Appendix J to the Trinity River Authority Clean Rivers Program FY 2018/2019

0820C Muddy Creek Metals

Prepared by the Trinity River Authority in cooperation with the Texas Commission on Environmental Quality (TCEQ)

Effective: Immediately upon approval by all parties

Questions concerning this QAPP should be directed to:
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SS-A1 Approval Page

Texas Commission on Environmental Quality

Water Quality Planning Division

Electronically Approved 6/21/2018

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Electronically Approved 6/25/2018

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Hong Wu Date
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Electronically Approved 6/21/2018

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Kelly McKnight Date
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Trinity River Authority CRWS Laboratory

Electronically Approved 6/21/2018

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Craig Harvey Date
TRA CRWS Lab Manager and Interim QA Officer

The Trinity River Authority will secure written documentation from each sub-tier project participant (e.g., subcontractors, other units of government) stating the organization's awareness of and commitment to requirements contained in this quality assurance project plan and any amendments or added appendices of this plan. Signatures in section A1 will eliminate the need to adherence letters to be maintained.

SS-A2 Table of Contents

List of Acronyms

As described in Section A2 of the basin-wide QAPP.

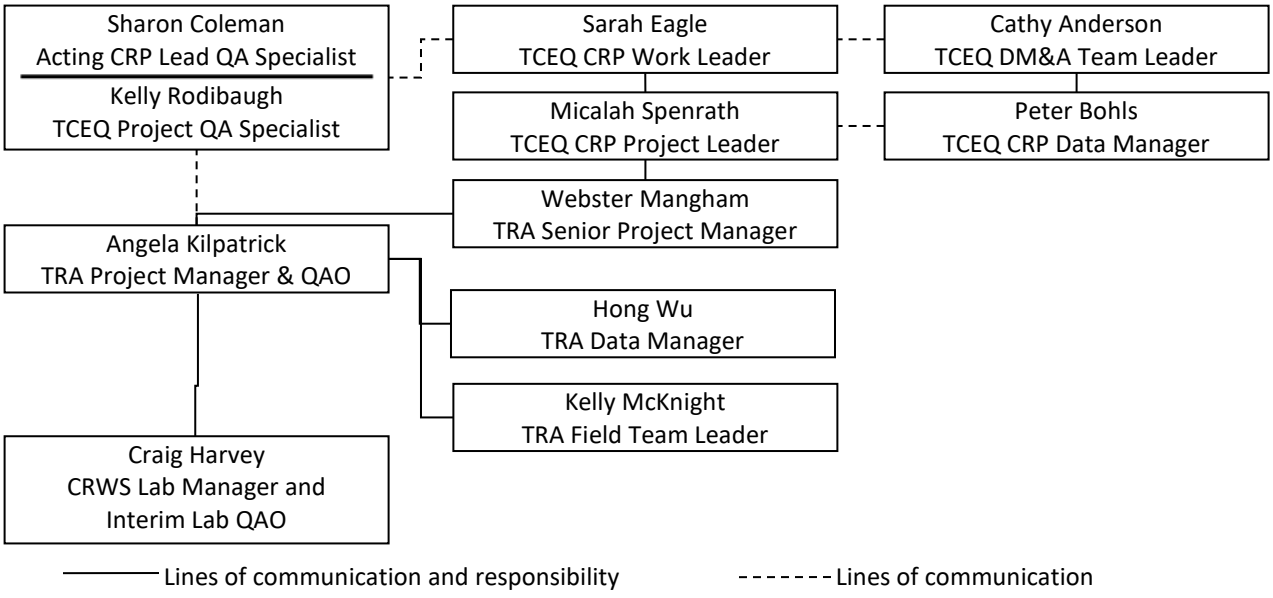
SS-A3 Distribution List

As described in Section A3 of the basin-wide QAPP for TCEQ, Trinity River Authority, and TRA CRWS Laboratory staff.

SS-A4 PROJECT / TASK ORGANIZATION

As described in Section A3 of the basin-wide QAPP for TCEQ, Trinity River Authority, and TRA CRWS Laboratory staff.

