RAILROAD COMMISSION OF TEXAS
HEARINGS DIVISION

OIL & GAS DOCKET NO. 08-0320870

APPLICATION OF NGL WATER SOLUTIONS PERMIAN, LLC (609265) PURSUANT TO STATEWIDE RULE 9 FOR A COMMERCIAL PERMIT TO DISPOSE OF OIL AND GAS WASTE BY INJECTION INTO A POROUS FORMATION NOT PRODUCTIVE OF OIL OR GAS FOR THE CENTRAL REEVES (46177) LEASE, WELL NO. 3SW, QUITO, WEST (CHERRY CANYON) FIELD, REEVES COUNTY, TEXAS

OIL & GAS DOCKET NO. 08-0320871

APPLICATION OF NGL WATER SOLUTIONS PERMIAN, LLC (609265) PURSUANT TO STATEWIDE RULE 9 FOR A COMMERCIAL PERMIT TO DISPOSE OF OIL AND GAS WASTE BY INJECTION INTO A POROUS FORMATION NOT PRODUCTIVE OF OIL OR GAS FOR THE CENTRAL REEVES (46177) LEASE, WELL NO. 4SW, QUITO, WEST (CHERRY CANYON) FIELD, REEVES COUNTY, TEXAS

OIL & GAS DOCKET NO. 08-0320872

APPLICATION OF NGL WATER SOLUTIONS PERMIAN, LLC (609265) PURSUANT TO STATEWIDE RULE 9 FOR A COMMERCIAL PERMIT TO DISPOSE OF OIL AND GAS WASTE BY INJECTION INTO A POROUS FORMATION NOT PRODUCTIVE OF OIL OR GAS FOR THE CENTRAL REEVES (46177) LEASE, WELL NO. 5SW, QUITO, WEST (CHERRY CANYON) FIELD, REEVES COUNTY, TEXAS

PROPOSAL FOR DECISION

HEARD BY: Ashley Correll, P.G. - Technical Hearings Examiner
Ezra A. Johnson - Administrative Law Judge

PROCEDURAL HISTORY:

Application Filed:	October 1, 2018
Hearing Date:	September 19-20, 2019
Hearing Transcripts Received:	October 8, 2019
Close of Record:	December 2, 2019
Proposal for Decision Issued:	April 6, 2020

APPEARANCES:

APPLICANT:

NGL Water Solutions Permian, LLC:

George C. Neale, Attorney
Christopher S. Hotchkiss, Attorney
Rick Johnston, Professional Engineer
Todd Reynolds, Geologist/Geophysicist
Tim Jurco, Vice President

PROTESTANT:

Carrizo (Permian), LLC:

Jamie Nielson, Attorney
Scott Hudson, Vice President
Thomas White, Operations Engineer

TABLE OF CONTENTS

I. Statement of the Case

NGL Water Solutions Permian, LLC (Operator No. 609265) ("NGL" or "Applicant") filed three applications ("Applications") for a commercial disposal permit pursuant to Statewide Rule 9,[1] to dispose of oil and gas waste by injection into a formation not productive of oil and gas on the Central Reeves Lease ("Lease"), Well Nos. 3SW, 4SW, and 5SW, in the Quito, West (Cherry Canyon) Field (Field No. 73933420), in Reeves County, Texas. NGL requests permits be issued for the proposed disposal wells granting authority to dispose of 20,000 barrels per day ("bpd") per well of saltwater and non-hazardous oil and gas waste at a subsurface depth of 4,500 feet to 6,800 feet true vertical depth ("TVD"), within the Bell Canyon, Cherry Canyon and Brushy Canyon Formations, also known as the Delaware Mountain Group. Following the hearing, NGL proposed to provisionally withdraw the application for Well No. 3SW on the condition that the applications for Well Nos. 4SW and 5SW be recommended for approval.

The Applications are protested by Carrizo (Permian), LLC ("Carrizo" or "Protestant"), who is the operator of the tract upon which the proposed disposal wells are located. Carrizo operates most of the wells within a five-mile radius and is one of the primary producers within a 10-mile radius of the proposed disposal wells. The Protestant states that the additional disposal capacity in the area is not needed and that the subject wells are not in the public interest. Carrizo further argues that the proposed disposal operations will pressure up the injection zone through which Carrizo must drill its wells to Wolfcamp producing zones, to the point that an additional string of casing will need to be set. The cost of setting the additional string of casing will render potential producing wells uneconomic and thus undrilled, leaving oil and gas reserves unrecovered.

Based on the evidence presented at the hearing, the Technical Examiner and Administrative Law Judge ("Examiners") recommend denial of the Applications to dispose of oil and gas waste by injection for Well Nos. 3SW, 4SW, and 5SW ("proposed disposal wells").

II. Notice and Jurisdiction

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.

On September 28, 2018, notice of the Applications was provided to operators and adjoining surface owners within a one half-mile radius of the proposed disposal well, which included Protestant Carrizo (Permian), LLC. NGL's Applications for the proposed commercial disposal wells were published on September 27, 2018 in the *Pecos Enterprise*. The publication discussed the proposed disposal wells, well locations, legal authority and notice of public hearing.

[1] Statewide Rule (SWR) 9 refers to 16 Tex. Admin. Code § 3.9.

On August 20, 2019, the Hearings Division of the Commission sent a Joint Notice of Hearing ("Notice") via first-class mail to Applicant and affected persons setting hearing dates for September 19, 2019 to September 20, 2019. Applicant and Protestant attended and participated in the hearing on the merits. Consequently, all parties received more than 10 days' notice of the hearing and an opportunity for hearing.

III. Applicable Law

Statewide Rule 9 (16 Tex. Admin. Code § 3.9) states the following:

> Any person who disposes of saltwater or other oil and gas waste by injection into a porous formation not productive of oil, gas, or geothermal resources shall be responsible for complying with 16 Tex. Admin. Code § 3.9, Texas Water Code, Chapter 27, and Title 3 of the Natural Resources Code.

Tex. Water Code § 27.031 states in pertinent part:

> 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.

Tex. Water Code § 27.051(b) states:

> (b) The railroad commission may grant an application for a permit under Subchapter C[2] in whole or part and may issue the permit if it finds:
>
> (1) that the use or installation of the injection well is in the public interest;
>
> (2) that the use or installation of the injection well will not endanger or injure any oil, gas, or other mineral formation;
>
> (3) that, with proper safeguards, both ground and surface fresh water can be adequately protected from pollution; and
>
> (4) that the applicant has made a satisfactory showing of financial responsibility if required by Section 27.073.[3]

[2] Subchapter C of the Texas Water Code authorizes the Commission to issue permits for injection wells used to dispose of oil and gas waste. *See, e.g.,* Tex. Water Code § 27.031.

[3] Section 27.073 of the Texas Water Code authorizes 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.,* Tex. Admin. Code § 3.78(a)(6), (d), (g).

IV. Discussion of the Evidence[4]

At the hearing, the Applicant appeared and presented evidence through its witnesses, Rick Johnston, Todd Reynolds, and Tim Jurco. Applicant provided 59 exhibits at the hearing. The Protestant appeared and presented evidence by and through its witnesses, Scott Hudson and Thomas White. Protestant provided 32 exhibits at the hearing.

