



# RAILROAD COMMISSION OF TEXAS

## HEARINGS DIVISION

**OIL & GAS DOCKET NO. 10-0309909**

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**APPLICATION OF PETCO PETROLEUM CORPORATION (657835) PURSUANT TO STATEWIDE RULE 46 FOR A PERMIT TO INJECT FLUID INTO A RESERVOIR PRODUCTIVE OF OIL OR GAS FOR THE ANNIE (00449) LEASE, WELL NO. 10, PANHANDLE GRAY COUNTY FIELD, GRAY COUNTY, TEXAS**

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### PROPOSAL FOR DECISION

**HEARD BY:** Robert Musick, P.G. - Technical Hearings Examiner  
Lynn Latombe - Administrative Law Judge

### PROCEDURAL HISTORY:

Application Filed:	March 13, 2018
Notice of Pre-Hearing Issued:	May 24, 2018
Pre-Hearing Conference:	June 25, 2018
Hearing Date:	October 10, 2018
Hearing Transcript Received:	October 25, 2018
Close of Record:	October 25, 2018
Proposal for Decision Issued:	March 29, 2019

### APPEARANCES:

#### For Applicant:

Petco Petroleum Corporation:

Leon Mitchell (Attorney) - Mitchell & Jones, Borger, Texas  
Marshall Daniel (Geologist) - Mt. Vernon, Illinois

#### For Protestant:

Kirkpatrick Oil Company, Incorporated:

Kelli Tieken Kenney (Attorney) - McElroy, Sullivan, Miller & Weber L.L.P.  
Mike McGinnis (Petroleum Engineer) - Vice President, Kirkpatrick Oil Co. Inc.

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### **CASE SUMMARY<sup>1</sup>**

Petco Petroleum Corporation (657835) ("Petco") requests to amend the existing Injection Permit conditions for the Annie (00449) Lease (referred to as the "Annie Lease" or "Lease"), Well No. 10, Panhandle Gray County Field, Gray County, Texas, pursuant to 16 Tex. Admin Code (TAC) § 3.46. The current permit authorizes an injection pressure of 200 psig (pressure per square inch, gauge) to inject a permitted maximum volume of 1,250 barrels per day ("bpd") of fresh water/salt water into the Brown Dolomite formation, located from an interval of 2,998 feet to 3,108 feet deep. Petco seeks authority to increase the injection pressure from 200 psig to 1,000 psig. The injection of fresh water and salt water is a water-flooding initiative by Petco to recover hydrocarbons on the Lease and is currently authorized by Fluid Injection Project No. F17278, which was last amended on January 27, 2014.

Petco submitted a completed application ("Application") dated November 20, 2017, requesting authorization for the Annie Well 10, to operate at an increased pressure. Petco asserts that the currently authorized pressure of 200 psig is only capable of injecting approximately 700 bpd of water into the Brown Dolomite formation,<sup>2</sup> causing waste.<sup>3 4</sup>

The Application is protested by Kirkpatrick Oil Company, Inc. ("Kirkpatrick"), the operator of the Blake (00207) Lease ("Blake"), which is on the southern boundary and contiguous with the Lease. The protestant asserts that the water-flooding operation on the Lease has caused damages to existing oil-producing wells on the Blake Lease. Kirkpatrick (Operator No. 468890) is specifically protesting the Application to increase the well's maximum surface injection pressure from 200 psig to the proposed 1,000 psig. Kirkpatrick contends the increase in maximum surface injection pressure will damage mineral resources associated with the Blake Lease and cause waste by stranding oil that will not be recovered.

Based on the evidence presented at the hearing, the Technical Examiner and Administrative Law Judge (collectively, "Examiners") recommend denial of the Application to amend the maximum surface injection pressure from 200 psig to 1,000 psig.

### **APPLICABLE LAW**

Statewide Rule 46 [TAC Title 16, Part 1, Chapter 3, Rule § 3.46] 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.<sup>5</sup>  
Permits may be issued when the injection will not endanger oil, gas or geothermal

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<sup>1</sup> The transcript for the pre-hearing conference held on June 25, 2018, is referred to as "PHC Audio. [minute: second(s)]." and the transcript for the hearing held on October 10, 2018, is referred to as "Hearing Tr. [pg:ln(s)]". Applicant's exhibits are referred to as "PHC Petco Ex. [exhibit no]." or "Hearing Petco Ex. [exhibit no]."; and the protestant's exhibits are referred to as "PHC Kirkpatrick Ex. [exhibit no]." or "Hearing Kirkpatrick Ex. [exhibit no]."

<sup>2</sup> Hearing Tr. Pg. 16, Lns. 19-20.

<sup>3</sup> Hearing Tr. Pg. 12, Lns. 6-14.

<sup>4</sup> Hearing Tr. Pg. 50, Lns. 6-14.

<sup>5</sup> Railroad Commission of Texas

resources or cause pollution of freshwater strata unproductive of oil, gas or geothermal resources.”

Texas Water Code Chapter 27 and Title 3 of the Natural Resources Code states the following:

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

1. The use or installation of the injection well is in the public interest;
2. The use or installation of the injection well will not endanger or injure any oil, gas, or other mineral formation;
3. With proper safeguards, both ground and surface fresh water can be adequately protected from pollution; and
4. The applicant has made a satisfactory showing of financial responsibility as required by Section 27.073.”

