

EXHIBIT "B"

SAN JUAN 30-5 UNIT  
RIO ARriba COUNTY, NEW MEXICO

GEOLOGIC REPORT  
DAKOTA PRODUCING INTERVAL

THIRD, FOURTH, FIFTH, AND SIXTH EXPANSIONS  
OF THE DAKOTA PARTICIPATING AREA

NORTHWEST PIPELINE CORPORATION

APPROVED BY:



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GENERAL INFORMATION

The San Juan 30-5 Unit is located along the central eastern margin of the productive portion of the San Juan Basin. The unit has a total of 20,092.24 acres in Township 30 North, Range 5 West. All or parts of Sections 1, 2, 3, 4, and 12 totaling 2,329.56 acres have been eliminated from the unit.

Within the unit area, the "Dakota Producing Interval" has been tested in 18 wells, resulting in two plugged and abandoned wells (#6 and #28) one non-commercial gas well (#27) and 15 commercial gas wells (nos. 37, 38, 39, 47, 48, 49, 50, 51, 52, 53, 70, 71, 72, 73, and 1E-57 Schalk). The Coastline Petroleum #1-57 Schalk well has been discussed in the Initial Dakota "A" Participating Area; the #1E-57 Schalk has been drilled as an infill well, but will be discussed in a separate report.

Log data from five additional wells (nos. 77, 79, 81, 82, and 83) which have been drilled and completed but not yet connected, was used in preparing the structure and isopachous maps. Future expansions will be required for these wells, depending on their commerciality.

The "Dakota Producing Interval" consists of the Graneros, Dakota, and Upper Morrison Formations below the Greenhorn limestone. This interval has been defined and the lithology and stratigraphy have been discussed in geologic reports for adjacent units.

Included in this report under Exhibit "C" are two maps (Figures 1 and 2). Figure 1 is a Dakota structure map contoured on the top of the Graneros Shale using mean sea level as the datum plane and a contour interval of 20 feet. The major structural features include an anticlinal nose plunging northward through the east half of the unit, which is bordered on the west by a northward-plunging synclinal trough. A northwest-southeast trending saddle occupies the syncline in the northwest quarter of the unit. Regional strike is northwest-southeast and regional dip is approximately 50 feet per mile ( $0.5^\circ$ ) to the northeast.

Figure 2 is an isopachous map of the net productive upper Dakota sandstone as determined from radioactive and electric logs of wells drilled within the unit. The net sand thickness of the middle Dakota sandstone is also included in Figure 2, but due to the discontinuous nature of the sands, no attempt was made to contour the interval.

Exhibit "D" (Table 1) is a tabulation of the Dakota gas production from the unit. Included in Table 1 is cumulative production through February 28, 1982. The San Juan 30-5 Unit has produced a total of 2,443,033 MCF of gas from the Dakota Formation as of March 1, 1982.

#### NEW WELLS DRILLED IN EXISTING DAKOTA PARTICIPATING AREAS

Well: San Juan 30-5 Unit #38  
Dedicated Acres: 320

The San Juan 30-5 Unit #38 well is located 1520 feet from the North line and 1535 feet from the East line, Section 18, Township 30 North, Range 5 West, N.M.P.M., San Juan County, New Mexico. This well was spudded on December 26, 1979 and completed on June 25, 1980 in the Dakota Formation at a plug back depth of 7860'. The Dakota Formation was perforated with one hole at each of the following depths:

7808', 7809', 7810', 7811', 7812', 7813', 7814', 7815', 7816'  
7817', 7818', 7819', 7820', 7821', 7822', 7823', 7824', 7825'  
7826', and 7827'.

These perforations were treated with 500 gallons of 7 1/2% HCl followed by a sand-water fracturing. The well was shut-in June 3, 1980 for 22 days with a SIPT of 2880 psig and SIPC of 2900 psig. On June 25, 1980 the well was tested and after flowing for three hours through a 3/4 inch variable choke on the 2 3/8 inch tubing, the well gauge 2035 MCFD with a calculated AOF of 2127 MCFD.

This well has been determined to be commercial.

#### THIRD EXPANSION OF THE DAKOTA PARTICIPATING AREA

Effective Date: January 1, 1980

Proposed Acreage: Township 30 North, Range 5 West, N.M.P.M.  
Section 20: E/2 (320 acres)  
Total Acres: 320

The Third Expansion of the Dakota Participating Area is based on the following: log interpretation, initial test results, and five months of production of the Northwest Pipeline Corporation San Juan 30-5 Unit #48 well. Production histories and log interpretation from surrounding wells were also used in determining the extent of this expansion. From this data, it is inferred that the proposed acreage is capable of producing unitized substances in commercial quantities from the Dakota Producing Interval.

