



Order 139-14
440-11
479-1

BEFORE THE OIL AND GAS CONSERVATION COMMISSION
OF THE STATE OF COLORADO

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IN THE MATTER OF THE PROMULGATION)
AND ESTABLISHMENT OF FIELD RULES) CAUSE NO. 139
TO GOVERN OPERATIONS IN THE RULISON) & 440
AND PARACHUTE FIELDS, GARFIELD)
COUNTY, COLORADO)

139.14

PURSUANT TO NOTICE to all parties in
interest, the above-entitled matter came duly on for
hearing at the State Education Building, Room 101,
201 E. Colfax Avenue, Denver, Colorado 80203, on
Tuesday, February 20, 1990.

RECEIVED

MAR 14 1990

BEFORE:

- Commissioner Ed McCord
- Commissioner Truman Anderson
- Commissioner Rogers Johnson
- Commissioner Gretchen Vander Werf
- Commissioner Welborn

ORIGINAL

Dennis Bicknell, Secretary

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1 CHAIRMAN WELBORN: All right. The
2 next remaining matters on the agenda are the
3 Rulison/Parachute Field matters and then the Lilli
4 Field matter. Let me -- I am going to want to take a
5 short break, but let me, before we do that, quickly
6 take appearances in Cause No. 139 and Cause No. 440.
7 Would this -- this is the Rulison Field in Garfield
8 County, and Parachute Field, also in Garfield County.
9 The applicant is the Office of Naval Petroleum and
10 Oil Shale Reserves for the U.S. Department of Energy.
11 Their counsel, Mary Egger, E-g-g-e-r, Michael S.
12 Yanock, Y-a-n-o-c-k.

13 There's a protest apparently by
14 Barrett Energy, through its counsel, Mr. Knowlton.
15 Can we take appearances.

16 MS. EGGER: My name is Mary Egger with
17 the Office of General Counsel, U.S. Department of
18 Energy. With me as cocounsel is Michael Yanock, also
19 with the U.S. Department of Energy.

20 CHAIRMAN WELBORN: Great. Thank you.
21 Welcome.

22 MR. KNOWLTON: David C. Knowlton,
23 appearing on behalf of Barrett Resource Corporation
24 as opposed to Barrett Energy Company.

25 CHAIRMAN WELBORN: Barrett Resource

1 Corporation. Those are separate entities.

2 MR. KNOWLTON: Barrett Energy Company
3 does not exist anymore. Now it's Barrett Resource
4 Corporation.

5 CHAIRMAN WELBORN: Any other
6 appearances in this matter?

7 MR. BICKNELL: There were no other
8 protests or interventions filed.

9 CHAIRMAN WELBORN: We have a rule;
10 whatever counsel tells us on time we automatically
11 double. What do you think roughly is the amount of
12 time this will take?

13 MS. EGGER: I would anticipate that
14 our presentation would take about 40 minutes,
15 depending on any questions the commission itself may
16 have, then add to that any time that Barrett Energy
17 -- Barrett Resource may have questioning our
18 witnesses.

19 CHAIRMAN WELBORN: You will have how
20 many witnesses?

21 MS. EGGER: Two.

22 CHAIRMAN WELBORN: You have how many
23 witnesses?

24 MR. KNOWLTON: We have two witnesses
25 and we would probably take a little time in

1 cross-examination, and I think our case would be, as
2 far as witnesses are concerned, maybe 30 minutes,
3 then, of course, I want to make some testimony.

4 CHAIRMAN WELBORN: Yes, I understand.
5 We're looking at two or three hours, then, probably.
6 All right. Do the Lilli people know that? What time
7 do you have them coming?

8 MR. BICKNELL: After lunch.

9 CHAIRMAN WELBORN: Great. If you will
10 bear with me, I need ten minutes break for the
11 commission to get coffee and to move my car, whatever
12 else, so let's reconvene at 10:10.

13 (Recess.)

14 CHAIRMAN WELBORN: All right. We're
15 back on the record in Cause No. 139 and 440. Mrs.
16 Egger, do you want to proceed.

17 MS. EGGER: Thank you very much.
18 Again, for the record, my name is Mary Egger. With
19 me is Michael Yanock. We're both from the Office of
20 the General Counsel, U.S. Department of Energy.
21 We're representing DOE today, the Office of Naval
22 Petroleum and Oil Shale Reserves Program. We
23 appreciate the opportunity to come before the
24 commission in support of the DOE application dated
25 December 15, 1989.

1 In brief, DOE, as owner of mineral
2 land in the state of Colorado, on behalf of the
3 United States, petitions the commission to establish
4 drilling and spacing units for the production of gas
5 and associated hydrocarbons from certain formations
6 in certain fields in Garfield County. We seek
7 commission action in order to enforce and protect
8 coequal and correlative rights of DOE as an owner and
9 producer of common sources of supplies of natural
10 gas.

11 Specifically, two formations are in
12 issue: Wasatch and deeper Mesaverde group. Let me
13 just move over to the easel we have here. The larger
14 map will give you an idea of the location, again in
15 Garfield County, Township 5 and Townships 6 and 7
16 here, there's Naval Shale Reserve No. 1, and Naval
17 Oil Shale Reserve No. 3 to the south of the Colorado
18 River. Just to give an idea, Rifle, Parachute are
19 down here.

20 The first part of our request concerns
21 the Rulison Field, down here to the south of Rulison
22 3. Second part concerns the Parachute Field to the
23 south and up to the north. And third concern is
24 what's been referred to as the Grand Valley Field
25 over here to the west of the program reserves.

1 CHAIRMAN WELBORN: Which cause is the
2 Grand Valley Field?

3 MR. BICKNELL: It's not a spaced area.

4 CHAIRMAN WELBORN: That area is the
5 subject of the notice as well. Okay. All right.

6 MS. EGGER: Let me say, at the present
7 time, too, our spacing application incorrectly asks
8 for the spacing of nonfederal lands in these areas.
9 We did not mean to include in that BLM lands. We're
10 just referring to the Department of Energy lands and
11 that was inadvertent. We can correct that for the
12 record. We are not here representing the Bureau of
13 Land Management's federal lands.

14 COMMISSIONER McCORD: Is Barrett aware
15 of this position?

16 MS. EGGER: Absolutely.

17 COMMISSIONER McCORD: Does that make
18 any difference to your protest?

19 MR. KNOWLTON: No.

20 CHAIRMAN WELBORN: So I thought I
21 heard you say in the beginning you don't represent --
22 you are not trying to space non-federal lands. You
23 mean non-DOE lands?

24 MS. EGGER: All non-DOE lands is what
25 we had in mind. There are also Bureau of Land

1 Management lands in this area and we're not making
2 any representations on behalf of Bureau of Land
3 Management.

4 CHAIRMAN WELBORN: Is Bureau of Land
5 Management here? They are here?

6 MR. BICKNELL: Yes, sir.

7 CHAIRMAN WELBORN: But they don't --
8 you are not making an ambush?

9 MR. ONSAGER: No, we're not. We're
10 basically neutral, and will go along with the
11 commission on this. Paul Onsager, O-n-s-a-g-e-r.
12 Thank you.

13 CHAIRMAN WELBORN: All right.

14 MS. EGGER: Thank you. The essence of
15 DOE's application is that we would like the
16 commission to extend the spacing acreage requirements
17 of -- that have already been established in this
18 matter; that is 160-acre spacing for wells in the
19 Wasatch formation and 320-acre spacing in the
20 Mesaverde group, upper and lower. To discuss the
21 technical basis for this application, we have brought
22 with us the chief geologist from our operating
23 contractors staff to discuss the geology, and one of
24 the chief petroleum engineers, the assistant director
25 from the DOE field office in Casper, Wyoming to

1 present a net present value analysis for the
2 Mesaverde wells. .

3 Before getting into the technical
4 issues, I want to take a few minutes, if I can, to set
5 up the DOE statutory authorities and responsibilities
6 and to explain the basic thrust of the DOE protection
7 plan, which we are in the process now of
8 implementing. I think this is important because I
9 hope this will put our request in perspective. We
10 recognize that the Department of Energy's request is
11 unusual; that ordinarily, spacing applications are
12 filed by commercial firms who are seeking to
13 develop certain areas. The Department of Energy, on
14 the other hand, on behalf of the American people, is
15 attempting to protect the resources from these lands
16 from drainage by commercial firms and to insure that
17 the United States gets its rightful share.

18 As you may know, the Naval Shale
19 Reserves No. 1 and No. 3 were withdrawn from the
20 public domain by executive order in 1916 and 1924
21 respectively. The purpose of the reservations was to
22 provide a future source of fuels for the military in
23 times of national emergency. The reserves were under
24 the jurisdiction of the United States Navy until
25 1977, when the Department of Energy was created. To

1 insure the future capability of these reserves,
2 Congress has passed, over the years, various laws
3 which delineate the Secretary of Energy's authorities
4 and responsibilities with respect to these lands.
5 These authorities are now codified in Title X, United
6 States Code, Chapter 641.

7 The Secretary of Energy's essential
8 statutory responsibilities with respect to these
9 reserves is to protect and to conserve these
10 resources, having developed protection plans and
11 consulted with Congress, as we are required by
12 statute to do. We now have the authority to drill
13 offset wells to communitize with private owners and
14 so forth in order to protect these resources. These
15 efforts, though, always must be to achieve protection
16 of the resources rather than development, and it's
17 provided, of course, that we have sufficient funds to
18 meet contractual commitments.

19 A few years ago when we came before
20 the commission to oppose a down-spacing application
21 by Barrett, DOE did not then have sufficient
22 authority to drill wells and to communitize at that
23 time. We had to consult yet with Congress and
24 develop more extensive protection plans. We now have
25 obtained needed authority, but we are constrained by

1 scarcity of funds. I think the federal budget
2 deficit is a matter of common knowledge. The NOSR
3 program must compete with other critical federal
4 programs for scarce funds.

5 Since 1988, when our authority to take
6 action to protect the reserves was expanded, we have
7 entered into eight communitized agreements with
8 Barrett, drilled eight offset wells. We have
9 arranged for installation of needed gathering systems
10 and other connections. We have competitively sold
11 the DOE production. Further DOE activities are
12 planned in 1990, including several communitized wells
13 with Fina and others.

14 However, budget restrictions have
15 required that we use our limited sources funds
16 judiciously, so we are trying to insure that
17 unnecessary wells are not drilled, and that wells
18 which are drilled are spaced appropriately so that
19 correlative rights of all owners are protected. It
20 is in this regard we felt obliged to file our spacing
21 application. We know that commercial firms active in
22 the area, Barrett Energy and Fina, to name two, have
23 drilled wells and/or intend to drill additional wells
24 that directly affect our resource. Barrett has
25 informed us that it plans on drilling 21 wells on our

1 borders. Then it plans on implementing three 25-well
2 drilling programs. Fina would like to drill nine
3 wells within a half mile of our borders, three of
4 which would require communitization.

5 Unfortunately, firms are able to take
6 advantages of areas around our borders that are
7 presently unspaced. For example, as we will hear
8 more about in the testimony, Barrett has drilled one
9 Mesaverde well, is in the process of completing
10 another, both in Township 6 South, Range 96, Section
11 36 on our borders. The drilling unit of these two
12 wells are 160 acres, half the size of the Mesaverde
13 drilling unit for other spaced areas in that area.

14 With 160-acre units, DOE's
15 participating share in the first well is zero. In
16 the second well it's 47 percent. At 320 acres,
17 however, which DOE maintains is the appropriate size
18 for a Mesaverde well, DOE's share would be 50 percent
19 and 75 percent respectively. We believe this is an
20 appropriate situation for the commission to act,
21 given the statutory charter to protect correlative
22 rights. The injury to DOE's ownership interest is
23 going on now. For this reason we strenuously object
24 to what we understand Barrett's position to be as is
25 set forth in their protest.

1 Barrett apparently maintains its
2 spacing in these sections around our borders should
3 be exactly opposite of the established spacing.
4 Instead of 160-acre spacing for Wasatch, Barrett
5 maintains it should be 320. Instead of 320 for
6 Mesaverde, Barrett maintains it should be 160. We
7 look forward to Barrett's presentation of supporting
8 data.

9 We had hoped to facilitate proceedings
10 today by making requests to both the commission and
11 to Barrett to share the technical data so we can have
12 our technical people review it in advance and
13 expedite these proceedings. Unfortunately, Barrett
14 refused, and although this would have facilitated the
15 proceedings, we are confident that the spacing
16 requested in DOE's application is appropriate.

17 We also understand that Barrett
18 believes the commission should allow total discretion
19 with the operator to drill additional wells or should
20 defer issuance of spacing orders until further
21 drilling occurs and additional technical data is
22 obtained. Our position is, on this proposal, if
23 later technical data demonstrates that the spacing
24 ought to be changed, Barrett is free to file requests
25 for spacing order modifications with the commission.

1 This will allow the commission and other interested
2 parties to fully review the data and to make
3 judgments accordingly.

4 As the testimony will show, the early
5 production months of these wells is the highest in
6 its production history, so the early production
7 waiting deferral till later will seriously injure our
8 interests. The DOE motivation in all this is to
9 protect the resources of the United States and to
10 assure that appropriate drainage areas are
11 established. With that we are prepared to present
12 our witnesses. The testimony of these witnesses is
13 intended to support our spacing requests, based on
14 three elements: An extension of existing spacing
15 order of the Parachute and Rulison Fields, the
16 geology of the area itself, and the net present value
17 analysis. We have provided to the commission members
18 and to Barrett blue cover folders of smaller copies
19 of our exhibits. We have some large exhibits as
20 well.

21 CHAIRMAN WELBORN: Fine. Thank you
22 very much. Do you want to make an opening statement
23 at this time or wait until your --

24 MR. KNOWLTON: I would reserve that
25 right, please.

1 CHAIRMAN WELBORN: Welcome to do so.

2 Your first witness will then be Lynda Fivas.

3 MS. EGGER: Linda Fivas.

4 (Whereupon the witness was sworn.)

5 CHAIRMAN WELBORN: Please proceed.

6 Now, we do have in front of us your resume. And you
7 can highlight and whatever you like. The purpose of
8 providing this is to try to save us some time.

9 MS. EGGER: Exactly. I had not
10 intended to, other than a few preliminary matters, to
11 go through that in detail and unless the commission
12 would like --

13 CHAIRMAN WELBORN: Will you intend to
14 offer Ms. Fivas as an expert geologist?

15 MS. EGGER: Yes, sir.

16 CHAIRMAN WELBORN: Her qualifications
17 as set forth in this are acceptable and she is
18 qualified to testify as expert geologist.

19 MS. EGGER: Thank you, sir.

20 EXAMINATION

21 BY MS. EGGER:

22 Q Mrs. Fivas, for the record, could you
23 state your full name and address.

24 A Linda Denice Fivas, 391 Indian
25 Paintbrush, Casper, Wyoming.

1 Q How are you employed?

2 A I am employed by John Brown E&C firm,
3 the primary contractors to the Department of Energy
4 for the Naval Petroleum Reserves No. 3 in Wyoming,
5 Naval Oil Shale Reserves No. 1 and 3 in Colorado and
6 the Naval Oil Shale No. 2 in Utah.

7 Q Okay. In what capacity are you
8 employed?

9 A I am chief geologist for that company.

10 Q You are a professional geologist by
11 education, training, and experience?

12 A Yes, ma'am.

13 Q Again, for the commission, what
14 properties is John Brown responsible for under this
15 contract, you are chief geologist for the Department
16 of Energy?

17 A We act as operators for the Department
18 of Energy, for the naval petroleum reserves about 40
19 miles north of Casper, Wyoming. That's commonly
20 known as Teapot Dome. We also oversee the Naval Oil
21 Shale Reserves 1 and 3, which is in Garfield County,
22 Colorado about 12 miles out of Rifle; the Naval Oil
23 Shale Reserve No. 2 about 40 miles south of Vernal,
24 Utah; that presently there's no activity in Utah,
25 with the exception of very minimal lease activities.

1 There is an ongoing program in Garfield County and we
2 actively drill between 30 and 50 wells a year on
3 Naval Petroleum Reserve No. 3.

4 Q As chief geologist of John Brown, is
5 it within your responsibilities to monitor and
6 evaluate nearby commercial doings on the oil shale
7 reserves?

8 A Yes, it is.

9 Q Is it also your responsibilities to
10 perform studies of the geology of the NOSRs?

11 A Yes, sir.

12 Q Of producing fields in the area?

13 A Yes. To direct any studies for all
14 geologists under my supervision for the same
15 purposes.

16 Q What sorts of studies do you get
17 involved in?

18 A Any type of reservoir study for input
19 into simulation, evaluation of whatever activities
20 are going on in the area, and recommendations for the
21 Department of Energy as to their appropriate action
22 regarding those properties.

23 Q In connection with your position, do
24 you also monitor various spacing areas, drilling
25 permits and other industry information associated

1 with the reserves?

2 A As a requisite for -- to make
3 appropriate recommendations, that is correct.

4 Q Look there at Exhibit 1 in your book,
5 let's identify that as DOE Exhibit No. 1, entitled
6 Piceance Creek Geologic Column. Could you just take
7 a few minutes to describe briefly the geology in this
8 area.

9 A This geologic column was taken from
10 the RMOGA, upon their approval. It shows the basic
11 geologic column of the area. The Green River is only
12 applicable in the upper portions. The immediate area
13 we're interested in -- up in the NOSR 1 area.
14 There's a drastic topographic change at that point.
15 The Wasatch is at the surface here, in most of the
16 NOSR 3, and most of the offsetting properties to the
17 south. Below that is the Fort Union and Ohio Creek,
18 below which comes the Mesaverde, which is the series
19 of different depositional environments, including the
20 upper, what we are calling the upper portion of the
21 Mesaverde, which includes the fluvial and more
22 lenticular sands, the lower part of the portion of
23 the Mesaverde including Cameo, Cozzette and Corcoran.

24 CHAIRMAN WELBORN: When you say NOSR,
25 you are meaning Naval Oil Shale Reserve?

1 A That's our terminology, just to
2 shorten the word. NOSR 1 is this area up in here.
3 NOSR 3 follows right along in here. There's 2 to
4 3,000 feet topographic difference where the ridge
5 comes right down. This line here comes very close to
6 following it.

7 Q (By Ms. Egger) Could you just a take
8 minute to briefly describe the geology of the major
9 producing areas in this area.

10 A Wasatch log A, stream-type deposit,
11 lakes being deposited by small streams in nearshore
12 deposits for a lake. The upper portion of the
13 Mesaverde is largely fluvial. The lower portion of
14 the Mesaverde is gradational, going from the various
15 stages, getting progressively closer to marine
16 environment until at the very base you are, in fact,
17 in the shoreline marine environment.

18 Q Are these tight sands? Considered
19 tight sands?

20 A All of them would be considered tight
21 sands.

22 Q Are they also highly fractured?

23 A All of them are highly fractured,
24 according to studies that were performed in an
25 in-depth research project funded by the Department of

1 Energy in the Rulison Field located right here. It's
2 on the south edge of the Rulison Field constituting
3 three closely spaced wells to determine the original
4 properties of Wasatch and Mesaverde in that area.

5 Q If we could just turn, then, to
6 Exhibit No. 2, which is entitled "Existing Spacing
7 Orders for Wasatch Formation." Could you go up to
8 the easel there and walk us through the various
9 spacing orders that have been established in this
10 area.

11 A For the Wasatch in this area, the
12 original spacing orders were established before any
13 appreciable drilling had occurred. In the Rulison
14 Field, which is over in here, the original spacing
15 orders established 640-acre spacing. There were --
16 they were subsequently revised in various, different
17 orders, the first being order No. 8, which revised
18 the Wasatch down to 160-acre spacing, the second
19 order in 1988 was revised by Bonneville Fuels for
20 four wells within a 640-acre spacing. And this
21 spacing order which is -- established the Parachute
22 Field by Barrett Resource for 160-acre spacing. The
23 only area that remains within this vicinity that is
24 not spaced at 160-acre spacing or equivalent are
25 these areas. They remain 640.

1 CHAIRMAN WELBORN: The yellow?

2 A The bright yellow, yes.

3 Q (By Ms. Egger) With respect to the
4 Mesaverde, can we go to the next exhibit, then.

5 A In the Mesaverde you have essentially
6 the same spaced area, with the exception of the
7 Parachute Field, which has remained unspaced for the
8 Mesaverde, this large area here, in addition to the
9 yellow, which is 640-acre spacing for the Mesaverde.
10 This one section received exception for a second well
11 within the spacing units.

12 Q Do you have -- do you happen to know
13 who has applied for this spacing order here in the
14 Mesaverde, who made the initial applications to the
15 commission?

16 A The original applications for the
17 earliest orders were done by Southern Union. This
18 order was revised by Northwest. This by Bonneville
19 Fuels. I don't remember the green area.

20 Q Was it Barrett Energy?

21 A No, it wasn't.

22 Q With respect to the Wasatch, do you
23 know who filed for application on those?

24 A Barrett Resources filed for the
25 application in the Parachute Field, Northwest and

1 Bonneville and Southern Union in the Rulison Field.

2 Q Barrett Energy was for 160-acre
3 spacing?

4 A Yes, it was, and it was not granted at
5 that time.

6 Q If we could go, then, to the next map,
7 Exhibit No. 4. What does this represent?

8 A This represents the area which DOE is
9 requesting the spacing be established or modified.

10 Q Is it basically, then, to cover the
11 unspaced areas within one mile of the DOE borders
12 here?

13 A It's to cover all of the areas south
14 of this township line, since no appreciable drilling
15 has occurred north of the township line. Everything
16 south of that is within the, what the Department of
17 Energy looks on as an area that could potentially
18 cause drainage problems for their property, which is
19 called, within the organization, a buffer zone that
20 is roughly one mile.

21 Q Is the DOE application for spacing
22 consistent with acreage assigned to drilling units
23 for the spaced area in the Wasatch and Mesaverde
24 formation?

25 A Yes, it is. We are requesting

1 160-acre spacing for the Wasatch and 320-acre spacing
2 for the Mesaverde.

3 Q In your professional judgment, do you
4 believe the spacing should be consistent in these
5 areas?

6 A There is no indication that the
7 formation changes drastically over such short
8 distance; that depositional environments changed
9 sufficiently drastically to warrant a change in
10 reservoir properties that would drastically change
11 the relative areas that could be drained by a given
12 well.

13 Q Are you familiar with the commercial
14 activity around the oil shale reserves?

15 A I necessarily have to follow that
16 activity in order to determine what level is going on
17 and what future activities the Department of Energy
18 might want to undertake.

19 Q Can we turn to the next map, Exhibit
20 No. 5, which is marked, "Existing Gas Wells Near NOSR
21 1 and 3." Could you just take a few minutes to
22 explain to the commission members some of the
23 activity.

24 A The Rulison Field over in this area
25 was originally drilled and the majority of the

1 drilling was completed in 1979 and 1980, filling in
2 the entire area with the exception of the BLM leases,
3 in which the Department of Energy and the BLM has a
4 restricted drilling clause. The Parachute Field,
5 earliest drilling was in 1984 and '85, and drilling
6 is continuing to date. The Grand Valley Field being
7 called -- at least being called by Barrett the Grand
8 Valley Field is drilled largely into the Mesaverde
9 with the few Wasatch wells in that area. That field
10 was originally -- or the earliest substantial
11 drilling was in 1984 and '85 as well as it is
12 currently extremely active. He has been drilling for
13 the last several months at a rate of several wells
14 per month. These wells were drilled, or two of these
15 wells, this well and this well, were drilled last
16 winter. And they are the first represented to be
17 drilled up on top. This well was drilled the year
18 prior to that. And that is just one individual well
19 originally proposed to be directionally drilled. Due
20 to hole problems, the directional hole was abandoned
21 and the well was drilled straight down.

22 Q Could you just point out the two
23 Mesaverde wells I was referring to in my opening
24 statement in Section (37) and where the NOSR property
25 line is?

1 A There are these two wells and the
2 heavy slashed line represent Department of Energy
3 property. The -- as you can see, the entire north
4 half section of that property belongs to the
5 Department of Energy, the west half of the west
6 quarter of this section belongs to the Department of
7 Energy.

