

NEW MEXICO OIL CONSERVATION COMMISSION

COMMISSION HEARING

SANTA FE, NEW MEXICOHearing Date SEPTEMBER 9, 1992 Time: 9:00 A.M.

NAME	REPRESENTING	LOCATION
DARRELL ROBERTS	SANTA FE ENERGY RESOURCES	MIDLAND, TX
Maurice Trimmer	R.W. Byram	SF
William A. Sam	Samuels, Sam. Trimmer & Sheridan	Santa Fe
PATRICK J. TOWER	ENRON OIL & GAS COMPANY	MIDLAND, TX
Gary L. Thomas	" " " "	"
FRANK C. ESTEP	" " " "	"
GARY HUTCHINSON	YATES PETROLEUM	DENVER
DAVE BONEAU	YATES PETROLEUM	ARTESIA
W. T. Kelbain	Bass Enterprises	Santa Fe
James Bunn	Humble Co. Perm	Santa Fe
Randy G. Patterson	Yates Petroleum	Artesia
MIKE HANAGAN	HANAGAN Pet Corp	Roswell
MIKE BOLING	INDEPENDANT	Roswell
Brett May	Yates Pet.	Artesia
Jim Walcott	Kaiser - Tronico	Tulsa, OK
Wayne Field	—	—
D. Van De Graaft	NM OGA	Santa Fe area
G. W. Warrick	Ind.	Albuquerque
Dan Butler	Cons. Eng	Santa Fe
Mark N. Stephenson	Mitchell Energy Corp	Houston

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NAME	REPRESENTING	LOCATION
John Michael Richardson	Ind.	Sandia Park, NM
T. BO'BRIEN	YATES	MIDLAND, TX
NELSON MUNCY	MYCO	ARTESIA
JERRY COOPER	POGO	MIDLAND
R.H. LANE	NEW MEXICO POTASH	HOBBS
ERNEST SZABO	S.L.O	SANTA FE
TIM WOOMEY	NMPC	HOBBS, NM
W. Trammell		Tucson, AZ.
Emil Z. Guss	Loose Canon	Arden
GARY HOOSE	POGO	MIDLAND
Elizabeth Harris	Phillips Petrol. Co.	Odessa
JIM CARLTON	PHILLIPS PETROL. Co	ODESSA
STEVE CROMWELL	DEVON ENERGY CORP.	OK, OK
Becky Harden	ARCO OIL & GAS Co	Midland
Arthur R. Maxwell	WCNA	Houston
Chig R	WMP	

1 NEW MEXICO OIL CONSERVATION COMMISSION

2 STATE LAND OFFICE BUILDING

3 STATE OF NEW MEXICO

4 CASE NOS. 10446, 10447, 10448, 10449

5 Consolidated

6
7 IN THE MATTER OF:

8 The Application of Yates Petroleum

9 Corporation for Authorization to

10 Drill, Eddy County, New Mexico

11 VOLUME I

12
13 BEFORE:

14 CHAIRMAN WILLIAM LEMAY

15 COMMISSIONER GARY CARLSON

16 COMMISSIONER BILL WEISS

17
18 FLORENE DAVIDSON, Senior Staff Specialist

19
20 State Land Office Building

21 September 9, 1992

22
23 REPORTED BY:

24 CARLA DIANE RODRIGUEZ
25 Certified Shorthand Reporter
for the State of New Mexico

ORIGINAL

A P P E A R A N C E S

FOR THE NEW MEXICO OIL CONSERVATION DIVISION:

ROBERT G. STOVALL, ESQ.

General Counsel
State Land Office Building
Post Office Box 2088
Santa Fe, New Mexico 87504-2088

FOR YATES PETROLEUM CORPORATION:

LOSEE, CARSON, HAAS & CARROLL, P.A.
300 American Home Building
Post Office Drawer 239
Artesia, New Mexico 88211-0239
BY: ERNEST L. CARROLL, ESQ.

FOR NEW MEXICO POTASH CORPORATION:

KEMP, SMITH, DUNCAN & HAMMOND, P.C.
Post Office Drawer 2800
El Paso, Texas 79999
BY: CHARLES C. HIGH, JR., ESQ.

KEMP, SMITH, DUNCAN & HAMMOND, P.C.
500 Marquette, N.W., Suite 1200
Post Office Box 1276
Albuquerque, New Mexico 87103-1276
BY: CLINTON W. MARRS, ESQ.

FOR POGO PRODUCING COMPANY, SANTA FE ENERGY
OPERATING PARTNERS, L.P., and PHILLIPS PETROLEUM
CORPORATION:

THE HINKLE LAW FIRM
218 Montezuma Street
Post Office Box 2068
Santa Fe, New Mexico 87504-2068
BY: JAMES G. BRUCE, ESQ.

FOR BASS ENTERPRISES PRODUCTION COMPANY:

KELLAHIN & KELLAHIN
Post Office Box 2265
Santa Fe, New Mexico 87504-2265
BY: W. THOMAS KELLAHIN, ESQ.

FOR KAISER-FRANCIS OIL COMPANY:

CAMPBELL, CARR, BERGE & SHERIDAN, P.C.
 110 N. Guadalupe Street
 Post Office Box 2208
 Santa Fe, New Mexico 87504-2208
 BY: WILLIAM F. CARR, ESQ.

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1 CHAIRMAN LEMAY: Good morning. This is
2 the Oil Conservation Commission. My name is Bill
3 LeMay. To my right is Commissioner Gary Carlson,
4 representing the Commissioner of Public Lands,
5 State of New Mexico. On my left is Commissioner
6 Bill Weiss.

7 Today we have four cases which will be
8 consolidated, Case No. 10446.

9 MR. STOVALL: And it appears on the
10 docket as 10466. This is the application of
11 Yates Petroleum Corporation for authorization to
12 drill, Eddy County, New Mexico.

13 CHAIRMAN LEMAY: Case No. 10447.

14 MR. STOVALL: It is styled in the same
15 manner, the application of Yates Petroleum
16 Corporation for authorization to drill.

17 CHAIRMAN LEMAY: Case No. 10448.

18 MR. STOVALL: Mr. Chairman, if you
19 would like to call both of them, I'll just read
20 them the same way.

21 CHAIRMAN LEMAY: And Case 10449.

22 MR. STOVALL: All four cases are styled
23 the application of Yates Petroleum Corporation
24 for an authorization to drill, Eddy County, New
25 Mexico.

1 Mr. Chairman, for the record, I think
2 it appears that based upon the last round of this
3 hearing the Commission entered an order, and the
4 functional purpose of these applications are for
5 an exception to the no drilling prohibition of
6 order R-111-P, but they are indeed for an
7 application to drill.

8 CHAIRMAN LEMAY: I think we're really
9 continuing these cases, are we not, because we
10 had a round of legal arguments? So we'll style
11 them a continuation of the de novo hearing
12 concerning these cases.

13 We'll call for appearances in all
14 cases.

15 MR. CARROLL: Mr. Chairman, my name is
16 Ernest Carroll of the Artesia law firm of Losee,
17 Carson, Haas and Carroll, and we are here today
18 representing the Applicant, Yates Petroleum.

19 CHAIRMAN LEMAY: Thank you, Mr.
20 Carroll. Mr. High?

21 MR. HIGH: For New Mexico Potash
22 Corporation, Mr. LeMay, Charles C. High, Jr., of
23 the Kemp-Smith Law Firm, and Clinton Marrs also
24 appears for New Mexico Potash.

25 CHAIRMAN LEMAY: Thank you. Additional

1 appearances?

2 MR. CARR: May it please the
3 Commission, my name is William F. Carr with the
4 Santa Fe law firm Campbell, Carr, Berge and
5 Sheridan. I would like to enter my appearance on
6 behalf of Kaiser-Francis Oil Company. We do not
7 intend to present a witness.

8 CHAIRMAN LEMAY: Additional appearances
9 in the case?

10 MR. BRUCE: Mr. Chairman, my name is
11 Jim Bruce from the Hinkle Law Firm in Santa Fe.
12 I'm entering an appearance on behalf of Pogo
13 Producing Company, Santa Fe Energy Operating
14 Partners, LP, and in association with Elizabeth
15 Harris, I'm entering an appearance on behalf of
16 Phillips Petroleum. We do not plan to present
17 any witnesses.

18 CHAIRMAN LEMAY: Mr. Kellahin?

19 MR. KELLAHIN: Mr. Chairman, I'm Tom
20 Kellahin of the Santa Fe law firm of Kellahin &
21 Kellahin. In the hearing back in March, we
22 entered our appearance on behalf of Bass
23 Enterprises Production, and we continue with that
24 representation today.

25 CHAIRMAN LEMAY: Will you have any

1 witnesses?

2 MR. KELLAHIN: No, sir.

3 CHAIRMAN LEMAY: Additional
4 appearances? Will those witnesses who will be
5 giving testimony over the next couple of days,
6 please stand to be sworn in?

7 MR. CARROLL: Mr. Chairman, I have
8 eight of my witnesses here. There is a ninth
9 that may or may not testify. He is not present,
10 so that he would have to be sworn in at a later
11 time, and his name is Arthur Maxwell.

12 CHAIRMAN LEMAY: We'll swear him in at
13 that time.

14 MR. CARROLL: I just wanted to bring
15 that to your attention, so we're not trying to
16 hide anything.

17 CHAIRMAN LEMAY: Sure.

18 [The witnesses were duly sworn.]

19 MR. STOVALL: Mr. Chairman, before we
20 start, I'm going to recommend that the
21 Commission, and I'm not sure it was done in the
22 previous rounds of these cases, that the Examiner
23 record be incorporated into the record. There
24 was no actual testimony given at that, but there
25 were legal discussions primarily between myself

1 and the attorneys for the parties, which laid
2 some of the legal bases that have gotten us here,
3 and if there are no objection from the parties, I
4 believe it would be useful to have that in the
5 record before you.

6 MR. CARROLL: I would concur in that
7 recommendation and we would so move.

8 CHAIRMAN LEMAY: Do you concur, Mr.
9 High?

10 MR. HIGH: We have no objection.

11 CHAIRMAN LEMAY: Without objection, the
12 record of the Examiner hearing concerning these
13 cases will be entered into the record of this
14 Commission hearing.

15 I think just to review some of the
16 legal discussions we've had, for those of you
17 that weren't present during our first hearing of
18 this case, the Commission voted to agree to hear
19 exception to the R-111 rule, our R-111 order,
20 which is why two of the applications of course
21 are on the docket for de novo hearing.

22 We also, and correct me Mr. High, Mr.
23 Carroll, if I'm not stating these correctly, we
24 agreed to confine the cases to arguments
25 concerning exceptions and concerning the actual

1 applications and not a colateral attack or not a
2 broad discussion of changing the R-111-P order.

3 MR. HIGH: That was my understanding.

4 MR. CARROLL: I think that was made
5 clear to us.

6 CHAIRMAN LEMAY: So, in that light,
7 have you gentlemen agreed how you're going to
8 handle presenting opening arguments and then
9 going on with your cases?

10 MR. CARROLL: I think the Commission
11 has heard enough opening argument in all the
12 legal arguments that preceded, and I would
13 propose just--I think you're well-educated in
14 what the case is, and I would propose starting
15 with the witnesses and trying to get our job
16 done.

17 CHAIRMAN LEMAY: Is that agreeable with
18 you, Mr. High?

19 MR. HIGH: I'll be more than glad to
20 give an opening statement if the Commission wants
21 to hear it again, but I would agree with Mr.
22 Carroll, given the length of time we were up here
23 last time, you may be tired of hearing about it
24 already.

25 CHAIRMAN LEMAY: I think we have a

1 pretty good idea where you're coming from,
2 gentlemen, so let's begin.

3 MR. HIGH: I would say let's go to it.

4 MR. CARROLL: Thank you, Mr. LeMay.
5 Yates Petroleum would call as its first witness,
6 Randy Patterson.

7 Do you have your exhibits, Mr.
8 Patterson? Each of my witnesses has been
9 responsible for his exhibits, and as each witness
10 testifies, I'll hand them out.

11 **RANDY G. PATTERSON**

12 Having been first duly sworn upon his oath, was
13 examined and testified as follows:

14 **EXAMINATION**

15 **BY MR. CARROLL:**

16 Q. Would you please state your name for
17 the record and occupation?

18 A. My name is Randy G. Patterson. I live
19 in Artesia, New Mexico, and I'm land manager for
20 Yates Petroleum Corporation in Artesia.

21 Q. Mr. Patterson, you have previously
22 testified before the Oil Conservation Division
23 and the Commission, have you not?

24 A. Yes, sir, that's correct.

25 Q. And you have had your credentials

1 accepted as a professional petroleum landman,
2 have you not?

3 A. Yes, sir.

4 MR. CARROLL: Mr. LeMay, I think
5 everyone is quite familiar with Mr. Patterson,
6 and I would offer him as an expert in the area of
7 petroleum land management.

8 CHAIRMAN LEMAY: His qualifications are
9 acceptable.

10 Q. Mr. Patterson, are you familiar with
11 the four pending applications that are the
12 subject of these four de novo hearings?

13 A. Yes, sir. Yates Petroleum Corporation
14 is seeking an authorization to drill four wells
15 in Section 2 of Township 22 South, Range 31 East
16 of Eddy County, New Mexico. Those four wells are
17 the Graham AKB State No. 3, the Graham AKB State
18 No. 4, the Flora AKF State No. 1 and the Flora
19 AKF State No. 2, and I'll probably just refer to
20 those as Flora No. 1 and Graham No. 3 from now
21 on, if that's okay.

22 Q. All right. Mr. Patterson, you have
23 prepared, so we can familiarize ourselves with
24 the location of these four wells, you've prepared
25 an exhibit which is a location plat, have you

1 not?

2 A. Yes, sir.

3 Q. That is Exhibit No. 1?

4 A. Exhibit No. 1.

5 Q. Okay. If you would describe the
6 information that's contained on Exhibit No. 1 for
7 the Commission.

8 A. Exhibit No. 1 is a location plat
9 showing Section 2 in the center of Township 22
10 South, Range 31 East, Eddy County, along with the
11 sections that border Section 2 all the way
12 around, the total of a nine-section area.

13 In the northeast quarter of Section 2,
14 you can see the arrow pointing to the Graham No.
15 3 and the Graham No. 4, the Graham No. 3 being in
16 the northwest/northeast of Section 2, the No. 4
17 in the southwest of the northeast, and then in
18 the southwest quarter the Flora No. 1 in the
19 southeast of the southwest, and the Flora No. 2
20 in the northeast of the southwest.

21 Also on this plat is some lease
22 information. The Graham lease is V-2705, a State
23 of New Mexico lease. That was due to expire
24 10/1/93. This lease is now held by production of
25 the Graham No. 1 and No. 2 wells there in the

1 northeast quarter.

2 The Flora lease is the southwest
3 quarter of Section 2. That's State Lease No.
4 V-2597, and that lease will expire on August 1,
5 1993, as shown on the plat.

6 Q. Additional information, this is a
7 nine-section plat, is it not?

8 A. Yes, sir.

9 Q. You also show the actual ownership of
10 the minerals in each one of those sections, and
11 that is the notation at basically the center of
12 the bottom of each one of these sections? And in
13 particular, for example on the bottom of Section
14 2, it shows this section belongs to the State of
15 New Mexico, or the minerals do?

16 A. That is correct.

17 Q. Now, the southeast quarter of Section 2
18 does not belong to Yates Petroleum, is that
19 correct?

20 A. No, sir. The southeast quarter is
21 another state lease, LH-1523, and that's owned by
22 Pogo Producing Company.

23 Q. And there are two producing wells
24 located on that acreage at the present time?

25 A. That is correct.

1 Q. Now, Yates Petroleum has, in fact,
2 filed four applications to drill, have they not,
3 on these four wells?

4 A. Yes, sir. Back in November of 1991,
5 Yates Petroleum first began the process to apply
6 for drilling of these four wells.

7 On November 21, 1991, we first notified
8 New Mexico Potash Company, pursuant to the rules,
9 of our proposal to drill the Flora No. 1 and the
10 Graham No. 3 and No. 4 wells. The Flora No. 2
11 well notification took place at a later date.

12 Then, on November 24th, the Flora 1,
13 the Graham 3 and 4 were staked, and on the 25th
14 of November the APD was submitted to the Artesia
15 office of the NMOCD.

16 On the 4th of December, we got a call
17 or our permit agent that works for me got a call
18 from Mr. Bob Lane of New Mexico Potash saying
19 that they were not going to sign a letter, a
20 waiver letter that we sent, notifying them of the
21 location.

22 Q. Mr. Patterson, let me interrupt you
23 just a minute. The process that you're
24 describing in sending out this letter and
25 notification, that is done in compliance with

1 Rule R-111-P, is it not?

2 A. Yes, sir, that's correct. According to
3 that rule, you're supposed to give notice and at
4 that time we asked for a waiver from the potash
5 company of their objection to our drilling under
6 those rules.

7 Q. If you would continue on with the
8 chronology of the events.

9 A. Okay. On December 4th Mr. Lane called
10 and said that they were not going to sign our
11 letter either objecting or voicing no objection,
12 because they were drilling core holes and they
13 would have the results in approximately two
14 weeks. He also advised us at that time that
15 unless the results were poor in Section 2, they
16 probably would not approve these locations.

17 On January 16th, our permit agent wrote
18 a letter to Mr. Lane requesting the status of our
19 waiver letter since we had not heard anything
20 from them in writing, so we were trying to follow
21 up and get our locations approved so we could go
22 ahead and drill.

23 On the same day, we notified New Mexico
24 Potash of our proposal to drill the Flora 2
25 location, which, as I mentioned before, came a

1 little bit later.

2 On the 17th of January we staked the
3 Flora 2 in the same procedure we used in the
4 other three wells, and on the 21st of January we
5 submitted the Flora 2 APD to the Artesia OCD
6 office.

7 On that same day, a letter was written,
8 received the next day, January 22, by Yates
9 Petroleum, by New Mexico Potash Company, which
10 objected to the Flora No. 1 and the No. 2 wells.
11 This letter, as I said, was received January 22
12 and it did state their objection to those
13 locations.

14 On January 23, a similar letter from
15 New Mexico Potash was written objecting to the
16 Graham 3 and 4 wells, and that letter we received
17 on January 27, 1992.

18 Subsequent to that, we requested the
19 hearing before the NMOCOD to try to get these
20 locations approved. That hearing was then
21 continued into March.

22 On March 25, 1992, we received the
23 order from the OCD, and then on the 26th of March
24 the Artesia OCD office approved the No. 1 and No.
25 2 Flora wells according to the order.

1 Q. Now, Mr. Patterson, you have prepared
2 as Exhibits No. 2 and 3, copies of the actual
3 APDs for each of the four wells and copies of
4 each of the well location and acreage dedication
5 plats, is that correct?

6 A. Yes, sir, that's right.

7 Q. And Exhibit No. 2 is the packet of APDs
8 for all four wells, is that correct?

9 A. That's right.

10 Q. And Exhibit 3 is the package of well
11 location plats?

12 A. Yes, sir.

13 Q. Now, Mr. Patterson, you've also
14 prepared to aid the Commissioners an Exhibit No.
15 4, is that correct?

16 A. Yes, that's correct.

17 Q. Would you explain what information is
18 contained in Exhibit No. 4?

19 A. Exhibit No. 4 is the same nine-section
20 area which was shown in Exhibit No. 1, but this
21 plat contains the potash leases and the ownership
22 of the potash within this nine-section area.

23 Again, Section 2 of 22 South, 31 East,
24 is in the center with all the bordering sections
25 next to it. Section 2 shows the ownership of the

1 potash to be New Mexico Potash Corporation. New
2 Mexico Potash Corporation owns the three sections
3 to the north; however, at the time that the
4 original hearing was held and when this plat was
5 created, the sections to the west, directly to
6 the east and to the south, were all unleased for
7 potash.

8 Q. That fact has changed or is in the
9 process of changing, is that correct, Mr.
10 Patterson?

11 A. Yes, sir, that's correct. In August
12 the federal government held a sale of potash
13 leases in Carlsbad, and Yates Petroleum and Pogo
14 were the successful bidders on the lease that
15 encompasses the south half of Section 3 to the
16 west there, and all of Section 10 and all of
17 Section 11. So you can see the pencilled writing
18 underneath the unleased area, showing that those
19 leases were purchased by Yates Petroleum and
20 Pogo. However, those leases are not yet issued
21 by the federal government.

22 Q. Did you personally attend the lease
23 sale that was held last month by the federal
24 government?

25 A. Yes, sir, I did.

1 Q. These three sections you just mentioned
2 were actually part of a larger parcel that Yates
3 and Pogo bought?

4 A. Yes, sir, that's correct.

5 Q. How many acres was involved in that
6 total parcel?

7 A. That parcel was 5,280 acres.

8 Q. Did New Mexico Potash Corporation, to
9 your knowledge, show up for that lease sale, Mr.
10 Patterson?

11 A. To my knowledge, there was not a
12 representative of New Mexico Potash at the sale.

13 Q. Mr. Patterson, you've also prepared
14 some additional exhibits to help the
15 Commissioners in understanding and reviewing this
16 case, have you not?

17 A. Yes, sir.

18 Q. I believe the next exhibit number is 5,
19 is that correct?

20 A. Yes.

21 Q. Would you explain to the Commission
22 what Exhibit No. 5 is and the pertinent
23 information contained therein?

24 A. Okay. Exhibit No. 5 is a potash mining
25 lease. In the upper left-hand corner, it shows

1 to be Lease No. M-14957. It was issued February
2 4, 1967 to Kermac Potash Company of Oklahoma
3 City, Oklahoma.

4 Down a little bit farther in the middle
5 of the page it shows the description of the lands
6 discovered by the potash lease, a total of 4,489
7 acres, and the third one on the list shows all
8 the Section 2, Township 22 South, Range 31 East,
9 which is the subject of this hearing.

10 If you'll turn about four more pages,
11 you'll see an Assignment of Mineral Lease, which
12 is an assignment dated 19 June 1968, and it
13 assigns this potash lease from Kermac Potash
14 Company to Kerr-McGee Corporation, also of
15 Oklahoma City, Oklahoma. And again, the third
16 description on the list was all of Section 2,
17 which we're talking about here.

18 Q. That assignment occurred in 1968, is
19 that correct?

20 A. Yes, sir, the 19th of June 1968 at the
21 bottom, just before the signatures.

22 Q. All right.

23 A. And then, if you'll turn one more page,
24 there's a New Mexico State Land Office Assignment
25 of Mineral Lease, and this is from Kerr-McGee

1 Corporation to New Mexico Potash Corporation of
2 Hobbs, New Mexico. This assignment, just before
3 the signature, is dated the 5th of April, 1985.

4 And if you'll turn the next two pages,
5 the fifth call on the description list shows
6 Section 2 of Township 22 South, Range 31 East.
7 So that is also the assignment on this particular
8 acreage.

9 Q. It's common knowledge that
10 approximately 1935 is the date that New Mexico
11 Potash actually acquired the particular mine in
12 question from Kerr-McGee, is that correct?

13 A. According to this assignment, that's
14 correct.

15 Q. Now, with respect to the original
16 potash mining lease, and again this is a lease
17 between the State of New Mexico and originally
18 Kermac Potash Company, are there certain
19 provisions in this lease that you would like to
20 bring to the attention of the Commission?

21 A. Yes, sir. Back on the first page of
22 the exhibit, at the bottom of the page, it
23 starts--"Section 2," and it says, "In
24 consideration of the premises, the lessee hereby
25 agrees as follows."

1 And then, if you'll turn the page on
2 over to small (d), about the fourth paragraph
3 down, it says, "...to pay the lessor a royalty of
4 five percent." So this is a five percent royalty
5 lease on the potash.

6 Then, continuing on down to paragraph
7 (h), it says, "If said minerals or any of them in
8 commercially paying quantities shall be
9 discovered on the lands embraced herein, to .
10 develop and produce"--going back to the first
11 sentence--"We agree to develop and produce in
12 commercial quantities with reasonable diligence
13 the potassium and other mineral deposits
14 susceptible of such production."

15 Q. Now, Mr. Patterson, have you and your
16 company performed at least an investigation as to
17 the activity that has been had out on Section 2
18 by the potash company?

19 A. Yes, sir. To the best of my knowledge,
20 the only activity on that particular section was
21 the core that was drilled in January during our
22 permitting process.

23 Q. Drilled around the end of last year,
24 beginning of this year?

25 A. Yes, sir, that's right.

1 Q. And this lease is approximately 25
2 years in age?

3 A. That's correct, 1967.

4 MR. HIGH: Excuse me. This is not a
5 lease file agent case, and I'm not sure what this
6 has any relevance to.

7 CHAIRMAN LEMAY: We'll see where he's
8 going. Just setting some background for us, I
9 assume?

10 MR. CARROLL: That's correct, Mr.
11 LeMay. In fact, we're now ready to move on. I
12 think we've gleaned what we needed to learn.

13 Q. Now, let's turn to your Exhibit No. 6,
14 Mr. Patterson. What is that?

15 A. Exhibit No. 6 is a copy of the State of
16 New Mexico oil and gas lease. At the top
17 left-hand corner of the lease it shows Lease No.
18 V-2705. This is the Graham lease, what we call
19 the Graham lease. It's dated October 1, 1988, to
20 Yates Petroleum Corporation, and then down at the
21 bottom it shows the description which describes
22 Lots 1, 2, 3 and 4 in the south half of the north
23 half, which altogether comprise the north half of
24 Section 2, Township 22 South, Range 31 East,
25 319.48 acres.

1 Q. All right.

2 A. This lease, if you'll turn the page to
3 the second page, provides for a primary term of
4 five years, and that's the second grammatical
5 paragraph there of the page, and then the number
6 "1" right there below that, it provides for a
7 1/6 part of the oil and gas produced, or a 1/6
8 royalty, 16-2/3 percent.

9 This lease, as I mentioned before, is
10 presently held by production from the Graham No.
11 1 and 2 wells in the east half, northeast of that
12 section.

13 Q. All right, now you've discussed both of
14 these leases at this time?

15 A. Would you like me to discuss Exhibit
16 7?

17 Q. Exhibit 6 is comprised of both of the
18 leases?

19 A. No, that's just the one. Exhibit 7 is
20 V-2597.

21 Q. Excuse me. My numbers were mixed up.
22 Exhibit 6 is V-2705, and Exhibit 7 is V-2597?

23 A. Yes, sir.

24 Q. All right. Would you describe Exhibit
25 7, then?

1 A. Okay. Exhibit 7 is State of New Mexico
2 lease V-2597, which is the Flora lease. It's
3 dated August 1, 1988, and it comprises 160 acres
4 being the southwest quarter of Section 2,
5 Township 22 South, Range 31 East, which was shown
6 at the bottom of the first page.

7 And then at the top of the second page
8 it also provides for a five-year term and a 1/6
9 royalty or 16-2/3 percent. The five-year term,
10 since this lease has no wells on it, this lease
11 is due to expire August 1, 1993.

12 Q. If no drilling or production is gained
13 from this section, does Yates Petroleum stand to
14 lose this particular lease, Mr. Patterson?

15 A. Yes, sir, that's correct. To my
16 knowledge, there is no provision for suspension
17 or extension of a State of New Mexico oil and gas
18 lease except by drilling.

19 Q. The next exhibit, Exhibit No. 8, again
20 this is a matter of housekeeping, would you
21 explain what this exhibit is?

22 A. This Exhibit No. 8 is a certificate of
23 mailing which is notice to the appropriate
24 agencies and to offset potash operators within a
25 mile of our application for the hearing which

1 we're talking about today. The case number is
2 listed in the upper right-hand corner.

3 With this certificate of mailing, there
4 were copies of the applications enclosed and
5 notice of the hearing, and it's signed by Ernest
6 Carroll, our attorney.

7 On page 2, called Exhibit A, is a list
8 of the people that this was sent to. Mr. Armando
9 Lopez of the Bureau of Land Management in
10 Roswell, Mr. Ernie Szabo of the New Mexico State
11 Land Office here in Santa Fe, and Mr. Bob Lane of
12 New Mexico Potash Corporation in Hobbs.

13 The next page, Exhibit B, is the first
14 of the letters. This is the one to New Mexico
15 State Land Office. It transmits copies of the
16 applications sent for filing. It also states
17 that Mr. Carroll will furnish each individual
18 with a date for the hearing, and requests that
19 they notify us if they plan to protest. Also at
20 the bottom of the page is a copy of the return
21 receipt which was received back by us, and this
22 one was stamped January 22, 1992.

23 The next page is the same letter to Mr.
24 Bob Lane at New Mexico Potash Company. It was
25 delivered January 22, 1992, at the bottom of the

1 page.

2 And the next page is the same letter to
3 Mr. Armando Lopez in Roswell, and it was stamped
4 "received" but the date is sort of blocked out
5 and you can't really tell what it says.

6 Q. All right.

7 A. The next three letters are letters to
8 the same people advising these people that the
9 hearing date was changed from February 20 to
10 March 19, 1992, with the corresponding return
11 receipts shown at the bottom of the letter.

12 Q. The purpose of this exhibit is to show
13 compliance with the basic rules for starting the
14 hearing process with the New Mexico Oil and Gas
15 Division?

16 A. Yes, sir, that's right.

17 Q. Now, Mr. Patterson, turning more to the
18 subject at hand before the Commission, it is true
19 that the United States is experiencing a
20 shortfall in oil and gas production, is it not?

21 A. Yes, sir. I believe that the United
22 States is up over 50 percent imports at this
23 time.

24 Q. And the State of New Mexico, through
25 the Oil Conservation Division, has at least

1 espoused certain, for lack of a better word,
2 policy decisions or policy stands, is that
3 correct?

4 A. Yes, sir, that's correct.

5 MR. HIGH: I don't want to interrupt a
6 lot, but Mr. Carroll is leading the witness I
7 think a little bit too much, and I object to the
8 leading.

9 CHAIRMAN LEMAY: I think if you ask the
10 questions, Mr. Patterson is well equipped to
11 answer your questions.

12 Q. Mr. Patterson, with respect to the
13 subject we're discussing, you've prepared an
14 exhibit. Would you please explain the purpose of
15 the next exhibit, which would be Exhibit 9?

16 A. Yes, sir. Exhibit 9 is a copy of a
17 letter that was sent to New Mexico Oil Producers
18 by the director of the Oil Conservation Division,
19 Mr. LeMay, during the period of time in 1990 that
20 the United States was experiencing a crisis in
21 the Middle East. The subject of this memo is
22 "Regulatory Initiatives to Increase New Mexico's
23 Oil Production," and you can see it's dated
24 September 6, 1990.

25 The memo goes on to state, "In response

1 to the crisis in the Middle East," and then
2 moving on, "the New Mexico Oil Conservation
3 Commission has placed on the September 24, 1990
4 docket, a hearing to receive comments and
5 suggestions from the oil industry on steps which
6 the Division or the Commission might take to
7 increase New Mexico's oil production immediately,
8 in the short term, three to six months, and in
9 longer time frames."

10 We were very interested in this memo
11 when we received it because we thought that was a
12 good step for New Mexico state government to take
13 to increase oil production in the state,
14 particularly during this crisis time. I
15 personally attended and presented testimony at
16 that hearing, and it was obvious to me that Mr.
17 LeMay and the OCD was very interested in doing
18 things to increase the oil production in the
19 State of New Mexico.

20 Q. The particular area with which we are
21 dealing, I think it has--there's a field name or
22 an area name for this section, too, is there not?

23 A. Yes, sir. We call this the Livingston
24 Ridge area.

25 Q. With respect to oil and gas activity in

1 New Mexico, is this a major or a minor player?

2 A. The Livingston Ridge area appears to be
3 probably one of the best new fields in the State
4 of New Mexico, possibly one of the best new
5 fields in the United States of America. This
6 field has really come on strong. There's been a
7 lot of drilling, and it appears to not be
8 finished yet.

9 Q. Do you have an opinion as to whether or
10 not development of this field is in compliance
11 with, I guess, the mandate of the letter from Mr.
12 LeMay that you just got through discussing?

13 A. Yes, sir, we do. The Delaware is a
14 good producer and the Livingston Ridge, as I
15 said, there have been several wells drilled in
16 this area and it has definitely increased the
17 production to the State of New Mexico.

18 Q. Now, Mr. Patterson, is it not true that
19 the Oil Conservation Division and the Commission,
20 since their obligations and duties are really
21 synonymous, that when they are promoting or
22 trying to increase oil and gas, they do have
23 other considerations or competing considerations
24 that they must also be cognizant of, isn't that
25 true?

1 A. Yes, sir, that's right. Even though
2 they have a philosophy of increasing the oil
3 production, they--

4 MR. HIGH: Excuse me, Mr. LeMay. I'm
5 going to object to Mr. Patterson testifying on
6 behalf of the Oil Conservation Division.

7 CHAIRMAN LEMAY: I think he's just
8 reiterating what his view was at the hearing. I
9 don't think he's putting words in our mouth. If
10 he does, I'll certainly stop him, Mr. High.

11 Q. If you would continue, Mr. Patterson.

12 A. Even though the New Mexico State Oil
13 Conservation Commission appears to have a
14 philosophy of increasing oil production in the
15 state, they have to work within certain
16 constraints of the law, and some of the main
17 constraints that the OCD emphasizes is the
18 prevention of waste of oil and gas, the
19 protection of correlative rights of other people
20 and owners and operators, and in the potash area
21 there is a statute that talks about the
22 prevention of undue waste of commercial potash.

23 Q. What is your understanding with respect
24 to the dictates of that statute? What are the
25 charges?

1 A. Well, the New Mexico statute 70-3-2-F
2 really has a two-prong definition of what the
3 waste of potash seems to be.

4 MR. HIGH: Again, Mr. LeMay, this
5 witness has no--no foundation has been laid that
6 this witness has any legal background to testify
7 as to what a law provides or doesn't provide.

8 CHAIRMAN LEMAY: I think if he gets
9 into controversy in that area, your
10 cross-examination can certainly clarify it. I
11 think he's setting a background for what their
12 actions in relationship to the Oil Conservation
13 Division rules, what the relationship is there,
14 and I think it's perfectly appropriate.

15 MR. CARROLL: Thank you, Mr. LeMay.
16 And again I would reiterate that part of my
17 question was directed, I'm asking for Mr.
18 Patterson's understanding so that we can judge
19 Yates Petroleum's reaction, because this is
20 who--that's their application, and I think that's
21 the controversy that's before the Commission.

22 Q. If you would again, Mr. Patterson,
23 please continue on in your answer.

24 A. We believe that this statute has a
25 two-pronged approach to the definition of the

1 waste of potash. The first part of it states
2 that drilling or producing operations for oil and
3 gas within any area containing commercial
4 deposits of potash, where such operations would
5 have the effect unduly to reduce the total
6 quantity of such commercial deposits of potash,
7 which may reasonably be discovered in commercial
8 quantities, that would constitute waste.

9 And then, the second prong of that,
10 waste would be constituted where such oil and gas
11 operations would interfere unduly with the
12 orderly commercial development of such potash
13 deposits.

14 In my understanding and our company
15 discussions of this, this doesn't mean that the
16 OCD is to prevent all waste. It talks about
17 undue waste and waste of potash economical to
18 produce. And also, the second prong of it talks
19 about unduly interfering with orderly
20 development. In our consideration of drilling
21 these wells and during the time that we were
22 permitting these wells, we did not believe that
23 our operations would interfere. Part of that
24 belief was because of statements made by some
25 representatives of New Mexico Potash and IMC

1 Potash at certain meetings that we had.

2 One of these statements was that
3 Section 2 was not part of an LMR of New Mexico
4 Potash. Another statement was made that no plans
5 for Section 2 were made for at least a 10-year
6 period, and another statement was made that the
7 LMR was very questionable in Section 2.

8 Q. Now, Mr. Patterson, when you make
9 reference to a meeting with New Mexico Potash
10 earlier in the year, this was part of this
11 ongoing process, was it not, when you initiated
12 the, I guess, informational process or
13 notification process calling to the potash
14 company's attention that you had an intention or
15 desire to drill out there, is that correct?

16 A. Yes, sir, that's correct.

17 Q. This was not some isolated event? It
18 was part of that chronology of events that you
19 described earlier in your testimony?

20 A. This was after our notification had
21 been made.

22 Q. And the drilling in Section 2, was that
23 the main topic of conversation with respect to
24 this meeting that you just referred to?

25 A. I believe in at least one meeting, that

1 was the main topic, and in other meetings there
2 were other areas considered, but in one or two
3 meetings, that was the main topic, Section 2.

4 Q. Do you recall the date of that
5 particular meeting?

6 A. I believe that meeting was January 10,
7 1992.

8 Q. Now, Mr. Patterson, you've also
9 prepared some numbers or economics for the
10 Commissioners' benefit, have you not, with
11 respect to a comparison between the potash and
12 oil company's exploration?

13 A. Yes, sir, I have.

14 Q. Would you explain your analysis?

15 A. Well, we believe that there can also be
16 waste. We were talking about waste and that
17 there can be waste of economics or economic waste
18 if wells are not drilled in Section 2.