A. Applicant's Evidence

1. Applications

NGL initially submitted a Commission Form W-14 for each of the three proposed wells on October 1, 2018, seeking to dispose of oil and gas waste by injection into a formation not productive of oil and gas under Statewide Rule 9. The Applications indicate the proposed injection interval is 4,500 to 6,800 feet TVD, which correlates to the Bell Canyon, Cherry Canyon, and Brushy Canyon formations, also known as the Delaware Mountain Group ("DMG").[5] With few exceptions, disposal operations in Reeves County focus primarily on the DMG. As Rick Johnston, consulting engineer, testified for NGL, "throughout Reeves County, the Delaware Mountain Group is the disposal interval of choice."[6]

On December 19, 2018, an amended Form W-14 was submitted for each of the proposed disposal wells to include the base of usable-quality water, the injection tubing size and depth, and the packer depth, each of which had not been indicated in the previous submittals. NGL also included the seismic report and a statement asserting that NGL agreed to perform a step-rate test and measure the initial bottom hole pressure ("BHP") for each of the proposed disposal wells prior to commencing injection.[7] The seismicity study within a 100 square mile area of the proposed disposal well indicated that six seismic events had been recorded in the study area.[8]

NGL requests commercial disposal authority pursuant to Statewide Rule 9 to inject oil and gas waste into a porous formation not productive of oil and gas for the Central Reeves Wells Nos. 3SW, 4SW, and 5SW, in the Quito, West (Cherry Canyon) Field, in Reeves County, Texas. The proposed disposal wells have not been drilled at the time of the hearing, but a permit to drill (W-1) for each of the three wells was received by the Commission on September 21, 2018. The drilling permit for Well No. 3SW states the proposed directional well is designated as API No. 42-389-37597 and its total measured depth is 8,000 feet.[9] The drilling permit for Well No. 4SW states the proposed vertical well

[4] The transcript for the hearing held on May 10, 2019, is referred to as "Tr. [Vol. at pg:ln(s)]". Applicant's exhibits are referred to as NGL Ex. [exhibit no.]."; and the protestant's exhibits are referred to as "Carrizo Ex. [exhibit no.].""
[5] NGL Ex. No. 1.
[6] Tr. Vol. 1 at 18:6-9.
[7] NGL Ex. No. 2; Tr. Vol. 1 at 18:18–19:8.
[8] NGL Ex. No. 3.
[9] NGL Ex. No. 3.

is designated as API No. 42-389-37596 and is 6,800 feet deep.[10] The drilling permit for Well No. 5SW states the proposed vertical well is designated as API No. 42-389-37600 and is 6,800 feet deep.[11] The surface location for Well No. 3SW was to be on the western side of the Lease and drilled directionally beneath US Hwy 285 to a bottomhole location on the northern corner of the Lease.[12] Well No. 4SW will be in the western corner of the Lease and the location of Well No. 5SW is proposed for the southern corner.[13] The draft permits for the proposed disposal wells show that the maximum daily injection volume has been reduced by agreement of NGL from 25,000 to 20,000 barrels per day and the maximum surface injection pressure has been reduced from 2,440 psi, one-half psi per foot depth, to 1,125 psi, one-quarter psi per foot depth.[14]

2. Geology and Resource Development

The proposed disposal interval for the subject wells is located within the DMG. At the hearing, Mr. Johnston provided a well log from the Central Reeves No. 2SW, which is located on the same tract as the proposed disposal wells. This log indicates that the top of the DMG is shown at a depth of approximately 4,520 feet subsurface.[15] According to Mr. Johnston's testimony, the well log further shows the Castile Formation located above the top of the requested disposal interval. Mr. Johnston later testified that the Castile Formation will act as a confining interval protecting the shallower freshwater formations.[16]

Following Mr. Johnston, Mr. Todd Reynolds, geologist and geophysicist, testified on behalf of NGL about the geology in the area of the proposed disposal wells. He described the structure of the DMG in this area as gently dipping to the east with no indication of any faulting at the top of the formation.[17] The DMG ranges from 3,200 to 3,300 feet thick in this in area.[18]

Mr. Reynolds presented two seismic lines through the proposed disposal area. He observed that subsurface formations maintain thickness across the area with no indication of missing sections or changes that would be indicative of faulting in the DMG.[19] The injection zone formations do not "pinch out," and they maintain a relatively consistent thickness for the injection interval.[20] Mr. Reynolds asserted that he reviewed gamma ray and porosity logs and calculated 926 feet of injectable rock in the proposed injection zone.[21]

---

[10] NGL Ex. 11.
[11] NGL Ex. 18.
[12] NGL Ex. No. 6; Tr. Vol. 1 at 25:10-25.
[13] NGL Ex. No. 6; Tr. Vol. 1 at 26:1-3.
[14] NGL Ex. 15 and 22; Tr. Vol. 1 at 27:7–28:6.
[15] Tr. Vol. 1 at 23:5-25.
[16] Tr. Vol. 2 at 179:4-17; NGL Exs. 3, 11, and 18.
[17] Tr. Vol. 1 at 45:17-20; NGL Ex. 24.
[18] Tr. Vol. 1 at 46:13-21; NGL Ex. 25.
[19] Tr. Vol. 1 at 48:18–49:18; NGL Ex. 27.
[20] Tr. Vol. 1 at 49:19-22.
[21] Tr. Vol. 1 at 51:14-25; Ex. 29.

Faulting is present in the area below the proposed injection zone and the productive Wolfcamp zones, with displacement at the Mississippian, Devonian and Ellenburger "basement" formations.[22] Mr. Reynolds testified, however, that faults within the basement formations tend to die out in the Lower Wolfcamp.[23] Mr. Reynolds later testified that the Bone Spring and tight facies within the Brushy Canyon at the base of the DMG will provide a confining layer below the proposed disposal interval.[24]

Mr. Reynolds further provided a revised seismicity report which included an updated fault slip potential ("FSP") model for the proposed wells. Mr. Reynolds testified that, because there is no observed faulting within the proposed injection interval in this part of the DMG, he had to run the FSP model that is required by the Commission's UIC section with test faults to produce output readings.[25] The FSP model was run using thickness, viscosity, various stress parameters, density, compressibility, and fault orientation.[26]

Mr. Reynolds testified that the observed seismicity in the 100-square-mile area around the proposed wells seems to be associated with development activity in the Wolfcamp rather than injection into the DMG. Extraction and fracking activities in the Wolfcamp are conducted at stratigraphic intervals that are much closer to the depths where faulting and seismic events are thought to be occurring. In addition, seismicity has been observed in this area at times and places that correlate very strongly with development activity in the Wolfcamp more so than with injection into the DMG.[27]

For this reason, Mr. Reynolds concluded that he does not see a correlation between DMG injection and seismicity. He sees evidence of faulting further down between the Wolfcamp and Woodford formations and below, but the pressure increases caused by injection into the DMG will not initiate fault slip in the deeper formations where there is evidence of faulting.[28] Mr. Reynolds testified that injection of water in the deeper depths at which faults occur would be riskier than injecting into the DMG.[29] NGL asserts that the proper safeguards have been put in place and will not endanger oil and gas or mineral formations associated with the injection interval.

3. Public Interest

NGL's evidence of public interest need for the proposed wells is based primarily upon a review by Mr. Reynolds of oil and gas wells completed, drilling permits, and current disposal activity within a 10-mile radius from the proposed disposal wells ("Area of

[22] Tr. Vol. 1 at 58:8-19.
[23] Tr. Vol. 1 at 58:8-19.
[24] Tr. Vol. 2 at 15:28-21.
[25] Tr. Vol. 1 at 69:18–70:13.
[26] NGL Ex. 34.
[27] Tr. Vol. 1 at 62:22–63:5.
[28] Tr. Vol. 1 at 88:10-14.
[29] Tr. Vol. 1 at 63:6-18.

Review"). [30] All of the witnesses for NGL testified that there is need for additional disposal capacity within the Area of Review.

As part of his review, Mr. Reynolds identified 1,059 active oil and gas wells within Area of Review as of June 2019. These wells produced 123,000 barrels of oil per day at that time.[31] Mr. Reynolds testified that he reviewed Form P-18 data to determine the volume of water being sent to a sample of approximately 10 injection wells located within the Area of Review. He took the number of barrels of water sent to each injection well for a month, compared it to nearby oil production, and developed a locally applicable ratio of five barrels of water per barrel of oil produced per day.[32] Using this ratio, Mr. Reynolds estimated that 616,000 barrels of water were being produced per day within the Area of Review.[33]

Mr. Reynolds then testified that he reviewed the Form H-10 data for disposal wells in Area of Review.[34] When taking into account the different Form H-10 filing dates, Mr. Reynolds estimated that there were 63 active disposal wells within the Area of Review.[35] For the 63 active disposal wells within the Area of Review, Mr. Reynolds looked at the most recent six months of Form H-10 data and determined that a total of 433,000 barrels of water per day were being injected in those wells:

> When you compare that to the estimated water, there's a deficit there. There appears to be more water being produced in that circle than is being disposed of in the same circle. So by these estimates it appears that the water production is exceeding the disposal, and you know, that's probably water that's having to be moved outside the circle, go somewhere else.[36]

Mr. Reynolds further claimed that disposal wells may not be capable of injecting the maximum permitted injection volume. Permitted injection volumes are rarely based upon prior step-rate injection tests or other similar data and can be unduly optimistic.[37] The actual volume a well is capable of injecting is dependent on the formation characteristics, wellbore specifications, pump specifications, and storage capacity.[38] For these reasons, Mr. Reynolds testified that permitted injection volumes are not necessarily good evidence of actual injection capacity for a particular well or cumulative available capacity in a particular area.[39]

