



RAILROAD COMMISSION OF TEXAS

HEARINGS DIVISION

OIL AND GAS DOCKET NO. 02-0288313

THE APPLICATION OF KDM OPERATING, LLC PURSUANT TO STATEWIDE RULE 46 FOR A PERMIT TO INJECT FLUID INTO A RESERVOIR PRODUCTIVE OF OIL OR GAS, STUBBLEFIELD, E. P. LEASE, WELL NO 1 SW, BLOOMINGTON (4600) FIELD, VICTORIA COUNTY, TEXAS

HEARD BY: Paul Dubois – Technical Examiner
Terry Johnson – Hearings Examiner

APPEARANCES:

REPRESENTING:

APPLICANT:

George Neale
Greg Cloud, P.E.
Keith Anderson
Matt Bradshaw

KDM Operating, LLC

PROTESTANT:

Danny Garcia
Delores Warnell
Lucy Morales
Deborah Ellsworth
John Ellsworth

Victoria County Commissioner
Bloomington ISD, Superintendent
Self
Self
Self

PROCEDURAL HISTORY

Application Filed:	March 3, 2014
Protest Received:	March 4, 2014
Request for Hearing:	March 31, 2014
Notice of Hearing:	April 11, 2014
Date of Hearing:	May 14, 2014
Transcript Received:	May 27, 2014
Proposal For Decision Issued:	August 4, 2014

EXAMINERS' REPORT AND PROPOSAL FOR DECISION**STATEMENT OF THE CASE**

KDM Operating, LLC (KDM) (Operator P-5 No. 452994) requests authority pursuant to Statewide Rule 46 to inject produced saltwater for pressure maintenance into the Frio Formation in the Stubblefield, E. P. Lease (No. 00119), Well No. 1SW, Bloomington (4600) Field, Victoria County, Texas. The well will be drilled about one mile north of the town of Bloomington. The proposed well is not a commercial disposal well.

Notice of the subject application was published in the *Victoria Advocate*, a newspaper of general circulation in Victoria County, on February 21, 2014. Notice of the application was sent to the surface owner of the injection tract on March 3, 2014. KDM is the only operator within a one-half mile radius of the proposed well. The application is protested by several persons, including Victoria County Commissioner Danny Garcia, Bloomington ISD Superintendent Delores Warnell, Lucy Morales, Deborah Ellsworth and John Ellsworth.

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

KDM proposes to drill and complete the Stubblefield, E. P. Lease (No. 00119), Well No. 1SW as a salt water injection well for the purpose of pressure maintenance in the Bloomfield (4600) Field, in Victoria County, Texas. The proposed well site is one mile north of the Bloomington townsite. KDM has obtained a drilling permit for the well (No. 784691), which has been assigned API No. 42-469-3403. KDM proposes to drill and complete the well as follows and illustrated on Attachment 1:

- The well will be drilled to a total depth of 5,000 feet;
- 13 3/8-inch surface casing will be set to a depth of 1,575 feet with cement circulated to the surface;
- 8 5/8-inch long string casing will be set to a depth of 5,000 feet with cement circulated to the surface;
- The disposal interval will be from 4,700 feet to 5,000 feet; and,
- 5 1/2 inch injection tubing will be set with a packer at a depth of 4,700 feet.

KDM proposes to operate the well as follows:

- The maximum injection volume will be 30,000 barrels of salt water per day;
- The average injection volume will be 18,000 barrels of salt water per day;
- The maximum surface injection pressure will be 2,350 psig; and,
- Fluids will be delivered to the injection well by pipeline from KDM's existing and planned future development in the Bloomington (4600) Field.

The Commission's Groundwater Advisory Unit (GAU) has determined that usable quality groundwater occurs from the land surface to a depth of 1,550 feet. Moreover, the Goliad Aquifer, which is estimated to occur from 750 feet to 1,275 feet, contains water of superior quality that must be isolated from water in overlying and underlying beds. The proposed casing scheme includes two strings of casing, both cemented to the surface, to isolate the base of usable quality groundwater (BUQW) at 1,550 feet from the disposal interval. The Goliad Aquifer will also be isolated from water in underlying and overlying beds by the two cemented casing strings.

