

OIL AND GAS DOCKET NO. 09-0234222

THE APPLICATION OF KEY ENERGY SERVICES INC.-NTD TO DISPOSE OF OIL AND GAS WASTE BY INJECTION INTO A NON-PRODUCING FORMATION IN THE JEFF MOSER LEASE, WELL NO. 2, ALVORD (STRAWN 2975) FIELD, WISE COUNTY, TEXAS

Heard by: Margaret Allen, Technical Hearings Examiner
Mark Helmueller, Hearings Examiner

Procedural history

Application received: December 10, 2002
Protest received: February 21, 2003
Hearing held: April 10, 2003
Proposal for decision issued: May 12, 2003

Appearances

Representing

Applicant

John Soule

Alan D. Means

A. Darryl James

W.A. Baker

Key Energy Services, Inc.-NTD

Protestants

Arturo Rodriguez

Michael Snyder

James Redwine

Edward L. Cowley

City of Chico

Roy J. Keene, Jr.

Himself

Robert Paddock

Thermex Energy Corp./Forsythe 5F Ranch

EXAMINERS' REPORT AND PROPOSAL FOR DECISION

STATEMENT OF THE CASE

Key Energy Services, Inc.-NTD ("Key") is seeking to use its newly drilled Jeff Moser Lease Well No. 2 as a commercial disposal well in Wise County. The application is protested by Roy J. Keene ("Keene") who is the operator of a well within 1/2 miles of the proposed disposal well. The application is also protested by the City of Chico ("the City") which has water wells near the disposal well. A representative of Thermex Energy Company/Forsythe 5F Ranch appeared at the hearing as a protestant but presented no evidence or testimony.

DISCUSSION OF THE EVIDENCE

Key applied to use its Jeff Moser Lease Well No. 2 ("Moser No. 2") for commercial disposal on December 10, 2002. On February 12, 2003, Key received a permit to allow disposal of up to 5000 BW per day at a maximum injection pressure of 1100 psig. This permit was rescinded March 4, 2003, because an offset operator had not received the required notice.

The Moser No. 2 was drilled in February of 2003. According to a letter from the TNRCC¹, usable-quality ground water occurs to a depth of 250 feet. Surface casing was set to 310', and the production casing was cemented from the surface to the total depth of 3005'. Disposal will be into the Brazos River Conglomerate in the interval between 2200' and 2400' and the well's perforations are between 2226' and 2298'.

Since 1998, the four commercial disposal wells in the vicinity of the Moser No. 2 have injected 13,784,000 barrels of saltwater into the Brazos River Conglomerate. One of these existing disposal wells is Key's Jeff Moser Lease Well No. 1 which has injected 3,896,000 barrels of saltwater into the same interval as is proposed for the Moser No. 2. The surface pressure in the Moser No. 1 drops to zero when injection is suspended, according to Key, showing that previous injection has caused little pressure increase in the Brazos River Conglomerate.

Key testified that the Brazos River Conglomerate is highly suitable for the disposal of large volumes of saltwater. Since 1989, the surface injection pressure required for disposal into Key's Moser No. 1 has only increased from 350 psi to 450 psi. The surface injection pressure required for two of the other three existing disposal wells has increased to a maximum of 650 psi. The surface pressure necessary for injection into the fourth existing well has increased from 420 psi in 1990 to 850 psi in 2000. According to Key, the increased pressure necessary in this well was probably due to skin damage at the perforations and this well has not been used during 2001 and 2002. Key testified that the relatively small increases in surface injection pressure despite the large injection volumes since 1988, indicate the disposal sandstones are laterally extensive and have good porosity and permeability.

Most of the water to be disposed of in the Moser No. 2 will be produced from Wise County. A number of new wells are producing significant amounts of water from the Barnett Shale and more wells are expected in this play. The existing disposal wells also receive water produced in the area from Caddo, Atoka and Strawn wells that are owned by a number of different operators. Key testified that at least one additional commercial disposal well is needed in this area because a shortage of disposal capacity could restrict the number of new wells drilled.

There have been 19 wellbores within a 1/2 mile of the proposed disposal well. Four of these wells are still producing, two are disposal wells and the rest were plugged and abandoned according to Commission standards at the time. Over half of the abandoned wells were part of a waterflood in the Miles-Jackson (Strawn 4300) Field. The wells included in this waterflood were drilled in the 1950's, and plugged in 1968 or 1969. When these wells were plugged, cement plugs were placed at the surface and across the base of the surface casing. The surface casing in the nearby wells was cemented from the

¹ Texas Natural Resources Conservation Commission, now known as the Texas Commission of Environmental Quality

surface to depths ranging from 216' to 335'. In each well that was plugged, Commission records show 50 to 150 sacks of cement were placed across the bottom of the surface casing. The resulting plugs were at least 100' thick and the base of these plugs ranges from 368' to 405'.

