TASK 3: WATER QUALITY MONITORING

Contents

Exhibits

General Monitoring Guidance

Monitoring programs should address program goals, identify reference and baseline conditions for future comparisons, and address areas that have water quality concerns, as identified by Basin Steering Committees and water quality assessments (e.g., Texas Integrated Report for Clean Water Act Sections 305(b) and 303(d), Basin Summary Report). The TCEQ *Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods* (RG-415) and the TCEQ *Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data* (RG-416) are essential guides for conducting water quality monitoring. The most current version of the TCEQ *Guidance for Assessing and Reporting Surface Water Quality in Texas* should be referenced when determining the amount of data needed for the assessment of various uses. The TCEQ Water Quality Standards Group should be consulted before beginning data collection to support the development of water quality standards.

Basin monitoring programs should provide:

- monitoring that considers chemical, physical, and biological data collection and evaluation that will advance the ability to identify and locate water quality issues
- water quality sampling to allow temporal and spatial analysis of water quality trends
- increased data collection for the development of water quality standards
- additional knowledge of stream flows
- enhanced knowledge of current monitoring techniques

Cost-effective watershed management decisions must be based on *scientifically valid* data and *complete* assessments of water quality conditions and contributing causes of impact. Water bodies should be selected based on the importance of the resource, risk from pollution, and input from the Steering Committee and TCEQ. Sites are chosen to be representative of the water body or a portion of the water body.

Deliverables

Deliverables for this task include a summary of all the monitoring activities for each quarter with each Quarterly Progress Report. Quarterly status reports and final reports for special studies are included in this task. The status reports must provide information on the activities related to each special study and will be submitted with each Quarterly Progress Report. Special study final reports and Binary Large Object Files (BLOBS) for biological monitoring will be submitted as designated in the work plan (see outline in Exhibits 3A and 4D). The electronic data generated from monitoring will be submitted in the Events/Results format as part of the deliverables for Task 4. Coordinated monitoring efforts will include facilitating a meeting with the other monitoring entities in the basin and communicating statewide coordinated monitoring schedule updates to the TCEQ CRP Project Manager.

Types of Monitoring

Monitoring activities can be grouped into four categories. Basin monitoring programs may employ any or all of these types of monitoring to achieve the stated monitoring objectives. These activities

characterize the status of water quality conditions and provide specific data in support of permit and regulatory decisions. The four categories, described below, are:

- routine monitoring
- systematic watershed monitoring
- permit support monitoring
- special studies in priority watersheds

Routine Monitoring

Routine monitoring is the traditional type of monitoring designed to delineate overall water quality throughout a river basin, and is not intentionally targeted toward any environmental condition or event. A routine monitoring network can provide information about water bodies with high public interest, reference conditions at ecoregion sites, and areas with persistent water quality problems. The monitoring design will be dependent on the actual use of the water body and potential sources of contamination. At a minimum, annual monitoring will include quarterly field measurements, flow measurements (where applicable), indicator bacteria analysis, and conventional chemical parameter analysis. Common objectives of routine water quality monitoring include:

- collection of surface water data needed for conducting water quality assessments in accordance with TCEQ's *Guidance for Assessing and Reporting Surface Water Quality in Texas*
- identifying trends in water quality
- monitoring progress in protecting or restoring water quality

Non-routine monitoring is designed to target specific environmental conditions (e.g., runoff flow, index period, spills). If the objective of the monitoring can only be met under these conditions, then the monitoring should not be considered routine. These data quality objectives should be outlined and discussed in the QAPP so the eventual data use can be determined by the user.

Systematic Watershed Monitoring

Systematic watershed monitoring is similar to routine monitoring except sampling is of short duration (1 to 2 years) and is designed to screen waters that are rarely monitored. Systematic monitoring has several common objectives including:

- screening waters that would not normally be included in the routine monitoring program
- monitoring at sites to check the status of water bodies (identify improvements or concerns)
- investigate areas of potential concern

Due to the limited period of time for which these data will be collected, the data will be primarily used to determine whether any locations have values above the TCEQ's water quality criteria or screening levels or, in some cases, values elevated above normal. When values are significantly elevated, the Planning Agency will use this information to determine future monitoring priorities.

