BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
October 8, 1975

EXAMINER HEARING

IN THE MATTER OF:

Application of Robert G. Cox for amendment of Order No. R-4561, Eddy County, New Mexico.

CASE 5571

BEFORE: Richard L. Stamets, Examiner.

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the New Mexico Oil Conservation Commission:	Thomas Derryberry, Esq. Legal Counsel for the Commission State Land Office Building Santa Fe, New Mexico
For the Applicant:	Sumner Buell, Esq. MONTGOMERY, FEDERICI, ANDREWS, HANNAHS & BUELL Attorneys at Law 350 East Palace Avenue Santa Fe, New Mexico
For Atlantic Richfield Company:	Clarence Hinkle, Esq. HINKLE, BONDURANT, COX & EATON Attorneys at Law Hinkle Building Roswell, New Mexico
For Amoco Production Company:	Guy Buell, Esq. Attorney at Law Amoco Production Company P. O. Box 3092 Houston, Texas

I N D E X

EXHIBIT INDEX

MR. STAMETS: We will call at this time Case 5571.

MR. DERRYBERRY: Case 5571, application of Robert G. Cox for amendment of Order No. R-4561, Eddy County, New Mexico.

MR. STAMETS: Call for appearances in this case.

MR. S. BUELL: Mr. Examiner, Sumner Buell appearing on behalf of the applicant and we will have one witness.

MR. STAMETS: Other appearances?

MR. HINKLE: Clarence Hinkle, Hinkle, Bondurant, Cox and Eaton appearing on behalf of Atlantic Richfield as unit operator of the Empire Abo Unit.

MR. DERRYBERRY: Do you have a witness?

MR. HINKLE: We may have one, I'm not sure.

MR. G. BUELL: For Amoco Production Company, I am Guy Buell. And may I move up here, Mr. Examiner, so I will be in the main stream?

MR. STAMETS: Certainly.

MR. G. BUELL: Thank you, sir.

MR. STAMETS: Are there any other appearances in this Case?

I would like to have everyone who will be a witness or who would be a potential witness to stand and be sworn at this time.

(THEREUPON, the witnesses were duly sworn.)

ROBERT G. COX

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

DIRECT EXAMINATION

BY MR. S. BUELL:

Q. Mr. Cox, would you state your name, where you reside and what your profession or occupation is?

A. I'm Robert G. Cox, I office at 4230 LBJ Freeway in Dallas, Texas. I'm a geologist and I'm the designated operator of the one hundred and sixty acre tract which is under consideration. Mr. Ben Scotter is the operator of record and the principal interest holder in the lease.

Q. Have you previously testified before the New Mexico Oil Conservation Commission or one of its examiners and had your qualifications as an expert accepted as a matter of record?

A. Yes, sir, I have.

Q. And are you familiar with what is sought in the application in Case 5571?

A. Yes, sir, I am.

MR. S. BUELL: Are the witness's qualifications acceptable?

MR. STAMETS: They are.

Q. (Mr. S. Buell continuing.) What is sought in this application, please?

A. The applicant asks that the matter be set forth before the Commission, or one of its designated examiners, as the Commission may desire, that Order R-4561 be amended to eliminate the requirement of a continuous multi-shot directional survey and permit the bottom of the well to be approximately eight feet from the west line and approximately fifty-eight feet from the north line of Section 12, Township 18 North, Range 27 East in NPM, Eddy County, New Mexico.

Q. Mr. Cox, as I understand it, the Number 1 Federal EA well is presently in violation of Order R-4561 essentially in two respects. Could you give some background for the Examiner as to why this violation came to pass?

A. Well, first of all, we had a fire in our office last January 11th that destroyed the office complex and all of our files and legal documents which were applicable to this particular Case.

I was advised by the USGS that the lease would expire on July 31st, due to the cancellation of Amoco of there communitization order on this particular one hundred and sixty acre tract and the lease must be completed as a commercial producer by July 31st. At that time under further checking I found that the date was actually August 31st. I had authority to deviate, I forgot the specific details. I forgot the requirement of the multi-shot survey be taken coming out of the hole. In getting the well drilled I was

concentrating on acquiring a contract to get on in sufficient time to protect the participants' investments in the lease.

Q. Would you explain to the Examiner the first phase of this multi-shot problem, why the multi-shot survey was not run in this hole or has not been run to date?

A. Well, as I previously stated, I forgot that I had to run one, but I ran a single-shot survey all the way from thirty-nine hundred where we kicked off to TD. These surveys, single-shot surveys, were taken from fifty to ninety feet apart. The average over the length of the section was seventy-one feet. I was assuming this to be correct because of lease commitments we had to get the equipment and rig lined up as quick as possible for a completion attempt. After equipping the well and turning in the completion reports and we then became aware that we were required to run multi-shot. As it took five to six days to establish production in the well, another well on the lease had failed to resume production when operations were ceased, I was afraid I would lose what production was established.

After being advised that I needed a multi-shot, I called Eastman and told him my problem. They said that the single-shot which was computed on the general method was as good of information as I could get from the multi-shot. They volunteered to run the data derived from the single-shot through their computers and record it on the radius curvature

method, which is a standard method they use in computing the multi-shot survey.

Q. What would be the effect on this well if you were required to run a multi-shot survey at this time?

A. Well, if they required to pull all of the downhole equipment and shut the well in while the survey is being made, we may have trouble reestablishing production or even the present oil production rate. That is what happened to us on the Number 1 when we shut it in before.

Q. Okay. Referring you to what has been marked for identification as Applicant's Exhibit Number One, would you turn to that and briefly explain what this exhibit shows?

A. May I have a copy of it, please? Yes, Exhibit One shows the R. G. Cox, et al, a hundred and sixty acre tract, the surface location of the Number 1 EA well, and the location to the south of the Amoco Number 1 Diamond Federal well drilled in 1973.

It also shows the locations of the offset wells to the west, to the northwest and to the north.

The map is a map on top of what is considered the Abo Reef Porosity Zone.

Q. Referring you to what has been marked for identification as Exhibit Number Two, would you explain what this is and what it shows?

A. This is Eastman Whipstock's certified report of

the subsurface directional survey, the magnetic single-shot, showing pages one through pages four, the depth at which they took off, the course direction and the angles of inclination.

Q. Okay, and this is certified to by Eastman?

A. By Eastman, that is correct.

Q. All right. Showing you what has been marked as Exhibit Number Three, would you briefly explain what this is ?

A. I believe in testimony I said that I had contacted Eastman in regards to the difference between the multi-shot and the single-shot survey and they told me that they generally ran the multi-shot on a radius of curvature, computed on a radius of curvature, and they would take the data derived from the single-shot and feed it into their computers and run us a radius of curvature survey.

The radius of curvature survey, of course, moved us a little bit further back from our lease line, both the north and the west, but this is inconsequential.

Q. Did Eastman indicate to you that the two single-shot surveys and the computations that were involved were as accurate as the multi-shot survey would be?

A. Yes, they would be.

Q. You touched on very briefly the difficulties you anticipate encountering should you be required to pull the

pumping equipment and the downhole equipment on this to run a multi-shot survey. Would you give a little more detail to the Examiner as to what your experience has been with the completion on this lease in this well?

A. On the particular well that we are on now?

Q. The history of this well in trying to get production.

A. When we first reentered the Aztec Number 1, we knocked the plug out at sixty-one ninety-five to sixty-two thirty and we got oil and gas and water production there. We shut it in and came on up the hole to zones that we felt like were more correlative to the zones in the offset wells, and failed to get what we considered commercial production, and went back down and again attempted to and couldn't reestablish oil production from it, we could get gas and water.

Q. So your previous experience with two completions in this area was that once you stopped production the well was essentially watered out?

A. Right.

Q. And you were never able to reestablish oil production?

A. We were never able to establish oil production.

Q. As far as this particular well and this completion is concerned, would you run through it for the Examiner a

brief history of the difficulties you encountered in deviating this well and drilling this well?

A. Well, we made two attempts to kick off the well towards the north, northeast. The first attempt we got back onto the casing stub and we had to go back in and set another cement plug and took off with two Dyna-drill runs and finally kicked off somewhere in the neighborhood of thirty-nine hundred, and when we established that we were out of the old hole and in our survey record that we were going northwest and climbing updip. We made repeated Dyna-drill runs to correct this. Actually we used thirteen bits and seventeen runs and twenty-four hundred feet to correct it. We were fighting a time deadline so could not come back up the hole and attempt another kick off because the way this one kicked off they couldn't guarantee us that the next one wouldn't do the same thing.

We continued looking for a soft spot to turn to the east, but our drilling time up the hole and actually while drilling didn't reflect one. It all appeared to be hard cherty dolomite.

The drilling contractor's and Eastman's estimate of time to get off the whipstock and back to the northeast total depth was estimated at eleven to twelve days. It took us twenty-three to twenty-four days to cut that roughly two thousand feet of hole, twenty-four hundred.

The estimated cost to drill and complete was a hundred and thirty thousand dollars. To date we have got two hundred and fifty thousand plus dollars tied up in this well, plus probably another three hundred and fifty thousand in the other two wells that we attempted completion in.

Q. I hand you what has been marked as Applicant's Exhibit Number Four and could you identify that, please?

A. Yes, that is a bit record of the Dyna-drill runs and the bits run in the Robert G. Cox Number 1 Federal AE reentry..

Q. I hand you what has been marked for identification, Applicant's Exhibit Number Five and would you briefly describe for the Examiner what that shows?

A. That is a detailed history of what went on while we were drilling. It is from drilling, trying to get off the casing stub, kick out of the old hole and get to total depth. It is a more detailed resume than where I made a brief explanation a few minutes ago.

Q. This is pretty much a blow-by-blow history of the drilling of this well?

A. Yes.

Q. And this was what, taken from your drilling record?

A. From our drilling records, from our bid records, from our deviation surveys and from the progress reports.

Q. From your personal knowledge from having supervised

the drilling of the well?

A. That is correct.

Q. So would you sum up finally what the problem resolved down into, when you had this well down to total depth and you found what you had on your hands?

A. Well, first of all I was fighting a time deadline in which I had to establish commercial production or the lease expired on August 31st. Every effort we took to correct the deviation and inclination as you can see from the deviation survey went sour. I wanted to be north, northeast but was in a worse spot when I bottomed the hole up that I wanted to be in. There was no guarantee of being able to do any better because of the dominant southeast dip that we were fighting and continually migrating off to the northwest, nor did we have time to do it, so I had to settle for what I got.

Q. Could you give the Examiner a very brief narrative description of the Abo formation and production history of the Abo Reef as it pertains to the well in question here?

A. I can give you a brief one, I guess a regular one would take two or three days.

Q. Just a brief one.

A. From published reports of detailed studies, the reef complex proper is made up of a number of stratigraphic intervals within the reef and reef complex proper that seem

to be controlled by porosity variations. Some zones on the apex of the reef, which should be considerably above the assumed oil-water contact are known to make water. Some zones on the flank are high and are producing relatively water free. Some geologists think that there is either a good vertical permeability or fracturing between the individual zones, lenses, stringers, or whatever geologists want to call it and placing them on communication. The static oil-water contact was believed to be approximately minus twenty-six sixty-five, but ensuing production may have raised this as much as a hundred feet in local areas. Production history from the south-flank wells over the past fourteen years appears to bear out this idea. As the wells to the west of us have been plugged out due to excessive water production their allowables transferred.

Q. Okay. I refer you to what has been marked as Exhibit Number Six and if you would go to the board up there.

A. Exhibit Number Six is an east-west cross section showing the log characteristics and the files used in the Abo in the wells immediately offsetting the Number 1 EA well. This is the Number 1 EA.

This was our indicated top of the Abo. Our zones of porosity were located between sixty-one twenty and sixty-one eighty. Sixty-one eighty on down to sixty-two ten

we hit nothing but hard dolomite, there were no shows.

The better porosity seemed to be in the zone sixty-one sixty-two to sixty-one seventy and sixty-one seventy-four to, say, eighty.

The production in the Pan-Am J well immediately to the west of us is out of a five-foot stringer at what they consider the top of the Abo formation there. The well was drill stem tested from sixty-one fifty to their total depth at sixty-two eleven and twelve. The tool was open two hours and fifteen minutes and they got gas in forty-five minutes and recovered sixteen hundred and seventeen feet of heavy gas cut muddy water and traces of crude oil from seventy feet of gas cut mud and two hundred feet of gas cut water below the circulating sub. They elected to come up high in the section and perforate the five-foot intervals which they were producing from.

The well to north of us I believe was marked on Exhibit One, the Pan-Am Number 3 well which is to the north of us encountered the top of the porosity in the Abo and there were shows at about a minus sixty thirty. They elected to complete at sixty-one ten, which was quite a bit lower in the section. All of this seemed to be saturated.

The F 12 which is located just to the east of it, encountered porosity and shows in the Abo. They elected to complete low in the section, which any prudent operator

would do. He would start at the bottom and work on up. If he got water in the bottom he would squeeze it off and go on up to the top.

Going a little bit farther west, this is the Humble well offsetting the F well, but the Humble Number 3's section actually comes right down through here, but for the purpose of being able to illustrate the log I had to offset it. They tested this interval in here in the Abo and only had one hundred and sixty-five pounds of pressure and got about thirty feet of gas cut mud. They tested this interval and got two hundred and seventy feet of gas in the drill pipe, thirty feet of gas cut mud and two hundred and forty-five pounds of shut-in pressure. They tested this zone here and got water.

Q. If I can stop you a minute, Mr. Cox, in referring to the Humble well, you said it was to the west of the Amoco 12, I believe it is to the east.

A. It's to the east, excuse me. And to the east of that is the Humble Number 4 which I did not try to tie into the section because the log characteristics are so divergent that it is almost impossible to make accurate correlation, but our principal zone of interest in the Cox Federal EA was the zone from sixty-one twenty down to sixty-one eighty. The zone we are producing from is much deeper in the section.

Q. Much deeper than the J well to the west and the Amoco wells to the north?

A. That is correct.

Q. By the way, did the logs give you any indication of the lithology that was encountered at the bottom of these various wells?

A. Well, according to the sample data that I had, the J well had a fine crystalline vugular porosity and so did the Abo in the wells to the north of us. In this here particular zone we had shows of vuggy porosity in the dolomite with shows in it and then a zone down here is a quartzy crystalline dolomite with no gilsonite or no vugs in it. They reported gilsonite throughout some of their samples, and it looks like there was just a difference in lithology in the two zones.

Q. If I understand your testimony, the J well and the two wells to the north not only are completed higher in the zone, but the lithology in those two wells is different from the lithology in the EA well?

A. Yes, and from my interpretation of their sample descriptions through there. I'm not privied to Amoco's records, so I don't know just exactly what they looked like, but from the information that I derived from the samples log data that is what they are described as.

Q. Now, referring you to Exhibit Seven, which is the

exhibit directly behind Mr. Stamets, would you explain what that shows?

A. Well, this is an east-west cross section along the south flank of the Empire-Abo Field, showing the perforated intervals in relation to subsurface depth. These are wells that were producing from the south flank.

We will refer back to the Humble, I mean the R. G. Cox EA well.

Q. Is this the well that you have just marked with a red arrow?

A. That is correct.

Q. Would you mark the west offset well with a W underneath and would you mark the two north offset wells with an N underneath them? Okay, go ahead, I'm sorry to interrupt you.

A. The J well was drill stem tested from approximately minus twenty-five or thirty-five down to total depth which would be minus twenty-five ninety-four.

As I refer to that cross section, they recovered traces of oil and water, and the water, I feel they assume were coming from the lower portion of the section or they would have attempted to place the completion lower, not higher.

In our attempts in our zone porosity, I have marked that on our electric log which we ran, both a

compensated density log and an induction log. It indicated that we had ten to twelve percent porosity in the zone a lot higher than the others. Our gamma ray neutron indicated that we had thirteen to fifteen percent porosity, so this was the zone that we were actually going for.

We hit this one with a two thousand gallon acid job and got back a trace of oil, a couple buckets full and swabbed it dry. Then we hit it with a ten thousand gallon acid job and got back some oil and gas, but it appeared that it lacked bottom-hole pressure, although the logs looked good, suggesting that it had probably been drained.

Q. When you say drained, drained by offsetting wells?

A. Yes.

Q. And this is the porosity that you have marked on that exhibit with a red circle?

A. With a red circle, right. Then I moved on up the section and attempted a perforated here and acidized it with two thousand gallons and swabbed it dry and there was very little show.

Q. Did that indicate anything to you other than the fact that it was dry there?

A. It suggested to me that my primary zone was depleted. Well there was some oil in it, but I didn't have bottom-hole pressure to bring back my stimulation treatment.

Q. So that upper zone had also been depleted, is that

correct?

A. Well, the upper zone did not look as good as this zone did, but it did have a better evaluation of the logs, it had as good a porosity on the gamma ray neutron as the others. It showed that it would have productive capabilities.

Q. So I take it from Exhibit Number Seven that you are producing from a zone where the west offset well shows water and, therefore, was not commercial and the two north offset wells have never been completed in that zone?

A. No, they haven't. They were total depth approximately ten to fifteen feet below the perforations.

Q. Okay.

A. I would like to expound a little further.

Q. Certainly.

A. Going on past the J well to the west, the C well which immediately offsets it, is producing considerably higher also, and the A well to the west of it ran a drill stem test across this zone recovering oil. They ran a drill stem test below that zone, a minus twenty-five eighty down to twenty-six twenty and recovered water. So some people would put an oil-water contact here; other people would put an oil-water contact below the Pan-Am C Number 2 E, which I understand has been abandoned. And other people, back to the east would put an oil-water contact between the Pan-Am CD and the Pan-Am Yates.

I understand from talking to people who are familiar with the field that there are other zones that have oil-water contacts a lot higher in the section.

Q. Now, referring you over to what has been marked as Exhibit Number Eight, would you explain what that shows, please?

A. Exhibit Number Eight is a north-south cross section across the -- this is our well again, the Cox Number 1 Federal EA. This is a Stanolind McPhearson which was drilled many years ago and the drill stem test they took at this interval reported water.

Amoco drilled a well two years ago to ten thousand and some odd feet into the Morrow. We have rights to sixty-two hundred and fifty feet, or sixty-two hundred and fifty feet or the base of the base of the Abo, whichever is deeper. I requested logs on numerous occasions and they told me to go to the commercial services but they did finally send us a log cut off at minus sixty-two fifty.

They say I'm not privied to Amoco's records, so I don't know what kind of show they had through there while drilling, but by taking the log and having it evaluated by a log analyist, he indicated a show of oil by log analysis in this zone here.

Moving to the north, this is Pan-Am Number 3, which is producing higher than me.

Moving north of that is the Pan-Am F 1 producing higher and moving to the next offset, Pan-Am F 2 which is producing approximately a hundred feet higher, and I could find no information on the Pan-Am R well as to where it was perforated or treated, but moving to the Pan-Am EB, it is perforated up here and the Pan-Am C Number 3 is producing considerably higher in the section.

This is the end of the reef. The reef breaks off a lot sharper on the north line than it does on the south line.

Q. Did you draw any conclusions from the log information you had available on the Amoco Diamond Federal, as well as your log information, and the log information on the Amoco Number 3 well that is the north offset, as to the geology in the area?

A. Well, from all indications we are producing from a zone that is below what I would consider the F zone, which is a zone where the F 3, the F 12, the Pan-Am J well, and also the Pan-Am A 1 well is. I feel like our production is coming out of a different zone, possibly even the oil-water contact extends a lot farther south than we thought and there may be production in this particular zone. If I had the information on down, there might be additional production farther in the section.

Q. Did you get any indication from your study there

that you might have been not only in a different formation, but in somewhat of geologic dip or dish right in that area?

A. Well, from looking at the variances in dip on our Exhibit One, it looks like we could almost create a -- geologically, and I know a lot of us in this room are geologists -- but we could almost create a separate feature with a barrier running through here in the better portion of the northwest quarter of Section 12, contributing in oil production.

Q. Okay. Referring you to what has been marked as Exhibit Nine, would you briefly explain what that is and what it shows?

A. Do you have a copy, Mr. Examiner?

MR. STAMETS: Yes.

A. Exhibit Nine is a composite section of the producing intervals in all of the wells that offset us to the east, west and northwest. They are color coded, our well is colored green; the two Humble wells to the west of us are color coded in brown; the J well is color coded in red; and the Pan-Am 1 C which is one location away is color coded in purple and the two Pan-Ams Number 3 and Number 12, are color coded in blue. The Gulf Oil, the Gulf 1 B which is northwest is color coded in orange, it is producing almost a hundred feet higher in the section than we are.

Q. Now, referring you back to Exhibit One, the copy you have in front of you has been marked for identification as Exhibit One-A, and as it is, it is identical to Exhibit One at the present time, is it not?

A. Yes, it is.

Q. Would you explain to the Examiner the ramifications of the oil-water contact that is presently shown on there?

A. Well, the 2 A well has been plugged out, apparently due to excessive water production. It is not shown on the section, but immediately offsetting it to the west is the 1 B, I believe, it has been plugged out due to excessive water production and they have offset it a couple hundred feet and reestablished production higher in the section.

I believe that there is a definite barrier between our zone and the zones that I referred to as the F zones that would roughly -- do you want me to mark on this?

Q. Go ahead and write it in red.

A. I roughly have to put it right in about through there.

Q. That is the north boundary?

A. The north boundary of ours.

Q. I asked you originally about this oil-water contact, is that how it shows on the engineering committe --

A. That's the way it shows on the engineering committee studies, as a minus twenty-six sixty-five, and

this is a projection into it. I just had to assume that since I didn't have the log on the Amoco deeper than that to establish an oil-water contact.

Q. Based upon the production from the northern wells, as well as attempts at other completions in your well, have you found evidence of coning water through your lease there?

A. Have I found any evidence of coning water? Yes, I believe that I have. We can see how the water cut increased on all of the wells, the 1 C; the 2 A, I understand, was basically flooded out. The J well is now cutting approximately thirty-two percent water, which two or three years ago wasn't cutting that much. The wells to the north aren't cutting any water, but the Humble wells now to the east of us are cutting considerable water, so I believe that there has been due to the fact that they are taking four hundred and fifty barrels a day out of the northern wells.

Q. You are referring to which wells now?

A. To the F 3, to the F 12 and the old Gulf 1 B. And Pan-Am, I believe, is producing somewhere in the neighborhood of one hundred and twenty-nine to one hundred and forty barrels of oil per day and fifty barrels of water per day with a gas-oil ratio of two thousand to one. We have a gas-oil ratio of about less than eight sixty-two to one.

I believe if we were in communication with the J well

we would have a lot higher gas-oil ratio.

Q. Much similar to theirs?

A. Yes, sir.

Q. Do you know what the total production has been out of that J well to date?

A. If I can return to the board I can tell you.

Q. All right.

A. The Pan-Am J well completed in 1959, and I think the initial potential was eighty-four barrels of oil per day and twenty-one barrels of water per day. Their accumulative production as of one, one, seventy-five, was five hundred and nineteen thousand, five hundred and forty-three barrels of oil. The monthly production in June was thirty-seven hundred and eighty barrels of oil; seven million, five hundred and sixty thousand cubic feet of gas; and seventeen, seventy-three barrels of water, which would be a daily average of one hundred and twenty-six barrels of oil, two hundred and fifty-two thousand cubic feet of gas and fifty-nine barrels of water.

The Pan-Am F 3 which was completed in '59 has accumulated to one, one, seventy-five, six hundred thousand, six hundred and ninety barrels of oil. Their monthly production in June was twelve thousand barrels. It made two hundred and forty-five barrels of water, which is a daily average of four hundred barrels of oil a day, and

three hundred and twelve thousand cubic feet of gas per day, and eight barrels of water.

The F 12, its accumulative production to one, one, seventy-five is five hundred and ninety thousand barrels of oil. Their monthly production for June was thirteen thousand five hundred barrels of oil, which comes out to a daily average of four hundred and fifty barrels of oil a day, three hundred and sixty two thousand cubic feet of gas and they weren't cutting any water.

The well to the northwest of us, the Gulf well, I don't have any data with me, but I believe it is producing somewhere between four hundred and five hundred barrels of oil per day.

Q. What are the production characteristics on the Federal EA well?

A. The Federal EA well is currently producing thirty-four barrels of oil per day. It will fluctuate between thirty-one and forty, depending on when the pumper gauges it and one hundred to one hundred and twenty-five barrels of water, and the initial GOR test taken after we had established oil production took us five days to get water, I mean, to get oil. It turned out to be thirty thousand that gave us a gas-oil ratio based on that of around eight hundred, eight sixty-two.

Q. Okay. Are you of the opinion that granting of

the application in this case would prevent waste and protect correlative rights?

A. Yes, I do. I believe we would prevent waste by recovery of oil that would not be produced in the offset wells. The zone, to me, did not appear to extend west or north any appreciable degree.

As to the protection of correlative rights, I do believe the offset operators are or would be capable of producing from this zone, so I don't believe I'm violating correlative rights, I think we are not wasting oil because we have been able to produce the oil that is down in the northwest quarter of Section 12.

Q. I take it from your indication with your pencil on Exhibit One-A you think that substantially all of your production is coming from the vicinity of the northwest quarter of Section 12?

A. Right. Of course, I don't know what's over here now, since this well --

Q. What do you mean, not over?

A. Well, I mean to the west -- I mean to the east of us.

Q. Were Exhibits One, One-A through nine prepared by you or under your supervision or at your direction?

A. They were prepared by me, by myself, under my supervision.

Q. Or at your direction?

A. At my direction.

MR. S. BUELL: I move the introduction of the exhibits.

MR. STAMETS: Is there any objection to the admission of these exhibits? They will be so admitted.

Are there any questions of the witness? Mr. Guy Buell?

CROSS EXAMINATION

BY MR. G. BUELL:

Q. Mr. Cox, during the controlled direction drilling of your EA Number 1 well, were you in charge of that operation?

A. As operator I was in charge of that operation.

Q. And you are the one who issued the orders and told everybody that was involved in the directional drilling of that well what you wanted them to do?

A. Yes.

Q. All right, sir, I believe you have already testified that Eastman was the service company that you employed to set the Dyna-drill and effect the directional drilling of your well?

A. Right.

Q. All right, sir, I have looked at your daily drilling report that you filed with the Commission and I

noticed in there several times and I believe you testified earlier to this that you had run the Dyna-drill to try to correct and come back, is that correct?

A. That is correct.

Q. Were you trying to orient the Dyna-drill such that you would come back and comply with the Order that would allow you to bottom this well anywhere within one hundred feet of the surface location of the well?

A. We were trying to come back to the north and the east to the fat part of the structure. To the northwest, as anyone could see, is the direction we wouldn't want to go.

Q. Really your target area then was to comply with the order and try to bottom the well within a hundred feet of the surface location of the well?