19 In the first place, the oil will be
20 wasted because the oil won't be produced and it
21 will be left in the ground, and there will be
22 considerable economic waste to the State of New
23 Mexico. We'll have testimony later on in this
24 hearing that will confirm that an average well in
25 this Livingston Ridge area around this produces

1 about 125,000 barrels over its lifetime, and if
2 you use a \$20-per-barrel price of oil, the
3 royalty lost to the State of New Mexico is about
4 \$417,000 per well. Or, if you consider all four
5 of these wells that we're talking about today,
6 that's \$1,668,000 that would be lost in royalty
7 lost to the State of New Mexico.

8 Also, along with that are the taxes
9 involved. Each well will produce \$230,000 worth
10 of taxes, or all four wells would be \$920,000.
11 And then the economic waste to the operator,
12 which would be his profit net of drilling,
13 completing, equipping, producing costs, is
14 approximately a million dollars a well. That's
15 another four million dollars.

16 So the total economic waste that could
17 be created by not drilling these four wells would
18 be \$6,588,000. That's only for these four wells
19 in question. You could drill, actually, another
20 eight wells in Section 2, if these were
21 successful.

22 Q. Now, Mr. Patterson, with respect to
23 this area, Section 2, Yates is more involved in
24 the general area just outside of or including
25 this Section 2, isn't that correct?

1 A. Yes, sir. Yates has a large commitment
2 in this Livingston Ridge area.

3 Q. And Exhibit 10 was prepared to help
4 illustrate that commitment, isn't that correct?

5 A. Yes, sir, that's correct.

6 Q. Would you explain what you find on
7 Exhibit 10?

8 A. Exhibit 10 is a map of a
9 several-township area, with blue cross-hatch
10 markings showing Yates' oil and gas leasehold
11 position, federal, state and fee leases cross-
12 hatched in different manners. There's a legend
13 at the bottom of the page showing the different
14 types of leases and how they're marked.

15 Yates has, on this map alone, 15,520
16 acres, approximately, in this area. We've
17 invested considerable dollars in that acreage.
18 We've also, right in that immediate area of
19 Section 2 and just to the north, drilled
20 approximately 37 wells and are continuing to
21 drill wells in the area.

22 We have over 100 APDs in different
23 stages of working at this time, being prepared
24 wells that we would like to drill in this area.

25 As of May 31, 1992, which was the

1 accounting numbers I could get, we have made
2 capital expenditures, including drilling and
3 equipping of wells, of \$8,422,000. We've built a
4 gas gathering system, pipelines and right-of-ways
5 totaling \$1,330,000, and we've installed a salt
6 water disposal system, pipelines and
7 right-of-ways at about \$950,000. We've made a
8 total capital commitment in the area of
9 \$10,700,000-plus.

10 And this does not include the purchase
11 price of the leases or the geological research
12 that is done and continues to be done and that
13 was expended before the drilling began in that
14 area.

15 So, I believe that Yates Petroleum is
16 very committed to this area, and we're ready to
17 continue drilling and ready to begin with these
18 locations if we can get them permitted.

19 Q. I think all the Commissioners are
20 familiar with Yates Petroleum Corporation's
21 involvement in the state of New Mexico, but with
22 respect to Yates Petroleum, this particular
23 project, is this a major or minor project for
24 Yates Petroleum in terms of dollar investment and
25 manpower investment?

1 A. This project is one of the two top
2 projects, highest priority projects in Yates
3 Petroleum. This was reiterated to me last week
4 by one of the principals of Yates Petroleum.

5 Q. The particular applications to drill,
6 two of them have been granted for the Flora
7 wells. The time period those permits are valid
8 for, could you tell us?

9 A. An APD is issued by the OCD for the
10 period of 180 days, at which time you have to
11 drill or your APD expires.

12 Q. Mr. Patterson, is there any matter
13 which you wish to bring to the Commissioners
14 which I have neglected to ask you about or
15 foreclosed you from talking about?

16 A. I don't think so.

17 Q. Well, then, Mr. Patterson, based upon
18 your area of expertise, do you feel that the
19 granting of these four applications to drill,
20 that they would be in the interests or promotion
21 of conservation, the prevention of waste, and the
22 protection of correlative rights?

23 A. Yes, sir, I believe they would.

24 MR. CARROLL: Mr. LeMay, with that I
25 would pass the witness.

1 CHAIRMAN LEMAY: Thank you Mr.
2 Carroll. Mr. High? I assume you want to
3 cross-examine?

4 MR. HIGH: Yes, sir, that's correct.

5 EXAMINATION

6 BY MR. HIGH:

7 Q. Mr. Patterson, you went real fast for
8 my note taking. I take it you have notes in
9 front of you?

10 A. I have the exhibits that you have and
11 some notes in front of me.

12 Q. Those notes are on that legal pad you
13 have?

14 A. Yes, sir.

15 Q. And that's where you got all these
16 dates and things that you were telling us about
17 this morning?

18 A. Yes, sir. Some of them are on the
19 exhibits.

20 Q. You prepared that yellow legal pad
21 before you came in here today?

22 A. Yes, sir. I made some notes

23 Q. How many pages are in that legal pad
24 that have notes on that you were reading from
25 this morning?

1 A. I don't know. I didn't count them.

2 Q. More than 10?

3 A. I don't think so.

4 Q. Did anyone else make those notes other
5 than you?

6 A. No, sir.

7 Q. They're all your notes?

8 A. Yes, sir.

9 Q. You're a land manager?

10 A. Yes, sir.

11 Q. Is that your only function at Yates
12 Petroleum?

13 A. I also participate in some management
14 functions.

15 Q. And what would that be?

16 A. I'm the secretary of the corporation.

17 Q. Which corporation?

18 A. Yates Petroleum Corporation.

19 Q. How much time do you spend out in the
20 field as opposed to in the office?

21 A. "Out in the field" meaning what?

22 Q. Away from the office.

23 A. Away from the office? Maybe one day a
24 week.

25 Q. Your primary duties are in the office?

1 A. Yes, sir.

2 Q. Do you have any other functions, other
3 than what you just told us about, being
4 secretary/treasurer?

5 A. Yes, sir, I manage the land department,
6 negotiate trades.

7 Q. How long have you been with Yates?

8 A. 16 years.

9 Q. And your background and training is in
10 what?

11 A. My degree is in chemistry and physics.

12 Q. Any advanced degrees?

13 A. No, sir. I have numerous seminars and
14 classes and college courses in land management,
15 and I'm a certified professional landman through
16 the American Association of Petroleum Landmen.

17 Q. All right. Let's look at some of these
18 exhibits, Mr. Patterson. Let's start with
19 Exhibit No. 2. This exhibit, as I understand it,
20 is the APD for each of the wells involved here?

21 A. Yes, sir. This is the front page of
22 the APD that has the information on the location,
23 the well name, et cetera.

24 Q. Do you know when these APDs were
25 actually filed with the state?

1 A. Yes, sir, these APDs were filed on the
2 date at the bottom, 11/25/91, 11/25, 11/25. The
3 last one was January 21, 1992.

4 Q. You're convinced that that was the date
5 that they were actually filed with the State of
6 New Mexico?

7 A. To my knowledge, that's correct.

8 Q. Let me ask you to look over at your
9 Exhibit No. 8. Do you have that in front of you?

10 A. Yes, sir.

11 Q. Look at the third page down into that
12 document. That document has at the top of it
13 "Exhibit B." Do you see that?

14 A. Yes, sir.

15 Q. That's the January 21, 1992 letter, I
16 believe you said from Mr. Carroll to Mr. Ernie
17 Szabo at the State Land Office, is that right?

18 A. Yes, sir.

19 Q. This letter, of course, was written on
20 behalf of Yates, correct?

21 A. Correct.

22 Q. The second sentence says, "On January
23 20, 1992, the above-referenced applications were
24 sent for filing by Yates Petroleum Corporation
25 for permits to drill its Graham AKB State No. 3

1 well, its Graham AKB State No. 4 well, and its
2 Flora AKF State No. 1 well, all in Section 2," so
3 forth and so on. Do you see that?

4 A. Yes, sir.

5 Q. Now, were they filed on January 20,
6 1992 or November 25, 1991, if you know?

7 MR. CARROLL: Mr. Commissioner, at this
8 point I would like to interject, since this is my
9 letter. The application which is referenced here
10 is the application before the OCD, the formal one
11 which started Case Nos. 10466, 10467, et cetera.
12 This is not the actual APD, this is my notice to
13 them, because we had already received at this
14 point in time an indication that they were going
15 to oppose, and the Oil Conservation Division
16 simply could not give a waiver. The Division
17 office in Artesia notified us that our permits
18 were not going to be granted.

19 MR. HIGH: I'll object to Mr. Carroll
20 testifying. He offered the exhibit. I have no
21 objection to it, I'm just asking Mr. Patterson
22 about some of the--

23 CHAIRMAN LEMAY: The point of
24 clarification about that might help, if he
25 presented it, Mr. High. You can continue with

1 the witness.

2 Q. Do you know, Mr. Patterson, if the APD
3 for these four wells was filed with the state on
4 January 20, 1992 or the date shown on your
5 Exhibit No. 2?

6 A. My records indicate that the dates on
7 the APD were the dates that they were filed. And
8 this letter refers to the application before the
9 OCD for hearing.

10 Q. Okay. And do you know on what date the
11 APDs, whenever they were filed, were sent to New
12 Mexico Potash?

13 A. I do not know the dates the APDs were
14 sent to New Mexico Potash, I do know that New
15 Mexico Potash did receive notice that they would
16 be filed.

17 Q. You don't know if they ever received a
18 copy of the APD, do you?

19 A. I do not know that.

20 Q. Do you know if they received a copy of
21 the well location documents?

22 A. I don't recall.

23 Q. Do you know if R-111-P requires that
24 they receive notice of any of those kinds of
25 things?

1 A. My understanding is that R-111-P
2 requires notice that a well will be staked and
3 permitted.

4 Q. Okay, well let's don't guess. Let me
5 read it to you and see if this is your
6 recollection of what it does require, Mr.
7 Patterson, and I'm reading from Section G.
8 Section G of R-111-P, in Section 2, "Before
9 commencing drilling operations for oil or gas on
10 any lands within the potash area, the well
11 operator shall prepare a map or plat showing the
12 location of the proposed well, said map or plat
13 to accompany each company of the notice of
14 intention to drill."

15 Now, let me stop right there. Did you
16 do that with respect to these four wells?

17 A. Yes, sir, I believe New Mexico Potash
18 got a copy of the map or plat prior to drilling,
19 because the wells have not been drilled yet.

20 Q. My question is, did you do that with
21 respect to these four wells?

22 A. Yes, sir, we submitted a map or plat to
23 New Mexico Potash.

24 Q. It goes on to say, "In addition to the
25 number of copies required by the Division, the

1 well operator shall send one copy by registered
2 mail to each potash operator holding potash
3 leases within a radius of one mile of the
4 proposed wells, as reflected by the plat
5 submitted under paragraph 1."

6 Now, did you send to New Mexico Potash
7 a notice of intention to drill, with a plat of
8 the proposed wells, by registered mail?

9 A. As I sit here today, I don't know.

10 Q. You don't have any papers with you here
11 that we can look to see whether or not you did
12 that, do you?

13 A. No, I don't.

14 Q. Would you agree with me that the
15 documents shown in Exhibit No. 8, do you think
16 that shows that you sent the plat and notice of
17 intention to drill to New Mexico Potash?

18 A. I believe that that indicates that
19 those were sent.

20 Q. If they were sent with the documents in
21 Exhibit 8, it would have been in January of 1992,
22 right?

23 A. They may have been sent in January 92.

24 Q. Now, you also testified that after the
25 APD was filed, your permit agent got a call from

1 Bob Lane of New Mexico Potash, is that correct?

2 A. That is correct.

3 Q. Did you get a call from Mr. Lane?

4 A. I don't recall talking to Mr. Lane, no.

5 Q. So anything you know about that
6 conversation would be hearsay from what the
7 permit agent told you?

8 A. Yes, sir. The permit agent works
9 directly for me, and I got a memo to that effect.

10 MR. HIGH: Mr. LeMay, may I approach
11 the witness?

12 CHAIRMAN LEMAY: Sure.

13 Q. Look if you will, Mr. Patterson, in the
14 book I've placed in front of you, to Exhibit 29.

15 MR. HIGH: And, Mr. LeMay, I've placed
16 in front of each Commissioner a book of
17 exhibits. In two books, those of Mr. Weiss and
18 Mr. Carlson, there are two maps missing, but you
19 have maps in yours. We just ran out of maps and
20 perhaps we can share some of those, but all of
21 our exhibits are in that book.

22 Q. You have Exhibit No. 29 in front of
23 you, Mr. Patterson?

24 A. Yes, sir, I do.

25 Q. Is that the memorandum that you just

1 referred to that your permit agent wrote you?

2 A. Yes, sir, that's right.

3 Q. That permit agent's name, I guess, is
4 Clifton May?

5 A. That's correct.

6 Q. And you understood on December the 4th
7 of 1991, the date of Exhibit No. 29, that New
8 Mexico Potash was not going to waive objections
9 to these four wells, weren't you?

10 A. No, I did not understand that. That's
11 not what the memo said.

12 Q. Did you understand they would not sign
13 your letters waiving objections?

14 A. They were not going to sign the letter
15 either waiving or accepting at that time.

16 Q. Let's look at Exhibit No. 29. I take
17 it that Kathy Porter works for you?

18 A. That's correct.

19 Q. This is the memo that you, apparently
20 saw?

21 A. Yes, sir.

22 Q. First sentence says, "Mr. Bob Lane of
23 New Mexico Potash called at 9:30 a.m. on December
24 4, 1991, regarding the above wells. They did not
25 sign our letter of no objection at this time"?

1 A. Right.

2 Q. And that's what Mr. May told you?

3 A. That's what the memo says.

4 Q. "They are drilling a potash test hole
5 and it will be two weeks before they have their
6 results." He told you that too, right?

7 A. Yes, sir.

8 Q. In fact, you had a copy of this memo in
9 front of you testifying from it this morning?

10 A. No.

11 Q. But you told us about this conversation
12 this morning?

13 A. Yes, sir.

14 Q. You knew on December 4, 1991, then,
15 that if you drilled this well, you would have to
16 have a hearing before the OCD?

17 A. At that time I did not know that
18 because they had not voiced objections to
19 permitting this well.

20 Q. They told you they weren't going to
21 waive their objections, didn't they?

22 A. No, they said they were not going to
23 waive them at that time.

24 Q. You thought maybe sometime in the
25 future they might waive them?

1 A. That's correct.

2 Q. You knew on December 4, 1991, that New
3 Mexico Potash was not waiving its objections to
4 these wells?

5 A. They were not going to sign our letter
6 at that time.

7 Q. You thought they might sign it sometime
8 in the future?

9 A. That's correct, because during the
10 conversation, Mr. May was told that if the core
11 hole was poor, they might waive the objection.

12 Q. That's even referred to in Exhibit No.
13 29, isn't it?

14 A. That's right.

15 Q. And did you ever later find out what
16 the results of that core hole was?

17 A. I personally, no, I don't know that.

18 Q. As you sit here today, September 9,
19 1992, you don't know the result of the core hole
20 No. 162 in Section 2?

21 A. No, sir. I'm not an engineer or a
22 geologist.

23 Q. You don't have any other layman's
24 knowledge of what the result of that hole was?

25 A. Not that I can recall.

1 Q. You testified Mr. Patterson, you did
2 some investigation, something about whether or
3 not New Mexico Potash apparently lived up to some
4 lease paragraphs?

5 A. Yes, sir.

6 Q. So you knew about the drilling of the
7 hole?

8 A. I knew about the drilling of the hole
9 and I did not think that anything else had gone
10 on in that section.

11 Q. You also pointed out a paragraph that
12 said something about due diligence if reserves
13 are found, and that sort of stuff?

14 A. That's right.

15 Q. Were you implying by that that New
16 Mexico Potash had a good core hole and should be
17 doing something?

18 A. I was merely pointing out what the
19 lease said.

20 Q. You have no particular expertise in the
21 interpretation of those leases, do you?

22 A. Well, I read oil and gas leases every
23 day.

24 Q. Do you read potash leases every day?

25 A. No, sir.

1 Q. That was just your personal opinion you
2 were giving us?

3 A. Yes, sir.

4 Q. Do you know today whether or not there
5 is a grade of potash in Section 2, as shown by
6 core hole No. 162, that's mineable in the basin?

7 A. I do not.

8 Q. Does it make any difference to you, Mr.
9 Patterson, if these wells are located in an area
10 where there's potash that can be mined by the
11 mines in Carlsbad?

12 A. Yes, it does make a difference, because
13 we don't want to unduly waste commercial potash.
14 That's part of the law.

15 Q. Well, if you don't want to do that,
16 wouldn't you think you would at least go out and
17 try and find out what core hole 162 showed?

18 A. We have expert witnesses that are very
19 familiar with that that are geologists and
20 engineers. I don't work in that area so I don't
21 personally know that.

22 Q. Are you in charge of this Livingston
23 Ridge project?

24 A. No, I'm not in charge of the project.

25 Q. You're involved with it?

1 A. Yes, sir, I'm involved with it, in a
2 supervisory capacity.

3 Q. In a very high supervisory capacity,
4 aren't you?

5 A. In a supervisory capacity.

6 Q. Yet you haven't made any efforts to
7 find out if there's good potash in Section 2?

8 MR. CARROLL: Mr. LeMay, I'm going to
9 object. This is merely argumentative.

10 MR. HIGH: I'll withdraw that. I think
11 he told us that he doesn't know.

12 Q. Now, when you did your investigation on
13 what New Mexico Potash did in Section 2, Mr.
14 Patterson, did you talk to anyone at New Mexico
15 Potash?

16 A. I don't believe that I personally
17 talked to anyone at New Mexico Potash other than
18 at maybe one of these meetings, in conversation.

19 Q. Did you talk with Mr. Walt Case, the
20 manager down there?

21 A. I talked with Mr. Case about some wells
22 previous to this, but about Section 2, I don't
23 believe that I did. I don't recall the
24 conversation with Mr. Case.

25 Q. Did you talk with Mr. Bob Lane, the

1 former mine engineer?

2 A. I don't recall a conversation with Mr.
3 Lane, either.

4 Q. So you really don't know what New
5 Mexico Potash has done in Section 2, do you, Mr.
6 Patterson?

7 A. I know what my people have told me,
8 that they do not believe that there was much
9 activity on Section 2.

10 Q. You understand, don't you, that mining
11 is based upon having a long-term asset, don't
12 you?

13 A. Yes, sir.

14 Q. That mining is different in terms of
15 how it works, as opposed to oil and gas, is that
16 correct?

17 A. Yes, sir.

18 Q. That mining is a long-term venture,
19 whereas oil and gas is a much shorter term
20 business?

21 A. Okay. If you say so.

22 Q. Do you think it's unusual for a mine to
23 have reserves under lease that it hasn't mined,
24 even though the lease may have been in effect for
25 5, 10, 15 years?

1 A. No, I don't think that's unusual, in
2 that time frame.

3 Q. You understand in the mining business
4 it's generally the case, that a mine will have
5 reserves that it will not be able to physically
6 get to, even at full production, for maybe 15,
7 20, 30 years?

8 A. I understood that a while ago.

9 Q. Now, if you look at Exhibit No. 6,
10 which I believe you said was your--

11 A. Mine or yours?

12 Q. Yours. Let's look at Exhibit No. 6
13 first, and this is Lease V-2705?

14 A. Yes, sir.

15 Q. This is related to which one of the
16 wells, Mr. Patterson?

17 A. This is the Graham lease, the north
18 half of that section.

19 Q. Okay. In Exhibit No. 7, which is Lease
20 V-2597, it's related to which wells?

21 A. That's the Flora lease.

22 Q. Now, both of these leases were entered
23 into in 1988, is that correct?

24 A. That is correct.

25 Q. In fact, Exhibit 6 was entered into on

1 October 1, 1988, right?

2 A. That's correct.

3 Q. And Exhibit No. 7 was entered into on
4 August 1, 1988?

5 A. That's correct.

6 Q. You knew at the time you entered into
7 these leases that they were in the R-111-P area,
8 didn't you?

9 A. I don't recall at the time we purchased
10 that lease whether we knew that or not or whether
11 we looked at it.

12 Q. Well, if you look at Exhibit 9 in front
13 of you, Mr. Patterson, that is a copy of R-111-P,
14 in my book Exhibit No. 9. You knew that, or you
15 wouldn't argue with the fact that February 18,
16 1988, when R-111-P was adopted, it preceded the
17 date you entered into these two leases?

18 A. No, I wouldn't argue with that.

19 Q. Now, you also said a minute ago, and I
20 don't want to dwell on this but I want to give
21 you a little bit more opportunity to comment, you
22 said there's a shortfall of oil in the United
23 States right now?

24 A. Yes, sir.

25 Q. And has that existed for a long time?

1 A. That's existed for several years.

2 Q. How would you characterize the price of
3 oil now?

4 A. Low.

5 Q. Do you think a low-selling price of oil
6 indicates an undersupply?

7 A. Well, no, I don't.

8 Q. Are you telling me that the price and
9 the supply are running in opposite directions?

10 A. No.

11 Q. If there was a great shortage of oil,
12 it would be selling for a lot more than it is
13 right now, wouldn't it, Mr. Patterson?

14 A. That's probably correct.

15 Q. In fact your industry, like ours, is
16 very cyclical, isn't it?

17 A. Yes, sir.

18 Q. We go up and we go down?

19 A. Yes.

20 Q. Are you able to sell and transport all
21 the gas that Yates now produces?

22 A. We are able to sell sometimes more than
23 we're able to transport.

24 Q. There are limitations on how much gas
25 you can actually get into the system?

1 A. Sometimes that's true.

2 Q. Same with respect to oil?

3 A. No. Usually--well, you can sell all
4 the oil you can produce.

5 Q. You can transport it in ways you can't
6 gas?

7 A. That's correct.

8 Q. You do understand that it's the OCC's
9 duty to prevent, as you call it, the undue waste
10 of potash?

11 A. Yes, sir, the undue waste of commercial
12 potash, is what the statute says.

13 Q. You don't have any problem with that
14 concept?

15 A. No.

16 Q. Probably where we disagree and what led
17 us here is what's "undue"?

18 A. What's undue and what's commercial.

19 Q. And you have one opinion or your own
20 opinion of what's undue and what's commercial,
21 and I understand we have a different view,
22 correct?

23 A. I believe that we will very effectively
24 present our opinion.

25 Q. Well, that's a matter yet to be

1 decided, Mr. Patterson. My question is, you
2 understand we have a different view than you do?

3 A. I understand you have a different view.

4 Q. Now, you participated, or your company
5 did, in the events leading up to R-111-P, didn't
6 you?

7 A. We had a representative that
8 participated on the committee.

9 Q. What was his name?

10 A. Norbert Rempe.

11 Q. You also told the Commissioners about
12 some statements made by some people that I think
13 you said led you to believe that drilling in
14 Section 2 would not interfere with the potash
15 operations?

16 A. Yes, sir.

17 Q. And I take it those were meetings that
18 were held with members of the Commission, is that
19 correct?

20 A. Yes, sir, I believe that's correct.

21 Q. In fact, those were meetings that were
22 held here in Santa Fe with Mr. LeMay and a number
23 of other people?

24 A. I believe that's true.

25 Q. And the purpose of that meeting was to

1 try and resolve the disagreement between the
2 industries over the development of Section 2?

3 A. Yes, sir, Section 2 and probably other
4 sections.

5 Q. And you guys wanted to drill oil and
6 gas wells, and the potash people didn't want you
7 to do that?

8 A. That's right.

9 Q. And Mr. LeMay hoped to get everybody
10 together and work it out?

11 A. That's correct, I believe.

12 Q. And there were representatives of the
13 oil and gas industry at that meeting along with
14 the potash people?

15 A. That's right.

16 Q. And at that meeting there were
17 discussions about langbeinite being the ore in
18 Section 2, wasn't there?

19 A. I've attended several meetings. I
20 would suspect that there was, but I don't recall
21 just exactly that that was talked about at this
22 time.

23 Q. Do you know what langbeinite is?

24 A. Yes, sir, I know that it's a potash
25 ore.

1 Q. Do you know the difference between
2 langbeinite and sylvite?

3 A. Not without looking at my notes.

4 Q. Do you know which one of them is more
5 plentiful in the world?

6 A. I believe I do know that, yes.

7 Q. Which one?

8 A. I believe that sylvite is the more
9 common of the two.

10 Q. And langbeinite is the one that's
11 harder to find?

12 A. I believe that's correct.

13 Q. Do you recall any discussions about why
14 the potash people didn't want oil and gas
15 drilling in Section 2, during this meeting you
16 talked about with Mr. LeMay?

17 A. I recall some of the discussions.

18 Q. Was that along the line that there was
19 ore in Section 2 that people wanted to mine?

20 A. I believe that was stated by your
21 representatives.

22 Q. How many type meetings like that did
23 you attend with a representative present that
24 discussed or talked about Section 2?

25 A. I've attended so many meetings the last

1 several months that they all run together. I
2 would hesitate to say how many.

3 Q. Well, this one you gave us a date on, I
4 think you got that from your notes, right?

5 A. I don't believe the date's in the
6 notes, but I did have some notes on the meeting.

7 Q. I understood you to testify that on
8 January 10, 1992, you attended a meeting and
9 that's when you found out about all of that?

10 A. That's correct, yes.

11 Q. And you got that from your notes?

12 A. The date is not in my notes. I got
13 that up here.

14 Q. What was it about that meeting that
15 makes it stand out in your mind?

16 A. Because we were talking about Section 2
17 quite a lot and because, at that time, it was the
18 same timing that we were trying to permit these
19 wells. And at that time we were, after the
20 comments made by representatives, we were
21 encouraged by the fact that they talked about no
22 plans and that the LMRs were questionable in that
23 area. So we thought we were going to drill
24 wells.

25 Q. Was there anything said at this January

1 10, 1992 meeting about a new core hole that was
2 being put down by New Mexico Potash Corporation
3 in Section 2?

4 A. Very possibly, but I don't recall
5 whether or not it was. I just don't recall.

6 Q. Did you already know, by January 10,
7 1992, about the results of the core hole 162?

8 A. I did not know the results of that, no.

9 Q. Now, you made a statement earlier, Mr.
10 Patterson, that there can be waste of oil if it's
11 not drilled, by leaving it in the ground?

12 A. Yes, sir, it can be economically
13 wasted.

14 Q. By that do you mean simply a delay in
15 getting money for it?

16 A. That's correct.

17 Q. Eventually you would recover the oil
18 and get the money but you just can't get it now?
19 Is that what you're saying?

20 A. I suppose if the oil doesn't move away
21 it will still be there.

22 Q. And I'm not disagreeing with you, I'm
23 just trying to understand what you mean by
24 economic waste. And I understand that to be the
25 delay in getting the money for the oil itself?

1 A. That's right, but there's also a
2 drainage problem. If someone else is allowed to
3 drill wells and you're not allowed to drill your
4 acreage, they can take your oil off your lease,
5 and that would be a waste for us.

6 Q. That's what unitization is designed to
7 eliminate, isn't it?

8 A. In some cases that is an alternative.

9 Q. You gave us numbers about the
10 Livingston Ridge and the average well production
11 is 125,000 barrels?

12 A. Yes, sir.

13 Q. At \$20 a barrel, and you gave us all
14 those numbers?

15 A. Yes.

16 Q. Do you have those written down in front
17 of you somewhere?

18 A. Yes.

19 Q. Is that from an exhibit, a piece of
20 paper you gave us last time?

21 A. No.

22 Q. That's just from your notes?

23 A. That's just my notes.

24 Q. Now, you also, in going through those
25 numbers, you said there's economic waste to the

1 operator. That's Yates Petroleum, isn't it?

2 A. That's correct.

3 Q. Of a million dollars a well?

4 A. That's approximately what it would be.

5 Q. Is that what a layman like me would
6 call profit?

7 A. That would be the net to the operator
8 after you've taken out the royalty, taxes,
9 drilling, completion, equipping, producing; the
10 hard charges.

11 Q. And that's assumed over what lifetime
12 of the well?

13 A. Well, I would hesitate to say what the
14 lifetime of the well was. We have an engineer
15 that will probably testify to that.

16 Q. I'm just trying to find out where you
17 got this number from.

18 A. Our engineer has told me that he
19 believes that the recoverable reserves in the
20 wells average around 125,000 barrels.

21 Q. Did you calculate this million dollars,
22 or did somebody else do that and tell you what it
23 was?

24 A. I did that with other parties involved.

25 Q. When you say a million dollars a well,

1 my question is, for how long did you assume the
2 well will last?

3 A. I didn't make that assumption. That's
4 the total oil that will come out of the ground.
5 I don't know for this purpose it matters how long
6 it takes.

7 Q. You just use the total number of
8 barrels, you get it and that's it?

9 A. That's right.

10 Q. You, of course, wouldn't shut the well
11 off if it kept producing after that number of
12 barrels came out of the well, would you?

13 A. No, certainly not. That would be
14 waste.

15 Q. But none of those numbers reflected any
16 of these prices?

17 A. None of what numbers?

18 Q. Any value of oil in excess of 125,000
19 barrels.

20 A. Well, 125,000 barrels is an average of
21 a number of wells in this area that I understand,
22 from our engineer, and he will probably testify
23 to, is an average recoverable reserve for an
24 average Livingston Ridge area Delaware well.

25 Q. I understand that, Mr. Patterson, and

1 I'm not really disagreeing with you. I'm just
2 trying to find out who I should cross-examine
3 about these numbers.

4 MR. CARROLL: If I may help here, Mr.
5 Boneau will testify to that. He has exhibits,
6 and under the heading of Dave Boneau's exhibits
7 you will find those numbers.

8 Q. Is Dr. Boneau the one you talked to to
9 get these?

10 A. Yes.

11 Q. He'll know more about the details than
12 you?

13 A. Probably.

14 Q. He'll be able to tell me how he arrived
15 at each one of them?

16 A. Yes, he probably will.

17 Q. Then I'll wait and talk to him about
18 it.

19 Now, with respect to Exhibit No. 10,
20 which is the map that you showed us, I take it
21 that has all of the Yates leases in the R-111-P
22 area?

23 A. No, sir, that's not correct. That is
24 just in this area that's presented on the map,
25 just in these townships. It's a convenient size,

1 and it more or less covers this Livingston Ridge
2 Delaware drilling area.

3 Q. And you would, of course, have leases
4 elsewhere in and around the potash area?

5 A. Yes, sir.

6 Q. Now, you said you had drilled 37 wells
7 was it?

8 A. Yes, sir, I believe that's a correct
9 number, more or less.

10 Q. In what period of time?

11 A. Since late 1990.

12 Q. Well, that's in the last two years or
13 so?

14 A. It's been within the last year and a
15 half, two years.

16 Q. Was that an increase in the number of
17 wells that you had drilled before?

18 A. Before when?

19 Q. Before 1990.

20 A. We drill wells--we drill better than a
21 hundred wells each year in the State of New
22 Mexico, so--

23 Q. Is this 37 wells you referred to over
24 the period of two years, I take it, is that a lot
25 of wells or a little bit of wells?

1 A. That's a good number of wells in an
2 area as small as what we're dealing with here.
3 Those wells are drilled primarily in just this
4 Livingston Ridge area, 22/31, Sections 24 down
5 to--or 21/31, Section 24, down to Section 24, of
6 22/31, and then a few of them up here around the
7 Laguna Plata area.

8 Q. How many wells does Yates Petroleum
9 normally average each year?

10 A. Between 120 and 160.

11 Q. How many in the State of New Mexico?

12 A. I don't know that number just right off
13 my head.

14 Q. A large percentage?

15 A. A large percentage.

16 Q. Upwards of 90 percent?

17 A. I couldn't say that. I don't know.

18 Q. How many wells does Yates plan to drill
19 in 1992?

20 A. For our fiscal year which ends March
21 31, we will probably drill 120 to 150, 160 wells
22 next year.

23 Q. Do you have a budget or do you have
24 some planning and forecasting when you say we're
25 going to try to drill--

1 A. No, sir, we do not use a formal
2 budgeting process.

3 Q. You just kind of do it as you go?

4 A. Yes, sir.

5 Q. You have over 100 APDs in the works
6 now?

7 A. Yes, in this particular Delaware area.

8 Q. You, of course, don't drill all the
9 wells that you get an okay to drill, do you?

10 A. We drill the biggest part of them. We
11 probably don't drill--we don't permit very many
12 that we don't drill.

13 Q. Do you send letters to the potash
14 people wanting objections or no objections on
15 wells that you have never drilled?

16 A. No.

17 Q. In the last year, would you know how
18 many letters you've sent out to the potash people
19 wanting to know if they would object or not
20 object to wells?

21 A. Not without doing some research.

22 Q. Would you agree it's been a whole
23 bunch?

24 A. Yes, it's been several.

25 Q. Would you agree with me that some of

1 those have come back "no objection"?

2 A. Some of those have.

3 Q. Some were objected to?

4 A. That's correct.

5 Q. Would you agree with me that the
6 largest number came back "no objection"?

7 A. No, I would not.

8 Q. You think most of them were objected
9 to?

10 A. I believe they were.

11 Q. At least as far as Yates was concerned?

12 A. Yes, sir.

13 Q. And those for which there are no
14 objections, do you plan to go ahead and go
15 forward and drill those wells?

16 A. Most of those we have already drilled.
17 We're waiting on some more.

18 Q. Are you familiar with the Bonneville
19 No. 3 well?

20 A. Yes, sir, I believe I am.

21 Q. Was that one drilled?

22 A. I don't recall whether the No. 3 was
23 drilled or whether the No. 2 was drilled. I get
24 confused on those two.

25 Q. One of them was directional and one of

1 them was vertical, is that right?

2 A. There was a directional well drilled,
3 if that's what you're asking.

4 Q. Is it your recollection that it was a
5 Bonneville or it might have been?

6 A. It was a Bonneville.

7 Q. It was a directional well?

8 A. It was a directional well.

9 Q. It was drilled by Yates Petroleum?

10 A. It was.

11 Q. Do you recall how far it was offset?

12 A. No, I don't, not in exact numbers.

13 Q. Do you recall why it was directionally
14 drilled?

15 A. Yes.

16 Q. Why?

17 A. Because we couldn't get a surface
18 location.

19 Q. From whom?

20 A. I don't recall.

21 Q. It didn't have anything to do with the
22 potash people?

23 A. I don't recall that.

24 Q. How many other directional wells do you
25 recall Yates Petroleum drilling in the R-111-P

1 area, if you know?

2 A. I think I can remember three to the
3 west of this area.

4 Q. And when would those have been drilled?

5 A. Two years ago, maybe three.

6 Q. And the Bonneville 1 you talked about,
7 do you recall when that one was drilled?

8 A. That was drilled recently, probably
9 during 1992.

10 Q. Does May of 1992 sound about right?

11 A. That sounds reasonable.

12 Q. Those were Delaware wells?

13 A. Which of "those wells"?

14 Q. The Bonneville.

15 A. The Bonneville is a Delaware well, yes,
16 sir.

17 Q. It was offset a distance you just don't
18 recall?

19 A. I don't recall that offset, no.

20 Q. The other directional wells you told me
21 about were not Delaware wells?

22 A. Those were not Delaware wells. Those
23 were deeper wells.

24 Q. Is the only directional well that Yates
25 has ever drilled to the Delaware, that you recall

1 now, this Bonneville well?

2 A. Yes, that's a correct statement.

3 Q. Do you know anyone else who has drilled
4 directional wells to the Delaware?

5 A. I can't think of anybody now.

6 Q. And I guess you would agree with me
7 that technologically it's possible to
8 directionally drill to the Delaware?

9 A. Yes, it's possible.

10 Q. And economically it's feasible, at
11 least it was in this Bonneville case for Yates?

12 A. I couldn't testify to that. I don't
13 know the answer to that. Our engineer would be
14 more likely to know the answer to that.

15 Q. Would you agree with me that going
16 forward and drilling a directional well is pretty
17 good evidence that it's economical to do so?

18 A. No, I wouldn't agree with that. I
19 couldn't testify to that. Our engineer would
20 have to say that.

21 Q. Do you sometimes drill wells that are
22 not economically worthwhile?

23 A. Not intentionally.

24 Q. Very good. I like that. It's like
25 some of our mining, we don't do things

1 intentionally.

2 But at least at the outset, when you
3 started drilling this directional well to the
4 Delaware, you thought it was going to be
5 economical?

6 A. We drilled that well more or less under
7 duress. We had to drill that well because it was
8 a farmout and we were going to lose our rights if
9 we didn't drill that well, with no chance of
10 getting it back.

11 Q. Would you, and I don't know how that
12 answered my question, my question was this:
13 Would you agree with me that at least prior to
14 drilling the Bonneville directional well to the
15 Delaware, you thought it was going to be
16 economical or you would not have gone forward?

17 A. No, that's not a correct statement. We
18 drilled the well because we wanted to maintain
19 our rights in that section, and it was considered
20 that the well might possibly, might very well be
21 uneconomic.

22 Q. Do you know what's happened, whether it
23 has or has not been economical?

24 A. I do not know the answer.

25 Q. You've never been interested enough to

1 look into it?

