**SOAH DOCKET NO. 582-24-22552**

**TCEQ DOCKET NO. 2023-1591-MWD**

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| **APPLICATION OF CORIX UTILITIES (TEXAS) INC. FOR TPDES PERMIT NO. WQ0013977001** | **§** | **BEFORE THE STATE OFFICE** |
| | **§** | **OF** |
| | **§** | **ADMINISTRATIVE HEARINGS** |

# EXHIBIT ES-200

# PREFILED DIRECT TESTIMONY OF

# D. LAUREN ROSS, PH.D., P.E.

D. Lauren Ross

Digitally signed by D. Lauren Ross
DN: cn=D. Lauren Ross, o=Glenrose Engineering, Inc., ou, email=lauren@glenrose.com, c=US
Date: 2024.12.19 19:00:34 -06'00'


**ON BEHALF OF**

**ENVIRONMENTAL STEWARDSHIP**

**SUBMITTED ON DECEMBER 19, 2024**

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**PREFILED DIRECT TESTIMONY OF D. LAUREN ROSS, PH.D., P.E.**

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## I. IDENTIFICATION OF WITNESS

**Q Please state your name.**

A My name is Dr. Lauren Ross.

Q **Please state your address.**

A 1405 Hillmont Street, Austin, Texas 78704.

**Q Please describe your occupation.**

A I am a consulting engineer and owner of Glenrose Engineering, Inc.

**Q What have you been asked to do with regard to this matter, SOAH Docket No. 582-24-22552?**

A I have been retained by Perales, Allmon & Ice, P.C., who is representing Environmental Stewardship, a protestant to the permit, to review the draft permit under consideration, the application, and relevant documents and information, and form opinions regarding whether the proposed draft permit will protect surface and groundwater quality.

## II. QUALIFICATIONS AND EXPERIENCE

**Q Please describe your educational background.**

A I have a Bachelor of Science degree in civil engineering from the University of Texas, awarded with highest honors, a Master of Science degree in civil engineering from Colorado State University, and a Doctor of Philosophy degree in civil engineering from the University of Texas. My master's degree research was water and solute movement into and through unsaturated soils. My doctoral research was multivariate statistical methods for analyzing environmental monitoring data.

**Q Do you have any professional certifications?**

A Yes. I have been a registered professional engineer in the State of Texas since 1984.

**Q Please briefly describe your current occupation and relevant professional experience.**

A I have worked as a civil and environmental engineer since 1977. My areas of expertise include water resources engineering, water quality protection and engineering design, groundwater transport, stormwater management, erosion and sedimentation controls, solid waste and wastewater management and disposal, statistical methods, and environmental

monitoring. I have served as a testifying expert in legal proceedings regarding these matters.

**Q Have you previously testified as an expert in any matter?**

A I have reviewed and prepared opinions on numerous wastewater permit applications in Texas, including facilities for the San Miguel Electric Cooperative, Inc.; City of Kyle, Texas; Undine Texas Environmental, LLC, SJWTX Inc.; City of Liberty Hill, Texas; Cherryville GP, Inc.; Kendall West Utility, LLC; City of Blanco; City of Dripping Springs; Aqua Texas, Inc. in Fort Bend County; City of Wimberley; the Johnson Ranch Subdivision; High Pointe Subdivision; Stratus Municipal Utility District #4; Jeremiah Venture Subdivision; Scenic Greens Subdivision; Hays County Water Control and Improvement District #1 (Belterra Subdivision); Rocky Creek Subdivision; and Barton Creek West Subdivision. I have also reviewed 9,283 unique records of sanitary sewage overflows for the City of Houston wastewater collection and treatment systems.

**Q Please refer to the document that has been marked as Exhibit ES-201. Can you identify this document?**

A Exhibit ES-201 is a resume of my education and experience.

**Q Is this a true and correct copy of your resume and a history of your experience?**

A Yes.

**Q What materials have you reviewed in developing your opinions in this matter?**

A In addition to the documents contained in the administrative record for this case, I have reviewed the documents, materials, and information listed in Exhibit ES-202.

## III. SUMMARY OF OPINIONS

**Q Do you understand the term "draft permit," in the context of this prefiled testimony, to refer to the TCEQ proposed draft TPDES Permit No. WQ0013977001 that would be issued to Corix Utilities (Texas) Inc.?**

A I do.

**Q Have you developed any opinions regarding the draft permit for these proceedings?**

A I have.

**Q On what topics have you developed an opinion?**

A I have evaluated whether the draft permit is protective of water quality, including the existing uses of the receiving waters and groundwater in the area in accordance with applicable regulations, including the Texas Surface Water Quality Standards in 30 TAC Chapter 307. In particular, I have developed opinions regarding whether the proposed discharge will not impair existing uses of the receiving waters (the "Tier 1" Antidegradation review required by 30 TAC § 307.5(b)(1)), and whether Corix has demonstrated that the discharge will result in a less than de minimis lowering of water quality required by 30 TAC § 307.5(b)(2).

**Q Please summarize your opinions regarding whether Corix has demonstrated compliance with the Tier 1 antidegradation review requirements of 30 TAC § 307.5(b)(1).**

A The Tier 1 antidegradation review provides that existing uses and water quality sufficient to protect those uses must be maintained. The draft permit would authorize discharge of pollutants including carbonaceous biochemical oxygen demand, bacteria, nutrients, sulfate, chlorides and dissolved solids. Corix has not shown that the discharge of these contaminants in the quantities that would be authorized by the draft permit would protect designated uses of the receiving stream, including minimal aquatic life uses for the unnamed tributary and exceptional aquatic life uses for the Colorado River receiving Segment 1428.

This failure to demonstrate protection of the Colorado River is particularly a concern given that TCEQ's review of water quality data has concluded, for more than two decades, concerns regarding the near nonattainment of Segment 1428 water quality for fish and macrobenthic communities, nitrate, and total phosphorus.

**Q Please summarize your opinions as to whether Corix has demonstrated compliance with the Tier 2 antidegradation requirements of 30 TAC § 307.5(b)(2).**

A As an initial matter, Corix has made no attempt in its TCEQ application to demonstrate that degradation of receiving water quality is necessary for important economic or social development. Thus, to pass the requirements of a Tier 1I review, Corix must demonstrate that the proposed discharge will not result in a lowering of water quality by more than a de

minimis extent in comparison to the highest water quality sustained in the receiving waters since November 28, 1975 (per 30 TAC § 307.5(c)(2)(B)). Corix has not demonstrated that issuance of the draft permit will not result in a lowering of water quality by a greater than de minimis extent in comparison to the highest water quality sustained in the receiving waters since November 28, 1975.

Based on information provided in the permit application regarding a pollutant analysis of treated effluent, the draft permit would also authorize discharge of effluent containing sulfates, chlorides and dissolved solids concentrations that are higher than their historical concentrations in relevant surface water samples and higher than their corresponding numerical water quality standards for Colorado River Segment 1428. No showing has been made by either the applicant or TCEQ that the discharge of these contaminants that would be authorized by the draft permit would not cause a greater than de minimis lowering of water quality in the Colorado River and a failure to meet the relevant minimum stream water quality standards.

Furthermore, evidence from testing similar wastewater effluent indicates that the draft permit would authorize a discharge of persistent substances that have been identified by U.S. Environmental Protection Agency (U.S. EPA) as contaminants of emerging concern. Similar types of information indicate that the draft permit would also authorize an effluent discharge containing per- and polyfluoroalkyl substances (PFAS). While these chemicals are widely present in domestic wastewater, neither the applicant nor TCEQ has provided data or analyses to demonstrate that the addition of these contaminants into the Colorado River under the authority of the draft permit would result in less than de minimis lowering of water quality.

TCEQ evaluation of Colorado River Segment 1428 water quality data as far back as 2002 indicates near nonattainment for nitrate and phosphate, as well as concerns regarding fish and macrobenthic communities. Despite this water quality history, the draft permit fails to require a phosphorus limit based on reasonably achievable technology, as is required by applicable Procedures to Implement the Texas Surface Water Quality Standards (hereafter referred to as the June 2010 IPs). Thus, the phosphorus limit in the draft permit is not adequately stringent to prevent additional degradation of the receiving water. The draft

permit also includes no limit on nitrate, a known constituent present in the effluent and a threat to local wells that produce water for domestic use.

## IV. RECEIVING WATER QUALITY HISTORY

**Q At what location would the wastewater flow proposed to be authorized by the draft permit be discharged?**

A The wastewater effluent would be discharged into an unnamed tributary of the Colorado River within the McKinney Roughs Nature Park and reaches the Colorado River only about a mile downstream. This area of the Colorado River has been designated by the TCEQ as Segment 1428. Segment 1428 is further subdivided into assessment units and the effluent would enter the Colorado River in Assessment Unit 1428_01, which is the most downstream assessment unit in the segment.

