

Appendix F

Proposal for Third Permit Term

The North Central Texas Regional Wet Weather Characterization Plan Proposal for the Third Permit Term

I. History of the Regional Program

Since 1996, a regional storm water monitoring program has been on-going in the Dallas-Fort Worth (DFW) metropolitan area among the seven largest cities and major transportation agencies for compliance with Federal and State storm water permit requirements. During the initial permit term (1996 -2001), seven municipalities (Dallas, Fort Worth, Arlington, Irving, Garland, Plano and Mesquite) and two local districts of the Texas Department of Transportation (TxDOT) received joint approval from U.S. Environmental Protection Agency (EPA) for a regional monitoring program which utilized the assistance of a shared consultant team and the United States Geological Survey (USGS) to sample and analyze 22 outfalls primarily from small watersheds of a predominantly single land use type. Although these sample collections served to characterize typical urban runoff from these limited land use types, and were useful for estimating general pollutant loadings, they did little to evaluate impacts on actual receiving streams. In the next permit term, now administered by the Texas Commission on Environmental Quality (TCEQ), approval was obtained to utilize in-stream stations for the regional monitoring program to better assess this impact. The revised program was termed the Regional Wet Weather Characterization Program (RWWCP) and was added as an option in Part IV.A.3 of the Texas Pollutant Discharge Elimination System (TPDES) Municipal Separate Storm Sewer System (MS4) permits issued to the Phase I North Central Texas governmental entities. The primary goal of this new in-stream monitoring program was to obtain baseline data on receiving streams in the DFW Metroplex for use in determining long-term water quality trends. Since the RWWCP language existed outside of each permit, it allowed greater flexibility for making changes to the program. During this second permit term, the North Texas Tollway Authority (NTTA) joined the regional program. All other participants remained the same, except for the TxDOT-Fort Worth District who became a co-permittee with the cities of Fort Worth and Arlington and were no longer required to conduct wet weather monitoring. According to the original RWWCP protocol, municipal participants collected data from three sampling sites in the watershed (typically upstream, midstream and downstream) and the transportation agencies collected data from two sites (upstream and downstream stations only). Samples were collected quarterly from each site during a qualifying rain event and were analyzed for 18 parameters.

As an added component, the City of Fort Worth selected the Representative Rapid Bioassessment Monitoring Option (Part IV.A.2) in their permit, which allowed the chemical sampling frequency to be reduced from four times per year per site to once per year per site. In its place, two bioassessments were conducted each year at a minimum of nine sites. These bioassessments were based on protocols developed by the EPA. A summarization of this bioassessment data was included along with the chemical data in the annual regional monitoring report each year of the permit term.

II. Lessons Learned from the Most Recent Permit Term

At the end of the second permit term's sampling effort, a final summary monitoring report was prepared by the regional consultant, PBS&J, to assess the three-year sampling effort. The report found that in general, firm conclusions regarding the factors determining in-stream water quality could not be made due to the limited number of samples collected. Nevertheless, the report observed that all of the watersheds sampled had relatively consistent concentrations when compared to each other and that there was a general tendency of decreasing concentrations of parameters analyzed going from upstream to downstream. Constituent concentrations were found to be typically higher in warmer months as expected, but the length of antecedent dry period had surprisingly little influence on the in-stream water quality. Depending on parameter, the data was either higher or lower than national averages of storm water outfall data; however, it was generally higher overall relative to local ambient, dry weather data. This last finding is somewhat to be expected since storm events wash down the urban landscape and carry a higher load of pollutants than ambient conditions. As a result of these findings and a retrospective evaluation of the regional sampling program, PBS&J made the following recommendations for modifying the RWWCP in the next term:

- Increase the number of sampling events per site - PBS&J suggested that either the frequency of monitoring during the year be increased or the same watershed be monitored for at least two years.
- Refine sampling site selection process – This suggestion includes locating sites within impaired watersheds, focusing on impairment-causing pollutants, locating sites that foster long-term deployment, allowing for flow monitoring and minimizing vandalism.
- Conduct more RBAs in other jurisdictions – Encourage more participating entities to include Rapid Bioassessments in the next permit term to gain a more thorough understanding of water quality impacts to urban receiving streams.
- Revise monitored pollutants – The residential use of Diazinon was banned several years ago and has not been detected in any samples taken during this permit term. Therefore, PBS&J has recommended that Diazinon be replaced with Carbaryl, a commonly-used pesticide, for the next permit term. They also suggested that Cadmium be dropped from the parameter list since it was detected at very low levels and in less than 25 percent of the samples collected.
- These recommendations were incorporated in this proposal for the next permit term.

