

STATE OF NEW MEXICO  
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT  
OIL CONSERVATION COMMISSION  
STATE LAND OFFICE BUILDING  
SANTA FE, NEW MEXICO

8 June 1988

EXAMINER HEARING

IN THE MATTER OF:

Application of Exxon Corporation for downhole commingling, simultaneous dedication, and an unorthodox gas well location, Lea County, New Mexico. and	CASE 9398
Application of Exxon Corporation to amend Division Administrative Order DHC-195, as amended, Lea County, New Mexico.	9399

BEFORE: David R. Catanach, Examiner

A P P E A R A N C E S

For the Division:	Robert G. Stovall Attorney at Law Legal Counsel to the Division State Land Office Bldg. Santa Fe, New Mexico
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For the Applicant:	James Bruce Attorney at Law HINKLE ,COX,EATON, COFFIELD & HENSLEY P.O. Box 2208 Santa Fe, New Mexico 87504
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## I N D E X

W. T. (BILL) DUNCAN, JR.

Direct Examination by Mr. Bruce 5

ROBERT C. ASREEN

Direct Examination by Mr. Bruce 10

Cross Examination by Mr. Catanach 25

LAWRENCE JOHN SOHANEY

Direct Examination by Mr. Bruce 30

Cross Examination by Mr. Catanach 54

STATEMENT BY MR. BRUCE 57

## E X H I B I T S

Exxon Exhibit One, Summary 6

Exxon Exhibit Two, A, B, C, D, Applications 8

Exxon Exhibit Three, DHC Order 195 9

Exxon Exhibit Four, Return Receipts 9

Exxon Exhibit Five, Map 13

## E X H I B I T S

1		
2		
3		
4	Exxon Exhibit Six, Type Log	13
5	Exxon Exhibit Seven, Cross Section A-A'	15
6	Exxon Exhibit Eight, Tabulation	20
7	Exxon Exhibit Nine, A&B, Data	21
8	Exxon Exhibit Ten, A&B, Data	23
9	Exxon Exhibit Eleven, A&B, Data	23
10	Exxon Exhibit Twelve, Map	31
11	Exxon Exhibit Thirteen, Production Plot	34
12	Exxon Exhibit Fourteen, Formulas	35
13	Exxon Exhibit Fifteen, Data	36
14	Exxon Exhibit Sixteen, Cost Estimate	41
15	Exxon Exhibit Seventeen, Data	43
16	Exxon Exhibit Eighteen, Pressure Data	45
17	Exxon Exhibit Nineteen, Calculation	47
18	Exxon Exhibit Twenty, Data	49
19	Exxon Exhibit Twenty-one, Summary	52

1 MR. CATANACH; Call next Case  
2 9398.

3 MR. STOVALL: Application of  
4 Exxon Corporation for downhole commingling, simultaneous  
5 dedication and an unorthodox gas well location, Lea County,  
6 New Mexico.

7 MR. CATANACH: Are there  
8 appearances in this case?

9 MR. BRUCE: Mr. Examiner, my  
10 name is James Bruce from the Hinkle Law Firm in Santa Fe,  
11 representing Exxon Corporation in this matter, and if I can  
12 go find my witnesses, and I would also like to consolidate  
13 this case with 9399.

14 MR. CATANACH: Okay.

15 MR. BRUCE: They concern the  
16 same subject matter.

17 MR. CATANACH: Let's call Case  
18 9399.

19 MR. STOVALL: Application of  
20 Exxon Corporation to amend Division Administrative Order  
21 DHC 195, as amended, Lea County, New Mexico.

22 MR. CATANACH: Any other ap-  
23 pearances in this case besides Exxon?

24 Let's take about a 10-minute  
25 break, Jim, so you can go get organized.

1 (Thereupon a recess was taken.)

2  
3 MR. CATANACH: All right,  
4 let's call this hearing back to order and Mr. Bruce, you  
5 may proceed.

6  
7 W. T. (BILL) DUNCAN, JR.,  
8 being called as a witness and being duly sworn upon his  
9 oath, testified as follows, to-wit:

10  
11 DIRECT EXAMINATION

12 BY MR. BRUCE:

13 Q Mr. Duncan, will you please state your  
14 full name and city of residence?

15 MR. STOVALL: Excuse me, Mr.  
16 Bruce. May we swear him in first, please?

17 MR. BRUCE: Oh, forgot.

18  
19 (Witnesses sworn.)

20  
21 Q Would you please state your name and  
22 city of residence?

23 A William T. Duncan, Junior, and I reside  
24 in Midland, Texas.

25 Q And what is your occupation and who are

1 you employed by?

2 A I'm a petroleum engineer working for  
3 Exxon Corporation in Midland, Texas.

4 Q And have you previously testified be-  
5 fore the OCD as an engineer?

6 A Yes, I have.

7 Q And are you familiar with the engineer-  
8 ing matters related to the applications in Case Numbers  
9 9398 and 9399?

10 A Yes, I am.

11 MR. BRUCE: Mr. Examiner, is  
12 the witness acceptable?

13 MR. CATANACH: He is.

14 Q Mr. Duncan, please refer to Exhibit Num-  
15 ber One and summarize what Exxon Corporation seeks in these  
16 two applications.

17 A Exxon seeks Division approvals to obtain  
18 the optimum wellbore configurations to achieve ultimate  
19 depletion of remaining oil and gas reserves penetrated by  
20 N. G. Penrose Lease wells.

21 To this end, and shown on this exhibit,  
22 we have asked on the N. G. Penrose Wells 1 and 2 to  
23 downhole commingle the Drinkard, Blinebry, and the gas com-  
24 pletion in the Tubb without the need to separately test  
25 each zone.

This downhole commingling involves a gas zone with the lowest pressured zone less than 50 percent of the pressure in the highest pressured zone.

The N. G. Penrose 3, we are requesting to amend our current downhole commingling permit No. DHC-195 to allow the Drinkard, Blinebry and Wantz Granite Wash Pools to be commingled without separately testing the Blinebry.

For this well the location is unorthodox for a Tubb 160-acre gas completion. Again we request no requirement to separately test each zone and we ask for simultaneous dedication to a 160-acre Tubb gas proration unit for Wells 1, 2, and 4.

I'd like to point out that the NMOCD ad-

1 vertisement had included that the N. G. Penrose No. 3 would  
2 also be simultaneously dedicated to the 160-acre Tubb gas  
3 proration unit and this is not correct.

4 The simultaneous dedication would only  
5 involve the Penrose Wells 1, 2, and 4. The Penrose Well  
6 No. 3 is not completed in the Tubb Pool, as such.

7 Q Would you please now refer to Exhibits  
8 Two-A, Two-B, Two-C and Two-D and describe them?

9 A This series of four exhibits labeled  
10 Exhibits Two-A through D are copies of the applications  
11 filed by Exxon for each of the four wells.

12 Two-A is for the N. G. Penrose Well No.  
13 1.

14 Two-B, the Well No. 2.

15 Two-C, the Well No. 3.

16 And Two-D is the application for Well  
17 No. 4.

18 Excuse me, I meant -- I would like to  
19 point out on Exhibit Two-C that the N. G. Penrose Well No.  
20 3 letter of application incorrectly requested that the --  
21 that we be given an exception to separately testing the  
22 Granite Wash before commingling. That letter should have  
23 said Blinebry and the Exhibit Two-C has the Granite Wash  
24 corrected to show Blinebry.

25 The notice was corrected by the NMOCD



1 before it was advertised.

2 Q Will you please now identify Exhibit  
3 Number Three?

4 A Exhibit Number Three is a copy of  
5 Administrative Order No. DHC-195, which granted permission  
6 to downhole commingle the Granite Wash, Drinkard and  
7 Blinebry Pools in Well No. 3.

8 We are asking for an exemption from  
9 requirement number one, which specifies that the newly  
10 completed zone, in this case the Blinebry, be separately  
11 tested for a minimum of 30 days or until production is  
12 stabilized.

13 Q Was notice of the applications in Case  
14 Numbers 9398 and 9399 sent to all offset operators by cert-  
15 ified mail?

