RAILROAD COMMISSION OF TEXAS
HEARINGS DIVISION

OIL & GAS DOCKET NO. 06-0318270

APPLICATION OF ROUNDROCK MIDSTREAM LLC (730112) PURSUANT TO STATEWIDE RULE 46 FOR A COMMERCIAL PERMIT TO INJECT FLUID INTO A RESERVOIR PRODUCTIVE OF OIL OR GAS FOR THE MUDHOLE LEASE, WELL NO. 1, CARTHAGE (TRAVIS PEAK) FIELD, PANOLA COUNTY, TEXAS

PROPOSAL FOR DECISION

HEARD BY: Robert Musick, P.G. - Technical Hearings Examiner
Kristi M. Reeve - Administrative Law Judge

PROCEDURAL HISTORY:

Application Filed:	July 20, 2018
Notice of Hearing:	May 3, 2019
Hearing Date:	June 11-12, 2019
Hearing Transcripts Received:	June 27 and 30, 2019
Written Closings Filed:	July 19, 2019
Replies to Written Closings Filed:	August 2, 2019
Close of Record:	August 2, 2019
Proposal for Decision Issued:	April 9, 2020

APPEARANCES:

For Applicant: Roundrock Midstream LLC – Center, Texas

John Soule (Attorney) – Scott Douglas McConnico, L.L.P., Austin, Texas
Heith L. Harper (Officer, Member) – Roundrock Midstream LLC
Michael Stewart (Consultant, Geologist) – HeLMS Oil & Gas

For Protestant: Chevron U.S.A., Inc.

Bill Hayenga II **(**Attorney) – McElroy, Sullivan, Miller & Weber L.L.P.
Sara Michelle Denton, (Attorney) – Chevron
Lee Banse (Attorney) – Chevron
Christopher Scott Wilson (Land Representative) – Chevron
Eric Swanson (Geologist) – Chevron
Mathew Burgess, P.E. (Engineer) – Chevron

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I. CASE SUMMARY[1]

Roundrock Midstream, LLC (Operator No. 730112) ("Roundrock" or "Applicant") filed an application ("Application") for a commercial permit for the Mudhole Lease, Well No. 1 ("Mudhole No. 1" or "Proposed Disposal Well") located in the Carthage (Travis Peak) Field (Field No. 16032812) in Panola County, Texas. Roundrock is seeking a permit to dispose of oil and gas waste by injection into a porous formation productive of oil or gas pursuant to 16 Tex. Admin. Code § 3.46. The Proposed Disposal Well is location approximately 13.7 miles southeast of Carthage, Texas. The Application is protested by Chevron U.S.A., Inc. ("Chevron").

Roundrock submitted an Application dated July 20, 2018, requesting authority to inject a maximum volume of 25,000 barrels per day ("bbls/day") of saltwater, and other non-hazardous oil and gas waste into the subsurface depth interval from 7,000 feet subsea depth to 8,400 feet subsea depth within the Travis Peak formation.[2] After a protest was received by the Railroad Commission of Texas ("Commission") from Chevron, a hearing was held on the merits on June 11-12, 2019. At the hearing, Roundrock amended their Application, reducing the maximum daily injection volume from 25,000 bbls/day to 17,500 bbls/day and also lowering the top of the disposal interval from 7,000 feet subsea depth to 7,320 feet subsea depth, which establishes a proposed injection interval from 7,320 feet subsea depth to 8,400 feet subsea depth. As part of the Application, a seismic survey was conducted by Roundrock and no seismic activity was noted within the 9.08-kilometer radius of the Proposed Disposal Well. Roundrock asserts that there is a need for disposal capacity in the vicinity and a growing market in East Texas and Louisiana that is seeking disposal of saltwater from oil and gas activities. Roundrock contends the Proposed Disposal Well meets the requirements established by Statewide Rule 46.[3]

Chevron's protest letter dated August 8, 2018, indicates that the proposed well will adversely affect future adjacent wells resulting from elevated pressures in the Travis Peak formation. The elevated pressures will cause new drilling risks and reduce the recovery of hydrocarbons within the Travis Peak reservoir due to flooding out the reservoir resulting in waste. In addition, disposal of water into the Travis Peak formation will seriously alter the strategy of Chevron regarding recovery of the gas reserves in the Travis Peak formation.

Based on the evidence presented at the hearing, the Technical Examiner and Administrative Law Judge (collectively, "Examiners") recommend denial of the Application.

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[1] The transcript for the hearing held on June 11-12, 2019, is referred to as "Hearing Tr. (volume no.), [pg:ln(s)]". Applicant's exhibits are referred to as "Hearing Roundrock Ex. [exhibit no].”; and the protestant's exhibits are referred to as "Hearing Chevron Ex. [exhibit no]."

[2] Hearing Roundrock Ex. 1.

[3] 16 Tex. Admin. Code § 3.46.

II. JURISDICTION AND NOTICE

Sections 81.051 and 81.052 of the Texas Natural Resources Code provide the Commission with jurisdiction over all persons owning or engaged in drilling or operating oil or gas wells in Texas and the authority to adopt all necessary rules for governing and regulating persons and their operations under the jurisdiction of the Commission.

Section 27.031 of the Texas Water Code states that no person may continue using a disposal well or begin drilling a disposal well or converting an existing well into a disposal well to dispose of oil and gas waste without first obtaining a permit from the Commission.

Statewide Rule 46 requires that notice of the Application for a disposal injection permit be sent to the surface owner of a proposed disposal well site, to operators of wells within a ½ mile radius of a proposed disposal well site, and to the county clerk.

Roundrock published notice of the Application for a commercial permit to dispose of oil and gas waste by injection for the Mudhole No. 1 in the Carthage (Travis Peak) Field and located in Panola County, Texas. The notice was published in *The Panola Watchman* on Wednesday, July 25, 2018.

On May 3, 2019, the Hearings Division of the Commission sent a notice of hearing on the merits ("Notice") via first-class mail to the Applicant and all affected persons setting a hearing on June 11-12, 2019.[4] The Notice contains (1) a statement of the time, place, and nature of the pre-hearing conference; (2) a statement of the legal authority and jurisdiction under which the hearing is to be held; (3) a reference to the particular sections of the statutes and rules involved; and (4) a short and plain statement of the matters asserted.[5] In addition to the Notice sent to the Service List on May 3, 2019, three supplemental notices were provided to potentially affected persons by Docket Services on May 21, 22 and 24, 2019.[6] These supplemental notices were provided because potentially affected persons were not included on the initial Notice dated May 3, 2019. The hearing on the merits was held on June 11 and 12, 2019, as noticed. Consequently, all parties received more than 10 days' notice of the hearing and an opportunity for hearing. Roundrock and Chevron attended and participated in the hearing on the merits.

[4] *See* Notice of Hearing dated May 3, 2019.
[5] *See* Tex. Gov't Code §§ 2001.051 and 2001.052; 16 Tex. Admin. Code §§ 1.41, 1.42, 1.45, and 3.46.
[6] *See* Supplemental Notice of Hearing dated May 21, 22 and 24, 2019. Hearing Tr. Vol. 1, Pgs. 37-39.

III. APPLICABLE LAW

Tex. Water Code § 27.031 states:

> PERMIT FROM RAILROAD COMMISSION. No person may continue using a disposal well or begin drilling a disposal well or converting an existing well into a disposal well to dispose of oil and gas waste without first obtaining a permit from the railroad commission.

Consistent with the Texas Water Code, Statewide Rule 46 (16 Tex. Admin. Code § 3.46(a)) states the following:

> Any person who engages in fluid injection operations in reservoirs productive of oil, gas or geothermal resources must obtain a permit from the Commission. Permits may be issued when the injection will not endanger oil, gas or geothermal resources or cause pollution of freshwater strata unproductive of oil, gas or geothermal resources.

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:

a. that the use or installation of the injection well is in the public interest;

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

c. that, with proper safeguards, both ground and surface fresh water can be adequately protected from pollution; and

d. that the Applicant has made a satisfactory showing of financial responsibility if required by Section 27.073.[7]

[7] Section 27.073 of the Texas Water Code authorized the Commission to require financial assurance in order to issue an injection well permit. Statewide Rule 78 does require financial assurance for operators of disposal wells. *See, e.g.,* 16 Tex. Admin. Code § 3.78(a)(6),(d),(g).

IV. DISCUSSION OF THE EVIDENCE

A. Fields

For clarity, a discussion about the hydrocarbon reservoirs in the vicinity of the Proposed Disposal Well is necessary. Below are hydrocarbon reservoirs within 2.5 miles of the Proposed Disposal Well that were discussed in the hearing.

1. Carthage (Haynesville Shale) Field

The field rules for the Carthage (Haynesville Shale) Field sets the correlative interval from 9,568 to 11,089 feet deep in Angelina, Gregg, Harrison, Nacogdoches, Risk, Shelby, and Panola Counties for the Field. The field rules include lease line spacing, between well spacing, acreage per unit and optional acreage and tolerance acreage for the field rules. The Field Rules also specify horizontal drainhole spacing and reporting format to develop the Field using horizontal drainhole wells.

Testimony in the hearing established that the Carthage (Haynesville Shale) Field is currently the primary target for much of the areas production. Stacked lateral horizontal wells result in a very productive reservoir.

