

OIL AND GAS DOCKET NO. 10-0261404

THE APPLICATION OF PETCO PETROLEUM CORP. TO INJECT FLUID INTO A RESERVOIR PRODUCTIVE OF OIL AND GAS, NOEL LEASE, WELL NO. 1G, PANHANDLE GRAY COUNTY FIELD, GRAY COUNTY, TEXAS

HEARD BY: Richard D. Atkins, P.E. - Technical Examiner
James M. Doherty - Legal Examiner

APPEARANCES:

REPRESENTING:

Applicant:

James Mosley
Dan G. Michael

Petco Petroleum Corp.

Protestants:

Jamie Nielson
Thomas H. Richter

Donald Maul

Observers:

Monique Norman
William Mullican

Panhandle Groundwater Conservation District

PROCEDURAL HISTORY

Application Filed:	November 24, 2008
Request for Hearing:	March 19, 2009
Notice of Hearing:	April 15, 2009
Hearing Held:	June 4, 2009
Closing Arguments Filed:	June 18, 2009
Proposal for Decision Issued:	July 15, 2009
Conference	August 18, 2009
Re-Opened Hearing:	October 29, 2009
Amended PFD Issued:	November 18, 2009

EXAMINERS' AMENDED REPORT AND PROPOSAL FOR DECISION

STATEMENT OF THE CASE

Petco Petroleum Corp. ("Petco") requests authority to inject both fresh water and salt water pursuant to Statewide Rule 46 in its Noel Lease, Well No. 1G, in the Panhandle Gray County Field, Gray County, Texas.

This application is protested by Donald Maul, the surface owner of the tract on which the proposed injection well is located.

On July 15, 2009, the examiners issued a Proposal for Decision recommending that the application be approved. The recommendation was presented to the Commissioners at conference on August 18, 2009. At this conference, the Commissioners ordered the hearing to be re-opened to allow the applicant to present evidence regarding the use of alternate sources of injection water in lieu of fresh water. The hearing was re-opened on October 29, 2009.

DISCUSSION OF THE EVIDENCE

Applicant's Evidence

Petco seeks authority to inject fresh water and produced salt water into the productive Brown Dolomite formation in the Noel Lease, Well No. 1G, at a depth of 3,100 feet. The proposed injection is for the purpose of disposing of produced salt water and waterflooding the Noel Lease to recover additional oil reserves. Petco estimates for every 30 barrels of injected fluids one barrel of additional oil will be produced.

Two Panhandle Gray County Field waterflood projects within 15 miles of Petco's lease have demonstrated favorable responses. The Johnson Ranch Unit, initially operated by Phillips Petroleum, and the Swanson-Davidson lease, operated by Petco, both showed an increase in production after waterfloods were initiated. On average, the two units exhibited a 2.5 fold increase in production within five years of injection. Based on the performance of these two projects, Petco performed a reserve and cash flow analysis on the Noel Lease, with and without a waterflood. With a waterflood, the analysis estimated an oil recovery increase of approximately 23,000 BO from the Noel Lease.

The Noel Lease, Well No. 1G, was drilled in October 1929 to a total depth of 3,333 feet. The well has 874 feet of 12 ¼" surface casing cemented to surface, 2,543 feet of 8 ¼" intermediate casing cemented with an unknown amount and 3,128 feet of 6 ⅝" production casing also cemented with an unknown amount. The proposed injection will be through 2 ⅜" tubing with a packer set at 3,050 feet. The proposed injection interval is between 3,128 feet and 3,333 feet. The maximum rate of injection requested is 740 barrels

OIL AND GAS DOCKET NO. 10-0261404

of fresh water and 500 barrels of salt water per day. The maximum requested injection pressure is 200 psi. The Texas Commission on Environmental Quality recommends that usable-quality ground water be protected to 600 feet.

Since there are no records to document that the well is cased and cemented in a manner sufficient to insure that injected fluids will be confined to the proposed injection interval, RRC Technical Permitting has recommend that Petco perform remedial work on the well, and Petco has agreed. To insure adequate zonal confinement and useable quality groundwater protection, Petco will be required to cement squeeze the 6 5/8" casing above the top of the injection interval with 100 sacks of cement. In addition, Petco will run a 4 1/2" casing liner to 3,100 feet and cement it back to the surface with 400 sacks of cement. Petco has also agreed to run a cement bond log or temperature survey to confirm the quality and top of cement on both cementing operations (See attached Petco Exhibit No. 3 - Wellbore Diagram).