16 A Yes, and copies of the certified return  
17 receipts are submitted as Exhibit Number Four.

18 Q Would you please repeat what the basic  
19 purpose of these applications are?

20 A Exxon is making these applications to  
21 enable us to recover the maximum amount of remaining re-  
22 serves in the N. G. -- on the N. G. Penrose Lease.

23 Q In your opinion are the granting of  
24 these applications in the interest of conservation and the  
25 prevention of waste?

1           A           Yes, they are.

2           Q           And were Exhibits One through Four  
3 prepared by you, under your direction, or compiled from  
4 company records?

5           A           Yes.

6                       MR. BRUCE: At this time I  
7 move the admission of Exhibits One through Four.

8                       MR. CATANACH: Exhibits One  
9 through Four will be admitted as evidence.

10                      MR. BRUCE: I have nothing  
11 further of this witness, Mr. Examiner.

12                      MR. CATANACH: Bruce, are you  
13 going to have a witness that goes into each of these zones  
14 and wells in more detail and what you intend to do?

15                      MR. BRUCE: Yes, sir.

16                      MR. CATANACH: In that case I  
17 have no questions of the witness.

18  
19                      ROBERT C. ASREEN,  
20 being called as a witness and being duly sworn upon his  
21 oath, testified as follows, to-wit:

22

23                      DIRECT EXAMINATION

24 BY MR. BRUCE:

25           Q           Would you please state your full name

1 and city of residence?

2 A My name is Robert Charles Asreen,  
3 Junior. I'm a resident of the City of Midland, Texas.

4 Q And what is your occupation and who are  
5 you employed by?

6 A I am a production geologist currently  
7 employed by Exxon Company, USA, Southwestern Division.

8 A And have you previously testified be-  
9 fore the Division?

10 A No, I have not.

11 Q Please summarize your educational and  
12 employment background.

13 A I would like to briefly summarize my  
14 education and employment background in that order.

15 I received an Associate of Arts degree  
16 from the Kingsborough Community College in Brooklyn, New  
17 York.

18 In 1971 I earned a Bachelor of Arts  
19 degree with a major in geography from Hunter College of  
20 the City University of New York, and in 1985 I received a  
21 Master of Science in the geological sciences from the Uni-  
22 versity of Tennessee at Knoxville.

23 My employment experience includes a job  
24 as a summer geologist with the Minerals Division of Getty  
25 Oil Company in Knoxville, Tennessee, during the summer of

1 1981, and I have been employed by Exxon Company, USA, in  
2 Midland, Texas, as a production geologist for approximate-  
3 ly the last four and a half years.

4 During the first two years, two and a  
5 half years of my Exxon employment I was assigned to the  
6 Reservoir Technology Group, where I conducted geologic  
7 evaluation of several Permian Basin reservoirs for poten-  
8 tial enhanced oil recovery projects.

9 My last two years have been spent in the  
10 Production Operations Group, where I've been responsible  
11 for the stewardship of Exxon's acreage in southeast Lea  
12 County, New Mexico, specifically that acreage which Exxon  
13 has on the Central Basin Platform Area.

14 Q And are you familiar with the geological  
15 matters relating to these two cases?

16 A Yes, I am.

17 MR. BRUCE: Mr. Examiner, are  
18 the witness' credentials acceptable?

19 MR. CATANACH: Yes, they are.

20 Robert, can you spell your  
21 last name for me?

22 A A-S-R-E-E-M.

23 MR. CATANACH: Thank you.

24 Q Mr. Asreen, please refer to Exhibit Num-  
25 ber Five and briefly discuss its contents.

1           A           Exhibit Number Five is a locator map  
2 which shows the N. G. Penrose Lease and its relationship t  
3 the State of New Mexico and specifically its place geo-  
4 graphically within Lea County.

5           The N. G. Penrose Lease is a 160-acre  
6 lease located in the eastern portion of southern Lea  
7 County, which is shown on the enlargement on the righthand  
8 side of the exhibit.

9           The lease covers the northeast quarter  
10 of Section 13, Township 22 South, Range 37 East, in Lea  
11 County, and lies about two and a half miles southeast of  
12 Eunice, New Mexico.

13           Geologically the lease is located on the  
14 northwestern portion of the Central Basin Platform of the  
15 Permian Basin.

16           Q           Thank you. Would you please now refer  
17 to the log marked Exhibit Six, which is also taped onto the  
18 wall, and describe its contents for the Examiner?

19           A           Okay. Exhibit Six is a type log for the  
20 N. G. Penrose Lease. This log is an open hole, gamma ray,  
21 compensated neutron formation density log from the N. G.  
22 Penrose -- N. G. Penrose Well No. 3, which is located in  
23 the southwest corner of the N. G. Penrose Lease.

24           This log shows the vertical intervals  
25 from which the four wells on the N. G. Penrose Lease pro-

1     duce.

2                     The gamma ray and caliper logs are shown  
3     on the lefthand side of the log; the neutron and density  
4     porosity on the righthand side of the log, and the depth  
5     track is in the center.

6                     The vertical scale is one inch equals 20  
7     feet. The horizontal scales are as follows:

8                     The gamma ray scale is at zero to 100  
9     API units and the porosity index is from 30 to -10 for the  
10    neutron and density porosity curves.

11                    The compensated neutron porosity curve  
12    is shown as a dashed line, whereas the density porosity  
13    curve is shown as a solid line.

14                    Present completion intervals are indi-  
15    cated by open circles along the righthand side of the depth  
16    track. The proposed completion intervals are shown by the  
17    shading along the lefthand side of the depth track.

18                    The pool tops are shown along the  
19    lefthand side of the log in bold print, while formational  
20    tops are shown in lighter print along the same side of the  
21    log.

22                    I would now like to point out these tops  
23    in reverse stratigraphic order, starting out with the  
24    Blinebry Pool top at 5500 feet; the Tubb Pool top at 6000  
25    feet; the Drinkard Pool top at 6300 feet; the Abo forma-

1 tional top at about 6570 feet; the Wantz Granite Wash Pool  
2 top at 7230; the Granite Wash formational top at 7370; and  
3 the PreCambrian top at 7440.

4 This well was drilled to a total depth  
5 of 7500 feet, where 5-1/2 inch casing was set.

6 Q Would you please refer to the cross  
7 section marked Exhibit Seven and discuss its contents?

8 A I'd now like to turn your attention to  
9 Exhibit Seven, which is a structural cross section running  
10 north/south through the Penrose Lease and offsetting acre-  
11 age.

12 The vertical scale is one inch to 100  
13 feet. The horizontal scale is one inch to 200 feet. The  
14 cross section has been datumed on -2000 feet subsea depth.

15 Wells in the cross section are shown in  
16 the index map on the righthand side of the exhibit. The  
17 outline -- the Penrose Lease has been outlined by a cross-  
18 hatched pattern.

19 Depth tracks, pool tops, and formational  
20 tops are indicated on both the right and the lefthand sides  
21 of the log -- of the cross section.

22 The northernmost well on the cross sec-  
23 tion is -- the cross section line is marked A to A' running  
24 from north to south across there. The northernmost well on  
25 this cross section is the Zachary Hinton No. 4 Well and is

1 shown on the far lefthand side of the exhibit.

2 Moving to the -- to the south, the wells  
3 illustrated on the cross section line are the Zachary Hinton  
4 No. 5 Well, the Zachary Hinton No. 6 Well, and the N.  
5 G. Penrose No. 4 Well, operated by Exxon.

6 Moving to the southwest from the N. G.  
7 Penrose No. 4 is the N. G. Penrose No. 1 Well.

8 South of the N. G. Penrose 1 is the N.  
9 G. Penrose No. 3.

10 Due east of the N. G. Penrose No. 3 is  
11 Exxon's N. G. Penrose No. 2 Well.

12 Moving south from the N. G. Penrose 2 we  
13 find the Marathon Edith Butler 1-B Well, and then southwest  
14 from the Edith Butler well is the Hendrix F. J. Danglade  
15 No. 3 Well, which appears on the righthand side of the  
16 cross section.

17 Shown at the top of each wellbore are  
18 the operator, the lease, the well name and number, and the  
19 Kelly -- Kelly bushing elevation.

