

LAW OFFICES
McGINNIS, LOCHRIDGE & KILGORE, L.L.P.

600 CONGRESS AVENUE
SUITE 2100
AUSTIN, TEXAS 78701

HOUSTON, TEXAS OFFICE
3200 ONE HOUSTON CENTER
1221 MCKINNEY STREET
HOUSTON, TEXAS 77010
(713) 615-8500
FAX (713) 615-8585

AUSTIN, TEXAS OFFICE
(512) 495-6000
FAX (512) 495-6093

WRITER'S DIRECT DIAL NUMBER:
(512) 495-6117
kmcbride@mcginnislaw.com
Fax: (512) 505-6338

February 17, 2009

LaDonna Castanuela, Chief Clerk
Texas Commission on Environmental Quality
Office of Chief Clerk
12100 Park Thirty-Five Circle
Bldg. F, Room 1101
Austin, Texas 78753

VIA HAND-DELIVERY

TEXAS
COMMISSION
ON ENVIRONMENTAL
QUALITY
FEB 17 PM 4:21
CHIEF CLERKS OFFICE

Re: Applicant Name: Hays County Water Control & Improvement District No. 1
Facility Location: Hays County, Texas
Permit Number: WQ0014293001
TCEQ Docket No: 2007-0426-MWD
SOAH Docket No: 582-08-0202

Dear Ms. Castanuela:

Enclosed please find the original and 7 copies of Motion for Incorporation for filing in the above referenced matter.

Thank you for your service.

Sincerely,



Kim McBride, CLA
Certified Legal Assistant

KLM
Enclosures

cc: The Honorable Roy Scudday
The Honorable Cassandra Church
TCEQ, Office of General Counsel
David O. Frederick
Stuart Henry

Via Hand-Delivery
Via Hand-Delivery
Via Facsimile
Via Email
Via Email

LaDonna Castanuela, Chief Clerk

February 17, 2009

Page 2

Robert M. O'Boyle

Via Email

Patricia Link

Via Email

Fred B. Werkenthin

Via Email

Kathy Humphreys

Via Email

Christina Mann

Via Email

William D. Dugat, III

Via Email

Susan Zachos

Via Email

Vic Ramirez

Via Email

Andrew Backus

Via Email

Andrew Barrett

Via Email

SOAH Docket No. 582-08-0202
TCEQ Docket No. 2007-1426-MWD

2007 FEB 17 PM 4: 21

IN THE MATTER OF	§	BEFORE THE STATE OFFICE	CHIEF CLERKS OFFICE
THE APPLICATION OF HAYS	§		
COUNTY WATER CONTROL &	§		
IMPROVEMENT DISTRICT NO. 1	§		
FOR AMENDMENT TO TEXAS	§	OF	
POLLUTANT DISCHARGE	§		
ELIMINATION SYSTEM (TPDES)	§		
PERMIT NO. WQ0014293001	§	ADMINISTRATIVE HEARINGS	

**APPLICANT'S MOTION FOR INCORPORATION OF THE
SETTLEMENT AGREEMENT INTO THE FINAL PERMIT**

TO THE HONORABLE COMMISSIONERS:

It has come to Applicant's attention that there is a discrepancy between the proposal for decision (the "PFD") (Ex. A.) and the Partial Settlement Agreement (the "Settlement Agreement") (Ex. B).

On pages 3 through 4 of the Settlement Agreement, Applicant agreed to have several terms and conditions included in its permit. Specifically, Applicant agreed to "continue to dispose of 150,000 gallons per day of treated effluent via subsurface drip irrigation either under the existing land application authorization or pursuant to a Chapter 210 Beneficial Reuse Authorization..." (Ex. B, p.4, III.2.C) (emphasis added).

In the PFD, the Administrative Law Judges (the "ALJ") summarized the terms of the Settlement Agreement. (Ex. A, p. 10-11). While Applicant agrees with the majority of the ALJs' summary, there is one area in which the summary differs from the terms of the Settlement Agreement. The PFD provides that the Applicant "will continue to dispose of 0.150 MGD of treated effluent via subsurface drip irrigation," but omits the additional settlement term "or pursuant to a Chapter 210 Beneficial Reuse Authorization."

This previously-agreed settlement term is important to the District. The significance is to allow the District greater flexibility in its effluent disposal, primarily in 210 beneficial reuse.

REQUEST FOR RELIEF

For these reasons, the Applicant requests that the actual terms of the Settlement Agreement, as evidenced in Exhibit B, be included in the Permit, instead of the summary of the Settlement Agreement contained in the PFD.

Respectfully submitted,

MCGINNIS, LOCHRIDGE & KILGORE, LLP
Ray Chester
Jessica Palvino
600 Congress Avenue, Suite 2100
Austin, Texas 78701
(512) 495-6000
Fax (512) 495-6093

BARRETT & SMITH, PLLC
505 West 14th Street
Austin, Texas 78701
(512) 439-1236
Fax (512) 472-6463

By: 

Jessica Palvino
SBN 24048780

ATTORNEYS FOR THE APPLICANT

CERTIFICATE OF SERVICE

I hereby certify that a true and complete copy of the above and foregoing has been sent on this the 17th day of February, 2009, to the following counsel of record:

VIA EMAIL

Mr. Stuart N. Henry
1350 Indian Springs Trace
Dripping Springs, Texas 78620
(512) 858-0385

VIA EMAIL

Mr. David Frederick
Lowerre, Frederick, Perales, Allmon & Rockwell
707 Rio Grande, Suite 200
Austin, Texas 78701
(512) 469-6000
(512) 469-9346 FAX

VIA EMAIL

Ms. Patricia Link
Assistant City Attorney
City of Austin Law Department
301 W. 2nd Street, Box 1088
Austin, Texas 78767
(512) 974-2173
(512) 974-1311 FAX

VIA EMAIL

Mr. Robert M. O'Boyle
Strasburger & Price, LLP
600 Congress Avenue, Suite 1600
Austin, Texas 78701-2974
(512) 499-3691
(512) 499-3660 FAX

VIA EMAIL

Mr. Fred B. Werkenthin, Jr.
Booth, Ahrens & Werkenthin, P.C.
515 Congress Avenue, Suite 1515
Austin, Texas 78701-3503
(512) 472-3263
(512) 473-2609 FAX

VIA EMAIL

Ms. Christina L. Mann
Office of Public Interest Counsel

12100 Park 35 Circle, Bldg. F
Austin, Texas 78753
(512) 239-6363
(512) 239-6377 FAX

VIA EMAIL

Ms. Kathy Humphreys
Texas Commission on Environmental Quality
P. O. Box 13087
Austin, Texas 78711-3087
(512) 239-3417
(512) 239-0606 FAX

VIA EMAIL

Mr. William D. Dugat, III
Bickerstaff, Heath, Delgado & Acosta, LLP
816 Congress Avenue, Suite 1700
Austin, Texas 78701-2443

VIA EMAIL

Ms. Susan Zachos
Law Offices of Susan G. Zachos
P. O. Box 157
Austin, Texas 78767

VIA EMAIL

Mr. Vic Ramirez
Lower Colorado River Authority
3700 Lake Austin Blvd.
Austin, Texas 78703

VIA EMAIL

Mr. Andrew Backus
Hays Trinity Groundwater Conservation District
P. O. Box 1648
Dripping Springs, Texas 78620

VIA HAND-DELIVERY

The Honorable Roy Scudday
State Office of Administrative Hearings
300 West 15th Street, Suite 504
Austin, Texas 78701

VIA HAND-DELIVERY

The Honorable Cassandra Church
State Office of Administrative Hearings

300 West 15th Street, Suite 504
Austin, Texas 78701

VIA FACSIMILE
TCEQ Office of General Counsel
P. O. Box 13087
Austin, Texas 78711-3087



Jessica Palvino

TEXAS
COMMISSION
ON ENVIRONMENTAL
QUALITY

2009 FEB 17 PM 4:21

CHIEF CLERKS OFFICE

SOAH DOCKET NO. 582-08-0202
TCEQ DOCKET NO. 2007-1426-MWD

IN THE MATTER OF THE APPLICATION OF HAYS COUNTY WATER CONTROL & IMPROVEMENT DISTRICT NO. 1 FOR AMENDMENT TO TEXAS POLLUTANT DISCHARGE ELIMINATION SYSTEM (TPDES) PERMIT NO. WQ0014293001	§ § § § § § §	BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS
--	---------------------------------	--

PROPOSAL FOR DECISION
TABLE OF CONTENTS

I. INTRODUCTION.....	1
II. PROCEDURAL HISTORY.....	2
III. APPLICABLE LAW.....	3
A. Statutes and Rules.....	3
B. Burden of Proof.....	5
IV. WCID HISTORY AND PROPOSED PERMIT TERMS.....	5
A. Existing Permit.....	5
B. Application	6
C. Application Review Procedures Leading to Draft Permit	7
D. Additional Terms of Partial Settlement Agreement	10
E. Receiving Waters	11
V. ENVIRONMENTAL IMPACTS.....	11
A. Whether the Effluent Discharge Would Cause Degradation of Bear Creek by More Than a <i>De Minimis</i> Extent.....	12
1. Antidegradation Analysis.....	12
2. Effects of Discharge Under the Revised Draft Permit.....	15
3. Effects of Discharge Under the Partial Settlement Agreement	28



- B. Whether the Effluent Discharge Would Cause Degradation of the Trinity Aquifer and/or the Edwards Aquifer by More Than a *De Minimis* Extent..... 30
 - 1. Trinity Aquifer 30
 - 2. Edwards Aquifer..... 31

- C. Whether the Effluent Discharge Would Cause Degradation of Barton Springs by More Than a *De Minimis* Extent 34
 - 1. Effect of Effluent Discharge on Current Algae Communities in..... 34
 - Barton Springs Pool..... 34
 - 2. Effect of Effluent Discharge on Barton Springs Salamander..... 36

- D. Effect of Effluent Discharge Regarding Emerging Contaminants..... 37
- E. Alternatives to Discharge of Effluent..... 39

- VI. TRANSCRIPTION COSTS 39

- VII. CONCLUSION 40

SOAH DOCKET NO. 582-08-0202
TCEQ DOCKET NO. 2007-1426-MWD

IN THE MATTER OF THE	§	BEFORE THE STATE OFFICE
APPLICATION OF HAYS COUNTY	§	
WATER CONTROL & IMPROVEMENT	§	
DISTRICT NO. 1 FOR AMENDMENT	§	OF
TO TEXAS POLLUTANT DISCHARGE	§	
ELIMINATION SYSTEM (TPDES)	§	
PERMIT NO. WQ0014293001	§	ADMINISTRATIVE HEARINGS

PROPOSAL FOR DECISION

I. INTRODUCTION

Hays County Water Control & Improvement District No. 1 (WCID) has applied to the Texas Commission on Environmental Quality (TCEQ or Commission) for an amendment to Texas Pollutant Discharge Elimination System (TPDES) Permit No. WQ0014293001 (Permit). WCID seeks authority to discharge treated wastewater effluent into Bear Creek, a tributary of Onion Creek in the contributing zone of the Edwards Aquifer, from a waste treatment facility that serves the Belterra Subdivision and is located approximately 1,100 feet west of County Road 163 (Nuttly Brown Road) and approximately 1.16 miles south of the intersection of County Road 163 and U.S. Highway 290 in Hays County, Texas. The proposed permit would authorize a discharge of 500,000 gallons per day (gpd) of treated effluent into the headwaters of Bear Creek south of U.S. 290W, 8 miles upstream from the boundary of the recharge zone of the Edwards Aquifer.

The Administrative Law Judges (ALJs) recommend that the Commission issue a revised permit with additional conditions as set forth herein.

II. PROCEDURAL HISTORY

WCID's application was filed on December 13, 2005. The ED recommended issuance of the permit and published the requisite notices. On August 30, 2007, WCID requested that the matter be directly referred to the State Office of Administrative Hearings (SOAH) for a contested case hearing. On September 18, 2007, the Commission referred the case for a contested case hearing.

At the preliminary hearing conducted on November 27, 2007, the following protestants were named as parties to the contested case and were subsequently aligned into four groups:

- Group A - City of Austin (Austin), Lower Colorado River Authority (LCRA), and Barton Springs/Edwards Aquifer Conservation District (BSEACD);
- Group B - Hays County (County), City of Dripping Springs (CDS), and Hays Trinity Groundwater Conservation District (HTGCD);
- Group C - Joel and Kim Stearns, Alston and Barbara Boyd, Owen Kinney and Darryl Howard, Robert O'Boyle and Barbara Stroud, The Davis Family Properties, Ltd., Charles O'Dell, Robert D. Hejl, Radiance Water Supply Corp., Sam Cobb, Tara Weaver, Charles Jones, and Gregg Brown; (Subsequently, the Davis Family Properties, Ltd., was removed from Group C and placed in its own separate group.)
- Group D - Bear Creek Property Owners Association (BCPOA), Hays Community Action Network (HCAN), and Save Our Springs Alliance (SOS).

Within a week of the hearing on the merits the following Protestants entered into a Partial Settlement Agreement with WCID and withdrew as parties to the contested case: LCRA, BSEACD, CDS, HTGCD, and Davis Family Properties, Ltd. In addition, during the course of the oral hearing, the following Protestants also withdrew as parties to the contested case: Charles Jones, Owen Kinney and Darryl Howard. The remaining protesting parties were: Austin; County; Group C Protestants Joel and Kim Stearns, Alston and Barbara Boyd, Robert O'Boyle and Barbara Stroud, Charles O'Dell, Robert D. Hejl, Radiance Water Supply Corp., Sam Cobb, Tara Weaver, and Gregg Brown; and Group D Protestants BCPOA, HCAN, and SOS. (The remaining members of Groups C

and D are referenced collectively in the PFD as "Landowners" and their exhibits are designated "LO.")

The hearing on the merits was conducted in Austin, Texas, on July 14 - 18, 2008, by ALJs Roy G. Scudday and Cassandra J. Church. The record closed on September 22, 2008, upon filing of a transcript and the parties' briefs.

WCID was represented by Ray Chester and Jessica Palvino, attorneys. Protestant Group A was represented by Patricia Link, attorney. Protestant Group B was represented by David Frederick, attorney. Protestant Group C was represented by Stuart Henry, attorney. Protestant Group D was represented by Robert O'Boyle, attorney. The Office of Public Interest Counsel (OPIC) was represented by Christina Mann, attorney. The Executive Director of Texas Commission on Environmental Quality (ED) was represented by Kathy Humphreys and Dede Sigman, attorneys.

III. APPLICABLE LAW

WCID's application is governed by TEX. WATER CODE ANN. ch. 26, and rules adopted thereunder, specifically those found at 30 TEX. ADMIN. CODE (TAC) chs. 213, 305, 307, 309, and 311. Those statutes and rules directly applicable to the disputed issues are discussed below.

A. Statutes and Rules

No person or entity may discharge sewage, municipal waste, recreational waste, agricultural waste, or industrial waste into or adjacent to any water in the state without authorization from the TCEQ.¹ The TCEQ may refuse to issue a permit for the discharge of pollutants of waste into or adjacent to any water in the state when the TCEQ finds that issuance of the permit would violate the provisions of any state or federal law or rule or regulation promulgated thereunder, or

¹ TEX. WATER CODE (CODE) § 26.121(A)(1).

TCEQ finds that issuance of the permit would interfere with the purpose of the statute.² The TCEQ shall prescribe conditions in the permit including its duration, the location of the point of discharge of the waste, the maximum quantity of waste that may be discharged under the permit at any time and from time to time, the character and quality of waste that may be discharged under the permit, and any monitoring and reporting requirements prescribed by the TCEQ for the permittee.³

The rule at 30 TAC § 307.4 sets forth the general criteria for waste discharges, including aesthetic parameters, toxic substances, nutrients, aquatic life uses and dissolved oxygen (DO), aquatic life uses and habitat, aquatic recreation, and antidegradation. The rule further provides that the general criteria do not apply to those instances in which surface water, as a result of natural phenomena, exhibit characteristics beyond the limits established by the rule.

In addition, Section 307.4 provides that nothing in the rule shall be construed or otherwise utilized to supersede the requirements of 30 TAC § 307.5, which sets forth the antidegradation policy of the TCEQ. That policy applies to actions regulated under state and federal authority which would increase pollution of the waters of the state. Section 307.5(b)(1)(2) provides as follows:

No activities subject to regulatory action which would cause degradation of waters which exceed fishable/swimmable quality will be allowed unless it can be shown to the commission's satisfaction that the lowering of water quality is necessary for important economic or social development. Degradation is defined as a lowering of water quality by more than a de minimis extent, but not to the extent that an existing use is impaired. Water quality sufficient to protect existing uses will be maintained. Fishable/swimmable waters are defined as waters which have quality sufficient to support propagation of indigenous fish, shellfish, and wildlife and recreation in and on the water.

² CODE § 26.027(a).

³ CODE § 26.029(a).

The rule at 30 TAC § 311.43 sets forth the effluent standards for discharges of treated sewage effluent into the waters of the state in the tributaries of Segment 1427, Onion Creek. Those standards include, as a minimum, 5 mg/L of biochemical oxygen demand (BOD), based on a 30-day average; 5 milligrams per liter (mg/L) of total suspended solids (TSS), based on a 30-day average; 2 mg/L of ammonia nitrogen, based on a 30 - day average; and 1 mg/L of phosphorus, based on a 30-day average (5/5/2/1). The rule at 30 TAC § 311.44(b) provides that chlorination disinfection systems shall be operated so that a minimum chlorine residual of 1.0 mg/L and a maximum chlorine residual of 4.0 mg/L, measured on an instantaneous grab sample, are met for all discharges into Segment 1427 of the Colorado River Basin, Onion Creek, and its tributaries.

