Amendment # _1_ to the Houston-Galveston Area Council (H-GAC) Multi-Basin Clean Rivers Program FY 2022/2023 QAPP

Prepared by the Houston-Galveston Area (H-GAC) 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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Justification

This document updates personnel changes within the TCEQ, H-GAC, and some of H-GAC's local partner agencies. Plus, it corrects typographical errors found in a couple of the local partner's tables.

Detail of Changes

Section/Figure/Table	Page	Change	Justification
Section A1	2	Replace Rebecca DuPont, CRP Work Leader, with Kyle Girten. Add 'Acting' in front of title.	Personnel change at TCEQ.
		Replace Rebecca DuPont, Acting Project QAS, with Luis Medina. Remove "Acting" before job title.	Personnel change at TCEQ.
	10	Replace Samantha Plunkett, Eastex Lab QAO, with Emily McGregor, as Eastex Lab QAO.	Personnel change at Eastex Lab.
Section A4	14	Replace Rebecca DuPont, CRP Work Leader, with Kyle Girten. Add 'Acting' in front of title.	Personnel change at TCEQ.
	14	Replace Sarah Kirkland, CRP Data Manager, with Scott Delgado as the CRP Data Mgr.	Personnel change at TCEQ.
	15	Replace Rebecca DuPont, Acting Project QAS, with Luis Medina. Remove "Acting" before job title.	Personnel change at TCEQ.
Section A4	16	Replace Samantha Plunkett, Eastex Lab QAO, with Emily McGregor, the new lab QAO.	Personnel change at Eastex Lab.
Section A4	18	Remove duties of Data Manager from Desta Takie. Reassign Data Manager duties to Michael Morfin.	Personnel change at DWO.
Section A4 Figure A4.1	21	Replace Rebecca DuPont with Kyle Girten or Luis Medina in Figure A4.1 - Organizational Chart. Kyle will be the "Acting" TCEQ CRP Work Leader. Luis Medina will be the TCEQ Project QA Specialist. Remove "Acting" before QAS job title.	Personnel change at TCEQ.

~Continued on next page~

Section/Figure/Table	Page	Change	Justification
	21	Replace Sarah Kirkland with Scott Delgado as the TCEQ CRP Data Manager.	Personnel change at TCEQ.
Section A4 Figure A4.1c	24	Replace Emina Marianovich with Roger Sealy as the Acting Chemistry Supervisor.	Personnel change at HHD Lab.
Section A4 Figure A4.1d	25	Replace Desta Takie with Michael Morfin as the new CRP Field Data Manager.	Personnel change at DWO.
Section A4 Figures A4.1a, e, f, g	22 26 27 28	Replace Samantha Plunket with Emily McGregor as the new Eastex Lab QAO in the org charts for H-GAC, SJRA, EIH, and TRIES.	Personnel change at Eastex Lab.
Section A8 Table A8.1	34	Replace Jean Wright with Kendall Guidroz as Designated Trainer for H-GAC.	Personnel change at H-GAC.
Section A9 Table A9.1b	35 35	Replace the number of years reported in this table for the Retention (yrs). They should all be changed to ≥7 years instead of only 7 years. Replace paper with 'Paper &/or electronic' in the Format column for QAPPs, amendments, and appendices plus Field SOP.	Correct error in table. Correct error in table.
Section A9 Tables A9.1g & h	38	Replace the number of years reported in this table for the Retention (yrs). They should all be changed to ≥7 years instead of only 7 years.	Correct error in table.
Section B2 Table B2.1h	45 46	Correct the Sample Volume and Holding Time in Table B2.1h and the footnotes.	Compared new field sheet, COC, and table to fix information in table.
Section B5 Matrix spike section	54 55	Replace the Eastex matrix spike recovery limits of 80-120 percent with 75-125 percent. There are two replacements in the Eastex bulleted paragraph.	Correct error in 'matrix spike recovery limits' conducted by the lab.

Section/Figure/Table	Page	Change	Justification
Appendix A	APP. Pg 1, 31-34	Added two parameters (water clarity & Turbidity, Observed) to A7.8a. Included complete A7 table- 8b,8c, and 8d.	Added to field parameters to A7.8a because TRIES added to replacement field sheet.
Appendix D	APP Pg 73 86	Replace original TRIES field data sheet with updated version.	Staff realized the updated field form was not provided to H-GAC during the writing of the original FY22-23 Multi-Basin QAPP.
Appendix E	APP Pg 87 94	Replace original TRIES COC form with an updated version.	Staff realized the updated COC form was not provided to H-GAC during the writing of the original FY22-23 Multi-Basin QAPP.

Distribution

QAPP Amendments and Revisions to Appendices will be distributed to all personnel on the distribution list maintained by H-GAC.

These changes will be incorporated into the QAPP document and TCEQ and the H-GAC will acknowledge and accept these changes by signing this amendment.

Texas Commission on Environmental Quality

Water Quality Planning Division

Electronically Approved 5/27/2022

Luis Medina Date
Project Quality Assurance Specialist
Clean Rivers Program

Electronically Approved 6/1/2022

Kyle Girten Date
Acting Work Leader
Clean Rivers Program

Electronically Approved 6/3/2022

Jenna Wadman Date
Project Manager
Clean Rivers Program

Electronically Approved 5/26/2022

Cathy Anderson, Team Leader Date
Data Management and Analysis

Monitoring Division

Jason Natho for Dana Squires
Electronically Approved 6/3/2022

Dana Squires Date
Lead CRP Quality Assurance Specialist
Clean Rivers Program

Houston-Galveston Area Council (H-GAC)

Electronically Approved	5/26/2022
Todd Running H-GAC Project Manager	Date

Electronically Approved	5/26/2022
Jean Wright H-GAC Quality Assurance Officer	Date

Harris County Pollution Control Services (HCPCS)

Electronically Approved 5/27/2022

Dr. Mohammed Serageldin Date
HCPCS CRP Project Manager

Electronically Approved 5/26/2022

Bryan Kosler Date
HCPCS CRP Field Quality Assurance Officer

Electronically Approved 5/27/2022

Dr. Mohammed Serageldin Date
HCPCS Laboratory Manager

Electronically Approved 5/26/2022

Ericka Jackson Date
HCPCS Quality Assurance Officer

City of Houston, Houston Health Department (HHD)

Electronically Approved 5/27/2022

Nguyen Ly Date
CRP Project Manager

Electronically Approved 5/27/2022

Darryl Tate Date
HHD CRP Field Quality Assurance Officer

Electronically Approved 5/31/2022

Roger Sealy Date
HHD BLS Lab Manager

Electronically Approved 5/27/2022

Kimyattia Smith Date
HHD BLS Lab Quality Assurance Officer

City of Houston, Drinking Water Operations (DWO)

Electronically Approved 5/27/2022

Shubha Thakur Date
CRP Project Manager & DWO Laboratory Director

Electronically Approved 5/27/2022

Harold Longbaugh Date
DWO Laboratory Manager

Electronically Approved 6/3/2022

Narendra Joshi Date
DWO Laboratory Quality Assurance Manager

Electronically Approved 5/27/2022

Desta Takie Date
DWO CRP Field Quality Assurance Officer

San Jacinto River Authority (SJRA)

Electronically Approved 5/27/2022

Shane Simpson Date
SJRA CRP Project Manager and
Field Quality Assurance Officer

Environmental Institute of Houston, University of Houston – Clear Lake (EIH)

Electronically Approved	5/27/2022
Dr. George Guillen EIH CRP Project Manager	Date

Electronically Approved	5/26/2022
Jenny Oakley EIH CRP Quality Assurance Officer	Date

Texas Research Institute for Environmental Studies (TRIES)

Electronically Approved	6/2/2022
Dr. Chad Hargrave TRIES CRP Project Manager	Date

Electronically Approved	5/26/2022
Ashley Morgan-Olvera TRIES Quality Assurance Officer	Date

Electronically Approved	5/26/2022
Dr. Rachelle Smith TRIES Laboratory Manager & Quality Assurance Officer	Date

Eastex Environmental Laboratory, Inc. (Coldspring, TX)

Electronically Approved 5/26/2022

Tiffany Guerrero Date
Eastex Lab Technical Director

Electronically Approved 5/26/2022

Emily McGregor Date
Eastex Lab Quality Assurance Officer

A4 Project/Task Organization

Description of Responsibilities

TCEQ

~~Rebeccca DuPont~~ Kyle Girten
Acting CRP Work Leader
Responsible for Texas Commission on Environmental Quality (TCEQ) activities supporting the development and implementation of the Texas Clean Rivers Program (CRP). Responsible for verifying that the TCEQ Quality Management Plan (QMP) is followed by CRP staff. Supervises TCEQ CRP staff. Reviews and responds to any deficiencies, corrective actions, or findings related to the area of responsibility. Oversees the development of Quality Assurance (QA) guidance for the CRP. Reviews and approves all QA audits, corrective actions, reports, work plans, contracts, QAPPs, and TCEQ Quality Management Plan. Enforces corrective action, as required, where QA protocols are not met. Ensures CRP personnel are fully trained.

Dana Squires
CRP Lead Quality Assurance Specialist
Participates in the development, approval, implementation, and maintenance of written QA standards (e.g., Program Guidance, SOPs, QAPPs, QMP). Assists program and project manager in developing and implementing quality system. Serves on planning team for CRP special projects. Prepares and distributes annual audit plans. Conducts monitoring systems audits of Planning Agencies. Concurs with and monitors implementation of corrective actions. Conveys QA problems to appropriate management. Recommends that work be stopped in order to safeguard programmatic objectives, worker safety, public health, or environmental protection. Ensures maintenance of audit records for the CRP.

Jenna Wadman
CRP Project Manager
Responsible for the development, implementation, and maintenance of CRP contracts. Tracks, reviews, and approves deliverables. Participates in the development, approval, implementation, and maintenance of written QA standards (e.g., Program Guidance, SOPs, QAPPs, QMP). Coordinates the review and approval of CRP QAPPs. Ensures maintenance of QAPPs. Assists CRP Lead QA Specialist in conducting Basin Planning Agency audits. Verifies QAPPs are being followed by contractors and that projects are producing data of known quality. Coordinates project planning with the Basin Planning Agency Project Manager. Reviews and approves data and reports produced by contractors. Notifies QA Specialists of circumstances which may adversely affect the quality of data derived from the collection and analysis of samples. Develops, enforces, and monitors corrective action measures to ensure contractors meet deadlines and scheduled commitments.

Cathy Anderson
Team Leader, Data Management and Analysis (DM&A) Team
Participates in the development, approval, implementation, and maintenance of written QA standards (e.g., Program Guidance, SOPs, QAPPs, QMP). Ensures DM&A staff perform data management-related tasks.