20 The Blinebry gas/oil contact at -2250 is  
21 shown by this dashed line. The gas cap has been stippled  
22 in.

23 All the wellbores show present comple-  
24 tion intervals as open circles and squeezed perforations as  
25 cross hatched areas along the righthand side of the well-



1 bore.

2 Proposed completion intervals for the  
3 four Penrose -- for the four Exxon Penrose wells are indi-  
4 cated by shading along the lefthand side of each wellbore.

5 IP dates and rates are included within  
6 boxes along the righthand side of each well for those ap-  
7 propriate zones, here and here.

8 At the base of each wellbore the TD  
9 depth and subsea, as well as the average 1986 daily produc-  
10 tion for each of the producing pools is shown in a boxed in  
11 area.

12 I would like to turn your attention now  
13 to the four Exxon wells and start with the Exxon N. G. Pen-  
14 rose No. 4, briefly review its present completion and what  
15 we propose to -- what intervals we propose to complete in.

16 N. G. Penrose No. 4 was drilled and  
17 completed -- at the end of 1987; therefore you will note  
18 that there is no 1986 average production for that well.

19 It was completed originally as a Granite  
20 -- Granite Wash well, and we propose to add perforations in  
21 the Blinbry, the Tubb, and the Drinkard in the well. This  
22 well has additional perforations in the Wantz Granite Wash  
23 Pool.

24 The N. G. Penrose No. 3, which is also  
25 our type log, is presently downhole commingled in the

1 Drinkard Pool and the Wantz Granite Pool.

2                   The N. G. Penrose No. 2 is currently a  
3 dual gas completion similar to the N. G. Penrose No. 1.  
4 It's currently open in the Blinebry and the Tubb and we  
5 have proposed to add perforations in the Blinebry Pool. It  
6 will remain open in the Tubb Gas Pool, and we will add  
7 additional perforations in the Drinkard Pool.

8                   And that's the end of the Exxon wells.

9                   As illustrated on this cross section,  
10 the Blinebry had a gas/oil contact of -2250 subsea in the  
11 study area -- in the study area, which includes this  
12 acreage surrounding N. G. Penrose.

13                  I'd like to turn your attention to the  
14 fact now that wells which were completed above this -2250  
15 subsea depth were completed as gas wells in the Blinebry  
16 and had GOR's of greater than 50,000.

17                  For example, the N. G. Penrose, was  
18 completed in 1946 and the perforations were totally above  
19 the gas/oil contact of -2250 subsea and it had a GOR of  
20 200,000.

21                  In addition, wells which were perfor-  
22 ated across this gas/oil contact, such as the Hendrix F. J.  
23 Danglade No. 3, had GOR's substantially lower than 50,000  
24 and were prorated as -- and were completed as oil wells.  
25 This Hendrix Danglade well was completed in the Blinebry in

1 1968 with perforations across the gas/oil contact, and had  
2 a GOR of 881 upon initial potential.

3 Q Mr. Asreen, before you step down would  
4 you describe the current completion of the N. G. Penrose  
5 No. 1 and the proposed perforations?

6 A Okay. The N. G. Penrose No. 1 is a dual  
7 completion. It's dualled as a gas well in the Blinebry and  
8 the Tubb gas Pools.

9 We propose to add perforations -- addi-  
10 tional perforations in the Blinebry, and to have the re-  
11 maining Tubb -- to have the perforations in the Tubb remain  
12 open and to add perforations in Drinkard Pool.

13 Q Mr. Asreen, referring to the Penrose No.  
14 3 Well, as shown on the cross section, it appears that it  
15 is completed partially in the Tubb formation.

16 Would you explain that, what -- what it  
17 is considered as completed in by the OCD?

18 A It is currently considered to be com-  
19 pleted as a Drinkard Pool well. The perforations which  
20 have extended into the Tubb formation were grandfathered  
21 into the Drinkard Pool in 1987.

22 Q By the Division?

23 A By the Division.

24 Q Would you please now move on to Exhibit  
25 Number Eight and discuss its contents?

1           A           Exhibit Number Eight is a tabulation of  
2 Blinebry Well status as a function of completion interval  
3 in the N. G. Penrose Lease area.

4                   It includes all Blinebry completions in  
5 the 1440-acre area surrounding the N. G. Penrose Lease.

6                   The purpose of this exhibit is to illus-  
7 trate that completion intervals determine whether a well  
8 completed in the Blinebry will be a gas well or an oil  
9 well.

10                   I'd like to start by showing you the  
11 arrangement of the table. On the far lefthand column we  
12 have the operator, followed by the lease, followed by the  
13 well, followed by the well location; then completion inter-  
14 val, initial GOR, completion status, and completion date.

15                   I'd like to now turn your attention to  
16 the column marked Completion Interval. In this area we  
17 have broken the perforations in the Blinebry out into three  
18 groupings, perforations entirely above -2250 subsea depth;  
19 perforations which occurred across -2250 subsea depth; and  
20 perforations which occurred entirely below -2250 subsea  
21 depth.

22                   You will note that for the 19 wells  
23 which have been completed in the Blinebry, 6 wells were  
24 completed entirely, or perforated entirely above -2250  
25 subsea. Their GOR's were substantially higher than 50,000

1 and they were completed as oil wells -- I mean as gas wells  
2 in the Blinebry Pool.

3 In all instances all wells which were  
4 perforated across -2250 subsea or entirely below -2250  
5 subsea, had GOR's substantially below 50,000 and were  
6 completed as oil wells in the Blinebry Pool.

7 Q And what conclusions do you reach from  
8 this exhibit?

9 A From this exhibit we can conclude that  
10 by adding perforations below or across -2250 subsea in the  
11 N. G. Penrose No. 1, No. 2, and No. 3 Wells, they will be  
12 completed as oil wells in the Blinebry Pool.

13 Q Okay. Thank you. Would you please now  
14 move on to Exhibits Nine-A and Nine-B and discuss them?

15 A Exhibit Nine-A and Nine-B -- I'd like to  
16 start with Exhibit Nine-A first.

17 Exhibit Nine-A is a production map for  
18 Blinebry completions in the vicinity of the N. G. Penrose  
19 Lease. Once again the N. G. Penrose Lease outline has been  
20 stippled. Blinebry producers are shown by shaded circles  
21 around the wellbore. The average 1986 daily production  
22 rate in barrels of oil, barrels of water, and MCF of gas,  
23 are shown above the solid line and below the solid line are  
24 shown the cums as of 1-1-87 in thousands of barrels of oil,  
25 thousands of barrels of water, and millions of cubic feet

1 of gas.

2 Exxon currently has two wells which are  
3 completed in the Blinebry formation. They are the No. 2  
4 Penrose Well, which has been shut in since 1977 after  
5 cuming only .3 million cubic feet of gas, and Exxon's N. G.  
6 Penrose No. 1, which has also been shut in since 1977 after  
7 cuming 25,000 barrels of condensate, and almost 5 BCF of  
8 gas.

9 Exhibit Nine-B is a tabular presentation  
10 of the '86 production data for the wells which are shown on  
11 the map in Exhibit Nine-A. The arrangement of the table is  
12 similar to that in Exhibit Eight, in which operator is  
13 shown on the far lefthand side of the exhibit, followed by  
14 lease, followed by well, unit, section, township and range,  
15 and the average 1986 daily production rates are then shown  
16 on the righthand side.

17 For the 13 active Blinebry completions n  
18 the study area, the 1986 daily production was 4.6 barrels  
19 of oil per day, 4.5 barrels of water, and 84.9 MCF of gas.

20 The conclusion one can make from this  
21 table is that production in the area in the Blinebry forma-  
22 tion is marginal.

23 Q And to reiterate your conclusion in --  
24 from Exhibit Number Eight, all of the four Penrose wells  
25 will be oil completions in the Blinebry, is that correct?

1           A           Yes. I think I neglected to mention the  
2 Penrose Four.

3           Q           Would you please now move on to the plat  
4 and table marked Ten-A and Ten-B and describe them?

5           A           Ten-A and Ten-B are similar exhibits to  
6 Nine-A and Nine-B. The format of the exhibits is the same.

