

**OIL AND GAS DOCKET NO. 09-0239466**

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**THE APPLICATION OF KEY ENERGY SERVICES, INC. - NTD FOR COMMERCIAL DISPOSAL AUTHORITY FOR ITS JEFF MOSER LEASE, WELL NOS. 1 AND 2, CHICO, WEST (CONGLOMERATE 5700) FIELD AND ALVORD (STRAWN 2975) FIELD, WISE COUNTY, TEXAS**

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**Heard by:** Donna K. Chandler, Technical Examiner  
Mark J. Helmueller, Hearings Examiner

**Procedural history:**

Application received:	June 15, 2004
Protest received:	June 25, 2004
Hearing held:	August 17, 2004
Transcript Issued:	September 2, 2004
PFD Issued:	September 16, 2004

**Appearances:**

**Representing:**

Applicant:

John Soule  
Terry Duffey  
Darryl James  
Walter Baker

Key Energy Services, Inc.

Protestants:

Mickey Olmstead

West Fork Tank Trucks, Inc.

Arturo Rodriguez

City of Chico

Roy Keene, Jr.

Himself

Observer:

David Cooney  
Doug Johnson

Railroad Commission of Texas,  
Environmental Services

**EXAMINERS' REPORT AND PROPOSAL FOR DECISION**

**STATEMENT OF THE CASE**

Key Energy Services, Inc -NTD ("Key") is seeking to amend the commercial disposal authority for its Jeff Moser Well Nos. 1 and 2 in Wise County. Both wells are active commercial disposal wells authorized for disposal into the Brazos River Conglomerate Formation at a depth of approximately 2,200 feet. Each well is permitted for a maximum injection volume of 5,000 BWPD with a maximum surface injection pressure of 1,100 psig.

In response to recent Commission investigations regarding Wise County shallow injection wells, Key requests that commercial disposal authority for the Moser No. 1 be granted to allow disposal into a deeper zone in the well. Key plans to deepen the well and equip it for disposal into the Ellenburger at approximately 7,000 feet. This application for a deeper disposal interval was unprotested.

In conjunction with the request to amend the permit for the No. 1 well, Key requests that the maximum injection volume for the No. 2 well be temporarily increased to 7,500 BWPD, with no increase in the maximum permitted surface injection pressure of 1,100 psig. Key requests the temporary authority for a maximum period of six months, beginning on the day that the No. 1 is shut-in for deepening operations. The temporary authority would end in six months, or whenever the No. 1 is equipped for Ellenburger disposal, whichever occurs first.

The application for temporary increase in injection volume into the No. 2 well was protested by West Fork Tank Trucks, the City of Chico, and Roy Keene, Jr. West Fork Tank Trucks operates commercial disposal wells in the area, the City of Chico has three water supply wells about 1,000 feet to the southeast of the Moser tract, and Roy Keene, Jr. is an offsetting operator to the Moser tract and is concerned that additional disposal into the No. 2 will adversely affect his producing well. None of the protestants presented a direct case. The Commission's Environmental Services Section did not object to temporary authority for the No. 2 well.

**DISCUSSION OF THE EVIDENCE**

The Moser Well Nos. 1 and 2 are both located on a 40 acre tract about 2 ½ miles north of Chico, Texas. The two wells are approximately 1,500 feet apart.

Commercial disposal authority for the Jeff Moser No. 1 was initially granted by the Commission on October 23, 2002. This permit was administratively granted, authorizing disposal into the Brazos River Conglomerate between 2,210 feet and 2,390 feet, with a

maximum injection volume of 2,000 BWPD and maximum surface injection pressure of 1,100 psig. On December 19, 2002, the permit was amended to allow a maximum injection volume of 5,000 BWPD.

Commercial disposal authority for the Jeff Moser No. 2 was granted by the Commission by Final Order on July 8, 2003. This application had been protested. The permit for this well authorizes disposal into the Brazos River Conglomerate between 2,200 feet and 2,400 feet, with a maximum injection volume of 5,000 BWPD and a maximum surface injection pressure of 1,100 psig.

The Moser No. 1 currently has a total depth of 5,875 feet. The well has 327 feet of 10<sup>3</sup>/<sub>4</sub>" surface casing cemented to surface and 5,869 feet of 7" casing, with top of cement at 3,800 feet. Prior to conversion of the well to a disposal well, a cement retainer was set at about 2,600 feet to circulate cement behind the 7" casing to surface. Key plans to deepen the well to approximately 7,500 feet and cement 5 1/2" casing to surface. It is expected that the top of the Ellenburger will be encountered at about 7,100 feet. Key requests that the permitted disposal interval be from 6,200 feet to 7,500 feet. Key further requests a maximum surface injection pressure of 3,100 psig and a maximum injection volume of 10,000 BWPD.

