GREATER LAWRENCE SANITARY DISTRICT

Cheri R. Cousens P.E., *Executive Director*

July 23, 2019

By Hand Delivery

Betsy Davis
United States Environmental Protection Agency
5 Post Office Square
Suite 100
Boston, MA 02109-3912

RE: Greater Lawrence Sanitary District Waste Water Treatment Facility
Comment on NPDES Draft Permit MA0100447

Dear Ms. Davis:

The Greater Lawrence Sanitary District (GLSD) respectfully submits the enclosed comments on the draft National Pollutant Discharge Elimination System (NPDES) permit (Draft Permit) issued by the United States Environmental Protection Agency (EPA) and Massachusetts Department of Environmental Protection (MassDEP) on June 7, 2019 for the Waste Water Treatment Facility (WWTF) and its Combined Sewer Overflow (CSO) discharges. Due to the significant impact the Draft Permit will have on future compliance strategies, capital investment, and overall affordability, GLSD developed the detailed comments below in conjunction with its consultants, Kleinfelder and Osprey Owl Environmental (OOE) and its attorneys, Nutter, McClennen and Fish LLP, to provide its full perspective on the Draft Permit prior to finalization by EPA and MassDEP. GLSD welcomes and appreciates any opportunity to work with EPA and MassDEP to resolve the questions and issues identified in these comments prior to the issuance of the final permit.

As provided in the following comments, GLSD requests that EPA and MassDEP incorporate the revisions provided by GLSD and re-issue the Draft Permit for further public comment. As previously stated in GLSD's May 7, 2019 correspondence to EPA prior to issuance of the Draft Permit and subsequent June 13, 2019 request to extend the public comment period, EPA's rush to issue a Draft Permit based on an artificial deadline resulted in a Draft Permit that is not reflective of actual conditions in the Merrimack River and is unnecessarily onerous. If EPA had delayed the Draft Permit and allowed GLSD to provide the significant new information provided herein, the Draft Permit and the public's comments on the Draft Permit would be more properly focused on the real conditions needed to protect the River and serve GLSD's ratepayers. Instead, substantial changes are now required to both the Draft Permit and EPA's rationale underpinning the conditions of the Draft Permit. If EPA had allowed GLSD to complete additional sampling to provide sufficient and reliable data for EPA's review and use in preparing the Draft Permit, and taken the time to review and incorporate the comprehensive findings of the United States Army Corps of Engineer's Phase III Lower Merrimack Summary Report, dated February 2019 by CDM Smith, significant effort in responding to the Draft Permit at this time would have been avoided, and GLSD and the public would not be required to comment on a Draft Permit that would, if imposed, require millions of dollars in improvements to the facilities to meet limits that have little, if any, benefit to the Merrimack River.

Background

GLSD owns and operates both the WWTF and an interceptor system, which includes 5 combined sewer (CSO) outfalls. The WWTF and interceptor system receive combined wastewater and separated wastewater from the City of Lawrence, MA, Town of Andover, MA, Town of North Andover, MA, City of Methuen, MA, and Town of Salem, NH. Currently, the WWTF and the CSOs are regulated by NPDES Permit No. MA0100447 (issued August 11, 2005). When finalized, the Draft Permit will supersede the 2005 NPDES permit.

The Draft Permit is also issued to five co-permittees: City of Lawrence, Town of Andover, Town of North Andover, City of Methuen, and Town of Salem. It is GLSD's understanding that any support for these comments or additional input from the co-permittees, including how the Draft Permit may impact the environmental justice communities served by them, will be provided by the co-permittees in separate comment letters.

Comments

GLSD offers the following comments and proposed resolutions on the Draft Permit, which covers both the WWTF and the CSO discharges:

1. **Revised Draft Permit:** Due to the substantial revisions, new and more reliable data, and other additional information provided in this comment letter, GLSD requests that EPA prepare and make available for additional public comment a revised Draft Permit incorporating the revisions requested herein. In addition, GLSD requests that EPA and MassDEP meet with GLSD to discuss the information provided herein prior to issuance of a revised Draft Permit.

2. **Average Monthly BOD_5 Load:** The average monthly effluent limitation for BOD_5 is presented as 30 mg/L and 13,000 lb/day on page 3 of 26 of the Draft Permit. While the concentration limitation is correct, it appears there is an error in the mass loading limit. The correct mass loading rate for BOD_5 should be 13,010 lb/day which is the same as the mass loading limit for TSS.

   Request: EPA should correct the BOD_5 mass loading limit to be 13,010 lb/day.

3. **Dilution Factor:** The Draft Permit Fact Sheet calculated the dilution factor based on U.S. Geological Survey gage station (#01100000) in the Merrimack River in Lowell, MA. GLSD has identified several errors with the calculation as described below.

   a) EPA used a smaller dataset to calculate the 7Q10 causing a Higher Uncertainty in Statistical Analysis: As stated at page 14 of 41 in the 2019 Fact Sheet, EPA extrapolated the 7Q10 flow from a portion of the USGS data set of daily river discharge data (January 1989 to October 2017). It is unclear why this 30-year period was selected even though the USGS data set included data from June 1923 to December 2018.

      The statistical estimate of 7Q10 flow was based on the log Pearson Type III distribution to fit the return frequency curve with annual 7-day low flow data. For statistical analysis, the larger the dataset (higher statistical sample number) available, the less uncertainty there will be associated with the estimated value. The 95% confidence interval with 30 years of data is 637.5 - 988.06 CFS while it is much smaller with a range of 826.33 – 979.24 for the 95-percent confidence interval with 95 years of data for USGS gage station

#01100000. The smaller range of the 95-percent confidence interval is an indication of less uncertainty in the statistical estimate. The Figure below shows the annual 7-day low flow values from 1923 to 2018. There is no observable trend over the entire 95-year dataset.

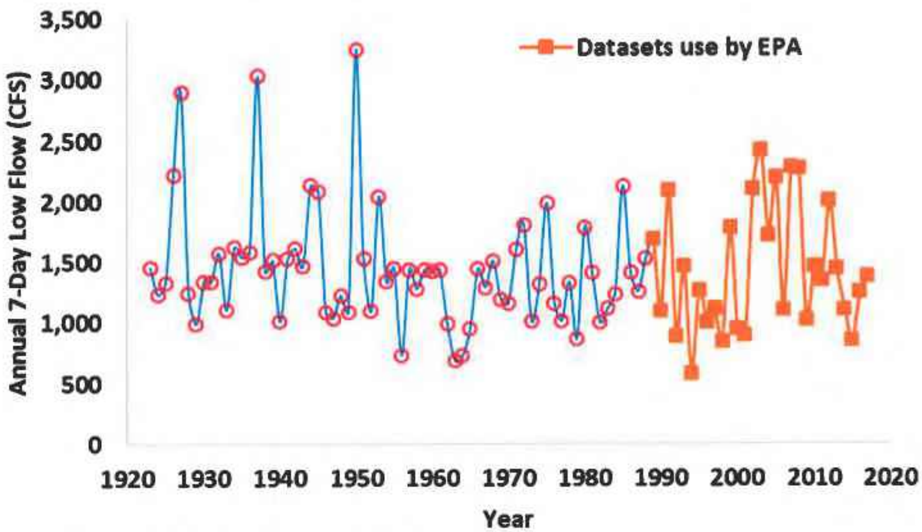

Figure 1. Annual 7-Day Low Flows from 1923 to 2018.

The Table below compares the 95 percent confidence intervals with the Log Pearson Type III distribution analysis using the entire 95 years of data versus only using most recent 30 years of data. The comparison shows that using a smaller sample number for 7Q10 results in much higher uncertainty (reflected in a much higher discrepancy over the 95 percent confidence interval (from 637.500 to 988.060 cfs). The Log Pearson Type III analysis results are included in Attachment 1.

Table 1 Summary of Confidence Interval Estimates of 7Q10 Flow.

	95 percent confidence intervals estimate of 7Q10 flow (CFS)	
	Lower	**Upper**
Entire USGS Data (95 Years)	826.330	979.240
Most Recent 30 Years' Data	637.500	988.060

Request: To provide a more accurate estimate of 7Q10 flow with less uncertainty, EPA should revise its methodology to use all river discharge data available (June 1923 to December 2018) for the USGS gage (#01100000). Doing so is also consistent with the example described in EPA's Handbook for NPDES Permit Writers for calculating 7Q10.[1]

b) The Calculated 7Q10 Provided in the Draft Permit at USGS Gage Station (#01100000) is Incorrect: EPA provided a 7Q10 flow of 832 cfs in the 2019 Fact Sheet (page 14 of 41). However, there is no description of how this value was estimated, and it is incorrect. Based on the methodology described in EPA's 2018, Low Flow Statistics Tools, A How-To

[1] US EPA, Office of Water, *Low Flow Statistics Tools, A How-To Handbook for NPDES Permit Writers*, EPA-833-B-18-001, October 2018.

Handbook for NPDES Permit Writers and USGS' SW Toolbox software, GLSD recalculated the 7Q10 value for the USGS gage station (#01100000) with all available data. The 7Q10 for this gage station is estimated to be 907.33 cfs, as illustrated in the Figure below as well as shown in Attachment 1.

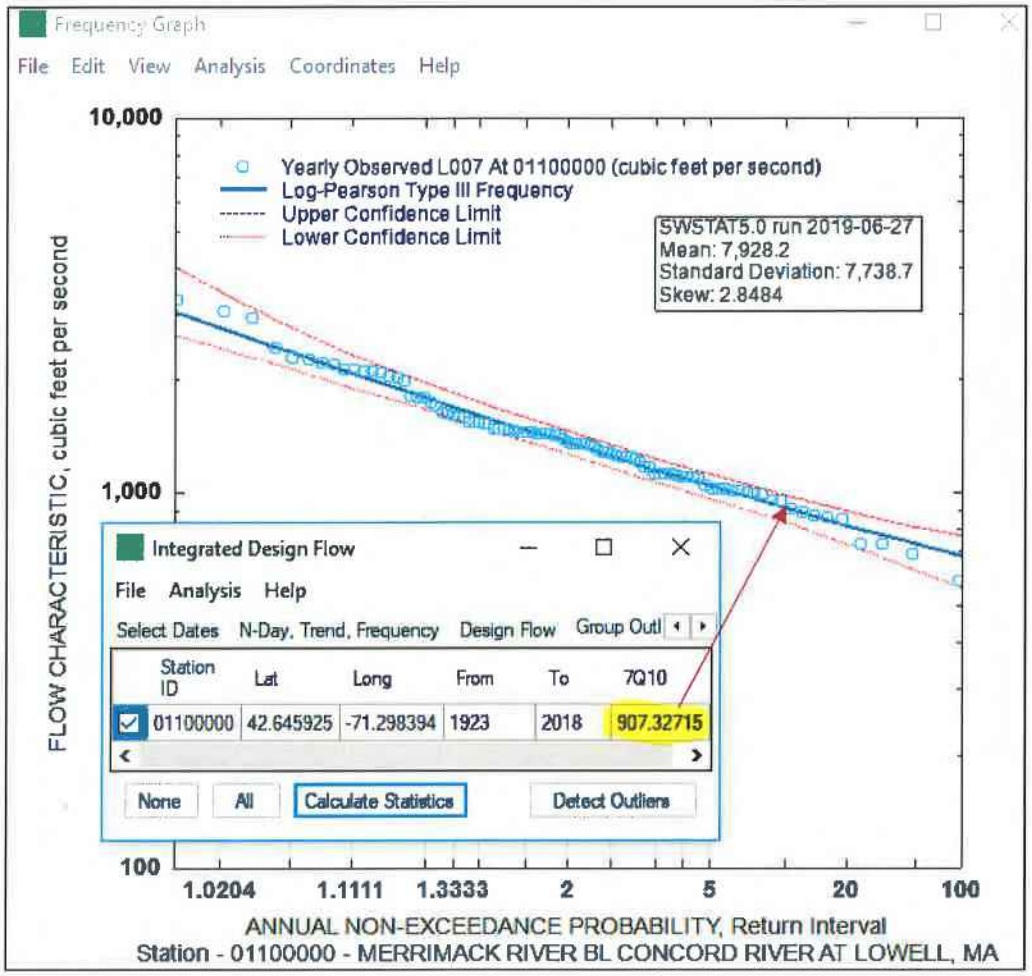

Figure 2 Low Flow Return Frequency Statistical Graph for USGS Gauge Station 01100000 Using USGS SW Toolbox Version 1.0.4[2]. The calculated 7Q10 flow is 907.33 cfs. The Analytical process is based on EPA's Handbook for NPDES Permit Writers.

Request: Based on EPA's Handbook for Permit Writers on estimating 7Q10 value, GLSD has calculated the 7Q10 value for USGS gage station (#01100000) to be 907.33 cfs. GLSD requests that EPA replace the 7Q10 value in the Draft Permit with this updated, correct estimation of 907.33 cfs.

c) The Drainage Basin Area for USGS Gage Station (#01100000) is Incorrect. The Draft Permit provided the drainage area at the gage to be 4,635 square miles. However, the correct drainage area is 4,412 square miles. GLSD contacted the USGS' Richard J. Verdi, Chief of Hydrologic Surveillance and Surface Water Investigations, who confirmed that *"The National Water Information System webpage indicates the total drainage area above the*

[2] https://www.usgs.gov/software/swtoolbox-software-information

gage is 4,635 mi^2, of which 214 mi^2 are used for Boston and Worcester. This nets 4,412 mi^2 that flows beyond the gage to Lawrence." The email communications with USGS are included in Attachment 2.

Request: Based on USGS' estimation of the drainage area that impact Lawrence at USGS gage station (#01100000), the drainage area for calculation of low-flow factor should be 4,412 square miles. Therefore, the flow factor for USGS #0110000 should be 0.2057 cfs/sq. mi:

$$Flow\ factor\ for\ USGS\ \#01100000 = \frac{907.33\text{ cfs}}{4{,}412\text{ square miles}} \approx 0.2057\frac{cfs}{sq.mi}$$

Because the drainage area upstream of the WWTF effluent discharge outfall is about 4,839.83 square miles, the 7Q10 flow at the outfall should be 996 cfs or 643 million gallons per day (MGD).

The dilution factor (DF) at the 7Q10 flow of 643 MGD in the receiving water upstream of the discharge, Q_s, and the Facility's design flow of 52 MGD, Q_d, should be 13.37:

$$DF = (Q_s + Q_d)/Q_d = (643\text{ MGD} + 52\text{ MGD})/52\text{ MGD} = 13.37$$

4. **Total Residual Chlorine:** The Draft Permit calculated the total residual chlorine limit with the incorrect dilution factor. Based on the analysis described in item #2 above, the correct dilution factor should be 13.37. Therefore, the total residual chlorine should also be calculated with this dilution factor, resulting in a chronic limit of 147 µg/L and an acute limit of 254 µg/L.

Request: The water quality-based chlorine limits should be calculated as follows:

$$Chronic\ limit = \text{Chronic criteria} \times \text{dilution factor}$$
$$= 11\mu g/L \times 13.37 = 147\ \mu\text{g/L}$$

$$Acute\ limit = \text{Acute criteria} \times \text{dilution factor}$$
$$= 19\mu g/L \times 13.37 = 254\ \mu\text{g/L}$$

5. **E. Coli Monitoring Requirement:** The Draft Permit Part I requires compliance with E. Coli limits for the first time. Although under current operating conditions GLSD has no objection to the change in pathogen criteria from fecal coliforms to E. Coli, GLSD requests 18 months to review plant performance relative to E. Coli, allowing time to adjust disinfection levels if needed, and better understand plant performance under all weather conditions, prior to this new limit becoming effective. However, should GLSD's future operations require a secondary bypass, a further modification of this requirement may be necessary.

Request: GLSD requests that a compliance period of 18 months be provided prior to the new E. Coli limits becoming effective. GLSD also requests that EPA include a reopener provision allowing GLSD to modify the permit in the future should GLSD use the secondary bypass.

6. **Metal Limits:** GLSD notes that EPA acknowledged in the Draft Permit Fact Sheet (page 28 and 29) that the ambient metals concentration data relied upon by EPA is not representative of the metals concentrations in the river. EPA states in the Fact Sheet at page 28 of 41 that "*During the site visit on March 19, 2019, EPA and MassDEP visited the sampling location where GLSD collects river samples. It was determined the location may not provide data that is representative of the metals concentrations in the river. The river samples were collected with a metal bucket and accumulated debris was visible on the riverbank at the sampling location.*" As discussed below, GLSD has undertaken a clean sampling program and requests that EPA use this new, more reliable data when determining effluent limitations for metals.

   As an initial note, it seems unlikely that two facilities (GLSD and Haverhill) were issued Draft Permits that both include a chronic (monthly average) aluminum limit of 87 µg/L. As different conditions and data underpin each Draft Permit, EPA should explain how the limits were calculated to be identical.

   As EPA is aware, EPA cannot rely on outdated and unsuitable data to calculate reasonable potential, and the proposed Aluminum limit is not based in sound science or law. As stated in *Sierra Club v. U.S. E.P.A.*, "EPA stands on shaky legal ground relying on significantly outdated data." 671 F.3d 955, 966 (2012) (holding that it was arbitrary and capricious for EPA to approve an air quality standard based on old data without considering new data and providing an explanation for its choice); *see also Dow AgroSciences LLC v. National Marine Fisheries Service*, 707 F.3d 462, 473 (4th Cir. 2013) (finding that the Fisheries Service acted arbitrarily and capriciously in relying on outdated data, despite receiving newer data, without explaining why it used the older data) (quoting *Sierra Club*); *Zen Magnets, LLC v. Consumer Product Safety Commission*, 841 F.3d 1141, 1149-50 (10th Cir. 2016) ("In general, where there is a known and significant change or trend in the data underlying an agency decision, the agency must either take that change into account, or explain why it relied solely on data pre-dating that change or trend.") (listing cases); *District Hosp. Partners, L.P. v. Burwell*, 786 F.3d 46, 57 (D.C. Cir. 2015) ("[A]n agency cannot *ignore* new and better data.").

   Here, as reviewed by Kleinfelder and OOE, the samples relied upon by EPA were historically collected by GLSD staff with the understanding that the samples were to be used for toxicity testing to determine suitability of the receiving water (Merrimack River) as dilution water for the WET test, or alternately to provide analytical evidence that laboratory dilution water is more appropriate to be used. WET testing involves determining the viability of the daphnia and fat head minnows in a range of effluent concentrations.

   A detailed review of GLSD's WET test sample collection method shows that the collection methods were never meant to be used to develop metals limits for NPDES Permits. Sample collection consisted of a GLSD staff member using a half-gallon sized steel pail, attaching a rope to the metal handle, and preparing for travel by coiling the rope and allowing it to drop into the bucket. At this point, the bucket is placed into the back of a vehicle and driven to the sampling site. Once at the site, the employee throws the bucket and rope into the river (see Figure 1) and pulls the bucket back so that the pail does not drag along the bottom of the river. During extremely low summer flows, it is not always possible to guarantee the bucket does not have contact with the river bed. The water sample is then transferred to a plastic container that has been provided by the WET testing lab and brought back to the lab.

