

WRE Section Core Routine Monitoring Parameter List

Environmental Resource Management Division
Watershed Protection & Development Review Department
City of Austin.

The core parameter list for Water Resource Evaluation (WRE) section routine water quality monitoring programs was established by WRE sub-committee in August 2003 and scheduled to take effect at the beginning of the 2004 Fiscal Year. The list was reviewed by the Water Quality Monitoring (WQM) and Watershed Management (WM) sections, and is to be used for all routine surface and ground water monitoring except where other parameters have been specified in the specific program sampling plans.

This document was last amended on 29 August 2003.

Objective

In an effort to homogenize the varying lists of routine parameters monitored by WRE field staff, a core parameter list was developed for use in all water chemistry sampling. Both surface and groundwater field staff are to restrict monitoring to these parameters except where a special study has been established and documented in the sampling plan for that specific program. A full summary by program is presented in Appendix A.

A single parameter list for use by the entire WRE group will reduce monitoring costs by eliminating historical parameters which provide only limited information, simplify chain-of-custody forms between projects, and simplify post-facto data analysis where data from multiple programs must be combined. Consistency in parameters was a recognized need for customer service, NPDES, TCEQ CRP, and budgeting.

Meetings were conducted to be certain that the customers of WRE data collection were satisfied with the proposed changes to routine monitoring. In order to better meet the data needs of these customers, an additional monitoring program was undertaken during baseflow conditions at several USGS gage stations, combined with EII sampling as discussed in detail below.

Core Parameter List

The core laboratory parameter list is presented in Table 1 along with justification for monitoring those specific parameters.

Table 1. Lab core parameter list.

Lab Parameter	Reason for Monitoring
Ammonia-Nitrogen, mg/L	NH ₃ is used by TCEQ for identifying secondary concerns; high levels of NH ₃ may be toxic to aquatic organisms; NH ₃ has multiple anthropogenic sources
Nitrate+Nitrite-Nitrogen, mg/L	NO ₃ +NO ₂ is also used by TCEQ for identifying secondary concerns in Texas waters; high levels of NO ₃ may be toxic to humans and aquatic life; NO ₃ has multiple anthropogenic sources
Total Orthophosphorus, mg/L	OP is the bioavailable portion of phosphorus in water; the state standard is for dissolved OP, and additional sampling techniques (field filtering of samples) would have to be employed for this data to be considered valid for inclusion in 303(d)/305(b) assessments. Total OP can still be used as a screening tool in non-official comparisons to dissolved OP standards.
Total Suspended Solids, mg/L	TSS is useful in quantifying suspended sediment loads and is required by the masterplan. BMP design criteria in TCEQ Edwards Rules (and others) are based on TSS removal
<i>Escherichia coli</i> , cfu/100mL	State standards for bacteria are shifting to E Coli.

The core field parameter list is presented in Table 2 along with justification for monitoring those specific parameters (in addition to their being consistent with our multi-parameter probe capabilities).

Table 2. Field core parameter list.

Field Parameter	Reason for Monitoring
Dissolved Oxygen, mg/L	Water quality standards exist for DO; despite high variability, DO is a useful screening tool in assessing water quality impairments
Water Temperature, °C	Water quality standards exist for temperature; temperature is useful in normalizing the concentrations of DO
Conductivity, µS/cm	Water quality standards exist for conductivity; conductivity does change with increasing urbanization; extreme concentrations of conductivity may be detrimental to humans and livestock
pH, Standard Units	Water quality standards exist for pH; extreme pH values may be harmful to aquatic life
Flow, ft ³ /s	Flow must be collected with field samples not only to enable pollutant loading calculations but also to document changing patterns in flow regimes over time

Special Study Parameter List

Several special studies have already been identified that contain parameters not on the routine core parameter list. Those special studies and the additional parameters are detailed in Table 3, along with the additional parameters to be collected during baseflow conditions at USGS gages in conjunction with the EII.

