Case Number

5893

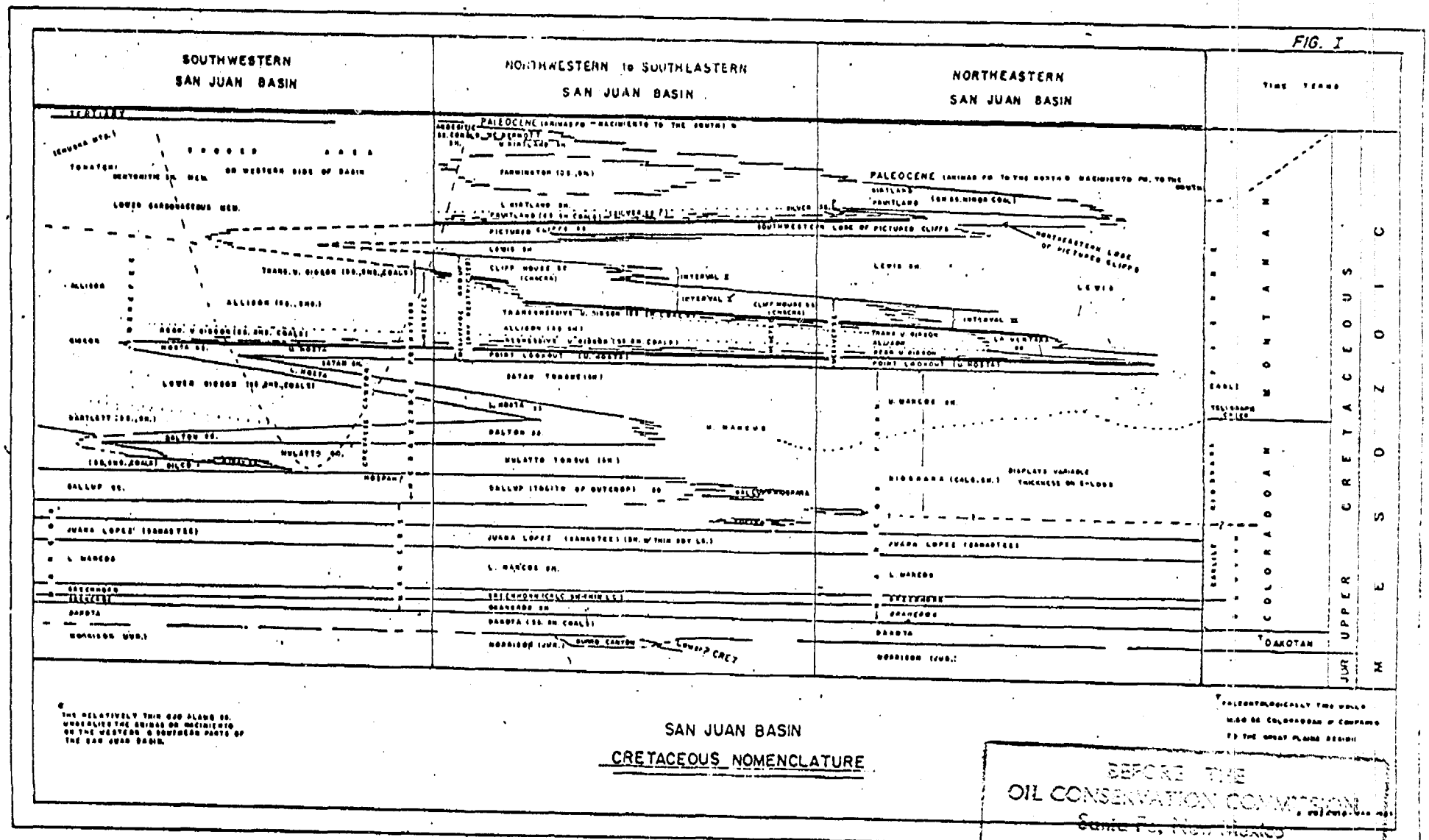
Application

Trascripts

Small Exhibits

ETC.

FIG. I



BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 5893 Exhibit No. 1
Submitted by K.C. Bowman
Hearing Date 3/23/77

NEW MEXICO OIL CONSERVATION COMMISSION

COMMISSION HEARING

SANTA FE, NEW MEXICO

Hearing Date MARCH 23, 1977 TIME: 1:00 P.M.

NAME	REPRESENTING	LOCATION
Paul Ellison	Amoco	Farmington
BRAD WHEELER	AMOCO	FARMINGTON
Charles Hustable	Amoco	Roswell
De Lacey Lee	Blackwood & Nichols Co	Durango, Colo
Tom Dugan	Dugan Prod.	Farmington
Charles F. Blackwood	Blackwood & Nichols Co	Okla City, Okla
Jim Farrell	Mesa Petroleum Co	Amarillo
Sam Slagle	" " "	"
Don Pent	" " "	"
Dennis Denney	" " "	"
David Hamilton	" " "	Denver
E. R. Manning	El Paso Natural Gas	El Paso, Tx
R. A. Ulrich	El Paso Nat Gas	Farmington, N.M
K.C. Bowman	Mesa Verde Committee	
Mel Martin	Northwest Energy	SLC.
Carl Warren	Northwest Energy	SLC
AR Kendrick	OCC	Artesia
MILLARD F. CARR	TENNECO	DENVER
VICTOR T. LYON	CONOCO	Hobbs
DON BOLT, JR.	CONOCO	HOBBS
DARL ERICKSON	CONOCO	HOBBS

NEW MEXICO OIL CONSERVATION COMMISSION

COMMISSION HEARING

SANTA FE, NEW MEXICO

Hearing Date March 23, 1977 TIME: 1:00 P.M.

NAME	REPRESENTING	LOCATION
William F. Carr	Blackwood + Nichols	Santa Fe
JOHN F NANCE	El Paso Natural Gas Co	El Paso, TX
James M. Hill	Office of the State Engineer	
V. E. Ahrgack	Lively Exploration Co	Farmington
Jim C. Jacobs	Dugan Prod	Farmington
Richard Tully	Dugan Production Corp.	Farmington
R. E. Mansfield	NMOCC	Aztec
Frank Gordon	Gordon	Aztec
Nina DuHaime	ATOM, INC.	FARMINGTON

BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
March 23, 1977

COMMISSION HEARING

IN THE MATTER OF:		
Application of the Oil Conservation Commission on its own motion for a redefinition of the vertical limits of the Blanco-Mesaverde Pool, Rio Arriba and San Juan Counties, New Mexico.	)	CASE 5893
Application of Blackwood & Nichols,Ltd. for a hearing de novo, San Juan County, New Mexico.	)	CASE 5821 (DE NOVO)

BEFORE: Joe D. Ramey, Director
Emery C. Arnold, Member
Phil R. Lucero, Member
Daniel S. Nutter
Richard L. Stamets

TRANSCRIPT OF HEARING

APPEARANCES

For the New Mexico Oil Conservation Commission: Lynn Teschendorf, Esq.
Legal Counsel for the Commission
State Land Office Building
Santa Fe, New Mexico

For Blackwood & Nichols: William F. Carr, Esq.
CATRON, CATRON & SAWTELL
Attorneys at Law
53 Old Santa Fe Trail
Santa Fe, New Mexico

APPEARANCES (Continued)

For Mesa Petroleum Company:	Don Dent, Esq. General Counsel for Mesa Amarillo, Texas
	Clarence E. Hinkle, Esq. HINKLE, COX, EATON, COFFIELD & HENSLEY Attorneys at Law Hinkle Building Roswell, New Mexico
For El Paso Natural Gas:	John Nance, Esq. Counsel P. O. Box 1492 El Paso, Texas
	MONTGOMERY, FEDERICI, ANDREWS & HANNAHS P. O. Box 2307 Santa Fe, New Mexico
For Lively Exploration Co., Continental Oil and Tenneco Oil:	W. Thomas Kellahin, Esq. KELLAHIN & FOX Attorneys at Law 500 Don Gaspar Santa Fe, New Mexico
For Tenneco Oil:	Millard Carr, Esq. Attorney at Law Denver, Colorado

I N D E X

INDEX (Continued)

INDEX (Continued)

EXHIBIT INDEX

EXHIBIT INDEX (Continued)

	Offered	Admitted
Mesa Exhibit Four, Production Curve	103	128
Mesa Exhibit Five-A, Production Curve	105	128
Mesa Exhibit Five-B, Production Curve	105	128
Mesa Exhibit Five-C, Production Curve	105	128
Mesa Exhibit Five-D, Production Curve	105	128
Mesa Exhibit Five-E, Production Curve	105	128
Mesa Exhibit Five-F, Production Curve	105	128
Mesa Exhibit Five-G, Production Curve	105	128
Mesa Exhibit Six, Plat	126	128
Lively Exhibit One, Well Data	129	134
Lively Exhibit Two, Pressure Comparisons	130	134
Lively Exhibit Three, Plat	130	134
Lively Exhibit Four, Pressure Comparisons	131	134
Lively Exhibit Five, Log	132	134

MR. RAMEY: The hearing will come to order. We will call the first case on the docket.

MS. TESCHENDORF: Case 5893, application of the Oil Conservation Commission on its own motion for a redefinition of the vertical limits of the Blanco-Mesaverde Pool, Rio Arriba and San Juan Counties, New Mexico.

MR. RAMEY: I think that for purposes of testimony that we will combine the two cases since they are related. Will you call the second case, please?

MS. TESCHENDORF: Case 5821, application of Blackwood & Nichols Co., Ltd., for a hearing de novo, San Juan County, New Mexico.

MR. RAMEY: I'll ask for appearances at this time.

MS. TESCHENDORF: Lynn Teschendorf appearing on behalf of the Commission and I have one witness.

MR. CARR: William F. Carr, Catron, Catron and Sawtell, appearing on behalf of Blackwood & Nichols. I have two witnesses.

MR. HINKLE: If the Commission please, Clarence Hinkle. I would like to enter an appearance for Mesa Petroleum Company, Mr. Don Dent, general attorney for Mesa in Amarillo, Texas and myself, Clarence Hinkle, Hinkle, Cox, Eaton, Coffield and Hensley.

MR. RAMEY: Who was the Mesa attorney?

MR. HINKLE: Don Dent.

MR. RAMEY: D-e-n-t?

MR. HINKLE: D-e-n-t, general attorney for Mesa in Amarillo.

MR. NANCE: John Nance with El Paso Natural Gas Company associated with the Santa Fe law firm of Montgomery, Federici. We do not plan to have any witnesses but we may wish to enter a statement later.

MR. KELLAHIN: Tom Kellahin of Kellahin and Fox, Santa Fe, New Mexico appearing on behalf of Lively Exploration Company, Continental Oil and Tenneco. I'm appearing in association with Mr. Millard Carr, an attorney and a member of the Colorado Bar. With regards to Tenneco I have one witness.

MR. RAMEY: Any other appearances?

I will ask that all witnesses stand at this time and be sworn.

(THEREUPON, the witnesses were duly sworn.)

MR. HINKLE: If the Commission please, I would like to make an opening statement on behalf of Mesa, if I may?

MR. RAMEY: Go ahead, Mr. Hinkle.

MR. HINKLE: The Animas-Chacra Pool was defined as a result of the Mesa Petroleum Company Primo Well No. 1-A located in Unit D of Section 6, Township 31 North, Range 10 West, which was completed as a gas well in the Chacra formation. This well was completed as a triple completion in the Chacra and in the Pictured Cliffs and the Mesaverde formations.

The two cases on the docket, of course, are closely related and the evidence which Mesa intended to introduce in both of these cases is the same and, of course, you have consolidated the cases so that solves that problem.

I think it's appropriate that we outline the position of Mesa in this case. Mesa has no objection to the inclusion of the Mesaverde formation which underlies the area which is defined by the Commission under Order R-5339 as being in the Animus-Chacra Pool and put it into the Blanco-Mesaverde Pool.

However, in redefining the vertical limits of the Blanco-Mesaverde Pool, Mesa takes the position that an exception should be made as to the northwest quarter of Section 6, Township 31 North, Range 10 West for which Mesa's Primo Federal No. 1 is located as to the Chacra formations. Mesa's evidence will show the Primo Federal No. 1 is a gas well and is producing from a separate and distinct reservoir from the Mesaverde formation. It will show that the well is located on a separate structure in the Chacra formation and that there is no relationship between the gas production in the Chacra formation and the production from the Mesaverde or Pictured Cliffs formations and that there is no communication between these formations.

Furthermore, the Chacra Pool from which Mesa will be producing is separate and distinct from the Navajo City-Chacra Pool which is in the second case.

Mesa will also show that its Primo Federal No. 1 Well has been producing gas at the rate of some two million cubic feet per day since December 31st, 1975 and has produced some one, point, two billion cubic feet of gas to date.

If an exception is not made as to the Chacra formation in this well and the well is defined as a Mesaverde well with three hundred and twenty acre spacing rather than a hundred and sixty acre as is the case, it will be an untenable economic position for Mesa as Mesa would have to reallocate production and the well costs with other owners of the lease-hold interest in the southwest quarter of Section 6.

The gas which has been produced by Mesa from the Chacra Pool has been produced under an order of the Commission in good faith as a separate and distinct pool. It would be extremely unequitable not to make an exception in this case and the failure to do so would raise a question of law as to whether under these circumstances the Commission can change or revoke its previous order as defining a separate and distinct pool.

MR. RAMEY: Thank you, Mr. Hinkle.

Mr. Hinkle, it is counsel's opinion that to grant exceptions at this time would not be within the scope of this hearing unless the Commission saw fit to combine the Chacra with the Mesaverde and it wouldn't be within the scope of this hearing to grant exceptions to the existing wells so that would

probably have to be the call of another hearing.

MR. HINKLE: Your are ruling then that it would be necessary for us to make application after you issue your order for an exception, is that right?

MR. RAMEY: That's correct.

MR. HINKLE: Well, under those circumstances I don't know if it would be necessary for us to introduce evidence.

MR. DENT: What is the desire of the Commission on a de novo hearing in the second case if we sought it?

MS. TESCHENDORF: If we have testimony that relates to the subject of the de novo that would be, I think, within the scope of the call of this hearing but Mr. Ramey states that it goes to all of the operators who might be here to put on testimony for exceptions not necessarily having to do with the de novo just general exceptions --

MR. HINKLE: I hate to disagree with the attorney for the Commission but it seems to me that you could well make exceptions in this case if there is evidence that warrants it and I think there are others in the same position that we have that will probably want to introduce evidence.

MR. KELLAHIN: That's right.

MR. RAMEY: Well, perhaps we better hear all of the testimony that you have to offer.

MR. HINKLE: We will go ahead and present our testimony just the same.

MR. RAMEY: Yes, I think that would be best.

I think however we go on this, Mr. Hinkle, there will be a time lag on any order issued by the Commission whereby any affected operator would have time to come in and ask for any special hearing before the effective date of the order to get that cleared up so I will ask Ms. Teschendorf to proceed.

MS. TESCHENDORF: I would call Mr. Kendrick as my witness.

A. R. KENDRICK

called as a witness, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MS. TESCHENDORF:

Q. Please state your name, position and place of residence?

A. A. R. Kendrick, District Supervisor for the Oil Conservation Commission for the northwestern part of New Mexico. I reside in Aztec, New Mexico.

Q. Does that district include the parts of Rio Arriba and San Juan Counties that are involved in this case?

A. It does.

Q. Are you familiar with the subject matter of this

case?

A. I am.

Q. And what does the Commission seek?

A. We are seeking a redefinition of the vertical limits of the Blanco-Mesaverde Pool because the definition of record at this time is as follows: I would read from Section 2 of Order R-110 dated in November of 1951. (Reading.) The special rules and regulations for the Blanco-Mesaverde Pool contained herein shall be limited in their application to the present forty-two hundred to fifty-one hundred foot productive horizon where the productive sands are contained between the top of the Cliff House sand and the base of the Point Lookout sand of the Mesaverede. End of quote.

In my opinion that definition is not precise enough to define the vertical limits of the Mesaverde Pool. It does not relate to whether the well's surface location is in any particular township; it does not relate to any particular well; it does not relate to the altitude of the wellhead, so, therefore, by this definition it could entirely miss the Mesaverde interval if we completed a well between forty-two hundred and fifty-one hundred feet.

For more than two years I have had periodic requests for the definition of the top of the Cliff House or the base of the Point Lookout and as a geologist I was -- or as a district supervisor or district engineer, and not having made a very

precise study in the Mesaverde geology, I was not in a position to make this definition and I find that we do need this definition because in my opinion there is gas and probably oil being left in the ground because some operators are not at this time completing the wells deep enough or shallow enough to involve all of the sands that are available in what I consider to be the Mesaverde interval.

The completion of infield wells in the Mesaverde Pool and some Dakota wells drilled in the last two years has proven gas to be producible above what is currently described as the Cliff House formation. This has concentrated the request for a definition of the Blanco-Mesaverde vertical limits so I appointed a committee of twelve operating companies who operate larger numbers of the wells in the pool and invited the U. S. Geological Survey to participate in this committee. We had a meeting in our office in Aztec on December 16th and discussed the problem. Six companies and the Geological Survey were represented with us at our office. We discussed the problem, dispersed and went back our separate ways so each could consult with their companies and their geologists and other people to determine what their company's position might be.

On January 19th we reconvened, this time in Farmington. Eight companies and the Geological Survey were represented at that meeting. The Committee agreed in principle

to a top and bottom figure or position for the Mesaverde producing interval. The committee also agreed to offer exceptions to an area in the southwest flank of the Blanco-Mesaverde Pool where Chacra wells had been completed and where it was determined that a Chacra reservoir existed, that is sandstones of sufficient porosity and permeability existed which were identifiable on electric or radioactive or other wire line logs to be definable.

We dispersed that meeting after I had appointed a subcommittee to study the position of a line to run from northwest to southeast across the southwest flank of the Blanco-Mesaverde Pool, southwest of which would be an approved Chacra formation separate from the Mesaverde and northeast of that line that same interval would be classed as Mesaverde. The subcommittee was under the supervision or chairmanship of the Geological Survey geologist. They worked closely with him.

We reconvened again on March the second of this year to discuss the results of the subcommittee's work. At that time we elected Mr. K. C. Bowman, a consultant from Denver, to present the committee's findings and he is here today to make that presentation.

Q. Would you like to list for the record which companies those were that comprised the subcommittee?

A. I don't believe I have that real handy but --

Northwest Energy Company, Amoco Production Company; the Geological Survey prepared a cross section; Blackwood & Nichols Company prepared a cross section; El Paso Natural Gas Company and Mesa Petroleum Company.

I would like to thank all of the people who served on this entire committee and on the subcommittee for their help and diligence and it is my personal opinion that this problem has come a long way in a short period of time. We've made great progress. Thank you.

Q. Anything further at this time?

A. No.

MS. TESCHENDORF: Mr. Bowman, would you please identify yourself for the record and explain to the Commission the recommendations of your committee?

MR. RAMEY: One minute, please, let's see if there are any questions of the witness. Mr. Carr.

CROSS EXAMINATION

BY MR. W. CARR:

Q. Mr. Kendrick, when did this Mesaverde study group start to work on the problem?

A. When we met in December.

Q. Subsequent to that time did the Commission create additional Chacra pools?

A. Yes.

Q. What procedure generally does the Commission follow when it creates a new pool?

A. The procedure for creating pools or the procedure that we used at this time was that the Commission staff prepares information and calls the case and presents the testimony to create a new pool and I might carry on and explain a little bit that Mr. Maxwell who is working as the district engineer in my office was preparing a nomenclature case while I was presently involved in this case. I read his recommendations but they failed to jell and they crossed in the process.

Q. In your opinion would it have been better for the Commission not to have created the Navajo City and Animas Chacra pools until the report of this study of the committee?

A. I think it would have. It would have been a little better, yes, but like I say the two crossed but they seemed to be on different tracks when they came by.

MR. RAMEY: Any other questions of the witness? He may be excused.

(THEREUPON, the witness was excused.)

K. C. BOWMAN

Called as a witness, having been first duly sworn, was examined and testified as follows:

MR. BOWMAN: My name is K. C. Bowman and I'm a consultant geologist presently on retainer with Northwest

Exploration Company in Denver, Colorado, with residence in Golden, Colorado. I work also for the mother company, Northwest Energy Company, when called on to do so.

To establish my credentials at this hearing, a short run-down. In 1953 I first came into the San Juan Basin and worked as a mud logging engineer and core analyst in the Basin. In 1954 and '55 I got my BS in geology at the University of New Mexico. I was hired by Pacific Northwest Pipeline in June of 1955 and worked for them as a geologist until the merger with El Paso in 1960.

I worked on the Pictured Cliffs, Mesaverde and Dakota development in the San Juan Basin while with Pacific Northwest. I worked for El Paso from 1960 until 1968. I handled the Mesaverde workover program and Mesaverde development for El Paso in the early 1960's and I was also charged with preparing a Chacra study which was used by El Paso in a subsequent extension of Chacra drilling in the Basin.

In 1968 I returned to school and attended Oregon State University where I earned a PhD in oceanography. My concentration was in marine geology. My thesis area was sediments on the Oregon continental shelf, shallow marine depositions.

From 1972 to 1974 I taught at the San Jose State University, courses in oceanography and marine geology.

From 1974 to the present I have been retained by

Northwest Exploration and Northwest Energy Company doing geologic studies in the San Juan Basin and the Four Corners area.

We of Northwest were members of the committee, Mesaverde study group, and on March second I was asked to be chairman of the committee which I accepted and I was also asked to present the data that we had prepared to this Commission.

I want to make clear that the opinions I give today are consensus opinions of the study group. At our March second meeting we had unanimous consent to these findings and I believe, to the best of my knowledge, from the study group it is still unanimous consent.

I would like to take a moment to set the stage, the geologic stage for our findings, if I could, and the first thing I would like to do, with the Commission's consent, is read from the Lexicon of Geologic Names of the United States, a statement about the Mesaverde of the San Juan Basin.

This is a paper by Beaumont, Dane and Sears, 1956. It appeared in the A.A.P.G. Bulletin, vol. 40, no. 9, pages 2149 to 2162. (Reading.) Mesaverde group substituted for Mesaverde formation, throughout San Juan Basin and formations of the type locality, Point Lookout sandstone, Menefee formation and Cliff House sandstone, are also extended throughout the basin. Several names for units formerly called members

of Mesaverde formation in southern part of basin are retained as names of tongues or members of the formations of Mesaverde group. Name Gallup sandstone replaces Tocito sandstone lentil of Mancos shale. Crevasse Canyon formation of Allen and Balk (1954) is accepted for that part of Mesaverde group between Gallup sandstone and Point Lookout sandstone with Gibson coal member restricted at its top. Name Cleary coal member of Menefee formation is proposed for beds formerly included in upper part of Gibson Coal member of Mesaverde. Beds included in Chacra sandstone member by Dane (1936) appear to be about equivalent to combined upper two southward-extending tongues of Cliff House sandstone northeast of Newcomb. Name Cliff House sandstone will replace Chacra sandstone member. (End of reading.)

I have handed out Exhibit Number One to members of the Commission. This is from the 1955 Four Corners Geologic Society Field Conference. It's from a paper by Bosnick who as I understand was then with Gulf Oil.

Because I had a cross section, a stratigraphic cross section, which was much more visible than the hand out, I brought it along which I would like to use to make the geologic setting. In all parts it follows the handout of Exhibit One except for one small exception I will point out as I describe the cross section. This is a stratigraphic cross section from the southwest of the San Juan Basin to the Chaco slope section called here through the San Juan,

typical San Juan Basin section. I have a map here showing the general extent of this cross section from Township 20 North, Range 20 West on the southwest to Township 30 North, Range 2 East on the northeast. I would point out that this is a stratigraphic, not a structural cross section. A stratigraphic cross section better defines the attitude of the beds as they were laid down at the time of deposition and for that reason it is a little handier to use in studying problems of this type.

This cross section and Exhibit One show the sedimentary layers from the Jurassic Morrison at the bottom through the Cretaceous sequence, through the Tertiary sequence to the present surface which because this is a stratigraphic section is not a true representation of the surface.

When I speak of the San Juan Basin I refer to the area included within the Pictured Cliffs outcrop in northwest New Mexico.

The main two features I want to point out here are two major transgressions of the Cretaceous seas across the area under consideration today. The Mancos Sea transgression and the Lewis Sea transgression on this cross section, areas shown in gray, represent fine-grained marine sediments. Sediments colored here in yellow are sandstones. I have tried to show by different tones of color a regressive sandstone in light

yellow versus a transgressive sandstone in an orangish tone.

Continental beds that I will be referring to are in purple, this being the Menefee formation.

The transgressive Mancos Sea swept across the area The shoreline was to the southwest, the sediment source area was to the southwest, outside of our area of interest. The shoreline because of a change in sea level regressed back across the San Juan Basin area and the Chaco slope area from the southwest to the northeast and laid down what we call the Point Lookout sandstone, a regressive sandstone, completely across the San Juan Basin area. It was followed and covered with continental sediments of the Menefee formation, shales, sands and coals that wedge out to the northeast, you can see by the shape of the continental wedge.

The direction of the shore regression changed and the Cliff House sandstone was laid down in a transgressive sequence back across the Basin to a point outside of the southwest of the Blanco-Mesaverde Pool where most of us believe we lose the correlation on the Cliff House. This is the one point where Exhibit One varies from my exhibit here. We show a gap, a hiatus, where we lose the Cliff House and pick up again the La Ventana. This could be caused by a rapid erosive transgression or non-deposition for some reason.

This shoreline progressed to the Chaco slope area and stacked up sands that the USGS call La Vetana and Chacra

sandstone, shoreline sandstone.

I have walked these sands in outcrop and they appear to be typical near shore, shoreline type beach sands, near shore sands.

The Lewis shale was a shallow sea covering this area. It lay, of course, to the northeast of this shoreline sand development. Minor fluctuations in the level of the sea, sea level changes caused widespread regressions of these La Ventana and Chacra sands northeastward across the San Juan Basin and is typical of this type of sand. Your best porosity is closest to shoreline. As you get out into the deeper marine environment you find your sediments, you wind up eventually going from sands to silt and, of course, if it tongues out you end up with marine shales.

This sequence of minor regressions of Chacra and in some cases even transgressions of Chacra which do not concern us here, continued until the Lewis Sea deepened and swept across the area of the San Juan Basin and the Chaco slope. Again as with the Mancos, the shoreline then was to the southwest, your source areas to the southwest.

Once more the sea's shoreline changed direction and the Pictured Cliffs sand was laid down as regressive sand, the last marine sand in the San Juan Basin.

Subsequently continental sediments of the Fruitland and Kirkland were laid down and then the sequence of Tertiary

sediments which do not concern us here today.

This is a fast once over of the geologic setting on which we based our findings.

MR. RAMEY: Could you point out just what formations are being considered here in the Mesaverde?

MR. BOWMAN: All right. Mr. Ramey, could I read the findings and then come back to the questions?

MR. RAMEY: Yes, please.

MR. BOWMAN: This then was the conclusions and the findings that we came up with. I have distributed these suggestions to members of the committee and again we have a consensus, a unanimous consensus and I will read what we now suggest as the vertical limits of the Blanco-Mesaverde Pool.

One, the upper limit of the Mesaverde producing interval within the Blanco-Mesaverde Pool will be the Huerfanito bentonite bed as defined on pages six through eight, USGS Professional Paper No. 676.

A comment here, I would like to point out that this is an easily correlatable horizon throughout that portion of the San Juan Basin where we find the Blanco-Mesaverde Pool.

Number Two, the lower limit of the Mesaverde producing interval within said Pool will be defined by a point five hundred feet below the top of the Point Lookout formation.

A comment here, what Al Kendrick has so beautifully called the Upper and Lower Fuzzy of the Mesaverde is being

considered here, the Lower Fuzzy. It appears that fine-grained members at the base of the Point Lookout are petroliferous, appearing to contain valuable quanitities of gas and/or oil.

Three, to protect existing legal and/or equitable rights in established Chacra production from porous sands in the areal confines of said Pool, a line will be provided to demarcate the Chacra and Chacra equivalent hydrocarbon production into the following described portions. The demarcation line will be a northwest-southeast line which runs generally from the northwest corner of Township 31 North, Range 13 West, to the southwest corner of Township 24 North, Range 1 East.

