

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 V

12 BEFORE:

13 CHAIRMAN WILLIAM LEMAY

14 COMMISSIONER GARY CARLSON

15 COMMISSIONER BILL WEISS

16
17 FLORENE DAVIDSON, Senior Staff Specialist

18
19
20 State Land Office Building

21 October 22, 1992

22 REPORTED BY:

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

3 CHAIRMAN LEMAY: Good morning. This is the
4 Oil Conservation Commission, and we're on our second
5 day of this three-day testimony in the cases for
6 exceptions to the rule of drilling the potash area.

7 I think when we adjourned yesterday we were
8 in the middle of Mr. Case's direct testimony, and at
9 that point we shall continue.

10 MR. HIGH: Thank you, Mr. Chairman.

11 WALT CASE (Recalled),
12 the witness herein, after having been previously duly
13 sworn upon his oath, was examined and testified as
14 follows:

15 DIRECT EXAMINATION (Continued)

16 BY MR. HIGH:

17 Q. Mr. Case, we were talking yesterday about
18 Section 2, and you testified that New Mexico Potash has
19 a capability of mining the grade of ore in Section 2.

20 Tell us, if you will, what problem, if any,
21 the distance of Section 2 from the other parts of the
22 mine presents to New Mexico Potash.

23 A. There's a federal safety requirement that any
24 mining that is done must be done at a distance that
25 miners can travel to the foot of the shaft or the base

1 of the shaft underground within an hour.

2 Until very early this year, Section 2 would
3 be on the fringe or perhaps out of reach of that time
4 requirement.

5 As we began to find that there was in fact
6 some 10th Ore Zone ore in Section 2, kind of issued a
7 challenge to my people to find a faster way of getting
8 there. And in fact, they have done that.

9 We have added ten modified either Volkswagen
10 diesel Rabbits or Toyota diesel pickup trucks, and
11 we've taken those down right to the window line, cut
12 everything off so that the height was low enough to get
13 into our mining areas, and we're using those vehicles
14 now for transporting personnel faster now to the faces
15 that we are operating.

16 But because those vehicles are capable of
17 going faster, they also will have Section 2 well within
18 the time frame requirement of mining.

19 So that was the second factor.

20 The first factor was finding the ore; the
21 second factor was finding a way to get people there.

22 Q. Was the decision to make the investment in
23 this additional equipment dependent at least in part on
24 the ore in these outer areas being available to be
25 mined?

1 A. That was certainly a part of the
2 consideration. The larger part of the consideration
3 was more immediate in that using faster transportation
4 gives our people longer in the mining operation for
5 each shift that they're there, and that benefit applies
6 immediately, as well as to any future mining.

7 Q. And what plans does New Mexico Potash have,
8 Mr. Case, to mine Section 2?

9 A. Part of the independent third-party analysis
10 of our ore reserves and mining plan included a time
11 frame for mining Section 2, and that is certainly a
12 plan for arriving at Section 2.

13 Q. Let me show you what I've marked as
14 Confidential Exhibit Number 37.

15 MR. ERNEST CARROLL: This exhibit right here?
16 Is that a mine plan?

17 (Off the record)

18 MR. ERNEST CARROLL: Mr. Chairman, at this
19 time I'm going to make an objection to this exhibit.

20 If you will recall, and we've been told, Mr.
21 High has just confirmed to me that this is a mine plan.

22 MR. HIGH: I didn't say that. I said I would
23 explain that.

24 MR. ERNEST CARROLL: I understand that, but I
25 don't think that this exhibit should even be allowed to

1 be testified to.

2 The reason why, Mr. Chairman, if you'll
3 remember, we issued a subpoena to get core-hole data so
4 that we could make our own mine plan and present
5 testimony to this Commission.

6 We were denied that information by New Mexico
7 Potash. We were given core hole 162.

8 What we see here -- and I think you can very
9 quickly tell that this is not even a complete mine
10 plan. We're not even being furnished the entire thing
11 so that we could even begin to judge its credibility.
12 We haven't been furnished the materials, the core-hole
13 data that's used to develop a whole mine plan.

14 And remember, what Mr. High just elicited
15 from Mr. Case was that they had a third party come in
16 and evaluate their ore reserves and develop a mine
17 plan. Such information, as based on the testimony that
18 we've already had presented by experts, would
19 necessarily involve the use of all of that information.

20 Mr. LeMay, since they have refused to give us
21 this information, which had to form some of the basis
22 of this, I do not think that this Commission should
23 allow it to be presented in any form or fashion.

24 I think this is a rule that this Commission
25 has followed for many years, that if a party refuses to

1 honor a subpoena issued by this Commission, then they
2 do not get to use that same information in the benefit
3 of exhibits or testimony that they plan to present in a
4 hearing.

5 This is exactly what they're doing. They're
6 back-dooring us.

7 And remember -- and I think it's also
8 extremely important that yesterday for the very first
9 time we finally learned what the reason was that we
10 didn't get to get all this confidential information.

11 They're not concerned about the competitive
12 effect. It's just apparently back in the 1960s, these
13 mines were charged with antitrust violations, and
14 they're trying to protect themselves.

15 Well, remember, Mr. LeMay, that when you
16 offered -- We had these hearings on the propriety of
17 these subpoenas. The Commission offered to these
18 parties confidentiality protection so that we would
19 never have these problems.

20 All this is is another example where the
21 potash companies have tried to keep valuable, important
22 information away from us so that we could judge the
23 credibility of what they're putting forth.

24 There is absolutely no way that we are going
25 to be able to cross-examine this. We don't get the

1 full mine plan, we don't get the information that it
2 was constructed from, and yet they expect us to be
3 satisfied that this is a fair an open hearing. No way
4 can that be -- can we characterize this situation.

5 So therefore, Mr. LeMay, based on the fact
6 that they have failed to honor the subpoena when the
7 Commission offered adequate confidentiality
8 requirements, I think this evidence should flatly not
9 be allowed to be presented at this time, or at any
10 time, in these areas.

11 CHAIRMAN LEMAY: Mr. High?

12 MR. HIGH: Mr. LeMay, the purpose of this
13 exhibit is to show that New Mexico Potash not only is
14 capable of mining the ore in Section 2, but in fact has
15 plans to do so, and -- or is considering a number of
16 alternative plans to do so.

17 If you'll recall, up until 1992, New Mexico
18 Potash's LMR extended down to the top of Section 2. We
19 are presenting no evidence regarding anything with
20 respect to that pre-existing LMR.

21 We are going to present evidence in this case
22 to justify our extension of the LMR down to include
23 Section 2 and we'll have evidence we'll present to do
24 that.

25 We have provided Yates Petroleum with all the

1 core-hole data, and we have agreed to the
2 confidentiality of that. We have given them all the
3 core-hole data upon which we relied to extend our LMR
4 down to Section 2.

5 As far as the core-hole data from up in this
6 other area that we have refused to give them, and we
7 refused to honor the subpoena from this Commission, and
8 we have appealed that to the District Court in
9 Carlsbad, that case is set for trial in February, and
10 we intend to proceed with that trial, because we think
11 that that information should not be disposed, and that
12 issue is being litigated.

13 This is not, at least in my judgment, what
14 Mr. Carroll has represented it to be. All we're doing
15 is to show what plan we have for Section 2. Are we
16 ever going to mine it? We've been accused of we're
17 never going to mine it. We are going to mine it, and
18 that's all this is.

19 CHAIRMAN LEMAY: I think Mr. Carroll's
20 objection, wasn't it, that you used that in Sections
21 26, 34, 35 to produce this data or this map, this
22 interpretation, which he was not given access to and
23 therefore has no way to challenge the document itself
24 or argue it.

25 Is that true? Do you know what went into

1 making the map?

2 MR. HIGH: I have no idea, Mr. Lemay, and I'd
3 be willing to chop out everything except that part on
4 Section 2.

5 CHAIRMAN LEMAY: Would that be acceptable --

6 MR. ERNEST CARROLL: No.

7 CHAIRMAN LEMAY: -- if he chopped everything
8 out but Section 2?

9 MR. ERNEST CARROLL: -- absolutely not, and
10 the reason why, if you'll remember, Mr. LeMay, we went
11 through a lot of testimony with Mr. Hutchinson which --
12 A mine plan, you mine blocks and you go from one stage
13 to the next stage.

14 What Mr. High is leaving out is the middle.
15 How do we get here, how do we know we're getting here,
16 under what conditions are we getting here? That's how
17 we judge the credibility of this mine plan.

18 We don't know how they're getting here. Are
19 they just flat -- Are they going to run one single
20 line? How many years is it going to take? We have
21 nothing to be able to judge the credibility of this.

22 And I also want to point out, Mr. LeMay, I
23 got this at three o'clock yesterday afternoon without
24 any explanation either.

25 But there is no -- The only way you can judge

1 the credibility -- and he's saying that he wants -- the
2 purpose of this is to show, one, we're capable of
3 mining and, two, that we have plans. Well --

4 MR. HIGH: No, don't misrepresent me, Mr. --

5 MR. ERNEST CARROLL: Hey, that -- you can --
6 We can have the record read back.

7 MR. HIGH: Read it back.

8 MR. ERNEST CARROLL: That's just exactly what
9 you said --

10 MR. HIGH: All right, read it back.

11 MR. ERNEST CARROLL: -- there were two
12 reasons --

13 MR. HIGH: Read it back.

14 MR. ERNEST CARROLL: -- and frankly, that's
15 the only reason that this could be introduced, is to
16 show that they're capable of mining the ore in Section
17 2 and that they have plans to mine it.

18 Well, unless we could judge that -- those --
19 that intent, the capability with respect to the entire
20 mine, we're talking about nothing. It's meaningless.
21 That was the whole point. That's why we presented a
22 complete mine plan.

23 COMMISSIONER CARLSON: Refresh my memory.
24 You had a mine plan, New Mexico Potash had a mine plan,
25 developed by an outside source; is that correct?

1 MR. HIGH: We had an analysis of reserves
2 made.

3 COMMISSIONER CARLSON: Which included a mine
4 plan; is that --

5 MR. HIGH: A suggested mine plan.

6 COMMISSIONER CARLSON: Is this part of that
7 suggested mine plan?

8 MR. HIGH: Yes, sir, it is.

9 COMMISSIONER CARLSON: Did the subpoena
10 issued, I guess by this Commission, but for Yates, did
11 that include that mine plan developed --

12 MR. HIGH: No, sir, it did not.

13 COMMISSIONER CARLSON: -- by that outside
14 company?

15 MR. HIGH: No, sir. The only thing the
16 subpoena covered was all core-hole data upon which we
17 relied to establish our LMR for the whole mine.

18 COMMISSIONER CARLSON: And that's what you're
19 contesting, is the --

20 MR. HIGH: That's right.

21 COMMISSIONER CARLSON: -- core-hole data?

22 MR. HIGH: That's right.

23 COMMISSIONER CARLSON: You did not ask for a
24 mine plan?

25 MR. HIGH: That's correct.

1 COMMISSIONER CARLSON: But this mine plan is
2 based on the core-hole data which you have refused to
3 give to Yates; that is correct?

4 MR. HIGH: Well, it may be with respect to
5 areas other than Section 2. You know, I really don't
6 know. But it's based upon core hole 162 in Section 2.

7 I don't want to represent to you what all
8 this other company relied upon in coming to this mining
9 plan because I don't have any idea.

10 COMMISSIONER CARLSON: Is it your intent to
11 introduce the mine plan developed by this company into
12 this hearing?

13 MR. HIGH: No, sir, I certainly have -- I
14 have no interest --

15 All I want to show, Mr. Carlson, is that we
16 have plans to mine Section 2. That should be obvious,
17 because we wouldn't have been holding the lease since
18 the Sixties if we didn't plan to mine it.

19 The only purpose of this document -- and I'm
20 only interested within the area within Section 2 -- is
21 that we do have plans as a mining company to mine
22 Section 2. That's the only purpose for which it's
23 offered.

24 MR. ERNEST CARROLL: Chairman LeMay, I
25 would -- If the Commission even considers allowing this

1 to come in, there's some other things that we need to
2 consider.

3 One, I don't think it should come in unless
4 the entire mine plan comes in.

5 And then if you'll also recall that we
6 learned for the first time yesterday that these mines
7 have been making three-year mine plans that are updated
8 annually. That came from the BLM witness, and I think
9 Mr. Case confirmed that in his -- early part of his
10 testimony.

11 Before any mine plan like this can come in --
12 Because this is done by a third party. There's no
13 proof that it's been adopted or been followed, and the
14 dates on this show 6-16-92. It's only two or three
15 months old.

16 And he's putting this on to prove that we're
17 going to mine down there.

18 The only way this should come in is if they
19 are required to produce the entire mine plan and all of
20 their other mine plans so that we can compare them.

21 CHAIRMAN LEMAY: Okay, let's -- Anything
22 else?

23 MR. HIGH: Those mine plans have not been
24 requested from us, Mr. LeMay, and we will not offer
25 into evidence the entire mine plan.

1 CHAIRMAN LEMAY: Rand, do you have anything
2 you want to ask?

3 MR. RAND CARROLL: No.

4 CHAIRMAN LEMAY: Okay, we'll confer for a
5 couple minutes here.

6 (Off the record)

7 CHAIRMAN LEMAY: We're going to deny this
8 exhibit, and I want you to know why, and I think most
9 of the reasons were explained, were at least objected
10 to by Mr. Carroll, but there were other reasons too.

11 Number one, this was not Mr. Case who drew it
12 up, so therefore it can't be defended in that nature.

13 Number two, the data that went into it is
14 necessary for cross-examination on anything. When
15 that's not available it leaves the opposing counsel at
16 a loss to even challenge it. It's like saying, Here it
17 is, accept it and trust us. And that's not the basis
18 of what we've done this stuff in the past. We've
19 always allowed both sides an equal chance to be able to
20 argue their case, and you're just -- you're at a
21 competitive disadvantage, not having that.

22 Plus, it's not the total mine plan. In
23 testimony you can bring out what Mr. Case would like --
24 what he would recommend, and we plan to ask him those
25 questions too.

1 But we just can't admit this into evidence
2 for those reasons.

3 MR. HIGH: We would ask that it be placed in
4 a rejected exhibit file, Mr. LeMay, so that the record
5 will be complete in the event of appeal.

6 CHAIRMAN LEMAY: Sure. Do we have a rejected
7 exhibit file? You may be the first to establish a
8 rejected exhibit file.

9 MR. HIGH: I'm glad to see that Florene's in
10 charge of it, so we'll know where to go.

11 CHAIRMAN LEMAY: Rejected Exhibit Number 1.

12 Q. (By Mr. High) Mr. Case, has New Mexico
13 Potash given any consideration to when it might mine
14 the ore in Section 2?

15 A. We have.

16 Q. And tell me, if you will, some of the
17 considerations that you've given to that process.

18 A. The orderly development of the mine, we are
19 concentrating on the southern part of our reserves of
20 the nominally 35-year reserve life that I mentioned to
21 you yesterday.

22 Perhaps 20 of those years are in the south
23 half of the mine, or the south -- what we call our
24 south ore body.

25 And for the last several years we have been

1 concentrating on developing that south ore body with an
2 intent in the future to move to the last remaining
3 large ore body, which is the northeast ore body.

4 So in the development of the south ore body,
5 certainly all of our leased land is considered in
6 developing those plans.

7 Q. And what is the current direction of your
8 mine development?

9 A. Southward.

10 Q. And Section 2 would be south of where you are
11 now?

12 A. That's correct.

13 Q. In the same direction of your current mine
14 development?

15 A. Yes, sir. Yes.

16 Q. What do you project, if anything, in terms of
17 time when you might be down there to mine Section 2?

18 A. Probably the shortest possible time to reach
19 there would be seven, eight years.

20 Q. And how long do you project it would take you
21 to mine the ore in Section 2?

22 A. It would probably be mined over a period of
23 10 to 12 years.

24 Q. And how much -- You know, when you look at
25 the ore in Section 2, for what period of time will that

1 ore provide jobs to people?

2 A. Mr. High, I can't speak specifically for
3 Section 2. But if we take a section of land and assume
4 that it is underlain by our typical ore, just one
5 square mile of it, that currently represents about two
6 and a half years of production. So that would be two
7 and a half years for 280 people.

8 Q. Okay.

9 A. Now, obviously you don't mine one section in
10 two and a half years. You use one or two mining
11 machines or faces in that area, and consequently the
12 time to extraction is substantially longer than the two
13 and a half years.

14 But if we just look at the reserves there, it
15 equates to two and a half years of mine life.

16 Q. Section 2 would be mined, I take it, using
17 the same procedure you do now where you have a number
18 of different faces and you blend the ore from different
19 areas?

20 A. That's correct.

21 Q. Now, you've heard the testimony here, Mr.
22 Case, that the oil people believe they can be in and
23 out of Section 2 before you are ready to mine, have you
24 not?

25 A. That's correct.

1 Q. And what is your response to that?

2 A. I believe Mr. Hutchinson projected a reserve
3 life of 85 years, and I don't know all of the
4 background of that analysis.

5 I think our more reliable analysis and
6 certainly our long-term projections and presentations
7 upon which several sales of the operation have been
8 based have the same sort of timing that we're looking
9 at in the nominal 35-year period.

10 Never have we discussed any mine life beyond
11 35 to 40 years.

12 Q. And would that projected mine life, Mr. Case,
13 include the -- mining the ore in Section 2?

14 A. Yes, it would. And I might add, not at the
15 end of that mine-life period.

16 Q. It would be during it sometime?

17 A. During.

18 Q. Okay. Now, what is the -- What are the
19 concerns, Mr. Case, that you have over the drilling of
20 these wells in Section 2?

21 A. I have numerous concerns. The first is
22 certainly personnel safety. We have the potential of
23 life-threatening accidents by the incursion of methane
24 into the mine.

25 Yesterday one of the witnesses testified that

1 the production of gas from all these wells was, I
2 believe, 150,000 cubic feet a day. That equates to
3 about a hundred cubic feet a minute. He presented that
4 to be no problem.

5 Any amount of methane over about 13 cubic
6 feet will form a true explosive mixture, something that
7 will go off like gunpowder in the end of a gun barrel.
8 And that's literally the sort of thing that we're
9 looking at in a mining drift or tunnel if we have
10 ignition of methane. The results of that explosion
11 have nowhere to go but down that drift. And how far it
12 travels depends on how much methane is there and so
13 forth. That's not my area of expertise.

14 But suffice it to say, explosive mixtures can
15 form from a hundred cubic feet per minute.

16 The other thing that I would like to point
17 out is that the encounters that we have had with
18 methane to date in our mine have all been in a depleted
19 air or essentially nitrogen carrier.

20 That allows two, three, four percent of
21 methane, which is below the explosive limit anyway, to
22 be diluted by air and never pass through an explosive
23 range.

24 A hundred percent methane -- and the point
25 that was overlooked yesterday, or glossed over fairly

1 quickly, yes, when that's diluted in 150,000 cubic feet
2 a minute or 250,000 cubic feet a minute, which is our
3 air circulation through the mine, that's normally split
4 in two, so say nominally 125,000 cubic foot in any
5 particular area would be a sort of typical airflow.

6 Yes, that will dilute methane very quickly to
7 below the explosive limit.

8 But when it comes in at a hundred percent and
9 goes down to .25 percent or .025, whatever the range
10 is, at some point it does pass through an explosive
11 range.

12 And therein lies the difference between pure
13 methane coming into the mine and small percentages of
14 methane in a nitrogen carrier. The methane in the
15 nitrogen carrier never goes through an explosive range.
16 Anytime you get anything over, I believe, about 15
17 percent methane in a mixture, it will come down through
18 an explosive range on its way to being diluted.

19 All you have to have is an ignition source at
20 the point where that concentration is in that flammable
21 range.

22 I would submit to you that there are a number
23 of ignition sources in our mine.

24 One of the things -- Another thing that has
25 sort of been glossed over or not developed fully in the

1 testimony is the difference between a gassy mine and a
2 non-gassy mine. I think you've heard both of those
3 referred to. I'd like to enlighten you a little bit on
4 what the differences are.

5 Gassy mines, that is, mines where methane is
6 routinely encountered and has to be guarded against for
7 the safety factor, the explosion possibility, have a
8 type of equipment that is called permissible equipment.
9 And anything that is in the mining face or any of the
10 return air system must be permissible. "Permissible"
11 roughly translates to "sparkproof", okay? All of your
12 electric motors have to have to have special paths at
13 the end bells, for example, to kill any spark that
14 might come from the inside of the motor getting to the
15 outside of the motor.

16 Nonpermissible or nongassy mines are not
17 required to have all of those safety features.

18 Another major feature of a gassy mine is that
19 -- I explained to you yesterday, in our mine, our
20 ventilation air goes from one area to another area to
21 another area, a series ventilation system.

22 In gassy mines, each area has to be
23 ventilated independently or separately. So if we have
24 three areas, you have to take a small amount of air or
25 a portion of your air, circulating air flow, through

1 area 1 and exhaust it independently of the air that
2 comes in and goes through section 2, and independently
3 of the air that comes in and goes through section 3.
4 All of those streams have to be maintained separately.
5 And anything from the mining face on has to have
6 permissible equipment, booster fans, main fans, this
7 sort of thing.

8 Gassy mines are required to have their
9 ventilation fans on the surface. Ours are located
10 underground.

11 For us to convert our mine to gassy-mine
12 standards would literally be a life-threatening cost to
13 our operation, because we're looking at nominally a
14 million and a half dollars in each of those ten mining
15 faces that I talk about to get permissible equipment
16 there, probably an equal amount back to the base of the
17 shaft.

18 Raising the fans to the surface would be
19 another major expenditure, but by and away -- or far
20 and away the largest expenditure would be the mining of
21 these ventilation drifts in all that's left now in that
22 salt or barren ore. That mining would probably take
23 one to two years to complete. That would be absolutely
24 non-productive time for all of the mining equipment
25 that we have. Hence, it's a life-threatening

1 situation.

2 My concerns, Mr. High, are, number one,
3 methane in a mine can be a life-threatening situation
4 to a miner.

5 Number two, it can be a life-threatening
6 situation to my operation.

7 And number three, because of the federal mine
8 safety standards, an incursion of methane from whatever
9 source into our mines -- we are currently in a Category
10 4 mine -- would not only impact our operation but all
11 of the other operations in the same geological horizon.
12 So it is truly an industry-threatening concern that I
13 have.

14 Q. Well, aside from the fact that methane could
15 create an explosion in an underground mine, at what
16 level of methane do you -- does a potash mine start to
17 have a, quote, problem?

18 A. Okay, Mr. High, I indicated yesterday, or we
19 developed some testimony that we have quarterly
20 inspections by the Mine Safety and Health
21 Administration, part of -- at least once a year.

22 Part of that inspection includes sampling for
23 gases throughout the mine. If methane at the level of
24 .25 percent is found in what's called the general mine
25 atmosphere -- that is, in normally ventilated areas --

1 that triggers a review by MSHA to determine whether we
2 would remain in the Category 4 or Category 3 or
3 Category 2 or Category 1. They are the 800-pound
4 gorilla in this case in determining what the
5 categorization is.

6 The importance of these categories are that
7 anything above Category 4 requires basically
8 permissible equipment, and again that's a life-
9 threatening situation.

10 So there's a trigger at .25 that could
11 precipitate an MSHA study and result in a
12 reclassification or recategorization of the mine.

13 Q. Has there been any attempt by the Mine Safety
14 and Health Administration already to classify the New
15 Mexico Potash Mine as gassy?

16 A. Yes, sir, there was an attempt in 1981. We
17 had a rather large relief of some of this nitrogen
18 under pressure, containing, my recollection is, up to
19 about two percent methane right at the source of the
20 material coming out of the mine.

21 We reported that to MSHA as a non-routine
22 event, and they came out, took their own samples, again
23 in what we contend was an illegal fashion in that
24 samples for categorization and so forth should be taken
25 in the general mine atmosphere. Their samples they

1 took right up where this bleed was coming from the
2 formation. But they encountered over one percent
3 methane in their samples.

4 Now, again, at that point they did not have
5 the appreciation of this nitrogen carrier. For them,
6 .25 methane was .25 methane was .25 methane, regardless
7 of where it came from. And at that time, the .25
8 automatically puts you into a gassy mine
9 categorization.

10 Q. Was MSHA successful in classifying you as
11 gassy?

12 A. Limitedly. We arrived at an operating plan
13 with MSHA while we were contesting this citation in
14 their finding of gassy that precluded smoking
15 underground, for example, greatly increased the number
16 of methane samples that we took in the mine, limited
17 where we could do cutting and welding work, this sort
18 of thing.

19 So it was very definitely an added cost while
20 we were litigating all this.

21 And there was some political intervention as
22 well that reduced their budget or eliminated their
23 budget for enforcing this particular standard on the
24 New Mexico mines until this issue of nitrogen carrier
25 and so forth was worked out. That was finally settled

1 in what? About 1986 or 1987, in that general time
2 frame, and resulted in this categorization system and
3 the placement of our mines into Category 4, which did
4 not require permissible equipment.

5 Q. What do you know, Mr. Case, about mishaps in
6 the oil and gas industry in southeastern New Mexico?

7 A. Mr. High, the only knowledge I have is some
8 information that was developed when these gassy mine
9 meetings were going on, and I have seen a page from a
10 document that categorized, I think, 14, 15, 16 unusual
11 occurrences in drilling operations that have been
12 reported to, I guess, the Oil Conservation Division
13 here.

14 Q. And do those mishaps in the oil and gas
15 industry create any concern on your part?

16 A. Certainly.

17 Q. For what reason?

18 A. Well, I think we've heard a lot of testimony
19 if everything is done just exactly as it's supposed to
20 be done, we've got no problem.

21 But we find evidence -- and I certainly don't
22 want to point the finger at the oil and gas industry,
23 because I tell my miners to mine straight, and they end
24 up going off this way or going off that way. But the
25 consequences of mishaps -- or the occurrence of mishaps

1 indicates to me that things don't always go as planned,
2 and I think that's something that anybody that has had
3 any experience in business is going to concede. And
4 it's that one instance, and all it takes is one.

5 You know, we may drill a thousand wells out
6 there, and the thousand and first one is the one that
7 gives us problems. That doesn't relieve the problem.
8 As soon as we have it, whether it's on the first well,
9 the five hundredth well, the thousandth well, whatever,
10 when that happens we are in a "life-threatening
11 situation" in the two or three contexts that I
12 mentioned to you.

13 Q. Mr. O'Brien suggested yesterday that --
14 although he admitted he had no mining experience --
15 that we could drill holes in the advancing face, and if
16 we encounter methane, just plug it up and go about our
17 business.

18 What's your response to that?

19 A. Once we encounter it, we're under the
20 obligation to notify MSHA. And if we encounter it, I
21 think we're there; it's too late at that point.

22 Q. What is the purpose of drilling these holes
23 currently, Mr. Case, in the advancing face?

24 A. We are not currently drilling those holes in
25 the advancing face. At one point in time -- and I was

1 a little bit disturbed by Mr. O'Brien's more or less --
2 I don't know whether to call it callous or cavalier
3 attitude toward these nitrogen encounters. He says,
4 you know, we -- in drilling we run into nitrogen, and
5 nobody's hurt but -- or nothing's hurt but feelings.

6 In 1983 one of my people mined into a pocket
7 of nitrogen under pressure and lost his life as a
8 result of that, and that's a little bit more than
9 feelings being hurt. And I suggest that perhaps Mr.
10 O'Brien was not familiar with that or he would not
11 categorize nitrogen encounters as hurting nothing but
12 feelings.

13 But Mr. High, that encounter with nitrogen is
14 certainly a problem as well.

15 We began after that encounter doing what we
16 call longholing, drilling several hundred feet in front
17 of us to try and intersect -- Our conclusion upon
18 investigating that accident was that there was what I
19 call an historic crack. That is, a crack that had
20 accumulated gases under pressure throughout geologic
21 history, not something that resulted -- The crack
22 wasn't something that resulted from mining operations.
23 It was a pre-existing condition, if you will. And
24 there were some theories proposed by rock mechanics as
25 to what might have caused it.

1 And during the time that we were in that
2 geologic regime or subregime, whatever you want to call
3 it, we were drilling holes a hundred, two hundred feet
4 in front of us. In the event that there was another
5 crack out there, we could relieve that pressure before
6 we mined into it.

7 And in fact, we encountered one or two more
8 fairly substantial blows, then went another quarter,
9 half mile, and had none, and stopped at that point
10 drilling the pilot holes in front of us.

11 Q. Are there any existing wells in the New
12 Mexico Potash Mine, Mr. Case?

13 A. There are three that I know of. All three of
14 them existed before the mining operation, all three of
15 them, to my understanding, were dry, plugged and
16 abandoned.

17 Q. There's no producing wells?

18 A. There are no producing wells.

19 Q. You've heard the suggestion here from the oil
20 and gas people that we as a mining company ought to
21 mine up and leave a 150-foot pillar around these
22 Delaware wells. Will you do that?

23 A. No, sir.

24 Q. Why not?

25 A. Well, to begin with, we've also heard

1 testimony that anything perhaps up to 15 degrees was
2 considered normal variation for a well. That 15
3 degrees, at the depth of our mine of 1650 feet, would
4 go out some 400 feet. So that suggests to me that a
5 150-foot pillar is absolutely a ludicrous number,
6 because if we have a well that for whatever reason
7 wanders off 15 degrees, we'd be two or three times that
8 far away.

9 What I'm saying is, we might very well mine
10 into the well, thinking it was somewhere else. So
11 that's certainly one consideration.

12 The other consideration is, a fair amount of
13 time was spent -- and I will certainly acknowledge Mr.
14 O'Brien's testimony. The agreement on the quarter-mile
15 and half-mile spacings has no basis in scientific fact,
16 but a number of people spent a number of hours
17 agonizing over that number and saying that we don't
18 know of a better number to use, so let's use that one.
19 And that would be what -- the guidelines that I would
20 use, unless I had better and more concrete information.

21 Q. What is your understanding of the purpose of
22 those distances?

23 A. To protect the oil wells from subsidence and
24 to protect us from subsidence or the possibility of
25 rupturing a strain and getting gas into the mine.

1 Q. Now, if you want to get closer than that to a
2 producing Delaware well, Mr. Case, is that, in your
3 judgment, going to result in the waste of potash in
4 Section 2?

5 A. Yes, sir. We have already approved wells
6 that will waste perhaps a quarter to a third of the
7 potash in Section 2. The approval of all four of these
8 wells and a half a mile spacing -- or a half a mile of
9 safety zone, as is required for buffers and that sort
10 of thing, virtually consumes all of Section 2.

11 Q. So if these four wells are allowed, virtually
12 all the ore in Section 2 will be wasted, in your
13 opinion?

14 A. I believe so.

15 Q. And what is your recommendation to this
16 Commission as to how this proceeding should be
17 resolved?

18 A. Well, Mr. High, I think there are perhaps two
19 or three. One certainly is continuing with the R-111-P
20 Order as presented or as now constituted.

21 I have grave concerns if one exception is
22 granted to that, that that's going to open a floodgate
23 and we will be spending more time looking at each other
24 than I will be looking at my mining people. So I've
25 got the concern of a precedent-setting action.

1 Another possibility is the idea of if we are
2 so sure that there are no problems, either the state or
3 the federal or an independent insuring company putting
4 money where the mouth is, if you will. That may be a
5 colloquial term, but basically the problem that I have
6 is that an incursion of methane into the mine will
7 literally be a life-threatening situation for a mine
8 that is currently employing 280 people. It will be a
9 life-threatening situation for an industry that is
10 currently employing 2000 people, an industry that does
11 business of the order of a quarter of a billion dollars
12 a year, an industry that is located within a 400,000-
13 acre concline and has nowhere else to go.

14 Mr. LeMay, I did a rather cursory study, and
15 the numbers certainly could be refined, but of the
16 400,000 acres in the known potash area, approximately
17 200,000 are leased for potash mineralization.

18 In Lea and Eddy Counties alone there are over
19 5 million acres of oil and gas leases. This suggests
20 to me that there is an industry employing 2000 people
21 and returning good sums to the State, since 19- -- the
22 early 1930s, and probably well into the next century,
23 dependent on that 400,000 acres for their livelihood.
24 They have nowhere else to go.

25 The oil industry and the gas industry, by the

1 same token, although they have some very interesting
2 plays in this area, have other places to go that they
3 can make a living.

4 And I think one of the considerations needs
5 to be the jeopardy of the industry. For this reason, I
6 think if the certainty is there that we're led to
7 believe, certainly some insurer would like to make some
8 money off that and perhaps charge a dollar a year for a
9 certain thing.

10 I say that somewhat facetiously, but when I
11 am looking at a potential of anywhere from \$50 to \$150
12 million, that's basically the profits that are left in
13 my mine.

14 And if there is any remote chance of an
15 incursion of methane into my mine, I want somebody to
16 bear the financial responsibility along with that.

17 We have one industry wanting to do all the
18 drilling and get all of the money for themselves and
19 for the State out of oil royalties, with no consequence
20 if they kill an industry, or if they kill one person.

21 MR. HIGH: Thank you, Mr. Case.

22 We'll pass the witness.

23 CHAIRMAN LEMAY: Thank you, Mr. High.

24 Mr. Carroll?

25 MR. ERNEST CARROLL: Are you going to use

1 that as an exhibit? Have you furnished it to the
2 Commission? I'd like to use it.

3 MR. HIGH: No, I haven't. I'd rather explain
4 it first. You don't have another one?

5 May we have just a moment, Mr. Chairman?

6 CHAIRMAN LEMAY: Sure.

7 (Off the record)

8 MR. HIGH: Mr. LeMay, Mr. Carroll wants to
9 use one of my exhibits that we've prepared and given
10 him, and I have no objection to that. Since I haven't
11 offered it into evidence -- I plan to cover it with a
12 later witness --

13 CHAIRMAN LEMAY: Okay.

14 MR. HIGH: -- I am going to go ahead and
15 cover it with Mr. Case so he can use it.

16 CHAIRMAN LEMAY: Great, thank you.

17 MR. HIGH: So I do have a few more.

18 CHAIRMAN LEMAY: It helps to have a reference
19 map when we're referring to this.

20 MR. HIGH: Mr. Case, look if you will at what
21 I've marked -- or what I should have marked as Exhibit
22 38. If you will write 38 on there.

23 This document, Mr. LeMay, is marked
24 "Confidential".

25 CHAIRMAN LEMAY: I see that.

1 Q. (By Mr. High) Can you identify --

2 CHAIRMAN LEMAY: This is not to go in the
3 rejected file, I take it?

4 MR. HIGH: No.

5 THE WITNESS: I hope the rejected file is
6 confidential as well.

7 MR. HIGH: I think Mr. Carroll has implied
8 that he's not going to try to put this in that file
9 since he's the one that wants to use it.

10 Q. (By Mr. High) Mr. Case, can you identify
11 this document for us, please, sir?

12 A. Yes, sir. It's entitled the "1992 Life of
13 Mine Reserves, New Mexico Potash Corporation, 10th Ore
14 Zone". Gives the townships and range references.

15 Q. Was that map prepared by New Mexico Potash?

16 A. It was.

17 Q. At any time, Mr. Case, have you ever avoided
18 mining on a State lease to avoid the payment of State
19 royalties?

20 A. No, sir.

21 Q. You heard Mr. Gary Hutchinson accuse you of
22 that?

23 A. Yes.

24 Q. What do you have, respond to that?

25 A. I think perhaps, Mr. LeMay, the area that

1 came to Mr. Hutchinson's attention was this area out on
2 the far west or left side of the map, nominally
3 Midships.

4 You'll notice on -- just above the red
5 outlined section, the green-hatched sections are mine
6 workings, areas where we've already mined or completed
7 mining.

8 You'll notice some dates along there, mined,
9 I believe, 5/1979 [sic], through 5/1981. In the lower
10 portion and further west, mined 7/1980 to 8/1982. That
11 gives you a time frame to look at.

12 If you'll notice the State leases immediately
13 to the south and the leases that Mr. Hutchinson
14 strongly suggested to the Commission that we avoid
15 because of high royalties, that lease was not acquired
16 from Mississippi Chemical Corporation until October of
17 1988.

18 This raises another concern that I have about
19 some of the testimony that was given earlier. It seems
20 to me that a reasonable review of publicly available
21 documents would have reflected the fact of these two
22 timings.

23 I believe a review of publicly available
24 records in the instance of the assignment of leases to
25 IMC would have confirmed that that had not in fact

1 taken place, and I'm concerned with the opposition
2 leaving you with some ideas that facts and available
3 information would have said not so. This is an
4 example.

5 Q. So the area on the left of this map that has
6 written on it "M-651", is that the one you're referring
7 to?

8 A. Yes, the State Lease M-651, Mississippi
9 Exchange, October, 1988.

10 Q. So that lease which Mr. Hutchinson accused
11 you of intentionally avoiding not to pay State
12 royalties wasn't even acquired by New Mexico Potash
13 until six or seven years after you had completed mining
14 in that area?

15 A. Yeah. Mr. High, I don't know if it was an
16 accusation. It was certainly a flavor that was left
17 with the Commission that that was an intentional act.

18 Q. Well, I don't want to put words in your
19 mouth, so just -- ever how you heard it, Mr. Case,
20 that's fine.

21 All right. And the other State leases are
22 shown in red blocks as well?

23 A. That's correct.

24 Q. Now, are there any other areas on the state
25 leases that you want to comment on, Mr. Case?

1 I'll tell the Commission too, we're going to
2 have another witness with this document. I am only
3 doing this, really, so Mr. carroll can use this
4 document.

5 A. Mr. High, just by way of general knowledge,
6 the area up here that will appear to have been avoided
7 was in fact avoided because we reached what was then
8 cutoff grade at the edge of that lease.

9 Q. Now, is that the one that the --

10 A. This is M-19393 and M-15171.

11 Q. You did not stop mining on that State lease
12 to avoid paying State royalties, did you?

13 A. That is correct.

14 Q. It was for mining purposes?

15 A. For mining reasons.

16 In the middle of the map, in the north end,
17 we have an area called M-14857 [sic], in this area
18 here. You'll notice that we mined extensively on that
19 State lease until we reached a barren zone, which is
20 shown by the wider blue hatching on the map.

21 There are some leases to the far northeast
22 that are in the northeast ore body that we discussed
23 earlier, that we have plans to mine in the intermediate
24 future, if you will.

25 Q. Will they be mined before or after the

1 development of the southern leases?

2 A. They'll be mined after the development of the
3 southern leases.

4 Q. All right. And the southern leases, are
5 those down in Sections -- What?

6 A. Well, virtually everything south of the
7 centerline of the map.

8 Q. Okay.

9 A. This area in here, Sections 26 and 35,
10 Section 2, Section 36, are the predominant sections in
11 that State lease. You might conclude that we have
12 stopped mining just by virtue of -- that's as far as
13 we've gone, right at the north end of that state lease.

14 As a matter of fact, we're mining in that
15 State lease today with every intention of developing
16 right straight down through that State lease, so --

17 Q. And that's the southern movement towards
18 Section 2 you referred to earlier?

19 A. That's correct.

20 Q. Okay. Does New Mexico Potash even take into
21 consideration, Mr. Case, the royalties it will be
22 paying when it's deciding in which areas to mine?

23 A. No, sir.

24 MR. HIGH: Mr. Chairman, we would offer
25 Exhibit Number 38.

1 CHAIRMAN LEMAY: Without objection, Exhibit
2 38 will be entered into the record.

3 MR. HIGH: And I believe that's all we have.

4 CHAIRMAN LEMAY: Thank you, Mr. High.

5 Mr. Carroll?

6 CROSS-EXAMINATION

7 BY MR. ERNEST CARROLL:

8 Q. Mr. Case, let's kind of go back in time to
9 the first part of your testimony and flesh out a little
10 bit of the things that you talked about.

11 Early on, you said that your basic education
12 and I guess early training was in the metallurgic
13 facets of mining engineering?

14 A. That's correct.

15 Q. And have you, though, during your period of
16 years -- and it seems like you've been out 20-plus
17 years at this particular mine -- have you had mine
18 production experience? Would you consider yourself as
19 having had to get into that area, what is commonly
20 termed that, anyway?

21 A. Well, I'm not sure what you call mine
22 production experience. Being responsible for the
23 entire operation, I am responsible for mine production.

24 Q. All right. And that would include
25 responsibility for determining what a mine plan would

1 be, what your LMR would be, those kind of things also?

2 A. The buck stops at the general manager's desk,
3 so to that extent responsible, yes. I have very
4 competent people who have much more mining and
5 geological training than myself on my staff, and I rely
6 heavily on them to do the physical work.

7 If you're after the fact, have I ever put
8 pencil to paper on an LMR map or tried to interpolate
9 between holes, no, I have not.

10 Q. But at least would you say that for the 20
11 years you have been concerned with these mine
12 production type problems such as developing mine plans,
13 developing where your ore reserves are, and have been,
14 at least with respect to this mine, familiarizing
15 yourself with those problems on a fairly daily basis
16 then?

17 A. Certainly.

18 Q. Okay. With respect to developing mine
19 feasibility studies, and in particular as these might
20 relate to capital investment, such things as that, have
21 you been also involved on basic -- probably a daily
22 basis, with those kind of issues, in looking at that
23 kind of data for those purposes?

24 A. Certainly.

25 Q. All right. Now, New Mexico Potash Company,

1 who owns? Is this -- What is the ownership?

2 A. New Mexico Potash is a 100-percent owned
3 subsidiary of a -- of Cedar Chemical Corporation.

4 Q. Cedar Chemical Corporation?

5 A. That's correct.

6 Q. And Cedar Chemical Corporation, is that part
7 of a conglomerate?

8 A. Yes, it is.

9 Q. And what's the name of that conglomerate?

10 A. Trans Resources, Inc.

11 Q. Trans Resources, Inc., also owns the mine in
12 this area by the name of Eddy Mine; isn't that correct?

13 A. That's correct.

14 Q. Does Trans Resources, Inc., own any other
15 mines in the southeastern New Mexico area?

16 A. No, sir.

17 Q. Do they own potash mines anywhere else?

18 A. No, sir.

19 Q. With respect to the marketing of potash from
20 your mine, New Mexico Potash has engaged at least in
21 some kind of contractual arrangement for another
22 company or producer of potash or group to help market
23 its potash; isn't that true?

24 A. Yes.

25 Q. And that company is the Potash Corporation of

1 Saskatchewan; isn't that correct?

2 A. Mr. Carroll, that's getting beyond my area of
3 expertise in that the division of responsibility for
4 the potash basically stops at the point that we put it
5 in the rail car.

6 There's another branch of the company, both
7 of us reporting to the same senior vice president who
8 is responsible for marketing. And quite frankly, I
9 can't talk intelligently with you about the marketing
10 arrangements.

11 Q. The marketing, then, arrangements are carried
12 out on a higher level of this conglomerate then; is
13 that what you're telling me?

14 A. That's correct.

15 Q. But at least basically you know that this --
16 that there is an entity that does market the potash,
17 and it's also responsible for marketing at least
18 three -- production from at least three mines in
19 southeastern New Mexico?

20 A. I don't know the particulars of that
21 arrangement.

22 Q. I understand that, but you are aware that
23 they are at least responsible for marketing the potash
24 from the New Mexico Potash Mine, the Eddy Mine and now
25 the Horizon Mine?

1 A. I don't know that for a fact.

2 Q. Are you aware that this conglomerate, that
3 there is a marketing at least for the New Mexico Potash
4 and the Eddy mines?

5 A. For some of the output of those mines, yes.

6 Q. All right. And so your degree of
7 uncertainty, then, is with respect to the inclusion of
8 the Horizon Mine into that category?

9 A. That as well as the particulars of the
10 contractual arrangements.

11 Q. Certainly. And I understand, and I'm not
12 trying to get into the particulars of the arrangements.

13 A. Yeah.

14 Q. It's just there's another -- There is a body
15 that is in charge of marketing at least some of the
16 product, is all -- as far as I'm going.

17 Are you familiar with a mining journal called
18 *The Mining Journal, Limited*?

19 A. Yes.

20 Q. Do you happen to take that publication on a
21 regular basis?

22 A. If that's the weekly publication that comes
23 from England, yes.

24 Q. All right. I do believe that is the same
25 one. In the June 19th -- Would you have any reason to

1 dispute the fact that in the June 19th, 1992, issue it
2 stated that in February of this year, PCS, this Potash
3 Corporation of Saskatchewan, entered into a long-term
4 agreement to be the exclusive sales agent from the
5 Horizon Potash which produces potash from the AMAX Mine
6 in Carlsbad?

7 MR. HIGH: Mr. LeMay, I'm going to object.
8 The witness already said he doesn't know anything about
9 this.

10 If counsel wants to introduce it through a
11 witness that does, fine, but this witness has already
12 said that he doesn't know anything about it.

13 CHAIRMAN LEMAY: Do you have anyone that
14 would be more qualified in this area that you're going
15 to have as a witness, Mr. High?

16 MR. HIGH: No, we're not going to put on any
17 marketing --

18 CHAIRMAN LEMAY: You have no marketing at
19 all?

20 Where are you going with it, Mr. Carroll?

21 MR. ERNEST CARROLL: Really, I think I'm at
22 my end.

23 CHAIRMAN LEMAY: Okay.

24 MR. ERNEST CARROLL: Just to answer the
25 question that --

1 Q. (By Mr. Ernest Carroll) Do you have any
2 reason to dispute the reports in this -- This is a
3 respected mining journal, is it not?

4 A. It is.

5 Q. Okay. And you have no reason to dispute that
6 report?

7 A. No, sir.

8 Q. Let's talk a minute in general terms about
9 potash mining in general.

10 On your Exhibit 38, as I take it, that by
11 your statement that there is -- at some time in the
12 future there is a plan to move back to the north end of
13 your mine reserves or ore reserves or what have you,
14 and begin developing up there; is that correct?

15 A. That's correct.

16 Q. If you'll look at your Exhibit 38, up in the
17 right-hand corner there would appear to be a -- I guess
18 a development passageway that goes right up next to the
19 Section 36 that's cross-hatched as State lease. Do you
20 see that?

21 A. Yes, sir.

22 Q. Okay. Now, there's a -- It says "Mined 4 of
23 1983." Is that when mining stopped in that passageway?
24 Is that what that meant to me?

25 A. Yes.

1 Q. Okay. So really, right now, is it fair to
2 say that this passageway -- let's say right out there
3 at the very end where it stops at Section 36, that --
4 The mining was completed there in 1983, but that is
5 still an open passageway?

6 A. Yes.

7 Q. Okay.

8 A. Or will be able to be rehabilitated.

9 Q. Okay. It hasn't completely closed in or
10 subsided into that hole?

11 A. No. If you'll notice, there is no mining for
12 a substantial distance on either side of that. That's
13 what we call a barrier pillar. That barrier pillar was
14 left there all the way from the existing shaft out
15 along those entries to insure that that was an area
16 that would remain open or we could rehabilitate for
17 future entry.

18 Q. Okay. Now, really, that -- I just wanted to
19 set up what I wanted to talk about, and it has nothing
20 to do with, really, that.

21 It's just -- Many times, mines do stop
22 activity in an area, but they do plan to go back into
23 it, and at times that area may be left open for a
24 considerable amount of time; is that correct?

25 A. True.

1 Q. What are the -- how do you keep -- What are
2 the many different ways that you can keep a development
3 entry like this open?

4 A. Again, general knowledge, not being a rock
5 mechanics expert or a mining engineer, barrier pillars
6 leaving unmined ground on either side, along those
7 entries is, I think, an accepted way.

8 Another way is mining those entries higher
9 than is required to extract the ore that's contained in
10 those entries so that what closure occurs still gives
11 you enough opening to re-enter those some years later.

12 Q. What about rock-bolting? Is that another
13 procedure?

14 A. We will have an expert on mining engineering
15 testifying later, and that is beyond my level of
16 expertise in the mining business, Mr. Carroll.

17 Q. Well, just -- Again, you've told me that on a
18 day-to-day basis you've been responsible for overseeing
19 this mine, and I'm trying to just get some general
20 categories elicited from you, Mr. Case.

21 Isn't that another one -- And I want you to
22 limit your testimony to what you use at New Mexico
23 Potash. You've been down in this mine, and you've
24 overseen it, or you've been there for 20 years, and
25 you've overseen it for a large part of that.

1 What have you observed at work in the New
2 Mexico Potash Mine to protect these and keep open these
3 many entryways that -- Apparently there's several of
4 them up in the northern part of your mine.

5 A. Basically what I've described to you. You
6 asked about rock-bolting. That is a way that entries
7 may be sustained.

8 Q. Do you use it at the New Mexico Potash Mine?

9 A. We rock-bolt in New Mexico Potash Mine for
10 various reasons.

11 Q. Okay. What other reasons would you rock-
12 bolt?

13 A. I'd have to defer to my mining experts on
14 that.

15 Q. All right. Do you use -- I think the terms
16 has been bandied about, stulls or timbers? Do you use
17 that, shoring up?

18 A. Very, very infrequently.

19 Q. Okay. Any other ways that you've encountered
20 in your mine?

21 A. Not that I recall.

22 Q. Now, this mine was opened up when, Mr. Case?

23 A. Began production in 1965.

24 Q. Okay. So it -- The digging and what have you
25 had to occur before that, but production actually --

1 A. No -- Well, okay. The mine went into
2 production in 1965. The sinking of the shafts and so
3 forth preceded that, obviously.

4 Q. And judging from Exhibit Number 38, there are
5 large portions of the mine where secondary mining has
6 actually occurred; is that correct?

7 A. That's true.

8 Q. In fact, you were referring a moment ago to a
9 state lease, this M-651.

10 The area to the north of M-651 has in fact
11 been second mined?

12 A. That's correct.

13 Q. All right. And that's really what these -- I
14 guess, these dates were, just right above the section
15 there. It says, "Mined 6/1979 through 5/1981". That
16 reflects the period during which this -- that area
17 right there went through the first and second mining
18 stages; is that correct?

19 A. Yes.

20 Q. Okay. Now, has New Mexico Potash Mine ever
21 conducted any studies on the surface to measure
22 subsidence?

23 A. Not since I've been in responsible charge,
24 no.

25 Q. And what would you -- What is that period

1 that you're referring to?

2 A. Since 1980.

3 Q. 1980?

4 A. That's correct.

5 Q. Okay. So that -- For the last twelve years,
6 you know of none?

7 A. That's correct.

8 Q. All right. Are you even aware of any being
9 performed prior to 1980?

10 A. Not specifically for our operation, no.

11 Q. Okay. Is there a reason why you haven't?

12 A. I can come at that from a couple of different
13 directions.

14 There has been a fair amount of subsidence
15 work done, I believe, by the Bureau of Mines, and
16 perhaps Mr. Lane can testify to that later since he's
17 been in the area much longer than I have, even. And I
18 think that we have generally accepted the findings of
19 those studies to be applicable to our operation as
20 well, and consequently did not find the need to develop
21 specific studies for New Mexico Potash Corporation.

22 Q. So when -- We've had numerous references to
23 studies done by a Mr. Pierson or Mr. Deere and
24 incorporated in the Golder report. Basically what
25 you've told me is that you're aware of those studies,

1 and the findings have been acceptable, at least, in
2 your mind; is that what you just testified to?

3 A. Yes.

4 Q. Okay. Now, I think what you were -- You were
5 here this morning talking about the situation of what
6 we might call pressure explosions, and in fact, you
7 stated that you had a miner -- or a fatality in one of
8 those?

9 A. Yes.

10 Q. And by -- I don't want to use the word
11 "explosion", because most people think of a detonated,
12 fire-type thing, but --

13 A. Fireball, right.

14 Q. -- that's not what we're talking about.

15 A. Okay.

16 Q. And that's not what occurred at your mine?

17 A. That's correct.

18 Q. Okay. So what we have is almost like a
19 situation where a kid blows a balloon up just too far
20 and it just goes, right?

21 A. Right.

22 Q. Okay. So now, would you -- Because you
23 mentioned some terminology here and you stated there
24 was -- because you were doing certain procedures and
25 you moved from a geologic hierarchy or something, and

1 I'm not sure what words you used -- Can you give me,
2 then, the benefit of, one, what caused -- apparently
3 you did some studies and what have you.

4 What was your -- in your mind, the official
5 reason that this pressure explosion occurred?

6 A. I believe I testified earlier that the
7 conclusion was that we mined into an historic crack
8 that contained these gases under pressure.

