CASE 7491: HARVEY E. VATES COMPANY FOR DESIGNATION OF A TIGHT FORMATION, LEA COUNTY, NEW MEXICO

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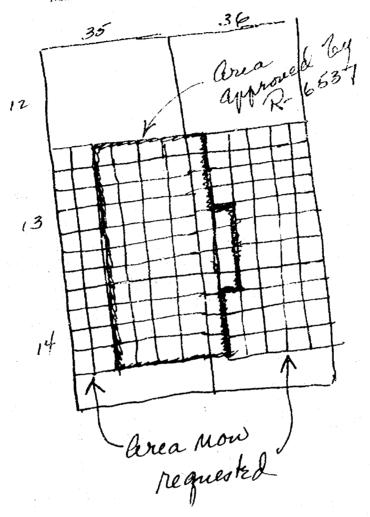
2/5/82

CASE NO.

7491

APPlication, Transcripts, Small Exhibits,

ETC.



1		2
2	INDEX	
3		
4	STATEMENT BY MR. STRAND	3
5		
6	ED GROVES	
7	Direct Examination by Mr. Strand	5 ,
8		
9	RAY NOKES	
10	Direct Examination by Mr. Strand	12
11.	Cross Examination by Mr. Stamets	25
12	Questions by Mr. Stogner	30
13		
14		
15	EXHIBITS	
16		
17	Applicant Exhibit One, Map	7
18	Applicant Exhibit Two, Cross Section	7
19	Applicant Exhibit Three, Cross Section	8
20	Applicant Exhibit Four, Booklet of Exhibits	13
21		
22		
23		
24		
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come to order.

come to order.

representation of the company of the case, and sworn; we have the company of the case of the c

MR. STAMETS: The hearing will please

We will call now Case 7491.

MR. PEARCE: Application of Harvey E.

Yates Company for designation of a tight formation, Lea County, New Mexico.

MR. STRAND: Mr. Examiner, Robert H. Strand, attorney from Roswell, representing the applicant in this case, and we have two witnesses, Mr. Groves is already sworn; we have one additional.

(Mr. Nokes sworn.)

MR. STRAND: Mr. Examiner, if I might make a very short opening statement on this matter.

The Division, by Order No. R-6537, entered on December 17th, 1980, in Case Number 7085, recommended to the Federal Energy Regulatory Commission that the Atoka formation underlying some 37,760 acres in Lea County be designated as a tight formation.

Subsequently, the FERC, in Order No. 138, so designated the Atoka underlying the applied for area as a tight formation.

And the purpose of the application by

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Harvey E. Yates Company in this case, Number 7491, is to request the Division to recommend to the FERC an eastward and westward expansion of the previously designated formation.

As set out in the application here, we are requesting that an additional area of approximately 46,720 acres be recommended for designation, and if this is approved, or recommended and eventually designated, the total Atoka tight formation area would be some 84,480 acres.

Since this application covers extension of an existing designated tight formation, I would request that the evidence previously submitted in Case Number 7085 be made a part of the record in this case, primarily because our material we will present here today will be basically supplemental to that.

Mr. Examiner, I believe the exhibits are included in the book we've prepared, the exhibits from the prior hearing.

MR. STAMETS: In that case I see no problem with incorporating the record in Case 7085 in the case here today.

MR. STRAND: Thank you.

As to the status of the exhibits we are presenting today, Mr. Examiner, they were not submitted during or more than fifteen days prior to the hearing, but we re-

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BY MR. STRAND:

 ceived leave from yourself and your attorney to submit them late.

Also, the USGS -- sorry, Minerals Management Service, in Albuquerque, also concurred in that and
requested that we send them a transcript of the hearing, which
we will do.

MR. STAMETS: Since this is not a Federal Energy Regulatory requirement, and since the primary reason for the requirement for the submittal was for the former Geological Survey, and since they concur, I see no problem with that slight variation in the approved procedures, and we should proceed today.

MR. STRAND: Thank you, Mr. Examiner.

ED GROVES

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

Please state your name.

A. Ed Groves.

Q Where do you reside, Mr. Groves?

. Midland, Texas.

1	6	
2	What is your position with the applican	ıt
3	Harvey E. Yates Company?	
4	A. Chief Geologist.	
5	Q. Mr. Groves, have you previously testi-	
6	fied before the Division or one of its Examiners?	
7	A. Yes, I have.	
8	Q And are your qualifications a matter	
9	of record?	
10	A. Yes, they are.	
11	MR. STRAND: Mr. Examiner, is Mr. Grove	s
12	considered qualified?	
13	MR. STAMETS: He is.	
14	0 Mr. Groves, are you familiar with the	
15	application in Case Number 7491?	
16	A. Yes, I am.	
17	Q Are you also familiar with and have	
18	you reviewed the evidence that we've previously presented	
19	in Case Number 7085?	
20	A. Yes.	
21	Q And have you read Order No. R-6537, pre-	
22	viously entered by the Division?	
23	A. Yes.	
24	Q. Mr. Groves, have you prepared certain	
25	exhibits for presentation at this hearing?	

designated type well, the one shown by a triangle, the

Betenbough, that was just about a mile northwest of the townsite of McDonald.

Q Referring to Exhibit Number Three, which is cross section B-B', would you briefly describe that?

A. B-B' starts in the southwestern corner of the west extension, proceeds through a well to the north and then moves to the east through the existing area that is designated and the well in Section 20, then, the Adobe No. 1 Head State, is the first well outside of the existing one, and is part of the eastern extension being requested, and ends in the southeastern portion of the requested area.

Q. Mr. Groves, would you explain in some detail the Atoka formation as it's depicted on these cross sections?

A. The Atoka in this immediate area of the Tatum Basin ranges in thicknesses from about 375 feet, found in the extreme northwestern portion of the area, to a maximum of some 750 feet in thickness, and that is found down in the south central portion.

This formation consists of shales interbedded with limestones and sandstones. The sandstones range from fine to medium grain, somewhat silty in many places, and fairly low porosity in most cases.

These sands are discontinuous, very dif-

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ficult to carry through a large area. For that reason we feel like we're dealing with possibly a fluviatile system, or at the best a very shallow water sedimentation.

Atoka formation as it exists in the expansion area as being similar to the formation characteristics in the originally designated area?

A. Yes, I do. We find very little changes as we move to either side of the existing area.

that have no more sand than what we find on the outskirts of it, so we feel like that the Atoka does extend throughout this area, and you'll notice the sections of the Atoka in the logs on either end of the cross sections show a thickness where that the Atoka does extend throughout this entire area.

Q Does the gross thickness of the formation remain fairly uniform over the whole area?

A. Farily uniform in a structural area, and the well on A-A', at "A", is one of these sitting on a structure, and that is the thinnest Atoka section in the area.

That has some 375 feet of Atoka in it.

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2	Q And which well is that, for the record?
3 .	A. It's the Union Texas Petroleum Company
4	No. 1 Shell State in Section 6, 13 South, 35 East.
5	Q Mr. Groves, in the previous hearing we
6	designated the log from the Betenbough No. 1 Well as the
7	type log for the Atoka formation which we were at that time
8	proposing for designation.
9	Would you propose any different well at
10	this time for the expanded area?
11	A. No, sir, I wouldn't. I feel like that
12	it's still the best type log, or as good as we have, in the
13	area. We have seen nothing to indicate that we should have
14	another type log.
15	<pre>0. Mr. Groves, what's the average depth</pre>
16	from the surface to the top of the Atoka formation which is
17	depicted on your logs, average over the entire area?
18	A. It's going to be approximately 12,200
19	feet.
20	Q Mr. Groves, is it your opinion that the
21	local formation, as we've described it, both the initially
22	designated area and the expansion area, are at least poten-
23	tially productive?
24	Andrew A. Yes.
25	Q The testimony in the previous case, 7085

indicated that there were two fresh water aquifers in the --under the originally designated area, the Ogallala, at approximately 300 to 400 feet and the Santa Rosa at 900 to
1200 feet.

Do these aquifers also exist under the proposed expansion area?

A. Yes, they do. Probably the only change I would make in those would maybe specify a depth of some 250 feet as you move to the west, up to the northwest, so let's say that the Ogallala may occur between 250 and 400 feet.

Q. Mr. Groves, are you familiar with the rules and policies of the Oil Conservation Division, the Minerals Management Service, and other Federal and State agencies, relating to protection of fresh water aguifers?

A. Yes, I am.

Q. And do you feel that compliance with these rules and policies, as they relate to wells that would be drilled within this area, would adequately protect these fresh water aquifers?

A. Yes, I do.

Q Mr. Groves, did you prepare Exhibits
One through Three, or were they prepared under your supervision?

1	1	1.2
2	A. Yes.	
3	3 MR. STRAND: That's	all the questions
4	4 I have on direct.	
5	5 MR. STAMETS: Are t	here any questions
6	6 of this witness at this time?	
7	7 He may be excused a	t this time.
8	8	1,7
9	9 RAY NOKES	
10	10 being called as a witness and being duly	sworn upon his oath,
11	11 testified as follows, to-wit:	
12	12	en e
13	13 DIRECT EXAMINATION	
14	14 BY MR. STRAND:	
15	Q. Please state your na	ame and residence.
16	A. Ray Nokes, Roswell,	New Mexico.
17 :	Q. Mr. Nokes, what is y	your position with
18	the applicant?	
19	19 A. I'm a reservoir engi	ineer for Harvey E.
20	20 Yates.	
21	Q. Have you testified k	pefore the Division
22	previously?	
23	A. Yes, sir.	
24	Q And are your qualifi	cations as a reser-
25	voir engineer a matter of record?	3

1					1.3
.2	A. Ye	s, sir.			
3	мя	. STRAND:	Mr. Exa	uminer, is M	lr. Nokes
4	considered qualified?				
5	MR	. STAMETS:	: He is.		
6	Q. Mr	. Nokes, a	are you f	amiliar wit	h the
7	application of Harvey E	. Yates Co	ompany ir	ı Case Numbe	r 7491?
8	h. Ye	s, sir, I	am.		
9	Q. Ar	e you also	familia	r with the	evidence
10	previously submitted in	Case Numb	er 7085	and with th	e prior
11	Order No. R-6537?				
12	A. Ye	s, sir, I	am.		
13	Q. Ha	ve you pre	pared ad	ditional en	gineering
14	exhibits relating to the	e engineer	ing aspe	cts of this	appli-
15	cation as they relate to	o the prop	osed exp	ansion of ye	our total
16	tight formation?				
17	A. Ye:	s, sir, I	have.		
18	Q. Mr	. Nokes, h	ave thes	e exhibits l	oeen
19	bound in booklet form,	which we w	ill desi	gnate the e	ntire
20	booklet as Exhibit Numbe	er Four?	¥2.		
21	A. Yes	s, sir, ī	have. T	hey are.	
22	Q. With	ch referen	ce to Ex	hibit Numbe	r Four,
23	Mr. Nokes, and your perm	neability	calculat	ions relatir	ng to
24	this formula or to the				
25	the nermeability calcula				

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On this calculation I requested from

there is a Prolog presentation in there.

on log interpretation of logs run by Dresser Atlas.

Dresser Atlas to -- to prepare and run a tabular Prolog over the intervals that were considered in the Atoka formation, and that Prolog is included in there. It would have been one of the exhibits but it's not numbered, I'm sorry, but

Okay. In that, I would like to explain that their calculations were run on a -- they were not run on the Archie -- I mean on the Humble equation, they were run on the Archie equation, which is a carbonate water saturation calculation, so therefor the exhibit which was prepared by me, there are the three areas of concern, which are calculated on a Humble equation, a sandstone equation, and also the Morris Biggs equation, which is also documented in the Dresser Atlas interpretative chart book for permeability calculations.

MR. STAMETS: Now you say you performed some calculations? Are those --

Yes, sir, they are attached.

MR. STAMETS: And attached to what?

In this package, I'm sorry. It would look similar to this.

> I'll have to have some MR. STAMETS:

help finding some of these things here. 2 Yes, sir. I'm sorry, those would have 3 been stamped. It will be --MR. STAMETS: You've got them? Okay, 5 Mike has them. 6 You do have them? Okay. A. 7 MR. STAMETS: You may proceed. 8 The materials, or the values that I did A. utilize from the Prolog were the resistivity readings on the 10 RT and also the permeability -- I mean the porosity calcula-11 12 tions throughout the pays. 13 Through this I did come up with an average permeability, which is indicated on the second page 14 15 of my calculations. The average porosity would be 8.11 per-16 cent throughout the Atoka area. 17 The permeability calculation, there again is based on Morris Biggs equation, and in this equation 18 it is a sandstone calculation of permeability, and in doing 19 20 so for the entire interval it is zero -- it is .0418 milli-21 darcy. 22 Mr. Nokes, in performing these calcula-23 tions what pay sections did you utilize within the gross 24 Atoka formation? The intervals that are listed on this

page where these calculations are presented, indicate the actual foot by foot pay that was considered as productive pay. There again, this is an overall view, which I would like to indicate that it is the most detrimental permeability calculation, or the highest permeability calculation that could have been reflected over this formation.

If we consider what we have looked at on logs as our target zone it would be, on the second page of this calculation, from a depth of 12,733 to 12,784, inclusive, a 52-foot net pay that we -- we are considering as the -- the target zone.

porosity is 8.42 percent and the average water saturation is 21.67 percent, and the permeability calculation for that area is .0 -- I'm sorry -- is .048562 -- no, I'm sorry, excuse me. That was considering both the upper and the lower zone that was indicated on this page. This was what was perforated in the Betenbough. I'm sorry.

The actual permeability for the lower zone, which is our target zone, is .040%5 millidarcy, and that was with an average permeability -- or porosity of 8.32 percent and a 22.768 percent water saturation.

I did this calculation based over the entire interval so that it would reflect the entire Atoka

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zone, which reflects the highest permeability calculation.

Utilizing the target zone, it is a lower permeability, but there again, I wanted to show the higher permeability, that it was well underneath the prescribed limit.

Q. Mr. Nokes, which wells, for the record, did you utilize data from in performing these calculations?

A. Okay, it was the McDonald Unit No. 1, which is in the proposed area, in the eastern area of the extension.

Also the Betenbough, the HEYCO Beten-bough No. 1, which is already an approved Atoka tight formation. The calculations on this as far as the permeability is reflected to have a higher permeability, a slightly higher permeability than the Betenbough, which was indicated in the -- on the record and in the exhibits of previous testimony, of a .025 millidarcy.

Mr. Nokes, based on the logs that form a part of the cross sections, Exhibits Two and Three, would you expect that the average permeability characteristics would be any different in the westward expansion area and the balance of the eastward expansion area?

A. No, sir. As a matter of fact, looking at the wells on the western boundary, or the western extension, I would expect it to be in an area of possibly 10 per-

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cent less than the permeability that is calculated on this, based on the thinner pay, as such.

The area around the McDonald Unit I would consider to be the same.

Q. Mr. Nokes, then considering the geological testimony of Mr. Groves and your permeability analysis, is it your opinion that the Atoka formation underlying the proposed expansion area would be expected to have an estimated average in situ gas permeability of less than .1 millidarcy --

- A. Yes, sir.
- Q -- throughout the pay section?
- A. Yes, sir, I do.

Mr. Groves, going on with Exhibit Number Four, would you describe your analysis and calculations relating to expected production against atmospheric pressure of wells drilled to the Atoka formation?

A. The production that I utilized, there again, is based on the production that was presented in the Betenbough application, and there again, that is attached in that exhibit Number Four, and gives the actual production rates and actual suggested maximum production in the discussion that was submitted in the previous approved tight gas application.

From that calculation, to be quite hones

I feel that the maximum calculated production that could be expected in the existing or in the proposed area would not be more than 563, I believe it is, Mcf.

973.816 Mcf. That is based on a ratio evaluation of the permeability in the Betenbough No. 1 and the McDonald Unit No. 1, in regards to the ratio of permeability that is expressed in both of these wells.

The Betenbough No. 1 was characterized by not to exceed 403 Mcf per day, and in a calculation of a factor of 1.67 greater permeability than the Betenbough, there is -- that is how I came about with the 673 maximum Mcf per day, and that is natural completion.

Q. Mr. Nokes, what is the current production status of the Betenbough No. 1 Well?

A. The current status of the production should be your last page of Exhibit Number Four. That production is depicted, and I broke this down on a day to day production.

Also, immediately below that it shows a cumulative production, but there again, you will notice that no time during the period in which production was recorded on the C-115's for the Commission, that it never exceeded more than the 1.6 magnitude on the regulations. And

completion production, I did that just to see what it would

come up with, based on natural completion it would not be

PBT analysis indicates a slope, dramatic slope change at approximately 3560 to 3570 psi, which considering this change, dramatic change, you'd have a dewpoint

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2	somewhere in the neighborhood of 3500 to 3600 psi. Therefor
3	it is assumed that or expected that any production coming
4	from this well would be assumed to have been in a single
5	state a single phase status at reservoir conditions.
6.	Q. It would be in a gas state in the reser-
7	voir?
8	A. Yes, it would be a gas state.
9	Q. And again, Mr. Nokes, these this is
10	based on the liquids produced from the Betenbough No. 1, is
11	that correct?
12	A. Yes, sir. This would be, actually, a
13	representation of retrograde condensate phenomenon.
14	Q. Would you expect the liquid hydrocar-
15	bons produced anywhere else from the Atoka formation under-
16	lying this area to have any different characteristics?
17	A. No, sir.
18	Q. Would it then be correct to say that
19	you would expect that there would be no crude oil produced -
20	A. No, sir.
21	Q from the Atoka formation?
22	A. There would be no crude oil.
23	Q Mr. Nokes, are you familiar with the
24	rules and policies of the Oil Conservation Division and
25	Minerals Management Service, and other governmental agencies

relating to casing and cementing programs which would be utilized in drilling wells to the Atoka formation?

A. Yes, sir, I am.

In your opinion would these -- or compliance with these rules and policies adequately protect the fresh water aquifers that Mr. Groves testified to?

A. Yes, sir. It was -- if you'll notice in the Exhibit Four, there again, this is a well description of every well that has been penetrated in the -- or that has penetrated the Atoka formation. It is a detail description of it, and the surface casing throughout this -- this area, the surface casing, the shallowest depth at which it was set was 319 foot, and the shallowest depth of intermediate casing was at 4300 foot.

Mr. Nokes, with regard to various types of treatment programs which might be employed for wells completed in the Atoka formation, in your opinion will any of these types of programs have any adverse effect on the fresh water aquifers?

A. No, sir. If the casing is cemented properly, which is required by the State Commission, there would be no contamination.

Q. Mr. Nokes, for identification purposes for the Federal Energy Regulatory Commission, what is the

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2	closest city or town to this proposed area?
3	A. McDonald, which is one-quarter of a mil
4	west of the McDonald Unit No. 1.
5	Q Mr. Nokes, were the materials that make
6	up Exhibit Number Four prepared by you or under your super-
7	vision?
8	A. Yes, sir, I prepared them.
9	MR. STRAND: Mr. Examiner, I'd move the
10	admission of Exhibits One through Four.
11	MR. STAMETS: These exhibits will be
12	admitted.
13	MR. STRAND: And that's all I have on
14	direct.
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16	CROSS EXAMINATION
17	BY MR. STAMETS:
18	Q Mr. Nokes, can you identify the wells
19	which have been drilled to the Atoka
20	A Yes, I'm sorry.
21	Q since the original hearing for the
22	first tight formation designation?
23	A. Mr. Stamets, indicated on the well
24	description of all the wells in this area, and there again,
25	I requested that the Betenbough be designated as a triangle

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on this area map, and all wells that have penetrated the Atoka formation be circled, which there are nineteen outlying wells in the proposed acreage on the east and west boundaries.

In this presentation, Exhibit Four, there again I refer back to the well-by-well description, and in this I not only give the description of when the well was drilled but also if it was commercial and there again, there's only one well, and that is the Betenbough, which I utilized in there, but I apologize, I did not indicate it as a reference well in the existing area.

That's on page two, or the second page there, the HEYCO Betenbough No. 1 in column three. That is the tie-in well in the existing tight -- tight gas area.

But the dates on which these wells were spudded are, and I mean also their date of completion, or plugged and abandoned.

Okay, that's very interesting. Q. Now, let's go back --

> A. Okay.

-- and answer the question. Q.

Would you tell me which wells on this map have been drilled subsequent to the original hearing?

Okay, the original hearing, there again, the original hearing date -- to be quite honest, I'm not sure

of the original date of the hearing, as such. 3 MR. PEARCE: November the 12th, 1980, according to the --5 Okay, November 12th of 1980, there are -6 and you're regarding spudding as such, is that correct? Yes. Q. Okay. The HEYCO Betenbough No. 1 was in the previous area and it was spud in March the 6th of 10 1980. 11 The McDonald Unit No. 1 was spud in 12 6-13-81, which is subsequent to that period of time. 13 That would be it, sir. 14 So all the rest of these wells existed 15 at the time of the original hearing. 16 Yes, sir. 17 In your conversations with HEYCO per-18 sonnel, were you able to ascertain why the original area 19 was not proposed to include this entire area to begin with? 20

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At the time, it would be my understanding that this information -- that the boundary that was set was considered all that was pertinent, and at this point we are trying to expand so that it will be to the benefit of those that are drilling either to or through the Atoka for an attempt that it would be profitable to drill this, commercially

posed area, is that correct?

