OXY USA INC.
Box 50250, Midland, TX 79710

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May 14, 1993

State of New Mexico
Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87504

Case 10771

Attention: Mr. Bill Lemay, Director

Re: Application of OXY USA Inc. for Enhanced Oil Recovery Project Qualification for Recovered Oil Tax Rate for the Skelly Penrose "B" Unit, Queen Formation, Langlie-Mattix Pool, Lea County, New Mexico

Dear Mr. Lemay:

Please find enclosed our application to qualify the Skelly Penrose "B" Unit under the EOR severance tax program. We recently bought this property from Sirgo Operating Company. In the near future we plan to commence infill drilling and injection on 40 acre five-spot patterns in the center of the unit. This should allow for approximately 1,000,000 barrels of additional oil recovery through improved vertical and areal sweep efficiency. Consequently, we believe it qualifies as an expansion of an existing project as defined in NMOCD Order No. R-9708.

For ease of processing, following is a list of the attachments as they are described in Order No. R-9708:

1. ***Operator's Name & Address:***

   OXY USA Inc.
   P. O. Box 50250
   Midland, Texas 79710

2. ***Legal description of the project area:*** (attached)

3. ***Status of operations in project area:*** First, a plat illustrating the project area (in yellow) is attached. Then a list of wells within this area and their current status follows. A copy of Order No. R-2915, approving the Unit Agreement, is included. Graphs showing production history since unitization for the entire unit and just the 40 acre five spot project area follow the NMOCD orders.

4. ***Method of recovery to be used:*** An information sheet about the injection fluids, volumes, etc., is next. Order No. R-2956, authorizing the waterflood project follows. Since this project will necessitate more injection wells, a request to administratively approve an expansion of the previous authority (C-108) is included with this application.

5. ***Description of the project:*** A list of wells in the project area entitled "proposed status" is the next item. Cost estimates for the 40 acre redevelopment and a table illustrating the estimated oil volume to be recovered as a result of this activity follow. A graphical depiction of the expected results is also included. Finally, we put together a one page discussion of the change in technology (going from a 80 acre five spot to a 40 acre five spot) and the increase in sweep efficiency that should occur from this project.

6. ***Additional items:*** The strategy behind this project flows from work done by T. Scott Hickman, which is described in the attached SPE technical paper (#23956). It is also discussed in detail in a reservoir evaluation of the Penrose "B" Unit performed by Mr. Hickman for the previous owner of this property. The 40 acre redevelopment strategy is promoted by Mr. Hickman as an advanced application of "improved oil recovery (IOR)" techniques. These technical papers are being provided with the permission of Mr. Hickman as further evidence that this project represents a significant change in technology for Queen waterfloods.

As mentioned above, included with this application is a request to administratively approve an expansion of our existing C-108 authority. If you have any questions relating to these requests, please call me at 915/685-5913 or Scott Gengler at 915/685-5825. Thank you for considering our applications.

Sincerely,

Richard E. Foppiano

Richard E. Foppiano
Regulatory Affairs Advisor
Western Region - Midland

REF/ref

XC: NMOCD, Santa Fe (orig + 2 copies)
NMOCD, Hobbs
Tom Kellahin

Skelly Penrose B Unit
40 Acre Five Spot Waterflood Project

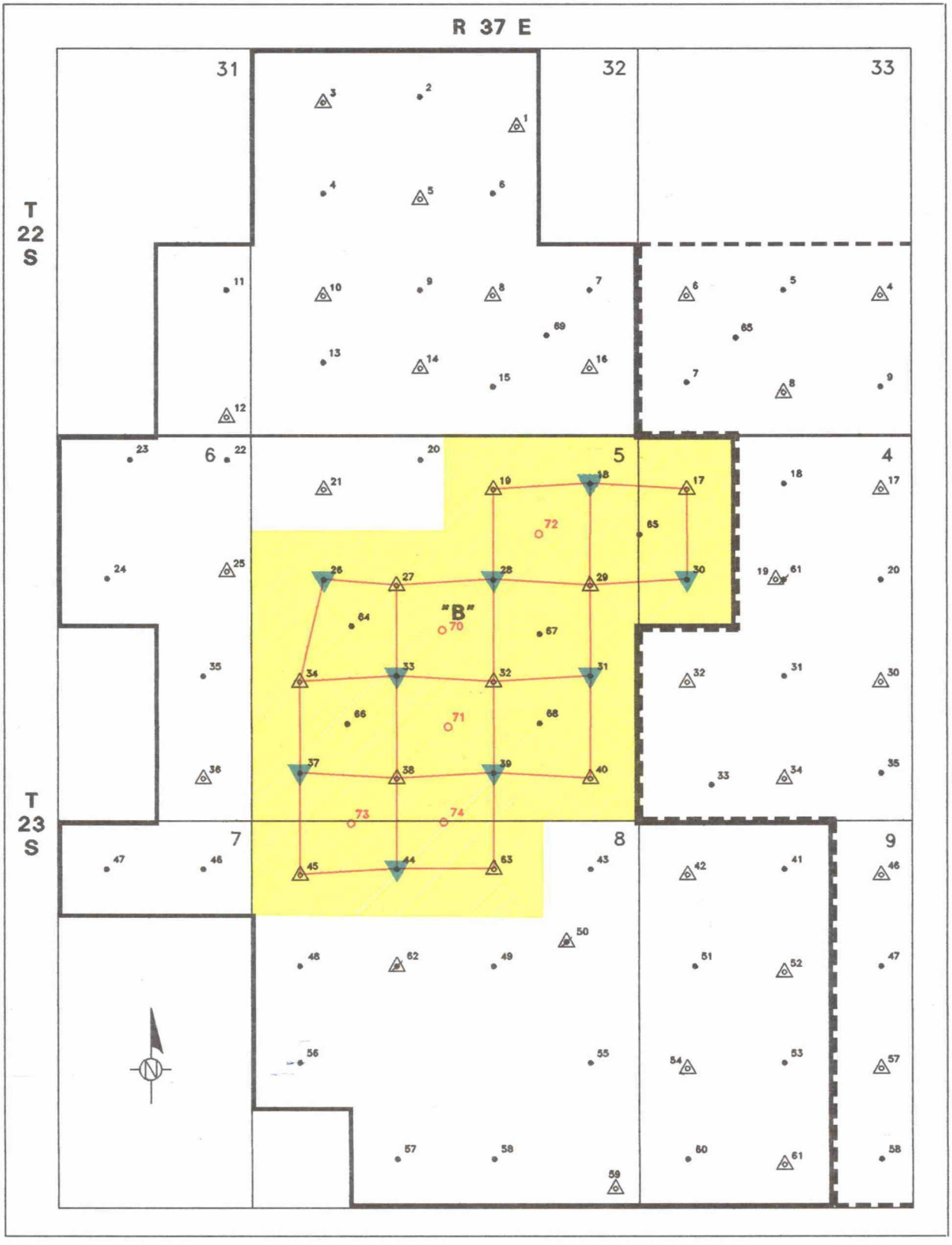
Field Name: Langlie Mattix Seven Rivers Queen Grayburg
Formation Name: Queen (Penrose)

Skelly Penrose B Unit Description

Legal Description	# of Acres
E/2 of the SE/4 of Section 31, T-22-S, R-37-E, Lea County	80
W/2 of Section 32, T-22-S, R-37-E, Lea County	320
SE/4 of Section 32, T-22-S, R-37-E, Lea County	160
W/2 of the NE/4 of Section 32, T-22-S, R-37-E, Lea County	80
W/2 of the NW/4 of Section 4, T-23-S, R-37-E, Lea County	80
Section 5, T-23-S, R-37-E, Lea County	640
NE/4 of Section 6, T-23-S, R-37-E, Lea County	160
E/2 of the SE/4 of Section 6, T-23-S, R-37-E, Lea County	80
N/2 of the NE/4 of Section 7, T-23-S, R-37-E, Lea County	80
N/2 of Section 8, T-23-S, R-37-E, Lea County	320
SE/4 of Section 8, T-23-S, R-37-E, Lea County	160
E/2 of the SW/4 of Section 8, T-23-S, R-37-E, Lea County	80
NW/4 of the SW/4 of Section 8, T-23-S, R-37-E, Lea County	40
W/2 of Section 9, T-23-S, R-37-E, Lea County	320
Total	2600

Skelly Penrose B Unit 40 Acre Five Spot Waterflood Project Description

Legal Description	# of Acres
W/2 of the NW/4 of Section 4, T-23-S, R-37-E, Lea County	80
W/2 of Section 5, T-23-S, R-37-E, Lea County	320
SW/4 of Section 5, T-23-S, R-37-E, Lea County	160
S/2 of the NW/4 of Section 5, T-23-S, R-37-E, Lea County	80
N/2 of the NW/4 of Section 8, T-23-S, R-37-E, Lea County	80
NW/4 of the NE/4 of Section 8, T-23-S, R-37-E, Lea County	40
Total	760



OXY USA INC. - OPERATOR

PENROSE "B" UNIT

Lea County, New Mexico

PROJECT AREA

Revised: 5/11/93
Wells Revised: 2/17/93

Skelly Penrose B Unit
40 Acre Five Spot Waterflood Project
Current Status

Well	Location	Status
Skelly Penrose B Unit #17	660' FNL & 660' FWL, Sec 4, T23S, R37E	Inactive Injector
Skelly Penrose B Unit #18	660' FNL & 660' FEL, Sec 5, T23S, R37E	Active Producer
Skelly Penrose B Unit #19	660' FNL & 1980' FEL, Sec 5, T23S, R37E	Inactive Injector
Skelly Penrose B Unit #26	1980' FNL & 990' FWL, Sec 5, T23S, R37E	Active Producer
Skelly Penrose B Unit #27	1980' FNL & 1980' FWL, Sec 5, T23S, R37E	Active Injector
Skelly Penrose B Unit #28	1980' FNL & 1980' FEL, Sec 5, T23S, R37E	Active Producer
Skelly Penrose B Unit #29	2112' FNL & 660' FEL, Sec 5, T23S, R37E	Active Injector
Skelly Penrose B Unit #30	1980' FNL & 660' FWL, Sec 4, T23S, R37E	Active Producer
Skelly Penrose B Unit #31	1980' FSL & 660' FEL, Sec 5, T23S, R37E	Active Producer
Skelly Penrose B Unit #32	1980' FSL & 1980' FEL, Sec 5, T23S, R37E	Active Injector
Skelly Penrose B Unit #33	1980' FSL & 1980' FWL, Sec 5, T23S, R37E	Active Producer
Skelly Penrose B Unit #34	1980' FSL & 660' FWL, Sec 5, T23S, R37E	Active Injector
Skelly Penrose B Unit #37	660' FSL & 660' FWL, Sec 5, T23S, R37E	Active Producer
Skelly Penrose B Unit #38	660' FSL & 1980' FWL, Sec 5, T23S, R37E	Active Injector
Skelly Penrose B Unit #39	660' FSL & 1980' FEL, Sec 5, T23S, R37E	Active Producer
Skelly Penrose B Unit #40	660' FSL & 660' FEL, Sec 5, T23S, R37E	Active Injector
Skelly Penrose B Unit #44	660' FNL & 1980' FWL, Sec 8, T23S, R37E	Active Producer
Skelly Penrose B Unit #45	660' FNL & 660' FWL, Sec 8, T23S, R37E	Active Injector
Skelly Penrose B Unit #63	660' FNL & 1980' FEL, Sec 8, T23S, R37E	Inactive Injector
Skelly Penrose B Unit #64	2617' FNL & 1366' FWL, Sec 5, T23S, R37E	Active Producer
Skelly Penrose B Unit #65	1357' FNL & 15' FWL, Sec 4, T23S, R37E	Active Producer
Skelly Penrose B Unit #66	1330' FSL & 1307' FWL, Sec 5, T23S, R37E	Active Producer
Skelly Penrose B Unit #67	2555' FSL & 1350' FEL, Sec 5, T23S, R37E	Active Producer
Skelly Penrose B Unit #68	1340' FSL & 1350' FEL, Sec 5, T23S, R37E	Active Producer
Skelly Penrose B Unit #70	2640' FNL & 2640' FEL, Sec 5, T23S, R37E	Proposed Producer
Skelly Penrose B Unit #71	1320' FSL & 2640' FEL, Sec 5, T23S, R37E	Proposed Producer
Skelly Penrose B Unit #72	1320' FNL & 1320' FEL, Sec 5, T23S, R37E	Proposed Producer
Skelly Penrose B Unit #73	0' FSL & 1320' FWL, Sec 5, T23S, R37E	Proposed Producer
Skelly Penrose B Unit #74	0' FSL & 2640' FWL, Sec 5, T23S, R37E	Proposed Producer

Note: Well #70,71,72,73, and 74 may be moved due to surface conditions

WEST LUSK DEEP UNIT
Eddy County, New Mexico

Order No. R-2921, Approving the West Lusk Deep Unit Agreement, Eddy County, New Mexico, June 9, 1965.

Application of Delaware-Apache Corporation for Approval of the West Lusk Deep Unit Agreement, Eddy County, New Mexico.

CASE NO. 3260
Order No. R-2921

ORDER OF THE COMMISSION

BY THE COMMISSION: This cause came on for hearing at 9 o'clock a.m. on June 9, 1965, at Santa Fe, New Mexico, before Examiner Elvis A. Utz.

NOW, on this 9th day of June, 1965, the Commission, a quorum being present, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:
(1) That due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) That the applicant, Delaware-Apache Corporation, seeks approval of the West Lusk Deep Unit Agreement covering 1920 acres, more or less, of State and Federal lands described as follows:

EDDY COUNTY, NEW MEXICO

TOWNSHIP 19 SOUTH, RANGE 31 EAST, NMPM
Section 15: W/2
Section 16: All
Section 17: E/2
Section 20: NE/4
Section 21: N/2
Section 22: NW/4

(3) That approval of the proposed unit agreement should promote the prevention of waste and the protection of correlative rights within the unit area.

IT IS THEREFORE ORDERED:
(1) That the West Lusk Deep Unit Agreement is hereby approved.

(2) That the plan contained in said unit agreement for the development and operation of the unit area is hereby approved in principle as a proper conservation measure; provided, however, that notwithstanding any of the provisions contained in said unit agreement, this approval shall not be considered as waiving or relinquishing, in any manner, any right, duty, or obligation which is now, or may hereafter be, vested in the Commission to supervise and control operations for the exploration and development of any lands committed to the unit and production of oil or gas therefrom.

(3) That the unit operator shall file with the Commission an executed original or executed counterpart of the unit agreement within 30 days after the effective date thereof; that in the event of subsequent joinder by any party or expansion or contraction of the unit area, the unit operator shall file with the Commission within 30 days thereafter counterparts of the unit agreement reflecting the subscription of those interests having joined or ratified.

(4) That this order shall become effective upon the approval of said unit agreement by the Commissioner of Public Lands for the State of New Mexico and the Director of the United States Geological Survey; that this order shall terminate ipso facto upon the termination of said unit agreement; and that the last unit operator shall notify the Commission immediately in writing of such termination.

(5) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

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

SKELLY PENROSE "B" UNIT
Lea County, New Mexico

Order No. R-2915, Approving the Skelly Penrose "B" Unit Agreement, Lea County, New Mexico, June 1, 1965.

Application of Skelly Oil Company for Approval of the Skelly Penrose "B" Unit Agreement, Lea County, New Mexico.

CASE NO. 3257
Order No. R-2915

ORDER OF THE COMMISSION

BY THE COMMISSION: This cause came on for hearing at 9 o'clock a.m. on May 26, 1965, at Santa Fe, New Mexico, before Examiner Daniel S. Nutter.

NOW, on this 1st day of June, 1965, the Commission, a quorum being present, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:
(1) That due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) That the applicant, Skelly Oil Company, seeks approval of the Skelly Penrose "B" Unit Agreement covering 2612.16 acres, more or less, of State and Fee lands described as follows:

(SKELLY PENROSE "B" UNIT - Cont'd.)

LEA COUNTY, NEW MEXICO

TOWNSHIP 22 SOUTH, RANGE 37 EAST, NMPM
Section 31: E/2 SE/4
Section 32: W/2, W/2 NE/4, and SE/4

TOWNSHIP 23 SOUTH, RANGE 37 EAST, NMPM
Section 4: W/2 NW/4
Section 5: All
Section 6: NE/4 and E/2 SE/4
Section 7: N/2 NE/4
Section 8: N/2, N/2 SW/4, SE/4 SW/4, and SE/4
Section 9: W/2

(3) That approval of the proposed unit agreement should promote the prevention of waste and the protection of correlative rights within the unit area.

IT IS THEREFORE ORDERED:
(1) That the Skelly Penrose "B" Unit Agreement is hereby approved.

(2) That the plan contained in said unit agreement for the development and operation of the unit area is hereby approved in principle as a proper conservation measure; provided, however, that notwithstanding any of the provisions contained in said unit agreement, this approval shall not be considered as waiving or relinquishing, in any manner, any right, duty, or obligation which is now, or may hereafter be, vested in the Commission to supervise and control operations for the exploration and development of any lands committed to the unit and production of oil or gas therefrom.

(3) That the unit operator shall file with the Commission an executed original or executed counterpart of the unit agreement within 30 days after the effective date thereof; that in the event of subsequent joinder by any party or expansion or contraction of the unit area, the unit operator shall file with the Commission within 30 days thereafter counterparts of the unit agreement reflecting the subscription of those interests having joined or ratified.

(4) That this order shall become effective upon the approval of said unit agreement by the Commissioner of Public Lands for the State of New Mexico; that this order shall terminate ipso facto upon the termination of said unit agreement; and that the last unit operator shall notify the Commission immediately in writing of such termination.

(5) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

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

CUEVA UNIT
Eddy County, New Mexico

Order No. R-2922, Approving the Cueva Unit Agreement, Eddy County, New Mexico, June 9, 1965.

Application of Monsanto Company for Approval of the Cueva Unit Agreement, Eddy County, New Mexico.

CASE NO. 3262
Order No. R-2922

ORDER OF THE COMMISSION

BY THE COMMISSION: This cause came on for hearing at 9 o'clock a.m. on June 9, 1965, at Santa Fe, New Mexico, before Examiner Elvis A. Utz.