9 You know, we're certainly familiar with the
10 gases under pressure. We drill a vertical relief hole
11 in virtually ever intersection of the mine to relieve
12 those gas pressures. And in fact when they're
13 relieved, with sensitive instrumentation we can see the
14 back or the top of the mine actually move back up a
15 small amount. And so we intentionally drill those
16 pressure-relief holes.

17 Those holes were up and active at the time of
18 that release of gases under pressure, and in
19 investigating and digging what we could, the extent of
20 that crack went well beyond anything that we could
21 reach --

22 Q. Uh-huh.

23 A. -- by digging with our mining equipment and
24 so forth.

25 And by looking at the inside of that crack

1 and seeing the crystals grown there and so forth, we
2 concluded that that was not a new crack. It had been
3 there, as I say, historically, that is pre-mining
4 times.

5 Q. Sure.

6 A. And there was no certain cause put to why
7 that crack was there.

8 Q. Okay.

9 A. There was a lot of speculation, we did a lot
10 of effort -- made a lot of effort to try and find, was
11 there a way of predicting those cracks or sighting
12 those cracks through the rock in front of us, and we
13 came up dry on that pursuit.

14 Q. Okay. So right now the -- I guess the
15 conventional wisdom of New Mexico Potash is that this
16 -- there was some sort of a cavity which had this gas
17 in it?

18 A. That's correct.

19 Q. And you have decided that there is absolutely
20 no way of predicting when and if you'll ever reach
21 another one of those cavities; is that correct?

22 A. That's correct.

23 Q. Okay. Now, you said that you dug into this
24 cavity.

25 How far did you actually follow the cavity,

1 Mr. Case?

2 A. Mr. Lane can testify to specifics on that.
3 My recollection was less than 10 feet with our mining
4 equipment.

5 Q. Okay. Now, the -- You said that for a period
6 of time after you encountered this, that you began to
7 drill relief boreholes ahead or in advance of the face
8 as you moved your mine?

9 A. That's correct.

10 Q. And you did this for a period of time and
11 then you stopped?

12 A. Uh-huh.

13 Q. Okay. Why did you stop drilling those
14 things?

15 A. Because immediately after we started doing
16 this, we would occasionally encounter another
17 pressurized point, okay?

18 Q. Okay.

19 A. That released pressure. Then we went on
20 several thousand feet and had no such encounters and
21 concluded that that was a localized phenomenon.

22 Q. Okay. Now, have you done any studies that
23 would tell you that this localized phenomenon will
24 never occur again?

25 A. I would defer to Mr. Lane on that.

1 Q. I don't want the substance of it, but have
2 you done -- are you aware of any other studies being
3 performed by --

4 A. We did a rather exhaustive study at the time
5 of the accident and have done no further studies after
6 that time.

7 Q. Okay. Is there a way to predict, in your
8 knowledge, to predict whether or not that will ever
9 happen again?

10 A. We feel like there are portions of the mine
11 that might be more susceptible to that, where you --
12 Can you predict where they are? No.

13 Q. Okay, But at this point in time New Mexico
14 Potash is not drilling the boreholes into the faces
15 they're mining? You've stopped doing that?

16 A. That's correct.

17 Q. Is it because the cost is prohibitive?

18 A. That's certainly a factor, yes.

19 Q. Okay. And in other words, you don't feel
20 it's good insurance -- or it's not necessary insurance
21 anymore to drill those boreholes to protect the safety
22 of your miners?

23 A. Mr. Carroll if I had unlimited funds I would
24 probably do it, and unlimited time to develop my
25 reserves.

1 Q. So at least within the potash industry, you
2 as a miner are faced with the everyday problems of
3 weighing economics with safety of the miners, aren't
4 you?

5 A. Certainly.

6 Q. And you make those decisions, don't you?

7 A. Yes.

8 Q. Now, let's -- Let's talk about monitoring
9 methane gas a little bit.

10 Do you have to do that right now on a regular
11 basis --

12 A. Yes.

13 Q. -- because of federal requirements?

14 A. Yes.

15 Q. What's the frequency in -- both in time and
16 area that you have to --

17 A. We sample with a hand-held methanometer each
18 shift prior to going to work in that face.

19 Q. Okay, so --

20 A. Active areas throughout the mine, wherever
21 they may be.

22 Q. Okay, and it's limited to the active areas in
23 the mine, then?

24 A. Yes, sir.

25 Q. All right. And how many shifts does the mine

1 -- New Mexico Potash, is it running? Is it running
2 three continuous shifts?

3 A. We run three shifts for ten days or eleven
4 days and then are down either four or three days.

5 Q. I see. So you run a 24-hour operation for a
6 certain amount of days --

7 A. Yes.

8 Q. -- and then you shut down for a while, and
9 then you come back on again?

10 A. That's correct.

11 Q. And so you could -- this monitoring, then --
12 And this is done, I take it, in satisfaction of federal
13 standards?

14 A. Certainly, yes.

15 Q. Okay.

16 A. Federally approved sampling equipment.

17 Q. Okay, and it's a hand-held device that you --
18 I guess you just take it close and -- or hold it in
19 proximity and turn it on, and it tells you?

20 A. That's correct.

21 Q. Okay. And I would take it that the mine
22 already has a number of -- You have to have one of
23 these machines for every face, then, I would take it?

24 A. Yes.

25 Q. The -- Let's talk about the ventilation

1 system that you've run through here.

2 You said that you have two main fans?

3 A. Yes.

4 Q. Okay. What's the size of those in
5 horsepower?

6 A. They are, I believe, 72-inch fans with
7 nominally 200-, 250-horsepower motors on them.

8 Q. Okay.

9 A. I'm not familiar with those particulars, but
10 that's the nominal size.

11 Q. Okay. And then you have booster fans that I
12 guess are down in the mine to keep this going?

13 A. Yes.

14 Q. And what kind of -- Are we talking about
15 small fans or large fans --

16 A. No, they're nominally 36- to 48-inch
17 diameter. They're skid-mounted and have probably 50-
18 to 100-horsepower motors on them.

19 Q. How many of those do you have situated in the
20 mine?

21 A. I'm not certain.

22 Q. Okay. Now, is there federal regulations as
23 to how much -- the volume of air that must move in
24 front of a face?

25 A. Yes.

1 Q. Are you bound --

2 A. I'm familiar with those regulations -- I'm
3 familiar that there are regulations. I count on my
4 mining people to tend to that and tell me.

5 Q. You can't tell me how much cubic feet of air
6 must pass by the --

7 A. No, I cannot.

8 Q. Okay. Is someone that's going to testify
9 later going to be able to tell me the exact number of
10 air that federal requirements --

11 A. I believe Mr. Lane can probably testify about
12 that.

13 Q. Okay. Now you did, though, testify -- gave a
14 number to Mr. High, and do you recall what that number
15 was, of air flow that --

16 A. Our total air circulation is approximately
17 250,000 cubic feet a minute.

18 Q. Okay, 250,000 cubic feet a minute.

19 Now, let's talk just a moment about that
20 calculation. You were -- when you were talking about
21 -- One of your concerns is the personal safety of these
22 people from this methane. And you did a compilation.
23 You broke that 250,000 cubic feet per minute down into
24 125,000 cubic feet per minute, because you said that
25 you basically have two ventilation systems?

1 A. Yes, it splits the air.

2 Q. Splits the air. And this 250 was for the
3 entire system?

4 A. That's correct.

5 Q. All right. And you made reference to the
6 fact that there was testimony that some of these wells
7 could produce 150,000 cubic feet a day?

8 A. That's correct.

9 Q. All right. And now -- and then you performed
10 a -- at least a -- as a rough calculation that you felt
11 like if the stream of 150,000 -- which was measured at
12 150,000 cubic feet a day entered the mine, that it
13 would be diluted, but it would go through that range
14 which methane would explode and --

15 A. Yes.

16 Q. Okay. And what we're talking about there is
17 that methane -- it has to have a certain ratio to
18 oxygen, or it's not explosive?

19 A. That's correct.

20 Q. And when methane is in the presence of
21 nitrogen, since nitrogen won't burn or what have you,
22 that's why it doesn't -- it isn't explosive, and that
23 was one of the reasons you defeated the MSHA
24 classification of your mine back in the early 1980s as
25 a gassy --

1 A. That plus the fact that the concentration of
2 methane even in the nitrogen carrier never got to the
3 lower limit of explosibility or --

4 Q. Okay. Now, that compilation that you gave
5 assumed, then, if a well was capable of producing
6 150,000 cubic feet of gas per day, your statements
7 there assume that the entire 150,000 cubic feet of gas
8 would be put into your mine? That's what you were
9 assuming when you were making those statements?

10 A. Worst-case scenario.

11 Q. Worst case. Do you -- okay, so that -- At
12 least for that part of your testimony, you assumed that
13 every bit of that gas was going into the mine?

14 A. That's correct.

15 Q. And -- But one other conclusion we can draw,
16 that even if we were putting the full stream of gas
17 into the mine, your ventilation systems will dilute
18 that stream, given enough time?

19 A. Correct.

20 Q. Okay. Did you try to calculate the time, or
21 have you done calculations?

22 A. I don't know.

23 Q. Now, when you were -- Initially yesterday,
24 when you were talking about the New Mexico Potash Mine
25 generally, when you were talking about the first and

1 second mining phases --

2 A. Yes.

3 Q. -- you stated that in the initial pass-
4 through, the first mining stage, you mined between 30
5 and 50 percent --

6 A. Uh-huh.

7 Q. -- of the ore.

8 Now, in a normal situation, is that closer to
9 50?

10 A. No, it depends on where you're mining and
11 what stage of development you're in.

12 Q. Okay. Could you explain why? That was my
13 next question.

14 A. Well, certainly if we're going out, say, to
15 the edge of the orebody, the first thing you do -- and
16 if we follow traditional mining practices, go to the
17 edge of the orebody, start mining from there back --
18 the first thing you would do would be develop a three-
19 entry -- what we call a three-entry system, that is,
20 three parallel tunnels to the very extent of the
21 orebody.

22 Roughly the center entry carries the belt
23 system, the conveyor belt system. The other entries,
24 the right-hand entry normally has the power, electrical
25 power, required to run the mining equipment going

1 through that entry. The third entry -- well -- and
2 fresh air goes down the right-hand entry.

3 There's a curtain wall established between
4 the second and third entries, so that air goes down to
5 the end of the curtain wall, comes back, and the third
6 entry is a return-air entry system.

7 So I think you can appreciate these tunnels
8 are nominally 25 feet wide, each of the entries,
9 nominally six feet high for long-term access.

10 There are pillars where each of these --
11 mining is done between each of these entries about
12 every 160 feet, is my recollection, that establishes
13 connections so that this air flow is within 160 feet of
14 the face at all times.

15 So you develop the crosscuts, circulate the
16 air around here, then you do a little bit of mining
17 ahead and are circulating your air over the miner, but
18 then very quickly again you do these crosscuts to
19 establish your entire ventilation pattern.

20 Now, I think you can appreciate you've got a
21 total width of perhaps -- The three entries are
22 separated, my recollection is, about 80 feet apart. So
23 you've got 25 feet, 80 feet, 25 feet, 80 feet, and 25
24 feet, whatever that adds up to, in this whole expanse
25 of ore.

1 So you know, at that point you'd say, okay,
2 you know, maybe five percent of the ore that you're
3 looking at to extract through those entries. So it
4 depends. Then you get out and you start taking what we
5 call submains off of those entries, then panels off of
6 those submains. And each of those consumes a little
7 bit more of the ore in place.

8 Where we draw the line between first mining
9 and second mining is where we get to one of these
10 panels, we drive nominally 2000 feet ahead of
11 ourselves, and then come off of that and start retreat
12 mining.

13 Everything up to the end of that 2500-foot
14 development is first mining. From there on back, as
15 we're retreating and maximizing the extraction of ore,
16 is second mining.

17 Q. So at least the speed, then, that your mine
18 advances is dictated by what you're doing? If you're
19 just driving to the edge of the ore, you're going to be
20 covering ground much faster and going farther distances
21 than you would be in any of the other processes that
22 you just described for us?

23 A. A ton of rock measures the same whether
24 you're advancing or retreating.

25 Q. What I'm talking about is that -- Let's say

1 if you're driving down into a new area, though, if
2 you're just driving these three tunnels that we're
3 talking about --

4 A. Yes, yes.

5 Q. -- you're going to get there a lot faster if
6 that's all you do, is drive that tunnel?

7 A. Certainly.

8 Q. Okay. Now, when we were talking a moment
9 ago, back up here on Exhibit 38, up in this upper
10 right-hand corner where you stopped just before
11 entering Section 36, would that green-hatched area up
12 there leading up to it, would that have the three
13 tunnels that you're talking about?

14 A. Yes.

15 Q. Okay. Now, it's -- Is it the policy of New
16 Mexico Potash to drive to the edge of the orebody when
17 you're making advance tunnels like that?

18 A. If economics will permit that, yes.

19 Q. If economics will prevent it?

20 A. Permit, permit.

21 Q. Permit, okay, excuse me. That was a slip of
22 the tongue, faux pas, I'm afraid. Apologize.

23 Is it then safe to assume that when you
24 stopped in 1983 at the edge of 36, that economics would
25 no longer permit you to advance that mine shaft to the

1 end of the ore which technically could be all the way
2 over to the edge of Section 31, the east edge of
3 Section 31?

4 A. That's correct. That area was one of many
5 areas under consideration. Recall we have ten faces.
6 You have to weigh the economics of all ten of those
7 faces together.

8 Q. Uh-huh. So anyway, at that time -- You're
9 saying that at that time economics no longer allowed
10 you to advance the face, and you stopped? Or is there
11 some other reason that you stopped?

12 A. There is some other reason --

13 Q. Okay.

14 A. -- and it gets rather complicated, but we
15 were working up on the west side in about Section 6,
16 that's shown on your map --

17 Q. Uh-huh.

18 A. -- up in here.

19 During that same period of time, we were --
20 The development of the green hatching that is under the
21 R-31-E in this area, we had developed south to the
22 maximum travel distance that we could from the shaft,
23 and were retreating that area back.

24 And you appreciate the fact that we had
25 basically a mine over here, near the R-31-E marking,

1 another mine over here. And the economics of
2 supporting those two mines and the distances required
3 for maintenance people to go from the central shops
4 area to either direction, the timing precluded doing
5 any further development to open a third mine if you
6 will.

7 So it was -- to the extent that that
8 optimization of manpower and resources entered into the
9 equation, certainly that was one of the elements.

10 Q. Now, what -- So you're saying that the grade
11 of the ore did or did not really affect your decision
12 in this particular case, then?

13 A. Grade affects virtually every decision, along
14 with economics.

15 Q. Okay. And the economics that we're talking
16 about is that you were getting too far away from the
17 mine shaft here --

18 A. Given the equipment that we then had for
19 moving people through the mine, yes.

20 Q. All right. Back in 1983, are you telling me
21 that they didn't have diesel Rabbits?

22 A. I'm saying that we did not employ diesel
23 Rabbits in the mine.

24 Q. Okay, you just didn't use them back at that
25 point in time?

1 A. That's correct.

2 Q. Was another consideration here the -- your
3 conveyor belt? You've told us that you have a set
4 amount of conveyor systems.

5 Were you stretching your conveyor system at
6 that point too, to its limits, for moving the mined
7 material?

8 A. I don't recall that entering the discussion.

9 Q. Okay. Now, at the time, then, that -- and
10 basically what you had is that you were -- you were
11 trying to develop two areas on opposite sides from each
12 other, and that put a considerable amount of distance
13 moving people and really aggravated the situation,
14 then, that you found yourselves in?

15 A. Let's put it, complicated.

16 Q. Complicated, okay.

17 When you finished mining -- When did you
18 finish mining the area, second mining block that's in
19 Section 6? Do you recall?

20 A. It's been within the past two to three years.
21 I don't recall exactly when that was.

22 Q. Now, the machines that you moved out of
23 there, why didn't you go back into this area up there
24 close to Section 36?

25 A. Because we -- At that time we had made a

1 commitment to develop the south part of the mine prior
2 to the northeast part.

3 Q. Okay. You made a commitment. What are the
4 elements of this commitment that you made? Why
5 couldn't you go back to someplace where you had already
6 started development?

7 A. The major consideration was that when we
8 finished mining in the R-31-E area over here, we began
9 pulling conveyor belting back and using it in the south
10 part of the mine.

11 We also made a major capital commitment to
12 run 48-inch-wide conveyor belting, which will carry all
13 of the mine's production, from the shaft which is --
14 You can see the little red note there, near Section 6,
15 in the left part of the mine -- from the shaft, east
16 approximately half a mile and then south for
17 approximately two to two and a quarter miles, so that
18 we could develop west off of that belt system and east
19 off of that belt system and have the single belt system
20 carrying ore to the shafts, rather than trying to
21 maintain additional miles of belting to support both
22 northeast and south.

23 Q. Now -- So what you're telling me is that up
24 prior to 1983, though, you had your conveyor belts and
25 system that allowed you to mine all the way up to

1 Section 36; is that correct?

2 A. That's correct.

3 Q. And so this commitment that you made, and
4 when you did it, it caused you to dismantle this
5 conveyor system and rebuild a conveyor system towards
6 the south; is that correct?

7 A. That's correct, which is part of normal
8 mining development.

9 Q. Certainly --

10 A. Anytime you're on development -- it doesn't
11 make any difference where you are -- you've got to hang
12 belt, you've got to hang power.

13 When you retreat, you retreat belt and you
14 retreat power.

15 Q. So for you to go back, though, and mine
16 Section 36 and mine stuff up in the northern part,
17 you're going to have to rebuilt your conveyor system
18 back up in there; is that correct?

19 A. That's correct.

20 Q. So essentially, then, you're -- to mine that
21 Section 36, you're going to build your mine conveyor
22 systems twice in a historical perspective for this
23 mine. You're going to be involved in or -- undertaken
24 that cost twice?

25 A. Yes.

1 Q. Is that economic, Mr. Case?

2 A. If you isolate that case by itself, probably
3 not. If you consider the entire mine development, it's
4 certainly within reason.

5 Q. And you're telling us that it had nothing to
6 do with the fact that Section 36 and Section 31 belong
7 to the State of New Mexico?

8 A. Yes, sir, I'm telling you that.

9 Q. And you're also telling us that it's just
10 merely coincidental that this development that stopped
11 in 1983 stopped at the lease line?

12 A. I don't recall the particular instant at
13 which we stopped northern -- the immediate item that
14 made that decision.

15 Q. While we're talking about that, let's turn
16 over here to this lease number 651. What -- Your map
17 shows that you --

18 New Mexico Potash acquired this lease back in
19 1988; is that correct? October?

20 A. That's correct.

21 Q. And you had already done your secondary
22 mining, at least in the part, the smaller part here,
23 this south half. I'm not sure what section number it
24 is, but you completed that second mining in 1982, and
25 you completed the second mining up above it, the

1 adjoining section, in 1981; is that correct?

2 A. That's correct.

3 Q. So --

4 A. Let me say, Mr. Carroll, that may appear to
5 raise the question, how can you mine out here in 1982
6 if you finished mining here in 1981?

7 Entries were kept open, belt systems were
8 open, and we orderly retreated the entry system. In
9 other words, the last thing you do is pull the belt in,
10 you pull the power, and then you send your miner in and
11 do what we call splitting pillars.

12 Q. I understand it. I wasn't trying to question
13 why --

14 A. That was part of that development.

15 But well before Kerr-McGee sold the
16 operation, we were out of even the section south of
17 Section 6 -- I guess that would be Section 7 -- having
18 adhered to our federal leases in that area.

19 The other leases at that point in time
20 belonged to Mississippi Chemical Corporation.

21 Q. Certainly. And I was not trying to --

22 A. Yeah.

23 Q. I understand the fact that the 1982 was out
24 farther away from --

25 A. Sure.

1 Q. Didn't bother me at all.

2 A. Right.

3 Q. All that I was trying to -- was really
4 getting as a starting point, your conclusion that all
5 of this area had been second mined at least by the end
6 of 1982.

7 A. Yes.

8 Q. And that was some six years prior to the
9 acquisition, then, of this particular --

10 A. Five years.

11 Q. Five years?

12 A. Well, yeah, six years prior to the lease or
13 thereabouts.

14 Q. Certainly. Now, look over on the eastern
15 edge of that section, that large -- and what section
16 did you call that, that full section there?

17 A. Well -- The one where M-651 is?

18 Q. Yes.

19 A. Or the one north of it?

20 Q. No, the one where it says just M-651 --

21 A. Okay.

22 Q. -- and that's the number that's just below
23 the 1979 through 1981 entry.

24 A. I believe that would be Section 17. I
25 believe M-651 is Section 18.

1 I'm not as adept as some of these oil folks
2 are at saying which section is immediately south of
3 another section.

4 Q. I'm not either. I'm not either, Mr. --

5 A. But I believe M-651, where the lettering is,
6 called M-651, would be Section 18.

7 Q. And I think -- I'm sitting here, if that
8 section is 6, two above it, that's probably correct.

9 Now, look along the eastern edge of Section
10 18 there. I see a notation that this was mined in
11 1990; is that correct?

12 A. Yes, sir.

13 Q. And in fact, that narrow strip there was in
14 fact second-mined down to your entryway in the year of
15 1990?

16 A. That's correct.

17 Q. And that was mined after acquisition of Lease
18 M-651, was it not?

19 A. That's correct.

20 Q. And it appears that while you just entered
21 this section 18, you have been driving even further
22 south in your development, because -- and I take it,
23 and I may be assuming too much by this notation,
24 "current area of mining" --

25 A. Yes.

1 Q. -- but that is where you're actually moving?

2 A. That's correct.

3 Q. And you are moving south; is that correct?

4 A. In the very heart of the State section there,
5 that's correct.

6 Q. All right. And in fact you've actually moved
7 out of the State section into -- I guess that would
8 be -- Well, no, you haven't moved out.

9 You're approaching the edges of that State
10 section in it looks like probably three different
11 areas; is that fair?

12 A. Yes.

13 Q. Okay. Can you tell me, Mr. Case, why, after
14 working so hard to get this M-651 lease, that you would
15 mine along the eastern boundary, secondary mine, and
16 then drive south away from areas which on this map I
17 know that -- I understand that there may be some barren
18 areas here because of this red outline, but there are
19 certainly ore reserves up in that area that you're
20 driving away from?

21 A. Mr. Carroll, this gets into essentially day-
22 to-day, minute-to-minute mining operations.

23 Our intent was to take that west-trending set
24 of mains through the center of Section 17, directly
25 west, as far as they would go into Section 18, and then

1 across into the area where the lettering says "State
2 Lease M-651", because some of the best grade that we
3 had encountered in the last, say, five to seven years
4 of mining was along that face where it says "Mined
5 7/1980 to 8/1982".

6 Q. Uh-huh, okay.

7 A. Are you with me?

8 Q. These federal leases?

9 A. Yes.

10 Q. Okay.

11 A. We left ore at the lease line all along that
12 one-mile front, along the half-mile front trending
13 north, and then not quite as good quality but still
14 definitely minable quality ore along the mile section
15 where it says "Mined 6/1979 to 5/1981".

16 Q. Uh-huh.

17 A. We had every reason to believe that there was
18 ore in the full section called M-651 and the half
19 section immediately to the west of that, that was State
20 leases.

21 As we developed those west-trending entries
22 through Section 17 and into Section 18, we ran into a
23 barren zone.

24 We turned south and then west again to try
25 and get around that barren zone. Along with the

1 drilling program that we did last year, which K-162 is
2 part of, there were two holes put down that gave us an
3 idea of the size of that barren zone that's shown
4 predominantly within M-651, but there is a separate
5 area with a little bit different hatching there, just
6 south of the lettering, M-651. You'll see an irregular
7 area in there.

8 That is a barren zone that we had no idea was
9 there. And we are continuing to probe around that area
10 and to try and find a way of extracting the reserves
11 all the way out to our lease boundaries.

12 Q. Now, the area that you second-mined along the
13 edge of Section 17, that northwest edge, had you not
14 second-mined that, that would have been an entryway to
15 go west of through the northern part of M-651 and that
16 little edge of the federal leases that you were talking
17 about having left, wouldn't it?

18 A. Excellent hindsight, Mr. Carroll, and we've
19 tried the same thing ourselves.

20 However, at that point in time -- One of the
21 balances that we try and do in the mining business,
22 because when we develop entries, we're developing them
23 high and taking a fair amount of salt dilution along
24 with the ore, that lowers the grade that you're mining.
25 Consequently, you try and keep a balance between the

1 areas that you're retreating at the four, four and a
2 half feet high to maximize the grade there and blend
3 these and keep a reasonably profitable operation going.

4 I guess another way of saying that is, we
5 don't want a hundred percent of our machines on advance
6 at one time because of the low-ore-grade situation that
7 that develops.

8 The reason for second-mining both that area
9 that says "Mined 1980" and the one right next to it --
10 or "1990" -- and the one immediately to the east of it
11 was to give us some of that balance.

12 Q. The area that you secondarily mined there in
13 1990 is a very small strip, isn't it?

14 A. That's a typical panel width in there,
15 probably, Mr. Carroll.

16 Q. And the extraction that you did there
17 followed the lease line, did it not?

18 A. What that followed or what -- the ore that
19 that was after, you can appreciate, if those west-
20 trending entries had developed, okay, if they had not
21 run into the barren zone, we would have been doing
22 panel mining to the north off of that entry probably
23 even today.

24 Q. And today you feel it is more economically
25 feasible to be driving south; is that correct? Than

1 going back up and getting this area, or access to this
2 area where you said that some of your best ore was
3 found in the north part of Section 18? And I guess
4 that would give you access over into the adjoining
5 section?

6 A. Mr. Carroll, we're trying to develop our mine
7 to responsibly extract the resources in Section 18, in
8 the section to the west of that.

9 We also maintain a balance between the
10 southwest and the southeast portions of the mine
11 because of ore-carrying capability of belt conveyor
12 systems and so forth, and we continue to mine in that
13 area.

14 Q. And you feel it's economically, then,
15 responsible or conservationally responsible to run away
16 from this small area of good ore?

17 A. I beg to differ with you that we're running
18 away from that. We have current mining going on in
19 that area, trying to find a way around that barren zone
20 to extract the reserves to the west of it.

21 Q. What about going straight north?

22 A. Would you like to come and run my mine for
23 me?

24 Q. No, Mr. Case, I'm just asking you, because
25 you have said that your mine plan is dictated by

1 certain economics, conservation, and what I see is that
2 you're moving away from it, you're leaving a small area
3 of ore which, because of its smallness in size, has got
4 to be -- it could quite possibly put you in a position
5 that to return at some later date it's going to be
6 economically impossible. Therefore that ore is wasted.

7 Secondly, you're talking about moving and
8 building systems that are going away, and what -- And
9 again, in the example up here in the northwest corner,
10 you're going to build your system twice. Again, that's
11 got to be building -- If you go in and build conveyor
12 lines and move them -- build them --

13 A. I don't understand where you're talking, Mr.
14 Carroll.

15 Q. Well, I'm talking about up here, in the
16 advance that went towards Section 36.

17 You built conveyor lines up through there
18 once, stopped, you dismantled them, put them all back
19 to the south. And you say, We're going to go back up
20 there. So that means you're going to have to rebuild
21 them.

22 What you're saying is the cost to get that
23 Section-36 ore going to have twice the capital costs of
24 building your conveyor system involved in the economics
25 of determining whether or not that ore is economic.

1 And what I'm saying, if you're building and
2 mining in such a situation where you're doubling your
3 capital costs, that cannot, in my mind -- and if you
4 differ, that's fine, and that's all I want to know, is
5 if you differ with my position here, that I'm saying
6 that it is economically unfeasible or at least not in
7 the conservation of your economic resources to put
8 yourself in a situation where you have to double your
9 capital costs to extract a small amount of ore.

10 A. I strongly disagree with you on doubling the
11 capital costs from the standpoint that you've re-used
12 and re-used and re-used once-bought conveyor belt.

13 Q. But you do?

14 A. Yes, you do have to rehang it.

15 Q. That's right.

16 A. That's a very minor part of the cost. You've
17 got the hardware, you've got the belt.

18 Q. But it does involve time, manpower, and
19 expenditure of some kind of resources?

20 A. Every drop of ore that I get out of that mine
21 involves time and manpower, Mr. Carroll.

22 MR. ERNEST CARROLL: Let's talk a minute --
23 Mr. LeMay, this might be a good, since I'm changing,
24 for the morning break.

25 CHAIRMAN LEMAY: Let's take a break for 15,

1 20 minutes.

2 MR. ERNEST CARROLL: Thank you, sir.

3 CHAIRMAN LEMAY: Make it 15.

4 (Thereupon, a recess was taken at 10:25 a.m.)

5 (The following proceedings had at 10:47 a.m.)

6 CHAIRMAN LEMAY: We shall continue.

7 Mr. Carroll, you're on cross-examination.

8 MR. ERNEST CARROLL: Thank you, sir.

9 Q. (By Mr. Ernest Carroll) Mr. Case, let's get
10 to a little different area. I think yesterday you told
11 me that the value of the mine was somewhere in the
12 proximity of \$150 million, your facility.

13 A. Mr. Carroll, that \$150 million would be
14 building a new mine and processing facility. The mine
15 is -- Please understand that that is mine and surface
16 facility combined.

17 Q. That, then, is a replacement cost type?

18 A. Exactly, yes.

19 Q. Now, this mine was purchased back in
20 nineteen-eighty-something?

21 A. 1985.

22 Q. 1985, from the Kerr-McGee Corporation who
23 actually, I guess, began the mine or built the mine
24 from --

25 A. They were in partnership in the early days of

1 the mine, yes.

2 Q. And back in 1985, the New Mexico Potash
3 Corporation purchased this mine for a price tag of \$3.5
4 million; isn't that correct?

5 A. You're talking about something that I don't
6 know.

7 Q. You don't know. And you have no information
8 about the price tag?

9 A. No, sir.

10 Q. Are you aware that -- Well, you don't dispute
11 the fact that this \$3.5-million figure is available
12 through public records?

13 A. I don't know. I don't know the source of it.
14 I was not privy to the negotiations of the sale. I'm
15 not equipped to talk intelligently about that.

16 Q. Well, then, when you're doing cost
17 feasibility studies and what have you, do you take into
18 consideration the depreciation of capital? What kind
19 of figures do you use? How do you -- Where do you have
20 a baseline, Mr. Case?

21 A. I'm not sure I understand your question.
22 Could you --

23 Q. Well, when you --

24 A. Try asking me a little bit different
25 question.

1 Q. Okay. Let me try again. And I apologize.

2 A. Yes.

3 Q. Please, anytime you don't understand, please
4 have me try to better express myself.

5 Let's say you're getting ready to go out and
6 buy ten Volkswagen Rabbits. I mean, you have to have
7 some kind of economic figures by which you judge the
8 feasibility of the expenditures.

9 When you're looking at your income tax,
10 profit and loss, which is -- when you're looking at
11 feasibility of expenditures, you're looking at your
12 profit and loss.

13 Well, profit and loss is oftentimes measured
14 by corporations in terms of after-depreciation dollars,
15 those kinds of things. And that's what I'm getting to,
16 Mr. Case.

17 And I'm just wondering, where do you start
18 from? What -- do you -- this -- If the mine sold for
19 \$3.5 million and it's worth \$150 million, that's an
20 extreme divergency there. And I'm just trying to get a
21 handle on what you use.

22 Do you use a \$150-million plant, or do you
23 use \$3.5 million, or do you just assume that there is
24 no depreciation because everything is written off?

25 A. Mr. Carroll, I believe your question is

1 directed to depreciation of the purchase price of the
2 operation; am I correct?

3 Q. Well, when you look at -- looking at what
4 kind of -- Somehow, if you go out and make a new
5 purchase, you've got to pay for that new purchase. You
6 pay for the new purchase out of profit.

7 Whether or not you're just existing on a
8 cash-flow basis gives you an idea about that profit.
9 Whether you're using depreciation in your situation,
10 your tax situation, that also gives you an idea of the
11 profit.

12 And I'm just trying to get a handle on that,
13 and -- you know --

14 A. Okay. Well, perhaps this will help you.
15 Being a hundred-percent owned subsidiary and selling
16 some of our -- and a measurable portion of our output
17 to a sister plant who further refines our product or
18 converts it from potassium chloride into potassium
19 nitrate, the economic considerations are made at a
20 higher level than our operation.

21 If you're asking me, is there a depreciation
22 line in our budget? Yes.

23 Do we have capital budgets? Yes.

24 Are they approved or disapproved? Yes.

25 Q. But they're performed on a level that is

1 above you, then, I take it?

2 A. The financial decisions, if you will, on what
3 the capital expenditure level should be are made at a
4 level beyond mine. We make recommendations, and then
5 an approved amount is returned to us, both for
6 operating and capital budgets.

7 Q. You told us yesterday that you had upgraded
8 the ore-moving capabilities of your mine through the
9 purchase of somewhere in the nature of three to five
10 years ago of used coal equipment; is that correct?

11 A. Yes.

12 Q. Well, why would you be buying used coal
13 equipment? Is this coal equipment going to last 35
14 years that you've got oil reserves down here?

15 A. No, sir, it will not. Nor would new
16 equipment.

17 Q. Well, why did you go after used equipment?
18 Because it's going to have probably a lesser lifetime
19 than new equipment.

20 A. That's correct. It also has somebody else
21 eating the depreciation on it. Why do you buy a used
22 car instead of a new car?

23 Q. That works for the same reason why you buy a
24 new -- buy a used -- a mine that's already in existence
25 as opposed to going out and opening up a new shaft;

1 isn't that true?

2 A. I think Mr. Hutchinson did a great job of
3 eliciting that part of the potash economics or mineral
4 economics.

5 Q. And if you were going to go and build a new
6 shaft down in the neighborhood of Section 2, you are
7 talking about in the neighborhood of a \$150-million-
8 type investment then?

9 A. I don't believe that we said anything at all
10 about building a new shaft.

11 Q. I know, but I just said if.

12 In the hypothetical, Mr. Case, let's just
13 suppose you're going to go down there and build a new
14 shaft. You're looking at in the face of -- Opening a
15 new mine you're looking at that kind of capital
16 expenditure?

17 A. Are you talking about digging a new shaft?
18 Are you talking about building a new processing
19 facility? I'm not sure I understand what you're
20 asking.

21 Q. Well, if you're talking about building
22 something comparable to what New Mexico Potash now has.

23 A. I have no desire to do that.

24 Q. I'm not saying you do. I'm just saying that
25 if you -- The figures that you've given me, this

1 replacement cost, would be a cost that we could say
2 that if -- in a hypothetical -- and I'm not trying to
3 say that you're going to do that; I'm saying that if a
4 party, an unnamed party, wanted to go and build a mine
5 comparable to what New Mexico Potash, you're talking
6 about a capital expenditure on the order of \$150
7 million?

8 A. If it were a complete grassroots facility,
9 mine to finished product, shipping, the whole works,
10 yes.

11 Q. What -- Building these conveyor lines, and a
12 cost per foot or mile, whatever you do that, what's
13 roughly the cost of constructing these conveyor lines
14 that you transport your ore?

15 A. It would be on the order of two-thirds of a
16 million dollars per mile if everything that went into
17 it was new.

18 Q. Per mile? How much new conveyor line are you
19 going to need to reach Section 2, over what you now
20 have?

21 A. I don't have that figure immediately at the
22 top of my head. It's included in studies that we have
23 looked at.

24 Q. Do you have a cost of what it's going to take
25 to get down to Section 2? Have you done studies and

1 got a figure for that?

2 MR. HIGH: Mr. LeMay, we have a witness that
3 will address that.

4 CHAIRMAN LEMAY: Yeah, why don't we limit the
5 question to what he's capable of answering?

6 MR. ERNEST CARROLL: Well, I didn't know if
7 he's capable or not. And if he's not, that's fine.
8 What witness --

9 Q. (By Mr. Ernest Carroll) Who is capable, Mr.
10 Case, with respect to that?

11 A. I believe Mr. Lane will be testifying.

12 Q. Mr. Lane?

13 A. I believe so.

14 Q. We learned yesterday that -- through Mr.
15 Herrell's testimony, and I believe you've confirmed --
16 that you're required by the BLM to prepare a three-year
17 mine plan which is required to be updated, I guess, on
18 an annual basis?

19 A. Yes.

20 Q. How many years have you been required to do
21 that, Mr. Case?

22 A. I would defer to Mr. Lane on that, but to my
23 knowledge, that's been a requirement for a long time.

24 Q. You don't remember a time when you haven't
25 had to do that, then, I take it?

1 A. Right.

2 Q. Okay. When you're defining a mine plan --
3 that's really -- When you're getting ready to construct
4 a mine plan, what are the criteria that -- and I take
5 it that you have third parties do this. What
6 criteria -- What are the instructions that -- the
7 parameters that they have to work within? What are the
8 considerations?

9 A. Optimum extraction of reserve is the bottom
10 line.

11 Q. Uh-huh.

12 A. They certainly consider grade, they consider
13 blending of grades from areas. They consider conveyor
14 carrying capacities, so that you don't overload a
15 portion of the mine with equipment that the conveyors
16 can't move ore away from.

17 Part of the constraints or part of the
18 consideration is annual production levels.

19 Q. What kind of -- What was your cutoff grade
20 that you used -- I guess let's ask it this way: The
21 cutoff grade that you used in your BLM mine plan and
22 the cutoff grade that you gave to this third party, was
23 it the same cutoff grade?

24 A. I will defer to Mr. Lane on that.

25 Q. Okay. Do you know what the cutoff grades

1 were?

2 A. No, I do not, not without going to my files.

3 Q. Okay. You made a -- With reference to that
4 issue, you made a statement that -- back in referring
5 to Section -- or your Exhibit Number 38 -- that there
6 is a State lease, there's two of them, it's right
7 almost in the middle of the papers, M-15171 and then
8 M-19393.

9 I believe you said, and correct me if I'm
10 incorrect, that there was some development tunnels
11 being driven in that direction. But then the grade of
12 the ore got to a level that was not economic?

13 A. At that point in time, that's true.

14 Q. At that point in time?

15 A. Yes.

16 Q. Do you recall what that grade of ore was?

17 A. No, sir, that was going on just about the
18 time that I arrived at the operation, and again, that
19 was one or two phases out of several, and I don't
20 recall. I was not involved in the day-to-day mine
21 planning at that point in time, so I don't know.

22 Q. As a general proposition, is that ore
23 economic today?

24 A. Without revisiting the how to get there and
25 the grade of that ore, I don't know. Without doing

1 substantial file-searching, which I don't have in my
2 mind --

3 Q. Did the mine plans that -- And you've seen
4 these mine plans, I take it?

5 A. Certainly.

6 Q. You review them, the one to the BLM and this
7 third party.

8 A. Uh-huh.

9 Q. Did they differ?

10 A. From what?

11 Q. One from the other?

12 A. Certainly -- Excuse me, one from the other
13 what?

14 Q. The BLM mine -- the mine plan that you
15 submitted to the BLM, as opposed to one of these third
16 parties?

17 A. We have not had to submit a mine plan since
18 the third-party plan was completed. When I said
19 certainly, I thought you meant from year to year to
20 year.

21 Basically, Mr. Carroll, a mine plan is a
22 snapshot of a period of time. The one certainty about
23 a mine plan is that six months from now it will be
24 different.

25 It will provide general guidance, but mining

1 rates, the blending of ten different areas and so
2 forth, precludes you from doing a very definitive plan.
3 You use it for guidance, you update it periodically,
4 and that's the intent of the study that we've recently
5 had done.

6 Q. No matter who draws up the mine plan or how
7 good it is, the actual ore itself dictates where you
8 go; is that what you're just -- basically what you just
9 said?

10 A. That is one of the factors, certainly. It's
11 not the only factor.

12 Q. When you say that you will be down into
13 Section 2 within a range of eight years from where you
14 presently are -- I think that was roughly -- seven to
15 eight --

16 A. That was the indication of the plan, yes.

17 Q. Okay. If you encountered a -- and let's turn
18 to your Exhibit 38. Your Exhibit 38, to get down
19 through -- to Section 2, and on Exhibit 38 you show a
20 barren zone that includes parts of Section 22, 27 and
21 26; is that correct?

22 A. Yes, I see that.

23 Q. If that barren zone moved farther to the --
24 say to the west, like the barren zone up with the
25 M-651, that could preclude you from ever reaching

1 Section 2, couldn't it? It's a possibility?

2 A. Possibility.

3 Q. So the prediction of being there in eight
4 years is dependent upon a number of things and is
5 basically a guess?

6 A. As is all the mine plan.

7 Q. Now, this third-party mine plan, it was
8 prepared this year; is that correct?

9 A. That's correct.

10 Q. And do you recall when it was submitted to
11 you, approximate dates?

12 A. Roughly mid-July.

13 MR. HIGH: Mr. Chairman, I'm going to object.
14 Counsel has objected to the document and won't let me
15 offer plans, so I'm going to object to his getting into
16 it himself.

17 MR. ERNEST CARROLL: We're talking about
18 motive now, and that's as far as I'm getting into it.

19 CHAIRMAN LEMAY: Yeah, but you can't get into
20 the plan if you -- The existence of a plan has been
21 testified to, so --

22 MR. ERNEST CARROLL: And that's all, that's
23 all I care about.

24 CHAIRMAN LEMAY: Okay.

25 Q. (By Mr. Ernest Carroll) At the beginning of

1 your testimony, and I was unable yesterday -- when I
2 was going back through my notes I made some rough notes
3 that I couldn't make a darn bit of sense out of.

4 You -- I think you listed some reasons why
5 you hired or contracted for this third-party mine plan;
6 is that correct? Do you recall? Did you give some
7 reasons why you did it?

8 A. I basically said we were asked by our senior
9 management to have a plan done.

10 Q. Okay, what was the reasons --

11 Well, first let me ask you this question:
12 This is not a normal occurrence, then, for you going
13 out and getting a third party, I guess, review of your
14 mine plan and oil reserves?

15 A. That's correct.

16 Q. What was the reason why management at this
17 point in time wanted you to go out and obtain this kind
18 of document?

19 A. I'm not in a position to second-guess my
20 management.

21 Q. Well, you must have an opinion, Mr. Case.

22 A. My opinion was that they wanted a
23 confirmation of the information we had been providing
24 them, since they had been owners and prior to them
25 becoming the owners, that they wanted a confirmation of

1 the information we provided to them.

2 Q. Okay. And what information do you think they
3 were seeking to have confirmed?

4 A. Ore grade, ore reserves.

5 Q. Now, did this mine plan in fact confirm the
6 fact that you had 35 years of minable reserves?

7 A. Yes.

8 Q. Now, when you say you have 35 years of
9 minable reserves, what is that based on? What do you
10 call minable reserves? What's your cutoff?

11 A. Those parameters were given to the consultant
12 that did the study. I don't have them fixed in my mind
13 at this point.

14 Q. Mr. Lane --

15 A. There were parameters given to them. They
16 adhered to those parameters and developed a plan using
17 accepted techniques.

18 Q. Did you, in your directions for development
19 of this, besides giving them parameters of cutoff
20 grade, did you tell them specifically that you wanted
21 to -- a mine plan to encompass mining of Section 2?

22 A. Mr. Carroll, I was not in the parameters
23 establishment meeting. Appreciate the fact that I have
24 three people on my staff that have lived with and in
25 that mine on a daily basis, and I rely very heavily on

1 their judgment and their direction in technical --
2 detailed technical matters such as this.

3 Q. Now, let's talk a minute about -- I believe
4 that you said that New Mexico Potash embarked upon a
5 core-hole program, and it was the first one that they
6 had had in a number of years. I don't recall the exact
7 number, but it was something on the order of nine. And
8 then you added one more, the K-162 hole?

9 A. That's correct.

10 Q. What was the motivation behind embarking on
11 this core-hole program, the drilling of these ten
12 holes?

13 A. Mine development, mine planning.

14 Q. And when did this program begin, roughly?

15 A. We had proposed that -- We meet with our
16 senior management on an annual basis. We had proposed
17 that prior to that meeting. It was discussed and
18 finalized late October of last year. We had proposed
19 it probably mid-year or thereabouts.

20 Q. How did you determine the areas that these
21 core holes would be drilled?

22 A. Again, I left that up to my experts and their
23 recommendations as to where they needed information to
24 assist them in mine development.

25 For example, Mr. Carroll, on the exhibit, we

1 had run into the edge of the barren zone in that
2 section that we've been calling M-651. I believe it's
3 Section 18.

4 Q. Uh-huh.

5 A. And we had run into the edge of that, and
6 they requested that we put down a couple of holes
7 there, or recommended that we put a couple holes down
8 there, to see if we could determine what the extent of
9 that barren area was so that we might have an
10 indication how we could extract the ore on out to the
11 west there that we know to be good ore.

12 Q. All right.

13 A. As a for-example. There were other holes
14 scattered across the intended mine workings.

15 Q. If you were to drive a mine shaft from your
16 present -- wherever you're presently working, down into
17 Section 2, where is the most feasible spot to begin
18 that shaft from?

19 You've got a broad frontier of -- I'm being
20 corrected, not a shaft --

21 A. Yeah, okay.

22 Q. -- but a development tunnel or --

23 A. Yeah.

24 Q. -- or a room, that we're talking about.

25 A. There are two potential avenues into Section

1 2, running on either side of the barren zone that you
2 know to be 4 and essentially -- Sections 26 and 27.

3 Q. Now, would New Mexico Potash drive a shaft,
4 let's say, on the west side of this barren zone, and
5 isn't it true that this barren zone, as depicted here
6 in Section 26 and 27, almost touches the edge of your
7 lease line, does it not, there in the -- your lease
8 line -- In fact, you don't control the southwest
9 quarter of Section 27, do you?

10 A. That's correct.

11 Q. So that barren zone comes very close to your
12 lease line; is that correct?

13 A. That's correct.

14 Q. So if we came down the east -- or excuse me,
15 the west side of the barren zone, you would -- in order
16 to stay out of the barren zone, would have to drive
17 through that very narrow corridor between that
18 southwest corner of 27 and the barren zone?

19 A. That's correct.

20 Q. Now, do you intend to drill more core holes
21 before you drive down through there?

22 A. Certainly.

23 Q. Do you have those core holes scheduled at
24 this time, Mr. Case?

25 A. We do not.

1 Q. Now --

2 A. Let me back up and say, we have them on a
3 calendar. We do not have an approved core-hole
4 drilling program year after year after year.

5 We have -- We currently have a proposal for
6 seven additional holes, at least one of which is in
7 that general area.

8 Q. Where are the other seven holes? Are they
9 going to be --

10 A. I don't think that that's of importance to
11 the issue of Section 2.

12 Q. Are they in Section 2?

13 A. No.

14 Q. Now, so without additional core-hole testing,
15 we don't have any idea that it's even feasible to drive
16 down on the west side right now? We have no idea what
17 we're going to encounter?

18 A. True.

19 Q. Now, let's talk about going down the east
20 side.

21 MR. HIGH: Mr. Chairman, I've listened to
22 this a long time. I don't know what this section has
23 to do with it or not. If we're going to mine north of
24 it, south of it, east of it. We're here to talk about
25 Section 2, and we're spending an inordinate amount of

1 time on this section --

2 CHAIRMAN LEMAY: I would agree with you
3 partly in the sense that we did spend a lot of time
4 trying to second-guess every little thing in the mine
5 operation, which -- I would have to say the same thing
6 I talked to Mr. High: Make your points and make them
7 quick and to the point.

8 I think when he's talking about reaching
9 Section 2, we have a significant issue there, because
10 Section 2 is what we're considering as part of this
11 case. And how to get there, I think, is part of that.

12 MR. ERNEST CARROLL: And that's my point,
13 and --

14 CHAIRMAN LEMAY: It took you a long time to
15 get there, Counselor. We wasted a lot of time mickey-
16 mousing around the mine. I think you're on a pretty
17 good issue now. Why don't you pursue it?

18 MR. ERNEST CARROLL: Well, I have to learn
19 some things too, Mr. LeMay, and I apologize.

20 CHAIRMAN LEMAY: Well, in every shaft you've
21 got, I mean, it's like saying -- second-guessing every
22 decision in drilling a well.

23 Q. (By Mr. Ernest Carroll) The -- Let's look on
24 the east side for just a moment. You would have to
25 come again -- you have the boundary of -- You would

1 have to get around your barren zone that you show over
2 into 26, would you not?

3 A. If that, in fact, is an accurate portrayal of
4 the barren zone.

5 Q. Okay. And in fact, part of your nine core-
6 hole program, you drilled three core holes in Section
7 26, didn't you?

8 A. I don't believe so.

9 Q. You didn't drill 159, 158 and 151?

10 A. Those are old holes --

11 Q. Those are old holes?

12 A. -- Mr. Carroll. They weren't in any of the
13 current drilling programs.

14 Q. You didn't drill any in Section 26, then, in
15 that program?

16 A. Not in the program that was completed the
17 first of this year.

18 Q. Okay. You heard testimony that -- You were
19 here when Mr. Lammers testified, didn't you?

20 A. Yes, I believe so.

21 Q. Core hole ERDA, ERD Number 6 is located in
22 the southeast part of Section 35?

23 A. Yes.

24 Q. You recall that, don't you?

25 And you also recall the testimony that -- of

1 Mr. Lammers that in the 10th Ore Zone, which is the ore
2 zone that we're mining --

3 A. Yes, sir.

4 Q. -- with your mine, that it was barren there?

5 A. I recall that testimony.

6 Q. You also recall the testimony that the three
7 oil wells -- if you look in Section 2, the three oil
8 wells -- There's four oil wells along that eastern
9 edge.

10 A. Yes.

11 Q. And the three bottom-most, Mr. Lammers also
12 testified that, from the use of well logs, that the
13 10th Ore Zone in each of those three wells indicated
14 that they were barren.

15 Do you recall that testimony?

16 A. To the extent that that information would be
17 relied on, yes.

18 Q. And at least on your Exhibit 38, your LMR
19 line is to the opposite side of that and includes those
20 ERDA 6 and those three oil wells within your 10th Ore
21 Zone orebody?

22 A. That's correct.

23 Q. And I guess the final question is, is that if
24 you honor ERDA Number 6, that it's quite possibly --
25 it's quite possible that this barren zone that's in

1 Section 26 would extend down and cut off your avenue to
2 the east to Section 2?

3 A. That's speculation, I believe.

4 Q. But it is within the realm of possibility,
5 based on that scientific evidence?

6 A. As well as the realm of possibility that ore
7 is exactly where it's shown.

8 Q. When you -- just -- Just help me understand.
9 When you do these core holes, like core hole K-162, are
10 they done sequentially in number? Would the last core
11 hole that you drilled have been K-161, or do you know?

12 A. Normally when we do a drilling program, there
13 will be a block of hole numbers assigned, and they will
14 be completed within that period.

15 What I'm saying is, for example, if we had
16 ten holes numbered K-170 to -179, those ten holes would
17 be completed in that drilling program. 175 may be
18 drilled before 173, but generally the time frame of
19 drilling you would be able to determine from the hole
20 number because, yes, we do number --

21 Q. -- sequentially?

22 A. -- generally sequentially.

23 Q. Well, would this -- This 162 hole, this is
24 nine- or ten-well program, do you know where those
25 numbers started? Are they in the 150s?

1 A. I believe they're in the 160s.

2 Q. Okay, so --

3 A. Perhaps the 150s, but -- yeah.

4 Q. You don't have that; Mr. Lane would probably
5 be --

6 A. I don't have it right up here. Mr. Lane
7 probably has it memorized.

8 Q. When you -- when you mine, the -- you're
9 taking out probably on the order of four-to-one, or
10 something in that nature, of tons of material to get
11 one ton of potash; is that correct?

12 A. Mr. Carroll, that's one of those numbers that
13 someone skilled in the art can take and begin to
14 develop costs from. All I can tell you is that that
15 ratio is low.

16 Q. Okay. And that suits my purposes for this.
17 The material that -- this excess material has to go
18 somewhere; is that correct?

19 A. That's correct.

20 Q. And in fact, a lot of this material, after
21 you go through your mining or milling process, is in a
22 liquid form. You use a lot of water, I guess, in your
23 processing, don't you?

24 A. Yes.

25 Q. Okay. And in fact, you have a large pond

1 where this water and stuff goes to?