Mr. Reynolds also provided an estimate of future demand for injection capacity and found 255 recently completed oil and gas wells within the Area of Review that do not yet

[30] *See* Tr. Vol. 1 at 90:13–91:8
[31] Tr. Vol. 1 at 91:11-22.
[32] Tr. Vol. 1 at 92:10-21.
[33] Tr. Vol. 1 at 92:22-24
[34] Tr. Vol. 1 at 93:12-15.
[35] Tr. Vol. 1 at 93:12-25; NGL Ex. 35.
[36] Tr. Vol. 1 at 94:1-13.
[37] Tr. Vol. 1 at 96:1-6.
[38] Tr. Vol. 1 at 95:12-17.
[39] Tr. Vol. 1 at 96:1-6.

have production records on file.[40] There are also 237 additional drilling permits for oil and gas wells within the Area of Review, and 21 permits and permit applications for disposal wells, including the proposed disposal wells.[41] Many of the disposal well requests are from operators with producing wells in the Area of Review.[42] Mr. Reynolds wrapped up his direct testimony by contending that this is evidence of additional need for injection in this area.[43]

Mr. Tim Jurco, Vice President of NGL, closed out NGL's direct case and provided a market analysis of the Delaware Basin. As part of this analysis, Mr. Jurco testified that the Delaware Basin had 33,000 active oil and gas wells, 9,000 permits, 246 active rigs; and the water-oil ratio for the entire basin is 3.6 times. Mr. Jurco calculated a compound annual growth rate of 24 percent for the Delaware Basin in 2017.[44] Mr. Jurco asserted that there is a need for commercial disposal capacity in the area.[45] On cross examination, Mr. Jurco acknowledged that NGL would transfer the subject permits to WaterBridge if granted by the Commission.[46]

In response to evidence submitted by Carrizo, Mr. Reynolds was recalled to further substantiate his analysis of disposal capacity in the Area of Review. In his rebuttal testimony, Mr. Reynolds used Carrizo's own water-type curve data in an effort to show that, within the first six months of a well's life, water production is roughly 8 barrels of water per barrel of oil.[47] If this ratio is applied to the 575,000 barrels of oil expected to be produced in the first six months of operations (the average of production from wells in the Area of Review) from the 20 additional wells proposed by Carrizo at the time of the hearing, disposal capacity for 94 million additional barrels of water would be needed in the Area of Review.[48]

Mr. Reynolds also provided Form P-18s as evidence to demonstrate that Carrizo is a primary source of the water injected into the nearby Clark SWD No. 1, Clark SWD No. 2, North Pecos SWD, and Central Reeves SWD No. 2.[49]

Mr. Jurco further testified on rebuttal that adding the proposed wells would be in the public interest because of the systemic benefit of operational redundancies that these additional wells would provide in the area.[50] Redundant wells can prevent disposal system upset when a well goes down at a particular site. Producers are more likely to bring a pipeline to a disposal well site if they know the disposal well operator has backup

[40] Tr. Vol. 1 at 96:8-22.
[41] Tr. Vol. 1 at 96:23–97:11.
[42] Tr. Vol. 1 at 97:2-5.
[43] Tr. Vol. 1 at 97:21-22.
[44] Tr. Vol. 1 at 100:16–101:5.
[45] Tr. Vol. 1 at 101:6-16.
[46] Tr. Vol. 1 at 107:8-23
[47] Tr. Vol. 2 at 130:12–131:25.
[48] Tr. Vol. 2 at 130:12–131:25.
[49] NGL Exs.47-57.
[50] Tr. Vol. 2 at 174:16-6.

capacity.[51] Without this backup capacity, producers would be compelled to shut-in wells each time the disposal system is down for maintenance and repairs.[52]

4. Protection of Useable Quality Water Aquifers

Mr. Johnston testified that NGL plans on accomplishing compliance with Statewide Rule 9 for the proposed disposal wells by running a 10 3/4-inch surface casing to 2,250 feet.[53] The surface casing will be cemented from the shoe of the surface casing to the surface.[54] In addition to the surface casing, Mr. Johnston testified that NGL plans on running a 7 5/8-inch long string casing to 6,800 feet with a DV tool at 4,500 feet and running cement up to 2,500 feet from the DV tool in Well Nos. 4SW and 5SW.[55] The 7 5/8-inch long string casing for Well No. 3SW will be run to a depth of 7,200 feet with a DV tool at 4,880 feet and running cement up to 2,500 feet from the DV tool.[56]

A letter for each of the proposed disposal wells dated September 27, 2018 from the Commission's Groundwater Advisory Unit ("GAU") was entered into the record. The GAU estimates that the base of usable quality groundwater ("BUQW") for proposed disposal wells is found at a depth of 1,300 feet, and there is also the freshwater-bearing Rustler formation estimated to occur from 1,700 feet to 2,100 feet.[57] The Commission also provided a letter dated September 27, 2018 stating the underground source of drinking water ("USDW") is at a depth of 2,150 feet.[58] Commission Form W-14 for the proposed disposal wells shows the surface casing will be set at 2,250 feet, which is deeper than the BUQW and USDW, and protective of fresh groundwater.[59]

5. Financial Assurance

NGL provided Commission records showing their active P-5 status required by Statewide Rule 80, along with a financial assurance amount of $50,000 required by Statewide Rule 78.[60]

B. Protestant's Evidence

The Applications to permit the proposed disposal wells is protested by Carrizo (Permian) LLC. Carrizo asserted that they are the primary operator within a five-mile radius and one of the primary operators within a 10-mile radius. Carrizo asserts that the proposed disposal wells with the requested 20,000 barrels of water per day per well disposal capacity, which will total 100,000 barrels of water per day on the Lease with the existing Central Reeves Well No. 2SW, are not in the public interest.

---

[51] Tr. Vol. 2 at 174:16–176:19.
[52] Tr. Vol. 2 at 174:16–176:19.
[53] NGL Ex. 2 and 11.
[54] NGL Ex. 2, 10, and 11.
[55] NGL Ex. 10.
[56] NGL Ex. 2.
[57] NGL Ex. 11.
[58] *Id.*
[59] NGL Ex. 10.
[60] Tr. Vol. 1 at 40:25–41:4; NGL Ex. 23.

1. Public Interest

Mr. Thomas White, Operations Engineer with Carrizo, testified that Carrizo is the primary operator for the area that the proposed disposal wells are expected to serve.[61] Carrizo operates 92 percent of the 12 producing wells within one mile from the proposed disposal wells and accounts for 75 percent of water production within that limited area.[62] Carrizo operates 30 percent of the 161 wells within a 5-mile radius of the proposed disposal wells and 42 percent of the wells drilled in the past two years.[63] These wells account for 38 percent of the water production within five miles of the proposed wells.[64] In the 10-mile radius surrounding the proposed disposal wells, Carrizo operates 12 percent of the wells and 19 percent of the horizontal wells.[65] These wells account for 21 percent of all water produced in the Area of Review.[66] More than 80 percent of all water produced in the Area of Review is attributable to just four operators: Carrizo, Centennial Resource Development, Occidental Petroleum and PDC Energy.

Mr. White testified that there are 66 active disposal wells within the Area of Review, injecting an average of 575,000 barrels of water per day combined within the last six months for which data was available at the time of the hearing.[67] Mr. White asserted that active injection wells in the Area of Review have a permitted disposal capacity of just under 1.4 million barrels of water per day.[68] Another 700,000 barrels of water per day of disposal capacity is permitted but not yet drilled.[69] Applications within the Area of Review for another 1.1 million barrels of water per day of injection capacity are currently pending before the Commission.[70]

Mr. White provided two produced-water forecasts for comparison with the current active and permitted disposal capacity in the Area of Review. Assuming that 16 oil and gas wells were drilled each month, with 12 wells to a half-mile unit, Mr. White forecasted an increase in water production that would exceed presently active disposal capacity in the Area of Review in the latter half of 2025.[71] At a slightly less aggressive pace of 14 oil and gas wells per month with 9 wells to a half-mile well unit, active disposal capacity would be exceeded in 2028.[72] At this more tempered pace of development, all of the remaining wells expected to be drilled in the Area of Review would be completed by 2040.[73]

---

[61] Tr. Vol. 1 at 118:19–119:2.
[62] Carrizo Ex. 4; Tr. Vol. 1 at 122:4-10.
[63] Carrizo Ex. 4
[64] Tr. Vol. 1 at 123:1-5.
[65] Tr. Vol. 1 at 124:20–125:3.
[66] Carrizo Ex. 4
[67] Tr. Vol. 1 at 126:7-11.
[68] Tr. Vol. 1 at 126:16–127:3.
[69] Tr. Vol. 1 at 126:16–127:3
[70] Tr. Vol. 1 at 126:16–127:3.
[71] Carrizo Ex. 6.
[72] Carrizo Ex. 6.
[73] Carrizo Ex. 6.