III. Characterization of the Proposed Program

Proposed Plan for Third Permit Term

The primary goal of the monitoring program was to obtain baseline data on receiving streams in the DFW Metroplex for use in determining long-term water quality trends. This was generally achieved in the past permit term but final analysis indicated that more data is needed to establish actual trends. The Regional Storm Water Monitoring Partners of North Central Texas seek to continue documenting water quality improvements resulting from BMP effectiveness as they have over the past several years encompassing two permit terms. The regional partners would like to continue with the RWWCP because it has allowed for: 1) more coordinated and comprehensive water quality sampling; 2) more sound and reliable data collection; 3) greater cost effectiveness; and 4) a truer assessment of regional impact on stream water quality.

For this upcoming permit term, the Cities of Arlington, Dallas, Fort Worth, Garland, Irving, Mesquite and Plano, together with the North Texas Tollway Authority and TxDOT-Dallas District have agreed to continue their regional partnership to work cooperatively through the North

Central Texas Council of Governments to develop a revised RWWCP. Permit numbers and relevant dates for each participant are included in Table 1.

TABLE 1: LIST OF PERMITTEES			
PERMITTEE	TPDES PERMIT NUMBER	DATE ISSUED	EXPIRATION DATE
City of Arlington	WQ0004635000	5/26/2006	5/26/2011
City of Dallas	WQ0004396000	7/27/2007	2/22/2011
City of Fort Worth	WQ0004350000	2/22/2006	2/22/2011
City of Garland	WQ0004682000	12/22/2005	12/22/2010
City of Irving	WQ0004691000	5/26/2006	5/26/2011
City of Mesquite	WQ0004641000	5/26/2006	5/26/2011
City of Plano	WQ0004775000	7/20/2007	7/20/2012
North Texas Tollway Authority	WQ0004400000	2/22/2006	2/22/2011
Texas Department of Transportation-Dallas	WQ0004521000	6/30/2006	6/30/2011

The municipal regional partners have created a new sampling plan that will effectively monitor at least 50% of their jurisdictional area by the end of the permit term. This extent of jurisdictional coverage will allow a reasonable assessment of jurisdictional watersheds while striving to achieve a balance among the various goals of obtaining valid scientific information, meeting permit compliance, and addressing what is practicable for each entity. As in the previous term, this plan proposes to continue in-stream watershed monitoring, but seeks to obtain greater statistical robustness of the data by increasing the sampling period at each location to a minimum of two years. The primary goal of the RWWCP during this permit term will be to continue the assessment of urban impact on receiving stream water quality and to document any improvement presumably resulting from local BMP implementation. The data collected during this permit term will build upon the set of regional data needed from each site for meaningful trend analysis.

This proposal also includes a more comprehensive biomonitoring component. Since assessing the impact of urban runoff on receiving stream quality is a primary focus of this program, assessing the biological integrity of the streams is fundamental. With this proposed plan, 24 watersheds will be chemically monitored and 12 watersheds will be bioassessed across the region, with substantial overlap between the two sampling approaches.

A map with each entity's selected watersheds is shown in Figure 1. Specific locations of sampling sites in each watershed will be determined prior to each sampling year and will be submitted in each prior year's annual regional monitoring report. Refer to Table 2a&b for identification of the watersheds selected by each entity and their relative proportion to jurisdictional area. The relative percent and the area of the selected watersheds are indicated with bold type. Unbolded watersheds indicate unselected, shared watersheds that were selected by other entities. Most of the municipal entities were able to achieve the 50% coverage with only two watersheds; however, due to the size of their jurisdictional area, the City of Dallas selected eight watersheds and the City of Fort Worth selected six to monitor. Jurisdictional coverage was not considered in the selection of the two transportation agency watersheds.