A. Within that to some degree, within a hundred to a hundred and fifty feet, plus or minus. We were trying to kick off and go northeast towards the fatter part of the reef, and when we come out from underneath the, finally -- it's in the records that we made, you can look at it if you want. We came out -- on a single-shot survey you have to drill a little ways before you run a picture, and we found we were going north forty-five degrees west.

I think the bit record will indicate that we made three or four Dyna-drill runs in an attempt to turn it,

but we were fighting and I think any geologist or engineer from Amoco will admit that once you get into a southeast dip or a north dip off the reef that the thing just climbs up on you.

Q. If I understand your answer then your target area instead of being a hundred feet from the surface location of the well, which the Commission's Order contained, your target area was within a hundred and fifty feet of the surface area?

A. Well, we talked about the, you know, the engineering factors in trying to control a well, Mr. Buell, and it is quite complicated. We were trying to comply with the Order, but with the understanding that anything can happen when you get inside a hole.

Q. I asked you what your target area was.

A. Our target was one hundred feet north northeast.

Q. Your target area was one hundred feet from the surface location of the well?

A. Well, yes. Yes it was. I'm trying to orient the surface location and where I kicked off from. I was going northeast.

Q. I'm going to have to ask you again --

A. Yes, it was, to answer your question. We wanted to go northeast and try to bottom within a range of a hundred feet of our surface location.

Q. So that was your target area? All right, sir, let me ask you this: Would you authorize Eastman to release their job file on this well to this Commission?

A. No, sir, I don't believe I would.

Q. You wouldn't?

A. No.

Q. Why would you object to the Commission having all of the facts, Mr. Cox?

A. If all the facts on all of the wells -- mine is the only one that is a matter of public record -- I just don't see why that request -- we've got a certified copy -- we're not denying where we are, Mr. Buell. We know we are ten feet from our line and that we are in violation of the Commission Rules and Regulations. We aren't trying to say what we didn't do, we are trying to tell you what we did do.

Q. Yes, sir, we are all aware of where the bottom location of your well is, very close to our lease line, but why would you object to the Commission having all of the factual data with regard to the directional controlled drilling of this well?

A. If the facts of Amoco are turned over to the Commission on some of the wells they drilled with the same thing, I might talk to my counsel and decide whether or not we want to release them.

Q. Mr. Cox, I am sure that you are aware that there is

no Amoco well that is the subject matter of this hearing. The subject matter of this hearing is the EA Number 1 well that you controlled in a directionally drilled manner?

A. Right.

Q. Why would you object to the Commission having the facts about the directional drilling of that well?

A. I have already given you the facts.

Q. So you refuse to give Eastman the authority to release that job file to the Commission?

A. Yes, sir, I do.

Q. All right, sir, what was the name of the Eastman man that oriented the Dyna-drill every time it was run, do you know?

A. R. B. Vickers.

Q. Is he here in the room today?

A. No, he isn't.

Q. All right, sir, let me ask you this, Mr. Cox: As I understand your geological testimony, the thrust of it is that the current completion in your directionally drilled well is from a zone that none of the offset wells have ever produced from, and in your opinion, none of the offset wells are capable of producing from that zone?

A. Right.

Q. So really you completed in a new and virgin reservoir insofar as your completion is concerned?

A. That is my geological opinion.

MR. G. BUELL: May it please the Examiner, would you recognize me for a motion?

MR. STAMETS: Certainly, Mr. Buell.

MR. G. BUELL: In preparing for this Case here today, Mr. Examiner, we relied on the testimony of the applicant in their Hearing on May 23, 1973, where their testimony was to the effect that they wanted to complete this well in the Empire-Abo zone. In fact, their testimony was that they wanted to complete in the same zone as the offset Amoco well. In reliance on that we are completely surprised from the standpoint of geologically proving one way or another whether or not this well is completed in a separate and distinct reservoir. Even if we hadn't relied on this testimony in preparing our case for today, we would have been unable to make any geological study because the log, the deviated bottom-hole location has not been released. The first time any of us have seen it was on the exhibit, Exhibit Number Six, I believe.

So for that reason, I move the Hearing be postponed to the hearing day for November the 19th. In the interim I would recommend and insist that the Commission witness a bottom-hole pressure test on the EA Number 1 well. To me that would be definitive proof as to whether or not that is a separate and distinct reservoir that has never been produced

before. I believe the bottom-hole pressure will give us the facts and and definitively prove whether or not that well is completed in a new reservoir.

I would further recommend that in the interim between now and November 19th, that the Commission also witness a survey of the surface location of the EA Number 1 well.

I make that recommendation because their bottom-hole location is so close to our lease line. Coupled with our experience and we have from time to time discovered inadvertently the surface location of a well is not at the precise survey point. At times we have found that wells will be ten to twenty feet from the survey point, and, of course, in this case being eight or nine feet off the lease line, if the surface location is inadvertently off, the bottom-hole location of this well could be off of the Cox lease.

I respectfully move that this Case be continued until the November 19th Hearing with a bottom-hole pressure test witnessed by the Commission and the surface location of the well surveyed.

MR. STAMETS: Sumner Buell, do you have a response to that?

MR. S. BUELL: I certainly do, Mr. Examiner.

Mr. Guy Buell has had ample notice of this Hearing, Amoco has had ample notice of this Hearing; Mr. Buell is also

aware of the subpoena power of the Commission that he can invoke. We have gathered our witnesses here today to have a Hearing today. In fact, there is a whole battery of them.

In addition, Mr. Examiner, I think you are aware that we are now pumping this well on a temporary allowable, with a temporary allowable of only five hundred barrels this month and that is estimated to run out in three to four days, or maybe five days and that well will have to be shut in and we are again faced with the problem of the well watering out and having lost another completion in this area.

Now, if Mr. Buell would like to make a survey of the location, Mr. Guy Buell, I'm sure he can do it. He can do it at his expense.

As far as being surprised, if he is surprised, it is through not being prepared, because he did have subpoena power, the logs are all available. I understand that most of those logs can be obtained as a matter of public record. I don't think he is surprised, I think the problem is just complete unpreparedness. I don't think the continuance should be granted.

MR. HINKLE: On behalf of Atlantic Richfield we would like to join with Mr. Buell in his motion for a continuance.

In my opinion, the best evidence of what happened would be the testimony of the Eastman man who was in charge,

and to add to what Mr. Buell has already suggested, is when it is continued, if the Eastman man is not going to be available, we would like to have him subpoened, together with his records.

MR. G. BUELL: May it please the Examiner, may I say one more thing? I'm afraid Mr. Sumner Buell is ill advised. The log of the Cox EA Number 1 well has not been released. We made every effort to obtain one so that we could have been prepared. We were not able to obtain one and I state that I am fully aware of the subpoena powers that the Commission has and I do intend to invoke that subpoena powers. The reason I didn't, I was in hopes that Mr. Cox would be willing for the Commission to have the facts without us having to resort to a subpoena.

I would also state that Amoco, that we would have no objection to continuing the testing allowable until the November 19th Hearing.

MR. S. BUELL: Mr. Examiner, Mr. Cox is on the stand right now, could we continue?

REDIRECT EXAMINATION

BY MR. S. BUELL:

Q. Mr. Cox, did Amoco ever contact you for a copy of that log?

A. No, they didn't.

Q. Have you requested copies of logs from them,

particularly on the Amoco Diamond Federal to the south?

A. Yes, I requested a copy from them.

Q. Was a complete copy supplied you?

A. No.

Q. They cut it off, didn't they?

A. Uh-huh, at sixty-two fifty.

Q. Okay.

A. They told me if I wanted a copy of the log I would have to go through the commercial services, they did not release copies of their logs.

Q. Okay.

MR. G. BUELL: May I please, Mr. Examiner, that is where we get copies of all of our logs, from the logging service, and when an operator releases a log the logging service has it and we obtain a copy. We weren't going to ask Mr. Cox to give us a copy of his log at his expense. If he had released the log we would have had a copy.

MR. STAMETS: This seems like an excellent time to take a short break, say ten minutes.

(THEREUPON, a short recess was taken.)

MR. STAMETS: The Hearing will please come to order.

Mr. Guy Buell and Mr. Hinkle, I would like to ask both of you if either of you would object to the granting of the thirty-five barrel a day allowable to

the subject well during the period of any continuance?

MR. G. BUELL: Amoco would have no objection.

MR. HINKLE: No, we have no objection.

MR. S. BUELL: Mr. Examiner, at this time I would propose a compromise in lieu of Mr. Guy Buell's eloquent motion. We would be more than happy to authorize Eastman to release their work papers from the time they kicked off this well at, I think it was thirty-eight hundred feet, a copy to Mr. Buell, and a copy to the Commission. In exhange, however, we would ask that Amoco release to us the logs and drilling records on the Amoco Diamond Federal to the base of the Abo formation, which they have not released, with copies to the Commission, of course. And in addition, as far as the bottom-hole pressure test is concerned that Mr. Guy Buell proposed, we are concerned about this well watering out and we would ask the Commission to consider measuring the fluid level in the pipe as opposed to a surface pressure and extrapolating back to bottom-hole pressure, using those instruments or using those guide-lines. I think this would give Mr. Buell what he has asked for, it would give us valuable geological information to help substantiate our position, but we would not like to have a continuance of this matter.

MR. S. BUELL: May I go on?

MR. STAMETS: Yes.

MR. S. BUELL: We would like to continue producing that well. If Mr. Buell finds anything in the Eastman records that he is alarmed with, or something of that nature, he can go ahead and move to have the Hearing reopened at a later date with a proper application before the Commission, but we would oppose a continuance at this time.

MR. STAMETS: The Examiner does not feel that he has the authority to order a bottom-hole pressure, or order the applicant to take a surface survey. The Commission certainly could take such action if it chose to do so.

We know of no reason why Amoco could not survey the location, the surface location, of the well in the meantime.

Mr. Guy Buell, will Amoco release the logs and data on the Diamond well that Mr. Cox has requested?

MR. G. BUELL: Mr. Examiner, the only thing I can say at this time, I never heard of that well until today. I will certainly recommend that we do. I will be happy to furnish that not only to you, but to Mr. Cox and Mr. S. Buell.

I would also point out that while I'm not an engineer, I've always been under the impression to take a static fluid level you are going to have to shut that well in, Mr. Cox, so you might as well shut it in and take that pressure.

MR. COX: No, sir, all you do is shoot a shotgun shell down there and you don't have to shut the well in. I believe your engineers will tell you that.

MR. G. BUELL: And also, Mr. Examiner, we would be happy to survey the surface location of the well at our expense, but we do not want to do it as a tresspasser. If Mr. Buell will authorize us to go on that lease to take a surface survey, we would be happy to do it at our expense.

MR. S. BUELL: Mr. Examiner, we don't own the surface, we only own the mineral rights and the right to use so much of the surface as is necessary to extract our mineral. Mr. G. Buell will have to negotiate with the rancher who owns the surface.

MR. STAMETS: Mr. S. Buell, I believe you are probably correct in your statement and there should be no real problem in surveying this particular location, I would assume.

The Examiner will continue this Case until November the 19th with the recommendation that bottom-hole pressures be obtained and that the surface location be surveyed, and the Examiner will also recommend to the Commission that a thirty-five barrel a day allowable be assigned to the subject well pending the issuance of an Order in this Case.

Anything further in this Case?

MR. G. BUELL: No, Mr. Examiner, we will not ask Mr. Cox to release his log, and I'm sure that his Exhibit Number Six will be available to us, so we will at least have it to work with.

MR. STAMETS: Yes, they will be available.

MR. HINKLE: How about the records of the company, will they be available to us?

MR. STAMETS: I believe Mr. Hinkle indicated that he would like a copy of the Eastman records as well.

MR. S. BUELL: We are going to authorize Eastman to release the records from the kick off point with the understanding that we get the Diamond Federal log to the bottom of the Abo. You said you would recommend it to your clients, but if we are going to make a deal, let's make a deal.

MR. G. BUELL: I'm not going to make a deal with you. I said I would recommend it and that is what I will do.

MR. STAMETS: This does not need to be on the record, this is not part of the Examiner's decision in this particular matter. It is something you can work out subsequent to the Hearing today.

MR. S. BUELL: Well, for the record, to make things clear, I do recommend the release of Eastman's records, if you will recommend the release of that log.

MR. G. BUELL: Both can be reached by subpoena.

Mr. Examiner, I know you don't like to be involved in this type of negotiations, but would you, Mr. Cox, and Mr. Buell, have any objection to having the Eastman man who oriented the Dyna-drill present in this hearing room on the nineteenth?

MR. S. BUELL: Mr. G. Buell, wherever your subpoena can reach, you can get.

MR. HINKLE: In other words, you want us to subpoena?

MR. G. BUELL: That's right.

MR. S. BUELL: We have no authority to order him in.

MR. G. BUELL: I said would you have any objection?

MR. S. BUELL: You just issue your subpoena, if you can serve it, have at it.

MR. Examiner, we would request one thing. You have indicated that you would recommend to the Commission a thirty-five barrel per day allowable pending the next hearing. I would like to impose upon you to raise that to maybe forty-five so that we can continue this as a test well, rather than just hold it where it is.

MR. STAMETS: I think that this would not have to be a matter of my recommendation to the Commission at this time. If the situation warrants the applicant can make his

own presentation to the Commission at that time, with copies to Mr. G. Buell and Mr. Hinkle and the Commission can consider that matter on its own.

MR. S. BUELL: Just make it outside of this Case?

MR. STAMETS: Yes, sir.

Is there anything further in this Case?

MR. COX: I would like to make just one brief statement. There is a further ramification of all of this. If the well is not declared commercial the lease expires and will again be put up for competitive bid. The only logical bidder on the lease is the unit operator. No one else is going to bid on the lease, a lease like this that is assigned a point, oh, oh, oh, oh, oh, three, four, three participation in the unit and thirty-seven hundred barrels of recoverable oil. It would work to the best interests of the unit operator to have this well declared non-commercial so they could acquire it and put it in the unit and make an allowable transfer to increase the productivity of some of their more prolific wells in the main Abo Reef complex proper.

MR. STAMETS: I believe, Mr. Cox, that that will be a matter for you and the U. S. Geological Survey to work out. Again it has no bearing on our deliberations here today.

MR. COX: Yeah, I know that.

MR. STAMETS: We will continue Case 5571 until November the nineteenth.

We will take a short recess.

(THEREUPON, a short recess was taken.)

State of New Mexico)
) ss.
County of Santa Fe)

I, SIDNEY F. MORRISH, a court reporter, do hereby certify that the foregoing and attached Transcript of Hearing before the New Mexico Oil Conservation Commission was reported by me, and the same is a true and correct record of the said proceedings to the best of my knowledge, skill and ability.

[signature]
Sidney F. Morrish, Court Reporter

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 5571 heard by me on 10-8 1975
[signature], Examiner
New Mexico Oil Conservation Commission

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BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
November 19, 1975

EXAMINER HEARING

IN THE MATTER OF:

Application of Robert G. Cox for amendment of Order No. R-4561, Eddy County, New Mexico.

CASE 5571 (Cont'd.)

BEFORE: Richard L. Stamets, Examiner

TRANSCRIPT OF HEARING

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EXHIBIT INDEX

MR. STAMETS: At this time we will call Case 5571.

MR. CARR: Case 5571, application of Robert C. Cox for amendment of Order No. R-4561, Eddy County, New Mexico.

MR. STAMETS: We will call for appearances at this time in this Case. Of course, this Case is a continued Case and we have already had appearances, but we will just get us all up-to-date.

MR. S. BUELL: Mr. Examiner, I'm Sumner Buell of Montgomery, Federici, Andrews, Hannahs and Buell in Santa Fe, appearing on behalf of the Applicant. Also appearing on behalf of the Applicant is Mr. James Day, Junior, of Dallas, Texas, a member of the Texas Bar and we ask that he be permitted to participate.

MR. STAMETS: Mr. Day.

MR. HINKLE: Clarence Hinkle, Hinkle, Bondurant, Cox and Eaton, Roswell, appearing on behalf of Atlantic Richfield.

MR. G. BUELL: Please, Mr. Examiner, my name is Guy Buell, representing Amoco Production Company.

MR. STAMETS: This Case was originally heard on October 8th, 1975 and on motion of Mr. Buell, was continued to today to permit examination of documents and evidence in connection with this Case.

At the time of the continuance Mr. Cox was on the stand, under cross examination and the cross examination may

continue at this time unless there is any other motion before it.

MR. S. BUELL: Mr. Examiner, before proceeding, I would like to note some difficulties with the transcript that was made at the last hearing. Referring you to Page twenty-six, Line four, Mr. Cox's testimony, he stated in Lines three and four on that page: The F 12, its accumulative production to one, one, seventy-five is five hundred and ninety barrels of oil. I believe his testimony was "five hundred and ninety thousand barrels of oil." Is that correct, Mr. Cox?

MR. COX: That is correct.

MR. S. BUELL: And referring you over to Page twenty-seven in the area of Lines seven and eight, part of Mr. Cox's testimony, he stated: As to the protection of correlative rights, I do -- then it should be inserted "not" believe the offset operators are or would be capable of producing from this zone.

Gentlemen, I would move that those corrections be made in the record.

MR. STAMETS: Any objection to those two corrections? It will be noted in the record.

MR. S. BUELL: One further thing, Mr. Examiner, before the cross examination continues by Mr. Buell, I believe that Mr. Cox has a very brief statement of clarification of some of his testimony in the area of Pages twenty-nine and thirty of a general nature that he would like to make

for the record, if that is permissible.

MR. STAMETS: Yes, I think that would be fine. As a matter of fact, at this time, if you had any other information you wished to offer, that would be fine.

MR. S. BUELL: At this time we will just clarify the record and we would like Mr. Cox to make this brief statement.

MR. STAMETS: Okay, Mr. Buell, you and Mr. Cox may proceed.

MR. COX: During cross examination I either testified or gave the impression that I was attempting to run the well back to the east to comply with the original Order of the New Mexico Oil Conservation Commission, issued in 1973. This is wrong. Again I want to reiterate, I did not have a copy of the Order stating that we had to be bottomed within a hundred feet while the well was being drilled nor while the well was completed. These records, as I stated before, were destroyed in a fire January 11, 1975. I was not aware of this Order until after the wells were drilled and completed. We were intending to go north-northeast, taking off from our point about eighty-five feet west of our surface location and bottom the well somewhere between a hundred and fifty feet north of our surface location and eighty to a hundred feet west of our surface location. We were aiming for the fat part of the structure to get away from the areas that had been subjected to stimulation attempts

in our Number 1 and Number 2 wells.

I think that is about all I want to say to clear it up.

MR. STAMETS: If I understood this correctly, what you were trying to do in drilling this hole was to wind up with a bottom-hole location about a hundred and fifty feet north by northwest?

MR. COX: North by northwest, that's correct, Mr. Stamets.

MR. STAMETS: Of the surface location?

MR. COX: Yes. But I was using as my take-off point my forty-one hundred or forty-two hundred bottom-hole location.

MR. STAMETS: Okay, so a hundred and fifty feet north by northwest of the kickoff point. A kickoff point of the surface location, I'm confused on that now.

MR. COX: Okay, about a hundred and fifty feet north of the kickoff point, Mr. Stamets.

MR. STAMETS: Okay, now, Mr. Cox.

Mr. Guy Buell, would you like to continue your cross examination of this witness at this time?

MR. G. BUELL: Well, let me do this, Mr. Examiner, if I might? May I get clarified on the clarification with Mr. Cox. Frankly I am a little confused at this point.

MR. STAMETS: You may cross examine the witness on

any testimony or statements that he has made to this point, Mr. Buell.

ROBERT G. COX

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

CROSS EXAMINATION

BY MR. G. BUELL:

Q. Mr. Cox, I'm a little confused just to what extent you are asking to change your testimony.

A. Well, I'm not really changing my estimony. I think that in the informal hearings and the formal hearing, I said I was going off to the north-northeast and it was after your cross examination, which was quite extensive, you were well aware that I was in violation of the Commission Order to be within a hundred feet of the target location, and you kept coming back and coming back and coming back and coming back, and finally, me knowing that I was in violation, I ascended to your -- I'm not going to call it badgering, but your leading me in to making the statement that I made.

Q. Well, I certainly in my opinion was not badgering you, Mr. Cox, and it was certainly not my intention. I was simply endeavoring to get an answer to my question. That was the target area that you gave the Eastman people to bottom your well and at the bottom of Page thirty you finally said that you gave them instructions to bottom that well within

a hundred and fifty feet of the surface location. Now, are you changing that part of your --

MR. S. BUELL: I'm sorry, where are you reading from, Mr. Buell?

MR. G. BUELL: At the bottom of Page thirty.

MR. S. BUELL: What line?

MR. G. BUELL: When he finally answered there -- to get the complete continuity and context, of course, you will probably have to go back a couple of pages.

A. Well, that again, I'll go back to my original statement that my intent was to go off to the north, to the northeast from my kickoff point and this is erroneous testimony on my part.

Q. (Mr. G. Buell continuing.) Well, let me ask you this, I think we can get this very simply: Did you or did you not, as you testified at the bottom of Page thirty, give Eastman a target area anywhere within a hundred and fifty feet of the surface location of the Federal EA Number 1 Well?

A. I gave Eastman a target in the north part of our forty-acre tract, which would be anywhere from a hundred and fifty to a hundred and sixty-five feet north of our northern part of our forty-acre tract, and that was the target that I gave them, and they picked the target.

Q. Your testimony now is that you did not give them a target area bottoming the well within a hundred feet of

the surface location?

A. The plat was prepared by Eastman, Mr. Buell. I asked Mr. Ratts who I retained as an engineer to contact both the drilling contractor and some well servicing company, then he called and had a Mr. Coats that was a sales representative for Eastman come to my office. I gave him this particular quadrant which I thought was the best part since the area in and around the wellbore had been heavily stimulated in our other two wells and we discussed costs, the whipstocking deviations and all of the other things. This was the first time I had ever been involved in a deviated well or had any knowledge of how it was done, and I believe, now going back because this has been sometime, I said a hundred to a hundred and fifty feet from the north lease line that I wanted to target out. We discussed the costs, Dyna-drill and everything.

At that time we had not secured a drilling contractor. He mentioned two or three who might be available. Mr. Ratts went into another room and called Moran, called Ard, and a couple more and they couldn't get on the well in time for us to get it to total depth by the time we were required. So I told Mr. Coats to submit us a cost estimate so that I could submit it as an AFE in my program and I received a plat from them. I did not prepare a plat. The plat came sometime in June. At that particular time I did not have a drilling contractor. I was discussing with numerous ones.

Cactus told me that they could probably get on the location sometime between the seventh of July and the latter end of the week.

So I went over the cost estimate. It think it was something like eleven or twelve thousand dollars from Eastman to do it. They would use two Dyna-drills to get to the target area. That target area was changed up.

Q. The target area was what?

A. Changed up from what their plat shows.

Now, the target area was sent to Bob Ratts, our engineer, who was in the field and failed to receive a copy of the target area.

But anyway in talking to Mr. Coats, to reiterate that I had said the location that he had chosen there for that hundred-foot quadrant which you have on the plat and which you had when you came into the last Hearing, I thought it was a little close to the lease line and Mr. Coats stated, "Heck, we have put them ten to fifteen feet from the lease line," he said, "Hell, we can hit a dime."

So I didn't feel like there was anything wrong with the particular target he chose. The reason the target was changed was because of advice of other engineers, due to the dominant west dip from the surface on down and there are other deviation surveys that we did go off in that direction we would probably encounter -- I mean west dip which would

swing us closer to our lease line.

Q. Mr. Cox, let me ask you this, and I assure you I'm not badgering you, I'm just making a good-faith effort to understand. Is your testimony now that your instructions to Eastman was to bottom at anywhere you want to in a northwest direction as long as you stay on my lease?

A. No, no.

Q. Is that your testimony?

A. No, that's not my testimony, I didn't say that I told them to bottom at anywhere in the northwest just so they stay on my lease.

Should I present a plat?

MR. S. BUELL: Just answer his questions.

MR. G. BUELL: Excuse me, Mr. Cox, maybe I can follow you a little easier. Mr. Examiner, may I have permission to refer to out of order what will be offered as Amoco's Exhibit One and proven up at that time? I don't think we will have any problem with Mr. Cox understanding the exhibit and knowing what it is. Let me tell you in essence so Mr. Buell and Mr. Dale will understand it.

It is simply a plot of the deviation, they ran a deviation in the old Number 1 Well, and also a plot of the directionally controlled deviation in the new hole portion of the Federal EA Number 1, and I believe if we had a map or something we could look at it would be easier

for me to follow Mr. Cox's testimony. I believe that even he is having difficulty.

May I show it to counsel and see if they have any objection?

MR. STAMETS: Show it to Mr. Sumner Buell and see if there is no objection to this.

MR. G. BUELL: Subject to our proving it up later with the accuracy, et cetera.

MR. DAY: Mr. Buell, may I ask you who prepared this?

MR. G. BUELL: Yes, it was prepared under the supervision of the engineer that you all subpoened, Mr. Dan Currens, who is present in the room and will prove up the exhibit.

MR. DAY: Dan Currens is an employee of your company?

MR. G. BUELL: Yes, sir, of Amoco Production Company.

MR. DAY: Is Mr. Dan Currens a graduate engineer or is he a field -- what is his --

MR. G. BUELL: He is a petroleum engineer with extensive experience as a petroleum engineer. His education and background and working experience is all in the field of petroleum engineering.

MR. DAY: Thank you.

MR. G. BUELL: But actually, Mr. Day, maybe it will help you to better understand this, it really represents a composite of the data that you have already presented to the Commission, not in this particular form.

MR. DAY: You are stating that Mr. Currens prepared this from exhibits in the record?

MR. G. BUELL: Exhibits and data in the record.

MR. DAY: Thank you.

(THEREUPON, a discussion was held off the record.)

MR. STAMETS: Let's go back on the record.

MR. S. BUELL: Mr. Examiner, on behalf of the applicant, what has been marked for identification as Amoco's Exhibit Number One, we have no objection to Mr. Cox referring to it, we do not make it our own exhibit, however, it is just up there for reference purposes and is subject to later proof and authentication.

MR. G. BUELL: That is certainly my understanding, Mr. Buell.

Q (Mr. G. Buell continuing.) Mr. Cox, before we start on this, let me clear up one other facet of your testimony on October 8th. At that time it was your testimony that you were the person in charge, and you were the only one that gave orders with regard to the directional drilling and control on this well, does that statement still stand?

A. Yes, sir.

Q. The reason I asked and let me tell you why as to all fairness to you. I implied from what you testified to a moment ago, that the target area was changed without your knowledge?

A. It was not changed without my knowledge.

Q. All right, sir, would you be kind enough to come over here to the wall where Exhibit One is posted and let's see, I'll stand over here so I won't be in your way.

