**STATE OF NEW MEXICO**
**ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT**
**OIL CONSERVATION DIVISION**

**IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION DIVISION FOR THE PURPOSE OF CONSIDERING:**

**CASE NO. 11996**
**Order No. R-11133**

**APPLICATION OF PENDRAGON ENERGY PARTNERS, INC. AND J. K. EDWARDS ASSOCIATES, INC. TO CONFIRM PRODUCTION FROM THE APPROPRIATE COMMON SOURCE OF SUPPLY, SAN JUAN COUNTY, NEW MEXICO.**

## ORDER OF THE DIVISION

**BY THE DIVISION:**

This case came on for hearing at 8:15 a.m. on July 28-30, 1998, at Santa Fe, New Mexico, before Examiner David R. Catanach.

NOW, on this 5th day of February, 1999, the Division Director, having considered the testimony, the record and the recommendations of the Examiner,

**FINDS THAT:**

(1) Due public notice has been given and the Division has jurisdiction of this case and its subject matter.

(2) The applicants, Pendragon Energy Partners, Inc., and J. K. Edwards Associates, Inc., (collectively "Pendragon"), pursuant to Rule (3) of the Special Rules and Regulations for the Basin-Fruitland Coal Gas Pool set forth in Division Order No. R-8768, as amended, seek an order confirming that the following described wells, completed within the vertical limits of the WAW Fruitland Sand-Pictured Cliffs Gas Pool or the Basin-Fruitland Coal Gas Pool, are producing from the appropriate common source of supply and providing further relief as the Division deems necessary:

**WAW Fruitland Sand-Pictured Cliffs Gas Pool Producing Wells**

| Operator | Well Name & API Number | Well Location |
|---|---|---|
| Pendragon Energy Partners, Inc. | Chaco No. 1 (API No. 30-045-22309) | 1846' FNL & 1806' FWL, Unit F, Section 18, T-26N, R-12W |
| Pendragon Energy Partners, Inc. | Chaco No. 2R (API No. 30-045-23691) | 1850' FSL & 1850' FWL, Unit K, Section 7, T-26N, R-12W |
| Pendragon Energy Partners, Inc. | Chaco No. 4 (API No. 30-045-22410) | 790' FNL & 790' FWL, Unit D, Section 7, T-26N, R-12W |
| Pendragon Energy Partners, Inc. | Chaco No. 5 (API No. 30-045-22411) | 790' FSL & 790' FEL, Unit P, Section 1, T-26N, R-13W |
| Pendragon Energy Partners, Inc. | Chaco Limited No. 1J (API No. 30-045-25134) | 1850' FSL & 1750' FWL, Unit K, Section 1, T-26N, R-13W |
| Pendragon Energy Partners, Inc. | Chaco Limited No. 2J (API No. 30-045-23593) | 790' FNL & 1850' FEL, Unit B, Section 1, T-26N, R-13W |

**Basin-Fruitland Coal Gas Pool Producing Wells**

| Operator | Well Name & API Number | Well Location |
|---|---|---|
| Whiting Petroleum Corp. | Gallegos Fed 26-12-6 No. 2 (API No. 30-045-28898) | 886' FSL & 1457' FWL, Unit N, Section 6, T-26N, R-12W |
| Whiting Petroleum Corp. | Gallegos Fed. 26-12-7 No. 1 (API No. 30-045-28899) | 2482' FSL & 1413' FWL, Unit K, Section 7, T-26N, R-12W |
| Whiting Petroleum Corp. | Gallegos Fed. 26-13-1 No. 1 (API No. 30-045-28881) | 828' FNL & 1674' FEL, Unit B, Section 1, T-26N, R-13W |
| Whiting Petroleum Corp. | Gallegos Fed. 26-13-1 No. 2 (API No. 30-045-28882) | 1275' FSL & 1823' FWL, Unit N, Section 1, T-26N, R-13W |
| Whiting Petroleum Corp. | Gallegos Fed. 26-13-12 No. 1 (API No. 30-045-28903) | 1719' FNL & 1021' FEL, Unit H, Section 12, T-26N, R-13W |

(3) Whiting Petroleum Corporation and Maralex Resources, Inc., (collectively "Whiting"), interest owners within the Gallegos Federal 26-12-6 No. 2, 26-12-7 No. 1, 26-13-1 No. 1, 26-13-1 No. 2 and 26-13-12 No. 1, appeared at the hearing in opposition to the application and to present evidence and testimony to support their position that the Pendragon Chaco wells, described in Finding No. (2) above, are producing:

a) from a sandstone interval located within the Fruitland formation; and

b) coal gas from the Basin-Fruitland Coal Gas Pool due to the establishment of communication between the Basin-Fruitland Coal and WAW Fruitland Sand-Pictured Cliffs Gas Pools within the Pendragon Chaco wellbores.

(4) Merrion Oil & Gas Corporation, an interested party, appeared and presented a statement at the conclusion of proceedings.

(5) All eleven wells that are the subject of this application are located within an area (hereinafter referred to as the "subject area") that comprises:

TOWNSHIP 26 NORTH, RANGE 12 WEST, NMPM
Section 6: W/2
Section 7: W/2
Section 18: NW/4

TOWNSHIP 26 NORTH, RANGE 13 WEST, NMPM,
Section 1: All
Section 12: N/2

(6) The "subject area" is located within the horizontal boundaries of the Basin-Fruitland Coal Gas Pool created by Division Order No. R-8768 dated October 17, 1988. The vertical limits of this pool, as defined by Ordering Paragraph (1) of Order No. R-8768, are as follows:

> "all **coal seams** within the equivalent of the stratigraphic interval from a depth of approximately 2,450 feet to 2,880 feet as shown on the Gamma Ray/Bulk Density log from Amoco Production Company's Schneider Gas Com "B" Well No. 1 located 1110 feet from the South line and 1185 feet from the West line of Section 28, Township 32 North, Range 10 West, NMPM, San Juan County, New Mexico".

(7) Order No. R-8768 further established Special Rules and Regulations for the Basin-Fruitland Coal Gas Pool including provisions for standard 320-acre gas spacing and proration units with wells to be located no closer than 790 feet from the outer boundary of the proration unit nor closer than 130 feet from any quarter section line nor closer than 10 feet from any quarter-quarter section line or subdivision inner boundary. In addition, wells are to be located in the NE/4 or SW/4 of a single governmental section.

(8) The "subject area" is also located within the horizontal boundaries of the WAW Fruitland Sand-Pictured Cliffs Gas Pool. The vertical limits of this pool comprise all of the Pictured Cliffs formation (Order No. R-4260 dated February 22, 1972) and all the **sandstone** intervals of the Fruitland formation (Order No. R-8769 dated October 17, 1988). The WAW Fruitland Sand-Pictured Cliffs Gas Pool is currently governed by Division Rule 104.C., which requires standard 160-acre gas spacing and proration units with wells to be located no closer than 790 feet from the outer boundary of the spacing unit nor closer than 130 feet from any quarter-quarter section line or subdivision inner boundary.