8 CHAIRMAN WELBORN: Our map just has
9 one well, I think, there.

10 A They are currently drilling the second
11 well, which is this well here.

12 Q (By Ms. Egger) It's not yet
13 completed?

14 A They have run casing on it. I don't
15 know the status beyond having the casing.

16 CHAIRMAN WELBORN: Should that be a
17 triangle, lower Mesaverde?

18 A Yes, it's targeted at -- the projected
19 depth is Rollins.

20 CHAIRMAN WELBORN: Mrs. Egger?

21 A It's not on that map because it hasn't
22 as yet been completed.

23 Q (By Ms. Egger) Go to the next map. I
24 believe it's on that one, Exhibit No. 6. Also a
25 topographic map that we have here, which is not the

1 same as in your folders. But it gives you an idea.

2 A Due to the extreme topography, it
3 doesn't reproduce well in 8 1/2 by 11. We opted to
4 give the plain base, show the topographic map. Up
5 here, this represents, to the best of our knowledge,
6 the activities that are currently being planned by
7 the offset producers to the naval oil shale reserve
8 over in here. These represent mostly Fina's wells
9 with four Barrett Mesaverde tests. These represent
10 wells that were proposed by Barrett to the Department
11 of Energy as wells that the Department of Energy
12 would potentially participate in. And the blue over
13 here are wells that were presented to the Department
14 of Energy by representatives of Barrett in an
15 informal session during December.

16 Q With respect to the Wasatch wells to
17 the north of NOSR 3, there on top of the Parachute
18 Field, what is the spacing of those wells at this
19 time?

20 A It would be fairly obvious that these
21 would be -- have to be sited on 160-acre spacing,
22 most especially when you identify four wells within
23 that section and two wells in the north half of all
24 of the section, across this section line. That would
25 indicate, at the very lowest, 160-acre spacing.

1 Q With respect to the Mesaverde --
2 proposed Mesaverde wells, is there a spacing plan
3 that you can identify there?

4 A Well, there seems to be various
5 spacing plans. These two, because there's only two
6 within that section and he could reasonably drill
7 three at 160-acre spacing. That would imply 320-acre
8 spacing. He, in fact, drilled three Wasatch wells in
9 that section, although a goodly portion of that
10 section belongs to the Department of Energy. We
11 initially only had information regarding this one;
12 that obviously gave no indication. Most of the wells
13 not included in the current drilling program would
14 indicate 320-acre space being -- because he has sited
15 only two wells per section. Due to topography, some
16 of them would have been moved from the opposing
17 quarter section because it is an extremely severe
18 topographic area.

19 Q With respect to Fina's proposed wells?

20 A Fina's proposed wells, with the
21 exception of areas where topography would cause
22 problems to them, indicate that they are following
23 the established 160-acre and 320-acre spacing.

24 Q In your professional judgment, how
25 does the level of existing and planned commercial

1 activity affect the reserves, naval oil shale
2 reserves?

3 A If any appreciable percentage of these
4 wells are, in fact, drilled and completed, then the
5 naval reserves would be obviously severely impacted,
6 especially in those areas where the wells would drain
7 DOE property. Obviously the DOE property would be
8 drained by those wells; therefore, they would have no
9 protection against drainage and their correlative
10 rights would not be protected.

11 Q Okay. Are you aware of any published
12 petitions that have indicated what the proper
13 drainage area is for Wasatch, what else the Rulison
14 should be?

15 A Several papers have been published in
16 support of the multiwell permit, which is these wells
17 right here.

18 CHAIRMAN WELBORN: You will have to
19 give us a rough legal description, if you can,
20 because -- for the record.

21 A Okay. There they are in Section 34 in
22 the northwest quarter. They are three closely spaced
23 wells which were a research project developed by the
24 Department of Energy to determine various
25 characteristics of the productive horizons in that

1 area. There were originally nonsolicited proposals
2 to the Department of Energy to evaluate those tight
3 gas sands. They were drilled in the early 1980s,
4 various times for each wells because they were
5 extremely slow drilling wells. Large quantities of
6 cores were taken from them, oriented pressure cores
7 and conventional cores. A large variety of research
8 was associated with it, including studies performed
9 by the United States Geologic Survey, Colorado
10 Geologic Survey, and other subcontracted groups,
11 including Sandia Laboratories, which did an
12 evaluation of the area for them.

13 The particular article that we're
14 referring to that directly addresses spacing in the
15 Wasatch is the SPE Article 15248. This is production
16 characterization of tight lenticular gas sands in the
17 Rulison area of western Colorado. This was
18 specifically addressing wells in close proximity to
19 the MWX wells, which we locally called the multiwell
20 experiment. All of the papers published regarding
21 that were called the multiwell experiment. This
22 addressed the, both the Mesaverde and Wasatch,
23 including three possible reservoir configurations:
24 The first assuming that the Mesaverde drained only
25 those sands which were in direct contact with the

1 well bore, the second being sand lenses in direct
2 sand to sand contact and direct contact with the well
3 bore, and the third being highly fractured Wasatch,
4 in which there was communication beyond the direct
5 sand-to-sand contact in the Wasatch formation.

6 Their conclusions essentially came
7 down to the established spacing in the Wasatch was
8 appropriate for both cases, and that reducing spacing
9 in the Mesaverde to 160-acre spacing where there was
10 only direct sand contact with the well bore was
11 appropriate. However, we feel that conclusion has
12 subsequently been invalidated to a certain extent due
13 to the high level of fracturing that has been proven
14 in the area.

15 Q Stay for a minute with Wasatch. The
16 established spacing in the area was supported by this
17 paper and was that 160-acre spacing?

18 A Yes. The -- established in both
19 cases. In the first case, they specifically cite
20 that in the case where you have sand-to-sand contact
21 of the individual sand lenses, and only sand-to-sand
22 contact, 160-acre spacing is appropriate. It further
23 says that well spacing, currently well spacing which
24 is 160-acre, would be appropriate for the Wasatch
25 within the shale separating sandstone lense, which is

1 naturally fractured, which there is ample evidence to
2 indicate there has been a high level of fracturing
3 throughout the section in that area.

4 Q With respect to the Mesaverde
5 formation, you mentioned that later studies have
6 indicated that the assumption in this first study
7 were not quite correct. Is there a study you can
8 point to or SPE paper on that?

9 A This study itself points out that
10 effective well spacing is a strong function of the
11 natural fracture system in the shale. Another
12 subsequent study that was reported in SPE 19007
13 specifically addresses the natural fracture in the
14 area. This was taken from the core of the MWX wells.
15 They took 4200 feet of core out of those wells. Of
16 that 4200 feet of core, 450 natural fractures of
17 sufficient size to drastically alter the permeability
18 of the reservoir were noted. Another 1430 fractures
19 that were not of that size were also noted. This
20 represents an extremely high fractured density within
21 that interval.

22 Q Is that to say that the more highly
23 fractured a reservoir is, it increases the
24 permeability and therefore increases the drainage
25 rates?



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1 A Yes, it would. There have been
2 reports that the natural fracturing identified in
3 these studies could increase permeability from what
4 one might anticipate of 3 millidarcies up to 500 to
5 5,000 millidarcies.

6 Q In connection with the radius, for
7 this hearing, have you had occasion to perform any
8 cross-sectional analyses?

9 A Yes, I have. The original cross
10 sections that were required were in support of the
11 technical report generated to assist the Department
12 of Energy in getting their original congressional
13 approval to drill and participate in wells in the
14 area. They were subsequently refined with additional
15 wells. This is an index map showing cross sections
16 that were drawn, three of the Wasatch, crossing all
17 of the way over into the Grand Valley Field, one
18 going north-south in portions of the Rulison Field,
19 including the furthest north well that there is any
20 control on, which happens to be a Department of
21 Energy well and north-south of the Parachute Field,
22 including the furthest north, which is a well drilled
23 by Barrett Resource.

24 CHAIRMAN WELBORN: This is Exhibit 7?

25 MS. EGGER: Yes, sir. DOE Exhibit

1 No. 7.

2 A And one Mesaverde cross section
3 because there are limited logs that cover the entire
4 Mesaverde section, including the Cozzette, Corcoran,
5 that only includes four wells that cross all three
6 fields.

7 Q (By Ms. Egger) Where did you get
8 technical data to perform the cross-sectional
9 analysis here?

10 A The data was largely purchased through
11 Petroleum Information, purchased their logs, gathered
12 any production information that we required from the
13 state directly.

14 Q So it's a commercial service that --

15 A That sells logs or copies of
16 reproductions of logs that have been run in the
17 area. We purchased all of those available up to
18 approximately two months ago.

19 Q We turn, then, to DOE Exhibit No. 6.
20 Could you describe what this represents?

21 CHAIRMAN WELBORN: The --

22 MS. EGGER: I am sorry, No. 8.

23 A This is the east-west cross section of
24 the Wasatch, just identifying the main productive
25 sands in those areas that have been perforated in the

1 Rulison Field, more smaller lenses having been
2 perforated than in the other fields. Main productive
3 horizon in all of the fields is what has locally been
4 called the good sands. All of the logs represented
5 on here are gamma ray logs, are actual logs from the
6 well bore at that location. If you follow the index
7 map, you can find the actual well names.

8 CHAIRMAN WELBORN: This is AA prime?

9 A AA prime. It's the east-west one
10 running across. As you can see, the good sands are
11 -- have various lenticular sandstones actually that
12 seem to be stacked upon one another, very close
13 proximity to one another. The actual interval can be
14 followed all of the way across, although the
15 individual sand lenses can't. Again, as a result of
16 the high level of fracturing and proximity of the
17 individual sand lenses, we feel they are no doubt in
18 communication with one another, and, therefore, would
19 again be supported by the original paper which
20 identified the highly fractured reservoir as 160-acre
21 spacing being appropriate.

22 Q (By Ms. Egger) This is a cross-
23 sectional analysis of both Parachute and Rulison
24 Field?

25 A All of the way across. This is the

1 furthest east we would -- we had control on in the
2 Rulison Field. This is in the furthest west, in the
3 Grand Valley Field. This represents the Parachute
4 Field right in here. This represents just barely to
5 the west of the NOSR boundary, which is the Rulison
6 Field. This represents the Department of Energy Well
7 1M19.

8 Q Anything, any other matters of
9 significance in that cross-sectional analysis?

10 A I don't think so.

11 Q Turn, then, to Exhibit No. 9.

12 CHAIRMAN WELBORN: You might, just for
13 the record, write on there quickly what you just
14 said. Rulison area, the Parachute area, so we have a
15 -- write the name of that one well on there, if you
16 would, so the record is clear. Thank you.

17 A The index, the large index has well
18 names on it. You can directly read the names off of
19 the index map.

20 CHAIRMAN WELBORN: All right.

21 A I think we can go back to that one for
22 just a minute. On this one, we have actually posted
23 the well names. This one is the furthest east of the
24 wells. This is 121 Rulison Federal.

25 CHAIRMAN WELBORN: You are looking at

1 Exhibit 7?

2 A Yes. That furthest west of the wells,
3 which is Cathedral Creek 2, that's a Barrett Resource
4 well. Some of the correlations we have in order to
5 insure that we were following the same sand unit all
6 of the way across. We have used the picks of those
7 that were being used in the immediate area. This
8 particular well we used Barrett Energy pick for the
9 good sand, to insure we were following it all of the
10 way across.

11 CHAIRMAN WELBORN: Be sure to give the
12 location of that well. What well was that?

13 MS. EGGER: For the record, what well?

14 A MV 158. MV 158.

15 Q (By Ms. Egger) Turning to Exhibit --
16 DOE Exhibit No. 9. Can you describe this map, this
17 cross section?

18 A This, again, is the Wasatch showing
19 the good sand interval in which various lenticular
20 sands are in sand-to-sand contact with one another.
21 The north-south running section, this being DOE Well
22 1M9, because it's furthest north of all of the wells
23 there over which we had logs on the Wasatch.

24 Q That's the log to the far left on the
25 exhibit?

1 A Yes, the furthest north.

2 Q Can you describe the other wells?

3 A The other wells are just in line going
4 to the south through the middle of the Rulison Field
5 tying in with the east-west cross section at this
6 here.

7 Q What is this cross section called?

8 A Essentially the same thing; that to
9 the north, at least within the Rulison Field, that
10 same sandy interval can be followed.

11 Q That's the good sand?

12 A That's the good sand.

13 Q And moving to DOE Exhibit No. 10
14 entitled "North-South Cross Section of the Parachute
15 Field Wasatch formation," can you describe this and
16 its significance?

17 A This is essentially the same interval
18 we're talking about again. Again, it's good sand
19 interval, in which you got multiple sand lenses that
20 are in sand-to-sand contact with one another or in
21 contact through major fracturing. The furthest well
22 to the north is 116-95 Allen Point drilled by Barrett
23 Energy. This well is the DOE well which is 1W21.
24 This well or these -- the remainder of these wells
25 are all Barrett Resource wells.

1 CHAIRMAN WELBORN: The second well
2 from the left?

3 A Going progressively south.

4 CHAIRMAN WELBORN: The second well is
5 1W21?

6 A Yes.

7 COMMISSIONER McCORD: Is that southern
8 well B prime; northern well B?

9 A Yes, it is.

10 COMMISSIONER McCORD: All right.

11 A Again this ties in with the east-west
12 cross section.

13 Q (By Ms. Egger) It again shows what?

14 A Although there are individual sand
15 lenses within what is being called the good sands,
16 they are in sufficient proximity to one another that
17 they are probably in communication with one another;
18 therefore, you could anticipate similar properties
19 throughout the area.

20 Q Okay. Going to DOE Exhibit No. 11,
21 entitled "East-west Cross Sections Through Grand
22 Valley, Parachute and Rulison Fields, Mesaverde
23 Formation." Can you describe this and its
24 significance?

25 A This is just identifying the major

1 depositional environments within the Mesaverde, as I
2 identified as MWX 1, because that is the well with
3 the majority of the control in the area and the most
4 studied well in the area. And it's just tying in the
5 depositional environment across, indicating there is
6 no major change across. Where you have lenticular
7 sands, you have got a repeat of the lenticularity of
8 that sand. Where you got more blanket sands coming
9 across, you still have blanket sands as you get over
10 into the Grand Valley Field. This again is Cathedral
11 Creek 2. This one being MWX 1.

12 CHAIRMAN WELBORN: Which is the
13 farthest one on the right?

14 A MWX 1 is more -- this is at the south
15 edge of the Rulison Field. This is the furthest
16 west, the log that we had in what is being called the
17 Grand Valley Field.

18 CHAIRMAN WELBORN: This is DD prime
19 running left to right?

20 A Yes.

21 Q (By Ms. Egger) Could you talk a
22 little bit about the productive zones here.

23 A Where we are making the distinction in
24 the upper and lower Mesaverde is essentially here at
25 coastal -- the coastal fluvial and perlitic are

1 considered the upper Mesaverde because they are more
2 lenticular. The communication that one would have
3 between sands would be more associated with the
4 fracturing than it would be with sand-to-sand
5 contact. This is the portion that was covered where
6 it says 320-acre spacing could be reduced to 160-acre
7 spacing, in the original article that I cited, as
8 long as there was no communication between the
9 fracturing.

10 We felt the other paper that I cited,
11 19007, indicates the high level of fracturing would
12 warrant communication; therefore, a larger draining
13 area would be expected. The lower portion of the
14 Mesaverde consists of the Cameo, Rollins, Cozzette
15 and Corcoran. The Cozzette and Corcoran are well
16 known as being blanket sands, shoreline marine
17 deposits. The Cameo is the interval which -- in
18 which the coal bed methane is identified. It has a
19 series of lenticular sands overlying and underlying
20 by relatively thin to thick coal bed seams.

21 Q Is the Cozzette formation
22 representative of the lower Mesaverde?

23 A Yes, it would be. Most especially of
24 the more blanket sands that are associated with the
25 lower Mesaverde. It is consistent with that type of

1 depositional environment.

2 Q Referring to, again, to that SPE paper
3 19007 that was published in March or presented in
4 March of 1989; is that correct?

5 A Yes, it was, at the coal bed methane
6 seminar. I think it was held here in Denver, or at
7 the low permeability reservoir symposium held here in
8 Denver. The SPE in combination with GRI and DOE has
9 tight gas sand symposium or equivalents.
10 Unconventional gas reservoirs, they are occasionally
11 called that, have been held since 1979. Multitude of
12 papers have resulted from this, a pretty fair
13 proportion of which are based on the MWX study that
14 was done because of the large volume of data that was
15 gathered at that time.

16 Q Based on your analysis, was it your
17 view that the Rulison, Parachute, and Grand Valley
18 Fields have similar formations?

19 A Yes, it would seem that it would be
20 very easily implied by the correlations that can be
21 made all of the way across all three of the fields.
22 You can find the same marker horizon all of the way
23 across. You can find the same general sand
24 characteristics, although individual sands usually
25 can't be followed all of the way across unless they

1 are in the lower Mesaverde. The intervals in which
2 they occur consistently are sandy, and consistently
3 there are multiple sands that look like they are in
4 sand-to-sand contact with one another.

5 Q Is it your view that Rulison,
6 Parachute and Grand Valley have similar reservoir
7 characteristics, similar depositional environment?

8 A Yes, they would.

9 Q Based on your analysis, is it your
10 view that the effective drainage areas for the
11 Rulison Field are appropriate for the Parachute and
12 Grand Valley Fields?

13 A Based on -- yes, all of them seem to
14 be the same basic depositional environment, same
15 reservoir characteristics, yes.

16 MS. EGGER: That concludes my
17 questions at this time, Mr. Welborn.

18 CHAIRMAN WELBORN: All right. Do you
19 have any cross-examination?

20 MR. KNOWLTON: Can I consult briefly?

21 CHAIRMAN WELBORN: If you don't mind,
22 there's a couple of questions from the commissioners.

23 COMMISSIONER McCORD: Your data would
24 seem to suggest that the Parachute and Rulison
25 Fields, for example, are in communication with each

1 other. Do you think that is the case?

2 THE WITNESS: At difference spots
3 within the structure, it could well be. You can draw
4 isopach maps of the Wasatch and portions over the
5 intervals that you have sufficient logs; on the
6 Mesaverde, you can draw isopach maps that would
7 indicate they could easily be in communication. But
8 the sands are continuous across or at least the sandy
9 units are continuous across, and that you could
10 potentially have communication between the three
11 fields, yes.

12 COMMISSIONER McCORD: Do you have any
13 opinion as to why the drilling wells seem to be
14 clumped together, then, in two separate fields as
15 opposed to continuous?

16 THE WITNESS: There are several
17 structures that are overlain by a main structure in
18 the area. There is a large anticline. There are
19 smaller anticlines that are overseeing it. Each of
20 the anticlines could be reasonably centered right
21 under the majority of the drilling. Although
22 production doesn't seem to be structurally dictated,
23 to a certain extent, necessarily, it will be in any
24 area.

25 COMMISSIONER McCORD: So the existence

1 of anticlines could explain why you have two separate
2 fields?

3 THE WITNESS: That's what I would say.

4 COMMISSIONER McCORD: Thank you.

5 THE WITNESS: That's what it appears
6 to be at this stage in development. There is very
7 little data to the north, so you can't really say
8 what is happening to the north. That is obviously
9 the Department of Energy's property and has not been
10 drilled to any extent.

11 CHAIRMAN WELBORN: Any other questions
12 at the moment? You want to wait a minute?

13 MR. KNOWLTON: May I ask some
14 questions now, please.

15 EXAMINATION

16 BY MR. KNOWLTON:

17 Q In the area where that MWX study was
18 conducted, can you, from one of your exhibits, point
19 out to the commission the area where those wells were
20 drilled.

21 A The wells were located right in here
22 in Section 34.

23 CHAIRMAN WELBORN: What exhibit are
24 you referring to?

25 A You are looking at Exhibit 5. It's

1 the least cluttered up. They were on the south side
2 of the river, at the south edge of the majority of
3 the drilling in the Rulison Field.

4 Q (By Mr. Knowlton) The conclusion, as
5 I understand it, there was an indication of highly
6 fractured, highly natural fractures in that area; is
7 that correct?

8 A Extremely high.

9 Q And you think that because that
10 conclusion was made there, that this applies all of
11 the way over to Parachute and to Grand Valley, and do
12 you think there's clear evidence to that effect?

13 A There are various other studies that
14 again were performed by the U.S.G.S. and by Sandia
15 that support the contention that the entire area
16 upper -- further north, into the -- further into the
17 basin itself, into the Piceance Creek basin, that
18 extensive fracturing is one of the paramount
19 considerations.

20 Q If this area is so highly fractured,
21 then why are most of these wells in here all
22 artificially fractured?

23 A In order to communicate with the
24 existing natural fractures. You would be
25 communicating with relatively few well bores. A well

1 bore is extremely small. A natural fracture by
2 virtue of being natural fracture, you can talk about
3 less than half an inch. That is an extremely small
4 target to try to fit into an approximately 800-inch
5 hole in the ground. Most of them were very near
6 vertical which decrease the probability of hitting
7 them, even though they have a very high density. We
8 have information in other areas that can indicate the
9 probability of hitting fractures.

10 We have a reservoir that we look at
11 over at Naval Petroleum Reserve No. 3 in Wyoming in
12 which the only reservoir is a fracture. And we hit
13 that fracture between 30 and 40 percent of the time.
14 That is the sum total of what the reservoir is, so we
15 know exactly when we have hit it, and whether -- what
16 the frequency of hitting those are. That area is
17 slightly more fractured than this area, so you could
18 anticipate hitting that more frequently than you
19 would hit correlative-type fractures in this area,
20 although you could anticipate that the fractures
21 would be of approximately the same size.

22 The particular reservoirs that I am
23 referring to in Wyoming are the Steele and Niobrara
24 shales. They are very dense marine shales, black
25 marine shales, with a high level of bentonite in

1 them. We produce wells that we -- we have
2 approximately 350 wells producing from those
3 horizons. There are absolutely no sands associated
4 with those wells, so they are producing strictly from
5 fractures.

6 The fractures there, the cores that we
7 have, indicate -- that we have seen and taken through
8 that interval are similar to those that were
9 diagrammed in the MWX wells in size -- orientation
10 obviously is a drastic difference, but, in size, they
11 are approximately similar, and in those, as I said,
12 when we drilled for them, we do specifically drill
13 for that horizon, because it produces between ten and
14 it can be up to a hundred barrels a day from one
15 well, from one fracture system; that we have.

16 And when we drill for those, we do get
17 a success ratio between 30 and 40 percent. Therefore
18 you could anticipate a somewhat lower success ratio
19 in penetrating fractures at the MWX sites and in the
20 vicinity.

21 Q I believe, from your testimony earlier
22 and from the studies you have reviewed, you concluded
23 or that perhaps the people who wrote this study
24 concluded that, absent this fracturing, the Mesaverde
25 should be spaced on 160, isn't that what you

1 testified to?

2 A That's correct.

3 MR. KNOWLTON: I have no further
4 questions.

5 CHAIRMAN WELBORN: Are there any
6 questions from the members of our staff? Questions
7 from the commission?

8 COMMISSIONER ANDERSON: Just one. As
9 I understand it, spacing was being requested, with
10 respect to both the Wasatch and Mesaverde, is a mile
11 around the reserve.

12 THE WITNESS: Additional area was
13 included just to include a full section as opposed to
14 breaking it out into smaller areas.

15 COMMISSIONER ANDERSON: You feel a
16 mile is the proper distance rather than half a mile
17 or two miles?

18 THE WITNESS: According to studies
19 that were done by Morgantown Energy Technology
20 Center, which is the research center within the
21 Department of Energy, one mile is the area within
22 which they feel -- the Department of Energy has to
23 watch extremely closely to anticipate what would be
24 required for their action subsequent to drilling in
25 that area.

1 COMMISSIONER ANDERSON: But based --
2 that's a general policy thing, based on your specific
3 knowledge of these particular reservoirs in this
4 area?

5 MR. KNOWLTON: It appears to be
6 consistent.

7 COMMISSIONER ANDERSON: Do you think a
8 mile is required?

9 THE WITNESS: It appears to be
10 consistent in that area by all of the evaluations we
11 have done, if we can anticipate that one mile, then
12 that gives us sufficient information and sufficient
13 warning for what would be required by the Department
14 of Energy.

