



Environmental Services Department Overview

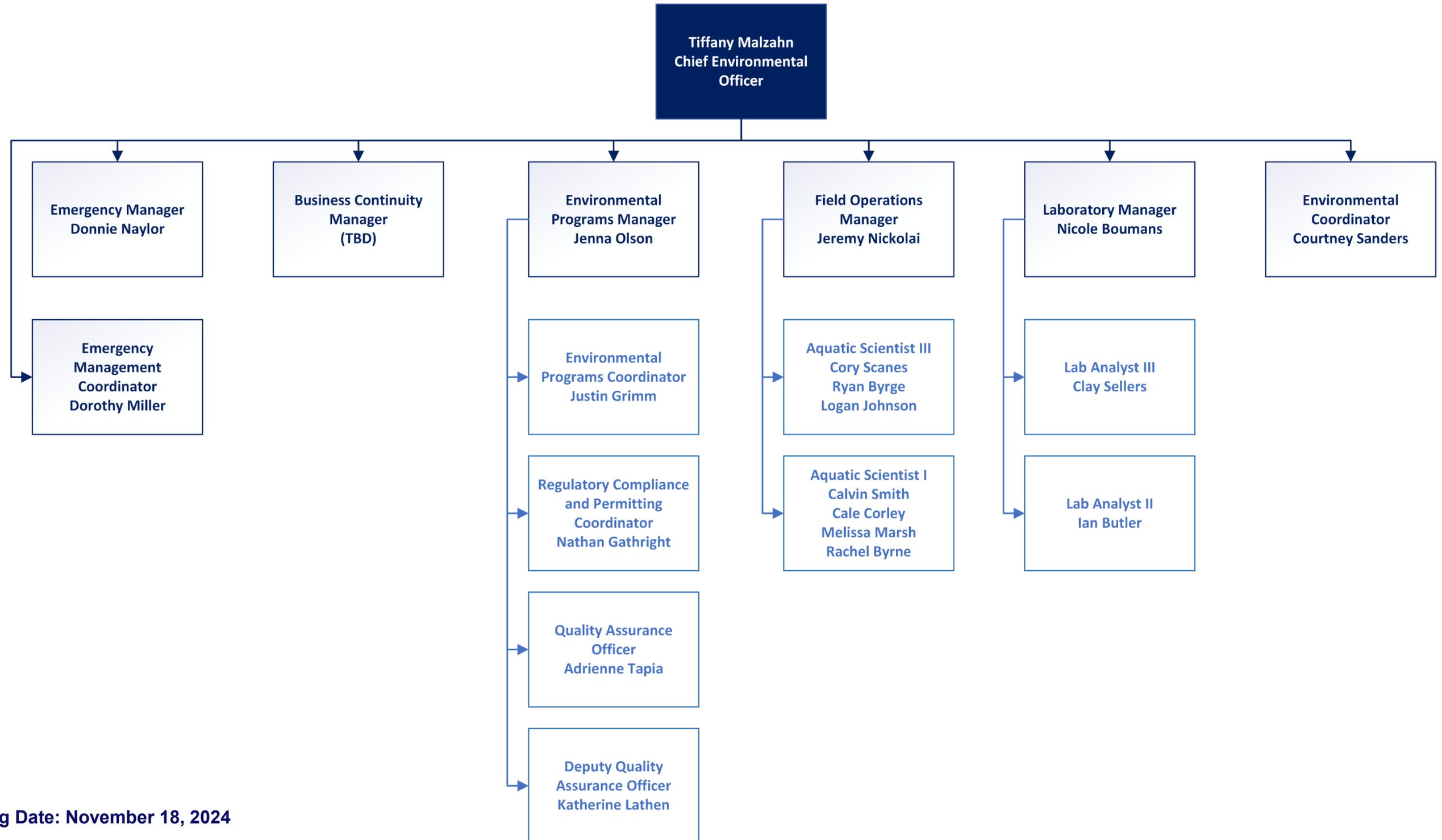
**Presented by
Tiffany Malzahn
Chief Environmental Officer**



Life History of a Water Quality Sample



Environmental Services





Clean Rivers Program

- **Established in 1991 under the Texas Clean Rivers Act**
 - **Mandated river authority participation**
- **For water quality sampling and analysis river authorities must:**
 - **Follow TCEQ's Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods**
 - **Be a NELAP Accredited Laboratory under the National Environmental Laboratory Accreditation Conference**
 - **Follow EPA approved methods**
 - **Follow CRP Quality Control/Quality Assurance standards**



Environmental Services Code of Ethics

- 1. We pledge to produce results that are technically sound and legally defensible.**
- 2. We pledge to only take on work for which we have the personnel and equipment.**
- 3. We pledge to present data in a confidential, honest, and forthright manner.**
- 4. We pledge to have a clear understanding of the project.**
- 5. We pledge to read and follow the BRA Quality Manual and SOPs.**
- 6. We pledge to train employees in the ethical and quality standards required.**
- 7. We pledge to protect the environment and health/safety of employees and the public.**
- 8. We pledge to obey all pertinent federal, state, and local laws and regulations.**
- 9. We pledge to continually improve product and service quality.**
- 10. We pledge to treat employees equitably, acknowledge their contributions, and provide them with professional growth and development opportunities.**
- 11. We pledge to recognize and respond to community concerns.**
- 12. We pledge to deal openly, honestly, and fairly in all business and financial matters with employees, clients, and the public.**



Water Quality Sample Collection Run Preparation

- Create sampling event in Laboratory Information Management System (LIMS)
- Data sheets
- Bottles
- Calibrate multiprobe instrument
- Conduct Pre-run Checks



Calibration Report

Last Calibration Time: 11/2/2022 6:45:04 AM
Calibration Start Time: 11/4/2022 11:30:16 AM
Calibration End Time: 11/4/2022 11:37:22 AM

Parameter: Sp Cond ($\mu\text{S}/\text{cm}$)

Instrument:

