RAILROAD COMMISSION OF TEXAS

HEARINGS DIVISION

AMENDED PROPOSAL FOR DECISION

OIL & GAS DOCKET NO. 7C-0298167

THE APPLICATION OF APPROACH OPERATING LLC PURSUANT TO STATEWIDE RULE 9 FOR A PERMIT TO DISPOSE OF OIL AND GAS WASTE BY INJECTION INTO A POROUS FORMATION NOT PRODUCTIVE OF OIL AND GAS, BAKER B LEASE, WELL NO. 110, HOLT RANCH (CONSOLIDATED) FIELD, CROCKETT COUNTY, TEXAS

HEARD BY: Brian Fancher – Technical Examiner
John Dodson –Administrative Law Judge

PREPARED BY: Paul Dubois – Technical Examiner
Jennifer Cook –Administrative Law Judge

APPEARANCES:

APPLICANT:	**REPRESENTING:**
George Neale	Approach Operating LLC
John Miller, P.E.	
Ted Oldham	
J. K. Brite	

PROTESTANTS:	**REPRESENTING:**
Mike Gershon	Crockett County Groundwater Conservation District
Troupe Brewer	
Slate Williams	
Ronald Green	

PROCEDURAL HISTORY

Application Published:	September 2, 2015
Application Filed:	August 13, 2015
Protest Received:	July 24, 2015
Request for Hearing:	September 4, 2015
Notice of Hearing:	September 25, 2015
Hearing Held:	November 12, 2015
Transcript Received:	December 1, 2015
Record Closed:	July 5, 2016
Original Proposal for Decision Issued:	September 7, 2016
Amended Proposal for Decision Issued:	September 27, 2016

STATEMENT OF THE CASE

Approach Operating, LLC ("Approach") is seeking authority pursuant to Statewide Rule 9 (16 Tex. Admin. Code §3.9) to dispose of oil and gas waste by injection into a formation not productive of oil or gas at the Baker B Lease, Well No. 110, in the Holt Ranch (Consolidated) Field, Crockett County, Texas. The Baker B No. 110 is an existing well that will be converted to disposal service. Approach seeks non-commercial authority to dispose of 10,000 barrels per day of its own produced saltwater and RCRA-exempt waste fluids from its Baker B Lease into the Clear Fork Formation in the depth interval from 2,700 feet to 3,140 feet. The application is protested by the Crockett County Groundwater Conservation District ("CCGCD").

The Technical Examiner and Administrative Law Judge (collectively, "Examiners") recommend the application be granted and the commercial disposal permit issued. Approach has met its burden of proof under Chapter 27 of the Texas Water Code and the Commission's Statewide Rule 9.

The original Proposal for Decision ("PFD") incorrectly identified the application to be for a commercial disposal well. Approach has requested authority for a non-commercial disposal well. Because Approach has requested authority for a non-commercial disposal well, Approach was not required to notify the surface owners of tracts of land that adjoin the disposal tract. The amended PFD corrects this error, specifically as it appeared in Finding of Fact No. 1.

APPLICABLE LAW

The Railroad Commission may grant an application for a disposal well permit under Texas Water Code §27.051(b) and may issue a permit if it finds:

1. The use or installation of the injection well is in the public interest;

2. The use or installation of the injection well will not endanger or injure any oil, gas, or other mineral formation;

3. With proper safeguards, both ground and surface fresh water can be adequately protected from pollution; and

4. The applicant has made a satisfactory showing of financial responsibility as required by Section 27.073.

DISCUSSION OF THE EVIDENCE

APPLICANT'S EVIDENCE

At the hearing, Approach offered evidence and testimony from John Miller, P.E., a consulting petroleum engineer with FTI Platt Sparks, and Theodore Oldham, Approach's chief operations geologist.

Notice

On September 2, 2015, notice of the application was published in the Ozona Stockman, a newspaper of general circulation in Crockett County, Texas. On July 9, 2015, Approach notified the owner of the surface tract, the Crockett County Clerk, and operators of wells within one-half mile of the proposed disposal well.

In its initial application and notice, Approach had requested an interval from 2,300 feet to 3,140 feet, which included a portion of the San Andres Formation. At the beginning of the hearing, Approach lowered the top of the interval to 2,700 feet, removing the San Andres Formation as part of the injection interval. The Examiners conclude no further notice was required as this revised injection interval was within the interval previously noticed.

