

OIL AND GAS DOCKET NO. 09-0249380

THE APPLICATION OF EOG RESOURCES, INC. TO DISPOSE OF OIL AND GAS WASTE BY INJECTION INTO A RESERVOIR NOT PRODUCTIVE OF OIL OR GAS, BISHOP SWD LEASE WELL NO. 1, NEWARK, EAST (BARNETT SHALE) FIELD, ERATH COUNTY, TEXAS

HEARD BY: Donna K. Chandler, Technical Examiner
Mark J. Helmueller, Hearings Examiner

APPEARANCES:

APPLICANT:

Flip Whitworth, Attorney
Mark Hanna, Attorney
Mark Germinario
Tim Mullen
Rick Johnston

REPRESENTING:

EOG Resources, Inc.

PROTESTANTS:

David Frederick, Attorney
Marisa Perales, Attorney
H. C. Clark
Bill Gordon
Robert Snote
Laura Dameron
Bobbie and Jim Stanfield
Cathey Hartmann
Darrell Speegle
Roger Pack
Georgia Scott
Roy and Colisa Gillespie
Larry Hauck
Glenn and Elaine Smith

Erath County Citizens for Clean Water
(ECCCCW)

Ron Coleman	Vista Canyon Home Owners Assn.
Jake Dameron	Self
Kim Roselle	Self
Lou Knight	Self
Jim Pateracki	Self
Anna Watson	Self

PROCEDURAL HISTORY

Application Filed:	September 22, 2006
Request for Hearing:	October 12, 2006
Notice of Hearing:	December 7, 2006
Date of Hearing:	April 3, 2007
Transcript Received:	April 17, 2007
Proposal For Decision Issued:	May 16, 2007

EXAMINERS' REPORT AND PROPOSAL FOR DECISION

STATEMENT OF THE CASE

EOG Resources, Inc. ("EOG") requests authority pursuant to Statewide Rule 9 to dispose of oil and gas waster in its Bishop SWD No. 1 in Erath County. EOG had initially requested commercial disposal authority. However, prior to the hearing, EOG amended its application such that the well will be used solely for the disposal of oil and gas waste from EOG's development of Barnett Shale wells in the area.

This application was protested by numerous individuals, many of whom are members of Erath County Citizens for Clean Water ("ECCCW"). The ECCCW is a group of concerned citizens who reside in the area of the proposed disposal well. The ECCCW was recognized as a party. None of the other protestants who attended the hearing requested party status.

DISCUSSION OF THE EVIDENCE

Applicant's Evidence and Position

The subject well has not yet been drilled. The proposed location for the well is approximately six miles south of the town of Bluff Dale. EOG has approximately 108,000 acres under lease in Erath County. EOG operates 19 producing wells in Erath County, with seven additional wells in the process of drilling/completion. EOG estimates that up to 500

Barnett Shale wells will be drilled in Erath County on its leasehold in the next decade. Each completion requires a fracture stimulation of 40,000-50,000 barrels of water, the majority of which is produced back to the wellbore, requiring proper disposal.

The proposed Bishop SWD No. 1 will be drilled through the base of the Ellenburger section. The well will have 700 feet of 9⁵/₈" surface casing with cement circulated from the casing shoe to the ground surface, and 7" casing set at the base of the Ellenburger, estimated to occur no deeper than 8,000 feet. (See EOG Exh. No. 10 Wellbore Diagram attachment). EOG estimates that the top of cement behind the longstring casing will be 4,000 feet, which is above the top of the Barnett Shale. The Texas Commission on Environmental Quality recommends that usable-quality ground water be protected to a depth 20 feet below the base of the Cretaceous-age beds, which is expected to occur at 475 feet. TCEQ therefore recommends that surface casing be set to a depth of at least 495 feet. As noted above, EOG will set casing to a depth of 700 feet.

The nearest well which was drilled into the Ellenburger is the Bishop No. 1H. This well was drilled by EOG in 2004 and is approximately 1.8 miles to the southwest of the proposed disposal well. The top of the Ellenburger in the Bishop No. 1H was found at 4,890 feet and the well penetrated approximately 250 feet of Ellenburger at total depth.

The closest well which penetrated the entire Ellenburger is the Davis "P" No. 1 approximately 13 miles south of the proposed disposal well. This well encountered the top of the Ellenburger at about 4,900 feet. The total Ellenburger thickness in the well is almost 2,500 feet. The Ellenburger overlies the Granite Wash, which was found at about 7,400 feet in the Davis "P" No. 1. The log of this well depicts a 500 foot tight limestone interval near the top of the Ellenburger which will provide an impervious barrier to migration of injected fluids from the deeper portion of the Ellenburger into the Barnett Shale, which directly overlies the Ellenburger.

