

March 20, 2002

**OIL AND GAS DOCKET NO. 03-0230706**

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**THE APPLICATION OF VENUS EXPLORATION INC. TO ADOPT RULES AND PERMANENTLY CLASSIFY THE CONSTITUTION (WESTBURY) FIELD AS A GAS FIELD, JEFFERSON COUNTY, TEXAS**

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**Heard by:** Margaret Allen, Technical Hearings Examiner

**Procedural history**

Application received: February 19, 2002

Hearing held: March 19, 2002

**Appearances**

John Soule  
Greg Cloud  
Jeff Bookout

Representing  
Venus Exploration Inc.

**EXAMINER'S REPORT AND RECOMMENDATION**

**STATEMENT OF THE CASE**

Venus Exploration is seeking to have the Constitution (Westbury) Field permanently classified as a gas field. It is also seeking to adopt the following two rules:

1. Designated interval from 13,800 to 14,350' as shown on the log of the Texaco (now Tri-Union) Westbury Farms Well No. 1; and
2. allocation based 75% on deliverability and 25% per well.

Venus would also like to have the overproduction of all of the wells in the field canceled.

**DISCUSSION OF THE EVIDENCE**

The Constitution (Westbury) Field is a non-associated gas field discovered in 1979, with the completion of the Texaco Westbury Farms Well No. 1. This well was first perforated from 14,316 to 14,336 feet and encountered a bottom-hole reservoir pressure of 12,768 psia. A fluid sample was recombined at initial reservoir temperature (200EF) and pressure and the recombined fluid was evaluated at various pressures. The reservoir fluid was single phase gas until the reservoir pressure reached 4900 psig (the retrograde dew point pressure), when small amounts of liquid began to condense from the gas. The highest percentage of liquid in the reservoir, 10.58%, would be reached when the bottomhole pressure declined to 2000 psi.

In 1985, Texaco recompleted this well to a shallower sand, perforating from 14,102 to 14,124 feet. A bottomhole pressure of 7666 psia was reported, which Venus testified was probably inaccurate.

In June of 2000, the current operator, Tri-Union, again re-completed this well, this time with perforations between 13,806 and 13,860 feet. The bottom-hole reservoir pressure in this sand was reported to be 12,000 psia and another PVT analysis showed the dew point pressure to be 4523 psia.

The three producing sandstones are separate reservoirs, requiring an allocation formula based on two different factors for statutory reasons. One based 75% on deliverability and 25% per well is similar to Statewide Rules and will satisfy the statutory requirement. The applicant believes the three sandstones in the proposed designated interval (13,800' to 14,350' in the discovery well) each contain a gas-condensate reservoir.

After the field was discovered, Texaco completed four additional wells which were classified as gas wells. These were completed sequentially in various of the three sandstone reservoirs. The bottom-hole reservoir pressures measured when each well was first perforated in a sandstone ranged from 11,288 to 12,077 psia. The dew points, where PVT analyses were made, ranged from 3570 to 5020 psia. All of these wells except the discovery well have been abandoned in this interval.

Beginning in 1998, Venus completed four wells within the proposed designated interval. Venus submitted PVT analyses to the Commission to support classification of all four wells as gas wells. Based on the PVT data, all were classified as gas wells, subject to review by the Commission at a later date. Venus requested this hearing in order to have the wells and field permanently classified as gas-producing. Otherwise, Commission staff will reclassify the wells as oil wells when the bottomhole pressure in each well declines to a level where there less than than 100,000 cubic feet of gas per barrel of liquid in the reservoir, based on the PVT analysis.

The PVT data are not identical for all four wells, but generally show that the gas-liquid ratio in the reservoir falls below 100,000 cubic feet per barrel when the reservoir pressure falls below 3650 to 3839 psig. The maximum amount of liquid in the reservoir was less than 10% for three of the four wells, though the fourth well would apparently have as much as 20% liquid when the pressure was sufficiently depleted.

The PVT results from Venus' wells are shown in the following table:

	First measured bottomhole pressure, psia	PVT analysis of dew point pressure, psia	Bottomhole pressure where well is reclassified to oil	Maximum % liquid content in reservoir	Reservoir pressure when liquid % is highest
Westbury Farms #1	11758 in '98 11705 in '99	4494 4830	not stated 3652	20.77 14.65	1232 1778
Apache Gas Unit #1	8423	4694	3839	6.3	973
Paggi Gas Unit #1	6155	4321	3755	9.25	994

Kolander #1	10995	4429	3736	9.33	1396
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It is widely accepted that oil in a reservoir is essentially immobile until it reaches a saturation of 10 to 20%<sup>1</sup>. Venus believes all of its wells should continue to be permanently classified as gas wells because the small volume of liquid in the reservoir below approximately 3800 psig is not mobile and will not be recovered as liquid.

Statewide Rule 79 defines a gas well as:

....a well which produces hydrocarbon liquids, a part of which is formed by a condensation from a gas phase and a part of which is crude petroleum oil, shall be classified as a gas well unless there is produced one barrel or more of crude petroleum oil per 100,000 cubic feet of natural gas; and that the term "crude petroleum oil" shall not be construed to mean any liquid hydrocarbon mixture or portion thereof which is not in the liquid phase in the reservoir, removed from the reservoir in such liquid phase, and obtained at the surface as such.