**Q Has TCEQ designated specific uses to be protected in Segment 1428?**

A Yes. The TCEQ rules at 30 TAC § 307.10(1) designate that Segment 1428 has exceptional aquatic life uses, primary contact recreation, and public water supply.

**Q Are there historic data on whether these criteria are met in the receiving waters?**

A Yes. Every two years, the TCEQ (and its predecessor agencies) review available information and determine whether the designated segments meet the applicable water quality standard for the designated uses of each segment. These bi-annual reports have been prepared to meet the requirements of Clean Water Act Section 303(d).

**Q Have you reviewed these reports?**

A Yes. I have summarized my review in Exhibit ES-203.

**Q What does Exhibit ES-203 demonstrate?**

A Exhibit ES-203 to this testimony summarizes TCEQ's water quality assessments for Segment 1428 and/or Assessment Unit 1248_01 from 1992 through the draft for 2024, prepared to meet requirements of the federal Clean Water Act Section 303(d). TCEQ water quality assessment formats have varied over those reports. Segment 1428 is not on the earliest report (1992), indicating that all uses were fully supported. In 1994, Segment 1428 is included on the 303(d) list. Reasons for the listing were that one or more toxic substances

exceeded screening criterion, known nonpoint source pollution, and relatively high concentrations of nitrogen, phosphorus, and chloride. In the 1993, 1996, 1999, and 2000 reports, Segment 1428 is listed as non-supporting only for contact recreation based on bacteria measurements. These reports indicated no concerns in Segment 1428 regarding nutrients. For Assessment Unit 1428_01, in the 2002, 2006, 2008, 2010, 1012, 2014, 2016, 2018, 2020, 2022 reports, and in the draft 2024 report, TCEQ identified surface water quality concerns (based on near non-attainment of numerical and narrative Texas Surface Water Quality Standards) regarding the fish community, the macrobenthic community, and nutrients associated with nitrogen and/or phosphorus.

**Q What conclusions did you reach based on your review of these data?**

A The TCEQ bi-annual analysis of water quality data for the draft permit receiving water indicates that prior to 2000, the State of Texas identified no water quality concerns related to nutrients, fish, or macrobenthic communities for Segment 1248. Since 2002, however, the State of Texas has reported persistent water quality conditions of concern with respect to meeting the applicable water quality standards in Assessment Unit 1428_01, the receiving water for the draft permit.

**Q Are TCEQ concerns regarding these water quality parameters reflected in any of the TCEQ documents for this draft permit?**

A Yes. The Permit Review of Unclassified Waters by Standards Team, signed by Jenna Lueg on September 1, 2022, acknowledges water quality concerns regarding impaired fish community, impaired macrobenthic community, nitrate, and total phosphorus in Assessment Unit 1428_01.

**Q Do any of the terms of the draft permit address TCEQ's water quality concerns for the receiving water?**

A No, in my opinion they do not. As I will explain below, despite decades-long concerns regarding nutrients in the receiving water, the draft permit fails to adequately limit either nitrate or total phosphorus in the effluent discharge.

**Q Have you reviewed other relevant information regarding the receiving water that would be affected by the draft permit?**

A Yes. I have reviewed the March 1, 2011 report by the Colorado and Lavaca Rivers and Matagorda and Lavaca Bays Basin and Bay Expert Science Team, included with this testimony as Exhibit ES-204. This report focuses on environmental flows to maintain existing aquatic habitats and contains useful descriptions and photographs of the Colorado River upstream and downstream from the proposed discharge.

**Q What did you learn from this report?**

A The Colorado River downstream from the discharge location that would be authorized by the draft permit is described as including numerous in-channel islands and sand bank deposits along low-terrace river bends. Images in the report show a shallow, rocky bottom. The report describes hydraulic modeling that shows a 10-year flow event would inundate most of the floodplain along the Colorado River mainstem. These characteristics are different than the Colorado River characteristics described by TCEQ staff in their Nutrient Screening Analysis for this draft permit.

**Q Is there anything else in the Exhibit ES-204 report that is significant in your mine?**

A Yes. The report also describes inverse relationships between flow rates and concentrations of nitrate-nitrogen, total phosphorus and specific conductance.

**Q What is the significance of that relationship in your mind?**

A An inverse relationship between flow rates and concentrations of nitrate-nitrogen, total phosphorus and specific conductance indicates higher concentrations of these pollutants during low flow events and a relationship between high pollutant concentrations and point-source discharges like the one that would be authorized by the draft permit, rather than sources associated with nonpoint runoff.

**q What other information have you reviewed?**

A Another report that I reviewed is a report prepared by BIO-WEST for the Lower Colorado River Authority and San Antonio Water System. The title of this report is *Lower Colorado River, Texas Instream Flow Guidelines; Colorado River flow Relationship to Aquatic Habitat and State Threatened Species: Blue Sucker*. I have included this report as Exhibit ES-205.

**Q Is there any other information you have reviewed regarding the water quality of Segment 1428?**

A Yes. I have reviewed the prefiled testimony in this case of Dr. Michael MacLeod.

**Q Do you agree with Dr. MacLeod's testimony regarding Segment 1428 water quality history?**

A Dr. MacLeod's testimony is based on his own evaluation of Segment 1428 water quality data with respect to applicable Texas Surface Water Quality Standards; an evaluation that I did not personally undertake. Nevertheless, Dr. MacLeod's opinion that TCEQ's data indicate degradation in the receiving waters for this permit since November 28, 1975 is the same as mine. Similarly, I agree with Dr. MacLeod that the additional pollution that would be authorized by the draft permit would potentially worsen existing receiving water quality with respect to nutrients and aquatic life. I also agree with Dr. MacLeod that TCEQ's basis for this draft permit fails to adequately consider those factors.

## V. QUAL-TX MODELING

**Q What is the QUAL-TX MODEL?**

A QUAL-TX is a one-dimensional, steady-state water quality model. The model is derived from computer code written for the U.S. Environmental Protection Agency in 1972. Modifications and refinements to the original model have produced the current QUAL-TX Model Version 9.32 (July 8, 2014). TCEQ staff implemented QUAL-TX Model Version 9.32 as the basis for their opinion that the draft permit effluent limitations are sufficient to maintain minimum dissolved oxygen concentrations required by Texas Surface Water Quality Standards for exceptional aquatic life use in Segment 1428.

**Q Does the QUAL-TX model account for impacts from nutrients, algae, or phosphorus?**

A While the QUAL-TX model has the capability to model algae and nutrients, TCEQ both generally and for this permit, has elected not to implement those model components.

**Q Does the presence of algae and nutrients affect stream dissolved oxygen concentrations?**

A Yes, it does. Nutrients and the responsive algae blooms produce diurnal dissolved oxygen concentration swings from algal respiration and oxygen consumption during sunless periods when there is no algae photosynthesis to produce oxygen. Those diurnal processes were not modeled by QUAL-TX, and neither TCEQ staff nor the applicant have undertaken any effort to predict those effects.

**Q Could the effects of nutrients in the discharge that would be authorized by the draft permit on algae blooms be modeled?**

A Yes. Both QUAL-TX and also other models developed by the U.S. EPA and others have the capability to model algal responses to nutrients in wastewater and resulting dissolved oxygen concentrations.

**Q Are there regulatory standards regarding how the QUAL-TX model is to be implemented as a basis for setting permit limits that will protect surface water quality and achieve the Texas Surface water Quality standards?**

A Yes. Requirements for dissolved oxygen modeling are specified part of the June 2010 IPs. TCEQ's Water Quality Assessment Team also uses a document: *Methods for Analyzing Dissolved Oxygen in Freshwater Streams Using an Uncalibrated QUAL-TX Model.* A Memorandum of Agreement between the Texas Natural Resource Conservation Commission (predecessor agency) and the Environmental Protection Agency – Region 6 (April 4, 2010) also contains agreed-upon QUAL-TX model parameters for uncalibrated QUAL-TX models used to set TPDES discharge permit effluent limits. This agreement specifies carbonaceous biochemical oxygen demand decay and settling rates, ammonia nitrogen oxidation rates, sediment oxygen demand, and a basis for selecting reaeration rates.