The San Juan 30-5 Unit #48 well is located 860 feet from the North line and 1770 feet from the East line, Section 20, Township 30 North, Range 5 West, N.M.P.M., Rio Arriba County, New Mexico. This well was spudded on December 8, 1979 and completed on January 2, 1980 in the Dakota Formation at a plug back depth of 7848'. The Dakota Formation was perforated with two holes at each of the following depths:

7804', 7805', 7806', 7807', 7808', 7809', 7810', 7811', 7812',  
7813', 7814', 7815', 7816', and 7817'.

These perforations were treated with 500 gallons of 7 1/2% HCl followed by a sand-water fracturing. The well was shut in December 24, 1979 for nine days with a SIPT of 2560 psig and SICP of 2563 psig. On January 2, 1980 the well was tested and after flowing for three hours through a 3/4 inch variable choke, the well gauged 3691 MCFD with a calculated AOF of 4189 MCFD.

On the basis of this well, the E/2 of Section 20 (320 acres) is recommended as the Third Expansion of the Dakota Participating Area.

#### FOURTH EXPANSION OF THE DAKOTA PARTICIPATING AREA

Effective Date December 1, 1980

Proposed Acreage: Township 30 North, Range 5 West, N.M.P.M.  
Section 8: E/2 (320 acres)  
Section 9: All (640 acres)  
Section 16: All (640 acres)  
Section 17: E/2 (320 acres)  
Section 21: All (640 acres)  
Section 22: W/2 (320 acres)  
Total Acres: 2880

The Fourth Expansion of the Dakota Participating Area is based on log interpretation, initial test results, and gas production (at least three months) of the following Northwest Pipeline Corporation wells: San Juan 30-5 Unit Nos. 49, 51, 53, 70, and 71. Production histories and log data from surrounding wells were also used in determining the extent of this expansion. These wells include the San Juan 30-5 Unit Nos. 37 and 47 (discussed in previous expansions) and 52 (to be discussed later). From this data, it is inferred that the proposed acreage is capable of producing unitized substances in commercial quantities from the Dakota Producing Interval.

The San Juan 30-5 Unit #49 well is located 810 feet from the South line and 800 feet from the West line, Section 9, Township 30 North, Range 5 West, N.M.P.M., Rio Arriba County, New Mexico. This well was spudded on November 7, 1980 and completed on December 30, 1980 in the Dakota Formation at a plug back depth of 7754'. The Dakota Formation was perforated with one hole at each of the following depths:

7682', 7683', 7684', 7685', 7686', 7687', 7688', 7689',  
7690', 7691', 7692', 7693', 7694', 7695', 7696', 7698',  
7699', 7700', 7701', 7702', 7703', and 7704'.

These perforations were treated with 500 gallons of 7 1/2% HCl followed by a sand-water fracturing. The well was shut in December 9, 1980 for 21 days with a SIPT of 2630 psig and SICP of 2631 psig. On December 30, 1980 the well was tested and after flowing for three hours through a 3/4 inch variable choke, the well gauged 855 MCFD with a calculated AOF of 855 MCFD.

On the basis of the above well and the surrounding geology, the E/2 (320 acres) of Section 8 and the W/2 (320 acres) of Section 9 are recommended as part of the Fourth Expansion of the Dakota Participating Area.

The San Juan 30-5 Unit #51 well is located 1000 feet from the North line and 1800 feet from the East line, Section 21, Township 30 North, Range 5 West, N.M.P.M., Rio Arriba County, New Mexico. This well was spudded on September 15, 1980 and completed on December 9, 1980 in the Dakota Formation at a plug back depth of 7790'. The Dakota Formation was perforated with one shot per foot at each of the following depths:

7764', 7765', 7766', 7767', 7768', 7769', 7770', 7771',  
7772', 7773', 7774', 7775', 7776', 7777', 7778', 7779',  
7780', 7781', 7782', 7783', 7784', 7785', 7786', 7787',  
7788', 7789', and 7790'.

These perforations were treated with 500 gallons of 7 1/2% HCl followed by a sand-water fracturing. The well was shut-in November 24, 1980 for 15 days with a SIPT of 2741 psig. On December 9, 1980 the well was tested and after flowing for three hours through a 3/4 inch variable choke on the 2 3/8 inch tubing, the well gauged 4792 MCFD with a calculated AOF of 4857 MCFD.