This monitoring can follow either a rotational watershed approach or an intensive watershed evaluation. A rotational watershed approach is a plan that divides the river basin into distinct

watersheds or, in some cases, subwatersheds. The watershed areas are then designated for a year or two of monitoring, in succession. Within each watershed, sampling sites are selected that adequately characterize the watershed. An intensive watershed evaluation is similar to the rotational watershed approach except that a specific watershed is selected due to a perceived condition and further information is needed to characterize the water body. Once the information is collected and analyzed, it may indicate the need for a special study which can be designed based on the data collected.

Watershed monitoring will follow the same protocols and standard field and laboratory measurements as routine monitoring, unless otherwise specified in the Quality Assurance Project Plan (QAPP). At a minimum, monitoring will usually include quarterly field measurements, flow measurements (where applicable), indicator bacteria analysis, and conventional chemical parameter analysis. If one of the objectives for the systematic data is to have it assessed by the TCEQ for the Water Quality Integrated Report, monitoring should be conducted considering the specifications outlined in the most current version of the TCEQ *Guidance for Assessing and Reporting Surface Water Quality in Texas*.

Permit Support Monitoring

The TCEQ or the regulated community may identify specific areas where additional information on water quality and quantity is needed for the permitting process. Data objectives will be determined by the project, but common objectives include:

- studies to develop site-specific criteria
- receiving water assessments
- characterization of flow conditions

Permit support monitoring must be planned with the appropriate TCEQ staff through the TCEQ CRP Project Manager to ensure the most beneficial data are collected appropriately. Since these efforts are generally of short, intense duration, the TCEQ has attempted to separate these efforts from routine and systematic monitoring. In order to simplify this process, these sampling efforts should be set apart by developing them as a QAPP appendix (as described in Task 2) that can be independently replaced or amended.

The TCEQ has developed a guidance document for measuring flows to support permit development (location, frequency, and method), titled “Stream Classification and Flow Measurement” (*Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods* (RG-415)). In addition to the standard electronic data submittal to SWQMIS described in Task 4, the flow cross section information must be provided using the *Stream Flow (Discharge) Measurement form* found in *Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods* (RG-415) or in another similar format. Field measurement data may also be collected during each flow survey and submitted electronically in the Event/Result format outlined in Task 4.

Special Studies in Priority Watersheds

Basin Steering Committee priorities and TCEQ needs may be addressed through intensive data collection efforts to better characterize water quality and identify and evaluate water quality issues, such as, loading contributions from nonpoint sources in the watershed and problems identified through data analyses. Typically, special study monitoring involves the development of a plan that is designed to address a specific objective, and is not used to generally screen a water body. Monitoring may be conducted at historical sites that are representative of the affected portion of the water body where previous sampling initially identified an impact or concern. Additional sites may be needed to establish the geographic extent of the issue.

Planning Agencies should review available reports and data before submitting a special study proposal that will outline how they can address the issue(s). Special studies must be planned with the appropriate TCEQ staff through the TCEQ CRP Project Manager, as specified in Task 2, to ensure the most beneficial data are collected appropriately. The TCEQ CRP Project Manager will work with each Planning Agency to plan studies that meet its current resources and capabilities. Status reports describing activities related to special studies will be submitted with each Quarterly Progress Report as either an attachment, or as part of the Quarterly Progress Report. Most special studies will result in a final report that summarizes and concludes the activities (see Exhibit 3A). In order to simplify this process, these sampling efforts should be set apart by developing them as a QAPP appendix (as described in Task 2) that can be independently revised.

