STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

October 29, 1986

TONEY ANAYA
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-5800

ARCO Oil & Gas Company
P.O. Box 1610
Midland, Texas 79702

Attention: David C. Douglas
Area Engineer

Re: Administrative Order NFL-140

Dear Mr. Douglas:

Reference is made to your application for an Infill Well Finding and Well-Spacing Waiver made pursuant to Section 271.305(b) of the Federal Energy Regulatory Commission regulations, Natural Gas Policy Act of 1978, and Oil Conservation Division Order No. R-6013 for the following described well:

> Seven Rivers Queen Unit Well No. 66, located 100 feet from the North line and 1450 feet from the West line of Section 3, Township 23 South, Range 36 East, NMPM, Lea County, New Mexico.

THE DIVISION FINDS THAT:

(1) Section 271.305(b) of the Federal Energy Regulatory Commission Interim Regulations promulgated pursuant to the Natural Gas Policy Act of 1978 provides that, in order for in infill well to qualify as a new onshore production well under Section 103 of said Act, the Division must find, prior to the commencement of drilling, that the well is necessary to effectively and efficiently drain a portion of the reservoir covered by the proration unit which cannot be so drained by any existing well within that unit, and must grant a waver of existing well-spacing requirements.

(2) By Division Order No. R-6013, dated June 7, 1979, the Division established an administrative procedure whereby the Division Director and the Division Examiners are empowered to act for the Division and find that an infill well is necessary.

(3) The well for which a finding is sought is to be completed in the Langlie Mattix Seven Rivers Queen Pool, and the standard spacing unit in said pool is 40 acres.

(4) A standard 40-acre oil proration unit comprising the NE/4 NW/4 (Unit C) of Section 3, Township 23 South, Range 36 East, is currently dedicated to the Seven Rivers Queen Unit Well No. 47 located in Unit C of said Section.

(5) Said unit is not being effectively and efficiently drained by the existing well(s) on the unit.

(6) The drilling and completion of the well for which a finding is sought should result in the production of an additional 29,000 MCF of gas from the proration unit which would not otherwise be recovered.

(7) All the requirements of Division Order No. R-6013 have been complied with, and the well for which a finding is sought is necessary to effectively and efficiently drain a portion of the reservoir covered by said proration unit which cannot be so drained by any existing well within the unit.

(8) In order to permit effective and efficient drainage of said proration unit, the subject application should be approved as an exception to the standard well spacing requirements for the pool.

IT IS THEREFORE ORDERED THAT:

(1) The applicant is hereby authorized to drill the Seven Rivers Queen Unit Well No. 66, as described above, as an infill well on the existing proration unit comprising the NE/4 NW/4 (Unit C) of Section 3, Township 23 South, Range 36 East, NMPM, Lea County, New Mexico. The authorization for infill drilling granted by this order is an exception to applicable well spacing requirements and is necessary to permit the drainage of a portion of the reservoir covered by said proration unit which cannot be effectively and efficiently drained by any existing well thereon.

(2) Jurisdiction of this cause is retained for the entry of such further orders as the Division may deem necessary.

Sincerely;

Michael E. Stogner
Examiner

N.M.O.C.D. - Hobbs

NFLARCI

ARCO Oil & Gas Company
P.O. Box 1610
Midland, Texas 79702

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Area Engineer

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(3) The well for which a finding is sought is to be completed in the Langlie Mattix Seven Rivers Queen Pool, and the standard spacing unit in said pool is 40 acres.

(4) A standard 40-acre oil proration unit comprising the NE/4 NW/4 (Unit C) of Section 3, Township 23 South, Range 36 East, is currently dedicated to the Seven Rivers Queen Unit Well No. 47 also located in Unit C of said Section.

(5) Said unit is not being effectively and efficiently drained by the existing well(s) on the unit.

(6) The drilling and completion of the well for which a finding is sought should result in the production of an additional 29,000 MCF of gas from the proration unit which would not otherwise be recovered.

(7) All the requirements of Division Order No. R-6013 have been complied with, and the well for which a finding is sought is necessary to effectively and efficiently drain a portion of the reservoir covered by said proration unit which cannot be so drained by any existing well within the unit.