(9) The evidence and testimony presented by both parties in this case is generally in agreement that Pendragon and Whiting received assignments of oil and gas leases in all or portions of the "subject area" from common grantors, Robert Bayless (Bayless) and Merrion Oil and Gas Corporation (Merrion), during the period from 1992-94. The assignments of rights to Whiting are as follows:

> "Operating rights from the surface of the earth to the base of the Fruitland (Coal gas) Formation subject to the terms and provisions of that certain Farmout Agreement, dated December 7, 1992 by and between Merrion Oil & Gas et al., Robert L. Bayless, Pitco Production Company, and Maralex Resources, Inc."

(10) The assignment of rights to Pendragon are as follows:

> "Leases and lands from the base of the Fruitland Coal formation to the base of the Pictured Cliffs formation."

(11) A brief history of the Pendragon wells, obtained from Division records, is described as follows:

a) the Chaco Well No. 1 was drilled by Merrion and Bayless in February, 1977 to test the Pictured Cliffs formation. The well was perforated and completed in the Pictured Cliffs formation from a depth of 1,113' to 1,139'. The well initially tested in this interval at a rate of approximately 342 MCFGD, 0 BOPD and 0 BWPD. In January, 1995, J. K. Edwards & Associates, Inc. (Edwards) became operator of the well. In January, 1995, the well was fracture stimulated in the perforated interval. In January, 1996, Pendragon became operator of the well;

b) the Chaco Well No. 2R was drilled by Merrion and Bayless in October, 1979 to test the Pictured Cliffs formation. The well was perforated and completed in the Pictured Cliffs formation from a depth of 1,132' to 1,142'. The well initially tested in this interval at a rate of approximately 150 MCFGD, 0 BOPD and 0 BWPD. In January, 1995, Edwards became operator of the well. In January, 1995, the well was fracture stimulated in the perforated interval. In January, 1996, Pendragon became operator of the well;

c) the Chaco Well No. 4 was drilled by Merrion and Bayless in April, 1977 to test the Pictured Cliffs formation. The well was perforated and completed in the Pictured Cliffs formation from a depth of 1,163' to 1,189'. The well was initially tested in this interval at a rate of approximately 480 MCFGD, 0 BOPD, and 0 BWPD. In January, 1995, Edwards became operator of the well. In January, 1995, the well was acidized with 500 gallons 7 ½ percent HCl. In May, 1995, the well was re-perforated in the interval from 1,163' to 1,189' and fracture stimulated in this interval. In January, 1996, Pendragon became operator of the well;

d) the Chaco Well No. 5 was drilled by Merrion and Bayless in April, 1977 to test the Pictured Cliffs formation. The well was perforated and completed in the Pictured Cliffs formation from a depth of 1,165' to 1,192'. The well initially tested in this interval at a rate of approximately 1029 MCFGD, 0 BOPD and 0 BWPD. In May, 1979 the well was fracture stimulated in this interval. In January, 1995, Edwards became operator of the well. In January, 1995, the well was re-perforated in the interval from 1,165' to 1,192 feet and was fracture stimulated in this interval. In January, 1996, Pendragon became operator of the well;

e) the Chaco Limited Well No. 1J was drilled by Merrion and Bayless in April, 1982 to test the Pictured Cliffs formation. The well was perforated and completed in the Pictured Cliffs formation from a depth of 1,200' to 1,209'. The well initially tested in this interval at a rate of approximately 10 MCFGD, 0 BOPD and a trace of water. In January, 1995, Edwards became operator of the well. In January, 1995, the well was acidized with 500 gallons 7 ½ percent HCl. In January, 1996, Pendragon became operator of the well; and

f) the Chaco Limited Well No. 2J was drilled by Merrion and Bayless in September, 1979 to test the Pictured Cliffs formation. The well was perforated and completed in the Pictured Cliffs formation from a depth of 1,186' to 1,202'. The well initially tested in this interval at a rate of approximately 208 MCFGD, 0 BOPD and 4 BWPD. In October, 1979, the well was fracture stimulated in this interval. In January, 1995, Edwards became operator of the well. In January, 1995, the well was acidized with 500 gallons 7 ½ percent HCl. In January, 1996, Pendragon became operator of the well.

(12) A brief history of the Whiting wells, obtained from Division records, is described as follows:

a) the Gallegos Federal 26-12-6 No. 2 was drilled by Maralex in December, 1992 to test the Basin-Fruitland Coal Gas Pool. The well was perforated and completed in the Fruitland Coal from a depth of 1,138' to 1,157'. The well was subsequently fracture stimulated in this interval. In September, 1995, Whiting became operator of the well;

b) the Gallegos Federal 26-12-7 No. 1 was drilled by Maralex in December, 1992 to test the Basin-Fruitland Coal Gas Pool. The well was perforated and completed in the Fruitland Coal from a depth of 1,131' to 1,150'. The well was subsequently fracture stimulated in this interval. In September, 1995, Whiting became operator of the well;

c) the Gallegos Federal 26-13-1 No. 1 was drilled by Maralex in December, 1992 to test the Basin-Fruitland Coal Gas Pool. The well was perforated and completed in the Fruitland Coal from a depth of 1,158' to 1,177'. The well was subsequently fracture stimulated in this interval. In September, 1995, Whiting became operator of the well;

d) the Gallegos Federal 26-13-1 No. 2 was drilled by Maralex in December, 1992 to test the Basin-Fruitland Coal Gas Pool. The well was perforated and completed in the Fruitland Coal from a depth of 1,047' to 1,208'. The well was subsequently fracture stimulated in this interval. In September, 1995, Whiting became operator of the well; and

e) the Gallegos Federal 26-13-12 No. 1 was drilled by Maralex in December, 1992 to test the Basin-Fruitland Coal Gas Pool. The well was perforated and completed in the Fruitland Coal from a depth of 1,178' to 1,197'. The well was subsequently fracture stimulated in this interval. In September, 1995, Whiting became operator of the well.

***Fruitland Sand vs. Pictured Cliffs Sand Geologic Issue***

(13) In its Chaco Wells No. 1, 4, 5 and its Chaco Limited Well No. 2J, Pendragon is producing from two separate sandstone intervals, hereinafter referred to as the "Upper Sandstone" and "Lower Sandstone" intervals and in its Chaco Well No. 2R and Chaco Limited Well No. 1J, Pendragon is producing only from the "Lower Sandstone" interval, all described as follows. It is the position of Pendragon that the top of the Pictured Cliffs formation occurs in this area at or above the top of the "Upper Sandstone" interval.

| Well Name & Number | "Upper Sandstone" Perforations | "Lower Sandstone" Perforations |
|---|---|---|
| Chaco Well No. 1 | 1,113'-1,119' | 1,134'-1,139' |
| Chaco Well No. 4 | 1,163-1,166' | 1,173'-1,189' |
| Chaco Well No. 5 | 1,165'-1,169' | 1,174'-1,192' |
| Chaco Limited Well No. 2J | 1,186'-1,188' | 1,200'-1,202' |
| Chaco Well No. 2R | None | 1,132'-1,142' |
| Chaco Limited Well No. 1J | None | 1,200'-1,209' |

(14) Whiting agrees that the "Lower Sandstone" interval is within the Pictured Cliffs formation; however, it contends that the top of the Pictured Cliffs formation occurs in this area at the top of the "Lower Sandstone" interval.