15 MS. EGGER: Sir, if I could just add,
16 additionally, with respect to the southern boundary
17 of the oil shale reserves, one mile also represents
18 what's presently unspaced. The rest of it is already
19 spaced. So we just want to continue the existing
20 spacing. With respect to the Grand Valley Field,
21 however, that's correct, none of that has been
22 spaced, the area, with the exception of the Mesaverde
23 being spaced here.

24 CHAIRMAN WELBORN: Give us a legal
25 area.

1 THE WITNESS: The Mesaverde is spaced
2 in Sections 12 13, 24, 25 and 36, of 7 South, 96
3 West. The remainder of the area that is in 96 and 97
4 west and north of this northern boundary of NOSR 3
5 has not been spaced.

6 CHAIRMAN WELBORN: Yes.

7 COMMISSIONER McCORD: I would like us
8 to focus on permeability. Projections that you gave
9 a minute ago, those were the result of the study that
10 you cited?

11 THE WITNESS: Yes.

12 COMMISSIONER McCORD: They did 4200
13 feet of core?

14 THE WITNESS: Yes.

15 COMMISSIONER McCORD: Do you have any
16 independent data to indicate what would be the case
17 for the wells versus the DOE drilled -- I note that
18 there's kind of a wide range here. You say from 3
19 millidarcies ordinarily, but factoring in fractures,
20 it could range from 500 up to 5,000 millidarcies?

21 THE WITNESS: Yes.

22 COMMISSIONER McCORD: Do you have any
23 idea what we're dealing with, for instance, in the
24 Rulison?

25 THE WITNESS: It will depend on size

1 of fracture you are dealing with. Obviously, the
2 larger the fracture, the greater the permeability.

3 COMMISSIONER McCORD: Sure. I just
4 wondered if you had any independent data to enlighten
5 us as to what you think the permeability may be in
6 this area.

7 THE WITNESS: I hate to go over 500,
8 but I have seen permeabilities that were higher.

9 COMMISSIONER McCORD: Okay.

10 THE WITNESS: In cores that -- in a
11 core analysis, when a core analysis is submitted to
12 you, if the core plug was taken out of a portion of
13 the rock that happened to have a fracture in it, they
14 will normally note that on the core analysis;
15 therefore, you could say that plug would represent
16 the fractured permeability. And in those cases you
17 can get extremely high permeabilities. I have seen
18 personally up to about 3 darcies. Generally more
19 conventional would be the 300 to 500 range.

20 COMMISSIONER McCORD: Thank you.

21 CHAIRMAN WELBORN: Further questions
22 from the commission? All right. Do you have any
23 further questions of this witness --

24 MS. EGGER: No, sir, I do not.

25 CHAIRMAN WELBORN: -- Mr. Knowlton?

1 All right. Thank you very much.

2 MS. EGGER: I would like to call our
3 next witness, just exchange chairs here a minute.
4 Our next witness is Lieutenant Ken Cowan.

5 CHAIRMAN WELBORN: All right.
6 Lieutenant Cowan.

7 (Whereupon the witness was sworn.)

8 CHAIRMAN WELBORN: Please proceed. We
9 have -- similarly have received Lieutenant Cowan's
10 curriculum vitae. You can highlight in there
11 whatever you would like. I can say for the record
12 that his qualifications as an expert in petroleum
13 engineering are accepted.

14 MS. EGGER: Thank you, sir.

15 EXAMINATION

16 BY MS. EGGER:

17 Q Could you please state your full name
18 and address for the record.

19 A Kenneth L. Cowan, 2024 Kelly Drive,
20 Casper, Wyoming.

21 Q And who are you employed by?

22 A I am employed by the United States
23 Navy attached to the Department of Energy.

24 Q So your present tour of duty is with
25 the Department of Energy in what capacity?

1 A I serve as the assistant director for
2 the Department of Naval Petroleum Oil Shale Reserves
3 in Colorado and Utah and in Wyoming.

4 Q What are the responsibilities of your
5 position there?

6 A As the assistant director, I am really
7 responsible for all facets of operations, including
8 the technical and engineering staff, the marketing of
9 products, the administrative staff, just really
10 everything.

11 Q What -- again, what properties does
12 your office oversee?

13 A Our office in Casper oversees the
14 operation of NPR 3, which is Teapot Dome. The three
15 naval oil shale reserves, two in Colorado and one in
16 Utah.

17 Q You have a master's in petroleum
18 engineering?

19 A Right.

20 Q Where is that from?

21 A University of Texas at Austin.

22 Q Are you responsible, also, in your
23 position as assistant director for analyzing the
24 economics of proposed or potential oil and gas field
25 activities?

1 A Yes, I am.

2 Q Could you give a few examples.

3 A Several drilling programs, anywhere
4 from 4-well drilling program to 35-well drilling
5 programs, we analyze the economics before we ever
6 conduct each operation's installation of gathering
7 equipment, and drilling programs in Colorado, natural
8 gas projects.

9 Q Are you responsible for monitoring and
10 analyzing, also, the drilling activities on and near
11 the oil shale reserves in Colorado?

12 A Yes, I am.

13 Q What methods do you use in performing
14 these economic analyses?

15 A Basically, just a discounted net cash
16 flow analysis, normally at about 10 percent of the
17 discounted rate. My analyses are probably a little
18 more simple than those in the commercial industry
19 because we do not pay taxes. So my analysis never
20 does consider the tax portion.

21 Q In preparation for this hearing, have
22 you had occasion to perform an economic analysis for
23 Mesaverde wells?

24 A Yes, I have.

25 Q And what spacing alternatives did you

1 look at?

2 A I compared the 80-acre alternative
3 with 160 acres with 320 acres in the Mesaverde
4 formation.

5 Q In general, can you describe your
6 economic analysis, the approach of your economic
7 analysis?

8 A Yes, I can. First of all, before one
9 can conduct an economic analysis on different
10 spacing, you have to have an idea of what kind of
11 total reserves you are looking at for each spacing
12 alternative. You also have to have an idea of the
13 lifetime of the well or the abandonment time. And in
14 order to get these kind of numbers, I used an SPE
15 paper, 19108, entitled "Production Strategies for
16 Tight Gas Sands," a case study of upper Cozzette
17 blanket sands conducted by three individuals from
18 Penn State University and one from the Morgantown
19 Energy Technology Center.

20 And really, what these people did was
21 run a series of simulations bearing different
22 parameters and these parameters were the fractures,
23 vertical fracture lengths, the different spacing
24 alternatives, and also looked at horizontal well
25 bores. And they obtained all of their reservoir

1 information from the multiwell experiment site which
2 Lynda has referred to earlier, all of the logs and
3 the core that was done, which provided them with
4 information on the characteristics of the Cozzette
5 sand.

6 Basically, there was a lot of
7 simulation done and a lot of results obtained. What
8 I did was try to fit, take the results from the
9 particular alternatives that I think best fit our
10 case in Colorado. And specifically, 600-foot
11 vertical fracture in all cases, 80-acre, 160-acre,
12 320-acre. And basically what the results showed was
13 for 80-acre spacing, total recovery would be 720
14 million cubic feet over 7.1 years.

15 Based on 160-acre spacing that we
16 would -- could recover 1,389 million cubic feet in
17 approximately 14.6 years. And on 320-acre spacing,
18 obtain 2,532 million cubic feet of gas over 27.6
19 years. This is how I obtained my total reserves for
20 each spacing. And basically I would have to multiply
21 the 80-acre case by four in order to determine how
22 many total reserves I would have in 320 acres. I
23 would multiply the 160-acre case by two in order to
24 get total recovery in 320 acres under this scenario.
25 And this is what I did in my analysis, based on these

1 reserves.

2 Futhermore, though, I had to have some
3 kind of decline curve to determine exactly how these
4 reserves were obtained over these time periods. In
5 order to obtain a decline curve, I used another
6 paper, this paper is entitled SPE/DOE's 11640. Paper
7 is "Decline Curve Analysis and Fractured Low
8 Permeability Gas Wells in the Piceance Basin" done by
9 D. H. Strife of Reservoir Management Services and
10 J. I. Gordon of Gordon Engineering, Inc.

11 Basically, what these people did was
12 to develop a technique for estimating the long-term
13 recoverability of natural gas wells in the Piceance
14 Basin based on short-term production data. I am
15 talking about maybe one to two years worth of data.
16 Their method was allowing them to -- or they were
17 claiming they could estimate the long-term
18 recoverabilities over 20, 25 years in gas wells in
19 this area.

20 And the reason this is significant is
21 because in the normal decline curve analysis you
22 would probably have to produce your field for half of
23 its lifetime before you could use decline curve
24 analysis to adequately project what your final
25 reserves would be. This technique would allow a

1 person or operator to estimate the reserves at maybe
2 the one- or two-year point. That was the purpose of
3 them conducting their study.

4 And they used three different wells:
5 One from the Manco shale, one from the Mesaverde
6 formation, one from the Wasatch. They compared
7 actual production data with their well. They
8 actually used the short-term production from these
9 three wells. They predicted a decline curve based on
10 their technique that they developed. They compared
11 it with actual production. And the results were very
12 good. They have very good correlation.

13 And what I did was use this technique
14 and -- very similar in calculating a decline curve
15 under these three scenarios: The 80-acre, 160-acre
16 and 320-acre with these total recoveries, and these
17 lifetimes. And basically what that -- what that
18 analysis was was Q or flow rate equals a constant
19 divided by the square root of time. That was the
20 result of their study. That equation would
21 adequately define a decline curve in a natural gas
22 well in the Piceance Basin. So based on that
23 information, I now had enough information to go ahead
24 and run economics under each one of these cases.

25 Q Before we get into the economics, I am

1 going back to the first study you referred to, SPE
2 19108. That dealt with the upper Cozzette formation,
3 is that what you indicated?

4 A Right.

5 Q That's in what we have been referring
6 to as the lower Mesaverde?

7 A Yes, it is.

8 Q The formation that Ms. Fivas indicated
9 was representative of the lower Mesaverde?

10 A Yes.

11 Q Again, with respect to that study, did
12 they take the characteristics, the reservoir
13 characteristics from the MWX wells?

14 A Yes, they did.

15 Q Did that paper also look at the
16 Wasatch formation?

17 A No, it didn't. Just the Cozzette.

18 Q You did not have the recovery totals
19 and abandonment time of the Wasatch formation?

20 A I could not obtain from this paper any
21 kind of corresponding information on the Wasatch.

22 Q In this paper or any other paper?

23 A Not that I could find.

24 Q Did the paper provide an economic
25 analysis?

1 A No, it did not.

2 Q Were you able, going now to the second
3 paper you referred to, SPE 11640, were you able to
4 check that equation against some production data that
5 you were aware of?

6 A Yes. Yes, I did do that.

7 Q What were the --

8 A I saw the results that they came up
9 with in this paper. I wanted to convince myself that
10 this was something that would be valid, so in two
11 cases, I had examples of wells that were in the
12 Piceance Basin, Well No. 104 Clough located in
13 Section 16, Township 6 South, Range 94 West.

14 Q Is that represented in DOE Exhibit No.
15 12 in our folders here?

16 A Yes, it is.

17 Q Can you describe what that is?

18 A The very jagged curve represents
19 actual production and it's pretty obvious that that
20 production is seasonal with higher production in the
21 winters. But the key was that there's an -- over 108
22 months of production data. And what we did was
23 calculate a decline curve based on the early
24 production from that well. We tried to match it with
25 that production data. And I think, as evident in

1 Exhibit 12, the curve fits very well with the actual
2 production, as well as any curve could expect to fit
3 something that's very seasonal like that.

4 Q Exhibit No. 13?

5 A Exhibit 13 is the same type of
6 information from 1 Langstaff located in Section 16,
7 Township 68, Range 94 West. Again we have
8 approximately 108 months of actual production, where
9 we used the early months or the early time production
10 to actually estimate a decline curve, then we matched
11 that decline curve with actual production. And
12 again, as an engineer speaking, from the engineer's
13 standpoint, I felt I had a very good match. I was
14 convinced that this technique actually did apply to
15 wells in the area. Not only did I have, now, two
16 wells that I have actually matched myself, but there
17 are also the three wells in the paper itself. I was
18 convinced that this technique was giving me a
19 representative decline curve for the well.

20 Q Based on or using this equation or
21 this approach, then, were you able to calculate or
22 form a decline curve analysis for the gas production
23 forecast of this spacing pattern?

24 A Yes, I did. DOE Exhibit 14 shows
25 three curves. And it shows the actual production



139.14

1 forecast based on this decline curve technique and
2 the abandonment times and total recoveries that were
3 from the earlier paper. And it shows -- the top
4 curve there represents a decline curve, based on four
5 times the 80-acre case, so I have taken the decline
6 curve of one 80-acre well and multiplied by four and
7 again that production technique on 80 acres spans out
8 in seven years, 7.1 years, and has a total recovery
9 of 2,880 million cubic feet in 7.1 years. The second
10 curve represents the 160-acre spacing case in which I
11 have just multiplied these numbers here by two and
12 obtained a decline curve, has total recovery of 2,278
13 million cubic feet in 14.6 years. Finally, the third
14 case is the 320-acre spacing recovery of 2,532
15 million cubic feet in 27.6 years. Those are the
16 representative decline curves that I used in my
17 economic analysis.

18 Q And for your economic analysis, what
19 gas prices did you assume?

20 A I assumed three separate gas price
21 scenarios.

22 Q They are represented in DOE Exhibit
23 No. 15?

24 A Yes. In DOE Exhibit 15. I consider
25 what I called a low demand, which would be the bottom

1 curve. Price starting at \$1.07 per MCF or MCF BTU.
2 I also inserted a moderate demand for -- where price
3 starts at about \$1.30 per MCF, then a high demand
4 where prices start at \$1.50 per MCF. I feel that at
5 least the prices are reflective of the prices that
6 are being obtained in the area right now under those
7 circumstances. Then they are inflated at inflation
8 rates that I obtained from the Office of Management
9 and Budget.

10 Q These are inflation rates that are
11 used in the federal budget process?

12 A Yes, for natural gas prices.

13 Q If you can, turn to Exhibits 16A
14 through C, 17A through C, and 18A through C. Is your
15 net present value analysis shown on these nine
16 tables?

17 A Yes. These tables reflect the
18 economic analysis under each case. Various columns,
19 representing the gas prices, the revenues, inflation
20 rates, the costs, et cetera, and at the very right,
21 under the last column, the actual net present value
22 based on discounted cash flow of 10 percent for each
23 case. 320 versus 160 versus 80 acres, under three
24 different economic scenarios.

25 Q So the gas price column under each --

1 in each table, which is the third column from the
2 left, is the gas -- starting gas price that you used
3 in each scenario?

4 A Yes, it is.

5 Q Identified at the top of each page is
6 the spacing assumption connected with that table?

7 A Yes.

8 Q Net present value is reflected in that
9 Column 5.

10 A It's not Column 5. It's the last
11 column on the right. The five just refers to the
12 footnote at the bottom. That was --

13 Q Showed the 10 percent?

14 A Discounted cash flow.

15 Q We can certainly go through these
16 tables. If you can turn to Exhibits 19, 20 and 21,
17 those are graphic illustrations of the results of
18 this present value; is that correct?

19 A Yes, it is.

20 Q Could you walk us through Exhibit 19
21 as an illustration?

22 A Exhibit 19 basically shows the net
23 cash flow for each year and 19 shows the low gas
24 demand case, which prices are what I consider low,
25 \$1.07 today being inflated at the rates that I have

1 previously mentioned. And the solid bar represents
2 the 320-acre spacing case. The cross-hatched bars
3 represent the 160-acre spacing case. The diagonally
4 hatched bars represent the 80-acre spacing case. And
5 note that the costs in the very beginning, rather
6 than distort the chart, I just chose to write the
7 costs in there so I wouldn't have to draw those bars
8 down any farther. But in this analysis, in this
9 analysis, the net present value of the 320-acre case,
10 was the most positive. In fact, that was the case in
11 the moderate gas demand and the high gas demand as
12 well.

13 Q So in each of the price scenarios that
14 you looked at, the net present value for the 320-acre
15 spacing was the highest of the three spacing
16 alternatives?

17 A Yes, it was.

18 CHAIRMAN WELBORN: Does high gas
19 demand make it better or worse?

20 A Depends on what you mean by better or
21 worse.

22 CHAIRMAN WELBORN: More efficient?

23 A The high gas demand, what that did was
24 make the 160-acre case closer in net present value to
25 the 320-acre case. But in that, even in the high gas

1 demand, the 320-acre case still provided the high net
2 present value.

3 COMMISSIONER McCORD: You are assuming
4 capital costs remain the same, no matter what the
5 demand would be?

6 A In all of the cases, I assumed -- yes,
7 I did. I think what's important here is that I was
8 consistent in all three, in the 80-acre to 160-acre
9 to 320-acre scenarios. As long as I was consistent
10 in my methods, then the relative net present value of
11 each would still remain the same. If I were to -- if
12 I would have changed my cost, changed my cost between
13 the low, the moderate and high case, that would not
14 have changed the relative rankings of my spacing.

15 Q So that might change the absolute
16 values of net present value?

17 A It could certainly change through the
18 net present value. It would not change the fact that
19 320-acre spacing was the most economic, if not maybe
20 attractive.

21 Q Based on your analysis of the three
22 spacing cases, does it make the most economic sense
23 to drill Mesaverde on 320-acre spacing in your view?

24 A Yes, it -- yes, it does.

25 COMMISSIONER ANDERSON: It is the case

1 that the net present value was determined by using
2 the discount factor of 10 percent?

3 A Yes, it is.

4 COMMISSIONER ANDERSON: You didn't use
5 lower or higher numbers?

6 A No, I didn't.

7 COMMISSIONER ANDERSON: You don't have
8 A 5 percent case or 15 percent case?

9 A No. Basically, I am required by
10 headquarters to use 10 percent. That's what I have
11 always used. I don't think it would change the
12 relative -- again, it would change the absolute net
13 present values of each case, not the relative.

14 COMMISSIONER ANDERSON: Wouldn't it
15 change the relative values if you used higher
16 discount rate, for example, since more wells would
17 show more cash flow sooner? Wouldn't there be a
18 change?

19 A I guess it is possible. I guess it
20 would depend on the -- I guess it would depend on
21 exactly which rates you used. I would have to run
22 them. What you are saying, I guess, yes, is feasible
23 because some of them have their production, for
24 example, the 80-acre case production, all within
25 seven years. Of course, you are also paying out four

1 times cost near zero, which is zero discount. That's
2 obviously why that one was always the most
3 economically unattractive.

4 The main thing is that -- I think the
5 main point to consider here is that I was consistent
6 with all of these three cases in spacing all of the
7 time. Now, there are things that could change here
8 -- that could change the -- through the net present
9 value. I am not going to argue with that. You want
10 to argue about drilling costs, you want to argue
11 about operating costs, as long as you are consistent
12 you should still come out with the same relative
13 ranking. And that's what I tried to do. I don't want
14 to get into specific costs. I just tried to be
15 consistent. I was -- I was looking for the optimum
16 spacing myself, not just to back up one case or
17 another. That was my conclusion, is that 320 is the
18 optimum spacing using these numbers.

19 COMMISSIONER JOHNSON: Observing those
20 were very linear relationships, did you play with
21 going out to 640-acre spacing?

22 A No, I didn't. I only used what was
23 obtained from the simulation studies, just because I
24 wanted to have a basis for my numbers. I didn't try
25 to extrapolate.

1 Q (By Ms. Egger). Did the SPE paper that
2 you used for total recovery consider 640-acre
3 spacing?

4 A Well, it didn't for vertical wells.
5 But, if I can check really quickly for horizontal
6 wells. No, it didn't consider 640 at all.

7 Q You wouldn't have had the data?

8 A Well, I did not have the data for
9 640. He was asking if I wanted to extrapolate
10 because it appears to be a linear relationship. I
11 just didn't do that.

12 CHAIRMAN WELBORN: All right. Mr.
13 Knowlton, cross-examination.

14 While he's conferring, let me just do
15 some quick housekeeping. Ms. Fivas, were these
16 Exhibits 1 through 11 prepared by you or under your
17 supervision?

18 MS. FIVAS: Yes.

19 CHAIRMAN WELBORN: They are admitted
20 into evidence. And likewise, Lieutenant Cowan, were
21 Exhibits 12 through 21 prepared by you or under your
22 supervision?

23 MR. COWAN: Yes.

24 CHAIRMAN WELBORN: They are admitted
25 into evidence.

1 MS. EGGER: Thank you, sir.

2 CHAIRMAN WELBORN: The document, you
3 want this -- that you have referred to -- marked as
4 an exhibit and become part of the record as well.

5 MR. COWAN: Okay.

6 CHAIRMAN WELBORN: Why don't we refer
7 to it as Exhibit 22. Just write that on there, DOE
8 Exhibit No. 22. All right. That Exhibit 22 is
9 admitted into evidence as well. Mr. Knowlton.

10 MR. KNOWLTON: Yes.

11 EXAMINATION

12 BY MR. KNOWLTON:

13 Q You had testified earlier it's very
14 critical to know the reserves when you are dealing
15 with the economics, and I am sure that's the case.
16 In that exhibit of yours, No. 13, on the Langstaff,
17 which is a well, I believe, that Barrett has drilled.
18 No. That's not a Barrett well. Doesn't matter. But
19 it is the northwest exploration well. What reserves
20 did you use on that?

21 A I didn't use the reserves. What I
22 said is that you have to use total reserves in order
23 to do an economic analysis. You have to know what
24 your total reserves and your abandonment time are. I
25 did not calculate that for the 1 Langstaff well.

1 Alls I did was calculate decline curve. Alls you
2 have to do is base that on a log, log plot of time
3 versus flow rate for the first couple of years, and
4 then you could develop your curve. Alls I did was
5 try to match the curve. I never did calculate total
6 reserves and abandonment time. I didn't know where
7 to end the curve.

8 Q Would you have -- would you estimate
9 that the -- estimate the reserves were in the
10 neighborhood of 2.5 DCF? Would it get that high?
11 You just didn't go that far?

12 A I didn't even estimate.

13 Q Do you know -- when it comes to a
14 Mesaverde location, in the area that's being
15 requested for spacing here, do you think that a
16 320-acre spot will adequately drain the Mesaverde?

17 A Yes, I do.

18 Q Okay.

19 MR. KNOWLTON: No further questions.

20 CHAIRMAN WELBORN: Questions from our
21 staff.

22 MR. SMINK: I just wondered if he had
23 any similar data which he's not shown us relative to
24 the Wasatch formation.

25 THE WITNESS: No, I don't. I.

1 attempted to get that data, and I could, as I have
2 shown here, I could find the decline curves, but I
3 did not know where to cut those decline curves off.
4 Based on different spacing scenarios, for instance,
5 that decline curve would just stop on 80-acre
6 spacing, much sooner than 160-acre, sooner than 320.
7 Since I could not find anything in the literature, I
8 did not have any production data or anything that
9 gave me indication of the total reserves for the
10 Wasatch wells. I could not do a similar economic
11 analysis. I did look at that and I couldn't get the
12 information.

13 MR. SMINK: Thank you.

14 CHAIRMAN WELBORN: All right.

15 Questions from the commission?

16 COMMISSIONER McCORD: I have a
17 question on Exhibit 14, which is your gas production
18 forecast for the three scenarios that are in Exhibit
19 22. Are you assuming under the forecast for 80-acre
20 spacing, you show at the end of seven years the well
21 would be producing around, oh, I guess about 18,000
22 MCF a month. Is that what you showed?

23 THE WITNESS: Yes, it is.

24 COMMISSIONER McCORD: Are you assuming
25 that -- I am sorry, seven years -- are you assuming

1 after that seven years, the gas production would just
2 fall off or the well would no longer be economically
3 producing or --

4 THE WITNESS: Yes. I am assuming that
5 well -- it wouldn't be one well, it would be four
6 wells, each well would be producing one fourth of
7 that. I would assume they would have adequately
8 drained that 80 acres at that time based on this
9 study. That's all that you could get out of there,
10 out of that 80 acres.

11 COMMISSIONER McCORD: So your
12 production would just taper off drastically after
13 that?

14 THE WITNESS: Yes.

15 CHAIRMAN WELBORN: All right. Further
16 questions of this witness? Do you have further
17 evidence to present?

18 MS. EGGER: Just one follow-up to that
19 question.

20 EXAMINATION

21 BY MS. EGGER:

22 Q The abandonment time that -- the
23 abandonment times that you used were provided in
24 that, in the first SPE paper you referred to?