The Bloomington (4600) Field was discovered in the 1940s. The field consists of a 230 to 280-foot thick sandstone interval in the Frio Formation. This productive interval is also known as the Greta Massive. Reservoir properties reported by KDM include average sand thickness of 230 feet with hydrocarbons accumulated in the upper 10 to 30 feet, average porosity of 32 percent, and average horizontal permeability of 1,000 millidarcies (mds). Current bottom-hole pressure is estimated to be 1,850 psig. The field has an anticlinal structure bounded by a fault to the south-southeast. The highest structure is adjacent and northwest of the fault. The proposed injection well is located at nearly the lowest limits of defined structure. The field is directly overlain by more than 200 feet of continuous shale and directly underlain by more than 300 feet of continuous shale, as indicated on the spontaneous potential log of the Beulah Stubblefield no. 1 well (API No. 42-469-31463), which is about 1,200 feet west of the proposed well in a similar structural position.

The Bloomington (4600) Field has been in continuous production since discovery. Daily oil production peaked at about 5,000 barrels per day in 1949, and the number of wells in the field peaked at about 150 in 1956. From about 2010 through 2013 daily oil production has fallen to less than 20 barrels of oil per day. The field has always produced significant amounts of salt water—in excess of 95 percent of total produced fluids, which have typically been re-injected into the reservoir. Most of the wells in the field have watered out and subsequently been plugged and abandoned.

However, in late 2013 the completion of a horizontal well in the field has resulted in an increase in oil production to over 100 barrels of oil per day, and a corresponding

increase in salt water production of more than 2,000 barrels per day. KDM intends to continue to revitalize the field with the development of additional horizontal wells. The revitalized development will require legal disposition of the produced saltwater. KDM proposes to re-inject the produced salt water low on the structure to maintain reservoir pressure in the upper producing interval. KDM projects a need to dispose of 23,750 barrels of saltwater per day from five horizontal wells to be completed by the end of 2014. Within two years, ten project wells will produce upwards of 40,000 barrels of saltwater per day requiring disposal. KDM believes the Gretta Massive will readily accept the volume of water proposed for injection based on reservoir porosity and permeability. The proposed disposal well location is down-dip on the structure, which is an ideal location for pressure maintenance.

KDM's existing options for salt water disposition are limited. KDM currently operates three permitted injection or disposal wells in the Bloomington area, but these wells do not provide the capacity KDM anticipates needing in the near future:

- Davis Unit Well No. 3R is an active injection well permitted to inject up to 12,000 barrels of salt water per day into the Bloomington (4600) Field.
- Stolz Unit Well No. 3 is permitted to inject up to 12,000 barrels of salt water per day into the Bloomington (4600) Field. However, this well is not active due to a wellbore obstruction. Two efforts to clear the obstruction have failed. The well is currently shut-in, and so its disposal capacity is not available to KDM.
- Bloomington Unit A Well No. 2 is permitted to dispose by injection up to 6,000 barrels of salt water per day into the Catahoula Formation, which overlies the Gretta Massive.

The current available injection capacity may meet KDM's existing needs, but will be insufficient to accommodate salt water produced by future development. The two injection wells into the Bloomington (4600) Field are also located higher on the structure than the proposed injection well, and are thus less effective for pressure maintenance.

KDM identified 10 wellbores within a one-quarter mile area of review. One of the wells is currently producing, two were dry holes that have been plugged, and the remaining seven wells were producing wells that have been plugged and abandoned. Plugging reports for these wellbores indicates that there is at least one cement plug separating the injection interval from the BUQW. Commission staff identified one well just outside of the one-quarter mile area of review that did not appear to have been adequately plugged, the J. L. Dean Well No. 2 (API No. 469-01678). KDM's expert engineering witness investigated commission and original operator records and concluded that the well was properly plugged.