~~Sarah Kirkland~~ Scott Delgado
CRP Data Manager, DM&A Team
Responsible for coordination and tracking of CRP data sets from initial submittal through CRP Project Manager review and approval. Ensures that data are reported following instructions in the Data Management Reference Guide, July 2019 or most current version (DMRG). Runs automated data validation checks in the Surface Water Quality Management Information System (SWQMIS) and coordinates data verification and error correction with CRP Project Managers. Generates SWQMIS summary reports to assist CRP Project Managers' data review. Identifies data anomalies and inconsistencies. Provides training and guidance to CRP and Planning Agencies on technical data issues to ensure that data are submitted according to documented procedures. Reviews QAPPs for valid stream monitoring stations. Checks validity of parameter codes, submitting entity code(s), collecting entity code(s), and monitoring type code(s). Develops and maintains data management-related SOPs for CRP data management. Coordinates and processes data correction requests. Participates in the development, implementation, and maintenance of written QA standards (e.g., Program Guidance, SOPs, QAPPs, QMP).

~~***Rebecca DuPont***~~ ***Luis Medina***
CRP Project Quality Assurance Specialist
Serves as liaison between CRP management and TCEQ QA management. Participates in the development, approval, implementation, and maintenance of written QA standards (e.g., Program Guidance, SOPs, QAPPs, QMP). Serves on planning team for CRP special projects and reviews QAPPs in coordination with other CRP staff. Coordinates documentation and implementation of corrective action for the CRP.

Houston-Galveston Area Council (H-GAC)

Todd Running
H-GAC Project Manager
Responsible for implementing and monitoring CRP requirements in contracts, QAPPs, and QAPP amendments and appendices. Coordinates basin planning activities and work of basin partners. Ensures monitoring systems audits are conducted to ensure QAPPs are followed by basin planning agency participants and that projects are producing data of known quality. Ensures that subparticipants are qualified to perform contracted work. Ensures CRP project managers and/or QA Specialists are notified of deficiencies and corrective actions, and that issues are resolved. Ensures that data collected is validated and are acceptable for reporting to the TCEQ. Supervises field monitoring with assistance from QAO to ensure all monitoring activities are completed as stated in the QAPP.

Jean Wright
H-GAC Quality Assurance Officer
Responsible for coordinating the implementation of the QA program. Responsible for writing and maintaining the Multi-Basin QAPP and monitoring its implementation. Responsible for maintaining records of QAPP distribution, including appendices and amendments. Responsible for maintaining written records of sub-tier commitment to requirements specified in this QAPP. Responsible for identifying, receiving, and maintaining project QA records. Responsible for coordinating with the TCEQ QAS to resolve QA-related issues. Notifies the H-GAC Project Manager of particular circumstances which may adversely affect the quality of data. Coordinates and monitors deficiencies and corrective action. Responsible for validating that data collected are acceptable for reporting to the TCEQ. Coordinates the research and review of technical QA material and data related to water quality monitoring system design and analytical techniques. Conducts monitoring systems audits on project participants to determine compliance with project and program specifications, issues written reports, and follows through on findings. Ensures that field staff is properly trained and that training records are maintained.

Jessica Casillas
H-GAC Data Manager
Responsible for ensuring that field data are properly reviewed and verified. Responsible for the transfer of basin quality-assured water quality data to the TCEQ in a format compatible with SWQMIS. Coordinates and maintains records of data verification and validation. Maintains quality-assured data on H-GAC internet sites.

Eastex Environmental Laboratory (Eastex) (Coldspring, TX, facility only)

Tiffany Guerrero
Laboratory Technical Director - Eastex Environmental Lab (Contract Lab)
Responsible for the overall performance, administration, and reporting of analyses performed by Eastex Environmental Laboratory (Coldspring, TX). Responsible for supervision of laboratory personnel involved in generating analytical data for the project. Ensures that laboratory personnel have adequate training and a thorough knowledge of this QAPP and related SOPs. Responsible for oversight of all laboratory operations ensuring that all QA/QC requirements are met, documentation is complete and adequately maintained, and results are reported accurately.

~~Samantha Plunkett~~ Emily McGregor
Eastex Lab QAO
Responsible for the overall quality control and quality assurance of analyses performed by Eastex Environmental Laboratory (Coldspring, TX). Monitors the implementation of the QM/QAPP within the laboratory to ensure complete compliance with QA data quality objectives, as defined by this QAPP. Coordinates and monitors deficiencies and corrective actions. Conducts in-house audits to ensure compliance with written SOPs and to identify potential problems. Responsible for supervising and verifying all aspects of the QA/QC in the laboratory.

Harris County Pollution Control Services (HCPCS)

Dr. Mohammed Serageldin
CRP Project Manager / Manager-Laboratory Services
Responsible for overall performance, administration, and reporting of analyses performed by HCPCS Laboratory. Responsible for supervision of laboratory personnel involved in generating analytical data for the project. Ensures that laboratory personnel have adequate training and a thorough knowledge of this QAPP and related SOPs. Responsible for oversight of all laboratory operations ensuring that all QA/QC requirements are met, documentation is complete and adequately maintained, and results are reported accurately. Additionally, the lab director will review and verify all laboratory data for integrity and continuity, reasonableness and conformance to project requirements, and will confirm data is validated against the data quality objectives listed in Appendix A of this QAPP.

Ericka Jackson
Lab Quality Assurance Officer (QAO) / CRP Data Manager
Responsible for monitoring the activities of HCPCS laboratory personnel, ensuring that all data collected meet the data quality objectives of the project. Ensures both field and laboratory data are entered into appropriate spreadsheets and data bases and is reviewed and validated as required. Responsible for submitting all data to H-GAC in the correct format. Responsible for the overall quality control and quality assurance of analyses performed by HCPCS Laboratory. Monitors the implementation of the QM/QAPP within the laboratory to ensure complete compliance with QA data quality objectives, as defined by this QAPP. Conducts in-house audits to ensure compliance with written SOPs and to identify potential problems. Responsible for supervising and verifying all aspects of the QA/QC in the laboratory. Responsible for coordinating the implementation of the QA program. Responsible for identifying, receiving, and maintaining project QA records. Responsible for coordinating with the H-GAC QAO to resolve QA-related issues. Notifies the H-GAC QAO of particular circumstances which may adversely affect the quality of data. Coordinates and monitors deficiencies and corrective action. Responsible for ensuring that field and laboratory data collected by or submitted to H-GAC CRP are properly reviewed, verified, and validated. Formats and delivers data in the format described in the DMRG, most recent version, to H-GAC CRP Data Manager.

Bryan Kosler
CRP Field Supervisor & CRP Field QAO
Responsible for monitoring the activities of HCPCS field personnel, ensuring that all data collected meet the data quality objectives of the project. Responsible for supervising the collection, preservation, handling and delivery of samples. Responsible for ensuring that field measurements, sample custody, and documentation follow procedures described in this QAPP. Notifies the HCPCS lab QA staff of particular circumstances which may adversely affect the quality of data. Responsible for coordinating with H-GAC QAO to resolve field related issues. Trains all field monitoring personnel.

City of Houston – Drinking Water Operations (DWO)

Shubha Thakur
CRP Project Manager / Laboratory Director
Responsible for implementing and monitoring CRP requirements in contracts, QAPPs and QAPP amendments and appendices. Coordinates basin planning activities and work of basin partners. Ensures monitoring systems audits are conducted to ensure QAPPs are followed by City of Houston Drinking Water Operations Laboratory participants and that projects are producing data of known quality. Ensures H-GAC project manager, H-GAC QAO, and/or HGAC data manager are notified of deficiencies and corrective actions, and that issues are resolved.

Harold Longbaugh
Laboratory Manager
Responsible for overall performance, administration and reporting of analyses by City of Houston Drinking Water Operations Laboratory. Responsible for supervision of laboratory personnel involved in generating analytical data for the project. Ensures that laboratory personnel have adequate training and a thorough knowledge of this QAPP and related SOPs. Responsible for oversight of all laboratory operations ensuring that all QA/QC requirements are met, documentation is complete and adequately maintained, and results are reported accurately. Responsible for reviewing & validating field data submitted on COCs & laboratory data against raw data entered in BTLIMS.

Narendra Joshi
Lab QA Manager / CRP Lab Data Manager
Responsible for overall quality control and quality assurance of analyses performed by City of Houston Drinking Water Operations Laboratory. Monitors the implementation of the QM/QAPP within the laboratory to ensure complete compliance with QA data quality objectives, as defined by the QAPP. Conducts in-house audits to ensure compliance with written SOPs and to identify potential problems. Responsible for supervising and verifying all aspects of the QA/QC in the laboratory. Responsible for training and keeping record of lab personnel to produce quality analytical data. Communicates any QA issues with laboratory manager and laboratory director. Responsible for coordinating and monitoring deficiencies and corrective actions. Responsible for coordinating with the H-GAC QAO to resolve QA-related issues. Notifies the City of Houston Drinking Water Operations Project Manager and laboratory manager of particular circumstances which may adversely affect the quality of data. Responsible for reviewing at least 10% of laboratory data against raw data entered in BTLIMS. Coordinates and maintains records of data verification and validation. Responsible for sending analytical data with required QA/QC and Data Review Checklist to HGAC CRP Data Manager.

Desta Takie
CRP Field Supervisor / CRP Field QAO / ~~CRP Field Data Manager~~
Responsible for supervising the collection, preservation, handling and delivery of samples. Responsible for ensuring that field measurements, sample custody, and documentation follow procedures described in the this QAPP. Notifies the DWO Lab QA Manager of particular circumstances which may adversely affect the quality of data. ~~Responsible for verifying and validating data files against measurement performance specifications and other requirements in the QAPP. Formats and delivers field data in the format described in the most recent revision of the DMRG to H-GAC CRP Data Manager. Submits hard copies of field sheets, chain-of custody reports and Data Review Checklist to HGAC CRP Data Manager.~~ Trains all field monitoring personnel and maintains training records.

Michael Morfin
CRP Field Data Manager
Responsible for verifying and validating data files against measurement performance specifications and other requirements in the QAPP. Formats and delivers field data in the format described in the most recent revision of the DMRG to H-GAC CRP Data Manager. Submits hard copies of field sheets, chain-of custody reports and Data Review Checklist to HGAC CRP Data Manager.

