

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-500

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BEFORE THE STATE OFFICE
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PREFILED TESTIMONY

OF

WOODY FROSSARD

ON BEHALF OF

GRANBURY FRESH

SUBMITTED ON FEBRUARY 4, 2022

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EXHIBITS

GF-501	Woody Frossard Resume
GF-502	Figure 1: Lake Granbury USGS Elevations 2010 - 2021
GF-503	Executive Director's Dissolved Oxygen Modeling Permit Review Checklist
GF-504	"Toxic Cyanobacteria in Water: A guide to their public health consequences, monitoring and management," World Health Organization, 1999
GF-505	TCEQ Water Quality Assessment Team Map of Segments for Dissolved Oxygen Modeling
GF-506	"Nutrient Screening for Local Effects in Reservoirs" by Executive Director
GF-507	TCEQ's March 16, 2009 Order issuing TPDES Permit No. WQ0014293001
GF-508	Figure 2: Bear Creek Upstream of Belterra Discharge Point
GF-509	Figure 3: Bear Creek Upstream of Belterra Discharge Point
GF-510	Figure 4: Bear Creek Downstream of Belterra Discharge Point
GF-511	Figure 5: Bear Creek Downstream of Belterra Discharge Point

1 I. INTRODUCTION

2 Q: Please state your name.

3 A: Gus W. Frossard. People know me as Woody.

4 Q: Please state your address.

5 A: 803 Mallard Pointe Drive, Granbury, Texas 76049.

6 Q: Do you have routine experience with observation/use of Rucker Creek and/or Rucker
7 Creek Cove?

8 A: Yes, due to my property location, I observe Rucker Creek most every day as I pass over
9 Rucker Creek in order to get to my job and also to get to the businesses within the City of
10 Granbury. This location is less than 1 mile upstream of the confluence of the intermittent
11 stream and Rucker Creek. I have my boat in the Marina located on Rucker Creek Cove and
12 utilize both the cove and the reservoir for recreational activities on a routine basis.

13 Q: Please describe your current occupation.

14 A: I am the Environmental Services Division Director at the Tarrant Regional Water District.

15 II. QUALIFICATIONS

16 Q: Please describe your educational background.

17 A: I received my Bachelor of Science in Natural Resources Management from Colorado State
18 University in 1976.

19 Q: Have you authored any publications?

20 A: Yes. I authored several papers for the Trinity River Authority of Texas relating to baseline
21 biological studies and surveys. I have also authored a paper relating to the integration of
22 different model types for use in watershed assessments.

1 **Q: Please describe your work experience that is related to your opinions regarding this**
2 **proposed wastewater treatment plant permit application.**

3 A: My work experience has included developing water quality sampling programs,
4 developing reservoir and watershed protection programs, representing my agency in water
5 rights and water quality permitting with the Texas Commission on Environmental Quality
6 (TCEQ) and its predecessor agencies, evaluating impacts on streams, rivers, and reservoirs
7 from proposed projects, negotiating permit criteria with applicants that proposed
8 discharges into my agency's area of responsibility, developing regulatory programs with
9 both the TCEQ Waste Control Orders (30 TAC Chapter 285 which include Cedar Creek,
10 Eagle Mountain, Bridgeport, and Richland Chambers Reservoirs) and Watershed Rules (30
11 TAC § 311.67 which includes Eagle Mountain, Bridgeport, Cedar Creek, Benbrook, and
12 Richland Chambers Reservoirs) for our area of jurisdiction and within my agency's
13 municipal separate storm sewer (MS4) TCEQ identified jurisdictional boundary.

14 **Q: Do you have experience in water quality modeling?**

15 A: Yes, while I can run some water quality models, my experience centers around taking the
16 results developed by the water quality modelers and applying that information to potential
17 impacts to the receiving waters and then working with the modelers to develop scenarios
18 to try and reduce or remove the proposed impact to the receiving stream. I have experience
19 in this regard with QUALTX, WASP, CE-QUAL-W2, SWAT, and SWIMM.
20 For example, the models will provide numerical results, but these have to be applied as
21 input to other models for a complete analyzation of any impact from the proposed
22 discharge. Also, the results must be applied to TCEQ permitting criteria and requirements

1 in order to determine if the resulting water quality impacts meet state requirements for
2 discharge permits.

3 **Q: Do you have experience in water quality management?**

4 A: Yes

5 **Q: Please describe your experience related to water quality management.**

6 A: I have been responsible for the development of Waste Control Orders for the reservoirs
7 that my agency is responsible for. A Waste Control Order is issued by TCEQ to a local
8 agency for permitting authority when that agency has demonstrated that the state default
9 criteria for On-Site Septic Systems are not adequate to protect the receiving water under
10 the agency's control. This required development of sampling programs, data analysis,
11 water quality modeling, and proving to TCEQ's predecessor agency why a more stringent
12 discharge permit was required.