**Q Are these standards adequate to meet non-degradation requirements and assure dissolved oxygen concentrations in the stream will be adequate to protect aquatic life?**

A The dissolved oxygen modeling implemented by TCEQ predicts only steady-state, average dissolved oxygen concentrations for the conditions that are modeled. They do not account for algae blooms in response to nutrients in the discharged effluent, as described above, algae blooms produce diurnal cycles, with depressed dissolved oxygen concentrations at

night, when algal respiration continues in the absence of photosynthesis. These cycles are not accounted for in the TCEQ dissolved oxygen modeling.

**Q What information regarding TCEQ's QUAL-TX modeling for this proposed draft permit have you reviewed?**

A As of now, the only information that I have is a file: QUAL-TX Modeling in PDF Format.pdf, provided to me as part of the documentation from TCEQ for this draft permit.

**Q What is contained in that QUAL-TX file?**

A The pdf document contains the output from three model runs. Two of the runs predict dissolved oxygen concentrations in the Colorado River and the third predicts dissolved oxygen concentrations in the unnamed tributary between the discharge outfall and the Colorado River.

**Q Does the QUAL-TX dissolved oxygen modeling for this draft permit comply with applicable regulatory standards?**

A No. Page 86 of the June 2010 IPs states *"model analyses for effluent limits are usually performed with summer temperatures. The temperature is normally assumed to be 30.5°C unless critical low-flows reliably occur only at other temperatures. Alternative critical temperatures can be used if justified based on analysis of measured temperatures."* Based on the file provided, however, a temperature of 24.5°C was assumed for modeling the unnamed tributary to the Colorado River. The two Colorado River QUAL-TX runs are both described as based on winter temperatures. Modeled reach temperatures range from 24.2 to 24.7°C. All of the temperatures for each reach are substantially below the recommended summer temperature of 30.5°C.

**Q Do any of the documents you reviewed for the draft permit include a justified basis for an alternative temperature based on measured temperatures?**

A No, they do not.

**Q What difference does temperature make in the QUAL-TX results?**

A Process rates in QUAL-TX are temperature dependent. At higher temperatures, carbonaceous biochemical oxygen demand degradation processes proceed more quickly. When carbonaceous biochemical oxygen demand degrades more quickly, the demand on

stream oxygen more quickly outpaces reaeration and minimum dissolved oxygen concentrations are lower. Stream oxygen reaeration and saturation are also lower at higher water temperatures. All of these differences mean that TCEQ's QUAL-TX modeling for the draft permit is over-predicting dissolved oxygen concentrations.

**Q Is there another difference between the requirements of the June 2010 IPs for dissolved oxygen concentration modeling and the QUAL-TX models you reviewed?**

A Yes. 30 TAC §307.8(a)(1) only exempts site-specific criteria for dissolved oxygen for flows below critical flows. The dissolved oxygen standard applies, therefore, at the critical flow. The term "critical flow" is based on the fact that this is the flow for which dissolved oxygen concentrations would be "critical" for aquatic life. QUAL-TX models for permit effluent limits must be implemented using critical flow rates. The QUAL-TX models for the Colorado River, presented as the basis for this draft permit, however, is based on flows higher than the critical flow. The June 2010 IPs (page 223) specify the Segment 1428 Colorado River critical low flow as 105 cubic feet per second (cfs). The two Colorado River QUAL-TX models, however, use Colorado River headwater flows of 123 and 150 cfs, respectively.

**Q Is there any information in the documents you reviewed regarding these alternative Colorado River Flows?**

A Yes. Item 14 Headwater flow on the Dissolved Oxygen Modeling Permit Review Checklist states: *"use updated 7Q2 of 123 cfs from USGS gage 08158000 (1993 – 2021) and 150 cfs for the different Segment 1428 model versions. (Previous 7Q2 (1988 – 2016) was 116 cfs)."*

**Q Did you find any analysis to document these higher flows compared to the critical low flow specified in the June 2010 IPs?**

A I did not.

**Q What is the consequence of using higher than the specified critical flow rate in the QUAL-TX modeling for this draft permit?**

A Modeling based on higher stream flows predicts higher dissolved oxygen concentrations, compared to modeling the Colorado River Segment 1428 using the critical low flow of 105 cfs.

**Q In addition to the Colorado River QUAL-TX modeling by TCEQ for this permit, did you also examine TCEQ's QUAL-TX modeling for the unnamed tributary into which the effluent would be discharged?**

A Yes, I did.

**Q Did you identify any concerns with TCEQ's QUAL-TX modeling for the unnamed tributary?**

A Yes. In developing an uncalibrated QUAL-TX model for the unnamed tributary, TCEQ staff used parameters that are consistent with TCEQ's Water Quality Assessment Team also has a document: Methods for Analyzing Dissolve Oxygen in Freshwater Streams Using an Uncalibrated QUAL-TX Model. This document specifies hydraulic parameters to be used when there is no other information available regarding a receiving water based on an analysis of streams across Texas. Those hydraulic parameters, along with the input flow rate, are used to calculate the flow width, depth, and velocity. The QUAL-TX model for the unnamed tributary, however, predicts unrealistic results.

**Q Please Explain.**

A The QUAL-TX model for the unnamed tributary predicts a water depth of about a half foot and a stream width of 23.6 feet. Examining aerial imagery, however, there are locations where the wetted stream width of the unnamed tributary is clearly visible. It is about 12 feet wide. The unrealistically wide stream width explains the model-predicted dissolved oxygen concentrations. Even in a dry creek, where 100 percent of the flow is effluent, and even though the model predicts decreasing carbonaceous biochemical oxygen demand, the dissolved oxygen curve fails to show any "sag." Instead, dissolved oxygen in the creek water increases monotonically beginning at the discharge point. This unrealistic result can be attributed to assuming a cooler water temperature than 30.5°C, as is required by the June 2010 IPs, and by hydraulic characteristics of the stream that over-predict its width, providing an unrealistically large aeration surface.

**Q Do you consider the QUAL-TX modeling results presented as a basis for this draft permit to be reliable?**

A For the reasons stated above, I do not.

## VI. NUTRIENT SCREENING

**Q Did TCEQ perform a nutrient screening for wastewater effluent discharge that would be authorized by the draft permit?**

A Yes. As part of discovery for this hearing, I received a document titled "Nutrient Screening for Streams and Rivers (see pages 47 – 54 of the January 2012 IPs). I have included this document as Exhibit ES-206.

**Q Have you seen similar nutrient screening documents associated with other wastewater permits?**

A Yes.

**Q Please describe what the document presents.**

A The document is a spreadsheet that assesses the eutrophication potential of a receiving water using site-specific screening factors. Assessed factors include the discharge flow rate, the percentage of total stream flow that is effluent, the stream bottom character, water depths, water clarity, shading, streamflow persistence, and the presence of impoundments. The assessment also includes scores for whether similar permits include effluent limitations for total phosphorus and whether there are documented nutrient or aquatic vegetation concerns.

**Q Based on their nutrient screening, what did TCEQ staff conclude regarding the importance of nutrient limits for the draft permit?**

A Staff concluded the following (see the bottom of Exhibit ES-206). *"Nutrient screening score is relatively low. No limits or monitoring for nutrients are warranted based on relatively low screening score and low number of high-scoring metrics."*

**Q Do you agree with the TCEQ nutrient screening scores?**

A There are several nutrient screening scores assigned by TCEQ staff that are inconsistent with evidence regarding the site-specific characteristics of the receiving water for this discharge. TCEQ, for example, assigned an instream dilution score of 1, the lowest possible score, associated with an effluent percentage less than 10%. This score is based on the ratio of effluent flow to the Colorado River critical low flow at the discharge location. While the contribution of this individual discharge into the Colorado River is less than 10%, however,

other permitted effluent discharges into the stream segment, as described in the QUAL-TX model for this permit, result in more than 65% of the flow at the Corix discharge location consisting of effluent. The vulnerability of the stream to excessive algae growth is a function of nutrients from these cumulative effluent discharges, not just those from this facility. The TCEQ score on the nutrient screening spreadsheet underrepresents the vulnerability of the stream. The score should be 5, not 1.

**Q Are there other nutrient screening scores that are contradicted by available data or information?**

A Yes. TCEQ staff also assigned the lowest possible score, 1, for both Bottom (sensitivity to growth of attached algae) and Depth (sensitivity to growth of attached algae). These scores were based on "knowledge of region", and "classified segment; large river; few shallow areas near banks." But information specific to the location where effluent authorized by the draft permit would enter the Colorado River indicates different stream conditions.