O That's right.

A. Okay, these are all Mississippian completions. These wells that are producing wells are Mississippian completions and, from my understanding, are being produced under a tight gas formation as it is right now.

Do you know if any of these wells were tested in the Atoka interval, and if that information is somewhere in this --

A Yes. There again, back to the well history on each individual well, the only one that I am aware of that did test the -- or I believe there's two, were the Austin Monteith, which was DST'd at 12,608 to 882, and --

What page is that on?

A. I'm sorry. It is on page three of the well history presentation.

Q Fine, I think we have that one now.

And it does show bottom hole temperature and shut-in pressure for that interval.

Also, on the Adobe Oil and Gas to the right of that, the next to the last column, is the State 16 No. ?. and they DST'd the Atoka, and there again, showing a shut-in pressure of 193. I do not know, but I anticipate that there was a packer problem on that.

Q In your permeability calculations on your Morris Biggs equation.

the McDonald Unit No. 1. The production that is in the

Betenbough is gas and therefor the calculation was based for

a gas permeability calculation, due to the fact that this is

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1 2 a gas, tight gas application request. 3 Do -- I'm not all that familiar with the formations yet -- I mean with the calculation yet, but do they account for possible GOR or water influx in that calculation, or do --The water calculation is in the formula itself. MR. STAMETS: Any other questions of 10 either of the two witnesses? Mr. Nokes may be excused. 11 Do you have anything further? 12 MR. STRAND: Nothing further, Mr. Exa-13 miner. 14 MR. STAMETS: We'll take the case under 15 advisement. 16 If there is nothing further, the 17 hearing is adjourned. 18 19 (Hearing concluded.) 20 21 22 23 24 25

CERTIFICATE

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

Sully W. Royd Cor

Examiner

do hereby ce tify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 7496

Oll Conservation Division

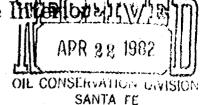
SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fc. New Mexico 87301
Phone (305) 455-7409



United States Department of the Interiors 1900 of the Secretary

OFFICE OF THE OPOLISION

Minerals Management Service South Central Region P. O. Box 26124 Albuquerque, New Mexico 87125



APR 2 1982

Mr. W. Perry Pearce Oil Conservation Division State of New Mexico P. O. Box 2088 Santa Fe, New Mexico 87501

Dear Mr. Pearce:

This jurisdictional agency concurs in the recommendation of the State of New Mexico, Case No. 7491, Order No. R-6537-A, dated April 9, 1982, that the Atoka Formation underlying the described lands in subject order in Lea County, New Mexico, be designated as a Section 107 tight formation.

It is requested that this concurrence be included with the recommendation submitted to the Federal Energy Regulatory Commission.

Sincerely yours,

沙尼 Gene F. Daniel

Deputy Minerals Manager

Oil and Gas

BRUCE KING GOVERNOR LARRY KEHOE SECRETARY

STATE OF NEW MEXICO

ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION

POST OFFICE BOX 2058 STATE LAND OFFICE BUILDING SANTA FE, NEW MEXICO 87501 (505) 827-8434

April 9, 1982

Mr. Robert H. Strand Re Attorney at Law P. O. Box 2226	: CASE NO. 7491 ORDER NO. R-6537-A
Roswell, New Mexico 88201	Applicant:
	Harvey E. Yates Company
Dear Sir:	
Enclosed herewith are two copie Division order recently entered	
Yours very truly,	
JOE D. RAMEY	
Director	
JDR/fd	
Copy of order also sent to:	
Hobbs OCD x Artesia OCD x Aztec OCD	
Other	
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STATE OF NEW MEXICO ENERGY AND MINERALS DEPARTMENT DIE CONSERVATION DIVISION

IN THE MATTER OF THE HEARTMS CALLED BY THE OIL CONSERVATION DIVISION FOR THE PURPOSE OF CONSIDERING:

> CASE NO. 7491 Order No. R-6537-A

APPLICATION OF HARVEY E. YATES COMPANY FOR DESIGNATION OF A TIGHT FORMATION, LEA COUNTY, NEW HEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 9 a.m. on February 17, 1982, at Santa Fe, New Mexico, before Examiner Richard L. Stamets.

NOW, on this 9th day of April, 1982, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises.

FINDS:

- (1) That due public notice having been given as required by law, the Division has jurisdiction of this cause and the subject matter thereof.
- (2) That the Division on December 17, 1980, entered its Order No. 8-6537, recommending to the Federal Energy Requision Commission that the Atoka formation, underlying the following described lands situated in Lea County, New Mexico, be designated as a tight formation pursuant to Section 13% of the Natural Gas Policy Act of 1978 and 18 CFR, Section 371-704:

TOWNSHIP 12 SOUTH, RANGE 35 EAST, NAPA Sections 33 through 36: All

TOWNSHIP 12 SOUTH, RANGE 36 EAST, NMPM Section 31: All

TOWNSHIP 13 SOUTH, RANGE 35 EAST, NMPH Sections 1 through 4: All Sections 2 through 16: All Sections 21 through 28: All Sections 33 through 36: All -2-Case No. 7491 Order No. R-6537-A

TOWNSHIP 13 SOUTH, RANGE 36 CAST, NEPH Sections 6 and 7: All Sections 18 through 20: All Sections 29 through 32: All

TOWNSHIP 14 SOUTH, RANGE 35 EAST, NAPA Sections 1 through 41 All Sections 9 through 161 All Sections 21 through 24: All

TOWNSHIP 14 SOUTH, RANGE 36 EAST, NMPH Sections 5 through 7: All Sections 18 and 19: All

Containing a total of 37,760 acres, more or less.

- (3) That the Federal Energy Regulatory Commission by its Order No. 138, as designated the Atoka formation underlying the above described lands as a tight formation.
- (4) That the applicant, Harvey E. Yates Company, requests that the Division in accordance with Section 107 of the Natural Gas Policy Act, and 18 CFR §271.701-705, recommend to the Federal Energy Regulatory Commission that the Atoka formation underlying the following lands situated in Lea County, New Mexico, which are contiguous to the previously designated lands, hereinafter referred to as the Atoka formation, be designated as a tight formation in said Federal Energy Regulatory Commission's regulations:

WESTERN CONTIGUOUS AREA

TOWNSHIP 12 SOUTH, RANGE 35 EAST, NHPM Sections 31 and 32: All

TOWNSHIP 13 SOUTH, RANGE 35 EAST, NMPM Sections 5 through 8: All Sections 17 through 20: All Sections 29 through 32: All

TOWNSHIP 14 SOUTH, RANGE 34 EAST, NMPM Sections 5 through 8: All Sections 17 through 20: All

EASTERN CUNTIGUOUS AREA

TOWNSHIP 12 SOUTH, RANGE 36 EAST, NMPM Sections 32 through 36: All

-3. Case No. 7491 Order No. R-6537-A

TOWNSHIP 13 SOUTH, RANGE 36 EAST, MIPH Sections 1 through 5: All Sections 21 through 28: All Sections 33 through 36: All

TOWNSHIP 14 SOUTH, RANGE 36 EAST, NEPM Sections 1 through 4: All Sections 8 through 17: All Sections 20 through 24: All

The entire area to be added containing a total of 46,720 acres, more or less.

- (5) That the Atoka formation underlies all of the above described lands; that the formation consists of shales interspersed with thin lime and sand sections; that the top of such formation is found at an average depth of 12,200 feet below the surface of the area set out in Finding No. (4) above; and that the thickness of such formation is from 375 to 750 feet within said area.
- (6) That the type section for the Atoka formation for the proposed tight formation designation is found at a depth of from approximately 12,230 feet to 12,978 feet on the Gamma Ray-Neutron log dated May 18, 1980, from the Harvey E. Yates Company Botenbough Well No. 1 located in Unit C of Section 32, Township 13 South, Range 36 East, Lea County, New Mexico.
- (7) That the following wells produce or have produced natural gas from the Atoka formation within the proposed area:

Harvey E. Yates Company . Betenbough #1

660 feet from North line and 1980 feet from West line of Section 32, Township 13 South, Range 36 East, NMPH, Lea County, New Mexico.

- (8) That the Atoka formation underlying the above described lands has been penetrated by several other wells, none of which produced natural gas in commercial quantities from the Atoka formation.
- (9) That the evidence presented in this case demonstrated that no well formerly or currently completed in the Atoka formation within the proposed area exhibited permeability, gas productivity, or crude oil productivity in excess of the

.4-Ceae No. 7491 Order No. R-6537-A

following parametors:

- (a) average in situ gas permeability throughout the pay section of 0.1 millidarcy; and
- (b) stabilized production rates, without stimulation, against atmospheric pressure, as found in the table set out in 18 CFR §271.703(c)(2)(8) of the regulations; and
- (c) production of more than five barrels of crude oil per day.
- (10) That based on analysis of available data from existing wells within the proposed area and utilizing generally and customarily accepted petroleum engineering techniques and measurements:
 - (a) The estimated average in situ gas permeability throughout the pay section of the Atoka formation is expected to be 0.1 millidarcy or less; and
 - (b) The stabilized production rate, against atmospheric pressure, of wells completed for production in the Atoka formation, without stimulation, is not expected to exceed production levels determined by reference to well depth, as found in the table set out in 18 CFR §271.703(c)(2)(8) of the regulations; and
 - (c) No well drilled into the formation is expected to produce, without stimulation, more than five barrels of crude oil per day.
- (11) That within the proposed area there are two recognized water aquifers being the Ogallala, found at depths of from 250 feet to 400 feet, and the Santa Rosa, found at depths of from 900 feet to 1200 feet.
- (12) That existing State of New Mexico and Federal Regulations relating to casing and cementing of wells will assure that development of the Atoka formation will not adversely affect said water zones.
- (13) That the Atoka formation, or any portion thereof, as described herein, is not currently being developed by infill drilling as defined in 18 CFR §271.703(b)(6) of the regulations.

-5. Case No. 7491 Order No. R-6537-A

(14) That the Atoka formation within the proposed area, described under Finding (4) above, should be recommended to the Federal Energy Regulatory Commission for designation as a tight formation.

IT IS THEREFORE ORDERED:

(1) That it be and hereby is recommended to the Federal Energy Regulatory Commission pursuent to Section 107 of the Natural Gas Policy Act of 1978, and 18 CFR §271.701-705 of the regulations that the Atoka formation tight gas formation area recommended by Division Order No. 8-6537 and approved by FERC Order No. 138 effective March 30, 1981, be extended, by designation, to include the following contiguous areas:

WESTERN CONTIGUOUS AREA

TOWNSHIP 12 SOUTH, RANGE 35 EAST, HAPM Sections 31 and 32: All

TOWNSHIP 13 SOUTH, RANGE 35 EAST, NMPM Sections 5 through 8: All Sections 17 through 20: All Sections 29 through 32: All

TOWNShip 14 SOUTH, RANGE 34 EAST, NHPH Sections 5 through 8: All Sections 17 through 20: All

EASTERN CONTIGUOUS AREA

TOWNSHIP 12 SOUTH, RANGE 36 EAST, NMPM Sections 32 through 36: All

TOWNSHIP 13 SOUTH, RANGE 36 EAST, NMPM Sections 1 through 5: All Sections 8 through 17: All Sections 21 through 28: All Sections 33 through 36: All

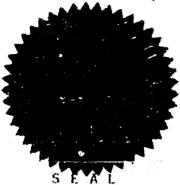
TOWNSHIP 14 SOUTH, RANGE 36 EAST, NMPM Sections 1 through 4: All Sections 8 through 17: All Sections 20 through 24: All

The entire area to be added containing a total of 46,720 acres, more or less.

-6-Case No. 7491 Order No. R-6537-A

(2) That jurisdiction of this cause is hereby retained for the entry of such further orders as the Division may deem necessary.

DONE at Santa Fe, New Hexico, on the day and year hereinabove designated.



STATE OF NEW MEXICO OF CONSESSATION OF VISION

ONE D. RAMEY

Director

NEW MEXICO OIL CONSERVATION DIVISION

EXAMINER HEARING

DOCKET NO.

EEFORE EMA INER STAMETS
CIL COMMANDIN DIVISION

CALENO, 7491

Submitted by Applicant

Hearing Date 2/17/82

Prepared by:

Harvey E. Yates Company Security National Bank, Ste. 300 P. O. Box 1933 Roswell, New Mexico 88201

Atoka Gas Sand Pool Extension

The purpose of this report is to present evidence which will demonstrate that the Atoka Gas Reservoir, under the Section described in the Tight Formation Application of January 27, 1982, in Townships 12, 13 and 14 of Ranges 35 and 36, N.M.P.M., Lea County, New Mexico, qualifies as an extension to the existing "Atoka Tight Formation" area.

The gas permeability in the Atoka Zone of the Harvey E. Yates Company operated McDonald Unit #1, were calculated from electric logs. The result of this analysis indicated an average in-situ gas permeability of .0418 millidarcies and is not expected to exceed 0.1 millidarcies. The Humble Equation and the Morris and Biggs Equation were used in calculating the Atoka sandstone permeability in the attached exhibits.

The stabilized production rate, at atmospheric pressure, for the Atoka Formation is not expected to exceed a maximum of 673.816 MCFGPD without stimulation. Attached is a production summary extracted from C-115 Monthly Operators Reports for the Heyco-Betenbough #1.

A comparison of the similarities in the Atoka Formation in-situ pressures, between the Heyco-Betenbough #1 and the McDonald Unit #1, indicates that the retrograde condensation phenomena which occurred in the Betenbough #1, would also occur in the McDonald Unit #1. The liquid hydrocarbons production expected from the Atoka Formation would have existed in a gas state at reservoir conditions; and therefore, would not exceed five barrels of crude oil per day.

Submitted with this report is a detailed description of each well which has penetrated the Atoka Formation and tests, is recorded.

Ray F. Nokes Reservoir Engineer Harvey E. Yates Company February 1, 1982

Robert H. Strand, P.A.

Attorney at Law

Practice Limited to Oil and Gas Law

Telephone (505) 624-0251 Suite 124 - Petroleum Building Rosscell, New Mexico 88201

Plane Reph 1 m P.O. Box 2226

January 27, 1982

Oil Conservation Division Post Office Box 2088 Santa Fe, New Mexico 87501

ATTN: Mr. Richard Stamets

Re: Applica

Application of Harvey E. Yates Designation of Tight Formation

Lea County, New Mexico

Dear Mr. Stamets:

Enclosed for filing is an original and two copies of the Application of Harvey E. Yates Company in the above referenced matter. This case has previously been set for hearing on the February 17, 1982 Docket.

Sincerely yours,

Robert H. Strand

RHS/bjt encls

DEFORE THE OIL CONSERVATION DIVISION ENERGY AND MINERALS DEPARTMENT OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE APPLICATION OF HARVEY E. VATES COMPANY FOR DESIGNATION OF A TIGHT FORMATION LEA COUNTY, NEW MIXICO

Case 1	lo.	يعارين والمارية	ador de Haradasse e qui a direction, sobre auto ; a dell'e trob tim q
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APPLICATION

COMES NOW HARVEY D. YATES COMPANY by its attorney and respectfully states;

1. Applicant is the owner of an interest in the Atoka Formation underlying the following described lands situated in Lea Jounty, New Mexico:

Township 12 South, Range 35 East, NMPM Sections 31 and 32

Township 13 South, Range 35 East, NMPM Sections 5, 6, 7, 8, 17, 18, 19, 20, 20, 30, 31, 32

Township 14 South, Range 35 East, NMPM Sections 5, 6, 7, 8, 17, 18, 19, 20

Township 12 South, Range 36 East, NMPM Sections 32, 33, 34, 35, 36

Township 13 South, Range 36 East, NMPM Sections 1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 21, 22, 23, 24, 25, 26, 27, 28, 33, 34, 35, 36

Township 14 South, Range 36 East, NMPM Sections 1, 2, 3, 4, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 23, 24

Containing a total of 46, 720 acres, more or less.

2. The Atoka formation underlying the above described lands is expected to have an estimated average in situ gas permeability throughout the pay section of less than 0.1 millidarcy.

- 7. The stabilized production rate, against atmospheric pressure of wells completed for production in said formation, without stimulation, is not expected to exceed the production levels set out in 18 c.F.R. §271.703 (c)(2)(3).
- 4. No well drilled into said formation is expected to produce, without stimulation, more than five barrels of crude oil par day.

WHEREFORE, applicant prays:

- A. That this application be set for hearing before an examiner, and that notice of said hearing be given as required by law.
- B. That upon such hearing, the Division enter its order recommending to the Federal Energy Regulatory Commission that pursuant to 18 CFR, Section 271.701-705, the Atoka formation underlying the above described lands be designated a tight formation.

DATED this 25% day of January, 1982.

HARVEY E. YATES COMPANY

ву:

Robert H. Strand
Attorney for Applicant

P.O. Box 2226

Roswell, New Mexico 88202-2226

PRS/bjt

NEW MEXICO OIL CONSERVATION DIVISION EXAMINER HEARING DOCKET NO.

PREPARED FOR:

HARVEY E. YATES COMPANY SUITE 300 SECURITY NATIONAL BANK BUILDING ROSWELL, NEW MEXICO 88201

TABLE OF CONTENTS

		PAGE
	Discussion	1
EXHIBIT 1	Summary of Buildups, Permeability and Flow Rates	
EXHIBIT 1 A	Pressure Buildup Analysis	
	Betenbough No. 1 Drill Stem Tests	4
EXHIBIT 1 B	Pressure Buildup Analysis	
	Betenbough No. 1 Reservoir	5
EXHIBIT 1 C	Pressure Buildup Analysis	
	Heyco Superior 19 No. 1 Drill Stem Tests	6
EXHIBIT 2	Production Summary	
	Betenbough No. 1	7
EXHIBIT 3	Well Data	8
EXHIBIT 4	Fractional Analysis Report, Gas	
	Betenbough No. 1	9

ATOKA GAS SAND POOL

In the matter of the determination of the Atoka formation underlying certain lands in Lea County, New Mexico, as a "Tight Formation" pursuant to regulations of the Federal Energy Commission. Section 107(b) of the Natural Gas Policy Act of 1978 (15 USC 3317) and regulations thereunder, the certain exhibits will be evidence presented which demonstrates that the Atoka gas reservoir beneath lands located in Townships 12, 13 and 14 South and Ranges 35 and 36 East, N.M.P.M., Lea County, New Mexico, qualifies as a "Tight Formation".

The producing Atoka zone is primarily a sand zone. The matrix is characterized as being very fine-grained with porosities ranging from 5% to 11%. The formation is highly cemented and the producing interval is encountered at an average depth of 12,600 feet.

The operator in the Bettenbough Atoka Zone gas well has conducted both drill stem tests and reservoir buildup pressure surveys on his wells. The results of the pressure surveys show the average in-situ gas permeability throughout the Atoka section averages 0.037 millidarcies and is not expected to exceed 0.1 millidarcy. The results of the pressure surveys together with all pertinent data are summarized on Exhibit No. 1. The individual Horner calculations, data and buildup curves are included as sub-parts to Exhibit No. 1.

The stabilized production rates, against atmospheric pressure of wells completed for production in the Atoka zone at 12,600 feet without stimulation, are not expected to exceed a maximum of 403 MCF of gas per day; and after stimulation with acid, the maximum flow rate of gas is not expected to exceed 1215 MCFD.

Exhibit No. 2 is a summary of gas production of the Bettenbough Atoka (Gas) Pool. Individual graphic presentation of the production history is not included.

The liquid hydrocarbons produced at the surface do not exist as liquid in the Atoka gas reservoir. A recombination of the separator fluids was not conducted to verify the Dew-Point pressure; however, an analysis of the produced gas and the Horner pressure buildup surveys in the Bettenbough No. 1 Well suggest that above a reservoir pressure of 3560 psig all fluids exist in a single gas phase. As the reservoir pressure declines, a reduction in gas production rates occurs as the retrograde condensation phenomena occurs when the reservoir pressure passes through the Dew-Point pressure. At some future date a form of artificial lift will probably be required to remove the retrograde liquids from the well bore and tubing to have sustained gas production.

Exhibit 3 is a Well Data Table and includes all pertinent well information. The casing design of the wells drilled and completed indicates that the fresh water aquifers in the area as required by rules and regulations of the New Mexico Conservation Commission have been fully protected.

South losa

13 1/8 - 369 comented w/ 400 SKC 95/1 - 4000 - 3400 SKS

EXHIBIT I

ATOKA GAS SAND POOL

LEA COUNTY, NEW MEXICO

SUKMARY OF RESERVOIR BUILDED SURVEYS

FRODUCTION TEST DATA, PORMATION RESERVOIR FLUID
CHARACTERISTICS, PERMFABILIPIES, RADIUS OF INVESTIGATION,
DAMAGE RATIOS AND CALCULATED FLOW RATES TO ATMOSPHERE

USING SURVEY YEST DATA AND RESULTS

WAIGH IT, VINEY & ARRECTOR, Irc.

