

**SOAH DOCKET NO. 582-07-2673
TCEQ DOCKET NO. 2007-0204-WDW**

**APPLICATION OF TEXCOM GULF, § BEFORE THE STATE OFFICE
DISPOSAL, L.L.C. FOR TEXAS §
COMMISSION ON ENVIRONMENTAL § OF
QUALITY UNDERGROUND INJECTION §
CONTROL PERMIT NOS. WDW410, §
WDW411, WDW412, AND WDW413 § ADMINISTRATIVE HEARINGS**

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TCEQ DOCKET NO. 2007-0204-WDW**

APPLICATION OF TEXCOM GULF, DISPOSAL, L.L.C. FOR TEXAS COMMISSION ON ENVIRONMENTAL QUALITY UNDERGROUND INJECTION CONTROL PERMIT NOS. WDW410, WDW411, WDW412, AND WDW413	§ § § § § §	BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS
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PROPOSAL FOR DECISION

I. INTRODUCTION

TexCom Gulf Disposal, L.L.C. (TexCom) has applied for four Underground Injection Control (UIC) permits to authorize four Class I underground injection wells to dispose of nonhazardous industrial wastewater at a facility located near the City of Conroe in Montgomery County, Texas. The Executive Director (ED) of the Texas Commission on Environmental Quality (TCEQ) approved the Application and prepared draft permits which, if approved, would authorize TexCom to conduct wastewater injection in accordance with the terms, requirements, and conditions set forth in the permits. Montgomery County and the City of Conroe (Aligned Protestants), the Lone Star Groundwater Conservation District (Lone Star), and several aligned individual protestants (Individual Protestants) oppose TexCom's Application. They contend that the Application is deficient, that TexCom did not meet its burden of proof, and that the proposed underground injection activities pose an unacceptable risk to the underground drinking water for the area. The TCEQ Office of Public Interest Counsel (PIC) also opposes the Application or, alternatively, requests additional conditions be added to the permits designed to protect the underground water supply and to alleviate traffic concerns.

TexCom requested a direct referral of this matter to the State Office of Administrative Hearings (SOAH) for a contested case hearing without limitation on the issues to be considered. In addition, TexCom requested a direct referral of TexCom's separate application for a solid waste permit for the proposed surface facility at the site. That application was designated as TCEQ Docket No. 2007-0362-IHW; SOAH Docket No. 582-07-2674. TexCom's Application for the UIC permits and its Application for an Industrial Solid Waste permit for the surface facility were consolidated

for the hearing on the merits, but a separate proposal for decision (PFD) concerning the surface-facility solid waste permit application will be issued simultaneously with this PFD.

Based on the evidence presented, the Administrative Law Judges (ALJs) recommend that the Commission approve TexCom's application with the addition of special conditions requiring relocation of the facility entrance and requiring additional fall-off testing and reservoir modeling after its existing well is re-perforated and before injection operations begin, as described in more detail later in this PFD.

II. PARTIES AND PROCEDURAL HISTORY

The following were designated as parties to this case:

Party	Representative
TexCom Gulf Disposal, L.L.C. (TexCom)	John Riley and Patrick Lee, Attorneys, Austin, Texas
Montgomery County and City of Conroe (Aligned Protestants)	David K. Walker, Montgomery County Attorney; Julie B Stewart, Assistant Montgomery County Attorney, Conroe, Texas
Lone Star Groundwater Conservation District (Lone Star)	Michael A. Gershon, Attorney, Austin, Texas
Aligned Individual Protestants ¹ (Individual Protestants)	Kevin A. Forsberg, Attorney, Montgomery, Texas
ED	J. Diane Goss and John E. Williams, Staff Attorneys, Environmental Law Division, TCEQ
PIC	Emily A. Collins, Attorney, Public Interest Counsel

¹ The individual protestants are: Nickey E. Dyer, Flora Harrell, Edgar Hoagland, Shirley Hoagland, Patty Mouton, James Langston, James A. Langston, III, Lois Nelson, James Nolan, George Phillips, Brian Rodel, Richard Ward, Edwin (Art) Wilson, Al Zaruba, and Jerry Zaruba.

The procedural history of this case is summarized as follows:

August 2, 2005	TexCom filed UIC Application with TCEQ for WDW410, WDW411, WDW412, and WDW413.
August 31, 2005	TexCom's UIC Application declared administratively complete.
March 9, 2006	ED held public meeting in Conroe to receive public comment.
April 27, 2006	TCEQ Staff issued Technical Summary and Executive Director's Preliminary Decision approving the Application.
January 11, 2007	ED issued written responses to public comment.
April 13, 2007	TexCom requested direct referral of the proceeding to SOAH.
April 19, 2007	Case referred to SOAH for a contested case hearing.
May 9, 2007	TCEQ Chief Clerk issued notice of hearing for July 18, 2007.
July 18, 2007	Preliminary hearing held by SOAH in Conroe.
July 24, 2007	SOAH Order No. 1 established a procedural schedule leading to a hearing on the merits on December 12, 2007.
December 12-18, 2007	Hearing on the Merits held in Conroe and Austin.
February 4, 2008	Parties filed Closing Arguments.
February 25, 2008	Parties filed Replies to Closing Arguments and the record closed.

III. BACKGROUND

TexCom is a Texas C Corporation formed to own, manage, and operate certain disposal businesses. It has applied for four permits to construct and operate up to four Class I UIC wells on approximately 27 acres of land located at 16185 Creighton Road in Montgomery County. TexCom purchased the 27-acre tract in 2005, and one of the permits (WDW410) would be for an existing Class I well at the site that was permitted in 1994 and completed in 1999 by a previous owner of the property, Crossroads Environmental, Inc (Crossroads). However, that well (previously permitted

as WDW315) was never placed into service and the prior permit for the well expired in 2004. The remaining three permits would be for new wells to be drilled by TexCom.

Class I UIC wells include wells that inject industrial wastewater into a geological formation that is deeper than the deepest underground source of drinking water (USDW) within 1/4 mile of the wellbore.² Class I wells may be permitted to receive hazardous waste, but TexCom has applied for permits that only allow disposal of nonhazardous wastewater, as defined by the U.S. Environmental Protection Agency (EPA) and the TCEQ. The permits would exclude wastewater with characteristics of ignitability, corrosivity, reactivity, or toxicity, as well as wastes generated from specific operations the EPA has designated as hazardous. The maximum allowed injection rate would be 350 gallons per minute for the entire facility, as specified by the UIC draft permits. This is a cumulative maximum flow, meaning that the combined injection rates for all operating wells at the site cannot exceed this total rate.³

If the permits are granted, TexCom's wells will dispose nonhazardous wastewater by injection into a geological formation known as the Lower Cockfield, which consists of shales and thin sands, at an injection interval between 6,045 and 6,390 feet below the surface. Immediately above the Lower Cockfield formation are the Middle Cockfield (5,629 to 6,045 feet) and the Upper Cockfield (5,134 to 5,629 feet) formations. Layers of shale separate the Lower, Middle, and Upper Cockfield members. Although the "injection zone " encompasses the entire Cockfield Formation, the "injection interval " (where the wells would be perforated) is within the Lower Cockfield only.⁴

² 30 TAC § 331.11(a)(1)(B)

³ TexCom Ex. 49, Casey direct at 23.

⁴ TexCom Ex. 49, Casey direct at 34. "Injection zone " is defined at 30 TAC § 331.2(48) as "A formation, a group of formations, or part of a formation that receives fluid through a well." "Injection interval" is defined at 30 TAC § 331.2(45) as "That part of the injection zone in which the well is authorized to be screened, perforated, or in which the waste is otherwise authorized to be directly emplaced."

Below the Lower Cockfield is the Cockfield Shale Member, consisting of massive marine shale with few thin sands and tite siltstones.⁵ The Cockfield Shale Member is the lower confining unit for the project. Immediately above the Upper Cockfield is the Jackson Shale Formation, a massive formation of marine shales or mudstones with a dough-like consistency approximately 1,000 feet thick. A core sample from the Jackson Shale Formation showed it to be an impermeable formation. The Jackson Shale Formation serves as the Upper Confining Unit for the injection zone.⁶ A diagram and a table of the geological formations are attached as Appendix A1 and A2.

The proposed facility is located within the area of the large Conroe oilfield, which has produced more than 700 million barrels of oil since the 1930s. Most of the hydrocarbon production of the Conroe oilfield was extracted from the Upper Cockfield at approximately 5,000 feet. No known hydrocarbon production has occurred in the Middle or Lower Cockfield. The Conroe oilfield includes about 17,000 acres, and it has had approximately 750 producing wells within its boundaries over the years.⁷ As noted above, the Jackson Shale formation is the upper confining unit, separating the injection zone from USDWs located above. However, because the primary production zone for the Conroe oilfield was the Upper Cockfield formation, numerous oil-well bore holes penetrated the Jackson Shale to reach the Upper Cockfield.

USDWs are located above the Jackson Shale. The base of the lowermost USDW is at approximately 4,088 feet, in the Catahoula Aquifer, which sits on top of the Jackson Shale Formation. However, the deepest drinking water well within the 2.5 mile area of review (AOR) is a municipal water well completed in the Jasper aquifer at 1,500 feet depth, approximately 11,900 feet distant from the existing TexCom well.⁸

⁵ TexCom Ex. 49, Casey direct at 32-33.

⁶ TexCom Ex. 49, Casey direct at 34.

⁷ TexCom Ex. 57, Langhus direct at 12.

⁸ TexCom Ex. 49, Casey direct at 35.

Through reservoir modeling, TexCom conservatively calculated that the waste plume will spread 2,770 feet out from the borehole over the 30-year life span of the injection well. However, brine water that already exists in the injection interval will be displaced by the injected wastewater. An east-west fault exists in the Cockfield formation about 4,400 south of the proposed injection wells (EW-4400-S fault). It was undisputed that the waste plume will not reach that fault, but the existing water in the injection interval will realize a pressure increase at the fault from injection operations. The parties dispute whether the fault is transmissive, thus allowing the pressurized water to pass through the fault, or is non-transmissive, thus acting as a pressure barrier. Whether the fault is transmissive is significant in determining the extent of the area where existing water will be pressurized from the injection activities and for identifying artificial penetrations within that area.

As previously noted, one of the four proposed UIC wells (WDW410) was permitted as WDW315 in 1994, and it was drilled and completed in 1999 by Crossroads, the previous owner of the property. However, Crossroads never constructed a surface facility and the permit expired before the well was put into wastewater disposal operation. If approved, that well would be re-permitted as WDW410, and the three additional proposed wells would be permitted as WDW411, WDW412, and WDW413.

Montgomery County is a suburban/rural county located immediately north of Houston. It has experienced rapid population growth and its current population exceeds 400,000. Currently, Montgomery County relies almost exclusively on groundwater from the Evangeline aquifer as its source for drinking water.⁹ The Evangeline aquifer is located above the wastewater injection interval for TexCom's facility, with several geological strata layered between them.

⁹ TexCom Ex. 6, UIC Application, Vol. I, at 77.

IV. APPLICABLE LAW

The Texas Injection Well Act is contained in TEX. WATER CODE (Water Code), Ch. 27, with Subchapter D governing the issuance of permits. Among other things, § 27.051 provides:

(a) The commission may grant an application in whole or in part and may issue the permit if it finds:

- (1) that the use or installation of the injection well is in the public interest;
- (2) that no existing rights, including, but not limited to, mineral rights, will be impaired;
- (3) that, with proper safeguards, both ground and surface fresh water can be adequately protected from pollution;
- (4) that the applicant has made a satisfactory showing of financial responsibility if required by Section 27.073 of this code;
- (5) that the applicant has provided for the proper operation of the proposed hazardous waste injection well;

...

(c) In the permit, the commission . . . shall impose terms and conditions reasonably necessary to protect fresh water from pollution, including the necessary casing.

(d) The commission, in determining if the use or installation of an injection well is in the public interest under Subsection (a)(1), shall consider, but shall not be limited to the consideration of:

- (1) compliance history of the applicant and related entities . . .;
- (2) whether there is a practical, economic, and feasible alternative to an injection well reasonably available;

...

In addition, 30 TAC § 331.121(a), (b), and (c)¹⁰ include a lengthy list of criteria that the Commission must consider before issuing a Class I Injection Well Permit, including information about the geologic structure of the local area, USDWs and freshwater aquifers,¹¹ the confining

¹⁰ Subsections (d), (e), (f), and (g) concern either salt caverns or hazardous waste injection well permits and do not apply to TexCom's application.

¹¹ Fresh water is defined at 331.2(40):

Fresh water – Water having bacteriological, physical, and chemical properties which make it suitable and feasible for beneficial use for any lawful purpose.

(A) For the purposes of this subchapter, it will be presumed that water is suitable and feasible for beneficial use for any lawful purpose only if:

(i) it is used as drinking water for human consumption; or

geologic zone, geologic faults, other wells and artificial penetrations into the injection zone, proposed operating data, the public interest, and other information. Additional general requirements are contained in 30 TAC §§ 281.5, 305.45, and 305.49.

On December 6, 2007, the Austin Court of Appeals issued an opinion in *Texas Citizens for a Safe Future and Clean Water v. Railroad Comm'n of Texas*,¹² which held that the public interest requirement for Class II injection wells should include consideration of traffic safety concerns. Based on that decision, the ALJs allowed the parties to offer evidence about any traffic safety concerns related to TexCom's proposed facility.

V. DISCUSSION

The issues contested by the parties at the hearing include: completeness of the Application, suitability of the location for the proposed wells, reservoir modeling, traffic, protection of surface water and groundwater, public interest requirements, and other issues. These are discussed below.

A. Completeness of Application

The Intervenors¹³ contend that TexCom's Application was incomplete in various respects. TexCom disputes these contentions. The ALJs find that whether TexCom's Application is administratively or technically complete is not a decisive issue for this case. Instead, the substance of the information provided in the Application and other evidence admitted at the hearing must be

-
- (ii) the groundwater contains fewer than 10,000 milligrams per liter (mg/L) total dissolved solids; and
 - (iii) it is not an exempted aquifer.

(B) This presumption may be rebutted upon a showing by the executive director or an affected person that water containing greater than or equal to 10,000 mg/L total dissolved solids can be put to beneficial use.