Now, Mr. Cox, you understand the makeup of this Exhibit One, it shows the surface location of your EA Number 1 Well. Drawn around that well location is a one-hundred-foot radius circle and imposed on this exhibit is the directional survey that you ran and furnished the Commission on the old Number 1 hole and also superimposed is the results of the directional survey that you furnished the Commission on your directionally controlled and deviated hole. Now, just so that we can understand the instructions that you gave to Eastman, by referring to that exhibit, would you again, please, tell us just the instructions you gave to Eastman as the target area where they should bottom that well?

A. Mr. Buell, I did not give any instructions to Eastman. I had no contact with Eastman after the time that Mr. Coats came into my office and gave me a cost estimate and sent me a plat until I met Dick Vickers on the well at

about fifty-seven hundred feet. That is the only contact with Eastman.

Q. Well, now, you were the person giving all of the orders and directions and instructions; who gave Eastman the instructions when he came running out to this well with a Dyna-drill under his arm?

A. Bob Ratts who was the engineer employed by us.

Q. Did you give him the instructions to give to Eastman?

A. Yes, I did, but he didn't get them in time.

Q. All right, what instructions did you give him that he didn't get in time?

A. Mr. Buell, can I submit that?

MR. S. BUELL: Just answer the question.

A. I told him to go off in a north-northeasterly direction at about a hundred and fifty feet north of our takeoff point which at that time was supposed to be about forty-one hundred, according to where he cut off the casing, between forty-one hundred and four thousand, going off in this direction because we were cognizant of this west dip, if we went with Eastman's recommendation that this west dip would hit us and carry us over to the west, so we weren't so concerned about where we were there, we were concerned about being twisted over this way.

MR. STAMETS: I would like to clarify that. You

told who to drill north-northeast, Mr. Ratts?

A. Mr. Ratts, yes, sir.

Q. (Mr. G. Buell continuing.) Would you spell his name so we will have it right in the record?

A. R-a-t-t-s.

Q. And his first name?

A. Robert.

Q. All right, sir, now, how did you send those instructions to him?

A. By mail.

Q. And he did not receive them when Mr. Vickers came out with his Dyna-drill?

A. That is correct.

Q. Do you know what instructions he gave Mr. Vickers?

A. He told Mr. Vickers after he came off at a degree of north seventy-five or slightly west, that we needed to turn it back to the east.

Q. All right, now, sir, looking at this exhibit, it is readily apparent that after the first one or two shot points, directional shot points in your deviated hole, it was obvious you were out of the old hole? Now, I'm still in the hundred-foot circle, is that not true?

A. We did not know -- I did not know that we were out of the old hole at thirty-two, twenty-two. I think we got off the old hole sometime between thirty-eight, twenty-two and

thirty-eight, eighty-five.

Q. And that's all within a hundred-foot circle, around the surface location of your well?

A. Yes.

Q. So before you left the hundred-foot circle, you knew you were out of the old hole, and you also knew that you were headed in a northwesterly direction, is that correct?

A. Well, when I got the report from my engineer, yes.

Q. Well, he knew it when he saw it?

A. Yes, but you asked me when I knew it.

Q. Well, I understood from your previous testimony that you were out on the well and you were the one who gave all of the instructions and orders and I was mislead and that is the reason for my confusion, Mr. Cox.

A. No, sir.

Q. And your instructions then did not reach Mr. Ratts in time and that he told Mr. Vickers, "You get that Dyna-drill in there and get that baby going north and east," is that correct?

A. I can't speak for him, I can speak for what I told Mr. Ratts, because I didn't see Mr. Vickers until I arrived on the job site and I realized that he was in trouble. Cactus contacted me somewhere around in here and they said that if we did not change the migration and the angle that we were going to be off our lease line before we were at

fifty-eight or fifty-nine hundred feet.

Q. Looking at that exhibit almost with the naked eye you can see that Cactus is right, can't you?

A. Right.

Q. All right, at that point and we're about at the shot point at forty-six, seventy-three feet when you again went in with a Dyna-drill, is that correct?

A. Without looking at my records, I would have to say --

Q. But if this exhibit is correct, that is correct?

A. Yes.

Q. What were his instructions at that time, Mr. Vickers' instructions?

A. My instructions to Mr. Ratts was to get it back to the east. I can't speak about the instructions to Mr. Vickers because I did not have any contact with Mr. Vickers.

Q. Did you have any reason to doubt that your engineer on the job was carrying out your orders to the letter?

A. No.

Q. Would you look at that point on Exhibit One that we just discussed and again with your naked eye would it not appear that the Dyna-drill affected a correction just far enough to the east to perhaps keep you on the lease?

A. From this shot point here?

Q. Yes, sir.

A. To which shot point?

Q. From forty-six, seventy-three to forty-seven, thirty-six, and the correction appeared to take effect at about shot point forty-seven, thirty-six, would not just with your naked eye that appear that correction be sufficient to keep you on the lease?

A. I wish it was that simple, Mr. Buell.

Q. All right, sir, I won't ask you to eyeball it then.

While we are looking at this exhibit, would you designate the approximate target area that this well would have been bottomed if your instructions had been carried out?

A. Probably right about up in here.

Q. Would you make a little "x" on that exhibit and I'll let the record show that he is making an "x" to the right of the word "west" and below the word "north".

A. Someplace in through here.

Q. In the area of the word "west" on the north part of our exhibit?

A. Yes, sir.

Q. Is it your testimony now, Mr. Cox, that even if your orders had been followed, that you had no intention of complying with the requirements of the Commission order?

A. I did not know of the Commission order at the time, and I have testified to that six or seven times.

Q. Yes, sir, I recall the fire, but let me ask you

this: You had a Santa Fe attorney that represented you at the hearing when you got the order?

A. That is correct.

Q. You knew of your knowledge of him representing you and that he knew the way over here to the Commission?

A. Yes.

Q. Since he met you over here at the hearing.

A. Yes.

Q. Did you ask him to get you an extra copy of the order?

A. No, sir, I did not.

Q. All right, now, the target area that you gave them would be north and west of the kickoff point, wouldn't it?

A. The target area I suggested was north and east of the kickoff point, but we expected the west migration of the upper beds to carry it to the northwest.

MR. G. BUELL: Mr. Examiner, I think that is all of the clarifications, questions, that I have of Mr. Cox, and I think until we settle the matter of the subpoened material, I will not have any further cross examination of him.

MR. STAMETS: Are there any other questions of Mr. Cox at this time?

MR. HINKLE: I might ask him one question here.

CROSS EXAMINATION

BY MR. HINKLE:

Q. To make sure that I understood your testimony correctly at the last hearing, is it your contention that this well is bottomed in a separate reservoir from the Empire-Abo reservoir that is under unit?

A. Well, Mr. Hinkle, that is a geological question and it is difficult to --

Q. Well, just answer it, is that your contention?

A. No, I believe it is in a different stringer than the other well.

Q. It is in a different reservoir?

A. Right.

MR. HINKLE: That's all I have.

CROSS EXAMINATION

BY MR. STAMETS:

Q. Mr. Cox?

A. Yes, sir.

Q. Are you the same Robert Cox who testified in Case Number 4970 on May 23, 1973 before Examiner Elvis A. Utz?

A. Yes, sir.

Q. On page four of the transcript Mr. Kellahin who was your attorney at that time and he asked the question: (Reading.) Mr. Cox, would you please state briefly what is

sought by this application? The answer as stated in the record: We are petitioning the Commission to sidetrack our Number 1 hole in order to restore it as close as to vertical as possible, as we possibly can, to test the Abo section at sixty-six, sixteen and sixty-six eighty in a virgin hole. (End of reading.)

Is that what you recall your testimony was in that Case?

A. It would have to be if it was on record, sir.

Q. You are the same man who made that statement?

A. Yes, I am.

Q. But you forgot or why did you then do something else altogether when you finally got around to drilling this hole?

A. I was trying to get away from the radius of stimulation that the Number 1 had been subjected to and the Number 2 had been subjected to. They had both been heavily stimulated with muddy fracs and acid fracs by both Aztec and Robert G. Cox and Associates.

Q. Mr. Cox, were you aware that an order was issued based on your application?

A. Yes, I was, but I don't have a copy of that order.

Q. Well, as a prudent man, would you assume that the order issued -- would you proceed if the order was not issued in your favor?

A. Would I --

Q. If the order was denied would you have proceeded?

A. Would you clarify that again, if you had denied my order, would I have gone on ahead and drilled the well?

Q. That's right, you asked for a deviated hole?

A. No, sir, I wouldn't have deviated the hole.

Q. Would a prudent man expect to do something other than what he had requested to do in his application?

A. Well, the way I look at it, Mr. Stamets, everything has to come before the Commission, all of the reports stating where your bottom-hole location is, and a survey plat, and sundry and other forms that go into it. If I had thought I was violating I sure enough wouldn't have submitted that plat, bottom six feet from the west line and sixty-two or sixty-three feet from the north line.

Q. Mr. Cox, do you remember if your application was granted or not in that case?

A. Yes, it was granted.

Q. Well, Mr. Cox, in the absence even of a written order in that case, would you not know that you were supposed to be drilling a vertical hole or a hole to the vertical, since that is what you asked for?

A. No, sir, I was trying to clear the stub and get off into -- clear the stub at forty-two hundred that we had cut off and take the casing out, set a plug and get off to

the northwest, I mean to the north, and attempt to drop angle and complete it in the northern portion of our reservoir where I have testified that I thought the fattest part of our structure was, I mean of the reef.

Q. Mr. Cox, are you aware of the necessity for an operator in the State to abide by the rules and regulations of the Commission?

A. Yes, that's Form 111 or something.

Q. I would like to just for the record cite our Rule 111 at this time which says that: (Reading.) This is 111 (b). No well shall be intentionally deviated without special permission of the Commission. (End of reading.) Then it goes on from that point, and what you received here was special permission of the Commission, and apparently what you did was drill outside of the terms of the order that was issued, is that correct? Based upon new testimony?

A. That is correct.

MR. STAMETS: Any other questions of this witness?

MR. S. BUELL: I have somemore direct.

MR. STAMETS: Okay, Mr. Sumner Buell.

REDIRECT EXAMINATION

BY MR. S. BUELL:

Q. Mr. Cox, did you make repeated efforts to turn

that well away from the west lease line?

A. Yes, sir, we did.

Q. And why wouldn't the well turn?

A. Because of the hard chertiness of the formation, apparently we were biting into the southeast dip in the upper beds, or the west dip in the upper beds migrating to the west.

Q. Were you having repeated difficulties with burning out bits on this well trying to make it turn?

A. Yes, sir, we were.

Q. What was the estimate of the cost that Eastman gave to deviate this well initially?

A. Eleven or twelve thousand dollars.

Q. And what did it finally cost?

A. Somewhere in the neighborhood of twenty thousand dollars.

Q. Is this difference eaten up in drilling time and bit costs, essentially?

A. No, it was eaten up in drilling time. We estimated ten to twelve days to drill the well, two Dyna-drills, it ended up taking twenty-four days and seventeen bit runs, thirteen bits. I forget which. They estimated two bits and two button bits.

Q. So you over ran on bits and over ran on drilling time both?

A. Yes, sir.

Q. And the reason for this and the extra money was essentially trying to turn this well back to the east, was it not?

A. That is correct.

Q. At the same time as this well was drilling were you having a very stringent time schedule as far as lease expiration was concerned?

A. Yes, we were.

Q. When was the lease due to expire, the date?

A. Our first official word was July 31st and a double checking by the USGS they found out it was August 31st.

Q. When did you finally complete the well?

A. August 30th.

Q. So you got this well finally completed under this time schedule one day before the lease expiration?

A. Yes, sir.

Q. Was your primary concern during the drilling the time factor that was involved in this?

A. Yes, sir.

Q. Were you running other wells and other drilling operations during this period of time?

A. Yes, sir.

Q. Approximately how many others?

A. Approximately four others.

Q. And when was the order issued that granted you permission to deviate this well and bottom it within a hundred foot radius of the surface --

A. Well, I don't have a copy of it, Mr. Buell.

Q. Approximately when was it issued?

A. In May or June of '73.

MR. STAMETS: Mr. Cox, for the record, I have a copy of Commission Order R-4561 and the date is the 25th day of June, 1973.

A. Well, Mr. Stamets, I did not have a copy and I asked Mr. Buell to get me a copy and he read it to me over the phone.

Q. (Mr. S. Buell continuing.) Now, back to my questions. So it is approximately a two-year time between the time you received that order and appeared at the Commission hearing before you got a chance to drill this well?

A. Yes, it is.

Q. So that is a considerable length of time and your memory as to the hearing is not exactly sharp at that time when it is two years later?

A. Right.

Q. Were you aware at the time you started drilling this well in 1975 that you were supposed to return it to the vertical?

A. No, sir.

Q. Now, Mr. Hinkle asked you a question that I need clarified now and correct me if I misstate the question. I believe he wanted to know if it is your contention that you are completed in a separate reservoir in the Abo formation, and your answer was in the affirmative?

A. Yes, sir.

Q. Is that your contention, or is your contention that you are completed and producing at the present time from an isolated stringer in the Abo formation which is not being produced from any adjacent offset wells?

A. That is my contention.

Q. You are in the Abo reef, however?

A. I imagine everybody in that particular area is in the Abo reef.

Q. So your real contention is not what Mr. Hinkle asked you, but that you are in an isolated production pocket, isolated from the offset wells?

A. Yes, sir.

Q. And you wish to correct your testimony to that extent?

A. That is correct.

MR. S. BUELL: I have nothing else at this time of this witness.

MR. STAMETS: Any other questions of this witness?

MR. G. BUELL: Yes, Mr. Examiner, I hate to burden

everybody, and I know that sometimes my confusion is hard to resolve.

FURTHER CROSS EXAMINATION

BY MR. G. BUELL:

Q. Now, Mr. Cox, on redirect with Mr. Sumner Buell you said you made a valiant effort to get this well going back to the east, did I understand you correctly?

A. Yes, sir.

Q. Would you come up here and tell me where those valiant efforts took place?

A. I believe we would have to go through the drilling record.

Q. I've been through them.

A. Have you? All right, then you probably know more than I do.

Q. But this isn't my application.

A. You are contesting it.

Q. I'm trying.

A. Everywhere throughout this section, I believe, that Eastman ran stabilizers and reamers trying to drop angles and taking weight off of the drill pipe and slowing up the RPM's and trying to keep it from migrating any more.

Q. Let me be more specific, Mr. Cox, maybe I'm not being fair with you. We agreed a minute ago that by the

time you ran the shot point at thirty-eight, twenty-two you knew that you were out of the old hole, is that correct?

A. Sometime between thirty-eight, twenty-two and thirty-eight, eighty-five.

Q. All right, sir, I'll go along with that. You also knew that you were headed in a northwesterly direction, not a north or easterly direction, didn't you?

A. Yes, sir.

Q. And you knew that shot point thirty-nine, forty-four; four thousand and seven; forty-one, oh, one; forty-one, ninety-six; forty-two, ninety-six; forty-three, eighty-nine; forty-four, eighty-eight; forty-five, fifty-two; forty-six, seventy-three, and it was only then -- well, let me ask you this: At that time did you instruct Eastman to run the Dyna-drill again?

A. I believe I did.

Q. Well, now was it you or your engineer that gave them the instructions?

A. I became real concerned here at forty-five hundred, they called me and they did not have any drilling time on the old Number 1 well because it was drilled by Aztec and those drilling records were destroyed. I said that I did have some drilling time on the Number 2 well which was drilled over here and I would go get it and I gave them three hundred and some odd feet of drilling time down there. They were looking for a soft spot to turn it back to the east.

I followed that up by taking the Geologram charts and making a list of the drilling time per minute for ten foot, and sent them to them, and it was my contention all the way along that they were orienting the tool to get it back to the northeast.

Q. All right, sir, and when the Dyna-drill was run on your instructions, shortly after shot point forty-six, seventy-three, it was your personal instructions to Mr. Vickers to turn this well to the east?

A. It was not my personal instructions going back to Mr. Vickers, I had no connection with Mr. Vickers, I gave the instructions to my engineer.

Q. You instructed your engineer to tell Eastman to turn this well to the east?

A. Yes, sir.

Q. And this slight little change we see in the direction, granted is to the east, appeared to be the best they could do?

A. It apparently is.

Q. All right, sir, now let's go on up here to shot point forty-seven, thirty-six, still to the northwest, forty-seven, ninety-seven, a little turned to the east, but still in a northwesterly direction, almost at a forty-five degree angle. At forty-eight, eighty-nine, still to the northwest, forty-nine, eighty-two, fifty seventy-six, fifty-

one, sixty-seven, and at approximately shot point fifty-two, twenty-seven the Dyna-drill was run again, is that correct?

A. Apparently it --

Q. If this is a faithful reproduction of your record. Now at that time did you personally tell anybody with Eastman anything?

A. Mr. Buell, I can't recall -- yes, I did, I told them the day before as I was on my way out and I told them to get the Dyna-drill in and turn it back to the east.

Q. Turn it to the east?

A. Right.

Q. And as we see from the results of this, they turned it a little to the east, but he sure didn't follow your instructions, did he?

A. I believe he was having a heck of a time turning it to the east.

Q. Well, this shows that it didn't turn to the east so he was not following your instructions, is that correct?

A. I think he was following my instructions, it was due to the condition of the rock that he was drilling through, which he could not turn it.

Q. All right, sir, how many other shot points, do we read a shot point fifty-eight, twenty-three and the Dyna-drill was run again. At that time did you give personal instructions to Eastman?

A. Yes, I did.

Q. What did you tell him then?

A. Well, anybody would know that we had to turn it to the east.

Q. And as this shows they were unable to follow your instructions?

A. That is correct, from the appearance of the map.

Q. Now, let's be sure that your instructions were, "Turn it to the east." Your instructions weren't, "Make a little correction to the east," your instructions were, "Turn that baby to the east", is that correct?

A. Right.

Q. Not just a little easterly direction, but, "Turn that baby to the east"?

A. Yes, sir.

MR. G. BUELL: Thank you, Mr. Cox.

That's all I have, Mr. Examiner, by way of cross until we handle the subpoened matters.

MR. STAMETS: Mr. Hinkle.

MR. HINKLE: I would like to ask one question.

FURTHER CROSS EXAMINATION

BY MR. HINKLE:

Q. I believe you corrected your testimony, Mr. Cox, to indicate that you completed your well in an isolated

stringer of the Abo, is that correct?

A. Yes, sir.

Q. Is it your contention that there is no communication between this isolated stringer and that portion of the Abo which is unitized under the Empire-Abo Unit?

A. From a structural standpoint in regards to sea level, it looks like it is producing much lower in the section.

Q. Well, answer my question. Is there any communication between this isolated stringer and the seciton that is unitized under the Empire-Abo field?

A. I don't believe so, sir.

MR. S. BUELL: One more question, if I may.

Mr. Cox, did you knowingly, willfully and intentionally violate a Commission order in this Case?

MR. COX: No.

MR. S. BUELL: This was accidental or out of ignorance?

MR. COX: Right.

MR. STAMETS:. Mr. Cox, were you aware that there was an order authorizing you to directionally drill this hole?

MR. COX: Yes, I knew I had the order.

MR. STAMETS: Did you make any attempt to get a copy of this order or determine what the contents of the

order was?

MR. COX: No, sir, the only thing I attempted to do, I wrote the USGS shortly after the fire, I think it was in February when we were transferring offices, and told them that our sundry report forms and completion report forms on the Number 1 Well were destroyed in a fire and would they send another copy and it would be three or four months before we were in a position to drill the well because we had all of our furniture, all of our records, everything was in restoration and/or storage.

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

(THEREUPON, the witness was excused.)

MR. STAMETS: Mr. Sumner Buell, do you have anything further at this time?

MR. S. BUELL: We have another witness for direct unless Mr. Buell and Mr. Hinkle want to handle the subpoena matter.

MR. G. BUELL: I certainly have no objection to any witness he wants to present, Mr. Examiner.

MR. S. BUELL: We will go ahead with the witness unless we want to exchange this material on the subpoenas, however the Examiner wants to do it.

MR. STAMETS: Let's just go ahead until the subpoenaed material comes up.

MR. S. BUELL: We will call Mr. Ratts at this time.

(THEREUPON, the witness was duly sworn.)

MR. STAMETS: You may proceed.

ROBERT V. RATTS

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

DIRECT EXAMINATION

BY MR. S. BUELL:

Q. Would you state your name, occupation and where you reside?

A. Robert V. Ratts, R-a-t-t-s. I reside at 1209 Birch, B-i-r-c-h, in the city of Hurst, H-u-r-s-t, Texas.

Q. And what is your occupation?

A. I'm a consulting petroleum engineer.

Q. Are you familiar with the Cox Federal EA Number 1 Well?

A. Yes, sir.

Q. And how did you become familiar with that well?

A. I had it reentered, the well, for Mr. Cox along in '68.

Q. And you did other work on that well I take it?

A. That is correct, yes.

Q. Were you the petroleum engineer on the job in June of 1975 when the last drilling project was undertaken

at that time?

A. I believe it was July.

Q. July of '75, I stand corrected.

A. Yes, sir.

Q. Would you give the Examiner a brief description of your formal education?

A. Yes, sir. I'm a graduate engineer from Kansas State University with a B.S. in mechanical engineering, and a petroleum option.

Q. What has been some of your employment history since graduation; by the way, when did you graduate?

A. In January, 1950.

Q. Give us some of your professional background, if you will, please?

A. I started to work on February 14, 1950 for Texas Pacific Coal and Oil Company and worked for them until along in April of 1964 after they sold.

Q. What did you do for them?

A. I drilled and completed wells from the Louisiana Gulf coast into northern Canada.

Q. What have you been doing the balance of your professional life since you left Texas Pacific Coal and Oil?

A. Directing the drilling and completion of wells.

Q. As a consulting engineer?

A. Yes, sir.

Q. Approximately how many wells have you drilled or been completed or been involved with over your career?

A. That is a pretty hard thing to answer, but on the magnitude of a hundred and fifty, two hundred, something like that.

Q. Have you previously testified before this Commission and had your qualifications accepted?

A. Yes, along about 1969 or something like that.

MR. S. BUELL: Are the witness's qualifications acceptable?

MR. STAMETS: They are.

Q. (Mr. S. Buell continuing.) When did you first arrive at the well site on this project in 1975?

A. I believe it was July 1.

Q. And what was the status of the drilling program at that time?

A. At that time I set the bottom-hole plug, shot the casing off, and pulled the casing at that time.

Q. When were the first efforts made to deviate this well?

A. May I look at my drilling report here, please?

Q. Certainly.

A. July 9.

Q. And what effort was made to deviate the well at that time; what steps were taken and what were the

results?

A. At that time we ran a Dyna-drill and the cement plug that we had set when we pulled the casing did not hold so we had to re-cement.

Q. Okay, what was the next step?

A. The next step was to re-cement and wait for the cement to set and then go back in with the Dyna-drill to try to sidetrack.

Q. And was that successful?

A. Yes, sir.

Q. And when you got out of the old hole and sidetracked it, where were you headed and what was your situation at that time?

A. At that time we headed someplace between thirty-eight, oh, six and thirty-eight, twenty-two. Mr. Vickers with Eastman Whipstock stated that he thought that we were out of the old hole or going out of the old hole. At thirty-eight, oh, six we had a two degree slope, our direction was north seventy-two west. That is almost straight west.

Q. Almost practically straight west?

A. Right.

Q. What was your reaction to that report from Eastman Whipstock?

A. I think the statement I made to him, "Dick we are

never going to be able to stay within our lease line if you are going to take off in that direction."

Q. Were there any instructions given to Mr. Vickers at that time?

A. Well, I just told him, "You're going to have to get that thing turned around to the north or we are never going to be able to stay on our lease line."

Q. Did Eastman Whipstock take any further corrective action at that time, or near that time, as the drilling progessed?

A. You mean -- just a moment, let me have your question again.

Q. After you discovered that you were coming out of the old hole practically in a western direction, what additional instructions did you give to Eastman Whipstock insofar as turning this hole is concerned?

A. To get the thing turned around to the north where we wouldn't get off our lease.

Q. You wanted to go north with it?

A. That's right.

Q. And do you know what Eastman did in response to your instructions?

A. They ran the Dyna-drill again.

Q. What was the result of that second run?

A. Well, we got it changed around to north, sixty-five

west.

Q. And they continued drilling?

A. At that time we came out of the hole with the Dyna-drill and went back with one reamer and a bit.

Q. And was there any particular purpose to the reamer and the bit combination?

A. Yes, the reamer is to make the bit take off at an angle. In other words, the reamer acts as a fulcrum to push the bit out to the side.

Q. And this was an effort to turn it north somemore?

A. No, sir, this is to build angle to get away from your old casing.

Q. I see. To get away from your vertical?

A. That's right.

Q. And as the drilling progressed did you give any additional instructions to Eastman Whipstock as to turning this well?

A. I constantly told Mr. Vickers that we were in trouble.

Q. What were your instructions to him?

A. To turn it to the north.

Q. Did you rely on Eastman Whipstock insofar as the technical support is concerned to get this well turned to the north?

A. Yes, sir, one hundred percent.

Q. Their service company specializes in this area?

A. That is correct.

Q. Do you know what efforts Eastman was making in this connection, in this regard, in trying to turn it to the north?

A. Well, we made five Dyna-drill runs after that to try to turn it to the north.

Q. And did you meet with any measurable success?

A. No, because not only were we building angle -- or direction to the west, but we were also building slope.

Q. In other words, you were leaving the vertical?

A. That's right, we were leaving that too.

Q. Were you taking any action to correct this deviation from the vertical?

A. Yes, sir.

Q. What type of action was being taken?

A. We put on another reamer and went up two joints from the other reamer. We put on another reamer to stabilize it.

Q. Did you have any luck with this?

A. Minimal.

Q. Just insignificant?

A. Right.

Q. And how long did you continue to drill using two reamers and a bit trying to stay as close to vertical as

you could?

A. If you will, let me look at my report, because I do so much work I can't keep up with everything.

All right, from four thousand and fifty-five we drilled to forty-two, ninety-one, and then we came out of the hole and added an additional reamer on top of the Monel drill collar.

Q. Do I understand you correctly, that is three reamers?

A. That has to be three reamers.

Q. This was a further effort to return the hole to the vertical?

A. That's right.

Q. Did you have any luck with that additional effort?

A. No, sir, in fact we built angle. Or built slope, excuse me, we built slope, increased the slope.

Q. And to what do you attribute this problem, using three reamers and not having any results as far as returning it to the vertical?

A. This is the way the formation lays in there.

Q. What is unique about this formation?

A. It must lay to the slope from the southeast to the northwest.

Q. What is the characteristics of the formation in there insofar as what it is made up of, hardness and what

have you?