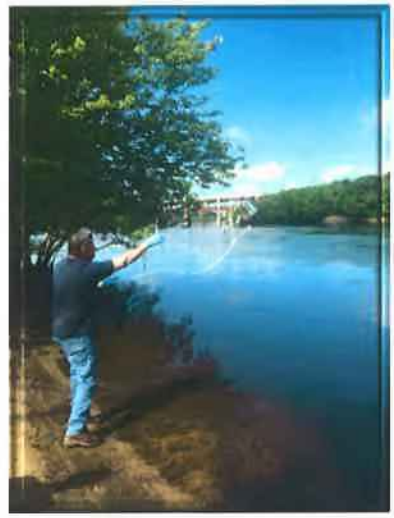

Figure 3. GLSD Staff Taking WET Samples.

This method of ambient river water collection would, at best, be considered marginally adequate to meet the Educational/Stewardship-level (lowest level and quality samples) as outlined in the MassDEP's Quality Management Plan[3] (MQMP). The five years of metals data based on these samples that the EPA used in calculating reasonable potential for metals effluent limits do not come close to meeting the rigor (i.e., accuracy, precision, frequency, comparability, overall confidence, etc.) required for use in waterbody assessments or TMDL development.

After becoming aware of the ambient river water collection method used by GLSD staff, EPA determined that the quarterly WET toxicity data used for a reasonable potential calculation (from January of 2014 through October of 2018) is not representative of the metals concentrations in the river as stated in the draft permit 2019 Fact Sheet, page 28 and 29 of 41 (quoted above).

Clean Sampling Program

To provide more reliable metals data, GLSD has contracted with Rick Cantu of OOE to develop and execute a clean sampling program to analyze ambient water quality in the Merrimack River, as well as effluent water quality from the WWTF. OOE reviewed the current sampling practices described above and developed clean sampling protocols and a quality assurance project plan (QAPP) based on a previous program successfully implemented for "Merrimack River Aluminum Study" for Manchester, NH. Key aspects of the clean sampling program are:

- Based on EPA Method 1669 guidance, OOE and GLSD reviewed three sampling locations and believed the most appropriate location was the current one used for WET test ambient Merrimack River sample collection. This site has an open area with no tree canopy cover, is well over 1,000 feet from the upstream bridge and has a small sloping shelf for easy access to the middle of the river during flows approaching 7Q10. This location complies with EPA Method 1669 guidance and generally avoids impacts from

[3] https://www.mass.gov/guides/water-quality-monitoring-quality-management-program

the nearby highway and commuter train while considering the impact of river hydraulics at varying flows;

- OOE and GLSD developed clean sampling protocols for both river and final effluent composite sampling and testing with location specific considerations (QAPP is attached as Attachment 3). 'Clean Techniques' assure metals-free sample containers, provide a higher level of assessment for ambient contaminants, require a specific outline of sampler dress code to assure no stray introduction of contaminants along with detailed sample collection protocol and quality assurance steps;
- The clean sampling program uses Enthalpy Laboratory to provide the sample bottles, preparation of samples, and analytical services. Enthalpy complies with EPA Method 1669 for sampling preparation;
- GLSD initiated ambient water and effluent discharge sampling in May 2019. The average daily flow in the Merrimac River upstream of the WWTF outfall discharge location varied from 6,680 to 12,600 cubic feet per second (CFS). This value is nearly 7-13 times the 7Q10 flow of 996 cfs (643 million gallons per day (MGD)). None of the samples were collected during a low flow period.

River samples using clean sampling techniques have been collected since May 21, 2019. The water quality data is summarized in Attachment 4 and the detailed laboratory reports are included in Attachment 5. GLSD will continue to collect samples during the summer of 2019 and submit the data to EPA as stated in the Fact Sheet and as stated by Dan Arsenault of EPA in his June 25, 2019 email to GLSD ("[EPA] will accept and consider additional sampling data submitted by GLSD after the close of the comment period and before issuance of the final permit. However, note that we will not accept additional comments after the close of the comment period").

Data Summary

Figure 4 plots copper concentrations from the 2014 to 2018 WET ambient river samples and the recent samples using clean sampling techniques.

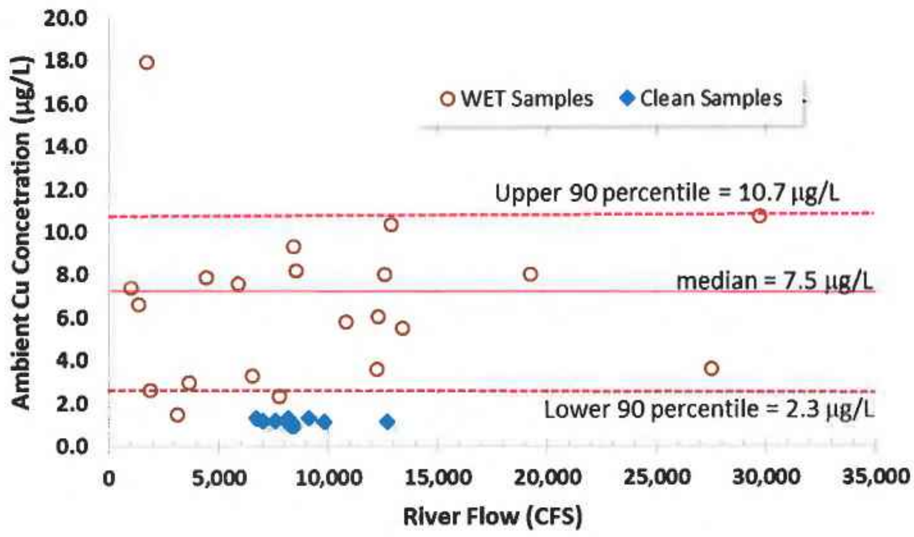

Figure 4. Comparison of Ambient Copper Concentration Between WET Samples and Clean Samples.

The WET sample results vary greatly with a median concentration of 7.5 µg/L while upper and lower 90th percentiles are 10.7 µg/L and 2.3 µg/L.

In comparison, the clean sample results are consistently below the lower 90th percentile of the WET sampling results. This shows that the WET sample results are unreliable and became contaminated during sampling and/or analysis processes while the clean sample results are more representative of the metal concentrations in the river.

In addition to mispurposed sampling techniques previously used by GLSD (appropriate for WET Testing, not metals testing), another source of elevated metal concentration could be from resuspension of particulate matters in the sediment, due to agitation or scouring of the stream bed because of high stream flow. Under high flow conditions, disturbing the streambed could cause sediment to enter the sample bottle, resulting in erroneous data. In accordance with the USGS's *Field Manual for the Collection of Water-Quality Data*,[4] these data should be discarded.

Figure 5 shows that WET samples had erroneously high aluminum concentrations during high flow periods when the river flow was 20 times or more above the 7Q10 flow. Based on the data analysis described above, the WET test data is unreliable and not representative of river metal concentrations. As shown in Figure 5, the WET sample results are scattering in a range of an order of magnitude between 0.058 mg/L and 1.12 mg/L while the clean sample results have been consistent in a relatively smaller range between 0.072 and 0.11 mg/L even though the river flow has fluculated between 6,680 and 12,600 cfs.

[4] USGS, National Field Manual for the Collection of Water-Quality Data, Techniques of Water-Resources Investigations, Book 9, Handbook for Water-Resources Investigations.

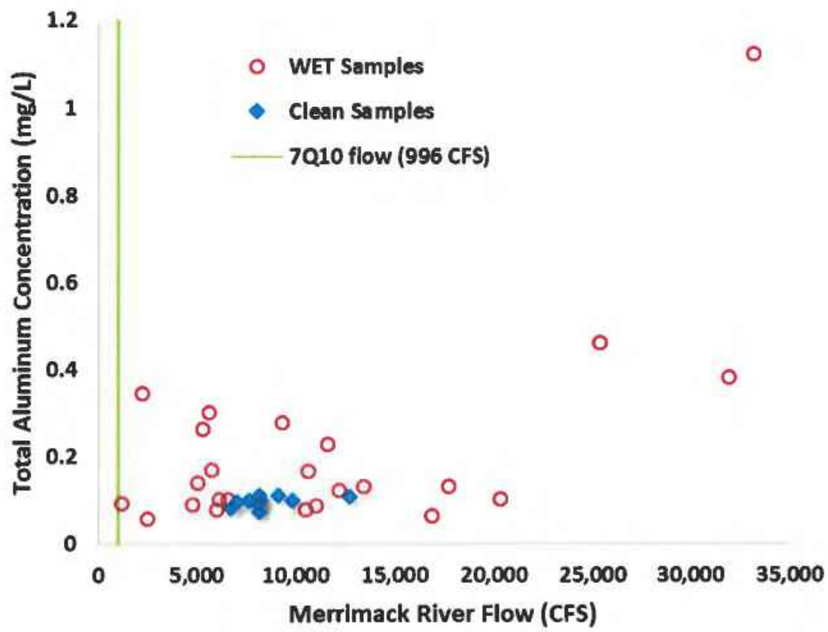

Figure 5 ***Comparison of Ambient Aluminum Concentration Between WET Samples and Clean Samples.***

Similar to the aluminum data, other metal testing results also show a similar pattern with clean sampling results within more consistent, narrow ranges.

Therefore, the clean techniques sample testing results should be used to calculate the acute and chronic exposure conditions for determination of reasonable potential.

Reasonable Potential Determination for Tested Metals

To account for variation in effluent monitoring data, Kleinfelder used EPA's statistical approach (lognormal distribution model) to calculate 95th percentile concentration level for the metals of concern. The upper limit for metals in the effluent and the median metal concentrations in the Merrimack River upstream of WWTF outfall are summarized in Table 1.

Calculation of ambient river metal concentrations at the WWTF outfall location under acute and chronic conditions is based on the following formula.

$$C_r = \frac{C_d * Q_d + C_s * Q_s}{Q_d + Q_s}$$

Where:

C_d = upper bound effluent concentration data (95th percentile)

Q_d = Average Design flow of facility for chronic exposure calculation; Peak design flow for acute exposure calculation.

C_s = Median concentration in Merrimack River upstream of discharge

Q_s = 7Q10 streamflow in Merrimack River upstream of discharge

Using the clean sample data collected to-date, the calculated river in-stream ambient concentrations for cadmium, copper, lead, and zinc are lower than the ambient water quality criteria as shown in Table 1. Therefore, there is no need for a water quality based effluent criteria for these metals in GLSD's NPDES permit.

Table 2 Metals Reasonable Potential and Limits Calculations

Metal	Q_s	[1]C_s	[2]Q_d	[3]C_d		Q_r	C_r		Criteria		Acute Reasonable Potential	Chronic Reasonable Potential	Limits	
	cfs	µg/l	cfs	Acute (µg/l)	Chronic (µg/l)	cfs	Acute (µg/l)	Chronic (µg/l)	Acute (µg/l)	Chronic (µg/l)	Cd & Cr > Criteria	Cd & Cr > Criteria	Acute (µg/l)	Chronic (µg/l)
Aluminum		99.5		71	71		105.32	97.37	750	87	N	Y	N/A	87
Cadmium		0		0	0		--	--	0.86	0.14	N	N	N/A	N/A
Copper	996	1.2	80.5 / 201	7.5	7.5	1,076.5	2.51	1.67	6	4.3	N	N	N/A	N/A
Lead		0.8		0.6	0.6		0.85	0.79	26.1	1	N	N	N/A	N/A
Zinc		6.6		55.6	55.6		16.49	10.26	56.1	56.1	N	N	N/A	N/A

[1]Median concentration for the receiving water just upstream of the facility's discharge taken from the clean sample testing data (see Attachment 4).

[2]Design flow of 80.5 CFS (52 MGD) was used to calculate Chronic exposure concentration and peak flow of 201 CFS (130 MGD) was used to calculated acute exposure concentration.

[3]Values represent the 95th percentile (for n ≥ 10) or maximum (for n < 10) concentrations from the DMR data and/or WET testing data during the review period (see Appendices A & C). If the metal already has a limit (for either acute or chronic conditions), the value represents the existing limit.

The reasonable potential determination using clean techniques sample data is consistent with EPA's analysis for The Lowell Regional Wastewater Utility (Lowell RWWU), which discharges its effluent to the Merrimack River approximately 10 miles upstream of the GLSD WWTF. EPA's reasonable potential determination calculation for the Lowell RWWU[5] included supplemental metal data collected with clean sampling techniques and concluded that there is no reasonable potential for the effluent to exceed the water quality criteria (including aluminum).

As shown in Figure 6, the ambient metal concentrations calculated from GLSD's clean sample data are higher than EPA calculated median ambient metal concentration for the Lowell RWWU, which is likely a result of Lowell sampling during low flow periods versus current higher flow periods during GLSD's sampling. Given the facilities' proximity to each other, it is reasonable to consider the ambient metals concentrations to be similar. It should be noted that the supplemental clean sample data for the Lowell RWWU were collected during low flow periods (1,010 – 6,210 CFS) that are close to 7Q10 flow at its outfall location. It is anticipated that GLSD's clean sample testing results will be close to those of the Lowell RWWU when samples are taken under flow conditions close to 7Q10 conditions.

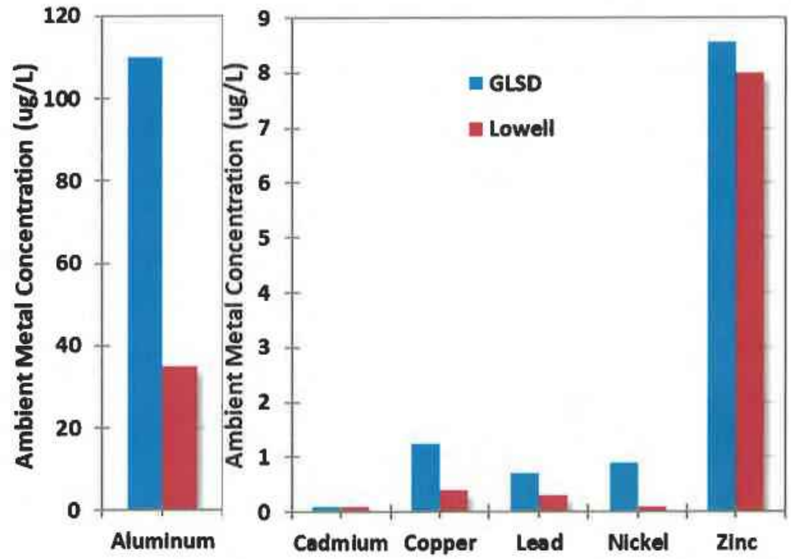

Figure 6. Comparison of Ambient Metal Concentration between Lowell RWWU Data and GLSD Clean Sample Data

Based on a detailed evaluation of GLSD's sampling practice for collecting ambient water samples versus an analysis of clean sample testing data, GLSD, Kleinfelder and OOE concluded the following:

- The WET test data (GLSD bucket sample method) is unreliable for use in calculating effluent limits and not representative of ambient river metal concentrations. Therefore, the clean sample testing results should be used to calculate the acute and chronic exposure conditions for conducting a reasonable potential determination.

- River velocity impacts ambient metal concentrations due to resuspension of sediments. Samples taken during low flow conditions (close to 7Q10) are more representative of river ambient water quality.

[5]Draft NPDES Permit for Lowell RWWU, Permit No. MA0100633. https://www.epa.gov/ma/public-notice-draft-permit-lowell-regional-wastewater-utility-and-csos-co-permittees-town

- Except for aluminum, the calculated ambient river metal concentrations (cadmium, copper, lead, and zinc) are lower than the ambient water quality criteria. With the addition of the GLSD effluent, a reasonable potential analysis demonstrates that there is no basis to require water quality based effluent limitations.

  Request: GLSD requests that EPA rerun the calculations to determine the effluent limitations for Cadmium, Copper and Lead and determine that no effluent limitation is necessary as discussed above for these metals. GLSD also requests that EPA rerun its analysis of the aluminum effluent limitation and adjust the limitation accordingly based on the above.

7. **Aluminum Implementation:** As discussed above, the Draft Permit includes a chronic (monthly average) aluminum limit of 87 μg/L. In addition to the comment above, GLSD objects to the imposition of a limit for the following reasons:

   a) EPA has recently adopted new aluminum criteria, which preliminary indications would result in a substantially higher criteria, and quite possibly the WWTF will no longer show cause or reasonable potential for the imposition of a water quality based effluent limitation for this metal.

   b) As stated in the Fact Sheet: *"Because MassDEP has indicated to EPA that its planned revisions to its aluminum criteria will be based on EPA's recommended criteria, EPA reasonably expects its new criteria may also be higher." The Fact Sheet further says: "If new aluminum criteria are adopted by Massachusetts and approved by EPA, and before the final aluminum effluent limit goes into effect, the permittee may apply for a permit modification to amend the permit based on the new criteria."* Although EPA acknowledges that the aluminum criteria specified in the Draft Permit is not necessary and will be significantly higher, it places the onus on GLSD to (1) take steps to comply with the criteria should MassDEP delay or not complete the planned revisions; or (2) apply for a permit modification.

   c) GLSD understands the need to invest in upgrades that will make a difference to the environment and support water quality being met in the receiving water body; however, there is simply no rational reason to impose a limit for aluminum at this time. Aluminum is not causing water quality to be compromised since both EPA and MassDEP agree that the current criteria in Massachusetts is not appropriate. To require a limit, as a "paper exercise" while waiting for MassDEP to change their regulation is wasteful not only of the time and expense for GLSD, but for time and unnecessary effort of MassDEP and EPA, whose efforts are spent imposing (and then, hopefully rescinding) an effluent limitation that has absolutely no scientific support as appropriate criteria.

   d) Although GLSD is appreciative of the 36-month compliance schedule that, according to the Fact Sheet, was given to allow Massachusetts time to adopt new criteria and the final permit to then be modified, once the limit is effective, rescinding this limit would be subject to stringent anti-backsliding and anti-degradation regulations, which may prevent any hope of this "paper" limit ever being removed or modified.

e) Finally, while the 36-month compliance schedule provided in Part I.H gives the appearance of a "wait and see" approach, once this limit is in the final permit, GLSD must immediately begin planning to meet it, because the Draft Permit allows no other option. To meet the new aluminum limit, GLSD will need to engage an engineering firm to evaluate the current treatment process at the facility, determine the type and extent of upgrade needed to meet the limit, design the upgrade necessary, prepare bid documents and issue and award bids for construction, and complete the construction necessary.

This process, in and of itself, requires 36 months. Therefore, GLSD is now forced to spend money to begin the evaluation and upgrade process for a limit that state and federal agencies agree is not necessary.

Request: Remove the environmentally unnecessary and costly aluminum effluent requirement from this Draft Permit. If EPA insists on keeping the effluent limitation, modify the compliance schedule in Part I.H.1 to allow for a 96-month compliance schedule that will:

a) Provide more time for Massachusetts to adopt the new criteria or, if necessary, provide more time for the co-permittees to modify their water treatment systems at significant cost, which will be necessary to meet the limit at the WWTF if MassDEP does not modify the aluminum criteria as expected at this time;
b) Prevent the need of GLSD to immediately begin planning and implementing the upgrades necessary to meet this unnecessary limit; and
c) Remove the requirement that GLSD must apply for a permit modification and instead allow for a substitution of the criteria following MassDEP's completion of its planned revisions.