Owner-Operator Lease Name Mell Nucler	ney ao	Yates Company Belanbough 2 No. 2	Harvey R. Yates Company Superior "15" Slate Well No. 1
Location: Section, Township and Range		1-13-8, R-35-5	Soc. 19, 1-16-5, R-58-E
Productive Atobs Formation Interval Measured Depth - Fest	11,175	f to 11,345° 71'	12,552° to 12,795° 263°
Test Data	Drill Stea Test	Faserver Bulldop	Linu Sten Test
Date of Flow Tests and Reservoir Buddup Survey Flowing Tubing Pressure - pag Flowing Bottom Hole Fressure (P _{er}) - pag	4-30-1950 14 557	8-15-1940 289: 957	9-17-1550 25 289
Choke Size - Inches Grs Gathering line Operating Pressure - paig	37/64 NA	33/66	3/4 NA
Production Data	• • • • • • • • • • • • • • • • • • • •		
		#33	105
Gas Production on Test - MCFO Condensate Production - Garrels Water Production - Barrels	102 NA NÁ	53 53 NA	107 NA NA
Cumulative Gas Production at Test Data - MCF	6.5	14,700	10.9
Formation, deservoir and Physical Characteristics Data			
Net Atoka Zone Thickness - Feet	12	72	62
Portectly (6) tof Bulk Volume	11 25	11 25	5. đ 25
Interestitud Water (S) % of Pore Space Reservoir Temperatura *F/*R	183/643	185/845	164/664
Specific Gravity of Gue (SG) Air = 1,00	0,733 0,01 76	0.753 0.0176	0.733 0.6178
Gas Viscouity (ii) at Average Reservoir Pressure During Teat - Centipolaes	0.0176	0.0175	0.0116
Critical Pressure (Pc) - pala Critical Temperature (Tc) - 2R	655 389	655 389	655 399
Gas Compressibility (Cg) - psi -1	4.02 x 10 ⁻⁴	4.02 x 10 ⁻⁴	4.02 x 13 ⁻⁴
Water Compressibility (Cw) - pai -1	3.00 x 10 ⁻⁶	3.00 x 10 ⁻⁶	3.03 x 19 ⁻⁶
Rock Compressibility (Cf) - pai -1	4.50 x 10 ⁻⁶	4.50 x 10 ⁻⁶	4.90 x 10 ⁻⁶
Total Compressibility (Ct) - pal -1	3.07 x 10 ⁻⁴	3.07 x 10 ⁻⁴	3.07 × 10 ⁻⁴
Jas Deviation Factor (2) 6	2 20	2107 2 33	
Floring Bottom Hole Pressure Average Reservoir Pressure Boundary Reservoir Pressure	0.98 0.82 0.65	0.83 0.83 0.89	0.99 0.17 0.80
Gas Formation Volume Factor (Bg) - Cubic Peet/SCF Well Bore Radius (r _p) - Feet	7.35 x 10 ⁻³ 0.333	6.227 x 10 ⁻³ 6.323	5.816 ½ 10 ⁻³ 0.333
Equivalent Liquid Rate of Test Cas Production (QREPD) - Barrels	133	976.1	236
Pseudo Fixe Time at Test Date (T_) - Hours	1.48	423	2.483
Shut in Time of Reservoir Buildup Test (at) - Hours	4.1	240	4.684
Slope of Buildup Curve (Horner Technique)(m) pat/cycle	209	480	1354
Reservoir Boundary Pressure from Buildup (Pa) - psig	1902	6279	2(91
Transmissibility			
(Kh/µ) = 162.6 F. QRBPD = Md - F1/Cps	103.22	313.54	42.27
Productive Capacity $(Kh/\mu)(\mu) = (kh) = Md.Ft.$	1.817.	5.52	9.7€
Permeability (kh/h) = K - Md.	0.025	0.0167	. 0.010
Radius of Investigation During Buildup Pressure Surveys			
r ₁ = \frac{kT}{37405 \text{ G \text{ \text{ic}}} \text{Fool}}	13.4	172.6	n .
where T is shut in time in minutes $T = \{\Delta T\}(60 \text{ minutes})$ Van Poolen Equation)		
Estimated Damage Rath (EDR)			
EDR = m(log T + 1.83)	3.635	0.981	1.178
Calculated Flow to Atmospheric Pressure For Various Drainage Radii - MCPD			
Using Darcy Radial Flow Equation for Gas			
0.703 kh (Pe ² -P _{wf} ²) ^{7k} ri	403	1715	316
qac =µTZ In (re/rw) r 0 00 acres	183 176	966 909	143 134
r 0 320 acres r 0 640 acres	170 163	874 849	133

Where

P is Reservoir pressure at drainage boundary

Setting $P_{\rm inf} = 0$ represents maximum flow that formation matrix would deliver into well bore.

has goming baseaus at mell pose

EXHIBIT 1 A
YATES BETENBOUGH NO. 1
DRILL STEM TEST APRIL 30, 1980
LEA COUNTY, NEW MEXICO

PRESSURE BUILD-UP ANALYSIS

				14. 15 miles			
POINT DOLU		SLOPE PSI/CYC		P. 1. M/D/PSI	COMPL.	SIBHP PSIG	AVG. P PSIG
1 - 2	्र ; र .	5993. 3	0. 00	0.02	141.0	3282.	6479.
2- 3	2.	4821.1	0.00	0. 02	134. 4	3775.	5854.
3- 4	2.	1863, 2	0.00	0.02	82. 9	3902.	4578.
n = 4	13.	611. 3	0. 01	0. 03	36. 0	3953.	4126.
6-15	ሃ .	148. 4	0. 03	0. 03	11.3	39 75.	3993.
POINT	PRESSURE	CORRECTED PRESSURE®	DT (HOURS)		CORR DT (T+DT	ECTED)/DT@	*
							:
1.	2205.	2205.	0. 37			5. 167	
2	3282.	3282.	0. 63	3. 4		3.416	
· 3	3775.	3775.	0. 90	2. 6		2. 699	
4	3902.	3902.	1. 17	2. 3		2. 307	
5	3938.	3938 .	1. 43	2. 0		2.070	
6	3953.	3953.	1. 70	1.9		1. 900	
7	3955.	3 95 5.	1. 97	1. 7		1. 776	
. 8	3959.	3959.	2. 23	1.6		1.686	
7	3962.	3962.	2. 50	1.6		1.612	
10	3964.	3964.	2. 77	1.5	,	1. 552	**
11	3966.	3966.	3. 03	1.5		1. 505	
12	3768.	3968.	3. 30,			1.463.	
13 14	3970. 3970.	3970. 3970.	3.57	1. 4		1. 428	
15	3970. 3975.	3970. 3975.	3.83	1.3		1.399	
	4774.	3773.	4. 10	1.3	13	1. 373	

[&]amp; CORRECTED FOR AFTERFLOW

GE CORRECTED FOR SUPERPOSITION

EXHIBIT 1 A

EXHIBIT 1 B
YATEO BETENBOUGH NO. 1
RESERVOIR BUILDUP AUGUST 15-25, 1980
LEA COUNTY, NEW MEXICO

PRESSURE BUILD-UP ANALYSIS

: 550 : 550		CLOPE PSI/CYC	X (HDS)	P ! M/D/P5!	COMPL.	918HP	AVQ P P519						
, 1	ម	1939. 7	0. 02	0. t3	148. 9	2337.	7436						
22 × 3	11	2351 6	0. 01	0, 11	152. 9	3044.	8518.						
· .	13	1673 1	0. 92	0.14	141, 2	3337	6939.						
4 y	1a.	1071 4	0. 03	0 19	119, 4	3470.	5640.						
5. 9	.24	408. 9	0. CØ	0 25	67. 3	3570.	4003.						
5 19	93	197.7	0. 17	0 26	39.0	3600	39 23 .						
11 83	52	131 1	0.56	0. 29	27. 6	3626	3910.						
	22/6	229 4	0.15	0.78	44.2	3784.	3959.						
239	288.	118 1	0.28	0 29	24.6	3810.	3861						
2-39	291.	1035 7	0. 03	0. 25	162. 9	3855	4279						
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4	3252	3337	3.00	142, 22		142 224							
5	3404,	3470.	8.00	105.7		108, 918			i				
6	3461.	3519.	5 00	65 73		65. 735							
7 8	3489, 3521,	3542, 3570	6, 60 7: 00	71 61 61 52		71. 612 61. 525							
9	3532	3560.	é. 🕉	53 9		53 959							
10	3556	3600	10.00	43.36	57	43, 367				•			
1.1	3562	3605.	12.00	36 30		36, 306							
15	3573. 3587.	3615. 3626.	14, 00 16, 00	31 24 27 48		31 262 27 480				•			
1.4	3603.	3640	18.00	24 50		24. 537							
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16	3655.	3684	28.00	16 13		16. 131	9			•			
17	3691). 3703.	3705. 3724.	36. 00 44, 00	12.76		12. 769 10. 629	C 8			•.			
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21	2743	3761.	68, OO	7 23		7. 230	c		•	•			
50 58	3/51	3764. 3767.	70, 00 90, 00	7 0: 8, 29		7. 052	T E		:				
24	3755. 3760.	3771:	90.00	3 70		6. 296 5. 707			:				
25	3767.	3777.	100.00	5, 20		5. 237	_		:	•			
26	3770.	3779.	110.00	4. 85		4. 832	T		*	•			
27 28	3776.	3784.	120.00	4. 53		4. 531	I			_			
29	3780. 3782.	3787. 3789.	140, 00	4, 25		4. 259 4. 026	M £						
30	3785	3792	150.00	3.82		7. 824	~		ı:	•			
31	3780 .	3794.	160, 00	3.64	13	3. 648		-					
32	3791	3797.	170: 00	3. 49		3. 492				•			
33	3794.	3799.	180.00	3. 35		3, 354			•	•			
34 39	3797. 3798.	3801. 3892	200.00	3, 23 3, 11		3. 230 3. 119			-	•			
36	3802	3806	210.00	3.01		3. 017				-			
37	3804.	3907	220.00	2.92	26	2. 926			:				
36	3807.	3910	230.00	2.84		2. 842			:	•			•1
39	3822	3822.	240. 00	2.76		2.765			1				

e CORRECTED FOR AFTERFLOW

1500 2000 2500 3000 3500 4000 4500 5000 5500 6000 6500

CORRECTED PRESSURE (PSI)

ee CORRECTED FOR SUPERPOSITION

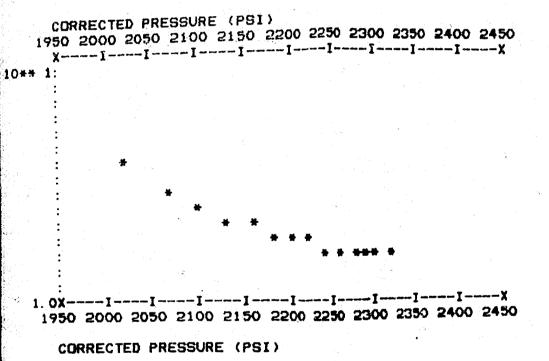
EXHIBIT 1 C HEYCO SUPERIOR 19 NO. 1 DRILL STEM TEST SEPTEMBER 17, 1980 LEA COUNTY, NEW MEXICO

PRESSURE BUILD-UP ANALYSIS

POINT USED		SLOPE PSI/CYC	K (MDS)	P.I. M/D/PSI			AVO. P PSIQ
1- 4	7.	390. 1	0, 04	∘0. 16	5 7. 3	2102.	2239.
4- 9	9.	759. 1	0. 02	0. 15	93. 7	2224.	2376.
9-15	11.	1303. 9	0. 01	0. 14	138. 6	2316.	2491.
POINT	PRESSURE	CORRECTED PRESSURE®	DT (HOURS)	(T+DT)/		ECTED)/DTee	
1	1953.	1953.	0. 33	5. 5	45	5. 545	
5	2019.	2019.	0. 60	3. 5	00	3. 500	
3	2066.	2066.	0. 87	2. 7	31	2. 731	
4	2102.	2102.	1. 13	2. 3	24	2. 324	
5	2133.	2133.	1. 40	2.0	71	2.071	
6	2161	2161.	1. 67	1. 9	00	1. 900	
7	2183.	2183.	1. 93	1.7	76	1. 776	
8	2205.	2205.	2. 20	1.6	82	1.682	
9	2224.	2224.	2. 47	1.6	08	1.608	
10	2244.	2244.	2. 73	1.5	49	1. 549	
11	2260.	2260.	3.00	1.5	00	1. 500	
12	2277.	2277.	3. 27	1. 4	59	1. 459	
13	2288.	2288.	3. 53	1.4	25	1. 425	
14	2305.	2305.	3. 80	1.3	95	1. 395	
15	2316.	2316.	4. 07	1.3	69	1. 369	

[€] CORRECTED FOR AFTERFLOW

ee CORRECTED FOR SUPERPOSITION



PVHIDIM 1 A

Date	Choke Size	Gas-MCFD	Condensate Barrels	Water Barrels	Flowing Tubing Pressure psig	Line Pressure psig
7-30-1980	32/64"	765	29	34	350	110
7-31-1980	32/64"	765	29	25	350	100
8- 1-1980	32/64"	765	29	25	350	100
8- 2-1980	32/64"	765	33	16	350	100
8- 3-1980	32/64"	765	39	25	350	100
8- 4-1980	32/64"	765	46	20	350	100
8- 5-1980	32/64"	765	23	16	350	100
8- 6-1980	32/64"	765	30	25	350	100
8- 7-1980	32/64"	803	30	26	325	100
8- 8-1980	32/64"	803	39	16	325	100
8- 9-1980	32/64"	803	39	20	300	100
8-10-1980	32/64"	803	39	21	300	100
8-11-1980	32/64"	803	39	20	300	100
8-12-1980	32/64"	819	39	18	350	100
8-13-1980	32/64"	826	63	16	350	100
8-14-1980	32/64"	834	40	20	350	100
8-15-1980	32/64"	856	36	12	350	100
8-27-1980	19/64"	765	53	6	900	110
8-28-1980	20/64"	872	54	. 15	800	100
8-29-1980	22/64"	903	43	13	650	100
8-30-1980	23/64"	918	51	16	600	100
8-31-1980	25/64"	898	46	15	500	100
9- 1-1980	24/64"	913	44	15	550	100
9- 2-1980	24/64"	918 ·	44	14	500	100
9- 3-1980	24/64"	918	44	13	500	100

Field Operator

Wildcat

County
Lease Name and
Well Number

Legal Description

Lea County

Harvey E. Yates Betenbough #1 Company

Unit C, 660' FNL, 1980' FWL, Sec.32

Date

6-18-1980

Choke Size

Test Interval

Gas

24 Hours

1/2"

EXHIBIT 3
WELL DATA
ATOKA GAS SAND GAS POOL
LEA COUNTY, NEW MEXICO
Ralph H. Viney & Associates, Inc.
Engineering Consultants

1740								
FSIP 3974.5#, BHT								
FP 127.6-172.3# 1.5 1								
102 MCF, HP 5799-58	١							
open 1 hr 29 min rec								
DST(Atoka)12275'-347								
1000 SCF N ₂ /bbl.								
3 stages 60/40 block;								
w/7500 gas 718 Ms.								
12315-12900' Acidized								
w/1000 gal 718 MS.								
12315-12331' Acidized	12,873-900'(112 Holes)							
w/1000 gal 7}% MB.	12,855-860'(24 Holes)							
12539-12642' Acidized	12,637-642'(24 Holes)		2100 Sx	13, 150'	5-1/2"			
w/1000 gal 738 Ms.	12,539-553'(64 Holes)		3400 Sx	4,600	9-5/8"	13, 478		
12855-12900' Acidized	12,315-331'(68 Holes)	Atoka	400 Sx	369	13-3/8"	14,000	6-19-80	3975' GL
- 13		:						
Well Stimulation	Perforated Interval	Zone	Cement	Depth	Size	Flug Back	Completion	Elevation
		Producing	rd	Casing Record	C	and	Date of	
	i e					Total Depth		

12	Condensate BOFD	1 n 1 t
į	Gas-Oil Ratio	ial Po
28 **	Water	Potentia
120	Tubing Pressure	l Hest
ť	lowing Pressure Bottom Hole Pressure	Data
Pkr.	Casing Pressure	•
0.733	Gas Air =	
45.3	Condensate API	

SOUTHWESTERN LABORATORIES

1703 West Industrial --- P. O. 8ox 2150 MIDLAND, TEXAS 79701 (915) 683-3348

FRACTIONAL ANALYSIS REPORT

				DATE RECEIVED	
Sample Marked.	Heyco Beter	riocugh #1 C	as Sales Line	FILE NO. C-1950-G	
	100 psiq 0	70° F.		LAB. NO. 44425	
sample from	Harvey C. Y	ates Co.,	Inc.	DATE SECURD 8-15-80	
OATE OF RUN	8-18-80			secured by Tofteller	·
COMPONENT	MOL. %	9. P. M.	HOUD YOU %		
lxygen					
litrogen	3.61			, t	
orbon Dioxide	0.60				
lethane	77.26				
thane	9.59	2.557		CONDENSATE VALUES, G.P.M.	
ropone	5.19	1,424		Propone	
Butone	0.92	0.300		Butune	
I-Butane	1.73	0,544		Gaseline	
Pentone	0.47	0.172		HEATING VALVE, B.T.S. Per Cu. Pr. *	
-Pentone	0.42	0.152		Calculated from % Composition	1214
exones	0.04	0.016		Calculated water saturated	_1193_
eprones & Hoovier	0.17	0.078		SULPHUR CONTENT, Grains Per 106 Cu. Pr. *	
		- •• · ·		Hydrogen Sulfide	
ydrogen Selfide	*None Det.			Mercophone	
etium				SPECIFIC GRAVITY®	
lquodeu				Calculated from % Composition	_0.733
arban Monexide					
OYALS	100.00	5.243		*14,696 lbs./sq. in., 60* F	

MARKS

Propane + GM - 2.686

*Determined on laboratory sample.

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3cc Harvey E. Yates Co., Inc. 1cc Tefteller, Inc.

Lacy M. Burch

EXHIBIT 4

STATE OF NEW MEXICO ENERGY AND MINERALS DEPARTMENT DIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION DIVISION FOR THE PURPOSE OF CONSIDERING:

CASE NO. 7085 Order No. R-6537

APPLICATION OF HARVEY E. YATES COMPANY FOR DESIGNATION OF A LIGHT FORMATION, LEA COUNTY, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 9 a.m. on November 12, 1980, at Santa Fe, New Hexico, before Examiner Richard L. Stamets

NOW, on this 17th day of December, 1980, the Division Director, having considered the Lestimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

- (1) That due public notice having been given as required by law, the Division has jurisdiction of this cause and the subject matter thereof.
- (2) That the applicant, Harvey E. Yates Company, requests that the Division in accordance with Section 107 of the Natural Gas Policy Act, and 18 C.F.R. §271.703 recommend to the Federal Energy Regulatory Commission that the Atoka formation underlying the following lands situated in Lea County, New Mexico, hereinafter referred to as the Atoka formation, be designated as a tight formation in said Federal Energy Regulatory Commission's regulations:

TOWNSHIP 12 SOUTH, RANGE 35 EAST, NMPM Sections 33 through 36: All

TOWNSHIP 12 SOUTH, RANGE 36 EAST, MMPM Section 31: All

- (6) That the Atoka formation underlying the above described lands has been penetrated by several other wells, none of which produced natural gas in commercial quantities from the Atoka formation.
- (7) That the evidence presented in this case demonstrated that no well formerly or currently completed in the Atoka formation within the proposed area exhibited permeability, gas productivity, or crude oil productivity in excess of the following parameters:
 - (a) average in situ gas permeability throughout the pay section of 0.1 millidarcy; and
 - (b) stabilized production rates, without stimulation, against atmospheric pressure, as found in the table set out in 18 C.F.R. §271.703(c)(2)(B) of the regulations; and
 - (c) production of more than five barrels of crude oil per day.
- (8) That based on analysis of available data from existing wells within the proposed area and utilizing generally and customarily accepted petroleum engineering techniques and measurements:
 - (a) The estimated average in situ gas permeability throughout the pay section of the Atoka formation is expected to be 0.1 millidarcy or less; and
 - (b) The stabilized production rate, against atmospheric pressure, of wells completed for production in the Atoka formation, without stimulation, is not expected to exceed production levels determined by reference to well depth, as found in the table set out in 18 C.f.R. §271.703 (c)(2)(B) of the regulations; and
 - (c) No well drilled into the formation is expected to produce, without stimulation, more than five barrels of crude oil per day.
- (9) That within the proposed area there are two recognized aquifers being the Ogallala, found at depths of from 300 feet to 400 feet, and the Santa Rosa, found at depths of from 900 feet to 1200 feet or approximately 11,000 feet above the Atoka formation.

- (10) That existing State of New Mexico and Federal Regulations relating to casing and cementing of wells will assure that development of the Atoka formation will not adversely affect said aquifers.
- (11) that the Aloka formation, or any portion thereof, as described berein, is not correctly being developed by infill drilling as defined in 18 C.F.R. §271.703(b)(6) of the regulations.
- (12) That the Atoka formation within the proposed area should be recommended to the Federal Energy Regulatory Commission for designation as a tight formation.