2 A. That's correct.

3 Q. What's the size, just roughly, of your
4 tailings pond out there at the New Mexico Potash?

5 A. Well, we have two tailings areas.

6 Q. Okay, you have two tailings areas.

7 A. One of them is nominally a half section. I'd
8 say one of them is probably three-quarters of a
9 section, something like that.

10 Q. Okay. These two tailings ponds, are they
11 over areas where you have secondarily mined?

12 MR. HIGH: Mr. Chairman, I'm going to object.
13 This has nothing to do with this case. We've got nine
14 witnesses to put on, and we're talking about things
15 that have absolutely no relevance.

16 CHAIRMAN LEMAY: Where are you going,
17 Counsel?

18 MR. ERNEST CARROLL: My next question is
19 going to be, I want to know if they've done any studies
20 on the subsidence, how it's affected that tailings pond
21 and the leaking of the water into the mines.

22 I think Mr. High knows the relevance.

23 CHAIRMAN LEMAY: Ask the question.

24 THE WITNESS: The tailings pond immediately
25 at the plant site would be over an area that has been

1 only first mined to protect the plant site pillar and
2 the shaft pillar.

3 To the best of my knowledge the outlying
4 pond, which is about three or four miles away from the
5 operation, is, I believe, over unmined land.

6 Q. (By Mr. Ernest Carroll) Have you had any
7 problems with subsidence or have you seen subsidence in
8 the area of these tailings ponds?

9 A. I am told by, again, Mr. Lane, and -- If it
10 please the Commission, I continue to defer to Mr. Lane.
11 The only thing older than Mr. Lane and this operation
12 is the deposit itself.

13 CHAIRMAN LEMAY: And that's undoubted.

14 THE WITNESS: He began his potash experience
15 back in the Fifties and has been involved with Kerr-
16 McGee since Hector was a pup, and he's the man that's
17 intimately familiar with this.

18 But again, he has the details of that
19 information.

20 I'm told that for six feet of mining
21 underground we will generally see something on the
22 order of one to two feet of subsidence on the surface.

23 Q. (By Mr. Ernest Carroll) Have you personally
24 seen any of that in that area, that --

25 A. I have not seen any of the effects of that,

1 if that's what you're asking.

2 Q. That's what I was asking, thank you.

3 With respect to the -- your ore reserves and
4 your mine -- You're saying you have 35 years of minable
5 ore. Do you -- Have you done any studies as to -- with
6 respect to how environmental issues are going to
7 reflect the length of the longevity of your mine? Is
8 that an issue that is cranked into this figure?

9 A. That was one of the items that the study
10 addressed.

11 Q. How does it address them? What were your
12 instructions on how it should be addressed?

13 A. To give us a general overview of potential
14 environmental problems, and that's like opening
15 Pandora's box, but there was a section of the report,
16 perhaps two pages, that addressed potential
17 environmental problems.

18 Q. Did it restrict the lifespan of this mine?

19 A. No, sir.

20 Q. You, yesterday made a statement that -- and I
21 think you were trying to -- you were quoting from -- I
22 guess it was one of the times when you gave an opinion
23 that you did not agree with the applicability of some
24 of the figures that Mr. Hutchinson used. And one of
25 those numbers that you did not disagree with is -- and

1 I think you said that you thought Mr. Hutchinson used
2 six feet of 16-percent ore to determine what economic
3 ore was.

4 Was that a fair statement for you?

5 A. My understanding of Mr. Hutchinson's
6 statements of parameters required for profitability was
7 six foot of ore, 16-percent grade.

8 Q. Well, Mr. Case, could you be mistaken about
9 that?

10 Because I've reviewed the testimony, and the
11 only time the six foot of 16-percent was used was when
12 he was calculating the amount of reserves that would be
13 left around a pillar 150 feet in diameter, for the
14 lifetime of a producing well.

15 And that -- Those figures only were used,
16 then, to come up with a tonnage figure.

17 Could you be mistaken?

18 A. Certainly.

19 Q. And you do recall that when Mr. Hutchinson
20 was developing his mine plan, that one of his
21 assumptions was -- is that if the ore within your lease
22 boundaries did not -- if the area within your lease
23 boundaries that was unmined did not fall into a
24 barren -- a depicted or plotted barren area that we had
25 shown, he used it as economic ore, and used that as

1 part of the mine plan. You do recall that assumption
2 being made by Mr. Hutchinson?

3 A. Yes.

4 Q. So basically in determining his mine plan, he
5 really gave no importance -- If it wasn't in a barren
6 area, he concluded that it was economic ore for the
7 purposes of the mine plan?

8 A. But I also believe that he -- in arriving at
9 a number, which I recall to be 135 acres per year, he
10 must have assumed some mining height to generate tons,
11 or assumed some tons to generate a mining height, and
12 the 135 acres per year is in error.

13 Q. Mr. Case, if you'll recall, the New Mexico
14 Potash Mine is required to show their current mine
15 workings and furnish maps --

16 A. Yes.

17 Q. -- to the OCD?

18 And if you'll recall, I think that it was Mr.
19 Hutchinson's -- He just computed the area of the mined-
20 out areas over the period of some 39 months and
21 arrove -- arrive -- arrived at -- excuse me, my mouth
22 is getting dry -- arrived at that 136 acres from that
23 basis?

24 A. I understand that that's the way he did it.

25 Q. All right. And that was just based on what

1 New Mexico Potash showed as having been mined?

2 A. If he included all the areas that were mined.
3 You know, I'm not privy to what he used, detail by
4 detail. I don't know where the error arose.

5 All I'm telling you is that 135 acres per
6 year is wrong.

7 Q. What -- How many acres do you need?

8 A. I believe I told you yesterday or told the
9 Commission this morning that one section, which is 640
10 acres, would currently support about two and a half
11 years of mining.

12 Q. Currently support two and a half years of
13 mining. And what -- At what rate a year mining are we
14 talking about?

15 A. Somebody divide 640 by 2 1/2 for me. I don't
16 have my calculator.

17 Q. It would be 256?

18 A. Close enough.

19 Q. No, what I'm talking about, when you're
20 saying support mining for two and a half years, how
21 many tons are you mining a year, then?

22 A. I believe I testified yesterday approximately
23 400,000 tons a year.

24 Q. And --

25 A. I'm sorry, we are producing. Thanks for

1 raising your eyebrows. We are producing 400,000 tons
2 per year of finished product, and each section will
3 contain about a million tons of finished product.

4 Q. And you're producing about 60 percent KCl,
5 right?

6 A. Of that, no.

7 Q. What are you producing?

8 A. We're producing 98.1 percent KCl.

9 Q. What about K₂O?

10 A. About 62 percent.

11 Q. About 62 percent. And when you convert that
12 400,000 tons, you divide 60 by 14, do you not, to come
13 up with approximately 4.29 tons of material to get the
14 60 percent or the 62 percent?

15 A. That may be the way you do it. I have a
16 number of other factors that I've put in there.

17 Q. The -- Assuming the maps that New Mexico
18 Potash furnished the OCD were correct, they should
19 depict the actual area that New Mexico Potash has been
20 mining the last several years?

21 A. Yes.

22 Q. You talked this morning about -- You alluded
23 to mishaps that give you concern. And let us talk
24 about these safety concerns as the last area that I
25 want to visit with you on.

1 You said that at some meeting or something
2 that you studied some 16 to 18 mishaps in southeastern
3 New Mexico and these caused you concern.

4 What kind of mishaps are we talking about?

5 A. My recollection was that they were blowouts
6 in drilling.

7 Q. These were surface blowouts?

8 A. I don't know. They were characterized as
9 blowouts.

10 Q. You did not ask any questions or do any
11 studies to determine what kind of blowouts or the
12 mechanics of those blowouts?

13 A. I don't know what information was developed
14 beyond the list that I saw, Mr. Carroll. I was not on
15 that committee. I was not responsible for developing
16 the list.

17 Q. The -- This little incident that you had with
18 MSHA where they came in and found the quarter percent
19 or better of one percent of methane --

20 A. Yes.

21 Q. -- did you happen to say that that incident
22 itself led to the adoption of the present gassy
23 classifications, the 1, 2, 3, 4?

24 A. This incident, one at Mississippi Chemical,
25 and several others across the country, certainly the

1 Belle Isle Salt Mine disaster had some impact on that.

2 But basically what generated the new mine-
3 safety regulations in regard to gassy mines was a
4 recognition on the part of industry and MSHA that one
5 classification for every mine, regardless of geologic
6 history, regardless of type of mining, regardless of
7 material mined, regardless of mine atmosphere, was
8 wrong.

9 Q. Now, the procedure that -- When you get a
10 notice that you may be upgraded from a 4 to a 3, it's a
11 notification process which allows you as a mine
12 operator to protest; is that correct?

13 A. That's correct.

14 Q. And that -- The rules themselves state that,
15 in particular, 57.22004, it says, "While the request
16 for the category/subcategory reassignment is pending,
17 the mine shall continue to operate under the standards
18 for the category or subcategory which was originally
19 assigned."

20 So this process starts out, you've got a
21 right to contest that particular reassignment or the
22 reclassification don't you?

23 A. Yes.

24 Q. And the fact that -- Let's just say that we
25 have an isolated leak. The fact that you can go in and

1 let's say you shut this leak off, that would be taken
2 into consideration and in fact would be your argument
3 that you shouldn't be permanently classified with -- if
4 you could -- if you could shut it off, and I'm assuming
5 that.

6 A. Here we get into probabilities or
7 possibilities or iffies again.

8 MSHA, I think, would take the position,
9 knowing the nature of MSHA and their regulatory
10 authority, if it's happened once it can happen again,
11 and we're going to be sure that you're equipped to
12 handle it.

13 Q. And in fact, when they give you this notice,
14 one of the criteria that they have to point out to you,
15 again, that same section number, is that in their
16 notice, they have to state whether or not the
17 conditions encountered during primary or access
18 development are transient or permanent, don't they?

19 They have to tell you that, and then -- so
20 that you know what kind of an issue you're dealing
21 with?

22 A. Yes, sir, and I hope at that point we would
23 be in bed together, saying it's only going to happen
24 once.

25 But I know the mentality of MSHA, and they

1 are going to guard against it happening again. If it's
2 happened once, it can happen again.

3 Q. Mr. Case, you stated that right now, in
4 response to a question from Mr. High, that there's no
5 way that they could -- would force you to mine within a
6 half mile of one of these wells, because that's the
7 buffer -- that's the safety zone. And you, I think
8 equate --

9 A. I believe what I said was absent any further
10 information or more intelligence, if you will, about
11 mining closer than that.

12 No one is going to force me. That's going to
13 be an option that we as a company reserve.

14 Q. You are aware that there are other mines in
15 the basin that are mining up to plugged and abandoned
16 wells?

17 A. As we have.

18 Q. As we speak?

19 A. No, as we have.

20 Q. As you have too?

21 A. We have three dry, plugged and abandoned
22 wells that we have mined within 200 feet of.

23 Q. All right. And the -- I believe when you
24 said that these zones, these half-mile zones -- that
25 there were a number of people that spent a number of

1 hours agonizing.

2 Were there any studies that you're aware of
3 that were performed to determine the safety, or was it
4 just agonizing going on?

5 A. Mr. Carroll, I don't know in detail the
6 history of the initial adoption of that quarter and
7 half mile, but it has been historic since the 1950s or
8 1960s, and something went into the establishment of
9 that. I don't know what, because I was not privy to
10 those studies.

11 Q. And New Mexico Potash has not done any
12 studies on its own --

13 A. We have not

14 Q. -- to determine that?

15 You're also aware that when the -- There's at
16 least some consensus of thought that when the half-mile
17 buffer zone was adopted for Delaware wells, that that
18 was merely a mistake and it should have been a quarter
19 mile?

20 A. Yes. I beg your pardon, a quarter of a mile
21 or depth of ore plus ten percent, and in our particular
22 mining configuration, we think more in terms of the
23 depth of ore plus ten percent because we're mining
24 nominally 1600 to 1700 feet deep.

25 Q. Are you saying that this depth of ore plus

1 ten percent, that that is going to provide your mine
2 opening safety for not only subsidence-caused leaks of
3 gas, but just any kind of leak of gas?

4 A. No. I think it has come out over and over
5 again in testimony, nobody knows what that distance is.
6 It seems like a reasonable distance.

7 Q. Are you aware of any studies which have
8 been -- that the Potash industries have done to
9 determine or not if that's reasonable?

10 A. I am not.

11 MR. ERNEST CARROLL: Pass the witness.

12 REDIRECT EXAMINATION

13 BY MR. HIGH:

14 Q. Mr. Case -- Oh, I'm sorry.

15 Mr. Case, after -- following the blowouts
16 which you described as being a nitrogen blowout when we
17 had a fatality down there --

18 A. Yes.

19 Q. -- Mr. Carroll asked you some questions about
20 discontinuing the drilling the holes.

21 A. Uh-huh.

22 Q. Did New Mexico Potash take any additional
23 steps or other steps to protect people in the
24 eventuality that you ran into that condition again?

25 A. Yes, we built substantial -- I guess the most

1 descriptive and understandable term is "windshields",
2 if you will, on the front of the miner ahead of the
3 cab.

4 We were uncertain at the time of the fatality
5 whether flying rock or a lamp that had been blown off
6 the front of the machine came back and struck the
7 operator on the forehead.

8 What we have done is built shields that would
9 deflect anything coming from that direction up over the
10 head of the operator, and those are installed and
11 maintained on all of our continuous mining equipment.

12 Q. And as we sit here today, are those
13 protective devices still being used?

14 A. Yes.

15 Q. Okay. Now, one area that I didn't ask you
16 about, that I overlooked and I want to just ask you
17 briefly about. You heard the testimony about -- Mr.
18 O'Brien, about the test that was done in the oil
19 industry, about -- in coal mining, about plugging an
20 abandoned well and then mining through it.

21 A. Yes.

22 Q. Is that something that you think is feasible
23 in the potash industry?

24 A. No, it is not.

25 Q. And why is it not feasible?

1 A. Well, we developed this morning the
2 difference between gassy and non-gassy mines.

3 The plug-and-abandoning test that was
4 reported was done in a coal mine wherein if the test
5 had failed, the mine was equipped to handle whatever
6 encounter of methane might have been there.

7 Such a test in potash would, for safety
8 purposes, require the mine or the area of the mine that
9 was being tested to be converted to a gassy --
10 permissible equipment to insure that if the plug failed
11 -- the safety of the miners that were trying to mine
12 through that plug.

13 And again, we discussed earlier, testified
14 earlier, what the costs associated therewith would be.

15 Q. The consequences of a leak in a plugged oil
16 and gas well like that into a coal mine are virtually
17 insignificant; is that correct?

18 A. That's correct, because they're dealing with
19 methane day in and day out. I believe the term is
20 coal-bed or coal-seam methane. I think that's a term
21 that's probably more familiar to you all than it is to
22 me.

23 But right along with the coal that they're
24 mining they get methane on a day-in, day-out basis, and
25 they're equipped to handle it.

1 Q. And the same cons- --

2 A. They develop their mines to handle it from
3 the git-go.

4 Q. The consequence is not the same with potash
5 mining?

6 A. That's right.

7 MR. HIGH: That's all we have, Mr. LeMay.

8 CHAIRMAN LEMAY: Thank you.

9 Mr. Carroll?

10 RECROSS-EXAMINATION

11 BY MR. ERNEST CARROLL:

12 Q. Did you read that coal-mine report? Have you
13 studied it?

14 A. I skimmed it.

15 Q. You skimmed it?

16 A. Yes.

17 Q. And it's your opinion that there are no
18 circumstances under which you could ever run a test in
19 a potash mine because you don't have this permissible
20 equipment; is that what you're saying?

21 A. Mama taught me never to say never, but I
22 would not want such a test done in my mind if there
23 were the possibility of methane coming around the test
24 plug or whatever.

25 Q. Well, are you saying that we cannot learn

1 from the fact that the plugging procedures there
2 absolutely precluded the passage of a gas, which wasn't
3 methane that they were measuring; it was another gas
4 that had a higher detectability?

5 A. Mr. Carroll, I believe if you read the report
6 very closely, you will find that they had three -- two
7 or three, and I don't know how they can't distinguish
8 between two and three -- reflections of sulfur
9 hexachloride in that mine that they attributed to
10 contamination during the injection process.

11 Was that contamination during the injection
12 process? I don't know. But they got some few number,
13 granted, shows of the test gas on the wrong side of the
14 casing.

15 Q. But MSHA has concluded, though, that plugging
16 those oil wells provides an effective seal. No gas
17 will escape. That's the conclusion that they report?

18 A. For mines that are equipped to handle methane
19 in the event that they do fail.

20 Q. But whether or not -- The fact that they're
21 equipped to handle methane afterwards has nothing to do
22 with the conclusion that the sealing process worked,
23 did it?

24 A. I'm not certain that the seal process did
25 work.

1 MR. ERNEST CARROLL: That's all.

2 CHAIRMAN LEMAY: Thank you.

3 Commissioner Carlson?

4 EXAMINATION

5 BY COMMISSIONER CARLSON:

6 Q. You mentioned that there was three P-and-A'd
7 oil and gas wells in the mine?

8 A. Yes.

9 Q. Where are those? I think I see one, which is
10 in -- I guess that's --

11 A. Again, Mr. Lane has these memorized. The map
12 that I had in front of me doesn't have that information
13 on it.

14 Q. I see one in Section 8, I think. And another
15 one way up in the northeast in -- I guess that's
16 Section 1. Or no, thirty- --

17 CHAIRMAN LEMAY: Thirty-five?

18 COMMISSIONER CARLSON: Thirty-five, yeah,
19 sure.

20 THE WITNESS: There is one in 35. I'm
21 pointing at it here, northeast quarter.

22 COMMISSIONER CARLSON: Right, okay, yeah.

23 THE WITNESS: There's another one down in the
24 general area of where these mains turn to the northeast
25 in this general area --

1 COMMISSIONER CARLSON: Okay.

2 THE WITNESS: -- here, Mr. Carlson.

3 MR. HIGH: In Section 35 down south.

4 CHAIRMAN LEMAY: Section 35?

5 MR. HIGH: Section 35 northeast, Section 35
6 south, and the one over close to M-651.

7 THE WITNESS: There's another one over in the
8 west part of the mine. I'm not certain right now where
9 it is.

10 Again, Mr. Carlson, Mr. Lane can put his
11 finger on those much quicker than I can.

12 Q. (By Mr. Carlson) And you didn't mine right
13 through those?

14 A. No, we did not.

15 Q. You left a pillar?

16 A. That's correct.

17 Q. Of --

18 A. -- about 200 feet.

19 Q. -- 200 feet?

20 A. With the knowledge that those had been dry
21 holes to begin with.

22 Q. When were those wells drilled? Do you know?

23 A. I believe in the 1950s, but again I don't
24 know and I would defer to Mr. Lane on that.

25 Q. Do you know if they had shows of

1 hydrocarbons --

2 A. I do not know.

3 Q. -- or were they completely dry?

4 A. I don't know.

5 Q. Did you check that when you decided to mine
6 up to within 200 feet?

7 A. Mr. Carlson, to the best of my knowledge,
8 most of that mining was done before I was involved in
9 the decision-making train.

10 Q. Would Mr. Lane know that?

11 A. Yes.

12 Q. What does it cost to drill a core hole?

13 A. It will depend on how much roadway you have
14 to build to access the site. The average cost of the
15 ten holes that was drilled last year was about, if I
16 recall, \$21,000, \$22,000 per hole. The current program
17 that we have in is on the order of \$30,000 per hole.

18 And again, the large variable is the roadway
19 requirements.

20 Q. Does that include the cost of evaluating the
21 cores?

22 A. Yes, the analytical work and the geologist's
23 time on the hole.

24 Q. Mr. Hutchinson, if I can find my notes, he
25 said that New Mexico mines will survive only as long as

1 Canadian mines let them.

2 Are you going to have somebody testify about
3 that, or is that something that you're knowledgeable
4 about?

5 A. I don't know how knowledgeable I am about
6 that. Basically, the Canada dog wags the Carlsbad
7 tail. They are by far the larger producer, the larger
8 reserve holders.

9 There's some question about their production
10 costs in terms of do they include or do they not
11 include the cost of flooding of mines in their planning
12 and costing of their projects, because two of those
13 mines up there have been lost or nearly lost up there
14 on flooding.

15 I know of one example up there where in one
16 of the International Chemical mines there, where their
17 pumping costs, their power for pumping is the same as
18 my power bill for the whole -- for my whole operation.
19 So there are some unusual costs, although they have
20 some beautiful ore.

21 And there are some additional development
22 costs that are not germane to Carlsbad.

23 But basically, Mr. Carlson, however you look
24 at it, if you add production costs and transportation
25 costs, that will define a line through the United

1 States, north of which Canada can compete and south of
2 which Carlsbad can compete.

3 Q. Well, Mr. Hutchinson testified that -- and it
4 was his estimate, he estimated that Canadian mines will
5 let New Mexico mines survive for another five to eight
6 years, and that's all. Do you agree with that?

7 A. I don't know what goes on in the minds of the
8 Canadians. We certainly haven't plugged that into our
9 mine planning and have not been directed to by people
10 who are much more knowledgeable about the international
11 potash market than I am.

12 Q. But you agree that Canadian mines do have
13 that market power if they'd choose to exercise it?

14 A. I don't know that they would shut us down.
15 They would greatly curtail our market area, and unless
16 other market areas were developed that we could serve
17 cost-effectively, yes.

18 They're, for example, running at 60-percent
19 capacity. It has to do -- And there was a Commerce
20 Department investigation that was completed late in
21 1987 regarding dumping of Canadian potash into the US
22 at the time that the potash industry was struggling in
23 the mid-eighties. It was concluded that that was as a
24 result of unfair trade practices.

25 That situation was resolved by setting a

1 floor below which the Canadians could not sell potash
2 in the United States, and I think that was a company-
3 by-company variation. And since that time we have been
4 able to co-exist very well.

5 So I assume that if Canada starts to do that
6 again, there perhaps would be some government
7 intervention that would offset that. That's an
8 assumption on my part, but that's what happened the
9 last time.

10 Q. Was your proposed -- I guess it was a lease
11 assignment to IMC. Was that for langbeinite only, or
12 were you intending to assign your whole rights to all
13 of the potash within Section 2?

14 A. At the time those discussions were going on,
15 we thought we had only langbeinite in that reserve, and
16 our intent would have been to assign the leases to
17 them, perhaps for the consideration of an override.

18 Q. So you never gave any thought to reserving
19 any sylvite because you didn't know it was there; is
20 that correct?

21 A. That's correct. And Mr. Carlson, I'm not
22 sure what either state or federal regulations will
23 allow in terms of two holders, one of sylvanite [sic]
24 leases and one of langbeinite leases. I don't believe
25 that that's a possibility. I think you either get the

1 potassium lease or you don't get it. And there can
2 only be one leaseholder, my understanding.

3 Q. I guess -- You testified you wouldn't -- 125-
4 feet radius pillars, you certainly wouldn't trust that.
5 Is there a number you would trust, or is it the half
6 mile?

7 A. The half mile or quarter mile or depth of ore
8 plus ten percent seem reasonable.

9 The 125 feet, I think, Mr. Carlson, the
10 reason I don't trust that is that we've heard several
11 people testify that so-called vertical wells can wander
12 off from vertical, and do. In fact, if you get one
13 that you can drop a rock from top to bottom without
14 touching the casing, you've got a miracle.

15 If they deviate as much as 15 percent -- or,
16 I'm sorry, 15 degrees -- which I've heard that number
17 several times through the testimony too, as perhaps the
18 outside limit. But if that outside limit were
19 approached, if I recall, it's a strict trigonometric
20 function, but if you go down 1650 feet, 15 degrees out
21 is out about 440, 450 feet.

22 So I would be very hesitant to look at
23 anything that would be much less than that, for fear
24 that we didn't know exactly where that pipe was.

25 Q. Is there any way to determine -- and you're

1 probably not the right witness, but exactly where a
2 pipe would be at 1600 feet? Can you tell that when
3 they're drilling an oil and gas well?

4 A. I assume there are ways. I don't know. I
5 don't know beans about oil-well drilling, so -- I've
6 learned more in the last six days of testimony than
7 I've ever wanted to know, I think.

8 Q. Well, we already have four producing oil
9 wells in Section 2; is that correct?

10 A. That's correct, drilled wells. I'm not
11 sure -- I think they're producing as well.

12 Q. Okay. And so your intent to mine Section 2,
13 you would not get within what? A half mile of those
14 wells already?

15 A. That's correct.

16 Q. So over half of Section 2, then, is already
17 unminable --

18 A. Very questionable, yes.

19 Q. -- as far as you're concerned?

20 So when you're talking about mining Section
21 2, you're really talking about, you know, if I go a
22 half mile out from where those wells are located,
23 you're talking about less than the west half of that
24 section?

25 A. That's correct.

1 Q. Now, you stated you check for methane before
2 each shift. Do you ever find any?

3 A. There may be a .01 or a trace shown.

4 Q. But you have found --

5 A. Usually --

6 Q. You have found traces?

7 A. Yes.

8 Q. Do you have any idea what the source of that
9 methane would be?

10 A. Oh, yes, these placings that we're dealing
11 with contain the nitrogen carrier of methane throughout
12 the mine.

13 Q. You stated you mine 256 acres a year, and Mr.
14 Hutchinson testified that you're mining 136 acres, and
15 that seems to me a big discrepancy, which is pretty
16 ascertainable, if you will.

17 I mean, is there any explanation for how your
18 number and his number differ so much?

19 A. Mr. Carlson, I haven't looked at the maps
20 that were submitted, but I suspect that a large part of
21 it is, those maps are not to the detail that would
22 show, for example, final mining or pulling pillars.
23 They would certainly show panels of second mining. But
24 the step of mining -- the last step of mining, after
25 you mine those panels, is to go in and pull the pillars

1 in the main entryways, and I don't know if those maps
2 are to the detail that would show, because those
3 entryways would be very narrow on those maps, and --

4 Q. So your number might be going back in
5 secondary mining on pulling pillars in mined areas?

6 A. Or final mining, and we've been doing a fair
7 amount of that. And to someone who didn't know our
8 operation very well, I could certainly understand where
9 perhaps a fringe where we pulled a little bit of ore
10 that had been used to hold up roof --

11 Q. Uh-huh.

12 A. -- was mined.

13 Q. So you could be counting, then that acreage
14 twice? in other words, when you go through it once, in
15 one year and --

16 A. No, no, what I'm saying is the accuracy of
17 the map may preclude him from noticing a small sliver
18 here or a small section here that's done.

19 Q. All right.

20 A. Not that we've counted it twice, but --

21 Q. What about unmined areas? Is it reasonable
22 to assume that it could be 136 acres a year?

23 A. No, sir, that was the number that I have
24 related to you. If we have a section of typical
25 height, typical grade ore, that will be mined at the

1 rate of -- What was it? 256 acres per year.

2 Q. Completely mined, in other words, the pillars
3 pulled too --

4 A. Yes.

5 Q. -- during that --

6 A. Now, perhaps the mistake that is made or part
7 of the error, when I say that section would be mined in
8 two and a half years, I mean it would be mined in two
9 and a half years, and there would still be some ore
10 left in place, the 20-some percent that is left for
11 final roof support and so forth.

12 Now, if somebody takes the number of tons I
13 mine and backs into that calculation and forgets about
14 the ore left in place, that's a source of error.

15 Are you with me? I see kind of a questioning
16 look there.

17 Q. Yeah, yeah. No, I understand.

18 What I'm trying to get at is, if I look here,
19 and approximate somewhere between a quarter and a half
20 section a year, and look at where you're mining now,
21 and that risk of bringing up a mine plan, which we
22 haven't seen, but I guess on the western edge there,
23 where it has "current area of mining" --

24 A. Yes.

25 Q. -- you've got a lot of full sections or

1 partial sections there to mine.

2 A. Yes.

3 Q. Also going over to the east side where you're
4 talking about "current area of mining", say, in
5 sections --

6 A. Yeah, around 24, in that area.

7 Q. Yeah, or even north of there, 13, 14, into
8 15. I mean, you've got a lot of -- and in 22, 23, and
9 24. You've got a lot of areas in there to mine.

10 Assuming that you progress, it's hard for me
11 to imagine that you'll get to Section 2 in seven or
12 eight years.

13 A. Mr. Carlson, the optimum way or the
14 traditional way of developing reserves is to go to the
15 edge of the reserve and then come back.

16 Now, a couple things that we have to consider
17 here is, that the conveying system -- If you'll notice,
18 there is a green-hatched area that comes north -- or
19 runs north and south directly -- essentially in the
20 middle of the map, just an inch to the left of the fold
21 of the map.

22 Q. Okay.

23 A. That is our mainline conveyor system that
24 must carry all of the ore that is mined. That is a 48-
25 inch wide conveyor system, down nearly to a little bit

1 larger square that you see right where that stops and
2 then T's left and right.

3 Q. Uh-huh.

4 A. Beyond that, we will try and keep a balance
5 of mining so that we have a southwest section and a
6 southeast section.

7 And again, what we're trying to do, and I
8 think you can see evidence, we didn't mine a whole lot
9 of area along those west-trending mains out toward M-
10 651. We were heading out that way to get as far out as
11 we could go and then retreat back.

12 And the reason for that is, if you try and
13 mine along either side of those entries, you have to
14 leave about an 800-foot-wide barrier pillar to insure
15 that those entries don't collapse before you can get
16 out to the edge of the ore and back.

17 If you get out to the edge of the ore, you're
18 running those entries through essentially virgin
19 ground, that is, the maximum protection of those
20 entries staying open.

21 And that's the reason for going out to the
22 edge first and then coming back.

23 Q. But by going to the edge -- How far out? You
24 wouldn't go all the way down to Section 2 and work all
25 your way back. I assume by --

1 A. That's certainly the direction that the
2 third-party plan has in it.

3 Q. In other words, go directly there, and then
4 work back?

5 A. Yes.

6 Q. You said you don't take royalty rates into
7 account.

8 First of all, you're aware that the state
9 royalty rate is a sliding scale, while the federal one
10 is a flat 2 percent for sylvite?

11 A. Mr. Carlson, both of them are sliding scale.
12 The -- By -- what? consent or whatever, the federal
13 leases have been excused from sliding scale down to a
14 set two percent. That has been done two years at a
15 time for about three two-year periods.

16 Q. So for six years now, the federal one has
17 been at two percent?

18 A. For approximately six years, yes.

19 Q. Okay. I was under the impression they had
20 made that permanent, but they haven't?

21 A. No, they have not.

22 Q. It's still a two-year deal?

23 A. It expires again the end of 1993.

24 Q. But at the present time the state royalty
25 rate you could conceive of being higher than the

1 federal royalty rate?

2 A. It is higher than the federal royalty.

3 Q. Mr. Hutchinson said that for each one percent
4 of royalty it translates into a four- to six-percent
5 net profits interest. Do you agree with that?

6 A. I'd have to put pencil to paper, and I don't
7 have the information at my fingertips to do that right
8 now, Mr. Carlson. I could certainly get back to you on
9 that one, but I'm not --

10 Q. Well, it's not important except that it is
11 some multiple of the percent royalty rate.

12 My question is, how can you not take royalty
13 rates into account if it translates -- if we're talking
14 the difference between a two-percent and a five-percent
15 royalty rates, and that's, according to Mr. Hutchinson,
16 a difference between 12 and 18 percent of the net
17 profits --

18 If I was a miner, I would take royalty rates
19 into account when I decided to mine. You stated that
20 you certainly take economics, and that to me is
21 straight economics.

22 A. Okay. Number one, we're not at the five-
23 percent royalty rate. That -- And I think Mr. Prando
24 testified to that yesterday. There's a cutoff minimum
25 ten percent. Anything ten percent or less is a two-

1 percent royalty rate. I believe the top end is 17
2 percent or more, is five percent. And we're mining
3 toward the middle to low middle of that range.

4 Q. Okay.

5 A. So that begins to halve what you quickly
6 conclude.

7 Basically, in our budgeting process, because
8 orderly mine development is so much more costly than
9 royalty decisions, as I budget year by year, I will ask
10 Mr. Lane's department, what percentage of our ore do
11 you expect to come from state leases and what from
12 federal leases, so that we do have a royalty
13 consideration in our budget.

14 But we do not make mining decisions based on
15 those different royalties.

16 Number one, the mining plans are longer than
17 these two-year extensions that we've gotten from the
18 federal government. And I'm very reluctant to develop
19 a plan based on different royalties, because within now
20 a year those might change to where they're the same.
21 And they are identical, when the federal people do
22 not -- or if they do not continue the two-percent
23 reduction.

24 I believe they entered that two-percent
25 production -- or reduction or two-percent flat royalty

1 rate, if you will, at the time of this Canadian
2 settlement, recognizing the importance of the potash
3 industry and those 2800 or 2000 jobs to the state's
4 economy, to the federal economy. And they said, We'll
5 give the folks a little bit of a leg up.

6 And I certainly appreciate Mr. Hutchinson's
7 suggestion that perhaps the state should consider
8 following suit on that.

9 But because of the potential imminent
10 expiration of that, we have not done any mine planning
11 based on royalty considerations.

12 Q. Well, if you'll remember, the state did
13 follow suit for a while there with a case-by-case
14 determination.

15 A. Yes.

16 Q. I don't know if your mine ever came in and
17 got --

18 A. Yes, we did.

19 Q. -- but we did issue a couple two-percent
20 royalties, until companies could no longer justify the
21 economics. In other words, they had to come in and
22 show us --

23 A. Right.

24 Q. -- that they needed it to make money --

25 Q. Yes.

1 A. -- and people quit doing that, so --

2 A. And the royalty was the last thing standing
3 between profitability or non-profitability.

4 Q. Right. I believe you said that you
5 anticipate being in Section 2 within seven or eight
6 years at the earliest, I think you said.

7 A. Yes.

8 Q. What is the latest that you anticipate being
9 in Section 2?

10 A. I really can't put a number on that, Mr.
11 Carlson, other than generalizations.

12 Nominally two-thirds of the remaining life of
13 the mine is in the south section, nominally a third of
14 it is in the northeast section. If we say we've got 35
15 years, then we should be in and out of the south side
16 within -- what? Twenty years, 22 years, something like
17 that. And certainly Section 2 would be earlier than
18 that, because it's at the very edge.

19 Q. But it could be as long as 20 years?

20 A. Yes.

21 COMMISSIONER CARLSON: That's all the
22 questions I have. Thank you.

23 CHAIRMAN LEMAY: Commissioner Weiss?

24 COMMISSIONER WEISS: Yes, I have several.

25 EXAMINATION

1 BY COMMISSIONER WEISS:

2 Q. Whereabouts on the map, on Exhibit 38, did
3 the nitrogen burst occur where you had the fatality?

4 A. Again, you see the north-south trending main
5 entries near the middle of the map. The outburst
6 occurred just after we turned that corner from the --
7 You'll see a fairly heavy dark area around what's
8 called "mine shafts". You go east from there three-
9 quarters of a section, and turn south.

10 Q. Yes.

11 A. It was approximately where that turn
12 occurred. It was what we call a 1 breakthrough or
13 nominally 180 feet, 160 feet south of that turn.

14 Q. So you've got that -- that fuzzy line down
15 below it, going south from the --

16 A. Right.

17 Q. What was the pressure?

18 A. We have no idea.

19 Q. Have you ever used your methane detector to
20 look for gas outside the pipe in some of these wells
21 that are scattered around?

22 A. We have not mined anything other than dry,
23 plugged and abandoned, and we can't get any closer than
24 200 feet to them.

25 Q. Okay. Well, what about just going out on the

1 surface and sticking it around a wellhead?

2 A. We have not done that.

3 Q. How come?

4 A. I don't know.

5 Q. Oh, yeah, this is a good point, I think, that
6 was brought up. What happens if the EPA stops salt-
7 water disposal down there on the surface?

8 A. That's a whole 'nother ballgame. And that,
9 again, is a life-threatening situation for us,
10 obviously.

11 Q. I would think it would be, yes.

12 A. By the same token, our leases permit us use
13 of surface lands as required by mining.

14 Now, I assume that there will be some kind of
15 confrontation between the BLM or the State Land Office
16 and the EPA if that comes to pass, we'll see who has
17 the biggest club, I guess. But, certainly that's a
18 threat.

19 Q. Yeah, I don't think you've got much of a
20 chance against those guys.

21 A. Well, I'll not inject pure opinion at that
22 point.

23 Q. Then this issue of confidentiality, that took
24 place, your antitrust problems began -- What year was
25 that?

1 A. My recollection was that the trials were held
2 in the late Sixties.

3 Q. Well, were the mines developed -- these mines
4 that are there now, I don't know if there's -- Are
5 there any new ones since 1960?

6 A. No. No, our mine began in 1965 and it was
7 the last one that came into being in this area.

8 Q. So the issue of confidentiality had nothing
9 to do with the development of these mines; is that
10 right?

11 A. Well, in fact it probably went the other way.
12 The rather free flow of information, as these mines
13 were being developed, led to the problems that caused
14 the antitrust hearings to be held.

15 Q. But there were mines developed prior to the
16 antitrust problems?

17 A. Oh, yes.

18 Q. Since the antitrust problems, we don't have
19 any more mines --

20 A. Correct.

21 Q. -- except yours?

22 A. Correct. Well, no, no, ours was developed
23 before the antitrust problems as well.

24 Q. I see.

25 A. But we were the newest and last of the

1 operations.

2 Mr. Weiss, I might say for perhaps your
3 clarification, what has changed was not the antitrust
4 situation but the Canadian potash deposits.

5 Q. That had nothing to do with it?

6 A. As far as I know, no.

7 Q. And then in cementing -- Maybe your expert
8 would be better equipped to answer this question. But
9 when you cement your test holes, you know, plug them,
10 do you go out there with a pump truck and pump cement
11 down under pressure and fill it full of cement, or do
12 you use a ready-mix truck, or --

13 A. No, my understanding is that we use a
14 cementing firm. Again, Mr. Lane is the one that
15 directs those operations, and he'll talk to you
16 intelligently about that.

17 COMMISSIONER WEISS: All right. That's my
18 only questions. Thank you.

19 THE WITNESS: Okay, thank you.

20 CHAIRMAN LEMAY: Don't lose Mr. Lane.

21 (Off the record)

22 EXAMINATION

23 BY CHAIRMAN LEMAY:

24 Q. When you're developing these shafts, now, do
25 you know exactly where you are underground in

1 relationship to the surface? I mean, you're tying it
2 to benchmarks, and you're pretty good there.

3 A. Yes. If you like, I can relate an
4 interesting incident to you.

5 When our mine was developed, we developed off
6 the current USGS map for that area. When the National
7 Mine was developed, which was the mine immediately
8 preceding ours, there was a different issue of the map.
9 My understanding, those two maps were off by like 30
10 seconds.

11 And we in fact had an encounter with the
12 National Mine where we're supposed to leave a barrier
13 pillar between mines and between leases. And so 30
14 seconds translated out ten miles or so, closes that
15 hundred-foot gap pretty quickly.

16 But yes, we do tie to existing USGS maps and
17 section corners and that sort of thing.

18 Q. Well, then, if a well was drilled and you
19 knew exactly where the intersection of that well was
20 with your mine workings or where your mine workings
21 would be, assuming you could pinpoint it, we didn't
22 have a 15-degree --

23 A. Sure.

24 Q. -- variation?

25 Actually, if they go to five degrees they

1 have to --

2 A. Yeah.

3 Q. -- run a bottomhole survey. But the industry
4 can tell you where that well is with a directional
5 survey.

6 Assuming that pipe was located, what then
7 would you consider a safe pillar radius for protection?

8 A. Well, Mr. LeMay, I think I mentioned the 400
9 feet, if that were the only consideration. What I said
10 was, when you come down 1650, 15 degrees out is 450
11 feet. But I would hesitate to go closer to that
12 without better information.

13 Q. Well, assuming you knew exactly where that
14 was.

15 A. If we've got the information, that eliminates
16 that consideration.

17 Q. Right.

18 A. But it doesn't eliminate the consideration of
19 if gas gets out --

20 Q. Right.

21 A. -- and then I have to go back to the half
22 mile, depth of ore plus ten percent or quarter mile,
23 whatever those things are, because people, I think with
24 a lot more intelligence than I have, established those,
25 and they appear to have worked.

1 Now, if --

2 Q. So you'd still use the same protection zone,
3 even if you knew where the location of the well was?

4 You'd still --

5 A. Yes, yeah. I think the protection zone might
6 be meaningful if you had a dry, plugged and abandoned
7 well, and the rule is you don't mine through those; you
8 leave some kind of a barrier around them. And that
9 might be --

10 Q. What would you recommend there?

11 A. -- germane in issuing these things.

12 I think historical practice, where the
13 location of the well has been known, it's been 200
14 feet.

15 Q. Okay, a radius of 200 feet?

16 A. Yes.

17 Q. Looking at your map -- and this is just a
18 layman talking, so please help me on this thing, please
19 -- as you start working south, you're running that
20 east/west tunnel there in the north part of Section 22
21 to 24.

22 A. Okay.

23 Q. It looks like you're bumping into a lot of
24 barren zones down here. Does that influence what might
25 be economic ore? If you knew those barren zones

1 existed before you started to run these shafts, do you
2 think you'd run the shafts? Is there enough ore there
3 left in order to go after?

4 A. Oh, sure, sure.

5 Q. Because in the northeast or northwest part of
6 your map we don't see those barren zones but --

7 A. Right, there are a few -- Some of these white
8 areas, for example, are there because they were barren.

9 But in general it seems that the further
10 south we go, the more frequent we are -- more
11 frequently we're running into these barren zones.

12 And if I had an unlimited capital budget I'd
13 do a lot more drilling to find those. I do not have an
14 unlimited capital budget, and I have to buy a conveyor
15 instead of drilling holes sometimes.

16 Q. Yeah, I guess that's my next question. If
17 you had information to outline these barren zones ahead
18 of time, get more information, would that help you in
19 the development of your mine plans and make it a more
20 economic operation?

21 A. It would certainly help in the development of
22 the mine plans, yes.

23 Q. Because is it the way you go now, you say
24 these mine plans are only a snapshot in time because
25 what's happening is, you run into barren zones in there

1 and have to change your -- what you plan to do in the
2 future?

3 A. Yeah, and we have instances where we have
4 mined within four feet or eight feet of a core hole
5 with a certain analysis given to us and had three or
6 four percent difference in grade.

7 So at best, the core holes give you an idea
8 of what's in that three- to five-inch diameter hole,
9 and --

10 Q. So it's not a projectible thing. You say you
11 could have a commercial ore right next to a zero core
12 hole and --

13 A. Well, Mr. LeMay, to the extent that these
14 deposits were laid down by the evaporation of an inland
15 sea and you expect them to be continuous, in other
16 words, just the geologic occurrence that laid these
17 beds down, this is why this is a leasable as opposed to
18 a locatable mineral, because it occurs generally over a
19 broad expanse of territory, and we expect a continuum
20 of ore.

21 Now, there are these things called salt
22 horsts or barren zones that come up with -- rather
23 unpredictably.

24 But we don't get into the situation where we
25 run into, if you will, an ore horst. Okay? We expect

1 the ore to be continuous with some interruptions. We
2 don't expect continuous intrusions with some ore.

3 Q. Well, just looking in this area, it looked
4 like -- I could draw a circle around it. It looked
5 like you have at least as much barren zone in this
6 particular area as you would commercial ore, according
7 to your map, taking 24, 25, 26, 22.

8 A. Yes, and certainly these known barren areas
9 are taken into account when we assign lifetimes to mine
10 reserves. The unknown ones obviously aren't.

11 But on the other side of the coin, we will
12 count as reserves only reserves up to a lease line.
13 And for example, that whole block north of State Lease
14 M-651, we were ordered across the boundary, as Mr.
15 Herrell testified yesterday, because when we got to the
16 lease boundary, there was ore there, and likely no one
17 else would develop that ore.

18 So if it was to be extracted, it was to be
19 extracted by us at the time we were there. And that
20 whole nearly -- what? Half of three-quarters of a
21 section in there, was unexpected ore.

22 So you get those offsets as well that are
23 adjacent to but immediately outside of your lease
24 boundaries, and to a degree those offset some of the
25 unexpected barren zones.

1 Q. Have you explored the possibility of a mining
2 partnership with Yates Petroleum to join and develop
3 your properties and --

4 A. Well, as I say, I was surprised after Yates
5 got those leases they didn't come knocking on our door
6 about what to do with Section 2, because that's -- that
7 what was in our play.

8 So I have not approached Yates because
9 basically we're in contention over Section 2 right now,
10 not over the potash reserves but over the oil/gas
11 versus potash reserves.

12 So no, I have not pursued subleasing or
13 assigning the potash leases in Section 2 to Yates.

14 Q. Well, in developing a mine plan, I guess the
15 point I'd like to ask is if the oil industry was
16 cooperative with the mining industry, more so than they
17 have been, in being able to, say, run a side-wall core
18 or something of an oil test, using more sophisticated
19 logs, is this of beneficial use to you?

20 A. Well, Mr. LeMay, any additional point of
21 information we get would be helpful.

22 Q. What's your cooperation to date between the
23 oil companies in this regard?

24 A. Well, a completely independent third party to
25 this -- and if you want the name I'll give it to you; I

1 don't know that the name is germane -- called and asked
2 about what our intentions were on some leases around
3 Section 2, if it was not specifically in Section 2.

4 And I told them that our best judgment was
5 that there was ore in that section and that at some
6 point we would develop it and that we would include it
7 in our life-of-mine reserves. In fact, it was included
8 in the life-of-mine reserves.

9 And I said -- We pursued the cost of coring
10 off of a full-blown drilling rig, as opposed to our
11 truck-mounted, basically portable rig. And where we're
12 talking \$20,000 to \$30,000 a hole, my response from the
13 oil company was, it would cost at least \$50,000 to do
14 the coring off of the rig, although it's there and in
15 place. But just the rig time and what have you.

16 In pursuing it a little bit further, the
17 bottom line for the oil company was, Gosh, we'd like to
18 go with you but we're afraid of what we might find.

19 Q. Now, that's --

20 A. And so, you know --

21 Q. That may be a consideration --

22 A. Well, I think --

23 Q. -- if they're working on it --

24 A. -- the major consideration on the part of the
25 oil companies --

1 Q. Yeah, I think that's very --

2 A. -- within the KPA.

3 Q. Sure, sure. And vice-versa, you may be
4 afraid to see a core hole in something because it might
5 indicate a bigger barren zone than you anticipated,
6 and --

7 A. Mr. LeMay, we have encountered so many barren
8 zones that another one will not be a surprise to us.

9 Q. Do you have a problem with oil wells in
10 barren zones?

11 A. Depending on the size of the barren zone, no,
12 if we can keep the spacing.

13 Q. When you're blending ore -- This is a
14 question. You get the high-grade stuff and you say
15 you're -- you can blend that with the weaker grades of
16 ore.

17 Is it easy to find the lower grades of ore to
18 blend with the higher stuff? Is that stuff readily
19 available or not?

20 A. There's probably more low-grade than there is
21 high-grade.

22 Q. Yeah, yeah.

23 A. You know, every mining operation -- It's
24 probably like oil fields: You drill right in the
25 middle of a pool if you know where the pool is, and you

1 start pumping like hell. Right?

2 Q. They don't mix two wells; They're top-
3 allowable wells --

4 A. Okay. Again --

5 Q. -- for the refinery --

6 A. -- but depending on the economics --

7 Q. Yeah.

8 A. -- senior management, corporate ownership
9 will direct you to get the best rate you can, because
10 we're headed into a tough time, and --

11 Q. So there's -- You are valuing your higher
12 grades at a higher grade than your lower grades, I
13 guess?

14 A. Well, what we do is attempt to mine at the
15 grade or blend to the grade of the remaining life, so
16 that we're neither high-grading nor low-grading.

17 Does that happen a hundred percent of the
18 time? No.

19 We have some grim years where we have gotten
20 into unexpected low ore grade situations across the
21 mine, and I always accuse my predecessors of getting
22 all the gravy, so --

23 Q. Have you purchased any oil leases or drilled
24 any oil wells in --

25 A. No, sir.

1 CHAIRMAN LEMAY: That's all the questions I
2 have.

3 Additional questions?

4 MR. HIGH: Just a couple of follow-up.

5 FURTHER EXAMINATION

6 BY MR. HIGH:

7 Q. Mr. Case, would you look at Exhibits 14 and
8 15 in front of you, please?

9 Mr. Carlson asked you about the source of the
10 traces of methane gas found in the basin. Do Exhibits
11 14 and 15 address the source of those traces of
12 methane?

13 A. Mr. High, Exhibit 14 is geology of the
14 Carlsbad Potash Mining District with emphasis on brine
15 and inert gases adjacent to or within the ore beds --

16 Q. Okay.

17 A. -- prepared by George Griswold. And when
18 somebody talks to me about the Griswold report, yes, I
19 associate that with the occurrence of the nitrogen
20 pockets and the minor amounts of methane that are found
21 with that.

22 I believe Exhibit 15 was prepared by Mr.
23 Chattabetti [phonetic] for the -- part of the WIPP
24 study, called occurrence of gases in the Salado
25 formation. I am not as familiar with that report as I

1 am with Mr. Griswold's report.

2 Q. But it does address the occurrence of gas in
3 the Salado formation?

4 A. Yes.

5 MR. HIGH: Mr. Chairman, and we would offer
6 Exhibits 14 and 15.

7 CHAIRMAN LEMAY: Without objection, Exhibits
8 14 and 15 will be admitted into the record.

9 MR. HIGH: And we have nothing further.

10 CHAIRMAN LEMAY: I think Commissioner Weiss
11 had additional questions.

12 FURTHER EXAMINATION

13 BY COMMISSIONER WEISS:

14 Q. Yeah. Again, on the confidentiality issue,
15 is there a need for it today if the Canadian industry
16 is what dictates the start of a new mine?

17 A. I'm sorry, Mr. Weiss, is there a --

18 Q. -- need for this confidentiality that exists
19 in your business down there if the Canadians are the
20 ones who dictate a new mine?

21 A. Well, Mr. Weiss, appreciate that there are
22 six mines in the Carlsbad Mining District, in that
23 400,000-acre area, and all of us must compete in
24 whatever market.

25 You know, I mentioned to you that the

1 production costs plus transportation dictate a line
2 that runs nominally along the Oklahoma-Kansas border,
3 for example, south of which Carlsbad can compete and
4 north of which Canada can compete.

5 In that area of US competition, we are head-
6 on-head in a number of instances with our competitors.

7 So yes, the need for confidentiality is
8 there, because we do not -- I believe you're familiar
9 enough with the antitrust laws, that you can't get into
10 price-fixing situations or anything that's construed to
11 be price-fixing.

12 And the interpretation of that, following
13 this lawsuit back in the Sixties, was that US producers
14 do not talk among themselves on issues of prices,
15 manufacturing costs, or significant portions of
16 manufacturing costs that could be easily compiled or
17 projected into manufacturing costs.

18 Q. Well, my point is, as I see it, on the issue
19 of these core holes, for instance, the value of those
20 core holes is whether you're going to develop a new
21 mine. I would think you --

22 A. No, no, no, no, no. Not at all. The value
23 of the core holes is in developing a plan for an
24 existing mine.

25 Q. Which is there. There's not going to be any

1 more if I understand your testimony.

2 A. No, that's correct.

3 Q. So why have the confidentiality? You guys
4 have the data. Hey --

5 A. Because there are still exchanges of lands
6 going on between the companies.

7 For example, this Mississippi Chemical lease
8 that we picked up, that in fact was a trade, because
9 there were some Mississippi leases that were close to
10 where we could mine. We had some leases that we were
11 unable to mine that were close to an area that
12 Mississippi might potentially mine. So we swapped that
13 information.

14 The confidentiality of the information lies
15 in, until you get into those business negotiations,
16 letting the competition know what you've got. And also
17 from that information, from the grade of ore and the
18 rate of mining, those are some of the factors that very
19 quickly can be fairly reasonably or reliably projected
20 into costs.