NOW, on this 9th day of June, 1965, the Commission, a quorum being present, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:
(1) That due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) That the applicant, Monsanto Company, seeks approval of the Cueva Unit Agreement covering 12,488.64 acres, more or less, of State, Federal and Fee lands described as follows:

EDDY COUNTY, NEW MEXICO
TOWNSHIP 22 SOUTH, RANGE 25 EAST, NMPM

Sections 21 and 22: All
Sections 27 and 28: All
Section 29: E/2
Sections 32,33 and 34: All

TOWNSHIP 23 SOUTH, RANGE 25 EAST, NMPM

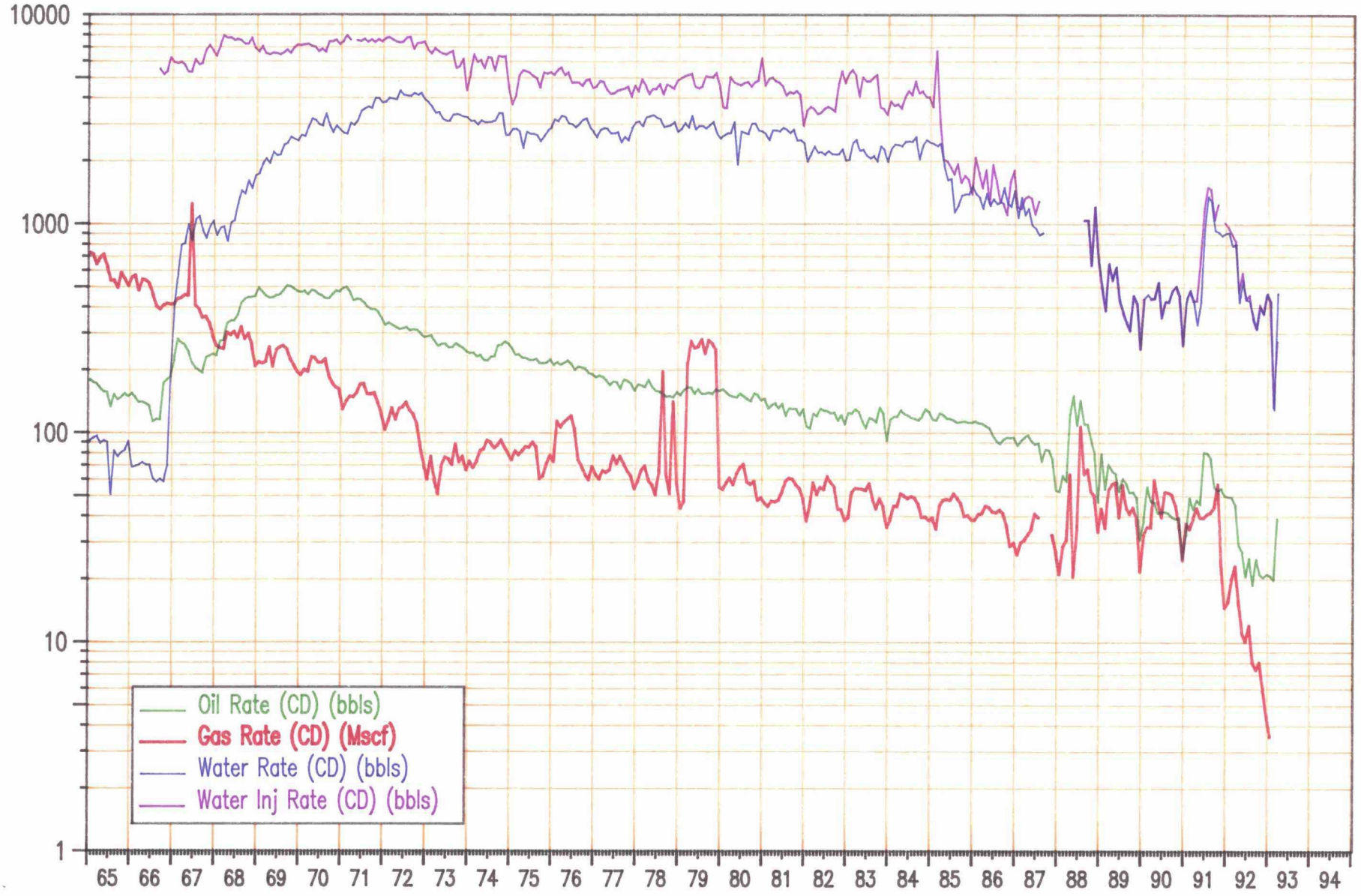
Sections 3 through 10 inclusive: All
Sections 15 through 18 inclusive: All

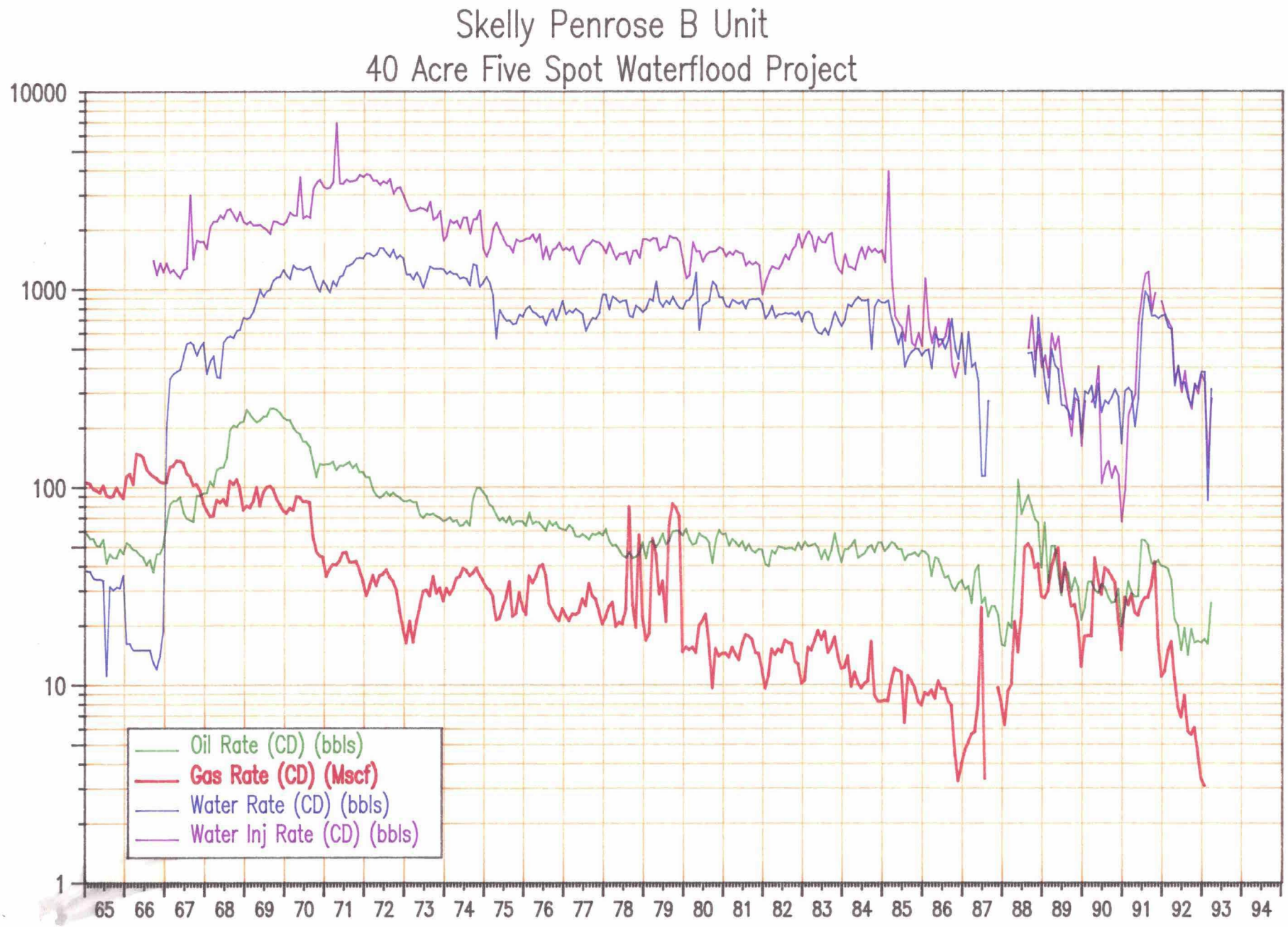
(3) That approval of the proposed unit agreement should promote the prevention of waste and the protection of correlative rights within the unit area.

IT IS THEREFORE ORDERED:
(1) That the Cueva Unit Agreement is hereby approved.

(2) That the plan contained in said unit agreement for the development and operation of the unit area is hereby approved in principle as a proper conservation measure; provided, however, that notwithstanding any of the provisions contained in said unit agreement, this approval shall not be considered as waiving or relinquishing, in any manner, any right, duty, or obligation which is now, or may hereafter be, vested in the Commission to supervise and control operations for the exploration and development of any lands committed to the unit and production of oil or gas therefrom.

Skelly Penrose B Unit




Skelly Penrose B Unit
40 Acre Five Spot Waterflood Project
10000
1000
100
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1
65
66
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73
74
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87
88
89
90
91
92
93
94
Oil Rate (CD) (bbls)
Gas Rate (CD) (Mscf)
Water Rate (CD) (bbls)
Water Inj Rate (CD) (bbls)

Skelly Penrose B Unit
40 Acre Five Spot Waterflood Project

Fluid to be Injected:	Water
Volumes to be Injected:	300 BWPD
Source of Water:	1 - Produced water from the unit 2 - Texaco's Jal Water System
Proposed Date of Injection:	July 1, 1993

LANGLIE-MATTIX POOL
(Skelly Penrose "B" Unit Waterflood)
Lea County, New Mexico

Order No. R-2956, Authorizing Skelly Oil Company to Institute a Waterflood Project in the Skelly Penrose "B" Unit Area, Queen Formation, Langlie-Mattix Pool, Lea County, New Mexico, August 16, 1965.

Application of Skelly Oil Company for a Waterflood Project, Lea County, New Mexico.

CASE NO. 3286
Order No. R-2956

ORDER OF THE COMMISSION

BY THE COMMISSION: This cause came on for hearing at 9 o'clock a. m. on August 11, 1965, at Santa Fe, New Mexico, before Examiner Elvis A. Utz.

NOW, on this 16th day of August, 1965, the Commission, a quorum being present, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) That the applicant, Skelly Oil Company, seeks permission to institute a waterflood project in the Skelly Penrose "B" Unit Area, Langlie-Mattix Pool, by the injection of water into the Queen formation through 33 injection wells in Sections 31 and 32, Township 22 South, Range 37 East, and Sections 4, 5, 6, 7, 8, and 9, Township 23 South, Range 37 East, NMPM, Lea County, New Mexico.

(3) That the wells in the project area are in an advanced state of depletion and should properly be classified as "stripper" wells.

(4) That the proposed waterflood project should result in the recovery of otherwise unrecoverable oil, thereby preventing waste.

(5) That the subject application should be approved and the project should be governed by the provisions of Rules 701, 702, and 703 of the Commission Rules and Regulations.

IT IS THEREFORE ORDERED:

(1) That the applicant, Skelly Oil Company, is hereby authorized to institute a waterflood project in the Skelly Penrose "B" Unit Area, Langlie-Mattix Pool, by the injection of water into the Queen formation through the following-described 33 wells in Lea County, New Mexico:

TOWNSHIP 22 SOUTH, RANGE 37 EAST, NMPM

Well No.	Unit	Section
12	P	31
1	B	32
3	D	32
5	F	32
8	J	32
10	L	32
14	N	32
16	P	32

TOWNSHIP 23 SOUTH, RANGE 37 EAST, NMPM

Well No.	Unit	Section
17	D	4
19	B	5
21	D	5
27	F	5
29	H	5
32	J	5
34	L	5
38	N	5
40	P	5
23	B	6
25	H	6
36	P	6
47	B	7
45	D	8
50	H	8
56	L	8
57	N	8
59	P	8
Re-entry, Old Abandoned Hole	B	8
Re-entry, Old Abandoned Hole	F	8
To Be Drilled	J	8
42	D	9
52	F	9
54	L	9
61	N	9

(2) That the subject waterflood project shall be governed by the provisions of Rules 701, 702, and 703 of the Commission Rules and Regulations.

(3) That monthly progress reports of the waterflood project herein authorized shall be submitted to the Commission in accordance with Rules 704 and 1120 of the Commission Rules and Regulations.

(4) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

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

Skelly Penrose B Unit
40 Acre Five Spot Waterflood Project
Proposed Status

Well	Location	Status
Skelly Penrose B Unit #17	660' FNL & 660' FWL, Sec 4, T23S, R37E	Injector
Skelly Penrose B Unit #18	660' FNL & 660' FEL, Sec 5, T23S, R37E	Injector
Skelly Penrose B Unit #19	660' FNL & 1980' FEL, Sec 5, T23S, R37E	Injector
Skelly Penrose B Unit #26	1980' FNL & 990' FWL, Sec 5, T23S, R37E	Injector
Skelly Penrose B Unit #27	1980' FNL & 1980' FWL, Sec 5, T23S, R37E	Injector
Skelly Penrose B Unit #28	1980' FNL & 1980' FEL, Sec 5, T23S, R37E	Injector
Skelly Penrose B Unit #29	2112' FNL & 660' FEL, Sec 5, T23S, R37E	Injector
Skelly Penrose B Unit #30	1980' FNL & 660' FWL, Sec 4, T23S, R37E	Injector
Skelly Penrose B Unit #31	1980' FSL & 660' FEL, Sec 5, T23S, R37E	Injector
Skelly Penrose B Unit #32	1980' FSL & 1980' FEL, Sec 5, T23S, R37E	Injector
Skelly Penrose B Unit #33	1980' FSL & 1980' FWL, Sec 5, T23S, R37E	Injector
Skelly Penrose B Unit #34	1980' FSL & 660' FWL, Sec 5, T23S, R37E	Injector
Skelly Penrose B Unit #37	660' FSL & 660' FWL, Sec 5, T23S, R37E	Injector
Skelly Penrose B Unit #38	660' FSL & 1980' FWL, Sec 5, T23S, R37E	Injector
Skelly Penrose B Unit #39	660' FSL & 1980' FEL, Sec 5, T23S, R37E	Injector
Skelly Penrose B Unit #40	660' FSL & 660' FEL, Sec 5, T23S, R37E	Injector
Skelly Penrose B Unit #44	660' FNL & 1980' FWL, Sec 8, T23S, R37E	Injector
Skelly Penrose B Unit #45	660' FNL & 660' FWL, Sec 8, T23S, R37E	Injector
Skelly Penrose B Unit #63	660' FNL & 1980' FEL, Sec 8, T23S, R37E	Injector
Skelly Penrose B Unit #64	2617' FNL & 1366' FWL, Sec 5, T23S, R37E	Producer
Skelly Penrose B Unit #65	1357' FNL & 15' FWL, Sec 4, T23S, R37E	Producer
Skelly Penrose B Unit #66	1330' FSL & 1307' FWL, Sec 5, T23S, R37E	Producer
Skelly Penrose B Unit #67	2555' FSL & 1350' FEL, Sec 5, T23S, R37E	Producer
Skelly Penrose B Unit #68	1340' FSL & 1350' FEL, Sec 5, T23S, R37E	Producer
Skelly Penrose B Unit #70	2640' FNL & 2640' FEL, Sec 5, T23S, R37E	Producer
Skelly Penrose B Unit #71	1320' FSL & 2640' FEL, Sec 5, T23S, R37E	Producer
Skelly Penrose B Unit #72	1320' FNL & 1320' FEL, Sec 5, T23S, R37E	Producer
Skelly Penrose B Unit #73	0' FSL & 1320' FWL, Sec 5, T23S, R37E	Producer
Skelly Penrose B Unit #74	0' FSL & 2640' FWL, Sec 5, T23S, R37E	Producer

Note: Well #70,71,72,73, and 74 may be moved due to surface conditions

Skelly Penrose B Unit
40 Acre Five Spot Waterflood Project
Cost Estimates

Drill and Equip 5 Producers	$ 1,125,000
Convert 9 Producers to Injection	$ 315,000
Reactivate 9 Injectors	$ 480,000
Reactivate 3 Producers	$ 65,000
Upgrade Battery and Injection Facilities	$ 70,000
Total Project Cost Estimate	$ 2,055,000

RESERVE ESTIMATES

40 Acre Five Spot Waterflood Project

Volumetric Reservoir Parameters:

Area	=	760 acres
Net Pay	=	32.5 feet
Porosity	=	10% average
Connate Water Saturation	=	40%
Formation Volume Factor	=	1.25 reservoir bbls/stock tank barrels

Project Area OOIP	=	9169.58 MSTB
Project Area Cumm Production to Date	=	1396.96 MSTB
Project Area % OOIP Recovery to 12/92	=	15.2%
Remaining Oil in Project Area @ 1/93	=	7772.62 MSTB
Estimated Current Oil Saturation	=	39%
Remaining Mobile Oil (@ residual oil saturation of 30%)	=	1495.04 MSTB
Estimated Project Recovery (with sweep efficiency = 65%)	=	**971.78 MSTB**

Skelly Penrose B Unit

40 Acre Five Spot Waterflood Project

Skelly Penrose B Unit
40 Acre Five Spot Waterflood Project

The proposed project for the Skelly Penrose B Unit includes the implementation of a 40 acre five spot waterflood project in the central part of the unit. The purpose of the project is to investigate the potential of infill drilling and waterflooding in a 40 acre five spot pattern to increase the ultimate recovery from the Penrose portion of the Queen formation. The Penrose B Unit was unitized in 1965 with waterflood operations commencing in mid - 1966 on a 80 acre five spot waterflood pattern. Ultimate primary oil recovery from the unit was 1,775,000 barrels of oil with ultimate secondary oil recovery from the 80 acre five spot pattern of 1,742,000 barrels of oil. Based on the ultimate primary and secondary oil recoveries, a secondary to primary oil recovery ratio of 0.98 will be ultimately achieved from the Penrose portion of the Queen formation on the Skelly Penrose B Unit. Based on work done by T. Scott Hickman & Associates, the oil recovery ratio on the Skelly Penrose B Unit is similar to other 80 acre five spot waterflood projects in the Queen/Penrose formation.

In the work done by T. Scott Hickman & Associates (copy attached), the Queen formation was studied for possible redevelopment on 40 acre five spot waterflood patterns to increase oil recoveries. In this study, the West Dollarhide Queen Sand Unit was used as an analog to other Queen projects in Southeast Lea County. The West Dollarhide Queen Sand Unit was redeveloped from 80 acre five spot waterflood patterns to 40 acre five spot waterflood patterns starting in 1987. Results from the redevelopment project on the West Dollarhide Queen Sand Unit show that the ultimate secondary to primary ratio will increase from 0.44 to 2.03. Hickman concluded that the reason for the drastic increase in secondary oil reserves was due to high mobile oil saturations which is caused by poor vertical and areal sweep efficiencies. Poor vertical and areal sweep efficiencies are typical in the Queen formation of southeast Lea County due to lateral discontinuity, directional permeability, completion techniques, insufficient well density, and water quality.

Due to the results of the West Dollarhide Queen Sand Unit, and the findings in the T. Scott Hickman paper, it is concluded that there is areas of the Skelly Penrose B Unit that have high mobile oil saturations. The Skelly Penrose B Unit produces from the same Queen/Penrose formation as the West Dollarhide Queen Sand Unit. Based on the performance of the 80 acre five spot waterflood pattern, the waterflood project on the Skelly Penrose B Unit suffers from poor vertical and areal sweep efficiencies. By increasing the well density in the unit from a 80 acre five spot waterflood pattern to a 40 acre five spot waterflood pattern, vertical and areal sweep efficiencies would be increased. The change in waterflood pattern would result in improved oil recovery of 1 million barrels of oil due to the greater areal and vertical sweep efficiencies and would allow the waterflood to sweep areas in the unit which have not been swept in the past.

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Society of Petroleum Engineers

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The Redevelopment of Depleted Queen Waterflood Projects in the Permian Basin

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SPE Members

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Introduction

Significant future reserve additions in the Permian Basin of West Texas and Southeastern New Mexico will come about through improved oil recovery techniques (IOR) applied to existing reservoirs. The major companies have an impressive list of improved or enhanced recovery projects on their strategic lists. On the other side of the street, independents are competing to acquire the major's non-strategical properties that are judged to have IOR potential. The Permian Basin is certainly one of the world's most mature producing provinces, but it is also a frontier for advanced IOR technology.

Primary development of the world class Permian Age producing horizons in the Permian Basin occurred from the mid-1930's through the 1950's. The 1960's was the era of secondary recovery with the establishment of many of the Basin's water injection projects. A majority of these waterflood projects were probably based on the "Tank Model" concept of a reservoir, involving little or no geologic input. The fallout from the initial failure of some of these projects started industry on the road to developing a joint geological/engineering approach. One of the earlier papers to appear in engineering literature discussing the geological aspects was Dowling's 1970 paper titled "Application of Carbonate Environmental Concepts to Secondary Recovery Projects"[1]. A recent contribution in this area is a 1991 SPE Paper by Holtz, Ruppel and Hocott with the Bureau of Economic Geology at the University of Texas[2]. Reading these two papers together shows the advances in carbonate geology and it's application to reservoir exploitation.

On the engineering side, much of the emphasis has been infill drilling. A 1974 paper by Driscoll listed nine factors that influence additional recovery through infill drilling[3]. In 1976, Stiles authored a paper on optimizing waterflood recovery in the Clearfork[4]. This was the first of several papers by Stiles and his colleagues at Exxon that has served as the foundation for the technology that has evolved into reservoir characterization. A good summary of what has been accomplished through infill drilling and reservoir characterization in West Texas carbonates is contained in a 1991 article by Wu et.al.[5]

Nearly all the current IOR efforts, and hence the literature, in the Permian Basin have been directed towards the San Andres and Clearfork carbonates. To paraphrase Willy Sutton, the infamous bank robber, in justifying his profession, "that's where the money is." The bulk of the remaining oil-in-place (ROIP) exists in these two horizons where the facies stacking nature of the marine depositional cycles creates complex, heterogeneous reservoirs often over a thousand feet in gross thickness. Following primary depletion, the remaining mobile oil volumes within these thick sections were the targets for secondary recovery through water injection. Now both the remaining mobile oil and residual oil are targets

References at end of paper

and depositional setting is based on study in the Keystone (Colby) field in Winkler County, Texas. This field produces from the lower half of the Queen formation which is the equivalent of the Penrose formation in New Mexico[7]. In contrast to the depositional environment described by Holly and Mazzullo for the northeastern margin area, Vanderhill attributes the numerous separate rock units to minor shifts in the local depositional environment and not large sea level fluctuations. The sands were deposited in a shallow marine setting but in somewhat deeper water than the shallow tidal or strandline dolomites. Although both papers agree that the majority of the porosity is secondary in nature, Vanderhill attributes it to the dissolution of feldspar. A total of 32 sand units six inches or greater in thickness have been identified in the Colby section. Figure 4 is a type log from the Myers Langlie Mattix Unit which identifies ten correlatable sand units within the gross productive interval.

Concepts

At first glance the old adage, poor primary recovery gives poor secondary recovery, would appear to hold true within the Queen formation. Projects with good primary performance exhibited good secondary recovery. Conversely projects with poor secondary recovery invariably had low primary recovery. That mindset combined with the concept that the pay intervals are continuous sands across structural traps may help explain why many projects were essentially abandoned after poor initial secondary response.

High remaining mobile oil saturation in a depleted waterflood is due to a lack of vertical and areal injection coverage. Poor vertical coverage can result from: 1) pay intervals not fully identified, 2) inefficient completion techniques, 3) out of zone injection, 4) pay intervals not completely penetrated, 5) water quality. The lack of areal injection coverage can be due to: 1) lateral discontinuity, 2) insufficient well density, 3) inadequate injection to withdrawal ratio, 4) improper pattern alignment, 5) directional permeability, 6) inadequate withdrawals.

Overall the lack of injection coverage results from the relationship between natural, i.e. reservoir and fluid parameters, and controlled, i.e. reservoir management, factors. Within the thick Permian carbonate sequences, the IOR potential is predominately a function of reservoir heterogeneity. In the Queen, where the lithologies are not nearly so complex, the potential results more from low reservoir energy, completion in efficiencies and operational difficulties. The primary and secondary development techniques utilized in the Queen reflected prevailing concepts which have since been rendered obsolete by engineering and geological advances.