Under Number Three, Part A, the portion northeast of said demarcation line, within which there is hydrocarbon production from the interval defined in paragraphs numbered one and two above, will be considered to be from a common source and treated as Blanco-Mesaverde Pool production.

Part B, the portion southwest of said demarcation line, within which there is or may be production from the Blanco-Mesaverde Pool, will be separated from the Mesaverde and treated as Chacra production within the various Chacra pools, existent and/or to be created.

Within this portion the vertical limits of the Chacra producing interval will be defined as extending from

the Huerfanito bentonite bed to a point seven hundred and fifty feet beneath said bed. The vertical limits of the Blanco-Mesaverde Pool would only include the interval from a point seven hundred and fifty feet below the Huerfanito bentonite bed to five hundred feet below the top of the Point Lookout formation.

That ends the suggested findings of the Mesaverde study group.

Now, Mr. Ramey's question then. What we are considering today for the bottom limit of the Mesaverde producing interval is a line five hundred feet below the the top of the Point Lookout. This would fall in the Mancos shale. We put it deep enough to insure that all of this Fuzzy Lower Point Lookout would be included.

The top of the Mesaverde producing interval is the Huerfanito bentonite bed which lies a few hundred feet below the Pictured Cliffs across the Basin and includes all that is shown here as Chacra, La Ventana, Cliff House, Menefee and Point Lookout.

CROSS EXAMINATION

BY MR. ARNOLD:

Q. Do you have anything indicating where the Huerfanito bentonite bed is in this cross section?

A. No, because this was prepared before the study group

started.

Q. How far below the Pictured Cliffs sandstone is it roughly?

A. May I refer to one of my cross sections? It varies. It's a stratigraphic time line. The Pictured Cliffs climbs stratigraphically to the northeast so it will vary. Here it is a hundred feet below the base of the Pictured Cliffs. At the other end of this particular cross section it is approximately five hundred feet below the base of the Pictured Cliffs but in all cases it appears to be well within what we would call marine Lewis shale. Does that answer your question?

Q. Yes, that answers it.

MR. BOWMAN: The Mesaverde study group looked at the question of the Chacra and realizing that we had to protect the correlative rights of producers that had been producing from an established Chacra Pool, we felt that we could define a line in the basin, a northwest-southeast line, which demarcated the porosity production from the Chacra.

We prepared six cross sections with this in mind and we came out with the six cross sections prepared by Northwest and by Mesa, by Mesa Petroleum, by Blackwood and Nichols, by El Paso Natural Gas and by Amoco and by the USGS and we had remarkable agreement.

The plan map here, Exhibit Number Two, shows the traces of the six cross sections that I will describe.

The Northwest Energy cross section is Exhibit Number Three. Amoco's cross section is Exhibit Number Four; and the USGS cross section is Exhibit Number Five; and Blackwood & Nichols cross section is Exhibit Number six; El Paso Natural Gas is Exhibit Number Seven; and Mesa Petroleum is Exhibit Number Eight, the far cross section.

Between the December and March meetings we prepared preliminary cross sections. At the March second meeting these preliminary cross sections were presented, compared and commented upon and we went back to the drawing board and prepared our final cross sections.

I asked the members, the designated members that I referred to of the Mesaverde study group who prepared the cross sections, to hang the cross sections on the Huerfanito bentonite bed. Again I want to emphasize that this is an easily recognizable correlatable point throughout the Blanco-Mesaverde Pool Unit extent. This is a very handy thing to have for a geologist if you have a recognizable time line, stratigraphic time line, that you can use as a definitive limit. It is very handy.

We agreed on a proposed northeast limit of Chacra pool production and we did this by examining two things. We examined the existing Chacra pools. The Otero Chacra is a type pool for the Chacra. The Chacra production extends northwestward along the strand line or trend line from the

Otero Chacra and there is Chacra production along that trend from the Otero to the Largo to the Harris Mesa to the Bloomfield Chacra in established pools.

We chose our cutoff line based on porosity indications from mechanical logs. This is for the most part electric logs. It included IES logs and in some cases where necessary, gamma logs.

I asked the members to color with yellow those sands that they felt were porosity production from the Chacra and that appears on each of the cross sections in yellow.

I asked them also to show their proposed northeast cutoff for Chacra porosity production. I also asked them to dash in a line seven hundred and fifty feet below the Huerfanito bentonite bed to show the base of the Chacra producing interval in that area southwest of our demarcation line. I asked them to put two correlation lines in, the top of the Pictured Cliffs where applicable and where their log showed the Pictured Cliffs and the top of the Point Lookout.

I also asked them to dash in a line five hundred feet below the top of their Point Lookout pick which we would use then as the base of the Mesaverde producing interval.

El Paso Natural Gas was kind enough to prepare the plan map that we are using here today.

At the March second meeting we picked a general demarcation line to demarcate the porosity Chacra to the

southwest in what we believe to be fractured siltstone production to the northeast of the demarcation line.

As I said, this line was constructed before the cross sections and we drew the line around the township units very carefully so as not to divide a unit, an operating unit, into two separate parts for the purpose of this demarcation line. I asked El Paso to square off on full section boundaries the line where it existed, being very careful to ask them not to move the line in any case southwest of the line we picked at the March second hearing. This line then is a result of that work and the result of our findings on the demarcation line.

MS. TESCHENDORF: Mr. Bowman, this line you are referring to is on Exhibit Two, is that correct?

MR. BOWMAN: This is on Exhibit Two.

I think that all of the members of the Mesaverde study group, as far as I can tell, believe that the Chacra production northeast of the Chacra demarcation line is from a fractured siltstone reservoir and in dealing with fractures, as most of you know that have worked with any fractured formation, you have a high random element of fracture distribution. We believe these to be high angle fractures. We do not believe that the hard data is in yet with which to fully define the reservoir. These wells in no case that I know of have been cored through this Chacra producing interval, Chacra equivalent producing interval, nor in most cases do sufficient logs exist with which

to evaluate these sands or silts.

This is not true southwest of the line where abundant information is available, cored wells and mechanical logs with which good reservoir engineering studies can be made of the Chacra production.

I have two more exhibits for the record. They are the type logs that I prepared. They are Exhibit Number Nine and Number Ten. These wells I picked from the existent cross sections. The well that I picked southwest of the demarcation line is the El Paso Natural Gas Company Johnson State No. 3. It is in Section 32 of Township 26 North, Range 6 West and it illustrates very well the nature of the Chacra porosity production and I would just like to show this to the members of the Commission so that they can sense the criteria which we used to show the porosity production from the Chacra.

MR. KENDRICK: Mr. Bowman, the log that you picked, the type section log, is it on one of the cross sections?

MR. BOWMAN: It's on one of the cross sections, it is from Blackwood & Nichols' cross section.

MR. KENDRICK: Thank you.

MR. BOWMAN: Exhibit Number Ten is from the USGS cross section. It is the El Paso Natural Gas Company Barren Kit No. 7. It is in Section 21 of Township 30 North, Range 6 West and it shows the change in character of the Chacra equivalent zone. It is quite apparent to anybody who has worked

with electric logs that we are dealing with a much finer grained sediment on the Barren Kit No. 7 and that the good porous sandstones have disappeared. We, the study group, believe that this is the type of section from which we are producing in the fractured siltstone Chacra production.

I think that will conclude our results.

MR. RAMEY: Any questions of the witness? Mr. Kendrick?

CROSS EXAMINATION

BY MR. KENDRICK:

Q. Mr. Bowman, your Exhibit Two, an area map which you said was prepared by El Paso Natural Gas Company, what is shown on that other than the trace of the cross sections which are Exhibits Three through Eight and the demarcation line which you previously testified to?

A. Thank you, Mr. Kendrick, that shows what happens when you get a little bit away from your prepared notes.

On this plan map that El Paso prepared they show all of the Mesaverde development wells within the Basin and this includes any well in which the Mesaverde was tested. If there was a dry hole in the Mesaverde it so designates by a dry hole symbol. If it is a producing well it is so designated by a producing symbol.

It does show the overlap of the Blanco-Mesaverde and

Chacra pool production wherein we are segregating the Chacra from the Mesaverde producing interval. It is not a Mesaverde penetration map but a Mesaverde testing -- I can't find the right word. It's a Mesaverde production map.

Q. Thank you.

MR. RAMEY: Mr. Arnold.

CROSS EXAMINATION

BY MR. ARNOLD:

Q. Doctor Bowman, in the area north of the demarcation line between the two there where you have production in the Chacra interval, do you feel that that gas comes from the same original sources of supply as the gas in the Blanco-Mesaverde?

A. Mr. Arnold, I don't think the data is in yet to make that conclusion. I think the source of the Mesaverde gas is still a point of contention. I'm not sure that we really know whether the Mesaverde gas itself in the Point Lookout, Menefee and Cliff House, whether it is sourced in the Mancos shale and the Lewis shale or the Menefee, whether we are speaking of a common source, in the overall aspect we are speaking of a common source.

Q. I wasn't necessarily talking about where it originated in the first place but the gas that is contained in the Cliff House and the Point Lookout now, I wondered if in your opinion it is in communication with the gas in these Chacra zones north

of the --

A. I have heard conflicting evidence and I haven't seen the hard facts so anything I would say would be an opinion of my own. The Mesaverde study group felt as I did that it had not yet been determined.

Q. Actually shouldn't that be the determining factor in what we decide should be the vertical limits of this pool that is what is a common source of supply?

A. Well, that in addition to the prudent operation of these wells as Mr. Kendrick pointed out. We have a wellbore there and we should prudently produce the formations as we can while we have a good wellbore there.

Q. All right, but you couldn't very well prudently produce both zones without changing the vertical limits of the Blanco-Mesaverde Pool?

A. Quite true, you would have to have a commingling order, I suppose, a commingling order in each instance, isn't that true?

Q. You would have to dual complete.

A. Or a dual completion.

Q. Or have separate wells?

A. Right.

MR. ARNOLD: I believe that's all I had.

CROSS EXAMINATION

BY MR. RAMEY:

Q. Doctor Bowman, would you point out on your Exhibits Three, Four, Five, Six and Seven where your line is that separates the Chacra production as such from what you are proposing as Mesaverde?

A. May I first point out the Huerfanito bentonite bed in there?

Q. Yes, if you will.

A. The Huerfanito bentonite bed on which the cross section is hung is here. This dashed line in this case is the proposed northeast limit of the Chacra Pool. In each case, I believe, in each case on the cross section that line and this line are coincidental. They are the same line. We tried to show it on the plan map as well as on the cross section.

MS. TESCHENDORF: Mr. Bowman, could you be a little more specific about which exhibit and which line you are referring to?

A. I'm referring to Exhibit Number Four in this instance and again what we believe to be Chacra, porous Chacra production, is shown in yellow. On the subsequent cross sections the same schema is used. Exhibit Number Five, here is the Huerfanito bentonite bed. Here is the line of demarcation, the Chacra demarcation line, which shows in small scale, I believe here. I'm sorry, it does not show on the USGS cross

section. The porous Chacra sands are shown in yellow.

Number Six, Exhibit Number Six, the Huerfanito bentonite marker, here is the cutoff line right here and I don't see it on the index map, the Chacra sands.

On Exhibit Number Seven, again the Huerfanito bentonite marker, the dashed cutoff line here and the Chacra sands in yellow again.

Exhibit Number Eight, the Huerfanito bentonite marker, the cutoff, the Chacra sands.

Q. In each case the cutoff line is at where it has been determined where there is no more porosity?

A. In the Chacra?

Q. In the Chacra.

A. This is our belief, yes. These points in the cross sections were used then to draw the demarcation line.

MR. RAMEY: Any other questions of the witness? Mr. Nutter?

CROSS EXAMINATION

BY MR. NUTTER:

Q. Doctor Bowman, referring to your pretty exhibit up there, the purple wedge is the Menefee, is that right?

A. Correct, sir.

Q. Okay, now, above that on the right-hand portion, the gray area is the Lewis shale?

A. Correct.

Q. And then above the purple to the left of the Lewis shale we have the yellow and the orangish colored area and that is the porosity on that cross section in the Chacra formation, correct?

A. Yes. Doing a stratigraphic cross section like this you may take a little bit of liberty in extending your lines but it is constructed in the same scheme that these were constructed. They were on the mechanical logs and it appeared to be that there was porosity sands, yes, sir.

Q. Now, that was what I was going to ask you next. I see some long fingers or tongues of porosity extending into the shale?

A. Yes, sir.

Q. However, essentially the main body of it stops at about the point where you've got your hand. Now, if you were going to draw the vertical line as these other cross sections show, to show the end of the Chacra formation, the porosity on the left and the lack of porosity on the right, that would be the approximate place where you had placed your hand on it?

A. Correction, if we had applied ourselves to that problem. We were not applying ourselves to that problem. This is well outside of the Blanco-Mesaverde Pool and we are not concerned with that, with the place where we did have the buildup. What we were concerned with was the place that we had

the porosity pinchout which is within the confines of the Blanco-Mesaverde Pool unit.

Q. Okay, now, in preparing these cross sections was some particular value chosen as far as net feet of porosity or total porosity feet?

A. We didn't try to do a reservoir engineering sort of study. What we did was take the last well in which it was apparent that there was a porosity development in the Chacra based on usually SP but influenced by reason of study, of course, and this was what we used.

Q. Not all of these cross sections where they show porosity in the Chacra or maybe none of them, I don't know, but all of those wells on the left side are not productive in the Chacra?

A. No, sir, but we do believe they have porosity sands.

Q. Now then as we proceed to the right on the cross section we lose that porosity and then we get into what you refer to as a fractured siltstone, if you have production in there, is that it?

A. Yes, sir, random production. Apparently at this time it is a random production due to random fracturing.

Q. And do we call it Chacra or do we call it Lewis shale when we get out there?

A. This is what the Mesaverde study is suggesting, that we include it within the Mesaverde producing interval and take

this out of the problem whether we call it Chacra or not. We just call it all Mesaverde and commingle it in essence with the rest of the Mesaverde. We felt that this was a prudent conservation approach to this problem.

Q. It's no Chacra sandstone though, is it?

A. No, I believe it is a Chacra siltstone and I refer to it as a Chacra equivalent.

Q. I see. And to the left is Chacra but this is Chacra equivalent then?

A. Yes, sir. I think it is a -- well, you can see it on the wall. I think it is a siltstone.

MR. NUTTER: Thank you.

MR. ARNOLD: Just a little bit further. Do you feel that that is a vertical fracturing sort of system which reaches from the Cliff House sandstone across the Chacra interval probably?

MR. BOWMAN: Mr. Arnold, I have cored a lot of Mesaverde wells and I've looked at a lot of natural fractures in the Mesaverde and they are usually high angle fractures. Whether those things extend up through the Mesaverde transition and into this Chacra I really don't know. I wish I could give you a definitive answer. I don't think we have enough evidence. I understand that Mesa may offer some evidence that it does not.

MR. ARNOLD: I just wanted your opinion.

MR. BOWMAN: All right, sir.

MR. ARNOLD: Thank you.

MR. RAMEY: Mr. Kellahin.

CROSS EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Bowman, I'm having trouble seeing that far but if I was up there I probably wouldn't understand it anyway. Can you give me somemore background on that plat behind the court reporter there? What's that number?

A. Number Two, I believe.

Q. Have you figured out how many Mesaverde wells are north of that demarcation line?

A. No, we did not make a count. It would be possible to do so but we did not do so.

Q. There is obviously a substantial number of them?

A. Correct.

Q. And there is also a substantial number south of the line?

A. Less than there are north of the line, correct.

Q. How many Chacra wells are north of that line?

A. I may have to call on Mr. Kendrick to help me. My understanding is that there may be five that we would think of as Chacra equivalent production.

MR. RAMEY: Can you clarify that, Mr. Kendrick?

MR. KENDRICK: At the present time there are four.

A. I stand corrected.

Q. (Mr. Kellahin continuing.) And how about south of that line with regard to Chacra wells?

A. I don't have a count, if somebody does --

Q. On your cross sections that were prepared there are some six of them, right?

A. Six cross sections.

Q. Six cross sections that are designated on your plat?

A. Right.

Q. The cross sections, how do I find the first well on the left of each cross section, is that the bottom well on the line up there?

A. There are two ways to do that, either referring to the traces as shown here in which the wells are symbolized on the map or in almost all cases to go to the plat that accompanies the cross section, again, the wells are numbered and symbolized.

Q. I want to read the cross sections from left to right and I want to apply them to your plat over there, do I start in the south corner and read to the north?

A. That's right, from the southwest to the northeast.

Q. How far apart is that northwest cross section from the next cross section. I think that is the Amoco.

A. Can I give you an approximation?

Q. Yes, sir.

A. It looks like about ten miles.

Q. How far is the distance from the Amoco cross section to the USGS cross section?

A. About ten miles.

Q. And the next one to the Blackwood & Nichols cross section?

A. Again, approximately, it appears to me to be about ten miles.

Q. The Blackwood & Nichols to the El Paso cross section?

A. About ten miles.

Q. And the El Paso to the Mesa cross section?

A. About ten miles. In the study group we tried to space them equitably.

Q. Would you tell me again, I wrote them down and I'm not sure I have them correct, your pick on the top and bottom on the Mesaverde. The top you told me was the Huerfanito bentonite bed?

A. Except where we have segregated the Chacra, yes.

Q. And the bottom of the Mesaverde was five hundred feet below the Point Lookout?

A. The top of the Point Lookout.

Q. Now you segregated out the Chacra below on the south side of the demarcation?

A. Southwest of the demarcation.

Q. Southwest of that line. You set a bottom then of

seven hundred and fifty feet below the Huerfanito bentonite bed?

A. That is correct.

Q. Why seven hundred and fifty feet?

A. Because in the March second meeting we all looked at the cross sections that had been prepared and we saw that seven hundred and fifty feet would include all of the Chacra that was producing to date and that we felt would be productive at some future date. We felt that the seven hundred and fifty feet would include all of the gas production, hydrocarbon production, that we felt would be coming from the Chacra sands.

Q. With the exception of those four or five wells north of the demarcation line that occurred in the Chacra?

A. That wasn't a point there, of course, because we were including that as Mesaverde.

Q. How do you conclude that is Mesaverde, Mr. Bowman?

A. Because I think I have established that the Chacra is a Mesaverde and we are merely segregating the Chacra production southwest of the line as a convenience to those operators who have drilled those wells historically and are in a historically established pool.

Q. I thought you would tell us that there was probably some fracturing in that area that would account for those Chacra wells northeast of the line and, therefore, in your opinion they ought to be included in the Mesaverde?

A. I did not use that as an argument for including those in the Mesaverde, I don't believe. My argument for including this interval within the Mesaverde was a geologic argument, not a production argument.

Q. Did you do any kind of pressure studies to determine where this demarcation line ought to run?

A. No, we didn't feel confident, we are not reservoir engineers, we are geologists.

Q. To your knowledge no pressure studies were done on this particular area?

A. To my knowledge they have been done but I learned this very recently, within the last day.

Q. We talked about these fingers of porosity, is there anything to preclude these fingers of porosity extending northeast beyond your demarcation line, in between your cross sections?

A. We considered that in the Mesaverde study group and none of us felt that we would find -- many of us in the study group have worked with the Mesaverde for many years. I have worked with it for some sixteen years. I have looked at, I think, almost every Mesaverde well that has been drilled. I couldn't in all honesty say that there were porous sands northeast of the line and I think by consensus that is the opinion of the Mesaverde study group.

Q. Mr. Bowman, have you ever been retained or are you

retained by Blackwood & Nichols Company?

A. No, I never have. I covered in my introduction my complete employment, geologically speaking.

Q. Could you explain again to refresh my memory, Mr. Bowman, about the fracturing you have indicated has taken place in the Mesaverde. I missed some of your explanation there. Would you mind repeating it for me?

A. Well, fracturing in the Mesaverde -- about the only way you can establish fracturing with any certainty is by coring the formation and high angle fractures in these cores that we bring up out of the wellbore have in every instance where I cored the Mesaverde and that may be -- let me guess, about twenty to twenty-five wells -- in every instance there are high angle fractures that are apparent when you get them out of the ground and as a personal opinion I believe that these are very effective permeability pathways in the Mesaverde

Q. Did you map those fractures in this Blanco-Mesaverde Pool?

A. It's impossible to map them by any method that I know of. We have tried and attempts are now proceeding for this type of thing but it is a very difficult problem.

MR. KELLAHIN: Thank you.

CROSS EXAMINATION

BY MR. DENT:

Q. Mr. Bowman, in the study of the group --

MR. RAMEY: Will you identify yourself for the reporter, please?

MR. DENT: Don Dent from Mesa Petroleum.

Q. (Mr. Dent continuing.) In your study group as shown by cross sections Three through Eight, you have colored in yellow the identifiable fingers of Mesaverde production, is that correct?

A. Chacra sandstone.

Q. Chacra, and you can identify it as a geologist, is that correct?

A. The only clarification I make is that these are the result of each individual that worked up the cross sections so we have here six different opinions. They are remarkably coincident.

Q. But you do have the six opinions of different geologists identifying the Chacra formation as it fingers or is situated in that area.

A. Again I would like to clarify. I asked them in a letter to color in what they believed to be porous Chacra sands on the cross sections. This is the result.

Q. And have you looked at their work?

A. On the cross sections, I have looked them over, yes, sir.

Q. And do you agree with it?

A. Yes, with very minor differences.

Q. If you are a geologist you can look at cross sections and identify the Chacra so why do you need to arbitrarily select a line of demarcation?

A. Again back to our argument, to start with we felt that those operators who had drilled Chacra wells in the porous production area needed protection.

Q. What about those operators north of that line that also may need protection, that is to established vested property rights in separate reservoirs?

A. Are you asking me an opinion?

Q. Well, yes, I'm asking do you also feel they need protection?

A. Yes, sir.

Q. In the study group, did you attend the meeting in Farmington on the nineteenth of January?

A. The nineteenth of January, yes.

Q. And I believe there Northwest passed out what they stated to the group was a position of Northwest Pipeline and I believe, and I read and I'm quoting from their position: A Chacra production line within established Chacra pool limits presently defined by the New Mexico Oil Conservation Commission and authorized extensions of same would be exempted from the Mesaverde. (End of reading.) Now, that was the general premise you worked from, was it not?

A. Yes, sir, I didn't know the existence at that time -- I had a hand in writing that up and I did not know of the existence of the two pools northeast of the demarcation line, if they did exist at that time, I don't know, I still don't know.

Q. Well, are you familiar with existing orders of this Commission which have established Chacra pools north of that line?

A. I am so informed.

Q. And in your study did you further inform yourself as to why the Commission delineated separate reservoirs or separate pools?

A. No, sir, I have not looked at the legal aspects of this.

Q. Well, as a geologist did you examine anything that had been presented to this Commission?

A. Is there a geological question involved?

Q. Well, as to these established by the Commission when they established a Chacra pool -- on what basis?

A. No, I do not.

Q. So there are Chacra producing pools recognized by this Commission north of your line of demarcation are there not?

A. That is correct.

Q. But you have not studied any information or data or

geological evidence that might show you as a geologist as to why the Commission delineated the pools as such?

A. I'm here as a spokesman for the Mesaverde study group and we did not as a group look at this particular information. There are people present I'm sure that can answer your question.

Q. But is it your opinion that the siltstone, Chacra siltstone, lying northwest of your line of demarcation is non-porous and incapable of having hydrocarbons within its confines of this reservoir, is that your testimony?

A. I didn't apply myself in my testimony to that particular problem. I have my own personal opinion about those things.

Q. What is your opinion?

A. You are asking a personal opinion and not an opinion of the Mesaverde study group --

Q. Well, you are an expert, are you not?

A. That's true, but I'm a spokesman here for the Mesaverde study group.

Q. What is your own personal opinion?

A. Well, I'm quite sure that there is porosity in siltstones as there is in shales.

Q. I believe you referred that to what in your opinion was the Chacra equivalent?

A. Yes, sir. I would like to point out one other thing. Porosity and effective porosities are two entirely different

matters when you come to production. You do need permeability of existing porosities to make it an effective porosity to have production.

Q. But if you have porosity that is recognizable as Chacra porosity, and if you have the permeability so that it will effectively give up hydrocarbons, would you have any objection to this Commission either continuing its present classification or further classifying those reservoirs as Chacra reservoirs?

A. Personally I have no objection whatever but I would point out that to this date this production has been very random and I fear it may be overlooked in the future if -- I believe that what we have found in the Mesaverde study group is the best approach to it, that's all I can say.

Q. Would you agree with me that based on what you have presented right here you have a marker which to me, I'm not a geologist, you could readily identify the Chacra formation if it's present?

A. It's a gradational change in the sediments and I think I can recognize the log characteristics, I'm not sure I can tell you from the log characteristics exactly what the lithology is, that's the problem.

Q. But you can tell from the logs whether or not it's Chacra or whether it's Mesaverde, can you not?

A. I have tried to establish the Chacra as part of the

Mesaverde.

Q. Well, it's apparent from here and I haven't looked at those real close but I think that the reflection on those logs in the area of the Chacra are different than where you are in the Mesaverde, in the well that is considered Mesaverde.

A. I think, Mr. Dent, you missed my point when I read from the lexicon which includes the Chacra as a continuation of the Cliff House and points out that it is part of the Mesaverde. This is the basis of much we did in the Mesaverde study group.

A. I understand that but you're saying though that northeast of this arbitrary line of demarcation that this Commission no longer recognizes as a separate and distinct geological pool any formations that is identifiable as Chacra, it becomes Mesaverde, is that correct?

A. That is our suggestion. Let me clarify one thing that it is an opinion, I tend to think that this would be for any subsequent well after this order has become effective.

Q. So you then adopted the position of northwest initially when you formed the study group, that any Chacra reservoir that has been delineated as such by this Commission where it presently is producing from a Chacra formation should continue to be classified as Chacra production, is that your testimony?

A. Not exactly because you obviously are referring to

the two fields northeast of those. As an opinion again, I don't have any -- personally I don't have any objection to an exception but I don't think that should be continued, I don't think that practice should be continued, I don't think that is prudent operation and what the study group is trying to get at I think is prudent operation conservation-wise.

Q. Now, the area that you are referring to again, I think in answer to Mr. Ramey's question a moment ago about the Mesaverde and the Chacra, would you again point to that area which you say is outside the study area or just point out to me what part of that beautiful Exhibit One is covered by the study group?

A. The Blanco-Mesaverde Pool outline would be somewhere, I imagine, about here. This would be the southwest limit of the Blanco-Mesaverde Pool. I'm making an estimation, I hope you realize that, the Blanco-Mesaverde Pool extending northeastward from that line.

Q. It extends northeastward?

A. Right.

Q. So there you do have, I believe, fingering Chacra within there and that then your line of demarcation is attempted to be at that point?

A. If this is the Blanco-Mesaverde southwest limit. Our line of demarcation falls slightly to the northeast of the furtherest extent of the porous Chacra within the Blanco-

Mesaverde Pool.

MR. DENT: I have no further questions.

MR. RAMEY: Yes, sir?

MR. CARR: Millard Carr with Tenneco.

CROSS EXAMINATION

BY MR. M. CARR:

Q. Doctor Bowman, I wonder if you could summarize a statement you just made a moment ago and also previously in response to a question by Mr. Kellahin, just how you have already established that the Chacra is part of the Mesaverde?

A. Geologists tend to use source material such as the Lexicon of Geologic names.

Q. When did you establish this?

A. I didn't establish it, it was done by Beaumont, Dane and Sears in 1956 as expressed in the Lexicon of Geologic Names.

Q. That is the source material for that?

A. That is the source of the statement that I made, yes, sir.

MR. RAMEY: Mr. Carr?

MR. CARR: I'm William Carr for Blackwood & Nichols.

CROSS EXAMINATION

BY MR. W. CARR:

Q. Mr. Bowman, correct me if I'm wrong, but I understood you to say that north of your line of demarcation on Exhibit Number Two it was more difficult to determine exactly where the Pictured Cliffs wells were completed.

A. I'm sorry, would you please restate it.

Q. Well, I understood you to say that on Exhibit Number Two north of the line of demarcation it was more difficult to determine exactly where the various wells were completed than south?

A. No, I didn't mean to infer that if I said it.

Q. Are you able to determine north of the line as easily as south whether or not you have a common source of supply?

A. I'll answer you this way. Southwest of the line where there are apparent sands, apparently these sands are the reservoir. We in the Mesaverde study group believe this to be true. Northeast of that line the reservoir is more vaguely defined and it seems to be controlled to the best of our knowledge by random fractures, angle fractures.