Special Studies Mapping

The Planning Agency and TCEQ CRP Project Manager may coordinate a special study to examine and map the types of environmental factors which may influence water quality. These special studies will be specified in the work plan and will require the execution of a QAPP Appendix which details the water quality issues under study in the watershed, and the study design for examining those issues. Spatial data which is acquired from third party resources requires advance consideration of quality needs, documentation that the source meets the expected needs, and how data will be handled to prevent inadvertent data loss or degradation. Spatial data which are collected through the project must document collection procedures, staff qualifications, the quality expectations for field measurements, data handling procedures, and other details to ensure the data are of adequate quality to analyze the variables of interest. The output of these projects may be maps, database tables, or GIS layers, with appropriate corresponding metadata layers, for the special study watershed. In addition, the QAPP appendix may include any data analysis techniques which will be utilized to inform a discussion of the factors in the watershed which correlate with water quality data.

Continuous Monitoring

Basin monitoring programs have traditionally been implemented by visiting a site and taking grab samples to characterize water quality. This type of monitoring gives you a snapshot of the conditions at that point in time, but does not provide information about the variability that may be of interest to some water quality program managers. In situ analyzers characterize water quality in greater detail than is possible with grab samples or short-term deployments of monitoring instruments. This type of

continuous monitoring has generically been referred to as "real-time monitoring" since it is possible to access the data from a remote location as the instrument is collecting them.

Continuous monitoring can potentially be used for a variety of purposes, with objectives including:

- identifying seasonal water quality trends and daily variation
- evaluating the influence of point and non-point sources of pollution, including short-term events
- assessing effectiveness of watershed management and implementation plans
- providing current data to the public

Improved instrumentation and communication systems are making continuous monitoring more feasible. Although the up-front costs in establishing a continuous monitoring strategy are considerably more than the traditional monitoring strategies, the expense may be justified by the monitoring objectives. Opportunities to partner with other agencies, including the TCEQ, has allowed continuous monitoring to be more economically feasible for those wanting to establish these programs.

Parameters Monitored

Field Parameters

Parameters measured in the field are used to detect and describe spatial and temporal changes, determine impacts of point and nonpoint sources, develop water quality standards, and assess compliance with water quality standards. Dissolved oxygen (DO), water temperature, total dissolved solids (often evaluated with specific conductance), and pH are field measurements for which water quality criteria are established for each classified water body. The measurement of flow at stream sites is also crucial in assessing water quality, evaluating the attainable use, and in developing site specific DO criteria. Samples for most parameters collected on perennial streams at flow conditions less than 7Q2 (seven-day, two-year low-flow) cannot be used for assessment purposes; however, low-flow sampling results can contribute to the understanding of water quality changes during critical periods or drought conditions and aid in long-term water resource planning.

Many chemical and biological processes in the aquatic environment are affected by the levels of each of these field parameters. Evaluation of field measurements also provides complimentary information necessary in evaluating chemical and biological data. A list of the water quality monitoring core parameters and parameters of interest for the Surface Water Quality Monitoring (SWQM) and Water Quality Standards are included on the *Surface Water Quality Monitoring Routine Parameters* document on the CRP Quality Assurance documents page.

Like continuous monitoring, measuring the variability of short-term conditions over a 24 or 48-hour period will provide more information than an instantaneous measurement. The objective for diel data is to collect and report surface water quality data that are representative of the diurnal variation in field parameters, such as, pH, temperature, dissolved oxygen, and specific conductance for comparison against the water quality standard. Water bodies identified with aquatic life concerns based on instantaneous DO measurements should be considered for 24-hour DO monitoring.

Conventional Parameters

Water samples collected and sent to a qualified lab for analysis are also an important part of the water quality monitoring program. The analysis of nutrients in water samples is needed to help characterize the ambient levels and to determine whether the water body exhibits a potential for generating excessive plant growth which, in turn, can lead to eutrophication and problems with dissolved oxygen. These data also support TCEQ's efforts to develop numeric nutrient criteria for the state's surface waters. Some key nutrient parameters are: total nitrogen, total Kjeldahl nitrogen, nitrite + nitrate-nitrogen, ammonia-nitrogen, and total phosphorus. In addition, chlorophyll *a* may be analyzed to determine the level of algal phyto-pigments as an indicator of algal biomass in the water column and is very important in the assessment of reservoir health. Chloride, sulfate, and total dissolved solids are analyzed to determine density stratification, document amounts and dispersion of pollutants, and evaluate the mixing of fresh and salt water in estuaries. Refer to the *Surface Water Quality Monitoring Routine Parameters* document on the CRP Quality Assurance documents page for a list of the SWQM program water quality monitoring core parameters and parameters important for the development of water quality standards.