II 15 THEREFORE ORDERED:

(1) That it be and hereby is recommended to the Federal Energy Regulatory Commission pursuant to Section 107 of the Natural Gas Pelicy Act of 1978, and 18 C.F.R. §271.703 of the regulations that the Atoka formation underlying the following described lands in Lea County, New Mexico, be designated as a tight formation:

TOWNSHIP 12 SOUTH, RANGE 35 EAST, NMPM Sections 33 through 36: All

IOWNSHIP 12 SOUTH, RANGE 36 EAST, NMPM Section 31: All

TOWNSHIP 13 SOUTH, RANGE 35 EAST, NMPM Sections 1 through 4: All Sections 9 through 16: All Sections 21 through 28: All Sections 33 through 36: All

INVISHIP 13 SOUTH, RANGE 36 EAST, NEPH Sections 6 and 7: All Sections 18 through 20: All Sections 29 through 32: All

TOWNSHIP 14 SOUTH, RANGE 35 EAST, NMPM Sections 1 through 4: All Sections 2 through 16: All Sections 21 through 24: All

TOWNSHIP 14 SOUTH, RANGE 36 EAST, NMPM Sections 5 through 7: All Sections 18 and 19: All

Containing a total of 37,760 acres, more or less.

(2) That jurisdiction of this cause is hereby retained for the entry of such further orders as the Division may deem necessary.

DONE at Santa fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW BEXICO

O) L. COMSERVATION DEVESTOR

JOE D. MAHEY

Director

SE A L

ATOKA PENETRATION IN PROPOSED TIGHT GAS CLASSIFICATION AREA

Lea County, New Mexico

Propared by Ray F. Nokes, Reservoir Engineer
Harvey E. Yates Company

February 1, 1982

38 28 :	Elevation:	Formation:	Tubing:	Castag:	vern's:	సంఖంక్ సెజ్యం	3 20:	Total Depth:	Location:	Completed or P & A	Spudded:	WELL NAME Operator:
No eses rec'd in Acoka	4115 61	T/Atoka @ 11,363'	%	11-3/4" to 405' w/400 sx 8-5/8" to 4300' w/500 sx 5-1/2" to 13,525' w/750 "	13,156-204' Devonian	13,156'	13,210'	13,252'	1980' FNL & 660' FWL Sec 6, T-13S, R-35 E Lea Co., NM	6-11-71/P & A	3-8-71	Shell State #1 Union Texas Petro.
rs7 fr 11,521-580'; op 3 hrs. GTS in 1 hr, 38 mins.	4113' GL	T/Atoka NR	- NA	13-3/8" to 319' w/280 sx 8-5/8" to 4409' w/2600 sx 5-1/2" to 11,830' w/350 "	†d & ≥	୍ଦ ନ ମ	11,831	14,440'	560' FSL & 660' FWL Sec 17, T-13S, R-35E Lea Co., NM	8-2-51/P & A	11-13-50	Seth Alston #1 Sharples Oil Corp.
No tsts rec'd in Atoka	4057' GL	T/Atoka @ 12,456'	NA	11-3/4" to 400' w/325 sx 8-5/8" to 4520' w/600 sx	NA	NA.	ХA	13,500	1980' FSL & 660' FWL Sec 8, T-145, R-35E Lea Co., NN	11-7-74/5 & A	9-12-74	Estacado Unit #1 Union Oil of CA
DST fr 12,478-653'; op 1 hr, 15 mins. 1500' wB, rec WB + 3 gal DM; FP 695-705#; ISIP Il15#/30 mins; FSIP 1376#/2 hrs, 15 mins.	4056' GL & 4075' KB	T/Atoka @ 12,390'	NA	13-3/8" to 384' w/425 sx 9-5/8" to 4530' w/1100 sx	NA	NA.	1	15,038'	660' FNL & 1980' FEL Sec 19, T-14S, R-35E Lea Co., NM	7-17-69/P & A	4-19-69	State H "A" Com #1 Amerada Hess
No tsts rec'd in Atoka c	3997' GL	T/Atoka @ 12,072'	NA A	13-3/8" to 380' w/420 sx 8-5/8" to 4589' w/1900 sx	NA.	NA	NA	13,476'	1980' FNL & 660' FWL Sec 4, T-135, R-36E	9-27-79/P & A	8-1-79	State "4" #1 Adobe Oil & Gas

						7.						Pests:	Blevation:	Formation:	Tubing:	Ousding:	2031 S:	హొంద్ లో క్రామం	Pato:	Motul Depth:	Copation:	Completed or P % &:	ವಿಶಾಣದಲ್ಲಿ 🦠	Operator:	WELL NAME
										•	J2481	No ests rec'd in Atoka	3962 CL	%/Atoka 0 12,0937	X,	12-3/4" to 405' w/400 sx 8-5/8" to 4525' w/325 "	XA XA	NA NA	NA	14,500	1650' FSL & 2310' FEL Sec 11, T-135, K-36E Lea Co., NN	6-9-69 x x	3-39-69	Freeport Oil	State #1
FORF 4009%, Mr 0300-0300#	#009#, #P ZZ67-484#, 3 nm	GCM (4 400=) 100 min ISIP	CFTG + 1000 c	Op 105 min, rec 900' GCM	DST (Atoka): 12,744-922'.	HP 5799-5799#. BHT 174 Deg F.	110-989#, 120 min FSIP 39		*/Er dist. (Smpir: .6 CFTG + 400 cc DF w/tr dist @		(Atoka):	IPF (Atoka): 832 MCFGPD, GR .733, GOR 416,000, 120#.	3992' GL	T/Atoka @ 12,274'	2-3/8" to 12,257'	13-3/8" to 369' w/350 sx 9-5/8" to 4600' w/3400 " 5-1/2" to 13,150' w/2100	12,315-900' Atoka	12,315'	13,050'	14,760'	560' FNI & 1980' FWL Sec 32, T-135, R-36E Lea Co., NM	6-18-80 Comp.	3-6-80	Harvey E. Yates Co.	Heyco Betenbough #1
			0			eg F.)43# ₁	ก บ	റ			Form tstr (Atoka): See	3945' GL	T/Atoka @ 12,204' Appr	*NA	13-3/8" to 367' w/400 sx 8-5/8" to 4611' w/2150 " 5-1/2" to 14,587' w/1405	NA	NA	14,415'	14,618'	660' FSL & 990' FEL Sec 33, T-135, R-36E Lea Co., NM	NA R	6-13-81	Harvey E. Yates Co.	McDonald Unit #1
						× .				lair oil	*Orig operated by	No tsts rec'd in Atoka	3944' GL	r. T/Atoka NA	NA	13-3/8" to 339' w/300 sx 9-5/8" to 4614' w/1500 " 5-1/2" to 11,106' w/450	NA	NA	10,875' CIBP	13,047'	660' FN & WL Sec 2, T-14S, R-36E Lea Co., NM	Re-en 11-12-65; P & A 1-28-66	7-23-52	Moran Oil *	Renshaw #1
											ر. يد .	No tsts rec'd in Atoka	3951' DF	T/Atoka NA	NA	13" to 388' w/350 sx 9" to 4668' w/3700 "	AN	NA	ÑÀ	15,115'	2310' FNL & 330' FEL Sec 3, T-145, R-36E Lea Co., NM	6 12-31-57 P & A	8-12-57	Zapata, Petrol, et al	Danglade #1

######################################	PKr talled.	93#, 120 min FSIP 139#, HP 6082-5961#.			-872#, 4 hr FS 976-5976#. BF	
Name	DST (Atoka): 12,764-850	DST (Atoka): 12,516-600'.	tsts rec'd	tsts rec'd in	변 O	ಗಳಿಂದು:
NAME	3954' GL	3945' GL	3944' GL	3959' CL	3966' GI	Blevation:
Name	T/Atoka @ 12,306	T/Atoka @ 12,333'	ଉ	T/Atoka @ 12,326'		Formation:
NAME Austin-Morteith #1 Austin-Monteith #2 State "16" #1 State "16" #2	NA.	NA	NA	NA A	KN	Tubing:
L NAME Austin-Monteith #1 Austin-Monteith #2 State "16" #1 State "16" #2 water: Harvey E. Yates Co. Adobe Oil & Gas Adobe Oil & Gas Adobe Oil & Gas dded: 3-17-79 4-29-80 2-18-78 6-1-79 pleted or P & N. 7-20-79 Comp. 6-29-80 P & A 4-29-78 Comp. 9-11-79 Comp. pleted or P & N. 1650' FSL & 1980' FWL 1980' FSL & 660' FEL 990' FSL & 660' FWL 1980' FN & WL Sec 8, 7-145, R-36E Sec 6, 7-145, R-36E Sec 16, 7-145, R-36E Sec 16, 7-145, R-36E Sec 16, T-145, R-36E Lea Co., NM 13,670' 13,770' 13,875' 13,875' 3: 13,478' NA 13,687' 13,400' 3: 33 13,288' 13,288-373' Miss	13-3/8" to 371' w/450 sx 8-5/8" to 4640' w/1880 " 5-1/2" to 13,831' w/1300	13-3/8" to 389' w/425 sx 8-5/8" to 4675' w/2200 " 5-1/2" to 13,876' w/1750	# # # 0 0 0	13-3/8" to 395' w/400 sx 8-5/8" to 4600' w/1830 "	8 8 8	Casing:
L NAME Austin-Monteith #1 Austin-Monteith #2 State "16" #1 State "16" #2 valor: Harvey E. Yates Co. Harvey E. Yates Co. Adobe Oil & Gas Adobe Oil & Gas dded: 3-17-79 4-29-80 2-18-78 6-1-79 pleted or P & A: 7-20-79 Comp. 6-28-80 P & A 4-29-78 Comp. 9-11-79 Comp. ation: 1650' FSL & 1980' FWL 1980' FSL & 660' FBL 990' FSL & 660' FWL 1980' FN & WL Sec 8, T-145, R-36E Sec 16, T-145, R-36E Sec 16, T-145, R-36E Sec 16, T-145, R-36E Lea Co., NM al Jepth: 14,000' 13,670' 13,770' 13,875' D: 13,478' NA 13,687' 13,288'	13,397-460' Miss	13,288-373' Miss	13,199-261' Miss	NA	13,360-391' Miss.	99 03 113 114 00
### Austin-Monteith #1	13,397'	13,288'	13,199'	WA	13,360'	0
Austin-Morteith #1 Austin-Monteith #2 Harvey E. Yates Co. #4-29-80 4-29-80 7-20-79 Comp. 6-28-80 P & A 1650' FEL & 1980' FWL Sec 8, T-145, R-36E Lea Co., NM 14,000' Austin-Monteith #2 State "16" #2 Adobe Oil & Gas Adobe Oil & Gas Adobe Oil & Gas 4-29-78 4-29-78 Comp. 9-11-79 Comp. 1980' FEL & 660' FEL Sec 8, T-145, R-36E Lea Co., NM Lea Co., NM 13,670' 13,875' 13,875'	13,520'	13,400'	13,687'	ΝA	13,478'	28 TD:
Austin-Monteith #1 Austin-Monteith #2 Harvey E. Yates Co. #4-29-80 1-20-79 Comp. 1650' FSL & 1980' FWL Sec 8, T-145, R-36E Lea Co., NM Austin-Monteith #2 State "16" #1 State "16" #1 State "16" #1 Adobe Oil & Gas Adobe Oil & Gas 4-29-78 2-18-78 4-29-78 Comp. 9-11-79 Comp. 1980' FSL & 660' FWL Sec 8, T-145, R-36E Lea Co., NM Lea Co., NM Lea Co., NM Lea Co., NM State "16" #1 State "16" #2 State "16" #2 Adobe Oil & Gas Adobe Oil & Gas 6-1-79 9-11-79 Comp. 1980' FSL & 660' FWL Sec 16, T-145, R-36E Lea Co., NM Lea Co., NM Lea Co., NM	13,832'	13,875'	13,770'	13,670'	14,000'	
Austin-Monteith #1 Austin-Monteith #2 State "16" #1 State "16" #2 H Harvey E. Yates Co. Harvey E. Yates Co. Adobe Oil & Gas Adobe Oil & Gas Adobe Oil & Gas Adobe Oil & Gas Ado 10 P W A: 7-20-79 Comp. 6-29-80 P & A 4-29-78 Comp. 9-11-79 Comp.	1980' FNL & 660' F Sec 17, T-14S, R-1 Lea Co., NM	1980' FN & WL Sec 16, T-14S, R-36E Lea Co., NM	-	င္က တ	1650' FSL & 1980' FWE Sec 8, T-145; R-36E Lea Co., NM	Location:
Austin-Morteith #1 Austin-Morteith #2 Hannah #1 Harvey E. Yates Co. Harvey E. Yates Co. Harvey E. Yates Co. Adobe Oil & Gas Adobe Oil & Gas Adobe Oil & Gas Adobe Oil & Gas 1-10-79	3-26-79 Comp.	9-11-79 Comp.		ත න	**	or P
Austin-Monteith #1 Austin-Monteith #2 Hannah #1 Harvey E. Yates Co. Harvey E. Yates Co. Adobe Oil & Gas Adobe Oil & Gas	1-10-79	6-1-79	2-18-78	4-29-80	3-17-79	Spudded:
Austin-Morteith #1 Austin-Monteith #2 State "16" #1 State "16" #2			oil &	E. Yates	Vates	Operator:
	Hannah #1	State "16" #2	State "16" #1	Austin-Monteith #2	Austin-Monteith #1	WELL NAME

		Tests: No tsts rec'd in Atoka	Elevation: 3979' Dr	Fermation: T/Atoka NA	Tubing:	Casing: 13-3/8" to 392' w/375 sx 11 9-5/8" to 4650' w/710 " 8	Perf's: 13,194-286' Miss	Top of Pay: 13/194'	Paro: 13,290'	Total Depth: 14,796'	Exection: 060' FS & WIJ Sec 17, T-145, R-36E Lea Co., NM	Completed or P & A: 7-22-57 Comp.	Spudded: 11-12-56	Operator: Phillips Pet.	WELL NAME Austin Unit #1
		No tsts rec'd in Atoka	3962' GL	T/Atoka @ 12,320'	NA	13-3/8" to 395' w/400 sx 8-5/8" to 4630' w/2700 " 5-1/2" to 13,830' w/1200	13,228-258' Miss	13,2281	NA	13,830'	1980' FN & WL Sec 17, T-145, R-36E Lca Co., NM	4-16-80 Comp.	2-13-80	Southern Union Explor.	State "17" #1
6262 rf (7 4)sp b loa	cushion + 568' mud w/NS. 60 min ISIP 4000#, FP 2014- 2212#, 215 min FSIP 4047#,		3954' OL	T/Atoka @ 12,538'	NA	13-3/8" to 383' w/450 sx 8-5/8" to 4650' w/2500 " 4-1/2" to 13,160' w/575 "	NA	NA	NA	13,550'	1980' FN & EL Sec 20, T-148, R-36E Lea Co., NM	1-12-8 P&A	10-17-80	Adobe Oil & Gas	Head State #1
		No tsts rec'd in Atoka	3923' CL	T/Atoka NA	NA	13-3/8" to 389' w/400 sx 9-5/8" to 4772' w/2664 "	NA NA	NA	NA .	15,100'	660' FSL & 1980' FEL Sec 22, T-14S, R-36E Lea Co., NM	5-7-79 P & A	2-17-79	Wm. K. Young	Terry, et al #1
		No tsts rec'd in Atoka	3967' GL	T/Atoka @ 12,050'	NA	13-3/8" to 435' w/425 sx 8-5/8" to 4609' w/2050 "	NA NA	NA	NA	14,081'	600' FNL & 990' FEL Sec 35, T-12S, R-36E Lea Co., NM	12-5-77 P & A	9-29-77	Hilliard Oil & Gas	Phillips State #1

Permeability Calculation for the McDonald Unit #1 660' FSL & 990' FEL, Sec 33, T-13S, R-36E Lea Co., NM

Prepared by Ray F. Nokes, Reservoir Engineer

HARVEY E. YATES COMPANY

February 1, 1982

Formation: Atoka Lithology: Sandstone

 S_W calculated by Humble Equation

K calculated by Morris-Biggs Equation

 $R_W = .133 @ 74 \text{ Deg F}$ for the REYCO Beten-

bough #1

 $R_W = .059 \ 0 \ 174 \ Deg \ F \ Corrected$

De	epth				RT Ohms	Crossplot Ø in %	S _w in
12,198'			,		174.2	9.7	17.79
12,199'					337.0	7.9	15.95
12,200'			•		762.9	5.9	14.51
12,201					1305.2	5.5	11.96
12,202					1911.6	4.6	11.98
12,203					1636.4	4.9	12.10
12,204'					1108.6	5.9	12.10
12,205'					1176.6	4.1	17.28
12,206'					756.1	4.6	19.05
12,207'					119.1	8.1	26.12
12,2081					39.8	13.5	26.10
12,209'			•		29.3	14.9	27.35
12,210'					40.6	13.5	25.84
12,211'					98.0	11.2	21.36
12,212'				·	165.5	18.9	8.9
12,588					177.3	²⁶⁶ / 9.3	18.46
12,589'					273.1	6.2	23.00
12,590'					261.5	5.7	25.72
12,591'					311.0	5.9	22.73
12,592'					342.7	6.6	19.19
12,593'					333.6	7.0	18.26
12,5941		*			319.4	7.7	16.85
12,595'					351.0	5.3	24.00
12,596'				•	548.7	4.3	24.04
12,597'					635.5	5.8	16.19
12,598'		47			408.9	6.7	17.29
12,599'					337.2	7.3	17.36
12,600'					323.3	9.4	13.51
12,601'					311.6	9.3	13.92
12,602'					370.9	9.4	12.51
12,603'					284.1	11.1	12.05
12,604'					119.9	11.6	17.70
12,605'					104.4	7.1	32.15
12,606'					242.1	4.9	31.45
12,607'					806.6	4.6	18.44
12,608'					526.0	7.4	13.70
12,609'					403.6	7.9	14.58
12,610'					434.3	6.8	16.51
12,611'			·		677.1	6.9	13.02
12,612'	en e	5)			1001.2	7.0	10.54

Depth			RT	Crossplot	Sw in
The second secon			ohms	Ø in %	3
10 9001			47.1	8.5	39,44
12,733'			180.6	6.4	27.33
12,734			179.8	6.4	21.96
12,735'			225.3	6.4	24.47
12,736' 12,737'			261.9	5.4	27.24
12,737			240.9	7.0	21.49
12,739			130.4	8.5	23.71
12,740'			110.5	8.8	24.81
12,741'			143.5	8.0	24.12
12,742'			153.0	7.4	25.40
12,743'			137.0	8.3	23,73
12,744			159.6	8.6	21.16
12,745			168.9	7.8	22.85
12,746'			144.2	8.6	22,26
12,747'			146.9	10.8	17.27
12,748'			173.8	11.3	15.12
12,749'	e'		230.7	10.0	14.97
12,750'			297.4	8.7	15.31
12,751'			239.1	10.7	13.67
12,752'			167.9	9.6	18.33
12,7531			160.2	3.8	20.60
12,754			212.0	6.2	26.10
12,755'			253.9	7.5	19.44
12,756'		3	224.1	6.9	22.63
12,757'			238.2	7.8	19.24
12,758'			266.4	6.4	22.50
12,759'			279.1	4.8	29.95
12,760'			298.3	4.9	28.34
12,761'			242.0	7.3	20.49
12,762'			185.3	8.7	19.40
12,763'			163.1	8.8	20,42
12,764'			145.5	8.7	21.89
1.2,765'			129.8	9.4	21.32
12,766'			130.3	8.1	24.98
12,767'			133.6	7.6	26.41
12,768'			132.2	7.9	25,47
12,769'		1	143.5	9.3	20.52
12,770'			213.1	7.3	21.84
12,771'			333.9	5.8	22.34
12,772'			199.1	9.0	18.04
12,773'			108.4	11.6	18,61
12,774'			95.9	9.5	24.53
12,775'			112.7	6.8	32.41
12,776'			132.7	7.7	26.13
12,777'			129.8	9.0	22.34
12,778'			113.5	8.9	24.18
12,779'			109.4	10.9	19.81
12,780'			112.5	11.5	18.44
12,781'			118.4	11.0	18.86
12,782'			128.8	9.4	21.41
12,783'			90.8	9.1	26.40
12,784'			43.5	9.3	37,26

Atoka Pay: 12,198' to 12,784'

Average Porosity = 8.11%

Average $S_W = 20.85$ % Average Permeability = .0418 md

Equations: Humble

$$S_{W} = \sqrt{\frac{.62}{\cancel{0}^{2} \cdot 15} (R_{W})}$$
RT

Morris-Biggs
$$\left(\frac{c}{S_{wi}}\right)^2$$
= 250 for Oil
80 for Gas

HALLIBURTON DIVISION LABORATORY

1342 4

HALLIBURTON SERVICES MIDLAND DIVISION HOBBS, NEW MEXICO 85242

LABORATORY WATER ANALYSIS

No. 1882-182

Te Harvey E. Yates		Date	1-21-82
Box 1933 Roswert, New Mod	čieo	it not any part thereof flor or it selected without first is of aboratory managements	of Halliburton Company and neither r a copy thereof is to be published ecuring the express written approva in timay however, be used in the
			operations by any person or collecte eveng such report from Habit orten
Submitted by			1=2]-83
Well So Betenbaugh	#1. Ceoth		
County Gea			
Resistivity	0.163 177°T.		
Specific Gravity	1,041		
pH	5.6	and the second s	the control of the co
Calcium (Ca)	3,150		
Magnesium (Mg)	1531		
Chlorides (Cl)	32,000		
Sulfates (SO ₄)	1,400		
Bicarbonates (HCO ₃)	425		
Soluble Iron (Fe)	80		<u> </u>
Remarks:		· · · · · · · · · · · · · · · · · · ·	*Milligrams per liter
	PECELIED		
	P. LOUI		
en e	Respectfully submitte	ed,	
Analyst: Brewer	<i>j</i>	HALLIBURTON	COMPANY
cc:		W. J. CHEMIS	Tenser

NOTICE

THIS REPORT IS LIMITED TO THE DESCRIBED SAMPLE TESTED, ANY USER OF THIS REPORT AGREES THAT HALLIBURTON SHALL NOT BE LIABLE FOR ANY LOSS OR DAMAGE, WHETHER IT BE TO ACT OR CHISSION, RESULTING FROM SUCH REPORT OR ITS USE.