Q. In the reservoir northeast of the line did your study group, based on the state of knowledge they had available to them, recommend to the Commission that this be treated as a common source of supply?

A. May I refer to my statement that I read here. It will be considered to be from a common source.

Q. You recommended that the Commission consider this as a common source?

A. Consider it to be.

Q. Now, I noticed that from Mr. Kendrick's testimony four Chacra wells northeast of this line of demarcation. Is this possible that these have been erroneously classified as Chacra and are merely the result of fractures in other Mesaverde sands?

A. I have looked at the producing intervals on at least three of the four wells and it apparently is from zones within the overall Lewis shale interval which includes these siltstones which is above what we consider to be the Cliff House.

Q. Now, your cross sections on Exhibit Two are about ten miles apart?

A. Yes, sir, that was a guess, an approximation.

Q. In your opinion can you, based on what these cross sections show, determine with a reasonable certainty that the Chacra does pinchout on or close to your line of demarcation?

A. I don't know that pinchout is a good word. I would say it grades or it facies gradationally from a sand to a siltstone within the limits of our study.

Q. I would like to go over your Exhibit Number One and you have been, and I'm not trying to beat a dead horse, would you explain that? You were not trying to -- when you prepared

all of your other cross sections, you were not trying to determine where there was any Chacra sand but where there was none, is that correct?

A. This was the purpose of the demarcation line, to try to establish a safe zone beyond or northeast of which we did not believe the porous sands would exist.

Q. Had you encountered any evidence of Chacra or Chacra sands in any of these would you have moved your demarcation line?

A. Very definitely, very definitely, yes.

MR. RAMEY: Any other questions of the witness? He may be excused.

(THEREUPON, the witness was excused.)

MR. RAMEY: We will take a fifteen minute recess.

MR. KENDRICK: Before we go to recess may I make one comment before any other witnesses go on the stand?

It is our request that the Commission go ahead and issue an order at an early date after this hearing should they decide to go along with this recommendation. We would recommend that the effective date of the change and the identity of the vertical limits of the Mesaverde be effective July first or some date in the proximity to allow any objections or companies who wish to ask for exceptions a chance to call a case and have that heard before this date goes into effect. Thank you.

(THEREUPON, the hearing was in recess.)

MR. RAMEY: The hearing will come to order.

Ms. Teschendorf, do you have anything further to add?

MS. TESCHENDORF: First on behalf of the study commission I would like to offer Exhibits One through Ten into evidence.

MR. RAMEY: Without objection they will be admitted.

(THEREUPON, Exhibits One through Ten were admitted into evidence.)

MS. TESCHENDORF: And secondly, Northwest Pipeline has not entered an appearance in this case but they have furnished a statement to the Commission instructing their support and agreement with the findings of the Mesaverde study group.

MR. RAMEY: Mr. Carr, I believe you are next.

MR. W. CARR: I would call Charles Blackwood.

CHARLES F. BLACKWOOD

called as a witness, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. W. CARR:

Q Will you state your full name and place of residence?

A. Charles F. Blackwood, Oklahoma City, Oklahoma.

Q. By whom are you employed and in what position?

A. I'm an independent consultant in this matter. I have been employed by Blackwood & Nichols Company.

Q. Have you previously testified before the Oil Conservation Commission and had your credentials accepted as a matter of record?

A. No.

Q. Would you briefly summarize for the Commission your educational background and your employment history?

A. I attended the University of Oklahoma and received a Bachelor's degree and Master's degree in geological engineering, completing that in 1960.

I was an officer in the Corps of Engineers for approximately three years, making geologic maps from aerial photographs. I was employed for seven years by J. M. Huber Corporation as an exploration engineer, making oil and gas evaluations, geologic maps, studies pertaining to where to drill and why in the Oklahoma and Texas area.

I was also employed for five years by Basin Petroleum Corp. as the vice president of their oil and gas division, basically, again, concerned with geologic and engineering studies, reservoir studies and such.

For the last two years I have been an independent consultant.

Q. Are you familiar with the the Northeast Blanco Unit?

A. Yes.

Q. And you are an agent here today for the unit operators, is that correct?

A. Yes.

MR. W. CARR: May it please the Commission, I tender Mr. Blackwood in addition to his knowledge as an agent for the unit operator, as an expert witness in the area of geological engineering.

A. I might add that I have appeared as an expert witness before the Commissions of Oklahoma, Arkansas and Kansas and am a registered professional engineer.

MR. RAMEY: We won't hold that against you, we will accept you as an expert witness.

Q. (Mr. Carr continuing.) Mr. Blackwood, are you familiar with the subject matter of these consolidated cases?

A. Yes.

Q. I would like briefly to ask you several questions concerning history of the Northeast Blanco Unit. When was this unit created?

A. It was created in 1951. If you would like a more precise date I have it.

Q. That will be fine. Has the Mesaverde participating area been extended since the original creation of the unit?

A. Yes, originally a group of companies went together

and formed approximately a thirty-two thousand acre unit area and then shortly thereafter the first Mesaverde participating area was formed of approximately twelve thousand, one hundred and forty-six acres. That was in May of 1952. It has been expanded five times since then to now a total of thirty-two thousand, five hundred, eight acres.

Q. Does this now include the entire Northeast Blanco Unit?

A. Yes, sir.

Q. Does the horizontal limits of the Northeast Blanco Unit encompass portions of the newly created Navajo City-Chacra Pool?

A. The Northeast Blanco-Mesaverde Unit encompasses everything from the surface to any depth that acreage is owned or that rights are owned. The only participating area is for Mesaverde and the Mesaverde as defined by the unit participants is somewhat slightly thinner vertically than the recommended Mesaverde definition of the study group but they are very similar.

Q Was not the Blanco Unit Well No. 64 drilled not only in the Northeast Blanco Unit but also acreage which has recently been designated by the Commission as being in the Navajo City-Chacra Pool?

A Yes, the order which we took exception to naming the Navajo City-Chacra Pool includes the south half of Section

24 on which this Well No. 64 is located.

Q. In the number and largeness of the participating area for the Mesaverde, how was the Mesaverde defined when you were making application for the enlargement of the participating area?

A. Well, sort of like the State, there has never been a specific vertical definition mentioned. The words "Mesaverde formation", "Mesaverde interval", "Mesaverde group", various names were used and no specific definition was ever written until October of last year by the unit.

Q. I would like to direct your attention to the drilling of the Northeast Blanco Well No. 64. When was this well drilled?

A. It was started in June of 1976 and completed on July 10th.

Q. Whereabouts is it located?

A. It's in the southeast quarter of Section 24, Township 30 North, Range 8 West, San Juan County, New Mexico.

Q. Now, was this well drilled pursuant to the unit plan of development?

A. Yes, sir.

Q. Why was it drilled?

A. The Section 24 contained two Mesaverde wells and the offsetting section to the south contained three Mesaverde wells and we were requested by the governmental agencies, specifically the USGS, to drill a third Mesaverde well to protect the unit

from offset drainage and we included that in our plan of development and drilled the well.

Q. What is the spacing of the Mesaverde formation?

A. Generally three hundred and twenty acres.

Q. Is there infield drilling allowed in this area?

A. Yes, it is allowed to drill a second well to each three hundred and twenty, bringing the density up to one well on each one sixty.

Q. What is the spacing of the Chacra formation?

A. I understand it is one hundred and sixty acres.

Q. In your opinion is the Northeast Blanco Unit Well No. 64 in communication with other offsetting wells?

A. It depends on how you think about that. I would say that the fractures that we found in the No. 64 Well in my opinion are in communication with the basic Mesaverde reservoir in which all of the other wells in the area are completed in.

Q. Who owns the lease on which this well is drilled?

A. Tenneco and Conoco.

Q. Whereabouts did you encounter production, at what depth?

A. At about forty-two hundred and fifty feet we encountered a gas flow.

Q. Now, was this a Chacra or a Mesaverde well?

A. Well, we consider it a Mesaverde well.

Q. If it is a Mesaverde well who owns it?

A. Then the unit participants own it.

Q. And if it is a Chacra well who would own it?

A. Tenneco and Conoco.

Q. Now, I gather the dispute was as to whether this was a Chacra or a Mesaverde well?

A. Yes, after the well was completed and tested Blackwood & Nichols filed on behalf of the unit and its participants, the normal State completion form and in one of the little blanks where you designate the pool reservoir we said Blanco-Mesaverde. That was returned to us with a line drawn through Blanco-Mesaverde and penciled in, undesignated Chacra.

Q. Now, what did you do to resolve this dispute?

A. Well, the first thing we did was to start checking our own unit records to see if we had defined Mesaverde and we found that we did not have any precise definition. We had been going on something like the State had been going on, forty-two hundred to fifty-one hundred feet with no well locations, no elevation, nothing to tie it down to anything specific.

Of course, I should point out that our well is within the forty-two hundred to fifty-one hundred foot that the State had been using all of this time. We checked our records and could not find that we had a specific definition so we started to write one. We checked the literature and we called a meeting of the participants in the unit and we wrote

a definition which we have gotten something like sixty-eight percent approval of the people present and we wrote a definition and got the approval of the unit participants.

Q. Now, your unit operating agreement and your unit agreement provide for an operating committee to resolve matters of this nature?

A. Yes.

Q. When did this operating committee meet?

A. It was in October of 1976.

Q. And what was the conclusion?

A. Well, the conclusion was that we made a specific definition of the vertical limits of the Mesaverde. I have a copy here of the application for a definition of Mesaverde that was approved by the majority of the unit participants and that we filed with the USGS for approval back in 1976.

Q. Now, you noted that some individuals dissented from the conclusion of the operating agreement?

A. Yes.

Q. Who dissented?

A. Tenneco and Conoco dissented and El Paso dissented.

Q. Now, you may have stated this, how did this committee define the Mesaverde?

A. Well, let me read it to you.

MR. RAMEY: This is the unit committee?

MR. W. CARR: This is the unit committee, not the Oil

Commission study group.

A. (Reading.) Resolved that the term Mesaverde as used in the application for approval of the Mesaverde participating area for the Northeast Blanco Unit, I-SEC. No. 929, San Juan and Rio Arriba Counties, New Mexco, and in subsequent applications for enlargements thereof and sometimes followed by the term, zone, formation, horizon or the like, all such applications duly approved by the director of the United States Geological Survey, the Commissioner of Public Lands, State of New Mexico and the Oil Conservation Commission, State of New Mexico, is hereby defined as the stratigraphic equivalent of the interval between the base of the green shale marker, which occurs at a depth of four thousand, fifty-four feet on the gamma ray neutron log dated May 31, 1957 of the Blackwood & Nichols Northeast Blanco Unit No. 34-19 Well, Section 19, Township 30 North, Range 7 West, Rio Arriba County, New Mexico and to three hundred feet below the base of the Point Lookout formation which base occurs at a depth of five thousand, five hundred and sixty-five feet on the log of the foregoing well. (End quote.)

Q. Mr. Blackwood, this definition would only apply to the Northeast Blanco Unit, is that correct?

A. Yes, we have no authority to extend this definition to any area other than the Northeast Blanco Unit.

Q. Will this definition allow reasonable development of

the hydrocarbons from the Mesaverde group in your opinion?

A. Yes, it will.

Q. Will it prevent production of Mesaverde gas from shallower zones, the gas being there only because of fractures in the Mesaverde formation?

A. Yes, this definition would allow all gas produced from within this inverval to be made of and declared a part of the unitized area and would prevent just what you are talking about.

Q. In your opinion, Mr. Blackwood, the gas which would be produced from the Northeast Blanco Unit No. 64, what formation is that gas from or would it be from?

A. Well, in my opinion it is from the Mesaverde group.

Q. Is this definition as proposed by the unit advisory committee consistent with definitions generally accepted in the industry for the Mesaverde group?

A. Yes, it is.

Q. Now, the data to which you have been referring is contained in the advisory committee's geological engineering memorandum. I have copies of that, do you want to offer that as an exhibit at this time?

A. Yes, I would like that put in evidence.

(THEREUPON, Blackwood & Nichols Exhibit Number One was marked for identification.)

Q. (Mr. Carr continuing.) Now, Mr. Blackwood, this just

contains data from which you have been testifying, is that correct?

A. Yes, sir.

Q. Now, this memorandum, I believe you stated, was submitted to the USGS?

A. Yes, we submitted this application for approval with the geologic memorandum attached.

Q. Were copies of this memorandum also submitted to the Oil Conservation Commission?

A. Mr. Kendrick was supplied a complementary copy, however, it was not submitted for approval because I was told over the telephone that rather than them acting on this immediately that they thought an industry-wide study commission should be formed to study the definition problem.

Q. And subsequent to the time you submitted this the industry committee was formed?

A. Yes, that's right.

Q. Did you serve on that committee?

A. Yes.

Q. And you heard Mr. Bowman's testimony here today?

A. Yes.

Q. And his definition of the Mesaverde formation?

A. Yes.

Q. How does that definition differ from the one adopted by the industry advisory committee?

to the northeasternmost limit of the Chacra as defined by the Oil Conservation Commission study group?

A. Both of these fields are several miles northeast of the northeast limit as defined by the study committee.

Q. According to the Mesaverde study group then, is there any Chacra formation under either the newly created Navajo City-Chacra Pool or the Animas-Chacra Pool?

A. There is no porous Chacra formation in that area. There is the Chacra equivalent which is within the Mesaverde group. I think this should be emphasized, the Chacra is, according to all of the literature, our studies, and the industry committee, the Chacra is a part of the Mesaverde group and we think the Committee is right in differentiating it in the southwest area where the Chacra pools and reservoirs have been recognized for many years but we don't think that it should continue in that area northeast of that line, the line of demarcation.

Q. According to the Mesaverde study group report, from what formation would the gas from the Northeast Blanco Unit Well No. 64 be produced?

A. From the Mesaverde.

Q. And according to this study group's findings, are there any Chacra sands under the tract in which Unit Well No. 64 is drilled?

A. No porous Chacra sands.

Q. Mr. Blackwood, in your opinion would rescinding paragraphs (i) and (j) of Order No. R-5336, those paragraphs being the paragraphs which created the Navajo City and the Animas Chacra pools, would rescinding those paragraphs be in the interest of waste prevention?

A. Yes, sir, I think it would.

Q. Why?

A. If these were allowed to stand then additional wells might be required to drill to and complete in and produce gas which in my opinion will be produced anyway from the Mesaverde wells, it would be economic waste.

Q. Would rescission of the provisions of this order protect correlative rights?

A. Inasfar as the area of the Northeast Blanco Unit is concerned, I can definitely state, yes. There may be legal complications in some other area that I'm unacquainted with and I can't give a legal answer to that.

Q. Was Exhibit One prepared by you or under your direction and supervision?

A. What is Exhibit One?

Q. Exhibit One is the application for approval.

A. Okay, this is our Exhibit One?

Q. Yes.

A. Yes, it was.

Q. Have you reviewed it and is it correct in all respects?

A. I belive so.

MR. W. CARR: At this time I would offer Blackwood & Nichols Exhibit Number One.

MR. RAMEY: Without objection it will be admitted.

(THEREUPON, Blackwood & Nichols Exhibit Number One was admitted into evidence.)

MR. W. CARR: I have no further questions.

CROSS EXAMINATION

BY MR. RAMEY:

Q. Mr. Blackwood, how many Mesaverde wells do you presently have in the Northeast Blanco Unit?

A. Sixty-five.

Q. Of those sixty-five wells are any besides the No. 64 perforated in this Chacra or Chacra equivalent?

A. No.

Q. This is the only well that is producing?

A. Yes, as a matter of fact, that well is offset in all four directions and producing gas from the Mesaverde in all four directions and none at this equivalent interval. I believe that gas produced from this interval is a result of vertical fractures or high angle fractures which are actually causing gas from the deeper traditional Mesaverde field to migrate up to this level.

Q. Is the total depth of the well still at this Chacra

interval?

A. The total depth of the well is like forty-two, seventy, approximately, within a foot or two. As this well was being drilled we encountered a high gas flow and we stopped right at this point and completed the well and then the only deepening occured within the casing. As the cement shoe was drilled out they did deepen it eight or ten feet below that level and the well is completed open hole natural at this level which is forty-two, fifty to sixty-eight.

Q. Which is within the Chacra or Chacra equivalent?

A. It's in a fracture interval above the Cliff House sandstone. It's not at the same equivalent level as the off-setting Tenneco well which has recently been -- which what we are in dispute about is called in this Chacra field. Those two are at different levels.

Q. Tenneco has drilled a second well?

A. No, Tenneco owns the section to the south, outside of the unit area. I could perhaps show you a map and their well is producing from what is called Cliff House fracture interval but it is still part of the Blanco-Mesaverde overall gas pool.

Our well is not producing. Our well is completed in an interval a couple of hundred feet higher than that which instead of being called Cliff House fracture interval somehow was called undesignated Chacra which precipitated in our unit

A. It's very similar to the definition that we employed within the Blackwood & Nichols Northeast Blanco Unit. However, the upper vertical limit is somewhat higher in the section, approximately one hundred feet. The Huerfanito bentonite marker occurs about a hundred feet above the green shale marker which we had chosen to limit the top of the Mesaverde and we have no objection to using the Huerfanito bentonite marker. We think that both markers are referred to in the literature and apparently the Huerfanito bentonite marker is easier to locate and find over a broader area than the green shale marker. The green shale marker is easy to find in our area of the field whereas the Huerfanito bentonite marker is easier to find throughout the entire region.

Then at the base again, the industry study committee lowered the base approximately a hundred and fifty feet lower than the Blackwood & Nichols definition would have put the base. We had, for reasons of wanting to be able to test for the oil and gas zones which occur below the recognized Point Lookout sandstone in which it is generally done, we had put the base as three hundred feet below the base of the massive sandstone member of the Point Lookout. The base of the massive sandstone member of the Point Lookout is somewhat harder to define and the industry-wide committee found that they thought that it would be easier to define the top of the massive Point Lookout sandstone, so their definition is five hundred feet

below the top, whereas our previous definition was three hundred feet below the base. That has the overall effect of in most instances making it a little thicker on the bottom end also but it is very, very similar, in some instances it would probably be almost an identical point.

Q. But by and large it is a broader definition than the one adopted by the industry?

A. By and large it is a little higher on the top and a little deeper on the bottom.

Q. Now, Mr. Blackwood, you heard Mr. Kendrick testify today as to the creation of the Navajo City-Chacra Pool and the Animas-Chacra Pool in a routine nomenclature case?

A. Yes.

Q. What is Blackwood & Nichols seeking with this application for this de novo hearing today?

A. Well, we are seeking that these two new Chacra pools not be created. We feel that they were created at a point in history at which a state-wide industry-wide committe had already been formed to define the Mesaverde and limit the Chacra and the preliminary findings of this committee were already in at the time these pools were created and we felt that it would have been better, as Mr. Kendrick testified, that perhaps these two fields be left in limbo until the findings of this committee were brought forth.

Q. Where do these two new Chacra pools lie with respect

the writing of a definition of the Mesaverde.

MR. RAMEY: Mr. Arnold.

CROSS EXAMINATION

BY MR. ARNOLD:

Q. How far above the top of the Cliff House is your zone?

A. Approximately five hundred feet. And, again, we are that far above the top of the massive Cliff House sand, which is easily mapped. When you take the proper definition for Mesaverde, Chacra is equivalent to Cliff House and all of this is part of the Mesaverde group but our productive interval is about five hundred feet above the top of the massive Cliff House sandstone.

Q. Have you made any pressure determination which would lead you to believe that it is or is not connected to the Blanco-Mesaverde Pool?

MR. CARR: I have another witness who is going to discuss that.

A. Well, I could say, if you want, that we have compared the pressure of this well and three recent Mesaverde wells which we have drilled in the unit and they are all very nearly the same and we believe that this definitely shows that these wells are all producing gas from the same reservoir.

Q. (Mr. Arnold continuing.) When you say very nearly the same what do you mean?

A. Just a minute, I'll --

MR. RAMEY: Maybe it would be better to save that for the next witness.

A. Okay.

MR. ARNOLD: Maybe it would be better for the next witness. That's all right.

MR. RAMEY: Are there any other questions of Mr. Blackwood? Mr. Dent?

CROSS EXAMINATION

BY MR. DENT:

Q. Mr. Blackwood, on your well, Northeast Blanco No. 64, did you log that well?

A. We did not log the producing interval.

Q. So you have no logs on the well?

A. We have some up-hole logs -- no, we don't have any logs at all on it.

Q. It's open hole completion I believe you testified?

A. That's right.

Q. No logs?

A. Right.

Q. On what basis again, please tell me and the Commission, that you have reached the conclusion that the gas that is produced in Well No. 64 is a fracture formation in the Mesaverde below? I believe that was your statement or something like that.

A. I believe that to be the case because of several factors. One is the pressure which indicates the pressures are very nearly the same in this Well No. 64 and other wells completed within the last year or so in the Mesaverde zone.

Q. When you made that statement you hadn't referred to pressures until just a moment ago, you made that conclusion based on geological evidence, is that not correct?

A. Well, the conclusion is based on a number of factors. It is based on both geologic and engineering evidence.

Q. What geological information did you base it on?

A. Well, the geological information is basically the interval. We took the elevations of the well, we calculated as best we could without logs and correlative depth at which this gas should be coming from and correlated it with the logs of offset wells and it came from an interval that was above the top of the massive Cliff House sandstone but was well below either the Huerfanito bentonite marker or below the green shale marker which we used as the top of the Mesaverde group.

Q. What evidence did you base that statement on?

A. I'm not confused by my statement, perhaps you should reword your question.

Q. Well, maybe I'm confused but you have reached several conclusions based on the results of a well which you did not log and in which you made certain hypothetical or opinions and then based on that opinion you reached other opinions. I'm

asking you what factual data did you look at from a geological standpoint to make those conclusions?

A. Again I can tell you that we have made studies of the offset logs, taking the elevation of the offset well, the depth drilled, locating the Cliff House sandstone, then we take the elevation of the Well No. 64 which does not have a log, we calculate an equivalent depth drilled and an equivalent sea level relationship datum and from the one log and the sea level datum point on it and the sea level datum point on the other, we discover approximately what level the gas must be coming from.

Q. It is all approximately in your opinion, based on the comparison to the other wells with logs?

A. Yes, that's right.

Q. And in the pressure data, you have another witness who is going to talk about pressure data?

A. Both of us can talk about that.

Q. Well, are you a geological witness or geological engineering witness or do you have another engineer witness?

A. We have another engineering witness who was present in the field as the well was completed. For all those details or any questions pertaining to that he is more knowledgeable because he was there at the time and witnessed the completion of the well and knows the minute-by-minute completion details.

Q. Excuse me, I'm not concerned with your engineering operations, I'm concerned with the obtaining of the pressure

data.

MR. RAMEY: I think, Mr. Dent, the next witness will probably get into that.

MR. DENT: Is he going to get into that, all right, I'll withhold the question.

MR. RAMEY: There hasn't been any pressure information submitted yet so I think we can hold the question.

MR. DENT: Well, he said he based his opinion on pressure data and I was going to ask him what pressure data he looked at, was it bottom-hole pressure?

MR. W. CARR: We'll get into that.

Q. (Mr. Dent continuing.) What is the accepted method of correlating horizons, formations or zones from one well to another from a geological standpoint, Mr. Blackwood?

A. The most frequently used and easiest way is to compare logs of the same type, electric logs or radioactive logs.

MR. DENT: I have no further questions.

MR. RAMEY: But you did have logs from offset wells?

A. Yes, that's right.

MR. RAMEY: That you could compare?

A. That's right. We can come up with an approximation which is a very nearly correct of where the producing interval is from offset logs.

MR. RAMEY: Any other questions of the witness? Mr. Kellahin?

CROSS EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Blackwood, you indicated that Blackwood is the operator of this Northeast Blanco Unit. To what extent does it participate in that unit?

A. Blackwood & Nichols owns approximately thirty percent of the unit.

Q. And I believe in response to a question from Mr. Carr you said if this Well No. 64 is dedicated to Mesaverde production then the unit would participate and Blackwood & Nichols would participate to the extent of thirty percent then?

A. Yes.

Q. And if this is dedicated to Chacra production the well would then revert to a hundred percent participation between Tenneco and Continental, is that correct, in the Chacra participating unit?

A. If the Chacra were found to be outside of the Mesaverde. We believe that the Chacra is a part of the Mesaverde and this point may be moot but that is Tenneco's hope, I understand.

Q. If it is found to be outside of the Mesaverde and in Chacra formation separate and apart from the Mesaverde, then the well is shared between Continental and Tenneco?

A. Yes.

Q. You indicated that this unit committee arrived at a

definition for the Mesaverde production and you read that to us. Is this unit agreement on the statutory Federal form, I believe this is Federal acreage, is it not?

A. There is all kinds of acreage within the unit. There is Federal acreage, State acreage, fee land, there are numerous types of ownership within the unit.

Q. The unit agreement itself, though, patterned itself after the statutory Federal form?

A. I'm not certain, the unit was put into effect in 1951 and has been recognized and approved by all of the necessary governmental agencies but as to the exact form I couldn't say.

Q. Did you submit this definition for Mesaverde to the USGS for approval?

A. Yes.

Q. And what response did you get from the USGS?

A. The USGS informally said that they felt that inasmuch as this was a far-reaching effect or could have far-reaching effects, that they thought that probably the best thing to happen would be that the State also be informed of it and so we sent a copy to Mr. Kendrick.

Q. The USGS referred its decision to the New Mexico Oil Conservation Commission?

A. They seemed to want to make a joint decision rather than an individual decision.

Q. The USGS at this point has not accepted your

definition of the Mesaverde formation?

A. No.

MR. RAMEY: Mr. Blackwood, let me get this straight. You drilled this well to what the Commission had defined as Mesaverde?

A. Well, we drilled the well to approximately forty-two hundred and fifty-four feet at which point we encountered a large gas flow. We completed the well. The only Commission order at the time referring to definition of Mesaverde was this statement which was read earlier by Mr. Kendrick from forty-two hundred to fifty-one hundred feet with no other details. So if we are going to look at that definition which may have been the definition in use at the time, yes, it was Mesaverde.

MR. RAMEY: So you assumed that when the well bottomed below forty-two hundred that you were in the Mesaverde and completed the well at a logical spot?

A. The main reason for completing the well at this spot was safety and we had a good well. I think -- well, Mr. Loos was there and can give you his reasons but my understanding was that the thing was blowing out ten million feet or more of gas -- ten or fifteen million feet a day blow and the main considerations were safety considerations to stop right there and complete the well.

MR. RAMEY: And then when you submitted the proper

paperwork to the Commission the Commission redefined it as Chacra?

A. Yes.

MR. RAMEY: Thank you. Any other questions? Mr. Carr?

REDIRECT EXAMINATION

BY MR. W. CARR:

Q. Mr. Blackwood, the unit operating committee was composed of individuals who had economic interest in the unit, is that correct?

A. Yes.

Q. They drafted a definition which was submitted to the USGS, is that correct?

A. Actually the definition was drafted by myself and another geologist with Blackwood & Nichols Company and then that draft was mailed out to the participants and they read it over and we had a meeting in October in Oklahoma City when most all of the participants came, we discussed it, voted on it and found that the majority approved of it.

Q. The USGS has not accepted this definition?

A. No.

Q. Have they rejected it?

A. No.

Q. Subsequent to the adoption of this definition the

Oil Commission formed its study committee, is that correct?

A. Yes.

Q. Did the USGS participate in that study committee?

A. Yes, they did.

Q. And their definition was broader than the one adopted by the Commission, is that correct?

A. Yes, that's true.

MR. W. CARR: I have no other questions.

MR. RAMEY: Any other questions of the witness?

MR. M. CARR: I have a question.

MR. RAMEY: Yes, sir.

CROSS EXAMINATION

BY MR. M. CARR:

Q. Did you just state that the definition that was adopted at the unit meeting in October was mailed out to all of the working interest owners before the meeting?

A. I said it was mailed out. I'm not sure it was mailed to everyone, I believe it was but I couldn't swear to that.

Q. You are not sure it was mailed out prior to the meeting?

A. I think it was mailed out but I could not be certain. You might ask some of the other members here if they received one, that might be --

Q. We did not.

A. Yeah.

MR. RAMEY: The witness may be excused.