A. It is made up of very hard dolomite.

Q. And is this generally recognized in the industry as being hard to work in as far as drilling is concerned?

A. Yes.

Q. How much weight were you carrying on the bit during this drilling operation?

A. Thirty thousand pounds.

Q. Was this throughout the drilling operation?

A. That is correct.

Q. And what was the RPM of the bit?

A. Fifty RPM's.

Q. And what is normal in drilling as far as weight on a bit is concerned?

A. If you are not trying to keep a hole from going anywhere, normally you would carry in the magnitude of forty-five to fifty thousand pounds and we like to get up around ninety RPM's with a button bit.

Q. You were using these tungston carbide button bits on this?

A. That is correct.

Q. And these are the hardest bits that you are aware of?

A. It is the only thing we know to drill with except for diamonds.

Q. Why were you carrying this light load and slow speed?

A. To keep from changing the -- building up angle and drift. Angle to the west and drift. Just a minute now, let me get that straight here. Can you go back and tell me whether I'm calling angle -- which am I calling angle and which is drift? Let me call drift from the vertical and angle north, south, east and west. All right, to cut down on the drift.

Q. That is deviation from the verticle?

A. That's right, deviation from the verticle. And to keep the well from turning to the west.

Q. Did this slow drilling time and -- I mean the light weight on the bit and the slow speed of the bit increase the cost of this well significantly?

A. Substantially.

Q. To what extent?

A. Somewhere in the neighborhood of two hundred and fifty percent of the original estimate.

Q. And this was an effort to try to keep the well headed somewhere approximately north of the takeoff point?

A. That is correct.

Q. Now, when this well was completed what was the total depth on the well?

A. The total depth was sixty-two twenty.

Q. Is that on a footage basis or from the vertical?

A. That's on a footage basis.

Q. What is it from the vertical?

A. It would be about sixty-one, ninety approximately. I think they said sixty-one, eighty-eight, I believe is what Eastman told us would be the true vertical.

Q. And where were the first set of perforations put in this well?

A. At sixty-two, oh, eight to sixty-two, twelve.

Q. And what type of test was performed at that time and what were the results?

A. We ran a swab test and then we acidized it and swabbed again.

Q. And what were the results?

A. Very little of anything.

Q. Did you have any oil shows?

A. Just a trace.

Q. Okay, where was the second set of perforations put in?

A. The second set of perforations were at sixty-two, oh, eight, to sixty-two --

Q. I believe that is your first set of perforations?

A. From sixty-two, twelve to sixty-two eighteen.

Q. And what was the results of that?

A. After we acidized we swabbed a trace of oil and a lot of sulphur water.

Q. And what was the next set of perforations?

A. Sixty-one, sixty-two to sixty-one, seventy and sixty-one, seventy-six to sixty-one, eighty.

Q. And what tests and results?

A. We got nothing out of that. We didn't even get all of our acid back.

Q. The formation just ate it?

A. It didn't give it back.

Q. And the next set of perforations?

A. Sixty-one, twenty to sixty-one thirty.

Q. And what kind of treatment and what were the results, if any?

A. We gave that a thousand gallons of acid and we didn't even get all of our acid back.

Q. The formation absorbed that too?

A. I think so.

Q. Do those last two sets of perforations that you testified to, the ones from sixty-one, sixty to roughly sixty-one, eighty, and the ones from sixty-one, twenty to sixty-one, thirty, do they correspond, to your knowledge, with any of the zones to offsetting wells to this lease?

A. I'm not a geologist, but it is my understanding that they do correspond with some of the perforations in the

main body of the dip.

Q. In which they are presently obtaining production in the offsetting wells?

A. Yes, that is correct.

Q. Do you have an opinion whether the reservoir in which the Federal EA Well Number 1 is completed is separate from the adjoining wells or nearby wells?

A. I think it is in a completely separate isolated reservoir from the main body.

Q. And on what do you base your opinion?

A. Because of the amount of water we are producing and the small amount of oil.

Q. Did the offsetting wells to the north and the west produce essentially large amounts of oil with no water?

A. That is correct, yes, and at a higher point subsea level.

Q. Stratigraphically at a higher level?

A. That's right. I think this is the lowest completed well on that side of the field in this area.

Q. How about the wells further west from that Malco J well that offsets this well to the west, what kind of completions did those have, do you know, or production history?

A. No, sir, I don't know.

Q. You don't.

MR. S. BUELL: I have nothing else, Mr. Examiner.

MR. STAMETS: Are there questions of this witness?

MR. G. BUELL: Yes, sir, Mr. Examiner.

CROSS EXAMINATION

BY MR. G. BUELL:

Q. Mr. Ratts, at the time you were out supervising the directional drilling and the control of the deviated hole in the Federal EA Number 1, were you even aware at that time of Order Number R-4561?

A. No.

Q. Did you ever hear of it until you were preparing your testimony for this hearing, or did you even hear of it then?

A. Yes, I heard of it then.

Q. But you had no knowledge of it whatsoever at the time you were supervising the drilling?

A. That is absolutely correct.

Q. So to save a lot of time, none of the instructions that you gave Eastman were given in an effort to bottom that well in conformance with this order?

A. That's not correct.

Q. Well, if you didn't know about the order how could you give them instructions to deviate the well such as it would conform to the order?

A. How do I know that it wouldn't bottom there in compliance with the order without even know what the order was?

Q. Well, Mr. Ratts, let me ask you this, I'm going to direct your attention, please, sir, to Amoco's Exhibit Number One.

A. May I go up there?

Q. Please do, sir. Now, just so the record will be clear, as you recall this exhibit, what the format is, it shows the surface location of the EA Number 1 and this hundred-foot radius circle was the flexibility, the area that the Commission gave Mr. Cox in which to directionally control, deviate and bottom his well?

A. That is my understanding.

Q. Yes, sir. Now, would you explain to me, please, how any of your instructions, and I tried to follow your testimony carefully, how any of your instructions to Eastman would have resulted in the deviated well being bottomed under this circle?

A. There are no instructions I gave them to bottom there.

Q. Did you give them a target area? I understand that you have had a lot of experience in directionally controlling a well.

A. No, sir, that is absolutely false. This is my

first deviated well that I have ever been on.

Q. All right, sir, I'm sorry. Let me ask you this: Did you give Eastman, when they came on the location and you were there with their Dyna-drill, did you say, "All right, boys, here is your target area, wherever it was, now use that Dyna-drill and get me there"?

A. No, sir.

Q. What were the specific instructions that you gave to the Eastman representative the first time the Dyna-drill was put in the hole?

A. To sidetrack the original hole.

Q. You didn't say orient it north, west, east or south?

A. In the northwest.

Q. Orient your Dyna-drill, start the well, that's in the northwest quadrant?

A. Yes, sir, in the northwest quadrant.

Q. All right, sir, now it is pretty obvious as we follow the trace of the deviated hole that Eastman complied with your instructions, it is headed for the northwest quadrant, is that not correct?

A. That's right.

Q. All right, at shot point forty-six, seventy-three, shortly after that point, that depth, the Dyna-drill was run again. What were your instructions to the Eastman representa-

tive at that time?

A. To turn it to the north.

Q. Were those your explicit instructions?

A. That is correct.

Q. You didn't say north, two degrees east, you just said turn it true north, orient the Dyna-drill in a true northerly direction?

A. I said orient it to the north.

Q. All right, sir, at the subsequent shot points before the Dyna-drill was run again at the shot point at about fifty-two, twenty-seven, you could see that it was still going to the northwest?

A. That is correct.

Q. Did you give instructions to the Eastman man when the Dyna-drill was run at about shot point fifty-two, twenty-seven?

A. Yes, I did.

Q. Again what were your instructions there?

A. Turn it to the east.

Q. Turn it to the east?

A. Correct.

Q. Let me ask you this, I won't bother with the other one. Since you were not aware of the Commission order, was your concern in giving your instructions to Eastman simply that you wanted to assure yourself that the

bottom-hole location of this well would not fall off the lease?

A. State that again, please?

Q. In giving your instructions to the Eastman man, since you were not aware of this order, was it not your main concern to assure yourself that this well would bottom on the tract and not bottom off the lease on someone else's property?

A. That was not my main concern. My main concern was to swing it to the north.

Q. Why, other than keeping it on the lease would you want to swing it to the north?

A. Because this is the best part of the reef right up here, straight north of the well.

Q. Have you seen Mr. Cox's structure map?

A. Yes, sir.

Q. Could you go take a look at his structure map and then come back up here, please. I believe it is Exhibit Number One at the October 8th Hearing.

(THEREUPON, the witness complies.)

Q. (Mr. G. Buell continuing.) Yes, that was Exhibit Number One introduced at this Hearing on October 8th.

A. Correct.

Q. Now, take all the time you want to analyze it.

A. What do you want me to tell you about it?

Q. Well, you told me that the reason you wanted to turn this to the north was not only to keep the bottom on your lease, but also the fattest part of the structure on the Federal EA lease was to the north and not to the northwest?

A. That is correct.

Q. And I have asked you to look at the Exhibit Number One submitted by Mr. Cox, your employer, as a geologist, which is his structural interpretation, and ask if you would interpret his structure to conform with your answer?

MR. S. BUELL: Only if you can.

Q. (Mr. G. Buell continuing.) If you can.

A. I will still say that the best part of the reef, to my knowledge, would be straight north, here in this area here.

Q. You said north, but you are using your finger to point northwest, right up to the corner of the meat.

A. May I draw a dot?

Q. Please, sir.

A. This I believe to be the best part of the reef right there.

Q. Well, that's off your lease. I'm talking about you want to bottom this well on your lease at the fattest part of the structure, according to this interpretation, would it be right up in the extreme northwest corner?

A. Not necessarily, no, sir, right in there would be

a good place.

MR. STAMETS: The record should show that the witness has put a circle on Applicant's Exhibit Number One, somewhat north and west of the well in question.

A. Yes, north-northwest, I think, would be more correct, wouldn't it.

Q. (Mr. G. Buell continuing.) Mr. Ratts, this is kind of for my own edification so that I can learn, but I believe in your direct testimony you were saying you used a reamer to try to control the direction of the well, did I misunderstand you?

A. That is correct.

Q. You use a reamer to control the direction?

A. Not the direction, the slope.

Q. What is the difference in direction and slope?

A. Direction is north, south, east or west. Slope is the number of degrees from true vertical.

Q. All right, what do you use the Dyna-drill for?

A. To change the direction, either slope or direction.

Q. Now the way you described the reamer you said that it was a heavy piece of metal and acted as a fulcrum to kick a well in a certain direction, is that the substance of your testimony?

A. I said it was to change the true vertical angle.

Q. Did you not say it acted as a fulcrum to kick the

bit?

A. That is correct.

Q. To the angle you want it?

A. That's right, from the drift.

Q. And you just about described a whipstock then?

A. It is in a sense, yes.

Q. A reamer is a whipstock?

A. If you want to call it that, yes.

Q. All right, now, you got into the field of reservoir engineering, what is your background in reservoir engineering?

A. I wasn't aware that I got into the field of reservoir engineering.

Q. Well, you looked at the performance of your well, the Federal EA Number 1 and compared it with the performance of others, and said that led you to believe that it was in a separate reservoir, isn't that reservoir engineering?

A. No, sir, that is production engineering, sir.

Q. All right, sir, I'll not quibble with you about that. Let me ask you this: And then you said, my conclusion is that it is a separate and distinct accumulation of oil because it is making more water than the offsets, is that --

A. That is true, and also being completed at a lower depth than any other well in that area.

Q. Would a production engineer realize that normally a lower well on the structure, that is lower than its

neighbors, where you have a water table and a water contact, is going to produce more water than its neighbors?

A. That is correct.

Q. So then would you say that this would be a natural and normal phenomenon for a well completed lower in the Empire-Abo reef than its neighbors, to produce more water than its neighbors?

A. That needs some qualifying, sir, in the fact that that is not always true. Sometimes your neighbor's wells, even though they are completed a little bit higher will produce more water than a well that may be completed lower and I think this Empire-Abo field is an example of this.

Q. You think -- I'm having a hard time following you.

A. Do you want me to tell you what I'm trying to say?

Q. Please do.

A. All right. What I believe, and what I'm trying to say is that this well is completed lower than any well that has ever been completed on that side and produce any oil whatsoever.

Q. Let me ask you this: Are you sure of that statement?

A. To the best of my knowledge, yes, from the information that I have available to me.

Q. In making that judgment did you use measured total depth or true total depth?

A. True vertical depth.

Q. You used true vertical depth?

A. Yeah.

MR. G. BUELL: All right, that's all I have, Mr. Examiner.

MR. STAMETS: Mr. Hinkle.

CROSS EXAMINATION

BY MR. HINKLE:

Q. In furtherance of Mr. Guy Buell's cross examination, in regard to being in a separate reservoir and all, isn't it a fact that the low amount of oil being produced could be caused by the low permeability in the area?

A. No, sir, because if it was in direct proportion to the permeability then you wouldn't be producing the fluid, it would be water. You've got to have permeability in order to produce the amount of water that it is producing.

Q. But the quantity of the oil, though, that you produce might be due to the fact that you have a low permeability, isn't that right?

A. No, sir, that is absolutely false.

MR. HINKLE: That's all.

CROSS EXAMINATION

BY MR. STAMETS:

Q. Mr. Ratts, if I understood your testimony correctly, you did not give Mr. Vickers a target area to finish the hole in. I may have missed it, did you give him a direction to kick the well off?

A. Yes, sir.

Q. And what was that direction?

A. In the northwest quadrant.

Q. And what were your instructions from Mr. Cox as far as bottoming this hole?

A. My instructions when I went out there was to get in the northwest quadrant, about a hundred and fifty to two hundred feet away from where we took off, at approximately thirty-eight hundred feet.

MR. STAMETS: Any other questions of the witness?

MR. S. BUELL: I have a few more, Mr. Examiner.

REDIRECT EXAMINATION

BY MR. S. BUELL:

Q. Referring you to what has been admitted into evidence as Applicant's Exhibit Number One, it purports to show the top of the Abo reef, and Mr. Buell has had you indicate, based upon that drawing where the thickness of the zones were at that time. From those contour lines can you tell thicknesses at all on there?

A. No, sir, this is not an isopach.

Q. That is not an isopach, it is strictly contoured on the top of the Abo reef?

A. That is correct.

Q. And so you cannot tell thicknesses from this map?

A. That is absolutely correct.

Q. Based upon your experience, Mr. Ratts, do you believe that the oil or the other hydrocarbons that are found in the Federal Ea Well will be produced, or could be produced in the adjoining wells to the north and west?

A. No, sir, I don't.

MR. S. BUELL: I have nothing else.

FURTHER CROSS EXAMINATION

BY MR. STAMETS:

Q. I would like to clarify the answer to my last question. The word "quadrant", I think, snuck in there which sort of adds a little confusion. Were your instructions from Mr. Cox to bottom this hole a hundred and fifty feet to two hundred feet north and west of the kickoff point?

A. Not necessarily north or west, north and west.

Q. North and west?

A. But in this north quadrant, this northwest quadrant, approximately two hundred feet from it.

Q. Well, the northwest quadrant of what?

A. Of where we took off, of the lease, the northwest

quadrant of the lease.

Q. In other words, you could have wound up due east of the well and still have been in the northwest quadrant?

A. That is absolutely true.

Q. Now, what did you tell Mr. Vickers, you told Mr. Vickers to orient the Dyna-drill and he kicked off north and west?

A. He took off in a northwest direction.

Q. What would that lead you to believe about the final hole location, where would you expect it to be from the kickoff point?

A. It should be someplace to the north and west of that.

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

CROSS EXAMINATION

BY MR. NUTTER:

Q. Mr. Ratts, the terminology of the word "quadrant" has got me confused now. Normally we think of a quadrant as being one of the four areas in either a northeast, northwest, southwest or southeast position from a given point. Now when we are talking about bottoming the well in the northwest quadrant, are we talking about bottoming the well in the quadrant that is in the northwest portion of the cross there,

northwest of the kickoff point?

A. That is correct.

Q. Well then how could you go directly east and be in the northwest quadrant?

A. I didn't say you could.

Q. You agreed with Mr. Stamets when he asked you if you could.

A. Yes, you can, yes, and still be in, well --

Q. You wouldn't be in the northwest quadrant any longer, would you?

A. Not from where you took off, no, sir, you could still be in the northwest quadrant of the well, from the surface location.

Q. From the surface location?

A. That's right.

Q. Or the northwest quadrant of the forty-acre tract, but not necessarily in the northwest quadrant from the kickoff point?

A. That's right.

Q. What quadrant were you referring to that your target area was deemed to be, the northwest quadrant of the kickoff point?

A. That is correct.

MR. NUTTER: Thank you.

MR. STAMETS: Any other questions of this witness?

He may be excused.

(THEREUPON, the witness was excused.)

MR. S. BUELL: At this time we would rest our case in chief, reserving the right to put on rebuttal testimony, and also additional testimony, depending on what the opposition develops.

MR. STAMETS: The witness may be excused from the stand. I would like for him to remain available for additional testimony, as well as Mr. Cox.

Mr. Hinkle, or Mr. Buell, who is going to proceed at this time?

MR. HINKLE: We have one witness.

MR. G. BUELL: Mr. Examiner, I'm going to move at this time that we go into the matter of the subpoenaed material. I think it is very material to this case in chief, not only from the standpoint of the material that has been subpoenaed from Eastman, but I'm sure they felt the material they subpoenaed from Amoco was important to their case in chief or they wouldn't have done it.

I think it would be appropriate at this time since they have concluded their direct to go into the matter of the subpoenaed material.

MR. STAMETS: The Commission, at the request of the applicant and also the request of Mr. Guy Buell, and Mr. Hinkle has issued about six supoenas in this case and

at this time I would like to take up the matter of each one of these subpoenas and clarify whether or not we are going to accept this material at this time on all of the subpoenas.

MR. S. BUELL: As far as the Applicant is concerned, we are ready to comply with the subpoena that was issued for Mr. Cox. Incidentally, Mr. Cox tells me that he never got a copy of it, but we have the material. And we would, when we deem it necessary during our presentation of the case, call upon Amoco and Arco to produce their witnesses with the requested material at a later time if we deem it necessary.

MR. G. BUELL: Again I reiterate, Mr. Examiner, I think right now is the time for that.

MR. S. BUELL: If he wants this material we will give it to him, right now. We'll call for ours later.

MR. STAMETS: Okay, the Examiner so directs that this material be submitted at this time.

MR. G. BUELL: Mr. Examiner, I would like for you to hear me briefly on the submission of our material.

MR. STAMETS: Okay. Before we get to that, Mr. Buell, are Mr. Meglasson and Mr. Vickers from Eastman Whipstock present?

MR. VICKERS: Yes, sir.

MR. STAMETS: And have you brought material which was subpoenaed?

MR. VICKERS: Yes, we have.

MR. STAMETS: Is there any objection at this time on your part to the submission of the material subpoenaed?

MR. VICKERS: No, sir.

MR. STAMETS: Okay, the Examiner orders that this material be submitted, which leaves us with subpoenas for Mr. Currens, for Mr. Ricks, and Mr. Howard.

Are you going to speak to all three of these, Mr. Buell?

MR. G. BUELL: No, sir, just Mr. Currens.

MR. HINKLE: I'll speak for Howard and Ricks.

MR. STAMETS: We will listen to you first, Mr. Buell.

MR. G. BUELL: The reason I thought it was extremely appropriate at this time, Mr. Examiner, I notice the hour is almost four twenty-five, and I'm sure that the amount or whatever subpoenaed material you require to be tendered, both sides, all parties would like to have the opportunity to study it overnight before we reconvene tomorrow, I'm sure that would be particularly true in the case of the data that you subpoenaed from us, Mr. Buell, because it is a lot of geological data that a man can't just look at in five minutes and say I've got it.

MR. S. BUELL: Mr. Examiner, we would object to any continuance overnight, we're here for a hearing and --

MR. G. BUELL: I'm talking about a continuance, Mr. Buell. I don't think you are going to ask Mr. Stamets to work all night are you?

MR. S. BUELL: He has been known to do it before, Mr. Buell.

Mr. Examiner, we will produce the stuff that Mr. Buell has subpoenaed at this time and we will call for the material and the witnesses that we have subpoenaed when we deem it necessary in the presentation of our case.

MR. STAMETS: Mr. Guy Buell, your point at this time is not whether or not this material is germane to the hearing, or whether or not you intend to submit it, but only as to a continuance.

MR. G. BUELL: No, sir, I'm not asking for a continuance at all, I can stay here as long as anyone. I want to speak to the pertinance and the relevancy of some of the items that were subpoenaed and that is why I think this is an appropriate time.

MR. STAMETS: I would like to resolve the matter of this subpoena at this time.

MR. G. BUELL: Thank you, Mr. Examiner, as you know, the subpoena from the Commission requested the presence of Mr. Currens and instructed him to bring with him all logs, drilling times, samples, sample logs, and deviation surveys from the surface to the base of the Abo formation,

or six thousand, seven hundred feet, whichever is deeper, on the Amoco Diamond Federal Number 1 well.

If you would look at Mr. Cox's Exhibit Number One, which is right there before you, you can see that the Amoco Diamond Federal Well is south and a little east of the Federal EA Number 1.

We have Mr. Currens here, we have all of the data that was included in the subpoena here. We have no objection to tendering the logs at any time that counsel for the applicant would like to have them and examine them. We have no objection to the logs because in the past, in the interim, Mr. Examiner, between October 8th and this hearing we furnished those to Mr. Buell, he returned them and in view of the fact that we furnished them to him once, we have no objection whatsoever for them being tendered, but I would request that the Examiner hear evidence from the applicant on the relevancy of the other data that had been requested. I'm speaking with regard to the drilling time, samples, sample logs and deviation surveys.

And may we go off the record just a minute, Mr. Examiner?

(THEREUPON, a discussion was held off the record.)

MR. STAMETS: Back on the record.

Mr. Sumner Buell, I presume at this point that

you still wish all of the other material besides the logs?

MR. S. BUELL: Yes, sir.

MR. STAMETS: At this time we will entertain testimony as to the relevancy of the additional data. You may proceed.

MR. G. BUELL: Mr. Examiner, I'm not going to prove the fact that they are relevant. I would like to have that burden on Mr. Sumner Buell.

MR. S. BUELL: We think they are relevant, we have subpoenaed them and if they have some reason to think they are not relevant, let them testify to it. We are just trying to find out the information on the well that sets immediately to the south of us, which is highly relevant with what the structure is down there, what the samples are, what the drilling time is. We don't think we have to prove a thing. They haven't contested these subpoenas before this time or asked for a protective order or any such thing.

MR. G. BUELL: No, sir, I'm here with the material in the room, but I do think the Examiner ought to rule on irrelevancy, and I can't imagine Mr. Sumner Buell doing a vain thing, just willy-nilly subpoenaing material, surely he can justify the relevancy of the material to this particular case.

Mr. Examiner, my objection is a valid type of objection. I'm simply thinking from a standpoint of

unnecessarily burdening the record. If the Applicant doesn't think they are relevant, it could be for the purpose for which he wants to use them, we may be able to stipulate to them.

MR. S. BUELL: Mr. Examiner, can I get heard on this question?

This idea of ruling on relevancy I believe Mr. Guy Buell is asking you to rule in the dark. We haven't moved anything into evidence at this point in time. We are entitled to a little discovery. We have asked for a minimum. If we try to put it into evidence, Mr. Buell can raise all sorts of cain about the introduction at that time.

MR. STAMETS: Mr. Guy Buell, the Examiner will order that the subpoenaed evidence be tendered and we will rule upon the admissibility of the individual pieces of evidence at the time they are submitted in this hearing.

MR. G. BUELL: Fine, Mr. Examiner.

MR. S. BUELL: We don't need it right now.

(THEREUPON, a short discussion was held off the record.)

MR. STAMETS: Mr. Guy Buell, why don't you hold off. As soon as we resolve this we are going to take a short break.

MR. G. BUELL: All right.

MR. STAMETS: Mr. Hinkle?

MR. HINKLE: Mr. R. E. Howard of Atlantic Richfield

was subpoenaed and requested to bring the latest participation parameters, tract summary, from the Empire-Abo pool, Eddy County. Now Mr. Howard is here and is perfectly willing to testify, but I have here the participation parameters and the unit agreement participation and I would like to tender those for what they are worth. These, as I understand it, have already been furnished heretofore to Mr. Cox, and all members of the unit, and I don't see any use of taking the time of the Commission here or of Mr. Howard because this is all he has to present and this is in compliance with the summons.

MR. DAY: Thank you, Mr. Hinkle, we will try to stipulate on that at recess.

MR. HINKLE: Now as far as George Ricks is concerned, he is also an employee of Atlantic Richfield and he was requested to bring all of the drilling records and deviation surveys concerning the Atlantic Richfield 2-11 in the Empire-Abo pool, Unit J, Section 6, Township 18 South, Range 28 East, Eddy County. Now Mr. Ricks is here and he has this information, but this well, this particular well that is referred to was a well that was lost, you might say, because of mechanical failure and the requested permission to deviate it and it was bottomed a hundred and two feet from the surface location. It is our contention that this cannot in any way be material to the issues in

this case, and we therefore request that the Commission rule on this as not being material at this time so that he can be excused.

MR. DAY: Mr. Examiner, if I may be heard? I appreciate Mr. Hinkle's statement, but until we can examine any records brought on that well or the witness, we would not be in a position to agree with Mr. Hinkle's proposal. We need the opportunity to examine the reasons for mechanical failure and the precise location. He says a hundred and two feet from the surface. I don't know whether it went north, south, west or east, and until such a time we feel that it should not be ruled upon by the Examiner at this hearing until we have had that opportunity.

MR. HINKLE: Mr. Examiner, a well which is clear off this lease that deviated cannot in any way be material to the issues of this case and I submit this testimony should be excluded.

MR. STAMETS: The Examiner rules that the material subpoenaed from Mr. Ricks, as well as Mr. Howard, will be tendered, and the admissibility will be ruled upon at the time that any of the information is presented for purposes of the record.

Let's go off the record just a minute.

(THEREUPON, a short discussion was held off the record.)

MR. STAMETS: Let's go back on the record.

At this time we will take a thirty-minute recess and the hearing will be reconvened at five o'clock.

(THEREUPON, the hearing was in recess.)

MR. STAMETS: The Hearing will come to order, please. At this time who is prepared to proceed?

MR. G. BUELL: Please, Mr. Examiner, I am prepared to report under the instructions that the Examiner gave us during the recess.

MR. STAMETS: Okay. Let's go off the record.

(THEREUPON, a discussion was held off the record.)

MR. STAMETS: The Hearing will be recessed until seven o'clock. It will be reconvened at that time in this room.

(THEREUPON, the Hearing was in recess.)

EVENING SESSION

MR. STAMETS: The Hearing will please come to order.