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(2) Jurisdiction of this cause is retained for the entry of such further orders as the Division may deem necessary.

Sincerely;

Michael E. Stogner
Examiner

N.M.O.C.D. - Hobbs

ARCO Oil and Gas Company
Central District
Post Office Box 1610
Midland, Texas 79702
Telephone 915 688 5200

NFLARCI

September 26, 1986

New Mexico Oil Conservation Division
P.O. Box 2088
Santa Fe, New Mexico 87501

100'FNL - 1450'FSL
Langlie Mattix
JRQ Pool
NE/4 NW/4 Unit C

RE: Seven Rivers Queen Unit #66 & #67
Infill Finding Application

Dear Sirs:

ARCO Oil and Gas Company respectfully requests the New Mexico Oil Conservation Division grant an infill finding for infill Wells No. 66 and No. 67 in the Seven Rivers Queen Unit. The Unit is located approximately six miles southwest of Eunice, in Lea County, New Mexico, in the South Eunice and Langlie Mattix pools.

Infill drilling is necessary to promote efficient and effective drainage of the Seven Rivers Queen Unit. The development drilling results in prevention of waste by developing new reserves which cannot be produced by the present 40-acre spacing. In particular, infill drilling reduces effects of a steep structural dip which causes oil to be trapped between wells. Documentation to support these claims is found in the attached engineering discussion.

This application is made in triplicate with a copy sent to the Hobbs office. Copies of this application and a request for a waiver of protest have been furnished to the offset operators by registered mail. A copy of the letter sent to the offset operators is included in this package. Should any questions arise, please do not hesitate to call me at (915) 688-5563. We will be happy to assist you with any concerns you may have.

Yours very truly,

David C. Dougals
Area Engineer

DCD:CWE:tis
Attachments

Presently dedicated to the SRQU #47 located 660'FNL 2310'FNL

ARCO Oil and Gas Company
Central District
Post Office Box 1610
Midland, Texas 79702
Telephone 915 688 5200

September 25, 1986

Offset Operators
ARCO's Seven Rivers Queen Unit
Infill Wells Nos. 66 and 67
Section 3, T23S, R36E
Lea County, New Mexico

Waiver of Objection
Infill Finding

Gentlemen:

ARCO Oil and Gas Company hereby notifies you as offset operator to our Seven Rivers Queen Unit that we have requested the New Mexico Oil Conservation Division grant an infill finding for infill Wells 66 and 67. If you have no objection to the request, please sign this waiver of protest. Send one copy to the NMOCD, one copy to ARCO, and retain one for your files. Stamped, self-addressed envelopes are enclosed for your convenience. Should any questions arise, please contact me at (915) 688-5563.

Yours very truly,

David C. Douglas

DCD:CWE:tis
Attachments

I waive protest to ARCO's application for an infill finding for their Seven Rivers Queen Unit Wells Nos. 66 and 67.

Name: _____

Title: _____

Company: _____

Date: _____

OFFSET OPERATORS
ARCO's Seven Rivers Queen Unit
Infill Wells No. 66 & 67

Conoco, Inc.
P.O. Box 460
Hobbs, New Mexico 88240

Sun Exploration & Producing Company
P. O. Box 1861
Midland, Texas 79702-9970

Seven Rivers Queen Unit No. 66 and No. 67
Infill Finding Application
Engineering Discussion

BACKGROUND

The Seven Rivers Queen Unit is located approximately six miles southwest of Eunice, in Lea County, New Mexico. The northern two-thirds of the Unit falls in the South Eunice (Seven Rivers-Queen) pool, and the southern one-third falls in the Langlie Mattix (Seven Rivers-Queen) pool. The unitized interval includes all of the Queen formation and the lower 100 ft of the Seven Rivers formation. The Unit is comprised of 2240 acres. A map of the Unit is attached as Figure 1.

The Unit was formed in 1973, and initial development was on 80 acre-5 spot patterns. An infill drilling program was initiated in 1982. Currently, the infill wells No. 60, 61, 62, 63, 66, and 67 account for 30% of the Unit's production. There are a total of 37 producers and 28 active injectors in the Unit.