(15) Pendragon presented the following geologic evidence and testimony to support its pick for the top of the Pictured Cliffs formation:

a) the perforations in its Chaco wells were made by Pendragon's predecessors in interest, Merrion and Bayless, and were reported to the Division and to the Bureau of Land Management (BLM) on the appropriate well completion forms. All forms filed by Merrion and Bayless indicate that all perforations in the Chaco wells are within the Pictured Cliffs formation. Casing collar survey logs performed in May and June, 1998 establish that none of the Chaco wells were perforated in or re-perforated in the Fruitland Coal formation;

b) the discovery well for the WAW Fruitland Sand-Pictured Cliffs Gas Pool was the WAW Well No. 1, located in Unit L of Section 32, Township 27 North, Range 13 West, NMPM, which was completed on June 20, 1970 by Dugan Production Corporation (Dugan). Dugan picked the top of the Pictured Cliffs formation at a depth of 1,317 feet, which is above the "Upper Sandstone" interval;

c) the discovery well for the Nipp-Pictured Cliffs Gas Pool, located directly southeast of the WAW Fruitland Sand-Pictured Cliffs Gas Pool, was the Chaco Plant Well No. 1, located in Unit O of Section 17, Township 26 North, Range 12 West, NMPM, which was completed in April, 1975 by Dugan. Dugan picked the top of the Pictured Cliffs formation at a depth of 1,132 feet, which is above the "Upper Sandstone" interval;

d) the term "stratigraphic equivalent" as used to define the vertical limits of the Basin-Fruitland Coal Gas Pool essentially means "the same kind of rock material." The primary distinguishing characteristic of the Pictured Cliffs sandstone is its creation in a marine depositional environment. Conversely, the Fruitland Coal and the Fruitland Sandstone were deposited in a non-marine depositional environment;

e) Pendragon's isopach map of the "Upper Sandstone" interval shows the occurrence of that sandstone along the shoreline trending from a northwest to southeast direction in a barrier bar marine littoral environment. The "Upper Sandstone" interval appears as a classic shoreline or chenier-type sand grading from 0 to approximately 13 feet thick toward the northeast where it coalesces into the "Lower Sandstone" or main body of the Pictured Cliffs formation as the sand trends from the shoreline environment on the southwest toward the center of the San Juan Basin to the northeast. The "Upper Sandstone" interval is also continuous in character and correlates over a large area covering portions of four townships;

f) the core analysis for the Lansdale Federal Well No. 1, located in Unit P of Section 7, Township 26 North, Range 12 West, NMPM, establishes that the grain size and sorting throughout the "Upper Sandstone" interval are uniform, which is consistent with a marine depositional environment. The core analysis further indicates that the sand appearing in the "Upper Sandstone" and "Lower Sandstone" intervals is grey, fine-grained, with little variation in clay content, consistent with a marine sand that has been laterally transported to the point where the energy available sorts the sand into uniform size. Sand sorting characteristics of this sort are not consistent with a fluvial deposit with graded bedding and coarsening downward;

g) the Fruitland sands are deposited along a trend from the southwest to the northeast on a channelized basis and those sands thin towards the northeast to the edge of the Pictured Cliffs sandstone body. The Fruitland sands are consistently recognized as non-marine (continental) deposits such as fluvial channels, deltaic-distributary channels and other landward deposits. The Fruitland formation is the non-marine facies consisting of inter-bedded sandstone, mudstone and coal beds deposited landward of the marine facies of the Pictured Cliffs sandstone; and

h) approximately thirty-four (34) wells in this area have been perforated in the "Upper Sandstone" interval in conjunction with other perforated sandstone intervals within the Pictured Cliffs formation. These perforations, which were reported to the Division and to the BLM as being Pictured Cliffs completions, are consistent with the picks for the top of the Pictured Cliffs formation from the WAW Well No. 1 and the Chaco Plant Well No. 1, the discovery wells for the WAW Fruitland Sand-Pictured Cliffs and Nipp-Pictured Cliffs Gas Pools, respectively. This evidence establishes that Pendragon's picks for the top of the Pictured Cliffs formation in its Chaco wells are consistent with those of other operators in this area.

(16) Whiting presented the following geologic evidence and testimony to support its pick for the top of the Pictured Cliffs formation:

a) there are two continuous coal seams within the lower portion of the Fruitland formation in this area. The upper coal seam, characterized by Whiting as the "B" Coal, is approximately 20 feet thick throughout the subject area. The lower coal seam, characterized by Whiting as the "Basal" Coal, varies from 2 to 4 feet thick and overlies the more massive Pictured Cliffs marine sandstone ("Lower Sandstone" interval);

b) the "Upper Sandstone" interval, which is between 2 to 7 feet thick in this area and is located between the "B" Coal and the "Basal" Coal, is a Fruitland sand within the lower portion of the Fruitland formation;

c) Whiting's depositional model, as determined from mapping the various sands in the Fruitland and Pictured Cliffs formations, suggests that the "Upper Sandstone" interval was formed by inland river deposits which filled the area in-between abandoned beach ridges. This type of depositional model suggests that the "Upper Sandstone" interval was deposited in a non-marine environment;

d) a marine environment does not provide the conditions necessary for the development of coal. Coal formation and deposition is representative of an inland environment;

e) due to bioturbation in a lagoonal (marine) depositional environment, the "Upper Sandstone" interval should not exhibit high permeability reservoir type sand; and

f) geologic literature suggests that the top of the Pictured Cliffs formation is usually placed at the top of the massive sandstone below the lower-most coal of the Fruitland formation. Whiting's interpretation of the top of the Pictured Cliffs formation is consistent with such geologic literature.

(17) Upon consideration of the geologic evidence and testimony presented by both parties in this case the ***Division finds that***:

a) the Pictured Cliffs formation was deposited in a marine environment. The Fruitland formation was deposited in a non-marine or inland terrestrial environment (i.e. fluvial channels, deltaic distributary channels, etc.). Both parties are generally in agreement that these criteria should be used in differentiating between the two formations in this area;

b) mapping of the "Upper Sandstone" interval shows a fairly uniform, fairly continuous "sheet" type sand body that appears to trend along a shoreline in a northwest to southeast direction. In contrast, the Fruitland formation is characterized by northeast to southwest trending fluvial and lower coastal-plain deposits;

c) the only available core analysis data (obtained from the Lansdale Federal Well No. 1) shows a similarity in physical description between the sands within the "Upper Sandstone" and "Lower Sandstone" intervals, and shows uniform grain size and sorting within the "Upper Sandstone" interval, which is indicative of a marine depositional environment;

d) the "Upper Sandstone" interval coalesces into the "Lower Sandstone" or main body of the Pictured Cliffs formation as the sand trends from the shoreline environment on the southwest toward the center of the San Juan Basin to the northeast which may be indicative of the same depositional environment;

e) the "Upper Sandstone" interval has been consistently picked by various other operators throughout the developmental history of this area to be contained within the Pictured Cliffs formation. Various regulatory agencies including the Division's Aztec District Office and the BLM have recognized and concurred with these operator's picks;

f) there is sufficient geologic evidence and testimony to adequately explain the development of the small coal seam below the "Upper Sandstone" interval as occurring in a marine depositional environment; and

g) there is insufficient geologic evidence to support Whiting's depositional model which indicates the "Upper Sandstone" interval to be part of the Fruitland formation.