(THEREUPON, the witness was excused.)

MR. RAMEY: You may call your next witness.

MR. W. CARR: De Lasso Loos.

DE LASSO LOOS

called as a witness, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. W. CARR:

Q. Would you state your name?

A. De Lasso Loos.

Q. Would you spell your name, please?

A. D-e L-a-s-s-o L-o-o-s.

Q. By whom are you employed and in what position?

A. Blackwood & Nichols Company, District Manager of the Durango District, Durango, Colorado.

Q. Have you previously testified before the Oil Conservation Commission and had your credentials accepted and made a matter of record?

A. Yes.

Q. And you were qualified in previous hearings as

a petroleum engineer?

A. Yes.

Q. Are you familiar with the Northeast Blanco Unit?

A. Yes.

MR. W. CARR: Are Mr. De Lasso Loos' credentials acceptable?

MR. RAMEY: Yes, they are.

Q. (Mr. Carr continuing.) Mr. Loos, I would like to direct your attention to events surrounding the completion of the Northeast Blanco Unit Well No. 64 and I would ask you to describe to the Commission what pressures you did encounter when you were completing the well?

A. Well, when we reached the zone we immediately shut the well in with the drill pipe on bottom and we closed it in with the pipe rams and immediately we had five hundred and fifty pounds of pressure and then after a little while we opened up the rams and blew the well through a seven and five-eighths inch blow line and then without igniting the gas, tested the gas through a pitot tube, through the seven and five-eighths flow line and the well tested fifteen million MCF. And immediately then after testing we shut the well in, killed the well with gel water, two hundred barrels of gel water and ran four and a half casing with an external casing packer, you know, to shut the cement off from getting on the formation and circulate cement behind them and above

the packer to make a completion out of the well.

Q. What was the shut-in tubing pressure, do you know?

A. After we set the casing then we drilled out the shoe and then drilled from forty-two, fifty-two to forty-two, seventy-eight with the well blowing. And then I blew the well ten hours through the seven and five-eighths blow line with no appreciable decrease in volume. Then in oil field terms, we nippled the well up and then I left the bit and the tubing in the hole because I didn't want to make a trip and then perforated the tubing. It was set at forty-two, forty-eight and I perforated ten holes in the tubing from forty-two, forty-four to forty-two, forty-five and immediately had a surface pressure, a gauge pressure, of six hundred and forty pounds.

And then several days after that I blew the well through the tubing through a three-quarter inch choke. The casing and tubing both had six hundred and forty pounds and after fifteen minutes the well pressures equalized or stablized at two hundred and fifty pounds through the choke and five hundred and forty-five pounds on the casing and that was after fifteen minutes and it stablized and remained there for three hours was the way I blew it.

And then on 11-23-76 we ran a bottom-hole pressure survey through the tubing. The lubricated pressure was six hundred and nineteen pounds, the bottom-hole pressure at forty-

two, fifteen was six hundred and ninety-two pounds and no liquid.

Q. Is the well connected to a purchaser at the present time?

A. Beg pardon.

Q. Is this well connected to a purchaser at the present time?

A. It is connected to a pipeline.

Q. And who is that?

A. El Paso.

Q. What is the present status of the well?

A. Shut in.

Q. Following the completion of the well did you file a well completion report and a request for an allowable from the Oil Conservation Commission?

A. Correct.

Q. And what happened when you filed those forms?

A. As was previously stated, we filed Form C-110 and we had Mesaverde in the space where it was supposed to be the producing formation and it came back with that scratched out and undesignated field written in.

Q. Mr. Loos, in your opinion does the producing interval in this well correlate with the producing interval in any of the offset wells?

A. Not to my knowledge.

Q. I would like to direct your attention to the gas that has been produced from the well, has it been analyzed?

A. It hasn't produced but we did take a gas analysis of that well and two offset wells, one to the east and one to the north.

Q. And what did these show?

A. In the 64 Well, methane, it had eighty-nine, point, ninety-five percent or molecular percent. The 34 Well which is immediately east has eighty-seven, point, ninety-three methane, that's the main gas and the 105 Well which is the old original Delhi Taylor Well to the north had eighty-eight, point, thirty-three molecular percent of methane and, of course, ethane, however, dractically lower percent.

Q. So you are comparing gas from the Northeast Blanco Unit Well No. 64 and two wells which are out of the Mesaverde?

A. Out of the Point Lookout, Menefee and Cliff House zones.

Q. What does this information tell you?

A. Well, it's the same gas, molecular percent.

Q. Could you explain how this gas could be encountered in the zone in which you found it?

A. In the 64 Well?

Q. Yes, sir.

Q. Well, when we drilled the well the bit was free for four feet which in other words is a fracture to me. Therefore,

this well being in a fracture and the offset wells around this well I know had seven inch casing leaks for years, or some of them had and which some of them were repaired and, therefore, in my opinion there is a good possibility that this well could have taken gas from the lower zone through leaks, if not some other way, you know, by fracture all the way or something, I don't know about that.

Q. And you indicated that you believed this to be Mesaverde gas?

A. Yes.

Q. Would you just summarize the various points that you base this decision on?

A. I base it on our bottom-hole pressure survey. I base it on the gas analysis.

Q. Why do you base it on the bottom-hole pressure?

A. Because the bottom-hole pressure on this well is the same or similar to the infield wells that are drilled, completed, now offsetting this well.

Q. And these are Mesaverde infield wells?

A. Right, Mesaverde or Lower Mesaverde.

Q. Is it safe to say that you also base this on the chemical makeup of the gas?

A. To me it is.

Q. Does the high flow rate you encountered indicate to you that this is Mesaverde?

A. I only had one other Lower Mesaverde well make this much gas in our unit and it was after fracturing, not natural.

Q. That was because of a fracture, is that what you said?

A. No, it was not a fracture, it was hydraulic fracturing.

Q. But the high penetration rate you would conclude was indicative of a fracture, is that correct?

A. Right, on this well, 64.

MR. W. CARR: I have no further questions of this witness.

CROSS EXAMINATION

BY MR. RAMEY:

Q. Mr. Loos, when you said you had a bottom-hole pressure of six hundred and ninety-two on this well, do you have any other bottom-hole pressures?

A. Not current. We for years took a cross section of the wells two ways across the Northeast Blanco Unit and took bottom-hole pressure ratings once a year but about five years ago or six we quit that and the only other pressure ratings we have are surface.

Q. You stated that this was similar to other infield Mesaverde wells?

A. Surface pressure.

Q. The surface pressure is the same but you don't have

any specific pressures with you?

A. No. This one is six, nineteen surface and we have some other wells up here within the unit that are shut-in wells on the annual deliverability test, the seven day shut-in and the one immediately north of this Well 64 is five hundred and ninety-eight pounds but these are old wells, you see what I mean, older Mesaverde wells and five hundred and twenty, five, sixty and so on, five, ninety-two is the shut-in pressure.

Q. So this well has in essence a hundred pounds more shut-in pressure than any other well you have in the immediate area?

A. Yes, correct.

Q. Mr. Loos, I'm reading bottom-hole versus shut-in, you have six, nineteen on this well and five, ninety-eight and five ninety-two and five, twenty?

A. That's right.

Q. Okay. What would you expect if this were an untapped reservoir so to speak, what would you expect the bottom-hole pressure to be of this?

A. Well, the ones that I know about up there, originally ran from a thousand to thirteen hundred pounds. The Fruitland is even higher than that.

Q. The Fruitland is above this?

A. The Fruitland and Pictured Cliffs is an over-pressured

reservoir.

MR. RAMEY: Did you have a question, Mr. Arnold.

MR. ARNOLD: No.

MR. RAMEY: Are there any questions of the witness? Mr. Kellahin?

CROSS EXAMINATION

BY MR. KELLAHIN:

Q. Let me ask you just one question, sir. What was the kelly bushing elevation on this No. 64 Well, do you have that information?

A. The ground level was sixty-three, twenty-eight and add eleven feet to that or twelve feet to that. The rotary table was eleven, the kelly bushing twelve.

Q. Gives me a total figure of what?

A. Sixty-three, twenty-eight was ground level.

MR. KELLAHIN: Thank you.

MR. RAMEY: Mr. Dent?

CROSS EXAMINATION

BY MR. DENT:

Q. Mr. Loos, let's look at those pressures agin. Did you make any calculations from your surface pressures or attempt to determine the bottom-hole pressures in those surrounding wells?

A. Those older wells carry liquid. I couldn't tell you.
Q. Was there any liquid in this gas?
A. No.
Q. Dry gas?
A. No liquid whatever in this well when we ran the bottom-hole temperature survey.
Q. And you are looking at a pressure of six hundred and ninety-two pounds bottom-hole pressure or is this an observed surface of five hundred and ninety-eight pounds?
A. No, six, nineteen.
Q. Didn't you give me one that was five, ninety-eight?
A. That's an offset well.
Q. That's right, an offset well of five, ninety-eight and if this reservoir was in communication with the other surrounding wells, would the pressure not be equal?
A. It looks like it would be relatively equal.
Q. In your opinion what would be relatively equal?
A. I don't know, the gradient between the two zones I don't have that figure. I never attempted to try to calculate the difference it would be in elevations.
Q. Well, you've got one well making gas and one well making liquids, could you not make some calculations and come up with a pretty good estimate?
A. Oh, it's possible but I never have.
Q. Are you familiar with observed pressures in other

wells in this Northeast Blanco Unit?

A. Surface.

Q. How do they compare within range, give me a pressure range?

A. The wells in this area, the southwest part of the unit, are roughly the same as what we are talking about.

Q. Do they vary as much as eighty or ninety pounds or do they vary ten or twelve pounds?

A. No, they are probably eighty or ninety and the shut-ins a little further north are higher, they are about seven hundred, six, fifty to seven hundred pounds, surface.

MR. DENT: I have no further questions.

MR. RAMEY: Any other questions? Mr. Arnold?

CROSS EXAMINATION

BY MR. ARNOLD:

Q. Mr. Loos, on the infield wells that are being drilled there is it unusual to encounter a pressure which is a hundred or two hundred and fifty pounds higher on infield wells than on the old wells?

A. I think that you could get that range difference.

Q. So that you could certainly have a range of a hundred and fifty or two hundred pounds?

A. I think so because I have found it when I was completing the original Mesaverde well that you would have

that range in offset wells. Sometimes it is a matter of completion method so you get a different pressure range.

MR. RAMEY: Any other questions? The witness may be excused.

(THEREUPON, the witness was excused.)

MR. RAMEY: Do you have anything further, Mr. Carr?

MR. W. CARR: Nothing further.

MR. RAMEY: Mr. Hinkle or Mr. Dent.

DAVID P. HAMILTON

called as a witness, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. DENT:

Q. State your name for the record, please?

A. David P. Hamilton.

Q. Mr. Hamilton, have you previously testified before the Commission?

A. No, sir.

Q. Would you briefly state your educational and professional qualifications?

A. I graduated from West Texas State University in 1970 with a BS degree in geology and I also got my Master of Science degree from the same university in 1976 and I was employed by

Mesa Petroleum Company in June of 1972 where I am still employed and I am a subsurface geologist and the bulk of my work has been in the San Juan Basin, New Mexico.

MR. DENT: Are there any questions about his qualifications?

MR. RAMEY: No, he's qualified.

Q. (Mr. Dent continuing.) Mr. Hamilton, have you made a geological study of the Blanco Mesaverde group pool in preparation for this hearing?

A. Yes, I have.

Q. Have you in addition made a study and assisted the Commission study group that has presented the exhibits today?

Q. Yes, sir.

A. As part of this study did you participate in all of the meetings that they had?

A. No, sir.

Q. At any time did you make known to members of that group certain questions or objections you had in connection with the study?

A. Yes, sir, I did.

Q. Would you please state to the Commission what those objections were?

A. I questioned the study group's use of a demarcation line to separate Chacra production from no Chacra production.

I specifically objected to placing the top of the Mesaverde producing interval at the Huerfanito bentonite bed because in my opinion there is no geological justification for extending the Mesaverde producing interval over such an extensive interval that it includes almost all of two separate and different aged and formerly named rock units such as the Lewis and the Mesaverde because these are physically different, different aged rock units.

Q. Discuss the different characteristics which in your opinion caused you to reach this conclusion?

A. Okay. This cross section here which has been entered.

Q. It is marked as Mesa's Exhibit Number One.

A. This is a three-well stratigraphic cross section and our Mesa Primo No. 1-A Well is the center cross section and the purpose of this cross section is to show the different characteristics of the two geologic rock units, the Mesaverde and the Lewis structure, and what this cross section does is show that the Mesavere is predominently composed of a marine sandstone sequence and the Lewis is predominently composed of a silt and shale sequence.

Q. Where did you look on this exhibit to testify about the predominent shale section. Would you point that out for the record, please?

A. Yes, sir. This last log, number three log, if you look at the SP curve and the resistivity curve you will see

quite a difference between the shale and the sandstone.

Q. What in your opinion causes this difference?

A. The shales are very fine grained and have no permeability, no effective permeability and that is why there is no SP.

Q. Where again do you show the Mesaverde?

A. I consider the top of the Mesaverde interval to be at the top of the massive Cliff House sandstone at this level right here.

Q. Approximately how many feet are there between that level and the bottom of what you have shown as the Chacra formation?

A. Approximately eleven hundred feet.

Q. In your opinion and based on your study of the characteristics of those sands and shales is it possible for them to be a fracture and communication between the Mesaverde formation and the Chacra?

A. No, sir, not in my opinion.

Q. I notice on the log on the Primo 1-A Well an area above that line that is different, has different charcteristics than the shale section above, what is that?

A. Well, although not formally names, some operators, some subsurface geologists, call this the Mesaverde transition interval and it usually lies two or three hundred feet above the massive Cliff House sand and this interval is composed of

a few lenticular sands and shales.

Q. Now, how can you explain your cross section which you prepared in the assistance to this group and this three-well cross section, is there any conflict in your opinion professionally between your work?

A. No, sir.

Q. Would you please tell the Commission how you can find a limit as to the Chacra but yet find it present northeast of the line of demarcation?

A. This is in my opinion a fractured reservoir. There is no true sand build up but it is a separate reservoir from the Mesaverde.

Q. Now, did you prepare a structure map which also assisted you in reaching your opinion that it was a separate and distinct reservoir?

A. Yes, I sure did. This has been marked as Exhibit Number Two. This is a structure map of the area surrounding our Primo No. 1-A.

Q. Would you please look at that structure map and discuss it for the Commission?

A. Okay. This was contoured on top of the Chacra formation and again here is the position of the three-well cross section. The heavy dark lines are the structural axes, synclinal-anticlinal. If you will note the Primo Federal 1-A, there is definitely a structural closure. This, in my opinion,

is what accounts for its hydrocarbon accumulation, it is structurally controlled.

Q. Is that in your opinion why such a silt body was not found in the wells adjacent to it?

A. Yes, sir. There are old Mesaverde wells completely surrounding this Primo No. 1-A and the reason that they did not have a gas reservoir was two-fold, either perhaps they were drilled with mud and they were old holes and they didn't see the gas or perhaps they are not on this structural closure.

Q. Have you also compared a type log for the Primo No. 1-A with the cross sections that were prepared by the group and offered as Exhibit Number Three?

A. Yes.

Q. Would you please look at what has been marked as Exhibit Three and illustrate for the Commission the correlative aspects between the Primo No. 1-A and one of the wells on the existing cross sections which shows the presence of a Chacra field?

A. Yes, the cross section that I'm going to illustrate this on is marked Exhibit Number Three and you will notice that on this Exhibit Number Three there is a Chacra gas producing -- some Chacra producing sands. These sands were designated the Rusty Chacra Pool on the same order that you designate our Animas Chacra Pool so I have reduced the logs down to the same scale. This is a reduced version of our Primo 1-A Well.

Here is the producing zone colored in yellow. There is the Huerfanito bentonite bed and if you hang it on this cross section at the Huerfanito bentonite level, our producing interval in our well is at the same stratigraphic position as these Chacra gas producing sands as noted here.

Q Is it your opinion, again would you please state for the Commission that the Primo 1-A Chacra zone is a separate and distinct reservoir from the Mesaverde formation?

A. Yes, sir, based on my geologic opinion it is a separate reservoir because of the structural closure, it is a structurally controlled accumulation in my opinion.

MR. DENT: That's all the direct I have.

MR. RAMEY: In your opinion, Mr. Hamilton, is this a one well pool?

A Yes, sir.

MR. RAMEY: And this is also above forty-two hundred feet?

A. Yes, sir.

MR. RAMEY: Any other questions of the witness? Mr. Nutter?

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Hamilton, there is some evidence of the existence of this pool up above there, I presume because of the fracture,

is that it?

A. Yes, sir, there is a high resistivity layer, yes, sir.

Q. That is gas in formation that is causing that?

A. Yes, sir.

Q. Now, did you encounter any drilling break or anything like they did in drilling the Blackwood & Nichols No. 64 when they drilled four feet in two minutes?

A. No, sir, I was not on the well. Our well site geologist was there. I was not present on the well but he made no mention of a rapid descent.

Q. It wasn't necessary to close the rams or anything on this well like it was the Blackwood & Nichols well?

A. This well did blow out, yes, sir.

Q. From this interval?

A. Uh-huh.

Q. It did?

A. Yes, sir.

Q. And you were able to go down and log the well, though, and drill on down to the Mesaverde?

A. Yes, sir, we ran a temperature log immediately, as soon as we hit the zone. Yes, sir, we've got logs on it.

Q. So it wasn't necessarily the kick on the log that caused you to complete in this zone, though?

A. No, it wasn't.

Q. You had a blow out?

A. We had ten million coming out of it, yes, sir.

MR. NUTTER: Okay, thank you.

MR. RAMEY: Mr. Arnold.

CROSS EXAMINATION

BY MR. ARNOLD:

Q. Mr. Hamilton, are you presuming that you don't have any gas reserves outside of this closed twenty-five, twenty contour?

A. Yes, sir, in this area, that is correct.

Q. Have you made any reserve estimates?

A. On our Primo 1-A?

Q. Right.

A. Our engineer will answer that for you.

MR. DENT: We are prepared to offer engineering pressures.

MR. RAMEY: Any other questions of the witness? He may be excused.

(THEREUPON, the witness was excused.)

DENNIS W. DENNY

called as a witness, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. DENT:

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

A. Dennis W. Denny.

Q. Mr. Denny, have you previously testified before the Commission?

A. No, sir, I haven't.

Q. Would you briefly state your educational and professional experience?

A. I attended Amarillo Junior College and received an Associate Degree in Science with a math background. I then went to work for Diamond Shamrock Corporation where I worked for six years, four of which was in the reservoir engineering department. I did well testing, gas well testing, economic work and that sort of evaluations. I then returned to school, went to Texas A & M, where I received a Bachelor of Science degree in petroleum engineering. I graduated in May of '76 and since that time I have been employed with Mesa Petroleum as a reservoir engineer.

MR. DENT: Are there any objections, are his qualifications accepted?

MR. RAMEY: We'll accept him as qualified.

Q. (Mr. Dent continuing.) Mr. Denny, would you briefly tell the Commission what type of studies you have made in preparation for these hearings.

A. Well, major studies involved the production decline curves of our well and offset wells.

Q. Have you prepared an exhibit of the Mesa Primo 1-A triple completion which shows the comparative flow rates and decline curves?

A. Yes, I have.

Q. Would you please look at that exhibit and explain to the Commission what it shows to you as an engineer?

A. Okay, this is marked Exhibit Number Four, I believe that's correct and it is a curve which shows average daily producing rates in MCF per day, on a monthly basis or averaged over the month since the wells have been turned on.

The major thing to notice here is that the Chacra zone has produced at one and a half to two times the rate of the Mesaverde completed zone and the Pictured Cliffs completed zones. The Mesaverde and Pictured Cliffs zones have declined at normal rates throughout their life. The Chacra has produced at essentially the same rates throughout its life thus far and shows no effect whatsoever on the Mesaverde zones.

Q. As shown on that exhibit what is the production rate for the Chacra zone?

A. In January it was approximately twenty-seven hundred and fifty MCF per day.

Q. When the well was first put on production what did you show as the rate of production?

A. Twenty-four hundred MCF a day.

Q. Do you know the cumulative production from the Chacra formation?

A. From the Chacra formation it is approximately one, point, two BCF in March.

Q. Have you made an estimate of the recoverable reserves in the Chacra formation?

A. The recoverable reserves in the Chacra formation are estimated -- were actually estimated by DeGolyer and MacNaughton, a consulting firm in Dallas, and they are in the neighborhood of four, point, five BCF for the Chacra zone.

Q. If there were communications between the Mesaverde and the Chacra formations, what would those reserves apparently be?

A. If there was communication between the Mesaverde and the Chacra the curves should be identical or nearly.

Q. So based on that exhibit what is your opinion as to these two reservoirs?

A. They are not in communication with each other whatsoever, they are two separate producing intervals.

Q. In addition to studying the producing characteristics of that one well, did you also study the flow rates of other wells near by?

A. Yes, I have.

Q. Would you please refer to what has been marked as

Exhibits Five through Five-G and point out to the Commission what these exhibits show?

A. All right, I'm not sure what order these are in but I'll start with the Salmon Well, Amoco Salmon Well No. 1 is the well to the east, it's the east offset to our Primo Well, Primo 1-A. The decline on that particular well has not been affected whatsoever since our well has come on production.

The Primo No. 1 which is also operated by Mesa is the south offset to the No. 1-A Well. You will notice that the Mesaverde production curve there certainly hasn't been affected. Well, it actually increased for a certain period of time and still shows no effect from the adjacent well, the No. 1-A.

The El Paso Natural Gas Mudge No. 4-R, which is the west offset to the Primo No. 1-A shows no effect from the Chacra zone. The production has decreased slightly during the middle portion of the year but this seems to be more in line with the well to the north of it which I will get to in a minute.

The Aztec Oil and Gas Harrison No. 1 is north of the Primo No. 1-A and it would appear at first glance that it has suffered some effect from our well, however, if you will look closely the flow rates have gradually increased over the life of this well and the decrease began approximately three months before our well was put on.

If you will look at the Mesa State Com M No. 9-A Well, it is a Mesaverde completion and the time of its being put on stream coordinates with the time the Harrison No. 1 Well began decreasing in rate. This to me shows that the Harrison Well was actually draining our acreage and was affected only by our Mesaverde completion.

This No. 9-A Mesaverde completion also is very closely related to the Mudge No. 4-R Well which I mentioned awhile ago. The effect of this decline in the Mudge Well seems to be more affected by our No. 9-A Well.

I believe that is all we can get from those at this time.

Q. Mr. Denny, did you have any bottom-hole pressures?

A. We have no bottom-hole pressure surveys on our wells.

MR. DENT: I have no further questions at this point.

CROSS EXAMINATION

BY MR. RAMEY:

Q. Do you have any shut-in pressures on your wells, Mr. Denny?

A. The only pressures we have are the pressures when the well was completed, on the State test and the deliverability test which was run sometime later.

Q. How about a packer leakage test?

A. We took a packer leakage test and the pressure was shown there also. It is interesting to note that the Mesaverde zone which did have the lowest pressures and the pressures were very close to the Chacra zone. However, these are all under pressured, both the Chacra and the Mesaverde are under pressured reservoirs when they were originally completed and the Mesaverde has been over the entire field approximately twenty-five to fifty percent depleted which would account for the low pressures there and it is just merely a coincidence, I believe, that the pressures are so similar. The Pictured Cliffs formation is even higher pressured than either of the other two.

Q. So you don't think that is relatively low pressure for the Chacra or anything unusual?

A. No, not necessarily.

MR. RAMEY: Any questions of the witness? Mr. Kendrick.

CROSS EXAMINATION

BY MR. KENDRICK:

Q. I believe your testimony about your Harrison Well on Exhibit Five-E was to the effect that it was possibly interfered with by the production from the Mesaverde interval of your Primo No. 1-A?

A. I'm not sure if that was exactly what I said. What

I meant to say was that the incline in pressure shown on this or incline in producing rate shown on this graph indicates that they may have possibly been draining our acreage. We drilled the No. 9-A Well and when it came on production the Harrison Well did show a drop in production rate which to me shows that we then started draining our acreage.

Q. What is the location of the Harrison Well? It's not shown on the exhibit you --

A. Okay, the Harrison Well is directly north of the Primo 1-A.

Q. In the southwest quarter of Section 31?

A. That's correct.

Q. Is it your testimony that you have evidence that the production from your 9-A Well affected that well or that this well was interfered with by the production from other source?

A. If you overlay the curve from the 9-A Well on top of the Harrison Well you will notice that they look very similar during that same period of time and the drop in production rate in the Harrison Well coincided with the initiation of production from the 9-A.

Q. Well, this would more imply to me that possibly the pipeline pressures varied instead of the producing capacity of the wells varied because both wells dropped the same months and both wells increased the same months. Do you

agree with that?

A. Well, some of those particular drops are probably State tests, at least one or two of them or one of them should be a State test which was run during the year. The main concern is that after the 9-A Well was put on production the Harrison Well began to decline in production. Before the 9-A Well was on the rates continually increased.

Q. Is it normal for a well to interfere to the far end of the proration unit within a matter of weeks when the anticipated life of the well is several years?

A. Well, I can say this, the well, the new well, when it begins production is going to drop the pressure in that area, therefore, the pressure sink will be close to the new well as opposed to only the old well. This should immediately slow down some production in the previous wells, the offset wells.

Q. Is it your testimony that interference should occur in a matter of weeks at this distance between wells in a reservoir of this type?

A. I'm not saying that our well is interfering with the Harrison Well, what I'm saying is that when our well came on stream we prevented them from draining our acreage at that time and this could happen within a matter of days or weeks.

Q. Well, is it your testimony that the Harrison Well interfered with your well's production?

A. Prior to its completion, yes. Prior to our 9-A Well being completed the production on that well was apparently due to the increased rates. The effective drainage area was increasing all of the time.

Q. Would this indicate to you that most probably these wells are connected by a fracture system to have such immediate interference with a well a half a mile away?

A. Not necessarily but they are in the same producing interval.

Q. Would it require in the absence of fractures, extremely high permeability in the reservoir?

Let me reword the question. Would it require extremely high permeability in a gas reservoir?

A. In a gas reservoir it would not require as high a permeability as it would in an oil reservoir. The effect in our 9-A Well was it was put on production at a higher rate than the -- if the 9-A Well was put on at a higher rate than the Harrison Well, which would indicate that it would drop the pressure in that area much quicker than the other well was dropping it.

Q. Well, I had assumed that gas was more easily compressible than a liquid, that is why I reworded the question.

A. The effect from a half a mile off on a well is going to be fairly slight in that the radius is quite large. However, when our well was put on production we started draining a

considerable area and a considerable portion of that external radius of drainage.

The point we are trying to make here is that the Chacra production came on from our Primo 1-A Well several months after the decline began on the Harrison Well, therefore, the decline on the Harrison Well was not affected by the Chacra. If you overlay the Chacra production curve on the Harrison, the Harrison sees no effect, the rate has stabilized at approximately seven hundred and fifty MCF a day by the time the Chacra well had been put on production.

MR. KENDRICK: No further questions.

RECROSS EXAMINATION

BY MR. RAMEY:

Q. Mr. Denny, you say you haven't made any reserve calculations on the Chacra in your Primo Federal No. 1-A?

A. Specifically I have not, no.

Q. Did DeGolyer and MacNaughton calculate the reserves at four and a half million cubic feet?

A. Correct.

Q. Do you agree with the previous witness, Mr. Hamilton, who said there was probably no gas outside of the twenty-five, twenty contour?

A. Roughly the twenty-five, twenty contour is correct. In order to have structural closure this is the only possible

type of reservoir I see here.

CROSS EXAMINATION

BY MR. ARNOLD:

Q. Have you calculated out what the acreage is inside that contour, about, it looks like probably eighty acres?

A. Eighty to eighty-five is what I would estimate.

Q. I guess you made a rough calculation of about fifty-five million to an acre, does that sound in the ball park?

A. Let's see, you calculated that from the reserves down to eighty acres?

Q. I just divided four and a half billion by eighty.

A. Okay, we are looking at a fairly thick interval. That sounds approximately correct. We are looking at a fractured reservoir here so we can't really determine the porosity and it becomes very difficult to calculate volumentrically the reserves.