Toxic Substances

Specific toxic substances, pollutants regulated by 30 TAC §307.6, Texas Surface Water Quality Standards (WQS), should be monitored in water, sediment, and fish tissue at selected sites where water monitoring workgroups have deemed that impact to water quality is likely. Information on how to participate in the Texas Surface Water Quality Standards workgroups can be found on the WQS Surface Water Quality Standards Advisory Work Group website. After an impact has been identified, monitoring efforts should move upstream to focus on identifying sources of concern for each subwatershed (point and nonpoint sources). A list of the SWQM program water quality monitoring core parameters can be found in the *Surface Water Quality Monitoring Routine Parameters* document.

Metals and Organics in Water: Monitoring metals and organics in water should initially focus on those subwatersheds where concentrations of permitted and nonpoint source pollutants might be anticipated. A complete scan of permitted pollutants may be cost-prohibitive, and is not generally recommended. The analysis of individual pollutants should be determined based on comprehensive watershed inventories, identification of water quality problems and their sources, and on past data analyses.

Metals and Organics in Sediment: Monitoring total metals in sediment should initially focus on those subwatersheds where the pollutants might be anticipated. In addition, conventional parameters in sediment can also be analyzed to provide valuable information. The results of sediment analyses are used to evaluate the condition of the benthic macroinvertebrate habitat, to determine point and nonpoint source impacts, and to monitor rates of recovery following establishment of pollution controls or improved wastewater treatment.

Fish Tissue: Fish tissue sampling to assess human health risk should only be conducted if tissue contamination is probable. Sampling should be designed and conducted cooperatively with the

Department of State Health Services (DSHS) since these surveys require substantial resources. For example, fish tissue should be collected where instream concentrations of a toxic compound, known to bioaccumulate, have been found at levels above the human health criteria. Fish tissue samples for purposes other than to assess human health risks are outlined in the TCEQ *Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods* (RG-415). Surveys to assess risk to aquatic predators can also be done cooperatively with the Texas Parks and Wildlife Department (TPWD).

Bacterial Measurements

Two forms of bacteria are analyzed in water samples to determine support of the contact recreation use: *Escherichia coli* (*E. coli*) in freshwater, and *Enterococci* in tidal water and designated high saline inland waters. The TCEQ can assist the Planning Agency in determining which indicator bacteria need to be analyzed. View the list of the SWQM program water quality monitoring core parameters on the CRP website.

Biological/Habitat Assessments

The health of aquatic systems can also be assessed by evaluating the biological community present. Along with physical habitat information, fish and benthic macroinvertebrates are collected and identified in a manner that permits an assessment of the composition and integrity of the aquatic community. Biological communities are useful in assessing water quality for a variety of reasons, including their sensitivities to low-level disturbances and their function as continuous monitors. Common objectives for biological monitoring include:

- collecting data useful for assessing, verifying, and determining appropriate aquatic life uses
- inventorying fish and benthic macroinvertebrate communities
- collecting data to be used for community structure trend analysis
- correlating measures of chemical water quality to biological information, where possible
- assessing the effects of episodic spills and dumping of pollutants, wastewater treatment plant malfunctions, toxic nonpoint source pollution, or other impacts that periodic chemical sampling is unlikely to detect
- assessing the effects of perturbations of the physical habitat such as sedimentation from stormwater runoff, dredging, or channelization
- monitoring rates of recovery following implementation of improved wastewater treatment
- providing early warning of potential impacts

