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* KEY ISSUES: WASTE/CONFISCATION *
* Recoverable reserves estimate *
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* FINAL ORDER: R37 EXCEPTION Dismissed Application *
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Rule 37 Case No. 0205453

APPLICATION OF BASS ENTERPRISES PRODUCTION COMPANY FOR EXCEPTION TO STATEWIDE RULE 37 TO DRILL ITS WELL NO. 2, M.H. GOODE ESTATE 4 LEASE, IN THE BROWN-BASSETT (ELLENBURGER) AND WILDCAT FIELDS, TERRELL COUNTY, TEXAS

APPEARANCES:	**REPRESENTING:**
APPLICANT	
Robert Grable (Attorney) C. Ronald Platt (Consultant) George Hillis	Bass Enterprises Production Company
PROTESTANT	
Brian Sullivan (Attorney) Ronald T. Sponberg Peggy Kerr Kenneth O. McDowell Tony McClain K. D. Krawietz	Arco-Permian
William Osborn (Attorney)	Mobil Producing Texas & New Mexico, Inc.

PROCEDURAL HISTORY

Application Filed:	May 10, 1994
Notice of Hearing:	June 10, 1994
Hearing Held:	July 19, 1994
Transcript issued:	August 23, 1994
PFD Circulated	October 18, 1994
Heard by:	Jeffrey T. Pender, Hearings Examiner James Irwin, Technical Examiner

STATEMENT OF THE CASE

Bass Enterprises Production Company ("Bass") has applied for a permit to drill its Well No. 2 on the 1116.34 acre M.H. Goode Estate 4 Lease in the Brown-Bassett (Ellenburger) and Wildcat Fields, Terrell County, Texas (see attached plat). The Brown-Bassett (Ellenburger) requires 1320' lease-line, 2640' between-well and 640 acre density. The drilling unit for the proposed well contains 476.34 acres but does qualify as a tolerance well under the field rules. The location of the proposed well is 2,007' from the location of the nearest well in the field, the M.H. Goode Estate #4-1, thereby requiring a Rule 37 exception. Bass argues the exception is necessary to prevent confiscation and waste.

The application was protested by Arco-Permian ("Arco") and Mobil Exploration & Production Company ("Mobil") who own leases to the south and east of the subject lease. The protestants put on a direct case and cross-examined the applicant's witnesses.

There is disagreement among the parties concerning the basic reservoir parameters used to make the gas reserves calculations. Bass calculates porosity-feet (φh) to be 38.5 (from h=1482' and φ=.026) which is almost seven times greater than Arco's calculated value of 5.99 (from h=107' and φ=.056). Accordingly, Bass believes there are 36.9 BCF of recoverable gas reserves under the M.H. Goode Estate 4 Lease. Adding to that, the 21 BCF cumulative production from the sole well on the lease (#4-1), Bass estimates that it is entitled to recover a total of 57.9 BCF from its lease. Arco believes that Bass' share is 17.1 BCF, the amount under the lease at the time the #4-1 well was completed.

The parties also disagree on the magnitude of throw across a major northwest - southeast trending fault on the lease. If the applicant's theory is correct, there is sufficient structural elevation on the downthrown block to the north of the proposed well such that the downthrown block would be productive of hydrocarbons. Therefore acreage over the downthrown block would be eligible to be included in the proposed well's proration unit. If the protestant's theory is correct, the downthrown block to the north is too deep to be productive of hydrocarbons and can not be included in the proration unit for the proposed well.

DISCUSSION

APPLICANT'S CASE

George Hillis, a geologist for Bass, presented all of the well data and interpretation of that data in support of the applicant's theory of the fault conditions in the Brown-Bassett and the adjacent J.M. Ellenberger Fields. Their interpretation of the structure at the Top Ellenburger is presented in Bass Exhibit 3. The interpretation is based on well data and previous geologic studies.

In the area of the proposed well, Hillis interprets a northwest-southeast trending fault ("Fault E") about 500 feet north of the proposed location dropping the northern-most block (within the proposed drilling and proration unit) down to the north approximately 1,300 feet.

Ronald Platt, a consultant for Bass presented several exhibits. His Exhibit 6 indicates that a regular location can only be drilled within a "triangular" area inside block 6 (see attached plat). All of the area inside the "triangular" area is on the downthrown block. The "hypotenuse" or long side of the triangle corresponds to the (-12,250') contour below which, Mr. Platt does not expect to find recoverable gas reserves. Mr. Platt presented in other exhibits, initial bottom hole pressure versus time plots tending to show that there is pressure communication across Fault E at the Ellenburger level. This was not disputed by Arco.

Platt argues that Bass should not be required to drill a well at a regular location on the downthrown block. A well on the downthrown block would not drain all recoverable gas on the upthrown block because of early natural water encroachment. He argues that the recoverable gas left on the upthrown block would not be drained by any other well at a regular location thereby causing waste.

In Exhibits 19 through 26, Mr. Platt attempted to show that today, it would be uneconomic to target the Ellenburger in the Brown-Bassett Field below (-11,850') because of excessive water production. Though there are currently wells that produce bypassed and dissolved gas from below this level it would not be economic to make these reserves the primary target.

