

I N D E X

1 April 4, 1991
 2 Examiner Hearing
 3 CASE NO. 10253

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A P P E A R A N C E S

1
2 FOR AMERADA HESS
3 CORPORATION

CAMPBELL & BLACK, P.A.
Attorneys at Law
BY: WILLIAM F. CARR, ESQ.
110 North Guadalupe
Santa Fe, New Mexico 87501

4
5
6 FOR MERIDIAN OIL,
7 ARCO OIL & GAS,
and CHEVRON:

KELLAHIN, KELLAHIN & AUBREY
Attorneys at Law
BY: W. THOMAS KELLAHIN, ESQ.
117 North Guadalupe
Santa Fe, New Mexico 87501

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9 * * *

1 EXAMINER CATANACH: Okay. At this time we'll call the
2 hearing back to order, and call Case 10253, which is the
3 application of the Amerada Hess Corporation for statutory
4 unitization, Lea County, New Mexico.

5 Are there appearances in this case?

6 MR. CARR: May it please the examiner, my name is
7 William F. Carr with the law firm of Campbell & Black, P.A.,
8 of Santa Fe. I represent Amerada Hess Corporation, and I
9 have three witnesses.

10 EXAMINER CATANACH: Any other appearance?

11 MR. KELLAHIN: Mr. Examiner, I'm from Tom Kellahin,
12 from the Santa Fe law firm of Kellahin, Kellahin & Aubrey,
13 appearing on behalf of Arco Oil & Gas, Meridian Oil and
14 Chevron U.S.A.

15 EXAMINER CATANACH: Any other appearances?

16 (No response.)

17 EXAMINER CATANACH: Will the witnesses please stand to
18 be sworn in?

19 (The witnesses were duly sworn.)

20 EXAMINER CATANACH: Before we start, Mr. Carr, we
21 should dispense with case 10252, which is the application of
22 Amerada Hess Corporation for a waterflood project in Lea
23 County, New Mexico.

24 MR. CARR: May it please the examiner, since 1981 the
25 operators in this particular portion of the Eunice Monument

1 pool have been developing plans to unitize this portion of
2 the reservoir, and that application has resulted -- that
3 interest has resulted in not only the application before you
4 for statutory unitization, but also in the application for
5 authority to implement and enhance the recovery project by
6 means of waterflooding. That is the application in Case
7 10252.

8 As our evidence will show, we have targeted the
9 first of January 1992 as a date in which we hope to have the
10 unit approved and be going to -- and implementing a
11 waterflood project. However, the technical committee that
12 has been working on this effort is continuing to fine-tune
13 the application for the enhancement recovery project, and
14 accordingly, we are requesting that that case be continued
15 until the first hearing in July of 1991.

16 We would like to go forward with our presentation
17 for statutory unitization, for, as the evidence will show,
18 we need to go back to and seek ratifications from in excess
19 of 1500 owners; and if we are to accomplish that and meet
20 our January 1, 1992, date, we believe it important to go
21 forward with statutory unitization now, have that order
22 authorizing unitization, and then we will come back and seek
23 authority to implement an enhanced oil recovery project in
24 this unit in July of 1991.

25 EXAMINER CATANACH: We'll continue case 10252 until the

1 first hearing in July

2 MR. CARR: At this time we would call Mr. Dan Foland.

3 DAN C. FOLAND,

4 the Witness herein, having been previously duly sworn, was
5 examined and testified as follows:

6 DIRECT EXAMINATION

7 BY MR. CARR:

8 Q. Will you state your name for the record, please?

9 A. Dan C. Foland.

10 Q. Mr. Foland, where do you reside?

11 A. Tulsa, Oklahoma.

12 Q. By whom are you employed?

13 A. Amerada Hess Corporation.

14 Q. In what capacity?

15 A. As professional landman.

16 Q. Have you previously testified before the
17 New Mexico Oil Conservation Division?

18 A. No.

19 Q. Would you summarize for Mr. Catanach your
20 educational background and then briefly review your work
21 experience?

22 A. I have a B.S. from the University of Tulsa in
23 1973. Since 1978 I've worked for various oil and gas
24 companies in related land work, and since July of 1988 I've
25 been employed with Amerada Hess Corporation.

1 Q. Are you familiar with the statutory unitization
2 application filed on behalf of the company?

3 A. Yes.

4 Q. Mr. Foland what are your duties and
5 responsibilities with Amerada Hess as they relate to the
6 formation of this unit?

7 A. I'm responsible for the land portions to identify
8 the various cost-bearing and noncost-bearing interest
9 owners.

10 Q. Are you familiar with the status of the lands
11 involved in the proposed North Monument-Grayburg-San Andres
12 unit area?

13 A. Yes, I am.

14 MR. CARR: Mr. Catanach, at this time we'd tender
15 Mr. Foland as an expert witness in petroleum land matters.

16 EXAMINER CATANACH: He is so qualified.

17 Q. (By Mr. Carr) Would you briefly state what
18 Amerada Hess seeks in this case?

19 A. Statutory unitization in the proposed North
20 Monument-Grayburg-San Andres unit containing approximately
21 13,385 acres.

22 Q. Have you prepared certain exhibits for
23 presentation in this case?

24 A. Yes, I have.

25 Q. Are these exhibits either contained in the

1 materials provided to Mr. Catanach or set forth on large
2 exhibits?

3 A. Yes.

4 Q. Why don't you go to what has been marked as
5 Amerada Hess Exhibit No. 1? Identify that and review it for
6 Mr. Catanach.

7 (Amerada Hess Corporation Exhibit 1
8 was marked for identification.)

9 A. Exhibit No. 1 is the area map, and that portion
10 of the Eunice Monument pool that is --

11 EXAMINER CATANACH: Excuse me, Mr. Foland. Could you
12 face this way?

13 THE WITNESS: Is that better?

14 EXAMINER CATANACH: Yeah. And speak a little louder,
15 if you would.

16 MR. CARR: Does the mike come off? Do you want him
17 to --

18 (Discussion off the record.)

19 EXAMINER CATANACH: Well, that's all right. Just speak
20 up.

21 A. Exhibit No. 1 is the area map, and the portion of
22 the Eunice Monument pool that is subject to the hearing
23 today is shaded in green. It surrounds the community of
24 Monument, which is located approximately ten miles southwest
25 of Hobbs, New Mexico. The other Grayburg-San Andres units

1 in the area are on the map here, and they're the Eunice
2 Monument, South Eunice (Expansion Area B) operated by
3 Chevron. The case and order numbers are attached to each of
4 these, shaded in blue.