8. Total Phosphorus: The Draft Permit contains an unnecessary effluent discharge concentration limit of 0.53 mg/l Total Phosphorus (TP). As discussed below, GLSD requests that EPA remove the TP limit and require only a reporting requirement.

Inappropriate Application of Massachusetts Narrative Standards for Nutrients: The Massachusetts Surface Water Quality Standards (MA SWQS) at 314 CMR 4.05(5)c, do not contain a numeric limitation applicable to this waterbody segment, but do contain a narrative criteria for nutrients as follows:

"Nutrients. Unless naturally occurring, all surface waters shall be free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses and shall not exceed the site-specific criteria developed in a TMDL or as otherwise established by the Department pursuant to 314 CMR 4.00. Any existing point source discharge containing nutrients in concentrations that would cause or contribute to cultural eutrophication, including the excessive growth of aquatic plants or algae, in any surface water shall be provided with the most appropriate treatment as determined by the Department, including, where necessary, highest and best practical treatment (HBPT) for POTWs and BAT for non POTWs, to remove such nutrients to ensure protection of existing and designated uses. Human activities that result in the nonpoint source discharge of nutrients to any surface water may be required to be provided with cost effective and reasonable best management practices for nonpoint source control."

The narrative criteria raise several issues that have not been appropriately addressed in the Draft Permit. These issues include:

- The Draft Permit fails to establish what specific existing and designated uses are impaired; and

- The Draft Permit fails to establish whether potential eutrophication is naturally occurring or man-made, or due to point source discharge, non-point sources, or other factors.

No Documented Impairment of Aquatic Life, Recreational, or Aesthetic Uses: At this time, there is no documented impairment attributable to phosphorus in the Merrimack River downstream of the GLSD wastewater discharge. Between 2004 and 2016, the United States Army Corps of Engineers (USACE)[6] sponsored a study conducted by CDM Smith that included extensive monitoring of water quality conditions in the Merrimack River (the USACE Study,[7]) all of which was conducted with an EPA-Approved Quality Assurance Project Plan (QAPP) for field work, laboratory procedures, and quality assurance provisions.

Aquatic Life: During the first and third phases of the 3-phase USACE Study, dissolved oxygen was monitored in the river, including numerous sites in Lawrence and downstream through the estuary in Newburyport. The dissolved oxygen consistently measured well above the required Massachusetts standard of 5.0 mg/l, according to the predominant method of in-situ field measurements and supplemental lab testing (Winkler Titrations) to validate the field measurements. These consistent observations, over more than ten recent years, refute any claim that aquatic life in the Merrimack River is impaired, or in danger of becoming impaired.

CDM Smith's Final Phase I Summary Report entitled "Merrimack River Watershed Assessment Study – Final Phase I Report" (September 2006) states in Sections 4.2.4.1 and 4.2.4.2 that for both dry weather and wet weather, "the river and its tributaries generally satisfy water quality standards for dissolved oxygen in both states." The supporting data is included in CDM Smith's

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[6] The findings throughout these comments are based on data and interpretations published by the USACE's consultant, CDM Smith. USACE has not yet published its own interpretation.

[7] GLSD understands that the USACE, at the request of the City of Haverhill and GLSD, has provided EPA with electronic copies of all available reports, including the summary reports prepared by CDM Smith, and all underlying sample data and laboratory reports. GLSD also understands that EPA, as a study partner, has access to the entire Merrimack River Study, including the summary reports and all supporting data through a data room prepared by the study consultant, CDM Smith. As these reports are integral to issuance of any permit for the Merrimack River, GLSD requests that to the extent that these reports are not in the administrative record already as part of the underlying information that EPA relied upon prior to issuance of the Draft Permit, that the reports be incorporated in the record. In addition, due to the voluminous nature of the reports and underlying sampling results, GLSD incorporates by reference these reports into these comments and is providing EPA with electronic copies of the reports (Attachment 6).

Report to the USACE entitled "Merrimack River Monitoring Report, May 2006." Both referenced reports are publicly available.

CDM Smith's Final Phase III Summary Report entitled "Merrimack River Assessment Study, Phase III Final Report" (February 2019) confirms the conclusion from Phase I with data obtained within the last 5 years. Figure 3-22 of this report illustrates that dissolved oxygen measurements (in-situ) remain well above the threshold of 5.0 mg/l in the entire reach from the GLSD discharge to the estuary in Newburyport, and in fact is almost always above 6.0 mg/l. This includes samples during which the mainstem river was at a low flow of 1840 cfs, or approximately twice the 7Q10 value on June 25, 2014. The supporting data for these graphs are included in CDM Smith's report entitled "Merrimack River Watershed Assessment Report, Phase III Final Monitoring Data Report (2017)." Both of the cited reports have been published by CDM Smith as Final and are available to EPA as a recognized study partner. The USACE plans to publish its own summary assessment and publish CDM Smith's final reports later this summer or fall (2019).

Recreational Uses and Aesthetics: The same studies cited above document that chlorophyll-a levels can, at times, exceed generalized guidance levels for US rivers. However, these guidance levels are generalized and intended for application only in the absence of site-specific documentation of the health or impairment of a water body and its uses. They do not apply to all rivers uniformly, and in fact are not intended for use when sufficient site-specific data are available to characterize the health or impairment of a water body, as is the case with the Merrimack River. During the approximately 13-year period of active field work supporting the USACE Study, field crews did not report algae blooms in the river or estuary. Unless there is documented evidence of algae blooms or a combined set of factors showing such blooms are likely, it cannot be stated that the river is impaired by nutrients for other uses beyond aquatic habitat, such as recreation or aesthetic value. There are no applicable state or federal regulations for nutrient levels or chlorophyll-a levels, both of which are indicators of potential impairment but which, on their own, do not constitute actual impairment. Documented evidence of harmful algae blooms in the Merrimack (or dissolved oxygen levels below 5.0 mg/l) would be needed to apply discharge limits predicated on the causal relationship between chlorophyll-a or phosphorus levels and actual use impairment.

Reasonable Potential for Impairment: On page 23 of the Fact Sheet, EPA states that "EPA is not aware of evidence of factors that are reducing eutrophic response in this segment of the Merrimack River downstream of the discharge." **We request clarification on the extent of investigation that EPA used in coming to this conclusion.** The data from the USACE Study referenced above, as described in CDM Smith reports to the USACE, shows that for this reach of the river, 0.1 mg/l of TP is far less likely to cause eutrophication than it may be in other water bodies. This may be because the river flows swiftly and does not allow sufficient time for nutrients to impair the water (see further discussion on travel times below), and/or because the river passes through rapids frequently enough to remain well oxygenated. This evidence, and the unique flow dynamics of the Merrimack, must be acknowledged in determining reasonable potential for impairment.

Fundamentally, Gold Book[8] standards that represent thresholds of reasonable impairment potential are not universally applicable. Many were developed for water bodies in warmer climates, with longer residence times than the Merrimack, and with different organic growth dynamics. That said, application may be appropriate in situations for which no other data or evidential facts are available to characterize the health of a water body. In this instance, ample site-specific data and evidence is available to establish a more accurate threshold for reasonable impairment.

This intended use of Gold Book standards for TP does not apply in the Merrimack River, where an abundance of site-specific data over wide ranges of water flow rates and seasonal temperatures in recent years are a more precise and more defensible indicator of the water's health and eutrophication potential.

As stated in the Gold Book, "Evidence indicates that: (1) high phosphorous concentrations are associated with accelerated eutrophication of waters, <u>when other growth-promoting factors are present</u>; (2) aquatic plant problems develop in reservoirs and other standing waters at phosphorous values lower than those critical in flowing streams; . . . (4) phosphorous concentrations critical to noxious plant growth vary and nuisance growths may result from a particular concentration of phosphate in one geographical area but not in another." (p. 243 of PDF) (emphasis added).[9]

Further, the "majority of the Nation's eutrophication problems are associated with lakes or reservoirs and currently there are more data to support the establishment of a limiting phosphorous level in those waters than in streams or rivers that do not directly impact such waters. There are natural conditions, also, that would dictate the consideration of either a more or less stringent phosphorous level. Eutrophication problems may occur in waters where the phosphorous concentration is less than that indicated above and, obviously, such waters would need more stringent nutrient limits. Likewise, there are those waters within the Nation where phosphorous is not now a limiting nutrient and where the need for phosphorous limits is substantially diminished." (p. 247).

"There are two basic needs in establishing a phosphorous criterion for flowing waters: one is to control the development of plant nuisances within the flowing water and, in turn, to control and prevent animal pests that may become associated with such plants; the other is to protect the downstream receiving waterway, regardless of its proximity in linear distance." (p. 247). EPA hasn't established the reasonable potential for either.

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[8] By way of background, under section 304(a) of the CWA, EPA is required to publish and periodically update ambient water quality criteria that reflect the "latest scientific knowledge" and that can be used by states to develop water quality criteria for application within their borders. 33 U.S.C. § 1314(a). In accordance with section 304(a), EPA published nationwide water quality criteria, known as the "Gold Book Standards," in 1986.

[9] https://www.epa.gov/sites/production/files/2018-10/documents/quality-criteria-water-1986.pdf.

Finally, the Gold Book states that "No national criterion is presented for phosphate phosphorous for the control of eutrophication." (p. 249)

Figures 3-19 (TP), 3-20 (chlorophyll-a), and 3-22 (dissolved oxygen) of the above-referenced report by CDM Smith to the USACE, "Merrimack River Assessment Study, Phase III Final Report" (February 2019) should be used in the determination of reasonable potential for impairment. The figures show that while TP downstream of GLSD sometimes (but not always) exceed the Gold Book standard of 0.1 mg/l TP, and while chlorophyll-a levels in the same reach sometimes (but not always) exceed guidance levels used by the State of New Hampshire (but not necessarily by Massachusetts), neither situation results in dissolved oxygen impairment or documented detrimental algae blooms, which are the ultimate measure of use attainment or impairment. The supporting data for these graphs are included in CDM Smith's report entitled "Merrimack River Watershed Assessment Report, Phase III Final Monitoring Data Report (2017)." Both cited reports have been published by CDM Smith as Final and are available to EPA as a recognized study partner. **Given the site-specific data, which are recent and clear in their depiction of river health, EPA cannot attempt to use the Gold Book's 0.10 mg/L criterion. This is especially true given that such an approach contradicts the very principles discussed in the Gold Book.**

Application of the Gold Book Standard for Phosphorus: Scientific studies during the past 15 years confirm that the EPA Gold Book standard of 0.1 mg/l of TP in the river is over-protective, for reasons noted above (principally, that higher levels are frequently observed but without any corresponding evidence of impairment). The evidence is in the monitoring data contained within CDM Smith's report to the USACE, "Merrimack River Assessment Study, Phase III Final Report" (February 2019). The instream sampling data presented in the report (figures 3-19 and 3-22) clearly show that the instream TP concentration in this reach of the river can be well above the Gold Book standard of 0.1 mg/l (up to approximately 0.17-0.18 mg/l) while still keeping dissolved oxygen well above the threshold of 5.0 mg/l. Simulation modeling, per figures 5-8 and 5-11 of this report suggest that an instream TP concentration of 0.25 mg/l is sufficient to keep dissolved oxygen well above 5.0 mg/l in this reach of the river. Courts have acknowledged that although EPA may use the Gold Book Standards when developing a limit, EPA should not blindly follow the Gold Book where site-specific data exists. *See, e.g., Upper Blackstone Water Pollution Abatement Dist. V. U.S. E.P.A.*, 690 F.3d 9, 31 (2012) (affirming use of Gold Book-recommended in-stream concentration because EPA's review included an examination of "additional site-specific data, including local water quality studies . . . ."). **Prior to issuance of a final permit, EPA must review the report and explain why the results from this federally-funded study, where EPA was a study partner, were not accounted for in the issuance of this Draft Permit because this site-specific data provides a more appropriate view of the conditions of the river**. In accordance with the measured river data, GLSD proposes an instream target for this reach of the Merrimack River of 0.17 mg/l. Anything less than this is unjustifiable given the availability of this site-specific data.

Further, the Draft Permit says that "EPA uses nationally recommended criteria and other technical guidance to develop effluent limitations for the discharge of phosphorus." EPA must explain:

- Was there any other "nationally recommended criteria and other technical guidance" that EPA used in addition to the "Gold Book"? If not, why not, since all waterways are unique?

- What is the specific cause of any determined risk of eutrophication in the waterway? Is it naturally occurring? Due to non-point source? Due to excessive nitrogen? Other factors?

Ambient Conditions: The proposed phosphorus discharge limit is conditioned on ambient conditions as measured recently – that is, before the issuance of this and other permits. Allowable discharge thresholds are computed by EPA as a function of current upstream ambient conditions, target phosphorus concentrations downstream, and the dilution factor representing the relationship between the discharge flow and the 7Q10 flow in the river. Upon implementation of upstream controls on TP, which are currently discussed and/or promulgated in draft form for Lowell and upstream Massachusetts tributaries, and for upstream discharges in New Hampshire through New Hampshire DES, the calculation for GLSD will become immediately invalid and over-prescriptive.

EPA has long advocated for a "watershed approach" to water quality management, and while permitting in Region 1 is still accomplished along political jurisdictions and not by watershed divides, surely each permit must necessarily consider the impacts of other permits upstream that would affect the anticipated near-term ambient conditions. In this way, the watershed ethic that EPA has endorsed can be applied in principle for comprehensive management of the Merrimack Watershed. Even if the issuance of permits remains individualized to each discharger, the relationships between each discharger and all others can and must be a foundational driver of future discharge thresholds. **EPA therefore must estimate future near-term ambient conditions upstream of the GLSD discharge as a function of other upstream permit requirements issued by the same agency (and New Hampshire DES) before issuing a permit for GLSD that will be immediately invalidated by the expected change in the input to EPA's calculation due to its issuance of other similar permits.**

CDM Smith's report to the USACE, "Merrimack River Assessment Study, Phase III Final Report" (February 2019) provides additional insights into likely effects of reducing upstream discharge loads throughout the watershed. Figure 5-8 of CDM Smith's report shows the anticipated (simulated) response of the river to the hypothetical scenario in which all wastewater discharge facilities in NH and MA (including GLSD) discharge with a TP concentration of 1.0 mg/l (or current average discharges, whichever is lower). **These results were simulated for extreme low flow conditions (94% of 7Q10 at Lowell) and suggest that ambient concentrations just upstream of GLSD could decrease by up to 65% if upstream discharges are controlled to 1.0 mg/l TP or maintained at their current levels if already lower.** The figure is based, in part, on the accumulated changes in ambient conditions resulting from the simulated reductions in load throughout the watershed. **The EPA should review the models and results, as presented in the report referenced above and in each of the referenced reports below, and account for the expected decrease in ambient phosphorus conditions due to other permit requirements upstream of this Draft Permit.**

EPA should also consider the following reports about simulation modeling:

- "Final Lower Merrimack Model Update Validation Technical Memorandum," prepared by CDM Smith for the USACE. 2017.
- "Upper Merrimack and Pemigewasset River Study Model Development Report," prepared by CDM Smith for the USACE. 2018.
- "Merrimack river Watershed Assessment Study Simulation Model Development Report," prepared by CDM Smith for the USACE. 2006.
- "Merrimack River Watershed Assessment Study Phase III – HSPF Model Updates," Technical Memorandum prepared by CDM Smith for the USACE, August 20, 2013.

Travel Time at 7Q10: The US Department of Interior (USDOI) issued a report on the Merrimack River entitled "Report on Pollution of the Merrimack River and Certain Tributaries – Part II – Stream Studies – Physical, Chemical, and Bacteriological (August 1966)." The section beginning on Page 31 entitled "Time of Stream Travel" reports on measured travel time in the river over a range of flow conditions. While this report is old, its findings were re-examined with the purpose of validation with physical measurements as part of the recent USACE study. The report to the USACE, issued by CDM Smith, is entitled "Merrimack River Watershed Assessment Study, Hydrology and Hydraulics Assessment (March 2004)," and is available with permission from USACE and designated study participants if EPA wishes to validate. Figure 14 of the USDOI study shows the time of travel in the river downstream of the Essex Dam in Lawrence (which is upstream of the GLSD wastewater treatment facility discharge) to Haverhill and all the way to Newburyport.

We first examined the time of travel to Haverhill, where, by issuance of its draft permit to Haverhill in June 2019, EPA suggests that the river is not impaired for nutrients, as no nutrient limitation is being proposed for the Haverhill POTW. Even under low flow conditions of 1,000 cfs, which approximates the 7Q10 flow in the river at this location, the time of travel between the Essex Dam and Haverhill is only 2 days. **Current nutrient discharge rates at GLSD cannot be reasonably linked to eutrophication within 2 days while flowing into a reach that is NOT impaired in Haverhill.**

We next examined the time of travel to the Newburyport Estuary from the Essex Dam, which under the same low-flow condition of 1,000 cfs is reported by the USDOI as 9 days. By definition, the 7Q10 flow lasts for only 7 days. Given that water effectively flows out of the system within this 7-day event that occurs once every ten years, and that dissolved oxygen in this reach was measured well above the threshold of 5.0 mg/l under similar low flow conditions in 2014, **an explanation is needed for why current nutrient discharge rates at GLSD could legitimately be considered as reasonable potential for impairment, in a water body (from Haverhill to Newburyport) which is not considered impaired by EPA.**

Dilution Factor: As documented in accompanying comments, GLSD believes that the 7Q10 flow, drainage area, and corresponding dilution factor used by EPA in determining the allowable TP level are incorrect. **At a minimum, the TP threshold should be recomputed with the correct input information,** though GLSD also seeks explanations for all the other factors listed above in the determination of the TP threshold as it stands in the draft permit. See proposed recalculation in the following sections, as it is a function of several factors, and not just the 7Q10 flow.

