

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
9 The Application of Yates Petroleum Corporation for
10 Authorization to Drill, Eddy County, New Mexico.

11 VOLUME VII

12 **ORIGINAL**

13 BEFORE:

14 CHAIRMAN WILLIAM LEMAY

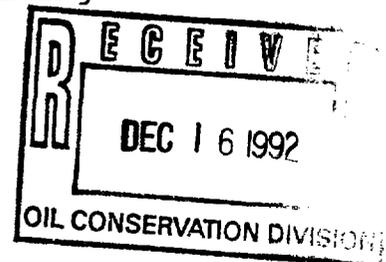
15 COMMISSIONER GARY CARLSON

16 COMMISSIONER BILL WEISS

17
18 FLORENE DAVIDSON, Senior Staff Specialist19
20
21 State Land Office Building

22 December 1, 1992

23 REPORTED BY:

24 STEVEN T. BRENNER
25 Certified Shorthand Reporter
for the State of New Mexico

A P P E A R A N C E S

1
2
3 FOR THE NEW MEXICO OIL CONSERVATION DIVISION:

4 ROBERT G. STOVALL
5 Attorney at Law
6 Legal Counsel to the Division
7 State Land Office Building
8 Santa Fe, New Mexico 87504

9 FOR YATES PETROLEUM CORPORATION:

10 LOSEE, CARSON, HAAS & CARROLL, P.A.
11 Attorneys at Law
12 By: ERNEST L. CARROLL
13 300 American Home Building
14 Post Office Drawer 239
15 Artesia, New Mexico 88211-0239

16 FOR NEW MEXICO POTASH CORPORATION:

17 KEMP, SMITH, DUNCAN & HAMMOND, P.C.
18 Attorneys at Law
19 By: CHARLES C. HIGH, JR.
20 2000 State National Plaza
21 Post Office Drawer 2800
22 El Paso, Texas 79901-1441

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

25 HINKLE, COX, EATON, COFFIELD & HENSLEY
Attorneys at Law
By: JAMES G. BRUCE
218 Montezuma
P.O. Box 2068
Santa Fe, New Mexico 87504-2068

A P P E A R A N C E S (Continued)

FOR BASS ENTERPRISES PRODUCTION COMPANY:

KELLAHIN & KELLAHIN

Attorneys at Law

By: W. THOMAS KELLAHIN

117 N. Guadalupe

P.O. Box 2265

Santa Fe, New Mexico 87504-2265

FOR KAISER-FRANCIS OIL COMPANY:

CAMPBELL, CARR, BERGE & SHERIDAN, P.A.

Attorneys at Law

By: WILLIAM F. CARR

Suite 1 - 110 N. Guadalupe

P.O. Box 2208

Santa Fe, New Mexico 87504-2208

* * *

I N D E X

| | Page Number |
|----|--|
| 1 | |
| 2 | |
| 3 | |
| 4 | Appearances 1574 |
| 5 | |
| 6 | Exhibits 1578 |
| 7 | |
| 8 | WITNESSES FOR YATES PETROLEUM CORPORATION: |
| 9 | NILES E. GROSVENOR |
| 10 | Direct Examination by Mr. High 1581 |
| 11 | Cross-Examination by Mr. Carroll 1616 |
| 12 | Redirect Examination by Mr. High 1645 |
| 13 | Examination by Commissioner Carlson 1650 |
| 14 | Examination by Commissioner Weiss 1656 |
| 15 | Examination by Chairman LeMay 1661 |
| 16 | Further Examination by Mr. High 1667 |
| 17 | TIM WOOMER |
| 18 | Direct Examination by Mr. High 1669 |
| 19 | Cross-Examination by Mr. Carroll 1694 |
| 20 | Examination by Commissioner Carlson 1731 |
| 21 | Examination by Commissioner Weiss 1736 |
| 22 | Examination by Chairman LeMay 1738 |
| 23 | Further Examination by Commissioner Weiss 1743 |
| 24 | Redirect Examination by Mr. High 1744 |
| 25 | Examination by Mr. Stovall 1749 |

| | | |
|----|-----------------------------------|------|
| 1 | WARREN C. TRAWEEK | |
| 2 | Direct Examination by Mr. High | 1752 |
| 3 | Cross-Examination by Mr. Carroll | 1805 |
| 4 | Examination by Commissioner Weiss | 1820 |
| 5 | Examination by Chairman LeMay | 1822 |
| 6 | Redirect Examination by Mr. High | 1827 |
| 7 | | |
| 8 | Certificate of Reporter | 1844 |
| 9 | | |
| 10 | * * * | |
| 11 | | |
| 12 | | |
| 13 | | |
| 14 | | |
| 15 | | |
| 16 | | |
| 17 | | |
| 18 | | |
| 19 | | |
| 20 | | |
| 21 | | |
| 22 | | |
| 23 | | |
| 24 | | |
| 25 | | |

| | E X H I B I T S | | |
|----|-----------------|---------|----------|
| | YATES EXHIBITS: | Offered | Admitted |
| 1 | | | |
| 2 | | | |
| 3 | Exhibit 14 | 1788 | 1788 |
| 4 | Exhibit 16 | 1781 | 1781 |
| 5 | Exhibit 17 | 1781 | 1781 |
| 6 | Exhibit 21 | 1615 | |
| 7 | Exhibit 32 | 1761 | |
| 8 | Exhibit 33 | 1646 | 1646 |
| 9 | Exhibit 43 | 1615 | |
| 10 | Exhibit 44 | 1615 | |
| 11 | Exhibit 45 | 1615 | |
| 12 | Exhibit 46 | 1615 | |
| 13 | Exhibit 47 | 1615 | |
| 14 | Exhibit 48 | 1615 | |
| 15 | Exhibit 49 | 1615 | |
| 16 | Exhibit 50 | 1615 | |
| 17 | Exhibit 51 | 1615 | |
| 18 | Exhibit 52 | 1615 | |
| 19 | Exhibit 53 | 1615 | |
| 20 | Exhibit 54 | 1687 | 1687 |
| 21 | Exhibit 55 | 1805 | 1805 |

* * *

1 WHEREUPON, the following proceedings were had
2 at 8:35 a.m.:

3
4 CHAIRMAN LEMAY: At this time we shall call
5 Cases 10,446, 10,447, 10,448 and 10,449.

6 MR. STOVALL: Each is the Application of
7 Yates Petroleum Corporation for authorization to drill,
8 Eddy County, New Mexico.

9 CHAIRMAN LEMAY: And I think where we last
10 left off, Mr. High, I think you were presenting some
11 witnesses.

12 MR. STOVALL: Mr. Chairman, I might ask --
13 I'll remind all witnesses who have previously been
14 sworn that they are still under oath.

15 Are there any additional witnesses who would
16 need to be sworn? Additions to the list who have not
17 been previously sworn?

18 MR. HIGH: We have none, Mr. Stovall.

19 MR. CARROLL: We have none, Mr. Stovall.

20 CHAIRMAN LEMAY: If that be the case, we
21 shall continue with Mr. High.

22 MR. HIGH: New Mexico Potash would call
23 Professor Niles Grosvenor.

24 CHAIRMAN LEMAY: Before we start, did you all
25 finally get some arithmetic where you agreed on some of

1 those --

2 MR. HIGH: No, sir.

3 CHAIRMAN LEMAY: You didn't. Okay.

4 MR. HIGH: I say that. I've been presuming
5 there's no stipulation.

6 I have a letter that Mr. Hutchinson sent to
7 Mr. Carroll and faxed to us after the close of business
8 for Thanksgiving holidays.

9 So we received a letter yesterday morning
10 that Mr. Hutchinson wrote, but we have discussed no
11 stipulations, although I believe that the numbers that
12 Mr. Lane testified to with respect to the net acres
13 advanced, Mr. Hutchinson now almost agrees with. His
14 numbers come up to almost our numbers.

15 CHAIRMAN LEMAY: Well, if they're close, we'd
16 like to have copies of those.

17 Then you could say -- within five or ten
18 percent or whatever.

19 MR. CARROLL: I'm not sure exactly how we'll
20 present that, Mr. LeMay.

21 As the hearing goes on --

22 CHAIRMAN LEMAY: Okay.

23 MR. CARROLL: -- we'll work something out.

24 CHAIRMAN LEMAY: Okay. That's where we left
25 that, and I just wanted to check with you.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

NILES E. GROSVENOR,

the witness herein, after having been previously duly sworn upon his oath, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. HIGH:

Q. Would you state your name, please?

A. Niles Earl Grosvenor.

Q. And what is your address, Mr. Grosvenor?

A. 5200 Aspen Drive, Littleton, Colorado.

Q. In what business are you engaged?

A. I'm a consulting mining engineer.

Q. And how long have you been in that business?

A. Thirteen years as the Vice President of Western Operations for Gates Engineering Company, and now six years as Grosvenor Engineering Company.

Q. All right. Tell us, if you will, Professor Grosvenor, your educational background, please.

A. I graduated from the Colorado School of Mines in Golden, Colorado, in 1950 with an engineer of mines degree.

I received a master's of science in all types of mining in 1952 from the Colorado School of Mines.

And in 1957-58 I attended Columbia University in New York City, working on a doctorate, and finished

1 all requirements for that except writing a thesis.

2 Q. And have you over the years maintained
3 memberships in professional organizations?

4 A. Yes, I have.

5 Q. And what are some of those, please?

6 A. I am a member of the National Professional
7 Society of Engineers, a member of the AIME Mining
8 Engineering Group, a member of the Rocky Mountain Coal
9 Mining Institute, I'm a director in the Colorado Mining
10 Association, and I'm a member of the American
11 Arbitration Association.

12 Q. All right. Would you tell us your work
13 experience, Professor Grosvenor, since you've completed
14 your educational training?

15 A. After graduating from the Colorado School of
16 Mines in 1952, I accepted a position of teaching at the
17 Colorado School of Mines in mining engineering, and I
18 taught from 1952 until 1972, and at that time I took a
19 leave of absence, and then they extended it for a year,
20 and I taught a course at night for them.

21 Then I officially retired from the Colorado
22 School of Mines.

23 And in 1972 I accepted the position of Vice
24 President of Western Operations for Gates Engineering
25 Company, which is a large coal consulting firm,

1 primarily, out of Beckley, West Virginia, and I ran the
2 Denver office for 13 years.

3 Q. While you were teaching, what were some of
4 the subjects or courses that you taught, Professor
5 Grosvenor?

6 A. I taught just about every course in that span
7 of time, including exploration, introduction of course
8 to mining, surveying, lectured in mine evaluation, mine
9 examination, ventilation, mining methods, mine design,
10 to name a few.

11 Q. Have you written any material that's been
12 published in connection with mining engineering?

13 A. Yes, I have written over, I think, 19
14 articles, at least, that have been published in regular
15 magazines.

16 Q. And over the course of your experience, have
17 you developed any particular expertise, Professor
18 Grosvenor, in any particular area?

19 A. One of the areas that I've always been
20 interested in, of course, is rock mechanics.

21 And I instituted or put the first course in
22 rock mechanics in an undergraduate curriculum in the
23 United States, as far as I know, and continued teaching
24 that course from 1955 until I left the school in 1972.

25 Q. And when you say "rock mechanics", what does

1 that involve the study of?

2 A. The study of stresses in the earth's crust,
3 movements, subsidence, effects of stresses and strains
4 around openings.

5 And during that time I developed the first
6 three-directional borehole gauge for measuring stresses
7 underground, and the -- I did that in 1964.

8 I also developed the first method of testing
9 rock by tension, which is used practically in all
10 laboratories throughout the country today.

11 Q. If we were talking about what happens to the
12 overburden when you mine out an area and it settles
13 down and it subsides, is that an area that is covered
14 by rock mechanics?

15 A. Yes, that is a part of it.

16 Q. Have you served in any appointed positions
17 representing the United States in connection with rock
18 mechanics?

19 A. Yes, I was a member of the National Academy
20 of Science committee that formed the first rock
21 mechanics symposium.

22 I also represented the United States three
23 times behind the Iron Curtain in deep mining at
24 Leipzig, Germany in 1964 and 1965 and 1967.

25 Q. Have you done any work with respect to

1 mineral valuation?

2 A. Yes.

3 Q. Tell us, if you will, Professor Grosvenor,
4 what your experience has been in that area.

5 A. We do, on a regular basis, and have for the
6 last -- I have for the last 35 years, I suppose,
7 evaluated mine properties.

8 We do work at the present time for banks.
9 When people want to borrow money, when people want to
10 sell a property or someone wants to buy a property, we
11 do feasibility studies to determine the value of the
12 property and its potential economic value.

13 We do work for the -- as I said, banks
14 primarily, but we do work for companies as well. And
15 if people -- One in particular.

16 If you wanted to borrow, say, \$500 million
17 and use a property for collateral, then we would
18 evaluate the property and determine if it was worth
19 that.

20 Q. And would that involve a determination, for
21 example, of whether or not a particular deposit was a
22 commercial deposit of ore?

23 A. Yes.

24 Q. All right. Have you had any experience,
25 Professor Grosvenor, in the potash basin itself in

1 southeastern New Mexico?

2 A. Yes.

3 Q. And relate to us, if you will, what
4 experience you've had in the basin.

5 A. Several years ago, I did some work for Kerr-
6 McGee when they were having trouble, when they wanted
7 to put an underground, I believe, slusher slot was
8 below the level of the mine entrywork, and they were
9 having trouble with fracturing and caving, and I came
10 down and looked at that for them.

11 I worked for International Minerals and
12 Chemical on the loss of value of their property when
13 WIPP was going to take some of the land which they had
14 under lease.

15 Q. So you've had some direct experience, then,
16 with the properties of potash in connection with
17 subsidence and also the valuation of potash?

18 A. Yes. In addition to that, in Kane Creek I
19 was employed to -- on a rock-mechanics problem where,
20 when they were sinking the shaft and got down into the
21 salt, the shaft was trying to go egg-shaped instead of
22 stay round like they tried to make it, and I worked for
23 them at that time.

24 Q. Now, when you say Kane Creek, you're
25 referring to the Kane Creek Potash Mine?

1 A. In Utah.

2 Q. Correct.

3 A. Moab, Utah.

4 MR. HIGH: Mr. LeMay, we would offer
5 Professor Grosvenor as an expert witness in rock
6 mechanics and mineral valuation.

7 CHAIRMAN LEMAY: His qualifications are
8 acceptable.

9 Q. (By Mr. High) Professor Grosvenor, explain
10 to us, if you will, what happens when you mine out an
11 area underground in the potash basin, as far as
12 subsidence is concerned, if you will. Explain to us
13 the phenomenon of subsidence in southeastern New
14 Mexico.

15 A. The potash basin, or potash in itself, is
16 unique in its method of subsidence. Potash is a
17 material that, if someone would mine -- sink a shaft
18 down to it and mine out and -- just a small opening,
19 left with time, that will completely close.

20 In other words, if you apply a load or a
21 stress to the pillar on the side and you have nothing
22 holding it because the opening is there and nothing
23 holding it back, that's a differential stress. And if
24 you put potash under a differential stress, it will
25 flow to the smaller stress.

1 And it is unique. It's different from coal
2 mining because there are many mines or metal mines, if
3 you want to talk of all types of mines, because you can
4 put a small opening in a metal mine, and some of them
5 -- King Solomon's Mines are still open. They do not
6 creep closed. You can still walk into some of the
7 mines that date back that many years.

8 Q. Do you have any experience in connection with
9 subsidence in coal mines?

10 A. Yes.

11 Q. Are you familiar with the work that Mr.
12 Hutchinson was using up here earlier, I believe by Dr.
13 Ping, was it?

14 A. I read the article that was used here in this
15 work.

16 Q. Was that about subsidence in potash mines or
17 coal mines?

18 A. That was definitely a coal mine.

19 Q. Are those -- The subsidence information in a
20 coal mine, is that transferable in every instance to
21 potash mines?

22 A. Not directly. In other words, you must
23 understand the situation, the type of material, the
24 characteristics of the material, the strength of it,
25 and so on. And that will vary the type of subsidence.

1 And I will --

2 Q. Let me ask this: Is there any empirical data
3 that you can look to to determine what the effects of
4 subsidence will be in the potash basin?

5 A. Definitely. There's a wealth of information
6 on subsidence in the potash basin, and to -- Do you
7 want me to explain some of the --

8 Q. Yes, if you will --

9 A. -- pertinent ones?

10 Q. -- relate to us what empirical data is out
11 there?

12 A. Well, they recognized in the potash basin,
13 the people working there, that it was unique in the
14 type of movement that they were having within the
15 openings, the mine openings.

16 And in 1958, Mr. Miller and Pierson -- Mr.
17 Miller being the mine superintendent, I believe, a
18 Pierson being the chief geologist or a senior geologist
19 -- decided to make some measurements on the surface to
20 see how much it was actually moving and how far out.

21 And they found out that if you have an
22 opening and you make it wide enough -- Of course, even
23 a small opening will appear on the surface at some
24 time. But a wide opening would appear on the surface
25 rather rapidly.

1 And if it was against a solid -- in other
2 words, no mining up to the side of the opening -- the
3 angle would be smaller than if you were on the side of
4 the opening where other mining had taken place.

5 In other words, if you had entries and so on,
6 on one side, that angle would be much greater. And
7 that they recorded up to 51 degrees. On the side that
8 was solid, it was down as low as 30 degrees. But with
9 time they both would probably extend further, according
10 to the literature.

11 In 1961, Dr. Don Deere, who was in Illinois
12 at the time, a consultant to U.S. Borax, did some work
13 for them and made measurements on the surface and
14 underground, and it was referred to in this hearing,
15 and I will show some sketches later on that.

16 Now, he found out that, over time, that the
17 angle would be somewhere between 42 degrees and 55
18 degrees. And left, with time, it would even extend
19 beyond that.

20 So we're talking about an angle that is 50 to
21 55 degrees from the side of the workings out to where
22 there would be subsidence showing on the surface that
23 they could measure.

24 In 1963, I recognized this fact. And a
25 graduate student I had working for me during 1962 and

1 1963 -- and we made a series of studies on time
2 deformation of potash. He was able to get some potash
3 from, I think, International Minerals and Chemical. We
4 cut the specimens, put them in, put them under
5 different loads, and watched this creep that took
6 effect.

7 And in 1965, the Bureau of Mines did a great
8 deal of study on creep in salt and potash mines, and
9 they came up with the statement, Dr. Obert came up with
10 the statement, that it would move very fast at first
11 and then it would settle down and creep indefinitely.
12 It would creep until the area of the opening below was
13 completely closed.

14 In 1977, Mr. Baar, B-a-a-r, wrote a book on
15 salt rock mechanics. He agreed with the work of Dr.
16 Obert in the 1960s and also did further work and had
17 many comments. It's a very well documented book.

18 And in 1979, the USGS or the Department of
19 the Interior asked Golder & Associates -- They are
20 rock-mechanics people that do a lot of rock-mechanics
21 work. And they studied all the literature, and they
22 came up with this same effect, that you had constant
23 creep and that the angle outside of the opening was 45
24 to 55 degrees, depending on the amount of mining, first
25 mining, that they had.

1 So there is a lot of material in the
2 literature and documented by actual measurements by
3 different groups.

4 Q. And are you satisfied, Professor Grosvenor,
5 that based upon that literature, that empirical data,
6 that you can predict with some scientific basis the
7 area that will be influenced by the subsidence from the
8 potash mines?

9 A. Definitely. This is empirical data that is
10 usable, yes.

11 Q. All right. And could you go through some of
12 that data with us, please, and explain to the
13 Commission how subsidence occurs and the scope of its
14 influence, if you will?

15 A. Yes. I would like to show some viewgraphs
16 here and explain what is happening, and -- primarily in
17 the Section 2 that we're talking about.

18 This is a part of Exhibit 6, and this is the
19 log of K-162, and what I would like to point out is
20 that the first 900 feet in this hole is not salt or
21 potash but are layers of sandstone. They have
22 siltstones, clays, red sandstone.

23 And I point out the thickness of these, that
24 they were 170 feet thick. The sandstone down here at
25 760 to 800 is 40 feet thick, red sandstone and a gray

1 gypsum material.

2 And at that point, at the 900-foot depth,
3 then the halite beds start to come in.

4 The rest of that hole, down to the sylvite
5 bed that we're interested in, is that -- You can see
6 that the sylvite is at five foot and one inch, and is
7 at the 1523 to 1528. It's five foot and one inch
8 thick.

9 I want to point out that in the 10th Ore
10 Zone, then there's four foot five inches of halite
11 right in the middle of the Ore Zone. And then there's
12 seven inches of brown clay and halite at the top of the
13 zone, which means that if you're mining down and you
14 have a bed seven inches thick that is brown clay and
15 halite, you don't have a very good roof because there's
16 no -- it's not stuck, so to speak, to the layers above
17 it.

18 And then we have some six foot of halite.
19 Then we have a one-inch band of green clay. This is a
20 clay band that's a marker bed, so to speak, at this
21 point and would not be a solid mass of halite up into
22 more halite, but it has a separation band in it. It
23 has ten inches of red polyhalite, it has some nine
24 inches of occasional blebs and stringers of polyhalite,
25 and halite, heavy inclusions.

1 So the area that's above the sylvite bed that
2 they're going to mine, or would mine at this point,
3 is -- the bed itself is five foot one inch thick, but
4 it has a series of materials above that are not solid.

5 In other words, you have a stringer of clay,
6 you have some other harder materials and softer
7 materials and so on.

8 So in looking at that, and remembering that
9 the sylvite bed is not just a sylvite bed and then
10 solid salt or something else above it, I would like to
11 go through just a few slides, and they may be in a
12 slightly different form than we've shown before.

13 But Mr. Hutchinson drew a sketch on the board
14 similar to this, and this is just to indicate that the
15 lines of stress -- Before the hole was there, these
16 were all straight lines.

17 You put a hole in there, such as a mine
18 opening, and if the layers over the top would cave,
19 could fill this area, and the stresses would go around
20 it. And then if you had another hole up here, another
21 hole down there, it wouldn't even know the hole was
22 there, and Mr. Hutchinson pointed that out.

23 So the area that collapses, and the only
24 thing in mining that we have to hold up, is really that
25 area.

1 If you were in bedded deposits that were
2 thick enough to stand the span -- In other words, it's
3 just like the joists in your roof, that if you have a
4 span too large, then the ceiling is going to sag down
5 and come in.

6 If you have a thick member right over here,
7 then the band would be thick enough, would keep it from
8 settling.

9 And I will show you on the -- another sketch,
10 this just out of the literature, they show you what
11 happens when you have an opening. The beds over the
12 top will sag. In other words, if they won't stand the
13 span -- It's like putting a 2-by-4 between here and
14 there. You'll notice that it sags down.

15 Well, those beds will sag, and there will be
16 space between them, crack, and the thinner beds will
17 sag further than the thicker beds. Thicker beds will
18 not bend as much. So there will be a space between
19 there. And then -- up to a certain point. And then
20 the beds above will actually flex, but they won't
21 separate, necessarily.

22 And it just shows you the area that the
23 stresses come around here, and in this area that they
24 would get back to the normal amount of stress that was
25 on that or load that was on that seam.

1 If you mine a seam such as coal and the beds
2 will not stand the span, they will break and pile up.
3 And when they do break, they expand, they fill up the
4 area. They could break enough so that they would fill
5 this area and even give some support to this. But they
6 break up to a thicker members.

7 But these thicker members crack. You see
8 that here, you see cracks in them here. And then as
9 these sag due to this span here, then you get cracks in
10 the members throughout.

11 If this would extend to a wider opening, then
12 this would go right to the surface, would show up, and
13 then the angle of draw that would be affected by it
14 would be outside of this line of break.

15 But it shows you that you do get cracking in
16 these members and do get separation.

17 And one of the problems with the separation
18 is that if there are gases in here, you are squeezing
19 these beds on each side, it will squeeze any gas that's
20 in there out into this opening, and it acts just like a
21 hydraulic ram. It will force this roof downward, and
22 it has happened.

23 And in the potash mines today, they drill 40-
24 foot holes, clear up into here, to relieve that gas
25 pressure that builds up in these areas, and they do it

1 in about every other intersection.

2 You heard some comment on critical widths and
3 so on. This is just to show that if the width was only
4 this wide, you would only have a small subsidence, this
5 little bit that's shown here. That's subcritical.

6 If you go out to critical, then it's a little
7 more subsidence, which is this line, and as you'll
8 notice, it comes down to here.

9 Then as you go beyond that, it doesn't cave
10 any further, it doesn't lower the surface any further.

11 So the critical is one where the surface just
12 reaches this point. And then if you can mine all of
13 this out here, this line would stay level across here.
14 That's all it's showing, and showing the three-
15 dimensional effect on the surface.

16 Q. Excuse me, Professor Grosvenor.

17 A. Yes, sir.

18 Q. Just so the record will be clear here if any
19 of us have to go back and read this, the document you
20 were just referring to is marked as Exhibit Number 47?

21 A. Forty-seven, yes.

22 And just to show that, I have an exhibit
23 here, 51, that just shows this same -- and it's
24 exaggerated, because if you don't have an opening this
25 big, you can't have that much subsidence or an opening

1 this way.

2 But this is what you call subcritical --

3 Q. Excuse me, Professor Grosvenor. You said 51.
4 I believe that was marked 52?

5 A. I'm sorry. This is just to show, an
6 exaggeration, that when you have a small opening, it
7 will subside something on the surface.

8 As you get to the critical width, it would
9 allow the surface to come down so far. But as you go
10 further, the surface will come no further down.

11 In other words, this point and this point are
12 the same. Just as you mine more out here, this just
13 creates a larger bowl.

14 So it has -- You'll hear subcritical.
15 Critical is just the point where it reaches its maximum
16 deformation or subsidence. And then as you go wider,
17 it just stays. It will not subside any further down
18 than that.

19 Now, just -- I have this Exhibit 43, and this
20 is just to show two effects, what we do underground.

21 In a coal mine, we -- if we have an opening
22 that's too wide and the roof layers tend to fall in --
23 And you can see that this small layer would not stand a
24 span like that.

25 It's just like saying if I put a 2-by-4 and

1 tried to go across here on it, you would find that it
2 would fall in.

3 So we can do two things with rock bolts. We
4 can tie them together, we can make this now a beam that
5 is three layers thick.

6 And that's the same as you can make the
7 scaffolding. If you put a 2-by-10, I would not walk
8 out on it if it was ten feet across. But if I put two
9 2-by-10s and I nailed them together, it has four times
10 the rigid, because they can't slide.

11 And that's all you're doing here, is you're
12 going to tie this into and you make it a nice beam.
13 And that beam has been calculated to be thick enough to
14 stand the span or the opening that you want to make.

15 Now, if those beds are not very good, they
16 have some fractures in them and so on and so forth, you
17 can go one more step, as shown in here. You can tie it
18 to a large thick member above.

19 In other words, this member is large enough
20 to stand the span. If this part fell out, it would not
21 bend even this big thick member.

22 So with the bolts, you can do two things:
23 You can make a beam out of the layers just above it, or
24 you can tie that beam to a thicker beam up above, and
25 that gives you the safety.

1 Q. Excuse me --

2 A. We're not trying to hold up the world; we're
3 only trying to hold up that amount of material, right
4 here in this area.

5 Q. Professor Grosvenor, before you go away from
6 that one, would you explain, please, what a rock bolt
7 is to make sure everyone understands? Keep it as basic
8 as we can, but explain what a rock bolt is, please.

9 A. A rock bolt is just like a piece of rebar
10 steel. In other words, it can be 3/4 of an inch, it
11 can be 7/8 of an inch or an inch in size.

12 And the old type used to have a threaded bolt
13 on the end, or nut, and you would run it up there and
14 tighten it up, and it would expand that out at that
15 point. And it had a plate on the bottom, so you would
16 just tighten it up and screw it together, just like if
17 you put two boards together, put a bolt through, put a
18 nut on the end and tightened it up.

19 Now, we do a little better than that today.
20 We use rebar that has lumps on it, so to speak, on it,
21 and we put in resin. And you put the resin in that
22 fills the hole, and you stir it up, and it sets in less
23 than 30 seconds. And then it's then tied throughout
24 its entire length. And it's much better than being
25 just tied at the top and at the bottom, because when

1 it's tied at the top and bottom, if this should break a
2 little bit around the collar down here, the thing would
3 be useless. So now we grout it or cement it throughout
4 with a resin-type bolt.

5 Q. Thank you. Go ahead.

6 A. Now, I have this Exhibit 44, and it's what
7 happens in potash. This very situation is what
8 happened at the WIPP site. They had a layer of potash
9 above their opening. The openings were too wide for
10 that layer to hold with this, a silt band or something,
11 not tying it to a thick member above.

12 So to buy some time, they put bolts clear
13 through, up into the larger member, so that you
14 wouldn't have any spalling or falling of this material
15 into the opening.

16 Now, that only buys you some time. This is
17 different than in a coal mine.

18 When we say "buying time", a potash or salt
19 deposit, the whole thing will flow, both members. This
20 will flow right into the opening. And therefore, as I
21 say, you can buy some time.

22 But with the deformation and subsidence, this
23 will flow right into the opening, and then you can see
24 that we have the angle of draw outside of this line,
25 even though we have bolted it. We have bought some

1 time, but this will still close entirely in a potash
2 mine.

3 Q. I take it, then, Professor Grosvenor, you
4 would disagree with the statement that rock bolts will
5 prevent subsidence?

6 A. Yes, I disagree with that. You buy some
7 time, but you will not prevent the thing from closing.

8 Q. When you say "buy time", what does that mean?

9 A. Oh, it may be only months. It's long enough
10 for you to use that entry, but you would not put it in
11 a pillar that you wanted to maintain permanently,
12 because it is going to subside or creep --

13 Q. Okay..

14 A. -- into that --

15 Q. Go ahead.

16 A. -- opening.

17 I have this as Exhibit 48, and I need to
18 explain that this is in potash. The angle of draw is
19 somewhere between 45 and 55 for maximum subsidence,
20 this angle right here, coming out here on this side,
21 both sides.

22 Now, I have some references down here that
23 this is a solid block of potash shown here. There was
24 some first mining in the area of the right-hand side of
25 this sketch, and the 51 degrees by Miller and Pierson

1 was on the side that had some subsidence. Because of
2 this -- These first openings are also caving or
3 sloughing or bending in, and the size of the pillars
4 are shortening, size of the pillars on each side of the
5 openings here are shortening. So therefore, it affects
6 this side more than it did the solid side.

7 Now, the solid side, Pierson and Miller said
8 this was in the 30-degree range, but with time would
9 probably extend further.

10 Deere, in his work in 1961 for U.S. Borax,
11 has 42 to 55 degrees for these angles, measured by the
12 subsidence on the surface and the amount of movement.
13 Now, you must realize, for this to happen the material
14 must move horizontally, at this point must move
15 horizontally, it must move downward, and it must
16 rotate, because these beds are bending.

17 Now, if these beds are solid, brittle
18 material, such as sandstone or something of that
19 nature, they will break. So they will not only move
20 toward the opening, they will then drop down and
21 rotate. And I have a slide to show that.

22 Golder, in doing the research of the
23 empirical work, data collected in the basin, came up
24 with an angle of 45 to 55 degrees for this angle, that
25 the subsidence would be affected out to a point of that

1 nature. Forty-five degrees, of course, would be equal
2 to the depth. Fifty-five would be greater than the
3 depth, depth plus some amount.

4 Q. So if the potash people, Professor Grosvenor,
5 say that the angle of subsidence or the area of
6 subsidence is equal to the depth of the ore plus ten
7 percent, is that based upon or contrary to the
8 empirical data?

9 A. No, the people that have worked in the basin
10 and worked on that document realized that they had
11 subsidence out in that range, that the depth plus 10
12 percent -- They had work such as Golder, who had
13 studied all of the stuff before, I assume, and they did
14 this for the Department of the Interior, that it's 45
15 to 55, and therefore the depth plus ten percent would
16 be a logical number.

17 I have an exhibit marked 50 to show how the
18 beds which I pointed out above the salt -- they're
19 sandstones, they're brittle beds of different types up
20 there. This is the action they must take, for as you
21 mine along, they must bend as shown here, they must
22 fracture, they must rotate and move. They have to move
23 out, they have to move down, and they have to rotate.

24 So that if -- Say, just say a drill-stem oil
25 well or something, just as an example, was down through

1 a point like this, and this sandstone bed is 20, 30
2 feet thick, and it must bend and it must break, then
3 you could damage a drill stem very easily.

4 And then I have -- This one you have seen
5 before, and this is the work of Dr. Deere in 1961 at
6 the U.S. Borax, and I believe Mr. Hutchinson used this
7 as an example.

8 This is the mined-out layer, this is the area
9 that has some first mining in it. It shows some first
10 mining. And over here it was solid.

11 And as they went through these different
12 angles, they finally arrived at the angle 3, which is
13 the angle out to this angle of draw, which included all
14 of this area. The angle would reach 42 degrees to 55
15 degrees, 42 degrees on this side and 55 degrees --
16 sorry, on this side, and 42 on this side.

17 Q. You say "this", the last side being the
18 left --

19 A. The left side.

20 Q. -- side of the exhibit?

21 A. The left side of the exhibit, where there had
22 been no mining in that area.

23 Okay, so it would reach that. And left with
24 time, then, it would reach greater than 49 degrees,
25 which would be greater than the depth plus 10 percent,

1 or in that range, and a maximum out here of 56 degrees.
2 Now, that's affecting the surface.

3 And if the surface moves down, it must move
4 also horizontally and at an angle, no matter how small
5 it is out here at this range.

6 Now, you heard of one other angle, angle of
7 break. The angle of break is the angle from the side
8 up to the point where the maximum bending on our
9 example here, or the maximum split in the surface would
10 be, but it doesn't say that that's the only split.
11 There would be fractures toward the opening and there
12 would be fractures beyond the point of maximum -- or
13 angle of break.

14 The angle of break would come up into
15 something like this point, and -- But there would be
16 fractures outside of that line, there would be other
17 fractures inside toward the subsidence area.