The Rule at 30 TAC § 282.21 provides that the ED shall provide a draft permit, technical summary, and compliance history to be considered in determining whether to grant or deny an application to discharge treated wastewater into or adjacent to the waters of the State. The draft permit is subject to change during the course of the proceedings on the application.

B. Burden of Proof

The applicant for the permit, in this case WCID, has the burden to prove that the proposed discharge permit will comply with the applicable statutes and rules regarding wastewater discharges into or adjacent to the waters of the State, 30 TAC § 80.17(a).

IV. WCID HISTORY AND PROPOSED PERMIT TERMS

A. Existing Permit

On November 30, 2004, the TCEQ issued Permit No. WQ0014293001 to authorize WCID to dispose of treated domestic wastewater effluent at a daily average flow not to exceed 0.150 million gallons per day (MGD) via subsurface drip irrigation on non-public access land of 35 acres. No discharge of pollutants was authorized by the permit.

B. Application

On December 13, 2005, WCID filed an application to expand the sewage treatment plant and authorize a discharge of 0.800 MGD of treated effluent. WCID subsequently amended the application to decrease the proposed discharge to 0.500 MGD.

WCID plans to expand its treatment system in three phases. WCID is currently operating in Phase I, using an activated sludge process plan, and the effluent limitations will remain the same. The Interim II Phase adds additional sewerage treatment steps and an effluent storage tank. WCID's effluent limitation and monitoring requirements are likewise phased in as the plant is expanded. Those limitations are discussed below in the analysis of potential effects of the discharge, but in general are more stringent than those in other permits issued in Texas. Julian Centeno, Jr., the ED's permit engineer, stated that the total phosphorus limit of 0.15 mg/L, based on a 30-day average, is the most stringent total phosphorus limit that he has seen, and that the next lowest level he had seen was 1 mg/L.⁴

In issuing his revised Draft Permit, the ED identified that effluent will enter a priority watershed of critical concern, Segment No. 1427 in Hays County. Segment No. 1427 is currently listed on the State's inventory of impaired and threatened waters, *i.e.*, the Clean Water Act Section 303(d) list, specifically for the depressed DO concentrations from the end of Segment 1427 to U.S. Hwy. 183. The watershed of Segment 1427 is also home to the Barton Springs Salamander. The ED concluded that DO will reach background levels prior to the confluence of Bear Creek with Onion Creek; therefore, WCID's discharge is not expected to contribute to the DO impairment in Onion Creek.⁵ The issues regarding potential impacts on the Barton Springs Salamander are discussed below.

⁴ ED Ex. 1, pp. 14 - 16; Ex. 6 (ED's Statement of Basis/Technical Summary, June 8, 2007).

⁵ ED Ex. 6, p. 2. (The ED also concluded that CBOD₅ and NH₃-N will reach background concentrations before the confluence of Bear Creek with Onion Creek.)

The revised Draft Permit contains an expiration date of September 1, 2011.⁶ The duration of each of the three phases of development is not specified in the revised Draft Permit, but are conditioned on the completion of the construction of the additional treatment facilities specified for the next phase.

The source of effluent is domestic water use; WCID's plant is not expected to receive significant industrial wastewater. WCID's average daily flow between December 2003 and November 2005 was 27,538 gallons per day (gpd).⁷

WCID's compliance history was rated as average due to one written Notice of Violation for the facility. Mr. Centeno stated that "average" means that the facility generally complies with environmental regulations.⁸

C. Application Review Procedures Leading to Draft Permit

As the first step of the application review process, TCEQ staff performed a water quality analysis of the receiving stream to determine whether the proposed discharge will allow the maintenance of existing water uses and quality and, in the case of waters that exceed fishable/swimmable quality, whether the proposed discharge will cause more than a *de minimis* lowering of the water quality, *i.e.*, a degradation of the water quality of the receiving waters.

In performing an antidegradation review, TCEQ uses numerical criteria that have been set for measurable parameters such as DO or pH. Because Texas has not established numerical criteria for nutrients such as phosphorus and nitrogen, those substances are evaluated using a narrative criteria. The narrative criteria in the rule at 30 TAC § 307.4(e) provide that nutrients from permitted

⁶ Pursuant to the plan for common expiration dates for permits within a basin in 30 TAC § 305.71.

⁷ ED Ex. 1, p. 23.

⁸ ED Exs. 1, pp. 12 and 13, and 7.

discharges “shall not cause excessive growth of aquatic vegetation which impairs an existing, attainable, or designated use.”

An antidegradation analysis of the impact of the proposed discharge on the receiving stream involves two separate analyses, a Tier 1 review for waters the quality of which do not exceed levels necessary to support propagation of fish, shellfish, wildlife, and recreation in and on the water (fishable/swimmable quality), and a Tier 2 review for waters the quality of which do exceed fishable/swimmable quality. Under a Tier 1 review, the TCEQ must determine that existing uses and water quality sufficient to protect those uses will be maintained. Under a Tier 2 review, the TCEQ must determine that a proposed discharge will not lower the water quality by more than a *de minimis* extent but not to the extent that an existing use is impaired. If it is determined that the proposed discharge will cause such a degradation of the receiving waters, *i.e.*, a lowering of the water quality by more than a *de minimis* amount, the discharge will only be allowed if it can be shown that the lowering of water quality is necessary for important economic or social development.⁹ No criteria for balancing economic or social development factors against lowering of water quality are set out in 30 TAC § 307.5(b).

Once it determines that no degradation will occur, TCEQ staff models the receiving stream to determine what effluent limits must be in the permit to maintain the DO criteria. Those effluent levels, as well as any levels recommended as the result of the water quality analysis, are then incorporated into the draft permit. In some permit reviews, as was the case regarding this permit, TCEQ staff will also evaluate the potential impact of the proposed discharge on groundwater.

After performing the review steps above in this case, the ED determined that he should impose additional conditions for control of the effluent and issued a Draft Permit. The ED tightened the effluent limitations for total phosphorus from 1 mg/L to 0.15 mg/L. The ED also concluded that, with the changes incorporated into the Draft Permit, the proposed discharge would not degrade the

⁹ 30 TAC § 307(b).

water of Bear Creek, any surface waters into which Bear Creek flows, or groundwater recharged from Bear Creek. The ED also determined that the proposed treatment plant would meet all limits in the Water Code for other elements, such as TSS and BOD.

The ED proceeded to issue a Draft Permit. During the course of the contested case proceeding, the ED added four conditions to the Draft Permit. The revised Draft Permit includes the following provisions:

Interim II Effluent Limitations and Monitoring Requirements

- 0.250 MGD daily average flow
- 5 mg/L BOD
- 5 mg/L TSS
- 2 mg/L Ammonia Nitrogen
- 0.15 mg/L Total Phosphorus daily average calculated as a median value and based on a long-term average of 0.10 mg/L.
- Chlorine residual of at least 1.0 mg/L after a detention time of at least 20 minutes (based on peak flow)
- Minimum dissolved oxygen of 5.0 mg/L

Final Effluent Limitations and Monitoring Requirements

- 0.500 MGD daily average flow
- 5 mg/L BOD
- 5 mg/L TSS
- 2 mg/L Ammonia Nitrogen
- 0.15 mg/L Total Phosphorus daily average calculated as a median value and based on a long-term average of 0.10 mg/L.
- Chlorine residual of at least 1.0 mg/L after a detention time of at least 20 minutes (based on peak flow)
- Minimum dissolved oxygen of 5.0 mg/L

Subsequent to the entering into of the Partial Settlement Agreement, the ED further revised the Draft Permit to add additional effluent characteristics and operating standards as follows:

- 6 mg/L Total Nitrogen
- 126 mg/L E.coli Bacteria colonies per 100 ml
- Use of an Ultraviolet Light (UV) system for disinfection purposes rather than chlorination.
- The wastewater treatment plant shall be operated by an operator holding a "Class A" wastewater operator license.

D. Additional Terms of Partial Settlement Agreement

The Partial Settlement Agreement included, among other terms, numerous changes to WCID's treatment and discharge, the design of the treatment facility, and other operating conditions. In all cases, the agreed-to terms were more stringent than the conditions in the revised Draft Permit. Although not added as conditions to the revised Draft Permit, WCID agreed in the Partial Settlement Agreement to the following provisions regarding the wastewater treatment facility:

1. All wastewater in the Interim II and Final Phase will be treated using membrane bioreactor technology with denitrification.
2. WCID will continue to dispose of 0.150 MGD of treated effluent via subsurface drip irrigation.
3. WCID shall apply for Chapter 210 Beneficial Reuse Authorization to treat at least 201 acres of irrigable land at a rate required for applying no more than 0.350 MGD of effluent, with soil moisture monitors in order to determine when irrigation areas are unsuitable for effluent irrigation.
4. WCID will build and maintain a lined effluent storage pond with a capacity of at least 5,250,000 gallons, exclusive of required freeboard.
5. WCID agrees to discharge no more than 0.350 MGD, and then only when the land to be surface irrigated is frozen or saturated and the effluent pond is full, or when Bear Creek is flowing at a rate of 14 cubic feet per second (cfs) measured at the USGS gauge on Bear Creek.
6. WCID will conduct in-stream monitoring on a monthly basis for at least one year prior to the commencement of the first discharge for determining background conditions.

7. WCID will conduct post-discharge in-stream monitoring during the first 18 months after the first discharge.
8. If, as a result of the in-stream monitoring it is determined that significant differences in the water quality of Bear Creek are caused by WCID's discharge, WCID shall commence construction of at least 1,750,000 gallons of additional effluent storage capacity and employ other measures to decrease the volume of effluent to be discharged.
9. WCID shall equip all lift stations receiving untreated effluent with automatic-on standby generator power.
10. WCID shall utilize an overflow pond or equivalent holding device to handle any untreated or partially treated effluent.
11. WCID shall conduct weekly sampling for Total Nitrogen and turbidity in the effluent to determine the effectiveness and performance of the membrane bioreactor wastewater treatment plant.

E. Receiving Waters

The proposed Draft Permit authorizes a discharge into Bear Creek in the contributing zone of the Edwards Aquifer, thence to Onion Creek in Segment 1427. Bear Creek is an unclassified receiving water that is intermittent with perennial pools. In the upper portion (or reach) of Bear Creek that extends from the proposed discharge point to Aspen Drive (approximately 0.94 km) there exists a Dry Pond and Pond 6B, the latter of which is used as a stormwater retention pond by WCID. The portion of Bear Creek downstream of Aspen Drive until it reaches the recharge zone of the Edwards aquifer (approximately 8 miles downstream from the discharge point) is spring-fed with small flows and contains several ponds, the first of which is Davis Pond.

V. ENVIRONMENTAL IMPACTS

As a result of the revisions to the Draft Permit and the provisions of the Partial Settlement Agreement, the ALJs considered the environmental impacts of discharges under both the revised Draft Permit and the Partial Settlement Agreement. The ALJs recognize, and stated to the parties,

that the Partial Settlement Agreement is not currently before the Commission as an alternative or amended proposal. However, as the parties' experts compared the impacts on Bear Creek under both scenarios, the ALJs concluded the evidence should be summarized and evaluated.

The evaluation of the impacts on Bear Creek of a discharge pursuant to the terms of the Partial Settlement Agreement necessarily included a consideration of the proposed change of the operation of the wastewater treatment plant from a continuous discharge to an intermittent discharge. The ALJs determined that such a consideration is authorized under the Notice of Hearing, which specifically refers to the permit application, the ED's preliminary decision, and the draft permit, and states they are available for viewing and copying. The application includes a discussion of the use of treated effluent to irrigate open space/greenbelt areas, commercial landscape areas, and right-of-ways within the Belterra Subdivision, as well as for make-up water for one wet pond used for stormwater quality purposes (Pond 6A).

A. Whether the Effluent Discharge Would Cause Degradation of Bear Creek by More Than a *De Minimis* Extent

1. Antidegradation Analysis

As pointed out by all the parties, neither the Water Code nor the rules of TCEQ define the term *de minimis*. The TCEQ's *Procedures to Implement the Texas Surface Water Quality Standards* (Manual) states that in order to assess the potential for degradation one must compare the proposed discharge to the baseline water quality conditions of the receiving waters.¹⁰ However, the Manual does not indicate what level of degradation would be considered to be *de minimis*. It merely states that the increased loading of nutrients is usually not considered to constitute degradation "if it can be reasonably demonstrated that detrimental increases to the growth of algae or aquatic vegetation will

¹⁰ ED Ex. 10, p. 31.

not occur.”¹¹ According to TCEQ staff aquatic scientist Lily Lytle Murphy, the term is interpreted by TCEQ staff as meaning “a less than noticeable decrease in water quality.”¹²

Several Protestants urged the TCEQ to adopt language in the U.S. 6th Circuit Court of Appeals decision in *Kentucky Waterways v. Johnson*, 2008 U.S. App., LEXIS 18802 to interpret the term *de minimis* in the water quality context. The opinion states the following at page 12:

The EPA has previously indicated that the central purpose of the federal Tier II antidegradation regulations is to protect a water body’s assimilative capacity, . . . a measurement of the amount by which its quality exceeds levels necessary to support fish, wildlife, and recreation. The Tier II review process ensures that this assimilative capacity is maintained so as to avoid further degradation of the high quality of Tier II waters. Thus, any exception to Tier II review cannot be deemed *de minimis* if they permit new discharges which significantly decrease a Tier II water body’s assimilative capacity. . . . The EPA’s prior guidance statements indicate that more than a ten percent reduction in assimilative capacity would be significant, and thus would not be *de minimis*.

The ALJs decline to adopt this definition as binding the TCEQ, but, given the absence of any case authority in Texas defining 30 TAC § 307.5, the ALJs used the definition of *de minimis* found in *Kentucky Waterways* as an aid in analyzing the evidence.

Some basic discussion of the effects of adding nutrients to streams such as Bear Creek is helpful. The following summarizes the aquatic science information gleaned from the many experts’ testimony and supporting literature.

Nutrient loadings affect algal growth in receiving streams. Streams that are classified as oligotrophic are nutrient limited with corresponding low populations of aquatic plants. Mesotrophic waters are the transition zones between oligotrophic and eutrophic waters, in which waters nuisance

¹¹ *Ibid.*, p. 33.

¹² ED Ex. 8, p. 14, lines 13 - 15.

plant growth may occur, but usually at a lower frequency and in more limited locations than for waters in the eutrophic range. Eutrophic waters are nutrient enriched, resulting in dense populations of aquatic plants that are considered nuisance by most persons and that will have an adverse affect on aquatic life and recreational uses. The boundary between oligotrophic and mesotrophic states is 0.025 mg/L for total phosphorus and 0.70 mg/L for total nitrogen. The boundary between mesotrophic and eutrophic states is 0.075 mg/L for total phosphorus and 1.50 mg/L for total nitrogen.¹³

An increased concentration of a limiting nutrient will increase the growth of algae, causing the eutrophication of the receiving water. Excessive algae will impair existing, attainable, or designated uses by driving down the DO, which could result in a change in the fish and macroinvertebrate community and affect the clarity of the stream, thereby altering the aesthetic appeal of the stream.¹⁴

Most of the testifying experts agreed that Bear Creek is oligotrophic, or at least on the border between oligotrophic and mesotrophic. (Ms. Murphy did not clarify why she agreed that the stream was oligotrophic when she utilized a background phosphorus concentration level of .03 mg/L, which is within the mesotrophic range.) Both WCID and the ED asserted that the proposed discharge would not change the algal growth characteristics of Bear Creek by more than a *de minimis* amount, while OPIC and the Protestants argued that it would.

Clearly, whether the background total phosphorus concentration level of Bear Creek is assumed to be 0.03 mg/L or 0.015 mg/L makes a big difference when determining the level of degradation to the creek that the proposed discharge would cause. This is because the assimilative capacity of the creek is based on the difference between the baseline concentration and the trophic boundary, the point at which a change in the system would generate readily observable increases in

¹³ LO Ex. 1, p. 13, line 23 - p. 14, line 21.

¹⁴ COA Ex. 20, p. 9, line 21 - p. 10, line 7.

algae. And, following the *Kentucky Waterways* opinion, more than a ten percent reduction in assimilative capacity would be more than *de minimis*.

2. Effects of Discharge Under the Revised Draft Permit

In her review of the permit application, Ms. Murphy determined the level of aquatic life in the upper and lower portions of Bear Creek. The upper portion, above Aspen Drive, is an unclassified receiving water that is intermittent with perennial pools and has the presumption of a limited aquatic life as is typically assigned to such unclassified bodies of water. The minimum DO criteria for such streams is 3.0 mg/L. The lower portion, below Aspen Drive to the Edwards Recharge Zone, is spring-fed with flows below 1.1 cfs, contains several ponds (man-made impoundments or ponds), and has the presumption of high aquatic life. The minimum DO criteria for this part of the stream is 5.0 mg/L.