**Q What information have you reviewed that contradicts how this reach of the Colorado River was characterized by TCEQ staff in the nutrient screening for this permit.**

A Exhibit ES-207 is one that I prepared. It shows an aerial image of the Colorado River immediately upstream from where effluent authorized by the permit would enter. Shallow areas, sand bars, and islands are visible on the imagery. Colorado River reaches downstream from where the Corix discharge would enter the Colorado River shows regular riffle/pool conditions. A photograph in a March 1, 2011 report by the Colorado and Lavaca Rivers and Matagorda and Lavaca Bays Basin and Bay Expert Science Team shows a "typical view of riffle habitat in the Colorado River near Bastrop." I've included this image as Exhibit ES-208.

**Q Based on the information you describe above, what nutrient sensitivity scores would better reflect this local, site-specific information for the Colorado River Bottom and depth?**

A For "Bottom (Sensitivity to growth of attached algae)," a score of 3 (rocky cobble, gravel, usually with riffle areas) better characterizes available information. For "Depth (Sensitivity to growth of attached algae)," a minimum score of 5 (substantial shallow areas near banks

and in stream channel), reflects the receiving water conditions. The TCEQ scores of 1 for these characteristics do not reflect local, site-specific information.

**Q If the nutrient sensitivity spreadsheet had been scored based on the local, site-specific information you have described, what would have been the results?**

A Exhibit ES-209 is nutrient screening spreadsheet that I prepared using scores based on local, site specific information. The column headed "Specific notes on scores for this permit" describes where I adopted the same score as TCEQ staff or else my basis for an alternative score. The conclusion of this analysis is an average nutrient score of 4. Based on that score, the IPs would conclude that a total phosphorus effluent limitation in the permit is probably needed.

**Q Is there evidence, aside from the results of the nutrient sensitivity screening, that nutrient limits in the draft permit are appropriate?**

A Yes. The Permit Review for Unclassified Waters by Standards Team for the draft permit, Exhibit ES-210, identifies the receiving water assessment unit 1428_01 as one with concerns for impaired fish community, impaired macrobenthic community, nitrate and total phosphorus. This statement by TCEQ staff is consistent with the water quality analyses performed by TCEQ for the receiving water assessment unit and summarized in Exhibit ES-203.

**Q Is there other evidence, in addition to the average numerical score for nutrient sensitivity screening and the Standards Team Permit Review document, that a total phosphorus limit is appropriate for this discharge?**

A Yes. Page 52 of the IPs states "*an effluent limit for TP is probably needed when a substantial number of the screening factors are rated moderate and high."* On TCEQ's nutrient screening spreadsheet, seven factors were rated moderate or high, compared to only 2 factors that were rated low. On my nutrient screening, based on site-specific and local factors, all of the assessed factors are either moderate or high.

**Q Despite the conclusion of the TCEQ nutrient sensitivity screening that no effluent limitation is warranted, is there, nonetheless, an effluent limit for total phosphorus in the draft permit?**

A Yes. The draft permit proposes a daily average effluent limit of 1 mg/L for total phosphorus for the Interim I, Interim II, and Final permit phases.

**Q What is the basis for imposing the total phosphorus effluent limit when the TCEQ nutrient sensitivity screening recommends no limit?**

A The existing permit for this facility includes a total phosphorus limit of 1.0 mg/L. Furthermore, 30 TAC §311.43(a)(4) requires all discharges of sewage effluent into tributaries of Segment 1428 of the Colorado River to achieve, at a minimum 1 mg/L total phosphorus, based on a 30-day average.

**Q Is that effluent limit, in your opinion, adequate to meet applicable requirements?**

A No, it is not. Independently from the requirements of 30 TAC §311.43(a)(4), the nutrient evaluation process outlined in the June 2010 IPs state: *"when screening indicates that a reduction of effluent TP is needed, an effluent limit is recommended based on reasonably achievable technology-based limits, with consideration of the sensitivity of the site."*

**Q Do total phosphorus effluent limits in the Corix draft permit comply with this June 2010 IPs recommendation?**

A In my opinion, they do not. A substantial body of research, including documents I have listed in Exhibit ES-202, demonstrates that wastewater treatment plants can consistently achieve total phosphorus in their discharge near to or below 0.01 mg/L. The total phosphorus effluent limitations proposed in the draft permit is 100 times larger than this value.

**Q Has TCEQ promulgated other domestic wastewater discharge permits with total phosphorus effluent limitations lower than the 1 mg/L proposed in this draft permit?**

A Yes. TCEQ proposed TPDES Permit No. WQ0014488003 for the City of Dripping Springs with effluent limits of 0.15 mg/L total phosphorus, as a median value. TCEQ Commissioners concluded, on April 25, 2024, that a total phosphorus effluent limitation of 0.02 mg/L or lower was necessary in all phases of the Liberty Hill wastewater permit to meet all Texas Surface Water Quality Standards and comply with the State Antidegradation Policy. Both of these permits, in addition to extensive science and engineering research,

indicate that a total phosphorus effluent limit lower than 1.0 mg/L would be reasonably achievable and technology-based.

## VII. CONTAMINANTS OF EMERGING CONCERN

**Q What do you understand the term "contaminants of emerging concern" to mean?**

A "Contaminants of emerging concern (CECs) is a term used by the U.S. Environmental Protection Agency to describe chemical compounds, including those found in pharmaceuticals and personal care products that may impact aquatic life. The U.S. Environmental Protection Agency has found them to be of concern because of their widespread use, because of chemical persistence, because of their effects in natural systems, and because of public concern. Many of these chemicals are used every day in homes, businesses, and industry.

**Q Can you provide examples of chemicals in this category?**

A Contaminants of emerging concern include persistent organic chemicals like those used in flame retardants and plastics, drugs prescribed for human- and veterinary use like antidepressants, blood pressure modifiers, ibuprofen, bactericides, antimicrobials, antibiotics, anti-fungals, synthetic and naturally occurring estrogens, and nano-scale carbon and titanium dioxide materials.

**Q Do you expect that chemicals within the category described as "contaminants of emerging concern" to be present in the discharge that would be authorized by the draft permit?**

A Yes. These chemicals are widely present in domestic wastewater like that that would be authorized by the draft permit. A U. S. Geological Survey study of 139 streams in 30 states during 1999 and 2000 found one or more chemicals in this class in 80 percent of the streams they sampled. They also commonly found that more than one compound. The researchers concluded that detectable quantities of these chemicals were in most of the U.S. streams tested because they are not removed by either wastewater treatment or in-stream biodegradation.

**Q How are contaminants of emerging concern relevant to the draft permit?**

A Many of these chemical compounds act as endocrine disruptors, altering the normal functions of hormones and cause significant reproductive effects at very low levels of exposure. They can disrupt aquatic life and reproduction at very low concentrations. These chemicals are not included in routine monitoring but are measured in natural streams in increasing frequency.

**Q You reviewed Texas Surface Water Quality Monitoring Information System data for Segment 1428, Colorado River Downstream from Lady Bird Lake/Town Lake, the receiving water for the draft permit. Does that database contain any information regarding the presence of emerging chemicals of concern?**

A The surface water quality database for Segment 1428 encompasses 25,338 individual records for samples collected from five stations within the segment between April 2, 1969 and August 21. 2023. The total number of measured parameters is 606. Examples of the types of parameters for which there are data are flow, stream characteristics, fish species, bottom sediment concentrations, and fish tissue concentrations. Sixty eight parameters were measured on water samples from the segment. Categories of measured water sample parameters include basic water quality parameters like alkalinity sodium, chloride, sulfate, and total dissolved solids. They include the nutrients potassium, nitrogen species, and phosphate. They include heavy metals and pesticides. There are no measurements, however, for any chemicals within the category of contaminants of emerging concern.

**Q Do you expect that chemicals in this category would be present in Segment 1428, the Colorado River Downstream from Lady Bird Lake/Town Lake?**

A Yes. Given that there six wastewater discharges into the Colorado River between the Longhorn Dam and the discharge location that would be authorized by the draft permit, and that two of the discharges are for the City of Austin, I would expect these chemicals to be present in the receiving water for this draft permit.

**Q If approved, would the proposed draft permit contribute additional emerging chemicals of concern to the receiving water?**

A Yes. The draft permit would authorize the treatment and discharge of wastewater from residential and commercial sources treated with traditional activated sludge processes. Wastewater from these sources would contain the pharmaceuticals and personal body care

products which have been categorized as emerging chemicals of concern. The proposed wastewater treatment processes are the typical processes which have been shown to be ineffective at removing these chemical compounds.

**q Are there potential deleterious aquatic life effects from chemicals in the wastewater effluent discharge that would be authorized by the draft permit?**

A Yes.

**Q Is there anything in the draft permit or anything within the TCEQ documents that you have reviewed for this case that indicate that TCEQ has evaluated those potential aquatic life effects or included any permit terms that would mitigate them?**

A No.