18 And Mr. Hutchinson pointed that out, that the
19 point of -- angle of break is smaller because it's at
20 the point of maximum bending or the maximum tensile
21 stress on the surface, to where you probably get the
22 largest crack, but there are other cracks beyond that
23 point, and we're concerned about the ones that are out
24 here beyond that point.

25 Q. So there will be fracturing of ground outside

1 of the angle of break?

2 A. Oh, yes.

3 Q. Does the depth of the mine have any impact on
4 all of this, Professor Grosvenor?

5 A. The depth of the mine would make a difference
6 in the time element of reaching the surface. The
7 amount that you take out affects the time it's going to
8 take to reach the surface. But it does have an element
9 of depth in relation to time.

10 Q. I'm sorry, do you have any other exhibits, or
11 is that all?

12 A. No, I do not.

13 Q. Okay. Now, given the effects of mining that
14 you've explained, Professor Grosvenor, should oil and
15 gas wells be allowed within the angle of draw of potash
16 mining, in your opinion?

17 A. No.

18 Q. Does the subsidence or the effects of
19 subsidence create paths through which gas can migrate?

20 A. Definitely, give possible fractures, and if
21 the -- the different beds have different strengths,
22 they have different movements on the beds, and
23 therefore there are possible paths of migration for
24 gas.

25 And one other item that has been overlooked,

1 I think, so far, this mine is under negative pressure.
2 In other words, it's below atmospheric pressure, it is
3 on an exhausting system.

4 So therefore, if there are gases or anything
5 else in that vicinity, it will be drawn into the mine,
6 because it is lower than even if the gas was at
7 atmospheric pressure. It would have a tendency to suck
8 that gas through any possible way into the mine.

9 Q. Mr. O'Brien testified earlier in this
10 proceeding that in his opinion it was okay to leave a
11 pillar of 125 feet around these oil and gas wells.

12 Do you have a response to that?

13 A. Definitely. Mr. O'Brien has not been,
14 evidently, underground. He has not fought the
15 conditions of gassy mines or caving pillars.

16 But if you only had a 125-foot-diameter
17 pillar, 250-foot, 125-foot, and you mined on all sides
18 of that, around that, the angle of draw would be such
19 that it would hit it not very far above the potash bed.

20 And above the potash bed there are weak
21 bands, there are clay bands, there are fractures that
22 could develop due to the subsidence, and therefore gas
23 could easily be transmitted from the well, if any
24 fracture in the casing or the movement caused the
25 cement to come free from the casing, because it doesn't

1 take very much.

2 Concrete has very little strength in tension,
3 and therefore very little -- We almost call it zero in
4 construction-type work. It's only in the pounds rather
5 than in the hundreds of pounds or thousands of pounds
6 as the compressive strength of concrete. Tensile
7 strength is very little.

8 It would separate the cement from the drill
9 stem, it could separate the cement from the walls of
10 the potash. And if there were any reason for a
11 fracture or a hole to be in that -- And Mr. Mitchell, I
12 think, showed where there were many ways for gas to
13 travel along this, even if there wasn't a hole in it.
14 But he also showed us that with a drill stem pumping,
15 that it could wear a hole in any point along this drill
16 stem.

17 Therefore, if the gas could migrate along
18 there and if you only had a pillar of 125 feet, the
19 angle of draw would hit that not very far above the
20 potash bed. And there's a possible -- If there's any
21 possible way for it to transmit, it could easily get
22 into the mine, because, as I said before, they drilled
23 40-foot holes on every other intersection, all the way
24 up through those beds.

25 So if there was any transfer of gases,

1 horizontally, could easily reach into the mine, for
2 small pillars around individual drill holes.

3 Q. Professor Grosvenor, would the presence of an
4 oil or gas well within the area of subsidence create a
5 hazard, in your opinion, to underground miners working
6 in that underground mine?

7 A. Yes, I -- I'm familiar with gassy mines, and
8 I have been in gassy mines, and I have coal mine
9 certificates for Colorado, Wyoming and New Mexico.

10 The problem that if you have a gas, a gassy
11 mine, then the equipment in the potash mines is not of
12 a nature that it would prevent an explosion. If you
13 put any amount of gas over one of the electric motors
14 in a potash mine, it would blow up, it would explode,
15 if it was in the right mixture, of course.

16 But the mine itself is not set up that you
17 could get the gas out.

18 In a coal mine they have permissible
19 equipment. When it reaches a certain point they even
20 shut the equipment off, but then they clear the rest of
21 the area and sweep the gas from the mine if they have
22 an inrush of gas.

23 They're not set up to do that in a potash
24 mine.

25 Q. Thank you. Let me switch gears on you now

1 and talk a little bit about mineral valuation.

2 When you are looking to determine whether or
3 not there is a commercial deposit of ore, give us some
4 idea, Professor Grosvenor, of some of the things that
5 you look for.

6 A. We look for the standards -- I just turned it
7 off so that the light wouldn't -- I'm just cooling the
8 light.

9 Q. Give us some idea, Professor Grosvenor, of
10 some of the things you look at when you're trying to
11 determine if ore is a commercial deposit of ore.

12 A. The quality, the assurance that you have
13 enough drill holes to assure that you have continuity
14 of beds, and tonnage enough that would be worth
15 investigating further.

16 Q. And have you looked at the corehole data
17 concerning Section 2 that's at issue in this
18 proceeding?

19 A. Yes, I have.

20 Q. And based upon those -- that corehole data,
21 Professor Grosvenor, what is your opinion concerning
22 whether or not the ore in Section 2 is commercial or
23 not?

24 A. Well, to start with, K-162 has 5.13 feet of
25 15.57 percent sylvite, certainly commercial in its own

1 -- meets the specifications of more than four foot of
2 10-percent sylvite, according to the U.S. Bureau of
3 Land Management and the USGS.

4 And then in addition to that, if you have a
5 hole within a hundred -- a mile and a half of quality
6 that would be considered ore, then you could loop --
7 link these together.

8 AEC Hole 8 is 5700 feet away, less than a
9 mile and a half, and it has, I think probably -- I
10 can't remember right off the top of my head -- 6.4 feet
11 of something like 12 percent, which is well among the
12 four.

13 And then the hole P-21, which is only 3700
14 feet away from that --

15 Q. Excuse me, let me refer you specifically to
16 New Mexico Potash Exhibit 23. It might be easier to
17 follow your testimony. And this is in the book for
18 each of the Commissioners, is a map, a BLM map that
19 will show these coreholes.

20 Does that map show the coreholes you're
21 referring to, Professor Grosvenor? Mine may be a
22 little easier to --

23 A. Well, the map that I have in my hand, Exhibit
24 23, does not show the Corehole 162 in Section 2, but it
25 does show AEC-8, and it also shows P-21.

1 Now, with -- The hole K-162 is just to the
2 right of the two in the center of the section, and it
3 may be just south or downward just a little.

4 So therefore you have three holes that would
5 be linked together and definitely would show a trend,
6 because this is a potash deposit, not a salt deposit.

7 So when you have holes that connect up, it
8 would be where the potash would then be assumed to be
9 within that range and would be in the -- within the
10 regulations or rules used by the USGS, that these holes
11 are within a mile and a half of each other and would
12 definitely show a trend.

13 Q. If someone were looking at the Corehole P-21,
14 and looking at corehole data on AEC-8, and then looked
15 at the corehole data from Corehole K-162, and they had
16 experience in the potash basin, could they reasonably
17 have believed that Section 2 contained ore that they
18 could mine using current-day technology and methods?

19 A. Yes.

20 Q. Look at Exhibit Number 11, if you will,
21 Professor Grosvenor, in the book in front of you.

22 A. I have Exhibit 11.

23 Q. Look at the first paragraph, if you will, the
24 second sentence. It says, "It is our conclusion that
25 Corehole Number 162 did encounter an economic

1 accumulation of sylvite. The quality of ore is such
2 that the southeast one quarter of Section 2, Township
3 22 South, Range 31 East, contains a commercial
4 deposit", period, close quote.

5 Is there any scientific basis at all to
6 support the conclusion reached in Exhibit Number 11
7 that based upon corehole data that was available, that
8 only the southeast one quarter of Section 2 contains a
9 commercial deposit of ore?

10 A. Well, the data of the corehole in Section 2
11 does not just cover the southeast quarter --

12 Q. And that's --

13 A. -- it covers the northeast quarter, the
14 northwest quarter and a part of the southwest quarter.

15 Q. And that's precisely my question. Is there
16 any basis at all, any evidence, any scientific
17 theories, any empirical data, anything you can think of
18 to support a conclusion that given the corehole data
19 available on March 27th of 1992, that you would limit
20 the area of commercial potash ore to the southeast
21 quarter of Section 2?

22 A. I would not.

23 Q. And do you know of any basis on which someone
24 could make such an argument?

25 A. No, I don't think of any right now.

1 Q. Would you characterize such a limitation as
2 being arbitrary?

3 A. Well, I don't understand what their reasoning
4 was.

5 Q. And as we sit here, can you think of anything
6 that would support such a conclusion?

7 A. Not offhand.

8 Q. Do you have an opinion, Professor Grosvenor,
9 whether or not New Mexico Potash is able to mine the
10 ore in Section 2?

11 A. There's no doubt in my mind that they would
12 be able to mine the ore in Section 2.

13 MR. HIGH: We'll pass the witness, Mr. LeMay.

14 At this time I would offer into evidence
15 Exhibit Number 21, which is Professor Grosvenor's
16 curriculum vitae, along with exhibits 43 through 53,
17 which I will also give a copy to each of the
18 Commissioners.

19 CHAIRMAN LEMAY: Let's take a little break
20 before we have cross-examination. Reconvene in 15
21 minutes.

22 (Thereupon, a recess was taken at 9:32 a.m.)

23 (The following proceedings had at 9:52 a.m.)

24 CHAIRMAN LEMAY: We shall continue with
25 cross-examination, Mr. Carroll, of Professor Grosvenor.

1 MR. CARROLL: Thank you, Mr. LeMay.

2 CROSS-EXAMINATION

3 BY MR. CARROLL:

4 Q. Mr. Grosvenor, let's first -- Let's begin
5 with the area of your testimony that you last dealt
6 with, and this is the mineral valuation aspect of it.

7 When was the last time that you evaluated a
8 potash mine for purposes of having a bank run a loan to
9 it?

10 A. I have never done that.

11 Q. All right. Let's look at corehole section
12 162. Now, you made the statement that at least within
13 that corehole, the potash found there in the assay was
14 commercial.

15 A. According to definition, yes.

16 Q. According to definition. And the definition,
17 I think, that you're using is the BLM or USGS statement
18 of four feet at ten percent; is that correct?

19 A. That is correct.

20 Q. Do you know of any mine in the potash basin
21 of southeastern New Mexico that is currently mining,
22 on the average, economically -- that is, making a
23 profit -- mining four foot of ten-percent sylvite ore?

24 A. And nothing else?

25 Q. And nothing else?

1 A. No, I do not.

2 Q. In fact, the average is much higher than
3 that, or at least four percent higher, I think, on the
4 basis of Tony Herrell's testimony, which I believe you
5 heard at the last session?

6 A. It is higher than that, yes.

7 Q. Now, the trend that you were talking about,
8 this is a trend that apparently is coming from the
9 south, going north, because you used a corehole that
10 was actually in the WIPP area, Corehole 21, I believe?

11 A. P-21.

12 Q. P-21. That's actually located in that WIPP
13 area boundary.

14 And then you moved -- And that corehole is
15 probably a couple of miles south of K-162?

16 A. Yes, it's 3700 feet south of AEC Hole 8.

17 Q. Okay. AEC-8 is the next corehole, going
18 north from P-21, and that is the next corehole that you
19 found potash in and that you felt this was a trend
20 running from P-21 up through AEC-8 and then on into
21 K-162?

22 A. Yes, sort of in a northeasterly direction.

23 Q. Okay, and that's the coreholes that you
24 examined, that gives you the basis for saying there's a
25 trend in there; is that correct?

1 A. That is correct.

2 Q. Did you examine in this development of your
3 trend idea Corehole ERDA-6?

4 A. I may have seen it, but I don't recollect
5 anything about it.

6 Q. ERDA-6 is the corehole in the section just to
7 the north, Section 35, which is barren in the 10th Ore
8 Zone.

9 Quite possibly the trend that you see coming
10 up from the south stops if you give credence to ERDA-6,
11 couldn't it?

12 A. I don't know where ERDA-6 is, so --

13 Q. Okay.

14 A. If it's not in the trend line, or is right
15 directly in the trend line, you would have to consider
16 it.

17 Q. Well, we've had maps, and let's just assume
18 that it is due north of K-162 in the section to the
19 north.

20 Did you give consideration to the testimony
21 of Mr. Lammers, who said he examined the well logs in
22 the two Pennzoil wells that are just to the east of
23 K-162 and -- Pogo, excuse me, not Pennzoil. I get --
24 Since they were offshoots of one another. I'm sure
25 Pogo management wouldn't like me for that. But to

1 correct myself, the two Pogo wells, which are in the
2 southeast quarter of Section 2, and then the
3 southernmost of the Yates wells.

4 And the testimony that I'm referring to was
5 where Mr. Lammers stated that on examination of the
6 logs, the oil well logs showed that there was no
7 commercial potash in the 10th Ore Zone as shown by
8 those logs.

9 Did you give any consideration to that
10 testimony when you were making or defining your trend?

11 A. Did he -- I don't know what he was using.
12 Was he using four feet at ten percent?

13 Q. The -- I don't think I can appropriately
14 equate what he said as far as measurements in the log
15 into the four feet at ten percent, and I'm -- I cannot
16 do that.

17 But he did make the finding, and it was his
18 opinion that there was no commercial potash ore.

19 Did you give that any consideration, is
20 basically the question?

21 I'm not trying to get you to analyze it, but
22 I'm just wondering if you considered that in defining
23 your trend line.

24 A. Yes, I asked for all three of those holes
25 along that east side of Section 2.

1 Q. Uh-huh.

2 A. I believe we saw one.

3 Q. Who did you ask for that information?

4 A. I don't know. I asked Mr. High to get it for
5 me, I guess.

6 Q. Okay.

7 A. Or the potash people. But I thought one of
8 those holes did have some sylvite in it.

9 Q. Have you examined -- How many oil well logs
10 have you examined to determine mineralization, potash
11 mineralization? Or have you ever done it before?

12 A. No, this is not -- That's what I said, I do
13 not read potash logs unless -- I would not be afraid to
14 read potash logs if you would core along and log that
15 hole, core it and log it so that we have a basis like
16 we do in coal that we core it, we look at it, we log
17 it, and then we could transfer that information to
18 other logs from oil well holes.

19 Yes, I would be capable of doing it, but I
20 would have to have a basis to do the work.

21 Q. But for the basis of our questioning right
22 now, you did not give any weight to Mr. Leo Lammers'
23 testimony?

24 A. No.

25 Q. What about Corehole FC-65, which is in the

1 section to the northwest of Section 2? It adjoins at
2 the corner. Did you give any consideration to Corehole
3 FC-65?

4 A. I think I looked at the information on the --
5 that was available through New Mexico Potash. I
6 probably looked at that information.

7 Q. That is the corehole where we learned at the
8 last hearing that New Mexico Potash was including, to
9 make that hole commercial, a large amount of carnalite,
10 wasn't it?

11 A. I didn't try to do that.

12 Q. Okay. What about Corehole FC-81, which is in
13 Section 3, just to the west? Did you look at that
14 corehole?

15 A. I believe I did see the information on that
16 corehole.

17 Q. And that corehole only shows potash in the
18 range of 2.7 percent; isn't that correct? Basically
19 it's barren?

20 A. But it is a sylvite vein or a sylvite bed,
21 and we have a sylvite bed here, and we have a sylvite
22 bed over there. Without information in between, we
23 don't know how thick or what the percentage is in
24 between.

25 Q. That's a good point, Dr. Grosvenor. You

1 don't know how thick the sylvite is in the northwest
2 corner of Section 2, do you, on the basis of Corehole
3 162?

4 A. No, I don't.

5 Q. You don't know the thickness of the sylvite
6 in the southwest corner of Section 2, do you, on the
7 basis of Corehole 162?

8 A. No, I didn't try to analyze it.

9 Q. And you don't know the basis [sic] of the
10 sylvite in the northeast section of Section 2 on the
11 basis of Corehole 162?

12 A. No, I didn't extend the trend that far.

13 Q. And if we're going to mine Section 2 from New
14 Mexico Potash's mine, we're going to have to come from
15 the north, aren't we, and mine south to Section 2?

16 A. Well, if this is the southernmost section
17 that we have, we would have to come from the north, or
18 some direction from the northern way.

19 Q. And if your trend that you're showing running
20 out of the WIPP area up into Section 2 runs out before
21 it ever gets much farther than K-162, you don't know
22 that it would be economic for New Mexico Potash Mine to
23 ever mine down into Section 2?

24 A. No, I don't know, no.

25 Q. In fact, you would never recommend to one of

1 your banking clients that they should lend the money to
2 drive a shaft some three miles from the current
3 workings down into Section 2, could you?

4 A. Drive a drift?

5 Q. Drive a drift, excuse me.

6 A. A shaft is vertical.

7 Q. I understand, and I apologize.

8 A. Without further drilling, no, probably not.

9 Q. And by "further drilling" we're talking about
10 coreholes, aren't we, to prove up that this layer of
11 potash extends in an extensive enough area to make it
12 economic to go in and spend the dollars to develop?
13 That's what we're talking about?

14 A. Yes. It doesn't have to be a corehole
15 necessarily. Good electric log with comparison logs
16 with it would probably give us some indication how
17 thick the sylvite was.

18 Q. But something more than just one corehole?
19 You need something more than that?

20 A. Usually.

21 Q. You were looking at Exhibit 11, and this is
22 the letter from the Commissioner of Public Lands?

23 A. Uh-huh.

24 Q. We -- You read and discussed with Mr. High --
25 Have you found it?

1 A. Yes, I have.

2 Q. You basically discussed paragraph 1.

3 Paragraph 2 states that, "We continue to feel
4 that one test hole is not adequate to seal off a full
5 section of land."

6 Now, that's the opinion of the Commissioner
7 of Public Lands, is it not? Paragraph 2?

8 A. Mr. Prando?

9 Q. Yes, since he apparently is the director of
10 oil and gas, at least for that --

11 A. Yes.

12 Q. All right. Now, in some questioning from Mr.
13 High, you stated that you felt like saying that there's
14 not commercial ore in Section 2 was an arbitrary
15 decision by others; is that correct?

16 A. No, I think that's not exactly what was said.
17 It's arbitrary to say that it was only in the southeast
18 quarter. The hole is right near the boundary between
19 the northeast quarter and the southeast quarter, and
20 why would you go southeast quarter? Why not go in the
21 northeast quarter, and to the west? Because it's on
22 the line halfway between the center of the section and
23 the east boundary, so therefore it should go into both
24 the northwest and the southwest quadrants as well.

25 Q. If you had looked at ERDA-6, which says the

1 10th Zone is barren, which is the corehole just due
2 north of K-162 in the adjoining section to the north,
3 then maybe that decision is not quite as arbitrary, is
4 it, if they were giving credence to that corehole?

5 A. But that's more than half a mile away. If I
6 have a hole right here that has ore, commercial ore in
7 it, and I have something that somebody drilled up here,
8 more than a half a mile away, doesn't mean that I can't
9 extend the extent of that hole, that is, the influence
10 of that hole, to the north as well as to the south.

11 Q. But that would also work for the barren hole
12 too, would it not? You can extend the influence of
13 that hole to the south towards K-162?

14 A. Yes, and as I said, this is a potash deposit,
15 not a salt deposit.

16 Q. And potash deposits are fairly erratic, are
17 they not?

18 A. This whole field is a potash deposit. This
19 whole area is a potash deposit, and it has some salt
20 horsts in it. True, they are spread quite irregular
21 and without any rhyme or reason that I think that
22 anybody has figured out yet, where they are.

23 But they are inclusions in a potash field.

24 Q. And there could be inclusions in the
25 northwest quarter, the northeast quarter, and the

1 southwest quarter of Section 2?

2 A. Absolutely.

3 Q. Absolutely. Let's talk about subsidence, Mr.
4 Grosvenor. You've stated that potash is unique in its
5 method of subsidence.

6 A. Yes, I did.

7 Q. That's basically because of the potash being
8 found in a very thick bed of salt, which has a nature
9 of its own. It's plastic, it moves, and it doesn't
10 bound back; is that correct?

11 A. When I was talking about potash, I included
12 salt. I wasn't just saying just the potash part, but
13 the salt part as well.

14 Q. And this salt zone out here that we're
15 talking about, looking at Exhibit 6, that you were --
16 this Corehole 162, begins about 900 feet and then runs
17 at least below 1500 feet, does it not? Or at least to
18 1500 feet?

19 A. Yes, it does.

20 Q. Because that's all the record of the core; it
21 just went that deep, and we don't know how much.

22 And in fact, you probably know from your own
23 experience that the salt section is actually deeper
24 than the 1500 feet out there.

25 A. This hole actually goes down to 1713 feet,

1 and there's some salt down there, yes.

2 Q. Okay, I see. On the second page -- The first
3 page is what I was looking at, didn't reflect that
4 1713, but...

5 So we know that the salt section is at least
6 800, 900 or more feet thick down there in this part of
7 the world?

8 A. Yes.

9 Q. Okay. Now, you made a comment first about
10 Dr. Ping, and you said that you had read his book or
11 read his article. He in fact has written a book, has
12 he not, that was recently published?

13 A. Yes.

14 Q. Have you read that entire book or just parts
15 of it or what?

16 A. I read the most part of it, but I haven't
17 read every bit of it.

18 Q. This is one of the most recent works in the
19 area on subsidence, is it not?

20 A. I believe so. I don't believe there are any
21 books since 1991, I guess, or --

22 Q. Well, I notice most of the cites that you
23 make in your exhibits are back in the 1960s and even
24 earlier, the works and the studies that have been going
25 on in this area.

1 A. That is correct, and I will also point out
2 that Dr. Ping doesn't talk about salt or potash.

3 Q. Uh-huh. Dr. Ping does talk about the angle
4 of draw, does he not, in his book?

5 A. In relation to coal mines, yes.

6 Q. And he states that the angle of draw is more
7 or less of academic interest, because the subsidence
8 profile levels off and subsidence becomes very small
9 far before it reaches the edges of the subsidence
10 basin. He made that statement, didn't he?

11 A. In the coal mines.

12 Q. In the coal mine. Are you saying that that
13 doesn't happen in the potash basin?

14 A. Not the same as it does in coal mines.

15 Q. Are you saying that the subsidence basin does
16 not taper off and extend for great distances in the
17 potash basin?

18 A. It does --

19 Q. It does?

20 A. -- extend great distances in the potash
21 basin.

22 Q. And the amount of subsidence that we're
23 talking about is very small, isn't it?

24 A. Yes, that -- very small.

25 But realize that the ground moves in two

1 directions. Even if it's only that small of down, it
2 has to move to the side because the cause of the going
3 down is that hole that's in that mine.

4 Q. And in fact, angle of draw, the actual length
5 is really a function of our ability to measure small,
6 minute amounts of movement, because you said that over
7 time it could even -- it keeps going. So really,
8 that's what it is; it's a function of our being able to
9 measure it, isn't it?

10 A. That's one of the parameters, yes.

11 Q. Now, you recited some of the -- and I guess
12 you won't disagree with me that site-specific studies
13 are the only true comparison for an individual area
14 when it comes to defining the amount of subsidence and
15 how it acts in a particular area?

16 A. Site-specific in the potash basin is one
17 thing. Site-specific for a particular mine is another
18 thing.

19 If you look at the work of Dr. Deere, I
20 believe that was 1000 feet of depth, with 500 feet of
21 -- down to the salt.

22 At New Mexico Potash, it's 1523 feet to the
23 sylvite and 900 feet to the salt. So you have to make
24 some allowances for the difference in the two.

25 Site-specific would give you a lot of

1 information about that particular mine. But it is the
2 material characteristics that we're worried about, and
3 how it reacts and how we can then apply it someplace
4 else in the basin.

5 Q. Well, do the formations above the salt
6 section behave differently than the formations above
7 the coal beds?

8 A. Maybe to some extent. It depends on -- you
9 have to analyze this -- how solid a sandstone. If that
10 was 70 feet of solid sandstone -- But it doesn't say
11 that.

12 And then I have seen logs where you have
13 limestone in layers in there. Now, they would react
14 slightly differently. They would break differently,
15 they would rotate different, and movement would be
16 different.

17 So that you would have to take into
18 consideration, yes.

19 Q. Well, how much movement, Mr. Grosvenor, is
20 necessary before you will affect a triple strain of
21 oilfield casing?

22 A. It does not take very much to -- in tension,
23 to affect the cement binding that cement to the pipe or
24 the cement to the wall of the hole. It takes very
25 little movement. As a matter of fact, it's in

1 fractions of an inch.

2 Q. Well, Mr. Grosvenor, what kind of effect are
3 we talking about? Effect that would damage the
4 oilfield casing, or just cause something that you could
5 note in a scientific study?

6 A. No, not a scientific study. It's the fact
7 that you would have a passageway along the outside of
8 that pipe in case the pipe was damaged for any reason,
9 up or down, by wear or corrosion.

10 And the same way with the attachment of the
11 cement to the wall of the hole, and it would take very
12 little movement to have a pathway for something to
13 travel up or down.

14 Q. So you're qualifying here your statements
15 about subsidence. The subsidence that you're worried
16 about is the creation of pathways rather than the
17 actual damage of this string of casing, this triple
18 string of casing out there?

19 A. I'm worried about that triple string of
20 casing. If we were in an island that was 125 feet in
21 radius and we had a drill stem down and we were mining
22 potash all the way around that, I would be concerned
23 about the casing itself, yes.

24 Q. Well, one thing about salt, and we know
25 there's probably -- since the salt starts at 1500 -- or

1 at 900 feet, there's probably 500 or 600 feet of salt
2 above the potash zone anywhere out there in this basin?

3 A. Uh-huh.

4 Q. Potash is going to flow and seal off these
5 passageways, will it not, because of the overburden
6 pressure?

7 A. It may flow and it may seal it off, but while
8 it's open it has a passageway, a possible passageway
9 for movement of gas. And I mentioned before that the
10 pressure in this mine was negative to the outside
11 because of its exhausting system; it would suck it in
12 that direction.

13 Q. Well, what is the differential in pressure
14 that you're talking about?

15 A. Oh, two or three inches of water gauge,
16 maybe.

17 Q. Well, how much suction is that going to
18 create?

19 A. That's quite a lot. That causes the air to
20 move throughout that mine. It causes it to come all
21 the way down that 1500-foot shaft, all the way through
22 the mine workings, out, and then forcing it out the
23 long shaft on the other side, two inches of water.

24 Q. Is that suction powerful enough to suck gas
25 through an impermeable substance such as salt, 400 or

1 500 feet?

2 A. I didn't say that it would pull it through
3 impervious material. I said if there are any pathways
4 for it to -- any openings, any movement that causes an
5 opening, then it has that possibility.

6 Q. In other words, the gas has got to be in the
7 mine before this effect that you're talking about is
8 going to have any true consequences?

9 A. I didn't say that.

10 Q. Sounded like it to me.

11 These pillars that you're worried about --
12 You've read the Golder report, haven't you?

13 A. Yes, I believe I have.

14 Q. And in fact, Mr. Hutchinson read a part of
15 that Golder report where it reported that there were
16 three producing wells currently located in the Wills-
17 Weaver mine site and are protected by salt pillars of
18 radii of approximately 150 feet.

19 And then it went on to say that these
20 closures at the mine horizon level would have impacted
21 the oil wells because of the limited pillar sizes, but
22 the level of disturbance has evidently not been
23 sufficient to cause problems.

24 Site-specific study, isn't it?

25 A. In that particular mine, yes.

1 Q. Do you know how big a pillar New Mexico
2 Potash has left about -- around the three oil wells
3 that are in their current mine?

4 MR. HIGH: Excuse me, I'm going to object to
5 the use of the word "oil well". There are no oil wells
6 in our mine, just some dry holes.

7 CHAIRMAN LEMAY: Rephrase the question,
8 Counsel.

9 Q. (By Mr. Carroll) Are you currently aware of
10 the pillar size of the three holes that were drilled in
11 the New Mexico Potash Mine?

12 A. I may have heard their dimensions in August
13 when I was at the mine, but I don't recall it right
14 now.

15 Q. Did you go out and do any studies?

16 A. No.

17 Q. When we're talking -- One of your exhibits, I
18 think it was 47, talked about subcritical, critical and
19 supercritical width, and I believe you explained that
20 really the term "critical" doesn't have anything to do
21 with the amount of stress; it really deals with the
22 kind of subsidence that we're talking about. And the
23 supercritical width is where your subsidence has
24 tapered off and would begin to find a flat area or
25 trough or bowl effect.

1 A. Yes. I'll just explain. Subcritical is a
2 very small opening, and you'll get a very small amount
3 of subsidence on the surface.

4 You reach a certain point for that thickness
5 and that depth, that you will get the maximum
6 subsidence that you're going to get for that thickness
7 of potash and that depth, you will get a certain amount
8 of subsidence on the surface.

9 As you extend that opening underground, it
10 will not subside any further down on the surface, but
11 it will extend out in a bowl, in a big basin. In other
12 words, if you took it all out, you'd have -- It would
13 come down on the sides and have a big, flat bottom on
14 it.

15 Q. When you talked about your Exhibit 52, which
16 actually depicts the subcritical, critical and
17 supercritical effects, and you see that ever expanding,
18 you stated that this diagram or exhibit was drawn out
19 of proportion, did you not?

20 A. Oh, absolutely.

21 Q. And what you were talking about is this area
22 in each one of the three little examples, which has got
23 the cross-hatched lines, which shows the actual area of
24 subsidence. That's what's being exaggerated, isn't it?

25 A. Yes.

1 Q. Because the area of subsidence is going to be
2 less than the area of -- Or the depth of subsidence is
3 going to be less than the height of the excavation.

4 A. It usually always is.

5 Q. It is, isn't it? Correct?

6 A. Surely.

7 Q. So in particular, this bottom example of 52,
8 where you have this great big and flat-bottom trough,
9 that trough is going to be -- the actual depth of that
10 is going to be less than the excavation that you're
11 showing down there on the bottom?

12 A. Oh, yes. Yes, I said that that was
13 exaggerated just to show that the subcritical just has
14 a little, critical is the maximum depth, and that if
15 you go beyond the critical, supercritical, it doesn't
16 get any deeper; it just gets bigger.

17 Q. Now, your next exhibits began to deal with
18 the rock-bolting issue. And I'm really more interested
19 in your statements that -- You say that all you're
20 doing with these rock bolts is buying time; is that
21 correct?

22 A. You're buying time in potash.

23 Q. In potash.

24 A. You are not necessarily just buying time,
25 because you can bolt in a coal mine, and it will last

1 as long as the bolts will last without corroding, and
2 if you put in resin-tight bolts and the water can't get
3 to the bolt, it might last for years and years and
4 years.

5 That's what I was referring to when I said
6 the buying of time.

7 In a coal mine that's permanent support, as
8 long as you're using those entryways.

9 And then if -- In the potash, though, that's
10 not the case.

11 Q. Well, how much time are you buying in the
12 case of potash, Mr. Grosvenor?

13 A. Well, the first -- When we look at the potash
14 one that we tie the lower member to the upper member,
15 we're buying a safety factor. We don't want that to
16 fall on anybody while people have to be working in that
17 entry. So we put them in that so that stuff won't slab
18 off. But -- and we then -- through with that entry,
19 even though the bolts are in there, it's going to
20 close.

21 Q. You've been in the New Mexico Potash Mine,
22 haven't you?

23 A. I have been in mines -- I was in the New
24 Mexico Potash Mine years ago. I was not in it just
25 recently, no.

1 Q. They use rock bolts in intersections and
2 places in that mine, don't they?

3 A. Well, I feel that they should if they don't,
4 but all right.

5 Q. That mine was opened in the early 1960s,
6 wasn't it?

7 A. It has a long history, yes.

8 Q. And they've been hauling ore through parts of
9 entryways or drifts which have been opened or were
10 opened back in the 1960s, haven't they?

11 A. They probably are.

12 Q. And they've bought at least 20 or 30 years of
13 time, haven't they, so far?

14 A. Not with the first installation. I'm just
15 assuming -- I haven't asked them, but they have
16 probably taken up floor, they may have rebolted areas,
17 they may have done lots. I have not asked them about
18 their mining --

19 MR. HIGH: Let me object, Mr. LeMay.

20 CHAIRMAN LEMAY: Mr. High?

21 MR. HIGH: There's no evidence that there's
22 rock bolts in the New Mexico Potash Mine areas Mr.
23 Carroll's referring to.

24 CHAIRMAN LEMAY: No evidence of what?

25 MR. HIGH: That there's rock bolts in the

1 areas that he's talking about.

2 CHAIRMAN LEMAY: I'm not even sure what areas
3 he's talking about.

4 MR. HIGH: Something about drifts drilled in
5 the 1960s.

6 MR. CARROLL: Mr. Grosvenor testified that he
7 was sure there was some kind of procedure such as that
8 being used, and I think he's the expert. He's supposed
9 to know about.

10 MR. HIGH: I beg your pardon, he didn't say
11 that.

12 MR. CARROLL: I think he did.

13 CHAIRMAN LEMAY: Well, we can check the
14 record. I think he said that this would happen. I
15 don't think in a -- Did you say what would happen in a
16 specific mine, or that it would happen in principle
17 over time?

18 THE WITNESS: Well, in principle over time is
19 what I'm saying, that you may bolt, now, in potash, but
20 the whole thing will close, bolts and all.

21 And you're buying, first, with the bolts
22 safety so that people can work under some slabby
23 material or a thin layer that would come down. You
24 would bolt that.

25 And then after time, that whole thing will

1 slowly come in. The bolts will not stop the flow of
2 closing the hole.