2. Carthage (Cotton Valley) Field

The field rules for the Carthage (Cotton Valley) Field sets the correlative interval from 7,940 feet to 9,630 feet in Harrison, Panola and Shelby Counties, Texas for the oil and gas Field. The field rules include lease line spacing, between well spacing, acreage per unit, tolerance acreage and diagonal maximum length of drilling unit/proration unit for both oil and gas field rules. The Field Rules also specify horizontal drainhole spacing, reporting format and allowances, to develop the Field using horizontal drainhole wells.

Testimony in the hearing established that the Cotton Valley formation is a productive reservoir and has historically been a primary target for production in Panola County. Evidence in the hearing indicated that the Carthage (Hayneville Shale) Field has been developed using horizontal well technology, therefore the Cotton Valley has become a secondary target.

3. Carthage (Travis Peak) Field

The field rules for the Carthage (Travis Peak) Field do not establish a correlative interval for the oil and gas Field. The field rules for the Carthage (Travis Peak) Field are primarily for lease line spacing, between well spacing, acreage per unit, tolerance acreage and diagonal maximum length of drilling unit/proration unit. Therefore, the Field Rules apply to all portions of the Travis Peak formation.

At the hearing, different definitions were used to describe depths within the Travis Peak formation associated with Panola County.

a. Roundrock utilized the term upper, middle and lower to designate different intervals within the Travis Peak formation. Although Roundrock did not define the terms in the hearing, the hearing record designates the upper Travis Peak from the top of the Travis Peak at about 6,250 feet subsea depth to approximately 7,000 feet subsea depth which represents a paralic environment (marine and continental sediments); the middle Travis Peak formation is from 7,000 feet subsea depth to approximately 7,800 feet subsea depth representing a fluvial depositional environment; and the lower Travis Peak formation is from approximately 7,800 feet subsea depth to about 8,400 feet subsea depth or the top of the Cotton Valley Group representing a deltaic depositional environment.

b. Chevron divided the Travis Peak formation into the upper and lower Travis Peak with the upper Travis Peak beginning at approximately 6,000 feet subsea depth and ending at 6,600 feet subsea depth representing a paralic depositional environment; and the lower Travis Peak beginning at 6,600 feet subsea depth and extending to the bottom of the Travis Peak formation at about 8,400 feet with the geologic contact between the Travis Peak and the Knowles Limestone/Cotton Valley Group representing a fluvial and deltaic depositional environment.

Testimony in the hearing established that the Travis Peak formation is not the primary target for production in Panola County, but typically is the secondary or tertiary production target as the deeper reservoirs (the Haynesville Shale and Cotton Valley) are depleted of oil or gas. In addition, historically, the upper portion of the Travis Peak strata is the most productive portion of the Travis Peak formation, but the middle and lower Travis Peak strata also produce oil or gas.

4. Carthage (L. Pettit 6100) Field

The field rules for the Carthage (L. Pettit 6100) Field do not establish a correlative interval for the Field but does establish the top of the lower Pettit at about 6,100 feet deep. The field rules are primarily for lease line spacing, between well spacing, acreage per unit and tolerance acreage. The Field Rules apply to all depths of the lower Pettit formation.

B. Amended Application

Roundrock amended their Application for the Mudhole No. 1 in the hearing by lowering the top of the requested disposal interval from 7,000 feet subsea depth to 7,320 feet subsea depth. In addition, the maximum injection volume as applied for was amended from 25,000 bbls/day to 17,500 bbls/day.[8] Roundrock asserts that adjusting the disposal interval will not affect production in the area.[9]

[8] Hearing Tr. Vol. 1, Pgs. 11, Lns.15-22.
[9] Hearing Tr. Vol. 1, Pgs. 18, Lns. 3-6.

C. Application

1. Form H-1 and Form H-1A[10]

Roundrock (Operator No. 730112) submitted to the Commission an application titled, *Application to Inject Fluid into a Reservoir Productive of Oil and Gas* (Form H-1) and the accompanying well information, titled, *Well Data (*Form H-1A*), dated* July 20, 2018. As part of the Application, a *Permit To Drill, Deepen, Plug Back, or Re-Enter On a Regular or Administrative Exception Location* was submitted for the Mudhole No. 1, a new drill (drilling permit number 842439), located in the Gibbs, V Section, Abstract 231 on a 14.83-acre parcel of property.[11] The Application was determined to be administratively complete, and a draft permit was generated for consideration by the Commission's technical staff.[12] The Application specifies the following:

a. *Field and Lease Name (Form H-1)* - The field name is the Carthage (Travis Peak) Field (Field No. 16032812), in Panola County, Texas. The lease name is the Mudhole Lease.

b. *Disposal Formation (Form H-1)* - The proposed disposal interval is part of the Travis Peak formation, which is primarily Sandstone.

c. *Type of injection Fluid (Form H-1)* - The fluids requested for disposal into the injection interval are Saltwater and RCRA-exempt waste liquids.

d. *Injection Well Data (Form H-1A)*[13] - The Application indicates the Mudhole No. 1 (API No. 36538441) is scheduled to be drilled to a depth of 8,400 feet subsea depth and has drilling permit number 842439. The injection interval stated on the Application is from 7,000 feet subsea depth to 8,400 feet subsea depth within the Travis Peak formation and limits the injection to a maximum daily injection volume of 25,000 bbls/day, with a maximum surface injection pressure of 3,500 psig. Roundrock amended the Application, reducing the maximum daily injection volume from 25,000 bbls/day to 17,500 bbls/day and also lowered the top of their disposal interval from 7,000 feet subsea depth to 7,320 feet subsea depth, which establishes a proposed injection interval from 7,320 feet subsea depth to 8,400 feet subsea depth.

[10] Hearing Roundrock Ex.1.
[11] Hearing Roundrock Exs. 1 and 6.
[12] Hearing Roundrock Ex. 9.
[13] Hearing Roundrock Ex. 7.

e. *Well casing and completion program (Form H-1A)* - The Mudhole No. 1 is proposed to be completed with a 9 5/8-inch surface casing to a depth of 600 feet deep with cement circulated to surface. The 7-inch diameter long string casing is set from surface to a depth of 8,400 feet subsea depth with cement circulated from the bottom to 7,000 feet subsea depth. The injection tubing is from the ground surface to a depth of 7,000 feet subsea depth, with a DV tool set at approximately 7,000 feet subsea depth (calculated). Mr. Stewart, Roundrock's consulting geologist from HeLMS Oil & Gas, asserts that the DV tool will be moved downward near the proposed 7,320 feet subsea depth injection interval to ensure high quality cement is circulated to the surface. In addition, tubing will be set within 100 feet of the top of the injection interval as required by the proposed injection permit's standard provision.[14]

2. Ground Advisory Unit

The July 30, 2018, Commission's Groundwater Advisory Unit's summary report identified an interval from the land surface to the base of the Wilcox, which is estimated to occur at a depth of 450 feet, to be protected as the useable quality groundwater (UQGW). In addition, the base of underground resources of drinking water (USDW) that is estimated at 500 feet and must be protected.[15]

Mr. Stewart testified that the well design will be protective of the UQGW and the USDW.[16] He also contended the amendment to the top of the proposed disposal interval will protect all zones that are productive of hydrocarbons in the area.[17]

3. Seismic Information

A review of the seismic data from the United States Geological Survey ("USGS") indicated no earthquakes have been reported within a 9.08 km radius circle (a 100 square miles area) of the Mudhole No. 1 location based on a search dated July 20, 2018.[18]

4. 1/2-Mile Review of Wellbores

An inventory of wells and potential migration pathways are typically conducted within a ½-mile radius of a proposed disposal well. Mr. Stewart testified that a review of the plugging, casing and cement portions of each well log within the ½-mile radius of the Proposed Disposal Well established no artificial pathway to the surface from the proposed injection interval.[19]

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[14] Hearing Tr. Vol. 1, Pgs. 81-83.
[15] Hearing Roundrock Ex.1.
[16] Hearing Tr. Vol. 1, Pg. 80, Lns. 20-25; Hearing Roundrock Ex. 16.
[17] Hearing Tr. Vol. 1, Pgs. 84 and 88; Hearing Roundrock Ex. 16.
[18] Hearing Roundrock Ex. 1
[19] Hearing Tr. Vol. 1, Pgs. 62 and 70; Hearing Roundrock Ex. 10.