## VIII. PFAS COMPOUNDS IN WASTEWATER

**Q What are PFAS componds?**

A Per- and polyfluoroalkyl substances (PFAS) are fluorinated aliphatic substances. They are persistent in the environment and bioaccumulative. Because of their extreme stability, they are sometime called "forever chemicals." Per- and polyfluoroalkyl substances have been used extensively in products like waterproof clothing, stain repellants, fire-fighting foams, non-stick cookware, food packaging, paints, waxes, and as well as in aerospace, automotive, building/construction, chemical processing, electronics, semiconductor, and textile industries. Exposure to one or more of these substances has been linked to health effects including suppressed antibody response, higher cholesterol, elevated liver enzymes, increased risk of kidney and testicular cancer, thyroid disease, asthmas, and fertility issues. In April 2024, the U.S. EPA established enforceable primary drinking water Maximum Contaminant Levels at concentrations of 4 to 10 nanograms per liter for a subset of these compounds.

**Q Would you expect PFAS compounds to be present in effluent discharges that would be authorized by the draft permit?**

A Because of their wide applications, PFAS compounds would certainly be present within residences and businesses contributing wastewater to the facility that would be authorized by the draft permit. Most of the focus of PFAS testing has been on surface water,

groundwater, and drinking water sources. Municipal wastewater effluent is, however, a widely identified PFAS source. And where it has been tested, effluent from most municipal wastewater treatment plants has contained PFAS.

**Q Has the State of Texas expressed concerns regarding PFAS chemicals?**

A Yes. On December 11, 2024, Texas Attorney General Ken Paxton filed a lawsuit against 3M and DuPont, accusing both companies of misrepresentations and omissions regarding the safety of PFAS.

**q Are there potential deleterious aquatic life effects from PFAS chemicals in the wastewater effluent discharge that would be authorized by the draft permit?**

A Yes.

**Q Is there anything in the draft permit or anything within the TCEQ documents that you have reviewed for this case that indicate that TCEQ has evaluated those potential aquatic life effects or included any permit terms that would mitigate them?**

A No.

## IX. GROUNDWATER

**Q What information have you reviewed regarding the occurrence of groundwater in the vicinity of the effluent discharge that would be authorized by the draft permit?**

A I have reviewed local and site-specific information in the U.S. Geological Survey Geological Database of Texas, maps of major and minor aquifers developed by the Texas Water Development Board, and information regarding wells in the vicinity of and downstream from the effluent discharge that would be authorized by the draft permit.

**Q What does the information relating to groundwater that you have reviewed show?**

A The draft permit would authorize effluent discharge onto the outcrop of the Carrizo-Wilcox Aquifer. Effluent that infiltrates the bottom of the unnamed tributary and the Colorado River alluvium would contribute to groundwater produced from local wells completed in the Wilcox aquifer and/or alluvium. Geologic materials immediately beneath the effluent outfall are those of the Hooper Formation of the Wilcox Group: mudstone with various amounts of sandstone, minor lignite, and ironstone concretions. Sandstone in the upper part

is fine to medium grained, moderately well sorted and 5 to 30 feet thick. The geology beneath the Colorado River is floodplain alluvium deposits of clay, silt, sand and gravel. These geologic materials would transmit effluent into the groundwater.

**Q Are there local wells completed in the Wilcox Aquifer or alluvium?**

A Yes. The Texas Water Development Board maintains two well databases with GIS information. I selected all of the wells from both databases that are located within one mile of the Colorado River for a distance of five miles along the Colorado River downstream from the draft permit discharge. These wells are most likely to be contaminated by effluent that would be authorized by the draft permit. Exhibit ES-211 is a map showing the location of these wells. Exhibit ES-212 is a table summarizing well properties. The Texas Water Development Board Groundwater Database includes 11 wells completed in the Wilcox and/or alluvium aquifers. Although the later Submitted Drillers' Reports Database does not include information on aquifer completion, based on the reported borehole depths, I would expect that at least 13 of these wells, and possibly more, are also completed in these aquifers.

**Q What effluent constituents would be most likely to contaminate these local wells?**

A There are many effluent constituents that could potentially contaminate local wells producing groundwater from the formations that are recharged in the vicinity of and downstream from the effluent discharge. Nitrate is an effluent component that is persistent and mobile in groundwater. The reported nitrate concentration in the effluent, 39.5 mg/L, is nearly four times the primary drinking water standard of 10 mg/L. Other potential groundwater contaminants in wastewater effluent include PFAS, organic chemicals, bacteria, and toxic metals,

**Q Have these kinds of chemicals contaminated other wells in Texas?**

A Yes, all of these chemicals and compounds are represented in TCEQ's Joint Groundwater Monitoring and Contamination Report – 2023. Groundwater contamination with nitrate and ammonia, for example, has been reported near the intersection of FM 973 and Highway 71 on Hornsby Bend on the east bank of the Colorado River.

**Q Is there anything within the draft permit that would prevent contamination of local wells from nitrates, PFAS, or other persistent chemicals that would readily migrate in the subsurface?**

A No, there is not.

## X. TIER 1 REVIEW

**Q Has TCEQ demonstrated that authorizing the draft Permit would protect existing uses of Segment 1428, as required by Teir 1 review standards?**

A No. A Tier 1 review requires effluent limits to avoid an increase in BOD loading unless it is demonstrated that the water quality standards for dissolved oxygen will be attained in the area affected by the discharge. The existing permit authorizes discharge of 2.1 pounds per day of carbonaceous biochemical oxygen demand (5-day). Under the final phase of the draft permit, that CBOD load would increase ten-fold to 21 pounds per day. TCEQ has based their opinion that this increased load would not violate the Segment 1428 dissolved oxygen standards on QUAL-TX modeling predictions. The QUAL-TX modeling for the draft permit, however, fails to reflect critical stream conditions and summer temperatures, as required by and defined in the June 2010 IPs.

**Q Considering the water quality history of Segment 1428 and Assessment Unit 1428_01, will authorization of the discharge by the Draft permit protect existing uses, as required by the Tier 1 review?**

A No. Since the receiving waters have consistently been identified as near non-attainment for nutrients, and as having concerns for macrobenthos and fish communities, additional nutrients into the receiving water, additions that would be authorized by the draft permit, would contribute to further concerns regarding nutrients, fish and macrobenthic communities in the receiving waters.

**Q Will the draft permit allow the discharge of additional nutrients?**

A Yes. The existing permit authorizes discharge of 0.42 pounds per day of total phosphorus and there are no limits on the discharge of nitrogen, which is also a nutrient present in domestic wastewater effluent. Under the final phase of the draft permit, the authorized phosphorus discharge could increase ten-fold to 4.2 pounds per day.

**Q Can the discharge of additional nutrients have an adverse impact upon a receiving water?**

A Yes.

**Q Please explain.**

A Additional nutrients in the receiving water contribute to algae blooms which can impede recreation, depress night-time oxygen concentrations, and stress or kill aquatic organisms that are oxygen dependent. Additional nutrients can also result in other changes in aquatic life, including increasing the amount of cyanobacteria, which release toxins that are harmful to humans, pets, and wildlife.

**Q Has it been shown that this discharge of additional nutrients will be protective of existing uses, as required by the Tier 1 review?**

A No, it has not.

## XI. TIER 1I ANTIDEGRADATION REVIEW

**Q Does a Tier 1I review involve looking at the change in the concentration of a contaminant in the receiving waters?**

A Yes. Under the TCEQ rules, degradation is the lowering of water quality by more than a de minimis extent unless that degradation is shown to be necessary for important social or economic development.

**Q Do the TCEQ rules establish a particular time for determining the baseline water quality for determining the relevant change.**

A Yes. At 30 TAC 307.5(c)(2)(B), the TCEQ rules establish that baseline conditions for determinations of degradation are the highest water quality sustained since November 28, 1975.

**Q Has a proper baseline been determined for any of the contaminants at issue for a Tier 1I review for this discharge?**

A No. The TCEQ staff treated existing conditions as baseline for determining whether degradation has occurred.

**Q Is this approach appropriate in this case?**

A No. The IPs allow the use of existing conditions as baseline where there is no information indicating that water quality in the receiving waters has previously been degraded. In this case, however, TCEQ's bi-annual water quality inventories, performed to comply with the requirements of the Clean Water Act Section 303(d), for Segment 1428 prior to 2002 generally indicated no concerns for nutrients. Each water quality inventory since 2002, however, has consistently indicated concerns for near non-attainment for nutrients, as well as concerns regarding the fish and macrobenthic communities. Thus, available information demonstrates that current conditions do not reflect the highest water quality sustained in the receiving waters since November 28, 1975. In these circumstances, it is inappropriate to treat existing conditions as the baseline for determining whether a lowering of water quality will be de minimis.