3 CHAIRMAN LEMAY: When you said "time", did
4 you use any time frame, years, in there?

5 THE WITNESS: It could be one year, it could
6 be ten years. But -- It varies.

7 CHAIRMAN LEMAY: Could it be longer than 30
8 or 40 years?

9 THE WITNESS: No -- I haven't studied out
10 that far.

11 But the situation that exists depends on the
12 amount of potash that has been mined, the pillars, what
13 you have. You'd have to study each case. It can be
14 that it may be longer than 10 years. I haven't asked
15 them, and I haven't been there recently to study it.

16 CHAIRMAN LEMAY: So in terms of this
17 discussion, though, you're talking about something in a
18 general sense and not site-specific to the potash mine
19 in question?

20 THE WITNESS: That is correct.

21 CHAIRMAN LEMAY: Okay.

22 THE WITNESS: Just to --

23 CHAIRMAN LEMAY: Does that clarify the issue,
24 gentlemen?

25 THE WITNESS: -- bolting in potash mines.

1 CHAIRMAN LEMAY: Okay, you may continue, Mr.
2 Carroll.

3 Q. (By Mr. Carroll) Let's turn to your Exhibit
4 Number 48. Do you have that before you?

5 A. Is that the one with the subsidence -- large
6 subsidence area?

7 Q. You've got -- Well, no, it's -- At the top
8 it's got "Original Surface", and then you've got "Angle
9 of Draw" on it, and then you've got down below it,
10 "Angle of Draw - References", and you've used the
11 Miller, the Deere and the Golder reports?

12 A. Yes, I have it in front of me.

13 Q. This particular diagram actually came from
14 the -- this year's version, I guess, the new version of
15 the *SME Mining Engineering Handbook* on page 939, didn't
16 it?

17 A. I don't know as it did. I believe I drew
18 that one myself, and I showed you three or four other
19 drawings leading up to this one, but --

20 Q. Well, let me show you that exhibit and show
21 you the exhibit, because there's only one real major
22 difference in the fact that you've left out the failure
23 plane, which corresponds with the angle of break that
24 Mr. Hutchinson talks so much about.

25 A. Yes, and in this book this is a coal mine.

1 It has nothing to do with this drawing here.

2 Q. Coal mines have nothing to do with the
3 drawing?

4 A. No.

5 Q. Well, let's turn to your Exhibit Number 46.
6 Would you pull that exhibit? That's the Deere report.

7 A. Oh, okay, I have it.

8 Q. The Deere report came from specific site
9 studies out in the potash basin, didn't it?

10 A. U.S. Borax.

11 Q. U.S. Borax Mine?

12 A. Uh-huh.

13 Q. And this chart down at the bottom, it starts
14 and reads across, angle at 1, angle at 2, angle at 3,
15 and you've discussed angle at 3, the 42 degrees and the
16 55 degrees.

17 But you neglected to discuss the angle at 1,
18 which corresponds to the angle of break, doesn't it?
19 That's the point of T_{\max} , maximum tension, the angle of
20 break as you defined it?

21 A. On the left side of the drawing, that is
22 true.

23 Q. And in fact, on the left side of the drawing,
24 the angle of break was a minus 3 degrees, because that
25 angle was actually inside the area being -- having been

1 mined out or excavated; isn't that correct?

2 A. That is true.

3 Q. And the max, which was on the right side,
4 where there were other hallways and rooms and pillars,
5 was a maximum of 10 degrees; is that correct?

6 A. Yes, that is correct, that's what it shows on
7 the sketch.

8 Q. Are you saying that in a potash mine there is
9 no angle of break?

10 A. No, I'm not saying that there's no angle of
11 break. I didn't say that at all.

12 And I don't know if anybody else has put an
13 angle of break on the -- through the salt section of
14 the mine. I'm not sure.

15 Q. Angle of break does have some significance
16 for potash mines, then, doesn't it, Mr. Grosvenor?

17 A. Absolutely, it has -- for any subsidence, it
18 has.

19 Q. And this angle of break helps us define the
20 angle of critical deformation, doesn't it? And that's
21 what you were to find.

22 A. Maximum tensile point on the surface, it's a
23 line from the side of the opening to the maximum
24 tensile point on the surface where the beds are
25 bending.

1 Q. Right.

2 A. It doesn't say it's not -- doesn't have
3 values on both sides of it. It just says that's the
4 maximum.

5 Q. When experts in this field use the word
6 "critical", they're actually meaning maximum, are they
7 not, in that sense at least?

8 A. I don't know if the experts use it that way.
9 I know I use it that way.

10 Q. Okay. Well, you've held yourself out as an
11 expert, Mr. Grosvenor, so...

12 As you get beyond this T_{max} , maximum
13 deformation or critical deformation, the deformation
14 stresses get smaller and smaller as you go out towards
15 this end that we call angle of draw?

16 A. That is true.

17 Q. Mr. Grosvenor, do you have an opinion as to
18 whether or not you can design oilfield casing to
19 withstand -- in other words, not burst -- to withstand
20 subsidence stresses?

21 Or is that out of your field of experience?

22 A. That -- I'm not an oilfield person.

23 MR. CARROLL: That's all I have.

24 CHAIRMAN LEMAY: Thank you, Mr. Carroll.

25 Redirect, Mr. --

REDIRECT EXAMINATION

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

BY MR. HIGH:

Q. Professor Grosvenor, when you're looking at mineral valuation, is it a consideration that you're looking at ore that occurs in a bedded deposit as opposed to random occurrences somewhere?

A. In potash, I would be looking at material in a bedded deposit, yes, in trona I would, in coal I would.

Q. When you're looking at a bedded deposit, and there's already some known reserves there, do you use that in determining whether or not to project the possible existence of ore elsewhere?

A. Yes. When you study the entire history of the area, if this was under large inland sea and so on, there may be places in a bedded deposit that thin down due to streams or history, but you would expect to pick up that bed somewhere else along the way.

Q. Those thinned-out occurrences would be the exception rather than the rule?

A. In -- Primarily in coal mining, that is true.

Q. Now, with respect to the Golder report, do you recall that report -- In fact, let's just refer to it. It's Exhibit 33, I believe.

MR. HIGH: If we haven't done so already, Mr.

1 LeMay, I would offer into evidence Exhibit Number 33.

2 CHAIRMAN LEMAY: Without objection, Exhibit
3 Number 33 will be admitted into the record.

4 Q. (By Mr. High) Now, I believe you -- You've
5 already testified, Professor Grosvenor, that you are
6 familiar with Exhibit 33, the Golder report.

7 And do you recall the discussion of the
8 Golder report on the effects of subsidence on the
9 existing wells that were in the Wills-Weaver area?

10 A. I read that quite a while ago. I don't
11 recall it specifically.

12 Q. Well, I don't see the portion that Mr.
13 Carroll was referring to.

14 Page 73 at the very bottom on the right-hand
15 side, do you see that?

16 A. Uh-huh, yes.

17 Q. Just take a minute, if you will, and read
18 that paragraph.

19 A. Yes, I've read it.

20 Q. Okay. At the time of the Golder report, the
21 conclusion is that the subsidence has not yet affected
22 those wells; is that correct?

23 A. Yes, they did not go down there, they did not
24 look at the mine to see how much it had subsided.

25 It says it would probably have occurred

1 within these areas, and they don't know, and the level
2 of disturbance has evidently not been sufficient, but
3 they expect further subsidence.

4 Q. Is that subsidence at Wills-Weaver someday
5 going to affect those wells?

6 A. In my opinion it would, yes.

7 Q. All right. Turn back two pages, to page 70.
8 Do you have that page 70? It's a chart.

9 A. Uh-huh, yes.

10 Q. Look in the lower right-hand corner, the
11 small chart.

12 A. Yes, I see it.

13 Q. Do you know what that little chart shows?

14 A. It shows that subsidence continuing, from the
15 dates, July, December, and then -- when it started in
16 1964, and then December, 1965, and that it was still
17 subsiding.

18 It's -- One line is still subsiding; the
19 other one seems to have leveled off.

20 Q. All right. And how long will that subsidence
21 continue to occur, Professor?

22 A. The opinion of the people who have studied
23 this, Dr. Obert, and in this document right here, plus
24 Mr. Baar is in his book, continues it indefinitely or
25 until the thing is completely closed.

1 Q. So the Wills Weaver mine, given enough time,
2 will completely close, close in terms of fully
3 subsiding?

4 A. Yes, that is the opinion of the people
5 studying the potash.

6 Q. As an area subsides around an existing well
7 -- and let's talk about these in the Wills-Weaver mine,
8 and assume that my pencil that I'm holding up is an oil
9 well casing and that my hand is the ground around it.
10 As that ground subsides around that well, am I correct
11 in saying that there's only one of two things that can
12 happen: Either the well casing has to take on the load
13 of the ground and support it like a tent pole --

14 A. That is correct.

15 Q. -- or something has to give way, "something"
16 being either the casing or the cement or something, and
17 then let that ground slide down around that casing?

18 A. That is correct.

19 Q. Is there anything else, other than those two
20 phenomena, that can happen if a well is located in an
21 area of subsidence, that you know of?

22 A. Not that I know of. It either holds the
23 ground up or it slides --

24 Q. Now, as far as -- Yes. As far as rock-
25 bolting is concerned, do you know whether or not

1 there's any legal requirement that you do rock-bolting
2 in coal mines? Is that legally required, or do you
3 know?

4 A. You have a support program approved by MSHA.
5 If it includes rock bolts, you put rock bolts in on
6 specific centers and a certain length.

7 Q. Do you know whether or not there is or is not
8 a similar requirement for non-coal mines?

9 A. No, I do not know that. I don't know that
10 it's required or not.

11 Q. All right. Do you know whether or not New
12 Mexico Potash has roof bolts in any particular area of
13 its mine?

14 A. No, I don't.

15 Q. Is there ways that you can keep entries open,
16 other than by rock-bolting?

17 A. Yes.

18 Q. And what would some of those be?

19 A. You could support it with timber, you could
20 support it with concrete pancakes, stacked. There --
21 steel support, timber support, steel support.

22 Q. Could you also mine out the drift, take more
23 out of the bottom to offset the effects of subsidence?

24 A. Yes.

25 MR. HIGH: That's all I have, Mr. LeMay.

1 Thank you.

2 CHAIRMAN LEMAY: Thank you, Mr. High.

3 Commissioner Carlson?

4 EXAMINATION

5 BY COMMISSIONER CARLSON:

6 Q. I think this question has been asked, but I
7 don't know if I've ever heard an answer.

8 How long does subsidence last? What are we
9 talking about? You say until the mine completely
10 closes?

11 A. That's right.

12 Q. Give me a time frame. How many years are we
13 talking about?

14 A. It may close -- might not subside on the
15 surface for three months or six months, and then it
16 might move very rapidly.

17 It depends on the situation, the size of the
18 opening, the amount removed, and how fast it will come
19 down.

20 It could be in three years or five years. A
21 lot of these tests are only run as far as a thousand
22 days, which is what? Three or four years.

23 You can completely close one area, where
24 other areas will stay open.

25 I've been in areas in IMC where we start down

1 through, and every timber is broken where they
2 supported the roof, and the roof came down and broke
3 every timber. You look down through, and everything is
4 broken. It doesn't look like a very safe place.

5 And I was with Mr. Hougland, who's been there
6 for thirty years, or was. He's now retired. And he
7 says, Oh, that happened six years ago. It subsided
8 enough to break the post and was still subsiding. But
9 that was a matter of six years.

10 But that depends on the size of the rooms
11 that you have, the percentage extraction you have
12 taken, how much the pillars actually -- large pillars
13 are left. They have to crush out, as well as the back
14 coming down or the roof coming in.

15 So you can have different time periods for
16 different areas.

17 In other words, if you would take out 95
18 percent -- Or I've read something, I wouldn't want to
19 be the man there doing it, but they took 95 percent of
20 the potash out of a large area. That would completely
21 close probably in a year or less, or something on that
22 order.

23 Q. So subsidence would be complete, then, in --

24 A. Well --

25 Q. -- that example, within a year?

1 A. -- not complete, because it wouldn't get all
2 the corners, and they're going to fill it up too.
3 Because anytime you have a differential, as I said, if
4 you have a load on it here and nothing holding here, an
5 opening, it's going to creep into that. It will move
6 until the spaces are filled.

7 And the beginning, say, of a -- pillars to
8 subside or something like that, they usually start very
9 fast, and that's why the curve looks very steep at the
10 beginning and then a straight line going off and keep
11 going.

12 And Dr. Obert has that in U.S. Bureau of
13 Mines publications. It's in Mr. Baar's book there, and
14 I imagine that this will complete -- continue to go at
15 a rather constant rate until it's completely closed.

16 Now, some do slow down because if the major
17 areas are filled and they only have some small
18 entrywork or corners that haven't filled up, that will
19 take time, and then it may level off and go more
20 slowly.

21 But it does -- It goes fairly rapidly.

22 Q. Is there a point, then -- At what time is it
23 safe, in your opinion, to drill an oil well, then, in a
24 mined-out potash mine, a mined-out area?

25 A. Out in the middle of one of these subsidence

1 basins?

2 Q. Yeah.

3 A. I haven't really studied that, so I would
4 hate to make some offhand guess to find out what other
5 factors might be affecting.

6 But if you have a supercritical area and it's
7 all mined out and it has subsided to as far as it's
8 been, then I have to consider all the other factors.

9 I really don't know the answer.

10 May I add a little to that?

11 Q. Sure.

12 A. You wouldn't want to put one down through
13 that area. It would -- It may be broken up on the
14 upper parts, but in the lower part -- but if the mine
15 was still working, still a working mine, and there were
16 any other reasons for a leak, ruptured casing,
17 corrosion, whatever the case may be, or movement of
18 gases along the side, I would hesitate to, right now,
19 without thinking further, approve a well in that
20 situation, with the mine still working.

21 Q. Mr. Hutchinson testified -- In looking back
22 over my notes, he stated that the point about
23 subsidence is, it is not a deciding factor; it can be
24 calculated and planned for, you can design wells and
25 mining to accommodate it.

1 Do you agree with that statement?

2 A. No. There are certain factors you can take
3 into consideration, and if you're talking about saying
4 that you're going to put an oil well in the area --
5 within the area of draw, we really don't know what
6 happens in that complete area. There may be fractures,
7 there may be paths of movement, and we don't know how
8 safe you are for the mine to put an oil well within
9 that area of draw.

10 So we would hesitate to say -- They can be
11 calculated, the amount of subsidence can be calculated
12 within that area of draw. That is a possibility. It
13 can be calculated, both horizontal, vertical, so on.

14 But what that does to a drill stem that has
15 been cemented in, if you have movement then you have
16 problems. And it's a possibility that if there are any
17 fractures or places for it to migrate -- As I
18 understand, oil has migrated in these salt beds or
19 potash beds. There's some evidence in the basin where
20 salt -- or oil has migrated. We don't know how far.
21 We just have -- They have found some spots, but there
22 may be others.

23 So we're not so sure that there isn't places
24 for oil or gas to migrate.

25 Q. But you testified you don't have the

1 expertise to know if you can design a wellbore to
2 withstand subsidence pressures.

3 A. Yes, I do not know anything about wellbores
4 other than the -- I know about slant drilling and so
5 on; I used to teach that.

6 And I was involved in the disaster where
7 Texas Oil drilled into the salt mine, and I had to give
8 a deposition in that case on really what happened.

9 And so I know about slant drilling and the
10 reasons for it and why it was there and so on.

11 But I am not in a position to say anything
12 about calculating drill stems or the design of drill
13 stems.

14 Q. But if you know what those subsidence
15 pressures are, you're saying it might be possible to
16 design a drilling program to withstand those?

17 A. No, because I don't believe they know -- Even
18 if you were designing it, the ground moves, not only
19 down, it moves horizontally and rolls.

20 Now, if there's some expert that says that he
21 knows how to make a drill stem that would not break the
22 cement away from the casing or the cement away from the
23 walls and all that, maybe so. But I don't know of any.

24 Q. Mr. O'Brien testified for Yates that he was
25 aware of many cases of subsidence, that there's many

1 examples of surface movements which have not damaged
2 wellbores.

3 Are you familiar with those cases he was
4 talking about?

5 A. No, I am not, but I looked at it slightly
6 different. I heard him testify to that effect, but I
7 didn't hear him testify much about gas in mines and
8 their effect and the safety.

9 May be true, it subsided and it still pumps
10 oil or gas or something. But I didn't hear anything
11 from Mr. O'Brien that I remember that had anything to
12 do with the safety in a coal mine if you allowed gas to
13 get into it, or any mine.

14 COMMISSIONER CARLSON: Thank you, that's all
15 I have.

16 CHAIRMAN LEMAY: Thank you, Mr. Carlson.

17 Commissioner Weiss?

18 EXAMINATION

19 BY COMMISSIONER WEISS:

20 Q. Yes, sir. If you have, say, a washout behind
21 the pipe to the salt section, I'm wondering if that
22 salt flow, creep, is evenly distributed around the
23 pipe? Do you have an opinion?

24 A. It probably would not be evenly distributed,
25 although it would probably close entirely in time, if

1 it's very deep.

2 Q. But it wouldn't -- You don't think it would
3 be even?

4 A. No, I don't know that it would be even.

5 Q. Oh, and then this -- I'm a little confused on
6 the terminology. Is the time to the -- typical time to
7 the maximum angle of break, is that the equivalent to
8 maximum subsidence?

9 A. No, not exactly, because the -- When the area
10 subsides, it's when the ground has to stretch to come
11 into the hole, and that's the point of maximum tensile
12 stress, and that's also the part that would pull the
13 furthest apart.

14 But that isn't -- If that's only the first
15 opening, it's here. And then if you go further, then
16 that thing moves out as the bottom moves.

17 So it's the maximum point of tensile stress
18 on the surface, is what that angle of break is, and
19 it's just a line running up to that point.

20 Q. And what is that time frame, then? Because I
21 heard you say something about one to ten years for
22 subsidence. Is this the equivalent of --

23 A. No, it could be six months or three months.

24 Q. Okay, much --

25 A. It depends on how big you make that opening.

1 If you have only a very small, it takes it a long time
2 to really settle, to get to the surface.

3 But if you take out an area that's several
4 thousands of square feet and pull the pillars, that can
5 reach the surface.

6 I have seen subsidence reach the surface when
7 a -- in a uranium mine when the men were underground --
8 They had two levels. They didn't get the pillars in
9 one level lined up over the other, and the pillar
10 punched right down through the -- into the intersection
11 in the other one, and the men ran out the mine, stepped
12 off the cage, and the hole was in the yard in front of
13 them.

14 So that's how fast it can go to the surface
15 if it's in the right sequence. It can be that fast.

16 So it's just -- There are several factors
17 that you have to look at to say, well, you won't get
18 subsidence on the surface for six months or three
19 months.

20 Q. Well, there's been, I think we've heard,
21 something like a thousand wells drilled in this area,
22 and to my knowledge there's never been any report of
23 damage to the pipe.

24 How do you reconcile your theoretical aspects
25 with reality?

1 A. Well, I would not want to comment on it until
2 I took a study to say how far away they were, how thick
3 the beds were, how much was mined out, and so on.

4 There are a lot of factors that would come
5 into the damage to that pipe.

6 Q. But there hasn't been any, to my knowledge.

7 A. Well, I don't know of any either. But I
8 haven't studied it either.

9 Q. Let's see, I think I have one more here. Oh,
10 yes, what's the anticipated extent of damage
11 vertically, you know, the cement cracking or something
12 around the pipe, the cement sheath cracking in an area
13 of subsidence?

14 A. Well, to give you a feel for, if you had a
15 12-foot bed of potash, which is on record in this
16 literature that we have here, that they had eight feet
17 of subsidence on the surface, eight feet --

18 Q. Uh-huh.

19 A. -- on the twelve.

20 On a five-foot bed, I believe they've been
21 recorded as much as two feet with only a five-foot bed,
22 two feet of subsidence in the middle.

23 Q. My question is, do you think that subsidence
24 affected the pipe, the drill pipe, as you call it --

25 A. If --

1 Q. -- from the mine to the surface, or was it
2 just a five-foot interval along the pipe, or --

3 A. Oh, no, I would assume that if the well was
4 in the range that you had a foot or so of subsidence,
5 that foot would be the maximum on the surface, and
6 decrease down to the angle of draw.

7 Q. Uh-huh.

8 A. But it would have to move along the way,
9 because I don't believe the drill stem can hold up the
10 surface of the ground.

11 Q. Okay, so the maximum would be from the mine
12 to the surface; that would be the maximum damage to the
13 drill stem?

14 A. If the well came right into the mine --

15 Q. Yeah.

16 A. -- or, in the case of a 125-foot pillar --

17 Q. Uh-huh.

18 A. -- that wouldn't be very far above the mine.
19 The angle of draw from the mine would cut it fairly low
20 down. It would be all the way from the surface down to
21 that -- roughly to that --

22 Q. But maximum, if it were drilled into the
23 mine, would from the floor of the mine to the surface,
24 I guess?

25 A. Yes.

1 Q. How about below this?

2 A. No, doesn't have any effect. Only a slight
3 distance below, if you were in the mine, because the
4 floor will heave. If you put pressure on the pillars,
5 sometimes if there's a thin bed of salt, four or five
6 foot of salt, and a clay layer --

7 Q. Uh-huh.

8 A. -- then the movement of that floor will come
9 up, so there may be a few feet below the bed of the
10 potash mining, but not too any extent.

11 Q. So if a mine is 2000 feet deep --

12 A. That's right.

13 Q. -- we might have damage to the -- and the
14 well penetrated the mine, the damage might be from 2050
15 feet to the surface?

16 A. No, 2005.

17 COMMISSIONER WEISS: Okay, thank you. That's
18 all the questions I have.

19 CHAIRMAN LEMAY: Thank you, Commissioner
20 Weiss.

21 EXAMINATION

22 BY CHAIRMAN LEMAY:

23 Q. Professor Grosvenor, following up on my
24 associates' questions here, will you agree with the
25 statement I think that Mr. Hutchinson made -- and I

1 hope I quoted him correctly here in my notes -- that
2 science is available to measure the zero or negligible
3 stress point where a well could be drilled and a buffer
4 zone can be adjusted on a site-specific basis?

5 A. I think in general it is site-specific. We
6 have the instrumentation to measure that point, with
7 zero subsidence or none, and where to drill that hole.

8 Q. Do you know what kind of science you would
9 employ to measure a zero or negligible stress point on
10 a site-specific basis?

11 A. We have instruments that we measure very
12 small movements on the surface, both vertical, and then
13 we also put pins so that the -- so far apart. As the
14 surface of the ground moves apart, as this maximum
15 tensile stress, we have ways of measuring the extension
16 of the ground, and we can calculate from that.

17 We can also measure any -- very, very small
18 deformations.

19 And we can also -- We have designed
20 instruments for underground, so we can go out 50 feet
21 into the wall and tell -- and put several anchors out
22 there, with levers here, and we can measure, is the
23 first foot moving, the second foot moving, is the third
24 or fourth or the fifth or the 20th foot out there? We
25 can measure exactly how much that is moving around an

1 opening. We have designed these instruments, we
2 designed them ourselves.

3 We also have very good instruments for
4 measuring the load that's on the -- If you want to put
5 load cells in the mine, we know what the pressure is.

6 And so I would say, generally, what Gary's
7 saying. The instrumentation is available, and we may
8 draw on others, even the aviation industry.

9 I, being a mining engineer, I worked some at
10 White Sands on stresses on missile fins from a mining
11 aspect. I was one of the first people to use
12 photostress where it changes colors when you look at
13 it, and so on and so forth.

14 And we can do that on shaft linings down in
15 the bottom of the shaft. We can glue patches on them.
16 They have them with the frozen-in patterns, and we can
17 put -- We can glue this little thing on there, and we
18 can see if there's any twist in the members and so on.
19 The technology is available.

20 Q. How about after the fact, where you do have
21 an existing well casing in a mine, surrounded by a
22 pillar?

23 There's no way to create the initial
24 circumstances, I assume, to see how much stress might
25 have occurred over --

1 A. Not that I know of. Maybe somebody has
2 studied that a little deeper than I have from the well
3 -- oil people's standpoint.

4 Q. Do you know of any studies on wells or dry
5 holes currently within the existing potash mines?

6 A. No, I don't.

7 Q. And just to re-emphasize, I guess, a point
8 that Commissioner Weiss made, do mining operations
9 cause any stress below the mine?

10 A. Only a short distance. And I can explain
11 that very easily, because when you have pillars, they
12 push down into the floor; they're holding an extra
13 amount of weight.

14 If there's any kind of material below for a
15 certain distance they'll have a tendency to force it
16 out and up in, and the floor will heave.

17 I worked in a uranium mine once when the
18 floor came up so fast -- It was 15 feet high. The
19 floor came all the way to the ceiling. The pillars
20 just pushed down, and the more they pushed down, the
21 more they stripped the pillars off. As it was coming
22 out from under the pillars, it stripped the sides off.
23 You could walk behind the slabs that would peel off.
24 And in that case it was happening maybe 25 feet below
25 the mine.

1 But as a rule, it doesn't fall on you, so
2 it's not a safety consideration. We can pick up the
3 floor. If it comes up, we pick it up. Or we redesign
4 the opening so that it doesn't cause that.

5 Q. But that's the five-foot you're talking
6 about? You're not --

7 A. Yes, I'm only talking --

8 Q. Well, then, assuming that your scenario, as I
9 understand it, will be the casing, the bond between the
10 casing and the formation would crack.

11 But that is always above the mine, and that
12 would allow the fluids maybe to migrate into the mine,
13 to whatever was there above the mine.

14 Nothing below the mine unless you had a
15 channelway -- I mean, your scenario is really stuff
16 above the mine?

17 A. That's right. The mine itself does not
18 affect stuff below. It puts a tremendous stress on the
19 first layers just below the mine, below the pillars,
20 but it --

21 Q. Well, I'm trying to get methane into the mine
22 some way with your scenario --

23 A. Okay.

24 Q. -- from oil and gas operations, which is
25 bottom line, I guess.

1 A. All right. But if there's a weak spot in the
2 casing as it goes through the mine, which has been the
3 case -- I think in the case that Mr. O'Brien said, they
4 had a hole in the casing when they mined over to it.

5 Well, how many more holes do we have in the
6 casing?

7 Q. But that's assuming a producing well, versus
8 an abandoned well, or a dry hole --

9 A. Okay.

10 Q. -- I guess, isn't it?

11 A. Yes.

12 Q. Okay.

13 A. Yes, that's a producing well.

14 Q. And we're talking about there a casing
15 element, of casing failure of some sort which --

16 A. Yes, and there are a lot of those, as I
17 understand it, because the hole's not straight, the
18 drill rods wear the site.

19 There are a lot of reasons for corrosion or
20 holes in oil -- as I understand it, as I heard Mr.
21 Mitchell talk about it.

22 Q. Do you know of any casing stress studies
23 under subsidence scenarios in the literature at all or
24 anyone who's studied that?

25 A. I do not, off the top of my head.

1 CHAIRMAN LEMAY: Okay, thank you. I have no
2 further questions.

3 Anyone else have additional questions?

4 MR. HIGH: I have. I have a couple I just
5 wanted to clear up.

6 CHAIRMAN LEMAY: Mr. High?

7 MR. HIGH: I have a question that -- I don't
8 want Commissioner Weiss to have the wrong impression
9 here, and I'm not sure he does, but I want to just make
10 it clear.

11 FURTHER EXAMINATION

12 BY MR. HIGH:

13 Q. The over a thousand -- The thousand or so
14 wells in the known potash area, Professor Grosvenor, do
15 you know how many of those are or are not in areas of
16 subsidence?

17 A. No, I do not know anything about those
18 thousand wells.

19 Q. All right. All that entire one thousand
20 wells is not in the areas of subsidence, as far as you
21 know, right?

22 A. I would assume they're not.

23 Q. And I don't know if Commissioner Weiss
24 thought they were or not, but I just didn't want anyone
25 to think they were.

1 Do you know anyone, anywhere, who has ever
2 studied the effects of subsidence on well casings and
3 cementing like we're talking about in this case?
4 Anyone who's ever studied that under site-specific
5 conditions?

6 A. No, I do not, unless Mr. Mitchell has done
7 something in that.

8 MR. HIGH: Thank you, that's all I have.

9 CHAIRMAN LEMAY: Additional questions of the
10 witness? If not, he may be excused.

11 I would like to take maybe a ten-minute break
12 and then start another witness. Is that okay with you,
13 Mr. High?

14 MR. HIGH: Fine with me, sure.

15 CHAIRMAN LEMAY: Okay. It's a little early
16 for lunch, is all. That's why.

17 (Thereupon, a recess was taken at 11:05 a.m.)

18 (The following proceedings had at 11:17 a.m.)

19 CHAIRMAN LEMAY: We shall continue.

20 For the record, I'd like to -- Before we get
21 into the next witness, I'd like to announce some
22 predates of Commission hearings in 1993.

23 The next Commission hearing will take place
24 on the 14th of January. Following month, we plan to
25 have a Commission hearing on the 11th of February, and

1 then on the 11th of March. So those three dates, we'll
2 advertise those three dates.

3 Beyond that, we'll have to get some maybe
4 additional scheduling to see where we go from there in
5 January.

6 Okay. Now, with the housekeeping out of the
7 way, I think we'll continue.

8 Mr. High, you may call your next witness.

9 MR. HIGH: New Mexico Potash would call Mr.
10 Tim Woomer.

11 TIM WOOMER,
12 the witness herein, after having been previously duly
13 sworn upon his oath, was examined and testified as
14 follows:

15 DIRECT EXAMINATION

16 BY MR. HIGH:

17 Q. Would you state your name, please?

18 A. Tim Woomer.

19 Q. And your address, please?

20 A. Three Fairmont Court, Hobbs, New Mexico.

21 Q. Where are you employed, Mr. Woomer?

22 A. I'm employed with New Mexico Potash
23 Corporation.

24 Q. And in what position?

25 A. Chief mine engineer.

1 Q. And how long have you held that position?

2 A. I've held it since January of 1992.

3 Q. And as chief mine engineer, what are some of
4 your duties?

5 A. Well, I'm in charge of mine planning and
6 production scheduling and cost-cutting efforts, reserve
7 studies and calculations.

8 Q. Tell us, if you will, Mr. Woomer, your
9 educational background, please?

10 A. I have a bachelor of science in mining
11 engineering from West Virginia University.

12 Q. And any other schooling beyond that, or is
13 that it?

14 A. No, sir.

15 Q. Okay. Tell us about your employment history.

16 A. I worked for a year down in Florida, Tampa
17 Bay, Florida, as a civil engineer, putting in and
18 designing roads and sewers.

19 1984, I got a job with Mapco, Inc. They own
20 several coal mines in the Illinois coal basin. I
21 worked for them for eight years, at which time I took a
22 position with New Mexico Potash.

23 Q. So your total mining experience would be
24 about how many years?

25 A. Approximately nine years after my degree was

1 received.

2 MR. HIGH: All right. Mr. LeMay, we would
3 offer Mr. Woomer as an expert mining engineer.

4 CHAIRMAN LEMAY: His qualifications are
5 acceptable.

6 Q. (By Mr. High) Mr. Woomer, you said that one
7 of your duties as chief mining engineer was to do
8 reserve calculations?

9 A. That's correct.

10 Q. And did I ask you to calculate the amount of
11 potash that would be lost if this Commission were to
12 allow any of the four wells that are being sought in
13 this case?

14 A. Yes, sir.

15 Q. All right. Look at Exhibit Number 27, if you
16 would, please, sir.

17 Did you prepare those documents?

18 A. Yes, I did.

19 Q. What does the first page of Exhibit Number 27
20 show, Mr. Woomer?

21 A. This is a calculation for the recoverable
22 tons in Section 2.

23 Q. All right, this covers the entire section?

24 A. Yes. Well, this is a -- What this is is a
25 general outline of how the calculation is made.

1 Q. All right. Walk us through this, if you
2 will, so the Commission will get some idea of how much
3 potash is contained in one full section of land.

4 A. All right. The first part there under
5 Recoverable Tonnage Calculation is determining the
6 tonnage that is available to be mined on a section.

7 The average extraction rate of our mine is 75
8 percent. In other words, we take 75 percent of the
9 material; when we're done, there's 25 percent left.

10 The average ore height in Section 2 was
11 figured to be five foot, and the ore density of the
12 material we're mining is 15.3 cubic feet per ton.
13 That's the weight of the material.

14 Under the Value Calculations, the grade,
15 average grade taken in Corehole 162 ACA surrounding
16 coreholes, it averaged out to 14.5 percent overall.
17 Even though 162 is at 16, if you take everything into
18 account, you can probably expect about 14.5 percent.

19 When we mine the material, we send it to our
20 mill, we don't get a hundred percent out of it; we end
21 up with only 80 percent. So we lose 20 percent.

22 Product is KCl, we sell it as K₂O, conversion
23 factor is 62 percent of KCl is K₂O. Product price
24 right now on the average is \$80 per ton.

25 Section 2 is a mile square, 27,878,400 square

1 feet, times the five-foot ore height, gives you a
2 cubic-foot volume, 139,392,000 cubic feet.

3 That times 75 percent extraction and divided
4 by the density of the material, you end up with
5 6,833,000 recoverable tons in Section 2.

6 We take that amount of material -- I have a
7 typo here; the calculation is right -- multiply that by
8 14.5 percent K_2O grade, times the 80 percent that we're
9 going to get out of the mill, and we end up with
10 792,428 [sic] tons, and that's KCl .

11 Now, if we're going to sell it, we're going
12 to sell it as K_2O , so it's 792,628 tons divided by the
13 62 percent, and we get 1,278,432 product tons.

14 Multiply that by \$80 per ton and the ore, or
15 the material in Section 2 is worth \$102,274,580.

16 Q. So based upon these assumptions, when we're
17 talking about the potash in Section 2 we're talking
18 about a product that we could sell after mining for a
19 sale price of \$102,274,580?

20 A. That's correct.

21 Q. And then what's -- Go to page 2 and tell me
22 what page 2 is, please, sir.

23 A. Page 2 just carries over the same material.
24 The only thing I calculated here is what the state
25 royalties would be.