The water to be injected is produced salt water from Petco's Noel Lease and fresh water from their fresh water supply well penetrating the Ogallala aquifer. In addition to the proposed injection well, Petco's Noel Lease has four producing, two shut-in and four plugged wells. The lease currently produces approximately 2 BOPD and 10 BWPD. Petco's project will require an additional 740 barrels of injection water per day. There are no other economically or technically feasible sources of salt water in the area. The Glorietta Sand found at a depth of approximately 1,400 feet is a loosely consolidated sand that produces sand along with the water. The sand production causes severe pump problems that are cost prohibitive to make a suitable source of salt water. Petco estimates it will use 3,700,000 barrels of fresh water over the life of the waterflood project. Over time, fresh water requirements will be reduced as produced water will increase as the waterflood project progresses.

Petco has obtained a permit (GR-560-SR) from the Panhandle Groundwater Conservation District that allows Petco to withdraw 82 acre-feet per year of fresh water for up to 30 years. This would allow Petco to withdraw up to 8.1 million barrels of fresh water. Petco estimates it will need only approximately 41% of what they are authorized to withdraw by the Panhandle Groundwater Conservation District. Petco is attempting to restore and increase production on the Noel Lease which was first drilled in 1929. Injection into the Noel Lease, Well No. 1G, will allow Petco to re-pressurize this depletion drive reservoir for secondary recovery. Petco believes that the proposed injection will increase the reservoir pressure and result in the secondary recovery of 22,815 BO which would not otherwise be recovered under primary methods.

There are six wellbores operated by Petco within a 1/4 mile radius of the Noel Lease, Well No. 1G, which penetrated the proposed injection interval. Two of the wellbores were plugged and abandoned in 1972 and 1974, three wellbores are producing wells and one wellbore is shut-in.

OIL AND GAS DOCKET NO. 10-0261404

Notice of the application was published twice in *The Pampa News*, a newspaper of general circulation in Gray County, on April 17, 2008 and February 26, 2009. A copy of the application was mailed on November 20, 2008 to the Gray County Clerk's Office, the surface owner and the two offsetting operators within ½ mile.

Protestant's Evidence

Donald Maul owns the surface of the property on which the Noel Lease, Well No. 1G, is located. Mr. Maul is primarily concerned that the project will use fresh water resources unnecessarily. His expert witness testified that Petco acknowledges that the Glorietta formation is a potential salt water aquifer. However, Petco did not address the salt water producing rate that could be expected from a Glorietta well nor did Petco investigate the feasibility of the use of screens and other pump technology to alleviate the effects of sand production.

Mr. Maul's expert witness also stated that Petco made no effort to investigate water produced by others as a source of salt water for its waterflood project. The expert witness submitted a map depicting three nearby commercial disposal wells and many other area operated lease disposal wells that were disposing of more than 100 BWPD. In addition, the witness submitted a tabulation of the area salt water haulers that Petco did nothing to identify or contact in an attempt to secure their salt water.

The expert witness stated that even a cursory investigation of Commission records shows that there are vast amounts of excess salt water available in the area and Petco failed to investigate these alternate sources of salt water, much less show that such sources are not technically or economically feasible. However, when the witness was questioned by the applicant, he stated that he knew of at least 37 fresh water injection wells already approved and permitted by the Commission in Gray County that were not shown on the submitted map exhibit.

Mr. Maul is also concerned that the project will contaminate ground water resources and his expert witness submitted a Commission Well Record form for the Noel Lease, Well No. 2. This well is outside of the ¼ mile radius of review and was drilled in June 1930. Mr. Maul was concerned that the Well Record form contained incomplete casing cementing information and that three shallow casing strings had been partially or wholly removed from the well. The witness felt that Well No. 2 could be a conduit for the injection fluids to leave the injection interval and enter zones of useable quality water as the reservoir is pressured up by injection.

Mr. Maul also raised general concerns over Petco's operations. He submitted several photographs showing improper surface equipment maintenance and several wells that appeared to be open to the atmosphere. The failure to maintain surface control of wells are violations of Statewide Rule 13(b)(1)(B). Mr. Maul stated that all of these issues could lead to potential surface pollution hazards.

OIL AND GAS DOCKET NO. 10-0261404

Re-Opened Hearing - Alternate Sources of Injection Water

At the re-opened hearing, Petco submitted a table of offset producers and salt water haulers that had been contacted. From this list, Petco had received commitments from offset producers to furnish 200 BWPD and from salt water haulers to furnish 390 BWPD, for a total commitment of 590 BWPD. Petco also estimated the cost to install salt water gathering lines and salt water treating equipment to be approximately \$51,000. The increased lease operating cost to operate the salt water treating facility was estimated at approximately \$1,000 per day.

Based on the above estimates and an oil price of \$70 per barrel, Petco submitted a cash flow analysis that showed the water injection project would never payout and Petco would lose approximately \$400,000 if Petco had to use produced water from offset producers or salt water haulers in lieu of fresh water. Petco felt that produced salt water from offset producers or salt water haulers was an interruptible water supply that would not allow for continuous injection which would adversely affect the waterflood sweep efficiency. In addition, the mixing of produced waters would create severe scaling problems over the 15 year life of the injection project. Petco stated that both of these factors would result in a poorer waterflood performance and a lower secondary recovery of oil.

