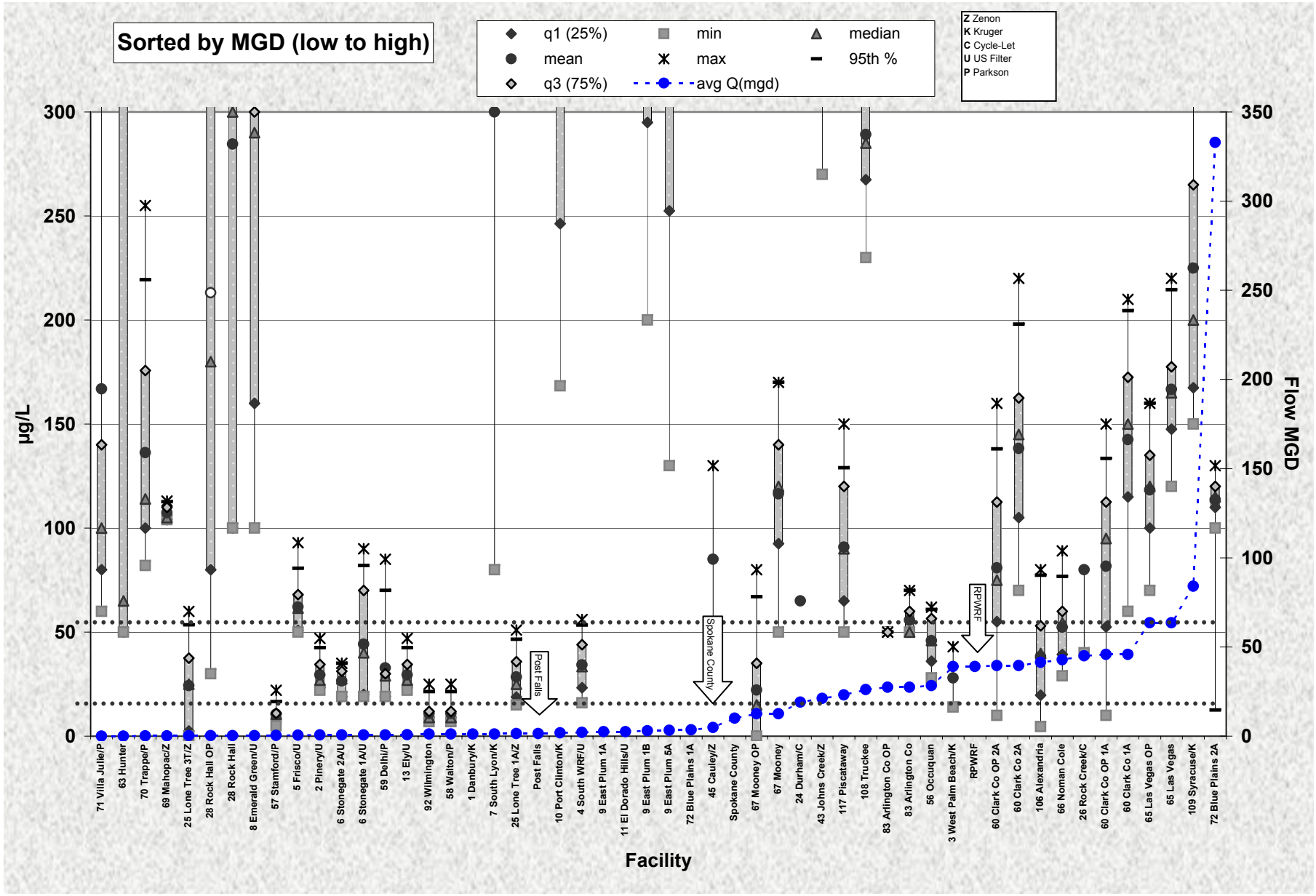
0.43
0.53
0.61
0.65
0.68
0.69
0.76
1.18
1.18
1.19
1.2
1.45
1.84
2.14
2.49
2.5
3.03
3.21
3.56
4.8
12.6
19
21.2
23.1
26.1
27.5
28.4
39
39.6
41.3
42.8
45
45.8
63.6
84
333
Facility (ID#/Name/technology)


Sorted by MGD (low to high)
q1 (25%)
min
median
mean
max
95th %
q3 (75%)
avg Q(mgd)
Z Zenon
K Kruger
C Cycle-Let
U US Filter
P Parkson
µg/L
Flow MGD
Facility
Post Falls
Spokane County
RPWRF
71 Villa Julie/P
63 Hunter
70 Trappe/P
69 Mahopac/Z
25 Lone Tree 3T/Z
28 Rock Hall OP
28 Rock Hall
8 Emerald Green/U
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5 Frisco/U
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1 Danbury/K
7 South Lyon/K