Methods outlined in the TCEQ *Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data* (RG-416) are recommended for fish, benthic macroinvertebrate, and habitat sampling in freshwater, wadeable streams. Methodologies for assessing tidal streams, reservoirs, and estuaries have not been developed. One monitoring approach for evaluating the biological community involves the determination of a “reference” condition that is representative of the watershed in a healthy, non-impacted condition from which to

compare other sites within the watershed. Locations where conditions differ significantly from reference conditions may be impacted by pollution, and should be the focus of further investigation and/or possible remedial action. The selection of a reference site should be done in consultation with TCEQ staff. When possible, the evaluation of habitat, fish, and/or benthic macroinvertebrate integrity should be used in conjunction with physical and chemical data to provide an integrated assessment of support of the aquatic life use for water bodies identified in the Texas Surface Water Quality Standards (TSWQS) (§307.4(h) and Appendices A and D).

All biological and habitat data reported to the TCEQ under the approved QAPP should also be summarized and submitted electronically as outlined in Task 4 of the CRP Guidance. Some biological and habitat monitoring (i.e. Receiving Water Assessment) may require submittal of a report, requirements of which are summarized in Exhibit 4D. The number of events necessary to meet the objectives for the different types of biological monitoring (e.g., Aquatic Life Monitoring, Use Attainability Analysis, Receiving Water Assessment) should be coordinated with the appropriate TCEQ staff.

Ambient Toxicity

Ambient toxicity is another effective means of determining whether any substances in the water are having an effect on the reproduction and survivability of fish and benthic macroinvertebrates that typically inhabit those waters. Sites should be selected based on the following criteria:

- known or suspected toxicity, suggested by supporting information
- integration of toxicity sampling with other biological or chemical testing at a contaminated site
- importance of the water body uses that may be impaired

Basin Monitoring Planning, Coordination and Development

Developing a comprehensive basin monitoring program that supports the various basin and statewide objectives requires intensive planning and coordination. The monitoring programs necessitate annual review and evaluation to address new cooperative efforts and emerging priorities and to ensure that monitoring programs remain effective and viable.

The intent, purpose, and protocols for each type of monitoring described in this task serve to support the decision about which type of monitoring to use and where to use it. A major objective of monitoring under the Clean Rivers Program is to provide data to support the assessment of surface water quality, water quality standards, and wastewater permits; therefore, monitoring decisions should be made considering the minimum requirements needed to support these objectives. These objectives are outlined in the most recent version of the TCEQ *Guidance for Assessing and Reporting Surface Water Quality in Texas*.

Coordinated Monitoring Process

Each spring, monitoring organizations meet to develop a coordinated monitoring schedule to be implemented in the coming fiscal year. The goal of this activity is to provide a process by which the Planning Agencies will coordinate their monitoring activities with the TCEQ and other basin monitoring organizations collecting data under a TCEQ or federally approved QAPP. By participating in this activity, Planning Agencies will be in compliance with the contract provision requiring that monitoring programs be planned in consultation with the TCEQ, as it relates to routine monitoring. Participation also ensures that monitoring resources for the basin will be more efficiently used.

Coordinated Monitoring Meeting Participation

Those organizations that have been identified as willing to comply with TCEQ requirements for collecting quality-assured water quality data should be invited to participate in the coordinated monitoring meeting. Where possible, invite other local monitoring entities (e.g., Texas Parks and Wildlife, USGS, Texas State Soil and Water Conservation Board) to participate. Depending on the type of monitoring (e.g., routine, seasonal, stormwater), the information entered into the schedule will need to follow the monitoring type code definitions to ensure the data quality objectives are conveyed to the eventual data user. The monitoring type codes can be found in Chapter 4 of the TCEQ *Data Management Reference Guide* (DMRG).

Coordinated Monitoring Meeting Preparation

In preparation for the meeting, the Planning Agency should seek input from the Basin Steering Committee or technical subcommittee regarding stakeholder monitoring issues or concerns to be addressed. Critical dates for monitoring meetings and associated deliverables are in the CRP work plan shell. The last possible date for the coordinated monitoring meeting should be indicated in the final work plan. Before finalizing the date of the meeting, the Planning Agency should get agreement on the date from all invitees.