The proposed injection will be through 3¹/₂" tubing set on a packer at approximately 7,000 feet, but no higher than 100 feet above the top of the injection interval. The proposed injection interval is the lower portion of the Ellenburger formation between 7,000 and 8,000 feet. The proposed maximum injection volume is 20,000 BWPD, with an estimated average of 7,000 BWPD. The proposed maximum injection pressure is 2,000 psig.

EOG plans to have a 750 barrel gun barrel on the site to separate the salt water from any small amount of condensate which may be present. A 300 barrel tank will collect the condensate. There will be four 400 barrel tanks for salt water storage for separation of the water. The tanks will be enclosed by berms sufficient to contain 125% of the volume of the largest tank. Pressure gauges will be on the tubing, tubing-casing annulus and the annulus between the surface and longstring casing. Pressures will be monitored at least daily and recorded. Surface injection pressure will be controlled by high-low sensors which will shut down the injection pumps if pre-set high or low pressures occur.

The only wellbore within a 1 mile radius of the proposed disposal well is a water supply well operated by EOG. This well had been drilled in 1974 to a total depth of 4,943 feet and was plugged as a dry hole. EOG re-entered the well in 2005 and completed it as a water supply well at a depth of 570 feet. This well is approximately 4,000 feet from the proposed Bishop SWD No. 1. The well has 606 feet of surface casing and has plugs set at 900 feet and 3,400 feet.

EOG operates the Terry SWD No. 1 in Jack County. This well is used for disposal into the Ellenburger through perforations between 6,932 feet and 8,406 feet. EOG performed a step-rate test on the Terry SWD No. 1 in March 2007, injecting at rates between 4 and 9 barrels per minute. The maximum bottomhole gradient was 0.887 psi/foot at a surface injection pressure of 2,990 psig. There was no indication of fracturing of the formation during the testing. With a proposed maximum surface injection pressure of 2,000 psig in the Bishop SWD No. 1 and assuming 9.6 lb/gal fluid, the maximum bottomhole gradient will be 0.784 psi/foot, which is not sufficient to fracture the formation. EOG believes the step-rate test on the Terry well supports the proposed Ellenburger injection in the Bishop SWD No. 1 at the pressure requested.

EOG's first Barnett Shale completion was in early 2006. By January 1, 2007, EOG was operating 16 of the 28 active Barnett Shale wells in the county. Currently, EOG hauls about 70% of the produced water from its wells in Erath County to either the Mustang Creek SWD No. 1 or the Meadows SWD No. 1. Both wells are operated by EOG in Johnson County about 34 miles to the east/northeast of the current Barnett Shale development in Erath County. For the remainder of the produced water in Erath County, EOG utilizes a commercial facility in Hood County operated by Majestic Consulting. The Majestic facility is about 15 miles away.

The proposed Bishop SWD No. 1 is only 8 miles from the EOG Barnett Shale development in Erath County. With just the current 16 producing wells, the use of the Bishop SWD No. 1 will save an estimated 100,000 miles of hauling per year. Additionally, EOG plans to drill 40 wells in Erath County during 2007. When applied to the combination of 56 existing and proposed wells, the use of the Bishop SWD No. 1 would save an estimated 350,000 truck miles during 2006. In addition to the decreased truck traffic, the use of the proposed disposal well will result in the recovery of additional reserves as a result of reduced operating expenses associated with the lesser costs of disposing water in closer proximity to the wells where it is generated. The reduction in disposal costs will result in the recovery of an additional 135 MMCF per well. EOG's witness also noted that any wells within a three mile radius of the Bishop SWD No. 1 will have produced water piped to the disposal well, instead of trucked.

Notice of the subject application was published in *The Stephenville Empire-Tribune*, a newspaper of general circulation in Erath County, on August 18, 2006. A copy of the application was mailed on September 20, 2006 to the Erath County Clerk's Office and the offsetting surface owners. EOG is the only offsetting operator within ½ mile and owns the 10 acre tract on which the well is proposed.

Protestants' Evidence and Position

Protestant Erath County Citizens for Clean Water ("ECCCW") is concerned that the use of the proposed disposal well will have adverse impacts on fresh water wells in the area, as well as possible run-off from the site. Several ECCCW members made statements at the hearing with respect to their concerns regarding contamination of drinking water and fresh water wells in the area of the proposed well. Statements also expressed concern regarding the increased heavy truck traffic in the area.

ECCCW believes the step rate test for the Terry Well is not sufficient because the well is located 58 miles from the proposed well. ECCCW therefore recommends that a step rate test be performed on the proposed well prior to injection. While admitting that the wells and facilities proposed by EOG will not pose a significant threat assuming EOG is the operator, ECCCW believes that the public interest requires additional monitoring be required as a condition of the disposal permit, including constant, automatic monitoring of wellhead/casing pressures and injection volumes, and the drilling of groundwater monitoring well(s) on the site.