Mr. Buell, are you first?

MR. G. BUELL: Yes, Mr. Examiner, and may I at this time and on the record return to Mr. Sumner Buell the material that was submitted under subpoena by Mr. Cox. As far as we can tell in the time frame we were working in, it is duplicated in the material that Eastman tendered into the record.

And, Mr. Examiner, I would like to call at this time, Mr. Meglasson. Am I pronouncing that right?

MR. STAMETS: At this time I would like to have everybody who has not been sworn, who potentially will be a witness in this case, to stand and be sworn. That would be Mr. Meglasson, Mr. Vickers.

(THEREUPON, the witnesses were duly sworn.)

MR. G. BUELL: Mr. Examiner, I would like to assure you and all others present that I am certainly aware of the lateness of the hour and I will do everything I can to expedite my participation in the Hearing.

E. G. MEGLASSON

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

DIRECT EXAMINATION

BY MR. G. BUELL:

Q. Mr. Meglasson, would you state your complete name, by whom you are employed, in what location, and in what capacity?

A. E. G. Meglasson, District Manager in Midland, Texas.

Q. In your capacity as District Manager, is it of Eastman Whipstock, Inc.?

A. It's Eastman Whipstock.

Q. No Inc.?

A. As far as I know.

Q. What is the scope of your duties as District Manager?

A. I'm over the West Texas District.

Q. Would that include the southeast area of New Mexico?

A. That is correct.

Q. And what is the primary function and business of Eastman Whipstock?

A. Oil field services, directional drilling survey, instrumentation.

Q. And is the fact that the word "whipstock" is in your corporate name or company name, is that indicative of one of the services that you perform?

A. That's true. It started out Whipstock, Incorporated, and Petro-Lane bought them.

Q. Has the trend in recent years been away from using a whipstock to directionally deviate a well and the trend has been in the use of the Dyna-drill?

A. The trend is more so in the Dyna-drill. The whipstock still has its place and we still run them.

Q. Yes, sir, as you probably know from the testimony you have heard here today that the deviation tool that was used on this particular job was a Dyna-drill?

A. Yes, sir.

Q. What is the stage of the science of directionally deviating and controlling a well at this time?

A. Well, I don't understand what you mean.

Q. I mean, is it kind of haphazard that you run a Dyna-drill in the hole and you cross your fingers and you say, "I hope it kicks off in the direction we want," or do you feel that you guys can do the job that you are directed to do?

A. In ninety-nine percent of the cases we can do what we are directed to do.

Q. Will you state for the record just what a Dyna-drill is and how it performs its function of deviating a well?

A. A Dyna-drill is a down-hole motor, it is run by pumping fluid through it. The housing stays still and the rotating sub on the bottom rotates. By putting a bent sub on top of it, or a bent-housing Dyna-drill, we kick these wells off. We drill with it, hold it in one direction, or angle, whatever, and kick the well off.

Q. And are you able to orient the Dyna-drill in such

a manner as it will kick the well off in the pre-determined and desired direction?

A. Yes, sir.

Q. Now you said that ninety-nine percent of the time you can directionally control a well with accuracy. Is the one percent failure that you have, are we talking about a failure there when you wanted to go east and you ended up going west?

A. Yes. I recall one job in the two years that I have been here where we couldn't. We possibly could have by backing up the hole and starting again or something of that nature.

Q. Would you consider it a failure if you missed your pre-determined bottom-hole target by about thirty feet?

A. Yes, sir, if we don't hit the target its --

Q. You consider that a failure even though you are trying to hit that target over six thousand feet below the surface of the earth? If you missed it by thirty feet you consider that a failure?

A. Unless they told us to drill ahead. Unless we had orders otherwise, it's a failure.

Q. About how many wells in southeast New Mexico have you personally been involved in where your company was called on to directionally deviate and control a deviated well?

I'll make it easy, is it many?

A. We've got seven operators, and assuming that we keep three of them busy, that's a lot of them. That's about a hundred days a month, operator days on the job.

Q. All right, sir, in the area of the Empire-Abo which we are dealing with in this subject case, have you generally considered it a problem area from the standpoint of directionally controlling a well and getting within the approximate desired bottom-hole location?

A. No, sir.

Q. To your knowledge and all your experience in southeast New Mexico -- no, not southeast New Mexico, Empire-Abo. Let's keep it to this pool. Has your company ever been called on to kick a well west and it ended up going east, regardless of anything you could do about it?

A. I don't recall any.

Q. You don't recall any?

A. I don't recall one, no.

Q. All right, sir, in the material that you brought to this Hearing under subpoena, and of course, I realize that the record will reflect that you are here yourself under subpoena, one of the documents that was in your file was this plat and I'll pass it down to you and ask you whether or not you can identify that document?

A. Yes, sir.

Q. What is that document?

A. That is a plat that we draw up before the well is started, normally before it is started, or near the beginning of the job.

Q. I notice this plat is headed at the top, "Geo Tech Petroleum, Inc. Federal EA Number 1, Eddy County, New Mexico." Is my observation correct?

A. Yes.

Q. Do you know whether or not Geo Tech Petroleum, Inc. is a corporate name that in some instances Mr. Cox, the Applicant in this case, operates under? If you don't know that, just --

A. I really don't know that.

Q. Do you know whether or not this plat was used on the job on Mr. Cox's well in Eddy County, New Mexico, the Federal EA Number 1?

A. Not this particular plat, one like it was used.

Q. Do you know how this plat came to be in your files and in the material that you brought here today?

A. Yes, sir.

Q. How did it get in there?

A. I run a copy off on a machine from that sepia, then I set down and we have two methods of figuring these holes. Gordon Sheetz and I sat down and plotted these up.

Q. All right, sir. I'll look up -- does this appear to be a plat of the directionally drilled and controlled

new hole in the Federal EA Number 1 Well of Mr. Cox, is that shown by the red line?

A. They are both the same pictures. It is just a different method of figuring our pictures up. One of them is a radius curvature which can't be figured in the field. It goes through the computer. The tangential is what we use in the field.

Q. I see, I thought there was just a red line, but I see now there appears to be a pencil line that closely approximates the red line.

A. Yes, they are very close.

Q. So there are two different methods of figuring?

A. Yes.

Q. Sir, I noticed up in the northwest corner what appears to be a plat of the northwest area of the Cox lease and there outlined in blue it says, "target area". Do you see that?

A. Yes, sir.

Q. What does that mean?

A. That was where we were supposed to bottom the well at whatever TD we were given.

Q. I notice a blue line, that is a straight line starting from the kickoff point, running up to the middle of the target area, labeled, "three, nine, five, point, what is that nine, eight, feet north forty-five degrees west?

A. Yes, sir.

Q. Is north forty-five degrees west about as true a northwest direction as you can go?

A. This is the surface location, this isn't the kickoff point. This is our surface location.

Q. Oh, I see.

A. The kickoff point was in this vicinity here, and I don't know.

Q. Let the record show that what he is saying here, he is showing at shot point approximately in the neighborhood of thirty-six hundred and thirty-seven, fifty-five.

So the straight blue line running to the center of what has been identified as the target area, is from the surface location of the well.

Now let me ask you this, and anytime I ask you a question that you don't know, just say so, because we might let the record reflect that, have I ever talked to you before today except when I introduced myself out in the hall?

A. No, sir.

Q. Let me ask you this: Do you know the origin of the target area that is reflected on this document that you and I have been discussing?

A. If I understand you right, do I know who give it to us?

Q. Yes, sir.

A. A salesman in the company who works for me there and I sent him to Dallas to get it and when he came back this was the information that he brought back.

Q. And that is the extent of your personal knowledge?

A. Yes.

Q. You sent him on a mission to Dallas to get the target area for the well, and this is what he came back with?

A. Yes.

Q. What is that man's name?

A. James Bocoats.

Q. All right, sir, let me ask you this: Directing your attention to the target area in the center of the square that we have been discussing in the northwest corner of this lease, and directing your attention to the bottom-hole location of the deviated well, it would appear that you missed this target by what, about thirty feet?

A. About forty foot, I guess, across here.

Q. Did you say about forty feet?

A. Yes, about forty.

Q. Could you give me what is shown to be the precise bottom-hole location target on this from the standpoint of footages from the north line and the west line?

A. Fifty foot both ways, from the north and fifty foot from the west.

Q. If you precisely hit your target as reflected on

here, it would be fifty feet from the west line and fifty feet from the north line of the lease?

A. That's right.

Q. To your knowledge, was the target which you were instructed to hit changed?

A. Not to my knowledge.

Q. Let me ask you this, Mr. Meglasson, rather than taking a lot of time with me more or less on a fishing expedition, just asking you question after question, can you think of anything else that you know of your own knowledge, that would be with regard to this deviated and controlled well, that would be of benefit to the Commission in resolving this matter?

A. I really don't know of anything. I've talked to them by phone, I'm not actually on the well site.

Q. I asked you of your own knowledge?

A. So I don't really know.

MR. G. BUELL: All right, sir. Mr. Examiner,could I have this marked as Amoco's Exhibit Two for purposes of identification.

(THEREUPON, Amoco's Exhibit Number Two was marked for identification.)

MR. G. BUELL: May it please the Examiner, that's all the questions I have of Mr. Meglasson.

MR. STAMETS: Are there questions of the witness?

I've got a few questions.

I would like to preface this by saying that these questions are just of a general nature about directional drilling, and don't really bear on the case before us, but the Commission would like to take this opportunity when we have got an expert with us to clarify some points which may come up in future cases concerning directional drilling.

CROSS EXAMINATION

BY MR. STAMETS:

Q. Mr. Meglasson, in your opinion, what are the different types of drilling tools which are usable in New Mexico?

A. Your down-hole motors for deflecting. We have a core-head assembly that we use for blind sidetrack, and we have a whipstock and there are several types of whipstocks, a permanent type for casing and open-hole whipstocks, and this sort of thing, and the tools that you run off of them can be varied considerably.

Q. These would be the ones that would be generally usable in this State?

A. Yes.

Q. Now, you talked about that you hit the target about ninety-nine percent of the time. I presume that is the degree of accuracy that can be achieved?

A. Maybe I should qualify that a little bit too, if there is enough time and money, but I will say that the majority of our targets are hit unless we are told to drill ahead.

Q. Would this ninety-nine percent be normally within the reasonable economic limits?

A. I don't know that much about the economics of it.

Q. Well, in your experience in the directional drilling field, are you normally able to achieve that type of accuracy, hit the target ninety-nine percent of the time?

A. Yes.

Q. So in all liklihood that is within the economics?

A. Usually, I would think so.

Q. What are the factors that tend to affect accuracy?

A. The formation dips and fractures have a great deal to do with it. We don't know why exactly, at what depth, or angle these dips have to be to go a certain direction. I don't know which way the fractures lay in there, but from talking to geologists this is what one of our problems is, pulling that bit off. We call it hole walk and this hole walk can be real severe or it may be nil.

Q. Is it any harder to achieve this ninety-nine percent accuracy in so-called New Mexico hardrock country, as compared, say, to the Gulf coast formations?

A. I'll put it this way, it's slower which runs the

the cost up.

Q. You can be as accurate, but it can be more expensive?

A. Yes.

Q. To your knowledge, are there any factors which make directional drilling especially difficult or expensive in New Mexico?

A. No, sir, no more than West Texas, Oklahoma.

Q. Now, during the course of drilling, how do you keep track of where the bottom of the hole is?

A. We run what we call a non-magnetic drill collar in the string. It will be near the bit. In this collar, in the bottom of it, we put what we call a baffle plat, it's a stop. Then we run an instrument in the hole, this instrument takes a picture of a compass and when we get it out we develop this picture and read the direction and the angle that is on this picture.

Q. Who determines how often that is done?

A. The man on the job, the directional driller usually. Sometimes the operator or company intervenes and say they want one here, or there, or wherever, but it is usually the directional driller on the job.

Q. In other words, your men recommend how often they need to be run to achieve the degree of accuracy required?

A. That's right.

Q. After completion how is the bottom of the hole determined?

A. With a gyro-multi-shot run on an electric line, normally.

Q. Now under normal circumstances, when your man makes the determination how often surveys are run during the course of drilling, is it necessary to run this multi-shot survey in order to accurately determine the bottom-hole location?

A. In my opinion it isn't. Of course, there are a lot of discussions on this and is still going on, but in many cases the single-shot picture will be more accurate because we take them closer together. If you will notice on the survey, some of them are thirty foot apart and some of them are sixty. The other method, we pick a ninety-foot for the stand or a hundred foot station, or maybe two hundred foot, and these are further apart and since we are working with triangles, the closer we get those triangles together, the more accurate we are, I feel.

Q. In other words, if the single shots are closer spaced than the multi-shots would be, your degree of accuracy should be more?

A. That is correct, yes, sir.

Q. Conversely, if you don't take the single-shots very often, the multi-shot might determine the bottom-hole location somewhat better?

A. That is correct.

Q. Are there any variables that can happen while you are drilling which would make the accuracy of some of the single-shots suspect, or would this average out?

A. Well, of course, like I say this has been going on for a long time, these discussions, and there are many things that can vary that compass, make it lean one way or the other. The usual rule, the directional man on the job can catch it. If one pictures laying, say, north, and the other picture is due west and we have any angle in the hole, something is wrong, and he should immediately shut down and change his compass, which is a two-minute chore, and take him some pictures to find out where he is.

Q. Since the Commission does not normally have a representative on the floor during the time of drilling, would it be reasonable for the Commission to require this multi-shot as a backup to the single shots taken during drilling?

A. Yes, I would think so.

Q. Now, do you always know before you go to work on a particular hole where the operator wants the hole to be bottomed?

A. We have to know before we set that first tool, if we don't we come up on a bad direction on this first tool and this really throws us behind, and once that angle starts up it creates more problems, because the more angle we have the

less we can turn the hole.

Q. Do you ask the operator or his representative where he wants the hole to be bottomed before you start?

A. We can't even start until -- we don't know what direction to turn the tool.

Q. Suppose I came in and I said I wanted to drill around some junk in the hole and I don't care where it goes.

A. In this case we wouldn't take a picture, we would just go in there and start drilling.

Q. Normally, though, the procedure is to have a target area in mind before you start?

A. No, a lot of our jobs are what we call sidetracks, and some of them we call blind sidetracks because we don't take any pictures, we don't know anything. If you only have a couple of degrees in the hole and in most instances there is no reason to orient, its a waste of money, so we don't recommend that they orient.

Q. Do you in any way guarantee the accuracy of your work?

A. Guarantee?

Q. Right.

A. No, sir.

Q. During the course of drilling how often do you report to the operator or his representative?

A. No certain time, and circumstances dictate when

I call them. If I have an operator on the job and they have a company man on the job, normally I try not to get involved in it, so that we have a three or four way deal there, unless I'm asked to. If I have an operator on the job who doesn't communicate with the office then I try to gap that in. So it depends on the circumstances. If the job is going good, they just drill it, no problems, I may not call them for several days or a week, I may not call him if it is going good. If we get into problems then I --

Q. You say if you get into problems, would that include if the hole is not going where the operator wants it to go?

A. Sometimes, yes, if we run an abnormal amount of tools, if we have to run too many tools and we are not getting good runs or something of this nature, I try to work out the problems.

Q. The direction of my question, Mr. Meglasson, would be to this point: If the Commission authorizes an operator to drill a well to a certain bottom-hole location, would you report to him often enough for him to be assured that it is not going to wind up someplace else?

A. Yes, sir, we don't have a man on the payroll that would start without permission.

Q. Now, and I want to get this clear, I'm not speaking about records which we could require directly from you, these would be records which we would require the

operator to obtain from you and submit to us. Are there records which the Commission could require to be submitted which would verify that the directional drilling company was directed to drill within the target area prescribed by the Commission?

A. We don't have them sign anything, I think I understand, we don't have them sign anything or anything. Most of this is done on a notepad and once we get the plat drawn up the notes are thrown away and this sort of thing. We don't go and have him to sign this approving this or anything of this nature.

Q. Is there anything in the nature of a contract or agreement that indicates where the hole is supposed to be bottomed?

A. No, sir, there is none. There is no contract or anything.

Q. I do have two or three questions concerning this particular hole, and should those be directed to you or to Mr. Vickers?

A. If they are pertaining to the drilling of the well, I believe to Mr. Vickers.

MR. STAMETS: Okay, I will reserve those questions for Mr. Vickers. Are there any other questions of this witness?

MR. DAY: Yes, sir, is it my turn?

MR. STAMETS: Yes, Mr. Day.

CROSS EXAMINATION

BY MR. DAY:

Q. Mr. Meglasson, I'm Jim Day, co-counsel with Sumner Buell on this case.

May I ask you, did you do the plotting of this line, I'm referring to the red line and pencil line, apparently, on Exhibit Two of Amoco?

A. Yes, I plotted both of them.

Q. Then you plotted these from what information?

A. The information that I turned over.

Q. Well, may I ask you, the surveys, the single-shot surveys?

A. Yes.

Q. And in your opinion, is this an accurate plotting of the direction of the drilling of this well?

A. Yes.

Q. And is it your opinion that a multi-shot would not add or subtract from this plotting of this curve.

A. A multi-shot will show different figures at the bottom of the hole.

Q. Could you elaborate?

A. They are never exactly together because as I explained before, they are taken at different stations.

Q. At the bottom of the hole, well, would you elaborate on what you mean by the bottom of the hole?

A. Well, whatever the TD is, the very last.

Q. The very last end of the point?

A. Yes, it would vary all up and down there.

Q. You are satisfied then that this well is on this lease?

A. Yes, sir.

Q. All right, sir, and this depth, give or take, is what?

A. Well, that is just what's on -- you would have to ask Vic as to what depth he actually drilled to.

Q. The Examiner asked you if the ninety-nine percent accuracy is guaranteed, but he also asked you if it would be within economic limits, do you recall that question?

A. Yes.

Q. What does economic limits mean to you? Do you know what it means?

A. That is rather vague.

Q. All right, sir. Mr. Meglasson, is this the usual form by which your company starts off with a target area?

A. Yes, sir.

Q. In other words, this type of paper, drawings, and everything?

A. Yes.

Q. To your knowledge, do you know who drew -- I'm talking about the heavy blue lines on this graph paper, on Exhibit Two?

A. We have three men who can do it, or four, and I don't know which one really drew this particular one.

Q. One of Eastman's men and that is why you have the sepia, of course?

A. Yes.

Q. All right, sir. Has your company done business for Amoco before?

A. Yes.

Q. Has your company done quite a bit of business for Amoco?

A. Yes.

Q. All right, sir, but have you yourself done any work for your company in this Empire-Abo field, you yourself?

A. No, sir.

Q. Are you aware that there is a drift in the Empire-Abo field area?

A. Nothing except what I can see on the wall.

Q. All right, sir. Is this the first job, to your knowledge, that Eastman has done for Mr. Cox?

A. To my knowledge.

Q. Or Geo Tech?

A. To my knowledge, yes, sir.

Q. You know of no other work that Eastman has ever done for Mr. Cox or Geo Tech?

A. No.

MR. STAMETS: Mr. Day, do you have some additional questions?

Q. (Mr. Day continuing.) What was the job that did not work out for you that your company was on that did not work out?

A. It was a job in West Texas for another company.

MR. DAY: All right, sir, we pass the witness.

MR. STAMETS: One question I would like to ask. Is this a copy of the exact plat that was used relative to this well? You said it was a copy.

MR. MEGLASSON: Yes, it's a copy of this sepia and we make all of our copies from that sepia.

MR. STAMETS: So this would reflect what you were normally using in your office or in the field relating to your work?

MR. MEGLASSON: Yes.

MR. G. BUELL: Please, Mr. Examiner, I would like to state for the record that the sepia that he has referred to is in the material that he furnished and in my haste I used this print instead of the sepia, but the sepia was in the material that he furnished us. Would the Examiner like to have it identified? The sepia does not have the trace of

the deviated and controlled wells.

MR. STAMETS: No, I don't believe so. That information appears to be reflected on the blue line.

MR. G. BUELL: I did want to assure the Commission that the sepia was in there and we accidentally overlooked it in our haste.

MR. STAMETS: Mr. Hinkle?

CROSS EXAMINATION

BY MR. HINKLE:

Q. Mr. Meglasson, the way you figured your bottom here, how far does that show from the lease line?

A. Tangential method, six foot. The radius of the curve here looks like about nine foot.

Q. What would be the expected radius of error of the bottom-hole location that is shown there, the expected radius of error, would it be ten, twenty, or thirty feet? Is that right pinpointed exactly or could there be radius of error there?

A. Most certainly, there has to be some error in a survey.

Q. What is the normal radius of error, is is ten, twenty or thirty feet, or what?

A. We have no way to check.

Q. From your experience do you know what it has been?

A. Well, when you say radius of error, we don't know which one, we can run one behind it, but we don't know which one is in error and possibly both of them are in error.

Q. If it is ten feet or more, if there is an error, that could be over across the lease line, could it not?

A. Yes, sir.

MR. HINKLE: That's all.

MR. STAMETS: Any other questions of this witness?

MR. G. BUELL: I have one.

REDIRECT EXAMINATION

BY MR. G. BUELL:

Q. Would you assume for the purpose of this question that your instructions and your assigned target area on this well, with the hundred-foot radius that you see here on Amoco's Exhibit One, does your company have the expertise and the techniques that you could have bottomed this well within this hundred-foot radius, if that had been your instructions?

A. To my opinion we could have.

Q. All right, sir, let me ask you this: Assume for the purpose of this question that your instructions and your orders were to kick out of the old hole, such as was done here, and then after you had kicked out return the well to verticle and drill it approximately vertical to the total depth. Do you have the expertise and the techniques and the

will be located in relation to the surface locations.

Q. Let me ask you this right at the outset: Is there a difference in directionally deviating and directionally controlling a well, such as was done here, as contrasted with deviating around junk in the hole or something of that nature?

A. Yes, there is.

Q. All right, sir, now with that out of the way, would you go on and explain just how you use this plat?

A. Well, when I began this well, normally at this point, this point right here indicates --

Q. This point?

A. This is called a vertical section.

Q. And you are speaking of the lefthand side of the document that you have identified?

A. The lefthand side, and this is the plan. This is a vertical section of the wellbore and this is a horizontal plan.

Q. Mr. Vickers, when we are both talking the reporter is going to miss both of our words of wisdom and not get either one of them.

A. I was still answering your question.

Q. I know, but see we can't get a finger into the record or anything like that, so you were referring to the vertical, did you call it scale?

A. No, vertical section.

Q. Vertical section. You were referring to a plot on the lefthand side of the document you have identified as your working plat?

A. Yes.

Q. Now, would you explain what the vertical section is?

A. The vertical section indicates the amount of drilling space vertically, the true vertical drilling space to the TD of the well, and also the measured depth, plus the amount of angle required to go from the surface location to this center point on the horizontal plat.

Q. Let me ask you this, Mr. Vickers: What is the significance of the area that is shaded in black again on your vertical section that looks like the skyline of a city?

A. This is a -- I hate to say that -- this is the plot I made here on the drilling time on one of these wells close to this well, I don't even know which one it was, in order to try to correlate drilling breaks with the drilling time in the well we were drilling in order to pick suitable places to run the down-hole motor.

Q. When you say down-hole motor, that's synonymous with the Dyna-drill?

A. Dyna-drill, right.

Q. Let me ask you this: Do you get all of these

background data, such as you were just discussing, drilling time, all that you can in the area to aid you in directionally controlling the well and making it easier for you to hit your bottom-hole target?

A. Well, normally one, one that is closest if we can come up with it. Usually the one is all I will use.

Q. All right, sir, let me ask you this, Mr. Vickers: Does this document that you have identified as your working plat show a target area similar to the target area on what has been identified as Amoco's Exhibit Number Two?

A. Yes.

Q. And it also shows a straight blue line from the surface location of the EA Number 1 to the center of the target area which has previously been located as fifty feet from the north and fifty feet from the west line, is that correct?

A. That is correct.

Q. All right, sir, I notice also on your working plat what appears to me to be the directional pattern of the deviated directionally controlled hole, is that observation correct?

A. Yes.

Q. I'm referring now to what appears to be, in this light, a pencil line which is below the straight blue line which we have discussed.

A. This line here?

Q. No, sir, this one right here.

A. This is an actual record of the single shot pictures, a graphic record.

Q. How did that get on this document?

A. I placed those on there as the well was being drilled as they were taken.

Q. Let me ask you this to clear it up in my own mind, and I'll refer to my Exhibit One, since I'm more familiar with it than I am your working plat. At every depth interval here, where I have indicated a shot point like thirty-eight, twenty-two, four thousand and seven, forty-one, oh, one, forty-one, ninety-six. Were these run -- did you run a whole bunch of these at one time and shoot at these different footages, or did you, say, run this one at four thousand and seven, get a reading, and then drill ahead, take a reading at forty-one, oh, one, and then drill ahead, forty-one, ninety-six and then drill ahead?

A. The latter.

Q. The latter. So that at any of these points, these shot points, you knew as soon as you had the shot points and they had been processed and you had looked at them, the direction this deviated well was taking?

A. Yes.

Q. All right, sir, let me ask you this, Mr. Vickers:

How did you come in possession of this working plat that has the target area depicted up in the northwest corner of the lease as shown on your working plat?

A. This was given to me in our office as a working plat for the well.

Q. Do you know of your own knowledge who set this target area?

A. I have no idea.

Q. Did you have this out at the well with you all of the time and were you looking at it out at the well and referring to it out at the well?

A. Yes.

Q. Let me ask you this: On any of the daily reports that you make out, and I'm talking specifically with what is headed, "Eastman Oil Well Survey Company Daily Work Report". Are any of those work reports furnished to the operator of the well?

A. No, unless they request them.

Q. Do you know whether or not it was requested in this case?

A. You mean during the course of the drilling of the well?

Q. Mr. Vickers, all I know is that in the documents that Mr. Cox furnished us, he furnished us copies of the daily work report. Do you have any idea when he received

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A. You mean during the course of the drilling of the well?

Q. Mr. Vickers, all I know is that in the documents that Mr. Cox furnished us, he furnished us copies of the daily work report. Do you have any idea when he received

those?

A. Of my own knowledge, no, I do not.

Q. All right, sir, now, let me ask you this with regard to the original Dyna-drill orientation, when you were kicking out of the old Number One hole, do you recall whether you were given any specific instructions at that time or were you simply going to orient your Dyna-drill to conform with what you had been told was your target area?

A. I set the first tool primarily to come out along this objective direction.

Q. You headed in the direction of what you had been instructed was the target area?

A. Yes, sir.

Q. All right, sir, do you recall, the records are rather confusing, Mr. Vickers, with respect to how many Dyna-drills were run in, and again I'm referring to Exhibit One. In this area where we see the divergence of the deviated well with the old random deviation of the old hole, on our Exhibit Number One we have two red arrows, which I have explained indicate where a Dyna-drill was run. Interpreting some of the documents that have been filed, you might think that three Dyna-drills were run. Do you recall in this particular area, at this particular depth, how many were run?