Figure SS-A4.1. Organization Chart - Lines of Communication



SS-A5 Problem Definition / Background

Copper levels in segment 0820C, Muddy Creek, have been noted as being elevated. As discussed in the 2015 Basin Summary Report, there does appear to be some correlation between a lack of precipitation and elevated copper concentrations. This indicates that there may be a point source of copper in the watershed. Further review of data collected on Muddy Creek shows that nickel and zinc follow a similar pattern – levels were stable until 2004 after which they became elevated. As of the 2014 TCEQ Integrated Report, copper was not yet impaired in this segment. However, because levels have remained elevated, it has been determined that additional sampling should be undertaken in order to potentially identify a source of these increased metals concentrations.

SS-A6 Project/Task Description

Samples for dissolved copper, nickel, zinc, as well as the standard field parameters will be collected from ten locations in the Muddy Creek watershed. Sampling will be conducted once during dry conditions when flows are normal to low. Dry conditions will be defined as at least three days of flow below 200 cfs at the nearby USGS gage 08061540 (Rowlett Creek near Sachse). Additionally, flows at this station should be on the falling limb of the hydrograph to prevent sampling during rising flows. As discussed in the 2015 Basin Summary Report, it is anticipated that concentrations of these metals will be highest during normal to low flows when rainfall is not causing dilution.

If a source is not immediately identified by the sampling conducted under this appendix, additional sampling may be performed under an amendment to this appendix.

Amendments to the Special Study Appendix

Amendments to the Special Study Appendix may be necessary to address incorrectly documented information or to reflect changes in project organization, tasks, schedules, objectives, and methods. Requests for amendments will be directed from the TRA Project Manager to the CRP Project Manager electronically. The TRA will submit a completed Special Study Appendix Amendment document, including a justification of the amendment, a table of changes, and all pages, sections or attachments affected by the amendment. Amendments are effective immediately upon approval by the TRA Project Manager, the TRA QAO, the CRP Project Manager, the CRP Lead QA Specialist, the CRP Project QA Specialist, the TCEQ QA Manager or designee, and additional parties affected by the amendment. Amendments are not retroactive. No work shall be implemented without an approved special study appendix or amendment prior to the start of work. Any activities under this contract that commence prior to the approval of the governing QA document constitute a deficiency and are subject to corrective action as described in section C1 of the basin-wide QAPP. Any deviation or deficiency from this Appendix which occurs after the execution of this Appendix should be addressed through a Corrective Action Plan (CAP). An Amendment may be a component of a CAP to prevent future recurrence of a deviation. Amendments will be incorporated into the Appendix by way of attachment and distributed to personnel on the distribution list by the TRA Project Manager.

SS-A7 Quality Objectives and Criteria

The intent of monitoring covered under this Appendix is to identify a potential source or sources of copper, nickel, and zinc in Muddy Creek. All data will be collected in accordance with the TCEQ *Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods* (RG-415, Revised August 2012). Sampling results will be submitted to SWQMIS following the guidance in the most current version of the *Surface Water Quality Monitoring Data Management Reference Guide*.

The measurement performance specifications to support the project objectives are specified in Table SS-A7.1.

Ambient Water Reporting Limits (AWRLs)

As described in Section A7 of the basin-wide QAPP.

Precision

As described in Section A7 of the basin-wide QAPP.

Bias

As described in Section A7 of the basin-wide QAPP.

Representativeness

Sites have been selected in order to obtain as much coverage of the Muddy Creek watershed as possible while being located in areas that are easily accessible. If additional monitoring is needed to locate a source, it may be necessary to sample in locations that are not easily accessible. This additional monitoring would require an amendment to this appendix.

Comparability

As described in Section A7 of the basin-wide QAPP.

Completeness

As described in Section A7 of the basin-wide QAPP.