Prior to the meeting, the current fiscal year's schedule will be used to populate the upcoming planning fiscal year's database on the statewide coordinated monitoring schedule. The TCEQ will post reference materials that will provide guidance on monitoring priorities and preparing for the monitoring meeting. To ensure an effective meeting and the participation of all appropriate parties, the following steps should be taken prior to the meeting:

- Prior to attending a coordinated monitoring meeting, use the current TCEQ reference materials and monitoring objectives for the basin when developing a draft schedule for the upcoming state fiscal year.
- Sites should be selected to meet the objective of the monitoring. If the objective is the assessment of overall water quality, then the site should be representative of that water body. Please see Chapter 2 of the TCEQ *Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods* (RG-415), for information on selecting a representative site.
- List the frequency of sampling for each parameter set. Provide a list of what will be included in each parameter set monitored.

- Print copies of the draft basin schedule, which is sorted by segment, waterbody identification, and then station number, from the statewide schedule on the web to ensure the most current edits are incorporated. Generate enough copies for everyone to use as a worksheet at the meeting.
- If the internet is unavailable for your meeting, create maps of a suitable scale that clearly identify each sampling site on the proposed coordinated monitoring schedule. Be sure to include and label major roads, cities, county lines, water bodies, outfalls, and agricultural areas.

Conducting the Coordinated Monitoring Meeting

Coordinated monitoring meetings are working meetings in which monitoring will be discussed segment by segment, and station by station. Information from participants and stakeholders will be used to select stations and parameters that will enhance overall water quality monitoring coverage, eliminate duplication of effort, and address basin priorities. It is important to begin documenting information about why sites are being monitored (e.g., site was added for BMP effectiveness monitoring; site is a long term trend site; site is a TCEQ least disturbed reference stream). This documentation can be added to the coordinated monitoring schedule "Comments" field or in a separate summary document about the stations in each basin. The TCEQ stations database has a comment field where this information may be captured when a station is created (SLOC process in SWQMIS), or a SLOC change request can be submitted to add this information.

Coordinated Monitoring Meeting Follow-Up

As a follow-up to each coordinated monitoring meeting, a "Summary of Changes" will be produced that reflects the meeting's discussions and outcomes. The summary should reflect what decisions were made: why a site was dropped or added, why the frequency was altered, why a parameter was dropped or added, why a monitoring need was unable to be addressed, and what are the future monitoring recommendations. This information will also be used in the QAPP Appendix B to help explain the sample design rationale, as well as, the justification of changes during the schedule updates. An example "Summary of Changes" can be found in Exhibit 3B.

Many factors may influence monitoring decisions after a coordinated monitoring meeting has been attended (e.g., stakeholder or TCEQ issues need to be addressed, monitoring resources needed in another basin). Participants in the coordinated monitoring schedule process should continue to communicate schedule changes until the schedule is finalized, as well as, throughout the year.

Maintaining the Monitoring Schedule

The statewide coordinated monitoring schedule will be maintained on the statewide coordinated monitoring schedule. A link to this web site should be readily accessible from the Planning Agency's CRP web page. All coordinated monitoring schedules need to be "finalized" by May 31. The deliverable will be the submittal of the Summary of Changes. Changes to the monitoring schedule should also be provided to the Steering Committee. Updates that occur during the year should be described in the Quarterly Progress Report.

Since CRP Partners, TCEQ Regional Offices, and TCEQ program areas have password access to update the statewide schedule at any time, all parties identified in the schedule should coordinate and

communicate monitoring changes with each other on an on-going basis. Changes to the QAPP may impact the statewide schedule. After a QAPP amendment or appendix has been approved, the information should be reflected on the statewide schedule, and email notification sent to the TCEQ CRP Project Manager and other affected parties (e.g., TCEQ Regional Offices). Updates should also be provided in the Quarterly Progress Report. Only the portion of the coordinated monitoring schedule which has been changed should be reported to the TCEQ CRP Project Manager in the Quarterly Progress Report.

EXHIBIT 3A

SPECIAL STUDY REPORT OUTLINE

EXHIBIT 3A
Special Study Report Outline

TITLE: Represents the report's content.