5 The Eunice Monument-Grayburg unit, operated by
6 Greenhill Petroleum, shaded in yellow. The Southeast
7 Monument unit, operated by Conoco, shaded in pink, and there
8 isn't a case and order number on this as it was a voluntary
9 federal unit. The Skaggs-Grayburg unit, operated by
10 Greenhill Petroleum and shaded in yellow.

11 Q. (By Mr. Carr) Mr. Foland, what do the red
12 triangles on this exhibit indicate?

13 A. They indicate the proposed injection wells.

14 Q. And those will be reviewed by Amerada's
15 engineering witness?

16 A. Yes.

17 Q. All right. Let's move to Exhibit No. 2. Would
18 you identify that for the examiner?

19 (Amerada Hess Corporation Exhibit 2
20 was marked for identification.)

21 A. Exhibit No. 2 is the ownership plat. It shows
22 the proposed unitized areas. It shows the operator of each
23 tract, and it shows the tract numbers which conform to the
24 government regulations.

25 The character of this land is state

1 47.15 percent, federal comprising 4.76, and fee comprising
2 48.09 percent.

3 Q. Mr. Foland, there is a slight variation in the
4 Eunice boundary as depicted on Exhibit 2 when you compare it
5 to Exhibit 1. Could you identify that for the examiner and
6 explain the reason for that discrepancy?

7 A. Yes. The Eunice boundary varies from the
8 original proposal in that 80 acres was taken out at the
9 request of the operator, the 80 acres being the northwest
10 quarter of the southeast quarter, and the northeast quarter
11 of the southwest quarter of Section 5, Township 20 South,
12 Range 37 East. It was deemed not to be essential to the
13 unit operations, that didn't affect the recovery, and so it
14 was taken out.

15 Q. And the operator who was concerned about this had
16 one 40-acre tract that was -- had only a single gas well on
17 it?

18 A. Yes, that's correct.

19 Q. And when you deleted that tract, you also, to
20 avoid having a window in the unit, had to delete an
21 additional 40 acres?

22 A. That is also correct.

23 Q. Following the request to delete that acreage, was
24 this proposal reviewed with other interest owners in the
25 unit?

1 A. Yes, it was.

2 Q. And it was also reviewed with the Bureau of Land
3 Management and the State Land Office?

4 A. Yes.

5 MR. CARR: Mr. Catanach, there will be some plats that
6 will show the Eunice boundary in each of these two forms,
7 the reasons being that the original application was made to
8 the Oil Conservation Division while the Eunice boundary was
9 as indicated on Exhibit No. 2, subsequent to that time this
10 80-acre was tract was deleted. We have -- Because some of
11 the documents had previously been filed, we did not change
12 all the exhibits. We would like the record to reflect,
13 however, that the Eunice boundary is as is set forth on
14 Exhibit No. 1.

15 Q. (By Mr. Carr) Mr. Foland, could you now refer to
16 Amerada Hess Exhibit No. 3, identify that and review it for
17 Mr. Catanach? And that is contained in the ring binder?

18 (Amerada Hess Corporation Exhibit 3
19 was marked for identification.)

20 A. Yes, it is. Exhibit No. 3 is a Chronology of
21 Unitization Effort that shows the date, the type and the
22 location of the meetings, the original proposal was in May
23 of 1981, and this exhibit shows the meetings since January
24 of 1990 that have resulted in this proposal today.

25 Q. And it was during 1990 that Amerada Hess was

1 attempting to complete a working interest owner chart to get
2 this unit to this division for approval and then
3 implemented?

4 A. Yes.

5 Q. Let's go now to Exhibit No. 4. Would you
6 identify that, please?

7 (Amerada Hess Corporation Exhibit 4
8 was marked for identification.)

9 A. Exhibit No. 4 is the unit agreement, and the
10 original is in front of you there. It was drawn from the
11 API model form for statutory unitization in March of 1974
12 and the joint federal and state model form for waterflood
13 units in 1984 and '85. It's extremely similar to the Enuice
14 Monument South Unit Agreement, and it contains the most
15 recent revisions.

16 Q. Now, when you talk about "revisions," you're
17 talking about revisions to the text of the agreement or to
18 the tables that are attached thereto?

19 A. The tables that are attached thereto.

20 Q. And are these tables current as of this date?

21 A. Yes, they are.

22 Q. And the text has not changed from how it was
23 originally submitted to the OCD?

24 A. Yes. The OCD made, I think, one or two
25 suggestions, and that was incorporated in it, so it's as it

1 was given back.

2 Q. Does this unit provide for enhanced recovery
3 techniques by either waterflooding or CO2?

4 A. Yes.

5 Q. Does it provide for periodic filing of plans of
6 development with various agencies?

7 A. Yes.

8 Q. And what agencies will the initial plan of
9 development be filed with?

10 A. The working interest owners, the Bureau of Land
11 Management, the State Land Office and the OCD.

12 Q. Does the unit agreement also provide for the
13 filing of subsequent plans of development?

14 A. Yes. And whether or not they're mentioned in the
15 unit agreement.

16 Q. They will be filed with the OCD whether or not
17 they are --

18 A. Specified.

19 Q. -- required in the agreement?

20 A. Yes.

21 Q. Would you identify now Exhibit No. 5?

22 (Amerada Hess Corporation Exhibit 5
23 was marked for identification.)

24 A. Yes. Exhibit No. 5 is the unit operating
25 agreement, and it's based on other joint operating

1 agreements that Amerada Hess has used. It's also based on
2 joint operating agreements for the Eunice Monument South and
3 the Arrowhead units. It contains all the standard
4 provisions, outlines supervision and management of the unit,
5 defines the rights and duties of all the parties,
6 establishes the voting procedure for decisions to be made by
7 the interest owners. This is equal to each working interest
8 owner's participation in the unit, and it sets forth the
9 accounting procedures showing how the cost will be allocated
10 and paid.

11 Q. And this agreement has also been filed with the
12 Oil Conservation Division at the time the original
13 application was filed?

14 A. Yes.

15 Q. Do your duties include maintaining communications
16 with all interest owners in the unit area?

17 A. Yes.

18 Q. Are you responsible for identifying and obtaining
19 voluntary joinders in this effort from all interest owners
20 in issue there?