¹² No. 03-07-00025-CV, 2007 WL 4269869 (Tex. App. Austin – Dec. 6, 2007, motion for rehearing pending).

¹³ Intervenors include PIC, Lone Star, the Aligned Protestants and the Individual Protestants.

evaluated to determine whether the proposed injection wells satisfy the requirements of the applicable statutes and rules. Those substantive issues are discussed in later sections of this PFD.

Intervenor Lone Star points out that the AOR is the area surrounding an injection well for which an applicant must provide information. 30 TAC § 331.42 defines the AOR for a Class I injection well as the territory within 2.5 miles of the proposed well, or the area within the cone of influence (COI), *whichever is greater*.¹⁴ In this case, the COI is the area of pressure increase within the injection zone of 421 pounds per square inch (psi) or greater, which would be sufficient to displace a drilling-mud plug in an abandoned well and thus create a potential pathway to contaminate a USDW or freshwater aquifer.¹⁵ As will be discussed in more detail in section V.C. (Reservoir Modeling), one of the calculations by Lone Star's expert (Mr. Phil Grant, P.G.) produced a COI of 14,300 feet, or 2.7 miles, which is greater than the 2.5-mile AOR for which TexCom provided data and information. Therefore, Lone Star contends that TexCom's Application was not complete because it did not expand the AOR to 2.7 miles.

In addition, Lone Star states that Mr. Grant identified eighteen oil wells in the area of his calculated COI that have no well information associated with them in TexCom's Application. Lone Star argues that TexCom should have provided either documentation that none of these wells penetrate the injection interval or a corrective action plan for plugging the wells, as required by 30 TAC § 331.121(a)(2)(A) and (B). Finally, Lone Star complains that TexCom failed to identify all

¹⁴ 30 TAC § 331.42 states:

Area of Review

(a) The area of review is the area surrounding an injection well or a group of wells, for which the permit application must detail the information required in Subchapter G of this title (relating to consideration Prior to Permit Issuance).

(b) The area of review is:

(1) for Class I wells, and area determined by a radius of 2 1/2 miles from the proposed or existing well bore, or the area within the cone of influence, whichever is greater. . . .

¹⁵ Tr. at 280-82. 30 TAC § 331.2(25) defines cone of influence as: "The potentiometric surface area around the injection well within which increased injection zone pressures caused by injection of wastes would be sufficient to drive fluids into an underground source of drinking water or freshwater."

known or suspected faults in the AOR as required by 30 TAC § 331.121(a)(2)(A). Although TexCom described two faults within the AOR, Mr. Grant testified for Lone Star that a third fault also exists, which he identified as NS-700-E, but which TexCom did not include in its Application.¹⁶

Aligned Protestants (Montgomery County and the City of Conroe) also contend that TexCom failed to properly identify and evaluate in its Application all known or suspected faults. They also state that TexCom's Application contains insufficient records of artificial penetrations within the COI, and that it did not include all water wells identified by public records within the AOR.¹⁷

Likewise, the Individual Protestants criticize TexCom's Application for failure to address artificial penetrations within the AOR. They also contend that the Application contains an improper COI and lacks compatibility testing of proposed injection materials.¹⁸

Based on *Citizens Against Landfill Location v. Texas Commission on Environmental Quality*,¹⁹ PIC contends that whether TexCom's Application is administratively or technically complete is not a decisive issue. Rather, PIC states, the purpose of the hearing is to determine whether the substance of the information provided in TexCom's Application and other evidence fulfill the statutory purposes of the Injection Well Act.²⁰

The ED points out that the Commission declared TexCom's Application administratively complete on August 31, 2005. And after reviewing the evidence presented at hearing, the ED's permit writer for these UIC draft permits, Ms. Kathryn Hoffman, adopted her Technical Summary

¹⁶ Lone Star closing argument at 10-31.

¹⁷ Aligned Protestants closing argument at 6-7.

¹⁸ Individual Protestants closing statement at 6-8.

¹⁹ 169 S.W.3d 258, 272 (Tex. App. – Austin 2005, pet. denied).

²⁰ PIC closing argument at 3-4.

and Preliminary Decision without change. Therefore, the ED concludes that the administrative completeness of the UIC Application is not at issue.²¹

TexCom argues that the purpose of the Commission's rules setting forth the information required in UIC Applications is to collect information needed by TCEQ Staff to evaluate the technical merits of the project. In this case, the TCEQ project manager, Ms. Hoffman, testified that the Application included all information required by the Commission's rules and all the information she needed to understand the project and make her evaluation. TexCom also states that the Protestants²² sole UIC expert did not testify that the Application was fatally flawed, but only that he disagreed with certain inputs in the reservoir modeling.

In response to Lone Star's arguments, TexCom notes that the substantive issues concerning COI modeling were discussed in other parts of the Application and the parties' briefing and will be evaluated in other parts of this PFD. Concerning the eighteen wells that Lone Star claims were not identified in the Application, TexCom points out that Lone Star's witness, Mr. Grant, actually testified only that eighteen wells did not have total depth information on file with the Railroad Commission.²³ In other words, Mr. Grant did not testify that these wells were not identified in the Application. Finally, TexCom acknowledges that Mr. Grant testified about an additional fault about 750 feet east of the wellhead, but it emphasizes that identification of faults is a subjective judgment. While Mr. Grant thought a fault existed at that location, he did not include it in his reservoir modeling, and TexCom's witness, Dr. Burce Langhus, reviewed the same materials and concluded that a fault did not exist at that location.²⁴

²¹ ED closing argument at 5-6.

²² Protestants refer to Lone Star, the Aligned Protestants and the Individual Protestants.

²³ Lone Star Ex. 8, Grant direct at 59.

²⁴ TexCom response brief at 2-6.

The ALJs agree with PIC that the purpose of this proceeding is to determine whether the substance of TexCom's Application and other evidence fulfills the statutory purposes of the Injection Well Act, as the ED has already determined that the Application was administratively and technically complete prior to the hearing. PIC cited *Citizens Against Landfill Location v. Texas Commission on Environmental Quality*.²⁵ That case involved a solid waste facility, rather than an injection well, and the court relied on TEX. HEALTH & SAFETY CODE § 361.068, which does not apply to this application. Nevertheless, the court's conclusion is persuasive that an applicant need not establish at a contested case hearing that its Application is technically and administratively complete, because the applicant will have already done so prior to the hearing.²⁶

Therefore, whether TexCom's Application is administratively or technically complete is not a decisive issue for this case. Instead, the substance of the information provided in the Application and other evidence must be evaluated to determine whether the proposed injection wells satisfy the requirements of the applicable statutes and rules. Thus, the parties dispute whether TexCom identified all known or suspected faults. Likewise, the dispute over identification and evaluation of artificial penetrations is based in part on the calculation of the COI in the reservoir modeling and a resulting possible expansion of the AOR. But these complaints made by the Protestants about the completeness of TexCom's Application all relate to disputes about the substantive issues discussed later in this Proposal for Decision (Presence and Significance of Faults, V.B.2.; Presence and Significance of Artificial Penetrations, V.B.3.; Reservoir Modeling, V.C.). Because the ED has already found that TexCom's Application is administratively and technically complete, the ALJs conclude that the issues raised by Protestants are properly addressed as substantive issues on whether TexCom's proposed injections wells comply with the germane legal and regulatory requirements. These substantive issues raised by the Protestants and PIC are considered in the appropriate sections of this PFD.

²⁵ 169 S.W.3d 258, 272 (Tex. App. – Austin 2005, pet. denied).

²⁶ *Id.*

B. Suitability of Location for Proposed Injection Wells

TCEQ rules set out the siting requirements for a Class I injection well.²⁷ In order to comply with 30 TAC § 133.121 (c)(2) and (3), TexCom must show, among other things, that the site and injection zone would be located in a geographically suitable area; that the injection zone has "sufficient permeability, porosity, thickness, and areal extent to prevent migration of fluids into USDW or fresh water aquifers," and that the confining zones are "laterally continuous and free of transecting transmissive faults or fractures over an area sufficient to prevent the movement of fluids into a USDW or freshwater aquifer; and . . . contain at least one formation of sufficient thickness with the lithologic and stress characteristics capable of preventing initiation and/or propagation of fractures"²⁸ As the applicant, TexCom has the burden of proving by a preponderance of the evidence that the injection wells meet the pertinent regulatory requirements. It is undisputed that TexCom meets the requirement set out in 30 TAC § 331.121(c)(1), so this issue will not be discussed further.

1. Geologic Suitability of Area and Injection Zone

Section 331.121(c)(2) requires that the siting for Class I injection wells be in areas that are geologically suitable. Geological suitability is to be based upon:

(A) an analysis of the structural and stratigraphic geology, the hydrogeology, and the seismicity of the region;

(B) an analysis of the local geology and hydrogeology of the well site, including, at a minimum, detailed information regarding stratigraphy, structure, and rock properties, aquifer hydrodynamics, and mineral resources; and

²⁷ 30 TAC § 331.121(c)(1-4).

²⁸ PIC's Closing Arguments at 6.

(C) a determination that the geology of the area can be described confidently and that limits of waste fate and transport can be accurately predicted through the use of analytical and numerical models.

Unlike typical UIC permit applications, TexCom has the benefit of geological data from the existing well (WDW315) permitted by TCEQ in 1994. Dr. Langhus testified that the Eocene sands of the Cockfield formation make an excellent injection reservoir because of its petro-physical characteristics, mineralogic composition, and areal extent.²⁹ Based on his review of core samples and wireline logs from the existing well, Dr. Langhus found that the injection interval in the Lower Cockfield has sufficient thickness, porosity, permeability and aerial extent to safely contain wastewater injected into this formation throughout the life of TexCom's facility.³⁰ John Santos, TCEQ's geologist responsible for reviewing Section V (Geology) and Section VII (Reservoir Mechanics) of TexCom's Application, agreed with Dr. Langhus and testified that the injection interval was sufficient to accommodate the proposed injection of wastewater and prevent the type of fluid migration that could pollute USDWs.³¹ Mr. Santos opined that the ground water flow within the injection interval and zone moves at "very slow rates generally toward the coast."³² It was undisputed that seismic risk is almost "non-existent."

According to Dr. Langhus, the Jackson Shale formation and the bottom Cockfield Shale formation will serve as adequate confining layers.³³ Mr. Santos confirmed that the Jackson Shale formation, a marine mudstone that contains a few thin sands, has a net impermeable shale thickness of approximately 1,000 feet. It is laterally continuous and free of transmissive faults or fractures in

²⁹ TexCom's Closing Arguments at 11; TexCom Ex. 57, Langhus direct at 21.

³⁰ TexCom's Closing Arguments at 11; TexCom Ex. 57, Langhus direct at 23.

³¹ ED Ex. 12, Santos direct at 7.

³² *Id.*

³³ TexCom's Closing Arguments at 12; Tex Com Ex. 57, Langhus direct at 21.

the AOR.³⁴ The Jackson Shale formation is also of sufficient thickness and has lithologic and stress characteristics to prevent the initiation and propagation of fractures because of its mudstone and dough-like consistency.

Lone Star's expert, Mr. Grant, testified that based on the three factors listed in Section 331.121(c)(2), he believes the area is geologically suitable for underground injection of nonhazardous waste.³⁵ But he disputes TexCom contention that it has met the remaining siting requirements. Mr. Grant clarified that while the Lower Cockfield sand strata are geographically suitable to serve as an injection reservoir, TexCom's injection wells create "endangerment issues" because of the impact that pressure increases will have on the artificial penetrations within the COI, and because TexCom's failed to meet the TCEQ rules designed to ensure the safety of USDWs and fresh water aquifers.³⁶ These issues are addressed further below.

The Aligned Protestants and Individual Protestants challenge the geological suitability of the location because TexCom did not use the most reliable permeability calculations in defining the AOR and COI; did not meet the requirements of 30 TAC §331.121(c)(4)(A-C); and because TexCom's wells may impair existing rights.³⁷ These issues, while relevant to siting requirements, are not dispositive of whether location of the area is geologically suitable based on the criteria set out in 30 TAC § 331.121(c)(2).

The ALJs find that TexCom satisfied the criteria set out in § 331.121(c)(2), and that TexCom's Class I wells are sited in geologically suitable areas. Dr. Langhus, Mr. Santos, and Mr. Grant agree that the proposed Class I injection wells would be located in a geologically suitable

³⁴ ED Ex. 12, Santos direct at 7.

³⁵ Lone Star Ex. 8, Grant direct at 19.

³⁶ Lone Star Ex. 8, Grant direct at 20.

³⁷ Aligned Protestants Closing Arguments at 7 and 8; Section 27.051(a)(2) of the Water Code.

area. TexCom has analyzed the structural and stratigraphic geology, the hydrogeology, and the seismic activity of the region and at the well sites; has described the geology of the region and the area at and around the wells confidently; and the limits of waste fate and transport can be accurately predicted through the use of analytical and numerical models and information from the existing well.

As noted previously, the Cockfield formations are made up of "a thick marine mudlike section overlain by interbedded sands and shales."³⁸ The Lower Cockfield formation has thick porous and permeable sand that can provide storage for large volumes of nonhazardous waste. The Jackson Shale formation will serve as the Upper Confining Zone and the Cockfield Shale will serve as the Lower Confining Zone. The region does not have a history of seismic activity. Based on the evidence, the ALJs find that TexCom's proposed wells are located in areas that are geologically suitable.

According to Lone Star, the remaining issues in dispute concern: (1) the effect faulting has on the size of the injection reservoir that is available to accept injected wastewater and the permeability of the reservoir; (2) the pressure caused by the wastewater on artificial penetrations, including oil and gas wells; and (3) TexCom's compliance with § 331.121(c)(4).

The Aligned Protestants claim that TexCom's reservoir modeling and evaluations have too many errors and omissions to be reliable. Reservoir modeling is discussed in Section V.C. below, and will not be addressed here. According to the Aligned Protestants, TexCom also failed to identify a buffer zone between the upper confining zone and the lowermost USDW, the Catahoula Aquifer, as required by 30 TAC § 331.121(c)(4)(A); identified the EW-4400-S-fault as laterally transmissive when it is not; improperly characterized the shale content of the Lower Cockfield, thus miscalculating its permeability; and, misrepresented that TexCom's wells will not impinge on the mineral rights of others.