Type: EXO1
Name: 357
Serial Number: 21H103357
Firmware Version: 1.0.86

Sensor:

Type: Conductivity
Serial Number: 21H101048
Firmware Version: 3.0.5

Status: Completed
Technician: <Unknown>

QC Score: Good

Sensor Specific

Cell Constant: 5.30

Notes:

Calibration Points:

Calibration Point #1:
Pre Calibration Value: 1414.1 $\mu\text{S}/\text{cm}$
Post Calibration Value: 1413.0 $\mu\text{S}/\text{cm}$
Raw Calibration Value: 0.0 $\mu\text{S}/\text{cm}$
Temperature: 21.879 $^{\circ}\text{C}$
Standard Value: 1413.0 $\mu\text{S}/\text{cm}$
Is Stable: True



Water Quality Sample Collection Activities at Each Site

• Record field observations

- Weather
- Flow/Lake Level
- Recreational Use
- Width/depth
- Aquatic Vegetation
- Invasive Species

• Perform in situ analysis

- Flow
- Transparency
- Dissolved Oxygen
- pH
- Water Temperature
- Specific Conductance
- Salinity
- Chlorine Residual

Discharge Measurement Summary												Date Generated: Mon Oct 14 2024			
File Information						Site Details									
File Name		13497 - 09OCT24.WAD				Site Name		REB							
Start Date and Time		2024/10/09 09:21:13				Operator(s)									
System Information						Units (English Units)		Discharge Uncertainty							
Sensor Type		FlowTracker				Distance		ft		Category		ISO		Stats	
Serial #		P3760				Velocity		ft/s		Accuracy		1.0%		1.0%	
CPU Firmware Version		3.9				Area		ft^2		Depth		0.4%		3.2%	
Software Ver		2.30				Discharge		cfs		Velocity		0.7%		4.5%	
Mounting Correction		0.0%								Width		0.1%		0.1%	
										Method		1.8%		-	
										# Stations		2.0%		-	
										Overall		3.0%		5.6%	
Summary															
Averaging Int.		40		# Stations		26									
Start Edge		LEW		Total Width		17.700									
Mean SNR		26.2 dB		Total Area		6.455									
Mean Temp		67.25 °F		Mean Depth		0.365									
Disch. Equation		Mid-Section		Mean Velocity		0.4148									
				Total Discharge		2.6772									
Measurement Results															
St	Clock	Loc	Method	Depth	%Dep	MeasD	Vel	CorrFact	MeanV	Area	Flow	%Q			
0	09:21	20.50	None	0.000	0.0	0.0	0.0000	1.00	0.0000	0.000	0.0000	0.0			
<i>1</i>	<i>09:21</i>	<i>20.90</i>	<i>0.6</i>	<i>0.150</i>	<i>0.6</i>	<i>0.060</i>	<i>-0.0459</i>	<i>1.00</i>	<i>-0.0459</i>	<i>0.090</i>	<i>-0.0041</i>	<i>-0.2</i>			
2	09:23	21.70	0.6	0.150	0.6	0.060	0.3799	1.00	0.3799	0.120	0.0456	1.7			
3	09:24	22.50	0.6	0.150	0.6	0.060	0.4062	1.00	0.4062	0.120	0.0487	1.8			
4	09:26	23.30	0.6	0.200	0.6	0.080	0.5420	1.00	0.5420	0.160	0.0868	3.2			
5	09:27	24.10	0.6	0.200	0.6	0.080	0.7110	1.00	0.7110	0.160	0.1139	4.3			
6	09:28	24.90	0.6	0.200	0.6	0.080	0.6919	1.00	0.6919	0.160	0.1108	4.1			
7	09:29	25.70	0.6	0.200	0.6	0.080	0.6296	1.00	0.6296	0.160	0.1008	3.8			
8	09:31	26.50	0.6	0.250	0.6	0.100	0.8307	1.00	0.8307	0.200	0.1662	6.2			
9	09:33	27.30	0.6	0.200	0.6	0.080	0.6890	1.00	0.6890	0.160	0.1103	4.1			
10	09:34	28.10	0.6	0.250	0.6	0.100	0.5236	1.00	0.5236	0.200	0.1048	3.9			
11	09:35	28.90	0.6	0.300	0.6	0.120	0.6785	1.00	0.6785	0.240	0.1628	6.1			
12	09:36	29.70	0.6	0.300	0.6	0.120	0.8629	1.00	0.8629	0.180	0.1550	5.8			
13	09:56	30.10	0.6	0.400	0.6	0.160	0.9482	1.00	0.9482	0.160	0.1517	5.7			
14	09:38	30.50	0.6	0.450	0.6	0.180	0.9380	1.00	0.9380	0.158	0.1477	5.5			
15	09:58	30.80	0.6	0.550	0.6	0.220	0.8770	1.00	0.8770	0.220	0.1929	7.2			
16	09:39	31.30	0.6	0.500	0.6	0.200	0.5741	1.00	0.5741	0.326	0.1870	7.0			
17	09:40	32.10	0.6	0.500	0.6	0.200	0.5915	1.00	0.5915	0.400	0.2367	8.8			
18	09:41	32.90	0.6	0.650	0.6	0.260	0.4311	1.00	0.4311	0.520	0.2242	8.4			
19	09:43	33.70	0.6	0.700	0.6	0.280	0.2995	1.00	0.2995	0.560	0.1678	6.3			
20	09:45	34.50	0.6	0.500	0.6	0.200	0.1568	1.00	0.1568	0.400	0.0627	2.3			
<i>21</i>	<i>09:46</i>	<i>35.30</i>	<i>0.6</i>	<i>0.500</i>	<i>0.6</i>	<i>0.200</i>	<i>-0.0951</i>	<i>1.00</i>	<i>-0.0951</i>	<i>0.400</i>	<i>-0.0381</i>	<i>-1.4</i>			
<i>22</i>	<i>09:49</i>	<i>36.10</i>	<i>0.6</i>	<i>0.500</i>	<i>0.6</i>	<i>0.200</i>	<i>-0.1270</i>	<i>1.00</i>	<i>-0.1270</i>	<i>0.400</i>	<i>-0.0508</i>	<i>-1.9</i>			
23	09:51	36.90	0.6	0.600	0.6	0.240	0.1532	1.00	0.1532	0.480	0.0736	2.7			
24	09:53	37.70	0.6	0.550	0.6	0.220	0.2500	1.00	0.2500	0.356	0.0891	3.3			
25	09:53	38.20	None	0.500	0.0	0.0	0.0000	1.00	0.2500	0.124	0.0310	1.2			

Rows in italics indicate a QC warning. See the Quality Control page of this report for more information.