Under his less aggressive development assumptions, Mr. White estimated that total water production would never exceed the currently permitted disposal capacity in the Area of Review at any time prior to the year 2050.[74] Even under Mr. White's more aggressive estimate of future development, presently permitted disposal capacity would not be exceeded until 2037.[75] Mr. White further argues that if all pending disposal well permits were granted, the permitted injection volume would be well above what is reasonably foreseeable for future water production in the Area of Review.[76]

Mr. White testified that it is realistic for saltwater disposal wells to inject the full permitted capacity. Disposal wells in the area are currently injecting 40 percent of the active permitted disposal capacity, because there is not enough produced water for the disposal wells to inject the maximum injection volumes.[77]

Mr. White testified that Carrizo and other operators in the area are recycling produced water and recycling would reduce water that would need to be injected into disposal wells.[78] Mr. White further testified that Carrizo contracts with WaterBridge to provide significant water disposal services in this area. Carrizo receives direct updates "semi-regularly" from WaterBridge as their disposal development plans change so that Carrizo can address any potential conflicts.[79] As part of those discussions with WaterBridge, Mr. White was not aware of any current plan by WaterBridge to drill new wells in the Area of Review.[80]

Mr. White testified that the wells are not in the public interest, because Carrizo is the primary operator in the area, and they have not had any issues disposing of water. At times, Carrizo struggles to meet the contractual minimum volume deliverability commitments with its third-party disposal vendors. These minimum deliverability requirements with disposal companies are anywhere from 50 percent to 85 percent of the dedicated capacity. Carrizo has struggled recently to meet the minimum water deliverability commitments.[81]

On cross-examination, Mr. White testified that, as Carrizo produces water volumes above their minimum contractual commitments to disposal well operators, the intent is for Carrizo to be at 50 percent or above for water recycling.[82] Carrizo's recycling program has no waste stream. Mr. White also testified that the produced water can be recycled multiple times due to all of the produced water being blended together in one common stream and reused.[83] Unrecycled wastewater from Carrizo's operations is going to existing disposal wells in the area operated by third parties, including the Central Reeves

[74] Carrizo Ex. 6.
[75] Carrizo Ex. 6.
[76] Tr. Vol. 1 at 133:17-21.
[77] Tr. Vol. 1 at 132:11-21.
[78] Tr. Vol. 1 at 134:21–135:7.
[79] Tr. Vol. 1 at 140:10-20.
[80] Tr. Vol. 1 at 141:15-22.
[81] Tr. Vol. 1 at 144:23–Pg. 144:24.
[82] Tr. Vol. 2 at 15:12–16:16.
[83] Tr. Vol. 2 at 18:4–19:4

No. 2SW, and two disposal wells on the same pipeline that Carrizo operates.[84] These available injection sites have been sufficient for all of Carrizo's disposal needs in the Area of Review. Carrizo has never needed to find additional disposal capacity during the time they have operated in this area.[85]

Carrizo also has several active disposal well permits with approximately 95,000 barrels of water per day of permitted capacity within the Area of Review.[86] After obtaining the permits, Carrizo has not seen fit to drill additional disposal wells because there is ample existing available capacity for disposal.[87] As an example, Mr. White noticed that the Pearl Heart 19 No. 1 well is location about 3.5 miles northwest of the Applicant's wells.[88] Carrizo received a permit for the well to dispose in the DMG.[89] Mr. White testified that Carrizo currently has no plan to convert the Pearl Heart 19 No. 1 to a disposal well, because there is currently not enough volume of water to justify adding additional disposals. The intent when Carrizo filed the permit would be to have a relief well if one of the third-party disposal wells were to go down. Carrizo would then have backup disposal capacity as an alternative to shutting-in wells.[90]

Mr. White asserts that there is not enough saltwater right now to justify converting the Pearl Heart 19 No. 1 to a saltwater disposal, partly because of minimum volume commitments to other disposal wells.[91] Mr. White also testified that the recompletion of the Pearl Heart 19 No.1 to a saltwater disposal would only provide value to Carrizo if Carrizo would stop sending water to the third-party commercial disposal wells and the commercial disposals would shut down their operation. Mr. White conceded, however, that the Pearl Heart 19 No. 1 would also not be a good location for saltwater disposal operations because Carrizo has already been moving their surface disposal operations away from current existing saltwater disposal wells.[92]

Mr. Scott Hudson, Vice President of Carrizo (Permian) LLC, testified on behalf of Carrizo that he believes WaterBridge has no intent to acquire or develop additional facilities in the area, even though WaterBridge is obligated to purchase NGL's permits for the proposed disposal wells.[93]

2. Pressure Front Calculation and Modeling

Mr. White asserts that some of Carrizo's recently drilled wells have experienced problems drilling through the proposed disposal interval. The reservoir pressure in the DMG has increased due to increased injection volumes and rates.[94]

---

[84] Tr. Vol. 2 at 19:20–21:25.
[85] Tr. Vol. 2 at 20:12-15
[86] Tr. Vol. 2 at 16:4-10
[87] *Id.*
[88] Tr. Vol. 2 at 43:10-14.
[89] Tr. Vol. 2 at 43:25–44:11.
[90] Tr. Vol. 2 at 44:12–45:1.
[91] Tr. Vol. 2 at 45:5-12.
[92] Tr. Vol. 2 at 45:13–6:12.
[93] Tr. Vol. 2 at 77:19–78:15.
[94] Tr. Vol. 1 at 46:12-17.

Mr. White first provided the example of the Carrizo Lovelace 31H and the Trinity 20H wells drilled at the same location one year apart. The Trinity 20H did not experience issues while drilling through the DMG, but the Lovelace 31H did one year later.[95] Mr. White's testified that is it his opinion that the one-year period between the drilling of the two wells "allowed the increased injection rate to increase the reservoir pressure nearly two miles away." At the time the Trinity 20H was being drilled, the saltwater disposal volume had just increased, but after a year at the higher rate, the Lovelace 31H experienced a saltwater influx while drilling.[96]

Southeast of the Clark SWD is the North Pecos SWD.[97] Carrizo's first oil and gas well in the vicinity of the North Pecos SWD was drilled in 2016 and did not experience any issues.[98] Carrizo then drilled the Allar 2H and Crowley 11H and 12H wells in late 2017 through early 2018. By that time, saltwater disposal influxes in the DMG attributed by Mr. White to operation of the North Pecos SWD caused $1.5 to $2 million in extra expenses.[99] The wells experienced problems such as differential sticking, mud weight adjustments, and having to drill with pressure.[100]

Similarly, Mr. White testified that several Carrizo wells in the area of the Central Reeves No. 2SW experienced problems drilling through the disposal interval. The Carrizo Zeman 1H was drilled in November 2016 and did not experience problems while it was drilled.[101] The Carrizo Zeman 10H was drilled in 2019 right after injection started in the Central Reeves No. 2SW and the DMG had not yet pressured up.[102] The Zeman 11H was drilled at the same location as Zeman 10H and experienced a significant increase in pressure through the DMG.[103] The final well drilled by Carrizo in this area was the Carrizo Zeman 40H. The Zeman 40H did not experience as much of a pressure increase in the DMG during drilling, but it was an additional half mile further away from the Central Reeves No. 2SW than the Zeman 11H.[104]

Mr. White testified that in order to hold back pressure when dealing with saltwater influxes, you must increase the mud weight to hold the back pressure back. Once the reservoir pressure reaches a certain point, pressure cannot be addressed through increased drilling mud rates, and an additional string of casing must be set across the higher pressure interval before proceeding to drill in a deeper interval.[105] Generally, this also requires drilling larger hole sizes and larger casing sizes to accommodate the extra string of casing. [106]

---

[95] Tr. Vol. 1 at147:19–149:12
[96] Tr. Vol. 1 at 147:17–149:18.
[97] Carrizo Ex. 13.
[98] Tr. Vol. 1 at 150:8-13.
[99] Tr. Vol. 1 at 150:15-151:4.
[100] Tr. Vol. 1 at 151:5-12.
[101] Tr. Vol. 1 at 172:22-24.
[102] Carrizo Ex. 16; Tr. Vol. 1 at 153:10-25.
[103] Tr. Vol. 1 at 174:17-24.
[104] Tr. Vol. 1 at 174:1 – Pg. 175:6.
[105] Tr. Vol. 1 at 156:8 –Pg. 157:1.
[106] Tr. Vol. 1 at 156:8 –Pg. 157:1.