WELL #66: HISTORY & RESERVES

Seven Rivers Queen Unit #66 was spudded on May 21, 1985. The well is located 100' FNL and 1450' FWL of Section 3, T23S, R36E. The nonstandard location was approved by New Mexico Oil Conservation Division Order No. NSL-2025. The well was drilled on 20 acre spacing between producers #36 and #48 and injectors #35 and #47. These wells were originally drilled in 1957 and 1958. Production from #36 and #48 was 38 BOPD when # 66 was drilled. Primary recovery from this 45 acre pattern was 75,300 barrels of oil, or 6.3% of Original Oil in Place. Ultimate secondary recovery prior to drilling well #66 was expected to be 60,900 barrels of oil, or 80% of the primary. This pattern's waterflood response has not been as good as that of the overall Unit. The Unit's secondary recovery is expected to be greater than the primary recovery. Infill drilling has proven to be successful in gaining new reserves in areas where secondary recovery has not been as expected.

Well #66 potentialed for 93 BOPD, 209 BWPD, and 45 MCFPD on June 27, 1985. This high rate indicates the location had not been drained by the offset producers. Production during July, 1986 was 22 BOPD, 38 BWPD and 11 MCFPD. Cumulative production is 13,100 barrels of oil and 9 MMCF gas through July, 1986. Decline curve analysis indicates that ultimate recovery from #66 will be 53,000 barrels of oil (4.5% of OOIP) and 29 MMCF. This will increase the pattern's secondary recovery to 113,900 barrels, or 51% more than the primary. The decline curve for well #66 is attached as Figure 2.

WELL #67: HISTORY & RESERVES

Seven Rivers Queen Unit #67 was spudded on June 2, 1985. The well is located 1250' FNL & 1415' FEL of Section 3, T23S, R36E. The nonstandard location was approved by New Mexico Oil Conservation Division Order No. NSL-2024. The well was drilled on 20 acre spacing between producers #46 and #52 and

injectors #45 and #51. These wells were originally drilled in 1957, 1958, and 1960. Production from #46 and #52 was 22 BOPD when #67 was drilled. Primary recovery from this 45 acre pattern was 67,300 barrels of oil, or 5.7% of OOIP. Ultimate secondary recovery prior to drilling #67 was expected to be 21,000 barrels of oil, or 31% of the primary. This pattern's waterflood response has been very poor in comparison to the response of the overall Unit.

Well #67 potentialed for 83 BOPD, 111 BWPD, and 59 MCFPD on July 10, 1985. This high rate indicates that the location had not been drained by the offset producers. Well #67 produced 22 BOPD, 45 BWPD, and 8 MCFPD during July, 1986. Cumulative production, through July, 1986, is 13,500 barrels of oil and 5 MMCF gas. Decline curve analysis indicates that ultimate recovery from #67 will be 50,000 barrels of oil (4.3% of OOIP) and 16 MMCF gas. This will increase the pattern's secondary recovery to 71,000 barrels of oil, or 5% more than the primary. This again proves that infill drilling has been successful in gaining new reserves where primary performance was good but waterflood performance has been poor. The attached Figure 3 shows the decline curve for #67.

STRUCTURAL EFFECTS

The structure of the Queen sand in the Seven Rivers Queen Unit is an anticline with the high centered in the southern portion of the Unit. A structure map is attached as Figure 4. In some parts of the Unit, the structure is very steeply dipping, approximately 150 feet per 3,000 ft. There is also a gas-oil-contact located at approximately -150 feet subsea and a water-oil contact located at approximately -285 feet subsea. Due to this limited oil column and the steeply dipping structure, oil can be trapped between existing wells.

This phenomenon is illustrated in the attached cross sections, Figures 5 and 6. From the cross section through wells #48, #66, and #36 (Figure 5); it is apparent that a large portion of the pay exposed in well #66 lies below the water-oil-contact in the offsetting well #48 and is, therefore non-productive in #48. These oil and gas reserves cannot be produced by well #36 either, because they lie outside of that well's drainage radius. Similarly, some of the pay exposed in well #66 lies above the gas-oil-contact in the up-structure well #36. Again, these reserves cannot be obtained from either of the existing producers. The oil is essentially trapped between the existing wells, and infill drilling is necessary to obtain these oil and gas reserves. Figure 6 illustrates the same situation with well #67. The structure here is very steeply dipping, and the oil pay continuity between producers #46 and #52 is extremely low. Nearly all of the pay in well #67 lies either below the water-oil-contact in well #46, or above the gas-oil-contact in #52. Again, infill drilling is necessary to produce these oil and gas reserves.