³⁸ TexCom's Closing Argument at 12.

2. Presence and Significance of Faults Within the Area of Review

Section 331.121(a)(2)(A) requires TexCom to submit a map with its Application "showing the location of the injection well for which a permit is sought and the applicable area of review. . . The map should also show faults, if known or suspected."³⁹ TCEQ rules further require TexCom to delineate all faults within the AOR and demonstrate that "the fault is not sufficiently transmissive or vertically extensive to allow migration of hazardous constituents out of the injection zone."⁴⁰ As noted previously, the confining zones (the Jackson Shale formation and the Cockfield Shale) must be: (1) "laterally continuous and free of transecting, transmissive faults or fractures over an area sufficient to prevent the movement of fluids into a USDW or freshwater aquifer," and must (2) contain "at least one formation of sufficient thickness and with lithologic and stress characteristics capable of preventing initiation and/or propagation of fractures."⁴¹

Whether faults exist in the AOR, and whether the fault is transmissive or nontransmissive, are important factors to consider in determining how much wastewater an injection zone can accept and whether the pressure build-up can cause fluid in the injection zone to migrate up the artificial penetrations and into USDWs. The parties disagree as to the number of faults within the AOR, the size of the AOR, and the effect these faults have on the build-up of pressure within the injection reservoir. Mr. Grant explained that the presence of faulting may limit the size of the injection reservoir available to accept wastewater, which will directly impact the resulting pressure increases calculated by the pressure modeling.⁴² TexCom identified two faults, Lone Star identified three faults, and the Aligned Protestants and Individual Protestants identified 31 faults.

³⁹ 30 TAC § 331.121(a)(2)(A).

⁴⁰ 30 TAC § 331.121(a)(2)(P).

⁴¹ 30 TAC § 331.121(c)(3)(B).

⁴² Lone Star Ex. 8, Grant at 31.

This area of the Conroe field sits on top of a salt dome structure that caused a number of faults along the area uplifted by the salt. Mr. Casey explained that TexCom identified any fault large enough to cause sufficient stratigraphic change in the formation and allow for communication between the layers. The closest such fault is the EW-4400-S fault, a fault that has between a 100-foot and 150-foot displacement (throw). The second fault identified is located at the extreme southern edge of the AOR and has a throw of approximately 75 feet.⁴³ Lone Star identified another fault in the AOR, a north-south fault with a 25-foot to 50-foot throw.⁴⁴ The two smaller faults were not discussed in significant detail by the parties. Instead, the parties focused on the EW-4400-S fault, the fault TexCom argues is horizontally transmissive.

Mr. Casey explained that faults with a displacement of 100 feet or more may permit different portions of member sands to communicate horizontally. For example, at such a fault the top of the Middle Cockfield sands would be across from the bottom of the Upper Cockfield sands. Mr. Casey agreed that it is theoretically possible that the AOR has other small faults. But he contends that none of the faults could extend above the Jackson Shale formation.⁴⁵

Mr. Casey also noted that the Injection Interval for all four injection wells would be between 6,045 feet and 6,390 feet,⁴⁶ and that the Injection Zone would include the Upper, Middle, and Lower Cockfield formations.⁴⁷ While the Lower, Middle, and Upper Cockfield could communicate at the EW-4400-S fault, Mr. Casey testified that the fault movement caused smearing of the clay on the formation that would inhibit or eliminate fluid movement vertically.⁴⁸

⁴³ TexCom Ex. 57, Langus direct at 18.

⁴⁴ Lone Star Ex. 8, Grant direct at 32.

⁴⁵ TexCom Ex. 49, Casey direct at 39; TexCom Ex. 57, Langhus direct at 22.

⁴⁶ Tr. at 178.

⁴⁷ TexCom Ex. 6, Application at 85.

⁴⁸ TexCom Ex. 49, Casey direct at 33.

Dr. Langhus and Mr. Casey testified that there are only two reliable methods to identify a fault. One is to review the pressure responses at various distances from the wellbore during a fall-off test. The other is to observe through wireline logs that a section of the subsurface stratum is missing, called "cut-with-wells."⁴⁹ Dr. Langhus stated that all other methods of identifying faults rely on the geologist's subjective interpretations.

Dr. Langhus agrees with Mr. Casey that only two relevant faults exist in the AOR. The EW-4400-S fault is located 4,400 feet to the south of the TexCom site,⁵⁰ and the second fault located on the extreme southern edge of the AOR with a 75-foot throw.⁵¹ Dr. Langhus contends that the EW-4400-S fault is laterally transmissive and that the pressure caused by the TexCom's wastewater injections will migrate to the other side of the fault, thus reducing the pressure.

Lone Star's expert, Mr. Grant, disagrees that the EW-4400-S-fault is laterally transmissive. He opined that just the opposite is true, this fault is nontransmissive and will not reduce the increased pressure within the injection reservoir. If the fault is nontransmissive, Mr. Grant explained, the pressure within the injection reservoir will significantly increase. As noted previously, Mr. Grant also located another fault that was not included on TexCom's mapping. According to Mr. Grant, TexCom should have identified this fault on its map because it was on Exxon's structural maps of the Conroe Oil Field. He maintains that the lateral and vertical transmissivity of this fault should have been addressed, and possibly factored into the pressure model, although he did not include it in his reservoir modeling.⁵²

⁴⁹ Tr. at 360-363 and 1323-1327.

⁵⁰ TexCom Ex. 57, Langhus direct at 18.

⁵¹ *Id.*

⁵² Lone Star Ex. 8, Grant at 32-33.

As for whether the EW-4400-S fault is laterally transmissive, Mr. Grant testified that because a fault cutting through shale in the Lower Cockfield smears the shales along the fault line, it creates a pressure seal at the fault.⁵³ Consequently, Lone Star maintains that the EW-4400-S-fault is not permeable and does not release pressure within the injection reservoir as argued by TexCom. Therefore, TexCom should have shown the EW-4400-S fault as impermeable in calculating the COI.

Dr. Collier claims that the AOR has 31 additional faults, beyond those found by the other two experts. Dr. Collier based his opinions on his interpretation of differences in stratum depths in various applications submitted by Exxon to the Railroad Commission. TexCom contends that these additional faults are purely interpretative and are not based on objective testing by either the fall-off test or by the cut-with-wells test. After reviewing the same materials that Dr. Collier reviewed, Dr. Langhus stated that Dr. Collier has no "credible evidence" to support any of the additional 31 faults.

During cross-examination, Dr. Collier conceded that some fault lines on his fault map either were not properly transcribed or could not be found on the source material he identified. He agreed that some fault lines appeared continuous through different geological horizons on the map, but were not, thus making the fault appear more substantial.⁵⁴ Finally, Dr. Collier conceded that Exxon's mapping may have been motivated by what Exxon wanted from the Texas Railroad Commission at the time.

Dr. Collier also presented testimony about surface faults in the AOR that he included on his map and documented with photographs of cracks in pavement and asphalt resurfacing.⁵⁵ However, Dr. Collier agreed that not every fault visible at the surface extended 6,000 feet below the surface.

⁵³ Lone Star's Closing Argument at 32; Tr. 1078-1079.

⁵⁴ Tr. at 959-961.

⁵⁵ Aligned Protestants Ex. 1-C.

Conversely, he agreed that not every fault within the AOR extends upward to the surface because they die out structurally.⁵⁶ Only one alleged surface fault, the "Big Barn East," was within the AOR,⁵⁷ and none of the surface cracks extended into the Lower Cockfield formation.⁵⁸

Dr. Collier could not identify the faults on his map that were transmissive laterally or vertically.⁵⁹ According to Dr. Collier, at least nineteen faults he identified went down as far as the Upper Cockfield formation, but he did not know if they were transmissive.⁶⁰ Dr. Collier did not independently assess the underlying data he considered and included faults with an interpreted offset of zero to 50 feet. Dr. Langhus was emphatic that an offset of zero is not an offset. He also questioned whether an offset of 50 feet is a fault or just local undulation of topography or regional dips.

While all 31 additional faults identified by Dr. Collier existed well above the injection interval,⁶¹ the Aligned Protestants and Individual Protestants asserted that the rules require a full disclosure of all known and suspected faults in the AOR. TexCom should have identified all surface and subsurface features that might be a fault. The rule, they contend, does not allow TexCom to pick and choose which fault or suspected faults exist in the AOR.⁶² Because TexCom failed to identify all the faults or suspected faults in the AOR, both request that TexCom's Application be denied.

⁵⁶ Tr. at 986-988

⁵⁷ Tr. at 896; TexCom's Closing Argument at 22.

⁵⁸ Tr. at 909.

⁵⁹ *Id.*

⁶⁰ Tr. at 1000-1001.

⁶¹ Tr. at 1006.

⁶² Aligned Protestants' Closing Arguments at 14-14.

The ED and PIC recommend that if the permits are issued to TexCom, TCEQ include in its order a requirement that TexCom conduct a new fall-off test on the existing well that extends past the EW-4400-S fault to determine if it is laterally transmissive. If the EW-4400-S-fault is transmissive, the existing fluid in the injection zone will be displaced to the south of the fault. If it is not transmissive, the EW-4400-S fault will act as a "dam" or barrier to the movement of the fluid in the injection zone causing the test fluid to compress existing fluid, which in turn will exert pressure back to the wellbore.⁶³

PIC also asked that if the EW-4400-S fault is not transmissive, TexCom be required to research the additional artificial penetrations within the enlarged COI and that the corrective action it takes ensures that the artificial penetrations present no endangerment or contamination to USDWs and fresh and surface water.

Normally, the parties would not have the amount of geological information that they have in this case because the well has not been drilled. In this case the parties have data from the existing well. However, it is still not clear whether the EW-4400-S-fault is transmissive. The ALJs recognize that if the fault is transmissive it will validate the calculations made by TexCom. But if the fault is not transmissive, TexCom's reservoir modeling will need to address the increase of pressure within the injection interval and make appropriate changes. This includes researching the additional artificial penetrations within the enlarged COI and taking corrective action to ensure that the artificial penetrations present no endangerment or contamination to USDWs and fresh and surface water.

The ALJs do not believe it is necessary that the Application be denied because of this uncertainty. A fall-off test is required to be performed on all of the wells prior to being put into operation. If the Commission grants TexCom's permits, the ALJs agree with the recommendations of the ED and PIC that TCEQ include in its order a requirement that TexCom conduct a new fall-off

⁶³ ED's Closing Argument at 10.

test on the existing well. The fall-off test must extend 1,000 feet past the EW-4400-S fault to determine if it is laterally transmissive. If it is not laterally transmissive, TexCom will be required to remodel and recalculate the COI, taking the corrective action set out above. Due to the sensitive nature of this issue, the ALJs recommend that TexCom be required to provide the other parties notice of the time, date, and place of the fall-off test and allow a representative of each party to be present during the testing.

3. Presence and Significance of Artificial Penetrations Within the Area of Review

The parties agree that this area is covered with active and abandoned oil and gas wells. Dr. Langhus represented that at least 750 producing wells have been drilled through the Jackson Shale formation since the Conroe Oil Field was discovered in 1931. As mentioned previously, at least 505 artificial penetrations are in the AOR, all of which are oil and gas wells.⁶⁴ Many of these wells have been plugged or abandoned.⁶⁵ While most oil and gas wells were drilled into the Upper Cockfield (depth of 5,000 feet), Dr. Langhus acknowledged that some wells were even drilled to depths of 14,000 feet, into the Wilcox sands. None were drilled to the Lower Cockfield.⁶⁶ Mr. Casey testified that the wells drilled past the Cockfield formation and into the Wilcox sands were dry holes and were plugged up to the Upper Cockfield for production.⁶⁷ Dr. Langhus explained that despite the significant drilling in the AOR, TexCom's wells are in an appropriate setting because the wastewater will be injected below most closed and existing wells.⁶⁸

⁶⁴ Aligned Protestants' Closing Argument at 19; Tr. at 382-384.

⁶⁵ TexCom Ex. 6, Application at 62; TexCom 49, Casey direct at 43..

⁶⁶ TexCom Ex. 57, Langhus direct at 12.

⁶⁷ TexCom Ex. 49, Casey direct at 44.

⁶⁸ TexCom Ex. 57, Langhus direct at 12.

Mr. Casey pointed out that approximately 110 underground injection wells exist in Texas, most of which have been operating for decades without incident.⁶⁹ By way of comparison, Mr. Casey noted that Texas has almost 50,000 Class II injection and disposal wells used to dispose of oil and gas drilling fluids. These injection wells are not regulated by TCEQ's strict standards, but are instead regulated by the Texas Railroad Commission under much less scrutiny.⁷⁰ TexCom will not accept any hazardous materials, including any radioactive or inflammable waste, or any waste with high bacteriologic concentration.⁷¹ Based on TexCom's projected, annualized, maximum modeled injection rates for a 30-year life, Mr. Casey concluded that inter-formational fluid flow would not occur in these boreholes even under conservative conditions.

According to Mr. Casey, since TexCom filed the Application, TexCom has identified six wells within the COI, none of which penetrated the Lower or Middle Cockfield.⁷² Mr. Langhus added that 26 water wells exist in the AOR. The deepest well is 1,500 feet deep. The Texas Water Development Board listed no other drinking water wells below 1,500 feet.⁷³

The Aligned Protestants point out that TCEQ's rules require an applicant for a Class I injection well to include a map of all artificial penetrations in the AOR, particularly those penetrating the injection zone or the confining unit. Therefore the applicant, they contend, must supply pertinent information about each well, including type, construction, drilled date, location, depth, records of plugging and completion. They argue that the absence of such records creates serious questions about the Jackson Shale formation's suitability as a confining unit. In addition, if Mr. Grant's

⁶⁹ TexCom Ex. 49, Casey direct at 16.

⁷⁰ TexCom Ex. 49, Casey direct at 16-17.

⁷¹ TexCom Ex. 49, Casey direct at 18.

⁷² TexCom Ex. 49a, Casey corrections at 1.