Facility Design and Operation

The Baker B Lease (No. 17263) Well No. 110 (API No. 42-105-41375) is located on a 6,238-acre lease about 13 miles north of Ozona, Texas. The well construction was finished on November 30, 2012 at a depth of 8,052 feet and plugged back to 7,986 feet. The well was completed with three casing strings:

- Surface casing (13 3/8-inch) was set at 810 feet and cemented to the surface with Class C cement;

- Intermediate casing (8 5/8-inch) was set at 2,113 feet and cemented with 500 sacks of Class C cement to a depth of 94 feet based on cement volume calculations; and

- Long-string casing (5 1/2-inch) was set to a depth of 8,052 feet and cemented with 1,210 sacks of Class H cement to a depth of 1,250 feet as determined on a cement bond log.

The Baker B Well No. 110 has not been completed for production. The long-string casing has not been perforated. Commission records indicate the well is currently listed as a "shut-in producer." The availability of an un-used wellbore was a significant aspect of its selection to be converted to injection service. To convert the wellbore to injection service, Approach proposes the following modifications and operating parameters:

- Approach will set a cast iron bridge plug at a depth of 3,240 feet and place 20 feet of cement on top of the plug;

- Approach will perforate the long-string casing in the injection interval from 2,700 feet to 3,140 feet;

- Approach will set 2 7/8-inch injection tubing with a packer at a depth of 2,650 feet, 50 feet above the top of the injection interval;

- The maximum daily injection volume will be 10,000 bwpd and the estimated average daily injection volume will be 6,500 bwpd;

- The maximum surface injection pressure will be 1,350 pounds per square inch gauge ("psig") and the average surface injection pressure will be 500 psig; and

- Injected waste will be limited to produced salt water and non-hazardous oil and gas waste exempt from regulation under the Resource Conservation and Recovery Act that is produced on Approach's Baker B Lease. Approach is not seeking authority for commercial disposal.

Groundwater, Geology and Hydrocarbon Resources

The Commission's Groundwater Advisory Unit (GAU) identified the base of usable quality water (BUQW) to be at a depth of 650 feet. The GAU required protection of fresh water resources in the interval from the land surface to 20 feet below the base of the Cretaceous-age beds. The base on the Cretaceous is estimated to occur at a depth of 650 feet, the BUQW. The base of the underground sources of drinking water ("USDW") is estimated to be at approximately 900 at feet. The GAU concludes that, if otherwise compliant with Commission rules and guidance, drilling and using this disposal well and injecting oil and gas waste into the subsurface stratum will not endanger freshwater strata in the area. The GAU determination was based on the original injection interval of 2,300 feet to 3,140 feet. Lowering the top of the interval from 2,300 feet to 2,700 feet will not alter the GAU's conclusion.

Lowering the top of the injection interval from 2,300 feet to 2,700 feet removes the San Andres Formation from the disposal interval. A well log from the subject Baker B No. 110 well indicates a 400-foot thick shale stratum from about 2,180 feet to about 2,640 feet. Mr. Miller stated there is about 100 feet of shale below the injection interval also.[1] The gamma ray log of the Baker B Well No. 110 did not appear to be significantly different from the overlying shale stratum. However, Mr. Miller estimated the proposed disposal interval included about 49 feet of thickness with about 8 percent porosity.[2] Mr. Miller also stated that his assessment of the suitability of the disposal interval is based on mud logs from the Baker B Well No. 110 that "showed a significant increase in the amount of limestone and dolomite in that interval."[3]

The San Andres and Clear Fork Formations are not productive in this area. The nearest production is from the Dean, Wolfcamp and Ellenburger Formations, which exist at depths from about 3,900 feet to 8,400 feet. Approach is the operator of wells on the Baker B Lease, and is actively developing the Wolfcamp Formation in this area.

A review of the records of the U. S. Geologic Survey did not identify any seismic events with a magnitude greater than 1.0 within a 9.08 kilometer radius (100 square miles) of the proposed disposal well between January 1, 1973 and July 5, 2015.

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[1] Tr. 38: 2-11.

[2] Tr. 54: 10-25.

[3] Tr. 55: 17-23. The referenced mud logs were not offered into evidence.