1 State royalty at this grade would be at 3.9
2 percent, and the royalties paid to New Mexico would be
3 \$3,988,709.

4 Q. And that's the royalties on the potash in all
5 of Section 2?

6 A. That's correct. That would be New Mexico
7 State's share.

8 Q. All right. Go to the next page, please, sir,
9 and tell me what that is.

10 A. I scaled out Section 2, and I inserted the
11 existing four wells on the eastern side of Section 2.

12 If we were to go by R-111 standards, we would
13 stay one-half-mile radius from those wells. The
14 hatched area could not be mined. Therefore, that
15 product would be lost.

16 And I calculated the value of that hatched
17 area using the same calculations we went through on the
18 first page, and the value of the lost product would be
19 \$46,505,597.

20 Q. So when the Oil Conservation Commission
21 approved the four wells that are already in Section 2,
22 is it a fair statement to say that in doing so they
23 wasted \$46,505,597 in potash product?

24 A. Under this scenario, yes, if you were to stay
25 half a mile away.

1 Q. And lost to the State royalties of
2 \$1,813,718?

3 A. Yes, sir.

4 Q. All right. Go to the next page, if you will,
5 Mr. -- I'm sorry, is there anything else about that
6 page we need to talk about?

7 A. No, except that that is what is already gone.

8 Q. All right. In that -- All of these
9 calculations, I take it, are based upon the fact that
10 these wells are deeper than 5000 feet --

11 A. That's correct.

12 Q. -- and therefore there's a one-half-mile
13 buffer zone required by R-111-P?

14 A. That's correct.

15 Q. Okay. Go to the next page, please, and tell
16 me what that shows.

17 A. This page shows under the scenario that if
18 Graham Number 3 were drilled by itself, what will be
19 lost by that one well, and it goes through the same
20 calculations.

21 And the value of the lost product will be
22 \$21,536,276 due to that one well. That's in addition
23 to what's already lost. That's just additional loss.

24 Q. So that's the additional potash that would be
25 lost --

1 A. Uh-huh.

2 Q. -- beyond that already caused to be lost by
3 the existing four wells?

4 A. That's correct.

5 Q. So the approval of Graham Number 3 by itself
6 would waste \$21 million, roughly, in potash?

7 A. Yes, sir.

8 Q. All right. Go to the next page, Mr. Woomer,
9 and tell me what that page is.

10 A. Same calculation and map, only Graham Number
11 4 is drilled by itself. If only Graham Number 4 were
12 drilled, in addition to what's already lost with the
13 four wells on the east, the additional loss would be
14 \$26,395,014 in product, \$1,029,406 in state royalties.

15 Q. Okay. And go to the next page, please, sir.

16 A. This depicts the same thing. If you were to
17 drill Graham 4 and 3, the loss would be \$28,185,890.
18 Royalties lost would be \$1,099,250.

19 Q. So you've done these calculations with each
20 individual well, and then in combination with other
21 wells?

22 A. Yes, sir.

23 Q. Okay. And the page we're looking at now is
24 the potash that would be lost if the Commission allowed
25 Graham Number 3 and Number 4 but did not allow the

1 other two; is that correct?

2 A. That's correct.

3 Q. Okay. And go to the next page, please, sir,
4 and tell me what that one shows.

5 A. That's if we were to allow Flora Number 1 by
6 itself, the loss would be \$35,451,022 in product loss
7 due to that one well, in addition, and \$1,382,590 lost
8 in royalties to the State.

9 Q. Now, that's the lost royalties by that one
10 well; is that correct?

11 A. Yes.

12 Q. Okay. And go to the next page, and what does
13 that show?

14 A. That is showing if the Flora 2 were drilled
15 only, the additional loss alone would be \$46,131,015 in
16 product value, and state royalties lost would be
17 \$1,799,110.

18 Q. It is pretty obvious that the well that
19 wastes the most potash, at least looking at them one by
20 one, is Flora Number 2?

21 A. In this scenario at a half mile, Flora Number
22 2 impacts the loss of product the most.

23 Q. Okay, and go to the next page, Mr. Woomer,
24 and what does that show?

25 A. That's showing Flora Number 1 and Flora

1 Number 2. This is no different than Flora Number 1
2 being -- Flora Number 2 being drilled, because once
3 Flora Number 2 is drilled, Flora Number 1's influence
4 is taken out, so it would be the same loss.

5 Once you drill Flora Number 2, you've lost
6 practically the entire section already.

7 Q. Now, when you -- These assumptions, let me go
8 back to that. You're assuming throughout Section 2
9 that there's 14.5 percent grade, I believe it is?

10 A. Yes, uh-huh. There will be areas of higher
11 grade and lower grade.

12 Q. Okay. But for these calculations, you've
13 assumed a constant 14 1/2 percent?

14 A. Yes, this was to show a comparison of what is
15 possibly to be lost.

16 Q. Okay, and what does the next page then show,
17 Mr. Woomeer?

18 A. It shows a scenario where if Flora Number 1
19 and Graham Number 3 were drilled in conjunction, the
20 additional lost potash would -- the value of it would
21 be \$44,801,939. The royalties lost to the State of New
22 Mexico would be \$1,747,276.

23 Q. Okay. And the next page?

24 A. This shows Flora Number 2 and Graham 3
25 drilled in conjunction. The value of the lost product

1 would be \$50,512,686. State of New Mexico royalties
2 would be \$1,969,995.

3 Q. All right. And the next page?

4 A. This scenario shows Flora 1, Flora 2 and
5 Graham Number 3 drilled in conjunction. The additional
6 loss would be \$50,512,000; would not impact to the
7 Flora 2/Graham 3 scenario.

8 Q. The next page, please, sir.

9 A. This shows Flora 1 and Graham 4 drilled in
10 conjunction. The additional loss would be \$43,793,293.
11 New Mexico royalties lost would be \$1,707,938.

12 Q. Okay, the next page?

13 A. This shows Flora 2 and Graham 4 drilled in
14 conjunction. The value of the lost product would be
15 \$48,852,599. New Mexico royalties lost would be
16 \$1,905,251.

17 Q. And the next page?

18 A. This shows Flora 1, Flora 2 and Graham 4
19 drilled in conjunction, and the value of the lost
20 product would be \$48,852,599. New Mexico royalties
21 lost would be \$1,905,251.

22 Q. All right. And let me ask you to turn to the
23 last page, Mr. Woomer. Let's skip a couple there and
24 just go right to the last one.

25 A. Uh-huh, yes.

1 Q. This shows all four wells, does it not?

2 A. That's correct.

3 Q. And what's the value of the product lost if
4 the four wells are allowed?

5 A. The four wells allowed, the value would be
6 \$50,512,686 lost in product. The royalties lost to New
7 Mexico would be \$1,969,995.

8 Q. In your opinion, Mr. Woomeer, is the allowance
9 of these wells -- Would that be an undue waste of
10 potash?

11 A. Yes, it would.

12 Q. Now, let me just ask you a little bit about
13 the mining.

14 About how many employees does New Mexico
15 Potash employ now?

16 A. Approximately 270 men and women.

17 Q. About how long would it take to mine a
18 section like Section 2? Do you know?

19 A. It would take approximately three years to
20 mine Section 2, or a normal-size section.

21 Q. So if this Commission were to allow these
22 four wells, would it be a fair statement to say, then,
23 that not only would the product be lost and the
24 royalties be lost, but 260 people would lose three
25 years' worth of work?

1 A. At least. If we were to mine it all at once,
2 it would take three years.

3 But a section is developed over a long term,
4 and this product is pretty good grade. It will
5 probably be used to blend to lower-grade areas and
6 improve our product through a long period of time.

7 Q. All right. Let me shift focus a little bit,
8 Mr. Woomer. We have been accused of avoiding state
9 leases because of royalties, and I haven't heard that
10 accusation withdrawn yet, so I want to ask you a couple
11 of questions about it.

12 You heard Mr. Hutchinson make that charge,
13 did you not?

14 A. Yes, sir.

15 Q. I'd like for you, if you will, to look at
16 Exhibit Number 38, and I'll give you -- It's not in
17 that book.

18 A. All right.

19 Q. I'll give you my copy. This is a
20 confidential exhibit. It is a map prepared earlier. I
21 believe each Commissioner has a copy, or should have a
22 copy. It's the map that Mr. Bob Lane was testifying
23 from at our last session.

24 Look to the left-hand side of Exhibit 38, Mr.
25 Woomer, where State Lease M-651 is shown. Do you see

1 that?

2 A. Yes, sir.

3 Q. And New Mexico Potash has mined on three
4 sides of that state lease, have they not?

5 A. Yes, sir.

6 Q. And you heard Mr. Hutchinson say that we went
7 around that to avoid paying higher state royalties?

8 A. That's correct.

9 Q. What's the date that we finished mining in
10 and around that state lease?

11 A. 1982, to the far west, 1981 to the direct
12 north, 1990 to the far east.

13 Q. Did I ask you to go back and determine what
14 the state and federal royalties were in effect at the
15 time we mined around that state lease?

16 A. Yes, sir.

17 Q. And did you do that?

18 A. Yes, I did.

19 Q. Can you tell this Commission whether when we
20 mined in and around that state lease, whether the state
21 royalties were higher or lower than federal royalties?

22 A. Yes, I can.

23 Q. And what were they, higher or lower?

24 A. They were lower. They were, in effect, only
25 one percent, compared to a federal royalty rate of five

1 percent.

2 Q. And did I ask you to write that up so we
3 could give it to the Commissioners?

4 A. Yes, sir.

5 Q. And did you do that?

6 A. Yes, I did.

7 Q. I would like to mark that as a new exhibit.
8 This will be 54.

9 Would you look at what I've marked as Exhibit
10 Number 54, Mr. Woomer, and tell me if you can identify
11 that, please?

12 A. Fifty-four?

13 Q. Exhibit 54.

14 A. It's this page here?

15 Q. Yes, that's the document entitled "Lease
16 Chronology".

17 A. And I made an error on that. I meant 3.5
18 percent, I'm sorry. It's one percent, a federal rate
19 of 3.5. We had a reduction at that time.

20 Q. Okay. Did you prepare what I have marked as
21 Exhibit Number 54?

22 A. Yes.

23 Q. And by the way, you have the original with
24 you?

25 A. Yes, I do.

1 Q. We just have copies of what you have?

2 A. Yes.

3 Q. What does Exhibit Number 54 show?

4 A. This shows basically a chronology of how the
5 leases followed through their lives --

6 Q. All right.

7 A. -- basically on royalty rate.

8 Q. All right, let's start on page 1 under number
9 1, and tell me what that shows under "Federal", Mr.
10 Woomer.

11 A. That's pointing out -- The federal lease,
12 when it first was acquired, was five percent of the
13 value of the K₂O product at the point of shipment
14 through February 26th, 1982. It was reduced to 3.5
15 percent sometime early in the lease life.

16 On February 26th, 1982, through June, 1986,
17 the federal went to a sliding-scale royalty rate, which
18 was calculated according to what I've written down
19 below.

20 Ten percent -- At a ten-percent grade of K₂O
21 or less, it was a straight two-percent royalty rate.

22 At 17.09 percent grade and more, it was a
23 straight five-percent royalty rate.

24 It was prorated in between, using the
25 calculation below that. From ten-percent to 17.09-

1 percent grade K_2O , was calculated by taking two percent
2 plus the factor to the right there. It was the percent
3 of K_2O of the grade of your raw ore, minus ten-percent
4 K_2O , and times that factor, .42377.

5 Say -- I did a small example. If your grade
6 were 16 percent, your final royalty rate would be 4.54
7 percent. That's what you would pay on your -- to the
8 federal government per ton.

9 On June 1st, 1986, the federal changed the
10 royalty rate to a straight two percent across the
11 board, effective for two years, and it's been renewed
12 every two years up to the present time.

13 At this time the federal royalty rate is two
14 percent.

15 Q. All right Let's go to page 2 now, and tell
16 me what that shows.

17 A. This shows chronology of the state royalties.
18 The state calculated the royalty at five percent, and
19 there's an error --

20 Q. Well, let me stop you right there.

21 A. Uh-huh.

22 Q. The five percent is higher than the federal
23 3.5 percent that was in effect at that time period?

24 A. That's correct. At that point it appears it
25 is higher or the same as the federal. Federal was

1 actually at 3.5. So yes, it appears that at this time
2 the royalty rate is higher.

3 Q. So if someone just looked at it and didn't
4 know a whole lot about potash, they might conclude that
5 the federal rate was higher?

6 A. That's correct.

7 Q. In reality, was it higher?

8 A. No, it was not.

9 Q. And why wasn't it higher?

10 A. Because the federal royalty rate was based on
11 the selling price of the product at the nearest
12 shipping point.

13 The state calculated the value of potash at a
14 straight \$17.65 per ton. That would be a lot -- Potash
15 was selling for a lot more than \$17.65 per ton.

16 So that's where you have to make a small
17 calculation in order to arrive at the royalty rate for
18 the state. At first it appears to be five percent, but
19 in actuality the effective rate is lower.

20 Q. So up through January 1, 1984, the effective
21 state royalty was one percent, compared to a federal
22 royalty of 3.5 percent?

23 A. That's correct, that was the effective rate
24 when compared to the federal rate.

25 Q. Now, looking back at Exhibit Number 38 with

1 specific reference to State Lease M-651 --

2 A. Yes.

3 Q. -- can you tell me, when did we mine to the
4 west of that?

5 A. 1982.

6 Q. When did we mine to the north of it?

7 A. 1981.

8 Q. And let's go up to Leases M at the top.

9 M-15171 --

10 A. Yes.

11 Q. -- when did we mine around that?

12 A. 1974.

13 Q. And State Lease M-19262, where we stopped
14 with the development entry, when did we stop that
15 development entry?

16 A. 1983.

17 Q. Now, during those times, Mr. Woomer, would
18 the royalty we would have paid on state leases have
19 been higher or lower than we paid on federal leases?

20 A. It would have been lower.

21 MR. HIGH: I would offer into evidence, Mr.
22 LeMay, New Mexico Potash Exhibit Number 54.

23 CHAIRMAN LEMAY: Without objection, Exhibit
24 54 will be admitted into the record.

25 Q. (By Mr. High) Now, Mr. Woomer, did you have

1 some discussions with Mr. Hutchinson since our last
2 hearing up here concerning the rate of mining?

3 A. Yes, I did.

4 Q. Was any stipulation agreed to, as far as you
5 know?

6 A. There was only one stipulation. We discussed
7 submitting a document, an agreed-upon document, to the
8 Commission for their review on everything we had
9 discussed, and what we had decided to make basically
10 common ground during this hearing.

11 Q. Who was to prepare that document?

12 A. Mr. Hutchinson was going to prepare the
13 document, send it back to myself and Walt Case. We
14 were going to review it, edit it, send it back, get his
15 comment. We were going to do it in that order.

16 Q. Did you ever receive that document?

17 A. Yes, I did.

18 Q. When did you receive it?

19 A. I received it on November 25th at 3:51,
20 faxed.

21 Q. And were you at the mine when it came in?

22 A. No, sir.

23 Q. Where were you?

24 A. I was -- That was the start of our
25 Thanksgiving holiday. We were shut down for four days.

1 Q. So when did you actually put your hands on
2 the document?

3 A. Monday morning at --

4 Q. That's yesterday?

5 A. Yesterday morning at 7:00 a.m.

6 Q. When was Mr. Hutchinson supposed to get the
7 document to you? Do you know?

8 A. There was no specific time agreed upon. We
9 agreed that we would review the document in conjunction
10 and come up with a common document to submit.

11 Q. Based upon the things that happened out at
12 the mine with Mr. Hutchinson, do you know whether or
13 not his number has changed as far as the net acres of
14 progress each year?

15 A. Yes, it has.

16 Q. And what numbers are you now signing off on?
17 Do you know?

18 A. We did agree on that part before he left, and
19 he basically has followed that.

20 We have -- As far as Mr. Weiss's question of
21 outlining the mine and determining the net progress, we
22 did that. He did that independently. We basically
23 came up with the same number, and it's 370 acres per
24 year, gross.

25 Q. Now, what does that mean, 370 acres gross,

1 Mr. Woomer?

2 A. That would be -- Basically, the way I did it,
3 I outlined the -- or I had the outline of the mine on
4 the computer. The computer can determine the area.

5 If you look at the map, Exhibit 23, or --
6 What is it? No number on this one.

7 CHAIRMAN LEMAY: Thirty-eight.

8 THE WITNESS: Thirty-eight?

9 It would be the entire hatched area on this
10 map.

11 Q. (By Mr. High) So Mr. Hutchinson backed off
12 of his earlier testimony of 136 net acres per year?

13 A. Yes. He -- And in defense of Mr. Hutchinson,
14 he did not have the information that he required.

15 Q. But you heard him get on this witness stand
16 and promise to tell the truth and testify there's a
17 hundred --

18 MR. CARROLL: I'm going to object --

19 MR. HIGH: I'm asking the witness a question.

20 MR. CARROLL: -- to that characterization
21 that you just characterized Mr. Hutchinson's testimony
22 in, because you're implying that he was lying.

23 MR. HIGH: I'm not implying --

24 MR. CARROLL: Ask the question --

25 MR. HIGH: -- anything.

1 MR. CARROLL: -- proper -- ask him --

2 MR. HIGH: I'll ask the question again. If
3 you don't like it, you can object.

4 Q. (By Mr. High) Mr. Woomer, did you hear Mr.
5 Hutchinson get on this witness stand and take an oath
6 to tell the truth and then testify that New Mexico
7 Potash progressed 136 net acres per year?

8 MR. CARROLL: I'm still going to object to
9 the taking the oath to tell the truth. I think that
10 Mr. Woomer has just testified he didn't have the
11 information necessary.

12 CHAIRMAN LEMAY: Well, I think all witnesses
13 take the oath to tell the truth. That's superfluous in
14 a question.

15 As far as what was testified by Mr.
16 Hutchinson, he can testify what he heard Mr. Hutchinson
17 say.

18 Is that what you're asking, Counsel --

19 MR. HIGH: Yes, sir.

20 CHAIRMAN LEMAY: -- without all the extras?

21 MR. HIGH: Yes.

22 CHAIRMAN LEMAY: You can testify to what you
23 heard Mr. Hutchinson say.

24 THE WITNESS: Yes, I heard that.

25 Q. (By Mr. High) And based upon what he saw

1 there at the mine, it's your understanding that he's
2 changed that now, right?

3 A. Yes, sir.

4 Q. And he agrees with the numbers agreed to by
5 New Mexico Potash?

6 A. Yes, he did.

7 Q. And is that essentially the numbers that were
8 testified to here by Mr. Bob Lane?

9 A. Yes, basically it is.

10 Q. Now, you said you were in charge of mine
11 planning?

12 A. Yes, sir.

13 Q. What is New Mexico Potash's plan with respect
14 to Section 2, from your vantage point, Mr. Woomer?

15 You heard Mr. Bob Lane, I guess, testify from
16 his vantage point, correct?

17 A. Yes.

18 Q. What's your understanding of New Mexico
19 Potash's plan with respect to mining Section 2?

20 A. Section 2 is within our long-term mine plan.
21 It is subject to a lot of contingencies.

22 Q. Can New Mexico --

23 A. In our long-term mine plan, Section 2 will be
24 mined within as short as eight years and within at
25 least 15 years.

1 Q. Can New Mexico Potash mine and mill the grade
2 of ore that's in Section 2?

3 A. Yes, it can.

4 Q. And it plans to do so within from eight to 15
5 years, is what you're saying?

6 A. Yes, sir.

7 Q. Is that a plan that you've developed?

8 A. Yes, sir.

9 Q. When would you actually get into Section 2?

10 A. Section 2, in the current plan, would be
11 developed in the year 2002.

12 Q. And when would you get out of Section 2?

13 A. We could get out approximately 2007.

14 MR. HIGH: Pass the witness, Mr. LeMay.

15 CHAIRMAN LEMAY: Thank you.

16 I think at this point we'll take a break for
17 lunch. It's close to twelve o'clock.

18 Resume one o'clock.

19 (Off the record)

20 CHAIRMAN LEMAY: Let's come back at 1:15.

21 (Thereupon, a recess was taken at 11:54 a.m.)

22 (The following proceedings had at 1:18 p.m.)

23 CHAIRMAN LEMAY: We'll continue. I think at
24 this point we've just finished direct testimony of Mr.
25 Woomer, and we're ready for cross-examination.

1 Mr. Carroll?

2 CROSS-EXAMINATION

3 BY MR. CARROLL:

4 Q. Mr. Woomer, when you began your testimony I
5 believe you told us you had something like nine years
6 of mining experience; is that correct?

7 A. That's correct.

8 Q. And approximately eight of those years came
9 in coal mines; is that correct?

10 A. Yes, it is.

11 Q. And really your only experience in the potash
12 industry has come since you went to work for New Mexico
13 Potash, I guess in the early part of this year?

14 A. Yes, basically ten months.

15 Q. Mr. Woomer, do you find that your experience
16 as a -- working as a mine engineer for the coal mines
17 eight years has helped you or benefitted you in
18 performing your duties as chief mine engineer in the
19 potash mines?

20 A. Yes, I believe it has.

21 Q. And Mr. Woomer, what kind of duties did you
22 have with respect to the coal mines?

23 A. When I left the coal mine, I had basically
24 the same position I have now.

25 Q. Chief mine engineer?

1 A. Yes. It was not titled that way; I was
2 titled mine engineer.

3 Q. Okay. Now, during part of your experiences
4 working at the coal mines, you dealt with oil and gas
5 wells, didn't you, that were located within the coal
6 mines?

7 A. Yes, sir, I did.

8 Q. And in fact, you had a position where, at
9 least for some period of time, where you went in and
10 checked some certain old oil and gas wells to ensure
11 that they were properly plugged and abandoned?

12 A. Yes, sir, that was part of my duties.

13 Q. And in some cases you went back, and when the
14 plugs appeared to not have been done properly, drilled
15 those plugs out and plugged those wells appropriately?

16 A. We did that one hundred percent of the time.
17 We filled every hole that we mined in proximity to from
18 top to bottom.

19 Q. Okay, with cement?

20 A. Yes, sir.

21 Q. And Mr. Woomer, after you accomplished that,
22 with respect to these coal mines, you mined right up to
23 the shaft, did you not, in some cases?

24 A. Yes, sir.

25 Q. And when I say shafts, I mean the oil well.

1 I keep getting my --

2 A. I understand.

3 Q. -- my terminology, and I apologize.

4 A. Yes.

5 Q. Mr. Woomer, when you talk about permissible
6 equipment, that is not fail-safe equipment?

7 A. No, sir, it's not.

8 Q. If there's sufficient gas, there are still
9 explosions can happen, even if you have permissible
10 equipment?

11 A. Absolutely.

12 Q. Mr. Woomer, let's go for a minute and talk
13 generally about the calculations that you've testified
14 to that are part of Exhibit 27.

15 A. Yes.

16 Q. Well, wait a minute. I have one other
17 question --

18 A. Yes.

19 Q. --in an area before we get into that.

20 Now, since you have come on board with New
21 Mexico Potash, have you done any studies with respect
22 to the three oil wells or dry holes or whatever they
23 may be called that exist within the New Mexico Potash
24 mine?

25 A. No, I haven't. I've looked at them and the

1 information we have on hand.

2 These are very, very old wells, and we
3 cannot -- Two wells, we didn't really mine very close
4 to, in actuality. One is over a thousand foot away,
5 and one is a couple -- three or four hundred foot.

6 The one well that we did mine actually mine
7 around extensively is inaccessible.

8 Q. All right. Now, the well that's up in
9 Section 10, which is called the Williamson Number 1
10 well --

11 A. Yes.

12 Q. -- how far away did you mine -- that's the
13 one -- You can refer to --

14 A. Yes.

15 Q. -- Exhibit 38 because I think we've
16 pinpointed it.

17 A. I don't have exactly the distance, but it's
18 round 300 foot --

19 Q. Okay.

20 A. -- plus or minus.

21 Q. And that well is located up, right in the
22 northwest of the --

23 A. That's correct.

24 Q. -- Section 10?

25 A. Uh-huh.

1 Q. Well, Mr. Woomer, have you gone to the New
2 Mexico Oil and Gas Commission to look at the scout
3 tickets that are on file with respect to that
4 particular well?

5 A. I have not.

6 Q. Do you perform any testing with respect to
7 that particular well?

8 A. I do not.

9 Q. Well, Mr. Woomer, would it surprise you to
10 find that that particular well did have a show of oil
11 in the Delaware between 4269 and 725?

12 A. Yes, it would.

13 Q. Well, now that you know that, do you think
14 you would want to go out there and start testing around
15 that well?

16 A. I think I ought to go and see if that's true.
17 If it were true --

18 Q. I only have one copy, but I do have the scout
19 ticket --

20 A. You have that --

21 Q. -- that was taken from the Oil and Gas
22 Commission, and I'll be glad to get you a copy of that
23 later in the day or --

24 A. Okay.

25 Q. -- tomorrow.

1 Let's turn, then, to your calculations.

2 MR. HIGH: May I see it, Counsel?

3 MR. CARROLL: Certainly, if you'd like to,
4 when Mr. Woomer gets through.

5 This came from the Artesia library. I'm not
6 sure what's up here in Santa Fe, but it did come from
7 the Artesia OCD office.

8 THE WITNESS: Where does it say that there's
9 a show of oil? All I see is dry and abandoned, and not
10 even a show written on there.

11 Q. (By Mr. Carroll) Yes, right here. If you
12 look on the front page --

13 A. Yes.

14 Q. -- "show of oil, 4269 through seventy-two
15 five".

16 A. Uh-huh.

17 Q. These are shows of water.

18 A. Uh-huh. But it doesn't give any quantity.
19 But on the rest of the notes, it says not even a show
20 of water -- or oil anywhere else, right?

21 Q. Well, that's apparently what was done in
22 19- -- I believe -46, or -45, excuse me.

23 A. Dry and abandoned is how they listed it.

24 Q. Uh-huh.

25 A. Right, okay.

1 Q. Let's turn to your Exhibit 27. Do you have
2 it there?

3 A. Yes.

4 Q. And let's start with the very front page.

5 A. All right.

6 Q. I believe that was your general explanation
7 page.

8 A. Yes.

9 Q. Let's start with, first, extraction rate.

10 A. Yes.

11 Q. Is this an average extraction rate for New
12 Mexico Potash Mine?

13 A. After mining is completed, that can be the
14 expected extraction rate. It could be higher, but this
15 is an average extraction rate, a rate for an area this
16 size.

17 Q. Okay. And this is the average experienced
18 rate of extraction for New Mexico Potash Mine?

19 A. Yes, it is.

20 Q. All right. So at least on the average then,
21 25 percent of the ore in place is left in a
22 particular -- in any given section, on the average?

23 A. That's correct.

24 Q. And that would be left in the form of
25 pillars, those sort of things that are left that --

1 A. Support pillars, yes.

2 Q. All right. Now, you have used an average ore
3 height of five feet; is that correct?

4 A. Yes.

5 Q. And that would be the average ore height that
6 you were mining?

7 A. Yes, if I were to take into account
8 development mining and secondary mining, the average
9 height would probably be right around five foot.

10 Q. Now, when we use your calculation, you use
11 five foot in it, do you not?

12 A. Yes, I do.

13 Q. For the height of the ore?

14 A. Uh-huh.

15 Q. Is it your experience that when you're mining
16 this potash ore, that actually the potash occurs in
17 stringers and is not throughout the full five feet?

18 A. Yes, the 14 1/2 percent ore grade is diluted
19 to mining height.

20 Q. All right. So if we're doing a volumetric
21 calculation, we have quite possibly overstated it
22 because we're using the full volume rather than the
23 actual amount of ore that may be in place?

24 A. No, we haven't, because I'm using a
25 downgraded grade to take care of that volume for the

1 mining of non-potash.

2 Q. Well, that gets me, then, to this downgraded
3 grade. This grade you're using and you're saying you
4 downgraded to --

5 A. Uh-huh.

6 Q. -- is the 14.5, is it not?

7 A. That's correct.

8 Q. For your calculations to be correct, it has
9 to have 14.5 percent throughout the entire 640 acres?

10 A. No, on average.

11 Q. On average?

12 A. That's correct.

13 Q. But that still says on average the full 640
14 acres contained 14.5 percent ore?

15 A. That's right. It's exactly the same as on
16 average 75 percent. Some areas will be 85 percent,
17 some areas will be less. Some ore heights will be
18 mined at higher than five foot, some less.

19 Q. Well, that's all speculation, isn't it, Mr.
20 Woomer? Because you have no coreholes other than K-162
21 in this particular section?

22 A. That's exactly right.

23 Q. In fact, you could have maybe 160 acres of
24 potash ore down there in that southwest corner, and the
25 entire remaining three-quarters of that section could

1 be barren, couldn't it?

2 A. With the information I have right now, I've
3 got the entire Section 2 in our ore-reserve area.

4 Q. Well, did you use ERDA-6 to put -- give it
5 any credence? Because it's barren just north of
6 Section 2.

7 A. Yes, I did.

8 Q. Well, did you just totally discount it and
9 ignore it?

10 A. No, sir.

11 Q. Well, what did you do with it?

12 A. Used the triangulation method. The ore
13 reserve line runs just south of ERDA-6, between 162 and
14 ERDA-6.

15 Q. You were present when Mr. Lammers testified
16 that in the three wells along the eastern edge of this
17 Section 2, that when examining the logs in this area,
18 that he determined that there was no mineralization
19 present?

20 A. That's what he said, yes.

21 Q. That would carve out part of -- If there was
22 no mineralization there, according -- as though logs
23 depict, that would carve out at least some of the
24 acreage out of that 640-acre tract, wouldn't it?

25 A. If that were true, yes, it probably would a

1 little bit.

2 It kind of puts a little weighted problem on
3 that, though, when you have a good core test with
4 specific analysis close by. The gamma-ray log reading
5 is useful but is not as useful as a true core test
6 hole.

7 Q. Well, we had in AEC-8, we had core-tests and
8 gamma-ray log comparisons, or down in that area, didn't
9 we?

10 A. That's correct.

11 Q. So Mr. Lammers at least had some known
12 samples within very close proximity to compare them to,
13 then, didn't he?

14 A. I think that he can make an arbitrary
15 judgment on what he believes to be a potassium deposit
16 and what isn't.

17 Q. Just like New Mexico Potash has made the
18 arbitrary judgment that all of Section 2 ought to be
19 considered as commercial ore? That was arbitrary too?

20 A. That was based on core data and pretty well
21 proven techniques used in the potash basin, a
22 widespread known evaporate deposit.

23 Q. Well, what -- Off to the north we have a
24 corehole, F-52 -- or FC-52, I don't remember.

25 A. Yes, sir.

1 Q. That was the one that New Mexico Potash
2 included a bunch of carnalite in, to up the grade so
3 that it would be commercial?

4 A. F-52.

5 Q. I think that's the one, or FC-52. It's up in
6 the --

7 A. -- northwest of Section 2?

8 Q. Not northwest -- There's no other coreholes
9 in the northwest of Section 2?

10 A. I believe F-52 is over to the east part. It
11 showed 15 percent sylvite.

12 Q. Now, why don't you -- If you'll look at
13 Exhibit 38, F-52 is in Section 34.

14 A. Thirty-eight? I don't think I have that one.

15 MR. HIGH: It's that map.

16 THE WITNESS: This map?

17 Q. (By Mr. Carroll) Okay, I am mis-speaking.

18 I think the one that we learned of from Mr.
19 Lane was F-65. It's in the extreme southwest corner of
20 Section 34.

21 A. Section 34?

22 Q. Uh-huh.

23 A. Yes, I see that one.

24 Q. Well, if the potash is diminishing as it
25 approaches F-65, wouldn't it also be reasonable to

1 conclude that quite possibly the potash amount is
2 declining much more rapidly than your average of 14.5
3 percent throughout the entire section?

4 A. No, this is how I calculated the 14.5
5 percent.

6 Q. In other words, you arbitrarily arrived at a
7 number, and that was 14.5, and you used it for the
8 entire section?

9 A. No, I used the standard method. It wasn't
10 arbitrary at all.

11 Q. I see. Reporting carnalite as something that
12 can be processed by New Mexico Potash, is that also
13 standard?

14 A. Reporting carnalite as being able to be
15 processed?

16 Q. Yeah. Well, as part of your figure for
17 reporting what the footage of commercial ore is in that
18 corehole.

19 MR. HIGH: I'm going to object to the
20 question. I don't want the record to look confused.

21 I don't know what Mr. Carroll is referring to
22 reporting something. I don't know what he's talking
23 about.

24 MR. CARROLL: Well, it was contained in your
25 exhibit that we examined through Mr. Lane at the last

1 hearing, and we -- carnalite --

2 CHAIRMAN LEMAY: It's a clumsy way to get at
3 the question, though, Counselor.

4 Can you ask him if he used that corehole in
5 his extrapolation? Isn't that what you're asking?

6 MR. CARROLL: Well, not exactly. But I'll
7 ask it that, and go on.

8 Q. (By Mr. Carroll) Did you use corehole F-65
9 in your extrapolation to arrive at 14.5 percent
10 throughout Section 2?

11 A. It had a weighted part of it, yes.

12 Q. What kind of weight? How did it play a part?

13 A. All these areas are calculated, and the
14 averages are weighted to the size of the resulting
15 triangle.

16 Q. And what data did you attribute to corehole
17 F-65? What was the amount of sylvite ore in there?

18 A. The amount of sylvite ore?

19 Q. Yes.

20 A. We used the nine percent. They're listed --
21 If that is FC-65. I'm not absolutely certain --

22 MR. HIGH: Excuse me, let me ask the witness
23 not read -- This is a confidential document, and if
24 we're going to start getting into specific corehole
25 data, then I would ask that we treat it as

1 confidential.

2 CHAIRMAN LEMAY: Okay.

3 MR. HIGH: We may be able to do it without
4 referring to that information, which I'd like to do.
5 But if we're going to get to specifics on the corehole
6 data, we would invoke the confidentiality.

7 CHAIRMAN LEMAY: Okay, thank you, Counsel.
8 Can we get around it that way? I'm not sure how we
9 can, but maybe pointing to this corehole, that corehole
10 might do it. Got a map up there?