7                   Ten-A and Ten-B show Tubb production,  
8 whereas Nine-A and Nine-B showed Blinebry production.

9                   Exxon currently has two Tubb wells on  
10 its N. G. Penrose Lease, the N. G. Penrose No. 2, which  
11 flowed at a daily rate of .4 MCF of gas in 1986 and the N.  
12 G. Penrose No. 1, which flowed at a daily rate of .1 MCF in  
13 1986.

14                   The tabular arrangement of the same data  
15 is shown in Figure Ten-B. I'd like to go down to the bot-  
16 tom line and the average production for the active comple-  
17 tions, which were 14 Tubb completions in the study area,  
18 was only .8 barrels of oil per day, .7 barrels of water per  
19 day, and 54.8 MCF of gas per day.

20                   From this table I can conclude that Tubb  
21 production in the area is also marginal.

22           Q           Would you then move on to Exhibits  
23 Eleven-A and Eleven-B and discuss them?

24           A           Exhibits Eleven-A and Eleven-B are in a  
25 similar format to the two previous exhibits, except that

1 this exhibit shows Drinkard oil production.

2 On the map we see that Exxon has only  
3 one Drinkard completion currently and that is the N. G.  
4 Penrose No. 3, which produced at a daily rate in 1986 of  
5 6.1 barrels of oil, .7 barrels of water, and 43 MCF of gas  
6 per day.

7 Turning to Eleven-B we see that the  
8 average production for 1986 for the 29 active Drinkard  
9 wells in the study area was 3.5 barrels of oil, 1.2 barrels  
10 of water, and 68.3 MCF of gas per day.

11 The conclusion one can make from this  
12 table is that Drinkard production in this area is also  
13 marginal.

14 Q And overall, regarding the N. G. Penrose  
15 Lease, how do you classify production from that lease?

16 A It is marginal production.

17 Q From all zones.

18 A From all zones.

19 Q In your opinion will the granting of  
20 these applications be in the interest of conservation, the  
21 prevention of waste, and the protection of correlative  
22 rights?

23 A Yes, it will.

24 Q And a final question, Mr. Asreen, appro-  
25 ximately how many wells in this general area are completed



1 in these -- the pools which are the subject of these appli-  
2 cations?

3 A The completions in the area are --  
4 roughly number 1000, and that would include Drinkard,  
5 Blinebry, Wantz Granite Wash wells.

6 Q And how many other wells does Exxon have  
7 in this area?

8 A Exxon operates about 50 or 60 comple-  
9 tions in this area.

10 Q And is Exxon reviewing similar workovers  
11 on some of these wells?

12 A Yes, we are.

13 Q Were Exhibits Five through Eleven-B pre-  
14 pared by you, under your direction, or compiled from com-  
15 pany records?

16 A Yes, they were.

17 MR. BRUCE: At this time, Mr.  
18 Examiner, I move the admission of Exhibits Five through  
19 Eleven-B.

20 MR. CATANACH: Exhibits Five  
21 through Eleven-B will be admitted as evidence.

22

23 CROSS EXAMINATION

24 BY MR. CATANACH:

25 Q You submitted data on the -- showing

1 that the Drinkard and the Tubb and Blinebry are all mar-  
2 ginal in this area.

3 Do you have any similar data from the  
4 Granite Wash?

5 A No, I don't.

6 Q Is that also fairly marginal in this --  
7 in this area?

8 A It depends.

9 Q On what?

10 A The Wantz Granite Wash play is a rather  
11 -- it's a stratigraphic trap and our completion in the N.  
12 G. Penrose No. 4, for example, potentialed at a rate of 260  
13 barrels of oil per day in September of '87. We ran a bot-  
14 tom hole pressure test in the well and found out the reser-  
15 voir was quite limited and by January of 1988 the well had  
16 quite flowing, and before it quit flowing it was averaging  
17 roughly about 15 or 16 barrels of oil per day.

18 Most -- there are some Granite Wash  
19 wells out here which are by far exceptional Granite Wash  
20 wells, as far as field-wide production goes, but for the  
21 most part the Granite Wash is a -- can -- most of the  
22 Granite Wash wells are fairly marginal.

23 Q Did I understand that you propose to --  
24 the Penrose No. 3, is that currently not completed in the  
25 Granite Wash?

1           A           It is currently completed in the Granite  
2 Wash.

3           Q           It is.

4           A           It is downhole commingled in the Drink-  
5 ard and the Granite Wash Pools.

6           Q           Are you adding the Granite Wash to any  
7 of these wells?

8           A           No. The Granite Wash is currently open  
9 only in the N. G. Penrose No. 3 and the N. G. Penrose No.  
10 4. The wellbores for the N. G. Penrose No. 1 and N. G.  
11 Penrose No. 2 do not penetrate the Granite Wash.

12          Q           You testified that you've got pretty  
13 much control in determining whether you complete the Bline-  
14 bry oil or gas. Do you feel pretty comfortable with that?

15          A           Yes, I do.

16          Q           You feel that you can do that fairly  
17 well and fairly (inaudible).

18          A           Yes.

19          Q           And you do intend to complete only in  
20 the Blinebry oil zone.

21          A           Well, we will add perfs in both zones  
22 but we feel that by adding the majority of the perfs in the  
23 Blinebry oil zone, that these wells will be oil productive  
24 and classify as oil completions.

25          Q           So you do intend to perforate also in

1 the gas zone?

2 A Yes, I believe in the N. G. Penrose No.  
3 4, but based on the data which I have looked at, my present  
4 feeling is that the Blinebry gas cap is pretty well pres-  
5 sure depleted in this area of the field.

6 Q How did you arrive at that conclusion?

7 A The exhibit which I presented for Number  
8 Eight, Exhibit Number Eight, shows that completion inter-  
9 vals which were strictly above this -2250 subsea depth were  
10 oil -- were classified as gas wells versus every other  
11 well -- every other completion across that interval or  
12 strictly below, which were all oil productive, oil comple-  
13 tions.

14 Now, there -- there -- I could not find  
15 any exceptions in the study area to that -- to that rule.

16 Q Okay. In the -- as I understand it, in  
17 the No. 4 Well you propose to add Tubb and that -- that's  
18 the only well that you propose to Tubb, also?

19 A Yes, to add the Tubb. The other ones  
20 are completed in the Tubb.

21 Q Okay. What's your -- is the Tubb also  
22 separated as having a gas cap and an oil zone?

23 A Not in this area. I couldn't find any  
24 evidence to indicate that it was.

25 Q So you don't --

1           A           As a matter of fact, most of the wells  
2 which I looked at out here were classified as gas wells.

3           Q           So you're really not going to have as  
4 much control as you would in the Blinebry in this area of  
5 the Tubb.

6           A           Probably not. We are -- we believe that  
7 the Tubb formation here will be gas productive, will be a  
8 gas completion.

9           Q           That's the experience you've had in the  
10 other wells, that the Tubb was -- was gas, mostly gas pro-  
11 ducing?

12          A           Yes.

13          Q           In the Well No. 2, do you know if that  
14 Blinebry zone in that well is currently classified as gas?

15          A           In the No. 2? Yes, it is.

16          Q           And the Tubb is also?

17          A           Yes. It's a dual completion in the  
18 Blinebry and Tubb as a gas well.

19                      All the perfs in the No. 2 are above  
20 -2250 subsea.

21          Q           How about the No. 1? Is it the same  
22 situation?

23          A           Same situation exists for the No. 1 and  
24 all the perfs in the No. 1 are above -2250 subsea.

25          Q           Your application requests simultaneous

1 dedication of the Tubb production. What about Blinebry gas  
2 production?

3 A We do not request simultaneous dedica-  
4 tion for Blinebry because we believe that these completions  
5 will be oil completions.

6 Q But you've got -- you've already got the  
7 No. 1 and 2 Wells classified as Blinebry gas.

8 A After the -- at the addition of the  
9 perfs they will no longer be classified as Blinebry gas  
10 wells.

11 MR. CATANACH: I think that's  
12 all I have of the witness at this time.

13 The witness may be excused.

14

15 LAWRENCE JOHN SOHANEY,  
16 being called as a witness and being duly sworn upon his  
17 oath, testified as follows, to-wit:

18

19 DIRECT EXAMINATION

20 BY MR. BRUCE:

21 Q Would you please state your name and  
22 where you reside?

23 A My name is Lawrence John Sohaney. I  
24 reside in Midland, Texas.

25 Q And who are you employed and in what

1 occupation?