Based upon observed pressure increases in the Carrizo wells drilled through the DMG, and common reservoir characteristics indicated by well logs for two nearby injection wells, Mr. White developed a predictive model to show the future impacts of injection into the DMG over time at different distances from the Central Reeves No. 2SW well.[107] In Mr. White's model, reservoir pressure is measured in pounds per gallon ("ppg"), which correlates to equivalent mud weights as used when a drilling rig is on location.[108] Mr. White was able to compare the actual pressures observed in Carrizo wellbores and the pressures observed in the model and found that the model dovetailed with observed pressures over time. Mr. White believed that this confirmed the predictive value of his pressure-front model.[109]

In his model, Mr. White estimated that 16 ppg is the theoretical maximum reservoir pressure based on the fluid weight and the surface pressure combined, and maximum surface injection pressure. Mr. White assumed an average oilfield produced water for the density, but testified it could be higher if the applicant pumped denser fluid than typical produced water.[110] Mr. White testified that the drilling mud could be created to sustain pressures above 16 ppg, but the formations above and below the disposal interval may not be able to handle the higher weight of the drilling mud. If the formations that are in-between the injection interval and the producing zones in the area have a lower formation pressure than the DMG, those formations would not be able to support the higher mud weight.[111] It was Mr. White's opinion, therefore, that reservoir conditions of the DMG at pressures above 16 ppg would require and additional casing string.[112]

According to Mr. White's model, if the Central Reeves No. 2SW well continues to inject at its current rate, maximum reservoir pressure will be reached in 5 years out to a half-mile from the well.[113] At that same time, this increased pressure would require substantial mud weights for any wells drilled through the DMG as much as 2.5 miles away.[114] If the proposed wells are permitted and become operational, Mr. White's model projects that maximum reservoir pressure in the DMG would be reached in five years out to 1.5 miles from the well locations. As the injection rates increase, the greater the impact to the drilling program at greater distances, thus causing an extra string of casing to be set at wells further away.[115] Mr. White testified that injection in the DMG in the area surrounding the proposed wells affects Carrizo's ability to economically drill and complete wells. Accordingly, even one additional disposal well near their leasehold would not be in the public interest.[116]

[107] Tr. Vol. 1 at 179:15 – Pg. 180:2.
[108] Tr. Vol. 1, at 152:10-13.
[109] Tr. Vol. 1 at 167:21-168:1.
[110] Tr. Vol. 1 at 182:19 –183:9.
[111] Tr. Vol. 1 at 183:10 –184:8.
[112] Tr. Vol. 1 at 184:1-8.
[113] Carrizo Ex. 28; Tr. Vol. 1 at 180:3-16.
[114] Carrizo Ex. 28; Tr. Vol. 1 at 180:3-16.
[115] Carrizo Ex. 28, Tr. Vol. 1 at 182:2-9.
[116] Tr. Vol. 1 at 182:10-16.

3. Drilling Economics and Waste of Reserves

Mr. Hudson, Vice President of Carrizo, provided an estimate of the cost of adding an additional protection string in the case of dealing with saltwater influx for each well to be drilled. The standard wellbore has 13 3/8-inch surface casing set down to 2,200 feet based on the Commission's Groundwater Advisory Unit recommendation, 9 5/8-inch intermediate casing set above or into the Wolfcamp formation, and 5 ½-inch production string to the bottom of the Delaware Mountain Group at about 7,900 feet.[117] In the scenario with saltwater influx, Carrizo would need to up-size the shallower casing strings by setting 20-inch surface casing to 2,200 feet, 13 3/8-inch string to 7,900 feet, and then setting 9 5/8-inch casing just above or into the Wolfcamp, and 5 1/5-inch production string into the lateral. The additional string would add substantially to the drilling costs of each well.[118] The main cost is the extra six days of rig time, the additional string of casing, the upsize in the casing, the additional cement, and the general time with fuel and labor and other services to drill across the zone.[119]

Mr. Hudson testified that Carrizo's development plan consists of a combination of Wolfcamp A and Wolfcamp B wells utilizing parent-child development. Mr. Hudson testified that with the parent-child development plan, the Wolfcamp A wells and the Wolfcamp B wells will need to be drilled at the same time. The Wolfcamp B is deeper than the Wolfcamp A. If Carrizo has to set an additional string of casing, it would reduce the rate of return to the point that some Wolfcamp B wells would not be drilled, thus reducing ultimate recovery and potentially stranding reserves.[120]

Carrizo is trying to locate wells as far away as possible from the area where the Central Reeves Well No. 2SW is located.[121] As more water is injected, however, the pressure wave created by injection into this well is moving closer to the area of Carrizo's mineral leasehold interest.[122] Mr. Hudson stated that, at some point, Carrizo is not going to be able to move well locations any further away, and will lose several Wolfcamp B wells as a result of the need for the additional casing string.[123] For this reason, Mr. Hudson stated that additional wells located on the same tract as the Central Reeves Well No. 2SW would not be in the public interest due to waste.[124]

On cross examination, Mr. White testified that Carrizo delivers water to both Carrizo-owned disposal wells and to third parties. Through its pre-existing disposal agreements, Carrizo delivers water to the Clark SWD Nos. 1 and 3, the North Pecos SWD No. 1, and the Central Reeves No. 2SW via pipeline.[125] Mr. White testified that Carrizo operates one saltwater disposal well, the Pit Stop SWD. The disposal interval for the Pit

[117] Tr. Vol. 1 at 189:2–190:4.
[118] Tr. Vol. 1 at 190:5-16.
[119] Tr. Vol. 1 at 190:23–191:3.
[120] Tr. Vol. 1 at 192:18–194:3.
[121] Tr. Vol. 1 at 197:20–198:8.
[122] Tr. Vol. 1 at 197:20–198:8.
[123] Tr. Vol. 1 at 198:8-15.
[124] Tr. Vol. 1 at 198:21–199:1.
[125] Tr. Vol. 2 at 11:1–12:6.

Stop is in the Bell Canyon and Cherry Canyon in the DMG.[126] Mr. White acknowledged that the Pit Stop SWD is injecting into the DMG and is permitted for 15,000 barrels of water per day.[127]

Mr. White conceded that Carrizo contributed to injection into the DMG by delivering water to Clark SWD Nos. 1 and SWD 2 between the drilling of the Trinity 20H and the Lovelace 31.[128] Carrizo moved their wells almost two miles away from the Clark SWD Nos. 1 and 2 to get away from the increased pressures.[129] The disposal wells predated Carrizo's acquisition of acreage, and the contracts were already in place for Carrizo to dispose of water in the Clark SWD Nos. 1 and 2.[130] Mr. White testified, "There's nothing we can do about those existing disposals. But it's also why we've consistently pushed to limit additional injection in the area where it's not necessary."[131]

In the area of the North Pecos SWD No. 1, the Allar 2H and the Crowley 11H and 12H were drilled by Carrizo.[132] Carrizo experienced problems drilling the Crowley 12H due to injection in the North Pecos SWD Well No. 1. Mr. White acknowledged that Carrizo was delivering water to the North Pecos SWD 1 while drilling the Crowley 12H due to contractual obligations (minimum volume commitment). Also, the disposals take water from other operators, and may continue injecting even if Carrizo does not give them water.[133] Carrizo tries to renegotiate minimum volume contracts when it can, but cannot force disposal companies to change their minimum volume requirements.[134] If Carrizo reduces their volume commitment, the disposal operators fill the reduction with another producer's water.[135]

Mr. White also acknowledged that Carrizo has not had to utilize extra casing yet to address the pressure problems, but other areas in the Midland basin have seen the need to run the extra strings of casing as common practice.[136] Mr. White testified that with current injection rates, Carrizo may be able to move far enough away from current injection to not run the additional string of casing, but if additional wells begin injecting, then Carrizo will be unable to get away from the pressure front.[137]

Mr. White testified that Carrizo proposes to drill 20 wells with surface locations within 1.5 miles of the proposed disposal wells, and believes all 20 wells will experience increased pressure in DMG from injection.[138] Mr. White testified that the wells may or may not need the additional string of casing depending on when the wells were drilled,