11 Well, we've mentioned it already, so it's in
12 the record.

13 Q. (By Mr. Carroll) Mr. Woomer, you were
14 present when Mr. Lane testified as to the composition
15 of the ore that was contained in that corehole, were
16 you not?

17 A. I think so, yeah. I mean, yes, I was. I
18 don't recall exactly -- I'm sorry, I -- But I was here
19 during Mr. Lane's testimony.

20 Q. And you were also aware that over half of
21 that percentage was contained in the carnalite, and
22 therefore that the amount shown on Exhibit 38 should be
23 reduced?

24 A. It should be reduced, yes.

25 Q. Let's go to your next page, and I believe

1 it's your page that talks about value of potash in
2 Section 2, 10th Ore Zone only sylvite.

3 A. Uh-huh.

4 Q. And you use here -- I think this is just a
5 compilation figure or your base number. Is that what
6 it is, Mr. Woomer?

7 A. All this shows is the value of the product in
8 a section, specifically here Section 2. The only
9 addition from the first page is that it shows the
10 royalties lost or due New Mexico, State of New Mexico.

11 Q. All right. Now, at the present time, the
12 State of New Mexico royalties are at 3.9 percent, are
13 they not?

14 A. State of New Mexico royalties are on a
15 sliding-scale basis.

16 Q. And where did you get the 3.9?

17 A. The sliding -- Did you read this about the
18 sliding scale?

19 Q. I read that, but I'm wondering where you got
20 3.9. How did you arrive at that number to use in your
21 calculations?

22 A. We took the 14 1/2 percent, went through the
23 calculation and came up with 3.9.

24 Q. All right. And the federal royalty at the
25 present time is two percent; is that correct?

1 A. That's correct.

2 Q. And if we were comparing what the rate or the
3 royalty on a section of federal land as opposed to
4 state land, the royalty on federal land would be
5 approximately one half of what the federal land is?
6 [sic]

7 A. Something like that.

8 Q. Now, royalty is one of the fixed costs that
9 you take into account in your cost accounting, and I
10 believe you told us you were responsible for that.

11 A. Not on that --

12 MR. HIGH: Mr. LeMay, I'm going to object to
13 this line of --

14 THE WITNESS: Not on that --

15 MR. HIGH: Excuse me, I'm going to object to
16 this line. We've already covered all of this with Mr.
17 Case and Mr. Lane. I don't know why we have to cover
18 it with a third witness. I didn't cover it with him on
19 direct; this is new territory. We're just repeating
20 things that have been already covered *ad infinitum*.

21 MR. CARROLL: I don't think so, Mr. LeMay,
22 because I'm going to broaden this into some of the
23 other testimony that he talked about with respect to
24 the mining of the state acreage and what their
25 intentions were, and I think this is necessary

1 preliminary groundwork that I need to lay.

2 CHAIRMAN LEMAY: Cost accounting? Well, as
3 long as he testified to it, you can raise the issues.

4 MR. CARROLL: He testified that he was in
5 charge of cost-cutting, and I'm just -- All I need is
6 the one question answered, is that royalty is one of
7 the fixed costs that you look at. And that's as far as
8 I'm going.

9 CHAIRMAN LEMAY: That sounds fair. You may
10 answer that question.

11 THE WITNESS: I do not look at the royalty
12 costs. That is done on down the line.

13 I do mining costs; that's what I'm
14 responsible for.

15 Q. (By Mr. Carroll) Who does that?

16 A. Oh, I really couldn't say. I'm sure Mr.
17 Case, the accounting, the chief accountant and the
18 corporate management.

19 Q. All right. Now, you prepared an Exhibit
20 Number 54, and this is your -- I think your handwritten
21 numbers; is that correct?

22 A. Yes.

23 Q. When did you prepare this particular exhibit?

24 A. These were taken from notes I've been taking
25 the last couple of weeks, researching through our

1 files.

2 Q. Okay, so all of this research has been done
3 in the last couple of weeks?

4 A. Yes, sir.

5 Q. Now, you -- referring again to your Exhibit
6 38 -- Do you have that?

7 A. Uh-huh.

8 Q. -- if you would, and let's look at that
9 Section 18.

10 MR. STOVALL: It's the map.

11 THE WITNESS: Yeah.

12 Q. (By Mr. Carroll) Okay. Now, when did New
13 Mexico Potash acquire Section 18?

14 A. Section 18?

15 Q. Yes, that's the state lease that goes under
16 the lease number M-651.

17 A. I believe it was 1988, Mississippi exchange.

18 Q. That acreage was assigned to New Mexico
19 Potash by Mississippi Chemical in 1988; is that
20 correct?

21 A. Yes, that's what my records show.

22 Q. And so the three areas of mining, the area to
23 the west of Section 18 was completed in 1982?

24 A. Yes.

25 Q. The area to the north was completed in 1981?

1 A. Uh-huh.

2 Q. But the area to the east was completed in
3 1990?

4 A. That's correct.

5 Q. And it was completed in 1990 when the federal
6 royalty rate was less than the state royalty rate?
7 According to your Exhibit 54?

8 A. That's correct.

9 Q. I'm going to make -- Just so I understand, on
10 your exhibit 54 down towards the bottom part, you say
11 at 16 percent grade K₂O royalty is 4.54 percent?

12 Now --

13 A. Which exhibit are you looking at?

14 Q. It's your Exhibit 54, your handwritten notes.

15 A. Oh, yeah. Okay.

16 Q. You find where I was talking about? At 16
17 percent grade K₂O royalty?

18 A. Yes, uh-huh.

19 Q. Now, I wasn't quite sure that I heard you
20 correctly, but that is just an example, is it not?

21 A. That's just an example, yes.

22 Q. All right. So if you had or were mining back
23 at that period of time a 16-percent grade of K₂O, that
24 royalty -- the royalty, assuming those things, would be
25 4.54 percent?

1 A. Uh-huh.

2 Q. Did you go back to determine exactly what was
3 being mined back in 1988 or any other period of time,
4 and determine --

5 A. Yes.

6 Q. -- the exact royalty?

7 A. Uh-huh.

8 Q. Okay. What periods of time did you look at?

9 A. I only looked at one case. I think it was
10 back in 1982. Our accountant did a little research job
11 for us and came up with the effective rate for state
12 and federal.

13 Q. Did you actually extrapolate from the actual
14 mine records what grade of ore was being mined on
15 federal property?

16 A. It's listed there.

17 Q. Excuse me?

18 A. It's listed there.

19 Q. Back when? Where is it listed? Could you
20 help me?

21 A. It's listed in what I was looking at.

22 Q. Oh. It's not listed on Exhibit 54?

23 A. It's not, huh-uh, no.

24 Q. Do you recall what --

25 A. I have all those records at the mine, yes.

1 Q. Okay. Do you recall what the grade was that
2 you were looking at?

3 A. No, I don't recall.

4 Q. If you would turn to your next page of your
5 Exhibit 27, this just has a heading, 10th Ore Zone
6 Sylvite, and you show the four existing wells, and --
7 with a half-mile radius drawn from each one.

8 A. Yes, sir.

9 Q. Now, as I understand the principles behind
10 your diagram here, the area of ore that is cross-
11 hatched or has the diagonal lines through it, that
12 would be the area of ore that you are saying is lost to
13 potash mining?

14 A. Yes.

15 Q. Okay. The white area is then the area that
16 at least at the present time is not lost to potash
17 mining?

18 A. That's correct.

19 Q. Now, the area of the white is larger than the
20 area of the cross-hatched; is that correct?

21 A. No, that's not correct.

22 Q. Why wouldn't the area of the white -- It
23 appears to be, just looking at it. Can you tell me
24 why?

25 A. Why it's not?

1 Q. Why the white is smaller, yes -- Is larger, I
2 guess, is what you told me.

3 A. The white --

4 Q. Okay, let's back up. Let's ask the question
5 again and make sure we're on the same wavelength.

6 A. Okay.

7 Q. The white area.

8 A. Yes.

9 Q. Okay, that's the ore that is still available,
10 at least in your opinion?

11 A. In this scenario, yes, that's what's
12 available.

13 Q. Okay, this scenario.

14 Is that white area the smallest part of the
15 section?

16 A. It is.

17 Q. Okay, now we're on the same wavelength.

18 A. Okay.

19 Q. Now, you have calculated in your scenario --

20 A. Uh-huh.

21 Q. -- the entire amount of tons of recoverable
22 ore for an entire 640-acre tract?

23 A. Yes.

24 Q. And that's your first line?

25 A. Uh-huh.

1 Q. Now, the recoverable ore with present oil
2 wells, which is your second line down --

3 A. Uh-huh.

4 Q. -- that is the white area, is it not?

5 A. Yes, it is.

6 Q. And the tonnage lost due to present oil
7 wells, that is the cross-hatched area, is it not?

8 A. Yes, it is.

9 Q. Can you tell me why there are more tons in
10 the white area, which is smaller, than there are in the
11 cross-hatched area, by your calculation?

12 A. The recoverable ore with the present wells is
13 the white area. That's what is recoverable.

14 Q. That's right, and I agree with you, and
15 that's what you've testified before.

16 A. Well, that should be larger --

17 Q. Why should it be larger?

18 In fact, what you've done is reversed your
19 numbers, haven't you, Mr. --

20 A. Oh, I don't know. Could be. It's very
21 possible.

22 Q. In fact --

23 A. Yes, on that one exhibit I have.

24 Q. Well, Mr. Woomer, I'd like you to take a
25 minute and look at every example, because I think that

1 same error is repeated throughout every example of
2 Exhibit 27.

3 A. That's only been done on the very first one.

4 Q. Well, turn to the next page, Recoverable
5 Ore --

6 A. Yes.

7 Q. -- Present Oil Wells.

8 A. Uh-huh.

9 Q. You've showed the 3.7 million tons?

10 A. Yes.

11 Q. That should be 3.1 million tons, should it
12 not?

13 A. I'll have to go through it and look at it
14 again.

15 Q. Well --

16 A. I'm not sure what got reversed.

17 Q. -- Mr. -- By my calculations, you have
18 819,956 tonnage error, which equates to a \$9 million
19 error on every one of these sheets on the value of lost
20 product.

21 A. Yes, it would make that value of lost product
22 larger on every one of them.

23 Q. No, it would mean that it's been overstated,
24 would it not?

25 A. No, because the tonnage lost due to present

1 oil wells would be larger, and therefore the values
2 would be larger. And the lost values would --
3 calculations -- That would increase each one of those
4 by \$9 million.

5 Q. Well, Mr. Woomer, your value of lost
6 product --

7 A. Yes.

8 Q. -- and let's go to this second page --

9 A. Yes, and I've used -- What you've pointed out
10 is correct; I used the smaller area to calculate that.

11 Q. Well, what you used, the -- Your value of
12 lost product was actually the figure just above. It
13 says, Tonnage lost due to the Graham 3 well. That's
14 what -- That's the number which results from
15 subtracting 2,287,099 from 3,725,945.

16 Now, if you put the real number, which should
17 be 3,107,055, you're going to have a smaller number
18 there in tonnage lost due to the Graham 3 well.

19 And as I understand -- and my calculations
20 seem to confirm it, that the value of lost product was
21 the \$80 times the difference between the two numbers
22 that we just quoted.

23 So if you've got a smaller difference, you're
24 going to have a smaller amount of value.

25 That was the way you calculated that, wasn't

1 it, Mr. Woomer?

2 A. Yes, it is.

3 Q. Mr. Woomer, when you were looking at the
4 royalties on state and federal acreage in these
5 different tracts and testifying --

6 A. Uh-huh.

7 Q. -- did you examine your records to determine
8 what the overriding royalties were in addition to --

9 A. In that one case --

10 Q. -- the federal royalties?

11 A. In that one case that the accountant did, he
12 did.

13 Q. Okay, and what were the overrides?

14 A. I can't disclose that.

15 Q. But they do exist, don't they, Mr. Woomer?

16 A. Yes, they're the same across the board, if
17 that's what you want to know.

18 Q. Now, you talked a minute with Mr. High about
19 the rate of mining, and you told us that the gross
20 acres is 370; is that correct? I think in your earlier
21 testimony?

22 A. Yes, I did.

23 Q. Gross acres means that some of those acres
24 that you're mining at the rate of -- could be areas
25 where you've already had some previous mining, pulling

1 of pillars, second mining, those things; is that
2 correct?

3 A. That includes everything.

4 Q. Includes everything.

5 Now, the net acres that we're talking about,
6 actually, new acres --

7 A. Uh-huh.

8 Q. -- is much less than 370, isn't it?

9 A. It makes a difference on what you're trying
10 to say here, Mr. Carroll. If you're going to talk
11 about and equate that into a mine's expansion, you have
12 to use the gross acres. If you want to know how many
13 tons a mine is going to produce, you would use the net
14 acres of what a mine can produce a day.

15 If you're going to equate that into a mine
16 plan to determine when a mine will be in a certain
17 position, you have to use the gross acres. That
18 includes both development and production mining.

19 Q. Well, right now New Mexico Potash is mining
20 and gobbing some of the ore mined, is it not?

21 A. We mine to the ore height and gob salt.

22 Q. Well, how do you take into account the amount
23 of salt that is gobbled?

24 Because that adds to the amount of area
25 mined, does it not?

1 A. That does not reduce your rate of mining.
2 The gobbing is done secondary. It is not done with a
3 production crew or equipment.

4 Q. But it is part of your gross acres, is it
5 not?

6 A. It is not part of our gross acres.

7 Q. You don't count that at all?

8 A. No, sir. That's part of basically
9 maintenance. It does not increase our area one bit.
10 All it does is increase height in the entries where we
11 need it.

12 Q. You told us that Section 2 now is in New
13 Mexico Potash's long-term mining plan?

14 A. Yes.

15 Q. And you said there were a lot of
16 contingencies?

17 A. Yes.

18 Q. What are those contingencies?

19 A. There are several things that can affect a
20 mine plan, especially when it's outside the five-year
21 plan. Conditions encountered that are unexpected --

22 Q. What kind of conditions? Would you
23 elaborate?

24 A. If you were to run upon a low-grade area or
25 an area that is perhaps unminable with a salt horst

1 encountered, you would have to move that unit to a
2 productive area of the mine.

3 This -- And in the south, we're finding this
4 a little bit more as these salt horsts are a little bit
5 more prevalent.

6 Basically what it will do is, it will
7 increase your mine plan rate.

8 Q. Well, what you're talking about is barren
9 areas; is that correct?

10 A. Yes.

11 Q. And if the condition is that you have a large
12 amount of barren area to go through to get down to
13 Section 2, that could make it uneconomic to even go
14 down there, couldn't it?

15 A. Not particularly. We've done that before
16 with a main development entry.

17 Q. And where did you do that?

18 A. We did it down -- straight down 169, southern
19 area, and again going to the west.

20 Q. That's the two entries that have run into
21 barren areas, and you've stopped there, the initial
22 area of the drift, haven't you?

23 A. No, we just narrowed them down and drove to
24 the good ore on the other side, which is common
25 practice.

1 Q. Well, let's look at Exhibit 38, then. Do you
2 have it?

3 A. I did.

4 Q. I think it's right there.

5 A. Okay.

6 Q. There is a section marked 22.

7 A. Uh-huh.

8 Q. Do you see that?

9 A. Yes.

10 Q. And there's an area where you're mining,
11 narrowed down?

12 A. Uh-huh.

13 Q. Is that what you were just talking about?

14 A. That was a low-grade area that we narrowed
15 down so we wouldn't have to take as much of the low
16 grade and get to the other side where the higher grade
17 picks up.

18 Q. I see. And --

19 COMMISSIONER WEISS: Where are you referring
20 to?

21 MR. CARROLL: Section 22. It's about three
22 sections due north of Section 2, and then one to the
23 west.

24 Q. (By Mr. Carroll) We're referring to that
25 little narrow area that has none of the little black

1 lines on it; is that correct?

2 A. (No response)

3 Q. Is it possible that that barren area that is
4 marked on this map extends through that area and
5 connects up to the barren area just above it?

6 A. It's possible. That's not a barren area;
7 it's low-grade.

8 Q. Low-grade?

9 A. Yes.

10 Q. Well, what other kind of contingencies are we
11 talking about, Mr. --

12 A. Most contingencies would speed up the mining
13 of Section 2, because it would change the plans that we
14 now have, which would move us quicker to the south.

15 Q. Well, one of those contingencies is to go
16 down and drill a bunch more coreholes in Section 2,
17 isn't it?

18 A. That is a fact, yes, and it is a common
19 practice.

20 Q. Common practice. It's a common practice of
21 potash mines, isn't it?

22 A. It is a common practice in any mining to try
23 to drill within your five-year plan.

24 Q. Another contingency is the price of potash,
25 isn't it?

1 A. Yes, it is.

2 Q. If the price of potash falls, it may make it
3 uneconomic to drive all the way down to Section 2;
4 isn't that correct?

5 A. Speculation.

6 Q. But that is one of those contingencies, isn't
7 it?

8 A. Yes, it is.

9 Q. The recent dumping of Russian potash is
10 another one of those contingencies that has to do with
11 market influences?

12 MR. HIGH: Mr. LeMay, I'm going to object.
13 There's no evidence in this record of any dumping of
14 potash by the Russians.

15 CHAIRMAN LEMAY: I think we're getting a
16 little bit out of the field of expertise when we're
17 talking about the Russians' influence on -- from this
18 witness.

19 MR. CARROLL: I think that witness is well
20 aware that the Russian --

21 Q. (By Mr. Carroll) Aren't you aware of that
22 fact, Mr. Woomer?

23 MR. STOVALL: Mr. Chairman, I would have to
24 support Mr. High in his objection --

25 CHAIRMAN LEMAY: Yeah.

1 MR. STOVALL: -- that there is no evidence in
2 the record which would support there's any dumping of
3 the -- There's no foundation for that question.

4 CHAIRMAN LEMAY: Yeah, I think we're getting
5 outside the realm of both expertise and what's relevant
6 here.

7 MR. CARROLL: The man is a mine engineer who
8 is responsible for cost-cutting, and I want to -- I
9 think I have an appropriate question to ask him, is,
10 Isn't that one of the contingencies?

11 He testified as to contingencies, and this
12 Commission needs to know what all those contingencies
13 are.

14 MR. STOVALL: Regardless of his expertise,
15 Mr. Chairman, I believe you can -- would sustain the
16 objection on the basis there's no information upon
17 which the question is asked.

18 CHAIRMAN LEMAY: Yes, that objection is well
19 founded. You're getting out of our area in many ways
20 when you're talk about the influence of Russia on the
21 ability of a five-year plan to be fulfilled here, and I
22 think you know that.

23 Just stay away from that area, Counselor.

24 Q. (By Mr. Carroll) There's already a problem
25 in the southeastern potash area with oversupply of

1 potash, isn't there, Mr. Woomer?

2 A. Not that I'm directly aware of, no.

3 Q. Well, you are aware that the Horizon Mine
4 just laid off its workers for at least two months in
5 the last two weeks?

6 MR. HIGH: Objection, your Honor -- Mr.
7 Lemay. There is no evidence that anybody has laid off
8 anybody.

9 MR. CARROLL: If you've been watching the
10 television shows, PB- --

11 CHAIRMAN LEMAY: Counselor, you're on a
12 fishing expedition.

13 MR. CARROLL: No, I'm not.

14 CHAIRMAN LEMAY: I don't think this witness
15 -- he -- The five-year plan has certain limitations.

16 Now, if you want to drag up the worldwide
17 situation, the economy, the discount rate, foreign
18 influence, layoffs and things like that, we have no
19 foundation in any of that here, and I think that's
20 just a fishing expedition, beyond the scope of this
21 hearing.

22 MR. CARROLL: It is one -- Mr. LeMay, the
23 reason that I point it out is that Mr. Hutchinson spent
24 a great deal of time developing -- and there is a lot
25 of evidence concerning these kind of issues in this

1 record, and I want Mr. Woomer to agree --

2 CHAIRMAN LEMAY: Well, I think Mr. Hutchinson
3 should be the one that you ask him those question. If
4 he's built the foundation, you ask him the questions;
5 don't ask this witness, who hasn't built up any
6 expertise in that area.

7 MR. CARROLL: I will then call Mr. Hutchinson
8 as a rebuttal witness, not only on this issue, but the
9 testimony about the recent meetings between him and Mr.
10 Woomer.

11 CHAIRMAN LEMAY: You may continue.

12 Q. (By Mr. Carroll) You testified that there is
13 a range, in your estimation, of eight years -- that was
14 your shortest time frame on your long-term plan -- and
15 as long as 15 years?

16 A. Yes.

17 Q. What is the major considerations that change
18 -- that build in a seven-year gap here in what you were
19 testifying to?

20 A. Depends on the ore in other areas, blending
21 process we'll have to go through, equipment
22 availability, where we're using equipment, that type of
23 thing.

24 MR. CARROLL: Excuse me just a moment.

25 Q. (By Mr. Carroll) I do want to make -- Just

1 one last question, Mr. Woomer, just to make sure my
2 notes are correct.

3 I think you've testified to the fact that to
4 develop Section 2 -- or to develop a 640-acre section,
5 I think is your testimony -- it would take
6 approximately three years; is that correct?

7 A. I said that it would take three years to mine
8 it, if your entire mine was concentrated in that
9 section, is what I meant. That's how long it takes.

10 Our mine produces 2.4 million tons a year.

11 Q. I see. So if there were mining operations
12 going on in other places, that would significantly
13 lengthen that period of time?

14 A. Yes, and that's not an "if"; that is a --

15 Q. -- a given?

16 A. That is a given.

17 MR. CARROLL: Okay. That's all I have, Mr.
18 Woomer.

19 CHAIRMAN LEMAY: Thank you.

20 Commissioner Carlson?

21 I'm sorry, do you have any redirect?

22 MR. HIGH: I'd like to hold it, though, until
23 you're --

24 CHAIRMAN LEMAY: Sure.

25 Commissioner Carlson?

EXAMINATION

1
2 BY COMMISSIONER CARLSON:

3 Q. I'm sorry, I didn't hear when you said how
4 many feet your mine got within the old wellbore in
5 Section 10. How many feet did you say?

6 A. I believe it's 400 foot.

7 Q. Four hundred feet?

8 A. Uh-huh.

9 Q. Before you would make a final decision to
10 mine Section 2, how many coreholes would you put in
11 that section?

12 A. The decision to mine has already been made.
13 The decision that -- or the coreholes that will have to
14 be drilled will be in advance of the five-year mine
15 plan.

16 When we get within five-year mine plan of
17 that area, then it will be drilled on quarter-mile
18 spacings at the best.

19 Q. On quarter- -- So you would put three more
20 drill holes in that section?

21 A. Probably two. It depends. That's at the
22 edge of our attainable orebody right now and it
23 probably wouldn't be that important to get the spacing
24 that dense there.

25 Q. And I assume --

1 A. It depends on what we've found to the
2 northeast and north of that section.

3 Q. Right, that was my next question.

4 A. Right.

5 Q. I assume you would go up to Section 35 first,
6 and --

7 A. Well, that would --

8 Q. -- possibly up into Section 26 above that?

9 A. Exactly. Your drillholes would be drilled in
10 advance of your mining plan.

11 Q. So when you decided to -- when that gets
12 within your five-year mine plan, you go down into
13 Section 26, you will drill -- what? One in each
14 quarter section of that section?

15 A. Well, it depends on what I've got there. You
16 know, I've got some holes there I'll fill in.

17 What those are -- you know, you're looking at
18 -- The outlying holes are used for exploratory and to
19 reserve the filing. And then as we approach the area,
20 then they would be infilled with production data test
21 holes.

22 Q. But it's approximately four per section? Is
23 that what you --

24 A. That's probably a little high.

25 Q. It's high?

1 A. Yeah.

2 Q. Was it your decision to put corehole K-162
3 where it is?

4 A. No, it was not.

5 Q. Do you know why it was put in an area that
6 was within the buffer zone of existing wells?

7 A. I only know what I heard Mr. Lane testify to,
8 which you've already heard.

9 Q. In your opinion, wouldn't it make more sense
10 to put it in an area that you could mine?

11 A. We can mine the west part of Section 2.

12 Q. Right, but corehole 162 is in the east part
13 of Section 2.

14 A. Yes, it is a little bit to the east. I think
15 Mr. Lane was trying to find out how far over the potash
16 was to those existing wells.

17 Q. Did you say that the overriding royalties are
18 the same throughout the mine?

19 A. Yes, basically. All the leases were acquired
20 from the same company. There might be some small
21 changes, but basically it's the same acquisition from
22 the same development company.

23 Q. Do federal regulations limit what overriding
24 royalties are?

25 A. I can't answer that. As far as I know, they

1 don't. That's a contractual agreement.

2 Q. I was under the impression they did have some
3 limitation.

4 A. That could be. I can't testify to that.

5 Q. Okay. One more question. On your Exhibit
6 54, you state that the state royalty was five percent,
7 but of a fixed price of \$17.65 per ton and that that
8 translates into a realistic royalty rate of one
9 percent?

10 A. Yes, and up there at the top I've -- That
11 probably shouldn't be written as value of product.
12 Actually, it's the value of the K₂O tons in the raw
13 ore, is how that's calculated, which is -- All the
14 calculations are based on that.

15 Q. But --

16 A. It's a little bit different. Not a --

17 Q. -- for five percent to translate to a
18 realistic one percent --

19 A. The sale price of potash would have to be
20 over \$35 a ton for it to be a break-even situation.

21 Q. Well, the way I look at it, it would have to
22 be approximately -- It would have to be five times
23 \$17.65, wouldn't it?

24 A. You have to take that by the percent of K₂O
25 per ton of ore. The calculation would be the ore tons

1 times the K₂O percent, times \$17.65, times five
2 percent. That would give you your royalty.

3 Q. What was the price of potash at various times
4 before January 1, 1984?

5 A. Before January I was not -- I have no idea.
6 I wasn't here. I can't testify.

7 Q. But to arrive at a realistic rate of one
8 percent, you had to know that, right?

9 A. That's correct.

10 Q. What was it?

11 A. I don't have that in front of me. That was
12 garnered from the accounting department.

13 If you were to take the percents and bring
14 them around -- The accountant came up with the numbers,
15 and it turned out to be one percent to 3.5 percent.

16 The state used a straight \$17.65 per ton.
17 The federal used the sale price, which was higher than
18 \$17.65, and on average it was one percent to 3.5.

19 Q. When you sell potash, you sell it as K₂O; is
20 that correct?

21 A. Yes.

22 Q. So if I have a sale price of \$17.65 per K₂O
23 ton and I'm taking five percent of that, and if I'm
24 going to say that equals one percent of something,
25 isn't that something five times \$17.65?

1 A. Five times, uh-huh.

2 Q. So I need a price of basically \$87 a ton for
3 that to translate to one-percent royalty?

4 A. No, because it's based on the percent of ore
5 tons.

6 Q. I guess that's what I don't understand.

7 A. Yes.

8 Q. What is a percent of ore ton?

9 A. That's the -- You know, like it would be 14.5
10 percent of sylvanite -- of total K_2O in a ton of ore,
11 whereas the federal, we're using K_2O tons at the point
12 of shipment.

13 Q. Are we --

14 A. We're talking about two different animals,
15 that's the problem. That's the way the state
16 calculated.

17 And the federal was doing it entirely a
18 different way. They were calculating it against what
19 -- raw ore tons is called manure salts.

20 COMMISSIONER CARLSON: I don't want to press
21 it. That's all I have.

22 CHAIRMAN LEMAY: Commissioner Weiss?

23 EXAMINATION

24 BY COMMISSIONER WEISS:

25 Q. Yeah, I have some concerning timing, your 15

1 years --

2 A. Yes, sir.

3 Q. -- to get to Section 2.

4 I used the historical mining rate, 270 acres
5 per year --

6 A. Yes.

7 Q. -- and I've divided that into 16 sections --

8 A. Uh-huh.

9 Q. -- which is about the number of sections that
10 are in my data --

11 A. Okay.

12 Q. -- and I come up with 38 years.

13 A. Okay.

14 Q. If I use three years per section --

15 A. Yes.

16 Q. -- I come up with 48 years to get there.

17 I don't --

18 A. Okay. Well, the only problem with that is
19 that you're mining everything as you go --

20 Q. Yeah.

21 A. -- but a mine works from the outside in. It
22 does not work from -- You cannot mine everything around
23 you, because how are you going to get your ore out?
24 You have to go out and come back into your shaft.

25 That's why this is split up, see? We mine

1 this area, we can get out there faster, you get out
2 here faster and mine this area too, and balance your
3 production.

4 Q. Well, see, this is an important question --

5 A. Yes.

6 Q. -- because it is so speculative, your mine
7 plan, in my opinion.

8 Do you have an analogy from the north that
9 shows where you did just exactly that and it took you
10 18 to 15 years?

11 A. I don't believe that it would parallel
12 exactly --

13 Q. Well --

14 A. -- what we're doing here. You know, very
15 part of the mine is different.

16 Q. So there is no analogy?

17 A. There is only 26 years of experience.
18 Basically, that's the analogy.

19 COMMISSIONER WEISS: That's the only
20 questions I have. Thank you.

21 EXAMINATION

22 BY CHAIRMAN LEMAY:

23 Q. Just a couple, Mr. Woomer.

24 A. Yes.

25 Q. Do barren areas contain low-grade ore, or are

1 they zero potash ore?

2 A. Low-grade ore, basically. There are some
3 zero.

4 Q. So when you're talking about that restriction
5 in here --

6 A. Yes.

7 Q. -- in Section 22 and, I guess, 23, that would
8 be mapped as a barren area once you've got --

9 A. Yes, it would, yes.

10 Q. Okay. Do you try and stay away from barren
11 areas? You don't want to mine them?

12 A. It depends on what's on the other side. If
13 it's economical to go through, as in these cases -- and
14 it does arise; we've got two good examples right here
15 -- we will drive through them to acquire the potash on
16 the other side.

17 Q. Okay, just something to help me understand a
18 little bit your mining plans.

19 What kind of -- Are you responsible for
20 mining plans, I guess, in three-year and five-year and
21 so forth?

22 A. Yes, I am.

23 Q. How many -- You have a three-year plan, a
24 five-year plan? What are the -- How many plans do you
25 have there? How many years apart do you submit plans?

1 A. You have a pretty firm one-year plan. You
2 have a three-year plan, a five-year plan, and a life-
3 of-mine plan, which actually fills in all of the in-
4 between years. It goes from today through the limits
5 of your reserve or what you believe to be minable.

6 Q. So this Section 2 would really fall under
7 your life-of-mine plan without --

8 A. It should --

9 Q. -- without being in your three- or five-year
10 plan?

11 A. Yes, it falls basically in the ten-year plan.

12 Q. You have a ten-year plan too?

13 A. Well, once you go from -- you don't -- Mining
14 plans change minutely, you know. What you have is, you
15 have your basic plan that you would like to follow.

16 Mines are very dynamic. They change from day
17 to day. What might be minable and good in this one
18 section today, you might have to move over, you know,
19 50 foot, but that's the way it's done. And mine plans
20 change from day to day.

21 But your long-term, life-of-mine plan
22 basically stays the same.

23 Q. Well, then, are there documents to conform
24 with a one-year plan, a three-year plan and a five-year
25 plan, and then a life-of-mine plan?

1 Do you submit those things to management, or
2 what kind of tools are they?

3 A. They are basically maps with notes attached.

4 Q. With what?

5 A. With notes attached. And they are kept in
6 the mine office and discussed with management from time
7 to time.

8 Q. And you have a one-year plan, a three-year
9 plan and a five-year plan with notes attached in your
10 office now?

11 A. They -- Basically, yes.

12 Q. I'm trying to get a feel for what mining
13 plans are. I've never fully understood them --

14 A. Yeah.

15 Q. -- because if they change so much --

16 A. They're not a long-winded, written-out --

17 A. They're not a formal thing?

18 A. No, they're not.

19 Q. They're just kind of a --

20 A. No, we --

21 Q. -- an idea of what you'd like to do?

22 A. Because they change so quickly -- minutely.
23 You could write it out. It's not like we're going to
24 build this highway and it's going to have ten curves,
25 and they're all going to be based on this grade of base

1 and all.

2 You can't do that. Things change from day to
3 day.

4 Q. I can understand the concept of keeping your
5 options open. I just wonder how reliable a mining plan
6 would be. If you were going to submit it to someone,
7 what probability is there that you would fulfill that
8 plan in your time frame that you stated?

9 A. Exactly as written?

10 Q. Or close, close. You see --

11 A. Close is very --

12 Q. -- you say they're going to get there in five
13 years.

14 A. Oh, yeah.

15 Q. What probability is, you'll be there in five
16 to eight years?

17 A. Yeah, close is -- You know, you have a very
18 good probability. Exactly, I would say you have zero.

19 Q. So it will change?

20 A. It will change.

21 Q. And it will change some, sometimes
22 drastically, sometimes minutely, depending upon --

23 A. Yes.

24 Q. -- the information you're acquiring through
25 time?

1 A. You've got to remember, when you change one
2 part of a mine plan, it changes everything. It changes
3 all the timing.

4 Like I said, if something were to happen in
5 our plan now, we would start for Section 2 X amount of
6 days or months earlier.

7 Usually mine changes are -- speed up your
8 mine plan. They very seldom slow it down.

9 CHAIRMAN LEMAY: Okay, thank you. That's all
10 the questions I have.

11 Oh, I'm sorry, Commissioner Weiss?

12 FURTHER EXAMINATION

13 BY COMMISSIONER WEISS:

14 Q. On this issue of mine plans and timing and
15 such, with the information you have today in your mine
16 plan, could you take it to a bank and borrow money and
17 get it done? Could you present it --

18 A. Take it to a bank and borrow money and get it
19 done?

20 Q. Yeah, is that within your expertise?

21 A. We take it to the bank, so to say, every year
22 when we go to get budgeted.

23 And yes, it does get approved, or we would be
24 shut down.

25 COMMISSIONER WEISS: Okay, thank you.

1 CHAIRMAN LEMAY: Do you want some redirect on
2 his testimony?

3 MR. HIGH: Yes, sir, I do.

4 REDIRECT EXAMINATION

5 BY MR. HIGH:

6 Q. Mr. Woomer, Mr. Carroll asked you some
7 questions about your coal-mining experience and mining
8 up to --

9 A. Yes.

10 Q. -- the casings of oil wells.

11 There's a difference, of course, in how coal
12 mines are equipped to deal with methane gas than what
13 you've found at New Mexico Potash?