21 A. Yes.

22 Q. Could you review for Mr. Catanach the efforts of
23 Amerada Hess to identify all interest owners in the unit
24 area?

25 A. Yes. The engineers on the project identify the

1 operator of each of the tracts. Then we contacted the
2 operators and ask the operators to provide a division of
3 interest statement on each of the tracts; and the working
4 interest owners are identified on Exhibit C to the Unit
5 Operating Agreement, which is Exhibit No. 5, and the unit
6 participation of each working interest owner is set out on
7 Exhibit C to the Unit Operating Agreement.

8 Q. Under this particular agreement, what percentage
9 of the working interest must be voluntarily committed to the
10 unit agreement for it to become effective?

11 A. 75 percent.

12 Q. And at this time what percentage of the working
13 interest ownership is committed to the unit?

14 A. 78.82 percent.

15 Q. Could you review for Mr. Catanach the efforts of
16 Amerada Hess to identify and communicate with the royalty
17 interest owners in the unit area?

18 A. Yes. The royalty interest owners were identified
19 from the operators' division of interest statements. There
20 were approximately 1,536 royalty owners a notice letter with
21 the royalty brochure was mailed January 29, 1991; and the
22 royalty brochure is Exhibit No. 6.

23 (Amerada Hess Corporation Exhibit 6
24 was marked for identification.)

25 A. The brochure explains unitization and enhanced

1 recovery, summarizes the unit plans, and also we provided an
2 800 number in the brochure so that the royalty owners,
3 should they have any questions, could call toll free and get
4 their questions answered.

5 Q. Where are the royalty interest owners identified
6 in the materials provided to Mr. Catanach?

7 A. On Exhibit B to the unit agreement, which is
8 Exhibit No. 4.

9 Q. And using this exhibit, can the royalty owners
10 determine their net interest on a per-tract basis in this
11 unit?

12 A. Yes, they can.

13 Q. What percentage of the royalty interest is
14 presently committed to the unit?

15 A. At the present the federal and state have given
16 preliminary approval and we feel that we have 52 percent of
17 the royalty committed to date. We will, after the order is
18 issued, go to the balance of the interest owners and ask for
19 their ratification. There being 1,536 of them, quite a few
20 number, we didn't want to confuse them by going back twice
21 and with the possibility that our unit agreement or
22 something might change, so we felt it best to go once, ask
23 them for the ratification after the order was issued.

24 Q. And you did not seek preratification of the unit
25 agreement?

1 A. No, we did not.

2 Q. Has Amerada Hess Corporation reviewed this
3 particular application with the Bureau of Land Management?

4 A. Yes.

5 Q. What response has Amerada received?

6 A. The BLM concurs in this proposal and has
7 designated the unit as an area logically suited for unit
8 development, and that is Exhibit No. 7.

9 (Amerada Hess Corporation Exhibit 7
10 was marked for identification.)

11 Q. And have you reviewed with the BLM the recent
12 change in the unit boundary?

13 A. Yes.

14 Q. What was the Bureau of Land Management's response
15 to that change in the boundary?

16 A. They didn't have any objection to the change.

17 Q. Have you reviewed this application with the State
18 Land Office?

19 A. Yes.

20 Q. What response have you receive from them?

21 (Amerada Hess Corporation Exhibit 8
22 was marked for identification.)

23 A. Exhibit No. 8 is the State Land Office's
24 preliminary approval letter.

25 Q. Have you also reviewed the changes in the

1 boundary with the Land Office?

2 A. Yes, we have.

3 Q. And have they expressed any objection to the
4 change in the boundary?

5 A. No, they have not.

6 Q. Mr. Foland, do you anticipate that within the
7 time period authorized by the Statutory Unitization Act,
8 that Amerada Hess will be able to obtain the necessary
9 ratifications from cost-bearing and noncost-bearing interest
10 owners in the unit area to make the statutory unitization
11 effective?

12 A. Yes.

13 Q. And if you can get that going in the relatively
14 near future, do you anticipate that you will be able to meet
15 the target date for commencement of unit operations of
16 January 1, 1992?

17 A. Yes.

18 Q. Could you identify for Mr. Catanach Exhibit 9 in
19 the Amerada Hess exhibit book?

20 (Amerada Hess Corporation Exhibit 9
21 was marked for identification.)

22 A. Yes. Exhibit No. 9 is an affidavit confirming
23 that notice of this hearing for the statutory unitization
24 has been given as required by the Oil Conservation Division
25 rules and regulations with the attached letter and computer

1 summary showing the names of all of the people that were
2 notified.

3 Q. And to whom has this notice been given?

4 A. To all working interest owners and all royalty
5 interest owners in the unit.

6 Q. And it was by certified mail?

7 A. Yes, it was.

8 Q. And for what percentage of these letters do you
9 have return receipts?

10 A. 89.52 percent.

11 Q. Mr. Foland, are Exhibits 1 through 9 prepared by
12 you and compiled under your direction and supervision?

13 A. Yes.

14 MR. CARR: At this time, Mr. Catanach, we would move
15 the admission of Amerada Hess Exhibits 1 through 9.

16 EXAMINER CATANACH: Exhibits 1 through 9 will be admit
17 as evidence.

18 (Amerada Hess Corporation Exhibits 1 - 9
19 were admitted into evidence.)

20 MR. CARR: That concludes my direct examination of
21 Mr. Foland.

22 EXAMINER CATANACH: Any questions of this witness?

23 (No response.)
24
25

EXAMINATION

1
2 BY EXAMINER CATANACH:

3 Q. Mr. Foland, the return receipts that you have not
4 received from the various mail-outs, are you following that
5 up in any way, trying to make an attempt to find out if that
6 was the correct address or anything like that?

7 A. Yes. We will -- they keep trickling in, and some
8 people when they receive a certified letter, just don't pick
9 it up for quite a while, but we will follow up on that.

10 Q. You feel confident that you have pretty good
11 addresses on these various interest owners?

12 A. Yes. They have been provided by all the
13 operators who should know the exact addresses of the working
14 interest owners and royalty owners.

15 Q. I'm sorry, I missed -- the initial contact with
16 the various working interest and royalty interest owners was
17 when?