Venus believes that because the liquid hydrocarbons in the reservoir are immobile, the liquid produced at the surface does not meet the definition of 'crude petroleum oil'. Instead, the produced liquid is a product of condensation and should not be used as a basis for classification of the wells as oil wells.

Venus has also requested cancellation of overproduction by any wells in the field. Only the Paggi Gas Unit had overproduction--18 MMCF on March 1 2002, due to the late filing of a report on the well's shut-in wellhead pressure. The report has since been filed and this well, along with the others in the field, still shows a reservoir pressure above the dew point.

### **EXAMINER'S OPINION**

The examiner recommends that the application be approved for wells in the Constitution (Westbury) Field. This is a retrograde condensate reservoir, which is initially a single-phase gas reservoir. At some time during the life of the field, liquid hydrocarbons will exist in the reservoir at a ratio of less than 100,000 cubic feet per barrel. However, the liquid hydrocarbons will be present at a maximum volume of 10 to 20% of the hydrocarbon pore space. Most or all of this volume is immobile, according to published literature which states that liquid saturations must be in the range of 10 to 20% before the hydrocarbon liquids in the reservoir become mobile. Therefore, the bulk of any liquid hydrocarbons produced at the surface have condensed from the gas and do not meet the statutory definition of crude petroleum oil. The condensed liquids should not be considered in determining the gas-oil ratio because most of the liquids produced at the surface are not crude petroleum oil. The wells in this field should be permanently classified as gas wells.

### **FINDINGS OF FACT**

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<sup>1</sup> Craft and Hawkins, 1954, *Applied Petroleum Reservoir Engineering*

1. Notice of this hearing was given to all operators and interest owners in the Constitution (Westbury) Field on February 19, 2002.
2. The Texaco (now Tri-Union) Westbury Farms Well No. 1 was designated as the discovery well of the Constitution (Westbury) Field in 1979, and was classified as a gas well based on PVT analysis.
3. The discovery well has produced from three different reservoirs, all of which contain a retrograde condensate.
  - a. The first sandstone was perforated between 14,316 and 14,336 feet, and encountered a reservoir pressure of 12,768 psia.
  - b. In 1985, the well was recompleted to a sandstone between 14,102 to 14,124 feet, but the reported bottomhole pressure of 7666 psia was probably inaccurate.
  - c. In 2000, the well was again recompleted, this time with perforations between 13,806 and 13,860 feet which encountered a bottom-hole reservoir pressure of 12,000 psia.
  - d. PVT analyses showed retrograde dew points of 4900 psi in fluid from the first perforations and 4523 psi in the third perforation set.
  - e. The highest percentage of liquid in the reservoir, 10.58%, would be reached when the bottomhole pressure declined to 2000 psi.
4. The various sandstones between 13,800 to 14,350', as shown on the log of the Texaco (now Tri-Union) Westbury Farms Well No. 1, are productive in one or more of the wells in the Constitution (Westbury) Field.
5. A two-factor allocation formula is necessary for statutory reasons due to the multiple reservoirs within the designated interval.
6. A formula based 25% per well and 75% on deliverability is close to the Statewide allocation formula, and will satisfy the statutory requirements.
7. The dew points measured in Venus' wells ranged from 4429 to 4830 psi and the bottomhole pressures where the gas-liquid ratios will decrease to less than 100,000 cubic feet per barrel ranged from 3652 to 3839 psi.
8. The maximum percentage of hydrocarbon pore space occupied by retrograde liquid in three of the wells will be less than 10%.
9. All of the liquid hydrocarbons produced at the surface from these wells will be the product of condensation and should not be classified as crude petroleum oil.
10. Venus' Westbury Farms Well No. 1 is producing from the same uppermost sandstone as three of the other four wells in the field, but two PVT analyses from this well showed over 10% liquid

may be possible in the reservoir when the pressure drops below about 3200 psi.

- a. A PVT test from 1998 showed this well's reservoir will have up to 20.77% liquid when the bottomhole pressure decreases to 1232 psi.
  - b. A 1999 PVT test from this well showed its reservoir will have 14.65% liquid at a bottomhole pressure of 1778 psi.
11. The Venus Westbury Farms Well No. 1 reservoir is probably more similar to those of the other wells than these tests show, but in any event, most of the liquid hydrocarbons produced at the surface from the this well will be the product of condensation and should not be classified as crude petroleum oil.
  12. Because little or no crude petroleum oil will be produced from this field, wells in the Constitution (Westbury) Field should be classified as gas wells.
  13. Cancellation of the overproduction for Venus' Paggi Gas Unit Well No. 1 is due to a late filing and cancellation of this well's overproduction will not harm correlative rights.

#### **CONCLUSIONS OF LAW**

1. Proper notice was given as required by statute.
2. All things have been done or occurred to give the Railroad Commission jurisdiction to resolve this matter.
3. The wells in the Constitution (Westbury) Field are completed in gas reservoirs based on the definition of gas wells pursuant to Statewide Rule 79(a)(11)(C).
4. The proposed field rules will satisfy statutory requirements and promote orderly development of the reservoirs.

#### **EXAMINER'S RECOMMENDATION**

Based on the above findings and conclusions, the examiner recommends that the Constitution (Westbury) Field be permanently classified as a gas field, and that the proposed field rules be adopted.

Respectfully submitted,

Margaret Allen  
Technical Hearings Examiner

Date of Commission Action: April 9, 2002