2 A. I have several things to do other than
3 look into that.

4 Q. So, I take it the answer is no?

5 A. No, sir.

6 Q. Now, would you look at Exhibit No. 2.
7 Do you have that in front of you?

8 A. Yes, sir.

9 Q. And this is Yates' Exhibit No. 2 I'm
10 referring to.

11 A. Yes.

12 Q. These are the APDs for those wells, I
13 believe, you referred to earlier?

14 A. This is the first page of those APDs,
15 that's correct.

16 Q. I take it you didn't fill this out
17 yourself, did you?

18 A. No, sir.

19 Q. You testified earlier about R-111-P,
20 Mr. Patterson. Do you know whether or not the
21 casing program outlined in Exhibit No. 2 complies
22 with the casing program in R-111-P?

23 A. I would assume that that is the correct
24 casing program because our engineers and our
25 permit people discuss that in the context of the

1 regulation.

2 Q. And you're assuming that it complies
3 because you trust your people?

4 A. That's correct.

5 Q. You don't have independent knowledge
6 that it complies?

7 A. I do not study those casing programs on
8 each and every APD, no, sir.

9 Q. Okay. Now, look at Exhibit No. 4.
10 There is a handwritten part, I believe that's YPC
11 and Pogo?

12 A. Yes, sir.

13 Q. And that's the potash leases that you
14 and Pogo went in and recently bid on?

15 A. That's correct.

16 Q. Those were federal leases, weren't
17 they?

18 A. Those were federal potash leases.

19 Q. I take it that was a joint venture with
20 Pogo?

21 A. Yes, sir.

22 Q. These leases that are shown on Exhibit
23 No. 4 are part of this larger group that you said
24 consisted of 5,000-some-odd acres, right?

25 A. It's a single lease, being 5,280 acres.

1 Q. Would it be a fair statement to
2 describe these leases, Mr. Patterson, as being
3 north of WIPP and coming east and going down the
4 east side of WIPP for a ways?

5 A. Yes, sir, that's a good description.

6 Q. You knew at the time you bid on these
7 leases that IMC Potash had been trying for
8 several years to get these leases from the BLM,
9 weren't you?

10 A. Yes, sir, I was aware of that.

11 Q. You and Pogo decided to get together
12 and outbid the potash people for these leases?

13 A. We decided to bid on the leases.

14 Q. And you in fact outbid IMC for these
15 leases, didn't you?

16 A. We did outbid them, yes.

17 Q. IMC was there to bid on these leases,
18 weren't they?

19 A. Yes, there was a representative of IMC
20 there.

21 Q. What kinds of ore do you understand
22 that IMC mines and mills?

23 A. Potash.

24 Q. Do you know whether or not they're one
25 of the largest langbeinite producers in the world?

1 A. I don't know that.

2 Q. Do you know whether or not they
3 actually mine langbeinite in the potash basin in
4 Carlsbad?

5 A. I understand that they do, yes, sir.

6 Q. Do you know whether or not all the
7 mines down there mine langbeinite?

8 A. I understand that there are mines that
9 do not.

10 Q. Do you know whether or not New Mexico
11 Potash can mine langbeinite?

12 A. I do not believe that they--well, I'm
13 sure that they mine it. There's probably some in
14 the potash, but I don't know that they process
15 it.

16 Q. Did you work on preparing the bid on
17 these potash leases?

18 A. Yes, sir.

19 Q. Did you evaluate the potash?

20 A. We had consultants evaluate the potash.

21 Q. And did you read their reports?

22 A. Yes. Their reports were presented to
23 me, as well as some of Yates' reports.

24 Q. And you authorized the expenditure of
25 funds, I take it, to bid on this lease?

1 A. Principals of the company authorized
2 that.

3 Q. And you and Pogo really, really wanted
4 this lease, didn't you?

5 A. We went to an open auction with the
6 intent of making a bid.

7 Q. And would it be a fair statement to
8 say, Mr. Patterson, that you outbid IMC for these
9 potash leases so you can drill oil and gas wells
10 on them?

11 A. These leases are in the area that we
12 are drilling, but we buy leases all over the
13 United States of various types.

14 Q. Do you intend to mine the potash on
15 these leases you bought, Mr. Patterson?

16 A. I don't know whether we'll do that in
17 the future or not.

18 Q. Has Yates Petroleum taken any steps to
19 see if someone else would mine the potash for
20 Yates?

21 A. We have not at this point. The leases
22 are not even issued yet.

23 Q. Is it Yates' intention to produce the
24 potash on those leases and pay the royalties
25 under the leases?

1 A. We have not continued to make a mine
2 plan or continued having our consultants continue
3 looking at this because it's premature, because
4 the leases have not yet been issued.

5 Q. Have you discussed with Pogo any
6 intention to mine these leases?

7 A. We have discussed the leases with Pogo.

8 Q. Have you discussed with Pogo the
9 intention to mine the leases?

10 A. I don't recall that that subject has
11 really come up.

12 Q. Have you discussed with any Pogo people
13 an intention not to mine but instead drill the
14 oil and gas wells?

15 A. Pogo and Yates are very interested in
16 drilling oil and gas wells in this area, yes.

17 Q. Have you discussed with the Pogo people
18 the intention to drill oil and gas wells on this
19 lease, and not mine the potash?

20 A. And not mine the potash, no, sir.

21 Q. Did Yates and Pogo bid on these potash
22 leases to eliminate conflicts over drilling oil
23 and gas wells on the lease?

24 A. I think that is a possibility that it
25 may eliminate some conflicts, since we're the

1 owner of the potash leases.

2 Q. You understand under R-111-P, consent
3 between a potash lessee and oil and gas lessee
4 makes things easier, don't you?

5 A. Yes, that's right.

6 Q. And if Yates and Pogo bought the potash
7 lease and also own the oil and gas lease, that
8 means that you can do things a lot easier, right?

9 A. Well, you would assume so, but Pogo
10 hasn't granted us any waivers.

11 Q. And we're not going to wait on those
12 either, are we, Mr. Patterson? We'll probably
13 see one about the same time you do.

14 MR. HIGH: I believe that's all the
15 questions we have right now.

16 CHAIRMAN LEMAY: Thank you, Mr. High.

17 MR. CARROLL: Additional questions of
18 the witness?

19 MR. CARROLL: Mr. LeMay, I have a
20 couple.

21 CHAIRMAN LEMAY: Do you want to do it
22 after we have the Commissioners ask questions or
23 do you want to do it now?

24 MR. CARROLL: It would probably be
25 better now. It's just a couple of areas of

1 clarification.

2 CHAIRMAN LEMAY: Fine.

3 FURTHER EXAMINATION

4 BY MR. CARROLL:

5 Q. Mr. Patterson, with respect to the last
6 area of questioning by Mr. High in reference to
7 this lease that was purchased by Yates, is it
8 Yates' attention to evaluate the potash in this
9 newly purchased lease?

10 A. Yes, sir, we do intend--in fact, we
11 have done some preliminary evaluation prior to
12 our bid, and we do have the intention of
13 evaluating the lease.

14 Q. In this preliminary evaluation, have
15 you received any advice from your engineer as to
16 whether or not there could be concurrent
17 development of both mineral resources?

18 A. Yes, sir, we have.

19 Q. What was that opinion?

20 A. Our consulting engineer told us that he
21 believed that it could very well be developed
22 concurrently.

23 Q. Now, I am going to show you four
24 letters, and I apologize to the Commissioners
25 that these are not exhibits. I will make these

1 exhibits. There are four letters here and we
2 will, for reference, refer to them as Exhibit
3 8(a), Exhibit 8(b), Exhibit 8(c) and Exhibit
4 8(d). I will supply sufficient copies to update
5 the Commissioners.

6 And Mr. Patterson, I have pencilled in
7 those exhibit numbers and I would like you to
8 please examine those quickly for me.

9 A. Okay.

10 Q. Now, earlier in your testimony you
11 indicated that it was a policy in compliance with
12 R-111-P that notification to the potash companies
13 be given with respect to Yates' intent to try to
14 permit a well, is that correct?

15 A. Yes, sir.

16 Q. Are Exhibit 8(a), (b), (c) and (d)
17 copies of those letters?

18 A. Yes, they are. These are letters from
19 our permit agent, Mr. Cliff May, to Mr. Bob Lane
20 of New Mexico Potash Company, on the four wells
21 here in question.

22 Q. Would you, first of all, as to each
23 exhibit, give me the date? Well, let's start
24 with Exhibit 8(a), and just read the letters,
25 since the Commissioners don't have it, and first

1 of all, give me the date of this letter?

2 A. This letter is dated November 21, 1991
3 to Mr. Bob Lane, New Mexico Potash, Hobbs, New
4 Mexico. "Dear Mr. Lane: Yates Petroleum
5 Corporation is the operator of Oil and Gas Lease
6 V-2705. We have staked the following location:
7 Graham AKB State No. 4, 1980 from the north line,
8 1650 from the east line, Section 2, Township 22
9 South, Range 31 East, Eddy County, New Mexico.

10 "An application to drill is being
11 filed with the Oil Conservation District. We
12 have been advised that your company is the owner
13 of record of certain potash leases in this area.
14 We respectfully request that you waive any
15 objection you may have to this proposed well
16 location and so indicate by signing and returning
17 one copy of this letter in the enclosed
18 envelope. Your favorable consideration of this
19 request will be greatly appreciated. Sincerely,
20 Yates Petroleum Corporation, Clifton May, Permit
21 Agent."

22 And at the bottom there's a place to
23 sign, "no objections offered, New Mexico Potash,"
24 by title and date, and then the other part of it
25 is covered up, but on the other side there is a

1 spot to sign similar to the one on the left, that
2 says, "objections offered."

3 Q. This is basically a form letter that
4 Yates Petroleum employs with respect to every
5 notification that they send within the potash
6 area?

7 A. That's right.

8 Q. Also on the face of Exhibit 8(a)
9 there's xeroxed two other items. What are they?

10 A. It is the receipt and the return
11 receipt for the mailing.

12 Q. And that actually shows that that
13 letter was received and signed by a
14 representative of New Mexico Potash, does it not?

15 A. Yes, it does. It's dated 11/22/91.

16 Q. One day after the date of the letter?

17 A. That's correct.

18 Q. Whose signature does that appear to be?

19 A. Well, he writes just about like I do,
20 but it looks like Walter--it could be Walter
21 Case, Walter S-C-something.

22 Q. That's with respect to what well, the
23 Graham 4?

24 A. The Graham 4, yes.

25 Q. Exhibit 8(b) is with respect to what

1 well?

2 A. Exhibit 8(b) is a similar letter on the
3 Graham 3.

4 Q. And it shows also the return receipt
5 card and dates?

6 A. Same signature, 11/22/91.

7 Q. You had apparently received it the same
8 date as the other letters, is that correct?

9 A. That's correct.

10 Q. And 8(c) is what?

11 A. 8(c) is the same letter on the Flora
12 State No. 1, and the return receipt shows the
13 same signature and the same date, 11/22/91.

14 Q. And 8(d) is on what well?

15 A. Exhibit 8(d) is on the Flora No. 2.
16 It's dated January 16.

17 Q. There is no return receipt card
18 attached to that letter, is there?

19 A. No, sir.

20 Q. However, look at the bottom of that
21 letter. In the area of whether or not an
22 objection was made or not, you do see a signature
23 and a date appearing there, is that correct?

24 A. Yes, there's a signature, Robert Lane,
25 Mining--I can't read the title, but the date

1 looks like it is--it's difficult to read. It's
2 either 7/21/92 or 1/21/92.

3 Q. What is the date of that letter?

4 A. This letter is January 16, 1992.

5 Q. All right. You are aware that Mr. Lane
6 is the mining superintendent of New Mexico Potash
7 and have seen him at some of these meetings, have
8 you not?

9 A. Yes, I have.

10 Q. And this is an apparent voicing of an
11 objection to that particular Flora well, is that
12 correct, the No. 2?

13 A. That's correct.

14 Q. One last area I want to talk to you
15 about, Mr. Patterson. Mr. High asked you some
16 questions about the shortage of oil in the United
17 States and the low price. Now, your statement is
18 correct, there is a shortage? In other words,
19 the United States does not produce enough oil to
20 meet its needs, is that correct?

21 A. As I recall, the United States at this
22 time is importing greater than 50 percent of its
23 oil consumption. Somewhere around there.

24 Q. However, the world market is in what,
25 oversupply or shortage?

1 A. The world market appears to be in
2 oversupply because of the OPEC nations' huge
3 reserves.

4 Q. In your opinion, does that have any
5 relationship to the low price?

6 A. Well, yes. The United States oil
7 market is sort of a price taker. They have to
8 take whatever the OPEC nations want to dictate
9 the price to be.

10 Q. Mr. LeMay's letter which is an exhibit,
11 I believe Exhibit 9, do you feel that this letter
12 was written so as to try and encourage some price
13 pressure, or is there another more basic problem
14 with respect to the need to develop oil reserves?

15 A. It seemed to me, through conversations
16 and listening at the hearing, that it was the
17 Commission's intention to increase oil production
18 because of a potential crisis in the United
19 States, a shortage of oil because of the war
20 situation and/or potential war--I don't recall
21 the timing of it--but the Middle East crisis
22 situation.

23 Q. One last question. On your Exhibit 2,
24 would you turn to that quickly, that is, again,
25 the applications for permit to drill, are they

1 not, for all four wells?

2 A. Yes, they are.

3 Q. Would you look at the bottom right
4 after the BOP program, and what notation is
5 listed there on each one of these exhibits?

6 A. It says, "Letter has been sent to NM
7 Potash Corporation."

8 Q. Is that abbreviation for New Mexico
9 Potash Corporation?

10 A. Yes, it is. All four APDs contain that
11 statement.

12 Q. And the notice, in the normal course of
13 business of Yates Petroleum, would that be the
14 letters that we introduced as Exhibits 8(a), (b),
15 (c) and (d)?

16 A. Yes, sir, that's our normal procedure.

17 MR. CARROLL: Thank you, Mr. Chairman.

18 CHAIRMAN LEMAY: Mr. High?

19 MR. HIGH: Yes. I would like to see
20 those documents.

21 FURTHER EXAMINATION

22 BY MR. HIGH:

23 Q. With respect, Mr. Patterson, to
24 documents 8(a), (b), (c) and (d), I believe it
25 is, those are the letters prepared by Yates

1 Petroleum, right?

2 A. Yes, sir.

3 Q. What's the first document you have to
4 file with the state before starting the process
5 to get to drill a well?

6 A. We file, I believe it is, the APD.

7 Q. That's the first document filed by
8 someone who wants to drill a well in the State of
9 New Mexico?

10 A. That's right.

11 Q. And that's required to be filed by the
12 state, right?

13 A. That's required by the OCD.

14 Q. How many copies do they require of
15 that?

16 A. I believe they get three copies, but
17 I'm not real sure. I just don't recall.

18 Q. Now, is it your belief that R-111-P
19 only requires a letter from Yates to the potash
20 people?

21 A. I believe that it requires a
22 notification and a copy of the information prior
23 to drilling.

24 Q. The letter that you have there that's
25 marked 8(a), (b) and (c), the ones you sent or

1 your company sent to New Mexico Potash?

2 A. Yes. •

3 Q. And we received those, by the way. Are
4 those letters required to be filed with the State
5 of New Mexico?

6 A. I don't recall. I don't participate in
7 this permitting process every day, but I believe
8 that we do file these letters with our APD.

9 Q. Turn if you will to R-111-P which are
10 our exhibits in the book. Turn to Exhibit No. 9
11 and turn over to page 11 for a minute, please.

12 A. Okay.

13 Q. You have Exhibit No. 9, which is
14 R-111-P, correct?

15 A. Yes, sir.

16 Q. Turn over, if you will, to page No. 11
17 and come down to the paragraph numbered 2. Do
18 you have that one?

19 A. Okay.

20 Q. Follow along here with me, because I
21 want to get your understanding, Mr. Patterson. I
22 read this earlier, but I want to ask you again
23 with respect to these Exhibits 8(a), (b) and
24 (c).

25 Paragraph 2 says, "Before commencing

1 drilling operations for oil and gas on any land
2 within the potash area, the well operator," that
3 would be Yates, right?

4 A. Yes, sir.

5 Q. "...shall prepare a map or plat showing
6 the location of the proposed well. Said map or
7 plat to accompany each copy of the Notice of
8 Intention to Drill." Do you see that?

9 A. Yes, sir.

10 Q. And "Notice of Intention to Drill" is
11 in initial capitalization, is it not?

12 A. Yes.

13 Q. Is it your understanding that all you
14 have to do to comply with that is just send a
15 letter to New Mexico Potash?

16 A. No. But it also says, "Before
17 commencing drilling," and that could be done at
18 any time prior to the drilling operations.

19 Also, I don't know without reading this
20 entire document, if the capitalized Notice of
21 Intention to Drill is a reference to notice to
22 the potash company or if it's a reference to the
23 APD, because many times, in our industry, the APD
24 is referred to as a notice of intention to drill.

25 Q. In fact, that's quite common, isn't it?

1 A. Yes, sir.

2 Q. That people know the APD is being the
3 notice of intention to drill?

4 A. That's right.

5 Q. That's the one you're required to file
6 with the state?

7 A. That's right.

8 Q. Three copies?

9 A. Okay.

10 Q. With a plat or a well location shown?

11 A. That's right. That's what we do.

12 Q. Would you agree with me, Mr. Patterson,
13 that that's what's being referred to in the first
14 sentence of R-111-P?

15 A. Without reading the document and seeing
16 what the definition of that is, I can't agree
17 with that, no.

18 Q. Would you agree with me that the
19 letters up there, 8(a), (b) and (c), are not an
20 APD, correct?

21 A. What are you--

22 Q. The letters that you identified as
23 being Exhibits 8(a), (b) and (c). The letters
24 you sent to New Mexico Potash.

25 A. Those are not an APD. I would agree

1 with you.

2 Q. And an APD was not attached to them?

3 A. I cannot tell that from the exhibits.
4 The statement--there is a plat attached to this
5 exhibit, and it's actually stapled to a copy of
6 the APD.

7 Q. All right. Can you tell from the cover
8 letter whether or not those were attached when
9 they were sent to New Mexico Potash?

10 A. From this cover letter, I cannot tell
11 whether they were attached or not.

12 Q. And what's the date of 8(a), (b) and
13 (c)?

14 A. November 21, 1991.

15 Q. If you look at Exhibit No. 2, which are
16 the APDs?

17 A. May I put this away?

18 Q. We're going to talk about it some
19 more. Are you having trouble locating it?

20 A. No, I'm just having trouble with too
21 much paper.

22 CHAIRMAN LEMAY: Do you want to take a
23 break now? How many more questions do you have?

24 MR. HIGH: I'm almost through. Do you
25 want to break now?

1 CHAIRMAN LEMAY: Well, I hate to break
2 a witness, but if you have some more questions,
3 we can.

4 MR. HIGH: I have a few more about
5 R-111-P.

6 CHAIRMAN LEMAY: Let's take a break,
7 then. We'll take a 15-minute break and come
8 back.

9 [A recess was taken.]

10 CHAIRMAN LEMAY: Before we continue, I
11 would just like to make a couple of comments. In
12 the interest of getting everything into the
13 record, I think we're getting somewhat cumulative
14 here, counselors, both of you.

15 Mr. High, this is the second time, as I
16 understand, you've read paragraph 2, page 11 of
17 your exhibit into the record, and I don't know
18 why it's come up the second time, but you did
19 that the first time.

20 Mr. Carroll, you could have presented
21 Exhibits 8(a), (b), (c) and (d) at the time
22 Exhibit 8 went in, so that that would be
23 complementary to the presentation then. I either
24 have to assume you think we're wandering around
25 this way or assuming we're not very smart up here

1 and didn't hear it the first time.

2 I'm not limiting testimony, but I'm
3 saying, let's get a little better prepared.
4 Let's handle the case in a precise, consise
5 manner, get it in the record, and sit down.
6 That's the purpose of it.

7 Comments?

8 MR. HIGH: My follow-up questions were
9 related to the additional exhibits that Mr.
10 Carroll offered.

11 CHAIRMAN LEMAY: Didn't you read the
12 same thing before? Doesn't it apply to those
13 exhibits as well? Does it have to be referenced
14 again and read again?

15 MR. HIGH: With respect to other
16 documents, Mr. LeMay.

17 CHAIRMAN LEMAY: But it's the same
18 paragraph, isn't it?

19 MR. HIGH: It's the same paragraph, but
20 the question is, what is the notice of intention
21 to drill?

22 CHAIRMAN LEMAY: I think you covered
23 that the first time, didn't you?

24 MR. HIGH: Not with respect to these
25 documents.

1 CHAIRMAN LEMAY: The whole thing,
2 intention to drill is intention to drill, whether
3 it's related to these documents, future
4 witnesses. It seemed very cumulative to me.

5 MR. HIGH: We didn't think it was. If
6 the Commission did, I apologize. I will tell you
7 that during the break Mr. Carroll and I have
8 talked about this issue and we have agreed that
9 there is no longer an issue in this case of
10 whether New Mexico Potash timely protested these
11 four wells. Therefore, I have no further
12 questions of Mr. Patterson.

13 CHAIRMAN LEMAY: Fine. Is it possible
14 for you to get together, the two of you, and
15 stipulate other things, too, prior to getting
16 witnesses on the stand and examining,
17 cross-examining, and recross-examining?

18 MR. HIGH: I'm just telling you what we
19 talked about.

20 CHAIRMAN LEMAY: Fine. I appreciate
21 that. I really do.

22 MR. HIGH: We were going back and forth
23 on this timeliness issue, and I thought it had
24 been resurrected. It has not. It is not an
25 issue in the case, and that was the purpose of my

1 questioning.

2 CHAIRMAN LEMAY: Thank you. I
3 appreciate it. And I do this in the spirit of
4 cooperation. I think we encourage this type of
5 dialogue between opposing counsel so that it does
6 provide for an efficient, fair and proper
7 hearing.

8 MR. CARROLL: Chairman LeMay, I think
9 Mr. High and I will endeavor, although I cannot
10 promise we will be able to reach an agreement in
11 any other areas, but I think both of us are well
12 aware of the time constraints, and my
13 representation to you is that I will try and I
14 think Mr. High will do the same.

15 CHAIRMAN LEMAY: Fine. That's all we
16 ask. Not only time constraints, counselor, but
17 you need for the Commission to focus on the
18 critical, important issues. If you're talking
19 about whether or not a paperclip was included in
20 the correspondence between these individuals, and
21 I can't quite read the date, I can't see how
22 that's relevant for us to focus on the critical
23 issues, and we do want to focus on the critical
24 issues. So please continue.

25 MR. HIGH: May I ask that the record

1 reflects whether or not I've correctly stated our
2 agreement, Mr. Carroll, with respect to the
3 timeliness issue?

4 MR. CARROLL: It does correctly state
5 it, because, as I understand it, as the
6 Commission ruled, this case would be tried as an
7 exception, and the timeliness, therefore, is
8 rendered moot. And I think that's what the
9 record reflects and that's how we will stand and
10 try our case.

11 MR. HIGH: And I have no further
12 questions of Mr. Patterson.

13 MR. CARROLL: Nothing further. My next
14 witness would be Mr. Szabo.

15 CHAIRMAN LEMAY: We may have questions
16 from the Commissioners on this witness.

17 MR. CARROLL: Excuse me. I'm trying to
18 hurry along.

19 CHAIRMAN LEMAY: Well, we're trying to
20 hurry as fast as we can, Counselor.

21 Additional questions from the
22 audience? Commissioner Carlson?

23 EXAMINATION

24 BY COMMISSIONER CARLSON:

25 Q. On your Exhibit No. 1, your Graham

1 State 1 and 2 wells, those wells are now
2 producing, is that correct?

3 A. Yes, sir, the Graham No. 1 and No. 2
4 are producing wells.

5 Q. When were those wells drilled?

6 A. I don't recall. I can get that
7 information for you, if you like.

8 Q. Obviously it was within the last four
9 years, right?

10 A. Oh, yes, sir.

11 Q. Subsequent to R-111-P?

12 A. Yes, sir.

13 Q. Did you follow R-111-P procedures, as
14 far as notification to New Mexico Potash of those
15 wells?

16 A. Yes, sir, we did.

17 Q. And they had no objection?

18 A. I believe that that's correct, that
19 there was no objections offered for those two
20 wells.

21 Q. Did you know, at the time you drilled
22 those wells, that they were in the buffer zone of
23 New Mexico Potash's LMR?

24 A. I don't believe that we did because I'm
25 not sure that we knew what the LMR was. But I'm

1 uncertain about that answer.

2 Q. You discussed directional drilling. Do
3 you know what additional costs of drilling a well
4 to the Delaware, what the additional costs would
5 be for directional drilling?

6 A. Right off the top of my head I don't
7 recall that, but I believe that one of our
8 witnesses may testify to that later.

9 Q. Okay, fine. On your Exhibit No. 4,
10 your newly acquired potash leases, what is the
11 term of those federal leases?

12 A. I believe that there is no term to
13 those leases. It is an open-ended lease. I
14 could not find the term in reading the lease. I
15 could not find a term.

16 Q. So you don't have to be producing
17 within a certain time frame?

18 A. No, sir. The only thing I read in the
19 lease was that you pay rental, and the rental has
20 an increasing value over time.

21 Q. Those are yearly rentals that increase
22 until production?

23 A. Yes, sir, each year, yearly rentals.

24 COMMISSIONER CARLSON: That's all I
25 have.

1 CHAIRMAN LEMAY: Commissioner Weiss?

2 COMMISSIONER WEISS: Yes.

3 EXAMINATION

4 BY COMMISSIONER WEISS:

5 Q. Has Yates been advised of the
6 development plan that the potash company has for
7 Section 2?

8 A. We have been made aware that in January
9 sometime, that the LMR was extended in Section 2,
10 down into Section 2, and I believe that was based
11 on the new core hole. We were advised that that
12 was the case.

13 Q. I'm curious as to whether there's
14 something comparable to a drilling permit that
15 the potash people send out, such as you send to
16 them when you want to drill a well?

17 A. To my knowledge, I've never seen a mine
18 plan or anything such as that that says anything
19 about Section 2.

20 COMMISSIONER WEISS: Thank you. That's
21 all the questions I have.

22 EXAMINATION

23 BY CHAIRMAN LEMAY:

24 Q. Do you have a location for this
25 Bonneville well that you drilled directionally?

1 Section, township and range?

2 A. Yes, sir, just a second, if you would.
3 Let me pull out Exhibit No. 10, and I think maybe
4 I can identify that section.

5 I understand that Bonneville was in
6 Section 19 of 21 South, 32 East, which is north
7 of that Section 2. It's one of those circles
8 there, open circles in Section 19 of 21 South, 32
9 East.

10 Q. Okay. Thank you.

11 A. And exactly which one, I'm sorry, I
12 can't tell you.

13 Q. That's okay. I just need to know a
14 general location. One other item, Mr. Patterson,
15 the price you paid, is that confidential or is
16 that a matter of public record?

17 A. For the potash lease? I don't know
18 that it's public record, but we paid \$6 an acre.

19 CHAIRMAN LEMAY: Thank you.

20 Additional questions of the witness?

21 If not, he may be excused.

22 THE WITNESS: Thank you.

23 You may call your next witness, Mr.
24 Carroll.

25 MR. CARROLL: Our next witness will be

1 Ernie Szabo of the State Land Office.

2 ERNEST SZABO

3 Having been first duly sworn upon his oath, was
4 examined and testified as follows:

5 EXAMINATION

6 BY MR. CARROLL:

7 Q. Would you please state your full name
8 and occupation for the record.

9 A. Ernest Szabo. I'm a geologist for the
10 State Land Office.

11 Q. Mr. Szabo, do you have a degree in
12 geology?

13 A. Yes, sir.

14 Q. How long have you been working with the
15 State Land Office?

16 A. Seven and a half years.

17 Q. Mr. Szabo, could you tell me what your
18 duties are with respect to your work with the
19 State Land Office?

20 A. Primarily I'm responsible for the oil
21 and gas lease end. I do get involved in land
22 trades. I also issue seismic permits and make
23 determinations on behalf of the Land Office as to
24 whether or not people are drilling or intending
25 to drill in potash LMRs or in the buffer zones.

1 Q. So you do have some duties with respect
2 to the LMR designation process, at least as to
3 how that involves the State Land Office?

4 A. Yes, sir.

5 Q. Are you the sole person that handles
6 that area, Mr. Szabo?

7 A. Unfortunately, yes.

8 Q. The buck stops there? Is that what
9 you're telling me?

10 A. [Deponent indicated.]

11 Q. Mr. Szabo, you are familiar then with,
12 and in fact I believe you were actually, although
13 it may have been confidential, you did give some
14 testimony at the Division level of these four
15 cases, is that correct?

16 A. Yes, sir.

17 Q. And you are familiar, then, with at
18 least the facts of these cases and familiar with
19 the LMR that has been designated by New Mexico
20 Potash Corporation with respect to its state
21 leases? I guess, well, in the entire potash
22 enclave, I suppose you get all of that
23 information?

24 A. Well, I would get all the information
25 in this case, yes, I'm familiar with 34, 35, 36

1 and Section 2.

2 Q. Section 2 is a state-owned acreage, is
3 that correct?

4 A. That's right.

5 Q. That's why you have concern with it?

6 A. Yes, sir.

7 Q. Mr. Szabo, prior to 1/1/92, New Mexico
8 Potash had, in fact, designated an LMR, had it
9 not?

10 A. Yes, sir.

11 Q. And it was on file with the State Land
12 Office?

13 A. That LMR was mailed to us effective
14 1/1/91.

15 Q. All right. Subsequent to 1/1/92, there
16 was a change, was there not?

17 A. Yes, sir.

18 Q. Do you recall when you received that
19 notice of change?

20 A. Yes. The letter of transmittal was
21 dated the 14th of January.

22 Q. Prior to your receipt of that letter
23 dated 1/14/92, was Section 2 within an LMR?

24 A. No.

25 Q. Was any part of Section 2 within a

1 buffer zone of an LMR?

2 A. Yes.

3 Q. What portion of Section 2?

4 A. The north half.

5 Q. After this notification letter, did
6 that fact change?

7 A. Yes, sir. The entire section became
8 LMR or was designated LMR by New Mexico Potash.
9 So they added a half-section.

10 Q. They added that one section?

11 A. Yes.

12 Q. Now, Mr. Szabo, did the State Land
13 Office just accept that designation, or could you
14 describe what, in fact, did happen with respect
15 to this designation process?

16 A. Well, we discussed the extension--

17 Q. When you say "We discussed," could you
18 explain?

19 A. The director and I, and then we sought
20 the assistant commissioner's advice. There was
21 no information with the map that accompanied the
22 transmittal. And the R-111 gives us the right to
23 data in the potash area, and if not R-111, then
24 State Land Office Rule No. 3 tells us we're
25 entitled to core and drill hole information on

1 state acreage.

2 So, rather than take this at, let's
3 say, artistic value, we then requested data to
4 confirm indeed that this was a real LMR or a real
5 extension or just an exercise.

6 Q. All right. Did you then request
7 additional information from them?

8 A. We did.

9 Q. Did you then receive additional
10 information from them?

11 A. We received information, I believe it
12 was, March 14th.

13 Q. Was additional core hole data received
14 with respect to Section 2?

15 A. There was one core hole listed.

16 Q. After the receipt of this information
17 in March, did the State Land Office issue a
18 letter to New Mexico Potash Corporation with
19 respect to its stand on the amendment of the LMR?

20 A. We did.

21 Q. That letter was signed by Mr. Prando,
22 was it not?

23 A. That's right.

24 Q. I'm going to hand you what has been
25 marked as Exhibit 11 by New Mexico Potash, this

1 is in their black book, Exhibit 11--and I won't
2 hand you the whole book, it's so voluminous. I'm
3 just going to take the exhibit itself. You have
4 just described to me a letter. Is that the
5 letter that you made reference to?

6 A. It is.

7 Q. Now, in the first paragraph, that
8 letter indicates that at least there was some
9 acceptance by the State Land Office of this
10 designation, is that correct?

11 A. Yes.

12 Q. It mentions "criteria." Is this
13 criteria that the State Land Office has
14 developed, or what is it? and is it something
15 that is going to continue in use by the State
16 Land Office or be changed?

17 A. We assume R-111-P as a starting point
18 or a zero point. For that, we also accepted what
19 was called the LMRs of the potash companies at
20 that time. The standard for the potash, we went
21 ahead and used BLM standard to be conformable, to
22 be agreeable with them, of four feet of 10
23 percent sylvite, or four feet or four percent
24 langbeinite.

25 Q. And that is the standard that the

1 federal government has utilized when they began
2 the leasing process? That was their leasing
3 standard, isn't it, that's existed from nearly
4 day one?

5 A. From the establishment of the enclave,
6 as far as I know.

7 Q. Now, with respect to that, is it the
8 State Land Office policy? Is that something that
9 they consider is correct, or do they feel bound
10 by it? Or is there a process right now going on
11 where it may be changed?

12 A. We accept it at the present time for
13 lack of standards of our own. They could be
14 changed in the future. They could be increased,
15 they could be decreased.

16 However, at the present time since my
17 function is primarily that as a petroleum
18 geologist, I didn't feel qualified to establish
19 standards for this particular case or condition,
20 so we used the BLM standard. Now, in the future,
21 we feel that we should and will have more to say
22 on how state acreage is used.

23 Q. And, in fact, the State Land Office is
24 looking for personnel to help it in that?

25 A. We are. We are looking for another

1 geologist. We've interviewed several. One of
2 the qualifications we asked for has been the
3 ability to be fluent or versatile or liquid or
4 whatever in mining operations.

5 Q. Now, paragraph No. 2 of this particular
6 letter does point out the position of the State
7 Land Office with the state of the information
8 provided, does it not?

9 A. Yes, it does.

10 Q. And what is that position? Could you--

11 A. Well, that is based mainly on my
12 observation, my experience, my opinion, that in
13 contouring, isopaching if you will, between
14 points, things are subject to rapid change
15 especially when you deal in things like sand or
16 reef or evaporites. So the fact that you supply
17 one point doesn't justify extending it for miles
18 around.

19 Q. Again, this particular letter was the
20 first notification to New Mexico Potash that at
21 least for State Land Office purposes, you had
22 accepted the amendment of the LMR?

23 A. Yes, sir.

24 Q. The State Land Office policy, and I ask
25 this question in deference to counsel of the

1 State Land Office, it is not the State Land
2 Office policy that the State Land Office takes
3 the position that its decisions must govern or
4 direct the Oil Conservation Commission, does it?

5 A. No. We determine for our own interests
6 and the Oil Conservation Division determines in
7 the general interest of whatever parties are
8 involved.

9 Q. And all of the processes that we have
10 talked about through your testimony, these were
11 thought processes or procedures that were
12 confined within the State Land Office without
13 consultation outside or direction from the Oil
14 Conservation Division then, wouldn't that be
15 fair?

16 A. Yes, sir.

17 MR. CARROLL: That's all the questions
18 I have, Mr. LeMay.

19 CHAIRMAN LEMAY: Thank you. Mr. High?
20 Before you go, did you want to qualify the
21 witness? I think that might have been
22 eliminated. He is qualified.

23 MR. CARROLL: I think he's an
24 employee. I don't know that I used him as an
25 expert.

1 MR. STOVALL: I think that's correct.
2 He is expressing the State Land Office policies
3 and procedures, and is not expressing an opinion
4 but as an expert geologist.

5 MR. CARROLL: That was my intent.

6 CHAIRMAN LEMAY: Thank you. That
7 clarifies the issue, then.

8 EXAMINATION

9 BY MR. HIGH:

10 Q. Mr. Szabo, who do you report to?

11 A. Mr. Floyd Prando, Director.

12 Q. Have you any prior experience working
13 with potash, other than through the State Land
14 Office?

15 A. No.

16 Q. Do you have any prior experience in
17 mining at all?

18 A. Not experience, no.

19 Q. Were you with the State Land Office
20 when R-111-P was adopted?

21 A. I was, but not an active participant.
22 At that time Bruce Stockton was the petroleum
23 engineer and he participated in the, shall we
24 say, proceedings.

25 Q. Since R-111-P was issued, has the State

1 Land Office adopted any written procedures with
2 respect to the submission of LMRs by potash
3 lessees?

4 A. Not written procedures, no.

5 Q. Has the State Land Office, since
6 R-111-P was issued, adopted any standards that
7 will be imposed by the State Land Office for a
8 potash lessee to get an LMR okayed or whatever it
9 is you say they have to do?

10 A. We haven't imposed any of our own. We
11 accept whatever the 111-P was trying to convey.

12 Q. Well, other than the R-111-P document
13 itself, did the State Land Office have any
14 written documents with respect to standards that
15 must be met for an LMR to be accepted or
16 approved, or whatever you said the State Land
17 Office does?

18 A. No. The objective was to have a
19 certain uniformity to proceeding.

20 Q. Does the State Land Office have any
21 written document saying it will follow the BLM
22 standard in one area or two areas or all areas
23 concerning mining?

24 A. No.

25 Q. Is that something that you decided to

1 do personally, since you're in charge of this
2 whole area?

