



# RAILROAD COMMISSION OF TEXAS

## HEARINGS DIVISION

**OIL AND GAS DOCKET NO. 6E-0299254**

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**THE APPLICATION OF BREITBURN OPERATING, LP TO INCREASE WATER-OIL RATIO LIMITS, RESCIND GAS-OIL RATIO LIMITS, AND CANCEL OVERPRODUCTION FOR VARIOUS LEASES, EAST TEXAS FIELD (#27302001), GREGG, RUSK, UPSHUR, CHEROKEE, AND SMITH COUNTIES, TEXAS**

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**HEARD BY:** Richard Eyster, P.G. – Technical Examiner  
Ryan Lammert – Administrative Law Judge

**HEARING DATE:** March 16, 2016

**CONFERENCE DATE:** August 24, 2016

**APPEARANCES:**

Tim George  
Roger Dreyling

**REPRESENTING:**

Breitburn Operating, LP.

**EXAMINER'S REPORT AND RECOMMENDATION**

**STATEMENT OF THE CASE**

This is the application of Breitburn Operating, LP (herein "Breitburn" or "Applicant") for changes to the water-oil ratio and gas-oil ratio allowable limits for wells producing in the East Texas Field.

Breitburn requests two changes, each of which is intended to reduce economic and administrative burdens and to promote recovery of remaining reserves in the last stages of depletion of the field. Breitburn requests amendment of the Commission's Special Order No. 20-64,900 for wells in East Texas Field (entered effective April 1, 1975) to increase the water-oil ratio limit on production to 30 barrels of water for each barrel of oil. Currently, the water-oil ratio is 15:1. Breitburn also requests that the Commission rescind Rule 8 of the Special Field Rules for East Texas Field that sets the gas-oil ratio limit at 500:1, so that the field reverts to the 2000:1 gas-oil ratio limit that is standard under Statewide Rule 49. In addition, Breitburn requests that the Commission cancel overproduction attributable to

water-oil ratio limits or to gas-oil ratio limits, if any such overproduction exists for any well or lease at the time of these changes.

Breitburn coordinated with the other operators in the field and with the Commission Staff concerning its requests. The application is un-protested. Three operators -- Basa Resources, Inc., Falcon Resources, Inc., and John Linder Operating Co. LLC -- submitted letters supporting the application. Also, a letter of support was submitted by the East Texas Salt Water Disposal Company, which confirmed that there is sufficient disposal capacity to handle the disposal of additional produced water resulting from approval of the application.

The Examiners conclude that Breitburn has met its burden of proof and recommend that the application be approved.

### **DISCUSSION OF EVIDENCE**

In support of the application, Breitburn presented testimony and exhibits from Robert E. Dreyling, an expert consulting engineer with four decades of experience with reservoir and regulatory matters in East Texas Field.

The East Texas Field has produced approximately 5.44 billion barrels of oil across five counties in East Texas. The field discovery date is 1930, with a discovery depth of 3,650'. Oil gravity is 39 degrees, API. Current spacing is 330'/330', with a 5-acre density rule. The allowable allocation formula is 2.32% of original hourly potential, subject to a water oil ratio limit of 15 barrels of water per barrel of oil (which the Applicant requests be changed to 30 barrels of water per barrel of oil). The penalty GOR field rule (which the Applicant requests be rescinded) is currently 500 cubic feet per barrel.

The field is bounded by geologic pinch-outs to the east and by an oil water contact to the north, west, and south. The current productive area has now become much smaller than the original productive area because of water influx from the west, indicating that much of the field has now reached the late stages of depletion.

The field is defined by both stratigraphic traps and local structural traps. The drive mechanism is solution gas and water drive. Dip is 0.5 degrees from east to west. Gross oil sand thickness averages 51 feet, with net oil sand averaging 39 feet. Original bottom hole pressure was 1,635 psi, with saturation pressure at 750 psi and solution GOR at 357 cubic feet per barrel. Porosity is about 20.9%, with initial water saturation of 14.2% and residual oil saturation of 13.6%. Permeability is very high at 1,383 md. Cumulative oil as of November 2015 was approximately 5.44 billion barrels. The current field production rate as of November 2015 was about 9,248 barrels per day.

The production history graph of the field production and injection rates from 1993

to present shows steady decline over the last 20 years into the late stages of depletion. During this time, daily production dropped from more than 85,000 barrels to a current level of 9,248 barrels. Gas production declined consistently with the declining oil production. Over that same time, water production increased, with water cut rising from 92% to more than 99%. All this indicates the advanced stage of depletion of the field.