18 A. The royalty owner brochure was mailed out
19 January 29th, I believe, 1991, notifying them of the
20 hearing, and it included a letter with the royalty owner
21 brochure, which explained the unitization process. It also
22 had an 800 number in it in case they had any questions.

23 Q. And that didn't have the ballot attached, or has
24 the ballot been sent to the royalty interests owners?

25 A. No, sir, it hasn't. We were waiting for the

1 order to come out and send them the ballot one time to not
2 confuse them with two ballots with any possible changes.

3 Q. The two ballots being when?

4 A. Well, we sent a ballot out, and then -- There's
5 1,536 of them. It's quite an arduous task, so we decided
6 that it would be less confusing to go ahead and get the
7 order, have everything in its final shape, and then send the
8 ballot out, asking for their ratification; and we feel we
9 can get this done within the time period allocated by the
10 commission.

11 Q. And you've got 78.82 percent of working interests
12 currently committed to the unit?

13 A. Yes, sir.

14 Q. That's signed up?

15 A. Yes.

16 Q. Okay.

17 A. Ratified.

18 EXAMINER CATANACH: I believe that's all I have.

19 THE WITNESS: Thank you.

20 EXAMINER CATANACH: You may be excused.

21 MR. CARR: At this time we call Mr. Gary Kline,
22 K-l-i-n-e.

23 (Discussion off the record.)
24
25

1 GARY L. KLINE,
2 the Witness herein, having been previously duly sworn, was
3 examined and testified as follows:

4 DIRECT EXAMINATION

5 BY MR. CARR:

6 Q. Would you state your full name for the record,
7 please?

8 A. Gary Livingston Kline.

9 Q. Where do you reside?

10 A. Tulsa, Oklahoma.

11 Q. By whom are you employed?

12 A. Amerada Hess.

13 Q. In what capacity?

14 A. As a professional geologist.

15 Q. Have you previously testified before the
16 New Mexico Oil Conservation Division?

17 A. No.

18 Q. Could you briefly review for Mr. Catanach your
19 educational background and then summarize your work
20 experience?

21 A. I received my bachelor's from the University of
22 Alaska in 1972. I received a master's in geology from the
23 University of California in Santa Barbara. I did additional
24 work toward a postdoctoral degree at the University of
25 California from 1975 into 1977.

1 I started my professional career as a petroleum
2 geologist with Amoco Production Company in New Orleans from
3 1977 to 1981. I continued that role as a professional -- as
4 a petroleum geologist with Sundance Oil Company in Denver
5 from '81 to '83. Was employed by a Saudi Arabian oil
6 company in Saudi Arabia from 1983 through 1988.

7 I was employed as a senior geologist on a
8 contract to the Department of Energy with Williams Brothers
9 Engineering in Washington, D.C., from 1989 into 1990. And I
10 resumed my career as a petroleum geologist with Amerada Hess
11 in 1990.

12 Q. Are you familiar with the application filed on
13 behalf of Amerada Hess in this case?

14 A. Yes, I am.

15 Q. Have you made a study of the portion of the
16 Grayburg and San Andres formations that are involved in this
17 case?

18 A. Yes, I have.

19 Q. And in making this study, what in particular did
20 you review?

21 A. I reviewed core data from the unit area and also
22 log data, and I prepared certain exhibits and reviewed
23 others that had been done previously.

24 MR. CARR: Mr. Catanach, at this time we would tender
25 Mr. Kline as an expert witness in petroleum geology.

1 EXAMINER CATANACH: Mr. Kline is so qualified.

2 Q. (By Mr. Carr) Mr. Kline, would you identify what
3 has been marked as Amerada Hess Exhibit No. 10, the type
4 log, and review this for the examiner? And I'd ask you
5 first to identify the unitized intervals for Mr. Catanach.

6 (Amerada Hess Corporation Exhibit 10
7 was marked for identification.)

8 A. This is Exhibit No. 10. The unitized interval is
9 from the top of the Grayburg on this type log, which is at a
10 depth of 3,642, to the base of the San Andres at a depth of
11 5,050. I might say that the type well for this unit area is
12 the Amerada Hess Monument Abo Unit No. 1, located in the
13 northeast quarter of the northwest quarter of Section 2,
14 Township 20 South, Range 36 East.

15 This type well was selected as representative for
16 the unit area because of the core that it contains. The
17 core represents essentially 64 percent of the core data that
18 we have in this unit, and it has a complete sweep of
19 monitoring logs and is well representative of the section
20 through the unitized interval. The unitized interval is
21 confined to the top of the Grayburg to the base of the
22 San Andres.

23 Q. Now, does Amerada Hess propose to interject into
24 both the Grayburg and the San Andres?

25 A. We propose to inject into the Grayburg formation.

1 The primary target for this injection are the lower two
2 zones, Zones 3 and 3C.

3 Q. Why is the San Andres included in this
4 application?

5 A. The San Andres is included for three reasons:
6 Number one, the San Andres may be a source of water for the
7 injection. Number two, there is a potential for tertiary
8 production, additional tertiary production from the
9 San Andres. And thirdly, this interval is comparable to the
10 unitized intervals in Eunice Monument South.

11 Q. And this exhibit also shows the thickness of each
12 of these formations?

13 A. Yes. The San Andres here is approximately 1,000
14 feet, and the Grayburg varies from 350 to 400 feet thick.

15 Q. Mr. Kline, would you now go to Exhibit No. 11,
16 identify that for Mr. Catanach and review that for him,
17 please?

18 (Amerada Hess Corporation Exhibit 11
19 was marked for identification.)

20 A. Exhibit No. 11 is a detailed summary of the
21 portion of the Grayburg that you see in Exhibit No. 10. I'd
22 like to just briefly review the stratigraphy and reservoir
23 quality of the Grayburg, which is the object of our
24 waterflood injection.

25 First of all, the Grayburg is divided by us into

1 four recognizable zones: Zones 1, 2, 3 and 3C. Over here I
2 have the log data along with the core, and over in this
3 column I have the porosity and permeability data and the
4 core information. I also show the fluid contacts as they
5 exist in this area.

6 Starting at the base and moving towards the top,
7 we find that the best reservoir quality is found in Zone 3C.
8 This unit or this zone at the lower part of the Grayburg
9 consists of silty to sandy dolomite with interbedded oolitic
10 and pelletal dolomite; and the reservoir has relatively good
11 quality, and it varies both vertically and laterally.