TANFL (there ain't no free lunches), applies also to depleted Queen waterfloods. Contrary to popular belief, blanket infill drilling is not necessarily the solution. An integrated geological /engineering analysis is required to focus redevelopment on the most highly productive areas. Emphasis is not on maximizing recovery, but optimizing economics. This requires sound reservoir management techniques at every stage from the analysis and design through the implementation and surveillance. Companies that acquire depleted waterfloods without doing their homework may achieve less than anticipated results.

Approach

This section was initially titled methodology, which suggested a routine approach to a problem. The peculiar nature of each project, the availability of data and the financial situation of the operator requires flexibility and innovations in the analysis and exploitation. However, the goals of each study were similar: 1) identify the potential, 2) quantify the potential, 3) map the distribution of the potential, 4) design an optimum exploitation plan, 5) project performance, 6) forecast economics, 7) set up a surveillance and data gathering program.

1. Identifying the potential requires determination or understanding of why primary and/or secondary recovery was low. The starting point is to characterize the reservoir which fortunately does not require the complex facies identification process necessary with carbonate reservoirs. Defining the net pay sequence from logs, cores, and tests is usually sufficient. A key step is determining the well completion efficiency from cross-sections connotated with completion and test information. This involves tedious and time-consuming work, but is indispensable for identifying zones that have not been drained due to being behind pipe, inefficiently completed or not penetrated. Knowledge is also gained about zonation and continuity. This characterization effort combined with information about original reservoir conditions, usually explains the primary recovery.

Understanding the reasons for low secondary response is critical to judging the potential. This requires a secondary performance review to analyze injection/withdrawal ratio, injection efficiency, oil response, pattern alignment, directional permeability and operational problems.

occurred on projects in an advanced stage of depletion where injection had been reduced to the return of produced water. Although some of the infill wells achieved economic recoveries without active water injection support, they are the exceptions. Effective water injection into closed patterns is required to provide the reservoir energy and sweep necessary for the economic recovery of remaining mobile oil through infill drilling.

The Bridge operated MFQAU is a direct south offset to the Sirgo SUC2U (Figure 5A). A total of 17 wells were drilled in the eastern two-thirds of the Unit during 1988-89 either as 20-acre infill or replacement wells (Figure 7). A semi-symmetrical injection pattern was established creating several situations that approximate 20-acre infill drilling with full injection support. Some wells have maintained high producing rates for several years in contrast to the rapid decline experienced by most Queen infill wells. Well No. 4532, which is offset by 3 injection wells, potentialed for 110 BOPD on 8/89 and was tested for 70 BOPD on 3/91 and 108 BOPD on 7/91. The performance of this unit with infill drilling is shown by Figure 6. The incremental average infill recovery is estimated at 52 MB per well.

Bridge has done similar redevelopment on the ULB4QU. Individual well information was not available, but the recent unit performance suggests that the production increases realized from the drilling of infill and replacement wells are being sustained by water injection (Figure 8).

All of the projects in the study areas have been subjected to millions of barrels of water injection. Water saturations and consequently permeability to water, while erratic, are high throughout much of the reservoir. The redeveloped projects will produce at high water cuts from the start, requiring the handling of large volumes of water. Economic recovery under these circumstances dictates that the redevelopment focus on the most prospective areas and be designed to produce the most oil in the least time.

Project Analysis

Table 4 summarizes basic data on the six redevelopment projects. The development and performance history of the individual units are summarized on Figures 9-14. Table 5 presents primary and secondary performance parameters for the projects. Each project is scheduled to be redeveloped on forty-acre five-spot injection patterns (20-acre well density) in phases starting with the lowest risk phase first. Implementation of each phase depends on results from the preceding phase. Redevelopment plans and the basis for recovery projections are summarized on Table 6. A final residual oil saturation of 30% was assumed for all cases. The conformance factors were based on estimates of vertical coverage and areal sweep for each project as modified by the detailed performance analyses.

Infill drilling has been completed on just one of the six redevelopment projects. Full scale pattern injection has not yet been implemented in any project. The presence of high mobile oil saturation has been established on all the projects either by infill drilling within the project or on a direct offset.

The pace of development is dependent upon the ability of small independents to raise capital in today's market. Not only are the redevelopment stages ranked according to risk and potential, but also the projects. The lower priority projects are deferred until the investment climate improves or the project is upgraded by additional information or offset performance.

1. West Dollarhide Queen Unit

The Sirgo-operated WDQU produces from what is termed the Penrose but is equivalent to the total Queen Section at 3600 feet. The development and performance history is shown on Figure 9. The project was acquired essentially as a salvage operation with plans to work over wells in an attempt to increase production. The original feasibility study suggested that the unit had good infill potential due to numerous possible productive zones either behind pipe or not penetrated. A preliminarily study in 1986 used limited data to make a volumetric estimation of OOIP and remaining mobile oil (Table 4). The unit was divided into five phases based on potential and risk as determined by individual well performance analysis (Figure 16). Phases 1 and 2 were located in the area of good secondary response (Figure 17). Based on the 1986 study, thirty infill wells were drilled and the study revised in 1988 utilizing the information gained. As each well was drilled, the logs were analyzed to improve the data base for volumetric calculations and reserve estimations. The OOIP volume was revised from 34 MMB to 44 MMB, so the original volumetrics proved reasonable in spite of the lack of data. Figures 15A and 15B show the original and revised net pay isopach maps.

The unit production increased from 40 BOPD to 1500 BOPD upon completion of the first 30 infill wells which almost equals the peak primary response from 60 wells. A number of the infill wells had initial potential in excess of 200 BOPD, positive evidence of the high mobile oil saturation remaining within areas of the unit. Without water injection support,

the 15% range. Similar to the other Queen projects studied, areas of good secondary response were found in both projects.

A low injection-withdrawal balance and operational problems contributed to poor secondary performance. Both units received pressured water from the Means System in lieu of having their own injection facilities. The Bridge-operated MFQAU project has achieved some significant results where infill wells are being supported by water injection (Table 3 and Figure 8). MFQAU offsets the SUC1U and SUC2U to the south (Figure 5). Redevelopment of the SUC1U is projected to give an improved/primary recovery ratio of 3.0 for a 23% ultimate recovery. Similarly, redevelopment of the SUC2U is projected to give an improved/primary ratio of 2.3 for a 23% ultimate recovery also.

Conclusions

1. Infill drilling has confirmed that some depleted Queen Sand Waterfloods still contain high mobile oil saturations.

2. This mobile oil saturation is not uniformly distributed and detailed analysis is required to define the more prospective areas.

3. The economic recovery of the remaining mobile oil requires redevelopment of the waterfloods by infill drilling and adequate water injection support.

4. Good reservoir management and financing requirements dictate that the most prospective areas be exploited first and the results used to upgrade the other stages.

Acknowledgements

Appreciation is expressed to Sirgo Operating, Inc. for permission to publish this paper and also Bridge Oil Inc. for allowing use of certain production data.

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OPERATOR	UNIT	NO. WELLS	PERIOD	AVERAGE INITIAL RATE (BOPD/WELL)	AVERAGE INITIAL RATE (BWPD/WELL)	EUR (MB/WELL)	COMMENTS
Texaco	S-PAU	5	1973-74	82	139	90	Full injection support
		1	1985	85	145	24	Located near 3MMB injector
Sirgo	WDSQU	52	1987-88	55	115	43	Marginal support from injection of produced water only
Sirgo	S-PBU	6	1988	15	178	12	No injection support
Bridge	MFQAU	13	1988-89	62	39	52	Full injection support on some wells since mid 1989
Texaco	MLMU	5	1986	61	226	78	Partial injection support from existing line drive
Sirgo	SUC1U & SUC2U	5	1990	46	77	15	No injection support

Table 3 – Results of 20 ac. Infill Drilling in Queen Waterfloods

PROJECT	ZONE	DEPTH (ft)	AREA (ac)	AVERAGE PROPERTIES: WELL DENSITY (ac)	Ø (%)	NET PAY (ft)	Sw (%)	K (md)	FVFI (VOL/VOL)	POROSITY CUTOFF (%)	OOIP (MMB)
Lea County, New Mexico											
WDOSU	QUEEN/ PENROSE	3700	2500	40	13.5	34	40	0.1-167	1.20	9.5	44
S-PBU	PENROSE	3800	2612	41	NA	NA	NA	NA	NA	NA	NA
MLMU	QUEEN/ PENROSE	3600	9560	42	13.0	23	40	0.1-100	1.18	9.0	115
Andrews County, Texas											
MXQU	UPPER QUEEN	4800	2144	40	14.0	18	40	1.0-31	1.17	10.0	20
SUC1U	UPPER QUEEN	4800	2560	57	14.0	18	35	0.3-32	1.15	10.0	29
SUC2U	UPPER QUEEN	4800	2120	40	14.5	20	35	0.3-29	1.15	10.0	32

Table 4 – Basic Reserve Data for Redevelopment Projects

PROJECT	PRIMARY: ULTIMATE (MB/WELL)	PRIMARY: RECOVERY (%)	SECONDARY: START INJECTION	SECONDARY: SECONDARY/ PRIMARY (VOL/VOL)	SECONDARY: INJECTORS/ PRODUCERS (RATIO)	SECONDARY: INJECTION/ RECOVERY (VOL/VOL)	TOTAL: ULTIMATE (MB/WELL)	TOTAL: RECOVERY (%)
Lea County, New Mexico								
WDSQU	50	7.4	1984	0.43	0.73	24	72	10.8
S-PBU	28	NA	1988	0.98	0.70	25	52	NA
MLMU	40	7.8	1975	0.78	0.92	27	68	13.8
Andrews County, Texas								
MXQU	28	7.2	1983	1.09	0.93	9	54	15.0
SUC1U	38	5.8	1981	1.51	1.04	11	95	14.6
SUC2U	42	8.8	1981	1.33	1.30	7	97	15.9

Table 5 – Primary & Secondary Performance for Redevelopment Projects

PROJECT	INFILL LOCATIONS: PROPOSED	INFILL LOCATIONS: DRILLED	INJECTORS/ PRODUCERS (RATIO)	RMOIP/ OMOIP (VOL/VOL)	CONFORMANCE (DECIMAL)	PROJECTED TOTAL IMPROVED/ PRIMARY (VOL/VOL)	PROJECTED TOTAL RECOVERY (%)
Lea County, New Mexico							
WDSQU	67	52	0.98	.53	.29	1.58	19.1
S-PBU	57	6	1.10	NA	NA	3.2	NA
MLMU	142	5	1.23	.54	.38	2.0	23.0
Andrews County, Texas							
MXQU	21	0	1.17	.48	.35	2.2	22.7
SUC1U	47	0	1.12	.40	.50	3.0	23.0
SUC2U	21	0	1.85	.38	.41	2.3	23.0

Table 6 – Plans & Projections for Redevelopment Projects

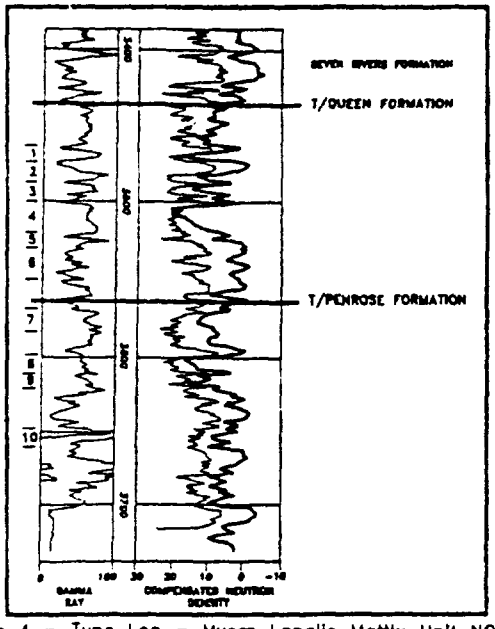

Figure 4 – Type Log – Myers Langlie Mattix Unit NO. 111
Lea County, New Mexico

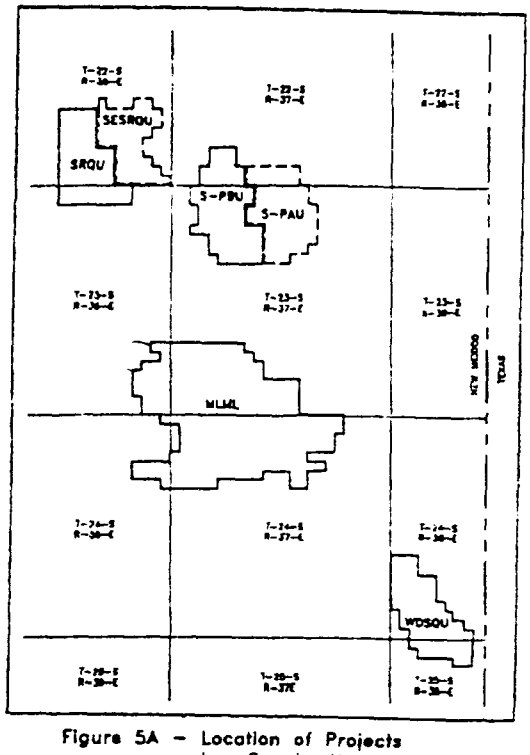

Figure 5A – Location of Projects
Lea County, New Mexico

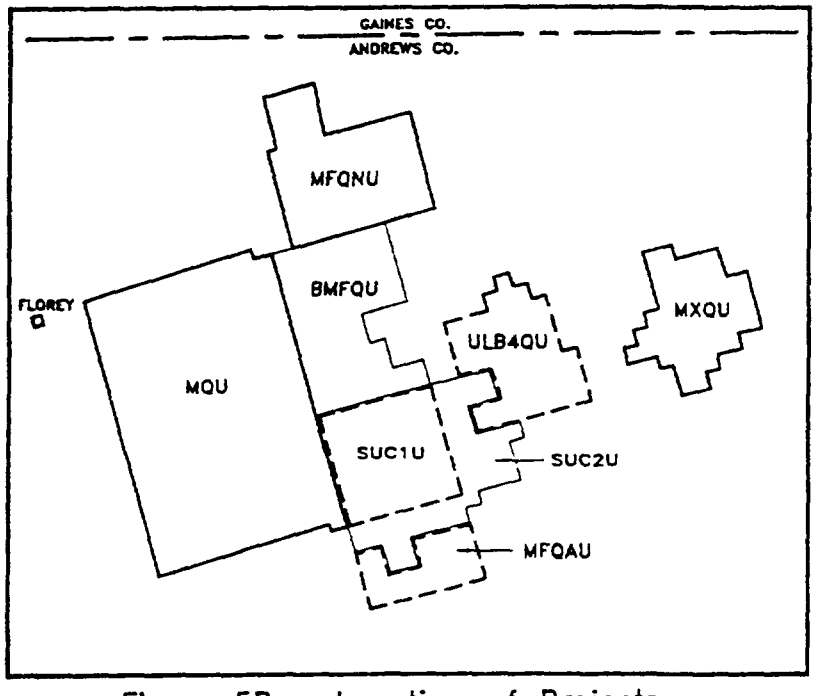

Figure 5B – Location of Projects
Andrews County, Texas

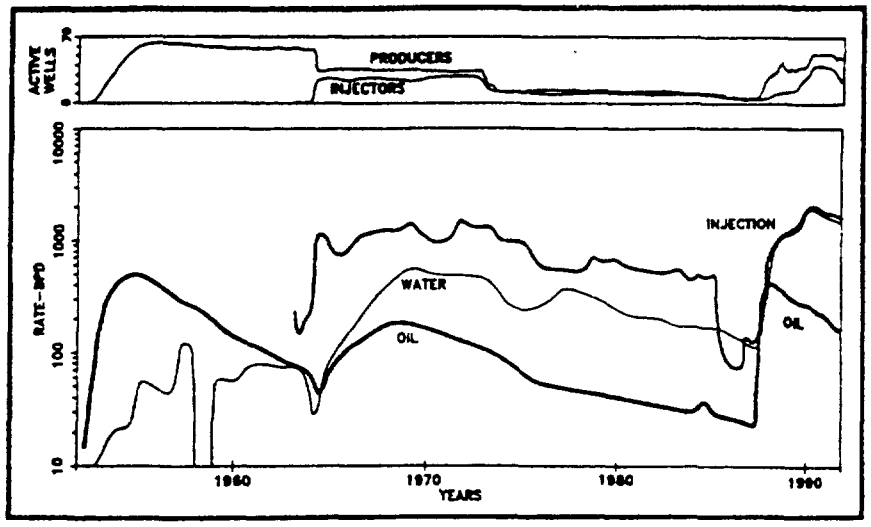

Figure 9 – Performance Graph
Sirgo–West Dollarhide Queen Sand Unit
Lea County, New Mexico

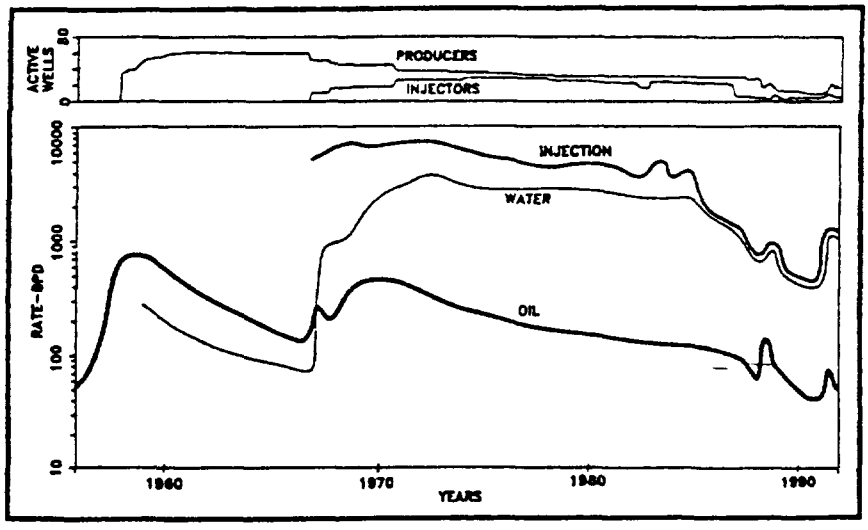

Figure 10 – Performance Graph
Sirgo–Skelly–Penrose B Unit
Lea County, New Mexico

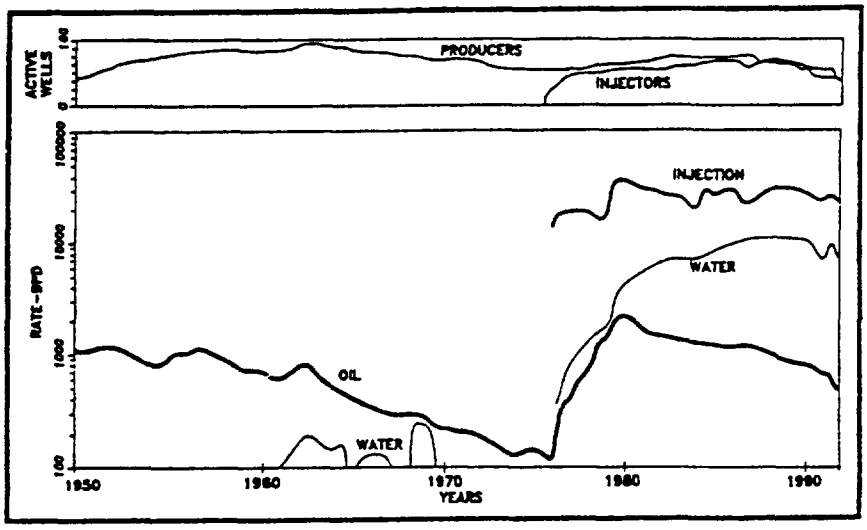

Figure 11 – Performance Graph
Sirgo–Myers Langlie Mattix Unit
Lea County, New Mexico