(18) There is sufficient geologic evidence to establish that the "Upper Sandstone" interval is located within the Pictured Cliffs formation, WAW Fruitland Sand-Pictured Cliffs Gas Pool.

(19) Pendragon's Chaco Wells No. 1, 2R, 4, 5 and Chaco Limited Wells No. 1J and 2J are perforated within the appropriate common source of supply, being the WAW Fruitland Sand-Pictured Cliffs Gas Pool.

***Issues Concerning Possible Communication Between the Fruitland Coal and Pictured Cliffs Formations within the Chaco Wells***

(20) Whiting contends that through the process of acidizing and/or fracture stimulation, Pendragon has established communication between the Basin-Fruitland Coal and WAW Fruitland Sand-Pictured Cliffs Gas Pools within the Chaco Wells No. 1, 2R, 4, 5 and the Chaco Limited Wells No. 1J and 2J. Whiting further contends that as a result of this communication, Pendragon is producing significant amounts of coal gas reserves through its Chaco wells. In support of its position, Whiting presented extensive geologic and engineering data.

(21) Pendragon contends that the acidizing and/or fracture stimulation conducted on its Chaco wells did not establish communication between the Basin-Fruitland Coal and WAW Fruitland Sand-Pictured Cliffs Gas Pools, and that the gas reserves currently being produced from its Chaco wells originate from the Pictured Cliffs formation.

***Pressure and Production Data***

(22) The pressure history of the Pendragon Chaco wells is summarized as follows:

| Well No. | Pre-Treatment Wellhead Shut-in Pressure/Date | Treatment Date and Type | Post-Treatment Wellhead Shut-in Pressure/Date |
|---|---|---|---|
| Chaco No. 1 | 137 psi (7/83) | 1/95 Frac'd | 170 psi (2/95) |
| Chaco No. 2R | 110 psi (7/83) | 1/95 Frac'd | 104 psi (3/95) |
| Chaco No. 4 | 97 psi (7/83) | 5/95 Frac'd | 153 psi (5/95) |
| Chaco No. 5 | 121 psi (6/80) | 4/95 Frac'd | 151 psi (5/95) |
| Chaco Ltd. 1J | 87 psi (6/84) | 1/95 Acidized | 158 psi (1/95) |
| Chaco Ltd. 2J | 157 psi (8/80) | 1/95 Acidized | 188 psi (3/95) |

(23) The production history of the Pendragon Chaco wells is summarized as follows:

| Well No. | Initial Production (Original Completion) | Pre-Acidization or Fracture Stimulation Production | Post-Acidization or Fracture Stimulation Production | Current Production |
|---|---|---|---|---|
| Chaco No. 1 | 80 MCF/D | 0 MCF/D | 250 MCF/D | 165 MCF/D |
| Chaco No. 2R | 70 MCF/D | 0-15 MCF/D | 90 MCF/D | 120 MCF/D |
| Chaco No. 4 | 200 MCF/D | 0 MCF/D | 425 MCF/D | 200 MCF/D |
| Chaco No. 5 | 190 MCF/D | 0 MCF/D | 370 MCF/D | 210 MCF/D |
| Chaco Ltd. 1J | 11 MCF/D | 0-10 MCF/D | 0-10 MCF/D | 0-10 MCF/D |
| Chaco Ltd. 2J | 30 MCF/D | 0-10 MCF/D | 0-10 MCF/D | 0-10 MCF/D |

(24) Cumulative gas production from the Pendragon Chaco wells is summarized as follows:

| Well No. | Cumulative Production Drill Date-Pre-Acidization or Fracture Stimulation | Cumulative Production Drill Date-May 31, 1998 | Difference (Post-Acidization or Fracture Stim.) |
|---|---|---|---|
| Chaco No. 1 | 102.8 MMCFG | 377.8 MMCFG | 275.0 MMCFG |
| Chaco No. 2R | 49.3 MMCFG | 99.2 MMCFG | 50.0 MMCFG |
| Chaco No. 4 | 201.8 MMCFG | 591.0 MMCFG | 389.2 MMCFG |
| Chaco No. 5 | 144.8 MMCFG | 507.8 MMCFG | 363.0 MMCFG |
| Chaco Ltd. 1J | 13.9 MMCFG | N/A | N/A |
| Chaco Ltd. 2J | 37.8 MMCFG | N/A | N/A |

(25) The production history of the Gallegos Federal wells is summarized as follows:

| Well No. | Date of Initial Production | Initial Production Rate | Current Production Rate |
|---|---|---|---|
| 26-12-6 No. 2 | 12/93 | 85 MCF/D | 733 MCF/D |
| 26-12-7 No. 1 | 12/93 | 124 MCF/D | 700 MCF/D |
| 26-13-1 No. 1 | 12/93 | 26 MCF/D | 383 MCF/D |
| 26-13-1 No. 2 | 7/93 | 51 MCF/D | 150 MCF/D |
| 26-13-12 No. 1 | 1/94 | 195 MCF/D | 350 MCF/D |

(26) With regards to pressure, production and gas reserve data, Pendragon presented the following engineering and geologic data:

a) in 1977, initial reservoir pressure in the Pictured Cliffs formation ranged between 230-250 psi in the subject area. As production continued into the 1980's, the rate of pressure decline in the Chaco wells, regardless of the volumes of gas produced, was generally the same indicating pressure communication over a large area. As the Chaco wells reached low rates of production during the early to mid 1980's the reservoir pressure was in the range of 90-130 psi. There is very little pressure data available from these wells during the period from 1983 to 1995;

b) in 1995, pressure readings taken from the Chaco Limited Wells No. 1J and 2J (which were not fracture stimulated) and from the Chaco Well No. 4 prior to fracture stimulation indicate that pressures had substantially increased since 1983-84 and ranged from 140 psi to 190 psi. This pressure data indicates that the reservoir pressure in the Pictured Cliffs formation was increasing in its Chaco wells prior to the conductance of fracture stimulations;

c) pressure data for the Chaco Wells No. 4 and 5 reflects that in 1995, these wells were producing at less than 1 percent of their producing rates in 1979 and pressures were equivalent to reservoir pressures in 1979. Such evidence indicates the existence of reservoir or skin damage;