Protestant's Evidence

The protestants gave statements and cross-examined KDM's witnesses, but did not put on direct cases of their own.

Victoria County Commissioner Danny Garcia gave a statement expressing concerns that the proposed well may harm Bloomington's groundwater, which is its source of drinking water. He stated that the Bloomington area is the largest socio-economically disadvantaged area in Victoria County, and he was not sure what benefits the injection well would bring to the residents of the area. He is concerned about risks caused by the well, and expressed doubts about the Applicant's claims that there are no risks. He stated that a water district had recently been created whose board members would soon be considering policy regarding injection wells in the area.

Ms. Lucy Morales cross-examined the Applicant's witness. Ms. Morales asked a series of questions about the volume of water to be injected, the distances from the proposed well to other wells, schools and establishments in Bloomington, and other related matters. Some of her questions were general—such as asking the witness to describe the difference between a Class 1 and Class 2 injection well. Other questions were specific to the subject area, such as whether KDM had performed particular studies to conclude that the water and geologic stratum would not be polluted by the injection well activities.

Ms. Delores Warnell, Superintendent of Bloomington Independent School District, spoke on behalf of the District's Board of Trustees. She stated on the record her concern about the safety of the drinking water for the students and the community. She stated her desire to have a guarantee that their drinking water will not be contaminated or not be altered in any way shape or form.

Ms. Deborah Ellsworth cross examined the Applicant's witness and gave a statement. Deborah and John Ellsworth live on a property adjacent to the proposed well and have a surface lease to graze cattle on the proposed injection well tract. Ms. Ellsworth's concern is for the safety of the community and for themselves, and for the protection of the ground water supply on which they depend. Ms. Ellsworth asked specific questions regarding the plugged wellbores in the area, and about the existing injection/disposal wells. She inquired about the shale confinement around the injection interval, and expressed her desire that any injection well be a mile or more from any private water supply well.

EXAMINERS' OPINION

The Applicant, KDM Operating, LLC, has applied for a well to inject salt water into a formation productive of oil or gas to maintain pressure in the reservoir. The application is protested by several persons, including Victoria County Commissioner Danny Garcia,

Bloomington ISD Superintendent Delores Warnell, Lucy Morales, Deborah Ellsworth and John Ellsworth. The Applicant has demonstrated that the proposed well will not harm fresh ground water resources, and that the well will prevent waste by allowing the continued development of the field with horizontal wells. The examiners recommend the application be approved.

Oil is produced from the Bloomington (4600) Field in a fluid stream that is more than 95 percent salt water. Thus each barrel of oil produced requires legal and safe disposition of about 19 barrels of salt water. The Greta Massive reservoir has excellent porosity and permeability, and the Bloomington (4600) Field structure is conducive to a pressure maintenance project by injection into the water saturated zone below the thin hydrocarbon zone. Recent development has proven that this 70-year old field can be revitalized with horizontal well technology, extending the field's productive life. To do so, however, will require the safe disposition of produced salt water. Injecting salt water produced from the field back into the same reservoir provides both safe disposition of the salt water and a means of maintaining reservoir pressure to improve ultimate recovery. Further, the Applicant proposes to pipe the salt water to the well, eliminating the need to continuously haul it through town in trucks.

The proposed well will be completed with two steel casing strings, both cemented to the surface. The surface casing will be set at 1,575 feet, which is below the base of usable quality water at 1,550 feet. The long-string casing will be set in the bottom of the wellbore and cemented to the surface. The Applicant provided evidence to demonstrate that the Greta Massive injection interval is bounded on the top and bottom by thick shale strata that would contain the fluids to the injection interval. Existing wellbores within a one-quarter mile radius of the proposed wells have been plugged in a manner that will protect usable quality groundwater.