Q. That is about twice the high value that is used in calculating Blanco-Mesaverde reserves, though, isn't it?

A. I'm not that familiar with the numbers.

MR. ARNOLD: That's all.

MR. RAMEY: Any other questions of the witness? Mr. Stamets?

CROSS EXAMINATION

BY MR. STAMETS:

Q. Mr. Denny, you testified that the Mesaverde and Chacra pressures were relatively close at the time of completion or when the initial potentials were taken, what were those pressures?

A. I'll have to find those. All right, the Mesaverde shut-in tubing pressure was seven hundred and sixty-one psig; the Chacra was seven hundred and fifty-eight psig; the Pictured Cliffs was seven hundred and ninety-two psig.

Q. So the shallower formations had the highest pressures?

A. Correct.

Q. And the other two formations were three pounds apart?

A. Correct.

Q. If these weren't separated by such a thick vertical interval would you be inclined to say that the reservoirs were connected based on pressures?

A. Based on pressures if the reservoirs were much closer together I would certainly look into the situation.

Q. All right, now, you testified that on the Primo No. 1 the Chacra production was just about on a straight line and that the Mesaverde has declined?

A. Correct.

Q. Now, I'm going to ask you for a moment to make some assumptions that if you are in a pool with tight sands like the Mesaverde and you got two different wells and one well is just connected to the ordinary sand, all it is producing from is the inter-granular porosity, and you've got another well located offsetting this that is connected to an extensive fracture system in the same pool, would you see the same type of production characteristics between these two wells, with the one connected to a fracture system producing more on a straight line and the one connected only to the tight sands declining more rapidly?

A. Well, I believe I've lost your question in there somewhere.

Q. Okay, in the same pool.

A. The same formation?

Q. The same formation and you've got one well only connected to sands like tight Mesaverde sands and you have an offsetting well connected to an extensive fracture system in a reservoir, are you going to see the well connected to the extensive fracture system producing more or less on a straight line and the well connected only to the reservoir declining rapidly?

A. If the sand or the well strictly in the sandstone reservoir was fairly tight and had not been stimulated in any way and the pressures in the fractured reservoir were

high enough to offset the overburden where the fractures would have a higher tendency of remaining open, then I would have to agree. However, we have in this situation pressures which will not keep a fracture open due to the overburden. They will not offset the overburden and the Mesaverde has been fractured. Is this correct in the Primo 1-A? They have been fractured so you are producing out of a fractured formation either way you look at it.

Q. Your answer to my hypothetical question was, yes, and then you went into another discussion. Now, based on that second discussion, if the overburden is heavy enough to close up the fractures, how can you be producing gas out of fractures in the Chacra formation?

A. These are much smaller fractures than you would have in the higher pressured zones and they would tend to reduce the permeability and keep the gas from flowing.

Q. I'm certainly confused by your answer. Now, I would like to rephrase my hypothetical question and talk about the same kind of fractures that you have in the Chacra zone of the Primo No. 1-A. Now, I'm talking about that kind of fracturing and we are comparing these two wells in the same formation, are you going to get more or less a straight line, relatively horizontal production on the fractured well and a sharper decline on the well which is not connected to the fracture?

A. That depends on how you restrict the flow from those wells, from the formations. If you restrict the flow according to the absolute open flow test which is taken the same then they should both act accordingly.

Q. In other words, a fractured well, your testimony is that a well connected to a fracture will not have any better production characteristics than a well connected to tight Mesaverde sands?

A. The initial flow rates are going to be extremely high in your fractured reservoir compared to the sandstone reservoir and, therefore, your open flow potentials are going to be much higher and if you restrict in the same percentage you are going to be flowing much more gas from the fractured reservoir than from the sandstone and the effects should be seen much earlier in the fractured reservoir. You are going to start the decline in your sandstone, well, at approximately the same time, I would think.

Q. In other words, you are saying that the fractures in this reservoir might extend over a fairly wide area but don't give you a much greater and effective radius of drainage than a well that is only connected to whatever the circumference of a six inch hole is?

A. Well, this particular Chacra interval, it has been stated, I believe, that most believe that it is a fractured zone. It has been perforated so it is not like an open hole

completion.

Q. I'm talking about my hypothetical situation, though. We've got one well connected to an extensive fracture and one well only to the sandstone formation by a six inch hole and you are telling me that this extensively fractured well is going to decline just the same as this one connected to this little tiny hole here and that this extensive fracture system will not allow for better drainage and lower rates of decline?

A. Okay, your widespread fractured reservoir should probably decline at a somewhat lower rate, this is true.

Q. Thank you. Now, if the Chacra here in the Primo No. 1-A is connected vertically to the Mesaverde sands by a fracture system, would that not be an extensive fracture system?

A. It would have to be very extensive.

MR. STAMETS: Thank you. That's all the questions I have.

MR. RAMEY: Any other questions of the witness? He may be excused.

(THEREUPON, the witness was excused.)

MR. RAMEY: Do you have anything further, Mr. Dent?

MR. DENT: Yes, I would like to call Mr. Farrell.

JIM FARRELL

called as a witness, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. DENT:

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

A. Jim Farrell.

Q. Mr. Farrell, you have previously testified before the Commission, have you not?

A. Yes, I have.

Q. Did you not present some testimony in connection with Mesa's application for a triple completion of the Primo 1-A Well?

A. Yes, I did.

Q. Also have you not had the duties and responsibilities of overseeing Mesa's operations in the San Juan Basin?

A. Yes, I have.

Q. In those operations have you personally been involved with the drilling and completing of approximately twenty wells in the Mesaverde formations?

A. Yes.

Q. Have you made a study and do you recall the events and the problems that occurred in connection with the drilling and completing of the Primo No. 1-A Well?

A. Yes.

Q. Would you state to the Commission briefly why in your opinion, based on the drilling operations and the operations in connection with completing this well, that the Mesaverde

completion is a separate and distinct reservoir from the Chacra formation which is also one of the zones completed in that well?

A. We were set up to drill this well as a dual Pictured Cliffs-Mesaverde well. We were drilling it in a conventional manner as other operators in the field, inasmuch as we were drilling a mud laden hole to the base of the Pictured Cliffs. We ran seven inch through the Pictured Cliffs and then drilled out beneath the seven inch with a six and an eighth inch hole using gas and we were prepared to go to the top of the Cliff House, even to TD without any particular problems. We were drilling in the area of thirty-four, forty and encountered a very distinct gas blow in the tune of six million cubic feet a day. We continued to drill that six and an eighth hole to a depth of approximately forty-six hundred at which time the gas had increased to a point crowding ten million cubic feet a day, which at that point it was determined by virtue of the blewey line being blown out by cuttings, we were out of the hole, we were concerned about the cutting out of the blowout prevention equipment so we made a decision to run a four and a half inch liner to be hung off in the seven inch at a total depth of forty-six, thirty-one, which we did.

We cemented that liner and then proceeded to drill another gas drilled hole, much smaller, of course, using a three and seven-eighths bit and continued on to total depth at

fifty-one, oh, nine. At that time we cemented and set a a two and seven-eighths inch lining and it was interesting to note that once we drilled out below our four and a half inch liner there was complete absence of the gas that we had up the hole and finished the hole at a rate of maybe in a little bit in excess of a million cubic feet a day. We had a whole new ball game.

We went and proceeded to complete the well in the Mesaverde, Chacra and Pictured Cliffs and then a subsequent triple completion, the uncontested hearing resulted.

Q. In connection with your testimony on the triple completion, did you present a packer leakage test?

A. I don't believe that was presented at the hearing but there has been one run.

Q. I think that was Exhibit Number Three that was filed in connection with that hearing.

A. Okay.

Q. So you did have a packer leakage test in support of your application for a triple completion?

A. Right.

Q. What was the cost of the Primo 1-A?

A. The total cost was approximately four hundred thousand dollars.

Q. Are there varying interest owners in the production from these zones?

A. Yes.

Q. Or are they all the same?

A. No, they vary from one reservoir to the other.

Q. Did you allocate certain costs to the different zones?

A. Yes.

Q. Of the total cost of the well how much did you allocate to the Chacra?

A. The agreed allocation between all partners, the formula that was used, we allocated approximately a hundred and thirteen thousand dollars to the Chacra reservoir. That portion of the total cost.

Q. Was there any objection from any of the working interest owners?

A. No, none.

Q. Based on your experience in the drilling and completing Mesaverde wells, what is your opinion as to the characteristics of that reservoir in comparison with the Chacra reservoir which was encountered in the Primo 1-A?

A. This is the first Chacra reservoir that I have experienced, however, drilling the other Mesaverde wells we encountered nothing of this magnitude.

Q. It is your opinion that they are separate and distinct reservoirs?

A. Yes, it is.

MR. DENT: I have no further questions from this witness.

MR. RAMEY: Any questions of the witness? Mr. Nutter?

CROSS EXAMINATION

BY MR. NUTTER:

Q. This is with regard to an exhibit that your first witness presented, that three-well cross section.

A. Yes, sir.

Q. I noticed here on the Primo No. 1 that you had a bunch of little black marks indicated up and down throughout here, two of them being in the Chacra, what are those little black marks?

A. Those are perforations, Mr. Nutter.

Q. Then this Primo Well is perforated well above what your geologist is calling Mesaverde interval and also the Mesaverde transitional zone then isn't it?

A. Yes, sir.

Q. And you've got perforations more or less scattered from thirty-four, forty down to forty-six hundred and something, haven't you?

A. Well, the Chacra, what we are calling the Chacra, the perforated interval goes to like thirty-four, forty-four down to thirty-nine, ninety. Our separating packer between

the Chacra and the Mesaverde is at four thousand and fifty.

Q. And then the perforations above the Cliff House in that well would be in the Mesaverde transitional zone referred to earlier? The packer is at forty-one, fifty?

A. Four, oh, five, oh. As I understand that log and I stand corrected by our geologist, the perforations immediately below or some hundred and fifty feet below, is in the transition zone.

Q. Okay, then where is the packer between the Chacra and the PC?

A. At twenty-seven, sixty-four, in the seven inch.

MR. NUTTER: Okay, I believe that's all I have.

MR. RAMEY: Do you have any questions, Mr. Stamets?

CROSS EXAMINATION

BY MR. STAMETS:

Q. On this same line, as a result of Mr. Nutter eliciting what these little black marks are, and you can correct me if I'm wrong, Mr. Farrell, it appears to me that about the greatest vertical distance between any set of perforations is between the top of the Cliff House and the top of the Chacra is about two hundred and fifty feet?

A. Well, that forty-two, oh, eight would be the top of the Cliff House perforations and the closest one to that would be thirty-nine, ninety which is some two hundred and

eighteen feet, right.

Q. So we don't really have two formations separated by a thousand feet like what was indicated earlier in the testimony here, two producing horizons separated by a thousand non-productive feet?

A. That's right and I might add that Chacra A zone which is the interval thirty-nine, twenty-nine to ninety is determined to be a moderate contribution to our Chacra zone. It by no means showed any -- it didn't show the fight that we had either after fracturing or while drilling that the upper zone did.

MR. STAMETS: Okay, thank you.

A. I might add too that we do have the BTU differences between the PC, Mesaverde and Chacra. I do not have any gas analysis with me but BTU's is a relatively accurate way of determining differences but where the PC is a thousand, ninety-one BTU, the Chacra is one thousand, one hundred and thirty-eight BTU and we are showing the Mesaverde is one thousand, one hundred and fifty-one BTU. There is a definite change in characteristics from our gas analysis. You know they are relatively close.

MR. RAMEY: Do you have any other wells in the area that are perforated above this transition zone that are Mesaverde wells?

A. Not to my knowledge, no, sir.

MR. RAMEY: Any other questions of the witness?

REDIRECT EXAMINATION

BY MR. DENT:

Q. Mr. Farrell, all of the perforations as shown on the exhibit existing below thirty-nine hundred feet may have been contributing some amount to the Chacra production, was it the decision of you and others in Mesa not to squeeze those zones since they were contributing some?

A. In efforts of complete drainage and a lack of waste we thought that it would be of some value.

MR. DENT: No further questions.

MR. RAMEY: Any other questions? The witness may be excused.

(THEREUPON, the witness was excused.)

MR. DENT: Our last witness I would like to call is Mr. Slagle.

SAM SLAGLE

called as a witness, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. DENT:

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

A. Sam Slagle.

Q. Mr. Slagle, have you previously testified before the Commission?

A. No, I have not.

Q. For whom are you employed and in what capacity?

A. Mesa Petroleum as a landman.

Q. Will you briefly state your professional background, please?

A. I graduated in 1961 with a BBA degree from West Texas State College and from '65 to '73 I was a landman for Oil Development Company of Texas and from '73 to the present with Mesa.

MR. DENT: Are there any objections to this man's qualifications?

MR. RAMEY: No, he is qualified.

Q. (Mr. Dent continuing.) As Mesa's division landman for the San Juan Division have you been involved in the formation of the drilling spacing units for the Primo 1-A Well?

A. The spacing unit for the Primo Federal Well was the west half of Section 6. It was communitized back in July of '53 and then we drilled our infield well on the same communitization agreement.

Q. As is shown on what has been marked as Exhibit Six, will you show who owns the quarter section shown there in the

northwest quarter of this section?

A. Mesa Petroleum owns the oil and gas in the northwest quarter by virtue of the Federal oil and gas lease.

Q. Who owns the southwest quarter?

A. Crown Central owns the west half of the southwest. Carmore and Umback own the southeast of the southwest and Mesa owns the northeast of the the southwest.

Q. Please show me or explain the proration unit that you show on this exhibit?

A. As I said before, the Mesaverde is the west half of the southwest. The PC and the Chacra in our Primo No. 1-A Well is the northwest quarter.

Q. Does Mesa own one hundred percent of the northwest quarter?

A. That is correct.

Q. If the Commission should accept the recommendations of the Mesaverde study group and delineate the limits of the Chacra formation as being the line that is shown on Exhibit Two, what would this do to Mesa's interest in the Primo 1-A Chacra formation?

A. It would put the Chacra formation in the Mesaverde and we would lose approximately thirty-seven, point, five percent of our Chacra production.

Q. Do you know approximately what that means in dollars based on the past production?

A. I'm sorry, I wasn't prepared for that.

Q. You do know and it is your testimony that Mesa's interest will be cut approximately three-eighths, is that not correct?

A. This is correct.

MR. DENT: That's all I have.

MR. RAMEY: Any questions of the witness? He may be excused.

(THEREUPON, the witness was excused.)

MR. DENT: That's all of the testimony we have. Mr. Hinkle had a statement I think he wanted to give.

MR. RAMEY: Did you offer your exhibits, Mr. Dent?

MR. DENT: Yes, at this time I would like to offer on behalf of Mesa Exhibits One, Two, Three, Four and Five through Five-G, Five-A through Five-G and Exhibit Six.

MR. RAMEY: Without objection they will be admitted.

(THEREUPON, Mesa's Exhibits One through Six were admitted into evidence.)

MR. RAMEY: Mr. Kellahin, do you want to --

MR. KELLAHIN: Yes, sir.

VINCENTE SHRYACK

called as a witness, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q. Would you please state your name, by whom you are employed and in what capacity?

A. My name is Vincente Shryack, I'm employed in this case by Lively Exploration Company as a consulting petroleum engineer.

Q. How do you spell your last name, Mr. Shryack?

A. S-h-r-y-a-c-k.

Q. Have you previously testified before the Oil Conservation Commission as an expert witness and had your qualifications as an expert accepted and made a matter of record?

A. Yes, I have.

MR. KELLAHIN: Are the witness' qualifications acceptable?

MR. RAMEY: He is qualified.

Q. (Mr. Kellahin continuing.) Mr. Shryack, would you please refer to what has been marked as Exhibit Number One and identify it?

A. Exhibit Number one is a well data sheet for the Lively Exploration Company, Lively Well No. 7-Y.

Q. Where is that well located?

A. It is located in Unit E, Section 35, Township 30 North, Range 8 West, San Juan County, New Mexico.

Q. Please refer to Exhibit Number Two and identify it?

A. Exhibit Number Two is a comparison of shut-in surface pressures of Blanco-Mesaverde wells and the Chacra completion in the Lively 7-Y in 1974 when the Lively 7-Y was completed in the Chacra.

Q. Please locate the Lively 7-Y Well for me?

A. I would like to direct your attention to the center of the page, the Lively No. 7-Y is colored red.

Q. When was this well completed?

A. This well was completed in the Chacra on May first, 1974.

Q. And what was the initial shut-in pressure?

A. Seven hundred and forty-eight pounds per square inch absolute.

Q. These other wells shown on your plat are what type of wells?

A. Blanco-Mesaverde.

Q. What are those figures adjacent to the well locations on the Mesaverde wells?

A. Those are the shut-in surface pressures of the annual deliverability test taken in 1974.

Q. Please refer to Exhibit Number Three and identify it?

A. Exhibit Number Three is a location plat of the northwest quarter of Section 35, Township 30 North, Range 8

West, which shows the location of the El Paso Natural Gas Company's Howell L Well No. 3-A which is an infield Mesaverde completion. This well was completed. It's initial pressure was taken on April 12, 1976 and its initial pressure was five hundred and eighty-six pounds per square inch absolute at the surface.

Q. What is the distance between the Lively Exploration Well and the El Paso Well?

A. Three hundred and fifty-three feet.

Q. The pressure information in June 30, '76 on your well was what?

A. The Lively 7-Y Well had a shut-in surface pressure of six hundred and fifty pounds per square inch absolute.

Q. As of that date what has been the total cumulative production from the Lively Well?

A. One billion, two hundred and eighty-three million, seven hundred and seventy-eight thousand cubic feet.

Q. Please refer to Exhibit Number Four and identify it?

A. Exhibit Number Four is a comparison of shut-in surface pressures of Blanco-Mesaverde wells in 1976 when the El Paso Howell L No. 3-A infield well was completed.

The Lively Exploration 7-Y is located in the center of the page and is colored red.

Q. What does the six hundred and fifty figure represent?

A. The six hundred and fifty is the shut-in surface

pressure of the Lively 7-Y Chacra taken on June 30th, 1976. The other pressures are indicated for the offset Mesaverde wells.

Q. What conclusions do you draw from this data, Mr. Shryack?

A. I should like to draw my conclusion with respect to both Exhibit Number Two and Exhibit Number Four if you will lay those side by side, please.

In 1974 the initial shut-in pressure of the Lively 7-Y was approximately a hundred and seventy-five pounds higher than one would expect it to be if it were connected pressure-wise to the presently defined Blanco-Mesaverde formation.

In 1976 in Exhibit Four the initial shut-in pressure of the El Paso Natural Gas Howell L No. 3-A which is completed in the presently defined Blanco-Mesaverde formation falls approximately where you would expect the pressure to fall and in 1976 the pressure in this infield well upon completion is still significantly less by sixty-four pounds than the shut-in pressure of the Lively 7-Y Chacra.

It is my conclusion that a pressure communication is not indicated by the pressure data surrounding the Lively 7-Y Chacra Well.

Q. Please refer to Exhibit Number Five and explain what information it contains?

A. Exhibit Number Five is a reproduction of the induction

gamma ray log on the Lively 7-Y from a measured depth of approximately thirty-five hundred feet down to forty-seven hundred feet measured depth.

The base of the Chacra is at thirty-seven, fifteen feet and the top of the porous Cliff House is at forty-six, twenty-two, resulting in a distance of nine hundred and seven feet measured depth between the two formations.

Q. At what depth is this well perforated?

A. This well is perforated from thirty-six, eighty-five to forty-seven hundred feet and is shown on the log.

Q. In your opinion, Mr. Shryack, from what formation does the Lively 7-Y produce?

A. The Chacra.

Q. Do you see any evidence of communication between the Mesaverde formation and the Chacra formation?

A. No, sir.

Q. Do you have anything else you would like to add to your testimony?

A. I don't believe so.

Q. Were Exhibits One through Five either prepared by you or were they prepared under your direction and supervision?

A. By me directly.

MR. KELLAHIN: I move the introduction of Exhibits One through Five.

MR. RAMEY: Without objection they will be admitted.

(THEREUPON, Lively Exploration Exhibits One through Five were admitted into evidence.)

MR. RAMEY: Any questions of the witness?

MR. KENDRICK: Yes.

MR. RAMEY: Mr. Kendrick.

CROSS EXAMINATION

BY MR. KENDRICK:

Q. Mr. Shryack, your testimony is that the pressure between what you have classed in the Lively Wells as being six hundred and fifty pounds in the Chacra interval and five hundred and thirty-one pounds in the Mesaverde interval indicates association with different portions of the reservoir or different reservoirs, is that your opinion because of the pressure difference of the hundred and twenty pounds?

A. My testimony in that exhibit which is Number Four, taken in 1976, is that the shut-in pressure of the Chacra sand completion in the Lively 7-Y is still sixty-four pounds higher than a virgin completion pressure, if you will, in an infield Mesaverde well three hundred and fifty-three feet from it. After a production of approximately a billion, point, three feet of gas it indicates to me that they are not pressure connected.

Q. On the same exhibit, two more wells, one having a

shut-in pressure measured on six, thirty and four hundred and forty-five pounds for Well No. 3?

A. Yes, sir.

Q. And the well to the west of it, No. 4-A with a shut-in pressure of five hundred and forty-six pounds?

A. Yes, sir.

Q. Apparently measured on eleven, forty-three, being a hundred pounds difference, are those wells in the same reservoir?

A. Yes, sir, they are.

MR. KENDRICK: Thank you.

MR. RAMEY: Any other questions? Mr. Carr.

CROSS EXAMINATION

BY MR. W. CARR:

Q. Mr. Shryack, I gather from your testimony that you believe that the pressure differential that you have been talking about indicates that you have one well in the Chacra and the other in the Mesaverde, is that correct?

A. My testimony, that, plus the difference in measured depths of five hundred and seventy.

Q. Would it be the fact that you are basing this on pressure?

A. Yes, sir.

Q. Are you aware of the average pressure differential

between old wells in the Mesaverde and the new infield wells that will be drilled?

A. I'm aware of them on these exhibits, yes, sir.

Q. Would it surprise you if it was off as much as two hundred and fifty pounds?

A. Not really.

MR. W. CARR: I would just ask that the Commission take note of its memorandum dated February 24, '77 from Mr. Norman Maxwell to the current Mesaverde interested parties regarding current Mesaverde infield well data and the pressure data.

MR. RAMEY: All right, Mr. Carr.

Any other questions of the witness?

MR. KELLAHIN: No other questions.

MR. RAMEY: He may be excused.

MR. SHRYACK: May I make one comment, please?

MR. RAMEY: Yes.

MR. SHRYACK: These pressures, I think, need some explanation -- really don't need explanation to the Commission because the techniques of taking them are different, there are different sands here have different permeabilities and there is a definite variance. My exhibits are intended to show that the Chacra is significantly different, with other factors included, from the surrounding Blanco-Mesaverde wells.

Now, I understand that the whole field varies all

between old wells in the Mesaverde and the new infield wells that will be drilled?

A. I'm aware of them on these exhibits, yes, sir.

Q. Would it surprise you if it was off as much as two hundred and fifty pounds?

A. Not really.

MR. W. CARR: I would just ask that the Commission take note of its memorandum dated February 24, '77 from Mr. Norman Maxwell to the current Mesaverde interested parties regarding current Mesaverde infield well data and the pressure data.

MR. RAMEY: All right, Mr. Carr.

Any other questions of the witness?

MR. KELLAHIN: No other questions.

MR. RAMEY: He may be excused.

MR. SHRYACK: May I make one comment, please?

MR. RAMEY: Yes.

MR. SHRYACK: These pressures, I think, need some explanation -- really don't need explanation to the Commission because the techniques of taking them are different, there are different sands here have different permeabilities and there is a definite variance. My exhibits are intended to show that the Chacra is significantly different, with other factors included, from the surrounding Blanco-Mesaverde wells.

Now, I understand that the whole field varies all

over the place. I have looked at wells here, there and everywhere and many things can be drawn from it but I believe these exhibits conclusively show that the 7-Y Chacra is not in present communication to the surrounding Blanco-Mesaverde wells and as to the technique of pressure testing, yes, there is a variance in that.

MR. RAMEY: The witness may be excused.

(THEREUPON, the witness was excused.)

MR. RAMEY: Is there anything further, Mr. Kellahin?

MR. KELLAHIN: No, sir.

MR. RAMEY: Do you have any statements at this time?

MR. HINKLE: If the Commission please, I would just like to comment on one thing.

MR. RAMEY: Mr. Hinkle.

MR. HINKLE: That we have two cases on the docket today. The first case is the redefinition of the Blanco-Mesaverde and the other one involved the doing away with two fields that have been designated pools, designated by the Commission.

It is my understanding that it was the ruling of the Commission that these were only consolidated for the purpose of taking testimony, is that right?

MR. RAMEY: Yes, sir, that's right.

MR. HINKLE: So there will be a separate order issued in the second case?

MR. RAMEY: Yes, sir.

MR. HINKLE: Now, your other ruling was that you didn't have any exceptions and I call your attention to the fact that the second case specifically deals with Mesa's situation and we have introduced testimony showing that in our opinion it is a separate pool, reservoir, no communication between the Mesaverde. Now, we can come up here again, several times, and ask for exceptions to the general order that you issue but it would be the same testimony and it would be a duplication again, so it seems to me or we would like, at least, for the Commission to take into consideration in deciding these cases that Mesa's situation can be taken care of in the order in the second case.

MR. RAMEY: Mr. Hinkle, I will assure you that if at all possible we will try to handle it with one hearing.

Mr. Carr, do you have anything?

MR. W. CARR: No.

MR. RAMEY: Anything further? The hearing is adjourned.

(THEREUPON, the hearing was adjourned.)

REPORTER'S CERTIFICATE

I, SIDNEY F. MORRISH, a Certified Shorthand Reporter, do hereby certify that the foregoing and attached Transcript of Hearing before the New Mexico Oil Conservation Commission was reported by me, and the same is a true and correct record of the said proceedings to the best of my knowledge, skill and ability.

Sidney F. Morrish, C.S.R.

OIL CONSERVATION COMMISSION

STATE OF NEW MEXICO
P. O. BOX 2088 - SANTA FE
87501

DIRECTOR
JOE D. RAMEY

LAND COMMISSIONER
PHIL R. LUCERO

STATE GEOLOGIST
EMERY C. ARNOLD

June 15, 1977

Re: CASE NO. 5893
ORDER NO. R-5459

Mr. Clarence Hinkle
Hinkle, Bondurant, Cox & Eaton
Attorneys at Law
Post Office Box 10
Roswell, New Mexico 88201

Applicant:

Oil Conservation Commission

Dear Sir:

Enclosed herewith are two copies of the above-referenced Commission order recently entered in the subject case.

Yours very truly,

JOE D. RAMEY
Director

JDR/fd

Copy of order also sent to:

Hobbs OCC x
Artesia OCC x
Aztec OCC x

Other William F. Carr, Don Dent, Millard Carr, Tom Kellahin, John Nance

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION COMMISSION OF NEW MEXICO ON ITS OWN MOTION TO CONSIDER REDEFINITION OF THE VERTICAL LIMITS OF THE BLANCO-MESAVERDE POOL, RIO ARRIBA AND SAN JUAN COUNTIES, NEW MEXICO.

CASE NO. 5893
Order No. R-5459

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on March 23, 1977, at Santa Fe, New Mexico, before the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission."

NOW, on this 14th day of June, 1977, the Commission, a quorum being present, having considered the testimony presented and the exhibits received at said hearing, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) That the Blanco-Mesaverde Pool, located in Rio Arriba and San Juan Counties, New Mexico, was created by Commission Order No. 799, dated February 25, 1949.

(3) That Section (2) of said Order No. 799 defined the vertical limits of said Blanco-Mesaverde Pool as the "4200-5100 feet productive horizon where the productive sands are contained between the top of the Cliff House Sand and the base of the Point Lookout Sand of the Mesaverde."

(4) That said definition of the vertical limits of said Blanco-Mesaverde Pool has proved inadequate for the following reasons:

A. The definition does not take into account variations in surface elevations and formation dip which can cause the "Mesaverde" productive horizon to occur above or below the 4200 feet to 5100 feet interval.

B. The definition does not adequately take into account the transgressive, regressive, gradational nature of formations composing the "Mesaverde" productive horizon.

(5) That because of the imprecise nature of said vertical limits definition, Mesaverde productive zones above or below the 4200 foot to 5100 foot interval in any particular well might not be completed in said well.