Mr. Platt estimates the original gas-in-place (OGIP) under the subject lease to be 161 BCF. This assumes an initial gas-water contact at (-12,600'), an original reservoir pressure of 6,760 psia, an average water saturation of 35% (assuming formation water resistivity, Rw=0.29), a reservoir thickness of 1482'(consisting of the entire penetrated and unpenetrated gross Ellenburger interval) and an average porosity of 2.6%. He calculated the OGIP for the separate fault blocks south of Fault E (357 acres) and north of Fault E (approximately 254 acres). OGIP north of the fault is 50.28 BCF and south of the fault, 110.54 BCF.

In calculating the estimated remaining volumetric recoverable gas reserves, Mr. Platt employed several other assumptions. Because Bass believes that bypassed and dissolved gas below (-11,850') will be produced, Mr. Platt has accounted for the gas contributions above and below this level. Recoverable reserves above this level are calculated assuming a water saturation of 35%. Below this level a water saturation of 60% is used. An abandonment pressure of 500 psia is also assumed.

Assuming these conditions, Mr. Platt calculates remaining recoverable reserves south of Fault E total 27.33 BCF. The area north of Fault E should yield 9.56 BCF. Therefore, the total estimated remaining reserves total 36.9 BCF. The Goode Estate #4-1 should recover only 20.4 BCF of those remaining reserves before it is abandoned. That implies that 16.5 BCF of the tract's remaining

reserves will not be recovered without the proposed well. The M.H. Goode Estate #4-1 has cumulative production of 20.98 BCF and currently produces 9.433 MMCFD.

PROTESTANT'S CASE

On cross-exam and in their direct case, Arco presented arguments refuting Bass' technical testimony in three relevant areas:

1. Determination of net pay ("h")
2. Determination of water saturation ("Sw")
3. Position and magnitude of the controlling faults

Determination of net pay:

Bass used a porosity of 2.6% derived from inspection of logs across the entire Ellenberger interval and an "h" value of 1482', equal to the entire penetrated and unpenetrated Ellenberger gross interval. On cross-exam, Mr. Platt alluded to doing some adjustment of his porosity picks based on saturations but did not elaborate.

Arco's approach was to do a computer-assisted digital log analysis with a net pay cutoff at water saturation = 50% and volume of clay = 35%. Arco's computer analysis came up with 107 net feet of pay out of a gross penetrated Ellenburger section of 1225 feet. On cross-exam Arco did admit that it could be leaving out some gas pay using these cutoff parameters.

Determination of water saturation:

Bass presented the results of a water analysis on produced water from the storage tank at the M.H. Goode No. 4-1 location. The results show formation water resistivity, Rw (at 77 F) equal to 0.29 and the resulting water saturation Sw, equal to 35%. The remarks accompanying the report state, "It is apparent in comparing the above with our records that the water at this time is all, or nearly all, natural Ellenburger."

Arco claims that this result is not the proper Rw to use when calculating water saturation. The proper Rw for reserve calculation purposes would be that Rw extrapolated to reservoir temperature. Arco estimates the in situ Rw to be 0.083. Its resulting Sw value is 17.9%.

Position and magnitude of the controlling faults:

Bass presented no seismic evidence to support their fault picks. Their structural interpretation was made strictly from the well data and other geologic studies. Arco maintains that the several seismic lines presented, including those shot across the Bass' acreage, show that Bass' fault interpretation is incorrect.

Arco contends that their seismic line #4 shows a major down-to-the-north fault just north of Bass' proposed location. Arco places this fault at the same location as Bass' fault "E". However, unlike Bass' interpretation, there is no fault "B" or "D" (see Bass Exhibit 3) out in front of the main fault. Based on Mr. McDowell's testimony, there is about 2,750' of throw on the fault in front of the proposed location. Bass' fault "E" shows only 1300' to 1400' of throw.

Bass estimates the top of the Ellenburger at the proposed location at about (-10785'). Adding Arco's estimate of 2750' of throw to that would push the top of the Ellenburger down to -13,535, about 1000' low to the original gas-water contact in the field. Therefore, if Arco's seismic interpretation is correct, there can be no productive acreage on the lease north of the main fault.

Arco estimates the OGIP to be 23.6 BCF assuming no productive acreage north of the fault, an original reservoir pressure of 5620 psia, an abandonment pressure of 700 psia, porosity of 5.6%, a net pay of 107' and water saturation of 17.9%. This is 6.8 times smaller than Bass' OGIP estimate. Of the 23.6 BCF originally in place, Arco estimates that only 20.7 BCF was originally recoverable. Arco estimates that at the time the M.H. Goode Estate #4-1 was completed there was 17.1 BCF recoverable reserves under the tract implying that some off-lease drainage of the original 20.7 BCF had occurred.

It is unrefuted that the M.H. Goode Estate #4-1 has recovered 20.98 BCF up to March, 1994. Then according to Arco, this is 3.9 BCF more than its share. Bass has already recovered more than its share of hydrocarbons under the lease and will recover another 20.4 BCF from Well #4-1 before it is abandoned.