Protestants are concerned about protecting their groundwater resources and their community. However, the Protestants did not introduce any evidence to suggest that the proposed well design or subsurface geology were not suitable. The examiners conclude that the Applicant has met its burden of proof and that its application for the proposed injection well be approved.

FINDINGS OF FACT

1. KDM Operating, LLC (KDM) (Operator P-5 No. 452994) applies for a permit to conduct fluid injection operations into a reservoir productive of oil or gas, specifically the Stubblefield, E.P. Lease (No. 00119), Well No. 1 SW, Bloomington (4600) Field, Victoria County, Texas.

2. KDM gave notice by timely mailing or delivering a copy of the application to the owner of record of the surface tract on which the well is located, to each commission-designated operator of wells within one-half mile of the proposed well and to the Victoria county clerk.
3. Notice of the application was published on February 21, 2014 in the *Victoria Advocate*, a newspaper of general circulation for Victoria County. 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.
4. The application is protested by several persons, including Victoria County Commissioner Danny Garcia, Bloomington ISD Superintendent Delores Warnell, Lucy Morales, Deborah Ellsworth and John Ellsworth.
5. KDM Operating, LLC (KDM) has obtained a drilling permit for the well (No. 784691), which has been assigned API No. 42-469-3403. KDM proposes to drill and complete the well as follows:
 - a. The well will be drilled to a total depth of 5,000 feet;
 - b. 13 3/8-inch surface casing will be set to a depth of 1,575 feet with cement circulated to the surface;
 - c. 8 5/8-inch long string casing will be set to a depth of 5,000 feet with cement circulated to the surface;
 - d. The disposal interval will be from 4,700 feet to 5,000 feet; and,
 - e. 5 1/2 inch injection tubing will be set with a packer at a depth of 4,700 feet.
6. KDM proposes to operate the well as follows:
 - a. The maximum injection volume will be 30,000 barrels of salt water per day and the average injection volume will be 18,000 barrels of salt water per day;
 - b. The maximum surface injection pressure will be 2,350 psig; and,
 - c. Fluids will be delivered to the injection well by pipeline from KDM's existing and planned future development in the Bloomington (4600) Field.

7. The base of usable quality groundwater occurs at a depth of 1,550 feet, and the Goliad Aquifer, which is estimated to occur from 750 feet to 1,275 feet, contains water of superior quality that must be isolated from water in overlying and underlying beds.
8. The proposed casing scheme includes two strings of casing, both cemented to the surface, to isolate and protect the base of usable quality groundwater (BUQW) at 1,550 feet from the disposal interval.
9. Fluids injected into the Bloomington (4600) Field in the Stubblefield, E. P. Well No. 1SW will be confined to the injection interval, which is bounded on the top and bottom by more than 200 feet of shale.
10. The Stubblefield, E. P. Well No. 1SW will provide KDM with sufficient capacity to inject salt water generated from its re-development of the Bloomington (4600) Field with horizontal wells.

CONCLUSIONS OF LAW

1. Resolution of the subject application is a matter committed to the jurisdiction of the Railroad Commission of Texas. Tex. Nat. Res. Code § 81.051
2. All notice requirements have been satisfied. 16 Tex. Admin. Code § 3.46
3. The proposed fluid injection operations will not endanger oil, gas or geothermal resources or cause the pollution of freshwater strata unproductive of oil, gas or geothermal resources. 16 Tex. Admin. Code § 3.46(a)