d) there is a lower Pictured Cliffs sandstone interval (identified by the applicant as the "third bench") which is located approximately 14 feet below where the Chaco wells are currently perforated. Although the water saturation in this lower zone is relatively high (67%-78%), this lower zone may be in pressure and production communication and may be acting as a gas recharge source for the main body of the Pictured Cliffs sandstone interval. There is also evidence indicating that a well located in the SW/4 SW/4 of Section 11, Township 26 North, Range 13 West, produced exclusively from the "third bench" of the Pictured Cliffs with cumulative production of approximately 93 MMCF of gas;

e) volumetric reserve estimates of original gas-in-place (OGIP) for the main body and "third bench" of the Pictured Cliffs sandstone interval in the Chaco Wells No. 1, 4, and 5 (based on 160-acre drainage) are summarized as follows:

| Well No. | OGIP (MMCF) Perforated Interval | OGIP (MMCF) "Third Bench" | Total (MMCF) |
|---|---|---|---|
| Chaco No. 1 | 442 | 236 | 678 |
| Chaco No. 4 | 410 | 380 | 790 |
| Chaco No. 5 | 395 | 228 | 623 |

f) remaining gas reserve calculations, based upon decline curve analysis of production subsequent to acizidation and/or fracture stimulation are summarized as follows:

| Well No. | Remaining Reserves MMCF) (As of July 1, 1998) | Drainage Area (Perforated Interval) |
|---|---|---|
| Chaco No. 1 | 178.0 | 236-acres |
| Chaco No. 2R | 94.0 | N/A |
| Chaco No. 4 | 219.0 | 384-acres |
| Chaco No. 5 | 219.0 | 351-acres |
| Chaco Ltd. 1J | 0.0 | N/A |
| Chaco Ltd. 2J | 0.0 | N/A |

g) both volumetric and decline curve analysis indicate that sufficient gas reserves exist in the Pictured Cliffs formation to account for the production from the Chaco wells;

h) the production history of the Chaco wells compared to the pressure data accumulated prior to the acidization and/or fracture stimulations on those wells indicate the reservoir in the immediate vicinity of the wellbores had experienced skin damage or other forms of reservoir damage. As a result, production from the Pictured Cliffs had significantly declined prior to the acidization and/or fracture stimulations;

i) a drop in production for the Pendragon and Whiting wells that occurred in August, 1995 corresponds to and was a result of frequent shut-ins of the El Paso Chaco Plant. This month was also preceded and followed by long periods of unusually high line pressure which may have also contributed to a drop in production in Whiting's wells; and

j) production plots for the Whiting wells shows gas and water production typical for a Fruitland Coal well. The gas and water decline curves for the Whiting wells show no inflections indicating any interference from the Pendragon Chaco wells.

(27) With regards to pressure, production and gas reserve data, Whiting presented the following geologic and engineering evidence and testimony:

a) The acidization and/or fracture stimulations performed by Pendragon on the Chaco wells resulted in significant pressure increases in these wells. The significant pressure increases achieved in these wells was markedly higher than the natural pressure increases experienced in the wells prior to the acidization and/or fracture treatments, and demonstrate that communication between the Pictured Cliffs and Fruitland Coal was established as a result of the treatments;

b) Pendragon introduced evidence at the hearing that pressures in the Chaco Well No. 5 had risen prior to any acidization or fracture stimulation on that well. Well file data indicates, however, that a casing leak occurred in that well prior to May, 1995. In February, 1995, black water was discovered flowing from the bradenhead. Given the evidence of the casing leak, and water behind the column, it is clear that communication in the Chaco Well No. 5 had already been established between the Pictured Cliffs sandstone and the Fruitland Coal prior to January, 1995;

c) by the mid 1980's the Chaco wells exhibited signs consistent with production from a depleting Pictured Cliffs sandstone reservoir. Pressures were steadily declining and production had dropped to low levels (0-15 MCFGD/Well). The decline in both volume of gas and pressure is consistent with a depleted sandstone reservoir;

d) after completion, the Gallegos Federal wells exhibited performance typical of coal seam wells. They produced high volumes of water and virtually no (or little) gas in the initial months of production. Gas production inclined as the wells de-watered and by 1995, gas production was at economic levels except for the Gallegos Federal 26-13-1 Wells No. 1 & 2;

e) following acidization and/or fracture stimulation, the Chaco wells experienced large increases in gas production which is not characteristic of Pictured Cliffs re-stimulations. In each case, production levels exceeded production levels experienced when the wells were originally drilled under virgin reservoir conditions. The increases in production obtained are far greater than results that could be expected had Pendragon simply been overcoming skin damage in the wells;

f) Whiting has calculated original gas-in-place reserves for the Chaco wells utilizing a simulation program, "PROMAT." The results of the "PROMAT" Simulator analysis of the Chaco wells are summarized as follows:

| Well No. | OGIP (MMCF) (Perforated Interval) | Drainage Area |
|---|---|---|
| Chaco No. 1 | 186.0 | 107-acres |
| Chaco No. 2R | 84.0 | 130-acres |
| Chaco No. 4 | 268.0 | 147-acres |
| Chaco No. 5 | 199.0 | 109-acres |
| Chaco Ltd. 1J | N/A | N/A |
| Chaco Ltd. 2J | N/A | N/A |

g) by the end of June, 1997, Pendragon had already produced, with the exception of the Chaco Well No. 2R, gas volumes far in excess of the calculated original gas-in-place for these wells. The Chaco wells have produced significantly more gas from 1995 to the present than they produced in the entire first 15-17 years of production;

h) the evidence of production volumes and pressure data on the Chaco wells since the acidization and/or fracture stimulation in 1995 is consistent with the conclusion that these wells have been producing significant volumes of coal seam gas;

i) typically, Pictured Cliffs producing wells do not exhibit significant water producing rates. The Chaco wells have produced significant volumes of water since the acidizations and/or fracture stimulations were conducted. Such high water producing rates are consistent with production originating from the Fruitland Coal;

j) Pendragon failed to report water production from the Chaco wells prior to February, 1998. Prior to that time, water production data from the Chaco wells is sparse. Pendragon disposed of produced water from its Chaco wells in unlined earthen pits in an area of sandy soils. The result of such disposal is that significant amounts of produced water were disposed of through evaporation and absorption into the soil, thus making it impossible to precisely quantify the volumes of water produced from the Chaco wells since the water production was not recorded by the pumpers or contract operator;

k) water/gas producing ratios for the Chaco wells are generally higher than those for the Whiting wells during the same periods; and

l) since the Chaco wells were shut-in by Order of the Santa Fe County District Court on June 30, 1998, pressure readings on the Chaco wells have confirmed communication with the Fruitland Coal. The shut-in pressure readings on the Chaco wells have fluctuated, such fluctuations coinciding with periods when the Whiting wells were shut-in due to pipeline and plant restrictions and when the Whiting wells went back on production. If there were no communication between the Pictured Cliffs and Fruitland Coal, the Chaco wells should exhibit a stable pressure once static pressure has been achieved.