### **DISCUSSION OF THE EVIDENCE**

#### **Applicant's Evidence (Petco Petroleum Corporation)**

Petco requests to amend the existing Injection Permit conditions for the Annie Lease, Well No. 10, Panhandle Gray County Field, Gray County, Texas. The current permit authorizes an injection pressure of 200 psig to inject a permitted maximum volume of 1,250 bpd of fresh water/salt water into the Brown Dolomite formation. Petco is seeking authority to increase the injection pressure to 1,000 psig to inject the permitted maximum volume of 1,250 bpd of fresh water/salt water. The injection of fresh water and salt water is a water-flooding initiative by Petco to recover hydrocarbons on the Lease and is currently authorized by Fluid Injection Project No. F17278, which was last amended on January 27, 2014.

Petco submitted a completed Form H-1 (*Application to inject fluid into a reservoir productive of oil and gas*) and H-1A (*Injection Well Data*), dated November 20, 2017, to request authorization for the Annie Well 10, to operate at an increased higher maximum surface injection pressure so the previously authorized injection volume of 1,250 bpd of water/saltwater can be injected into the Brown Dolomite formation. The Application to amend the current permit, identified as Forms H-1 and H-1A, is protested by Kirkpatrick, the operator of the Blake Lease, located on the southern boundary of the Annie Lease (see Attachment 1 in Proposal for Decision). The Annie Well 10 is off-set from the southern boundary by approximately 330 feet and is in close proximity to the Blake Lease wells.

Petco's initial version of the Application to amend Permit F17278 (“Injection Permit”) was dated November 20, 2017.<sup>6</sup> On January 30, 2018, the Commission sent a letter to Petco

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<sup>6</sup> Petco Letter to the RRC was dated November 21, 2017.

identifying deficiencies with the Application, along with a notice that a protest was received for the Application.<sup>7</sup> On February 15, 2018, the Oil and Gas Division issued a letter stating that the Application is administratively complete.<sup>8</sup> On February 27, 2018, Petco requested a public hearing to address the protest received from Kirkpatrick.<sup>9</sup>

### ***Pre-Hearing Conference and Hearing***

On June 25, 2018, a prehearing conference was held to establish a hearing date and establish a docket control order for the case.<sup>10</sup> On September 12, 2018, Docket Services issued a Notice of Hearing to the service list. On October 10, 2018, a hearing on the merits was held.

### ***Permitted Injection Well***

The Annie Lease consists of approximately 560 acres and is located 10 miles south of Pampa, Texas.<sup>11</sup> The well's target injection zone is the Brown Dolomite formation, with a pay thickness of approximately 100 to 150 feet thick.<sup>12</sup> Petco received an Injection Permit from the Commission to inject fresh water/salt water into the Brown Dolomite formation with a maximum liquid injection volume of 1,250 bpd; and a maximum surface injection pressure at 200 psig.<sup>13</sup> The Annie Well 10 is capable of injecting approximately 700 bpd of water with the current permitted authorized pressure of 200 psig.<sup>14</sup> The approval of the current Injection Permit for the Annie Well 10 included the following special conditions:

- An annual annulus pressure test must be performed and the results submitted in accordance with the instructions of Form H-5; and
- The tubing-casing annulus pressure must be monitored at least weekly and reported annually on Form H-10 to the Commission.<sup>15</sup>

The initial Injection Permit for the Annie Well 10 dated August 3, 2009, limited the volume of saltwater to be injected to 22 bpd and freshwater limited to 728 bpd, with a maximum liquid injection volume of 750 bpd.<sup>16</sup> In addition, the operating maximum surface injection pressure in the initial Permit was 200 psig.<sup>17</sup>

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<sup>7</sup> Hearing Tr. Pg.13, Lns.5-10.

<sup>8</sup> RRC Letter dated January 30, 2018.

<sup>9</sup> Petco Letter dated February 27, 2018.

<sup>10</sup> PHC Audio, 30 sec. to 9 min.

<sup>11</sup> Petco Ex. 1 - H-1 Form dated November 20, 2017.

<sup>12</sup> Petco Ex. 1 - H-1 Form dated November 20, 2017.

<sup>13</sup> Hearing Tr. Pg. 16. Lns. 19-20.

<sup>14</sup> Hearing Tr. Pg. 16. Lns. 19-20.

<sup>15</sup> Petco Hearing Ex. 1.

<sup>16</sup> Kirkpatrick Cross-Examination Ex. 4; Hearing Tr. Pg. 38, Lns. 6-11.

<sup>17</sup> Kirkpatrick Ex. 4; Hearing Tr. Pg.37, Lns. 8-25; and Pg. 38. Lns. 1-10.

The Annie Well 10 is described by the Form H-1A as follows:<sup>18</sup>

- Surface casing is 8 5/8 inches diameter and is set from the surface to 510 feet;
- Long String casing is 5.5 inches in diameter and runs to 2,998 feet (TD);
- Liner is 4.5 inches in diameter and runs to 2967 feet;
- Tubing Size is 2 3/8 inches in diameter and runs 2,948 feet deep;
- Tubing packer set at 2,948 feet; and
- The injection formation is the Brown Dolomite formation.

### ***Production History of Leases***

Petco's evidence in the record indicates the Annie Lease has oil production recovery volumes that oscillate over time with a pattern of relative stability from December 2009 to 2018.<sup>19</sup> Petco's evidence indicates the Blake Lease, located on the southern border of the Annie Lease, shows production data with a period of stable production from 1993 to 2018, with one period of lower production from approximately 2006 through 2012.<sup>20</sup>

Testimony from Mr. Marshall Daniel asserts the injection of freshwater and saltwater has arrested the decline of production on the Annie Lease with an increase in oil production on a yearly basis for the last four years.<sup>21</sup> Mr. Daniel contends that there are two injectors on the Annie Lease, the Annie Well 10 and another injection well to the north of the Annie Well 10 identified as the Annie 3 Well. Mr. Daniel's testimony asserts production is dependent on the injection pressure caused by these two injection wells because the natural pressure in the reservoir is very low.<sup>22</sup> Mr. Daniel maintains the energy in the reservoir is solution gas and associated water production.<sup>23</sup> Testimony from Mr. Daniel contends production has improved in the Annie Lease because of the injection of water into the Brown Dolomite formation.<sup>24</sup>

### ***Protection of Useable Quality Water Aquifers***

In the vicinity of the Annie Well 10, a July 7, 2009 letter from the Texas Commission on Environmental Quality<sup>25</sup> received by the RRC on July 20, 2009, estimates the base of usable-quality water (BUQW) at 550 feet or 10 feet into the Permian red beds, whichever is deeper.<sup>26</sup>

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<sup>18</sup> Petco Ex. 1.