Petco also discounted the use of the Glorietta formation as a possible source of salt water. Petco stated that Phillips Petroleum Company has tried twice to use the Glorietta formation for produced salt water in the area, and both times, the operation was deemed uneconomic and shut down as the direct result of problems created by the production of large quantities of sand.

Mr. Maul's expert witness submitted a 10 mile radius of review map depicting three nearby commercial disposal wells and many other area operated lease disposal wells that were disposing of more than 100 BWPD. The expert witness stated that Petco could have done more to investigate water produced by others as a source of salt water for its waterflood project.

EXAMINERS' OPINION

The examiners recommend that the application be approved. The proposed injection well will be completed in a manner which will protect useable quality water resources and will confine the injected fluids to the injection interval. Based on Petco's reserve and cash flow analysis, the use of Well No. 1G for injection will result in the secondary recovery of approximately 23,000 BO as the reservoir is re-pressured. Therefore, the approval of the application is in the public interest.

Although the protestant argues that produced salt water could be used from nearby operators and SWD facilities, he did not provide any evidence as to the cost or feasibility of that use. The protestant ignored the fact that his own evidence shows that there are at least 37 fresh water injection wells already approved and permitted by the Commission in

OIL AND GAS DOCKET NO. 10-0261404

Gray County. It naturally follows, that if salt water were a viable and cost-effective method for area waterflood projects, it is doubtful that the Commission would have already issued 37 fresh water injection permits in the same area.

The examiners do not believe that using fresh water to enhance the waterflood project will cause an unnecessary waste. Petco has obtained the necessary fresh water permits from the Panhandle Groundwater Conservation District to withdraw up to 82 acre-feet per year of fresh water. The Noel Groundwater Conservation District has the jurisdiction and authority to manage freshwater resources and issue permits for its use. Petco estimates it will only use approximately 41% of its permitted fresh water withdrawal over the life of the project. In addition, Petco's cash flow analysis shows that the waterflood project would be uneconomical if Petco was required to use produced saltwater supplied by offset producers or salt water haulers in lieu of fresh water.

Although, the Commission Well Record form for the Noel Lease, Well No. 2, contains incomplete casing cementing information, the form shows that the well still contains 10" casing set at 1,067 feet, 8 ¼" casing set at 2,585 feet and 6 ⅝" casing set at 3,100 feet. The well is outside of the ¼ mile radius of review and the maximum permitted injection pressure is only 200 psi. These facts alone should not allow the Noel Lease, Well No. 2, to be a conduit for the injection fluids to leave the injection interval and enter zones of useable quality water as the reservoir is pressured up by injection.

To insure adequate zonal confinement and useable quality groundwater protection, Petco's injection permit will be issued with the following Special Conditions:

- a. Cement squeeze the 6 ⅝" casing above the top of the injection interval with 100 sacks of cement.
- b. Run a 4 ½" casing liner to 3,100 feet and cement it back to the surface with 400 sacks of cement.
- c. Run a cement bond log or temperature survey to confirm the quality and top of cement on both cementing operations.
- d. Weekly tubing-casing pressure monitoring and annual mechanical integrity tests.
- e. Bring all wells on the Noel Lease into compliance with Statewide Rule 13(b)(1)(B).

The examiners have officially noticed the UIC database. This database shows that there have been a total of 258 fresh water injection permits issued in Gray County since May 1955. Of those permits, there are currently 39 active fresh water injection permits and the last permit was issued to Petco in August 2009 for its Annie Lease, Well No. 10.

OIL AND GAS DOCKET NO. 10-0261404

The examiners have also officially noticed the Commission P-5 Financial Assurance and Docket databases that establishes that Petco has an active Organization Report and a \$250,000 financial assurance bond on file with the Commission. Petco also operates 486 wells and has no past or pending enforcement dockets at the Commission. Any other possible violations by the applicant should be addressed by the Pampa District Office.