12 As we go up into the next zone, the rock becomes
13 somewhat less favorable in terms of reservoir quality and
14 development because of increased dense dolomite which is
15 interbedded with intervals of porous oolitic and pelletal
16 dolomite and also silty and sandy dolomite.

17 As we move up into Zones 2 and 3, the rock
18 becomes more dense, and the reservoir quality in terms of
19 porosity, permeability decreases. And the upper zone is
20 very much a dense dolomite and also a shaly dolomite.

21 Just to review, the reservoir quality is
22 indicated both by log and by porosity and permeability.
23 You'll see on the log that we have a decrease in porosity as
24 we go up and as indicated by the formation density
25 compensated log.

1 This is also seen in the lower porosity. The
2 lower zone is more porous, but as we go up, our porosity
3 decreases. Likewise we see a trend of decreasing
4 permeabilities upwards into Zone 1.

5 To review the sum of this data, the average
6 porosity in Zone 3C is approximately 13.3 percent, in Zone 3
7 it's 7.2, in Zone 2 it's 5.1, and in Zone 1 it's
8 2.1 percent. We can see that the porosity decreases upward
9 on an average basis. The permeability also decreases. The
10 geometric average of permeability, while having a wide
11 range, is 4.0 millidarcies, and this decreases to 1.9, .6
12 and .2 millidarcies respectively into Zone 2.

13 Consequently, based on this information both from
14 the log and core data, Zones 3 and 3C are the most favorable
15 zones for waterflood injection within the Grayburg unit.

16 Q. Would you now identify Amerada Hess Exhibit 12?

17 (Amerada Hess Corporation Exhibit 12
18 was marked for identification.)

19 A. Exhibit 12 is an index map of the unit area,
20 showing two lines of cross sections which are indicated as
21 A and A - A' and B and B - B'. These are essentially
22 east/west cross sections. I will be showing you
23 stratigraphic and structural cross sections in each of these
24 lines later in my testimony.

25 Q. Why don't we go right away to the stratigraphic

1 cross section? And if you could, review that for
2 Mr. Catanach.

3 A. Mr. Examiner, in both cross sections A and A' and
4 B and B' of the stratigraphic cross section which is found
5 at the top of the Grayburg, you will note that all of these
6 four zones that I've indicated previously are present
7 throughout the unit area. We have Zone 1, Zones 2, 3 and 4
8 -- or 3C, and also there is San Andres shown in these
9 particular wells.

10 One thing I'd like to note, as I stated
11 previously, there is some thickness variation within the
12 unit and these zones do vary in thickness, but nowhere in my
13 study have I seen that any of these zones are either cut out
14 stratigraphically by unconformity or by fault.

15 Therefore, based upon my study and observations,
16 all four zones are present. Zone 1 varies from,
17 essentially, 20 to 60 feet, Zone 2 from approximately 60 to
18 120, and Zone 3 from 80 to 125 and Zone 3C from 120 to 160
19 feet.

20 Q. Would you now go to Exhibit No. 14, please.

21 (Amerada Hess Corporation Exhibit 14
22 was marked for identification.)

23 Q. Gary, you might --

24 MR. CARR: David, it may be better to present this
25 closer to you. It's hard to see.

1 EXAMINER CATANACH: That would be fine.

2 Q. (By Mr. Carr) Let's go to Exhibit 14, the
3 structure map on the top of the Grayburg, and I'd ask you to
4 review that information for Mr. Catanach.

5 A. This is the structure map on the top of the
6 Grayburg. You will note the line of cross section, as I
7 indicated previously, A and A', B to B'. Also indicated
8 here in red is the gas-oil contact.

9 You will note that the structure, the anticlinal
10 structure, is approximately a north/south anticlinal
11 structural trend. This area is the northern extension of
12 essentially a non-mile north/south trend which varies
13 overall in width about six miles. And we in North Monument
14 Grayburg unit are the northern part of this structural
15 trend. This essentially is the structure at the top of the
16 unit.

17 Q. Let's go down to your structure map of the Zone
18 C3 -- 3C.

19 A. This is the structure map at the top of Zone 3C.
20 (Amerada Hess Corporation Exhibit 15
21 was marked for identification.)

22 Q. You're talking now about Exhibit No. 15; is that
23 right?

24 A. Exhibit No. 15, that's correct. On this map
25 you'll also note that the gas-oil contact is indicated in

1 of primary reserves, assessment of the waterflood potential,
2 and the proposal for a waterflood development plan in the
3 North Monument-Grayburg-San Andres unit.

4 Q. And are copies of all the exhibits you have
5 presented also contained as figures in that geologic report?

6 A. Yes.

7 Q. Based on your study of the reservoir, have you
8 reached certain conclusions about its suitability for
9 waterflooding in the unit area?

10 A. Yes, I have.

11 Q. What are those conclusions?

12 A. Number one, the recommended, unitized interval
13 from the top of the Grayburg to the base of the San Andres
14 consists of five subdivisions. These include the San Andres
15 and the four zones within the Grayburg formation, which are
16 identifiable and correlatable throughout the unit area.

17 Number two, the four subdivisions of the Grayburg,
18 Zones 1, 2, 3 and 3C in the Grayburg formation have distinct
19 lithologic and technical differences which effect the
20 distribution and nature of porosity and permeability
21 development.

22 Thirdly, the best reservoir quality -- that is,
23 with the highest overall porosity and permeability is
24 present in the lower half of the Grayburg in Zones 3 and 3C.
25 Zone 1, which is the uppermost Grayburg, has the lowest and

1 poorest reservoir quality.

2 Five, lateral and vertical continuity of flow
3 units is likely to be best developed in Zones 3 and 3C, and
4 the degree of continuity in the upper zones will vary and
5 decrease upwards within the Grayburg formation as reservoir
6 quality decreases.

7 There appears to be a sufficient stratigraphic
8 continuity, particularly in Zones 3 and 3C, which will allow
9 these two zones to be flooded in the proposed unit area.

10 Lastly, there are no known, significant structure
11 deviations, i.e., major unconformities or faults which will
12 exhibit in the unit area which will interfere with the
13 waterflood intentions within the Grayburg formation, and
14 that the unit thickness within the unit area will be
15 relatively constant throughout.

16 Q. In your opinion, is the San Andres and the
17 Grayburg in this area a suitable zone for the application of
18 enhanced oil recovery techniques?