Table SS-A7.1 - Measurement Performance Specifications

Parameter	Units	Matrix	Method	Parameter Code	AWRL	LOQ	LOQ Check Sample %Rec	Precision (RPD of LCS/LCSD)	Bias %Rec. of LCS	Lab
Field Parameters										
TEMPERATURE, WATER (DEGREES CENTIGRADE)	DEG C	water	SM 2550 B and TCEQ SOP V1	00010	NA*	NA	NA	NA	NA	Field
TEMPERATURE, AIR (DEGREES CENTIGRADE)	DEG C	air	SM 2550 B and TCEQ SOP V1	00020	NA*	NA	NA	NA	NA	Field
TRANSPARENCY, SECCHI DISC (METERS)	meters	water	TCEQ SOP V1	00078	NA*	NA	NA	NA	NA	Field
SPECIFIC CONDUCTANCE,FIELD (US/CM @ 25C)	us/cm	water	EPA 120.1 and TCEQ SOP, V1	00094	NA*	NA	NA	NA	NA	Field
OXYGEN, DISSOLVED (MG/L)	mg/L	water	SM 4500-O G and TCEQ SOP V1	00300	NA*	NA	NA	NA	NA	Field
PH (STANDARD UNITS)	s.u	water	EPA 150.1 and TCEQ SOP V1	00400	NA*	NA	NA	NA	NA	Field
DAYS SINCE PRECIPITATION EVENT (DAYS)	days	other	TCEQ SOP V1	72053	NA*	NA	NA	NA	NA	Field
DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE	meters	water	TCEQ SOP V2	82903	NA*	NA	NA	NA	NA	Field
Flow Parameters										
FLOW SEVERITY:1=No Flow,2=Low,3=Normal,4=Flood, 5=High,6=Dry	NU	water	TCEQ SOP V1	01351	NA*	NA	NA	NA	NA	Field
Conventionals										
HARDNESS, TOTAL (MG/L AS CACO3)	mg/L	water	SM 2340 C	00900	5	5	NA	20	80-120	TRA
Metals in Water										
COPPER, DISSOLVED (UG/L AS CU)	µg/L	water	EPA 200.8 Rev 5.4 (1998)	01040	1	1	70-130	20	80-120	TRA
NICKEL, DISSOLVED (UG/L AS NI)	µg/L	water	EPA 200.8 Rev 5.4 (1998)	01065	10	1	70-130	20	80-120	TRA
ZINC, DISSOLVED (UG/L AS ZN)	µg/L	water	EPA 200.8 Rev 5.4 (1998)	01090	5	5	70-130	20	80-120	TRA

* Reporting to be consistent with SWQM guidance and based on measurement capability.

References:

United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020

American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998. (Note: The 21st edition may be cited if it becomes available.)

TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).

TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416)

SS-A8 Special Training/Certification

As described in section A7 of the basin-wide QAPP.

TRA staff are experienced in the water column sampling techniques required for this project.

SS-A9 Documents and Records

As described in Section A9 of the basin-wide QAPP, with the exception of Table A9.1. Table SS-A9.1 below describes document retention for this project.

Table SS-A9.1 Project Documents and Records

Document/Record	Location	Retention (yrs)	Format
QAPPs, amendments and appendices	TCEQ, TRA	Min 7 years	Paper or Electronic
Field SOPs	TRA	Min 7 years	Paper or Electronic
Laboratory Quality Manuals	TRA, Laboratory	Min 7 years	Paper or Electronic
Laboratory SOPs	TRA, Laboratory	Min 7 years	Paper or Electronic
QAPP distribution documentation	TRA	Min 7 years	Paper or Electronic
Field staff training records	TRA	Min 7 years	Paper
Field equipment calibration/maintenance logs	TRA	Min 7 years	Paper
Field instrument printouts	TRA	Min 7 years	Paper or Electronic
Field notebooks or data sheets	TRA	Min 7 years	Paper or Electronic
Laboratory calibration records	Laboratory	Min 7 years	Paper or Electronic
Laboratory instrument printouts	Laboratory	Min 7 years	Paper or Electronic
Laboratory data reports/results	TRA, Laboratory	Min 7 years	Paper or Electronic
Laboratory equipment maintenance logs	Laboratory	Min 7 years	Paper or Electronic
Corrective Action Documentation	TRA, Laboratory	Min 7 years	Paper or Electronic

SS-B1 Sampling Process Design

The data collection design is summarized in Table SS-B1 (Sampling Sites and Monitoring Frequencies) and Figure SS-B1 (Sample Site Maps).

Sample Design Rationale and Site Selection Criteria

Sites have been selected in order to obtain as much coverage of the Muddy Creek watershed as possible while being located in areas that are easily accessible. Sampling will be conducted once during dry conditions when flows are normal to low. Dry conditions will be defined as at least three days of flow below 200 cfs at the nearby USGS gage 08061540 (Rowlett Creek near Sachse). Additionally, flows at this station should be on the falling limb of the hydrograph to prevent sampling during rising flows.