21 Q. My point is, the competition is not going to
22 come open up a new mine.

23 A. The competition is there with their mining.

24 Q. Yeah. And so whatever agreements you make
25 are going to be between offset mines.

1 A. They're among competitors, though. We're not
2 all owned by the same operation.

3 Q. Yeah, if I want to see the logs or the
4 equivalent of a core hole --

5 A. Yeah.

6 Q. -- in the oil field, I can go upstairs
7 here --

8 A. I understand that.

9 Q. -- and look at some file cabinets and see the
10 logs on every well --

11 A. Yes.

12 Q. -- in New Mexico.

13 A. Right.

14 Q. And the competition is, believe me, great in
15 the oil business in New Mexico.

16 I have a lot of problems with the issue of
17 confidentiality down here.

18 A. Well, those are the guidelines I've been
19 given and learned to live with, and as a result of
20 antitrust hearings, and I don't know where to go beyond
21 that, Mr. Weiss, other than just to say if someone gets
22 a different reading of the law that says open up your
23 books to anybody and everybody, I will then consider
24 relaxing my standards.

25 COMMISSIONER WEISS: Thank you.

1 CHAIRMAN LEMAY: Thank you very much. We
2 appreciate a couple long days there.

3 THE WITNESS: Thank you, Mr. LeMay.

4 CHAIRMAN LEMAY: Rather than start another
5 witness, why don't you take those -- an extra 15
6 minutes at lunch?

7 MR. HIGH: That's fine with me, your Honor.

8 CHAIRMAN LEMAY: Okay. Can you all stay till
9 six? Okay. Can you?

10 Okay, we'll go on to six tonight to make up
11 for it.

12 MR. ERNEST CARROLL: Reconvene at 2:00?

13 CHAIRMAN LEMAY: Two o'clock.

14 (Thereupon, a recess was taken at 12:30 p.m.)

15 (The following proceedings had at 2:03 p.m.)

16 CHAIRMAN LEMAY: If you'll be seated, we'll
17 continue on with the direct on the potash companies.

18 Mr. High?

19 MR. HIGH: We would now call Dr. Bill
20 Mitchell. I believe Mr. Mitchell was sworn earlier,
21 but I'm not sure.

22 Were you sworn earlier, Dr. Mitchell?

23 DR. BILLY J. MITCHELL: Yes, I was.

24 MR. HIGH: Okay. We're going to have some
25 overheads too, so we're going to --

1 CHAIRMAN LEMAY: Fine, great. Do we have
2 copies of those as exhibits in here or not?

3 MR. HIGH: No, sir. I don't believe they're
4 there. We have them here, though.

5 CHAIRMAN LEMAY: Okay.

6 MR. HIGH: I'll give them to you.

7 BILLY J. MITCHELL,
8 the witness herein, having been previously duly sworn
9 upon his oath, was examined and testified as follows:

10 DIRECT EXAMINATION

11 BY MR HIGH:

12 Q. Dr. Mitchell, would you state your full name,
13 please?

14 A. Billy Joel Mitchell.

15 Q. And where are you employed, Dr. Mitchell?

16 A. Colorado School of Mines, Golden, Colorado.

17 Q. And how long have you been a professor at
18 Colorado School of Mines?

19 A. Since 1966. About 26 years.

20 Q. And in what area do you teach?

21 A. Oil-well drilling.

22 Q. Do you hold any other titles there at the
23 Colorado School of Mines?

24 A. Yes, I'm the Director of the Center for
25 Directional Drilling Research and Principal

1 Investigator for the Gas Migration Consortium and
2 Principal Investigator for a group called Drilling
3 Engineering Research.

4 Q. What is the Center for Directional Drilling
5 Research? What is that all about?

6 A. We do research for some of the major
7 companies, Norway, Dubai is another one in the Persian
8 Gulf, Mobil, for instance.

9 So we do the research, accuracy of surveys,
10 surveying techniques, those sorts of things.

11 Q. And as Principal Investigator of the Gas
12 Migration Consortium, what's that all about?

13 A. Well, companies are wondering how gas migrate
14 in the wellbore, and we basically make studies to show
15 that -- or demonstrate observations of how this could
16 occur.

17 For instance, in the percolation process by
18 which gas migrates, we're asked things like, What is
19 the effect of the rugosity of the hole, hole diameter
20 versus the pipe diameter that's in there, and the angle
21 of the hole or the slant angle, deviation. Those sorts
22 of things.

23 Q. All right. Would you relate to us, Dr.
24 Mitchell, your educational background please?

25 A. Yes, in 1957 I received a BS in petroleum

1 engineering at the University of Oklahoma, 1962 a
2 master of petroleum engineering, and 1970 doctor of
3 philosophy, all from the University of Oklahoma.

4 Q. Are you certified as a professional engineer
5 in any states?

6 A. Yes, in Colorado, and my number is 9442.

7 Q. And after you got out of school and got your
8 degrees, where did you go to work at that point?

9 A. I first went to work for Exxon in their
10 Drilling Research Lab, and I worked there about two
11 years. I had a break for the military. I was in the
12 military for three years.

13 Q. Okay. And then you went to the Colorado
14 School of Mines?

15 A. No, I actually went to Venezuela and worked
16 for another 25 months there and returned to the
17 Colorado School of Mines.

18 Q. All right, what were you doing in Venezuela?

19 A. I was a drilling engineer.

20 Q. And so you first joined the faculty at the
21 Colorado School of Mines in what year?

22 A. 1966.

23 Q. And you've been there ever since?

24 A. Yes.

25 Q. Tell us, if you will, Dr. Mitchell, some of

1 the courses that you teach at the Colorado School of
2 Mines.

3 A. Well, the beginning level, I teach -- they're
4 all drilling, by the way, so I teach a basic course in
5 drilling, secondary course in drilling, and advanced
6 courses in drilling such as horizontal drilling,
7 directional drilling, casing design, air and gas
8 drilling, bit selection, type, material, typical
9 drilling.

10 Q. Do you have a specialty that you deal with?
11 Are you a specialist in any particular area of
12 petroleum engineering?

13 A. Well, petroleum engineers more or less divide
14 themselves into production, reservoir, and drilling,
15 and I happen to be in the drilling phase.

16 Q. Have you taught any industrial courses?

17 A. Yes, I teach numerous industrial courses.

18 Q. And what are industrial courses, Dr.
19 Mitchell?

20 A. Well, someone like Exxon, Shell, Mobil, would
21 like to have courses taught to their professional
22 engineers, kind of an update, maybe, that sort of
23 thing, and I go and teach the schools for them.

24 Q. And what are some of the courses or topics
25 that you've covered or taught in these industrial

1 courses?

2 A. Oh, blow-out control, casing design, tubing
3 design, cementing, air drilling, bottomhole assemblies,
4 drill pipe design, for instance, would be another one,
5 air and gas drilling, drilling fluids, that sort of
6 thing.

7 Q. Are you involved in any ongoing research
8 there as a member of the faculty?

9 A. Yes, as I stated earlier, I'm the Director
10 for the Center of Directional Drilling Research and
11 Principal Investigator for the Gas Consortium. And for
12 the DER group, the Drilling Engineering Research group,
13 I'm the Principal Investigator there too.

14 Q. Where do those research projects come from,
15 Dr. Mitchell?

16 A. Basically, companies come to me, want certain
17 studies made, and I do it. We perform it as a service
18 there, more or less.

19 Q. All right. Have there been any other
20 research projects in which you've been involved?

21 A. Well, earlier I was in foam drilling, air
22 drilling, and foam cementing, cementing wells with foam
23 cement rather than just a normal liquid cement.

24 Q. And have you done any industrial teaching?

25 A. Let me back up. I also noticed on my résumé,

1 and I forgot this, I was a co-investigator for a
2 straight-hole mine shaft drilling project for US Bureau
3 of Mines, and also on the board for the Deep
4 Observation and Sampling of the Earth's Continental
5 Crust, called DOSECC, also on a drill-bit project for
6 them.

7 You asked me about my industrial teaching.
8 Well, I still teach for -- And since there's been a big
9 shutdown in the oil business as we all know -- in the
10 United States, I might add; overseas it's booming --
11 but I still teach for Oryx, I teach overseas for a
12 company called P.T. Loka Datamas Indah, Mobil Oil
13 Corporation. And I teach basically tubular design,
14 tubular running and handling practices and optimum
15 drilling practices.

16 I teach some courses for myself.

17 Other people I teach for off and on would be
18 Tenneco, Continental, Shell, Consolidated Natural Gas,
19 Exxon, Preston Moore. Taught in Petrobras in Brazil, I
20 taught a directional drilling course there. And I
21 teach -- I've been a guest lecturer for the Society of
22 Petroleum Engineers since 1982. And on my résumé I
23 show that I stopped in 1987, however they've contacted
24 me and would like for me to start teaching again.

25 Q. Do you have any on-site oil well drilling

1 experience, Dr. Mitchell?

2 A. Yes, I started out -- My grandfather worked
3 in the drilling business, my father worked in it, four
4 uncles, my brother. My dad actually owned a drilling
5 company, and I started roughnecking when I was twelve.
6 I was kind of big for my age, so I started roughnecking
7 when I was twelve and have been at it ever since.

8 Q. And what type of jobs have you actually
9 worked in?

10 A. Well, I've been a roughneck, derrick man,
11 tool pusher, rig supervisor, drilling superintendent,
12 drilling manager and drilling engineer.

13 Q. All right. Would you give us some --

14 A. I've been a drilling research engineer also,
15 for Exxon.

16 Q. Okay. And would you give us some of the
17 locations where you have on-site experience?

18 A. Well, Egypt -- I'll just read from this list
19 here. Egypt, Dubai, Abu Dhabi, Indonesia, Malaysia,
20 Argentina, Canada. Alaska also should be added in
21 there. United States, Alaska, Gulf Coast, west Texas,
22 Rocky Mountain and California, Texas and Louisiana.

23 Q. And have you actually planned and supervised
24 the drilling of some oil and gas wells, Dr. Mitchell?

25 A. Yes.

1 Q. And are the various companies that you have
2 either planned or supervised the drilling for set forth
3 in our résumé?

4 A. Yes, I notice there's -- I've listed 35. I'm
5 sure there's more. But if -- most of the people that
6 are operating today.

7 Q. Okay. Have you ever testified before in a
8 court proceeding or to a commission like this before,
9 Dr. Mitchell?

10 A. Once to a commission, and not more than 14,
11 15 times before a jury or a court.

12 Q. And were the issues that you testified -- had
13 to do with petroleum engineering?

14 A. Yes, and drilling in particular.

15 Q. Have you designed any computer software for
16 the oil and gas industry?

17 A. Yes, I have.

18 Q. And what types of computer software --

19 A. It's all drilling software, and I distribute
20 it with one of the books that I've recently written,
21 and it's gaining popularity, actually.

22 Q. Do you continue to serve on committees that
23 are addressing issues in the oil and gas industry?

24 A. Yes, in the Society of Petroleum Engineers I
25 currently am on the Education Committee. In the past

1 I've served on the Deep Observation and Sampling the
2 Earth's Crust, National -- National Science Foundation
3 arm, served on their board, Chairman of the Pressure
4 Control Committee of the International Association of
5 Drilling Contractors, called IADC, and annual meeting
6 session co-chairman for ASME.

7 Q. And have you published any works at all, Dr.
8 Mitchell?

9 A. Yes, I've published newsletters, books and
10 manuals and papers.

11 Q. How many books have you written?

12 A. Four.

13 Q. And could you give us the titles or the
14 subject matter of those four books?

15 A. Well, I wrote one in 1977 that has 244 pages
16 called *Well Drilling Handbook*.

17 I wrote another one that was called *Advanced*
18 *Oil Well Drilling and Engineering Handbook and Computer*
19 *Programs*. It has currently -- I revised it recently.
20 It has 615 pages.

21 *Oil Well Fishing* I wrote in 1991, has 153
22 pages.

23 And then *Horizontal and Directional Drilling*,
24 I wrote that, and it has about 180 pages or so at this
25 time.

1 Q. All right. What's the newsletter that you
2 referred to?

3 A. Oh, when I go out and teach, people ask me
4 complicated things that are somewhat difficult to cover
5 in a course, in a five-day course or two-day course, so
6 I publish a little newsletter covering some of those
7 items that people have asked most about, and it's
8 fairly popular.

9 At the time I wrote this, I had 402
10 subscribers. I think maybe that might be cut in half
11 when I publish again here.

12 Q. All right. How about manuals? Have you had
13 occasion to prepare any manuals for use of the oil and
14 gas industry?

15 A. Yes, I have a list here, *Tubular Design* for
16 Mobil Oil Corporation, 356 pages.

17 *Optimized Drilling* for Mobile, 282 pages.

18 *Tubing Running and Handling Practices*, 371
19 pages.

20 *Air Drilling Manual* for Conoco; it has about
21 60 pages.

22 *Marine Riser Operations* for offshore location
23 of -- running of risers and how to handle risers
24 offshore, for Continental.

25 And *Directional Drilling Manual* for

1 Petrobras. I wrote that in 1987.

2 Q. Okay, and I notice in your curriculum vitae,
3 Dr. Mitchell, that you have written or listed some 48
4 different papers, theses and reports. Let me ask you,
5 are any of those related to the topics that we're
6 talking about here today?

7 A. Well, they all relate to drilling, and
8 there's actually 49, because on October the 7th, I gave
9 a paper in Washington, DC, at the National Society of
10 Petroleum Engineers conference.

11 I went through and checked off some titles
12 that might -- people may want to hear for future
13 questions:

14 Fluid Characterization and Pressure Drop and
15 High Pressure Drop and High Pressure Foam System; Foam
16 as the Drilling Fluid; Foam Pressure Loss in Vertical
17 Tubing; Strength, Permeability and Porosity of Cellular
18 Oil-Well Cement; Determination of Laminar, Turbulent
19 and Transitional Flow -- Foam Flow -- in Pipes;
20 Strength, Permeability and Porosity in Foam Cement;
21 Rheology of Foam Cement; Compressive and Tensile
22 Strength and Setting Time of Foam Cement with Common
23 Additives; Long-Term Strength and Permeability of Foam
24 Cement at Elevated Temperatures; Recommended Cementing
25 Practices in Wyoming; Wellhead Loans and Surface Casing

1 Failures; Centralizer Spacing with Plain Casing
2 Bending; Gas Flow after Cementing, a Physical Model;
3 Effect of Cement Column Inclination on Gas Migration;
4 Oil Well Tubular Deformation and Severe Doglegs; The
5 Effect of Hole Inclination on Gas Migration; and the
6 last one, which you don't have, is Bending of Tubulars
7 in Horizontal Wells.

8 Q. That's the most recent one you just told us
9 about?

10 A. Yes.

11 MR. HIGH: Mr. Chairman, I would ask that the
12 Commission accept Dr. Mitchell's credentials, and I
13 would also offer into evidence Exhibit Number 20, which
14 is a copy of his curriculum vitae.

15 CHAIRMAN LEMAY: His qualifications are
16 acceptable.

17 Q. (By Mr. High) Dr. Mitchell, what did I ask
18 you to come here to do?

19 A. You asked me to look at the risk of gas
20 entering the wellbore and migrating up to the potash
21 zones and to give a cost estimate, provide a cost
22 estimate for drilling of a directional well into the
23 Delaware formation.

24 Q. And you are prepared, I take it, to do that?

25 A. Yes.

1 Q. Now, about how much time do you split or
2 have, Dr. Mitchell, between the academics that you
3 pursue and the work that you told us about? As a
4 professor, do you have time available to do both?

5 A. Let me add one thing about why I'm here. I'm
6 really here to help -- community service.

7 As a professor, we're required to teach, do
8 research and provide community service, and so I would
9 like for everyone to know that I'm here to assist you,
10 I'd like to assist Yates and assist the Oil
11 Conservation Commission in any way that I can, and I'll
12 try to answer all the questions that are asked --

13 Q. Very good.

14 A. -- impartially.

15 Q. Would you give us some idea of the amount of
16 time that you have available, Dr. Mitchell, to do some
17 actual hands-on type work?

18 A. Yes, people often think that professors are
19 geared to the academic, and as a matter of fact, I
20 think if you tried to do that, you'd probably end up
21 getting relieved of your position.

22 Of course, at CSM -- There's 365 days a year.
23 We have 124 academic days that we actually teach, and
24 that leaves 240 days for work. And if -- For instance,
25 I'm down here now; I have a capable associate teaching

1 my classes. He has ten years of experience in
2 drilling. He's 34 years old. He even worked for two
3 or three years in southeastern New Mexico drilling
4 wells for Arco.

5 And for instance, in comparison with
6 industrial employees, there's still 365 days in a year.
7 There's 104 weekends, ten vacation days, ten holidays,
8 given 241 days of work, so professors have a lot of
9 time off. And the taxpayers expect that -- they don't
10 expect people to -- professors to stay in an ivory
11 tower and not provide the latest information for the
12 students.

13 Q. All right. You understand, Dr. Mitchell, as
14 I have explained to you, that the potash industry's
15 concern with respect to methane gas is both from the
16 point of not wanting to have an explosion in a mine,
17 but also directed to a much smaller amount that might
18 result in a mine getting classified as gassy?

19 A. Yes, I discussed that also with Warren
20 Traywick, and I hope I've arrived at some understanding
21 of this.

22 But I'd like to remind everybody here, I have
23 no mine experience, and I have been in one inactive
24 gold mine in Colorado, and I think I walked in about a
25 hundred feet and then I walked back out.

1 Q. But you can tell us, I take it, how much
2 methane gas it would take to propagate an explosion?

3 A. Well, I have one reference, and that's from
4 the US Bureau of Mines, and that reference is by J.J.
5 Forbes and J.W. Grove, and the title of it is *Mine*
6 *Gases and Methods for Detecting Them*, Miners Circular
7 33, Bureau of Mines, United States Printing Office,
8 1954, page 7.

9 Q. All right. And what does that document show,
10 Dr. Mitchell?

11 A. Let me read this. It's a US Bureau of Mines
12 study, that one I just mentioned, opined that in a coal
13 mine with the presence of coal dust, which we don't
14 have, that at least 200 cubic feet of methane, a
15 natural gas usually found in petroleum natural gas, are
16 required for an explosive oxidation of the gas.

17 Two hundred cubic feet would be a box that
18 would be five feet high, five feet wide, and eight feet
19 long, would hold 200 cubic feet, so five by five by
20 eight.

21 Q. All right. And given the amount of gas that
22 would be produced by one of these Delaware wells, Dr.
23 Mitchell, can you tell us about how long it would take
24 to put that much gas in one of these potash mines?

25 A. Yes, I relied on a document that Yates sent

1 to Mr. Randy Patterson, and that document has that the
2 average production rate for the first year out of the
3 Delaware formation would be 17,941,000 standard cubic
4 feet per year, and in that case -- and if it all were
5 to go into the mine, which is not likely, but it would
6 take 5.86 minutes to produce 200 cubic feet into the
7 mine, 5.86 minutes.

8 Q. Now, Dr. Mitchell, you heard some testimony
9 about the bottomhole pressure of a Delaware well and
10 the pressure in the casing and the pressure alongside
11 the McNutt member.

12 Can you tell us, please, what in your opinion
13 those pressures would be?

14 A. Yes. We've heard a lot of estimates. This
15 would be a Delaware well --

16 MR. HIGH: Excuse me, Doctor. Let me just
17 say, Mr. LeMay, if I may, Dr. Mitchell's exhibits will
18 be Exhibit 39, starting with A through whatever letter,
19 and what he has on the screen now would be 39B, just to
20 keep them in consecutive order.

21 Q. (By Mr. High) I'm sorry, Dr. Mitchell. Go
22 ahead.

23 A. We can see we have a Delaware well here with
24 5-1/2-inch casing at 8400 feet. A reservoir pressure
25 of -- given to me by Mr. -- excuse me, Dr. Boneau -- of

1 2800 p.s.i. And we'd have perforations, holes through
2 the cement, through the casing, through the cement and
3 into this zone, which we would anticipate the gas to
4 flow up the well.

5 And assuming that under some conditions we
6 could have a gas column in there as well -- there may
7 be an oil column at times, but if the gas pressure
8 builds up it can easily push the oil back into the
9 formation, which has happened.

10 But anyway, at the McNutt level, we'd expect
11 a pressure in the ballpark of 2395 p.s.i.

12 Q. All right. And can you tell us, Dr.
13 Mitchell, if you'll recall, Mr. O'Brien said the p.s.i.
14 at the McNutt member would be 2000 p.s.i. Do you
15 remember that testimony?

16 A. I guess I do.

17 Q. Do you agree that the p.s.i. at the McNutt
18 member would be about 2000 p.s.i.?

19 A. Well, I think Mr. O'Brien somehow -- and I
20 have the ultimate respect for Mr. O'Brien -- confused
21 what we'll call pressure with stresses.

22 Now, if this McNutt is 1600 feet deep or
23 thereabouts, then we could expect the stress in the
24 rock from the overburden to be in the range of 1600,
25 and maybe as high as 2000.

1 But the pressure of the liquid in the McNutt,
2 which is going to try and attempt to push back on the
3 gas, will only be about 700, maybe as low as 400.

4 Now, I rely on Mr. Robert Lane. You've heard
5 his name a lot. But he said if you were to drill a
6 well through McNutt, that the water in there would
7 stand at about 700 feet deep, and if that were the case
8 you'd have about 1000 feet of water that would stay in
9 there. So the pressure would be exactly equal to the
10 head of the water plus atmospheric. All that adds up
11 to in the range of something like 450 to maybe 700
12 p.s.i., if the wellbore actually were to fill a little
13 higher than what he thought it could or what he felt
14 like it could.

15 Q. So needless to say, if the pressure at the
16 McNutt was 700 p.s.i. and there was gas present from
17 wherever at 2395 p.s.i., it would go in the McNutt
18 formation?

19 A. Yes. Well, if it had a path.

20 Q. Now, do you know, Dr. Mitchell, if any
21 studies have been done concerning the gas getting out
22 of the wells in southeastern New Mexico?

23 A. Well, not in the Delaware wells. I could not
24 find one of those.

25 And I think we ought to make a distinction

1 between the shallow 1900-foot wells, where -- I noticed
2 in one of them it said TSTM, which stands for too small
3 to measure.

4 Those types of wells should be separated from
5 a well that's capable of making 18 million standard
6 cubic feet in one year. I think that separation should
7 be made.

8 Q. And you've heard some testimony here from
9 other witnesses about other wells that should be used
10 for comparison with these Delaware wells.

11 Is it your opinion that that comparison
12 should not be made?

13 A. Well, you know, I think any data point is
14 good. But I think the parallelism between a 1900-foot
15 well and an 8500- or 8400-foot Delaware well should be
16 carefully looked at.

17 So I would say that from an 18 million to a
18 too-small-to-measure is quite a jump for a data point.

19 Q. All right. Would you tell us, if you will,
20 Dr. Mitchell, what are some of the risks to the
21 underground potash mines if oil and gas wells are
22 allowed, as Yates seeks to do in this case?

23 A. Well, I have a series of slides here I might
24 show you that elaborate on that.

25 I'm not a mining man, so I can't really say

1 what would be a risk to the mining people, but I feel
2 like we could talk about the risk of getting gas up and
3 to the wellbore opposite the McNutt.

4 Q. This would be Exhibit 39D?

5 A. Thirty-nine?

6 Q. Yes. For the purpose of our record here,
7 yes, it's 39D.

8 A. So one of the first ways it could happen is
9 during a blowout.

10 And then people say, Well, blowouts probably
11 aren't going to happen.

12 But I noticed a well that was drilled by
13 Exeter, one of the four wells on the eastern side of
14 Section 2 -- Exeter Company in Denver -- had a fire
15 that burned up part of the rig during the week that we
16 were here. It was in the paper.

17 So blowouts, you know, do occur. And I'm not
18 trying to paint any horror stories.

19 But during the drilling of the well, it could
20 be conceived that the -- you've drilled down into the
21 oil zone, blow out some of the or all of the mud that's
22 in there, go up through the cement and some of the
23 passages I might be talking about, or, better yet, go
24 up into the casing, you may have a hole in the casing,
25 and then whether it enters the McNutt or not, I don't

1 really feel like I'm an expert to testify to.

2 But anyway, we can get the gas up to the
3 McNutt formation.

4 Q. There are a number of ways, are there not,
5 that gas can get up to the McNutt member?

6 A. Yes.

7 Q. All right, go right ahead.

8 A. One of the ways is to -- is during
9 production. Or that other way is during drilling and
10 have a blowout.

11 But during production particularly one is
12 going to have gas in the wellbore. And again, 2800
13 p.s.i. is your driving force into the wellbore.

14 Up the wellbore we have a hole there in the
15 casing. That requires two holes, 5 1/2 and the 8 5/8,
16 the other casing on the outside. And then we could
17 have gas opposite the McNutt in the wellbore.

18 Or else we could have a leaking casing
19 connector. In that case, what -- I think you heard Mr.
20 O'Brien testify that the strength of the couplings,
21 connectors would be somewhere around 4000 p.s.i., and
22 since I could not find in any of the records what these
23 were, what type of couplings they were, I couldn't make
24 a standard American Petroleum Institute calculation of
25 what the strength would be. I'll take his word for it.

1 I'm sure he's in the ballpark in regard to that number.

2 But what really can happen is that the
3 couplings can have gas pass along through the threads.
4 They don't really match up perfectly. They don't get
5 in there and form a perfect seal around this thread
6 loop. So they put dope in there. It's called pipe
7 dope, and the popular dope is Modified Eighties, it's
8 called.

9 So we put that in there -- I'll say "we"
10 because I'm in the drilling business. We put that dope
11 in there to seal this. And the strength of the
12 coupling, the resistance to leaking would be like maybe
13 4000, 4500, if it fits together correctly.

14 Now, the primary problem for the reduction in
15 the strength of these couplings is that the taper along
16 the thread here is not constant, nor is it at the right
17 angle.

18 Now, you realize that people have to cut
19 these quickly to make money in casing, and they do the
20 best they can, and it's pretty good. Usually, the
21 casing companies manufacture it very accurately.

22 And then the threads aren't cut the right
23 depth. And if the casing -- since this thing is going
24 to seal by compression of the casing into the coupling.
25 So if the casing is manufactured with levality -- and

1 there are limits that API allows for levality -- then
2 the casing when it screws together will have too much
3 compression on one side, not enough on the other side,
4 and a reduction of 50 percent in the leak resistance of
5 the casing is maybe one out of a hundred joints, and
6 the usual reduction is about 70 percent. And of
7 course, a lot of those will be stronger than the 4000.

8 So anyway, that's one of the possible leak
9 paths.

10 And to make sure that, for instance, that we
11 don't try to match a connector with the wrong casing
12 taper -- you see, you could get them so they would be
13 way off -- why, we use a device called a Torque Turn.
14 People come out and torque up the pipe and turn it, and
15 for this type of pipe you'd expect to have about three
16 turns after what they call intimate contact to make up
17 the pipe, make it up correctly.

18 And the Torque Turn people, if it doesn't
19 fall within a range of -- number of turns and amount of
20 torque, they take that out and lay it down and pick up
21 another one.

22 Now, I don't know that Yates is going to hire
23 Torque Turn company or not, and we'd have to ask them.
24 It is not in any plan that I saw.

25 So that's one of the real issues here.

1 Something that I'd also like to bring up is
2 that leak from the outside for the inside in a wellbore
3 is more difficult because from the outside you'll have
4 a mud-caked form and that will act as a seal, and on
5 the inside you usually have clean fluid, which pushes
6 the dope out.

7 And one of the classical tests was done by
8 Shell Oil Company. They tested a casing for six hours.
9 It leaked, so they pulled the whole string out, run in
10 another string, tested it again for six hours. It
11 leaked, up around about 70 to 80 percent of its rating.
12 And that was in a well that was about 8000 feet deep,
13 7000 to 8000 feet deep.

14 Now, most of the time, I think Mr. O'Brien
15 stated that these -- that they would test the casing.
16 Most casing tests last 15 minutes, not five hours. And
17 in five hours it will extrude the dope out and then
18 start leaking.

19 Q. This would be Exhibit 39F, just for the
20 record, Mr. LeMay.

21 Go ahead, Dr. Mitchell.

22 A. Well, there's some -- I think we actually
23 have three categories that we might put gas leakage
24 into, and one of the might be a scientific amount, in
25 other words, maybe not even detectible, but somehow you

1 know in your heart that it has to be leaking. And then
2 an amount that would be detrimental to the economics of
3 a mine. And then maybe an amount that would be
4 hazardous to the employees of a mine.

5 So one of the ways that you could get some
6 natural migration would be for the gas in the Delaware
7 just simply to migrate up through the formations.
8 Well, it's been there for a million years, I guess --
9 I'd have to ask Dr. Boneau -- but it would be there for
10 a long time. It didn't really migrate any significant
11 amount. So possibly that I would call a scientific
12 amount and --

13 Q. So absent any disturbance, the gas should
14 migrate from the Delaware up to the McNutt?

15 A. Well, not in any reasonable amount, other
16 than just scientific purposes.

17 Q. Mr. O'Brien touched on microannuli, and he
18 said, well, he didn't even know if they exist.

19 A. Well, that's true. You know, I think what
20 you say is, as I've seen, courts and lawyers deal in
21 facts, and scientists and engineers deal in
22 observations. We observe something, and then we try to
23 explain it. We try and find a mechanism which will
24 explain the phenomena which we see occur.

25 And one of them is that, for instance, with a

1 cement bond log, if you show that you have a micro- --
2 or you show that the cement hasn't really gripped the
3 pipe and the cement bond log shows a little ringing
4 noise -- And it's rather simple; it either rings or it
5 doesn't ring. If you had a cup I could demonstrate it.

6 But anyway, so what you really expect is, for
7 a microannulus, is for the cement to set up, and then
8 the pipe over here could be reduced in temperature,
9 maybe you pump a cold fluid down, maybe you do
10 something of that sort, and the reduction in the
11 temperature is going to cause the pipe to shrink more
12 than the cement. So naturally we expect to see a gap.

13 Now, you make these calculations -- Oh, by
14 the way, the pressure would also cause the pipe -- You
15 reduce the pressure, then the casing would also shrink
16 a little bit in diameter.

17 Calculations show that anything over 30
18 thousandths of an inch of shrink would be a lot, and
19 anything under a couple of thousandths would be
20 probable, possible.

21 Q. Are the size of these annuli, Dr. Mitchell,
22 nonetheless, of the size that would allow the passage
23 of gas?

24 A. Yeah, I worked out a little problem here to
25 show people how much you expect, you know, or to...

1 And what we really have here, I picked a
2 5000-foot-long section, and a gap of 15 thousandths of
3 an inch, about average, and I used Weymouth's equation,
4 which is popular in some areas, and I found that you
5 could expect through that not more than 26 standard
6 cubic feet per day.

7 It might be important as far as mine
8 classification, but I really don't see how it could
9 ever cause a hazard to the mining.

10 Q. But it is nonetheless one of the ways which
11 gas could go from the Delaware up to the McNutt
12 formation?

13 A. That's one possible path, yes.

14 Another one I have is gas flow through the
15 cement. And cement is relatively impermeable. I think
16 Mr. O'Brien stated some of the permeabilities, and I
17 couldn't disagree with those. In high-temperature
18 situations, which we don't have here, the permeability
19 could go up maybe to 10 million millidarcies, which
20 would match a lot of gas zones that people produce gas
21 out of for sale.

22 But anyway, gas flow through the cement under
23 the worst conditions, which would probably not occur in
24 a single stage, I used -- again, I used Weymouth's
25 equation, some typical values for the viscosity of gas.

1 But anyway, you get there to the bottom line
2 and, sure enough, it's 55 standard cubic feet per day.
3 And you may not even detect that in a line, or else --
4 you know, you might.

5 Another way is mud channels. And just having
6 a mud channel in itself is not sufficient to have a gas
7 channel.

8 So what happens here is -- and this is done
9 -- could be -- happen in two ways, is that over -- Now,
10 it's a hydraulic principle that it's easier to displace
11 mud out of this section of the pipe with flowing cement
12 than it is next to the wall. And I think if you think
13 about it, that makes sense. But anyway, this will have
14 mud in it, and here we have the cement bypassing that
15 mud.

16 Now, once it's bypassed -- O'Brien alluded to
17 this but he didn't ever really say it. Once it
18 bypasses the mud, then it's very difficult to ever get
19 it out. The cement will just flow by it and it may not
20 ever clean it out.

21 But then after you have the mud channel,
22 somehow we've got to get gas to go through it. And
23 then that requires that something in the mud channel
24 dissipate the -- part of the mud or part of it or all
25 of it.

1 But this type of a gas channel is really
2 troublesome, especially in small holes like the 7-7/8-
3 inch hole by 5-1/2-inch casing, because that gap is
4 very small.

5 And R-111-P does not state how many
6 centralizers, if any at all, will be put on the casing,
7 for instance, by an oil company. I'm sure, having been
8 in an oil company, that the oil companies will do their
9 best to make this seal. But on the other hand,
10 centralizers do cost money, and each one of them,
11 although they're a little piece of steel like this, and
12 I called up Halliburton, and they want \$57 for each one
13 that they're going to put on 5-1/2-inch casing.

14 Anyway --

15 Q. Central- --

16 A. Could I apologize to whoever owns the chair?

17 Q. Centralizer, Dr. Mitchell, would it cure the
18 offsetting of the center that you have shown?

19 A. Well, not entirely. I did -- I was involved
20 in a study for API on location of centralizers and how
21 much they would do, what good they would do.

22 And if you've got a dogleg in the hole, then
23 between the centralizers you could have a close
24 location here.

25 And even at the centralizers, if you pull

1 hard enough on the casing, you'll just compress the
2 spring. They're a spring device. You'll compress the
3 spring, and they'd move a little closer to the --

4 Q. Can these mud channels occur over long
5 distances?

6 A. Oh, yes, these are notorious for connecting
7 two zones that are some distance apart.

8 Another way the mud channel could occur...
9 Let me first of all show you something here.

10 The volume of gas through a mud channel is
11 not inconsequential. The -- Here I just worked this
12 out, and what it shows is, you have a mud channel, and
13 you have to work out the geometry for the hydraulic
14 radius of the channel and whatnot, and that's what all
15 this is, just math. But down here I used Weymouth's
16 equation again, and I show a value of about 503,385
17 standard -- that's what the calculation did -- standard
18 cubic feet per day could go through the channel.

19 Now, these wells, I've heard the number
20 130,000 standard cubic feet per day would be maximum
21 that the well could produce. And then if you take that
22 18 million, or close to 18 million, and divide it by
23 365, you actually end up with a little over 49,000
24 standard cubic feet per day.

25 So 503 could go through the channel. I doubt

1 that the well would produce that. So we would see
2 maybe closer to 50,000.

3 Q. In either event, a lot of gas could pass
4 through one of these mud channels?

5 A. Yes, that's true.

6 I'm about to skip something. Let me look
7 at...

8 Well, another way that -- This was actually
9 done by a Union Oil study, and they have to give me
10 their report. What they're having trouble with was
11 offshore. If you set this pipe off bottom down here, I
12 think Mr. O'Brien said that they planned on setting the
13 casing two or three feet off bottom, but mistakes are
14 made.

15 One of the ones that could be made, for
16 instance, and not really be that big a mistake, would
17 be drill an extra 30 feet of hole, because the drillers
18 often lose track of the number of feet of hole they
19 drill. But anyway, drill an extra 30 feet of hole, and
20 then would you actually buy another joint of pipe to
21 run to the bottom, or would you just leave it 30 feet
22 off bottom?

23 Well, anyway, Union -- Also I did some work
24 for Canmar in the Beaufort Sea on this problem and how
25 to solve it. But anyway, the casing was going to be

1 run some distance off bottom.

2 And now, if this cement that you're going to
3 pump up here is heavier than the mud, then the mud will
4 -- the cement will come down and go up the hole. See,
5 it really won't -- Well, it will start to try to fall
6 to the bottom of the hole through the mud, but it won't
7 have time to fall that far, probably.

8 Now, then, in the lab what we've noted --
9 I've got a cement lab, and of course people pay us to
10 demonstrate this type thing, or give us money, so --
11 called research grants.

12 But anyway, the cement comes up the hole like
13 this, but then it starts to fall down the hole, and
14 it's called "swapping out" because the cement is going
15 to fall down and the mud is going to go up, right?
16 They have to swap because there's no volume to displace
17 something without something else being displaced.

18 So what happens is, in the wide part of the
19 hole, out here in this part of the hole, is where
20 you'll have a stringer of mud going up.

21 Now, Mr. O'Brien said that it was his -- he
22 thought that the mud would start up and it would form a
23 gel with the cement and wouldn't really go very far.
24 People have believed that they've gone -- In the lab I
25 can't go more than about 60 feet. But people believe

1 that the swapping out has gone one up to as much as a
2 thousand feet. Five hundred is -- from the cement bond
3 log, is what we kind of thought that Canmar was having
4 trouble with.

5 And if you've got two production zones,
6 they'll commingle and go through these -- the channel
7 caused by swapping out.

8 Gas percolation is also called gas migration,
9 and that's the one that people gave us a research grant
10 to demonstrate and model, because I guess they didn't
11 want to fool with it. Anyway, what happens here, you
12 do make a clean displacement to the bottom of the hole,
13 let's assume, and the cement and the mud -- the cement
14 particles and the liquid base, water, put a pressure on
15 the bottom of the hole.

16 For instance, you might want to double the
17 pressure on the bottom of the hole with a liquid
18 column. What you could do is put in solid particles.
19 As long as they don't settle out or set up, they're --
20 and freely suspended in the liquid, they'll add
21 pressure to the bottom of the hole and up its
22 resistance, pushing on the gas.

23 Now, as soon as that cement starts to set up,
24 the particles grab the wall of the hole, and the gas
25 then only has to overcome the liquid column, which is

1 usually water in -- let's call it dirty water, but
2 anyway water. And so the pressure on the gas may drop
3 from equivalent 12 pounds per gallon, or 12.6, all the
4 way down to 8.45, something like that.

5 So the gas now has enough pressure to push
6 this water column up the hole, and it pushes the
7 partially set cement particles out of the way.

8 Now in Sumatra, Arco asked myself and -- you
9 know, like -- Well, what do you think the phenomenon is
10 that burned up our last two rigs? You think, well --
11 The first one, you might think, Well, they should have
12 found out. But that's not the way it is with
13 cementing.

14 Mr. O'Brien was correct in the aspect of
15 this, that it's behind pipe, it's downhole, and you
16 can't see what took place. And you can only -- And he
17 called it theory, and that's correct. You can only
18 theorize what took place. But then you can eliminate
19 things and come up with this.

20 Now, we felt certain that gas percolation --
21 or gas migration is also a cause -- probably burned up
22 those two rigs. And corrective measures were taken.

23 Q. And how deep was that well, Dr. Mitchell?

24 A. Oh, it was about 9500 feet.

25 Q. And the gas migrated all the way to the top

1 of the well?

2 A. And burned up the rig.

3 If you expected a gas percolation path -- And
4 of course, our research grants, we have to make
5 measurements in the lab. But if you just apply a
6 formula that I've applied already before, you end up
7 with around 900,000 standard cubic feet a day could go
8 through one of these channels.

9 The -- another one is -- This is a south
10 Texas problem Exxon ran into, and what we have here is
11 bridging and gas cut cement.

12 So suppose that you have a water zone up
13 here, something of that sort, and you form a bridge in
14 the wellbore here, and the pressure of this fluid, the
15 weight of this fluid rests on the bridge.

16 Now, the way I've got it drawn here, it looks
17 like, you know, the bridge has to be a real strong
18 entity. But in reality, the gap is only about an inch
19 and a quarter on a side. Well, it's actually $7 \frac{7}{8}$
20 minus $5 \frac{1}{2}$, divided by 2, exactly the equation that
21 O'Brien used.

22 So anyway, it's like this thick. If this
23 zone here were 25, 50, 100 feet thick, then you've got
24 this building here, and you've got this bridge in there
25 that's formed. So it will support the weight of this

1 fluid, taking the pressure off of the gas down here,
2 since the weight will be supported by the bridge.

3 Then the gas comes out of the zone, comes up
4 and forms bubbles, and a channel maybe, and could go up
5 into something like the -- I don't say it can go in. I
6 want to say it can go up, opposite, in the wellbore, of
7 the McNutt. That could be a possibility.

8 Now, the -- this well, as others have done in
9 the past, have been stage-cemented. Now, stage-
10 cementing, as told to you by Mr. O'Brien, was
11 straightforward. He simply said that we pump cement up
12 to a DV tool, which is a device -- You're going to open
13 a hole in the pipe and circulate cement out that hole
14 and finish filling up to the next DV tool, and then use
15 three stages needing three sets of cements, then open
16 up -- close that hole, open another hole and pump
17 cement out, and all the bore will be full, because
18 they're going to overlap each stage.

19 Now, you know, I heard the term last time I
20 was here, "fantasy world". Now, that is fantasy. What
21 really happens is -- And it doesn't happen every time;
22 don't get me wrong. What happens is that the stage
23 collar, the cement, you lose cement out one of the
24 zones someplace in the wellbore, and the cement does
25 not arrive at the next DV tool. So there's a gap

1 there. And that gap is shown right here, you see.
2 This would be the gap that would occur because the
3 cement did not get up to this DV tool.

4 Now, when you cemented the next stage, it
5 would go up to the next DV tool, next one on up, and
6 you could use as many as three or four stages.

7 So we have this gap down here, and that gap
8 could become a passage for natural gas to flow up the
9 wellbore.

10 Now, the correct -- What most people do for
11 correction of this gap is to perforate holes into the
12 casing and then pump out. And this is called a squeeze
13 cement job. Set a packer in the casing, pump the
14 cement out, and hope it fills upward and fills the gap.

15 Now, that's nice. One time I pumped six
16 stages of squeeze -- trying to squeeze up to -- and
17 finally we said, That's close enough.

18 Now, the way you know that it didn't really
19 do it is, you can run a cement bond log or a
20 temperature log and measure the temperature outside of
21 the casing, because cement has an exothermic reaction
22 and gives off heat. So you would expect to see the
23 temperature rise, and if it doesn't, well then, you
24 didn't get the cement up there.

25 So squeeze jobs in a correction of a faulty

1 cement is not always the answer. Of course, a lot of
2 times it works.

3 The -- Something that could be of benefit
4 would be an external casing packer shown here, and it
5 screws into the casing.

6 I called up Halliburton. They said, Well,
7 one that is two feet long costs \$5000, and thereafter
8 they cost a dollar a foot. So, you know, you could --
9 might spend \$25,000 for an external casing packer right
10 here, and that's a large portion of the sum of the
11 well. In fact, that's about 20, 25 percent of the well
12 costs. So an external casing packer, I'd call it an
13 expensive solution.

14 But anyway, here we -- We can set it.

15 Things that can go wrong is, we set it in a
16 permeable zone so the gas would just go around it.

17 Another one would be, we would have an
18 enlarged hole and the packer would never really get out
19 there to seal, especially if it were a short one.

20 And then it could pass around it and go up
21 and out -- No, I don't want to say it could go out. It
22 could go up adjacent to the McNutt formation.

23 Now, it turns out -- A lot has been said
24 about angling wells, but in truth, the doglegs are the
25 serious problem. And one of the things could happen,

1 for instance, to the 8 5/8 casing is the drilling of
2 the rest of the well, you could be rotating the pipe,
3 which is a normal, standard practice, and wear a hole
4 in the casing.

5 Now, the casing -- You think of casing maybe
6 as being something strong and big and hard and all
7 that. But actually, the wall is about 3/8 of an inch.
8 That's with most casing. So you're -- got to wear
9 through about three -- But you don't have to wear all
10 the way through it; you just wear partway through it
11 and you let the pressure crack the rest of it.

12 So anyway, here we could have worn casing and
13 a dogleg, and that could actually be more trouble.

14 Now, in the 5 1/2, you could get a hole in
15 the casing by running wireline tools, tubing and rods
16 up and down where you have a dogleg.

17 I have a little chart -- I have a calculation
18 that comes out of RP7G and -- about doglegs.

19 Q. What is RP7G, Dr. Mitchell?

20 A. It's Recommended Practice published by
21 American Petroleum Institute.

22 Okay, let me read this to you. The API
23 charts, American Petroleum Institute charts, RP7G,
24 April 1st, 1989, page 58, shows a contact force between
25 the drill pipe and the wall of the casing here of 2000

1 pounds, and API says you've got 2000 pounds, you have
2 potential problems.

3 And this is a typical 4-1/2-inch drill pipe,
4 and if the pipe is in tension by 125,000 pounds, which
5 would be possible on these wells, the -- if the
6 curvature is three degrees per hundred feet of length
7 -- So we'd get that 2000 pounds if we have a three-
8 degree dogleg in the well. We'd get that 2000 pounds,
9 and it would push up -- it would pull it up and could
10 give us a problem.

11 For instance, in a -- if you had a well that
12 were 25 degrees but straight, straight 25-degree well,
13 then you would expect to have a contact force of 233
14 pounds on a tool joint, on the drill pipe. 233 is
15 approximately one-tenth of 2000.

16 So you can see that the doglegs, which API
17 actually has a chart, would be one of the factors that
18 would give you casing wear.

19 The other one, of course, is running pipe in
20 and out of the hole or dragging cable or pipe up and
21 down through the dogleg would also cause trouble.

22 Q. Did you look, Dr. Mitchell, at the
23 possibility of some of the casing in these wells being
24 loaded to the point where they might wear a hole in
25 them?

1 A. Yeah, I made up a little chart here. This is
2 a chart from the Graham AKB State Number 1, and it
3 shows the inclination. And I think in the State of New
4 Mexico it's called a deviation chart or deviation
5 survey, and other places it's called inclination. But
6 anyway, it's the angle of the hole at various depths.

7 And you can see that we started out here at
8 about a half a degree, is what we measured. The
9 accuracy of these inclination surveys is probably about
10 a half or a quarter of a degree, depending upon how
11 much money you spend for the instrument and how long
12 you take to run it.

13 So at 2000 feet we have about a degree and a
14 quarter. It goes out to four and a quarter and then
15 back down. So you can see that we have changing
16 inclinations, which is exactly what a dogleg is,
17 curvature in the hole. And you can see that there are
18 curvatures and doglegs.

19 Q. Is it -- The doglegs in the AKB State Number
20 1, which is already drilled, how close is that to the
21 point where API says you might have a problem with
22 wearing a hole in the casing?

23 A. Well, their surveys aren't close enough
24 together to get a true dogleg severity, like one for
25 every hundred feet. So that really can't be said.

1 But what can be said is that we do have
2 deviation going from one out to about four and a
3 quarter, and that would be over that distance, and then
4 from four and a quarter back to about a half.

5 So the possibility does exist that you could
6 have a dogleg in there that might be severe enough to
7 wear a hole in the casing, according to API, or cause
8 potential trouble.

9 Q. All right. Are there any other ways, Dr.
10 Mitchell, that methane gas could possibly get from the
11 Delaware up to the McNutt formation? Is that pretty
12 much the ones that you have to tell us about?

13 A. Well, you could always have -- You know, I
14 don't like horror stories, but you could always have an
15 earthquake break the pipe off. I don't think that's
16 likely to happen. I haven't looked at the earthquake
17 survey for the area, but -- You could have it. It
18 happened in California. Looked at seven wells, and
19 sure enough, after a minor quake it reported they could
20 no longer get in the hole and produce the wells.

21 Q. Now --

22 A. Well, another way would be -- is to collapse
23 the casing strain. And in a casing collapse, usually
24 the collars don't collapse, so you're left here with a
25 connector. And those connectors are about a foot long,

1 nine inches, a foot long. And the pipe could collapse.
2 Of course, give you a hole by collapsing.

3 I don't see that happening here either, by
4 the way.

5 Q. And I take it, Dr. Mitchell, you're not
6 saying that the ways in which gas can get from the
7 Delaware formation outside the casing up to the McNutt
8 that you've gone through, is not going to happen every
9 time somebody drills an oil and gas well either, is it?

10 A. I would say if you drilled a hundred wells --
11 Are you looking for a number?

12 Q. Well, let me ask it another way. Inside the
13 known potash area --

14 A. Yes.

15 Q. -- there are currently over 1000 oil and gas
16 wells?

17 A. I've heard that testimony, yes.

18 Q. Okay. Assume, if you will, that within the
19 known potash area that there are over 1000 oil and gas
20 wells.

21 What, in your professional opinion, is the
22 probability that in some of those wells methane gas has
23 gotten out of the casing, up to the McNutt formation?

24 A. Well, in the shallow wells I doubt that a
25 significant amount has gotten out of any of them. But

1 of course you can always could have a little bit.

2 The Delaware wells I would put at four or
3 five percent of them may have some gas outside a well.

4 And on the other hand, I think I could say
5 that four or five percent of them would have no gas
6 outside. In other words, that were drilled. And the
7 true answer, I'm sure, is someplace in between.

8 Q. What would you say the odds are that all 1000
9 of them have never leaked any gas outside the casing?

10 A. Well, I --

11 Q. That's a negative question.

12 A. Yeah. Well, you know, there has to be at
13 least one or -- I would say one, or more.

14 Q. Are you also involved, Dr. Mitchell, with
15 directional drilling?

16 A. Yes.

17 Q. And have you actually done some directional
18 drilling?

19 A. Yes, I have.

20 Q. Did I ask you to take a look at these wells
21 and come up with a plan for directionally drilling
22 these wells and a cost estimate?

23 A. Yes, you did.

24 Q. And did you do that?

25 A. Yes, I did.

1 MR. HIGH: Mr. Chairman, I'll have a series
2 of exhibits -- or Dr. Mitchell will -- that will be
3 Exhibit Number 40, starting with the first page being
4 40A and going up to whatever the letters are. And I
5 have copies for each of the Commissioners here when we
6 get through.

7 THE WITNESS: Due to a time -- Oh, are you
8 through?

9 Q. (By Mr. High) Yes. Go ahead, Dr. Mitchell.

10 A. Due to a time constraint, I took one well,
11 the Flora AKF State Number 1, and looked at an
12 estimated cost of directional drilling that well, and
13 here is what we're talking about.

14 Drilling the well -- it's actually this one
15 down here -- from this location, which is 330 feet from
16 the corner -- from each side of the vertical and
17 horizontal line, over here to this location, which is
18 -- would give a departure -- and I think Mr. O'Brien
19 called that a deviation or -- anyway, it's commonly
20 called a departure from this point to that point of
21 2660.55 feet. And so that's the one I would like to
22 discuss.

23 And my experience is that the amount of
24 departure -- and I think one of Yates' people said this
25 too. Up to about 45 degrees it doesn't really matter

1 what the departure is, that the costs are about the
2 same. You still have to hire the same people, drill
3 approximately the same footage.

4 And so these two wells up here, although
5 they're only 1320 feet, will be at about the same cost
6 as these. Of course, you have a little more footage
7 down here, but not nearly as much as it looks on that
8 chart.

9 So my plan -- And believe me, if you ask ten
10 engineers, drilling engineers, to write up a plan for
11 you, you'd have ten different plans. And an architect
12 in buildings, geologists and their maps...

13 So anyway, I picked 2000 feet as a kickoff
14 point. That's in the salt. Now, Mr. O'Brien said that
15 ten years or so ago, that he knew they had trouble
16 kicking off of the salt. And may I say, that's
17 correct, ten years ago. Today it's not much of a
18 problem.

19 The problem is, ten years ago it was
20 difficult to maintain hole diameter, and so when you
21 run your tool in the hole, why, it would slop around
22 the hole instead of taking off and drilling in the
23 right direction.

24 Little bottomhole motors today, isn't really
25 that much of a problem anymore. In fact, one of my

1 friends in Denver told me that in the State of New York
2 they drilled a horizontal well, kicked it off, drilled
3 it out and had no problems, and that's what we would
4 expect. There's nothing new there.

5 So today's practices, kicking off in the salt
6 is no problem.

7 The two degrees per hundred feet was selected
8 to keep below that three degrees that's going to give
9 us the trouble with holes in the casing, so we're not
10 going to wear any holes in the casing.

11 And then down here I've got 24.3 degrees
12 kicking off to 2661 feet or 2660.55 feet. Going to
13 give a hole here, a length of 9055 feet or an extra 555
14 feet of hole we would expect to have to drill.

15 Now, the expensive part is, starting up here
16 at the kickoff point, is making that angle.

17 Well, it's not so tough to drill the angle.
18 In fact, that's rather easy. What's tough is getting
19 all the equipment out there and getting people ready,
20 and that takes time, and you lose a lot of time in
21 making this kickoff.

22 Then below this, drilling this hole, as Mr.
23 O'Brien said, it can actually be faster than drilling
24 the vertical, depending on how you drill it.