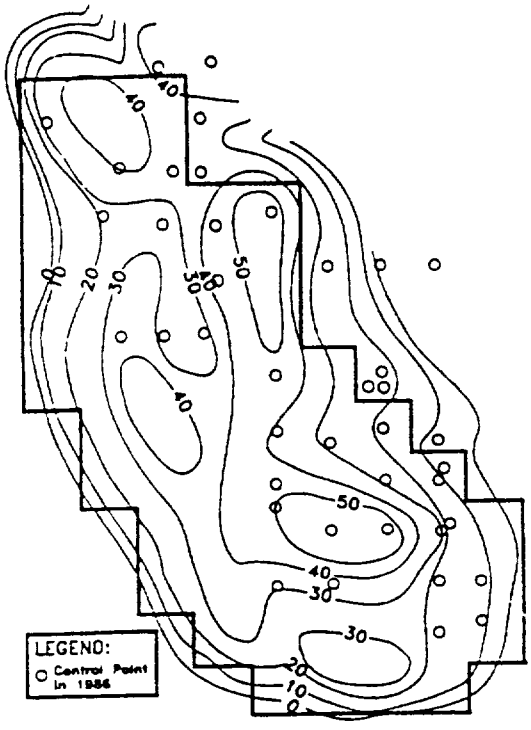

Figure 15A – Net Pay Isopach, 1986
Sirgo–West Dollarhide Queen Sand Unit

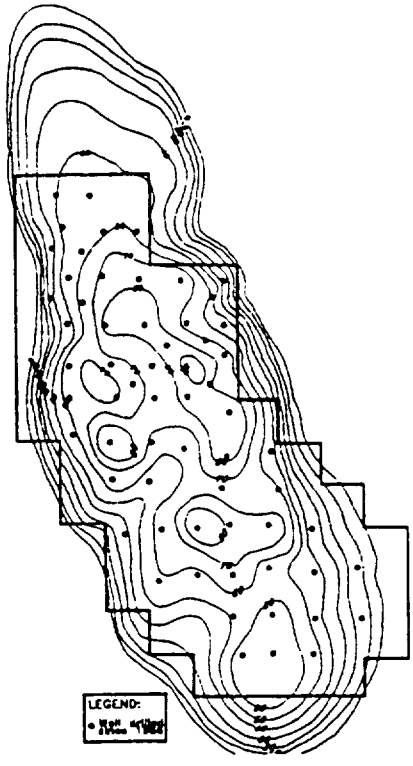

Figure 15B – Net Pay Isopach, 1988
Sirgo–West Dollarhide Queen Sand Unit

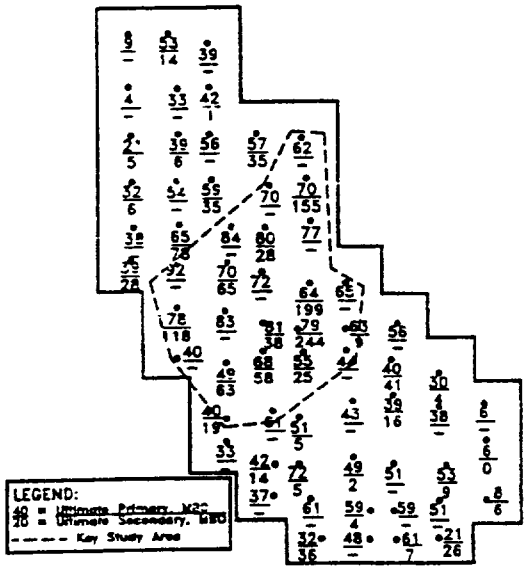

Figure 16 – Initial Estimated Recoveries as of 5–1–87
Sirgo–West Dollarhide Queen Sand Unit

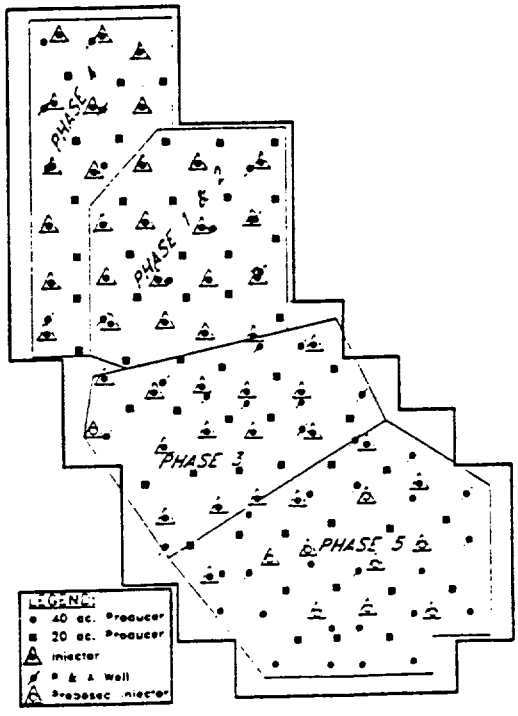

Figure 17 – Redevelopment Phase Areas
Sirgo–West Dollarhide Queen Sand Unit

EVALUATION OF

WATERFLOOD REDEVELOPMENT PROJECT

SKELLY-PENROSE "B" UNIT

LEA COUNTY, NEW MEXICO

T. SCOTT HICKMAN & ASSOCIATES, INC.
PETROLEUM CONSULTANTS

September 28, 1987

Sirgo-Collier, Inc.
P. O. Box 3531
Midland, TX 79702

Attention: Mr. Manny Sirgo

Home Savings Association
P. O. Box 11023
Midland, TX 79712

Attention: Mr. Mike Irons

Casa Energy
P. O. Box 11023
Midland, TX 79712

Attention: Mr. Alan Byars

Gentlemen:

Re: Waterflood Redevelopment Project
Skelly-Penrose "B" Unit
Lea County, New Mexico

In accordance with Messrs. Sirgo's, Byars' and Irons' request, we have evaluated the Proved crude oil and gas reserves as of September 15, 1987 attributed to additional development and re-establishing injection in the Skelly-Penrose "B" Unit, Lea County, New Mexico. The results of this study are discussed in the attached report as outlined in the Table of Contents. A summary of our evaluation to 100% working interest (75% net revenue interest) is as follows:

	Net Reserves		Future Net Revenue	
	Liquid (MBBL)	Gas (MMCF)	Undis-counted (M$)	Discounted @ 10% (M$)
Effective Date:	- - - - - September 15, 1987 - - - - -			
PDP Reserves	143	43	1,461	1,030
PUD Reserves:				
Phase I	564	169	9,129	4,524
Phase II	456	137	6,058	2,758
Phase III	259	78	3,415	1,553
Total PUD	1,279	384	18,602	8,835
Total Proved	1,422	427	20,063	9,865

Net oil and gas reserves are estimated quantities of crude oil, natural gas and natural gas liquid attributed to the composite revenue interests being evaluated after deduction of royalty and/or overriding royalty interests. The Society of Petroleum Evaluation Engineers' reserve definitions, as modified by use of assumed rather than existing economic conditions, were used to classify the reserves. Future net revenue was adjusted for capital expenditures, operating costs, interest reversions, ad valorem taxes and wellhead taxes (severance and windfall profit), but no consideration was given to Federal income taxes or any encumbrances that might exist against the evaluated interests.

Reserves were determined using industry-accepted methods including extrapolation of established performance trends, volumetric calculations, reservoir simulator solutions and analogy to similar producing projects. Where applicable, the evaluator's own experience was used to check the reasonableness of the results.

No attempt was made to quantify any reserves in the "Non-Proved" category. Additional reserve potential may exist in other portions of the unit. However, insufficient geological and/or engineering data exists at this time with which to make a determination sufficient for reserve assignment.

In the preparation of this report, we have reviewed for reasonableness, but accepted without independent verification information furnished by Sirgo-Collier, Inc. with respect to interest factors, current prices, operating costs, gas contracts, current production and various other data. The price and expense escalation scheme and prime discount rate are in accord with current industry expectations, but represent speculation that is subject to changes in economic conditions. The use of predicted rather than existing economic parameters affects both the cash flow projections by the difference in prices and expenses and also the reserve volumes by changing the economic limit at which production is terminated. The assumed pricing also has a major effect on the economic viability of non-developed potential and hence the volume of reserves that can be assigned to the non-producing categories.

No consideration was given to the existing debt burden, which would decrease the value of the producing interests. We are qualified to perform engineering evaluations and do not claim any expertise in accounting or legal matters. As is customary in the profession, no field inspection was made of the properties nor have we verified that all operations are in compliance with any states and/or Federal regulations that apply to them.

Initial oil prices were based on posted prices as of August 28, 1987 after adjusting for gravity and transportation. Oil pricing was held constant to December 31, 1987 then increased $1/BBL in 1988. Starting

January 1, 1990, the pricing was escalated at 5% per annum to a maximum of $35/BBL. The windfall profit tax was not applicable.

Starting gas prices were based on prevailing area prices as of June 1, 1987 and held constant to January 1, 1989. Starting January 1, 1989, the price was escalated at a rate to reach 65% parity with oil by January 1, 2001.

Lease operating expenses were estimated by Sirgo-Collier, Inc. based on anticipated operating conditions for each project phase. Expenses were held constant to January 1, 1989 then escalated at 5% per annum until the primary product reached the maximum price. No equipment salvage value or abandonment costs were included for the properties. The costs for drilling, workovers and re-establishing injection were developed by Sirgo-Collier, Inc. We have reviewed their estimates for reasonableness.

This study was performed using industry-accepted principles of engineering and evaluation that are predicated on established scientific concepts. However, the application of such principles involves extensive judgment and assumptions and is subject to changes in performance data, existing technical knowledge, economic conditions and/or statutory provisions. Unless otherwise noted, we have based our reserve projections on current operating methods and well densities. Consequently, our reserve estimates are furnished with the understanding that some revisions will probably be required in the future, particularly on new wells with little production history and for reserve categories other than Proved Developed Producing. The restriction of production by mechanical, regulatory or market conditions also introduces uncertainty into reserve estimates and projections.

This report is solely for the information of and assistance to Sirgo-Collier, Inc., Casa Energy and Home Savings Association in negotiating loans or credit and is not to be used, circulated, quoted or otherwise referred to for any other purpose without the express written consent of the undersigned except as required by law. Persons other than those to whom this report is addressed shall not be entitled to rely upon the report unless it is accompanied by such consent. Data utilized in this report will be maintained in our files and are available for your use.

Yours very truly,

T. SCOTT HICKMAN & ASSOCIATES, INC.

C. Don Hunter, P. E.

par

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D I S C U S S I O N

INTRODUCTION

The Skelly-Penrose "B" Unit is located in the Langlie Mattix Field of southeastern Lea County, New Mexico. The field produces from the Permian age Queen formation at a depth of approximately 3600'. The discovery well for the Unit area was the Skelly-Harrison "A" No. 1, which is now designated the Skelly-Penrose "B" Unit No. 34. Forty-acre development began in the 1930's with drilling continued through the 1950's. Early completion methods consisted of open hole completions stimulated by nitroglycerin. However, the majority of completions are cased holes stimulated by frac treatment.

At the time of unitization - July 1, 1965 - the Penrose "B" Unit was comprised of 63 wells encompassing 2612 acres. Waterflood operations were initiated during mid-1966 on 80-acre, 5-spot patterns. Ultimate primary oil recovery from the Unit has been 1775 MBBL. As of April 1, 1987, total oil production from the Unit was 3,310,156 barrels. Under the current mode of operation, ultimate secondary oil recovery is estimated at 1742 MBBL. The Unit is currently producing at 95 BOPD and 1099 BWPD from 29 active producers. Only 5 injectors are currently active. Approximately 191 MBBL of reserves remain under the current mode of operation. Unit performance is summarized by Table 2.

CONCLUSIONS

1. The Penrose sand formation of the Penrose "B" Unit appears to be geologically contiguous with that of adjoining properties.

2. Oil productive limits of this field are controlled primarily by stratigraphic influence.

3. Under current mode of operations, the Penrose "B" Unit is in the latter stages of depletion.

4. Ultimate primary oil production is estimated at 1775 MBBL.

5. Ultimate secondary oil recovery, under current mode of operation, is estimated at 1742 MBBL.

6. Oil recovery has varied greatly across the field due to variations in completion techniques, reservoir heterogeneity and water injection inefficiencies.

7. An estimated 1705 MBBL of Proved Undeveloped reserves are economically recoverable through infill drilling, rework and the re-establishment and expansion of water injection.

RECOMMENDATIONS

1. Proceed with 20-acre infill drilling, rework, re-establishment of water injection and initiation of 40-acre, 5-spot patterns in phases, as outlined in this report.

2. Development of each subsequent phase should be contingent upon the results of the preceding phase.

3. As sufficient well logs and core data become available, initiate a detail engineering study of the reservoir to maximize economic recovery.

GEOLOGY AND RESERVOIR PROPERTIES

The Skelly-Penrose "B" Unit produces from the Queen and Penrose formations of Permian age. The type log for the field is shown by Figure 1. Ten sand members have been identified and correlated across the field (Table 1). Average depth in the Langlie Mattix Field is approximately 3600'. The productive section consists of layered sand or sandy dolomite, interbedded with shale or non-porous dolomite. No quantitative well logs or cores were available with which to determine lithology. Determinations of depositional environment were beyond the scope of this study. The hydrocarbon accumulation was controlled primarily by stratigraphic factors. Porosity and permeability are apparently highly variable as demonstrated by individual well performance and simulation studies.

Structural position does not appear to be a major factor in defining the production characteristics of the reservoir with the exception of a suspected gas cap in the southern portion of the Unit (Figure 2). The Penrose "B" Unit appears geologically continuous with the Penrose "A" Unit, which adjoins the "B" Unit along the eastern boundary. A significant number of completions extend below -400' subsea with minimal water production reported during primary depletion.

No quantitative well logs or cores were available on the 63 wells in the Unit, although three wells were reported to have been cored. A modern log suite was available from the Penrose "A" Unit No. 66, which was used to approximate porosities and original water saturations for the Penrose sand in this area. This log analysis indicated that the "A" Unit Penrose sand formation was similar in stratigraphic and lithologic character to that of the West Dollarhide Queen Sand Unit (WDQSU). Based on a net pay porosity cutoff of 9% and neutron deflection versus porosity relationships derived from the WDQSU study, apparent net pay was derived from neutron log response. This preliminary estimate of net pay for the Penrose "B" Unit was mapped as shown on Figure 3.

REVIEW OF UNIT PERFORMANCE

The primary depletion mechanism is solution gas-drive with no apparent water influx. Ultimate primary recovery was determined by extrapolation of the individual well decline trends and is summarized

on Table 3 and Figure 4. This yields a total ultimate primary recovery from the Unit of 1775 MBBL.

The Unit became effective July 1, 1965 and water injection was initiated one year later (Figure 7). Oil production response occurred within six months and peaked in early 1971 at 500 BPD with final expansion of the 5-spot pattern. During this period, 37 producers and 26 injectors were active. Oil production had gradually declined to 120 BPD by 1982. The Unit is currently producing 95 BOPD, 30 MCFPD and 1099 BWPD from 29 active producers (Table 3 and Figure 5). During the peak injection years of 1970 through 1973, water injection averaged 7500 BWPD compared to the current 1300 BWPD (Table 4 and Figure 6).

As shown by Table 1, a limited number of Unit wells were also completed in the Queen sand. The Queen sand's contribution to overall performance cannot be broken out due to nonavailability of specific Queen sand interval test data. Unit wells Nos. 41, 42 and 62 were initially completed as gas wells and No. 62 was subsequently converted to water injection. The lack of quantitative well logs in this southern portion of the Unit precluded an analysis of the effect of the apparent gas cap upon performance of the Unit.

Determination of secondary recovery was based on extrapolation of individual production decline trends, as shown on Table 3. Ultimate secondary oil recovery for the Unit is estimated to be 1742 MBBL, giving a secondary to primary ratio of 0.98:1. Average secondary oil recovery was 50 MBBL/well for the 35 producers. However, as reflected by the distribution of reserves on Figure 4, secondary oil response was highly erratic, ranging from 4 MBBL to 192 MBBL per producer. This extreme range is larger than can be accounted for by variation in individual well primary performance, which suggests inadequate injection coverage.

RESERVOIR PERFORMANCE PREDICTION

A reservoir simulator was utilized in an effort to 1) gauge the reasonableness of the preliminary net pay isopach, 2) obtain a more comprehensive understanding of reservoir performance and 3) help establish remaining reserve potential.

Reservoir simulation was done with PC-Boast, a three-dimensional, three-phase black oil simulator. PC-Boast can simulate oil and/or gas recovery by fluid expansion, displacement, gravity drainage and capillary imbibition mechanisms. The area for the model was chosen on the basis of relatively high net pay and good primary and secondary performance, which should afford the maximum opportunity for additional reserve recovery. The model area (Figure 3) was represented by a single layer of uniform thickness. Porosity was varied within each of the 72 model blocks to attempt to represent pore volume (ϕh) variations in apparent net pay, as shown by Figure 3.

Fluid properties as a function of pressure were derived from empirical correlations, in lieu of lab derived data. Relative permeability relationships were developed from empirical equations for the specified initial fluid saturations. The rock and fluid properties and initial fluid

saturation conditions are presented as Table 5. Individual well productivity index (PI) and pressure constraints were imposed to attempt to duplicate individual well rates and recoveries.

A reasonable history match was obtained in most cases for oil recoveries and oil producing rates. A consistent good match for GOR's could not be obtained, apparently due to gas production from Queen sand completions (Table 1). The lack of accurate fluid properties and relative permeability data would compound the GOR problem. Significantly lower water injection and water production volumes were derived by the model as compared to actual performance. Also, actual injection greatly exceeded water production (Table 2). This suggests inefficient water displacement, i.e., water injection displaced out of zone. Indication of poor injectivity profiles and premature water breakthrough further supports inefficient injection.

Although reasonable history matches were obtained under both primary and waterflood operations (Table 6), the primary objective of the simulation effort was to determine estimates for current oil saturation. The areal oil saturation distribution obtained was utilized as input for the simulator studies of infill drilling and more dense injection pattern spacing, i.e., 40-acre, 5-spot patterns.

REDEVELOPMENT PLAN AND ECONOMICS

A number of simulation runs were made to determine the incremental reserves potential, which could be achieved in the model area through selective infill drilling on 20-acre and 40-acre spacing, 5-spot injection patterns. The modeling results indicate that an additional 1.2 MMBBL of economic oil could be achieved from development of the model area alone.

The simulation results were utilized as a basis for determining infill well locations within the model area. Elsewhere, locations were assigned on the basis of net pay and historical performance. Production performance prediction was based on modeling results and ranged from 15 BOPD/well to 60 BOPD/well. Initial injection rates for the proposed well conversions range from 100 to 300 BWPD.

Proceeding with 20-acre infill drilling, reworking and re-establishing water injection in a phased procedure is recommended (Table 8 and Figure 8). Development of each subsequent phase will depend, to some degree, upon success of the preceding phase. As geological and engineering data becomes available (i.e., well logs, cores and production tests), plans for subsequent phases may require revision, refinement or expansion.

The total project as outlined by this evaluation (Table 8) requires the drilling of 26 producers, reworking 5 producers and conversion of 9 wells to water injection. All redevelopment costs were furnished by Sirgo-Collier, Inc. and were reviewed for reasonableness.

Phase I will require drilling of ten, 20-acre infill producers and re-establishing injection in the central portion of the Unit (Figure 8). Phase II will involve drilling eight, 20-acre infill producers, reworking 5

producers and conversion of 9 wells to water injection. This will establish 40-acre, 5-spot patterns within a portion of Section 5. Phase III will involve the drilling of 8 additional producers as 20-acre infill wells. The total capital cost of the project (Phases I through III) is estimated at $4.8MM. Table 7 shows the investment schedule by phase as estimated by Sirgo-Collier, Inc. Table 8 is the projected well count under this plan.

Reserves ranged from 28 to 117 MBBL per well based on model simulation with initial rates ranging from 15 to 60 BOPD/well. Gas-oil ratios for individual wells were estimated to average 0.3 MCF/BBL.

Initial oil prices were based on posted prices as of August 28, 1987 after adjusting for gravity and transportation. Oil pricing was held constant to December 31, 1987 then increased $1/BBL for 1988. Starting January 1, 1990, the pricing was escalated at 5% per annum to a maximum of $35/BBL. The windfall profit tax was not applicable.

Starting gas prices were based on prevailing area prices as of June 1, 1987 and held constant to January 1, 1989. Starting January 1, 1989, the price was escalated at a rate to reach 65% parity with oil by January 1, 2001.

Lease operating expenses were estimated by Sirgo-Collier, Inc. based on anticipated operating conditions for each project phase utilizing company experience for similar projects. Expenses were held constant to January 1, 1989 then escalated at 5% per annum until the primary product reached the maximum price. The costs for drilling, workovers and re-establishing injection were developed by Sirgo-Collier, Inc. We have reviewed their estimates for reasonableness. No equipment salvage value or abandonment costs were included for the properties.

Project economics indicate that a capital investment of $4.8MM will generate a 10% discounted future net revenue of $8.8MM over 24 years giving a 71% rate of return and a 2.0 year payout. The investment cost does not include the initial acquisition cost. A summary of the reserves and economics for each phase and the total project is shown on Table 9. Tables 10, 11 and 12 show the economic summaries for Total Proved, Proved Developed Producing and Proved Undeveloped, respectively. Tables 13, 14 and 15 are Proved Undeveloped cash flows for Phases I, II and III.

PENROSE "B" UNIT WELL NO. 52

(Skelly Harrison B-5)
1900 FN & WL Sec. 9-T23S-R37E
Lea County, N.M.