(28) Upon consideration of the pressure data presented by both parties in this case the ***Division finds that***:

a) there is no pressure data available for the Chaco Well No. 4 and the Chaco Limited Wells No. 1J and 2J during the period from 1983-84 to January, 1995; consequently, it cannot be demonstrated that the pressure increases experienced in these wells occurred **prior** to their acid stimulations which were performed in January, 1995;

b) subsequent to acidization and/or fracture stimulation, the Chaco Wells No. 1, 4, 5, and the Chaco Limited Well No. 2J experienced increases in shut-in wellhead pressure. These pressure increases appear to have occurred as a **result** of the stimulation;

c) there is no pressure data available for any of the Chaco wells during the period from 1983-84 to 1995. The reservoir pressure in the Pictured Cliffs formation during the early to mid 1980's, at which time the Chaco wells were producing at low marginal rates, was approximately 90-130 psi;

d) there is not sufficient evidence to establish that the Chaco wells experienced "skin damage" resulting in premature production decline in the Pictured Cliffs formation;

e) given the state of depletion within the Pictured Cliffs producing interval (perforated interval), any pressure recharge that occurred within the Chaco wells during or subsequent to acidization and/or fracture stimulation originated from a source outside this interval;

f) during late 1994, the Fruitland Coal pressure within the Gallegos Federal wells ranged from approximately 175 to 225 psi. This data indicates that at the time the Chaco wells were acidized and/or fracture stimulated, there existed sufficient pressure within the Fruitland Coal formation to act as a recharge source for the Chaco wells;

g) Pendragon presented no data with regards to the pressure within the "third bench" of the Pictured Cliffs formation; and

h) on June 30, 1998, the Chaco wells were ordered shut-in by the Santa Fe District Court. Recorded wellhead pressures taken on the Chaco wells during the period from June 30-July 13, 1998 (13-day shut-in) showed the pressures to be stable within these wells. On July 14 for a 2-day period, and again on July 23 for a 2 1/2-day period, the Chaco Gas Plant was shut-in and, as a result, production from the Gallegos Federal wells was severely curtailed during these shut-in periods. The data indicates that each of the Chaco wells generally exhibited an increase in shut-in pressure at the times the Gallegos Federal wells' production was curtailed, and generally exhibited a decrease in shut-in pressure at the times normal production from the Gallegos Federal wells resumed.

**(29) The pressure data generally indicate pressure communication between the Pictured Cliffs and Fruitland Coal formations within the Pendragon Chaco wells.**

(30) Upon consideration of the production and gas reserve data presented by both parties in this case the ***Division finds that***:

a) Prior to the acidizations and/or fracture stimulations, the Chaco wells produced at rates ranging from 0-15 MCF gas per day. Post stimulation production from the Chaco Wells No. 1, 2R, 4 and 5 ranged from 90-425 MCF gas per day. Post stimulation production from the Chaco Wells No. 1, 4, and 5 significantly exceeded initial production from these wells at virgin reservoir conditions;

b) the Pictured Cliffs reservoir within the Chaco wells, which exhibited pressure and production decline typical of a sandstone reservoir, appears to have been depleted prior to the acidization and/or fracture stimulations which occurred in 1995;

c) stimulation efforts (acidization) performed on the Chaco Limited Wells No. 1J and 2J did not alter these wells' rates of production. These wells continue to produce at low marginal rates;

d) the significant post stimulation increases in producing rates obtained in the Chaco Wells No. 1, 2R, 4 and 5 cannot solely be attributable to overcoming "skin damage" in the wells. In addition, given the state of depletion within the Pictured Cliffs producing interval, the significant gas reserves being produced from the Chaco Wells No. 1, 2R, 4 and 5 do not likely originate from this interval;

e) Pendragon presented no evidence to demonstrate that there is pressure and/or production communication between the Pictured Cliffs producing interval and the "third bench" of the Pictured Cliffs formation;

f) typically, Pictured Cliffs completions produce very small amounts of water. Fruitland Coal completions are characterized by substantial water production until such time as the reservoir is de-watered;

g) although there is very limited water production data for the Chaco wells prior to February, 1998, testimony by Maralex indicates that as early as August, 1996, it witnessed substantial amounts of water contained within earthen pits at the Chaco well locations. There is further evidence indicating that the Chaco Well No. 1 continues to produce significant amounts of water (640 barrels in March, 1998, 640 barrels in April, 1998);

h) during 1998, water/gas ratios in the Chaco Wells No. 1, 2R and 4 were at least as high, and in some cases substantially higher, than those in the closest offsetting Gallegos Federal wells;

i) combined production data for the five Gallegos Federal wells shows that during 1994 the wells exhibited a fairly constant rate of production incline, which is characteristic of Fruitland Coal gas production. An effect on the Gallegos Federal well's production is evident commencing during the 2nd quarter of 1995, at which time the rate of production incline for the wells decreased;

j) cumulative gas production from the Chaco Wells No. 4 and 5 (591 MMCFG and 508 MMCFG, respectively) has exceeded Pendragon's original gas-in-place volumetric reserve estimates (based upon 160-acre drainage) for the Pictured Cliffs producing interval (410 MMCFG and 395 MMCFG, respectively);

k) there is no evidence to demonstrate pressure and production communication between the Pictured Cliffs producing interval and the "third bench" of the Pictured Cliffs formation within the Chaco wells; consequently, gas reserves contained within the "third bench" of the Pictured Cliffs formation should not be included in any production/gas reserve analysis;

l) Pendragon's decline curve and material balance gas reserve calculations are based upon post-stimulation production data from the Chaco wells. This data may not accurately reflect gas reserves in the Pictured Cliffs formation due to the possible establishment of communication with the Fruitland Coal formation during stimulation; and

m) Whiting's original gas-in-place reserve calculations for the Chaco wells were made utilizing "PROMAT," a reservoir simulation program which utilized historic production data from the Chaco wells prior to acidization and/or fracture stimulation.

**(31) The producing characteristics of the Chaco wells (i.e. high initial producing rates subsequent to stimulation, water production, water/gas ratios, etc.) are indicative of gas production originating from the Fruitland Coal formation rather than the Pictured Cliffs formation.**

**(32) The Pictured Cliffs formation was depleted by the Chaco wells prior to the stimulations performed on these wells in 1995.**

**(33) There is no evidence to support Pendragon's contention that the "third bench" of the Pictured Cliffs formation is the source of production recharge within the Chaco wells.**

**(34) There is some evidence indicating that production from the Gallegos Federal wells has been affected by production from the Chaco wells.**

**(35) Whiting's method and resulting gas reserve calculations for the Chaco wells appears to more accurately depict the original gas-in-place reserves within the Pictured Cliffs formation than those presented by Pendragon.**

***BTU/Gas Analysis Data***

(36) It is Pendragon's position that even though there is a difference in BTU content between Pictured Cliffs and Fruitland Coal gas, BTU content cannot be used as an indicator of communication between the zones for the following reasons:

a) variations in BTU content could be attributable to a number of factors, including variations in reservoir pressure draw-down rates and production over time affecting the production of various gas liquids; and

b) phase change graphs demonstrate that phased transition from gas to liquids in a low permeability reservoir shows significant variations for methane, ethane, propane, butane and pentane. The production of these liquids and the resultant effect on gas BTU content was shown to be affected by a number of factors, including reservoir pressure and rates of production. As a result of these variable, dynamic forces, the various components move through the reservoir at different velocities, affecting the BTU content of the produced gas. As reservoir conditions are historically variable rather than static, the BTU content of the gas is continually affected.