14 A. Yes, sir.

15 Q. Is New Mexico Potash equipped to deal with an
16 encounter of methane gas?

17 A. Not in any way, shape or form.

18 Q. Is there a difference, in your opinion, Mr.
19 Woomer, in a dry, plugged and abandoned well, and the
20 wells that Yates is asking for in this hearing?

21 A. Very much so, yes.

22 Q. Now, when you were asked about royalty rates,
23 you said you didn't take into account what the royalty
24 rates were when you were doing your mining plans, and
25 you said that was -- somebody else dealt with that.

1 Do you know whether or not anyone at the New
2 Mexico Potash makes mining decisions based upon royalty
3 rates?

4 A. No one at New Mexico Potash makes mine plans
5 according to royalty rates.

6 Q. Now, I want to follow up on something that
7 was talked about before and Commissioner Weiss just
8 asked about, and that is this -- the amount of time it
9 takes to gobble up some acres.

10 And I believe you said earlier that that is
11 not something, in your opinion, that can be used for
12 measurement on when you're going to get to a certain
13 section; is that correct?

14 A. That's correct.

15 Q. And let's see if we can't illustrate that so
16 people understand that that is not a unit of
17 measurement.

18 If you mine a complete section -- Let's
19 suppose you go in and you first-mine that section, you
20 would have disturbed those acres, they would be part of
21 the net acres that you disturbed, correct?

22 A. Yes.

23 Q. And if you looked at the rate of advance
24 after you first-mined, you would have done that in,
25 let's say, one year. Let's just use that as an

1 example, all right?

2 A. All right.

3 Q. Then if you stayed in that same section doing
4 second-mining, and you were in there a year doing
5 second-mining, you would not affect any additional
6 acres, would you?

7 A. No, huh-uh. The acreage wouldn't be
8 affected.

9 Q. But the time would double --

10 A. Yes.

11 Q. -- is that correct?

12 And is that the reason that it's not a way to
13 measure advancement?

14 A. That, and in addition, you will keep your
15 machine on development. It would continue to develop.

16 You would take another machine geared towards
17 production to second-mine the rest of that section, and
18 you would still continue to affect more sections.

19 Q. If you also assumed that the rate of advance
20 to Section 2 was the area concept we're talking about,
21 when you got to Section 2 you would have second-mined
22 behind yourself, wouldn't you?

23 A. That's correct, yes, you would have -- You
24 would have essentially cut yourself off or painted
25 yourself in a corner.

1 MR. HIGH: That's all I have, Mr. LeMay.

2 CHAIRMAN LEMAY: Thank you.

3 Additional questions of the witness?

4 MR. CARROLL: No.

5 CHAIRMAN LEMAY: If not, he may be excused.

6 MR. HIGH: Excuse me, let me ask one
7 question.

8 CHAIRMAN LEMAY: Sure.

9 MR. HIGH: I'd like to follow up Mr.
10 Carlson -- I'm concerned that Commissioner Carlson is
11 still not understanding the royalties.

12 CHAIRMAN LEMAY: Uh-huh.

13 MR. HIGH: I would like to take a few minutes
14 with this witness and see if he can -- and I don't know
15 if he can or not.

16 I was going to ask him the question whether
17 or not he can make the actual calculation.

18 I would like to do an assumed amount of
19 product, do the same calculation using the federal and
20 the state, so that Commissioner Carlson can see the
21 difference, how it works out.

22 Now, I can do it with this witness if he
23 knows how.

24 If not, I want to call an additional witness
25 to do that.

1 CHAIRMAN LEMAY: Commissioner Carlson, do you
2 want to --

3 MR. HIGH: So if we could just have a little
4 recess, I could ask the witness if he could do it.

5 COMMISSIONER CARLSON: I don't think it's
6 going to be a substantive matter when we decide this.

7 From a State Land Office perspective, however
8 I'd like to know it sometime. You know, maybe you
9 could just supply it to me independently.

10 I don't think it's going to enter into the
11 deliberations in this matter.

12 MR. HIGH: Well, I would like it as a matter
13 of record, because we have been accused here falsely
14 not mining state leases because of the royalty rate.

15 I want the answer reflected in this record,
16 because that is just out-and-out false, and I want you
17 to know it, and I want everybody else to know it, and I
18 want it shown in this record.

19 So I would like to submit that as part of
20 this file, this record.

21 COMMISSIONER CARLSON: Fine.

22 MR. STOVALL: Mr. High, could I just ask one
23 question of the witness -- Mr. Chairman, with your
24 indulgence -- on that?

25 CHAIRMAN LEMAY: Yes.

EXAMINATION

1
2 BY MR. STOVALL:

3 Q. If I understand what you said, the royalty
4 rate -- I think it's pre-1984 -- on federal was based
5 on actual tons, measured tons, whereas on the state it
6 was a calculated amount --

7 A. That was both --

8 Q. -- based upon some --

9 A. Yes, what I'm -- What the difference is, is
10 that the federal royalty rate was based on the selling
11 price of the product.

12 Q. A measured amount of ore sold?

13 A. Yes.

14 The state royalties were based on a fixed
15 price for that. In other words, it did not fluctuate.

16 It only fluctuated with the percent or the
17 grade of the ore. That's the only fluctuation there
18 was.

19 That's how the federal rate got higher,
20 because potash was selling for more than \$17.65.

21 Another reason the five factor doesn't
22 exactly follow through is that you have to throw in the
23 grade of the ore.

24 The state used grade of the ore times a fixed
25 price.

1 CHAIRMAN LEMAY: I might make a suggestion,
2 without interrupting -- Sorry, were you through,
3 Counsel?

4 MR. STOVALL: That was the only question I
5 had.

6 CHAIRMAN LEMAY: I think the hangup is on the
7 K₂O, whether that's -- And if you want to, you could
8 before tomorrow get an Exhibit 54A and maybe outline a
9 comparison that might be clearer than trying to do it
10 just in the short intermission. You'll have that time.

11 MR. HIGH: I will accept the suggestion, and
12 we'll certainly do that.

13 CHAIRMAN LEMAY: That would help all of us to
14 understand the issue too.

15 MR. HIGH: Okay, that sounds very good.

16 CHAIRMAN LEMAY: Okay. And whoever you
17 wanted to testify to 54A, you could, and that would
18 clear it up.

19 MR. HIGH: Okay.

20 CHAIRMAN LEMAY: Anything else? Let's --

21 MR. HIGH: Not from this witness.

22 CHAIRMAN LEMAY: Okay. Let's take a 15-
23 minute break and we'll resume.

24 (Thereupon, a recess was taken at 2:27 p.m.)

25 (The following proceedings had at 2:50 p.m.)

1 CHAIRMAN LEMAY: We shall resume. I think
2 we're through cross-examination on the last witness.

3 Mr. High, call your next witness.

4 MR. HIGH: Yes, Mr. LeMay. Before I call the
5 next witness, though, let me make a request with
6 respect to Exhibit Number 27.

7 A question was raised whether or not two of
8 those numbers were inverted.

9 CHAIRMAN LEMAY: Yes.

10 MR. HIGH: I would ask that we be allowed to
11 double-check those tonight. I don't want to mislead
12 this Commission.

13 I would like to double-check those numbers
14 tonight and, if a couple of them were in fact inverted,
15 submit a revised exhibit Number 27A so that the correct
16 numbers, if indeed these are incorrect, are before the
17 Commission.

18 It's certainly not our intent to mislead you.

19 CHAIRMAN LEMAY: No, we understand that.

20 Is there any problem with that, Mr. Carroll?

21 MR. CARROLL: No, sir.

22 CHAIRMAN LEMAY: Okay. That's acceptable
23 procedure.

24 MR. HIGH: Thank you.

25 We would call Mr. Warren Traweek. Mr.

1 Traweek has not been sworn either, Mr. Lemay. He was
2 not here the first day.

3 CHAIRMAN LEMAY: Okay, we'll swear Mr.
4 Traweek.

5 WARREN C. TRAWEEK,
6 the witness herein, after having been first duly sworn
7 upon his oath, was examined and testified as follows:

8 DIRECT EXAMINATION

9 BY MR. HIGH:

10 Q. Mr. Traweek, would you state your full name,
11 please, sir?

12 A. Warren C. Traweek.

13 Q. And what's your address, please, sir?

14 A. 770, Calle Dadivoso, Tucson, Arizona.

15 Q. You may need to spell that for the court
16 reporter.

17 A. C-a-l-l-e and then D-a-d-i-v-o-s-o.

18 Q. And how are you employed, Mr. Traweek?

19 A. I'm the safety, health, medical and security
20 director for Asarco Ray Complex in Hayden, Arizona.

21 Q. And how long have you held that position?

22 A. It will be two years December the 10th.

23 Q. And of course, Asarco is not involved in this
24 proceeding, are they?

25 A. No, they are not.

1 Q. Would you tell us, Mr. Traweek, some of your
2 duties at Asarco?

3 A. I'm charged with those activities I
4 mentioned, managing those, planning for them, following
5 up on them, tracking them, budgeting for them, for
6 those four areas at a large open-pit copper mine with
7 about 1615 employees at present, and we have a mine,
8 two mills and a smelter with facilities scattered over
9 about 22 miles.

10 Q. And how many employees?

11 A. Sixteen hundred and about fifteen right now.

12 Q. Okay. Tell us, if you will, your educational
13 background.

14 A. I have a bachelor's degree from the
15 University of Arizona in Commercial design, and I have
16 numerous other courses that I've taken with the
17 government and with private industry related to safety
18 and health.

19 Q. All right. Tell us, if you will, your
20 employment history since you got your degree.

21 A. Kind of a long story. I started working
22 underground for the Magma Copper Company right out of
23 college, worked for them as a ventilation engineer, as
24 a planning engineer.

25 Hired on with the State of Arizona as a

1 deputy state mine inspector and industrial hygienist.
2 Worked for them for about two years.

3 At that time we were under a so-called state
4 plan with MESA, the Mine Enforcement and Safety
5 Administration, and the Department of the Interior,
6 federal government, and under that state plan we worked
7 directly side by side with the federal inspectors. And
8 as a result of that, I eventually became a federal mine
9 inspector under MESA. Stayed with them through the
10 transition into the present agency, MSHA, when they
11 changed over to the Department of Labor.

12 Eventually left them and went back into
13 private industry with Duval Corporation, the mining
14 subsidiary of Pennzoil. We served as the corporate
15 safety coordinator in their corporate office, corporate
16 mining office, in Tucson, Arizona.

17 They eventually transferred me into
18 operations as a mine superintendent at the Nash Draw
19 Mine in Carlsbad, New Mexico. And while I was in New
20 Mexico, Duval was broken up by Pennzoil, properties
21 sold off individually.

22 I went to work for Western Ag Minerals, which
23 is a Canadian-owned firm. Actually, I just stayed in
24 the same position at the Nash Draw Mine, but became an
25 employee of Western Ag Minerals.

1 And I personally decided that my long-term
2 future was not with Western Ag. It was a personal
3 decision, no animosity or nothing involved.

4 I voluntarily left, went back to Arizona,
5 attempted a couple of small businesses and didn't do
6 too well in them, and eventually hired on with an
7 insurance company as a western safety engineer over 11
8 western states for Rockwood Insurance Company,
9 primarily doing mining and heavy-industry construction.

10 From there, I went to work for Arizona State
11 OSHA, as an OSHA inspector and industrial hygienist.

12 And then about two years ago, Asarco came and
13 found me and asked me to come back into mining.

14 Q. About how many years out of that period you
15 just told us about were you employed either by a state
16 or a federal mine-enforcement agency?

17 A. About seven years.

18 Q. And that would be --

19 A. That would be in mining. There was another
20 about nine years if you include the OSHA experience as
21 well.

22 Q. Okay. Nine years experience, seven of which
23 was mining?

24 A. Yes.

25 Q. Okay. And that would have been with the

1 Arizona State Mine Inspector's Office, as well as
2 Arizona State OSHA?

3 A. That's right.

4 Q. And the Federal Mine Safety and Health
5 Administration?

6 A. That's right.

7 Q. And while you were employed in those
8 enforcement positions, Mr. Traweek, what were some of
9 your duties?

10 A. I was actually hired initially with the State
11 of Arizona as an industrial hygienist. That was not
12 really the title of the occupation at the time. They
13 had kind of a funny little title: Mine Dust
14 Specialist, I think, was what it was called, something
15 like that. But essentially you were an industrial
16 hygienist.

17 In a very short time, for whatever reason --
18 they had other needs -- they moved me into about a 50-
19 50 safety and health, industrial hygiene activities,
20 and I would say within a year of hiring on with them I
21 was probably doing 75 percent safety, 25 percent
22 health.

23 When I shifted over to the federal
24 government, MESA at the time, I was actually hired as a
25 mining engineer. I didn't ask for that title, and in

1 fact objected to it. I'm not a mining engineer by
2 degree. I objected to that, but the federal government
3 reviewed my background and assigned that title to me.
4 And it took me almost -- I would say probably a year
5 and a half to get them to remove that title. I did not
6 want to be called a mining engineer. And I -- There's
7 reasons for that.

8 At that time I reverted to being called a
9 federal mine safety and health inspector. Eventually I
10 became a special investigator for MSHA under the
11 Department of Labor.

12 Q. What would you do as a mine safety and health
13 inspector on a day-to-day basis? What were you called
14 upon to do?

15 A. Day-to-day basis, we would conduct regularly
16 scheduled safety and health inspections of mining
17 properties, open pit, underground and mills. We did
18 not do smelters; we stopped at smelters. We did mills,
19 any kind of mining facility, open-pit and underground,
20 as a mine inspector.

21 And an awful lot of complaint activity in
22 those days where we responded to complaints from
23 employees.

24 Tremendous number of accident investigations
25 in those days, including fatalities.

1 Q. And in carrying out those duties, your
2 primary job, I guess, was to enforce the federal and
3 state laws, safety laws, as they applied to the mines?

4 A. When I was with the state, we were under a
5 state plan, agreement, and we essentially enforced
6 federal standards at a state level under that
7 agreement.

8 When I went to work for MESA, we just kind of
9 totally ignored what the state did and worked strictly
10 off the federal standards.

11 Q. And in the -- How many years out of the
12 employment experience you gave us earlier were you
13 working in private industry where you had to insure
14 compliance with the same standards that you just told
15 us about that you were enforcing? About how many
16 years' experience did you have doing that?

17 A. Without really setting down with my résumé
18 and going over it, it would be kind of a guess. Well,
19 you know, in one role or another, I guess my entire
20 experience is doing that, because if you're in
21 management that is your ultimate responsibility.

22 For example, when I was working in the potash
23 area, superintendent of mines, certainly safety was my
24 responsibility, and I got charged with that and got
25 blamed for it if we came up short, so that was my

1 responsibility as well.

2 Working as a safety engineer would be
3 something less than that, where I was working directly
4 as a safety engineer.

5 Q. And how many years' experience do you have in
6 safety, specifically in the potash basin?

7 A. In the potash basin?

8 Q. Yes, sir.

9 A. About two and a half years.

10 Q. During the time you were working with the
11 enforcement agencies, Mr. Traweek, did you have
12 occasion to attend some training schools on safety?

13 A. I certainly did.

14 Q. Would you relate to us some of those, please,
15 sir?

16 A. The federal government, for example, had a
17 mandatory requirement -- it's been a lot of years, but
18 I believe it was 80 hours per year mandatory annual
19 training, a lot of which was conducted at the federal
20 Mine Safety and Health Academy in Beckley, West
21 Virginia, some of which was not. They would send you
22 off to specialized schools. For example, I spent some
23 time at the University of Alabama doing some
24 specialized studies for the federal government.

25 That 80 hours I mentioned was what they

1 required.

2 I can distinctly remember one year, I was
3 about two or three years into my federal employment
4 when I got assigned to do another week in West Virginia
5 in the middle of the winter, and I remember complaining
6 to my boss, subdistrict manager, that I already had 270
7 hours, some-odd hours, of training that year, and that
8 I felt that I had enough for the year and preferred not
9 to go. So there was a good deal more than the 80 hours
10 involved. That was the minimum.

11 Q. Did any of this training relate to the
12 presence of methane gas in underground mines?

13 A. Yes, it did.

14 Q. And tell us about some of the training you've
15 had in that area.

16 A. Training, you can talk about it generically
17 or specifically, but within the standard -- Most of the
18 training we would receive under the federal government
19 in some way or other related directly to the standards,
20 to the federal standards.

21 And there have always been gassy-mine
22 standards. Early on, they were basically copies of the
23 coal-mine standards.

24 We received extensive training on how to
25 sample for that, what to look for, what to do about it

1 when we found it, that sort of thing. That involved
2 both a little bit of -- in my mind, pure safety work as
3 well as industrial-hygiene-type work, analysis-type
4 work. That's the generic side.

5 There were other specific classes just on
6 methane in mines, that sort of thing.

7 MR. HIGH: Mr. LeMay, at this time I would
8 offer into evidence Exhibit Number 32, which is Mr.
9 Traweek's résumé, and also ask that Mr. Traweek be
10 recognized by the Commission as an expert in mine
11 health and safety.

12 CHAIRMAN LEMAY: His qualifications are
13 acceptable.

14 Q. (By Mr. High) Mr. Traweek, what hazards to
15 underground mining does methane gas present?

16 A. The hazard as such is the threat of
17 explosion. And going a little bit beyond that, it's
18 more than just a -- the fact of the explosion itself.
19 There are side effects from explosions. In other
20 words, you don't have to be right in the area of an
21 explosion to be affected by an underground fire or
22 explosion.

23 Q. Any other hazard presented, other than
24 explosions?

25 A. Most definitely. The -- I call them

1 atmospheric overpressures; there may be a more
2 technical term for that.

3 The temperatures, extreme temperatures at
4 great distances from the source of explosion, and I'm
5 not necessarily talking about fire or flame; I'm
6 talking about superheated air.

7 Probably the biggest one in terms of threat
8 to life, other than an actual explosion if you were in
9 an area, is the air blast phenomenon or the atmospheric
10 overpressure.

11 Q. Well, let me back up one step, Mr. Traweck,
12 just so everyone understands.

13 The oil and gas industry, is it covered by
14 the Mine Safety and Health Administration?

15 A. No, it is not.

16 Q. What's it covered by?

17 A. OSHA, Occupational Health and Safety
18 Administration.

19 Q. Well, just so everyone understands the
20 differences, let's explain very briefly the differences
21 between OSHA and MSHA, so people understand the
22 differences.

23 And you've had experience in both, correct?

24 A. Yes, I have.

25 Q. Tell us, if you will, the differences in how

1 OSHA enforces standards and how MSHA, the Mine Safety
2 and Health Administration, enforces mine-safety
3 standards in underground mines.

4 A. Let me first just give you a little bit of
5 background on the basic differences or why they came to
6 be.

7 Mining, for some reason -- and I -- There are
8 historical reasons but they're kind of ancient history;
9 they happened back in the early part of this century
10 and back into the last century. Nonetheless, when it
11 happened, mining has always been perceived as being one
12 of our most hazardous industries in the United States.
13 That's not true at present, but it's still viewed that
14 way by the general public and the legislators in
15 Washington.

16 As a result of that, when the government
17 decided to get into the safety business they first
18 created a variety of mining regulatory agencies,
19 actually starting in about 1910. And MSHA -- actually,
20 MESA it was at the time -- actually came into existence
21 before the OSHA Act. And it's a separate little body
22 of standards -- not very little, but it's a large body
23 of standards, very detailed and very specifically
24 devoted to mining, to hazards that happen in mining.

25 OSHA is just charged with doing everything

1 else, everything else except mining. However, there
2 are a few exceptions for OSHA, but not very many. And
3 OSHA in some ways has to be a little bit more generic
4 in what they do, because you have to cover such a wide
5 variety of industries: manufacturing, construction,
6 that sort of thing. Mining pretty well comes down to
7 one type of activity, and the standards can be quite
8 specific.

9 I think in terms of the impact upon an
10 operator -- and my present property, for example, has
11 both OSHA and MSHA areas, just to tell you -- OSHA does
12 not show up very often, but when they do, they do a
13 very thorough and in-depth inspection of us, and quite
14 often the fines just go sky-high. And we're looking
15 into the -- some cases, we're looking into the hundreds
16 of thousands of dollars in terms of a fine from OSHA.

17 MSHA, on the other hand, is mandated to show
18 up at our property. We have two different ID numbers
19 under MSHA, so they'll be there four times a year,
20 mandated. They have to be there under the Act. And
21 when they show up, their fines are not very high, but
22 they issue a lot of citations. Some of them are very
23 nit-picky, some of them are not. Some of them are very
24 legitimate.

25 And I think that's the basic difference.

1 There is one other important distinction, I
2 think: MSHA has the power of shutting down, and they
3 can do it in several different ways. One of them
4 simply is an imminent danger. They walk in and see
5 something that they believe is an imminent hazard,
6 imminent danger to an employee, shut it down, pull your
7 people out of there. And they have the power to do
8 that.

9 OSHA does not really have that power to do
10 that. I think that's a pretty distinct --

11 Q. Let me put it in another example. Let's
12 assume that OSHA walked into this room and saw
13 something on one of the lights up here or on the
14 ceiling. Could they make us vacate this room?

15 A. Not really, no, they couldn't.

16 Q. All right.

17 A. They could certainly encourage us to do that,
18 but they couldn't force us to.

19 Q. All right. And let's take the same room and
20 put it underground and say the Mine Safety and Health
21 Administration walks in and they don't like the
22 ceiling. Can they make us get out of this room?

23 A. They certainly can.

24 Q. Can they make us shut it down?

25 A. Yes, they can.

1 Q. And how long can they make us shut it down?

2 A. Till it's fixed or they feel like it's -- or
3 they suddenly like a roof, and they'll let you back in.

4 Q. Can they shut it down before we even have an
5 opportunity for a hearing?

6 A. Certainly can. They shut it down right now,
7 they walk in and see it right now. Your people -- We
8 would all leave here right now and would not come back
9 until --

10 Q. So under the Mine Safety and Health
11 Administration, it's comply with what the government
12 says do, whether they're right or wrong, and litigate
13 later?

14 A. That's correct.

15 Q. And under OSHA it's simply not that way?

16 A. No, it's not.

17 Q. And you know the difference between coal mine
18 safety standards, the requirements, I take it, and non-
19 coal mines, do you not?

20 A. Yes, I do.

21 Q. Tell us briefly, Mr. Traweek, how is it
22 different? We've heard a lot of evidence in this case
23 about what happens in coal mines.

24 A. Uh-huh.

25 Q. Give us an idea of the differences in terms

1 of safety requirements between coal mines and potash
2 mines.

3 A. Talking basic safety requirements, aside from
4 the differences in conditions encountered in those
5 types of mines, there's not a great deal of difference.

6 There is a little bit of a difference in
7 enforcement philosophy, probably based on the long --
8 long history of antagonism and militancy in coal mining
9 that has not been so much in metal mining.

10 And that's what I'm talking about, the
11 standard safety things that guard. An MSHA coal-mine
12 inspector will approach a guard in much the same way as
13 a metal or nonmetal inspector would.

14 If you're referring to specifically gassy
15 mines there's a vast difference, and that difference
16 primarily centers on the idea of what you have to do
17 different to deal with potentially explosive or, in
18 some cases, already explosive conditions. And we're
19 talking about permissible equipment, need to bring it
20 on down. Other things than that. There's a lot of
21 other things you have to do. But --

22 Q. Are they separate standards or safety
23 standards for coal mines and non-coal mines?

24 A. Yes, they are. They've been blended to where
25 they're essentially the same.

1 At one time under MESA there was a lot of
2 difference, and then they made an effort to blend
3 them. And they're essentially the same, with the
4 exception of the gassy standards again, which are still
5 different.

6 Q. Tell us about the differences with respect to
7 methane gas. How does a coal mine respond or prepare
8 for methane gas, versus a potash mine?

9 A. Well, again, that probably depends on how
10 long you want to talk about it.

11 Probably start at the top of the shaft or, in
12 the case of a coal mine, an adit, a horizontal entry
13 into the side of a hill or whatever.

14 The primary fans on a coal mine will be on
15 the surface. That means they will be either at the top
16 of the shaft or outside the adit.

17 Q. Why is that?

18 A. That has to do with methane -- the potential
19 for methane being in the air passing over the fan, and
20 there's potential for an ignition source out of the
21 fan, both from the power source and from static
22 electricity off the generation, off the moving of the
23 air.

24 In metal/nonmetal mines that are nongassy,
25 you can put your fans anywhere you want, and the

1 easiest place to put them is underground. It's a lot
2 easier to do that.

3 The potash mines, as far as I know, every
4 single one in the basin has underground fans. If they
5 were suddenly declared gassy mines, those fans have got
6 to come out and come to the surface.

7 Q. Is that a big deal?

8 A. It certainly is. It's just like starting
9 over. And it's not just a matter of saying, Okay,
10 we'll unplug this big fan here and haul it up the shaft
11 and plug it back in.

12 You have to mount them in offsets so that if
13 you have an explosion underground and that air blast I
14 was talking about a while ago comes out through the
15 workings, goes up the shaft, it will knock out a weak
16 wall without taking out your fan. In other words, you
17 don't want the fan sitting in the line of fire in case
18 the place blows up. That's only one thing.

19 You go all the way down to your very smallest
20 piece of equipment that's at the most remote area in
21 your mine, back in there, and it also has to be
22 permissible.

23 And permissible means permissible to the
24 federal government. It means it's been examined,
25 tested, and you're basically dealing with electrically

1 permissible-type things that do not create sparks, that
2 do not create ignition sources.

3 Q. And then does the equipment have to be
4 maintained in permissible condition?

5 A. Yes, it does, very much so.

6 Q. Is that a big deal?

7 A. It certainly is. Mining's a tough
8 environment, and you can buy it brand new and it's
9 tough to maintain in permissible...

10 In fact, there are major coal mine disasters
11 on record, simply involved a flaw in the maintenance of
12 an otherwise permissible equipment.

13 Q. So needless to say, then, all of these
14 additional safety precautions with permissible
15 equipment and that sort of thing has not eliminated
16 disasters in underground coal mines?

17 A. Certainly not. No, it has not.

18 Q. Now, how -- What does the federal government
19 require with respect to potash mines dealing with
20 methane gas? You've told us about coal mines and what
21 they require. How about the potash mines?

22 A. At present -- I made a little -- went through
23 the standard book. At present in the gassy mine
24 regulations, potash mines essentially have to deal with
25 six standards, six additional standards that are

1 related to the gassy mines over what they -- over what
2 this traditional safety standards and health standards
3 that they have.

4 And in terms of how that impacts the
5 operation of the mine, I would have to say it's very
6 minimal. There were some minor changes required when
7 this standard kicked in, but very minimal.

8 One of them, for example, is potash does now
9 have to conduct pre-shift examinations of workplaces,
10 which they did not have to do before.

11 Q. Now, what does that mean for people who are
12 not miners?

13 A. Okay, that basically means prior to starting
14 up your work in a work face, work place, wherever
15 you're going to do your mining or your development,
16 advancement or whatever, you have to go in and test the
17 environment.

18 Q. And who does that? What person goes in to do
19 that?

20 A. Depends on the mine. Probably the shift
21 foreman, the foreman in most cases. Some mines, it
22 might be the safety guy. I know of one mine, and I'm
23 not talking potash here, but I know of one mine where
24 they send one of the Indian people in to do that.

25 Q. So before you can even start to work in a

1 potash mine, you've got to go in and test the air to
2 make sure there's not gas in it?

3 A. That's correct, and not just one time. You
4 have to check all the working places, every place
5 you're going to be working.

6 Q. And that's even for the potash mines in
7 southeastern New Mexico?

8 A. Yes, it is.

9 Q. Even given their history of not encountering
10 methane gas, they are still required to do that?

11 A. That's correct.

12 Q. All right. What are some of the other things
13 they're required to do?

14 A. I'd have to -- We'd have to go through the
15 standards to really look at it, if you want to really
16 get a comparison of what Category IV is.

17 Q. Well, we'll do that perhaps later. I just --
18 Just see if you knew them off the top of your head.

19 A. Yeah.

20 Q. Let's go on, though, Mr. Traweek, and talk
21 instead of the history, some of the history on methane
22 gas and underground mines.

23 Have you -- You've been involved in some of
24 that yourself, have you not?

25 A. Yes, I have.

1 Q. Have you had any direct experience in methane
2 gas being encountered in underground mines?

3 A. Yes, I have.

4 Q. And what is some of your experience?

5 A. Probably the one that got the most press, it
6 was -- I used to say internationally known, and then I
7 started getting letters from overseas, so I guess in
8 some ways worldwide known -- was the Belle Isle mine
9 disaster down off the coast of Louisiana in 1979.

10 At that time I was working as a so-called
11 special investigator for MSHA, and about a week before
12 I had been appointed as one of three special
13 investigators nationwide to respond to what MSHA termed
14 disasters, and that meant five or more fatalities in
15 any one incident. Myself, there was a fellow in
16 Denver, and there was a fellow in Birmingham that were
17 chosen as a national response team for disasters.

18 And naturally, a week later we had a disaster
19 and so responded to that. Spent the better part of
20 two years -- I mean, not full-time but off and on, go
21 down there and work a week or two and then come back
22 and do my other duties -- better part of two years on
23 that particular case, investigating the Belle Isle
24 disaster. That's the biggest one.

25 Q. What type of mine was the Belle Isle mine?

1 A. Salt mine, domal salt mine.

2 Q. And what happened there?

3 A. What happened there was, they encountered an
4 outburst or a blowout -- I don't know which terminology
5 you want to use -- and -- quite common in the domal
6 salt mines. In fact, there's only one down there that
7 claims to have never had an outburst, and to be honest
8 with you, I have some information that I'm a little bit
9 suspicious of that claim. I think there are some
10 things that approximate outbursts.

11 What an outburst essentially is, is some
12 entrapped gas, that's high-pressure gas entrapped
13 within the salt. It's not a void. It's not a big hole
14 in the salt deposit. It's actually crystalline salt,
15 very hard crystalline salt, like rock salt, and the gas
16 is entrapped within the grains between those crystals.

17 And there's even some studies indicate that
18 it's actually inside the crystals. In other words, you
19 can put some of that salt into water, and it sits there
20 and fizzes, and that's -- I've been told that's the gas
21 releasing out of the salt itself.

22 In terms of how the mines encounter those
23 things, they would be mining along in their normal
24 mining process, and they would traditionally occur
25 right after a production blast. And basically what

1 that means is, you reach a -- you blast, and you
2 relieve a certain amount of material, and it causes a,
3 in my mind, a structural failure of the remaining
4 barrier between you and that high-pressure outburst.
5 That structural barrier, the wall, the face or whatever
6 in your drift, fails, and you have a sudden rush of all
7 this rock salt and methane gas.

8 And it's in quite large volumes, and it
9 spreads real rapidly, and many cases it will take days
10 to vacate that gas out of the mine. I think there's
11 one case on record where the mine was actually shut
12 down like six days while they were trying to vacate the
13 gas out of the mine.

14 Once it's out of there, there is no more
15 methane gas in a domal salt mine till they hit another
16 one. And they're so -- They're very unpredictable.
17 You know, you might not hit one a year, you might hit
18 five in one year.

19 Q. And were you assigned to investigate the
20 disaster at Belle Isle?

21 A. I was assigned to conduct the special
22 investigation portion of that, which means I was on the
23 full-accident investigation team. I was looking for a
24 little bit of other type of activity than the standard
25 investigation team.

1 Q. And were you able to determine what caused
2 that ignition, explosion?

3 A. We believe that it was either faulty or
4 damaged -- that's the part we don't know, whether it
5 was damaged or incorrectly installed -- electrical
6 equipment in the vicinity of the outburst, seven main
7 east.

8 Q. Was that mine previously required to have
9 permissible equipment before that explosion occurred?

10 A. No, they were not.

11 Q. And when that explosion occurred, how many
12 people died in that?

13 A. Five died in it.

14 Q. And what caused their deaths? Was it just
15 the concussion, or tell us what an explosion causes in
16 an underground mine.

17 A. The actual cause of death -- I'm trying to
18 think of the official legal title, the medical title of
19 it. Alveolar rupture leading to pulmonary hemorrhage,
20 which I believe essentially means it ruptured the sacs
21 in your lungs and then you bled to death internally, on
22 four of the five victims. The fifth victim, it was
23 partially that and partially carbon-monoxide poisoning.

24 Q. Okay.

25 A. That man lived long enough to put on his

1 self-rescuer.

2 Q. Describe for us what happens when an
3 explosion takes place in an underground mine to the --
4 What does it do to the equipment? Is it just in an
5 isolated area or --

6 A. No, it virtually destroys the equipment,
7 certainly within the immediate vicinity of the
8 explosion.

9 In the case of Belle Isle -- and I don't even
10 consider that to be a very large explosion event -- To
11 give you an example, some of the fatalities occurred up
12 to 4000 feet away from the blast itself, away from the
13 explosion, where that occurred. And you're talking
14 about rupturing of the lungs, so you're talking about
15 atmospheric overpressures that rupture the lungs.

16 The equipment all over that mine, clear from
17 the face which occurred in the far southeast corner of
18 the mine, clear out to the shaft equipment, was just
19 virtually destroyed. It was upside down, it was
20 burned.

21 There was a conveyor belt that ran in one of
22 the main haulage ways that you could -- The closer you
23 got to the blast event, the more it was destroyed. And
24 by the time you got out to the shaft it had been
25 severely damaged, but at least it was still standing.

1 And you could just follow that conveyor and see the
2 progress of those blast forces. And we're talking
3 about air blasts here.

4 In fact, it was estimated -- and I believe
5 it's right in the Belle Isle report -- that the winds
6 in the -- underground, exceeded 300 miles an hour
7 following that blast.