13 I have been responsible for developing Watershed Management Areas around our
14 reservoirs that require a higher quality wastewater discharge requirement for nutrients
15 within these zones. As above, the program has to be designed to develop the information
16 to justify to the TCEQ why the risk to the water quality of the receiving water was going
17 to be impaired unless additional requirements were placed on wastewater discharges. Upon
18 agreement by TCEQ that the additional protection was needed, this was accomplished by
19 rulemaking by TCEQ.

20 In regard to rivers, my agency was identified as a MS4 Phase I entity by U.S. EPA. I
21 negotiated with EPA originally, and now TCEQ, the requirements of this permit. From this
22 effort, based upon developing the program to identify potential impacts to the receiving
23 stream, we have instituted a permitting program for all new discharges into the MS4

1 boundary that require modeling and proposed infrastructure to treat the stormwater prior
2 to being discharged into the river. My agency is the permitting authority for all new
3 permits, and I am responsible for the program.

4 **Q: Can you identify what has been marked as Exhibit GF-501?**

5 A: Yes. This exhibit is a representative resume summarizing my experience in various areas
6 of practice.

7 **Q: Is this a true and accurate copy of your resume?**

8 A: Yes.

9 *Granbury Fresh offers Exhibit GF-501.*

10 **Q: What materials have you reviewed in preparation for your testimony?**

11 A: I have reviewed the City of Granbury permit application, TCEQ's Draft Permit, the
12 Environmental Information Document prepared by Enprotec / Hibbs & Todd for the City
13 of Granbury's TWDB loan application, comments I provided to TCEQ regarding this draft
14 permit, information provided by TCEQ regarding their modeling of the impacts to Rucker
15 Creek and Rucker Cove, Procedures to Implement the Texas Surface Water Quality
16 Standards (RG-194, June 2010), as well as the documents that have been provided to me
17 filed by the Applicant, TCEQ, OPIC, and Protestants.

18 **Q: What other type of research have you done in preparation for your testimony?**

19 A: I have reviewed information on Lake Granbury lake levels from the United States
20 Geological Survey (USGS) lake level information web page, reviewed information on the
21 TCEQ Clean Rivers Program (CRP) Data Tool for Lake Granbury, Texas Water
22 Development Board (TWDB) Hydrographic Survey for Lake Granbury, Aid Granbury
23 Lake Map, personal on the lake, cove, and creek experience, had communication and

1 meetings with other agencies managing water quality impacts from Cyanobacteria,
2 workshops on Cyanobacteria, reviewing documents associated with the Hays County
3 Water Control and Improvement District No. 1 TPDES Permit No. WQ0014293001,
4 reviewing documents associated with the City of Dripping Springs TPDES No.
5 WQ0014488003, Citizen Petition for Corrective Action or Withdrawal of NPDES Program
6 Delegation from the State of Texas submitted to U.S. Environmental Protection Agency,
7 Washington D.C., Toxic Cyanobacteria in Water: A guide to their public health
8 consequences, monitoring and management, World Health Organization, 1999, Managing
9 microcystin: identifying national-scale thresholds for total nitrogen and chlorophyll a.
10 Yuan et al 2014., Biological Stoichiometry Regulates Toxin Production in Microcystis
11 aeruginosa. Wagner et al 2019., and The dual role of nitrogen supply in controlling the
12 growth and toxicity of cyanobacterial blooms, Gobler et al., 2016.

13 III. SUMMARY OF OPINIONS

14 **Q: Have you developed any opinions regarding the Application by the City of Granbury**
15 **(“the City” or “Applicant”) for Permit No. WQ0015821001?**

16 A: Yes.

17 **Q: On what subjects have you developed opinions?**

18 A: I have evaluated whether the City of Granbury has demonstrated compliance with the
19 requirements of TCEQ’s antidegradation policy. In particular, I have developed opinions
20 regarding whether the City of Granbury has demonstrated the proposed discharge will not
21 impair existing uses of the receiving waters (the “Tier I” antidegradation review required
22 by 30 TAC § 307.5(b)(1)), and whether the City of Granbury has demonstrated that the

1 discharge will result in a less than *de minimis* lowering of water quality (the City's claimed
2 showing under 30 TAC § 307.5(b)(2)).

3 **Q: Please summarize your opinions with regard to whether the City of Granbury has**
4 **demonstrated compliance with the Tier I antidegradation review requirements of 30**
5 **TAC § 307.5(b)(1).**

6 A: In applying the QUALTX model, the state identified the Rucker Creek Cove as the
7 receiving water to meet the required dissolved oxygen water quality standard 5.0 mg/l.

8 TCEQ is required to analyze potential impacts to the immediate receiving water as required
9 by the Antidegradation Policy for a Tier I review. This is stipulated in the TCEQ's
10 Procedures to Implement the Texas Surface Water Quality Standards. The Executive
11 Director's QUALTX modeling resulted in a receiving water DO of approximately 4.8 mg/l
12 and the required minimum DO Criteria is 5.0 mg/l.