25 A Yes, they were.

1 Q It had an assumption of cutoff time
2 after which abandonment would occur?

3 A Right.

4 MS. EGGER: Those are all of the
5 questions I have.

6 CHAIRMAN WELBORN: Mr. Knowlton, any
7 further questions.

8 MR. KNOWLTON: No, no questions.

9 CHAIRMAN WELBORN: Anybody else? Any
10 further evidence to present?

11 MS. EGGER: That concludes our primary
12 case. We are available to answer any other questions
13 anyone might have.

14 CHAIRMAN WELBORN: All right. That
15 very often happens. Let me just, before we go, ask a
16 couple of questions. You are going to take about
17 half an hour, you said, with evidence and then
18 probably -- so it's probably safe to say at least an
19 hour of time?

20 MR. KNOWLTON: Be safe.

21 CHAIRMAN WELBORN: Recognizing we get
22 grumpy when we get hungry, it would be appropriate to
23 break now. Do you think that's going to throw off
24 that Lilli hearing?

25 MR. BICKNELL: We can contact the

1 Lilli people. They definitely will not go away.

2 CHAIRMAN WELBORN: Let me ask you, is,
3 considering the fact that you recognize that DOE has
4 asked for some prehearing discovery and information,
5 I wish we could accommodate any party in that regard,
6 we certainly don't have the rules to do it yet.
7 We're working on it, however. Would anything
8 constructive come out of the parties conferring for a
9 period of time; is that beyond the realm of
10 possibility?

11 MR. KNOWLTON: Well --

12 MS. EGGER: We would be totally
13 receptive to that.

14 MR. KNOWLTON: Sure. But I don't -- I
15 wouldn't be encouraged, if your --

16 CHAIRMAN WELBORN: I am not looking
17 for encouragement.

18 MR. KNOWLTON: I think that if you
19 were -- we would do that, if you took a lunch break
20 now. But I wouldn't plan on it.

21 CHAIRMAN WELBORN: I am not planning
22 on anything. It's just that, very often, especially
23 the distances that people have been working over,
24 since there hasn't been time to confer, the issues
25 might at least be narrowed. I guess, specifically, I

1 want to think about whether the issues can be
2 narrowed feasibly to two different formations.

3 MR. KNOWLTON: I think that can be
4 accomplished. I am prepared to make a statement in
5 that and Mrs. Egger and I talked about that briefly.

6 CHAIRMAN WELBORN: Why don't we
7 adjourn, then. Is that acceptable to the
8 commissioners? Eat early this time? And what do you
9 think, Dennis? Back here at quarter to one or should
10 I say two?

11 MR. BICKNELL: Ought to be able to try
12 quarter to one.

13 CHAIRMAN WELBORN: Shoot for quarter
14 to one. Will that give you enough time to confer and
15 eat?

16 MR. KNOWLTON: No, I think one,
17 please.

18 CHAIRMAN WELBORN: Whatever time it
19 takes, if you can narrow the issues. All right.
20 Let's adjourn, then, until 1:00.

21 (Recess.)

22 CHAIRMAN WELBORN: Back on the record.
23 This is Cause Nos. 139 and 440. And we're about to
24 embark upon the Barrett Resource case. Do you have a
25 statement to make, Mr. Knowlton?

1 MR. KNOWLTON: Yes, I do.

2 CHAIRMAN WELBORN: Please proceed.

3 MR. KNOWLTON: I am David Knowlton
4 appearing on behalf of the protestant Barrett
5 Resources Corporation. Obviously we're here because
6 of the application of the DOE. That's not the whole
7 story, however; we have a significant interest in
8 this area. We have actively, right now, over five
9 rigs drilling. We have over 80 wells that we drilled
10 in there the last five or six years. Probably half
11 Wasatch, half Mesaverde. We have been before you
12 previously in a matter with the DOE. Some of you
13 were not on the commission at that time. What we
14 were doing at that time was trying to get the
15 Department of Energy to participate with us in their
16 acreage and our acreage and we knew we were
17 offsetting them and we knew we were taking
18 significant risks, and we wanted to have them
19 participate with us. We tried to force pool the
20 DOE. I think we agreed in some infinite wisdom that
21 came to us maybe we couldn't force pool the DOE. We
22 weren't sure, but fortunately we went ahead and
23 drilled the wells. We have participated with the DOE
24 on a number of wells in the area. We cooperate with
25 them, and I regret we're unable to resolve this

1 completely.

2 I think the concern here is, that,
3 DOE's concern. Not saying they were not acting in
4 good faith. I am sure they are in seeking this
5 spacing, but they are here because we are offsetting
6 them on less than 320 acres in the Mesaverde
7 formation. That's the reason they are here. And we
8 would like, again, to resolve that situation, but I
9 am not sure we can. We have tried. I think also the
10 real purpose of their application is not one of
11 seeking and making certain that correlative rights
12 are protected. Quite the contrary. I think the
13 definition of correlative rights says that they --
14 offset operator shall have an equal opportunity to
15 obtain and produce his just and equitable share of
16 production, and in no way are they restricted from
17 getting just that. So their correlative rights are
18 well protected. I think they can come in and offset
19 anything we drill and they are protected. That's not
20 what I think we're here for. I think we're here
21 because the Department of Energy has, frankly,
22 uncertainty and certain scarcity of funds. These are
23 their own words. That's why we're here.

24 We're going to come before the
25 commission now, we'll offer our evidence based on

1 about seven years' history, some 80 wells. We're
2 going to try to distinguish clearly, we hope, between
3 the Mesaverde application that they have presented
4 and the Wasatch. We're not so far apart on the
5 Wasatch. To refresh your memory, the Wasatch is
6 being requested to be spaced on 160. And in that
7 situation, we're saying 160 is all right for most of
8 the area.

9 But what we are saying, and our
10 testimony will so indicate, is that in an area to the
11 north of the area being requested to space here, what
12 we call the Allen's Point area, that area has
13 significant overburden of about 3,000 feet, and that
14 area economically will simply not justify drilling a
15 Wasatch well on 160s. We think they should be
16 drilled on 320, and each well looked at closely. If
17 they are darn good wells, hopefully we would drill
18 them on 160. So we only disagree with the Department
19 of Energy on this one area, which is outlined in
20 heavy orange over there, which we will discuss
21 through our witnesses. So the Wasatch is not as near
22 as big a problem.

23 The Mesaverde is a bigger problem. And
24 our testimony will be directed towards a request that
25 if you space it at all, we would like to have you

1 space it on 160s. And we realize that heretofore the
2 spacing for the Mesaverde has been on 320, but I
3 think a lot of data, a lot of the information has
4 happened and has come about through various efforts
5 and other operators and what we know now tells us
6 that that's the way to develop. And that's what our
7 proof will show. We think, as I say, no one is being
8 damaged by asking for 160. That's what we're asking
9 for.

10 We would point out to the commission
11 that we intend to come in at a later date with a much
12 larger area and request spacing of the Mesaverde and
13 probably the Wasatch, and I regret we weren't able to
14 come together at one time. We were considering this
15 last fall, what we wanted to do, and, in the
16 meantime, we notified the DOE, which we have tried to
17 do, of our proposed drilling plans. I think that
18 alerted them and perhaps alarmed them and they moved
19 fast. That's why we're here.

20 I wish we could take and put this
21 whole matter aside for about six months. I wish we
22 could gather more data, which we are gathering on a
23 daily basis, come to you people with better
24 information than we now have. We have what we think
25 is very sound information at the time but I think, in

1 the meantime, the Department of Energy is concerned
2 about offsets so we will have to go ahead and do this
3 piecemeal. I regret that very much because we are
4 going to be before you in at least a six-month period
5 asking for spacing in a much larger area covering
6 both of these horizons. I think those are my opening
7 comments. We'll start with our geologic testimony
8 first.

9 CHAIRMAN WELBORN: All right.

10 MR. KNOWLTON: You want to swear both
11 of them in at the same time?

12 CHAIRMAN WELBORN: Take them one at a
13 time.

14 (Whereupon the witness was sworn.)

15 CHAIRMAN WELBORN: All right. We have
16 received Mr. Reinecke's resume, and I have reviewed
17 it and his qualifications as an expert geologist are
18 accepted. You can highlight to go over this. Keep
19 it to a minimum.

20 EXAMINATION

21 BY MR. KNOWLTON:

22 Q Mr. Reinecke, have you ever testified
23 before the Oil and Gas Commission of the State of
24 Colorado?

25 A Yes, I have.

1 Q I do want the commission to understand
2 the extent of your experience in this area, so why
3 don't you advise them of the period of time in which
4 you have been involved in this area.

5 A Okay. Well, I joined Barrett
6 Resources in 1985, when the initial four discovery
7 wells were, for the Mesaverde and initial Wasatch
8 well or discovery well for the Wasatch had been
9 drilled. Since that time, my primary duties have
10 been to oversee the development and operating of the
11 Grand Valley, Parachute area, and in that time I've
12 watched 37 Mesaverde wells be drilled, and 40-plus
13 Wasatch wells be drilled in the area. And as part of
14 my duties, I have also done detailed studies on the
15 Rulison Field and surrounding areas with the like
16 production.

17 Q Mr. Reinecke, you have heard the
18 testimony of the DOE expert in the field of geology.
19 Would you care to add anything to what she testified
20 to regarding the characteristics of the Mesaverde?

21 I will point out to the commission
22 we're going to talk, at this time, only about
23 Mesaverde, so there's no confusion as to what we're
24 talking about. We'll cover Mesaverde only. His
25 testimony, frankly, will be limited to Mesaverde.

1 Do you have anything you wish to add
2 to or modify or alter to what has been testified?

3 A Generally, I agree with the testimony
4 given by the Department of Energy on the depositional
5 environment, in a gross sense, of Mesaverde. True
6 that there are marine sands and marine shales in the
7 lower part of the section, and the upper part of the
8 Mesaverde is generally considered fluvial and
9 lenticular sandstone.

10 Listening to the testimony, there were
11 two things that I felt needed to be addressed, and
12 one was the fractures in the area and, secondly, a
13 little bit more detailed on the lenticularity of the
14 sandstones in the area. And first, I just would
15 address the fractures.

16 There are, I think it was an
17 implication, that through studies conducted at the
18 MWX site, which is located here in Section 34 of 6
19 South, 94 West, that by studying the data gathered
20 from there, one well, that you are able to take that
21 data across the area that is being requested for
22 spacing. That just simply is not the case, if you
23 really get down and look at some of the results from
24 wells that have been drilled, in Rulison itself,
25 Parachute and in Grand Valley. And really what we

1 have seen as far as fracturing, I do agree there is a
2 high amount of fracturing at the MWX site. It is
3 restricted in area in the Rulison Field with a north
4 or northeast boundary line, somewhere in here, and a
5 southwest boundary line in here. So you got maybe a
6 two-section square that trends north-south, east-
7 west.

8 The main development of the Rulison
9 Field that is fractured, what can I say to back that
10 up? Well, you simply -- I think it's evident that
11 the entire area here has got the same type of
12 depositional environment as far as the sands there.
13 You just look at a typical section that is being
14 completed. You have just a series of discrete
15 sandstones with shales interspersed in here. Section
16 has -- cross section of 3,000 feet does not change.
17 If you, the closer you look at it, the more
18 discontinuous the sands appear. But in general, you
19 have sand shale sequences in Rulison, Parachute, and
20 in Grand Valley.

21 In Rulison, which was developed, you
22 know, was initially discovered in the mid to late
23 1950s, but the main development of that field took
24 place in the late '70s, early '80s. Northwest
25 Exploration came in here and did their drilling on a

1 similar type of drilling techniques, similar type of
2 completion techniques. Yet if you look inside these
3 boundaries here, you will find that most of your
4 Mesaverde wells have now cummed on the order of half
5 a BCF to three-quarters of a BCF of gas. If you step
6 out from these boundaries with the same completion
7 techniques, same geologic conditions, these wells
8 here have got about 50 million to 100 million cummed
9 wells, have been on-line producing in the same amount
10 of time roughly, and in all conditions are the same.
11 But, for some reason, these wells in here seem to
12 have higher productivity than the wells on either
13 side.

14 We agree that there is some fracturing
15 in here. If you look on the seismic, there's a
16 well-known seismic line that travels up I-70,
17 parallels the Colorado River. There, in this area,
18 you can define a seismic anomaly, which seems to
19 coincide with the area of higher production. Again,
20 outside that area you don't see the seismic anomaly.
21 Essentially, what appears to me, you would lose your
22 reflective capabilities of some of the sands in
23 there. You trace a marker when you cross in here,
24 you don't see that marker when you come back out. So
25 there's something that's occurring inside this area

1 that seems to suggest something is different there.

2 You also, when you say, well, then,
3 what's the difference? MWX fracture production says
4 you got higher productivity. In Grand Valley,
5 Parachute, you need to compare those with some of the
6 drilling characteristics that are seen in Rulison.
7 Rulison Field was essentially drilled down through
8 the Mesaverde and stopped at the top of the Cameo;
9 whereas, in Parachute, Grand Valley, we're extending
10 through the Cameo, T.D.ing wells in the Rollins,
11 which has marine sands.

12 Last year we drilled a well in Section
13 29 of 6, 96, the MV 35. We air drilled that well.
14 We air drilled down to the top of the Cameo. We got
15 a little bit of a gas show, maybe an occasional --
16 there's nothing to suggest fractures. Rulison, they
17 drilled quite a few wells with air. And more than
18 one time they would hit a sand and they would I.Q.
19 that well at five million cubic feet of natural gas a
20 day. There was no stimulation at all. We have access
21 to many of Northwest's well history. There's more
22 than one occasion of that happening.

23 Something else about drilling of the
24 wells that would suggest that this area is not
25 fractured, this area is not as fractured or not

1 fractured at all. As you drill a well, you have
2 detention gas coming up through the mud column. As
3 you drill a while, the mud is -- comes up the well
4 bore and rolls over a shaker. You liberate and
5 detect that mud with a hot wire so you are able to
6 detect the amount of gas that is in place in the mud.

7 Well, in the Rulison, when you would
8 hit one of these sands which would be in a well in
9 this area here, your gas would come along, sort of
10 low end gas, very little, then you would hit some
11 sand and the gas would come out. It would just stay
12 out almost ATD. Whereas, in Grand Valley, when we
13 drill a sand we will come down with low end gas,
14 we'll hit the show of the sand, gas will increase and
15 the show will drop right off. Suggest that
16 essentially what you are getting in Rulison is gas
17 feeding into the well bore because of higher
18 permeabilities because of fractures.

19 Essentially, in Grand Valley, in
20 Parachute what is happening there is, you are just
21 liberating the gas as you cut through the sand. So
22 there's another thing that would suggest that there
23 are very few fractures in the area.

24 That we have had CER, who is a
25 research outfit, come out and core a couple of wells

1 for us. One was the MV 5 in Section 10 of 7 South,
2 96 West. They cored the marine interval, which was
3 the Rollins, Cozzette, Corcoran. They took about 400
4 feet of core. And they basically were so
5 disillusioned at the results of the core being so
6 tight that -- they had initially intended on doing
7 completion work with us -- they basically backed off
8 of it because it was just too tight for them. They
9 didn't have any fractures at all.

10 Just last fall, we drilled a well in
11 Section 4 of 7 South 96 west, the MV 8. And we cored
12 sands that would be oh, probably in about this
13 interval here about, maybe 500 feet above a Cameo
14 specifically looking for natural fractures. Because
15 of the -- it's by the same group that had done MWX --
16 they were trying to tie some of the fracture data
17 they got here into Grand Valley. They simply
18 approached Barrett, so actively we had wells going
19 down at the time they report fractures initially to
20 us. But it turned out, upon comprehensive study of
21 the core, that all of those fractures were
22 drilling-induced fractures. They were not natural
23 fractures.

24 Q Anything else that you think you would
25 perhaps disagree with the testimony of the DOE

1 geologist?

2 A Well, I am just, right now, I am just
3 addressing the fracture part, as far as the fractures
4 and discontinuity story. I am just making sure that
5 I am covering --

6 Q Would you advise the commission so
7 that we would have a good understanding, the Cameo is
8 what part of the Mesaverde and explain the coal
9 aspects of it.

10 A Well, as -- when you look at this
11 depositional environment, you have a marine sand and
12 with progressive time the sands migrated out of the
13 area. So if you have a fixed spot, that sand will
14 migrate out of the area, whatever is behind the sand,
15 in this case, coal swamps would migrate after that,
16 and after -- as the shoreline regresses farther and
17 farther, each depositional environment is stacked on
18 top of each other. First you have marine sands, then
19 you have coals of the Cameo, then you have fluvial
20 deposit of the main part of the Mesaverde.

21 So you have -- the Rollins here is the
22 last marine sands in the Grand Valley area. And then
23 you have about 400 to 500 feet of interval with both
24 coals and sands, the thickest, more persistent coals
25 being at the base because the swamps that deposited

1 them were obviously larger there, because they were
2 closer to the shoreline. These are a lot more
3 discontinuous, all of these coals are quite
4 discontinuous in the area. As you get further and
5 further up the section, you migrate out of nearshore
6 environment of deposition event, a recovery costal-
7 dominated section here which is characterized by
8 these sands in here.

9 Q Mr. Reinecke, what do you refer to,
10 generally, to the most productive section of the
11 Mesaverde, other than the Cameo, what do you refer to
12 -- what do you call it?

13 A Cameo is definitely a productive
14 section, both sands and coals are productive. But in
15 the Grand Valley area, the lower two-thirds of this
16 section is generally gas productive. The further
17 down you go toward the Rollins, the higher the
18 pressures and the better the reserves and the sands.

19 Q By definition, what do you call the
20 horizon that is productive in the -- above the
21 Cameo? What do you call it?

22 A I call this middle Mesaverde. You
23 know, it's a very arbitrary thing. You can call it
24 upper Mesaverde, but I tend to call this area here
25 middle Mesaverde.

1 Q Why don't you proceed with the cross
2 sections on those. By the way, your base map is, the
3 main area, that pretty well lays out the well spots
4 that you are aware of?

5 A This?

6 Q Have you distinguished the Barrett
7 wells or can you --

8 A This is up to date as of yesterday.
9 And Barrett Wasatch wells are generally located here.
10 They were the gas symbols with the green dots. We
11 have a few gas wells here, here, the wells up on
12 Allen Point in this area. The Mesaverde wells are
13 the wells that are generally confined in this area
14 here that are Barrett wells. They have the gas
15 symbol with the solid red. Then the side here, the
16 drilling rigs are rigs that are currently drilling
17 today. This is generally Fina, Bonneville, Mesaverde
18 and Wasatch production. The Wasatch are the solid
19 dots. The Mesaverde are the small gas triangles.
20 Barrett also has two Mesaverde wells here and four
21 Wasatch wells in Rulison Field.

22 CHAIRMAN WELBORN: What exhibit number
23 is that?

24 THE DEPONENT: This is Exhibit No. 1.

25 Q (By Mr. Knowlton) For the information



139.14

1 of the commission, why don't you just locate Rifle,
2 Debeque, the Colorado River and highway I-70 so they
3 can relate to it.

4 A Rifle is behind the section right
5 here. Here's I-70. Down to Parachute, Grand
6 Junction is off the map. And Glenwood Springs is off
7 to the right there. Colorado River simply parallels
8 the freeway. Battlement Mesa retirement community
9 here about -- is located right here. Unocal has
10 their oil shale plant here.

11 Q The area outlined in orange, although
12 this is going to be covered in other testimony,
13 briefly what is that?

14 A Those are areas that were, this
15 outline here, outlines sections or areas that were
16 requested for 160-acre spacing on Wasatch. They fall
17 in acreage that is effected on the Allen Point lease,
18 plus other leases that are located here are all
19 either on the side of this 3,000-foot cliff. If
20 anybody has ever driven to Grand Junction on I-70,
21 they know the height of these cliffs of the -- or
22 they are, on top -- you are looking at elevation
23 along the river here of about 5200 feet. On top here
24 you are looking at about 8400 feet.

25 Q Okay. Then go back, why don't you, to

1 the cross section.

2 A Okay. Well, the second part of the --
3 one thing I also wanted to say about these fractures,
4 that if these fractures are connected and are
5 pervasive throughout the area in that they extend
6 everywhere, and which they do not, most of the
7 fractures trend in east-west fashion in the area
8 through data gathered by MWX. But if they cut the
9 section totally, you would expect to see gas shows on
10 your immediate logging equipment in both shales and
11 sands. You don't see that. You see the sands giving
12 you a kick. But you do not see the kick in the
13 shales. If there were fractures that were cut
14 through sands and shales, you would think that within
15 37 wells we would have seen an occasional shale, that
16 there would appear to be show coming out of shale.
17 It just doesn't. It hasn't seemed to occur.

18 The other part of this is the
19 discontinuity of sands. You cannot think of
20 Mesaverde as one continuous sand body. It is
21 discrete reservoirs. If you complete in this sand
22 here you are not going to drain or even affect any of
23 the other part of the section. You are only going to
24 drain this section or this sand for some distance out
25 from that well bore.

1 Now, the question is, how far do these
2 sands go. What we attempted to do was to take three
3 wells that we currently had that would be on 160-acre
4 spacing distance. There were not three wells. There
5 are now. But at the time I did the study, there were
6 not three wells in any one section. I went to an
7 area -- this is in 6 South, 96, Sections 31 and 32.
8 The wells are the GV7, the GV2, and MV9. They are
9 separated from each other by the distances of from
10 anywhere from 1800 feet to 4100 feet. I have simply
11 tried on best efforts to correlate the sands to see
12 what kind of correlation you would expect between
13 wells.

14 The first correlation attempt was on
15 the two wells that are 4100 feet apart. That's the
16 GV7 and the MV9. So I am going to look at this
17 section here; that is pretty close to what ideal 320
18 spacing would be. That would be 3733 feet if you
19 ideally place those things on a pattern. That's as
20 close as you could get. So best I could do was a
21 well on 4100-foot spacing.

22 I simply went in there and tried to
23 correlate like reservoirs. I did. They had to have
24 reservoir characteristics, meaning they had to have
25 gas shows, they had to have porosity. They had to

1 appear productive. I did not try resistivity. I
2 didn't look at this upper section because it was
3 considered by us to be either gas and water bearing
4 or just water bearing here.

5 What I did then is color up the sands
6 which I felt correlated between these two wells.
7 These were green, these are green sands that
8 correlated. The, essentially, my numbers were on the
9 GV7 that I had about 752 feet of total pay, both
10 yellow and green sands. This is Exhibit 2, by the
11 way. Green sands were the sands that appear to
12 correlate. The yellow sands appeared in that
13 particular well. Best as I could tell they were
14 unique. I have a nice 60- to 70-foot sand here which
15 just does not -- there's no 60- to 70-foot sands
16 there to correlate. Sands that are unique to this
17 well are 501 feet out of 752 feet of pay. So roughly
18 two-thirds of the sand in this well that are unique
19 to that well bore, they are only occurring in this
20 well bore.

21 You do the same thing here with the
22 MV9. You have 729 feet of total pay, both yellow and
23 green sands, 488 feet; the total pay that's colored
24 yellow appears to be unique to the well bore. Again,
25 about two-thirds of the pay appears to be unique to

1 the well bore. Well, what happens then if you drill
2 a well that -- that's closer. We would -- we happen
3 to have the GV2, which actually was a -- was in
4 existence when I did this cross section, actually
5 aided in the correlation of these sands. Because
6 without these, I think this is -- I would have been a
7 lot more concerned at making some of these
8 correlations if I really didn't have a well that was
9 in between. But nonetheless I have now an -- I have
10 drilled. There is a well here. The distance between
11 the GV7 and GV2 is 1800 feet and distance between the
12 GV2 and the MV9 is 3100 feet. An ideal spacing for
13 the -- on 160 would be about 2600 feet. Okay. Here
14 again is the GV7.

15 CHAIRMAN WELBORN: Is this Exhibit 3?

16 A This is Exhibit 3. I am sorry.

17 Q (By Mr. Knowlton) That is MV9?

18 A And here is the GV2 that's in the
19 center here. Again, the distance between this well
20 to this well is 1800 feet and 3100 feet. So you will
21 note that the green sands have increased. We got
22 quite a bit more correlation with the infill on
23 approximately 160-acre spacing.