Formation Testing Service Report



HALLIBURTON SERVICES

BECEIGEURY J. B. CO.

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SPECIAL PRESSURE DATA

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		717000	Ticket) /	. 1"	-1) _ _		127221	フミスト		33	7.	

NOMENCLATURE

Ь	ann b	: Approximate Radius of Investigation	Feet
b,		Approximate Radius of Investigation (Net Pay Zone h.)	Feet
D.R	. ::::	Damage Ratio	
ΕI	;7	Elevation	Feat
GD	~.	8 J. Gauge Depth. From Surface Reference?	Feet
h		Interval Tested	Feet
h,		Net Pay Thickness	Feet
K	575	Permeability	nid
К:	225	Permeability From Net Pay Zone has a second	uid
m		Slope Extrapolated Pressure Plot (Psil/cycle Gas)	psi/cycle
OF-	27.	Maximum Indicated Flow Rate	MCF/D
OF:	===	Minimum Indicated Flow Rate	MCF/D
OF:	==	Theoretical Open Flow Potential with/Damage Removed Max	MCF/D
OF,		Theoretical Open Flow Potential with/Damage Removed Min.	MCF/D
P,	===	Extrapolated Static Pressure	Psig.
Ρ,	<u>-</u>	Final Flow Pressure	Psig.
Ρ.,	==	Potentiometric Surface (Fresh Water*)	Feet
Q	===	Average Adjusted Production Rate During Test	bbls/do
Q :		Theoretical Production w/Damage Removed	bbls/da
Q,	===	Measured Gas Production Rate	MCF/D
R	==	Corrected Recovery	bbls
r "	=	Radius of Well Bore	Feet
t	=	Flow Time	Minutes
t.	===	Total Flow Time	Minutes
T	: :	Temperature Rankine	*R
Z	==	Compressibility Factor	
نر	==	Viscosity Gas or Liquid	СР
Log		Common Log	

^{*} Potentiometric Surfice Reference to Roman. Table When Sievation Not Given. - Fresh Water Corrected to 110 February

ATOKA TIGHT GAS SANDS PRODUCTION

Betenbough #1

Prepared by Ray F. Mokes, Reservoir Engineer

HARVEY E. YATES COMPANY

February 1, 1982

Potential test 6-18-80: 832 MCF/2 BO/28 BW on 1/2" ck in 24 hrs.

	Average Daily Production (Sales)					
Month		BO	MCF	BW		
7-80		31	420	30		
8-80	· ·	43	795	12		
9-80		46	754	9		
10-80		38	682	.8		
11-80		30	574	8		
12-80		27	539	7		
1-81	en e	33	744	9		
2~81		1.7	291	6		
3-81		15	380	5		
4-81		10	324	4		
5-81		10	311	4		
6-81		11	288	4		
7-81		10	247	4		
8-81		8	1.97	3 °		
9-81		9	233	3		
10-81		8	197	5		
11-81		7	203	5		
12-81		9	177	6		

Cumulative Production: 9024 BO/188277 MCF/2841 BW

Note: Production reflects effects of stimulation of the Atoka Formation.

Dockets Nos. 7-82 and 8-82 are tentatively set for March 3 and March 17, 1982. Applications for hearing must be filed at least 22 days in advance of hearing date.

DOCKET: EXAMINER HEARING - WEDNESDAY - FEBRUARY 17, 1982

9 A.M. - OIL CONSERVATION DIVISION 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:

- ALLOWABLE: (1) Consideration of the allowable production of gas for March, 1982, from fifteen prorated pools in Lea, Eddy, and Chaves Counties, New Mexico.
 - (2) Consideration of the allowable production of gas for March, 1982, from four prorated pools in San Juan, Rio Arriba, and Sandoval Counties, New Mexico.
 - (3) Consideration of purchaser's nominations for the one year period beginning April 1, 1982, for both of the above areas.
- CASE 7445: (Continued from December 16, 1981, Examiner Hearing)
 (THIS CASE WILL BE CONTINUED TO THE EXAMINER HEARING ON MARCH 17, 1982)

Application of Harvey E. Yates Company for an NGPA determination, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks a new onshore reservoir determination in the San Andres formation for its Fulton Collier Well No. 1 in Unit G of Section 1, Township 18 South, Range 28 East.

CASE 7479: Application of Northwest Pipeline Corporation for amendment of Order No. R-2046, Rio Arriba County, New Mexico. Applicant, in the above-styled cause, seeks the Amendment of Division Order No. R-2046, which authorized approval of six non-standard proration units, Basin-Dakota Gas Pool.

The amendment sought is for the creation of the following non-standard proration units to be drilled at standard locations thereon: Township 31 North, Range 6 West, Section 25: N/2 (272.16 acres) and S/2 (273.3 acres); Section 36: N/2 (272.56 acres) and S/2 (272.89 acres); Township 30 North, Range 6 West; Section 1: N/2 (272.81 acres) and S/2 (273.49 acres).

- CASE 7480: Application of Arco Oil & Gas Company for pool creation, Lea County, New Mexico.

 Applicant, in the above-styled cause, seeks the creation of a new Upper Devonian gas pool for its

 Custer Well No. 1 located 1810 feet from the North line and 2164 feet from the West line of Section
 6, Township 25 South, Range 37 East, Custer Field.
- CASE 7481: Application of Arco Oil & Gas Company for amendment of Order No. R-6792, Lea County, New Mexico.

 Applicant, in the above-styled cause, seeks the amendment of Division Order No. R-6792, which authorized the directional drilling of applicant's Custer Wells Well No. 1 to an unorthodox location in the Devonian and Ellenburger formations and imposed a penalty in the Devonian. By stipulation applicant and the offset operator have agreed that the subject well is not affecting the offsetting property and applicant herein seeks removal of the penalty imposed for so long as the well produces only from the present perforated interval in the Upper Devonian.
- CASE 7459: (Continued from January 20, 1982, Examiner Hearing)

Application of Red Mountain Associates for the Amendment of Order No. R-6538, McKinley County, New Mexico. Applicant, in the above-styled cause, seeks the amendment of Order No. R-6538, which authorized applicant to conduct waterflood operations in the Chaco Wash-Mesa Verde Oil Pool. Applicant seeks approval for the injection of water through various other wells than those originally approved, seeks deletion of the requirement for packers in injection wells, and seeks an increase in the previously authorized 68-pound limitation on injection pressure.

CASE 7410: (Continued from January 20, 1982, Examiner Hearing)

Application of B.O.A. Oil & Gas Company for two unorthodox oil well locations, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox location of a well to be drilled 2035 feet from the South line and 2455 feet from the East line and one to be drilled 2455 feet from the North line and 1944 feet from the East line, both in Section 31, Township 31 North, Range 15 West, Verde-Gallup Oil Pool, the NW/4 SE/4 and SW/4 NE/4, respectively, of said Section 31 to be dedicated to said wells.

CASE 7457: (Continued from January 20, 1982, Examiner Hearing)

Application of E. T. Ross for nine non-standard gas preration units, Harding County, New Mexico. Applicant, in the above-styled cause, neeks approval for nine 40-acre non-standard gas proration units in the Bravo Done Carbon Diexide Area. In Township 19 North, Range 30 East: Section 12, the NW/4 NW/4 and NE/4 NW/4; Section 14, the NW/4 NE/4, SW/4 NE/4, and SE/4 NE/4. In Township 20 North, Range 30 East: Section 11, the NE/4 SW/4, SW/4 SE/4, SE/4 SW/4, and NW/4 SE/4.

- CASE 7482: Application of Wiser Oil Company for an unorthodox oil well location, Lea County, New Mexico.

 Applicant, in the above-styled cause, seeks approval of an unorthodox location 1295 feet from the South line and 1345 feet from the West line of Section 32, Township 21 South, Range 37 East, Penrose-Skelly Pool.
- CASE 7483: Application of Adams Exploration Company for salt water disposal, Chaves County, New Mexico.

 Applicant, in the above-styled cause, seeks authority to dispose of produced salt water into the San Andres formation in the perforated interval from 4176 feet to 4293 feet in its Griffin Well No. 4 located in Unit A, of Section 10, Township 8 South, Range 32 East, Chaveroo-San Andres Pool.
- CASE 7462: (Continued from February 3, 1982, Examiner Hearing)

Application of Marathon Oil Company for downhole commingling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the downhole commingling of the Drinkard and Blinebry production in the wellbore of its C. J. Saunders Well No. 3, located in Unit C of Section 1, Township 22 South, Range 36 East.

CASE 7474: (Continued from February 3, 1982, Examine: Hearing)

Application of Union Oil Company of California for compulsory pooling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Strawn, Atoka and Morrow formations underlying the E/2 of Section 25; Township 19 South, Range 33 East, 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, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

- CASE 7484: Application of Anadarko Production Company for compulsory pooling, Eddy County, New Mexico.

 Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Atoka and Morrow formations underlying the E/2 of Section 1, Township 19 South, Range 25 East, 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, designation of applicant as operator of the the well, and a charge for risk involved in drilling said well.
- Application of Berge Exploration for compulsory pooling, Chaves County, New Mexico.

 Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Abo
 formation underlying two 160-acre proration units, the first being the NW/4 and the second being
 the SW/4 of Section 27, Township 7 South, Range 26 East, each 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 wells and the allocation of the cost thereof as well as actual operating costs
 and charges for supervision, designation of applicant as operator of the wells and a charge for
 risk involved in drilling said wells.
- CASE 7486: Application of MGF Oil Corporation for compulsory pooling, Lea County, New Mexico.

 Applicant, in the above-styled cause, seeks an order pooling all mineral interests down through and including the Abo formation underlying the NE/4 NE/4 of Section 6, Township 20 South, Range 39 East, 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, designation of applicant as operator of the well and a charge for risk involved in drilling said well.
- CASE 7487: Application of MGF Oil Corporation for compulsory pooling, Lea County, New Mexico.

 Applicant, in the above-styled cause, seeks an order pooling all mineral interests down through and including the Abo formation underlying the SE/4 SE/4 of Section 31, Township 19 South, Range 39 East, 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, designation of applicant as operator of the well and a charge for risk involved in drilling said well.

CASE 7488: Application of Burkhart Petroleum Company for compulsory pooling, Roosevelt County, New Mexico.

Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the San Andres formation underlying the SW/4 NW/4 of Section 13, Township 8 South, Range 37 East, 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, designation of applicant as operator of the well and a charge for risk involved in drilling said well.

CASE 7073: (Reopened and Readvertised)

In the matter of Case 7073 being reopened pursuant to the provisions of Order No. R-6558, which order promulgated special rules for the South Elkins-Fusselman Pool in Chaves County including provisions for 80-acre spacing units and a limiting gas-oil ratio of 3000 to one. Ail interested parties may appear and show cause why said pool should not be developed on 40-acre spacing units with a limiting gas-oil ratio of 2000 to one.

CASE 7074: (Reopened and Readvertised)

In the matter of Case 7074 being reopened pursuant to the provisions of Orders Nos. R-6565 and R-6565-B, which created the South Elkins-Fusselman Gas Pool in Chaves County. All interested parties may appear and present evidence as to the exact nature of the reservoir, and more particularly, as to the proper rate of withdrawal from the reservoir if it is determined that said pool is producing from a retrograde gas condensate reservoir.

CASE 6373: (Reopened and Readvertised)

In the matter of Case 6373 being reopened pursuant to the provisions of Orders Nos. R-5875 and R-5875-A, which created the East High Hope - Abo Gas pool in Eddy County, and promulgated special rules therefor, including a provision for 320-acre spacing units. All interested parties may appear and show cause why said pool should not be developed on 160-acre spacing units.

CASE 7489: Application of Curtis J. Little for designation of a tight formation, Rio Arriba County, New Mexico.

Applicant, in the above-styled cause, seeks the designation of the Chacra formation underlying portions of Township 25 North, Range 6 West, containing 6,720 acres, more or less, as a tight formation pursuant to Section 107 of the Natural Gas Policy Act and 18 CFR Section 271.701-705.

CASE 7490: Application of Harvey E. Yates Company for compulsory pooling, Chaves County, New Mexico.

Applicant, in the above-styled cause, seeks an order pooling all mineral interests down through and including the Atoka-Morrow formation, underlying the N/2 of Section 19, Township 8 South, Range 30 East, 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, designation of applicant as operator of the well and a charge for risk involved in drilling said well.

CASE 7491: Application of Harvey E. Yates Company for designation of a tight formation, Lea County, New Mexico.

Applicant, in the above-styled cause, seeks the designation of the Atoka formation underlying portions of Townships 12, 13, and 14 South, Ranges 35 and 36 East, containing 46,720 acres, more or less, as a tight formation pursuant to Section 107 of the Natural Gas Policy Act and 18 CFR Section 271. 701-705, said area being an eastward and westward extension of previously approved tight formation area.

CASE 7492: Application of Harvey E. Yates Company for designation of a tight formation, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks the designation of the Atoka-Morrow formation underlying all or portions of Townships 7, 8, and 9 South, Ranges 29,30, and 31 East, containing 115,200 acres, more or less, as a tight formation pursuant to Section 107 of the Natural Gas Policy Act and 18 CFR Section 271.701-705.

CASE 7493: In the matter of the hearing called by the Oil Conservation Division on its own motion for an order creating and extending certain pools in Chaves, Eddy, Lea, and Roosevelt Counties, New Mexico.

(a) CREATE a new pool in Lea County, New Mexico, classified as a gas pool for Morrow production and designated as the East Bootleg Ridge-Morrow Gas Pool. The discovery well is Getty Oil Company Getty 15 Federal Well No. 1 located in Unit J of Section 15, Township 22 South, Range 33 East, NMPM. Said Pool would comprise:

TOWNSHIP 22 SOUTH, RANGE 33 EAST, NMPM Section 15: S/2

- CASE 7488: Application of Burkhart Petroleum Company for compulsory pooling, Roosevelt County, New Mexico.

 Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the San Andres fermation underlying the SW/4 NW/4 of Section 13, Township 8 South, Range 37 East, 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, designation of applicant as operator of the well and a charge for risk involved in drilling said well.
- CASE 7073: (Reopened and Readvertised)

In the matter of Case 7073 being reopened pursuant to the provisions of Order No. R-6558, which order promulgated special rules for the South Elkins-Russelman Pool in Chaves County including provisions for 80-acre spacing units and a limiting gas-oil ratio of 3000 to one. All interested parties may appear and show cause why said pool should not be developed on 40-acre spacing units with a limiting gas-oil ratio of 2000 to one.

CASE 7074: (Reopened and Readvertised)

In the matter of Case 7074 being reopened pursuant to the provisions of Orders Nos. R-6565 and R-6565-B, which created the South Elkins-Fusselman Gas Pool in Chaves County. All interested parties may appear and present evidence as to the exact nature of the reservoir, and more particularly, as to the proper rate of withdrawal from the reservoir if it is determined that said pool is producing from a retrograde gas condensate reservoir.

CASE 6373: (Reopened and Readvertised)

In the matter of Case 6373 being reopened pursuant to the provisions of Orders Nos. R-5875 and R-5875-A, which created the East High Hope - Abo Gas pool in Eddy County, and promulgated special rules therefor, including a provision for 320-acre spacing units. All interested parties may appear and show cause why said pool should not be developed on 160-acre spacing units.

- CASE 7489: Application of Curtis J. Little for designation of a tight formation, Rio Arriba County, New Mexico.

 Applicant, in the above-styled cause, seeks the designation of the Chacra formation underlying portions of Township 25 North, Range 6 West, containing 6,720 acres, more or less, as a tight formation pursuant to Section 107 of the Natural Gas Policy Act and 18 CFR Section 271.701-705.
- Application of Harvey E. Yates Company for compulsory pooling, Chaves County, New Mexico.

 Applicant, in the above-styled cause, seeks an order pooling all mineral interests down through and including the Atoka-Morrow formation, underlying the N/2 of Section 19, Township 8 South, Range 30

 East, 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, designation of applicant as operator of the well and a charge for risk involved in drilling said well.
- CASE 7491: Application of Harvey E. Yates Company for designation of a tight formation, Lea County, New Mexico.

 Applicant, in the above-styled cause, seeks the designation of the Atoka formation underlying portions of Townships 12, 13, and 14 South, Ranges 35 and 36 East, containing 46,720 acres, more or less, as a tight formation pursuant to Section 107 of the Natural Gas Policy Act and 18 CFR Section 271. 701-705, said area being an eastward and westward extension of previously approved tight formation area.
 - CASE 7492: Application of Harvey E. Yates Company for designation of a tight formation, Chaves County, New Mexico.