Site 1 (16828) – This site is at the last bridge crossing before Muddy Creek enters Lake Ray Hubbard.

Site 2 (22072) – This site is located upstream of all landfill discharge canals.

Site 3 (22073) – This site is located at the most downstream bridge crossing on Long Branch before the confluence with Muddy Creek.

Site 4 (20110) – This site is located downstream of a golf course and dense residential area.

Site 5 (22074) – This site is located at the most downstream bridge crossing of a tributary to Muddy Creek before the confluence with Muddy Creek.

Site 6 (22075) – This site is upstream of the confluence with the tributary to Muddy Creek and is downstream of what appears to be a mixed use area of light industrial, schools, and sports fields.

Site 7 (22076) – This site is downstream of a dense residential area and Muddy Creek Reservoir.

Site 8 (22077) – This site is upstream of Muddy Creek Reservoir and downstream from a transition area between dense residential and rural land use.

Site 9 (22078) – This site is upstream of the transition area between dense residential and rural land use.

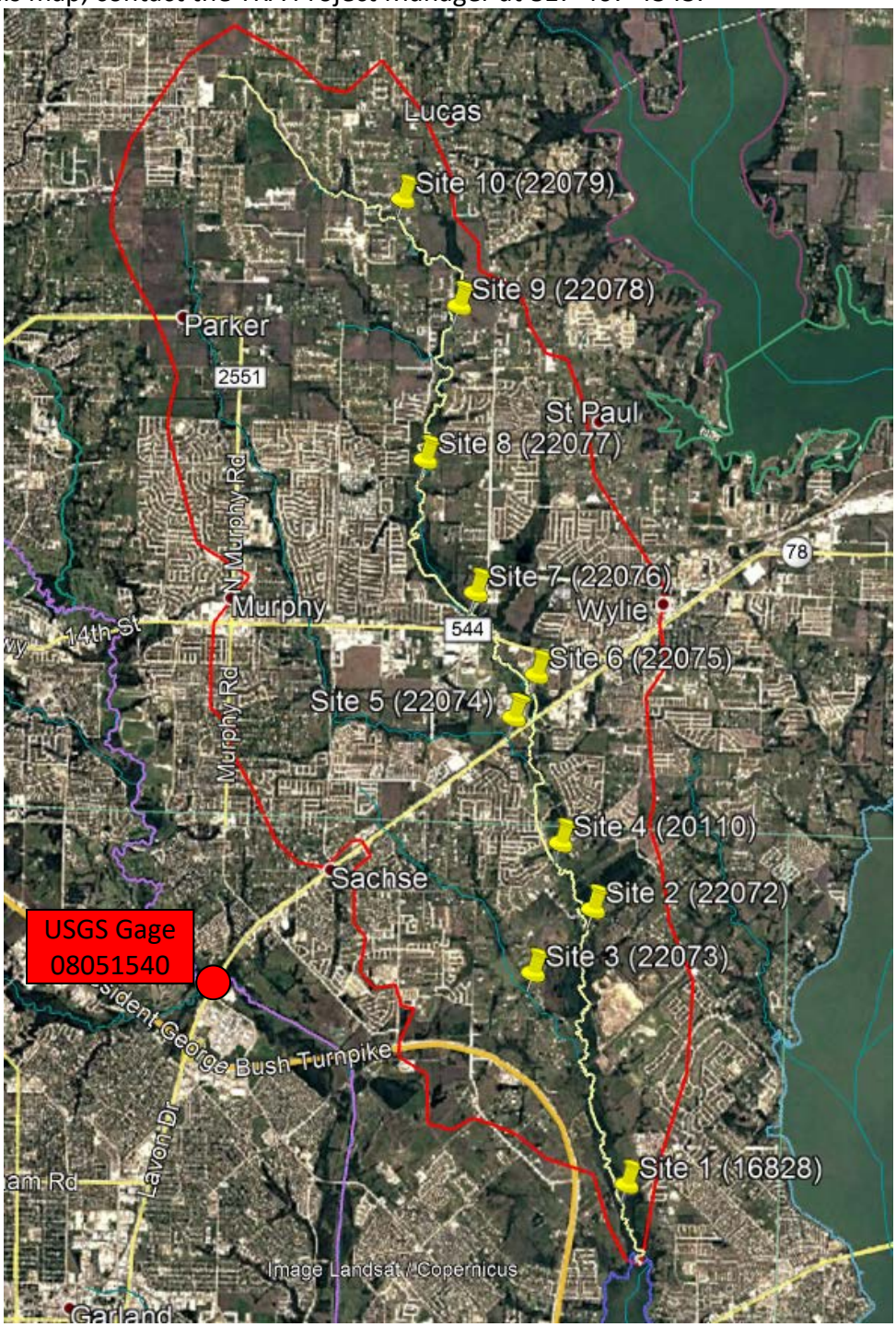
Site 10 (22079) – This is the most upstream site to be sampled and is downstream of a lighter residential rural area.