2 A I'm employed by Exxon Corporation as a  
3 Staff Reservoir Engineer.

4 Q And have you previously testified be-  
5 fore the OCD as an engineer?

6 A Yes, I have.

7 Q And are you familiar with the engineer-  
8 ing matters relating to these two cases?

9 A Yes, I am.

10 MR. BRUCE: Mr. Examiner, are  
11 the witness' credentials acceptable?

12 MR. CATANACH: They are.

13 Q Mr. Sohaney, would you please refer to  
14 Exhibit Number Twelve and describe its contents?

15 A Exhibit Number Twelve is a current lease  
16 status map for Exxon's N. G. Penrose Lease.

17 The lease is shown at the top of the ex-  
18 hibit. It's 160-acre lease located in the northeast  
19 quarter of Section 13.

20 There are four wells on the lease. I'd  
21 like to review each of the four wells in the current  
22 status.

23 Well No. 1 is located in the northwest  
24 corner of the lease. That well was drilled in 1945. It  
25 is currently a dual completion. The upper completion is in

1 the Blinebry and it is dead. The lower completion is in  
2 the Tubb and during the year 1987 it produced zero barrels  
3 of condensate, zero barrels of water, and 5.8 MCF per day,  
4 on average.

5 Both of these completions will probably  
6 benefit by the installation of artificial lift.

7 Well No. 2 is located in the southeast  
8 corner of the lease. Well No. 2 was drilled in 1953. It  
9 is also a dual similar to Well No. 1.

10 The upper completion is in the Blinebry.  
11 It is a gas completion made in 1977. It has been shut in  
12 since 1977.

13 The lower completion is in the Tubb and  
14 during 1987 it produced an average of zero barrels of con-  
15 densate, zero barrels of water, and 42.8 MCF per day of  
16 gas.

17 Well No. 3 is located in the southwest  
18 corner of the lease. It was drilled in 1975. It is cur-  
19 rently a downhole commingled completion.

20 The upper completion is in the Drinkard  
21 Pool. During 1987 it averaged 7.7 barrels of oil per day,  
22 0.8 barrels of water per day, and 13.9 MCF per day of gas.

23 The lower completion is completed in the  
24 Wantz Granite Wash Pool and during 1987 it averaged 3.3  
25 barrels of oil per day, zero barrels of water per day, and



1 10.3 MCF per day.

2 The last well on the lease is the  
3 Penrose No. 4, located in the northeast corner. The well  
4 was drilled in 1987. During 1987 it averaged 15.2 barrels  
5 of oil per day, zero barrels of water, and 82.1 MCF per day  
6 of gas.

7 Currently that well is dead. It ceased  
8 to flow on or about January 28th, 1988. It needs artifi-  
9 cial lift.

10 Just prior to ceasing to flow that well  
11 was producing at a rate of about 14 barrels of oil per day  
12 and 85 MCF per day of gas.

13 I'd like to address now your question  
14 that you had to Mr. Asreen concerning the Wantz Granite  
15 Wash production.

16 Certainly in the No. 3 Well it is very  
17 marginal and in the No. 4 Well it is marginal also with a  
18 rate of about 14 barrels of oil per day and 85 MCF per day.

19 The center part of the exhibit  
20 summarizes the production for the lease on a total lease  
21 basis and on a per completion basis.

22 The average total lease production  
23 during 1987 was 26 barrels of oil, .9 barrels of water, and  
24 118.4 MCF per day.

25 On a per average completion, of which

1 there were seven, it's only 3.7 barrels of oil per day, 0.1  
2 barrels of water per day, and 22 MCF per day, and if we put  
3 that on a per active completion basis, of which there only  
4 five, it's only 5.2 barrels of oil per day, .2 barrels of  
5 water, and 31 MCF per day of gas.

6 Q Thank you. Would you now move on to  
7 Exhibit Thirteen and briefly describe it?

8 A Exhibit Thirteen is a production plot  
9 for the Penrose Lease. It shows total gas production, that  
10 would be casinghead gas and gas well gas, as well as con-  
11 densate and oil production, the Y axis scale is semiloga-  
12 rithmic, going from 1 to 10 to 100 to 1000 in units of bar-  
13 rels of per day and MCF per day, and we show production for  
14 the years 1977 through current.

15 Gas production on this lease has been on  
16 a 6 percent decline and oil and condensate production has  
17 been on a 9 percent decline.

18 The sharp spike that you see in Septem-  
19 ber of 1987 was the drilling of the No. 4 Well, which  
20 potentialed in the Wantz Granite Wash. You can see how  
21 production skyrocketed and then fell back down and current-  
22 ly that completion is dead.

23 Q Would you please now move on to Exhibit  
24 Fourteen and discuss Exxon's proposed allocation formulas  
25 for this lease?

1           A           Exhibit Number Fourteen is entitled Pen-  
2   rose Allocation Formulas. It contains the proposed allo-  
3   cation formulas for all four wells.

4                   I'd like to turn our attention to the  
5   Penrose No. 4 at the bottom of the table and by going  
6   through the Penrose No. 4 we can understand what we're  
7   proposing for the 1, 2 and 3.

8                   The Penrose No. 4 Well will be comming-  
9   led in four zones, the Blinebry oil and gas, the Drinkard,  
10   the Tubb oil and gas, and the Wantz Granite Wash.

11                   Starting with the Wantz Granite Wash on  
12   the No. 4 Well, the projected producing rate for the Wantz  
13   Granite Wash would be 14 barrels of oil per day, and 85 MCF  
14   per day of gas. That was the reported production rate just  
15   prior to the well dying.

16                   For the Tubb oil and gas the expected  
17   production is 0.8 barrels of condensate per day and 54.8  
18   MCF per day. That number was the average taken from Exhi-  
19   bit Number 10-B.

20                   For the Drinkard, the projected  
21   production is 3.5 barrels of oil per day and 68.3 MCF per  
22   day. That is the number projected from Exhibit Number  
23   Eleven-B.

24                   And for the Blinebry oil and gas the  
25   production will be 4.6 barrels of oil per day and 84.9 MCF

1 per day of gas. And that was the calculated average from  
2 Exhibit Number Nine-B.

3 So the total production out of the  
4 Penrose No. 4 will be approximately 22.9 barrels of oil per  
5 day and 293 MCF per day of gas.

6 The percent columns are simply taking  
7 the expected producing rates out of each zone and dividing  
8 by the total to come up with the percents.

9 Looking at the bottom line in this  
10 table, and at the grand -- grand sum total, the expected  
11 producing rate out of all four wells is 56 barrels of oil  
12 per day and 816 MCF per day of gas. That's roughly double  
13 the daily oil producing rate and about 7 times the amount  
14 of gas.

15 Q In your opinion is this allocation  
16 formula fair and reasonable?

17 A Yes, it is.

18 Q Will you please now describe Exhibit  
19 Fifteen?

20 A Exhibit Fifteen is entitled Incremental  
21 Reserve Summary.

22 The purpose of this exhibit is to show  
23 the incremental reserves that will be recovered by the  
24 granting of the commingling applications that we seek here  
25 today, and let's turn to the bottom line number, which I've

1 boxed off in the lower righthand corner of the exhibit, at  
2 the bottom. The grand sum total for all four wells that we  
3 project is approximately 58,000 barrels of additional oil  
4 recovery and a little over 2-billion cubic feet of gas.

5 What I'd like to do now is to go  
6 through this table with one well to explain how these  
7 numbers were calculated to arrive at that bottom line  
8 number.

9 Let's start with the Penrose No. 1 Well  
10 at the top of the table and turn our attention to the line  
11 titled Sequential Single Completions With Lift. What I  
12 mean by sequential single completions is to produce each  
13 pool separately in this well to depletion, plug back the  
14 well to the next higher pool, produce it to depletion, plug  
15 it back and go on to the next pool.

16 So there are three pools involved with  
17 the Penrose No. 1, the Blinebry oil and gas, the Drinkard,  
18 and the Tubb oil and gas.

19 For the Blinebry oil and gas the expected  
20 beginning rate is 4.6 barrels of oil per day and 84.9  
21 MCF per day of gas.