3 A. It's something that we agreed upon
4 because we had to have a starting point.

5 Q. Who is "we"?

6 A. The director and I--well, the director
7 and I.

8 Q. That would be Mr. Prando?

9 A. Mr. Prando.

10 Q. When you say follow BLM standards, that
11 was kind of across-the-board type stuff?

12 A. No more than BLM is across the board
13 with us.

14 Q. Which BLM standard did you agree to
15 follow, is what I'm getting at?

16 A. Designation of an LMR, the buffer zone
17 idea, the four-ten and four-four.

18 Q. Now, I understand under R-111-P a
19 potash lessee can amend their LMR, is that right?

20 A. Yes, sir.

21 Q. Do you recall the time period during
22 which they can do that?

23 A. It's got to be done by January 21 of
24 the next following year.

25 Q. I think it's probably January 31st.

1 A. Okay. Somewhere in there.

2 Q. My recollection is you said that
3 January 31st following the date that new data
4 becomes available?

5 A. Well, the date I'll not question.

6 Q. You're aware of the fact that a new
7 core hole was drilled in Section 2 by New Mexico
8 Potash?

9 A. Yes, sir.

10 Q. Well, you're aware of that now?

11 A. I'm aware of that now, yes.

12 Q. You're aware that core hole 162 was
13 drilled?

14 A. Yes, after submittal of the data by New
15 Mexico Potash, yes.

16 Q. Do you recall when that core hole was
17 drilled?

18 A. No, because I had no previous knowledge
19 of it.

20 Q. New Mexico Potash did file a
21 designation or some document with the State Land
22 Office prior to January 31st, changing their LMR,
23 correct?

24 A. Yes.

25 Q. And you say "we," and you described the

1 director and an assistant commissioner?

2 A. I would say we're primarily responsible
3 for consultations.

4 Q. That's the Commissioner of the Office
5 of Public Lands, right?

6 A. Yes, sir.

7 Q. Not the Oil Conservation Commission?

8 A. No. We have nothing to do with the Oil
9 Conservation Commission, in a business way.

10 Q. You asked New Mexico Potash for some
11 data to back up the change in LMR, is that right?

12 A. Exactly.

13 Q. That was provided to you, was it not?

14 A. At a later date, yes.

15 Q. Mr. Bob Lane even came to Santa Fe and
16 met with you, right?

17 A. That was the date of the hearing for
18 the wells in question.

19 Q. He showed you information on what core
20 hole 162 showed?

21 A. No. We discussed operations, the cost
22 of operations, and I got the core hole
23 information with a transmittal letter at a later
24 date.

25 Q. And when you got the core hole data,

1 you agree that it shows ore that New Mexico
2 Potash can mine?

3 A. Judging by the standards set up under
4 BLM, yes.

5 Q. And you, then, with Commissioner
6 Prando's signature, sent the letter that you
7 called Exhibit No. 11?

8 A. Okay, yeah.

9 Q. Now, you say in that letter or Mr.
10 Prando says in that letter, the first paragraph,
11 that "It is our conclusion that core hole 162 did
12 encounter an economical accumulation of sylvite.
13 The quality of ore is such that the southeast
14 quarter of Section 2, Township 22 South, Range 31
15 East, contains a commercial deposit." And that
16 was the conclusion you and Mr. Prando reached?

17 A. Right.

18 Q. That was based on the core hole data
19 given to you by New Mexico Potash?

20 A. Right.

21 Q. And your meeting and discussion with
22 Mr. Bob Lane?

23 A. Yeah.

24 Q. What standards did you use, Mr. Szabo,
25 to limit the area of commercial potash to the

1 southeast one-quarter-section of Section 2?

2 A. By looking at LMRs, I noticed that
3 there are frequent barren areas that can be
4 contoured in if you allow one core hole per
5 section. In other words, I personally feel, as I
6 said earlier, that one core hole does not justify
7 blocking out an entire section.

8 Q. And you said that's your personal
9 opinion?

10 A. That's right.

11 Q. Does the State Land Office have any
12 written standards--

13 A. No.

14 Q. Excuse me. Let me finish. Does the
15 State Land Office have any standards on the
16 interpretation to be given to a core hole that's
17 drilled in the potash basin?

18 A. No, sir.

19 Q. Are you aware of any standards in the
20 mining industry concerning the area of influence
21 to be used in interpreting a core hole?

22 A. The BLM uses three-point to contour in.

23 Q. What distance away from a core hole
24 will the BLM use in interpreting core hole data
25 whole?

1 A. Well, they claim a mile and a half.

2 Q. Did you use the BLM standard in that
3 regard?

4 A. No.

5 Q. Is there any written document in the
6 State Land Office that says which of the BLM
7 standards you will follow?

8 A. No. And may I point out, though, if
9 we're discussing three-point and contouring by
10 three-point, that such would be done if all
11 points contained the objective.

12 Q. Do you know whether or not core hole
13 No. 162 connects up with two other core holes
14 that contain ore that New Mexico Potash can mine?

15 A. It connects up with at least one to the
16 north and at least two to the south and west.

17 Q. That show ore that New Mexico Potash
18 can mine?

19 A. Well, I don't know if they show ore or
20 not, because all I got was the point and no data,
21 and a series of lines connecting in triangles,
22 and that was it. I got no data for the other
23 core holes.

24 Q. Other than the discussions that you
25 referred to and the information submitted by New

1 Mexico Potash and your discussion with Mr. Bob
2 Lane, did you do any independent research on
3 whether or not this Section 2 contained
4 commercial potash?

5 A. We have neither the facilities nor the
6 personnel nor the financing to do any kind of
7 research.

8 Q. All you considered is what New Mexico
9 Potash submitted to you?

10 A. We have no choice. We accept the word
11 of the operator as being true.

12 Q. Did you call the BLM and ask them for
13 any data?

14 A. No.

15 Q. You understand that all core hole
16 information is and has been for years filed with
17 the BLM?

18 A. The fact is, we feel that we should
19 have it, too.

20 Q. I understand, but--

21 A. Yes, I understand your point.

22 Q. You understand that they have people
23 with backgrounds in mining?

24 A. Undoubtedly.

25 Q. Do you know whether or not anyone else

1 at the State Land Office had any communication
2 with the BLM people?

3 A. No.

4 Q. At the time you and Mr. Prando decided
5 to send the document marked as New Mexico Potash
6 Exhibit No. 11, Mr. Szabo, were you aware that
7 Section 2 did, in fact, contain a commercial
8 deposit of potash in areas other than the
9 southeast one-quarter?

10 A. No.

11 Q. Is it your understanding and
12 interpretation that core hole 162 only influences
13 the southeast one-quarter of Section 2?

14 A. No, but I could contour the various
15 points in several different ways and either work
16 out or work in, whichever my pleasure was, to
17 show that the ore reserves were or were not
18 there.

19 Q. Did you do that?

20 A. I speculated on it. I didn't mark up
21 the information that was submitted, no.

22 Q. Did you conclude that there were
23 commercial deposits of potash in anyplace in
24 Section 2 other than the southeast one-quarter?

25 A. I concluded that there was a

1 possibility of it, but I didn't say there is.

2 CHAIRMAN LEMAY: Could I just
3 interrupt? For clarification, you're talking
4 about this core hole 162, but no one has given a
5 location for this core hole.

6 THE WITNESS: It's approximately the
7 center of the southeast quarter.

8 CHAIRMAN LEMAY: Center of the
9 southeast of the southwest?

10 THE WITNESS: No, approximately the
11 center of the southeast quarter.

12 CHAIRMAN LEMAY: Where Pogo has that
13 lease?

14 THE WITNESS: That would be roughly.

15 CHAIRMAN LEMAY: That's all. I hope
16 you don't mind the interruption; you just keep
17 talking about that and we need to reference the
18 location.

19 MR. HIGH: That's all the questions I
20 have, Mr. LeMay. Thank you.

21 CHAIRMAN LEMAY: Thank you. Additional
22 questions of the witness?

23 Commissioner Carlson?

24 COMMISSIONER CARLSON: First of all, as
25 a point of clarification, Mr. High, when Ernie

1 talks about the assistant commissioner, not being
2 the Oil Conservation Commission, I am the
3 Assistant Commissioner of Public Lands that he's
4 referring to. I think in his one statement
5 there. That's not a question, just a
6 clarification.

7 EXAMINATION

8 BY COMMISSIONER CARLSON:

9 Q. Ernie, you are satisfied, then, by the
10 core hole data that the southeast quarter of
11 Section 2 should be within an LMR?

12 A. Without question.

13 Q. Do you have any opinion or knowledge
14 about the northern half of Section 2?

15 A. The northern half we had placed into
16 the buffer zone because it offset by within a
17 half-mile the LMR that New Mexico Potash had
18 designated in Section 35.

19 Q. Right, but do you have any knowledge
20 about the location of any commercial potash
21 deposits in the northern half?

22 A. No, sir. For all the information we
23 have, it could be barren or it could be
24 completely full.

25 Q. And is that true also of the southwest

1 quarter?

2 A. Well, I would lean more toward allowing
3 potash in the southwest quarter, because I would
4 be connecting toward what was indicated as potash
5 accumulation toward the west.

6 COMMISSIONER CARLSON: That's all.

7 CHAIRMAN LEMAY: Commissioner Weiss?

8 COMMISSIONER WEISS: I have just one.

9 EXAMINATION

10 BY COMMISSIONER WEISS:

11 Q. Is it generally accepted in the mining
12 industry that contour points a mile and a half
13 apart are valid?

14 A. Pretty much so.

15 Q. Do banks lend money on that?

16 A. Apparently they do. My experience in
17 petroleum is that that's far too far apart. I
18 can fit a full section into it. And I have so
19 many contour options with three points that, you
20 know, as I said, I can either do or do without.
21 I can put it in or take it out as I please.

22 COMMISSIONER WEISS: Thank you. That
23 was my only question.

24 CHAIRMAN LEMAY: I have only one
25 question for you, Mr. Szabo.

EXAMINATION

BY CHAIRMAN LEMAY:

Q. Is it the State Land Office's policy that the acceptance of the LMR is when the potash company files the data, as a example in this case January, or is it the timing of a letter such as Exhibit No. 11 that confirms the findings?

A. We started our acceptance of LMRs as a zero point after the R-111-P was passed and accepted, so that we, in other words, had to have a point at which to take off.

Now, our feeling has been that we cannot delegate to the BLM the right to speak for us, any more than they do for themselves. In other words, if we are agreeable, we have a joint opinion; else, BLM has stated that they'll take their marbles and go elsewhere.

So we feel we have a right to the same thing. We're not any less than the BLM. So we took the designated LMRs as a starting point and, in the future, we are expecting to take a more active part in the LMRs when it comes to state acreage. We don't expect to interfere with the BLM on federal acreage, but we definitely feel we should have more say on state acreage than we

1 have so far.

2 In other words, everything that is data
3 goes to BLM. It's BLM that says yes or no. They
4 are, then, determining our right. They're taking
5 away our right to determination. And, in fact,
6 if they so please, they can take our property and
7 prevent maximum utilization. And our
8 instructions are to maximize returns from all
9 state acreage for the benefit of its
10 beneficiaries, so we are intending to take a more
11 active part so that we can maximize our returns.

12 Q. I guess, then, in this particular
13 situation, what date was the LMR established?
14 Was it in January or March?

15 A. We feel that it was in March, with the
16 letter.

17 CHAIRMAN LEMAY: Thank you.

18 Additional questions of the witness?

19 MR. HIGH: I have a few follow-up to
20 some of the questions you asked, Mr. LeMay.

21 FURTHER EXAMINATION

22 BY MR. HIGH:

23 Q. Mr. Szabo, has the State Land Office
24 notified potash lessees of the new role that the
25 State Land Office will be taking?

1 A. No. We're in the process of doing that
2 now.

3 Q. Has the State Land Office come up with
4 any standards that the potash lessee will have to
5 meet to satisfy the State Land Office with this
6 new active role?

7 A. If necessary, we will.

8 Q. You didn't have those standards back in
9 January of 1992, did you?

10 A. We had embarked on a new-- Yes, the
11 R-111-P clearly stated that we're entitled to the
12 data. A map without data is no better than a
13 piece of Kleenex. Therefore, we had to confirm
14 this as being a serious extension rather than a
15 capricious line-drawing exercise.

16 Q. Do you feel that a potash mine might,
17 in fact, go through a senseless gesture of
18 sending in an LMR that means nothing?

19 A. They could, because I've known this to
20 happen in the oil industry. I have known people
21 to send in senseless pieces of paper to hold
22 acreage, yes.

23 Q. Is it the position of the State Land
24 Office that the State Land Office has the right
25 to approve or disapprove an LMR designated by a

1 potash lessee?

2 A. It is our position that we should and
3 will have the right to advise or approve or
4 disapprove on the maximum utilization of our
5 property. We will not waste, but, at the same
6 time, will not idly sit by.

7 Q. Well, and I appreciate that, but I
8 don't think it answered my question, Mr. Szabo.

9 When a potash lessee sends an LMR to
10 the State Land Office, are you going to approve
11 it or disapprove it? Is that what you're saying?

12 A. If they send the data to go with it, we
13 will probably approve it if they're confident the
14 data is valid.

15 Q. If it's not acceptable to the State
16 Land Office, you're going to disapprove it?

17 A. We will return the data and inform them
18 that we don't approve.

19 Q. Is this policy already into effect?

20 A. No.

21 Q. Was this policy you just described to
22 me about approving or disapproving, in effect
23 back in January of 1992?

24 A. Obviously, because we requested and got
25 more data in later.

1 Q. Were potash lessees notified that the
2 State Land Office was taking a--

3 A. This was the first case where we had
4 the opportunity to test this.

5 Q. So New Mexico Potash didn't know before
6 all these events happened about this new role
7 you're telling us about, did they?

8 A. No, they didn't. If they were serious
9 about it, they could have submitted the data as
10 required by R-111-P.

11 Q. Would you agree with me, Mr. Szabo,
12 that it would be difficult for a potash lessee to
13 know what they have to do to satisfy the State
14 Land Office without some written standards?

15 A. No.

16 Q. Well, they have to get their--

17 A. They've already got the BLM standard.
18 If we change the BLM standard, they will be
19 notified, but they do have the BLM standard to go
20 by and we have R-111, which clearly states that
21 we're entitled to the data. And if they want to
22 extend it, they've got to have reasonable grounds
23 to extend it on.

24 Q. My question to you is, you don't have
25 anything in writing that says what those

1 reasonable grounds will be in your opinion,
2 right?

3 A. They haven't changed so far. They
4 still say four feet of 10, four feet of four, and
5 submit the data take to prove it.

6 Q. And that's all they have to do?

7 A. That's all they have to do so far.

8 MR. HIGH: Okay. Thank you, Mr.
9 Szabo.

10 CHAIRMAN LEMAY: Thank you, Mr. High.
11 Additional questions of the witness? If not, he
12 may be excused.

13 Boy, you timed that just right, didn't
14 you? It's noon time. We'll break for lunch and
15 be back at 1:15.

16 [The noon recess was taken.]

17 CHAIRMAN LEMAY: We shall resume when
18 you're ready.

19 MR. CARROLL: Thank you, Mr. LeMay.
20 The next witness Yates Petroleum will call would
21 be Brent May.

22 **BRENT A. MAY**

23 Having been first duly sworn upon his oath, was
24 examined and testified as follows:

25 MR. CARROLL: I have just handed out to

1 the Commissioners the brown envelope, and that
2 will be Mr. May's exhibits, numbered 11 through
3 21.

4 May I proceed, Chairman LeMay?

5 CHAIRMAN LEMAY: Please.

6 EXAMINATION

7 BY MR. CARROLL:

8 Q. Would you please state your name,
9 occupation, and residence for the record?

10 A. My name is Brent May. I'm a geologist
11 with Yates Petroleum in Artesia.

12 Q. Mr. May, you have told us that you are
13 a petroleum geologist, is that correct?

14 A. That is correct.

15 Q. And you have had occasion to testify as
16 a petroleum geologist before the Oil Conservation
17 Division?

18 A. Yes, I have.

19 Q. On numerous occasions?

20 A. Yes.

21 Q. And on those occasions, you've had your
22 credentials accepted, is that correct?

23 A. Yes, I have.

24 Q. And how many years of experience do you
25 have in the field?

1 A. Approximately three.

2 Q. With Yates Petroleum?

3 A. Yes, that's correct.

4 Q. You are familiar with Yates Petroleum's
5 applications in the four wells that are before
6 the Commission today?

7 A. Yes, I am.

8 MR. CARROLL: Mr. LeMay, I would tender
9 Mr. May as an expert in the field of petroleum
10 geology.

11 CHAIRMAN LEMAY: His qualifications are
12 acceptable.

13 Q. Mr. May, you've told us you are
14 familiar with Yates Petroleum's applications in
15 this case?

16 A. Yes.

17 Q. Were you the principal geologist for
18 each of the four applications of the four
19 proposed wells?

20 A. Yes, I was.

21 Q. You have prepared certain exhibits to
22 illustrate the geological issues with respect to
23 these four particular wells, have you not?

24 A. Yes, I have.

25 Q. Your first exhibit, Exhibit 11, that is

1 basically a synopsis of your testimony, is it
2 not?

3 A. Yes, it's a brief description of the
4 geologic figures that I will present, which are a
5 stratigraphic cross-section, showing the
6 producing zones, the structure map, a net
7 porosity map, plus an article describing
8 depositional environments in the Delaware, and an
9 initial potential map.

10 Q. Mr. May, without me trying to interrupt
11 you and so that your discussion can be put on in
12 an expedited fashion, if you can, would you just
13 go through your exhibits and explain to the
14 Commissioners what they are, identifying them for
15 the record, and their relevance to the issues
16 before this Commission?

17 A. The next exhibit is Exhibit 12, if I
18 can get it unfolded. Cross-section A - A' is a
19 southwest/northeast stratigraphic cross-section.
20 The location is shown in the bottom-right corner
21 with the wells indicated in red. The
22 cross-section is hung on top of a Cherry Canyon
23 shale marker, shown as the datum. The
24 correlations of the Cherry Canyon and Brushy
25 Canyon formations are shown along with perforated

1 intervals.

2 The main pay zone is colored in orange
3 along with three secondary pay zones and what I
4 term a potential pay zone. The main pay and
5 secondary pay zones were perforated and producing
6 in this area. The producing zones can be
7 correlated to the Clayton Williams well in
8 Section 15, southwest of the Lost Tank and
9 Livingston Ridge pools, which is on the far left
10 side of the cross-section, and that well is
11 actually within the WIPP boundary.

12 These zones were not tested in the
13 Clayton Williams well with the exception of what
14 I termed the potential pay zone, which produced
15 oil during a drill-stem test. The possible
16 potential of the Clayton Williams well suggests
17 that the reservoir should extend further west of
18 the established production in the pools.

19 The primary objective is to test the
20 basal Cherry Canyon Formation, the main pay and
21 the other secondary pays, and extend the western
22 limits of the Lost Tank and Livingston Ridge
23 pools. The secondary objectives include the
24 Brushy Canyon, as shown, and the Bell Canyon
25 Formations.

1 The sands of these three formations are
2 generally thought to be submarine channel/fan
3 complexes that were deposited in the Delaware
4 basin in Permian time.

5 Next I would like to move on to Exhibit
6 No. 13. The structure map with a Cherry Canyon
7 shale marker as a datum, shows the east dip in
8 the Livingston Ridge area. Green circles around
9 the location symbols--does everybody have their
10 maps out yet? The green circles around the
11 location symbols indicate the contested locations
12 we're talking about here today. The trapping
13 mechanisms of the Delaware sands is more
14 stratigraphic than structural in nature, thus the
15 structural noses and closures are not necessarily
16 needed for production but can enhance it.

17 The proposed locations are situated
18 updip from established production; thus, the
19 oil/water contact should not be encountered.

20 The next exhibit, Exhibit 14, is an
21 article titled, Guadalupean Depositional Cycles
22 of the Delaware Basin and Northwest Shelf by
23 Jacka, et al, and describes the depositional
24 environment of Delaware Mountain Group. Jacka,
25 et al., believed the Delaware sands were

1 deposited by deep sea submarine fans.

2 Figure 8 on page 85, in the lower
3 right-hand corner of the page, shows a plan view
4 of a submarine fan. The channels of the fan are
5 separating and fingering into the fan as they
6 move away from the source area. This
7 depositional environment can be applied to the
8 Delaware sands in the Livingston Ridge area. I
9 might add that it's generally common knowledge
10 with most geologists working Delaware that the
11 depositional environment is thought to be
12 submarine fans or channels.

13 The next exhibit, Exhibit 15, is a net
14 porosity map that shows the limits of the main
15 pay, which I have on my cross-section. This is
16 the main pay only. It does not include the
17 secondary pay zones. The map is an isopach of
18 density porosity of 15 percent or greater. Wells
19 with porosity of 15 percent or greater should
20 produce commercial amounts of oil from this
21 zone. Lower porosities will produce, but the
22 wells are not quite as good. The colors that are
23 used on the map are used to highlight the sands
24 and sand thicks. These are not used as cutoffs
25 in any way on the map.

1 The depositional environment present is
2 represented by the channels within a submarine
3 fan system, such as the one described by Jacka,
4 et al., and this explains the fingering of the
5 sands. The source area would be back to the
6 north with the sand flowing to the south,
7 starting to finger and separate out, which is
8 what I'm showing with each one of these sand
9 thicks. Most of Section 2 should have a
10 sufficient amount of porosity to establish good,
11 commercial production.

12 Q. Mr. May, when you talk about this main
13 pay, since we are talking about four wells, what
14 is the average depth of this main pay?

15 A. For the main pay, it's approximately
16 7,000 feet.

17 Q. And that would be similar for all four
18 wells?

19 A. Yes. Yes.

20 Q. On your Exhibit No. 15, I notice over
21 in Section 3 there's an open red circle. Could
22 you tell me what that is?

23 A. That is a Phillips location which they
24 have spotted. It's a Delaware location. And I
25 can assume that evidently they think there's

1 potential even further west than where I have it
2 shown.

3 Q. Is this a recent spotting of a
4 location?

5 A. I think within the last month or two, I
6 believe.

7 Q. Is it a fair statement that with
8 respect to your map there may be at least some
9 other schools of thought that tend to believe
10 that it is even more optimistically than you have
11 drawn it?

12 A. That's true. The information I base my
13 map on are the wells in the Livingston Ridge and
14 Lost Tank pools. I could draw this contour map
15 showing the various fingers or thicks of the
16 sands shown, but we have, because of our
17 constraints of drilling, we don't know where the
18 western limits of this field is at presently.
19 There could be possibly another sand going off to
20 the west of what I have drawn.

21 Q. Would that, Mr. May, be consistent with
22 the depositional type environment that you were
23 just discussing, the fan-type environment that
24 was listed in the study that you used as your
25 exhibit?

1 A. Yes, it is. As these sands flow from
2 the source area, like I said, as they start to
3 lose energy, they start to separate and spread
4 out and thus there could be another sand lag
5 spreading out to the west.

6 Q. All right. With respect to your study
7 of this general area, have you seen other legs of
8 these fans that have been existing or moving from
9 an east to a west direction?

10 A. Let me just give a slight history of
11 what's happened out here and maybe I can explain
12 that. When Yates Petroleum started in this area,
13 on this map the first well that was drilled was
14 in Section 11, the very southeast corner. There
15 were no other Delaware producers at that time on
16 this map; none whatsoever.

17 As you can see, we encountered one sand
18 with that well, which would be in the middle
19 because I've got one on the left, one in the
20 middle and one just on the very edge of the map
21 to the right. We then jumped up to Section 36 in
22 21 South, 31 East, and drilled the, let's see,
23 that would be Unit N in 36. And I'll repeat,
24 there were no other Delaware producers up here at
25 this time. The main pay was a lot thinner in

1 this one, but we still made a well out of it.

2 We then proceeded to move to the east.
3 We caught this sand thick that we caught in the
4 first well and proved that thick up. I believe
5 the next well we drilled was in Unit J of Section
6 36, and mind you we had already drilled these
7 other wells to the east and proven up the thick.
8 It looked like we had thinned. At that point we
9 were wondering if we were at the western edge of
10 the field. That well did make a commercial well,
11 and we decided to go one location further west
12 and see what would happen, even though we were
13 worried we were at the western edge of this
14 field.

15 We drilled Unit K. It thickened again
16 at 31 feet, from 16 feet to 31 feet. We then
17 came down and drilled Unit M. It thickened again
18 from the one just directly to the east. And then
19 we came down and drilled the Grahams, which were
20 showing thicks again. That's where I'm basing
21 this most western thick that I have. This thick
22 has developed up, and with our--since we don't
23 know the western edge of this field at the
24 present, there could be others because we didn't
25 think this western one I have drawn here was

1 there until we drilled further west.

2 Q. What you have just described, then, is
3 evidence of this type of depositional environment
4 that, at least from a geological standpoint, has
5 been encountered in other areas of the basin?

6 A. That's true.

7 Q. I'm sorry to have interrupted you. If
8 you could move on to your next exhibit.

9 A. I would like to move on to Exhibit 16.
10 The initial potential map shows an initial daily
11 production from each well in the established
12 pools. The initial potential map was constructed
13 instead of a cumulative production map, because
14 most of the wells have been completed within the
15 last year.

16 The green numbers represent barrels of
17 oil per day, red represents thousand cubic feet
18 of gas per day, and blue represents barrels of
19 water per day. All the wells on this map are
20 producing from what I call the main pay zone,
21 except for three, and these three are producing
22 from one of the secondary pay zones. They have
23 lower IPs. One is located in the southwest of
24 the northwest of Section 1. Another one is
25 located in the northeast of the southeast of

1 Section 1, also, and the third one was located in
2 the northeast of the southeast of Section 2.

3 Generally, these three wells producing
4 from the secondary pays have lower IPs than the
5 wells that are producing from the main pay. The
6 main pay was present in these wells but it was
7 thinner and probably should produce if opened
8 up. Many of the wells are producing from both
9 the main pay zone and one or more of the
10 secondary pay zones.

11 The four wells in Section 2 are
12 currently producing, all the ones along the east
13 side. Two of our proposed locations are direct
14 offsets to production, and the other two are one
15 location away from being direct offsets. So this
16 is not, in my opinion, a wildcat venture, this is
17 developmental.

18 Q. Excuse me. Go on.

19 A. I was going to summarize what I've just
20 gone through.

21 Q. Going back to your Exhibit 16, I see in
22 the lower, right-hand corner of Section 1, the
23 southwest of the southwest, there's just a dry
24 hole symbol. Is that a recent vintage well or
25 what?

1 A. Let me explain that. No, that is not a
2 recent well. That well was drilled numerous
3 years ago before this production started up. It
4 only penetrated the very top of the Bell Canyon
5 Formation, which would be approximately 2000 to
6 2500 feet above our pay zones, so they did not
7 penetrate the pay zones we're producing from.

8 Q. Do you have any information about the
9 one other dry hole symbol up in Section 35?

10 A. I believe that is a similar instance.
11 It was a Bell Canyon penetration only.

12 Q. There's also a gas well symbol in
13 Section 12.

14 A. That is a Pogo well that I think is
15 producing either out of the Morrow or the Atoka.

16 Q. That is a very deep well?

17 A. Yes, and they do have the main pay zone
18 in that well. It's thin, but it is there.

19 Q. All right. If you would, then, could
20 you give the Commissioners the benefit of at
21 least your opinion as to what the significance of
22 this geology that you find out here in this area
23 means?

24 A. Basically in summary, four locations
25 have been proposed. These tests should encounter

1 what I call the main pay zone along with several
2 secondary pay zones. The pay zones should be
3 updip or producing wells and the amount and
4 quality of reservoir encountered should be
5 sufficient to produce economic wells. The
6 locations are very near current production if not
7 directly offsetting it.

8 These developmental locations will
9 further define the western limits of the Lost
10 Tank and the Livingston Ridge pools. Each well,
11 as I stated before, should produce approximately
12 125,000 barrels of oil, and at \$20 a barrel, this
13 should be around \$10 million for the four wells.

14 Q. Now, Mr. May, besides having performed
15 a study from the geological standpoint of what
16 the productive interval is and the likelihood of
17 encountering that, you have also looked at this
18 area and performed a study addressing, if you
19 will, some of the concerns that have been
20 published or told to us with respect to drilling
21 of wells in this area in relationship to potash
22 mines, is that correct?

23 A. Yes, I have. This would be on Exhibit
24 17, in which I summarize the geology of some of
25 the concerns on some of the potash safety

1 concerns to the oil and gas activity.

2 Q. Would you, Mr. May, since you do just
3 deal with the area of the field of geology, would
4 you summarize, then, the concerns that you
5 thought you could address from a geological
6 standpoint, and then deal with each one of those,
7 if you would.

8 A. Okay. I'm looking at this from a--my
9 experience has been in looking for zones of
10 hydrocarbon potential, looking for zones that
11 encompass porosity and permeability for a flow of
12 fluids. And thus, looking at the potash and the
13 safety concerns, I am looking at it in that same
14 point.

15 Exhibit 18 is a statement that the New
16 Mexico Potash industry, I believe, gave to Mr.
17 Lujan, the Secretary of the Interior, and they go
18 through several things, but the main things I
19 want to look at are some of their safety
20 concerns. They had five safety concerns, and I
21 would like to go through those, each one of those
22 safety concerns, and talk a little bit about
23 those.

24 Q. From a geological standpoint?

25 A. From a geological standpoint. No. 1,

1 it is not known how close to mine workings an oil
2 or gas well can be drilled with the assurance of
3 safety. The petroleum and potash industries have
4 jointly agreed to use one-half mile as a standard
5 for deep oil and gas wells and one-quarter mile
6 for oil wells less than 5,000 feet deep.

7 Much research is needed to permit
8 defining the safe distance more closely,
9 particularly since ground conditions and the
10 efficiency of casing can be expected to vary
11 widely among individual wells. To drill more
12 closely at present would be to place human life
13 at risk unnecessarily and could be interrupted as
14 violating the intent of federal mine safety and
15 health laws.

16 Q. Now, Mr. May, that is the actual
17 expression of the concern by the potash company
18 as taken from Exhibit 18?

19 A. Yes, this is taken straight out of
20 their statement.

21 MR. HIGH: Excuse me. I'm going to
22 object to this witness testifying what the potash
23 industry has said. If he wants to refer to a
24 document, fine, but the potash industry does not
25 authorize Mr. May to speak on their behalf.

1 CHAIRMAN LEMAY: He's not qualified as
2 an expert in potash, that's for certain, but I
3 think he can use your document here to explain
4 the geological considerations.

5 MR. HIGH: We have no objection to
6 that, as long as he doesn't speak for us.

7 CHAIRMAN LEMAY: Proceed.

8 A. Going to No. 2, casing programs cannot
9 provide protection in the event of accidents. At
10 least seventeen blowouts or oil-well fires have
11 occurred in the area around the potash basin. It
12 is a virtual certainty that others will occur
13 from time to time.

14 No. 3, examples of oil migration into
15 potash workings have already been documented. In
16 the most serious of these, oil migrated 700 feet
17 along mud seams from an improperly plugged well
18 into the Eddy Potash Mine. It should be clear
19 that petroleum gases potentially can migrate much
20 greater distance and in much greater quantity
21 than oil. Had the well been a high pressure gas
22 well, the consequences could have been
23 disastrous.

24 No. 4, practical experience has shown
25 that it is unlikely that a casing and cementing

1 program can give completely adequate assurance of
2 protection against gas migration, concerning the
3 enormity of the potential consequences. The
4 occurrence of fractures and voids makes it
5 difficult at best to seal off formation fluids,
6 particularly in salt or heavily fractured zones.

7 No. 5, the occurrence of hydrogen
8 sulfide can be predicted to have a highly
9 corrosive effect on casing, which can lead to
10 casing failure and a leakage of both flammable
11 and toxic gases long after the well has been
12 abandoned.

13 The third, fourth and fifth concerns I
14 will address in this geologic discussion, while
15 the first two can be better addressed by
16 engineering testimony, which covers casing.
17 Through the need to address these concerns
18 geologically, I would like to discuss the fourth
19 concern first, then proceed to the third, and end
20 with the fifth.

21 Q. All right. If you would, Mr. May,
22 then.

23 A. The last sentence of the fourth concern
24 states that there are fractures and voids in
25 salt, thus creating paths of migration for

1 fluids. And, as I stated before, engineering
2 will discuss the first sentence of this concern
3 involving the casing programs.

4 It will be shown that the salt in the
5 Salado Formation has very little porosity and is
6 virtually impermeable. A brief description of
7 the general geology I'll show before proceeding
8 any further, which is Exhibit 19. This is a
9 generalized section in the Delaware basin; it's a
10 stratigraphic column just showing all of the
11 formations that are present. Most of the
12 formations that we are concerned with today are
13 from the Delaware up, including the Salado and
14 the McNutt member of the Salado.

15 Q. Mr. May, with respect to the Salado
16 Formation, which seems to be a broad interval
17 within the Ochoa, approximately what is the depth
18 or the breadth of the Salado Formation?

19 A. Basically, the thickness of the Salado
20 in the Livingston Ridge area is approximately
21 2000 feet, with the McNutt member that has
22 approximately 600 feet of salt above and a
23 thousand feet of salt below. The Salado here is
24 composed of mostly halite, with minor amounts of
25 anhydrite potash minerals, which is the McNutt

1 member, and mudstone. And the Salado is the--the
2 formation above the Salado is the Permian, the
3 Rustler, and the Castile is directly below the
4 Salado.

5 Q. These zones, there are apparently 10 or
6 more zones of potash. Do they lie at the top, at
7 the bottom, or somewhere in the middle of this
8 McNutt-Salado Formation?

9 A. They're in the McNutt. The McNutt
10 encompasses the basic potash ore, and probably
11 some of the other witnesses could go into more
12 detail on the individual ore zones and
13 everything. I basically wanted to show a
14 generalized picture here of what the stratigraphy
15 is.

16 Q. All right.

17 A. The Salado is formed mainly of halite
18 which is incapable of transmitting any
19 appreciable amount of fluid. George Griswold
20 concurs with this statement in his paper
21 submitted to Mr. High on March 1982, his paper
22 titled, Geology of the Carlsbad Potash Mining
23 District, which is in Appendix 2 of what I term
24 the Miner's Bible.

25 Q. Now, Mr. May, for purposes of

1 explanation, what will be referred to by yourself
2 and other witnesses as the Miner's Bible, it is
3 actually a compilation of reports that were
4 prepared and used during the original hearings
5 from R-111-P, is that correct?

6 A. That's what I understand, yes. And I
7 might point out, I'm not handing out several of
8 these papers I quote from, but I have them
9 available if the Commissioners want to look at
10 them.

11 Mr. Griswold said in his paper, and I
12 quote, "Halite has the well-known behavior of
13 behaving plastically under pressure. Petrofabric
14 analysis, along with modern-day observation of
15 halite, being deposited in evaporation basins,
16 indicate that loosely packed crystals form within
17 saturated brine pools. Continued burial forces
18 the brine upward so that closer packing is
19 achieved. On continued burial, the halite
20 crystals become completely plastic and all brine
21 is ejected. The only exception being those
22 fluids trapped in negative crystals at the time
23 of crystallization. Thus, halite becomes a true
24 solid and possesses no porosity except for
25 brine-filled negative crystals and, therefore, no

1 permeability.

2 Permeability tests performed on sale
3 cores either yield results that are beneath the
4 measurement capability of the test apparatus or,
5 if measurable, can be accounted for by fractures
6 induced into the sample. Generally, the halite
7 itself has very little porosity and no
8 permeability, but it is not completely
9 homogeneous. Thin mud or clay seams, fractures
10 and breccia pipes occur within the Salado halite.
11 The potash industry claims that these are paths
12 of fluid migration. Upon examination of the
13 facts, it is found that this is not entirely the
14 case.

15 Gas, of an inert nature, has been
16 associated with the clay seams that they had
17 mentioned. In fact, several in-mine explosions,
18 which were nonflammable, have been attributed to
19 gas that has collected at the interface of the
20 halite and clay seams. The Environmental
21 Evaluation Group of the New Mexico Health and
22 Environment Department state, in their March 1984
23 paper titled, Occurrence of Gases in the Salado
24 Formation, and it is in Appendix 3 of the Miner's
25 Bible, and I quote, "All salt deposits contain

1 some fluids, brine and gas, and the Salado
2 Formation is no exception. Within halite
3 crystals, gas can often be seen as a bubble
4 within a fluid inclusion.

5 "To estimate the percentage of fluids
6 in the halite crystals in the Salado Formation,
7 35 selected core samples from ERDA-9 borehole,
8 which is a WIPP-related borehole, were heated to
9 500 degrees Celsius and weighted before and after
10 the expulsion of gas and brine. The results
11 showed that more than half the specimen showed
12 only a .5 percent weight loss. The maximum
13 weight loss recorded by one sample was 3.5
14 percent.

15 "Since most of the fluid in the
16 inclusions consist of brine, total amount of gas
17 trapped within the crystals is negligible."