Therefor, according to Key, all of the abandoned wells have surface casing or cement at 250'. There are thick shale beds that separate the Brazos River Conglomerate disposal interval from the shallow drinking water. In particular, there are 400' of continuous shale that start at about 550' below the surface.

The protestant Keene's C.A. Foster Lease Well No. 1 is about 2200' southwest of Key's existing disposal well, the Moser No. 1, and 2000' south of the proposed Moser No. 2. Keene's well has produced 17,000 BO and 361 MCF from the Alvord (Atoka Conglomerate) Field since 1978. According to Keene, disposal into the Brazos River Conglomerate poses an unacceptable risk to the casing in his well. The C.A. Foster No. 1 has uncemented casing across this disposal interval.

Keene pointed out that the saltwater produced from Barnett Shale wells has a salinity of 90,000 to 100,000 ppm, which is the equivalent of 10 pound brine. At a gradient of 0.46, the hydrostatic pressure at the formation face 2200' deep would be 1012 psi. According to Keene, the high salinity of this saltwater injected into the proposed new disposal well could corrode the casing in his well, causing loss of the wellbore. Keene testified that electric logs of his well indicate untested but possible productive zones at depths of 4346-4352', 5465-5480', 5710-5714' and 5734-5744'.

Key submitted evidence that its proposed disposal well poses no threat to the existing or to any potentially productive intervals in Keene's well. The C.A. Foster Well No. 1 completion at 5686' is now producing only 100 MCF and a few barrels of oil per month. The potential zone Keene identified in his well at 4346-4352' is the same one that was depleted by the waterflood in the Miles-Jackson (Strawn 4300) Field. The other potential intervals in Keene's well that are deeper than the current perforations are behind cemented casing and are separated from the Brazos River Conglomerate by thick shale beds.

Key also pointed out that another operator has the disposal well that is closest to Keene's well. The West Fork Tank Trucks, Inc., Patton Lease Well No. 1 is only 700' northwest of the C.A. Patton No. 1 and West Fork Tank Trucks is proposing another disposal well only 650' to the southwest.

The City of Chico has three fresh water wells about 1200' southeast of Key's existing disposal well and 2650' from the proposed Well No. 2. The City's wells produce from the Paluxy sandstone of the Trinity Series (of Cretaceous age) at 130' to 150' and it is concerned about possible saltwater contamination of these wells. The city elicited testimony from Key that it has not studied the possibility of vertical fractures in the area. Key also admitted that it does not know the porosity or areal extent of the disposal interval, and that it made no independent review of the depth of freshwater.

Key pointed out that another operator uses commercial disposal wells much closer to the City's wells than are its Moser Well Nos. 1 and 2. Bridgeport Tank Trucks, Inc., operates its Singleton Lease Well No. 1 is only 500' south of the City's water wells and its Singleton Lease Well No. 2 is 1000' south of these water wells. No contamination has been evident in the water wells due to commercial disposal

in the area.

The protestant, Keene, is also concerned about possible contamination of drinking water by the commercial disposal wells. Key's cross section shows that Cretaceous beds extend to a depth of 450' to 550' below the surface. According to Keene, the log of his well shows the Cretaceous sandstones that are deeper than 250' may contain usable-quality water. When the Miles-Jackson (Strawn 4300) wellbores were abandoned in the 1960's, their production casing above about 3000' was removed. If the surface casing and cement plugs in these abandoned wells did not reach to the base of the usable-quality water, then salt water injected into the Brazos River Conglomerate could rise in the abandoned wells and contaminate the lower portion of the freshwater aquifer.

EXAMINERS' OPINION

The examiners believe that this application should be granted. The casing and cement in the proposed disposal well should ensure that injected waste will be confined to the disposal sandstones. The production casing is cemented from the base of the well to the surface. Because of the possibility that usable-quality water may be present to the base of the Cretaceous (deeper than the 250' recommended by the TNRCC), the applicant should be required to test the casing in its Moser No. 2 annually at the maximum permitted pressure of 1100 psi. Weekly monitoring of the pressure in the casing/tubing annulus of the disposal well will detect any possible casing leaks immediately and disposal can be stopped until the casing is repaired.