19 A. I believe it is.

20 Q. Were Exhibits 11 through 21 prepared by you or
21 can you testify as to their accuracy?

22 A. Yes, they were, and I can testify to their
23 accuracy.

24 MR. CARR: At this time, Mr. Catanach, I would move the
25 admission of Amerada Hess Exhibits 11 through 21.

1 EXAMINER CATANACH: Exhibits 11 through 21 will be
2 admitted as evidence.

3 (Amerada Hess Corporation Exhibits 11
4 through 21 were admitted into evidence.)

5 MR. CARR: That concludes my direct examination of
6 Mr. Foland.

7 EXAMINATION

8 BY EXAMINER CATANACH:

9 Q. Just a couple of questions, Mr. Kline. Most of
10 the oil that has been produced within the unit boundary,
11 that has originated from Zones 3 and 3C?

12 A. To the best of my knowledge, most of the oil,
13 yes, has been derived from the lower zones.

14 Q. Were most of the well completions in the unit,
15 were they perforated, or did they have any open-hole
16 completions?

17 A. I would like to defer on that question, if I may.

18 MR. CARR: To the engineering witness?

19 THE WITNESS: Yes.

20 Q. (By Examiner Catanach) Okay. Do you know if
21 there was any San Andres production within the unit area?

22 A. There has been San Andres production within the
23 unit area, yes.

24 Q. Did the geologic factors influence the size and
25 shape of the unit boundary?

1 A. Yes, to some degree, but again I'd like to defer
2 that to the engineering witness.

3 MR. CARR: Mr. Catanach, we will call an engineering
4 witness who will explain how the actual boundary of this
5 unit was determined.

6 EXAMINER CATANACH: Okay. Well, let's do that then.

7 MR. CARR: Mr. Kline will be available if you have
8 questions after you hear from the engineering witness.

9 EXAMINER CATANACH: Okay.

10 MR. CARR: And at this time we would call Mr. Jeff
11 Hermann.

12 JEFFREY BRUCE HERMANN,
13 the Witness herein, having been previously duly sworn, was
14 examined and testified as follows:

15 DIRECT EXAMINATION

16 BY MR. CARR:

17 Q. Would you state your name for the record?

18 A. Jeffrey Bruce Hermann.

19 Q. Where do you reside?

20 A. Broken Arrow, Oklahoma.

21 Q. By whom are you employed and in what capacity?

22 A. I'm employed by Amerada Hess Corporation. I'm a
23 professional petroleum engineer in the reservoir engineering
24 group.

25 Q. Mr. Hermann, have you previously testified before

1 the New Mexico Oil Conservation Division?

2 A. No, I haven't.

3 Q. Could you summarize your educational background
4 and then briefly review your work experience for
5 Mr. Catanach?

6 A. I received a bachelor of science degree in
7 geological engineering from the Colorado School of Mines in
8 1971, and I did do some post graduate work at Ohio State
9 University until 1975. I was employed by the Ohio
10 Department of Natural Resources from 1972 to 1981, first as
11 a subsurface geologist in the division of geological survey,
12 then as an engineer in the division of oil and gas.

13 Since 1981 I've worked for Amerada Hess
14 Corporation as a petroleum engineer.

15 Q. What has been your responsibility with Amerada
16 Hess as it relates to the formation of this particular unit?

17 A. I have been the technical committee
18 representative for Amerada Hess to this unitization effort,
19 and I've attended all the technical committee meetings since
20 1981 and most of the working interest owner meetings.

21 Q. Are you familiar with the application filed in
22 this case?

23 A. Yes, I am.

24 Q. And have you made a study of the formations
25 involved in this case?

1 A. Yes.

2 Q. As a result of your work on this proposed unit
3 and your study of the area, have you reached certain
4 engineering conclusions and opinions about the proposed unit
5 the its suitability for secondary or enhanced recovery
6 operations?

7 A. Yes, I have.

8 MR. CARR: Mr. Catanach, at this time we tender
9 Mr. Hermann as an expert witness in petroleum and reservoir
10 engineering.

11 EXAMINER CATANACH: Mr. Hermann is so qualified.

12 Q. (By Mr. Carr) Mr. Hermann, are you familiar with
13 the New Mexico Statutory Unitization Act?

14 A. Yes.

15 Q. And have you prepared certain exhibits for
16 presentation in this case?

17 A. I have.

18 Q. Could you just characterize for the examiner the
19 sufficiency of the data you've had available to you on this
20 area as you have prepared your exhibits and reached your
21 conclusions?

22 A. The technical committee has reviewed a
23 substantial amount of information since 1981. We reviewed
24 historical oil, gas and water production on nearly 600 wells
25 in the unit area and immediately around the unit area. That

1 production dates back to the mid-1930s for the discovery
2 date of the field. We also reviewed all historical pressure
3 data and obtained copies and evaluated all the logs, core
4 data and well cuttings we could find in the field.

5 Q. I think at this time, Mr. Hermann, I would ask
6 you to refer back to Amerada Hess Exhibit No. 1, and using
7 this map, I'd like you to review the current status of the
8 wells in the proposed unit area for Mr. Catanach.

9 A. Within the proposed unit area indicated in green,
10 we still have approximately 247 Grayburg-San Andres wells.
11 There are also 31 wells in this area that are plugged and
12 abandoned, another 83 that are temporarily abandoned in the
13 Grayburg-San Andres. So the total 361 Grayburg-San Andres
14 completions, nearly a third of them are now abandoned in
15 that zone, attesting to the advanced state of depletion of
16 this field.

17 Q. As I look at this plat, there are certain tracts
18 on the extreme east and also to the northwest that don't
19 have, at least at this time, proposed injection wells on
20 them. Could you explain the reason for including those
21 tracts in the unit?

22 A. The technical committee when this was set up,
23 first of all, was looking at all tracts that had some
24 historical Grayburg-San Andres production; and then at that
25 time, we reviewed historical performance of the field to

1 look at whether or not these correct tracts would have
2 potential for enhanced recovery via waterflooding.

3 The tracts we essentially excluded from the unit,
4 the ones just south of our unit boundary here, have produced
5 via a very strong, natural water drive to the point where
6 these tracts here no longer have much, if any, secondary
7 recovery potential.

8 The tracts along the eastern edge of the field
9 and along the northern edge of the field do have historic
10 Grayburg oil production. They have not produced via water
11 drive. We do feel these areas do have waterflood
12 potential, and that's why --

13 (Discussion off the record with the reporter.)