The North Central Texas Council of Governments (NCTCOG) role in the regional monitoring program is to coordinate the overall program, obtain consultant assistance on behalf of the

regional partners, assist participants in site selection and the development of the sampling protocol(s); collect and summarize the data; and generate/deliver annual compliance reports.

Sampling Metrics

Monitoring is proposed to commence January 1 of the year following the issuance of the City of Garland's permit, anticipated in mid-2011. Given the existing staggered permit expiration dates among the participants, it is likely that permit renewals issued by TCEQ will also be staggered. Consequently, the regional program will need to have written endorsement from TCEQ that participants will receive credit for any monitoring they contribute as part of the regional effort that would be applied toward their eventual permit. However, by incorporating a lag period to maintain a calendar year-based schedule, most of the participating permittees will likely have their renewals issued by then (i.e. January 1, 2011), making for a smoother transition.

Table 3 provides a detailed breakdown of the number and frequency of each partner's proposed sampling activity(ies). Most entities are chemically sampling one watershed in their jurisdiction for two consecutive years and then moving to a second watershed for another two years. There are a few exceptions to this standard pattern:

- The City of Dallas will need to sample at least six watersheds in order to achieve the 50% coverage; this will be accomplished by chemically sampling four watersheds and performing bioassessment in four additional watersheds as a part of the regional program.
- To achieve the 50% area coverage, the City of Fort Worth needs to sample six watersheds. They intend to bioassess all six watersheds at two locations twice a year for all five years of the permit term. For chemical sampling, they intend to collect in-stream samples at two sites within two watersheds each year. By the end of the third year, they will have monitored each of their six selected watersheds once. They propose to then select the top four most biologically-impaired watersheds to continue with a second sample in the remaining two years of the permit term. Table 3 reflects this sampling pattern of four watersheds being sampled twice and two watersheds being sampled once for a total of 20 chemical samples in the permit term.
- The City of Mesquite has a unique situation where there are only two watersheds in their jurisdiction and the two creeks of those watersheds are almost wholly contained within the city limits. They would prefer to establish permanent in-stream monitoring stations in each of the two creeks and to sample them concurrently all four years. Due to the relatively small size of the watersheds, they feel they can adequately assess the urban runoff impact by strategically locating a single sampling station in each watershed.

Chemical Sampling Details

Each participating entity will be responsible for final selection of sampling sites. Samples will be collected from these sites according to the schedule identified previously and analyzed for the parameters listed in the table below. Following consultant recommendations (see Section II Lessons Learned...), Diazinon has been replaced with Carbaryl, and Cadmium has been dropped from the parameter list.

Entities may use in-house staff or a consultant of their choice for sample collection. Although we encourage the use of a common laboratory for analysis to ensure consistency, entities may also

select the TCEQ-approved laboratory of their choice, as long as procedures are followed and data quality objectives are met as specified in the approved regional monitoring protocol (to be finalized prior to the first sampling year).

Table 4: List of Parameters	
Parameter	Method of Collection
Oil & Grease	Grab
pH	Grab
<i>E. coli</i>	Grab
Total Coliforms	Grab
Total Dissolved Solids (TDS)	Composite
Total Suspended Solids (TSS)	Composite
Biochemical Oxygen Demand (BOD ₅)	Composite
Chemical Oxygen Demand (COD)	Composite
Total Nitrogen	Composite
Dissolved Phosphorus	Composite
Total Phosphorus	Composite
Carbaryl	Composite
Total Arsenic	Composite
Total Chromium	Composite
Total Copper	Composite
Total Lead	Composite
Total Zinc	Composite