8 Q. Would the effect of an explosion in an
9 underground mine be a whole lot like an explosion in a
10 shotgun barrel? Is that what we're talking about, that
11 kind of --

12 A. Yes, I guess so, if you would think of the
13 collar of the shaft or the surface of the shaft as
14 being the outlet of the barrel.

15 The difference is, I guess in a shotgun you'd
16 have all kinds of particles could come flying down
17 through there, whereas in the mine you're basically
18 dealing with atmospheric overpressures, unless there's
19 some equipment flying around to hit you.

20 But I would -- Yeah, that's a pretty good
21 analogy, I think.

22 Q. You've heard testimony here, Mr. Traweck,
23 that the potash people often refer to the Belle Isle
24 report and what happened there, and they also refer to
25 the Kane Creek disaster, which was a potash mine --

1 A. Uh-huh.

2 Q. -- when talking about their concerns over
3 getting methane in these -- in the underground mines.

4 A. That's correct.

5 Q. In fact, I think that was referred to by
6 someone as yellow journalism.

7 A. I believe I recall that.

8 Q. Is there any basis for the potash industry to
9 be concerned with methane gas, given what happened at
10 Belle Isle and Kane Creek?

11 A. There most certainly is, yes.

12 Q. Would you relate to the Commissioners here
13 how that's relevant to the concerns of the potash
14 industry in southeast New Mexico?

15 A. Prior to the Belle Isle disaster, nobody in
16 the potash basin -- operators, union people, government
17 -- nobody paid much attention to the methane that was
18 encountered there, and there are trace amounts that are
19 encountered in the potash basin. The reason was,
20 history had shown it to be no real problem. Government
21 believed that, and there's no doubt in my mind they
22 did. I happened to be working for the government at
23 the time.

24 When Belle Isle occurred, during the course
25 of that investigation, the government suddenly became

1 aware of an event that occurred in 1963. Now, I guess
2 I shouldn't say that they suddenly became aware of it,
3 because that information was always there. But nobody
4 talked about it, nobody had remembered it.

5 And as a part of the accident investigation
6 team, a gentleman came up to me one day and said, You
7 might be interested in this. Handed me a copy of the
8 Kane Creek disaster report, which I still have that
9 original copy, and it happened to be in a potash mine,
10 it happened to have -- Characteristics of the explosion
11 and the events prior to the explosion were in many ways
12 virtually identical to what had happened in Belle Isle.

13 And I remember very well all of a sudden the
14 government said, Wait a minute, we've got three areas
15 here that essentially deal with salt or salt-type
16 formations. We've got three areas here that we know
17 have some gas in them of some type. And therefore,
18 that means -- Two of them have already blown up, the
19 third one is getting ready to, and we're going to go
20 down there and do something about it.

21 And they came into the area -- I was with the
22 government at the time; I remember when the decision
23 was made. I did not --

24 Q. When you say they came into the area, what
25 area are you talking about?

1 A. They came into southeast New Mexico -- and I
2 did not go in with them, but I recall when they sent
3 the team in -- with the intent of classifying the
4 Carlsbad mines as gassy, based on Belle Isle and Kane
5 Creek.

6 MR. HIGH: Those reports we have attached
7 here as Exhibits 16 and 17, and we would offer those at
8 this time, Mr. LeMay.

9 CHAIRMAN LEMAY: Without objection, Exhibit
10 16 and 17 will be admitted into the record.

11 Q. (By Mr. High) Once MSHA sent this team into
12 the potash basin, Mr. Traweek, to classify the potash
13 mines in southeastern New Mexico as gassy, were they
14 successful in doing that?

15 A. I think they thought at first they were, and
16 if I'm not mistaken -- I stand to be corrected here,
17 but I believe that was at Kerr-McGee where they
18 attempted to do that initially. And no, they were not
19 successful.

20 Q. All right. And what happened when they tried
21 to classify some of the mines gassy in the potash
22 basin?

23 A. To be blunt about it, I'd say the potash
24 industry kind of got up in arms and started doing an
25 awful lot of work, put a tremendous amount of pressure

1 on the regulatory agencies, trying to convince them
2 that, you know, you're barking up the wrong tree here.
3 We're not Kane Creek and we're not Belle Isle.

4 And as I understand, they eventually got some
5 kind of a stay where they actually could not enforce
6 the gassy-mine standards in the New Mexico potash
7 basin, pending development of new standards, or pending
8 at least a look at the standards to see if they were
9 applicable to southeastern New Mexico.

10 Q. And were the gassy-mine standards in fact
11 reviewed and revived with the federal government as a
12 result of those efforts?

13 A. Yes, they were.

14 Q. So the gassy-mine standards that you referred
15 to earlier are those that were adopted after MSHA
16 attempted to classify the potash mines as gassy?

17 A. They were attempting to classify the potash
18 mines gassy under the previous -- under the existing
19 standards --

20 Q. Right.

21 A. -- which were essentially coal-mine
22 standards, really didn't fit what was happening in
23 potash at all.

24 Q. Okay. And under the new safety standards for
25 methane in potash mines, what type of a different

1 approach was taken?

2 A. The approach was -- and by the way, I want to
3 make it very clear here that from -- and I changed from
4 the government to private industry right in this --
5 right in this era here. In fact, I was on the
6 government side during the Belle Isle thing and a
7 little bit after that, and then I was actually involved
8 to a minor degree in some of this work, development of
9 the standards, very minor degree.

10 The approach that was taken by the potash
11 industry -- and before long it went to a lot larger
12 area than just the potash industry. It became a
13 nationwide thing, virtually all segments of the mining,
14 of metal/nonmetal mining got interested in this process
15 and got involved in it and submitted proposals.

16 And you wound up with what I call a
17 categorization approach to gassy mines, and that simply
18 means that you go into certain areas and you establish
19 a set of standards that deal with the potential hazards
20 in those areas, rather than painting everybody with
21 this same broad brush, which didn't suit what was
22 really going on.

23 And that's what we have in effect today.

24 Q. Would it be a fair statement to say that
25 after the Kane Creek disaster and after the Belle Isle

1 explosion and the adoption of these new mine safety and
2 health regulations, that the standards changed from one
3 being where you would classify a mine gassy and have it
4 do things following an explosion, to a philosophy where
5 every mine, everywhere, would do things in advance to
6 try to prevent explosions?

7 A. It shifted from closing the gate after the
8 horse got out to trying to head off those types of
9 things and deal with what potentials were there ahead
10 of time, yes.

11 Q. Now, in your opinion, Mr. Traweck, is the
12 concern of the mines in the potash basin over the
13 possible migration of methane gas into their mines from
14 oil and gas wells overstated? Are they being alarmist
15 in any way?

16 A. Not at all.

17 Q. Do you think it's a legitimate concern?

18 A. I think it's a legitimate concern, just from
19 the concern, the safety point of view. I also think
20 it's a moral obligation of the mine operators too, to
21 take that position, ethical obligation.

22 Q. Are you aware of any evidence of the possible
23 migration of oil or gas in the basin?

24 A. Yes, I am.

25 Q. And relate to us, if you will, what evidence

1 there is of possible migration of oil and gas into the
2 underground mines in New Mexico.

3 A. Well, there's two different levels here. One
4 of them has to do with the gas that I mentioned that is
5 in the workings, that is in the deposit. There is gas
6 in the deposit. It is not flammable gas, and it is not
7 hazardous gas, and there's not very much of it,
8 apparently.

9 You've heard, I think, in the testimony here,
10 you've heard continued reference to drilling relief
11 holes or bore- -- or holes at intersections.

12 Within the deposit, and I hope that's become
13 clear to you by now, you're not talking about a solid
14 formation that has no seams, that has no cracks in it.
15 You have -- Every so often you have what I will refer
16 to as marker beds, and they are -- You can also refer
17 to them as clay seams if you want. Some of them are
18 tiny, some of them are quite -- several inches. Those
19 seem to be pathways by which gas can migrate around
20 within an existing potash bed.

21 When you start mining in the vicinity of
22 those, you build up stresses, as Mr. Grosvenor pointed
23 out to you, you build up stresses around the workings,
24 which either -- which do two things, in my opinion:
25 They both move those gases across those partings, those

1 mud seams, we call them, and they pressurize the gas.
2 I think they increase the pressure on the gases that
3 are already in there under some pressure.

4 So you drill one of these relief holes up.
5 And not every one, but you hit some very high-pressured
6 gas, enough that you could be standing there in a six-
7 or eight-foot room and dust the floor with the pressure
8 coming out of that hole.

9 Now, that's not explosive gas. That's
10 largely nitrogen. The government knows about it. The
11 government accepts it. We handle it, and we know how
12 to deal with it in the potash industry. And when I say
13 "we", I'm reverting back to my experience as a
14 superintendent a few years ago.

15 And that's one type of gas. And yes, it does
16 migrate within its -- within the workings.

17 The second type of gas and oil -- and I will
18 shift that back to oil because I do not know of any
19 real evidence of gas related to that, but I think
20 it's -- probably can be assumed. There have been oil
21 seeps that have occurred within the potash beds that
22 are known and are documented. One of them occurred in
23 the National Eddy Mine in 1965 where they encountered
24 oil in their workings actually seeping out of the beds.

25 Now, in all of the literature I've ever

1 reviewed and all the people that I've talked to and the
2 experts that I've talked to on potash, there are no
3 naturally occurring oil or flammable methane gas
4 deposits within the potash member itself, within that
5 area. Certainly no oil within that area at all.

6 So here you are mining along within that
7 potash member, and you encounter oil, and something has
8 gone wrong. Some way or other, that oil has gotten in
9 there. That's not a natural inclusion.

10 National Eddy conducted a study in 1965 based
11 on their oil seep, and the conclusion was that the
12 likelihood was that that migrated from an oil well a
13 distance -- I believe it was some, as I recall, some
14 700 feet away from that.

15 Subsequent to that, in 1973, PCA, about
16 roughly 900 feet away from another mine but about 900
17 feet away from the original National Eddy oil seep,
18 also encountered an oil seep. And at that time when
19 they first encountered it, I believe it was on like a
20 main haulageway or a main development drift.

21 They kind of backed off, drilled a borehole
22 through the area and reported, I believe, seven -- I
23 believe it was seven different indications of oil
24 within a 340-foot section within that borehole they
25 drilled.

1 They kind of backed off their drift, the
2 direction they were going, and kind of moved around to
3 the side and kept on moving, a short time later, and
4 encountered oil again. They drilled another borehole,
5 and in that case they found two different oil deposits
6 about 15 feet apart, I believe, on the horizontal at
7 that place, oil stains.

8 It's kind of sketchy documentation on it, but
9 there is reference within that PCA study to, I believe,
10 abandoned oil wells approximately a thousand feet away,
11 and they believe that was the source of the oil.

12 The oil came from somewhere. It was not
13 included with that deposit, in my opinion.

14 Q. And let me refer you to Exhibit Number 14.
15 When you refer to the absence of any naturally
16 occurring methane, I take it you're referring at least
17 in part to the study prepared by Dr. George Goodwall?

18 A. Yes, I am.

19 Q. Do you have Exhibit Number 14?

20 A. Yes, I do have it.

21 MR. HIGH: We would offer Exhibit Number 14
22 into evidence, Mr. LeMay.

23 CHAIRMAN LEMAY: Without objection, Exhibit
24 14 will be admitted into the record.

25 THE WITNESS: I think there was one other

1 indication of oil in the potash area, if you'd like me
2 to cover that while we're here.

3 MR. HIGH: Well, why don't we wait for --

4 THE WITNESS: Okay.

5 MR. HIGH: -- Commissioner Carlson to come
6 back? I'd like for him --

7 THE WITNESS: Okay.

8 MR. HIGH: -- to hear this also, if we can.

9 COMMISSIONER WEISS: Say, Charlie, what are
10 your exhibits, this report your witness is talking
11 about?

12 MR. HIGH: George Griswold, where there's no
13 methane?

14 COMMISSIONER WEISS: About the oil seeps. Is
15 it one of these?

16 MR. HIGH: Yes, sir, it's going to be Exhibit
17 Number 19.

18 Q. (By Mr. High) I'm sorry, is there something
19 that you wanted to add, now that Commissioner Carlson
20 is here?

21 A. There was one other, and there may be more,
22 but there was one other oil seep or oil encounter
23 within the potash horizon that I was aware of. And
24 that had to do with -- I believe it originated out of
25 WIPP.

1 When they first started coming in, they
2 became concerned about so-called breccia pipes in the
3 area. And a breccia pipe is -- Some people even refer
4 to them as chimneys. It's a vertical, cylindrical
5 formation, approximately vertical, that penetrates
6 through the salt beds, through the potash member, and
7 who knows where else. It goes up, it's a vertical
8 thing. It's not a hollow -- It's not a pipe; it has
9 material in it. But it is a discontinuity within the
10 ore beds.

11 WIPP became concerned about breccia pipes and
12 decided to do some drilling. In addition to which I
13 believe Mississippi Chemical, I believe it was, had
14 encountered a breccia pipe in their mining process.
15 WIPP set up and drilled into the surface into the core
16 of some of these chimneys, some of these breccia pipes,
17 did encounter salt seeps that had migrated up the
18 breccia pipes. They were not natural to the breccia
19 pipes in the sense that -- an in-place deposit there.
20 They had migrated to where they were.

21 They went down near the -- Mississippi
22 Chemical -- breccia pipe underground, moved out from
23 the breccia pipe, drilled a vertical hole. And I
24 believe about 140 feet, I believe, from the edge of the
25 breccia pipe, they encountered an oil seep within the

1 salt member.

2 Now, the theory behind it -- and it's only a
3 theory, I understand -- is that that migrated, the oil
4 migrated up the breccia pipe from oil deposits, oil
5 pools below, through hydrostatic pressure. I believe
6 I've read that.

7 Q. Are some of the material that you referred
8 to, Mr. Traweck, in Exhibit Number 19 in that book in
9 front of you?

10 A. Uh-huh. Yes, it is.

11 Q. Does that deal with the oil spot or seep at
12 PCA?

13 A. At PCA and at National.

14 Q. This is part of Exhibit Number 19, and is
15 this -- discusses, I take it, the oil spot you were
16 telling us about?

17 A. Yes, it does, uh-huh.

18 Q. And this oil was certainly found in the
19 potash bed, right?

20 A. Yes, it was.

21 Q. The same level?

22 A. Yes, it was. It was actually found by one of
23 their advancing headings.

24 Q. And how far was it from the nearest oil well?

25 A. I believe on the PCA one, they talk about

1 being about a thousand feet away, I believe, from the
2 nearest, that last paragraph, seeps approximately 600
3 feet below the surface and 1000 feet from the nearest
4 abandoned oil well in the Getty Pool. I believe
5 there's even a reference to being about halfway between
6 two abandoned oil wells, a thousand feet away from
7 either one.

8 Q. All right. I notice the last sentence in
9 paragraph 1 says, A core test, PCA 107 --

10 A. Uh-huh.

11 Q. -- shown in Section 5 on Figure 1, had seven
12 zones of oil-stained --

13 A. -- core --

14 Q. -- core over an interval of 304 feet in the
15 salt section.

16 A. Right.

17 Q. Do you see that?

18 A. Right.

19 Q. Let me --

20 A. That's the one that I mentioned a minute ago.

21 Q. All right. Let me put the figure 1 on there
22 so we can take a look at it.

23 Now, is that the one you was telling us about
24 a minute ago?

25 A. Yes, it is. And my understanding is, they

1 were driving down this way in this heading, encountered
2 that oil seep, did do the corehole, and encountered the
3 seven zones.

4 And as you can see obviously there, they
5 said, Well, we're going to go around that. And they
6 backed off and went around to the side and then
7 encountered it again down here.

8 Q. So the mine actually changed direction
9 because it ran into the oil seep?

10 A. As a result of the oil, yes.

11 Q. And the nearest well from that oil seep was
12 how many feet?

13 A. I believe they say a thousand feet from an
14 abandoned well, roughly.

15 Q. Can you tell us what that distance is from
16 the Continental Chase oil test out to the seep?

17 A. 1400 feet to the initial one, and it looks
18 like 900 there, so they must have averaged that one and
19 said 1000, yes.

20 Q. What would it suggest to you if an oil seep
21 was found in an underground mine at 1400 feet from an
22 oil well with respect to the possible migration of oil
23 in the potash basin.

24 A. Short of some other source like a breccia
25 pipe or other oil wells or other wells, I would

1 certainly think it would have to come from that hole.

2 And I think that's also verified by the
3 corehole. It also picked up oil other than in the face
4 itself.

5 I think the other important thing here is
6 in -- and the drawing's not here, but the National
7 encounter was only about 900 feet away from these
8 particular encounters.

9 Q. All right. And let me -- The National one,
10 let me just put it on here, since you've referred to
11 it. Is that the incident you referred to?

12 A. Yes, it is.

13 Q. And what happened there, Mr. Traweek?

14 A. Again, they were just mining along, and they
15 encountered an oil seep in their -- oil stain, I guess
16 they called it, three or four oil stains, two separate
17 entries in the panel, and they backed off of it.

18 I believe the US -- Yes, paragraph 4, USGS,
19 US Geological Service [sic], got involved in the
20 investigation, and they determined that the well --
21 that it was migration from Getty Number 1 and that that
22 well had been improperly -- had not been properly and
23 adequately sealed.

24 I think the other thing that's interesting
25 there is, they continued that over into some other --

1 It is my understanding that this led further to a check
2 of several other wells in the Getty Pool, which the
3 findings were the same: They were not sealed either.

4 Q. And what did the mine do when it encountered
5 the oil seep? If you would, in reference to paragraph
6 3.

7 A. Uh-huh. They discontinued their operations
8 so that it could be investigated, and they transferred
9 their operations into other areas where their oil was
10 not.

11 Q. And the closest well to this seep --

12 A. About 700 feet.

13 Q. And what would it suggest to you, Mr.
14 Traweck, as a person trained in safety, if you have an
15 oil spot in an underground potash mine in which the
16 evidence indicates it's not naturally occurring, and
17 it's within 700 feet of an oil well?

18 What does that suggest to you with respect to
19 possible migration?

20 A. I would certainly suspect the nearest source,
21 and if I didn't have a breccia pipe or something else,
22 I would go to the nearest oil well.

23 And beyond that, I think that my suspicion
24 has been backed up by somebody else, other than myself.

25 And one thing else that I think might be

1 important here -- at least it is to me, and I'd like to
2 state it. These oil seeps did not migrate through
3 broken-up ground that had been broken up by mining or
4 under stress or whatever from mining.

5 It apparently -- Based on the readings I have
6 of it, it apparently migrated through unmined sections
7 of the potash area which were not cracked or not broken
8 unnaturally by mine stresses.

9 So I think that shows you there is a way
10 things can migrate regardless of the source. The oil
11 did migrate through those.

12 Q. All right. Let me refer you, Mr. Traweck, to
13 Exhibit Number 18, in referring to a WIPP encounter
14 with oil spots earlier in your study of it.

15 A. Uh-huh.

16 Q. Look at Exhibit Number 18 in your study, if
17 you will.

18 A. Okay.

19 Q. Do you have that in front of you?

20 A. Yes, I do.

21 Q. Is that the study you were referring to?

22 A. Yes, it is.

23 Q. And this is a study prepared for the
24 Department of the Interior?

25 A. Yes, it is.

1 Q. And do you know who Dr. Kadaveri [phonetic]
2 is? Is this -- I'm sorry, this is Snyder and Garth, is
3 it not?

4 A. Yes, it is. No, I don't know those
5 gentlemen. No, I do not.

6 Q. This was not prepared for the potash
7 industry, was it?

8 A. It certainly was not.

9 Q. Let me refer to page 28, put it on the screen
10 where others can see.

11 In the second paragraph from the top it says,
12 At some time minor amounts of oil migrated from the
13 Yates formation upward into the Salado.

14 A. Yes.

15 Q. What would that suggest to you, Mr. Traweek,
16 as someone trained in safety with respect to the
17 possible migration of oil and gas in the potash basin?

18 A. I would say that if you gave any avenue of
19 migration, that you would get the same response from
20 the oil. You would have an upward migration, any --
21 whether it's a natural or a manmade pathway.

22 Q. Let me refer you now to page 31 and call your
23 attention to the next-to-the-last paragraph where it
24 says, Oil smears were found on the core from WIPP 16,
25 just as they were in WIPP 31.

1 A. Uh-huh.

2 Q. In WIPP 16, the rocks containing these smears
3 were anhydrite, halite and dolomite of the Rustler
4 formation.

5 A. Uh-huh.

6 Q. (Analysis of this oil was reported by
7 Palacas...) and others in 1982.

8 A. Right.

9 Q. That was, as I understand it, oil spots in
10 the area of the potash beds away from the breccia pipe,
11 was it not?

12 A. Yes, I believe it was. I believe it was in a
13 corehole that was away from the -- I believe, from the
14 breccia pipes, yes.

15 Q. And as someone trained in safety, what would
16 that suggest to you, Mr. Traweck, with respect to the
17 possible migration of oil and gas in the potash basin?

18 A. Somewhere in that area there's a source, and
19 I'd like to know what it is and know where it's
20 migrating from. That did not -- In my opinion, was not
21 in place within the beds without migrating in from
22 somewhere else.

23 Q. You can turn that off now, if you would like.

24 A. Okay.

25 Q. In your opinion, Mr. Traweck, and given the

1 material that you've reviewed, do you have an opinion
2 on whether or not it is possible for methane gas to
3 migrate into an underground potash mine if it's
4 released in the potash basin?

5 A. I would certainly imagine that if you have
6 oil migrating across the potash bed, that methane gas
7 would probably migrate much easier. Yes, I think it
8 certainly is possible. And I think it's not only
9 potash, I think it's occurred.

10 And I wonder if we had been able to -- if we
11 had taken the time to measure some of these oil seeps,
12 if we might not have detected methane at that time. I
13 found no record that we did check for methane at that
14 time.

15 Q. If you had to advise this Commission on
16 whether or not to allow these four wells from a safety
17 standpoint, would you tell them to allow the wells or
18 not to allow the wells?

19 A. I would tell them not to allow the wells in
20 their present form as they're desired to be drilled.

21 Q. And why is that?

22 A. I think you're providing those types of
23 avenues, I think testimony here has indicated that.

24 Certainly nobody plans for that happening. I
25 think the oil industry has indicated that they would

1 plan so that it wouldn't happen, and yet I think we can
2 see that it has happened, not only here but it's
3 happened in other areas. Things do go wrong, they go
4 wrong in mining. I'm sure they go wrong in the oil
5 industry.

6 I think you're just providing avenues for
7 those types of events to occur, and I think that -- I
8 think if you open the door for that type of activity,
9 whether it's Yates or somebody else, I think sooner or
10 later it will occur.

11 Q. You heard Mr. O'Brien come in here and
12 testify that although he had never been in an
13 underground mine, he thought a pillar of 125 or 150
14 foot would be okay.

15 What's your response to that?

16 A. I would not want to work in that mine, I can
17 tell you that.

18 Q. Is there a difference from a safety
19 standpoint, Mr. Traweck, in a hole that is dry, plugged
20 and abandoned, and one that is drilled to a depth of
21 8500 feet and may have a bottomhole pressure of
22 somewhere in excess of 2000 p.s.i.?

23 A. Certainly there's a difference. However, I
24 want to make it very clear, I'd be very concerned about
25 both, be very concerned about both, less concerned

1 about the one that was dry and plugged and abandoned,
2 but certainly concerned, and increased concern over the
3 deeper hole, yes.

4 Q. You are aware that there are some wells in
5 the known potash area -- In fact, there's three on the
6 leases of New Mexico potash. You're aware of that, are
7 you not?

8 A. I believe I am, yes, sir.

9 Q. And that New Mexico Potash has mined in some
10 proximity to those?

11 A. Yes, sir.

12 Q. Do you know when those wells were drilled?

13 A. My understanding is -- I don't have exact
14 dates, but I was given a range of in the 1940s to early
15 1950s, in that range.

16 Q. Has there been a change in governmental
17 regulation and consequences since that took place?

18 A. Most assuredly, yes. What we could do in the
19 1950s, what we could do in the 1970s, we cannot do --
20 What we could do in the 1980s, we cannot do now.
21 Simple as that.

22 Q. So just because a well may have been drilled
23 and mined around in the 1940s and the 1950s doesn't
24 mean that under current-day standards you could do the
25 same thing?

1 A. No, you could not, not in my mind. Or you
2 probably could, but you would be foolish to do that,
3 yes.

4 Q. You are aware under R-111-P that wells no
5 deeper than 5000 feet are required to have a spacing
6 from underground potash of a quarter mile or 110
7 percent of the depth of the ore, and those deeper than
8 5000 feet are required to be spaced at least one half-
9 mile, are you not?

10 A. Yes, I am.

11 Q. In your opinion, Mr. Traweek, as someone
12 trained in safety, would you advise this Commission to
13 grant an exception to that standard and allow an oil
14 and gas operator to drill closer than either of those
15 two requirements?

16 A. I certainly would not.

17 Q. Are you even comfortable with those two
18 requirements?

19 A. I'm definitely not, and I'm definitely not
20 comfortable with them if they were in an interior
21 location as opposed to the perimeter of an operation.

22 Either way, I'm not comfortable with them,
23 but I would be less comfortable if they were in the
24 middle of a mine.

25 Q. Do you think even at one-fourth mile and even

1 at one-half mile, that the underground potash mines are
2 at some risk from the possibility of methane gas?

3 A. In my opinion, they would be, and I say that
4 simply because I don't think any of us know. I don't
5 think I know, I don't think the oil industry knows. I
6 think -- I don't know where that figure came from,
7 those dimensions. I suspect they're arbitrary, but I'm
8 not comfortable with them. I'm really not.

9 Q. Are you aware of any studies that say it's
10 safe to allow an oil or gas well closer than one-fourth
11 mile or one-half mile?

12 A. No, I'm not.

13 Q. Do you think it is an acceptable approach
14 from the safety standpoint to allow the drilling of oil
15 and gas wells closer and closer and closer until you
16 kill somebody, and then back off and say that's as
17 close as you can get?

18 A. Obviously not, I'm in the safety business.
19 And even if I were not -- if I was -- I guess I
20 couldn't be any more concerned. But if I was in the
21 operations end of the thing I would be equally as
22 concerned; I'll put it that way too. It's a bad way to
23 do it. You keep moving until you hurt somebody and
24 then you say, Well, now we know the limit. That's not
25 the way to do it.

1 Q. By observing the one-fourth and one-half mile
2 standard, do you know whether or not that has been able
3 to prevent any disasters from methane gas in the potash
4 basin?

5 A. Safety is a funny business and, you know, my
6 boss at present comes to me all the time and says, I'm
7 going to give you X number of dollars; you show me X
8 number of accidents you have prevented. And I can't
9 really do that, although he knows -- and I know he does
10 that jokingly, because he knows and I know that without
11 those dollars I'm not going to prevent the accidents.

12 No, I cannot positively testify that I know
13 there have been disasters or accidents prevented by
14 observing that, but -- in the lease. But it's
15 certainly a good practice. I wish we knew more about
16 it.

17 Q. If by using that standard we have had a 100-
18 percent success rate in preventing loss of life in
19 underground mines from methane, is that any argument to
20 let oil and gas move in closer?

21 A. It certainly is not.

22 MR. HIGH: We would pass the witness, Mr.
23 LeMay.

24 CHAIRMAN LEMAY: Thank you.

25 Your witness, Mr. Carroll.

1 MR. HIGH: I'm sorry, let me also offer into
2 evidence something we referred to, the safety
3 standard -- federal Safety Standards for Methane in
4 Metal and Nonmetal Mines. We would offer this as
5 Exhibit Number 55, I believe it would be.

6 CHAIRMAN LEMAY: Okay, without objection,
7 Exhibit 55 will be admitted into the record.

8 CROSS-EXAMINATION

9 BY MR. CARROLL:

10 Q. Mr. Traweek, the exhibit that's in the
11 exhibit book of the Belle Isle explosion disaster
12 report omits the body of the report, does it not?

13 A. I'd have to look at it and see. Do you know
14 what the exhibit number is?

15 MR. HIGH: I believe --

16 MR. CARROLL: Eighteen or 19, I'm not sure.

17 MR. HIGH: Seventeen.

18 MR. CARROLL: Seventeen.

19 MR. HIGH: I prepared --

20 THE WITNESS: Yes, it does, Exhibit 17. Yes,
21 I believe it does. It omits quite a bit of it, yes.

22 Q. (By Mr. Carroll) It left out quite a bit of
23 the body of the report --

24 A. Yes, it did.

25 Q. -- which was background, wasn't it?

1 A. Yes, it was.

2 Q. One of the items of background that it left
3 out is that the gas and oil -- or the problem that we
4 had here was naturally occurring in this particular
5 salt domal area, wasn't it?

6 A. During our investigation there was one theory
7 that the gas in the mine had migrated from nearby gas
8 wells. I personally do not believe it did, and I don't
9 believe that we wound up thinking that, all -- any of
10 us, on --

11 Q. In fact, that was not a finding of your
12 committee, was it?

13 A. No, I don't believe we agreed with that.

14 Q. The -- In fact, in the historical background
15 part, beginning on page 10 of the report, reflects that
16 even back as early as 1900s, there were encounters of
17 gas naturally occurring, and that was long before the
18 oil and gas wells had begun to be drilled out there?

19 A. Yes, sir.

20 Q. And in fact, the concentrations of methane
21 gas were reported in page 15 of your report to be such
22 as this, it said concentrations of methane gas were in
23 sufficient amounts for Cargill mining engineers to
24 consider using the methane gas commercially to heat
25 oyster shells to make a soda-ash by-product.

1 In other words, there was a tremendous amount
2 of gas down there in this salt domal area, wasn't
3 there?

4 A. Yes, there was.

5 Q. And there was a history of incidents, minor
6 explosions and some injuries, prior to the one in 1979
7 in this particular Belle Isle mine, wasn't there?

8 A. No, there was not.

9 Q. None whatsoever?

10 A. None at all.

11 Q. Well, starting at least --

12 A. Now, maybe you should define what you mean by
13 "explosion".

14 Q. Well, outbursts.

15 A. Yes, there was.

16 Q. And in fact, one of those outbursts that
17 occurred in 1976 was sufficient to shut the mine down
18 for approximately the six-day period that you talked
19 about?

20 A. Yes, it was.

21 Q. And in fact, during these -- one of the
22 things that were reported in this report, the body of
23 the report that's missing, is that inspectors for --
24 and I'm not sure if it was MESA or MSHA at that time --
25 had grown concerned about this, but there was pressure

1 put on them not to report it; isn't that true?

2 A. That's exactly correct.

3 Q. And in fact, there was an imminent danger
4 order issued on this mine back in March of 1977?

5 A. Yes, there was.

6 Q. And in fact, when you reported the cause of
7 the explosion in questioning by Mr. High, the cause
8 was, in fact, faulty electrical equipment?

9 A. Faulty or damaged, we never were quite able
10 to determine. There was one theory that the electrical
11 equipment was in good shape, and it was damaged by the
12 force of the outburst itself prior to the ignition, but
13 we were not able to determine that.

14 Q. But your reporting group went on to find
15 another cause, cause of the disaster, and you stated in
16 this report, The cause of the disaster was a general
17 failure by MSHA and Cargill management to recognize the
18 serious hazards of the blowout phenomena with the
19 sudden and violent release of large quantities of
20 flammable gas into the mine atmosphere and a failure to
21 correlate the significant events that should have
22 indicated the potential for a major flammable gas
23 explosion.

24 That was the cause of the disaster, was
25 human, wasn't it?

1 A. Very much so.

2 Q. There was not a single finding, as you told
3 us, by your report group that oil and gas drilling
4 contributed to this explosion or this disaster?

5 A. I don't think we even discussed that.

6 Q. As for the Kane Creek disaster, there was no
7 finding in the report on the Kane Creek disaster that a
8 contributing cause of this explosion or disaster was
9 oil and gas drilling, was there?

10 A. No.

11 Q. In fact, they don't even allow oil and gas
12 drilling in that area, did they?

13 A. That I don't know.

14 Q. This is also an area of extremely high
15 faulting and problems with that kind of phenomenon?

16 A. I understand that. I was never in the Kane
17 Creek mine.

18 Q. At least as a result of these disasters,
19 there was some revamping of the rules and regulations
20 of mines and how they deal with methane, and that's
21 basically what --

22 A. No, I wouldn't say that.

23 Q. Well, sometime after those explosions we have
24 what --

25 A. That's right.

1 Q. -- we've just identified as Exhibit 55?

2 A. That's right, but for another reason.

3 Q. Okay, but it does deal with safety, and it
4 does deal with the encountering of methane gas, does it
5 not --

6 A. Yes, it does.

7 Q. -- these safety standards?

8 And in fact, the procedures that are set
9 forth is that if during some of this testing, which you
10 say is one of the requirements that you go to each of
11 the working faces and someone, whether it's a shift
12 foreman or a safety manager, he has to go in there with
13 a gas- or some kind of methane-measuring device, does
14 he not?

15 A. Yes, he does.

16 Q. And that's what he's measuring on this as
17 each shift changes. It's for measuring for the
18 presence of methane gas; is that correct?

19 A. Yes, it is.

20 Q. Now, if methane gas is actually encountered,
21 it would have to be reported, wouldn't it?

22 A. At certain -- Well, there's a little bit of
23 question on that. But at certain levels I would say
24 yes.

25 Q. Okay. Well, let's say it starts getting into

1 the level of being unsafe. And then if it's reported
2 to MSHA, MSHA can then take some sort of action on that
3 report, couldn't it? That would be one of the possible
4 things --

5 A. Yes, they can.

6 Q. The order to stop -- The imminent-danger
7 order could order them to change their classification,
8 could it not?

9 A. Certainly could.

10 Q. And if it were to decide to change its gas
11 classification from Category -- I think it's from IV to
12 III, in that -- The way it would be, the III is the
13 gassy mine?

14 A. Yes, it is.

15 Q. They would notify the mine operators; isn't
16 that correct?

17 A. Yes, it is.

18 Q. And the report that they have to do -- it
19 provides in Exhibit 55 some of the steps for changing
20 this category placement -- is that they have to decide
21 whether or not the conditions encountered are transient
22 or permanent; isn't that one of the things?

