Procedures to Implement the Texas Surface Water Quality Standards 2021 Revisions

What are "Implementation Procedures (IPs)"

Procedures to Implement the Texas Surface Water Quality Standards (IPs) RG-194

A guidance document that explains how TCEQ applies the Texas Surface Water Quality Standards

IP Revision process

- Triennial review process
- 2010 IPs approved at the June 30, 2010 TCEQ Commissioner's Agenda
- EPA approved most of the 2010 IPs on July 12, 2013
- Stakeholder meetings held March 9, 2020 and June 30, 2020
- IP revisions targeting 2023 completion date

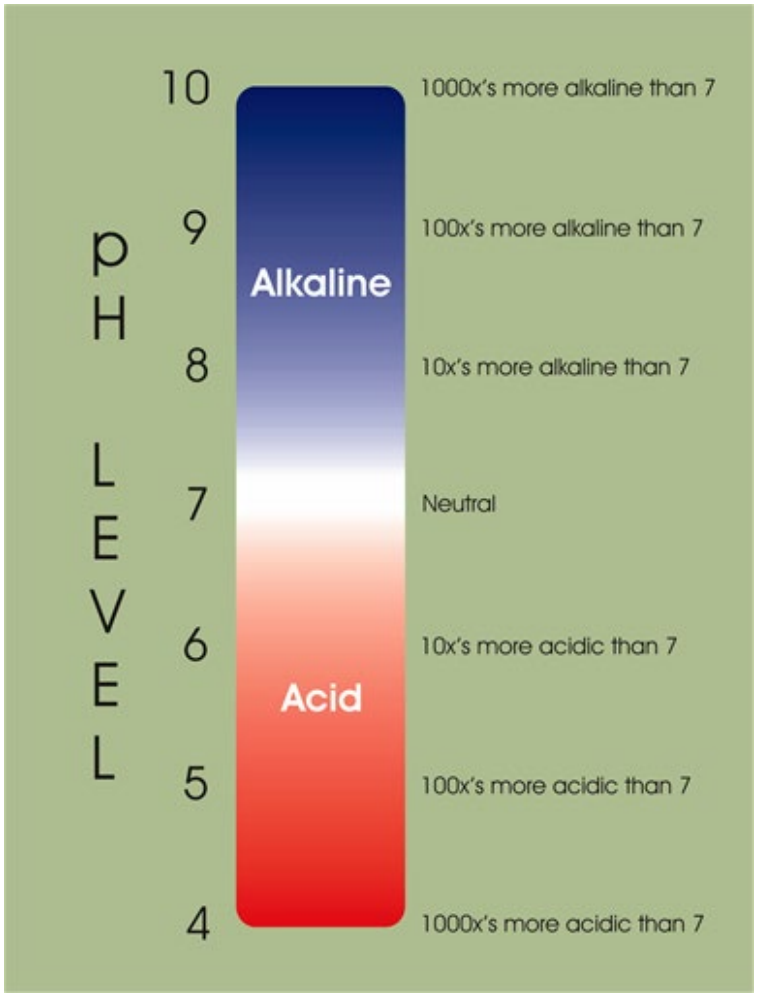
Unresolved EPA Objections to 2010 IPs:

- **Dechlorination**
- **Variances**
- **Whole Effluent Toxicity (WET) and Reasonable Potential (RP)**
- **pH screening procedures**

Focus of 2022 IP Revisions

- pH Screening procedures
- WET -RP analysis
- Appendix B updates -Endangered species
- Appendix C Updates- Segment flow data
- Tables D-1 through D-25 -Update Segment ambient WQ data
- Appendix E updates -MALs/Methods Update Rule
- TDS screening procedures – minor revisions
- Bioequivalency Factors (BEFs)
- Toxic Pollutants without Criteria
- Temporary Standards
- General updates and corrections