Table B1.1 Sample Design and Schedule, FY 2018

Site Description	Station ID	Waterbody ID	Latitude	Longitude	Region	SE	CE	MT	Metal Water	Conventionals	Flow	Field	Comments
MUDDY CREEK AT LIBERTY GROVE ROAD 0.65KM UPSTREAM OF LAKE RAY HUBBARD	16828 (Site 1)	0820C	32.929474	-96.544975	04	TR	TR	BFSI	1	1	1	1	Dissolved Cu, Ni, & Zn only for Metals Hardness only for Conventionals Flow Severity only for Flow
MUDDY CREEK AT PLEASANT VALLEY ROAD EAST OF SACHSE	22072 (Site 2)	0820C	32.968225	-96.551136	04	TR	TR	BFSI	1	1	1	1	Dissolved Cu, Ni, & Zn only for Metals Hardness only for Conventionals Flow Severity only for Flow
LONG BRANCH AT PLEASANT VALLEY ROAD SOUTHEAST OF SACHSE	22073 (Site 3)	0820C	32.958947	-96.561267	04	TR	TR	BFSI	1	1	1	1	Dissolved Cu, Ni, & Zn only for Metals Hardness only for Conventionals Flow Severity only for Flow
MUDDY CREEK IMMEDIATELY UPSTREAM OF SACHSE ROAD APPROXIMATELY 8.3 KM UPSTREAM OF LAKE RAY HUBBARD NORMAL POOL ELEVATION IN SACHSE IN NORTHEAST DALLAS COUNTY	20110 (Site 4)	0820C	32.977743	-96.556914	04	TR	TR	BFSI	1	1	1	1	Dissolved Cu, Ni, & Zn only for Metals Hardness only for Conventionals Flow Severity only for Flow
MAXWELL CREEK AT SH 78 NORTHEAST OF SACHSE	22074 (Site 5)	0820C	32.995625	-96.565192	04	TR	TR	BFSI	1	1	1	1	Dissolved Cu, Ni, & Zn only for Metals Hardness only for Conventionals Flow Severity only for Flow
MUDDY CREEK AT SANDEN BLVD NORTHEAST OF SACHSE	22075 (Site 6)	0820C	33.001836	-96.561392	04	TR	TR	BFSI	1	1	1	1	Dissolved Cu, Ni, & Zn only for Metals Hardness only for Conventionals Flow Severity only for Flow
MUDDY CREEK AT COUNTRY CLUB ROAD EAST OF MURPHY	22076 (Site 7)	0820C	33.013475	-96.572019	04	TR	TR	BFSI	1	1	1	1	Dissolved Cu, Ni, & Zn only for Metals Hardness only for Conventionals Flow Severity only for Flow
MUDDY CREEK AT McMILLEN ROAD SOUTHEAST OF PARKER	22077 (Site 8)	0820C	33.032492	-96.580997	04	TR	TR	BFSI	1	1	1	1	Dissolved Cu, Ni, & Zn only for Metals Hardness only for Conventionals Flow Severity only for Flow
MUDDY CREEK AT EAST PARKER ROAD SOUTH OF LUCAS	22078 (Site 9)	0820C	33.05475	-96.57575	04	TR	TR	BFSI	1	1	1	1	Dissolved Cu, Ni, & Zn only for Metals Hardness only for Conventionals Flow Severity only for Flow
MUDDY CREEK AT STINSON ROAD SOUTH OF LUCAS	22079 (Site 10)	0820C	33.069894	-96.585503	04	TR	TR	BFSI	1	1	1	1	Dissolved Cu, Ni, & Zn only for Metals Hardness only for Conventionals Flow Severity only for Flow

Figure SS-B1. Sampling Site Map

Maps of stations monitored by the TRA are provided below. The maps were generated by the TRA. This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries. For more information concerning this map, contact the TRA Project Manager at 817-467-4343.