**Q Has it been demonstrated that the discharge will result in a less than de minimis lowering of water quality for nitrate nitrogen?**

A Station 12466 is the closest active Colorado River surface water monitoring station upstream of the location where effluent discharged under the draft permit would enter the river. Based on 56 water quality records for nitrate nitrogen measured in samples from Colorado River Station 12466, collected between December 1984 and October 1994, the average nitrate concentration in the receiving waters is 2.28 mg/L. The applicant reported an effluent nitrate concentration more than ten times higher: 39.5 mg/L. There has been no demonstration that the discharge that would be authorized by the draft permit would not result in lowering of receiving water quality for nitrate nitrogen by more than a de minimis extent.

**Q Has it been demonstrated that the discharge will result in a less than de minimis lowering of water quality for chlorides?**

A Based on 246 water quality records for chloride measured in samples from Colorado River Station 12466, collected between December 1984 and August 2023, the average chloride concentration of receiving waters is 57.2 mg/L. The applicant reported an effluent chloride concentration more than four times higher: 242 mg/L. The reported effluent chloride concentration is also higher than the Segment 1248 water quality standard for chloride: 100 mg/L. There has been no demonstration that the discharge that would be authorized by the

draft permit would not result in lowering receiving water quality for chlorides by more than a de minimis extent.

**Q Has it been demonstrated that the discharge will result in a less than de minimis lowering of water quality for sulfates?**

A Based on 251 water quality records for chloride measured in samples from Colorado River Station 12466, collected between December 1984 and August 2023, the average sulfate concentration of the receiving waters is 51.6 mg/L. The applicant reported an effluent sulfate concentration more than seven times higher: 379 mg/L. The reported effluent sulfate concentration is also higher than the Segment 1248 water quality standard for sulfate: 100 mg/L. There has been no demonstration that the discharge that would be authorized by the draft permit would not result in lowering receiving water quality for sulfate by more than a de minimis extent.

**Q Has it been demonstrated that the discharge will result in a less than de minimis lowering of water quality for total dissolved solids?**

A Based on 71 water quality records for total dissolved solids measured in samples from Colorado River Station 12466, collected between December 1984 and August 2007, the average total dissolved solids (total filtrable residue dried at 180C) concentration of the receiving waters is 364 mg/L. The applicant reported an effluent total dissolved solids concentration nearly five times higher: 1800 mg/L. The reported effluent total dissolved solids concentration is also higher than the Segment 1248 water quality standard for total dissolved solids: 500 mg/L. There has been no demonstration that the discharge that would be authorized by the draft permit would not result in lowering receiving water quality for total dissolved solids by more than a de minimis extent.

**Q Please Identify Exhibit ES-213.**

A Exhibit ES-213 is a memorandum prepared by Dr. Jordon Crago regarding the impact of toxic chemical that would likely be present in the effluent that would be authorized by the draft permit on receiving water aquatic life.

**Q Have you reviewed this memorandum?**

A Yes, I have.

**Q Does the analysis provided by Dr. Crago inform your opinion as to whether the draft permit is compliant with the Texas Surface Water Quality Standards?**

A Yes, Dr. Crago's opinions address the impact of the draft permit upon aquatic species, which is a consideration in determining whether the permit complies with the general criteria for toxic substances contained in the general criteria of the TSWQS at 307.4(d), and is worth consideration in determining whether the draft permit will be protective of Texas Surface Water Quality Standards for the exceptional aquatic life designation of Segment 1428. The impacts upon endangered and threatened species which he addresses are likewise a consideration in determining whether surface waters will be toxic to aquatic life.

**Q Is Dr. Crago the type of professional upon whom you would, in the ordinary course of your professional Engineering practice, rely?**

A Yes. Dr. Crago is an associate professor in the Department of Environmental Toxicology at Texas Tech University. His resume includes numerous publications of research involving the toxicity of chemical compounds, including PFAS chemicals, in surface water and their effects on aquatic life. He is well-qualified to offer the opinions expressed in this memorandum. This memorandum is similar to the type of information that I routinely rely upon in my own professional practice.

## XII. CONCLUSION

**Q Does this conclude your testimony?**

A A Yes, though I reserve my right to amend or supplement this testimony if I learn of information that causes me to change any of my opinions stated here.

**SOAH DOCKET NO. 582-24-22552**
**TCEQ DOCKET NO. 2023-1591-MWD**

| | | |
|---|---|---|
| **APPLICATION OF CORIX UTILITIES (TEXAS) INC. FOR TPDES PERMIT NO. WQ0013977001** | **§** | **BEFORE THE STATE OFFICE** |
| | **§** | **OF** |
| | **§** | **ADMINISTRATIVE HEARINGS** |

# EXHIBIT ES-201

# D. Lauren Ross, Ph. D., P. E. – Principal Engineer

Dr. Lauren Ross is an environmental engineer and owner of Glenrose Engineering, Inc. in Austin, Texas since 1987.

## Education

Ph. D. Civil Engineering, University of Texas at Austin; 1993
M. S. Civil Engineering, Colorado State University, Fort Collins, Colorado; 1982
B. S. Civil Engineering, University of Texas at Austin; 1977, *summa cum laude*

## Registration, Certification, and Training

Registered Professional Engineer: State of Texas, 1984
OSHA 40-hour Hazardous Waste Health and Safety Training, 1993
Certified Professional in Erosion and Sediment Control, 2009
U. S. E.P.A. 5-Day Water Quality Analysis Simulation Program (WASP), 2016

## Experience

**Wastewater Engineering and Permitting**

- Design of a constructed wetland system to treat high biochemical oxygen demand and concentrated nutrient wastewater from a tofu production facility.
- Soil, spring, and groundwater monitoring system recommendations for Texas land application systems: Barton Creek West Water Supply Corporation, Rocky Creek Wastewater Utility, Austin Highway 290 (Headwaters), City of Dripping Springs, Travis County Municipal Utility District No. 4, Scenic Greens, Hays County Water Control and Improvement District No. 1, Prentiss Properties Acquisition Limited Partnership.
- Water balance modeling for septic systems in the Barton Springs Edwards Aquifer Recharge and Contributing Zones.
- Water balance modeling for Three Rivers Refinery wastewater effluent irrigation.
- Environmental sampling and/or data analysis associated with wastewater effluent irrigation at Barton Creek West WSC, Hays County Water Control and Improvement District No. 1 (Belterra), Hays County Municipal Utility District No. 5 (Highpointe) Three Rivers Refinery, and West Cypress Hills wastewater effluent irrigation.

**Ground Water**

- Pollution concentration predictions in Barton Springs from a pipeline leak using a numerical model based on field dye trace data.
- Evaluation of environmental data to determine coal combustion waste disposal impacts in the Four Corners region.
- Groundwater contamination study, waste evaluation, sampling, and analysis for petroleum refinery.
- Closed landfill study: field investigation, compiled and reviewed historical records, assessed potential environmental consequences, installed, sampled, and evaluated data from monitoring wells.
- Conducted geologic assessment, designed and installed groundwater monitoring well system for municipal landfills.
- Designed a system to limit methane and leached organic chemical migration from a closed municipal landfill into a karst limestone sole-source drinking water aquifer.

## D. Lauren Ross, Ph. D., P. E. – Principal Engineer

- Developed groundwater management alternatives to limit withdrawal and related land subsidence.

**Environmental Assessment**

- Baseline and impact assessment for wastewater line remediation project including evaluation of soils, geology, topography, and flow regimes.
- Environmental Assessment evaluation for a proposed project to convert an inactive crude oil pipeline, largely constructed in 1950, into active service as a high-pressure fuel transmission line. Work included: evaluating historical spill records; calculating statistical failure probabilities for different pipeline reaches and spill sizes; predicting time and concentrations of toxic and carcinogenic constituent migration through and discharge from a karst limestone aquifer; and evaluating the Operational Reliability Assessment performed for the pipeline.

**Solid Waste**

- Investigated waste metal migration in soil for petroleum land treatment unit.
- Investigated geologic setting and groundwater contamination and designed recovery well system for groundwater remediation at a commercial RCRA waste storage impoundment.
- Designed petroleum waste land treatment units: baseline soil and groundwater characterization; monitor well system design and installation; lysimeter systems; and land treatment demonstrations to determine maximum waste capacity and loading rates.
- Developed sampling procedures and in-place treatment for RCRA waste at electrical generation power plants.
- Managed and prepared technical phases of Industrial Solid Waste Permit Applications under RCRA and Texas Natural Resource Conservation Commission regulations for waste management facilities: land treatment units, surface impoundments, container storage areas.
- Designed closure plans for RCRA waste impoundments to store, treat and dispose of inorganic acids, spent pickle liquor, and organic chemicals.
- Review of proposed municipal solid waste landfill applications.