22 And the economic limit is .5 barrels of  
23 oil per day and 20 MCF per day of gas.

24 The life of that completion would be  
25 23.3 years. The calculated remaining reserves are approxi-

1 mately 16,000 barrels of oil and 383-million cubic feet of  
2 gas.

3 Similarly I performed the same calcula-  
4 tions for the Drinkard and the Tubb.

5 To summarize the Drinkard, the life of  
6 the Drinkard completion will be 19.8 years. The remaining  
7 reserves out of the Drinkard Pool will be 11,610 barrels  
8 and the reserves are 285-million cubic feet of gas.

9 And for the Tubb zone the remaining life  
10 is 16.3 years. The reserves are about 2.3-thousand barrels  
11 of condensate and 205-million cubic feet of gas.

12 So the total reserves, by producing this  
13 well as sequential single completions is 29,799 barrels of  
14 oil and 873-million cubic feet of gas, and the time that it  
15 would take to do that, is approximately 60 years.

16 Next we have the proposed commingle  
17 operation drawing. This is what we propose to do with the  
18 well. The expected producing rate is 8.9 barrels of oil  
19 per day and 208 MCF per day of gas. The calculated remain-  
20 ing life is 37.8 years. The calculated remaining reserves  
21 are approximately 33,000 barrels of oil and a little over  
22 1.1-billion cubic feet of gas.

23 Now I'd like to turn your attention to  
24 the continued operations case at the top.

25 If the commingling applications that we

1 seek are not granted, this is what Exxon will do.

2 We will plug back the well and produce  
3 only one single completion, which is the Blinebry and when  
4 the Blinebry is produced the well will be plugged. So in  
5 that case the remaining life would be 23.3 years and the  
6 calculated reserves are about 16,000 barrels of oil and  
7 383-million cubic feet of gas.

8 So under the proposed commingling  
9 operations shown in the farmost right column, the incre-  
10 mental reserves to be produced versus the continued opera-  
11 tions case, is 17,000 barrels of oil and 726-million cubic  
12 feet of gas.

13 The same calculations were performed on  
14 the Penrose No. 2, No. 3, and No. 4 Wells.

15 The summary at the bottom of the table  
16 shows what one would expect for all four wells. Under  
17 continued operations the average remaining life is about  
18 37-1/2 years. The remaining reserves are 149,000 barrels  
19 of oil, and approximately 2.2-billion cubic feet of gas.

20 With the proposed operations that we  
21 seek here today, the reserves are 208,000 barrels of oil  
22 and approximately 4.3-billion cubic feet of gas.

23 That's about a doubling in the amount of  
24 remaining gas reserves to be produced and about 30 or 40  
25 percent increase in the barrels of oil and condensate to be

1 produced.

2 Q So your estimate is that the increment-  
3 al reserves recoverable by the proposed workovers are  
4 approximately 15,000 barrels of oil per well and one-half  
5 BCF of gas per well, is that correct?

6 A That is correct.

7 Q And the proposed workovers would gain  
8 additional reserves, even over and above the -- what you  
9 set out as the sequential single completions, is that  
10 correct?

11 A That is correct. If we look at the  
12 bottom line under the sequential single completions with  
13 lift, for instance, the oil reserves are 179,000 barrels  
14 versus the commingling of all three zones is 208.

15 Q Do you consider the sequential single  
16 completions as an option in this case?

17 A No, they are not an option.

18 Q Would you please set forth a few reasons  
19 why Exxon does not consider that an option?

20 A Well, due to the additional cost invol-  
21 ved for one to produce these marginal wells as single com-  
22 pletions and the risk involved in doing that, and the addi-  
23 tional years that you can see that it takes to produce  
24 those reserves sequentially, it is just not economically  
25 feasible at this point to produce them separately, and the



1 riskier zones are the zones that are more difficult to  
2 reach, and can't be, will simply be plugged back and never  
3 be produced. We will go to those zones that I have listed  
4 under the continued operations case.

5 Q Thank you. Would you please now refer  
6 to the cost estimate marked Exhibit Sixteen and describe  
7 that?

8 A Exhibit Number Sixteen is entitled Cost  
9 Estimate Summary.

10 The purpose of this exhibit is to show  
11 the cost in dollars of satisfying two NMOCD requirements  
12 from which we seek relief on all four wells.

13 And the two requirements from which we  
14 seek relief are, first of all, the separately testing re-  
15 quirement for each new zone to be opened up in these wells.

16 And the second requirement that we seek  
17 relief from is the isolating of any prorated gas pool com-  
18 pletion. As we've stated earlier, we believe that the Tubb  
19 completions will be gas completions.

20 Let's look at the Penrose No. 1 Well,  
21 for instance.

22 The workover cost as we propose it on  
23 the Penrose No. 1 is \$40,700. In addition to that will be  
24 the cost of installing artificial lift on the well of  
25 \$35,000, bringing the total cost to \$75,700.

1                   Listed below are the additional requests  
2 that would be necessary, or potentially necessary, to meet  
3 the two requirements from which we seek relief.

4                   There would be a requirement to separ-  
5 ately test the Drinkard because this zone is not currently  
6 open in the well. That would cost an additional \$11,400.

7                   There would be no cost to separately  
8 test the Tubb because that zone is currently open in the  
9 well.

10                  But there would be a cost to separately  
11 test the Blinebry to prove by test that it is indeed an oil  
12 completion, and that would be \$8600.

13                  In addition there would be the cost of  
14 dualing the well to separate out the Tubb gas completion.  
15 That would cost at lest \$6600 additional. And there would  
16 be the cost of additional dual flow line facilities of  
17 \$9200, bringing the total additional costs, if the relief  
18 is not granted, of \$27,200, raising the total cost from  
19 \$75,700 to \$102,900.

20                  I've performed these same calculations  
21 on the other three wells and in the rightmost column sum-  
22 marized the total on all four wells.

23                  The total cost of all the workovers  
24 comes to \$190,000. The artificial lift cost comes to ap-  
25 proximately \$104,000, for a grand sum total as proposed by

1 Exxon of \$294,000.

2 Total potential additional cost that  
3 would be required if the relief is not granted, is \$160,000  
4 which would raise the cost from \$294,000 to \$454,000.  
5 That's about a 55 percent cost increase.

6 Q In your opinion is that additional  
7 expense necessary to better produce these wells or to  
8 better allocate production?

9 A No, it is not.

10 Q Has Exxon management approved the  
11 \$294,000 expenditure for the workover of these four wells?

12 A They have approved the \$294,000 but I  
13 might add that the approval was extremely difficult and  
14 very lengthy.

15 Q And will Exxon approve the workover if  
16 costs are increased by approximately \$160,000?

17 A No, they will not.

18 Q Would you please now refer to Exhibit  
19 Number Seventeen and discuss the Tubb gas production in  
20 these wells?

21 A Exhibit Number Seventeen is entitled  
22 Likelihood of Shut-in Tubb Gas Pool.

23 This exhibit addresses the likelihood of  
24 gas production from the three wells exceeding the top  
25 allowable out of the Tubb Gas Pool.

1 will be about 90 psia because it's in a pumped off --  
2 pumped off mode of operation.

3 Now what happens when the well is shut  
4 in is shown on the righthand side of the exhibit, and this  
5 represents a worst case scenario. When a well is shut in  
6 completely, that will represent the maximum potential cross  
7 flow that could occur.

8 When the wellbore is shut in the first  
9 thing that happens is that pressure within the wellbore has  
10 to rise and the pressure has to rise to at least the bottom  
11 hole pressure of the lowest pressure zone, which in this  
12 case is the Tubb and the Tubb pressure was 474 psia. So  
13 the pressure in the wellbore has to rise from 90 to 474.

14 Now when that pressure rises, of course,  
15 that backs off the rates coming out of the other zones that  
16 continue to produce in the cross flow, so for instance, in  
17 the Blinebry, the Blinebry now only produces 1-1/2 barrels  
18 of oil per day versus the 4.6 it was producing before, and  
19 looking down at the Drinkard zone, it now only produces 2.3  
20 barrels of oil per day versus the 3.5 before.

21 So if we look at the total cross flow  
22 rate flowing into the lowest pressure zone, which is the  
23 Tubb, the total cross flow rate is 3.8 barrels of oil per  
24 day.