⁷³ TexCom Ex 57, Langhus direct at 20.

reservoir modeling correctly expands the AOR, TexCom will need to research, evaluate, and take corrective action, if necessary, on more artificial penetrations.

The Protestants object to TexCom's failure to secure well records for eighteen wells in the AOR. According to Dr. Collier, the lack of well records, the deterioration of closed wells over time, and the potential for improper plugging of abandoned wells raises serious questions as to the suitability of the Jackson Shale formation to serve as the upper confining unit.⁷⁴ Because of the lack of records for some of these wells, he claims it is inconclusive as to whether the artificial penetrations penetrated the Lower Cockfield. Moreover, if the COI is increased, additional wells will be in the AOR and will need to be researched.

The ED explained that the lightest plugging mud for oil and gas wells used in the Conroe Field weighs nine pounds per gallon. Because wastewater is being injected into the well, if the upward pressure of the fluid is greater than the downward pressure of the plugging mud, the plugging mud and ultimately the fluids will migrate upwards through abandoned wells that penetrate the injection zone.⁷⁵ TexCom maintains that the no artificial penetrations extend to the Lower Cockfield. As a result, the ED found that there are no artificial penetrations that could be influenced by the injection zone pressure.⁷⁶

In response to Protestants' arguments, TexCom explained that both the characteristics of the Cockfield formations and the Jackson Shale formation will prevent any migration of fluid from the Lower Cockfield to USDWs or fresh water. Mr. Casey explained that it is unlikely the waste fluid could even migrate to the Jackson Shale formation because it is being injected 1,000 feet below the Jackson Shale formation. Layers of shale separate the Lower Cockfield from the Middle Cockfield,

⁷⁴ Aligned Protestants Ex. 1, Collier direct at 37; Aligned Protestants' Response at 23.

⁷⁵ ED's Closing Arguments at 10; Tr. at 193.

⁷⁶ ED's Closing Arguments at 11.

and the Middle Cockfield from the Upper Cockfield. Consequently, he opined, multiple layers of shale separate the Lower Cockfield from the Jackson Shale formation and serve to prevent the vertical migration of fluids. According to Mr. Casey, the pressure build-up in the injection interval because of the injectate would be insufficient to cause a migration to the Jackson Shale formation.⁷⁷

Mr. Casey and Dr. Langhus further argue that if fluid did migrate upward, the Jackson Shale formation would act as an intact trapping feature because the massive quantity of mudstone lacks sufficient strength to maintain open channels (as is supported by the wire log signatures). Any faults within the AOR and beyond are therefore sealed by the mudstone in the Upper Confining Zone. Given the significant number of oil gas wells and production in the Upper Cockfield, the Jackson Shale formation has proven to be an effective confining layer.⁷⁸ Finally, Mr. Casey opined that waste fluids from the Lower Cockfield could not migrate through almost a mile of shale, mudstone, and other geologic formations between the injection zone and the deepest drinking well or USDWs.⁷⁹

The ALJs agree that TexCom did not identify every artificial penetration within the AOR, but instead restricted its listing to those that penetrated the Cockfield formations. However, as indicated by the evidence, the artificial penetrations not listed by TexCom will also be effectively confined by the Jackson Shale formation. Those few that were drilled past the Lower Cockfield were drilled in the 1930s and 1940s, and these uncased wells have been sealed by the Jackson Shale formation. The ALJs agree that if the Jackson Shale formation was not an effective confining zone, the large number of oil and gas wells drilled in this area would have already contaminated the USDWs and freshwater aquifers. Therefore, the ALJs find that TexCom provided sufficient evidence regarding the artificial penetrations in TexCom's current AOR to show that it complied with TCEQ's rules, 30 TAC 331.121 (a)(2)(A-C). If the fall-out test done by TexCom prior to the

⁷⁷ TexCom Ex. 49, Casey direct at 34-35.

⁷⁸ Tr. at 1013.

⁷⁹ TexCom Ex. 49, Casey direct at 35.

first well being put into operation increases the AOR, TexCom will need to provide additional information regarding artificial penetrations within the revised AOR.

4. Other Issues Related to Location of Proposed Injection Wells

According to the Aligned Protestants, TexCom failed to comply with the siting requirements set out in 30 TAC § 331.121(c)(4)(A-C). An applicant must comply with the provisions of 30 TAC § 331.121(c)(4)(A-C) unless the applicant can show that it meets the exception set out in 30 TAC § 331.121(c)(4)(D).⁸⁰ According to TexCom, this exception applies to its Application because "the geology, nature of the waste, or other considerations" ensure that abandoned boreholes or other conduits would not cause endangerment of USDWs, and fresh or surface water. TexCom explained that the Jackson Shale formation's mudstone composition is impermeable and will prevent the migration of fluid into a USDW and fresh or surface water. Therefore, TexCom insists that it does not need to comply with § 331.121(c)(4)(A-C). The Protestants disagree that the Jackson Shale formation is completely impermeable, and argue that TexCom must comply with the requirements set out 30 TAC § 331.121(c)(4)(A-C).

⁸⁰ 30 TAC § 331.121(c)(4) provides:

The owner or operator shall demonstrate to the satisfaction of the executive director that:

- (A) the confining zone is separated from the base of the lowermost USDW or freshwater aquifer by at least one sequence of permeable and less permeable strata that will provide an added layer of protection for the USDW or freshwater aquifer in the event of fluid movement in an unlocated borehole or transmissive fault; or
- (B) within the area of review, the piezometric surface of the fluid in the injection zone is less than the piezometric surface of the lowermost USDW or freshwater aquifer, considering density effects, injection pressures, and any significant pumping in the overlying USDW or freshwater aquifer; or
- (C) there is no USDW or freshwater aquifer present;
- (D) the commission may approve a site which does not meet the requirements in subparagraphs (A), (B), or (C) of this paragraph if the owner or operator can demonstrate to the commission that because of the geology, nature of the waste, or other considerations, that abandoned boreholes or other conduits would not cause endangerment of USDWs, and fresh or surface water.

The Protestants charge that TexCom failed to provide a "buffer zone" between the Catahoula Aquifer and the Jackson Shale formation as required by 30 TAC § 331.121(c)(4)(A). TexCom contends that it does not need to include a buffer zone for the reasons stated above. TexCom reasons that the geology and high permeability of the Lower Cockfield formation, demonstrated by its reservoir modeling, prevents the build-up of sufficient pressure over the project lifetime to cause injected wastewater to migrate upward through abandoned boreholes. But if pressure did build up, TexCom reiterated that the Jackson Shale formation would confine any migration of fluid from the injections zone.⁸¹ Consequently, TexCom asserts that a buffer zone is not required.

However, even if a buffer zone is required, TexCom maintains it complied with this requirement. As stated in the Application, in the unlikely event that injected wastewater migrated approximately 1,000 feet and through the impermeable Jackson Shale formation, TexCom posits that the sands at the base of the Catahoula Aquifer (2,800 feet to 4,000 feet) will serve as a buffer zone between the Jackson Shale formation and the USDW. TexCom describes the Catahoula as "largely a thick mudstone" with isolated thin sands.⁸² The base of the Catahoula Aquifer has brackish water, with a salt content between 2,000 and 10,000 ppm. Until 2002, the bottom of the Catahoula was used for permitted disposal of Class II waste and oilfield brine. Consequently, Dr. Langhus questions whether the water in the base of the Catahoula Aquifer meets the definition of USDW because it contains brine and oil and gas from the oil fields.⁸³ No water wells are currently using the Catahoula Aquifer in the AOR. However, the water is treatable to health and aesthetic standards, although Dr. Langhus says the cost to remove the oil and brine would be prohibitive.⁸⁴

⁸¹ TexCom's Closing Argument at 14 and 16; TexCom Ex. 57, Langhus direct at 22 and 24; and TexCom's Response at 7.

⁸² TexCom's Closing Arguments at 13.

⁸³ Tr at 402-404, 446, and 455-458.

⁸⁴ TexCom Ex. 6, Application at 83 to 85.

Protestants' vehemently disagree with TexCom's position, stating that all of the Catahoula Aquifer is a USDW and cannot be used as the buffer zone.⁸⁵ The Protestants emphasize that TCEQ's rules require the protection of all USDWS — it does not allow an applicant to selectively choose which USDWs are worthy of protection.

The Aligned Protestants also argue that TexCom failed to prove it satisfied the requirements of 30 TAC § 331.121(c)(4)(B). The rule requires TexCom to show that "within the area of review, the piezometric surface of the fluid in the injection zone is less than the piezometric surface of the lowermost USDW or freshwater aquifer, considering density effects, injection pressures, and any significant pumping in the overlying USDW or freshwater aquifer" The Aligned Protestants challenge Dr. Langhus' position that § 331.121(c)(4)(B) is irrelevant because the geology will prevent the upward migration of wastewater to the USDW.

The reservoir modeling issue is discussed in detail in Section V.C. While TexCom appears to have failed to meet the requirements regarding a buffer zone and the piezometric surface, the initial question for the ALJs to consider is whether TexCom is required to comply with these provisions. The ALJs find that TexCom is not required to do so because the geology of this area will prevent the upward migration of wastewater into the USDW or freshwater. The Jackson Shale formation, the upper confining zone, will prevent boreholes or other conduits to endanger USDWs and fresh or surface water. As TexCom explained, the thick, marine mudstone of the Jackson Shale formation will effectively seal any fault that may occur. Any uncased abandoned boreholes or other conduit would have collapsed under the weight of the Jackson Shale formation. Therefore, the ALJs find that TexCom has demonstrated that the geology of the area will prevent the upward migration of wastewater into a USDW and fresh and surface water.

The Aligned Protestants also raise an issue about whether TexCom complied with § 27.051 (a)(2) of the Water Code. According to the Aligned Protestants, TexCom's injection wells are

⁸⁵ TexCom Ex. 6, Application at 84-85; Tr at 402-404; and Aligned Protestants Closing Arguments at 9.

encroaching on the mineral rights of Conroe Field oil operator, Wapiti. Consequently, Wapiti sued TexCom, claiming trespass into its oil producing zone.⁸⁶ TexCom countered that the lawsuit has been dismissed because TexCom wells do not interfere with any mineral rights.⁸⁷

Based on the evidence presented, the ALJs find that TexCom has shown that no other rights have been infringed on by its proposed underground injection wells. These wells will be drilled significantly below any known oil and gas deposits (Upper Cockfield) and pose no proven threat to any other rights. Therefore, the ALJs find that TexCom's proposed injection wells would not interfere with any others rights in the area.

C. Reservoir Modeling

1. Introduction

Reservoir modeling's ultimate purpose is to protect USDWs and other freshwater resources. It is used to determine how the pressures exerted by injected wastewater will dissipate throughout the reservoir over time, to calculate the COI, and to make a meaningful evaluation of the proposed project. The COI, as described previously, is the area around an injection well where the injection zone pressure could increase to a level sufficient to displace a mud plug in an abandoned oil well, thus providing a pathway for injected wastewater to migrate to a USDW or freshwater aquifer located above the injection zone. The COI is important because it defines the area where such artificial penetrations must be identified and evaluated. Reservoir modeling also predicts the extent of the waste plume over the life of the well's injection activities.

⁸⁶ Aligned Protestants Response at 9.

⁸⁷ TexCom's Response at 29.

Inputs into the reservoir model include injection rates and quantities, injection-interval layer thickness, permeability, porosity, structure, water saturation, temperature, rock compressibility, water compressibility, and the type of formation fluid found in the Lower Cockfield.⁸⁸ To perform the calculations for reservoir modeling, TexCom's consultants used a BOAST98 computer model; Lone Star's witness used a PRESS2 model; and ED witness Hoffman used a PRESS model. The PRESS, PRESS2, and BOAST98 programs all produce similar pressure-increase calculations, while the BOAST98 also predicts flow and transport.⁸⁹

The disputed issues related to the reservoir modeling, which produced different results and were most hotly contested, concerned the model input for the permeability of the injection interval and the transmissivity of the fault located 4,400 feet south of the well site (EW-4400-S). Because TexCom and Lone Star used different model inputs concerning these issues, the COI calculated by Lone Star's modeling covered a larger area than TexCom's calculated COI. A larger COI would encompass more abandoned oil and gas wells, and more information would be needed about the depth and plugging of these wells.

In most cases, an applicant performs its initial reservoir modeling based on maps, reports, and other secondary information concerning permeability and other geological characteristics of the area. However, to assure more accurate reservoir modeling, TCEQ's rules at 30 TAC § 331.65 require a permittee to remodel and recalculate the AOR and COI after a new well is drilled, based on actual data and testing information obtained from logging and testing of the well and formation. This actual data about the well's subsurface characteristics provides for more accurate modeling than secondary information, and if this new modeling calculates a larger AOR or COI, the permittee must conduct further evaluation of additional artificial penetrations that may exist in the expanded area or must alter the operating parameters to reduce the size of the newly modeled AOR and COI.

⁸⁸ TexCom Ex. 49, Casey direct at 37.

⁸⁹ Tr. at 1049-50.

The present case is unique, however, because a great amount of geologic information is known about the Conroe oilfield and the completion and testing of existing well WDW315 provided actual information about the proposed injection interval and zone. Much of the dispute concerning reservoir modeling results from TexCom using a higher permeability factor than shown by the prior testing of WDW315. TexCom used the higher permeability factor because it plans to re-perforate WDW315 at both the currently perforated sands and additional sands. The Intervenor expressed great concern that TexCom would not be required to retest and remodel the COI and AOR for WDW315, because they believe that § 331.65 may not apply to an existing well as contrasted with a new well. Although TexCom and the ED believe that § 331.65 requires retesting and remodeling of WDW315's reservoir, to alleviate the Intervenor's concerns, the ED has proposed, and TexCom has agreed, to adding a special condition to the permit for WDW410 to require retesting and remodeling after TexCom re-perforates WDW315, and to require additional investigation or adjustment of TexCom's proposed operating parameters if the new testing and modeling produce results adverse to TexCom's prior assumptions and modeling.

As will be discussed in greater detail below, the ALJs believe that TexCom should have used more conservative assumptions regarding permeability and the transmissivity of the EW-4400-S fault in its modeling. However, the ALJs conclude that these concerns can be adequately addressed by the proposed special condition for WDW410 that would require TexCom to retest and remodel the reservoir for that well.