CONCLUSIONS

Reserves of 53,000 barrels of oil and 29 MMCF of gas will be produced by the infill well Seven Rivers Queen Unit #66. Infill well #67 will produce 50,000 barrels of oil and 16 MCF of gas. Infill drilling was necessary to produce these reserves. The wells which were drilled on 40 acre spacing could not produce these reserves due to their structural positions. Infill drilling has significantly increased recovery from the Seven Rivers Queen Unit waterflood.

Seven Rivers Queen Unit #66 & #67
Infill Finding Application
Data Sheet

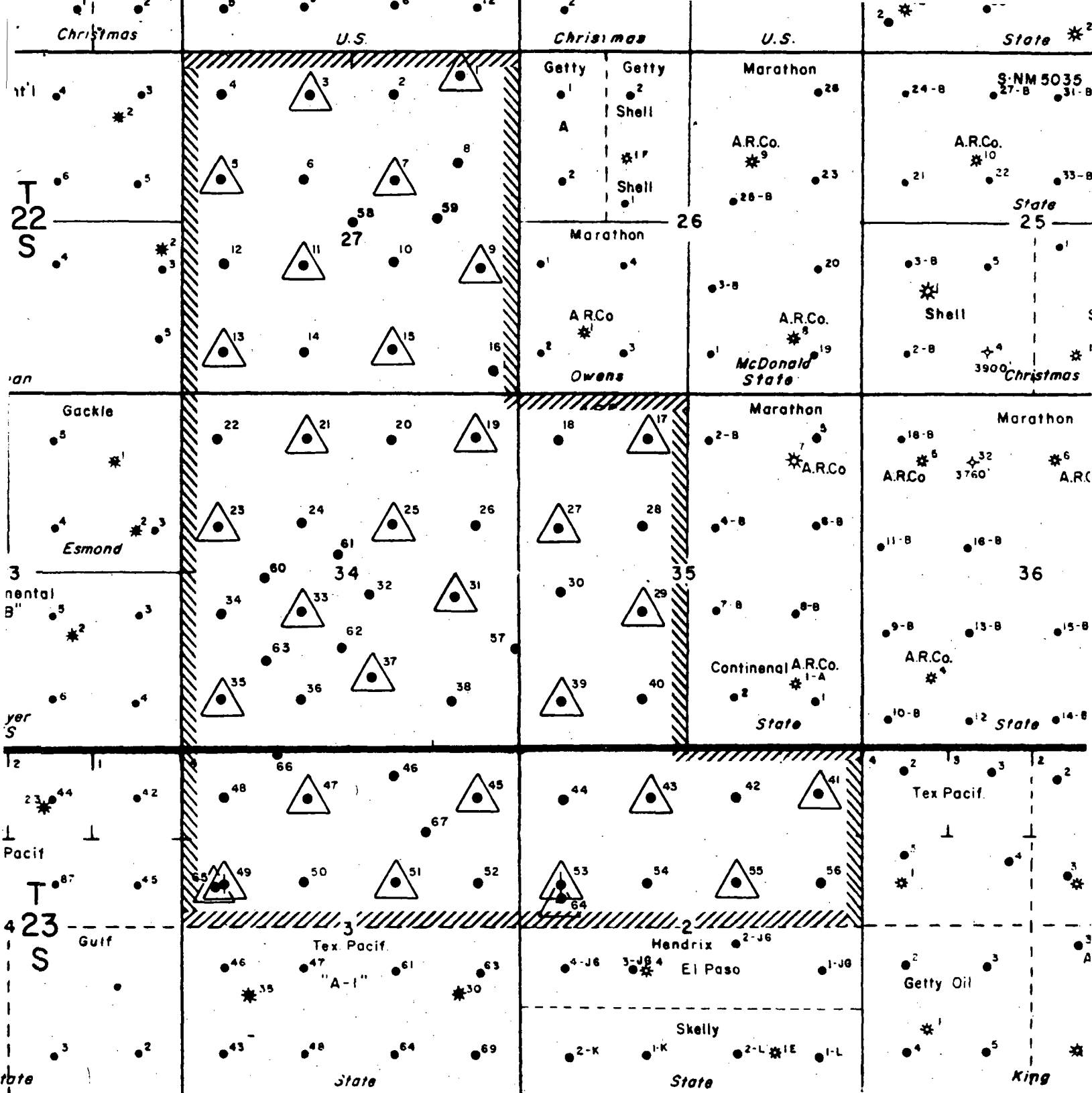
Well #66

Location: 100' FNL & 1450' FWL, Sec. 3, T23S, R36E, Lea County, New Mexico
Nonstandard Location Approval # NSL-2025
Spacing: 20 Acres
Pool: Langlie Mattix (Seven Rivers-Queen)
Spud Date: 5-21-85
Completion Date: 6-27-85
Initial Potential: 93 BOPD, 209 BWPD, 45 MCFPD
Ultimate Recovery: 53,000 BBLS Oil, 29 MMCF Gas

Well #67

Location: 1250' FNL & 1415' FEL, Sec. 3, T23S, R36E, Lea County, New Mexico
Nonstandard Location Approval #NSL-2024
Spacing: 20 Acres
Pool: Langlie Mattix (Seven Rivers-Queen)
Spud Date: 6-2-85
Completion Date: 7-10-85
Initial Potential: 83 BOPD, 111 BWPD, 59 MCFPD
Ultimate Recovery: 50,000 BBLS Oil, 16 MMCF Gas

Seven Rivers Queen Unit # 66 & # 67
Infill Finding Application
List of Figures



ARCO Oil and Gas Company
Division of Atlantic Richfield Company
Permian District Midland, Texas

SEVEN RIVERS-QUEEN UNIT

LEA COUNTY, NEW MEXICO

FIGURE 1.

SCALE 1" = 2000'

By C. ELLIS	Drawn By	Date 7-85
Date 7-85	Revised By	Date
Dept WEST AREA ENGR.	Dwg No	