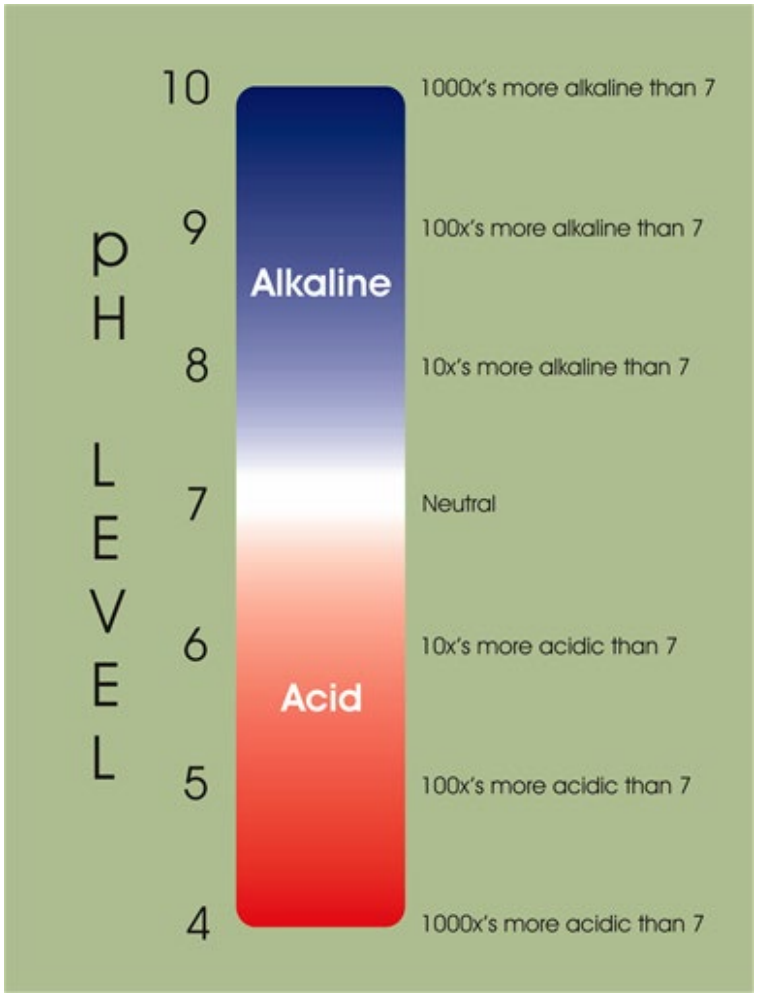
pH Screening Procedures



- Screening procedure established with EPA concurrence for certain direct discharges to classified segments
- pH Sceening conducted:
  - major municipal facilities (≥1 MGD flow)
  - industrial discharges with process wastewater
- pH Sceening Spreadsheets available on web:

https://www.tceq.texas.gov/waterquality/standards/WQ_stds

pH Screening Procedures



Freshwater-generally follows the procedure in EPA's DESCON program (*Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling*, USEPA Office of Water, Washington D.C., 1988).

Saltwater- generally follows the procedure for calculation of pH of a mixture in seawater based on the CO_2SYS program (Lewis and Wallace, 1998,

Calculation of pH of a mixture of two flows. Based on the procedure in EPA's DESCON program (EPA, 1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington D.C.)

Discharge of 46 MGD to segment 1911

INPUT

	Lower pH limit	Higher pH limit	Step 1	Step 2	Step 3
1. DILUTION FACTOR AT MIXING ZONE BOUNDARY	1.183	1.183	Percent effluent at edge of MZ **84.53**	Convert to decimal and invert **1/0.8453**	1/0.8453=1.183 **1.183**
RECEIVING WATER CHARACTERISTICS					
2. Temperature (deg C):	32.00	32.00	Range of values		
3. pH:	7.4	7.4	*Appendix D*		
4. Alkalinity (mg CaCO3/L):	202.00	202.00	*Appendix D- where available*		
EFFLUENT CHARACTERISTICS					
5. Temperature (deg C):	23.00	23.00	Range of values 5 -35		
6. pH:	6.00	9.00	pH limits in permit		
7. Alkalinity (mg CaCO3/L):*	20.00	80.00	Range of values - 20 at lower pH		

OUTPUT

1. IONIZATION CONSTANTS		
Upstream/Background pKa:	6.32	6.32
Effluent pKa:	6.36	6.36
2. IONIZATION FRACTIONS		
Upstream/Background Ionization Fraction:	0.92	0.92
Effluent Ionization Fraction:	0.30	1.00
3. TOTAL INORGANIC CARBON		
Upstream/Background Total Inorganic Carbon (mg CaCO3/L):	218.62	218.62
Effluent Total Inorganic Carbon (mg CaCO3/L):	66.04	80.18
4. CONDITIONS AT MIXING ZONE BOUNDARY		
Temperature (deg C):	24.39	24.39
Alkalinity (mg CaCO3/L):	48.15	98.87
Total Inorganic Carbon (mg CaCO3/L):	89.64	101.60
pKa:	6.35	6.35
pH at Mixing Zone Boundary:	**6.42**	**7.91**

* Assume minimal total alkalinity at low effluent pH based on carbonate equilibrium chemistry of natural and treated waters