2. Permeability Used in Reservoir Modeling

Permeability refers to the capacity of pores or openings in the sands and rocks of the injection zone to transmit fluids.⁹⁰ The more permeable the injection zone, the more readily the wastewater

⁹⁰ TexCom Ex. 6, Application at 126. "Porosity" is the ratio of void space in a given volume of rock to the total bulk volume of rock, expressed as a percentage. *Id.* at 127. The Middle Cockfield has an estimated porosity of 29% and the Lower Cockfield has an estimated porosity of 24%. *Id.* at 124 of 314.

will pass through the sand and rock and disperse, thus more rapidly reducing the hydraulic pressure around the injection well and resulting in a smaller COI.⁹¹ Conversely, a less permeable injection zone will hinder the flow of the wastewater and the reduction of pressure, causing a larger COI. A “darcy” is the accepted unit of porous permeability; a millidarcy is 1/1,000th of a darcy.

In performing its reservoir modeling, TexCom assumed the Lower Cockfield injection zone had a permeability of 500 millidarcies and assumed that the fault located 4,400 feet south of the site (EW-4400-S) was laterally transmissive within the Cockfield formation. In contrast, Lone Star's witness assumed a permeability of 80.9 millidarcies and performed two models, one assuming the EW-4400-S fault was laterally transmissive and the other assuming the fault was not transmissive. With these assumptions, TexCom calculated a COI of 750 feet (radius). Lone Star calculated a COI of 3,170 feet, assuming that fault EW-4400-S was transmissive, and a COI extending 14,300 feet (approximately 2.7 miles) north of the bore hole, assuming the fault was not transmissive and acted as a dam or flow barrier to the south. A larger COI would require further investigation into possible artificial penetrations in the enlarged area, or it could require a modification to operational parameters, such as a reduction in the maximum injection pressure and injection rate, to limit the COI to 750 feet beyond the borehole.

As mentioned previously, WDW315 was never put into wastewater disposal operation, but the previous owner did perform a fall-off test on the well, which was designed, in part, to determine permeability of the injection zone by measuring the reduction or "fall-off" of pressure after injecting water.

A fall-off test is performed by injecting a fluid (typically water) into an injection well for a specific period of time, followed by shutting in the well for an additional period of time. A pressure transducer placed in the well records the dissipation, or fall-off, of bottom hole pressures during the

⁹¹ Tr. at 191.

testing period. This data is analyzed using reservoir analysis software to determine various reservoir characteristics, such as permeability and the presence of pressure barriers.⁹²

The fall-off test conducted by the prior owner on WDW315 (now WDW410) calculated the permeability of the injection interval at 80.9 millidarcies,⁹³ which Lone Star used as a "conservative assumption" in its reservoir modeling. In contrast, TexCom assumed permeability of 500 millidarcies based on core samples taken when WDW315 was drilled in 1999, and based on its plans to enlarge the perforated injection interval for the well and to increase the number of perforations per foot of well casing. TexCom also argues that, in any event, if the permit is granted, another fall-off test will be conducted after it re-perforates the well casing and before injection operations begin; and if that fall-off test indicates a permeability less than 500 millidarcies and a larger COI, operational adjustments would be made to the permit (reduce injection rates and volumes) to compensate for the lower permeability.

TexCom's witness, Mr. Casey, testified that core analysis performed when WDW315 was drilled in 1999 indicated a permeability range of 550 to 685 millidarcies for the section that TexCom plans to perforate, and a literature review indicated estimates of reservoir permeability as high as 1,400 millidarcies. He stated that he expects an average permeability between 600 and 800 millidarcies after the well is re-perforated, but he used a 500-millidarcies permeability factor in his modeling to be conservative.⁹⁴

TexCom contends that the previous fall-off test performed on WDW315 does not represent the sand intervals that TexCom will perforate; consequently, it rejects Lone Star's argument that a permeability value of 80.9 millidarcies should be used in reservoir modeling. Mr. Casey testified

⁹² Lone Star Ex. 8, Grant direct at 23.

⁹³ TexCom Ex. 6, UIC Application, Vol. I, at 126.

⁹⁴ TexCom Ex. 6, UIC Application, Vol. I, at 126; TexCom Ex. 49, Casey direct at 22; Tr. at 189, 199, 202.

that, for unknown reasons, the previous owner of the well perforated about 90 feet at the shaliest (least permeable) parts of the Lower Cockfield. In contrast, TexCom will re-perforate the well across a total of 145 feet of sand intervals (including the 90 feet already perforated) in order to reposition the injection interval in a more permeable segment.⁹⁵ In response to Lone Star's statement that the additional sands to be used by TexCom would require a permeability factor of 1,400 millidarcies in order to bring the injection interval average up to 500 millidarcies, TexCom argues that Lone Star fails to account for TexCom perforating with four to six shots per foot, as opposed to the prior owner perforating with two shots per foot,⁹⁶ and Lone Star's averaging calculation failed to account for the high permeability sections adsorbing wastewater more quickly than other segments.⁹⁷

In TexCom's view, the real concern of Lone Star's witness, Mr. Grant, was that TexCom would not be required to re-perforate the injection interval as it has represented.⁹⁸ But it argues this concern is not founded and that it will re-perforate WDW315 as represented in the Application. TexCom emphasizes that its own interests are served by re-perforating the well because it would be difficult to inject wastewater into the sections perforated by the prior owner. In addition, the draft permits require TexCom to follow the plans and specifications of its Application, which specifies that WDW315 will be re-perforated as described.⁹⁹ Likewise, TexCom states, the UIC permitting rules require TexCom to submit to TCEQ a completion or workover report that must include fall-off testing, and, if appropriate, a recalculated AOR and COI based on the new tests.

⁹⁵ Tr. at 180, 201-202.

⁹⁶ TexCom Ex. 6, UIC Application, Vol. I, at 113.

⁹⁷ TexCom response brief at 15-16.

⁹⁸ Tr. at 1059-60.

⁹⁹ TexCom Ex. 6, UIC Application, Vol. I, at 113.

If the new testing shows TexCom's assumptions were not conservative enough, the TCEQ will require certain project parameters be changed to compensate for the unfavorable test results, such as reduction of the maximum allowable injection pressure.¹⁰⁰ Finally, TexCom stated that it had no objection to a permit condition proposed by Mr. Grant that would require TexCom to: (1) perform fall-off testing after re-perforating WDW315; and (2) if the permeability is found to be lower than 500 millidarcies, (a) re-calculate the COI, (b) evaluate any additional artificial penetrations located within the enlarged COI, and (c) make any needed changes to the operating parameters or undertake any corrective actions needed with respect to any endangered artificial penetrations. Under these conditions, TexCom believes any concerns about the permeability assumptions used in reservoir modeling are adequately addressed.¹⁰¹

Lone Star explains that reservoir modeling is important for understanding the consequences of a proposed UIC injection operation, and a reliable formation pressure model requires the use of valid, appropriately conservative input parameters. It also stresses that, based on data from the previous fall-off testing on WDW315, 100 feet of the 145 feet of net sands available for TexCom to inject into in the Lower Cockfield have an average permeability of only 80.9 millidarcies. In Lone Star's view, this conservative permeability factor from an actual fall-off test should be used in the reservoir modeling in order to be protective of USDWs and fresh water aquifers. Therefore, Lone Star's expert, Mr. Grant, used a permeability factor of 81 millidarcies and a 145-foot injection zone in performing his reservoir modeling (along with other assumptions that the parties do not dispute). As noted previously, this produced a COI of 3,170 feet, assuming fault EW-4400-S is laterally transmissive, and a COI extending 14,300 feet (approximately 2.7 miles) north of the bore hole, assuming the fault is not transmissive, compared to TexCom's 750-foot COI.¹⁰²

¹⁰⁰ Tr. at 1111-13. *See also*, 30 TAC §§ 331.45, 331.62, and 331.65.

¹⁰¹ TexCom closing brief at 32-34.

¹⁰² Lone Star Ex. 8, Grant direct at 51-54.

Lone Star emphasizes that approximately 100 feet of the 145 feet that TexCom will re-perforate have an average permeability of only 80.9 millidarcies. Thus, in order for the entire 145 feet of sands to have an average permeability of 500 millidarcies, as suggested by TexCom, the remaining 45 feet of available sands must have an average permeability of 1,400 millidarcies.¹⁰³ It also points out that the original owner of WDW315, Crossroads, estimated in its Application that the permeability of its entire proposed injection interval (430 feet) would average 1,400 millidarcies, but the subsequent fall-off test showed that those estimates were much too high.¹⁰⁴ Thus, Mr. Grant testified that, although theoretically possible, it is extremely unlikely that the remaining 45 feet of net sands available for TexCom in the Lower Cockfield will have a high enough permeability to bring the average for the entire 145 feet of available net sands up to 500 millidarcies, as assumed in TexCom's reservoir modeling.¹⁰⁵ Therefore, Lone Star argues that the permeability value used by TexCom is neither appropriate nor sufficiently conservative to adequately safeguard the USDWs and freshwater aquifers located above the injection zone.¹⁰⁶

Aligned Protestants repeat the arguments of Lone Star. They also criticize TexCom reliance on a core sample taken during the drilling of WDW315 from a single sand strata located above the current 100-foot perforated injection interval.¹⁰⁷ Therefore, the Aligned Protestants reject TexCom's contention that a 500-millidarcy permeability factor was a conservative assumption when the fall-off test performed on WDW315 indicated a permeability of only 80.9 millidarcies.¹⁰⁸

The PIC asserts essentially the same arguments as Lone Star and the Aligned Protestants.

¹⁰³ Tr. at 1130-31, 1145-46.

¹⁰⁴ See TexCom Ex. 11, at 153, 165.

¹⁰⁵ Tr. at 1134.

¹⁰⁶ Lone Star closing argument at 37-41.

¹⁰⁷ Lone Star Ex. 8 at 12, 27-29.

¹⁰⁸ Lone Star closing argument at 23-25.

The ED agrees with Lone Star's witness, Mr. Grant, that a pressure fall-off test should be conducted following completion of WDW410 to accurately determine the permeability of the injection zone. The ED notes that prior to beginning injection operations, TexCom would be required to obtain written approval from the ED.¹⁰⁹ In addition, the ED has proposed new permit provisions to clarify that TexCom will be required to perform a pressure fall-off test and submit the results in a completion report for WDW410 within 90 days of completing the well.¹¹⁰

3. Transmissivity of Fault Located 4,400 Feet South of Site

Although there is general disagreement about geologic faulting in the area of the proposed facility, the parties do agree that an east-west running fault exists in the Lower Cockfield formation approximately 4,400 feet south of the site (EW-4400-S). The Lower Cockfield injection interval already contains saltwater, brine, and other fluids, so if wastewater is injected into the proposed injection wells under pressure, it would displace the existing fluids in the injection interval in all directions. If the EW-4400-S fault is transmissive, the portion of the existing fluid in the injection zone that is displaced to the south will pass the fault.¹¹¹ But if that fault is not transmissive, it will act like a dam or barrier to the movement of the existing fluids in that direction. Further, if not transmissive, the injected wastewater would compress the existing fluid, which would then exert pressure backwards towards the well and cause the plume and COI to extend a greater distance in other directions.

The parties agree that a fall-off test can detect such pressure boundaries, but the previous fall-off test performed on WDW315 had a radius of investigation of only 1,500 feet and did not reach the fault located 4,400 feet to the south. TexCom assumed the fault is transmissive in performing

¹⁰⁹ 30 TAC 331.65(a)(4); *see also*, Draft Permits at page 2, Section V.

¹¹⁰ ED's closing argument at 11-12.

¹¹¹ According to TexCom's modeling, the actual waste plume would not reach the fault, but the existing fluids in the injection zone would be displaced in the area of the fault.

its reservoir modeling that calculated a 750-foot COI. Because it assumed the fault was transmissive between the Lower and Middle Cockfield formations, TexCom model inputs increased the thickness of the injection interval to 401 feet to the south of the fault to account for the net layer thickness of the Middle Cockfield.¹¹² In contrast, Lone Star calculated a COI of 3,170 feet, assuming the fault is transmissive (but using a 145-foot injection interval throughout), and a COI extending 14,300 feet (approximately 2.7 miles) north of the bore hole, assuming the fault is not transmissive.¹¹³

TexCom points out that in calculating the extent of the wastewater plume (2,770 feet), it was more conservative to assume the fault was horizontally transmissive, as the wastewater plume would spread farther under that assumption.¹¹⁴ Further, Dr. Langhus testified that before oil production began, the oil/water contact point was at the exact same depth, 4,990 feet below the surface, on both sides of the fault, indicating that the two sides were in communication and that the fault was horizontally transmissive.¹¹⁵ TexCom adds that the transmissivity of the fault can be verified by a fall-off test, and it does not object to a permit special condition specifying a radius of investigation extending 5,400 feet (1,000 feet beyond the fault) for the fall-off test that would be conducted after WDW315 is re-perforated (if the permit is granted), in order to confirm whether the fault is transmissive.¹¹⁶

Lone Star contends that the evidence established that the fault is likely not transmissive at the Lower Cockfield, and an appropriate conservative approach to reservoir modeling would be to

¹¹² TexCom Ex. 6, UIC Application, Vol. I, at 124; Lone Star Ex. 8, Grant direct at 48; Tr. 330, 343-44.

¹¹³ As discussed previously, TexCom and Lone Star also used different assumptions concerning the permeability of the injection zone.

¹¹⁴ Tr. at 322.

¹¹⁵ Tr. at 1360-62.