FIGURE 2.
SEVEN RIVERS QUEEN UNIT #66

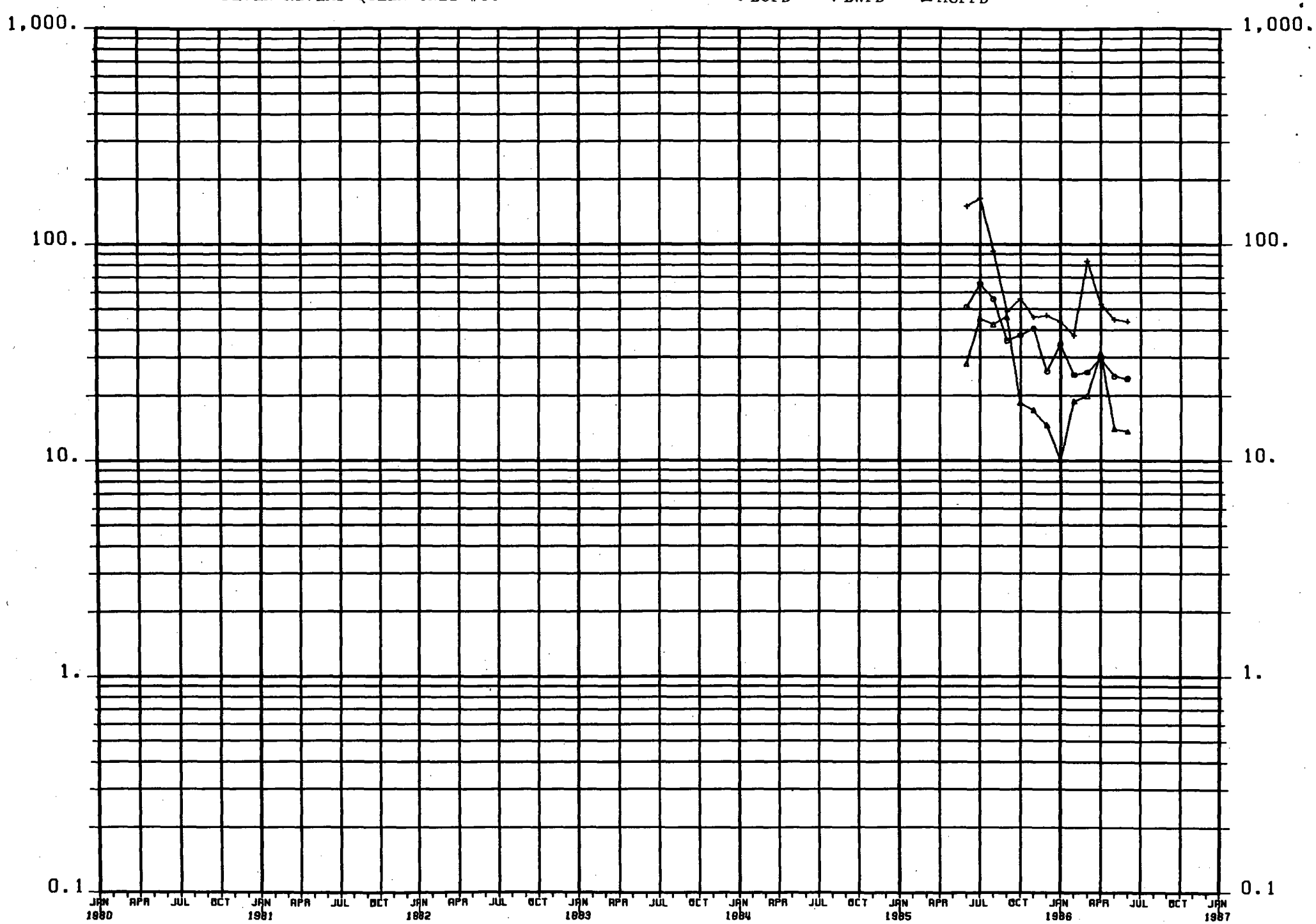
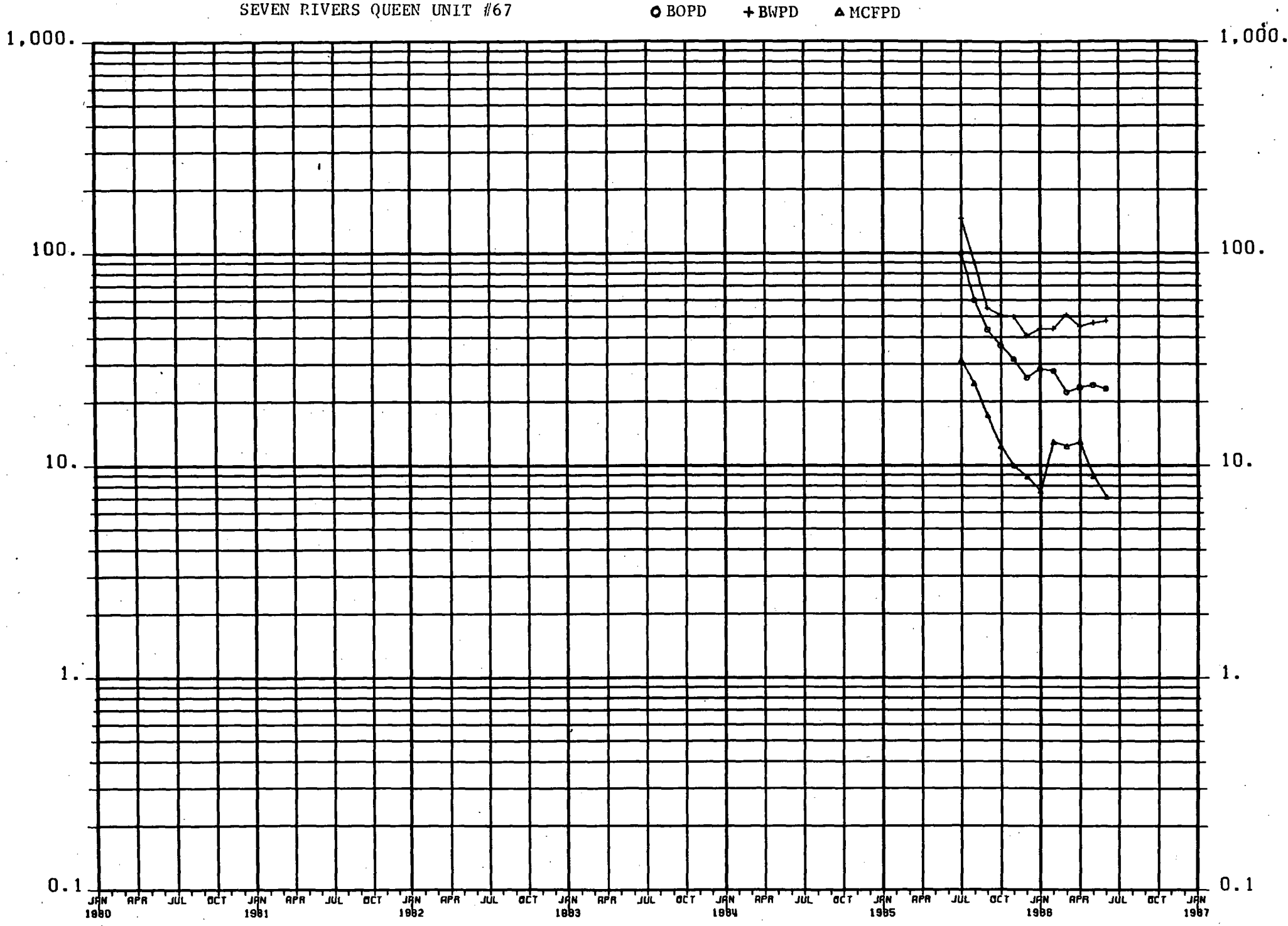