18 The report goes on to say, and I quote,
19 "Almost every reported encounter of gas in
20 potash mines, as well as near the WIPP
21 repository, is associated with either clay seams
22 or clay-enriched zone of salt. The composition
23 of the gas shows that it was mostly derived from
24 the original atmospheric air at the time of the
25 depositional Salado. The gas is depleted in

1 oxygen mostly due to high chemical activity of
2 oxygen which allows it to react to a variety of
3 elements to form oxides.

4 "Methane must have originated from
5 decomposition of marine organic life during times
6 when clays were deposited in the Salado sea. The
7 presence of gas near the clay layers is probably
8 due to the contrast of the mechanical properties
9 of the clay and salt. Gas originally trapped
10 must have migrated along crystal boundaries until
11 it reached the impermeable clay layer."

12 Thus, there are pockets of porosity at
13 the clay-shale interface, and gas has accumulated
14 at these pockets. The gas migrated probably over
15 thousands of years from fluid inclusions within
16 the salt. The clay itself is impermeable, and
17 the porosity pockets are limited in size and are
18 not connected to each other. When mining occurs
19 near an enclosed pocket containing confined,
20 pressurized gas, an explosion can occur, a
21 nonflammable explosion.

22 The nature of the explosions in the
23 mines can be explained by the limited nature of
24 the porosity pockets and the lack of permeability
25 between the pockets. If the pockets were

1 permeable and interconnected and not limited,
2 then the gas would continue to blow strongly
3 after the explosion, but this is not the case.
4 Only small blows continue after the explosions,
5 which is characteristic of limited cavities.

6 The Environmental Evaluation Group
7 report has a 1964 Department of the Interior
8 report within its Appendix A. This report
9 studied gas blows in the potash mines, and the
10 drilling of vertical boreholes into the back, and
11 at dripped intersections to relieve gas
12 pressure.

13 Some of the boreholes produced blows
14 and it seemed that the holes drilled in the
15 intersections were more likely to blow than holes
16 located elsewhere. In one of the intersections
17 the report states, and I quote, "Gas pressure in
18 one hole in the center of an intersection was
19 sealed in by means of a packer and gauge. The
20 pressure built up to 50 psi. A second hole,
21 drilled 20 feet from the original, and six feet
22 outside the intersection, did not reduce the
23 pressure in the original hole. Another hole
24 drilled in the intersection, seven feet from the
25 original, relieved pressure in the original

1 hole."

2 Thus, the permeability carried seven
3 feet, at least, but not more than 20. Looking at
4 the data from this report, it can be concluded
5 that the permeability between the two holes was
6 artificially enhanced by mining. The report
7 states that intersections were more likely to
8 have blows, and at the tested intersection, the
9 hole outside the intersection was not permeable
10 with holes in the intersection.

11 Conclusions drawn from this data are
12 that when the intersections are mined, support
13 underneath the back is removed and the back can
14 start sagging a little bit, thus creating space
15 above the back and thus artifically enhancing
16 porosity and permeability. This explains why the
17 two holes within the intersection were connected
18 and the hole outside the intersection was not.

19 Even if the porosity and permeability
20 are not artifically enhanced, the permeability
21 only had a maximum extent of less than 20 feet.
22 The same report notes that some of the holes have
23 pulsating blows.

24 This also can be explained by low
25 permeability. If a cavity is limited in size and

1 the surrounding rock has low permeabilities, gas
2 will bleed slowly into the cavity. At some point
3 the pressure will build up enough to bleed into a
4 nearby drilled relief borehole. When this
5 happens, the pressure in the cavity drops, and it
6 will take some time for the gas in the
7 surrounding rock to bleed into the cavity to blow
8 the pressure up again. Thus, low permeabilities
9 can explain these pulsating blows.

10 Another example of the limited nature
11 of the porosity pockets are seen when wells are
12 drilled in the Livingston Ridge area. Three
13 wells that Yates operated encountered gas pockets
14 while drilling through the Salado. In most
15 cases, when these encounters occur, the drilling
16 activity stops and the blow is allowed to die,
17 which occurred in a few hours. If the pockets
18 had any extent, they should have blown for far
19 longer periods of time.

20 Fractures within the halite are another
21 possible path of fluid migration. Fractures
22 induced in halite should naturally heal
23 themselves. Griswold, 1982, talks about the
24 plastic nature of halite and how, under pressure
25 from overburden, porosity is destroyed. The same

1 thing will happen to fractures unless the fluid
2 inside the fracture has a greater pressure than
3 the overburden. The Environmental Evaluation
4 Group report (1984) questions whether fractures
5 present at one explosion site were containing
6 gases or if the fractures were induced by the
7 explosion. That point is really kind of moot in
8 the context of this discussion. What is
9 important are the findings on how extensive the
10 fractures are.

11 The report states, and I quote, "The
12 fractures associated with the gas blow-outs,
13 however, are not continuous for more than a few
14 tens of feet. They are not intercepted in any of
15 the parallel drifts." Thus, fractures in halite
16 will tend to close up because of overburden, and
17 if they remain open they're limited in area, as
18 are the porosity pockets associated with the clay
19 seams.

20 The last possible path of fluid
21 migration would be breccia pipes, also known as
22 breccia chimneys and collapse chimneys. Snyder
23 and Gard, in 1982, in their U.S.G.S. report
24 titled, "The Evaluation of Breccia Pipes in
25 Southeastern New Mexico and their Relation to the

1 WIPP Site, which is in Appendix 20 of the Miner's
2 Bible states, and I quote, "Breccia pipes, also
3 called breccia chimneys, as they occur in
4 evaporites are vertical, cylindrical pipes or
5 chimneys that may or may not involve more than
6 one geologic formation. The chimneys are filled
7 with downward, displaced brecciated rock.

8 "In this context, the rock is
9 brecciated by having collapsed into a void at
10 depth that was probably created by ground-water
11 solution and removal of deep-lying evaporite or
12 carbonate rocks in an underlying aquifer system."
13 This describes the Capitan Reef. It is a major
14 aquifer system in this area, and it is composed
15 of carbonate rock.

16 Snyder and Gard in 1982 go on to say,
17 and I quote, "Because the Tansill and Yates do
18 not contain water-soluble evaporites, they are
19 probably not the cause of the collapse of
20 overlying rocks. Below these formations is the
21 Capitan Limestone, a somewhat soluble rock known
22 to contain large caverns, such as Carlsbad
23 Caverns. The most reasonable explanation for
24 collapse of the rocks cored in WIPP 31 is that a
25 large cavern formed in the Capitan, and overlying

1 rocks, as young as the Triassic Dockum Group,
2 collapsed into the void."

3 One suspected and three known breccia
4 pipes were identified by Snyder and Gard in 1982,
5 Hills A, B and C, plus the suspected Wills
6 Weaver. Snyder and Gard, in 1982, concluded that
7 breccia pipes only formed over the Capitan Reef.
8 The Livingston Ridge area is not over the Capitan
9 Reef. It is located basinward of the reef,
10 approximately five to six miles to the south, and
11 I would like to show my next exhibit, which is
12 Exhibit 20.

13 There's a lot of information on this
14 map, and some of the later witnesses will go into
15 great detail on what that means. The main thing
16 I want to point out, at this point, is the
17 location of the Capitan Reef front, which is an
18 approximation, and the location of Section 2,
19 colored yellow.

20 Section 2 is about five to six miles
21 south of the Capitan Reef in the basin. The
22 Capitan Reef extends from that line, that I have
23 drawn here, to the north, approximately 10-15
24 miles. Thus, no breccia pipes are present in the
25 area of Livingston Ridge. Some minor solution

1 features may occur in the Rustler formation above
2 the Salado, but they do not extend through the
3 Salado.

4 Snyder and Gard (1982) place the age of
5 the breccia pipes at approximately 400,000 to
6 500,000 years. One borehole, which is WIPP 31,
7 was emplaced in a breccia pipe and that is
8 located on the map as a dashed circle--that would
9 be in Section 5 of Township 21 South, 30
10 East--with continuous core being taken.

11 Drill-stem tests were also taken in
12 this borehole. Concerning the drill-stem tests,
13 Snyder and Gard in 1982 concluded, and I quote,
14 "Hydrologic tests," which are the drill-stem
15 tests, "show that the breccia pipe material is
16 not capable of transmitting ground-water. The
17 clay matrix surrounding the rock fragment acts as
18 an impermeable barrier, so there is probably no
19 additional dissolution of evaporitic rocks in the
20 pipe, at least in the upper 1800 feet above the
21 massive anhydrite found at the bottom of the
22 drill hole, WIPP 31."

23 Thus, Snyder and Gard feel that there
24 will be no fluid movement through the breccia
25 pipe down to the massive anhydrite, which is

1 probably the Fletcher Anhydrite, which is basal
2 Salado.

3 The data presented by the potash
4 industry shows that halite, in general, has very
5 little porosity and no permeability. The
6 possible exceptions to this, clay seams,
7 fractures and breccia pipes have been shown to
8 have some porosity but lack the properties to
9 transmit fluids over any distance.

10 Clay seams are limited and not
11 interconnected; fractures are present but only
12 tens of feet in length, and breccia pipes occur
13 in the Salado but only over the Capitan Reef
14 which is not present in the Livingston Ridge
15 area. It is true, fractures and voids do occur
16 as stated in concern No. 4, but this is the
17 exception and not the rule, and even if the
18 wellbore penetrated some of the fractures and
19 voids, they would be sealed off easily with
20 casing and cement due to their limited extent.

21 Q. Mr. May, with respect to your Exhibit
22 20, you've actually located the breccia pipes
23 that were discussed in this paper that was
24 included in what we've been calling the Miner's
25 Bible, is that correct?

1 A. Yes, I have. There's another one
2 located in Section 35, of 20 South, 30 East, and
3 although it's not marked on the map, there's
4 another one real close to it, and then the one
5 they call the Wills Weaver pipe is in Section 12
6 of 20 South, 29 East.

7 Q. Up in the upper left-hand corner which
8 is closer to, I guess, the old Wills Weaver Mine?

9 A. I believe so. I don't know why they
10 named it that.

11 Q. And all of these breccia pipes that
12 you've located on this map all appear in the
13 Capitan Reef front, which is above this line
14 you've drawn, a horizontal line across the
15 mid-point of this map?

16 A. They occur above the Capitan Reef.

17 Q. All right. Continue on.

18 A. Safety concern No. 3 refers to examples
19 of oil migration into mine workings, and
20 specifically refers to a serious case around 1965
21 where oil migrated 700 feet along clay seams from
22 a well into the Eddy potash mine. There have
23 been documented cases of oil seeps in the mine
24 workings, but there is no published evidence, at
25 least that I could find, that says that any of

1 these seeps are resulting from a leaking oil and
2 gas well.

3 The case mentioned above is part of
4 Appendix 21 of the Miner's Bible. The only
5 documents pertaining to this incident are a
6 memorandum on National Potash Company stationery,
7 accompanying map, a letter on file with the BLM
8 to Tidewater Oil Company which was the operator
9 of the nearby oil wells, and a memoranda on a
10 meeting between the U.S.G.S. and Tidewater, and
11 those last two I acquired from the U.S.G.S.

12 The Natural Potash memorandum refers to
13 an oil seep located in the northwest quarter of
14 Section 25 of Township 20 South, Range 29 East,
15 which is shown on Exhibit 20. The well in
16 question, I believe, was the one in the same
17 section in the very far northwest corner.

18 Q. In relation to the mines that are
19 listed here, so that the Commissioners can hone
20 in on this, which mine is that closest to?

21 A. That would be inside what is labeled on
22 this exhibit Eddy potash, but it was actually at
23 this time the natural potash mine, was the way I
24 understand it.

25 Q. I'm not sure if we've located that.

1 A. It would be in the northwest quarter of
2 Section 25, of Township 20 South, 29 East.

3 Q. This is on the very left edge?

4 A. Very left edge, and you see the mine
5 there.

6 Q. Just below the 20 South, 29 East
7 notation, you have Eddy Potash and it says oil
8 seeps and mine workings, is that correct?

9 A. Yes, that one specifically in that
10 section is the one I'm talking about.

11 Q. All right. If you could, continue on.

12 A. The U.S.G.S. was notified, and everyone
13 involved in the case assumed the oil was coming
14 from one of Tidewater's oil wells. No study was
15 performed to determine the origins of the oil,
16 and no evidence showing that the oil from the
17 Tidewater wells has ever been published, at least
18 as far as I could find.

19 The U.S.G.S. did ask Tidewater to
20 perform tests on their wells to determine if they
21 were leaking, but due to the poor economic status
22 of the wells and the cost of the test, Tidewater
23 opted to plug the wells in question. Whether the
24 seeps stop before, during or after the plugging
25 operations, I do not know. I could not find any

1 information on that.

2 Q. When were these wells, would they have
3 been drilled in an era prior to the adoption of
4 R-111-P?

5 A. Yes.

6 Q. And the casing requirements that are
7 also incorporated in R-111-P?

8 A. Yes, that's true. Also included in
9 Appendix 21 of the Miner's Bible, along with the
10 National Potash memorandum, is a memorandum from
11 Potash Company of America, referring to two other
12 oil seeps in 1965. The next one I'll talk about
13 is just to the northeast of the one I finished
14 describing in Section 24, of the same township
15 and range. I believe the wells in question are
16 in the far southwest corner of that same section.

17 Q. Actually, this notation says "oil seeps
18 and mine workings," and the arrow actually points
19 to two different locations, does it not?

20 A. Yes.

21 Q. One's in 25 and the other is in 24?

22 A. And the National Potash was the one in
23 25, which I just described, and the one in 24 is
24 the one I'm talking about right now. This seep
25 was reportedly associated with a fine vertical

1 fracture extending above and below the ore body.
2 Again, all parties involved assumed the oil was
3 coming from nearby leaking oil wells and again no
4 study was performed nor any evidence offered that
5 this was the case.

6 Included with the memorandum was a map
7 showing the location of the seeps, the oil wells
8 and the mine workings on those maps, the PCA
9 seep, and I should point out that the PCA seep
10 has mine workings on their map that they
11 submitted with that memorandum, as mine workings
12 in between the reported seep and the suspected
13 wells. If the oil had seeped from the wells, it
14 would seem that there should be more seeps or
15 stains in the workings closest to the wells in
16 question, but there were none that I could find
17 that were reported.

18 And the last seep that I talked about
19 is in the northwest quarter of Section 9 of
20 Township 20 South, Range 30 East, which would be
21 northeast about three or four miles from the well
22 I was talking about. It's the map showing two
23 seeps reporting in the mine workings and shows
24 some oil stains in the nearby potash core.

25 The well in question is in Section 8,

1 along the east line. It's a dry hole shown on
2 this map. Again, no evidence was presented nor a
3 study conducted to prove that the oil actually
4 came from a nearby well. As stated above,
5 there's no available evidence supporting the idea
6 that sources for oil seeps and mine workings are
7 oil wells, but there is a U.S.G.S. Open File
8 Report suggesting that some of the oil seeps are
9 naturally occurring. Open File Report 82-421,
10 which is Exhibit No. 21, entitled Geochemical
11 Analysis of Potash Mine Seep Oils, Collapsed
12 Breccia Pipe Oil Shows and Selected Crude Oils,
13 Eddy County, New Mexico, suggests that the oils
14 in the studied seeps were naturally emplaced and
15 did not leak from present oil wells.

16 This study examined oil samples from
17 core holes in two breccia pipes, which were Hills
18 A and C, which I pointed out in Section 5,
19 Township 21 South, Range 30 East, which was
20 related to the Mississippi Chemical Potash Mine.
21 This also associated oil samples from different
22 wells completed in different formations to
23 determine the origins of the seep oils.

24 And I would like to turn to figure 1,
25 page 19 of Exhibit 21. This is just another

1 location map showing Hill A and Hill C with
2 the--with what we use in the oil and gas industry
3 as gas wells, but they're using it here to show
4 breccia pipes.

5 I would also like to point out the
6 location of the approximate reef front, the
7 Capitan Reef on this. The samples from the cores
8 and seeps were compared chemically with the
9 samples from the different wells to determine
10 which geologic formation the oils were derived.
11 The samples were found to be most similar to the
12 oils from the Yates Formation. This also fits
13 geologically, as previously stated breccia pipes
14 form over the Capitan Reef.

15 When the Capitan Reef collapsed forming
16 breccia pipes strata in the Seven Rivers, Yates,
17 Tansill, Dewey Lake, and Dockum, caved into the
18 void created in the Capitan Reef. The U.S.G.S.
19 report, concludes, and I quote from page 14, "The
20 breccia pipe and mine seep oils were probably
21 emplaced during or sometime after brecciation,
22 fracturing and faulting of rocks in response to
23 the dissolution of the Capitan Limestone, a reef
24 facies, and subsequent caving of the overlying
25 rocks. Partial leakage from disrupted Yates oil

1 reservoirs probably accounts for the above oil
2 shows."

3 Thus, the oil leaked out of the
4 breached Yates Formation and made its way into
5 the Salado via the breccia pipe. Snyder and
6 Gard, in their 82 paper, conclude and I quote,
7 "It's possible that oil from this formation,"
8 and they're referring to the Yates, "migrated
9 toward the area of the breccia pipes and either
10 entered the rocks before collapse occurred or it
11 was forcefully emplaced during collapse, being
12 pushed stratigraphically upward by hydrostatic
13 pressure as water in the underlying void was
14 forced upward by infalling rocks."

15 The possibility exists that there is
16 some communication within the breccia pipe and
17 oil could have leaked upward after the pipe was
18 formed; but the key point made is that the oil
19 found in the Salado was emplaced naturally.

20 To the knowledge of myself, all of the
21 reported oil seeps that I have seen have occurred
22 in an area which overlies the Capitan Reef.
23 Knowing that breccia pipes only form in the same
24 area and that breccia pipes are associated with
25 oil seeps, I've concluded that the reported oil

1 seeps in the mine workings are naturally
2 occurring and are not from oil and gas wells. I
3 have seen no available proof that any oil seep
4 was related to oil and gas wells.

5 Q. Isn't it also true, Mr. May, that any
6 of the wells that were pointed to as maybe being
7 associated with these seeps were all wells
8 drilled prior to the adoption of R-111-P and the
9 more stringent casing requirements?

10 A. Are you referring to the location map?

11 Q. Yes, the wells that we're talking--

12 A. Oh, yes, yes.

13 Q. All right, sir. If you would continue
14 on with your testimony.

15 A. Safety concern No. 5 discusses the
16 problems encountered when hydrogen sulfide is
17 present. This is not a problem when drilling oil
18 wells in the Delaware Mountain Group such as the
19 ones located in the Livingston Ridge area. Oil
20 produced from the Delaware is sweet, which means
21 there's no sulphur or hydrogen sulfide present.
22 It is common knowledge throughout the petroleum
23 industry in southeastern New Mexico, that
24 Delaware oil is sweet. And it is also stated in
25 publications, such as an article titled, Oil and

1 Geology in the Permian Basin of Texas and New
2 Mexico, authored by Mr. John Galley, page 432.

3 In the Livingston Ridge area, the only
4 time hydrogen sulfide has been encountered was
5 when drilling through the Upper Castile Formation
6 and only in a few wells. A water flow was
7 encountered along with small amounts of hydrogen
8 sulfide. Water and hydrogen sulfide were
9 detected coming up with the circulating drilling
10 mud. This hydrogen sulfide was natural from the
11 Castile Formation. Commercial sulfur deposits
12 occur in the Castile across the state line in
13 Texas, in the Delaware Basin.

14 Griswold, in 1982, even mentions
15 hydrogen sulfide occurring naturally in the
16 Solado. The Delaware produces sweet oil so no
17 hydrogen sulfide will come from this formation.
18 The only time hydrogen sulfide might be
19 encountered is when drilling through the Castile
20 or Salado.

21 An intermediate string is set through
22 the Castile and Salado and drilling resumes into
23 the Delaware. Thus, any hydrogen sulfide is
24 behind casing. Even if hydrogen sulfide did
25 reach the level of the Salado, which is highly

1 unlikely, you would have to penetrate back into
2 the Salado which, in my opinion, would not happen
3 for the reasons I discussed earlier.

4 Q. Is that because of the lack of
5 permeability of the Salado Formation?

6 A. That's true. I should note that only
7 four of the 29 wells in the actual Lost Tank and
8 Livingston Ridge pools that Yates has operated in
9 the Livingston Ridge area have encountered any
10 hydrogen sulfide.

11 In summary, the potash industry has
12 stated several safety concerns involving oil and
13 gas activity within the potash enclave. It is
14 stated that there are voids and fractures in the
15 salt that will allow migration of fluids into the
16 mine. It is true that there are voids and
17 fractures within the Salado, but this is the
18 exception and not the rule. These voids and
19 fractures are very limited in area and are not
20 innerconnected and will not allow fluids to
21 freely migrate any distance in the Salado.

22 The potash industry correctly states
23 that there are documented examples of oil
24 migration into mine workings, but then they go on
25 to state that the oil is migrated from an

1 improperly plugged well. There is no
2 documentation of this that I can find, nor is
3 there any published proof back in this state that
4 I can find.

5 There is a published U.S.G.S. report
6 showing that many of the oil seeps are natural
7 and not caused by oil and gas activity. Also,
8 all the published reports of oil seeps appear to
9 be located over the Capitan Reef area. And I've
10 stated before that breccia pipes are associated
11 with the oil seeps and the reef. The Livingston
12 Ridge area is several miles south of that reef
13 and out of the breccia pipe area. Hydrogen
14 sulfide is a concern of both the potash and the
15 oil and gas industries.

16 The Delaware oil is sweet, it contains
17 no sulfur. The only hydrogen sulfide encountered
18 when drilling the Delaware wells was in the
19 Castile, and has only been in a few wells in the
20 Livingston Ridge area.

21 Q. The last page of that Exhibit 17 is a
22 list of references?

23 A. Just the references that I referred to.

24 Q. Mr. May, do you have any further
25 comments to make with respect to the exhibits

1 that have been prepared by you, and your
2 testimony before the Commission?

3 A. Not presently, no.

4 MR. CARROLL: Mr. LeMay, I would pass
5 the witness, then, at this time.

6 CHAIRMAN LEMAY: Mr. High, you may
7 proceed.

8 EXAMINATION

9 BY MR. HIGH:

10 Q. Mr. May, you say you've been with Yates
11 for three years?

12 A. Yes, sir.

13 Q. Where did you work before that?

14 A. I worked for an environmental firm in
15 Houston.

16 Q. What were you doing for them?

17 A. I was a hydrogeologist.

18 Q. How long have you been out of school?

19 A. I graduated with a master's degree in
20 1989.

21 Q. That was three years ago?

22 A. Excuse me, 1988.

23 Q. Four years ago. I'm sorry.

24 A. Yes.

25 Q. How long did you work for the

1 environmental firm?

2 A. Approximately nine months.

3 Q. Was that right after you got your
4 degree?

5 A. After I got my master's degree, yes.

6 Q. Was that your first professional
7 employment in the area of geology?

8 A. In the area of geology, yes.

9 Q. Yates was your second?

10 A. That's true.

11 Q. From the time you got your master's
12 degree, it's been four years, and you've had
13 those two jobs?

14 A. Yes, sir.

15 Q. Have you ever worked in a mining
16 industry?

17 A. No, I have not.

18 Q. Have you ever worked for a potash mine?

19 A. No, I have not.

20 Q. Have you ever been inside of a potash
21 mine?

22 A. I have not been inside of a potash
23 mine.

24 Q. Have you ever done any laboratory test
25 using potash?

1 A. No, I have not.

2 Q. Have you ever done any laboratory test
3 on gas migration through mud seams?

4 A. Not laboratory tests, no.

5 Q. Have you ever done any laboratory tests
6 on gas migration through anything?

7 A. No, I have not.

8 Q. Have you ever done any on-site test of
9 gas migration in the potash basin?

10 A. No, I have not.

11 Q. Have you ever hired anybody to do any
12 of those kinds of tests?

13 A. No.

14 Q. Would it be a fair statement to say
15 that your testimony this morning, to the extent
16 that it consisted of reading the document that
17 you've marked Exhibit No. 17, is simply your
18 comments on the literature that's been written on
19 the subjects that you talked about?

20 A. I went through the data and made my
21 conclusions from that, relying on-- My job at
22 Yates Petroleum is to find porosity and
23 permeability in hydrocarbon-bearing zones, plus I
24 applied that to the salt section, plus my
25 background knowledge of geology in general.

1 Q. You used your four years of knowledge
2 of geology?

3 A. It would be more than that. I have a
4 master's degree. Six years.

5 Q. Six years. And the literature,
6 whatever information was in the literature is
7 what you used to write Exhibit No. 17?

8 A. Yes, sir, that's true, basically from
9 mostly the potash data.

10 Q. From what?

11 A. From data we received from the potash
12 industry.

13 Q. You were just commenting on it?

14 A. Yes.

15 Q. Do you feel, Mr. May, that when lives
16 may be at jeopardy that research and tests ought
17 to be conducted on a fairly high level of
18 sophistication?

19 A. Sure.

20 Q. Do you think that your conclusions were
21 based upon research and studies of a high level
22 of sophistication?

23 A. I used basically your data from the
24 potash industry.

25 Q. You've commented on our data?

1 A. Yes, I have.

2 Q. You didn't do any studies or anything
3 else yourself?

4 A. I studied the material.

5 Q. So you think your opinions, your
6 comments as shown in Exhibit 17, reflect a high
7 level of professional research and comments?

8 A. Yes.

9 Q. Do you know what hazard methane gas
10 presents to underground mining?

11 A. I'm sure it presents a very large
12 hazard.

13 Q. Do you know what that hazard is?

14 A. An explosion.

15 Q. Do you know how much methane it takes
16 to propagate an explosion?

17 A. I don't have that number on the top of
18 my head, no.

19 Q. Do you think that's something that
20 would be important if you're talking about gas
21 migration, how much it will allow to flow into a
22 mine?

23 A. That's true, but I'm saying that there
24 should be hardly anything flowing. There should
25 be no-- I've said that this salt is impermeable.

1 Q. You referred to a study by Mr. George
2 Griswold?

3 A. Yes.

4 Q. Do you disagree with that study in any
5 way?

6 A. In basic context, no.

7 Q. I'm going to go through some of these
8 comments here. Do you know why Mr. Griswold was
9 talking about the gas that may be found in the
10 crystals? You quoted all of that here. Do you
11 know what he's talking about here?

12 A. I believe so. He's trying to
13 determine, the way I understood his article, he
14 was trying to show the nature--where the natural
15 occurring gases in the Salado come from.

16 Q. He wasn't talking about migration, was
17 he?

18 A. Well, he did talk about, if I'm
19 remembering his paper correctly, he did talk
20 about migration on a small scale through the
21 crystals.

22 Q. Are you familiar with the geology of
23 domal salt mines?

24 A. A little bit, through the crystals.

25 Q. Do you know how methane gas occurs in a

1 domal salt mine?

2 A. From what I understand on a domal salt
3 mine, usually hydrocarbons are present in
4 association with salt domes, and usually these
5 salt domes have moved because they are of a
6 lighter density in the overlying formations, and
7 through this movement they have undergone several
8 physical changes.

9 Q. Well, my question is, do you know how
10 the methane occurs in a domal salt mine?

11 A. I assume if there's methane occurring
12 in domal salt mines, I assume it comes through
13 fractures through the salt which were induced
14 through the movement of the salt.

15 Q. Are you guessing, Mr. May, or is that--

16 A. That's based on the knowledge that I
17 have.

18 Q. And if the evidence is that that's not
19 what happens, would you dispute that?

20 A. I don't think I could because I'm not
21 well read or up to par on that.

22 Q. You did understand that George Griswold
23 was talking that the gas, the methane gas that
24 was encapsulated in the crystals in the halite in
25 the potash basin, were not the hazard?

1 A. Yes, I understand that, yes, and I'm
2 sorry if I alluded to that but I'm not trying to
3 say that, that the natural occurring gases of the
4 Salado are not a hazard. I'm not trying to say
5 that.

6 Q. Well, gases in the Salado can occur in
7 a number of ways, right?

8 A. What do you mean?

9 Q. Can the gases be entrapped in the
10 halite crystals?

11 A. I would assume so.

12 Q. And George Griswold said that was not a
13 problem in the basin?

14 A. I assume, yes.

15 Q. Gases may occur in the bedded deposits
16 in the Salado Formation?

17 A. The natural gases, yes, I assume so.

18 Q. You talked about the halite being
19 impermeable?

20 A. Yes.

21 Q. And also, in referring to your Exhibit
22 No. 19, which is the generalized cross-section,
23 you don't show all the bedded deposits in this--

24 A. No, it's just a generalized section.

25 Q. You are aware, or are you aware, that

1 there are bedded deposits in the potash basin
2 consisting of materials other than halite?

3 A. Sure. There's potash materials and
4 clay seams, and there could be other evaporite
5 minerals.

6 Q. Did you address anywhere the extent to
7 which those deposits might provide a path of
8 migration?

9 A. Halite is the major component of a
10 Salado, and the way I understand, especially the
11 way the potash minerals form, is that they're
12 encapsulated within the halite. Potash minerals
13 are also evaporitic and should have fairly
14 similar qualities to halite.

15 Q. My question, Mr. May, is did you
16 evaluate at all--

17 A. I believe I did.

18 Q. Let me finish. Did you evaluate at all
19 the extent to which gas might migrate along
20 bedded deposits other than halite?

21 A. I believe I did, yes.

22 Q. Did you do any studies on that?

23 A. As far as laboratory studies?

24 Q. Any studies in the field, the
25 laboratory or whatever.

1 A. I reviewed the data available.

2 Q. Tell me what data you reviewed
3 concerning the migration of gas along the bedded
4 deposits containing anhydrite.

5 A. Including anhydrite?

6 Q. Yes, sir.

7 A. That there are--that, I included,
8 basically in general within the halite. The
9 anhydrite is going to act plastically in a
10 similar fashion to the halite, the way I
11 understand it.

12 Q. What happens to an anhydrite bed when
13 it's opened up into the atmosphere?

14 A. To the atmosphere? I'm sure when you
15 relieve the confining pressure it might expand a
16 little bit.

17 Q. Well, do you know?

18 A. Based on my knowledge of geology,
19 that's what I would expect.

20 Q. It's your testimony here today that
21 when the strata is opened up and the anhydrite
22 beds are exposed to the general mine atmosphere,
23 they expand?

24 A. I would assume. How much, I'm not
25 sure.

1 Q. Is it your conclusion, Mr. May, that
2 all the hoopla from the potash industry about its
3 concerns over the possible migration of methane
4 gas into underground mines is simply totally
5 lacking in foundation?

6 A. Totally lacking in foundation?

7 Q. Yes, sir.

8 A. When it's concerned to low-pressure
9 Delaware oil wells--

10 Q. I don't want you to qualify it. I'm
11 asking you, is it your testimony to this
12 Commission that the potash industry's expressed
13 concern over the possibility of gas migrating
14 into our underground workings is a big to-do
15 about nothing.

16 A. Not about nothing, no.

17 Q. It can happen, can't it, Mr. May?

18 A. It depends on what circumstances you're
19 talking about.

20 Q. Well, is it your testimony here today
21 that there are some circumstances under which
22 methane might migrate from an oil and gas well
23 into an underground potash mine?

24 A. Anything's possible, but I believe that
25 to be a small possibility.

1 Q. But you're not saying that the geology
2 is such that there is never an instance to
3 prevent that migration from happening?

4 A. Like I said, anything is possible. I'm
5 saying there's a large likelihood that it will
6 not happen.

7 Q. Do you know what type gases are
8 generally encountered by the potash?

9 A. From what I understand, mostly it's
10 nitrogen.

11 Q. Do you know where they're encountered?

12 A. You mean within the mines?

13 Q. Well, what occurs prior to the
14 encounter with this gas you're talking about?

15 A. I'm not sure I'm getting the drift of
16 your question.

17 Q. Do you know when it is that the potash
18 mines encounter gas? What it is that they're
19 doing at the time they encounter the mines?

20 A. They're mining, is what I understand
21 they're doing.

22 Q. Beyond that you don't know?

23 A. That's-- On the data I reviewed,
24 that's what I understood, that they encountered
25 the gas when they were mining and encountered the

1 gas in their vertical boreholes that they drilled
2 to relieve pressure in the back.

3 Q. Do you know what an air relief hole is?

4 A. I assume that's what I was talking
5 about.

6 Q. That's what you called a vertical
7 borehole?

8 A. Yes.

9 Q. Do you know how high those go up?

10 A. Is it, what, approximately, I'm not
11 sure offhand, but I'm sure it's several feet.

12 Q. Would you think it's important to know
13 how far that went up and what it intersected in
14 talking about the possibility of the migration of
15 methane gas?

16 A. I'm sure it is.

17 Q. Did you look at that issue?

18 A. Yes, but I can't give you that figure
19 off the top of my head right now.

20 Q. Do you know the type bed that those air
21 relief holes encounter when they go up?

22 A. Evaporites.

23 Q. Beyond that, can you be more specific?

24 A. I mean in general. I don't know
25 specifically, but evaporites; halite, polyhalite,

1 potash minerals, clay seams.

2 Q. You referred to, and these pages are
3 not numbered but it's on page 3, you refer to
4 pockets of porosity at the clay salt interface,
5 and gas has accumulated in these pockets. Have
6 you found where I'm reading from the third page?
7 Are you with me?

8 A. Yes.

9 Q. The paragraph starts, "There are
10 'pockets' of porosity at the--

11 A. Yes.

12 Q. --clay salt interface, and gas has
13 accumulated at these pockets"?

14 A. Yes.

15 Q. Right?

16 A. Right.

17 Q. The next sentence says, "The gas
18 migrated probably over a period of thousands of
19 years from the fluid inclusions within the salt"?

20 A. Yes.

21 Q. That's gas migration, isn't it?

22 A. Yes.

23 Q. So, there can be some migration in the
24 potash basin, right?

25 A. Over a period of thousands of years.

1 Slow. Very slow.

2 Q. You wouldn't have any way of measuring
3 that, would you?

4 A. No, I don't.

5 Q. You go on to talk about explosions.
6 What do you mean by the term "explosion"?

7 A. The way I understand it in the data is
8 when, during mining, they encounter a high
9 pressure gas zone, and then the salt within the
10 mine was removed, it relieved the confining
11 pressure and thus there was an expansion of the
12 confined gases, creating an explosion.

13 Q. You're not talking about explosions
14 that propagate flames?

15 A. No, no.

16 Q. Are you aware, Mr. May, of any incident
17 in the potash basin in which methane gas has been
18 ignited in an underground mine?

19 A. I'm not aware of that, no.

20 Q. Are you familiar with the work done by
21 Mr. Rutledge?

22 A. I believe I've read a few papers by Mr.
23 Rutledge.

24 Q. Did you read all of his papers?

25 A. I can't say I've read all of them.

1 I've read some. I've read all I can find.

2 Q. Do you know the scope of the studies he
3 did on the profitability of migration in the
4 basin?

5 A. From what I remember of the name
6 Rutledge, I remember reading some articles on
7 potash geology, and that's basically all I can
8 recall right now.

9 Q. Do you recall him talking about small
10 vugs in the overhead? Do you know the word vugs,
11 V-U-G-S?

12 A. I'm familiar with vugs, yes. I might
13 have. I mean, I can't recall at this point.

14 Q. What is a vug?

15 A. A vug is a small porosity. It's
16 porosity. It's porosity.

17 Q. And he observed some of those in the
18 underground mine, didn't he?

19 A. He probably did, yes.

20 Q. Up in the back. Will a vug allow
21 migration?

22 A. If it has no permeability, no. If it's
23 not connected with any other porosity, no.

24 Q. Does the mining, the activity of
25 mining, have any affect at all on the possibility

1 of these deposits allowing migration?

2 A. I would say so, yes, because as you
3 relieve the pressure, the confining pressure on
4 the rock near the mine workings, that could open
5 up some areas like I described in that
6 intersection. It would relieve the pressure and
7 maybe some of the bedding plains would part a
8 small amount.

9 Q. Ground that has been disturbed by
10 mining activities would have a greater tendency,
11 would it not, to allow migration than these other
12 areas you're talking about?

13 A. Yes.

14 Q. Are you aware of the experiences of
15 drilling air relief holes in intersections at
16 distances greater than those you referred to in
17 Exhibit 17?

18 A. That's the only example I found.

19 Q. Do you know whether or not other mines
20 have also drilled air relief holes?

21 A. I would assume they have, yes.

22 Q. Do you think that what they encountered
23 would be important, Mr. May, before you reached
24 any kind of conclusion?

25 A. Yes, but I did not find any of those.

1 Q. Did you contact any of the other potash
2 mines?

3 A. I went through the data available.

4 Q. My question was, did you contact any of
5 the other potash mines?

6 A. No.

7 Q. So, if they had done or had any
8 experiences with migration from intersection to
9 intersection and the length of those, you
10 wouldn't have any knowledge of that, would you?

11 A. I am not privy to any of the potash
12 company's files. This is all based on public and
13 published data.

14 Q. Well, do you feel like your study here
15 and the conclusions you reached, it is as
16 supported as you can get it?

