

OIL AND GAS DOCKET NO. 7C-0261666

THE APPLICATION OF ASPEN OPERATING COMPANY, LLC FOR A PERMIT TO INJECT FLUID INTO A RESERVOIR PRODUCTIVE OF OIL OR GAS PURSUANT TO STATEWIDE RULE 46 FOR THE NOELKE "20" LEASE, WELL NO. 4, OLSON FIELD, CROCKETT COUNTY, TEXAS

HEARD BY: Richard D. Atkins, P.E. - Technical Examiner
Marshall F. Enquist - Legal Examiner

APPEARANCES:

APPLICANT:

David Jackson
John McBeath
A. James Nuttall
Kevin J. Spencer
Todd Harris
Dr. Robert C. Trentham

REPRESENTING:

Aspen Operating Company, LLC

PROTESTANTS:

Brian R. Sullivan
Paul Tough
Ana Irion
Donald Wayne McClure
Roy C. Williamson
Lee Roberts
Dr. Michael A. Senich
Dr. Charles Kreidler

Ranchero Esperanza, Ltd.

John B. Meadows

Meadows Brothers Ranch

EXAMINERS' REPORT AND PROPOSAL FOR DECISION**PROCEDURAL HISTORY**

Application Filed:	January 22, 2009
Request for Hearing:	April 10, 2009
Notice of Hearing:	April 27, 2009
Date of Pre-Hearing Conference:	June 5, 2009
Dates of Hearing:	July 9, 10 & 31, 2009
Transcript Received:	August 11, 2009
Late Filed Exhibit Admitted:	September 22, 2009
Proposal For Decision Issued:	November 12, 2009

STATEMENT OF THE CASE

Aspen Operating Company, LLC ("Aspen") requests authority pursuant to Statewide Rule 46 to inject salt water into the San Andres formation in its Noelke "20" Lease, Well No. 4, Olson Field, Crockett County, Texas.

This application is protested by Rancho Esperanza, Ltd. ("Rancho") and Meadows Brothers Ranch who are adjacent surface owners to the Noelke "20" Lease.

DISCUSSION OF THE EVIDENCE**Applicant's Evidence**

Aspen seeks authority to inject produced salt water into the productive San Andres formation in the Noelke "20" Lease, Well No. 4. The proposed injection interval is in the lower San Andres between 2,250 feet and 2,900 feet. The proposed injection is for the purpose of disposing of lease produced salt water which is currently being disposed of on the Aspen operated, Olson Unit, located directly east of the Noelke "20" Lease. The lease water production has increased as a result of a recently drilled horizontal well and Aspen plans on drilling additional horizontal development wells on the lease. Aspen requests a maximum injection volume of 8,500 BWPD with a maximum surface injection pressure of 1,100 psig.

The Noelke "20" Lease, Well No. 4, was drilled and completed in January 1998 to a total depth of 2,577 feet. The well has 755 feet of 8 5/8" surface casing cemented to surface and 2,565 feet of 5 1/2" production casing cemented to surface. Injection will be through 2 7/8" tubing set on a packer at 2,271 feet into perforations and open hole from 2,306 feet to 2,900 feet (See attached Aspen Exhibit No. 13 - Wellbore Diagram). Aspen submitted a Cement Bond Log on Well No. 4 that confirmed a good quality cement bond that would provide hydraulic isolation for the injection interval. The Texas Commission on Environmental Quality recommends that usable quality ground water be protected to a depth of 750 feet in this area.

There are two wellbores located within a ¼ mile radius of the proposed injection well No. 4. The Noelke "20" Lease, Well No. 1, was drilled in 1997 to a total depth of 2,536 feet and is carried as a producer on the oil proration schedule. The Noelke "20" Lease, Well No. 3, was drilled in 1998 to a total depth of 2,632 feet and is temporarily abandoned. Both wells are cased and cemented in such a manner to protect the fresh water resources and prevent the migration of fluids from the injection interval.

There are 14 wellbores located within a ½ mile radius of the proposed injection well No. 4. Aspen noted that there is one plugged and abandoned well located within a ½ mile radius. That well is located due east of the Noelke "20" Lease, Well No. 1 and lies within the Olson Unit boundary. The well is the Noelke Livestock "M" Lease, Well No. 2, which was drilled in 1943 to a total depth of 2,196 feet and had surface casing set at 632 feet and production casing set at 2,196 feet. However, there is no cementing or plugging information for the well, so Aspen proposed to re-enter the well to confirm its mechanical integrity and return the well to production or properly plug the well. The other 13 wells located within a ½ mile radius are relatively new wells, drilled between 1996 and 2008, and are cased and cemented in such a manner to protect the fresh water resources and prevent the migration of fluids from the injection interval.