Water Quality Sample Collection Activities at Each Site

- Collect samples
- Preservation
- Field Filtering





Water Quality Sample Collection End of Day

- Sign custody of samples to Laboratory
- Review and sign all field data sheets
- Enter field collected data into LIMS

BRAZOS RIVER AUTHORITY
FIELD DATA SHEETS FOR SAMPLES COLLECTED FOLLOWING SWQM VOL.I

LIMS#: 022624-11846-SW-263760	STORET Code: 89966	2	Description: SKIES: 1=CLEAR, 2=PT/CLOUDY, 3=CLOUDY, 4=RAIN
	89965	3	WIND: 1=CALM, 2=SLIGHT, 3=MOD, 4=STRONG
SITE ID: 11846	00078	0.07	TRANSPARENCY, SECCHI DISC (METERS)
	89861	78	AVG STREAM WIDTH (METERS)
SITE NAME: Brazos River at US 90A in Richmond	89926	<1	AQUATIC VEGETATION @ COLLECTION SITE (PERCENT)
DATE: 27-Feb-24	89978	0	NUMBER OF PEOPLE OBSERVED PERFORMING PRIMARY CONTACT RECREATION
	89979	0	EVIDENCE OF PRIMARY CONTACT RECREATION: OBSERVED (1) NOT OBSERVED (0)
TIME: 08:00	01351	3	FLOW SEVERITY: 1=NO FLOW*, 2=LOW, 3=NORMAL, 4=FLOOD, 5=HIGH, 6=DRY
		0	INVASIVE SPECIES PRESENCE (0=ABSENT 1= PRESENT AND NOTE IN COMMENTS)
COLLECTORS: Byrge Johnson		<1	INVASIVE SPECIES PERCENT COVERAGE
RUN: Richmond	89835	1	FLOW METHOD: 1=USGS, 2=MARSH MCBIRNEY, 3=MECH, 4=WEIR/FLUE, 5=DOPPLER
	00061	-	STREAM FLOW INSTANTANEOUS (CFS) (0.0 if flow severity = 1)
SONDE SN# 205 207 356 357 706	72053	23	DAYS SINCE LAST SIGNIFICANT PRECIPITATION (DAYS)

Sample Type: Grab Matrix: Surface Water

Bottle ID	263761	263762	263763	263764	263765	263766	263767		
Test	Anions ¹	TSS	TDS	Turbidity	Chl a	E.coli	TKN ² NH ₃ ²	Alkalinity	Metals ³
Sample Receipt TEMP			2.3°C						263784
						Sample Receipt pH: 7.6			TP ²

DEPTH	Temp (°C)	DO (% Sat.)	D.O. (mg/L)	Specific Conductance (µs/cm)	Salinity (ppt)	pH (s.u.)	Cl Res (mg/L)
	00010	00301	00300	00094	00480	00400	
Surface 0.3m	18.85	94.4	8.77	683	0.33	8.08	—

COMMENTS

¹Field Filtered ²Preserved with H₂SO₄ ³Preserved with HNO₃ *Record Pool Parameters All Samples collected preserved on ice. Sample receipt temp and pH recorded by receiver at date/time of receipt.

Receiver's Signature: Form Completed by: RB

Time of Receipt: 11:40 Date of Receipt: 27 FEB 24



Laboratory Analysis

- Calibrates instruments
- Accepts custody of samples from Aquatic Scientists
- Verifies preservation
 - Temperature
 - Acidification
- Enters samples into LIMS
- Schedules analysis

Ammonia

Date \ Time : 2024-10-22 13:22:12
 Tray number : 3
 Tray name : 24.10.22 LR,LS BRA LAB 010 REV8 EPA 350.1 REV2

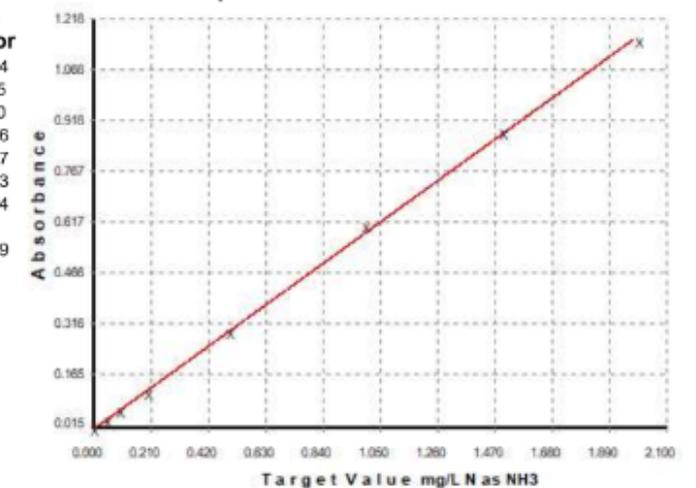
NH3 EPA 103-D Rev 2A

Calibration Chart

Type	Absorbance	Calc mg/L N as NH3	Target mg/L N as NH3	% Error
S96	1.1605	1.9792	2.0000	-1.04
S95	0.8885	1.5097	1.5000	0.65
S94	0.6117	1.0320	1.0000	3.20
S93	0.3007	0.4952	0.5000	-0.96
S92	0.1238	0.1899	0.2000	-5.07
S91	0.0693	0.0957	0.1000	-4.33
S90	0.0411	0.0470	0.0500	-5.94
S1	0.0146	0.0013	0.0000	
*89	1.1692	1.9942	2.0000	-0.29
S0	0.0150	0.0021	0.0000	