14 A. -- have not produced by water drive, in contrast
15 to these tracts down here that have. So these tracts have
16 been retained in the unit. We do feel that they have
17 waterflood potential.

18 Q. Are you aware of the decision to delete the
19 80 acres on the southern boundary of the unit?

20 A. Yes, I am.

21 Q. What basically from an engineering point were the
22 considerations and the reasons for releasing them?

23 A. Well, the tracts in question, Meridian's tract,
24 had been included in the unit area all along. The operator,
25 Meridian, had not been a party to the technical committee

1 meetings or had attended any of the owner meetings.

2 When they came in after the technical committee
3 report was approved, they requested that tract be deleted.
4 The technical committee and the owners both reviewed that
5 tract and found it was not really necessary in processing
6 the waterflood area. One of the major reasons it was
7 included, as to exclude that tract by itself would have
8 resulted in a window in the unit area.

9 So the technical committee and the owners got
10 together and thought by excluding this tract here and the
11 40 acres of the larger tract immediately to the west, we
12 could comply with Meridian's request to delete their tract
13 from the unit, with no adverse impact on the proposed
14 waterflood project

15 Q. And delete it without creating a window in the --

16 A. And delete it without creating a window.

17 Q. Are there duly completed wells in the proposed
18 unit?

19 A. At the present time there are nine duly completed
20 wells within the unit area. We anticipate having no and
21 plan to have no duly completed wells. After the unitization
22 date a hundred percent of each well will be specifically
23 addressed towards unit operations.

24 Q. Mr. Hermann could you explain to Mr. Catanach how
25 the unit boundary was the determined?

1 155 million barrels of oil, and that's indicated by the dark
2 green color. Remaining primary reserves on August 1, 1989,
3 as determined by the technical committee amounted to 14
4 million barrels of oil. That forecast is shown in the light
5 green color.

6 The technical committee assessment of incremental
7 waterflood reserves and recovery from our secondary recovery
8 program was 44 million barrels of oil. That forecast is
9 shown by the red color. You can see by the numbers that the
10 field is essentially 90 percent depleted under primary
11 operations and that implementation of a waterflood project
12 results in significant increase for recovery for the unit
13 area.

14 Q. Now, the 44 million barrels of additional
15 recovery, that is only from a waterflood project?

16 A. That is only from a waterflood project.

17 Q. In your opinion, does this reservoir also have
18 the potential for a later enhanced oil recovery project, a
19 CO2 flood --

20 A. Yes. As a matter of fact, the technical
21 committee has just completed a study of infill drilling
22 potential for the unit area. One of the conclusions we came
23 to is that by going out and just infill drilling the best
24 portions of the waterflood area, we may be able to increase
25 waterflood reserves by up to 8 million barrels of oil.

1 Q. What is the status of that part of the technical
2 committee report?

3 A. That report should be mailed out to the working
4 interest owners early next week. It includes
5 recommendations for some additional drilling and for
6 implementation of a comprehensive data acquisition program.

7 Q. And those recommendations have gone to the other
8 interests owners for their reactions?

9 A. They will be going early next week.

10 Q. Do you believe that by July 1991 Amerada Hess
11 will be prepared to come forward and seek approval of an
12 enhanced oil recovery project by waterflooding for this unit
13 area?

14 A. Yes, I do.

15 Q. Mr. Hermann, in your opinion is unitized
16 management operation and further development of the portion
17 of the pool covered by this application reasonably necessary
18 to substantially increase the ultimate recovery of oil from
19 the unitized portion thereof?

20 A. Yes.

21 Q. Does the participation formula set forth in the
22 unit agreement allocate production to the separately owned
23 tracts on the proposed unit on a fair, reasonable and
24 equitable basis?

25 A. In my opinion it does. The working interest

1 owners spent considerable time reviewing the technical
2 report and negotiating what ultimately became a two-phased
3 formula.

4 Phase 1 addresses the primary recovery potential
5 of the tracts in the field. It will last until just over 11
6 million barrels of oil is produced from the effective
7 unitization date. The 11 million barrels of oil represents
8 the technical committee assessment of remaining primary
9 reserves in the unit on that date.

10 At that point in time, we'll switch to phase 2
11 operations, which reflects the secondary and tertiary
12 recovery potential of these tracts.

13 Q. Mr. Hermann, will the additional cost, if any, of
14 conducting unitized operations exceed the estimated value of
15 additional oil recovered from unitized management, plus a
16 reasonable profit?

17 A. No. If you could, refer to Table 10 in the
18 technical committee report. That's the last table in that
19 section just before the tab labeled "Appendix A." We've
20 outlined the economic summary which indicates that the
21 additional capital investment for this project will amount
22 to \$57 million. It will require additional capital expenses
23 of approximately \$85 million, but the additional of the
24 income to the unit after taxes will amount to \$334 million.

25 Q. In your opinion, will unitization and adoption of

1 the proposed unitized methods of operation benefit working
2 interest owners and royalty interest owners in the area
3 affected by this application?

4 A. Yes.

5 Q. Is unitized management, operation and further
6 development of that portion of the pool, which is the
7 subject of this application, reasonably necessary to
8 effectively carrying on enhanced recovery operations in the
9 unit area?

10 A. Yes.

11 Q. Will unitized methods of operations, in your
12 opinion, prevent the waste of oil and result with
13 reasonability in the increased recovery of substantially
14 more oil from the unitized portion of the pool than
15 otherwise would be recovered?

16 A. Yes.

17 Q. Have you developed an opinion as a reservoir
18 engineer based on your study of this area about the results
19 that can be obtained if this proposal is, in fact,
20 implemented?

21 A. I think we can achieve considerably more reserves
22 from the field and we can prevent waste.

23 Q. What impact will the proposed unit and waterflood
24 project have on the correlative rights of interest owners in
25 the unit area?

1 operation takes place.

2 We have then taken the tract participation
3 factors from the unit agreement and listed those phase 1 in
4 column F and phase 2 in column G. We've taken those phase
5 participations parameters, then, and applied them to
6 recovery of both under primary and under secondary to arrive
7 at the tract recovery for the proposed waterflood project.
8 And that's listed in columns H, I, J and K.