SS-B2 Sampling Methods

Field Sampling Procedures

Field sampling will be conducted in accordance with the latest versions of the TCEQ *Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods* (RG-415, Revised August 2012). Updates to SWQM Procedures are posted to the Surface Water Quality Monitoring Procedures website (https://www.tceq.texas.gov/waterquality/monitoring/swqm_guides.html), and shall be incorporated into the TRA's procedures, QAPP, SOPs, etc., within 60 days of any final published update.

Sample Containers

Sample containers for metals are new, certified plastic bottles.

Sample volume, container types, minimum sampling volume, preservation requirements, and holding time requirements

As shown in Table SS-B2 below.

Table SS-B2. Sample Storage, Preservation, and Handling Requirements

Parameter	Matrix	Container	Minimum Sample Volume	Preservation	Maximum Storage
Dissolved Metals	Water	New Plastic	250 mL	Filter immediately with 0.45 µm filter, add HNO_3 to pH < 2, may also place on ice to cool to < 6 °C but not frozen	6 months
Hardness, Total	Water	Plastic	500 mL	Add HNO3 to pH <2, place on ice to cool to < 6 °C but not frozen	6 months

Processes to Prevent Contamination

As described in Section B2 of the basin-wide QAPP.
Documentation of Field Sampling Activities
Field sampling activities are documented on field data sheets as shown in Figure SS-B2. The following will be recorded for all visits:

- Station ID
- Sampling Date
- Location
- Sampling Depth
- Sampling Time
- Sample Collector's name and signature
- Values for all field parameters collected
- Notes containing detailed observational data not captured by field parameters, including;
    - Water appearance
    - Weather

- Biological activity
- Recreational activity
- Unusual odors
- Pertinent observations related to water quality or stream uses (e.g., exceptionally poor water quality conditions/standards not met; stream uses such as swimming, boating, fishing, irrigation pumps, etc.)
- Watershed or instream activities (events impacting water quality, e.g., bridge construction, livestock watering upstream, etc.)
- Missing parameters (i.e., when a scheduled parameter or group of parameters is not collected)

Recording Data

As described in Section B2 of the basin-wide QAPP.

Sampling Method Requirements or Sampling Process Design Deficiencies, and Corrective Action

As described in Section B2 of the Basin-wide QAPP.

Figure SS-B2: Field Data Sheet/Chain of Custody Form

1

LIMS # (TRA Lab No.)_____

LIMS Text ID (TRA Lab ID)_____

MUDDY CREEK METALS **PEM** **CRP**

Date:

Tag No:

32.929474 -96.544975

Station: Site 1 (16828) - Muddy Creek at Liberty Grove Road Time:

Write site description if original site has been moved:_____

Sample(s) Collected By:_____

Secchi Depth (m): Appears_____ Disappears_____ Avg _____ Chlor(ug/L):_____ BGA (ug/L)_____

Air Temperature(^{0}C):_____ Days Since Last Rain:_____ Turbidity (NTU):_____

Drought Parameters

Depth at Sample Site (m):_____ Max Pool Width (m):_____ Max Pool Depth (m):_____

Pool Length (m):_____ % Pool Coverage in 500 Meter Reach:_____

Observations (weather, obvious signs of eutrophication, etc.):_____

Analyses to be Conducted	**Samples Collected**					
	quantity	**volume**	**Matrix**	**preservative**	**filtered**	**Parameters**
Dissolved Metals (Cu, Ni, Zn)	1	500 ML bottle	Water	HNO3	YES	Dissolved Metals (Cu, Ni, Zn)

FIELD PARAMETERS

Flow severity:

If site is wadeable, depth of water column (m): _____

<0.5 m: collect at 1/3 depth from surface
>0.5 m & <1.5 m: collect at 0.3 meters from surface
>1.5 m: profiles if possible otherwise at 0.3 meters from surface
>1.5 m to <3 m: 0.3 m from surface, mid-depth, 0.3 m from bottom

Corrections must be made with a single strike-thru and initialed. No writeovers, scratchouts, or whiteout.