¹¹⁶ TexCom brief at 37; TexCom response brief at 18. 30 TAC § 331.66 authorizes the Commission to add additional requirements and conditions: "Additional Requirements and Conditions . . . (4) The commission may prescribe additional requirements for Class I wells to protect USDWs, and fresh or surface water from pollution."

treat the fault as non-transmissive. It stresses that the shales throughout the Cockfield formation have a muddy, dough-like consistency that smear along fault planes, and that this shale smearing can create a pressure seal that inhibits flow from one side of the fault to the other side.¹¹⁷ In addition, it notes, a pressure seal can occur by a sand-shale juxtaposition across the fault. This occurs when a non-permeable shale layer on one side of a fault aligns with a permeable sand layer on the other side of the fault. Lone Star's witness, Mr. Grant, testified that both shale smearing and sand-shale juxtaposition are likely at EW-4400-S in the Lower and Middle Cockfield formations, making it a non-transmissive fault.¹¹⁸ Therefore, Lone Star argues that the fault is not transmissive and that TexCom's reservoir modeling is not based on conservative assumptions to safeguard USDWs and fresh water aquifers.¹¹⁹

Aligned Protestants rely on the testimony of Mr. Grant and also argue that the more conservative approach to reservoir modeling would be to assume the fault is non-transmissive. They also cite ED-witness Santos' testimony that, in his experience, faults in general are not transmissive.¹²⁰

PIC noted the contradictory positions taken by TexCom's and Lone Star's experts concerning the transmissivity of fault EW-4400-S. But PIC stated that its concerns would be adequately addressed if TexCom were required by a special permit condition to run a fall-off test after re-perforation of WDW315 long enough to have a radius of investigation of 5,400 feet (1,000 feet beyond the fault).¹²¹

¹¹⁷ Tr. at 418-19; 934, 1078-79.

¹¹⁸ Lone Star Ex. 8, Grant direct at 48-49; Tr. at 1078-79.

¹¹⁹ Lone Star closing argument at 41-43.

¹²⁰ Tr. at 1290; Aligned Protestants closing argument at 25-26.

¹²¹ PIC closing argument at 10-11.

4. Other Issues Related to Reservoir Modeling

During the weekend break of the hearing, Staff witness Kathryn Hoffman again modeled the COI using different inputs than she had previously used, resulting in a COI ranging from 5,000 to 10,000 feet, as compared to her previously estimated COI of 150 feet. However, she testified that she believed her original calculation of a 150-foot COI was based on more reasonable assumptions and was more accurate.¹²² Aligned Protestants state that this new modeling raises concerns about Ms. Hoffman's ability to confirm the accuracy of TexCom's modeling. They also criticize her reliance on TexCom to re-perforate the well and conduct another fall-off test to verify the reservoir model inputs.¹²³

TexCom discounts Ms. Hoffman's revised modeling performed during the course of the hearing. It stresses that Ms. Hoffman herself testified that the results of this model run should be discounted and that she believed her original calculated 150-foot COI was more accurate. In TexCom's view, there should be no disagreement with Ms. Hoffman's rejection of her weekend modeling because she was the person who performed the modeling and no other person even reviewed her model inputs or procedures. Further, TexCom notes that even if Ms. Hoffman's most extreme estimate of 10,000 feet were accepted, it would still not affect TexCom's AOR, which was 2.5 miles (13,200 feet).¹²⁴

5. ALJs' Analysis Concerning Reservoir Modeling

The ALJs believe that in modeling the COI, TexCom should have used a permeability factor of 81 millidarcies rather than 500 millidarcies in its reservoir modeling, and it should have assumed

¹²² Tr. at 1206-12

¹²³ Aligned Protestants response to closing arguments at 27-28.

¹²⁴ TexCom closing brief at 38-39.

that the EW-4400-S fault was non-transmissive, in order to be conservative and protective of USDWs in the area. However, like Mr. Grant and PIC, the ALJs also believe these concerns can be adequately addressed by adding a special condition to the UIC permit requiring re-perforation of WDW315; requiring a new fall-off test conducted long enough to extend 5,400 feet from the well bore and to test the transmissivity of the fault; and requiring adjustments to the operating parameters to compensate for any adverse results determined from this testing.

Concerning permeability, in most cases an existing well with fall-off test results is not available. In those circumstances, it is reasonable to rely on literature searches and other secondary information in estimating permeability. This case is different, however, because an existing well with fall-off test results is available, and that testing produced permeability results much lower than estimated by other sources.

The evidence showed that the prior owner of WDW315 estimated permeability of 1,400 millidarcies based on literature searches and secondary information. However, the actual results from its fall-off test for WDW315 produced a vastly lower permeability factor of 80.9 millidarcies, and those results covered approximately 100 of the 145 feet that TexCom plans to use as the injection interval.

To achieve an average permeability of 500 millidarcies, as assumed by TexCom, would require the remaining available 45 feet to have significantly higher permeability than 500 millidarcies. Although TexCom questioned his methodology, Mr. Grant calculated that the remaining 45 feet would require a permeability of 1,400 millidarcies to achieve an average 500 millidarcies for the entire 145 feet. TexCom states that Mr. Grant failed to account in his calculation for its plan to re-perforate the existing 100 feet along with perforating the additional 45 feet, but the ALJs were nevertheless unpersuaded that an average permeability of 500 millidarcies can be achieved for the entire 145-foot injection interval.

The ALJs agree with TexCom that use of a 500 millidarcies permeability factor was conservative when calculating the potential extent of the waste plume; such modeling with higher permeability would show a larger waste plume. But assuming higher permeability reduces the modeled area of the pressure buildup in the COI and is not conservative. Therefore, in calculating the COI, the ALJs find that TexCom should have used a conservative permeability factor of 81 millidarcies in order to be protective of USDWs and underground freshwater.

The ALJs also find that, for purposes of calculating the COI, TexCom should have assumed that the fault EW-4400-S was non-transmissive. In this instance, the ALJs believe that both experts – Dr. Langhus on behalf of TexCom and Mr. Grant on behalf of Lone Star – were knowledgeable, credible witnesses who had an honest difference of opinion about whether the fault is horizontally transmissive at the offset between the Lower and Middle Cockfield. Dr. Langhus' observation that the oil/water contact point was at the exact same depth below the surface on both sides of the fault before oil production began is consistent with the two sides of the fault being in communication, but it is not conclusive.¹²⁵ In addition, Mr. Grant's testimony about shale smearing and sand-shale juxtaposition is a recognized phenomenon in geological science. Indeed, even TexCom witness Greg Casey testified that the fault was possibly transmissive, but that "the fault movement probably caused smearing of the clay on the formation which would inhibit or eliminate fluid movement across the fault."¹²⁶ Likewise, ED-witness John Santos testified that he did not believe the fault was transmissive.¹²⁷

In short, based on the credible evidence, the ALJs cannot state with any confidence whether fault EW-4400-S is transmissive or not. And if the fault to the south is not transmissive, the

¹²⁵ Tr. at 1361-62.

¹²⁶ TexCom Ex. 49, Casey direct at 33.

¹²⁷ Tr. at 1289. However, when read in context, it is not clear whether Mr. Santos was referring to the fault not being vertically transmissive or horizontally transmissive. Because the Middle Cockfield slipped down into the Lower Cockfield at the fault, these two members could have communication horizontally even if the fault was not transmissive vertically.

resulting COI will extend a greater distance to the north, potentially requiring further investigation of additional artificial penetrations in that area. Under these circumstances, the ALJs find that TexCom should have assumed that the EW-4400-S fault was not transmissive in performing a reasonably conservative reservoir model and in order to be protective of USDWs and underground freshwater resources.

Aligned Protestants express concern about Staff-witness Kathryn Hoffman's weekend modeling of the COI, using different model inputs than she had previously used. This resulted in a COI ranging from 5,000 to 10,000 feet, as compared to her previously estimated COI of 150 feet. However, the ALJs place no significance on her later modeling. At most, it shows that the models will produce varying results when different assumptions and inputs are used. Even Ms. Hoffman testified that she thought that modeling was inaccurate, and she believed her original modeling was based on more reasonable assumptions and was more accurate.

Even though the ALJs find that, in modeling the COI, TexCom should have used an 81-millidarcies permeability factor and should have assumed the EW-4400-S fault was non-transmissive, the ALJs do not find that these issues compel denial of TexCom's proposed UIC permits. As mentioned previously, TexCom has agreed to special conditions being added to the permit for WDW410 (now known as WDW315) to require re-perforation of that well as represented in the Application and to require a new fall-off test to be conducted on WDW410 long enough to encompass a radius of at least 5,400 feet (1,000 feet beyond the EW-4400-S fault). The special condition would also provide that, if the new fall-off test shows permeability to be lower than 500 millidarcies or that the EW-4400-S fault is non-transmissive, the ED would require TexCom to recalculate the COI, evaluate any additional artificial penetrations located within the enlarged COI, and make any needed changes to the operating parameters or undertake any corrective actions with respect to any endangered artificial penetrations.

The Intervenors expressed concern about relying on testing after the permit is issued. However, as discussed previously, in nearly all other UIC permit cases there is no existing well or fall-off testing, and the permit is issued with a requirement for subsequent testing and corresponding corrective action or modifications to the operating parameters, as required. In this case, both PIC and Lone Star witness Philip Grant agreed that the special permit conditions described above would satisfy their concerns about permeability and the transmissivity of the fault.¹²⁸ Further, the ALJs believe the overwhelming evidence showed that the massive, 1,000-foot thick Jackson Shale formation provides an exceptional upper confining unit. With the additional testing and modeling required by the special permit conditions, any concerns about additional artificial penetrations in an expanded COI or AOR can be addressed. Therefore, the ALJs believe that the additional testing and modeling requirements described above will result in a Facility that is protective of USDWs and other freshwater resources.

D. Traffic

Traffic is only one issue to consider in evaluating whether the installation and use of the injection well are in the "public interest." The Third Court of Appeals in *Texas Citizens vs. Railroad Commission*,¹²⁹ held that "road-safety and increased truck traffic" must be considered in making a "public interest" finding. PIC reasons that the Injection Well Act holds TCEQ to the same broad statutory language in § 27.051(a)(1) of the Water Code.¹³⁰ The ALJs agree with this position.

¹²⁸ PIC closing argument at 11; Tr. at 1064 and 1140-41.

¹²⁹ See footnote 12.

¹³⁰ Section 27.051(a)(1) of the Water Code provides that, "(a) The commission may grant an application in whole or part and may issue the permit if it finds: (1) that the use or installation of the injection well is in the public interest. . ."

As noted above, TexCom's facility is located on 27 acres of land at 16185 Creighton Road, near the corner of Creighton Road and FM 3083 on the east side of Conroe.¹³¹ In the 1990's this area had a mix of commercial, industrial and residential property. Residential homes are located on Creighton Road adjacent to TexCom's facility, and residential neighborhoods are located in the area. With Conroe's explosive growth, the complexion of this area is evolving into a primarily commercial and residential area, with residential communities being developed within five miles of TexCom's facility.¹³²

Currently, the proposed entrance to TexCom's facility (the driveway) is 700 feet west of the intersection of Creighton Road and Albert Morehead Road.¹³³ Creighton Road is a narrow, two-lane rural county road, with an unimproved shoulder. The road has a 30,000 pound maximum capacity and requires two turns to get into TexCom's facility. Aligned Protestants and Individual Protestants expressed concern for the safety of people living near and traveling on this road because the trucks cannot easily maneuver the turns and will cause the road to deteriorate rapidly. Daniel Wilds, Aligned Protestants' expert, testified that the heavy truck traffic will ultimately cause the asphalt in the traveling lanes to fail.¹³⁴

The opposite end of TexCom's properties has 72 feet of frontage property on FM 3083. TexCom proposes to construct an entrance along FM 3083 for incoming trucks to use rather than the entrance on Creighton Road.¹³⁵ FM 3083 is a rural two-lane state highway with asphalt pavement, improved shoulders, and a 55-60 mph speed limit. The Texas Department of Transportation (TxDot)

¹³¹ Aligned Protestants's Closing Argument at 30; TexCom Ex. 82.

¹³² Aligned Protestants's Closing Argument at 30.

¹³³ A map of this are is attached as Appendix B.

¹³⁴ Aligned Protestants's Response at 35.

¹³⁵ Tr. at 146; PIC's Closing Arguments at 12.

has jurisdiction over FM 3083.¹³⁶ Changing of the entrance to FM 3083 is contingent upon TxDot granting TexCom a driveway permit. Before granting the permit, TxDot must be satisfied that an entrance off FM 3083 is safe for all traffic.¹³⁷

TexCom's expert, Scott Graves, P.E., testified about the impact TexCom's waste disposal facility will have on traffic. In formulating his expert opinion, Mr. Graves accepted as true that TexCom will preschedule truck deliveries, will evenly distribute the deliveries through the day, that tanker trucks have a volume of 5,000 gallons, and they will use the facility entrance on Creighton Road.¹³⁸ According to Mr. Graves, these five routes provide access to the facility:

1. North and southbound traffic on IH-45 to Loop 336 to FM-3083 to Albert Morehead to Creighton Road;
2. Northbound IH-45 to Creighton Road to Creighton Road;
3. Northbound US 59 to FM-1314 to Loop 334 to FM-3083 to Albert Morehead to Creighton Road;
4. Westbound on FM-3083 to Albert Morehead to Creighton Road; or
5. Southbound on Jefferson Chemical Road to Albert Morehead to Creighton Road.¹³⁹

Mr. Graves believes that truckers will likely use "through-roads" without weight restrictions and with speed limits of 55 mph or greater.¹⁴⁰ In his opinion, truckers will most likely use the Loop 336 and FM-3083 routes (Routes 1, 3, and 4) because these are new highways without weight restrictions and provide connections from IH-45 and US 59.¹⁴¹ From FM 3083, trucks would have

¹³⁶ TexCom Ex. 8 at 11 and 15.

¹³⁷ TexCom's Closing Argument at 42; Tr. at 1437.

¹³⁸ TexCom Ex. 80, Graves at 8; TexCom's Closing Argument at 41; TexCom Ex. 33 at 178 (Surface Facility Application).

¹³⁹ PIC's Closing Argument at 12, TexCom Ex. 80 at 11.

¹⁴⁰ TexCom 80, Graves at 11.