[126] Tr. Vol. 2 at 15:13–16:1.
[127] Tr. Vol. 2 at 46:20–47:8.
[128] Tr. Vol. 2 at 34:6-16.
[129] Tr. Vol. 2 at 34:17-35:10.
[130] Tr. Vol. 2 at 35:15-20.
[131] Tr. Vol. 2 at 34:12–36:7.
[132] Tr. Vol. 2 at 36:10 to 22; Carrizo Ex. 15.
[133] Tr. Vol. 2 at 36:23–38:6.
[134] Tr. Vol. 2 at 39:1-9.
[135] Tr. Vol. 2 at 39:1-17.
[136] Tr. Vol. 2 at 56:5-14.
[137] Tr. Vol. 2 at 56:15–59:1.
[138] Tr. Vol. 2 at 61:16–62:8.

how many drilling permits are issued, and at what rate the injection wells are injecting fluid.[139] Mr. White claimed, however, that there currently is capacity for the volume of water that will be generated if Carrizo drills the 20 wells.[140]

Mr. Hudson testified during his cross-examination that there is currently enough disposal capacity for the 20 planned wells south of the Central Reeves location.[141] The wells that are due east of the Central Reeves would be the first wells to be drilled according to Carrizo's schedule and currently there are no plans to drill with the additional protection string.[142] Carrizo plans to drill the first well without the protection string, but if the well experiences problems due to pressure from saltwater disposal in the DMG, the subsequent wells would need the extra protection string of casing.[143] Carrizo would not be able to continually raise the mud weight, because it may cause losses in the Avalon in the Bone Springs.[144] Once the mud weight cannot be adjusted to control the pressure encountered in the wellbore, the protection string of casing would need to be run. Mr. Hudson acknowledged that protection strings are routinely run in the Midland Basin.[145] Mr. Hudson stated that those strings are not only run to protect against saltwater flows, but:

> They're also run for production needs. The reservoir pressure in the Midland Basin is much lower, and they run ESPs, and in order to operate those ESPs effectively and efficiently, they need that bigger casing string. So it is -- it's a two-fold issue. And I know for a fact that the drilling is much cheaper and faster in the Delaware -- excuse me -- in the Midland Basin than the Delaware. It's a completely different situation. Just because it costs $1.3 million in the Delaware doesn't mean it costs $1.3 million in the Midland.[146]

In response to questioning from the Examiners, Mr. Hudson conceded that Carrizo's objection to the proposed wells is based entirely upon economic projections, not upon a threat of potential physical waste.[147] He argued, however, that if additional casing is required to drill the Wolfcamp wells, Carrizo would be unable to wait for more favorable economic conditions to drill the "parent-child" Wolfcamp B wells. Carrizo cannot wait because they are under lease obligations to drill wells on the acreage.[148] Due to the parent-child relationship, if they wait to drill the Wolfcamp B wells, the Wolfcamp wells would not be effectively stimulated and those reserves would potentially be lost.[149]

---

[139] Tr. Vol. 2 at 62:9-22.
[140] Tr. Vol. 2 at 67:15-24.
[141] Tr. Vol. 2 at 78:16 –79:7.
[142] Tr. Vol. 2 at 79:13 –80:22.
[143] Tr. Vol. 2 at 81:1-12.
[144] Tr. Vol. 2 at 81:13-21.
[145] Tr. Vol. 2 at 82:1-10.
[146] Tr. Vol. 2 at 82:5-23.
[147] Tr. Vol. 2 at 95:24–Pg.96:11.
[148] Tr. Vol. 2 at 95-7-12.
[149] Tr. Vol. 2 at 94:11–95:12.

V. Examiners' Analysis of the Evidence

NGL did not meet its burden to show that the Applications for the proposed disposal wells meet the requirements of Chapter 27 of the Texas Water Code and Statewide Rule 9. The Examiner's recommendation is to deny NGL's applications because the requirement to show that the proposed disposal wells are in the public interest has not been met.

A. 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."[150] 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.[151] 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.[152] Neither Chapter 27 of the Water Code nor Statewide Rule 9 defines the term, "public interest," however.

It is generally understood that safe and efficient disposal of produced water is necessary to the proper maintenance of oil and gas development and production. The Commission has traditionally considered the following as evidence that the installation of a disposal well is in the public interest:

1. Injection of water into a disposal well is a preferred method of disposal in terms of overall environmental protection.

2. The economic life of a producing well will be extended and more oil produced if an operator has a means of disposing of his produced water.

3. Extra disposal capacity is needed in the area of the proposed well.[153]

These generally 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

[150] Tex. Water Code §27.051(b)(1).

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

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

[153] *See* Discussions of Law Practice and Procedure (1992) p. 67. Evidence that extra capacity is not needed, standing alone, has not customarily been considered by the Commission as proof that the proposed well is not in the public interest. *See id.*

excessive as to compel traveling greater distances at greater expense to dispose of produced water.[154] 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.[155]

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.[156] In addition, past examiners have noted the utility of redundancy in disposal operations; it can reasonably be inferred that backup capacity to prevent system upsets and avoid the shutting-in of producing wells is also in the public interest.[157]

The witnesses for NGL testified that there is need for additional disposal capacity within the Area of Review, and that the proposed disposal wells are in the public interest. Mr. Reynolds provided evidence of 1,059 active oil and gas wells within the Area of Review, with the active wells in that area producing 123,000 barrels of oil per day.[158] NGL further provided an analysis of the volume of water being produced within the Area of Review and compared that volume with the volume of water actively being disposed by injection. NGL also provided testimony of concerning the overall need for disposal capacity in the Delaware Basin due to substantial anticipated future growth of drilling activity in the area.[159]

In this matter, the evidence submitted by NGL to prove public interest is lacking. Mr. Reynolds attempted to establish by his testimony that, because more water is being produced in the Area of Review than is being disposed, this is proof that active disposal wells in this area have reached capacity and cannot take additional water. This is unconvincing for several reasons. Nothing in NGL's presentation suggests that water produced near the outer edges of the Area of Review cannot be or piped to other, nearby facilities just outside the Area of Review. There is ample evidence in the record from both parties showing significant additional disposal capacity located just outside the Area of Review, some of which is connected to a fairly extensive pipeline system accessible to wells in this area. In addition, there is evidence in the record suggesting that not all water produced in the Area of Review requires disposal. Carrizo's witnesses described a concerted effort by operators in the area to recycle as much water as practicable.

NGL does not contest Carrizo's assertion that current disposal volumes represent 40% of active disposal capacity in the Area of Review. Instead, NGL attempted to rebut this testimony by suggesting that permitted capacity is not directly proportional to a well's actual capacity and asserting that Mr. Reynold's findings are a more accurate snapshot of industry need in the Area of Review. NGL further provided evidence that, on at least

---

[154] See, e.g., Oil and Gas Docket No. 06-0273122, Application of Chireno Disposal, LLC, Examiners' Proposal for Decision (10-10-2012), p. 6
[155] *See id.*
[156] Oil and Gas Docket No. 08-0289657, *Application of Lotus LLC*, Examiners' Proposal for Decision (1-27-2015), p. 12
[157] *See, e.g.,* Oil and Gas Docket No. 06-0273122, *Application of Chireno Disposal, LLC*, Examiners' Proposal for Decision (10-10-2012), p. 6.
[158] Tr. Vol. 1 at 91:11-22.
[159] Tr. Vol. 1 at 100:16–101:5.

one occasion, the Central Reeves No. 2SW reached its maximum permitted surface pressure for a short period of time. NGL's presentation does not show, however, that existing disposal wells in the Area of Review are incapable of injecting a full 60% of their permitted capacity. The Examiners find more compelling Mr. White's testimony that Carrizo, one of the most significant water producers in the Area of Review, is having difficulty meeting its contractual minimum disposal volumes with third party disposal vendors because Carrizo's operations do not produce enough water to meet those obligations. Accordingly, the Examiners consider it more likely that current injection rates are at 40% of active permitted capacity in the Area of Review because that is all the water that is being supplied to at least 63 existing disposal wells withing ten miles of the proposed wells.

In addition, Carrizo provided evidence of substantial additional permitted capacity in the Area of Review which if drilled, would meet the disposal needs of the area for many years to come. NGL cautions the Examiners against taking permitted capacity into account in assessing locally available disposal volume. A permitted well may never be drilled and should not be considered in determining future capacity. Carrizo admits that it holds multiple disposal permits that it has not used and does not presently intend to drill due to lack of current need. The Commission has previously taken permitted capacity into account, however, when assessing public interest need.[160] It appears, therefore, that NGL failed to provide sufficient evidence to show that additional disposal capacity is needed in the Area of Review.