Polynomial Order : 1
 Correlation Coefficient : 0.9998
 Carryover(%) : 0.0
 Calibration equation: $y = bx + a$
 y =: Concentration mg/L N as NH3
 x =: Measured absorbance
 a =: -2.388781E-02
 b =: 1.726132E+00
 Date & Time : 2024-10-22 12:05:31

Calibration Graph



Reagents

Reagent Name	Batch Number	Operator	Expiry Date
NH3 - EDTA Buffer	RL-16301	DCS	2024-11-14 00:00:00
NH3 - Sodium Phenate	RL-16781	RICCA	2025-02-28 00:00:00
NH3 - Bleach	RL-17999	CNB	2024-11-04 00:00:00
NH3 - SodiumNitropruss	RL-16302	DCS	2024-11-14 00:00:00

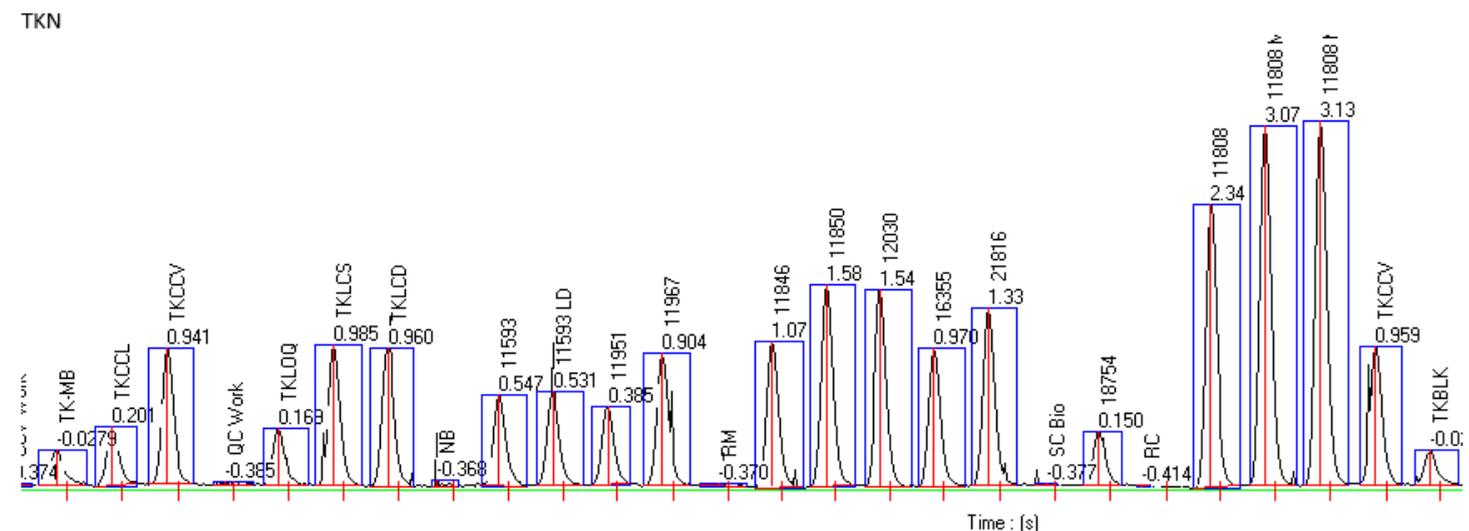
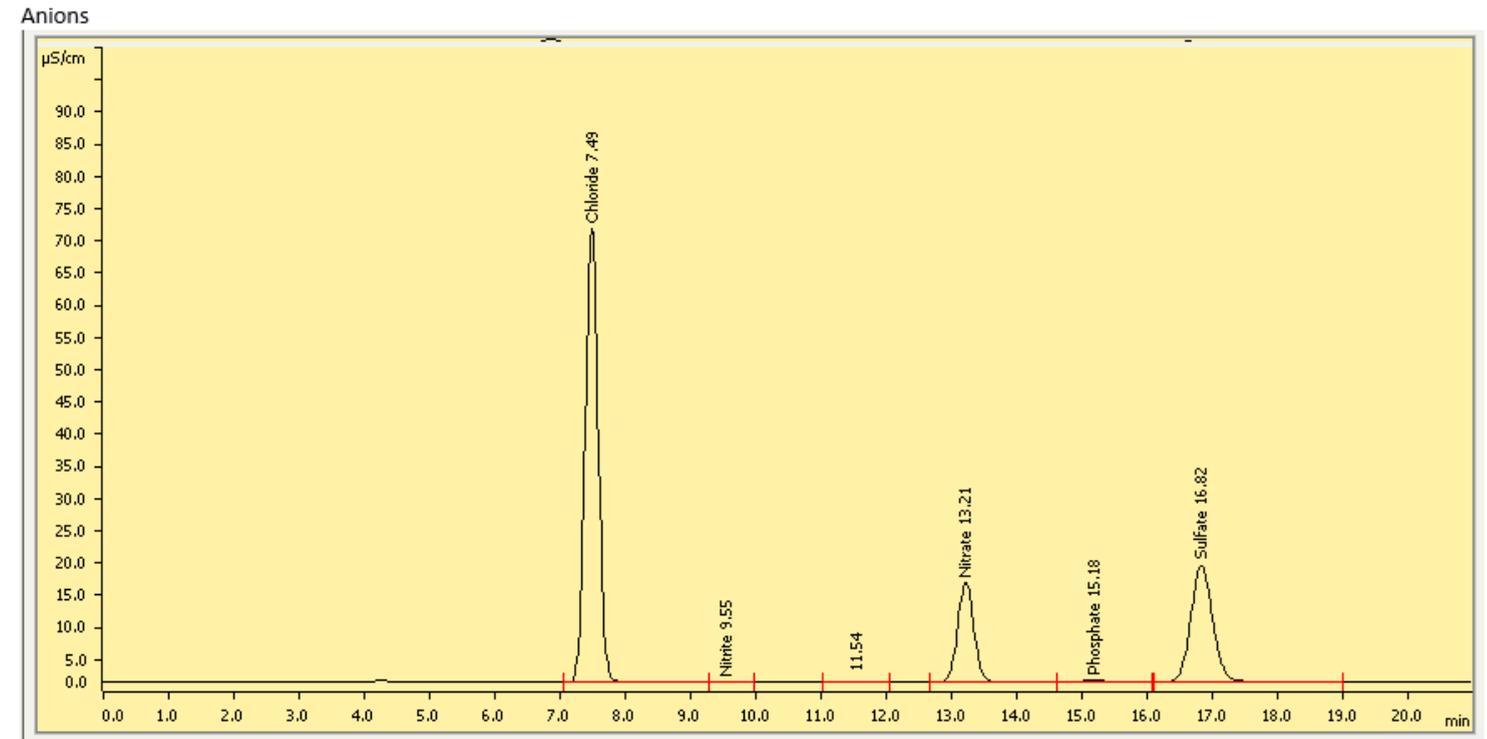
Test Results