 Applicant, in the above-styled cause, seeks the designation of the Atoka-Morrow formation underlying all or portions of Townships 7, 8, and 9 South, Ranges 29,30, and 31 East, containing 115,200 acres, more or less, as a tight formation pursuant to Section 107 of the Natural Gas Policy Act and 18 CFR Section 271,701-705.
- CASE 7493: In the matter of the hearing called by the Oil Conservation Division on its own motion for an order creating and extending certain pools in Chaves, Eddy, Lea, and Roosevelt Counties, New Mexico.
 - (a) CREATE a new pool in Lea County, New Mexico, classified as a gas pool for Morrow production and designated as the East Bootleg Ridge-Morrow Gas Pool. The discovery well is Getty Oil Company Getty 15 Federal Well No. 1 located in Unit J of Section 15, Township 22 South, Range 33 East, NMPM. Said Pool would comprise:

TOWNSHIP 22 SOUTH, RANGE 33 EAST, NAPM Section 15: S/2

CREATE a new pool in Lea County, New Mexico, classified as an oil pool for Devonian production and designated as the North King-Devonian Pool. The discovery well is Samedan Oil Corporation Speight Well No. I located in Unit B of Section 3, Township 13 South, Range 37 East, NMPM. Said pool would comprise:

> YOWNSHIP 13 SOUTH, RANGE 37 EAST, HMPM Section 3: NE/4

(c) CREATE a new pool in Eddy County, New Mexico, classified as a gas pool for Atoka production and designated as the North Loving-Atoka Gas Puol. The discovery well is Gulf Oil Corporation Eddy GR State Well No. 1 located in Unit E of Section 16, Township 23 South, Range 28 East, NMPM. Said pool would comprise:

TOWNSHIP 23 SOUTH, RANGE 27 EAST, MMPM Section 12: N/2

TOWNSHIP 23 SOUTH, RANGE 28 EAST, NMPM

Section 4: S/2

Section 7: All Section 9: All

Section 9: All

Section 16: All

Section 17: All Section 18: E/2

CREATE a new pool in Lea County, New Mexico, classified as an oil pool for Drinkard production and designated as the Teague - Drinkard Pool. The discovery well is Alpha Twenty-One Production Company Lea Well No. 1 located in Unit B of Section 17, Township 23 South, Range 37 East, NMPM. Said pool would comprise:

TOWNSHIP 23 SOUTH, RANGE 37 EAST, HMPM Section 17: NE/4

(e) EXTEND the West Atoka-Morrow Gas Pool in Eddy County, New Mexico, to include therein:

> TOWNSHIP 18 SOUTH, RANGE 25 EAST, NMPM Section 23: All Section 24: W/2

(f) EXTEND the Atoka-Pennsylvanian Gas Pool in Eddy County, New Mexico, to include therein:

> TOWNSHIP 18 SOUTH, RANGE 26 EAST, NMPM Section 16: W/2

(g) EXTEND the Avalon-Morrow Gas Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 21 SOUTH, RANGE 26 EAST, NMPM Section 2: Lots 1 through 8

(h) EXTEND the Brunson-Fusselman Fool in Lea County, New Mexico, to include therein:

> TOWNSHIP 22 SOUTH, RANGE 37 EAST, NMPM Section 5: SE/4

(i) EXTEND the Brushy Draw-Delaware Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 26 SOUTH, RANGE 29 EAST, NMPM Section 26: E/2

EXTEND the Buffalo Valley-Pennsylvanian Gas Pool in Chaves County, New Mexico, to include therein:

TOWNSHIP 15 SOUTH, RANGE 27 EAST, NMPM

Section 23: All Section 26: All

PAGE 5 EXAMINER HEARING - WEDNESDAY - FEBRUARY 17, 1982

> (k) EXTEND the Cary-Montoya Pool in Lea County, New Hexico, to include therein:

> > TOWNSHIP 22 SOUTH, RANGE 37 EAST, NMPM Section 4: W/2 SW/4
> > Section 5: SE/4
> > Section 9: W/2 W/2

(1) EXTEND the Crow Flats; Morrow Gas Pool in Eddy County, New Mexico to include therein:

TOWNSHIP 16 SOUTH, RANGE 27 EAST, NMPM Section 35: E/2 Section 36: W/2

EXTEND the South Culebra Bluff-Bone Spring Pool in Eddy County, New Mexico, (æ) to include therein:

TOWNSHIP 23 SOUTH, RANGE 28 EAST, NMPM Section 25: S/2 SW/4 Section 27: SW/4

(n) EXTEND the Elkins-San Andres Pool in Chaves County, New Mexico, to include therein:

TOWNSHIP 7 SOUTH, RANGE 28 EAST, NMPM Section 21: NE/4

(o) EXTEND the Empire-Abo Fool in Eddy County, New Mexico, to include therein:

TOWNSHIP 17 SOUTH, RANGE 29 EAST, NNPM Section 19: S/2 SW/4

(p) EXTEND the Henshaw-Queen Grayburg-San Andres Pool in Eddy County, New Mexico. to include therein:

TOWNSHIP 16 SOUTH, RANGE 31 EAST, NMPM Section 19: NE/4 NH/4

(q) EXTEND the Indian Flats-Morrow Gas Pool in Eddy County, New Mexico, to include

TOWNSHIP 21 SOUTH, RANGE 28 EAST, NMPM Section 26: 0/2

(r) EXTEND the West Nadine-Blinebry Pool in Lea County, New Mexico, to include therein:

> TOWNSHIP 20 SOUTH, RANGE 38 EAST, NMPM Section 8: NW/4

(s) EXTEND the Peterson-Mississippian Pool in Roosevelt County, New Mexico, to include therein:

TOWNSHIP 4 SOUTH, RANGE 33 EAST, NMPM Section 28: NW/4

(t) EXTEND the Race Track-San Andres Pool in Chaves County, New Mexico, to include therein:

TOWNSHIP 10 SOUTH, RANGE 28 EAST, NMPM Section 7: S/2 SW/4 Section 18: NW/4 and N/2 SW/4 and SW/4 SW/4

PAGE 6
EXAMINER HEARING - WEDNESDAY - FEBRUARY 17, 1982

(u) EXTEND the Railroad Mountain-San Andres Pool in Chaves County, New Nexico, to include therein:

TOWNSHIP 8 SOUTH, FACUR OR EAST, HMPM Section 2: NE/4 and E/2 PW/4

(v) EXTEND the Red Lake-Queen-Grayburg-San Andres Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 17 SOUTH, RANGE 28 EAST, NMPM Section 7: S/2 Section 8: SW/4 Section 18: E/2 NW/4

(w) EXTEND THE West Sawyer-San Andres Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 10 SOUTH, RANGE 37 EAST, NMPM Section 5: SW/4

(x) EXTEND the Turkey Track-Atoka Gas Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 19 SOUTH, RANGE 29 EAST, NMPM Section 15: All

(y) EXTEND the Twin Lakes-San Andres Associated Pool in Chaves County, New Mexico, to include therein:

TOWNSHIP 8 SOUTH, RANGE 28 EAST, NMPM Section 13: SE/4 Section 24: NE/4

TOWNSHIP 9 SOUTH, RANGE 28 EAST, NMPM Section 12: S/2 NE/4

TOWNSHIP 9 SOUTH, RANGE 29 EAST, NMPM Section 7: S/2 Section 8: NW/4

HEYCO





P.O. BOX 1933 SECURITY NATIONAL BANK BUILDING ROSWELL, NEW MEXICO 88201

February 5, 1982

Oil Conservation Division P. O. Box 2088 Santa Fe, NM 87501

Attn: Mr. Richard Stamets

Re: Application of Harvey E. Yates Company Designation of Atoka Tight Formation Lea County, New Mexico

Dear Mr. Stamets:

Please find enclosed three sets of exhibits for the captioned application. Mr. Bob Strand indicated that the attached exhibits should have been submitted to your office at least fifteen days preceding the hearing.

Please accept my sincere apology for the delay. Our geological department in Midland, Texas is forwarding their exhibits to your office.

Very truly yours,

HARVEY E. YATES COMPANY

Ray F. Nokes

Reservoir Engineer

RFN:dy

Enclosures

cc: Allen Buckingham

c/o Mineral Management Service

P. O. Box 26124

Albuquerque, NM 87125

NEW MEXICO OIL COMMENVATION DIVISION

EXAMINER HEARING

DOCKET UO.

Prepared by:

Harvey E. Yates Company Security National Bank, Ste. 300 P. O. Box 1933 Foswell, New Mexico 88201

Table of Contents

Exhibit #1	Discussion
fxhibit #2	Copy of the Application for Designation of Tight Formation
Exhibit #3	Copy of the Exhibits presented at the previous Atoka Tight Formation Hearing
Exhibit #4	Copy of the Atoka Tight Formation Order No. R-6537
Exhibit #5	Atoka Penetrations in the proposed Tight Formation Classification area
Exhibit #6	Permeability calculations for the McDonald Unit #1, Atoka Formation
Exhibit 27	McDonald Unit #1 - Prolog with Tabular Print Out (Archie Calculation)
Exhibit #8	Current Water Analysis from the Heyco-Betenbough #1
Exhibit #9	Heyco-Betenbough #1 - Atoka Formation DST Report
Exhibit #10	McDonald Unit #1 - Formation Multi Tester Log
Exhibit.#11	Heyco-Betenbough #1 - Atoka Formation Production Sales
%Exhibit #12	Area map showing Atoka penetrations

Atoka Gas Sand Pool Extension

The purpose of this report is to present evidence which will demonstrate that the Atoka Gas Reservoir, under the Section described in the Tight Formation Application of January 27, 1982, in Townships 12, 13 and 14 of Ranges 35 and 36, N.M.P.M., Lea County, New Mexico, qualifies as an extension to the existing "Atoka Tight Formation" area.

The gas permeability in the Atoka Zone of the Harvey E. Yates Company operated McDonald Unit #1, were calculated from electric logs. The result of this analysis indicated an average in-situ gas permeability of .0418 millidarcies and is not expected to exceed 0.1 millidarcies. The Humble Equation and the Morris and Biggs Equation were used in calculating the Atoka sandstone permeability in the attached exhibits.

The stabilized production rate, at atmospheric pressure, for the Atoka Formation is not expected to exceed a maximum of 673.816 MCFGPD without stimulation. Attached is a production summary extracted from C-115 Monthly Operators Reports for the Neyco-Betenbough #1.

A comparison of the similarities in the Atoka Formation in-situ pressures, between the Heyco-Betenbough #1 and the McDonald Unit #1, indicates that the retrograde condensation phenomena which occurred in the Betenbough #1, would also occur in the McDonald Unit #1. The liquid hydrocarbons production expected from the Atoka Formation would have existed in a gas state at reservoir conditions; and therefore, would not exceed five barrels of crude oil per day.

Submitted with this report is a detailed description of each well which has penetrated the Atoka Formation and tests, is recorded.

Ray 1. Mokes Reservoir Engineer Harvey E. Yates Company February 1, 1982

Rubert H. Strand, P.A.

Attorney at Law

Practice Longitudes Of and Gas Land

Telephone (505) 624-0251 Naive 124 - Petroleum Building Rescell, New Mexico 88201

Phose R./4 10 P.O. Box 2226

January 27, 1982

Oil Conservation Division Post Office Box 2088 Santa Fa, New Mexico 87501

MOTER: Mr. Richard Stamets

Re:

Application of Harvey E. Yates Designation of Tight Formation Lea County, New Mexico

Dear Mr. Stamets:

Unclosed for filing is an original and two copies of the Application of Harvey E. Yates Company in the above referenced matter. This case has previously been set for hearing on the February 17, 1982 Docket.

Sincerely yours,

Robert H. Strand

RHS/bjt encls

BEFORE THE OIL CONSERVATION DIVISION ENERGY AND MINERALS DEPARTMENT

OF THE STATE OF NEW MEXICO

IN	THE	MATTE	R OF	PHE AI	PRICATION
or	HARV	EY E.	$\mathbb{T} Y A \mathbb{T} \mathbb{S}$	S COME	PANY FOR
DES	EGMA	TION	OF A 1	Pight	FORMATION 1
LEA	COU	NTY,	NEW M	COLKE	

Case No.

APPLICATION

COMPANY NOW HARVEY E. VATES COMPANY by its attorney and respectfully states;

1. Applicant is the owner of an interest in the Atoka Formation underlying the following described lands situated in Lea County, New Maxico:

Township 12 South, Range 35 East, NMPM Sections 31 and 32

Township 13 South, Range 35 East, NMPM Sections 5, 6, 7, 8, 17, 18, 19, 20, 29, 30, 31, 32

Township 14 South, Range 35 East, NMPM Sections 5, 6, 7, 8, 17, 18, 19, 20

Township 12 South, Range 36 East, NMPM Sections 32, 33, 34, 35, 36

Township 13 South, Range 36 East, NMPM Sections 1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 21, 22, 23, 24, 25, 26, 27, 28, 33, 34, 35, 36

Township 14 South, Range 36 East, NMPM Sections 1, 2, 3, 4, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 23, 24

Containing a total of 46, 720 acres, more or less.

2. The Atoka formation underlying the above described lands is expected to have an estimated average in situ gas permeability throughout the pay section of less than 0.1 millidarcy.

- The standbred production rate, against atmospheric is some of wells sampleted for production income formation, without standbren, as not expected to exceed the production levels set out in [18] C.F.R. [1271.703 (c) (2) (3).
- 4. To well imitted into said formation is expected to predicte, without stimulation, one than five barrels of crude oil per day.

WHEREFORD, applicant prayer

- A. If it this application be set for hearing before an excense, it i that not be of sail hearing be given as required by left.
- B. That upon such hearing, the Division enter its order rescamending to the Foderal Energy Regulatory Commission that pursuant to 15 CPR, Section 271.701-705, the Atoka formation underlying the above described lands be designated a right resemble.

DATES this Air day of January, 19924

GARVEY E. YATES COMPANY

By: Robert H. Strand
Attorney for Applicant
D.O. Dox 2226
Engage11, New Mexico 39202-2226

HES/bit

NEW MEXICO OIL CONSERVATION DIVISION EXAMINER HEARING DOCKET NO.

PREPARED FOR:

HARVEY E. YATES COMPANY SUITE 300 SECURITY NATIONAL BANK BUILDING ROSWELL, NEW MEXICO 83201

TABLE OF CONTENTS

			4.5	PAGE
		Discussion		1
ENHIBIT :		Summary of Buildups, Permeability		
		and Flow Rates		3
EXHIBIT :	1 A	Pressure Buildup Analysis		
		Betenbough No. 1 Drill Stem Tests		4
EXHIBIT :	В	Pressure Bulldup Analysis		
		Detenbough No. 1 Reservoir		5
EXHIBIT I	C	Pressure Buildup Analysis		
		Heyco Superior 19 No. 1 Drill Stem Tests		6
EXHIBIT 2	2	Production Summary		
		Betenbough No. 1		7
ехнівіт з	3	Well Data		8
EXHIBIT 4		Fractional Analysis Report, Gas		
		Betenbough No. 1		9

ATOKA GAS SAND POOL

In the matter of the determination of the Atoka formation underlying certain lands in Lea County, New Mexico, as a "Tight Formation" pursuant to regulations of the Federal Energy Commission, Section 107(b) of the Natural Gas Policy Act of 1978 (15 USC 3317) and regulations thereunder, the certain exhibits will be evidence presented which demonstrates that the Atoka gas reservoir beneath lands located in Townships 12, 13 and 14 South and Ranges 35 and 36 East, N.M.P.M., Lea County, New Mexico, qualifies as a "Tight Formation".

The producing Atoka zone is primarily a sand zone. The matrix is characterized as being very fine-grained with porosities ranging from 52 to 118. The formation is highly cemented and the producing interval is encountered at an average depth of 12,600 feet.

The operator in the Bettenbough Atoka Zone gas well has conducted both drill stem tests and reservoir buildup pressure surveys on his wells. The results of the pressure surveys show the average in-situ gas permeability throughout the Atoka section averages 0.027 millidarcies and is not expected to exceed 0.1 millidarcy. The results of the pressure surveys together with all pertinent data are summarized on Exhibit fig. 1. The individual Horner calculations, data and buildup curves are included as sub-parts to Exhibit No. 1.

The stabilized production rates, against atmospheric pressure of wells completed for production in the Atoka zone at 12,600 feet without stimulation, are not expected to exceed a maximum of 403 MCF of gas per day; and after stimulation with acid, the maximum flow rate of gas is not expected to exceed 1215 MCFD.

Exhibit No. 2 is a summary of gas production of the Bettenbough Atoka (Gas) Pool. Individual graphic presentation of the production history is not included.

The liquid hydrocarbons produced at the surface do not exist as liquid in the Atoka gas reservoir. A recombination of the separator fluids was not conducted to verify the Dew-Point pressure; however, an analysis of the produced gas and the Horner pressure buildup surveys in the Bettenbough No. 1 Well suggest that above a reservoir pressure of 3560 psig all fluids exist in a single gas phase. As the reservoir pressure declines, a reduction in gas production rates occurs as the retrograde condensation phenomena occurs when the reservoir pressure passes through the Dew-Point pressure. At some future date a form of artificial lift will probably be required to remove the retrograde liquids from the well bore and tubing to have sustained gas production.

Exhibit 3 is a Well Data Table and includes all pertinent well information. The casing design of the wells drilled and completed indicates that the fresh water aquifers in the area as required by rules and regulations of the New Mexico Conservation Commission have been fully protected.

Santo Rosa - 310-400 Ocallato - 900-1200 13 1/8 - 369 camented w/ 400 SKE 95/2 - 4000' 1 3400 SKE

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EXHIBIT 1 A
YATES BETENBOUGH NO. 1
DRILL STEN TEST APRIL 30, 1980 LEA COUNTY, NEW MEXICO

PRESSURE BUILD-UP ANALYSIS

POINTS Value	9777777 7677777	SLOFE PSI/CYC	K (MDS)	P I M/D/PSI	COMPL. EFF., %	SIBHP	AVG. P PS1G
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[©] CORRECTED FOR AFTERFLOW CORRECTED FOR SUPERPOSITION

CORRECTED PRESSURE (PSI)
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CORRECTED PRESSURE (PSI)

EXHIBIT 1 A

EXHIBIT 1-B YATEG SETERBOUXH NO. 1 REGERVOIR BUILDUP AUGUST 15-25, 1980 LEA COUNTY, NEW MEXICO

PRESSURE BUILD-UP ANALYSIS

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. CORRECTED FOR AFTERFLOW

es CORRECTED FOR SUPERPOSITION

CORRECTED PRESSURE (PSI)

EXHIBIT L B

EXHIBIT 1 C
HEYCO SUPERIOR 19 NO. 1
DRILL STEM TEST SEPTEMBER 17, 1980
LEA COUNTY, NEW MEXICO

PRESSURE BUILD-UP ANALYSIS

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CORRECTED FOR AFTERFLOW CORRECTED FOR SUPERFOSITION

CORRECTED PRESSURE (PSI)

EXHIBIT 2 PRODUCTION SUMMARY BETTENBOUGH NO. 1 WELL (ATOKA ZONE) LEA COUNTY, NEW MEXICO

Choke Size	Gas-MCFD	Condensate Barrels	Water Barrels	Flowing Tubing Pressure psig	Line Pressure psig
and a second		00	2.4	350	110
					100
32/64"	765	29	23		
		••	o.c	250	100
					100
32/64"					100
32/64"	76 5				100
32/64"					100
32/64"	765				100
32/64"	765				100
32/64"	803				100
32/64"	803				100
	803	39			100
	803	39			100
	803	39			
		39	18		100
			16		100
			20		100
			12	350	100
			6	900	110
				800	100
				650	100
				000	100
				500	190
25/64	0.70	30	-		
OA LCAN	017	44	15	550	100
				500	100
				500	100
	32/64" 32/64" 32/64" 32/64" 32/64" 32/64" 32/64"	Size Gas-MCFD 32/64" 765 32/64" 765 32/64" 765 32/64" 765 32/64" 765 32/64" 765 32/64" 803 32/64" 803 32/64" 803 32/64" 803 32/64" 803 32/64" 803 32/64" 803 32/64" 803 32/64" 803 32/64" 803 32/64" 803 32/64" 803 32/64" 803 32/64" 804 32/64" 804 32/64" 804 32/64" 804 32/64" 804 32/64" 804 32/64" 808 32/64" 809 32/64" 809 32/64" 809 32/64" 809 32/64" 809	Size Gas-MCFD Barrels 32/64" 765 29 32/64" 765 29 32/64" 765 29 32/64" 765 39 32/64" 765 39 32/64" 765 23 32/64" 765 30 32/64" 803 30 32/64" 803 39 32/64" 803 39 32/64" 803 39 32/64" 803 39 32/64" 803 39 32/64" 803 39 32/64" 803 39 32/64" 803 39 32/64" 803 39 32/64" 803 39 32/64" 803 39 32/64" 804 40 32/64" 826 63 32/64" 834 40 32/64" 872 54 <td< td=""><td>Size Gas-MCFD Barrels Barrels 32/64" 765 29 34 32/64" 765 29 25 32/64" 765 29 25 32/64" 765 33 16 32/64" 765 39 25 32/64" 765 23 16 32/64" 765 23 16 32/64" 803 30 25 32/64" 803 30 26 32/64" 803 39 20 32/64" 803 39 20 32/64" 803 39 21 32/64" 803 39 20 32/64" 803 39 20 32/64" 803 39 20 32/64" 803 39 20 32/64" 803 39 20 32/64" 826 63 16 32/64" 834</td><td>Size Gas-MCFD Barrels Water Barrels Tubing Pressure Psig 32/64" 765 29 34 350 32/64" 765 29 25 350 32/64" 765 29 25 350 32/64" 765 39 25 350 32/64" 765 39 25 350 32/64" 765 39 25 350 32/64" 765 23 16 350 32/64" 765 23 16 350 32/64" 765 23 16 350 32/64" 803 30 26 325 32/64" 803 30 26 325 32/64" 803 39 20 300 32/64" 803 39 20 300 32/64" 803 39 20 300 32/64" 803 39 20 300</td></td<>	Size Gas-MCFD Barrels Barrels 32/64" 765 29 34 32/64" 765 29 25 32/64" 765 29 25 32/64" 765 33 16 32/64" 765 39 25 32/64" 765 23 16 32/64" 765 23 16 32/64" 803 30 25 32/64" 803 30 26 32/64" 803 39 20 32/64" 803 39 20 32/64" 803 39 21 32/64" 803 39 20 32/64" 803 39 20 32/64" 803 39 20 32/64" 803 39 20 32/64" 803 39 20 32/64" 826 63 16 32/64" 834	Size Gas-MCFD Barrels Water Barrels Tubing Pressure Psig 32/64" 765 29 34 350 32/64" 765 29 25 350 32/64" 765 29 25 350 32/64" 765 39 25 350 32/64" 765 39 25 350 32/64" 765 39 25 350 32/64" 765 23 16 350 32/64" 765 23 16 350 32/64" 765 23 16 350 32/64" 803 30 26 325 32/64" 803 30 26 325 32/64" 803 39 20 300 32/64" 803 39 20 300 32/64" 803 39 20 300 32/64" 803 39 20 300

EXHIBIT 3
WELL DATA
ATOKA GAS SAND GAS POOL
LEA COUNTY, NEW MEXICO
Ralph H. Viney & Associates, Inc.
Engineering Consultants

Harvey E. Yates Company	Wildcat	Field Operator
s Betenbough =1	Lea County	County Lease Name and Well Number
Unit C, 660 FNL, 1930 FWL, Sec. 32 T-13-S, R-36-E		Legal Description
3975' GI		Elevation
6-19-80		Date of Completion
14,000° 13,478°		Total Depth and Plug Back
13-3/8" 9-5/8" 5-1/2"		Size
4,600 13,150		Casing Record Depth C
400 Sx 3400 Sx 2100 Sx		Cement
Atoka		Producing Zone
111111		פַּי

Initial Potential Test Data

6-18-1980	Date
1/2"	Choke Size
24 Hours	Test Interval
832	Gas MCFD
13	Condensate BOPD
ı	Gas-Oil Ratio
28	Water
120	Tubing Pressure
1	Bottom Hole Pressure
Pkr.	Casing Pressure

GAS POOL V MEXICO ociates, Inc. sultants

	Casing Rec		Producing	D C	to a carry a sta
k Size	Depth	Cement	Zone	Perforated Interval	Well Stimulation
13-3/8" 9-5/8" 5-1/2"	369' 4,600' 13,150'	400 Sx 3400 Sx 2100 Sx	Atoka	12,315-331'(68 Holes) 12,539-553'(64 Holes) 12,637-642'(24 Holes) 12,855-860'(24 Holes) 12,873-900'(112 Holes)	12855-12900' Acidized w/1000 gal 7½8 Ms. 12539-12642' Acidized w/1000 gal 7½8 Ms. 12315-12331' Acidized w/1000 gal 7½8 MS. 12315-12900' Acidized w/7500 gas 7½8 Ms. 3 stages 60/40 block; 1000 SCF N ₂ /bbl. DST(Atoka)12275'-347' open 1 hr 29 min rec. 102 MCF, HP 5799-581 FP 127.6-172.3# 1.5 h FSIP 3974.5#, BHT

t Data
Flowing Pressure
Bottom Hole
Pressure Test ter VPD Casing Condensate Tubing Gas Pressure Pressure API Air = 128 45.3 120 Pkr. 0.733

SOUTHWESTERN LABORATORIES

1703 West Industrial --- P. O. Box 2150 MIDLAND, TEXAS 79701
{915} 683-3348

FRACTIONAL ANALYSIS REPORT

				DATE RECEIVED
SAMPLE MARKED	Heyco Betc	nbough #1 G	as Sales Line	C-1950-G
-	100 peiq e	70° P.	LAB. NO. 44425	
SAMPLE FROM	Harvey C,	Atos Co.	DATE SECURED 8-15-80	
DATE OF BURY	8-18-80			SICUMO BY Tefteller
COMPONENT	MCA. %	0. P. M.	HEALD AOF #	
Isygen fitrogen arbon Diaside Sethane Thane ropane Eurone Pentane Pentane exones	3.61 0.60 77.26 9.59 5.19 0.92 1.73 0.47 0.42 0.04	2,557 1,424 0,300 0,544 0,172 0,152 0,016		CONDENSATE VALUES, G.P.IA. ——————————————————————————————————
epianes & Hisavler	0.17	0.078		SULPHUR CONTENT, Grains For 100 Cu. Ft. * Hydrogen Sulfide
ydrogen Sulfide etium ydzogen arbon Monoalde	*None Det.			Mercaptans SPECIFIC GRAVITY* Colculated from % Composition 0.733
OTALS	100.00	5.243	-	*14,696 lbs./sq. in., 60* F

MARKS

Propane + GPM - 2.686

*Determined on laboratory sample.

læ Harvey E. Yates Co., Inc. læ Tefteller, Inc.