**Water Quality and Engineering Design**

- Gravity-flow retention and irrigation water pollution control system for a large hospital complex within the contributing watershed of the karst Barton Springs Aquifer.
- Design of an innovative bioretention water quality control system for a municipal complex located on the Barton Springs Edwards Aquifer Recharge Zone and permitting under Texas Commission on Environmental Quality Edwards Aquifer protection rules.
- Design of an innovative pervious pavement storm runoff detention and treatment system for a proposed parking lot to be located on the Northern Edwards Aquifer Recharge Zone and permitting under stringent City of Austin and Texas Commission on Environmental Quality water quality protection rules.
- Wet pond design and detention basin retrofit to treat stormwater from existing residential and commercial development in the Oak Springs neighborhood in East Austin.
- Combined wet pond and bioretention design for commercial storm runoff.
- Combined wet pond and retention/irrigation design for an existing 162-acre residential development over the sensitive Barton Springs recharge zone in the City of Austin, Texas.

## D. Lauren Ross, Ph. D., P. E. – Principal Engineer

- Municipal engineer responsible for all water quality design, review, inspection, rules, and ordinances for the City of Sunset Valley, Texas.
- Analyzed nonpoint pollution sources and structural and non-structural retrofit controls for recharge and contributing zone of a sensitive karst aquifer.
- Analyzed nonpoint pollution sources and structural and non-structural retrofit controls as water quality engineer for the City of Sunset Valley, Texas.
- Technical consultant to the City of Austin on implementation of the 1991 Comprehensive Watersheds Ordinance and associated water quality monitoring system.
- Analyzed stormwater conveyance and flooding potential, designed regional detention basin to protect natural ecological systems for Armand Bayou Master Drainage Study.
- Estimated long-term groundwater yields based on rainfall rates, soil type, and river losses for Chisumbanje region of Zimbabwe, Africa.
- Evaluated land use, soils, agricultural and silvicultural practices to assess non-point pollution potential in the San Jacinto River Basin.
- Designed storm water drainage for subdivisions and regional water detention facilities.

**Teaching and Presentations**

- Semester Course in Statistics for Environmental Monitoring; University of Texas at Austin; Fall 1995.
- Semester Course in Water Resources, University of Texas at Austin.
- Land Development Seminar; Travis County Bar Association, 12 July 1996.
- Water Quality Protection Programs to Reduce Nonpoint Source Pollution, a presentation to the Barton Springs/Edwards Aquifer Conservation District's Watershed Management: Challenges and Innovations—A Nonpoint Source Pollution Conference, 25 July 1996.
- Presenter at Emerging Issues in Groundwater Regulation panel discussion, Key Environmental Issues in U.S. EPA Region VI conference, hosted by U.S. EPA and the American Bar Association, May 12-13, 1997.
- Short Courses in Statistics for Environmental Monitoring; University of Texas Continuing Engineering Studies Program: Spring 1995, Fall 1995, Spring 1996, Spring 1997, Spring 1998.
- Short Courses in Statistics for Environmental Monitoring; Louisiana Department of Environmental Quality. Focus on surface water sampling considerations, trend analysis and methods to assess the achievement of data quality objectives.

**Statistics**

- Evaluated surface and groundwater measurements for normality, differences in mean, spatial variability, and time series analysis. Techniques used include Student's t-test, Wilcoxon test, parametric and non-parametric ANOVA, Fourier series decomposition, Shapiro-Wilkes test, and Chi-squared tests.
- Geostatistical analysis and kriging of groundwater transmissivity data.
- Statistically-based sampling design including optimum sample number, stratified random sampling, and assessment of monitoring parameters to achieve efficient sampling designs.

**Field/ Laboratory Experience**

## D. Lauren Ross, Ph. D., P. E. – Principal Engineer

- Field supervision of auger drilling, rotary-bit drilling, well installation, Shelby-tube core and split-spoon sampling, and soil type identification using the Unified Soils Classification System
- Surface, groundwater and hazardous waste sampling for a variety of constituents, including volatile organic constituents, dioxins, nutrients, metals, anions, cations, and other collection-sensitive parameters.
- Laboratory experiments to measure unsaturated hydraulic conductivity, water content versus soil water pressure, and other geophysical soil properties.

**Reports and Publications**

- *Prefiled Direct Testimony of D. Lauren Ross, PH. D., P.E.,* regarding Application of Clancy Utility Holdings, LLC for an Operating Permit from the Hays Trinity Groundwater Conservation District on behalf of Save Our Springs Alliance and Save the Pedernales, September 16, 2024.
- *Prefiled Direct Testimony of D. Lauren Ross, PH. D., P.E.,* regarding Application by San Miguel Electric Cooperative, Inc. for Renewal and Major Amendment to Texas Pollutant Discharge Elimination System Permit No. WQ0002043000 on behalf of Swaim, Lively & Shorty, Owners, July 3, 2024.
- *Prefiled Direct Testimony of D. Lauren Ross, PH. D., P.E.,* regarding Application by City of Kyle for a Major Amendment to Texas Pollutant Discharge Elimination System Permit No. WQ001041002, on behalf of San Marcos River Foundation, Inc, May 29, 2024.
- *Total Petroleum Hydrocarbons Present in Soils at the Absher Equine Center, Flatonia, Texas,* prepared for Phillip Polin, attorney, February 19, 2024.
- *Prefiled Direct Testimony of D. Lauren Ross, PH. D., P.E.,* regarding Application of San Miguel Electric Cooperative, Inc. for Renewal/Revision of Permit No. 60, San Miguel Lignite Mine, Areas F, G & H, McMullen County, Texas before the Railroad Commission of Texas, on behalf of Protestants Swaim, Lively, and Shorty Owners, October 9, 2023.
- *Prefiled Direct Testimony of D. Lauren Ross, PH. D., P.E.,* regarding Application by Undine Texas Environmental, LLC for New Texas Pollutant Discharge Elimination System Permit No. WQ0016046001, on behalf of Brazoria County, December 14, 2023.
- *Prefiled Direct Testimony of D. Lauren Ross, PH. D., P.E.,* regarding Application by SJWTX, Inc. and Mary Jane Cielencki for New Texas Pollutant Discharge Elimination System Permit No. WQ0016052001, on behalf of Protestants Annette Gass, Rita Acker, and Rhonda Luman, July 19, 2023.
- *Prefiled Direct Testimony of D. Lauren Ross, Ph.D., P.E. on Remand,* regarding Application by City of Liberty Hill for Renewal of Texas Pollutant Discharge Elimination System Permit No. WQ0014477001, on behalf of Protestant Stephanie Morris, June 7, 2023.
- *Warrior Oil Tank Well Tank Battery and Associated Contamination,* prepared for Phillip Poplin, attorney, January 2, 2023.
- *Pre-Filed Direct Testimony of D. Lauren Ross, Ph.D., P.E. on Behalf of the Swaim, Lively & Shorty Protestants, regarding San Miguel Electric Cooperative, Inc.'s Application for New Permit, X, Y, and Z Area Lignite Mine, McMullen County, Texas,* Railroad Commission of Texas Docket No. MR-21-00006257, October 11, 2022.
- *Prefiled Direct Testimony of D. Lauren Ross, Ph.D., P.E.* regarding Application by City of Liberty Hill for Renewal of Texas Pollutant Discharge Elimination system Permit No. WQ0014477001, on behalf of Protestant Stephanie Morris, July 20, 2022.