A. To the best of my knowledge, two Dyna-drills were

run. The first Dyna-Drill was on a poor plug and it was a total loss, a failure.

Q. Mr. Cox has testified that he can certainly tell by the time of shot point thirty-eight, eighty-five that you were out of the old deviated hole, would you agree with him that by the shot point at thirty-eight, eighty-five you could tell that you were out of the old hole?

A. Not with what I have here. From my own knowldege though, I'm sure that we could tell that.

Q. Could you tell by looking at what is depicted here on Amoco's Exhibit One?

A. Well, I have to get up there and see.

Q. Please do, Mr. Vickers.

A. Yes, this does show a sidetrack from the original hole.

Q. All right, sir, and based on these single-shot readings that you were getting, would you agree with me, approximately every sixty-five foot of depth you had a single-shot reading?

A. According to what you have here, but I don't know if it coincides with what we have.

Q. Mr. Vickers, let me assure you, and I realize this exhibit is subject to being proved up, Mr. Buell, but let me assure you that this is as faithful a reproduction off of your single-shot survey as we can make. Assuming that we are

accurate then you would say that it appears to be about every sixty-five feet.

A. Yes, right.

Q. All right, sir, at any of these shot points between four thousand and seven, and forty-five, eighty-two, that you see on Amoco's Exhibit Two, would you, Mr. Vickers, have been concerned about the direction the well was taking?

A. Not enough to -- no.

Q. All right, sir, now the Dyna-drill was run shortly below depth forty-six, seventy-three. Do you recall why a Dyna-drill was run at that point?

A. To the best of my knowledge, from what I can remember, at that point the angle had increased to a greater amount than we needed to get into our target area, and also our directions needed to be corrected from what we call a righthand turn. In other words, turn the hole to the right.

Q. Let me ask you this, Mr. Vickers: Based on the shot readings you have, and knowing your total depth objective, would you have had any concern, you as an expert, that if you continued the course that you were following at forty-six, seventy-three, that your bottom-hole location could well be off the lease?

A. Yes.

Q. All right, sir, do you recall any of the instructions that were given you by any representative of Mr. Cox

at this point as to how to orient the Dyna-drill? I'm speaking of the Dyna-drill that you run shortly after a depth of forty-six, seventy-three.

A. Can you state that question again?

Q. Yes. Do you recall any instructions that were given you by Mr. Cox or any of his representatives at the time you ran this Dyna-drill with regard to orienting it north or orienting it east?

A. The only thing I remember would be a conversation with Mr. Ratts. I didn't have any dealing with Mr. Cox at that time.

Q. All right, sir, do you remember any specific instructions that he gave you?

A. The only -- I made a recommendation at this point that the well should be turned to the right, back towards the target area, the center of the target area.

Q. Did Mr. Ratts agree with you at that time?

A. Yes.

Q. At this time when you were discussing this with Mr. Ratts did you have your working plat out before you so that he could see the target area?

A. At sometime during this decision-making time, yes.

Q. There was no doubt in your mind or in his mind that you were both talking about the same target area?

A. Well, I can't answer for him, but for me, no.

Q. Let me ask you this: Do you have the ability in your knowledge and technique of orienting the Dyna-drill, if you had wanted to could you have oriented that Dyna-drill such that the well would have kicked off in a true north direction?

A. Well, in order to answer that I need those -- I would need my computation sheets, because it all hinges on how much angle we had in the hole.

Q. All right, sir, here is the package of material that you brought and I recall seeing your computation sheets. Please refer to it.

A. Would you repeat again what depth and what we were discussing?

Q. All right, sir, we were discussing the Dyna-drill that was run slightly below forty-six, seventy-three, and my question was, whether or not you could have oriented that Dyna-drill such that you would have taken the well off in a true north direction?

A. This could have been done, but probably not with one single run. In other words, it would have required a considerable amount of hole, something like several hundred feet of hole.

Q. All right, sir, let me ask you this while you are looking at your data there, or your computations: Did you have the ability to orient the Dyna-drill such that you would

have moved the direction of the hole farther to the right than you actually moved it?

A. Come again.

Q. Remember first I asked you about due north. I'm now asking you if the Dyna-drill run slightly below forty-six seventy-three, if you could have oriented it such that the well would have gone farther to the right than it actually did?

A. Well, it wouldn't have hinged on the orientation, but the amount of hole that we were able to make.

Q. But you could have moved farther to the right?

A. Yes, with more hole.

Q. But your concern there was simply, one, to move it far enough to the right so the bottom of the hole wouldn't go off the lease, and, two, move it farther to the right so it would be more nearly the approximate center of your target area?

A. Yes.

Q. And your recommendation to Mr. Ratts with regard to setting it was accepted?

A. Yes.

Q. All right, sir, let's go on down the hole to the Dyna-drill that was set at approximately fifty-two, twenty-seven.

A. Okay.

Q. Now, do you recall any specific instructions on that Dyna-drill run from either Mr. Cox or Mr. Ratts?

A. No, there again I made the recommendation again.

Q. All right, what was the basis of your recommendation; why did you make a recommendation?

A. On the same as before.

Q. Again using this straightedge, does it appear obvious that if you had followed the path that the well was on prior to running that Dyna-drill that the bottom-hole location would have been off the lease?

A. Yes.

Q. And also you wanted to turn it to the right a little to more nearly hit the center of your target area?

A. The objective at all times was to hit the center of the target area.

Q. And stay on the lease?

A. Well, we would have automatically done that.

Q. Yes, sir, it would follow. All right, sir, lets go on down to the Dyna-drill that was run at fifty-eight, twenty-three. Was this your recommendation or was there any specific recommendations or instructions from either Mr. Cox or Mr. Ratts?

A. No, there again I made this recommendation. We had some mechanical problems there and ran a three-cone double bit and our whole direction changed radically back

toward the west as a result and it was imperative that we did set this tool.

Q. You were afraid with the distance you still had left to drill that unless you moved her to the right you would go off the lease?

A. There it is the same reason as before, so we could get closer to the center of the target.

Q. All right, sir, do you recall any instructions you received from the time you first set your Dyna-drill, the last time you set your Dyna-drill at fifty-eight, twenty-three, of having anybody telling you to turn it due east, or anybody in the Cox organization telling you to turn it due north?

A. To the best of my memory I don't.

Q. Was anything ever said to you by Mr. Cox or Mr. Ratts that would indicate to you in any way that the target area that you were hitting at, fifty feet from the north and fifty feet from the west line, was not also their target area?

A. Well, to the best of my knowledge, no, we were working to that point.

Q. Let me ask you this while we are looking at Exhibit One: Assume for the purpose of this question that your instructions from the operator were to deviate this well such that the bottom-hole location would be somewhere in this hundred-foot radius that you see on Exhibit One, do you feel that you have the expertise and the techniques and

the ability to have bottomed that well at that location?

A. In my opinion that is true.

Q. Let me ask you this question and assume for the purposes of this question that your instructions were: Kick out of the old hole, return the well to verticle, and bottom it in close proximity to the kick-out surface location, could you have done that?

A. Within reasonable limits, to the best of my knowledge.

Q. Mr. Vickers let me ask you the same question I asked Mr. Meglasson. Rather than me take up your time, my time and everyone's time with this fishing-expedition type of questions. You have been in the hearing room all this afternoon, can you think of anything that I have overlooked asking you that you think would be of benefit to the Commission in making their decision?

A. No, I don't think so.

Q. Let me have your working plat.

MR. G. BUELL: Mr. Examiner, may I have this working plat of Mr. Vickers identified as Amoco's Exhibit Three?

MR. STAMETS: It will be so identified.

(THEREUPON, Amoco's Exhibit Number Three was marked for identification.)

MR. G. BUELL: Mr. Examiner, I am returning to the

center of the table, the documents that have not been identified as an Amoco exhibit, that were furnished by Mr. Vickers and Mr. Meglasson, and I think I intended to return to Mr. Buell, if I didn't, the documents furnished by Mr. Cox.

That is all I have of Mr. Vickers.

MR. STAMETS: Are there questions of Mr. Vickers? Mr. Hinkle?

MR. HINKLE: No.

CROSS EXAMINATION

BY MR. STAMETS:

Q. Mr. Vickers, is this hole bottomed where it is, within reasonable limits, because that is where you were told to bottom it, or because of mechanical considerations?

A. Well, the best way I could put this is that it is bottomed within the target area. Is that the answer to the question you asked?

Q. No. Were you told to bottom this hole within the target area?

A. Yes, sir.

Q. By whom?

A. By Mr. Ratts and Mr. Cox.

Q. Personally by Mr. Cox?

A. I could not say that for certain because -- but he

was on the scene there.

Q. You were told to bottom it in this target area personally by Mr. Ratts?

A. Well, yes.

Q. Before the first Dyna-drill was set?

A. At the time the well started.

Q. At the time of the kickoff?

A. When the directional drilling began.

MR. STAMETS: Any other questions of the witness?

MR. DAY: Yes.

CROSS EXAMINATION

BY MR. DAY:

Q. Mr. Vickers, you were asked on examination by Mr. Guy Buell about orders and who told you and so forth. He asked if Mr. Cox had told you about the target area and you stated that, no, he hadn't. When Mr. Examiner asked you the same question you said, yes, he had, then you later changed it to no. I want you to very carefully search your memory and state, where you can positively state under oath, that Mr. Ratts told you to go to that target area.

A. I don't know that actually my memory is that good.

Q. Thank you, Mr. Vickers, for being honest.

This is Exhibit Number Three and these calculations

here on this line, directional drilling, are your calculations, is that correct?

A. Yes.

Q. And these that were done on Exhibit Number Two were not done by you, but by someone else?

A. That is correct.

Q. But they were pretty much on the money together, were they not?

A. Yes.

Q. Are you satisfied with the accuracy of your plotting?

A. Yes.

Q. And you have heard the figure, ninety-nine percent, are you ninety-nine percent certain this is accurate and that you are bottomed within the lease line?

A. To the best of my knowledge.

Q. Mr. Vickers, it seems like every time that either referring to that Exhibit One or any of these exhibits here, that each time that the Dyna-drill was turned the well would still drift, is that correct, and you would have to go and turn it again, or use the Dyna-drill again?

A. It had a tendency to walk, as we would say, to walk to the left.

Q. To the left?

A. Yes.

Q. And it then needed continuing attention to try to

turn it back?

A. Each one of these tools was set to turn it back toward the target.

Q. There is one thing that I don't quite grasp or understand, and if you would explain it for me. What is this shaded area here which is the inside shaded area that Mr. Guy Buell referred to as the skyline; this represents what?

A. That's the drilling time.

Q. Of this well?

A. Of the sidetrack hole.

Q. But not this one?

A. That hole, yes.

Q. This one that you were in charge of?

A. Yes.

Q. What does this indicate here, at what depth and what did it indicate?

A. To the best of my knowledge it indicates the rate of penetration, the number of minutes for ten feet.

Q. And is this a depth that you have written here?

A. That's at forty-six, seventy-three.

Q. And does that indicate a soft spot?

A. Directly below there, yes.

Q. All right. Do you know Mr. Ben Scotter?

A. Yes.

Q. And Mr. Lipsky?

A. Yes.

Q. And, of course, you can identify Mr. Ratts?

A. Yes.

MR. DAY: We pass the witness.

MR. STAMETS: I've got a couple more questions, Mr. Vickers.

FURTHER CROSS EXAMINATION

BY MR. STAMETS:

Q. During the course of the drilling of this hole, from the kickoff point to total depth, did you have this plat which is marked Exhibit Three in your possession, was it on the floor, was it around the room, where was this plat?

A. This was in my possession all of the time.

Q. And during the course of the drilling did you and Mr. Ratts look at the plat to see where the hole was going?

A. Yes, we compared notes, on practically after each picture was taken practically.

Q. How about Mr. Cox, did he also see this while the drilling was going on?

A. No, Mr. Cox was only there the last four, or maybe five days.

Q. Did Mr. Ratts or Mr. Cox upon observing this direct you to drill the well to any other area other than what has been called the target area?

A. To my knowledge, no.

MR. STAMETS: Thank you.

Any other questions?

MR. G. BUELL: I have one, Mr. Examiner.

MR. STAMETS: Mr. Guy Buell.

MR. G. BUELL: Mr. Vickers I overlooked asking you this, I certainly intended to. I'm going to refer to the three Dyna-drill runs that were made and reflected on Exhibit One by our red arrows, after you kicked out of the old hole. Running three Dyna-drills over this vertical distance when your target area is in such close proximity to a lease line, are three runs of the Dyna-drill unusual, or would you say that would be fairly standard for this vertical depth, working this close to a lease line?

MR. VICKERS: It would be about normal.

MR. G. BUELL: Thank you. That's all I have, Mr. Examiner.

At this time I offer into evidence what has been identified as Amoco's Two and Three, both being documents furnished under subpoena by Eastman Whipstock.

MR. STAMETS: Any objection to the admission of these exhibits? They will be admitted.

Any other questions of this witness? He may be excused.

(THEREUPON, the witness was excused.)

MR. STAMETS: You may call your next witness, Mr. Buell

MR. G. BUELL: If it please the Commission, at this time I'm going to yield to Mr. Hinkle.

MR. STAMETS: Mr. Hinkle?

(THEREUPON, a short recess was taken.)

MR. STAMETS: The Hearing will please come to order. Mr. Hinkle, you may proceed.

HUGH CHRISTIANSON

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

DIRECT EXAMINATION

BY MR. HINKLE:

Q. State your name, your residence and by whom you are employed?

A. My name is Hugh Christianson, I reside in Midland, Texas and I'm employed by the Atlantic Richfield Company.

Q. What is your position with Atlantic Richfield?

A. Currently I'm a Senior Operations Engineer with responsibilities for the Empire-Abo engineering group.

Q. Have you made a study of the Empire-Abo area since the very beginning and before it was unitized?

A. That's right. I was first transferred to Roswell, New Mexico specifically to work on pre-unitization phases of the Empire-Abo unit in 1967 and I have been working

continuously on the Empire-Abo unit in various capacities since that time.

Q. You were the principal witness in the various hearings which have been held in connection with the Empire-Abo?

A. That is correct.

Q. Since the very beginning of the unitization of the Empire-Abo?

A. 1967, and prior to the formation of the engineering geological committee and I've been continuously at it since then.

MR. HINKLE: Are the witness's qualifications acceptable?

MR. STAMETS: They are.

Q. (Mr. Hinkle continuing.) You have heard the testimony of Mr. R. G. Cox at the hearing on October 8th and today?

A. That is correct.

Q. And I believe you heard his testimony to the effect that his conclusion is that his well is completed in an isolated stringer of the Abo formation and there is no communication between that stringer and the Abo reef which is unitized under the Empire-Abo unit, is that correct?

A. That is my understanding of the burden of Mr. Cox's testimony, yes.

Q. Have you prepared exhibits for introduction in this

case?

A. Yes, sir, I have.

Q. And are they directed toward this particular thing that we have just testified to?

A. Yes, sir, that is correct. I might say that they were prepared by me or under my supervision and they were directed towards this particular burden of Mr. Cox's presentation.

Q. And they are the exhibits that have been marked One through Five?

A. That's right.

Q. Refer to Exhibit One and explain what this is and what it shows?

A. Well Exhibit One is a copy of the survey report of Mr. John W. West on a survey taken October 20th, 1975. And this survey which was witnessed by representatives of the NMOCC and USGS and of Atlantic Richfield established and verfied that the Robert G. Cox Federal EA Well Number 1 has a surface location some three hundred and thirty feet from the west line and three hundred and thirty-one feet from the north line of Section 12, Township 18 South, Range 27 East, Eddy County, New Mexico.

Q. Is this the survey that was authorized or discussed at the hearing on October 8th?

A. Yes, it was.

Q Refer to Exhibit Two and explain what this is and what it shows?

A Exhibit Two is a copy of a single page from the regular monthly statistical report put out under the auspices of the New Mexico Oil Conservation Commission, and it is entitled, "New Mexico Oil Conservation Commission Monthly Statistical Report, Volume I, Southeast New Mexico, June 1975," and this is page one fifty-five. The purpose of submitting this sheet is to correct an error in the production data as submitted October 8th, 1975 by Mr. Cox in his, I believe it is Exhibit Number Six which is a structural east-west cross section, south flank, Empire-Abo pool.

I've got a copy that we have of that. Okay, specifically, let me call your attention to the fact that Mr. Cox in his Exhibit Six of October 8th, it was a cross section, and the particular well I want to direct your attention to was the Pan American Malco J Number 1, log cross section. At the bottom of this cross section there were some monthly production figures stated for the month of June 1975. They said, and I'm reading from Mr. Cox's Exhibit Six that: (Reading.) For this well, Pan American Malco J Number 1, the monthly production for June 1975 was thirty-seven hundred and eighty barrels of oil, seventy-five hundred and sixty MCF of gas, seventeen hundred and seventy-three barrels of water. (End of reading.)

That well now is the Empire-Abo Unit M Number 16 Well under our unit designation, so I would like to direct the Examiner's attention back to the 1975 monthly statistical report, page one hundred and fifty-five, and if you will look down here on the left, column one where it says: "Description, Empire-Abo Unit M", about half way down the page and then follow down the well numbers under the well column, you will find Well Number 16, and all the data on that line, that horizontal line across from Well Number 16 has to do with Well Number 16's production.

To compare with Mr. Cox's data we find that the oil production column, which is about three columns or so over to the right, thirty-seven hundred and eighty barrels of oil were produced from that M-16 Well for the month of June 1975, and this agrees with Mr. Cox's Exhibit Six.

And then we move one more column over which is the casinghead allowable column. Now this column is determined simply by multiplying the oil allowable over here in our previous column, thirty-seven hundred and eighty barrels of oil, times two thousand to one, and this is how the casing-head allowable column is determined. We find that number seventy-five hundred and sixty, and we look over here at Mr. Cox's Exhibit Six and there listed as monthly production for June 1975 is that number, seventy-five hundred and sixty MCF gas.

If you want to get the actual production from that well we move back to page one fifty-five here, the 1975 monthly statistical report, and we find in the gas production column a figure of thirty-eight hundred and ninety-five MCF of gas was produced along with the thirty-seven hundred and eighty barrels of oil that were produced in the month of June. If we divide the thirty-eight, ninety-five actual MCF of gas produced by the thirty-seven hundred and eighty barrels of oil produced we get a gas-oil ratio of a thousand thirty cubic feet per barrel, not the two thousand to one GOR indicated by Mr. Cox's Exhibit Six.

And the importance of this correction is that at least twice in Mr. Cox's testimony of October 8th he specifically compared this particular well to his own well in saying that the two thousand to one GOR on the Malco J 1 Unit M-16 well varied so much from his own well's GOR of eight eighty-two, that it indicated the possibility of a separate reservoir and I'm simply stating that the comparison should have been between the Cox Federal EA Number 1 GOR of eight eighty-two cubic feet per barrel and an actual GOR of a thousand and thirty cubic feet per barrel on this west offset Unit M-16 or Malco J 1 Well, which in my opinion is strongly supportive of reservoir communication between the two wells, so this is just setting the record straigh on that point.

Q. Now refer to Exhibit Three and explain what this shows?

A. Exhibit Three is a table and this table compares, as noted at the top, gas-oil ratios and API oil gravities for the Cox EA Federal Number 1 as compared to the four nearest offset producing wells in the Empire-Abo unit.

The unit prouction data that you see on this table is either from the NMOCC Form C-115 submitted by the operator or the monthly statistical report, volume one, that we have previously referred to one page of here.

Looking under Roman One, gas-oil ratio comparison, Table A, Empire-Abo unit well, June 1975, and looking in column number one, operator and well, Empire-Abo Unit L-16, which is a northwest offset to Mr. Cox's well, had a gas-oil ratio in June of '75 of ten, seventy-three cubic feet. Well, I'm looking over here in column four for that data.

The north offset to Mr. Cox's well, EAU L-17 had a gas-oil ratio of seven eighty-one cubic feet per barrel in the month of June.

The northeast offset, Empire-Abo unit L-18 in column four had a gas-oil ratio of eight, oh, six cubic feet per barrel, and the west offset, the EAU M-16, a well we have already talked about, had a gas-oil ratio of ten, thirty cubic feet per barrel, and when we add the total gas production for these four offset wells to Mr. Cox's EA Federal Number 1

and the total oil production and we divide the total gas production by the total oil production we get an average gas-oil ratio for those four direct offsets to the Cox Federal EA Number 1, of nine hundred cubic feet per barrel for the month of June.

In the same manner, Roman One, Table B, simply gives another month's data, September 1975, and I won't go through those same four wells except to say that the average gas-oil ratio for the four wells was eight, ninety-eight cubic feet per barrel, so we've got an average GOR of nine hundred cubic feet per barrel in the month of June for these four offset wells and eight, ninety-eight cubic feet per barrel for the month of September, and we drop down to Roman One-C, which is Mr. Cox's EA Federal Number 1 Well for September 1975, reported data we have on production for that well. It was reported to have produced six hundred MCF, seven hundred barrels of oil for a gas-oil ratio of eight, fifty-seven and an actual test, a twenty-four hour test taken nine, fifteen, seventy-five, thirty-four oil and thirty MCF gas for a gas-oil ratio of eight, eighty-two cubic feet per barrel. So we are comparing the average GOR's on the four Empire-Abo Unit offset wells of nine hundred cubic feet per barrel in June, eight, ninety-eight cubic feet per barrel in September, with Mr. Cox's two ratios of eight, fifty-seven and eight, eighty-two, and as I understand he is not selling that gas anyway so that these

ratios are approximate. These three ratios, these ratio comparisons, indicate to me that the wells are in the same reservoir.

And then we move over to page two of Exhibit Three, and this is Roman Two, the oil API gravity comparison. For the Empire-Abo unit the two nearest batteries to the Cox EA Federal Number One well, and these batteries, of course, each one of them has a number of wells going into it. One of them is perhaps a half-a-mile northwest, the other less than that northeast of the Cox EA Federal Number 1 well. We see the average API oil gravity, representative gravity for September 1975 on battery M-14 was forty-three point five degrees API. On battery K-18 was forty-three point eight degrees API.

Roman Two, item B there gives Mr. Cox's EA Federal Number 1, gravity reported on the USGS well completion or recompletion report and log, test date of nine, fifteen, seventy-five. That gravity is forty-three degrees, so we are comparing Empire-Abo unit gravities of forty-three point five and forty-three point eight with Mr. Cox's well gravity of forty-three.

Q. Mr. Christianson, I believe that you have on the board --

A. I'm not quite completed, excuse me.

In my opinion then, this above data that I have just reported, plus the cross sections that I will be

talking about in a minute, indicate that the Cox EA Federal Number 1 completion is in a portion of the Abo reef, and is communicated to the Empire-Abo reservoir, and I would like to mention finally that the best proof and an added proof of reservoir connection would be a forty-eight, seventy-two hour shut-in reservoir pressure build-up test on Mr. Cox's EA Federal Number 1 Well.

Q. Now, referring to your Exhibit Four on the board, do you want to go up there?

A. Yes, I do want to mention in connection with the pressure build-up, there was some discussion, I believe, in the October 8th session that there might be damage to the well, to Mr. Cox's well, if the well were shut in for a reservoir pressure determination.

In the interim I have looked over our records on wells in the area and a number of them are producing water and oil and there have been many shut ins for rod parts and pump mechanical problems, et cetera, and I don't see any apparent damage to the oil productivity from these short shut ins for a short duration it would be necessary to get a reservoir pressure test on Mr. Cox's well. Okay, that completes it.

Q. Refer to your Exhibit Four and you can go up to the board if you want to.

A. Exhibit Four is a northwest-southeast dip cross section through the area of the Cox Federal EA Number 1 Well.

The purpose of this cross section is to show the general configuration of the top and base of the reef, moving through Mr. Cox's well and past and beyond it, and to orient you as to where we are, I would like for you to look at the map and see that the point NW corresponds with the point NW or northwest. This is in the northwest section here.

Q. You are pointing to the insert index map?

A. That's right, the NW on the cross section correlates with this trace of the cross section drawn through, and actually this is a dip cross section, that is the strike of the main axis of the reef is in this general southwest-northeast direction as can be inferred pretty well by the unit boundaries as we see with these dashed lines at the top and bottom, but basically the reservoir strike of the main axis of the reservoir is this general southwest-northeast direction, so this northwest-southeast cross section does cut through, all the way from back reef, NW, to fore reef, down dip, SE, and cuts through Mr. Cox's well and this is the log that we have available. Unfortunately it is a reproduction from his Exhibit Six because he has not yet released his logs and it is as we understand it a gamma ray neutron cased hole. Correct me if I'm wrong.

MR. COX: There was a compensated density log, and an induction electric log and there was also a borehole compensated gamma ray neutron log.

A. Right. We would have liked to have those, but all we had was what we had to reproduce and what we had to do was have our draftsman trace a tracing from our copy of your Exhibit Number Six from the October 8th hearing, so you'll forgive us if this particular log is not the greatest.

At the same time I think there is no question, and I want to emphasize that these correlations, that is reef top and reef base is shown by this cross section with the reef proper itself, of course, lying between the top and the base, and the entire cross section is hung on a subsea point of two thousand, a subsea point of twenty-five hundred, which I think is the key point, hung on the logs. So you are seeing a true subsea relative position of these wells, and I might add that we corrected Mr. Cox's log to true vertical depth, using his deviation survey indicated that his true vertical depth, I think, was about thirty feet shallower than measured depth, of course, due to the deviation of the wellbore. The measured depth would naturally be longer than the true vertical. So we gave Mr. Cox's EA Federal well hung on true vertical depth.

The red color indications here are the perforated intervals in the various wells completed, most of them as you can see towards the base of the Abo reef with one or two exceptions when you get into the down dip wells that aren't worried about the position of the gas-oil contact as yet.

But I do want to point out what this cross section shows is the continuity of the Abo reef across Mr. Cox's well and on to the Amoco Diamond Federal Number 1, which is approximately, a little less than a half-a-mile southeast of the bottom-hole location of the Cox well.

Again I want to say these tops and bases on oil wells that were completed at the time of the engineering committee, are not specifically my picks, although I was involved in all of them, they are the picks of those geologists and petroleum engineers representing all of the various companies involved in the unitization study of the Empire-Abo unit, so these are a consensus pick of a large group of people who were quite familiar, both geologists and petroleum engineers, quite familiar with the Abo reef.

What I'm saying is shown is that the completion shown here in red, Mr. Cox's well, very definitely correlates to be within the Abo reef section, and it has been the opinion of the majority of the engineering and geological committee, as well as other geologists with Arco and other companies, who I have conferred with and it is my own opinion that you cannot correlate particular porous streaks well-to-well in this reservoir.