25

1                   And I summarize this in the box in the  
2 lower lefthand corner of this exhibit by the ratio of cross  
3 flow rate of -- producing rate, and for the oil it's the  
4 3.8 barrels divided by 8.9 and .43 and for the gas it's  
5 0.35. So if we average the oil and the gas the cross flow  
6 rate divided by the producing rate is about .39 or .4.

7                   The point to be made here is that a well  
8 does not cross flow at a rate anywhere close to its pro-  
9 ducing rate in a pumped off mode.

10                  Q           Would you please now discuss the cross  
11 flow exposure and discuss Exhibit Twenty?

12                  A           Exhibit Number Twenty is entitled Maxi-  
13 mum Potential Cross Flow Exposure and we're going to use  
14 Exhibit Number Nineteen and build upon it in Exhibit Number  
15 Twenty and to try and quantify what -- what potential cross  
16 flow exposure could be.

17                         Now, exposure can be quantified by the  
18 quotient of reserves lost to reserves produced, and I give  
19 the equation down below: Quotient equals reserves lost  
20 divided by reserves produced.

21                         Now the numerator, reserves lost, is  
22 simply the time the well is cross flowing, which is the  
23 percent time that the well is shut in, times the rate at  
24 which it cross flows, times the percent of that cross flow  
25 that is lost. What I mean by the percent of cross flow

1 that is lost is that it simply -- simply cross flowing does  
2 not equate to loss.

3 If you -- if you cross flow gas into a  
4 gas reservoir, you can produce that gas back, as you know.  
5 So cross flow by and of itself does not necessarily equate  
6 to loss. Reserves produced, the denominator, is simply the  
7 time the well is left producing, which is 1 minus the per-  
8 cent time it was shut in, times the producing rate.

9 Below that equation I've built a  
10 quotient table for the quotient of reserves lost divided by  
11 reserves produced for various percent shut-in time and  
12 various percents of cross flow lost, and this table was  
13 built for a cross flow rate of a producing rate of .4,  
14 which we calculated in the prior exhibit for the Penrose  
15 No. 1 Well.

16 So, for instance, if we read across that  
17 table with a 20 percent shut-in time and a 30 percent cross  
18 flow lost, the quotient that is calculated is .03, which  
19 basically means about 3 percent of the reserves to be  
20 potentially lost with cross flow, given those circumstan-  
21 ces.

22 Now below I performed an example calcu-  
23 lation. Using 20 percent shut-in time and a 30 percent  
24 cross flow loss from that table, which gave the quotient of  
25 .03.

1                   From Exhibit Number Fifteen, a summary  
2 of all four wells, we saw earlier that under continued  
3 operations the reserves were 149,772 barrels of oil.

4                   Under the proposed commingling opera-  
5 tions the reserves are 208,602 barrels, and that assumed no  
6 shut-in and consequently no cross flow.

7                   What we're now going to do is adjust  
8 that 208,000 barrels for cross flow, and so the reserves  
9 will actually produce simply the 208,602 barrels divided by  
10 1 plus the quotient of .03, or 202,526 barrels.

11                   That's about 6000 barrels less than the  
12 208,000 barrels, but it is still significantly larger than  
13 the 149,000 barrels under continued operations.

14                   And I might also point out, although  
15 it's not shown here, that 202,000 barrels is also larger  
16 than the sequential single completions with lift.

17                   And basically -- the basic conclusion is  
18 that recovery under the proposed operation significantly  
19 exceeds recovery under continued operations even when ad-  
20 justed for any potential cross flow.

21                   Q           In your opinion what is the likelihood  
22 of Penrose wells being shut in?

23                   A           Well, as we showed on Exhibit Number  
24 Seventeen, we don't believe that the wells will be shut in  
25 at all for proration reasons due to the Tubb gas, and based

1 on our marketing arrangements for the gas, we also do not  
2 believe that it will be shut in on the purchasing.

3 Q Would you please now refer to Exhibit  
4 Number Twenty-one and summarize the last three exhibits?

5 A Exhibit Twenty-one is entitled Cross  
6 Flow Summary and it basically lists the major points  
7 pertaining to this cross flow, or potential cross flow  
8 situation.

9 The first major point is that cross flow  
10 does not necessarily equate to loss of reserves. Loss  
11 depends upon what fluid is flowing into what zone and what  
12 the abandonment pressure of each zone will be with com-  
13 mingling versus without commingling, and I've listed the  
14 five possibilities that could take place here with the  
15 Penrose wells.

16 The first possibility is dry gas flowing  
17 into a gas reservoir and that results in little to no loss.  
18 It can be produced back.

19 Dry gas flowing into -- the second is  
20 dry gas flowing into an oil reservoir results in very minor  
21 gas loss but probably some gain in oil production. It's  
22 more or less similar to a small gas drive open (unclear).

23 The third situation is oil flowing into  
24 an oil zone and that results in little to no loss. It can  
25 be produced back.



1           The fourth situation is oil flowing into  
2 a gas zone for the first time. That results in about a 43  
3 percent loss. That is the most significant potential loss.

4           The last situation is similar to number  
5 four but it is oil flowing into a gas zone that was pre -  
6 viously saturated with oil, and in that case that results  
7 in little to no loss as long as the oil flowed in the  
8 second time or the third time does not exceed what was  
9 flowed in the first time.

10           The second major point is that comming-  
11 ling, even with potential shut-in, recovers significant  
12 additional reserves and we show this by the example calcu-  
13 lation in the prior exhibit.

14           The third major point is that the proba-  
15 bility of both shut-in and cross flow decreases with time  
16 as the producing rate declines.

17           The last point is that the expected pro-  
18 ducing rates are low and as we showed, the potential cross  
19 flow rates are even lower; furthermore, as the wells are  
20 produced, pressures in the commingled zones will approach a  
21 common value and therefore the magnitude of any cross flow  
22 will continue to decline with time.

23           Q           In your opinion, Mr. Sohaney, will the  
24 granting of these applications be in the interests of con-  
25 servation, the prevention of waste, and the protection of

1 correlative rights?

2 A Yes, it is.

3 Q And were Exhibits Twelve through  
4 Twenty-one prepared by you or under your direction?

5 A Yes, they were.

6 MR. BRUCE: Mr. Examiner, I  
7 move the admission of Exhibits Twelve through Twenty-one.

8 MR. CATANACH: Exhibits Twelve  
9 through Twenty-one will be admitted into evidence.

10

11 CROSS EXAMINATION

12 BY MR. CATANACH:

13 Q Mr. Sohaney, artificial lift will be  
14 utilized on all four of these wells?

15 A That is correct.

16 Q How did you arrive at your reserve  
17 calculations for these wells?

18 A The -- the first thing I had to arrive  
19 at was a decline, which I took from Exhibit Number  
20 Thirteen, which is a production plot.

21 As I mentioned, the gas was on a 6 per-  
22 cent decline and the oil and condensate was on a 9 percent  
23 decline. This was the best data that I had available.

24 Now turning to Exhibit Number Fifteen,  
25 to calculate the reserves, beginning in column number two I

1 show a beginning rate for each zone, and that is the  
2 starting rate column number (unclear due to tape turning).

3 Q Turning to your Exhibit Number Sixteen  
4 you've got additional costs as if we -- if we require  
5 separately testing of the zones. The -- you've got costs  
6 down there of dualing the well. What -- when would that --  
7 when would that situation arise if you had tested the zone?

8 A Well, dualing would arrive -- would  
9 arise when we would have to satisfy the requirement of  
10 separately producing a prorated gas zone, which in this  
11 case would be the Tubb in the Penrose No. 1 and the Penrose  
12 No. 2 and the Penrose No. 4.

13 There's -- there's also the potential  
14 that the cost of dualing these wells could significantly  
15 exceed the cost that you see here. The \$6600 is very low  
16 and that assumes that we could dual the well in the fashion  
17 by flowing one zone up the annulus and producing the other  
18 oil zones by pump through the tubing. Now if two strings  
19 are necessitated for the dualing, is a little more compli-  
20 cated. That number could easily go up to \$30,000.