Within ¼-mile radius of Mudhole No. 1, Mr. Stewart maintained that one of the permitted wells was not drilled, leaving two wells, the Werner-Pope No. 4 well and the Werner-Pope No. 1H well, both in a deeper reservoir, the Carthage (Cotton Valley) Field. He contended that only one of the wells is currently producing oil and gas.[20]

Mr. Stewart testified that 11 total well permits, all of which are for producing wells, have been issued by the Commission within a ½-mile radius, with three well permits being issued by the Commission within ¼-mile radius and eight permits have been issued by the Commission to Chevron, Texaco and Brammer Engineering, Inc. with the following status:[21]

a. three Commission drilling permits have expired without a well being installed;

b. one well was completed in the Carthage (Cotton Valley) Field and was plugged in January 2011;

c. one well identified as the Werner-Pope No. 1 well was completed in the Carthage (Petit, Lower) Field at 6,575 feet subsea depth and is currently active;

d. one well identified as the Werner-Pope No. 2 well was completed in the Carthage (Travis Peak-Deadwood) Field at 9,925 feet subsea depth and is currently active and located about 2,900 feet away in the northeast direction; and,

e. two drilling permits were approved for well installation in the Carthage (Cotton Valley) Field at 9,800 feet subsea depth.[22]

5. Type Log

In response to the Commission's request during initial application review, Roundrock provided details of the injection interval by submitting a type log of an offset well in the Proposed Disposal Well vicinity. The type well was Chevron's Werner-Pope No. 2 well, which represented the entire injection interval with both porosity and resistivity data available.[23] In addition, the Application included a cross-section showing the geologic formation tops above and below the Proposed Disposal Well's injection interval.[24]

[20] Hearing Roundrock Exs. 12-13.
[21] Hearing Tr. Vol. 1, Pg. 82, Lns. 1-15; Hearing Roundrock Exs. 10 and 13.
[22] Hearing Tr. Vol. 1, Pgs. 68-69; Hearing Roundrock Exs.12 and 13.
[23] Hearing Tr. Vol. 1, Pg. 62, Lns. 1-9; Hearing Roundrock Exs. 10 and 14.
[24] Hearing Tr. Vol. 1, Pgs. 62-64.

6. Special Permit Conditions

The Injection-Storage Permits Unit of the Commission ("UIC") drafted a permit for the Hearings Division consideration for the Mudhole No. 1.[25] The draft permit has standard and special conditions.[26] The special conditions are:

a. For wells with long string casing set more than 100 feet below the permitted injection interval, plug back depth shall be within 100 feet of the bottom of the permitted injection interval;

b. Step-rate test must be conducted and filed with the Injection-Storage Permits Unit in Austin within 30 days of completion of the step-rate test submitted for confirmation;

c. Perform an initial static bottom hole pressure test to quantify reservoir pressure prior to injection into the permitted formation;

d. Operator shall provide the Commission an opportunity to witness the bottom hole pressure test;

e. Measurement for the bottom hole pressure test shall be performed via wireline tool(s) or other Commission approved bottom hole pressure measurement technique;

f. Must isolate the formations from discrete shut-in bottom hole pressure measurements for each separate formation;

g. Notify District 48 in advance of the test in order to provide opportunity for the RRC field inspector to witness the test.

D. The Applicant's Evidence

1. Request for Hearing

On February 12, 2019, Roundrock requested that their Application be set for hearing. The UIC Tracking Number assigned to the Application is No.49118.

2. Mineral Ownership

Mr. Harper, officer and witness for Roundrock, testified that Roundrock does not own any mineral rights associated with the approximately 14-acre parcel of property

[25] Hearing Roundrock Exs. 9 and 11.
[26] Draft Permit, Special Permit Conditions.

designated for the injection disposal well.[27] His testimony established that Roundrock has no history or experience with operating a disposal well.[28]

3. Source of Water

Mr. Harper testified that about 70 percent of the liquids to be disposed in the Proposed Disposal Well will be from Louisiana and the remaining will come from Texas.[29]

4. Injection Strata and Interval

The Application for the Mudhole No. 1, states the permitted injection interval consist of the Carthage (Travis Peak) Field, specifically the Travis Peak formation from 7,000 to 8,400 feet subsea depth.[30] The sandstone lithology of the proposed injection interval has an estimated 15 percent porosity.[31]

Mr. Stewart testified that the fluids injected into the proposed injection interval will be confined to the permitted interval. He indicated that the initially proposed top of the disposal interval at 7,000 feet subsea depth, overlaps about 164 feet of the upper Travis Peak strata that is being produced by one of Chevron's wells located about 1 and ½-miles away from the Proposed Disposal Well. The proposed amendment to the disposal interval from 7,320 feet subsea depth to 8,400 feet subsea depth was proposed by Roundrock to eliminate the overlap with any oil and gas productive zones in the area. Mr. Stewart maintained that a large portion of the gas from the Travis Peak formation is associated with the upper Travis Peak strata and not the middle to lower Travis Peak strata. Mr. Stewart disagreed with Chevron's assertion that 6 Bcf of gas has been produced from the middle and lower Travis Peak strata within a 2 and ½-mile radius of the proposed injection well.[32] He asserted that sources outside of the Commission, such as *DrillingInfo,* had different values than the Commission's production totals.[33]

Mr. Stewart testified that a significant number of barriers exist above and below the injection interval primarily composed of tight carbonates above the injection interval and shales, cemented sandstone/siltstones and mudstones below the injection interval showing low porosities to contain fluids from 8,600 feet subsea depth to the top of the Cotton Valley at about 8,850 feet subsea depth. Mr. Stewart stated:

> One of the reasons that we made the change from 7,000 to 7,320 was in reviewing this document and …type log, …I felt like the barriers that are displayed at approximately 7,320, along with the barrier -- and then 7,285 feet subsea [depth] and then at 7,200 feet subsea [depth] and then another one at about 7,055 feet subsea [depth] would be additional reassurance

[27] Hearing Tr. Vol. 1, Pg. 117, Lns. 3-10.
[28] Hearing Tr. Vol. 1, Pgs. 117 and 118.
[29] Hearing Tr. Vol. 1, Pg. 117, Lns. 17-22.
[30] Hearing Tr. Vol. 1, Pg. 41, Lns. 1-9; Hearing Roundrock Exs. 1 and 7.
[31] Hearing Roundrock Ex. 1.
[32] Hearing Tr. Vol. 1, Pg. 91, Lns. 1-14.
[33] Hearing Tr. Vol. 1, Pg. 92.

> that the fluids would be contained into the middle and lower Travis Peak [strata] and not escape into the upper Travis Peak [strata]. So that just added additional barriers to the ones that were below or above the originally proposed injection interval of 7,000 feet subsea depth. [34]

5. Depositional Environment

Mr. Stewart testified that the middle and lower Travis Peak strata were fluvial and deltaic depositional environment deposits, so you have different reoccurring sequences of sands, shales, and siltstones layers. The upper Travis Peak is mostly packstone (*grain-supported carbonate rock containing 1% or more mud-grade fraction*) and braided stream channel deposits composed of sand, etc., not a deltaic depositional sediment.[35]

6. Production Zones

Mr. Stewart stated that a two-mile radius review around the Mudhole No. 1 shows that there has been production within the Carthage (Travis Peak) Field at proposed injection interval, but no production has occurred within ½-mile of the Proposed Disposal Well. He testified that the Travis Peak formation within the amended disposal interval from 7,320 feet subsea depth to 8,400 feet subsea depth, identified as the middle and lower Travis Peak strata, is not a productive interval for oil and gas.[36]

Mr. Stewart testified that Roundrock meticulously evaluated the production within a two-mile radius of the Mudhole No. 1. The source of the information was Commission records, confirmed using *DrillingInfo*, a paid subscription service. He contended that Commission records indicate nine wells occurring from 0.59-miles to 1.87 miles away from the Proposed Disposal Well, with six wells having perforations in the proposed injection interval and none within a ½-mile radius of the Proposed Disposal Well. Roundrock stipulated in the hearing that wells that were once productive within the proposed disposal interval as amended (7,320 feet subsea depth) have all been plugged and abandoned and currently no well is producing within the proposed injection interval.[37]

7. Stratigraphic Assessment

Mr. Stewart evaluated the stratigraphy of the area to assess faulting. He indicated that no big lateral changes associated with the stratigraphy associated with the Travis Peak formation and its overlying formations, the Pettit, James Lime and Rodessa formations, which would indicate faults, etc. The results of the assessment established uniformity proximal to the Proposed Disposal Well with no identified preferential pathways from one unit to another.

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[34] Hearing Tr. Vol. 1, Pgs. 76-77.
[35] Hearing Tr. Vol. 1, Pg. 88, Lns. 17-21.
[36] Hearing Tr. Vol. 1, Pgs. 88-89.
[37] Hearing Tr. Vol. 1, Pgs. 99-100, 110, 128-130; Hearing Roundrock Exs. 17 and 18.

8. Investors

Mr. Harper testified that investors are willing to spend money at this location on a proposed commercial disposal well because of the need. He contended that a couple of operators, Sabine Oil and Gas and Goodrich Energy are interested in the injection capacity.[38] He also stated that Louisiana is a market for the disposal well since the Louisiana border is about five miles from the Proposed Disposal Well.[39]

Mr. Harper indicated that a "substantial percentage" of the water for disposal may come from Louisiana.[40] Currently, a lot of the Louisiana water goes to Joaquin, located about 15 to 20 miles away from the Proposed Disposal Well. Roundrock asserts that disposal wells near Joaquin have volume capacity concerns and are pressuring up the zones of injection. He believes a benefit of this Proposed Disposal Well is reducing highway traffic in the Joaquin area and giving relief to an area with injection limitations.

E. The Protestant's Evidence

1. Protestant's Claim

Chevron contends they are protesting the Application because the Travis Peak formation is productive of oil and gas in the vicinity of the Mudhole No. 1. Chevron asserts that Roundrock does not have a mineral lease to inject fluids into a productive interval identified as the Carthage (Travis Peak) Field. In addition, Chevron maintains that they have mineral interest ownership beneath the surface tract where the Proposed Disposal Well will inject fluids and flood the productive formation with injected liquids, resulting in a reduction in hydrocarbon recovery and cause waste and alter their production strategy in East Texas.