25 So there's going to be a balance between the

1 tools and method you choose to drill the hole, and the
2 additional time. If you go cheap, it's going to take
3 longer to drill it. If you go expensive with tools, it
4 takes less time to drill it. So there's a balance, and
5 there's a tradeoff. And that's -- Anyway, that's what
6 I found in my experience over here.

7 So that's my plan.

8 And the plan for a 1320-foot departure, the
9 upper two wells, gives an angle of about half what you
10 would expect, about 12 degrees.

11 I have those angles here, and this one turns
12 out to be -- some computer software -- turns out to be
13 24.337 degrees, close enough to 24.3. And for the
14 other well we have, the 1320-foot well, we have a value
15 of 12 degrees, and then .02, a fraction more.

16 So those are typical numbers that a
17 directional driller would be interested in.

18 For a cost comparison, which is to a vertical
19 hole, I took the letter that was sent to Randy
20 Patterson by a fellow by the name of Boneau, and he's
21 listed in there the costs that Yates expected. I
22 didn't have any costs. I relied on their expert or
23 their people to give me those costs. If they're wrong,
24 I'm wrong. If they're right, I'm right.

25 So anyway -- And it did look reasonable from

1 my experience. So I didn't think that they had
2 inflated the numbers or deflated the numbers. I
3 thought they looked reasonable in what they had.

4 And here is the Graham AKB State Well Number
5 2, and the State Well Number 1, and this -- I got these
6 bit records, and this is a bit record from Hughes Tool
7 Company, and they actually faxed them to me. And I
8 used those as my data well, my information well at
9 which to construct at cost.

10 The -- Plot this up, we see something like
11 this. Start out over here on the 26th of March, they
12 spud the well, bit number 2, they hit an air pocket
13 which -- they ran 13 3/8 casing, hit an air pocket,
14 took about three-quarters of a day to subside.

15 Bit number 3 went to about 3000, all the way
16 down to -- ran the 8 5/8 casing here, and bit number 4.

17 Bit number 5 there, bit number 5 came out of
18 the hole here. Finally they ran down to TD and set
19 their 5-1/2-inch casing, and that took about 22 days, I
20 believe.

21 And then on the other well, the Pogo Well,
22 State Well 2, I did the same thing to get an idea of
23 what was taking place in drilling these wells.

24 And here once again, we spud the well, pull a
25 bit or two that are dull, ran the 13 3/8 casing, ran

1 the 8 5/8 -- you might notice it took quite a bit
2 longer here -- and finally finished the well and in
3 some regard quite similar to the previous well.

4 Now, comes the estimation part. What do we
5 think we can do in the way of directional drilling, and
6 how long will it take?

7 Well, I took the well here, and I have
8 regular drilling time, 16 days, estimated drilling days
9 from the bit record. Daywork days, six days. Drilling
10 footage, 8500 feet.

11 So my drilling rate in days per thousand feet
12 is 1.88, and I'm going to use that as a factor later
13 on.

14 My drilling footage is going to be 9055 feet.
15 The footage in the build section where -- the two
16 degrees per hundred feet -- is going to be 1217 feet.

17 Estimated additional days for that is three
18 point -- Additional days, so it's going to take 4.8 to
19 drill it. And I put a factor in there of 2.5.

20 Now, if you had been drilling these wells
21 routinely, then 2.5 would be too high. I think even
22 Mr. O'Brien alluded to that. If you haven't been
23 drilling them, well, then, maybe 2.5 is about right.

24 So our footage in the slant section is 5838
25 feet. And for the tools I picked, I figure that it's

1 going to take about three-tenths longer or a 1.3
2 factor. And I'm just going to take an additional 3.3
3 days.

4 Then I've got to drill this 5500 feet, and so
5 I've got my 1.36 total -- Well, anyway, the days turn
6 out to be 8.5 additional days total, and my days to
7 drill this 555 feet is a 1.36 days.

8 Anyway, it all adds up to 30.5, and that's
9 what I've got for the tools that I thought might ought
10 to be out there.

11 So my directional drilling time, regular
12 time, is a factor of 1.384, and my drilling footage
13 over a vertical well or near vertical well would be
14 1.065.

15 So I'm going to multiply the appropriate cost
16 factors by those two numbers.

17 So what I did -- I put this estimated costs
18 of Flora AKF State Number 1 -- was make a comparison
19 here for the regular dryhole, which ends up with
20 \$317,600 which comes directly off of the report sent to
21 Mr. Randy Patterson through Yates. So that's based --
22 that is their number.

23 Again, I'm going to add in a directional
24 dryhole and add in the various costs here.

25 I have to drill an extra 555 feet; I've got

1 the bend. And so I come down, and it looks like --

2 Oh, I have to buy some centralizers. R-111-P
3 states that the hole is going to be directionally
4 drilled, and you have to put a centralizer on each
5 casing joint, and the casing is about 40 foot long, so
6 we put them on there. And that turns out to be an
7 additional cost of -- where are my centralizers? -- of
8 \$3286.

9 Directional equipment I figure will cost
10 \$55,000, and -- so my total intangibles.

11 Finally, I have a directional dryhole cost of
12 \$443,861 or an additional \$126,261. That's an increase
13 of 40 percent.

14 Now, Mr. O'Brien stood right here and said,
15 in his best knowledge, it would be about 35 percent.

16 Q. So yours is a little higher than Mr.
17 O'Brien's?

18 A. Yes. But I'm not inferring that he's wrong.

19 Q. Okay.

20 A. I mean, you know, because estimates can be
21 off, you know.

22 So anyway, that's the 140. I got 140 percent
23 with -- using the method I did. And of course, a lot
24 of practical experience in there.

25 Okay, here's a regular oil well, comes down

1 to -- What is that number?

2 Q. \$581,700.

3 A. \$581,700, and we add in the directional
4 drilling costs here, the centralizers, additional time
5 to drill the curve using those factors I had over
6 there. Additional casing costs are in here as they are
7 over here. And the additional costs for mud and
8 whatnot is also in this cost.

9 For instance, you might notice that for drill
10 stem testing, \$10,000 for a regular one. Well, they've
11 got to run the drill stem test a little deeper so they
12 can charge you more money, and I put in \$10,650, \$650
13 more. So you can see that we have additional costs
14 over here.

15 Anyway this number comes down to \$135,723
16 additional dollars or 123 percent of a vertical hole.

17 Now, stuff like casing, that stuff could be
18 exactly calculated. That's why this number has the
19 less variance for directional versus vertical than this
20 number does. And you've got a little better feel for a
21 lot of costs.

22 Q. So the difference in your estimated costs for
23 Yates to drill the AKF State Number 1, Flora Number 1
24 well, if that well was drilled directionally as opposed
25 to straight, the additional costs would be \$135,723?

1 A. Yes, of the items that they considered in the
2 Randy Patterson letter.

3 I noticed they didn't have fracturing in
4 there. But on the other hand, I don't know if they
5 fracture these wells.

6 Q. So if we wanted to avoid any possible risk
7 these wells would cause to underground miners, or if we
8 wanted to not waste potash, we're talking about
9 spending an additional \$135,723?

10 A. Well, I really can't say that because I don't
11 really understand -- I mean, I don't feel like I do --
12 the risk to the miners.

13 But let's say that if we don't want to get
14 gas up opposite the potash -- okay? -- then, yes,
15 that's correct.

16 MR. HIGH: All right, we'll pass the witness,
17 Mr. Chairman.

18 I would offer into evidence New Mexico
19 Potash's Exhibits 39A through whatever the number turns
20 out to be, and Exhibit 40A through whatever the number
21 turns out to be.

22 CHAIRMAN LEMAY: Okay, let's take a short
23 break before cross-examination. About 15 minutes.

24 (Thereupon, a recess was taken at 3:23 p.m.)

25 (The following proceedings had at 3:44 p.m.)

1 CHAIRMAN LEMAY: We shall resume. We're at
2 the point where Dr. Mitchell is still on the stand.

3 This is cross-examination by Mr. Carroll.

4 CROSS-EXAMINATION

5 BY MR. ERNEST CARROLL:

6 Q. Mr. Mitchell, just as a matter of
7 housekeeping, I'm going to go right back through your
8 exhibits in the same order you presented them, so I
9 hope you have them so that we can...

10 And it probably would be wise to use your
11 overhead projector again, if you don't mind.

12 A. Okay.

13 Q. Do you have them available so that you can go
14 through them like that?

15 A. Well, I tried to put them in order.

16 Q. Okay, well --

17 A. I thought you knew that.

18 Q. Okay. We'll bear with you if you have a
19 problem.

20 A. Okay.

21 Q. The first thing, just kind of a matter of
22 curiosity, Mr. Mitchell, I don't think it's proper for
23 me to assume that you've donated your time to Charlie
24 High, have you?

25 A. You know the definition of community service,

1 right?

2 Q. That's what I'm really interested in. What
3 is your definition of community service?

4 A. Well, preachers serve the community, don't
5 they?

6 Q. Yes, sir.

7 A. And you pay them, right?

8 Q. Right.

9 A. Thank you.

10 Q. All right. Well, that's the definition I
11 wanted.

12 The next thing, am I also to assume that a
13 professor at the Colorado School of Mines doesn't get
14 weekend days off or vacation days or holidays?

15 A. Some do take those off and they're usually in
16 the poorhouse. You know how a professor's pay is,
17 about half of what yours is. Oh, not yours, but a lot
18 less.

19 Q. All right.

20 A. So you've got your choice, you know.

21 Q. Okay.

22 A. Work or go hungry.

23 Q. You're still hungry; is that what you're
24 telling us?

25 A. No, I'm not hungry, huh-uh.

1 Q. Why don't you turn to your 39B exhibit, if
2 you'd put that up on the board?

3 A. Let's see, now. I really don't have -- But
4 you just flash and I'll --

5 Q. That's the first. That's the Delaware well,
6 is the title at the bottom.

7 A. Delaware Well, very good.

8 MR. HIGH: That should be 39B.

9 MR. ERNEST CARROLL: Excuse me, 39B, I just
10 misread.

11 Q. (By Mr. Ernest Carroll) Now, when you were
12 talking about, you were saying that this particular
13 diagram here is drawn with the -- an assumption that
14 you have a gas column; is that correct?

15 A. Yes, that's true.

16 Q. Now, you said that a gas column could occur
17 under some conditions. Well, Mr. Mitchell, would you
18 tell us what conditions it would take before a gas
19 column -- or for a gas column to exist in a Delaware
20 well that we're talking about?

21 A. Yes, I'd be happy to. What would happen is,
22 you'd have -- In a Delaware well you'd expect to have
23 the gas and oil flow into the well. And then if you
24 had the well closed in -- Now, closure of a well is
25 quite common. You might want to work it later on,

1 something of that sort, change the rods or something,
2 run a pressure test of some sort.

3 And in doing that, the gas would separate
4 from the oil and shove -- push the oil back into the
5 reservoir, leaving a gas column.

6 Q. Well, Dr. Mitchell --

7 A. By the way --

8 Q. Excuse me.

9 A. -- under some circumstances the gas could go
10 above that 2395.

11 Now, I don't have a sample of the reservoir
12 crew nor the report, so I don't know whether that's
13 possible or not. But it could be under some
14 circumstances.

15 Q. Now, you are aware that these Delaware wells
16 that we're talking about are oil wells; is that
17 correct?

18 A. Well, yes, I saw your letter. In that letter
19 from Mr. Boneau to Randy Patterson he does show that
20 oil will be produced.

21 Q. Well, these are primarily and are classified
22 by the Oil Conservation Division as oil wells. You
23 know that to be a fact, don't you?

24 A. No, I didn't, but thank you very much.

25 Q. Okay. You are also aware that these wells

1 produce about as much water as they do oil?

2 A. I'm not aware of that either.

3 Q. All right. Now, are you also aware that the
4 experience out here in the field is that there are --

5 A. Let me -- Could I ask you a question?

6 Q. Yes.

7 A. At what time does the oil and water
8 production become equal?

9 Q. From the beginning.

10 A. From the very beginning?

11 Q. As I understand.

12 A. Okay, thank you.

13 Q. And then I am also to take it that you're not
14 aware that the general experience out here is that
15 there will be a column of probably 6000 to 7000 feet of
16 oil and gas in these wells normally?

17 A. That could be very true, yeah, I would expect
18 that to occur at times.

19 Q. Now, your diagram here that -- this Delaware
20 well, it is missing some very important items.

21 First of all, we don't have the tubing
22 through which this well would be produced; is that
23 correct?

24 A. That's correct.

25 Q. Now, when you're producing or pumping this

1 particular well, when you start pumping it, you're
2 going to be pumping off the gas and the fluid, and
3 you'll be dropping off these pressures, won't you?

4 A. Well, I'd like to agree with part of that,
5 and you're absolutely correct. But gas isn't really
6 pumped, so -- You might bleed the gas off, take it some
7 other way.

8 Q. And really, I thought it was very interesting
9 on your next Exhibit, the 39C --

10 A. Okay.

11 Q. -- that's your calculation.

12 A. Is this the one that shows blowout?

13 Q. It says "Expected Natural Gas Pressure in the
14 Well Bore at the McNutt".

15 A. Okay, I have that one. Go ahead.

16 Q. In the upper part of this calculation, you
17 list the variables. You have the Pb with the 2800
18 pounds, which is the bottomhole pressure.

19 A. That's true, sir.

20 Q. And then the next one, Pt, you have the 700-
21 pound wellbore pressure at the McNutt zone. You are
22 aware that that is approximately the expected pressure
23 that we normally find at -- or would expect to find at
24 this area, not the 2300 pounds?

25 A. I do show a wellbore pressure at, not in, nor

1 does it say in the casing, but at McNutt zone. So --

2 Q. Well, then, explain to me what is the
3 difference between wellbore pressure at the McNutt zone
4 and your notation down here. It says "Expected
5 pressure...adjacent to the McNutt..." Isn't that the
6 same thing? Or shouldn't it be?

7 A. Well, this is the pressure in the McNutt at
8 the wellbore level of the McNutt, and that's how we get
9 to the 700.

10 I think that was made clear in my testimony.

11 Q. Well, are you saying that you -- am I --

12 A. The pressure inside the wellbore, inside the
13 wellbore, inside the casing --

14 Q. Right.

15 A. -- would be 2395. I think you follow what
16 I'm saying now.

17 Q. I'm sorry, I don't understand how you can in
18 one instance say it's 700 pounds and in the next
19 instance say it's 2395.

20 A. 2395 inside the casing, 700 in the McNutt, at
21 the level of the --

22 Q. If you have -- But I take it, then, you have
23 not tried to determine the actual wellbore pressures
24 that do exist out here that are commonly found in this
25 particular field?

1 A. Are you asking me do I have experience at
2 collecting data to show what wellbore pressures are?

3 Q. No, I'm asking, have you done that in this
4 particular case in preparation for your testimony?

5 A. No, I haven't.

6 Q. Well, you heard testimony, then, of Mr.
7 O'Brien and Mr. Boneau where they suggested that the
8 pressures in these areas are going to be in the
9 neighborhood of 700 pounds, within the wellbore?

10 A. Well, that's -- Yes, I agree, that's totally
11 possible at times.

12 Q. Now, let's talk about your blowout and
13 closure exhibit, which is the next one.

14 Let's talk about, first of all, the -- What
15 you're assuming here, I guess, in this example, is that
16 you're going to be drilling into the Delaware; is that
17 true?

18 A. Yes.

19 Q. And you hit gas and it's going to cause a
20 blowout; is that correct?

21 A. That's a possibility, yes.

22 Q. Possibility. Well, isn't the most likely
23 possibility is that this gas is going to go up to the
24 surface?

25 A. Yes.

1 Q. All right. Also, if the gas is not going to
2 go out to the surface, isn't it even -- the next likely
3 place that this gas is going to go is into a weaker
4 formation somewhere above the salt section and above
5 the Delaware section?

6 A. Well, let's take one question at a time.

7 It probably won't go out the top as shown
8 here, because we're going to close the BOPs, the
9 blowout preventers, at the top of the hole. If you
10 don't, you're going to burn up your rig, okay? Yes?

11 Q. Yes, I understand.

12 A. Okay. Now, next, it is true that there are
13 weak zones down here, as pointed out by Mr. O'Brien.

14 Q. Right.

15 A. And those zones will take gas. They'll be
16 like a pressure relief valve until they either pressure
17 up around the wellbore from accumulation of gas in the
18 zones, or else, cemented, they may be strengthened by
19 the cement and not be all that weak.

20 I would venture to say that those zones have
21 not been tested after cementing but have been tested
22 during the drilling.

23 Q. Well, there is going to be a considerable
24 amount of hole between the bottom of the 8 5/8 casing
25 and the 4200 and the Delaware at 8500. Some 4000 foot,

1 right? That wouldn't be cemented?

2 A. Well, I show 2500 feet. Somehow I was led to
3 believe that the Delaware started at 6700 feet. But I
4 think that's insignificant. Go ahead, yes.

5 Okay. Now, there are a -- There is a lot of
6 hole, yes.

7 Q. All right. Now, if we're talking about now,
8 what you -- for this diagram to even -- for the gas to,
9 let's say, to get into the McNutt area, you've, one,
10 got to assume that you've got a hole or a perforation
11 of some kind through the casing. That's your first --
12 one scenario, right?

13 A. That's -- Yes.

14 Q. Okay. And then through that perforation,
15 then, your gas has got to move into the McNutt
16 formation; is that correct?

17 A. That's shown on the diagram. In my testimony
18 I just said that I would explain how the gas would get
19 to -- in the wellbore, adjacent to the McNutt.

20 Q. And the reason you didn't explain anything
21 else is because you know the salt is impermeable and
22 that that gas is not going to go anywhere because there
23 is no effective permeability for the gas to enter the
24 McNutt section?

25 A. Let's see, now, you just told me what I knew,

1 right?

2 Q. I --

3 A. If you'd like to --

4 Q. I think so. I'm suggesting that that's the
5 reason why.

6 A. Would you like to -- I'm trying to be
7 helpful, you know, I mean -- So would you rephrase your
8 question?

9 Q. All right. For the gas, after it goes
10 through this perforation in the steel and in the
11 cement, for it to move beyond the edge, there has to be
12 something permeable there for that gas to flow into;
13 isn't that correct?

14 A. Absolutely.

15 Q. If the area there is impermeable, you've got
16 no movement of gas; isn't that correct?

17 A. That's absolutely true.

18 Q. Thank you. Let's go to your holes-in-the-
19 casing exhibit next.

20 A. Okay.

21 Q. I believe that as I judge from your testimony
22 that this particular exhibit was really to be used in
23 connection with the next exhibit, the coupling gas
24 leakage, because here again you were -- this is just to
25 show that -- how you get gas to the outside edge of the

1 casing in the McNutt area, and it would be your
2 coupling problem; is that right?

3 A. That's a hundred percent true, but not
4 necessarily does it go with the next slide.

5 Q. Well, what -- Was there some phenomenon that
6 you were discussing that was other than that --

7 A. Well, you can get holes in the casing --

8 Q. -- with respect to this exhibit?

9 A. Well, you get holes in the casing from wear,
10 and corrosion, also, by the way.

11 Q. Okay, but --

12 A. -- leaks is just one of them --

13 Q. All right.

14 A. -- if I may be of help.

15 Q. Okay. But then again, even with this
16 exhibit, the same thing would hold true, is that for
17 the gas to move beyond the edge of the casing, you'd
18 have to have a permeable body in which the gas -- to go
19 into?

20 A. That's absolutely correct. I agree with that
21 a hundred percent.

22 Q. Now, the gas coupling problem. Now, these
23 threads are designed according to API standards, aren't
24 they? That are used on J55 casing?

25 A. When you say "designed" do you mean --

1 Q. Or, excuse me, they are manufactured
2 according to, I think, would be a proper --

3 A. That's better, yes.

4 Q. For -- if you go out -- I guess if you went
5 out on the black market somewhere, you might get
6 anything.

7 But if you go to a reputable dealer and a --
8 reputable steel products made in the United States, and
9 they represent to you they have a particular type of
10 coupling, well, on J55 casing, that you're going -- you
11 know that that coupling was designed according to
12 certain API standards?

13 A. Well, they attempt it, but, you know, Shell
14 and Exxon and Mobil have shown that five percent of the
15 casing fails to meet the API standards, and they sell
16 it as API anyway.

17 In other words, there's always that small
18 fraction of casing that doesn't meet the standard that
19 is sold as meeting.

20 But in principle you're correct.

21 Q. All right, so --

22 A. They are sold to meet the tolerances
23 specified by API.

24 Q. Okay. Now, let's talk about, now, a set of
25 circumstances for gas to get out from a wellbore into a

1 particular zone.

2 A. Yes.

3 Q. First of all, we have our casing, and we have
4 to assume that there was some error made in the
5 construction of the threads so that they don't totally
6 meet up; is that correct?

7 A. Yeah, that's correct.

8 Q. That's the first mistake that we have to
9 assume?

10 A. Yes, I'll help you keep track.

11 Q. Okay. The second mistake that we have to
12 assume is that -- Now, pipe dope is also manufactured
13 according to certain standards; isn't that correct?

14 A. That's true, yes.

15 Q. In fact, there's a variety of types of pipe
16 dope with all kinds of additives to perform different
17 kinds of functions, and one of them is to seal pipe
18 threads?

19 A. There's -- The way you made it sound like,
20 there's millions of them to choose from, but actually,
21 there's very few.

22 Q. But there's several, more than one?

23 A. Yes, that's true.

24 Q. And they are manufactured to standards, and
25 standards are designed so that this product meets its

1 particular purpose?

2 A. Well, we'd hope so.

3 Q. We would hope so. So the next problem, too,
4 is that we would not only have a thread failure, but we
5 would have a failure of the --

6 A. No, don't call it thread failure. That's not
7 true.

8 Q. Okay.

9 A. And don't call it pipe-dope failure. That's
10 not true either.

11 But let me agree with you in principle that
12 you are correct.

13 Q. Okay. Then the next item, the second item,
14 is that the pipe dope fails to meet the needs that it
15 was designed to be --

16 A. That could be.

17 Q. All right. Now, we now have this -- and
18 let's assume that this our 5-1/2-inch casing.

19 We next go, and we know that this 5-1/2-inch
20 casing is surrounded by an encasement of cement,
21 correct?

22 A. Well, we would hope so.

23 Q. Well, that was our plan?

24 A. Yeah, that was our plan.

25 Q. Okay. And we're sitting here in a completed

1 Delaware well like we have seen described, and we're
2 trying to get gas from the wellbore into the McNutt
3 series.

4 So item three would be that we would then
5 have to get our gas -- Somehow the cement would have to
6 not be impermeable as it's designed to be?

7 A. Well, you could have cracks in the cement.

8 Q. Okay. But it's designed not to have cracks,
9 right?

10 A. Design is such that we never depend upon the
11 cement to contain pressures.

12 Q. All right. Then if this is up in the McNutt
13 series, we then go in after the cement, we go to the
14 8 5/8 intermediate string of casing.

15 A. I think they call it the salt string, but
16 yeah.

17 Q. The salt string, right?

18 A. Right.

19 Q. Okay. Now, somehow we have got to get
20 through the metal pipe, either through a hole or
21 through the threads in this casing. 8 5/8 has threads
22 also and couplings just like the 5 1/2?

23 A. By "hole" you meant worn hole?

24 Q. Worn hole or whatever.

25 A. Or whatever. That's true, yes.

1 Q. And let's just -- If there was already a worn
2 hole in the 8 5/8 when we set the 5-1/2-inch casing,
3 that cement would go into that worn hole, wouldn't it?

4 A. Well, we would hope it would, yes.

5 Q. Okay. So --

6 A. Doesn't mean it has to, though.

7 Q. So again, if we've got a hole, the cement in
8 the hole has got to break down and become permeable
9 when it wasn't designed to be, or again we go through
10 the same steps that the threads wouldn't hold or the
11 pipe dope wouldn't hold, to get it outside of the 8 5/8
12 into the cement, which encapsulates the 8 5/8, right?

13 A. Yes. I mean, that's --

14 Q. Okay.

15 A. -- obvious.

16 Q. And then again we've got to have the problem
17 about that sheath of cement would have to break down
18 and become permeable.

19 A. That, I think, would be a minor problem.

20 Q. And then, if we're here in the McNutt series,
21 we've got to have a zone out there that's permeable
22 rather than impermeable before we could get that gas
23 moving away from the well, from the bore, et cetera.

24 A. Let me ask you one question here, because I
25 don't want to confuse anybody.

1 When you say the McNutt is impermeable, are
2 you talking about the salt or the stringers that are in
3 there?

4 Q. I'm talking about the salt section.

5 A. And not the stringers that just lie right on
6 top of the salt?

7 Q. Well, are you talking about stringers on top
8 of the salt or within the salt, Mr. Mitchell?

9 A. Well, I'm talking -- I saw that record off of
10 that 162 corehole. It had stringers in there.

11 So what I really need to know is, are you
12 talking about permeability between the planes, between
13 the clay and shale and that type of stuff?

14 Are you talking about those planes between
15 the salt and those -- Or are you talking about just a
16 solid salt there?

17 Q. Well, Mr. Mitchell, you were here when Brent
18 May testified, weren't you? The geologist for Yates?

19 A. Would he hold up his hand? Yes, I was here.

20 Q. And you also heard him testify as to the
21 nature of these layers as being clay, right?

22 A. I can't remember the testimony, but I did see
23 the core report.

24 Q. And you know enough about drilling, that clay
25 is impermeable also?

1 A. Well, that's not altogether true.

2 Q. Well, that was Mr. May's --

3 A. I would love to agree with you, and the
4 bedding planes definitely aren't impermeable.

5 Q. Well, whether or not we want to debate the
6 permeability of the clay seams --

7 A. But let me say this, that if you had the
8 McNutt opposite this and you had that impermeable salt,
9 and gas were contained in a six-foot mining zone I keep
10 hearing about, then it would be kind of difficult,
11 except for cracks in the McNutt, to get it to go in
12 there. I mean, that I will grant you.

13 Q. All right.

14 A. And I'm not a mining engineer, and I'd like
15 for the OCC to definitely take that into account.

16 But I think I can see how you could be right
17 under, you know, a limited circumstance.

18 Q. Well, Mr. Mitchell, can you calculate the
19 probability of all of that series of accidents or
20 whatever you want to call them, occurring for gas to
21 get all the way from the wellbore within the 5-1/2-inch
22 casing out to the edge of the casing?

23 A. Yes.

24 Q. And what -- is that -- Have you calculated
25 it?

1 A. You asked me if I could.

2 Q. Yeah, could you? Have you calculated it?

3 A. No, I haven't.

4 Q. You have a -- It would be almost so small
5 that it would be immeasurable, wouldn't it, Mr.
6 Mitchell?

7 A. Oh, I'd say that -- As I said before, four
8 out of five wells drilled down there, you'd have some
9 type of gas outside the casing.

10 Q. But in that number of situations where you go
11 through that much steel in the casing?

12 A. Well, there's other ways too, you know. You
13 could have it flow up.

14 But just through this particular -- The
15 scenario that you described probably would be somewhere
16 around three or four wells, and the others would add
17 another two or three.

18 Q. Three or four wells.

19 Have you done any studies to back or verify
20 your three or four wells in a thousand wells, Mr.
21 Mitchell?

22 A. You said three or four wells in a thousand?

23 Q. I guess that's what you're referring to.

24 A. No, I meant three or four wells in a hundred
25 wells.

1 Q. In a hundred wells?

2 A. (Nods)

3 Q. Do you have any empirical data which tell you
4 in fact that's what happens when wells are cased as
5 these are cased for this Delaware section according to
6 R-111-P standards?

7 A. Well, RP-111 -- What, now? Wait just a
8 minute. I think you brought in something that we
9 haven't been discussing yet.

10 Q. The well design, the casing design that we've
11 been talking about in these wells, is dictated by Order
12 R-111-P, which controls the drilling for oil and gas
13 within this area.

14 And what I'm asking is, when you -- Do you
15 have any empirical data to back up your statement that
16 three or four wells out of every hundred wells, when
17 cased according to this kind of criteria, are going to
18 have gas outside the casing?

19 A. Absolutely not.

20 Q. Let's go to your next exhibit -- Well, that
21 was where you had these little arrows going up through
22 the Delaware to the McNutt, and I think you basically
23 said that that wouldn't happen.

24 A. No, no, no, I said that would happen, but it
25 would be immeasurable.

1 Q. Immeasurable.

2 A. Small amounts.

3 Q. If it were --

4 A. That's this one.

5 Q. If it were immeasurable, there wouldn't be
6 any oil and gas in the Delaware, would there?

7 A. That's right, so it wouldn't be --

8 Q. Let's talk about your next one, is the
9 microannuli path.

10 A. Yes.

11 Q. All right. Now, you're saying that this
12 microannuli path could provide a path up into the
13 McNutt area; is that correct? And this diagram is
14 supposed to depict that?

15 A. Basically, yes.

16 Q. Now, the cement that you're talking about
17 here, is that the 5-1/2-inch casing. Or is that the
18 8-5/8-inch casing? One's missing, isn't it?

19 A. Well, it could be a combination.

20 Q. Well, that's what's interesting. Let's talk
21 about the microannuli path that would lie against the
22 5-1/2-inch casing.

23 If we assume that it went 6000 feet, it would
24 be -- as it got up to the level of 4000 feet, it would
25 then become inside or go inside the 8-5/8-inch casing,

1 wouldn't it?

2 A. Well, not necessarily. You know, both of
3 them could shrink. The 5 1/2 could shrink, the 8 5/8
4 could shrink, and it would go up outside the 8 5/8.

5 Q. But you would have to have a path from --
6 right along the pipe of the 5 1/2 casing, a path to the
7 outside of the 8 5/8, wouldn't you? You'd have to have
8 a connection, wouldn't you --

9 A. Oh, definitely.

10 Q. -- for it to get on the outside?

11 A. Of the 8 5/8.

12 Q. Now, Mr. Mitchell, have you done any studies
13 which confirm the fact that one continuous microannuli
14 exists anywhere in the world, 6000 feet in length?

15 A. No.

16 Q. And in fact, in your -- one of the books that
17 you describe, the *Advanced Oil Well Drilling and*
18 *Engineering Handbook and Computer Programs*, you list
19 this as one of your problems, and you give solutions to
20 it, don't you?

21 A. Well, there's solutions to every -- Let me
22 see this. There's solutions to every problem in here,
23 if the oil company or the operator wants to spend the
24 money. Every one of them.

25 Q. And the solution with respect to the

1 microannuli that you offered in your book was that you
2 just reduced the pressure inside the casing so that you
3 don't have it pushing against the cement, and then when
4 it does, when pressure goes off, that allows it to come
5 in? That was your proposed solution?

6 A. That is, but there's one other aspect, and
7 that's temperature. If you had the full book, you
8 would see a solution to that.

9 But anyway, if you have a temperature problem
10 too, why I mean the temperature problem is so narrow in
11 the annulus that not much gas would get through, but a
12 little bit would.

13 Q. Let's turn to the next exhibit, was this
14 "Expected Natural Gas Flow Rate through Micro Annulus".

15 Now, you use -- The key figure here that I'm
16 interested in is the gap, and it's .015 radial width of
17 the annulus in inches.

18 A. Yes.

19 Q. Where did you get that figure?

20 A. It's rather -- You know, from mechanics you
21 calculate -- Let's say you put 3000 p.s.i. on a piece
22 of pipe, and you've got the temperature up pretty high,
23 so you cool it down, reduce the pressure bolt, and the
24 thing would -- could shrink as much as .015.

25 Q. You've never measured a microannulus at

1 zero -- .015, have you?

2 A. I've never measured a microannulus.

3 Q. And you are aware that after this phenomenon
4 or this, I guess, theory of this phenomenon had been
5 discussed, that there have actually been tests where
6 holes have been drilled and companies have tried to
7 pump up into these microannuluses and have failed?

8 A. Well, I would -- I'd have to see the test
9 before I could say that that's true or not true.

10 In other words, people attempt to demonstrate
11 things that -- and observe, you know, what happens, and
12 sometimes they get confused.

13 Q. And in fact, what -- All this equation here
14 is just an attempt to demonstrate something by
15 yourself, isn't it, Mr. Mitchell?

16 A. I think microannuluses are recognized in the
17 industry. And yes, I'm trying to show that a
18 microannulus will present a small problem in cementing.

19 Q. Now, you've used the Weymouth's equation also
20 here; isn't that true?

21 A. We've always called it Weymouth.

22 Q. Okay. I'm sorry, I'm not an engineer, and
23 this is one of my first --

24 A. I'm sure some people do call him Weymouth.

25 Q. Okay. Well, Weymouth.

1 A. Yeah.

2 Q. Wasn't the Weymouth equation developed to
3 determine this flow rate in short lengths of smooth
4 steel pipe? That where it's valid?

5 A. It's most valid there. But in drilling it's
6 used by Angel in producing air charts and, for
7 instance, by Pottman for his air charts also, for the
8 production of fluids.

9 But it's a common equation that's used.

10 Q. Let's go to your next exhibit. You have an
11 exhibit here, "Gas Flow through Cement", and it's just
12 an arrow going through what I could -- understand this
13 to be cement, right?

14 A. Yes, that was my intent.

15 Q. And what we're talking about here is gas flow
16 through solidified cement?

17 A. Solid cement.

18 Q. Solid cement, that's cured or set.

19 Would you turn to your equation? Now, you
20 heard Mr. O'Brien testify that cement -- the
21 permeability of neat cement is usually considered in
22 the industry as one millionth millidarcy -- one
23 millidarcy, I guess, is the proper way to say it.

24 A. No, it's closer to one-tenth millidarcy. In
25 other words, ten times smaller than just -- what you

1 said.

2 Q. Well, is that what this figure is under "k"
3 in this upper part?

4 A. Yes.

5 Q. All right. Then you basically stated that
6 there's a possibility, based on this equation down
7 here, the bottom equation, that there could be 55.226
8 standard cubic feet a day flow through the cement; is
9 that correct?

10 A. Yes, that's what that equation works out.

11 Q. That is only possible if you reduce the
12 permeability that you show up here under "k" to .01,
13 isn't it? Or increase it, actually, increase the
14 permeability to that?

15 A. That's what I was going to say.

16 Q. Excuse me.

17 A. That would be an increase. And that really
18 would be the outer extreme. That's 10 millidarcies.

19 Q. Right.

20 A. And so we would never expect 55 in this well.
21 In some wells that's possible.

22 What we really would expect is to have this
23 half a standard cubic feet that's called .55. That's
24 what we would expect according to these equations.

25 Q. Well, are you -- So what you're saying is

1 that you would expect to see gas flowing through
2 impermeable cement as it comes from --

3 A. Well, first, you know, there's no such thing
4 as impermeable cement. Even O'Brien said that there
5 cement has permeability. It's just that it's lower.
6 You know what I mean? So I'm in agreement with him.

7 Q. All right. So at least --

8 A. Maybe I ought to state that differently.
9 He's in agreement with me.

10 Q. All right. And basically what his position
11 was, this isn't a problem?

12 A. No, I think he said that he would be
13 concerned, because see, cement that's not blended
14 correctly can develop permeability, as high as ten
15 millidarcies.

16 You know, in a swimming pool -- Let me say
17 this: In a swimming pool, if you don't block the
18 permeability and you have a sand zone below your
19 swimming pool, you'll go broke buying water. Cement is
20 very permeable under some conditions.

21 Q. So really, there is one additional factor
22 that's not shown here on this table, and that
23 assumption is that the cement is not going to be mixed
24 properly before it would become impermeable?

25 A. No, I think I've got it here. You know, if

1 you take a look at it -- I show that -- what do we
2 really expect? A half a standard cubic foot. Concern,
3 but not a problem.

4 And down here, just in case somebody thinks
5 that there may be a mixing problem or some other
6 problem that could occur, we could expect no more than
7 55, which would be a concern, but maybe not a problem
8 either.

9 So I mean, at both ranges I show that it's
10 probably not a problem.

11 Q. Let's go to your next exhibit, your mud
12 channel. This phenomenon here as it's depicted would,
13 one, assume that if you were using centralizers on your
14 pipe, that you didn't get your pipe centralized
15 properly?

16 A. That's totally correct. I have to agree with
17 you there.

18 Q. All right. And now, what you're saying here
19 is that for some reason the cement is going to overrun
20 the mud and go on beyond it, past it; is that correct?

21 A. Yes, I think -- You know, this has been
22 observed in the lab, Mobil, Halliburton, Exxon, and
23 they spent about 5 million bucks in Ponca City, and
24 what they did is, they had a bunch of cementations like
25 this, the pipe out of center, and they pumped mud by,

1 then they went back and cut the pipe up and showed
2 where these -- mud had been bypassed by the cement.
3 This is a standard, known thing in the industry.

4 Q. And again, like all other problems, it's one
5 that can be corrected, one, through the use of
6 centralizers, two, raising and lowering your pipe,
7 three, rotating --

8 A. The most effective way is rotating the pipe.
9 And Mobil Oil Company showed that if you rotate the
10 pipe at 35 r.p.m. for one minute, you'll mix that mud
11 into a casing.

12 But there's a problem. You can't usually
13 rotate the pipe if you put centralizers on it. And if
14 you don't put centralizers on, the pipe will definitely
15 be up against the wall of the hole.

16 So you've kind of got a choice there. A lot
17 of people choose no centralizer rotation, and that
18 partially resolves the problem.

19 And like T.B. O'Brien said, he prefers to put
20 centralizers on and rotate -- and then reciprocate.
21 And that doesn't solve the problem either.

22 This is a major problem that's with us today
23 in the oil industry, without a concrete solution.

24 Q. Now, where this is going to exist and where
25 it's going to present a problem is within -- inside of

1 the 8 5/8 casing; isn't that correct?

2 A. What do you mean by "inside the 8 5/8
3 casing"?

4 Q. Well, you've got -- what I think you're
5 talking about here -- Well, the reason why is that
6 first of all, the intermediate string that we have --

7 A. Yes.

8 Q. -- that goes down about 4000 feet?

9 A. Yes.

10 Q. -- it doesn't enter any of the oil and gas
11 producing zones, does it?

12 A. No, but it still could have mud channels.

13 Q. It doesn't enter any of the oil and gas
14 producing zones, does it?

15 A. No, but it still could have mud channels.

16 Q. For us to have a problem, we've got to have
17 gas; isn't that what we've been talking about in all of
18 this hearing so far?

19 A. Yeah, but you could have a mud channel and
20 then have gas problems too.

21 Q. All right, and --

22 A. I mean, I would like to agree with you, and
23 -- I really do. But if you've got a mud channel and
24 you have gas, that can migrate up to the channel. Then
25 it can further migrate through that channel.

1 Q. Now, if you had this mud channel --

2 A. Yes.

3 Q. -- that's going to be a void that's
4 detectible with a temperature log or a bond log or one
5 of those logs, isn't it?

6 A. No. I'll tell you what, I'd like to show
7 something that T.B. tried to show. Has anybody got a
8 little cup here? Could I borrow that cup? I need one
9 that will have a ring to it, and I think maybe --

10 MR. ERNEST CARROLL: He doesn't trust you to
11 give it all back.

12 THE WITNESS: You know, a cement bond log, he
13 said it's an acoustic device. And what it does is, it
14 sends a ring out of the casing -- through the casing
15 out to the cement and down the hole. And what it
16 really does is measure the amount of ring in this
17 thing, see? [taps cup] So if the cement isn't
18 gripping -- [taps cup] -- the casing, it sounds. It
19 will ring.

20 But now, if you grip it like this -- I'm only
21 going to grip it on one side -- [taps cup] -- it sounds
22 like that. Okay?

23 And that's what the cement bond log does. In
24 principle, this is a hundred percent correct. Notice,
25 that if I grip three-fourths of the way around -- [taps

1 cup] -- it sounds about the same. [taps cup] Over
2 here it sounds the same.

3 So actually the cement bond log tells you,
4 one, is it totally free? Or, two, is it not totally
5 free? [taps cup] And I think you could ask -- [taps
6 cup] -- There. And that's the principle.

7 So, you know, a bond log, as T.B. said, you
8 know, it's questionable whether it's of all that value
9 or not. Okay.

10 Q. (By Mr. Ernest Carroll) How many of these
11 mud annuli have you measured in -- at a length of 5000
12 feet?

13 A. None, but I tell you what. I was in Alaska
14 one time, on the Cook Inlet, on the Grayling Platform
15 for Union Oil, and they had a gas zone at about 3500
16 feet. They cemented 9-5/8-inch casing, and they had
17 lost circulation, just like you have here in this area.

18 Q. And what you're talking about -- Excuse me,
19 I'm sorry.

20 A. And what happened was that we put a line on
21 the top of the casing and sent it out to a burner on
22 the platform. And the well made a volume of gas up
23 through the annulus for 3500 feet that was about 25,000
24 standard cubic feet per day, as estimated by the
25 production man on location. He looked at it and said

1 about 25,000.

2 Well, 25,000 on an enclosed platform in the
3 Cook Inlet has got to be dangerous in anybody's world.
4 So he immediately set up a task force, solving the
5 problem of intermediate casing strings.

6 But go ahead.

7 Q. That was a gas well with extremely high
8 pressure to it?

9 A. No, oil well, and the pressure was about
10 normal.

11 Q. Well, what's that?

12 A. Well, about water gradient. In other words,
13 the amount of pressure that water would have at that
14 depth.

15 Let me say this in your behalf: The pressure
16 here is less than water gradient by about two pounds
17 per gallon.

18 Q. Let's go to your next exhibit, "Swapping
19 Out". If you do this well as has been testified -- and
20 "do" is probably a bad word -- drill it and set casing
21 which is a foot or two off the bottom of the total
22 depth, I think even you admit that you're not going to
23 have a problem; isn't that correct?

24 A. You wouldn't expect it. I'll even go further
25 than that: You would not have a problem.

1 Q. The only time you would have a problem is if,
2 like you -- I think you suggested that maybe the
3 driller would go and drill 30 extra feet of hole; is
4 that correct?

5 A. Yeah, that's happened.

6 Q. I'm sure that's happened, and I know that
7 you've been on a number of rigs just like I, and the
8 standard procedure is when you bring that pipe out of
9 the hole you strap it out, don't you? Well, you know
10 exactly how deep you drill?

11 A. What pipe?

12 Q. You strap the drill pipe. That's the only
13 thing that causes the hole, right?

14 A. Well, that and the bottomhole assembly. Yes,
15 that's standard practice.

16 Q. And when you're putting that -- tool joints
17 together, you strap each one of them so that you can
18 total those up and you know exactly how deep you are?

19 A. Well, you'd like to think you hadn't made a
20 mistake.

21 Now, let me ask you this, since you seem to
22 be knowledgeable about this and you've been on a rig.
23 Have you drilled an extra 30 feet? Have you ever heard
24 of it?

25 Q. I have heard of drilling an extra 30 feet,

1 but we always knew about it because but we always
2 measured it. We knew how much pipe was in the hole.

3 A. That's true, but did you buy an extra joint
4 of casing and make sure it would go to the bottom?

5 Q. Absolutely. When you say --

6 A. Well, some people won't buy that extra 30
7 feet of casing.

8 Q. Well, Mr. Mitchell, that's what has been
9 prescribed by this drilling program, and I think I'm
10 going to be safe and assume --

11 A. Well, you have me at a --

12 Q. -- that we're going to be doing it like we
13 say we are.

14 A. You have me at an advantage. I haven't seen
15 your drilling program.

16 Q. Okay. And there's also available what they
17 call something like an E log to measure total depth of
18 the hole? That's commonly used in the industry, isn't
19 it?

20 A. Oh, yeah, usually the State record is based
21 on the driller's measurement, though.

22 Q. And with respect to this, because -- for this
23 swapping out -- and the reason I think -- and I think
24 we need to tell the Commission why it's not going to be
25 a problem, is that for this passageway or annuli to

1 occur, we have to have mud, enough mud to create the
2 opening, don't we?

3 And if you run out of mud in the swapping out
4 process -- or maybe the better way to put it is, it's
5 only going to go as high as you've got enough mud to go
6 that high? Right?

7 A. Well, how high is that?

8 Q. Well, how high is it? You can calculate the
9 volume of mud at the hole and if you --

10 A. Careful now. How big is the shaft of mud
11 going up through the cement? What's its diameter? You
12 see, that's going to be a factor too.

13 Q. That's right, that is going to be a factor.

14 A. So it's not only the volume of the mud but
15 the size of the --

16 Q. Size of the annuli.

17 A. The size of that pipe going up that --

18 Q. And I think what you -- You told us that some
19 people believe that there might be some that exist a
20 thousand feet; is that correct?

21 A. Yes, that's true.

22 Q. And what we're talking about is something
23 like -- on the order of 6000 feet, aren't we?

24 A. That's true. Let me totally agree with you.
25 So it would take a combination of these things to --

1 you know, in some cases to reach this, you know -- But
2 go ahead.

3 Q. Going to your next exhibit, and I think it's
4 called "Gas Percolation" --

5 A. Yes.

6 Q. -- now, let's talk about first of all -- Now,
7 this gas percolation process, so that we understand
8 what's happening, this is gas percolating through unset
9 cement; is that correct?

10 A. Partially set cement.

11 Q. Partially, but it --

12 A. What most people -- yes.

13 Q. But it has not become a solid?

14 A. Semi-solid.

15 Q. Okay. Well, now -- So right away, if -- This
16 problem of gas percolation is only going to be a
17 problem that we have with casing and cementing that's
18 going to go into a zone containing gas, right?

19 A. Well, yes.

20 Q. So the problem here is limited only to the
21 5-1/2-inch casing, not the 8 -- the immediate inner
22 salt string or the surface or the conductor pipe?

23 A. That's true.

24 Q. So --

25 A. That's what's drawn in the picture too, by

1 the way.

2 Q. But you've got arrows that go from this
3 darkened hole out into the cement of the 8 5/8 casing?

4 A. Yeah. But see, you would expect a gas
5 channel to go from the Delaware all the way to the
6 surface if it could. There may be something to block
7 it in there.

8 Q. Uh-huh.

9 A. But anyway, if it could, it would go all the
10 way to the surface. And then in order to get gas in
11 the wellbore opposite the McNutt, it would have to go
12 some other way, in other words, a gas channel or a
13 microannulus or something that exists that would be in
14 combination with this gas percolation. And that's
15 totally possible, it just is.

16 Q. The -- When you were talking about this gas
17 percolation exhibit you mentioned that you had an
18 experience over in Sumatra of a rig burning up.

19 A. Two of them.

20 Q. Was that a -- Two?

21 A. Yeah.

22 Q. Was this high-pressure gas wells?

23 A. Oh, well, yeah. It doesn't parallel the zone
24 here all that much. It was slightly overpressured so,
25 you know, instead of being able to drill the well with

1 water, you'd have to use something like -- I think it
2 was 11.2 pounds per gallon, but -- So that aspect of
3 the parallelism does exist.

4 Q. And for the calculation that you performed
5 after this gas percolation, you assumed a diameter of a
6 single annuli or channel of .75 inch or another three-
7 quarters of an inch?

8 A. Three-quarters of an inch, yes.

9 Q. And so for this to occur, then, you've got to
10 have a tube 3/4 inch in diameter. And if we're talking
11 about -- Well, diameter. And that would be diameter
12 for -- at least to get up to the McNutt level,
13 approximately 6000 feet in length?

14 A. Well, yeah, I mean, I can't see anything
15 wrong with that.

16 Q. Have you ever measured --

17 A. Oh, yes, yes, I've --

18 Q. -- 6000 feet, three-quarters of an inch?

19 A. Oh, I was -- I've measured three-quarters of
20 an inch before, but not 6000 feet.

21 Q. All right. It's interesting, I was just
22 noticed it, and I've seen it on several of your
23 calculations down here. You say that this well, then,
24 has the capability of producing 889,512 standard cubic
25 feet a day through this three-quarter-inch channel?

1 A. No, I object to that. I object. You know
2 exactly what you said to me.

3 Q. No, I don't, I'm sorry. Please explain --
4 what --

5 A. You said I said that the well would produce
6 8000-something standard cubic feet -- 800,000-some
7 standard cubic feet a day. That's not what I said.

8 Q. Well, I --

9 A. You know --

10 Q. -- thought I said it could.

11 A. No.

12 Q. I thought I said it could, so I'm sorry if I
13 didn't.

14 A. Okay --

15 Q. What I'm saying, what you said, this
16 projection --

17 A. I would like to have an apology.

18 Q. Well, you can have it, Mr. Mitchell.

19 A. Okay, thank you.

20 Q. Now, Mr. Mitchell --

21 A. What I said was is that the channel has that
22 capability if the well does.

23 Q. Okay, and that's my point. You know that
24 these wells don't have that capability, don't you?

25 A. Absolutely do not have that capability.

1 Q. Now, the next exhibit, this "Gas Cut Cement
2 and Bridging", isn't this also kind of the same or
3 similar phenomenon with gas percolation?

4 A. No.

5 Q. It is gas getting into the cement, and it
6 doesn't percolate, or what is that -- what is the --
7 What is the difference, then?

8 A. Oh, it rises through the cement; in that way
9 the parallelism is correct.

10 Q. Okay.

11 A. But the way that the pressure is relieved on
12 the gas zone such that it can enter the formation is
13 totally different.

14 Q. Okay, what is the mechanism, then, if you
15 would describe it? Because I --

16 A. You form a permeable block up here and call
17 it a bridge up here, and it supports the weight of all
18 of this mud above it.

19 The pressure down here could decrease by
20 bleeding of some of the filtrate in the cement into a
21 water zone, something of that sort, lowering the
22 pressure on the gas. Then the gas would percolate
23 through the cement.

24 Q. Is this cement that is still in a non-solid
25 state?

1 A. Yes.

2 Q. Okay, it would --

3 A. As a matter of fact, it would be in a liquid
4 state.

5 Q. Be in a liquid state?

6 A. And then the percolation would continue till
7 it set and you would have gaseous cement and bubbles
8 down there.

9 Q. Again, this particular exhibit is missing
10 some very important ingredient, and that's the 8-5/8-
11 inch casing, isn't it?

12 A. Oh, that's -- Yes, that's true.

13 Q. So this gas -- your exhibit here, if we had
14 our 8-5/8-inch casing imposed outside here, these
15 arrows would stop or could be stopped by the casing,
16 the 8-5/8-inch casing? Rather than --

17 A. Yeah, I agree a hundred percent. You'd have
18 to have a secondary path there through the 8 5/8.

19 Q. All right. Now, this problem that you're
20 talking about here, voids in the cement --

21 A. Which one is that?

22 Q. This is the "Squeeze Cementing" problem, I
23 think.

24 A. Oh, yes.

25 Q. Again, these voids in the cement, the

1 solution that the industry uses is to condition the
2 hole by circulating, and then when they pump cement
3 into the hole they pump known quantities and more than
4 enough, like circulate 200 or more sacks, or less,
5 cement; is that correct?

6 A. Well -- I don't understand the question.

7 Q. Okay. Maybe I don't understand the problem
8 that you were trying to describe here.

9 A. Well, that's -- Let me explain it again,
10 then, please.

11 What happens is that you have a void,
12 especially in a stage cement job, where you might have
13 the cement fill to here in the first stage, and in the
14 second stage it might fill higher, right? So you're
15 going to have a section of the hole here which may not
16 have any cement in it at all.

17 Q. Uh-huh.

18 A. Okay? Now, the correct procedure is, that
19 most people use, is to perforate the casing and try to
20 fill up that void section there with cement.

21 Q. Uh-huh.

22 A. It's not void; it's full of mud. But anyway,
23 it's void of cement.

24 So they pump it out there, and instead of the
25 cement rising to the top and filling this section here

1 with cement, it simply goes out into the formation down
2 here and never fills up. Part of the casing there,
3 that is void of cement.

4 Q. That is a very detectible problem, isn't it?

5 A. Yes, a cement log will pick that up
6 instantly.

7 Q. Okay. External casing packers, they're not
8 widely used in the industry, are they?

9 A. No, they're not. They're expensive.

10 Q. I have heard the number of one percent of the
11 wells. Is that a fair, in your experience --

12 A. No, that would be too many.

13 Q. Too many. So we're talking about something
14 that is very limited, then?

15 A. Yes.

16 Q. And the problem, then, that you are
17 describing here is limited to the use of these kind of
18 packers and further complicated by having set one of
19 these packers in a very permeable or weak zone?

20 A. Or fractured.

21 Q. Or fractured zone.

22 A. Yeah, uh-huh.

23 Q. Let's talk about your "Worn Casing and
24 Doglegs" exhibit, Mr. Mitchell. Now, we're talking
25 here -- This truly was intended just to depict the

1 8-5/8-inch casing; isn't that correct?