(6) That failure to complete such zones could result in waste of gas in the ground.

(7) That the current infill drilling program within said Blanco-Mesaverde Pool has increased the need for a more precise definition of the vertical limits of such pool.

(8) That in December, 1976, the Commission appointed an industry-government study committee to examine the problem and report its findings to the Commission.

(9) That, based on geological evidence, the study committee recommended that the vertical limits of said Blanco-Mesaverde Pool be redefined as that interval from the Huerfanito bentonite marker to a point 500 feet below the top Point Lookout formation.

(10) That the Induction-Electrical Log of the El Paso Natural Gas Company Johnston State Well No. 1 located in Unit A of Section 32, Township 26 North, Range 6 West, NMPM, Rio Arriba County, New Mexico, should be the type log for said Blanco-Mesaverde Pool.

(11) That the Huerfanito bentonite marker and the top of the Point Lookout formation are found at depths of 3255 feet and 5100 feet, respectively, on said type log.

(12) That such definition should permit maximum development of productive horizons within the Blanco-Mesaverde Pool, thereby preventing waste.

(13) That there are several Chacra Sand gas pools developed along the Southwest flank of the Blanco-Mesaverde Pool which have been separately drilled and developed which would be included within the revised definition of the vertical limits of the Blanco-Mesaverde Pool.

(14) That such pools are completed in porous Chacra sands.

(15) That such porous Chacra sands lie South and West of a line generally running from the Northwest corner of Township 31 North, Range 13 West, NMPM, San Juan County, New Mexico, to the Southwest Corner of Township 24 North, Range 1 East, NMPM, Rio Arriba County, New Mexico, as more fully described on Exhibit "A" of this order.

(16) That to protect the correlative rights of the owners in said Chacra pools, the top vertical limit of said Blanco-Mesaverde Pool should be lowered to a point 750 feet below the Huerfanito bentonite marker within the area South and West of the line defined in Finding No. (15) above and Exhibit "A".

(17) That there are 4 wells North and East of the line defined in Finding No. 15 above and Exhibit A which may be producing from fractured shale or siltstone zones equivalent to said Chacra sands and which may or may not be connected to other producing zones in said Blanco-Mesaverde Pool.

(18) That to protect the correlative rights of the owners of said four wells, the effective date of any redefinition of the vertical limits of said Blanco-Mesaverde Pool should be delayed to provide such owners with the opportunity to bring a case for an exception before the Commission.

(19) That with the safeguards provided in Finding No. (16) and No. (18) above, the proposed redefinition of the vertical limits of the Blanco-Mesaverde Pool will not violate correlative rights.

(20) That to prevent waste, the vertical limits of said Blanco-Mesaverde Pool should be redefined in accordance with the study committee recommendation as adjusted to protect Chacra gas pools as set out in Finding No. (14) above.

IT IS THEREFORE ORDERED:

(1) That effective August 1, 1977, the vertical limits of the Blanco-Mesaverde Pool, Rio Arriba and San Juan Counties, New Mexico, as previously described and defined by the Commission are hereby redefined as follows:

A. That North and East of a line generally running from the Northwest corner of Township 31 North, Range 13 West, San Juan County, New Mexico, to the Southwest corner of Township 24 North, Range 1 East, NMPM, Rio Arriba County, New Mexico, as fully described on Exhibit "A" attached to this order, and incorporated herein by reference the vertical limits of the Blanco-Mesaverde Pool shall be from the Huerfanito bentonite marker to a point 500 feet below the top of the Point Lookout Sandstone.

B. That South and West of the line described under A above, the vertical limits of the Blanco-Mesaverde Pool shall be from a point 750 feet below said Huerfanito bentonite marker to a point 500 feet below the top of the Point Lookout Sandstone.

(2) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

PHIL R. LUCERO, Chairman

EMERY C. ARNOLD, Member

JOE D. RAMEY, Member & Secretary

S E A L

jr/

EXHIBIT "A"

COMMISSION ORDER NO. R-5459

This exhibit defines the Northwest-Southeast trending line that divides the Blanco-Mesaverde Pool, Rio Arriba and San Juan Counties, New Mexico, for purposes of defining the vertical limits for said pool. Said line traverses the South side or west side of the sections listed below:

TOWNSHIP 31 NORTH, RANGE 14 WEST, NMPM
Section 12: South

TOWNSHIP 31 NORTH, RANGE 13 WEST, NMPM
Sections 7 and 8: South
Section 16: West and South
Sections 15 and 14: South
Section 24: West and South

TOWNSHIP 31 NORTH, RANGE 12 WEST, NMPM
Section 19: South
Section 29: West and South
Sections 28 and 27: South
Section 35: West and South
Section 36: South

TOWNSHIP 30 NORTH, RANGE 11 WEST, NMPM
Section 6: West and South
Section 5: South
Section 9: West and South
Sections 10 and 11: South
Section 13: West and South

TOWNSHIP 30 NORTH, RANGE 10 WEST, NMPM
Section 18: South
Section 20: West and South
Sections 21 and 22: South
Section 26: West and South
Section 25: South

TOWNSHIP 30 NORTH, RANGE 9 WEST, NMPM
Section 31: West and South
Section 32: South

TOWNSHIP 29 NORTH, RANGE 9 WEST, NMPM
Section 4: West and South
Section 3: South
Section 11: West and South
Section 12: South

TOWNSHIP 29 NORTH, RANGE 8 WEST, NMPM
Section 18: West and South
Section 17: South
Section 21: West and South
Section 22: South
Section 26: West and South
Section 25: South

TOWNSHIP 29 NORTH, RANGE 7 WEST, NMPM
Section 31: West and South
Sections 32 through 36: South

TOWNSHIP 28 NORTH, RANGE 6 WEST, NMPM
Sections 7, 18, 19, 30, and 31: West

TOWNSHIP 27 NORTH, RANGE 6 WEST, NMPM
Section 6: West
Section 7: West and South
Sections 8 and 9: South
Section 15: West and South
Section 14: South
Section 24: West
Section 25: West and South

TOWNSHIP 27 NORTH, RANGE 5 WEST, NMPM
Section 31: West and South
Sections 32 through 36: South

TOWNSHIP 27 NORTH, RANGE 4 WEST, NMPM
Sections 31 through 36: South

TOWNSHIP 27 NORTH, RANGE 3 WEST, NMPM
Sections 31 and 32: South

TOWNSHIP 26 NORTH, RANGE 3 WEST, NMPM
Section 4: West and South
Sections 3 and 2: South
Section 12: West and South

TOWNSHIP 26 NORTH, RANGE 2 WEST, NMPM
Sections 7 and 8: South
Sections 16 and 22: West and South
Section 26: West
Section 35: West and South

TOWNSHIP 25 NORTH, RANGE 2 WEST, NMPM
Section 1: West and South

TOWNSHIP 25 NORTH, RANGE 1 WEST, NMPM
Section 7: West
Sections 18 and 20: West and South
Section 28: West
Section 33: West and South

TOWNSHIP 24 NORTH, RANGE 1 WEST, NMPM
Section 3: West
Sections 10 and 14: West and South
Section 24: West
Section 25: West and South

TOWNSHIP 24 NORTH, RANGE 1 EAST, NMPM
Section 31: West

OIL CONSERVATION COMMISSION

STATE OF NEW MEXICO
1000 RIO BRAZOS RD. · AZTEC
87410

DIRECTOR
JOE D. RAMEY

LAND COMMISSIONER
PHIL R. LUCERO

STATE GEOLOGIST
EMERY C. ARNOLD

April 1, 1977

Mr. Dick Stamets:

The attached cross-section graph illustrates the productive intervals in four of the Chacra equivalent wells as compared with a number of regular Mesaverde offsets. The four Chacra equivalent wells are the Lively 7-Y, The Tenneco Florance 29-A, the Blackwood & Nichols NEBU # 64 and the Mesa- Primo Fed. 1-A.

My pick of the top of the Chacra runs fairly uniform to my pick of the Huerfanito marker. So far, all of the problem wells are below the Huerfanito marker.

The graph is based on a sea-level datum. The first 9 wells run from SW to NE beginning in M of 34-30-8 and running thru P 24-30 & 8 with the Southern Union- Nordhaus # 5 thrown in.

Only two of the 4 wells in question have logs thru the pay. Excerpts of the two "Chacra" - Mesaverde logs are attached with the perforated interval marked. Logs were not run on the other two wells because they were blowing too hard.

A production graph of the Mesa-Primo 1-A thru February 1977 is also attached.

A rough graph has been made on the production of the offsets to the Lively 7-Y. Monthly figureswere plotted from Jan. 1973 thru November 1976 on Howell L-3, Florance # 39, Howell L-4, There was no discernible interference in production rates and the Lively 7-Y was the largest producer at about a rate of 1,850 MCFD. This graph can be refined and furnished upon request. The Lively 7-Y went on production in June of 1974.

Please advise, what further information my be useful.

N. E. Maxwell Jr.

N. E. Maxwell Jr.

DATA FOR MESAVERDE VERTICAL LIMITS DETERMINATION USING HUERFANITO MARKER

4-1-77

EPG Thompson #2 M-34-30-8	EPG Howell L-4 G-34-30-8	Lively Lively 7-Y E-35-30-8 Mesaverde-Dakota Dual	EPG Florance 39 B-35-30-8	Tenneco Florance 29 K-25-30-8	So. Union Nordhaus 5 M-12-31-9	Tenneco Florance 29A F-25-30-8	EPG Howell L-2 A-25-30-8	Black-Nichols NEBU # 64 P-24-30-8	Amoco Sammons GC I P-6-31-10	Mesa Primo 1-A D-6-31-10 PC-MV-Dakota Triple Completion	Amoco Sammons GC 1 B-6-31-10

SEA LEVEL DATUM

3000

2578
2493

Chacra Datum above sea level

2450 2487 2443 2477 2444 2479 2481

HUERFANITO MARKER

2347

2473
2407

Perf.
2408
2392

Blowout
2076
2050

Open Hole
No Logs

2524
2479

Blowout
2507
2560
2493

2000

1873
1760TD

Open Hole

Top Of Cliffhouse- above sea level

1625 1557 1471 1561 1599 1449 1412 1414 1491 1448 1372 1733 1499 1734 1491

1448

Perfs

No Log

Perfs

1000

952 902 860 863 849 897 915 890

Sea Level Datum

NEM Jr.

Lively
Lively 7-Y
E-35-30-8
6093 Grd. Elev.

3650 Chacra Top / 2443

3685 / 2408
3700 / 2393

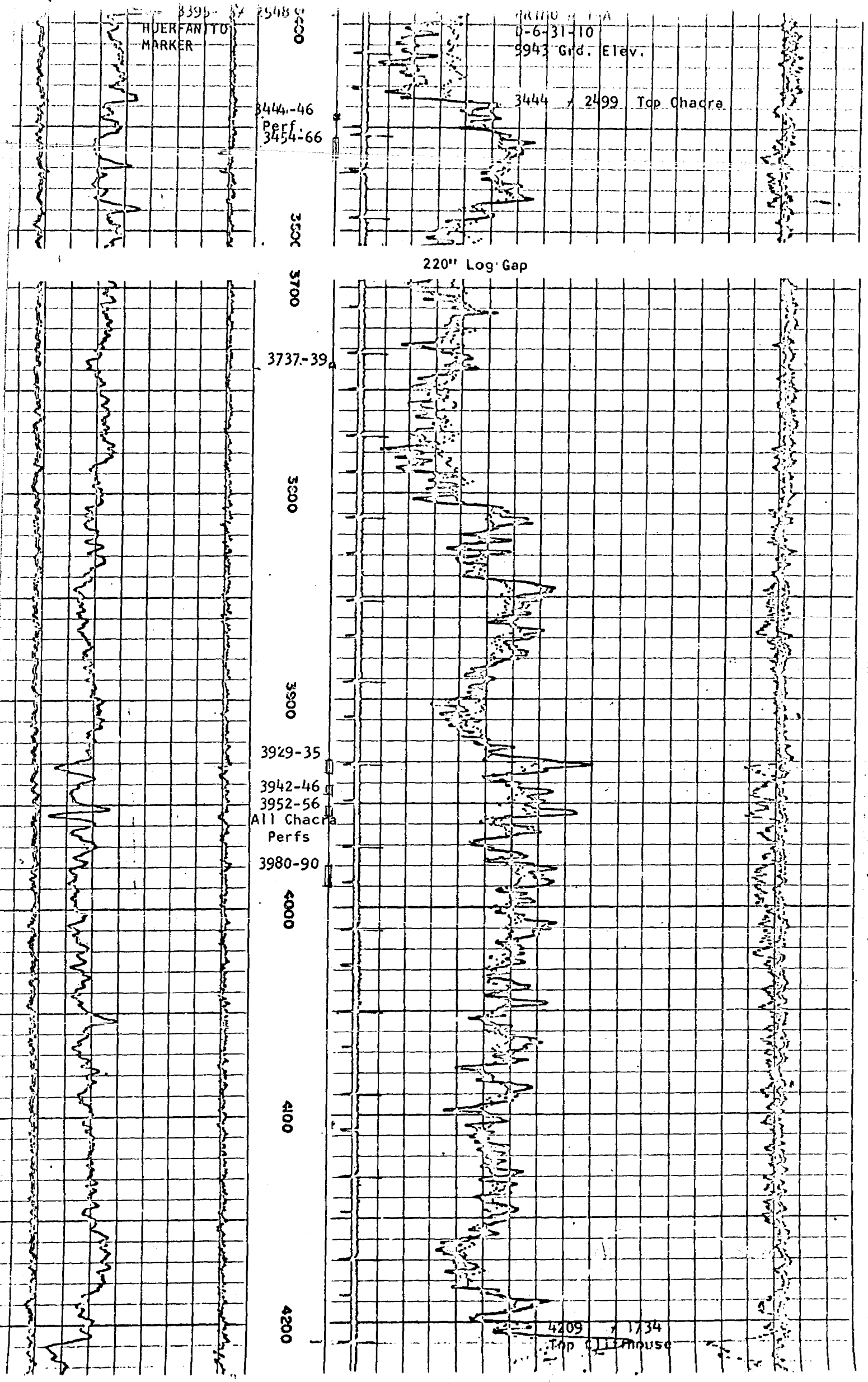
1839 @
748#

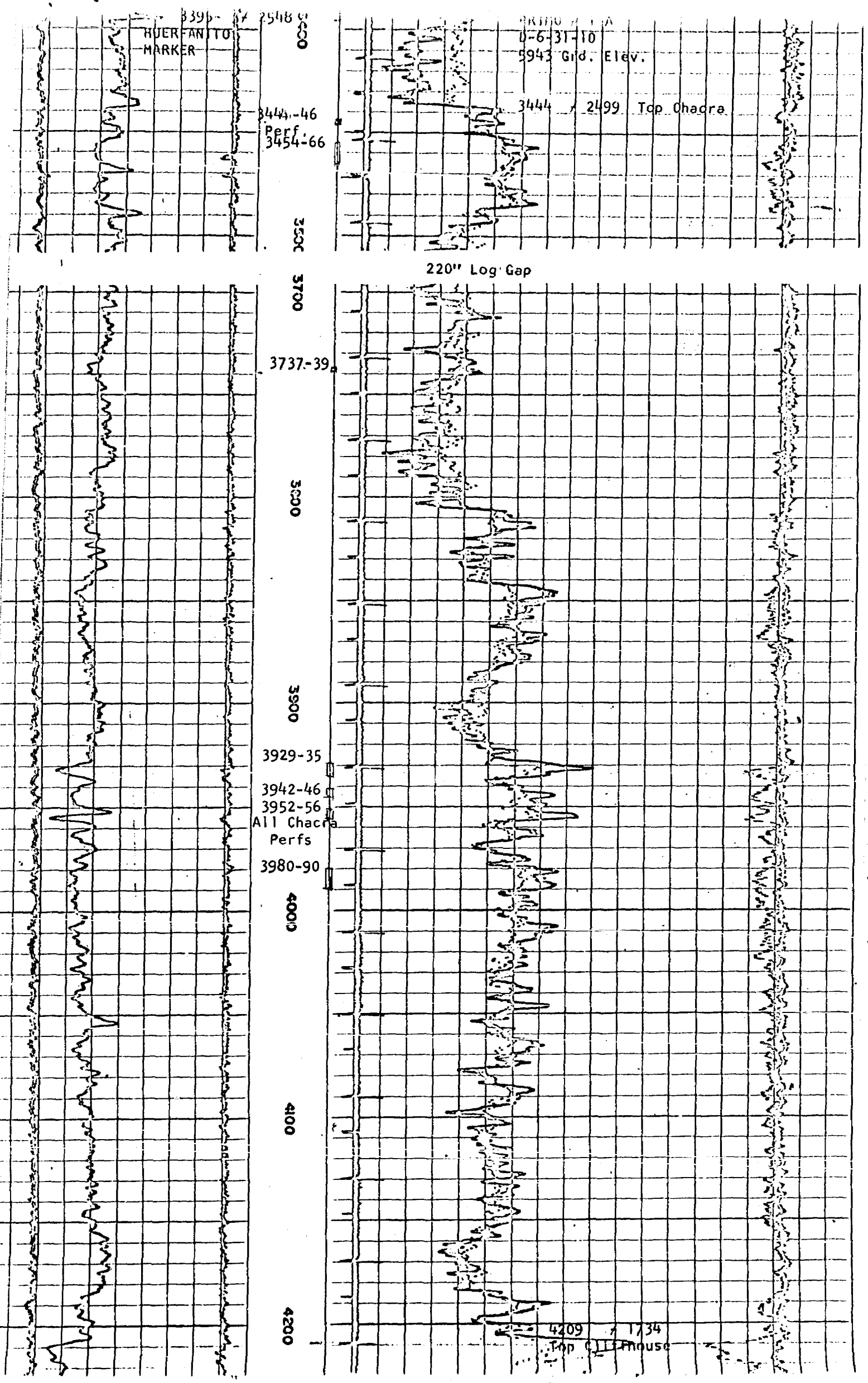
3600
3700
3800
3900

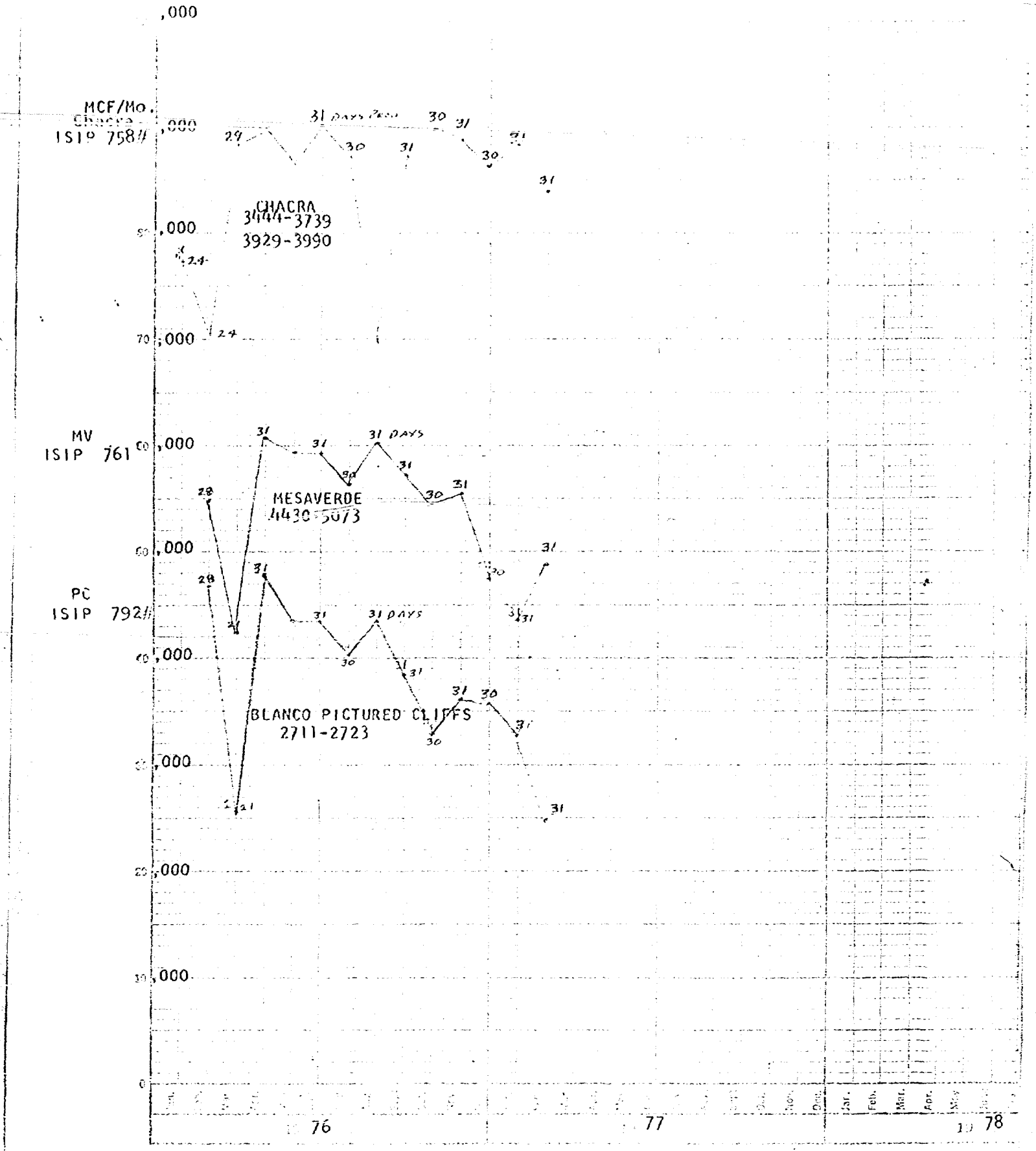
LOG
GAP

4500
4600
4700

4622 / 1471 Top Cliffhouse


HUERFANITO
MARKER
3444-46
Perf
3454-66
0-6-31-10
5943 Grd. Elev.
3444 + 2499 Top Chacra
220" Log Gap
3737-39
3929-35
3942-46
3952-56
All Chacra
Perfs
3980-90
4209 + 1734
Top Cliffhouse
3500
3600
3700
3800
3900
4000
4100
4200


HUERFANITO
MARKER
3444-46
Perf.
3454-66
4-6-31-10
5943 Grd. Elev.
3444 / 2499 Top Chacra
220" Log Gap
3737-39
3929-35
3942-46
3952-56
All Chacra
Perfs
3980-90
4209 / 1134
Top Cliffhouse
3500
3600
3700
3800
3900
4000
4100
4200



MBSA PETROLEUM CORP. PRIMO FED. 1-A D-6-31N-10W. Comp. 12-16-75 G.L.-5943

NORDHAUS #1
N-13-31N-9W

NORDHAUS #1-A
F-13-31N-9W

NORDHAUS #5
M-12-31N-9W

NORDHAUS #3-A
I-11-31N-9W

DATUM

MARKER

+2500

2433
2366

2434

2414

2354

2217

2216

2170

+2000

1599
1491

+1500

1379

1278

1188

PAY ZONE

687

625

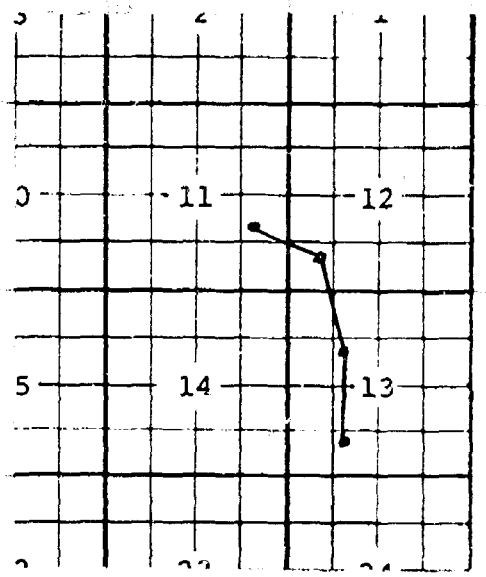
+1000

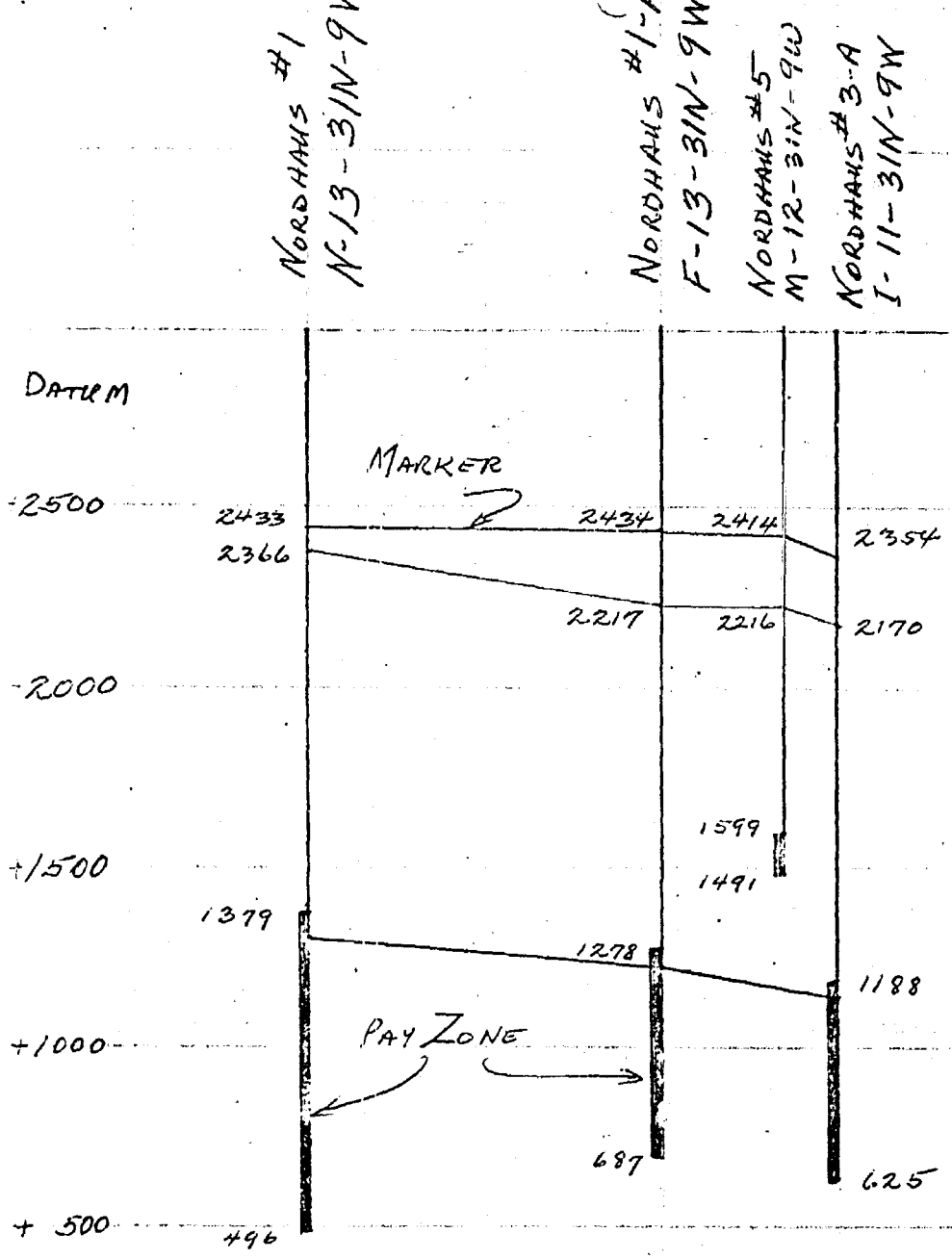
+500

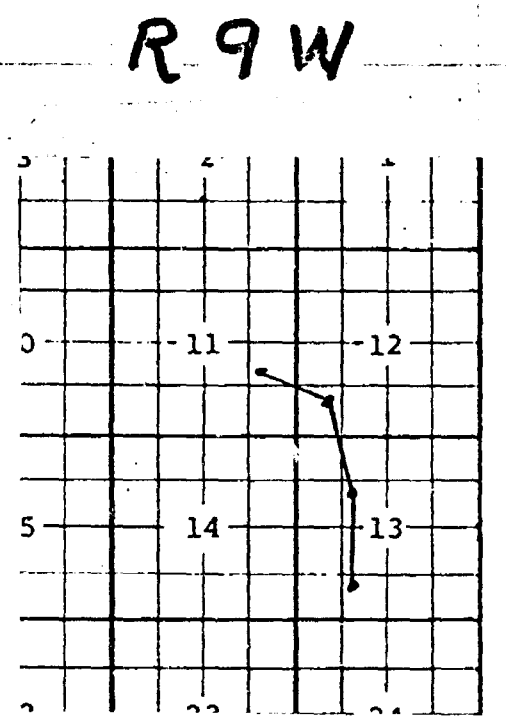
496

R 9 W

T 31 N




NORDHAUS #1
N-13-31N-9W
NORDHAUS #1-A
F-13-31N-9W
NORDHAUS #5
M-12-31N-9W
NORDHAUS #3-A
I-11-31N-9W
DATUM
MARKER
-2500
2433
2366
2434
2414
2354
2217
2216
2170
-2000
1599
1491
+1500
1379
1278
1188
PAY ZONE
+1000
687
625
+ 500
496


R 9 W
T 31 N
11
12
14
13
5

Dockets Nos. 11-77 and 12-77 are tentatively set for hearing on April 6 and April 20, 1977. Applications for hearing must be filed at least 22 days in advance of hearing date.