<sup>19</sup> Hearing Tr. Pg. 18. Lns.15-24; Petco Ex. 5.

<sup>20</sup> Hearing Tr. Pg. 19. Lns.1-24; Petco Ex. 6.

<sup>21</sup> Hearing Tr. Pg. 18. Lns. 1-21.

<sup>22</sup> Hearing Tr. Pg. 20. Lns. 10-25.

<sup>23</sup> Hearing Tr. Pg. 21. Lns. 8-18.

<sup>24</sup> Hearing Tr. Pg. 22. Lns. 1-11.

<sup>25</sup> Texas Commission on Environmental Quality, a state agency regulating environmental media.

<sup>26</sup> Letter dated July 7, 2009 from the TCEQ estimating the BUQW at 550 feet deep; Petco Ex. 1 - Form H-1A.

## ***Injection Strata and Injection Pressure***

### **Injection Strata**

Injection Permit F17278 authorizes Petco to inject fresh water and salt water into subsurface strata from 2,998 to 3,108 feet deep, identified as the Brown Dolomite formation.<sup>27</sup> Testimony from Mr. Daniel, maintains that the Brown Dolomite formation beneath the Annie Lease is dipping from the north, (being the high structural area), to the southeast, (which is the lower structural area). In response to a question about the subsurface strata and structure of the Brown Dolomite, Mr. Daniel stated:

“...the significance just shows -- and I don't have any data down on the Blake Lease, but it shows the structural orientation of the -- of the dip or how the structure lays on the top of the Brown Dolomite. We get a sense that as we go south onto the Blake Lease that the structure is more east -- or from west to east with a slight north component it's dipping from the north, being the high structural area, to the southeast would be the lower structural area. ... all things being equal and the formations being roughly similar throughout the area, you would expect by gravity that any water put in the 10 [Annie Well 10] would travel southeastward [to the Blake Lease] from the Annie 10.”<sup>28</sup>

The distance from the Annie Well 10 and the nearest downgradient well on the Blake Lease (identified as the Blake 9 Well) is approximately 660 feet;<sup>29</sup> and 1,200 feet to the Blake 1 Well.<sup>30</sup>

### **Injection Pressure**

Injection Permit F17278 authorizes the injection of saltwater at a maximum volume of 250 bpd and injection of freshwater at 1,000 bpd, with a total fluid volume of 1,250 bpd.<sup>31</sup> The source of the freshwater to be injected is the Ogallala Aquifer at approximately 355 feet below the surface.<sup>32</sup>

In the current Application Petco requests to amend the maximum surface injection pressure from 200 psig to 1,000 pounds psig to achieve the current authorized permitted level of 1,250 bpd of fluid injection. Petco asserts the current permitted maximum surface pressure of 200 psig will result in 700 bpd of fluid to be injected.<sup>33</sup>

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<sup>27</sup> Petco Ex. 1 - Form H-1A.

<sup>28</sup> Hearing Tr. Pg. 23. Lns 20-25; Pg. 24. Lns. 1-24.

<sup>29</sup> Hearing Tr. Pg. 28. Lns. 1-3.

<sup>30</sup> Petco Ex. 3.

<sup>31</sup> Petco Ex. 1 - Form H-1A.

<sup>32</sup> *Id.*

<sup>33</sup> Hearing Tr. Pg. 19. Lns. 9-19.

Petco asserts the current reservoir pressure in the Brown Dolomite formation has resulted in greater production on the Annie and Blake Leases.<sup>34</sup> Petco maintains that the increased pressure as requested in the Application will improve recoverability of oil from the Brown Dolomite formation, therefore increasing production for all operators, including off-set operators (e.g., Kirkpatrick).<sup>35</sup>

**Protestant's Evidence (Kirkpatrick Oil Company, Inc.)**

The Application is protested by Kirkpatrick, the operator of the Blake Lease, which is immediately south of the Annie No. 10 Well.<sup>36</sup> (See Attachments 1 and 2 in the PFD.) Testimony by Mr. Michael McGinnis, a petroleum engineer for Kirkpatrick, maintains that 10 wells are on the Blake Lease with the nearest well to the Annie Lease being approximately 330 feet off-set from the property boundary.<sup>37</sup> (See Attachments 1 and 2 in PFD.) The Blake Lease was the first lease for Kirkpatrick.<sup>38</sup> Mr. McGinnis asserts that the injection or secondary recovery production on the Annie Lease is unnecessary to maintain production for the Blake Lease wells. (See Attachment 4 in PFD.) To the contrary, Mr. McGinnis argues the influx of water production from the Annie Lease has resulted in two wells on the Blake Lease being "watered-out" in the past couple of years, resulting in waste.<sup>39 40</sup>

Testimony by Kirkpatrick indicates the Panhandle Gray County Field ("Field") was discovered in 1921 and is approximately 3,000 feet deep. The oil has an API gravity of 29 with a field GOR ratio of 2,000:1; and an allowable of 60 barrels of oil ("BO") per day. The current lease line spacing is 330/467 feet. Cumulative field production identified on the proration schedule is 523,685,067 BO.<sup>41</sup>