24 Now, what happened, what happened to
25 the GV7? Well, we still have the 752 feet of pay but

1 instead of having 501 feet that is unique, we drop
2 now to 383 feet of unique pay. Still, even on 160-
3 acre spacing, I have got 50 percent of the sands more
4 or less that are still appearing to be unique or
5 occurring only in that well bore. They don't seem to
6 correlate across at all.

7 The GV2 being in between, has, in
8 between the GV7 and MV9, has better correlation. We
9 have a total pay in that well of 677 feet. 249 feet
10 is still unique to that well bore. I believe that is
11 about 37, 38 percent of the sand is still considered
12 to only be penetrated by that well bore. The MV9
13 again still has 729 feet of total pay. We had 488
14 feet that was unique. When we just had wells that
15 are approximately 320 spacing, we are now down to 340
16 feet that is unique to this well. That works out, I
17 believe, to about 47 percent still unique to that
18 well bore.

19 Q What does that indicate?

20 A Well, to me it indicates that they're
21 certainly not getting all of the sands that you could
22 on 320. I am not even sure you are doing it on 160.
23 You're at least improving the amount of time you're
24 exposing yourself to more reservoir by having an
25 increased well --

1 Q Did you have any other areas where you
2 have conclusions such as this?

3 A Well, today, you know, I do. But a
4 week or two ago I did not. Just because the amount
5 of drilling we're doing out there, there are areas
6 now that have, in the last couple of weeks, ended up
7 having some development that would be equivalent to
8 the 160-acre spacing. There is not one section yet,
9 though, that has four wells in the section.

10 Q Have you had time to make any
11 correlations on those other --

12 A No, I haven't had time. But it's my
13 feeling that I pick these -- it was random there;
14 that these were the wells I had. I would like to
15 have anybody try these correlations to check the
16 numbers, but I think this is quite representative of
17 what you are going to find in Grand Valley,
18 Parachute, Rulison, anywhere where this type of
19 depositional environment occurs.

20 Q Were those exhibits all prepared by
21 you or under your direction and control?

22 A Yes, they sure were, yes, sir.

23 MR. KNOWLTON: We would ask that they
24 be introduced into evidence at this time.

25 CHAIRMAN WELBORN: They are admitted.

1 Q (By Mr. Knowlton) Do you have an
2 opinion, Mr. Reinecke, as it just applies to the
3 geology of the area, do you have an opinion as to the
4 maximum area that will efficiently and economically
5 be drained by one Mesaverde well in this area?

6 A I would say it's no more than than 160
7 acres and I say that because the permeability on
8 unfractured rock were in the tens of millidarcies,
9 the porosities are in the 8 to 12 percent range. I
10 don't see how that could happen.

11 Q Do you know whether or not Barrett has
12 ever requested any spacing of the Mesaverde in this
13 area?

14 A No. Barrett has never had to request
15 spacing.

16 Q Of the Mesaverde?

17 A Of the Mesaverde.

18 Q Do you know whether there's been any
19 Mesaverde spacing on 160 in this area?

20 A The only area I am aware of for
21 spacing is down -- it's two townships south of the
22 Rulison. It's in a field called Brush Creek that is
23 completed and producing. That would be identical
24 type of depositional environment, really identical
25 interval. They are spaced on 160 acres, Cause 429.

1 Q Okay. Do you have any further
2 testimony to be of benefit to the commission?

3 A Well, I think I can pile up some of
4 the publications here, but essentially, they would
5 come to the same type of conclusion on the type of
6 distribution of these sands. Generally these sands
7 are, through outcrop studies, through studies of MWX,
8 they are no more than 1500 to 2,000 feet wide. And
9 there is a study upon a study that was based in this
10 area that's says that that is about the width that
11 you are going to expect to see here. I think,
12 really, the conclusion was already made that you need
13 160-acre spacing if you are not naturally fractured.
14 And you know, even if that's the case, on this sand
15 lense here, is going to be naturally fractured. If
16 it's not present anywhere else, you are going to
17 drain that sand lense. You are not going to drain
18 this one here or that one there because the fractures
19 are not going to cross-cut the shale boundaries.

20 I guess a final comment would be, even
21 my correlations that were made in here are, I think,
22 conservative because I look at this sand here,
23 correlated across, I think if you look at it you will
24 see that the properties of the sands change. I am
25 saying the sand body correlates. I am not not so

1 sure the reservoir correlates. I went out and pulled
2 the logs on these three sands, these sands here at
3 the MV9. It has resistivities of 20 to 30 ohms. By
4 the time you get over to the MV7, you have
5 resistivities of 60 to 70 ohms. What causes that?

6 Well, you pull out the porosity log,
7 you see you have excellent porosity, excellent
8 shows. This sand, this one is tight. The shows are
9 a lot poorer. Not to say it won't make a reservoir.
10 We wouldn't complete in it. If you were unfortunate
11 to drill this well here you could expect this sand to
12 tap into this nice development over here. It just
13 wouldn't happen.

14 MR. KNOWLTON: We have no further
15 questions at this time.

16 CHAIRMAN WELBORN: All right.

17 EXAMINATION

18 BY MS. EGGER:

19 Q Just a couple questions, Mr. Reinecke.
20 Regarding the localization of the fractures, your
21 view is that these are localized fractures, that,
22 again, is based on production history?

23 A One aspect, one of the points I would
24 make is your deriving all of your data from the MWX
25 and inside boundaries which are defined by production

1 and seismic, you see enhanced production, higher cums
2 than you do outside those parameters.

3 Q I think you also referred to a core
4 sample taken by CER. Do you know what formations
5 were cored?

6 A Well, they, they -- it would be what I
7 would term the middle Mesaverde. The exact depth I
8 couldn't say. But -- because I don't have that exact
9 log but it would lie about 1200 feet above the
10 Rollins is where approximately the interval they were
11 trying to core. They were trying to core reservoir
12 which we are currently producing out of, I mean
13 intervals.

14 Q In the cluster of three wells that you
15 were pointing to over there, what intervals were
16 perforated in those three wells?

17 A Okay. In the 32, we are now completed
18 up to about 5600 feet, I believe. In the 2 we're
19 about 5700 foot. And then in the 7, about 560 feet.
20 That means everything from that depth down to the
21 Rollins, anything that appeared to be a reservoir,
22 except in the two GV wells, only the coal seams are
23 perforated in those two wells.

24 Q There are two intervals that are
25 perforated?

1 A Correct. This stuff is behind-pipe
2 reserves. This is either just recently completed or
3 in this case this well has been on-line for two or
4 three years, I believe.

5 Q How many perforations?

6 A Well, generally, what we'll do is, we
7 will take an interval of about 400 feet. We will put
8 approximately 20, 22 holes in that 400 feet of
9 interval. We will place about 350 to 450 pounds of
10 sand in the interval.

11 MS. EGGER: If I could just take a
12 minute.

13 CHAIRMAN WELBORN: Sure.

14 Q (By Ms. Egger) With respect to the
15 CER core again, how much core was taken out of the
16 fluvial? *

17 A 100 feet of core was. They
18 essentially -- previously the well being drilled --
19 they had preselected the core point, went in with
20 core barrel, cored 120 feet. I think they had 90, 95
21 percent recovery, so we recovered both sands and
22 shales in that core. That's all still very
23 preliminary data. We don't -- we haven't got the
24 final reports yet.

25 Q You had taken other cores in addition

1 to that?

2 A We have narrowed -- that was the first
3 core in the fluvial that we have. We do have core
4 that has been taken in the MV5 well. Escapes me who
5 it was at that time; that it was either CER or GIR or
6 one of those groups. And that was primarily Cozzette
7 Corcoran that they had cored.

8 Q How many feet?

9 A Three to 400 feet.

10 Q Back to the perforations here, how
11 many perforations in the middle of Mesaverde?

12 A Again, the same story as below. About
13 400 feet of interval. What you essentially try to
14 do, try to find natural break. Like here you try to
15 find another gap somewhere where's there 100 feet
16 between the completion. You bracket that off. You
17 selectively put 20 holes in your better reservoirs,
18 then you fracture that.

19 Q Were all of the sands identified
20 perforated?

21 A If I think it's got a gas in it I
22 perforate it.

23 MS. EGGER: Thank you very much.
24 That's all of the questions I have.

25 CHAIRMAN WELBORN: All right. Any

1 questions from the our staff?

2 MR. KNOWLTON: Mr. Chairman, one other
3 thing. I need another exhibit introduced by him.
4 Just take a second, just for the record.

5 EXAMINATION

6 BY MR. KNOWLTON:

7 Q This would be Exhibit 4, which I think
8 you are aware of it. Do you know if it was prepared
9 by the land department? Would you identify it and
10 briefly tell the commission what it represents.

11 A Exhibit 4 is the -- shows the Barrett
12 leasehold in the area. We are by far the largest
13 leasehold in the central Piceance area, and we have
14 quite a bit of interests in the potential of the area
15 and to show. I think we know pretty much all there
16 is. We know more than most people do.

17 Q To the best of your knowledge, is this
18 accurate?

19 A Yes.

20 MR. KNOWLTON: We would ask that our
21 Protestant's Exhibit 4 also be introduced into
22 evidence at this time.

23 CHAIRMAN WELBORN: Do you have any
24 objection to that?

25 MS. EGGER: No objection.

1 CHAIRMAN WELBORN: Exhibit 4 is
2 admitted. You want to ask some questions about it?

3 MS. EGGER: No questions.

4 CHAIRMAN WELBORN: Any questions from
5 the commissioners?

6 COMMISSIONER ANDERSON: I take it,
7 Barrett -- what generated this is that Barrett has
8 proposed a drilling program, number of wells that it
9 intends to drill, both in the Wasatch and Mesaverde
10 this year. The DOE Exhibit No. 6 shows a number of
11 locations both in the Wasatch and the Mesaverde. Are
12 those all of the wells that are going to be drilled
13 in the current proposed program?

14 THE WITNESS: No. The locations
15 changed, the numbers stay the same. In other words,
16 what we are doing is, we, when -- the locations that
17 they appear to have put on their maps, appears from
18 October or November, sometime like that. Since that
19 time, we now have weekly lists that list the status
20 of our locations because, you know, problems with
21 whatever, topography, lands, results of previous
22 drilling, is a continually changing thing. I mean,
23 in general, you can say, yes, in here we're going to
24 be drilling, here we're going to be drilling, but
25 saying we're quarter quarter drilling in --

1 COMMISSIONER ANDERSON: What was
2 striking about -- it was a small enough scale, was
3 hard to read. Looked like in just about every case
4 the Barrett locations were right up against the
5 edges.

6 THE WITNESS: Yes. I notice that
7 too. That was pretty nice. That is not
8 representative of our drilling. That is, the
9 locations that were sent to them were only locations
10 that would involve them. I notice that around there
11 they had all of these locations clustered. Well, at
12 that time, we were thinking about drilling 160s.
13 That was my fault. Because I didn't know what the
14 engineering people were coming up with. I simply was
15 going by the 160s we were drilling there.

16 But what our plans are now, are just
17 to have 320-acre spacing in Wasatch, the same thing
18 with Mesaverde. All that was shown to them were the
19 locations they were going to be involved in. And we,
20 because of their problems with financing, tried to
21 give them as many locations we felt we could
22 conceivably bring them in on, or that they possibly
23 would be involved with, so that was a, you know, an
24 estimate, not so much like -- it looks like we are
25 all of a sudden crowding them in. It was simply an

1 aid for them to prepare to obtain the financing.

2 COMMISSIONER ANDERSON: I take it, the
3 significant number of locations at the present you
4 plan to drill are not immediately adjacent to --

5 THE WITNESS: Half of these locations
6 didn't exist four months ago. You could see if we
7 had -- if that was our intention, we would have
8 already drilled. Many of these around the boundary,
9 we would -- already come up clustered, Mesaverde
10 wells against the boundary. That's not our
11 intention.

12 MR. KNOWLTON: Mr. Anderson, I might
13 point out, existing rig location would indicate we
14 are not really hovering over the DOE. We're quite a
15 ways away from them as a matter of fact.

16 THE WITNESS: Here's rigs, here's one,
17 here's one. What's dictating location to us,
18 previous drilling and accessibility, trying to drill
19 our best wells, trying to drill as cheap as possible
20 was causing us to drill in the river valleys in the
21 area. If we wanted to drill upon DOE it could cost
22 us a lot more money because of the topography of
23 their terrain.

24 COMMISSIONER ANDERSON: That certainly
25 makes sense, just based on looking at that. What I

1 understand you to be -- your proposed location looked
2 strange.

3 THE WITNESS: They are proposed to the
4 DOE for the DOE. They are not -- Barrett has other
5 locations that, ultimately, you would prudently
6 develop locations, in time, if this is your known
7 going the unknown, you would do -- you would simply
8 drill here and drill there.

9 COMMISSIONER McCORD: You don't
10 dispute the percentage or the number of fractures
11 developed by the core sample in the study? I assume
12 just because it was present in the Rulison doesn't
13 mean it was present everywhere else.

14 THE WITNESS: I get my information
15 from the same source, which is the mountains of
16 information that come out of the people that are
17 running the MWX site. So I believe that, but I do
18 not believe you can look at this three-well cluster
19 here and say 6, 12 miles away it's the same thing
20 there.

21 COMMISSIONER McCORD: In your opinion,
22 is there a decrease in fracture as you move from east
23 to west? Any kind of trends you could testify to?

24 THE WITNESS: All I can say -- only
25 thing I can tell you is that inside this boundary, it

1 appears to be highly fractured. I don't have a north
2 end. I don't have a south end. There's no well
3 control to help me out on that.

4 COMMISSIONER McCORD: Wouldn't you
5 have inclination to drill where you thought the areas
6 would be the most highly fractured?

7 THE WITNESS: You bet. I would love
8 to have some leases in here but I don't have any. We
9 did, we drilled two wells on a lease we were able to
10 obtain. We drilled two wells right in what we felt
11 were the fractures area. We specifically drilled
12 there. We're attracted to those leases because of
13 the data that came off of the MWX.

14 COMMISSIONER McCORD: Your proposed
15 sites are, for the most part, in Grand Valley?

16 THE WITNESS: That's where our
17 leasehold is.

18 COMMISSIONER McCORD: Okay.

19 THE WITNESS: You could look at the
20 yellow on the map, see that we don't have that much
21 yellow in Rulison.

22 COMMISSIONER McCORD: That's why I am
23 looking at Exhibit 4.

24 CHAIRMAN WELBORN: Other questions
25 from the commission? I had a couple just carrying on

1 with that. Rulison area or this so-called fractured
2 area, you are not disputing the conclusions that the
3 DOE geologists came to, based upon the MWX wells.
4 You are just disputing the extent to which you could
5 extrapolate from these wells in these areas; is that
6 correct.

7 THE WITNESS: To a point, yes. Now, I
8 don't dispute this area is fractured. What I do
9 dispute, in this area, is that you can say that this
10 sand is fractured; therefore it is draining other
11 sands in the area. I do dispute that. Because I
12 don't -- one of the ways -- fractures will tend to
13 propagate in the more competent rocks, tend to
14 terminate against the less competent rocks, I think
15 internally; and the reservoir, you can fracture that
16 as much as you want, you will get higher productivity
17 out of it. I don't think fracturing -- this sand is
18 necessarily fractured, this sand and same well bore,
19 or -- is fractured, you know, the sand in the
20 adjacent well bore. But I do say, yes, this area
21 here is fractured, and all the MWX did was support
22 the fact that is fractured. MWX is inside this area
23 that I say is fractured.

24 CHAIRMAN WELBORN: Are you saying we
25 should not adopt 320-acre spacing in that Rulison

1 area in the Mesaverde formation?

2 THE WITNESS: I think yes, I don't
3 think you should, because of the sands. The second
4 part of the argument is the discontinuity. I think
5 the same thing that applies in Grand Valley with this
6 untapped feet of pay, applies in Rulison, same type
7 of depositional environment. Grand Valley got two
8 things. You have no fracture. You have
9 discontinuity. In the Rulison, certain areas you
10 have fractures, but you still have this discontinuous
11 nature of the sands.

12 CHAIRMAN WELBORN: Well, what is it --
13 Mr. Knowlton started out by saying that you still are
14 gathering the information. You don't have enough
15 information yet. You don't have all of the
16 information that you would like to have. I suppose
17 that's always going to be true. Is Barrett taking no
18 position with respect to spacing anywhere in this
19 area? Is it saying we should do the spacing exactly
20 as it now exists? What is the position of Barrett?

21 THE WITNESS: Our position is 320,
22 from our data, 320 has not effectively encountered
23 the number of reservoirs that are there. And 160 we
24 have a much better shot at denser well spacing and
25 more chance of hitting some of these, 37 to 50

1 percent of the sands that are appearing to stay
2 unique to that particular well bore.

3 CHAIRMAN WELBORN: You don't think
4 it's ever going to be possible that we will be
5 drilling the necessary wells in, say, the Rulison
6 area if we allow one well per each 160.

7 THE WITNESS: I don't believe so.
8 It's the same, I believe it is, it's the same type of
9 data that we're seeing over in Grand Valley, I think
10 you would see the same thing over here. I don't
11 think you would see unnecessary. I think what you
12 would see is enhancement in the amount of
13 deliverabilities that would come out of the Rulison
14 Field because you would be tapping into many discrete
15 reservoirs that are currently untapped. Some of
16 those are fractured. As far as studying, you know,
17 yes, I would just like -- I would love for somebody
18 to come in here and try to do this, give me the
19 answer instead of me having to generate it. There's
20 actually some people that are doing just that. Right
21 now they are trying to do these studies to correlate
22 some of these things.

23 CHAIRMAN WELBORN: The thing that I
24 guess is on my mind, although Barrett is objecting,
25 protesting the spacing application, it really doesn't

1 own much in that Rulison area. And parties who do
2 own in that area don't seem to be objecting to it.

3 THE WITNESS: That's fine. Like I
4 said, I don't have a leasehold in there, so to me you
5 are right. I don't have a problem with that. If we
6 had leases in there, which we do have a few up in
7 this area, but probably good majority of this we
8 don't. But two-thirds of that shaded area Barrett
9 has some type of leasehold under it, and we don't
10 have -- because it's already developed and producing.
11 I can't speak for Fina or whoever else owns the
12 leases in there.

13 MR. KNOWLTON: Mr. Chairman, I think
14 our position, any more spacing of the Mesaverde on
15 320s is probably a geologic and engineering mistake.
16 And it's more of a mistake in Grand Valley and
17 Parachute but it's a mistake everywhere. We think
18 that if now is the time to space an additional
19 spacing area, we're saying it should be on 160.
20 Probably, eventually, it will be on 80s. That's what
21 our, I think our proof is. That's his, you know,
22 they disagree. He says there's discontinuity of the
23 sands, and there testimony is that there is
24 continuity.

25 CHAIRMAN WELBORN: It's a mistake to

1 to be corrected in that you can always drill wells
2 whereas the mistake the other way can't be corrected.

3 MR. KNOWLTON: Agreed, but the
4 operators are the ones that are taking the risks. If
5 they think that they are not getting it all, I think
6 that's their risk.

7 CHAIRMAN WELBORN: Is this Exhibit 3
8 of DOE accurate? Have you looked at it? The one
9 that sets forth the existing spacing in the area?

10 THE WITNESS: Yes. Yes, that is, to
11 the best of my knowledge, it's accurate.

12 CHAIRMAN WELBORN: Everybody in
13 agreement on 3, this exhibit. Any other questions
14 from anybody? All right. Thank you very much.
15 Please proceed.

16 MR. KNOWLTON: Our next witness is
17 Allan Heinle.

18 (Whereupon the witness was sworn.)

19 CHAIRMAN WELBORN: We have likewise
20 received your resume and accept your qualifications
21 as expert petroleum engineer. So if you would keep
22 further inquiry to a minimum, Mr. Knowlton, I would
23 appreciate it.

24 EXAMINATION

25 BY MR. KNOWLTON:

1 Q You have been sworn in, Mr. Heinle?

2 A Yes.

3 Q Please state your full name and your
4 address and your present occupation.

5 A It's Allan R. Heinle. Business
6 address is 1228 15th Street, Suite 405, Denver,
7 Colorado. And I am employed as an independent
8 consulting petroleum engineer under the name of
9 Heinle and Associates.

10 Q Have you ever testified before this
11 oil and gas commission?

12 A I have not.

13 MR. KNOWLTON: Then you have stated
14 that his qualifications have been accepted.

15 CHAIRMAN WELBORN: Yes.

16 Q (By Mr. Knowlton) Would you advise
17 the commission of the extent of the studies and type
18 of studies which you have made in the area of
19 interest?

20 A Over the last two or three years, I
21 have had the opportunity to do some detailed
22 reservoir engineering work in and around the Rulison
23 Field, looking specifically at recoveries out of the
24 Mesaverde drainage areas, and recoveries in drainage
25 areas out of the Wasatch formation. And maybe to get

1 right to the point here, I also selected Rulison
2 Field as a study area and the highly fractured areas
3 we're talking about lies right within this area here,
4 in the Mesaverde.

5 CHAIRMAN WELBORN: You are referring
6 to what exhibit number?

7 THE WITNESS: This is Exhibit No. 5,
8 excuse me.

9 CHAIRMAN WELBORN: Do we have a small
10 copy of this?

11 MR. KNOWLTON: No, we don't. We just
12 have the large copy.

13 A What I have attempted to demonstrate
14 here is to determine the expected ultimate recoveries
15 for the various Mesaverde wells, and back calculate
16 out drainage radius based on log calculation. The
17 reason we selected -- or I selected Rulison Field is
18 that the Mesaverde wells that have been producing
19 here have been producing for ten plus years. Some of
20 them have more extensive production history, but
21 that's ten years of which at least half of those, the
22 gas producing rates were uncurtailed. So we have got
23 what I believe to be reliable production data that we
24 can use for decline curve analysis to extrapolate out
25 expected recoveries for these wells.

1 What I would like to do is focus in on
2 this Langstaff well, Langstaff No. 1. It happens to
3 be the best well in this area in terms of recovery
4 and recovery efficiency. My projections of expected
5 ultimate recovery out of this well is 1.4 BCF. We
6 saw some earlier testimony today talking about 2.5
7 plus BCF. Well, this particular area here, where
8 this fracturing appears to be prevalent, the better
9 area, there's not a well in that there that's going
10 to recover 2.5 BCF. The best well, Langstaff, is
11 going to recover 1.4.

12 And what I did was, taking that
13 recovery amount of 1.4 BCF, and calculating the pore
14 volume of gas in place that's been perforated in the
15 well bore, I mean by that the feet of pay, net pay in
16 the well bore, the porosity that is attributable to
17 those feet, and the amount of hydrocarbon in those
18 feet, I was able to back calculate a drainage radius
19 using the 70 percent recovery factor of 50 acres.
20 The highlighted area here represents a 160-acre
21 square tract if you will.

22 Now, why the 70 percent recovery
23 factor. As you are probably aware, drainage area is
24 going to be dependent on what you are going to get
25 out of the well, the amount of hydrocarbon pore space

1 in the well and then the recovery factor. Well, if
2 this area is highly fractured, one, you would expect
3 to see better recoveries. The fractures should
4 improve the overall drainage. But I know that
5 reasonable engineers can differ and may not agree
6 that 70 percent is the appropriate recovery factor to
7 use, so I prepared an exhibit, Exhibit No. 6, which I
8 believe you have a copy of. It's a graph, and what I
9 have attempted to do here is show the interrelation
10 between drainage area and recovery factor.

11 For example, I have got on the
12 vertical scale, which is to the left, drainage area
13 in acres. The horizontal scale to the right is
14 recovery factor and percent. As I stated earlier, if
15 you enter a -- five acres, which I calculated, and
16 come down that's a 70 percent recovery factor. What
17 if the drainage is 320 acres, what if that is what
18 the commission decides should be the appropriate
19 spacing in this area. Well, if you enter 320 acres
20 and come down, you come up with about a 10 percent
21 recovery factor.

22 What that is telling you, for the best
23 well in the field, you are only affecting 10 percent
24 of the gas in that 320-acre drainage area. 90
25 percent of the gas is unaffected by it. In other

1 words there's a lot more ^{ppic} pour volume in that well-
2 bore than is being seen in the production. And if --
3 likewise, if the fractures were extensive and
4 communicating all of these sands, again, one would
5 expect to see better recovery efficiency than we're
6 seeing.