Table 3. Special study parameter list.

Special Study Parameter	Program	Reason for Monitoring
Chlorophyll-a (& pheophytin) ¹	Town Lake	Can be used as one measure of suspended algal growth (in reservoirs only) and compared to TCEQ screening criteria; pheophytin will be analyzed at W/WW lab as long as there is no charge for the analysis.
Secchi Disk Depth	Town Lake	Useful in quantifying clarity in the lake; not practical to measure in surface water streams
Total Metals (As, Cu, Fe, Pb, Zn)	Town Lake	Limited sampling will be conducted to measure total metals in our primary urban receiving water and compared to state standards
Total Metals (As, Cu, Fe, Ni, Pb, Zn)	Groundwater	Anthropogenic sources indicated
Total Organic Carbon	Groundwater	Increasing in Barton Springs regressions.
Chlorophyll-a (& pheophytin) ^{1,2}	Groundwater	Barton Springs algae assessment
Volatile Suspended Solids ²	Groundwater	
Ions (Ca, Mg, Na, K, SO ₄ , F, Cl)	Groundwater	Ion balance and spring site characterization
Ions (Ca, Mg, Na, K, SO ₄ , F, Cl) ³	Bull	
Sulfate	EII	State standards exist for sulfate; sulfate is correlated with urbanization; sulfate is a minor-nutrient; sulfate has several anthropogenic sources
Total Kjeldahl Nitrogen	USGS Baseflow	Needed by masterplan staff to calculate total nitrogen loads for use in modeling and in comparison to stormwater concentrations
Chemical Oxygen Demand	USGS Baseflow	Needed by masterplan staff for use in modeling and in comparison to stormwater concentrations
Total Phosphorus	USGS Baseflow	Needed by masterplan staff for use in modeling loads and in comparison to stormwater concentrations
Total Metals (As, Cu, Fe, Pb, Zn)	USGS Baseflow	Needed by masterplan staff for use in modeling. Anthropogenic sources indicated

1. Pheophytin will be monitored in Town Lake as long as there is no charge for the analysis at W/WW.
2. Sampled at Barton Springs only.
3. Sampled at Jollyville Salamander site only.

Recently Monitored Parameters to be Dropped

Numerous WRE programs were monitoring additional constituents prior to the adoption of the list of core lab parameters. Several of those parameters are presented in Table 4 along with justification for no longer monitoring those parameters on a routine basis. Despite utility by other agencies, COA historical data indicate these parameters are not useful for their intended purpose.

Table 4. Recently monitored parameters to be dropped from routine monitoring.

Parameter to be Dropped	Reason for Dropping
Volatile Suspended Solids, mg/L	Estimation of the organic (or volatile) portion of the total suspended solids load is of limited importance to WRE staff, as this is highly variable changing with factors such as seasonality and stream morphology. VSS has not proven useful in characterizing the suspended algae within the water column. TSS will still be used as a screening tool.
Total Phosphorus, mg/L	Most of the phosphorus load that reaches waterways is sorbed onto soils and becomes bioavailable only under special circumstances. TP will be monitored for at USGS gages during baseflow conditions for use in masterplan water quality modeling for total P.
Dissolved Total Phosphorus, mg/L	See description for TP.
Dissolved Ortho-Phosphorous, mg/L	Not significantly different from TOP, TCEQ CRP protocols would require expensive field filtering for acceptance.
Total Organic Carbon, mg/L (Surface Water Streams Only)	Analysis results indicate not a useful parameter. Characterization of the organic carbon load in Austin waterways is not crucial, especially since DO debts are not prevalent in most Austin waterways.
Chlorophyll-a, µg/L (Surface Water Streams Only)	Chlorophyll a has not been found useful in surface water streams in the Austin area, and is rarely in exceedance of the current TCEQ screening level. Chlorophyll-a will continue to be monitored in Town Lake.
Chemical Oxygen Demand, mg/L	A general lack of oxygen demand problems in most Austin streams under base flow conditions and the relatively high detection limit of COD (5 mg/L) suggest that this parameter be dropped. Surrogate as a measure for organic toxics not pertinent at low levels, and indistinguishable from natural organic material. This parameter will be added to the baseflow monitoring at USGS gages.
Total Kjeldahl Nitrogen, mg/L	Few data analyses were using TKN data to estimate organic nitrogen content of Austin water, or to estimate total nitrogen. There is no State screening level for either TKN or organic nitrogen. TKN will be added to the baseflow sampling at USGS gages so that total nitrogen can be calculated
Fecal Coliform, cfu/100mL	State standards are shifting from Fecal Coliform to E Coli. WRE has collected concurrent data for both bacterial parameters to establish correlation for any historical analysis. However, high variability in bacterial counts generally obscure long-term temporal trends and small spatial differences. Thus, bacteria data is most useful as a screening tool, and changing to the new recommended parameter poses no loss of information.