2 A. Well, you can wear a hole in any casing, so
3 that's -- As shown here, you'd expect it. Since you're
4 drilling out, it has to be an 8 5/8 for this particular
5 drawing.

6 Q. Well, we know if we set 5-1/2-inch casing
7 we're not going to be drilling through that. I mean,
8 that's casing that goes to the bottom.

9 A. Let me agree with that. But you will be
10 running tubing and whatnot through the 5 1/2, also wear
11 holes too. No, both strings have the wherewithal and
12 whatnot to wear holes in it.

13 Q. If you did wear a hole in this casing, one of
14 your expectations is that when you do the cementing of
15 this 8 5/8 -- excuse me, when you do the cementing of
16 the 5-1/2-inch casing, when it's run, that you would --
17 the cement would go into that hole and fill it,
18 wouldn't it?

19 A. You would certainly hope that would happen.
20 But even if it did, you wouldn't have pressure
21 integrity.

22 Q. Wouldn't have what?

23 A. Pressure integrity. In other words, the
24 cement isn't nearly as strong as the steel, pump the
25 cement in there.

1 Q. When this cement is in, encapsulated or
2 within and has -- because we're not -- we don't have
3 free-standing cement.

4 The pressure -- How much pressure are we
5 talking about would bust or destroy the integrity of
6 this cement when it's setting in a situation like this?

7 A. Oh, you know, for design purposes -- Well, no
8 one really knows that for sure. Bur for design
9 purposes, we'd use it strength zero for the cement
10 because -- You see, the cement is really going to break
11 in tension.

12 I mean, you've got -- You look at it kind of
13 like a balloon, one of those long-dog balloons, you
14 know?

15 Q. Uh-huh.

16 A. You blow it up and the pressure is going to
17 expand the cement like this and crack it
18 longitudinally, probably, so that gas will go out.

19 Q. So what we really have is the fact that if we
20 have pressure coming up the wellbore and get in contact
21 with this cement, was filling this gap, we'd actually
22 be finding the cement in compression, wouldn't we?

23 A. Well, you probably wouldn't have any cement
24 back there anyway. You'd have that gas -- that mud
25 channel back there, you know, the one I drew. So you

1 probably wouldn't have any cement there anyway.

2 But if you did have the cement there, then
3 the cement probably couldn't be depended upon to give
4 you much strength, if any at all.

5 Q. But if -- But the cement would be in
6 compression in that sort of circumstances?

7 A. If you pressure it up on the wellbore it
8 would put the cement in tension, not in compression, if
9 it were there at all. It probably wouldn't be there.

10 Q. Let's go to the inclination survey. Now,
11 this was taken from an instrument called a totco; is
12 that correct?

13 A. I don't know that. I took that off -- Let me
14 tell you what I did.

15 When I was here last time I went up and got
16 the state records, and in there they had a listing of
17 the directional -- or the inclination surveys, and I
18 really don't know how they did it.

19 Q. Okay.

20 A. But let me say this: I would suspect that
21 you're right, because that's the cheapest instrument
22 out there.

23 Q. Common use in southeastern New Mexico?

24 A. Well, it's used all over the world.

25 Q. All over the world.

1 Now, these kind of surveys, as we're talking
2 about here, they give you a degree of inclination, but
3 they don't give you any orientation, do they?

4 A. Well, by "orientation", you mean direction?

5 Q. Which direction.

6 A. It's called azimuth.

7 Q. Azimuth, right. I couldn't think of the
8 word.

9 A. Okay, yeah.

10 Q. So we don't know anything about azimuth then?

11 A. Yeah. I could say this, though, that any
12 change in azimuth would add to the dogleg, not subtract
13 from it.

14 Q. The -- We know from experience that, as Mr.
15 O'Brien said, is that when we drill an oil and gas
16 well, it doesn't go straight down. It kind of rotates
17 down into the ground; isn't that true?

18 A. You know, that happens some. But if they
19 have any depth to the beds whatsoever --

20 Q. Uh-huh.

21 A. -- and you know, in our Directional Drilling
22 Research Center we have a little program that allows us
23 to look at this stuff 3-D, and it's oddly enough that
24 most wells go down and then take off in one direction
25 and maintain that direction, and that surprises a lot

1 of people.

2 Q. Now, when you look at the point out -- the
3 first point that goes out to 4 1/2 degrees on your
4 diagram --

5 A. That looks like 4 1/4.

6 Q. It may be 4 1/4.

7 A. Yes.

8 Q. Anyway, it's the farthest one out. It's the
9 first one -- It's just below, somewhere below 2000
10 feet.

11 You show that the -- Then the next one drops
12 back to 3.5, and this -- We see a jagged type
13 reflection here on your diagram.

14 A. Yes.

15 Q. You don't know that that in fact -- Is that
16 going back --

17 A. No, no --

18 Q. There's something missing with this diagram;
19 it's not in three dimensions, is it?

20 A. We can do better than that.

21 Q. Uh-huh.

22 A. It isn't jagged, as sharp corners here
23 representing doglegs.

24 Q. Right.

25 A. You know, the bottomhole assembly must drill

1 a curved hole, must.

2 Q. So that's really what we've got. This could
3 very well just depict a gradually curved hole, couldn't
4 it?

5 A. Considering -- the error within a certain --
6 Not really.

7 This point here, back to this point here,
8 probably is a real thing, because it's a little bit too
9 big. You know, here's a $4 \frac{1}{4}$ to a $3 \frac{1}{4}$, so you
10 probably do have a pretty sharp little turn there.

11 Q. One degree in several hundred feet; is that
12 correct?

13 A. I don't know where that turn occurred, but I
14 could draw you a little diagram and show you how the
15 turn could occur in a few feet instead of a lot of
16 feet.

17 Q. But the only way that that is measured is,
18 it's measured in one degree over the distance of
19 several hundred feet here on your diagram?

20 A. Well, just because it's -- you know, you take
21 a survey here and here, doesn't mean that you have a
22 gradual turn. You could have it sharp and then go all
23 the way down straight, see? Do you see what I'm trying
24 to say?

25 Q. Well, what you're saying is anything's

1 possible --

2 A. I don't know.

3 Q. -- but we don't know.

4 A. I don't know.

5 Q. All right.

6 A. But I do know that it could be a dogleg of
7 consequence, especially the one down at 3500 feet.
8 See, that looks very suspicious.

9 Q. Well, really you've got quite -- this --

10 A. See, we go from three-quarters out to 4 1/4.
11 See, that is in the range of being troublesome,
12 according to API's chart.

13 Q. That's interesting that that occurred at
14 approximately 3500 feet. That's within the salt
15 section, isn't it?

16 A. Where is the bottom of the salt? I mean,
17 I'll take one of your experts' word for it. I mean, I
18 want to agree with you. I think Dr. Boneau would know.
19 Where's the bottom of the salt, Dave?

20 You mean nobody in here knows that number?

21 FROM THE FLOOR: Forty-two. T.B.'s exhibit
22 number.

23 THE WITNESS: Okay, I agree with you, it's in
24 the salt.

25 Q. (By Mr. Ernest Carroll) All right. And in

1 fact, all of this problem, the most -- the -- most of
2 the deviations that we see occur in the 2000- to 4000-
3 foot area, which is, as we learned, is the salt
4 section? From looking at your diagram.

5 A. Well, the top of it, the top of the salt, I
6 think, is around 700 or 800, unless I stand corrected.

7 Q. The -- Well, then, that would include most of
8 these, then.

9 That does give some credence to the fact that
10 you do have deviation problems or hole problems when
11 you're in the salt, don't you? Like Mr. O'Brien
12 indicated?

13 A. I don't think he ever said that, no.

14 Q. Well, when you're trying to kick off and
15 drill a deviated hole?

16 A. Yeah, that's another one. That is not what
17 you said.

18 Well, let me agree with you that most of the
19 deviation problems here in the way that this well was
20 drilled is in the salt, yes, let me agree with that.

21 But I can't agree with you that kicking off
22 would have something to do with these deviations shown
23 here. No correlation.

24 Q. Well, if -- When you have holes and deviating
25 -- when you have a problem in deviating a hole, they're

1 usually caused by the strata that you're going through?

2 There are certain --

3 A. Oh, no.

4 Q. -- strata that we know do cause deviation
5 problems; isn't that true?

6 A. No. I wish I could agree with you. It's one
7 factor, but not the major factor.

8 Major factor is the bottomhole assembly, the
9 bits and the location of the reamers and stuff like
10 that on your bottomhole assembly. And charts have been
11 published by Lubinsky and Woods showing exactly how to
12 drill a straighter hole in troublesome formation.

13 Q. If you turn -- You had a set of exhibits that
14 dealt with the Flora Number 1. These are the, I think,
15 the group. And you have a graph drawn on the Graham
16 AKB State Well Number 2.

17 A. Are you over on --

18 Q. This is Exhibit 40, and I don't have any idea
19 where --

20 A. Oh, okay. Let me find my through to that
21 one. Okay, I've got it.

22 Q. Yeah, it's a time -- It's a foot-and-time
23 graph.

24 A. May I put this away?

25 Q. Yes, I'm not -- I'm through with those

1 exhibits.

2 A. Which one, now? The Flora or the --

3 Q. Yeah, well, it says "Graham AKB State Well
4 Number 2", and under that it says "Dates in 1992". And
5 what you've got there is the spud date, the bits are
6 noted on that and...

7 A. Yes.

8 Q. The portion of this particular hole that took
9 the longest to drill is that portion that goes through
10 the salt section, isn't it?

11 A. From about 1000 feet down to 4200 feet, yes,
12 that took up the major amount of time.

13 Q. That took close to 12, 13, 14 days?

14 A. I'll take your word for it.

15 Q. Okay. Isn't it quite possible that the
16 problems with drilling the salt here, the crooked hole
17 and those kind of things, contribute to or could cause
18 that kind of a drilling time problem in the salt
19 section?

20 A. If they didn't drill it correctly, that could
21 be true.

22 I would think, though, that these companies,
23 drilling as much as they have, probably drilled it, you
24 know, problem-free.

25 Q. The salt can cause problems in drilling,

1 can't it?

2 A. That's -- Well, that's true, you know. All
3 rock can cause problems, you know. It's --

4 Q. Now, let's talk about this directional
5 drilling. Now, you were told and asked to look at
6 drilling a directional hole out of there.

7 What criteria, designwise, were you given by
8 Mr. High to crank into your formula here so that you
9 can come up with a cost?

10 A. He never said anything.

11 Q. All right. Now, isn't it true that one of
12 the best ways to determine what's going to really
13 happen in any particular locality is to look at actual
14 case experiences?

15 A. You know, what I wished? I wished I could
16 have drilled a well, then done the cost --

17 Q. Sure.

18 A. -- but that wasn't possible.

19 Q. And -- Because actual drilling experience is
20 going to be a better guide than just the theories or
21 formulas that you've got here?

22 A. Yeah, the only help I had was my assistant
23 who's 34 years old and worked for Arco as a drilling
24 engineer, and he had drilled some wells down here.

25 Q. Have you drilled any deviated holes down here

1 in southeastern New Mexico, in this potash --

2 A. No, you know, and neither had he, so that
3 made it double-tough.

4 Q. Okay. Were you aware that there had been a
5 recent deviated hole drilled down here in the salt
6 section?

7 A. Yes, that came out in the testimony by --

8 Q. The Bonneville well?

9 A. Yeah, that's the name of it, yes.

10 Q. You were aware that the deviating offset in
11 that particular well was 750 feet?

12 A. I tell you, I never looked at the well, you
13 know, because the drilling of one well is just one data
14 point, and often confusing.

15 Q. Well, you're -- That deviated hole at 750
16 feet would be something on the order of about one-
17 quarter of the distance that you were using for your
18 Flora Number 1 Exhibit, because you're talking about
19 26.

20 A. Talking about 26?

21 Q. Right.

22 A. I'll take your word for it.

23 Q. Okay. Roughly a quarter, and I'm not trying
24 to be exact here.

25 And you -- In your formula, you arrived at a

1 30-day drilling record for drilling this particular
2 well?

3 A. I thought it was 30.5

4 Q. 30.5 Were you even aware, or even considered
5 the fact that the Bonneville AK -- whatever the -- the
6 one Bonneville well took 31 days to drill?

7 A. You know, when you said that, I thought, My
8 goodness, I hit it again, you know, because I hadn't
9 looked at it, I hadn't got the bit record for it or
10 anything else.

11 Q. Now, you made an interesting statement that -
12 - You said that if you go cheap it takes a longer time
13 to drill. If you go expensive, you can drill these
14 wells quick.

15 A. Well, not quite.

16 Q. What did you choose?

17 A. Not quite, okay?

18 Q. Well, those were words that you said, and all
19 I'm wondering is, where did you fall in, I guess, these
20 two extremes?

21 A. Well, I chose a bottomhole motor, right? I
22 chose a bottomhole motor technique --

23 Q. Uh-huh.

24 A. -- which would mean that it would be fairly
25 fast.

1 Q. So are you saying it's in the middle to upper
2 range, then, of --

3 A. Middle to upper range.

4 Q. Now, in your formulation here, you
5 certainly --

6 A. Are we through with this one?

7 Q. Yes, yes. You certainly -- Let's talk about
8 things that I don't think that you tried to cover.
9 Here --

10 A. Okay, sounds good. What exhibit are we --

11 Q. Well, I'm talking about basically here your
12 last two in this group. They're these calculation
13 sheets. That's the first --

14 A. Okay, I see.

15 Q. That's the next to the last one.

16 A. You mean you're going to skip all these
17 others?

18 Q. We've already talked about one or two.

19 A. Okay. Which one do you want first?

20 Q. Well, first of all, with respect to these
21 items, let's just talk about things that I don't think
22 that you attempted to even render an opinion, and I
23 want to make sure.

24 A. Okay, sure.

25 Q. The -- With respect to the economic viability

1 of the well, you didn't make any predictions or any
2 calculations as to that?

3 A. Oh, I -- No, not any at all.

4 Q. Not any at all.

5 A. I had no reservoir, except that one letter
6 from Patterson.

7 Q. Certainly. And with respect to the
8 calculations you've performed here, you didn't attempt
9 to calculate what the difference in the cost of
10 operating a directional hole would be as opposed to a
11 straight or a standard hole? Cost over the life of the
12 well, operational cost?

13 A. I did not take that into account.

14 Q. You didn't deal with that.

15 And those were two things that Mr. O'Brien
16 did deal with in his testimony, and that's the
17 difference: You didn't render any, or give any
18 evidence as to those two issues?

19 A. Well I don't know about what you mean by
20 evidence, but I didn't take --

21 Q. Testimony, I mean.

22 A. Okay. Yeah, let me agree with that. I did
23 not take operating cost, just the cost of the well --

24 Q. Now, one of the -- With respect to the
25 designing of the -- you can design a deviated hole in

1 lots of different directions -- different ways, can't
2 you?

3 A. Well, let's call it a directional hole.

4 Q. A directional hole.

5 A. Yeah. Oh, yes, there would be a hundred --
6 You know, no one would come up with the same thing.

7 Q. Are you aware that the deviated holes that
8 are being designed down here tend to be in -- rather
9 than kicking off like you do at an angle and then go
10 straight into the formation, that they tend to go --
11 they kick off and then another deviation to drop more
12 on a perpendicular basis through the Delaware sands?
13 Were you aware of that?

14 A. Now, those are kind of universally called
15 S-type wells.

16 Q. S-type, okay, good. You've got nomenclature
17 there.

18 A. Okay.

19 Q. The well you designed, that was not an S-
20 curve type well; is that --

21 A. That's true.

22 Q. Okay. Now, are you -- did you take -- or did
23 you even know or were you told that the Delaware zones
24 out here are in multiple pay?

25 A. Yes, I did. I heard that from Dr. Boneau.

1 Q. All right. Did you design your well,
2 trying -- taking into consideration that when -- that
3 the Oil and Gas Commission requires the production of
4 these wells from certain ortho- -- from locations that
5 have to be within certain proration units and not too
6 close to boundaries, and that's because of -- someone
7 else may own the oil and gas adjacent.

8 Did you use that at any point?

9 A. You said Oil and Gas -- You mean the Oil
10 Conservation Commission?

11 Q. Oil Conservation Commission.

12 A. All right. I wasn't aware of that, no. But
13 I'm sure that their rules are similar to other states
14 that have petroleum production.

15 Q. Well, the S-curve type deviated or
16 directional hole would be more expensive than -- I'm
17 not sure what you would call that, the C -- What do you
18 call the kind of directional hole that you designed?

19 A. Do you know that API Bulletin D-50 discusses
20 directional wells, and they do not name the type of
21 hole that goes straight down --

22 Q. Okay.

23 A. -- straight. I call them slant wells.

24 Q. Slant wells, okay.

25 A. Slant wells.

1 Q. Slant wells, as opposed to S-type?

2 A. Yes.

3 Q. Which is more expensive, in your experience?

4 A. They'd be about the same.

5 Q. There's no additional cost in trying to --

6 A. No, because you have to have a little higher
7 angle, which doesn't really enter into the cost till
8 you get it, as one of your experts said, out to about
9 45 degrees. So you have to have a little bit steeper
10 angle.

11 But when you get ready to drop, it's rather
12 simple to drop back to the vertical from something like
13 12 degrees or 24 degrees. It's old hat. You just
14 simply let her drop into the target.

15 So it's about the same cost.

16 Q. Let's talk about the risk factor.

17 Drilling a directional hole over a straight
18 hole, the risk of completing the well, actually getting
19 down there, it's greater for the directional hole, is
20 it not?

21 A. Yes.

22 Q. How much -- Do you have in mind a figure in
23 your experience where -- how much the risk increases?

24 A. Yeah, I have a figure. Continental Oil
25 Company used -- They're called contingency factors --

1 Q. Uh-huh.

2 A. -- and for a -- for their worldwide vertical
3 holes -- Well, for all holes, they have 22 percent
4 contingency.

5 In other words -- And they really didn't
6 distinguish between -- Come to think about it, they
7 didn't distinguish between vertical and directional.

8 But I don't put a number on it. Oh, maybe an
9 additional four or five percent. I mean, you have --
10 That's just an estimate, based on my experience.

11 Q. With respect to problems in producing these
12 kind of wells, do you -- they are increased problems in
13 production a directionally drilled, whether it be a
14 slant hole or an S-curve type directional hole?

15 A. You know, you are out of my expertise, and I
16 know it's hard to believe but I've never worked in
17 production where they actually pump wells and that sort
18 of thing.

19 But I will say this: I have talked to people
20 -- Maybe it's best that I not make a statement, since
21 it's out of my expertise.

22 MR. ERNEST CARROLL: I think I'll pass the
23 witness.

24 CHAIRMAN LEMAY: Thank you. Any redirect?

25 MR. HIGH: Yes, I have just one question.

REDIRECT EXAMINATION

BY MR. HIGH:

Q. Dr. Mitchell, upon what do you rely for your opinion that in the 1000 or so wells, oil and gas wells, that have been allowed in the known potash area, that some of those wells have allowed gas to get out of the casing?

A. Well, experience first. I have had gas get out of the casing.

And then second, it's just overwhelmingly reasonable that that would happen.

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

Thank you.

CHAIRMAN LEMAY: Thank you. Mr. Carlson?

COMMISSIONER CARLSON: Just a couple questions.

EXAMINATION

BY COMMISSIONER CARLSON:

Q. Following up on that point, it's your expert opinion, expert estimate, that there would -- you said between three and four -- I gather that was percent, not wells?

A. Well, three or four out of a hundred would be percent.

Q. Right, okay, it wasn't three or four of the

1 thousand. It would be 30 or 40 out of the thousand?

2 A. Okay. Now, I think here you -- this thing
3 was -- the bore was really -- three or four out of a
4 hundred, I think I would expect to find some gas
5 outside the casing.

6 Q. Okay. And that isn't gas that has migrated
7 up to the potash zone; that's gas that's outside of the
8 casing, somewhere on the casing in those wells?

9 A. That I would expect to find opposite the --
10 adjacent to the potash zone.

11 Q. Adjacent to the potash zone?

12 A. Yes.

13 Q. Three or four percent?

14 A. Yeah. Casing leaks are much more prevalent
15 than what people suspect because no one ever measures
16 or tries to detect it. So it's going to be tough to
17 put a number on it as gas outside.

18 I drilled three wells in San Maria one time,
19 and we sent down what's called a noise log. It's just
20 an earphone, and we run a wire line. We were listening
21 for gas outside the casing. And sure enough, we had
22 gas outside the casing in that case. It was about a
23 6000-foot -- They're all about 6000.

24 Q. Obviously you don't know the cementing
25 program and what went into those thousand wells.

1 Is your three- or four-percent number based
2 on a cementing program similar to the type we've been
3 talking about today as proposed by Yates and as in your
4 exhibit?

5 A. Well, I suspect there would be all types of
6 cements, but --

7 Q. Right, but your three or four percent would
8 be -- your -- This?

9 A. Yeah.

10 Q. Of every hundred wells drilled and completed
11 like this, three or four percent of them would have
12 gas?

13 A. Some gas.

14 Q. Some gas.

15 A. Not explosive gas, for sure, but there'd be
16 some gas out there.

17 Q. Some gas outside the casing in the McNutt
18 zone formation?

19 A. Yeah, opposite or adjacent to that. I
20 sincerely believe that's true.

21 Q. Mr. O'Brien yesterday -- He said that it
22 would take pressures greater than 3000 p.s.i. inside
23 the wellbore to get gas into the salt formation.

24 Do you agree with that? I noticed --

25 A. Well, yeah, that's what he -- You know, you

1 have to understand what he was saying.

2 If you wanted to go into the salt, in the
3 McNutt zone, then you would need about ten thousandths.
4 I think he started at two and went to three.

5 But if you want to get gas in the bedding
6 planes, in the shale, that type of stuff, then you're
7 talking about maybe only 700, pressure differential.
8 You know, 700 would overcome the liquid pressure inside
9 -- inside the bedding planes.

10 Q. Do you have any feel for how far that gas
11 would migrate under that pressure differential?
12 Obviously, as long as that pressure differential
13 remained. But could it go 400 feet? What are we
14 looking at? Through one of those shales?

15 A. Well, if you had the total, about 1700
16 pressure differential -- you know, 2300, 2400 inside,
17 700 outside -- then that could go quite a distance,
18 probably to the end of whatever that string is.

19 Q. You said you didn't take the operating costs
20 in your directional drilling calculations.

21 Do you have a feel for what those operational
22 costs would be compared to a vertically drilled well?

23 A. About the same.

24 Q. Now, you heard Mr. O'Brien, and I don't have
25 his testimony, but -- his exhibit. But I think it was

1 -- he claimed it would be \$200 a day, versus \$50 a day,
2 if I remember correctly.

3 A. Well, he's in the same position I am. I know
4 the man personally. He relied on Yates's people to
5 give him those numbers. And of course, I don't have
6 them.

7 But in a lot of drilling work 20 degrees or
8 less is considered vertical. You know, 20 degrees is
9 just not very much. 24.3 is a little bit more than 20,
10 so -- Deep in my heart, I would feel that the operating
11 costs would be somewhat similar.

12 If you get out to something like 35 degrees,
13 40, then I know they'd go up.

14 But let me remind you, I've never worked as a
15 production man. Just things I've heard at meetings,
16 things of that sort.

17 COMMISSIONER CARLSON: Thank you.

18 CHAIRMAN LEMAY: Commissioner Weiss?

19 COMMISSIONER WEISS: Yes, sir.

20 EXAMINATION

21 BY COMMISSIONER WEISS:

22 Q. Most of your exhibits that showed the various
23 ways that gas can get from the Delaware up behind the
24 pipe, it just looks to me like it ought to go to the
25 surface more often than not.

1 A. Oh, it probably would.

2 Q. Rather than, you know, into another zone.

3 A. That's -- That's an astute observation.

4 That's true.

5 But if they close in the well or something
6 like that, then of course it can't go to the surface.
7 They'd close in the BOP's or do something of that
8 nature to prevent it from exhausting to the atmosphere.
9 Now is when you're going to get into trouble.

10 Q. Well, I'm talking behind the pipe.

11 A. Oh, well, that's -- yes, that's -- But the
12 cement is rather impermeable. I think I showed that,
13 you know. So rather than going up the outside of the
14 annulus to the surface, it could stop or accumulate
15 opposite the McNutt.

16 Q. It looked to me like if there's a crack of
17 any type, microannulus or mud channel that extends --
18 although people say they don't extend too far -- if
19 they extend 6000 feet, they ought to go another 2000 to
20 the surface.

21 A. Oh, that's totally possible, yes.

22 Q. That just seems to be more realistic than
23 not.

24 A. Well, one other thing too, Mr. O'Brien said,
25 you know, that the pressure inside the mine is also

1 atmospheric, and so it has to go from the wellbore in
2 the annulus into the mine. Might be easier than going
3 2000 feet through the annulus. You've got to keep that
4 in mind too.

5 Q. Okay. But yet -- And now there's 40 or 50
6 wells out in that area that might have gas leaks on the
7 surface, is my point.

8 A. Well, that could be. I doubt that anyone
9 ever measured it.

10 Q. Obviously nobody has. I don't know why not.
11 If I were concerned about things of that nature, I damn
12 sure would.

13 A. You know the Alaskan story I told you? We
14 tapped in at the surface, you know, and sure enough,
15 the thing made 25,000.

16 Q. Yeah, that was a good story.

17 A. I mean, you hit it right on the nose.

18 Q. Yeah, it seemed important to me.

19 And then you mentioned in one of your
20 exhibits there, I think it was -- it had an air pocket
21 -- hit an air pocket while drilling at 2000 feet.

22 Did you happen to see a pressure associated
23 with that, from your research?

24 A. I've got the record with me if you want to
25 look it up.

1 Q. Yeah, I'm curious about what the pressure is
2 at 2000 feet. I would appreciate it.

3 A. Let's see. Maybe one of the people with
4 Yates would know what that was. This is going to take
5 me a little while to find.

6 Q. Let's see, was that in your -- here, it's on
7 this -- It's on Exhibit 40F, for Graham AKB State Well
8 Number 2, Yates Pet., Dates, 1992. It shows "hit air
9 pocket". Took about a day.

10 A. Okay, this is it. Oil Conservation Division
11 report here. It says, "...into a high pressure zone at
12 a depth of 1557 feet. Blowout preventers were closed
13 immediately to control abnormal pressure. Shut-in
14 pressure reached 500 p.s.i." Okay.

15 COMMISSIONER WEISS: Thank you very much.

16 THE WITNESS: By the way, that's a pretty
17 good reading of what the real pressure is at 1557 feet.

18 COMMISSIONER WEISS: Yeah, that's kind of my
19 thinking.

20 I have no more questions.

21 THE WITNESS: Not 2000 or 3000 but 500,
22 which, by the way, agrees very closely with Mr. Robert
23 Lane of 450 or so.

24 CHAIRMAN LEMAY: Okay.

25 EXAMINATION

1 BY CHAIRMAN LEMAY:

2 Q. Dr. Mitchell, did your experience ever
3 address tools?

4 A. I ran a water-well machine for my dad.
5 You're talking about hammering on steel, aren't you?
6 Yes, I addressed tools.

7 Q. Your analysis of a lot of -- oh, the -- your
8 testimony, I guess, concerning the gas coming up and
9 all, and what we're trying to go with, is trying to
10 somehow measure the risk associated with gas entering
11 the potash zone.

12 All this -- Is it your expert opinion that
13 this applies to wells that are currently producing, or
14 what about depleted wells after they've been plugged
15 and abandoned? Would you have the same risk assessment
16 for those wells as you're applying to these type wells?

17 A. The risk would be reduced, maybe by half, you
18 know. I don't know. But somewhat. It would be
19 reduced, of course. Yeah, you're right there.

20 Q. I think what we're talking about is not
21 necessarily having producing wells opposite mining
22 operations, but the timing of such. My idea is, Yates
23 wants to get in there and get out. When they get out,
24 they're plugging the wells. And then when the mine
25 comes to them, you'll have a different situation,

1 maybe, than trying to assess the situation we've
2 actually --

3 A. You know, I don't really think this applies,
4 but -- Well, I guess it could apply too. But it is a
5 phenomenon that casing leaks out of the casing much
6 more than it leaks from the zone back into the casing.

7 So if you pressure-up a zone, then when it
8 tries to come back, the mud and the debris in the
9 formation plugs the leaks. You follow what I'm saying?
10 So that the gas can't get back inside the casing to be
11 produced.

12 But if you were to wait 30 years, well, you
13 know, that would tend to alleviate itself.

14 But nevertheless, that does -- that
15 phenomenon does exist.

16 Q. But your expert opinion would be, you're
17 lessening by about 50 percent the danger of gas --

18 A. Yes, I would say so.

19 Q. -- getting up into the zone?

20 That's all --

21 A. That's a pretty rough number.

22 CHAIRMAN LEMAY: Okay, that's all I have.

23 Thank you very much.

24 Additional questions?

25 MR. HIGH: We have no more questions.

1 CHAIRMAN LEMAY: Okay, he may be excused.

2 Let's go off the record for a minute.

3 (Off the record)

4 CHAIRMAN LEMAY: Well, let's just break for
5 today, then.

6 (Thereupon, evening recess was taken at 5:20
7 p.m.)

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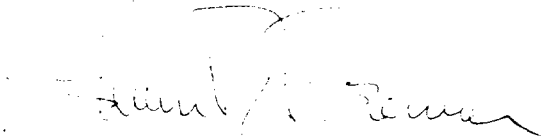
1 CERTIFICATE OF REPORTER

2
3 STATE OF NEW MEXICO)
4) ss.
COUNTY OF SANTA FE)

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 November 6th, 1992.

17
18 
19 STEVEN T. BRENNER
CCR No. 7

20 My commission expires: October 14, 1994
21
22
23
24
25

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
10 Corporation for Authorization to
Drill, Eddy County, New Mexico.

11 VOLUME VI

12
13 BEFORE:

14 CHAIRMAN WILLIAM LEMAY

15 COMMISSIONER GARY CARLSON

16 COMMISSIONER BILL WEISS

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

21 October 23, 1992

22
23 REPORTED BY:24 CARLA RODRIGUEZ
Certified Court Reporter
25 for the State of New Mexico

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OIL CONSERVATION DIVISION

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* * * * *

I N D E X

	Page Number
Appearances	2
WITNESSES FOR YATES PETROLEUM CORPORATION:	
1. <u>ROBERT H. LANE</u>	
Exam by Mr. High	1437, 1546, 1567
Exam by Mr. Carroll	1484, 1549
Exam by Mr. Carlson	1541, 1550
Exam by Mr. Weiss	1543, 1555, 1569
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E X H I B I T S

NEW MEXICO POTASH EXHIBITS:	REFERENCE
Exhibit No. 2	1443
Exhibit No. 3	1442
Exhibit No. 4(a) and 4(b)	1444
Exhibit No. 5	1456
Exhibit No. 6	1450
Exhibit No. 7(a) & 7(b)	1452
Exhibit No. 8	1483

1	NEW MEXICO POTASH EXHIBITS (CONTINUED)	REFERENCE
2	Exhibit No. 8(a) and 8(b)	1453
3	Exhibit No. 8(c) & 8(d)	1482
4	Exhibit No. 9	1446
5	Exhibit No. 10(a) & 10(b)	1457
6	Exhibit No. 11	1484
7	Exhibit No. 25	1460
8	Exhibit No. 26	1468
9	Exhibit No. 28	1459
10	Exhibit No. 29	1482
11	Exhibit No. 30	1482
12	Exhibit No. 38	1453
13	Exhibit No. 41	1436
14	Exhibit No. 42(a) & 42(b)	1441
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1 CHAIRMAN LEMAY We'll look at our
2 schedule at the break and we'll check on
3 schedules when we reconvene. Okay. Day 3,
4 Hearing 3. Day 6, actually. Mr. High?

5 MR. HIGH: Mr. Chairman, before we call
6 our next witness, I would like to offer into
7 evidence an additional exhibit. Yesterday,
8 during the testimony of Dr. Mitchell, he was
9 asked for information and pulled a document out
10 of his briefcase to look at it in response to a
11 question from Mr. Weiss. I would like to put
12 that document into the record so we'll have it,
13 and I'll offer it as New Mexico Potash Exhibit
14 No. 41.

15 CHAIRMAN LEMAY: Exhibit 41 will be
16 admitted into the record without objection.

17 MR. HIGH: We would call Mr. Bob Lane.

18 ROBERT H. LANE

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

21 EXAMINATION

22 BY MR. HIGH:

23 Q. Have you already been sworn, Mr. Lane?

24 A. Yes.

25 Q. Would you state your full name please,

1 sir.

2 A. Robert H. Lane.

3 Q. Where do you reside, Mr. Lane?

4 A. 500 Baja, Hobbs.

5 Q. Hobbs, New Mexico?

6 A. Right.

7 Q. Where are you employed?

8 A. New Mexico Potash.

9 Q. How long have you been employed there,
10 Mr. Lane?

11 A. New Mexico Potash, since they purchased
12 it in 85.

13 Q. Tell us, if you will, Mr. Lane, your
14 educational background.

15 A. I have a bachelor of science in mining
16 engineering from New Mexico Tech.

17 Q. What year?

18 A. 1950.

19 Q. After you obtained your mining engineer
20 degree, where did you go to work?

21 A. I went to work for International
22 Minerals and Chemical Corporation in January of
23 1950.

24 Q. At what location?

25 A. Carlsbad, New Mexico.

1 Q. What type of operation was that?

2 A. Potash mining, both langbeinite and
3 sylvite.

4 Q. How long did you stay with IMC?

5 A. With IMC-Carlsbad, from 1950 to 1957 as
6 junior engineer, geologist, mine surveyor, mine
7 engineer.

8 Still with IMC but transferred to
9 IMC-Canada, Ltd., in Esterhazy in 1957. Stayed
10 there until 1960 as mine superintendent.

11 In 1960 to 63, transferred back to
12 Carlsbad with IMC as chief engineer.

13 1963 to 1985, when New Mexico Potash
14 purchased the Kerr-McGee mine, I was with
15 Kerr-McGee as chief engineer, mine superintendent
16 and superintendent of mine engineering.

17 Q. So you have been working in potash
18 mines since 1950?

19 A. Yes, sir, on a continuous basis.

20 Q. That includes potash mines both in
21 Southeastern New Mexico and in Canada?

22 A. Yes.

23 Q. As far as the New Mexico Potash
24 facility is involved, you have worked
25 continuously at that facility since 1963?

1 A. At that facility since 1963.

2 Q. During the time of the change in
3 ownership, you were with the same facility?

4 A. With the same facility, yes.

5 Q. Tell us some of your duties and
6 responsibilities that you had at the New Mexico
7 Potash facility, Mr. Lane, from 1963 through
8 1965.

9 A. 1963 through construction of the
10 underground--missile construction of the
11 underground and surface facilities, we were
12 working on mine plans, general design for both
13 surface and underground.

14 After production started in 65, we had
15 an engineering department which took care of the
16 geology, rate control, mine surveying, lease
17 maintenance for both minerals, water,
18 right-of-ways, tailings, drilling of water
19 wells. On the staff, working on budgets and
20 long-range mining plans.

21 Q. Have you had occasion previously, Mr.
22 Lane, to testify before the Oil Conservation
23 Commission?

24 A. I have.

25 Q. Had your credentials accepted?

1 A. Yes.

2 MR. HIGH: Mr. Chairman, we would ask
3 the Commission to accept the credentials of Mr.
4 Lane as a mining engineer.

5 CHAIRMAN LEMAY: His credentials are
6 accepted.

7 Q. Mr. Lane, were you involved in the
8 designation by New Mexico Potash of its Life of
9 Mine Reserve?

10 A. I was.

11 Q. Tell us, if you will, your involvement
12 in the whole Life of Mine Reserve issue?

13 A. Well, the Life of Mine Reserves, the
14 first one was put out in 1988. I developed that
15 from those plans.

16 Q. Let me interrupt there and focus a
17 little bit more. The Life of Mine Reserve
18 concept is relatively new, isn't it?

19 A. Yes.

20 Q. Did you participate in the process that
21 led up to the adoption by the OCC of the Life of
22 Mine Reserve concept?

23 A. I was. I did.

24 Q. Those were the negotiations between the
25 potash industry and the oil and gas industry?

1 A. That's correct.

2 Q. There have been some references to
3 what's been called the Miner's Bible?

4 A. Yes.

5 Q. You understand that to be some comments
6 that were prepared on behalf of the potash basin?

7 A. That's right.

8 MR. HIGH: Mr. Chairman, given the
9 extensive references to this document, we would
10 like to offer it for inclusion in the record as
11 our Exhibit No. 42, the April 1992 document, I'll
12 call it, prepared on behalf of the potash
13 industry addressing this issue, and we would
14 offer it as our Exhibit No. 42.

15 CHAIRMAN LEMAY: With no objection,
16 Exhibit No. 42 will be admitted into the record.

17 [Discussion off the record.]

18 MR. HIGH: Mr. Chairman, just so we do
19 have a complete record, the document I referred
20 to a moment ago as Exhibit 42, we would like to
21 refer to it and offer it as Exhibit 42(a), and
22 then we would offer, as Exhibit 42(b), a prior
23 bound volume that was prepared by the potash
24 industry in 86?

25 MR. CARROLL: 86 or 87, when the

1 initial--we don't know if there's any difference
2 and that's our problem, Mr. LeMay, between the
3 two documents. I've never seen this bound
4 document, and I've seen this one.

5 MR. HIGH: We'll put them both in the
6 record and Mr. Carroll and I will exchange
7 copies.

8 CHAIRMAN LEMAY: Let the record reflect
9 we have two Exhibit 42s, (a) and (b).

10 Q. (BY MR. HIGH) Now, Mr. Lane, following
11 the adoption of R-111-P that set out the Life of
12 Mine Reserve concept, did you have any
13 responsibilities on behalf of New Mexico Potash
14 to make that designation?

15 A. Yes.

16 Q. And did you do so?

17 A. I did.

18 Q. Look at the book in front of you, if
19 you will, at Exhibit No. 3.

20 COMMISSIONER WEISS: There are no
21 Exhibit 3s in our book.

22 MR. CARROLL: Mine didn't have one,
23 either.

24 Q. Look if you will, Mr. Lane, at Exhibit
25 3, and tell me if you can identify that, please?

1 A. This is a computer--

2 Q. I'm sorry, it's letter I just handed
3 you.

4 A. I'm sorry. This is a letter of
5 transmittal to the State of New Mexico Energy,
6 Minerals and Natural Resources Department, dated
7 March 20, 1989.

8 Q. Is that the letter when you filed the
9 first LMR designation following the adoption of
10 R-111-P?

11 A. It is.

12 Q. Look back at Exhibit 2. It's the large
13 map. Look, if you will, Mr. Lane, at Exhibit No.
14 2, and tell me if you can identify that for us,
15 please.

16 A. This is a computer map. It's the same
17 as the LMR--the first LMR was submitted in 89.

18 Q. Does Exhibit 2 accurately reflect the
19 LMR of New Mexico Potash when it was filed in
20 1989, and the one-quarter mile and the one-half
21 mile buffer zones?

22 A. As submitted in 89, it only had the LMR
23 on it. The quarter-mile, half-mile has been
24 added to this map.

25 Q. When you submitted the LMR map to the

1 state and to the BLM, you didn't put the buffer
2 zones on it?

3 A. No, I did not.

4 Q. But on Exhibit 2 you have added those
5 to this document?

6 A. I also added our drill holes.

7 Q. Now, two of the proposed wells we're
8 talking about, Graham 3 and 4, would be within
9 the buffer zones of the initial LMR of New Mexico
10 Potash?

11 A. They are.

12 Q. Look, if you will, at Exhibit 4(a) in
13 the book. Hopefully, if you turn to Tab 4,
14 you'll find two documents, 4(a) and 4(b)?

15 A. Yes.

16 Q. Can you identify those documents for
17 us, please?

18 A. Exhibit 4(a) is a letter of transmittal
19 dated January 14, 1992, State of New Mexico
20 Energy, Minerals and Natural Resources
21 Department. "Enclosed find two copies of plats
22 showing our Life of Mine Reserves of New Mexico
23 Potash, for the corporation, as per Section 2(a)
24 of order 12-111-P."

25 Q. Is this an update of the LMR?

1 A. This was an update of the LMR as of
2 January 7, 1992.

3 Q. What is Exhibit 4(b)?

4 A. Exhibit 4(b), dated January 14, 1992,
5 to the Bureau of Land Management, Roswell
6 District, in Roswell. Same transmittal as read
7 before.

8 Q. I take it that the reference to Order
9 12-111-P is a typographical error and it should
10 be order R-111-P?

11 A. Right. Correct.

12 Q. Between the time that you filed the
13 initial designation of an LMR with the State and
14 BLM and the date you sent Exhibits 4(a) and 4(b),
15 were there any other modifications to the LMR?

16 A. No.

17 Q. So the first modification to New Mexico
18 Potash's LMR would have been in January of 1992?

19 A. That is correct.

20 Q. Have there been any other modifications
21 of the LMR since that time?

22 A. Not since that date.

23 Q. Do you know whether or not Order
24 R-111-P authorizes changes in an LMR?

25 A. Yes.

1 Q. Look in front of you, if you will, at
2 Exhibit No. 9, and go to page 11, please.

3 A. Exhibit 9?

4 Q. Yes. There should be a copy of Order
5 R-111-P under Tab 9?

6 A. I don't have a copy of it.

7 Q. Let me let you use this one. Look on
8 page 11, if you will, paragraph C.

9 A. All right.

10 Q. Take a minute and read that paragraph
11 if you will, Mr. Lane.

12 A. Paragraph C: "A potash lessee may
13 amend its designated LMR by filing a revised
14 designation with the BLM and the State Land
15 Office, accompanied by the information referred
16 to in Section A above. Such amendments must be
17 filed by January 31st next following the date the
18 additional data became available."

19 Q. And did additional data become
20 available prior to the time that you filed the
21 revised designation with the State and BLM as
22 shown in Exhibits 4(a) and 4(b)?

23 A. It did.

24 Q. And what new data did you have, Mr.
25 Lane?

1 A. The new data was from a new core test
2 which was drilled in December of 1991.

3 Q. All right. Explain to the
4 Commissioners, if you will, how it came about
5 that we drilled Core Hole No. 162 at that time?

6 A. A drilling program was planned in the
7 fall of 91. A series of nine holes were
8 planned. The drilling program wasn't finalized
9 until about the first of November. Actual
10 drilling was towards the end of November, the
11 first of December.

12 In that time, Mr. Case requested an
13 additional hole to be placed in Section 2. I
14 located the hole and we put it into the drilling
15 program.

16 Q. Had you previously been asked to
17 approve wells in Section 2?

18 A. Yes.

19 Q. And this is before you drilled Core
20 Hole 162?

21 A. That's right.

22 Q. Did you object to the wells that were
23 sought in Section 2 prior to the drilling of Hole
24 162?

25 A. I did.

1 Q. Which holes were you objecting to? Are
2 these the four along the east side?

3 A. The four holes along the east side. I
4 objected to the original location as they wanted
5 them, and they moved them back to a minimum
6 location of 330 from the east line.

7 Q. When you say you objected to the wells
8 being moved back, we're talking about the wells
9 that were, in fact, drilled along the east side
10 of Section 2?

11 A. Correct.

12 Q. Do you recall who drilled those wells?

13 A. Yates Petroleum and Pogo Producing.

14 Q. The two northern wells were Yates and
15 the two southern wells were Pogo? Is that the
16 way you recall it?

17 A. I think so.

18 [At this time, Mr. Rand Carroll is
19 present.]

20 Q. Why did you ask Yates and Pogo to move
21 those wells back closer to the east section line?

22 A. There was langbeinite indicated by an
23 AEC hole to the south, with a trend coming to the
24 northeast, and that would be the minimum loss if
25 there was langbeinite in that section.

1 Q. And when you objected to the original
2 location of these four existing wells and asked
3 them to move them back, how far did they move
4 them back?

5 A. 330 feet to the east.

6 Q. But they were still within Section 2?

7 A. Yes.

8 Q. How close, do you recall, Mr. Lane, did
9 that put those four wells along the east side of
10 Section 2? How close were they to the existing
11 other wells?

12 A. Generally, it would be 990 feet.

13 Q. Why did you even allow those four wells
14 along the east side, Mr. Lane?

15 A. I didn't have Section 2 in our present
16 LMR, and at the time we did this I had no plans
17 for drilling a well in that section.

18 Q. At the time the original was approved?

19 A. At the time it was approved, yes.

20 Q. And after you drilled Core Hole 162,
21 what did you find?

22 A. We found good mineralization in the
23 10th ore zone and also in the 4th ore zone, the
24 10th ore zone being sylvite, the 4th ore zone
25 being langbeinite.

1 Q. Before you drilled Core Hole 162, you
2 felt like there was mineralization in Section 2
3 already, didn't you?

4 A. Yes.

5 Q. What type mineralization?

6 A. The 4th ore zone langbeinite.

7 Q. And New Mexico Potash, of course,
8 doesn't process langbeinite?

9 A. No.

10 Q. After you drilled Core Hole 162, you
11 also found there was some sylvite in Section 2?

12 A. Yes.

13 Q. Was it of a grade that New Mexico
14 Potash was capable of mining?

15 A. Yes.

16 Q. Look, if you will, Mr. Lane, to Exhibit
17 No. 6 in front of you there.

18 A. All right.

19 Q. Can you identify that document for us?

20 A. Exhibit 6 is a copy of our abandonment
21 of the Core Test Well No. 162.

22 Q. Does that have attached to it the Core
23 Hole Analysis of 162?

24 A. It does.

25 Q. Does it reflect the level of

1 mineralization of sylvite?

2 A. Yes.

3 Q. Is the amount reflected there of
4 sufficient grade and thickness that New Mexico
5 Potash can mine it?

6 A. It is.

7 Q. There's been some testimony, Mr. Lane,
8 that you may have heard about the speed at which
9 Core Hole 162 was drilled. Tell us, if you will,
10 how many core holes, during the time you've been
11 at New Mexico Potash, you've been involved in
12 having drilled, just roughly?

13 A. 70.

14 Q. And of those, how long does it
15 generally take to drill a core hole?

16 A. Two days or less, without any troubles
17 or breakdowns of the rig and equipment.

18 Q. Is there anything unusual in your mind
19 about Core Hole 162 being drilled in what someone
20 said was 48 hours?

21 A. No.

22 Q. Now, after you got the results of Core
23 Hole 162, what, if anything, did you do with
24 respect to your existing LMR?

25 A. Revised it and put it in in January.

1 Q. Were there any other core hole data or
2 data from core holes that you relied upon to
3 revise the LMR?

4 A. There is.

5 Q. Look at Exhibit 7(a) in front of you
6 there, if you will, please, sir.

7 A. All right.

8 Q. What is that document?

9 A. Exhibit 7(a) is a summary sheet for
10 Core Test F-52 drilled by Farmers Educational
11 Cooperative Union of America.

12 Q. Is that one of the core holes that you
13 used in revising the LMR?

14 A. It is.

15 Q. All right. Look at Exhibit 7(b).

16 A. Exhibit 7(b) is the same data for Core
17 Test FC-65.

18 Q. Did that go into your revisions of the
19 LMR in 1992?

20 A. It did.

21 Q. Look at Exhibit No. 8, if you will, and
22 tell me what those are.

23 A. Exhibit 8?

24 Q. Yes.

25 A. I have 6, 7 and 9. Sorry, no 8. Wait,

1 I'm sorry. 8(a), yes, sir.

2 Q. Look at Exhibits 8(a) and 8(b) and tell
3 me if you know what those are, please.

4 A. Exhibit 8(a) is United States
5 Department of Interior Geological Survey, potash
6 ore reserves in proposed waste isolation plant
7 area, Eddy County, Southeastern New Mexico.

8 Q. Which core hole is that for, or does
9 that report cover?

10 A. This covers potash tests drilled by the
11 government, P-21.

12 Q. Was that considered by you and relied
13 on in the LMR in 1992?

14 A. Yes, and also AEC-8.

15 Q. Now, Mr. Lane, how do you go about,
16 when you get core hole data, how do you go about
17 giving influence to the analysis of the core
18 hole? How do you go through that process and how
19 did you go through that process at New Mexico
20 Potash when you got the results of Core Hole 162?

21 A. With the five adjacent holes available,
22 I used a triangular method plotting isogrades on
23 each of the legs and connecting the grade at
24 which it's using as a cutoff grade.

25 Q. Let me show you Exhibit No. 38. I

1 believe the Commissioners have a copy of this
2 from yesterday. Does Exhibit No. 38 show the
3 triangulation method that you just referred to,
4 Mr. Lane?

5 A. Yes.

6 Q. And explain to the Commissioners how
7 you go about using that triangulation method to
8 plot out an LMR.

9 A. Are we giving the grades?

10 Q. No. Just refer to the core hole, if
11 you would.

12 A. Going from--we start from 162 in
13 Section 2, over to F-65, which is in the
14 southeast corner of Section 34, 21-31, we have a
15 grade for each of those holes, a value. And
16 where the red line crosses that leg of that
17 triangle, that would be our cutoff grade.

18 Q. Do you project it out to each of those
19 core holes?

20 A. Yes.

21 Q. By what method?

22 A. By plotting isograde points and then
23 connecting equal points.

24 Q. You're extrapolating out from each
25 hole?

1 A. That's correct.

2 Q. And go ahead and complete the triangle
3 for us.

4 A. The same thing would be from F-65 to
5 F-52. We have an isograde point as a cutoff.
6 F-52 back to 162, both are above the cutoff
7 grade. The same thing going down from F-62 to
8 AEC-8. Both are above cutoff grade. F-62 to
9 P-21, both data points are above cutoff grade.
10 So there's no crossing. No line.

11 Q. Using that triangulation method, Mr.
12 Lane, what did you conclude with respect to the
13 mineralization in Section 2?

14 A. That the majority of Section 2 was
15 mineralized.

16 Q. Is the triangulation method something
17 that you have used for a long time in New Mexico
18 Potash?

19 A. I have used it ever since being on this
20 property.

21 Q. That would be since 1963?

22 A. 29 years.

23 Q. Now, look at Exhibit No. 5 in front of
24 you there, Mr. Lane. Do you have Exhibit 5 in
25 front of you, Mr. Lane?

1 A. Yes.

2 MR. HIGH: For the Commissioners'
3 information, I could have used Exhibit 38.
4 There's nothing different between the two.

5 Q. Look at Exhibit 5, Mr. Lane. Does that
6 document reflect the LMR as you revised it in
7 January of 1992?

8 A. It does.

9 Q. Based upon the core hole data you just
10 told us about?

11 A. Correct.

12 Q. This was the new LMR designation you
13 filed with the State and the BLM?

14 A. Yes.

15 Q. Now, after you filed this new
16 designated LMR with the State Land Office, did
17 you, thereafter, have some communications with
18 them concerning the new designation?

19 A. Yes.

20 Q. Tell me how that came about.

21 A. The LMR was sent in mid-January to the
22 State Land Department. In early February I
23 received a letter asking for additional
24 information.

25 Q. Look at Exhibit No. 10(a) and tell me

1 if that's the letter you're referring to.

2 A. Yes.

3 Q. Did you respond to that letter?

4 A. I did.

5 Q. Look at Exhibit No. 10(b) and tell me
6 if you could identify that?

7 A. Exhibit 10(b) is in response to the
8 letter of February the 10th from Mr. Prando,
9 which passes on the information that Hole 162 was
10 mineralized in both the 4th and the 10th ore
11 zones; and he also pointed out in his letter of
12 February 10th that sylvite mineralization also
13 existed in that hole instead of just langbeinite.

14 Q. Look at Exhibit 11 and tell me if
15 that's the letter you received from Mr. Prando
16 also.

17 A. It is.

18 Q. Now, in this letter, Mr. Lane, in the
19 first paragraph, Mr. Prando says that the
20 quality--and this is the last sentence in the
21 first paragraph, after he acknowledges that Core
22 Hole 162 does shows an economic accumulation of
23 sylvite, the last sentence says, "The quality of
24 ore is such that the southeast quarter of Section
25 2, Township 22 South, Range 31 East, contains a

1 commercial deposit." Do you see that?