Project Organization Charts

Figure A4.1. Organization Chart - Lines of Communication

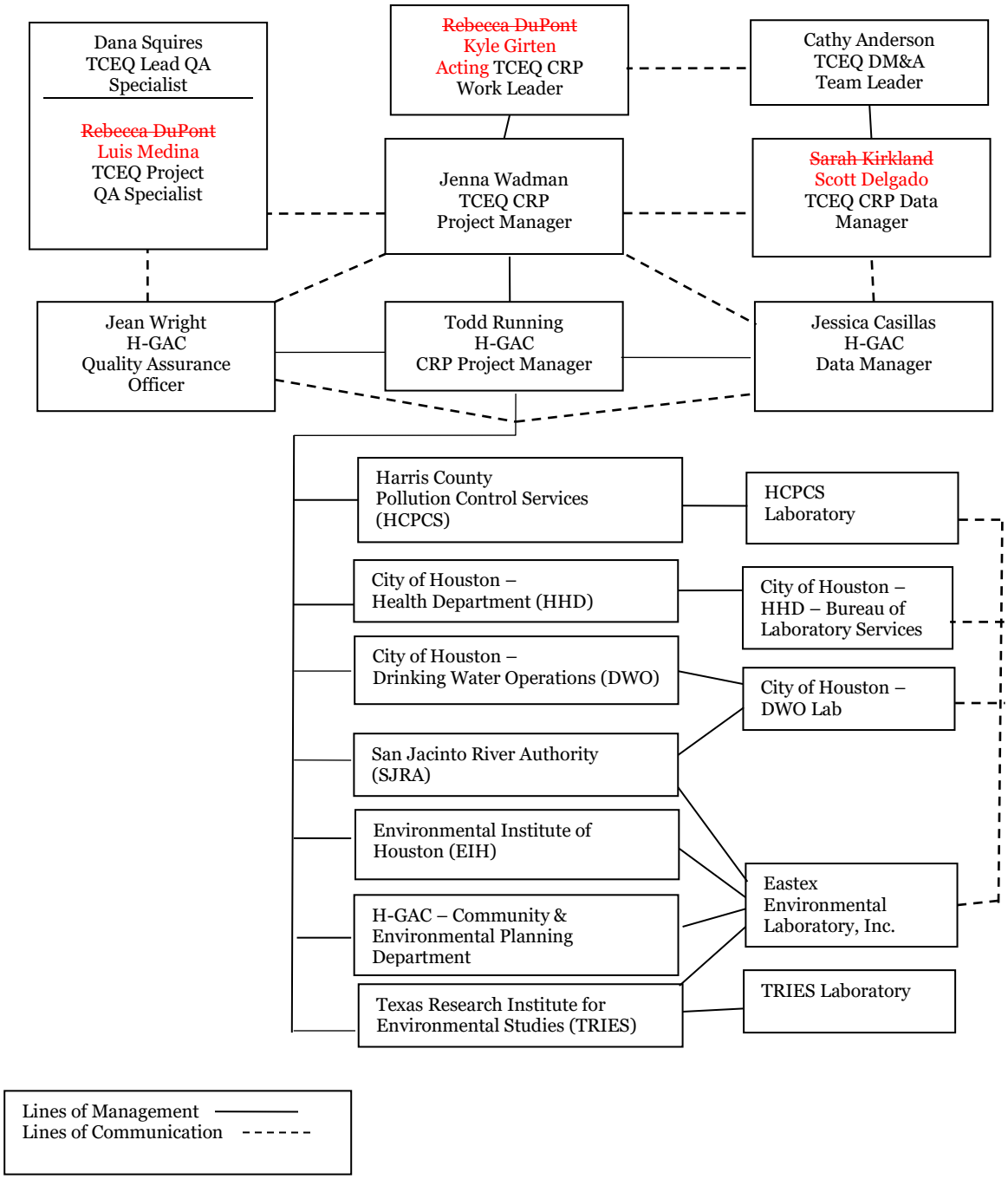


Figure A4.1a. The Houston-Galveston Area Council (H-GAC) CRP Organizational Chart.

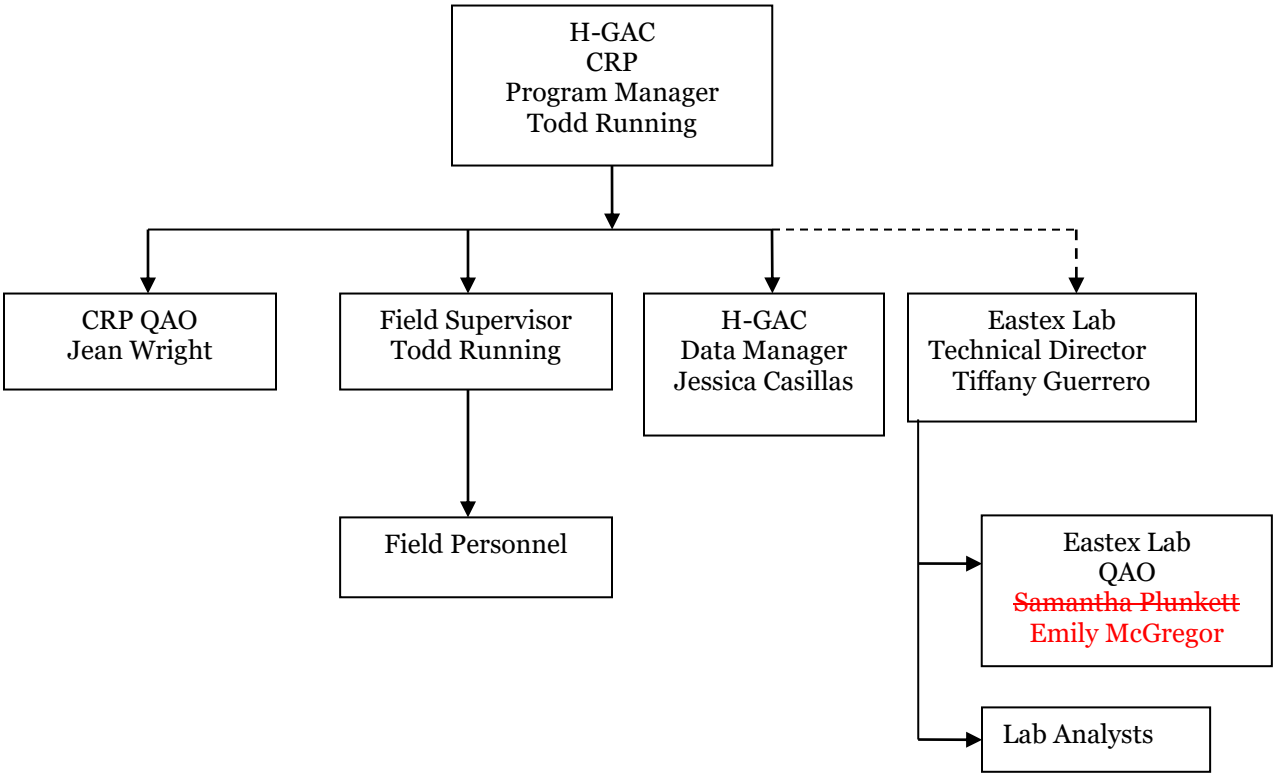


Figure A4.1c. The City of Houston, Health Department (HHD) CRP Organizational Chart.

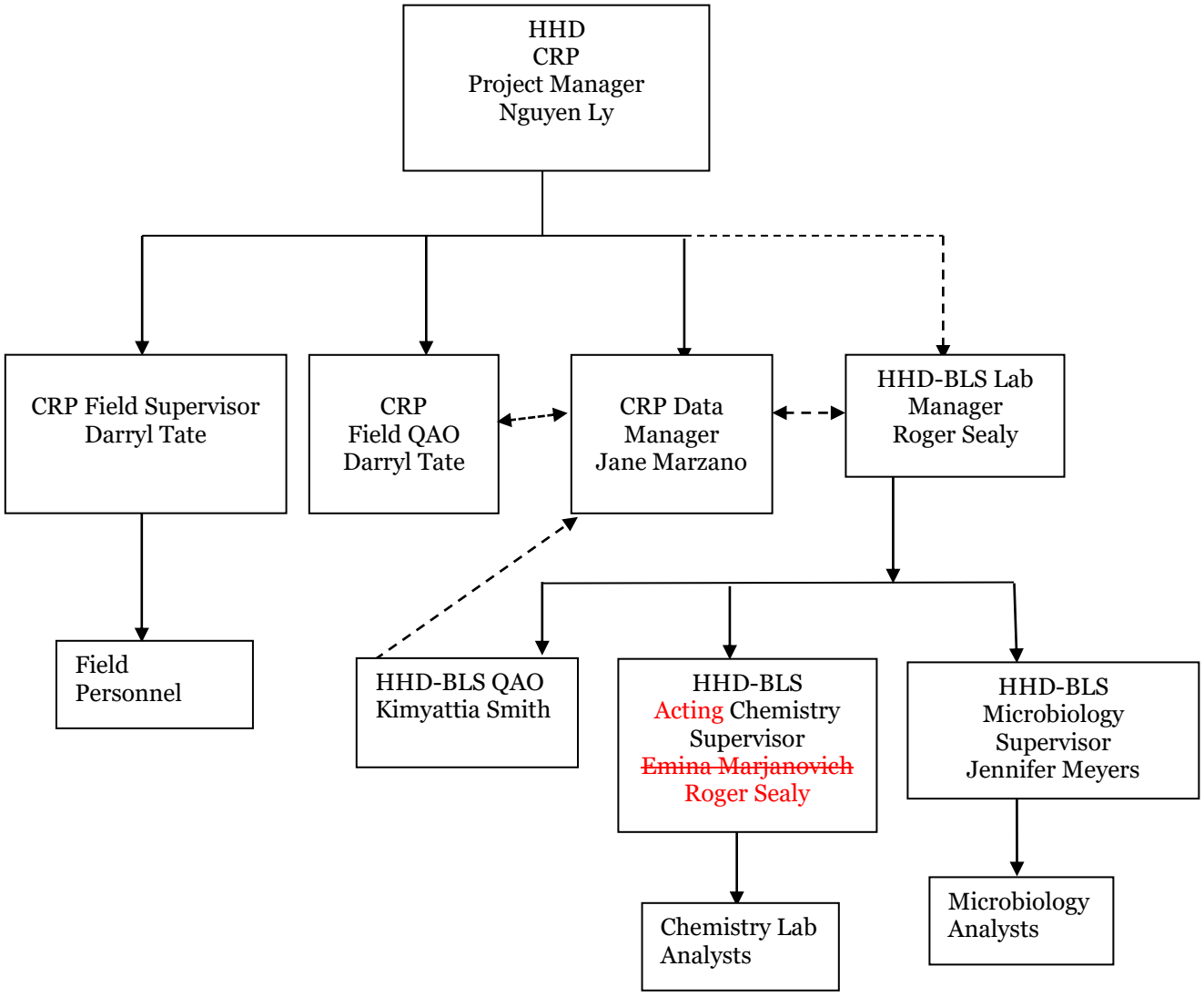


Figure A4.1d. The City of Houston, Drinking Water Operations (DWO) CRP Organizational Chart.