Additional Considerations & Recommendations

During the planning and review process, several additional considerations or customer needs were identified. Those considerations or alterations to existing sampling programs are outlined below.

- To better satisfy the data needs of WRE customers, additional sampling will be undertaken at USGS gages during baseflow conditions. Gages will be sampled in conjunction with the EII (same watershed schedule with samples collected quarterly along with EII samples). Samples from these gages will be analyzed at the W/WW lab. This data will be used not only in comparison to storm flow data collected by the WQM group, but also used in estimating loads with the masterplan modeling tools. For more detailed information or a list of the EII stations corresponding to these gage locations, please see the current EII sampling plan.
- The routine parameter list does not include any phosphorus nutrient parameters which are used by TCEQ in establishing secondary concerns for Texas waters. However, total phosphorus will be monitored at USGS baseflow gages. If total phosphorus becomes problematic (more than 25% of samples at any gage exceed the TCEQ screening criteria), additional sampling for total phosphorus will be considered. The routine parameter list does contain total orthophosphorus (although TCEQ screening levels are for dissolved orthophosphorus). If total orthophosphorus becomes problematic in any watershed (more than 25% of the total orthophosphorus samples exceed the current TCEQ screening level for dissolved orthophosphorus), then additional sampling may be undertaken. Additional sampling for total phosphorus or dissolved orthophosphorus would most likely be conducted under the Clean Rivers Program QAPP with LCRA in order to submit this data to TCEQ for inclusion in the 303(d)/305(b) assessment process.
- The EII measures Total Nitrate-Nitrogen in the ERM laboratory. Because of the general lack of difference between Nitrate-Nitrogen and Nitrate+Nitrite-Nitrogen from the relatively negligible concentrations of nitrite, this deviation is ignored.
- EII sampling will be conducted in conjunction with routine programs. For example, if the EII is sampling the Onion Creek Watershed in a given year according to the three-phase schedule, routine Onion Creek sampling events will be collected with other watersheds of the same phase. The primary difference is that all data from Onion Creek routine sites would be analyzed at the W/WW laboratory according to the Onion Creek Sampling Plan. *Routine monitoring locations should be consistent with EII sites wherever possible.* FSDB staff will advise on the proper method of data storage.
- Sulfate will be added to the routine EII parameters. Chloride will not be added at this time. Both parameters are correlated with conductivity. Although most watersheds show a decrease in chloride over time, sulfate levels are constant or are slightly increasing. If sulfate or conductivity become problematic relative to TCEQ water quality standards, additional sampling for chloride may be undertaken.
- Replicate QC samples will be collected for each program during each sampling event. If and only if necessary for Clean Rivers Program compliance, split samples will be collected

instead of replicate samples. One equipment blank will be collected for each program one time per year.

- The East Bouldin/Blunn Project will be dropped, as this monitoring will be accomplished by the new baseflow sampling at most active USGS flow gages.