17 A. I believe so, yes.

18 Q. You don't feel like you need to get any
19 other studies to support this?

20 A. As far as I can find from the published
21 data, I believe that, yes.

22 Q. Now, these oil spots that you talk
23 about, have you ever seen any of them?

24 A. I have not seen any of them in a potash
25 mine, no.

1 Q. Have you ever seen the breccia pipes?

2 A. I have not been inside a potash mine,
3 as you asked before, so I have not seen those
4 breccia pipes, no.

5 Q. Do you know whether or not any of those
6 oil spots in the potash mine have actually flowed
7 with oil?

8 A. I read where some of them did flow some
9 oil, but, from what I understand, small amounts,
10 and I believe the one instance, off the top of my
11 head, they tamped a wooden peg in and stopped the
12 flow.

13 Q. Do you think the presence of these
14 multiple oil spots is some indication that the
15 oil and gas industry and the potash industry are
16 getting real close together in the potash basin?

17 A. No.

18 Q. You think all of these are just
19 naturally occurring?

20 A. Based on the data I've gone through,
21 that's the conclusion I've drawn.

22 Q. Did you find any oil spot, Mr. May, in
23 the potash basin, whether it was in the old PCA
24 mine or the Mississippi Chemical mine, did you
25 find any oil spot that was not in close proximity

1 to an oil spot?

2 A. Did I not?

3 Q. Did you find any oil spot in the potash
4 basin that was not in close proximity to an oil
5 well?

6 A. I can't say that I did on the reported
7 oil seeps, no. Maybe I should ask you what you
8 mean by "close."

9 Q. Would you consider 700 feet in close
10 proximity to an oil well?

11 A. Okay. I'll go with that.

12 Q. Did you find any, and let me ask the
13 question again, did you find any oil spots that
14 were not in close proximity to an oil well?

15 A. No, I did not.

16 Q. Did you think that the fact that these
17 oil spots all seemed to have occurred in close
18 proximity to an oil well, would make it incumbent
19 upon somebody to investigate where they came
20 from?

21 A. Yes.

22 Q. Would that be particularly true if you
23 were concerned about an explosion underground in
24 a mine?

25 A. I would think so, yes.

1 Q. Would the presence of oil give you
2 cause to think that perhaps methane was
3 accompanying it?

4 A. Yes.

5 Q. And if you get methane in a mine and
6 you have a spark, there can be an explosion,
7 right?

8 A. Yes.

9 Q. Do you know of any studies, other than
10 those that you cite in the paper, that have
11 studied where this oil came from?

12 A. No. That's the only one I found.

13 Q. Do you know of any study that concluded
14 that the oil spots did not come from the oil
15 well?

16 A. Could I hear that question again,
17 please?

18 Q. Yes. Do you know of any study that
19 reached a firm conclusion, let's say, that the
20 oil spots did not come from these oil wells?

21 A. The one in my Exhibit 21.

22 Q. Which one is that?

23 A. It's the article on Geochemical
24 Analysis of Potash Mine Seep Oils.

25 Q. Is this the Parson study? I'm sorry,

1 Exhibit what?

2 A. Exhibit 21.

3 Q. I mean the Palacas study. Did they
4 conclude it doesn't come from an oil well?

5 A. They concluded it was natural. It came
6 from the Yates reservoir.

7 Q. Weren't they studying, Mr. May, whether
8 or not this particular oil spot came from oil
9 that had been poured down a potash borehole?
10 Isn't that what they were studying?

11 A. Yes, they looked at that.

12 Q. And they concluded that the oil spot
13 did not come from the five-gallons or so that had
14 been poured down that borehole?

15 A. That's right.

16 Q. They did not really study, did they,
17 whether or not that oil came from any oil well,
18 did they?

19 A. Their conclusions were they were
20 naturally emplaced, and that's what they studied.

21 Q. Well, the study will speak for itself.
22 Do you know anything about a dike that
23 runs across the basin?

24 A. I've heard of that, yes, and I've seen
25 a few references on it.

1 Q. You haven't gone underground anywhere
2 and observed it, have you?

3 A. No.

4 Q. Do you know whether or not there's any
5 fractures coming off that dike anywhere?

6 A. I don't know, because I haven't
7 observed it.

8 Q. How far does the dike go across the
9 potash basin?

10 A. I'm not sure, right off the top of my
11 head.

12 Q. Wouldn't it seem to be important, Mr.
13 May, to know the extent to which that dike
14 intersects or does not intersect the various
15 horizons through the potash basin?

16 A. From what I understand, from what I
17 remember, that dike runs well north of the area
18 that we're speaking about.

19 Q. Do you know what the mining experience
20 has been around that dike?

21 A. No, I don't.

22 Q. Do you know any of the geological
23 characteristics that are encountered in close
24 proximity of the dike?

25 A. All I can say is that I know there's a

1 dike through the potash area.

2 Q. Well, you're talking here and
3 testifying this morning and reading from Exhibit
4 No. 17 about the fractures being very small and
5 short. You're not saying there may not be other
6 fractures out there than may be larger than one
7 you referred to, are you?

8 A. Based on the data I have, that's what
9 I've given.

10 Q. Are you willing, Mr. May, to expose
11 underground miners to a potentially
12 life-threatening hazard by simply looking at
13 what's published and not going beyond that?

14 A. I don't want to expose anybody to any
15 hazardous situation.

16 Q. Would you agree with me that before
17 people are exposed or asked by an employer to be
18 exposed to a life-threatening situation, there
19 ought to be some very detailed studies done on
20 the issue?

21 A. Sure.

22 Q. Are you prepared to tell the potash
23 companies that, based upon your study, that we
24 are to expose our miners to hazardous methane
25 gas?

1 A. I'm not saying anything about exposing
2 anybody to anything.

3 Q. Are you saying, through your study and
4 testimony, that our miners are not exposed to the
5 possibility of the migration of methane gas?

6 A. I'm saying that there should be no
7 exposure of methane gases from what I discussed
8 related to Delaware oil wells.

9 Q. So we shouldn't blow up our people
10 underground?

11 A. No.

12 Q. And you're willing to go to the bank
13 with that?

14 A. There's a small-- You can't guarantee
15 anything in life, but there is an extremely
16 small, extremely small possibility that that
17 would happen.

18 Q. And you believe that based just on the
19 study that you've done?

20 A. Yes.

21 Q. And you don't believe that these oil
22 spots or that the available evidence supports the
23 idea that the oil seeps in the mine workings came
24 from these oil wells?

25 A. From the data I've reviewed, the only

1 conclusion I can draw is that they were natural.

2 Q. Did you take into account whether or
3 not the changing stresses from mining--

4 A. I have to go on.

5 Q. Excuse me. Let me finish my question.

6 A. I'm sorry.

7 Q. --whether or not the changing stresses
8 from mining may have played some part in the
9 appearance of these oil seeps?

10 A. I went on the information available to
11 me and drew the conclusions I did off the
12 available data I had.

13 Q. Are you aware, also, Mr. May, that when
14 the WIPP people were drilling some core holes,
15 they also intersected some oil spots in those
16 core samples?

17 A. No, I'm not aware of that.

18 Q. You didn't read that in the literature?

19 A. I can't recall it off the top of my
20 head.

21 Q. Did you look at, I believe it's WIPP
22 core hole No. 31?

23 A. Yes. I did not look at any core
24 descriptions, but I'm aware of WIPP 31, and WIPP
25 31 is the well that I pointed out associated with

1 Mississippi Chemical. It drilled through that
2 breccia pipe and it's what Exhibit 21 talks
3 about.

4 Q. Okay. Well, would it make a difference
5 to you that aside from the oil spot on the
6 breccia pipe, that WIPP core hole 31 also had oil
7 spots in it?

8 A. It also had oil spots and it was cored
9 inside the breccia pipe.

10 Q. Okay. Are you aware of any of the
11 other WIPP core samples that also had oil spots
12 on them?

13 A. That's the only one I can think of
14 right off the top of my head.

15 Q. If there's any others in the
16 literature, you overlooked them?

17 A. Based on the data available, the only
18 ones I've come up with are the ones I've
19 discussed, and nowhere have I seen documentation
20 that any of the oil seeps related to oil and gas
21 wells.

22 Q. Well, did you approach this concept,
23 Mr. May, with the idea that these oil seeps did
24 not come from the wells unless I find evidence
25 that they did?

1 A. I approached this from an attitude that
2 I was going to research the public data
3 available.

4 Q. And you've encountered H₂S in four out
5 of the 29 wells in the area?

6 A. Approximately, yes.

7 Q. That's 14 percent, roughly?

8 A. If you say so.

9 Q. Do you think that's a lot?

10 A. No, especially considering the small
11 amount of H₂S encountered.

12 Q. Now, on the significance of the geology
13 that you explained to us about this western
14 part--

15 A. As far as Livingston Ridge?

16 Q. Yes. And then you're looking over to
17 the western side, most of the activity so far has
18 been on the eastern side?

19 A. That's correct.

20 Q. And now you're saying there may be
21 something over on the west side?

22 A. That's correct.

23 Q. You referred to an exhibit where a well
24 had been spotted?

25 A. Yes.

1 Q. What do you mean? That's just where
2 you want to drill?

3 A. That was a location spotted by Phillips
4 Petroleum. They have intentions to drill there.

5 Q. And that's also located on the lease
6 that Yates and Pogo bought, isn't that correct?

7 A. I believe so, but that was spotted
8 before that lease was bought.

9 Q. When did you reach the conclusion that
10 there may be more of this Livingston Ridge stuff
11 out west?

12 A. As I was talking about--when I went
13 through the history of drilling the different
14 wells, and when we had drilled one of the wells
15 and thought we were to the western extent, we
16 decided to go one more further and encountered a
17 thicker sand.

18 Q. My question is when.

19 A. A date?

20 Q. Yes.

21 A. I don't think I could give a date off
22 the top of my head.

23 Q. In the last year? two years?

24 A. Within the last year, I would think,
25 yes.

1 Q. Is that one of the reasons that Yates
2 decided to go in and bid on the potash leases in
3 Section 3?

4 A. I have no idea on that. I was not
5 directly involved in that.

6 Q. Now, Exhibit No. 20 is a map. Do you
7 know who made that map?

8 A. Who made the map?

9 Q. Yes, sir.

10 A. There were several people that made the
11 map. Well, actually, it was taken from,
12 originally, the 1984 BLM potash map. And, as I
13 stated earlier, one of the next witnesses down
14 the line will describe in more detail all the
15 various features.

16 Q. I understand what you said about that.
17 My question is, who made the map? Did you help
18 make the map?

19 A. Our drafting department did, under my
20 supervision.

21 Q. Would you agree with me, Mr. May, that
22 when we're talking about something as serious as
23 we're talking about here, the possible migration
24 of methane gas, and I use the word "possible,"
25 that the consequences of it happening is

1 something that ought to be taken into
2 consideration in whatever we do?

3 A. Sure.

4 Q. You don't have any problems with that,
5 do you?

6 A. No.

7 Q. That if the consequences were
8 insignificant, we might be expected to take more
9 risk, right?

10 A. If you say so, yes.

11 Q. But if the consequences were of greater
12 magnitude, then you would tend to come down on
13 the more conservative side?

14 A. In your hypothetical situation, yes.

15 Q. You don't disagree with that, do you?

16 A. No, not in your hypothetical situation.

17 Q. Do you know what the consequences of
18 getting methane gas into an underground mine is?

19 A. An explosion, I assume.

20 Q. And it can kill people, right?

21 A. Sure.

22 MR. HIGH: That's all I have right now.
23 Thank you.

24 CHAIRMAN LEMAY: Thank you. Additional
25 questions of the witness?

1 MR. CARROLL: No.

2 CHAIRMAN LEMAY: Commissioner Carlson?

3 EXAMINATION

4 BY COMMISSIONER CARLSON:

5 Q. Are you testifying that there will
6 essentially be no migration of hydrocarbons
7 through, I guess, the borehole into a potash
8 mine, is that correct?

9 A. Yes, that's my interpretation, yes.

10 Q. Right now, R-111-P generally calls for
11 a half-mile buffer zone. Are you saying that
12 that could be reduced to zero? two inches? three
13 feet? What would you recommend as a safe
14 distance?

15 A. I don't think I could recommend a
16 distance, but I think the half-mile is too great
17 in the case of Delaware oil wells.

18 Q. Do you think they could mine right up
19 to the borehole?

20 A. That would be up to the potash
21 companies. I'm not qualified on that, how close
22 they do mine up to the wells.

23 Q. You don't think there would be any
24 migration of hydrocarbons into that mine if they
25 came right up to that hole?

1 A. Right up to it?

2 Q. Yes.

3 A. We would have to assume that, first,
4 that there would have to be a leak in the casing
5 program, which other people will talk about
6 later. If the potash was disturbed in any manner
7 around the borehole in short distances, I've
8 talked about that there are permeabilities in
9 short distances. I might point out, and it will
10 be pointed out later, too, that there are, in the
11 active workings, oil wells in some of the mines.

12 Q. If you were sitting on this Commission,
13 you wouldn't have an opinion as far as how--

14 A. Let me put it this way. If a well was
15 plugged properly under R-111-P, I don't think I
16 would have too much problem going up real close
17 to it.

18 Q. You mentioned WIPP core hole 31, and
19 that had oil spots?

20 A. Yes, sir.

21 Q. Where was that drilled?

22 A. That was inside the breccia pipe
23 labeled Hill C in Section 5, of 21 South, 30
24 East, and it would be over on the left side of
25 the map right around on the northeast side of the

1 Mississippi Chemical mine.

2 Q. Right. Okay. I see it. One more
3 question. Could you explain what the difference
4 in the orange hash marks is on this map?

5 A. I think I better let the next--not the
6 next, but later people talk about that. There's
7 going to be a person who can tell you completely
8 about the other features on this map.

9 COMMISSIONER CARLSON: Thank you.

10 CHAIRMAN LEMAY: Commissioner Weiss?

11 COMMISSIONER WEISS: I have just one
12 question.

13 EXAMINATION

14 BY COMMISSIONER WEISS:

15 Q. Was there an advancement in science in
16 exploration that allowed the discovery of the
17 Delaware zone there since April 21, 1988?

18 A. Our completion techniques have
19 improved. In the past, from what I've gathered
20 when the Delaware wells were drilled, most all
21 the Delaware sands have to be artificially
22 fractured. And the completion techniques, from
23 what I understand, were of the sort where the
24 frac was, quote, too large--and I'm not a
25 reservoir engineer, but too large, and it frac'd

1 out of zone, bringing water in from accompanying
2 water zones. And we've learn now how to frac
3 these Delaware sands better and make better
4 production with less water production.

5 Q. Does the water produced come from the
6 bottom, or out of the zone, or--

7 A. I don't think there's-- In some of the
8 sands there could be a true oil/water contact,
9 and I think over on the east side of the
10 Livingston Ridge there is, but all of the
11 Delaware wells will produce water and I think
12 it's due to the very fine-grain nature of the
13 sand and the water, because the pore size is so
14 small it captures some of the water.

15 COMMISSIONER WEISS: That's all the
16 questions I have.

17 CHAIRMAN LEMAY: I don't have any
18 questions. Are there additional questions of the
19 witness? If not, he may be excused. We'll take
20 a 15-minute break at this time.

21 [A recess was taken.]

22 [Commissioner Carlson is not present.]

23 CHAIRMAN LEMAY: Let's continue.
24 Commissioner Carlson can join us when he wants
25 to.

1 MR. CARROLL: Our next witness will be
2 Dr. David Boneau, and I have placed his packet of
3 exhibits up there, and they're numbered 22
4 through 27.

5 Chairman LeMay, I have not up to this
6 time, but I would like to move our Exhibits 1
7 through 21 at this time.

8 CHAIRMAN LEMAY: Without objection,
9 Exhibits 1 through 21 will be admitted into the
10 record.

11 **DAVID FRANCIS BONEAU, Ph.D.**

12 Having been first duly sworn upon his oath, was
13 examined and testified as follows:

14 EXAMINATION

15 BY MR. CARROLL:

16 Q. Dr. Boneau, would you state your full
17 name, place of residence, and employer?

18 A. My name is David Francis Boneau. I
19 reside in Artesia, New Mexico, where I work for
20 Yates Petroleum.

21 Q. In what capacity do you work for Yates
22 Petroleum?

23 A. I'm employed by Yates Petroleum as
24 reservoir engineering supervisor.

25 Q. What kind of educational background do

1 you have to support that position?

2 A. I have a B.S. in physics from the
3 University of Notre Dame in 1962, and a Ph.D. in
4 nuclear spectroscopy from Iowa State University
5 in 1969, plus some experience in the oil and gas
6 industry.

7 Q. How long have you been in the oil and
8 gas industry?

9 A. Since 1968; 24 years.

10 [Commissioner Carlson is present.]

11 Q. You have testified numerous times
12 before the Commission and the Division as a
13 petroleum engineer and reservoir analyst?

14 A. Yes, sir, that's correct.

15 MR. CARROLL: I would tender Dr.
16 Boneau as an expert in the field of petroleum
17 engineering and reservoir analysis.

18 CHAIRMAN LEMAY: But not nuclear
19 spectroscopy? His qualifications are acceptable.

20 MR. CARROLL: Thank you.

21 Q. Dr. Boneau, you are familiar with the
22 four applications that Yates Petroleum has before
23 the Commission today?

24 A. Yes, sir.

25 Q. And you have performed certain studies,

1 have you not, with respect to those four proposed
2 wells?

3 A. Yes, sir.

4 Q. And you have also prepared exhibits to
5 illustrate the testimony that you'll be giving,
6 is that correct?

7 A. That's correct.

8 Q. Your first exhibit, Exhibit 22, I would
9 ask you to turn to and, if you would, Dr. Boneau,
10 I would like to allow you to testify concerning
11 your exhibits, starting with Exhibit 22.

12 As you go through and come to your
13 exhibits, would you clearly identify the exhibit
14 by number and identify what it is so the record
15 will be very clear. And if you would, with that,
16 I'll let you present your testimony.

17 A. My habit is to outline what I'm going
18 to try to say and then try to say it. My
19 intention is to make three points: First, that
20 there are good reserves and good economics for
21 Delaware oil wells in this area. The second
22 point will be that the casing and cementing
23 program designed for these wells will protect the
24 potash; and thirdly, I would like to talk briefly
25 about the lifetime of Delaware production.

1 One of my ideas in this controversy has
2 been that in some areas the oil and gas can be
3 produced and the well safely abandoned before the
4 potash mines reach the area and I'll discuss that
5 in a minute.

6 So the first point is the good reserves
7 and the good economics for Delaware oil
8 production. And that brings us to Exhibit 22.
9 And you're going to let me discuss that?

10 Q. Yes, please. If you'll identify what
11 it is and tell us what the conclusions are from
12 it that you draw.

13 A. Exhibit 22 is a four-page exhibit
14 listing all the Delaware-producing wells in a
15 10-township area, with the center being in the
16 Livingston Ridge Delaware Pool. It includes
17 wells in Townships 19 South, 32 and 33 east, 20
18 South, 32 and 33 East, 21 South, 31 and 32 East,
19 22 South, 31 and 32 East, and 23 South, 31 and 32
20 East. It's an area 30 miles in height and 12
21 miles wide, with the long, thin Livingston Ridge
22 Pool in the middle.

23 There are 153 Delaware producers in
24 this area. 111 of them are operated by people
25 other than Yates Petroleum, and 42 are operated

1 by Yates Petroleum.

2 Really the point of this exhibit is
3 that the average reserves--and this will be at
4 the bottom of the fourth page--for the wells in
5 this area, is 89,452 barrels of oil. 89,000
6 barrels of oil is an average reserve for a
7 Delaware well in this region, and the further
8 conclusion that the really close wells are the
9 Graham No. 1 and the Graham No. 2, and the
10 reserves of those two wells are on the average of
11 130,000 barrels of oil.

12 The Yates wells in this area have
13 average reserves of 113,000 barrels of oil and
14 the other people's wells have average reserves of
15 81,000 barrels of oil. There's a reason for that
16 other than our superior geology or some such
17 thing. The habit of Yates Petroleum in this area
18 is to complete all the productive zones and
19 produce them. Many of the other companies are
20 just producing the main pay zone and keeping the
21 other pays till, probably, until whether they see
22 whether Yates makes any money producing them.

23 Anyway, the difference in reserves is
24 probably attributable to the number of producing
25 zones in our wells as compared to other wells.

1 So, Exhibit 22 sets up the economic
2 calculations. The average well is 89,000
3 barrels, and the wells adjacent to the wells that
4 are the subject of this hearing average 130,000
5 barrels of oil.

6 In the next exhibits I'll discuss the
7 economics of those wells.

8 Q. So, the purpose of Exhibit 22 was to
9 provide a database to start from in performing
10 economic calculations that you believe will be
11 indicative of these four wells that we're
12 proposing to drill?

13 A. Yes, sir, that's correct.

14 Q. So if you'll go into your Exhibit No.
15 23, would you identify what this is and then
16 discuss it with the Commission?

17 A. Exhibit 23 is obviously
18 computer-generated, but it's a cash flow
19 projection for an average well that produces
20 89,000 barrels of oil. It's set in the time
21 frame that you would drill it now, but it's the
22 economics and the cash flow projections for an
23 average well.

24 The lifetime of the well is
25 approximately 12 years. That was something that

1 was questioned earlier in the day. The reserves
2 are 89,000 barrels of oil and about 105 million
3 cubic feet of gas. The well cost \$700,000 to
4 drill and complete. The completion costs are
5 quite high when you complete numerous producing
6 zones.

7 The rate of return on this well is 35
8 percent, which is a nice rate of return. The
9 well, assuming gas prices as shown there of \$19
10 and \$1.75 for the associated gas, will pay off
11 the \$700,000 cost of the well plus give a profit
12 of \$517,000.

13 Mr. Patterson said similar numbers to
14 this this morning, but the working interest owner
15 of this well would pay \$158,000, approximately,
16 in production taxes, and the royalty generated by
17 the well would be about \$250,000 for the average
18 well.

19 So the average well is a good, economic
20 prospect. That's what Exhibit 23 shows. As a
21 Delaware oil well, an average well is a good
22 economic prospect.

23 Q. That's your professional opinion?

24 A. Yes, sir.

25 Q. All right. If you would turn to your

1 Exhibit 24, then?

2 A. Exhibit 24 is a similar cash flow for a
3 well with reserves of 130,000 barrels of oil.
4 This is going to be a better well, as I think
5 anyone intuitively would say.

6 The rate of return on this well is 90
7 percent per year. This well returns the \$700,000
8 drilling cost plus a profit of about \$1.1
9 million, \$1,149,910 is what the computer printout
10 says.

11 The working interest owner here would
12 pay \$230,000 in production taxes and would
13 generate royalty of \$420,000, and those are,
14 essentially, equivalent to the two numbers Mr.
15 Patterson quoted this morning, and I believe he
16 attributed them to me at that time.

17 So, an average well is a good economic
18 prospect. A well like the Graham 1 and 2 is an
19 excellent, very good, super economic prospect.

20 Q. And that again is your professional
21 conclusion?

22 A. Yes, sir.

23 Q. Any other statements you would like to
24 make in relationship to your first three
25 exhibits, 22, 23 or 24?

1 A. No, sir.

2 Q. As you indicated, one of the second
3 points that you wanted to discuss with the
4 Commission dealt with the issues of cementing and
5 casing of the four wells, is that correct?

6 A. Yes, sir, that's correct.

7 Q. All right, sir. You've prepared
8 Exhibit 25 which actually depicts what the casing
9 would be in at least four proposed wells?

10 A. That's the idea. Exhibit 25 shows the
11 actual casing and cementing program for the
12 Graham AKB State No. 1, and the casing and
13 cementing program for the four wells we're
14 talking about would be very, very similar,
15 essentially identical to this.

16 This has real numbers, real--and I
17 think this illustrates the point better than
18 saying this is what we hope to do. This is what
19 we actually did on the Graham 1.

20 Q. One question before you go into a
21 discussion of this exhibit. The casing program
22 that was performed on this Graham AKB State No.
23 1, was it in compliance with R-111-P?

24 A. Yes, sir, it complies with R-111-P.

25 Q. All right. If you would, then, explain

1 in detail what's depicted here on Exhibit 25.

2 A. The Graham AKB State No. 1 has three
3 strings of casing, all of which are cemented to
4 the surface. From the top down, there's a
5 17-1/2-inch hole to 879 feet, and in that is set
6 13-3/8-inch casing which is cemented back to the
7 surface and circulated.

8 Then there's 11-inch hole to 4200 feet,
9 and in that was set 8-5/8-inch casing, so-called
10 intermediate casing, which was then cemented back
11 to the surface and circulated.

12 Finally, a 7-7/8-inch hole was drilled
13 to total depth of 8450 feet, and in that hole was
14 set the production casing, 5-1/2-inch production
15 casing. It was cemented to surface with cement
16 circulated. Actually, cement was circulated on
17 each of the three stages. So, there are three
18 strings of casing; all of them are cemented back
19 to surface.

20 The potash in this area is located at
21 about 1800 feet, and that would be opposite the
22 11-inch hole, and the potash would be protected,
23 is protected by the 8-5/8-inch casing and the
24 5-1/2-inch casing at that depth of about 1800
25 feet, so the potash is separated from any

1 hydrocarbons in the wellbore by first an outside
2 cement sheath, then the steel 8-5/8-inch casing
3 that's about 3/4 of an inch thick, and by an
4 inside cement sheath, and finally, fourthly, by
5 the 5-1/2-inch steel casing.

6 In my mind, there are some other
7 mitigating kind of safety factors associated with
8 this well. This is an oil well producing from
9 the Delaware at 6700 to 8200. The oil well is
10 pumped. The wells that we want to drill would be
11 pumped up-tubing. There's essentially no
12 pressure, very low pressure in the wellbore. The
13 pressure in the wellbore is much lower than the
14 pressure in the potash or in any of the rock
15 outside.

16 Q. When you say "low," what range would
17 the pressure be in, associated with the Delaware
18 well?

19 A. The pressure would be in the range of
20 10 psi, maybe 25 psi, 5 psi. 2 to 25 psi, in
21 that range. It's not a high-pressure gas well,
22 it's low pressure. In the oil vernacular, it's
23 definitely low pressure.

24 Q. All right. Now, your statement about
25 the pressure inside the pipe would be less than

1 the pressure naturally occurring in the
2 formation, is that what you're telling us?

3 A. When the well is producing, the
4 pressure in the wellbore will be less than the
5 pressure in the surrounding formations anywhere.

6 Q. So, even if a hole occurred, then, with
7 respect to this casing in the potash area, the
8 pressure going inward to the center of the pipe
9 would be greater than the pressure exerted going
10 out, is that correct?

11 A. Yes. The pressure would make whatever
12 fluids were in the formation move towards the
13 wellbore, rather than fluid in the wellbore
14 moving toward the formation.

15 Q. So, then, you wouldn't have, then, the
16 possibility of a leak within--a leak from in the
17 formation towards the outside, or a leak of the
18 oil into the potash areas?

19 A. That's correct. I think the main point
20 is that there's not going to be a leak. You've
21 got two strings of casing with solid cement
22 between them, and that's going to be very
23 strong. You've got 8-5/8-inch casing reinforced
24 with a 5-1/2-inch casing acting as a liner.
25 You've got a very good casing cement protection

1 across the entire salt section there, from 4200
2 feet up.

3 Q. Dr. Boneau, are you aware of this kind
4 of casing program ever failing and allowing a
5 leak?

6 A. No. In my experience, which is not
7 universal--there would be other people with
8 different experience--but in my experience, the
9 leaks in casing have always been in casing that
10 had no cement behind it. I've never seen a leak
11 in casing that had two strings cemented in place.

12 Q. Is there any problem--you've told us
13 that this is actually what happened in the Graham
14 AKB State No. 1. Was this just a lucky chance
15 that you complied with it, or is this something
16 that the state of technology is capable of
17 duplicating time and time again?

18 A. I think the industry can duplicate
19 this. Yates has drilled, like I said, about 40
20 wells in this area. They all have essentially
21 this kind of casing and cementing program. We
22 have installed casing and cement, as you see in
23 this diagram, in all of these wells.

24 The only, what I would call a problem,
25 in one well called Dolores No. 1, which is a few

1 miles from here, from this area we're discussing,
2 and in that case the first stage on the long
3 string, on the production string, did not reach
4 the DV tool, so there was a 700-foot section at
5 approximately 7000 feet where there was no
6 cement.

7 Yates went in and perforated the casing
8 and filled that void with casing so that the
9 final result was the scheme you see here. It
10 just didn't go quite as smoothly as it has in the
11 other cases. But we've done 40 wells
12 successfully this way, and I'm confident that we
13 can implement this casing and cementing program
14 in the four wells under discussion here.

15 Q. There are logs designed or within the
16 industry that can tell you whether or not you
17 have, in fact, achieved this goal of placing
18 cement behind the casing, is that correct?

19 A. Yes. There are ways to tell that the
20 cement is actually in place there.

21 Q. All right. And I take it, then, you
22 utilize those means in correcting the problem
23 that occurred on the Dolores and thus achieving
24 this kind of casing program?

25 A. Yes, sir, that's correct.

1 Q. Dr. Boneau, in earlier testimony, five
2 basic concerns of the potash industry were
3 illustrated or were taken from a published
4 document or a document prepared by the potash
5 industry.

6 The second concern that they discussed
7 was, and quoting it it says, "Casing programs
8 cannot provide protection in the events of
9 accidents. At least 17 blow-outs or oil well
10 fires have occurred in the area around the potash
11 basin. It is a virtual certainty that others
12 will occur from time to time."

13 Now, when you're talking about
14 blow-outs or oil well fires, are those things
15 that casing is designed to prevent, or are we
16 talking about a totally different problem here
17 and actually confusing the real issue?

18 A. My understanding is that those fires,
19 fires normally occur, and I believe these fires
20 are like that, occur when the drilling encounters
21 an unexpectedly high pressure zone at depth. My
22 understanding is that most of these blow-outs
23 were in Pennsylvanian formations, Atoka Morrow.

24 But the situation would be that the
25 surface casing and the intermediate casing are in

1 place, as shown on Exhibit 25, and the 7-1/2-inch
2 hole, the thin, deep hole is being drilled and it
3 encounters high pressure gas which blows the mud
4 out of the hole and hydrocarbons come out, et
5 cetera, and something catches on fire.

6 When that happens, you have a problem
7 on the surface where you have a fire, and you
8 have a problem down at a depth where the high
9 pressure zone is, but the two casing strings that
10 are in place serve only as a conduit to transfer
11 that high pressure to the surface. When the fire
12 is put out and things are put together, you still
13 have those two strings of surface and
14 intermediate casing intact and unharmed, and in
15 this case the potash would still be protected as
16 if there had been no fire.

17 Q. In other words, the casing is not
18 designed to protect the surface or explosion of
19 hydrocarbons out of the surface, but they're to
20 protect the intermediate zones between your
21 surface and the pay zones, is that correct?

22 A. That's correct.

23 Q. In the kind of situations that they're
24 describing in this concern, the casing performed
25 that function or you wouldn't have had the

1 explosion of gas to the surface, is that a fair
2 assessment?

3 A. Yes, sir, that's true.

4 Q. You also have an Exhibit 26, is that
5 correct?

6 A. Yes.

7 Q. Would you explain what that is?

8 A. Well, let--

9 Q. Maybe I've jumped you along too far
10 with respect to your Exhibit 25. If I have,
11 would you please finish whatever you had to say.

12 A. 25 and 26 are details of the cementing
13 program, and I had a couple more comments on
14 those two exhibits that I would like to finish,
15 if you'll let me.

16 Q. I certainly will.

17 A. Okay. Really, two points. I was
18 talking about safety factors, and when the well
19 is abandoned, and in my head, really, that's when
20 the mining is going to encounter these wells, and
21 I think the mining is going to be far enough down
22 the road that these wells will be abandoned, and
23 that's just my opinion.

24 When these wells are abandoned, my
25 recommendation would be that the 5-1/2" casing be

1 filled with cement, from top to bottom, and that
2 would cost the oil companies a little money but
3 not really very much. You would have a
4 strong--you would have very strong casing with
5 three sets of steel all separated by cement,
6 total cement and steel for a foot of diameter,
7 approximately, and there would be no pressure in
8 the well. There would be nothing but cement in
9 the well.

10 When that is done, you could mine up
11 close to that abandoned wellbore, and you
12 probably could mine right through it.

13 Q. In other words, even break through the
14 casing and the cement there in place at the
15 2000-foot-or-above level?

16 A. Yes, sir. And that leads, really, to
17 the other point. The protection that this casing
18 design offers is in isolating the Delaware at
19 6700 feet from the potash at 1800 feet. That's
20 not quite a mile but almost a mile of steel and
21 cement that isolate the source of the methane gas
22 from the mine, where you do not want it to get.
23 This is the protection that we're emphasizing.

24 One of the problems that the potash
25 people have told me about in the past is

1 subsidence, which would have no effect on
2 anything below the level of the potash. So, what
3 I view as the main protection from the bottom of
4 the potash to the top of the Delaware, that 4500
5 feet or so of steel and cement, is not involved
6 in the subsidence issue at all. Okay.

7 Q. In your professional opinion, then,
8 would that 4500 feet of steel and cement be
9 sufficient to adequately protect the potash
10 zones?

11 A. Yes, I believe that very muchly.

12 Q. Are there any other points you would
13 like to make with respect to these exhibits?

14 A. Not really. Exhibit 26 is simply a
15 detailed listing of the cement program that was
16 used in the Graham AKB State No. 1, and it
17 supplies more details to the picture in Exhibit
18 25.

19 Q. All right. You have another exhibit
20 you prepared, Exhibit 27. Would you identify
21 what that is and discuss that with the
22 Commissioners?

23 A. Exhibit 27 is information concerning
24 the lifetime of Delaware fields in Southeast New
25 Mexico. Like I said, what I think will happen

1 here is that the oil wells will be drilled,
2 produced and abandoned before the potash mining
3 arrives in Section 2.

4 Exhibit 27 addresses, then, the issue
5 of how long the oil would have to be produced for
6 us to be finished before the miners came. In
7 Exhibit 27, I've listed information on the 22
8 Delaware fields in Southeast New Mexico that
9 contain at least 10 wells. There are some small
10 Delaware fields, but this gives us a pretty good
11 cross-section of the Delaware fields. There's 22
12 fields that contain at least 10 wells. Four of
13 these fields have been waterflooded after primary
14 production, and those are the four that have a
15 number in the column labeled "years flooded."
16 The "N/A" is supposed to mean "not applicable,"
17 but the four fields that have numbers there have
18 been waterflooded.

19 For the most part, the primary
20 production lasts 10 to 18 years, and those
21 numbers are really found most easily under the
22 comments column at the very right-hand side.
23 Brushy Draw Delaware, for example, the second
24 one, says "Primary end, 1998, 15 years." That's
25 my shorthand for primary production from these

1 fields will become uneconomic in 1998, and that
2 will be 15 years of primary production.

3 So, you look down that column and
4 there's a 15, 14, 10, 12, 18, 10, 17, 11, 14, 15,
5 16, on average about 15 years, and that's in
6 agreement with the economic projections I made in
7 Exhibits 23 and 24.

8 There are a couple fields with primary
9 production of 30 years or more, and those are
10 Mason Delaware North, where years primary says
11 38, and I think Double X Delaware, where years of
12 primary says 31. These fields have been marginal
13 for the past 20 years, and the incentive for the
14 producer is to maintain them, and they've
15 maintained them in marginal condition. Most of
16 the oil was produced. 90-plus percent of the
17 primary production comes within 15 years, and I
18 don't think those two exceptions detract from my
19 conclusion.

20 The lifetimes of the four waterfloods,
21 and again you have to look in the comments column
22 to find this, but the lifetimes of the four
23 waterflooded fields are 21, 15, 20 and 28 years.
24 I believe these times would be shortened somewhat
25 under the pressure of an approaching potash mine,

1 but those are the actual numbers for the
2 waterfloods in the Delaware field.

3 My conclusion from this exhibit is that
4 primary production will end within 15 years and a
5 waterflood, if one proves to be a good thing to
6 do at Livingston Ridge, would take an extra 15 to
7 20 years. If we can all cooperate in a
8 reasonable way, the waterflood should start five
9 years before the end of primary production, so
10 that 30 years should be a good estimate for the
11 length of time to produce primary and secondary
12 oil from this area under discussion. I think
13 that we can produce oil for those 30 years, plug
14 the wells with cement, as I described, and then
15 the potash mines can safely mine this same area.

16 Q. Dr. Boneau, how much additional
17 production would be added, in general terms, by
18 going to the waterflood situation? How much
19 reserves are we actually talking about adding to
20 a well?

21 A. Let's start--well, Yates has 40 wells
22 in this area we're talking about. At 120 or
23 something, 120, 130,000 barrels a well, that's
24 four million barrels, I believe, if my math is
25 right. As a general rule, waterfloods double

1 primary production.

2 The four waterfloods in the Delaware in
3 Southeast New Mexico have been a little poorer
4 than average, so if we're talking about four
5 million barrels of primary oil, a rule of thumb
6 would be four million barrels of secondary oil.
7 My estimate from looking at these four
8 waterfloods would be three million barrels of
9 additional oil. Does that answer your question,
10 sir?