13 This result does not demonstrate compliance with the applicable dissolved oxygen
14 standard. In addition, the modeling of dissolved oxygen was inadequate because it did not
15 accurately characterize the critical conditions at this location. Finally, with regard to the
16 Tier I review, the Executive Director did not consider potential health impacts from
17 harmful algal blooms.

18 **Q: Please summarize your opinions as to whether the City of Granbury has**
19 **demonstrated compliance with the Tier II antidegradation requirements of 30 TAC**
20 **§ 307.5(b)(2).**

21 A: As an initial matter, the City of Granbury has not made an attempt in its TCEQ application
22 to demonstrate that the degradation of water quality in the receiving waters is necessary for
23 important economic or social development. Thus, to pass the requirements of a Tier II

1 review, the City must demonstrate that the proposed discharge will not lower water quality
2 by more than a *de minimis* extent.

3 The City has not demonstrated that Dissolved Oxygen (DO) will not be lowered by a
4 greater than *de minimis* extent. Certainly, a lowering of dissolved oxygen to 4.80 would
5 be greater than *de minimis*. In addition, the QUALTX model developed by the Executive
6 Director only analyzed for impacts to Dissolved Oxygen. While this parameter is critical
7 for aquatic life, it does not address nutrient loading to the receiving water and impacts that
8 result from that additional loading. The Executive Director did not utilize QUALTX to
9 determine the concentration of nutrients in Rucker Creek that would result from the
10 discharge. Without a determination of the extent to which nutrient concentrations in Rucker
11 Creek will be changed, it is impossible to conclude that the extent will be *de minimis*.

12 TCEQ's Water Quality Standards Implementation procedures also require the analysis of
13 any additional impacts that might occur from the discharge. As a benchmark, if there is a
14 change in the resulting water quality that consumes more than 10% of the assimilative
15 capacity, then the change in water quality is not considered *de minimis*, and a permit cannot
16 be issued absent a showing that the discharge is necessary for important economic or social
17 development. The state did not look at impacts in the cove for any other parameter than
18 DO. Without modeling the nutrients, they did not adequately assess the change in nutrient
19 concentrations that are a result of the discharge.

20 The City of Granbury has failed to demonstrate that the discharge will not result in a
21 greater than *de minimis* lowering of water quality with respect to nutrients and associated
22 algal growth. Notably, the proper baseline for a Tier II evaluation is the highest water
23 quality sustained since November 28, 1975, as set forth at 30 TAC § 307.5(c)(2)(B). The

1 existing conditions for dissolved oxygen and algal growth do not reflect the highest water
2 quality sustained in the receiving waters for dissolved oxygen, nutrients, or algal growth.
3 So, it is also the case that a proper baseline water quality has not been determined and used
4 for an appropriate Tier II review.

5 **Q: In performing your evaluation, did you examine whether the impact of the discharge**
6 **upon *E. coli* levels would meet the Tier I and Tier II requirements?**

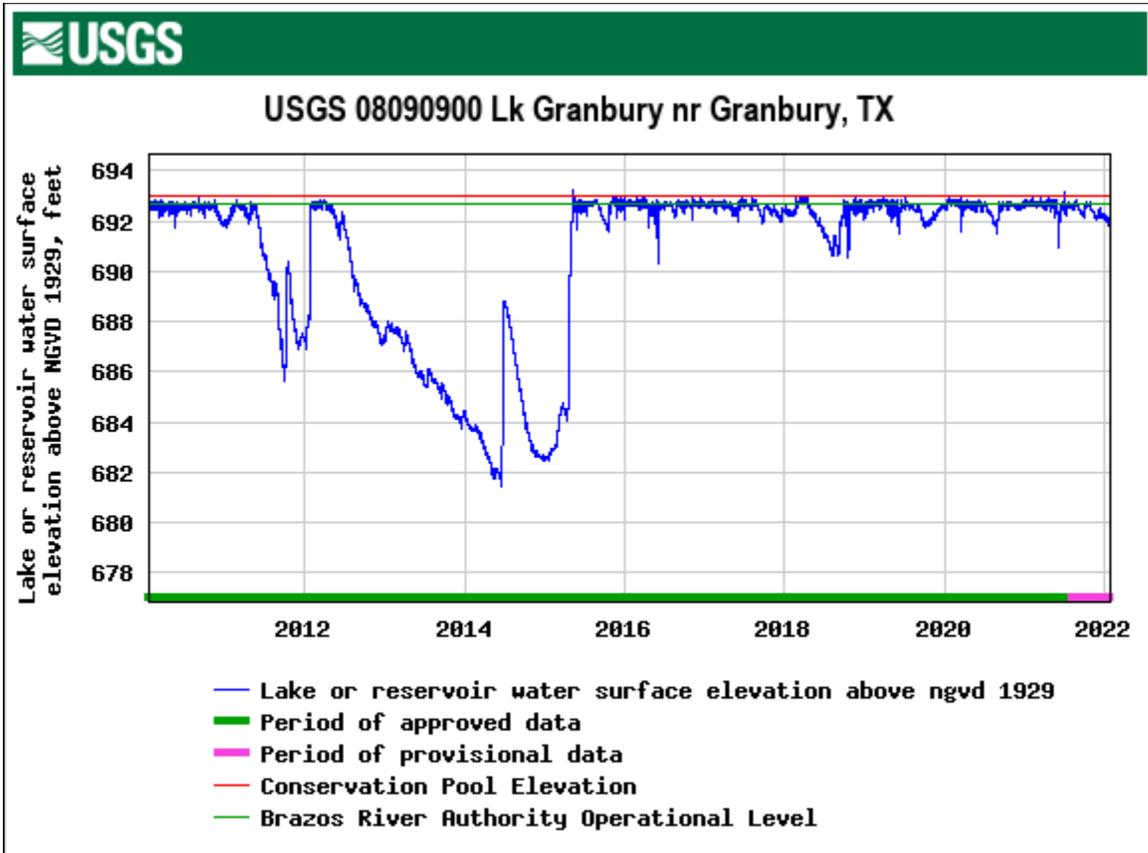
7 A: No. That was not included within the scope of my review. Steve Esmond has evaluated
8 potential *e coli* impacts of the discharge.