(37) It is the position of Whiting that BTU content of gas can be utilized to demonstrate communication between the Pictured Cliffs and Fruitland Coal. Whiting presented the following engineering evidence and testimony:

a) a sample of 40 wells located within Township 26 North, Ranges 12 and 13 West indicates that the BTU content of Pictured Cliffs gas is generally in the range of 1,050 to 1,150, while the BTU content of Fruitland Coal gas is generally around 1,000;

b) historical data indicates that the BTU content of the Chaco wells prior to acidization and/or fracture stimulation was consistent with Pictured Cliffs produced gas in this area;

c) the gas analysis of the Gallegos Federal wells generally indicates a gas composed of 97-99% methane. The gas analysis of the Chaco wells prior to acidization and/or fracture stimulation generally indicates a gas composed of 90-93% methane; and

d) following the acidization and/or fracture stimulations, the Chaco wells began producing gas with a BTU content and gas analysis consistent with Fruitland Coal seam gas. The evidence presented to the Division demonstrates that the BTU readings on the gas produced in the Gallegos Federal wells and the BTU readings on the gas produced from the Chaco wells has become increasingly similar and consistent overtime, thus indicating that the Chaco wells are producing significant volumes of coal seam gas.

(38) Upon consideration of the BTU content and gas analysis (% methane) data presented by both parties in this case the ***Division finds that***:

a) there is no evidence to support Pendragon's contention that variations in BTU content in its Chaco wells are attributable to factors such as variations in reservoir pressure draw-down rates and production over time affecting the production of various gas liquids;

b) BTU content and gas analysis trends for the Chaco wells prior to acidization and/or fracture stimulation appear to be fairly consistent. In addition, BTU content and gas analysis trends for the Gallegos Federal wells prior to the acidization and/or fracture stimulation of the Chaco wells appears to be fairly consistent;

c) the BTU content decreased and the percentage of methane increased in the Chaco Wells No. 1, 4 and 5 subsequent to acidization and/or fracture stimulation; and

d) the current BTU content and gas analysis of the Chaco wells appears to be more characteristic of Fruitland Coal gas than Pictured Cliffs gas.

**(39) BTU content and gas analysis trends can be utilized as an indicator of communication between the Fruitland Coal and Pictured Cliffs formations.**

**(40) The BTU content and gas analysis data presented generally indicates communication between the Pictured Cliffs and Fruitland Coal formations within the Chaco wells.**

***Fracture Stimulation Data***

(41) The evidence presented by the parties indicates that the foam fracture stimulations performed on the Chaco wells consisted of fluid volumes averaging 31,248 gallons at proppant weights averaging 38,421 pounds injected at treating rates ranging from between 22 to 34 barrels per minute. The evidence further indicates that the foam fracture stimulations performed on the Gallegos Federal wells consisted of fluid volumes averaging 41,030 gallons at proppant weights averaging 72,656 pounds injected at treating rates between 45 to 60 barrels per minute.

(42) Pendragon presented the following engineering evidence and testimony in the area of fracture technology:

a) pressure and injection rate data derived from formation fracture treatments can be used to determine the vertical height growth and horizontal extension of fractures within the formation;

b) lithologic analysis from well logs may be used to design fracture stimulation treatments that remain contained within the target zone or formation. Moreover, changes in lithology and facies will predictably act as a barrier to fracture growth out of zone. Specifically, there is a distinct lithology change at the top of the Pictured Cliffs formation within the Chaco wells;

c) the fracture stimulations performed by Whiting were accomplished at significantly higher rates and higher volumes with fracture fluids of greater viscosity. By comparison, the fracture stimulations performed by Pendragon on its Chaco wells were accomplished at relatively low rates and low volumes;

d) Nolte Plots are an effective and reliable means of determining vertical height growth and extension of formation fractures;

e) the Nolte Plots for the Chaco wells show a slight incline in pressure over the time of the treatment, indicating restricted height growth and lateral extension of the fractures. In contrast, the Nolte Plots for the Gallegos Federal wells show negative slopes, indicating unrestricted, vertical growth and in one case, "run away" vertical fractures;

f) coal is an effective barrier to fracture growth because it is more elastic than the surrounding sandstones. The cleat systems within the coal body also allow for the pressure at the fracture tip to become diffuse, negating the ability of the tip and fluids to fracture into the coal itself;

g) the fracture treatments for the Chaco wells were designed specifically to utilize the thin coal and shale stringers as effective barriers to maintain containment of the fracture. Several examples of this type of fracture design and its effect were demonstrated for wells in the Raton Basin;

h) fracture simulators such as "FRACPRO," which was utilized by Whiting in this case, are generally recognized to exaggerate the height of actual fracture growth, thus making them a less reliable means for determining whether fractures remained confined within zone; and

i) the evidence and data presented are sufficient to support the conclusion that the fracture treatments on the Chaco wells did not escape out of zone and remained contained within the Pictured Cliffs formation. The evidence available is also insufficient to demonstrate that the fracture stimulations performed on the Whiting Gallegos Federal wells resulted in communication between the Pictured Cliffs and the Fruitland Coal.

(43) Whiting presented the following engineering evidence and testimony in the area of fracture technology:

a) the net pressures depicted on the Nolte Plots presented by the applicant in this case were incorrectly calculated and, as a result, applicant's conclusions as to the extent of fracture height growth within the Chaco and Whiting wells cannot be relied upon as accurate;

b) utilizing "FRACPRO," a fracture simulation program, Whiting has determined that the fracture stimulations performed on the Chaco Wells No. 1, 4 and 5 extended upward into the Fruitland Coal interval of the Basin-Fruitland Coal Gas Pool; and

c) as a result of Pendragon's fracture stimulations extending into the Fruitland Coal interval of the Basin-Fruitland Coal Gas Pool, coal gas is being produced from the Chaco wells in substantial quantities.