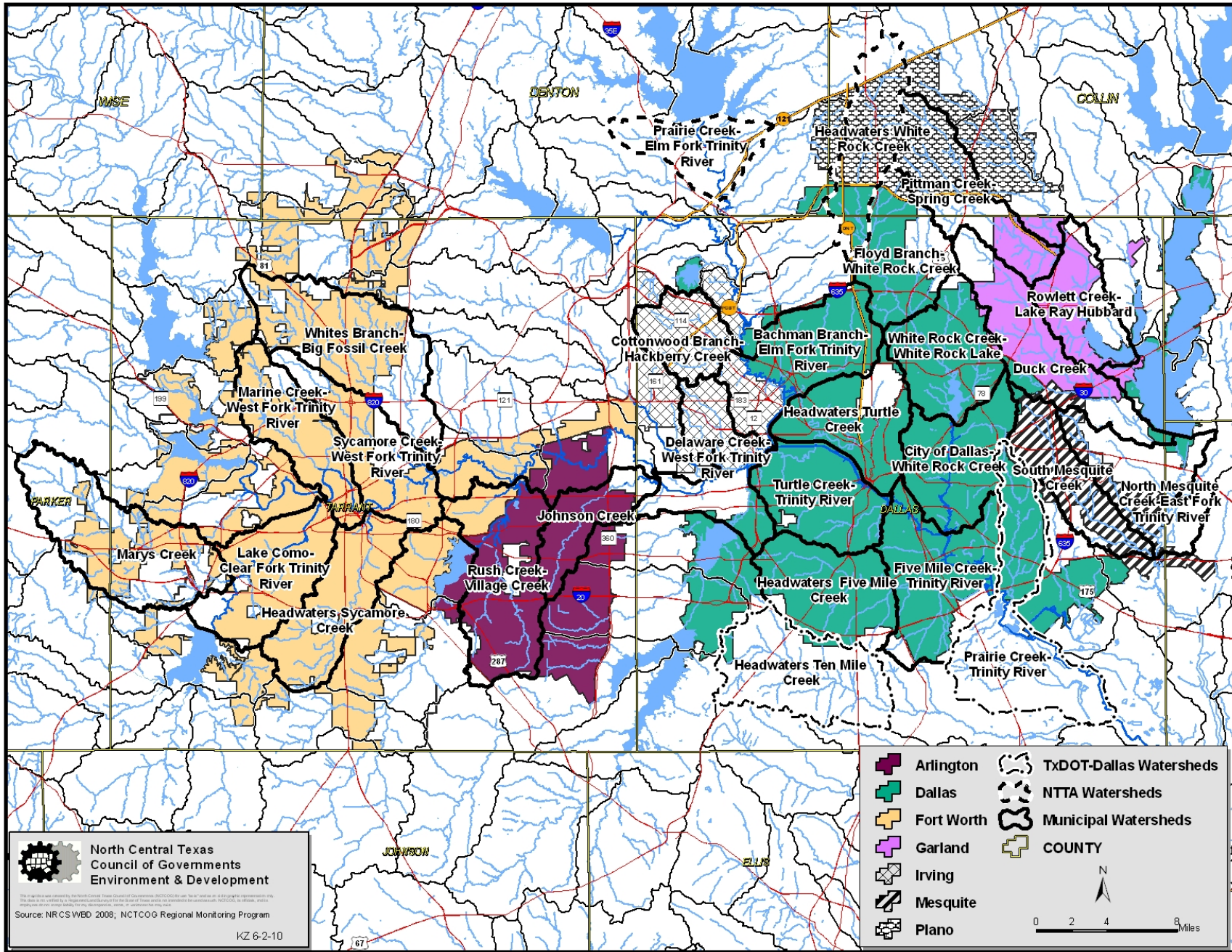


Figure 1: Regional Monitoring Entities & Selected HUC-12 Subwatersheds for Third Term Monitoring