9 **IV. OPINIONS REGARDING TIER I ANTIDegradation REVIEW**
10 **REQUIREMENTS OF 30 TAC § 307.5(b)(1)**

11 **Q: Now, I would like to discuss your evaluation of the Tier I review in a bit more detail.**
12 **Can you please explain your opinion with regard to whether the modeling performed**
13 **by the Executive Director justifies a conclusion that the proposed discharge is**
14 **compliant with the Tier I Dissolved Oxygen requirements in Rucker Creek?**

15 A: Yes. As a perennial waterbody, Rucker Creek is presumed to have high aquatic life uses,
16 meaning that dissolved oxygen may not be lowered to less than 5.0 mg/l. The results of an
17 uncalibrated model showing a resulting dissolved oxygen of 4.80 mg/l does not
18 demonstrate that this standard has been met in Rucker Creek. Once it had been determined
19 that the DO criteria of 5.0 mg/l could not be met by utilizing the uncalibrated QUALTX
20 model, TCEQ should have required the applicant to collect enough data to calibrate the
21 model to the existing water quality conditions in the Cove. The calibrated model would
22 have then been utilized to determine if the proposed discharge criteria in the draft permit
23 were adequate to meet the DO criteria. If not, the discharge criteria would be changed to

1 lower limits until the DO was either met or the determination that the receiving waters
2 could not assimilate a discharge of 2 mgd and the discharge would not be permitted.
3 I also question whether the TCEQ chose the most critical period for Rucker Creek and
4 Rucker Creek Cove. As can be seen by Figure 1, I downloaded the USGS Lake Granbury
5 water surface elevation for the past 10 years.



6
7 **Figure 1: Lake Granbury water surface elevation 2010 - 2021**

8 As this shows, during 2013, the reservoir reached a low of slightly below 682 feet above
9 mean sea level (msl). The conservation elevation of Lake Granbury is approximately 693
10 msl. During this period of time, the reservoir was reduced by approximately 11 feet.
11 Utilizing the data provided by the Executive Director's Dissolved Oxygen Modeling
12 Permit Review Checklist (DO Modeling Checklist) the area utilized for determining the

1 DO standard in Rucker Creek Cove averages approximately 6 feet or less in depth. So, for
2 the lowest period of time, most of the area used by the TCEQ for analysis was dry. Over
3 the period of July 2012 to May 2015, the reservoir average was approximately 6 feet low.
4 So, for a period of 3 years, Rucker Creek and the area utilized by TCEQ for determining
5 impacts to receiving waters was dry. This is the reason I believe the most critical period
6 was not evaluated.

7 **Q: Please identify Exhibit GF-502.**

8 A: Exhibit GF-502 is a copy of the USGS water surface elevation figure which I downloaded
9 from the USGS website, and which is shown in Figure 1 above.

10 *Granbury Fresh offers Exhibit GF-502.*

11 **Q: Please identify Exhibit GF-503.**

12 A: Exhibit GF-503 is a copy of the Executive Director's Dissolved Oxygen Modeling Permit
13 Review Checklist that I just referenced.

14 *Granbury Fresh offers Exhibit GF-503.*

15 **Q: In your opinion, has it been demonstrated that the impact of the proposed discharge**
16 **upon Algal components such as Chlorophyll a will not impair the existing and**
17 **attainable uses of the receiving waters?**

18 A: No. The QUALTX model does not have the ability to model Algal components and
19 specifically Chlorophyll a. Research by the World Health Organization and others has
20 identified that Cyanobacteria at certain levels can cause both human and animal health
21 issues. They have also identified that the risk can be measured by the level of Chlorophyll
22 a in the water which is a parameter that can be easily measured. This information is readily
23 available, but the TCEQ did not model or analyze the potential of the discharge to cause

1 the Cyanobacteria levels and their production of toxins to be a health risk, especially in the
2 cove.

