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

APPLICATION BY CITY OF GRANBURY, FOR TPDES PERMIT NO. WQ0015821001	**§ § § § §**	**BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS**

EXHIBIT GF-400

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PREFILED TESTIMONY

OF

JAMES L. MACHIN, P.E.

ON BEHALF OF

GRANBURY FRESH

SUBMITTED ON FEBRUARY 4, 2022

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GF-401	James Machin Resume
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I. INTRODUCTION

Q: Please state your name.

A: James Machin.

Q: Please state your address.

A: 8409 Bell Mountain Drive, Austin, Texas 78730.

Q: Please describe your current occupation.

A: I am the Principal Engineer for my firm, JLM Engineering, which I have run since 2018.

II. QUALIFICATIONS

Q: Please describe your educational background.

A: I received my Bachelor of Science in Engineering from Princeton University in 1971. I then went on to receive a Master of Business Administration from the University of Michigan in 1974 and then received my Master of Science in Environmental and Water Resources Engineering from the University of Texas in 1980.

Q: Are you a licensed professional engineer in the State of Texas?

A: Yes. License No. 53349.

Q: How long have you been a licensed professional engineer in the State of Texas?

A: Since 1983.

Q: Do you have any other licenses or registrations?

A: Yes. I am also a licensed professional engineer in the State of Arizona.

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

A: I have worked on numerous wastewater treatment plant (WWTP) applications throughout my career.

Q: Do you have experience in water quality modeling?

A: Yes.

Q: Please describe your experience related to water quality modeling.

A: I have worked on water quality models including QUAL-TX and LA-QUAL for several WWTPs. I have performed modeling for both applicants and protestants. Some projects were not part of a contested case. For example, most recently I performed modeling for the City of Seguin to support their application for an expansion of the Geronimo Creek WWTP to determine what the effluent limitations were likely to be.

Q: Do you have experience in wastewater treatment?

A: Yes.

Q: Please describe your experience related to wastewater treatment.

A: My engineering master's degree included design of WWTPs. I have since worked on many plants.

Q: Can you identify what has been marked as Exhibit GF-401?

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

Granbury Fresh offers Exhibit GF-401.

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

A: I have reviewed the draft TPDES permit, TCEQ's water quality model for this permit, TCEQ's public Surface Water Quality (SWQM) data, and the Executive Director's Response to Protestants' First Set of Interrogatories and Requests for Production in this case. I have reviewed analysis performed by Woody Frossard of total phosphorus concentrations in Rucker Creek. I have also toured the site location and receiving waters.

Q: What other research have you done in preparation for your testimony?

A: I reviewed the Membrane Bioreactor process in the application, TCEQ's "Procedures to Implement the Texas Surface Water Quality Standards," (2010) and EPA's "Nutrient Criteria Technical Guidance Manual Lakes and Reservoirs" (2000).

III. SUMMARY OF OPINIONS

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

A: Yes.

Q: On what subjects have you developed opinions?

A: The TCEQ modeling and effluent limitations.

Q: Please summarize your opinions with regard to the City's Application for Permit No. WQ0015821001.

A: The proposed final phase discharge of 2 million gallons per day (MGD) will not meet the water quality standard (WQS) for dissolved oxygen of 5.0 mg/L at critical conditions. Phosphorus concentrations in the effluent are likely to cause algal blooms and excessive growth of aquatic vegetation in the receiving waters.

IV. OPINIONS RELATING TO MODELING FOR DISSOLVED OXYGEN

Q: Okay, let's begin with the first part of your opinion. Can you outline the concerns you have with the modeling completed by the Applicant?

A: Yes. TCEQ used the default barometric pressure of 1013.25 millibars (mb), which is the average sea level pressure on earth, as an input when they modeled the impact of the proposed discharge on dissolved oxygen in the receiving waters. Pressure drops with elevation. At the site, elevation is about 700 feet above mean sea level, according to the

USGS map provided in the permit application. Average pressure at this elevation is about 988 mb. The solubility of oxygen in water is proportional to its partial pressure above the water (Henry's Law), meaning that at higher elevations, solubility is lower.

TCEQ's modeled minimum dissolved oxygen (DO) at 1013.25 mb is 4.81 mg/L in the final phase. The DO water quality standard is 5.0 mg/L.

When the barometric pressure is changed to 988 mb, the minimum DO in the final phase is 4.03 mg/L, which is well below the water quality standard.

Q: So, can you sum up your opinion regarding the Applicant's modeling?

A: Yes. The modeling done by TCEQ is inaccurate. I ran the model using the correct barometric pressure for the site location. This modeling shows that the water quality standard will not be met.

V. OPINIONS RELATING TO PHOSPHORUS CONCENTRATIONS

Q: Moving on to your second criticism or opinion, can you summarize your concerns with phosphorus in the effluent?

A: Yes. Total phosphorus concentrations in the effluent of 1.0 mg/L Interim Phase (1 MGD) and 0.5 mg/L Final Phase (2 MGD) are likely to cause algal blooms and excessive growth of aquatic vegetation in Rucker Creek and the Rucker Creek arm of Lake Granbury. Phosphorus is generally the limiting nutrient for aquatic plants in Texas. Rucker Creek has a critical low flow of virtually zero, so the WWTP flow, especially at the final phase of 2 MGD, will comprise essentially all of the inflow to the arm of Lake Granbury during critical conditions. Consistent with the TCEQ Implementation Procedures (IPs), no loss of total phosphorus is assumed between the outfall and the normal pool of Lake Granbury since it is a distance of less than 1 mile (0.6 miles). Most suspended sediment will have

settled out, and the lake will become relatively clear during these conditions. Rucker Creek upstream of the reservoir is exceptionally clear during low flow conditions. The increased light penetration will also stimulate the growth of aquatic vegetation. Concentrations of total phosphorus as low as 0.02 mg/L can result in eutrophic conditions (over-enrichment of surface waters with plant nutrients) in lakes based on scientists' opinions (EPA, 2000). The TCEQ Surface Water Quality Monitoring (SWQM) database contains total phosphorus data for Station 20307 on Lake Granbury, which is on the main body of the lake on the Brazos River approximately 2/3 mile downstream of the Rucker Creek arm. 152 samples were collected between 2008-2021. Total phosphorus concentrations ranged from <0.05 to 0.24 mg/L with an average of 0.052 mg/L (less than values were averaged at ½ the detection limit). This shows that Lake Granbury is already enriched in phosphorus. Additional phosphorus will tend to exacerbate aquatic plant growth.

According to an analysis done by Mr. Woody Frossard, another expert on this case, the concentration of total phosphorus in the Rucker Creek arm may increase to approximately 0.4 mg/L, or over 650% over ambient, as a result of the WWTP discharge. This is an order of magnitude higher than the minimum eutrophic value mentioned in the EPA document referenced above. Mr. Frossard followed the procedure in the IPs. I agree with his analysis. The resulting increased concentrations of phosphorus and clearer water will result in excessive aquatic vegetation growth in Rucker Creek and the Rucker Creek arm.

Q: Can you identify what has been marked as Exhibit GF-402?

A: Yes. This exhibit contains two photographs I took on January 28, 2022 of Rucker Creek during low-flow conditions, depicting the clarity of the water in the creek.

Q: Is the top photograph a true and accurate representation of Rucker Creek as you observed it at the time of the photograph?

A: Yes.

Q: Is the bottom photograph a true and accurate representation of Rucker Creek as you observed it at the time of the photograph?

A: Yes.

Granbury Fresh offers Exhibit GF-402.

VI. CONCLUSION

Q: Does this conclude your testimony?

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