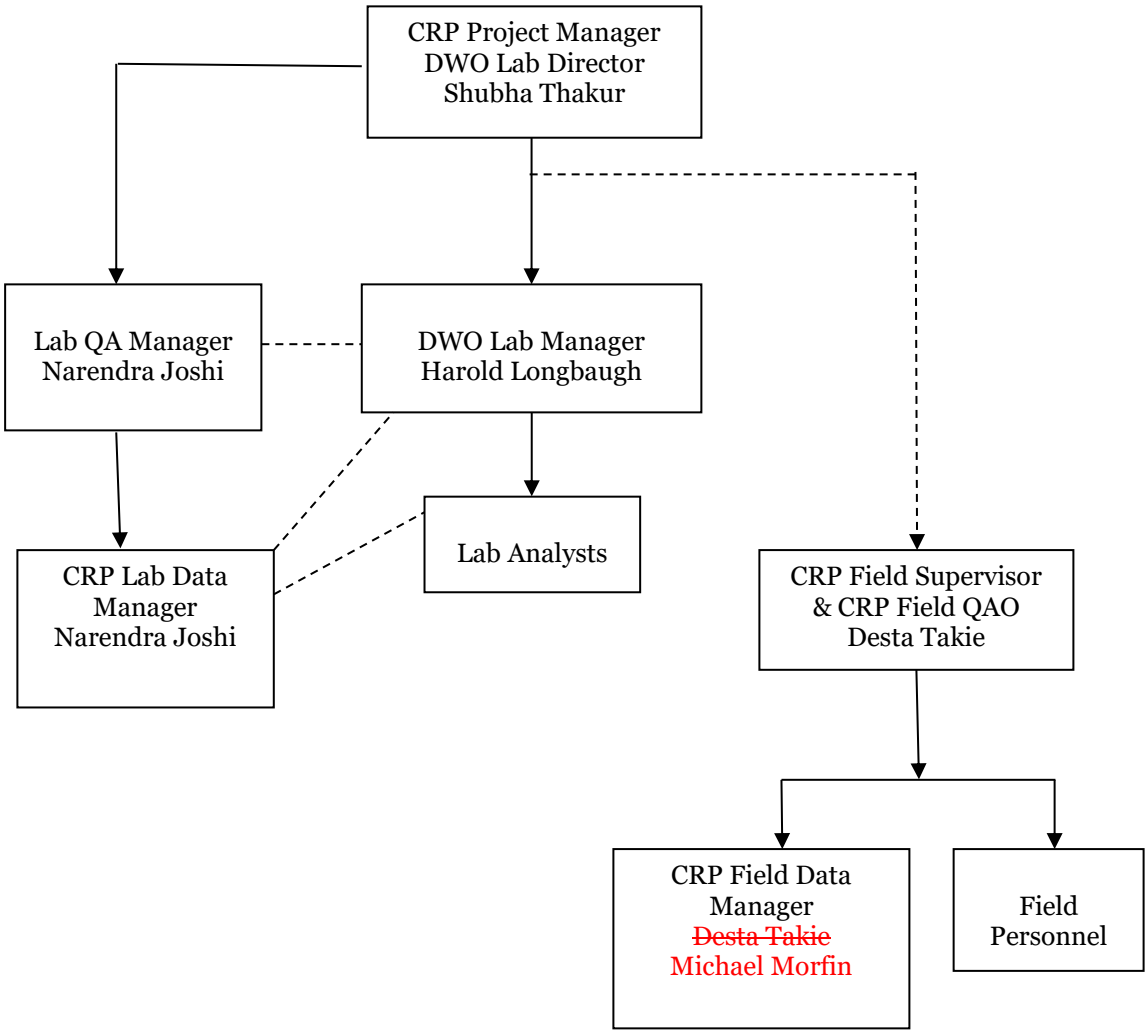


Figure A4.1e. San Jacinto River Authority (SJRA) CRP Organizational Chart.

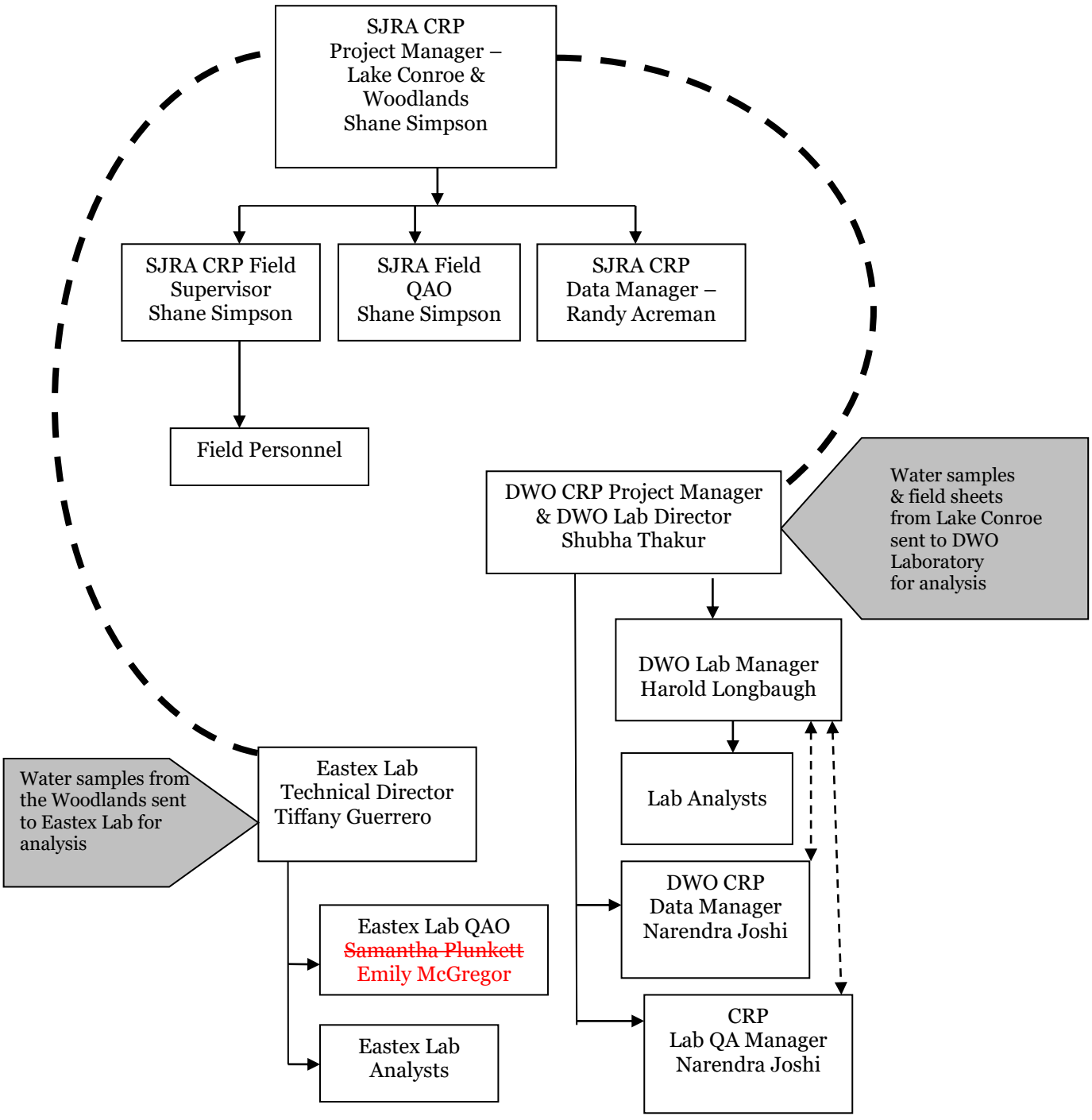


Figure A4.1f. The Environmental Institute of Houston (EIH) at the University of Houston - Clear Lake (UHCL) CRP Organizational Chart.