2. Property and Mineral Ownership

Mr. Wilson, Land Representative for Chevron, presented evidence showing 100% surface ownership by Roundrock Midstream of the 13.68 acres proposed for the Proposed Disposal Well. He stated that mineral ownership for the 13.68 acres is divided at 50% each between the McMillans and their heirs and assigns and the Furrhs and their heirs and assigns.[41] He testified that Chevron U.S.A. Inc. and PetroQuest Energy LLC have a 50% split in leasehold estate rights associated with the Travis Peak and Cotton Valley formations (also referred to as the Carthage Travis Peak) Field and the (Carthage (Cotton Valley) Field) beneath the 13.68 acres.[42] He also testified that Chevron has 100% of the leasehold estate rights for all other depths associated with the acreage.[43]

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[38] Hearing Tr. Vol. 1, Pgs. 48-49.
[39] Hearing Tr. Vol. 1, Pgs. 52-53.
[40] Hearing Tr. Vol. 1, Pg. 50, Lns. 20-25.
[41] Hearing Tr. Vol. 1, Pg. 146, Lns. 9-23.
[42] *Id.*
[43] Hearing Tr. Vol. 1, Pg.146; Hearing Chevron Exs. 4 and 5.

3. Inventory of Wells Proximal to the Proposed Disposal Well

Mr. Wilson provided evidence consisting of a list of wells in Commission records that were installed within one mile of the Proposed Disposal Well. He testified that the Commission's well data has 33 records in the data query, with 14 wells in the query listed as active. He said that five of the 33 wells were installed in the Carthage (Travis Peak) Field, with none of the subject Field wells producing as of the hearing.[44]

Mr. Wilson also testified about the active gas units surrounding the Proposed Disposal Well, which he represented as Chevron's Deadwood unit that includes 68 gas units on approximately 43,000 acres. He stated that the disposal well is "smack dab in the middle of" the Deadwood gas unit.[45]

Mr. Swanson, Geologist for Chevron, testified using Chevron's Exhibit 12A, which is a map showing differing radii distances and wells completed in reservoirs deeper than the Travis Peak, specifically the Cotton Valley and the deeper Haynesville formations.

Mr. Swanson indicated the map shows seven wells located within a one-mile radius of the Proposed Disposal Well with one of the wells, the Furrh-Kate 7H Well, located approximately 2,000 feet from the Proposed Disposal Well. In addition to the seven wells, a well 1.9 miles from the Proposed Disposal Well is an example of a well that was recompleted in the Carthage (Travis Peak) Field and renamed the TS Lagrone 1A Well. The TS Lagrone 1A Well succeeded in producing gas from the lower Travis Peak strata from 2015 to 2019.[46] Also, Mr. Swanson testified that the Furrh-Kate 7H Well is a candidate to be recompleted from the Cotton Valley formation to the lower Travis Peak strata because of recent gas signatures on well log data.[47]

Mr. Swanson confirmed that all these wells are currently installed in a deeper reservoir, and therefore may be recompleted into the Travis Peak in accordance with Chevron's strategy of recompletion in the area.[48] Mr. Swanson presented a proposed well list for the Haynesville formation which identified 24 wells that are being proposed for installation and is within one mile of the Proposed Disposal Well.[49] Mr. Swanson stated,

> These will be Haynesville wells horizontally. We'll come up and look at the Cotton Valley and then we'll come up and look at the Travis Peak. As I mentioned before we just work our way uphole.[50]

[44] Hearing Tr. Vol. 1, Pg.144, Lns. 2-20; Hearing Chevron Ex. 2.
[45] Hearing Tr. Vol. 1, Pg.144; Hearing Chevron Ex. 3.
[46] Hearing Tr. Vol. 1, Pg. 205; Hearing Chevron Ex. 12D.
[47] Hearing Tr. Vol. 1, Pgs. 207-208 and 235-236; Ex.12D and 16B.
[48] Hearing Tr. Vol. 1, Pg. 189; Lns. 7-11; Hearing Chevron Ex. 14A.
[49] Hearing Chevron Exs. 12A and 14A.
[50] Hearing Tr. Vol. 1, Pg. 200; Lns. 1-6; Hearing Chevron Ex. 12B.

4. Production and Well Completion Strategy

Mr. Swanson testified about the inventory of wells located within a 2.5-mile radius of the Proposed Disposal Well. He maintained that wells are essentially on all four sides of the Proposed Disposal Well within the area.[51] He stated that Chevron produces a lot from the upper Travis Peak strata in the Carthage (Travis Peak) Field and has a lot of wells that are completed in both the lower and upper Travis Peak strata that are recompleted wells from the deeper Cotton Valley formation. He testified that Chevron has a lot of potential targets that start in the Cotton Valley and work toward shallower stratigraphic horizons such as the Travis Peak and Pettit formations. He agreed that for the past 15 years, Travis Peak has been a secondary target with the Cotton Valley as the primary target for production. In the last couple of years, this has changed so the Hayneville formation in the Carthage (Haynesville Shale) Field has become the primary target with shallower reservoirs as the secondary targets.[52] Mr. Swanson stated,

> [We would] go with the Haynesville first, then the Cotton Valley, we would come up to the Travis Peak and continue to work our way up the hole if there's any available hydrocarbons to be produced. …Recompletion techniques have changed significantly in the past 10 years, and what we may not have targeted before is now open for meeting a target now with new completion practices.[53]

Mr. Swanson stated that a mud log cross-referenced with the density neutron log in Exhibit 11B indicated gas is associated with the Werner-Pope 1H well through the entire Travis Peak section, but specifically at 6,750 to 7,050 feet subsea depth and also promising for the Furrh-Kate 7H well, with gas signatures at 6,750 to about 8,200 feet subsea depth, all within the proposed injection interval.[54] The Werner-Pope 1H well and the Furrh-Kate 7h well are located approximately 2,900 feet and 2,000 feet, respectively, to the Proposed Disposal Well.[55] Mr. Swanson testified,

> We've got some really nice gas shows that actually appear in the Travis Peak adjacent to where they want to inject.[56] …[S]ome of these shows, again, are -- it's mostly in the lower Travis Peak where you start seeing those.[57]

[51] Hearing Tr. Vol. 1, Pg.174; Hearing Chevron Exs. 10 and 11A.
[52] Hearing Tr. Vol. 1, Pg. 237; Hearing Chevron Ex. 16D.
[53] Hearing Tr. Vol. 1, Pgs. 180-183; Hearing Chevron Ex. 11A.
[54] Hearing Tr. Vol. 1, Pg. 189, Lns. 11-25; Hearing Chevron Exs. 11B and 14B.
[55] Hearing Tr. Vol. 1, Pgs. 207-208 and 235-236.
[56] Hearing Tr. Vol. 1, Pg. 188; Hearing Chevron Ex. 11B.
[57] Hearing Tr. Vol. 1, Pg. 189; Lns. 1-4.

5. Chevron's Well Completion Technology

Mr. Burgess, a Petroleum Engineer for Chevron, testified about Chevron's current well completion technology makes the Travis Peak formation a viable producing reservoir. He stated that although the Travis Peak has been a productive reservoir, the initial production rates were caused by poor performance of well systems that were less than an ideal design for recovery of hydrocarbons from the Travis Peak reservoir. Mr. Burgess maintained that the well production rates would improve if the well was designed in a way to enable water to be lifted out instead of loading up causing a reduction in hydrocarbon recovery from the wells in the Travis Peak formation. Chevron has implemented new well designs to improve performance of Travis Peak wells, thus increasing well performance and ultimately increasing hydrocarbon recovery.[58] A good example of this is the TS Lagrone 1H well that was recompleted in the upper and lower Travis Peak from the Cotton Valley reservoir and renamed the TS Lagrone A1.[59] This recompletion demonstrates how Chevron recompletes wells into secondary targets, as the primary target is depleted. Mr. Burgess stated,

> You can see that it follows the similar design where the Travis Peak is fracked and then a packer is set above it and the Travis Peak is produced up the tubing, and that allows for more effective production of the Travis Peak. You can look at the production curve of this well from the Travis Peak. It IP'd just under 2 million a day, and then has been producing since then. A decline curve is shown on this with an EUR of over 1.5 Bcf.[60]

Mr. Burgess confirmed this is a modern recompletion technique which will get the results you want from the Travis Peak wells. He maintained that the wells are completed in both productive intervals of the upper Travis Peak, as well as the productive intervals of the lower Travis Peak, which represent the best analog if we were evaluating wells in this area.[61]

Mr. Burgess indicated that Chevron takes a very long-term view of assets so legacy assets are produced as effectively as possible, and that also aligns with the State of Texas, regarding paying taxes on hydrocarbons that are produced from legacy assets.[62]

[58] Hearing Tr. Vol. 1, Pg. 224;
[59] Hearing Chevron Ex. 16B.
[60] Hearing Tr. Vol. 1, Pgs. 223-233; Hearing Chevron Ex. 16A.
[61] Hearing Tr. Vol. 1, Pgs. 232-233; Hearing Ex.16A.
[62] Hearing Tr. Vol. 1, Pg. 234, Lns. 1-13.

