

SOAH DOCKET NO. 582-22-0585
TCEQ DOCKET NO. 2021-1001-MWD

APPLICATION BY
CITY OF GRANBURY,
FOR TPDES PERMIT NO.
WQ0015821001

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BEFORE THE STATE OFFICE
OF
ADMINISTRATIVE HEARINGS

EXHIBIT GF-506

Nutrient Screening for Local Effects in Reservoirs (see pages 29 - 37 of the draft IFS)

STEP 1 - Effects on main pool TP concentration (See pages 21 - 25 of the draft IFS for more details)

Enter data into the black font columns. Blue font indicates formulas. Green font indicates constants.

Permit #, Permittee, Outfall, Segment	Distance (m) 1609,344 m (= 1 mile)	Permitted mean flow (cfs) flow (mgd)	Harmonic mean flow (m3/s)	Permitted flow (m3/s)	Harmonic mean flow (m3/s)	Fraction of TP remaining	TP of effluent (mg/L) - assume 3.5 mg/L if no data	TP concentration delivered (mg/L)	TP loading (g/Yr)	Reservoir surface area (acres); Table F-2 in IFS	Reservoir volume (ac-ft); Table F-2 in IFS	Reservoir ambient TP (mg/L); Table F-1 in IFS	Mean depth (ft)	TP areal loading (g/m2Xyr)	Settling velocity (m/yr) - assumed to be 13 for TP	Retention time (Yrs); Table F-2 in IFS	Increase in TP due to discharge (mg/L)	TP % change
Example from IFS	0	2	0.1	0.08764	0.002832	1	2.57	2.570	7,101,039	1,558	25,730	0.059	17	1,1262	13	1	0.0624506	105.85
Predicted change in % TP due to discharge = 105.85																		
City of Granbury, 15821-001, Segment 1205	965	2	0.1	0.08764	0.002832	0.991092	0.5	0.481	1,327,772	7,945	129,001	0.054	16	0.0413	13	0.21	0.0011293	2.09
Predicted change in % TP due to discharge = 2.09																		

If predicted change in % TP is greater than 10%, then proceed to Step 2 below

STEP 2 - Estimate Change in Chlorophylla (See pages 26 - 28 of the draft IFS for more details)

Enter data into the black font rows. Blue font indicates formulas. Green font indicates constants. These formulas also reference data from Step 1 - so you have to complete that first.

Chlorophyll criterion from Appendix F, Standards (ug/L)
 Mean reservoir chlorophyll from Table F-1, IFS (ug/L)
 Chlorophyll without discharge
 Chlorophyll with discharge
 Change in chlorophyll due to discharge
 % change in assimilative capacity

*If change in assimilative capacity is > 20% then a TP limit is indicated.
 If change in assimilative capacity is 10 - 20% then TP monitoring is indicated.
 If change in assimilative capacity is < 10% then neither a TP limit or monitoring is indicated.*

STEP 3 - NOTES AND CONCLUSIONS

Nutrient Screening for Local Effects in Reservoirs (see pages 29 - 37 of the draft IPs)

Applicant name City of Granbury
 Permit Number W00015821001
 Segment Number 1205 - Lake Granbury

Enter 1, 3, or 5 in the box to the right as indicated. Only ONE number per box.