(Note: Titles should be clear, specific, and informative.)

TABLE OF CONTENTS: Provide an easy to follow guide of what the report has to offer. Add what is necessary so your audience can understand what is included in the report: list of abbreviations, list of tables, list of figures.

EXECUTIVE SUMMARY: Informative digest of the significant content and conclusions of the report. It is meant to be intelligible by itself, summarizing the purpose, findings, conclusions and recommendations.

(Note: This is the minimum that should be included on the web site when a report is too large, or includes graphs and figures that cannot be posted.)

INTRODUCTION: States the objective(s) of the report.

(Note: When the QAPP amendment was designed, the data quality objective(s) and the study design have already addressed this.)

PROJECT SIGNIFICANCE AND BACKGROUND: Why did you decide to do this project?

METHODS AND MATERIALS: Include enough detail that would allow someone to evaluate what was done or even duplicate if necessary (e.g., discuss experimental design).

RESULTS AND OBSERVATIONS: Presents the results that logically support (or provides data against) the objective stated in the introduction. Conclusions drawn from numerical data should be supported by brief explanations of the statistical criteria applied.

DISCUSSION: Interpret the data presented in the "Results and Observations" section, especially regarding the objective given in the introduction. Include discussion of previous findings that support and do not support your findings.

SUMMARY: State the conclusions that can be drawn from your data considering all the factors you presented in your "Discussion" section. State the logical implications of your findings for future application and study. What did you learn and what are the implications? What are the recommendations based on your findings? Was the objective accepted or rejected?

REFERENCES: Give credit where credit is due. If you reference or paraphrase other work, give the reference of the source document. If you researched lots of documents, but did not specifically reference them in your report, you may consider a BIBLIOGRAPHY since this will allow others more information if they are interested.

APPENDICES: Include as necessary to clarify or supplement the text. This could include the raw data or a survey used to gather data.

References:

CBE Style Manual Committee. CBE style manual: a guide for authors, editors, and publishers in the biological sciences.
5th ed. rev. and expanded. Chicago, IL: Council of Biology Editors, Inc.; 1983.
Brusaw, C.T., G.J. Alred, and W.E. Oliu. Handbook of technical writing. 5th ed. New York, NY: St. Martin's Press. 1997.

EXHIBIT 3B

COORDINATED MONITORING MEETING

SUMMARY OF CHANGES

EXHIBIT 3B
Coordinated Monitoring Meeting: April 9, 2011
Summary of Changes

The following changes, additions, or deletions have been made to the FY2012 Coordinated Monitoring Schedule to address monitoring issues identified by the involved monitoring entities or steering committee members.

1. The Wet River at the Industrial site will be discontinued at the present location and a new site that is downstream and out of the mixing zone of the Industrial discharges will be found for 2012.
2. A new site on Peachy Creek will be added bimonthly in 2012 (Station ID 17935, Peachy Creek at FM 397.) Data at this site was collected during the Peachy Creek TMDL. The site will be monitored in 2012 and beyond to identify any changes in the water quality that may be a result of the implementation of BMPs in the watershed.
3. Weekly monitoring of E. coli will no longer be funded by CRP. The TCEQ has sufficient data for assessment purposes and does not need the bacterial data at this frequency any longer. RA will evaluate their ability to continue monitoring at these sites for their own use and use by their constituents.
4. Region 13 will add a quarterly monitoring location in City Park on the Wet River (Station ID to be determined).
5. Samples for E. coli will be sampled every Saturday for eight weeks, beginning in mid-May and ending in July 2012, for screening of bacterial concentrations during peak recreational use on the Green and Wet Rivers.
6. Example Creek, Segment 1806Z, is impaired for dissolved oxygen. Biological and 24Hour information needs to be collected at this site. Neither RA nor the Regional office could pick up this monitoring with available resources.
7. Organics in sediment, specifically those organics associated with urban environments (TPH and BTEX) have been identified by the Steering Committee as a concern and will be added as a special study later.