Calculation of pH of a mixture in seawater.				
Based on the CO2SYS program (Lewis and Wallace, 1998)				
http://cdiac.esd.ornl.gov/oceans/co2rprt.html		**Example discharge of 2 MGD to Segment 2484**		
INPUT				
1. MIXING ZONE BOUNDARY CHARACTERISTICS		Percent effluent at edge of MZ	Convert to decimal and invert	Value
Dilution factor at mixing zone boundary	33.33	3	1/0.03	33.33333333
Depth at plume trapping level (m)	2.00			
2. BACKGROUND RECEIVING WATER CHARACTERISTICS				
Temperature (deg C):	10.00	Range of values tested 5 - 35		
pH:	7.20	Appendix D		
Salinity (psu):	30.00	Range of values tested 10-25		
Total alkalinity (meq/L):	10.00	Appendix D where available converted to meq/L		
		Range of values tested 1 -10 meq/L		
3. EFFLUENT CHARACTERISTICS				
Temperature (deg C):	30.00	Range of values tested 5 - 35		
pH:	6.00	Permit limits		
Salinity (psu):	1.00	Range of values tested 1 - 20		
Total alkalinity (meq/L):	0.40			
4. CLICK THE 'calculate" BUTTON TO UPDATE OUTPUT RESULTS >>	calculate			
OUTPUT				
CONDITIONS AT THE MIXING ZONE BOUNDARY				
Temperature (deg C):	10.60			
Salinity (psu)	29.13			
Density (kg/m^3)	1022.29			
Alkalinity (mmol/kg-SW):	9.50			
Total Inorganic Carbon (mmol/kg-SW):	10.03			
pH at Mixing Zone Boundary:	7.19			
Notes:				
*To convert from units of mgCaCO3/L to meq/L divide by 50.044 mg/meq				
PSU refers to the Practical Salinity Scale (PSS) and is approximately equivalent to parts per thousand (ppt)				

Reasonable Potential for WET Testing

EPA approval letter 12/28/2015

- Last 3 years of WET data
- 1 or 2 failures = 3-year permit
- 3 or more failures = RP and WET limit

Reasonable Potential for WET Testing

- Switch default statistical methodology from NOEC to IC25

- Switch default dilution water from receiving to synthetic

Appendix B
Endangered Species

- **New listings**
  - **Smalleye and Sharpnose Shiner**
  - **Texas Hornshell Mussel**
  - **Salado Salamander**
  - **Jollyville Plateau Salamander**
  - **Austin Blind Salamander**
  - **Georgetown Salamander**
  - **Peppered chub**
- **De-listings**
  - **Concho Water Snake**

Table B. Locations of Federally Endangered and Threatened Aquatic and Aquatic-Dependent Species in Texas

Segment No.	Common Name	County	Water Body
0101	Arkansas River shiner	Hemphill Hutchinson Roberts	Canadian River Below Lake Meredith
0103	Arkansas River shiner	Oldham Potter	Canadian River Above Lake Meredith
1202	Houston toad	Austin	Deep Creek
1209	Houston toad	Leon	Running Creek
1211	Houston toad	Burleson	Second Davidson Creek
1212	Houston toad	Bastrop	Marshy Branch
		Lee	Blue Branch
		Milam	Hills Branch
1242	Houston toad	Burleson	Sweet Gum Branch
1302	Houston toad	Colorado	Hayes Creek

Appendix C
Critical low-flow (7Q2) and Harmonic Mean Flow Data

- Data from available USGS gages
- Analyzed based on 29 year period of record- where available
- Gage data provisional until verified by USGS

Appendix C
Critical Low-Flows and Harmonic Mean Flows for Classified Segments

- Approximately 300 USGS and IBWC gages
- 7Q2 and harmonic mean values based on 29 years of latest data (if available)

Seg-ment	Stream/River	Gage	County	Period of Record		Crit. Low-Flow (ft^3/s)	Harmonic Mean Flow (ft^3/s)
				Starts	Ends		
0101	Canadian River	07228000	Hemphill	1980	2007	5.8	2.0
0103	Canadian River	07227500	Potter	1978	2007	0.23	1.3
0104	Wolf Creek	07235000	Lipscomb	1979	2007	0.38	1.1
0201	Red River	07337000	Bowie	1979	2007	1714	5017

Calculator for Low Flows (CaLF)

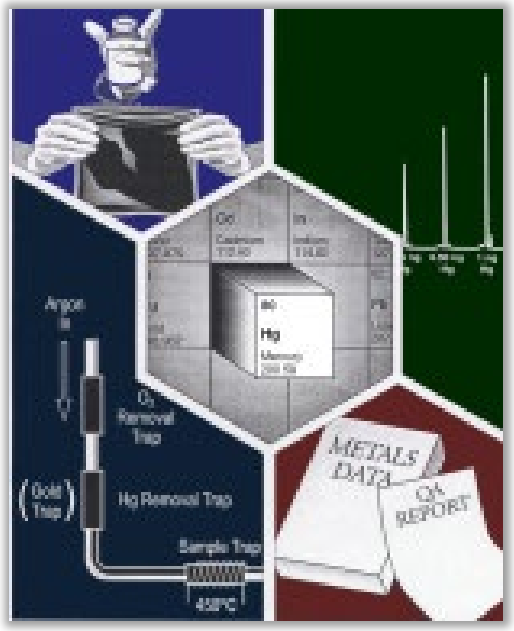
- Excel program used to download USGS flow data
- Calculates the 7Q2 and harmonic mean for specified period of record