Level of concern	LOW (1 point)	MOD (3 points)	HIGH (5 points)	Points	Specific notes on scores for this permit.	Additional Instructions
Permitted flow (<0.25	0.25 to <1.0	>1.0	5	2.0 MGD	A higher level of concern may be assigned to discharges in sensitive areas (page 30 of the draft IPs).
Size of discharge and distance to lake: Discharge <0.25 MGD	>3 miles	3 to >1 miles	≤ 1.0 miles	5	2.0 MGD discharge is ~0.6 mi to normal pool elevation of Lake Granbury.	*Very large discharges may be evaluated on a case-by-case basis (pages 30 - 31).
Discharge 0.25 to 1.0	>7 miles	7 to >3 miles	≤ 3 miles			
Discharge >1.0*	>15 miles	15 to >7 miles	≤ 7 miles			
Water clarity/Sensitivity to nutrient enrichment: Option 1: qualitative analysis	Turbid or tannic	Some turbidity but w/o heavy murkiness	"Clear water" reservoir w high transparency	3	secchi mean=1.14 m. 2010 Ips	Option1: Use general observations and knowledge by individuals who are familiar with the reservoir or similar reservoirs (page 31). Option2: Use mean of long-term secchi data in the main pool of the lake or at sampling sites near the discharge (page 31).
Option 2: Secchi (meters)	≤ 0.75	0.76 to 1.27	≥ 1.28		NA- There are currently no other discharges to this arm of the lake	Use this metric when site-specific observations are available in areas of the water body with EXISTING wastewater discharges (pages 31 - 32).
Shading and sunlight in narrow backwaters and small coves (Sensitivity to growth of aquatic veg)	Extensive canopy cover shades most of water surface	Substantial canopy cover, but shading is only partial and not equivalent to "deep woods"	Canopy cover diffuses light to some extent, but substantial light reaches water	5		(page 32)
Chlorophyll a to TP ratio	<1	1 to 1.5	>1.5	1	0.77/1292897	Enter chlorophyll (mg/L) and TP (mg/L) from Table F-1 of the IPs into the column H and I, respectively. Formula in column F will calculate the ratio. Ratio = (C0.01*ln(CH))/TP. (page 32)
Consistency with other permits	Similar permits usually do not have limits for TP	Some similar permits have TP limits, but applicability is site-specific, not across-the-board	Discharges with similar characteristics usually have a TP limit	5		Assess if TP limits have been required for other permits with similar characteristics and locations in this area (pages 32 - 33).
Local dispersions and mixing: Option 1: Qualitative analysis	Large, open covers or main body of reservoir	Coves with restricted circulation	Narrow, backwater transition zones	5		Option1: See IPs for examples and a more complete description of each category (page 33). Option 2: Use for coves w/ restricted circulation narrow backwaters. See IPs for appropriate calculations (pages 33 - 34)
Option 2: Quantitative - change in local TP (mg/L)	<0.05	0.05 to <0.25	≥ 0.25			See column R in the "Main pool effects" spreadsheet (value is automatically generated from there). If you haven't performed the "Main pool effects" screening because you are evaluating a reservoir without nutrient criteria, you can either skip this metric or estimate the needed values (lake depth, lake area, lake volume, residence time, ambient TP).
Predicted change in TP (mg/L) in main pool of reservoir	<0.0001	0.0001 to <0.001	≥ 0.001	5	predicted TP change in main pool is =0.001129 mg/L	
Existing concerns 305(b) or 303(d)	No concerns	Exceeds 85th percentile	Documented problem	3	Lake Granbury is listed for Chlorophyll-a in 2014 Texas Integrated report, not assessed in 2016	Check the latest 305(b) integrated report

TP change

Chl (mg/L) TP (mg/L)

0.01553 0.054

Sum: 37

Average: 4.11

Average <2, probably no TP limit needed
 Average >4, TP limit probably needed
 Average 2-4, TP monitoring or a limit is possible, depending.
 If a TP limit is needed, screening factors and levels of concern can be used to determine the TP limit.

Nutrient Screening for Streams and Rivers (see pages 37 - 43 of the draft IPs)

Applicant Name

Permit number:

Segment:

STEP 1: Determine evaluation distance. This a rough guide (page 37).

Permitted flow (MGD)	Evaluation distance (stream miles)
<0.25	<3
0.25 to <1.0	<7
≥ 1.0	<15

STEP 2: Assess concerns: enter point values in boxes to the right.

Level of concern	LOW (1 point)	MOD (3 points)	HIGH (5 points)	Specific notes on scores for this permit.
Discharge (MGD)	<0.25	0.25 to <1.0	≥1.0	
Instream dilution (percent effluent)*	<10	10 to <25	≥25	
Bottom (Sensitivity to growth of attached algae)	Mud or sand	Rocky cobble, gravel, usually with some riffle areas	Larger rocks and boulders, rock slabs	
Depth (Sensitivity to growth of attached vegetation)	Relatively steep banks and deep channels across streams	Gently sloping sides with some shallow areas	Substantial shallow areas near banks and in stream channel	
Water clarity	Turbid or tannic	Some turbidity, not murky	Clear water	
Observation* (Sensitivity to growth of aquatic vegetation)	Little	Limited/some	Heavy patches	
Shading (Sensitivity to growth of aquatic vegetaion)	Extensive canopy cover shades most of stream surface	Substantial canopy cover but only partial shading; not "deep woods"	Canopy cover diffuses light some, but substantial light reaches stream	
Stream type	Intermittent	Intermittent with pools	Perennial	
Impoundments	No impoundments >300' long, not many pools	No impoundments >300', substantial pools over 20% of reach	At least one impoundment >300'	
Consistency	Similar permits do not have TP limits	Some similar permits have TP limits, but applicability is site-specific and not across the board	Discharges w/similar characteristics usually have a TP limit	
Concern 305(b) and 303(d)	No concern for nutrients or aquatic veg in latestet integrated report	Concern for exceedance of 85th percentile	Documented problems	

Sum: 0

Average: #####

Average <2, probably no TP limit needed

Average >4, TP limit probably needed

Average 2-4, TP monitoring or a limit is possible, depending.

If a TP limit is needed, screening factors and levels of concern can be used to determine the TP limit.