3 This is an emerging issue that is already impacting public use of state waters. Both the City
4 of Austin and the Lower Colorado River Authority have developed water quality programs
5 because of the existing impacts to the state water in their jurisdiction. These programs
6 include routine sampling for the toxins and web pages dedicated to informing the public of
7 the locations where the risk to humans or pets are not acceptable, along with signage to
8 warn the public about the condition of the water. They have experienced documented
9 animal death due to the ingesting of Cyanobacteria while in the water. The existing science
10 and documentation indicate that one of the major causes of proliferation of Cyanobacteria
11 is excessive phosphorus and nitrogen. I attended a meeting with the City of Austin and the
12 Lower Colorado River Authority in November of last year in order to better understand
13 their knowledge of Cyanobacteria and the programs they have developed around the public
14 utilizing water impacted by Cyanobacteria. Some of the programs are identified above.

15 **Q: Please identify Exhibit GF-504.**

16 A: Exhibit GF-504 is an excerpt from “Toxic Cyanobacteria in Water: A guide to their public
17 health consequences, monitoring and management,” which is a publication of the World
18 Health Organization that addresses Cyanobacteria issues such as those I have just
19 mentioned.

20 *Granbury Fresh offers Exhibit GF-504.*

21 **Q: When considering a TCEQ permit application, what is meant by the term “critical
22 conditions”?**

1 A: The impact of a discharge is intended to be evaluated under a reasonable “worst-case”
2 scenario. By default, this is considered the 7Q2 flow which stands for a 7-day, 2-year low
3 flow.

4 **Q: Do you agree that the assumptions used in the modeling accurately reflect the**
5 **relevant conditions in this case?**

6 A: No.

7 **Q: Please explain.**

8 A: In my opinion, the assumptions regarding the reported cove depth and dispersion associated
9 with the modeling were not justified.

10 As previously discussed, the reservoir has a history of lower water levels in the summer
11 critical period. The Executive Director identified the average cove depth is from 1.5 to 3.5
12 (m) based on conservation pool levels for the Lake. The reservoir has experienced long
13 periods of time when the reservoir is from 2 to 3 (m) low during this same critical time
14 period. The State should have used these criteria for analyzing the cove segments for
15 meeting the state standards during the critical time period. This would have resulted in area
16 utilized by the State for meeting the DO criteria as dry with no cove in existence which
17 would have changed their modeling input for cove depth and dispersion.

18 **Q: Please identify Exhibit GF-505.**

19 A: Exhibit GF-505 is a copy of the map developed by the TCEQ Water Quality Assessment
20 Team to illustrate the segmentation of the receiving waters to analyze Dissolved Oxygen
21 impacts.

22 *Granbury Fresh offers Exhibit GF-505.*

1 **Q: Are you aware of Mr. James Machin’s observation that the elevation of the receiving**
2 **waters was not accurately characterized for the modeling performed?**

3 A: Yes.

4 **Q: Is that another example of an inaccurate assumption in the modeling performed?**

5 A: Yes.

6 **V. OPINIONS REGARDING TIER II ANTIDegradation REVIEW**

7 **REQUIREMENTS OF 30 TAC § 307.5(b)(1)**

8 **Q: Please summarize your opinions as to whether the City of Granbury has**
9 **demonstrated compliance with the Tier II antidegradation requirements of 30 TAC**
10 **§ 307.5(b)(2)).**

11 A: Yes. As an initial matter, the City of Granbury has not made an attempt in its TCEQ
12 application to demonstrate that the degradation of water quality in the receiving waters is
13 necessary for important economic or social development. Thus, to pass the requirements
14 of a Tier II review, the City must demonstrate that the proposed discharge will not lower
15 water quality by more than a *de minimis* amount.

16 The City has not demonstrated that Dissolved Oxygen will not be lowered to a greater than
17 *de minimis* amount. Certainly, a lowering of dissolved oxygen to 4.80 would be greater
18 than *de minimis*. In addition, the QUALTX model developed by the Executive Director’s
19 staff only analyzed for impacts to Dissolved Oxygen. While this parameter is critical for
20 aquatic life, it does not address nutrient loading to the receiving water and impacts that
21 result from that additional loading. They did not utilize QUALTX to analyze nutrients but
22 stated they used RG-194 to analyze Phosphorus. They stated that Total Nitrogen was not
23 analyzed. The City of Granbury has not demonstrated that the discharge will not result in

1 a greater than *de minimis* lowering of water quality with respect to nutrients and associated
2 algal growth. Notably, the proper baseline for a Tier II evaluation is the highest water
3 quality sustained since November 28, 1975, as set forth at 30 TAC § 307.5(c)(2)(B). The
4 existing conditions for dissolved oxygen and algal growth do not reflect the highest water
5 quality sustained in the receiving waters for dissolved oxygen, nutrients, or algal growth.
6 So, it is also the case that a proper baseline water quality has not been determined and used
7 for an appropriate Tier II review.