Cup	Type	ID	Result	Units	QC Pro	Auto Dil.	Man Dil.	User	Time & Date
S96	Standard	Standard 96	1.1605						2024-10-22 11:41:32
S95	Standard	Standard 95	0.8885						2024-10-22 11:44:11
S94	Standard	Standard 94	0.6117						2024-10-22 11:46:52
S93	Standard	Standard 93	0.3007						2024-10-22 11:49:31
S92	Standard	Standard 92	0.1238						2024-10-22 11:52:11



Laboratory Analysis

- Ammonia
- Chloride
- Sulfate
- Nitrate-nitrogen
- Nitrite-nitrogen
- Total Kjeldahl Nitrogen
- Orthophosphate-phosphorus
- Total Phosphorus
- Total Suspended Solids
- Total Dissolved Solids
- Turbidity
- Chlorophyll *a*
- *E. coli*
- Enterococcus





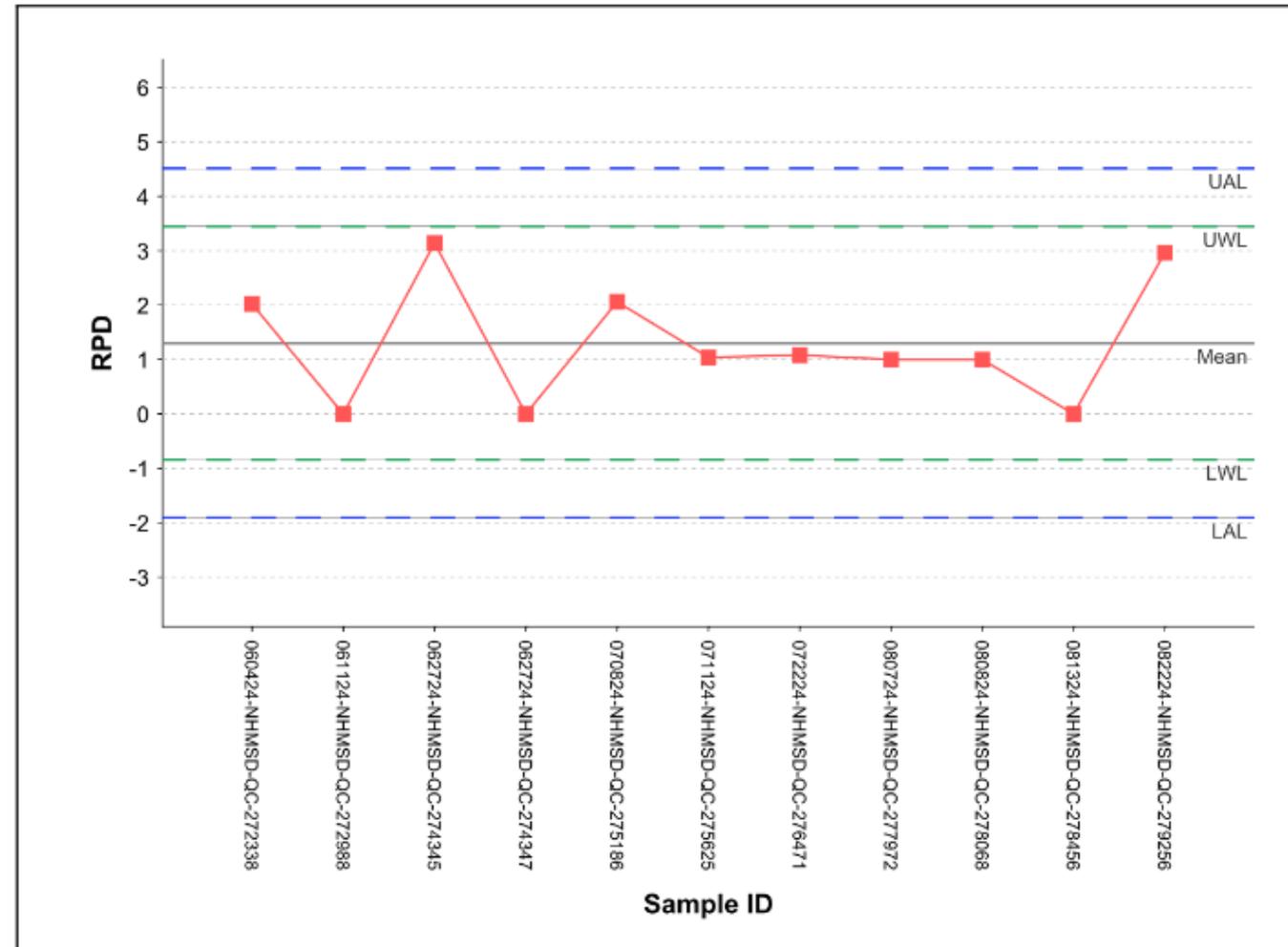
Control Charts

00610

Spike Dup NHMSD

- Reviewed quarterly by Lab Manager to track trends in individual analyses

Date	Sample ID	Result	QC Batch			
Count	Mean	Std Deviation	LWL	UWL	LAL	UAL
11	1.30	1.07	-0.84	3.44	-1.91	4.51