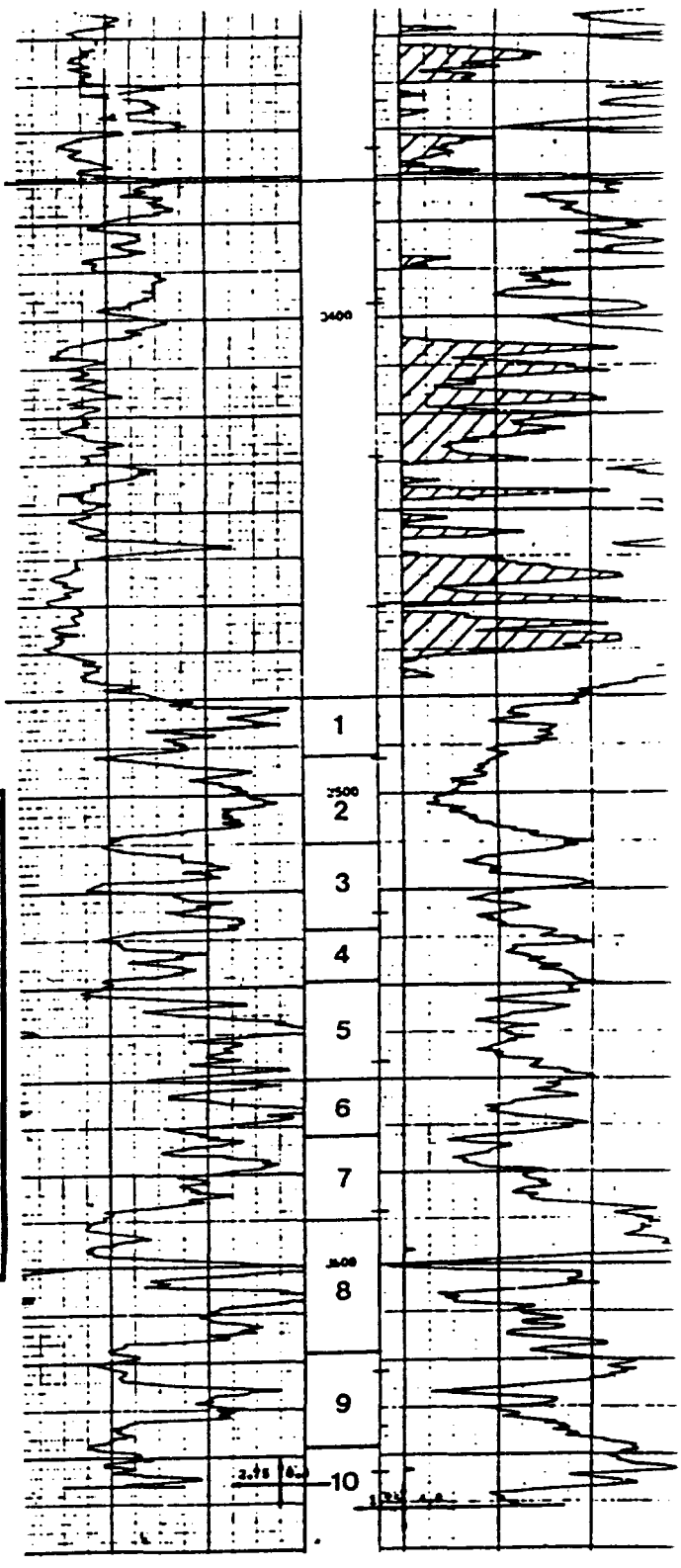


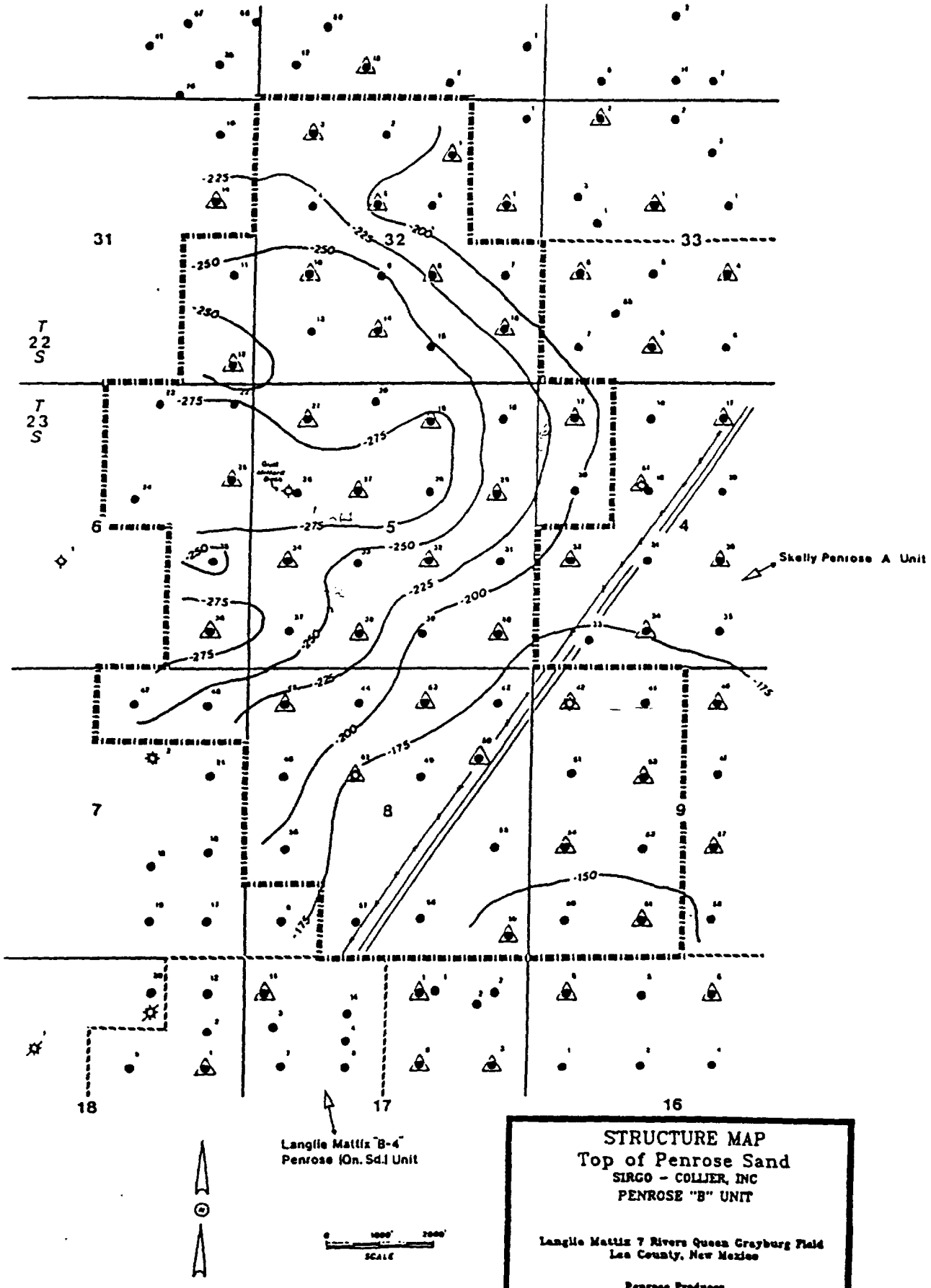
Figure 1

TYPE LOG

SIRGO-COLLIER, INC.

Penrose "B" Unit
Langlie Mattix 7 Rivers Queen Grayburg Field
Lea County, New Mexico

T. SCOTT HICKMAN & ASSOCIATES, INC.
PETROLEUM CONSULTANTS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T 23 S
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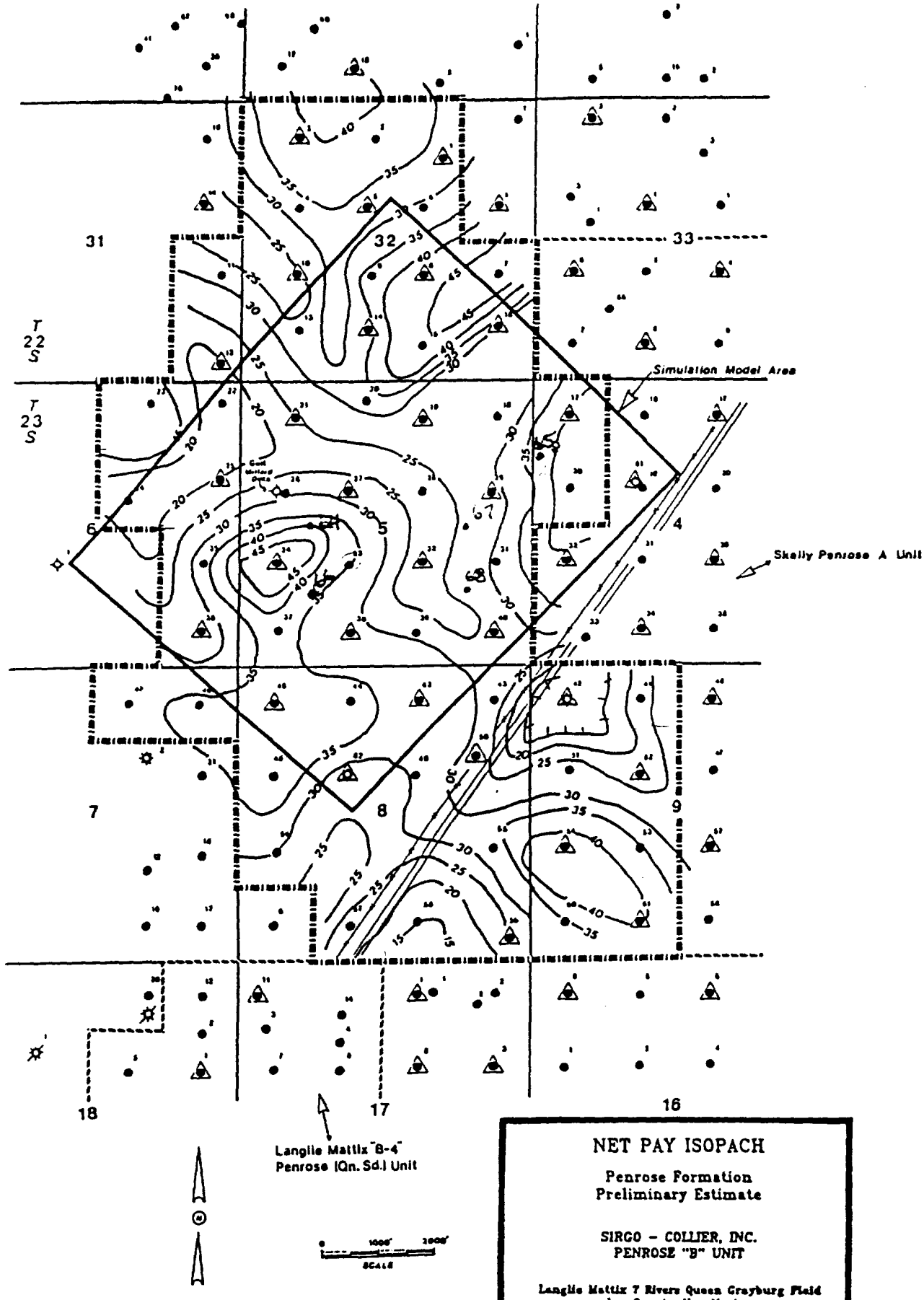
17
16
-225
-250
-275
-200
-175
-150
Skelly Penrose A Unit
Langlie Mattix "B-4" Penrose (On. Sd.) Unit
STRUCTURE MAP
Top of Penrose Sand
SIRGO - COLLIER, INC
PENROSE "B" UNIT
Langlie Mattix 7 Rivers Queen Grayburg Field
Lea County, New Mexico
Penrose Producer
Queen-Penrose Producer
Queen-Penrose Injector
Figure 2
T. SCOTT HICKMAN & ASSOCIATES, INC.


R 37 E
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T 23 S
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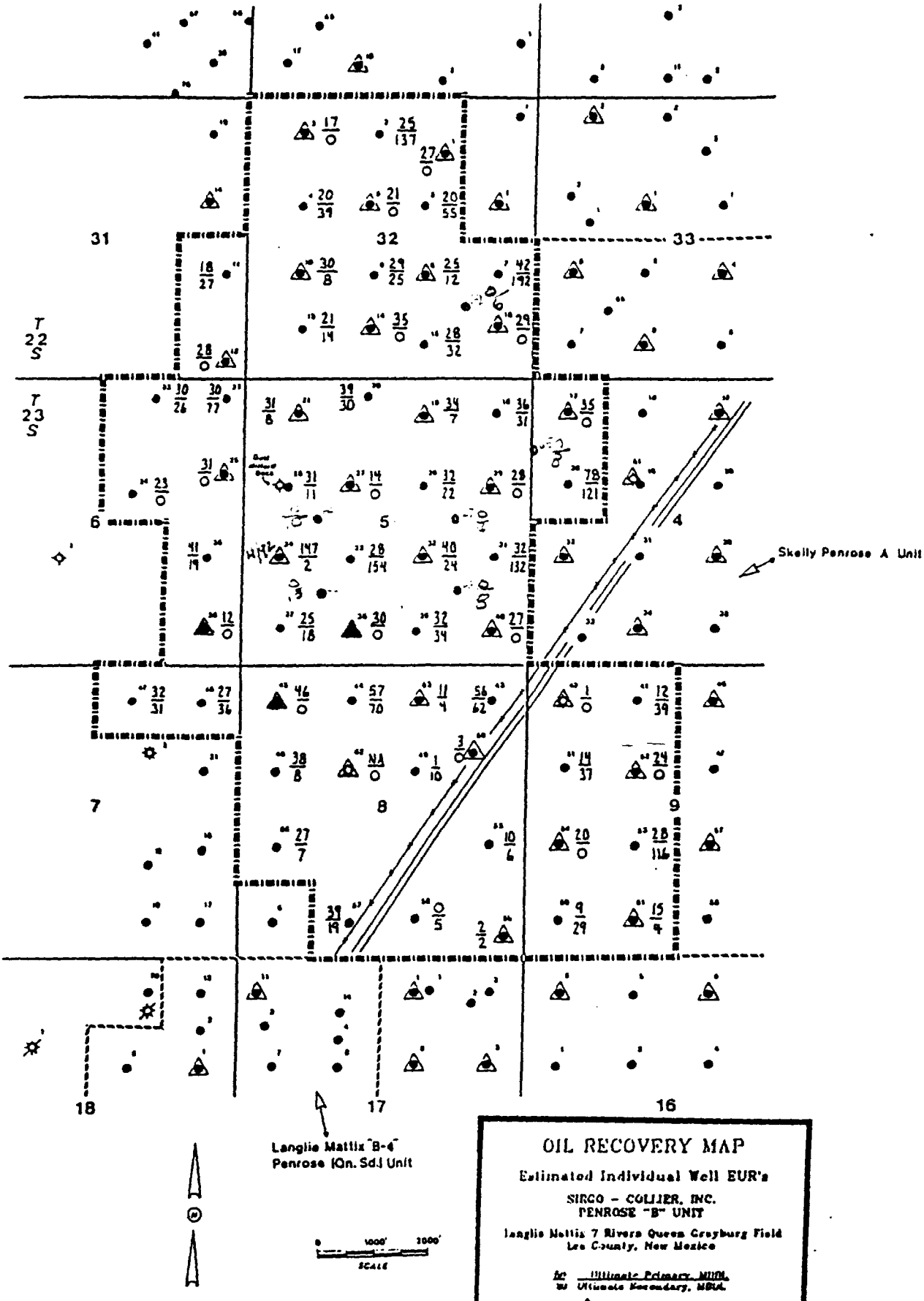
17
16
Simulation Model Area
Skelly Penrose A Unit
Langlie Mattix "B-4" Penrose (Qn. Sd.) Unit
NET PAY ISOPACH
Penrose Formation
Preliminary Estimate
SIRGO - COLLIER, INC.
PENROSE "B" UNIT
Langlie Mattix 7 Rivers Queen Grayburg Field
Lea County, New Mexico
T. SCOTT HICKMAN & ASSOCIATES INC.
PETROLEUM CONSULTANTS

R 37 E



OIL RECOVERY MAP

Estimated Individual Well EUR's

SIRGO – COLLIER, INC.
PENROSE "B" UNIT

Langlie Mattix 7 Rivers Queen Greyburg Field
Lea County, New Mexico

for Ultimate Primary, MBO
& Ultimate Secondary, MBO

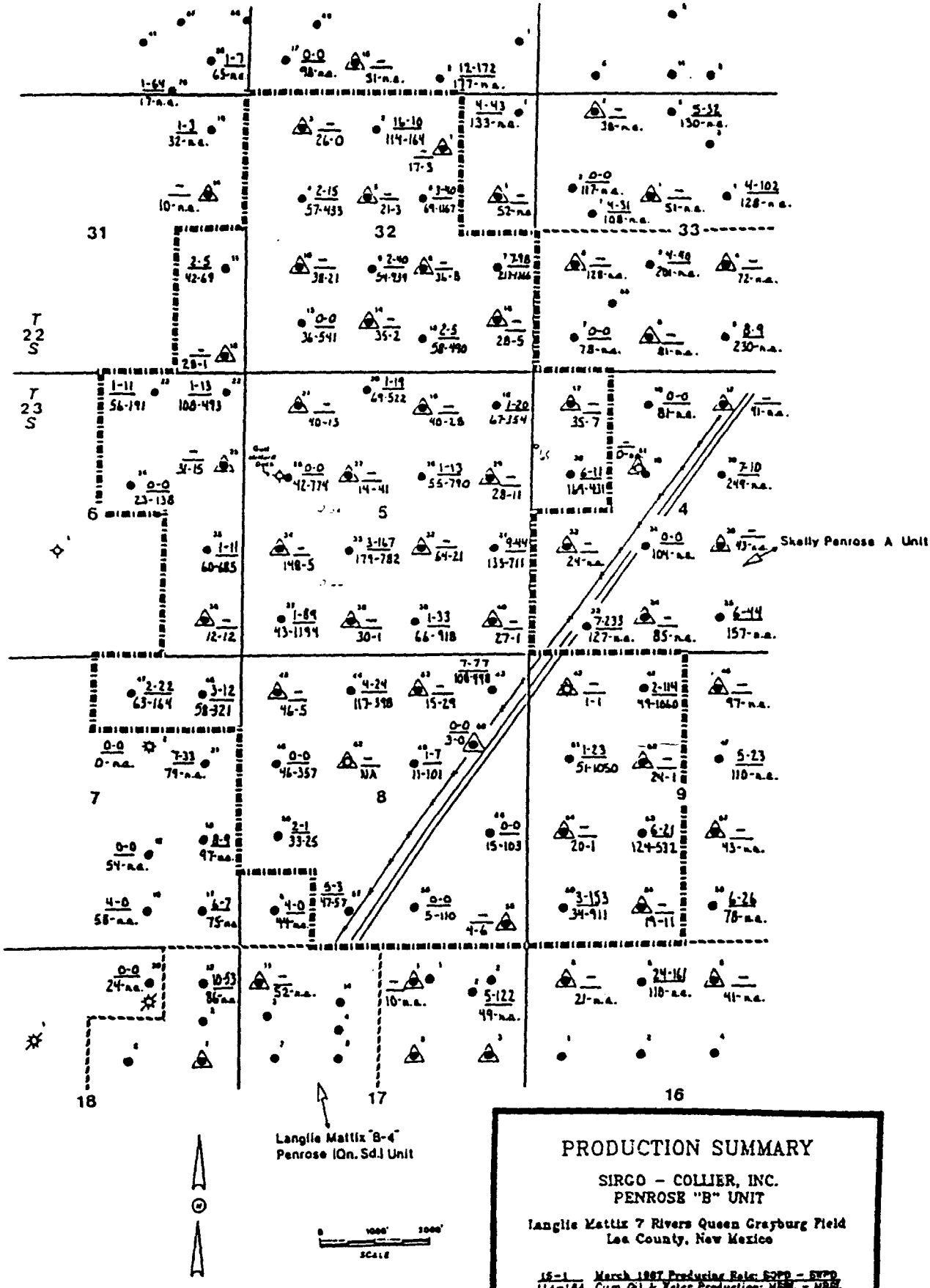
△ Injection Well

N.A. = Data Not Available

Figure 4

T. SCOTT HICKMAN & ASSOCIATES, INC.
PETROLEUM CONSULTANTS

R 37 E



PRODUCTION SUMMARY

SIRGO – COLLIER, INC.
PENROSE "B" UNIT

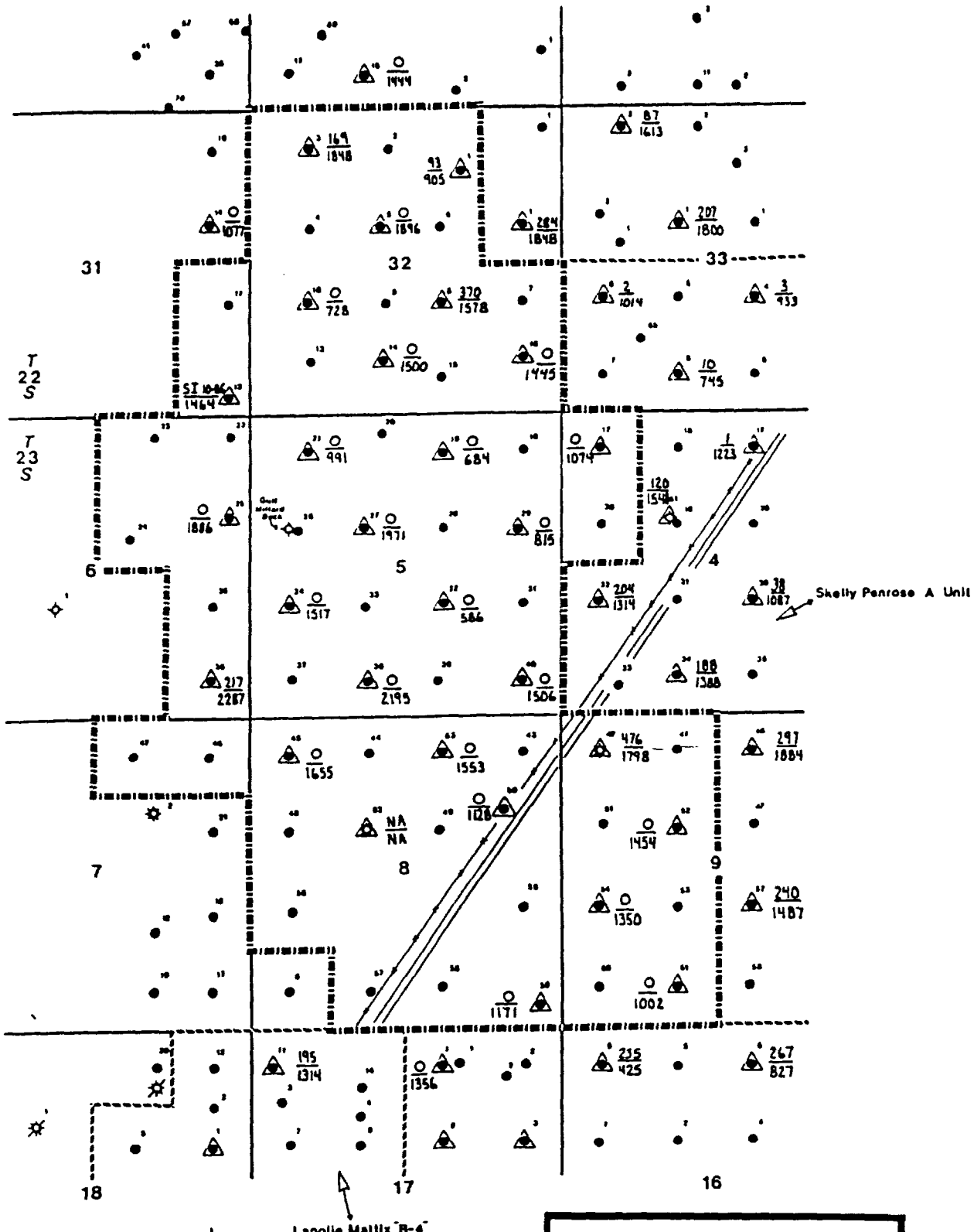
Langlie Mattix 7 Rivers Queen Grayburg Field
Lea County, New Mexico