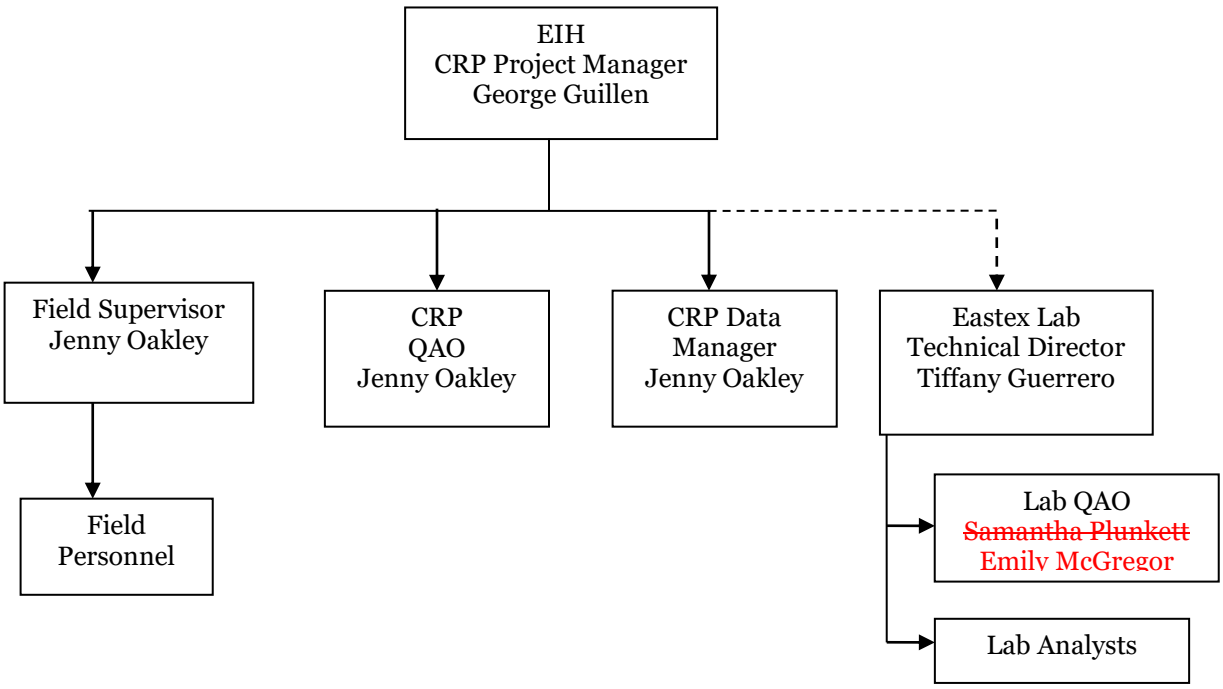
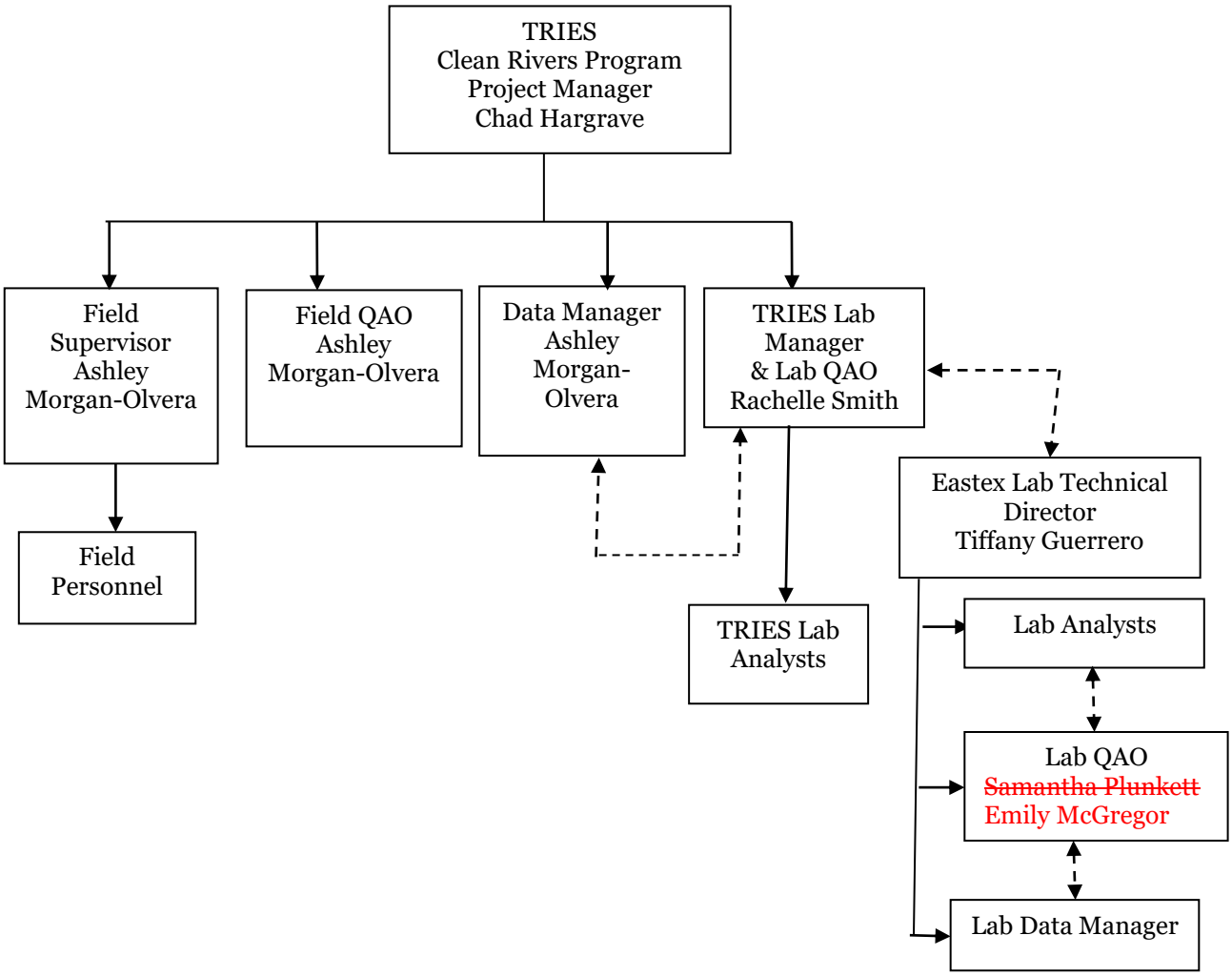


Figure A4.1g. Texas Research Institute for Environmental Studies (TRIES) CRP Organizational Chart.



quality conditions. Water quality data are collected on a routine frequency and are separated by approximately even time intervals. At a minimum, samples are collected over at least two seasons (to include inter-seasonal variation) and over two years (to include inter-year variation) and include some data collected during an index period (March 15- October 15). Although data may be collected during varying regimes of weather and flow, the data sets will not be biased toward unusual conditions of flow, runoff, or season. The goal for meeting maximum representation of the water body will be tempered by funding availability.

Comparability

Confidence in the comparability of routine data sets for this project and for water quality assessments is based on the commitment of project staff to use only approved sampling and analysis methods and QA/QC protocols in accordance with quality system requirements as described in this QAPP and in TCEQ guidance. Comparability is also guaranteed by reporting data in standard units, by using accepted rules for rounding figures, and by reporting data in a standard format as specified in the Data Management Plan in Section B10.

Completeness

The completeness of the data describes how much of the data are available for use compared to the total potential data. Ideally, 100% of the data should be available. However, the possibility of unavailable data due to accidents, insufficient sample volume, broken or lost samples, etc. is to be expected. Therefore, it will be a general goal of the project(s) that 90% data completion is achieved.

A8 Special Training/Certification

Before new field personnel independently conduct field work, the local partner's designated trainer (See table A8.1 below) trains him/her in proper instrument calibration, field sampling techniques, and field analysis procedures. The QA officer (or designee) will document the successful field demonstration. The local partner's QA Officer (or designee) will retain documentation of training and the successful field demonstration in the employee's personnel file (or other designated location) and ensure that the documentation will be available during monitoring systems audits.

Table A8.1 The Designated Trainer for each Local Partner Agency

Local Partner Agency	Designated Trainer
Houston-Galveston Area Council	~~Jean Wright~~ Kendall Guidroz
Harris County Pollution Control Services	Bryan Kosler
City of Houston – Houston Health Department	Darryl Tate
City of Houston – Drinking Water Operations	Desta Takie
San Jacinto River Authority	Shane Simpson
Environmental Institute of Houston	Jenny Oakley
Texas Research Institute for Environmental Studies	Ashley Morgan-Olvera

The requirements for Global Positioning System (GPS) certification are located in Section B10, Data Management.

Contractors and subcontractors must ensure that laboratories analyzing samples under this QAPP meet the requirements contained in The NELAC Institute Standard (TNI) (2016) Volume 1, Module 2, Section 4.5.5 (concerning Subcontracting of Environmental Tests).

A9 Documents and Records

The documents and records that describe, specify, report, or certify activities are listed. The list below is limited to documents and records that may be requested for review during a monitoring systems audit.

Table A9.1a Project Documents and Records – H-GAC

Document/Record	Location	Retention (yrs)	Format
QAPPs, amendments and appendices	H-GAC	≥7	Paper & electronic
Field SOPs	H-GAC	≥7	Paper & electronic
Laboratory Quality Manuals	Eastex Lab	≥7	Paper & electronic
Laboratory SOPs	Eastex Lab	≥7	Paper & electronic
QAPP distribution documentation	H-GAC / Eastex Lab	≥7	Paper & electronic
Field staff training records	H-GAC	≥7	Paper & electronic
Field equipment calibration/maintenance logs	H-GAC	≥7	Paper
Field instrument printouts	H-GAC	≥7	Paper & electronic
Field notebooks or data sheets	H-GAC	≥7	Paper
Chain of custody records	H-GAC / Eastex Lab	≥7	Paper & electronic
Laboratory calibration records	Eastex Lab	≥7	Paper
Laboratory instrument printouts	Eastex Lab	≥7	Paper
Laboratory data reports/results	Eastex Lab	≥7	Electronic
Laboratory equipment maintenance logs	Eastex Lab	≥7	Paper
Corrective Action Documentation	H-GAC / Eastex Lab	≥7	Paper & electronic

Table A9.1b Project Documents and Records - HCPCS

Document/Record	Location	Retention (yrs)	Format
QAPPs, amendments and appendices	HCPCS / H-GAC	≥7	Paper &/or electronic
Field SOPs	HCPCS	≥7	Paper &/or electronic
Laboratory Quality Manuals	HCPCS Laboratory	≥7	Paper &/or electronic
Laboratory SOPs	HCPCS Laboratory	≥7	Paper &/or electronic
QAPP distribution documentation	HCPCS / H-GAC	≥7	Paper
Field staff training records	HCPCS	≥7	Paper
Field equipment calibration/maintenance logs	HCPCS	≥7	Paper
Field instrument printouts	HCPCS	≥7	Paper &/or electronic
Field notebooks or data sheets	HCPCS / H-GAC	≥7	Paper
Chain of custody records	HCPCS Laboratory / H-GAC	≥7	Paper
Laboratory calibration records	HCPCS Laboratory	≥7	Paper
Laboratory instrument printouts	HCPCS Laboratory	≥7	Paper
Laboratory data reports/results	HCPCS Laboratory	≥7	Paper &/or electronic
Laboratory equipment maintenance logs	HCPCS Laboratory	≥7	Paper
Corrective Action Documentation	HCPCS / HCPCS Laboratory / H-GAC	≥7	Paper

Table A9.1g Project Documents and Records – EIH

Document/Record	Location	Retention (yrs)	Format
QAPPs, amendments and appendices	EIH / Eastex Lab / HGAC	≥7	Paper
Field SOPs	EIH	≥7	Paper
Laboratory Quality Manuals	Eastex Lab	≥7	Paper &/or electronic
Laboratory SOPs	Eastex Lab	≥7	Paper &/or electronic
QAPP distribution documentation	EIH / Eastex Lab / HGAC	≥7	Paper
Field staff training records	EIH	≥7	Paper
Field equipment calibration/ maintenance logs	EIH	≥7	Paper &/or electronic
Field instrument printouts	EIH	≥7	Paper
Field notebooks or data sheets	EIH / H-GAC	≥7	Paper &/or electronic
Chain of custody records	EIH / Eastex Lab / HGAC	≥7	Paper &/or electronic
Laboratory calibration records	Eastex Lab	≥7	Paper
Laboratory instrument printouts	Eastex Lab	≥7	Paper
Laboratory data reports/results	Eastex Lab	≥7	Electronic
Laboratory equipment maintenance logs	Eastex Lab	≥7	Paper
Corrective Action Documentation	EIH / Eastex Lab / HGAC	≥7	Paper

Table A9.1h Project Documents and Records - TRIES

Document/Record	Location	Retention (yrs)	Format
QAPPs, amendments and appendices	TRIES / Eastex Lab / H-GAC	≥7	Paper &/or electronic
Field SOPs	TRIES	≥7	Paper &/or electronic
Laboratory Quality Manuals	TRIES Lab / Eastex Lab	≥7	Paper &/or electronic
Laboratory SOPs	TRIES Lab / Eastex Lab	≥7	Paper &/or electronic
QAPP distribution documentation	TRIES / TRIES Lab / Eastex Lab / H-GAC	≥7	Paper
Field staff training records	TRIES	≥7	Paper
Field equipment calibration/maintenance logs	TRIES	≥7	Paper
Field instrument printouts	TRIES	≥7	Paper &/or electronic
Field notebooks or data sheets	TRIES / H-GAC	≥7	Paper &/or electronic
Chain of custody records	TRIES / TRIES Lab / Eastex Lab / H-GAC	≥7	Paper &/or electronic
Laboratory calibration records	TRIES Lab / Eastex Lab	≥7	Paper
Laboratory instrument printouts	TRIES Lab / Eastex Lab	≥7	Paper
Laboratory data reports/results	TRIES Lab	≥7	Paper &/or electronic
Laboratory equipment maintenance logs	TRIES Lab / Eastex Lab	≥7	Paper
Corrective Action Documentation	TRIES / TRIES Lab / Eastex Lab / H-GAC	≥7	Paper &/or electronic