On the basis of the above well and the surrounding geology, Section 21 (640 acres) and the E/2 of Section 16 (320 acres) are recommended as part of the Fourth Expansion of the Dakota Participating Area.

The San Juan 30-5 Unit #53 well is located 1765 feet from the South line and 970 feet from the West line, Section 16, Township 30 North, Range 5 West, N.M.P.M., Rio Arriba County, New Mexico. This well was spudded on September 2, 1980 and completed on December 12, 1980 in the Dakota Formation at a plug back depth of 7775'. The Dakota Formation was perforated with one shot per foot at each of the following depths:

7723', 7724', 7725', 7726', 7727', 7728', 7729', 7730',  
7731', 7732', 7733', 7734', 7735', 7736', 7737', 7738',  
7739', 7740', 7741', and 7742'.

These perforations were treated with 500 gallons of 7 1/2% HCl followed by a sand-water fracturing. The well was shut-in November 20, 1980 for 22 days with a SIPC of 2911 psig and a SIPT of 2761 psig. On December 12, 1980 the well was tested and after flowing for three hours through a 3/4 inch variable choke on the 2 3/8 inch tubing the well gauged 1209 MCFD with a calculated AOF of 1228 MCFD.

On the basis of the above well and the surrounding geology, the W/2 of Section 16 (320 acres) and the E/2 of Section 17 (320 acres) are recommended as part of the Fourth Expansion of the Dakota Participating Area.

The San Juan 30-5 Unit #70 well is located 790 feet from the North line and 790 feet from the East line, Section 9, Township 30 North, Range 5 West, N.M.P.M., Rio Arriba County, New Mexico. This well was spudded on November 22, 1980 and completed on December 31, 1980 in the Dakota Formation at a plug back depth of 7785'. The Dakota Formation was perforated with one shot per foot from 7764' to 790' (27 holes).

These perforations were treated with 500 gallons of 7 1/2% HCl followed by a sand-water fracturing. The well was shut-in December 24, 1980 for seven days with a SIPC of 2251 psig and a SIPT of 2251 psig. On December 31, 1980 the well was tested and after flowing for three hours through a 3/4 inch variable choke on the 2 3/8 inch tubing, the well gauged 1584 MCFD with a calculated AOF of 1619 MCFD.

On the basis of the above well, the E/2 of Section 9 (320 acres) is recommended for inclusion in the Fourth Expansion of the Dakota Participating Area.

The San Juan 30-5 Unit #71 well is located 860 feet from the South line and 1070 feet from the West line, Section 22, Township 30 North, Range 5 West, N.M.P.M., Rio Arriba County, New Mexico. This well was spudded on October 18, 1980 and completed on December 16, 1980 in the Dakota Formation at a plug back depth of 7420'. The Dakota Formation was perforated with one shot per foot at each of the following depths:

7770', 7771', 7772', 7773', 7774', 7775', 7776', 7777',  
7778', 7779', 7780', 7781', 7782', 7783', 7784', 7785',  
7786', 7787', 7788', 7789', 7790', 7791', 7792', 7793',  
and 7794'.

These perforations were treated with 500 gallons of 7 1/2% HCl followed by a sand-water fracturing. The well was shut-in December 2, 1980 for 14 days with a SIPC of 2702 psig and a SIPT of 2691 psig. On December 16, 1980 the well was tested and after flowing for three hours through a 3/4 inch variable choke on the 2 3/8 inch tubing the well gauge 2145 MCFD with a calculated AOF of 2231 MCFD.

On the basis of this well, the W/2 of Section 22 (320 acres) is recommended for inclusion in the Fourth Expansion of the Dakota Participating Area.

#### FIFTH EXPANSION OF THE DAKOTA PARTICIPATING AREA

Effective Date: March 1, 1981

Proposed Acreage: Township 30 North, Range 5 West, N.M.P.M.  
Section 6: S/2 (320 acres)  
Section 10: N/2 (320 acres)  
Section 15: All (640 acres)  
Total Acres: 1280

The Fifth Expansion of the Dakota Participating Area is based on log interpretation, initial test results and gas production (at least three months) of the following Northwest Pipeline Corporation wells: San Juan 30-5 Unit nos. 50, 52, and 73. From this data, it is inferred that the proposed acreage is capable of producing unitized substances in commercial quantities from the Dakota Producing Interval.