Area of Review

Three vertical wellbores are located within the one-quarter mile area of review. One of the wells, the Baker B No. 101 (API No. 42-105-41007) was an abandoned wellbore that was drilled in 2009 to a depth of 2,074 feet and was immediately plugged and abandoned. While attempting to set surface casing, Approach encountered a bridge (obstruction) in the wellbore at a depth of 905 feet. The wellbore was abandoned because of the obstruction. The depth of deepest fresh water in this wellbore was reported to be at 725 feet. Evidence of plugs set in the abandoned Baker B No. 101 well on October 13 and 14, 2009, comes from two sources. First, there are two plugs in the wellbore as documented on the Form W-3 filed on March 18, 2010:

- A 1,502 cubic foot (1,120-sack) plug was set through tubing placed at 776 feet. The top of cement was tagged at a depth of 729 feet.

- A 138 cubic foot (100-sack) plug was set from a depth of 93 feet and circulated to the surface.

Apart from the plugs, the wellbore was filled with 8.6 pound per gallon drilling mud. Based on this information, it is not certain that the bottom plug extends to a depth of 905 feet (at the bridge/obstruction) or to 900 feet (at the USDW, as reported for the proposed disposal well, the Baker B. No. 110, 1,200 feet to the south). However, the well was plugged from 50 feet below the base of fresh water at 725 feet. Further, the wellbore may be open from the top of the bottom plug at 729 feet to the base of the surface plug at 93 feet.

A second piece of evidence provides a little more information. A "morning drilling report" indicates that on October 14, 2009, additional plugging material was placed between the two plugs but was not documented on Form W-3. The morning drilling report (Approach Exh. No. 11) states that 10 yards of sand and gravel were placed into the well followed by 8.5 cubic yards of ready mix concrete. A cement slurry placed on top of that material was later tagged at a depth of 90 feet. A similar corroborating note was included on the Form W-15 Cementing Report filed with the Form W-3. Approach asserts that the BUQW has been isolated with cement in this well.

The other two wells, the Baker B Nos. 101X (API No. 42-105-) and 104 (API No. 42-105-), are active producing wells assigned to the Holt Ranch (Consolidated) Field and are located nearly one-quarter mile to the north and east, respectively. These wells penetrate the disposal interval. Baker B No. 101X was drilled about 75 feet from the abandoned location of Baker B No. 101.

Within one-half mile of the proposed disposal well are three plugged and abandoned wellbores and five producing wells. In addition, Approach has permitted six horizontal well locations that traverse the one-half mile area of review, but these two wells will be completed in the Wolfcamp Formation, several thousand feet below the disposal interval. Approach is the only operator of wells within one-half mile of the proposed disposal well.

Public Interest and Need for Additional Disposal Capacity

Approach has a significant leasehold in the Baker B Lease (6,238 acres), and its position occupies about a quarter of the area encompassed by a 10-mile radius drawn from the proposed disposal well location.[4] There are six commercial disposal wells located within the 10-mile radius. These commercial disposal wells inject into the San Andres, Clear Fork and Ellenburger Formations. One of the six wells is operated by EP Energy and appears to only accept water from EP Energy leases, and a second well did not appear to be operational at the time of the hearing. Approach utilizes the remaining four commercial disposal wells in this area, sending these wells about 1,000 barrels of water per day in August and September 2015.[5] In addition, Approach has completed three non-commercial saltwater disposal wells for its own use in the area. Two of Approach's wells were operational at the time of the hearing and were receiving about 2,000 barrels of water per day.

In the Baker B Lease area, Approach produces from 2,000 to nearly 20,000 barrels of water per day. The rate of water production is highly dependent on Approach's fracture stimulation schedule; water production surges following stimulation and well completion. More broadly, Approach's company-wide gross water production since about September 2013 has been from 20,000 to 40,000 barrels of water per day. In the broader basin area, Approach has contracts with 10 commercial wells for saltwater disposal. Utilization of some of these wells may require hauling distances of 40 to 45 miles.