Appendix D
Ambient Water Quality Data

- **Routine water quality data is analyzed to derive segment-specific values**

- **TSS, pH, hardness, alkalinity, TDS, chloride, sulfate**

Appendix E updates - CWA 2017-2021 Methods Update Rules and EPA's Sufficiently Sensitive Rule



- Methods Update Rule (MUR) amended 40 CFR Part 136
  - Laboratory testing procedures approved for analysis and sampling under the Clean Water Act
- MUR affects TPDES permit applicants and monitoring and reporting requirements for permittees
- Sufficiently Sensitive Rule – inclusion and applicability

Methods Update Rule (MUR)

Revised analytical methods published by EPA

- 608.3
- 624.1
- 625.1

Revised procedure for determination of the Method Detection Limit (MDL)

Includes Minimum Levels (MLs) and MDLs

- MLs are published in method or calculated as the MDL*3.18
- ML is synonymous with : “quantitation limit” and “reporting limit”
- ML and minimum analytical level (MAL) are the same

MUR Implementation in the IPs

- Held stakeholder meeting on August 20, 2019 to discuss the full scope of implementing the 2017 MUR
- Updated definitions in the IPs (e.g. MDL)
- Updated Appendix E of the IPs
  - Combined Tables E-1 and E-2
  - Revised analytical methods and MALs as affected by:
    - MUR and
    - revisions to the Texas Surface Water Quality Standards (criteria and new pollutants)
    - Additional guidance addressing EPA's Sufficiently Sensitive Rule

TDS screening procedures

- Include use of WET RP analysis to establish that anions are balanced and effluent is protective of aquatic life- may eliminate need to screen for TDS, chloride, and sulfate in unclassified streams, which have no numeric criteria.
  - Must meet segment criteria at segment
- Under consideration- Include use of actual flow rather than permitted flow for municipalities that are not showing signs of population growth.

Calculating permit limits for specific toxic pollutants

- Allow for use of Great Lakes Bioaccumulation Equivalency Factors (BEFs).
- 40 CFR Appendix F to Part 132 - Great Lakes Water Quality Initiative Implementation Procedures

Bioequivalency Factors (BEFs)

- (TEC)tcdd=∑(C)x(TEF)x(BEF)x(TEC)tcdd=∑(C)x(TEF)x(BEF)x
- where:
- (TEC)tcdd = 2,3,7,8-TCDD toxicity equivalence concentration in effluent
- (C)x = concentration of total chemical x in effluent
- (TEF)x = TCDD toxicity equivalency factor for x
- (BEF)x = TCDD bioaccumulation equivalency factor for x

Table 1 – Toxicity Equivalency Factors for CDDs and CDFs

Congener	TEF
2,3,7,8-TCDD	1.0
1,2,3,7,8-PeCDD	1.0
1,2,3,4,7,8-HxCDD	0.1
1,2,3,6,7,8-HxCDD	0.1
1,2,3,7,8,9-HxCDD	0.1
1,2,3,4,6,7,8-HpCDD	0.01
OCDD	0.003
2,3,7,8-TCDF	0.1
1,2,3,7,8-PeCDF	0.03
2,3,4,7,8-PeCDF	0.3
1,2,3,4,7,8-HxCDF	0.1
1,2,3,6,7,8-HxCDF	0.1
2,3,4,6,7,8-HxCDF	0.1
1,2,3,7,8,9-HxCDF	0.1
1,2,3,4,6,7,8-HpCDF	0.01
1,2,3,4,7,8,9-HpCDF	0.01
OCDF	0.001

Table 2 Bioaccumulation Equivalency Factors for CDDs and CDFs

Congener	BEF
2,3,7,8-TCDD	1.0
1,2,3,7,8-PeCDD	0.9
1,2,3,4,7,8-HxCDD	0.3
1,2,3,6,7,8-HxCDD	0.1
1,2,3,7,8,9-HxCDD	0.1
1,2,3,4,6,7,8-HpCDD	0.05
OCDD	0.01
2,3,7,8-TCDF	0.8
1,2,3,7,8-PeCDF	0.2
2,3,4,7,8-PeCDF	1.6
1,2,3,4,7,8-HxCDF	0.08

Establishing permit limits for Toxic Pollutants without criteria

Human Health Criteria

- removal of the lipid correction factor consistent with current state and federal practice

Temporary Standards

- Minor revision - Clarifies which standard applies when a criterion or designated use is not attained and cannot be attained for reasons listed in 40 CFR 131.10(g)
- Clarifies that a temporary standard must preclude degradation of existing water quality standard as opposed to impairment of an existing use.

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Have comments?

Send them to:

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