9 Columns H and I represent taking the tract
10 participation parameter for phase 1 in column F and applying
11 that to the total anticipated primary oil and gas reserves.
12 The oil and gas numbers in columns J and K represent taking
13 the phase 2 participation primary, multiplying that by the
14 incremental secondary oil and gas reserves.

15 To better compare these numbers, we have
16 converted everything to dollars, actual gross revenue.
17 Again taking numbers right out of the technical committee
18 report, we assume the constant oil price of \$18 a barrel and
19 a constant gas price of \$1.20 per MCF. We took those values
20 first and multiplied them times the oil and gas recovery for
21 no unitized operations that we previously referred to in
22 columns D and E. That gross revenue on a tract basis is
23 summarized in column L.

24 We then took the same dollar values for oil and
25 gas, multiplied them times the recoveries in columns H, I, J

1 and K and arrived at gross revenue for each tract and
2 summarized that in column M. In every case gross revenue
3 for the tract is greater with unitized operations than it
4 would be otherwise. The magnitude of the increase is
5 summarized in column N.

6 And on the last page of this table at the bottom
7 of column L, we show that the total gross revenue from
8 1/1/92 without a unit would amount to approximately
9 \$236 million. With unitized operations and just assuming a
10 waterflood at this time -- this does not include any
11 additional recovery from infill drilling or from CO2
12 flooding -- gross revenue would increase to over \$1 billion,
13 the total increase would be \$798 million.

14 So we feel that, again, there's considerable
15 benefit to the unit as a whole and that each tract in the
16 unit for unitized operations.

17 Q. Mr. Hermann, if this application is granted at
18 this time, in your opinion would Amerada Hess be able to go
19 forward with its ratification efforts and hopefully have a
20 waterflood project approved and in place January 1, 1992?

21 A. Yes.

22 Q. In your opinion, will granting this application
23 otherwise be in the best interest of conservation and
24 prevention of waste and protection of correlative rights?

25 A. I believe it will.

1 Q. Were Exhibits 22 through 24 prepared by you or
2 compiled under your direction and supervision?

3 A. Yes, they were.

4 MR. CARR: At this time, Mr. Catanach, we move the
5 admission of Amerada Hess Exhibits 22 through 24.

6 EXAMINER CATANACH: Exhibits 22 through 24 will be
7 admitted as evidence.

8 (Amerada Hess Corporation Exhibits 22 - 24
9 were admitted into evidence.)

10 MR. CARR: That concludes my direct examination of
11 Mr. Hermann.

12 EXAMINATION

13 BY MR. EXAMINER CATANACH:

14 Q. Mr. Hermann, let me ask you about the type of
15 completion that was generally used in this area.

16 A. Most of the old wells, the wells drilled back in
17 the 30s and 40s were open-hole completions. Some of the
18 later wells drilled, in particular along the flanks of the
19 field, were often case-hole completions with perforations.

20 Q. In your waterflood portion of -- or in your
21 waterflood, would you plan to -- Let me ask you this: Are
22 the open-hole completions going to be utilized?

23 A. They will be utilized if need be. We may have to
24 run liners in some of the wells.

25 Q. How can you -- or how are you going to

1 effectively isolate the zone that you want to inject into
2 from the other zones?

3 A. Most of the wells along the flanks of the field
4 will not be any problem since they will be completed in
5 Zone 3 and a portion of Zone 3C which are not experiencing
6 water drive. The only question and the only problem may
7 occur as we go towards the center of the field where we do
8 have a portion of the oil column experiencing water drive
9 and a portion of the oil column experiencing solution gas
10 drive. Then we will have to use some combination of
11 plug-backs or liners. And we have also included in the
12 development plan the possibility of drilling replacement
13 wells for some of these injectors so we can better isolate
14 where that injection water is going.

15 Q. Why is it in the center portion of your units you
16 don't have any injection wells?

17 A. At the present time, we have limited our
18 injection operations as shown here because, again, as you go
19 towards this side of the field there is greater impact from
20 water drive in this particular area, and at the present time
21 we do not feel it would be in our best interest to go out
22 and convert wells to injectors.

23 Those tracts will be necessary, however, to
24 process the secondary oil from the adjacent injection wells,
25 and it may well be that as we further develop the field,

1 we'll be able to convert some additional wells to injectors
2 that are secondary recovery operations, and we do feel this
3 will be a very important area for tertiary operations, and
4 ultimately that whole area we would envision under tertiary
5 would be completely developed.

6 Q. Why is it that the San Andres doesn't have any
7 secondary -- doesn't have any waterflood potential?

8 A. The San Andres in this particular area has a
9 large aquifer associated with it. As a matter of fact the
10 wells in this portion of the field that were left out of the
11 North Monument unit were largely San Andres completions and
12 watered out very early compared to some of the water
13 influxes that were seen in the northern portions of the
14 field. Some of these wells were watered out back in the
15 1950s and 60s, were plugged back out of the San Andres oil
16 column entirely.

17 The San Andres in this area is also used as a
18 disposal zone for salt water by the Rice Engineering, and
19 they're able to inject, the last I checked which was a few
20 years ago, several thousand barrels a day with no injection
21 pressure at the surface.

22 And in fact, we plan to use the San Andres
23 aquifer in this area as our water supply source. Chevron's
24 Eunice Monument South is using that as a supply source and
25 is producing 20,000 barrels of water a day with no apparent

1 problems at all.

2 EXAMINER CATANACH: I believe that's all I have.

3 MR. CARR: That concludes our direct presentation in
4 this case, Mr. Catanach. I have prepared a proposed order
5 granting the application for statutory unitization that I
6 would like to leave with you. I would note that this
7 proposed order does provide that no enhanced oil recovery
8 operations shall take place until a project is brought
9 before you and appropriate approvals obtained from that
10 division.

11 With that, that concludes our presentation in
12 this case.

13 EXAMINER CATANACH: Mr. Carr, I have one question. I
14 never heard mentioned a proposed or that you guys want a
15 nonconsent penalty. Is that not being proposed in this
16 case?

17 A. MR. CARR: Mr. Catanach, we did discuss this,
18 and the unit agreement, I believe, does not contain a
19 nonconsent penalty, and therefore, since it does not, we
20 were not asking for it here.

21 EXAMINER CATANACH: Okay. Is there anything further in
22 this case? There being nothing further, Case 10253 will be
23 taken under advisement, and this hearing is adjourned.

24 (The foregoing hearing was concluded at the approximate
25 hour of 1:45 p.m.)