2 A. Correct.

3 Q. Does a statement like that have any
4 basis at all in mining?

5 A. No, it doesn't.

6 Q. Why is that so?

7 A. The main reason, that the influence of
8 Hole 162 is not equal in all directions.

9 Q. Should it be?

10 A. It should be in this case, at least
11 minimum.

12 Q. What minimum distance or influence
13 should you give a core hole like 162, from your
14 experience?

15 A. My experience, half-mile by itself.

16 Q. So you would assume that whatever Core
17 Hole 162, the same type ore and the same type
18 grade would be found within a half-mile circle of
19 that core hole?

20 A. Correct.

21 Q. Has that been the system you've used
22 during the time you've been at the New Mexico
23 Potash facility?

24 A. I used 2500 feet, not the half-mile.

25 Q. Which is close to a half-mile?

1 A. Right. Oh, half-mile, yes. 2500
2 feet. Close to it.

3 Q. Instead of a half-mile, you just use a
4 straight 2500 feet?

5 A. Yes.

6 Q. Is that what you've generally used
7 throughout your work there at New Mexico Potash?

8 A. Yes, without information on the off
9 side of it, if I don't have any of the drill hole
10 data.

11 Q. Have you found that process to be
12 predictable with respect to what's out there?

13 A. Reasonably so, yes.

14 Q. Now, at the time Core Hole 162 was
15 drilled, you were aware, I take it, Mr. Lane,
16 that International Minerals and Chemicals was
17 interested in acquiring Section 2 from New Mexico
18 Potash?

19 A. I was aware of it, yes.

20 Q. Do you know whether or not they were
21 aware of some wells that were being proposed to
22 be drilled in Section 2?

23 A. Yes.

24 Q. Look at Exhibit No. 28, if you would,
25 please. What is that document, Mr. Lane?

1 A. Exhibit 28 would be the letter from
2 Michael Stogner to IMC Fertilizer, Incorporated,
3 in Carlsbad, dated November 5, 1991.

4 Q. What's the second page? Is that
5 dealing with Section 2?

6 A. Yes. Section 2, 22 South, 31 East.

7 Q. And it has reference to the possible
8 drilling of the very wells we're talking about
9 here?

10 A. Yes.

11 Q. What's the second page of that
12 document?

13 A. It's a letter from IMC Fertilizer,
14 Incorporated, to the New Mexico Oil Conservation
15 Commission, protesting wells in Section 2, 22
16 South, 31 East.

17 Q. And what's the date of that letter?

18 A. October 31, 1991.

19 Q. Now, without referring specifically to
20 the numbers, Mr. Lane, let me direct your
21 attention to Exhibit No. 25, please.

22 Do you have Exhibit No. 25 in front of
23 you, Mr. Lane?

24 A. I do.

25 Q. What are those documents, please, sir?

1 Just take the first page and explain them, if you
2 will. Explain to us what that document shows.
3 Don't refer to the numbers, just tell us what it
4 shows.

5 A. It is a copy of daily mine production
6 statistics.

7 Q. All right--

8 A. And it's the one for the last
9 production day of that month.

10 Q. Let's start with the left-hand column,
11 and let me ask you which one of these to
12 describe, because this document is marked
13 "Confidential."

14 The left-hand column, what does the
15 first entry, 8220 mean?

16 A. That's a mining machine number.

17 Q. Would the same be true for those below
18 that number?

19 A. It would.

20 Q. All those would be machines at these
21 various stages?

22 A. Individual machine numbers.

23 Q. And column 2, then, would be what?

24 A. Tons produced.

25 Q. What does the little mark--

1 A. Are you on the top line or on the
2 bottom?

3 Q. I'm on the top line.

4 A. Top line, second column, is the area in
5 which that machine and production came from.

6 Q. That would be 203, and what's that
7 entry after that? Is that an X?

8 A. I don't know what that is. It's
9 something.

10 Q. It has no meaning as far as you know?

11 A. Not right now.

12 Q. So Mining Machine 8220 on this
13 particular day was working in what we call Area
14 203?

15 A. It was.

16 Q. Now, I notice in the next couple of
17 columns there, there's entries for some mining
18 machines and no entries for the others?

19 A. That's correct.

20 Q. What does that mean?

21 A. It did not operate during that shift.
22 The first column was day shift, middle column was
23 afternoon, and the third set of numbers would be
24 night shift.

25 Q. Where would the day shift cut off? Is

1 the entire top portion of the document the day
2 shift?

3 A. No, just the top left set of numbers is
4 day shift. The center set is afternoon shift,
5 the right-hand side is night shift.

6 Q. Across the top one-half of the
7 document, it should be divided into three
8 columns?

9 A. Right.

10 Q. The first column being the day shift,
11 the next column being the second shift and the
12 third column on the right-hand, top side of the
13 page, being the third shift?

14 A. Third shift.

15 Q. And the numbers alongside the mining
16 machines would be the ore that was mined by each
17 of those particular mining machines?

18 A. That's correct.

19 Q. If there were no entries, it means that
20 that particular mining machine was not operating
21 that shift?

22 A. Not operating that shift, that's
23 correct.

24 Q. After "area" there's the column
25 "tons." I take it that's the number of tons

1 mined by that particular mining machine?

2 A. It is.

3 Q. The next column entitled K20, does that
4 show the grade of the ore that was mined by that
5 mining machine on that shift?

6 A. It is.

7 Q. All right. Let's drop down to the
8 bottom one-half of the page and again, the page
9 we're talking about is for September 28, 1989?

10 A. Correct.

11 Q. What does the bottom one-half of the
12 page show?

13 A. It's a summation of the upper lines,
14 the upper three shifts. It brings it down and
15 totals it for the day in the second column, month
16 to date in the third column. The day's grade in
17 the fourth column, and month-to-date grade in the
18 fifth column.

19 Q. So, by looking at these documents, you
20 could tell, on a daily or monthly basis, how much
21 ore was mined and the grade of that ore?

22 A. Yes.

23 Q. Now, all of Exhibit No. 25, Mr. Lane,
24 appear to be the same document. Is this just for
25 different periods of time?

1 A. Yes. I think there's six sheets here
2 and it runs from the last day of each month, from
3 September through January of 90. The line runs
4 through December. We're talking about 89.
5 Okay. September through January. This is
6 February.

7 Q. We have already seen, Mr. Lane, the
8 grade of the ore in Section 2. Now, I would like
9 for you to go with me through these documents,
10 and let's point out to the Commissioners the
11 lowest grade of ore on each page which we have
12 mined in our mine. Let's start with the first
13 page.

14 A. On a monthly basis or a shift basis?

15 Q. Let's go ahead and do it on a shift
16 basis.

17 A. Shift basis.

18 Q. What's the lowest that we mined on
19 September 28, 1989?

20 A. 10.94.

21 Q. Go to the next page and tell me the
22 lowest grade we mined on October 31, 1989.

23 A. 9.73.

24 Q. Next page is November 30, 1989. What's
25 the lowest grade in the mine?

1 A. 10.86 percent K20.

2 Q. Look that up on the top on the
3 afternoon shift?

4 A. I'm sorry. 10.57.

5 Q. And go to the next page, which is
6 December 31, 1989, and tell me the lowest grade
7 ore we mined?

8 A. 11.85.

9 Q. Go to the next page, January 31, 1990,
10 and tell me the lowest grade we mined.

11 A. 11.37.

12 [Commissioner Carlson is not present.]

13 Q. The next page was February the 28th of
14 19--

15 MR. HIGH: Should we wait on
16 Commissioner Carlson?

17 CHAIRMAN LEMAY: Two of us are all
18 that's necessary.

19 Q. Okay. Look at February 28, 1990, Mr.
20 Lane, and tell me the lowest grade ore we mined.

21 A. 9.22.

22 Q. If we continued throughout these
23 documents, we could determine on a daily basis
24 the grade of ore that New Mexico Potash was
25 actually mining?

1 A. Actually mining, yes.

2 Q. Does this document also show the tons
3 of ore that we take out of the ground and ship up
4 to the mills?

5 A. It does.

6 Q. Where would I go to find that number,
7 Mr. Lane? Let's go back to the very first page
8 of the exhibit, and tell me where it shows the
9 number of mined tons that we take out.

10 A. It would be in the lower set of
11 numbers, the third column, in the "total" line.

12 Q. So, under the column at the bottom, the
13 bottom-half of the paper, the column entitled
14 "tons," to the right there's a column with the
15 initials "MTD" at the top of it?

16 A. That's correct, the third column.

17 Q. And if I dropped down to the line under
18 that that says "total," which on this particular
19 document is 191028?

20 A. That's correct.

21 Q. That would give me the mined tons taken
22 out of the mine and sent to the surface?

23 A. Sent to the surface.

24 Q. That's month-to-date as of September
25 28, 1989?

1 A. That's correct.

2 Q. So that's roughly a month's worth of
3 production?

4 A. That's the last working day for that
5 month.

6 Q. Now, once we get the ore up to the
7 surface, Mr. Lane, we send it through a refining
8 process, I take it?

9 A. That's correct.

10 [Commissioner Carlson is present.]

11 Q. And we recover ore out of what we bring
12 up from underground?

13 A. Correct.

14 Q. Look at Exhibit No. 26, please, and
15 tell me if you can tell me what that is.

16 A. Exhibit 26 is month-end metallurgical
17 statistics, New Mexico Potash. This exhibit was
18 entered to show mill recovery, recovery of potash
19 from the total potash.

20 Q. Is that an internal document that's
21 kept by New Mexico Potash?

22 A. It is.

23 Q. And used in its potash business?

24 A. Yes.

25 Q. Are there any numbers that have been

1 removed from that exhibit?

2 A. All numbers except the actual recovery.

3 Q. And, of course, this document is
4 stamped "Confidential," is it not?

5 A. Yes.

6 Q. Can you, by looking at Exhibit No. 26,
7 determine on a monthly basis what your mill
8 recovery was of the ore that you mined as shown
9 on production curves?

10 A. Yes.

11 Q. Do these documents that are set forth
12 in Exhibit 26 show the mill recovery of New
13 Mexico Potash?

14 A. It does.

15 Q. Now, taking all those things into
16 consideration, Mr. Lane, is it your opinion that
17 New Mexico Potash has the capability of mining
18 the ore in Section 2?

19 A. I do.

20 Q. Let's talk in terms of getting down
21 there. You mentioned earlier that you have had
22 some involvement in mine planning during the
23 course of your, what, almost 30 years at that
24 property?

25 A. Correct.

1 Q. What is New Mexico Potash's plan with
2 respect to mining down towards Section 2?

3 A. Their plans have always been, and the
4 plans we've had in the past, whatever, to mine
5 all the reserves in that south ore body. That
6 extended down in the north line of Section 2 in
7 past planning. Since Drill Hole 162 was drilled,
8 it extended that area and it can be added to
9 existing plans.

10 Q. In your position at New Mexico Potash,
11 Mr. Lane, did you have responsibility over the
12 the haulage and belt lines and that sort of
13 thing?

14 A. Yes, that's taken into consideration in
15 yearly plans, long plans, short range, whatever.

16 Q. Looking at where New Mexico Potash is
17 currently mining, and let me refer you
18 specifically to Exhibit No. 38, which might be a
19 little easier to follow, it looks like the
20 southernmost penetration of New Mexico Potash's
21 mining is in Section 23. Do you see that?

22 A. Yes.

23 Q. Tell the Commissioners what additional
24 capital equipment, such as underground
25 transportation, belt lines, that sort of thing,

1 that New Mexico Potash would have to go out and
2 purchase to get down to Section 2?

3 A. Mr. Case testified to the
4 transportation end of that, which is available
5 and makes that range comply with state laws, I
6 mean time-wise, for travel. I want to correct
7 his statement of the other day on the amount of
8 conveyor belt that's in use at the present time.
9 I think Mr. Case stated 10 miles. That is plus
10 16 miles.

11 Q. Let's make clear, you say plus 16
12 miles. You don't mean 10 plus 16?

13 A. No, correcting it from 10 miles to 16
14 plus miles, and with mining plans, that amount of
15 conveyor belt would reach into Section 2 if
16 maintained, without new equipment.

17 Q. So to mine the ore in Section 2, New
18 Mexico Potash would not have to buy any
19 additional belt lines?

20 A. Just for maintenance. Maintaining the
21 additional structures.

22 Q. That's true today?

23 A. That's true everywhere.

24 Q. Whether we have Section 2 or not?

25 A. That's correct.

1 Q. To mine Section 2, we would have to buy
2 no additional belt lines, is that correct?

3 A. No. With a balanced mining plan, you
4 wouldn't have to have new footage.

5 Q. No new transportation equipment?

6 A. Yes, it will take some new
7 transportation equipment which Mr. Case
8 mentioned.

9 Q. Is that transportation equipment that
10 we would have to buy or which we now have?

11 A. Buy and modify ourselves. We have
12 some.

13 Q. We have some of the modified equipment
14 now?

15 A. In use, yes.

16 Q. Would it take a large purchase of
17 equipment for us to go down and mine Section 2?

18 A. No.

19 Q. Now, let's talk about getting to
20 Section 2, Mr. Lane. Mr. Hutchinson has done
21 some calculations and said it would take us a
22 whole lot of time to get down there. In fact he
23 said, according to his calculations, we only
24 mine, I think it was, 136 acres a year. Do you
25 recall that?

1 A. Yes.

2 Q. Do you agree with that?

3 A. I do not.

4 Q. He got his numbers, as he said, by
5 comparing the October 1, 1988 mine working map
6 that's on file with the State, along with the
7 January 1992, I believe it was, mine working map
8 that's also on file. Do you recall that?

9 A. Yes.

10 Q. Have you, yourself, compared those two
11 mine working maps and reached a calculation on
12 the number of acres that we have mined?

13 A. I did.

14 Q. Would you explain to the Commissioners
15 how you went about calculating the acres that we
16 mine by comparison of those two maps?

17 A. I had the LMR map and the mine working
18 map of October 89 and the one of January 92. All
19 I had was an off-breed scale to do it, but I put
20 it into square units of the change between the
21 two maps.

22 I added up the square units for the
23 change, the square units for one section, divided
24 the two to see how many sections were mined in
25 that 39-month period.

1 Q. What number did you come up with, Mr.
2 Lane, in terms of the acres mined per year, by
3 comparing the 88 to 92 mine working maps?

4 A. The numbers are over there.

5 Q. Do you have it written down somewhere?
6 Where is it?

7 A. The yellow--no, wait a minute.

8 Q. How many acres per year did you come up
9 with by comparing those two maps?

10 A. 293 acres per year.

11 Q. And it wasn't the most accurate scale.

12 A. It was a smaller scale.

13 Q. Do you feel like the 293 acres per year
14 is more accurate than the 136 that was testified
15 to by Mr. Hutchinson?

16 A. I do.

17 Q. Is there any reason or explanation you
18 think might exist for Mr. Hutchinson's
19 calculation of 136?

20 A. I don't know what it is.

21 Q. Are there any other ways, Mr. Lane, if
22 we want to put to bed the issue of how many acres
23 we mine a year, are there any other ways we can
24 make that calculation?

25 A. Yes.

1 Q. How would that be?

2 A. Looking at an average monthly tonnage,
3 take that to a yearly tonnage and relate that
4 back to acres.

5 Q. Let's refer back to Exhibit No. 25,
6 please, sir.

7 A. All right.

8 Q. How would you go about using the
9 production to determine the number of acres we
10 mine per year?

11 A. We could get an average monthly rate
12 off of these sheets for tonnage produced, move it
13 up to yearly rate. Then we could get it back
14 into acres, one acre, which is 43,560 square
15 feet, estimate the height--five feet for both
16 retreat mining and advanced mining--which gives
17 you a figure of some 218,000 cubic feet.

18 You divide that by our cubic feet per
19 ton for the ore we mine, which is 15.3. We come
20 out with an acre, that five-foot height
21 containing 14,235 tons in place.

22 Then estimating, since I don't have the
23 split here of the retreat areas to advance areas,
24 I used a figure of 65 percent extraction for
25 combined. That would give, one acre would have

1 9,252 tons per acre at that extraction.

2 The tonnage we used an average of, if
3 we looked at three sheets, 205,000 tons per month
4 or 2,460,000 tons a year. Dividing that by the
5 tons per acre, we come out at 266 acres per year.

6 Q. Now, using those numbers, Mr. Lane, or
7 in your experience, what would you project to be
8 the time for us to get down to Section 2, if you
9 know?

10 A. A reasonable mine plan for that area,
11 it must be within the next 10 years.

12 Q. And to mine Section 2, since it's on
13 the outside of our lease, what would be the
14 standard mining procedure, in terms of how you're
15 going to mine Section 2?

16 A. It would be mined in the same fashion
17 as we're mining today, in the other 10 areas.

18 Q. When you're driving down to mine
19 Section 2, would you drive down to the far lease
20 line and mine back, or would you mine on the way
21 down there?

22 A. You would try to make the lease line or
23 ore cutoff.

24 Q. Referring to Exhibit No. 38, you're
25 saying you would drive down to the south side of

1 Section 2 and then develop panels off into
2 Section 2 from that point?

3 A. No. The mine plan I would recommend
4 would be coming off our main entry system, which
5 is just on the left-hand side of the centerfold,
6 and develop south from there.

7 Q. And is that consistent with the
8 southerly direction that New Mexico Potash has
9 been mining over the last few years, Mr. Lane?

10 A. Yes.

11 Q. Looking again at Exhibit No. 38--and
12 you have that in front of you?

13 A. Yes.

14 Q. Let's look up at the top or toward the
15 northeast corner of the exhibit, in the green
16 part, where it says mined 4/1983. Do you see
17 that?

18 A. Yes.

19 Q. Tell us, Mr. Lane, why it is we stopped
20 mining there in 1983.

21 A. There was a decision of management to
22 consolidate workings and start the development of
23 the south, and also to stop development at that
24 point so that the northeast ore body would not be
25 cut up for long periods of time, any entries into

1 it.

2 Q. What is the northeast ore body?

3 A. Extending to the northeast of where it
4 says mined 4/83.

5 Q. Is that in the area where the state
6 leases are shown in red on Exhibit 38?

7 A. Yes, just to the west of 36.

8 Q. Did the decision to stop mining at the
9 point that mining was stopped in 1983, have
10 anything to do with state royalties?

11 A. No.

12 Q. Do state royalties play any role at all
13 in that?

14 A. None whatsoever.

15 Q. Do you know what the state royalties
16 were in 83?

17 A. Yes, they were lower than federal.

18 Q. If you had a state lease in 1983 and
19 you mined it, your royalty would be less than it
20 would be on the federal lease at that time?

21 A. That is correct.

22 Q. Now, looking over directly to the left
23 there, Mr. Lane, at the state lease that has
24 M15-171 and M19--looks like--393, do you see that
25 one?

1 A. Yes.

2 Q. That shows that mining took place in
3 and around that area from 1970 to 74?

4 A. Correct.

5 Q. You were, of course, with New Mexico
6 Potash at that time, right?

7 A. I was.

8 Q. Do you know why the remaining part of
9 that section was not mined?

10 A. That was what we considered cutoff
11 grade at that time.

12 Q. And what does that mean to a layman?

13 A. To as low as we wanted to mine it in
14 blending at that time.

15 Q. Have the grades that New Mexico Potash
16 can mine and process and sell, changed since
17 1974?

18 A. It has.

19 Q. Can you now mine lower grades than you
20 could in 1974?

21 A. Yes.

22 Q. Can you get back in to mine that state
23 lease?

24 A. Yes.

25 Q. How would you do that?

1 A. It would be in Section 2 of 21-31, the
2 state section that's in the red. It would be
3 Lease 14-957. There's an entry system going to
4 the northwest. It would be mined in conjunction
5 with the open ground in that area.

6 Q. As we look at the section just east of
7 the state lease that we're talking about here,
8 Mr. Lane, there's been some mining in that
9 section already, right?

10 A. Yes.

11 Q. The white part around the green slash,
12 is that ore?

13 A. Yes.

14 Q. Is that ore that will eventually be
15 mined?

16 A. Eventually.

17 Q. Let's go to the next section just east
18 of that one, that has mostly white in it but some
19 green.

20 A. Same thing.

21 Q. Does that have ore in it?

22 A. Same thing.

23 Q. That has yet to be mined by New Mexico
24 Potash?

25 A. Correct.

1 Q. The state lease toward the west will be
2 mined in connection with the same time when those
3 others are mined up there?

4 A. Correct.

5 Q. Do you know about the time period, Mr.
6 Lane, that the state royalties were less than the
7 federals? Do you recall about when that was?

8 A. Yes. I think the state went to a
9 sliding scale around January 1st of 1984. Before
10 that date, they were less.

11 Q. So, up until 1984, the state was less
12 than the federal?

13 A. Yes.

14 Q. And then in 1984, when the state went
15 to a sliding scale, it was equal with the
16 federal?

17 A. Uh-huh.

18 Q. Do you know at what point in time they
19 became unequal?

20 A. In 86, I think.

21 Q. Now, during the time you were drilling
22 Core Hole 162, Mr. Lane, you were talking with
23 Yates about their desire to drill the four wells
24 we're contesting here today, correct?

25 A. Yes.

1 Q. Look at Exhibit No. 29, please. That
2 appears to document a telephone conversation that
3 you had with Mr. Clifton May?

4 A. That's correct.

5 Q. On December 4, 1991?

6 A. That's correct.

7 Q. It goes on to say, "They," being New
8 Mexico Potash, "will not approve our locations.
9 Unless the tests are poor, we will not be able to
10 drill the wells at this time." Is that
11 essentially the conversation you had with Mr.
12 Clifton May?

13 A. That's correct.

14 Q. Look at Exhibit No. 30. Is that a
15 letter that Mr. May sent you--

16 A. It is.

17 Q. --inquiring about the test results in
18 Core Hole 162?

19 A. It is.

20 Q. Look at Exhibit No. 31. Is that a
21 letter you sent Mr. Clifton May on January 21,
22 1992?

23 A. It is.

24 Q. Let me show you, Mr. Lane, Yates
25 Exhibits 8(a), (b), (c) and (d). Did you receive

1 those letters?

2 A. Yes.

3 Q. Did they have attached to them either a
4 plat or an APD?

5 A. Not to my knowledge.

6 Q. All right. Let me show you Yates
7 Exhibit No. 8, which includes a letter dated
8 January 21, 1992, addressed to you, which says
9 it's enclosing copies of the APDs?

10 A. Yes.

11 Q. You did receive the APDs on these four
12 wells at that time?

13 A. At that time.

14 MR. HIGH: Mr. Chairman, at this time
15 we would offer into evidence Exhibits 2, 3, 4(a),
16 4(b), 9, 6, 7(a), 7(b), 8(a), 8(b), 5, 10(a),
17 10(b), 11, 25, 26, 29, 30 and 31.

18 CHAIRMAN LEMAY: Without objection,
19 those exhibits will be admitted into the record.

20 MR. HIGH: And we'll pass the witness.

21 CHAIRMAN LEMAY: Let's take about 10
22 minutes and then come back.

23 [A recess was taken.]

24 CHAIRMAN LEMAY: Okay. We'll start the
25 cross-examination now of Mr. Lane, by Mr.

1 Carroll.

2 EXAMINATION

3 BY MR. CARROLL:

4 Q. Mr. Lane, let's start, first of all,
5 with this concept of LMR. When you're defining
6 an LMR, what is your criteria? Do you use or
7 include a minimum grade cutoff to draw the
8 boundaries of your LMR?

9 A. Yes.

10 Q. What is the minimum grade that you use
11 to draw your LMR?

12 MR. HIGH: Excuse me, Mr. Chairman.
13 This is confidential information and it's shown
14 on the documents in evidence, and I would object
15 to bringing it out in here unless we go into
16 confidential session.

17 CHAIRMAN LEMAY: Can he identify the
18 document and, by pointing to the document, say is
19 this the grade?

20 MR. HIGH: I don't have any problem
21 with that.

22 CHAIRMAN LEMAY: Or could you write it
23 down on a piece of paper?

24 MR. CARROLL: I'm just looking for a
25 minimum.

1 CHAIRMAN LEMAY: It's the confidential
2 part he's having a problem with.

3 MR. CARROLL: That's fine.

4 Q. Can you tell me some reference?

5 A. The reference would be Exhibit 38.

6 Q. Yes, sir.

7 A. In the center, left-hand side, you see
8 the 10th ore zone? The red line under it?

9 Q. I see it. Okay.

10 A. Percent indicated will then draw up to
11 the red line.

12 Q. All right. Thank you. Now, when you
13 are in the LMR drawing process, do you give
14 consideration to barren areas?

15 A. Some, yes.

16 Q. Some. What is the basic criteria? How
17 do they influence an LMR?

18 A. There is some core data inside of those
19 barren areas or they wouldn't be drawn. I still
20 use triangles. They aren't completely blank.
21 There is some mineralization.

22 Q. Do you figure the ore in a barren area
23 as part of your ore reserves?

24 A. No.

25 Q. So at least within the areas, let's

1 say, that are drawn in barren areas on Exhibit
2 38, you exclude that area from your ore reserves?

3 A. Yes.

4 Q. Now, Mr. Case made a statement
5 yesterday that there were barren areas up in the
6 north part of the--north area of your mine, which
7 were barren but weren't indicated on this map as
8 barren.

9 My main question is, if that is, in
10 fact, a true statement, where would they be? Are
11 you aware of any?

12 A. North portion. Yes, there's two that
13 were left off.

14 Q. All right, sir. Where would--

15 A. And that would be in Section 5, 21-31.
16 It's still shaded as being unhatched in blue, in
17 Section 5, 21-31.

18 Q. All right. That's within the mined out
19 ore body, is that correct? These are the
20 abnormally sized sections, Section 5, because
21 they're not numbered "5," for the Commissioners'
22 benefit.

23 A. Yes, the upper tier of that township is
24 the correction line.

25 Q. These are barren areas that are within,

1 except for the one in Section 5?

2 A. Section 5, and the northeast corner of
3 Section 4 of 21-31.

4 Q. The one in Section 5 has been totally
5 mined around?

6 A. Yes, sir.

7 Q. And one in Section 4, there is at least
8 a small opening?

9 A. Yes.

10 Q. Any others that you're aware of?

11 A. Not that I can see.

12 Q. Okay. Now, when you're defining this
13 LMR, do you honor all core holes available?

14 A. Try to.

15 Q. You try to. You're aware of a core
16 hole numbered--or the nomenclature ERDA-6 that
17 was drilled in the 1970s?

18 A. Yes.

19 Q. You're also aware that ERDA-6 shows the
20 10th ore zone as barren, is that correct?

21 A. That's correct.

22 Q. And reference to your Exhibit No. 38,
23 ERDA-6 is in the southwest quarter of Section 35,
24 is it not?

25 A. No.

1 Q. Where is ERDA-6?

2 A. Southeast quarter of 35.

3 Q. You're correct. I misspoke myself.

4 The southeast quarter of Section 35?

5 A. Yes.

6 Q. Your LMR is approximately, not quite
7 but close to a half-mile further to the east of
8 ERDA-6, is it not?

9 A. This line, yes.

10 Q. And ERDA-6 is approximately a half-mile
11 from the nearest barren zone as depicted on your
12 map, is that correct?

13 A. That's correct.

14 Q. So, in fact, this LMR line did not give
15 credit to ERDA-6?

16 A. This line doesn't, no.

17 Q. And this line is your new LMR as of
18 1992?

19 A. The one that was sent in the LMR, as
20 originally sent in, had a dashed line on that
21 east side, questionable. And I think one of your
22 witnesses pointed that out.

23 Q. Now, you did know there was a
24 map--well, in fact it's Exhibit 38, you did
25 triangulation for three core holes, did you not?

1 I mean, you drew two triangles on Exhibit 38?

2 A. Yes.

3 Q. And utilized K-162, F-65, and--

4 A. There's three triangles on that.

5 Q. I see. You went up to F-52?

6 A. Yes.

7 Q. There are so many cross hatches, I'm
8 losing that one. Now, you could very well have
9 used ERDA-6 as a triangle, couldn't you, as part
10 of one of your points for triangulation?

11 A. I could have.

12 Q. And that could have, if you used that
13 triangulation method, that could very well affect
14 the number you're placing on the ore body in
15 Section 2, couldn't it?

16 A. It could, as connecting the LMR coming
17 down through Section 25, 24, to the Section 2.
18 There's ore indicated by the U.S.G.S. in 36,
19 also, but I don't know how much or what the
20 values are.

21 Q. Now, Mr. Lane, you say that you
22 normally give a sphere of influence to each of
23 these core holes of somewhere around 2500 feet,
24 close to a half-mile, roughly?

25 A. Yes.

1 Q. Now, you would also give that same
2 sphere of influence to a barren core hole?

3 A. Not to a complete barren hole, no.

4 Q. Not to a complete barren hole?

5 A. No.

6 Q. Why is that?

7 A. Past experience. Major large areas are
8 not completely barren, usually. There's usually
9 some mineralization in the larger ones. You can
10 find small areas. You can't give a definite area
11 of influence to a barren hole.

12 Q. But you can give it to good core holes?

13 A. Yes.

14 Q. You don't disagree with the statement
15 of Mr. Lammers that the mineralization that we're
16 looking at down here is fairly erratic?

17 A. By the barren areas that are shown, you
18 might say that.

19 Q. What about by the differing percentage
20 rates of K2O? Wouldn't that also tell you it's
21 pretty erratic, because they do differ
22 considerably?

23 A. There's a good range, yes.

24 Q. You also get a good range in the actual
25 heights where you find the percentages of or

1 where you can find potash?

2 A. Not too much change in the height.

3 Q. Between Core Hole F-52 and K-162,
4 you've got a difference of from 48 inches to 61
5 inches, don't you?

6 A. Yes.

7 Q. And then, if you drop down to AEC-8,
8 you've got 75 inches, right?

9 A. Coming up from the south, yes.

10 Q. In ERDA-6, you've got no inches?

11 A. I don't know what the bed was in
12 ERDA-6. There are inches of the 10th ore zone.

13 Q. Now, this barren zone we've got, this
14 big one here in Sections 26, 27, 22, you have
15 three core holes in there, don't you? K-157, 158
16 and 151?

17 A. I don't have it here in front of me,
18 but 157--I know of two right off.

19 Q. I'll show you what for reference, it's
20 our exhibit that Mr. Lammers testified to, No.
21 41. It has those core holes depicted, does it
22 not, 151, 157 and 158 with a K letter?

23 A. Yes.

24 Q. Just a general question. Were these,
25 you talked about a nine-hole program that you

1 drilled here in the last year. Were these part
2 of that nine-hole program, 151, 157 and 158?

3 A. No. 157 and 158 were.

4 Q. Okay. Do you recall what numbers
5 started that nine-number program just offhand?

6 A. K-153.

7 Q. K-157 and K-158 are on the southernmost
8 leading edge of this barren area, are they not?

9 A. They are.

10 Q. And you did not give a half-mile or
11 2500 feet reference to those?

12 A. No, I didn't.

13 Q. Those showed barren in the 10th ore
14 zone because you included those within your
15 barren area?

16 A. Within the barren area, low cutoff
17 grade.

18 Q. Let's look at your Exhibit No. 7(b),
19 please. I think it's 7(b).

20 A. Just a second. I didn't get this
21 exhibit book back together right. What exhibit
22 is that?

23 Q. 7(b), as in boy.

24 A. I have it.

25 Q. I guess that is the recapitulation of

1 Core Hole F-65?

2 A. That is correct.

3 Q. And Core Hole F-65 formed one of the
4 legs of your triangulation of the three
5 triangles, did it not, in the very corner of
6 Section 34--

7 A. That is right.

8 Q. --on your Exhibit 38. Now, you show on
9 Exhibit 38, 9.19 percent K2O with--

10 MR. HIGH: Excuse me, Mr. Chairman,
11 again I have the same problem.

12 CHAIRMAN LEMAY: I agree.

13 MR. CARROLL: I'm sorry.

14 Q. You have on your Exhibit 38 a number,
15 do you not?

16 A. Yes.

17 Q. If you look at Exhibit 7(b), when you
18 go down to the 10th ore zone under the beds
19 analyzed, I find a number that is only one-third
20 of that. Do you see what I'm talking about?

21 A. Yes.

22 Q. We have no way of correlating that
23 number to the one on your Exhibit 38?

24 A. It's a combination of the first two
25 numbers under the K2O in that deal. And the

1 height, the bottom portion of that, of the bed
2 itself, that's the total height of the 10th ore
3 zone.

4 Q. New Mexico Potash does not have the
5 ability to process carnallite, does it?

6 A. In certain amounts, yes. It's soluble.

7 Q. Where it's two-thirds of the product?

8 A. In limiting blending, yes.

9 Q. How much is "limited"?

10 A. One unit, or something in that area.

11 Q. One unit--

12 A. One mining unit, at the most.

13 Q. When we're talking about mining units,
14 is that a weight measurement?

15 A. No. One mining area. And maybe
16 limited scheduling. It can be controlled.

17 Q. It creates problems and it has to be
18 watched very carefully?

19 A. Yes, sir.

20 Q. Now, did you combine carnallite with
21 sylvite on any of these other core holes to
22 arrive at the--

23 A. Not that I know of.

24 Q. So this is the only one that we did
25 that to, as far as you understand?

1 A. To my knowledge at this time, yes.

2 Q. Now, this nine-hole core, as Mr. Case
3 told us that there had not been a coring program
4 for several years out here in New Mexico Potash,
5 and then there was a management decision to do
6 these nine, what was the criteria that you picked
7 the first nine before you got to 162?

8 Why did you pick those? As a general
9 comment, and I'm not trying to get you to go
10 through each one, but generally what determined,
11 what was the criteria that you used to determine
12 where we're going to put our core holes?

13 A. Short-range mining plans.

14 Q. Short-range mining plans. So the
15 placement of these core holes was in advance of
16 or in the areas where you were mining then, I
17 take it?

18 A. Right.

19 Q. Now, K-162 was not determined on the
20 basis of short-range mining plans, was it?

21 A. No, it wasn't.

22 Q. How was the exact location of K-162
23 picked or determined, as opposed to the southwest
24 quarter, the northwest quarter, or the northeast
25 quarter?

1 A. No scientific way, I'll put it that
2 way. That's where I put the availability of
3 roads and a fair location.

4 Q. It was almost like throwing a dart in a
5 dart board?

6 A. Or a rabbit sitting under a mesquite
7 bush. In the same general area, yes.

8 Q. We've had a lot of discussion about the
9 core holes that are drilled by potash companies,
10 and we saw depicted in earlier testimony, I think
11 by Mr. O'Brien, we have two exhibits that
12 depicted that. In one example we've been able to
13 determine that the core holes are drilled fairly
14 rapidly, they're drilled all the way down, cored,
15 and then cement is put in without any casing.

16 Then there was another example that
17 there was actually casing set through water
18 bearing strata, it was mudded in rather than
19 cemented; when the coring was done, cement was
20 put in the hole.

21 Are those the general methods used by
22 your company and, to your knowledge, any other
23 companies, for the coring and then the cementing
24 of that core hole?

25 A. New Mexico Potash and Kerr-McGee has

1 never cased.

2 Q. So those two examples would be
3 representative of how New Mexico Potash does a
4 coring operation with respect to the issue of
5 plugging it?

6 A. One of those examples. The one without
7 casing.

8 Q. So New Mexico Potash, then, just never
9 uses casing, then?

10 A. No.

11 Q. Casing, like the mudding, does that
12 increase the cost of the coring operation?

13 A. It will raise it some.

14 Q. Why don't you use it? Is there a
15 reason why or a management decision why you've
16 elected not to use it?

17 A. Yes.

18 Q. What is that, Mr. Lane?

19 A. In our general area of Lea and Eddy
20 County, the culebra and the magenta are nearly
21 dry of water.

22 Q. You have a number of core holes that
23 have actually been mined through, have you not?

24 A. Yes.

25 Q. Have you ever encountered a problem

1 with leakage of any kind of liquid when you've
2 gone through these plugged core holes?

3 A. No problem.

4 Q. We heard from Mr. Case that there were
5 some large tailing dams and tailing ponds. Are
6 any of the tailing dams which hold these ponds of
7 water, are they located over second-mined areas,
8 to your knowledge?

9 A. The coarse tailings pond is over some
10 second mined.

11 Q. Would that be the dam and the pond,
12 both?

13 A. Yes.

14 Q. What's about the size of that coarse
15 tailing pond?

16 A. Approximately one section, including
17 the catch basin, the tailings pond, and a runoff
18 basin.

19 Q. All right. Now I notice, too, there's
20 one thing about this Exhibit 38, where when you
21 say this is your LMR, that's not your complete
22 LMR? This is only for the area of concern, is
23 that correct?

24 A. That's correct.

25 Q. The LMR that you have drawn on Exhibit

1 38, actually a good portion of it is not on
2 acreage that New Mexico Potash owns or controls,
3 is it?

4 A. That's correct.

5 Q. Was the only change in your LMR from
6 the 1990 or 88 version to the 92, did the only
7 change occur in Section 2 to your knowledge?

8 A. No. Some of what you're calling barren
9 areas, which are what they're called on the map,
10 were added.

11 Q. Did you accept that this area of
12 Section 2, did you push your LMR downside
13 boundary to include more acreage as you've done
14 here? Was this the only example of that?

15 A. One area was extended.

16 Q. Was that in the area where you
17 purchased new leases?

18 A. Purchased new leases?

19 Q. Or acquired.

20 A. Not as of this date.

21 Q. So there's at least one other area
22 where you moved the LMR to acreage you don't own?

23 A. Right.

24 Q. As just a general proposition, Mr.
25 Lane, do you think it's unfair to object to

1 drilling of oil wells which are inside an LMR
2 when you don't control the lease acreage?

3 A. I don't. I consider that as a possible
4 reserve and try to protect it. We lease them as
5 needed and, at times, we're ordered to cross out
6 of our lease line and continue mining.

7 Q. Now, you were part of the original team
8 that went down and started this whole mine, as I
9 understand it?

10 A. Yes.

11 Q. When you were getting ready to sink
12 your shaft and you were--apparently, there was a
13 program where you went out and drilled core holes
14 first, right?

15 A. Yes.

16 Q. Did you give a half-mile or 2500 feet
17 sphere of influence to those core holes you were
18 drilling when you were trying to decide on the
19 location of your shaft?

20 A. I was not there for some 92 core tests,
21 the original core tests, which went into the
22 initial planning and decision to build a plant.

23 Q. Well, isn't it a fair statement that
24 Kerr-McGee would not have given a sphere of
25 influence for single core holes of a half-mile

1 when they were just trying to determine where to
2 set that mine shaft, judging by the number of
3 core holes you're talking about, just by that
4 alone, the 92 core holes?

5 A. The policy, I don't know exactly what
6 that policy was.

7 Q. Now, when we were talking about, you
8 said the main--I guess when you were deciding and
9 you say this is going to be the consideration
10 that guides you in the development of Section 2,
11 is that when you strike off in a direction, you
12 usually go to the lease limit or the limit of the
13 ore, is that correct, and then you stop there and
14 work back?

15 A. Generally, unless there's indicated
16 ore. If you run into an unexpected barren area
17 or below-grade ore, if there's indicated ore on
18 the other side, you'll decide possibly to take
19 and drive through it.

20 Q. That's a decision that's governed by
21 economics, isn't it?

22 A. You might say that.

23 Q. Well, let's go up to the northeast
24 corner of your mine here on Exhibit 38, where you
25 stopped your mining in 4/83 just adjacent to

1 Section 36, the state lease acreage?

2 A. Uh-huh.

3 Q. Now, you told us that mine management
4 decided to move to the southernmost part of your
5 ore reserves and leave that area, is that
6 correct?

7 A. Yes.

8 Q. Was that an economic decision?

9 A. In part. It was two-fold there.

10 Q. You didn't go to the lease lines or the
11 end of the ore body with respect to that mine
12 shaft in April of 1983, did you?

13 A. No, we didn't.

14 Q. What was the economic consideration
15 that stopped you there?

16 A. We were working in what they call the
17 southwest ore body, finishing up over in an area
18 to the east. The decision was to come back and
19 start the development of the south and reserve
20 the east for a later date, without cutting up
21 that block of ore, and leaving the entry standing
22 as long as it might be.

23 Q. There's plenty of ore up there in the
24 northeast, isn't there?

25 A. Yes.

1 Q. Now, when we talk about the royalty on
2 this state acreage, some of your acreage out here
3 also has overriding royalties that go to persons
4 other than the State of New Mexico?

5 A. That is correct.

6 Q. Section 36 and 31 have some of those
7 overriding royalties?

8 A. There is sections. I'm not sure which
9 ones.

10 Q. You just don't know if Section 36 has--

11 A. Not right now, no. I don't have the
12 list with me.

13 Q. Isn't it true that when we look at the
14 lease burden and the economics of mining a
15 particular area, you don't look just at the
16 federal or state royalty but you look at all
17 burdens on that acreage, don't you?

18 A. To my knowledge, royalty has never
19 entered into mine plans, starting or stopping of
20 an area, in any decisions.

21 Q. But economics dictated that you
22 completely leave the area of the northeast and
23 move down to the south?

24 A. Possibly, yes.

25 Q. How important is it to mine close to

1 your shaft?

2 A. You leave a barrier pillar, and within
3 that pillar you have limited extraction.

4 Q. How important is it when you're
5 planning your mine faces, the mining faces, such
6 as where you've got your current areas of
7 mining? How important is that to get them close
8 to your shaft?

9 A. It's important, yes.

10 Q. From an economic standpoint it's
11 important, isn't it?

12 A. Safety and possible damage through
13 subsidence.

14 Q. Section 2, the mining in Section 2
15 would be the farthestmost point that you've ever
16 mined from your shaft, wouldn't it?

17 A. Yes, sir.

18 Q. And you've said that right now that New
19 Mexico Potash does have approximately 16 or so
20 miles of conveyor capacity, and that would get
21 you to Section 2, wouldn't it?

22 A. Yes.

23 Q. But that would mean that you would have
24 to stop mining in other areas and you would have
25 to concentrate your mining in just one area?

1 A. No.

2 Q. What other areas, if you drove down
3 into Section 2, would you be mining at?

4 A. As I said, the main entry or main
5 access, it would be my access, what I would do,
6 would be this main entry system, which is to the
7 left of the centerfold of the map. You would be
8 mining to the west of that, along with the south
9 down here. There would be different blocks
10 coming back along that belt line.

11 MR. HIGH: With Mr. Carlson out of the
12 room, do you want to break now?

13 CHAIRMAN LEMAY: I thought I'd let him
14 get through with his point.

15 MR. HIGH: I would like to have all
16 the Commissioners here. Yates had the benefit
17 of having all three Commissioners and I would
18 request the same. I would like to adjourn when
19 someone has to leave.

20 MR. CARROLL: I can stop. It won't
21 bother me at all.

22 CHAIRMAN LEMAY: You might want to pick
23 it up again after the recess.

24 MR. CARROLL: Sure.

25 CHAIRMAN LEMAY: I'm sorry for our

1 schedule.

2 MR. HIGH: That's fine. All I ask is
3 that my witnesses be heard by all three
4 Commissioners. And I understand budget hearings,
5 so whatever you need is fine with me.

6 CHAIRMAN LEMAY: We'll come back at
7 12:30.

8 [The noon recess was taken.]

9 CHAIRMAN LEMAY: We shall continue.
10 Before lunch, Mr. Carroll, you were
11 cross-examining Mr. Lane.

12 EXAMINATION RESUMED

13 BY MR. CARROLL:

14 Q. Mr. Lane, I think right at the close of
15 our morning session, I had just asked you a
16 question concerning if you had run your conveyor,
17 the conveyor belt or systems that you now have,
18 run them down to Section 2, I had asked you
19 whether or not that would allow for additional
20 mining off in other areas, and I think you told
21 me it would?

22 A. It would.

23 Q. Now, in order to accomplish that mining
24 in other areas, would that require you to
25 purchase any new conveyor belts or systems at

1 all?

2 A. I don't think it would.

3 Q. Turn to your Exhibit 38, would you,
4 again. Let me ask you a question. There are
5 three areas that are termed current area of
6 mining. Let's start with these on the right-hand
7 side here, on the east edge. There's one above
8 each other.

9 The ones up above Section 22, do you
10 intend to mine out that particular area before
11 going to Section 2?

12 A. Yes. The section right above 22, yes,
13 it would be mined out.

14 Q. All of that white area above Section
15 2. It seems you have a number of belts and
16 tunnels going in different directions. You're
17 saying you would intend to mine all of that area
18 before going to Section 2. And would that also
19 include driving to the lease line over here that
20 runs north and south along the eastern edge of
21 Sections 24 and 25 and the section above that?

22 A. The area which would be Section 13,
23 north of 24?

24 Q. Yes.

25 A. 13 and 12 would follow the mining of

1 the section above 22, in the west half of Section
2 14.

3 Q. Would that include both first and
4 secondary mining?

5 A. In that portion there, yes.

6 Q. What about this current area of mining
7 over here to the left side of your map? Do you
8 intend to turn those tunnels back to the west and
9 drive all the way to the lease line there before
10 going to Section 2?

11 A. Looking at the bottom of that M-651
12 lease where it says current mining areas?

13 Q. Yes.

14 A. West of the word "current," there's
15 some drifts turned off and they are proceeding
16 west, also, west and south.

17 Q. So before you get to Section 2, you
18 would intend to drive to the lease line and mine
19 that, is that correct?

20 A. That west side, yes.

21 Q. Really the term "ore body," many times
22 New Mexico Potash, that ore body, you're talking
23 about blocks of ore, and New Mexico Potash has
24 gone out here and classified blocks and they
25 would go in and mine that block and move into

1 another block? Isn't that really the way you do
2 it?

3 A. Blocks?

4 Q. Blocks.

5 A. No, we had a northwest ore body and a
6 northeast ore body, a southwest ore body and now
7 the south ore body, not as a block.

8 Q. Let's look to the north of your Lease
9 No. M-651, the full section of that lease. You
10 say this was a mined area. It starts 6/79 and
11 ends 5/81; is that correct?

12 A. That's correct.

13 Q. That would mean that in that area, the
14 secondary mining terminated at the end of the
15 1981--

16 A. --period there. Yes.

17 Q. Then you see there's a block even
18 further away from your mine shaft, to the west,
19 which shows that it would begin mining and
20 actually terminated almost a year later?

21 A. That is correct.

22 Q. So you didn't drive all the way to the
23 end and secondarily mine and work back towards
24 your mine shaft, did you?

25 A. This one case here, this last panel

1 came out before the entry system was retreated
2 back, for access to that part over there we mined
3 from 80 to 82. We still had an entry system
4 through there.

5 Q. But you did not mine all the way--just
6 totally mine and retreat from that area until
7 1982, did you?

8 A. Not completely, no. We found more ore
9 out in this other area than we planned on.

10 Q. Well, is it the finding of the more ore
11 that somehow affects your driving to the lease
12 line?

13 A. That lease line moves. That was a new
14 lease, that south half of the north half of 13, I
15 think it is.

16 Q. Just one question, and it just occurred
17 to me as I was looking here. When we were
18 talking with Mr. Case, he was pointing out the
19 oil wells, there were three of them. I'm not
20 sure that we actually got them pinpointed. I
21 made a note to myself that we didn't. You're
22 familiar enough with this map and you can point
23 out the oil wells? I just noticed the dry hole
24 symbol in this area we were talking about?

25 A. Yes, I can.

1 Q. Would you, so that we do know what
2 we're talking about?

3 A. It shows one in the southeast quarter
4 of Section 8, 21-31.

5 Q. That's just above Section 17 or just
6 diagonally offset from this M-651?

7 A. Right, to the northeast.

8 Q. That dry hole symbol, I guess the dry
9 hole symbol, that's the well?

10 A. That's correct.

11 Q. Where's the next one?

12 A. Section 14, just a little southwest of
13 the plant site or the shaft area.

14 Q. It's right snuggled up in that corner
15 of that section, isn't it, the northwest corner?

16 A. Pretty close.

17 Q. Is that an entry or development shaft
18 that runs north and south there?

19 A. That is right.

20 Q. That well is right against that, is
21 that correct?

22 CHAIRMAN LEMAY: You have to find that
23 one again for us.

24 A. You see where the mine shaft symbol is,
25 pointing up to this dark area right in the

1 center? It's in Section 4, Section 14, the next
2 section to the southeast in the northwest
3 corner.

4 MR. CARROLL: Do all three of you see
5 that one now?

6 A. That's Section 14. No, not 14. 12,
7 11, 10. Section 10.

8 CHAIRMAN LEMAY: That would be 10, not
9 14?

10 THE WITNESS: Section 10. I'm sorry.

11 Q. And there is a third one up close to
12 the area where it says mined 4/1983?

13 A. Yes, up in Section 35 of 20-32.

14 Q. Starting back with the last one we
15 talked about, do you know the distance that your
16 mine shaft is actually from the wellbore in
17 Section 35?

18 A. At least 200 feet.

19 Q. The one down here in Section 10, do you
20 know how close that one was?

21 A. The same. We mined with the 200 pillar
22 around it.

23 Q. The third one to the east, was that a
24 200-foot pillar?

25 A. That's approximately 400 off the main

1 drifts heading northeast.

2 Q. Is it in a pillar, then?

3 A. Yes, it's in a pillar.

4 Q. This is in a secondary mined area, is
5 that correct?

6 A. Where is that, out in the east?

7 Q. No, the one to the west.

8 A. The one in the west is.

9 Q. It's in a pillar?

10 A. Uh-huh.

11 Q. The size of that pillar, then?

12 A. That was 200 feet.

13 Q. When we were talking about the change
14 in the royalty rates, you said it was in 1984
15 that New Mexico went to the sliding scale?

16 A. Yes.

17 Q. In this area, when you stopped mining
18 up there in the northeast, was in April of 1983.
19 You were aware before 1984 that the change was
20 coming, weren't you?

21 A. I don't think I was. I wasn't.

22 Q. That change was dictated by the
23 legislature, wasn't it?

24 A. I don't know.

25 Q. When you say you don't use royalty in

1 your calculation, can you say that the management
2 of the mine does not consider royalty?

3 A. I think I can, yes. I've sat in on
4 budgets.

5 Q. Did I understand you that in an overall
6 sense, you expect to mine Section 2 completely
7 before returning back to the north part of your
8 mine area, this area where mining was stopped
9 back in the early 80s?

10 A. I would say Section 2 would be mined
11 before we go west--I mean going to the
12 northeast. There would still be mining in the
13 south but not in Section 2. It would be
14 retreating the entries out in the remaining ore.

15 Q. Mr. Case indicated that you could tell
16 us approximately how much fresh air would be
17 circulating by the work faces. There is a
18 federal requirement?

19 A. Yes.

20 Q. What is the federal requirement?

21 A. The federal requirement, I think, is
22 9000 cubic feet in the last open break.

23 Q. That's cubic feet per minute?

24 A. Yes.

25 Q. Across the mine face?

1 A. The last opening.

2 Q. Your main entryways for air, are they
3 up here in the areas around the mine shaft for
4 ventilation of your mine?

5 A. They're located in this main area, yes.

6 Q. Now, if you drive down to Section 2,
7 you're going to have to move the air that you
8 ventilate your mine with, then, from the mine
9 shaft all the way down to Section 2?

10 A. That's correct.

11 Q. Have you done any calculations--well,
12 first of all, you lose some of your velocity, you
13 can't just put fans up here at the shaft and
14 expect it to go all the way to the mine working
15 faces, can you?

16 A. No.

17 Q. You have to increase or put booster
18 fans, I take it, all the way along?

19 A. That's correct.

20 Q. Does the fact that your mine enlarges,
21 are you able to channel your air so that you're
22 not losing air off into areas that have already
23 been mined and that sort of thing? Can you
24 pretty well predict the volume of air you're
25 going to need as you go into your mine?

1 A. Yes, we have moved the air
2 satisfactorily.

3 Q. Have you done any calculations on what
4 the additional cost will be to move air from your
5 mine shaft all the way down to Section 2?

6 A. No, I haven't.

7 Q. That, at least, as a general
8 proposition, is going to involve some additional
9 boosting and capital outlay to increase your air
10 flow all the way down there, is that correct?

11 A. I don't know about the capital outlay.
12 We have booster fans now throughout, and they'll
13 be moved as areas are retreated and reused and
14 relocated.

15 Q. The same way with problems of
16 electrical power, and your continuous miners are
17 electrically powered, are they not?