Application of Current Clean Samples for Ambient Condition: GLSD has been applying proper clean sampling techniques and collecting ambient TP data upstream of its discharge beginning in May 2019, and will continue through the summer of 2019. Already, as they have become available, these data have been supplied to EPA, and will continue to be supplied (even beyond closure of the public comment period) as they become available. These new values have not been included by EPA in the calculations issued in the Draft Permit (the agency has used a median value of 0.060 mg/l based on older data). These new data suggest lower ambient levels, and should be applied in the calculation, in addition to the further expected reduction of ambient conditions as detailed above due to the expected reductions in upstream discharges as outlined in other draft permits. Between May 21, 2019 and June 26, 2019, 10 clean ambient samples of TP were collected upstream of the GLSD discharge (although GLSD has provided the data for the initial rounds of sampling, all of the data collected to date is provided as an attachment to these comments to be included in the administrative record), with a median concentration of 0.048 mg/l, which is lower than the value of 0.060 used in the EPA calculation using 2017 EPA data (Page 24 of the Fact Sheet). Furthermore, these measurements do not account for additional expected reductions due to enforcement of lower TP effluent limits proposed by EPA and NHDES upstream. At a minimum, the ambient conditions used in calculating the effluent phosphorus limit should use both data sets, as outlined in the table below, resulting in a median ambient TP concentration of 0.052 mg/l:

Ambient Total Phosphorus Upstream of GLSD

Date	TP (mg/l)	Data Source
7/31/2017	0.050	EPA
8/14/2017	0.054	EPA
8/29/2017	0.062	EPA
9/14/2017	0.057	EPA
9/26/2017	0.090	EPA
10/11/2017	0.087	EPA
5/21/2019	0.041	GLSD
6/4/2019	0.054	GLSD
6/5/2019	0.037	GLSD
6/12/2019	0.032	GLSD
6/13/2019	0.038	GLSD
6/14/2019	0.046	GLSD
6/18/2019	0.050	GLSD
6/19/2019	0.050	GLSD
6/25/2019	0.064	GLSD
6/26/2019	0.064	GLSD
MEDIAN	**0.052**	

GLSD expects any future permit condition to be based on data inclusive of current ambient measurements AND expected near-term reductions in ambient conditions due to permits being issued by EPA and NHDES to upstream discharges, and requests that EPA explain why or why not the expected impacts of regulatory action upstream are included in GLSD's threshold. See proposed alternative calculation in the following sections, as it is a function of additional factors beyond the ambient concentration.

In addition to the changes to the ambient sampling program discussed herein, EPA must also consider how the clean sampling program impacts GLSD's effluent sampling results. As part of the clean sampling program, GLSD has new protocols as outlined in the attached QAPP (Attachment 3). The new available data (Attachments 4 and 5) indicates that levels of phosphorous in the effluent from the WWTF are lower than the samples relied upon by EPA in calculating the limit in the Draft Permit. The clean sampling program is a significant operational change at the WWTF and shows that the previously submitted data does not reflect the amount of phosphorous in the facility's current effluent. For these reasons, EPA should use the new data, which GLSD continues to collect and will provide to EPA as requested and allowed by EPA in the Fact Sheet, and disregard the data relied upon by EPA prior to GLSD's implementation of the clean sampling program.

Alternatives to TP Thresholds: The comments above, individually and in aggregate, suggest that a TP threshold for GLSD of 0.53 mg/l is unwarranted and over-prescriptive for the following reasons:

a. There is no documented evidence of nutrient-induced impairment downstream of GLSD.
b. To determine "reasonable potential" for impairment, EPA has applied Gold-Book standards, which are intended for use in the absence of current, site-specific data. Current, site-specific data are available for the Merrimack River downstream of GLSD over broad flow ranges and temperature conditions, and these data should be used for a more scientific determination of reasonable potential for impairment instead of the Gold-Book standard.
c. Expected changes in ambient conditions due to similar permits being proposed by EPA and NHDES upstream of GLSD would immediately render the current calculation of GLSD's allowable threshold of 0.53 mg/l as over-prescriptive. Results from simulation modeling (provided by CDM Smith to the USACE as described above), and EPA's own due diligence in estimating expected near-term reductions in ambient phosphorus levels due to new upstream permit requirements must be accounted for in the prescription of a discharge limit for GLSD.
d. Travel time downstream of GLSD to the unimpaired reaches of the Merrimack in Haverhill is on the order of only 2 days during flow conditions that approximate 7Q10 flow. It is not reasonable to associate this with a reasonable potential for nutrient impairment, when no documented impairment exists currently and when the reach flows directly into an unimpaired reach beginning in Haverhill.
e. The dilution factor, watershed area, and 7Q10 flow values used by EPA to determine an allowable discharge threshold for GLSD are incorrect and should be corrected in any calculation of a future phosphorus threshold.
f. Any calculation of allowable discharge thresholds must account for current field data for ambient conditions (in addition to expected reductions in ambient conditions due to issuance of other upstream permits), which have been and will continue to be provided by GLSD to EPA before, during, and after this public comment period.

While GLSD does not see a rational need for a TP discharge limit for the reasons outlined above, we offer the following alternatives:

Alternative 1 – Monitoring Only: Because the river does not exhibit current signs or risks of nutrient impairment, we propose a program that would monitor and report TP in the effluent, as well as TP and dissolved oxygen upstream and downstream of the discharge. This will provide even more focused data that can be used to evaluate trends in the river's health in future years.

Alternative 2 – Correct the Calculation and Re-issue as a Revised Draft Permit with any potential phosphorus discharge threshold imposed as an "Action Level," for further comment and evaluation: At a minimum, if an effluent discharge threshold is to be applied for TP despite the indications to the contrary presented herein, the calculation should be corrected. The value of 0.53 mg/l was computed with flawed and incomplete data:

- The 7Q10 flow and associated dilution factor used by EPA are not correct (see relevant comments elsewhere). The 7Q10 flow for GLSD should be corrected from 869 cfs to 996 cfs, as noted in earlier comments.
- The ambient conditions used in the calculations should account for recent samples of ambient TP upstream of the discharge, which are being continually provided to EPA, but which were not used in the initial determination of the 0.53 mg/l threshold. When the ten recent clean samples obtained upstream of the GLSD between May 21, 2019 and June 26, 2019 (supplied to EPA but not included in the draft permit conditions) are included in the calculation of a median value along with the six values used by EPA on page 24 of the Fact Sheet, the appropriate median TP concentration is 0.052 mg/l, which should be used instead of 0.060 mg/l based on the availability of new and applicable data. See the table below:

Ambient Total Phosphorus Upstream of GLSD

Date	TP (mg/l)	Data Source
7/31/2017	0.050	EPA
8/14/2017	0.054	EPA
8/29/2017	0.062	EPA
9/14/2017	0.057	EPA
9/26/2017	0.090	EPA
10/11/2017	0.087	EPA
5/21/2019	0.041	GLSD
6/4/2019	0.054	GLSD
6/5/2019	0.037	GLSD
6/12/2019	0.032	GLSD
6/13/2019	0.038	GLSD
6/14/2019	0.046	GLSD
6/18/2019	0.050	GLSD
6/19/2019	0.050	GLSD
6/25/2019	0.064	GLSD
6/26/2019	0.064	GLSD
MEDIAN	**0.052**	

- As cited above, recent river monitoring and simulation modeling conclusively demonstrate that instream concentrations of TP in this reach of the Merrimack River can be between 0.17 mg/l (via monitoring) and 0.25 mg/l (via modeling) while still maintaining dissolved oxygen levels well above the threshold of 0.5 mg/l, and without a history of documented detrimental algae blooms. We conservatively suggest that 0.17 mg/l be used as the instream target in lieu of the Gold Book standard of 0.1, because site-specific data clearly supersede the Gold Book standard in this situation.

- **When the above modifications are made to the effluent discharge calculation per page 25 of the Fact Sheet, the resultant effluent discharge concentration (Cd) increases from EPA's proposed 0.53 mg/l to 1.63 mg/l.** It must be noted, however, that this alternative does NOT account for reasonable expectations of further reductions in ambient conditions due to EPA's and NHDES' imposition of phosphorus discharge controls in other upstream locations, which it is incumbent upon EPA to estimate and include in any permit threshold for GLSD, and would be reasonably expected to result in a further increase in allowable discharge.

Request: GLSD requests that EPA eliminate the TP effluent limit and require only monitoring. As an alternative, as described above, GLSD requests that EPA rerun the TP calculation and set the limit at a minimum of 1.63 mg/l or 658 pounds per day, with further upward adjustment based on EPA's expected impacts of additional reductions in ambient concentration due to other new permit requirements upstream

9. Monitoring Requirement for Nitrogen: The existing NPDES permit for GLSD includes monitoring and reporting requirements for the sum of nitrate and nitrite and total Kjeldahl nitrogen (TKN). The average nitrate plus nitrite is 1.45 mg/L and average TKN was 20.7 mg/L during the review period. The Draft Permit is now proposing to increase this monitoring to include total nitrate plus total nitrite, TKN and total nitrogen weekly from April through October, and monthly monitoring and reporting from November through March.

As provided in the Fact Sheet page 22 of 41, EPA believes this additional monitoring is necessary as more data is needed to determine if nitrogen causes or contributes to a violation of the Massachusetts narrative criteria; provide information on the fate of nitrogen through the treatment process; understand the impact of nitrogen on the Merrimack River; and prepare for a future nitrogen limits that may be included in subsequent NPDES permits.

GLSD takes great exception to the increased monitoring for the following reasons:

Existing levels of nitrogen from the GLSD facility do not show cause or reasonable potential to exceed the water quality criteria of the Merrimack River.

First, we would like to note that in accordance with the Fact Sheet page 13 of 41, the MassDEP's 2014 Integrated List of Waters does not name nitrogen as a cause of impairment. Therefore, any reasonable conclusion would be that further evaluation and possible limitations for nitrogen are not indicated in accordance with EPA permitting procedures.

MassDEP provides narrative criteria for nutrients at 314 CMR 4.05 (5)(c) which states in part:

"Unless naturally occurring, all surface waters shall be free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses and shall not exceed the

site-specific criteria developed in a TMDL or as otherwise established by the Department pursuant to 314 CMR 4.00.

Any existing point source discharge containing nutrients in concentrations that would cause or contribute to cultural eutrophication, including the excessive growth of aquatic plants or algae, in any surface water shall be provided with the most appropriate treatment as determined by the Department, including, where necessary, highest and best practical treatment (HBPT) for POTWs and BAT for non POTWs, to remove such nutrients to ensure protection of existing and designated uses."

As EPA has failed to identify nitrogen as a nutrient that would cause or contribute to an impairment, GLSD does not understand how further expenditures and additional study of the nitrogen is warranted.

<u>Fate of nitrogen through the treatment process</u>: GLSD operates an activated sludge treatment facility that provides secondary treatment. These types of treatment process have been in common existence for nearly 50 years, are approved by EPA and delegated states in the numbers that reach into the many thousands and have excessive studies and literature available regarding the fate of nitrogen trough the treatment process. GLSD fails to understand under any reasonable scenario, why EPA needs to study the fate of nitrogen through yet, again, another typical activated sludge secondary treatment system.

<u>Understanding the impact on nitrogen on the receiving water</u>: Since nitrogen has not been shown to cause or contribute to nutrient impairments on the Merrimack River, to what extent does EPA believe that further studies of the impact of nitrogen on the Merrimack River are warranted? This seems to be additional cost and effort for which the outcome is not relative to any way of impacting water quality.

Further, if EPA is still determined to understand the impact of nitrogen on the receiving water, this is done through an ambient water quality study and effluent data from all the treatment facilities that discharge to the river, as well as non-point sampling. Finally, existing effluent data from the GLSD facility is far and above more than is necessary for EPA to understand the impacts of nitrogen on a receiving water – particularly one in which nitrogen is not impacting the designated uses.

<u>Prepare for a future nitrogen limits that may be included in subsequent NPDES permits:</u> GLSD finds this last reason for EPA needing to increase monitoring for the facility particularly concerning for the following reasons:

There is already adequate effluent data to determine if nitrogen from the GLSD facility is causing or contributing to a water quality impairment – and there is no evidence that is doing so; MassDEP does not have numeric criteria for nitrogen, and MassDEP has already concluded that a TMDL is not required for nitrogen on the Merrimack River and does not cause or contribute to an impairment of the River;

The MassDEP narrative criteria, if indeed was being violated by the discharge from the WWTF (which it is not) requires that: "Any existing point *source discharge containing nutrients in concentrations that would cause or contribute to cultural eutrophication, including the excessive growth of aquatic plants or algae, in any surface water shall be provided with the most appropriate treatment as determined by the Department, including, where necessary, highest and best practical treatment (HBPT) for POTWs... "*

Therefore, prior to the imposition of any numeric limitations, EPA would first need to prove that the WWTF nitrogen effluent causes or contributes to cultural eutrophication, then EPA would need to determine HBPT for this facility. Finally, if HBPT is not sufficient, EPA can adopt a TMDL for nitrogen, which would assign numeric effluent limitation necessary to meet water quality – although again, since nitrogen has not been shown to be a cause of cultural eutrophication, is unclear what, if any, numeric limitations would be indicated.

Request: GLSD requests that nitrogen sampling be conducted quarterly as required in the current permit. In addition, GLSD requests that if the permit is administratively continued after the five-year term expires, that the nitrogen reporting requirement be discontinued as EPA will have collected sufficient data for any future permitting requirements.

10. **Secondary By-Pass:** GLSD has identified several concerns related to the discussion of a secondary bypass (blending) as described below:

a) Bypass Is Considered Non-Compliance: The Draft Permit page 6 & 7 of 26, footnote 6, states: *"A bypass of secondary treatment also is subject to the requirements of Part II.B.4.c and Part II.D.1.e of this permit."*

Part II.B.4.c refers to an unanticipated bypass, for which notification in accordance with II.D.1.e must be submitted. Notification requirements are necessary for *"any non-compliance which may endanger health or the environment. This section requires not only 24-hour reporting, but a written submission which details the cause of the non-compliance, and steps taken to reduce, eliminate and prevent reoccurrence of the non-compliance."*

As EPA is aware, it has permitted GLSD to operate the WWTF during high flow conditions to bypass a portion of the effluent from secondary treatment and blend it after it has received disinfection and dechlorination. This practice maximizes the volume of wastewater which receives primary treatment and disinfection, rather than to divert through the CSOs. It is of particular concern that each time GLSD initiates blending of primary and secondary treated flows, it is considered "non-compliance." Not only does this expose the Facility to fines and penalties from the EPA, it also exposes the WWTF to third party lawsuits. Additionally, it is perplexing why EPA is choosing to identify blending at this facility as a non-compliant event, when in the Fact Sheet page 8 of 34, EPA states: *"At this time, there(sic) no feasible alternatives to this bypass have been identified without the discharge of additional untreated sewage in the system's CSOs."*

Note that in accordance with the EPA 1994 Combined Sewer Overflow Control Policy 59 Fed. Reg. 18,688 (Apr. 19, 1994) (National CSO Policy), Section II.C.7 "Maximizing

Treatment at the Existing POTW Treatment Plant," a facility may be authorized to allow a CSO-related bypass of secondary treatment without the need to provide approval on a case-by-case basis, where it can be shown that the facility has completed a No Feasible Alternatives Analysis in accordance with this section.

Specifically, EPA's National CSO Policy states that a permit may "define the specific parameters under which a bypass can legally occur," and further states:

> Under this approach, EPA would allow a permit to authorize a CSO-related bypass of the secondary treatment portion of the POTW treatment plant for combined sewer flows in certain identified circumstances.

59 Fed. Reg. at 18,693 (emphasis added). The Clean Water Act (CWA) requirement that "each permit...for a discharge from a municipal combined storm and sanitary sewer shall conform to" the CSO Policy provides statutory authority for issuance of permits authorizing peak wet weather discharges consistent with the National CSO Policy. CWA 402(q)(1), 33 USC 1342(q)(1).

Further, EPA's own guidance documents support the authorization of a CSO-related bypass. Combined Sewer Overflows Guidance for Permit Writers (EPA 832-B-95-008, Sept. 1995) (CSO Permit Writers Guidance). That document has never been withdrawn by EPA, and provides the following example permit language for authorized CSO related bypasses:

> A CSO-related bypass of the secondary treatment portion of the POTW treatment plant is authorized when the flow rate to the POTW treatment plant is as a result of precipitation event exceeds [insert flow rate in MGD]. Bypasses that occur when the flow at the time of the bypass is under the specified flow rate are not authorized under this condition and are subject to the bypass provision at 40 CFR 122.41(m).

Finally, new requirements proposed by EPA for the secondary bypass reflects a substantial change in the regulatory requirements that are imposed on NPDES dischargers, which are proposed to be imposed without following any of the procedures required before such a change can be made.

Since the Fact Sheet identifies that there are "no feasible alternatives" to the secondary bypass, GLSD is authorized under this permit to operate a secondary bypass. Therefore, the event should not be identified as a "non-compliant" event (since it is clearly authorized) and reporting requirements under II.D.1.e should also not be required.

Request: EPA must expressly identify the bypass of secondary treatment under the circumstances described in the permit as an authorized bypass as it has done in other recent permits and in accordance with the National CSO Policy Section II.C.7, and remove those sections of the Draft Permit that identify this treatment process as non-compliant with the permit. Further, the Draft Permit should acknowledge that Bypass does not occur until the WWTF exceeds its 130 MGD design flow.

b) Reference of Anticipated By-Pass: The Draft Permit page 6 & 7 of 26, footnote 6, states: *"The Permittee shall not accept septage during any calendar day in which a bypass of secondary treatment is anticipated."* It is not clear how EPA defines anticipated bypass. However, Part II.B.4.c requires advance notice of anticipated bypass.

Request: As GLSD has the ability to accept and hold septage for a period of time, GLSD requests that this language be modified to read: *"The Permittee shall not add septage to the waste stream at the treatment plant during activation of the secondary bypass treatment".*

11. Compliance Schedule: The Draft Permit requires new limitations for TP, aluminum, cadmium, copper, and lead. Notwithstanding comments elsewhere in this document where GLSD provides the basis for removal of the limitations for each of these parameters, in the event that EPA continues to include new limitations, we have the following comments on the compliance schedule:

a) Compliance schedule comments relative to aluminum are included in comment number 7, of this document.

b) EPA has provided a one (1) year compliance schedule for TP, cadmium, copper and lead. It is simply not possible for the GLSD WWTF to meet these limitations within one year. The plant has not been designed for metals removals or TP removal, to the extent required by this Draft Permit as presented.

GLSD will need to evaluate the current treatment process and determine the type and extent of upgrade necessary to meet the new limitations. Further, the Commonwealth of Massachusetts procedures for bidding and procurement are extensive and require adequate time for each phase of the design, construction bidding, award, and implementation process. These procedures include but are not limited to budgeting and obtaining funding, procurement of engineering services to determine current plant treatability levels and the extent of upgrade required, design of the necessary upgrade, development and bidding plans and specifications, advertising and bidding process, and contract award – all of which must occur prior to beginning work on the contract.

There is no possibility this can all occur in a one-year period.

Request: GLSD requests the following compliance schedule:

- 12 months from the effective date of the permit: engage engineering services to evaluate current plant treatability levels, and determine type and extent of upgrade necessary;
- 36 months from the effective date of the permit: design plant upgrade, prepare bidding documents and specifications, obtain funding;
- 48 months from the effective date of the permit: advertise contract for plant upgrade;
- 54 months from the effective date of the permit: award contract;

- 96 months from the effective date of the permit: construct upgrade and provide necessary testing to ensure compliance with new limitations.

12. **<u>Part I.B.2 – Unauthorized discharges:</u>** GLSD has two concerns regarding this section, as detailed below:

    a) GLSD understands that unauthorized discharges, including sanitary sewer overflows (SSOs) as defined by EPA, are not authorized by this Draft Permit. However, by definition SSOs also include discharges that may occur in basements of private dwellings due to sewer system backups, or in other areas where the SSO does not result in a discharge to surface water. While GLSD is agreeable to providing public notification for SSO events that impact surface waters, as these could potentially result in a public health hazard, GLSD objects to providing public notification of basements backups in private dwellings, and other sanitary sewer releases that do not impact surface water, the municipal separate storm sewer (MS4) or would not otherwise pose a widespread public health threat. Further, reporting of discharges that do not impact surface waters exceeds EPA's authority under the CWA.