The Olson Field was discovered in 1940 and is located on the Ozona Arch in west central Crockett County, eleven miles southeast of the town of Iraan, Texas. The field contains approximately 2,400 acres and is located along a northwest plunging anticline with one degree of dip and two localized highs. The localized high to the northwest encompasses the Aspen operated Noelke "20" and Shannon "O" and "M-1" Leases. The localized high to the southeast encompasses only the Aspen operated Olson Unit.

Each high contains three lithofacies that grade up from dolomitic sandstone to fusulinid-peloid wackstones to ooid-meloid packstones and grainstones. The entire sequence is capped with an evaporite and anhydrite layer with the fusulinid-peloid wackstones representing the best reservoir quality rock. Although the geologic sequences are the same, Aspen's expert geologist stated that the sequences were laid down in different geologic time intervals and this represents a facies change and is a barrier to fluid flow between the highs. Accordingly, while the capping anhydrite bed exhibits only one degree of dip, the internal geologic beds could have much higher dips.

Aspen's expert geologists presented several cross sections that were created based on the chronostratigraphic interpretation method. This method is based on correlating the same geologic time sequences and is a clinofom interpretation. The geologist stated that this method is different from the protestants lithostratigraphic interpretation method that simply correlates the same facies and is a layer cake interpretation. The geologist testified that he disagreed with the layer-cake interpretation and felt that the clinofom interpretation was more logical even though it's more complicated. The geologist stated that, based on the clinofom interpretation and previous geologic and engineering studies going back to the 1950s, the northwest and southeast fields were not in communication.

Aspen's expert engineer presented a series of producing well water production rate maps by decade beginning in 1940. The maps were based on well test data from 200 wells in the area and showed that the Shannon and Noelke areas to the northwest produce more water than the Olson Unit to the southeast, even though the Olson Unit has had water injection operations since 1965. The engineer stated that the maps clearly indicated that the northwest area's primary drive mechanism was a water drive, while the southeast area's primary drive mechanism was a depletion drive. He felt that the maps supported the prior geologic and engineering studies that there was geologic separation of the two areas and any water injected on the Noelke "20" lease would not migrate onto the Olson Unit.

Aspen's ground water hydrologist presented a map of the minor aquifers in the State of Texas. The four aquifers located in western Crockett County listed from shallowest to deepest are the Edwards, Trinity, Dockum and Rustler. Of these, only the Edwards and Trinity are recognized as fresh water aquifers in the area of the Olson Unit and Noelke "20" Lease. The Rustler is not present and two of the three wells in the Dockum have chloride concentrations that exceed the secondary drinking water standard of 300 milligrams per liter.

The hydrologist had reviewed the chloride concentrations reported in the Texas Water Development Board database in all of the Edwards and Trinity water wells in western Crockett County. The data showed a wide variation in water quality. He felt that this was a result of drilling practices where water well drillers would penetrate the Edwards and then drill into the Trinity until a certain volume of water was encountered. He stated that this drilling practice can have a significant impact on the range of water quality.

The hydrologist compared the water quality of all of the fresh water wells in western Crockett County to 18 water wells located in the area of the Olson Unit and Noelke "20" Lease. In western Crockett County, 51% of the wells had chloride concentrations less than 100 milligrams per liter and ranged up to over 1,000 milligrams per liter. In the 18 water wells located in the area of the Olson Unit and Noelke "20" Lease, 67% of the wells had chloride concentrations less than 100 milligrams per liter and ranged up to only 500 milligrams per liter. He concluded that there were a greater percentage of water wells in the less than 100 milligram per liter category, in the area of the Olson Unit and Noelke "20" Lease, than there are in western Crockett County. Accordingly, the distribution of water quality data in the area of the Olson Unit and Noelke "20" Lease is very similar to, if not better than, what it is found in all of western Crockett County.

Notice of the subject application was published in *The Ozona Stockman*, a newspaper of general circulation in Crockett County, on March 18 and June 17, 2009. A copy of the application was mailed on January 19, 2009, to the Crockett County Clerk's Office, the surface owner of the Noelke "20" Lease and the one offset operator, EOG Resources, Inc.

Protestant's Evidence

The adjacent surface owners to the Noelke "20" Lease, Ranchero Esperanza, Ltd. and Meadows Brothers Ranch, appeared at the hearing to protest the application.

Ranchero is the surface owner on the adjacent Olson Unit located to the east of the Noelke "20" Lease. The protestants were concerned about groundwater contamination and Railroad Commission Rule violations by Aspen on the Olson Unit.