Approach has established a water recycling facility that can accommodate 20,000 barrels of produced saltwater per day, about half of its maximum daily load. The water is treated and reused in completion activities, reducing the volume requiring disposal by injection. Approach has also constructed a pipeline network to reduce its trucking needs. Mr. Oldham stated that the proposed disposal well location—as an existing, unused wellbore—is in a good location to benefit Approach's water recycling facility. The proposed location can easily be connected to Approach's water management infrastructure, which will reduce Approach's disposal costs. Mr. Oldham estimates the propose disposal well will result in an incremental savings of $1.2 per barrel. At 2,000 barrels per day base load, that equates to a savings of about $867,000 per year. Approach will still need access to a disposal well during times of peak saltwater production.

Financial Assurance

Approach has an active Organization Report (Form P-5, Operator No. 028625), and has filed a $250,000 letter of credit for financial assurance.

PROTESTANT'S EVIDENCE

Two witnesses offered testimony and evidence on behalf of CCGCD, including Slate Williams, CCGCD General Manager, and Dr. Ron Green, P.G., a groundwater hydrologist from

[4] Approach Exh. No. 18. Examiners' estimate of the area.

[5] Approach Exh. No. 18.

the Soutwest Research Institute. Dr. Green summarized CCGCD's concerns about the well as follows:

> *Well, the basic concern is that the confining zone between the interval of injection and the USDW at 900 feet is not -- does not have full integrity, and there's opportunity for fluids that are injected into the injection horizon could migrate to... the USDW, and potentially the usable-quality water.*[6]

CCGCD's concern was illustrated by the plugging and abandonment records of the Baker B Lease, Well No. 101, located about one-quarter mile north of the proposed disposal well. CCGCD contends the Baker B No. 101 was not plugged in a manner to be protective of the USDW. Second, CCGCD is concerned about the presence of six wells in the area that were completed with long-string casing that was not fully cemented through the disposal interval. Together, CCGCD contends that the uncemented long-string casings in production wells combined with the potential for the Baker B Well No. 101 to not be protective of the USDW could contribute to salt water contamination of the USDW.

The Baker B Lease Well No. 101 did not penetrate the disposal interval. However, Dr. Green stated that the wellbore may be open from its total depth of 2,074 feet to a depth of 776 feet. When setting the plug in the wellbore, the cementing tubing was set at a depth of 776 feet, so it cannot be assured that cement is below this depth in the borehole. Further, the wellbore was bridged (obstructed) at 905 feet, which is essentially the depth of the USDW. The USDW, which is defined as water with a total dissolved solids content of less than 10,000 parts per million (ppm), is estimated to occur at a depth of 900 feet, therefore the wellbore may be open to the USDW. Dr. Green acknowledges that the Baker B No. 101 did not penetrate the disposal interval, but he did identify six wellbores within one-half mile (including two wells, Baker B Nos. 101X and 104, which are within one-quarter mile) that do penetrate the disposal interval and could be a conduit for migration of fluids from the disposal interval and into the borehole of the Baker B No. 101. Specifically, these wellbores have long-string casing that is not cemented through the disposal interval. In particular, the surface location of the Baker B No. 101X is located about 75 feet from the Baker B No. 101 and may present the most direct threat.

As an example, the Baker B Nos. 101 and 101X are located about 1,200 feet north of the proposed disposal well. The long-string casing on Baker B No. 101X was set at a depth of 8,470 feet and cemented to depth of 6,692 feet. The intermediate casing was set at a depth of 2,106 feet and cemented to the surface. This leaves an uncemented annular space from 6,692 feet to 2,106 feet, which extends through the disposal interval and through the upper confining shale. The Baker B No. 101X is immediately adjacent to the Baker B No. 101, which could provide a conduit for migration from its total depth of 2,074 feet up into the USDW at 900 feet. Further, the Form W-2 completion report for the Baker B No. 101X indicates the base of the Cretaceous is located at a depth of 865 feet, not the 650 feet anticipated by the GAU.[7]

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[6] Tr. 109: 17-22.

[7] CCGCD Exh. No.

The other five wells (Baker B Nos. 104, 109, 111, 204 and 205) identified by CCGCD are all operated by Approach. All five of these wells are completed with surface casing set at depths of 901 to 927 feet and cemented to the surface. All five of these wells are completed with intermediate casing set at depths of 2,054 feet to 2,213 feet and cemented to the surface. However, CCGCD points out that all five of these wells also have some length of production casing that is not cemented through the proposed disposal interval.