    GLSD is agreeable, however, to providing reporting of such events to MassDEP in accordance with paragraph 3 of this section.

    > **<u>Request:</u>** Modify Part B.2 to state that public notification, with the exception of SSOs that do not impact surface water (Waters of the United States), the MS4 or otherwise provide a widespread public health threat, shall be provided within 24 hours.

    b) With respect to "notification to the public within 24 hours of any unauthorized discharge on a publicly available website..." At times, an unauthorized discharge may occur and GLSD may not become aware of it, or be notified, for a significant time. It is unreasonable to require public notification within 24 hours of the commencement of an unauthorized discharge for which there may have been a delay of GLSD becoming aware of the discharge.

    <u>Request:</u> Modify Part B.2 as follows (underlined text additional) "...the permittee must provide notification to the public within 24 hours <u>of becoming aware</u> of any unauthorized discharge..."

13. <u>Part I.C.4 – collection system mapping:</u> The Draft Permit provides that within 30 months of the effective date of this permit, the permittee and co-permittees shall prepare detailed and extensive collection system mapping. Please provide the regulatory authority for this request, as this request exceeds the requirements under the federal nine minimum controls (NMC).

    <u>Request</u>: The above notwithstanding, GLSD requests the following modifications:

    - Mapping is required of all sanitary sewers and manholes. Please revise this language to state, "All sanitary sewer extensions in the public-right-of way owned by GLSD or the co-permittees."

- Where the requirements mention information such as pipe diameter, date of installation, type of material, distance between manholes, interconnections, etc., please revise this language to include "to the extent feasible."

- Please allow 36 months to comply with this requirement to allow sufficient time to do procurement and provide a meaningful work product.

14. **Part I.C.5 – Operation and Maintenance of the System:** GLSD has four comments on the Operation and Maintenance requirements in Part I.C:

a. Parts 1.C.2-3, the Draft Permit requires that GLSD "shall" implement preventive maintenance and infiltration/inflow programs. Although GLSD agrees that these programs are necessary, GLSD notes that such programs are already implemented by GLSD.

   Request: GLSD requests that EPA acknowledge that it already implements such programs and that compliance with these programs satisfies compliance with the Draft Permit.

b. In Part 1.C.5(a) of the Draft Permit EPA is requiring the submission of a report that provides a description of the collection system management goal, staffing information, and legal authorities. In addition, it requires a list of pump stations, recent studies and construction activities, and a plan for the development of a comprehensive operation and maintenance plan.

   Six months is an insufficient amount of time to research, analyze, describe and report on these numerous items, particularly for any co-permittee who may not have done this in the past. In addition, the permittee and co-permittee each have its own procurement process that require board, City/Town council or meeting, and/or public work committee for approval of funding, preparation of request for proposal to select consulting firm, negotiation of contract with selected firm to start the work. This process typically takes 9-12 months. Therefore, GLSD requests that 18 months be allowed for compliance with this condition.

   Part (b) requires that a complete and comprehensive Operation and Maintenance (O&M) Plan be completed, implemented, and submitted to EPA and MassDEP within 24 months. As above, this is a tremendous undertaking requiring an extensive amount of time and resources, particularly for any co-permittee who does not already have the prescribed O&M plan. In addition, as discussed above, the permittee and co-permittee each have its own procurement process that typically takes 9-12 months. Therefore, GLSD requests that 36 months be provided for the completion and implementation of this plan.

   Request: GLSD requests that 18 months be provided for the completion of section (a) and 36 months be provided for the completion of the O&M Plan under section (b).

c. Part 1.C.5(b)(6) requires an infiltration and inflow (I/I) reduction program, including focusing on disconnection and redirection of illegal sump pumps and roof down spouts. Although GLSD does not own the collection system in the municipalities served by the WWTF, these municipalities are already required to implement an I/I program. In addition, GLSD notes that not all such sources can be practicably remediated.

Request: GLSD requests that this provision requiring an I/I program or a specific program aimed at removing connected sump pumps and roof down spouts be removed from the permit or in the alternative that such connections will be evaluated and removed where feasible solely by the co-permittees.

d. Part 1.C.5(b)(8) requires GLSD to prepare an Overflow Emergency Response Plan to protect public health from overflows and unanticipated bypasses or upsets that exceed any effluent limitation in the Draft Permit. However, it is unclear what such a plan would entail or if the GLSD's current Emergency Plan already is adequate to meet this requirement.

Request: GLSD requests that EPA clarify the scope of the Overflow Emergency Response Plan.

15. Combined Sewer Overflows: Part I.F.1 authorizes GLSD to discharge storm water/wastewater from the CSOs listed in the Draft Permit during wet weather. However, in addition to wet weather events, GLSD can experience high flows during periods of warm weather that cause snow melt.

Request: GLSD requests that EPA add the underlined language below to Part I.F.1: "During wet weather or when snow melt occurs, the Permittee is authorized to discharge storm water/wastewater from the CSO outfalls ... ."

16. Combined Sewer Overflow Bypass: GLSD notes that Footnote 6 of the Draft Permit prohibits secondary bypasses that do not qualify as allowable bypasses and that Part 1.F.2.b prohibits violations of federal or state water quality violations. However, GLSD may treat certain peak wet weather flows using a secondary bypass, which should be authorized as a means to maximize treatment during wet weather events.

Request: As with other recent NPDES permits issued by EPA, GLSD requests that the secondary bypass be an authorized discharge in the Draft Permit and that CSO or secondary bypasses do not violate federal or state water quality standards. Further, GLSD requests that the Draft Permit identify high flow management facilities.

17. Part I.F.3.a. Combined Sewer Overflows Implementation Levels:

In section I.F.3.a, the Draft Permit states: *"The permittee must implement the nine minimum controls in accordance with the documentation provided to EPA and MassDEP or as subsequently modified to enhance the effectiveness of the controls. This implementation must include the following controls plus other controls the Permittee can reasonably undertake as set forth in the documentation."*

GLSD understands that as a CSO permittee, it must comply with the NMC requirements of the National CSO Policy. However, the Draft Permit states that requirement in a way that improperly adds to what is required under the policy.

The parts that are underlined above have no legal authority. The NMCs are clearly laid out in the CSO policy, but here EPA appears to be adding to them, and to be doing so in a vague way, leaving GLSD to guess at what additional steps are required to comply. The first underlined term, "or as subsequently modified to enhance the effectiveness of the controls," seems to imply that GLSD has some obligation to "enhance the effectiveness" of the steps that it is taking to meet the NMCs. Beyond the fact that "enhance the effectiveness" is a vague term that is defined nowhere in the Draft Permit or in EPA regulations or guidance, EPA has no authority to require this. Similarly, the concept of "other controls the permittee can reasonably undertake" is completely undefined and vague, and EPA has no legal authority to require GLSD to take any such steps. **Both underlined clauses should be deleted from the Draft Permit language**.

GLSD requests that EPA provide a description of "the documentation provided to the EPA and MassDEP." Once this documentaiton is identified, GLSD requires an opportunity to review the contents and determine whether implementation of the NMCs is appropriate and feasible with respect to its contents.

The second sentence of paragraph 3.a. states: *"must include the following controls..."* Please note that there are no additional items following this statement, or as a subset of Part 3.a.

Finally, GLSD cannot agree to implement the NMCs in accordance with documentation that may be "subsequetly modified" (in documentation which is yet to be identified). GLSD is not in a position to confirm, prior to having the opportunity to review any future modifications, that the modifications are feasible, attainable or technically appropriate.

> **Request:** GLSD requests that EPA delete the underlined clauses in this language ("or as subsequently modified to enhance the effectiveness of the controls" and "plus other controls the permittee can reasonably undertake"). Please specifically identify the "documentation provided to EPA and MassDEP," and identify "the following controls" or remove the sentence; allow GLSD an opportunity to examine and comment on "the documentation provided to EPA and MassDEP" prior to its inclusion in a final permit; remove references to compliance with future (unseen) modifications.

18. Part 1.F.3.e Combined Sewer Overflows NMC metering: In Part 1.F.3.e of the Draft Permit, EPA is requiring that all flows through all CSOs be quantified through direct measurement. Such measurement is to include hours of discharge and volume.

GLSD does not object to the need to measure flow, however, the Draft Permit should allow GLSD to propose alternative means to comply in the future. GLSD does object to the extensive and over-reaching nature of EPA's determination of NMC number 9: "Monitoring to effectively characterize CSO impact and the efficacy of CSO controls."

While recording CSO events is necessary to comply with the NMC policy, additional data collection such as hours of discharge, volume of discharge, and the National Weather Service precipitation data will result in excessive costs to GLSD, and are requirements that go far beyond those necessary to comply with the NMC, which EPA has repeatedly qualified as "low cost measures." GLSD complies with the NMC policy. Presently, GLSD has instrumentation at two of its CSO outfalls that allow for direct measurement. Flow is measured in the remaining three CSO outfalls based on interceptor elevations and industry standard hydraulic calculations. Due to the remote locations of the other three CSO outfalls, the smaller flows associated with these outfalls and the vandalism observed over the years, GLSD recommends continuing its practice of calculating flows at these three CSO outfalls. GLSD also notes that the instrumentation is prone to malfunctions and repairs, and again emphasizes that it is not feasible to provide direct measurement at all the CSO outfalls. With this said, GLSD typically reports flows from its CSO outfalls within one business day of a CSO event.

Section 1-7 of the NMC guidance document specifically states that, "The NMC are controls that...do not require significant engineering studies or major construction, and can be implemented in a relatively short period..."

EPA recognizes that flow metering is a component of the characterization required under Long Term Control Plan implementation and is used to develop appropriate models. Flow metering is not a requirement of the NMC (see NMC guidance document page 10-1: "This minimum control is the precursor to the more extensive characterization and monitoring efforts conducted as part of the LTCP..."). Specifically, EPA guidance as detailed in the NMC guidance document prescribes the following levels of monitoring as being in compliance with the National CSO Policy:

- Page 10-1: "The ninth minimum control involves visual inspection and other simple methods to determine the occurrence and apparent impacts of CSOs."
- Page 10-2: "The municipality should record the number of CSO overflows at as many outfalls as feasible...Large systems should work with the NPDES permitting authority to select a percentage of outfalls that represent the entire drainage area and sensitive locations."
- Page 10-2: "Monitoring of flow and quality at the level necessary to calibrate models and/or estimate pollutant loadings is addressed in EPA's... 'Combined Sewer Overflows-Guidance for Long Term Control Plan' and may be beyond the intended scope of minimum control monitoring." (emphasis added).
- Page 10-2: "In cases where a calibrated model of the CSS exists (or when one becomes available) model projections may be used to determine the frequency and location of overflow events."
- Page 10-3 "The following measures can be applied to detect overflows; ...visual inspection...a chalk mark...wood blocks...mechanical counting device..."

Request: In accordance with the above EPA guidance, GLSD requests that CSO events be recorded on DMR submittals in accordance with the above noted EPA guidance, including the option to estimate flows based on elevations in the interceptors or to use a variety of CSO activation recordings such as the EPA-approved methods of wood blocks, chalk lines, and mechanical counting devices, as well as any flow meters that may be available. Further, GLSD requests that EPA acknowledge that the GLSD's current measuring procedures are acceptable.

19. Part 1.F.3.g - Combined Sewer Overflows NMC Public Notification Plan:

The Draft Permit contains new, detailed requirements for GLSD to install and maintain signs at all CSO outfall structures, specifying the exact size, color, languages, and wording of the signs. In addition, the Draft Permit requires GLSD to develop a public notification plan and specifies that GLSD has to provide notification of every CSO discharge when it occurs, and when it ends, and must do so within 4 hours of becoming aware of when the discharge began, and within 24 hours of becoming aware of when the discharge ends. Further, this public notification plan must be developed, installed and implemented within 180 days of the effective date of the final permit.

GLSD supports public notification of discharge events, however these new requirements, which will result in substantial added costs to GLSD and its ratepayers, go far beyond what is required by Federal and state law. GLSD requests that EPA provide the legal authority to specify these requirements. Under the National CSO Policy, EPA provides that notification under the NMCs includes: *"public notification to ensure that the public receives adequate notification of CSO occurrences and CSO impacts."* The new requirements in the Draft Permit go well beyond the NMC provision and should be deleted from the Draft Permit.

The above notwithstanding, GLSD offers the following specific comments:

a) Public Notification Plan Contents: The Draft Permit requires that:
"Initial notification of a probable CSO activation shall be provided to the public and any other potentially affected party as soon as practicable, but no later than four (4) hours after becoming aware by monitoring, modeling or other means that a CSO discharge has occurred."

Additionally:

"Supplemental notification shall be provided to the public and any other potentially affected party as soon as practicable, but no later than twenty-four (24) hours after becoming aware of the termination of any CSO discharge(s)."

The Draft Permit requires that GLSD provide public notification of:

- Date and time of probable CSO discharge
- CSO number and location
- Confirmation of CSO discharge
- Date, start time and stop time of the CSO discharge

In EPA's Combined Sewer Overflows Guidance for Nine Minimum Controls, Chapter Nine contains specific guidance for the implementation of this NMC measure, as follows:

- Section 1-7 specifically states that, *"The NMC are controls that...do not require significant engineering studies or major construction, and can be implemented in a relatively short period..."*

- Section 9-1: *"The intent of the eighth minimum control, public notification, is to inform the public of the location of the CSO outfalls, the actual occurrences at CSOs, the possible health and environmental effects of CSOs, and the recreational and commercial activities...curtailed as a result of CSOs."*

- EPA NMC guidance provides specific examples of control measures under pubic notification which are:

  - Posting at affected use areas (GLSD will consider this in the plan)
  - Posting at selected public places (GLSD will consider this in the plan)
  - Posting at CSO outfalls (GLSD has completed this)
  - Notices in newspapers, radio, TV news programs, letters to residents, telephone hotline (GLSD is considering a website notification process)

The requirements of flow duration, and starting and stopping times, go far beyond any controls EPA considered in the NMC guidance.

GLSD is supportive of providing public notification of CSO events as they occur. To this end, GLSD has an extensive email notification system and has and continues to develop a website to provide predicative CSO activation notification to the public. GLSD considers the development of a meaningful public notification plan to be one of our highest priorities. Not only will the GLSD develop a plan that meets the requirements of the National CSO Policy and NMC guidance documents, but GLSD intends to continue notifying interested parties above and beyond the requirements of its current NPDES permit including community CEO's, BOH, DPH, Division of Marine Fisheries, Shellfish Wardens, Harbor Masters, politicians, and others as it has been doing for well over a year now. These notifications include an initial CSO Notification and a follow-up Report, typically within one business day, that confirms or negates the previous notification. Time is needed to verify data from the instrumentation before publicly providing such data. Doing so ahead of verification is irresponsible. If it is determined that a CSO event occurred, the Report includes which CSO outfalls activated and the flows associated with the outfall in addition to a precautionary statement about recreating in the waters following such an event. By September of this year, GLSD will have a subscriber-based system for parties to join the email notification system via GLSD's public website. GLSD will also post other information related to CSOs on the website as well.

However, the development and implementation of an extensive public notification plan as outlined in the Draft Permit, particularly the implementation of a web-based notification system, cannot be achieved within 180 days. This is simply insufficient time to develop a meaningful plan, solicit appropriate input, determine the content and extent of appropriate notification, develop a web-based notification system, evaluate public posted signs and need for additional public postings, plus other contents of a meaningful public notification plan.

Notwithstanding the significant degree of effort involved in developing the web-based notification system, GLSD and the Commonwealth of Massachusetts procedures for bidding and procurement are extensive and require adequate time for each phase of the design, construction bidding, award, and implementation process. These procedures include but are not limited to: budgeting and obtaining funding from our Board, procurement of engineering services to assist in the program development and design, development and bidding plans and specifications, advertising and bidding process, and contract award – all of which must occur prior to beginning work on the contract.

Request: GLSD requests that submittal and implementation of a public notification system be extended to 36 months following the effective date of the permit.

20. Part 1.F.5 Combined Sewer Overflows NMC Outfall Monitoring
The Draft Permit requires GLSD to report the number of discharge "events" on a monthly basis. GLSD requests that EPA define the term "event." GLSD suggests that the following language, previously approved by EPA, be used:

In a hydraulically connected system that contains more than one CSO outfall, multiple periods of overflow from one or more outfalls are considered one overflow event if the time between periods of overflow is no more than 24 hours without a discharge from any outfall.

Request: Define "event" using the above-noted EPA definition.

21. Percent Removal for BOD and TSS: The Draft Permit has the greater than or equal to 85% removal requirement for both BOD and TSS. While GLSD has no objection to this limitation, we request that it be calculated using a six-month rolling average of influent and effluent data, rather than the individual monthly average.

The Draft permit requires influent sampling to be conducted twice/month for both TSS and BOD. Since the plant serves a combined sewer community, the influent flow can vary greatly depending on the weather conditions. During wet weather, influent TSS could be as low as 100 mg/L, which is substantially below the industry design standard of 250 mg/L.

Having the ability to use a six-month rolling average of influent flow values when calculating percent removal will allow GLSD to have better representative data when calculating the limit. Another alternative would be exclusion of wet flow days in the calculation.

Request: GLSD request that EPA allow a six-month rolling average value of influent BOD and TSS to be used when calculating percent removal. In the alternative, GLSD requests that EPA limit the required removal percentage to only dry weather (meaning any calendar day on which there is less than 0.1 inches of rain and no snow melt).

22. Flow: The flow limitation in the permit should be removed or designated as a "report only" requirement. EPA should recognize that flow is not a regulated parameter because it is not a "pollutant" and should not be included in the permit. It is not permissible to regulate flow, regardless of the pollutant levels present. GLSD disagrees with EPA's assertion that the flow of water is considered a pollutant in 33 U.S.C. §1362(6), which defines "pollutant" as:

> dredged spoil [sic], solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water.

Although GLSD agrees that municipal waste such as that discharged by GLSD qualifies of a pollutant, flow is not a pollutant. However, EPA's identification of "non-conventional pollutants" as defined at 40 CFR § 439.1(n) does not identify flow as a parameter. EPA is seeking to re-write the applicable NPDES rules as well as the Clean Water Act to regulate flow regardless of the pollutant levels present, a premise that the federal courts have found impermissible. See e.g. Iowa League of Cites v. EPA (8th Cir. 2013).

EPA contends at page 8 of 39 in the Fact Sheet that its "practice is to use design flow as a reasonable and important worst-case condition" to calculate reasonable potential and water quality based effluent limitations. As stated by a US District Court decision in the case Virginia *Department of Transportation et al. vs. EPA*, where the Court decided in favor of Virginia DOT that stormwater cannot be considered a pollutant as a surrogate for sediment load. The Court affirms that there is "no ambiguity in the wording" of 33 U.S.C. §1362(6), stating on Page 9 that "Stormwater runoff is not a pollutant, so EPA is not authorized to regulate it via TMDL." The Court goes on to state that

> Claiming that the maximum stormwater load is a surrogate for sediment, which is a pollutant and therefore regulable, does not bring stormwater within the ambit of EPA's TMDL authority. Whatever reason EPA has for thinking that a stormwater flow rate TMDL is a better way of limiting sediment load than a sediment load TMDL, EPA cannot be allowed to exceed its clearly limited statutory authority.