Proficiency Testing and Blind QC Samples

- Lab analyzes double blind Proficiency Testing samples 2x/year
- Lab analyzes single blind QC samples in quarters when PT testing is not completed





Quality Assurance/Quality Control

- **Laboratory and field data receives 3 levels of review for EVERY test and EVERY chain of custody**
 - **Analyst**
 - **Manager**
 - **QA staff**
- **Internal Audits**
 - **Conducted quarterly by QA staff**
- **Biannual NELAP Audit by TCEQ**



Incident Reporting Application

- Incidents involving data loss are reported
- Documents
 - Impacted samples
 - Root Cause investigation
 - Corrective Actions to prevent recurrence
 - Approval Audit
 - Impact to project

ENV Incident Reporting Add New Incident View Incidents Approval Reports Admin

View Incidents - All

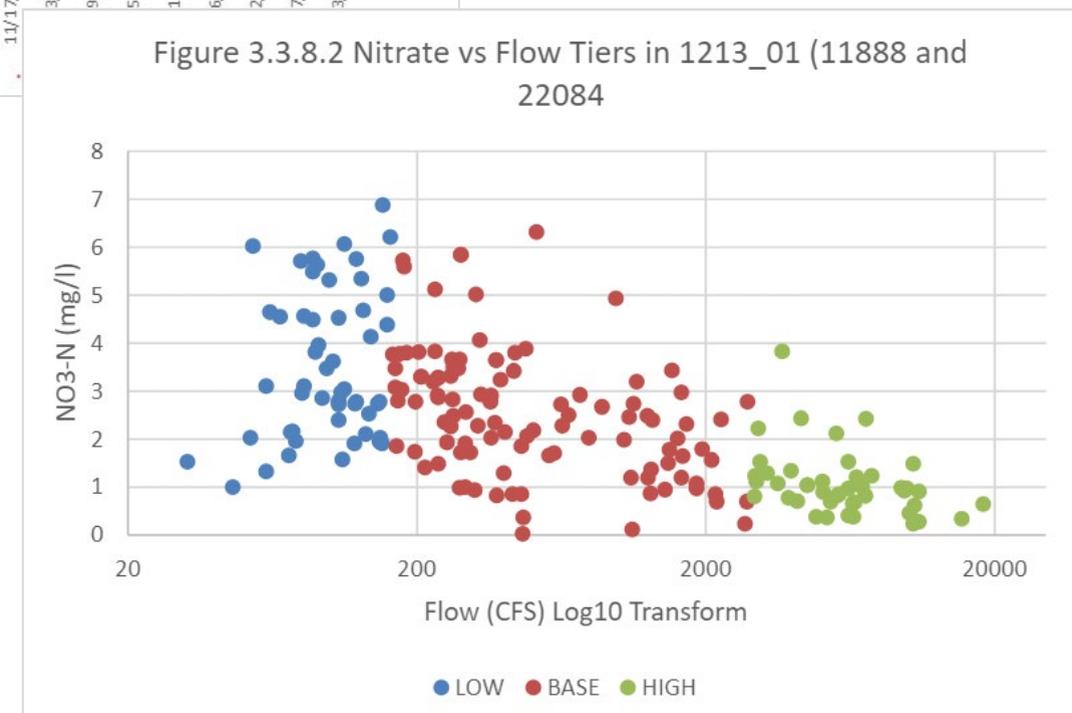
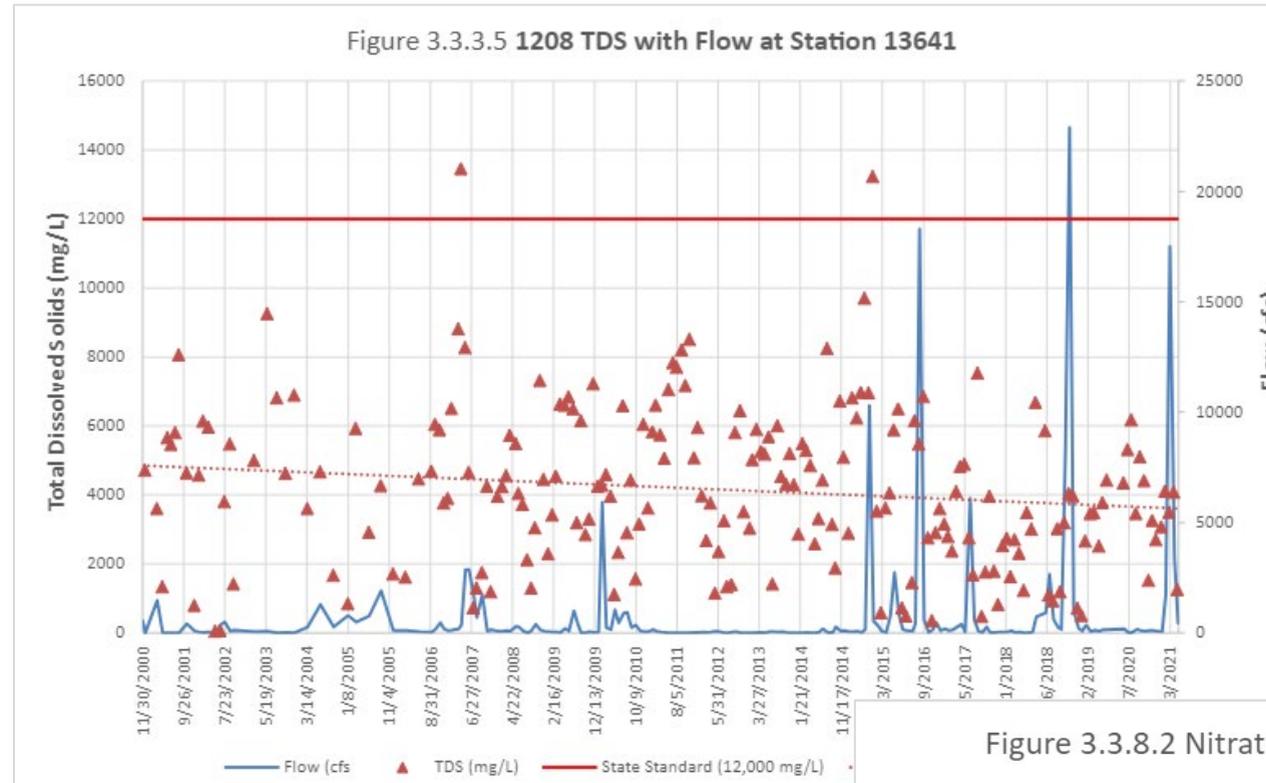
Click the **Q** icon to view the Incident Details or to Approve an Incident when applicable. When available, click the **✎** or **✖** icons to Edit or Delete the Incident, respectively. Incident information can only be edited when in Not Submitted or the Admin role only. Incidents can only be deleted by the Initiated By when the Status is Not Submitted, or by the Admin role when the Incident is NOT Closed. The default sort is by Incident ID descending. Click the column header text to sort. To remove filters, click the Reset Filters button at right.