Ms. Murphy then performed the antidegradation review using both the numerical and narrative criteria. She based her review on a 0.1 mg/L daily average of total phosphorus in the effluent with an average daily flow of 0.500 MGD based on the revised Draft Permit and a background phosphorus concentration level in the receiving waters of 0.03 mg/L.¹⁵ This background phosphorus level was based on a 1986 analysis of water quality and use attainability made by Jack R. Davis.¹⁶ Ms. Murphy performed a Tier 1 review of the upper portion of the stream and formed the opinion that the existing water quality uses in that portion of the stream would not be impaired by the discharge. She performed a Tier 2 review of the lower portion of the stream and determined that there would be no significant degradation of the high aquatic life uses of that portion of the stream or of its on-channel improvements. She also determined that no degradation of Onion Creek would be anticipated and that existing uses would be maintained and protected.¹⁷

¹⁵ LO Ex. 85

¹⁶ LO Ex. 9.

¹⁷ ED Ex. 12

Although the DO levels in the receiving stream are generally important to maintaining the health of the receiving waters, the primary focus of this case was on the addition of nitrogen and phosphorus. In order to make a determination of this issue, the testimony of the various experts on the subject must be examined.

WCID's Experts

James L. Machin, P.E., a specialist in environmental and water resources, testified on behalf of WCID regarding the impacts of the proposed wastewater discharge on Bear Creek. Working with Bruce Wiland, an expert in the area of water quality modeling, Mr. Machin conducted a modeling study on both the upper and lower portions of Bear Creek. He used an average daily flow of 0.800 MGD (the discharge volume in the original permit application), an effluent quality of 5 mg/L BOD, 5 mg/L TSS, 2 mg/L ammonia nitrogen, and 1 mg/L phosphorus, and assumed low-flow conditions, *i.e.*, between 0.02 cfs below Pond 6B and 0.164 cfs above Davis Pond. Based on the modeling study, greater than 4 mg/L DO would be met throughout the upper portion of the stream, although there would be a DO sag, *i.e.*, a drop off of the DO, to a minimum of 4.16 mg/L in Pond 6B. For the lower portion of the stream the study indicated that the 5 mg/L standard for DO would be met.¹⁸ If he had used the revised permit flow of 0.500 MGD, Mr. Machin opined that the DO levels would have been higher according to the model.¹⁹

Mr. Machin testified that ponds reduce nutrients as a result of settling, uptake by algae, uptake by higher plants, and chemical changes. He described Pond 6B as a large aerated water designed for the very purpose of water quality improvement that will naturally remove TSS, nitrogen, and phosphorus from the stream significantly and relatively permanently. (Mr. Callegari, the engineer for WCID, testified that Pond 6B was a stormwater quality retention pond and never

¹⁸ App. Ex. 11, pp. 3 - 4.

¹⁹ Machin, pre-filed testimony, p. 8, lines 1 - 2.

intended to be part of the effluent treatment unit. It was not included in the application as a treatment unit. Mr. Machin stated that the vast majority of the phosphorous content of the effluent will be removed in the stream, Dry Pond, and Pond 6B before the flow reached Davis Pond, the first impoundment downstream from the property controlled by WCID.²⁰

Mr. Machin also determined that the proposed discharge would not cause any significant increase in algal growth in Bear Creek. He reached that conclusion by performing nutrient-loading calculations. Assuming that the entire 0.500 MGD of effluent would be discharged and assuming a treatment level of 10 mg/L total nitrogen and 0.5 mg/L phosphorus, he calculated that the total loading for a year would be 15,000 lbs. for total nitrogen and 760 lbs. for phosphorus.²¹ This load is low, approximately 9 percent, when compared to the total nonpoint source annual phosphorus loading in Bear Creek estimated by Mr. Machin at 8,406 lbs.²² The nutrient loading on Bear Creek from an average stormwater runoff event as measured by the City of Austin would contain 155 lbs. of nitrogen and 27 lbs. of phosphorus.²³

On cross examination, Mr. Machin affirmed that his modeling was based on .800 MGD and predicted that with a lesser volume of 0.500 MGD there would be less of a DO sag due to lower flow and a resulting lower loading of nutrients. Mr. Machin agreed that lower flow would reduce re-aeration and cause a longer residence time that could result in more decay of nutrients, resulting in more algae growth.²⁴ However, he also testified that the reduction of flow resulting in a reduced demand on DO would be more than enough to offset the decreased aeration and decreased travel

²⁰ Machin, pre-filed testimony, p. 10, lines 11 - 18.

²¹ Machin, pre-filed testimony, p. 18, lines 17 - 20.

²² Transcript, vol. 3, p. 90, lines 2 - 11; Exhibit LO - 44.

²³ Transcript, vol. 2, p. 232, line 23 - p. 233, line 10.

²⁴ Transcript, vol. 2, p. 247, line 23 - p. 251, line 15.

time factor.²⁵ He also admitted that no modeling was performed on a discharge of .500 MGD and that no quantitative analysis of the effect of that flow on the growth of algae was performed.²⁶

In calculating the effect of nutrients in the proposed effluent on algal growth in Bear Creek under the terms of the Partial Settlement Agreement, Mr. Machin utilized a water balance study prepared by Dr. Al Blair for WCID (Blair Study).²⁷ Based on the amount of land irrigated, Dr. Blair calculated the average number of days that a discharge would occur in a year. Assuming, based on the Blair Study, that 150,000 gpd of effluent would be drip irrigated, 350,000 gpd of effluent would be used for surface irrigation, a discharge would occur 24 days a year resulting in an annual average discharge of 12,000 gpd, and the phosphorus limitation would be 0.1 mg/L, Mr. Machin determined that the average phosphorus level from the proposed discharge would be .0302 mg/L by the time it reached Davis Pond. The background phosphorus level in Davis Pond is .031 mg/L.²⁸ In addition, he calculated that the total loading for a year would be 215 lbs. for Total Nitrogen and 4 lbs. for phosphorus.²⁹ Compared to the total nonpoint source annual phosphorus loading in Bear Creek, estimated by Mr. Machin at 8,406 lb, the phosphorus loading in the proposed discharge would be .042 percent. He concluded that the loading would be significantly lower than that of the average stormwater runoff loadings; the average storm would have 7.5 times more phosphorus and 72 per cent of the annual nitrogen loading of the proposed discharge.³⁰

Mr. Machin also testified that the intermittent nature of the discharge would further diminish any effect of the effluent on algae and aquatic plant growth in Bear Creek because some types of

²⁵ Transcript, vol. 3, p. 147, line 21 - p. 148, line 1.

²⁶ Transcript, vol. 2, p. 251, line 16 - p. 252, line 7.

²⁷ App. Ex. 27.

²⁸ Machin, pre-filed testimony, p. 17, lines 4 - 16; Transcript, vol. 3, p. 101, line 25 - p. 102, line 8.

²⁹ Transcript, vol. 2, p. 232, line 15 - 19.

³⁰ Transcript, vol. 2, p. 232, line 23 - p. 233, line 11.

algae will not survive without a constant source of nutrients. In addition, because the majority of the discharge will occur in winter months, in that the capacity to irrigate is much higher in warmer months, the effects on aquatic plant growth from nutrients in the discharge would be lower because there is less sunlight and lower temperature in winter months, hence slower algal growth.³¹

The ED's Experts

Ms. Murphy agreed that if a nutrient-poor waterbody that doesn't generate algae becomes a nutrient-enriched body of water that generates excessive algae, *i.e.*, goes from oligotrophic to eutrophic, then that would constitute degradation.³² She also agreed that, if the effluent level of total phosphorus were higher than 0.1 mg/L., effectively putting a greater nutrient loading into the receiving water, the existing water quality of the lower portion of Bear Creek would be degraded.³³ However, she reaffirmed that at the effluent levels of 5/5/2/0.1 there was no significant potential for the proposed discharge to degrade the existing uses and to lower the existing water quality of the stream.³⁴ She also stated that she was even more confident about her antidegradation analysis if the terms of the settlement agreement were considered in conjunction with the revised Draft Permit.³⁵

Karen Holligan, a TCEQ Modeling and Assessment Specialist, evaluated the effect of the proposed discharge on the DO in the receiving stream. Based on her model using the QUAL-TX program, for effluent flows of .25 MGD and .5 MGD she determined that the proposed effluent levels of 5/5/20/0.5 were adequate at either proposed flow to ensure that the DO levels, 3 mg/L above Aspen Drive and 5 mg/L below Aspen Drive, would be maintained.³⁶ Protestants did not

³¹ Machin, pre-filed testimony, p. 19, lines 9 - 21.

³² Transcript, vol. 5, p. 209, line 25 - p. 210, line 4.

³³ Transcript, vol. 5, p. 191, lines 2 - 6.

³⁴ Transcript, vol. 5, p. 192, lines 2 - 9.

³⁵ Transcript, vol. 5, p. 198, lines 20 - 24.

³⁶ ED Ex. 16.

dispute Ms. Holligan's projection of the DO limits although they did disagree with her reliance on a steady-state model because it did not evaluate the impact of a change in DO under a range of possible weather and flow conditions.

Ms. Holligan testified that the trustworthiness of modeling programs is validated by comparing test data collected in the field with the values predicted by the model. She stated that the TCEQ has used the QUAL-TX model for many years for DO but that it had not been validated for the predictions regarding nutrients.

Protestants' Experts

Although Protestant's experts disagreed with WCID's experts and also with the ED's experts on everything from proper modeling techniques to how to determine degradation, one of the most dramatic differences was regarding the background phosphorus concentration level of Bear Creek. The differences here were the most significant in terms of analyzing the impacts on Bear Creek because the background levels are the "floor" on which additional nutrients will be stacked. Even minor differences in this "floor" yield considerable variation in the final impact.

Ms. Murphy used the average total phosphorus concentration of 0.03 mg/L. Dr. Lauren Ross, consulting environmental engineer and expert witness for Protestant Hays County, testified that, based on a United States Geological Survey (USGS) and City of Austin samples taken between 1978 and 1985, the average total phosphorus concentration of Bear Creek is 0.03 mg/L.³⁷ Mr. Machin used an average total phosphorus concentration of 0.031 mg/L. Chris Herrington, a senior programmer and analyst in the Watershed Protection and Development Review Department of the City of Austin and expert witness for Protestant City of Austin, used an average total phosphorus

³⁷ HC Ex. 2, p. 12, lines 7 - 10.

concentration of 0.03 mg/L in his modeling of the potential impact of the proposed discharge on algal growth in Bear Creek.³⁸

Contrary to these various experts for WCID, the ED, and the two governmental protestants, Dr. Lial Tischler, a consulting environmental engineer and expert witness for Protestant Landowners, testified that he calculated the background total phosphorus level of Bear Creek to be of 0.015 mg/L.³⁹ Dr. Tischler derived this number using a geometric mean as opposed to an arithmetic mean used by the other experts. He stated that he took that approach because the dataset included a lot of nondetect values and because the use of the geometric mean more properly represented the midpoint or most common denominator in the dataset.⁴⁰ In short, failure to account for nondetect values and using an average, in Dr. Tischler's view, overstated the background phosphorus level. On the other hand, Ms. Holligan testified that the agency modelers' general practice was to use the median number of a dataset.

As there was fair agreement among the experts that 0.03 mg/L is the background total phosphorus concentration of Bear Creek, the ALJs concluded that number should be used in evaluating the potential impacts on the creek.

The experts' opinions on background phosphorus levels were based, at least in part, on nutrient levels measured in Bear Creek. By contrast, all the experts relied on modeling to evaluate the possible impact of the proposed discharge on algal growth in the creek. The ED's experts relied on Ms. Holligan's model that used the QUAL-TX program developed by Mr. Wiland. She not only used the model to predict DO, but, at the request of TCEQ staff, adapted the model to predict phosphorus and nitrogen concentrations in Bear Creek between the proposed discharge point and the Edwards Aquifer recharge zone. Using phosphorus and nitrogen decay rates of 0.08 per day

³⁸ App. Ex. 35.

³⁹ Transcript, vol. 6, p. 43, line 25 - p. 44, line 8.

⁴⁰ Transcript, vol. 4, p. 121, line 7 - p. 122, line 19.

provided by Jim Davenport, team leader of the Water Quality Standards Team, and background phosphorus and nitrogen concentrations provided by Standards Team staff, she plotted the output from the nutrient model runs. She did not use the features of the QUAL-TX model that simulate algae growth in response to nutrient input.⁴¹ She did not utilize a background phosphorus concentration value because she assumed the low-flow condition of the stream would be zero so that the only phosphorus concentration would be that in the effluent.⁴² Based on her nutrient modeling, she determined that the phosphorus concentration dropped from 0.06 mg/L to 0.03 mg/L at Davis Pond.⁴³ Ms. Holligan testified that she used a total phosphorus limit of 0.1 mg/L in her nutrient model and agreed that if she had used the 0.15 mg/L figure, the total output numbers and predicted nutrient concentrations would have been higher, but she could not tell how much higher.⁴⁴ The revised Draft Permit calls for a 0.15 mg/L Total Phosphorus daily average calculated as a median value based on a long-term average of 0.10 mg/L. This means that the actual discharge would be in the range of both higher and lower concentrations. Notwithstanding this, the ALJs are of the opinion that the cumulative difference between discharge concentrations within the anticipated range would be *de minimis*.

As discussed above, Mr. Machin relied on Mr. Wiland's model that used the LA-QUAL program also developed by Mr. Wiland. Mr. Machin only used the model to analyze the impact of the proposed discharge on DO, not on algal growth in the stream.

Dr. Tischler primarily relied on a model run by Mr. Herrington.⁴⁵ Mr. Herrington used the LA-QUAL program, but concluded that it did not accurately represent the natural processes that

⁴¹ ED Ex. 14, p. 13, line 3 - p. 14, line 17.

⁴² Transcript, vol. 6, p. 10, lines 20 - p. 11, line 6; p. 36, line 18 - p. 37, line 14.

⁴³ Transcript, vol. 6, p. 40, lines 10 - 14; p. 41, line 7.

⁴⁴ Transcript, vol. 6, p. 71, line 20 - p. 79, lines 12 - 22.

⁴⁵ LO Ex. 1, p. 15, line 17 - p. 16, line 21.

would occur with the introduction of additional nutrients because it, as well as the QUAL-TX program, is a steady-state program that does not consider different parameters such as water temperature and stream flow. As a result, Mr. Herrington extended the LA-QUAL model to 60 different scenarios that varied ambient temperature and flow and changed Bear Creek background concentrations to account for storm conditions. As a result of his expanded modeling, Mr. Herrington determined that the proposed discharge would increase the growth of algae in Bear Creek.⁴⁶

On cross-examination it was pointed out that Mr. Herrington is not a licensed engineer. He admitted that he had never used the LA-QUAL program before nor had he taken any courses or instruction on the use of LA-QUAL or received any instruction from an engineer or experienced modeler before using the program in his modeling of Bear Creek. He admitted that he was not aware of any scientific literature supporting the use of the model program in the way that he did.⁴⁷ Based on these admissions, the reliance of Dr. Tischler on Mr. Herrington's modeling results is questionable.

In short, none of the modeling regarding the effects of added nutrients was based on validated modeling. Texas has no numerical standard for nutrients, so no field data has been collected to validate the models. No party presented any supporting literature or other data supporting the use of these particular models or modeling techniques as valid for nutrients, especially as the effects of the nutrient loading may vary over the course of time.

ALJs Analysis of Degradation Elements

As noted above, the greater weight of the credible evidence on the condition of the receiving stream supports a conclusion that Bear Creek, with an average total phosphorus concentration of

⁴⁶ COA Ex. 4, p. 11, line 22 - p. 18, line 14; COA Ex. 8.

⁴⁷ Transcript, vol. 4, p. 153, line 20 - p. 155, line 11; p. 173, lines 21 - 25.

0.03 mg/L, falls within the oligotrophic-mesotrophic category regarding pre-existing algae populations. The question then becomes what the effects of the proposed discharge under the revised permit will have on the algal growth of Bear Creek. Without a valid nutrient model, the issue depends on an analysis of the nutrient loadings on and the assimilative capacity of the receiving stream at Davis Pond.

According to Dr. Tischler, based on Ms. Holligan's model, the proposed discharge of 0.500 MGD would result in a phosphorus concentration of at least 0.06 mg/L at Davis Pond, the first perennial pond downstream of Aspen Drive.⁴⁸ If the background concentration is assumed to be 0.015 mg/L, and the oligotrophic-mesotrophic boundary is 0.027 mg/L, then the assimilative capacity of Bear Creek would be 0.012 mg/L. At the background level of 0.015 mg/L, the proposed discharge will increase the phosphorus concentration at Davis Pond by 0.045 mg/L, or 347 per cent of the assimilative capacity of the stream.⁴⁹ Using the same methodology, if the background concentration is assumed to be 0.03 mg/L, which is greater than the oligotrophic-mesotrophic boundary, and the mesotrophic-eutrophic boundary is 0.075 mg/L, then the assimilative capacity of Bear Creek would be 0.045 mg/L. In that scenario, the proposed discharge will increase the phosphorus concentration at Davis Pond to 0.06 mg/L, which is 150 percent of the assimilative capacity of the stream.

Accordingly, using either background phosphorus concentration level, the proposed discharge will be substantially greater than the assimilative capacity of the stream at Davis Pond.