6. Carthage (Travis Peak) Field Gas Production

Mr. Swanson testified about Chevron's Exhibit 11C, which is a diagram showing all active and inactive wells for the last 10 years that have produced out of the Travis Peak, Petit and Knowles Limestone (upper Cotton Valley) within a 2.5-mile radius of the Proposed Disposal Well.[63] He stated that 11,718,428 Mcf (or 12 Bcf) of gas has been produced from 36 wells in the three aforementioned formations and 6,364,336 Mcf (or 6 Bcf) of gas from 16 of the 36 wells are perforated within the upper and lower Travis Peak strata located within 2.5-miles of the Proposed Disposal Well. A review of the exhibit data establishes the majority of the Travis Peak wells are producing from both the upper and lower segments of the Travis Peak Formation identified as the upper/lower Travis Peak strata. Chevron's gas recovery strategy for the area is to recomplete wells to perforate shallower reservoirs which often include the entire Travis Peak geologic segment established as the Travis Peak formation.[64]

7. Geology of the Travis Peak Formation

Mr. Swanson testified regarding the Travis Peak formation based on work by the Bureau of Economic Geology ("BEG") which performed core studies to assess the lithology, porosity, permeability, grain matrix, etc.[65] He read the following excerpt from the BEG study:

> The sandstones at the top of the formation were deposited in paralic and meandering fluvial environment, and they averaged about 10 feet in thickness. They are separated by thick mudstones. In most of the lower parts of the Travis Peak formation the sandstones are dominantly braided fluvial. The braided-stream system consists of stacked sandstones which individually range from 10 feet to 50 feet in thickness. They average about 21 feet.[66]

Mr. Swanson stated that petrographic studies associated with the BEG work indicates that the Travis Peak formation contains mainly fine to very fine grain sandstone, muddy sandstone, silty sandstone and sandy mudstone, with an absence of clay or shale.[67] He maintained that hydraulic fractures may not be contained because of the absence of shale associated with the Travis Peak formation.[68] Mr. Swanson cited the BEG's study, which reads, "Natural fractures could cause increased leak-off and fracture branching and curvature during well treatment." [69]

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[63] Hearing Chevron Ex.11D.
[64] Hearing Tr. Vol. 1, Pgs. 193-194; Hearing Chevron Ex. 11C.
[65] Hearing Tr. Vol. 1, Pgs.156-157; Hearing Chevron Ex. 7: Excerpt from "Dutton S.P., Laubach, S.E, Tye R.S., 1991, *Depositional, Diagenetic, and Structural Controls on Reservoir Properties of Low-Permeability Sandstone, Travis Peak Formation, East Texas, Transactions-Gulf Coast Association of Geological Studies.*
[66] Hearing Tr. Vol. 1, Pg.157; Hearing Chevron Ex. 7.
[67] Hearing Tr. Vol. 1, Pg.158, Lns. 16-24.
[68] Hearing Tr. Vol. 1, Pg.159, Lns. 1-2.
[69] Hearing Tr. Vol. 1, Pg.159, Lns. 14-16.

8. Depositional Environments

Mr. Swanson testified about a USGS Survey ("USGS") paper dated 2006.[70] He argued that the USGS looked at the undiscovered conventional resources in the lower Travis Peak and its stratigraphic equivalent in Louisiana. An excerpt from the USGS report about the depositional systems indicate the Travis Peak Formation in Panola County is a river-dominated fluvial system, which is a braided system that is composed of highly connected sand, with shale barriers above the Travis Peak formation that are not contiguous across the area.[71]

Mr. Swanson described the stratigraphy in the vicinity of the disposal well using a 12-mile cross-section of the Travis Peak formation.[72] He indicated the cross-section illustrates, using gamma ray logs, signatures of different lithologies such as sand versus siltstones. Mr. Swanson argued the cross-section of the Travis Peak formation illustrates that the lower half of the formation is primarily a fluvial braided depositional environment with highly connected sands and siltstones and the upper half of the Travis Peak formation grades to a paralic environment (defined as a interfingered marine and continental sediment) with mudstones and silty mudstones.[73] Mr. Swanson asserted that whether you are producing gas or injecting fluids you have connectivity in the fluvial sediments of the lower Travis Peak strata. He also maintained that gas production typically targets the disconnected deposits in the upper portion of the Travis Peak, but contended that Chevron can find some really nice gas in the fluvial deposits in the lower Travis Peak strata.[74]

Mr. Swanson indicated that mudstones in both fluvial and paralic systems in the Travis Peak formation are very silty and cannot be relied upon to stop vertical fracture growth utilized to hydraulically stimulate connectivity. Therefore, hydraulically induced fractures are likely to grow uncontrollable out of the targeted zone. Mr. Swanson maintained that in his geologic opinion, the highly graded features of the sands being connected due to fluvial and deltaic depositional environments, the sediments have no significant lateral barriers in the Travis Peak, with some vertical migration limitations because of the mudstones.[75]

Mr. Swanson utilized Roundrock's Exhibit 21, a series of well log profiles, to demonstrate a point about shales in the Travis Peak formation. On Roundrock's Exhibit 21, he used the log for the Chevron Furrh-McMillan No. 3, one of the approximately six well logs on the exhibit, to illustrate a shale signature observed at about 5,770 feet subsea depth, the Pine Island Shale. Mr. Swanson contended that the James Limestone in this well is approximately 5,600 feet subsea depth and is geologically above the Pettit and

[70] Hearing Tr. Vol. 1, Pg.160; Hearing Chevron Ex. 7.
[71] Hearing Tr. Vol. 1, Pgs.160-162; Hearing Chevron Ex. 7.
[72] Hearing Tr. Vol. 1, Pg.163; Hearing Chevron Ex. 8: Excerpt from the "Transactions-Gulf Coast Association of Geological Studies, Vol XLI, pages 209-220". The cross-section is from the Dutton S.P., Laubach, S.E, Tye R.S., 1991 and titled, "Depositional, Diagenetic, and Structural Controls on Reservoir Properties of Low-Permeability Sandstone, Travis Peak Formation, East Texas".
[73] Hearing Chevron Exs. 8 and 9.
[74] Hearing Tr. Vol. 1, Pgs.164-165 and 171; Hearing Chevron Exs. 8 and 9.
[75] Hearing Tr. Vol. 1, Pg.183; Lns. 17-25.

Travis Peak formations at about 5,850 feet subsea depth and 6,300 feet subsea depth, respectively. Mr. Swanson characterized the Pine Island Shale as a true shale and used the resistivity log signature on one of Roundrock's exhibits to evaluate other litho-signatures in the Travis Peak and demonstrate his point about shales using the Applicant's data.[76] He stated,

> When you take that shale marker and you come down to the Travis Peak you don't see that very low resistivity shale at all coming down to the Travis Peak. Going back to Shirley Dutton's proclamation that really what -- you don't have true shales in the Travis Peak. Really what you've got are siltstones. And so -- and, again, the resistivity on these siltstones you can't trace laterally very far at all. So, it doesn't form a barrier all the way across the two or four-mile radius.[77]

9. Confining Bed

Mr. Swanson testified that he respectfully disagrees with Roundrock's geologic expert, Mr. Stewart, about the top seal of the injection interval, but he did agree that the top seal for the Travis Peak formation is going to be the Pettit formation, a thick limestone, which has zero porosity and is located immediately above the Travis Peak formation.[78] He also testified that he agrees with Mr. Stewart on the lower barrier to the injection interval, which is the Knowles Limestone, a 400-500-foot thick limestone below the Travis Peak with zero porosity.[79] Therefore, everything is confined between these two barriers, the Pettit formation above the Travis Peak formation and the Knowles Limestone, below the Travis Peak formation. The disagreement with Mr. Stewart is about a confining shale stratum within the Travis Peak formation at about 7,320 feet subsea depth. Mr. Swanson stated that there is not a naturally occurring confining interval at the top of the injection interval at 7,320 feet subsea depth, therefore fluids into the amended disposal interval will escape the disposal interval into the upper Travis Peak strata, a well-established hydrocarbon reservoir.[80]

10. Injection calculations

Mr. Burgess testified about recovery of hydrocarbons based on volumetric-type gas reservoir conditions, similar to the Travis Peak formation. He concluded, based on engineering principles and site-specific data, that since the residual gas saturation is independent of the pressure, recovery of gas from the Travis Peak reservoir will be greater if you have lower stabilized pressure. Therefore, well-accepted engineering principles establish that disposal of liquid into the Travis Peak formation will act as a water drive type reservoir and result in less gas recoveries from the reservoir.[81] In conclusion, flooding the reservoir by the Proposed Disposal Well will cause a reduction in the

[76] Hearing Roundrock Ex. 21.
[77] Hearing Tr. Vol. 1, Pg.168, Lns.14-25; Hearing Roundrock Ex. 21.
[78] Hearing Tr. Vol. 1, Pgs.169-170, Lns. 17-11.
[79] Hearing Tr. Vol. 1, Pg.169, Lns.15-22.
[80] Hearing Tr. Vol. 1, Pgs.171-173; Hearing Chevron Ex. 9.
[81] Hearing Tr. Vol. 1, Pgs. 243-244; Hearing Chevron Exs. 17A, 17B and 17C.