ID	INITIATED BY	DATE INITIATED	INCIDENT DATE	DESCRIPTION	ROOT CAUSE
2685	Nicole.Boumans	10/9/2024	10/9/2024	IC is having pressure and recovery issues, leading to data loss of Highbank and Navasota Nitrate and Granbury, SFSGR Biological, and SG Mankins Branch Biological Nitrate and Phosphate	Pump check valve failure led to instrument pressure inconsistencies.



Data Analysis

- Compliance with Texas Surface Water Quality Standards
- Trend analyses by site and parameter





Data Reporting

- **QA staff produce monthly and quarterly reports on data completion**
- **All data collected under the CRP gets submitted to TCEQ Surface Water Quality Monitoring Information System 3x/year**
 - **10% of this data undergoes an additional QA/QC review of the transfer**
 - **Outliers are investigated and verified before transfer**
- **Annual Basin Highlights Report submitted to TCEQ**
- **Basin Summary Report submitted to TCEQ every 5 years**



Basin Highlights Reports

- Produced annually
- Overview of scheduled routine monitoring for Fiscal Year
- Summary of TCEQ's Texas Integrated Report of Surface Water Quality
- Summary of on-going activities and projects that address water quality

The screenshot shows a web browser window displaying the Brazos River Authority website. The URL is brazos.org/about-us/environmental/texas-clean-rivers-program. The page features the organization's logo and a navigation menu. A large image of a river is prominently displayed with the text "Texas Clean Rivers Program" overlaid. Below the image is a "Back to Environmental" link. The main content area is titled "Texas Clean Rivers Program" and contains introductory text about the program's history and goals. A sidebar on the right, titled "More Information", lists several links, with "Reports, Presentations, and Meeting Minutes" highlighted in a red box.



Basin Summary Report

- Produced every 5 years
- Intensive water quality trend analysis
- Interactive format on BRA website
 - <https://storymaps.arcgis.com/collections/66baaa23923b41ebb3eba6859e45b79a?item=1>

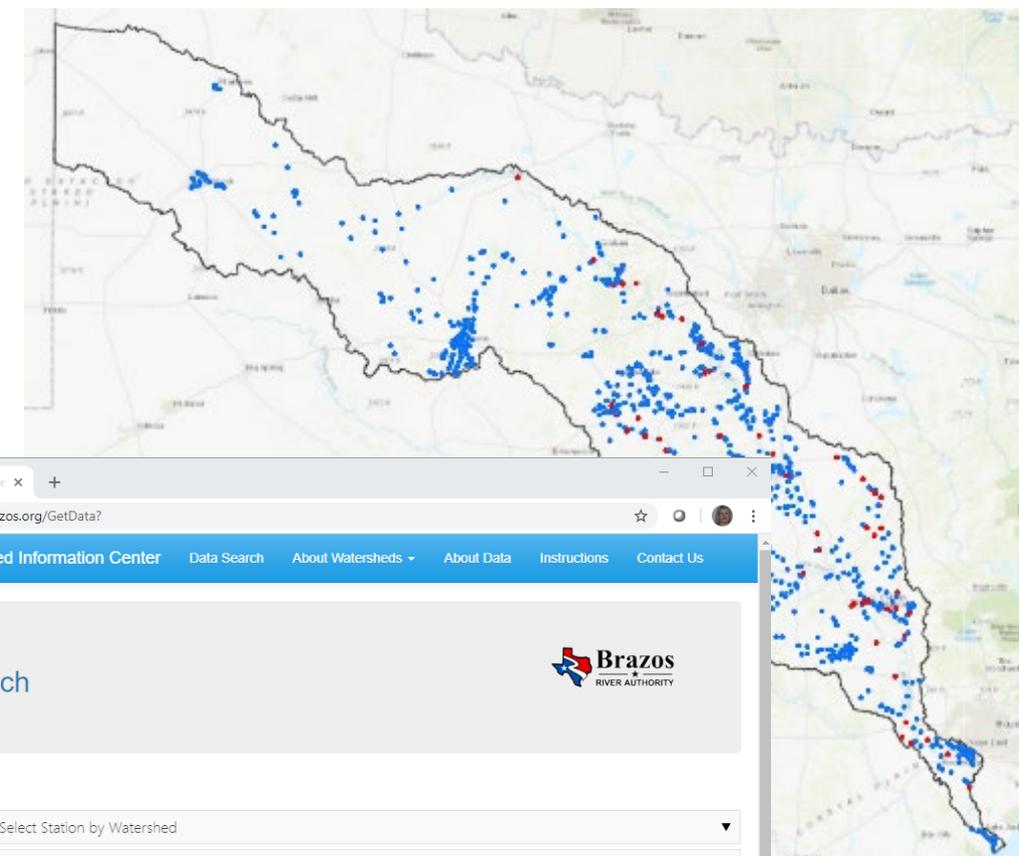
Table 3.3.1 Segment Specific Water Quality Standards with Indications of Impairment and/or Concern from the 2020 Texas Integrated Report for Clean Water Act Sections 303(j) and 303(d) and Significant Long-Term Trends