DOCKET: EXAMINER HEARING - WEDNESDAY - MARCH 23, 1977

9 A.M. - OIL CONSERVATION COMMISSION CONFERENCE ROOM
STATE LAND OFFICE BUILDING, SANTA FE, NEW MEXICO

The following cases will be heard before Richard L. Stamets, Examiner, or Daniel S. Nutter, Alternate Examiner:

CASE 5882: Application of Amoco Production Company for special pool rules, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks the promulgation of a special gas-oil ratio limit of 6000 cubic feet of gas per barrel of oil for the South Empire Wolfcamp Pool, Eddy County, New Mexico.

CASE 5883: Application of Am-Bett Oil Company, Inc. for an oil treating plant permit, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority for the construction and operation of an oil treating plant for the purposes of treating and reclaiming sediment oil at a site in the SE/4 NW/4 of Section 3, Township 21 South, Range 37 East, Lea County, New Mexico.

CASE 5884: Application of BCO, Inc., for downhole commingling, Rio Arriba County, New Mexico. Applicant, in the above-styled cause, seeks authority to commingle Greenhorn, Graneros, and Dakota production in the wellbore of its Dunn Well No. 1 located in Unit M of Section 10, Township 23 North, Range 7 West, Rio Arriba County, New Mexico.

CASE 5885: Application of Continental Oil Company for amendment of Order No. R-5315, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks the amendment of Order No. R-5315 to permit the dedication of a previously approved 320-acre proration unit comprising the W/2 of Section 31, Township 22 South, Range 31 East, Los Medanos Field, Eddy County, New Mexico, to a well to be drilled at a standard location in Unit E of said Section 31, rather than in Unit L as previously approved.

CASE 5886: Application of Continental Oil Company for an unorthodox gas well location, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox location of a well to be drilled at a point 1980 feet from the North line and 660 feet from the West line of Section 31, Township 22 South, Range 31 East, Los Medanos Field, Eddy County, New Mexico, the N/2 of said Section 31 to be dedicated to the well.

CASE 5887: Application of Gas Company of New Mexico for suspension of Rules 14(a) and 15(a) of the gas proration rules, Catclaw Draw-Morrow Gas Pool, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks suspension for a period of one year from April 1, 1977, of those provisions of Rules 14(a) and 15(a) of the General Rules and Regulations for the prorated gas pools of Southeastern New Mexico promulgated by Order No. R-1670, as amended, that provide for the cancellation of underproduction and the shutting-in of overproduced wells, as applied to the Catclaw Draw-Morrow Gas Pool, Eddy County, New Mexico.

CASE 5888: Application of Dalport Oil Corporation for an unorthodox gas well location, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox location of its A. L. Christmas Well No. 3 to be drilled 330 feet from the South line and 2310 feet from the East line of Section 25, Township 22 South, Range 36 East, Jalmat Gas Pool, Lea County, New Mexico.

CASE 5889: Application of Saturn Oil Company for compulsory pooling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests down to and including the Blinebry formation underlying the NE/4 SE/4 of Section 11, Township 23 South, Range 37 East, Lea County, New Mexico, to be dedicated to its Lineberry Well No. 1 located in Unit I of said Section; and underlying the NW/4 SE/4 of said Section 11 to be dedicated to its Lineberry Well No. 2 located in Unit J of said Section. In the event re-entry into either well is unsuccessful, applicant proposes to drill a replacement well at a standard location on its tracts. Also to be considered will be the costs of recompletion or drilling and completing said wells and the allocation of the costs thereof, as well as actual operating costs and charges for supervision. Also to be considered will be the designation of applicant as operator of the wells and a charge for risk involved in recompletion or drilling of said wells.

CASE 5890: Application of James C. Whitten for an unorthodox well location, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the re-entry of a well at an unorthodox location 1980 feet from the South line and 660 feet from the East line of Section 14, Township 20 South, Range 34 East, Lea Devonian Pool, Lea County, New Mexico. If said re-entry if unsuccessful, applicant proposes to drill a new well at an unorthodox location 2030 feet from the South line and 660 feet from the East line of said Section 14.

(g) CREATE a new pool in Eddy County, New Mexico, classified as a gas pool for Atoka production and designated as the Quahada Ridge-Atoka Gas Pool. The discovery well is the Perry R. Bass Big Eddy Unit Well No. 40 located in Unit G of Section 22, Township 21 South, Range 29 East, NMPM. Said pool would comprise:

TOWNSHIP 21 SOUTH, RANGE 29 EAST, NMPM
Section 22: N/2

(h) CREATE a new pool in Lea County, New Mexico, classified as a gas pool for Morrow production and designated as the East Red Tank-Morrow Gas Pool. The discovery well is the Gulf Oil Corporation Covington "A" Federal Well No. 1 located in Unit C of Section 25, Township 22 South, Range 32 East, NMPM. Said pool would comprise:

TOWNSHIP 22 SOUTH, RANGE 32 EAST, NMPM
Section 25: N/2

(i) CREATE a new pool in Eddy County, New Mexico, classified as a gas pool for Morrow production and designated as the South Rock Tank-Morrow Gas Pool. The discovery well is the Amoco Production Company South Rock Tank Well No. 1 located in Unit H of Section 2, Township 24 South, Range 24 East, NMPM. Said pool would comprise:

TOWNSHIP 24 SOUTH, RANGE 24 EAST, NMPM
Section 2: N/2

(j) CREATE a new pool in Lea County, New Mexico, classified as an oil pool for Wolfcamp production and designated as the Trinity-Wolfcamp Pool. The discovery well is the Wainoco, Inc. Hodge et al Well No. 1 located in Unit P of Section 28, Township 12 South, Range 38 East, NMPM. Said pool would comprise:

TOWNSHIP 12 SOUTH, RANGE 38 EAST, NMPM
Section 28: SE/4

(k) EXTEND the Baum-Upper Pennsylvanian Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 13 SOUTH, RANGE 33 EAST, NMPM
Section 30: NE/4

(l) EXTEND the South Bell Lake-Atoka Gas Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 23 SOUTH, RANGE 34 EAST, NMPM
Section 31: S/2
Section 32: W/2

(m) EXTEND the South Bell Lake-Morrow Gas Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 23 SOUTH, RANGE 33 EAST, NMPM
Section 36: NE/4

(n) EXTEND the Blinebry Oil and Gas Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 20 SOUTH, RANGE 38 EAST, NMPM
Section 21: SW/4
Section 28: NW/4

(o) EXTEND the Cemetery-Morrow Gas Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 19 SOUTH, RANGE 24 EAST, NMPM
Section 36: S/2

TOWNSHIP 19 SOUTH, RANGE 25 EAST, NMPM
Section 28: S/2
Section 31: S/2
Section 32: S/2
Section 33: All
Section 34: N/2
Section 35: N/2

TOWNSHIP 20 SOUTH, RANGE 24 EAST, NMPM
Section 1: All

TOWNSHIP 21 SOUTH, RANGE 24 EAST, NMPM
Section 6: Lots 1, 2, 7, 8, 9, 10, 15 & 16

CASE 5891: Application of Sam H. Snoddy for directional drilling and a non-standard gas proration unit, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the directional drilling of two 13,500 foot Morrow test wells from a single drilling site in the extreme Northwest five acres of the NW/4 SE/4 of Section 25, Township 20 South, Range 32 East, Potash-Oil Area, Lea County, New Mexico. Applicant proposes to vertically drill each of said wells to a depth of approximately 3000 feet and to then directionally drill one well in a Northeasterly direction bottoming said well in the approximate center of the NE/4 of said Section 25, and to then directionally drill the other well in a Southwesterly direction, bottoming said well in the approximate center of the SW/4 of said Section 25. Applicant would dedicate the N/2 to the first of the aforesaid wells, and would dedicate a non-standard 160-acre unit comprising the SW/4 of said Section 25 to the second.

CASE 5820: (Continued from March 9, 1977, Examiner Hearing)

Application of Texas Oil & Gas Corporation for compulsory pooling, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Wolfcamp and Pennsylvanian formations underlying the W/2 of Section 4, Township 22 South, Range 26 East, Eddy County, New Mexico, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof, as well as actual operating costs and charges for supervision. Also to be considered will be the designation of applicant as operator of the well and a charge for risk involved in drilling said well.

CASE 5892: Southeastern New Mexico nomenclature case calling for the creation and extension of certain pools in Eddy and Lea Counties, New Mexico.

(a) CREATE a new pool in Eddy County, New Mexico, classified as a gas pool for Atoka production and designated as the East Burton Flat-Atoka Gas Pool. The discovery well is the J. C. Williamson & D. W. Underwood et al Williamson Federal Well No. 1 located in Unit J of Section 9, Township 20 South, Range 29 East, NMPM. Said pool would comprise:

TOWNSHIP 20 SOUTH, RANGE 29 EAST, NMPM
Section 9: E/2

(b) CREATE a new pool in Lea County, New Mexico, classified as a gas pool for Morrow production and designated as the North Eidson-Morrow Gas Pool. The discovery well is the Sabine Production Company North Eidson Fee Well No. 1 located in Unit M of Section 34, Township 15 South, Range 34 East, NMPM. Said pool would comprise:

TOWNSHIP 15 SOUTH, RANGE 34 EAST, NMPM
Section 34: W/2

(c) CREATE a new pool in Eddy County, New Mexico, classified as an oil pool for Delaware production and designated as the Forehand Ranch Delaware Pool. The discovery well is the Husky Oil Company of Delaware Forehand Well No. 2 located in Unit K of Section 15, Township 23 South, Range 27 East, NMPM. Said pool would comprise:

TOWNSHIP 23 SOUTH, RANGE 27 EAST, NMPM
Section 15: SW/4

(d) CREATE a new pool in Eddy County, New Mexico, classified as a gas pool for Strawn production and designated as the Grayburg-Strawn Gas Pool. The discovery well is the Amoco Production Company Empire South Deep Unit Gas Com Well No. 8 located in Unit L of Section 33, Township 17 South, Range 29 East, NMPM. Said pool would comprise:

TOWNSHIP 17 SOUTH, RANGE 29 EAST, NMPM
Section 33: S/2

(e) CREATE a new pool in Eddy County, New Mexico, classified as a gas pool for Morrow production and designated as the Indian Flats-Morrow Gas Pool. The discovery well is the Perry R. Bass Big Eddy Unit Well No. 41 located in Unit J of Section 35, Township 21 South, Range 28 East, NMPM. Said pool would comprise:

TOWNSHIP 21 SOUTH, RANGE 28 EAST, NMPM
Section 35: E/2

(f) CREATE a new pool in Eddy County, New Mexico, classified as a gas pool for Morrow production and designated as the South Maroon Cliffs-Morrow Gas Pool. The discovery well is the Perry R. Bass Big Eddy Unit Well No. 44 located in Unit H of Section 16, Township 21 South, Range 30 East, NMPM. Said pool would comprise:

TOWNSHIP 21 SOUTH, RANGE 30 EAST, NMPM
Section 16: E/2

(g) CREATE a new pool in Eddy County, New Mexico, classified as a gas pool for Atoka production and designated as the Quahada Ridge-Atoka Gas Pool. The discovery well is the Perry R. Bass Big Eddy Unit Well No. 40 located in Unit G of Section 22, Township 21 South, Range 29 East, NMPM. Said pool would comprise:

TOWNSHIP 21 SOUTH, RANGE 29 EAST, NMPM
Section 22: N/2

(h) CREATE a new pool in Lea County, New Mexico, classified as a gas pool for Morrow production and designated as the East Red Tank-Morrow Gas Pool. The discovery well is the Gulf Oil Corporation Covington "A" Federal Well No. 1 located in Unit C of Section 25, Township 22 South, Range 32 East, NMPM. Said pool would comprise:

TOWNSHIP 22 SOUTH, RANGE 32 EAST, NMPM
Section 25: N/2

(i) CREATE a new pool in Eddy County, New Mexico, classified as a gas pool for Morrow production and designated as the South Rock Tank-Morrow Gas Pool. The discovery well is the Amoco Production Company South Rock Tank Well No. 1 located in Unit H of Section 2, Township 24 South, Range 24 East, NMPM. Said pool would comprise:

TOWNSHIP 24 SOUTH, RANGE 24 EAST, NMPM
Section 2: N/2

(j) CREATE a new pool in Lea County, New Mexico, classified as an oil pool for Wolfcamp production and designated as the Trinity-Wolfcamp Pool. The discovery well is the Wainoco, Inc. Hodge et al Well No. 1 located in Unit P of Section 28, Township 12 South, Range 38 East, NMPM. Said pool would comprise:

TOWNSHIP 12 SOUTH, RANGE 38 EAST, NMPM
Section 28: SE/4

(k) EXTEND the Baum-Upper Pennsylvanian Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 13 SOUTH, RANGE 33 EAST, NMPM
Section 30: NE/4

(l) EXTEND the South Bell Lake-Atoka Gas Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 23 SOUTH, RANGE 34 EAST, NMPM
Section 31: S/2
Section 32: W/2

(m) EXTEND the South Bell Lake-Morrow Gas Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 23 SOUTH, RANGE 33 EAST, NMPM
Section 36: NE/4

(n) EXTEND the Blinebry Oil and Gas Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 20 SOUTH, RANGE 38 EAST, NMPM
Section 21: SW/4
Section 28: NW/4

(o) EXTEND the Cemetery-Morrow Gas Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 19 SOUTH, RANGE 24 EAST, NMPM
Section 36: S/2

TOWNSHIP 19 SOUTH, RANGE 25 EAST, NMPM
Section 28: S/2
Section 31: S/2
Section 32: S/2
Section 33: All
Section 34: N/2
Section 35: N/2

TOWNSHIP 20 SOUTH, RANGE 24 EAST, NMPM
Section 1: All

TOWNSHIP 21 SOUTH, RANGE 24 EAST, NMPM
Section 6: Lots 1, 2, 7, 8, 9, 10, 15 & 16

(p) EXTEND the North Dagger Draw-Upper Pennsylvanian Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 19 SOUTH, RANGE 24 EAST, NMPM
Section 13: SE/4

(q) EXTEND the South Empire-Morrow Gas Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 18 SOUTH, RANGE 29 EAST, NMPM
Section 5: S/2

(r) EXTEND the Indian Draw-Delaware Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 22 SOUTH, RANGE 28 EAST, NMPM
Section 7: S/2 SW/4
Section 18: N/2 NE/4

(s) EXTEND the South Loco Hills-Morrow Gas Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 17 SOUTH, RANGE 30 EAST, NMPM
Section 29: All

(t) EXTEND the Ped Lake Queen-Grayburg-San Andres Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 17 SOUTH, RANGE 27 EAST, NMPM
Section 22: S/2 NE/4
Section 23: S/2 SE/4 and SW/4 NW/4

(u) EXTEND the North Teague-Devonian Gas Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 23 SOUTH, RANGE 37 EAST, NMPM
Section 22: SE/4

(v) EXTEND the North Vacuum-Abo Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 17 SOUTH, RANGE 34 EAST, NMPM
Section 2: NW/4

(w) EXTEND the Warren-Tubb Gas Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 20 SOUTH, RANGE 38 EAST, NMPM
Section 21: S/2

(x) EXTEND the White City-Pennsylvanian Gas Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 24 SOUTH, RANGE 26 EAST, NMPM
Section 15: All
Section 28: All

TOWNSHIP 25 SOUTH, RANGE 26 EAST, NMPM
Section 2: All

Docket No. 10-77

Dockets Nos. 11-77 and 12-77 are tentatively set for hearing on April 6 and April 20, 1977. Applications for hearing must be filed at least 22 days in advance of hearing date.

DOCKET: COMMISSION HEARING WEDNESDAY MARCH 23, 1977

1 P.M. - OIL CONSERVATION COMMISSION CONFERENCE ROOM
STATE LAND OFFICE BUILDING, SANTA FE, NEW MEXICO

CASE 5893: Application of the Oil Conservation Commission on its own motion for a redefinition of the vertical limits of the Blanco-Mesaverde Pool, Rio Arriba and San Juan Counties, New Mexico, to include the interval from the Huerfanito bentonite marker to a point 500 feet below the top of the Point Lookout sandstone, except that South and West of a Northwest-Southeast line generally running from the Northwest corner of Township 31 North, Range 13 West, to the Southwest corner of Township 24 North, Range 1 East, the vertical limits would include only the interval from a point 750 feet below the Huerfanito bentonite marker to 500 feet below the top of the Point Lookout sandstone.

CASE 5821: (DE NOVO)

Application of Blackwood & Nichols Co., Ltd., for a hearing de novo, San Juan County, New Mexico. Upon petition of applicant in the above-styled cause and pursuant to the provisions of Rule 1220, Paragraphs (i) and (j) of Case No. 5821 will be heard de novo for the purpose of considering the nullification of Paragraphs (i) and (j) of Order No. R-5339 which created and defined the Navajo City-Chacra Pool in Township 30 North, Range 8 West, and the Animas-Chacra Pool in Township 31 North, Range 10 West, both in San Juan County, New Mexico.

NORTHWEST EXPLORATION COMPANY
ONE PARK CENTRAL, SUITE 1487
DENVER, COLORADO 80202
(303) 623-9303

March 7, 1977

Members of Mesaverde Study Group:

Re: Criteria to be presented to New Mexico Oil and Gas Commission at hearing to establish vertical limits of Mesaverde Producing Interval, tentatively scheduled for March 23, 1977 at Santa Fe, New Mexico.

Recap:

The third and final meeting of the Mesaverde Study Committee met at the New Mexico Oil and Gas Commission office in Aztec, New Mexico on March 2, 1977. Six cross sections which had been prepared by various Study Group members were presented (ref. letter from J. E. Fassett, USGS, February 1, 1977). A Chacra consensus line was drawn (see attached plat) which the Study Group believes best defines the northeastward extent of porosity controlled Chacra production. In addition, the vertical limits of the Chacra were determined by consensus for the area southwest of the line. Several suggestions were made for changes in the cross sections. I was asked to be chairman of the Study Group and to present the data and arguments to the Oil and Gas Commission hearing in Santa Fe on March 23, 1977. Dick Stamets, attorney with the New Mexico Oil and Gas Commission informed us the notices for the hearing would be published on March 3, 1977.

The following outline will be the basis of the argument which I will present to define the vertical limits of the Blanco Mesaverde Gas Pool in the San Juan Basin of New Mexico. These limits and criteria represent a consensus of the Mesaverde Study Group.

1) The upper limit of the Mesaverde Producing Interval within the Blanco Mesaverde Pool will be the Huerfanito Bentonite Bed as defined by Fassett and Hinds on pp 6 through 8, USGS Professional Paper No. 676.

2) The lower limit of the Mesaverde Producing Interval within the Blanco Mesaverde Pool will be defined by a point 500 feet below the top of the Point Lookout Formation.

The Mesaverde Study Group believes that this depth will insure prudent production of the oil and gas apparently present in the lower portion of the Point Lookout in parts of the Blanco Mesaverde Pool.

3) In order that established Chacra production from porous sands within the areal confines of the Blanco Mesaverde Pool be protected from a legal, equitable and historical stance, a Chacra consensus line has been established by the Mesaverde Study Group.

This line divides Chacra and Chacra equivalent hydrocarbon production into two portions, a) and b) below:

a) The portion northeast of this line within which any hydrocarbon production from the top to bottom of the Mesaverde Producing Interval (1 and 2 above) will be considered as having a common source and will be treated as Blanco Mesaverde Pool production.

The Mesaverde Study Group believes that production from Chacra and LaVentana equivalent siltstones in this area is controlled by natural fractures and production from these zones may be discontinuous with a high random element of areal distribution.

b) The portion southwest of this line: Here the Chacra production lying within the confines of the Blanco Mesaverde Gas Pool will be segregated from the Mesaverde and treated as Chacra production within the various Chacra pools (including extentions of same or new Chacra pools as established by the New Mexico Oil and Gas Commission).

Within this portion southwest of the Chacra consensus lines, the vertical limits of the Chacra Producing Interval will be defined as extending from the Huerfanito Bentonite Bed to a point 750 feet below this marker bed.

Data to be presented at the March 23, 1977 hearing:

We are asking under a separate letter that those members who prepared cross sections make minor changes and additions to those cross sections and to furnish me with six copies each so that I may distribute copies to the proper agencies. El Paso Natural Gas has agreed to prepare six copies of the expanded scale map showing the Chacra consensus line. I have asked them to square the line along full section boundaries where applicable and in no case will they extend the squared line southwest of the line which we established at the March 2 meeting.

I will annotate appropriate wells from a centralized position southwest of the Chacra consensus line which will show the various criteria involved in the Mesaverde Producing Interval.

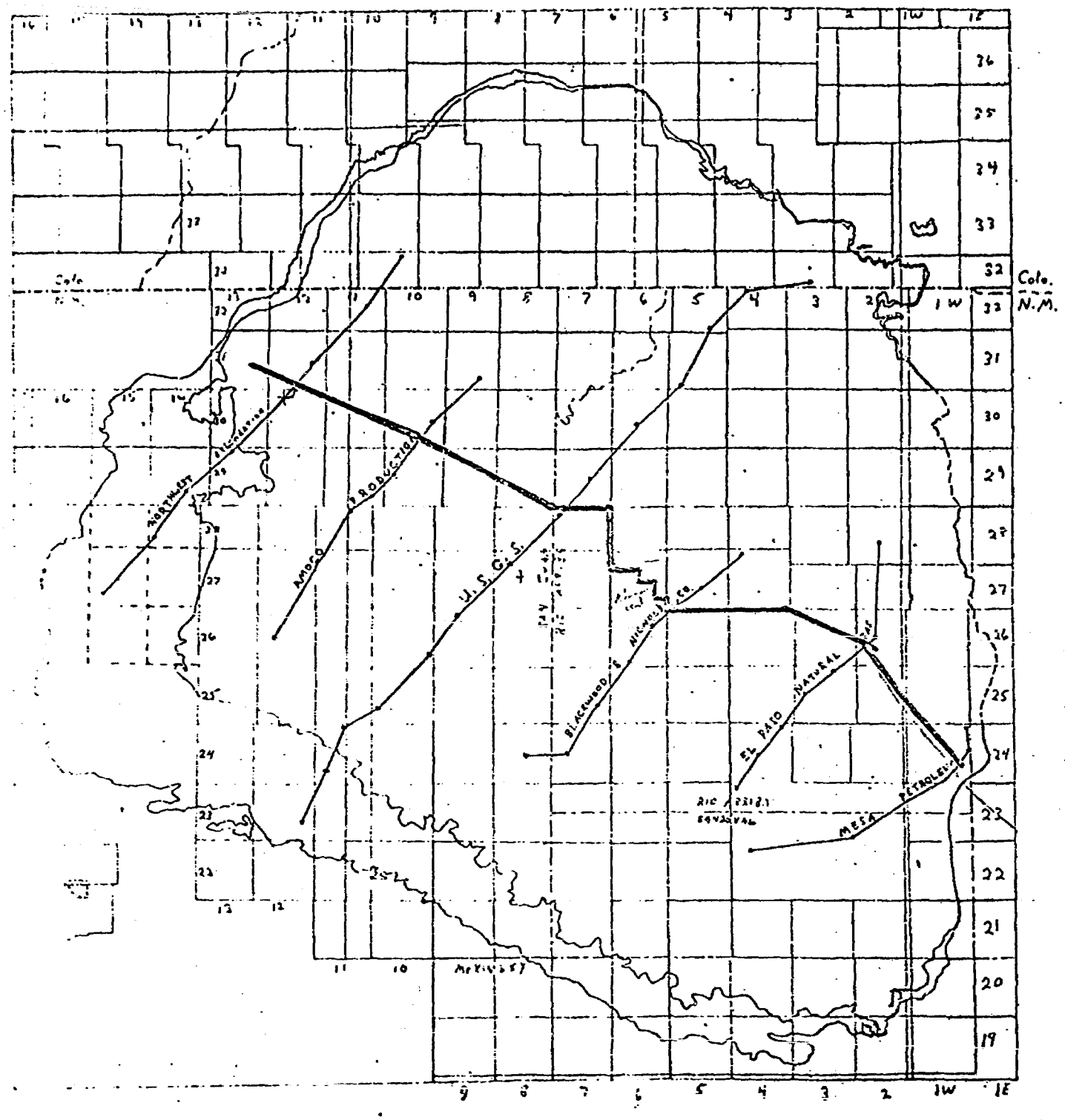
I welcome any comments or questions from members of the Study Group. As I plan to be in Oregon for a short time between now and March 23, I am including my home telephone number below.

K. C. Bowman

K. C. Bowman, Ph.D.
Consultant
c/o Northwest Exploration Company
(303) 623-9303
Oregon: (503) 752-5844

Distribution per attached list
KCB:tks
attachment

INDEX MAP : SHOWING LOCATION OF CROSS-SECTIONS



DISTRIBUTION LIST

Emery Arnold	New Mexico State Geologist	Santa Fe, New Mexico
Al Kendrick	Oil & Gas Conservation Commission	Aztec, New Mexico 87401
R. L. Stamets	New Mexico Oil Conservation Commission	Santa Fe, New Mexico
James Fassett	U.S.G.S.	Farmington, New Mexico
Jerry Long	U.S.G.S.	Durango, Colorado
Charles Boyce	Amoco Production Company	Denver, Colorado
Paul Ellison	Amoco Production Company	Farmington, New Mexico
L. O. Van Ryan	Aztec Oil & Gas Company	Farmington, New Mexico
C. F. Blackwood	Blackwood & Nichols	Oklahoma City, Oklahoma
DeLasso Loos	Blackwood & Nichols	Durango, Colorado
Jim Jacobs	Dugan Production Corporation	Farmington, New Mexico
R. A. Ullrich	El Paso Natural Gas Company	Farmington, New Mexico
E. R. Manning	El Paso Natural Gas Company	El Paso, Texas
David Hamilton	Mesa Petroleum	Denver, Colorado
Rudy Motto	Southern Union Production Company	Farmington, New Mexico

LIVELY EXPLORATION COMPANY

WELL DATA:

WELL NAME

Lively Exploration Company (Operator)
Lively No. 7Y

LOCATION

Unit E Sec. 35, T 30N, R 8W
San Juan County, New Mexico

PRODUCING FORMATION

Chacra

COMPLETION DATE

April 20, 1974

FIRST SALE TO EL PASO NATURAL GAS CO.