Virginia DOT et al. vs. EPA, 2013

This decision is applicable to GLSD as EPA intends to use "design flow as a reasonable and important worst-case condition," or, in other words, as a surrogate for the load of pollutants discharged by GLSD.

Request: GLSD requests that the flow limit be deleted, recognizing that EPA does not have the authority to regulate such flow.

23. **<u>Average Monthly Concentration Reporting:</u>** Footnote 4 in Part I.A indicates that "in calculating and reporting the average monthly concentration when the pollutant is not detected, assign zero to the non-detected sample result if the pollutant was not detected for all monitoring periods in the prior 12 months. If the pollutant was detected in at least one monitoring period in the prior twelve months, then assign each non-detected sample result a value that is equal to one half of the minimum level of detection for the purposes of calculating averages." Based on this, using cadmium as an example, if one sample comes back at 0.5 µg/l, then there is a monthly average violation. All other samples that are measured as non-detect would then need to be given the designation of 0.25 µg/l for cadmium, resulting in 12 violations rather than one. This methodology, which has no basis in the law, would also skew the annual average for lead and copper.

Request: GLSD requests that Footnote 4 be deleted from the Draft Permit.

24. Industrial User and Pretreatment Program: Part I.E.1 of the Draft Permit requires that "The Permittee shall develop and enforce specific effluent limits (local limits) for Industrial User(s), and all other users, as appropriate, which together with appropriate changes in the POTW Treatment Plant's Facilities or operation, are necessary to ensure continued compliance with the POTW's NPDES permit or sludge use or disposal practices." Although GLSD has and will continue to develop and enforce local limits, it objects to the use of the term that it will "ensure" compliance.

Request: GLSD requests that any requirement to "ensure" compliance other than developing and enforcing local limits be deleted from the Draft Permit.

25. Industrial User and Pretreatment Program: Part I.E.1 of the Draft Permit requires that: (1) "Within 90 days of the effective date of this permit, the Permittee shall prepare and submit a written technical evaluation to the EPA analyzing the need to revise local limits"; and (2) "Should the evaluation reveal the need to revise local limits, the Permittee shall complete the revisions within 120 days of notification by EPA and submit the revisions to EPA for approval." Although GLSD understands the need to develop and enforce local limits, due to the technical nature of evaluating its current limits and the potential need to retain outside technical consultants, additional time is necessary to effectively evaluate the current local limits and industrial user and pretreatment program and provide a report to EPA.

Request: GLSD requests that (1) the time to prepare and submit the written technical evaluation to the EPA analyzing the need to revise local limits be extended from within 90 days of the effective date of the final permit to within 120 days of the effective date of the final permit; and (2) if the local limits need to be revised, any revision must be submitted to EPA within 180 days of notification by EPA.

As requested above, GLSD believes that EPA and MassDEP should revise and re-issue the Draft Permit, allowing for public comment on the significant changes proposed herein. GLSD looks forward to working with EPA and MassDEP to resolve the above issues and develop a final permit that is protective of the Merrimack River and sustainable for GLSD, its member communities and the ratepayers, including environmental justice communities that it serves.

Sincerely,

Cheri Cousens

Cheri R. Cousens, P.E.
Executive Director

Enclosures

cc: Ellen Weitzler (weitzler.ellen@epa.gov) Municipal Permits Section Chief
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Christian Rodrick, EPA
Congresswoman Lori Trahan, Massachusetts Third District
Congressman Seth Moulton, Massachusetts Sixth District
U.S. Senator Elizabeth Warren
U.S. Senator Ed Markey
Senator Diana DiZoglio
Senator Bruce E. Tarr
Senator Barry Finegold
Representative Christina Minicucci
Representative Linda Dean Campbell
Representative Marcos Devers
Representative Frank Moran
Representative Tram Nguyen
Thomas Connors, Chairman, GLSD Board of Commissioners
Daniel P. Sieger, MA Undersecretary of Environmental Affairs
Commissioner Martin Suuberg, MassDEP
Eric Worrall, MassDEP
Michael A. Leon, Esq.

ATTACHMENT 1
Log Pearson Type III Analysis and 7Q10 Analysis

```
Program SWStat          U.S. GEOLOGICAL SURVEY                  Seq 00001
Ver. 5.0      Log-Pearson & Pearson Type III Statistics   Run Date / Time
03/13/2018              based on USGS Program A193          6/27/2019 10:18 PM
```

Notice -- Log-Pearson Type III or Pearson Type III distributions are used for these computations. Users are responsible for assessment and interpretation.

```
     Description:  01100000 MERRIMACK RIVER BL CONCORD RIVER AT LOWELL, MA
  Year Boundaries:  December  1 - November 30
 Period in report:  December  1, 1923 - November 30, 2018
        Parameter:  7-day low
  Non-zero values:    95
      Zero values:     0
  Negative values:     0  (ignored)
```

Input time series (zero and negative values not included in listing.)

1456.700	1230.300	1334.900	2215.700	2900.000	1241.000	989.290	1336.400
1344.000	1575.000	1106.000	1622.300	1538.000	1586.100	3030.000	1423.400
1516.600	1012.300	1527.600	1614.700	1468.000	2129.700	2081.000	1086.900
1036.900	1225.900	1088.900	3247.100	1416.300	1094.700	2041.400	1335.700
1450.900	729.430	1435.300	1279.600	1431.400	1425.300	1438.900	991.140
686.290	723.000	951.290	1443.700	1289.600	1509.100	1194.300	1160.900
1600.900	1805.700	1015.400	1315.100	1985.700	1163.100	1015.100	1334.000
866.710	1788.600	1412.700	1006.600	1113.100	1236.900	2124.300	1420.000
1257.100	1528.600	1694.300	1097.600	2092.900	884.140	1471.400	581.430
1270.000	997.430	1114.300	844.860	1785.700	947.860	899.000	2104.300
2422.900	1724.300	2200.000	1112.900	2285.700	2268.600	1021.600	1467.100
1350.000	2010.000	1445.700	1111.400	856.430	1251.400	1380.000	

LOG PEARSON TYPE III Frequency Curve Parameters
(based on logs of the non-zero values)

Mean (logs)	3.135
Variance (logs)	0.020
Standard Deviation (logs)	0.141
Skewness (logs)	0.198
Standard Error of Skewness (logs)	0.247
Serial Correlation Coefficient (logs)	0.115
Coefficient of Variation (logs)	0.045

Frequency Curve - Parameter values at selected probabilities

Non-exceedance Probability	Recurrence Interval	Parameter Value	Variance of Estimate	95-Pct Confidence Intervals Lower	Upper
0.1000	10.00	907.330	1.001	826.330	979.240

ATTACHMENT 2
USGS Correspondence regarding Gage Station

Colleen M. Spero

From:	Verdi, Richard <rverdi@usgs.gov>
Sent:	Thursday, June 20, 2019 1:55 PM
To:	Colleen M. Spero
Cc:	Linda Comeau; Gardner Bent
Subject:	Fwd: [EXTERNAL] RE: Drainage area for 01100000

Hello Ms. Spero,

It was good talking with you on the telephone. This email will serve as a summary of our conversation.

Linda Comeau (the person you initially spoke with) is our Information Officer and Senior Hydrographer. She consulted with our Surface Water Specialist, Gardner Bent, regarding the drainage area at 0110000 Merrimack River below Concord River at Lowell, MA.

The National Water Information System webpage indicates the total drainage area above the gage is 4,635 mi2, of which 214 mi2 are used for Boston and Worcester. This nets 4,412 mi2 that flows beyond the gage to Lawrence.

I hope this helps. If you have further questions, feel free to reach out.

-RJV.

****
Richard J. Verdi
Chief, Hydrologic Surveillance and Surface Water Investigations

USGS
New England Water Science Center (MARI)
10 Bearfoot Road
Northborough, MA. 01532

Telephone: (508) 490-5064
Cell Phone: (774) 275-4770
Visit Me: My Profile Page
****

"If your actions inspire others to dream more, learn more, do more and become more, you are a leader." -- John Quincy Adams

---------- Forwarded message ---------
From: **Colleen M. Spero** <CSpero@glsd.org>
Date: Thu, Jun 20, 2019 at 12:52 PM
Subject: [EXTERNAL] RE: Drainage area for 01100000
To: Comeau, Linda <lcomeau@usgs.gov>

ATTACHMENT 3
Clean Sampling QAPP
(Submitted Electronically in Attached Thumb Drive)

ATTACHMENT 4

Summary of Water Quality Data and Sampling

Attachment 4

Table 1. Summary of Clean Sampling Program Results – Ambient River Water Quality

Sampling Date	River Flow (CFS)	Al (μg/L)	Cd (μg/L)	Cu (μg/L)	Pb (μ/L)	Ni (μ/L)	Zn (μ/L)	TP (μ/L)	Oth-P (μ/L)	DOC (mg/L)	Total Hardness (mg/L as $CaCO_3$)	pH	Trip Blank	Field Blank
5/21/2019	12,700	109	0	1.1	0.7	0.8	59	41	7	4.2	35	7.12	ND all	ND all
6/4/2019	9,120	110	0	1.3	0.8	1	8.2	54	21	6.3	34	7.09	ND all	ND all
6/5/2019	8,190	99	0.8	1.1	0.7	0	5.6	37	16	6.4	35	7.1	ND all	ND all
6/12/2019	8,170	72	0	1.2	0.6	0.9	11	32	16	5	35	7.09	ND all	ND all
6/13/2019	9,820	100	0	1.1	0.7	0.9	5.6	38	21	5.2	33	7.09	ND all	ND all
6/14/2019	8,140	110	0	1.3	0.8	1.3	7.3	46	22	5.4	33	6.99	ND all	ND all
6/18/2019	8,100	91	0	1.2	0.9	1	6.6	50	23	5.8	36	7.03	ND all	ND all
6/19/2019	7,590	100	0	1.2	0.9	1	6	50	10	5.9	37	7.07	ND all	ND all
6/26/2019	6,680	80	0	1.3	1.1	1.1	6.6	64	18	5.7	35	7.07	ND all	ND all
6/27/2019	7,020	95	0	1.2	0.9	1.2	5.7	64	18	10	35	7.11	ND all	ND all
Median		**99.5**	**0.0**	**1.2**	**0.8**	**1.0**	**6.6**	**48.0**	**18.0**	**5.8**	**35.0**	**7.1**		
Average		**96.6**	**0.1**	**1.2**	**0.8**	**0.9**	**12.2**	**55.1**	**17.2**	**6.0**	**34.8**	**7.1**		

Table 2. Summary of Clean Sampling Program Results – WWTF Effluent Water Quality

Sampling Date	Al (μg/L)	Cd (μg/L)	Cu (μg/L)	Pb (μ/L)	TP (μ/L)
5/21/2019	51	0	7.5	0.6	448
6/4/2019	40	0	5.5	0.5	217
6/5/2019	54	0	5.9	0.6	239
6/12/2019	41	0	4.8	0.4	235
6/13/2019	71	0	5.5	0.5	314
6/14/2019	50	0	5.9	0.4	147
6/18/2019	41	0	5.8	0.5	220
6/19/2019	58	0	5.8	0.4	238
6/26/2019	40	0	3.9	0.4	139
6/27/2019	42	0	4.2	0.4	157
Maximum	**71.0**	**0.0**	**7.5**	**0.6**	**448**
Minimum	**40.0**	**0.0**	**3.9**	**0.4**	**139**
Average	**48.8**	**0.0**	**5.5**	**0.5**	**235**

ATTACHMENT 5
Laboratory Reports
(Submitted Electronically in Attached Thumb Drive)

ATTACHMENT 6
USACE Merrimack River Reports
(Submitted Electronically in Attached Thumb Drive)

4544537.10

Greater Lawrence Sanitary District
QAPP for Ambient Merrimack River and Plant Effluent Sampling

Prepared for:

Greater Lawrence Sanitary District
North Andover, MA

Prepared by:
Ricardo Cantu, OspreyOwl Environmental

July 2019

TABLE OF CONTENTS

Quality Assurance Project Plan (QAPP) – Greater Lawrence Sanitary District, Wastewater Plant and Merrimack River, Metals and Nutrient Sampling for the Summer of 2019

1.0 Introduction

The Greater Lawrence Sanitary District (GLSD) is in the process of coordinating a permit renewal for their NPDES Permit #MA0100447. GLSD is a regional facility that also serves Lawrence, Andover, North Andover, and Methuen which are all in Massachusetts and the Town of Salem, NH. The previous permit was issued on August 11, 2005 with expiration on August 10, 2010 (five-year permit). GLSD has been operating under this permit pending reissuance.

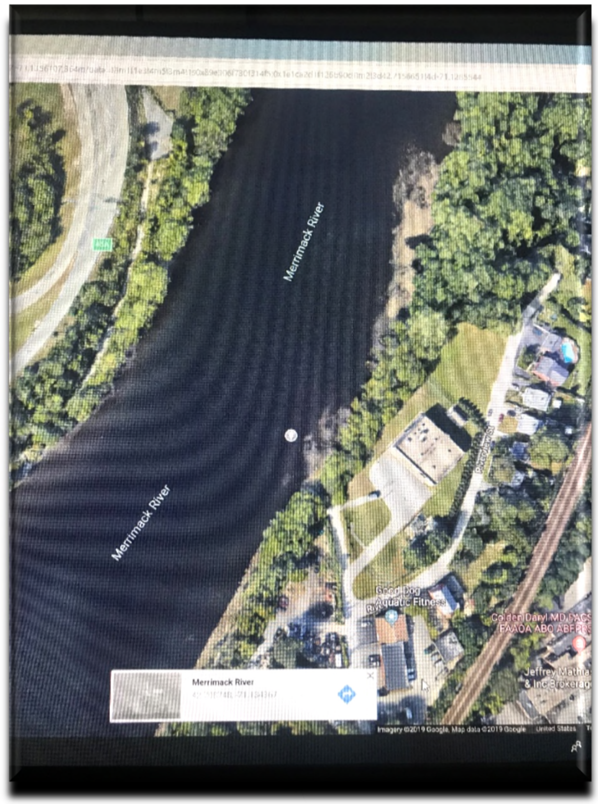
GLSD has always been under the impression that the river water collected during the quarterly WET testing was for determining suitability for use as the dilution water regarding daphnid viability. The purpose of analysis was to determine the constituents and associated concentrations to make up laboratory pure water as the diluent for the WET testing if needed. With each quarterly WET testing a galvanized pail is used, rope attached to the metal bailer and coiled into the bucket, thrown in either the cab or back truck body of the truck, transported to the sampling site and thrown into the river to retrieve the Merrimack River water sample.

There is no Quality Assurance Project Plan (QAPP), no equipment preparation standard operating procedures (SOP), no SOP for field sampling and the overall current sample collection practice would fail to meet any data quality objectives, or QC-level and project-level reviews. The lack of protocols would not meet the 2015 Sampling and Analysis Plans (SAP) as contained in Appendix G of MassDEP's Quality Management Plan (MQMP), therefore causing this data to be censored in determining background concentrations in the Merrimack River.

GLSD has looked at current internal WET testing sampling protocol and finds that it barely meets the Educational/Stewardship-level (lowest level and quality samples) as outlined in the MQMP – https://www.mass.gov/guides/water-quality-monitoring-quality-management-program). These samples do not meet the rigor (i.e., accuracy, precision, frequency, comparability, overall confidence, etc.) required for use in waterbody assessments or TMDL development. The WET testing data falls within the censored category when viewed from collection quality criteria.

It is anticipated that the findings from this subsequent study in regards to metals and nutrients will be similar to tests performed over the past three years for the Cities of Manchester, Nashua, Merrimack and Hooksett, New Hampshire and Lowell, Massachusetts, which are all located on the Merrimack River above the GLSD outfall. As those results have been very similar in concentration during low-flow conditions within the Merrimack River. There is no reason not to believe similar results will be mirrored in this stretch of the Merrimack River.

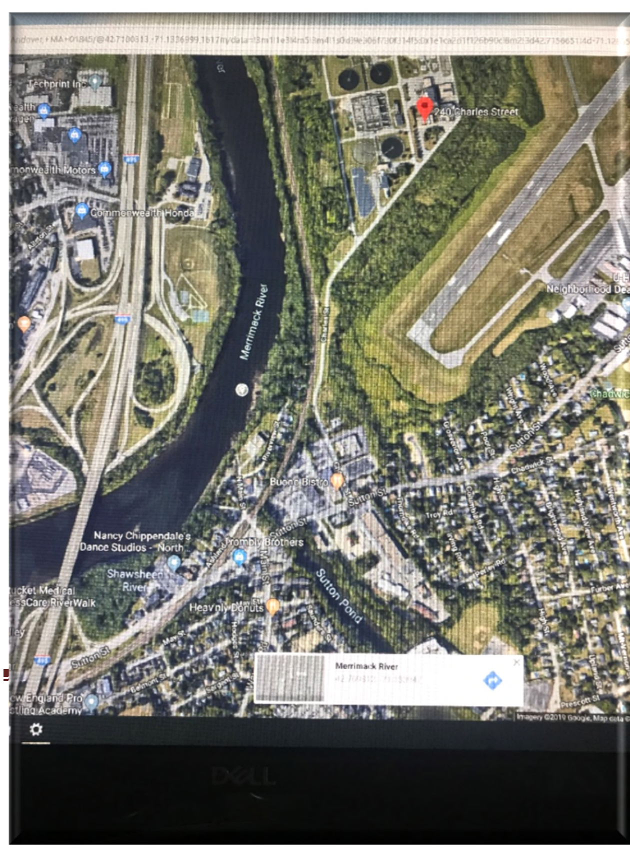
The GLSD NPDES Permit states that, *"Any change in sampling location must be reviewed and approved in writing by EPA and MADEP. All samples shall be tested using the analytical methods found in 40 CFR 136, or alternative methods approved by EPA in accordance with the procedures in 40 CFR 136. Samples shall be 24-hour composites unless specified as a grab sample in 40 CFR 136."*



The current location was reviewed for suitability of remaining the WET test collection station for the purpose of sampling. The current location is at 42.708748 and 71.134367. This is the launch at the Riverview Road Pump Station.

It was deemed that this point would continue to be suitable as it is at a further downstream (1,500 ft) location from the Blue Star Memorial Highway Bridge (I-495) on this side of the river. This location is also 3,340 feet downstream from the confluence of the Spicket River and 1,890 feet downstream from the confluence of the Shawsheen River assuring adequate mixing of both locations with the waters of the Merrimack River.

GLSD's understanding is that the EPA currently uses the metals data from a WWTP's previous five years of WET testing for metals limitations. As outlined earlier, these datasets are not representative of the actual metals' concentrations in the Merrimack River at levels near 7Q10 conditions.



