

TOTAL DISSOLVED SOLIDS, CHLORIDES, AND SULFATE SCREENING AND EFFLUENT LIMITATION CALCULATIONS

Intermittent Stream with Perennial Pools (Unclassified)

The following procedures are used to evaluate total dissolved solids, chloride, and sulfate loadings in discharges to intermittent streams with perennial pools. Screening procedures and effluent limitations are calculated using the methodology in the document "Procedures to Implement The Texas Surface Water Quality Standards" (January 2003) and criteria in the Texas Surface Water Quality Standards (30 TAC §307).

TCEQ Implementation Procedures specify, on page 91, the use of two screening procedures for intermittent streams with perennial pools: those for unclassified intermittent streams (total dissolved solids only) and those for unclassified perennial streams or rivers. These screening values are compared, and the more stringent of the two is used to calculate effluent limitations for the discharge.

Effluent Screening

Screening procedures are as follows:

Intermittent Stream (Unclassified)

The following default screening values (C_{SV}) are assumed:

Specific Type of Intermittent Stream	Default C_{SV}
Intermittent streams demonstrated to be dry, except for short term flow in immediate response to rainfall.	$\geq 4,000$ mg/L
Constructed ditches conveying storm water and wastewater, considered water in the state.	$\geq 4,000$ mg/L
Intermittent streams within 3 miles of tidal waters.	$= 6,000$ mg/L

When default screening values are not assumed, the screening value is determined as follows:

$$C_{TDS} = (C_c / 500 \text{ mg/L}) * 2,500 \text{ mg/L}$$

Where:	C_{SV} = TDS screening value C_{TDS} = TDS concentration used to determine C_{SV} screening value C_c = TDS criterion at the first downstream segment C_E = Effluent concentration
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The value 500 mg/L is the median concentration of TDS in Texas streams. 2,500 mg/L is the minimum TDS screening value. The C_{SV} is determined by comparing C_{TDS} with the following:

If C_{TDS}	Then C_{SV}
$\leq 2,500$ mg/L	$= 2,500$ mg/L
$> 2,500$ mg/L	$= C_{TDS}$
$> 6,000$ mg/L	$= 6,000$ mg/L

Total Dissolved Solids
$C_c = 1500$ mg/L

C_E	=	439.78 mg/L
C_{TDS}	=	7500 mg/L
C_{SV}	=	6000 mg/L

Unclassified Perennial Streams or Rivers (Unclassified)

The following default screening equation is used:

$$C_{SV} \geq (Q_S C_A + Q_E C_{E1}) / (Q_E + Q_S)$$

Where:	C_C = Segment Criterion
	Q_S = Harmon mean flow of the first perennial downstream waterbody
	C_A = Ambient concentration
	Q_E = Effluent flow
	C_{E1} = Effluent concentration
	C_{SV} = TDS screening value

Total Dissolved Solids		
C_C	=	1500 mg/L
Q_S	=	0.08 cfs
C_A	=	988 mg/L
Q_E	=	0.0372 cfs
C_{E1}	=	439.78 mg/L
Screening Calculation		
C_{SV}	=	813.9916

Chlorides		
C_C	=	600 mg/L
Q_S	=	0.08 cfs
C_A	=	245 mg/L
Q_E	=	0.0372 cfs
C_{E1}	=	59.49 mg/L
Screening Calculation		
C_{SV}	=	186.118

Sulfate		
C_C	=	500 mg/L
Q_S	=	0.08 cfs
C_A	=	206 mg/L
Q_E	=	0.0372 cfs

C_{E1}	=	15.6 mg/L
Screening Calculation		
C_{SV}	=	145.5659

****IF EFFLUENT LIMITATIONS ARE DETERMINED UNNECESSARY DELETE SECTION BELOW:

Effluent Limitations (perennial screening is more stringent)

Screening values calculated for total dissolved solids, chloride, and sulfate using the unclassified perennial streams or rivers evaluation are more stringent. Therefore, the unclassified perennial stream or rivers procedures are used to calculate effluent limitations, as outlined below:

Effluent limitations are calculated in the following way:

$$C_{E2} = [C_C (Q_E + Q_S) - (Q_S)(C_A)]/Q_E$$

Daily Average	=	$(C_{E2}) \cdot (0.93) \cdot (1.47)$
Daily Maximum	=	$(C_{E2}) \cdot (0.93) \cdot (3.11)$

Where:	C_C = Segment Criterion
	Q_S = Harmon mean flow of the first perennial downstream waterbody
	C_A = Ambient concentration
	Q_E = Effluent flow
	C_{E1} = Effluent concentration
	C_{E2} = Waste Load Allocation
	C_{SV} = TDS screening value

Total Dissolved Solids		
C_C	=	1500 mg/L
Q_S	=	0.08 cfs
C_A	=	988 mg/L
Q_E	=	0.0372 cfs
C_{E1}	=	439.78 mg/L
C_{E2}	=	2601.075 mg/L

TDS Effluent Limitations		
Daily Average =	3555.93 mg/L	2381.622 lbs/day
Daily Maximum =	7523.09 mg/L	3613.416 lbs/day

Chloride		
C_C	=	600 mg/L
Q_S	=	0.08 cfs
C_A	=	245 mg/L

Q_E	=	0.0372 cfs
C_{E1}	=	59.49 mg/L
C_{E2}	=	1363.441 mg/L

Chloride Effluent Limitations		
Daily Average =	1863.96 mg/L	1248.407 lbs/day
Daily Maximum =	3943.48 mg/L	1894.093 lbs/day

Sulfate		
C_C	=	500 mg/L
Q_S	=	0.08 cfs
C_A	=	206 mg/L
Q_E	=	0.0372 cfs
C_{E1}	=	145.5659 mg/L
C_{E2}	=	1132.258 mg/L

Sulfate Effluent Limitations		
Daily Average =	1547.91 mg/L	1036.729 lbs/day
Daily Maximum =	3274.83 mg/L	1572.934 lbs/day

Effluent limitations are required when results of analysis submitted with the permit application exceed 85% of the calculated daily average effluent limitation. Monitoring and reporting requirements are required when results of analysis submitted with the permit application equal or exceed 70% of the calculated daily average effluent limitation.

Effluent Limitations (intermittent is more stringent)

Screening values calculated for total dissolved solids using the intermittent streams evaluation are more stringent. Screening procedures for chloride and sulfate are not available using the unclassified perennial stream or river evaluation only. Therefore, the intermittent stream procedures are used to calculate effluent limitations as outlined below:

Daily maximum effluent limitations are 2.12 times the daily average.

Total Dissolved Solids		
C_C	=	1500 mg/L
C_E	=	439.78 cfs
C_{TDS}	=	7500 mg/L
C_{SV}	=	6000 cfs
Dly Avg.	=	mg/L
Dly Avg.	=	0 lbs/day
Dly Max	=	0 mg/L
Dly Max	=	0 lbs/day

Effluent limitations are required when results of analysis submitted with the permit application exceed

85% of the calculated daily average effluent limitation. Monitoring and reporting requirements are required when results of analysis submitted with the permit application equal or exceed 70% of the calculated daily average effluent limitation.

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