June 7, 1974

INITIAL SHUT-IN CASING PRESSURE

748 psia on May 1, 1974

INITIAL DELIVERABILITY TEST

Flow from 6-26-74 to 7-4-74
P_c on 7-11-74 737 psia

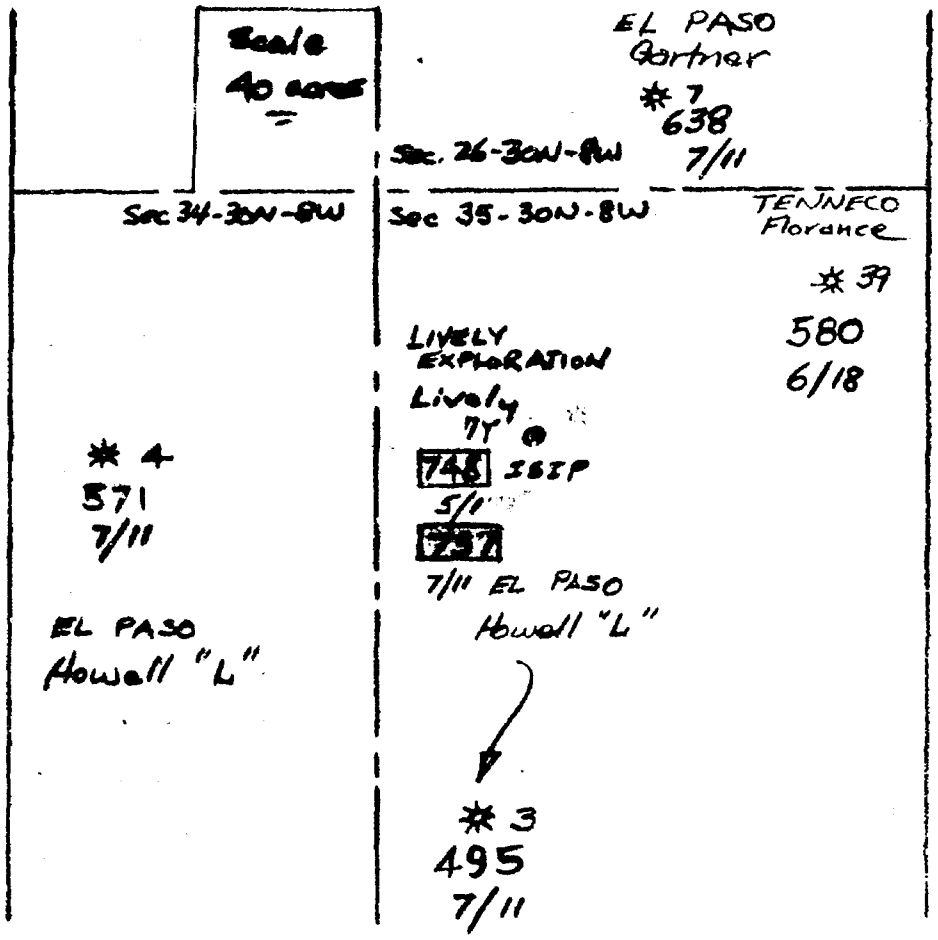
OIL CONSERVATION COMMISSION ORDER APPROVING CHACRA COMPLETION

Order No: MC-2109 dated May 28, 1974

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 5893 Exhibit No. 1
Submitted by: Lively
Hearing Date

LIVELY EXPLORATION COMPANY

Comparison of shut-in surface pressures of Blanco Mesaverde Wells and the Chacra completion in the Lively 7Y in 1974 when Lively 7Y was completed.



KEY:

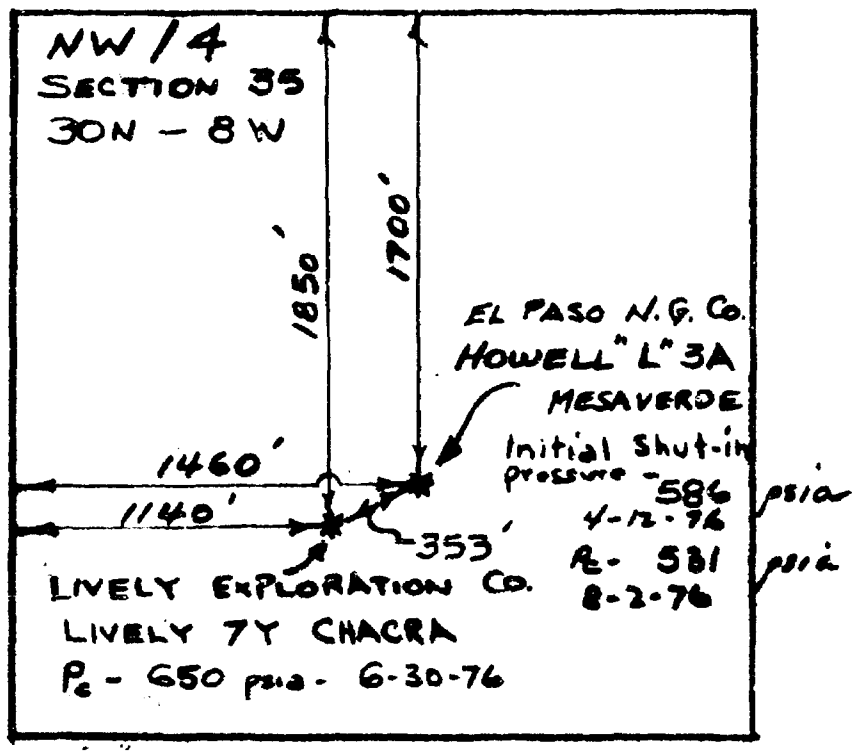
* Blanco Mesaverde gas well
● Chacra gas well
571 P_c Mesaverde gas well
7/11 Date of P_c test
ISIP Initial shut-in pressure
748 ISIP Chacra
737 P_c Chacra

SAN JUAN BASIN
SAN JUAN COUNTY
NEW MEXICO

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 5893 Exhibit No. 2
Submitted by: Lively
Hearing Date

LIVELY EXPLORATION COMPANY

COMPARATIVE SHUT-IN SURFACE PRESSURE OF THE CHACRA FORMATION IN THE LIVELY 7Y & THE EL PASO NATURAL GAS CO. HOWELL "L" 3A.



CUMULATIVE PRODUCTION:

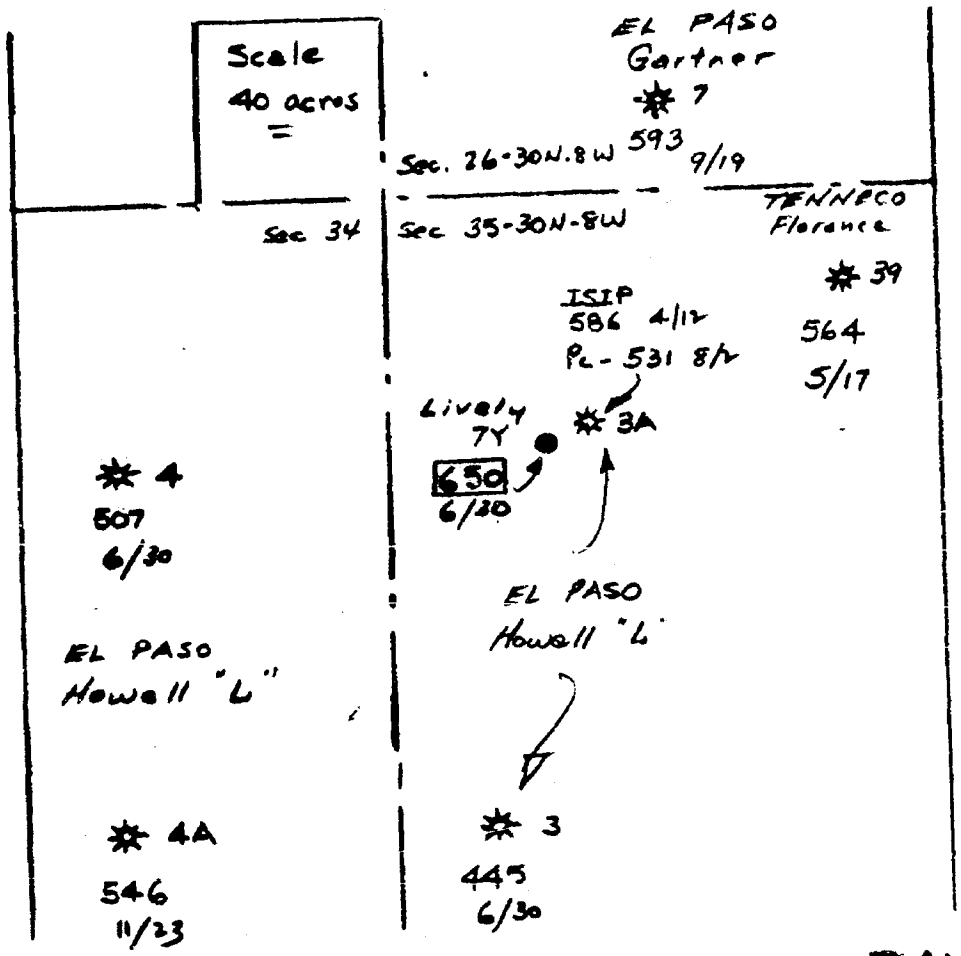
HOWELL "L" 3A - FIRST SALE 6-25-76
47228 MCF
AS OF 8-2-76

LIVELY 7Y 1,283,778 MCF
AS OF 6-30-76

OIL CONSERVATION COMMISSION
Case No. 5893 Exhibit No. 4
Submitted by: Lively
Hearing Date:

LIVELY EXPLORATION COMPANY

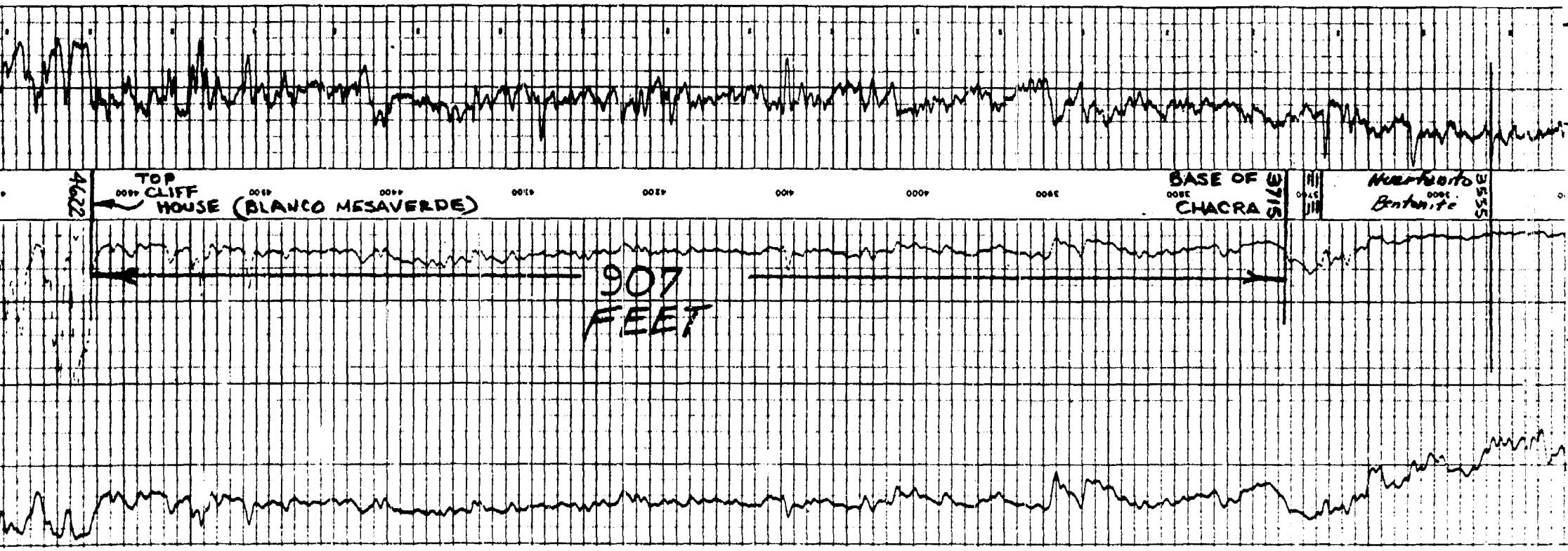
Comparison of Shut-in Surface Pressures of Blanco Mesaverde Wells in 1976 when EL PASO Howell 'L' 3A infill well Completed.



SAN JUAN BASIN
SAN JUAN COUNTY
NEW MEXICO

KEY:
ISIP Initial Shut-in pressure
✲ Blanco Mesaverde gas well
● Chacra gas well
546 P_c Blanco Mesaverde
11/23 Date of P_c Test in 1976
650 P_c Chacra

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 5893 Exhibit No. 5
Submitted by Lively
Hearing Date



Induction Gamma Ray

COMPANY LIVELY EXPLORATION CO.
WELL LIVELY #1Y
FIELD BASIN DAKOTA
COUNTY SAN JUAN STATE N. M.
LOCATION 1350' FNL X 1140' FWL
Other Services: COL-GR GR-N
Permanent Datum
Log Measured From
Drilling Measured From
Elev.: K.B.
D.F.
G.L.
Date
Run No.
Depth-Driller
Depth-Logger
Bottom Logged Interval
Top Logged Interval
Type Fluid in Hole
Salinity, PPM Cl
Density
Viscosity
pH
Fluid Loss
Source of Sample
Rm @ Meas. Temp.
Rmf @ Meas. Temp.
Rmc @ Meas. Temp.
Source of Rmf
Source of Rmc
Rm @ BHT
Time Since Circ.
Max. Rec. Temp.
Equip. Location
Recorded By
Witnessed By
Run No. FN-4786

NORTHWEST PIPELINE CORPORATION

March 18, 1977

M. S. MARTIN
SENIOR ATTORNEY

P.O. BOX 1526
SALT LAKE CITY, UTAH 84110
801 - 534-3325

Oil Conservation Commission
State of New Mexico
State Land Office Building
310 Old Santa Fe Trail
Santa Fe, New Mexico

RE: Case #5893

Members of the Commission:

Northwest Pipeline Corporation hereby expresses its support and agreement with the Commission's application to redefine the vertical limits of the Blanco-Mesaverde Pool, Rio Arriba and San Juan Counties, New Mexico, as follows:

1. The upper limit of the Mesaverde Producing Interval within the Blanco Mesaverde Pool will be the Huerfanito Bentonite Bed as defined on pages 6 through 8, U.S.G.S. Professional Paper No. 676;

2. The lower limit of the Mesaverde Producing Interval within said Pool will be defined by a point 500 feet below the top of the Point Lookout Formation;

3. To protect existing legal and/or equitable rights in established Chacra production from porous sands in the area confines of said Pool, a line will be provided to demarcate the Chacra and Chacra equivalent hydrocarbon production into the following described portions. The demarcation line will be a Northwest-Southeast line which runs generally from the Northwest corner of Township 31 North, Range 13 West, to the southwest corner of Township 24 North, Range 1 East.

A) The portion northeast of said demarcation line, within which there is hydrocarbon production from the Interval defined in paragraphs numbered 1 and 2, above, will be considered to be from a common source and treated as Blanco-Mesaverde Pool production.

B) The portion southwest of said demarcation line, within which there is or may be production from the Blanco-Mesaverde Pool, will be separated from the Mesaverde and treated as Chacra production within the various Chacra pools, existent and/or to be created.

Within this portion, the vertical limits of the Chacra Producing Interval will be defined as extending from the Huerfanito Bentonite Bed to a point 750 feet beneath said bed. The vertical limits of the Blanco-Mesaverde Pool would only include the interval from a point 750 feet below the Huerfanito Bentonite Bed to 500 feet below the top of the Point Lookout Formation.

Respectfully submitted,

M. S. Martin

M. S. Martin

MSM/gh

1) Case 5893

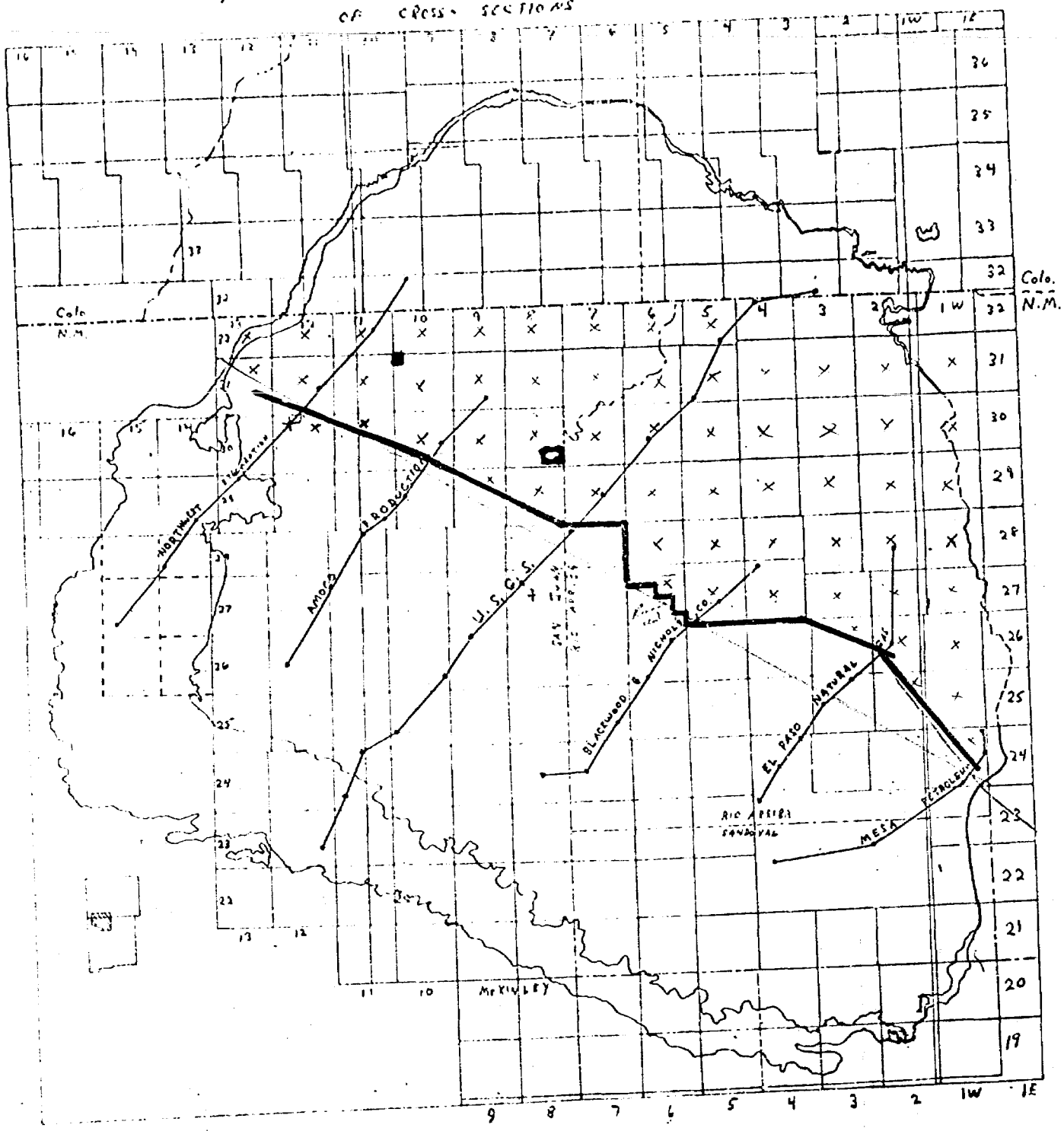
MESAVERDE DETERMINATION MEETING

March 2, 1977

Paul C. Ellison	Amoco Production	Farmington
Rudy D. Motto	Southern Union Production	Farmington
R. L. Stamets	Oil Conservation Commission	Santa Fe
Lynn Teschendorf	Oil Conservation Commission	Santa Fe
Roy Pritchard	El Paso Natural Gas	Farmington
K. C. Bowman	Northwest Pipeline	Denver
David Hamilton	Mesa Petroleum	Denver
Jim Jacobs	Dugan Production	Farmington
N. E. Maxwell, Jr.	Oil Conservation Commission	Aztec
E. R. Manning	El Paso Natural Gas	El Paso
R. W. Sledge	El Paso Natural Gas	El Paso
C. F. Blackwood	Blackwood & Nichols	Oklahoma City
DeLasso Loos	Blackwood & Nichols	Durango
R. A. Ullrich	El Paso Natural Gas	Farmington
T. L. Malone	El Paso Natural Gas	Farmington
Charles Gholson	Oil Conservation Commission	Aztec
Emery Arnold	State Geologist	Santa Fe
John Ahlm	El Paso Natural Gas	Farmington
Russell Jentgen	U.S.G.S.	Farmington
Jim Fassett	U.S.G.S.	Farmington
Al Kendrick	Oil Conservation Commission	Aztec

Case SP73

INDEX MAP SHOWING LOCATION OF CROSS SECTIONS



DRAFT

dr/

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
COMMISSION OF NEW MEXICO ~~FOR~~
~~THE PURPOSE OF CONSIDERING~~ ON ITS
OWN MOTION TO CONSIDER REDEFINITION
OF THE VERTICAL LIMITS OF THE BLANCO-
MESAVERDE POOL, RIO ARRIBA AND SAN
JUAN COUNTIES, NEW MEXICO.

CASE No. 5893

Order No. R-5459

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on March 23, 1977, at Santa Fe, New Mexico, before the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission."

NOW, on this _____ day of ~~May~~, 1977, the Commission, a quorum being present, having considered the testimony presented and the exhibits received at said hearing, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) That the Blanco-Mesaverde Pool, located in Rio Arriba and San Juan Counties, New Mexico, was created by Commission Order No. 799, dated February 25, 1949.

799

(3) That Section (2) of ~~Commission~~ said Order No. ~~R-110 dated November 9, 1951,~~ 799 defined the vertical limits of said Blanco-Mesaverde Pool as the "4200-5100 foot productive horizon where the productive sands are contained between the top of the Cliff House Sand and the base of the Point Lookout Sand of the Mesaverde."

(4) That said definition of the vertical limits of said Blanco-Mesaverde Pool ~~have~~ has proved inadequate for the following reasons:

A. The definition does not take into account variations in surface elevations and formation dip which can cause the "Mesaverde" productive horizon ~~sands~~ to occur above or below the 4200 feet to 5100 feet interval.

B. The definition does not adequately take into account the transgressive, regressive, gradational nature of formations composing the "Mesaverde" productive horizon.

(5) That because of the imprecise nature of said vertical limits definition, Mesaverde productive zones above or below the 4200 foot to 5100 foot interval in any particular well might not be completed in ~~said~~ well.

(6) That failure to complete such zones could result in waste of gas in the ground.

(7) That the current infill drilling program within said Blanco-Mesaverde Pool has increased the need for a more precise definition of the vertical limits of such pool.

(8) That in December, 1976, the Commission appointed ~~called~~ an industry-government study committee to examine the problem and report its ~~their~~ findings to the Commission.

(9) That, based on geological evidence, the study committee recommended that the vertical limits of said Blanco-Mesaverde Pool be redefined as that interval from the Huerfanito bentonite marker to a point 500 feet below the top Point Lookout formation.

(10) That such
of productiv~~e~~ ~~zone~~ Induction-Electrical
pre~~s~~
(10) That the Induction-Electrical Log of the El Paso Natural Gas Company Johnston State Well No. 1 located in Unit A of Section 32, Township 26 North, Range 6 West, NMPM, Rio Arriba County, New Mexico, should be the type log for said Blanco-Mesaverde Pool.

(11) That the Huerfanito ~~Bentonite~~ Marker and the top of the Point Lookout Formation are found at depths of ~~3255~~ 3265 feet and 5100 feet, respectively, ~~on the Induction-Electrical Log~~ on said type log.

(17) That there are 4 wells North and East of the line defined in Finding No. 15 above and Exhibit A which may be producing from fractured shale or siltstone zones equivalent to said Chacra sands and which may or may not be connected to other producing zones in said Blanco-Mesaverde Pool.

(18) That to protect the correlative rights of the owners of said four wells, the effective date of any redefinition of the vertical limits of said Blanco-Mesaverde Pool should be delayed to provide such owners with the opportunity to bring a case for an exception ~~to such limits~~ before the Commission.

(19) That with the safeguards provided in Finding No. (16) and No. (18) above, the proposed redefinition of the vertical limits of the Blanco-Mesaverde Pool will not violate correlative rights.

(20) That to prevent waste, the vertical limits of said Blanco-Mesaverde Pool should be redefined in accordance with the study committee recommendation as adjusted to protect Chacra gas pools as set out in Finding No. (14) above.

IT IS THEREFORE ORDERED:

(1) That effective August 1, 1977, the vertical limits of the Blanco-Mesaverde Pool, Rio Arriba and San Juan Counties, New Mexico, as previously described and defined by the Commission are hereby redefined as follows:

A. That North and East of a line generally running from the Northwest corner of Township 31 North, Range 13 West, San Juan County, New Mexico, to the Southwest corner of Township 24 North, Range 1 East, NMPM, Rio Arriba County, New Mexico, as fully described on Exhibit "A" attached to this order and incorporated herein by reference, the vertical limits of the Blanco-Mesaverde Pool shall be from the Huerfanito bentonite marker ~~as described on Pages 6 through 8 of U.S.G.S. Professional Paper 676~~ to a point 500 feet below the top of the Point Lookout Sandstone.

B. ~~And~~ That South and West of the line described under A above, the vertical limits of the Blanco-Mesaverde Pool shall be from a point 750 feet below said Huerfanito bentonite marker to a point 500 feet below the top of the Point Lookout Sandstone.

(2) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

EXHIBIT "A"

Commission Order No. R-

This exhibit defines the Northwest-Southeast trending line that divides the Blanco-Mesaverde Pool, Rio Arriba and San Juan Counties, New Mexico, for purposes of ~~application of the definition of~~ defining the vertical limits for said pool. Said line traverses the South side or west side of the sections listed below; ~~as indicated~~:

TOWNSHIP 31 NORTH, RANGE 14 WEST, NMPM
Section 12: South

TOWNSHIP 31 NORTH, RANGE 13 WEST, NMPM
Sections 7 and 8: South
Section 16: West and South
Sections 15 and 14: South
Section 24: West and South

TOWNSHIP 31 NORTH, RANGE 12 WEST, NMPM
Section 19: South
Section [redacted]29 West and South
Sections 28 and [redacted]27 South
Section 35: West and South
Section 36: South

Sections 5: South

TOWNSHIP 30 NORTH, RANGE 11 WEST, NMPM
Sections 6: ~~and 5. South~~ West and South
Section 9: West and South
Sections 10 and 11: South
Section 13: West and South

TOWNSHIP 30 NORTH, RANGE 10 WEST, NMPM
Section 18: South
Section 20: West and South
Sections 21 and 22: South
Section 26: West and South
Section 25: South

TOWNSHIP 30 NORTH, RANGE 9 WEST, NMPM
Section 31: West and South
Section 32: South

TOWNSHIP 29 NORTH, RANGE 9 WEST, NMPM
Section 4: West and South
Section 3: South
Section 11: West and South
Section 12: South

TOWNSHIP 29 NORTH, RANGE 8 WEST, NMPM
Section 18: West and South
Section 17: South
Section 21: West and South
Section 22: South
Section 26: West and South
Section 25: South

TOWNSHIP 29 NORTH, RANGE 7 WEST, NMPM
Section 31: West and South
Sections 32 through 36: South

TOWNSHIP 28 NORTH, RANGE 6 WEST, NMPM
Sections 7, 18, 19, 30, and 31: West

TOWNSHIP 27 NORTH, RANGE 6 WEST, NMPM
Section 6: West
Section 7: West and South
Sections 8 and 9: South
Section 15: West and South
Section 14: South
Section 24: West
Section 25: West and South

TOWNSHIP 27 NORTH, RANGE 5 WEST, NMPM
Section 31: West and South
Sections 32 through 36: South

TOWNSHIP 27 NORTH, RANGE 4 WEST, NMPM
Sections 31 through 36: South

TOWNSHIP 27 NORTH, RANGE 3 WEST, NMPM
Sections 31 and 32: South

TOWNSHIP 26 NORTH, RANGE 3 WEST, NMPM
Section 4: West and South
Sections 3 and 2: South
Section 12: West and South

TOWNSHIP 26 NORTH, RANGE 2 WEST, NMPM
Sections 7 and 8: South
Sections 16 and 22: West and South
Section 26: West
Section 35: West and South

TOWNSHIP 25 NORTH, RANGE 2 WEST, NMPM
Section 1: West and South

Section 7: West

TOWNSHIP 25 NORTH, RANGE 1 WEST, NMPM
Sections 18 and 20: West and South
Section 28: West
Section 33: West and South

TOWNSHIP 24 NORTH, RANGE 1 WEST, NMPM
Section 3: West
Sections 10 and 14: West and South
Section 24: West
Section 25: ~~South~~ West + South

TOWNSHIP 24 NORTH, RANGE 1 EAST, NMPM
Section 31: West