7 The next exhibit I put together
8 addresses some of the economics of these Mesaverde
9 wells. I have got a summary that's listed as Exhibit
10 No. 7. And it sets forth my parameters that I used
11 in trying to determine, what is the minimum recovery
12 one needs to get for a Mesaverde completion versus a
13 Mesaverde in Cameo completion. I will just briefly
14 go over it.

15 The well cost that I have listed
16 there, I have used \$650,000 as a cost that we can
17 expect for a typical Mesaverde completion only. When
18 I say Mesaverde, I am referring to this portion of
19 sand above the Cameo. Okay. And below that I have
20 got the cost for a typical Mesaverde Cameo dual
21 completion, being \$130,000. Below that is listed
22 some actual well costs that were obtained in the area
23 that formed the basis for these numbers, using a gas
24 price of \$1.50 per MCF BTU, the gas being about a
25 thousand BTU per standard cubic foot. And operating

1 costs and escalation are shown there.

2 What I was able to develop was what I
3 have labeled Exhibit No. 8, which is is a graph that
4 relates rate of return, which is on the vertical
5 axis, to recoverable reserves on the horizontal
6 axis. You will see there's two lines on here: One
7 that's defined by a square box, one that is defined
8 by pluses. The square box represents a single
9 Mesaverde completion. The pluses would represent the
10 Mesaverde in Cameo.

11 And what it shows, if you pick a
12 hurdle rate of 15 to 20 percent rate of return, which
13 is probably the minimum rate of return that an
14 exploration company would look at, that would yield
15 for the Mesaverde single completion, somewhere
16 between 1 and 1.2 BCF needed to achieve those
17 economics. And a commingled well somewhere between
18 1.1 and 1.3 BCF.

19 The other thing we looked at is,
20 unfortunately, Exhibit 5 covers it up, Barrett has
21 obtained some bottom hole pressure data on a well
22 over here in the Grand Valley area, the MV 4-3 which
23 produces -- at one time produced only out of this few
24 zones in this middle Mesaverde section, had been on
25 production for a period of time. And when Barrett



139.14

1 drilled this second well, which simulates 160-acre
2 well distance, they were able to correlate. I have
3 reviewed the logs and agreed with the correlation,
4 correlate two producing sands here, the producing
5 interval here, with this newly drilled well. And on
6 the newly drilled well, the GV12, two pressure tests
7 were run opposite the interval that had been
8 producing for some time.

9 And although it appears that we had a
10 mechanical failure in the packers, prior to that
11 failure, the bottom hole pressure had built up to
12 within 93, 94 percent of the original bottom hole
13 pressure. Did not see any signs of drainage from
14 that data. Now, had the tests not failed analog,
15 continued to build up, it very likely could have
16 built up to original bottom hole pressure.

17 CHAIRMAN WELBORN: What's the
18 significance of that?

19 A The significance being that if you got
20 160-acre well spacings with a zone that can be
21 correlated in one well, considerable amount of gas
22 has been produced out of that zone, if you had very
23 effective communication in that zone, you would have
24 expected to see a pressure lower than an original
25 bottom hole pressure on this new well. We didn't see

1 that.

2 CHAIRMAN WELBORN: This is in the
3 Grand Valley?

4 A Over in the Grand Valley area, yes.

5 Q (By Mr. Knowlton) Can you identify
6 for the record those two wells?

7 A Yes, the MV 4-3, which is in Section
8 3. And the GV12-3, which is also in the northeast
9 part of that section, Section 3. So I guess, in
10 summary, what we're seeing in Rulison, in this area
11 of better productivity, drainage areas that don't
12 even approximate 160 acres, and most likely, due to,
13 one, the discontinuity of the pay; and, two, even
14 when you can correlate these zones -- we talked about
15 a 40 percent correlation -- we have -- we haven't
16 seen the pressure depletion in those zones at this
17 stage.

18 Q Do you have any other evidence
19 regarding the economics involved in the Mesaverde, in
20 the Mesaverde spacing proposal?

21 A The only other comment I would make is
22 in regards to some testimony that was provided this
23 morning, I guess by the DOE. 10 percent rate of
24 return was used. Well, keep in mind that if you go
25 to higher rate of return versus 10 percent, the

1 320-acre case that was shown was pushing a lot of
2 those reserves out to the future at high dollars or
3 high gas values. If you only use 10 percent discount
4 factor, it's going to result in a large number. If
5 you use 20 percent or 25 percent or 15 percent,
6 what's going to happen is, the net present value of
7 that cash flow stream is going to be less because the
8 future dollars are going to be severely discounted.
9 It's, in part, I guess the rate exaggeration
10 philosophy; that on a present worth basis, sometimes
11 it makes more sense to go in and exaggerate the
12 production because it adds a higher discounted value.

13 Q Mr. Heinle, I think that the exhibits
14 and testimony of the DOE petroleum engineer would
15 have indicated a much -- not much -- but a lower gas
16 price. What gas price did you use in your
17 projections?

18 A I used the \$1.50 per MCF BTU. The --
19 effectively, \$1.50 per MCF, that -- I believe that
20 was high, was the high demand case that DOE presented
21 -- as the DOE indicated, at that high demand price,
22 the economics on a 160-acre spacing became much more
23 closer to the 320-acre spacing and applying the
24 higher discount factor, which certainly an oil and
25 exploration, oil and gas exploration company would

1 do, it could possibly even exceed it.

2 Q Do you know the -- what Barrett has
3 been receiving on most of their gas pricings in the
4 last year. I don't remember so. . .

5 A \$1.50 plus.

6 Q Any other testimony regarding the
7 drainage radius of the wells which you have studied?

8 A Just one other thing I would like to
9 reiterate again. The Langstaff, which is the best
10 well in this section, is only going to recover 1.4
11 BCF. I have not seen a well out there yet that's
12 going to recover 2 1/2 BCF.

13 CHAIRMAN WELBORN: That's in 6 South,
14 94 West?

15 A Exactly.

16 Q (By Mr. Knowlton) You want to locate
17 that again on the big map, the Langstaff well on the
18 other one. Flip it, can you. . .

19 A Right there.

20 CHAIRMAN WELBORN: On exhibit, what
21 was that? Exhibit No. 1?

22 A Exhibit 1.

23 Q (By Mr. Knowlton) Mr. Heinle, do you
24 have an opinion as to the maximum area that will
25 effectively and economically be drained by one

1 Mesaverde well in the area in question?

2 A Yes.

3 Q What is that opinion?

4 A It's certainly going to be less than
5 160 acres, 160 acres or less.

6 Q Assuming that an operator were to
7 offset the DOE acreage, and let's say they offset it
8 on what I think would probably be a minimum of 160-
9 acre offset, you have an opinion as to whether or not
10 there would be drainage from DOE acreage?

11 A Yes, I do.

12 Q What is that opinion?

13 A The opinion is that they would not be
14 drained.

15 Q Is there any question in your mind
16 about that at all?

17 A The data I have got today, none
18 whatsoever.

19 Q Were the exhibits that you have spoken
20 from, I think, perhaps, starting with Exhibit 6, 7,
21 8?

22 CHAIRMAN WELBORN: Exhibit 5.

23 Q (By Mr. Knowlton) Is there 5? 5, 6,
24 7 and 8 dealing with Mesaverde? Are those the only
25 ones dealing with the Mesaverde formation?

1 A Yes, they were.

2 Q Were they prepared by you or under
3 your direction or control?

4 A They were.

5 MR. KNOWLTON: I would like at this
6 time to introduce those particular exhibits into
7 evidence, please.

8 CHAIRMAN WELBORN: They are admitted.

9 Q (By Mr. Knowlton). Change from the
10 Mesaverde formation completely to the Wasatch. Would
11 you advise the commission as to what you think the
12 Wasatch spacing should be and feel free to bring it
13 down into different areas, if that's what you chose
14 to do. You heard the testimony of Mr. Reinecke
15 regarding some of the Wasatch production and some of
16 the variances that exist in the drilling cost, but I
17 want you to be more specific.

18 A First, I would like to point out, as
19 far as the Wasatch goes, I don't think there's a
20 whole lot of dispute between what the DOE has
21 presented and what Barrett or myself have concluded
22 in this area, but the real problem is, we have got a
23 3,000-foot cliff in this Allen Point area that
24 increases significantly the cost to drill these wells
25 out here. We're expecting, and based on the wells

1 that have been drilled, the data out there, and the
2 log information that we have got, we're seeing the
3 same types of reservoir, generally same type of
4 reservoir pressure. So we ran the -- really
5 expecting nothing a whole lot different up there
6 except increased drilling costs.

7 And I have prepared some economics to
8 compare the economics for a Wasatch well drilled in
9 Rulison versus a Wasatch well drilled up on this
10 3,000-foot cliff. And Exhibit No. 9 summarizes some
11 of the parameters that went into my economic
12 calculations. And under well costs, I am estimating
13 a typical well to cost \$335,000. Now, keep in mind,
14 too, there isn't a gathering line up there. A
15 gathering line is going to have to be laid to gather
16 the gas up there. Those costs were not reflected in
17 here.

18 On the other hand, Rulison and
19 Parachute typical well cost is running \$140,000. In
20 the Rulison, Parachute area we are talking about
21 drilling to a depth of 1500 to 2,000 feet. And you
22 add an extra 3,000 feet plus the additional depth,
23 and you are looking anywhere from 35 and 5,000 feet
24 up on top of this cliff here. So we have more than
25 doubled well costs. Using a \$1.50 per MCF BTU about

1 1,000 BTU per standard cubic feet. The other
2 parameters that I have listed there, and reserves of
3 450,000 MCF for a typical 160-acre spaced well.

4 Now, where I got that number from,
5 again, in the Rulison Field, the Wasatch has been
6 producing for ten plus years. We have got a number
7 of those years that are unrestricted, uncurtailed
8 production history, so, again, we can go to the
9 decline curves and come up with what I believe to be
10 a reasonable estimate of the recoveries for those
11 wells. When you do that, in some areas you come up
12 with about 450,000 MCF per well. This area is spaced
13 and has been drilled on 160 acres.

14 Going to Exhibit No. 11 --
15 incidentally this is Exhibit No. 10, the one with the
16 drainage areas on it for the Wasatch. Going to
17 Exhibit No. 11, I prepared a graphical presentation
18 to compare the economics of an Allen Point well
19 versus that of a well drilled in Rulison. So again,
20 on the vertical scale, I have got rate of return; on
21 horizontal scale I have got recoverable reserves in
22 BCF. This square box line is an Allen Point well.
23 The plus represents a well drilled in Rulison. As
24 you can see, if you enter at this 450,000 MCF
25 recoverable reserves, and go up to the Rulison well

1 and across you get a 40 percent plus rate of return,
2 a very attractive rate of return.

3 On the other hand, entering and going
4 to the Allen Point well and across it drops to 5
5 percent rate of return. Reason it drops is because
6 of the increased well costs for having to drill
7 through all this overburden. Oh, now the obvious
8 question, how much gas do we need to make it
9 economical, and over what drainage area does that
10 have to be?

11 Exhibit No. 12 relates to a typical
12 Allen Point well. Assuming that your hurdle rate on
13 economics is 15 to 20 percent rate of return, that
14 you would be required to get somewhere between
15 seven-tenths plus of a BCF to eight-tenths plus of
16 BCF to achieve those minimum hurdle rates, 15 to 20
17 percent.

18 Exhibit No. 13 represents that
19 recovery to well spacing. Recoverable reserves on
20 the vertical axis, drainage area on the horizontal
21 axis. The seven-tenths to eight-tenths plus BCF of
22 gas correspond to between 280 and 320 acres drainage.

23 What that is saying is that if, because of this
24 increased cost up here, if you are restricted to
25 drilling on 160 acres, all of these wells are going

1 to be developed on 160 acres, based on the data we
2 have now, the economics are going to be marginal.
3 You need to at least be given the opportunity, or the
4 well does, to try drain a larger area. Can it drain
5 that large of an area in the Wasatch?

6 Referring back to Exhibit No. 10 here,
7 again over the past two or three years that we have
8 had an opportunity to work in this area, we have
9 prepared some drainage radius calculations that the
10 Wasatch is different from the Mesaverde. Tends to be
11 more blanket sands. You are talking higher
12 permeabilities, higher porosities, more of a
13 conventional reservoir, if you will. And you will
14 notice that some of these wells down in the southern
15 portion of this field have large drainage radiuses in
16 excess of 160 acres. As a matter of fact, the
17 vertical height is somewhere around 245.

18 These wells were drilled ten years
19 ago. Until recently, within the last year, these
20 offset wells had not been drilled. These wells were
21 allowed to drain the larger area. As a matter of
22 fact, Barrett drilled one of these wells and obtained
23 some bottom hole pressure information out of the
24 Wasatch when they drained it. I believe it was a
25 well located right here, in the northeast or

1 northwest of 29. And that bottom hole pressure
2 information indicated about a 15 percent drawdown in
3 the original reservoir pressure. So given the
4 reservoir development, by that I mean the
5 permeability and continuity, it appears that the
6 wells could drain a larger area. It becomes an, in
7 my opinion anyway, an economic necessity in this
8 Allen Point area because the overburden increases
9 costs.

10 Q Mr. Heinle, I think that in the
11 protest filed by Barrett that we have suggested in
12 this, in the area of the Wasatch, that we, if the
13 commission chooses to space it at all that it be
14 spaced on 320s with an option by the operator to
15 drill an infill well. We're now limiting that
16 request only to the Allen Point area because of the
17 economics; is that correct?

18 A That's correct.

19 Q So the, really, the area outside of
20 the area that we definitely showed in orange was
21 Allen Point, we're not objecting to spacing on 160s
22 in the Wasatch; is that correct?

23 A That's correct.

24 Q For the reasons you have stated?

25 A Yes.

1 Q Is there anything further to add?

2 MR. KNOWLTON: I think probably being
3 what it is, we better move on, unless there's
4 something specific on the Wasatch. No further
5 questions of the witness. We would like to have the
6 exhibits introduced into evidence, though, that dealt
7 with the Wasatch testimony.

8 CHAIRMAN WELBORN: That would be
9 Exhibit 10 through 13, is that what it is?

10 THE WITNESS: Yes.

11 MR. KNOWLTON: Yes, I think so. Yes.

12 CHAIRMAN WELBORN: I am sorry. 9
13 through 13. They are admitted. All right.

14 MS. EGGER: Just a couple of
15 questions.

16 EXAMINATION

17 BY MS. EGGER:

18 Q I think you mentioned that an oil and
19 gas exploration company would use a higher discount
20 rate than 10 percent?

21 A They would.

22 Q Would you elaborate on that?

23 A Oil and gas exploration company would
24 not consider a 10 percent rate of return, with the
25 risk involved, sufficient to drill. They would hope

1 to find something in the at least 15 to 20 percent
2 range. My experience in the past dealing with
3 companies that explore for oil and gas, 15 to 20
4 percent represents a minimum hurdle rate.

5 Q With respect to some of your drainage
6 studies, were they limited to the Rulison Field?

7 A Yes, they were.

8 Q Just if you can clarify a couple of
9 points in that, in calculations of drainage radius,
10 did you use net or gross sand intervals as we --

11 A Net sand interval.

12 Q What rock characteristics were used
13 and how did you obtain them?

14 A We did a detailed study in the area.
15 We digitized all of the well logs. Normalized them.
16 Calculated water saturations. And basically, without
17 getting too technical, we built a plot of porosities
18 versus water saturation, you get a very definite
19 capillary-shaped curve; that at some point in water
20 saturation and porosity you see a significant drop in
21 that water saturation, indicating maybe some minimum
22 ^{poie} pour float through which the oil and gas in this
23 situation originally migrated into the pours and from
24 which you could expect to be produced.

25 Q What porosity, permeability, initial

1 pressure and initial gas saturation and total gas in
2 place did you assume?

3 A It varies from well to well, but
4 generally speaking I would say the water saturation
5 and porosity cutoff in the Mesaverde was in the 6
6 percent range on porosity. 50 percent range in water
7 saturation. I think that was comparable for the
8 Wasatch now that, in other words, anything that was
9 greater than 50 percent water saturation and less --
10 or less than 6 percent was not considered pay.

11 Q And permeability?

12 A We did not have in our very few pour
13 data available out here, that we're not able to
14 utilize core data to arrive at permeability cutoffs.

15 Q How exactly was recovery factor
16 calculated?

17 A In the case that I made with the
18 drainage area, in the Mesaverde, I used, from my
19 experience, 70 percent. And I also show in the
20 exhibit that if somebody didn't agree with my 70
21 percent recovery factor, say they thought it was 10
22 percent, or some other recovery factor, that knowing
23 what the volume of gas would be that was going to be
24 produced out of that well, if you are going to
25 decrease the recovery factor to 40, 30, 20, 10

1 percent, okay, you are looking at a larger area. I
2 think the example I showed in there is, if we went
3 and assumed 320 was the appropriate drainage area,
4 that represents only a 10 percent recovery factor.
5 90 percent of the gas in place on that 320-acre
6 spaced area is unaffected by the producing wells.
7 It's not being drained.

8 Q What kind of decline curve analysis or
9 decline curves were used?

10 A Semilog rate/time that have rate on
11 the vertical axis and time on the horizontal axis on
12 a semilogarithmic plot.

13 Q Where did you terminate your decline
14 curves?

15 A At the economic limit of the wells.

16 Q How did you define that?

17 A It's a good point. There was DOE
18 testimony this morning of not knowing where to define
19 the end of the well. The end of the well is at the
20 economic limit. You have certain operating costs,
21 taxes, we have to pay taxes, a price, you received
22 all of that, figures in to determine the minimum rate
23 at which you can operate these wells. When that rate
24 was achieved, the well became uneconomic, was no
25 longer produced. That identified the expected

1 ultimate recovery for that well.

2 MS. EGGER: No further questions.

3 CHAIRMAN WELBORN: All right. Any
4 questions from our staff?

5 MR. SMINK: I have one I would like to
6 pursue. Decline curve analysis confuses me a bit.
7 You have any comments as to concerning the shape of
8 the curve? Hyperbolic, exponents, probably square
9 root of time extrapolation? Can you tell us more
10 about how you did that?

11 THE WITNESS: One of the reasons we
12 selected or I selected Rulison as a study area is
13 because most of the wells had -- these wells exhibit
14 typical tight gas sand behavior. They started with
15 very high initial productivities and within a period
16 of maybe four, five years, have dropped down
17 significantly and have stabilized at a fairly slow
18 rate of decline. It's one of the reasons we selected
19 this area; that there wasn't a whole lot of mystery
20 in extrapolating that decline curve to make a future
21 projection of reserves.

22 MR. SMINK: Was it a hyperbolic
23 curve?

24 THE WITNESS: Hyperbolic and
25 logarithmic in cases.

1 MR. SMINK: Did you find anything that
2 showed linear flow at all? I understand there are
3 several papers in the literature which indicate that
4 some of the Mesaverde reproduces under linear form.

5 THE WITNESS: In the early time
6 portion of the curve, when the wells have been
7 hydraulically stimulated, producing through a
8 fracture, yes, there is some linear flow that appears
9 there, but over the entire -- if you look at the
10 entire life of the well, if you will, I didn't see
11 significant signs of it.

12 MR. SMINK: Thank you.

13 CHAIRMAN WELBORN: Questions from the
14 commission. Mr. Anderson.

15 COMMISSIONER ANDERSON: It's your
16 belief that despite initial cost in the Allen Point
17 area drilling the Wasatch, that with 320 acres you
18 can reach the hurdle rate of 15 to 20 percent. Is it
19 really what you are showing? It's simply
20 noncommercial to drill for the Wasatch in that area.

21 THE WITNESS: I think what I am saying
22 there is, if, based on the information we have got
23 now, if we're forced to drill those wells on 160
24 acres, limited to 160-acre spacings, the wells do not
25 appear that they will be commercial. We get

1 insufficient reserves per well to make them economic.
2 Whether we're going to drain 320-acre out there and
3 make these wells commercial, I think only time will
4 tell that. But it appears that the wells need the
5 opportunity to try to drain this larger area.

6 COMMISSIONER ANDERSON: But if, in
7 fact, if it were drilled on 320, even if you were to
8 get a larger amount of reserves, you get them over
9 much longer period of time.

10 THE WITNESS: That's reflected in the
11 economics. I have attempted, rather than changing
12 just the initial productivities, to change the
13 schedule at which those reserves would be recovered
14 in arriving at the economics.

15 COMMISSIONER McCORD: Barrett doesn't
16 contemplate drilling to the Mesaverde from Allen
17 Point?

18 THE WITNESS: I don't think so.

19 COMMISSIONER McCORD: Too tall?

20 MR. KNOWLTON: Too deep.

21 COMMISSIONER VANDERWERF: Mr. Heinle,
22 on your Exhibit 6, which is the comparison of the
23 recovery factor versus the drainage area for the
24 Langstaff well, I believe you said that was the best
25 Mesaverde well in the Rulison field based on your

1 study.

2 THE WITNESS: That's correct.

3 COMMISSIONER VANDERWERF: It seems to
4 me, looking at this exhibit, that 80 acres or perhaps
5 even 40 acres might appear to be the most optimum
6 spacing area. It indicates that tighter spacing, in
7 fact, is preferable.

8 THE WITNESS: It indicates that to get
9 an efficient recovery of the gas out of all of that
10 rock, that due to the discontinuous nature, the tight
11 nature, you have to go to small spacing areas to
12 effectively drain it. But what it shows is this
13 Langstaff well, which I am projecting will recover
14 about 1.4 BCF, using the 70 percent recovery factor
15 is only going to effectively drain 50 acres.

16 CHAIRMAN WELBORN: Other questions?
17 Rogers?

18 It's Barrett's position that then you
19 are actually seeking, with respect to Mesaverde,
20 160-acre spacing?

21 MR. KNOWLTON: It's -- what's that?

22 CHAIRMAN WELBORN: It's Barrett's
23 position you are actually seeking, with respect to
24 the Mesaverde formation, 160-acre spacing.

25 THE WITNESS: That's right, yes.

1 MR. KNOWLTON: That's correct, yes.

2 CHAIRMAN WELBORN: And you have done
3 the same kind of analysis that the Department of
4 Energy has, comparison of 80-acre versus 160 versus
5 320 and your conclusions are based on that kind of
6 analysis, the difference -- primary difference being
7 that you have used a higher rate of return.

8 THE WITNESS: No. That's only one of
9 the differences. If you recall from the testimony
10 this morning, I believe for a 320-acre well, the DOE
11 was talking about 2.5 BCF recovery. And I don't see
12 that out there. I see maybe 1.4 out of the best
13 well. And so given all of that pour volume in the
14 well bore, only recovering 1.5 BCF, it tells me you
15 are not doing a very good job of draining that
16 reservoir right.

17 CHAIRMAN WELBORN: You don't -- you
18 say you don't see that out there. Based on what
19 don't you see?

20 THE WITNESS: Decline curve analysis
21 from wells that have been on production for ten plus
22 years.

23 CHAIRMAN WELBORN: This is Mesaverde.

24 THE WITNESS: Mesaverde, where the, in
25 my opinion, the decline rates are fairly well

1 established. I think the DOE had an exhibit this
2 morning on the Langstaff well. And if you look at
3 that, we're in the phase of production on that well
4 where there should no longer be a whole lot of
5 mystery in determining what that ultimate recovery is
6 going to be out of that well. It's, you know, the
7 scary part, that initial -- four or five years from
8 initial productivity dropping off rapidly before it
9 stabilizes is behind us.

10 CHAIRMAN WELBORN: You see that both
11 in the Rulison and in the Grand Valley, that 1.4 as a
12 maximum?

13 THE WITNESS: Some of the wells in
14 Grand Valley may exceed that. The reason they may is
15 that from testimony we already heard in Rulison, most
16 of the wells did not penetrate the Cameo or the lower
17 portion of this Mesaverde section. And Barrett over
18 in Grand Valley has penetrated that section and is
19 producing out of that zone. It's another zone that's
20 producing at Grand Valley that was not producing in
21 Rulison.

22 CHAIRMAN WELBORN: Well, if -- does
23 that suggest the spacing should be different between
24 the lower Mesaverde and upper Mesaverde?