11 Q. I think it does. Are there any other
12 statements that you would like to make or
13 conclusions, based on your Exhibit No. 27?

14 A. No, sir. This question has come up in
15 the past, and I just decided it would be
16 informative to look at all these fields and try
17 and make some conclusions. The data is here. I
18 haven't seen all this put together in one place
19 before. Obviously I believe my conclusions, but
20 at least the data is here so that other people
21 can talk sensibly about a different conclusion.

22 Q. Thank you, Dr. Boneau. Let's now turn
23 to a slightly different subject, one that has
24 been touched upon in earlier testimony, and this
25 deals with the concept--not concept, but the

1 actual drilling of a directional hole. Yates has
2 had limited experience with respect to that in
3 this area, has it not?

4 A. Yates has drilled one directional well
5 in this area.

6 Q. And that's the Bonneville AKH No. 2
7 well, is that correct?

8 A. Yes, it's the Bonneville No. 2.

9 Q. And that is just north of this area. I
10 believe the bottom hole location is in Section
11 19, is that correct?

12 A. Yeah, that's correct. That's two or
13 three miles north of this area.

14 Q. And the actual location of that well
15 was on the section to the west of Section 19?

16 A. The surface location was in the
17 township to the west.

18 Q. All right. Would you describe for the
19 Commission, basically, what kind of distances
20 were involved? Were we talking about a direct
21 offset, or less distances; the cost associated
22 with doing a directional hole, and the problems
23 that are associated down there?

24 A. The bottom hole location of the
25 Bonneville 2 was in the center of Unit M, so it

1 was 660 feet from the west line of Section 19.
2 The surface location was approximately 300 feet
3 to the west of the township boundary, so the 300
4 feet added to the 660 feet is the offset. It's
5 about a 900 or a thousand-foot offset. It's a
6 smaller offset from the center of one 40 to the
7 center of the adjacent 40. It's slightly smaller
8 than that. It's about, say, a thousand-foot
9 offset.

10 The well cost about \$900,000. The well
11 was drilled this spring. The date's on Exhibit
12 22, but it was this spring, June about, something
13 like that, and I'm not completely sure that all
14 the bills have reached our computer system yet,
15 but most of them are and the cost is about
16 \$900,000. That's approximately an extra \$200,000
17 over a vertical well.

18 I know I've answered some parts of that
19 question. I may have missed a part or two.

20 Q. With respect to drilling wells that are
21 even further deviated, in your experience would
22 that increase the cost or have you reached the
23 limit of the additional cost caused by the
24 directional drilling? Would you touch on the
25 mechanics and the problems involved?

1 A. Okay. R-111-P requires that any
2 directional well, any deviated well, be vertical
3 through the salt, through the intermediate
4 casing. So you start your deviation at about
5 4200 feet. The production is at 6500 feet or
6 some number like that, so you've got relatively
7 little vertical distance in which to do the
8 deviation.

9 The result of that is that you can
10 deviate a well from the one 40 to the center of
11 another 40, about 1320 feet. You can also
12 mechanically deviate a well from the center of
13 one 40 to the center of a diagonally opposite 40,
14 which is a distance of the square root of two
15 times 1320 feet, so about 1800, 2000 feet.
16 Beyond that, you cannot get there because of
17 the--because of starting the deviation
18 low--because of drilling vertically for 4200 feet
19 and then having to make all this deviation from
20 4200 feet until you reached the Delaware.

21 A diagonal offset is the furthest you
22 can reach, and, of course, the costs, the cost of
23 drilling to the center of adjacent 40, a
24 1320-offset, is about an extra \$3- to \$400,000,
25 and the cost of drilling to a diagonally offset

1 40 is an extra \$550-, \$600,000, that range. You
2 almost double the total cost of the well going to
3 a diagonal offset, and you eat up most of your
4 profit, but it can be done.

5 And beyond that, it cannot be done
6 within the parameters of R-111-P. Of course, if
7 you could deviate starting at the surface, you
8 could reach out further; but in going the
9 distance I talked about, 2000 feet, you're
10 doubling the cost of the well and, going further,
11 you would further increase the cost of the well.

12 Q. The cost of producing these kinds of
13 wells also increase, do they not, over a
14 traditional vertical well?

15 A. You have more room for problems, you
16 have trouble pumping the wells. If you can pump
17 them, you wear out tubing and rods rubbing
18 against the sides of things; going around dog
19 legs. Yeah, there are some other associated
20 problems.

21 Q. Dr. Boneau, were you aware of what the
22 land circumstances were surrounding the drilling
23 of this deviated well? I know I haven't asked
24 you that question. I'm just wondering if you're
25 familiar with those.

1 A. I am familiar with some of them. There
2 are some details I will not be familiar with.
3 I'm familiar with the fact that at least Yates
4 wanted to save, and that we were not allowed to
5 drill a vertical well to save it, and the feeling
6 of Yates was that ultimately the lease could
7 prove valuable enough that it would be worth
8 drilling a marginal well, spending the extra
9 money to drill a deviated well to save the lease,
10 in the hope that the lease would prove to be
11 productive and, at some future time, we could
12 drill up the rest of the lease with vertical
13 wells that would be economic.

14 Q. This lease came to Yates by virtue of a
15 farmout agreement that had a very short fuse on
16 it, is that correct, Dr. Boneau?

17 A. That's my understanding, but that's
18 really somebody else's expertise.

19 Q. That's why the well had to be drilled
20 when it was drilled and there's no other
21 alternative?

22 A. That's my understanding.

23 MR. HIGH: Object as leading.

24 CHAIRMAN LEMAY: You can phrase the
25 question differently and get the same answer.

1 Q. Again, would you state for the
2 Commission, then, what the circumstance were for
3 the drilling of this deviated well, knowing the
4 additional costs and risks?

5 A. As an engineer, all I really know is
6 that there was a farmout. We had a short time to
7 drill a well. There was a surface occupancy
8 problem. We could drill a deviated well that was
9 not deviated too awful much and save the lease.
10 And Yates' management, of which I'm not a member,
11 made the decision that that was a good, economic,
12 way to spend some money, and we did that.

13 Q. There were additional proration units
14 available, then, on that lease, besides the one
15 drilled?

16 A. Yes. There were multiple proration
17 units that could possibly be drilled.

18 Q. Dr. Boneau, with respect to the
19 parameters, the goals that the Commission is
20 charged with protecting by statute, would the
21 granting of Yates' four applications, in your
22 professional opinion, promote conservation,
23 prevent waste, and protect correlative rights?

24 A. Yes, sir.

25 Q. And do you feel that, at least with

1 respect to your area of the testimony, that there
2 is any problem with the causing of waste of
3 potash?

4 A. No, sir. As I've said, I think what
5 really will happen, what really should happen, is
6 that we drill these wells. They're safe while we
7 produce them. We abandon them, we plug them very
8 securely, and the potash comes in later and mines
9 it. Everybody gets what he wants.

10 The other way around does not work as
11 well and, of course, fighting over it doesn't
12 work as well.

13 MR. CARROLL: I would move at this time
14 the admission of Exhibits 22 through 27.

15 CHAIRMAN LEMAY: Without objection,
16 Exhibits 22 through 27 will be admitted into the
17 record.

18 MR. CARROLL: I would pass the witness.

19 CHAIRMAN LEMAY: Thank you. Mr. High?

20 EXAMINATION

21 BY MR. HIGH:

22 Q. Dr. Boneau, during the time you worked
23 for Yates, which I believe you said was since 68,
24 was it?

25 A. I didn't say that, sir. I just didn't

1 give that information. I worked in the oil
2 industry since 1968. I worked with Phillips
3 Petroleum for 12 years and for Yates Petroleum
4 for 12 years.

5 Q. What did you do for Phillips?

6 A. I worked in the research lab in
7 Bartlesville initially for Phillips Petroleum on
8 the improved oil recovery processes, involving
9 things like polymers, surfactants, CO₂. I was
10 head of the group that worked on tar sands for a
11 while.

12 Q. You worked on what?

13 A. Tar sands, the basket tar sands, et
14 cetera. We developed, we, in the lab, my
15 colleagues and myself, developed what we thought
16 at the time was a promising surfactant
17 methodology and formulation, and I spent about
18 three years with Phillips--I assume you're really
19 interested in all this? It's fun for me to talk
20 about, so I'll tell you.

21 Q. Have you been out in the field drilling
22 any oil wells?

23 A. That's what I'm getting to.

24 Q. Okay. That's what I'm interested in
25 knowing.

1 A. Okay. And I spent three years on a
2 surfactant plug pile involving 25 wells in a
3 place called North Burbank Unit, which is like
4 the third or fourth biggest field in Oklahoma.

5 Then Phillips shipped me to Odessa and
6 I worked as a district production engineer in
7 Odessa in the years 1977, 78 and 79, where I did
8 field work with the Ellenburger Field, the South
9 Caldon Unit, [phonetic], the biggest fields that
10 Phillips has in West Texas.

11 Q. Have you ever worked as a drilling
12 supervisor?

13 A. No.

14 Q. Have you ever been in charge of
15 actually drilling the well?

16 A. I have not been the--I'm trying to
17 answer your question. I've not been the on-site,
18 in-charge person for drilling a well. I could
19 make a statement that I was the office person in
20 charge, but that's probably not what you're
21 after.

22 Q. Have you ever been in charge of casing
23 design?

24 A. It's vague what that means, but I have
25 designed casing for a small number of wells. I

1 have never done that as my main job for an
2 extended period of time.

3 Q. Has your main job ever included
4 resolving problems that were encountered during
5 drilling by other people?

6 A. A portion of my job at Yates is
7 involved with that. It's hard to say what my
8 main job is.

9 Q. You've done some troubleshooting?

10 A. When there are problems, there's a
11 group of us in the office that consult on the
12 handling of--

13 Q. Are you basically an office employee of
14 Yates?

15 A. Yes. I'm a supervisor, yes.

16 Q. As a reservoir engineer supervisor, is
17 your work more with respect to the reservoir
18 instead of getting it out of the ground, or is
19 that part of the same thing?

20 A. No. I would say you're right. I view
21 the job as a reservoir engineer as getting the
22 hydrocarbons to the bottom of the well and
23 somebody else worries about them after that.

24 Q. I want to cover these three areas that
25 you talked about. I want to start with the

1 economics on Exhibit 22, which is the Livingston
2 Ridge area, the Delaware-producing wells in the
3 Livingston Ridge area.

4 A. Yes, sir, I have that exhibit.

5 Q. All right. And I don't know a whole
6 lot about drilling oil and gas wells, Dr. Boneau,
7 so help me out here. How do you decide whether
8 to put a well on here or not?

9 A. The wells on here are the wells in an
10 area who are located in these 10 townships I
11 mentioned. They're in an area--

12 Q. How did you decide on the 10 townships?

13 A. I looked at the Livingston Ridge field,
14 which is that long, skinny thing about six or
15 eight miles long.

16 Q. Have you looked at your geology maps?

17 A. No, surface maps. Just plain-old
18 location maps.

19 Q. Where someone had defined the
20 Livingston Ridge reservoir?

21 A. I looked at the wells that were
22 producing from what is called Livingston Ridge,
23 Delaware, Lost Tank Delaware.

24 Q. And is this information in Yates'
25 office, or is this something that you got from

1 the State OCD and the BLM?

2 A. This had nothing to do with the BLM.

3 Q. Where would I go to get this data, if I
4 was trying to find out? Is it--

5 A. Yeah, it's public data. You could go
6 to the NMOCD office in Artesia or in Hobbs,
7 depending on where the well is. There are
8 commercial--there are people who sell this stuff
9 on CD-roms, on microfiche, on modems over
10 computers. You can go to the NMOCD office and
11 they have a file for every well arranged by
12 location, and you can go and look at all the
13 wells in these locations.

14 Q. Tell me, if you will, how you arrived
15 at the number on the last page, of the average,
16 ultimate recovery of oil, of 89,452 barrels from
17 wells that are obviously still producing?

18 A. I took a production history of each
19 individual well and drew a graph for each well, a
20 graph of time versus barrels of oil produced each
21 month, a history of barrels of oil produced each
22 month, and drew a picture of that--what's
23 normally called a decline curve, because they
24 always decline when the amount of oil goes
25 down--and I projected, extrapolated, whatever

1 word you want to use, forecast how that line, how
2 that production, would extend into the future.
3 And when it reached a point that was not
4 uneconomic, I cut it off and I added up how many
5 barrels that was. So, I took the production for
6 past times and I forecast production for future
7 times for each of these wells.

8 Q. So the 89,452 barrels is an estimated
9 number that you arrived at which you're
10 expressing as your opinion?

11 A. Yes, sir. These wells, as you can see
12 on page 4, these wells have produced a total of
13 4,295,694 barrels of oil, and I'm estimating that
14 ultimately they will produce 13,686,147 barrels
15 of oil. So the actual totally solid numbers that
16 are not my opinion are approximately one-third of
17 the total, and two-thirds of it are my opinion.

18 Q. I can read your numbers, Dr. Boneau.
19 I'm interested in how you arrived at the 89,000.

20 A. I went through that procedure for each
21 of these and added them all up.

22 Q. And that is your opinion as to the
23 ultimate number of barrels in this reservoir?

24 A. Yes, that's right.

25 Q. It could be short? it could be long? it

1 could be wrong?

2 A. Oh, it probably will be wrong, but this
3 is my main job and this I do better than some
4 other things. And these numbers are the best
5 estimates you're going to get of what these wells
6 are going to make.

7 Q. Let's pick up Yates Exhibit No. 23.

8 A. Yes, sir, I have that.

9 Q. Again, you're going to have to help me
10 out here. This may be old hand to you but it's
11 not to me. Let's start with the first column.
12 You're projecting a life of this well of 12.25
13 years? Is that what it comes out to?

14 A. That's correct, I believe.

15 Q. And that's also shown down toward the
16 bottom center?

17 A. Yes.

18 Q. That's driven solely by the reserves
19 which is your opinion?

20 A. It's driven by some other things which
21 are also my opinion; but, yes, it is driven by--

22 Q. You've taken the 89 million barrels and
23 decided how long it will take you to get them out
24 of the ground, and that's how you get the life of
25 the well?

1 A. Your statement is not blatantly false,
2 but it's a little bit misleading. I have history
3 from 153 wells, how they decline, and the
4 picture--the forecast production here is in
5 accord with how those 153 wells have done and are
6 doing. It's my opinion, but there's some basis,
7 from a study of these 153 wells, for how that
8 thing is formed.

9 Q. Do you take this well beyond the
10 production of 89,000 barrels of oil?

11 A. No.

12 Q. You never would, would you?

13 A. No. This well becomes uneconomic after
14 producing 89,613 barrels, is what Exhibit 23
15 says.

16 Q. That's what I'm saying. You wouldn't
17 take this well beyond that number in the
18 reserves, correct?

19 A. That's correct. This well has reserves
20 of 89,000 barrels of oil.

21 Q. How do you determine gross production?
22 Is that, again, just based on your experience and
23 knowledge and best hunch?

24 A. It takes my picture that I've derived
25 from how these 153 wells decline, kind of a

1 typical decline curve, and that typical decline
2 curve essentially, in my mind, I slide it up and
3 down so that it starts at a place that gives
4 89,000 barrels of oil before it becomes
5 uneconomic. The shape of the decline curve I
6 determine from the behavior of those 153 wells,
7 and I make it have reserves that are 89,000
8 barrels of oil because that's the average
9 reserves that I determine in Exhibit 22.

10 Q. Driven again by the reserve estimate?

11 A. Yes. Yes.

12 Q. Now, over in net operating revenues, I
13 assume that's just the mathematical calculations
14 of the gross production and the prices that you
15 have indicated here?

16 A. That's true. The other factor is, it's
17 a net operating revenue, so it's after royalty
18 and it's based on the net revenue interest of the
19 owner.

20 Q. Well, do we know what the gross
21 revenues are going to be?

22 A. Well, they're going to be 15 percent
23 greater than the numbers there.

24 Q. And how do you know that?

25 A. Because I've used an NRI of 0.85 in

1 this example. The other way of calculating would
2 be take the \$19-- The numbers that are shown
3 there under net operating revenue are the numbers
4 under the net production, the fourth and fifth
5 column. Do you see where that is?

6 Q. Yes.

7 A. So net production of oil times \$19,
8 added to net production of gas, \$92.43 as an
9 example number, times \$1.75, gives \$165,002.

10 Q. And what comes off of gross operating
11 revenues to get net operating revenues?

12 A. The royalty.

13 Q. And that's all?

14 A. That's all.

15 Q. The next column is entitled, I assume,
16 Severance, plus ADV, plus-- What's all that?

17 A. The words mean severance, plus ad
18 valorem plus windfall profits taxes, and there
19 are no windfall profits taxes anymore, but
20 severance taxes, what I would call production
21 taxes in New Mexico, it's the sum of the four
22 components that go into that. We sure don't need
23 to talk about that. Anyway, for taking it out of
24 the ground you have to pay a tax, and then you
25 pay ad valorem taxes ostensibly on equipment, but

1 really on production in New Mexico.

2 Q. How do you determine net operating
3 expenses?

4 A. Our experience with those 40 wells in
5 the Livingston Ridge, and those net operating
6 expenses include paying the pumper and fixing
7 things and they also include disposing of water
8 that's produced with these Livingston Ridge
9 wells.

10 Q. How do you arrive at the net operating
11 expense? Is that just everything added up? Net
12 operating expenses. That's all the expenses
13 added up to operate this well, is that correct?

14 A. Yes, that's correct.

15 Q. Is there anything in there for
16 overhead?

17 A. No, there's nothing in there for--no,
18 that's not true. There is something in there for
19 overhead.

20 Q. How can I find out if Mr. Yates' salary
21 is in here, for example? Is that in here?

22 A. No, Mr. Yates' salary is not in there,
23 but there is an overhead charge in there.

24 Q. And all the expenses of doing business
25 would be included in this?

1 A. Only the expenses of operating the
2 well.

3 Q. I understand that part. My question
4 is, going beyond that, is there a pro-rata share
5 of the general corporate expense assigned to any
6 of these wells?

7 A. No. I mean, my answer is no. I think,
8 as far as I understand your question, the answer
9 is no. There's an overhead charge in there and
10 I'm not sure what you ascribe that to. But, no,
11 Mr. Yates' salary is not in there.

12 Q. Other than the direct expenses for
13 operating the well, what overhead factors are in
14 here?

15 A. There's an overhead of something in the
16 order of \$300 a month.

17 Q. Anything else?

18 A. No, nothing else.

19 Q. And the next column is capital cost,
20 \$700,000. That's the cost of the well?

21 A. That's the cost to drill and complete
22 the well. This analysis assumes it's all spent
23 on October 1st of 1992. The idea is we go drill
24 a well now, spend \$700,000, start producing it.
25 We assume it's going to produce an average of

1 89,000 barrels of oil.

2 Q. And you just literally, this is like
3 expensing the \$700,000 is what you're doing here,
4 right?

5 A. No. No. The idea is to get revenue so
6 that when you take away the direct operating
7 costs you have enough money left to repay the
8 \$700,000 and make a profit.

9 Q. But you don't capitalize the cost of
10 the drilling over a period of time?

11 A. No. This is what is called a
12 before-tax analysis. There are no income tax
13 implications in this at all.

14 Q. Would that change the rate of return?

15 A. If you did an after-tax analysis? Yes,
16 that would change the rate of return.

17 Q. It would increase it substantially,
18 wouldn't it?

19 A. No, it normally lowers it.

20 Q. It would lower the rate of return shown
21 on Exhibit 23?

22 A. Yes, sir, if you pay taxes.

23 Q. If you took into account the income tax
24 treatment, would it increase or decrease?

25 A. If you took into account the income tax

1 treatment, the main income tax treatment is that
2 you pay income tax and that lowers your return
3 for the project.

4 Q. The rate of return?

5 A. It lowers the rate of return.

6 Q. How did you arrive at the \$700,000?

7 A. Our experience in drilling these 40
8 wells in Livingston Ridge. That's an average
9 kind of cost.

10 Q. It's your testimony that that's what
11 you ordinarily encountered in drilling these
12 wells in Livingston Ridge?

13 A. Yes, sir.

14 Q. Well, I was just looking at some
15 documents, Dr. Boneau, and the Graham AKB State
16 No. 1 which was referred to earlier, I have been
17 given documents showing that the AFE on a
18 completed well was \$581,700. Do you agree with
19 that?

20 A. I do not disagree that there's an AFE
21 for Graham No. 1 that says the number you said.

22 Q. And the AFE for Graham No. 2 was
23 \$556,700?

24 A. I don't disagree with that, if that's
25 what that paper says.

1 Q. Would these be atypical wells, since
2 they're well below your \$700,000 estimate?

3 A. No. What I'm telling you is that we
4 actually spend \$700--we write these AFEs for
5 \$500,000--and-whatever and we spend \$700,000, and
6 the difference is we spend a lot by completing
7 them by stimulating these five or six or eight
8 zones, and that stimulation is simply not in that
9 estimate.

10 Q. Why would you do an AFE for these
11 particular wells that was less than \$700,000?

12 A. Because before they drilled the well
13 they didn't know what the stimulation and how
14 many of these zones they were going to encounter,
15 and the drilling people like to have low numbers
16 and the actual numbers sometimes come out higher.

17 Q. I appreciate that, Dr. Boneau, but you
18 knew by November of 1991 about these additional
19 costs that you're now telling us about, didn't
20 you?

21 A. Probably not. That's not a fair
22 statement.

23 Q. Is that something you discovered
24 recently?

25 A. My memory of the timing is not going to

1 be completely accurate, but Yates completed
2 original wells at Livingston Ridge with one or
3 two zones, a small number of zones, more or less
4 in line with that AFE, and we decided to test
5 some of the other zones. We went back into a
6 handful of wells, 5 or 10 wells, and opened up
7 other zones and produced them for six months or
8 something on that order and decided that it was
9 worth producing these other zones and we changed
10 our completions from hitting a single zone to
11 opening most of the zones. And, like I say, I
12 don't remember exactly when that occurred but
13 sometime around November 91. We're not real far
14 off.

15 Q. You've only started producing from all
16 these other zones after, roughly, November of 91?

17 A. That's my memory, yes, sir. The only
18 thing possibly with my memory is the exact date
19 when that started.

20 Q. Is it your testimony that that explains
21 the difference in the \$700,000 assumed here in
22 cost on Exhibit No. 24, in the amount shown for
23 the Graham No. 1 and the No. 2?

24 A. Yes, that is the difference in those
25 two numbers.

1 Q. Is there anything else that you can
2 think of that would impact or increase the
3 estimate of \$700,000 above the numbers that it
4 cost to drill Graham 1 and 2?

5 A. No, sir. I'm sure you realize that if
6 we could drill these wells for
7 \$500-some-thousand, our profit and rate of return
8 would increase and we would be very happy.

9 Q. You understand that's one issue
10 involved in this litigation, and the higher the
11 number here, the better it's going to look,
12 right?

13 A. I don't understand that, no.

14 Q. I don't need your understanding.

15 A. The lower, the better it would look.

16 Q. You may not even know the issues
17 involved.

18 A. I don't know the issue that you're
19 referring to.

20 Q. All right. Let me direct your
21 attention to Exhibit No. 25, and that's the
22 casing program for these four wells?

23 A. Is that a question, sir?

24 Q. Yes, sir, it is.

25 A. This is specifically the casing program

1 for the Graham No. 1, which is in the same
2 section. It is the casing, it is representative
3 of the casing program we propose for the four
4 wells, yes, sir.

5 Q. And you're involved in making sure that
6 those things are taken care of, that the casing
7 program meets R-111-P?

8 A. I'm involved, yes, sir.

9 Q. And you're satisfied, of course, that
10 the proposed casing program does meet R-111-P?

11 A. In my understanding, that casing
12 program meets R-111-P.

13 Q. All right. I want you to, and you may
14 not have it there in front of you and if it's not
15 I can give you mine, Yates' Exhibit No. 2. Let
16 me let you use my copy of it.

17 MR. HIGH: May I approach the witness,
18 Mr. Chairman?

19 CHAIRMAN LEMAY: Please do.

20 Q. Now, Dr. Boneau, look at Yates Exhibit
21 No. 2. Did you have any part in preparing that
22 document?

23 A. No, sir.

24 Q. Can you look at it and tell me if it
25 complies with R-111-P?

1 A. I believe it complies with R-111-P. It
2 looks to me like it complies with R-111-P.

3 Q. All right. Let's talk about that,
4 then. Do you know, by memory, what R-111-P
5 requires?

6 A. I know, and you'll find something about
7 it I don't know, but I know some of the things,
8 yes. I know most of the things.

9 Q. I assure you, I truly hope I find
10 nothing about it that you don't know, but let's
11 talk about it because we want to see if Yates
12 Exhibit 2 complies with it. The first
13 requirement in R-111-P is the surface casing,
14 correct?

15 A. Yes, sir.

16 Q. And that's basically designed to
17 protect the water bearing surface?

18 A. Protect surface water.

19 Q. And that casing is required to come
20 down a certain distance, right?

21 A. To the Rustler anhydrite, is how I say
22 it.

23 Q. Roughly the top of the salt?

24 A. Yes, sir.

25 Q. And your Exhibit No. 25 shows that

1 surface casing being at 879 feet, right?

2 A. Yes, sir.

3 Q. And I believe Yates Exhibit No. 2 shows
4 it as a surface casing down to 850 feet, right?

5 A. That's correct.

6 Q. And that's what R-111-P required, that
7 surface casing, right?

8 A. Uh-huh; 850, 879, that's engineering
9 accuracy. Same place.

10 Q. Cemented back to the surface?

11 A. Cemented back to the surface.

12 Q. Which Yates' Exhibit No. 2 says it will
13 be done, right?

14 A. Yes, sir.

15 Q. Now, the next set of casing required by
16 R-111-P is the salt protection string, right?

17 A. Yes, sir.

18 Q. That's also required to be set to a
19 specified distance, correct?

20 A. Not more than 600 feet below the base
21 of the salt, is how I remember it.

22 Q. You have to be at least 100 feet below
23 but not more than 600 below the base of the salt,
24 right?

25 A. That's what I remember.

1 Q. In Exhibit No. 25, that's shown as
2 being how deep?

3 A. 4200 feet.

4 Q. On Yates Exhibit No. 2 it's shown as
5 being how deep?

6 A. 4500 feet.

7 Q. Is that about where you would estimate
8 the bottom of the salt to be?

9 A. Yes, sir.

10 Q. And so those numbers, in your judgment,
11 would be within the range of what's required in
12 the salt protection string?

13 A. Yes, sir.

14 Q. Now, after the salt protection string
15 is set, it has to be cemented to the surface,
16 right?

17 A. Uh-huh.

18 Q. After you set that one, then R-111-P
19 says you set a production string? I assume you
20 don't set an intermediate string, right?

21 A. There's no intermediate string here.
22 The salt protection string serves the same
23 purpose.

24 Q. So the next casing would be to the
25 production string, right?

1 A. Yes.

2 Q. And R-111-P requires it to also be
3 cemented to the surface if there's no
4 intermediate string, correct?

5 A. Yes, I believe that's right. I'm a
6 little fuzzier about that than the other ones,
7 but I believe that's right.

8 Q. And that's shown on your Exhibit No.
9 25, correct?

10 A. Yes.

11 Q. Now, look at Yates' Exhibit No. 2 and
12 tell me where that production string is to be
13 cemented to.

14 A. About two minutes ago I got your point
15 and read that. What it says is tie back, are the
16 words used here, and I would interpret that to
17 mean that the cement be brought above the base of
18 the 8-5/8, which is not the surface.

19 Q. And that's not what R-111-P requires,
20 is it?

21 A. Frankly, I would have to look at
22 R-111-P, but that's not what--I'm hazy on that
23 requirement of R-111-P. I could read it here, I
24 guess. If you're telling me that's what it says,
25 we can believe you.

1 Q. Let me represent to you that R-111-P
2 says if you don't run the intermediate string,
3 you have to cement the production string to the
4 surface.

5 A. All right. And the only discussion
6 there is whether the salt protection string is,
7 in fact, an intermediate string. That would be
8 the only--

9 Q. You agree with me that the production
10 string proposed by Yates in Yates' Exhibit No. 2
11 is not cemented to the surface or is not supposed
12 to be cemented to the surface, right?

13 A. That's what it says here. I think I
14 can tell you that it will be cemented to the
15 surface.

16 MR. CARROLL: May I--I'm afraid I'm
17 disagreeing with Mr. High's interpretation of
18 R-111-P, and I propose to let Dr. Boneau look at
19 it.

20 MR. HIGH: Fine. Let him look at it.
21 Exhibit No. 9, page 9.

22 Q. You have that in front of you now, Dr.
23 Boneau?

24 A. I have order R-111-P in front of me,
25 yes, sir.

1 Q. Turn to page 9.

2 A. I happen to be on that page.

3 Q. And the first thing at the top is
4 intermediate string?

5 A. Yes, Item 4.

6 Q. All right. And under production
7 string--

8 A. Yes, Item 5.

9 Q. --A-1 one deals with wells to the
10 shallow zone, right?

11 A. And you take that to mean above 5000
12 feet?

13 Q. Isn't that what R-111-P says it is?

14 A. I believe so.

15 Q. If you're going below 5000 feet,
16 R-111-P calls it a deep well, right?

17 A. Yes, sir.

18 Q. All right. Drop down to A(ii), the
19 second indented paragraph says, "For wells
20 drilled to the deep zone," and that would be
21 these, "the production string shall be cemented
22 with a volume adequate to protect the pay zone
23 and the casing above such zone, provided that if
24 no intermediate string shall have been run and
25 cemented to the surface, the production string

1 shall be cemented to the surface." Did I read
2 that correctly?

3 A. Yes, and that's exactly what I
4 remembered. And what I'm saying is, the question
5 I can't resolve is whether the string set at 4500
6 is, in fact, an intermediate string.

7 Q. Well, let's look at R-111-P. Right
8 above it, production string refers to
9 intermediate string, right? Do you see that?

10 A. Those are the words there in Item 4,
11 yes, sir.

12 Q. Look at 4(b). It's different from the
13 salt protection string, right? Look at 4(b).

14 A. I don't know what you mean by
15 "different."

16 Q. All right. Let me read 4(b).
17 "Cementing procedures and casing tests for the
18 intermediate string shall be the same as provided
19 under subsections D(3), C and F for the salt
20 protection string." Do you see that paragraph?

21 A. Yes, sir, I surely see that.

22 Q. So for purposes of R-111-P, the
23 intermediate string is something separate and
24 apart from the salt protection string, right?

25 A. That's not clear to me, no. It's not

1 clear where you set the intermediate string in
2 this well. I'm not here to argue with you and I
3 know it's our intention to cement this well to
4 the surface.

5 Q. Dr. Boneau, I don't doubt that for one
6 minute, but we're here talking about things that
7 can go bad; and human error is one of them,
8 right?

9 A. Human error causes problems sometimes,
10 yes, sir.

11 Q. And let me ask you this question. Is
12 it human error that the APD casing program is
13 described in such a way that it doesn't comply
14 with the casing program that R-111-P requires,
15 which you've described on Exhibit 25?

16 A. It's not clear to me that Exhibit 2
17 does not comply with R-111-P. That's a question
18 that Mike Williams can answer, or somebody.

19 Q. Do you know or do you not know whether
20 or not the casing program set forth on Yates
21 Exhibit No. 2 complies or does not comply with
22 R-111-P?

23 A. I believe that it complies with R-111-P
24 and the other thing I'm telling you is that we
25 intend to cement these back to the surface as

1 I've shown in Exhibit No. 25.

2 Q. Notwithstanding what Yates' Exhibit 2
3 says?

4 A. Notwithstanding the interpretation of
5 Exhibit No. 2.

6 Q. Would you agree with me that a tie back
7 is not cemented to the surface?

8 A. Yes, I'll agree with that.

9 Q. How long do you think it would take to
10 drill from 4200 feet, or whatever the APD said,
11 4500 feet, down to the total depth of the hole?
12 You go another 4000 feet?

13 A. Yes, sir.

14 Q. How long would it take you to drill
15 that?

16 A. Two weeks.

17 Q. That's three shifts a day? When you're
18 drilling you go around-the-clock?

19 A. When you're drilling, you drill
20 around-the-clock, yes, sir.

21 Q. Constantly drilling?

22 A. That's the idea.

23 Q. How many RPMs do you drill at in the
24 basin?

25 A. I do not know.

1 Q. Well, the casing that's reflected on
2 Yates' Exhibit No. 2 will be the casing through
3 which you have rotated the drill stem for 4000
4 feet, right?

5 A. Yeah, that's right.

6 Q. Is there any wear and tear on that
7 casing after drilling through it like that?

8 A. The wear and tear is non-zero, it's
9 small. There's no appreciable wear and tear.

10 Q. So the time it would take to drill from
11 4500 feet to the total depth wouldn't cause any
12 real wear and tear on the casing, right?

13 A. That's my opinion, yes.

14 Q. Look at Yates' Exhibit No. 2 and tell
15 me, if you can, the bottom hole depth of that
16 hole for any of these wells. And you can look at
17 all four of them on Yates' Exhibit No. 2, if you
18 like.

19 A. Item No. 10 on the first one says 8500
20 feet. And Item No. 10 on all of them say 8500
21 feet.

22 Q. Is that the bottom hole location?

23 A. That's the proposed depth. That's how
24 deep the well will be.

25 Q. Now, continuing with this casing

1 program, Dr. Boneau, how far can you or do you
2 have to go down before you kick off on R-111-P?

3 A. You have to go past, I believe the
4 word's intermediate casing. You have to go past
5 the string at 4200 feet.

6 Q. Do you know if there's some other sign
7 down there you have to go beyond before you can
8 kick off?

9 A. I don't recall.

10 Q. Have you had very much experience in
11 drilling directional wells in the basin?

12 A. Have I?

13 Q. Yes, sir.

14 A. Yates has had a fair amount of
15 experience mainly drilling those Strawn wells
16 that were referred to in the western part of the
17 potash area.

18 Q. My question is, do you have very much
19 experience with directional wells?

20 A. I have the same kind of office
21 experience that we talked about with those wells,
22 and I think you want to judge that as not very
23 much experience and I won't dispute that.

24 Q. I'm not trying to judge anything. I'm
25 trying to figure out how much experience you

1 have. How much directional drills have you
2 drilled or been personally involved in drilling?

3 A. I have been personally involved in
4 drilling five.

5 Q. And were all those here in the potash
6 basin?

7 A. Those are the four wells at East Burton
8 Flat Strawn plus Bonneville.

9 Q. One by Yates and the other four by
10 other people back in Oklahoma?

11 A. The other four are Yates and East
12 Burton Flat Strawn.

13 Q. And who drilled those wells? Did
14 Yates?

15 A. Yates is the operator of those five
16 wells.

17 Q. Who did the actual drilling?

18 A. It was a drilling contractor, and I
19 don't remember which one.

20 Q. You don't remember who you contracted
21 it outside to?

22 A. Not those particular wells, no, I
23 don't.

24 Q. Does Yates have a drilling company that
25 it owns?

1 A. No.

2 Q. Is there a corporation called Yates
3 Drilling Company?

4 A. Yes.

5 Q. And is that company in the business of
6 drilling oil wells?

7 A. No.

8 Q. Does Yates ever take bids on drilling
9 wells?

10 A. Yes. That's normal procedure.

11 Q. Have you taken bids on drilling a
12 directional well in the potash basin?

13 A. Yes, we took bids related to drilling
14 these wells I referred to.

15 Q. Which ones? The five you just
16 mentioned?

17 A. Yes, sir.

18 Q. All those were bid?

19 A. All those were bid.

20 Q. Is this \$700,000 that you've estimated
21 for a well in the Delaware, is that based upon
22 bids you received for these wells?

23 A. That \$700,000 is talking about vertical
24 wells.

25 Q. I understand that and I'm asking you if

1 that number is based upon bids, or is that--

2 A. Yes, that's based upon bids. That
3 number is based upon bid for the billing and
4 there's a lot of other expenses.

5 Q. You know the total offset of these
6 other wells that you mentioned, these five wells?

7 A. The four in East Burton Flat Strawn
8 were offsets considerably larger than the
9 Bonneville, had offsets approaching a mile.

10 Q. You gave us some numbers, and let me
11 just jump right to the bottom line, Dr. Boneau.
12 You gave us some numbers earlier about the cost
13 of drilling a directional well. Do you recall
14 telling Mr. Carroll about that?

15 A. Yes, sir.

16 Q. Is that based upon your experience with
17 these five wells?

18 A. Yes, sir.

19 Q. And a well that was offset 1320 feet,
20 you said cost an additional \$300- to \$400,000?

21 A. Yes, sir.

22 Q. And that's additional over what? Is
23 that over the 700,000?

24 A. Over the \$700,000 dollars.

25 Q. So it's your testimony that to

1 directionally drill a well in the potash basin to
2 the Delaware, offset 1320 feet is, ballpark, a
3 million bucks?