Finally, ECCCW urges that "public interest" as defined by Texas Water Code Section 27.051 is sufficiently broad to include the Commission's consideration of more than the economic factors associated with the increased development of the oil and gas resources. ECCCW argues that public interest should also include consideration of public safety hazards associated with increased traffic from trucks hauling salt water in the locale of the facility, and the adequacy of the entrances and exits from the public roadway to the facility.

Mr. Jake Dameron lives approximately two miles from the proposed injection well site. Mr. Dameron testified that there are at least ten fresh water wells in the immediate area which he and other residents rely on for personal use and for livestock. Mr. Dameron is concerned about any possible run-off from the disposal site and the possible adverse affects on his water well. Mr. Dameron suggests that monitor wells be drilled around the site with analysis on a regular basis to determine if any pollution is occurring. He also urges frequent inspections of the disposal well by the Commission.

Mr. Ron Coleman owns property ½ mile from the proposed disposal well and will be living on the property within the next six months. He has two water wells on the property, one 440 feet deep and the other 90 feet deep. Mr. Coleman's neighbors also have water wells in the immediate area. Mr. Coleman shares concerns about the adverse impact of the disposal operations on his fresh water sources, including ponds on his property. He relies on his water wells for personal use and livestock use. Mr. Coleman is also concerned about the increased truck traffic on Farm to Market Road 205. This highway is fairly narrow, about 20 feet wide, with no paved shoulders, and has numerous curves and hills which will present hazards to others who travel the road.

Finally, protestants presented several resolutions from governmental entities regarding disposal wells. A resolution of the Board of Directors of the Middle Trinity Groundwater Conservation District dated February 5, 2007 requests "...the Railroad Commission of Texas to protect groundwater resources by denying approval of any, and all, waste injection wells located within the recharge zone of an aquifer." A resolution of the City of Stephenville, dated January 9, 2007, "...urges the Texas Railroad Commission to deny approval of injection disposal wells in recharge zones and source-water zones of the Trinity Aquifer." A resolution of the Erath County Commissioners' Court dated February 12, 2007 "...urges the Texas Railroad Commission to deny approval of injection disposal wells in recharge zones and source-water zones of the Trinity Aquifer."

EXAMINERS' OPINION

The examiners recommend that this application be approved. The Bishop SWD No. 1 will be completed in a manner which will confine disposal fluids to the proposed disposal interval in the lower portion of the Ellenburger. The longstring production casing will be cemented from total depth up to a depth above the top of the Barnett Shale to prevent migration from the injection interval. Additionally, EOG proposes to use only the lower 1000 feet section of the Ellenburger for disposal. With a gross thickness of approximately 2,500 feet in the Ellenburger, more than 1,500 feet of Ellenburger formation will separate the proposed disposal interval from the Barnett Shale. There are no wellbores which penetrate the proposed disposal interval, within one mile of the proposed disposal well.

Approval of the requested permit is in the public interest given the number of wells being drilled to the Barnett Shale by EOG in Erath County. With the large fracture treatments necessary to stimulate production of the Barnett Shale and the accompanying produced frac water, disposal facilities like the proposed well are necessary to fully develop and prevent waste of the natural gas reserves in Erath County. Use of the Bishop SWD No. 1 will reduce trucking costs, which will reduce the disposal costs for produced water and increase the economic life span of the Barnett Shale wells. This will result in the recovery of additional reserves in Erath County associated with EOG's development of the Barnett Shale of 135 MMCF per well. Applied to the 400 to 500 Barnett Shale wells EOG intends to drill in Erath County, this proposed disposal facility will allow the recovery of an additional 54 to 67.5 BCF of natural gas.

The evidence further indicates that the operation of the subject disposal well will not adversely impact useable quality water. Surface casing will be set at 700 feet and cemented to surface. This is approximately 200 feet deeper than the base of useable quality water as recognized by the TCEQ. A monitor well is not necessary at the site. Any escape of injected fluid from the permitted interval in the well will cause a pressure increase at the surface, at which time remedial actions can be taken.

The examiners do not recommend that a step rate test be required for the proposed well prior to commencing disposal. The maximum surface injection pressure requested by EOG is 2,000 psig, which is less than the 0.5 psi/foot which is routinely approved for injection at this depth. Additionally, EOG provided data from a step rate test performed on

an Ellenburger disposal well it operates in Jack County, the Terry SWD No. 1. This test demonstrates that the Ellenburger will not fracture under 2,000 psig surface injection pressure. Though the Terry SWD No. 1 is 58 miles away, the Ellenburger encountered in that well is representative of Ellenburger rock found anywhere in the Fort Worth basin.