EXAMINERS' RECOMMENDATION

The examiners believe that Bass did not meet its burden to prove the necessity for an exception to Rule 37 to prevent confiscation or waste.

Confiscation

The examiners believe that the M.H. Goode Estate 4-1 Well will recover all recoverable gas under the lease because the acreage north of the fault is not productive.

Bass claims that of the 161 BCF OGIP, there is 16.5 BCF remaining under the lease that will not be recovered by the existing well. According to Arco, there was only 23.6 BCF OGIP and Bass has already recovered 20.98 BCF from the existing well. It is undisputed that the existing well will recover an additional 20.4 BCF before the well is abandoned.

The factor most responsible for the six to seven-fold difference in OGIP calculations is the "porosity-feet" estimate. Arco determined porosity-feet equals 5.99. Bass' value for porosity-feet is 38.5. The examiners believe Arco's estimate of porosity-feet is more accurate. Arco performed a foot by foot "net pay" analysis of the logs using defined and reasonable cutoffs for water saturation

and percent clay content. By their own testimony, Bass did not employ the use of such cutoffs. (I Tr. 161;14). Instead, Bass used the entire Ellenburger thickness times an estimated average porosity.

Bass used the wrong value for Rw and hence derived an overly pessimistic estimate of water saturation. They should have extrapolated the value reported by the lab to insitu reservoir conditions. This casts doubt on the credibility of Bass' evidence especially since using the correct value would have been to their benefit by leading to higher calculated reserves.

Bass' fault interpretation can not stand in the face of Arco's strong seismic evidence to the contrary. The lines as processed and presented, though recorded in the 1970's, exhibit a fair to good signal-to-noise ratio at the Ellenburger event. The data show a large down-to-the-northeast fault at the same location on the subject lease as Bass' fault "E" but with over twice the vertical throw and with no additional splay faults further to the north. The resulting structural interpretation predicts no productive acreage north and east of the fault.

Waste

Because the examiners believe Arco's seismic interpretation, there is no productive acreage north of the fault. The only productive acreage on the lease is south of the fault. There is no recoverable gas under the lease in the southern fault block that can not be drained by the existing M.H. Goode Estate 4-1 Well.

FINDINGS OF FACT

1. Notice of hearing was given by first class mail at least 10 days before the hearing to all designated operators, lessees of record for tracts that have no designated operator, and owners of record of unleased mineral interests for each adjacent tract and each tract within 1320 feet of the proposed location.

2. Bass Enterprises Production Company has submitted a Form W-1, dated May 10, 1994 to drill its Well No. 2, M.H. Goode Estate 4 Lease, in the Brown-Bassett (Ellenburger) and Wildcat Fields, Terrell County, Texas.

    a. The Brown-Bassett (Ellenburger) requires 1320' lease-line spacing, 2640' between-well spacing and 640 acre density.

    b. The Wildcat field requires 467' lease-line spacing, 1200' between-well spacing and 40 acres density.

3. The proposed well location is 2007' from the location of the M.H. Goode Estate No. 4-1.

4. Bass proposes to drill the well on the remaining 476.34 acres of the 1116.34 acre M.H. Goode Estate 4 lease.

5. Bass's determination of net pay, water saturation and the position and magnitude of the controlling faults is not reliable.

    a. Bass' estimate of porosity-feet included Ellenburger section not penetrated in the immediate area.
    b. Bass did not employ any cutoff values for water saturation and percent clay in making its net pay or porosity-feet calculation.
    c. Bass used the incorrect value for the resistivity of the formation water in calculating water saturation.
    d. Bass' fault interpretation is not reasonable in light of the seismic data presented by Arco.

6. Arco's determination of net pay, water saturation and the position and magnitude of the controlling faults is more reliable than Bass' determinations.

7. Bass will recover its share of hydrocarbons under the lease or the equivalent in kind from the existing well on the lease.

    a. At the time the M.H. Goode Estate No. 4-1 was drilled, there was 17.1 BCF of recoverable reserves under the tract.

    b. The M.H. Goode Estate No. 4-1 recovered 20.98 BCF as of March of 1994 and will recover another 20.4 BCF before it is abandoned.

8. There will be no ultimate loss of a substantial amount of hydrocarbons if this application is not granted.

    a. All of the remaining reserves under the subject lease can be drained by existing wells.

CONCLUSIONS OF LAW

1. Proper notice of hearing was timely given to all persons legally entitled to notice.

2. All things have occurred and have been done to give the Commission jurisdiction to decide this matter.

3. Bass can receive its share of hydrocarbons under the M.H. Goode Estate 4 Lease in the Brown-Bassett (Ellenburger) Field, or the equivalent in kind, from the existing M.H. Goode Estate 4-1 and is therefore not entitled to an exception to Rule 37 to prevent confiscation.

4. There will be no ultimate waste of a substantial amount of oil or gas if the applicant is not granted an exception.

5. An exception to Rule 37 is not necessary to prevent waste.

Respectfully submitted,

Jeffrey T. Pender,
Hearings Examiner

James Irwin,
Technical Examiner

JTP/kam