Table 2a: RWWCP Watersheds Selected for Third Permit Term Monitoring

Area of City Sq mi. →		Arlington 98.57		Dallas 385.92		Fort Worth 344.67		Garland 57.16		Irving 67.88		Mesquite 46.36		Plano 72.25	
HUC-12 Watersheds	*	% of City	HUC12 Sq. Mi.	% of City	HUC12 Sq. Mi.	% of City	HUC12 Sq. Mi.	% of City	HUC12 Sq. Mi.	% of City	HUC12 Sq. Mi.	% of City	HUC12 Sq. Mi.	% of City	HUC12 Sq. Mi.
Johnson Creek	C	17.61%	17.36												
Rush Creek-Village Creek	C	35.51%	35.01												
Bachman Branch-Elm Fork Trinity River	B			7.98%	30.79					16.16%	10.97				
City of Dallas-White Rock Creek	C			9.00%	34.75							0.27%	0.13		
Five Mile Creek-Trinity River	C			10.79%	41.66										
Floyd Branch-White Rock Creek	B			5.5%	21.3									3.1%	2.2
Headwaters Five Mile Creek	B			9.00%	34.74										
Headwaters Turtle Creek	C			7.4%	28.4										
Turtle Creek-Trinity River	C			8.94%	34.5										
White Rock Creek-White Rock Lake	B			8.73%	33.7			1.46%	0.83						
Headwaters Sycamore Creek	BC					10.22%	35.22								
Lake Como-Clear Fork Trinity River	BC					9.79%	33.74								
Marine Creek-West Fork Trinity River	BC					8.58%	29.56								
Mary's Creek	BC					6.29%	21.69								
Sycamore Creek-West Fork Trinity River	BC					6.77%	23.32								
Whites Branch-Big Fossil Creek	BC					9.73%	33.52								
Duck Creek	BC			0.92%	3.56			42.19%	24.11			5.75%	2.67		
Rowlett Creek-Lake Ray Hubbard	BC			0.63%	2.42			29.92%	17.1						
Cottonwood Branch-Hackberry Creek	C			0.04%	0.15					29.90%	20.29				
Delaware Creek-West Fork Trinity River	C			1.53%	5.91					22.16%	15.04				
North Mesquite Creek-East Fork Trinity River	C			0.39%	1.5							26.82%	12.43		
South Mesquite Creek	C			0.22%	0.85							54.27%	25.16		
Pittman Creek-Spring Creek	BC							16.04%	9.17					25.42%	18.37
Headwaters White Rock Creek	BC			1.66%	6.42									26.2%	18.93
Totals of selected (bolded) watersheds →		53.12%	52.37	67.34%	259.84	53.76%	185.24	72.11%	41.21	52.06%	35.33	81.09%	37.59	51.62%	37.3

* (C) – Chemical (B) – Bioassessment (BC) – Both Bioassessment & Chemical

"HUC12 Sq. Mi" indicates the area of the watershed within the jurisdictional

**Table 2b: RWWCP Watersheds Selected for Third Permit Term Monitoring
Transportation Agencies**

Area of City Sq mi. →	*	Arlington 98.57		Dallas 385.92		Fort Worth 344.67		Garland 57.16		Irving 67.88		Mesquite 46.36		Plano 72.25	
		% of City	HUC12 Sq. Mi.	% of City	HUC12 Sq. Mi.	% of City	HUC12 Sq. Mi.	% of City	HUC12 Sq. Mi.	% of City	HUC12 Sq. Mi.	% of City	HUC12 Sq. Mi.	% of City	HUC12 Sq. Mi.
HUC-12 Watersheds															
<i>TxDOT- Dallas Selected Watersheds</i>															
Headwaters Ten Mile Creek	C			0.7%	2.5										
Prairie Creek-Trinity River	C			4.7%	18.0							1.6%	0.7		
<i>NTTA Selected Watersheds</i>															
Headwaters White Rock Creek	C			1.66%	6.42									26.2%	18.93
Prairie Creek-Elm Fork Trinity River	C														
Totals of all watersheds (in this table only) →				7.06%	26.92							1.6%	0.7	26.2%	18.93