The protestant's expert geologist submitted a cross section based on a lithostratigraphic interpretation method that simply correlates the same facies and is a layer cake interpretation. Based on his interpretation, the geologist felt that the northwest and southeast portions of the field were in communication. In support of this concept, the protestant's expert engineer submitted production, oil gravity and oil pricing graphs for the Olson Unit and several Shannon Leases located to the northwest. The graphs showed similar production characteristics, oil gravities and oil pricing for the Olson Unit and Shannon Leases. Based on this data, the engineer also felt that the northwest and southeast portions of the field were in communication.

To support groundwater contamination, the protestants submitted a map showing the chloride concentrations for 18 water wells located in the area of the Olson Unit and Noelke "20" Lease. The protestants had Aspen's hydrologist contour the data points to create an isopach map. The resultant map showed a football shaped feature trending west to east, with the highest chloride concentrations located near the center and the lowest chloride concentrations located around the flanks. The feature was perpendicular to the groundwater flow which is north to south.

The protestants submitted photographs and Commission Inspection reports depicting salt water spills, bradenhead pressures and pressure and volume injection well permit violations that have occurred on the Olson Unit beginning in 2008. In addition, the protestants noted that many of the Olson Unit wells did not have a bradenhead valve installed for monitoring the bradenhead pressure.

The protestants complained that the saturated salt solution had flowed to the surface around a plugged well, the Olson Unit, Well No. 812. The salt water flow had left the well location and run down the lease road killing all of the native vegetation. After Aspen had re-entered the plugged well, further investigation showed that the surface casing contained holes at 21 feet and 42 feet and the cement plug across the surface casing shoe was not present.

The protestants were also concerned that the saltwater had leached out a cavern between the wells and would create a sink hole similar to the Wink Sink Hole which formed outside of Wink, Texas. The protestants submitted the daily report on the plugging of the Olson Unit, Well No. 812, that was witnessed by Commission District staff. The reports indicated that there was a void space between the base of the surface casing at 680 feet and the top of cement at 749 feet. The void space was still present after Aspen had pumped 3,300 sacks of cement and dumped 58 loads of pea gravel into the well. The protestants stated that ultimately the well was plugged, with Commission approval, by setting a cement retainer at 630 feet, squeezing the well with 200 sacks of cement and then circulating cement to surface inside the surface casing.

Applicant's Rebuttal Evidence

The salt water spills and bradenhead pressures were determined to be the result of a casing leak on the flowing Olson Unit, Well No. 711, which is located approximately 1.7 miles west of the proposed injection well. Well No. 711 was found to have holes in the tubing and also in the production casing from 621 feet to 880 feet that had allowed salt water to leach into the Salado Salt formation which occurs between 600 feet and 1,200 feet. As a result, the produced water had migrated to the offsetting wells and pressured up the bradenheads with a saturated salt solution having a chloride concentration between 192,000 milligrams per liter and 220,000 milligrams per liter. The average chloride concentration for produced salt water in the Olson Unit is approximately 47,000 milligrams per liter.

Aspen's engineer stated that after the Olson Unit, Well No. 711, was found to be the source of the salt water flow, Aspen set a CIBP at 1,925 feet in Well No. 711 to isolate the casing leak from the producing formation. Aspen started a program to monitor the bradenhead pressures on the offset wells and installed bradenhead pressure gauges on the wells which did not already have one present. In addition, Aspen was performing remedial work on all of the injection wells in the Olson Unit, to insure that the wells would be in compliance with the terms and conditions stated in their injection well permits.

Aspen's engineer submitted the monitoring report that showed that most of the bradenhead pressures were now at 0 psi and the ones that were not at 0 psi, were trending towards 0 psi. In addition, there no longer was a salt water flow at the Olson Unit, Well No. 812, prior to the re-plugging of the well. Aspen's engineer felt that the bradenhead pressures were a transient problem and were not an ongoing issue after the casing leak in Well No. 711 was isolated.

Aspen's engineer also presented an environmental study performed by Talon/LPE to determine the nature and extent of soil and groundwater contamination. Talon had done six surface soil borings and drilled one groundwater monitoring well down to 225 feet adjacent to the Olson Unit, Well No. 812. The soil and groundwater were then tested for BTEX, THP and salinity and Talon found no impacts from any BTEX or THP constituents. The soil in and around the Olson Unit, Well No. 812, had the characteristics of a typical brine water spill and the chloride concentration in the monitor groundwater well was only 99 milligrams per liter.

EXAMINERS' OPINION

The examiners recommend that the application be approved. The proposed injection well is completed in a manner which will protect useable quality water resources and will

confine the injected fluids to the injection interval. Use of the well for injection will result in the recovery of additional oil reserves produced by the horizontal development wells on the Noelke "20" Lease by providing an economic means of salt water disposal. Therefore, the approval of the application is in the public interest.