estimated ultimate recovery of gas for each well effected up to 40 percent.[82] Mr. Burgess asserted that the calculations he utilized to determine his conclusions were consistent with precedent established in Oil and Gas Docket No. 08-0291954, the Application of Ruger Properties in a Statewide Rule 46 hearing, in which the Examiners for the case went through a very detailed description on how the Commission expects these calculations to be done. Chevron utilized these calculations as the basis for how data was utilized for the present case.[83]

11. Pressure Front Calculations

Mr. Burgess testified that he performed pressure-front calculations based on EPA guidance, etc.[84] Mr. Burgess relied on Roundrock's Application to supply specific data to enter into the calculations to establish the reservoir pressure.[85] Mr. Burgess calculated the pressure-front calculation for the Furrh-Kate 7H well that is 2,035 feet distance from the Proposed Disposal Well. The calculations using Roundrock's own data establishes that after a year with 25,000 bbls/day injected into the Travis Peak Formation the pressure increases by 350 psi and after 25 years the pressure is increased to 680 psi. The calculations were redone using the amended disposal volumes of 17,500 bbls/day. The pressure will increase by 351 psi and after 25 years the pressure will be at 669 psi. It is noted the change of disposal liquids pressure from disposing of 25,000 bbls/day does not change the pressures significantly.[86] Mr. Burgess confirmed the pressure increase will be enough over time to migrate fluid up through the Travis Peak to the top seal at the top of the Travis Peak Formation. Mr. Burgess stated,

> That increase in pressure is what's preventing the abandonment pressure at this location from declining which is reducing our reserves. It's trapping that gas at a higher pressure, not letting it be produced. That's reducing the EUR.[87]

12. Disposal Wells in Area

Mr. Burgess testified an inventory of disposal wells was conducted by Chevron within a 10-mile radius of the Mudhole No. 1.[88] He established that numerous commercial and non-commercial wells are found within the area and utilized a series of maps to demonstrate the ample supply of injection wells in close proximity to Mudhole No. 1. Mr. Burgess asserted that the permitted disposal wells in the area reviewed in the 10-mile radius of Mudhole No. 1 are injecting into the Rodessa formation and the Pettit formation, with an estimated surplus capacity of about 60,000 bbls/day of water capacity available for injection within the area.[89]

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[82] Hearing Tr. Vol. 1, Pgs. 246-248; Hearing Chevron Exs. 17B and 17C.
[83] Hearing Tr. Vol. 2, Pgs. 9 and 10; Hearing Chevron Exs. 18A and 18B.
[84] Hearing Tr. Vol. 2, Pg. 12; Hearing Chevron Ex. 18C.
[85] Hearing Tr. Vol. 2, Pgs. 13-15; Hearing Chevron Ex. 18D.
[86] Hearing Tr. Vol. 2, Pg. 18.
[87] Hearing Tr. Vol. 2, Pg. 17. Lns. 14-18. Hearing Chevron Ex. 18E.
[88] Hearing Tr. Vol. 2, Pg. 17, Lns. 45-60; Hearing Chevron Exs. 21A, 21B, 21C, 21D.
[89] Hearing Tr. Vol. 2, Pgs. 49-50 and 59.

13. Revenue Issues

Mr. Burgess testified that Chevron has several wells that are planned to be plugged-back from the deeper fields, the Cotton Valley and the Haynesville, and recompleted in shallower reservoirs, including the Travis Peak. Mr. Burgess utilized three wells to make his point about the economic impact using the Furrh-Kate 7H well, the Werner-Pope 1H well and a planned installation in the Hayesville. He testified the EUR is based off of the TS Lagrone A1 well, which was recently recompleted in the Travis Peak from the Cotton Valley and perforated in the upper and lower Travis Peak strata. Had the wells not been able to be recompleted, Mr. Burgess indicated the result would have been a revenue loss for these three wells of $15,602.500; and the lost severance tax revenue for the State of Texas on these three wells of $1,596,587.

V. EXAMINERS' ANALYSIS OF THE EVIDENCE

Roundrock filed an Application for a commercial permit to dispose of oil and gas waste by injection for the Mudhole Lease, Well No. 1, Carthage (Travis Peak) Field, in Panola County, Texas, pursuant to Statewide Rule 46. Based on evidence in the record, the Examiners' recommend denial of the Application. The Examiners' analysis below focuses on the four major criteria necessary to meet the regulatory requirements for a Statewide Rule 46 permit.

A. Prevent Pollution of Ground and Surface Water

Based on the July 30, 2018, Groundwater Advisory Unit, Groundwater Protection Determination (GAU No. 202458) Summary, an interval from the land surface to the base of the Wilcox, which is estimated to occur at a depth of 450 feet, must be protected as the useable quality groundwater (UQGW). The base of underground resources of drinking water (USDW) is estimated to be at 500 feet and also must be protected.

Evidence in the hearing established that the groundwater and surface water will be protected with several confining formations between the injection interval and the fresh-water aquifers. Although Roundrock and Chevron cannot agree regarding the upper confining barrier immediately above the proposed permitted injection interval, it is agreed that migration of liquid waste to aquifers and surface water bodies will not occur, thus protecting the UQGW and the USDW. The hearing record established that the Pettit formation, a thick limestone, at 5,850 feet subsea depth and the Pine Island Shale at 5,770 feet subsea depth, are dense, low porosity and permeability formations that will result in liquid injected waste not migrating to shallow aquifers and surface waters of the State of Texas.

The Examiners found upon review of the Application, that the well design will be protective of shallow groundwater and surface water. Mr. Stewart testified that the well is designed with three strings of casing and is adequately cemented to depths that will protect the UQGW and the USDW. Chevron did not argue the issue. The Examiners concur that the UQGW and the USDW will be protected.

B. Demonstrate Financial Responsibility

As of the date of this PFD, Roundrock has an active P-5 and meets the financial assurance requirements of the Commission.

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

1. Confining Beds

Roundrock contended that groundwater will be protected, injected fluids will be confined to the injected interval and the proposed disposal well will not harm or threaten any productive hydrocarbons.

Roundrock amended the proposed disposal interval from 7,000 feet subsea depth to 7,320 feet subsea depth in the hearing on the merits to address overlap with a producing interval in the upper Travis Peak strata perforated by a Chevron well located about 1 and ½ miles away from the Proposed Disposal Well.

Roundrock presented testimony in the hearing on the merits that the upper confining unit is a shale layer at about 7,320 feet subsea depth. Roundrock indicated that the upper confining boundary is a low porosity layer that will contain the injected fluids to the middle and lower Travis Peak strata and will also protect the fresh waters associated with the UQGW and the USDW. In addition to the shale layer, Roundrock argued that a number of barriers exist in the Travis Peak to limit migration into the upper Travis Peak strata, including cemented sandstones and siltstones.

In the hearing, Chevron testified that Roundrock's geologic interpretation about the top seal of the injection interval being a shale is an incorrect interpretation. Chevron utilized a BEG study and a USGS paper to demonstrate that the Travis Peak formation contains mainly fine to very fine grain sandstones and siltstones, with an absence of clay or shale and is not contiguous across the area. The BEG and USGS studies established that the Travis Peak formation in Panola County is a river-dominated fluvial system, that is a braided river-channel depositional environment. This type of depositional environment will result in discontinuous layers of river-deposited strata, including highly transmissive strata. Chevron contended that braided river fluvial deposits are not contiguous across the area and therefore are not an upper confining layer to contain the injected waste within the permitted injection interval.

Chevron utilized a series of well log profiles from one of Roundrock's own exhibits to demonstrate a resistivity log's shale signature. Chevron compared the Pine Island Shale resistivity log signature with the upper confining barrier interpreted by Roundrock to be a shale. Chevron concluded that the proposed confining layer was not a shale and may not be a confining barrier to contain the fluids to the injection interval for the Proposed Disposal Well.

In Chevron's opinion, the upper confining unit is the Pettit formation located stratigraphically above the Travis Peak formation. Chevron argued that the proposed confining layer at 7,320 feet will allow fluids to migrate outside of the permitted injection interval into a known portion of the upper Travis Peak strata that has production in close proximity to the Proposed Disposal Well.

The Examiners are persuaded by Chevron's demonstrations that the upper confining barrier may allow migration of injected fluids to areas outside the requested injection interval. Evidence in the record established that the proposed upper confining barrier is not contiguous based on a braided stream depositional environment geologic principles and will allow injected fluids to migrate beyond the permitted injection interval and injure or harm mineral formations associated with the Travis Peak formation that are productive of oil or gas.

2. Carthage (Travis Peak) Field

Chevron presented evidence that the Travis Peak formation, along with other reservoirs above and below the Travis Peak formation, have produced over 11 billion cubic feet ("Bcf") of gas within the last 10 years in close proximity of the Proposed Disposal Well. Chevron also presented evidence that 16 wells perforated in the Travis Peak formation within the 2.5-mile radius of the Mudhole No. 1 Well have produced over 6 Bcf of gas within a 10-year period. Roundrock disagrees with Chevron's calculation that 6 Bcf of gas has been produced and that a portion of this gas production volume is from the middle and lower Travis Peak strata.