There are no wells within a 1/4 mile radius of the Moser No. 1 which penetrate the proposed disposal interval at 6,200 feet. Therefore, there will be no conduits for fluid migration out of the disposal interval.

There are four other permitted commercial disposal wells within about 1/2 mile of the Moser wells. Two of these wells, the Patton No. 1 and Patton No. 2, are operated by West Fork Tank Trucks. The other two wells, the Singleton No. 1 and Singleton No. 2, are operated by Bridgeport Tank Trucks. All are permitted for disposal into the Brazos River Conglomerate Formation at approximately 2,200 feet. The total permitted capacity for the six commercial disposal wells is 23,900 BWPD. In February 2004, the total injection into the six wells was 17,600 BWPD. Five of the six wells are active disposal wells, the exception being the Singleton No. 1, which has not reported injection activity since 2000.

Through 2003, cumulative injection into the Moser No. 1 is 6.8 million barrels of water; cumulative injection into the Moser No. 2 is 0.462 million barrels of water. Total cumulative injection into all six wells has been 17.9 million barrels of water.

On July 23, 2004, a bottomhole pressure survey was run on the Moser No. 2. At 2,260 feet, which is the mid-perforation depth, the pressure was 752 psig. The fluid level in the wellbore was at 583 feet from the surface.

Key also performed a step-rate injection test on the Moser No. 2 to determine the pressure at which the formation would begin to fracture. Initially the injection rate was 3 barrels per minute, increasing to 9 barrels per minute. The bottomhole pressure recorder in the well showed a bottomhole pressure of about 1,565 psig at the initial rate. The pressure readings indicate that the formation began to break down at 1,650 psig, at a rate of 5.25 barrels per

minute, or 7,560 barrels per day. Based on this data, Key believes that even with a temporary increase in injection volume to 7,500 BWPD into the Moser No. 2, the injected fluids will be confined to the Brazos River Conglomerate interval. Key had originally requested that injection volume be increased to 10,000 BWPD. However, based on the results of the step-rate test indicating formation fracture at the lower volume, Key amended its request to 7,500 BWPD. This volume is less than would be allowed for the two Moser wells combined.

Key presented a cross-section of five wells in the immediate vicinity of the Moser wells. The Brazos River Conglomerate has a gross thickness of 200-250 feet and is continuous across the area. There is a 300 foot thick shale interval above the Brazos River Conglomerate and a 300-500 foot thick shale interval below the Brazos River Conglomerate. Both shale intervals are continuous in the area and Key contends that the shale intervals serve as barriers which will confine injected fluids to the Brazos River Conglomerate.

The nearest wellbore which penetrates the Ellenburger is about three miles to the south. The nearest Ellenburger production is about three miles to the northwest. Based on this data, Key estimates that the top of the Ellenburger in the No. 1 well will be encountered at about 7,100 feet. However, Key requests that the top of the disposal interval be 6,200 feet in the No. 1 well. The deepest producing horizon within  $\frac{1}{4}$  mile of the Moser wells is about 6,000 feet. Approval of the interval from 6,200 feet to total depth will allow Key to use another interval for disposal, should any suitable zones be encountered above the Ellenburger.

There is a need for commercial disposal wells in this area due to the significant development of the Barnett Shale. To complete wells in the Barnett Shale, large fresh water fracture treatments are used. Commercial disposal facilities are necessary to accommodate disposal of the large volumes of water produced after fracture treatment. Key submitted Form P-18 for June 2004 listing the various operators which are using the Moser wells for disposal.

#### Protestants' Positions

West Fork Tank Trucks operates commercial disposal wells in the immediate vicinity of the Moser wells. West Fork believes that Key's requested authority for additional disposal volume into the No. 2 may result in problems for all operators of commercial disposal wells in the area, given the issues that Environmental Services is currently investigating in this area.

Mr. Roy Keene, Jr. is an operator of a producing well approximately  $\frac{1}{4}$  mile to the south of the Moser No. 1. This well produces from the Alvord (Atoka Conglomerate) Field at approximately 5,700 feet. Mr. Keene is concerned about Key's proposed increase in injection volume into the No. 2 well will result in an increase in casing pressure in his producing well. There was no casing pressure on this well in July of this year and the well now has about 30 psig.

The City of Chico has three fresh water supply wells less than  $\frac{1}{2}$  mile from the Moser

wells. The City of Chico appeared at the hearing to voice its concerns about protection of its water supplies but presented no evidence or testimony.

### **EXAMINERS' OPINION**

The examiners recommend that the permit for the Jeff Moser No. 1 be amended as requested by Key for disposal into the Ellenburger. This portion of the application was unprotested and could have been administratively approved. The application meets the requirements of Statewide Rule 9.