21 Q Okay, the costs that you've outlined  
22 there are only assuming that we don't let you commingle the  
23 prorated gas zone after you test it, is that correct?

24 A That is correct, except in the Penrose  
25 No. 3. That -- that case there is a contingency which we

1 -- we really don't feel is probable of dualing the well for  
2 the Blinebry.

3 Q Okay. Does Exxon actually object to  
4 testing each zone separately or to the time period which is  
5 stipulated for testing each zone?

6 A Really to testing each zone separately.  
7 The time is probably appropriate if one were to test each  
8 zone. In fact, it might could even be argued that 60 days  
9 might be more appropriate than 30.

10 Some of these zones after they've been  
11 worked on take several months to recover.

12 Other zones, when they're first perfor-  
13 ated may come on very strong for the first week or two and  
14 then take another six or eight weeks to settle down to  
15 stable producing rates.

16 So one could -- could possibly argue  
17 that even 60 days might be more appropriate than 30.

18 What we really object to is the cost and  
19 the effort that it takes to separately produce each zone.

20 And not only that, but we -- we even  
21 question the reliability. For instance, if we have to test  
22 a zone that is deeper than two zones that are currently  
23 open, for instance, in the Penrose No. 1 Well to test the  
24 Drinkard zone, which is deeper than the Blinebry or Tubb,  
25 the first thing we'll have to do is spend the \$35,000 to

1 put a pumping unit on the well before we even know that we  
2 have a well, and then we'll have to pump that well from  
3 below a packer to isolate off the upper zones from the  
4 deeper zone, and the Drinkard is expected to be very gassy,  
5 and all these zones are very gassy, high GOR. As we all  
6 know, it's -- it's very difficult to pump a well below a  
7 packer when it's high GOR and I'm not sure that we really  
8 get a very representative pumping rate.

9 In other words, the accuracy of the test  
10 that we might get, even after pumping, say for 60 days or  
11 120 days, may be no more better than the proposed alloca-  
12 tion formula based on statistical averages.

13 Q What would -- what would be involved in  
14 the typical workover when you -- when you do one of these  
15 wells, generally just go in and perforate the gas and other  
16 (unclear)?

17 A What we plan to do is perforate all  
18 interval and then acidize the perforations in stages, or  
19 perhaps even one by one with a pinpoint packer.

20 So there's -- there's a lot of cost  
21 involved in the perforating and the acidizing.

22 Q Okay, in your allocation formulas you've  
23 used -- your zones are currently producing in each of these  
24 wells. You've used current producing rates?

25 A In some cases I have and in some I have

1 not.

2 Q Okay, in the cases that you have would  
3 your -- would your stimulation of the well result in a pos-  
4 sible increase in production from these zones which might  
5 throw off your whole allocation formula?

6 A Well, that -- that raises a good ques-  
7 tion; not only could stimulation affect the rates out of  
8 one zone, it could affect, of course, the rates out of the  
9 other zones, so the assumption is if it increases it in one  
10 zone, that it will increase if proportionately in the other  
11 zones.

12 You can even make a -- or raise another  
13 question. When you put these wells on lift will the pro-  
14 duction after it's on artificial lift, necessarily be  
15 identical to what it was prior to lift.

16 And in some cases it may be and in other  
17 cases it may not be.

18 MR. STOVALL: Once you do  
19 that, if you had -- if you put it on to a -- don't separ-  
20 ately test, complete the well as you propose and put it on  
21 some sort of artificial lift, you wouldn't really have any  
22 way then of determining whether there's been any signifi-  
23 cant change in production ratios within that -- between the  
24 zones, would you?

25 A Not between the zones, we would not.

1           Q           So you couldn't prove there was a pro-  
2           portional increase in some --

3                   MR. STOVALL:   I think what he means  
4           is relationship, in the same relationship.

5           A           You could not -- you could not prove it  
6           by test, no. You would not have actual proof by test.

7                   I would expect it to be proportional.

8           Q           Why is that?

9           A           Well, I'm not -- well, I guess basic-  
10          ally to answer that question, looking at it on a statisti-  
11          cal basis, there's no reason to believe why one zone should  
12          respond necessarily better to a stimulation than another  
13          zone, at least on a statistical basis.

14                   MR. STOVALL:   Let me ask  
15          another question, bearing in mind, of course, that I'm not  
16          an engineer in this.

17                   If you are producing these  
18          commingled zones by common artificial lift mechanism, you  
19          equalize the pressure in the -- in the casing or tubing, is  
20          that not correct?

21          A           That is correct.

22                   MR. STOVALL:   Would you not  
23          expect a greater drawdown of pressure than from a -- the  
24          higher pressure zones? Would that affect that production?

25                   Do you understand what I'm

1 saying? In terms of -- if you're equalizing the pressure  
2 in the -- in the casing or tubing, are you not getting a  
3 greater flow from the high pressure zones than you would  
4 from the low pressure zones if a differential is created,  
5 or proportion?

6 A That's -- that's basically correct.

7 MR. STOVALL: And would that  
8 -- would that not, then, affect the flow from those zones  
9 relative to the other zones if there -- if the reduction is  
10 greater from the zones to the -- to the tubing or casing,  
11 would not there be a greater flow from those zones?

12 A Well, I think Exhibit Number Nineteen  
13 addresses your question. The lefthand part of that exhi-  
14 bit shows that we've drawn the casing down to 90 pounds in  
15 a pumped off mode and you can see the drawdown, for in-  
16 stance is greater in the Blinbry zone than it is for the  
17 lower pressure Tubb.

18 MR. STOVALL: Well, let me ask  
19 you another question, then, and perhaps -- perhaps you have  
20 answered it.

21 Are your calculations based  
22 upon this analysis? Have you made your allocations based  
23 upon the effects of what you've demonstrated in -- in Exhi-  
24 bit Nineteen?

25 A Yes.



1 MR. STOVALL: I'm through.

2 MR. CATANACH: Okay, are there  
3 any other questions of this witness?

4 If not, he may be excused.

5 Is there anything further in  
6 Case 9398 or 9399?

7 MR. BRUCE: Mr. Examiner, I  
8 would -- I would merely like to state that Exxon believes  
9 that the granting of these two applications is necessary to  
10 enable it to obtain the maximum economically recoverable  
11 reserves from the subject lease and formations.

12 It should be noted that the  
13 incremental reserves per well which can be recovered by  
14 Exxon's proposed workovers are approximately 15,000 barrels  
15 of oil per well and 1/2 BCF of gas per well.

16 There are about 1000 wells in  
17 this area which have similar workover potential and Exxon  
18 itself operates 50 or 60 of these wells and it is looking  
19 at additional workover operations on these.

20 We're just playing this out to  
21 show that the incremental reserves are quite large and we  
22 believe that this aids in the recovery of additional re-  
23 serves and the prevention of waste.

24 MR. CATANACH: So I assume if  
25 we approved these we will be looking forward to approving

1     --

2                     MR. BRUCE: Well, that's not  
3 certain.

4                     MR. CATANACH: These two cases  
5 will be taken under advisement.

6                     MR. STOVALL: Wait a minute,  
7 one question before we -- before we do that.

8                     You've indicated that some how  
9 the notice was incorrect, Mr. Bruce, is that --

10                    MR. BRUCE: Yeah, I don't  
11 think it requires a re-notice because it merely -- the  
12 advertisement stated that the Penrose No. 3 would also be  
13 completed in the Tubb and that is not correct.

14                    MR. STOVALL: I agree it  
15 isn't. Okay.

16                    MR. CATANACH: Then we won't  
17 need to readvertise them.

18                    These two cases will be taken  
19 under advisement.

20

21                    (Hearing concluded.)

22

23

24

25

## C E R T I F I C A T E

I, SALLY W. BOYD, C. S. R. DO HEREBY  
CERTIFY that the foregoing Transcript of Hearing before the  
Oil Conservation Division (Commission) was reported by me;  
that the said transcript is a full, true and correct record  
of the hearing, prepared by me to the best of my ability.

Sally W. Boyd CSR

I do hereby certify that the foregoing is  
a complete record of the proceedings in  
the Examiner hearing of Case No. 9398 <sup>9399</sup>  
heard by me on June 8 1958.

David R. Catanzul, Examiner  
Oil Conservation Division