The Blake Lease has 10 wells identified in the Field, Wells 1 through 11, with Blake Well 4 not being on the proration list.<sup>42</sup> Kirkpatrick has noticed an influx of water associated with Blake Well Nos. 1 (API No. 179-04756) and 9 (API No. 179-07648).<sup>43</sup> It is noted that Blake Well 1 was completed in 1945 and Blake Well 9 was completed in 1954.<sup>44</sup> Mr. McGinnis asserts that all the Blake Lease wells are oil wells.<sup>45</sup> (See Attachments 3 and 4 in PFD.) Total production from the Blake Lease has been 1.7 thousand barrels of oil ("MBO") and 431 million cubic feet ("MMCF") of

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<sup>34</sup> Hearing Tr. Pg. 10. Lns.20-25; Petco Hearing Ex. 4.

<sup>35</sup> Hearing Tr. Pg. 11. Lns. 1-10.

<sup>36</sup> Hearing Tr. Pg. 10, Lns.10-12.

<sup>37</sup> Hearing Tr. Pg. 11 Lns.17-25.

<sup>38</sup> Hearing Tr. Pg. 12 Lns.1-5.

<sup>39</sup> Hearing Tr. Pg. 12 Lns.6-14.

<sup>40</sup> Hearing Tr. Pg. 50 Lns.6-14.

<sup>41</sup> Kirkpatrick Ex. 3.

<sup>42 42</sup> Hearing Tr. Pg. 54, Lns.9-19.

<sup>43</sup> Hearing Tr. Pg. 54, Ln 15-18.

<sup>44</sup> Kirkpatrick Ex.6 and Ex. 7.

<sup>45</sup> Hearing Tr. Pg. 60, Ln 15-18.



gas compared to the Annie Lease which has produced approximately 920 MBO and 3.6 billion cubic feet ("BCF") of gas.<sup>46</sup> Mr. McGinnis states:

"...one thing that Mr. Daniel mentioned about solution gas, that kind of shows out on this map in the cumulative production that in his structure map. It showed that the Annie wells were more up-dip [*structurally higher*] and the Blake wells were down-dip [*structurally lower*]. This kind of shows that their wells were ...in the gas cap; over life a lot more gas production than the Blake Lease."<sup>47</sup> (See Attachment 2 in PFD)

Mr. McGinnis asserts that water injected into the Annie Well 10 will travel directly down (southerly) to the Blake 1 Well (located on the southern boundary of the Annie Lease) as presented in Kirkpatrick Exhibit 9, establishing groundwater flow controlled by the structural high associated with the Annie Lease and the structural low associated with the Blake Lease.<sup>48</sup> (Attachment 2 in PFD) With respect to Exhibit 10, Mr. McGinnis testified:

"This is a structure map generated on the top of the Brown Dolomite. This is -- would be an extension of what Mr. Daniel showed (from Petco's Exhibit 7). This uses -- here again, we didn't have access to a lot of the Annie wells, but we did have through our log library the Annie 17 Well. And then the numbers listed here next to the wells are the TVD [true vertical depth] subsurface depths to the top of the Brown Dolomite. ...So this shows the structure similar to what Mr. Daniel said, that we are down-dip from the injection; that ...there's a low to the west. And, therefore, with the injection of water into the Annie Well 10, the direction of flow of that water would be south and southeast with the structure."<sup>49</sup>

After discussion of the structure map, Mr. McGinnis maintains that the injected water from the Annie Well 10, based on the structure and being down-dip (structurally lower), would result in flow migrating toward the Blake Lease wells.<sup>50</sup> (Attachment 2 in PFD)

Mr. McGinnis asserts that the Blake Wells 1 and 9 were impacted by the injection water from the Annie Well 10. Mr. McGinnis maintains with testimony and Kirkpatrick's Exhibit 11 that the increase in water in the Blake 1 and 9 Wells is due to the Annie Well 10 continuously injecting water and migrating to the Blake 1 and 9 Wells, the closest wells to the Annie Well 10 (injection well) and also located structurally down-dip. (See Attachments 2 and 3 in PFD.)

Mr. McGinnis asserts that the Annie Lease is not getting any benefits from the injection of water from the Annie Well 10. In addition, Mr. McGinnis maintains through testimony and using Kirkpatrick's Exhibit 12, that production on the Annie Lease is similar to Blake's production, with analogous trends. (See Attachment 4 in PFD.) Mr. McGinnis' testimony indicates that no positive

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<sup>46</sup> Hearing Tr. Pg. 59, Ln 10-25; and Pg. 60, 1-3.

<sup>47</sup> Hearing Tr. Pg. 61, Ln 11-17.

<sup>48</sup> Hearing Tr. Pg. 63, Ln 2-15; Ex. 9 and 10.

<sup>49</sup> Hearing Tr. Pg. 63, Ln 17-25; and Pg. 64, 1-10; Petco Exhibit 10.