GLSD has determined it would be prudent to also take samples from the WWTP outfall. The GLSD contracted with OspreyOwl Environmental (OOE) to assist with 'Clean Sampling' of the WWTP effluent along with river sampling at the upstream location above the WWTPs outfall.

GLSD Staff will seek concurrence with the EPA and MassDEP that this proposed location is still acceptable.

1.1 Sampling Locations

The upstream location has a small embankment that goes to a gently sloping sandbar-shelf in the Merrimack River. It is the boat launch area at the Riverview Pump Station location with easy access for vehicles. This location is approximately 3,400 feet upstream of the WWTP's outfall. Samples will be taken here during the summer/fall sampling program and continue throughout the NPDES permit.

The Merrimack River at Lowell (USGS 01100000) gage will be used to determine flow comparisons to the 7Q10 at the time of sampling. The 7Q10 (lowest seven-day average flow over a 10-year period) and is currently being debated regarding dilution flow in the new permit. It is anticipated that the 7Q10 will be in the vicinity of 950 cfs +/- as recalculated using Log-Person Type III distribution curves.

In previous discussions (spring of 2018) with the NHDES and EPA regarding the Town of Merrimack, NH's NPDES, these regulatory personnel indicated that the ideal river sample flows for sampling at this upstream location would be from 650 cfs to as high as 5,000 CFS (between 7Q10 and up to seven time the 7Q10 flows). As scouring velocities occurred in Manchester, NH at 6,500 cfs during the 2009/2010 Aluminum Study, it would be expected that scouring velocities would also be mirrored in this GLSD portion of the Merrimack River at flows approaching 10,000 cfs. To eliminate the effects of riverbed scouring, 8000 cfs would be considered the upward limit of river flow for any sampling event in this Riverview Pump Station Area before scouring effects could add suspended sediment to samples taken at flows exceeding this target.

The effluent sample will also be a 24-hour composite at the usual WWTP location for effluent sampling. The carboy for the effluent sample will have a 'Clean' plastic bag insert to assure there is no contamination from the inside of the carboy container. For this sample, as the effluent metals are anticipated to be in the ppb range, new pvc tubing will be installed on the sampler line along with a new peristaltic pump hose to assure the cleanest samples possible in regards to the effluent sampling.

With this in mind, the purpose of the sampling effort described in this QAPP is to determine;

1) Field reconnaissance to determine a suitable location where an upstream sample can be taken while considering the possible impacts from dislodging particulate bed material and river scouring high flow water impacts;
2) Determine how this 'Clean Sampling' for various metals and nutrients compare to typical WET sampling performed over the previous five-year permit period;
4) How total recoverable metals concentrations relate to river flow, dissolved organic carbon, hardness, and pH;

5) How metals concentrations vary upstream of the WWTP outfall on different weeks of varying months compared with previous historic WET testing;
6) To determine if the Merrimack River is impaired for metals and nutrients as outlined in Gold Book criteria and as previously indicated in non-clean sampling events with historic WET testing.

It is expected that the data collected under this QAPP will be used by GLSD, MassDEP and EPA to determine if GLSD's permit renewal should contain metals limitations and what specific limits will be set for phosphorus and any metals determined to contribute to impairment of the Merrimack River.

Over the course of six months (May, June, July, August, September, and October) with an estimated two sampling days each week during the summer/fall of 2019, OOE will sample the WWTP and the upstream river locations for various pollutant concentrations. GLSD has contracted OOE to sample the Merrimack River using 'Clean Sampling' protocol as outlined in this QAPP to determine actual background metals levels in the Merrimack River above the GLSD WWTP outfall. This effort also includes support from GLSD plant staff in assistance with the practices of clean sampling techniques. During this sampling period, GLSD staff will be trained in the methods of 'Clean Sampling' techniques. This data will be compiled by OOE and sent along to GLSD, EPA and MassDEP once received, verified against the QAPP and QA/QC protocols and footnoted where needed.

OOE reviewed the Merrimack River upstream location from the WWTP to determine the adequacy of the current sampling location and to determine if there was a more suitable location. A location immediately across from the present location was reviewed, but determined to be too close to the I-495 on-ramp with a constant traffic flow that would impact ambient air conditions during any time of sampling. A location below the Riverview Pump Station was visited, but a large 60" stormwater pipe from North Andover, MA would contribute a high dilution flow to actual Merrimack River flows and not represent a true Merrimack River homogenized sample. It was determined to continue the use of the existing location to assure conditions remained the same as samples performed on the previous five years of WET testing. The current sampling location assures a well homogenized sample.

EPA Method 1669 "Clean Sampling Techniques"

In some cases, these water quality criteria are as much as 280 times lower than those achievable using existing EPA methods and required to support technology-based permits. Therefore, this sampling method, and the analytical methods referenced in this document, were developed by EPA to specifically address state needs for measuring toxic metals at water quality criteria levels, when such measurements are necessary to protect designated uses in state water quality standards. The latest criteria published by EPA are those listed in the National Toxics Rule (57 *FR* 60848) and the Stay of Federal Water Quality Criteria for Metals (60 *FR* 22228). These rules include water quality criteria for 13 metals, and it is these criteria on which this sampling method and the referenced analytical methods are based.

Method 1669 is "performance-based"; i.e., *an alternate sampling procedure or technique may be used, so long as neither samples nor blanks are contaminated when following the alternate procedures*. Because the only way to measure the performance of the alternate procedures is through the collection and analysis of uncontaminated blank samples in accordance with this guidance and the methods contamination problems in trace metals analysis preventing ambient water samples from becoming contaminated during the sampling and analytical process is the greatest challenge faced in trace metals determinations. In recent years, it has been shown that much of the historical trace metals data collected in ambient water are erroneously high because the concentrations reflect contamination from sampling and analysis rather than ambient levels. Therefore, it is imperative that extreme care be taken to avoid contamination when collecting and analyzing ambient water samples for trace metals.

2.0 Sampling Process Design

Water samples for metals will be collected during the Summer/Fall of 2019, approximately twice weekly for six consecutive months during different river flow conditions. Metals of concern will be collected during this period along with nutrients, hardness, dissolved organic carbon, pH and other parameters as needed. The main target metals are total aluminum, cadmium, copper, lead, nickel and zinc (six metals outlined in toxicity testing).

Samples will be collected 3,400 feet upstream of the GLSD outfall, but below the confluence of the Spicket and Shawsheen Rivers and the I-495 bridge. This sampling location is a bit removed from heavy traffic roadways, upstream bridge structures, and areas of rapids. There is a commuter train that passes by within a few hundred yards of this sampling location, and should a train be passing, or have passed within the past 10 minutes, the sampling will be delayed to assure airborne dust has settled so as not to influence sample collection. This section of the Merrimack River is slow moving and fairly quiescent at conditions that approach 7Q10. Also, the riverbed is made up mostly of ledge with little bottom river sediment to effect sample collection and assure good footing during sample collection. This location is representative of background conditions and conforms with the recommendations of EPA Method 1669. This station is located a little over ½ mile upstream of GLSD's outfall.

The upstream station is the critical station for the purpose of determining permit limits for the GLSD's NPDES Permit since it represents background conditions.

In general, water samples for Total Recoverable Metals, will be collected using clean techniques as described in this QAPP.

Samples will be analyzed at the Enthalpy laboratory in Hampton, NH using the "Clean" Laboratory Protocol for TRM and ASM as outlined in EPA Method 1669.

Temperature, conductivity and pH will be collected in accordance with the Field Protocol outlined in the QAPP. Monitoring for pH, conductivity and temperature will be performed at the GLSD WWTP Certified Laboratory in accordance with this QAPP and GLSD Laboratory SOPs.

Flow information will be generated from the Lowell (USGS 01100000) gaging station upstream from the GLSD WWTP outfall. Flow data will be recorded for each sampling day at the 15-minute interval from the time the first sample is collected and averaged for reporting purposes.

3.0 Quality Assurance/ Quality Control

(Note: Items highlighted in yellow are from the Enthalpy QA/QC Protocol)

Water samples will include those taken at the respective sites to include duplicates and trip blanks. Duplicate samples are defined as a second analysis of the field sample, made from the original sample container. The trip blank is a second field sample container filled with 'Certified Clean' DI water from the Enthalpy lab. The trip blank for metals will be prepared as follows:

In the Lab:

Add 5 mL of a 1000 ug/L spiking solution to a 500 mL Class A plastic volumetric flask and bring to volume with DI water for a final concentration of 10 µg/L. This will be prepared in the class 100 prep room.

The lab will retain a 50 mL aliquot for analysis to obtain a reference level for the blank. The reference level will be used to determine the validity of the sample results associated with the trip blank.

In the field:

The remaining 450 mL will be sent to the field in a prepared sampling container. It will be transported to the sample site in the sample storage cooler, and brought back to the lab for analysis.

The Enthalpy Laboratory Reporting Detection Limit (RDL) for Al (10 ug/l), Ag (0.5 ug/l), As (1 ug/l), Cd (0.2 ug/l), Cr (1 ug/l), Cu (0.3 ug/l), Pb (0.2 ug/l), Ni (1 ug/l), and Zn (1 ug/l) using the "clean" analysis protocols. The measurement performance criteria acceptance limits for the accuracy for the spiked trip blank and the field duplicates is +/- 20% of the RDL

QA/QC sampling frequency for each parameter is 10% of the total samples taken for QA/QC purposes or at least once per round of sampling.

4.0 Clean Sampling Technique & Definitions

4.1 Scope & Application

This Standard Operating Procedure is applicable to the collection of representative metals samples from lakes, ponds and streams. This procedure is a clean sampling procedure and has been developed for minimizing contamination. Although this SOP was developed for metals sampling, this procedure may be used for organic and/or inorganic compounds where a clean sampling procedure is necessary.

4.2 Summary of Method

This SOP describes the procedure for the collection of representative water samples from: a boat, using waders, from a structure that spans the water body, or from shore. This method assumes that the sampling parameters (pollutants) are uniformly distributed in the water column. This SOP includes sample parameters for specific methods used in ambient metals collection. It does not address flow proportioned sampling.

4.3 Definitions

4.3.1 **Bottle Blank**: Analyte-free water is collected into a sample container, of the same lot number as the containers used for the environmental samples. This sample evaluates contamination introduced from the sample container(s) from a common lot.

4.3.2 **Field Blank**: In the field, analyte-free water is prepared at the laboratory using "Clean Sample" technique preparation. The sample containers are the same lot used for the environmental samples. This evaluates contamination introduced from the ambient condition(s) when opened in the field before sampling. Field blanks are not used for volatile samples. In this sampling event all sampling equipment (Teflon beaker(s)) are prepared in the laboratory and certified clean. The Field Blank will be used as an environmental blank during time of sample collection. This blank will be opened, placed on the outer "dirty bag" with the cover cap remaining sealed in the clean bag, and left open during the entire sample collection process. It will be the last bottle closed and secured. It will be analyzed to determine contamination from dust, wind conditions, forested canopy, rain etc.

4.3.3 **Filter Blank**: In the field, analyte-free water is passed through a filter and collected into in the appropriate 'Clean' sample container. The filter blank is then preserved. This procedure is the same as the sample collection procedure. When feasible, it is more appropriate to allow the lab to filter collected samples in a 'Clean Room' environment to assure no minute amounts of contaminants enter the original sample during the time of field filtering.

4.3.4 **Trip Blanks**: A sample collected at the laboratory using analyte free water in the appropriate sample container with the proper preservative, taken out to the field, and returned to the laboratory for analysis without being opened. Trip blanks are generally for volatile organic compounds, low level metals, and gasoline range hydrocarbon samples. Trip blanks are used to assess contamination introduced during sample transport and bottle preparation in the laboratory.

4.3.5 **Field Replicates/Duplicates**: Two or more samples collected at the same sampling location. Field replicates should be samples collected side by side or by collecting one sample and immediately collecting the second sample. Field replicates represent the precision of the whole method, site heterogeneity, field sampling and the laboratory analysis. Field duplicates are shared samples from the originally collected sample. With this QAPP, a 1-liter 'Certified Clean' Teflon beaker is used to collect the original river sample. The two duplicate containers are then opened, caps placed in the inner clean bags, and the water from the beaker poured back and forth between both duplicate sample bottles (about a 20 ml pour each pass) to equate to about a dozen shared interval pours from the Teflon beaker. Following this protocol usually results in duplicate samples that are within 5% or less metal concentration of each other.

4.3.6 **Field Split Samples**: Two or more representative sub-samples taken from one environmental sample in the field. Prior to splitting, the environmental sample is homogenized to correct for sample heterogeneity that would adversely impact data comparability. Field split samples are usually analyzed by different laboratories (intra- laboratory comparison) or by the same laboratory (intra-laboratory comparison). Field splits are used to assess sample handling procedures from field to laboratory and laboratory's comparability. The pouring of the field split sample should mimic the duplicate field sample collection method mentioned in 4.3.5.

4.3.7 **Clean sampling procedure**: A procedure used to minimize contamination during sample collection. This procedure differs from regular sampling procedures by taking extra steps such as using gloves, wearing only cotton clothing and canvas boat shoes, no jewelry or metals of any kind on the body, no glasses, minimizing contact with other surfaces, and in most cases having a clean and dirty hands person.

5.0 Health and Safety Warnings

5.1 All appropriate personal protection clothing and equipment must be worn.

5.2 All sampling involving hazardous material or hazardous conditions (i.e. sampling material, sample preservatives) must be performed with at least two people.

5.3 When working with potentially hazardous materials or situations, follow EPA, OSHA, and site specific health or safety procedures. If a site has a known hazardous chemical is present on site, review all chemical data including exposure guidelines and Material Data Sheets (MDS) before visiting the site.

5.4 When sampling lagoons or surface impoundments, the sampling team member(s) collecting the sample should not get too close of the edge of the impoundment, where bank failure may cause them to lose their balance.

5.5 Follow the OEME Boat Safety SOP (see reference) when conducting sampling from a boat.

5.6 When sampling at a new location, use a life preserver and attach with a harness. Attach a rope to the rear of the vest and either have the dirty hands person secure, or tie off to a tree or vehicle, while entering the river via an embankment. If a sudden drop-off or slip should occur, then the sampler will have a secure means of staying afloat and pulling themselves back to shore.

5.7 When field preserving samples all proper personal protection clothing and equipment is to be worn. At a minimum, this will include adequate shoes, all plastic safety goggles (if working with pre-preserved sample bottles that contain HNO_3 or H_2SO_4) and impervious gloves. Clean water and baking soda should be available for rinsing and neutralizing acids. Generally, preservatives are added by the lab during 'Clean Bottle' preparation to assure one less means of introducing contaminants when field preserving samples.

5.8 When working with potential hazardous chemicals or biological agents, avoid inhalation, skin contact, eye contact or ingestion. If skin contact occurs remove contaminated clothing immediately. Wash the affected areas thoroughly with large amounts of water and soap and water. If available consult the MDS for prompt action, and in all cases seek medical attention immediately. If inhalation, eye contact or ingestion occurs, consult the MDS for prompt action, and in all cases seek medical attention immediately.

5.9 When sample handling is complete, wash your hands thoroughly.

6.0 Contamination and Interferences

6.1 There are numerous routes by which samples may become contaminated. Potential sources of trace metals contamination during sampling include metallic or metal-containing sampling equipment, containers, labware (e.g. talc gloves that contain high levels of zinc), reagents, and deionized water; improperly cleaned and stored equipment, labware, and reagents; and atmospheric inputs such as dirt and dust from automobile exhaust, cigarette smoke, nearby roads, bridges, wires, and poles. Tree canopy along embankments can have small metallic dust particles on the leaves and can shake free in even a mild wind. Even human contact can be a source of trace metals contamination. For example, it has been demonstrated that dental work (e.g., mercury amalgam fillings) in the mouths of laboratory personnel can contaminate samples that are directly exposed to exhalation. Also certain personal hygiene products such as underarm deodorant contain aluminum. Also, the metal frames of eye glasses, metal eyelets on shoes/boots and clothing, metal zippers and snaps, cell phones, keys, pocket change and any metal-based objects can contribute minute amounts of contamination to a sample. Samplers who have practiced at a shooting range two days or less prior to sampling may carry residual lead upon their person.

6.2 Avoiding contamination – The best way to control contamination is to completely avoid exposure of the sample and sampling apparatus to contamination in the first place. Avoiding exposure means performing operations in an area known to be free from contamination. Two of the most important factors in avoiding/reducing sample contamination are (1) an awareness of potential sources of contamination and (2) strict attention to work being performed. Therefore, it is imperative that the procedures described in this method be carried out by well trained, experienced personnel. Documentation of training should be kept on file and readily available for review.

6.3 Minimize exposure – The Apparatus that will contact samples or blanks should only be opened or exposed in a clean room, clean bench, glove box, or clean plastic bag, so that exposure to atmospheric inputs is minimized. When not being used, the apparatus should be covered with clean plastic wrap, stored in the clean bench or in a plastic box or glove box, or bagged in clean, colorless zip-type bags. Minimizing the time between cleaning and use will also reduce contamination.

6.4 Wear gloves – Sampling personnel must wear clean, non-talc gloves during all operations involving handling of the Apparatus, samples, and blanks. An additional ultra-clean step may be taken in that Non-Latex, Biogel® Skinsense® synthetic polychloroprene surgical gloves, may be used for very low-level critical work.

These are individually wrapped in a sterilized package and are used for surgery at hospitals. Only clean gloves may touch the Apparatus. If another object or substance is touched, the glove(s) must be changed before again handling the apparatus. If it is even suspected that gloves have become contaminated, work must be halted, the contaminated gloves removed, and a new pair of clean gloves put on. Wearing multiple layers of clean gloves will allow the old pair to be quickly stripped with minimal disruption to the work activity (which is only recommended on very cold days or times when sampling must be rushed more than anticipated).

6.5 Use metal-free Apparatus—All apparatus used for metals determination must be nonmetallic and free of material that may contain metals. When it is not possible to obtain equipment that is completely free of the metal(s) of interest, the sample should not come into direct contact with the equipment. A sterile plastic bag insert secured with a heavy rubber band is an appropriate precaution.

6.6 The following materials have been found to contain trace metals and must not be used to hold liquids that come in contact with the sample or must not contact the sample, unless these materials have been shown to be free of the metals of interest at the desired level: Pyrex, Kimax, methacrylate, polyvinylchloride, nylon, and Vycor. In addition, highly colored plastics, paper cap liners, pigments used to mark increments on plastics, and rubber all contain trace levels of metals and must be avoided.

6.7 Contamination by indirect contact—Apparatus that may not directly contact samples may still be a source of contamination. For example, clean tubing placed in a dirty plastic bag may pick up contamination from the bag and subsequently transfer the contamination to the sample. Therefore, it is imperative that every piece of the apparatus that is directly or indirectly used in the collection of ambient water samples be cleaned as specified in the analytical method(s).