8 **Q: Has the Executive Director agreed that the discharge will result in a less than *de***
9 ***minimis* lowering of water quality?**

10 A: Yes.

11 **Q: Do you agree that the discharge will result in a less than *de minimis* lowering of water**
12 **quality with respect to dissolved oxygen?**

13 A: No.

14 **Q: Please explain.**

15 A: I have discussed my criticisms of the Dissolved Oxygen modeling above. Just as I believe
16 this modeling does not demonstrate that uses will not be impaired due to the lowering of
17 dissolved oxygen in Rucker Creek, I am certainly of the opinion that this modeling does
18 not demonstrate that the discharge will result in a less than *de minimis* lowering of water
19 quality in Rucker Creek with regard to Dissolved Oxygen.

20 **Q: In your opinion, has it been shown that the discharge will result in a less than *de***
21 ***minimis* lowering of water quality with regard to nutrient impacts?**

22 A: No. The QUALTX model is limited in the parameters it can analyze and did not address
23 nutrient impacts to the receiving water. Because of this limitation in this model, impacts to

1 existing uses, recreation, and public health will be at risk and the Tier II analysis undertaken
2 by the TCEQ did not meet the required analysis. The TCEQ should have utilized a model
3 capable of analyzing for the impact of the increase in nutrient concentrations and
4 Cyanobacteria on existing uses.

5 **Q: In order to accurately determine the nutrient impacts of the proposed discharge, is it**
6 **necessary to specifically evaluate the impacts of the discharge upon Rucker Creek**
7 **Cove?**

8 A: Yes. The water within the coves of Lake Granbury only undergoes limited mixing with
9 the main stem of Lake Granbury. This results in more limited dilution of contaminants
10 entering the coves. The water depth at the junction of Rucker Creek Cove with the main
11 body of the lake is reduced to only approximately 8-9 feet when the reservoir is at
12 conservation elevation. While the Rucker Creek Cove is deeper on the upstream side of
13 this barrier, the actual mixing is restricted and if the reservoir elevation is down to any
14 degree, no mixing will occur at all.

15 **Q: Did the Executive Director properly make this specific evaluation of the water quality**
16 **impacts upon Rucker Creek with regard to nutrients?**

17 A: No. The Executive Director provided in their discovery information the “Nutrient
18 Screening for Local Effects in Reservoirs” from the implementation procedures that the
19 Executive Director’s staff used to determine that their predicted change in percent total
20 phosphorus (TP) due to discharge was 2.09 % for the final phase of the permit limits. The
21 same calculation was provided for the predicted change in TP due to the discharge at the
22 interim phase was 3.25 %. In applying the Nutrient Screening for Local Effects in
23 Reservoir methodology as identified in the Procedures to Implement the Texas Surface

1 Water Quality Standards, the Executive Director chose to apply the total reservoir volume
2 and the total surface area of Lake Granbury.

3 **Q: Please identify Exhibit GF-506.**

4 A: Exhibit GF-506 is a copy of the Nutrient Screening for Local Effects in Reservoirs
5 conducted by the Executive Director.

6 *Granbury Fresh offers Exhibit GF-506.*

7 **Q: How did the Executive Director's use of the total area and volume of Lake Granbury**
8 **impact the Executive Director's consideration of nutrient impacts, such as total**
9 **phosphorus?**

10 A: By utilizing the total area and volume of Lake Granbury, the TP concentration was diluted
11 and their analysis does not represent the increase in TP concentration at the receiving water.

12 **Q: Considering the limited dilution within Rucker Creek Cove, how would you expect**
13 **the concentration of total phosphorus to change within Rucker Creek Cove as a result**
14 **of the proposed discharge?**

15 A: If the total phosphorus impact upon Rucker Cove is examined in the same manner as
16 dissolved oxygen was evaluated, the result for the interim phase would be a 651 %
17 increase in the total phosphorus concentration within the Cove. If this analysis had been
18 done correctly for the final phase, the TP change would be 661% change.

19 **Q: How did you reach those conclusions?**

20 A: I utilized the document provided by the TCEQ to analyze the same information but using
21 the cove information provided in the TCEQ Water Quality modeling memo titled
22 "Dissolved Oxygen Modeling Permit Review Checklist" (Exhibit GF-503) that was
23 developed specifically for the City of Granbury draft TPDES permit. The use of this

1 document allowed me to use the same data that the Executive Director used in the
2 QUALTX model to determine the resulting DO criteria of 4.81 for the final phase of the
3 permit. The Executive Director chose to use the total volume and surface area of Lake
4 Granbury in their nutrient analysis instead of using the same receiving water (Rucker Creek
5 Cove) that was their basis for trying to meet the DO criteria standard. By diluting the total
6 phosphorus load with the total volume of the reservoir instead of the cove, it completely
7 obfuscates the impact of the phosphorus on the receiving water.