The applicant has demonstrated that the proposed disposal well is in the public interest because it will encourage the drilling of additional wells and will not harm usable-quality water nor oil and gas resources. Waste produced by oil and gas activity should be disposed of close to the site of generation if it is safe and reasonable to do so.

The applicant has already agreed to the extra monitoring requirements necessary for commercial facilities. These include all catch basins, storage and pretreatment facilities that must be constructed of concrete, steel or fiberglass. The entire storage, pretreatment and disposal facilities must be surrounded by dikes and by fences with locked gates.

FINDINGS OF FACT

- 1 Notice of hearing on this application to inject into the subject well was mailed to all interested persons at least ten (10) days prior to the hearing.
 - a. Notice of this application (Form W-14) was mailed to the Wise County Clerk on November 11, 2002.
 - b. Notice of the application was published in the Wise County Messenger, a newspaper of general circulation in Wise County, on November 25, 2002.
 - c. Notice of this hearing was mailed to surface owners, offset surface owners, and to all operators of wells within 1/2 mile of the proposed well on March 26, 2003.

- d. One surface owner, Jerry Morrow, signed a waiver of objection on April 9, 2003.
2. The Key Energy Resources L.P. Jeff Moser Lease Well No. 2 was drilled as a commercial disposal well in 2003, and is adequately cased and cemented to protect usable- quality water.
 - a. The 9-5/8th inch surface casing is cemented to 310 feet.
 - b. The 7 inch production casing is cemented from the surface to total depth of 3005 feet.
 - c. Tubing of 3-1/2 inches will be installed on a packer at 2208 feet above the injection perforations which will be between 2226 and 2298 feet.
 - d. The disposal interval will be the porous and permeable sandstones in the Brazos River Conglomerate between 2200 and 2400 feet.
3. The maximum injection rate will be 5000 BWPD while the average injection rate will be 4000 BWPD.
4. The average injection pressure will be 500 psi with the maximum injection pressure to be 1100 psi.
5. There are four existing disposal wells nearby which have already disposed of 13,784,000 barrels of saltwater into the Brazos River Conglomerate.
6. The disposal interval has shown great capacity to accept saltwater as the surface pressure on the Key Energy Services, Inc.-NTD Jeff Moser No. 1, 1500 feet southeast of the proposed disposal well, returns to zero after injection operations cease.
7. All of the wellbores within 1/2 mile of the proposed disposal well are still producing, are used as disposal wells or have been adequately plugged and abandoned by Commission standards.
8. Using the Jeff Moser Lease Well No. 2 to dispose of lease-produced water is in the public interest as there is active exploration in the area for wells in the Barnett Shale which produce large amount of saltwater that must be disposed of.
9. Use of the proposed disposal well poses no greater risk of pollution than trucking the saltwater to other disposal wells which are even closer to the water wells of the protestants.
10. A letter from the Texas Natural Resource Conservation Commission states that usable-quality water extends to a depth of 250 feet.
11. Annual pressure tests of the Moser Lease Well No. 2 and weekly monitoring of the casing/tubing annulus will ensure that any casing leaks are detected immediately and disposal can be halted until the casing is repaired.
12. Key Energy Services, Inc.-NTD has agreed to all requirements for commercial disposal wells as requested by the Environmental Services Section of the Railroad Commission.

CONCLUSIONS OF LAW

1. Proper notice was given to all necessary parties as required by Statewide Rule 9(5) [Tex. R.R. Comm'n, 16 TEX. ADMIN. CODE § 3.9(5)] and other applicable statutory and regulatory provisions.
2. All things necessary to give the Commission jurisdiction to decide this matter have been performed or have occurred.
3. Applicant has shown that fluid injection operations, conducted at the proposed pressures and volumes, under the proposed permit conditions, will not endanger oil, gas or geothermal resources or cause the pollution of freshwater strata unproductive of oil, gas or geothermal resources, thus meeting the requirements of Statewide Rule 9 [Tex. R.R. Comm'n, 16 TEX. ADMIN. CODE § 3.9].

EXAMINERS' RECOMMENDATION

Based on the above findings and conclusions, the examiners recommend that the application of Key Energy Resources L.P. to dispose of up to 5000 barrels of water per day by injection at a maximum surface pressure of 1100 psi in its Jeff Moser Lease Well No. 2 in the Alvord (Strawn 2975) Field be **GRANTED**, with the conditions proposed in the attached Final Order.

Respectfully submitted,

Mark Helmueller
Hearings Examiner

Margaret Allen
Technical Hearings Examiner