Commission practice and procedure recognizes, however, that evidence of substantial excess disposal capacity in the Area of Review is not proof of a lack of public interest if other relevant evidence supports the need for additional disposal. But NGL also failed to provide other forms of evidence of industry need for the proposed disposal wells. There is no evidence presented by NGL to show that wells in the Area of Review will suffer from increased disposal costs without additional disposal capacity. There was no testimony concerning long wait times at existing facilities in the area. NGL did not provide any letters of support from other operators in the Area of Review or disposal contracts In addition, NGL cannot claim that its own willingness to take on the expense of drilling and operating these wells is evidence of public interest; the permits, if granted, will be immediately transferred to WaterBridge. NGL did not offer any direct evidence showing that WaterBridge intends to actually drill these wells if given the authority to do so.

Instead NGL argued that the proposed wells would be in the public interest because of the systemic benefit of operational redundancies that these additional wells would provide in the area. While Carrizo and NGL agree that there is some public interest in creating redundant disposal facilities to prevent service interruptions, there appears to be so much excess disposal capacity in the Area of Review that redundant wells are not needed for this purpose.[161]

---

[160] *See id.; see also* Oil and Gas Docket No. 09-0262947, *Application of IWOC, Inc.*, Examiners' Proposal for Decision (1-1-2010), p. 11.

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

Carrizo also asserted that the approval of the proposed wells will cause waste of recoverable oil and gas reserves to remain in the ground. To develop the Wolfcamp producing zones, Carrizo would need to drill through the pressured-up injection zones. Carrizo is concerned that the increases in pressure in the DMG caused by the proposed disposal operations would eventually require setting a fourth string of casing to protect against the pressure influx, therefore making potential Wolfcamp wells uneconomic The additional cost of setting the fourth protection string of casing may result in neither the Wolfcamp A nor B well being drilled.

Wolfcamp A and Wolfcamp B wells are drilled by Carrizo as part of a drilling parent-child development to maximize recovery. Carrizo plans to drill 20 wells in the area of the subject wells, and the Wolfcamp B wells are in risk of not being drilled if the need for additional casing makes the wells uneconomic. Carrizo would not be able to drill the Wolfcamp B wells due to the pressure sink caused by the Wolfcamp A wells. This would leave recoverable reserves remaining in the ground because it would be impractical to drill Wolfcamp B wells when economic conditions are more favorable to use of additional protection casing after the Wolfcamp A wells have already been drilled. As of the date of the hearing, however, Carrizo has not needed run protection casing to produce from both benches of the Wolfcamp, in spite of the noted pressure increases in the DMG caused by existing disposal wells in the vicinity of Carrizo's leasehold position in and around the Area of Review. Accordingly, the Examiners do not find Carrizo's evidence of the possible loss of the Wolfcamp B wells sufficient to show a lack of public interest for the proposed wells.

Instead, however, Carrizo provided substantial evidence that there is considerable excess disposal capacity for current and future oil and gas production in the area. NGL did not provide sufficient evidence demonstrating industry need for the proposed disposal wells. The Examiners conclude that NGL failed to prove that the disposal wells are in the public interest pursuant to Texas Water Code § 27.051(b)(1); 16 Tex. Admin. Code § 3.9.

B. Protection of Mineral Formations

NGL contends that the proposed disposal wells will not injure any oil, gas, or other mineral formations. Mr. Reynolds testified that there is no production in the DMG within two miles. Mr. Reynolds testified that there is no faulting or any other structure issues. Faulting is significantly deeper than the injection interval. The Castile Formation confines the zone at the top of the injection interval and the Bone Spring and tight facies within Brushy Canyon would confine fluids to the injection interval from the bottom. Carrizo did not provide evidence that mineral formations would be endangered from activities associated with the proposed Central Reeves disposal wells. Examiners are persuaded that the proposed disposal wells will not injure any oil, gas, or other mineral formations.

C. Protection of Ground and Surface Fresh Water

Carrizo did not provide evidence that fresh water was endangered from operational activities associated with the proposed Central Reeves disposal wells. This is not a

disputed issue. NGL proposes to set 10 3/4-inch surface casing in Central Reeves No. 3SW from ground surface to a depth of 2,250 feet, which is 150 feet below the BUQW, which is estimated to be at a depth of 2,100 feet as determined by the Commission's Groundwater Advisory Unit. The surface casing for the proposed well will be set 100 feet below the USDW. The surface casing will be cemented from the shoe of the surface casing to the surface. The long string casing will be a 7 5/8-inch casing from ground surface to a depth of 7,200 feet. Fluids will be injected down the wellbore using a 5 1/2-inch tubing installed from ground surface to a depth of 4,780 feet with a packer set at 4,780 feet. The permitted injection interval will include the Bell Canyon, Cherry Canyon, and Brushy Canyon formations from a depth of 4,500 to 6,800 feet TVD, 4,880 feet measured depth.

NGL proposes to set 10 3/4-inch surface casing in Central Reeves Nos. 4SW and 5SW from ground surface to a depth of 2,250 feet, which is 150 feet below the BUQW, which is estimated to be at a depth of 2,100 feet as determined by the Commission's Groundwater Advisory Unit. The surface casing for the proposed well will be set 100 feet below the USDW. The surface casing will be cemented from the shoe of the surface casing to the surface. The long string casing will be a 7 5/8-inch casing from ground surface to a depth of 6,800 feet. Fluids will be injected down the wellbore using a 5 1/2-inch tubing installed from ground surface to a depth of 4,400 feet with a packer set at 4,400 feet. The permitted injection interval will include the Bell Canyon, Cherry Canyon, and Brushy Canyon formations from a depth of 4,500 to 6,800 feet.

Mr. Reynolds testified that there is adequate separation between the BUQW and the top of the disposal interval. Examiners are persuaded that the proposed disposal wells have been designed to be protective of fresh water.

D. Financial Security

Statewide Rule 78 states that any person, including any firm, partnership, joint stock association, corporation, or other organization, is required to file an organization report and financial security with the Commission. NGL Water Solutions Permian, LLC (Form P-5, Operator No. 609265) has an active P-5 as of the date of the hearing, and they have a $50,000 bond in place with the Commission. The P-5 renewal date is August 1, 2020. Mr. Johnston states NGL is operating 73 wells and has financial assurance for up to 99 wells. No testimony or evidence was presented in the hearing by the protestants regarding NGL's ability to meet its financial assurance obligations. The evidence in the record demonstrates the applicant has made a satisfactory showing of financial responsibility.

E. Seismicity

The seismicity study performed by NGL within a one-hundred square mile area of the proposed disposal wells (which is overlapped entirely by the Area of Review) indicated that six seismic events had previously been recorded. As a result, Mr. Reynolds performed a full seismic study in response to a request to do so from the Commission's UIC section. Mr. Reynolds concluded that the recent seismicity in the Delaware Basin is

focused on the section from the Wolfcamp to the top of the Devonian. The current seismic events in the area are in formations below the DMG and the frequency of the seismic events correlates with development activity in the Wolfcamp. Mr. Reynolds testified that pressure increase in the DMG would not impact deeper formations where the faulting occurs. Seismic events were reported prior to injection related activities and prior to significant pressure increases related to saltwater injection. Faulting is present at depths immediately below the Wolfcamp Formation, and injection into those deeper formations would increase the risk of fault slip.

As a result of the seismicity review, the Commission's UIC section recommended a reduction in the maximum daily injection volume from 25,000 barrels of water per day to 20,000 barrels of water per day, and a reduction in the maximum surface injection pressure from 2,440 psi to 1,125 psi for each of the proposed disposal wells. NGL agreed to the recommendation.