Dr. Green concludes that all six of the nearby wells may be a conduit for migration of fluids into the USDW, if sufficient pressure is present to lift the fluids.[8]

Further, Dr. Green does not see geophysical log evidence of better porosity in the Clear Fork than in the overlying shale. This indicates to him that the Clear Fork Formation at this location may not be capable of accepting significant fluids for disposal.

CCGCD identified three water supply wells in the area of the proposed disposal wells. Those three water supply wells indicated a depth to water of 350 to 385 feet and produce from the Edwards Formation. The specific locations of the water supply wells were not identified.

Reservoir Pressure Calculations

Dr. Green performed pressure front calculations using Matthews & Russell's solution to the Theiss Equation. Dr. Green used Clear Fork Formation reservoir properties obtained from an older injection well application located about 4.4 miles from the subject well. The calculations indicate that after one year of injection at the average daily injection rate (6,500 barrels per day), the Baker B No. 101X would experience a pressure increase of 477 psi in the injection interval. After 30 years the pressure increase would be 1,035 psi. But, those calculations were based on the original injection interval from 2,300 feet to 3,140 feet, a thickness of 840 feet. Approach's modified disposal interval is reduced by about half (400 feet), which would result in a doubling of the observed pressure increase. Given these geologic and pressure conditions, Dr. Green is skeptical that the Clear Fork Formation will be capable of accepting the fluid Approach intends to attempt to inject.[9]

CCGCD also provided an exhibit (No. 7) describing the pressure build-up in offsetting wells in terms of the hydrostatic head, or the height of a water column supported by the reservoir pressure. This evidence indicates that a surface injection pressure of 1,150 psi in the proposed disposal well will cause sufficient pressure in the plugged Baker B No. 101 well to raise saltwater to the surface, were it not for the plugs in the No. 101 wellbore.

On cross examination, Dr. Green agreed that each of the six wells located within one-half mile of the proposed disposal well were constructed with surface and intermediate casing cemented to the surface isolating the USDW and BUQW. Mr. Green stated that his concern is not, specifically, with any of the six wells individually. But, rather, that an increase in pressure in the Clear Fork Formation due to injection activities could raise connate saltwater above the

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[8] Tr. 125: 16-23.

[9] Tr. 129 – 132; CCGCD Exh. Nos. 3, 4, 5 & 6.

confining shale strata. From there, it could migrate via the plugged Baker B No. 101 well above the USDW.

APPLICANT'S REBUTTAL EVIDENCE

In rebuttal, Mr. Miller stated that the six wellbores identified by CCGCD for which the production casing is not cemented from the injection interval to the surface provide a means for Approach to monitor the formation pressure in the reservoir. Operators are required to monitor fluid pressure in casing annuli and immediately report any positive pressure observations to the Commission. Therefore, if the injection activities were to increase reservoir pressure in the Clear Fork Formation such that fluids could be raised out of the formation, a pressure increase would be observed in an offset well.

Nonetheless, Approach stated that it would not be opposed to a permit condition that required a cement squeeze to close off the annuli between the long-string casing and the wellbore/intermediate casing in the Baker B Well No. 101X. Approach stated that a cement squeeze from 3,500 feet to the surface would eliminate the potential for this annulus to be a potential conduit for migration.

Mr. Miller cautioned, however, that squeezing cement into this annulus would also preclude the possiblility of using the annulus as a monitoring point for reservoir pressure at this location.

EXAMINERS' ANALYSIS

The evidence in the record demonstrates Approach has met its burden of proof and that the proposed Baker B disposal well application meets the requirements of Chapter 27 of the Texas Water Code and Statewide Rule 9. There is no disagreement between the parties regarding Texas Water Code § 27.051(b)(1, 2, and 4)(i.e., public interest, protection of hydrocarbon resources, and financial assurance). The dispute in this case centers on Texas Water Code § 27.051(b)(3), which states:

> *With proper safeguards, both ground and surface fresh water can be adequately protected from pollution.*

The Examiners conclude the proposed Approach Baker B well will, with the adequate safeguard of a cement squeeze in the nearby Baker B Well No. 101X, protect ground and surface freshwater from pollution. The four required elements of the Texas Water Code § 27.051(b) will considered sequentially.