Regarding the temporary authority requested for the Jeff Moser No. 2, the examiners recommend that Key be allowed to inject a maximum of 7,500 BWPD for a period not to exceed 180 days from the date that the Order in this case become Final. In addition, it is recommended that the surface injection pressures for both the Jeff Moser No. 1 and Jeff Moser No. 2 wells be limited to 650 psig, effective immediately. Key's own evidence shows that the disposal interval at 2,200 feet in the Jeff Moser No. 2 begins to break down at a bottomhole pressure of 1,650 psig, at an injection rate of 7,560 barrels per day. The weight of a 2,200 foot column of fluid is 990 psig, assuming a 0.45 psi/foot saltwater gradient. The current 1,100 psig surface injection pressure would result in a bottomhole pressure of 2,090 psig, which is several hundred psig in excess of the 1,650 psig fracture pressure. Continued injection at 1,100 psig would likely fracture the formation, possibly allowing injected fluids to escape from the permitted injection zone. A maximum surface injection pressure of 650 psig would result in a bottomhole pressure slightly less than 1,650 psig.

### **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 to amend the disposal authority for the Jeff Moser No. 1 was published in the *Wise County Messenger*, a newspaper of general circulation in Wise County, on June 3, 2004.
2. The application for amended commercial disposal authority in the Jeff Moser No. 1 was unprotested.
3. The application for temporary authority to increase injection pressure and volume in the Jeff Moser No. 2 was protested by West Fork Tank Trucks, Roy Keene, Jr., and the City of Chico.
4. The Jeff Moser Well Nos. 1 and 2 are both permitted for commercial disposal operations into the Brazos River Conglomerate at a depth of approximately 2,200 feet. Each well is authorized to dispose of a maximum of 5,000 barrels of water per day at a maximum surface injection pressure of 1,100 psig.

5. The recompletion of the Jeff Moser No. 1 for disposal between 6,200 feet and 7,500 feet will be in a manner which will protect usable quality water.
  - a. The subject well has 327 feet of 10 $\frac{3}{4}$ " surface casing cemented to surface.
  - b. The subject well has 5,869 feet of 7" casing with the top of cement at 3,800 feet.
  - c. The well will be deepened to the Ellenburger at approximately 7,500 feet and will have 5 $\frac{1}{2}$ " casing with cement circulated to surface.
  - d. Injection will be through tubing set on a packer at 6,100 feet.
  - e. There are several hundred feet of shale between the top of the disposal interval and the base of usable quality water.
  - e. The Texas Commission on Environmental Quality considers usable-quality water to occur to a depth of 250 feet in the area of the proposed Moser No. 1 Well.
6. Limiting surface injection pressure to 650 psig for the Jeff Moser No. 1 and Jeff Moser No. 2 for Brazos River Conglomerate injection is necessary to confine injected fluids to the permitted disposal zone.
  - a. The formation parting pressure of the Brazos River Conglomerate disposal zone in the Jeff Moser No. 2 is 1,650 psig, based on a step-rate test performed on the well on July 23, 2004. The injection rate at this pressure is 7,560 barrels per day.
  - b. With a surface injection pressure of 650 psig, the bottomhole pressure should be slightly less than 1,650 psig.
7. Temporary injection authority of 7,500 barrels of water per day at a maximum surface injection pressure of 650 psig into the Brazos River Conglomerate in the Jeff Moser No. 2 will not endanger useable quality water resources. The additional injection will occur only while the Jeff Moser No. 1 is shut in for recompletion to the deeper disposal interval, for a maximum of 180 days.

**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. Disposal into the interval between 6,200 feet and 7,500 feet in the Jeff Moser No. 1 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].
4. Amending the existing permits to reduce the maximum surface injection pressure for injection into the Brazos River Conglomerate in the Jeff Moser No. 1 and Jeff Moser No. 2 is necessary to confine injected fluids to the permitted zone as required by Statewide Rule 9 [Tex. R.R. Comm'n, 16 TEX. ADMIN. CODE § 3.9].
5. Increased injection volume into the Jeff Moser No. 2 on a temporary basis for 180 days while the Jeff Moser No. 1 is shut-in for recompletion 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 the following:

1. Approval of commercial disposal authority into the Jeff Moser No. 1 in the interval from 6,200 feet to 7,500 feet, with maximum injection volume of 10,000 barrels per day and maximum surface injection pressure of 3,100 psig;
2. Limitation of surface injection pressure to 650 psig for injection into the Brazos River Conglomerate for the Jeff Moser No. 1 and Jeff Moser No. 2;
3. Approval of 180 day temporary authority to inject a maximum of 7,500 barrels of water per day with a maximum surface injection pressure of 650 psig into the Jeff Moser No. 2, while the Jeff Moser No. 1 is shut-in for recompletion.

Respectfully submitted,

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Mark J. Helmueller  
Hearings Examiner