Lary M. Burch
SOUTHWESTERN LABORATORIES

EXHIBIT 4

ENERGY AND MINERALS DEPARTMENT OIL COMSERVATION DIVISION

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION DIVISION FOR THE PURPOSE OF CONSIDERING:

CASE NO. 7085 Order No. R-6537

APPLICATION OF HARVEY D. YATES COMPANY FOR DESIGNATION OF A TIGHT FORMATION, FEA COUNTY, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 9 a.m. on November 12, 1980, at Santa Fe, New Mexico, before Examiner Richard L. Stamets

NOW, on this 17th day of December, 1980, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

- (1) That due public notice having been given as required by law, the Division has jurisdiction of this cause and the subject matter thereof.
- (2) That the applicant, Harvey E. Yates Company, requests that the Division in accordance with Section 107 of the Natural Gas Policy Act, and 18 C.F.R. §271.703 recommend to the Federal Energy Regulatory Commission that the Atoka formation underlying the following lands situated in Lea County, New Mexico, hereinafter referred to as the Atoka formation, be designated as a tight formation in said Federal Energy Regulatory Commission's regulations:

TOWNSHIP 12 SOUTH, RANGE 35 EAST, NMPH Sections 33 through 36: All

TOWNSHIP 12 SOUTH, RANGE 36 EAST, NMPM Section 31: All

CHERGY AND MINERALS DEPARTMENT OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION DIVISION FOR THE PURPOSE OF COMSIDERING:

CASE NO. 7085 Order No. R-6537

APPLICATION OF HARVEY L. YATES COMPANY FOR OUSIGNATION OF A TIGHT FORMATION, LEA COUNTY, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

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- (2) That the applicant, Harvey E. Yates Company, requests that the Division in accordance with Section 107 of the Natural Gas Policy Act, and 18 C.F.R. §271.703 recommend to the Federal Energy Regulatory Commission that the Atoka formation underlying the following lands situated in tea County, New Mexico, hereinafter referred to as the Atoka formation, be designated as a tight formation in said Federal Energy Regulatory Commission's regulations:

TOWNSHIP 12 SOUTH, RANGE 35 EAST, NAPA Sections 33 through 36: All

TOWNSHIP 12 SOUTH, RANGE 36 EAST, NMPM Section 31: All

TOWNSHIP 13 SOUTH, RANGE 35 EAST, NAPH Sections 1 through 4: All Sections 9 through 16: All Sections 21 through 28: All Sections 33 through 36: All

TOWNSHIP 13 SOUTH, RANGE 36 EAST, NMPH Sections 6 and 7: All Sections 18 through 20: All Sections 29 through 32: All

IOWNSHIP 14 SOUTH, RANCE 35 EAST, NMPM Sections 1 through 4: All Sections 2 through 16: All Sections 21 through 24: All

TOWNSHIP 14 SOUTH, RANGE 36 CAST, HMPH Sections 5 through 7: All Sections 18 and 19: All

Containing a total of 37,760 acres, more or less.

- (3) That the Atoka formation underlies all of the above described lands; that the formation consists of shales interspersed with thin lime and sand sections; that the top of such formation is found at an average depth of 12,200 feet below the surface of the area set out in finding No. (2) above; and that the thickness of such formation is from 700 to 900 feet within said area.
- (4) That the type section for the Atoka formation for the proposed tight formation designation is found at a depth of from approximately 12,230 feet to 12,970 feet on the Gamma-Ray-Neutron log dated May 18, 1980, from the Harvey E. Yates Company Betenbough Ne. 1 Well located in Unit C of Section 32, Township 13 South, Range 36 East, Lea County, New Mexico.
- (5) That the following described well produces natural gas from the Atoka formation within the proposed area:

Harvey E. Yates Company Betenbough #1

660 feet from North line and 1980 feet from West line of Section 32, Township 13 South, Range 36 East, N.M.P.M., Lea County, New Mexica.

Case No. 7085 Order No. R-6537

- (6) That the Atoka formation underlying the above described lands has been penetrated by several other wells, none of which produced natural gas in commercial quantities from the Atoka formation.
- (7) That the evidence presented in this case demonstrated that no well formerly or currently completed in the Atoka formation within the proposed area exhibited permeability, gas productivity, or crude oil productivity in excess of the following parameters:
 - (a) average in situ gas permeability throughout the pay section of 0.1 millidarcy; and
 - (b) stabilized production rates, without stimulation, against atmospheric pressure, as found in the table set out in 18 C.F.R. §271.703(c)(2)(B) of the regulations; and
 - (c) production of more than five barrels of crude oil per day.
- (8) That based on analysis of available data from existing wells within the proposed area and utilizing generally and customarily accepted petroleum engineering techniques and measurements:
 - (a) The estimated average in situ gas permeability throughout the pay section of the Atoka formation is expected to be 0.1 millidarcy or less; and
 - (b) The stabilized production rate, against atmospheric pressure, of wells completed for production in the Atoka formation, without stimulation, is not expected to exceed production levels determined by reference to well depth, as found in the table set out in 18 C.F.R. §271.703 (c)(2)(8) of the regulations; and
 - (c) No well drilled into the formation is expected to produce, without stimulation, more than five barrels of crude oil per day.
- (9) That within the proposed area there are two recognized aquifers being the Ogallala, found at depths of from 300 feet to 400 feet, and the Santa Rosa, found at depths of from 900 feet to 1200 feet or approximately 11,000 feet above the Atoka formation.

- (10) That existing State of New Mexico and Federal Regulations relating to casing and cementing of wells will assure that development of the Atoka formation will not adversely affect said aquifers.
- (11) That the Atoka formation, or any portion thereof, as described herein, is not currently being developed by infilt drilling as defined in 18 C.F.R. §271.703(b)(6) of the regulations.
- (12) That the Atoka formation within the proposed area should be recommended to the Federal Energy Regulatory Com-mission for designation as a tight formation.

11 15 THEREFURE ORDERED:

(1) That it be and hereby is recommended to the federal Energy Regulatory Commission pursuant to Section 107 of the Natural Gas Policy Act of 1978, and 18 C.F.R. §271.703 of the regulations that the Atoka formation underlying the following described lands in Lea County, New Mexico, be designated as a tight formation:

TOWNSHIP 12 SOUTH, RANGE 35 EAST, NAPM Sections 33 through 36: All

TOWNSHIP 12 SOUTH, RANGE 36 EAST, NMPM Section 31: All

TOWNSHIP 13 SOUTH, RANGE 35 EAST, NMPM Sections 1 through 4: All Sections 9 through 16: All Sections 21 through 28: All Sections 33 through 36: All

ISWNSHIP 13 SOUTH, RANGE 36 EAST, NHPM Sections 6 and 7: All Sections 18 through 20: All Sections 29 through 32: All

TOWNSHIP 14 SOUTH, RANGE 35 EAST, NAPM Sections 1 through 4; All Sections 9 through 16: All Sections 21 through 24: All

TOWNSHIP 14 SOUTH, RANGE 36 EAST, NMPM Sections 5 through 7: All Sections 18 and 19: All

Case No. 7085 Order No. R-6537

Containing a total of 37,760 acres, more or less.

(2) That jurisdiction of this cause is hereby retained for the entry of such further orders as the Division may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW HEXICO

O)L CONSERVATION DIVISION

JOE D. RAMEY

Director

SEAL

fd/

ATOKA PENETRATION IN PROPOSED TIGHT GAS CLASSIFICATION AREA

Lea County, New Mexico

Prepared by Ray F. Nokes, Reservoir Engineer Harvey E. Yates Company

February 1, 1982

	ISIP 1115#/30 mins; FSIP 1376#/2 hrs, 15 mins.				λ
No tsts rec'd in Atoka	2 (2 K)	No tets rec'd in Atoka	DST fr 11,521-580'; op 3 hrs. GTS in 1 hr, 38 mins.	No tsts rec'd in Atoka	63 61 63 6
3997' GL	4056' GL & 4075' KB	4057' GL	4113' GL	4118, 01	Elevation:
T/Atoka @ 12,072'	T/Atoka @ 12,390'	1/Atoka @ 12,456'	T/Atoka NR	T/Atoka 9 11,563'	Formation:
NA	NA	N.A.	N.A.	\$ \$	
13-3/8" to 380' w/420 sx 8-5/8" to 4589' w/1900 sx	13-2/8" to 384' w/425 sx 9-5/8" to 4530' w/1100 sx	11-3/4" to 400' w/325 sx 8-5/8" to 4520' w/600 sx	13-3/8" to 319' w/280 sx 5-5/8" to 4409' w/2600 sx 5-1/2" to 11,830' w/350 "	11-3/4" to 405' w/400 sx 8-5/8" to 4300' w/500 sx 5-1/0" to 13,525' w/750 "	Clobage
NA NA	NA NA	NA	'ປ ອ ນ	13,156-204' Devonian	9685°6
NA	NA	P. N.	ਾਹ ਲ ਨਾ	1.00 mg (*)	Top of Pays:
NA	NA	KX.	11,831'	13,210	10 13 13 13 14
13,476'	15,038'	13,500'	14,440'	13,652	Total Depth:
1980' FNL & 660' FWL Sec 4, T-135, R-36E Lea Co., NM	660' FNL & 1980' FEL Sec 19, T-145, R-35E Lea Co., NM	1980' FSL & 660' FWL Sec 8, 7-145, 8-35E Lea Co., NM	560' FSI, & 660' FWL Sec 17, T-135, R-35E Lea Co., NH	1950' ENL & 660' ENLS Sec 6, T-135, R-35 E 120 Co., NM	Location:
9-27-79/P & A	7-17-69/P & A	11-7-74/P & A	6-2-51/P & A	A 6-11-71/5 & A	Completed or F & .
8~1-79	4-19-69	9-12-74	11-13-50	0) - 00 - 1 - 1	Spudded:
State "4" #1 Adobe Oil & Gas	State H "A" Com #1 Amerada Hess	Estacado Unit #1 Union Gil of CA	Seth Alston #1 Sharples Oil Corp.	Shell State =1 Union Texas Petro.	Operator:

						Posts:	Elevation:	Formation:	Tubing:	Casing:	रिवर्धा है।	Top of Pay:	78 20 ±	Total Depth:	Cocation:	Completed or P G A:	ತ್ರಾಬಡೆದೆಂದೆ :	Operator:	WELL HAVE
						No tots repid in Atoka	3962 ° GI	T/Acoka 3 12,093'	ig.	12-3/4" to 406' w/400 sx 8-5/3" to 4525' w/325 "		NA NA	27. 23.	14,500'	1650' FSL & 2310' FBL Sec 11, T-138, R-36E Loa Co., NM	5-9-69 D & A	3-39-60	Freebort 011	3cate *1
(Smplr: 1.2 CFTG + 1000 cc GCM 0 400#) 100 min ISIP 4009#, PP 2267-484#, 3 hr FSIP 4009#, HP 6368-6368#.	HP 5799=5799#. BHT 174 Deg	100#) 90 min ISIP 3878#, FP		OP 90 min, rec 558' GCDF	12,275-3	<pre>IPF (Atoka): 832 MCFGPD, GR .733, GOR 416,000, 120#.</pre>	3992' GL	T/Atoka @ 12,2741	2-3/8" to 12,257'	13-3/8" to 369' w/350 sx 9-5/8" to 4600' w/3400 " 5-1/2" to 13,150' w/2100	12,315-900' Atoka	12,315'	13,050'	14,780'	360' FNL & 1980' FWL Sec 32, T-135, R-36E Lea Co., NM	6-18-80 Comp.	/3-6-80	Harvey E. Yates Co.	Heyer Dotenbough #1
	Q 四.	אר ער ער אר				Form tstr (Atoka): See . Dresser Atlas Rep.	3945' GL	T/Atoka @ 12,204' Appr.	NA	13-3/8" to 367' w/400 sx 8-5/8" to 4611' w/2150 " 5-1/2" to 14,587' w/1405	W.	NA NA	14,415'	, 14,6181	660' FSL & 990' FEL Sec 33, T-138, F-36E Lea Co., NR	NA P	6-13-81	Harvoy E. Yates Co.	McDonald Chic =1
				Sinclair Oil & Gas	*Oriq operated by	No tsts rec'd in Atoka	3944' GL .	T/Atoka MA	NA	13-3/8" to 339' w/300 sx 9-5/8" to 4614' w/1500 " 5-1/2" to 11,106' w/450	NA	NA	10,875' CIBN	13,047'	660' FN & WL Sec 2, T-14S, R-36E Lea Co., MM	Re-en 11-12-65; P & A 1-28-66	7-23-52	Moran Oil *	Fenshaw #1
			; ;*3			No tsts rec'd in Atoka	3951' DF	T/Atoka NA	NA	13" to 388' w/350 sx 9" to 4668' w/3700 "	A KEE	NA	NA.	15,115'	2310' FNL & 330' FEL Sec 3, T-14S, R-36E Lea Co., NM	6 12-31-57 P & A	8-12-57	Zapata, Petrol, et al	Danglade #1

	93#, 120 min FSIP 139#, HP 6082-5961#.			76+. BHT 1	
DST (Atoka): 12,764-850'. Pkr failed.	12,516-	No tsts rec'd in Atoka	No tsts rec'd in Atoka	DST: 12,608-882'. Op 3 hrs, ked 120' M. Fr 2795-872%, 4 hr FSIP 2617%,	Pests:
3954' GL	3945' GL	3944' GL	3959' GE	3966, CT	Elevation:
T/Atoka @ 12,306'	T/Atoka @ 12,333'	% 12,310'	T/Atoka @ 12,326'	7/Acoka @ 12,328'	Formation:
NA.	NA	N,	N. Y.	33	Fubing:
13-3/8" to 37!' w/450 sx 8-5/2" to 4640' w/1880 " 5-1/2" to 13,831' w/1300	13-3/8" to 389' w/425 sx 8-5/8" to 4675' w/2200 " 5-1/2" to 13,876' w/1750	13-3/8" to 366' w/450 sx 9-5/8" to 4661' w/1600 " 5-1/2" to 13,770' w/1600	13-3/8" to 395' w/400 sx 8-5/8" to 4600' w/1630 "	13-3/8" to 388' w/400 sx 8-5/8" to 4608' w/1630 " 8-1/2" to 14,000' w/1750	Casing:
13,397-460' Miss	13,288-373' Miss	13,199-261' Miss	ž.	13,360~391' Miss.	100H.5.
13,397'	13,288'	13,199'	גא	13,360'	ाठ्य ०६ स्थ्रः
13,520'	13,400'	13,687'	Š	13,478	70 E E E E E E E E E E E E E E E E E E E
13,832'	13,875'	13,770'	13,670'	14,0001	Total Tepth:
1980' FNL & 660' FEL Sec 17, T-145, R-36E Lea Co., NM	1980' FN & WL Sec 16, T-14S, R-36E Lea Co., NM	990' FSL & 660' FWL Sec 16, T-145, R-36E Lea Co., NM	1980' FSL & 660' FBL Sec 8, T-148, R-36E lea Co., NE	1650' FSL & 1980' FWI Sec 8, T-148, E-36E Lea Co., NN	Location:
3-26-79 Comp.	9-11-79 Comp.	4-29-78 Comp.	6-28-80 P & A	7-20-79 Comp.	Completed or 7 & A.
1-10-79	6-1-79	2-18-78	4-29-80	3-17-79	हा के अपने के किया है। इस के अपने के किया के इस किया किया किया किया किया किया किया किया
Adobe Oil & Gas	Adobe Oil & Gas	Adobe Sil & Gas	Harve∳ E. Yates Co.	Harvey E. Yabes Co.	Operator:
Hannah #1	State "16" #2	State "16" #1	Austin-Wonteith #2	Austin-Montgith #1	WELL NAME

	Pests:	Elevation:	Formation:	Tubing:	Casing:	100 Kth 15 ::	Top of Pay:	: 01.84	Total Depth:	Location:	Completed or 1 v	Spudded:	Operator:	WELL NAME
	No tsts rec'd in Atoka	39791 DE	T/Atoka NA	NA.	13-3/8" to 392' w/375 sx 9-5/8" to 4650' w/710 " 7" to 13,425' w/590 "	13,194-286' Miss	13,194'	13,290	14,796'	560' FS & WL Sec 17, 7-145, 8-36E Lea Co., NM	7-22-57 Comp.	11-12-56	Phillips Pet.	Austin Unit #1
	No tsts rec'd in Atoka	3962' GL	2/Atoka @ 12,320'	N.F.	13-3/8" to 395' w/400 sx 8-5/8" to 4630' w/2700 " 5-1/2" to 13,830' w/1200	13,228-258' Miss	13,228	NA	13,830'	1980' FW & WL Sec 17, T-148, R-36E Lea Co., NM	4-16-80 Comp.	2-13-80	Southern Union Explor.	State "17" *1
cushion + 568' mud w/NS. 60 min ISIP 4000#, FP 2014- 2212#, 215 min FSIP 4047#, HP 6262-6262#. Perf (Atoka): 12,782-786' w/4 jspf. A w/2000 gals, swb load, PB to 12,700'.	DST (Atoka): 12,724-877'.	3954' GL	T/Atoka @ 12,538'	NA	13-3/8" to 383' w/450 sx 8-5/8" to 4650' w/2500 " 4-1/2" to 13,160' w/575 "	NA	NA	NĀ	13,550	1980' FN & EL Sec 20, T-145, R-36E Lea Co., NM	1-12-81 Р 8 Л	10-17-80	Adobe Oil & Gas	Head State #1
	No tsts rec'd in Atoka	3923' GI	T/Atoka NA	NA	13-3/8" to 389' w/400 sx 9-5/8" to 4772' w/2664 "	NA	AN	NA	15,100'	660' FSL & 1980' FEL Sec 22, T-145, R-36E Lea Co., NM	5-7-79 F & A	2-17-79	Wm. K. Young	Torry, et al #1
	No tsts rec'd in Atoka	3967' GL	T/Atoka @ 12,050'	1 NA 1 1 1 2	13-3/8" to 435' w/425 sx 8-5/8" to 4600' w/2050 "	NG.	N.P.	NA A CAR	14,081'	600' FNL & 990' FEL Sec 35, T-12S, R-36E Lea Co., NK	12-5-77 P & A	9-29-77	Hilliard Oil 5 Gas	Phillips State #1

Permeability Calculation for the McDonald Unit #1 660' FSL & 990' FEL, Sec 33, T-13S, R-36E