<sup>50</sup> Hearing Tr. Pg. 64, Lns.11-17.

response was noted from the water injection.<sup>51</sup> In addition, Mr. McGinnis maintains increased oil production on the Blake Lease is primarily due to well workovers identified on Kirkpatrick's Exhibit Nos. 11 and 12, which show a pattern of increased oil production after the specified well workover was completed and the specified well brought back to production. (See Attachments 3 and 4 in PFD)

Mr. McGinnis states:

"I think it could be explained through well work as much as influence from the water being injected."<sup>52</sup>

"Well, my concern is that if permitted to increase the pressure and increase the volume, that we will have additional loss of wells and production due to continued flooding in the down-dip direction."<sup>53</sup> (See Attachment 2 in PFD)

Mr. McGinnis argues the production plot (production compared to operating expenses) shows a current cumulative production of approximately 1.75 million BO, with an ultimate recovery of 1.9 million BO or a remaining volume of 145,000 BO.<sup>54</sup> Mr. McGinnis asserts that the continued influx of water production from the Annie injection wells will result in a portion of the remaining oil to be stranded, resulting in waste.<sup>55</sup>

### ***Cross-Examinations by Kirkpatrick***

Mr. Daniel asserted in cross-examination that two permitted injection wells are on the Annie Lease, the Annie 3 and 10 Wells amended on January 27, 2014, under Project No. F-17278 Amendment. The Annie 3 Well is authorized for an injection interval of 3,001 to 3,122 feet; and the Annie Well 10 is authorized for injection for an interval of 2,998 to 3,108 feet. The injection permits (issued on January 27, 2014) for both wells established a maximum injection volume of 1,250 bpd of liquids with an operating maximum surface injection pressure of 200 psig.<sup>56</sup>

Mr. Daniel testified that the total reported injected volumes do not approach the maximum injection volumes established in the Injection Permits. Mr. Daniel responded that "it actually decreased in the amount of water it's been injecting."

On redirect, Mr. Daniel testified that to maximize the operation and recovery of the Annie Lease, the 1,250 bpd of water will require the pressure to be increased from 200 psig to 1,000 psig.

Mr. Daniel states:

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<sup>51</sup> Hearing Tr. Pg. 69, Lns.17-10.

<sup>52</sup> Hearing Tr. Pg. 71, Lns.24-25.

<sup>53</sup> Hearing Tr. Pg. 72, Lns.11-14.

<sup>54</sup> Hearing Tr. Pg. 73, Lns.21-25; and Pg. 74, Ln 1-4.

<sup>55</sup> Hearing Tr. Pg. 74, Lns.4-14.

<sup>56</sup> Kirkland Cross-Ex. 5; Hearing Tr. Pg. 39, Lns.4-25; Pg. 40. Lns. 1-25; Pg. 41. Lns. 1-4.

"At the current time, I couldn't tell you what the pressure -- what it will take -- what pressure it will take. I know that it will take more. I don't -- I couldn't tell you if it's gonna be 400 pounds, 500 pounds, 600 pounds or 700 pounds. It's just gonna take more than the 200. And that pressure will, as time goes on, as in most all waterfloods I've ever been -- involved in, that pressure will increase as more water is injected."<sup>57</sup>

### ***Cross-Examinations by Petco***

During cross-examination, Mr. McGinnis, on behalf of Kirkpatrick, testified that the Annie Well 10's water-flooding operation has adversely affected the Blake 9 and 1 Wells.<sup>58</sup> Also, regarding the downhole pressure of the Blake 11 well, Mr. McGinnis stated:

"On the initial completion of the Blake No. 11 [located about 1,850 feet to the south of the Annie 10 Well], the [well head] casing pressure was reported as 8 psi. And through well work on the other wells until recently or in the mid-2000s, it was common to -- when you pulled one of the wells.....it was common to go check total depth because these are open whole completions and bail any fill that had occurred that might block production. When that happened, they also reported the amount of fluid that was recovered, and usually there was not more than 10s [tens] of feet of fluid in the well when it was bailed. From TD it would be just into the casing, which is basically at the top of the Brown Dolomite. So there's very little fluid in the wells. So the bottom hole pressure is very low."<sup>59</sup>

During cross-examination, Mr. McGinnis indicated that post-flooding calculations have not been taken to determine bottom hole pressures. The only metrics have been an increase in water production.<sup>60</sup> Mr. McGinnis asserts that the Blake Well 9, located due south of the Annie Well 10, was pumped for a couple of months [referenced as July to September] concurrent with the Annie Well 10 injecting water before the well started producing water, which was not previously observed. Therefore, Kirkpatrick shut the well in.<sup>61</sup> Mr. McGinnis maintains that Kirkpatrick did not notify Petco about any well problems caused by their flooding.<sup>62</sup>

During cross-examination, Mr. McGinnis asserts that no oil was being produced during the couple of months; therefore the well was shut-in to stop producing water which had to be disposed at a commercial saltwater disposal well.<sup>63</sup> Mr. McGinnis argued during the cross-examination that

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<sup>57</sup> Hearing Tr. Pg. 46. Lns. 17-25; Pg. 47, Lns.1-22.

<sup>58</sup> Hearing Tr. Pg. 75. Lns. 13-21.

<sup>59</sup> Hearing Tr. Pg. 77. Lns. 1-25.

<sup>60</sup> Hearing Tr. Pg. 78. Lns. 1-8.

<sup>61</sup> Hearing Tr. Pg. 78. Lns. 9-20.

<sup>62</sup> Hearing Tr. Pg. 80. Lns. 9-13.