Table B2.1g Sample Storage, Preservation and Handling Requirements for EIH. Samples Analyzed by Eastex Environmental Laboratory

Parameter	Matrix	Container	Preservation	Sample Volume	Holding Time
TSS	water	Plastic	Cool to <6°C but not frozen	1 L	7 days
Sulfate	water	Plastic	Cool to <6°C but not frozen	100 ml[3]	28 days
Chloride	water	Plastic	Cool to <6°C but not frozen	100 mL[3]	28 days
E. coli IDEXX Colilert	water	Sterile Plastic w/ sodium thiosulfate	Cool to <6°C but not frozen	120 mL[4]	8 hours[1]
Enterococci IDEXX Enterolert	water	Sterile Plastic w/ sodium thiosulfate	Cool to <6°C but not frozen	120 mL[4]	8 hours
TKN	water	Plastic	Cool to <6°C but not frozen H_2SO_4 to pH <2	500 mL[2]	28 days
Ammonia-N	water	Plastic	Cool to <6°C but not frozen H_2SO_4 to pH <2	125 mL[2]	28 days
Nitrite-N	water	Plastic	Cool to <6°C but not frozen	100 mL[2 and 5]	48 hours
Nitrate-N	water	Plastic	Cool to <6°C but not frozen	100 mL[2 and 5]	48 hours
Nitrite + nitrate-N	water	Plastic	Cool to <6°C but not frozen, H_2SO_4 to pH <2	125 mL[3 and 5]	28 days
Phosphorus-P, total	water	Plastic	Cool to <6°C but not frozen Acidified at lab[6]	125 mL[2]	28 days
Chlorophyll-*a*	water	Brown plastic	Dark & iced before filtration; Dark & frozen after filtration	4 L	Filtered w/in 48 hours; after filtered, then frozen up to 24 days

1. *E. coli* samples should always be processed as soon as possible and incubated no later than 8 hours from time of collection. When transport conditions necessitate sample incubation after 8 hours from time of collection, the holding time may be extended and samples must be processed as soon as possible and within 30 hours.
2. Five tests are analyzed from one 1L plastic bottle.
3. One 500 mL plastic container is used to collect these three samples.
4. Maximum volume analyzed for bacteria analysis is 50 ml allowing duplicate analyses from 1 container.
5. Eastex will run IC speciation (100 mL samples) first but will analyze Nitrite+Nitrate (125 mL sample) by cadmium reduction method if IC equipment is down.
6. T. Phosphorus sample taken out of TSS 1-liter and preserved at the lab with Nitric Acid (HNO_3) in separate bottle.

Table B2.1h Sample Storage, Preservation, and Handling Requirements for TRIES. Samples Analyzed by the TRIES Laboratory or Eastex Environmental Laboratory

Parameter	Matrix	Container	Preservation	Sample Volume	Holding Time
TSS	water	Plastic	Cool to <6°C but not frozen	1 L	7 days
Sulfate	water	Plastic	Cool to <6°C but not frozen	100 mL [3]	28 days
Chloride	water	Plastic	Cool to <6°C but not frozen	100 mL [3]	28 days
E. coli IDEXX Colilert	water	Sterile Plastic w/ sodium thiosulfate	Cool to <6°C but not frozen	120 mL [2]	8 hours [1]
Ammonia-N	water	Plastic	Cool to <6°C but not frozen H_2SO_4 to pH <2	125 mL	28 days
Nitrate-N	water	Plastic	Cool to <6°C but not frozen	125 mL [3]	48 hours

Nitrite-N	water	Plastic	Cool to <6°C but not frozen	125 mL [3]	48 hours
Nitrite + nitrate-N	water	Plastic	Cool to <6°C but not frozen, H_2SO_4 to pH <2	125 mL	28 days [4 and 5]
Phosphorus-P, total	water	Plastic	Cool to <6°C but not frozen HNO_3 to pH <2	125 mL [6]	28 days

1. *E.coli* samples analyzed by IDEXX Colilert method should always be processed as soon as possible and incubated no later than 8 hours from time of collection. When transport conditions necessitate sample incubation after 8 hours from time of collection, the holding time may be extended and samples must be processed as soon as possible and within 30 hours.
2. Maximum volume analyzed for *E. coli* is 50 ml allowing duplicate analyses from 1 container.
3. One 250 mL plastic container is used to collect these four samples.
4. Eastex Environmental Lab will pick up and analyze sample(s) if necessary.
5. TRIES & Eastex can both run IC speciation but if TRIES IC unit is down, Eastex will analyze Nitrite+Nitrate by cadmium reduction method.
6. T. Phosphorus sample collected in separate 125 ml plastic bottle and preserved at the lab with Nitric Acid (HNO3).

Sample Containers

Certificates from sample container manufacturers are maintained in a notebook by each of the monitoring partners as appropriate. Information about the various sample containers for each local partner is described below.

Houston-Galveston Area Council (H-GAC)
All sample containers are provided to H-GAC by their contract lab, Eastex. The lab performs and tracks required QC procedures for all bottles purchased.

- Plastic, disposable sample containers are used for conventional parameters.
- Sterile, sealed, 120 mL plastic, disposable bottles with a sodium thiosulfate tablet added, are used for bacteriological samples.
- When preservation is required for particular parameters, the acid is added to the container in the field by field personnel immediately after samples are collected.

Harris County Pollution Control Services (HCPCS)
All sample containers are purchased by the HCPCS Lab except as noted below. The labs perform and track all required QC procedures for the bottles they purchased and provide to the field crew.

- Pre-cleaned, plastic, disposable sample containers are used for conventional parameters.
- Sterile, sealed, 120 mL plastic, disposable bottles with a sodium thiosulfate tablet added, are used for bacteriological samples.
- Brown, polyethylene, 4-liter cubitainers are used routinely for chlorophyll-*a* samples and are provided by H-GAC's contract lab, Eastex Environmental Lab.
- Pre-cleaned, plastic, disposable sample containers for the TKN samples are also provided by H-GAC's contract lab, Eastex Environmental Lab.
- When preservation is required for particular parameters, the bottles are pre-acidified at the lab. Containers are never dipped underwater but are filled using a white or opaque, plastic pitcher and water sample are collected from the required depth as specified in the SWQM Procedures Volume 1 manual.

City of Houston - Health Department (HHD)
All sample containers are purchased by the Bureau of Pollution Control and Prevention except as noted below. All containers are received at the field office located on Park Place. Before containers are used by field crews, a specified number of containers are pulled out for delivery to the HHD-BLS Lab where all QC checks and documentation are performed. The HHD-BLS Lab QAO reviews and tracks the results of all QC testing.

- Pre-cleaned, plastic, disposable sample containers are used for conventional parameters.
- Sterile, sealed, 120 or 250 mL plastic, disposable bottles with sodium thiosulfate tablet added, are used for the microbiological samples.
- Pre-cleaned, plastic, disposable sample containers for the TKN samples are provided by H-GAC's contract lab, Eastex Environmental Lab.

When preservation is required, the preservative is added to the container in the field by field personnel

For most parameters except bacteria, precision is evaluated using the relative percent difference (RPD) between duplicate results as defined by 100 times the difference (range) of each duplicate set, divided by the average value (mean) of the set. For duplicate results, X_1 and X_2, the RPD is calculated from the following equation:

$$RPD = \frac{|X_1 - X_2|}{\left(\frac{X_1 + X_2}{2}\right)} \times 100$$

If the precision criterion is exceeded, the data are not acceptable for use under this project and are not reported to TCEQ. Results from all samples associated with that failed duplicate (usually a maximum of 10 samples) are considered to have excessive analytical variability and are qualified as not meeting project QC requirements.

For bacteriological parameters, precision is evaluated using the results from laboratory duplicates. Bacteriological duplicates are analyzed at a 10% frequency (or once per preparation batch, whichever is more frequent). Sufficient volume should be collected to analyze laboratory duplicates from the same sample container.

The base-10 logarithms of the results from the original sample and its duplicate are calculated. The absolute value of the difference between the two base-10 logarithms is calculated and compared to the precision criterion in Appendix A.

The precision criterion in Appendix A for bacteriological duplicates applies only to samples with concentrations > 10 MPN.

Matrix spike (MS) – Matrix spikes are prepared by adding a known quantity of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.

Matrix spikes indicate the effect of the sample on the precision and accuracy of the results generated using the selected method. Matrix-specific QC samples indicate the effect of the sample matrix on the precision and accuracy of the results generated using the selected method. The information from these controls is sample/matrix specific and would not normally be used to determine the validity of the entire batch. The frequency of matrix spikes is specified by the analytical method, or a minimum of one per preparation batch, whichever is greater. To the extent possible, matrix spikes prepared and analyzed over the course of the project should be performed on samples from different sites.

The components to be spiked shall be as specified by the mandated analytical method. The results from matrix spikes are primarily designed to assess the validity of analytical results in a given matrix and are expressed as percent recovery (%R).

The percent recovery of the matrix spike is calculated using the following equation, where %R is percent recovery, S_{SR} is the concentration measured in the matrix spike, S_R is the concentration in the parent sample, and S_A is the concentration of analyte that was added:

$$\%R = \frac{S_{SR} - S_R}{S_A} \times 100$$

Matrix spike recoveries are compared to the acceptance criteria published in the mandated test method. If the matrix spike results are outside established criteria, the data for the analyte that failed in the parent sample is not acceptable for use under this project and will not be reported to TCEQ. The result from the parent sample associated with that failed matrix spike will be considered to have excessive analytical variability and will be qualified by the laboratory as not meeting project QC requirements. Depending on the similarities in composition of the samples in the batch, the H-GAC may consider excluding all of the results in the batch related to the analyte that failed recovery.

Measurement performance specifications for matrix spikes for each partner lab are discussed below.

- Harris County Pollution Control Services (HCPCS) The measurement performance specification for matrix spikes is recovery between 75 and 125 percent. If a spike recovery is outside this range, the result is qualified in the QC narrative contained in the data submittal checklist. In addition, the laboratory applies control chart techniques to monitor performance, and establishes updated internal control limits for matrix spike recovery on an annual basis.