Public Interest

Approach generates a base load of produced water in the Baker B Lease area of about 2,000 barrels per day. During completion and initial flow-back periods, however, the volume of produced water increases to nearly 20,000 barrels per day in the Baker B Lease area. Company-wide, Approach produces 20,000 to 40,000 barrels of water per day. Currently Approach uses

several commercial disposal wells and lease wells to dispose of its produced waste water. There are six commercial disposal wells within a 10-mile radius, and Approach has three disposal wells for its own use in this same area. Approach testified that sometimes it must ship waste 40 to 45 miles to an available disposal facility.

Approach proposes to use the subject well for the non-commercial disposal of produced water and waste liquids produced on its Baker B Lease. Approach has not requested authority to dispose of off-lease generated waste at this location. Further, Approach plans to pipe a significant portion of the water produced on the lease to a regional water treatment and recycling facility. The proposed well will be connected by pipeline to the recycling facility. Approach anticipates the proposed disposal well connected to existing produced water infrastructure and the nearby recycling facility will save about $1.2 per barrel in water disposal costs, mostly from eliminated the demand for truck transportation.

CCGCD provided no evidence to suggest the proposed disposal well was not in the public interest apart from its concerns with regard to the potential for harm to ground water. The Examiners conclude that the evidence in the record indicates the subject well is in the public interest pursuant to Texas Water Code § 27.051(b)(1).

Endanger or Injure Any Oil, Gas, or Other Mineral Formation

Approach proposes to inject water into the Clear Fork Formation, which is not productive in this area. The nearest production is from the Wolfcamp, Dean and Ellenburger Formations, which are more than 1,000 feet below the proposed disposal interval. The base of the disposal interval will be 3,140 feet, and the top of the Wolfcamp Formation is at 5,501 feet. The proposed well is an existing well that will be recompleted for disposal service. Although the well has been completed and cased through the Wolfcamp Formation, the casing has not been perforated. A cast iron bridge plug topped with 20 feet of cement will be set to isolate the disposal interval from the lower reaches of the wellbore. There is also 100 feet of shale below the injection interval to provide further protection of the deeper productive formations.

Approach is the only operator of producing wells within a one-half mile radius of the proposed disposal well. Within a one-quarter mile radius of the proposed disposal well there are two active producing wellbores that penetrate the disposal interval, Approach's Baker B Lease Well Nos. 101X and 104. These two wells are cased and cemented in such a way as to prevent the migration of injected fluids into the lower producing intervals. Further, the casing annuli between the long-string casing and the wellbore/intermediate casing provides a mean to monitor pressure in the disposal interval in Well No. 104 (Approach proposes to place a cement squeeze in the interval in Well No. 101X), should that become an issue. The evidence in the record demonstrates the proposed disposal well will not endanger or injure any oil, gas, or other mineral formation pursuant to Texas Water Code § 27.051(b)(2).

Prevent Pollution of Ground and Surface Fresh Water

The proposed disposal well will be cased and cemented in such a way as to prevent the migration of injected fluids from the disposal interval. The surface and intermediate casing

strings are set to depths of 810 feet and 2,113 feet, respectively. Both the surface and intermediate casing strings are cemented to the ground surface. The production casing was cemented to a depth of 1,250 feet, as confirmed by a cement bond log. There is adequate geologic confinement separating the disposal interval from the BUQW and USDW.

CCGCD offers a theory for how the disposal activities could increase reservoir pressure in the Clear Fork Formation and cause saltwater to be raised to the USDW. The potential for a confinement failure arrises from the following conditions resulting from petroleum exploration and production activities:

1. CCGCD identified six producing wells within a one-half mile radius of the proposed disposal well, and all of these wells were completed in such a manner that at least part of the disposal interval was exposed to uncemented long-string casing. One of the six producing wells, Approach's Baker B Lease Well No. 101X is located about 75 feet from Approach's Baker B Lease Well No. 101.

2. Approach's Baker B Lease Well No. 101 was plugged and abandoned because of a wellbore obstruction at a depth of 905 feet that was encountered while attempting to set surface casing. It is uncertain whether a cement plug extends below a depth of 776 feet in the abandoned wellbore. Thus, CCGCD contends, the USDW, which is encountered at a depth of about 900 feet, may be at risk of being harmed by the infiltration of saltwater.