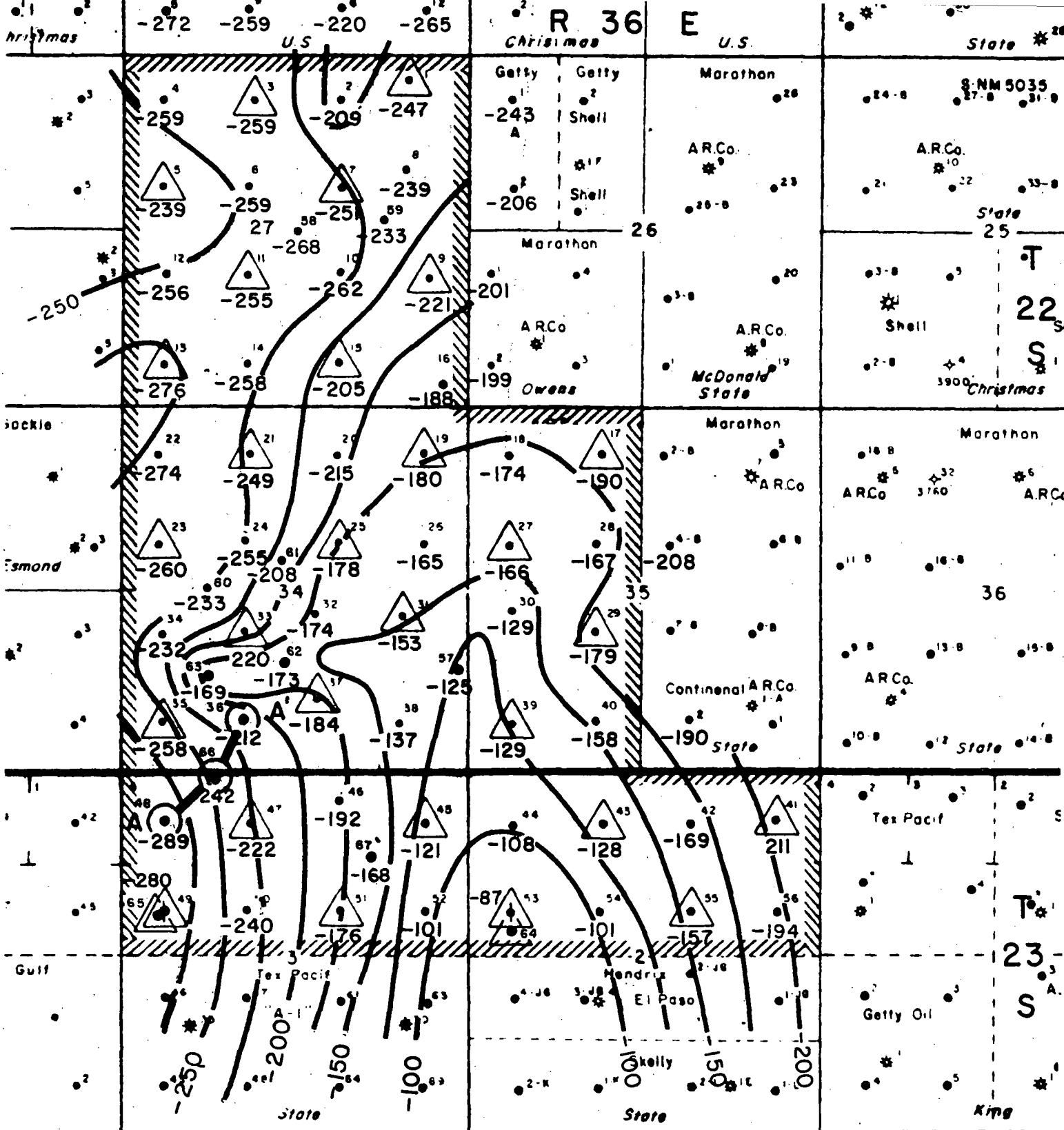