Table 3: Sampling Metrics

Entity	Chemical Sampling									Bioassessment Sampling				
	Annual				Permit Term					Annual			Permit Term	
	Sampling Sites per Watershed	Number of Watersheds Sampled	Frequency of Sampling	Total Annual Samples	Number of Years Sampling	Total Samples For Permit Term	Number of Watersheds Sampled	Number of Samples Taken in Each Watershed	Number of Samples Per Site	Sites Per Watershed Per Year	Frequency of Sampling	Watersheds Per Year	Number of Years Sampling	Total Samples
A	B	C	D (A×B×C)	E	F (D×E)	G	H (F÷G)	I (H÷A)	J	K	L	M	N (J×K×L×M)	
Arlington	3	1	4	12	4	48	2	24	8	-	-	-	-	-
Dallas	3	2	4	24	4	96	4	24	8	1	2	4	4	32
Fort Worth	2	2	1	4	4 and 1	16 + 4	4 and 2	4 + 2	2 and 1	2	2	6	5	120
Garland	3	1	4	12	4	48	2	24	8	1	2	1	4	8
Irving	3	1	4	12	4	48	2	24	8	-	-	-	-	-
Mesquite	1	2	4	8	4	32	2	16	8	-	-	-	-	-
Plano	2	1	4	8	4	32	2	16	8	1	2	1	4	8
NTTA	2	1	4	8	4	32	2	16	8	-	-	-	-	-
TxDOT-Dallas	2	1	4	8	4	32	2	16	8	-	-	-	-	-

Grab samples will be collected during the first flush and analyzed for *E. coli*, total coliforms, oil and grease, and pH. An additional first flush sample and four subsequent samples collected at equal time intervals will be taken over the first two hours of the event and combined for a composite sample. Samples will be collected for no more than two hours, regardless of storm duration. The grab samples can be obtained either manually or from some type of automated collection device to better address safety concerns. Sampling will be conducted only on qualifying events which are defined as satisfying the following requirements: 1) Antecedent dry period of 72 hours minimum; 2) Rainfall volume of 0.10 inch minimum; and a 3) Quantifiable increase in water surface elevation attributable to storm water runoff. Rain gauges will be deployed in each watershed to support assessment of local wet weather conditions.

Bioassessments

The recent National Research Council (NRC) report *Urban Stormwater Management in the United States* recommends including bioassessments for assessing storm water management program progress. It also recommends that storm water management strategies should address all stressors to a stream which can be accomplished through biological monitoring since biota naturally integrate the environmental conditions that impact them. TCEQ has continued the option established by EPA in the MS4 permit language of allowing bioassessments to be used as a replacement for a portion of the chemical monitoring requirement. The RWWCP has always had a bioassessment component as part of its overall approach and the partners would like to continue including it. In fact, this proposal suggests a greater use of bioassessments across the region than ever before.

Both EPA and TCEQ have developed an array of methods and approaches that can be used in conducting bioassessments. Each of these regulatory entities has developed manuals outlining these various steps. As EPA states in their manual, Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish, 2nd Ed. (1999) the protocols described are not "intended to be used as a rigid protocol without regional modifications. Instead, they provide options for agencies or groups that wish to implement rapid biological assessment and monitoring techniques."

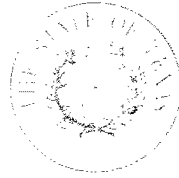
As such, the regional program participants that are implementing bioassessments (Dallas, Fort Worth, Garland and Plano) will be performing bioassessment based upon standardized protocols as set forth in applicable EPA and TCEQ manuals. These protocols will be detailed in each annual report but generally involve habitat assessment, a measurement of standard field physical conditions, and collection and identification of macroinvertebrates and possibly other biota. Watershed parameters will be compared to a baseline standard to determine the habitat's health, through use of a reference site or other methods. The number of watersheds being sampled, stations per watershed and samples per year using bioassessment protocols are all listed in Table 3.

IV. Summary of the RWWCP Proposal for the Third Permit Term

In summary:

- Each participant has selected watersheds to achieve greater than 50% coverage of their jurisdictional area.
- To increase statistical robustness, most watersheds will be sampled for a minimum of two years.
- Most watersheds will be sampled quarterly; Fort Worth is putting a greater effort into the bioassessment sampling instead.
- The number of sites per watershed varies per entity based on local conditions.
- Arlington, Dallas, Garland, Irving, Mesquite, Plano, NTTA and TxDOT-Dallas will collect samples for the first four years of the five-year permit term.
- Fort Worth has elected to perform chemical monitoring for the entire five-year permit term.
- 17 chemical parameters will be analyzed in each storm event sample
- Dallas, Fort Worth, Garland and Plano will also do biological assessments.