The examiners do not believe that there is any evidence of fresh water contamination caused by the applicant. This area of Crockett County has a history of erratic and random fresh water well chloride concentrations. The alleged fresh water contamination evidence is contrary to the north to south fresh water aquifer flow, as the protestants map it trending west to east. If the fresh water chloride analysis was due to contamination, then the fresh water aquifer flow direction should cause the contamination to be mapped as trending from north to south.

Aspen has complied with all Railroad Commission District Office inspection requests and acted as a prudent operator in resolving the casing leak incident in the Olson Unit, Well No. 711. In addition, Aspen is performing remedial work on all of the injection wells in the Olson Unit, to insure that the wells are in compliance with the terms and conditions stated in their injection well permits. The examiners do not believe that the photographs and testimony are sufficient to deny the requested injection application, as the problems associated with the Olson Unit occurred over 1.7 miles to the west of the proposed injection well.

The examiners have officially noticed the Commission P-5 Financial Assurance and Docket databases that establishes that Aspen has an active P-5 Organization Report and a \$250,000 financial assurance bond on file with the Commission. Aspen operates 262 wells and has no past or pending enforcement dockets at the Commission in Crockett County. Any future violations by the applicant on the Olson Unit should be addressed by the San Angelo 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 in *The Ozona Stockman*, a newspaper of general circulation in Crockett County, on March 18 and June 17, 2009. A copy of the application was mailed on January 19, 2009, to the Crockett County Clerk's Office, the surface owner of the Noelke "20" Lease and the one offset operator, EOG Resources, Inc.
3. The Noelke "20" Lease, Well No. 4, is cased and cemented in a manner to protect usable quality water.
 - a. The Texas Commission on Environmental Quality recommends that usable-quality water be protected to 750 feet in the area of the proposed well.

- b. The well has 755 feet of 8 $\frac{5}{8}$ " surface casing cemented to surface.
4. Fluids injected into the Noelke "20" Lease, Well No. 4, will be confined to the injection interval.
 - a. The well has 2,565 feet of 5 $\frac{1}{2}$ " production casing cemented to surface.
 - b. Injection will be through 2 $\frac{3}{8}$ " tubing set on a packer at 2,235 feet.
 - c. There are two Aspen operated wellbores within a $\frac{1}{4}$ mile radius of the proposed injection well. One well is an active producer and one well is temporarily abandoned. Both wells are cased and cemented in such a manner to protect the fresh water resources and prevent the migration of fluids from the injection interval.
 - d. There is one plugged and abandoned well located within a $\frac{1}{2}$ mile radius of the proposed injection well. The Noelke Livestock "M" Lease, Well No. 2, was drilled in 1943 to a total depth of 2,196 feet and had surface casing set at 632 feet and production casing set at 2,196 feet. There is no cementing or plugging information for the well, so Aspen proposed to re-enter the well to confirm its mechanical integrity and return the well to production or properly plug the well.
 - e. The other 13 wells located within a $\frac{1}{2}$ mile radius are relatively new wells, drilled between 1996 and 2008, and are cased and cemented in such a manner to protect the fresh water resources and prevent the migration of fluids from the injection interval.
5. Use of the Noelke "20" Lease, Well No. 4, as an injection well is in the public interest.
 - a. The proposed injection is for the purpose of disposing of lease produced salt water which is currently being disposed of on the Aspen operated, Olson Unit, located directly east of the Noelke "20" Lease.
 - b. The Noelke "20" Lease water production has increased as a result of a recently drilled horizontal well.
 - c. Aspen plans on drilling additional horizontal development wells on the Noelke "20" Lease.
 - d. Use of the well will provide a safe and economic means of disposal of produced saltwater on the Noelke "20" Lease.

6. Aspen has an active P-5 Organization Report and a \$250,000 financial assurance bond on file with the Commission.
7. Aspen operates 262 wells and has no past or pending enforcement docket at the Commission in Crockett County.

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. The use or installation of the proposed injection well is in the public interest.
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 further development and recovery of additional reserves from the Olson Field.
5. Aspen has made a satisfactory showing of financial responsibility to the extent required by Section 27.073 of the Texas Water Code.
6. Aspen 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.

EXAMINERS' RECOMMENDATION

Based on the above findings of fact and conclusions of law, the examiners recommend that the application be approved as set out in the attached Final Order.

Respectfully submitted,

Richard D. Atkins, P.E.
Technical Examiner

Marshall F. Enquist
Legal Examiner