The San Juan 30-5 Unit #50 well is located 1050 feet from the South line and 890 feet from the West line, Section 6, Township 30 North, Range 5 West, N.M.P.M., Rio Arriba County, New Mexico. This well was spudded on January 20, 1981 and completed on March 25, 1981 in the Dakota Formation at a plug back depth of 7935'. The Dakota Formation was perforated with one shot every two feet from 7768' to 7792' (13 shots).

These perforations were treated with 750 gallons of 7 1/2% HCl followed by a sand-water fracturing. The well was shut-in March 13, 1981 for 12 days with a SIPC of 2412 psig and a SIPT of 2410 psig. On March 25, 1981 the well was tested and after flowing for three hours through a 3/4 inch variable choke on the 2 3/8 inch tubing, the well gauged 735 MCFD with a calculated AOF of 746 MCFD.

On the basis of the above well, the S/2 of Section 6 (320 acres) is recommended as part of the Fifth Expansion of the Dakota Participating Area.

The San Juan 30-5 Unit #52 well is located 800 feet from the South line and 1785 feet from the West line, Section 15, Township 30 North, Range 5 West, N.M.P.M., Rio Arriba County, New Mexico. This well was spudded on February 2, 1981 and completed on March 30, 1981 in the Dakota Formation at a total depth of 7999'. The Dakota Formation was perforated with one shot every two feet from 7928' to 7952'.

These perforations were treated with 500 gallons HCl followed by a sand-water fracturing. The well was shut-in on March 23, 1981 for seven days with a SIPT of 2786 psig and a SIPC of 2792 psig. On March 30, 1981 the well was tested and after flowing for three hours through a 3/4 inch variable choke on the 2 3/8 inch tubing, the well gauged 2679 MCFD with a calculated AOF of 2809 MCFD.

On the basis of the above well and the surrounding geology, Section 15 (640 acres) is recommended for inclusion in the Fifth Expansion of the Dakota Participating Area.

The San Juan 30-5 Unit.#73 well is located 900 feet from the North line and 1760 feet from the East line, Section 10, Township 30 North, Range 5 West, N.M.P.M., Rio Arriba County, New Mexico. This well was spudded on February 26, 1981 and completed on March 31, 1981 in the Dakota Formation at a plug back depth of 7958'. The Dakota Formation was perforated with fourteen holes from 7924' to 7950'.

These perforations were treated with 500 gallons of 7 1/2% HCl followed by a sand-water fracturing. The well was shut-in March 17, 1981 for 14 days with a SIPC of 2829 psig and a SIPT of 2823 psig. On March 31, 1981 the well was tested, and after flowing for three hours through a 3/4 inch variable choke on the 2 3/8 inch tubing, the well gauged 2635 MCFD with a calculated AOF of 2773 MCFD.

On the basis of this well, the N/2 of Section 10 (320 acres) is recommended as part of the Fifth Expansion of the Dakota Participating Area.

#### SIXTH EXPANSION OF THE DAKOTA PARTICIPATING AREA

Effective Date: April 1, 1981

Proposed Acreage: Township 30 North, Range 5 West, N.M.P.M.  
Section 10: S/2 (320 acres)  
Total Acres: 320

The Sixth Expansion of the Dakota Participating Area is based on log interpretation, initial test results, and two months of production of the Northwest Pipeline Corporation San Juan 30-5 Unit well #72. From this data, it is inferred that the proposed acreage is capable of producing unitized substances in commercial quantities from the Dakota Producing Interval.

The San Juan 30-5 Unit #72 well is located 805 feet from the South line and 820 feet from the West line, Section 10, Township 30 North, Range 5 West, N.M.P.M., Rio Arriba County, New Mexico. This well was spudded on February 15, 1981 and completed on April 13, 1981 in the Dakota Formation at a plug back depth of 7860'. The Dakota Formation was perforated with 12 holes from 7790' to 7812' and with three holes from 7840' to 7846'.

These perforations were treated with 500 gallons of 7 1/2% HCl followed by a sand-water fracturing. The well was shut-in April 6, 1981 for seven days with a SIPC of 2907 psig and a SIPT of 2900 psig. On April 13, 1981, the well was tested, and after flowing for

Dakota Producing Interval  
March 1982  
Page 9

three hours through a 3/4 inch variable choke on the 2 3/8 inch tubing, the well gauged 2456 MCFD with a calculated AOF of 2579.

On the basis of this well, the S/2 of Section 10 is recommended as the Sixth Expansion of the Dakota Participating Area.