¹⁴¹ PIC's Closing Argument at 13; TexCom Ex. 80 at 13.

to turn on Albert Morehead to Creighton Road to enter the facility.¹⁴² With the exception of the segment leading to the current driveway, he does not think that truckers would use the Crighton/Creighton route because this route is not significantly shorter than using Loop 336 to FM 3083, and Crighton Road has a load restricted bridge that most tanker trucks cannot cross. This route also has narrower roads, is in poorer condition, is difficult to navigate, has two turns on Creighton Road between FM 1314 and TexCom's facility, and has lower speed limits than the other routes.¹⁴³

Even if the truckers do use the Crighton/Creighton route (by residential homes), Mr. Graves opined that the increase in traffic the first year would be minimal and would remain small even if TexCom operated at full capacity.¹⁴⁴ Dr. Ross told Mr. Graves that for the first year of business, TexCom has a target waste disposal volume of 2,000,000 gallons per month. Based on this target, Mr. Graves calculated that 23 vehicles (including the employees' vehicles) would be entering and exiting the facility each day (based on six days per week) generating 46 vehicles per day on the roadways (23x2).¹⁴⁵

Alternatively, Mr. Graves estimated the project traffic if TexCom was accepting and injecting the maximum amount of waste each day, at a rate of 350 gallons per minute. Assuming that truckers delivered 504,000 gallons of wastewater over a period of 12 hours, Mr. Graves estimated that approximately 101 trucks would be coming and going to TexCom's facility per day. However, Mr. Grave spread these delivers over the 12-hour day, finding that only nine trucks per hour would be delivering waste. Adding the employees' vehicles to this, Mr. Graves predicted that 108 vehicles

¹⁴² TexCom Ex. 80, Graves at 80.

¹⁴³ TexCom's Closing Argument at 40; TexCom Ex. 80 at 13.

¹⁴⁴ TexCom's Closing Argument at 41; TexCom Ex. 80 at 17-19.

¹⁴⁵ TexCom Ex. 80, Grave direct at 8.

would be entering and exiting the facility each day, generating 216 vehicles per day on the surrounding roads.¹⁴⁶

Relying on TxDot's traffic count map of the area showing the Average Annual Daily Traffic and Average Daily Traffic, Mr. Graves was able to estimate the impact TexCom's business would have on the current traffic near the facility.¹⁴⁷ According to Mr. Graves, during the first year of operation the average daily traffic for the road segments near the facility that truckers may use is:

Loop 336	12,400 vehicles per day
FM-3983	9,400 vehicles per day
Creighton Road	1,200 vehicles per day
Jefferson Chemical Road	3,070 vehicles per day

Assuming that all trucks used the same route, Mr. Grave calculated the facility's traffic contribution to the total amount of traffic on the surrounding roads for both the first year and at maximum capacity. For the first year, Loop 336 would experience a 0.4 percent increase in traffic; FM 3083 would experience a 0.5 percent increase; Creighton Road would experience a 3.8 percent increase, all minimal increases according to Mr. Graves. At maximum capacity, Loop 336 would experience a 1.7 percent increase in traffic; FM 3083 would experience a 2.3 percent increase; and Creighton Road would experience a 17.9 percent increase, again small changes according to Mr. Graves.¹⁴⁸

Mr. Graves agreed that if TexCom relocated the entrance to FM 3083, truckers would not need to use either Albert Morehead Road or Creighton Road to enter the facility, thus discouraging

¹⁴⁶ *Id.*

¹⁴⁷ TexCom Ex. 80, Graves at 16; TexCom Ex. 83 (TxDot's traffic count maps).

¹⁴⁸ TexCom Ex. 80, Graves at 17.

the use of the Crighton/Creighton road route.¹⁴⁹ However, if this does not happen, Mr. Graves opined that the impact on traffic generated by TexCom would be minimal. Mr. Graves concluded that there are suitable roads to access TexCom's facility from major transportation corridors, and that the increased traffic will not create a situation that is adverse to the public interest.¹⁵⁰

PIC requests that TexCom be required to change the entrance to FM 3083, as Dr. Ross proposed, to lessen the public safety impact on traffic in accordance with § 27.051(a)(1) of the Water Code.¹⁵¹

The ED does not believe that traffic is a public interest issue in this matter. But, if the Commission finds it is, the ED asserts that TexCom showed that traffic would not be significantly influenced by its business. The ED accepted Mr. Graves' expert testimony that the traffic impact caused by TexCom would be minimal and that the truckers would usually use Loop 336 and FM 3083 to access the facility. The short part of Creighton Road that truckers would have to use if TexCom does not relocate the driveway to FM 3083, Mr. Graves contends, does not pose a safety issue, but is a comfort issue for the truckers because Creighton Road is in poor condition.

The Aligned Protestants dispute the accuracy of Mr. Grave's assumptions used to form his opinions. Mr. Brassow, a TexCom expert, testified that TexCom does not have a plan for scheduling truck deliveries. Trucks will arrive randomly. On occasions, truckers may need to park their trucks on Creighton Road until TexCom can accept the waste.¹⁵² Aligned Protestants also question the accuracy of Mr. Grave's expert opinion.¹⁵³ Mr. Graves said he viewed the site on a weekend and not

¹⁴⁹ PIC's Closing Argument at 13; TexCom Ex. 80 at 15.

¹⁵⁰ TexCom Ex. 80, Graves at 19-20.

¹⁵¹ PIC's Reply at 6.

¹⁵² Tr. at 499-501, and 531-532.

¹⁵³ Aligned Protestants Closing Argument at 33; Tr. at 151 and 505.

during business hours, so he did not see the traffic on Creighton Road.¹⁵⁴ As a result, Aligned Protestants and Individual Protestants maintain that Mr. Grave cannot adequately address this issue and that permitting this site will create safety hazards for the public on Creighton Road, particularly for those living close to TexCom's facility. The Aligned Protestants also question TexCom's ability to secure permission from TxDot to move the driveway to FM 3083, because TexCom has made no effort to obtain the driveway permit.¹⁵⁵

The ALJs agree that Creighton Road is not capable of handling the increased traffic and weight of trucks going to and from TexCom's facility. All parties agree that the portion of Creighton Road that all trucks would have to enter to get into the facility is narrow and in poor condition and is not designed to accommodate such heavy trucks. It also runs along side residential homes. While the overall increase in traffic may not seem significant to Mr. Graves, tanker trucks passing homes throughout the day would pose a risk to children of the area, and would increase the noise and congestion on this narrow, rural road. This condition gets significantly worse if the trucks have to park along Creighton road while waiting to enter TexCom's facility.

The ALJs agree that changing the location of TexCom's entrance to FM 3083 will obviate these concerns. FM 3083 is in good condition and was designed for heavier traffic. Therefore, the ALJs recommend that if TCEQ issues UIC permits to TexCom, that it include in the order a special condition that TexCom be required to relocate the entrance to FM 3083 prior to its accepting deliveries of nonhazardous waste.

¹⁵⁴ Aligned Protestants's Closing Argument at 33; Tr. at 1415.

¹⁵⁵ Tr. 1401-1403.

E. Protection of Surface Water and Groundwater

Section 27.051(a)(3) of the Water Code provides that the Commission may grant an Application and issue a UIC permit if it finds, among other things, that, "with proper safeguards, both ground and surface fresh water can be adequately protected from pollution."

TexCom believes it is not possible for injected wastewater at the proposed facility to reach any USDW. It notes that shale layers prevent vertical communication of fluids between the Lower Cockfield (where wastewater will be injected) and the Middle and Upper Cockfield, so there is no pathway for wastewater to migrate up out of the Lower Cockfield unless it travels horizontally to fault EW-4400-S and then moves vertically.¹⁵⁶ However, TexCom states that its modeling shows that over the lifetime of the facility, wastewater will only travel 2,770 feet radially from the borehole and will not even reach fault EW-4400-S, located 4,400 feet to the south. TexCom also contends that no artificial penetrations within the COI extend into the Lower Cockfield.

In addition, TexCom points out that if injected wastewater could reach fault EW-4400-S and migrate into the Middle or Upper Cockfield, the entire Cockfield sands are separated from all USDWs by the 1,000-foot thick marine shales of the Jackson Shale Formation, which form the upper confining zone.¹⁵⁷ Further, any artificial penetrations into the Upper or Middle Cockfield that lacked proper casing would naturally collapse and close within the Jackson Shale formation.¹⁵⁸ In TexCom's opinion, it would simply be impossible for any injected wastewater to escape the Injection Zone, located well below the USDWs, even if it somehow managed to migrate out of the Lower Cockfield injection interval and into the Middle or Upper Cockfield layers.¹⁵⁹

¹⁵⁶ TexCom Ex. 49, Casey direct at 35.

¹⁵⁷ *Id.* 30 TAC § 331.2(26) defines confining zone as: "A part of a formation, a formation, or group of formations between the injection zone and the lowermost underground source of drinking water or freshwater aquifer that acts as a barrier to the movement of fluids out of the injection zone."

¹⁵⁸ Tr. at 441.

¹⁵⁹ TexCom Ex. 49, Casey direct at 35.

Finally, TexCom states that its UIC Application calls for it to build and operate the wells in accordance with applicable standards and regulatory requirements, which are designed to protect water resources, and the wells will be continuously monitored and annually tested for proper operation and safety.¹⁶⁰ TexCom also notes that the adequacy of well construction and operating parameters was not contested.¹⁶¹

Lone Star disputes TexCom's contention that it is impossible for wastewater to reach any USDW because, as discussed previously, TexCom's reservoir modeling assumed a 500-millidarcy permeability factor, which Lone Star believes was too high, producing a 750-foot COI. In contrast, one of Lone Star-witness Grant's calculations using an 81-millidarcy permeability factor produced a COI of up to nearly 2.7 miles, and that expanded COI would include a number of undocumented artificial penetrations. Therefore, Lone Star believes TexCom's proposed injection activities can endanger USDWs and fresh surface water sources.¹⁶²

Aligned Protestants reiterate that the parties have significant disputes concerning reservoir modeling and the geologic suitability of the location of the proposed facility, as discussed previously. They also stress that the industrial contaminants to be included in the proposed wastewater stream are hazardous and potentially threatening to human health and the environment. In Aligned Protestants' view, a catastrophe would occur for Montgomery County if its groundwater source for drinking water is somehow contaminated by the wastewater to be disposed by TexCom. They complain that, even though the wastewater to be disposed will be classified as "nonhazardous," the categories of nonhazardous waste that TexCom proposed to inject are "very non-specific in terms of the types of wastes that are to be disposed."¹⁶³ Aligned Protestants state that the wastewater could

¹⁶⁰ *Id.* at 58.

¹⁶¹ TexCom closing argument at 42-43.

¹⁶² Lone Star reply brief at 47-48. Lone Star also makes arguments concerning surface water protection that are discussed in the PFD concerning the surface facility. *See* SOAH Docket No. 582-07-2674, TCEQ Docket No. 2007-0362-IHW (April 25, 2008).

¹⁶³ Aligned Protestants Ex. 2, Pearce direct at 15.

include herbicides, pesticides, metals, and caustic materials that could degrade equipment and increase the risk for potential contamination.¹⁶⁴ In short, Aligned Protestants argue that TexCom has not established that the sole source of drinking water for Montgomery County will be protected from contamination from the proposed industrial wastewater injection wells.¹⁶⁵

Individual Protestants point out that TexCom cannot satisfy the requirements of 30 TAC § 333.121(c)(4) that there be a sequence of permeable and less permeable strata between the confining zone (Jackson shale) and the lowermost USDW; that the piezometric surface of the fluid in the injection zone is less than the piezometric surface of the lowermost USDW or freshwater aquifer; or that there is no USDW or freshwater aquifer present. Under these circumstances, the rule requires TexCom to demonstrate that abandoned boreholes or other conduits would not endanger the USDWs, freshwater groundwater, or surface water. But for the reasons discussed in previous sections, the Individual Protestants argue that TexCom cannot satisfy the burden of demonstrating that abandoned wells within the COI would not endanger surface or groundwater in the area. Therefore, Individual Protestants argue that TexCom has not satisfied the requirement of protecting groundwater and surface water.¹⁶⁶

The ED simply states that the previous analysis concerning geologic suitability and reservoir modeling establish that the proposed injection well facility will be protective of surface water and groundwater.¹⁶⁷

As discussed in the previous sections, the ALJs find that the area of the proposed injection-well is geologically suitable. The ALJs also recommend that special conditions be added to the permit for WDW410 to require: re-perforation of well WDW315; new fall-off testing to establish

¹⁶⁴ *Id.* at 19-20.

¹⁶⁵ Aligned Protestants closing argument at 33-37.

¹⁶⁶ Individual Protestants closing statement at 13-14.

¹⁶⁷ ED closing argument at 13.

the permeability of the Lower Cockfield injection interval and to establish whether the EW-4400-S fault is transmissive; new reservoir modeling based on the new fall-off test results; and alterations to operating parameters or other corrective action, as needed, to account for any adverse results that may be determined. With the adoption of these special conditions, the ALJs find that both ground and surface fresh water will be adequately protected from pollution from the proposed UIC wells if TexCom operates the injection activities in compliance with the terms and conditions of the applicable rules and regulations, the proposed permits, and the Application (which is incorporated into the permits). The Water Code § 27.051(a)(3) requires proof that, "with proper safeguards, both ground and surface fresh water can be adequately protected from pollution." If the additional conditions described above are adopted, the ALJs find that the evidence in this case does establish that ground and surface fresh water would be adequately protected.

F. Public Interest Requirements

The term "public interest" is not defined in either the Water Code or TCEQ's applicable regulations. But the Water Code does identify two factors that must be considered when evaluating whether the use or installation of a Class I UIC is in the public interest. The first is the applicant's (and its related entities') compliance history. The second is whether there is a practical, economic, and feasible alternative reasonably available.¹⁶⁸

The ED agrees that TCEQ may consider other factors when determining whether the use and installation of a nonhazardous UIC well is in the public interest, but only if it is set out in case law.¹⁶⁹ The ED relies on the 1976 Supreme Court decision *NAACP v. Federal Power Commission*¹⁷⁰ to define "public interest." In this case, the Supreme Court held that "the use of the words 'public interest' in a regulatory statute is not a broad license to promote the general public welfare. Rather

¹⁶⁸ § 27.051(d)(1) and (2); 30 TAC § 331.121(b).

¹⁶⁹ ED's Closing Argument at 14.