VI. Findings of Fact and Conclusions of Law

The Examiners recommend that the Commission adopt the following Findings of Fact and Conclusions of Law:

FINDINGS OF FACT

1. The following findings concern the procedural history for the Docket:

   a. NGL Water Solutions Permian, LLC (Operator No. 609265) ("NGL" or "Applicant") filed applications ("Applications") for commercial disposal permits for Well Nos. 3SW, 4SW and 5SW ("proposed disposal wells") pursuant to Statewide Rule 9, to dispose of oil and gas waste by injection into a formation not productive of oil and gas pursuant to 16 Tex. Admin. Code § 3.9, in Reeves County, Texas.

   b. NGL's Applications for commercial disposal wells were published on September 27, 2018, in the Pecos Enterprise. The publication discussed the proposed disposal well, well location, legal authority, notice of public hearing, etc.

   c. Letters dated September 27, 2018, from the Commission's Groundwater Advisory Unit, estimates the base of usable quality water ("BUQW") is at 2,100 feet, which correlates to the base of the Rustler formation.

   d. On October 1, 2018, the Applications (Commission Form W-14) for the proposed disposal wells were submitted to the Commission for review and consideration.

   e. On May 16, 2019, the Applications were determined to be administratively complete by the Commission's technical staff.

   f. A protest was received on the Applications from Carrizo (Permian), LLC. The Commission's technical staff sent a memo dated June 11, 2019 to Docket Services

of the Hearings Division. The memo indicates NGL requested a hearing for the Applications.

g. On August 20, 2019, the Hearings Division of the Commission sent a Notice of Hearing ("Notice") via first-class mail to Applicant and affected persons setting the hearing dates for September 19, 2019 through September 20, 2019. The Notice contained (1) a statement of the time, place, and nature of the hearing; (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.

h. The hearing on the merits was held on September 19, 2019 through September 20, 2019.

2. The Applications are protested by Carrizo (Permian) LLC who operates wells within the one-half mile of the proposed disposal wells.

3. Carrizo (Permian) LLC opposes the applications and asserts that the additional disposal capacity is not needed in the area, and the pressure front that is created from saltwater injection will require an additional string of casing to be set. The additional string of casing will raise the cost for drilling wells that target the Wolfcamp formation. Carrizo asserts the increased cost will make certain wells uneconomic to drill and will cause reserves to remain unrecovered.

4. The Central Reeves No. 2SW is on the same tract as the proposed disposal wells and has a commercial disposal permit to inject 40,000 barrel of water per day.

5. NGL seeks to drill and complete the proposed disposal wells in the Quito, West (Cherry Canyon) Field (Field No. 73933420). The Central Reeves Lease is located 4.2 miles North of Pecos, Texas. The permits to drill (W-1) the wells were received by the Commission on September 21, 2018.

6. NGL performed a seismic study in the one-hundred square mile area surrounding the proposed disposal wells and reported the occurrence of six seismic events.

7. The proposed disposal Well No. 3SW has the following proposed design:

a. The drilling permit for the Well No. 3SW states the proposed directional well is designated as API No. 42-389-37597 and its total measured depth is 8,000 feet.

b. The proposed injection interval is from 4,500 to 6,800 true vertical depth, 4,880 to 7,180 measured depth, which correlates to the Bell Canyon, Cherry Canyon, and Brushy Canyon formations, also known as the Delaware Mountain Group.

c. The planned surface casing is planned to be 2,250 feet deep, which is deeper than the BUQW and protective of fresh groundwater.

d. NGL plans on running a 7 5/8-inch long string casing to 7,200 feet deep with a differential valve ("DV") tool at 4,880 feet. Cement will run from the 4,880 feet deep at the DV tool up to 2,500 feet.

e. The tubing will be 5.5-inches in diameter and run to a depth of 4,780 feet.

8. The proposed disposal Well Nos. 4SW and 5SW have the following proposed design:

a. The drilling permit for the Well No. 4SW states the proposed vertical well is designated as API No. 42-389-37596 and is 6,800 feet deep.

b. The drilling permit for the Well No. 5SW states the proposed vertical well is designated as API No. 42-389-37600 and is 6,800 feet deep.

c. The proposed injection interval is from 4,500 to 6,800 feet, which correlates to the Delaware Mountain Group.

d. The surface casing is planned to be 2,250 feet deep, which is deeper than the BUQW and protective of fresh groundwater.

e. NGL plans on running a 7 5/8-inch long string casing to 6,800 feet deep with a DV tool at 4,500 feet. Cement will run from the 4,500 feet deep at the DV tool up to 2,500 feet.

f. The tubing will be 5.5-inches in diameter and run to a depth of 4,400 feet.

9. NGL seeks authority in the Applications to inject a maximum daily volume of 20,000 barrels per day per well at a maximum surface injection pressure of 1,125 psig.

10. NGL provisionally withdrew its application for the Central Reeves Well No. 3SW on December 2, 2019, on the condition that Central Reeves Well Nos. 4SW and 5SW be approved.

11. NGL agreed to perform a step-rate test and to measure bottomhole pressure prior to operating the proposed disposal wells.

12. With proper safeguards, both groundwater surface fresh water can be adequately protected from pollution.

a. A letter dated September 27, 2018, from the Commission's Groundwater Advisory Unit, estimates the BUQW is at a depth of 2,100 feet, which correlates to the Rustler Formation. The proposed disposal wells will have surface casing set to a depth of 2,250 feet, which is 150 feet below the BUQW.

b. In addition to surface casing, a 7 5/8-inch diameter long-string casing will be installed from the surface to a depth of 7,200 feet in Well No. 3SW, and to a depth of 6,800 feet in Well Nos. 4SW and 5SW. Injection fluids will be transported from

the surface to the injection interval using a 5.5-inch tubing installed from ground surface to a depth of 4,780 feet in Well No. 3SW, and from ground surface to a depth of 4,400 feet in Well Nos. 4SW and 5SW.

c. The permitted injection interval, consisting of the Bell Canyon, Cherry Canyon and Brushy Canyon, from 4,500 to 6,800 feet TVD are below a confining layer, the Castile Formation.

13. NGL has an active Commission Organization Report (Form P-5, Operator No. 609265), on file with $ 50,000 as financial assurance required by Statewide Rule 78.

14. The oil, gas or mineral formations in the area are not endangered and will not be endangered if the permits are approved as requested.

15. Carrizo demonstrated that there is excess disposal capacity in the 10-mile radius surrounding the proposed disposal wells for current and future development.

a. There are at least 63 active disposal wells with a permitted disposal volume just under 1.4 million barrels of water per day.

b. Active disposal wells are injecting approximately 40 percent of the permitted disposal capacity.

c. The capacity for permitted disposal wells that are not yet operational is over 700,000 barrels of water per day.

d. The capacity for pending disposal well permits is approximately 1.1 million barrels of water per day.

16. NGL did not provide evidence sufficient to show that there is industry need for the proposed wells; there is substantial excess disposal capacity within ten miles of the proposed wells and NGL did not submit any evidence that (i) there are substantial wait times at existing disposal facilities, (ii) the economic life of any oil and gas well would be shortened as a result of lack of nearby capacity, (iii) there is industry support for additional disposal capacity, or (iv) that NGL is willing to incur the expense of drilling and operating the proposed wells based upon a factually supported market assessment of area need.

CONCLUSIONS OF LAW

1. Resolution of the Applications 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 § 3.9.

3. NGL has made a satisfactory showing of financial responsibility. Texas Water Code § 27.051(b)(4); 16 Tex. Admin. Code § 3.9.

4. NGL has made a satisfactory showing of the use or installation of the proposed disposal wells will not endanger oil, gas, or geothermal resources or cause the pollution of freshwater strata unproductive of oil, gas, or geothermal resources. Texas Water Code § 27.051(b)(2); 16 Tex. Admin. Code § 3.9.

5. With proper safeguards, both ground and surface fresh water can be adequately protected from pollution. Texas Water Code § 27.051(b)(3); 16 Tex. Admin. Code § 3.9.

6. The proposed disposal wells are not in the public interest. Texas Water Code § 27.051(b)(1); 16 Tex. Admin. Code § 3.9.

7. NGL has not met its burden of proof and its application does not satisfy the requirements of Chapter 27 of the Texas Water Code and the Railroad Commission's Statewide Rule 9.

VII. Examiners' Recommendation

Based on the evidence presented at the hearing, Examiners recommend denial of the Applications of NGL Water Solutions Permian, LLC for commercial permits to dispose of oil and gas waste by injection into the Cherry Canyon, Brushy Canyon and Bell Canyon Formations, porous formations not productive of oil and gas for the Central Reeves proposed disposal Well Nos. 3SW, 4SW, and 5SW, in the Quito, West (Cherry Canyon) Field, in Reeves County, Texas.

Respectfully submitted,

DocuSigned by:
Ashley Correll
9BA42C769073423...

Ashley Correll, P.G.
Technical Examiner

DocuSigned by:
2F31E6B6E48340B...

Ezra A. Johnson
Administrative Law Judge