23 A. I believe it is.

24 Q. And basically what they do is they go in and
25 they study the situation, allow management for a period

1 of -- because this change notice is not automatic at
2 that point in time, it allows for a hearing period or
3 an appeal process and that sort of thing, and the
4 original classification stays in place while you're
5 hearing this evidence in the appeal process right?

6 A. Uh-huh.

7 Q. And isn't it your opinion that if this were
8 -- Let's say there was a gas leak into one of the
9 working faces that's coming from an oil and gas well,
10 we found it, and MSHA orders a change order.

11 If it could go in and plug this well or stop
12 the leak, that would be one of the things taken into
13 consideration by MSHA, whether or not to make the
14 change order permanent, wouldn't it?

15 A. I don't believe so.

16 Q. You don't believe so?

17 MR. HIGH: Mr. LeMay, excuse me, I'm going to
18 object. I'm not sure where counsel is going, but he's
19 asking this witness now legal questions on what the
20 government's going to do, and I think it's interesting,
21 and I'd be interested in Mr. Traweek's opinion, but I
22 don't know that he can answer legal questions.

23 CHAIRMAN LEMAY: Well, he can state that,
24 certainly, yeah, that it's legal and he's not qualified
25 to answer a legal assumption.

1 Q. (By Mr. Carroll) If MSHA can't prove its --

2 MR. CARROLL: And I'm not sure -- Was I told
3 not to go forward?

4 You're leaving it up to the witness to tell
5 if he's --

6 CHAIRMAN LEMAY: Oh, I think so, if he's
7 comfortable. Isn't that your point? If he's
8 comfortable answering it and feels an expert, fine.
9 But if he's not, he can certainly say it's a legal
10 question, beyond my expertise.

11 MR. CARROLL: That's what I took, and I was
12 afraid I was assuming too much.

13 MR. HIGH: I just don't want this witness
14 proclaiming what the law is, because --

15 CHAIRMAN LEMAY: Oh, no, we don't qualify him
16 that way. I don't think he's qualified that way. But
17 he can say that.

18 Q. (By Mr. Carroll) If MSHA can't establish
19 that this is a permanent condition, do you believe the
20 classification is going to be changed?

21 A. I believe once you have an encounter, once
22 you get gas into the mine, it is a permanent condition,
23 under this scenario right here.

24 It occurred once, it could occur again.
25 Therefore, the potential is permanent, and MSHA is

1 going to reclassify your mines, all of your mines, to
2 Category III so that in the event that this unplanned
3 incident happened again, you're not going to hurt
4 anybody when it happens in the future.

5 And that has become a permanent potential
6 which MSHA would address. That's my personal opinion.

7 Q. Well, can you tell me why on page 8, under
8 (d), it says, The Administrator shall promptly appoint
9 an MSHA committee to investigate the occurrences
10 reporting in accordance with paragraph (a) [sic] --

11 A. Uh-huh.

12 Q. -- and it says, "These investigations may
13 include an evaluation of the following:" Number (6),
14 "Whether the occurrence is isolated, continuous or
15 could recur".

16 Why would you go into that unless --

17 A. If I was appointed to the committee -- and
18 while I worked for the government I was appointed to
19 similar committees -- I would go in there and say, It's
20 occurred once, it could sure recur again. And I would
21 say this is a permanent possibility, therefore they
22 have to -- they have to have their mine address that
23 possibility. It only takes one time, and you've got
24 the whole mine. You'll kill everybody underground, the
25 possibility of killing everyone underground.

1 Q. Well, only if there's an explosion do you
2 have a possibility of killing people underground; isn't
3 that correct?

4 A. That's correct, but if you --

5 Q. That's right.

6 A. Well, go on.

7 Q. And you are aware that --

8 MR. HIGH: Excuse me, Counsel is cutting off
9 the witness when he's trying to answer a question here.

10 CHAIRMAN LEMAY: Do you have anything else to
11 say?

12 THE WITNESS: I'd just say if you get methane
13 in there, you have that possibility. And in the types
14 of operations that are run from Carlsbad, it's a very
15 real possibility because you do not have permissible
16 equipment.

17 Q. (By Mr. Carroll) But you do have testing at
18 each change of shift, don't you?

19 A. Too late. If you encounter that, it's too
20 late. You don't have time to test and say, Oh, well,
21 let's get on out of here. The place is already gone if
22 you suddenly encounter it.

23 Q. So testing is ineffective; is that what your
24 conclusion is?

25 A. Testing is ineffective in terms of a sudden

1 unplanned encounter with methane gas that would migrate
2 into the mine.

3 Q. You're not a geologist, are you, Mr. --

4 A. No, I'm not.

5 Q. -- Traweek?

6 And you've never been qualified as a
7 geologist, have you?

8 A. No, I have not.

9 Q. You reported from a number of studies done on
10 oil seeps in the potash basin just a moment ago, didn't
11 you?

12 A. I answered questions on them, yes, sir.

13 Q. And you were present when a geologist, Brent
14 May, from Yates Petroleum, talked about each one of
15 those very same reports, weren't you?

16 A. I was present, I believe, when Mr. May
17 talked, yes.

18 Q. And Mr. May reached exactly the opposite
19 conclusion that you reached, didn't he?

20 A. I don't believe -- As I recall, and I'm not
21 trying to put words in Mr. May's mouth, I don't believe
22 he was that familiar with mining as it really occurs in
23 the potash basin.

24 Q. But he was very familiar with geology and
25 those oil seeps and those reports, wasn't he?

1 A. Geology in a basin that has not been
2 disturbed by mining is vastly different than geology in
3 a basin that has been disturbed by mining.

4 Q. And where are your credentials to make that
5 statement? Have you studied geology? Do you have any
6 credentials with respect to that?

7 A. My credentials are going underground and
8 looking at the roof and looking at the rib and looking
9 at the face and seeing what's happening.

10 Q. And in fact, the reports of oil seeps that --
11 and particularly the PCA mine, there were two reports
12 of oil seeps there, weren't there?

13 A. I believe there was, yes, sir.

14 Q. And one of the things that Mr. May brought up
15 was that there was -- with respect to the one in
16 Section 24, that there was even a drift or working
17 opening or whatever you want to call it, between the
18 suspected oil-leaking oil well and where the oil seeps
19 were found, and that no seeps were found in that
20 intervening opening, was there? And that was reported
21 in the report?

22 A. I'm not familiar with that.

23 Q. You've drawn the conclusion that methane is
24 always or should always be a concern, almost an ethical
25 concern?

1 A. Well, I certainly think so in mining. It
2 always is of concern to the government and to the
3 operator and to me as a safety --

4 Q. And that's -- Excuse me.

5 A. -- and to me as a safety man, certainly.

6 Q. And that concern should extend not only to
7 methane that comes from an oil and gas, but methane
8 that is in place naturally within the salt beds?

9 A. Well, certainly. Methane is methane.

10 Q. And you are aware that this particular mine,
11 New Mexico Potash -- the New Mexico Potash Mine has had
12 a series of outbursts --

13 A. Yes, I am.

14 Q. -- in its mine?

15 A. Yes, I am.

16 Q. And in fact, for a period of time they were
17 drilling pilot holes ahead of the advancing face to
18 test for these pockets?

19 A. I understand they were, yes, sir.

20 Q. And you're also aware that New Mexico Potash,
21 according to Mr. Case, stopped doing those because one
22 of the concerns was economic?

23 A. I -- Yes, I heard him say that.

24 I suspect one of the other concerns was that
25 it probably didn't work. I've seen that in other

1 mines. He didn't tell me that; that's my guess.

2 They drilled in advance of the face in Belle
3 Isle as well.

4 Q. The three wells that were drilled, the oil
5 wells that were drilled, I believe you testified that
6 you thought those wells were drilled in the 1940s and
7 1950s?

8 A. That's what I was told. I have no direct
9 knowledge of when they were drilled.

10 Q. You do know that the New Mexico Potash Mine
11 was opened up after that period of time, in the 1960s?

12 A. That's my understanding, that it was opened
13 after those wells, whenever those wells were put in.

14 Q. And at least from the timing standpoint, mine
15 management didn't feel that those wells posed a
16 problem, did they, because they did mine around them?

17 A. I don't know. I can't answer for mine
18 management on that.

19 Certainly you can look at the maps, and
20 that's all I've done, and you can deduce that they left
21 a certain area, at least in one area, that must have
22 been related to a well.

23 MR. CARROLL: That's all I have, Mr. LeMay.

24 CHAIRMAN LEMAY: Thank you.

25 Do you want us first, or do you --

1 MR. HIGH: Why don't you go ahead and then
2 I'll --

3 CHAIRMAN LEMAY: Commissioner Carlson?

4 COMMISSIONER CARLSON: I don't have any
5 questions.

6 CHAIRMAN LEMAY: Commissioner Weiss?

7 COMMISSIONER WEISS: I have a few.

8 EXAMINATION

9 BY COMMISSIONER WEISS:

10 Q. Mr. Traweek, when you were the manager of the
11 Pennzoil mine, were there any wells in that, that
12 mining area?

13 A. I was not the manager, I was the
14 superintendent of the mine.

15 Q. Superintendent.

16 A. But no, there were not.

17 Q. In regards to the PCA report, I think it was
18 19 that showed the oil leaks --

19 A. Yes, sir.

20 Q. -- and I think it was in that one, or maybe
21 it was 18, one of them we just saw, refers to -- they
22 suggest -- Whoever wrote the report suggested that the
23 wells be resealed. I forget which exhibit.

24 A. I believe, if I'm not mistaken, that was in
25 the National Potash Company one, and the USGS

1 investigated.

2 MR. HIGH: It's page 4 of Exhibit 19.

3 THE WITNESS: Page 4.

4 Q. (By Commissioner Weiss) Did it work?

5 A. I have no idea. I do not know, sir.

6 In relation to -- If that event occurred
7 today, it would be too late for it to work for two
8 reasons. One of them is safety, the other is the
9 government's requirements -- You may not have hurt
10 anybody, but they're going to change the entire nature
11 of the mine and in my opinion would stand a very good
12 chance of putting the industry out of business, even
13 though no one got hurt.

14 Q. Do you think there should be any more oil
15 wells drilled down in the potash area?

16 A. If they are drilled in the potash area, they
17 should be drilled in compliance with the requirements,
18 the islands that we've talked about, at a minimum. And
19 even that I'm concerned about, even those islands.

20 Q. So if you had your wish, if you were the one,
21 would there be any more wells?

22 A. No, there would not.

23 COMMISSIONER WEISS: Thank you, no more
24 questions.

25 CHAIRMAN LEMAY: Commissioner Weiss.

1 Just a couple things.

2 EXAMINATION

3 BY CHAIRMAN LEMAY:

4 Q. I think you made a statement that methane can
5 migrate across potash beds easier than oil?

6 A. That's my guess.

7 Q. Your guess maybe, I don't know if you're
8 qualified as an expert in this area.

9 A. Okay, very well.

10 Q. But if that's your guess, why do you assume
11 they haven't found any methane in association with the
12 oil?

13 A. I don't think they tested for it. If they
14 did -- and I may be incorrect in that. We may be able
15 to find the records that they did test for it. I'm
16 just not aware right now, today, that they did test for
17 methane at that time.

18 They basically backed out, did an
19 investigation for the oil, and didn't say much about
20 the methane.

21 There were very -- There weren't hardly any
22 standards they were concerned about in those days in
23 terms of the economic impact, so they were more curious
24 about the oil than anything else, I think, at that
25 time.

1 Q. Okay. Well, just one more -- a little bit
2 like -- I guess Commissioner Weiss was saying, I think
3 you made the statement that you would assume things
4 would go wrong in the oil and gas business, and
5 therefore you would -- if you were voting or if you
6 were the one making the decision, you would not allow
7 drilling close to mines, or certainly you wouldn't want
8 to mine around pillars where oil wells were in there,
9 because things could go wrong in the oil and gas
10 business and cause explosions, I guess, and methane in
11 the mines and that kind of thing.

12 A. That's correct. And I'm not trying to speak
13 for the oil and gas business, obviously, but I think we
14 have -- I think we've had testimony here as to the
15 events that have occurred in oil and gas that
16 definitely were not planned.

17 I mean, when we set out to drill this well,
18 such and such, we didn't plan this to happen. And I
19 think we've had testimony that things do go wrong, just
20 like they do in mining. And that's --

21 Q. Well, I think you would, wasn't your
22 testimony, like to outlaw oil and gas activity in
23 mining areas because of that --

24 A. Well, I --

25 Q. -- that things can go wrong?

1 A. If I had my druthers, I would not mine near
2 an oil and gas well at all.

3 Q. Because of safety considerations?

4 A. That's correct.

5 Q. And then you said things can go wrong in
6 mining, because -- That was your example?

7 A. Well, I -- I mean, we make mistakes every day
8 in mining. Where do you want me to start?

9 Q. Well, I guess with that, why not outlaw
10 mining, if there's --

11 A. Because we're --

12 Q. -- gas considerations that could be a --

13 A. Because --

14 Q. -- safety hazard?

15 A. Because we're already there. We will
16 continue to make mistakes, but we'll continue
17 progressing. We're already there, we're already
18 heading in the right direction, and --

19 Q. Is it your mistakes --

20 A. -- the oil will remain there, and you can get
21 it later, you can get it at another time.

22 Q. Well, I'm more concerned with the safety
23 issues.

24 A. Okay.

25 Q. It sounded to me like it's okay for mining

1 mistakes to happen because you're in the mine, but oil
2 and gas mistakes -- And I'm only saying that because it
3 may be you're more familiar and comfortable with the
4 mistakes that could be made in the mining industry, but
5 you're not comfortable about what --

6 A. No.

7 Q. -- mistakes could be made in oil and gas?

8 A. No, I'm not comfortable with mistakes made in
9 mining. It's my job to prevent those, and I think
10 we're doing a better job than we did five years ago or
11 ten years ago.

12 I'm just saying that it's the nature of any
13 complicated industrial process, whether it's mining or
14 drilling, that those things do occur.

15 The property I work at in Arizona got a call
16 last night, they had a major fire yesterday. Certainly
17 we didn't plan on that happening, and we had all the
18 steps in place so that it wouldn't happen. But it did
19 happen.

20 And so that's what I'm saying. I'm not
21 comfortable with that, no.

22 Q. But you're going to leave -- I mean, it would
23 be your testimony that mining operations can be
24 conducted in as safe a method as possible, given some
25 of the precautions you like to put in place in mining?

1 A. Yes.

2 Q. Is that not possible in oil, that certain
3 restrictions or rules and regulations can be instituted
4 to certainly reduce as much as possible the influence
5 of oil and gas on mining operations?

6 A. Well, I hope this makes sense: There's not
7 very much that I could do in mining that's going to
8 affect the safety of an oil and gas operator's
9 employees. There's a whole lot that they can do in oil
10 and gas that's going to affect the safety of my
11 employees. And that's my concern.

12 Whatever mistakes we make wouldn't affect
13 them. Any mistakes they might possibly make, they
14 could affect my people that are underground.

15 Q. Well, would you accept the premise that maybe
16 there are experts in oil and gas that can do -- What
17 you do in mining, they could do in oil and gas to
18 prevent --

19 A. Can I be perfectly honest with you?

20 Q. Yes.

21 A. Based on the testimony I've heard here --

22 Q. Yes.

23 A. -- it scares me, the oil and gas testimony.
24 I think they are not familiar with what occurs in
25 mines. And it's scary, the things I've heard here.

1 They simply are not familiar with what's
2 happening in underground mines, despite the support of
3 a very excellent expert witness that they have.

4 CHAIRMAN LEMAY: Thank you. I have no
5 further questions.

6 MR. HIGH: I have just a couple.

7 CHAIRMAN LEMAY: Mr. High?

8 REDIRECT EXAMINATION

9 BY MR. HIGH:

10 Q. Mr. Traweek, let me refer you to page 6 --
11 this is of Exhibit -- I believe it's number 16, the
12 Kane Creek report, I believe it's Exhibit 16. Yes, it
13 is. And this is page 6 out of that report.

14 The last paragraph, "Early during shaft-
15 sinking operations, crude oil was encountered -- "
16 And that's just part of the sentence.

17 So prior to the Kane Creek disaster, they too
18 encountered crude oil, did they not?

19 A. Yes, they did, early in the process, I
20 believe.

21 Q. All right. And the only other thing I have -
22 - You can turn that off, Mr. Traweek. The only other
23 thing I have, Mr. Traweek, given your experience and
24 knowledge of the potash basin, if a mine encountered
25 methane that leaked from an oil and gas well and

1 migrated into the mine and, as a result, all of the
2 potash mines in the potash basin were recategorized
3 from Category IV to Category III, could they exist, in
4 your opinion?

5 MR. CARROLL: Mr. LeMay, I'm going to object
6 to this particular question because this man was not
7 qualified as an economist or anything to do with mine
8 budgeting, anything such as that, which I think is what
9 we're dealing with here. He's qualified solely as a
10 safety expert, not as mine management or as a mine-
11 management person or dealing with anything to do about
12 the economics of mining.

13 MR. HIGH: This witness, your Honor, knows
14 the differences between safety requirements in mines in
15 Category III and mines in Category IV. And what I'm
16 asking him is, given those difference and the
17 additional things, from a safety standpoint, that the
18 potash mine would have to do if they were moved up to
19 Category III, can they do it?

20 MR. CARROLL: He still has not laid --

21 MR. HIGH: And that's precisely --

22 MR. CARROLL: -- a foundation as to any of
23 that.

24 MR. STOVALL: Mr. Chairman, I would have to
25 agree with Mr. Carroll on this one, that that is -- He

1 can testify as to the equipment that's required, but
2 the economic impact on the mines is not -- he has not
3 been qualified nor has he laid a foundation to testify
4 as to the economic impact on the overall operation of
5 the mine.

6 MR. HIGH: Then I would like to ask a few
7 more questions, if I may.

8 CHAIRMAN LEMAY: You may.

9 Q. (By Mr. High) Mr. Traweek, in the course of
10 your duties as safety manager, is it part of your
11 responsibility to determine the cost of those safety
12 measures?

13 A. It certainly is.

14 Q. And how long have you been doing that?

15 A. Oh, well, probably within my career, I would
16 say -- Pick a number. Fifteen years out of my career,
17 I've had direct responsibility for assigning costs to
18 safety.

19 Q. Would it be a fair statement to say that
20 determining the cost of safety items is a routine part
21 of a safety manager's job?

22 A. Very much so. It's not something that people
23 like to talk about, because it's like motherhood and
24 apple pie type thing, but it's just as much a part of
25 safety as preventing an accident.

1 Q. Based upon that experience and those routine
2 duties, and knowing the differences between Category
3 III requirements and Category IV requirements, do you
4 have an opinion with respect to whether or not the
5 potash industry could absorb that cost?

6 MR. CARROLL: Again, I'm going to make the
7 same objection. He has not built any foundation as to
8 this man's knowledge of the financial conditions of any
9 mine down in southeastern New Mexico.

10 CHAIRMAN LEMAY: I think that's a critical
11 part of it, Mr. High, that -- You're asking a
12 management question. He's ducked another management
13 question in terms of what management would do, and
14 you're asking him what management would do.

15 He can testify that the costs are excessive
16 and therefore, you know, would possibly cause this or
17 that. But whether that would be the decision that
18 would be made is something that he's not qualified to
19 make.

20 MR. HIGH: I don't want to argue with you,
21 Mr. LeMay. I disagree with you wholeheartedly and
22 violently. I think you are wrong, and so is Mr.
23 Carroll.

24 But I will ask some questions, because --

25 CHAIRMAN LEMAY: Well, get at it a different

1 way. You're asking if he'd shut down the mine as a
2 manager --

3 MR. HIGH: Okay.

4 CHAIRMAN LEMAY: -- and he's not qualified to
5 be a manager.

6 MR. HIGH: Mr. Traweek --

7 CHAIRMAN LEMAY: He can state that --

8 MR. HIGH: All right.

9 CHAIRMAN LEMAY: -- say I'm not a manager,
10 but, you know, give him the -- He's not a geologist
11 either --

12 MR. HIGH: I will ask more questions.

13 CHAIRMAN LEMAY: -- and he's testified on
14 some geology.

15 MR. HIGH: I will ask more questions, if I
16 may --

17 CHAIRMAN LEMAY: You can get at it a
18 different way.

19 MR. HIGH: Okay.

20 MR. STOVALL: Mr. High, may I make a
21 suggestion? Why don't you ask him what the incremental
22 cost of compliance would be --

23 MR. HIGH: Well --

24 MR. STOVALL: -- rather than --

25 MR. HIGH: -- that's exactly what I intended

1 to do here.

2 Q. (By Mr. High) Do you --

3 MR. STOVALL: But not based upon the whole
4 operation of a mine, because that's too variable.

5 Q. (By Mr. High) Do you know, Mr. Traweek,
6 approximately what it would cost in terms of US dollars
7 for the potash industry in southeastern New Mexico to
8 come into compliance with the additional requirements
9 if they were moved from Category IV to Category III?

10 A. No, I do not at this time. At one time there
11 was a figure, but that was many years ago, and it's
12 changed.

13 Q. All right. And when did you have an occasion
14 to look at those numbers?

15 A. Oh, that was during the -- I believe the
16 development of the standards process. And again I
17 don't even recall that specific number.

18 Q. All right.

19 A. It was in the multiple millions.

20 Q. Do you recall whether or not the industry
21 could afford to comply with that number at that time?

22 A. If I'll be permitted, I can answer Mr. High's
23 question without answering his question.

24 CHAIRMAN LEMAY: Try it.

25 THE WITNESS: When I was superintendent of

1 the Nash Draw Mine, had we been declared gassy, the
2 decision had been made that we would not survive.

3 MR. HIGH: I have no further questions.

4 THE WITNESS: There is another answer too.

5 CHAIRMAN LEMAY: Anything else? If not --

6 MR. HIGH: No, sir, I have nothing else.

7 CHAIRMAN LEMAY: Okay, well, looking to our
8 own.

9 If not, the witness may be excused.

10 We'll adjourn for the day.

11 Let me mention a little bit on your rebuttal
12 witness, though, tomorrow, Ernie, so you don't -- Don't
13 open up the Soviet Union and all that, in terms of how
14 that influences the mine plan.

15 We recognize the variables in a mine plan,
16 and that's almost an open-ended type of situation. If
17 you're going to tackle every possible variable and the
18 outcome of it and how it affects the Commission and
19 therefore the mine plan, that's a little beyond the
20 scope of the hearing.

21 MR. CARROLL: I will -- The redirect or the
22 rebuttal testimony I'll put on through Mr. Hutchinson
23 will be brief, and I promise that it will be less than
24 probably 20 minutes at the outside. So I don't intend
25 to go into --

1 CHAIRMAN LEMAY: Well, I mean -- okay, this
2 is only -- I mean, we got the impression you were
3 getting into some areas we haven't even covered and
4 were highly speculative, and I just urge you not to get
5 into those areas and spend a lot of time trying to
6 develop arguments in those areas, that's all.

7 MR. CARROLL: I understand.

8 MR. HIGH: What would the Commission like in
9 terms of argument tomorrow? Assuming we finish.

10 CHAIRMAN LEMAY: We'll have plenty of time
11 for a summation.

12 I need to check with my fellow Commissioners
13 to see if we would like you to prepare draft orders or
14 not. But that's -- You know, that will be instructions
15 after your testimony.

16 MR. HIGH: We will have an opportunity to
17 give something of a summation --

18 CHAIRMAN LEMAY: Sure, we'll have time.

19 MR. HIGH: -- tomorrow --

20 CHAIRMAN LEMAY: Sure.

21 MR. HIGH: -- or do you want written briefs
22 or --

23 CHAIRMAN LEMAY: Well, we have time for a
24 summation. What's your pleasure on it?

25 MR. HIGH: Well, I don't know. I'm just

1 asking the question. I don't -- You've heard a whole
2 lot here, and I don't know how much more you want to
3 hear, and I don't want to wear out my welcome.

4 MR. STOVALL: Mr. Chairman, let me advise --

5 CHAIRMAN LEMAY: Yeah.

6 MR. STOVALL: -- the Commission, what I'd
7 recommend to the parties or require of the parties --

8 CHAIRMAN LEMAY: Right.

9 MR. STOVALL: -- at the Division hearing on
10 the other potash case was that they submit proposed
11 findings supported by legal argument, use findings as
12 the structure for the argument.

13 Now, I don't know how they've -- We have not
14 received those yet, but it puts some structure to an
15 argument to propose findings to you, rather than write
16 an order which you would have to manipulate and play
17 with, to simply write proposed findings to go to their
18 specific issues and the legal and record basis for
19 supporting those findings.

20 Does that sound practical, Mr. High, as a --

21 MR. HIGH: Sounds like a transfer of duties
22 to me, but we'd be willing to do it. I'm being
23 facetious.

24 MR. STOVALL: Well, I suspect they're going
25 to be different from both, so...

1 MR. HIGH: I'm being facetious. That would
2 be fine with me.

3 If you want us to submit proposed findings
4 and cite the supporting evidence in the record, we'll
5 be more than glad to do that.

6 MR. STOVALL: I'm suggesting that as a way to
7 brief it in a logical fashion rather than as a -- just
8 simply a draft order and a brief. That's your one
9 alternative.

10 CHAIRMAN LEMAY: I think in normal cases, a
11 summation could be handled fairly easily, because the
12 material covered is minimal.

13 But certainly here with nine days of
14 testimony, an oral summation, I don't think, would
15 really accomplish what it would in other cases. You
16 know, we've had that before.

17 MR. CARROLL: I would like --

18 CHAIRMAN LEMAY: How can you sum up nine days
19 of testimony? You can make a brief statement, what you
20 think. But I think what was suggested by Bob would be
21 more helpful to us.

22 MR. CARROLL: Since I was involved -- Mr.
23 High and I both are involved in the other case. I
24 don't know if he's got responsibility for drafting that
25 document or not.

1 But I have no objection with what Mr. Stovall
2 has suggested, as long as we have sufficient time,
3 because there's a difference in that case and this one.
4 The record here is so voluminous it's going to take us
5 some time.

6 I -- One, I would ask, first of all, the
7 nature of who the witness that we're going to hear from
8 tomorrow. It's been a secret, and I'd like to know
9 just so I have an idea of what it's going to take.

10 MR. HIGH: I honestly don't even now the
11 person's name. When I know the person's name, I'll let
12 you know.

13 MR. CARROLL: Well, what he's going to
14 testify to, Mr. High? I'm sure you have to have --

15 MR. HIGH: About this case, I have a person
16 who wants to talk to me about being a witness in this
17 case, because there's a whole lot of concern about what
18 the OCC may do to R-111-P.

19 MR. CARROLL: Well now, that may be an area
20 that's impermissible, and I think --

21 MR. HIGH: -- No.

22 MR. CARROLL: -- we were given instructions
23 to stay away from R-111-P.

24 MR. HIGH: No, about granting an exception to
25 R-111-P. And I told you --

1 MR. STOVALL: Mr. High, don't you know what
2 your -- who your witness is --

3 MR. CARROLL: I can't believe that.

4 MR. STOVALL: -- or what his expertise is?

5 MR. HIGH: I know what his expertise is. I
6 don't know what his name is.

7 MR. STOVALL: Well, what's his expertise?
8 That's more important than his name.

9 MR. HIGH: He is president of a steel
10 workers' local union who was very involved in the
11 adoption of R-111-P and is concerned about the OCC
12 granting exceptions to R-111-P without their
13 involvement.

14 He represents the underground miners who work
15 and will be subject to whatever this exception is
16 granting.

17 MR. STOVALL: Okay, well --

18 MR. HIGH: Okay?

19 MR. STOVALL: -- at least now what we know
20 somewhere where he's going to be coming from.

21 CHAIRMAN LEMAY: It will generally reflect
22 the safety concerns again tomorrow?

23 MR. HIGH: It will reflect the concerns of
24 those people who will be most impacted by what you
25 people do. That's what it --

1 MR. CARROLL: I will reserve a right to even
2 question the admissibility of that kind of testimony,
3 because I don't think that has any place in an
4 administrative hearing which is dealing with expert
5 issues.

6 CHAIRMAN LEMAY: Well, that's why I suggested
7 safety -- I mean safety concerns, we've heard one
8 witness there, but -- By second-guessing --

9 MR. CARROLL: I don't think --

10 CHAIRMAN LEMAY: -- what we may do and the
11 implication of what we may do sounds a little bit out
12 of the scope of this hearing.

13 MR. HIGH: Mr. LeMay, you have allowed Yates
14 to ask every witness up there, repeatedly in the same
15 area, the same question in the same areas.

16 Surely I -- if this other witness covers
17 safety, it's not so cumulative of Mr. Traweck that I
18 shouldn't be allowed to call on, after what you've
19 allowed them to do in terms of Mr. O'Brien, Mr.
20 Hutchinson, Mr. Brent May, Mr. Lammers.

21 They've called three geologists; all have
22 testified about the same thing.

23 MR. STOVALL: Mr. Chairman, it seems to me
24 that we could spend a lot of time arguing this
25 afternoon. Let's -- I recommend to the Commission that

1 we wait till tomorrow morning, hear the witness's
2 qualifications, and proceed from there.

3 CHAIRMAN LEMAY: Yeah, we're not saying -- If
4 you get this witness tonight and you want to go over
5 some items with him, we're not saying that the items
6 that we've covered in this case are not germane. We'd
7 like to hear arguments.

8 My concern is that the speculation is what
9 you're getting into on the R-111-P. We started off
10 with legal arguments about -- We're not going to take a
11 collateral attack on R-111-P.

12 And I'm not hearing what you're really going
13 to present tomorrow. But maybe we ought to hear it and
14 then decide where you're going with the witness. That
15 may be the -- Because I'm not sure what you're saying,
16 Charlie, I guess, is the question.

17 MR. STOVALL: Mr. High --

18 MR. HIGH: One of the issues in this case is
19 whether or not this Commission ought to grant an
20 exception to R-111-P.

21 CHAIRMAN LEMAY: Right.

22 MR. HIGH: This witness opposes that very,
23 very much.

24 CHAIRMAN LEMAY: Okay. And he has reasons
25 for it?

1 MR. HIGH: Pardon?

2 CHAIRMAN LEMAY: And he has reason for
3 opposing it?

4 MR. HIGH: Yes, sir. Yes, sir, and they will
5 be primarily safety, and he speaks for the people who
6 will be most impacted, and that's why he wants to come
7 testify.

8 MR. CARROLL: I still think there will be an
9 issue whether or not it's admissible and whether he has
10 any expertise.

11 But one thing that I would like clarification
12 is that -- and I would request some kind of closing
13 arguments. I don't mind if you put a limit on them, a
14 time limit, but I'd like to know if -- And I think that
15 they can complement a hearing like this, maybe to put
16 things back into perspective, because it has been a
17 disjointed hearing.

18 And I just want to know one way or the other
19 if there's going to be a limitation, because if we're
20 not going to get to do it, I'd really like -- I don't
21 want to prepare tonight for it and avoid that second
22 highball which I really do need after nine days of
23 testimony. But I would like some guidance there, just
24 so I know what I ought to be prepared for, having
25 stated my opinion.

1 CHAIRMAN LEMAY: Well, if you give us a
2 couple minutes here, we'll discuss it.

3 MR. CARROLL: Great.

4 (Off the record)

5 CHAIRMAN LEMAY: Okay, back on the record. I
6 understand tomorrow we'll have a summation of key
7 issues by each side, twenty minutes max, and that will
8 -- We'll also have submitted within a period of time --
9 Think how long you want to -- it will take you to get
10 this summary of findings in to us.

11 MR. STOVALL: Mr. Chairman, make a
12 suggestion. What we did, again, in the Examiner
13 hearing was tie it to the transcript, and I think we
14 started the clock on the transcript -- actually, it was
15 delivered to the parties --

16 CHAIRMAN LEMAY: Okay.

17 MR. STOVALL: -- and then -- We can --

18 CHAIRMAN LEMAY: What do you --

19 MR. STOVALL: -- throw in some time for
20 Christmas to cover that, I think.

21 And that should start that clock running
22 probably after their briefs are due in the Examiner
23 hearing. So hopefully that will...

24 MR. CARROLL: Well, like I say, I think we
25 ought to give some thought to it. I've got some real

1 calendar problems, and I think we can discuss that.

2 MR. STOVALL: Again, I would state again, as
3 I did in the Examiner hearing, I think this case is far
4 more important than the urgency of time. Quality is
5 much more important than merely getting it in on a
6 short time frame.

7 MR. CARROLL: A few weeks is not going to
8 make a difference after we've gone on this many --

9 CHAIRMAN LEMAY: No, and that's why I'm
10 really looking for input from you.

11 How many days, how many weeks from receipt of
12 transcript do you all feel comfortable for a -- you
13 know, a closing of this case, taking under advisement,
14 after you've submitted your summary of findings? Okay?

15 How about nine o'clock tomorrow? We can
16 start at nine, can't we? We'll finish it up in the
17 morning.

18 Okay, we'll be adjourned until nine o'clock
19 tomorrow morning. Thank you, gentlemen.

20 (Thereupon, evening recess was taken at 4:42
21 p.m.)

22 * * *

23

24

25

1 CERTIFICATE OF REPORTER

2
3 STATE OF NEW MEXICO)
4 COUNTY OF SANTA FE) ss.

5
6 I, Steven T. Brenner, Certified Court
7 Reporter and Notary Public, HEREBY CERTIFY that the
8 foregoing transcript of proceedings before the Oil
9 Conservation Commission was reported by me; that I
10 transcribed my notes; and that the foregoing is a true
11 and accurate record of the proceedings.

12 I FURTHER CERTIFY that I am not a relative or
13 employee of any of the parties or attorneys involved in
14 this matter and that I have no personal interest in the
15 final disposition of this matter.

16 WITNESS MY HAND AND SEAL December 9th, 1992.

17
18 

19 STEVEN T. BRENNER
20 CCR No. 7

21 My commission expires: October 14, 1994
22
23
24
25