8 In my analysis, the only criteria I changed from their original model analysis was the
9 Reservoir surface area. The TCEQ utilized 7,945 surface acres to represent the entire area
10 of Lake Granbury; I utilized a surface of 40 acres, as identified in the Dissolved Oxygen
11 Modeling Permit Review Checklist, that is more representative of Rucker Creek Cove. The
12 other parameter in their model that I changed was the Reservoir volume. The TCEQ
13 utilized a volume of 129,001ac/ft for Lake Granbury while I used 312 ac/ft as identified in
14 the Dissolved Oxygen Modeling Permit Review Checklist that is more representative of
15 the limited mixing occurring between the Cove and the main stem of Lake Granbury.

16 **Q: In your opinion, are the changes in total phosphorus concentration within Rucker**
17 **Creek Cove as a result of the proposed discharge “*de minimis*”?**

18 A: No. Under either the interim phase or the final phase, the Tier II review fails.

19 **Q: In your opinion, did the Executive Director’s analysis address whether water quality**
20 **for nutrients within Rucker Creek Cove would be lowered by less than a *de minimis***
21 **extent?**

22 A: No. The Executive Director’s staff used the process outlined in the Procedures to
23 Implement the Texas Surface Water Quality Standards (often referenced as the

1 “implementation procedures,” or “IPs”) to analyze if a phosphorus limit should be included
2 in the permit. This methodology does not determine what the phosphorus criteria should
3 be in the permit, nor does it determine the resulting concentration of phosphorus in Rucker
4 Creek Cove.

5 **Q: In your opinion, did the Executive Director adequately address the impact of the**
6 **proposed discharge upon total nitrogen (TN)?**

7 A: No. The Executive Director staff stated that Total Nitrogen (TN) was not analyzed. In
8 other permits, the TCEQ chose to include a review of the TN potential impacts upon the
9 receiving waters and required the applicant to have a discharge of no more than a TN of 6.
10 In the City of Granbury draft permit, the TCEQ did not include any limit for TN.

11 **Q: Has it been shown that the discharge of nitrogen as authorized by the permit will**
12 **lower water quality by less than a *de minimis* extent?**

13 A: No. The absence of a TN limit allows for unrestricted discharge of Nitrate and or Nitrate
14 Nitrogen from this proposed plant which become readily available for algal uptake. While
15 TCEQ reviewed total phosphorus as the potential limiting nutrient for algal growth in this
16 application, the discharge of the permitted limit of phosphorus can change the limiting
17 factor from phosphorus to nitrogen as the phosphorus would be available in a concentration
18 that is no longer limiting algae growth. In that circumstance, the nitrogen that is allowed to
19 be discharged without any restriction can become the nutrient that will cause excessive
20 algae growth. This relationship is critical in understanding nutrient limiting for excessive
21 algae growth and the TCEQ chose not to establish limits within the permit based upon
22 limiting growth but instead an arbitrary phosphorus limit of 1 at interim phase and 0.5 at
23 final phase with no modeling or science for the justification of the phosphorus limit. They

1 chose not to consider total nitrogen at all and therefore have no knowledge of the potential
2 impact on the receiving waters from this discharge.

3 **Q: Has the TCEQ previously issued permits with more stringent total phosphorus limits**
4 **than the phosphorus limit in the draft permit?**

5 A: Yes. The TCEQ has issued permits with total phosphorus limits in permits as low as 0.15
6 mg/l as opposed to the 0.5 mg/l the Executive Director proposes in the draft permit. One
7 example of such a permit is the permit issued to Hays County Water Control and
8 Improvement District No. 1, TPDES Permit No. WQ0014293001, which authorizes the
9 discharge of 0.500 million gallons per day of domestic wastewater into Bear Creek in Hays
10 County. That permit limits Total Phosphorus to no greater than 0.15 mg/l as a daily
11 median, or 0.44 pounds per day. That permit also contains limits on Ammonia Nitrogen
12 and Total Nitrogen.

13 **Q: Does that permit serve the “Belterra” subdivision near Austin?**

14 A: Yes.

15 **Q: Is it OK if we reference that as the “Belterra Permit”?**

16 A: Yes.

17 **Q: Please identify Exhibit GF-507.**

18 A: Exhibit GF-507 is a copy of TCEQ’s March 16, 2009 Order issuing TPDES Permit No.
19 WQ0014293001, which is the Belterra Permit.

20 *Granbury Fresh offers Exhibit GF-507.*

21 **Q: Have you relied upon this in forming your opinions expressed in this testimony?**

22 A: Yes.

23 **Q: Have you visited Bear Creek in the area of the Belterra discharge?**

1 A: Yes. In December of 2021, I took the opportunity to go visit Bear Creek, the receiving
2 water for the Hays County Water Control and Improvement District No. 1 TPDES Permit
3 No. WQ0014293001.

4 **Q: What did you observe upstream of the discharge point during that visit?**

5 A: The photographs identified as Figures 2 and 3 below are pictures of Bear Creek above any
6 flow in the creek which would have been within the Belterra development. These photos
7 show Bear Creek upstream of the Hays County TPDES permit. It is a natural flowing
8 stream with no dominate aquatic vegetation that would represent a natural flowing stream
9 that is not dominated by excessive nutrients.