¹⁷⁰ 425 U.S. 662 (1976).

the words take meaning from the purposes of the regulatory legislation."¹⁷¹ The purpose of the Injection Well Act is set out in § 27.003 of the Water Code and states:

It is the policy of this state and the purpose of this chapter to maintain the quality of fresh water in the state to the extent consistent with the public health and welfare and the operation of existing industries, taking into consideration the economic development of the state, to prevent underground injection that may pollute fresh water, and to require the use of all reasonable methods to implement this policy.¹⁷²

The ED emphasized that the words "public interest " do not permit a "broad unfettered interpretation " of what must be considered in this matter, and posits that to use a public interest determination as a substitute for zoning or county waste regulations is wrong.¹⁷³ The ED contends that the term "public " is not restricted to Montgomery County residents nor does it matter that the nonhazardous waste TexCom would dispose may not originate in Montgomery County.

According to the ED, TCEQ must consider three factors to determine whether TexCom's project is in the public interest: (1) TexCom's compliance history; (2) whether practical economic, and feasible alternatives to an injection well are reasonably available; and (3) whether the purposes set out in § 27.003 of the Injection Well Act are satisfied. If the underground injection wells would not pollute fresh water, would maintain the quality of fresh water, and would promote economic development, then according to the ED, TexCom's project would serve the purposes of the Injection Well Act.

¹⁷¹ *Id* at 669.

¹⁷² ED's Closing Argument at 15.

¹⁷³ ED's Closing Argument at 19.

1. Compliance History

Ms. Hoffman testified that TexCom's compliance history classification is average by default and TexCom's compliance history score is 3.01. This is the classification and score given if TCEQ has no compliance history about a site.¹⁷⁴ This classification is sufficient for a permit issuance.¹⁷⁵

The Protestants take issue with this position, noting that average by default means TexCom's history is insufficient to support any classification. Lone Star points out that the ED ignored what little history TexCom does have with TCEQ. TexCom received a notice of violation because TexCom failed to respond to four non-report notices (September 12, 2005; April 27 and July 10, 2006; and February 1, 2007) and failed to post signs and paint the wellhead of the existing well. Given that TexCom is a new company, this history is particularly important because it demonstrates "TexCom's lack of experience or know-how with Class I wells," according to Lone Star.¹⁷⁶

The Protestants point out that TexCom is in the process of trying to secure a new 60-percent partner on this project for an infusion of capital, begging the question of TexCom's solvency. At the time of the hearing, TexCom indicated that Foxborough Energy Corp. (Foxborough) is that partner. Nothing is known about Foxborough other than it may be TexCom's 60-percent partner. The Protestants insist that the compliance history of the new entity must also be considered and evaluated before any permits can be issued.

The ALJs are aware the TexCom is new to the business of nonhazardous waste disposal by a Class I injection well and that it purchased the site because it had an injection well already in place. This advantage saved TexCom the cost of drilling its first well, and it removed a great deal of

¹⁷⁴ TexCom Ex. 62, Hoffman Deposition at 15.

¹⁷⁵ TexCom Ex. 62 at 19. ED's Closing Argument at 17.

¹⁷⁶ Lone Star's Reply at 50; Tr. 37-43; Lone Star Ex. 16.

uncertainty about the underground geology. The well was drilled to the same level TexCom intends to use for disposing of waste, and the prior owners conducted fall-off testing. The question is whether TexCom has a satisfactory compliance history. Because the company has no history other than its initial problems with reporting, signage, and painting, the ED correctly assessed it as average by default. To do otherwise would penalize all new companies irrespective of the qualifications of the new business to operate a disposal system. It is a neutral classification indicating that the business has no history with TCEQ.

2. Disposal Alternatives

As to whether any disposal alternative exists, Ms. Hoffman testified that she had reviewed TexCom's public interest demonstration (Section XIV, Attachment C, of the Application) and found that it complied with the applicable rules and statutes.¹⁷⁷ The ED relied predominantly on the Application and Dr. Ross' testimony in reaching his conclusion that permitting TexCom's UICs was in the public interest. Dr. Ross testified that UIC wells provide "a safe, responsible, and state approved means to dispose of Class I nonhazardous wastewater generated specifically by generators within the county."¹⁷⁸ In his opinion, underground injection wells are superior to all other methods of disposal, including landfills, incineration, or direct discharge into surface waters.¹⁷⁹ Mr. Casey agreed and opined that no practical, economic, and feasible alternatives exist for the disposal of the type of nonhazardous waste that TexCom plans to dispose.¹⁸⁰

PIC noted that other than the presence of the existing well, TexCom offered no meaningful evidence on this issue. PIC pointed out that as the applicant TexCom had the burden of proof to show what other disposal methods were available and why an UIC is the best alternative. The

¹⁷⁷ ED Ex. 1 at 6 and 23.

¹⁷⁸ Tr. at 102; ED's Closing Argument at 17.

¹⁷⁹ ED's Closing Argument at 17.

¹⁸⁰ TexCom Ex. 49 at 55-57.

Protestants listed several alternatives available to dispose of nonhazardous waste, *i.e.* commercial incineration and landfill disposal after treatment of the wastewater and solidification. Ray Shull, Lone Star's expert, testified that publicly owned treatment works can accept Class I nonhazardous industrial wastewater that is retreated by an industrial wastewater generator.¹⁸¹ In addition, the businesses in Montgomery county that do generate nonhazardous waste have found alternative disposal methods indicating that there is no need for TexCom's proposed business.

Likewise, the Protestants disagree that TexCom has shown that there are no other practical, economic, or feasible alternatives. They contend that TexCom failed to prove this issue except to say that underground injection was the most feasible alternative for the disposal of nonhazardous waste. The Protestants suggest that the reason TexCom did not consider any alternative is because TexCom had purchased the site with the well in place at a bargain price.

It is evident to the ALJs that theoretical alternatives to a UIC exist. And as argued by PIC, TexCom was required to present alternatives with "a measure of specificity " to comply with the Water Code's requirement that the Commission consider whether there is a practical, economic, and feasible alternative to an UIC that is reasonably available. TexCom's argument that the injection method is the only practical method of disposal because a well already exists, does not excuse TexCom from discussing other alternatives. However, TexCom did discuss other alternatives in its Application in Attachment C and through its witnesses that is sufficiently detailed. Therefore, the ALJs agree that TexCom has adequately addressed this issue.

3. Purposes of the Injection Well Act

While the ED does not believe *Texas Citizens* applies to this case, if it does, the ED maintains the record still supports a finding that the installation and use of the wells are in the public interest and that TexCom has satisfied all the public safety requirements. The Protestants disagree and

¹⁸¹ PIC Closing Argument t 16; Tr. at 592-595.

accuse the ED of giving insufficient attention to this issue. They charge that Ms. Hoffman is not trained to evaluate a claim for public nuisance¹⁸² and that she only conducted a limited technical review of this issue. In their view, the ED failed to conduct "any qualitative analysis on whether the proposed injection project would be in the public interest."¹⁸³

The Protestants interpret § 27.003 of the Code and *Texas Citizens* differently than the ED. The Protestants insist that the most critical factor in considering TexCom's Application for the UIC permits "is whether any benefits to be obtained from this project would be outweighed by the threat to the sole source of water for a very large population."¹⁸⁴ To support their strenuous objections to the project, the Protestants emphasized that Montgomery County is the third fastest growing county in Texas,¹⁸⁵ and that since WDW315 was permitted in 1994, Montgomery County has experienced substantial growth. In the year 2000, the population was approximately 293,000 and by the time of the hearing it was approximately 423,000. This significant growth is continuing, with the entire population dependent on the Evangeline Aquifer.¹⁸⁶ The possible pollution of any USDW, the Protestants urge, is a critical public interest factor that neither the ED or TexCom has adequately addressed.

With this growth, the complexion of the area near TexCom's site is changing into a residential and commercial area. Residential developers have begun investing in property for future community development. Montgomery County Judge Alan Sadler expressed serious reservations about the "chilling effect " TexCom's facility would have on both residential and commercial

¹⁸² Tr. at 1267.

¹⁸³ Aligned Protestants' Closing Argument at 39.

¹⁸⁴ Aligned Protestants' Closing Argument at 40.

¹⁸⁵ Aligned Protestants Ex. 5 at 6.

¹⁸⁶ Aligned Protestants Ex. 5 at 6 and 9; Tr. at 1049.

development of the area.¹⁸⁷ This is not only due to the possible contamination of the water supply, but also due to the increase truck traffic in the area, the "eyesore" of this site, increased noise from the trucks, the odor from trucks and the storage tanks, and the risk associated with spills from both trucks and the surface facility.

The Protestant's also challenge TexCom's assertion the this project will provide a service to the businesses in Montgomery County that generate and must dispose of nonhazardous waste.¹⁸⁸ Judge Sadler testified that no one has expressed support for TexCom's facility "because their needs were not currently being met."¹⁸⁹ While Dr. Ross testified that TexCom was targeting large companies in Montgomery County such as Huntsman Chemical, TexCom presented no evidence of negotiations or contracts with any business in Montgomery County.

Expenses in Montgomery County would increase because of TexCom's facility. Roads would need to be repaired more frequently due to the trucking traffic. Drainage ditches would need to be monitored around the facility to ensure that nonhazardous waste is not seeping off TexCom's property. Emergency services must be prepare to respond to spills that may include unidentified waste.¹⁹⁰ According to Judge Sadler, Montgomery County would also have to absorb the additional expense of having the County's Environmental Health Department oversee TexCom's compliance with environmental regulations and address the public inquiries about the facility.¹⁹¹

The ALJs are mindful that most communities do not want a waste disposal system as their neighbor. But waste disposal facilities are necessary. The Protestants' concern about the

¹⁸⁷ Aligned Protestants Ex. 6 at 16-17.

¹⁸⁸ Aligned Protestants' Closing Argument at 43. *See* TexCom Ex. 1 at 5-6 and Tr. at 102.

¹⁸⁹ Aligned Protestants Ex. 5 at 16; Tr. At 834-835.

¹⁹⁰ Aligned Protestants' Closing Argument at 45; ap Ex. 3 at 20, Aligned Protestants Ex. 4 at 13-15.

¹⁹¹ Aligned Protestants Ex. 5 at 15.

contamination of Montgomery County is a serious issue. However, TexCom and the ED have shown that fluid from the Lower Cockfield cannot migrate through the shales of the Cockfield formation and through the Jackson Shale formation. The issue before the ALJs is whether TexCom has met the requirements of the Code and TCEQ's regulations. As discussed above, TexCom has met these requirements, provided the proposed conditions are made a part of the order.

G. Other Issues Concerning UIC Permit Applications

Aligned Protestants point out that TexCom has never operated a Class I injection well and has no experienced personnel in this field. They also cite evidence that a privately held investment firm called Foxborough will become a new majority partner in TexCom, but little information was provided about this entity.¹⁹² Therefore, Aligned Protestants argue that TexCom's lack of experienced personnel and an uncertain financial status raise questions about whether can carry out a flawless operation, as it claims.¹⁹³

Like the Aligned Protestants, the Individual Protestants express concern about the lack of information regarding Foxborough, including no information about its environmental history. They believe that the identity and environmental history of this new owner in TexCom are important issues for the Commission to consider. The Individual Protestants argue that a permit should not be issued when so little information is available about the new majority owner.¹⁹⁴

In response, TexCom states that the applicant in this case is TexCom Gulf Disposal, LLC, regardless of the ownership interests of other individuals or groups. It points out that none of the applicable statutes or rules require TexCom to make any kind of demonstration regarding its

¹⁹² Tr. at 138-43.

¹⁹³ Aligned Protestants closing arguments at 44-45.

¹⁹⁴ Individual Protestants closing statement at 17-18.

individual investors, particularly an investor or group that acquires an interest in the company long after the ED has completed its review of the Application.¹⁹⁵

The ALJs find that TexCom's new partner (Foxborough) and TexCom's lack of prior experience in operating a Class I UIC facility do not compel denial of its Applications. As noted by TexCom, it is the applicant, not Foxborough, and the rules do not require detailed information about its investors. Although TexCom does not have prior experience operating a UIC well, its Application, which is incorporated into its permit, requires it to have competent, qualified employees. In addition, the facility and operation is subject to numerous reporting requirements, as well as inspection and monitoring by the TCEQ.

VI. ASSESSMENT OF REPORTING AND TRANSCRIPTION COSTS

By Order No. 1, the ALJs required a transcript to be prepared in this case because the hearing was scheduled to last longer than one day. *See* 30 TAC § 80.23 (b)(4). TexCom paid the transcription costs totaling \$8,616.50. The parties have reached an agreement on the allocation of these costs. Under the agreement, TexCom is responsible for the \$25.00 charge for "E-Transcript" and the \$553.00 charge for "Exhibit Copies – Oversize or Color." The responsibility for the remaining \$8,038.50 is allocated as follows:

- TexCom \$4,019.25
- Aligned Protestants \$2,009.62
- Lone Star \$2,009.63

¹⁹⁵ TexCom response brief at 29.

The ALJs find this agreed allocation of transcript costs is fair and reasonable, and they recommend that the Commission approve the agreed allocation and require Aligned Protestants and Lone Star to reimburse TexCom for the amounts shown above.

VII. CONCLUSION AND RECOMMENDATION

The ALJs recommend that the Commission approve TexCom's UIC well applications with the following additional special conditions:

- Relocation of the entrance to the facility from Creighton Road to FM 3083;
- Before injection operations begin on WDW410, TexCom shall: re-perforate the well as represented in the application; after re-perforation, perform a new fall-off test extending at least 5,400 feet from the borehole (1,000 feet beyond the EW-4400-S fault); remodel and recalculate the waste plume, AOR and the COI utilizing the results of the new fall-off test; evaluate any additional artificial penetrations located within any enlarged AOR; and make any needed changes to the operating parameters or undertake any corrective actions with respect to any endangered artificial penetrations. Due to the concerns of the Protestants, the ALJs also recommend that the Protestants be allowed to observe the fall-off testing and to review the results of the test and of TexCom's new modeling, if Protestants desire to do so.

SIGNED April 25, 2008.

CATHERINE C. EGAN
ADMINISTRATIVE LAW JUDGE
STATE OFFICE OF ADMINISTRATIVE HEARINGS

THOMAS H. WALSTON
ADMINISTRATIVE LAW JUDGE
STATE OFFICE OF ADMINISTRATIVE HEARINGS