- The City of Houston, HHD BLS Lab has a matrix spike recovery requirement of 80-120 percent unless specifically stated for the parameter. A spike that falls outside laboratory limits is reanalyzed. If the spike fails a second time, another sample within the same set is prepared as a spike and analyzed. When several different matrix spikes fall outside stated limits, matrix interference is likely. If the required matrix spike recovery is not met, the data affected are qualified and flagged as exceeding control limits.

- The City of Houston, DWO Lab The recovery of matrix spikes for the samples analyzed in DWO laboratory is between 80 to 120 percent. If a spike recovery is outside this range, the result is qualified in the QC narrative contained in the data submittal checklist. In addition, the laboratory applies control chart techniques to monitor performance.

- Eastex uses matrix spike recovery limits of ~~80-120~~75-125 percent for parameters where a spike solution is available. These recoveries are monitored with QC charts to help determine interferences or detect trends. Matrix spikes that fail to meet these guidelines are reanalyzed, if possible. An alternate sample may be used to help determine whether the problem was specific to that sample. If matrix spikes are not achievable within ~~80-120~~75-125 % recovery then this recovery is flagged as exceeding the control limit on the QC report.

- TRIES Lab uses matrix spike recovery limits of 75-125 percent which are published in the mandated test method where a spike solution is required. Matrix spikes that fail to meet these guidelines are reanalyzed, if possible, or an alternate sample may be used to help determine whether the problem was specific to that sample. If matrix spikes are not achievable within method acceptance criteria, the data are reported with appropriate data qualifying codes on the analytical report. Control Charts are monitored for laboratory performance.

Method blank

A method blank is a sample of matrix similar to the batch of associated samples (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as the samples through all steps of the analytical procedures, and in which no target analytes or interferences are present at concentrations that impact the analytical results for sample analyses. The method blank is used to document contamination from the analytical process. The analysis of method blanks should yield values less than the LOQ. For very high-level analyses, the blank value should be less than 5% of the lowest value of the batch, or corrective action will be implemented. Samples associated with a contaminated blank shall be evaluated as to the best corrective action for the samples (e.g. reprocessing, data qualifying codes). In all cases the corrective action must be documented.

The method blank shall be analyzed at a minimum of one per preparation batch. In those instances for which no separate preparation method is used the batch shall be defined as environmental samples that are analyzed together with the same method and personnel, using the same lots of reagents, not to exceed the analysis of 20 environmental samples.

Quality Control or Acceptability Requirements Deficiencies and Corrective Actions

Sampling QC excursions are evaluated by the H-GAC Project Manager, in consultation with the H-GAC QAO and/or H-GAC Data Manager. In that differences in sample results are used to assess the entire sampling process, including environmental variability, the arbitrary rejection of results based on pre-determined limits is not practical. Therefore, the professional judgment of the H-GAC Project Manager, QAO and Data Manager will be relied upon in evaluating results. Notations of blank contamination are noted in the data summaries that accompany data deliverables.

Laboratory measurement quality control failures are evaluated by the laboratory staff. The disposition of such failures and the nature and disposition of the failure is reported to the Laboratory QAO. The Laboratory QAO

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Appendix A: Measurement Performance Specifications (Tables A7.1-8)

Contains TRIES A7.8a, 8b,8c, and 8d replacement pages 31-34.

TABLE A7.8a Measurement Performance Specifications for Texas Research Institute for Environmental Studies (TRIES)					
Field Parameters					
Parameter	Units	Matrix	Method	Parameter Code	Lab
TEMPERATURE, WATER (DEGREES CENTIGRADE)	DEG C	water	SM 2550 B and TCEQ SOP V1	00010	Field
TRANSPARENCY, SECCHI DISC (METERS)	meters	water	TCEQ SOP V1	00078	Field
SPECIFIC CONDUCTANCE,FIELD (US/CM @ 25C)	us/cm	water	EPA 120.1 and TCEQ SOP, V1	00094	Field
OXYGEN, DISSOLVED (MG/L)	mg/L	water	SM 4500-O G and TCEQ SOP V1	00300	Field
PH (STANDARD UNITS)	s.u	water	EPA 150.1 and TCEQ SOP V1	00400	Field
DAYS SINCE PRECIPITATION EVENT (DAYS)	days	other	TCEQ SOP V1	72053	Field
DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE	meters	water	TCEQ SOP V2	82903	Field
MAXIMUM POOL WIDTH AT TIME OF STUDY (METERS)**	meters	other	TCEQ SOP V2	89864	Field
MAXIMUM POOL DEPTH AT TIME OF STUDY(METERS)**	meters	other	TCEQ SOP V2	89865	Field
POOL LENGTH, METERS**	meters	other	TCEQ SOP V2	89869	Field
% POOL COVERAGE IN 500 METER REACH**	%	other	TCEQ SOP V2	89870	Field
WIND INTENSITY (1=CALM,2=SLIGHT,3=MOD.,4=STRONG)	NU	other	NA	89965	Field
PRESENT WEATHER (1=CLEAR,2=PTCLDY,3=CLDY,4=RAIN,5=OTHER)	NU	other	NA	89966	Field
WATER SURFACE(1=CALM,2=RIPPLE,3=WAVE,4=WHITECAP)	NU	water	NA	89968	Field
WATER ODOR (1=SEWAGE, 2=OILY/CHEMICAL, 3=ROTTEN EGGS, 4=MUSKY, 5=FISHY, 6=NONE, 7=OTHER (WRITE IN COMMENTS))	NU	water	NA	89971	Field
WATER COLOR 1=BRWN 2=RED 3=GRN 4=BLCK 5=CLR 6=OT	NU	water	NA	89969	Field
WATER CLARITY (1=EXCELLENT, 2=GOOD, 3=FAIR, 4=POOR)	NU	water	NA	20424	Field
TURBIDITY, OBSERVED (1=LOW, 2=MEDIUM, 3=HIGH)	NU	water	NA	88842	Field

* Reporting to be consistent with SWQM guidance and based on measurement capability.
** To be routinely reported when collecting data from perennial pools.

References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
U.S. Code of Federal Regulations (CFR). Title 40: Protection of Environment, Part 136
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017.
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).

TABLE A7.8b Measurement Performance Specifications for Texas Research Institute for Environmental Studies (TRIES)

Flow Parameters					
Parameter	**Units**	**Matrix**	**Method**	**Parameter Code**	**Lab**
FLOW STREAM, INSTANTANEOUS (CUBIC FEET PER SEC)	cfs	water	TCEQ SOP V1	00061	Field
FLOW SEVERITY:1=No Flow,2=Low,3=Normal,4=Flood,5=High,6=Dry	NU	water	TCEQ SOP V1	01351	Field
FLOW MTH 1=GAGE 2=ELEC 3=MECH 4=WEIR/FLU 5=DOPPLER	NU	other	TCEQ SOP V1	89835	Field

References:

United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
U.S. Code of Federal Regulations (CFR). Title 40: Protection of Environment, Part 136
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard
Methods for the Examination of Water and Wastewater, 23rd Edition, 2017.
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).

TABLE A7.8c Measurement Performance Specifications for Texas Research Institute for Environmental Studies (TRIES)										
Conventional Parameters in Water										
Parameter	**Units**	**Matrix**	**Method**	**Parameter Code**	**TCEQ AWRL**	**LOQ**	**LOQ Check Sample %Rec**	**Precision (RPD)**	**Bias %Rec. of LCS**	**Lab**
RESIDUE, TOTAL NONFILTRABLE (MG/L)	mg/L	water	SM 2540D	00530	5	2.5	NA	NA	NA	TRIES
RESIDUE, TOTAL NONFILTRABLE (MG/L)	mg/L	water	SM 2540D	00530	5	1	NA	NA	NA	Eastex
NITROGEN, AMMONIA, TOTAL (MG/L AS N)	mg/L	water	SM 4500-NH3 D	00610	0.1	0.1	70-130	20	80-120	TRIES
NITROGEN, AMMONIA, TOTAL (MG/L AS N)	mg/L	water	SM 4500-NH3 G	00610	0.1	0.1	70-130	20	80-120	Eastex
NITRITE NITROGEN, TOTAL (MG/L AS N)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	00615	0.05	0.05	70-130	20	85-115	TRIES
NITRITE NITROGEN, TOTAL (MG/L AS N)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	00615	0.05	0.05	70-130	20	80-120	Eastex
NITRATE NITROGEN, TOTAL (MG/L AS N)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	00620	0.05	0.05	70-130	20	85-115	TRIES
NITRATE NITROGEN, TOTAL (MG/L AS N)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	00620	0.05	0.05	70-130	20	80-120	Eastex
NITRITE PLUS NITRATE, TOTAL ONE LAB DETERMINED VALUE (MG/L AS N)	mg/L	water	SM 4500-NO3 F	00630	0.05	0.02	70-130	20	80-120	Eastex
PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P)	mg/L	water	EPA 200.7	00665	0.06	0.04	70-130	20	85-115	TRIES
PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P)	mg/L	water	EPA 200.7	00665	0.06	0.06	70-130	20	80-120	Eastex
CHLORIDE (MG/L AS CL)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	00940	5	4	70-130	20	85-115	TRIES
CHLORIDE (MG/L AS CL)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	00940	5	5	70-130	20	80-120	Eastex
SULFATE (MG/L AS SO4)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	00945	5	3	70-130	20	85-115	TRIES
SULFATE (MG/L AS SO4)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	00945	5	4	70-130	20	80-120	Eastex

References:

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

U.S. Code of Federal Regulations (CFR). Title 40: Protection of Environment, Part 136

American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017.

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).

TABLE A7.8d Measurement Performance Specifications for Texas Research Institute for Environmental Studies (TRIES)										
Bacteriological Parameters in Water										
Parameter	**Units**	**Matrix**	**Method**	**Parameter Code**	**TCEQ AWRL**	**LOQ**	**LOQ Check Sample %Rec**	**Log Difference of Duplicates**	**Bias %Rec. of LCS**	**Lab**
E. COLI, COLILERT, IDEXX METHOD, MPN/100ML	MPN/100 mL	water	IDEXX Colilert or Colilert-18**	31699	1	1	NA	0.50*	NA	TRIES
E.COLI, COLILERT, IDEXX, HOLDING TIME	hours	water	NA	31704	NA	NA	NA	NA	NA	TRIES
E. COLI, COLILERT, IDEXX METHOD, MPN/100ML	MPN/100 mL	water	IDEXX Colilert**	31699	1	1	NA	0.50*	NA	Eastex
E.COLI, COLILERT, IDEXX, HOLDING TIME	hours	water	NA	31704	NA	NA	NA	NA	NA	Eastex

* This value is not expressed as a relative percent difference. It represents the maximum allowable difference between the logarithm of the result of a sample and the logarithm of the duplicate result. See Section B5.

** E.coli samples analyzed by these methods should always be processed as soon as possible and within 8 hours. When transport conditions necessitate delays in delivery longer than 6 hours, the holding time may be extended and samples must be processed as soon as possible and within 30 hours.