25 THE WITNESS: I don't think so. If

1 you look at the economics and the amount of gas that
2 you need to recover out of these wells, I think you
3 are going to need that additional gas to make it a
4 viable project. In addition, you have got the same
5 sequence. You have got sands and coals interspersed.
6 I don't know how you differentiate this from this.
7 They are producing. There are sands that will
8 produce as well as coals.

9 CHAIRMAN WELBORN: The Wasatch is very
10 different.

11 THE WITNESS: That's correct. It's a
12 very blanket type of sand. Higher permeabilities,
13 higher porosities, it's much shallower so the
14 economics were significantly different.

15 CHAIRMAN WELBORN: All right. Any
16 further questions of this witness?

17 MR. KNOWLTON: No.

18 CHAIRMAN WELBORN: Any further
19 evidence to present?

20 MR. KNOWLTON: No further evidence to
21 present.

22 CHAIRMAN WELBORN: You have any
23 further evidence to present, Mrs. Egger?

24 MS. EGGER: We would like to take a
25 few minutes to recall a couple of witnesses. Could

1 we take a short --

2 CHAIRMAN WELBORN: We'll have a short
3 ten-minute break.

4 (Recess.)

5 CHAIRMAN WELBORN: We're back on the
6 record in Cause No. 139 and 440. And, Mrs. Egger,
7 you were going to have some more testimony; is that
8 correct?

9 MS. EGGER: We would like to recall
10 very briefly our two witnesses. First Miss Lynda
11 Fivas, if we could.

12 CHAIRMAN WELBORN: Please proceed.

13 MS. EGGER: She's still under oath,
14 continuation of that?

15 CHAIRMAN WELBORN: That's correct.

16 EXAMINATION

17 BY MS. EGGER:

18 Q Mrs. Fivas, you have heard the
19 testimony of Barrett Resource; is that correct?

20 A Yes, I have.

21 Q Are there any points that you would
22 like to add to or challenge or question in any way?

23 A There are just a couple of points that
24 I would continue to challenge. First of all, that
25 regarding the fractures that are within the Mesaverde

1 and Wasatch formations. There are two studies on
2 record presented by the United States Geological
3 Survey. Both of them are specifically related to
4 fractures in the Piceance Creek Basin. They relate
5 to the fracture orientation and the general fracture
6 trends in the basin to joint sets that are regionally
7 controlled in the area. Specifically, the
8 relationship that was established was in an area
9 ranging from DeBeque over into the Mountain Creek
10 Field producing area to the north all along the Grand
11 Hogback, which more than covers the area that we're
12 representing as being in a general area of the high
13 fracturing.

14 We recognize that not every locality
15 within this area will be highly fractured. What
16 we're essentially saying is that a goodly portion of
17 them will be. Therefore, one has to anticipate
18 higher fracturing than in an area where you wouldn't
19 anticipate such high fractures. This study
20 essentially correlates the orientations of the MWX
21 wells with surface studies that were generated in
22 evaluating the joints that are within the Piceance
23 Creek Basin, most specifically with Grand Hogback.
24 They also follow the Colorado River to outcrops that
25 were occurring along that area over to Palisade. We

1 have the records, which unfortunately we can't
2 submit, but the open file report is 84-156.

3 Another report that was also generated
4 by the United States Geological Survey is open file
5 report 84-757, which also supports the same
6 contention that joint sets which are related to the
7 fracturing that we are referring to are regional in
8 nature as opposed to just in a specified small area.

9 In addition, we did not mean to imply
10 that the, what we are calling the upper Mesaverde,
11 what Barrett is calling the middle Mesaverde are not
12 lenticular in nature. We do feel it's highly
13 lenticular in nature. We have evidence -- there has
14 been published evidence that says the correlatable
15 distance between any sand unit within that portion is
16 about 6800 feet at the maximum. We concur with that
17 entirely, but we feel that the nature of the
18 reservoir would be in communication, result of the
19 high level of fracturing.

20 The third point that we had to make
21 was --

22 CHAIRMAN WELBORN: So the significance
23 of that in your mind is that you tap those sources?

24 A You tap more than one sand lense as a
25 result of the high level of fracturing that is

1 resulting. So you would be draining a larger area.
2 Despite the fact that the actual well bore might
3 penetrate individual sand lenses, you are still
4 draining other sand lenses that are not in direct
5 communication with the well bore.

6 Our third contention is that the
7 Wasatch is not a blanket sand. It is lenticular sand
8 that has been stacked on top of itself. This is
9 generally representative of the depositional
10 environment which has been widely cited as channel
11 sands. Channel sands are not known to be blanket
12 sands. They are known to be individual sand lenses
13 that stack up on one another. When you have
14 sand-to-sand correlation, then you have communication
15 between the sands; or when you have a high level of
16 fracturing, then you have communication between the
17 sands. Other than that, they would act as unique
18 reservoirs. Those are the only points of
19 clarification that we wanted to present.

20 CHAIRMAN WELBORN: What's the
21 significance of your last point with respect to
22 Wasatch?

23 THE WITNESS: Just for clarification,
24 it was strictly for clarification purposes.

25 CHAIRMAN WELBORN: But in terms of

1 DOE's application here today, what do I conclude from
2 that? 160-acre spacing was appropriate in the
3 Wasatch?

4 THE WITNESS: We're saying, based on
5 the evidence in the two papers, that one paper, if
6 you had sand-to-sand correlation or fracturing within
7 the Wasatch, then 160-acre spacing would be
8 appropriate. If it were blanket sand, we would say
9 that a greater spacing and greater drainage area
10 would be more appropriate because you would have a
11 greater amount of communication. Because you would
12 have one big huge sand as opposed to multiple smaller
13 ones; that you were relying on something else to
14 create the communication for you.

15 COMMISSIONER ANDERSON: If I
16 understand Barrett's position correctly, they are
17 saying that in the Wasatch, most of the area being
18 discussed today, they agree that 160-acre spacing is
19 appropriate. It's simply a matter of whether or not
20 the unique circumstances in the Allen Point are such
21 that 320 with an optional second well is appropriate. X
22 Do you, having heard this testimony on what may be
23 unique facts there, continue to believe that 160 --

24 THE WITNESS: We feel that 160 is
25 appropriate. Economically speaking, their economics

1 indicate that it wouldn't be, but I did personally
2 have a little problem with that. When you're paying
3 for a Mesaverde well -- IPs that have been reported
4 in Petroleum Energy by Barrett Energy, you have the
5 same IPs that were reported to the companies of
6 116-95, Allen Point is not drastically, but markedly
7 less than Mesaverde wells. They are saying that
8 Mesaverde wells are economic at 160-acre spacing. I
9 find the correlation between the two to be
10 inconsistent.

11 CHAIRMAN WELBORN: Mr. Knowlton. Do
12 you have questions?

13 MR. KNOWLTON: I have no questions.

14 CHAIRMAN WELBORN: Questions from our
15 staff? Further questions from the commissioners?
16 Thank you.

17 MS. EGGER: That's all the questions
18 we have for Mrs. Fivas. Call again Lieutenant Cowan.

19 CHAIRMAN WELBORN: Yes, please.

20 EXAMINATION

21 BY MS. EGGER:

22 Q Lieutenant Cowan, you have heard the
23 testimony of Barrett Resource?

24 A Yes.

25 Q Do you have any points you would wish

1 to add or challenge in any way?

2 A Yes, I do. I would like to stand over
3 here because I want to point out a couple of things.
4 First of all, I want to point out I have absolutely
5 no problems with the method used by Mr. Heinle --
6 it's based on sound engineering principles -- he used
7 to calculate his drainage radius. I wanted to point
8 out a couple of factors that I think may alter those
9 numbers or at least affect results that he obtained
10 with the method he used. And the first issue is the
11 issue of recovery factors.

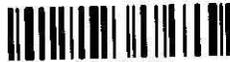
12 I really feel that 70 percent is a
13 very high recovery factor for this type of tight gas
14 sand with the lenticular nature of the Mesaverde
15 formation. What I am going to use to back that up,
16 again, is a paper that I referred to that is SPE
17 19108. That's the production strategies for the
18 tight gas sands in the -- one of the wells, the MWX
19 wells. But I guess what I want to point out is that
20 his comment about 70 percent recovery factor is going
21 to get him his 1.4 BCF. Okay. I understand that
22 point.

23 What I don't necessarily concur with
24 is, if you assume the recovery factor is what he
25 said, 10 percent, that's going to mean that you are

1 going to have to drain a larger radius to get that
2 1.4 BCF. I concur with that. But what I disagree
3 with is that -- well, let me get back to the point
4 that 90 percent of that gas is not being recovered.
5 And that I agree with. What I disagree with, if you
6 were to infill to may be 160- or even 80-acre
7 spacing, that you would significantly change that
8 recovery factor to something like 70 percent.

9 I want to just give you some
10 examples. At 320 acres -- in those numbers that I
11 gave you, the 2.5 BCF recovery, on 320 acres, the
12 recovery factor was 20.9 percent. Run with a
13 simulator, that was a specific tight gas simulation.
14 The raw properties were again obtained from the MWX
15 wells. When that was infilled to 160 acres, the
16 recovery factor increased to 22.8 percent. When it
17 was infilled to 80 acres, recovery factor went to
18 23.7 percent.

19 What I would like to suggest is, I
20 don't think you see the significant difference. You
21 don't see a jump in that 10 to 70 percent in your
22 recovery factor. I think your recovery factor, while
23 it is a function of your spacing, I suggest that it's
24 much more a function of the type of rock and
25 reservoir you are dealing with. I think the



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1 simulation shows that so I think that we're probably
2 talking about recovery factors that are much smaller
3 than 70 percent, would indicate that the drainage
4 radius is more than what we have seen here.

5 Second issue that I would like to
6 cover was the issue of linear flow. And this
7 gentleman over here brought up the issue of linear
8 flow. And one thing I didn't mention in my decline
9 curve analysis, when I used the one over square root
10 of time, I didn't want to get into the detail of how
11 they got this, it was based on the fact that these
12 gentlemen concluded that linear flow played a much
13 more prevalent role in production in the Piceance
14 Basin specifically than you would normally expect in
15 the tight gas sand.

16 And in fact, the one over square root
17 of time decline curve that I used is basically a
18 result of an extended period of linear flow, which
19 basically flow from fractures rather than through the
20 matrix. In fact, I made a couple of statements that
21 it could be as much as ten years or longer. These
22 wells in these tight gas sands in the Piceance
23 Basin.

24 Which brings me to the point that
25 there -- one of their conclusions is that exponential

1 or hyperbolic-type decline curves used on these type
2 of wells is going to give you very conservative
3 estimate on what the reserves for that well are.
4 They showed a couple of experiments, examples. I
5 guess my point here is, it's possible, obviously -- I
6 haven't run any numbers -- that if the reserves are
7 higher than what have been obtained in these -- in
8 this analysis that was done by Mr. Heinle, it's
9 possible that drainage radius could also be a little
10 bit higher. I am just throwing that out. I am not
11 making that statement. It's just possible.

12 Finally, I would like to point out
13 some evidence that we have had and I don't have the
14 exact information with me. I didn't realize that I
15 would need it. But the Department of Energy has
16 drilled two Mesaverde wells in 1985 and 1986 within a
17 year. One of them is referred to as 1XM9 located
18 right here within the Department of Energy property.
19 Another one, I mean this is 1MX19 and this is IMX9,
20 both Department of Energy wells.

21 CHAIRMAN WELBORN: You are referring
22 to Exhibit 10, is that --

23 MS. EGGER: Exhibit 10.

24 CHAIRMAN WELBORN: Barrett's Exhibit
25 10.

1 THE WITNESS: Right.

2 CHAIRMAN WELBORN: The wells you are
3 referring to are located in 6 South, 94 West?

4 A Both of them, are yes. And the first
5 on is Section 19, second one is in Section 9. I just
6 want to point out that we have evidence that there
7 was already drainage at the time that we drilled
8 those wells. There was a 500-pound difference --
9 bottom hole pressure difference in those two wells
10 when we first drilled them, approximately 500-pound
11 difference. Two wells were essentially completed in
12 the same area, essentially the same depth.

13 CHAIRMAN WELBORN: They were completed
14 in what formation?

15 A What we call the upper Mesaverde
16 formation. That just gives us evidence that somehow
17 that this well 1MX19 would already have resource
18 drawn from underneath that area before we ever
19 drilled, from some of the wells that are in the area.

20 And that was my final statement is, I
21 wanted to point out, we do have evidence that
22 drainage has been occurring there already, and was
23 occurring in 1985, much less, five years later, which
24 I am sure and I feel strongly is much more
25 significant now. That's all I have.

1 CHAIRMAN WELBORN: All right. Thank
2 you.

3 MS. EGGER: Those are all of the
4 questions I have.

5 CHAIRMAN WELBORN: All right. Mr.
6 Knowlton, any questions of this witness?

7 MR. KNOWLTON: No.

8 CHAIRMAN WELBORN: Questions from our
9 staff? Questions from the commissioners? All right.
10 Any further evidence from the --

11 MS. EGGER: That concludes our
12 presentation. Thank you very much.

13 CHAIRMAN WELBORN: All right. Thank
14 you. Any further evidence from your side, Mr.
15 Knowlton?

16 MR. KNOWLTON: No further evidence.

17 CHAIRMAN WELBORN: I understand. Does
18 our staff have anything it wishes to present in the
19 form of position or testimony on this matter. You
20 are going to let us sit up here and twist in the
21 wind.

22 MR. KNOWLTON: Can we make --

23 CHAIRMAN WELBORN: Make closing
24 statements. I want to make sure we have no position
25 on this. Care to take or make a recommendation?

1 Now's the time to do so. You can be cross-examined
2 by counsel.

3 MR. SMINK: I think both sides have a
4 good argument.

5 MR. BICKNELL: We spent considerable
6 time talking to both sides trying to reconcile but
7 were unsuccessful.

8 CHAIRMAN WELBORN: Let's proceed with
9 our closing statements. Ms. Egger.

10 MS. EGGER: I will be very brief. I
11 think the presentation of our case is pretty
12 straightforward. Our spacing request is limited to
13 the resources in our boundaries. We don't try to
14 affect and don't want to affect commercial drilling
15 in the area, with the exception of what is affecting
16 us. We're basically asking the commission to extend
17 the existing spacing in that area for the Wasatch and
18 the Mesaverde.

19 With respect to the Wasatch formation,
20 as I understand Barrett's position as presented
21 today, we understand that they are in agreement with
22 us with respect to the southern portion of our
23 boundaries. So I guess there is no dispute with
24 respect to Wasatch, in those areas. We would be
25 inclined to agree with Barrett's recommendation or

1 request for 320 Wasatch spacing in the northern
2 section or in the Allen Point area they're referring
3 to, provided there is stipulations we can have
4 approval of DOE with respect to well locations that
5 again would be affecting our interests and our
6 budgetary resources. We have talked a little bit
7 about that.

8 CHAIRMAN WELBORN: What do you mean?
9 Can you elaborate on that briefly?

10 MS. EGGER: As I understand it,
11 Barrett is asking for 320 spacing in Wasatch and in
12 the Allen Point area. We too don't have any interest
13 in seeing unnecessary wells drained, provided that we
14 can be involved in and conferred with in the space --
15 in the actual location of those wells, so that
16 depending on how those units are situated, whether in
17 the north-south direction or in east-west direction,
18 we can insure that our interests are looked after.

19 CHAIRMAN WELBORN: What would happen
20 in the event of a dispute between the two of you?
21 What standard would operate to control?

22 MS. EGGER: We would like to see that
23 it be required that we consent to it.

24 CHAIRMAN WELBORN: I see. One well
25 per 320, but location to be subject to the consent of

1 you within the 320.

2 MS. EGGER: In those areas that are on
3 our borders obviously.

4 CHAIRMAN WELBORN: In the area that --
5 as to which you are requesting spacing, you are not
6 seeking to go beyond that?

7 COMMISSIONER McCORD: Is there any
8 problem defining Allen Point?

9 MR. KNOWLTON: No. If we could, the
10 orange area outlined in our Exhibit 1 is what we call
11 Allen Point and it definitely conforms to the
12 topography there, but it's just so dramatic.

13 CHAIRMAN WELBORN: You are going
14 beyond the DOE spacing area in your request for 320
15 spacing for that portion of the Wasatch because --

16 MR. KNOWLTON: I don't think we can
17 because I don't think we have notices out on it. I
18 don't think we can really do that.

19 CHAIRMAN WELBORN: That's one question
20 I was going to have when this was all over.

21 MR. KNOWLTON: We will have to do that
22 later when we come later to really space areas.

23 CHAIRMAN WELBORN: In other words,
24 your application, to the extent you are applying for
25 spacing, is only within the area for which the DOE

1 has applied for spacing?

2 MR. KNOWLTON: Yes.

3 CHAIRMAN WELBORN: Any further --

4 MS. EGGER: With respect to the
5 Mesaverde formation, I just guess we're at odds. I
6 think the point of you, sir, that the less drill --
7 wells drilled early on you can always correct later
8 mistakes. But if more wells are allowed to be
9 drilled now that's difficult to correct in the
10 future.

11 With that we truly appreciate the
12 commission's attention and accomodation of our
13 presentation today and thank you.

14 CHAIRMAN WELBORN: Great. Thank you
15 very much.

16 MR. KNOWLTON: My comments would be
17 directed only towards the Mesaverde application and
18 our protest there. What I am worried about is, if
19 the feeling, because of the difficulty of this
20 decision, it might be better to go ahead and space
21 the Mesaverde on 320s and as we continue to learn
22 things we will come in and maybe you will entertain
23 our motion or our application to space on 160.

24 What bothers me about that thinking,
25 if that would be there, is that it never gives us

1 really the opportunity to find out if it's better to
2 drill on 160s. We're drilling a few locations now on
3 160. We're encouraged, we are very encouraged. Sure
4 we have some stake location on 160s, because, rather
5 than have that, because rather than have that idea
6 prevail, have you space on 320, expect us to come
7 back later, we would rather have you not space at
8 all. Let us drill and see what we find. And, of
9 course, we're spending the \$750,000 on these dual
10 completed Mesaverde wells. And I am sure the
11 commission would know that an operator the size of
12 Barrett is not going to be drilling unnecessary
13 wells.

14 I think we have to look for just a
15 minute as to where we're coming from and where the
16 Department of Energy is coming from. By their own
17 admission they are here because of, frankly, because
18 they are being encroached upon somewhat and they are
19 -- they have a scarcity of funds. I regret that, but
20 that's not our problem. The reason we're here is
21 because we want to get orderly spacing and what we
22 think is right for the area, not just as to the DOE
23 and for Barrett, but for anybody. And we have some
24 37 set wells that we have drilled in the Mesaverde
25 alone. And our testimony is based not so much as on

1 other people's studies, ours is based upon our
2 experience. And we think the basic credibility of
3 testimony coming from people who have experienced
4 this and who have the knowledge is a good deal better
5 than testimony based upon other people's studies. So
6 we would ask that if you are going to space the
7 Mesaverde at all in the area requested by DOE, that
8 you space it on 160s. Thank you.

9 CHAIRMAN WELBORN: All right. Nothing
10 further? That concludes the record. We need
11 deliberations. I can't really tell if there's any
12 disagreement on Wasatch.

13 COMMISSIONER McCORD: This would be to
14 space 160 on Wasatch with the exception of Allen
15 Point as designated by -- is it Barrett Exhibit 1?

16 COMMISSIONER ANDERSON: I don't know
17 that we can have an order that gives the DOE the
18 veto.

19 CHAIRMAN WELBORN: We can do whatever
20 we want. That's the question. We've entered orders
21 in the past giving operators the right to locate
22 wells or decide where an additional well is going to
23 be drilled. Doesn't sounds like there is tremendous
24 objection to that, if that's a control, it's going to
25 work, we can try it. Undoubtedly, if there's a

1 dispute, everybody will be back in here anyway.

2 I just want to make sure I understand
3 the -- I was looking -- you have to look at Exhibit
4 2, DOE Exhibit 2 and Exhibit 4, and then I guess you
5 have to look at that Exhibit 1 of Barrett. Maybe I
6 could even look at that Exhibit 4 of Barrett's.
7 Allen Point is, as I understand it, is just the part
8 that lies to the north there, the part that's labeled
9 Allen Point Prospect in this Exhibit 4. Could you
10 take it down so we could see Exhibit 1? Yes. That
11 helps. I guess pretty much all of that that's in
12 that orange boundary is in the DOE spacing request,
13 if you look at Exhibit 4 of DOE.

14 MR. KNOWLTON: All of the shaded area
15 is the requested spacing.

16 CHAIRMAN WELBORN: Yes, but so, that
17 lies within the orange boundary as I see. Okay.

18 MR. KNOWLTON: What we call, is what
19 we call Allen Point.

20 CHAIRMAN WELBORN: Well, I am not
21 adverse to doing it that way, if everybody is okay
22 with it, seeing how it works. Is there a motion on
23 the Wasatch?

24 COMMISSIONER McCORD: I would move
25 that the Wasatch be spaced at 160, according to the

1 application of DOE, except for that portion of the
2 that lies within the orange boundary on Barrett
3 Exhibit 1; also with the understanding that was
4 proposed before; that DOE approval will be sought for
5 any wells drilled what, in the --

6 CHAIRMAN WELBORN: In the orange
7 boundary you are saying that would be 320?

8 COMMISSIONER McCORD: That's right; in
9 the orange boundary.

10 CHAIRMAN WELBORN: That DOE approval
11 would be a condition of well location.

12 COMMISSIONER McCORD: Right.

13 CHAIRMAN WELBORN: If there was a
14 dispute, the parties would be back in here anyway. I
15 think that goes without saying. Does that sound
16 workable to you, Dennis?

17 MR. KNOWLTON: I didn't hear the
18 language with the option. I realize it's going to be
19 -- you're saying subject to DOE. But we have an
20 option to infill on the Allen's Point.

21 COMMISSIONER McCORD: I thought that's
22 what the parties talked about.

23 MR. KNOWLTON: I want to be sure
24 that's a matter of record.

25 COMMISSIONER McCORD: So moved.

1 MR. KNOWLTON: It's 320 with an option
2 to infill and --

3 COMMISSIONER McCORD: Subject to DOE
4 consultation and approval.

5 CHAIRMAN WELBORN: Approval of well
6 location.

7 MR. KNOWLTON: Subject to approval of
8 DOE on wells that involve DOE.

9 CHAIRMAN WELBORN: Yes, that are
10 within, well, I don't know what the word "involved"
11 means. I had understood it to be that lie within the
12 area that DOE seeks to have spaced.

13 Ms. Egger, can you help us with the
14 definition of those claims as to which the DOE would
15 want to have some say in well location.

16 MR. KNOWLTON: Mr. Chairman, any
17 section in which they have land, how about that
18 definition? Any section in which they have lands we
19 will seek their approval.

20 CHAIRMAN WELBORN: So with respect to
21 the so-called Allen Point area, that Allen Point area
22 is the area outlined in orange on Barrett's Exhibit
23 1; that's capable of accurate legal description for
24 our order.

25 MR. KNOWLTON: Yes.

1 CHAIRMAN WELBORN: Within that area,
2 in any section in which the DOE owns an interest in
3 mineral estate, well location would be subject to DOE
4 prior consent. The spacing in that area would be
5 320-acre spacing as is according to the motion as
6 we're making it. It hasn't been seconded yet. I
7 want to ask about the motion, as we're making it,
8 would be 320-acre spacing with an optional infill
9 well at the option of the operator. Is that what you
10 are suggesting?

11 MR. KNOWLTON: That's what we're
12 suggesting.

13 CHAIRMAN WELBORN: How does that sit
14 with DOE?

15 MS. EGGER: We have a fair amount of
16 problems with total discretion with the operator
17 unless there is consent of 50 percent of the working
18 interest owners on continuous or adjoining lands.

19 CHAIRMAN WELBORN: Well, but you were
20 seeking 160-acre spacing in there anyway. What we're
21 saying, that we're allowing the additional well, but
22 at the option of the operator.

23 COMMISSIONER McCORD: Mr. Chairman, if
24 there's not agreement, I am inclined to frame my
25 motion --

1 CHAIRMAN WELBORN: I thought that.

2 COMMISSIONER McCORD: I am inclined to
3 frame my motion such that the Allen Point area be
4 spaced at 320. Let the parties come back to us for
5 application for approval for the pursuit of it if
6 there's consensus. I am willing to go along with it
7 if there's not.