The majority of the Travis Peak wells have produced in the upper Travis Peak strata, which historically has been the primary producing portion of the Carthage (Travis Peak) Field. Chevron presented evidence in the hearing that shows both upper and lower segments of Carthage (Travis Peak) Field are capable of producing gas. Well logs presented as Chevron's Exhibit No. 11B, indicate gas is associated with the upper and lower strata of the Travis Peak formation. Chevron's example demonstrated that the mud log for the Werner-Pope 1H well indicated gas is located from 6,750 to 7,050 feet subsea depth and the mud log for the Furrh-Kate 7H well shows gas signatures at 6,750 to about 8,200 feet subsea depth and is within the proposed injection interval. It is noted that the two wells with mud log profiles used for examples are located approximately 2,900 feet and 2,000 feet, respectively, to the Proposed Disposal Well and are completed in the Carthage (Cotton Valley) Field and not the Carthage (Travis Peak) Field.

Roundrock presented evidence showing a two-mile radius around the Proposed Disposal Well, with historic production within the proposed injection interval. Roundrock contended the absence of wells within the ½-mile radius indicates that the lower and middle Travis Peak strata are non-producing segments of the Travis Peak formation and may be utilized for deep-well injection in contrast with Chevron's position that gas is available in close proximity of the Proposed Disposal Well, but not currently being recovered.

Chevron argued in the hearing that their current strategy is to recomplete wells through the entire Travis Peak geologic segment because gas has been observed in all portions of the Travis Peak formation. Chevron has a recompletion strategy to exercise their mineral interest ownership associated with the Travis Peak formation. As an example of Chevron's recompletion strategy, Chevron submitted as evidence the TS Lagrone 1H well that was initially a Carthage (Cotton Valley) Field well and recently recompleted into the Carthage (Travis Peak) Field after the primary gas recovery target was exhausted.

The Examiners conclude that the Travis Peak formation is a producing reservoir as established by the field rules. Historically, the majority of oil and gas production has been from the upper Travis Peak strata. The Examiners were unconvinced by Roundrock's argument that the absence of wells indicates a non-producing segment. The lower segments of the Travis Peak formation referred to as the middle and lower Travis Peak strata by Roundrock appear to have significant segments of the strata that have the potential to be a producing reservoir within the Carthage (Travis Peak) Field. In addition, the evidence shows the middle and lower Travis Peak strata can be developed with updated well completion technologies and prudent recompletion strategies. The Examiners are compelled by the evidence that the Proposed Disposal Well will harm the mineral formation and cause waste if flooding is allowed to occur by injecting into the proposed injection interval from 7,320 feet subsea depth to 8,400 feet subsea depth.

D. Public Interest

Section 27.051 of the Texas Water Code requires that the use or installation of a proposed injection well or facility be in the "public interest."[90] Prior examiners have noted that "public interest" is a "separate and independent prerequisite" from the other required findings outlined in Chapter 27 of the Texas Water Code.[91] The burden of proof to establish that a proposed commercial disposal facility is in the public interest as required by Chapter 27 of the Texas Water Code is placed upon the applicant for the permit.[92] Neither Chapter 27 of the Water Code nor Statewide Rule 46 define the term, "public interest."

Accepted proofs of public interest have often been expressed in terms of "industry need." If an applicant submits evidence of a lack of nearby disposal facilities or lack of capacity at existing facilities is shortening the economic life of oil and gas wells, this has customarily been considered proof of industry need for additional disposal capacity and thus proof of public interest. For example, industry need has been shown for past disposal applications where truck wait times at area facilities were so excessive as to compel traveling greater distances at greater expense to dispose of produced water.[93]

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[90] Tex. Water Code §27.051(b)(1).

[91] Oil and Gas Docket No. 02-0285578, *Application of Supreme Vacuum Services, LLC,* Examiners' Proposal for Decision (5-20-2014), p. 8.

[92] See e.g. Oil and Gas Docket No. 09-0262947, *Application of IWOC, Inc.*, Examiners' Proposal for Decision (1-1-2010), p. 11

[93] See, e.g., Oil and Gas Docket No. 06-0273122, Application of Chireno Disposal, LLC, Examiners' Proposal for Decision (10-10-2012), p. 6

Evidence in the form of disposal contracts or letters of support from nearby operators has also been accepted by the Commission to demonstrate industry need if coupled with some evidence of a lack of capacity.[94] More recently, the Commission has been willing to consider an applicant's readiness to incur the expense of drilling and operating a disposal well based upon a factually supported market assessment of area need as evidence of public interest.[95]

Roundrock asserts the Proposed Disposal Well is in the public interest. Roundrock stated that Louisiana is the primary market for the Mudhole No. 1 Well, since the Texas and Louisiana border is approximately five miles from the well, with 70% of their business coming from Louisiana.[96] Roundrock contends there is a need for disposal capacity in the area. Roundrock stated that investors are willing to spend money on proposed commercial disposal wells because of the need in oil and gas disposal in the area.[97] In support of their claim, Roundrock identified two of operators, Sabine Oil and Gas and Goodrich Energy, who have shown interest in the additional injection capacity of the Proposed Disposal Well.[98]

Roundrock stated that there are concerns regarding the disposal wells near Joaquin, regarding volume capacity and pressuring up of injection zones.[99] Roundrock contends the Proposed Disposal Well will divert from other disposal wells in the area and reduce over-pressuring of injection intervals. Roundrock asserts "the public interest test does not legally include a requirement to prove need or lack of existing capacity."[100] In addition, Roundrock argued that if it does not threaten pollution, it is in the public interest.[101]

Chevron contends the Proposed Disposal Well is not in the public interest. Chevron conducted a study that identified the inventory of disposal wells within a 10-mile radius of the proposed Mudhole No. 1. Chevron utilized a series of maps to demonstrate their claim regarding disposal capacity inventory within the area. Chevron supported their assertion that there is current disposal capacity surplus by summarizing the operational injection capacity in a 10-mile area using Commission records. Chevron utilized Commission Form H-10s, showing spare capacity as determined by the operator, which is the operational capacity minus the average injection rate for the well.[102] Chevron argued that disposal wells in the 10-mile area of the Mudhole No. 1 Well have an estimated surplus operational capacity of about 60,000 bbls/day of water.[103] In addition to the operational capacity determination conclusion in their assessment, Chevron contends that there are 19 non-commercial disposal wells and 11 commercial disposal wells within a 10-mile radius of the Proposed Disposal Well, therefore the majority of

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[94] *See id.*
[95] Oil and Gas Docket No. 08-0289657, *Application of Lotus LLC*, Examiners' Proposal for Decision (1-27-2015), p. 12
[96] Hearing Tr. Vol. 1, Pg. 117, Lns. 17-22.
[97] Hearing Tr. Vol. 1, Pgs. 48-49.
[98] *Id*.
[99] Hearing Tr. Vol. 1, Pgs. 50-51.
[100] Hearing Tr. Vol. 1, Pg. 19, Lns. 7-10.
[101] Roundrock Written Closing Statement, Pg. 6.
[102] Hearing Tr. Vol. 2, Pgs. 47-55 and 75; Hearing Roundrock Exs. 21A, 21B, and 21C.
[103] Hearing Tr. Vol. 2, Pgs. 49-50 and 53-59.

operators in the area have their own non-commercial disposal wells and are not dependent on commercial facilities in the area.[104]

Chevron also addressed the wells near Joaquin, Texas and the need for additional capacity in that area. Chevron argued that some of the currently operating disposal wells in the Joaquin area are connected by pipeline to other disposal wells, including a group of wells in Louisiana and also within the 10-mile radius of the proposed Mudhole No. 1 Well. Chevron contends that any of these pipeline-connected disposal wells can easily transfer liquids from one well to the other with a lot of flexibility to address disposal needs in the area. Chevron maintains that the flexibility was not being fully utilized because of the ample surplus capacity from the current disposal well network. [105]

In summation, Chevron argued that denial of a disposal well application based on the market-based industry need is well established by Commission precedent. Chevron stated that numerous disposal permit applications have been denied because of identified surplus disposal capacity.[106]

The Examiners find Roundrock's evidence failed to justify a need for additional disposal capacity in the area at this time. Roundrock's basis for additional capacity consisted solely of a willingness of others to invest in a disposal well and two companies that had expressed an interest in possibly using the Proposed Disposal Well. In contrast, Chevron's evidence shows there is available capacity in the area. Evidence which Roundrock failed to rebut, other than by saying that neither Commission rules nor the applicable statutes require a need-based showing.

The Examiners find it is not in the public interest of the State of Texas to permit the Proposed Disposal Well. The Examiners find sufficient capacity exists for Texas wells. The Examiners find it is not in the public interest of the State of Texas to permit a well that is primarily for waste that is trucked in from another state.