Regarding total nitrogen concentration, based on Ms. Holligan's model, the proposed discharge of 0.500 MGD would result in a nitrogen concentration of 11.18 mg/L at Davis Pond. Using a background concentration of 0.09 mg/L, which is greater than the oligotrophic-mesotrophic boundary of 0.07 mg/L, and the mesotrophic-eutrophic boundary of 1.5 mg/L, then the assimilative capacity of Bear Creek for nitrogen would be 0.06 mg/L. The proposed discharge will increase the

⁴⁸ LO Ex. 1, p. 18, lines 6 - 13.

⁴⁹ LO Ex. 1, p. 25, line 17 - 23.

nitrogen concentration at Davis Pond to 11.18 mg/L, which is 1,863 percent of the assimilative capacity of the stream.⁵⁰

Dr. Tischler also testified that the hydrology of Bear Creek is important when considering the ability of the creek to properly assimilate the treated effluent proposed to be discharged.⁵¹ Based on a streamflow analysis performed by Raymond Slade, Jr., (Slade Study) the median stream flow at the USGS monitoring station, located approximately 5.1 miles downstream of the proposed discharge point, is 1.1 cfs. Because it can reasonably be expected that stream flows upstream from the monitoring station will be lower because the watershed decreases in area and is at higher elevations, Dr. Tischler was of the opinion that a continuous flow of treated effluent as authorized by the revised Draft Permit would result in treated effluent constituting most or all of the stream flow in all of the ponds downstream from the discharge point more than 14 percent of the time.⁵²

Based on the median flow of 1.1 cfs and a background phosphorus concentration of 0.015 mg/L, Dr. Tischler calculated that if the proposed discharge of 0.500 MGD were added to the stream, the additional total phosphorus loading on Bear Creek would be 0.042 lb/day, or 14.6 lbs/year.⁵³ Dr. Tischler determined that such a loading would increase the total phosphorus concentration in Bear Creek sufficiently to change the existing algal trophic state from oligotrophic to mesotrophic-eutrophic at the median stream flow and to eutrophic at zero stream flow, which occurs greater than 14 percent of the time. This level of phosphorus would result in excessive growth of aquatic vegetation that would impair the recreational and non-recreational uses of the creek.⁵⁴

⁵⁰ LO Ex. 1, p. 26, line 1 - 5.

⁵¹ LO Ex. 1, p. 9, line 4 - 10.

⁵² LO Ex. 1, p. 8, line 8 - p. 9, line 10; LO Ex. 4.

⁵³ Transcript, vol. 4, p. 141, line 17 - p. 142, line 6; LO Ex. 3.

⁵⁴ LO Ex. 3.

However, Dr. Tischler also testified that the anticipated phosphorus would not stimulate excessive algal growth under two different scenarios. The first is if the stream flow were lowered to 9 cfs because at that flow there would be a 10-to-1 dilution factor of the effluent and the total phosphorus loading would not impact the creek. The second scenario in which this would occur is if the discharge were 0.350 MGD and was within the total nitrogen limit of 6 mg/L and the stream flow were 14 cfs.⁵⁵

Alan Groeger, Ph.D., Assistant Professor of Biology at Texas State University, testified as an expert witness for the City of Austin regarding algae and nutrient interactions in stream ecosystems. His focus was on the long-term effects of cumulative nutrient loading on the stream. He explained the impact of nutrients on algal growth as follows:

- Limiting nutrients such as phosphorus and nitrogen are needed by algae to build biomass structure cells.
- When a nutrient concentration reaches a level at which the nutrient is no longer being biologically taken up by algae in the growth process or bonding to inorganic matter and sinking to the bottom of a stream, the nutrient flows downstream.
- When the sediments of an impoundment that is initially efficient at reducing nutrient movement downstream becomes organically rich nitrogen and phosphorus will move back out of the sediments in dissolved states, which is referred to as internal loading.
- As an impoundment becomes more eutrophic, it will be less efficient at trapping nutrients.
- At high flows, scouring will pick up and transport nutrient-rich sediments and algae and wash them downstream.

⁵⁵ Transcript, vol. 4, p. 96, line 21 - 24; p. 102, line 4 - 8.

- Re-suspension, *i.e.*, the mechanism whereby particles are picked up from bottom sediments and moved downstream, also will move nutrients downstream.
- If the flow of an effluent stream is increased with the same nutrient concentration, then the nutrient loading will increase.
- An increased concentration of a limiting nutrient in a stream will increase the growth of algae, similar to fertilizing a lawn.
- The growth of algae will lower the DO levels of the stream.⁵⁶

Dr. Groeger testified that, pursuant to the revised Draft Permit, there would be an increase in nutrients in the creek, and because Bear Creek has a lot of dams that have a small upstream reservoir, a stair step situation will result over a period of five years, as follows:

- An increase of algal growth will occur and organic matter will build up in the pond sediments;
- Once a pond is exposed to enough nutrients, the sediment will become more organic and will tend to be totally devoid of oxygen much of the time due to bacterial metabolism;
- Nutrients will then move back into the water column and move downstream and algal growth will move downstream as well, repeating the process from pond to pond, resulting in excessive algae growth affecting dissolved oxygen, stream clarity, and aquatic plant life.⁵⁷

Dr. Groeger further testified that, even if the discharge were limited to 12,000 gpd as calculated by Mr. Machin, resulting in a total phosphorus load of 4 lbs/yr, he was of the opinion that by the second year of discharge there would be significant effects on Davis Pond.⁵⁸

⁵⁶ COA Ex. 20, p. 4, line 21 - p. 9, line 18.

⁵⁷ COA Ex. 20, p. 9, line 1 - p. 10, line 10.

⁵⁸ Transcript, vol. 4, p.211, line 18 - p. 215, line 24.

Several of the expert witnesses relied on a study by Dr. Robert A. Short, an Associate Professor of Biology at Texas State University. In that study Dr. Short stated that the threshold of the stimulation of algal growth is 0.05 mg/L to 0.10 mg/L total phosphorus.⁵⁹ According to Dr. Tischler, based on Ms. Holligan's model, the proposed discharge of 0.500 MGD would result in a phosphorus concentration of at least 0.06 mg/L at Davis Pond, the first perennial pond downstream of Aspen Drive.⁶⁰ Such a 200 percent increase of total phosphorus concentration would push Davis Pond toward the upper end of the mesotrophic classification and would clearly be more than *de minimis*. Mr. Machin admitted that he had not performed any quantitative analysis of the effect of that flow to dispute this conclusion.

Taking together the effect of the proposed discharge on the assimilative capacity of the creek and the long-term effects of the phosphorus loadings, WCID has failed to show by a preponderance of the evidence that a continuous discharge pursuant to the terms of the revised Draft Permit would not cause degradation of Bear Creek below Aspen Drive by less than a *de minimis* extent. Nor has WCID provided any evidence to show that the lowering of the water quality of Bear Creek is necessary for important economic or social development.

3. Effects of Discharge Under the Partial Settlement Agreement

The experts' conclusions regarding the affects of the proposed intermittent discharge pursuant to the terms of the Partial Settlement Agreement are less certain, primarily due to the lack of data. Ms. Murphy stated that she was confident that a discharge under the terms of the settlement agreement would not cause degradation of Bear Creek under both a Tier 1 and a Tier 2 evaluation, and was even more confident in her analysis if there were some provision for in-stream monitoring. Dr. Tischler agreed that if the stream flow were at least 9 cfs the total phosphorus loading would not

⁵⁹ LO Ex. 13, p. 10; LO Ex. 12.

⁶⁰ LO Ex. 1, p. 18, lines 6 - 13.

impact the creek, and that if the discharge were 0.350 MGD and was within the total nitrogen limit of 6 mg/L and the stream flow were 14 cfs, the discharge would not stimulate excessive algal growth.

Dr. Groeger testified that even if the discharge were intermittent at an annual average of 12,000 gpd, by the second year of discharge there would still be significant effects on Davis Pond. However, he also agreed that, under the intermittent discharge scenario anticipated by the Partial Settlement Agreement, in-stream monitoring at various points for changes in nutrient concentrations and algal growth would be desirable.

The limitations in the Partial Settlement Agreement are to a large extent focused on reducing the nutrients introduced into Bear Creek through a more intense treatment sequence including the denitrification and membrane bioreactor technology, extensive monitoring, limited total discharge, and, in the last resort, abandonment or further reduction in the discharge. Dr. Calvin Patterson, the plant design engineer, testified that the parameters regarding phosphorus and nitrogen set forth in the Partial Settlement Agreement were, in his estimation, achievable.⁶¹

Despite the last-minute nature of the Partial Settlement Agreement, the parties, for the most part, were able to address it generally in regard to the impact of the discharge on Bear Creek. As none of the models were based on its terms, the predictions of the experts were extrapolations rather than conclusions based on use data or tested modeling assumptions. WCID and the ED contend that the terms of the Partial Settlement Agreement should not be part of the permit. It appears to the ALJs, however, that each and every one of these terms is necessary to ensure that WCID's discharge is intermittent, limited in volume, and only made when it would have the least impact on Bear Creek. In addition, the agreed-to monitoring will assure the TCEQ and Protestants that the discharge is not having more than a *de minimis* effect. (Whether the incorporation of these terms into the permit, as well as whether Pond 6B should be considered a part of the wastewater treatment process, would separately, or taken together, constitute a major amendment under 30 TAC § 305.62(c)(1) are

⁶¹ Transcript, vol. 2, p. 229, line 25 - p. 231, line 17.

questions that would need to be determined by the TCEQ.) Based on the limited record, it appears that an intermittent discharge pursuant to such a permit would not cause degradation of Bear Creek below Aspen Drive by more than a *de minimis* extent.

B. Whether the Effluent Discharge Would Cause Degradation of the Trinity Aquifer and/or the Edwards Aquifer by More Than a *De Minimis* Extent

1. Trinity Aquifer

The Upper Trinity Aquifer and the Middle Trinity Aquifer are the main sources of water for wells in the area of WCID, and the Upper Aquifer is the source for the spring flows in Bear Creek.⁶² The Trinity Aquifers underlie Bear Creek to the Edwards Aquifer recharge zone and, as such, also lie within the contributing zone of the Edwards Aquifer.

Michael Chadwick, is licensed by the State of Texas as a geoscientist in the discipline of geology and is on the Water Quality Assessment Team of TCEQ. As part of the permit review process, Mr. Chadwick was asked to perform a geological investigation as to whether the proposed discharge may affect the groundwater quality of water wells down gradient from the discharge point. Based on his investigation, including a review of the Slade Study,⁶³ Mr. Chadwick determined that the confining limestone layers that compose the bed of Bear Creek, coupled with the absence of recharge features, would result in little or no impact on the Trinity Aquifer from the proposed discharge of effluent.⁶⁴

Robert S. Kier, Ph.D., evaluates water resources, ground water contamination, and water and wastewater disposal from geologic, hydrogeologic, or engineering geologic perspectives. Dr. Keir was employed by WCID to evaluate the effects, if any, of the proposed discharge on the Trinity

⁶² COA Ex. 12, p. 13, line 22 - p.14, line 5.

⁶³ LO Ex. 4.

⁶⁴ ED Ex. 19, p. 12, lines 11 -17.

Aquifer and the Edwards Aquifer. He determined that, based on available studies and literature, there is very little if any recharge from Bear Creek to the Middle Trinity Aquifer.⁶⁵

Nico Hauwert, a licensed professional geoscientist and a hydrogeologist with the City of Austin's Watershed Protection and Review Department, opined that there was not enough data to be able to characterize the recharge from Bear Creek to the Upper Trinity Aquifer.⁶⁶

In sum, most of the experts appear to agree that all available evidence indicates that there is no meaningful recharge from Bear Creek to either level of the Trinity Aquifer. Accordingly, there is no evidence that the proposed discharge pursuant to the revised Draft Permit would result in degradation of the waters of the Trinity Aquifer. It follows that there would be no degradation of the waters of the Trinity Aquifer from a discharge subject to the provisions of the Partial Settlement Agreement.

2. Edwards Aquifer

Mr. Chadwick observed that the Edwards Aquifer recharge zone underlies Bear Creek beginning approximately 7.68 miles downstream from the proposed discharge point. As noted above, the site of the outfall channel in Bear Creek is in the Edwards Aquifer contributing zone, but the contributing and recharge zones are connected hydraulically by conduits in the limestone subsurface and by conduits between the subsurface and surface waters. Surface water can be conveyed rapidly to the subsurface through surface conduits developed in the limestone that comprise the Edwards Aquifer. Mr. Chadwick used the primary drinking water standards to analyze the impact of the proposed effluent discharge that flows into the contributing zone of the aquifer. He determined that, based on the TCEQ nitrogen-decay model performed by Ms. Holligan, the effluent would reach an equivalent EPA primary drinking water standard of 10 mg/L for nitrate as nitrogen

⁶⁵ Kier, pre-filed testimony, p. 4, line 10 - p. 5, line 9.

⁶⁶ COA Ex. 12, p. 11, lines 4 - 20.

by the time it reached the southern boundary of WCID property, well before it reached the recharge zone. (The 10 mg/L level of groundwater nitrate as nitrogen is the maximum concentration allowable for groundwater to remain unimpaired with respect to use and consistent with nondegradation.)⁶⁷ Mr. Chadwick also determined that, based on a City of Austin study, Bear Creek would recharge surface water at 2.17 mg/L nitrate to the Edwards Aquifer during low flow conditions, which nitrate value is less than that of the EPA drinking water standard.⁶⁸

Based on his investigation, Mr. Chadwick concluded that the Edwards Aquifer would not be impacted by the proposed discharge into Bear Creek because, by the time it reached the southern boundary of WCID property, the level of nitrate as nitrogen in the proposed discharge would be less than the minimum required by the EPA drinking water standard.⁶⁹ Mr. Chadwick also agreed that if the effluent were meeting the total nitrogen level of 6 mg/L required in the revised Draft Permit, it would necessarily be under the drinking water standard for nitrate as nitrogen.⁷⁰

Dr. Kier determined that, using the Slade Study's estimate of the maximum rate of discharge of Bear Creek into the Edwards Aquifer at 33 cfs, a discharge at the permitted volume of 0.500 MGD would only represent approximately 2.5 percent of the amount of recharge from Bear Creek into the Edwards Aquifer. He further stated that a percentage this low would not adversely impact the water in the Edwards Aquifer.⁷¹

Mr. Hauwert disagreed with Dr. Kier and Mr. Chadwick. He testified that the Trinity Aquifer recharges the Edwards Aquifer and that surface flow recharging into the Edwards through the Trinity

⁶⁷ ED Ex. 19, p. 20, line 22 - p. 21, line 3.

⁶⁸ ED Ex. 19, p. 14, lines 12 - 18.

⁶⁹ ED Ex. 19, p. 20, lines 3 - 12.

⁷⁰ Transcript, vol. 6, p. 118, lines 1-25.

⁷¹ Kier, pre-filed testimony, p. 9, lines 4 - 16.

Aquifer or flowing directly into the Edwards Aquifer can bypass potential attenuation, *i.e.*, reduction of material such as nutrients, that may occur in Bear Creek on the surface.⁷² However, on cross-examination, Mr. Hauwert agreed that, based on his one survey of Bear Creek, he can't be certain that there is any recharge from the creek to the Trinity Aquifer.⁷³ Consequently, if there is no recharge from Bear Creek to the Trinity Aquifer, the effluent from the proposed discharge would not bypass potential attenuation in Bear Creek.

Mr. Machin testified that, using the decay rates used by Ms. Holligan and estimating a low-flow travel time of 13 days to the Edwards Aquifer recharge zone from the proposed outfall, any phosphorus added to Bear Creek by the proposed effluent discharge will have virtually disappeared by the time it reaches the recharge zone.⁷⁴

Michael Barrett, Ph.D., is a Research Associate Professor in the Department of Civil, Architectural, and Environmental Engineering at the University of Texas at Austin. Dr. Barrett testified on behalf of the City of Austin on the potential impacts of the proposed discharge on the groundwater that recharges the Barton Springs segment of the Edwards Aquifer. Dr. Barrett was of the opinion that if the surface water in Bear Creek were degraded by the proposed effluent discharge, then the groundwater going into the Edwards Aquifer would likewise be degraded.⁷⁵

Based on the preponderance of the credible expert testimony, the effect of the proposed discharge on the Edwards Aquifer will depend on the quality of Bear Creek. Because WCID has failed to show that a continuous discharge pursuant to the terms of the revised Draft Permit would not cause degradation of Bear Creek below Aspen Drive by less than a *de minimis* extent, it follows that there likewise is no showing that such a continuous discharge would not cause degradation of

⁷² COA Ex. 12, p. 14, line 12 - p. 15, line 1.

⁷³ Transcript, vol. 5, p. 59, lines 13 - 16.

⁷⁴ Machin, pre-filed testimony, p. 23, lines 1 - 12.

⁷⁵ COA Ex. 18, p. 4, line 14 - p. 5, line 12.

the Edwards Aquifer recharge zone. On the other hand, because it appears that an intermittent discharge pursuant to a permit based on the terms of the Partial Settlement Agreement would not cause degradation of Bear Creek below Aspen Drive by more than a *de minimis* extent, it follows that there likewise is no showing that such an intermittent discharge would cause degradation of the Edwards Aquifer recharge zone.