FIGURE 3.
SEVEN RIVERS QUEEN UNIT #67





ARCO Oil and Gas Company
Division of AtlanticRichfieldCompany
Permian District Midland, Texas

SEVEN RIVERS-QUEEN UNIT

LEA COUNTY, NEW MEXICO

FIGURE 4.

SRQU NO. 66
CROSS-SECTION A-A'

SCALE: 1" = 2000'

By C. ELLIS	Drawn By	Date 7 - 85	
Date 7 - 85	Reviewed By:	Date	
Dept NORTH AREA ENGR.	Dwg No		

ARCO Oil and Gas Company
Central District
Post Office Box 1610
Midland, Texas 79702
Telephone 915 688 5200

September 25, 1986

Offset Operators
ARCO's Seven Rivers Queen Unit
Infill Wells Nos. 66 and 67
Section 3, T23S, R36E
Lea County, New Mexico

Waiver of Objection
Infill Finding

Gentlemen:

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Yours very truly,

David C. Douglas

DCD:CWE:tis
Attachments

I waive protest to ARCO's application for an infill finding for their Seven Rivers Queen Unit Wells Nos. 66 and 67.

Name: Hugh Ingram

Title: Conservation Coordinator

Company: Conoco

Date: 10/20/86

ARCO Oil and Gas Company
Central District
Post Office Box 1610
Midland, Texas 79702
Telephone 915 688 5200

September 25, 1986

Offset Operators
ARCO's Seven Rivers Queen Unit
Infill Wells Nos. 66 and 67
Section 3, T23S, R36E
Lea County, New Mexico

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Infill Finding

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David C. Douglas

DCD:CWE:tis
Attachments

I waive protest to ARCO's application for an infill finding for their Seven Rivers Queen Unit Wells Nos. 66 and 67.

Name: _____

Title: _____

Company: _____

Date: _____

Production Department
Hobbs Division
North American Production

Conoco Inc.
P.O. Box 460
726 East Michigan
Hobbs, NM 88240
(505) 393-4141

October 20, 1986

New Mexico Oil Conservation Division
P.O. Box 2088
Santa Fe, New Mexico 87501

Attention V. T. Lyon

Gentlemen:

Infill Drilling, Seven Rivers Queen Unit

Conoco Inc. has approved ARCO's letter ballot for drilling Infill Wells Nos. 66 and 67. One copy is forwarded for your records.

Yours very truly,

H. A. Ingram
Conservation Coordinator

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