<sup>63</sup> Hearing Tr. Pg. 78. Lns. 15-20; Pg. 80, Ln1-5.

the well prior to the water being observed was significant and looked at using the bleeder valve.<sup>64</sup> Mr. McGinnis maintained, "There was still oil coming from ....these wells ....a half to two barrels a day. They're stripper wells..."<sup>65</sup>

During cross-examination, Mr. McGinnis indicated the No. 1 Well was shut-in because of water production increasing toward the end of [20]16. After water was observed, Well No. 1 was re-worked for approximately six months, from April [20]17 to October [20]17.<sup>66</sup> Oil production continued to fall off and the Blake Well 1 was shut-in approximately October 2017.<sup>67</sup>

During cross-examination, Mr. McGinnis testified he saw a correlation between the oil production on the Blake Lease and the water injection from the Petco Lease. After each workover, the oil production would increase to mirror the increased recovery of the reworked wells.<sup>68</sup> Mr. McGinnis stated:

"In that case where the oil production was low and we repaired the No. 1 and the No. 10 well, the production came back up -- that tells me that -- and at that time the No. 1 and the No. 10 were two of the better wells. The No. 1, the No. 10 and the No. 11 are where -- the better of the wells, No. 1, No. 2, No. 11 and No. 10."<sup>69</sup>

#### **EXAMINERS' ANALYSIS OF THE EVIDENCE**

Petco is requesting authorization for the Annie Well 10 to operate at an increased surface injection pressure in order to inject the current permitted maximum volume of 1,250 bpd of water. The Annie Well 10 injects fresh water and salt water into the Brown Dolomite formation for the purpose of a water-flooding initiative to recover hydrocarbons on the Annie Lease. The Examiners focused on the major criteria required to fulfill the regulatory requirements for a §3.46 case.

Based on the evidence in the record, the Examiners recommend denial of Petco's Application to amend the maximum surface injection pressure from 200 psig to 1,000 psig.

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<sup>64</sup> Hearing Tr. Pg. 80. Lns. 23-25; Pg. 81, Lns.1-9-13.

<sup>65</sup> Hearing Tr. Pg. 81. Lns. 17-25.

<sup>66</sup> Hearing Tr. Pg. 83. Lns. 3-17.

<sup>67</sup> Hearing Tr. Pg. 84. Lns. 7-12.

<sup>68</sup> Hearing Tr. Pg. 86. Lns. 11-25; Pg. 87, Lns.19-22.

<sup>69</sup> Hearing Tr. Pg. 87. Lns. 23-25; Pg. 88, Lns.1-4.

Petco is requesting the maximum surface injection pressure be amended to 1,000 psig, from the current permitted pressure of 200 psig, to achieve the injection of 1,250 bpd of fresh water/salt water authorized by the current Injection Permit. Petco contends that the water-flooding on the Annie Lease is in everyone's best interest, including landowners and offset operators. Kirkpatrick asserts that the increase in authorized surface injection pressure to the proposed 1,000 psig will damage mineral resources associated with the Blake Lease.

Mr. Daniel, on behalf of Petco, asserts that the Brown Dolomite formation beneath the Annie Lease is dipping from the north to the southeast. Also, Mr. McGinnis, on behalf of Kirkpatrick, maintains that the injected water from the Annie Well 10, based on the structure and being down-dip (structurally lower), would result in water flowing and migrating toward the Blake Lease wells. The distance from the Annie Well 10 to the nearest downgradient well, the Blake 9 Well, is approximately 660 feet. In addition, the Blake 1 Well is located approximately 1,200 feet from the Annie Well 10. Kirkpatrick has evidence in the record that suggests the "watering-out" of the Blake 1 and 9 Wells and the continued influx of water production from the Annie Well 10 from the unwanted water-flooding operations will result in oil potentially being stranded, thus causing waste. Kirkpatrick contends that a portion of the approximately 145,000 BO remaining to be produced on the Blake Lease would be stranded by the water-flooding operations on the Annie Lease.

Petco failed to show that the requested amendment to increase the maximum surface injection pressure from 200 psig to 1,000 psig would not harm mineral resources being produced by Kirkpatrick. As such, an increase in water injection caused by the five-fold increase in maximum surface injection pressure (from 200 psig to 1,000 psig) will exacerbate the current conditions.

The Examiners were persuaded that the mineral resources associated with the Blake Lease may be damaged as Kirkpatrick asserted in the hearing.

A July 7, 2009 letter from the Texas Commission on Environmental Quality received by the Commission on July 20, 2009, estimates the base of usable-quality water (BUQW) in the vicinity of the Annie Lease is 550 feet or 10 feet into the Permian red beds, whichever is deeper. The Application indicates the surface casing is set from the surface to 510 feet, which may not be deep enough to protect the BUQW established as 550 feet, as established by the July 20, 2009 letter.<sup>70</sup> To ensure protection of ground and surface water, the Injection Permit for the Annie Well 10 includes the requirement to perform an annual annulus pressure test and weekly monitoring of the tubing-casing annulus. Petco has demonstrated that under the special permit conditions in the original permit that the current existing Annie Well 10 is protective of the ground and surface waters at the permitted 200 psig maximum surface injection pressure.

The injection interval for the Annie Well 10 is the Brown Dolomite formation located at approximately 3,000 feet deep, which has approximately 1,950 feet of separation between the BUQW and injection interval. No evidence was entered into the hearing that suggests the drinking water within one-quarter mile of the Annie Well 10 is not protected by the strata between the injection interval and the BUQW.

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<sup>70</sup> Petco Ex. 1 - Form H-1A.

Petco has an active Organization Report (Form P-5, Operator No. 657835), on file indicating a \$250,000 financial assurance.

### **Examiners' Recommendation**

The effects of any influx of water migrating from the Annie Well 10 to the Blake Lease should be fully considered regarding its effects on production and causing waste. The increase in maximum surface injection pressure to inject higher volumes of water into the injection interval will not maximize production and prevent waste on the Blake Lease. The Examiners note that the water-flooding operation fluids migrating to the off-set Blake Lease are not part of an optimized hydrocarbon recovery design and may cause waste on both the Annie and Blake Leases. Based on the evidence in the record, the Examiners recommend denial of Petco's Application to amend the maximum surface injection pressure from 200 psig to 1,000 psig.