Bryan W. Shaw, Ph.D., *Chairman*
Buddy Garcia, *Commissioner*
Carlos Rubinstein, *Commissioner*
Mark R. Vickery, P.G., *Executive Director*

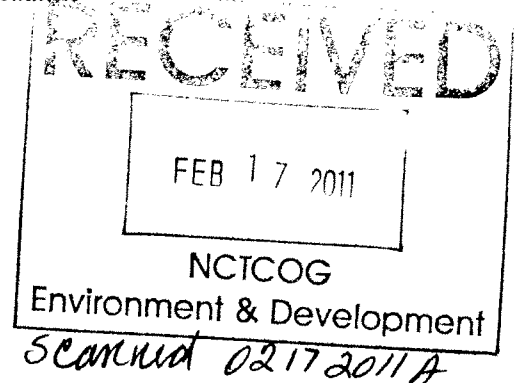


TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

February 11, 2011

Mr. Keith C. Kennedy, Manager
Environmental Programs
North Central Texas Council of Governments
P.O. Box 5888
Arlington, Texas 76005-5888



Re: Revised North Texas Regional Wet Weather Characterization Program

Dear Mr. Kennedy:

Thank you for your letter of January 12, 2011 requesting approval to implement changes to the North Central Texas Regional Wet Weather Characterization Program (RWWCP). The RWWCP includes the cities of Arlington, Dallas, Fort Worth, Garland, Irving, Mesquite and Plano, together with the North Texas Tollway Authority and TxDOT-Dallas District. We have reviewed the submittal and approve the RWWCP with the changes that you proposed.

As you stated in your letter, the primary goal of the RWWCP program has been to obtain baseline data on receiving streams in the DFW Metroplex for use in determining long-term water quality trends. While this was generally achieved in the past permit terms for the regional partners, your analysis indicated that more data is needed to establish actual trends. You stated that the regional partners propose to continue with the RWWCP because it has allowed for more coordinated and comprehensive water quality sampling; more sound and reliable data collection; greater cost effectiveness; and a truer assessment of regional impact on stream water quality. We certainly support this effort as an effective tool to monitor the MS4.

The revised sampling plan will continue in-stream watershed monitoring, will refine the sampling site selection process, and will include some changes to the pollutants monitored (i.e., diazinon is being replaced by carbaryl and cadmium is being removed). The plan will effectively monitor at least half of each regional partner's jurisdictional area by the end of their TPDES MS4 permit term and will increase the sampling period at each location to a minimum of two years. This proposal also includes a more comprehensive biomonitoring component, in that 24 watersheds will be chemically monitored and 12 watersheds will be bioassessed across the region.

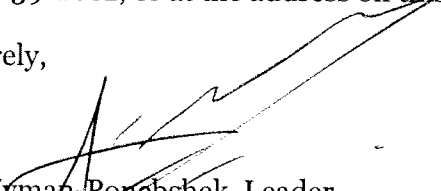
You indicated that monitoring is proposed to commence January 1 of the year following the issuance of the MS4 permit for the City of Garland. This is because the permit is scheduled to be issued before the permits for the other regional partners are issued and will require a start delay. TCEQ recognizes that given the existing staggered permit expiration dates among the participants, it is likely that permit renewal dates will also be staggered. Each permittee will be given credit for that effort in their respective permit renewals.

Mr. Keith C. Kennedy, Manager
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You asked how the regional partners will be required to report data, since the previous permits have required the use of discharge monitoring report (DMR) forms to tabulate outfall data. For each regional partner that continues participating in the RWWCP, DMRs will not be required. Our staff has worked with both TCEQ and EPA enforcement staff to address this issue; and as a result, the requirement to submit DMRs has been removed when the regional sampling option is chosen.

If you have any additional questions, please contact me at your convenience, either by phone at (512) 239-2012, or at the address on this letter.

Sincerely,



Jaya Zyman-Ponebshek, Leader
Storm Water & Pretreatment Team
Wastewater Permitting Section (MC-148)
Texas Commission on Environmental Quality

JZP/CH/gv