6.8 Contamination by airborne particulate matter—Less obvious substances capable of contaminating samples include airborne particles. Samples may be contaminated by airborne dust, dirt, particulate matter, or vapors from automobile exhaust; cigarette smoke; nearby corroded or rusted bridges, pipes, poles, or wires; nearby roads; and even human breath (Section 6.1). Whenever possible, the sampling activity should occur as far as possible from sources of airborne contamination. Areas where nearby soil is bare and subject to wind erosion should be avoided.

6.9 Interference may result from using contaminated equipment, solvents, reagents, preservatives, sample containers, gloves, or sampling in a disturbed area.

6.10 Cross contamination problems can be eliminated or minimized by meticulously following the specified procedure.

6.11 All sampling equipment must be routinely demonstrated to be free from contaminants under the conditions of the analysis by running filter blanks and bottle blanks.

7.0 Personnel Qualifications

7.1 The field samplers should be pre-trained in all sampling equipment and procedures by an experienced sampler before initiating the sampling procedure.

7.2 All personnel shall be responsible for complying with all quality assurance/quality control requirements that pertain to their organizational/technical function.

8.0 Equipment and Supplies

8.1 For this sampling procedure, it is a recommended a sampling kit be made ahead of time. The kits should contain all equipment for sampling at each site. They should be assembled in the lab ahead of time by a handler wearing gloves and under clean room conditions, and at the very least, semi clean-room conditions. Each should consist of the following items placed in a sealed plastic Zip-Lock bag.

8.2 One 250 ml ultra clean bottle (two bottles may be necessary for total and dissolved metals sampling). Dissolved metals will require a 1-liter, ultra clean plastic container. The dissolved metals should be filtered in the lab under clean conditions to avoid the contamination that is likely to occur during field filtering.

8.3 One pair of "powder free" Polyethylene gloves which have been stored in their commercial packaging or in a sealed Zip-Lock plastic bag.

8.4 A new clean filter, syringe, in their original packaging. You will also need:

8.5 A box of regular powder-free gloves (suggested gloves are outlined in 6.4)

8.6 Blank water (deionized water from OEME's house supply or other suitable, analyte-free water.)

8.7 Chest waders with belt, hip boots (if necessary, but static may attract dust that may ultimately fall into the sample container at the time of collection). For quiet, slow moving rivers that have a steady slope into the watercourse, cotton shorts and shirt with canvas boat shoes are all that is necessary to go out into the river to a depth of three to four feet to grab an ambient sample. Waders and hip boots tend to produce static which can attract atmospheric dust and contamination.

8.8 Boat (if necessary), but discouraged as they are inherently hard to clean and usually contribute to ambient contamination of samples.

8.9 Safety harness and ropes.

8.10 Acid washed one-liter Teflon beaker in a clean zip-lock bag.

8.11 General equipment: Site logbooks, indelible marker, waterproof pen (non-metallic caps and clips), field data sheets, chain of custody forms.

<u>Note: If preserving in the field, you will need the following: (Preservatives added at Enthalpy).</u>

8.12 Ultrex-grade nitric acid and clean, packaged pipettes;

8.13 pH paper, preferably measuring a range of pH from 0 to 2.5;

8.14 Safety goggles, baking soda, and DI water.

9.0 Pre-sample Collection

9.1 Determine the number of samples (including QC samples) specified in QAPP. Refer to section 4.0 for QC sample definitions. At a minimum, a trip blank and field blank must be conducted for each sampling event, or for each day.

9.2 Determine the sample locations, analytical sampling parameters, the sampling methods to be employed, and which equipment and supplies are needed.

9.3 Prepare a schedule and coordinate with the staff, clients, laboratory and regulatory agencies.

9.4 If possible, perform a general site survey prior to the site entry in accordance with the health and safety plan and QAPP.

9.5 Use GPS, topographic maps, stakes, flags, or buoys to identify and mark all sampling locations. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions.

10.0 Sample Collection

10.1 When collecting samples, the field location should be recorded using Global Positioning System (GPS). The date and time of sample collection, field measurements and unusual ambient conditions must be recorded.

11.0 Collection from a Boat

11.1 Use only a fiber-glass, wood, rubber type zodiac or plastic boat for sampling.

11.2 Approach the sampling point from a downstream or down-wind position and then motor slowly toward the sampling point. The motor should be turned off prior to reaching the sampling location and the boat allowed to coast a short distance to the anchoring point to prevent sampling of water affected by motor exhaust.

11.3 Allow the boat to come to a complete stop and lower the anchor slowly to prevent bottom sediments from being disturbed. Do not drop or toss the anchor overboard. If there is no wind or current you may not need to anchor.

11.4 Allow the boat to drift into anchored position before beginning sampling.

11.5 As it is almost assured that the use of a boat will generate some type of contamination, it is preferred if the sampler(s) wear cotton shorts, t-shirt and non-metal water shoes and wade into the water to a depth of three feet. This way all potential contamination sources from a boat are prevented.

12.0 Sample Collection from the Shore or Using Waders

12.1 Don waders with belt.

12.2 Where there is flow or current, always approach the sampling location slowly from the downstream. Once you have reached the sampling location allow the water to return to a pre-disturbed condition. Avoid contacting the syringe with the bottom or adjacent rocks and stream debris. If the water depth is less than 1-2 feet, record this condition and sample the water at mid depth.

12.3 Sample Collection from Overhead Structures Spanning the Water Body

12.4 Determine traffic pattern (both ways) and set up appropriate barricades;

12.5 Provide the required fall protection (if necessary);

12.6 Assure sampling equipment does not come in contact with structure during the sampling process;

12.7 Mark the sampling location on the structure for future sampling events;

12.8 Sample on the upstream side of the structure.

13.0 Collection Procedure for Dissolved Metals

(Note: Clean Hands duties designed in **green**, Dirty Hands duties designed in **blue**)

13.1 Sampling is done in teams of two. The person taking the sample is designated the "clean hands" person (CHP), and the assistant is designated the "dirty hands" person (DHP). The CHP is not to touch anything except the syringe, filter, inner sealed bag and 'Clean Sample' bottle until sampling is complete. The DHP should only touch the outer bags containing the clean bottles, and outside packaging of the syringe and filter package until sampling is complete.

13.1.1 If it is necessary to attach a bottle to the device in the field, "clean hands" (CHP) performs this operation,

13.2 Immediately before collecting the sample, the DHP dons regular powder-free gloves. DHP then opens the sample kit outer bag, extracts the inner bag containing the non-powdered latex gloves and opens it, allowing the CHP to take them out and put them on.

13.3 Next, the DHP takes out and opens the filter package or the teflon beaker bag. The CHP then removes the filter or the teflon beaker from the bag.

13.4 Next, the DHP removes the syringe package from the kit and opens it.

13.5 The CHP now takes the syringe out of the package. While holding the filter in one hand, the CHP reaches up stream or up-current and fills the syringe with water from about 2" to 12" below the surface. The CHP then places the tip of the syringe into the inlet of the filter (this is marked on the filter) and empties it into the filter, purging the water out of the filter downstream from the sampling site. (Do not allow the filter, syringe, bottle cap, or bottle to contact any unclean surfaces such as a stream bank or the boat.) If the CHP is using the teflon beaker, the surface of the water is inspected for pollen or other transient debris and the riverbed is reviewed for disturbed silt and sands. Once the bottom sediment has resettled, and the top flow is free from debris, insert the teflon beaker face down to a depth of about 18". Turn the beaker upright, releasing the air to create a large up-flow bubble and filling the teflon beaker rapidly with ambient water. Lift the filled Teflon beaker up through bubble that burst at the water surface where the radius of the bubble, when it broke the water surface, would have pushed back all pollen and particulate particles that had collected on the surface. This method assures that no surface contamination contributed to the water sample that was collected at the 18" depth level.

13.6 Next the DHP takes the inner 'Clean Sample' bag and pushes up on the bottom of the bag to expose the top of the 'clean bottle' without actually touching the clean bottle. The DHP holds this in front of the CHP without opening the cap for the purpose of not touching the inside. Make every effort to assure the clean bottle is facing downwind should it be a windy day. The CHP quickly unscrews the cap, pours the water sample from the Teflon beaker (being careful not to touch the teflon beaker spout to the side of the clean bottle), fills to the lower neck level, then immediately caps the bottle to assure the smallest of exposure time has transpired during the sample transfer from the clean teflon beaker to the clean sample bottle. The CHP assures the cap is held in one hand (without touching the inside) during this procedure.

13.7 While holding the filter in one hand, the CHP reaches up stream or up-current and fills the syringe with water from about 2” to 12” below the surface. The CHP then places the tip of the syringe into the inlet of the filter (this is marked on the filter) and pushes the water through the filter into the bottle that the DHP is holding. They continue to do this until the bottle is nearly full, leaving enough room for about 1 ml of preservative to be added (EPA OEME metals analysis require> 150 ml of sample volume).

13.8 The CHP then caps the sample bottle.

13.9 The filter blank sample should be collected using the same sampling technique used to collect the water sample. If collecting samples by wading into a stream or river you may conduct the filter blank on the stream bank. Choose a location on the stream bank that has similar conditions to the stream or river sampling location. (i.e. there should not be any immediate sources of dust or fugitive emissions). For the filter blank, the CHP will use the syringe to draw from a container of blank water. The CHP is not to touch anything except the syringe, filter, and bottle until sampling is complete. When conducting sampling in the stream or collecting the filter blank movement should be kept to a minimum to avoid suspending sediment or dust. At least one filter blank should be collected during every sampling event and by each sampling team. For sampling event greater than 10 samples, EPA recommends 10% of the samples are filter blanks.

13.10 Field duplicate samples should be collected by the sampling crew immediately after the sample collection using the same sample collection procedure. Project involving two sampling crews can collect comparison (duplicate) samples side by side in the stream or on a boat. For this procedure both sampling crews should sample at the same time adjacent to each other and should not influence the water quality of each other’s team. EPA recommends 10% of the samples are duplicate samples.

14.0 Collection Procedure for Total Metals

14.1 Sampling for total metals can be done by continuing with the procedure described above. Sampling is done in teams of two (limited samples can be taken by a team of one see 14.9). The person taking the sample is designated the "clean hands" person (CHP), and the assistant is designated the "dirty hands" person (DHP). The CHP is not to touch anything except the sampling bottle until sampling is complete. The DHP should only touch the bags containing the bottles until sampling is complete.

14.2 Immediately before collecting the sample, the DHP dons regular powder-free gloves. The DHP then opens the sample kit, extracts the bag containing the powder free gloves and opens it, allowing the CHP to take them out and put them on.

14.3 Field Blank – The field blank is used to determine any potential site contamination during the sample collection process as outlined in 6.8. This field blank is double-bagged and prepared at the laboratory with uncontaminated blank water. This sample is opened first using all "Clean Sampling techniques" and placed open in an area away from the sampling activities, upwind of the sampler, and set upon the outside of the dirty bag as not to collect dirt, dust, leaves, grass, pine needles etc on the bottom of the field blank container[1]. This assures that any dust on the sampler's clothing or sample bags does not drift toward the field blank open container. Once all sampling activities are complete and the ambient water samples secured for transport, the field blank is closed using all the appropriate "Clean Sampling" techniques and the sample is placed back into the inner bag first then the outer double-bag for transport to the laboratory.

14.4 The CHP removes the sample container cap. Reaching up stream or up-current, the CHP gently plunges the container (with the opening facing directly toward the water) quickly though water surface to avoid surface scum. If there is significant surface scum, record this in the field notes. The sampler will submerge the container 12" to 18" inches and allow the container to fill. Avoid contacting the sample bottle with the bottom or adjacent rocks and stream debris.

14.5 The CHP brings the bottle up and immediately caps the container.

14.6 An alternative to this method is for the CHP to submerge capped container to 12" to 18" inches and then remove cap, allowing container to fill, and then recapping at the same depth.

[1] Springfield Water Plant Laboratory Technician, Sinnet Abdoo, made this observation during the sampling of the Morning Glory, NPDES location at the second lagoon at the water treatment plant. There were some particles of sand on the bottom of the field blank container when it was capped and placed back into the inner "clean sample" bag. This measure will prevent the contamination of the bottom of the bottle and is an addition to Method 1669.

14.7 The total metals blank sample should be collected using the same sampling technique used to collect the water sample. If collecting samples by wading into a stream or river you may place the blank on the stream bank. Choose a location on the stream bank that has similar conditions to the stream or river sampling location. (i.e. there should not be any immediate sources of dust or fugitive emissions). For the total metals blank, the DHP first hands the CHP the bottle containing the blank water. The CHP then pours the blank water into the sample container that the DHP is holding. The DHP then caps the sample container. When conducting sampling in the stream or collecting the blank movement should be kept to a minimum to avoid suspending sediment or dust. At least one total metals blank should be collected during every sampling event and by each sampling team. For sampling event greater than 10 samples, EPA recommends 10% of the samples are filter blanks.

14.8 Field duplicate samples should be collected by the sampling crew immediately after the sample collection using the same sample collection procedure. Project(s) involving two sampling crews can collect comparison (duplicate) samples side by side in the stream or boat. Both sampling crews should sample at the same time adjacent to each other and should not influence the water quality of each other's team. EPA recommends 10% of the samples are duplicate samples.

14.9 At times it may be necessary for one person to be the DHP and CHP due to accessibility, staff training, or other circumstances. In these circumstances the CHP must carry additional regular, powder-free gloves. Once the lone sampler collector has finished the performance of the DHP work (in this case the outer double-bag is placed open on a rock, log, sand, dock etc. with the inner bag still inside the outer bag, but has been opened to expose the clean sample bottle) the DHP dons a new set of powder-free gloves and becomes the CHP. CHP now opens the bag holding the acid-washed Teflon beaker (assure the beaker opening is facing downwind to avoid ambient contaminants that may be airborne) and collects the ambient water sample. Beaker is quickly, but gently, placed face down into the ambient water to a depth of between 12" and 18." The clarity of the water should be determined, sediment kick up should have abated, and teflon beaker should be completely upside down with the full air pocket in the upside down submerged container. Once conditions are determined to be quiescent and free from any kicked-up sediment, then the teflon beaker is turned upward very slowly, releasing the entrained air in the beaker and slowly filling the beaker with water. The beaker is gently lifted out of the water, the CHP then takes one hand to unscrew the sample

container cap, holds cap between two fingers, and lifts sample container out of the inner clean bag. The water is gently poured off the Teflon beaker, being careful not to touch the sample bottle up to 95% full. The Teflon beaker is tucked under the arm and the free hand now takes the cap from between the two fingers and carefully screws this onto the sample bottle. The bottle is placed back into the inner sample bag, sealed and then the outer sample bag is sealed. The sample is then placed in the cooler. This is only effective with there are a limited amount of samples to be taken (one to two) at any individual sampling station.

15.0 Sample Handling, Preservation, and Storage

If field preservation is necessary, it should be done immediately after sampling, continuing with the "dirty hands/clean hands" technique. For most projects, and to assure the cleanest possible conditions, it is preferable to have the "clean sampling kit" ***laboratory add the preservative while preparing the kit to minimize contamination***.

15.1 The CHP dons safety goggles (must be all plastic with no metal parts), powder free latex gloves and any other necessary safety equipment. Have a neutralizing agent (such as baking soda) and rinse water readily available.

15.2 The DHP opens the pipette package and the CHP removes the pipette.

15.3 Next, the DHP opens the bottle containing Ultrex-grade nitric acid and the sample bottle.

15.4 The CHP draws 0.5-1.0 ml of acid per 250 ml sample and adds it to the bottle. The pipette is placed back in its original wrapper until preservation is complete.

15.5 The DHP caps the sample bottle and shakes it gently to mix the preservative with the sample.

15.6 The CHP takes out a piece of pH paper and the DHP pours a drop of the sample onto it. To avoid contamination, **do not dip the pH paper in the sample bottle.**

15.7 If the pH does not register < 2.0, add a drop or two more of acid to the sample, cap and shake the bottle, and retest the pH using the above protocols until the correct acidity is achieved (no glove changes needed).

15.8 Once the sample has been preserved properly, the CHP caps the sample bottle (using a custody seal if the sample is for enforcement), places it in a Zip-lock plastic bag (optional), and places the bottle in a cooler or container. The cooler or container holding the samples should be plastic and free of dirt or heavy stains. The cooler or container should be wiped clean prior to sampling.

15.9 Record all pertinent data in the site logbook and on the field data sheet and chain of custody. At a minimum this includes date, time, station number, sampling number and sampling conditions.

16.0 Chain of Custody

16.1 Follow the Sample Control Procedures, chain-of-custody Standard Operating Procedures.

16.2 At a minimum enter the following information on the Chain of Custody form: sampling date, sampling time, station number and/or sample numbers, project name, number of containers per station/sample number, type of analyses, type of sample (composite or grab), and samplers signatures.

16.3 Chain of custody forms should stay with the samples at all times. When samples are not in custody of the sampler or designated person (who signs the form) they should be maintained under lock and key (i.e. a locked vehicle or locked building).

16.4 Attach the custody seals to the cooler prior to shipment if for investigation or shipment to another laboratory.

17.0 Data and Records Management

17.1 All data and information shall be recorded in a hardbound book or on a data sheet.

17.2 The chain of custody form is signed over to the laboratory. A copy is kept with the sampling records.

17.3 Final reports generated by OOE and will be kept with GLSD's files for seven years and forwarded to the EPA and MassDEP with comments on the final NPDES Permit at the appropriate time.

17.4 Field, laboratory, and meta-data may be uploaded to EPA's Water Quality Exchange (or other appropriate national data system) and the MassDEP database at their discretion.

18.0 Quality Control/Quality Assurance and Decontamination:

18.1 Representative samples are required. OOE had evaluated the site during the Spring, of 2019, May 10th site visit and subsequent follow up to confirm location should be completed by both the federal and state regulatory agencies.

18.2 All field QC sample requirements in the QAPP must be followed. These may involve trip blanks, field blanks, equipment blanks, filter blanks, field duplicates and the collection of extra samples for the laboratory's quality control.

19.0 Waste Management and Pollution Prevention:

During field sampling and analysis events there may be hazardous waste produced from the sample collection. The waste must be handled and disposed of in accordance with federal, state, and municipal regulations. Dispose of the site specific hazardous waste produced where the work was performed, if the operating site has proper disposal available. If there is no disposal that meets regulatory requirements, the waste must be transported back to the GLSD WWTP and lab-packed for future disposal through a hazardous waste disposal facility. The sample volume should be minimized to reduce unnecessary waste.

20.0 References:

20.1 U.S. EPA, Office of Environmental Measurement and Evaluation, January 1998, revision 2. Safe Boating Standard Operating Procedures. EPA-RG 1-0EME/BOAT

20.2 U.S. EPA, Office of Environmental Measurement and Evaluation, 1/30/07, Revision 9. Standard Operating Procedures for calibration and field measurement procedures for the YSI model 6- series Sondes (Including: temperature, pH, specific conductance, turbidity, dissolved oxygen, chlorophyll, rhodamine WT, ORP, and barometric Pressure. ECSSOP- YSI Sondes9

20.3 U.S. EPA, Office of Environmental Measurement and Evaluation, August 1996, Revision 1. Sample Control Procedures, chain-of-custody.

20.4 U.S. EPA 40 CFR Part 136.3 (e) Table II