C. Whether the Effluent Discharge Would Cause Degradation of Barton Springs by More Than a *De Minimis* Extent

1. Effect of Effluent Discharge on Current Algae Communities in Barton Springs Pool

As noted above, Bear Creek recharges the Edwards Aquifer. The Barton Springs segment of the Edwards Aquifer feeds into Barton Springs Pool, which is used for sunbathing, picnicking, and swimming.

Dr. Kier testified that Bear Creek could have some impact on Barton Springs Pool, but pointed out that Bear Creek constitutes only about 10 percent of the total recharge to the Barton Springs segment of the Edwards Aquifer, and other creeks such as Williamson Creek, Onion Creek, and Barton Springs also make up part of that recharge. He further testified that the bulk of the major recharge in the Barton Springs segment was stormwater.⁷⁶

Mr. Hauwert testified that a molecule of water located in the portions of Bear Creek that recharge the Edwards Aquifer could take from two to three weeks to reach the discharge point into Barton Springs at low flow. He compared this to a travel time of less than three days to reach the discharge point of Barton Springs at moderate and high-flow conditions.⁷⁷

⁷⁶ Transcript, vol. 3, p. 198, line 6 - p. 199, line 10.

⁷⁷ Transcript, vol. 5, p. 61 line 13 - p. 62, line 1.

Mr. Herrington testified that runoff and creek flow in the contributing and recharge zones of the Edwards Aquifer are the sources of flow in Barton Springs Pool. He also testified that Barton Springs Pool has a relatively high concentration of nitrogen relative to other surface waters that are less impacted by low flows.⁷⁸

Based on the concentration of phosphorus at the Edwards Aquifer recharge zone as determined by Mr. Herrington's model, Dr. Barrett ran his own model on the removal of phosphorus. He predicted that there would be no significant removal of dissolved phosphorus occurring in the Edwards Aquifer, but, rather, an increase of about 3.4 percent in the average discharge concentration of dissolved phosphorus between Bear Creek and Barton Springs.⁷⁹ However, as discussed above, the reliance by Dr. Brooks on the Herrington model, as was similar reliance by Dr. Tischler, is questionable.

As Dr. Groeger testified, an increased concentration of a limiting nutrient such as phosphorus in a stream will increase the growth of algae. Based on the preponderance of the credible expert testimony, it seems clear that, particularly at low flow conditions, the phosphorus concentration in Bear Creek would impact the phosphorus concentration in Barton Springs Pool. Again, because WCID has failed to show that a continuous discharge pursuant to the terms of the revised Draft Permit would not cause degradation of Bear Creek below Aspen Drive by less than a *de minimis* extent as a result of the increase in the level of nutrients in the stream, it follows that there likewise is no showing that such a continuous discharge would not cause an increase in the level of nutrients in Barton Springs Pool at low-flow conditions, resulting in an increase of algal growth in the Pool. On the other hand, because it appears that an intermittent discharge pursuant to a permit based on the terms of the Partial Settlement Agreement would not cause degradation of Bear Creek below Aspen Drive by more than a *de minimis* extent, it follows that there likewise is no showing that such an intermittent discharge would cause an increase in the algal growth in Barton Springs Pool.

⁷⁸ Transcript, vol. 4, p. 189 line 16- p. 190, line 12.

⁷⁹ COA Ex. 18, p. 5, lines 16 - 20.

2. Effect of Effluent Discharge on Barton Springs Salamander

Barton Springs is the habitat for the Barton Springs Salamander, which is listed by the U.S. Fish and Wildlife Service as an endangered species. Danger to an endangered population of animals is measured in terms of the degree of lethality, *i.e.*, the percentage of the population that will be injured or killed by the introduction of identified constituents to their environment or by other changes in that environment.

Bryan Brooks, Ph.D., is the Director of Ecotoxicology and Aquatic Research Laboratory, affiliated with the Center for Reservoir and Aquatic Systems Research at Baylor University. Dr. Brooks testified on behalf of Hays County concerning whether the effluent from the proposed discharge would have an adverse impact on the Barton Springs Salamander. According to Dr. Brooks, the suitability of Barton Springs as a habitat for the salamander can be reduced by decreasing DO concentrations.⁸⁰

Using the model developed by Mr. Herrington, Dr. Brooks determined that the DO in Barton Springs would fall below the lethal concentration of 3.9 mg/L for longer than 28 consecutive days at which 5 percent of the animals are expected to die (LC5). (Five percent lethality is the recognized benchmark for threatened and endangered species.)⁸¹ Based on the model, Dr. Brooks calculated that the total observations of days below the LC5 value would increase from 0.29 percent to 4.15 percent with the proposed discharge of 0.500 MGD. Based on those calculations, Dr. Brooks predicted that five percent of the population of the salamander would be killed as a result of the proposed discharge on at least two occasions when the DO level falls below the LC5 value for longer than 28 consecutive days, as opposed to no such occasions if there were no discharge.⁸²

⁸⁰ BSEACD Ex. 7, p. 5, lines 9 - 11.

⁸¹ Transcript, vol. 4, p. 245 lines 13 - 18.

⁸² BSEACD Ex. 7, p. 8, line 1 - p. 9, line 4.

There was no evidence suggesting that the anticipated increases in nutrients would affect the Barton Spring Salamander directly, only that its effects on the DO levels would affect the species.

For the reasons discussed above, the reliance by Dr. Brooks on the Herrington model is questionable. While it is not questioned that a fall of DO below the 3.9 mg/L LC5 value for longer than 28 consecutive days would kill five percent of the salamander population, as Dr. Brooks testified, his opinion that the DO would fall that low was totally dependent upon the accuracy of Mr. Herrington's model.⁸³ Dr. Brooks did state, however, that he had reviewed results of a model run by Martha Turner, Mr. Herrington's supervisor at the City of Austin, that showed that the DO in Barton Creek with one treatment plant discharging 0.500 MGD would be 8.36 mg/L. Dr. Brooks testified that, based on Ms. Turner's model, the proposed discharge of 0.500 MGD would not cause any significant impact on the Barton Springs Salamander.⁸⁴ As a result, the preponderance of the evidence is that the proposed discharge pursuant to the revised Draft Permit would not effect the Barton Springs Salamander. It follows, therefore, that an intermittent discharge pursuant to the Partial Settlement Agreement would likewise not affect the Barton Springs Salamander.

D. Effect of Effluent Discharge Regarding Emerging Contaminants

Protestants contended that one of the measures of degradation that the Commission should consider is the potential harmful effects of pharmaceutical and personal care products (PPCPs) that may be found in any effluent discharged under the permit. PPCPs can include medicines, industrial chemicals, detergents, disinfectants, and components of agricultural chemicals and are generally described as "emerging contaminants." Neither the EPA nor the TCEQ has adopted a numerical standard for acceptable levels of PPCPs in treated effluent.⁸⁵ Further, the TCEQ has adopted no rule or policy document stating that PPCPs are among the elements that must or should be considered in

⁸³ Transcript, vol. 4, p. 250 lines 7 - 12.

⁸⁴ Transcript, vol. 4, p. 269 line 21 - p. 270, line 17; LO Ex. 11.

⁸⁵ ED Ex. 1, p. 4 (Pre-filed testimony of Julian Centeno, Jr.).

conducting an antidegradation analysis to determine whether the water quality is sufficient to support propagation of indigenous fish, shellfish, and wildlife. Nor does it appear that the TCEQ has issued permits with site-specific standards on PPCPs.⁸⁶

Protestants pointed to the growing body of scientific research that shows that a wide variety of chemicals used in medicines, industry, and everyday household products persist in the environment, including persisting through the standard sewerage treatment methods.⁸⁷ Testifying on behalf of Hays County, Dr. David Crews, Director of the Center of Behavioral Neuroendocrinology, a research unit of the University of Texas, stated that there are numerous sources of endocrine-disrupting chemicals (EDCs) including industrial chemicals, pesticides, fungicides, plasticizers, pharmaceuticals, and phytoestrogens.⁸⁸ EDCs are of concern because they can alter the sexual and reproductive development of many species of animals or alter an animal's body composition by causing stunted or abnormal growth, abnormal or erratic escape behaviors, or dysfunctional organs. Dr. Crews stated that he has concluded, based on his 15 years of research and study, that there are no safe concentrations of EDCs, *i.e.*, levels that will not adversely affect some species, and that the effects of EDCs are both cumulative and synergistic when more than one EDC is present in the environment.⁸⁹ He acknowledged that researchers differ as to how much harm may be caused by EDCs.

Notwithstanding the growing number of studies, this area of research appears not to have matured to the point of a consensus on the appropriate way to regulate PPCPs. Journal articles from 2005 and 2006 that Dr. Crews presented as background to his testimony posed questions concerning the potential effects of PPCPs in humans and the best research methods to flesh out the emerging picture of PPCPs.⁹⁰ However, the scientific and public policy questions regarding the impacts of

⁸⁶ Transcript, vol. 5, pp. 40 and 47 (Testimony of Dr. Lauren Ross).

⁸⁷ See County Exs. 8 and 9.

⁸⁸ County Ex. 4, pp. 5 - 7.

⁸⁹ *Id.* at pp. 6 and 9.

⁹⁰ County Ex. 9, pp. 4328 - 4329.

these chemicals have not yet been answered by 2008. The ALJs concluded that, absent a standard against which to measure any PPCPs in WCID's effluent, there is no legal basis to require WCID to test for or control these constituents, either under the TCEQ's general discharge rules or the antidegradation requirements.

E. Alternatives to Discharge of Effluent

Much was made by the Protestants during the hearing regarding the failure of WCID to use other methods of disposal of effluent as opposed to a direct discharge of effluent into Bear Creek. However, as a result of the Partial Settlement Agreement, WCID will be using alternative methods. Specifically, WCID will continue to dispose of 0.150 MGD of treated effluent via subsurface drip irrigation, will apply for Chapter 210 Beneficial Reuse Authorization to treat at least 201 acres of irrigable land, and will build and maintain a 5.2 million gallon lined effluent storage pond. Only after those treatment methods are used will WCID discharge a limited amount of effluent into Bear Creek. Whether WCID has considered alternatives to discharge is not directly relevant to the question of whether the permit should be issued. Even if it were, the Partial Settlement Agreement shows that WCID has considered and incorporated alternatives to minimize discharges.

VI. TRANSCRIPTION COSTS

At the conclusion of the hearing on the merits, the parties provided their positions on the appropriate allocation of transcription costs under the factors set forth in 30 TAC § 80.23.⁹¹ WCID contended that a 50-50 allocation between itself and the Protestant would be reasonable. WCID contended that all parties were well-funded and also that Protestants' pursuit of their arguments, notwithstanding the changes in WCID's treatment that will result from the Partial Settlement agreement, prolonged the hearing time.

⁹¹ Transcript, vol.6, pp. 139 - 150.

The Protestants, collectively, argued that WCID should be assessed all of the transcription costs. The protesting land owners disputed the notion that they were well funded, noting that much of the attorney time was *pro bono* and also contended that assessing significant transcript costs against the protestants would have a chilling effect on protests generally. The protesting landowners also contended that the hearing, as well as discovery, was prolonged by WCID's decision to refer the case directly to SOAH, thus by-passing the Commission's pre-referral review that may have narrowed the issues. Hays County did not assert it could not afford some costs, but contended that the Protestants should not be asked to shoulder costs of opposing plans by WCID that were essentially based on anticipated cost savings to the district and the developer. The City of Austin requested that its technical support in the course of the extensive settlement negotiations be taken into consideration in allocating costs. There was no evidence regarding the finances of any party.

After reviewing the parties' arguments in light of the factors in 30 TAC § 80.23(d), the ALJs concluded that 75 percent of the costs of reporting and transcription⁹² should be allocated to WCID. The remaining 25 percent of the costs should be allocated equally among the City of Austin, Hays County, and each of the two protesting landowner groups. All participants benefitted from having the multi-day proceeding transcribed and all fully participated in the hearing to develop a complete record for the Commission to consider.

VII. CONCLUSION

In conclusion, the ALJs found that WCID met its burden of proof to show that the discharge proposed under the terms of the revised Draft Permit will not harm the Trinity Aquifers and the Barton Springs Salamander. However, the ALJs found that WCID has not met its burden of proving that the proposed discharge under the terms of the revised Draft Permit would not cause more than a *de minimis* degradation of Bear Creek, Edwards Aquifer, and Barton Springs, concerning algal growth in Barton Springs Pool.

⁹² That is, transcriptions provided to the ALJs for use in preparation of the PFD and Proposed Order and that accompany the record of the case sent to the Commission.

On the other hand, the ALJs found that WCID proved that a discharge pursuant to a permit that incorporates the terms and conditions of the Partial Settlement Agreement would not cause more than a *de minimis* degradation of Bear Creek, the Edwards Aquifer, and Barton Springs, in regards to its effects on the algal growth in Barton Springs Pool.

The ALJs concluded that there is no numerical standard for emerging contaminants that an applicant for a discharge permit in Texas must meet and that any constituents being evaluated under the rubric of emerging contaminants are not water characteristics that must be considered under an antidegradation review. Thus, the ALJs recommend that the Commission make no findings in this regard.

Other than the issues discussed in this PFD, the Protestants did not contend that WCID failed to meet any of the technical requirements for issuance of a permit. The ALJs recommend that the Commission find that WCID met all other conditions for issuance of a discharge permit.

In sum, the ALJs recommend that the Commission issue a permit that incorporates the terms and conditions of the Partial Settlement Agreement. The ALJs further recommend that the Commission adopt all Findings of Fact and Conclusions of Law in the Proposed Order on these issues.

SIGNED November 19, 2008.



ROY G. SCUDDAY
ADMINISTRATIVE LAW JUDGE
STATE OFFICE OF ADMINISTRATIVE HEARINGS



CASSANDRA J. CHURCH
ADMINISTRATIVE LAW JUDGE
STATE OFFICE OF ADMINISTRATIVE HEARINGS

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY



**ORDER
CONCERNING THE APPLICATION BY
HAYS COUNTY WATER CONTROL & IMPROVEMENT DISTRICT NO. 1
FOR AMENDMENT TO TPDES PERMIT NO. WQ0014293001
TCEQ DOCKET NO. 2007-1426-MWD
SOAH DOCKET NO. 582-08-0202**

On _____, the Texas Commission on Environmental Quality (TCEQ or Commission) considered the application of Hays County Water Control & Improvement District No. 1 (WCID) for a permit to discharge treated wastewater effluent into Bear Creek, a tributary of Onion Creek, in Hays County, Texas. A Proposal for Decision (PFD) was presented by Roy G. Scudday and Cassandra J. Church, Administrative Law Judges (ALJs) with the State Office of Administrative Hearings (SOAH).

The following are parties to the proceeding: WCID; the Executive Director (ED); City of Austin (Austin), Hays County (County), Joel and Kim Stearns, Alston and Barbara Boyd, Robert O'Boyle and Barbara Stroud, Charles O'Dell, Robert D. Hejl, Radiance Water Supply Corp., Sam Cobb, Tara Weaver, Gregg Brown, Bear Creek Property Owners Association (BCPOA), Hays Community Action Network (HCAN), and Save Our Springs Alliance (SOS) (collectively, Protestants); and the Office of Public Interest Counsel (OPIC).

After considering the Proposal for Decision, the Commission makes the following Findings of Fact and Conclusions of Law.

I. FINDINGS OF FACT

GENERAL FINDINGS

1. On December 13, 2005, WCID applied to the TCEQ for a major amendment to Permit No. WQ0014293001 to authorize a discharge of 500,000 gallons per day (gpd) of treated effluent into Bear Creek, a tributary of Onion Creek in the contributing zone of the Edwards Aquifer (the Application).
2. The wastewater treatment facility serves the Belterra Subdivision and is located approximately 1,100 feet west of County Road 163 (Nuttly Brown Road) and approximately 1.16 miles south of the intersection of County Road 163 and U.S. Highway 290 in Hays County, Texas.
3. The Application was deemed administratively complete by the TCEQ on January 19, 2006.
4. The Notice of Receipt and Intent was published on January 31, 2006, in the *Austin American-Statesman*, a newspaper published and generally circulated in Travis and Hays Counties, Texas.
5. The ED issued a Draft Permit for public comment on June 8, 2007.
6. The Notice of Application and Preliminary Decision for TPDES Permit for Municipal Wastewater Amendment was published on July 21, 2007, in the *Austin American-Statesman*.
7. The Notice of Public Meeting was published on August 24, 2007, in the *Austin American-Statesman*.
8. On August 30, 2007, WCID requested that its application be directly referred to SOAH for a contested case hearing.

9. On September 18, 2007, the Commission referred the case to SOAH for a contested case hearing.
10. On October 15, 2007, Notice of Hearing on the Application was published in the *Austin American Statesman*.
11. On November 27, 2007, a preliminary hearing was held in Austin, Texas, at which the following were designated as parties to the proceeding: the ED; Austin; Lower Colorado River Authority (LCRA); Barton Springs/Edwards Aquifer Conservation District (BSEACD); County; City of Dripping Springs (CDS); Hays Trinity Groundwater Conservation District (HTGCD); Joel and Kim Stearns; Alston and Barbara Boyd; Owen Kinney and Darryl Howard; Robert O'Boyle and Barbara Stroud; Davis Family Properties, Ltd.; Charles O'Dell; Robert D. Hejl; Radiance Water Supply Corp.; Sam Cobb; Tara Weaver; Charles Jones; Gregg Brown; BCPOA; HCAN; SOS; and OPIC. The Protestants were subsequently aligned into five groups.
12. Prior to the hearing on the merits the following entered into a Partial Settlement Agreement with WCID and withdrew as parties to the contested case: LCRA; BSEACD; CDS; HTGCD; and Davis Family Properties, Ltd. In addition, during the course of the hearing on the merits, the following Protestants also withdrew as parties to the contested case: Charles Jones, Owen Kinney, and Darryl Howard.
13. The evidentiary hearing was conducted on July 14 - 18, 2008, in Austin, Texas, by ALJs Roy G. Scudday and Cassandra J. Church. The record closed September 22, 2008.