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Figure 2: Bear Creek Upstream of Belterra Discharge



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Figure 3: Bear Creek Upstream of Belterra Discharge

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Q: Please identify Exhibit GF-508.

4

A: Exhibit GF-508 is a copy of the photograph shown in Figure 2, above, which I took while

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visiting Bear Creek.

1 **Q: Does this photograph fairly and accurately represent the conditions of Bear Creek**
2 **upstream of the Belterra discharge point, as you observed those conditions at that**
3 **time?**

4 A: Yes.

5 *Granbury Fresh offers Exhibit GF-508.*

6 **Q: Please identify Exhibit GF-509.**

7 A: Exhibit GF-509 is a copy of the photograph shown in Figure 3, above, which I took while
8 visiting Bear Creek.

9 **Q: Does this photograph fairly and accurately represent the conditions of Bear Creek**
10 **upstream of the Belterra discharge point, as you observed those conditions at that**
11 **time?**

12 A: Yes.

13 *Granbury Fresh offers Exhibit GF-509.*

14 **Q: What did you observe downstream of the discharge point during that visit?**

15 A: The photographs identified as Figures 4 and 5 below are pictures of Bear Creek below the
16 Belterra Permit discharge. These photos were taken still on the Belterra development
17 downstream of the Hays County wastewater treatment plant. Bear Creek was completely
18 dominated by excessive algal growth. Most of the streambed was covered with algae both
19 at the surface and suspended in the water column.



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Figure 4
November 2021 Algal growth downstream of Belterra Discharge

This photo shows the density of the algal growth that has developed downstream of the Belterra discharge.

Q: Please identify Exhibit GF-510.

A: Exhibit GF-510 is copy of Figure 4.

Q: Is GF-510 a fair and accurate depiction of Bear Creek downstream of the Belterra discharge as you observed it at that time?

A: Yes.

Granbury Fresh offers Exhibit GF-510.



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Figure 5
November 2021 Algal growth downstream of Belterra Discharge

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This photograph reflects the widespread nature of the algal growth downstream of the Belterra discharge.

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Q: Please identify Exhibit GF-511.

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A: Exhibit GF-511 is copy of Figure 5.

8

Q: Is GF-511 a fair and accurate depiction of Bear Creek downstream of the Belterra discharge as you observed it at that time?

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A: Yes.

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Granbury Fresh offers Exhibit GF-511.

1 **Q: How does the authorized volume of the Belterra discharge compare to the authorized**
2 **volume in the City of Granbury's draft permit?**

3 A: At 0.5 mgd, the Belterra Permit is for only one-quarter the amount of the 2.0 mgd volume
4 of discharge that would be authorized by the City of Granbury's draft permit.

5 **Q: How does the authorized concentration of total phosphorus in the Belterra discharge**
6 **compare to the authorized concentration of total phosphorus in the City of**
7 **Granbury's draft permit?**

8 A: The total phosphorus concentration limit of 0.15 mg/l is roughly one-sixth of the
9 concentration of total phosphorus authorized by the City of Granbury's draft permit.

10 **Q: Based on the analysis you have performed, and the work by Mr. Machin, do you have**
11 **an opinion as to whether the City of Granbury's proposed discharge would**
12 **potentially result in algal growth within Rucker Creek Cove similar to that which you**
13 **observed in Bear Creek downstream of the Belterra discharge?**

14 A: Yes. In my opinion, Bear Creek has similar characteristics with Rucker Creek and with
15 excessive loading of phosphorus and nitrogen into Rucker Creek, it will be impacted like
16 Bear Creek. Without the additional modeling for determining nutrient loads on Rucker
17 Creek or Rucker Creek Cove as described above, I don't believe TCEQ can demonstrate
18 this won't occur at Rucker Creek or in the cove, especially in low flow conditions. The
19 proposed discharge limits for the City of Granbury permit are approximately 5 times higher
20 for TP and contain no restriction on TN.

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V. CONCLUSION

Q: What are some of the consequences of the problems you have identified?

A: There is a high potential for impacts to the aquatic life and human health in Rucker Creek and Rucker Creek Cove from this proposed discharge. The requirements of 30 TAC § 307.4, 30 TAC § 307.5 and 30 TAC § 307.6 will be violated. Section 307.5 includes the antidegradation policy, which I have discussed in detail above. Section 307.4(e) provides that nutrients from permitted discharges must not cause excessive growth of aquatic vegetation that impairs an existing, designated, presumed, or attainable use. This has not been met for the same reasons as identified with respect to the Tier I evaluation above. Section 307.6(b)(3) provides that water in the state must be maintained to preclude adverse toxic effects on human health resulting from contact recreation. The City of Granbury has failed to demonstrate that the discharge will not cause such toxic effects as the result of Cyanobacteria growth in the receiving waters.

Q: In your professional opinion, does the permit analysis comply with TCEQ requirements?

A: No. In my professional opinion, the TCEQ did not do an adequate Tier I or Tier II or public health analysis.

Q: Does this conclude your testimony?

A: Yes, although I reserve the right to supplement this testimony.