4 A. That's correct.

5 Q. And I believe you said part of that
6 cost was because you had to go down so far before
7 you kick off?

8 A. That's part of the cost, but that fact
9 limits the distance that you can offset.

10 Q. All right. Let me ask you, what do you
11 consider to be a vertical hole?

12 A. A hole where the deviation is always
13 less than five percent. I should have said five
14 degrees, but five percent is pretty close to the
15 same thing.

16 Q. Have you ever seen a case where the
17 hole was unintentionally deviated more than five
18 degrees?

19 A. I have seen holes that were more than
20 five degrees for a short distance.

21 Q. What's the highest variation you've
22 ever seen of deviation?

23 A. Oh, eight degrees, something like
24 that. A very short distance.

25 Q. What would you consider to be an ideal

1 angle for a directional well in the Delaware?

2 Well, let me back up. Is there such a thing as
3 an ideal angle?

4 A. I think what would be ideal to one
5 person, I don't think you would get an agreement
6 on what that answer is.

7 Q. Do you have an opinion on what's an
8 ideal angle?

9 A. You've got conflicting--well, you want
10 to get there and you also want to test all these
11 zones, so that if your angle is too big, you hit
12 the top Delaware in a legal location and you hit
13 the bottom Delaware on the adjacent guy's lease,
14 and that's unlikely to be a good situation. In
15 the 45-, 50-degree range.

16 Q. Would be what?

17 A. Would be the kind of thing I would
18 shoot for.

19 Q. And why is it you would shoot for an
20 angle of that 45 to 50 degrees?

21 A. Because, so that you can get there and
22 test all the zones. I'm trying to tell you that
23 this is a different situation than trying to
24 offset to a single target.

25 Q. You're talking about horizontal

1 drilling? Is that what you're trying to say?

2 A. No, no.

3 Q. Is there a cost ratio between vertical
4 and the degree of angle, or do you know?

5 A. Well, I don't know what you're asking.

6 Q. If you don't understand it, please
7 don't answer it. I'll put it in words you
8 understand.

9 Does it cost more or less to drill a
10 directional well that has a higher degree of
11 angle than one that has a lesser degree of angle?

12 A. It costs more to drill one with a
13 higher degree of angle.

14 Q. At what point in the angle does the
15 price start getting higher, or is it a constant
16 increase with the increase in angle, if you know?

17 A. At a small angle it's not higher at
18 all.

19 Q. When you say "small," it would be up to
20 what?

21 A. 10 degrees, things that are normal.

22 Q. So, roughly up to 10 degrees? In fact
23 some people might even call that a vertical hole,
24 right? Unintended deviated hole?

25 A. Some people might call it something

1 else. I don't know.

2 Q. And that would be about the same cost
3 as a vertical hole?

4 A. Yes.

5 Q. At what point in the angle of deviation
6 does it start costing you more? From 10 degrees
7 on up?

8 A. In my mind there's a jump getting to
9 real deviated holes, 40- to 60-degree holes, and
10 there's an additional jump trying to get to 80-
11 or 90-degree holes, where you're trying to
12 maintain that horizontal.

13 Q. What is it about the directional
14 drilling that makes the cost escalate?

15 A. You've got to drill with special tools
16 and you've got to convince yourself by
17 measurements you're going the direction that you
18 want to go.

19 Q. Okay. Anything else that you can think
20 of?

21 A. Those are the two main factors.

22 Q. And do you know whether or not there
23 were companies on the market that provide those
24 kinds of services you just identified?

25 A. Yes, there surely are.

1 Q. In fact, there's companies out there
2 whose business is nothing but directional
3 drilling, right?

4 A. Oh, yes, sir.

5 Q. Have any of those people been involved
6 in drilling the directional wells that Yates has
7 drilled?

8 A. Yes, sir.

9 Q. What angle of draw did you use in
10 coming up with the estimated cost that you gave
11 Mr. Carroll earlier today?

12 A. You'll have to help me. "Angle of
13 draw" is a potash term, and I don't know how to
14 apply that to an oil well.

15 Q. I didn't mean angle of draw--the angle
16 of deviation. How much deviation did you assume
17 when you came up with these estimates on
18 directional drilling?

19 A. Those angles are 35 to 50 degrees, from
20 what I remember.

21 Q. Have you ever sat down and said, how
22 much would it cost me to directionally drill from
23 a position alongside Graham No. 1 and Graham No.
24 2 over to where you want Graham 3 and 4?

25 A. Those are basically the

1 direct-offset-40 locations. I talked about a
2 1320-foot offset.

3 Q. You have done an analysis on the cost
4 of directionally drilling the four wells we're
5 talking about here today?

6 A. We've done an analysis on drilling a
7 1320-foot offset in the Delaware in the
8 Livingston Ridge area. It was not personalized
9 to exactly Graham 1 or the Graham 3, but it was--

10 Q. You just assumed it would be the same?

11 A. The overall characteristics would be
12 the same, yes, sir.

13 Q. How about Flora No. 1 and Flora No. 2?
14 Have you done any analysis on what it would cost
15 to directionally drill those?

16 A. If you'll tell me where the surface
17 location is, I could tell you whether it fits
18 into the limited number of cases we've done, but
19 again, no, I've not done one personalized to
20 Flora 1 and Flora it.

21 Q. That answered my question. So, you
22 don't know what it would cost you to
23 directionally drill from an area in close
24 proximity to the four wells along the east side
25 of Section 2, and hit the bottom hole location

1 you want to hit with Flora 1 and Flora 2? You
2 don't know the cost of doing that?

3 A. I think it's not possible to do that.

4 Q. I didn't ask you that. You don't know
5 the cost to do that, do you?

6 A. I don't know what you want for an
7 answer. I studied the problem and my conclusion
8 is you cannot do that.

9 Q. When you say you've studied the
10 problem, this is in the abstract about the cost
11 of directional drilling?

12 A. About drilling that big an offset,
13 which would be about a half a mile offset.

14 Q. Anything beyond these footages you gave
15 me earlier, falls into the no-can-do category?

16 A. No-can-do and hit the group of Delaware
17 sands.

18 Q. So, any one of these wells that goes
19 beyond 1320 feet is in the no-can-do category?

20 A. No. The no-can-do line is, like I
21 said, the square root of 2 times--

22 MR. MUNCY: 1866.

23 A. --1866, about 2000 feet.

24 Q. Can it still be profitable if you
25 offset it 1866? I'm sorry, you were looking at

1 Mr. Muncy, and I think Mr. Muncy is shaking his
2 head down here; maybe trying to help you out?

3 A. I'm looking at God and not Mr. Muncy.

4 MR. MUNCY: I wasn't even looking at
5 him.

6 MR. HIGH: You were shaking your head.

7 A. I have analyzed that, and my conclusion
8 is that you just get your money back for an
9 average well. This 89,000 barrel well or 100,000
10 barrel well, you break even, which is not
11 attractive, but that's what you do. By doing
12 this directional drilling, you get no additional
13 income, you spend extra money drilling the well,
14 and at the deviation you referred to, you use up
15 all your profit in extra charges for drilling the
16 well. So, the economic and the physical
17 limitations are about the same.

18 Q. You also told Mr. Carroll that, in
19 coming up with these estimates, these numbers for
20 a directional well, that you kicked off at 4200
21 feet?

22 A. Yes, sir.

23 Q. And that's what you assumed in coming
24 up with these numbers?

25 A. Yes, sir.

1 Q. Do you know the depth of Marker Bed
2 126?

3 A. Not in this area.

4 Q. Do you even know what Marker Bed 126
5 is?

6 A. It's one of the marker beds in the
7 potash zones.

8 Q. Do you know it has any significance
9 with respect to R-111-P?

10 A. My memory is that R-111-P says that you
11 cannot kick off above Marker Bed 126.

12 Q. Do you know how deep Marker Bed 126 is
13 in the area of Section 2?

14 A. In a vague way I do. If it's less than
15 4200 feet.

16 Q. If you kicked up at a point above your
17 4200 feet, that would reduce the amount of angle,
18 wouldn't it?

19 A. It would give you more depth, more
20 distance in which to hit your target, yes, sir.

21 Q. And it would reduce the cost, wouldn't
22 it?

23 A. It would reduce the cost somewhat.

24 Q. Did you give any thought in coming up
25 with your estimates in kicking off at a point

1 above 4200 feet so the angle would be smaller and
2 less costly?

3 A. No.

4 Q. When you were talking earlier, Dr.
5 Boneau, about primary life of the well, what does
6 that mean?

7 A. I don't know that those are the exact
8 words I used, but I think we can come to an
9 understanding as to what that means.

10 Q. Let's refer specifically to Exhibit No.
11 27, because you have a column there entitled
12 "years primary"?

13 A. Yes.

14 Q. What does that mean?

15 A. The column in Exhibit 27 that's marked
16 years primary, is the number of years that the
17 field has been on primary production as of today.

18 Q. So that's--

19 A. It's 1992 minus the number in "start
20 primary" column.

21 Q. So some of these wells have been going
22 for 31 years, 23 years, and 38 years?

23 A. That's correct.

24 Q. So, when you talked earlier about
25 life-expectancy of 12.25, there's some of them

1 here that's gone nearly three times that much,
2 correct?

3 A. Well, you're talking about slightly
4 different things, but it's true that--here we're
5 talking about fields, and elsewhere we're talking
6 about wells, and that can cause you some
7 confusion, but yes, there are wells, Delaware
8 wells, that have produced 30 years.

9 Q. And you hope there's a whole lot more
10 of them?

11 A. That would be lovely.

12 Q. You want a well to go beyond the 12.25
13 years you project for, right? You want it to
14 keep producing forever until it becomes
15 economical?

16 A. In a sense, but if I know how much it's
17 going to produce, I want to produce that amount
18 early. All I'm saying, in the earlier exhibits,
19 23 and 24, is that that's the way the wells in
20 Livingston Ridge produce. The wells in these
21 other fields start lower and go longer and last
22 longer.

23 Q. You're not going to shut down a well
24 after 12 years if it's still economical?

25 A. Not going to shut down a well after 12

1 years if it's still economical.

2 Q. Now, in Livingston Ridge, and again I'm
3 referring here to Exhibit 27, Livingston Ridge
4 Delaware, you show 29 wells as of 1/1/92?

5 A. Yes, sir.

6 Q. Will I find those wells on your Exhibit
7 No. 22?

8 A. Yes. They should be there.

9 Q. Will there be any additional wells on
10 there?

11 A. Exhibit 22 probably contains additional
12 wells that were drilled after 1/1/92.

13 Q. Would that be the only difference?
14 There's far more than 29 wells on your Exhibit
15 No. 22, correct?

16 A. Yes.

17 Q. And it's entitled "Livingston Ridge
18 area"?

19 A. Okay. Will you give me a second to
20 explain? Livingston Ridge area has two
21 meanings: In my lexicon, Livingston Ridge area
22 has two meanings. First of all, it means
23 Livingston Ridge Delaware Pool, Lost Tank
24 Delaware Pool, Livingston Ridge Delaware
25 Northeast Pool. That's the first definition.

1 The small group of wells in a contiguous area,
2 that includes the Livingston Ridge Delaware Pool,
3 okay?

4 Q. And that's the basis for your Exhibit
5 No. 22?

6 A. No, the other definition is the basis
7 for my Exhibit 22.

8 Q. All right, what is that?

9 A. And the other definition is essentially
10 Delaware wells in that 10-township area that I
11 described, that include other wells in what I
12 would call the same trend. You understand the 10
13 townships is bigger than the Livingston Ridge
14 Pool?

15 Q. I understand that, and I'm just trying
16 to figure out how you arrived at some of these
17 cutoffs, and I think you've explained that the
18 best you can.

19 Again, going back to Exhibit No. 27,
20 "Years Flooded," that column means what?

21 A. That column means the number of years
22 from the time when waterflood started in that
23 pool until the present time.

24 Q. Well, would there be any type tertiary
25 recovery, polymer CO₂, that sort of stuff?

1 A. I really don't know.

2 Q. Well, have you planned for any or
3 projected for any?

4 A. There are tertiary recovery projects in
5 two or three Delaware pools in the country. The
6 ones I know about have not been primary followed
7 by secondary followed by tertiary.

8 My assumption, to get it hopefully
9 simple, my assumption is that if tertiary is the
10 thing that people decide to do, they will do it
11 in the time frame of what we're talking about,
12 the waterflood here. You go straight from
13 primary to tertiary, and that's what Exxon and
14 Yates are in the process of planning to do in the
15 Avilon Delaware field, for example, just to tell
16 you I'm not making this up on the spot. This is
17 a procedure that the major oil companies think is
18 the way to go in some fields.

19 Q. But you don't think we'll see that here
20 in the Delaware, in Livingston Ridge?

21 A. I'm telling you, I don't know what
22 we'll see. I think that we will see--

23 Q. If we do, will it extend the life of
24 the wells, life of the field?

25 A. If there is 15 years of primary

1 followed by 15 years of waterflood followed by 15
2 years of CO₂, the lifetime will be 45 years. I
3 think what's more likely is that there will be 15
4 years of waterflood followed by 15 years of CO₂,
5 or 15 years of nothing.

6 Q. Now, have you ever been involved, Dr.
7 Boneau, in cementing the casing?

8 A. Yes.

9 Q. And you have actually been on site when
10 casing was cemented, and played some role in
11 that?

12 A. Yes.

13 Q. On how many occasions are we talking
14 about? Frequently? a few times? or--

15 A. A few times. 10 perhaps.

16 Q. Pardon?

17 A. Perhaps 10.

18 Q. That's not something that's part of
19 your normal, regular duties?

20 A. That's correct.

21 Q. These roughly 10 times or so where
22 you've been on site involved in cementing, has
23 that all been here in the potash basin?

24 A. No, some of that was when I was with
25 Phillips in Odessa, and the rest of the time was

1 with Yates, but not all of them in the potash
2 basin.

3 Q. How many occasions would you say with
4 Yates that you've been on site involved in
5 cementing the casing?

6 A. I missed the end of that question.

7 Q. I'm sorry. How many times would you
8 estimate that while you've been employed by Yates
9 you've been on site involved in cementing the
10 casing?

11 A. Five.

12 Q. Would you say those were recent or just
13 over the last, what, 12, 14 years that you've
14 been with Yates?

15 A. A couple of them have been recent, but
16 they've been spread over that time.

17 Q. What was it that caused you to get
18 involved with these cementing programs?

19 A. Mostly curiosity, to know how things
20 work.

21 Q. Just trying to figure out more about
22 the oil drilling business?

23 A. Yes, sir.

24 Q. Do you have any special training or
25 education, in any way, Dr. Boneau, with respect

1 to casing cementing?

2 A. My mind says I can say yes or no. I
3 really must not understand exactly what you mean.

4 Q. Well, have you ever been to school and
5 got any degree that in any way involved cementing
6 casing on an oil well?

7 A. No, sir.

8 Q. I take it you've attended some
9 seminars, maybe a day or two seminar?

10 A. That's correct. I described my degrees
11 to you earlier.

12 Q. In physics, right?

13 A. Yes, sir.

14 Q. That's not drilling or cementing gas
15 wells or oil wells, is it?

16 A. No, sir.

17 Q. In your nuclear--in fact, I didn't
18 catch all of that. Nuclear something-or-other.

19 A. Spectroscopy. Spectra. Spectra is a
20 word people hear once in a while.

21 Q. That has nothing to do with cementing
22 casing in an oil well, does it?

23 A. There's not much connection, no, sir.

24 Q. Any other experience or education that
25 you have had with respect to cementing casing on

1 an oil well that would give you some special
2 expertise with respect to cementing casing in an
3 oil well?

4 A. I have been to so many jobs, I have
5 been to the cement labs at the cementing
6 companies, I have been to the research labs at
7 the cementing companies. I've seen tests on
8 cement. I've seen flow tests with cement. I did
9 lots of flow tests when I was with Phillips'
10 Research Center, but cementing has never been my
11 primary occupation. I'm trying to provide you
12 the right answer without saying it in one word.

13 Q. Would you agree with me that you have
14 no special expertise in cementing?

15 A. I would agree with that, yes, sir.

16 Q. Look at Exhibit No. 26. That's the
17 cementing program for the Graham No. 1?

18 A. Yes, sir.

19 Q. Can you tell me, just from looking at
20 that document, whether or not there was any
21 problem with the cementing on this well?

22 A. Again, I'm not clear what you mean. I
23 wrote this and I know the background of the
24 well. Are you asking if another person looking
25 at this can tell?

1 Q. My question to you is, can you look
2 solely at Exhibit No. 26 and, with the
3 information given, tell me if any difficulties or
4 problems were encountered during the cementing of
5 Graham No. 1?

6 A. No, I can't tell that. To me, the
7 critical information is that cement was
8 circulated on each day, and that information is
9 actually written on Exhibit 25 and is not written
10 on Exhibit 26, just not to duplicate it.

11 Q. So you can't look at Exhibit 26, anyone
12 familiar with cementing couldn't look at Exhibit
13 No. 26 and tell if something went wrong during
14 the cementing?

15 A. I think that's true. But if they
16 looked at both those exhibits, they could tell.

17 Q. Do you know whether or not there were
18 any cementing problems with Graham No. 1?

19 A. Yes, I know that there were not
20 cementing problems with Graham No. 1.

21 Q. There were not?

22 A. There were not.

23 Q. Okay. Do you know whether or not
24 Graham No. 1 ever lost circulation?

25 A. I can tell from this that Graham No. 1

1 never lost circulation below surface casing. I
2 cannot tell whether or not it lost circulation
3 above surface casing.

4 Q. My question is, do you know whether or
5 not Graham No. 1 lost circulation on any of the
6 cementing?

7 A. You can't tell from this, and I would
8 be relying on my memory, and my memory is that it
9 lost circulation in drilling the surface casing.
10 But that's just my memory and it's not related to
11 these two exhibits at all.

12 Q. Do you know what Stage 1, 2 and 3 is
13 under your paragraph C?

14 A. Yes, sir.

15 Q. And what are they? What's Stage 1?

16 A. I think everybody realizes it's not
17 possible or not easy to inject cement down the
18 5-1/2-inch casing and have it fill up outside the
19 5-1/2-inch casing from 8450 feet to surface,
20 and--

21 Q. You're saying that's not possible?

22 A. I said it's either not possible or not
23 easy. It's not done. You would be foolish to
24 try. So, what is done is that these--these
25 distribution values, DD tools, these stage

1 cementing tools are inserted in the casing, and
2 that 5-1/2-inch casing is cemented in three
3 stages.

4 The first stage is injected into the
5 casing and it's designed--it comes up the back
6 side to above 7401 where this DV tool is set, and
7 then a so-called opening bomb is dropped, which
8 opens a valve, and water is pumped in the casing
9 and the cement above 7401 is circulated out of
10 the hole.

11 So the first stage cements behind the
12 5-1/2-inch from 7401 to 8450, and that sets for
13 approximately three hours, and then the second
14 stage is pumped, which goes out the tool, the
15 holes, at 7401, and goes up behind the casing to
16 above the DV tool at 4485. And that's the second
17 stage.

18 And again, a so-called opening bomb is
19 dropped which opens the DV tool at 4485, and the
20 excess cement from that second stage is
21 circulated out of the hole so that State 2
22 cements the casing from 4485 to 7401.

23 And then the third stage, after a
24 three-hour wait for that to set up, a third stage
25 is pumped that goes in the DV tool at 4485 and is

1 circulated to surface, so that the cement behind
2 the 5-1/2-inch is placed there in three stages.
3 And the information on Exhibit 26 describes the
4 cement used in those three stages.

5 Q. And it's your testimony that the use of
6 Stage 1, 2 and 3, as reflected on Exhibit No. 26,
7 is standard practice in terms of cementing
8 casing?

9 A. Yes.

10 Q. Do you know whether or not that same
11 procedure is followed when you've lost
12 circulation?

13 A. Yes. It's got to be modified. You put
14 the DV tools at advantageous places for the lost
15 circulation, but, yes, that's the procedure that
16 is used.

17 Q. Even after you lost circulation?

18 A. Yes, sir.

19 Q. It's your testimony you use it whether
20 you lost circulation or not?

21 A. If you want to put cement behind that
22 casing, you need to use DV tools.

23 Q. It's your testimony you're going to
24 have cement around all or each of those casings?

25 A. I think the answer is yes, but again,

1 I'm not sure what you're saying.

2 Q. The goal is to get cement around each
3 casing, right?

4 A. Yes. Each piece of casing? each length
5 of casing? Is that what you mean? Yes, the goal
6 is to get cement from the bottom of the hole to
7 the top of the hole.

8 Q. Is it your belief that that occurs
9 whenever you cement a casing?

10 A. Whenever you cement it by this
11 procedure, that's what occurs. There's ways you
12 can make that not occur, if you want to.

13 Q. Would the same amount of cement be
14 equidistant around the casing?

15 A. It depends if your casing is
16 centralized. The cement fills up the void
17 between the casing and the formation.

18 Q. What if it's not centralized?

19 A. The casing fills up that void, but
20 there can be a bigger void on one side than on
21 the other in parts of the hole.

22 Q. And you'll get a mud displacement? Let
23 me ask you a different way.

24 A. That doesn't compute.

25 Q. What happens if it's not centralized,

1 what might happen when you're cementing?

2 A. What might happen, you could get a
3 cement job where you've got cement everywhere but
4 you have more of it on one side than the other.

5 You could get a place where the cement
6 is, where the casing is up against the formation
7 or close enough to the formation that you get no
8 cement there for one foot, 10 foot, 100 foot.

9 Q. And things like that happen all the
10 time?

11 A. Well, Yates takes-- The goal, you
12 know, and these are not dummies doing these
13 things, the goal is to get this, and Yates takes
14 precautions and the cementing company takes
15 precautions to try to avoid that, but I'm not
16 going to tell you that it never happens. It does
17 happen, but I'm not going to say it happens all
18 the time.

19 Q. Yates doesn't do its own cementing,
20 does it?

21 A. No, sir.

22 Q. You're like everybody else, you hire
23 somebody to do that, right?

24 A. Yes, sir.

25 Q. And you depend on the expertise and the

1 work and the craftsmanship of the other people,
2 right, that you're hiring?

3 A. You work with them as a team to get the
4 job done, yes, sir. You depend on them. You
5 have your input, and you depend on them.

6 Q. Do you know of any instance, Dr.
7 Boneau, where the cement around the casing has
8 leaked?

9 A. I don't compute what that means. You
10 needs to explain to me what that means.

11 Q. What part of the word "leak" don't you
12 understand?

13 A. I don't understand cement leaking.

14 Q. Do you know of any instance where gas
15 has been present in the annulus behind the
16 casing, even though it was cemented?

17 A. I don't of any in Yates' wells, but it
18 does happen in wells where there are gas zones,
19 and if the cement is not formulated correctly,
20 the gas will migrate into the cement before it
21 sets up and there will be a weakening of the
22 cement because of the gas in the cement.

23 Q. It can literally percolate to the top,
24 can't it?

25 A. Not in Livingston Ridge, but in some

1 place in the world, yes. The problem that causes
2 that does not exist in this area. But as a
3 general question, yes, that can happen, and
4 cement companies have spent research dollars and
5 a lot of work formulating things that prevent,
6 mitigate, increase the effect of that.

7 Q. Would you agree with me, Dr. Boneau,
8 that a lot of money is spent on trying to keep
9 gas from leaking around cement?

10 A. That was a big area of research with
11 the cement companies, and they think they have
12 the answer.

13 Q. It's still a big issue today, isn't it?

14 A. If you think it's a big issue today,
15 it's a big issue today. It's not an issue at
16 Livingston Ridge at all.

17 Q. Do you know what a microannulus is?

18 A. Yes, sir.

19 Q. Where would you find a microannulus?

20 A. In the oil industry, microannulus
21 refers to the condition where the cement is not
22 bonded to the casing and there is an annulus
23 path, a small annulus, a small path, given the
24 word microannulus, between the cement and the
25 casing.

1 Q. Can it occur anywhere else?

2 A. If you want to define "anyplace else,"
3 where two things come together, and they don't
4 come together quite totally.

5 Q. It could occur between the cement and
6 the strata as well, couldn't it?

7 A. It's possible that they wouldn't bond
8 completely, although it's a lot easier to bond
9 there, than it is to steel.

10 Q. Do you know whether or not there's a
11 lot of money spent being spent today to try to
12 solve this microannulus problem, if you know?

13 A. I don't know what "lot" means, and no,
14 I don't know.

15 Q. Do you know whether or not it's even an
16 interest that people are interested in anymore?

17 A. No. I know that it still occurs in
18 wells from time to time. We do worry about it in
19 wells from time to time. It's not a problem
20 that's totally disappeared.

21 Q. And people are still trying to find
22 ways to stop it, right?

23 A. I can agree with that, yes.

24 Q. Let me just ask you, Dr. Boneau, given
25 that single issue by itself, the issue of

1 microannulus either between the well casing in
2 the cement or the strata in the cement, and the
3 fact that it is still an on-going issue in debate
4 today, is it still your testimony that these
5 wells present no hazard at all to the underground
6 potash miners down there?

7 A. Yes, sir, that's my testimony.

8 Q. Do you think that the cement job that
9 Yates gets on its wells is not going to be
10 subject to this microannulus thing?

11 A. It's not going to be subject to
12 microannulus over the entire mile that prevents
13 the migration. These are local problems, and
14 there can be local problems and still plenty of
15 cement left to ensure that the gas does not
16 migrate.

17 Q. But it is still a possibility today, as
18 you and I stand here, that a well can be cemented
19 in the potash basin and that cement can still
20 allow gas to migrate for any number of reasons,
21 correct?

22 A. I think I disagree with that
23 statement. Again, I'm not exactly clear what
24 you're asking, but just to say that
25 everything--that cement is going to migrate

1 everywhere, is not true. The cement job is going
2 to prevent the migration.

3 Q. What is?

4 A. The casing and cement program is going
5 to prevent the migration of gas in the Delaware.

6 Q. You have a high degree of confidence in
7 cement, I take it?

8 A. Yes, sir.

9 Q. Do you?

10 A. Yes, sir.

11 Q. Do you believe that there is at least a
12 risk in the potash basin that gas can migrate, in
13 whatever way, around that cement?

14 A. No, I don't think that gas will migrate
15 over these distances, with this casing and cement
16 program.

17 Q. Do you think the fact that a leak might
18 develop in the casings or liners might result in
19 something that we ought to be concerned with?

20 A. No. A leak is not going to develop
21 that penetrates the 5-/12 inch in the cement, the
22 8-5/8 inch in the cement.

23 Q. Do you ever get leaks in the casing? or
24 would you be in a position to even know that?

25 A. Yes, I clearly know that. I told you,

1 I testified that, in my experience, I can
2 remember 20 or so wells that had casing leaks,
3 and they all were behind--they all were in casing
4 that had no cement behind them. And at the time
5 I said other people may have different
6 experience; I testified to my experience.

7 Q. So, leaks do develop in the casing?
8 That's not an issue?

9 A. No, that's not an issue.

10 Q. You agree with that, right? Leaks
11 develop in casing?

12 A. No. The issue is, do leaks develop in
13 two strings of casing both cemented to the
14 surface.

15 Q. Well, let's just take the casing for a
16 minute, forget about the cementing or where it
17 goes. Does casing leak?

18 A. Does casing leak? Some casing leaks,
19 some casing--there are leaks in casing. They
20 have occurred and they will occur in the future.

21 Q. And if oil and gas wells are drilled on
22 the potash basin, we have to expect that leaks in
23 the casing are going to develop? I'm not talking
24 about where it's going to go, but leaks in casing
25 do occur? That's just part of the oil and gas

1 drilling business, correct?

2 A. You may penetrate the 5-1/2-inch casing
3 with a leak somewhere sometime. It's very
4 unlikely, but it may happen. But that leak is
5 not going to penetrate the other casing in the
6 outside cement.

7 Q. And I told you I'm not talking about
8 where it's going to go. I'm just talking about
9 the issue of leaks from casing. That does occur
10 in the oil business, right?

11 A. It occurs in the oil business. It's
12 very unlikely that it will occur at Livingston
13 Ridge where we have sweet oil. We have none of
14 the things that are normally associated--

15 Q. You see Mr. Hutchinson shaking his head
16 now, agreeing with you.

17 A. I think he's nodding off.

18 CHAIRMAN LEMAY: Mr. Carroll?

19 MR. CARROLL: I am going to lodge an
20 objection at this point. I think we're getting
21 very argumentative.

22 CHAIRMAN LEMAY: Well, I don't know how
23 many times we're going to go over this. Mr.
24 High, let me say something for you--

25 MR. HIGH: All right.

1 CHAIRMAN LEMAY: --to be efficient in
2 your cross-examination. It took you five minutes
3 to talk around an issue about how much this
4 witness had specialty in cement casing. You
5 could have asked him, you finally did, "Did you
6 have some special expertise in cementing?" Why
7 don't you save the 10 minutes and come out and
8 ask him? Get to the point? You wander all
9 around and are so inefficient with your time.

10 MR. HIGH: I apologize. He was offered
11 as an expert by Yates. I had no idea the man had
12 no expertise until I started asking him.

13 CHAIRMAN LEMAY: That's not what my
14 comment concerned. It concerned spending five to
15 10 minutes talking around an expertise issue,
16 when you could come right out and ask him. We do
17 this here. We're very direct. We don't
18 grandstand, we don't waste a lot of time. We try
19 and make points by being direct. Believe me,
20 you're not going to offend any witnesses by being
21 direct.

22 MR. HIGH: I apologize if I've not been
23 as efficient as you like. I assumed, and perhaps
24 erroneously, that this man had some expertise
25 with respect to casing and cementing, because

1 he's offered as an expert. I agree with you that
2 he has no such expertise.

3 CHAIRMAN LEMAY: No, I didn't say that.
4 I said just to ask him the questions. Don't beat
5 around the bush with it. If you want to find out
6 if he's an expert, ask him.

7 MR. HIGH: Then let me get right down
8 to the bottom line.

9 CHAIRMAN LEMAY: That's all I'm asking
10 you to do here, sir.

11 Q. (BY MR. HIGH) Dr. Boneau, would you
12 agree with me that you have no special expertise
13 on cementing casing?

14 A. I would agree that the reason I'm here
15 and my expertise is what cement programs Yates
16 follows, and the results of them; and, further, I
17 would agree that the specialized questions that
18 you're asking are not my expertise, and that one
19 of the other witnesses can better answer some of
20 these questions.

21 Q. If I wanted to get into this real
22 detailed stuff about what I might consider to be
23 a safety hazard from cementing casing, you're not
24 the person I should be asking those questions of,
25 right?

1 A. I told you my experience, I told you my
2 experience with leaks, and all that supports what
3 I've said, and what I've said is limited and you
4 want to extend it past its limits and there is a
5 limit. I admit there is a limit, and you want to
6 extend it past that.

7 MR. HIGH: I think you have answered my
8 question, Dr. Boneau, with respect to the limits
9 of your expertise. I appreciate that, and I
10 apologize to the Commission if I've extended this
11 unnecessarily. Again, I assumed the witness had
12 expertise in an area he did not.

13 CHAIRMAN LEMAY: Ask them directly in
14 the future, either counsel. Additional questions
15 of the witness? Commissioner Carlson?

16 COMMISSIONER CARLSON: I don't have
17 any.

18 CHAIRMAN LEMAY: Commissioner Weiss?

19 EXAMINATION

20 BY COMMISSIONER WEISS:

21 Q. I would like to know your opinion of
22 what an expert in cement is. You may be one. I
23 don't know.

24 A. There have got to be a couple kinds of
25 experts to satisfy the questions involved. An

1 expert is probably someone who has spent 25 years
2 cementing wells while he was awake and noticed
3 things and understands, and there's got to be a
4 kind of expert who has addressed some of these
5 issues on a fundamental level in a laboratory and
6 related them to the field.

7 I don't know if one person exists who
8 is both of those, but those are two types of
9 legitimate experts. You're asking my opinion,
10 that's what you're getting.

11 Q. Thank you.

12 A. There are other people who have
13 cemented wells and are familiar with the process
14 and can explain what's going on, and that's what
15 I did, for the most part. That's my answer. I
16 hope that helps.

17 Q. I have one other question, Dr. Boneau.
18 On a deviated well, are there additional
19 cementing problems?

20 A. On a deviated well, you have additional
21 problems centralizing the casing and getting the
22 cement all around the casing, yes, sir.

23 COMMISSIONER WEISS: Thank you. Those
24 were the only two questions I had.

25 CHAIRMAN LEMAY: I've got about three.

EXAMINATION

BY CHAIRMAN LEMAY:

Q. Let's start with your compilation of Delaware sand fields. I take it you didn't separate Ramsey production from the Cherry Canyon, Brushy Canyon, the multi-zone completions you're making in Livingston Ridge in your analysis on Exhibit No. 27?

A. No.

Q. Or in your--

A. That's correct. It's all fields that the State calls "Delaware." I look at all fields that the State calls "Delaware" and threw out the ones with less than 10 wells and included the other ones.

Q. The two different reserve estimates you were giving, 87,000 that was testified before and 125,000, could that be the difference in a single-zone Ramsey completion versus a multi-zone deeper Delaware completion on average?

A. I think that's the main factor in that.

Q. Have you ever encountered or are you cognizant of any high pressure zones while drilling to the Brushy Canyon members? Any blow-outs? Any high pressure zones on the way

1 down to that objective?

2 A. Two-part answer. I'm not familiar with
3 any. From my memory of the 17 blow-outs that
4 were discussed, one of those was in a Delaware
5 well, I believe in the Brushy Canyon Field, and
6 there was, I guess, a pocket in the Delaware. I
7 know that Avilon Delaware field, where Yates
8 operates wells, has some gas stringers but, to my
9 knowledge, none of them are extremely high
10 pressure.

11 Q. In analyzing the Avilon Delaware, which
12 has a little more history than some of the
13 others, in comparison to a possible secondary
14 tertiary operation, would you anticipate, because
15 of water production, what you and Exxon have
16 agreed to in Avilon, that you may go directly
17 from primary to a carbon dioxide flood without
18 trying to waterflood the properties?

19 A. That looks to be the most attractive
20 option at present. The waterfloods have not been
21 all that wonderful. You need some water
22 injection to repressure the reservoir.

23 CO₂ has been reasonably successful in
24 two Delaware floods in Texas, south of Lea
25 County. Oh, shucks, Conoco and HNG. I'm not

1 thinking of other fields at the moment. Yes is
2 the answer to your question.

3 Q. One final question here. Your analysis
4 in Exhibit No. 27, where you show the years
5 primary and also the years secondary, it looks
6 like some of the older fields back in the early
7 60s, especially, have the longer primary years.
8 I agree it's before your time, but are you
9 familiar with the allowable system back in the
10 early 60s that New Mexico employed?

11 A. I'm probably more familiar with
12 Texas's, but I assume they're similar.

13 Q. I'm talking about the early 60s now.
14 The Texas system was similar. My point is, if
15 you were only allowed to produce 30 or 33 barrels
16 of oil per day and the wells were-- What's the
17 allowable now in Livingston Ridge, do you happen
18 to know?

19 A. Some places it's up to 187.

20 Q. Well, could you get the primary
21 production over with quicker? Would you have a
22 shorter life span to a well, if you could produce
23 180 barrels of oil per day or one you could
24 produce 33 barrels of oil per day?

25 A. Yes, sir. That same situation, to an

1 extent, exists in the Avilon Delaware now. Some
2 of those wells are allowable limited, and if you
3 look at that production it's relatively steady
4 for nine years. It hasn't declined like
5 Livingston Ridge wells do.

6 Q. My question involves some of the older
7 fields that you listed in Exhibit 27.

8 A. The older fields could have longer
9 primaries because of the allowable system.
10 That's a factor that extends their life.

11 CHAIRMAN LEMAY: Thank you. Those are
12 the only questions I have.

13 Are there additional questions of the
14 witness? We are going to break. Let's come back
15 tomorrow.

16 Check your calendars, Counsel, and
17 we'll do the same. It looks like we'll be here
18 part of Friday, and I'm thinking about 10:00 to
19 2:00 or 3:00 on Friday, and then coming back some
20 other time if we can't finish up in that length
21 of time.

22 MR. CARROLL: What time in the
23 morning?

24 CHAIRMAN LEMAY: 9:00, unless you want
25 to start earlier. 8:30? Let's do it at 8:30.

1 We'll see you at 8:30.

2 (And the proceedings were recessed, to
3 reconvene at 8:30 a.m., the following day.)
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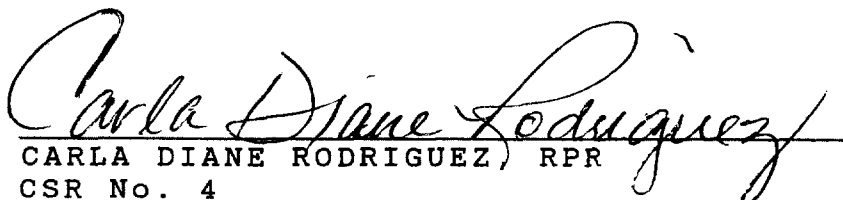
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I FURTHER CERTIFY that I am not a
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no personal interest in the final disposition of
this matter.

WITNESS MY HAND AND SEAL September 18,
1992.


CARLA DIANE RODRIGUEZ, RPR
CSR No. 4