## D. Lauren Ross, Ph. D., P. E. – Principal Engineer

- *Stormwater Control Measures Audit: Water Conservation Supply and Ecosystem Benefits,* memorandum for City of Austin, January 31, 2022.
- *Direct Prefiled Testimony in Application from Kendall West Utility, LLC for a new TPDES Permit WQ0015787001* for Save Our Springs Alliance, January 28, 2022.
- *Storm Water Pollution Prevention Plan for Country Club Creek West; Roy G. Guerrero Park Channel Stabilization, City of Austin C.I.P. No. 5848.026,* for City of Austin, November 2021.
- *Review of Houston Tradeport Municipal Setting Designation Application* for EarthJustice, April 2021.
- *Prefiled Testimony in Application by Silesia Properties, LP for TCEQ Permit WQ0015835001,* for Greater Edwards Aquifer Alliance, Mary 31, 2021.
- *Prefiled Testimony for Application of Cherryville GP, Inc. and Cherryville #5 LTD for new TPDES Permit No. WQ0015738001,* for Save Our Springs Alliance, January 15, 2021.
- *Review of Application to Register Domestic Septage Beneficial Use Site; Jack County, Texas for the Two Bush Community Action Group, October 15, 2020.*
- *Prefiled Testimony in Application of Texas Regional Landfill Company, LP, for MSW Permit No. 1841B* for Marisa Perales, attorney, August 25, 2020.
- *Review of Proposed City of Liberty Hill Sewage Effluent Discharge to the South Fork San Gabriel River,* prepared for Texas RioGrande Legal Aid, August 12, 2020.
- *Urban Sinkhole Evaluation and Mitigation Preliminary Engineering Report* with Geosyntec Consultants, January 31, 2020.
- *Prefiled Testimony in Application by Aqua Texas, INC> for TPDES Permit No. WQ0015642001,* for Mary Conner, attorney, June 21, 2019.
- *Black Mountain Sand Mine Review,* Wintergarden Groundwater Conservation District, January 2019.
- *Soils, Surface Water and Groundwater Hydrology in the Vicinity of the Peeler Ranch in Atascosa County, Texas,* Mary Whittle, attorney, August 2018.
- *June 28 to 29, 2018 Field Investigation Report for Peeler Ranch, Atascosa County, Texas,* Mary Whittle, August 2018.
- *Direct Testimony in Application by the City of Dripping Springs for New TPDES Permit No. WQ0014488003,* for Save Our Springs Alliance, July 24, 2018.
- *Sampling Plan for June 28 to 29, 2018 Peeler Ranch Atascosa County, Texas,* Mary Whittle, June 2018.
- *City of Houston Sanitary Sewer Overflow Data Summary: Preliminary Report,* Eric Allmon, attorney, June 2018.
- *Water Quality Control Concept Design; Courtyard Park @ 5811 Southwest Parkway; Austin, Texas* for RealTex Ventures LP, April 11, 2018.
- *Arrowhead Landfill Protestant's Field Protocols,* for EarthJustice, May 26, 2017.
- *Review of Proposed City of Dripping Springs Wastewater Effluent Discharge to Onion Creek,* Protect Our Water, November 2016.
- *Prefiled Testimony on Application of 130 Environmental Park, LLC for Proposed TCEQ Municipal Solid Waste Permit No. 2383,* attorney Marisa Perales, June 2016.

## D. Lauren Ross, Ph. D., P. E. – Principal Engineer

- *Barnes Family Farm Water Availability Report*, Barnes Family Farm, Inc., April 2015.
- *Preliminary Engineering Design of Storm Runoff Treatment System,* Parkside Montessori Community School, February 2015.
- *Declaration regarding Wetlands Development in Galveston Baykeeper, Inc. vs. Trendmaker Homes, Inc.,* Galveston Baykeeper, Inc., November 2014.
- *Prefiled Testimony on Application of DHJB Development, LLC for a Major Amendment to TPDES Permit No. WQ 0014975001,* attorney Mary Conner, October 2014.
- *Potential Improvements to the Join Task Force Municipal Separate Storm Sewer MS4 Permit,* Houston Parks Board, Galveston Bay Foundation, Buffalo Bayou Partnership and Bayou Preservation Association, March 2014.
- *Asher Property Water and Soil Sampling Results* for Phillip Poplin Law Office, 23 January 2014.
- *Circle Acres Environmental Sampling Report*, Ecology Action, January 2014.
- *Potential Improvements to the Harris County Municipal Separate Storm Sewer MS4 Permit*, Houston Parks Board, Galveston Bay Foundation, Buffalo Bayou Partnership, and Bayou Preservation Association, January 2014.
- *Circle Acres Preliminary Engineering Biofilter Design*, Ecology Action, August 2013.
- *Circle Acres Storm Water Management Concept Plan*, Ecology Action, May 2013.
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- *Water for Coal-Fired Power Generation in Texas: Current and Future Demands,* for Sierra Club, February 2012.
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| **APPLICATION OF CORIX UTILITIES (TEXAS) INC. FOR TPDES PERMIT NO. WQ0013977001** | **§** | **BEFORE THE STATE OFFICE** |
| | **§** | **OF** |
| | **§** | **ADMINISTRATIVE HEARINGS** |

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**ESRI/ArcGIS Data**

The following GIS coverages were accessed through ESRI Online Portals or agency GIS hubs:

- TCEQ_AU_Lines_Impairment 2022.
- TCEQ_Public_Water_System_Intakes.
- TCEQ_Wastewater_Outfalls.
- National Hydrologic Database Flow Line.
- Base Maps through ESRI: World Street Map, World Imagery, USA Topographic Map.

**SOAH DOCKET NO. 582-24-22552**
**TCEQ DOCKET NO. 2023-1591-MWD**

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|---|---|---|
| **APPLICATION OF CORIX UTILITIES (TEXAS) INC. FOR TPDES PERMIT NO. WQ0013977001** | **§** | **BEFORE THE STATE OFFICE** |
| | **§** | **OF** |
| | **§** | **ADMINISTRATIVE HEARINGS** |

# EXHIBIT ES-203

# Exhibit ES-203. Segment 1428 Listing History

| Year | Contact Recreation | Fish Community | Macro-benthos | Nitrate | Ortho-phosphorus | Total Phosphorus |
|---|---|---|---|---|---|---|
| **1992*** | | | | | | |
| **1994*** | Rank 39; Tox; NPS-K; N, P, Cl | | | | | |
| **1996*** | N | | | | | |
| **1998*** | N (PS, NPS) | | | | | |
| **1999*** | N (NPS) | | | | | |
| **2000*** | N (NPS) | | | | | |
| **2002** | | Concern | Concern | Concern | Concern | |
| **2004** | S | | | | | |
| **2006** | | CN:UKN | CN:UKN | CS: NPS/ PS/ UNK | CS: NPS/ PS/ UNK | CS: NPS/ PS/ UNK |
| **2008** | | CN:UKN | CN: MPS/ UNK/ NPS | Nutrient Screening Levels: CS: MPS/ UNK/ NPS/ | | |
| **2010** | | CN:UKN | CN:UKN | CS: NPS/ MPS/ UNK | CS: NPS/ MPS/ PS/ UNK | CS: NPS/ MPS/ UNK |
| **2012** | | CN:UKN | CN:UKN | CS: NPS/ MPS/ UNK | CS: NPS/ MPS/ PS/ UNK | CS: NPS/ MPS/ UNK |
| **2014** | | CN:UKN | CN:UKN | CS: MPS/ UNK/ NPS | | CS: MPS/ UNK/ NPS |
| **2016** | | CN:UKN | CN:UKN | CS: NPS/ MPS/ UNK | | CS: NPS/ MPS/ UNK |
| **2018** | | CN:UKN | CN:UKN | CS: NPS/ MPS/ UNK | | CS: NPS/ MPS/ UNK |
| **2020** | | CN:UKN | CN:UKN | CS: NPS/ MPS/ UNK | | CS: NPS/ MPS/ UNK |
| **2022** | | CN:UKN | CN:UKN | CS: NPS/ MPS/ UNK | | CS: NPS/ MPS/ UNK |
| **2024 (draft)** | | CN:UKN | CN:UKN | CS: NPS/ MPS/ UNK | | CS: NPS/ MPS/ UNK |

*** Assessments for these years were for the entire segment. For all subsequent years, for Assessment Unit 1428_01.**

**Key for 1994:**

**Tox: toxic substances (≥1) measurement exceeded screening criterion**
**NPS-K: Nonpoint sources known**
**N: ammonia nitrogen + nitrate nitrogen levels were relatively high**
**P: phosphorus levels were relatively high**
**Cl: chloride levels were relatively high**

**Key for 1996 through 2004**

**S = Support, P = Partial Support, N = Nonsupport, T = Threatened, NC = No Concern, C = Concern, NA = Not Assessed**

**PS - Point Source; NPS - Nonpoint Source; UNK - Source Unknown**

**Key for 2006 through 2024**

**NS - Non Support; CN - Concern for near-nonattainment of the TSWQS based on numeric criteria; CS - Concern for water quality based on screening levels.**

**MPS - Municipal Point Source; PS - Point Source Unknown; NPS - Nonpoint Source; UNK - Source Unknown**

**Sources:**
https://wayback.archive-it.org/414/20210527095853/https://www.tceq.texas.gov/assets/public/comm_exec/pubs/sfr/050_00/index.html.
**Texas IR Sources Reports, https://www.tceq.texas.gov/waterquality/assessment.**