### **FINDINGS OF FACT**

1. The following is the procedural history for the Docket:
  - a. Petco submitted a completed application ("Application"), consisting of the Forms H-1 and H-1A, to amend the existing permit conditions for the Annie Lease, Well 10 (API 179-04749), Panhandle Gray County Field (No. 68873001), Gray County, Texas, pursuant to 16 TAC § 3.46;
  - b. On February 15, 2018, the Oil and Gas Division issued a letter for the Application establishing it to be administratively complete;
  - c. The Application is protested by Kirkpatrick Oil Company, Inc. ("Kirkpatrick"). Kirkpatrick is the operator of Blake Lease, an off-set lease, contiguous with the southern border of the Annie Lease;
  - d. Petco (657835) requested a public hearing on February 27, 2018, to address the protest received from Kirkpatrick for their Application to amend the maximum surface injection pressure from 200 psig to 1,000 psig;
  - e. June 25, 2018, a prehearing conference was held to establish a hearing date and establish a docket control order for the case. On September 12, 2018, Docket Services issued a Notice of Hearing to the service list; and
  - f. On October 10, 2018, a hearing on the merits was held.
2. The Annie (00449) Lease consists of approximately 560 acres and is located about 10 miles south of Pampa, Texas.
3. The Panhandle Gray County Field ("Field") was discovered in 1921 and is approximately 3,000 feet deep. Oil from the Field has an API gravity of 29, and the daily allowable for the field is 60 BO per day. Cumulative field production identified on the proration schedule is 523,685,067 BO.

4. The injection (UIC No. 000101029) of fresh water and salt water into the Annie Well 10 is currently authorized by Fluid Injection Project No. F17278, which was last amended on January 27, 2014. The Injection Permit from the Commission authorizes injection of fresh water and salt water into the Brown Dolomite formation.
5. The source of the freshwater to be injected into the Brown Dolomite formation is the Ogallala Aquifer, at approximately 355 feet below the ground surface.
6. The injection of saltwater and fresh water by the Annie Well 10 is for water-flooding to recover hydrocarbons on the Annie Lease. The Annie Well 10 is described by the Application (Form H-1 and Form H-1A) as follows:
  - a. Surface casing is 8 5/8 inches diameter and is set from the surface to 510 feet;
  - b. Long String casing is 5.5 inches in diameter and runs to 2,998 feet;
  - c. Liner is 4.5 inches in diameter and runs to 2,967 feet;
  - d. Tubing Size is 2 3/8 inches in diameter and runs 2,948 feet deep;
  - e. Tubing packer set at 2,948 feet; and
  - f. The injection formation is the Brown Dolomite formation and the injection interval is 2,998 feet to 3,108 feet.
7. The maximum surface injection pressure currently authorized by the existing Injection Permit for the Annie Well 10 is 200 psig.
8. Petco seeks authority to increase the maximum surface injection pressure from 200 psig to 1,000 psig in the Application.
9. An increase in maximum surface injection pressure would authorize Petco to potentially inject the maximum volume of 1,250 bpd of liquid (fresh water/salt water) as authorized by the existing Injection Permit.
10. The initial Injection Permit for the Annie Well 10 dated August 2009, limited the volume of saltwater to be injected to 22 bpd and freshwater limited to 728 bpd, with a maximum liquid injection volume of 750 bpd. In addition, the maximum operating maximum surface injection pressure in the initial Injection Permit was 200 psig.
11. The Annie Lease has oil production recovery volumes that oscillate over time with a pattern of relative stability from December 2009 to 2018. Production data for the Blake Lease show a period of stable production from 1993 to 2018, with one period of lower production from about 2007 to 2012.

12. The Annie Well 10 is located proximal to the southern boundary of the Annie Lease. The Annie Well 10 is off-set from the southern boundary of the Lease by approximately 330 feet and is in close proximity to the Blake Lease wells, the off-set operator to the south of the Annie Lease. The distance from the Annie Well 10 and the nearest structurally lower-down and downgradient well on the Blake Lease identified as the Blake 9 Well is approximately 900 feet; and approximately 1,250 feet to the Blake 1 Well (based on Petco's map scale). The Blake Lease has 10 wells identified in the Field, 1 through 11, with Blake Well 4 not on the proration schedule.
13. With proper safeguards, both ground and surface fresh water can be adequately protected from pollution.
  - a. The base of usable quality groundwater ("BUQW") occurs at a depth of 550 feet or 10 feet into the Permian red beds, whichever is deeper, as established by a July 7, 2009 letter from the Texas Commission on Environmental Quality received by the RRC on July 20, 2009.
  - b. The injection interval for the Annie Well 10 is the Brown Dolomite formation located at approximately 3,000 feet deep, which has approximately 1,950 feet of separation between the BUQW and injection interval.
  - c. To ensure protection of ground and surface water, the Injection Permit for the Annie Well 10 includes the requirement to perform an annual annulus pressure test and the results submitted in accordance with the instructions of Form H-5; and the tubing-casing annulus pressure must be monitored at least weekly and annually and submitted on Form H-10 to the Commission's Austin Offices.
14. Petco has an active Organization Report (Form P-5, Operator No. 657835), on file indicating a \$250,000 financial assurance.
15. The requested increase in the maximum surface injection pressure from 200 psig to 1,000 psig will endanger or injure oil, gas, or other mineral formations.
  - a. Petco failed to demonstrate that increasing the maximum surface injection pressure from 200 psig to 1,000 psig and increasing the fluids being injected would not harm the Brown Dolomite formation.
  - b. For every 30 barrels of water injected through the Annie Well 10, approximately one barrel of oil will be recovered. Two wells on the Blake Lease have been affected by the secondary recovery operations on the Annie Lease. The influx of injected water from the Annie Well 10 will cause a portion of the approximately 145,000 BO remaining to be produced on the Blake Lease to be stranded by the Annie Lease water-flooding operations, causing waste.