Although the field has declined, Breitburn believes there are still significant remaining oil reserves to be recovered, especially from the Lower Woodbine sand within the field interval. The field contains both Upper and Lower Woodbine intervals. The Woodbine interval that comprises the field lies in a wedge-type stratigraphic trap, below an unconformity at the base of the Austin Chalk and above the Maness Shale. There are two primary depositional environments within the Woodbine formation. The Upper Woodbine sand is thicker, more continuous, and better quality. In contrast, the Lower Woodbine sand is fluvial-deltaic and lower quality. Both intervals, however, exist across the entire field. The Upper Woodbine sands are generally continuous, thick, blocky, and connected to the downdip aquifer and, therefore, have historically produced under strong water drive. The Lower Woodbine sands are discontinuous, thin, lenticular, shaly, and less well-connected to the aquifer, producing generally under a combination dissolved gas drive and weak water drive. Water has moved across the entire field from West to East in the Upper Woodbine.

The current 15:1 water oil ratio limit was adopted in early 1970s to prevent overproduction of water that might have an adverse impact on the water drive mechanism. Since mid-1973, however, daily oil production has declined from 210,000 to 9,248 barrels, daily water production has increased from 550,000 to 1,152,309 barrels, and the water drive has swept across the entire field. Therefore, the protection of the water drive mechanism is no longer a reservoir conservation or waste-prevention concern, and the water-oil ratio limit can be increased to 30:1 without harming oil recovery. Moreover, the increased water resulting from this change will be within the capability of the available disposal well infrastructure.

The current gas-oil ratio rule was adopted in the early 1940s to arrest declining reservoir pressure. It was last reviewed by the Commission in the early 1970s. Since that time, gas production has become insignificant, declining from 74,450 to 4,670 mcf or about 1 mcf per day per well. Therefore, limiting gas production to maintain reservoir pressure is no longer a concern for recovery of remaining oil reserves.

#### **FINDINGS OF FACT**

1. Applicant requests that Special Order No. 20-64,900 for wells in East Texas Field (entered effective April 1, 1975) be amended to increase the water-oil ratio limit to production of 30 barrels of water for each barrel of oil; that Rule 8 of the special field rules for the East Texas Field be rescinded; and that any overproduction resulting

- from these limits be cancelled.
2. Notice of this hearing was sent to all operators in the field at least ten (10) days prior to the hearing. The Commission Staff was notified and consulted, and does not oppose the proposed rules. Applicant coordinated with other operators to develop the proposed changes. The application is un-protested.
  3. The evidence proves that the East Texas Field is in an advanced stage of depletion:
    - a. The strong water drive has advanced to the point that the water influx has swept across the entire field in the Upper Woodbine.
    - b. The field continues to cover a large area in five counties, but with only about 4,700 currently producing wells and daily oil production of about 9,248 barrels.
    - c. Most wells in the field typically produce only a few barrels of oil per day.
    - d. Most wells in the field produce with a 99% water cut.
  4. The evidence proves that portions of the Lower Woodbine within the field can be further developed for recoveries from the field.
    - a. Sands in the Upper Woodbine are generally continuous, thick, blocky, and connected to the downdip aquifer, the Upper Woodbine has produced under a strong water drive.
    - b. Sands in the Lower Woodbine are discontinuous, thin, lenticular, shaley, and less well-connected to the aquifer; therefore, the Lower Woodbine has produced under a combination dissolved gas drive and weak water drive.
    - c. Additional operations can be conducted to optimize future depletion of the Lower Woodbine, including infill drilling, re-entry of plugged and abandoned wellbores, and deepening existing wells that are not drilled through the total field interval.
    - d. Economic and administrative burdens that serve no conservation or waste-prevention purpose could negatively impact future development.
  5. The evidence proves that the 15:1 water-oil ratio limit no longer serves a reservoir conservation or waste-prevention purpose.
  6. Amending Special Order No. 20-64,900 to increase in the water-oil ratio limit to 30:1

will remove water production restrictions for most wells in the field.

7. Rescinding the current 500:1 gas-oil ratio penalty in field Rule 8, the field would revert to the 2000:1 gas-oil ratio limit that is the standard under Statewide Rule 49.
8. Increasing the water-oil ratio limit to 30:1 and rescinding the gas-oil ratio field rule will eliminate and reduce economic and administrative burdens that would limit future oil recoveries from the field and will thereby promote the conservation and recovery of remaining oil resources in this field.

**CONCLUSIONS OF LAW**

1. Resolution of the subject application is a matter committed to the jurisdiction of the Railroad Commission of Texas under Tex. Natural Resources Code Section 81.051 and 91.201 et seq.
2. Legally sufficient notice has been provided to all affected persons.
3. The proposed amendment of Special Order No. 20-64,900 and rescission of field Rule 8 will protect correlative rights, prevent waste, and promote the orderly development of the field.

**EXAMINERS' RECOMMENDATION**

Based on the above findings of fact and conclusions of law, the Examiners recommend that Breitburn's application be approved.

Respectfully submitted,



Richard Eyster, P.G.  
Technical Examiner



Ryan Lammert  
Administrative Law Judge