16-1 March 1987 Producing Rate: BOPD – BWPD
114-164 Cum Oil & Water Production: MBBL – MBBL

N.A. = Data Not Available

Figure 8

T. SCOTT HICKMAN & ASSOCIATES INC.
petroleum consultants


R37E
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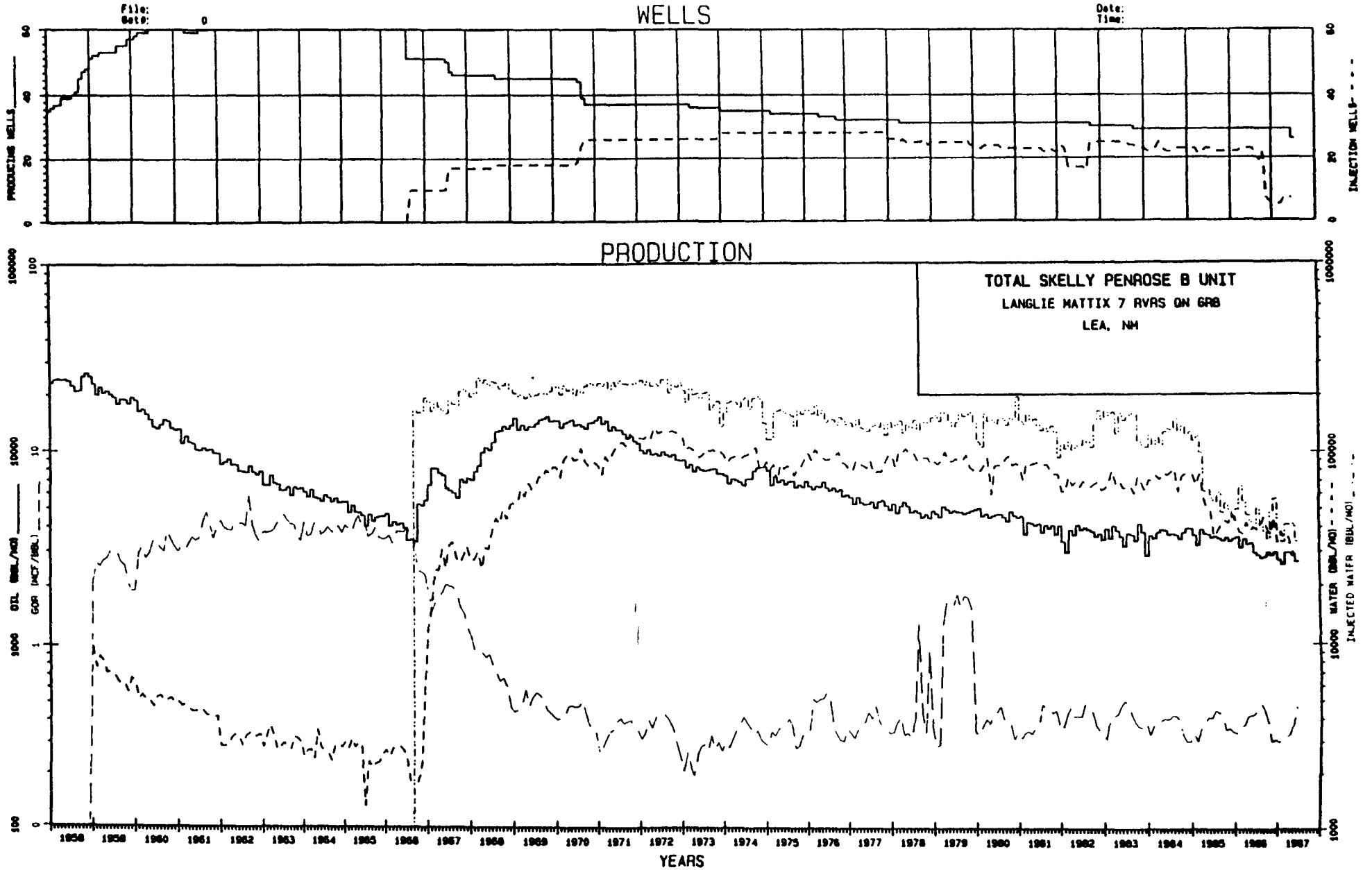
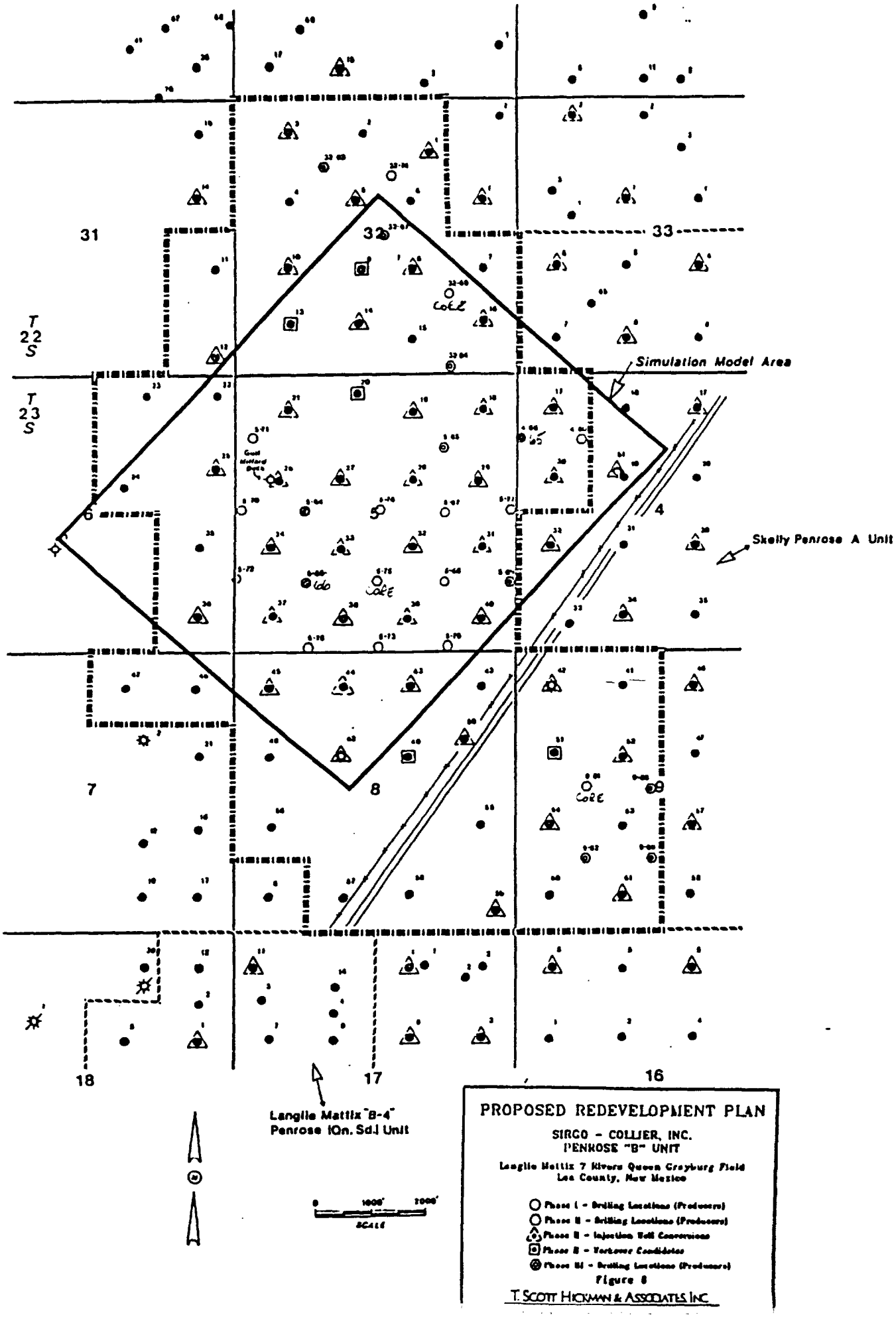
Skelly Penrose A Unit
Langlie Mattix "B-4" Penrose (Qn. Sd.) Unit
INJECTION SUMMARY
SIRGO - COLLIER, INC.
PENROSE "B" UNIT
Langlie Mattix 7 Rivers Queen Grayburg Field
Lea County, New Mexico
170 April 1987 Injection Rate, BWPD
1048 Cum Water Inj. (as of 5/1/87), MBBL
Figure 6
T. SCOTT HICKMAN & ASSOCIATES INC.
petroleum consultants


File:
Date:
WELLS
Date:
Time:
PRODUCING WELLS
INJECTION WELLS
PRODUCTION
TOTAL SKELLY PENROSE B UNIT
LANGLIE MATTIX 7 RVRS QN GRB
LEA, NM
OIL BBL/MO
GOR (MCF/BBL)
WATER (BBL/MO)
INJECTED WATER (BBL/MO)
1958 1959 1960 1961 1962 1963 1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987
YEARS

(Figure)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Simulation Model Area
Skelly Penrose A Unit
Langlie Mattix "B-4" Penrose (On. Sd.) Unit
PROPOSED REDEVELOPMENT PLAN
SIRGO - COLLIER, INC.
PENROSE "B" UNIT
Langlie Mattix 7 Rivers Queen Grayburg Field
Lea County, New Mexico
Phase I - Drilling Locations (Producers)
Phase II - Drilling Locations (Producers)
Phase II - Injection Well Conversions
Phase II - Workover Candidates
Phase III - Drilling Locations (Producers)
Figure 8
T. SCOTT HICKMAN & ASSOCIATES INC.

TABLE 1

GEOLOGIC STRUCTURE SUMMARY
PENROSE SAND
LANGLIE MATTIX
LEA COUNTY, NEW MEXICO

LOCATION	UNIT WELL NO.	ELEV. (KB)	OPERATOR-LEASE-WELL	COMP. DATE	SUBSEA ELEVATION (FEET) ZONE 1	ZONE 2	ZONE 3	ZONE 4	ZONE 5	ZONE A	ZONE 7	ZONE 8	ZONE 9	ZONE 10	COMPLETION DEPTH TOP (FEET)	COMPLETION DEPTH BOTTOM (FEET)	TD SUBSEA ELEV. (FEET)	GROSS COMP. (FEET)	REMARKS
SEC 5 T23S-R37E																			
660 FN & EL	18	3362	R.LOWE-KING #3	04-57	-246 3608	-257 3619	-275 3637	-295 3657	-305 3667	-325 3687	-337 3699	-361 3723	-385 3747		-252 3614	-382 3744	-408 3770	130	
660 FNL & 1980 FEL	19	3366	R.LOWE-KING #5	06-57	-276 3642	-286 3652	-304 3670	-324 3690	-338 3704	-351 3717					-279 3645	-367 3733	-384 3750	88	
330 FNL & 2310 FWL	20	3376	R.LOWE-KING "B" #2	10-57	-272 3648	-283 3659	-305 3681	-326 3702	-335 3711	-362 3738	-374 3750	-392 3768			-280 3656	-399 3775	-404 3780	119	
660 FNL & 990 FWL	21	3368	R.LOWE-KING "B" #3	01-58	-269 3637	-278 3646	-299 3667	-310 3678	-330 3698	-345 3713	-364 3732	-386 3754			-275 3643	-400 3768	-382 3750	125	
1980 FNL & 990 FWL	26	3369	R.LOWE-KING "B" #4	02-58	-277 3646	-297 3666	-307 3676	-327 3696	-337 3706	-355 3724	-377 3746	-388 3757			-290 3659	-399 3768	-411 3780	109	
1980 FNL & WL	27	3357	R.LOWE-KING "B" #1	09-57	-293 3650	-303 3660	-321 3678	-339 3696	-352 3709	-372 3729	-383 3740				-303 3660	-404 3761	-413 3770	101	
1980 FNL & EL	28	3350	R.LOWE-KING "B" #6	07-57	-278 3628	-289 3639	-307 3657	-327 3677	-338 3688	-358 3708	-368 3718	-389 3739			-278 3628	-374 3724	-400 3750	96	
2112 FNL & 660 FEL	29	3349	R.LOWE-KING #2	05-57	-237 3586	-249 3598	-269 3618	-289 3638	-302 3651	-325 3674	-337 3686	-359 3708	-384 3733		-241 3590	-374 3723	-451 3800	133	
1980 FSL & 660 FEL	31 *	3349	SKELLY-HARRISON B-3	09-57	-216 3565	-227 3576	-243 3592	-264 3613	-279 3628	-299 3648	-312 3661	-329 3678			-231 3580	-349 3698	-361 3710	118	
1980 FS & EL	32	3345	SKELLY-HARRISON B-4	10-57	-235 3580	-243 3588	-265 3610	-284 3629	-295 3640	-316 3661	-330 3675	-351 3696			-239 3584	-344 3689	-365 3710	105	
1980 FSL & WL	33	3349	SKELLY-HARRISON A-2	12-57	-246 3595	-257 3606	-275 3624	-294 3643	-303 3652	-324 3673	-334 3683	-356 3705			-261 3610	-370 3719	-375 3724	109	
1980 FS & WL	34 *	3353	SKELLY-HARRISON #1	01-36	-259 3612	-265 3618	-281 3634	-302 3655	-314 3667	-330 3683	-347 3700				-137 3490	-409 3762	-441 3794	272	(QUEEN SAND OPEN)
660 FSL & WL	37	3353	SKELLY-HARRISON A-4	03-58	-252 3605	-261 3614	-283 3636	-295 3648	-309 3662	-327 3680	-344 3697	-363 3716			-253 3606	-377 3730	-372 3725	124	3/58 IPOT P-105 80PO 975 CF/BBL

TABLE 1

GEOLOGIC STRUCTURE SUMMARY
PENROSE SAND
LANGLIE MATTIX
LEA COUNTY, NEW MEXICO

LOCATION	UNIT WELL NO.	ELEV. (KB)	OPERATOR-LEASE-WELL	COMP. DATE	SUBSEA ELEVATION (FEET) ZONE 1	ZONE 2	ZONE 3	ZONE 4	ZONE 5	ZONE 6	ZONE 7	ZONE 8	ZONE 9	ZONE 10	COMPLETION DEPTH TOP (FEET)	COMPLETION DEPTH BOTTOM (FEET)	TD SUBSEA ELEV. (FEET)	GROSS COMP. (FEET)	REMARKS
SEC 5 T23S-R37E																			
660 FSL & 1980 FWL	38	3343	SKELLY-HARRISON A-3	01-58	-233 3576	-248 3591	-265 3608	-285 3628	-291 3634	-317 3660	-331 3674	-351 3694			-236 3579	-341 3684	-377 3720	105	
1980 FN & 660 FEL	39	3339	SKELLY-HARRISON B-7	12-57	-197 3536	-205 3544	-226 3565	-245 3584	-254 3593	-277 3616	-288 3627	-313 3652	-337 3676		-215 3554	-346 3685	-366 3705	131	12/57 IPOT F-150 BOPD 1300 CF/BBL
660 FSL & EL	40	3334	SKELLY-HARRISON B-6	11-57	-176 3510	-190 3524	-206 3540	-227 3561	-236 3570	-259 3593	-273 3607	-292 3626	-317 3651		-192 3526	-327 3661	-346 3680	135	
SEC 6 T23S-R37E																			
330 FNL & EL	22	3384	R.LOWE-KING "B" 05	04-58	-284 3668	-292 3676	-320 3704	-328 3712	-343 3727	-356 3740	-375 3759	-385 3769			-294 3678	-402 3786	-414 3798	108	
330 FNL & 1650 FEL	23	3390	R.LOWE-KING "B" 07	10-58	-297 3687	-306 3696	-332 3722	-347 3737	-362 3752	-382 3772	-390 3780				-293 3683	-403 3793	-410 3800	110	
2113 FNL & 1980 FEL	24	3392	R.LOWE-KING "B" 08	07-51	-306 3698	-317 3709	-340 3732	-356 3748	-370 3762	-384 3776					-308 3700	-412 3804	-423 3815	104	
1788 FNL & 330 FEL	25	3384	R.LOWE-KING "B" 06	08-58	-288 3672	-301 3685	-321 3705	-342 3726	-354 3738	-379 3763	-393 3777				-293 3677	-409 3793	-416 3800	116	
1980 FSL & 660 FWL	35	3371	SUN-RICHARDS 01	06-36	-239 3610										-185 3556	-427 3798	-427 3798	242	1/59 7 BOPD 72MCFD(10068 CF/B) 541MC OH 3556-3798 OH SD OPEN
660 FSL & EL	36	3365	SUN-RICHARDS 03	12-58	-283 3648	-297 3662	-315 3680	-338 3703	-350 3715	-370 3735	-381 3746				-164 3529	-403 3768	-415 3780	239	9/72 BP 3664 AS MIN 3529-3616 (QUEEN & PENROSE COMP/OHSD OPEN)
660 FNL & 1980 FSL			DOYLE HARTMAN-KING 03														3430		
SEC 7 T23S-R37E																			
660 FNL & EL	46	3362	SUN-RICHARDS 02	12-56	-226 3588	-233 3595	-257 3619	-265 3627	-286 3648	-307 3669	-320 3682	-342 3704			-244 3606	-374 3736	-408 3770	130	