EXAMINERS' RECOMMENDATION

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

Respectfully submitted,

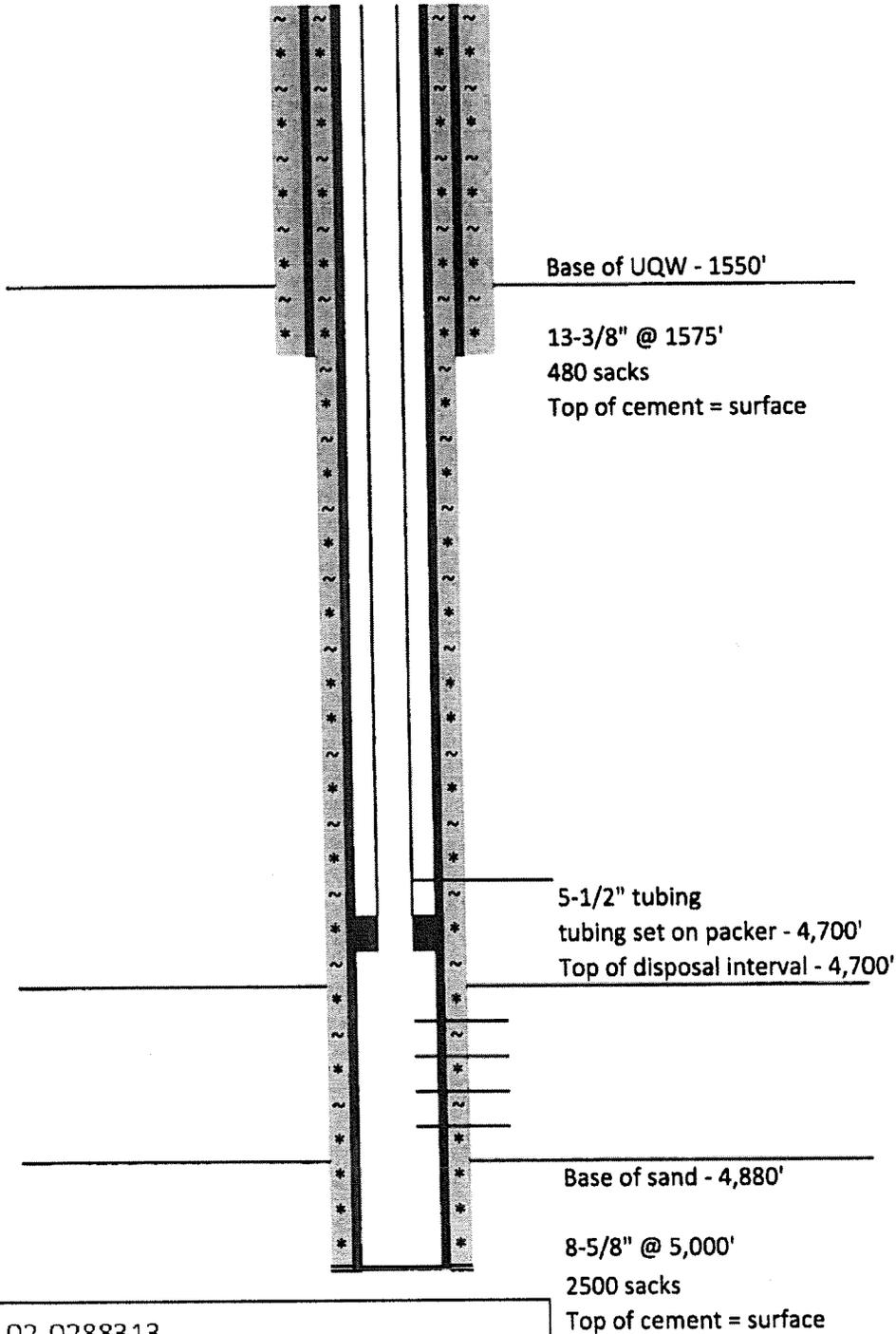


Paul Dubois
Technical Examiner



Terry Johnson
Hearings Examiner

**Proposed Completion
KDM Operating, LLC
E.P. Stubblefield No. 1SW**



02-0288313
PFD ATTACHMENT 1 – Well Diagram
Applicant's Exhibit No. 3

Exhibit No. 3
O & G Dkt. No. 02-0288313
Date: May 14, 2014
KDM Operating, LLC