Lea Co., MM

Prepared by Ray F. Nokes, Pepervoir Engineer

- HARVEY E. YATES COMPANY

February 1, 1982

Formation: Atoka

Lithology: Sandstone

Sw calculated by Humble Equation

K calculated by Morris-Biggs Equation

 $R_W = .133 \, 0.74$ beg P for the HEYCO Beten-

bough #1

 $R_W = .059 @ 174 Deg F Corrected$

Depth	RT ohms	Crossplot Ø in %	S _w in
12,198*	174.2	9.7	17.79
12,1991	337.0	7.9	15.95
12,200'	762.9	5.9	14.51
12,201	1305.2	5.5	11.96
12,202	1911.6	4.6	11.98
12,203	1636.4	4.9	12.10
12,204'	1108.6	5.9	12.04
12,205'	1176.6	4.1	17.28
12,206'	756.1	4.6	19.05
12,207'	119.1	8.1	26.12
12,208'	39.8	13.5	26.10
12,209'	29.3	1.4.9	27.35
12,210'	40.6	1.3.5	25.84
12,211'	88.0	11.2	21.36
12,212'	165.5	18.9	8.9
12,588'	177.3	9.3	18.46
12,5891	273.1	6.2	23.00
12,590'	261.5	5.7	25.72
13,591'	311.0	5.9	22.73
12,592'	342.7	6.6	19.19
12,593'	333.6	7.0	18.26
12,594'	319.4	7.7	16.85
12,595'	351.0	5.3	24.00
12,596'	548.7	4.3	24.04
12,597'	635.5	5.8	16.19
12,598	408.9	6.7	17.29
12,599'	337.2	7.3	17.36
12,600'	323.3	9.4	13.51
12,601	311.6	9.3	13.92
12,602'	370.9	9.4	12.61
12,603'	284.1	11.1	12.05
12,604'	119.9	11.6	17.70
12,605'	104.4	7.1	32.15
12,606'	242.1	4.9	31.45
12,607'	806.6	4.6	18.44
12,608	526.0	7.4	13.70
12,609'	403.6	7.9	14.58
12,610	434.3	6.8	16.51
12,611'	677.1	6.9	13.02
12,612'	1001.2	7.0	10.54

Depth	RT	Crossplot	Sw in
	olus	Ø in 3.	9.
12,733'	47.1	8.5	39.44
12,734'	180,6	6.4	27.33
12,735'	179.8	6.4	21.96
12,736	225.3	6.4	24.47
- 12,737'	261.9	5.4	27.24
12,738'	240.9	7.0	21.49
12,739'	130.4	8.5	23.71
12,740'	110.5	8.8	
12,741'	143.5	8.0	24.81
12,742'	153.0	7.4	24.12
12,743'	137.0	8.3	25.40
12,744'	159.6		23.73
12,745'	168.9	8.6 7.8	21.16
12,746'	144.2		22.85
12,747'	146.9	8.6 10.3	22.26
12,748'	173.8		17.27
12,749'	230.7	11.3	15.12
12,750'	297.4	10.0	14.97
12,751'	239.1	8.7	15.31
12,752	167.9	10.7	13.67
12,753	160.2	9.6	18.33
12,754'	212.0	8.8	20.60
12,755'	253.9	6.2	26.10
12,756'	224.1	7.5	19.44
12,757'	238.2	6.9	22.63
12,758'	266.4	7.8	19.24
12,759'	279.1	6.4	22.50
12,760'	298.3	4.8	29.95
12,761'	242.0	4.9	28.34
12,762	185.3	7.3	20.49
12,763'	163.1	8.7	19.40
12,764'	the second secon	8.8	20.42
12,765'	145.5	8.7	21.89
12,766	129.8	9.4	21.32
12,7671	130.3	8.1	24.98
12,768'	133.6	7.6	26.41
12,7691	132.2	7.9	25.47
12,770'	143.5	9.3	20.52
12,771	213.1	7.3	21.84
12,772'	333.9	5.8	22.34
12,773'	199.1	9.0	18.04
12,774'	108.4	11.6	18.61
12,775!	95.9	9.5	24.53
12,7761	112.7	6.8	32.41
12,777'	132.7	7.7	26.13
12,778'	129.8	9.0	22.34
12,779'	113.5	8.9	24.18
12,780'	109.4	10.9	19.81
12,781'	112.5	11.5	18.44
12,782'	118.4	11.0	18.86
12,783'	128.8	9.4	21.41
12,784"	90.8	9.1	26.40
	43.5	9.3	37.26

Atoka Pay: 12,198' to 12,784'

Average Porosity = 8.11%

Average $S_W = 20.85$ %

Average Permeability = .0418 md

Equations: Humble

$$S_{W} = \sqrt{\frac{.62}{\cancel{0}^{2} \cdot 15} (R_{W})}$$
RT

Morris-Biggs
$$\left(\frac{c \not o^3}{s_{wi}}\right)^2$$

C= 250 for Oil 80 for Gas

. 142

HALLIBURTON DIVISION LABORATORY

HALLIBURTON SERVICES
MIDLAND DIVISION
HOBBS, NEW MEXICO 88240

LABORATORY WATER ANALYSIS

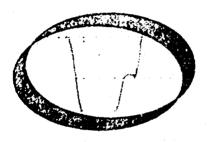
No. W82-082

To Harvey E. Yates	e de la companya del la companya de	gan di magan asawa () militi () an () again Milita () mil	Date	1-21-82
Box 1933 Roswell, New Mexic		or d of la cours and Com	or any part thereof re isclosed without first aboratory management se of regular business	y of Halliburton Company and neither or a copy thereof is to be published securing the express written approva- nt; it may however, be used in the soperations by any person or concern eceiving such report from Halliburton
Submitted by		omen and an extension of the last of the l	Date Rec.	1-21-82
Well No Betenbaugh #1	Depth	er en	Formation.	Atoka
CountyLea	Field Mellona	ald	Source	
Resistivity	0.133 @ 74°F.			
Specific Gravity	1.041	and the second of the second o		
pH	6.6			
Calcium (Ca)	3,150	en e		*MPL
Magnesium (Mg)	Nil			·
Chlorides (CI)	32,000	to the state of th	n the spina application design to replace the completion of the co	
Sulfates (SO ₄)	1,400	The state of the s		
Bicarbonates (HCO ₃)	1125			
Soluble Iron (Fe)	XII			
		Section 1995 Annual Conference of the Conference		
		and the contract of the contra	and the second s	
Remarks:			5 738%	*Milligrams per liter
	Ŗ	ECENED '	() · R 11 	
	Respect	fully submitted,		·
Analyst: Brewer		• •	HALLIBURTON	COMPANY
cc:		ву	CHEM	Senser 15T

NOTICE

THIS REPORT IS LIMITED TO THE DESCRIBED SAMPLE TESTED. ANY USER OF THIS REPORT AGREES THAT HALLIBURTON SHALL NOT BE LIABLE FOR ANY LOSS OR DAMAGE, WHETHER IT BE TO ACT OR OMISSION. RESULTING FROM SUCH REPORT OR ITS USE.

Formation Testing Service Report



HALLIBURTON SERVICES

RECEIVED BAT 6 600

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FORMATION TEST DATA

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REMARKS: *First interval is equal	l to 11 minute:	s. ** = 18	minutes	. OAS = c	open at	surface	C = cho	ke change		
M = minimum flow pressure		1			•	4		.		

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SPECIAL PRESSURE DATA

11 THE S. SHAPE 21 C. # 724

NOMENCLATURE

b	## Approximate Radius of Investigation .	Feet
Ь,	m Approximate Radius of Investigation (Net Pay Zone h.) 👙 🛒 🗀	Feet
D.R	sz Damage Ratio	##**
El	str Elevation	Feet
GD	zz B.T. Gauge Depth From Surface Reference)	. Feet
h	= Interval Tested	Feet
h.	zn Net Pay Thickness	Feet
K	m Permeability	md
Κ:	zz Permeability From Net Pay Zone h)	md
m	= Slope Extrapolated Pressure Plot (Psi ² /cycle Gas)	psi/cycle
OF.	zz Maximum Indicated Flow Rate	MCF/D
OF,	= Minimum Indicated Flore Rate	MCF/D
OF,	=: Theoretical Open Flow Potential with/Damage Removed Max	MCF/D
OF.	== Theoretical Open Flow Potential with/Damage Removed Min.	MCF/D
P,	== Extrapolated Static Pressure	. Psig.
P,	= Final flow Pressure	Psig.
P .,	== Potentiometric Surface (Fresh Water*)	Feet
Q	= Average Adjusted Production Rate During Test	bbls/day
Q,	== Theoretical Production w/Damage Removed	bbls/day
Q,	and Measured Gas Production Rate	MCF/D
R	== Corrected Recovery	bbls
r	== Radius of Well Bore	. Feet
t '	Flow Time	Minutes
t.	= Total Flow Time	Minutes
T	m: Temperature Rankine	. •R ·
Z	na Compressibility Factor	
יע	≈ Viscosity Gas or Liquid	CP
Log	= Common log	

^{*} Patentiametric Surface Reference to Potary Table When Elevation Not Given, Fresh Water Corrected to 100 %.

ATOKA TIGHT GAS SANDS PRODUCTION

Betenbough #1

Frepared by Ray F. Nokes, Reservoir Engineer HARVEY E. YATES COMPANY

February 1, 1982

Potential test 6-18-80: 832 MCF/2 BO/28 BW on 1/2" ck in 24 hrs.

	Averag	•	ction	
		(Sales)		
Month		BO	MCF	BW
7-80		31	420	30
8-80		43	795	12
9-80		46	754	9
10-80		38	682	8
11-80		30	574	8 -
12~80		27	539	7
1-81		- 33	744	. 9
2-81		17	291	- 6
3-81		15	380	5
4-81		10	324	4
5-81		10	311	4
6-81		11	288	4
7-81		10	247	4
8-81		8	1.97	3
9-81		9	233	3
10-81		8	197	5
11-81		7	203	5
19-91			177	6

Cumulative Production: 9024 BO/188277 MCF/2841 BW

Note: Production reflects effects of stimulation of the Atoka Pormation.

Robert H. Strand, P.A.

Attorney at Law

Practice Limited to Oil and Gas Law

JAN 28 1982

Oll-Telephone (505) 624-0251

Suite 124 - Petroleum Building
Roswell, New Mexico 88201

Please Reply To: P.O. Box 2226

January 27, 1982

Oil Conservation Division Post Office Box 2088 Santa Fe, New Mexico 87501

Case 7491

ATTN: Mr. Richard Stamets

Re:

Application of Harvey E. Yates Designation of Tight Formation

Lea County, New Mexico

Dear Mr. Stamets:

Enclosed for filing is an original and two copies of the Application of Harvey E. Yates Company in the above referenced matter. This case has previously been set for hearing on the February 17, 1982 Docket.

Sincerely yours,

Robert H. Strand

RHS/bjt encls BEFORE THE OIL CONSERVATION DIVISION JAN 28 1982 ENERGY AND MINERALS DEPARTMENT

OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE APPLICATION OF HARVEY E. YATES COMPANY FOR DESIGNATION OF A TIGHT FORMATION LEA COUNTY, NEW MEXICO

Case No. 7471

APPLICATION

COMES NOW HARVEY E. YATES COMPANY by its attorney and respectfully states;

1. Applicant is the owner of an interest in the Atoka Formation underlying the following described lands situated in Lea County, New Mexico:

Township 12 South, Range 35 East, NMPM Sections 31 and 32

Township 13 South, Range 35 East, NMPM Sections 5, 6, 7, 8, 17, 18, 19, 20, 29, 30, 31, 32

Township 14 South, Range 35 East, NMPM Sections 5, 6, 7, 8, 17, 18, 19, 20

Township 12 South, Range 36 East, NMPM Sections 32, 33, 34, 35, 36

Township 13 South, Range 36 East, NMPM Sections 1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 21, 22, 23, 24, 25, 26, 27, 28, 33, 34, 35, 36

Township 14 South, Range 36 East, NMPM Sections 1, 2, 3, 4, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 23, 24

Containing a total of 46, 720 acres, more or less.

2. The Atoka formation underlying the above described lands is expected to have an estimated average in situ gas permeability throughout the pay section of less than 0.1 millidarcy.

- 3. The stabilized production rate, against atmospheric pressure of wells completed for production in said formation, without stimulation, is not expected to exceed the production levels set out in 19 C.F.R. §271.703 (c)(2)(B).
- 4. No well drilled into said formation is expected to produce, without stimulation, more than five barrels of crude oil per day.

WHEREFORE, applicant prays:

- A. That this application be set for hearing before an examiner, and that notice of said hearing be given as required by law.
- B. That upon such hearing, the Division enter its order recommending to the Federal Energy Regulatory Commission that pursuant to 18 CFR, Section 271.701-705, the Atoka formation underlying the above described lands be designated a tight formation.

DATED this 217 day of January, 1982.

HARVEY E. YATES COMPANY

7: N

Robert H. Strand

Attorney for Applicant

P.O. Box 2226

Roswell, New Mexico 88202-2226

RHS/bjt

Memo

Drom

FLORENE DAVIDSON
ADMINISTRATIVE SECRETARY

To February 12, 1982 Called in Dry Bob Strand 1/25/52

Harvey E. Yates Company Clasignution of right Formation Atoka Loa 46,720 acres

T125, R35E 531 and 32 T135, R35E 55-8, 17-20, 29-32 T145, R35E 55-8, 17-20 T125, R36E 532-36 T135, R36E 51-5, 8-17, 21-28, 33-36

7145, R 36 E51-4, 8-17, 20-24 OIL CONSERVATION COMMISSION-SANTA FE

STATE OF NEW MEXICO ENERGY AND MINERALS DEPARTMENT OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION DIVISION FOR THE PURPOSE OF CONSIDERING:

> CASE NO. 7491 Order No. R-6537-A

APPLICATION OF HARVEY E. YATES COMPANY FOR DESIGNATION OF A TIGHT FORMATION, LEA COUNTY, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 9 a.m. on February 17, 1982, at Santa Fe, New Mexico, before Examiner Richard L.

NOW, on this _____ day of March, 1982, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

- That due public notice having been given as required (1)by law, the Division has jurisdiction of this cause and the subject matter thereof.
- That the Division on December 17, 1980, entered its order No. R-6537, recommending to the Federal Energy Regulatory Commission that the Atoka Formation, underlying the following described lands situated in Lea County, New Mexico, be designated as a tight formation pursuant to Section 107 of the Natural Gas Policy Act of 1978 and 18 CFR, Section 271.701-705:

TOWNSHIP 12 SOUTH, RANGE 35 EAST, NMPM Sections 33 through 36: All

TOWNSHIP 12 SOUTH, RANGE 36 EAST, NMPM Section 31: All

TOWNSHIP 13 SOUTH, RANGE 35 EAST, NMPM Sections 1 through 4: All Sections 9 through 16: All Sections 21 through 28: All Sections 33 through 36: All

TOWNSHIP 13 SOUTH, RANGE 36 EAST, NMPM

Sections 6 and 7: All

Ø,

Sections 18 through 20: All tions 29 through 32: All

TOWNSHIP 14 SOUTH, RANGE 35 EAST, NMPM Sections 1 through 4: All Sections 9 through 16: All Sections 21 through 24: All

TOWNSHIP 14 SOUTH, RANGE 36 EAST, NMPM Sections 5 through 7: All Sections 18 and 19: All

Containing a total of 37,760 acres, more or less.

- (3) That the Federal Energy Regulatory Commission by its Order No. 138, so designated the Atoka Formation underlying the above described lands as a tight formation.
- (4) That the applicant, Harvey E. Yates Company, requests that the Division in accordance with Section 107 of the Natural Gas Policy Act, and 18 CFR \$271.701-705, recommend to the Federal Energy Regulatory Commission that the Atoka formation underlying the following lands situated in Lea County, New Mexico, which are contiguous to the previously designated lands, hereinafter referred to as the Atoka formation, be designated as a tight formation in said Federal Energy Regulatory Commission's regulations:

WESTERN CONTIGUOUS BREA Township 12 South, Range 35 East, NMPM Sections 31 and 32; All

Township 13 South, Range 35 East, NMPM

Section 5 Through 8: 1711
" 17 " 20: 1711
" 29 " 32: 1711

Voonslip 14 South Runge 34 East, NMPM Section 5 through 8: 1711

EASTERN CONTIGUOUS FREA Voonship 125outh Rouge 36 East, NAPM Section 32 through 36: A11 Voronship B South, Bange 36 East, NMPM Section 14hrough 5: B. // " 8 " 17: A11 " 21 " 28: A11 " 33 " 36: F711

Township 14 South, Range 36 East, NMPM Section 1 through 4: 7711 "8" 17: 811

The entire area containing a Lote/ of 46,720 acres, more or less.

- (5) That the Atoka formation underlies all of the above described lands; that the formation consists of shales interspersed with thin lime and sand sections; that the top of such formation is found at an average depth of 12,200 feet below the surface of the area set out in Finding No. (4) above; and that the thickness of such formation is from 375 to 750 feet within said area.
- (6) That the type section for the Atoka formation for the proposed tight formation designation is found at a depth of from approximately 12,230 feet to 12,970 feet on the Gamma Ray-Neutron log dated May 18, 1980, from the Harvey E. Yates Company Betenbough No. 1 Well located in Unit C of Section 32, Township 13 South, Range 36 East, Lea County, New Mexico.
- (7) That the following wells produce or have produced natural gas from the Atoka Formation within the proposed area:

Harvey E. Yates Company Betenbough #1

660 Feet from North Line and 1980 feet from West line of Section 32, Township 13 South, Range 36 East, NMPM, Lea County, New Mexico.

- (8) That the Atoka formation underlying the above described lands has been penetrated by several other wells, none of which produced natural gas in commercial quantities from the Atoka formation.
- (9) That the evidence presented in this case demonstrated that no well formerly or currently completed in the Atoka formation within the proposed area exhibited permeability, gas productivity, or crude oil productivity in excess of the following parameters:
 - (a) average in <u>situ</u> gas permeability throughout the pay section of 0.1 millidarcy; and
 - (b) stabilized production rates, without stimulation, against atmospheric pressure, as found in the table set out in 18 CFR §271.703(c)(2)(B) of the regulations; and
 - (c) production of more than five barrels of crude oil per day.
- (10) That based on analysis of available data from existing wells within the proposed area and utilizing generally and customarily accepted petroleum engineering techniques and measurements:
 - (a) The estimated average <u>in situ</u> gas permeability throughout the pay section of the Atoka formation is expected to be 0.1 millidarcy or less; and

- (b) The stabilized production rate, against atmospheric pressure, of wells completed for production in the Atoka formation, without stimulation, is not expected to exceed production levels determined by reference to well depth, as found in the table set out in 18 CFR §271.703(c)(2)(B) of the regulations; and
- (c) No well drilled into the formation is expected to produce, without stimulation, more than five barrels of crude oil per day.
- (11) That within the proposed area there are two recognized water aquifers being the Ogallala, found at depths of from 250 feet to 400 feet, and the Santa Rosa, found at depths of from 900 feet to 1200 feet.
- (12) That existing State of New Mexico and Federal Regulations relating to casing and cementing of wells will assure that development of the Atoka formation will not adversely affect said water zones.
- (13) That the Atoka formation, or any portion thereof, as described herein, is not currently being developed by infill drilling as defined in 18 CFR §271.703(b)(6) of the regulations.
- (14) That the Atoka formation within the proposed area, described under Finding (4) above, should be recommended to the Federal Energy Regulatory Commission for designation as a tight formation.

IT IS THEREFORE ORDERED:

(1) That it be and hereby is recommended to the Federal Energy Regulatory Commission pursuant to Section 107 of the Natural Gas Policy Act of 1978, and 18 CFR \$271.701-705 of

The regulations

That the Atoka formation tight gas
formation area recommended by

Division Order No B-6537 and approved

by FERC Order No 138 effective Merch 30, 1981

be extended, bydasjandion

contiguous areas:

WESTERN CONTIGUOUS PREA Township 12 South, Range 35 East, NMPM Sections 31 and 32; All

Township 13 South, Range 35 East, NMPM

Section 5 Through 8: 1711
" 17 " 20: 1711
" 29 " 32: 1711

Voonslip 14 So. th Runge 34 East, NMPM Section 5 through 8: All

EASTERN CONTIGUOUS FREA Voonslip 125outh Rouge 36 East, NMPM Seethon 32 Vhrough 36: A11

Vouship B South, Banje 36 East, NMPM Section 14hrough 5: All "8" 17: All "21" 28: All "33" 36: All

Township 145outh, Range 36 Est, NMPM.
Section 1 Through 4: A11
"8" 17: A11

The entire darea ocontaining a total

1 46720 acres, more or lead

(2) That jurisdiction of this cause is hereby retained for the entry of such further orders as the Division may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year herein-above described.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

Joe D. Ramey Director

CASE 7492: HARVEY E. YATES COMPANY FOR DESIGNATION OF A TIGHT FORMATION, CHAVES COUNTY, NEW MEXICO

DOCKET MAILED

Des 2 5/82