DRAFT PERMIT

14. WCID's current facility is an activated sludge process plant currently disposing of wastewater through subsurface drip irrigation on 35 acres of non-public lands under a Texas Land Application Permit (TLAP Facility).
15. Bear Creek is an unclassified receiving water that is in the contributing zone of the Edwards Aquifer.
16. The treated effluent from the Interim II and Final Phases of Applicant's plant development will discharge into Bear Creek; thence to Onion Creek in Segment No. 1427 of the Colorado River Basin.
17. Segment 1427 is designated for high aquatic life use, public water supply, aquifer protection, and contract recreation.
18. Segment 1427 is currently listed on the State's inventory of impaired and threatened waters, *i.e.*, the Clean Water Act Section 303(d) list, specifically for the depressed Dissolved Oxygen (DO) concentrations from the end of the segment to U.S. Hwy. 183.
19. The upper portion of Bear Creek that extends from the proposed discharge point to Aspen Drive, approximately 0.94 kilometers (km), is intermittent with perennial pools and has the presumption of a limited aquatic life as the ED typically assigns to such unclassified bodies of water. The minimum DO criteria for such streams is 3.0 milligrams per liter (mg/L).
20. The lower portion of Bear Creek that extends from Aspen Drive to the boundary of the Edwards Aquifer Recharge Zone, approximately 8 miles downstream from the proposed discharge point, is spring-fed and with small flows, contains several man-made ponds, and

has the presumption of high aquatic life. The minimum DO criteria for that portion of the stream is 5.0 milligrams per liter (mg/L).

21. In accordance with 30 TEX. ADMIN. CODE (TAC) §307.5 and the TCEQ implementation procedures for the *Texas Surface Water Quality Standards*, the TCEQ performed an antidegradation review of the receiving waters.
22. WCID will maintain current disposal operations under the TLAP until the treatment plant is built; the treatment plant will come on line in two phases, the Interim II and Final Phases, but there is no timetable set for implementation of either phase.
23. The revised Draft Permit included the following provisions for the two implementation phases of the wastewater treatment plant:

Interim II Effluent Limitations and Monitoring Requirements:

- 0.250 MGD daily average flow
- 5 mg/L BOD
- 5 mg/L TSS
- 2 mg/L Ammonia Nitrogen
- 0.15 mg/L Total Phosphorus
- Chlorine residual of at least 1.0 mg/L after a detention time of at least 20 minutes (based on peak flow)
- Minimum DO of 5.0 mg/L

Final Effluent Limitations and Monitoring Requirements

- 0.250 MGD daily average flow
- 5 mg/L BOD

- 5 mg/L TSS
- 2 mg/L Ammonia Nitrogen
- 0.15 mg/L Total Phosphorus daily average calculated as a median value and based on a long-term average of 0.10 mg/L
- Chlorine residual of at least 1.0 mg/L after a detention time of at least 20 minutes (based on peak flow)
- Minimum DO of 5.0 mg/L.

24. Subsequent to the entering of the Partial Settlement Agreement, the ED further revised the revised Draft Permit to add additional limits on effluent characteristics as follows:

- 6 mg/L Total Nitrogen
- 126 mg/L E. coli Bacteria colonies per 100 ml
- Use of an Ultraviolet Light (UV) system for disinfection purposes.

PARTIAL SETTLEMENT AGREEMENT

25. In addition to the terms of the Partial Settlement Agreement that the ED incorporated into the revisions to the Draft Permit, the Agreement also contained the following terms, which included changes or additions to the wastewater treatment process and plant (Proposed Facility):

- All wastewater in the Interim II and Final Phase will be treated using membrane bioreactor technology with denitrification.
- WCID will continue to dispose of 0.150 MGD of treated effluent via subsurface drip irrigation.
- WCID shall apply for Chapter 210 Beneficial Reuse Authorization to treat at least 201 acres of irrigable land at a rate required for applying no more than 0.350 MGD of effluent, with soil moisture monitors in order to determine when irrigation areas are unsuitable for effluent irrigation.

- WCID will build and maintain a lined effluent storage pond with a capacity of at least 5,250,000 gallons, exclusive of required freeboard.
- WCID agrees to discharge no more than 0.350 MGD, and then only when the land to be surface irrigated is frozen or saturated and the effluent pond is full, or when Bear Creek is flowing at a rate of 14 cubic feet per second (cfs) measured at the U. S. Geological Survey (USGS) gauge on Bear Creek, 5.1 miles down stream of the discharge point.
- During the Interim II and Final Phase, the wastewater treatment plant shall be operated by an operator holding a “Class A” wastewater operator license.
- WCID will conduct in-stream monitoring on a monthly basis for at least one year prior to the commencement of the first discharge for determining background conditions.
- WCID will conduct post-discharge in-stream monitoring during the first 18 months after the first discharge.
- If, as a result of the in-stream monitoring it is determined that significant differences in the water quality of Bear Creek are caused by WCID’s discharge, WCID shall commence construction of at least 1,750,000 gallons of additional effluent storage capacity and employ other measures to decrease the volume of effluent to be discharged.
- WCID shall equip all lift stations receiving untreated effluent with automatic-on standby generator power.
- WCID shall utilize an overflow pond or equivalent holding device to handle any untreated or partially-treated effluent.
- WCID shall conduct weekly sampling for Total Nitrogen and turbidity in the effluent to determine the effectiveness and performance of the membrane bioreactor wastewater treatment plant.

26. If operated correctly in accordance with the revised Draft Permit and the Partial Settlement Agreement, the Proposed Facility can consistently meet a total phosphorus effluent long-term average limit of 0.1 mg/L, and a total nitrogen limit of 6 mg/L.

27. WCID has included an Emergency Response Plan and Spill Prevention Plan in the Application that will adequately prevent and protect against accidental discharge under the revised Draft Permit.
28. The compliance history at the TLAP Facility is average.

BEAR CREEK

29. There are currently no wastewater discharges directly into Bear Creek.
30. The discharge route begins at the headwaters of Bear Creek, which are dry, except in storm conditions.
31. The discharge route continues from the headwaters to Dry Pond, which is dry.
32. From Dry Pond, the discharge route flows into Pond 6B, which is a stormwater retention pond built as part of the Belterra development.
33. After Pond 6B, the discharge route continues to Aspen Drive, where spring flow begins.
34. The first perennial pool below the Belterra Subdivision property is Davis Pond.
35. Both WCID and the ED conducted DO modeling for a continuous daily flow of 0.500 MGD, at 5 mg/L BOD, 5 mg/L TSS, 2 mg/L ammonia nitrogen, and 0.1 mg/L phosphorus (5/5/2/0.1) effluent limits.
36. Both WCID and TCEQ's modeling showed that the DO standards in Bear Creek would be met with the discharge permitted under the revised Draft Permit.
37. Limiting nutrients such as phosphorus and nitrogen are needed by algae to build biomass structure cells.
38. Bear Creek is limited by both phosphorus and nitrogen.

39. Limiting nutrients can move through a body of water or stream by several means, as set forth below:
- When a nutrient concentration in a body of water reaches the level at which the nutrient is no longer being biologically taken up by algae in the growth process or bonding to inorganic matter and sinking to the bottom of a stream, the nutrient will flow downstream.
 - When the sediments of an impoundment that is initially efficient at reducing nutrient movement downstream become organically rich, nitrogen and phosphorus will move back out of the sediments in dissolved states.
 - At high flows, scouring will pick up and transport nutrient-rich sediments and algae and wash them downstream.
 - Re-suspension, *i.e.*, the mechanism whereby particles are picked up from bottom sediments, also will move nutrients downstream.
40. If the flow of an effluent stream is increased with the same nutrient concentration, then the nutrient loading will increase.
41. An increased concentration of a limiting nutrient in a stream will increase the growth of algae; the growth of algae will lower the DO levels of the stream.
42. Once a pond is exposed to enough nutrients, the sediment will become more organic and will tend to be totally devoid of oxygen much of the time due to bacterial metabolism. Nutrients will then move back into the water column and move downstream and algal growth will move downstream as well.
43. If there are several ponds along the course of a stream, the oxygen depletion and nutrient movement cycle will repeat from pond to pond, resulting in excessive algae growth affecting DO, stream clarity, and aquatic plant life in successive downstream areas of the stream.

44. Streams are classified by the levels of aquatic plants, from least-dense to most-dense concentrations, as set forth below:
- Oligotrophic waters are nutrient limited with corresponding low populations of aquatic plants.
 - Mesotrophic waters are the transition zones between oligotrophic and eutrophic waters, and have occurrences of nuisance plant growth, but usually at a lower frequency and in more limited locations than for waters in the eutrophic range.
 - Eutrophic waters are nutrient enriched, resulting in dense populations of aquatic plants that are considered nuisance by most persons and that will have an adverse affect on aquatic life and recreational uses.
45. The boundary between oligotrophic and mesotrophic states (trophic boundary) is 0.025 mg/L of total phosphorus concentration and 0.70 mg/L of total nitrogen concentration.
46. The most credible estimate of background total phosphorus concentrations in Bear Creek is 0.30 mg/L (baseline concentration).
47. In Bear Creek, the threshold concentration for stimulation of algal growth is a total phosphorus level of 0.05 to 0.1 mg/L.
48. The assimilative capacity of a stream regarding nutrient loadings is based on the difference between the baseline concentration and the trophic boundary.
49. The assimilative capacity regarding total phosphorus of Bear Creek at Davis Pond is 0.045 mg/L, and the proposed discharge pursuant to the revised Draft Permit will increase the phosphorus concentration at Davis Pond to 0.06 mg/L, or 150 percent of the assimilative capacity.

50. The assimilative capacity regarding total nitrogen of Bear Creek at Davis Pond is 0.06 mg/L, and the proposed discharge pursuant to the revised Draft Permit will increase the nitrogen concentration at Davis Pond to 11.8 mg/L, or 1,863 percent of the assimilative capacity.
51. The proposed effluent discharge will cause an increase of the total phosphorus concentration at Davis Pond from 0.03 mg/L to 0.06 mg/L, or 200 percent, and would have the result of pushing Davis Pond toward the upper end of the mesotrophic classification.
52. A 200 percent increase in the total phosphorus concentration at Davis Pond, together with the effect of the proposed discharge on the assimilative capacity of the creek and the long term effects of the increased phosphorus loading, would cause more than a *de minimis* degradation of Bear Creek.
53. There is no evidence that the lowering of the water quality of Bear Creek by more than a *de minimis* amount is necessary for important economic or social development.
54. Based on the terms of the Partial Settlement Agreement, a discharge would only occur 24 days a year on average, resulting in an annual average discharge of 12,000 gpd.
55. As the operation of the Proposed Facility will result in effluent with a total phosphorus long-term average of 0.1 mg/L, the proposed discharge pursuant to the terms of the Partial Settlement Agreement will not increase the phosphorus concentration at Davis Pond above Bear Creek's assimilative capacity of 0.045 mg/L.
56. As the operation of the Proposed Facility will result in effluent with a 6 mg/L Total Nitrogen, the proposed discharge pursuant to the revised Draft Permit as modified by the Partial Settlement Agreement will not increase the nitrogen concentration at Davis Pond above Bear Creek's assimilative capacity of 0.06 mg/L.

57. The median flow of Bear Creek at the USGS monitoring station is 1.1 cfs. If the stream flow increased to 9 cfs, there would be a 10-to-1 dilution factor of the effluent and the total phosphorus loading would not impact Bear Creek.
58. If the effluent discharge were 0.350 MGD, with a Total Nitrogen limit of 6 mg/L, and the stream flow were 14 cfs, the total nitrogen loading would not impact Bear Creek.
59. The in-stream monitoring provisions in the Partial Settlement Agreement and optional alternate disposal methods are sufficient to assure that the proposed discharge will not have more than a *de minimis* effect on the receiving streams.

TRINITY AQUIFERS

60. The Upper Trinity Aquifer and the Middle Trinity Aquifer are the main sources of water for wells in the area of WCID, and the Upper Aquifer is the source for the springflows in Bear Creek.
61. The Trinity Aquifers underlie Bear Creek to the boundary of the Edwards Aquifer Recharge Zone and, as such, also lie within the contributing zone of the Edwards Aquifer.
62. There is no meaningful amount of recharge from Bear Creek to either level of the Trinity Aquifer.
63. The proposed discharge under the revised Draft Permit and the Partial Settlement Agreement would not degrade the waters of the Trinity Aquifers.

EDWARDS AQUIFER

64. The contributing and recharge zones of the Edwards Aquifer are hydraulically connected by conduits in the limestone subsurface and by conduits between the subsurface and surface waters.

65. Surface water can be rapidly conveyed to the subsurface through surface conduits developed in the limestone that composes the Edwards Aquifer.
66. Bear Creek recharges the Edwards Aquifer approximately 8 miles downstream from the proposed discharge point.
67. The degradation of the surface water in Bear Creek by the proposed discharge pursuant to the revised Draft Permit will also degrade the groundwater going into the Edwards Aquifer.
68. The discharge of effluent authorized by the revised Draft Permit would cause greater than a *de minimis* degradation of the Edwards Aquifer due to the recharge from Bear Creek.
69. An intermittent discharge pursuant to the terms of the revised Draft Permit as modified by the Partial Settlement Agreement would not cause greater than a *de minimis* degradation of the Edwards Aquifer.

BARTON SPRINGS POOL

70. Bear Creek contributes about 10 percent of the total recharge to the Barton Springs segment of the Edwards Aquifer.
71. The Barton Springs segment of the Edwards Aquifer feeds into Barton Springs Pool, which is used for sunbathing, picnicking, and swimming.
72. At low-flow conditions, the phosphorus concentration in Bear Creek would impact the phosphorus concentration in Barton Springs Pool.
73. The effluent discharge authorized by the revised Draft Permit that would cause greater nutrient loadings in Bear Creek would likewise cause an increase in the level of nutrients in Barton Springs Pool at low-flow conditions, resulting in an increase of the growth of algae in the Pool.

74. An intermittent discharge pursuant to the terms of the revised Draft Permit as modified by the Partial Settlement Agreement would not cause an increase in the level of nutrients in Barton Springs Pool at low-flow conditions that would result in an increase of algal growth in the Pool.

BARTON SPRINGS SALAMANDER

75. Barton Springs is the habitat for the Barton Springs Salamander, which is listed by the U.S. Fish and Wildlife Service as an endangered species.
76. The suitability of Barton Springs as a habitat for the Barton Springs Salamander can be reduced by decreasing DO concentrations.
77. A fall of the DO level in Barton Springs below the lethal concentration of 3.9 mg/L for longer than 28 consecutive days would kill five percent of the population of the Barton Creek Salamanders, which would be the kill level considered significant for the salamander population.
78. The DO in Barton Creek with one treatment plant discharging 0.500 MGD would be 8.36 mg/L.
79. The proposed discharge of 0.500 MGD under the revised Draft Permit would not cause any significant impact on the Barton Springs Salamander.
80. An intermittent discharge pursuant to the terms of the Draft Permit as modified by the Partial Settlement Agreement would not cause any significant impact on the Barton Springs Salamander.

EMERGING CONTAMINANTS

81. Components of pharmaceutical and personal care products (PPCPs) can persist in the environment, particularly in water bodies; PPCPs include medicines, industrial chemicals, detergents, disinfectants, and agricultural chemicals.
82. PPCPs, referred to generally as emerging contaminants, are the subject of research and policy discussion in the environmental regulatory community, particularly in regard to those constituents that affect the reproduction of aquatic animals.
83. Texas has not adopted any numerical or narrative criteria for the regulation of PPCPs.
84. There is no evidence concerning which PPCPs, if any, will exist in the effluent proposed for discharge either under the revised Draft Permit or under the Partial Settlement Agreement.

TRANSCRIPTION COSTS

85. Reporting and transcription of the hearing on the merits was warranted as the hearing lasted four days.
86. All parties fully participated in the hearing by presentation of witnesses and cross examination.
87. All parties benefitted from preparation of a transcript.
88. There was no evidence that any party subject to allocation of costs was financially unable to pay a share of the costs.

II. CONCLUSIONS OF LAW

1. The Commission has jurisdiction over permits for the discharge of wastes into or adjacent to waters in the State pursuant to TEX. WATER CODE ANN. ch. 26.