The examiners do not believe that constant monitoring of wellhead pressures as suggested by protestant is necessary. EOG's witness testified that the well will be equipped with a pressure transducer which will shut down the injection pumps if pre-determined high or low pressures occur. This will prevent any injection at pressures in excess of the permitted 2,000 psi. Additionally, the pressure gauges on both the tubing and the tubing-casing annulus will be monitored at least daily by EOG personnel at the site and any changes in pressure will be investigated.

Protestants also argue that "public interest" as defined by Texas Water Code Section 27.051 is sufficiently broad to include the Commission's consideration of more than the economic factors associated with the increased development of the oil and gas resources. Protestants believe public interest should also include consideration of public safety hazards associated with increased traffic from trucks hauling salt water in the locale of the facility, and the adequacy of the entrances and exits from the public roadway.

EOG's public interest case in part relied on an estimated overall reduction in the number of truck miles due to the close proximity of the well to existing and future EOG Barnett Shale wells in Erath County. Protestants presented evidence to counter EOG's argument, asserting that the increased truck traffic in the immediate vicinity of the proposed disposal facility creates highway safety concerns the Commission should consider under the public interest.

When an applicant's case to support a finding that a proposed disposal well is in the public interest is based in part on reduced truck traffic on county roads associated with salt water hauling, Protestants may present evidence to counter that claim. However, in this instance, the evidence presented did not rebut applicant's evidence of an overall decrease in truck miles traveled, but instead attempted to raise safety concerns regarding increased traffic in the immediate vicinity of the well as evidence that the proposed disposal well is not in the public interest.

Public safety related to oil and gas operations is a paramount responsibility of the Commission, as expressed in Texas Natural Resources Code Section 85.042(b). However, the Commission does not possess either the jurisdiction or expertise to evaluate potential traffic safety issues which may arise from the increased use of public roadways used for access to a disposal facility. Local governmental entities with jurisdiction over local roads, county roads, and other byways, state governmental entities with jurisdiction over state roads and highways, and federal governmental entities with jurisdiction over federal highways and interstates, all may have potential responsibility and jurisdiction to consider the types of traffic safety issues raised by Protestants.

Based on the record in this docket, the examiners recommend adoption of the following Findings of Fact and Conclusions of Law:

FINDINGS OF FACT

1. Notice of this hearing was given to all persons entitled to notice at least ten (10) days prior to the hearing. Notice of the application was published in *The Stephenville Empire-Tribune*, a newspaper of general circulation in Erath County, on August 18, 2006.
2. EOG Resources, Inc. plans to drill the Bishop SWD No. 1 to a maximum depth of approximately 9,000 feet. The top of the Ellenburger is expected to occur at approximately 4,900 feet, based on offsetting logs.
3. The maximum requested injection volume is 20,000 barrels of water per day and the maximum requested surface injection pressure is 2,000 psi. The requested disposal interval is the lower portion of the Ellenburger formation between approximately 7,000 and 8,000 feet.
4. The Bishop SWD No. 1 will be 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 495 feet in the area of the proposed well.
 - b. The subject well will have 700 feet of 9⁵/₈" surface casing cemented to surface.
5. Fluids injected into the Bishop SWD No. 1 will be confined to the injection interval.
 - a. Injection will be through tubing set on a packer no higher than 100 feet above the top of the injection interval.
 - b. The subject well will have approximately 7" casing set at the base of the Ellenburger, estimated to occur no deeper than 8,000 feet. The estimated top of cement behind the 7" casing is 4,000 feet, which is above the top of the Barnett Shale.
 - c. With a maximum surface injection pressure of 2,000 psi, the fracture gradient of the Ellenburger will not be exceeded.
6. There are no wellbores within one-quarter mile of the proposed disposal well which penetrate the proposed disposal interval.
7. Use of the Bishop SWD No. 1 Well as a disposal well is in the public interest to promote the active development of the Barnett Shale.
 - a. Use of the well will provide a safe, economic means of disposal of the fluids associated with production.

- b. Use of the well will result in reduced truck traffic associated with hauling of disposal fluids to other facilities.
 - c. Use of the well will result in the recovery of an additional 135 MMCF of gas per well operated by EOG due to a lower economic limit for wells.
- 8. The use or installation of the proposed injection well will not endanger or injure any oil, gas, or other mineral formation.
 - 9. With proper safeguards, as provided by terms and conditions in the attached final order which are incorporated herein by reference, both ground and surface fresh water can be adequately protected from pollution.

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. EOG Resources, Inc. has made a satisfactory showing of financial responsibility to the extent required by Section 27.073 of the Texas Water Code.
- 5. EOG Resources, Inc. 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 9.

EXAMINERS' RECOMMENDATION

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

Respectfully submitted,

Donna K. Chandler
Technical Examiner

Mark J. Helmueller
Hearings Examiner