Sample Depth	Water Temp (^{0}C)	pH (SU)	Sp Cond uS/cm	DO mg/L
Calibration Acceptable				

Relinquished By:_____
Date/Time:_____
Received By:_____
Date/Time:_____

Relinquished By:_____
Date/Time:_____
Received By:_____
Date/Time:_____

Copy before delivering original to lab; sheet must be signed prior to submittal of samples.

Customer: Environmental Planning and Management
Attention: Angela Kilpatrick
Trinity River Authority Clean Rivers Program
5300 South Collins, Arlington, TX 76018

SS-B3 Sample Handling and Custody

Chain-of–Custody

As described in Section B3 of the basin-wide QAPP. See Figure SS-B2 for an example of the combined field data sheet/chain of custody form to be used for this project.

Sample Labeling

As described in Section B3 of the basin-wide QAPP.

Sample Handling

As described in Section B3 of the basin-wide QAPP.

Sample Tracking Procedure Deficiencies and Corrective Action

As described in Section B3 of the basin-wide QAPP.

SS-B4 Analytical Methods

The analytical methods, associated matrices, and performing laboratories are listed in Table SS-A7.1 of section SS-A7. The authority for analysis methodologies under CRP is derived from the 30 Tex. Admin. Code ch. 307, in that data generally are generated for comparison to those standards and/or criteria. The Standards state “Procedures for laboratory analysis must be in accordance with the most recently published edition of the book entitled Standard Methods for the Examination of Water and Wastewater, the TCEQ Surface Water Quality Monitoring Procedures as amended, 40 CFR 136, or other reliable procedures acceptable to the TCEQ, and in accordance with chapter 25 of this title.” Copies of laboratory SOPs are retained by the TRA CRWS Laboratory and are available for review by the TCEQ. Laboratory SOPs are consistent with EPA requirements, as specified in the method.

Standards Traceability

As described in Section B4 of the basin-wide QAPP.

Analytical Method Deficiencies and Corrective Actions

As described in section B4 of the basin-wide QAPP.

SS-B5 Quality Control

Sampling Quality Control Requirements and Acceptability Criteria

As described in Section B5 of the basin-wide QAPP.

Laboratory Measurement Quality Control Requirements and Acceptability Criteria

As described in Section B5 of the basin-wide QAPP.

Quality Control or Acceptability Requirements Deficiencies and Corrective Actions

As described in Section B5 of the basin-wide QAPP.

SS-B6 Instrument/Equipment Testing, Inspection, and Maintenance

As described in Section B6 of the basin-wide QAPP.

SS-B7 Instrument Calibration and Frequency

As described in Section B7 of the basin-wide QAPP.

SS-B8 Inspection/Acceptance of Supplies and Consumables

As described in Section B8 of the basin-wide QAPP.

SS-B9 Acquired Data

Only data collected directly under this QAPP is submitted to the SWQMIS database.

SS-B10 Data Management

As described in Section B10 of the basin-wide QAPP, with the exception of the Collecting Entity table found in the Record Keeping and Data Storage section. The Collecting Entity table for the project detailed in this appendix is provided below.

Name of Entity	Tag Prefix	Submitting Entity	Collecting Entity	Monitoring Type Code
Trinity River Authority	TR	TR	TR	BFSI*

*Biased to Flow Source Identification

SS-C1 Assessments and Response Actions

As described in Section C1 of the basin-wide QAPP.

Corrective Action

As described in Section C1 of the basin-wide QAPP.

SS-C2 Reports to Management

Reports to Planning Agency Project Management

As described in Section C2 of the basin-wide QAPP.

Reports to TCEQ Project Management

As described in Section C2 of the basin-wide QAPP.

Reports by TCEQ Project Management

As described in Section C2 of the basin-wide QAPP.

SS-D1 Data Review, Verification, and Validation

As described in Section D1 of the basin-wide QAPP.

SS-D2 Verification and Validation Methods

As described in Section D2 of the basin-wide QAPP.

SS-D3 Reconciliation with User Requirements

As described in Section D3 of the basin-wide QAPP.