TABLE 1

GEOLOGIC STRUCTURE SUMMARY
PENROSE SAND
LANGLIE MATTIX
LEA COUNTY, NEW MEXICO

LOCATION	UNIT WELL NO.	ELEV. (KB)	OPERATOR-LEASE-WELL	COMP. DATE	SUBSEA ELEVATION (FEET) ZONE 1	ZONE 2	ZONE 3	ZONE 4	ZONE 5	ZONE 6	ZONE 7	ZONE 8	ZONE 9	ZONE 10	COMPLETION DEPTH TOP (FEET)	COMPLETION DEPTH BOTTOM (FEET)	TD SUBSEA ELEV. (FEET)	GROSS COMP. (FEET)	REMARKS
SEC 7 T23S-R37E																			
660 FNL & 1980 FEL	47	3379	SUN-RICHARDS #4	01-59	-268 3647	-291 3670	-318 3697	-328 3707	-346 3725	-345 3724	-357 3736				-283 3662	-353 3732	-411 3790	70	
SEC 8 T23S-R37E																			
660 FN & EL	43	3324	GULF-DAVIS #1	NA											-78 3402	-388 3712	-388 3712	310	LOGS NOT AVAILABLE (QUEEN SAND OPEN)
660 FNL & 1980 FWL	44 *	3346	GOLDEN-FLORA #1	03-40											-94 3440	-334 3680	-334 3680	240	(ON SD OPEN)IPOT F-100BOPD 155MCFPD HIGH H2O PROD DURING MF
660 FNL & WL	45 *	3349	BLACK-REDFERN #1	08-57	-222 3571	-234 3583	-263 3612	-274 3623	-287 3636	-298 3647	-310 3659	-327 3676	-359 3708	-385 3734	-249 3598	-376 3725	-401 3750	127	
660 FNL & 1980 FWL	48	3348	BLACK-REDFERN #2	09-57	-210 3558	-236 3584	-250 3598	-258 3606	-270 3618	-290 3638	-299 3647	-314 3662	-350 3698	-365 3713	-212 3560	-336 3684	-392 3740	124	
1780 FNL & EL	49 *	3331	BYRON-FLORA DAVIS #2	11-56	-151 3482	-162 3493	-181 3512	-201 3532	-212 3543	-227 3558	-238 3569	-259 3590	-283 3614	-301 3632	-221 3552	-330 3661	-359 3690	109	HIGH GOR=NOV56 12 BOPD 250 MCFPD 20 BWPD
990 FSL & 1650 FEL	50	3327	BYRON-DAVIS #1	08-56											-215 3542	-263 3590	-373 3700	48	LOGS NOT AVAILABLE
1980 FSL 660 FEL	55 *	3324	OLSON-CLIFT #2	02-48	-161 3485	-173 3497	-187 3511	-202 3526	-215 3539	-230 3554	-248 3572	-270 3594	-293 3617	-314 3638	-96 3420	-365 3689	-365 3689	269	(ON SD OPEN)NO REPORT OF INITIAL GAS RATES
1980 FSL & 660 FWL	56	3341	TP-CLIFT #5	08-61											-195 3536	-239 3580	-353 3694	44	1/62 RATE=11 BOPD 260 MCFPD 15% WC LOGS NA
660 FSL & 1980 FWL	57	3334	OLSON-CLIFT #3	02-56	-152 3486	-157 3491	-175 3509	-196 3530	-209 3543	-224 3558	-232 3566	-256 3590	-299 3633		-267 3601	-284 3618	-334 3668	17	8/61 RATE=2 BOPD 356 MCFPD
660 FSL & 1980 FEL	58	3337	USCON-CLIFT #1	07-46											-75 3412	-316 3653	-316 3653	241	(ON SD OPEN)7/46 IPOT 20 BOPD 50 MCFPD NO WAT
330 FSL & EL	59 *	3339	OLSON-CLIFT #4	09-60	-135 3474	-148 3487	-168 3507	-186 3525	-196 3535	-215 3554	-228 3567	-252 3591			-141 3480	-273 3612	-296 3635	132	

TABLE 1

GEOLOGIC STRUCTURE SUMMARY
PENROSE SAND
LANGLIE MATTIX
LEA COUNTY, NEW MEXICO

LOCATION	UNIT WELL NO.	ELEV. (KB)	OPERATOR-LEASE-WELL	COMP. DATE	SUBSEA ELEVATION (FEET) ZONE 1	ZONE 2	ZONE 3	ZONE 4	ZONE 5	ZONE A	ZONE 7	ZONE 8	ZONE 9	ZONE 10	COMPLETION DEPTH TOP (FEET)	COMPLETION DEPTH BOTTOM (FEET)	TD SUBSEA ELEV. (FEET)	GROSS COMP. (FEET)	REMARKS
SEC 8 T23S-R37E																			
1980 FNL & WL	62	3337	BLACK-DAVIS #1	11-57	-168 3505	-176 3513	-207 3544	-219 3556	-236 3573	-250 3587	-258 3595	-280 3617	-310 3647	-334 3671	-259 3596	-343 3680	-388 3725	84	'57 GW 3596-3680 IPOT 1680MCFD WIW 7/67 SAME INTERVAL
660 FNL & 1980 FEL	63	3343	BLACK-DAVIS #2	11-57	-199 3542	-214 3557	-232 3575	-247 3590	-257 3600	-279 3622	-297 3640	-310 3653	-342 3685		-164 3507	-319 3662	-387 3730	155	QUEEN SAND OPEN
660 FS & WL		3342	TP-CLIFT #6		-196 3538	-206 3548	-232 3574	-259 3601	-275 3617	-285 3627	-306 3648	-328 3670	-353 3695				-408 3750		
SEC 9 T23S-R37E																			
660 FNL & 1980 FWL	41 *	3316	SKELLY-HARRISON B-1	07-37											-74 3390	-374 3690	-374 3690	300	GW (OH 3390-3690)(QN SD OPEN)
660 FN & WL	42 *	3320	SKELLY-HARRISON B-2	08-37											-130 3450	-362 3682	-362 3682	232	RE-SPUD AUG 68 AS WIW 3586-3618(QN SD MAY BE OPEN)
1980 FNL & 760 FWL	51 .	3319	SKELLY-HARRISON B-8	12-57	-147 3466	-159 3478	-179 3498	-197 3516	-209 3528	-231 3550	-251 3570	-268 3587	-295 3614		-161 3480	-304 3623	-311 3630	143	
1980 FNL & WL	52	3316	SKELLY-HARRISON B-5	10-57	-165 3481	-176 3492	-194 3510	-213 3529	-223 3539	-234 3550	-256 3572	-274 3590	-302 3618	-322 3638	-196 3512	-317 3633	-338 3654	121	
1980 FSL & WL	53	3317	SKELLY-HARRISON B-10	05-58	-165 3482	-180 3497	-194 3511	-213 3530	-222 3539	-243 3560	-255 3572	-274 3591	-292 3609	-322 3639	-199 3516	-319 3636	-343 3660	120	
1980 FSL & 660 FWL	54	3325	SKELLY-HARRISON B-9	12-57	-151 3476	-163 3488	-181 3506	-201 3526	-213 3538	-236 3561	-247 3572	-266 3591	-295 3620		-198 3523	-311 3636	-320 3645	113	
660 FS & WL	60	3332	SKELLY-HARRISON B-12	03-60	-146 3478	-157 3489	-184 3516	-203 3535	-215 3547	-232 3564	-246 3578	-268 3600	-297 3629		-294 3626	-304 3636	-338 3670	10	
660 FSL & 1980 FWL	61	3328	SKELLY-HARRISON B-11	02-60	-146 3474	-157 3485	-179 3507	-200 3528	-210 3538	-228 3556	-242 3570	-259 3587	-285 3613	-306 3634	-183 3511	-301 3629	-372 3700	118	
1980 FS & EL		3301	SAMEDAN-HUGHES A-2 #7		-167 3468	-176 3477	-202 3503	-221 3522	-233 3534	-255 3556	-266 3567	-292 3593					-342 3643		

TABLE 1

GEOLOGIC STRUCTURE SUMMARY
PENROSE SAND
LANGLIE MATTIX
LEA COUNTY, NEW MEXICO

LOCATION	UNIT WELL NO.	ELEV. (KB)	OPERATOR-LEASE-WELL	COMP. DATE	SUBSEA ELEVATION (FEET) ZONE 1	ZONE 2	ZONE 3	ZONE 4	ZONE 5	ZONE 6	ZONE 7	ZONE 8	ZONE 9	ZONE 10	COMPLETION DEPTH TOP (FEET)	COMPLETION DEPTH BOTTOM (FEET)	TD SUBSEA ELEV. (FEET)	GROSS COMP. (FEET)	REMARKS
SEC 9 T23S-R37E																			
NW/4 NW/4	•	3316	SKELLY-PENROSE A-46		-159 3475												-313 3629		
660 FSL & 1980 FEL		3292	SAMEDAN-HUGHES B-2 #9		-153 3445	-163 3455	-186 3478	-207 3499	-219 3511	-232 3524	-247 3539	-268 3560	-295 3587				-342 3634		
SEC 31 T22S-R37E																			
1980 FSL & 330 FEL	11	3400	DALPORT-KING A-2	01-59	-254 3654	-264 3664	-287 3687	-310 3710	-322 3722	-343 3743	-357 3757	-377 3777	-398 3798		-258 3658	-382 3782	-424 3824	124	RE-ENTRY 11/74 P-24BOPD NM 3658-3810
330 FS & WL	12	3351	DALPORT-KING A-1	09-58	-237 3588	-251 3602	-269 3620	-289 3640	-303 3654	-317 3668	-333 3684	-356 3707	-383 3734		-333 3684	-440 3791	-447 3798	107	
1980 FNL & 660 FEL		3400	HUMBLE-NM STATE M-14		-236 3636	-254 3654	-279 3679	-292 3692	-305 3705	-328 3728	-350 3750	-366 3766	-402 3902				-420 3820		
660 FN & EL		3396	HUMBLE-NM STATE M-19		-214 3610	-225 3621	-252 3648	-265 3661	-284 3680	-306 3702	-314 3710	-328 3724	-357 3753				-288 3684		
SEC 32 T22S-R37E																			
990 FNL & 1250 FEL	1	3368	OPERATORS SERV-COLE STATE #1	04-59	-188 3556	-198 3566	-218 3586	-232 3600	-243 3611	-264 3632	-275 3643	-296 3664	-322 3690		-192 3560	-310 3678	-359 3727	118	
660 FNL & 2310 FWL	2	3364	COMPASS-STATE 2-32	08-59	-210 3574	-220 3584	-240 3604	-262 3626	-270 3634	-290 3654	-306 3670	-326 3690	-355 3719	-374 3738	-206 3570	-352 3716	-442 3806	146	
660 FNL & 990 FWL	3	3375	COMPASS-STATE 4-32	12-59	-211 3586	-223 3598	-245 3620	-267 3642	-280 3655	-293 3668	-308 3683	-327 3702	-357 3732		-219 3594	-334 3709	-425 3800	115	QUEEN SAND OPEN
1900 FNL & 990 FWL	4	3374	COMPASS-3-32	11-59	-231 3605	-244 3618	-268 3642	-280 3654	-291 3665	-318 3692	-329 3703	-346 3720	-376 3750	-393 3767	-234 3608	-375 3749	-446 3820	141	
1980 FNL & 2310 FWL	5 •	3372	COMPASS-STATE 1	12-48	-198 3570	-218 3590	-278 3650	-338 3710	-363 3735	-420 3792	-460 3832	-494 3866	-540 3912		-216 3588	-354 3726	-435 3807	138	11/72 CONV MIW=3592-3653

TABLE 1

GEOLOGIC STRUCTURE SUMMARY
PENROSE SAND
LANGLIE MATTIX
LEA COUNTY, NEW MEXICO

LOCATION	UNIT WELL NO.	ELEV. (KB)	OPERATOR-LEASE-WELL	COMP. DATE	SUBSEA ELEVATION (FEET) ZONE 1	ZONE 2	ZONE 3	ZONE 4	ZONE 5	ZONE 6	ZONE 7	ZONE 8	ZONE 9	ZONE 10	COMPLETION DEPTH TOP (FEET)	COMPLETION DEPTH BOTTOM (FEET)	TD SUBSEA ELEV. (FEET)	GROSS COMP. (FEET)	REMARKS
SEC 32 T22S-R37E																			
1980 FNL & EL	6	3370	O.BOURG-STATE A-5	10-58	-194 3564	-202 3572	-217 3587	-236 3606	-245 3615	-266 3636	-278 3648	-297 3667	-323 3693	-343 3713	-196 3566	-336 3706	-505 3875	140	
1980 FSL & 660 FEL	7	3370	O.BOURG-KING #1	09-56	-195 3565	-202 3572	-222 3592	-242 3612	-244 3614	-268 3638	-290 3660	-310 3680			-208 3578	-306 3676	-326 3696	98	
1980 FS & EL	8	3378	O.BOURG-KING #3	11-58	-222 3600	-234 3612	-260 3638	-278 3656	-292 3670	-300 3678	-320 3698	-348 3726	-382 3760		-222 3600	-300 3678	-507 3885	78	
1980 FSL & 2310 FWL	9	3388	O.BOURG-STATE #2	01-58	-252 3640	-262 3650	-282 3670	-302 3690	-313 3701	-330 3718	-345 3733	-366 3754	-394 3782		-256 3644	-390 3778	-412 3900	134	
1980 FSL & 990 FWL	10	3394	O.BOURG-STATE #3	09-58	-260 3654	-270 3664	-287 3681	-306 3700	-316 3710	-338 3732	-346 3740	-366 3760	-396 3790		-272 3666	-404 3798	-577 3971	132	
990 FSL & WL	13 *	3391	O.BOURG-STATE B-2	10-58	-258 3649	-269 3660	-288 3679	-310 3701	-321 3712	-344 3735	-361 3752	-381 3772	-410 3801	-431 3822	-269 3660	-401 3792	-612 4003	132	
990 FSL & 2310 FWL	14	3385	R.FURR-STATE #1	09-57	-270 3655	-277 3662	-297 3682	-316 3701	-327 3712	-349 3734	-360 3745	-381 3766			-277 3662	-399 3784	-406 3791	122	
1980 FSL & 660 FWL	15 *	3370	SKELLY-KING 1	05-36											-82 3452	-380 3750	-380 3750	298	(ON SD OPEN) LOGS NOT AVAILABLE
990 FSL & 660 FEL	16	3375	O.BOURG-KING #2	01-57	-223 3598	-236 3611	-255 3630	-274 3649	-286 3661	-305 3680	-317 3692	-336 3711			-235 3610	-283 3658	-350 3725	48	
SEC 4 T22S-R37E																			
660 FN & WL	17	3354	R.LOWE-KING #4	05-57	-204 3558	-216 3570	-236 3590	-256 3610	-318 3672	-286 3640	-296 3650	-322 3676	-342 3696		-212 3566	-338 3692	-374 3728	126	
1980 FNL & 660 FWL	30	3337	R.LOWE-KING #1	01-49											-168 3505	-350 3687	-350 3687	182	PROBABLE QUEEN SAND OPEN
1980 FSL & 660 FWL		3324	SAMEDAN-HUGHES A-1 #6 (A-32)		-188 3512	-196 3520	-219 3543	-241 3565	-256 3580	-274 3598	-288 3612	-314 3638	-336 3660				-352 3676		

TABLE 2

PERFORMANCE DATA
PENROSE "B" UNIT
LEA COUNTY, NEW MEXICO

Total Completions:	Producers	35
	Injectors	28
	Total	63
Active Completions:	Producers	29
	Injectors	5
	Total	34
Unitized Area (Acres)		2,612.16
Average Spacing (Acres/Well)		41.46
Cumulative Oil Production at April 1, 1987 (MBBL)		3310
Average Oil Cumulative Per Well (MBBL/Well)		52.5
Current Oil Rate Per Producer - 29 Wells (BOPD/Well)		3.3
Ultimate Primary Oil Recovery (MBBL)		1,775
Average Oil Recovery Per Well (MBBL/Well)		28.2
Ultimate Secondary Oil Recovery Under Current Operations (MBBL)		1,742
Average Oil Recovery Per Well (MBBL/Well)		49.8
Range in Well Recoveries (MBBL/Well)		5-192
Cumulative Gas Production at April 1, 1987 (MMCF)		3,875
Cumulative GOR (MCF/BBL)		1.171
Current Gas Rate (MCFD/Well)		1.1
Current GOR (MCF/BBL)		0.320
Cumulative Water Production at April 1, 1987 (MBBL)		18,989
Cumulative WOR (Volume/Volume)		5.7
Current WOR (Volume/BBL)		11.5
Cumulative Water Injection at April 1, 1987 (MBBL)		38,821
Cumulative Injection : Secondary Oil Recovery Ratio		22.3

TABLE 3

PRODUCTION AND ULTIMATE RECOVERY
SIRGO-COLLIER INC.
PENROSE "B" UNIT
LEA COUNTY, NEW MEXICO

UNIT WELL NO.	MARCH '87 PRODUCTION OIL (BOPD)	GAS (MCFD)	WATER (BWPD)	CUM PRODUCTION @ 4-1-87 OIL (MBBL)	GAS (MMCF)	WATER (MBBL)	EUR PRIMARY (MBBL)	EUR SECONDARY (MBBL)	EUR TOTAL (MBBL)
1	WIW CONV. DATE 08/66			26.822	173.551	0.000	26.822	0.000	26.822
2	15.8	0.8	9.5	113.571	117.889	163.834	25.075	136.996	162.071
3	WIW CONV. DATE 08/66			17.094	57.907	2.922	17.094	0.000	17.094
4	2.4	0.0	15.1	57.413	88.560	433.227	20.409	39.364	59.773
5	WIW CONV. DATE 08/66			20.642	57.287	2.624	20.642	0.000	20.642
6	3.2	0.8	39.5	69.155	82.309	1166.784	20.403	55.241	75.644
7	7.1	1.7	98.2	213.361	56.792	1266.503	42.482	192.329	234.811
8	WIW CONV. DATE 10/70			36.360	51.689	8.075	24.760	11.600	36.360
9	1.5	0.0	39.5	54.453	71.439	938.864	29.365	25.088	54.453
10	WIW CONV. DATE 09/70			38.151	60.883	21.069	30.108	8.043	38.151
11	2.4	3.4	4.8	42.446	61.359	69.055	18.084	26.722	44.806
12	WIW CONV. DATE 08/66			28.207	42.508	0.318	28.207	0.000	28.207
13	0.0	0.0	0.0	35.955	76.797	541.347	21.567	14.388	35.955
14	WIW CONV. DATE 08/66			35.449	43.263	2.585	35.449	0.000	35.449
15	2.4	0.0	4.8	58.340	10.344	490.364	27.807	32.284	60.091
16	WIW CONV. DATE 08/67			28.680	35.009	4.789	28.680	0.000	28.680
17	WIW CONV. DATE 07/67			35.380	47.990	7.156	35.380	0.000	35.380
18	1.3	0.0	19.9	66.843	81.684	354.218	36.120	30.723	66.843
19	WIW CONV. DATE 09/70			40.402	36.941	27.891	33.517	6.885	40.402
20	1.0	0.5	18.6	68.781	36.812	521.622	39.216	29.565	68.781

TABLE 3

PRODUCTION AND ULTIMATE RECOVERY
SIRGO-COLLIER INC.
PENROSE "B" UNIT
LEA COUNTY, NEW MEXICO

UNIT WELL NO.	MARCH '87 PRODUCTION OIL (BOPD)	GAS (MCFD)	WATER (BWPD)	CUM PRODUCTION @ 4-1-87 OIL (MBBL)	GAS (MMCF)	WATER (MBBL)	EUR PRIMARY (MBBL)	SECONDARY (MBBL)	TOTAL (MBBL)
21	WIW CONV. DATE 09/70			39.879	23.163	13.364	31.482	8.397	39.879
22	1.3	0.0	13.4	107.515	41.097	493.363	30.029	77.486	107.515
23	1.3	0.0	11.4	55.924	50.198	190.509	29.527	26.397	55.924
24	0.0	0.0	0.0	23.539	21.575	137.771	23.539	0.000	23.539
25	WIW CONV. DATE 08/66			31.300	37.121	15.390	31.300	0.000	31.300
26	0.0	0.0	0.0	41.956	38.685	773.909	31.087	10.869	41.956
27	WIW CONV. DATE 08/66			13.881	9.070	41.267	13.881	0.000	13.881
28	0.5	0.0	13.4	54.502	74.407	790.270	32.237	22.265	54.502
29	WIW CONV. DATE 08/67			28.179	27.599	10.511	28.179	0.000	28.179
30	6.3	0.8	11.0	169.037	80.637	431.490	77.629	121.295	198.924
31	9.4	0.6	43.9	132.947	76.208	710.782	31.963	131.626	163.589
32	WIW CONV. DATE 10/70			63.613	89.932	20.809	39.509	24.104	63.613
33	3.2	3.4	166.7	178.894	74.507	782.003	28.240	153.558	181.798
34	WIW CONV. DATE 09/70			148.575	31.305	4.819	146.869	1.706	148.575
35	0.5	0.6	10.6	59.902	46.054	684.827	40.969	18.933	59.902
36	WIW CONV. DATE 08/66			11.923	37.677	12.424	11.923	0.000	11.923
37	0.3	0.8	88.5	43.520	52.932	1193.605	25.543	17.977	43.520
38	WIW CONV. DATE 08/66			30.080	58.876	0.072	30.080	0.000	30.080
39	0.8	0.0	33.1	66.212	73.008	918.493	32.430	33.782	66.212
40	WIW CONV. DATE 08/67			27.056	58.896	0.085	27.056	0.000	27.056

TABLE 3

PRODUCTION AND ULTIMATE RECOVERY
SIRGO-COLLIER INC.
PENROSE "B" UNIT
LEA COUNTY, NEW MEXICO

UNIT WELL NO.	MARCH '87 PRODUCTION OIL (BOPD)	GAS (MCFD)	WATER (BWPD)	CUM PRODUCTION @ 4-1-87 OIL (MBBL)	GAS (MMCF)	WATER (MBBL)	EUR PRIMARY (MBBL)	SECONDARY (MBBL)	TOTAL (MBBL)
41	2.4	0.0	113.8	49.332	44.284	1060.326	12.462	38.621	51.083
42	WIW CONV. DATE 09/67			0.099	111.866	0.093	0.099	0.000	0.099
43	7.1	1.2	77.3	107.796	17.845	497.882	56.137	62.126	118.263
44	3.9	0.0	24.4	117.295	12.646	393.297	57.246	69.679	126.925
45	WIW CONV. DATE 08/70			45.910	44.038	4.628	45.910	0.000	45.910
46	3.2	2.5	11.8	58.147	98.746	320.716	27.030	36.370	63.400
47	1.5	0.0	21.7	62.992	69.439	163.636	31.840	31.152	62.992
48	0.0	0.0	0.0	46.113	38.132	357.280	37.615	8.498	46.113
49	0.5	0.0	7.2	10.849	40.016	100.568	1.249	9.600	10.849
50	WIW CONV. DATE 08/66			3.083	0.000	0.000	3.083	0.000	3.083
51	1.0	0.8	23.2	51.013	62.453	1050.408	13.698	37.315	51.013
52	WIW CONV. DATE 07/67			23.397	69.631	0.470	23.897	0.000	23.897
53	5.5	0.0	20.5	124.939	152.328	531.553	27.792	115.923	143.715
54	WIW CONV. DATE 09/63			20.014	89.520	0.853	20.014	0.000	20.014
55	0.0	0.0	0.0	15.287	38.615	103.345	9.586	5.701	15.287
56	1.5	0.2	0.8	33.136	266.433	25.485	26.596	6.570	33.166
57	4.7	10.8	3.2	46.770	196.954	56.937	39.282	19.307	58.589
58	0.0	0.0	0.0	4.832	7.060	110.473	0.000	4.836	4.836
59	WIW CONV. DATE 04/73			4.345	24.335	5.902	2.016	2.329	4.345
60	3.2	1.6	153.3	34.087	89.514	911.193	8.823	28.690	37.513

TABLE 3

PRODUCTION AND ULTIMATE RECOVERY
SIRGO-COLLIER INC.
PENROSE "B" UNIT
LEA COUNTY, NEW MEXICO

UNIT WELL NO.	MARCH '87 PRODUCTION OIL (BOPD)	GAS (MCFD)	WATER (BWPD)	CUM PRODUCTION @ 4-1-87 OIL (MBBL)	GAS (MMCF)	WATER (MBBL)	EUR PRIMARY (MBBL)	SECONDARY (MBBL)	TOTAL (MBBL)
61	WIW CONV. DATE 01/74			19.137	82.545	10.737	15.238	3.899	19.137
62	WIW CONV. DATE 09/66			0.000	0.000	0.000	0.000	0.000	0.000
63	WIW CONV. DATE 09/70			15.244	24.692	29.117	11.016	4.228	15.244
*** Total ***	95.2	30.5	1099.1	3310.156	3875.052	18988.909	1775.288	1742.467	3517.755

		PRODUCERS	INJECTORS	TOTAL
MARCH 1987 STATUS:	ACTIVE	29	5	34
	SHUT-IN	6	23	29
	TOTAL	35	28	63

NOTE: ULTIMATE RECOVERIES ARE BASED ON ESTIMATED ABANDONMENT OIL RATES. ACTUAL ULTIMATE OIL RECOVERIES ARE SUBJECT TO MINIMUM COMMERCIAL RATES IMPOSED BY ACTUAL PREVAILING ECONOMIC CONDITIONS.