2. SOAH has the authority to conduct evidentiary hearings and prepare proposals for decision on contested matters referred by the Commission pursuant to TEX. GOV'T CODE ANN. § 2003.047.
3. WCID has not shown by a preponderance of the evidence that a continuous discharge pursuant to the terms of the revised Draft Permit would not cause degradation of Bear Creek below Aspen Drive by less than a *de minimis* extent nor that such lowering of the water quality of Bear Creek is necessary for important economic or social development, within the meaning of 30 TAC § 307.5.
4. WCID met its burden of proof to show that a proposed discharge under the terms of the revised Draft Permit will not result in degradation of the waters of the Trinity Aquifers, within the meaning of 30 TAC § 307.5.
5. WCID has not shown by a preponderance of the evidence that a continuous discharge pursuant to the terms of the revised Draft Permit would not cause degradation of the Edwards Aquifer, within the meaning of 30 TAC § 307.5.
6. WCID has not shown by a preponderance of the evidence that a continuous discharge pursuant to the terms of the revised Draft Permit would not cause an increase in the level of nutrients in Barton Springs Pool at low-flow conditions, resulting in an increase of algal growth in the Pool, in violation of 30 TAC § 307.4.
7. WCID met its burden of proof to show that a proposed discharge under the terms of the revised Draft Permit would not cause any significant impact on the Barton Springs Salamander, pursuant to 30 TAC § 307.4.

8. WCID has shown by a preponderance of the evidence that an intermittent discharge pursuant to the terms of the revised Draft Permit as modified by the Partial Settlement Agreement would not cause degradation of Bear Creek by greater than a *de minimis* extent, within the meaning of 30 TAC § 307.5.
9. WCID has shown by a preponderance of the evidence that an intermittent discharge pursuant to the terms of the revised Draft Permit as modified by the Partial Settlement Agreement would not cause degradation of the Edwards Aquifer, within the meaning of 30 TAC § 307.5.
10. WCID has shown by a preponderance of the evidence that an intermittent discharge pursuant to the terms of the revised Draft Permit as modified by the Partial Settlement Agreement would not cause an increase in the level of nutrients in Barton Springs Pool at low-flow conditions sufficient to cause an increase of algal growth in the Pool, pursuant to 30 TAC § 307.4.
11. WCID has no legal obligation under existing Texas law to monitor or treat its effluent for pharmaceutical and personal care products (PPCPs) that may enter its treatment facility.
12. Allocating 75 percent of reporting and transcription costs for the hearing on the merits to WCID and 25 percent of the costs to the City of Austin, Hays County, and each of the two protesting landowner groups, collectively, is a reasonable allocation of costs under the factors set forth in 30 TAC § 80.23(d).
13. Based on the above Findings of Fact and Conclusions of Law, a major amendment to Permit No. WQ0014293001, pursuant to the terms of the revised Draft Permit as modified by the Partial Settlement Agreement, will comply with the requirements of 30 TAC ch. 332 in

regard to environmental impact, specifically the nondegradation of the receiving waters greater than a *de minimis* extent.

14. In accordance with 30 TAC § 50.117, the Commission issues this Order and the attached permit as modified by this Order as its single decision on the permit (amendment/renewal) application. Information in the agency record of this matter, which includes evidence admitted at the hearing and part of the evidentiary record, document the ED's review of the permit amendment application, including that part not subject to a contested case hearing, and establishes that the terms of the attached permit (Exhibit A) as modified by this Order are appropriate and satisfy all applicable federal and state requirements.

NOW, THEREFORE, BE IT ORDERED BY THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY, IN ACCORDANCE WITH THESE FINDINGS OF FACT AND CONCLUSIONS OF LAW, THAT:

1. The application of Hays County Water Control & Improvement District No. 1 for an amendment to Permit No. WQ0014293001 is granted in part; and the attached Draft Permit, as modified to include the terms of the Partial Settlement Agreement, set out in Finding of Fact No. 25, is issued to Hays County Water Control & Improvement District No. 1.
2. The Commission adopts the Executive Director's Response to Public Comment in accordance with 30 TEX. ADMIN. CODE § 50.117. Also, in accordance with Section 50.117, the Commission issues this Order and the attached permit (Exhibit A) as modified by this Order as its single decision on the permit amendment application. Information in the agency record of this matter, which includes evidence admitted at the hearing and part of the evidentiary record, document the Executive Director's review of the permit amendment

application, including that part not subject to a contested case hearing, and establishes that the terms of the attached permit as modified by this Order are appropriate and satisfy all applicable federal and state requirements.

3. All other motions, requests for entry of specific Findings of Fact or Conclusions of Law, and any other requests for general or specific relief, if not expressly granted herein, are hereby denied.
4. The effective date of this Order is the date the Order is final, as provided by TEX. GOV'T CODE ANN. § 2001.144 and 30 TEX. ADMIN. CODE § 80.273 .
5. The Commission's Chief Clerk shall forward a copy of this Order to all parties.
6. If any provision, sentence, clause, or phase of this Order is for any reason held to be invalid, the invalidity of any provision shall not affect the validity of the remaining portions of this Order.

ISSUED:

**TEXAS COMMISSION ON
ENVIRONMENTAL QUALITY**

**Buddy Garcia, Chairman
For the Commission**

SOAH DOCKET NO. 582-08-0202
TCEQ DOCKET NO. 2007-1426-MWD

IN THE MATTER OF THE	§	BEFORE THE STATE OFFICE
APPLICATION OF HAYS COUNTY	§	
WATER CONTROL AND	§	OF
IMPROVEMENT DISTRICT NO. 1	§	
FOR AMENDMENT TO TPDES	§	
PERMIT NO. WQ0014293001	§	ADMINISTRATIVE HEARINGS

FULL AND FINAL SETTLEMENT AGREEMENT

This Agreement is entered into by and among the parties on the following terms and conditions:

I.
DEFINITIONS

As used in this Agreement, the following terms have the assigned meanings:

- A. The "Agreement" means this Full and Final Settlement Agreement.
- B. The "Draft Permit" means the Draft Permit issued by the Texas Commission on Environmental Quality ("TCEQ") on November 26, 2007, Permit No. WQ0014293001.
- C. The "Applicant" means Hays County Water Control & Improvement District No. 1.
- D. The "Permit" means Permit No. WQ0014293001 as amended, modified, or renewed by TCEQ and its successor agencies.
- E. "Protestants" means the following parties who have filed a contest, protest, or appeal with regard to the Draft Permit:

Lower Colorado River Authority
Barton Springs/Edwards Aquifer Conservation District
City of Dripping Springs
Hays Trinity Groundwater Conservation District
The Davis Family Properties, Ltd.



Charles Jones
Joel Stearns
Kim Stearns
Owen Kinney

F. The "Executive Director" means the Executive Director of the TCEQ, along with all staff and attorneys of the Executive Director.

G. The "OPIC" means the Office of Public Interest Counsel of the TCEQ.

H. The "Parties" means the Applicant and all Protestants.

I. The "effective date of this agreement" means July 7, 2008.

J. The "Interim II Phase" means the Interim II Phase defined in the Draft Permit, as amended by this Agreement.

K. The "Final Phase" means the Final Phase defined in the Draft Permit, as amended by this Agreement.

II. RECITALS

WHEREAS, Applicant has applied for an amended wastewater discharge permit from TCEQ under Permit Number WQ0014293001;

WHEREAS, the Draft Permit was issued on or about November 26, 2007 by TCEQ;

WHEREAS, each of the Protestants opposed the Draft Permit and requested a contested case hearing;

WHEREAS, urbanization in Hays County poses both a potential benefit and risk to the citizens of Hays County and, therefore, must be managed as rationally as possible;

WHEREAS, the Protestants expressed concerns regarding the water quality effects and the related impacts on the ecology of the surface water and groundwater of the proposed discharge, which would be the first domestic wastewater discharge in the contributing zone of

the Barton Springs Segment of the Edwards Aquifer;

WHEREAS, the Protestants are concerned that the Applicant's discharge of effluent to Bear Creek will be in excess of the amount that the Applicant can beneficially reuse and the Parties recognize some of these discharges may occur when Bear Creek is under low flow conditions;

WHEREAS, upon the request of Applicant, TCEQ made a direct referral of this case to the State Office of Administrative Hearings ("SOAH") and the Honorable Administrative Law Judge Roy Scudday was assigned;

WHEREAS, the Executive Director and OPIC were also parties to the contested case hearing;

WHEREAS, the Parties have reached a compromise settlement agreement in lieu of proceeding with the contested case hearing; and

WHEREAS, the Parties have agreed to conduct an instream monitoring program to assure the protection of water quality intended by the settlement Agreement.

III. THE AGREEMENT

The Parties agree as follows:

1. Purpose and Goal of Agreement: The Parties agree that the purpose and goal of this Agreement is to protect the water quality of Bear Creek, the Barton Springs Segment of the Edwards Aquifer, and the Trinity Aquifer from adverse impacts from the Applicant's wastewater treatment facility.

2. The Permit: The Parties agree that a wastewater discharge permit be issued to

Applicant by TCEQ under the following terms and conditions, which shall be included in the permit:

A. All wastewater will be treated in Interim II and Final Phase using membrane bioreactor technology with denitrification to meet the discharge effluent limits of the Permit;

B. The Interim II Phase and Final Phase effluent limitations and monitoring requirements shall be as described in the Draft Permit with the addition of a total nitrogen limit of 6.0 mg/L, daily average. The total nitrogen limit shall only apply when Applicant is discharging to waters of the State. Total Nitrogen will be monitored, at least weekly, when discharging to waters of the State.

C. Applicant shall continue to dispose of 150,000 gallons per day of treated effluent via subsurface drip irrigation either under the existing land application authorization or pursuant to a Chapter 210 Beneficial Reuse Authorization and continue to use the moisture monitoring plan associated with existing drip irrigation field;

D. Applicant shall apply for a Chapter 210 Beneficial Reuse Authorization. Applicant will phase in the number of acres irrigated with treated wastewater and, prior to reaching capacity of the Final Phase, as described in the Permit, Applicant shall irrigate at least 201 acres with treated wastewater. Throughout the phase-in of acres irrigated, Applicant shall use sufficient irrigable land to apply effluent that is being generated at all times at a rate no higher than the rate required for applying the 350,000 gallons per day on 201 acres without causing or resulting in runoff from the irrigation acreage. Applicant shall install soil moisture monitors where necessary to determine soil saturation of those irrigation areas immediately adjacent to the creek's buffer zone in

order to determine when irrigation areas are unsuitable for effluent irrigation. The amount and location of the soil moisture monitors shall be determined by the Applicant.

E. Applicant shall build and maintain a lined effluent storage pond with a capacity of at least 5,250,000 gallons, exclusive of required freeboard;

F. The daily discharge shall not exceed 350,000 gallons per day. Applicant shall only discharge treated effluent into Bear Creek if:

1. the land to be surface irrigated (as described in Paragraph III.2.D above) is frozen or saturated and the effluent storage pond is full; or

2. when Bear Creek is flowing at a rate of at least 14 cfs measured at the USGS gauge on Bear Creek. For purposes of this subparagraph (III.2.F.2), Bear Creek shall be deemed to be flowing at or above 14 cfs for 24 hours following any point in time when the USGS gauge (08158810) reads 14 cfs or higher.

G. Applicant's wastewater treatment facility shall not serve any facilities outside of the physical boundaries of Hays County Water Control and Improvement District No. 1 and Hays County Water Control and Improvement District No. 2, as they existed on April 12, 2007 and shown in Exhibit A. This is to ensure that the plant is not utilized as a regional facility;

H. During the Interim II Phase and Final Phases, the wastewater treatment plant shall be operated at all times by an operator holding a "Category A" wastewater operator license;

I. A study of instream conditions shall be conducted in accordance with the Workplan, attached as Exhibit B;

J. Applicant shall use ultraviolet light disinfection in accordance with TCEQ requirements and in lieu of chlorination, but if a better disinfection technology becomes available and is agreed to by Applicant, by representatives of Protestants, and by TCEQ, the alternate technology can be employed; and

K. If any of these provisions cannot be included in the Permit due to TCEQ limitations, the Applicant still agrees to abide by those provisions and all of the terms of this Agreement.

3. Additional Provisions Not Required to be in the Permit:

A. In-Stream Monitoring:

1. Background conditions: Instream monitoring for determining background conditions will occur on a monthly basis beginning within 60 days of Permit issuance and for at least one year prior to the commencement of the first discharge. This period will be considered the pre-discharge background period. Applicant will be responsible for monitoring during the first eighteen (18) months of the pre-discharge background period. Monitoring may be continued thereafter by representatives of the Protestants during this period. Direct discharge of any effluent terminates the background period.

2. Post-discharge monitoring: Post-discharge instream monitoring will commence after the first discharge of effluent into the creek by the Applicant. Applicant will be responsible for monitoring during the first eighteen (18) months of the post-discharge background period. Monitoring will be continued thereafter by representatives of the Protestants at their own cost.

3. Nothing in III.3.A.1 or 2 should be construed as limiting the

Protestants' ability to monitor at any time at their own cost.

4. Instream monitoring shall be conducted in accordance with the Workplan attached as Exhibit B.

5. Interpretation of the results from instream monitoring shall be governed by the Workplan, attached as Exhibit B.

B. Remedies:

1. If, on the basis of the interpretation of the instream monitoring as provided for in Exhibit B, the Workplan, significant differences (triggers) are caused by the Applicant's discharge of treated effluent, then Applicant within 180 days of notification shall:

a. commence construction of and complete within a reasonable amount of time at least 1,750,000 gallons of additional effluent storage capacity; or

b. employ other measures to decrease the volume of effluent to be discharged to the creek on a continuing basis with the demonstrably equivalent effect of increasing storage by 1,750,000 gallons of effluent.

2. The Applicant's duty to implement one or more remedies begins after the first discharge of any amount of effluent into the creek and continues for fifteen (15) years.

3. For purposes of this section, "the first discharge" shall mean the first discharge of effluent to the creek that is necessary due to saturated irrigation acreage (which includes subsurface drip irrigation and Chapter 210 acreage as defined by TCEQ) and the effluent storage pond is at capacity.

C. Applicant shall equip all lift stations receiving untreated effluent with automatic-on standby generator power.

D. Applicant shall utilize an overflow pond or other equivalent holding device to handle any untreated or partially treated effluent. No partially treated effluent shall be discharged to Bear Creek.

E. Notwithstanding the language of the Permit, which states “Discharge limitations and monitoring requirements apply only when discharging to waters in the State”, the Parties agree that all wastewater shall be treated using the membrane bioreactor technology and denitrification. The Applicant shall conduct weekly sampling for Total Nitrogen and turbidity in the effluent to determine the effectiveness and performance of the wastewater treatment plant. These monitoring data are to confirm plant performance and shall be provided to designated representatives of the Protestants on a monthly basis.

4. Approval By Governing Bodies: This Agreement is subject to the approvals of the governmental or quasi-governmental entities that are parties to this Agreement. The deadline for obtaining all necessary approvals shall be July 9, 2008. Any party may terminate this Agreement by written notice to the other parties, delivered by noon on the day following the approval deadline.

5. Approval By ALJ and TCEQ: Within five (5) business days after the final approval by all Parties (and applicable governing bodies), the Parties will file a joint Motion for Remand to the Executive Director with a recommendation that the Permit be issued in accordance with this Agreement, or in the event a SOAH contested case regarding the Draft Permit is still necessary, the Parties will file an agreed motion to the ALJ to issue a proposal for

decision that recommends approval of the Draft Permit in accordance with this Agreement. In the event that the terms and conditions of Paragraph III.2 (the Permit) conflict with the Draft Permit, the terms and conditions of Paragraph III.2 shall control.

6. Within five (5) business days after the Effective Date of this Agreement, all Protestants agree to withdraw protests and requests for hearing in SOAH Docket No. 582-08-0202. However, if a SOAH contested case regarding the Draft Permit is held, Protestants are not required to withdraw their protests and may participate in a contested case hearing only to support the permit with the terms of the Settlement Agreement.

7. Costs and Attorneys, Fees: Each party to this Contested Case Hearing shall bear its own attorneys' fees, court costs, and expenses; no party to this Agreement shall have any liability to pay any other party's fees or expenses.

8. Notices: Any notice required or permitted to be delivered under this Agreement shall be forwarded via hand delivery or the United States Postal Service, postage prepaid, to the addresses shown below:

On behalf of the Applicant, HCWCID No. 1:
Andrew N. Barrett
Barrett & Smith
505 West 14th Street
Austin, TX 78701

On behalf of the LCRA:
Vic Ramirez
LCRA
PO Box 220
Austin, TX 78767-0220

On behalf of BSEACD:
Kirk Holland, General Manager
Barton Springs/Edwards Aquifer Conservation District
1124 Regal Row
Austin, TX 78748

On behalf of the City of Dripping Springs:
Alan J. Bojorquez
City Attorney, City of Dripping Springs
12325 Hymeadow Drive, Ste. 2-100
Austin, TX 78750

On behalf of Hays Trinity Groundwater Conservation District:
Andrew Backus
16204 Hidden Springs Lane
Austin, TX 78737

On behalf of the Davis Family Properties, Ltd.:
Fred B. Werkenthin, Jr.
Booth, Ahrens & Werkenthin, PC
515 Congress Avenue, Suite 1515
Austin, TX 78701

9. Applicant agrees to notify designated representatives of the Protestants of any prospective, proposed, or requested change in the Permit specifications, including but not limited to term period, effluent limitations, other restrictions, plant and storage performance, and effluent and stream monitoring program including results.

10. Applicant agrees to notify designated representatives of the Protestants of scheduled dates of sampling based on the Workplan, Exhibit B.