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[104] Hearing Tr. Vol. 2, Pgs. 48-58.
[105] Hearing Tr. Vol. 2, Pgs. 54-55.
[106] Hearing Tr. Vol. 2, Pgs. 138-139. *See* Oil and Gas Docket No. 01-0295061, *Application of Seawater Production, LLC*, Proposal for Decision (April 7, 2016), pg. 13-14, Final Order signed June 7, 2016; Oil and Gas Docket No. 01-0285961, *Application of Select Energy Services, LLC*, Proposal for Decision (February 22, 2016), pg. 13, Final Order signed March 29, 2016; Oil and Gas Docket No. 01-0295778, *Application of Texokan Operating, Inc.*, Proposal for Decision (October 20, 2015), pg. 7, Final Order signed December 8, 2015; Oil and Gas Docket No. 01-0288953, *Application of JTC Energy Group, LLC*, Proposal for Decision (March 31, 2015), pg. 8, Final Order signed May 12, 2015; Oil and Gas Docket No. 08-0289657, *Application of Lotus, LLC*, Proposal for Decision (January 27, 2015), pg. 12-13, Final Order signed June 9, 2015; Oil and Gas Docket No. 02-0285578, *Application of Supreme Vacuum Services, LLC*, Proposal for Decision (March 20, 2014), pg. 7, Final Order signed July 8, 2014; Oil and Gas Docket No. 02-0278322, *Application of Karnes County Properties, LLC*, Proposal for Decision (February 13, 2013), pg. 5, Final Order signed May 7, 2013; Oil and Gas Docket No. 06-0273122, *Application of Chireno Disposal, LLC*, Proposal for Decision (October 10, 2012), pg. 8, Final Order signed November 20, 2012; Oil and Gas Docket No. 05-0263367, *Application of Alice Environmental Services, LP*, Proposal for Decision (November 17, 2010), pg. 9-11, Final Order signed January 13, 2011; Oil and Gas Docket No. 06-0264337, *Application of Don H. Wilson*, Proposal for Decision (July 13, 2010), pg. 5, Final Order signed August 10, 2010; Oil and Gas Docket No. 09-0262947, *Application of IWOC, Inc.*, Proposal for Decision (January 15, 2010), pg. 11-12, Final Order signed February 23, 2010, Denial of Motions for Rehearing signed April 20, 2010.

VI. FINDINGS OF FACT AND CONCLUSIONS OF LAW AND EXAMINERS' RECOMMENDATION

The Examiners recommend that the Commission deny Roundrock's Application for the Mudhole No. 1 well, pursuant to Statewide Rule 46, and adopt the following findings of fact and conclusions of law.

A. Findings of Fact

1. The following is the procedural history for the Docket:

a. Roundrock Midstream, LLC (Operator No. 730112) ("Roundrock" or "Applicant") filed an application ("Application") for a commercial permit to dispose of oil and gas waste by injection for the Mudhole Lease, Well No. 1 (referred to as, "Mudhole No. 1" or "Proposed Disposal Well"), Carthage (Travis Peak) Field (Field No. 16032812), in Panola County, Texas, pursuant to 16 Tex. Admin. Code § 3.46.

b. Roundrock submitted an Application dated July 20, 2018, seeking authority to inject a maximum volume of 25,000 barrels per day ("bbls/day") of saltwater, and other non-hazardous oil and gas waste into the subsurface depth interval from 7,000 feet subsea depth to 8,400 feet subsea depth within the Travis Peak formation.

c. The Application is protested by Chevron U.S.A., Inc. ("Chevron"). Chevron's protest letter dated August 8, 2018, indicates that the proposed well will adversely affect future adjacent wells resulting from elevated pressures in the Travis Peak formation. The elevated pressures will cause new drilling risks and reduce the recovery of hydrocarbons within the Travis Peak formation, which is part of the Carthage (Travis Peak) Field, resulting in waste.

d. On May 3, 2019, the Hearings Division of the Commission sent a notice of hearing on the merits ("Notice") via first-class mail to the Applicant and all affected persons setting a hearing on June 11-12, 2019. The Notice contains (1) a statement of the time, place, and nature of the pre-hearing conference; (2) a statement of the legal authority and jurisdiction under which the hearing is to be held; (3) a reference to the particular sections of the statutes and rules involved; and (4) a short and plain statement of the matters asserted.

e. In addition to the Notice sent to the Service List on May 3, 2019, supplemental notices were provided to potentially affected persons by Docket Services. These supplemental notices were provided because the potentially affected persons who were not on the initial Notice dated May 3, 2019. Consequently, all parties received more than 10 days' notice of the hearing and an opportunity for hearing.

f. Roundrock published notice of the Application for a commercial permit to dispose of oil and gas waste by injection for the Mudhole No. 1 in the Carthage (Travis Peak) Field and located in Panola County, Texas. The notice was published in *The Panola Watchman* on Wednesday, July 25, 2018.

g. The hearing on the merits was held on June 11 and 12, 2019. Roundrock and Chevron attended and participated in the hearing on the merits.

2. The Mudhole No. 1 Proposed Disposal Well is approximately 13.7 miles southeast of Carthage, Texas.

3. At the hearing, Roundrock amended the Application by reducing the maximum daily injection volume from 25,000 bbls/day to 17,500 bbls/day and by lowering the top of their disposal interval from 7,000 feet subsea depth to 7,320 feet subsea depth, which establishes a proposed injection interval from 7,320 feet subsea depth to 8,400 feet subsea depth.

4. Roundrock submitted to the Commission an application titled, Application to Inject Fluid into a Reservoir Productive of Oil and Gas (Form H-1) and the accompanying well information, titled, Well Data (Form H-1A), dated July 20, 2018. The following is a summary of the well specifications as outlined in the Application:

a. The field name is the Carthage (Travis Peak) Field (Field No. 16032812) which is composed of the Travis Peak formation in Panola County, Texas;

b. The lease name is the Mudhole Lease;

c. The proposed disposal interval is part of the Travis Peak formation, which is primarily Sandstone;

d. The fluids requested for disposal into the injection interval are Saltwater and RCRA-exempt waste liquids;

e. The Mudhole No. 1 (API No. 36538441), is scheduled to be drilled to a depth of 8,400 feet subsea depth and has drilling permit number 842439;

f. The Application's injection interval is from 7,000 feet subsea depth to 8,400 feet subsea depth within the Travis Peak formation and limits the injection to a maximum daily injection volume of 25,000 bbls/day, with a maximum surface injection pressure of 3,500 psig. At the hearing, Roundrock amended the Application by reducing the maximum daily injection volume from 25,000 bbls/day to 17,500 bbls/day and also lowered the top of their disposal interval from 7,000 feet subsea depth to 7,320 feet subsea depth, which establishes a proposed injection interval from 7,320 feet subsea depth to 8,400 feet subsea depth.

g. The Mudhole No. 1 Well is proposed to be completed with a 9 5/8-inch surface casing to a depth of 600 feet deep with cement circulated to surface.

h. The 7-inch diameter long string casing is set from surface to a depth of 8,400 feet subsea depth with cement circulated from the bottom to 7,000 feet subsea depth.

i. The injection tubing is from the ground surface to a depth of 7,000 feet subsea depth, with a DV tool set at approximately 7,000 feet subsea depth (calculated).

5. Chevron operates in several different hydrocarbon reservoirs, such as the Travis Peak Formation, Cotton Valley Group and the Haynesville Shale, which are in close proximity to the Proposed Disposal Well identified as the Mudhole No. 1.

6. With proper safeguards, both ground and surface fresh water can be adequately protected from pollution. Based on the July 30, 2018, Groundwater Advisory Unit, Groundwater Protection Determination (GAU No. 202458) summary report, an interval from the land surface to the base of the Wilcox, which is estimated to occur at a depth of 450 feet must be protected as the useable quality groundwater (UQGW). Also, the base of underground resources of drinking water (USDW) estimated to be at 500 feet must also be protected. Evidence in the hearing established that the groundwater and surface water will be protected with the overburden sediments and the Proposed Disposal Well has adequate design to protect the UQGW and USDW.

7. Roundrock has an active Commission Organization Report (Form P-5) on file with appropriate financial assurance.

8. The oil, gas or mineral formations in the area are endangered by the Proposed Disposal Well. The middle and lower Travis Peak stratas are productive reservoirs within 2.5 miles of the proposed injection well. Evidence in the record indicates the Carthage (Travis Peak) Field will be harmed by the injection of fluids into the proposed injection interval.

9. Roundrock failed to provide sufficient evidence to support their claim the disposal well is in the public interest.

10. The upper confining barrier as proposed in the Proposed Disposal Well at 7,320 feet subsea depth is not contiguous across the area and may allow injected liquid waste injected into the permitted injection interval to migrate to the upper Travis Peak strata. The upper Travis Peak strata is currently a productive portion of the Carthage (Travis Peak) Field in close proximity to the Mudhole Well No. 1.

11. As part of the Application, a seismic survey was conducted by Roundrock and no seismic activity was noted within the 9.08-kilometer radius of the Proposed Disposal Well.

B. Conclusions of Law

1. Resolution of the Application is a matter committed to the jurisdiction of the Commission. Tex. Nat. Res. Code § 81.051.

2. All notice requirements have been satisfied. 16 Tex. Admin. Code § 3.46.

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

4. Roundrock has made a satisfactory showing of financial responsibility. Texas Water Code § 27.051(b)(4) and required by Section 27.073.

5. The use of the proposed Mudhole No. 1 will endanger or injure oil, gas, or mineral resources. Texas Water Code § 27.051(b).

6. Roundrock failed to provide sufficient evidence to support their claim the disposal well is in the public interest.

7. Roundrock has not met its burden of proof to satisfy the requirements of Chapter 27 of the Texas Water Code and the Commission's Statewide Rule 46.

C. Recommendation

Based on the evidence in the record, the Technical Examiner and Administrative Law Judge recommend denial of the Roundrock's Application.

Respectfully,

DocuSigned by:
Robert Musick
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Robert Musick, P.G.
Technical Examiner

DocuSigned by:
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Kristi M. Reeve
Administrative Law Judge