8 CHAIRMAN WELBORN: It's your motion.

9 COMMISSIONER McCORD: Proposed to --

10 CHAIRMAN WELBORN: I have a problem
11 with these optional wells at the discretion of
12 operator because we have had so much trouble with it
13 in Cause No. 407, also in the DJ basin. It's just I
14 am very concerned about whether that is an improper
15 delegation of the commission authority to space, and
16 worried that legally it's subject to challenge. I've
17 worried about that in the past; that was going to be
18 my response to it. I don't like Order No. 407, the
19 way the 407-18, the way it was originally worded, so
20 I have a problem with it. Makes it look like you are
21 telling somebody else to go space.

22 COMMISSIONER McCORD: I will frame my
23 motion with the term 160/320 split between Allen
24 Point and --

25 CHAIRMAN WELBORN: Frame your motion.

1 COMMISSIONER McCORD: I think I did.

2 CHAIRMAN WELBORN: Within the Allen
3 Point area the 320-spacing well location will be
4 subject to prior consent of DOE, with respect to
5 sections where DOE owns an interest.

6 COMMISSIONER McCORD: Yes.

7 CHAIRMAN WELBORN: Outside of that,
8 Wasatch, with respect to the area to be spaced, is
9 160s.

10 COMMISSIONER VANDERWERF: Second.

11 CHAIRMAN WELBORN: Any further
12 discussion. Dennis, do you understand the motion and
13 the second?

14 MR. BICKNELL: Yes, sir.

15 CHAIRMAN WELBORN: Are we ready to
16 vote on this puppy?

17 (Whereupon the vote was called.)

18 CHAIRMAN WELBORN: Motion carries
19 unanimously.

20 COMMISSIONER McCORD: That was the
21 easy part.

22 CHAIRMAN WELBORN: Yes, it was. Now
23 we need to confer with respect to the Mesaverde. And
24 I agree with our staff that both parties have made
25 excellent presentations. As a matter of fact, I just

1 might say, we have had good presentation in the past,
2 but this was outstanding. It was well done and I
3 appreciate it. Ran smoothly and as quickly as could
4 be expected under the circumstances, everything came
5 in very clearly.

6 What's the -- what are your thoughts?
7 Anybody bold enough to state an initial thought out
8 loud on the record for the world to see?

9 COMMISSIONER JOHNSON: May I ask a
10 question of one of the parties?

11 CHAIRMAN WELBORN: I hate to have you
12 do it, because you may, I am afraid, we're just going
13 to open back up.

14 COMMISSIONER JOHNSON: I would like to
15 ask Barrett Resource in the next months, how many
16 wells they might drill, in effect, near or against
17 DOE.

18 MR. BARRETT: In the six to ten range,
19 probably nearer six than ten.

20 CHAIRMAN WELBORN: Do you want to ask
21 any questions about -- you are welcome to.

22 MS. EGGER: Is that consistent with
23 drilling plans that you propose? I was under the
24 impression that there were 21 proposed wells along
25 our borders.

1 CHAIRMAN WELBORN: Wait until she is
2 through.

3 MS. EGGER: According to the
4 information that I have, there were going to be about
5 21 proposed wells on our borders.

6 MR. BARRETT: These are Mesaverde
7 wells. We're out of the Wasatch area.

8 MS. EGGER: You are just referring to
9 Mesaverde. I am sorry.

10 CHAIRMAN WELBORN: Does that answer
11 your question? Does that help you make a decision?

12 COMMISSIONER JOHNSON: It helps.

13 COMMISSIONER McCORD: I think this is
14 living proof that reasonable people can differ.
15 There are two thoughts that I have. One is the
16 concept which we all know, that if you make a mistake
17 in error on two large of spacing, you can always
18 infill. And I think everybody here probably
19 understands that concept.

20 The other thing I look at is the DOE
21 Exhibit 3, where we're looking at the area around,
22 and should we decide on 160, we would literally have
23 spacing at 640 which is outlined in this checkered
24 area abutting 160s. So to me, I think we have got to
25 focus on what we have done in the past, try and have

1 some consistency. For those reasons, I am leaning
2 toward 320. I am certainly open for hearing what
3 anyone else has to say.

4 COMMISSIONER VANDERWERF: I would
5 second what the chairman said. I think both sides
6 made excellent presentations today. I agree with Mr.
7 McCord; that normally we think it's better to space
8 on a wider pattern, then go to infill well later, if
9 we think that's justified. But I am, I think I am
10 leaning towards the case presented by Barrett, based
11 on the engineering testimony, the recovery factors
12 versus the drainage area, the economics, that there
13 is a compelling case here for 160-acre spacing. If
14 you space on a wider pattern we're going to leave
15 resources in the ground.

16 COMMISSIONER ANDERSON: Maybe this is
17 a good argument for not having such well-presented
18 cases on both sides. It's a struggle. It's
19 ordinarily the case, I think the commission
20 typically, when in doubt, picks the bigger number.
21 We tend to space on the larger side, on the correct
22 view that error on the larger side is more easily
23 corrected. So I think that ordinarily going into
24 this with the presumption that there is a want to
25 space on Mesaverde on 320s, my -- and I think we

1 could argue that even 320s aren't ultimately proper
2 spacing; that with not that much experience, within
3 the next six months or year, perhaps with more
4 grooming and further review, it might well choose
5 smaller, smaller spacing for further drilling.

6 The problem with -- for me on that
7 general approach, based on the testimony I heard
8 today, I think that 160 is proper spacing.
9 Conservation, there is no damage in waiting. If you
10 are going to err you will have to err on the side of
11 spacing on the larger area, then review later. I
12 think that based on the testimony I heard today, that
13 160 is the appropriate spacing. It's even on the DOE
14 economics for example, using what I think are
15 realistic pricing assumptions, spacing on 160 --
16 rates of return assumptions, spacing on 160 would be
17 more economical. I am inclined to support a spacing
18 on Mesaverde on 160 acres.

19 CHAIRMAN WELBORN: You're saying that
20 you think that the 10 percent rate of return is not
21 realistic; that if you use a little higher rate of
22 return it's going to make the larger spacing
23 uneconomic.

24 COMMISSONER ANDERSON: If you use a
25 rate of return that's realistic, I think 15 to 20

1 percent, and assuming that, as you can, that the
2 price is in the \$1.50 range, making those
3 adjustments, even on the DOE exhibit, although that
4 wasn't done, it appeared to me that if that were
5 done, the 160 spacing would be yield a net higher
6 present value curve.

7 CHAIRMAN WELBORN: Wasn't convinced of
8 that. I think a big part of Barrett's case,
9 significant part of it, anyway, with respect to the
10 160-acre spacing, so-called Rulison area, was based
11 on their position that -- about the sands, the
12 depositing, the geologic characteristics. I just
13 wasn't convinced of it. I am reluctant to, I guess,
14 maybe I will. I am of the school if you err, I would
15 rather err on the side I can undo than on the side I
16 can't undo, especially with respect to that area.

17 To me the case was not made for
18 160-acre spacing. The threshold case was made for
19 320-acre spacing, the kind of case based on which we
20 spaced areas in the past. And knowing that, yes, we
21 may well go further in terms of density someday, but,
22 geez, on a lot let less evidence than this, we spaced
23 Craig Field at 640-acre spacing in January, again, on
24 this philosophy which generally works pretty well.
25 It's hard to undo what you have done.

1 I am sympathetic to the need for
2 figuring out what 160 really will do. We always have
3 the exception well location option. We always have
4 infill drilling options. So I've fallen off a little
5 bit on the other side of the horse. Especially,
6 maybe only with respect to that Rulison. But it
7 would seem a large part of their case was built on
8 geologic characteristics that I was more convinced
9 where the DOE were concerned, at least in that area.
10 Rogers.

11 COMMISSIONER JOHNSON: To me it's a
12 situation where we're being asked to space somewhat
13 prematurely. That may also be the case, but quite a
14 little of the DOE presentation is based upon, really,
15 research reports. And I would like to ask Barrett
16 Resources of those six to ten wells that would be in
17 or against DOE, what number of those wells might be
18 spaced at 160 acres versus 320?

19 MR. BARRETT: I guess I can answer
20 that. The majority of those wells up against DOE
21 will be 320-acre or 160s with a skip 160 because that
22 is not spaced Mesaverdewise, really is no spacing
23 existing in there at this point. But we have offered
24 to, for a period of six months, or whatever, until we
25 come in with a spacing for the remainder of the area,

1 which we plan on doing in six to nine months,
2 probably, to not have to drill more than one well per
3 320-acre contiguous unit in there.

4 CHAIRMAN WELBORN: Do you have any
5 questions to ask, Ms. Egger?

6 MS. EGGER: I didn't understand his
7 response with respect to what spacing they intend.

8 CHAIRMAN WELBORN: I think the
9 majority would be spaced -- the majority of six to
10 ten wells drilled in the Mesaverde formation would be
11 spaced, absent some control or rule to the contrary,
12 on 160-acre pattern; is that correct?

13 MR. KNOWLTON: No.

14 CHAIRMAN WELBORN: I didn't understand
15 it either.

16 MR. BARRETT: What I said is, we had
17 planned on drilling along the border, not more than
18 one well per contiguous 320 for the period between
19 that and when we come back in to space the remaining
20 area out there, which is considerable area, just to
21 protect, give that protection that they wouldn't have
22 contiguous 160s prior to our coming in for the whole
23 area.

24 COMMISSIONER JOHNSON: That's a piece
25 to the puzzle to include in my line of thinking.

1 Then, in my opinion, we should space 320s for six
2 months, then six to nine months reconsider. All of
3 the more reason. It's not really penalizing the
4 operator. We're playing safe, which I think is our
5 natural role, with more information in six to nine
6 months, then we can downspace it.

7 CHAIRMAN WELBORN: All right. Which
8 one of us feels strongly enough about our respective
9 positions to make a motion? Dennis.

10 MR. BICKNELL: May I just get clear on
11 what you have done so far?

12 CHAIRMAN WELBORN: We have done
13 nothing for Mesaverde.

14 MR. BICKNELL: I understand the
15 application has three components. They are asking to
16 modify Order 139-8, 139-11 and 440 and a new area
17 it's my understanding that the entire area noticed is
18 now, by your motion, on 160 acres except the Allen
19 Point.

20 CHAIRMAN WELBORN: For the Wasatch.

21 MR. BICKNELL: For the Wasatch only.
22 Am I correct?

23 CHAIRMAN WELBORN: And Allen Point
24 area is 320.

25 MR. BICKNELL: 320 with one well.

1 CHAIRMAN WELBORN: Doesn't appear to
2 me now to be the subject of any order, the Allen
3 Point area.

4 MR. BICKNELL: That's correct. But
5 so, I wonder if it is any help to consider these
6 requests in the application as part by part.

7 CHAIRMAN WELBORN: That's not a bad
8 idea. I think that's what Commissioner McCord was
9 trying to get us to start doing, was looking at where
10 we were.

11 COMMISSIONER McCORD: Can I state, I
12 am looking at DOE Exhibit No. 4. I am asking, is
13 that the land we are considering spacing for both
14 formations today? Am I correct?

15 MS. EGGER: That's our spacing
16 request.

17 COMMISSIONER McCORD: That's the land
18 we're thinking about. We've already talked about
19 what we're going to do with one formation. Now we're
20 on Mesaverde.

21 MR. BICKNELL: That's correct. Some
22 of it is already spaced.

23 COMMISSIONER McCORD: I understand
24 we'll be modifying those orders that are sitting on
25 DOE Exhibit 3, that just happen to fall within that

1 land that's on DOE Exhibit 4.

2 CHAIRMAN WELBORN: We would be
3 starting spacing for -- commencing spacing in some
4 areas, modifying spacing in others.

5 MR. BICKNELL: If you choose to do
6 that.

7 COMMISSIONER McCORD: That's true. I
8 am correct in saying that the land we're talking
9 about is in Exhibit 4, some of it happens to be new
10 spacing, some of it happens to be prior order on DOE
11 Exhibit 3.

12 CHAIRMAN WELBORN: When the -- if you
13 look at Exhibit 3, Dennis, the cross-hatched lands,
14 under either party's application, some of those would
15 be changed to 320. They are now 640, as I
16 understand, the criss cross.

17 COMMISSIONER McCORD: We would be
18 amending Order 139-3.

19 CHAIRMAN WELBORN: 139-3.

20 COMMISSIONER McCORD: Also Order
21 139-8.

22 CHAIRMAN WELBORN: Next thing we would
23 be doing is amending, if we went with the DOE, would
24 be, would not be changing Order 139-8. We would be
25 extending one of those orders, either 139-3 as

1 modified or 139-8 without modification into Sections
2 36 and 30 and 34 and 35 and 32 of Township 6 South,
3 Range -- that must be 95 West. And the order would
4 have to be carefully drawn because there are lands
5 that lie up against NOSR 3 that aren't spaced at all.
6 Is that correct, what I have just said?

7 MR. BICKNELL: I think you are
8 correct. Order 139-8, essentially what perhaps you
9 are being asked to do is just space some additional
10 sections.

11 CHAIRMAN WELBORN: We're just being
12 asked, as Ms. Egger said, we're being asked to extend
13 that and we would be asked -- she's asking us -- her
14 client is asking us to modify Order 139-3 in part.

15 MS. EGGER: Exactly. Yes, sir.

16 CHAIRMAN WELBORN: Okay. Then we're
17 -- I don't know which one it is we would be
18 extending. We're also being asked to space unspaced
19 areas in the NOSR as well and to the north up in the
20 Allen Point area and in the Grand Valley area. Both
21 parties are asking us to do that. One on 160 and
22 other on 320. All right. Back to the question.
23 Anyone feel strongly enough about his or her position
24 to make a motion?

25 COMMISSIONER VANDERWERF: Well, I will

1 make a motion. Looking at DOE Exhibit 4, the shaded
2 area to be spaced, specifically the Mesaverde
3 formation, I move that the DOE application be denied
4 and that this area be spaced on 160-acre spacing for
5 the Mesaverde.

6 CHAIRMAN WELBORN: Is there a second
7 to that motion?

8 COMMISSIONER ANDERSON: Second.

9 CHAIRMAN WELBORN: All right. Is
10 there any further discussion of that motion? Further
11 discussion? Ready to call the question.

12 (Whereupon the vote was called.)

13 CHAIRMAN WELBORN: Motion fails.
14 Anybody else feel strongly enough about this to make
15 a motion?

16 COMMISSIONER McCORD: I move that the
17 DOE application to space at 320 be approved
18 incorporating the discussion we had on the land and
19 modification of the orders. I think everybody -- is
20 everybody clear on that?

21 CHAIRMAN WELBORN: Yes.

22 COMMISSIONER McCORD: You want to go
23 through recitation of what orders will be amended
24 again? Dennis, do you understand?

25 MR. BICKNELL: I understand what you

1 said.

2 CHAIRMAN WELBORN: Same orders either
3 way. Just a question of what number you plug in in
4 terms of spacing.

5 MR. BICKNELL: What I was getting at
6 is whether you want to do them all en masse or
7 whether you prefer to look at them --

8 COMMISSIONER McCORD: I think we can
9 do it in one.

10 CHAIRMAN WELBORN: Up to movant.

11 COMMISSIONER McCORD: Tell me
12 mechanically, if you would rather have two orders, we
13 could move to modify Order No. 139-3.

14 CHAIRMAN WELBORN: It might represent
15 the rest of commission if we took -- why don't you
16 try -- start with that motion with respect to 139-3.

17 COMMISSIONER McCORD: I move that.

18 MR. BICKNELL: I would request you
19 modify 139-8.

20 COMMISSIONER McCORD: 139-8.

21 MR. BICKNELL: The notice is very
22 carefully written. I don't think there is a 139-3.

23 COMMISSIONER McCORD: If I am covering
24 139-8, it is spaced on 320, my motion is going to be
25 to space at 320.

1 CHAIRMAN WELBORN: With respect to
2 that, would you propose to extend that anywhere?

3 COMMISSIONER McCORD: I move to extend
4 that to cover those portions of that land covered in
5 DOE Exhibit 4.

6 CHAIRMAN WELBORN: Then that,
7 presumably, to the extent of applicability with
8 139-8, you would -- your motion would include a
9 motion to modify that appropriately.

10 COMMISSIONER McCORD: That's correct.

11 CHAIRMAN WELBORN: Does that take care
12 of it for you, Dennis?

13 MR. BICKNELL: (Nodded in the
14 affirmative.)

15 CHAIRMAN WELBORN: Is there an -- is
16 that your motion?

17 COMMISSIONER McCORD: Yes.

18 CHAIRMAN WELBORN: Does everybody
19 understand the motion? Anybody who doesn't
20 understand the motion? Is there a second to the
21 motion?

22 COMMISSIONER JOHNSON: I second it.

23 CHAIRMAN WELBORN: Is there further
24 discussion about the motion? Anybody feel strong
25 enough to call the question?

1 COMMISSIONER JOHNSON: Question.

2 (Whereupon the vote was called.)

3 CHAIRMAN WELBORN: All right. I am
4 going to vote in favor of the motion, which would
5 split the tie. And that means that DOE's request is
6 granted.

7 MR. BICKNELL: You understand that.

8 CHAIRMAN WELBORN: I understand that.
9 My hesitation, I was hoping somebody would come up
10 with a compromise.

11 MR. BICKNELL: Does the chair want to
12 now look at Order 440-1 and unspaced area.

13 CHAIRMAN WELBORN: Well, he's already
14 done that in his motion, by moving to amend order
15 139-8. You are saying he can't do that into Cause
16 No. 440?

17 MR. BICKNELL: I don't think so.

18 CHAIRMAN WELBORN: You are probably
19 right. Where does Cause 440 stop on this map,
20 looking at DOE spacing request Exhibit 4.

21 MR. BICKNELL: Six south, 95. They
22 again, 440 is established all in Wasatch. Do I
23 understand the motion now to say that Mesaverde,
24 inherent in the area of 440 on 320s.

25 CHAIRMAN WELBORN: Is 440 defined

1 geographically or by formation?

2 MR. BICKNELL: Both. It's for
3 Wasatch.

4 CHAIRMAN WELBORN: Within a certain
5 geographic area.

6 MR. BICKNELL: Within a certain
7 geographic area.

8 CHAIRMAN WELBORN: We have taken care
9 of the Wasatch in either cause, I don't know what
10 cause. The Wasatch is in with our first motion. It
11 was the intent of the movant in this motion to impose
12 320-acre spacing on lands shaded in DOE Exhibit 4.

13 COMMISSIONER McCORD: Mechanically you
14 tell me how to do that.

15 CHAIRMAN WELBORN: He's making that
16 motion. If it takes making it in both causes, I
17 think he's willing to do that. Is that correct?

18 COMMISSIONER McCORD: That's correct,
19 exactly right. If anything else is required let me
20 know.

21 CHAIRMAN WELBORN: Are we clear? Are
22 you clear on how to write the order? Are you sure?
23 Now's the time with everybody here, I just hate when
24 you call me the next day with something we haven't
25 thought of.

1 MR. BICKNELL: I understand.

2 CHAIRMAN WELBORN: The only lands that
3 are spaced are the lands shaded in Exhibit 4.

4 MR. BICKNELL: On Exhibit 4?

5 CHAIRMAN WELBORN: Yes. DOE Exhibit
6 4, those are the only lands we spaced today either by
7 amendment, by change, or by extension. All right.
8 We're through with that cause. Thank you very much.

9 (Recess.)

10 CHAIRMAN WELBORN: All right. With
11 respect to, while I have you in the room, our orders
12 are effective upon service. However, we have a
13 policy of asking the parties if they agree to be
14 bound by the oral order so the order will be
15 effective today but they don't have to agree with it.

16 MR. KNOWLTON: I agree. What I don't
17 know, the question was asked what if we're already
18 permitted. We may be on some unspaced locations.

19 CHAIRMAN WELBORN: I was hoping Dennis
20 would tell us that. Everybody hold on in Cause No.
21 139 and 440. Are there permits in effect that were
22 in violation of this spacing order on their face?

23 MR. BICKNELL: Undoubtedly. Well, I
24 would assume we would have to grandfather them in.
25 We would have to write them into the order, if that's

1 what you want.

2 CHAIRMAN WELBORN: They would have to
3 be written in as exceptions unless the DOE -- how
4 many of them are there?

5 MR. BARRETT: Just got to look. I
6 don't know.

7 CHAIRMAN WELBORN: Can we tell that?
8 This is the kind of thing that hits me the next day.
9 I just don't want to hear it.

10 MR. KNOWLTON: I would withdraw my
11 agreement to make it effective today because of this
12 situation.

13 CHAIRMAN WELBORN: Well, let's just
14 all remain calm. Is there some way we can, in this
15 room, find out, Dennis, how many permits we're
16 talking about?

17 (Discussion off the record.)

18 MR. BICKNELL: I don't think there's
19 any way we can determine that here in a very quick
20 time frame. You have got people out there drilling.
21 I would think we would have to look at the individual
22 well permits issued. What parcel they have -- put to
23 each well. And then just address them one -- may
24 just have to write them into the order.

25 MR. KNOWLTON: We're not sure we have

1 any. We don't even know.

2 CHAIRMAN WELBORN: You don't know.

3 MR. KNOWLTON: We don't know that we
4 have any --

5 MR. BICKNELL: I can't find it.

6 MR. KNOWLTON: -- in this area.

7 CHAIRMAN WELBORN: The order stands.
8 We have not made a provision for it. We have your
9 agreement which means that the order will be
10 effective upon service. I can't require you to do
11 anything differently. I understand. These causes
12 are always open. DOE needs to understand that as
13 well. If there's some injustice that's occurred,
14 some problem that's occurred, we'll hear it again.
15 We're about to listen to a matter tomorrow afternoon
16 we hear on a monthly basis just because we like those
17 people, want to see them come in.

18 MS. EGGER: Can I ask a question? I
19 just don't know the answer to this. Is it your
20 policy and practice that outstanding permits
21 necessarily are grandfathered in? If there is debate
22 on that issue as well?

23 CHAIRMAN WELBORN: Usually wells that
24 are drilled that are in violation are grandfathered
25 in. Question is if there are outstanding permits,

1 there is a practice of grandfathering them in, but it
2 depends upon the quantity and amount of it. What I
3 am concerned about is that tomorrow I will get a call
4 in here and hear there are 10, 15 that are in
5 violation of the order and that makes a significant
6 difference which way we go with respect to those.

7 MR. BARRETT: Do we know the -- will
8 there be specific spacing on the 320 to be drilled in
9 northeast-southwest.

10 CHAIRMAN WELBORN: That's what Mr.
11 Bicknell was getting at it. Will the 320-acre
12 provision provided for in Order 139-8; is that right
13 right, Mr. Bicknell?

14 MR. BICKNELL: Northeast-southwest on
15 320 acre.

16 CHAIRMAN WELBORN: Northeast-
17 southwest.

18 MR. REED: My memory says there are
19 three wells permitted today in Section 23. I don't
20 know if there are any more, but my memory is
21 incomplete about where we were in the permit process.

22 CHAIRMAN WELBORN: What is your name?

23 MR. REED: Ralph Reed. I am with
24 Barrett.

25 CHAIRMAN WELBORN: Let's leave that.

1 The order stands. The order will be served, it will
2 be effective upon service. If there's a problem
3 because of existing permits we will hear about it.
4 You got some time with this field. We'll hear about
5 it. Thank you all.

6 (Thereupon this proceedings were
7 concluded at 4:30 p.m.)

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CERTIFICATE

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STATE OF COLORADO) ss
CITY AND COUNTY OF DENVER)

I, Harriet S. Weisenthal, Certified Shorthand Reporter and Notary Public for the City and County of Denver, State of Colorado, do hereby certify that the foregoing proceedings were taken in shorthand by me at 201 E. Colfax, Denver, Colorado on the 20th day of February, 1990 and was reduced to typewritten form under my supervision;

That the foregoing is a true transcript of the proceedings had; That I am neither attorney nor counsel, nor in any way connected with any attorney or counsel for any of the parties to said action or otherwise interested in the event;

IN WITNESS WHEREOF, I have hereonto set my hand and affixed my notarial seal this 12th day of March, 1990.

My Commission expires October 15, 1993.

Harriet S. Weisenthal