TABLE 4

INJECTION SUMMARY
SIRGO-COLLIER, INC.
PENROSE "B" UNIT
LEA COUNTY, NEW MEXICO

UNIT WELL #	MARCH 1987 WATER INJECTION (BWPD)	MARCH 1987 WHP (Psi)	CUM WATER INJECTION @ 4-1-87 (MBBLS)
01	52.4	1650	902743
03	149.8	1650	1843352
05	INACTIVE		1895528
08	320.2	1775	1568067
10	INACTIVE		728087
12	INACTIVE		1464354
14	INACTIVE		1499626
16	INACTIVE		1444523
17	INACTIVE		1074299
19	INACTIVE		683615
21	INACTIVE		991015
25	INACTIVE		1886149
27	INACTIVE		1971140
29	INACTIVE		815050
32	INACTIVE		585681
34	INACTIVE		1517385
36	395.5	1725	2293149
38	INACTIVE		2194819
40	INACTIVE		1505760
42	415.0	1675	1786178
45	INACTIVE		1654722
50	INACTIVE		1127768
52	INACTIVE		1454485
54	INACTIVE		1349675
59	INACTIVE		1161547
61	INACTIVE		1001935
63	INACTIVE		1551924
TOTAL	1332.9		37952576

MARCH 1987 WELL STATUS:		
	ACTIVE	5
	SHUT-IN	23
	TOTAL	28

TABLE 5

SIMULATION MODEL PARAMETERS
PENROSE "B" UNIT
LEA COUNTY, NEW MEXICO

Model Configuration

Number of Layers	Single-Layer
Layer Thickness (Feet)	20
Number of Blocks and Dimension/Block	72 @ 933' x 933'
Area/Block (Acres)	20
Size: X times Y (Feet)	8,397 x 7,464
Model Area (Acres)	1,438.8
Mid-Point Elevation (Feet)	3,600

Rock Properties

Permeability Range (md)	0.5 - 50.0
Porosity Range (%)	9 - 23

Fluid Properties

Residual Oil Saturation, %	32.0
Immobile Water Saturation, %	34.0
Critical Gas Saturation, %	1.0
Oil Gravity, Degree API	37
Estimated Gas Gravity	0.8
Initial Bottom-Hole Pressure (Psia)	1,730
Initial Formation - Volume Factor	1.16
Oil Viscosity At Initial Bottom-Hole Pressure (cp)	1.97
Solution Gas-Oil Ratio (SCF/BBL)	300
Initial Oil Saturation, So (Decimal)	0.66
Initial Water Saturation, Sw (Decimal)	0.34

Initial Fluid Volume

Oil-In-Place (MMSTB)	17.749
Water-In-Place (MMSTB)	11.255
Solution Gas-In-Place (BSCF)	5.246
Free Gas-In-Place (BSCF)	0.304

TABLE 6

SIMULATION MODEL DEPLETION RESULTS
PENROSE "B" UNIT
LEA COUNTY, NEW MEXICO

	Model Results	Actual Results
Primary Depletion		
Pressure (Psia)	637	Not Available
Average So (Decimal)	0.558	Not Available
Average Sw (Decimal)	0.350	Not Available
Average Sg (Decimal)	0.092	Not Available
Cumulative Oil (MBBL)	1,198	1,083
Primary Recovery (Percent of OOIP)	7.3	Not Available
Cumulative GOR (MCF/BBL)	1.964	1.066
Cumulative Water (MBBL)	62	216
Final Oil Rate (BPD)	73	63
Final GOR (MCF/BBL)	5.630	2.476
Final Water Rate (BWPD)	9	45
Producing Time (Years)	10.0	9.0
Number of Wells	34	34
End of Waterflood (Current Operations)		
Pressure (Psia)	3,763	Not Available
Average So (Decimal)	0.514	Not Available
Average Sw (Decimal)	0.486	Not Available
Average Sg (Decimal)	0	Not Available
Cumulative Oil (MBBL)	1,952	2,070
Total Recovery (Percent of OOIP)	11.0	Not Available
Cumulative Secondary Oil (MBBL)	754	987
Secondary Oil (Percent of OOIP)	4.6	Not Available
Secondary/Primary (Ratio)	0.63	0.91
Cumulative GOR (MCF/BBL)	1.644	0.757
Cumulative Water (MBBL)	1,241	10,368
Cumulative WOR (Volume/Volume)	0.59*	5.01
Cumulative Injection (MBBL)	5,602*	27,355
Estimated Economic Floodout (Years)	26	29.5 @ 4/1/87
Number of Producers	16	16
Number of Injectors	18	18

* Reflects effective injection, i. e., all injection restricted to confines of single layer.

TABLE 6

SIMULATION MODEL DEPLETION RESULTS
PENROSE "B" UNIT
LEA COUNTY, NEW MEXICO

Infill Drilling and 40-Acre, 5-Spot Injection Support	Model Results
Pressure (Psia)	2,977
Average So (Decimal)	0.469
Average Sw (Decimal)	0.531
Average Sg (Decimal)	0
Cumulative Oil (MBBL)	3,229
Total Recovery (Percent of OOIP)	18.2
Cumulative Secondary Oil (MBBL)	1,925
Secondary Oil (Percent of OOIP)	10.8
Secondary/Primary (Ratio)	1.48
Incremental Oil Recovery (MBBL)	1,277
Cumulative GOR (MCF/BBL)	1,155
Cumulative Water (MBBL)	13,420
Cumulative WOR (Volume/Volume)	4.02
Cumulative Injection (MBBL)	19,290
Cumulative Economic Floodout (Years)	40
Number of Producers	29
Number of Injectors	20

TABLE 7

PROPOSED INVESTMENT SCHEDULE
PENROSE "B" UNIT
LEA COUNTY, NEW MEXICO

Phase	Date	Description	Gross Investment (M)	(M)
I	October 1987	Drill 3 Producing Wells (1 Cored)	465.0	
	November 1987	Drill 3 Producing Wells	450.0	
		Install Satellite Producing Facility	10.0	
		Install Injection Facility	120.0	
	December 1987	Drill 3 Producing Wells	450.0	
		Install Satellite Producing Facility	10.0	
	January 1988	Drill 1 Producing Well	150.0	
		Install Satellite Producing Facility	5.0	
		Total Phase		1,660.0
II	January 1988	Drill 2 Producing Wells	300.0	
	February 1988	Drill 3 Producing Wells	450.0	
		Workover 5 Producing Wells	250.0	
		Convert 9 Wells to Injection	337.5	
		Install Injection Facility Expansion	150.0	
	March 1988	Drill 3 Producing Wells	450.0	
		Total Phase		1,937.5
III	April 1988	Drill 3 Producing Wells	450.0	
	May 1988	Drill 3 Producing Wells	450.0	
	June 1988	Drill 2 Producing Wells	300.0	
		Total Phase		1,200.0
		Total Project		4,797.5

TABLE 8

WELL COUNT SUMMARY
PENROSE "B" UNIT
LEA COUNTY, NEW MEXICO

		Producers			Injectors			Project Total		
Date	Phase	Active	In-Active	Total	Active	In-Active	Total	Active	In-Active	Total
Existing										
September 1987		29	6	35	5	23	28	34	29	63
Planned										
October 1987	I	32	6	38	9	19	28	41	25	66
November 1987	I	35	6	41	13	15	28	48	21	69
December 1987	I	38	6	44	17	11	28	55	17	72
January 1988	I	39	6	45	17	11	28	56	17	73
January 1988	II	41	6	47	17	11	28	58	17	75
February 1988	II	37	4	41	26	11	37	63	15	78
March 1988	II	40	4	44	26	11	37	66	15	81
April 1988	III	43	4	47	26	11	37	69	15	84
May 1988	III	46	4	50	26	11	37	72	15	87
June 1988	III	48	4	52	26	11	37	74	15	89

Note: The projected active well count will be dependent upon success of each phase and as dictated by mechanical conditions and/or activation or de-activation of wells in the interest of more efficient operations.

TABLE 9

SUMMARY OF ECONOMICS
PROJECT WATERFLOOD REDEVELOPMENT
PENROSE "B" UNIT
LEA COUNTY, NEW MEXICO

	Proved Developed Producing	Proved Undeveloped				Total Proved
		Phase I	Phase II	Phase III	Total	
Effective Date:	- - - - - - - - - - - - - - - -	September 15, 1987				- - - - - - - - - - - - - - - -
Gross Reserves:						
Oil (MBBL)	191	752	608	345	1,705	1,896
Gas (MMCF)	57	225	183	103	511	568
Net Reserves:						
Oil (MBBL)	143	564	456	259	1,279	1,422
Gas (MMCF)	43	169	137	78	384	427
Net Operating Revenues:						
Oil (M$)	3,301	14,297	11,506	6,485	32,288	35,589
Gas (M$)	71	322	259	141	722	793
Total (M$)	3,372	14,619	11,765	6,626	33,010	36,382
Expenses:						
Wellhead Taxes (M$)	252	1,091	878	494	2,463	2,715
Operating Costs (M$)	1,659	2,739	2,891	1,517	7,147	8,806
Total (M$)	1,911	3,830	3,769	2,011	9,610	11,521
Investments (M$)	0	1,660	1,937	1,200	4,797	4,797
Future Net Revenue:						
Undiscounted (M$)	1,461	9,129	6,058	3,415	18,602	20,063
Discounted @ 10$ (M$)	1,030	4,524	2,758	1,553	8,835	9,865
Payout* (Years)	-	1.3	2.3	3.0	2.0	-
Annualized Rate of Return (%)	-	100	56.3	47.7	71.7	-
Profit/Investment Ratio:						
Undiscounted	-	6.5	4.1	3.9	4.9	-
Discounted @ 10%	-	3.8	2.5	2.4	2.9	-

* Payout based on project effective date.

TOTAL PROVED

TABLE 10

DATE: 08/31/
TIME: 14:08.
FILE: PEN
GET#: 0

RESERVES AND ECONOMICS

PENROSE "B"
ESCALATED CASE

AS OF SEPTEMBER 15, 1987

T. SCOTT HICKMAN & ASSOC
PETROLEUM CONSULTANTS

-END- MO-YR	GROSS PRODUCTION OIL, MBBL	GROSS PRODUCTION GAS, MMCF	NET PRODUCTION OIL, MBBL	NET PRODUCTION GAS, MMCF	PRICES OIL $/B	PRICES GAS $/M	OPERATIONS, M$ NET OPER REVENUES	OPERATIONS, M$ SEV+ADV+ WF TAXES	OPERATIONS, M$ NET OPER EXPENSES	CAPITAL COSTS, M$	CASH FLOW BTAX, M$	10.00 % CUM. D BTAX,
12-87	22.421	6.728	16.816	5.047	18.40	1.40	316.481	23.827	80.474	1505.000	-1292.820	-1275.
12-88	252.215	75.664	189.166	56.752	19.40	1.40	3749.277	281.959	443.489	3292.500	-268.671	-1621.
12-89	229.281	68.783	171.966	51.590	19.94	1.44	3502.760	263.198	473.130	.000	2766.432	710.
12-90	188.171	56.454	141.133	42.346	20.96	1.51	3022.706	226.792	496.800	.000	2299.114	2473.
12-91	160.101	48.026	120.079	36.021	22.04	1.59	2703.963	202.587	482.736	.000	2018.640	3879.
12-92	139.472	41.843	104.607	31.387	23.17	1.66	2476.488	185.296	506.862	.000	1784.330	5009.
12-93	123.559	37.067	92.672	27.804	24.36	1.75	2306.410	172.341	532.207	.000	1601.862	5932.
12-94	110.855	33.258	83.145	24.947	25.61	1.83	2175.267	162.350	558.821	.000	1454.096	6693.
12-95	100.454	30.132	75.342	22.601	26.92	1.93	2071.930	154.453	586.750	.000	1330.727	7326.
12-96	91.778	27.535	68.838	20.654	28.30	2.02	1989.795	148.167	616.098	.000	1225.530	7856.
12-97	84.389	25.317	63.295	18.991	29.74	2.12	1922.950	143.043	646.600	.000	1133.307	8302.
12-98	73.304	21.992	54.980	16.498	31.26	2.23	1755.502	130.456	634.302	.000	990.744	8657.
12-99	56.464	16.938	42.351	12.708	32.85	2.34	1421.143	105.503	448.183	.000	867.457	8939.
12- 0	48.351	14.505	36.265	10.883	34.24	2.46	1268.642	94.107	421.313	.000	753.222	9161.
12- 1	42.113	12.634	31.587	9.478	34.40	2.58	1111.060	82.374	385.167	.000	643.519	9334.
S TOT	1722.928	516.876	1292.242	387.707	24.08	1.73	31794.374	2376.453	7312.932	4797.500	17307.489	9334.
REM.	173.105	51.935	129.839	38.962	34.40	3.12	4588.113	339.374	1493.545	.000	2755.194	9865.
TOTAL	1896.033	568.811	1422.081	426.669	25.03	1.86	36382.487	2715.827	8806.477	4797.500	20062.683	9865.
CUM.	3339.303	1003.691										
ULT.	5235.336	1572.502										

NET OIL REVENUES (M$)	35589.096		
NET GAS REVENUES (M$)	793.391		
TOTAL REVENUES (M$)	36382.487		
BTAX RATE OF RETURN (PCT)	83.54	PROJECT LIFE (YEARS)	24.232
BTAX PAYOUT YEARS	1.86	DISCOUNT RATE (PCT)	10.000
BTAX PAYOUT YEARS (DISC)	1.99	GROSS OIL WELLS	48
BTAX NET INCOME/INVEST	5.18	GROSS GAS WELLS	.000
BTAX NET INCOME/INVEST (DISC)	3.14	GROSS WELLS	48

PRESENT WORTH PROFILE

DISC RATE	PW OF NET BTAX, M$	DISC RATE	PW OF BTAX,
.0	20062.683	30.0	3549.
2.0	17077.937	35.0	2836.
5.0	13682.306	40.0	2269.
8.0	11182.382	45.0	1809.
10.0	9865.042	50.0	1430.
12.0	8757.057	60.0	843.
15.0	7396.381	70.0	414.
18.0	6308.070	80.0	89.
20.0	5698.037	90.0	-163.
25.0	4471.126	100.0	-364.

TOTAL PROVED UNDEVELOPED

TABLE 12

DATE: 08/31/
TIME: 14:08.
FILE: PEN
GET#: 0

RESERVES AND ECONOMICS

PENROSE "B"
ESCALATED CASE

AS OF SEPTEMBER 15, 1987

T. SCOTT HICKMAN & ASSOC
PETROLEUM CONSULTANTS

-END- MO-YR	GROSS PRODUCTION OIL, MBBL	GROSS PRODUCTION GAS, MMCF	NET PRODUCTION OIL, MBBL	NET PRODUCTION GAS, MMCF	PRICES OIL $/B	PRICES GAS $/M	OPERATIONS, M$ NET OPER REVENUES	OPERATIONS, M$ SEV+ADV+ WF TAXES	OPERATIONS, M$ NET OPER EXPENSES	CAPITAL COSTS, M$	CASH FLOW BTAX, M$	10.00 P CUM. DI BTAX,
12-87	13.252	3.977	9.939	2.984	18.40	1.40	187.056	14.083	9.424	1505.000	-1341.451	-1323.2
12-88	223.251	66.975	167.443	50.235	19.40	1.40	3318.727	249.581	258.689	3292.500	-482.043	-1867.2
12-89	203.792	61.137	152.849	45.855	19.94	1.44	3113.367	233.939	332.010	.000	2547.418	280.4
12-90	165.741	49.725	124.310	37.299	20.96	1.51	2662.401	199.758	348.624	.000	2114.019	1900.6
12-91	140.362	42.104	105.275	31.579	22.04	1.59	2370.601	177.611	366.047	.000	1826.943	3173.6
12-92	122.103	36.632	91.580	27.479	23.17	1.66	2168.085	162.221	384.339	.000	1621.525	4200.7
12-93	108.273	32.481	81.207	24.364	24.36	1.75	2021.070	151.019	403.558	.000	1466.493	5045.1
12-94	97.404	29.223	73.057	21.921	25.61	1.83	1911.343	142.653	423.739	.000	1344.951	5749.2
12-95	88.617	26.581	66.464	19.938	26.92	1.93	1827.783	136.253	444.914	.000	1246.616	6342.4
12-96	81.361	24.410	61.025	18.310	28.30	2.02	1763.957	131.350	467.170	.000	1165.437	6846.6
12-97	75.223	22.567	56.420	16.928	29.74	2.12	1714.082	127.507	490.226	.000	1096.349	7277.8
12-98	65.237	19.572	48.930	14.683	31.26	2.23	1562.327	116.101	470.109	.000	976.117	7627.1
12-99	56.464	16.938	42.351	12.708	32.85	2.34	1421.143	105.503	448.183	.000	867.457	7909.3
12- 0	48.351	14.505	36.265	10.883	34.24	2.46	1268.642	94.107	421.313	.000	753.222	8131.9
12- 1	42.113	12.634	31.587	9.478	34.40	2.58	1111.060	82.374	385.167	.000	643.519	8305.0
S TOT	1531.544	459.461	1148.702	344.644	24.22	1.74	28421.644	2124.060	5653.512	4797.500	15846.572	8305.01
REM.	173.105	51.935	129.839	38.962	34.40	3.12	4588.113	339.374	1493.545	.000	2755.194	8835.14
TOTAL	1704.649	511.396	1278.541	383.606	25.25	1.88	33009.757	2463.434	7147.057	4797.500	18601.766	8835.14
CUM.	.000	.000										
ULT.	1704.649	511.396										

NET OIL REVENUES (M$)	32287.652
NET GAS REVENUES (M$)	722.105
TOTAL REVENUES (M$)	33009.757

BTAX RATE OF RETURN (PCT)	71.70
BTAX PAYOUT YEARS	2.01
BTAX PAYOUT YEARS (DISC)	2.16
BTAX NET INCOME/INVEST	4.88
BTAX NET INCOME/INVEST (DISC)	2.91

PROJECT LIFE (YEARS)	24.232
DISCOUNT RATE (PCT)	10.000
GROSS OIL WELLS	19
GROSS GAS WELLS	.000
GROSS WELLS	19

PRESENT WORTH PROFILE

DISC RATE	PW OF NET BTAX, M$	DISC RATE	PW OF NE BTAX, M
.0	18601.766	30.0	2916.84
2.0	15726.099	35.0	2258.76
5.0	12469.809	40.0	1738.03
8.0	10085.773	45.0	1317.21
10.0	8835.146	50.0	971.10
12.0	7786.812	60.0	438.12
15.0	6504.422	70.0	49.84
18.0	5483.254	80.0	-243.11
20.0	4912.814	90.0	-470.20
25.0	3770.268	100.0	-650.03