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10 Port Clinton/K
4 South WRF/U
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3 West Palm Beach/K
RPWRF
60 Clark Co OP 2A
60 Clark Co 2A
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26 Rock Creek/C
60 Clark Co OP 1A
60 Clark Co 1A
65 Las Vegas OP
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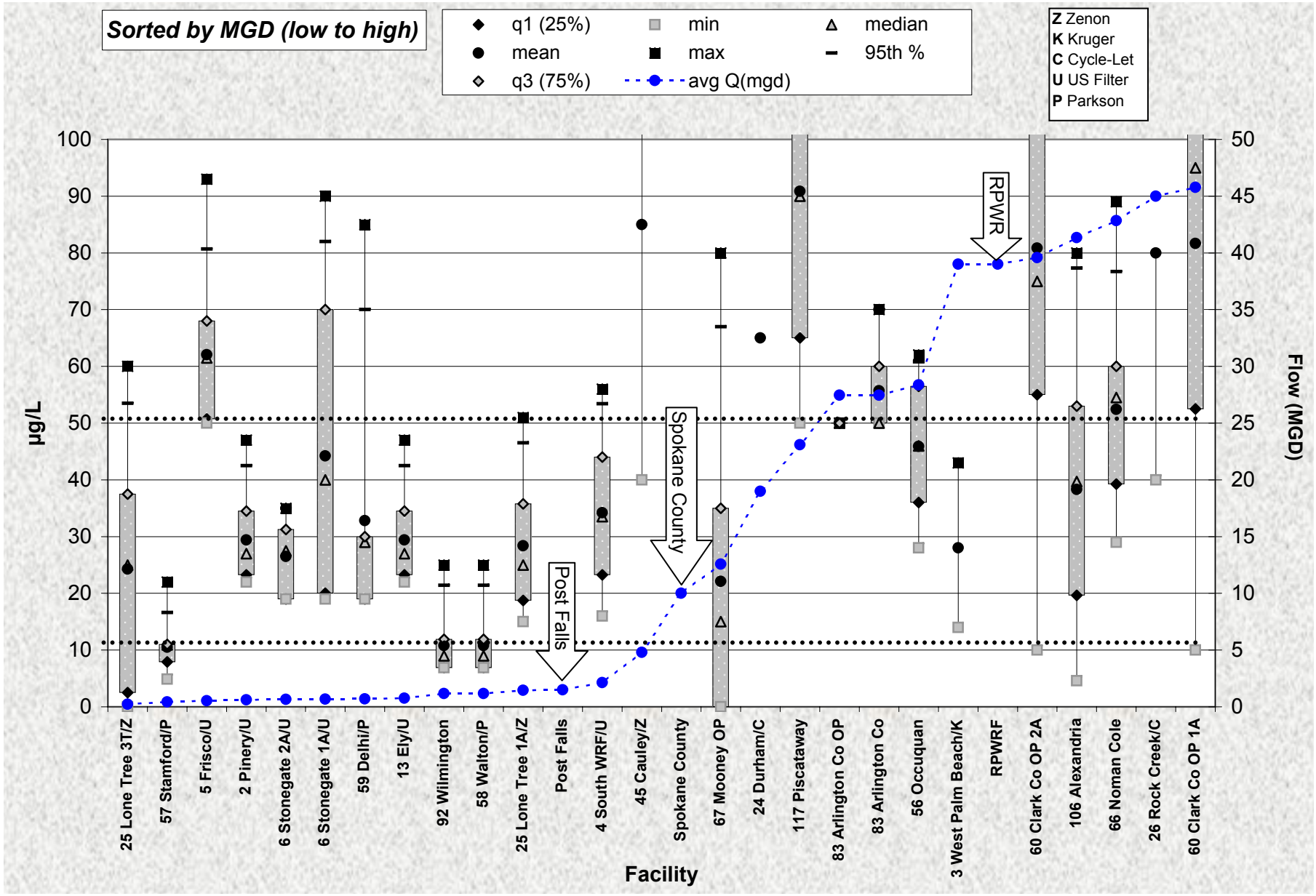
109 Syracuse/K
72 Blue Plains 2A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K Kruger
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Flow (MGD)
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Spokane County
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