The Examiners note that Approach's Baker B Lease Well No. 101 was plugged and abandoned in accordance with Commission rules, which require the BUQW be isolated by the placement of a cement plug. The evidence in the record indicates (1) the BUQW at this location was determined to be at a depth of 725 feet, and (2) adequate plugging material is present in the wellbore from a depth of 776 feet to the surface.

Further, the Examiners note that the nearby six producing wells are also completed in such a manner as to adequately protect the BUQW, generally identified to be shallower than 900 feet around those wells. All six of those nearby wells have two casing strings cemented to the surface. The surface casing generally extends to depths of about 900 feet, and the intermediate casing extends to depths of about 2,000 feet.

In fact, the presence of an uncemented casing string does, as Approach asserts, provide an opportunity to directly monitor the formation pressure of a reservoir into which fluids are being injection. The Commission's Statewide Rule 17 (16 Tex. Admin. Code §3.17) requires operators to monitor the pressure between the annuli of uncemented adjacent casing strings, and to report any pressure observed in the annuli.

Approach stated it would not consider a permit condition requiring a cement squeeze in the Baker B Lease Well No. 101X in the depth interval from 3,500 feet to the surface to be adverse. The Examiners conclude such a pro-active protective workover would be protective of groundwater resources. While squeezing cement into the 101X well annulus would prevent it from being used to monitor reservoir pressure, the Baker B Lease Well No. 104, located about one-quarter mile to the east of the proposed disposal well, would continue to be available to

monitor the reservoir fluid pressure. The evidence in the record demonstrates that, with proper safeguards, both ground and surface fresh water can be adequately protected from pollution pursuant to Texas Water Code § 27.051(b)(3).

Demonstrate Financial Responsibility

Approach has an active Organization Report (Form P-5, Operator No. 028625), and has filed a $250,000 letter of credit for financial assurance. CCGCD presented no testimony or evidence with regard to Approach's ability to meet its financial assurance obligations. The evidence in the record demonstrates the applicant has made a satisfactory showing of financial responsibility as required by Texas Water Code § 27.073 pursuant to Texas Water Code § 27.051(b)(4).

FINDINGS OF FACT

1. Notice of the application was published in The Ozona Stockman, a newspaper of general circulation in Crockett County, Texas, on September 2, 2015. On July 9, 2015 Approach Operating LLC ("Approach") notified the owner of the surface tract, the Crockett County Clerk, and operators of wells within one-half mile of the proposed disposal well.

2. The Baker B Lease Well No. 110 is a shut-in well that has never been completed for production. The well was drilled to a total depth of 8,052 feet, plugged-back to 7,986 feet, and cased and cemented as follows:

    a. Surface casing (13 3/8-inch) was set at 810 feet and cemented to the surface with Class C cement;

    b. Intermediate casing (8 5/8-inch) was set at 2,113 feet and cemented with 500 sacks of Class C cement to a depth of 94 feet based on cement volume calculations; and

    c. Long-string casing (5 1/2-inch) was set to a depth of 8,052 feet and cemented with 1,210 sacks of Class H cement to a depth of 1,250 feet as determined on a cement bond log.

3. The proposed disposal well will be converted to non-commercial disposal service, completed and operated as follows:

    a. Approach will set a cast iron bridge plug at a depth of 3,240 feet and place 20 feet of cement on top of the plug;

    b. Approach will perforate the long-string casing in the injection interval from 2,700 feet to 3,140 feet;

    c. Approach will set 2 7/8-inch injection tubing with a packer at a depth of 2,650 feet, 50 feet above the top of the injection interval;

d. The maximum daily injection volume will be 10,000 bwpd and the estimated average daily injection volume will be 6,500 bwpd;

e. The maximum surface injection pressure will be 1,350 pounds per square inch gauge ("psig") and the average surface injection pressure will be 500 psig; and

f. Injected waste will be limited to produced salt water and non-hazardous oil and gas waste exempt from regulation under the Resource Conservation and Recovery Act that is produced on Approach's Baker B Lease.