On the other hand, if you are completed in a porous interval that is productive within this interval, there is no question, or very little question that you could possibly

be anything but connected to the Abo reef, the bulk of the reef. So I do want to bring that point out. In other words, lateral, or well-to-well correlations of individual porosity zones is not believed to be a feasible method of trying to determine whether a zone is connected or not connected in the Abo reef.

I might make one further point out that it would be -- looking at this cross section, which I said is a dip cross section across Mr. Cox's lease. I think northwest-southeast, I think you might get the idea that as far to the northwest as you could get on this lease you would be assuring yourself of the maximum amount of reef section, so if there were no Commission controls you would like to be right in the corner, because you would be giving yourself as much of a chance at good reef porosity as you possibly could.

Q. Do you have anything further with respect to Exhibit Four.

A. I believe that's all.

Q. Refer to Exhibit Five and explain that.

A. Exhibit Five is a west-east strike cross section, and with, of course, the W and the W, the E and the E, and it is essentially a strike cross section along the toe of the reef and in other words, basically where it cuts through, it cuts through Mr. Cox's well, EA Federal Number 1, which you will note the familiar log from over there. It is located

right here. And right here is the bottom-hole location on our plan view of the cross section, so I think you can see from where this is located relative to the unit boundary that we are looking at a down dip strike cross section. If you projected that cross section right through here it would be, you know, right about through here.

So we are looking at, with the exception of those two wells that jump up in the middle, we are looking at a cross section about through the general type of reservoir that Mr. Cox's well is completed in.

And for the most part in the toe of the reef, and that is to say in this particular area, the reef toe, and I want to illustrate. I think it is illustrated better over here.

Q. That's on Exhibit Four?

A. Exhibit Four. Again, the toe of the reef has been in this area, there has been found to be one where the wells will produce oil and water above the original oil-water contact of point six, sixty-five subsea. And this is in my opinion an oil-water transition zone, which is not an unusual thing to find in an oil reservoir. It is simply a zone where the water saturation is greater than what it takes to flow some water along with the oil.

So Mr. Cox's well is completed in that transition zone and it is making oil and water, and if you reviewed the

production data along for all of these wells --

Q. You are referring now to Exhibit Five?

A. I'm back on Exhibit Five, I'm sorry for jumping around, I don't know how else to do it. But back on Exhibit Five, which again is the west-east down dip strike area. Here is Mr. Cox's well making thirty-five oil and a hundred and thirty-five water, I believe, on test approximately, and this again is hung on a true vertical subsea depth, Mr. Cox's well. And I think you can see that he is completed, and I will lay this pointer in here, somewhat lower subsea than the west offset well which is producing oil and water, in the month of June, a hundred and twenty-six barrels of oil a day and fifty-nine barrels of water a day, and that well has produced more water than that in the past. Again this type of production, in my opinion, is indicative of this situation what we have in this area, the Empire-Abo reef, this down-dip toe in this area which has enough water saturation to produce oil and water. In other words, it is a transition zone, rather than a clean oil-water contact. Anyway that well has produced more water than it is producing now. This well which is producing, it is again higher subsea --

Q. Which well is that?

A. This is the Arco Empire-Abo Unit Number M-15. The previous well, I should have mentioned, was Unit 16, the west offset to Mr. Cox's well.

At any rate, the Empire-Abo Unit M-15 is producing in the month of June, a hundred and fifty barrels of oil and forty-two barrels of water and my records show that that well has produced as much as fifty-six barrels of water per day, so it is down a bit currently, similar to this M-16 Well. So these two wells are slightly higher than Mr. Cox's well, are producing oil and water, but they have produced more water in the past.

Moving to these two wells, the Empire-Abo Unit L-17 and L-18 are higher up in the cross section and they are not -- one of those wells has begun to produce a little water, eight barrels of water a day, and the other well is producing water free.

Moving over to the Empire-Abo Unit L-19 and L-20. L-19 is producing currently twelve barrels of water a day. It has produced as much as forty-two barrels of water a day in the past. It is completed subsea, about ten or fifteen feet lower than Mr. Cox's well. But here again one of these oil-water transition zones, you get that sort of behavior, it can be due to acidizing into a local fracture zone possibly in an area. Here is Mr. Cox's well. There are explanations, of course, for that sort of performance.

I might say just one point further that this, I should have brought it out again, this cross section is our representation of the same cross section as was Mr. Cox's Exhibit Number Six at the October 8th hearing. The purpose of

it was to illustrate that we are in what I feel is an oil-water transition zone, and the fact that Mr. Cox's EA Federal Number 1 does produce oil, we will say a little bit down dip, and water, of course, quite a bit of water down dip. Nearby wells are producing more oil and less water is one of the things that you can see in an oil-water transition zone of this type.

Q. I take it that one of the wells, or more than one of the wells, are producing oil and water, is that any indication that they are in separate reservoirs?

A. I would say not, no.

Q. Do you have anything further with respect to Exhibit Five?

A. No, I don't have anything further to add.

Q. From your study, Mr. Christianson, of this area, what is your opinion with respect to whether or not Mr. Cox's well will violate the correlative rights of those in the Empire-Abo unit?

A. Yes, I definitely feel that it has violated and will adversely affect the correlative rights of the offsetting Empire-Abo unit. It is less than ten feet from the unit boundary line, and in my opinion, the great bulk of this well's production will come by drainage from the Arco Empire-Abo unit. I would like to say further that the gas-injection project that we've got in effect now in the Empire-Abo unit

will actually act to improve oil flow toward Cox EA Federal Number 1 well.

Q. Do you have any recommendations to make to the Commission with regard to the Cox well?

A. My recommendation as representative of Atlantic Richfield would be that the Applicant should be required to plug and abandon the Abo completion in this well. And in any event Arco would recommend that no allowable be assigned to this well.

Q. Do you have anything further with respect to any of the exhibits or any of the testimony?

A. I believe not.

MR. HINKLE: We would like to offer Exhibits One through Five.

MR. STAMETS: Any objection to these exhibits? They will be admitted.

MR. HINKLE: That's all of direct.

MR. STAMETS: Are there any questions of this witness?

MR. DAY: Yes, sir.

CROSS EXAMINATION

BY MR. DAY:

Q. Mr. Christianson, you have stated that you are a Senior Operations Engineer?

A. Yes, sir.

Q. For the unit for sometime?

A. That's right.

Q. And you played a part in the original parameters for the unit, discussions and negotiations that were going on, and the formation of the unit, and the production of the unit since that time?

A. That is correct.

Q. All right. There is something I would like to refer you to on your Exhibit Three, in column four, and you mentioned also in the formula that was used for the gas-oil casinghead allowable, rather, two thousand to one times the oil allowable, that's on Exhibit Two?

A. Yes, that is on Exhibit Two.

Q. Two thousand to one is the way you calculate the casinghead gas allowable?

A. That is the way the Commission calculates it, I don't.

Q. What is that based on, and why that formula?

A. A state-wide rule. I believe that is in their computer program if I'm not mistaken. There is a state-wide rule that two thousand times the top oil allowable is the maximum gas production that you can assign to a well.

Q. And you believe that is state-wide, not to this field?

A. Yes, but as far as the Empire-Abo unit is concerned it is not operable in that we are injecting something like sixty-five to seventy percent of our produced gas which doesn't even show in this report. Our net gas-oil ratio for the unit is very low.

Q. Does your gas-oil ratio ever get higher than it should be or do you have any problems with it fluctuating or varying up or down?

A. No, as a matter of fact, we have the flexibility that you have when you are unitized. If we've got a well that is making a lot of gas, they cut that well back and transfer its allowable to a down dip well which is producing a low oil-gas ratio and thereby gaining efficiency and increases the reserves in the reservoir.

Q. If the figures for August of '75 were available to you and I'm referring to the September, in reference to the September figures on Exhibit Three. We had October and August, there were reasons, I suppose, why they weren't given, but may I ask you if you know that the M-16 gas-oil ratio in August 1975 was one thousand, two hundred and eighty-one, and if the L-17 was one thousand, thirty-one and the L-18 was one thousand, fifty-six, and the M-15 was one thousand, three hundred and twenty, all much higher than reported in September?

A. End of what?

Q. I'm referring to the gas-oil ratio.

A. Didn't you get onto some wells that aren't even on here? The one you got onto was the M-15, that would be the Humble Number 5.

Q. I will refer to them, the M-16, the L-17, and the L-18.

A. Yeah, that is the four wells I submitted which are the direct offsets to Mr. Cox's well.

Q. All right. I'm asking you if you know that the gas-oil ratio in August '75 for M-16 was one thousand, two hundred and eighty-one.

A. Let me get that down, M-16, twelve, eighty-one, okay.

Q. L-17, one thousand, thirty-one.

A. One, oh, three one?

Q. Yes. And L-18, one, oh, five, six.

A. Okay. Now, what's bothering you about that?

Q. I'm asking you if you know that those are the August figures?

A. As a matter of fact I don't because I just checked -- the reason I gave June of '75 was because Mr. Cox had given June of '75 production in his exhibits with his testimony of October 8th and I wanted to correct the data for the Empire-Abo Unit M-16 Well, where he erroneously assigned the M-16 a two thousand, one gas-oil ratio, so that is the reason for having June, the reason for having September is because it

is the latest month I had data available. I think you will note if you want to look at September that those wells that were up a bit in August, if your August figures are right, that those wells whose GOR's were up in August are down in September which is the month after August, so I don't think it is anything to get very excited about.

Q. Well, those figures were available to you for August, were they not, as well as all of the other months?

A. Oh, sure.

Q. And one of your claims for the common reservoir, if I understand your -- is the gas-oil ratio?

A. That's right. You understand how a GOR is on a lease basis or obtained. They are based on tests and there can be a little variation from month-to-month on how the productions ratio is relative to the test.

Q. Mr. Christianson, is one of the methods used or techniques, or studies, maybe I should use studies, in determining whether the production is from the same reservoir is lithology, the comparison of the characteristics of the zone in which the wells are producing, the actual cuttings?

A. Lithology, yes, I think that is part of the picture. You look at that along with everything else.

Q. Have you made any studies in this area before on your log correlations, have you caused any to be made before?

A. Yes, I have either made or reviewed all kinds of

studies as far as log correlations.

Q. Well, in this particular area here concerning the leases surrounding the Cox lease?

A. No, that is, let me point out that I was involved in the original engineering committee work, very closely and one of the two, along with the Amoco engineer, who did ninety percent of the work, I would say, and as such we had correlations from geologists from Amoco, Arco, Signal, we reviewed them, we had sample logs, we had drilling time, we had oil shows, drill stem tests and we used all of this material so I don't question that I have looked at cross sections throughout this whole area, backwards and forwards, but not recently, no.

Q. While you mention that point, may I ask you if you and your studies with Signal and all of these others, made certain parameters and then established certain parameters for this unit?

A. Yes, that's right. That was one of our assignments from the operator committee.

Q. Were those parameters ever changed before the final ones were agreed upon?

A. Yes, there were some changes made along the way. There were some errors, there was an additional well drilled, the Humble, now Exxon EA Federal Number 5 Well, which gave us some data for those. The parameters were revised from the time they were first proposed, back in the first report of

1968 to the final parameters on which we based our unit negotiations on, which were those of February 24th, '71, and April 1st, '71. To the best of my knowledge, now I haven't had occasion to really study this particular area here recently.

Q All right, sir, but the change in the parameters then were brought about by consultation with engineers and geologists and going over and going over again and changing and negotiating and coming up with negotiated figures?

A Well, they are really not negotiated, the best technical opinions of the whole group.

Q Well, the opinions undoubtedly differed or there wouldn't have been any changes?

A This is right, but I don't know if you are familiar with the way an engineering committee operates, but it doesn't go by majority rule. You've got to get everybody going your way or in other words the man who doesn't agree with you, you try to sell him, you don't railroad in an engineering committee, now you don't go if fifty-one percent wants a particular top and forty-nine percent don't, what you do is sit down and start talking about the technical reasons why you think this top or that top is right and you get those other fellows convinced that your position or your top is the one that is right based on the technical evidence.

Q Thank you. From what you know now would those parameters be true, the last ones, that you said were 1971?

I believe that you brought them with you.

A. Yes, they should be -- hopefully, yes.

Q. Well, is there any estimated oil figures on those parameters?

A. These are the production parameters, if you want to let me have that sheet.

Q. That's production?

A. Yes. Are you looking for the oil in place, for example, for Mr. Cox's lease?

Q. No, my question to you, sir, is: Are your estimates of production based on those parameters, have they held true, based on what you now have knowledge of in this unit?

A. My estimates of production -- now the only -- would you define what kind of production you are talking about. For example, the current production parameters here are -- I don't think anybody would argue with them, there might be clerical errors involved, but they are simply taken from Commission records.

Q. I'll see if I can make it clear to you. On that parameter figure to which you are referring, do they have any estimate of production?

A. Estimates of production?

Q. Yes, sir.

A. I presume you mean estimates, for example, of primary oil reserves, total oil reserves and that sort of

thing. In other words, you are saying your future estimates as made here?

Q. Yes, sir.

A. Right. Do they -- now what's your question again?

Q. I think we're together now. From what you now know, would the unit produce more or less oil than that estimate?

A. We are still tracking the overall predictions very well. Our predicted model pressure at this current rough cumulative oil is within just a few percent of -- in other words, the actual reservoir pressure is within just a few percent of what was predicted by this model, as far as the reservoir as a whole is concerned. The gas-oil contact is running essentially the same level as was predicted at the time when we would have produced this much oil from the reservoir. So that I can say that our reserve predictions are looking very good. Now this is, let me qualify it, for the reservoir as a whole. I have not gone back and studied a lot of individual tracts because there is no point in it.

Q. All right. Well, if you will refer to the tract that would be M-16. Is that tract number forty-five on there?

A. It probably is. It's Malco J, which should be Malco J-1, right.

Q. Do you know how much oil it would have produced because of those parameters and how much it has actually produced?

A. Under what column? There are one, two, three, four, five different columns with different sorts of predictions as to future reserves here, and which one would you like me to read, because all of them are different?

Q. All right, without my technical knowledge of those parameters, let me ask you: Is there an estimate on that parameter schedule of the oil that would be recovered from tract 45?

A. Which is the Malco J-1.

Q. Yes.

A. Well, yeah, I can give you any number if you want one, let's take Arco's -- well, let's take Amoco's here at the end. Total oil reserves, which was primary plus unitized partial pressure maintenance, and that number is, and this is reserves after one, one, seventy-one, because that is the way the thing was worked out, and that was the particular date. Reserves after one, one, seventy-one, one million, one hundred and ninety-eight thousand, three hundred and sixty-nine barrels of oil.

Q. And how much has it produced today?

A. How much has it produced today since one, one, seventy-one, I don't know.

Q. You don't know?

A. It is a pretty fair well, though, it has produced quite a bit of oil.

VOICE: A couple hundred thousand barrels of oil.

A. Yeah, right.

Q. (Mr. Day continuing.) All right, that parameter summary or tract summary that you have there with you, the tract forty-five has how many productive acres assigned to it?

A. I show twenty-four productive acres. Right.

Q. Now, would you refer to tract fifty-two?

A. Tract what?

Q. Fifty-two, is that the Malco F lease?

A. Malco F-11 Well lease, right.

Q. What does that show on the same column?

A. Productive acres?

Q. Yes, sir.

A. Four hundred and thirty-seven, point two, five acres.

Q. Now would you refer to tract one, oh, three?

A. Tract one, oh, three, yes, that is Mr. Cox's Federal EA, right.

Q. What are the productive acres assigned to it?

A. Fourteen.

Q. And your gross pay column on the tract forty-five, is how many acre-feet?

A. Gross pay oil column?

Q. Yes, sir.

A. Tract forty-five, two thousand, nine hundred and eleven acre-feet.

Q. The same question as to tract one, oh, three?

A. Tract one, oh, three?

Q. Yes, sir.

A. Two thousand, six hundred and eighty-five.

Q. And then the net pay column for both tracts?

A. Right. Net pay column. Okay, we're talking about tract forty-five?

Q. Yes, sir.

A. Net pay, thirteen hundred and thirty-one acre-feet.

Q. And tract one, oh, three?

A. Three, forty-two acre feet.

Q. Is there a column there about original oil in place?

A. Original oil in place. Right.

Q. And what was the original oil in place?

A. That is the volume of oil calculated by the engineering committee to be originally in place beneath the particular tract at the time of the discovery of the reservoir, originally prior to any production.

Q. (Mr. Day continuing.) And how many barrels of original oil in place do you show for tract forty-five?

A. Tract forty-five. I show two hundred and thirty million thousand, three hundred and thirty-nine.

Q. And for tract one, oh, three, the subject lease?

A. Thirty-nine thousand, eight hundred and ninety.

Q. And the tract forty-five has produced, do you know that it has produced cumulative to date or to June 1, '75, five hundred and nineteen thousand barrels?

A. No, I don't know that, but it sounds quite reasonable.

Q. Far more in excess of the original oil in place.

A. This is correct, you can find this all over the reservoir. Are you familiar with the type of reservoir this is?

Q. Let me ask you if it is comprised -- you say it is a reef?

A. That is correct, a dolomite reef.

Q. All right, and is it composed of one solid pay zone or are there many pay zones in there that produces from different amount of depths in terms of feet from one well to the other?

A. Well, I wouldn't define it in the terms you are using there. If you are asking me if the reservoir is connected, I'll say that everything that I have seen within the confines of the reef, it is interconnected. It has excellent vertical and lateral permeability. This is upon the basis of reservoir pressures, well productivities, studies by engineering and geological subcommittees, and my own study.

Q. Are you stating that it has different production

zones throughout this unit?

A. No.

Q. If I use the term --

A. I'm saying if you can characterize it, you understand that you are lumping an entity here that is twelve and a half miles long and a mile and a half wide and three hundred feet thick on the average and you are trying to get me to characterize it as one particular type of thing and I really can't do that.

Q. Well then it is composed of different stringers, is that the term?

A. Oh, no. This is the opposite of what it is, I can certainly say that.

Q. Now you show up here on Exhibit Number Four, your Exhibit Number Four, that a well produces -- is that red mark there where it produces?

A. I beg pardon?

Q. The red marks there on the well logs, is that where the well is producing?

A. That is the perforated interval, yes.

Q. Well, my question to you, if that whole thing is the reef, why don't you perforate up higher?

A. We would get the prettiest gas well you ever saw in your life up there. The communication is so good in this reservoir that when the gas comes out of solution in the oil,

the bulk of it immediately starts moving up structure because the vertical permeability is so good, so what you have got is what we call a secondary gas cap, and that particular dashed line at two thousand is approximately where we think the current gas-oil contact is currently. Everything above that is basically gas saturated and residual oil and everything below that is the oil column.

Q. But you are producing at different depths according to your subsea level, is that correct, throughout?

A. Well --

Q. And yet you say it is all correlated and yet you are saying -- to me what you are saying is that it is really all the same.

A. No, it varies. I mean you get good and less good permeability, good and less good flow capacities wherever you go in the reservoir and it varies like any reservoir from good to better and best, I'll put it that way.

Q. Didn't you also state that you could not explain the water-oil percentages in production varying?

A. No, I'm satisfied with what has happened there.

Q. I know you're satisfied with the unit, but can you explain why a well would produce oil and water and then more oil and less water. As I understood you, you said it varies and you can't really explain it.

A. Yeah, I can explain it. If I said I couldn't, I'm

sorry. At least it satisfies me that when you are in a transition zone of this type you can get that sort of situation. Now I'm talking about a very limited area, relatively speaking, of this reservoir that has this transitional zone situation.

Q. It's not in other parts of the reservoir?

A. It's in the toe of the reservoir as you saw me indicating the toe up there on the cross section.

Q. Well, this toe, is this an offset well over here, you are referring to the most extreme --

A. I'm referring to the down dip portion. Well, let me get up there. You know where the reef kind of necks down the base and the top tend to come together. Here. See they are far apart here and they get much closer together and we just call that a toe because it is kind of like a toe on a shoe. It is really down in about this general zone in through here, from about this point subsea through here.

Q. Then it is limited to a very small area of the whole reservoir?

A. Well, it stretches pretty far from west to east as that cross section up there indicates.

Q. Well, how far?

MR. HINKLE: Refer to them by exhibits.

A. All right. I don't know, you would have to say it started probably -- you begin to see some effects of it in

this general area here in the toe I'm talking about. Not back up this way, but right in here, and it is a situation where there is somewhat less permeability in the reservoir here than back up here because -- there are a lot of reasons geologically speaking. I don't see any point in going into it, but it is out here on the fore reef side of the reservoir. You get this somewhat lower flow capacity of the reservoir rock.

Q (Mr. Day continuing.) Well, then in this area of the reservoir, but it doesn't appear on the north flank of the reservoir. You are saying that this condition exists in this particular area of the reservoir?

A Yeah, this type of thing. I don't know that possibly you might make some water locally somewhere else in the reservoir, again where you have low permeability somewhere in the base of the section, but I can't think of a situation like that, you might be able to point one out, but I don't really think that would be germane to this area, to where Mr. Cox's well is located anyway.

Q Did you say that these log studies were difficult as to accuracy because of the porosity conditions?

A Were the log studies difficult? No, they weren't especially difficult. They would drive you crazy if you tried to correlate a particular porous zone in a well with another particular porous zone in a well. That's generally what

the geological and engineering committee concluded after its study.

Q. Then the Cox well there, did you accept the true vertical as shown in the exhibits before the Commission on October 8th? Did you change the true vertical as submitted by Mr. Cox?

A. No, I didn't know he had submitted one.

Q. I thought you referred to a true vertical?

A. Yes, I did. Our well is hung on a true vertical depth which is approximately, which means it is about, according to Mr. Cox's survey, it's about thirty feet up the hole in effect on measured depth. You know true vertical is straight down and Mr. Cox's well went off like this, and so naturally the well was logged through a hole that went off this way and so, therefore, there would be a greater distance that his log would show you at some common subsea point, say the level of this table. Mr. Cox's well would be reading sixty-two hundred feet and the distance directly vertical would be sixty-one hundred and seventy feet. That's all we did, that's the only correction we made and it is directly off of his survey.

Q. Then your people determined the true vertical as shown on this Exhibit Four from information that you --

A. Only in looking, we determined it from Mr. Cox's survey that was submitted to the USGS and at the last hearing.

Q. These are comparison studies you made to compare with exhibits that Mr. Cox submitted on October 8th?

A. Well, not this one, that one.

Q. Exhibit Five?

A. It is essentially the same well. Well, it is the same wells as Mr. Cox's Exhibit Six is to the best of my ability to get the same wells on there.

Q. Now coming back to the parameters that we have discussed. We talked about the original oil in place on tract forty-five and the fact that it has now produced more than is shown on that parameter, what do you call that thing? Participation parameters schedule?

A. Right, original oil in place, yes.

Q. And yet as far as the Cox well, tract one, oh, three, there was assigned approximately forty-two percent less productive acres, approximately twelve percent more gross pay column was shown to be in the tract forty-five than the Cox lease, and yet the net pay column was seventy-four percent more in tract forty-five than in the Cox lease?

A. Yeah, you find that strange. I don't understand what you are getting at.

Q. Is there any oil under the Cox lease, in your opinion?

A. Well, the engineering committee said there was and he has had actually two wells that he produced there. I think

they produced like a total of like ninety-eight hundred, plus barrels of oil, which is coming from the Abo reef, in my opinion.

Q. All right, it is your opinion that there is oil underneath the Cox lease, and that there is now oil underneath the Cox lease?

A. Yes.

Q. And if this lease were not under lease and went back to the Federal government, would you recommend that the unit purchase this lease or bid on it?

A. I can't really see doing that now, no.

Q. Not now?

A. No.

MR. DAY: Mr. Examiner, we pass the witness.

MR. STAMETS: Are there any other questions of this witness? Mr. Ramey.

CROSS EXAMINATION

BY MR. RAMEY:

QMr. Christianson, because of the nature of this reservoir, in that it is a reasonably steep dipping reservoir, from north to south, so to speak, and through your gas-injection program which is maintaining reservoir pressure and such, is it not a fact that oil is migrating from one tract to another tract within the reservoir?

A. Most assuredly, there is no question.

Q. So those wells which are down dip will in effect recover more oil than what was originally in place because of this migration from wells up dip?

A. That is exactly correct.

Q. So it is not unusual to have wells which will produce considerably more than the original oil in place?

A. That's right. You can find them all around the reservoir if you start looking.

Q. Now, would you refer to your, is this Exhibit Four?

A. Right.

Q. Is not the fifth well from the northwest producing at an interval roughly fifty some feet from the top of the Abo reef?

A. That is correct.

Q. And does not the Cox well produce from approximately the same depth from the top of the reef?

A. Yes, it looks like it is very close to that.

Q. So if you did have a stringer situation you could say that the fifth well is producing from the same stringer as the seventh well or the Cox well?

A. Well, you could say it is in the same relative position to the top of the reef. That is certainly true. And if there were a stringer there, that is true.

MR. RAMEY: Thank you. That's all I have.

MR. STAMETS: Mr. Buell.

MR. G. BUELL: Yes, thank you, Mr. Examiner.

CROSS EXAMINATION

BY MR. G. BUELL:

Q. Mr. Christianson, I don't want to belabor the point, but I want to be sure that I understand. If I understand what you have been describing as the primary producing mechanism in this reservoir is what you engineers call gravity segregation?

A. Right.

Q. And true gravity segregation as Mr. Ramey asked you, is a steeply dipping reservoir with good permeability, your gas comes out of solution and starts finding its way up structure and as it finds its way up structure and gets there, does it not then form a producing mechanism by expanding, which pushes oil on down structure?

A. That is exactly how it operates.

Q. And you are replacing what was once oil-occupied porous space with gas and that gas is moving that oil on down?

A. That's right.

Q. And a reservoir of that type under primary recovery, where would you prefer to have a well if you had your choice, low on the structure or high on the structure?

A. As low as you can get.

Q. All right, now, we have been speaking of the unit's secondary recovery program, what is that secondary recovery program?

A. It is injection of all of the plant residue gas, which amounts to sixty-five percent or more of the produced gas, back into the top of the reef up there in the secondary gas cap.

Q. And what's the effect of that injection?

A. The effect of it is to maintain, or to tend to maintain pressure and increase oil recovery.

Q. And accelerate the normal, natural gravity segregation drive that was occurring?

A. There is some acceleration effect possibly, yes.

Q. All right, sir, under the unitized secondary recovery program, we have now, if you had your choice and you could have a well high on the structure or a well low on the structure like the Cox well, where would you want it?

A. I would want to get low.

Q. You would want to get low because the natural drainage system accelerated by the unitization secondary recovery program is just going to keep pushing other people's oil to you, and pushing other people's oil to you, and you are going to be one of the last wells in the field to be abandoned, are you not?