**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. Petco has made a satisfactory showing of financial responsibility. Texas Water Code § 27.051(b)(4).
5. The use of the proposed Annie Well 10 with an increased surface injection pressure of 1,000 psig will endanger or injure oil, gas, or mineral resource. Texas Water Code § 27.051(b)(2).
6. Petco 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.

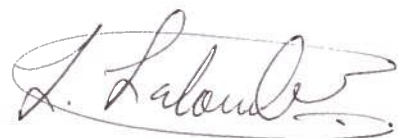
**EXAMINERS' RECOMMENDATION**

Based on the above findings of fact and conclusions of law, the Examiners recommend denial of the Petco Application to amend the surface injection pressure from 200 psig to 1,000 psig by amending the existing Injection Permit conditions for the Annie Lease, Well No. 10, Panhandle Gray County Field, Gray County, Texas, pursuant to 16 Tex. Admin Code (TAC) § 3.46.

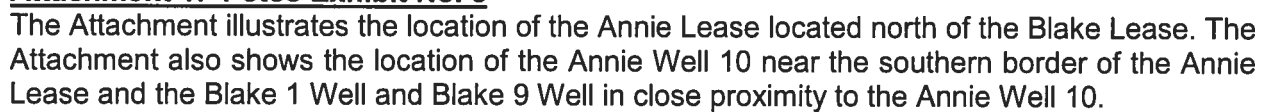
Respectfully,



Robert Musick, P.G.  
Technical Examiner



Lynn Latome  
Administrative Law Judge

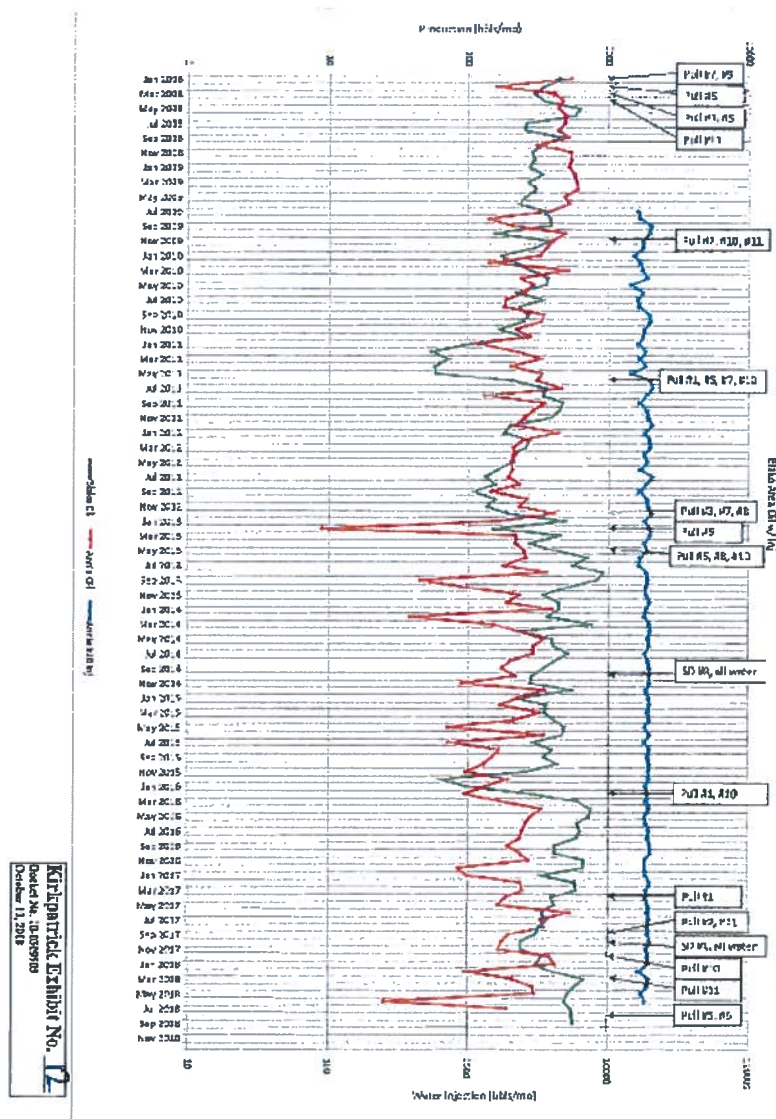


**Attachment 2: Kirkpatrick Exhibit No. 10**

The Attachment shows the location of the Annie Lease located north of the Blake Lease and the illustration of the Brown Dolomite formation's southerly dip and water flow. The water flow has the potential to migrate toward the Blake 1 Well and Blake 9 Well.

**Attachment 3: Kirkpatrick Exhibit No. 11**

The Attachment illustrates the production volumes for the Blake Lease oil (green), Blake Lease water (blue) and the Annie Well 10 injection rates. The oil production rate oscillates based on the well workover activity also shown on the Attachment. In general, the production from 2008 to 2018 remains fairly constant over the 10-year period, with water production increasing until June 2017.



**Attachment 4: Kirkpatrick Exhibit No. 12**

The Attachment illustrates the production volumes for the Blake Lease oil (green), Annie Lease oil (red) and the Annie Well 10 injection rates (blue). The Blake oil production rate oscillates based on the well workover activity and also shows the relationship with the Annie Oil production. Compared to the Annie Lease with the secondary recovery operations, the Blake Lease oil shows a higher rate of volume recovery from about 2013 to 2018, which Kirkpatrick associates with the pump workovers being performed to keep oil flowing.