4. The use or installation of the injection well is in the public interest.

a. Approach generates about 2,000 barrels of water per day in the Baker B Lease area, and during completion and initial flow-back periods the volume of produced water increases to nearly 20,000 barrels per day.

b. In the region, Approach produces 20,000 to 40,000 barrels of water per day.

c. On occasion, Approach ships saltwater 40 to 45 miles to an available disposal facility.

d. The subject well will be used for the non-commercial disposal of produced water and waste liquids produced on Approach's Baker B Lease.

e. The proposed disposal well is part of a larger water infrastructure system that includes a water recycling facility.

f. The proposed disposal well connected to existing produced water infrastructure and the nearby recycling facility will save about $1.2 per barrel in water disposal costs, mostly from eliminated demand for truck transportation.

5. The use or installation of the injection well will not endanger or injure any oil, gas, or other mineral formation.

a. The Clear Fork Formation is not productive of oil or gas in this area.

b. The nearest production is from the Wolfcamp, Dean and Ellenburger Formations, which are more than 1,000 feet below the proposed disposal interval. The base of the disposal interval will be 3,140 feet, and the top of the Wolfcamp Formation is at 5,501 feet.

c. A cast iron bridge plug topped with 20 feet of cement will be set to isolate the disposal interval from the lower depths of the cased wellbore.

d. There is 100 feet of shale below the proposed disposal interval.

6. With proper safeguards, both ground and surface fresh water can be adequately protected from pollution.

    a. There are no abandoned wellbores within the one-quarter mile area of review that penetrate the disposal interval.

    b. There is one abandoned wellbore within the one-quarter mile area of review.

    c. The Baker B Lease Well No. 101 was drilled to a depth of 2,054 feet, and plugged from 776 feet to the surface. The BUQW in this well is located at a depth of 725 feet.

    d. The injection interval is overlain by a 400-foot thick shale stratum.

    e. A cement squeeze behind the long-string (5 ½-inch) casing in the Baker B Lease Well No. 101X will eliminate the possibility of the annulus in this well to be a potential conduit for the migration of saltwater into shallow freshwater zones.

    f. The uncemented annulus behind the long-string casing in five other Approach wells that are located within one-half mile of the proposed disposal well will provide a means to monitor the fluid pressure in the Clear Fork Formation.

    g. An increase in Bradenhead pressure between the intermediate and long-string casing must be reported to the Commission pursuant to Statewide Rule 17 (16 Tex. Admin. Code §3.17).

7. The base of usable quality groundwater ("BUQW") occurs at a depth of 650 feet, and the base of the underground sources of drinking water ("USDW") is 900 feet.

    a. The Baker B Lease Well No. 110 is completed with surface casing cemented through the BUQW.

    b. The Baker B Lease Well No. 110 is completed with intermediate casing cemented through the USDW.

    c. The six producing wellbores located within a one-half mile radius of the proposed disposal well are all completed with surface casing cemented across the BUQW and intermediate casing cemented to depths of about 2,000 feet.

8. The applicant has made a satisfactory showing of financial responsibility as required by section 27.073 of the Texas Water Code. Approach has an active Organization Report (Form P-5, Operator No. 028625), and has filed a $250,000 letter of credit for financial assurance.

CONCLUSIONS OF LAW

1. Resolution of the subject application is a matter committed to the jurisdiction of the Railroad Commission of Texas. Tex. Nat. Res. Code § 81.051

2. All notice requirements have been satisfied. 16 Tex. Admin. Code § 3.9

3. The use or installation of the proposed disposal well is in the public interest. Tex. Water Code §27.051(b)(1).

4. The use or installation of the proposed disposal wells will not endanger or injure any oil, gas, or other mineral formation. Tex. Water Code §27.051(b)(2).

5. With proper safeguards, both ground and surface fresh water can be adequately protected from pollution. Tex. Water Code §27.051(b)(3).

6. Approach has made a satisfactory showing of financial responsibility. Tex. Water Code §27.051(b)(4).

7. Approach has met its burden of proof and its application satisfies the requirements of Chapter 27 of the Texas Water Code and the Railroad Commission's Statewide Rule 9.

EXAMINERS' RECOMMENDATION

Based on the above findings of fact and conclusions of law, the Examiners recommend the Commission enter an order granting the application of Approach Operating LLC for a permit to dispose of oil and gas waste by injection into the Clear Fork Formation, a porous formation not productive of oil or gas, for the Baker B Lease, Well No. 110, in the Holt (Consolidated) Field, Crockett County, Texas.

Respectfully,

Paul Dubois
Technical Examiner

Jennifer Cook
Administrative Law Judge