FINDINGS OF FACT

1. Notice of this application and hearing was provided to all persons entitled to notice at least ten (10) days prior to the date of the hearing.
2. Notice of the application was published twice in *The Pampa News*, a newspaper of general circulation in Gray County, on April 17, 2008 and February 26, 2009. A copy of the application was mailed on November 20, 2008 to the Gray County Clerk's Office, the surface owner and the two offsetting operators within ½ mile.
3. The saltwater production on the lease is currently 10 barrels per day. Petco's project will require an additional 740 barrels of injection water per day.
4. There are no other economically or technically feasible sources of salt water in the area.
 - a. Phillips Petroleum Company has tried twice to use the Glorietta formation for produced salt water in the area, and both times, the operation was deemed uneconomic and shut down as the direct result of problems created by the production of large quantities of sand.
 - b. The waterflood project would be uneconomical if Petco was required to use produced saltwater supplied by offset producers or salt water haulers in lieu of fresh water.
 - i. Petco estimated the cost to install salt water gathering lines and salt water treating equipment to be approximately \$51,000.
 - ii. The increased lease operating cost to operate the salt water treating facility was estimated at approximately \$1,000 per day.
 - iii. Based on the above estimates and an oil price of \$70 per barrel, a cash flow analysis showed that the water injection project would never payout and Petco would lose approximately \$400,000.
 - c. Produced salt water from offset producers or salt water haulers is an

OIL AND GAS DOCKET NO. 10-0261404

interruptible water supply.

- i. An interruptible water supply would not allow for continuous injection which would adversely affect the waterflood sweep efficiency.
 - ii. The mixing of produced waters would create severe scaling problems over the 15 year life of the injection project.
 - iii. Both of these factors would result in a poorer waterflood performance and result in a lower secondary recovery of oil.
5. Petco has obtained a permit (GR-560-SR) from the Panhandle Groundwater Conservation District that allows Petco to withdraw 82 acre-feet per year of fresh water for up to 30 years. Petco estimates it will need only 41% of what it is authorized to withdraw from the Panhandle Groundwater Conservation District.
6. Two Panhandle Gray County Field waterflood projects within 15 miles of Petco's lease have demonstrated favorable responses. The Johnson Ranch Unit, initially operated by Phillips Petroleum, and the Swanson-Davidson lease, operated by Petco, both showed an increase in production after waterfloods were initiated. On average, the two units exhibited a 2.5 fold increase in production within five years of injection.
7. Based on the performance of the two waterflood projects, Petco performed a reserve and cash flow analysis on the Noel Lease, with and without a waterflood. With a waterflood, the analysis estimated an oil recovery increase of approximately 23,000 BO from the Noel Lease.
8. There are six wellbores within a ¼ mile radius of the Noel Lease, Well No. 1G. These wellbores are plugged or cased in a manner which will not provide a conduit for migration of injected water from the injection interval into other oil, gas or mineral bearing formations or useable quality water zones.
9. The proposed injection into the Noel Lease, Well No. 1G, will not endanger useable quality water.
 - a. The Texas Commission on Environmental Quality recommends that usable-quality ground water be protected to 600 feet.

OIL AND GAS DOCKET NO. 10-0261404

- b. The well has 874 feet of 12 ¼" surface casing cemented to surface, 2,543 feet of 8 ¼" intermediate casing cemented with an unknown amount and 3,128 feet of 6 ⅝" production casing also cemented with an unknown amount.
 - c. The proposed permit will require a cement squeeze on the 6 ⅝" casing above the top of the injection interval with 100 sacks of cement. In addition, it will require Petco to run a 4 ½" casing liner to 3,100 feet and cement it back to the surface with 400 sacks of cement.
 - d. Injected fluids will be confined to the injection interval between 3,128 feet and 3,333 feet.
 - e. The proposed permit will require weekly tubing-casing pressure monitoring and annual mechanical integrity tests due to the remedial work performed on the well.
 - f. Petco will be required to bring all wells on the Noel Lease into compliance with Statewide Rule 13(b)(1)(B).
- 10. The proposed injection is in the public interest because it will result in the recovery of additional oil from the Panhandle Gray County Field without endangering water resources.
 - 11. Petco has an active Organization Report and a \$250,000 financial assurance bond on file with the Commission.
 - 12. The Commission's Docket database did not show any current or past enforcement dockets against Petco Petroleum Corp.

CONCLUSIONS OF LAW

- 1. Proper notice was issued in accordance with the applicable statutory and regulatory requirements.
- 2. All things have occurred to give the Railroad Commission jurisdiction to consider this matter.
- 3. Petco Petroleum Corp. has met its burden of proof and satisfied the requirements of Chapter 27 of the Texas Water Code and the Railroad Commission's Statewide Rule 46.

OIL AND GAS DOCKET NO. 10-0261404

4. Approval of the application will not harm useable quality water resources, will not endanger oil, gas, or geothermal resources and will result in the recovery of additional secondary reserves from the Panhandle Gray County Field.

EXAMINERS' RECOMMENDATION

Based on the above findings of fact and conclusions of law, the examiners recommend that the application of Petco Petroleum Corp. for authority to inject fresh water and salt water into its Noel Lease, Well No. 1G, be approved as set out in the attached Final Order.

Respectfully submitted,

Richard D. Atkins, P.E.
Technical Examiner

James M. Doherty
Legal Examiner