Segment	Name	Type	Priority	Water Quality Standards					Assessment		Trend			
				Flow (cfs)	DO (mg/L)	BOD (mg/L)	TSS (mg/L)	Temperature (°F)	Impairment	Concern	Increasing	Decreasing		
1280	Whitney Lake	PCR	H	400	300	1,000	5,000	50.0	120	90	6.11	8.07	0.20	20.7
1281A	Snake Creek	PCR	H	400	300	1,000	5,000	50.0	120	90	6.33	1.98	0.89	14.1
1281B	Brazos De los Arroyos	PCR	H	180	280	1,000	5,000	50.0	120	91	6.33	1.98	0.89	14.1
1281C	Clay Creek	PCR	L	180	280	1,000	5,000	50.0	120	91	6.33	1.98	0.89	14.1
1281D	Lake Creek	PCR	H	1,000	400	2,000	5,000	50.0	120	93	6.11	8.07	0.20	20.7
1281E	Blue Creek	PCR	L	1,000	400	2,000	5,000	50.0	120	93	6.33	1.98	0.89	14.1
1281F	Walnut Creek	PCR	L	1,000	400	2,000	5,000	50.0	120	93	6.33	1.98	0.89	14.1
1281G	Cedar Creek	PCR	L	1,000	400	2,000	5,000	50.0	120	93	6.33	1.98	0.89	14.1
1281H	Rubber Creek	PCR	M	1,000	400	2,000	5,000	50.0	120	93	6.33	1.98	0.89	14.1
1281I	Silver Creek	PCR	L	1,000	400	2,000	5,000	50.0	120	93	6.33	1.98	0.89	14.1
1281J	Redwood Creek	PCR	L	1,000	400	2,000	5,000	50.0	120	93	6.33	1.98	0.89	14.1
1281K	Long Creek	PCR	L	1,000	400	2,000	5,000	50.0	120	93	6.33	1.98	0.89	14.1
1281L	Brazos River Below Pecos	PCR	H	1,000	400	2,000	5,000	50.0	120	96	6.33	1.98	0.89	14.1
1281M	Palo Pinto Creek	PCR	H	1,000	400	2,000	5,000	50.0	120	96	6.33	1.98	0.89	14.1
1281N	Lake Mineral Creek	PCR	H	1,000	400	2,000	5,000	50.0	120	96	6.11	8.07	0.20	20.7
1281O	Pecos River	PCR	H	1,000	400	2,000	5,000	50.0	120	96	6.33	1.98	0.89	14.1
1281P	Brazos River Above Pecos	PCR	H	1,000	400	2,000	5,000	50.0	120	96	6.33	1.98	0.89	14.1
1281Q	Wolfe River	PCR	H	1,000	400	2,000	5,000	50.0	120	96	6.33	1.98	0.89	14.1
1281R	Buffalo Creek	PCR	L	1,000	400	2,000	5,000	50.0	120	96	6.33	1.98	0.89	14.1
1281S	Lake Fork	PCR	H	1,000	400	2,000	5,000	50.0	120	96	6.33	1.98	0.89	14.1
1281T	Pecos River	PCR	H	1,000	400	2,000	5,000	50.0	120	96	6.33	1.98	0.89	14.1
1281U	Stamper Creek	PCR	H	1,000	400	2,000	5,000	50.0	120	96	6.33	1.98	0.89	14.1
1281V	Lake Park	PCR	H	1,000	400	2,000	5,000	50.0	120	96	6.11	8.07	0.20	20.7
1281W	Lake Park	PCR	H	1,000	400	2,000	5,000	50.0	120	96	6.11	8.07	0.20	20.7
1281X	Lake Graham	PCR	H	1,000	400	2,000	5,000	50.0	120	96	6.33	1.98	0.89	14.1
1281Y	Brazos River Below Lake Whitney	PCR	H	1,000	400	2,000	5,000	50.0	120	96	6.33	1.98	0.89	14.1



Water Quality Data Available Online

- Two ways to search
 - Interactive map
 - www.brazos.org/About-Us/Environmental/Texas-Clean-Rivers-Program
 - Will direct user to TCEQ database for sites monitored by other entities or historical BRA data
 - Query based by classified segment
 - www.crpdata.brazos.org/GetData
- Data downloadable to Excel



Get Data - Brazos River Watershed

crpdata.brazos.org/GetData?

Brazos River Watershed Information Center Data Search About Watersheds About Data Instructions Contact Us

Data Search

Brazos RIVER AUTHORITY

Select Stations

Watershed: Select Station by Watershed

Stream Segment: Select Station by Segment

Station: Select by Station

Date Range

Start Date: 8/18/2019

End Date: 2/18/2020

This site contains no data prior to September 2016.

Parameters

<input type="checkbox"/> Basic Water Quality Chemistry	<input type="checkbox"/> Observational Field
<input type="checkbox"/> Nutrients	<input type="checkbox"/> Dissolved Minerals
<input type="checkbox"/> Dissolved Solids	<input type="checkbox"/> Carbamates
<input type="checkbox"/> Total Suspended Solids	<input type="checkbox"/> Bacteriological
<input type="checkbox"/> Volatile Organic Compounds	<input type="checkbox"/> Dissolved Metals
<input type="checkbox"/> Semi Volatile Organic Compounds	

Get Data Clear Selection



Variety of Conditions in Basin





Brazos River Authority



Brazos

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