11. Both the terms of the Permit and the terms of this Agreement are binding upon and will inure to the benefit of the Parties and their respective successors and assigns. Applicant shall notify designated representatives of the landowner Protestants and the governmental entity Protestants of any transfer or change in control or ownership of facilities authorized by the Permit.

12. This Agreement may be executed in multiple originals either copy of which shall be considered an original.

13. Where this Agreement calls for agreement of the Parties or their representatives, agreement shall not be unreasonably withheld.

14. Upon written request of the Barton Springs Edwards Aquifer Conservation District, the Applicant shall provide to the Barton Springs Edwards Aquifer Conservation District Discharge Monitoring Reports when the same are provided to TCEQ.

IV.

ENFORCEMENT OF THE AGREEMENT

1. Notice and Opportunity to Cure. Notwithstanding any provision in this Agreement to the contrary, if either party (referred to herein as the “Defaulting Party”) fails to comply with its obligations under this Agreement or is otherwise in breach or default under this Agreement (collectively, a “Default”), then the other party (referred to herein as the “Non-Defaulting Party”) shall not have any right to invoke any rights or remedies with respect to any Default until and unless: (i) the Non-Defaulting Party delivers to the Defaulting Party a written notice (the “Default Notice”) that specifies all of the particulars of the Default and specifies the actions necessary to cure the Default; and (ii) the Defaulting Party fails to commence the cure of any matters specified in the Default Notice within a reasonable period of time after the Defaulting Party’s receipt of the Default Notice, but not less than 30 days, or fails to thereafter pursue curative action with reasonable diligence to completion.

2. Remedies. If any Party fails to comply with its obligations under this Agreement or fails to correct any default after notice and opportunity to cure, the other Party may exercise any remedy authorized at law or in equity, including termination or filing suit in a court of competent jurisdiction to seek any available remedy, including by way of example only, injunctive relief, specific performance and/or monetary damages. The prevailing party to the litigation may recover costs of court, attorney’s fees and expert consultant and witness fees incurred in enforcing or defending a claim under this Agreement.

3. Venue. Venue for any suit arising under this Agreement is in Travis County or Hays County.

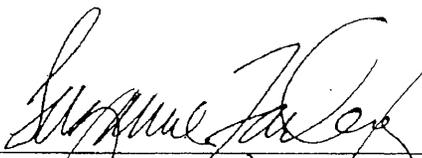
SIGNED and AGREED, subject to approval by the governing bodies of each Party as applicable, this 11th day of July, 2008.

Paul Kelly

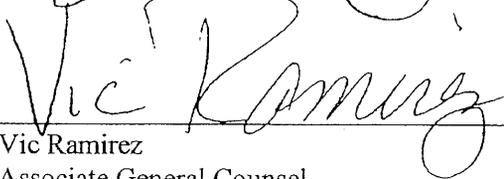
Authorized Representative of Hays County
Water Control and Improvement District No. 1

Ray Chester

Ray Chester
Attorney for Hays County Water Control and
Improvement District No. 1



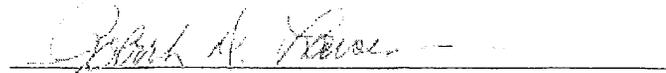
Authorized Representative of the
Lower Colorado River Authority



Vic Ramirez
Associate General Counsel
Attorney for Protestant LCRA

ATTEST TO SIGNATURE
OF DR. ROBERT LARSEN:


Jack Goodman
Board Vice President


Dr. Robert Larsen, President, Board of Directors
Authorized Representative of Barton
Springs/Edwards Aquifer Conservation District


William D. Dugat, III
Attorney for Barton Springs/Edwards Aquifer
Conservation District

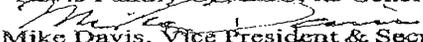
Authorized Representative of the City of
Dripping Springs

Susan Zachos
Attorney for the City of Dripping Springs

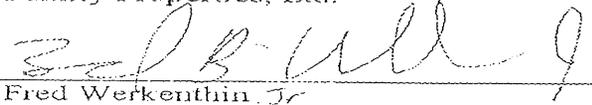
Andrew Backus
Authorized Representative of Hays Trinity
Groundwater Conservation District

DAVIS FAMILY PROPERTIES, LTD.

By: Davis Family GP, LLC, its General Partner

By: 
Mike Davis, Vice President & Secretary

Authorized Representative of The Davis
Family Properties, Ltd.



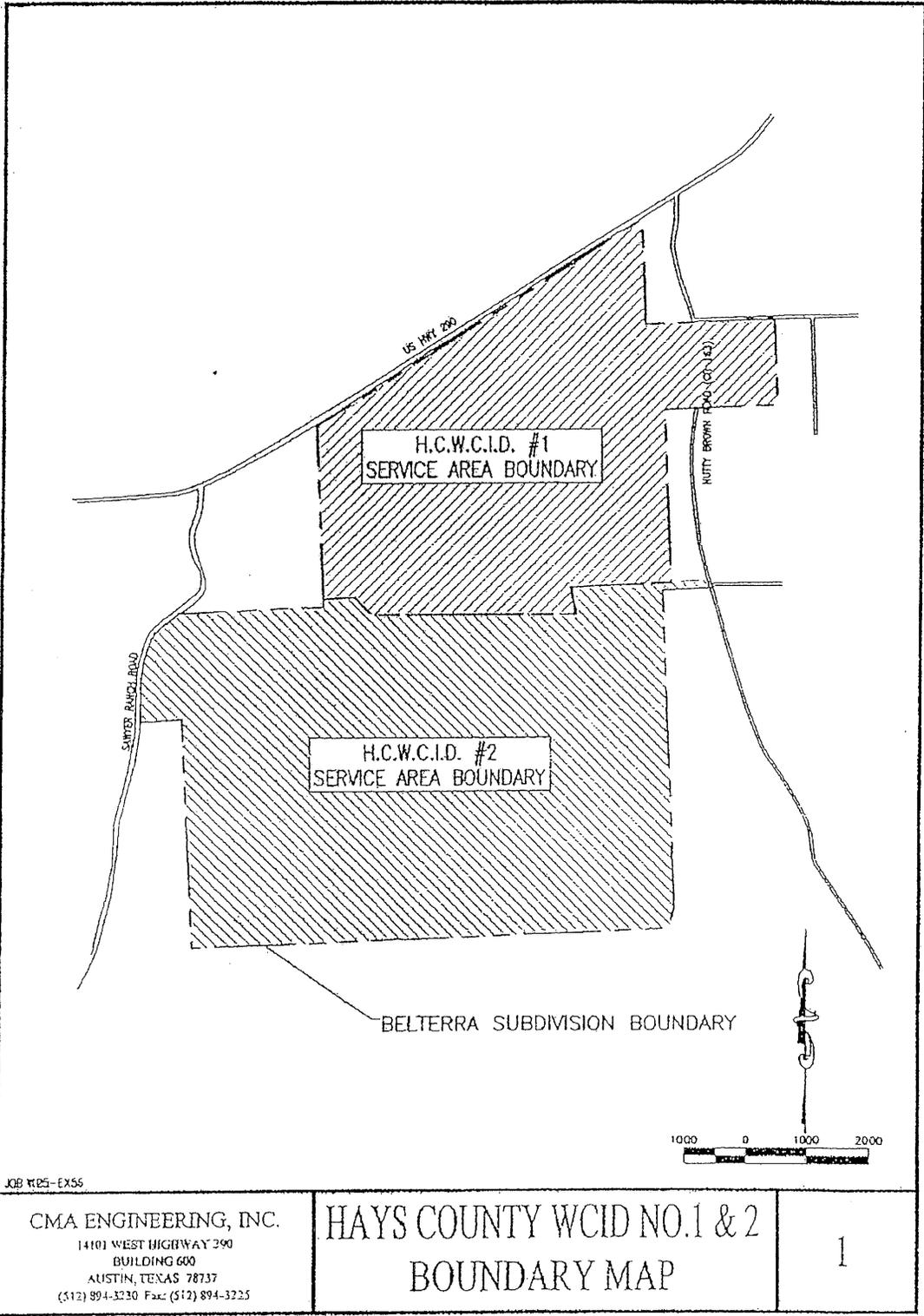
Fred Werkenthin, Jr.
Attorney for Protestant The Davis Family
Properties, Ltd.

Charles Jones

Joel Stearns

Kim Stearns

Owen Kinney



JOB 825-EX55

CMA ENGINEERING, INC.
 14101 WEST HIGHWAY 290
 BUILDING 600
 AUSTIN, TEXAS 78737
 (512) 894-3230 Fax: (512) 894-3225

HAYS COUNTY WCID NO.1 & 2
 BOUNDARY MAP

1

EXHIBIT
 A

ATTACHMENT WORKPLAN

Purpose:

The purpose of the monitoring study is to determine whether nutrient limitations and management of irrigation storage versus discharge from the HCWCID1 WWTP will prevent the growth of excessive algae and aquatic vegetation in receiving waters as provided by Texas Commission on Environmental Quality (TCEQ) regulations at 30 TAC 307.4(e). The study includes triggers from the monitoring data to determine whether the Settlement Agreement remedies must be instituted.

Procedures:

The permittee and the settling parties or their designated representative shall prepare a Quality Assurance Project Plan (QAPP) including sampling and analysis protocols. Once the QAPP has been approved by the permittee and the settling parties or their designated representatives, the permittee, at permittee's expense, shall conduct the monitoring study according to the QAPP.

Changes in Scope:

Changes may be made to the QAPP upon approval of the permittee and settlement parties to address changes in objectives determined necessary or appropriate as site-specific information becomes available. This includes the elimination of data collection activities if it can be demonstrated that the additional effort will not significantly improve the value of the study. These changes may also include additional parameters if found necessary from TCEQ studies on transport of nutrients in the Barton Springs segment of the Edwards aquifer or changes in triggers or covariates necessary due to changing watershed conditions.

Study Scope:

The monitoring study will evaluate Bear Creek from the Belterra property boundary to a point just upstream of the Barton Springs segment of the Edwards Aquifer recharge zone boundary using two primary locations in addition to the wastewater outfall. The study will include field data collection and laboratory analysis capable of determining if the discharge is degrading Bear Creek by increasing algae growth due to effluent nutrients. Impacts from intermittent discharge are inherently difficult to adequately determine; therefore, the study analysis incorporates statistics to reflect the overall change in distribution of data and the biological significance of such changes.

Field Data Collection:

Field data collection and monitoring activities are to be conducted in accordance with the Guidance for Assessing Texas Surface and Finished Drinking Water Quality Data (TCEQ 2004) and the Surface Water Quality Monitoring Procedures Manual (TCEQ 2005). Monitoring locations will be identified by map in the QAPP. The sampling design and monitoring schedule is indicated in Table 1.

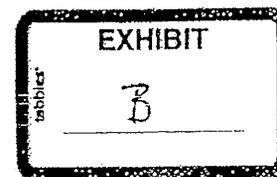


Table 1 – Sampling Design and Monitoring Schedule

	Monitoring Parameter	Location	Frequency	Trigger Locations	Notes
1	Diel dissolved oxygen (Avg. range)	Davis Pond	Continuous	Davis Pond	Sondes serviced and redeployed monthly
2	Continuous CHL-A (ug/L, Turner probe)	Davis Pond	Continuous	Davis Pond	Sondes serviced and redeployed monthly
3	Benthic Periphyton (mg/m ²)	Above Davis riffle	Monthly Grab	Above Davis Riffle	USGS NAWQ protocol
4	Macroalge percent cover (transect)	Above Davis riffle	Monthly Grab	Above Davis Riffle	USGS NAWQ protocol
5	Chlorophyl a (mg/L, water column)	Davis pond	Monthly Grab	N/A	Sampled monthly during baseflow on a priori schedule
6	NH3-N	Both sites	Monthly Grab	N/A	Sampled monthly during baseflow on a priori schedule
7	NO3-N	Both sites	Monthly Grab	Above Davis Riffle	Sampled monthly during baseflow on a priori schedule
8	TKN	Both sites	Monthly Grab	N/A	Sampled monthly during baseflow on a priori schedule
9	OP	Both sites	Monthly Grab	N/A	Sampled monthly during baseflow on a priori schedule
10	TP	All three sites	Monthly Grab	Above Davis Riffle	Sampled monthly during baseflow on a priori schedule
	*Shade = trigger variables required to be monitored by HCWCID1 as part of this settlement agreement. Other parameters are used for interpretation only.				

Algal Monitoring

Free floating algae in the water column algae (phytoplankton) will be evaluated by non-filtered chlorophyll-a sampled from the water column. Benthic algae density estimates will be obtained at each sampling station in the receiving stream, using two components. The first component will be benthic algae density by measurement of chlorophyll-a from instream rock scrapings and laboratory analysis. This method is a standard procedure used by USGS in NAWQA sampling and will be reported as mg/m². The second component will involve the establishment of a permanent transect at each site, which will be visually examined during each sampling visit to generate an estimate of macroalgae density on the streambed. Using a tape measure, the portion of transect occupied by macroalgae will be divided by the total width of the transect to derive a percent coverage estimate.

Laboratory Analysis:

Standard operating procedures for laboratory analysis are available at the contract laboratory selected for this monitoring. Methods for laboratory analyses shall be consistent with TCEQ acceptable standard methods.

Data Interpretation:

The interpretation will be based on statistical comparison between pre-discharge and post-discharge values and ecologically relevant criteria for algae impacts and nutrient concentrations. Variables for triggers and calculations are specified by site including two sites: Riffle above Davis Pond, and Davis Pond. If any of the triggers by site are met the overall trigger for remediation is assumed to be met on an annual reporting interval. Under these conditions, data verification by technical representatives of parties will be made before submitting the annual report three months after the end of the annual monitoring period. If the data indicating the overall trigger is met is found to be adequate without mitigating circumstances then remedies will be initiated in accordance with the settlement agreement. If the trigger is found to be an anomalous event, monitoring will continue according to the workplan. If the parties' technical representatives disagree on the validity of the trigger, the issue will be submitted to mediation.

Analysis methods include Analysis of Variance with covariates (ANCOVA) and Chi-Square Tests. The significance level will be $\alpha = 0.05$. A minimum of 8 samples is needed for analysis. Reanalysis will occur after 6 months to one year. Reporting is done annually. Baseflow is considered to be flow with three prior days of no rainfall over 0.1 inches.

Trend analysis will be performed on background monitoring period data to determine if non discharge conditions are changing. If regression analyses indicate statistically significant trends are occurring before any discharge, these results will be considered by parameter in the other analysis comparisons evaluated for trigger conditions to be met. All data will be adjusted by the subtracting the size of expected increase for the date of the sample from the sample concentrations. This will partially compensate for any non-point source increases in the watershed that influence the data. Any additional compensation for non-point source discharge increases in data analysis will be considered through mediation. In addition dissolved oxygen levels were included on the basis that they will be impacted by nutrient values in the intermittent discharge and are ecologically relevant in Davis Pond.

Action Trigger Dynamics

For any one of the two sites, a combination of two triggers must be met, with the following specifications:

Riffle above Davis Pond – Total phosphorus OR NO₃-N OR chlorophyll a from scrapings OR percent cover of macro algae from transects.

Davis Pond – Both water column Chl. a AND dissolved oxygen criteria.

Riffle above Davis Pond

Trigger variables: TP, NO₃-N, Chlorophyll a (benthic scrapings), percent cover of macro algae (transects)

TP/NO₃-N

Test for significance: ANCOVA on means before and after. Covariates = flow and water temperature

TP Trigger :

Significant increase in baseflow TP and TP is 3 times higher than background baseflow AND TP > 0.025 mg/L (mesotrophic boundary in streams).

NO₃-N Trigger :

Significant increase in baseflow NO₃-N and NO₃-N is 2 times higher than background baseflow and NO₃-N > 0.7 mg/L (mesotrophic boundary in streams).

Chlorophyll a (benthic scraping)

Test for significance: ANCOVA on means before and after. Covariates = flow and water temperature.

Chi square test for the percent of the samples which fall in the higher trophic level than background (i.e. from Oligotrophic to Mesotrophic > 30 mg/m², and >90mg/m² for Mesotrophic to Eutrophic, Dodds et al 1998).

Chlorophyll a Trigger: significant increase and significant change in trophic status.

Percent cover of macro algae (transects).

Test for significance: ANCOVA on means before and after. Covariates = flow and water temperature.

Algae Cover Trigger: significant difference and mean increases by 35%.

Davis Pond

Trigger variables: DO, Chlorophyll a (water column).

Chlorophyll a (water column) (Datasonde).

Test for significance: ANCOVA on means before and after. Covariates = flow and water temperature.

Chi square test for the percent of the samples which fall in the Oligotrophic category before and after (< 4 ug/L is Oligotrophic, 4 – 10 mesotrophic, 10-25 eutrophic, Olem 1990)

Chlorophyll a Trigger: significant increase and significant change in percent which are oligotrophic.

DO (mean, range) – daily (datasonde)

Test for significance: ANCOVA on means before and after. Covariates = flow and water temperature

DO Triggers (either):

mean: The mean DO after discharges begin is less than 5 mg/L and is significantly different from the mean DO before discharges began.

DO events: Significant change in number of episodes when DO is <2 mg/L for more than 8 hours out of a 24-hour day.

Reporting:

Annual written reports will be provided to the parties to the settlement agreement including raw data, statistical analyses, and results of trigger comparisons. Data will be available to parties of the settlement agreement at any time upon request.