18 A. Correct.

19 Q. You're going to have to lay electric
20 lines and compensate for, if you're coming from
21 the mine shaft, you do have electricity loss and
22 those things where you'll have to step it up so
23 that you have a sufficient amount of power to run
24 your continuous miners, don't you?

25 A. Correct.

1 Q. And that is additional cost? The
2 farther you get away from that, that's an
3 expensive item, isn't it?

4 A. Yes, but we've already installed a
5 borehole in the south portion of the mine, and we
6 have new power located in the south part of the
7 mine now. It's not coming from the shaft area.
8 It's already there.

9 Q. But you'll have to run lines all the
10 way down into Section 2, then, to convey that
11 power?

12 A. Correct.

13 Q. Where is that location, just roughly?

14 A. Section 15, which would be south of
15 that indicated barren area that's cut by the main
16 drift going south. In that corner down here,
17 below the barren area, in that corner in Section
18 15.

19 Q. That would be just above what is marked
20 Section 22?

21 A. Right, in the next section up in the
22 southwest corner.

23 Q. All right. That particular area is
24 about two miles from the shaft, is it not?

25 A. About two and a half.

1 Q. All right. When you're having power
2 loss problems already down here on the southern
3 advance of your mining, that necessitated--

4 A. No. When we put in this new borehole,
5 we compensated for that by--before, we only had
6 4,160-volt primary, and we now have 13,000
7 primary coming down into the mine, which doubles
8 or triples the distance.

9 Q. Mr. Lane, we've had indicated, I think,
10 and correct me if I'm wrong, I believe Mr. Case
11 indicated that for the year 1991, you were mining
12 about 400,000 tons of product, or selling 400,000
13 tons?

14 A. Selling.

15 Q. And that is approximately 60 percent
16 K20, is that correct?

17 A. 62 percent K20.

18 Q. Is that what the market sets the level
19 at and you meet that market, then, that level of
20 purity?

21 A. That level is purity is from our mill.
22 Our mill is set for that.

23 Q. For the year prior to 1991, do you
24 recall how many tons of product you sold,
25 roughly?

1 A. No, I don't.

2 Q. Was it in the order of 400,000 tons?

3 A. In the order of it. Somewhere in
4 there.

5 Q. Do you think it was less or more?

6 A. I'm not sure. It's in that range or
7 should be.

8 Q. As a proposition, over the last three
9 or four years, has the amount of product you've
10 been selling going down or going up?

11 A. Going up.

12 Q. Do you have any idea, percentage-wise,
13 what it is? One or two percent or anything like
14 that?

15 A. No, I don't.

16 Q. Do you recall what the lowest amount
17 was in the last five years that you may have
18 sold?

19 A. No. I do not know.

20 Q. If you would, I want to run through a
21 calculation here, and I'm just about through with
22 my cross-examination, what you have told us is
23 that your mine is capable of, what you're
24 figuring, I think you said you used a scale to
25 measure your map or the map that's been

1 submitted, basically you've been mining at a rate
2 of roughly 265 acres per year, is that correct?
3 Is that what you testified to?

4 A. Around that number.

5 Q. And I believe you gave me a number,
6 there are 43,560 square feet per acre, and that's
7 just a normal--

8 A. Right.

9 Q. That's a volumetric calculation, I
10 guess?

11 A. Correct.

12 Q. So that's 43,560, and is that square
13 feet or cubic feet?

14 A. Square feet.

15 Q. And I think you said that for your
16 calculation you were using an average mining
17 height of approximately five feet?

18 A. Approximately five. Five feet for that
19 period.

20 Q. So to find out the square feet that you
21 would be mining in a five-foot mining height, you
22 would need to multiply this figure here, the
23 43,000, times five feet, right?

24 A. Correct.

25 MR. CARROLL: Let me borrow a

1 calculator.

2 MR. HIGH: Here's a calculator.

3 Q. All right. By my calculations, and if
4 you check me, if you multiply five times 43,000,
5 you end up with 57,717,000 cubic feet or square
6 feet cubed?

7 MR. HUTCHINSON: Cubic feet.

8 Q. That's cubic feet, right? Is that the
9 right number?

10 A. No.

11 Q. Okay. What is the number?

12 A. Well, if you had a 10-foot mining
13 height you would only have 435,000 cubic feet.
14 You got 57 million cubic feet?

15 Q. Well, tell me what the number is.

16 A. 217,800.

17 CHAIRMAN LEMAY: Why don't we break for
18 a minute.

19 MR. CARROLL: No, I can figure this out
20 now.

21 Q. All right. What I haven't done, and I
22 goofed up here, we should have multiplied 265
23 times this first of all, isn't that correct, if
24 we're going to try and determine how many feet
25 are in this mined-out area?

1 A. Go ahead.

2 Q. If we multiply 265 times 43,560, and
3 then multiply that figure times five feet, you
4 would end up with this number, wouldn't you?

5 A. Correct.

6 Q. And that would be, if we're mining 265
7 acres, that would be the cubic feet of ore that
8 we would remove at a five-foot mining height from
9 an acre, or from 265 acres of land?

10 A. Correct.

11 Q. I am going to put "cubic feet of ore"
12 here, in this 265-acre plot.

13 Now, let's convert this to tons. I
14 have been told that there are 5.3 cubic feet per
15 ton.

16 MR. HUTCHINSON: 15.3.

17 Q. Excuse me, 15.3 per ton.

18 A. 15.3 is correct.

19 Q. Now, the first step in converting how
20 many cubic feet we have per ton, we would then
21 take the 57,717,000 and divide that by 15.3, is
22 that correct?

23 A. That's correct.

24 Q. And this number here, would that not be
25 3,772,353? Would that be correct? I would just

1 ask you to check my math.

2 A. Yes.

3 Q. So, this number here, this 3.7 million
4 tons, would be, if we mined out this 265 acres,
5 we've now converted that area to tons, and this
6 is how many tons of material are being removed,
7 right? Would you agree with me?

8 A. Keep going.

9 Q. Now, if we're going to convert this
10 tons of ore mined, then, to tons of product, we
11 need to then determine how much--because really
12 you mine a lot more ore than you actually end up
13 with product? That's a gross way of saying it?

14 A. Correct.

15 Q. So, what we have to do, then, is
16 convert this gross number here to our product.
17 And, for purposes of this illustration--and I'm
18 not trying to be exact but I think we can
19 illustrate this--is that looking at your Exhibit
20 25, which has all these average numbers in it,
21 and then looking at the exhibit that Mr. Herrell
22 prepared, a ballpark figure for the average ore
23 being mined would be roughly 14 percent? That is
24 a ballpark figure?

25 A. Within the ballpark, yes.

1 Q. Let's use 14 even, which is an easier
2 number to divide, but it's a closer number
3 representative of your mind and what Mr. Herrell
4 said. You say your mill is putting out 62
5 percent, is that correct?

6 A. 62 percent.

7 Q. And isn't it true, though, that the
8 market that the industry is looking at is roughly
9 60 percent? That's what the buyers expect for
10 the potash that's being shipped?

11 A. The majority of it, yes.

12 Q. 60 percent is also a nice round, easy
13 number. Now, to be able to use this and to
14 convert this, what you do is to divide, and the
15 common practice is to divide this number into
16 this number, and then take the reciprocal, that
17 is, dividing the results here into one, and you
18 come out with a figure which tells you basically
19 how many tons of ore it takes to produce a ton of
20 potash? Isn't that the formulation that potash
21 miners go through?

22 A. No.

23 Q. What is the formulation or do you even
24 try to formulate that?

25 A. We do it all the time. There's two

1 factors missing. There's mill recovery and mine
2 extraction.

3 Q. How does mill recovery affect the
4 number that I was talking about?

5 A. Product tons are produced by the mill.
6 There is losses to any mill. You don't recover
7 100 percent of the potassium chloride you send to
8 the surface.

9 Q. Do you know about how much that rate
10 is?

11 A. Approximately 80 percent, as shown in
12 the exhibit.

13 Q. You lose 80 percent or you get 80
14 percent?

15 A. 80 percent is what we recover.

16 Q. Is that representative of the industry?

17 A. I couldn't say.

18 Q. And then what was the other? You said
19 mill recovery rate and what other factor?

20 A. And mine extraction.

21 Q. What is that?

22 A. We do not take 100 percent of the ore
23 in an acre.

24 Q. And when you did your compilation, you
25 used approximately 60 percent, is that right?

1 A. 60, 65 percent.

2 Q. Mr. Case testified yesterday it was
3 somewhere between 75 and 80 percent?

4 A. That is on second mining.

5 Q. All right. Are you saying that 60
6 percent is not second mining, and you weren't
7 using the second mining rate when you were
8 figuring this?

9 A. No.

10 Q. Oh, you were not using a second mining
11 rate?

12 A. No. We're doing development mining and
13 second mining at the same time, every day. So
14 it's not maximum, it's not minimum.

15 Q. Wouldn't you agree with me if you mine
16 14-percent ore and you sell 60-percent ore,
17 you're in fact taking care of the problem of your
18 mill and mine recovery?

19 A. No.

20 Q. Well, if you're trying to determine--
21 Let's define what we're trying to determine.

22 A. All right.

23 Q. If we're trying to determine exactly
24 the amount of material being moved out of a mine
25 and then classify that amount in terms of acres,

1 you can do it as I describe?

2 A. You're starting to get on the right
3 track, but you haven't completed it.

4 Q. Let's finish my computation here, and
5 I'll tell you up front, what I'm trying to do is
6 determine right in here exactly the amount of
7 ore, I guess determine the ore that is being
8 mined here, and then recompute that into
9 acreage.

10 So, if we do the calculation that I
11 formed here, it would be dividing .233. The .233
12 would be this computation dividing 60 percent
13 into 14 percent. And then if we do this, what
14 we're ending up with is 4.29? What we're trying
15 to do here, what this number is, if you'll agree
16 with me, it takes 4.29 tons of ore to give you
17 one ton of potash? Do you follow my calculation
18 now to where I'm going?

19 A. No, I can't follow that.

20 Q. You don't follow that at all? Have you
21 done a computation of how much ore it takes to
22 provide you with one ton of product?

23 A. I can.

24 Q. Have you ever done that?

25 A. Yes.

1 Q. Have you done it recently?

2 A. Yes.

3 Q. What is that most recent number, do you
4 recall?

5 A. May I put it up on the board?

6 Q. Can you give me what the--

7 A. All right. 1. Put a "1" down. Okay.
8 Then, times your 14-percent grade, .14.

9 MR. HIGH: Mr. Chairman, I'm afraid
10 we're going to get into numbers we want treated
11 as confidential. I don't mind Mr. Carroll
12 testifying like he's been doing, but if he's now
13 going to let Mr. Lane testify for a while, I'm
14 concerned about the numbers. I don't mind Mr.
15 Lane putting them on the board and letting him
16 see them, I just don't want them broadcast.

17 CHAIRMAN LEMAY: That would help.

18 Q. Okay. And what is that?

19 A. Whatever that figures out there. It
20 would be .18 tons of product.

21 Q. Per ton of ore, is that correct?

22 A. Yeah.

23 Q. Now, the next step would be, then, to
24 take this number times that number to determine
25 how many--well, how would you do it, then? Just

1 tell me the procedure. How do you convert gross
2 tons of ore to tons of potash, procedure-wise?

3 A. We need the mine extraction factor in
4 there.

5 Q. Well, if we're just talking about--if
6 we're just trying to get back to just the gross
7 acres--

8 A. You still need the extraction factor.

9 Q. What is that extraction factor? Is it
10 something that you have to calculate?

11 A. You use that .60, for a combination
12 of--

13 Q. If we use this number, which we talk
14 about acreage per year, you've already used that
15 mine extraction factor up here to arrive at this
16 number, didn't you?

17 A. Uh-huh.

18 Q. What you're doing, our calculation down
19 here, if we use that figure again, we'll get an
20 incorrect factor because we've taken into account
21 this computation of your mine extraction factor
22 to get there?

23 A. It would be close, yes. Mine was a
24 straight unit measurement without grade coming
25 into it. I wasn't working for product tons, I

1 was working for mined tons.

2 Q. Well, if we've already got our mine
3 extraction rate in here, and we understand here,
4 Mr. Lane, that one, I have a calculation and I
5 have a disagreement with you with whether or not
6 we've already taken into account these additional
7 factors, but let's do both computations. Your
8 computation, as I think we've already taken it
9 in, and if we multiply this times that, that
10 should tell us at least for the purposes we're
11 talking about here, how many tons of potash?

12 MR. HIGH: Mr. Chairman, let me
13 object. I've been very patient. Mr. Lane has
14 already told Mr. Carroll that he's off track.
15 Why doesn't Mr. Carroll ask him how he did his
16 calculation to come out with the 265?

17 Mr. Lane obviously does not agree with
18 what Mr. Carroll is trying to do.

19 CHAIRMAN LEMAY: It might help if we
20 could get through here and find out what his
21 testimony is or where it might be different.

22 Q. Let me go ahead and perform my
23 calculation here. Mr. Lane, if you will, just
24 watch my math here and whether or not you believe
25 in my theory, if we've taken into consideration

1 your mill recovery loss and your extraction rate,
2 if we've taken those into account and multiplied
3 this 4.2 times this, it will give us a number,
4 dividing 4.29 into this. That mathematical
5 calculation would give you 879,336 tons of
6 60-percent potash? I know you don't agree with
7 my methodology, but that is correct math, isn't
8 it?

9 A. No. I don't agree at all.

10 Q. Okay. Dividing that number into that
11 number does not give that number?

12 A. I disagree with the 4.29 factor,
13 whatever that is.

14 Q. Okay. Well, let's put aside that
15 disagreement right now, Mr. Lane.

16 A. Okay.

17 Q. And we'll do what you're talking about
18 here, but if you do divide that number into that,
19 that's what you're getting, correct?

20 A. It's possible. That's correct, from
21 your numbers.

22 Q. All right. And if my hypothesis or
23 theory is correct--and I understand that this is
24 the area where you're disagreeing with me--this
25 would show that during this year that you're

1 saying you mined 265 acres, you actually produced
2 more than twice the amount of tons of sellable
3 product? That's what that calculation shows?

4 A. You asked me if the mine extraction was
5 in the 265 acres?

6 Q. Yes.

7 A. No. I have the calculation out in
8 front of the 265,000.

9 Q. You're going to have to repeat that for
10 me, Mr. Lane.

11 A. Well, you do not have the--your
12 3,772,000, whatever it is, it's not in there.
13 That extraction is not in the numbers as they're
14 being peeled out here. Where did that come from
15 there?

16 Q. If you'll remember, you said that
17 there's 15.3--I believe that was cubic feet and
18 this is how many tons.

19 A. The error is up on the top of the page
20 where you have a full section at five feet.
21 You're throwing in a 100-percent mined acre.

22 Q. All right. That's where you think the
23 calculation is wrong?

24 A. Yes.

25 Q. You're not taking into account the 60

1 percent?

2 A. Correct.

3 Q. What I think that does, I think we're
4 down to where we--the difference--

5 MR. HIGH: Mr. Chairman, can I ask that
6 we take a short break?

7 CHAIRMAN LEMAY: Let us take a
8 five-minute break. You all can do your
9 calculations. When we come back, I would like
10 you to, in very simplified terms, tell us where
11 the two figures disagree.

12 MR. CARROLL: That's my last point.

13 CHAIRMAN LEMAY: I like to hear that,
14 but it seems like you need to do some
15 calculations to get there.

16 [A recess was taken.]

17 CHAIRMAN LEMAY: Are we ready to resume
18 with correct mathematics or outline the
19 differences?

20 MR. CARROLL: I think we can outline
21 the differences. And I think this will be up to
22 faith, but let us--

23 MR. HIGH: If you would like, Mr.
24 Chairman, we would be more than willing to sit
25 down with Mr. Hutchinson or whoever Mr. Carroll's

1 expert is, and try to agree upon this acreage
2 thing, if you want us to.

3 CHAIRMAN LEMAY: If might be helpful to
4 at least point out to us where you disagree. Is
5 that what we're looking at?

6 MR. HIGH: I don't know what we're
7 looking at. We've given these two calculations
8 on acreage, one based on production and one based
9 on comparison to two maps.

10 CHAIRMAN LEMAY: Where are you going on
11 this, Mr. Carroll?

12 MR. CARROLL: Ultimately where I'm
13 going is that what Mr. Hutchinson, when he
14 testified to something like 136 acres, what he
15 said basically, that was net acres. What we're
16 talking about, that's absolute. You mine out 100
17 percent and get your net acres.

18 What we feel, and some of the
19 statements Mr. Lane indicated to me, is that this
20 265 acres is not net mined, 100 percent, it's
21 only approximately 60 percent.

22 CHAIRMAN LEMAY: Let me stop you
23 there. Is that about 65 percent, Mr. Lane, the
24 265-acre figure?

25 THE WITNESS: For present mining,

1 that's a combination of second mining, which is
2 high extraction, and development mining, which is
3 at a lower extraction, and 60 would be about the
4 average of the two for today's condition.

5 CHAIRMAN LEMAY: I see. And that's
6 where the difference is?

7 THE WITNESS: Eventually, the
8 development extraction will go back up on the
9 final retreat.

10 MR. CARROLL: And I think when Mr.
11 Hutchinson was developing his testimony, we
12 weren't just measuring the net change here, but
13 we know there was mining going on up in the first
14 mining areas, and we could see the indications of
15 that change. So what we were saying was that
16 this mine was advancing into new territory at the
17 net rate of 136 acres because there was some
18 secondary mining going on, and that was one of
19 the questions I know Mr. Carlson asked earlier
20 on, maybe in the last three-day period, and that
21 was the issue we have been trying to explain.

22 I think Mr. Lane gave it to me. This
23 may be what they figure that they can advance,
24 that's the rate that they might be advancing,
25 producing 400,000 tons of product, but that's not

1 the actual rate of advance because some of their
2 mining is going to go back into the secondary
3 areas. And that's my whole point. I don't know
4 if you agree with what I just said or not.

5 CHAIRMAN LEMAY: Why don't we have Mr.
6 Lane comment on what your point was, Counselor?
7 Is that all right?

8 MR. HIGH: Well, to make sure I
9 understand it, are you saying, Mr. Carroll, that
10 Mr. Hutchinson's 136 acres means a total void
11 underground of taking all the ore out? Is that
12 what it is?

13 MR. CARROLL: Could I let Mr.
14 Hutchinson state it?

15 MR. HIGH: I thought that's what you
16 just said. We haven't found a way to get 100
17 percent.

18 MR. CARROLL: When I said "complete," I
19 meant complete as Mr. Hutchinson defined it, and
20 I think he was using 90 percent. Because we know
21 there's always some ore left in the mining
22 process. You couldn't get out of there quick
23 enough, probably. So, when I say "complete," it
24 has to be redefined.

25 MR. HIGH: We'll agree with that.

1 MR. CARROLL: At least that's what
2 we're told. But that's the point.

3 Q. (BY MR. CARROLL) Can you agree with me
4 as to that, as to how I may have classified or
5 clarified the difference in the two areas?

6 A. You haven't clarified it.

7 Q. Well, have I stated it?

8 A. I don't think you have.

9 CHAIRMAN LEMAY: Mr. Lane, could I
10 interrupt? Would you state it for us, what you
11 consider to be the differences in the two
12 figures?

13 THE WITNESS: May I put up some numbers
14 up?

15 CHAIRMAN LEMAY: You're the witness,
16 anyway. Now, may I ask something here? Gary,
17 see if you agree with Bob's figures there, and if
18 not, the two of you kind of tell me where you're
19 disagreeing.

20 MR. HUTCHINSON: The calculations are
21 correct. However, a few minutes ago this was 65
22 percent and now it's 60 percent. I only had the
23 maps they gave me to planimeter the areas that
24 they mined in that 39-month period.

25 When I got those and adjusted them for

1 what was published information up to a 90-percent
2 recovery, which you can find that published in a
3 lot of places that these mines do that, I think
4 Mr. Case suggested that they get at least 80
5 percent in this particular mine, so I was able to
6 take those areas in that 39-month period and
7 adjust them for either 65-percent recovery, first
8 mining, which we're not too far off, plus in the
9 second-mined areas I kicked that up to 90
10 percent, or an incremental increase of 35
11 percent.

12 MR. HIGH: Let me object. I don't mind
13 us doing this, but I would rather just go off the
14 record and let us sit down again. I don't want
15 Mr. Hutchinson again testifying in the middle of
16 my witness.

17 CHAIRMAN LEMAY: He's not testifying.
18 I'm trying a new procedure. We're trying to find
19 out what the differences are. And we can find
20 out better by asking the scientists rather than
21 getting the lawyers involved.

22 MR. HIGH: I agree with that.

23 CHAIRMAN LEMAY: If the lawyers will be
24 quiet and I can ask the scientists, I'll go back
25 and forth. It may be a little bit off what we're

1 supposed to do, but I think we can get some
2 answers without trying to protect.

3 MR. HUTCHINSON: Within the scale of
4 the maps that he submitted, and adjusting for
5 numbers that I didn't have, mill recovery is a
6 very confidential thing, and this, you know,
7 we're in the same ballpark. But when I wanted to
8 see if the acres that I was using had some basis
9 in fact, I went back to how many tons they were
10 producing and back-calculated and came up within
11 12, 15 percent. So I thought okay, well, I've
12 checked into that through an independent means,
13 and that's where I came up with the 136 or
14 whatever.

15 I never discounted that. When they got
16 further away from the shaft I just held it
17 constant, knowing on an average basis I didn't
18 know where they were going to mine, but wherever
19 they picked to mine, I wouldn't be too far off.

20 CHAIRMAN LEMAY: I'm more interested
21 in, do you tend to agree now, with this new
22 knowledge, with the numbers that Bob put up
23 there?

24 MR. HUTCHINSON: Yes, this is a correct
25 way to calculate it. I didn't have the benefit

1 of this. But we disagree, not in reality, but at
2 the point in time this will be 90 percent rather
3 than the 60 percent.

4 CHAIRMAN LEMAY: Is it fair to say with
5 this new knowledge you would tend to agree with
6 what Mr. Lane has put up here?

7 MR. HUTCHINSON: Yes. We were talking
8 about apples and oranges on the acreage.

9 CHAIRMAN LEMAY: I understand the idea
10 that he is including going back and doing
11 secondary mining, where you were just figuring
12 advance.

13 MR. HUTCHINSON: Yeah. I didn't have
14 the benefit of--

15 CHAIRMAN LEMAY: You're still in
16 disagreement 265 versus 134, but maybe we've
17 defined the disagreement better?

18 MR. HUTCHINSON: If he used his maps
19 and checked the areas more accurately, his
20 numbers would be reduced.

21 CHAIRMAN LEMAY: Do you agree with
22 that? If you looked at your maps and checked it,
23 the numbers would be reduced, or not?

24 THE WITNESS: Very little, if any, if
25 he's using the same two maps.

1 CHAIRMAN LEMAY: All right, Counsel. I
2 hope you don't mind. At least we know exactly
3 where we disagree.

4 MR. CARROLL: That was my whole purpose
5 and we got there.

6 CHAIRMAN LEMAY: I understand your
7 style. You're schooled in that way.

8 MR. CARROLL: Well, I didn't know how
9 else to do that.

10 CHAIRMAN LEMAY: That's why I stepped
11 in. I hope you don't mind. Excuse me.

12 MR. CARROLL: Chairman LeMay, I
13 appreciate it, because that was my sole purpose
14 of this line of cross-examination. And I think
15 you're now aware of it and it's up to you to make
16 the decision. And I have no further questions.

17 CHAIRMAN LEMAY: All right. Are there
18 any questions that we need to ask at this point?

19 MR. CARROLL: Well, I'm through.

20 CHAIRMAN LEMAY: You are?

21 EXAMINATION

22 BY COMMISSIONER CARLSON:

23 Q. I think the gist of this thing is, how
24 much acreage is this mine eating up for a year on
25 its way to Section 2. We've had testimony that

1 we're going to get there in 50 years or 80 years,
2 and Mr. Case yesterday said somewhere between
3 seven or eight and 20 years. As I understand it,
4 that's what we're looking for, this mine is
5 grabbing acreage on its way down there.

6 You say it's 265 new acres per year
7 that the mine is extending out, is that correct?

8 A. That's correct.

9 COMMISSIONER CARLSON: And excuse me,
10 but I guess your testimony is still that it's
11 136?

12 MR. HUTCHINSON: It's going to be less
13 than that considering they stop and take all of
14 the secondary mining as they develop their panels
15 away from the shaft, correct.

16 CHAIRMAN LEMAY: You're shaking your
17 head, but isn't that the point we're looking at?
18 or did I misinterpret you? What we're trying to
19 do is find the difference and see if there's
20 enough agreement as to where the disagreement is
21 and the point that's being raised. That's the
22 reason we're interrupting this
23 cross-examination.

24 MR. HIGH: I can't tell you what the
25 difference is because their numbers are wrong. I

1 don't know the difference. I don't know the
2 difference.

3 CHAIRMAN LEMAY: That's what we're
4 trying to define, the reasonable differences.

5 CHAIRMAN LEMAY: Anything else, Gary?

6 COMMISSIONER CARLSON: No.

7 CHAIRMAN LEMAY: Commissioner Weiss?

8 EXAMINATION

9 BY COMMISSIONER WEISS:

10 Q. If you planimetered the mined area on
11 Exhibit 38, have you done that?

12 A. No.

13 Q. That's how you can tell what the
14 historical mining rate is. This represents 30
15 years of mining?

16 A. Well, you could with planimeters, yes.
17 You could do it with computers.

18 Q. I would think the software would tell
19 you what the area is in hatched green here. Do
20 you know what it is?

21 A. I don't right now. We have answers for
22 ore reserves, which would give you--

23 Q. Can you tell me what this green striped
24 area is?

25 A. No, I couldn't right now.

1 Q. Does your software permit an easy
2 calculation of that number?

3 A. An easy calculation.

4 Q. Was that mined up in 30 years?

5 A. It's been mined to date, yes. And
6 we've been in business 29--no, 25.

7 Q. If we take that area and divide it by
8 29 years--

9 A. 26.

10 Q. 26 years, that's the historical mine
11 rate, the way I see it. That would be a nice
12 number to have.

13 MR. WEISS: Does anybody have that
14 number?

15 MR. CASE: I don't have it, Mr. Weiss,
16 but one word of caution: Until 1985, when we
17 became New Mexico Potash, we were running the
18 mine around the clock 365 days a year,
19 basically.

20 Market conditions at the time we became
21 New Mexico Potash dictated reducing that rate to
22 10 days on, four days off, so you've got to be
23 careful.

24 COMMISSIONER WEISS: I understand, but
25 that would be a historical rate, by definition.

1 MR. CASE: Yes, but with some caveats.

2 COMMISSIONER WEISS: Has anybody made
3 that calculation? Sir?

4 MR. HUTCHINSON: In 26 years, beginning
5 in 1965 through 1991, which is the best
6 information I had, I calculated the gross acres
7 mined to be 9,622. Again, I was doing it on maps
8 that may not be of the best scale, but they were
9 New Mexico Potash maps or copies of them.

10 That averaged 370 gross acres per year,
11 the kind of acres that they're talking about now,
12 I believe, as being gross acres. Much of that
13 time, as Mr. Case just said, they were mining 365
14 days a year, three shifts a day, and now they're
15 mining something like 70 percent of that. So
16 that was another rule-of-thumb judgment I used.
17 And they're further away from the shaft and the
18 demand is less.

19 Q. If we have more of this next month,
20 would you get your computer to tell me how many
21 acres are in the green stripes there, please?

22 A. Yes.

23 COMMISSIONER WEISS: Thank you.

24 CHAIRMAN LEMAY: Anything else? Excuse
25 the interruption, but maybe we got that point

1 covered and you can go on, Mr. Carroll.

2 MR. CARROLL: Mr. LeMay, I was
3 through. That was my last issue.

4 CHAIRMAN LEMAY: Mr. High, do you have
5 some additional direct?

6 MR. HIGH: Yes, sir, I do.

7 EXAMINATION

8 BY MR. HIGH:

9 Q. Mr. Lane, look if you will at Yates
10 Exhibit 41. Do you still have it up there?

11 A. No.

12 Q. Let me give you mine. Mr. Carroll
13 asked you some questions about other core holes
14 drilled in the same drilling program as Core Hole
15 162, and he referred to some that were in the
16 barren area shown on Exhibit 41, one being Core
17 Hole K-157.

18 He asked you a question about how much
19 influence you gave to the data from Core Hole
20 157. Do you remember that?

21 A. He was talking about either 157 or 158,
22 I think, in that combination.

23 Q. What kind of data did you get from Core
24 Hole 157?

25 A. I received no data from 157. We lost

1 that hole.

2 Q. What do you mean you "lost the hole"?

3 A. We lost the hole. It was a blow-out.
4 We had to move the rig off of it.

5 Q. When you say "blow-out," what happened?

6 A. We hit an air pocket.

7 Q. So that core hole was never completed?

8 A. Not completed, no.

9 Q. Now, when someone uses the word barren
10 with reference to a core hole, what does the word
11 barren mean when you use it?

12 A. Below cutoff grade.

13 Q. Would a core hole that has zero
14 mineralization, is that different from a barren
15 core hole?

16 A. It would be located in the barren area.

17 Q. So, if you had a core hole that was
18 below cutoff grade but still had some
19 mineralization, would it still figure into the
20 computation of how much influence you're going to
21 give it?

22 A. Yes.

23 Q. Would you give it some influence?

24 A. I would give it some influence.

25 Q. That would be based upon how much

1 mineralization, even though it's below the
2 cutoff?

3 A. Yes.

4 Q. Now, the location of Core Hole 162, I
5 believe you said, was determined primarily
6 because of access?

7 A. Access, yes.

8 Q. And that's one of the biggest expenses
9 on core holes is getting in and out?

10 A. That's one of the large expenses, yes.

11 Q. Look at Exhibit No. 9 there in front of
12 you, Mr. Lane, which is Order R-111-P. Do you
13 have that?

14 A. I have it over here.

15 Q. Turn to page 10, please, sir. Go down
16 to paragraph G(a)?

17 A. All right.

18 Q. It's talking about a potash operator
19 filing or designating an LMR. Do you see that
20 paragraph? Paragraph (a) under G?

21 A. Yes, I'm on (a). Yes, go ahead.

22 Q. The second sentence of that section
23 says, "For purposes of this agreement, Life of
24 Mine Reserves means those potash deposits within
25 the potash area reasonably believed by the potash

1 lessee to contain potash ore in sufficient
2 thickness and grade to be mineable, using
3 current-day mining methods, equipment and
4 technology."

5 Is it your opinion, Mr. Lane, that with
6 the information you have, you reasonably believe
7 that Section 2 contains potash ore in sufficient
8 thickness and grade that New Mexico Potash can
9 mine it using current-day methods, equipment and
10 technology?

11 A. I do.

12 MR. HIGH: That's all I have.

13 MR. CARROLL: One quick question.

14 FURTHER EXAMINATION

15 BY MR. CARROLL:

16 Q. When you indicated that this K-157 was
17 not completed because of a blow-out, do you
18 recall what depth that blow-out was?

19 A. Not exactly, but above the ore bed.

20 Q. Approximately how far above the ore
21 bed? Was it within a hundred feet?

22 A. Plus or minus. It was within that
23 range.

24 MR. CARROLL: Thank you.

25 CHAIRMAN LEMAY: Commissioner Carlson?

1 FURTHER EXAMINATION

2 BY COMMISSIONER CARLSON:

3 Q. A couple of questions, Mr. Lane. The
4 two Yates wells in Section 2 that are already, I
5 guess, drilled and producing, the Graham State 1
6 and Graham State 2, is that correct? When did
7 you approve those wells?

8 A. I'm not sure the date. Possibly early
9 October. I'm not sure. It's possible. I don't
10 know.

11 Q. At the time you approved them, those
12 wells were within the half-mile buffer zone of
13 your then Life of Mine Reserves, is that correct?

14 A. They were.

15 Q. Weren't you concerned that if you mine
16 to the extent of your Life of Mine Reserves, I
17 guess at the southern portion of Section 35
18 there, that you would be coming dangerously close
19 to producing oil wells?

20 A. The LMR, which was in existence at that
21 time, does not follow the north line of Section
22 2. It's curved off that end. I don't know the
23 exact distance this well is off of that LMR right
24 now.

25 Q. So your LMR was not within a half-mile

1 of those wells?

2 A. It might have been fairly close, yes.

3 Q. Your Exhibit 2 shows, I guess at least
4 the one in the farthest northeast, that's the
5 Graham State No. 1 and No. 2, that's within the
6 quarter-mile buffer zone and the other one is
7 well within the half-mile buffer zone, is that
8 correct?

9 A. That is correct.

10 Q. Mr. Case testified yesterday that he
11 would be afraid to mine within a half-mile of a
12 producing oil well, and yet here you approved oil
13 wells within a quarter-mile of your LMRs,
14 apparently without too much concern, is that
15 correct?

16 A. We approved it.

17 Q. Were you concerned about mining within
18 a quarter-mile of those when you approved them?

19 A. I, myself--

20 Q. Excuse me?

21 A. My own opinion, I play with the depth
22 plus 10, usually. What Mr. Case feels, that's
23 what it will be at New Mexico Potash.

24 Q. Do you know, and I think this has been
25 testified to last month, do you know if IMC bid

1 on those langbeinite leases that they mentioned
2 in one of your exhibits that were being offered
3 in the area southwest of Section 2?

4 A. I'm not sure. I have no information on
5 it.

6 Q. If I remember the exhibit, they
7 requested that those applications to drill not be
8 approved because they were concerned about
9 langbeinite was going to be leased southwest of
10 there, and they intended on applying for those
11 leases. And I assume those are the leases that
12 Yates got, is that correct?

13 A. They were the only ones up for sale in
14 a recent time.

15 Q. You don't know if IMC--

16 A. No, I don't.

17 Q. Getting back to those three dry holes
18 that are within your present mine workings, do
19 you know when those oil and gas wells were
20 drilled?

21 A. Two were drilled in the early 40s, I've
22 not gone back and checked recently, and one in
23 the early 50s. The early 50s.

24 Q. Do you know how deep those wells were?

25 A. Under 4000. I don't know the exact

1 numbers right here.

2 Q. Do you know if they found any shows of
3 hydrocarbons?

4 A. I checked those wells years ago,
5 meaning off the old logs if I'm not mistaken, and
6 I didn't see any report of hydrocarbons, to the
7 best of my knowledge right now.

8 Q. When New Mexico Potash got to within
9 200 feet of those wells, were you concerned about
10 potential gas in the mine?

11 A. I wasn't, no.

12 Q. What year was that?

13 A. When we mined?

14 Q. Yeah, when you got up to--

15 A. The one out east would be late 60s or
16 real early 80, somewhere in that range.

17 MR. HIGH: What did you say?

18 A. Late 79 or early 80, along in that
19 range. This is plus or minus years. I was
20 trying to look at a map to remember when we were
21 in that area.

22 Q. This is the one in Section 35?

23 A. 35.

24 Q. Do you know when the mining got up to
25 the other two?

1 A. Early 80s for the center one, and I'm
2 not sure the one in the west.

3 Q. At least the one in the early 80s and
4 possibly the one in Section 35 was after your
5 scare in 1981 with MSHA, being a gassy mine--the
6 fear that you would have a gassy mine under MSHA,
7 is that correct?

8 A. It would be in that time frame, yes.

9 Q. And yet you got within 200 feet of
10 these wells and weren't that concerned about gas
11 getting into your mine?

12 A. There's always concern for gas.

13 Q. You say you don't want to mine any
14 closer than depth plus 10 percent?

15 A. That's my personal feeling.

16 Q. And Mr. Case says he doesn't want to
17 mine any closer than a half-mile, and yet you got
18 within 200 feet and it appears that you weren't
19 that concerned. You didn't take any precautions?

20 A. Not in this case here, where there was
21 no indication of hydrocarbons, to my
22 recollection.

23 Q. Okay. I just have one more question.
24 When you extend your mine, say you're going to go
25 into a new section, I assume you do more drilling

1 than you did for--well, in Section 2 you did one
2 drill hole.

3 If you were going to extend your mine
4 down there, would you do another drilling program
5 to delineate the reserves exactly?

6 A. There's another drilling program being
7 planned, to my knowledge, right now, which will
8 still take place, and I'm sure they will put at
9 least one or two holes in that general direction.

10 Q. The intent of that drilling program is
11 to delineate the reserves in this southern
12 portion of your mine?

13 A. Yeah, to help mine planning and
14 delineation.

15 Q. When is that drilling program?

16 A. I don't know when it will be approved.

17 Q. Five years? next year?

18 A. I would think before that. Possibly
19 next year or within next year.

20 COMMISSIONER CARLSON: That's all I
21 have. Thank you.

22 CHAIRMAN LEMAY: Commissioner Weiss?

23 FURTHER EXAMINATION

24 BY COMMISSIONER WEISS:

25 Q. Mr. Lane, do you have a safety man as

1 such in the mine or with the company?

2 A. Yes, we have a safety department.

3 Q. Safety department. Good. Yesterday,
4 Professor Mitchell said that the Exeter rig
5 caught fire and burnt, down in Section 2, I
6 believe, or 36, perhaps, last year?

7 A. I missed that.

8 Q. Well, he said that. Was there any
9 change in the methane readings in your group C's
10 and the mine faces that were related to that?

11 A. Would you repeat your question again?

12 Q. Was there any change in the methane
13 readings in the mine as a result of the Exeter
14 rig catching on fire, the blow-out?

15 A. I have no knowledge of any.

16 MR. HIGH: Mr. Weiss, I don't want to
17 leave you with the wrong impression. I'm not
18 sure I heard that testimony that way yesterday.
19 We've had no rig in our mine blow up.

20 COMMISSIONER WEISS: No, the Exeter oil
21 well. They were drilling a well for Pogo, wasn't
22 it? That was the testimony yesterday.

23 MR. CARROLL: I understood that to be
24 in some other part of the country.

25 MR. HIGH: Yeah, I didn't understand

1 that to be a fire. That wasn't in our mine.

2 THE WITNESS: That wasn't in our
3 immediate area, that I know of.

4 COMMISSIONER WEISS: That was a
5 misunderstanding on my part there.

6 MR. HIGH: I'm sorry to interrupt.

7 COMMISSIONER WEISS: No, I appreciate
8 it. Thank you.

9 Q. (BY COMMISSIONER WEISS) how are the
10 core holes plugged? Do you use a pump truck? a
11 ready-mix truck? How is that done?

12 A. The last series was done by Halliburton
13 or B & J.

14 Q. That's general practice?

15 A. Yes.

16 Q. Just a moment ago, when we were
17 discussing the green hatched area on Exhibit 38
18 and I asked you to get the area off your computer
19 and then divide it by time, can you normalize
20 that time with your comments and Mr. Case's
21 comments concerning whether you're running three
22 shifts or one?

23 A. I guess it could be done. I can't do
24 it on the computer, but one of our people might
25 be able to.

1 MR. CASE: Commissioner Weiss, if I
2 might, area calculations are helpful at best.
3 Royalties are paid on tonnages removed. And
4 perhaps we can try and close on how many tons
5 we've removed versus how many acres are shown on
6 the map and at different rates.

7 We're currently mining X number of tons
8 per year and previously we were mining Y tons per
9 year. We can back into that calculation or front
10 into it. It would be awfully hard to come off
11 the map, because during the time we've been
12 running the reduced rates, we've been doing
13 second mining in areas that were previously first
14 mined at the higher rate. It will be like a
15 jigsaw puzzle to try and hit areas first.

16 But, to answer your question, yes, you
17 can planimeter all that and say, okay, there are
18 so many acres that have been affected by mining.

19 COMMISSIONER WEISS: Maybe you can give
20 me the average time-related number.

21 MR. CARROLL: Chairman LeMay, if I
22 might make a suggestion here, I have no objection
23 to asking the experts, Mr. Hutchinson and Mr.
24 Case, to get together and come up with a single
25 map so that both of them know what's going on,

1 sometime between now and December 1. That might
2 really save a lot of this.

3 CHAIRMAN LEMAY: Is that something we
4 need? You made the request, Commissioner Weiss.

5 COMMISSIONER WEISS: I would like to
6 know what the historical mining rate is over the
7 life of the mine, not the last six months or the
8 two years. What the real mining rate is.

9 MR. CARROLL: If we don't have the two
10 sit together, we'll probably get a disagreement
11 again.

12 COMMISSIONER WEISS: I think you can
13 come up with one for the life of the mine. I'm
14 not sure if the life of the mine is 30 or 26.

15 MR. CASE: It depends on the rate you
16 pull the ore out.

17 COMMISSIONER WEISS: I mean, when it
18 started. Was it 1962?

19 MR. CASE: 1965.

20 COMMISSIONER WEISS: 1965? I've heard
21 different numbers. So, that's not clear to me.

22 MR. CARROLL: Can we agree, then, that
23 Mr. Hutchinson can come down and sit with you,
24 Walter?

25 MR. CASE: If we can have an agreement

1 on what may or may not be covered during those
2 discussions, and that would be between you and
3 Mr. High, but again we're getting into this odd
4 area of confidentiality between potential
5 competitors.

6 MR. HIGH: I have no objection to
7 sitting down with Mr. Carroll and Mr. Hutchinson
8 and trying to work out some stipulations. I
9 won't open up the mine to Mr. Hutchinson.

10 CHAIRMAN LEMAY: That's not what was
11 requested.

12 MR. HIGH: We'll be more than glad to
13 come up with any stipulations that will speed
14 this thing up.

15 CHAIRMAN LEMAY: Let's leave it at
16 that, then. You have your areas of
17 confidentiality and you heard Mr. Weiss' concern,
18 and I was just trying to accommodate that in some
19 fashion.

20 MR. CARROLL: We'll do that.

21 Q. (BY COMMISSIONER WEISS) And one last
22 question here, there was testimony, I think it
23 was today, I have it down for a question to you,
24 at least, concerning the nonleased area in the
25 LMR of 38.

1 What are the mine lease boundaries down
2 here on Exhibit 38?

3 A. It's the blackout line, generally going
4 around the worked-out areas.

5 Q. The black line goes to the heart of
6 Section 27 and it goes south. What happens in
7 there when it hits Section 34?

8 A. The lease line would be in the
9 northwest corner to the west quarter corner, then
10 over to the center of the section, down to the
11 south quarter corner and back over to the
12 southwest corner section and back over to the
13 southwest corner. That is unleased at the time,
14 that 160 acres of the southwest quarter.

15 Q. Of which section?

16 A. Of Section 27.

17 Q. Is that the only area that was
18 nonleased? Does New Mexico Potash own the leases
19 on most of 34, 35, 36 and 2?

20 A. We own all of 36, all of 35, all of 34
21 and all of 2, yes.

22 Q. I have one more question. Why were the
23 core hole locations left off of Exhibit 38, all
24 of the core hole locations of interest down here?

25 A. That was our preference there, and how

1 much information we would give related to this
2 hearing.

3 COMMISSIONER WEISS: Thank you. That's
4 all I have.

5 EXAMINATION

6 BY CHAIRMAN LEMAY:

7 Q. I just have one follow-up. On those
8 three dry holes that Commissioner Carlson raised,
9 do you remember if you took gas readings at all
10 on the surface around those casings?

11 A. No, I didn't.

12 Q. In the mine itself, did you go around
13 the well at all? I guess you have a sniffer,
14 but--

15 A. That area adjacent to it had been
16 checked on a shift-by-shift basis, as the faces
17 went by, at least.

18 Q. And there were no anomalous readings?

19 A. None that I know of.

20 Q. I would like to explore a little bit,
21 you mentioned the coring you've been involved
22 with. In your career at the mine, have you had
23 any sidewall cores or core slicer cores, or do
24 you need a hole core diameter to do the work you
25 need to do in getting grade?

1 A. No, we quarter the core. We use
2 one-quarter of it to retain three-quarters of it.

3 Q. You use one-quarter to retain
4 three-quarters. Explain that.

5 A. We use one-quarter for analytical
6 analysis.

7 Q. You're talking about a hole core
8 analysis?

9 A. You take one-quarter of the core.

10 Q. For a whole core analysis?

11 A. Yes.

12 Q. What about the other three-quarters?

13 A. We retain that.

14 Q. Have you ever experimented with
15 sidewall coring or any other type of coring
16 method?

17 A. No, I haven't.

18 Q. Could that be useful in your Life of
19 Mine Reserve plans and so forth?

20 A. I never looked into it. I don't know,
21 sir.

22 Q. I would like to ask you more about
23 these barren core holes. You mentioned you don't
24 give them a 2500-foot radius of influence. A
25 barren core hole with zero mineralization, how

1 much do you give it, or is it arbitrary?

2 A. Enough to get a line around it or, say,
3 500 feet.

4 Q. So a barren core hole--

5 A. If it sat on the edge, yes.

6 Q. --would be somewhere in the
7 neighborhood of 500 feet, radius of influence?

8 A. Yes.

9 Q. If there was some mineralization, would
10 that effect your radius of influence?

11 A. With mineralization, I normally will
12 use a triangle method and bring that line back
13 out to the isopach grade of cutoff.

14 Q. So you have a proportional gradation
15 between commercial ore and whatever that grade of
16 influence would be?

17 A. Right.

18 Q. Isn't that basically what you're doing
19 with those core holes that have cored commercial
20 ore?

21 A. Yes, sir.

22 Q. So you follow the same procedure with a
23 core below the grade?

24 A. Right.

25 Q. On your four feet of 11 percent

1 mineralization that you showed on Exhibit 106, is
2 that one percent higher than the BLM? I think
3 I've heard the figure four feet of 10 percent?

4 A. Yes, it is.

5 Q. You're different in that area?

6 A. Yes.

7 Q. Would that affect any of the LMR areas,
8 or is that one percent?

9 A. Very, very little.

10 Q. Who owns the southwest of Section 27,
11 do you know, on your map there?

12 A. Southwest quarter of 27 is federal
13 lands, BLM, unleased.

14 Q. If you have to drive down to Section 2,
15 you would have to go through there, wouldn't you,
16 in order to get ore?

17 A. Chances are we would. And we would
18 apply for a lease.

19 Q. Would you try and lease it or anything?

20 A. Yes.

21 Q. Have you made any effort to try and
22 lease that land?

23 A. We have discussed it and we're looking
24 at possibly leasing, at an early date, some area
25 there in the south.

1 Q. Once you drive down to Section 2,
2 according to your mine plan, it looks like your
3 LMR just kind of opens up. You have Section 11,
4 which looks perspective, and 14, evidently, has
5 pretty good mineralization. You're not
6 interested in those because they're too far away
7 from your main shaft? Is that your reason, or
8 what?

9 A. That will be a decision when we get
10 into Section 2 or close to it.

11 Q. I thought Mr. Case mentioned something
12 about, you have to be so close for your miners to
13 get to the shaft; otherwise you're violating some
14 federal restrictions there?

15 A. In the next 7 to 8 years,
16 transportation might change as much as it did in
17 the past three years.

18 Q. Might put a monorail underground to zip
19 around. So that's an open-ended decision, you
20 might keep going or stop or whatever?

21 A. That's right.

22 CHAIRMAN LEMAY: That's all I have.
23 Thank you very much.

24 MR. HIGH: I have a few more questions.

25 FURTHER EXAMINATION

1 BY MR. HIGH:

2 Q. Mr. Lane, look at Exhibit No. 2, if you
3 will, please. It's the original LMR map. Now,
4 when you said that you approved the four wells
5 along the east side of Section 2, Mr. Lane, the
6 two northernmost wells being Yates and the two
7 southern wells being Pogo, I take it that those
8 people asked you for your approval to drill those
9 wells?

10 A. They did.

11 Q. And you were cooperative and agreed to
12 them?

13 A. Yes.

14 Q. You knew these were Delaware wells,
15 right?

16 A. Uh-huh.

17 Q. Did you recall what the industry
18 agreement was with respect to Delaware wells?

19 A. I do today.

20 Q. What is it?

21 A. One-half mile.

22 Q. For a well drilled to the base of the
23 Delaware, where the bottom hole location is above
24 the base of the Delaware, do you recall if the
25 buffer zone was one-quarter mile?

1 A. It was one-quarter mile.

2 Q. If it went below the Delaware, it was
3 one-half mile?

4 A. Okay.

5 Q. The line on which the northernmost, I
6 guess it's Graham No. 3, it's right at the
7 one-quarter mile?

8 A. Graham 3 is on that line, yes.

9 Q. That would be consistent with what the
10 potash industry agreed to do with the oil and gas
11 people as the industry agreement? We agreed to
12 that one-quarter mile?

13 A. One-quarter above the Delaware, yes.
14 Right. I agree.

15 Q. Now, do you have any different
16 concerns, Mr. Lane, between a dry hole that's
17 been plugged and abandoned and a well that's
18 drilled to 8500 feet and 2,600 to 2,800 psi? Is
19 there a difference in the bottom hole pressure?

20 A. Restate your pressure.

21 Q. Do you have any different concerns
22 between a hole that was dry and then it's plugged
23 and abandoned, and an operating or producing well
24 that's drilled to 8500 feet, bottom hole depth,
25 and has a bottom hole pressure of 2,600 to 2,800

1 psi, is there a difference between those two?

2 A. Yes, there is a difference.

3 Q. Which one would you be the most
4 concerned about?

5 A. The one that was a producer and had the
6 pressures indicated.

7 Q. Looking again at Exhibit 2, the two
8 wells in Section 36 that are within the
9 one-quarter mile buffer zone, were you asked to
10 approve those two wells?

11 A. Yes.

12 Q. Why did you agree to those wells?

13 A. On the LMR that's not the computer run
14 of it, I had a dashed line, a questionable line
15 on that LMR in that area right there, in 36,
16 going through to the west half, and we gave
17 them--we approved the standard location.

18 Q. And even though it was within a
19 quarter-mile of the buffer zone?

20 A. Yes, sir.

21 MR. HIGH: That's all I have, Mr.
22 Chairman.

23 FURTHER EXAMINATION

24 BY COMMISSIONER WEISS:

25 Q. Mr. Lane, on the plugged and abandoned

1 wells, is it the fact that it has 2,800 pounds
2 bottom hole pressure? Or what about a producing
3 well that's no longer producing, it's dry or it's
4 depleted? Do you have the same concern with it
5 as you do a dry hole, or how do you view that?

6 A. I'd have less concern for a dry hole
7 never producing than one that's produced and
8 abandoned.

9 Q. If the bottom hole pressure is 100
10 pounds or 500 pounds, can you quantify that for
11 me?

12 A. No, I can't.

13 COMMISSIONER WEISS: Okay. Thank you.

14 CHAIRMAN LEMAY: Additional questions
15 of the witness? He may be excused. Do you have
16 a quickie you want to put on, or do you want to
17 call it a day?

18 Let's take a 15-minute break and decide
19 whether you want to put another witness on. It's
20 your call.

21 [A recess was taken.]

22 CHAIRMAN LEMAY: Mr. High?

23 MR. HIGH: We would like to insert into
24 the record some information, and we can do so by
25 stipulation or with another witness, some

1 information on those other three wells, when they
2 were mined and when they weren't.

3 I have several questions to ask about
4 when we mined around those dry holes. We want to
5 pin those dates down, and we can either do it by
6 stipulation, an exhibit or another witness.
7 Other than that, we have nothing further.

8 CHAIRMAN LEMAY: Do you have anything
9 else?

10 COMMISSIONER CARLSON: No.

11 CHAIRMAN LEMAY: Bill?

12 COMMISSIONER WEISS: Nothing else.

13 CHAIRMAN LEMAY: We're adjourned until
14 the 1st at 8:30 in the morning.

15 (And the proceedings concluded.)
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1 CERTIFICATE OF REPORTER

2
3 STATE OF NEW MEXICO)
4) ss.
COUNTY OF SANTA FE)

5
6 I, Carla Diane Rodriguez, Certified
7 Shorthand Reporter and Notary Public, HEREBY
8 CERTIFY that the foregoing transcript of
9 proceedings before the Oil Conservation
10 Commission was reported by me; that I caused my
11 notes to be transcribed under my personal
12 supervision; and that the foregoing is a true and
13 accurate record of the proceedings.

14 I FURTHER CERTIFY that I am not a
15 relative or employee of any of the parties or
16 attorneys involved in this matter and that I have
17 no personal interest in the final disposition of
18 this matter.

19 WITNESS MY HAND AND SEAL November 24,
20 1992.

21
22
23 
24 CARLA DIANE RODRIGUEZ, RPR
25 CSR No. 4