References:

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

U.S. Code of Federal Regulations (CFR). Title 40: Protection of Environment, Part 136

American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017.

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).

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Appendix D: Field Data Sheets

contains replacement page 86 for TRIES field sheet only

Texas Research Institute for Environmental Studies - Sam Houston State University

Clean Rivers Program Field Data/Sampling Sheet

Station ID:_____ Date:_____ Sample Time: _____

Location:_____ Lat:_____ Long:_____

Collected By:_____

FIELD MEASUREMENTS (If < 1.5m deep - record @ 0.3m from surface; If≥ 1.5m deep - perform profile @ 0.3m from bottom, @ middle, and @ 0.3m from surface)

	1	2	3	4	5
Temp (C)					
Conductivity (uS)					
Salinity (psu)					
DO (%sat)					
DO mg/L					
pH					
Depth (m)					

FIELD OBSERVATIONS

	TOTAL DEPTH (m)		PRESENT WEATHER 1-clear 2-partly cloudy 3-cloudy 4-rain 5-other
	WATER ODOR 1-sewage 2-oily/chemical 3-rotten egg 4-musky 5-fishy 6-none 7-other		FLOW SEVERITY 1-no flow 2-low 3-normal 4-flood 5-high 6-dry
	WATER SURFACE 1-calm 2-ripples 3-waves 4-whitecap		FLOW (cfs)
	WIND INTENSITY 1-calm 2-slight 3-moderate 4-strong		FLOW METHOD 1-gage 2-electric 3-mechanical 4-weir/flume 5-doppler
	WATER COLOR 1-brownish 2-reddish 3-greenish 4-blackish 5-clear 6-other		SECCHI DISK (m)
	TIDE STAGE 1-low 2-falling 3-slack 4-rising 5-high		RECREATIONAL USE 1=1° observed, 2=2° observed, 3=non-contact observed, 4=1° evidence, 5=2° evidence, 6=non-contact evidence, 7=no evidence
	DAYS SINCE LAST SIG. RAINFALL		Primary Contact Rec. Observed (enter number of people)
			Evidence of Primary Contact Rec. Observed 0= no evidence observed, 1= evidence observed

WATER SAMPLES

☐ **FRESH** (Non-Tidal) ☐ **MARINE** (Tidal) Field Split Collected (yes/no)

☐ *E. coli* ☐ *Enterococcus*

Container	Preservative	Analysis Requested	Comments
2 x 1L - Plastic	Ice	TSS	
2 x 1L - Plastic	Ice, 2 mL H_2SO_4 added	NH_3, TPO_4, NO_2+NO_3	
2 x 500ml - Plastic	Ice, 1 mL H_2SO_4 added	TKN	
2 x 500ml - Plastic	Ice	Cl, SO_4 (fresh water only)	
2 x 4L - Plastic (amber)	Ice	Chlorophyll-a (select sites)	
1 x 100ml - Plastic	Ice, $Na_2S_2O_3$ tablet	Bacteria (Entero and/or *E. coli*)	

ADDITIONAL INFORMATION & REMARKS

* If site is dry, determine if there is any pool with 500m reach. If pool(s) exists (> 10m in length and 0.4m deep) record: Lat _____ Long_____ of largest pool in reach Maximum pool width_____(m). Maximum pool depth _____ (m). Pool length _____(m), and percent pool coverage in 500m reach _____%.

Texas Research Institute for Environmental Studies - Sam Houston State University

Clean Rivers Program Field Data/Sampling Sheet

Station ID:_____ Date:_____ Time of Water Sample Collection: _____

Location:_____ Lat:_____ Long:_____

Collected By:_____

FIELD MEASUREMENTS (If < 0.5m (50cm) - record at 1/3 of depth from the surface. If between 0.5m (50cm) & 1.5m (150cm) deep - record @ 0.3m (30 cm) from surface).

	1	2	3	4	5
Temp (C)					
Conductivity (uS)					
DO mg/L					
pH					
mple Depth (cm/m)					

FIELD OBSERVATIONS

	TOTAL DEPTH (cm/m)	
	WATER ODOR	1-sewage 2-oily/chemical 3-rotten egg 4-musky 5-fishy 6-none 7-other
	WATER SURFACE	1-calm 2-ripples 3-waves 4-whitecap
	WIND INTENSITY	1-calm 2-slight 3-moderate 4-strong
	WATER COLOR	1-brownish 2-reddish 3-greenish 4-blackish 5-clear 6-other
	WATER CLARITY	1-EXCELLENT 2-GOOD 3-FAIR 4-POOR
	OBSERVED WATER TURBIDITY	1-LOW 2-MEDIUM 3-HIGH
	PRESENT WEATHER	1-clear 2-partly cloudy 3-cloudy 4-rain 5-other
	FLOW SEVERITY	1-no flow 2-low 3-normal 4-flood 5-high 6-dry
	FLOW (cfs)	
	FLOW METHOD	1-gage 2-electric 3-mechanical 4-weir/flume 5-doppler
	SECCHI TUBE (cm/m)	
	DAYS SINCE LAST SIG. RAINFALL (> or = 0.50 inches)	
	Primary Contact Rec. Observed	(# of people observed)
	Evidence of Primary Contact Rec. Observed	0= no evidence observed, 1= evidence observed

WATER SAMPLES

☐ **FRESH** (Non-Tidal) ☐ **MARINE** (Tidal)

☐ *E. coli* ☐ *Enterococcus*

Field Split Collected (yes/no)

Container	Preservative	Analysis Requested	Comments
1 x 200ml - Plastic	Ice, $Na_2S_2O_3$ tablet	Bacteria (Entero and/or E. coli)	
1 x 1L - Plastic	Ice	TSS	
1 x 250 ml - Plastic	Ice	Cl, NO_3, NO_2, SO_4	
1 x 1L - Plastic	Ice, H_2SO_4	TKN	
1 x 125 ml - Plastic	Ice, H_2SO4	NH_3	
1 x 125 ml - Plastic	Ice, HNO_3	T PO_4	

ADDITIONAL INFORMATION & REMARKS

* If site is dry, determine if there is any pool with 500m reach, If pool(s) exists (> 10 m in length and 0.4m deep) record: Lat _____ Long_____ of largest pool in reach Maximum pool width_____(m), Maximum pool depth _____ (m), Pool length _____(m), and percent pool coverage in 500m reach _____%.

QAPP AMENDMENT 1

Appendix E: Chain of Custody Forms

contains TRIES COC replacement page 94 only

Texas Research Institute for Environmental Studies (TRIES) Analytical Laboratory
Sam Houston State University
Chain of Custody

REPORT TO:				BILL TO:			
Name: Kaitlen Gary				**Name:** Kaitlen Gary			
Company: TRIES Aquatics Laboratory				**Company:** TRIES Aquatics Laboratory			
Address: 2424 Sam Houston Avenue, Suite B-8				**Address:** 2424 Sam Houston Avenue, Suite B-8			
City, State, Zip: Huntsville, Tx 77340				**City, State, Zip:** Huntsville, TX 77320			
Phone: 936-294-2501	**Fax**	**Email:** kpgary@shsu.edu		**Phone:** 936-294-2501	**Fax:**	**Email:** kpgary@shsu.edu	
Sampler Name:	**Sampler Signature:**			Analysis Required		TRIES Log #	

Date Collected	Time Collected	Matrix Code	Type* C	Type* G	Sample Description/Location	Bottle ID	pH	°C	Preservation Code	Cl, SO4, NO2, NO3	TSS	T PO4	NH3				Sample Number
		AQ		X		B1			C	X							
		AQ		X		B2			C		X						
		AQ		X		B3			A			X					
		AQ		X		B4			D				X				

Requested TAT:
Normal (10 days)
Expedite: (5 days)
Rush (1 Day)
*C=Composite
G=Grab

Matrix Code:
WW=Wastewater
AQ=water
SW=solid

Preservation
C = <6° C
A = pH <2 HNO_3
B = pH <2 HCl
D = pH <2 H_2SO_4
E = $Na_2S_2O_3$

Sample Receiving/Lab Comments:

TRIES Use Only

Sample Receipt Checklist:

Shipped: _____
Hand Del: _____

Container Tape:
Present: Y N NA Intact Y N NA

Cooler Temp: _____(°C)

Broken: Y N Leaking: Y N

Preserved: Y N
Acid type: _____
Acid vol: _____
Acid lot: _____

COC Seals:
Present: Y N NA Intact: Y N NA

COC & Labels Match: Y N

Sufficient Quantity: Y N

Relinquished By:	**Date/Time:**	**Relinquished By:**	**Date/Time:**
Received By:	**Date/Time:**	**Received By:**	**Date/Time:**
Thermometer ID:	**pH strips Lot:**	**Project:** Clean Rivers Program	

2424 Sam Houston Ave. Suite B8 · Huntsville, Texas 77340 · (936)294-3715 · Fax (936)294-3822

Texas Research Institute for Environmental Studies (TRIES) Environmental Studies Analytical Laboratory
Sam Houston State University
Chain of Custody

TRIES Log Number:

Name: Ashley Morgan-Olvera	**Company: TRIES Aquatics Lab**
Address: 2424 Sam Houston Avenue, Suite B-8	**City, State, Zip: Huntsville, TX 77341**
Telephone: 936-294-3716	**Email: arm001@shsu.edu**
Sampler Name: Ashley Morgan-Olvera	**Sampler Signature:**

Date Collected	Time Collected	Matrix Code	Type C	Type G	Sample Description/Location	Sample Number	Bottle ID	Preservation Code	Acid Type	Acid volume (mL)	Obs °C / Cf °C	pH	CL, SO4, NO2, NO3	TSS	T PO4	NH3	*E. coli*				
		AQ		G			B1	C					X								
		AQ		G			B2	C						X							
		AQ		G			B3	A							X						
		AQ		G			B4	D								X					
		AQ		G			Col	C									X				

TAT	Matrix Code	Type Code	Preservation Code
N= Normal (10 days)	WW = wastewater	C = composite	C = 0 to <6 °C
E = Expedite (5 days)	AQ= aqueous	G = grab	A = pH<2 HNO_3
R= Rush (1 day)	SW= solid		B = pH<2 HCl
			D = pH<2 H_2SO_4

Sample Receipt Checklist:
Shipped _____ Delivered_____ Container tape present _____Container tape intact _____ Cooler Temp (°C)_____
Broken _____Leaking_____Preserved_____ COC and labels match _____ Sufficient quantity _____
Lab Comments:

Relinquished by:	**Date/Time:**	**Relinquished by:**	**Date/Time:**
Received by:	**Date/Time:**	**Received by:**	**Date/Time:**
Thermometer ID:	**pH strips lot:**	**HNO3:** **HCl:**	**H2SO4:**

Effective Date: 10/28/2019

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