(44) Upon consideration of the fracture data presented by both parties in this case the ***Division finds that***:

a) the Nolte Plots presented by Pendragon do not appear to accurately reflect the net treating pressure and consequently these plots cannot be relied upon to ascertain whether the fracture stimulations performed on the Gallegos Federal wells resulted in fracturing of the Pictured Cliffs formation and whether the fracture stimulations performed on the Chaco wells resulted in fracturing of the Fruitland Coal formation;

b) the "FRACPRO" simulation data presented by Whiting indicates that the fracture stimulations performed on the Chaco Wells No. 1, 4, and 5 resulted in the fracturing of the Fruitland Coal formation;

c) no fracture simulation data was presented for the Chaco Well No. 2R;

d) no fracture simulation data was presented for the Gallegos Federal wells; and

e) neither Whiting nor Pendragon acted prudently to verify by means of additional testing whether its fracture stimulations extended out of their respective producing horizons;

**(45) There is sufficient evidence to establish that the fracture stimulations performed on the Chaco Wells No. 1, 4 and 5 resulted in the fracturing of the Fruitland Coal formation within the Basin-Fruitland Coal Gas Pool.**

**(46) There is not sufficient evidence to establish that the fracture stimulation performed on the Chaco Well No. 2R resulted in the fracturing of the Fruitland Coal formation within the Basin-Fruitland Coal Gas Pool.**

**(47) There is not sufficient evidence to establish that the fracture stimulations performed on the Gallegos Federal wells resulted in the fracturing of the Pictured Cliffs formation within the WAW-Fruitland Sand Pictured Cliffs Gas Pool, although, given the close proximity of the Pictured Cliffs formation to the Fruitland Coal formation, and given the parameters utilized by Whiting in the fracture treatment of its wells, it is possible that the fracture stimulations performed on the Gallegos Federal wells did result in the fracturing of the Pictured Cliffs formation.**

(48) The preponderance of evidence and testimony presented in this case demonstrates that the Pendragon Chaco Wells No. 1, 2R, 4 and 5 and the Chaco Limited Wells No. 1J and 2J have established communication with the Basin-Fruitland Coal Gas Pool by virtue of acidization and/or fracture stimulation performed on these wells.

(49) The communication established between the Basin-Fruitland Coal and WAW Fruitland Sand-Pictured Cliffs Gas Pools has resulted in significant volumes of coal gas being produced from Pendragon's Chaco Wells No. 1, 2R, 4 and 5. This communication appears not to have affected production from the Chaco Limited Wells No. 1J and 2J.

(50) The evidence and testimony presented in this case is not sufficient to demonstrate that the Whiting Gallegos Federal 26-12-6 No. 2, 26-12-7 No. 1, 26-13-1 No. 1, 26-13-1 No. 2 and 26-13-12 No. 17 have established communication with the WAW Fruitland Sand-Pictured Cliffs Gas Pool by virtue of fracture stimulations performed on these wells.

(51) The communication established between the Basin-Fruitland Coal and WAW Fruitland Sand-Pictured Cliffs Gas Pools within the Chaco wells has resulted in the violation of Whiting's correlative rights.

(52) As a solution to the pool communication within the Chaco wells, Whiting has proposed that the Division order Pendragon to plug and abandon the Chaco Wells No. 1, 2R, 4 and 5 and the Chaco Limited Wells No. 1J and 2J.

(53) Pendragon presented no proposed resolution in the event the Division determines that communication between the Basin-Fruitland Coal and WAW Fruitland Sand-Pictured Cliffs Gas Pools has been established within its Chaco wells.

(54) Pendragon should be given the opportunity to propose a method by which its Chaco wells may be produced exclusively from the WAW Fruitland Sand-Pictured Cliffs Gas Pool, or a method for producing its Chaco wells in their current state which is acceptable to the Division and to Whiting. These proposals should be evaluated at a forum which allows discussion and/or input from Whiting.

(55) Pending Division approval of a method by which Pendragon's Chaco wells may be produced exclusively from the WAW Fruitland Sand-Pictured Cliffs Gas Pool, or a method by which the wells may be produced in their current state which is acceptable to the Division and to Whiting, Pendragon should shut-in its Chaco Wells No. 1, 2R, 4 and 5 and Chaco Limited Wells No. 1J and 2J.

**IT IS THEREFORE ORDERED THAT:**

(1) Pursuant to the application of Pendragon Energy Partners, Inc., and J. K. Edwards Associates, Inc., it is determined that the following described wells are perforated within the Pictured Cliffs formation, WAW Fruitland Sand-Pictured Cliffs Gas Pool. It is further determined that the following described wells are producing from the WAW Fruitland Sand-Pictured Cliffs Gas Pool and the Basin-Fruitland Coal Gas Pool, San Juan County, New Mexico:

| Operator | Well Name & API Number | Well Location |
|---|---|---|
| Pendragon Energy Partners, Inc. | Chaco No. 1 (API No. 30-045-22309) | 1846' FNL & 1806' FWL, Unit F, Section 18, T-26N, R-12W |
| Pendragon Energy Partners, Inc. | Chaco No. 2R (API No. 30-045-23691) | 1850' FSL & 1850' FWL, Unit K, Section 7, T-26N, R-12W |
| Pendragon Energy Partners, Inc. | Chaco No. 4 (API No. 30-045-22410) | 790' FNL & 790' FWL, Unit D, Section 7, T-26N, R-12W |
| Pendragon Energy Partners, Inc. | Chaco No. 5 (API No. 30-045-22411) | 790' FSL & 790' FEL, Unit P, Section 1, T-26N, R-13W |
| Pendragon Energy Partners, Inc. | Chaco Limited No. 1J (API No. 30-045-25134) | 1850' FSL & 1750' FWL, Unit K, Section 1, T-26N, R-13W |
| Pendragon Energy Partners, Inc. | Chaco Limited No. 2J (API No. 30-045-23593) | 790' FNL & 1850' FEL, Unit B, Section 1, T-26N, R-13W |

(2) It is further determined that the following described wells are producing singly from the Basin-Fruitland Coal Gas Pool:

| Operator | Well Name & API Number | Well Location |
|---|---|---|
| Whiting Petroleum Corp. | Gallegos Fed 26-12-6 No. 2 (API No. 30-045-28898) | 886' FSL & 1457' FWL, Unit N, Section 6, T-26N, R-12W |
| Whiting Petroleum Corp. | Gallegos Fed. 26-12-7 No. 1 (API No. 30-045-28899) | 2482' FSL & 1413' FWL, Unit K, Section 7, T-26N, R-12W |
| Whiting Petroleum Corp. | Gallegos Fed. 26-13-1 No. 1 (API No. 30-045-28881) | 828' FNL & 1674' FEL, Unit B, Section 1, T-26N, R-13W |

| | | |
|---|---|---|
| Whiting Petroleum Corp. | Gallegos Fed. 26-13-1 No. 2 (API No. 30-045-28882) | 1275' FSL & 1823' FWL, Unit N, Section 1, T-26N, R-13W |
| Whiting Petroleum Corp. | Gallegos Fed. 26-13-12 No. 1 (API No. 30-045-28903) | 1719' FNL & 1021' FEL, Unit H, Section 12, T-26N, R-13W |

(3) Pendragon is hereby ordered to shut-in its Chaco Wells No. 1, 2R, 4 and 5 and its Chaco Limited Wells No. 1J and 2J until such time as the Division approves a method by which its Chaco wells may be produced exclusively from the WAW Fruitland Sand-Pictured Cliffs Gas Pool, or a method for producing its Chaco wells in their current state that is acceptable to Whiting.

(4) Jurisdiction is hereby retained for the entry of such further orders as the Division may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

Lori Wrotenbery

LORI WROTENBERY
Director

S E A L