A. That's correct.

Q. All right, sir, now we have been speaking of the unit and only Arco and Amoco are here today, but so the record will be complete is the Empire-Abo unit composed only of major interest owners, major companies like Arco and Amoco?

A. Oh, no, there are all sorts of what you would say very small independent operators, Walter Solt, for example, Granbury. There is something like a hundred and twelve to the best of my recollection, a hundred and twelve working interest owners who have interests in the Empire-Abo.

Q. Of course, Arco and Amoco are substantial interest owners, but among our working interest owners are many independents?

A. Right.

Q. Would you say the ratio is about twenty-five to one, numerically twenty-five to one, independent to major?

A. I would say it is probably more like fifteen to one, fifteen independents to majors.

Q. And the oil that is going to be pushed to the Cox well, if it is allowed to continue to produce only ten feet from the unit line will come from the independents as well as those big rich majors, Amoco and Arco, is that not correct?

A. You bet.

Q. And let me ask you this: You said that you concurred with the engineering committee -- let me ask you about that engineering committee, was its members composed only of Arco

and Amoco and Exxon and people like that?

A. Oh, absolutely not. Of course, Amoco was ramrodding the study at that point, they were very diligent in inviting everybody that had any semblance of an interest to come to these meetings.

Q. Did independents actively participate in the work?

A. Many of them did, yes.

Q. You said that you agreed that originally there was some oil under the Federal EA lease?

A. That is correct.

Q. Now you have no objection to Mr. Cox locating a well so that he could recover that oil, would you?

A. No, none whatsoever.

Q. But you do object to him producing a well only ten feet from the unit line where ninety to ninety-nine percent of the production in that well is coming from the unit and not from the Federal EA tract, is that correct?

A. I would hesitate to put an exact percentage, but you are in the ball park I would think, and that is what I do object to, yes, to the production from a well so close.

MR. G. BUELL: Thank you. That's all, Mr. Examiner.

MR. STAMETS: Any other questions of the witness?

MR. RAMEY: One more, Mr. Stamets.

This toeing effect that you have on your exhibit here, now that is not just confined to the area of the Cox

well, is it?

MR. CHRISTIANSON: No, it is prevalent from about a little east of Mr. Cox's well on west, all the way west in the reservoir.

MR. RAMEY: It happens on the south flank of the reservoir that you have the toeing effect?

MR. CHRISTIANSON: Right, and roughly the west half of the reservoir.

MR. RAMEY: I see.

MR. STAMETS: Any other questions of the witness? Mr. Day.

FURTHER CROSS EXAMINATION

BY MR. DAY:

Q. Mr. Christianson, I believe you answered the question of Mr. Ramey about the comparison of the Number Five log there with the Cox log and that it was producing from the same depth and you said if there is a stringer there then that would be true?

A. That's right. Mr. Ramey postulated a stringer and I just went along with his postulation. If there were a stringer there then it could be connected because they are at about the same relative distance below the top of the reef. I don't concede there is a stringer there.

Q. All right, we'll leave that then. Again you have

stated repeatedly that there is oil under Mr. Cox's lease, there was and is?

A. Right.

Q. Now as far as numbers that Mr. Guy Buell pointed out, do you know the percentage of ownership of the majors of this unit; how much percentage does Amoco and how much does Arco have?

A. Amoco has about thirty-four, point, oh, seven, and Arco thirty-four, point, one, four.

Q. In other words, they own two-thirds of the field?

A. Working interest. That's just about right.

Q. All right, can you state how much of the remaining one third is owned by major companies?

A. I really couldn't give you a number on that.

Q. Thank you, Mr. Christianson. One more question. Do you know who represented the interests of this lease at any hearing or consultation or engineering meetings when the parameters and formulas were worked out for the unit?

A. No, I surely don't but I'm sure that to the best of my knowledge and just remembering from looking at the circulation lists that Mr. Cox was on the list in getting all of the notices of meetings, because Amoco was very diligent in that.

Q. You don't know that anyone did?

A. I can't recall a Cox representative actually being

there, no.

MR. DAY: Thank you.

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

(THEREUPON, the witness was excused and a short recess was held.)

MR. STAMETS: The Hearing will please come to order.

Mr. Hinkle: Do you have any further witnesses?

MR. HINKLE: No, sir.

MR. STAMETS: Mr. Buell, are you going to re-commence at this time?

MR. G. BUELL: Yes, Mr. Examiner, at this time we are going to call Mr. Currens. Just a second, we are preparing a set of exhibits for the Applicant and also for the Examiner's benefit at the table. All of our exhibits are now on the wall. We'll have those ready for you in just a second.

I believe we are all set.

MR. STAMETS: You may proceed.

DANIEL R. CURRENS

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

DIRECT EXAMINATION

BY MR. G. BUELL:

Q. Mr. Currens, would you state your complete name,

by whom you are employed, in what capacity, and at what location?

A. Daniel R. Currens, employed by Amoco Production Company, Senior Staff Engineer, Houston, Texas.

Q. Mr. Currens, your qualifications as an engineer, a petroleum engineer are a matter of published record before this Commission, but due to the fact that there may be people here who are not acquainted with your experience and background, could you very briefly summarize your educational background and the depth of your experience with Amoco?

A. Yes, sir, I was graduated from Texas A & M in 1954 with a B.S. degree in chemical engineering. I was employed upon graduation by what was then Stanolind Oil and Gas Company, subsequently Pan American Petroleum Corporation, now Amoco Production Company. Initial employment was in the Odessa area in Texas. I moved to Hobbs, New Mexico shortly thereafter; then a tour in the army; then I was subsequently in the Roswell, New Mexico District Office, at the time of the Empire-Abo field and was involved in reservoir engineering assignments. Subsequent to that time I have worked in operations assignments, reservoir engineering, regulatory activities. I have been what we refer to as an area engineer, that's the engineer in charge of all producing operations in an area. I've had that function in two different areas. Several tours in the division office in Fort Worth and now I'm in our Houston

Division Office.

Q. All right, sir, I think that is well.

Let me direct your attention to what has been identified as Amoco's Exhibit Four. I'll call it an orientation map. Is my description accurate?

A. Yes, sir, it's a map of a portion of the Empire-Abo pool and it shows the area of the Cox EA Federal lease in the section that is in the southeast corner of this exhibit and offsetting and well locations of the Empire-Abo wells, other Empire-Abo wells.

Q. All right. In this Hearing quite often we have referred to wells adjacent to the Cox well, sometimes by their unit designation, sometimes by their oil lease and well designation, is that correct?

A. Yes, sir, we have.

Q. How is that handled on our Exhibit Four?

A. The unit wells are designated with the unit designation number in parenthesis by the well spot. For instance, this one in the extreme southwest corner, there is an N-131, and that is the unit designation for that well. Adjacent to it also is the Number 1, and in the center of that eighty-acre tract a B in parenthesis and the entire tract shown as the Amoco Malco Federal, which was the old lease name prior to unitization. So both old lease name and well designation and unit designation is shown on the map by the wells.

Q. All right, Mr. Currens, Case 4970, that was the case that was heard on May 23rd, 1973, it has been mentioned in this case quite often and not without reason because this case here today is really an outgrowth of that case. Let me ask you whether or not you were present at that hearing back in May of 1973?

A. I was present at that hearing, yes, sir.

Q. Do know know whether or not Mr. Cox's many experiences both geologically and completion-wise were detailed for the record at that time?

A. Yes, sir, in the Number 1 and Number 2 well.

Q. Would you briefly summarize, you may not get it in chronological order, but would you briefly summarize the geological experience on the Federal EA lease that Mr. Cox had at that time and the experience he had had in attempting completions in wells on that lease?

A. Well, originally, as I recall, the EA-1 was an Aztec well that had been completed as a producer and produced a few thousand barrels and was temporarily abandoned. My recollection is that that well was reentered by Mr. Cox in a completion attempt made in the well, which he temporarily abandoned.

Subsequently he drilled another well, the Number 2 Well, slightly to the east of that well and made completion attempts in that well and made evaluations of the work that had

been done in the well, the bottom-hole location by the natural drift of the wells and so on. At that point he had requested a hearing for a directionally controlled well.

Q. Did you mention that fact that Mr. Cox at that time had also had directional surveys made both on the old Number 1 and the Number 2 that he drilled?

A. Yes, sir, I did mention that.

Q. All right, sir, the record of that hearing will certainly show that Mr. Cox had had extensive geological and completion experience at the time of that May 23rd, 1973 hearing?

A. Yes, sir.

Q. All right, sir, Mr. Stamets has already asked Mr. Cox, in Mr. Cox's testifying, about his testimony to the effect that what he wanted to do was deviate it about forty-two hundred feet, get out of the old hole and then drill as nearly vertical as possible and bottom under the forty-two hundred foot spot where he left the well. Do you recall that?

A. Either four thousand or forty-two hundred. It was in that range and that was one of the things he requested. The other was to perhaps return the well to under the surface location.

Q. All right, sir, as I also recall a petroleum engineer named D. I. Alspaw, A-l-s-p-a-w, testified as a

witness for Mr. Cox at that May '73 hearing, is that correct?

A. Yes, sir.

Q. In looking at that transcript, Mr. Currens, I notice where Mr. Alspaw, at page fourteen of the transcript, if you all would like to follow me and I'm going to quote him. I'm quoting Mr. Alspaw now. (Reading.) Our objective here was, of course, to kick the well off by controlling the weight on the bit return and return it to the vertical and bottom the well out in a location in close proximity of the Number 20 that we see here on the deviation survey. (End of reading.) Do you recall that testimony?

A. Yes, sir.

Q. Mr. Cox entered that deviation survey as an exhibit of his, would you look at survey point number twenty?

A. I'm looking at the survey on the Cox Federal EA Number 1, dated February 27, 1973, which was the survey referred to in that and at point number twenty the measured depth was four thousand feet.

Q. All right, sir, would you turn now to Exhibit One and if Mr. Day and Mr. Buell will bear with me, if I can refer to it one more time before I prove it up and tell us whether or not under both the recommendation of Mr. Cox and the recommendation of Mr. Alspaw, what they were asking of the Commission. Would the bottom-hole location have been

within the hundred-foot circle the Commission gave him as a target area?

A. That point at four thousand feet is within the one-hundred-foot radius and therefore to return it to the vertical below that point would be within the one-hundred-foot radius.

Q. All right, do you recall whether or not Arco was present at that hearing?

A. Yes, sir.

Q. I know you know about Amoco, let me ask you that first. Did Amoco object or protest in any way to the Commission granting the request made by Mr. Cox and Mr. Alspaw?

A. No, sir, Amoco did not protest that.

Q. Do you recall whether or not Arco did?

A. Arco did not protest the application.

Q. So then the order issued by the Commission on June 25, 1973 gave Applicant Cox precisely what he and his petroleum engineer had requested in the way of relief?

A. Well actually even more latitude than that because they gave him a hundred foot target area, diameter around the surface location, radius around the surface location.

Q. All right, sir, they gave him more flexibility really than either he or his engineer asked for?

A. Oh, yes.

Q. All right, sir, now turning to Exhibit One that has

been referred to so often that I think the format is pretty well on the record, but would you mind relating for the record how that exhibit was prepared?

A. This exhibit was prepared from two items that were in the record of the 1973 hearing and of the October session of this hearing. One that I have just referred to was the survey we talked about, dated February 27th, 1973. Now the dark spot here with the number one, entitled "Surface Location" is the starting point for this survey. As it courses to the west and then takes the south branch, the data from this Eastman report of subsurface directional survey are plotted on this exhibit.

Q. In other words, that is a directional survey of old hole Number 1?

A. Yes, sir, that is old hole 1.

Q. Now what else is on that exhibit?

A. Okay, in addition to that on this exhibit are plotted the results of the survey submitted by Eastman Whipstock, dated July 8th, 1975 and was Exhibit Three at the October hearing, using the radius of curvature method of computation, and the points beyond the place where the depiction of the course of the hole branches. Those that go on up to the north and up into the northwest corner of the lease are those points taken from this survey.

Q. And as depicted on our Exhibit Number One is that as

faithful plotting of that Eastman survey as we could make?

A. Yes, sir.

Q. And comparing it with the plot of Eastman and that and I don't recall whether or not any other -- well, yes, the plots on our Exhibits Two and Three that were prepared by Eastman personnel. Are all of those extremely similar?

A. Yes, sir.

Q. All right, we discussed the significance of the red arrows and what they refer to on there, that's where a Dyna-drill was run. Would you briefly relate for the record how you selected the places where you would position the arrows?

A. In using Exhibit Five from the October hearing, which I believe was entitled "well history" at that hearing. I went through the exhibit and took the spots noted in there where the Dyna-drill was run and tried to indicate those spots. Now all of them are not on a precise depth point here from a survey shot, so some of them, you know, may be between survey points shown on this exhibit, but as I see the well history, after overcoming the problem of parted surface casing and so on and getting the plug finally set and dressed off, the first Dyna-drill was run at thirty-seven, fifty-five. The next one at thirty-eight, twenty-two. The next one at forty-six, eighty-seven and the next one at fifty-two, twenty-seven and the next one at fifty-eight, twenty-three.

Q. All right, sir, and the in point, the actual bottom-hole location, shown roughly about ten feet from our west line and that is what all of the data, including the Eastman and the Cox exhibits have shown, is that not correct?

A. Yes, sir.

Q. All right, can you think of anything else that is on that exhibit that we haven't testified to, Mr. Currens?

A. With respect to my testimony? It also includes the depth, true vertical depth and measured depth, the footage north and west from the surface location and the closure by distance and angle from the surface location for the new hole. The last entry of Number 1, the similar information on the old Number 1, the hundred-foot radius circle I think we have referred to, and, of course, the north and west lines of the lease.

Q. All right, sir, will you turn your attention now, please, to what has been identified as Amoco's Exhibit Five, what is that Exhibit?

A. Exhibit Five is based on the Exhibit Number Nine presented in the October hearing by Mr. Cox. And that exhibit was a single-stick section depicting the completion interval in a number of wells including his Federal EA Number 1.

Q. All right, sir, why don't you state for the record the wells that were identified on this particular stick exhibit by a color legend, were they not?

A. They were, the Pan Am 1-C was purple; the Pan Am 1-J is red; the Cox 1-EA is green; the Gulf B-1 is orange; the Pan Am F-3 is blue; the Pan Am F-12 was a blue stripe or a cross-hatching; the Humble Number 5 was solid brown; and the Humble Number 4 is a black cross-hatching.

Q. All right, sir, the thrust of this exhibit, as I remember it, it was simply another portrayal by Mr. Cox of the fact that his well was completed much lower than any of the nearby and adjacent wells and, therefore, it must be a new, separate and distinct virgin reservoir. Does that statement generally jibe with your memory of the purpose of this exhibit?

A. Yes, sir, that generally jibes with what I recall his purpose being.

Q. All right, sir, have you added anything to that exhibit of Mr. Cox's?

A. Yes, I have. I have added several things to this exhibit.

Q. All right, what have you added?

A. Well, to begin with I have added a green square some thirty feet above the green box that was marked on that exhibit to correct the perforating interval from the measured depth to true vertical depth. I put an "x" through the measured depth and an arrow to depict the new location of those.

Q. Now that was discussed to some degree by Mr. Christianson in his Exhibit Four, but I believe this will more vividly show the actual transformation you see when you use true vertical depth rather than the total measured depth?

A. Yes, sir.

Q. Mr. Christianson also explained the difference, but do you feel you need to elaborate on it a little, the difference between true vertical depth and measured depth?

A. No, I don't really think so. If you drill a hole that deviates from the vertical then the measured length of that hole must be greater than true vertical distance, or the distance measured in vertical plane to th bottom of it.

Q. In making a geological comparison, using data obtained on a well that is known to have been deviated and looking at Exhibit One of ours, I would say extensively deviated, some three hundred and ninety-five feet from the surface location.

A. Some four hundred and eighteen feet from the surface location.

Q. Thank you for correcting me. Now do you think it is a valid comparison if you use total measured depth as compared to true vertical depth?

A. No, sir.

Q. What happens on this exhibit when you use true vertical depth rather than total measured depth, how does that

shift this lowest completion in the area?

A. Well, it puts two wells on this exhibit below it.

Q. What wells are they?

A. Those wells being the ones designated Humble Number 4 and Humble Number 5.

Q. So if we are going to use this geological tool at the lowest well in the formation as separate and distinct, we just put the two Exxon wells, or Humble wells in a new and virgin reservoir, haven't we?

A. If that's the criteria we did, yes, sir.

Q. Do you have any other comments on our Exhibit Five, Mr. Currens?

A. No, sir.

Q. All right, sir, let me ask you this, Mr. Currens, and I want you to remember and keep clear in your mind, I'm asking this as a reservoir engineer, strictly as a reservoir engineer, and I want you to look at Exhibit One at the bottom-hole location of the Federal EA Number 1, ten feet from our line, from a reservoir engineering standpoint, does it make one scintilla of difference whether that well is ten feet off our line or one foot over on our side of the line?

A. From a reservoir standpoint I don't see any difference between the two locations you have described.

Q. If this well is allowed to remain a completion and to produce, is there any conceivable way, from a reservoir

engineering standpoint, that the correlative rights of the owners of interest in the Empire-Abo unit will not be grossly violated?

A. I believe they would be grossly violated if the well is allowed to continue producing.

Q. Mr. Currens, let me ask you this: Based on your experience in New Mexico, I'll ask you if you realize, that often in an application for an unorthodox well location at the surface, where an operator wants to crowd a line in one direction or another, that the statutes mandate and the Commission rules mandate that the allowable of that well can be adjusted, let's say penalized, in order to protect the offset operators of the properties this well is crowding, do you realize that --

A. Yes, sir, that can occur.

Q. In this case, with the bottom-hole location of this well only ten feet off of our line, is there any way that a penalty could be applied to this well, even if it is only allowed to produce two barrels of oil a day, that will not violate the correlative rights of the owners of interest in the Empire-Abo unit?

A. I don't believe an allowable can be assigned to this well that will not violate the rights of the Empire-Abo unit owners.

MR. G. BUELL: Thank you, Mr. Currens. That's

all I have by way of direct.

May I offer at this time Amoco's Exhibit One, Exhibit Four and Five into evidence, please?

MR. STAMETS: Is there any objection to the admission of these exhibits?

MR. DAY: Will you leave them on the board? We would like to have voir dire on one of the exhibits, Mr. Examiner, and on Number One because he made a statement I didn't quite understand.

Are you ready to ask him questions?

MR. HINKLE: No, I don't have any.

CROSS EXAMINATION

BY MR. DAY:

Q. You made a statement in correcting Mr. Guy Buell on the distance from the surface location to the lease line and what number is that exhibit right there?

A. This is Exhibit Number One.

Q. Number One?

A. Yes, sir.

Q. I don't remember what happened to Two and Three, but you made a statement to him that, no, it wasn't, it was four hundred and eighteen feet.

A. You just asked me the distance from the lease line. He asked me the closure of that from the surface location, and

bottom-hole closure is listed on Exhibit Three from the October portion of the hearing as four hundred and eighteen, point, two, two feet, which is the number that is shown here. That is the distance from the surface location to the bottom-hole location.

Q. Well, I missed it on that direction.

A. Yes, sir.

Q. Well, according to your footage there, I may have to do a little subtraction, how far from the lease line is the bottom of this well?

A. Well, actually coming at that from a different direction, the bottom of the well is shown to be three hundred and twenty, point, five, nine feet west of the surface location.

Q. How far would that put it from the lease line?

A. That would put it -- this is three hundred and thirty from the west line -- that would put it nine, point, four, one feet from the west line.

Q. All right, sir, and from the north line?

A. From the north line it is two hundred and sixty-eight, point, five, six from the surface location. Let me make a subtraction there. And that is three hundred and thirty-one feet from the north line, if I recall the prior exhibit correctly. I get sixty-two, point, four, four feet from the north line.

Q. From the north line?

A. Yes, sir.

Q. As to where this well is --

A. The bottom-hole location.

Q. From the lease line. And what do you find to be the depth on that exhibit?

A. It shows sixty-two, thirty-one as the measured depth on that exhibit.

Q. Is that what you call true vertical?

A. No, sir, that's the measured depth and I take that from the first column of the Exhibit Three I have been referring to, which has a column called "measured depth". "True vertical depth" is the fourth column of that exhibit and it shows that in the measured depth of sixty-two, thirty-one, the true vertical depth is six thousand, two hundred, point, four, one feet or thirty, point, five, nine feet shallower.

Q. And you stated that you prepared this Exhibit Number One from Eastman's records?

A. From data that were introduced as Eastman records at this hearing and at the hearing in 1973.

Q. Did you receive any information directly or indirectly from Eastman, outside of the records before the Commission?

A. I received no definitive information on this. I'm aware that Eastman did the work and I checked with them and they said, "yes, they had been the directional driller on this

well."

Q. What other items or matters were discussed?

A. I asked them the general location of the target, which they indicated was to the northwest.

Q. Anything else that you recall?

A. Not specifically.

Q. And that's all the information you received from Eastman, outside of the hearings before the Commission?

A. Yes, sir, and that was a telephone conversation I had with them.

Q. All right. You are familiar with the reservoir?

A. I have not made a detailed study recently, but I have made reservoir engineering studies of this reservoir.

Q. You are aware of the northwest drift in this area?

A. What northwest drift?

Q. The drift that you have heard testimony on and based on your prior knowledge of the reservoir, and current knowledge of the reservoir. The drift in drilling, that the well would take in drilling a well in this area or on this leasing?

A. Well, certainly, the strike of the reservoir is northeast-southwest, and as you approach bedding planes that are reflective of the reef build up, a bit does tend to attack them at right angles, making it go northwest. That's illustrated pretty well here, as you get, say, fifty-

four, fifty-six hundred feet, where there is starting to be a northwest tendency in old hole Number One, as you can tell, approached the place where there is an influence of the reef on the overlying strata.

MR. DAY: We have no objection to Exhibit Number One, Mr. Examiner.

MR. STAMETS: The exhibits will be admitted.

MR. DAY: Sir, I said Exhibit Number One. Isn't that the exhibit we just referred to?

MR. STAMETS: Right, and that is the only one I understood you had any question on.

Exhibit Number One will be admitted.

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

MR. DAY: May I do something else before I forget it. I would like to introduce this participation parameter which Mr. Christianson referred to in his testimony into the record as our exhibit.

MR. STAMETS: Has that been identified with an exhibit number?

MR. DAY: No, it hasn't.

MR. S. BUELL: It will be Exhibit Number Ten.

MR. STAMETS: Is there any objection to the admission of this exhibit? Applicant's Exhibit Ten will be admitted.

(THEREUPON, Applicant's Exhibit Number Ten was admitted into evidence.)

MR. G. BUELL: We have no objection, Mr. Examiner, it is already in the Commission files.

MR. DAY: Now we have no objection to that middle exhibit, Exhibit Four.

MR. STAMETS: Exhibit Number Four is admitted.

(THEREUPON, Exhibit Number Four was admitted into evidence.)

Q (Mr. Day continuing.) This is Exhibit Number Five?

A Yes, sir.

Q You plotted these graphs with adjusting to, did you call it true vertical?

A Yes, sir.

Q Did you also do that on -- is that a true vertical on the Humble well?

A I have no information on the true vertical on the Humble well.

MR. DAY: We object to the admission of that exhibit as being un-correlated to the true verticals of all of the wells, if we are going to do the graph it should be all true verticals or all knowns.

MR. G. BUELL: Mr. Examiner, I urge its admission, I don't think that is a valid objection, for the simple reason that the only known deviated well on that exhibit is

REPORTER'S NOTE: pages misnumbered. This page inserted for continuity.

Mr. Cox's EA Number 1.

MR. DAY: I don't understand that objection, Mr. Examiner. My objection still stands.

MR. G. BUELL: Mr. Examiner, will you grant me leave to ask a couple more questions which I think will make your decision a lot easier on the admissibility of -- I didn't realize that Mr. Day had any objection on this one or I would have gone into more detail at the time.

MR. STAMETS: Yes, would you please do that?

REDIRECT EXAMINATION

BY MR. G. BUELL:

Q. Now this exhibit was designed by Mr. Cox to show the wells in the immediate area of the Federal EA Number 1 well, his well, were all completed above or to say it conversely, his well is completed much lower.

A. That is my understanding of it.

Q. The wells in this area?

A. Not this exhibit.

Q. Is that correct?

A. It is my understanding that his original Number Nine was prepared for that purpose.

Q. Let me ask you this, Mr. Currens: Do you have any data on the deviation and drift of the wells that are drilled randomly, and when we speak of drilling a well with random

drift, what do we mean?

A. We mean an uncontrolled deviation of the well, letting it take its natural course in movement from the vertical plane.

Q. You don't use any specially designed tools to kick it off in a predetermined direction like was the case on this directionally controlled well of Mr. Cox?

A. Yeah, that's right.

Q. Do you have any data available to you on wells in this area that were drilled randomly and as each of these wells on this exhibit was, to show the significance of their total measured depth with a comparison of their true vertical depth?

A. Yes, sir, I do.

Q. What two wells are those, Mr. Currens?

A. The Cox Federal EA 1, the old hole, and the Cox Federal EA 2, the second well that he drilled just to the east of the original Number 1.

Q. Have you made a calculation to determine, or did you look off of Mr. Cox's own exhibit and get the true vertical depth of those two randomly drilled wells?

A. I got the information from the exhibits that were filed by Mr. Cox in the 1973 hearing.

Q. All right, sir, would please state for the record, if you assume that these are representative drifts, and the thrust of all the testimony is that these were pretty

representative wells, particularly with their northwest drift. Assume that these are typical, how would that affect your Exhibit Number Five with respect to the position of the wells that have been drilled randomly?

A. The old EA Number 1 had a measured depth of sixty, fifty, six thousand and fifty feet, a true vertical depth of six thousand and forty-six, point, two, seven, slightly less than a four foot difference in the true vertical to measured depth.

The Well Number 2 had a measured depth of six thousand, one hundred and ninety-five feet with a true vertical depth of six thousand, one hundred and eighty-nine, point, seven, four feet, slightly less than six feet difference in true vertical versus measured depth.

Q. Mr. Currens, if you made that change for the random wells on Exhibit Number Five, it would be barely perceptible or noticeable, would it not?

A. The Humble Federal Number 4 which is the lowest of those, would be perforated, and using the maximum of those.

Q. Yes, please use the maximum.

A. Of six feet -- would be perforated still eight below the Cox well and the other well, the Humble 5, would still be perforated six feet below the Cox well.

Q. If it does anything, making that correction, it just puts Mr. Cox's well more in bad with his Empire-Abo

neighbors, doesn't it.

A. It would put him right at the same subsea depth almost, they would have overlapping perforations in one of those cases, subsea bases.

MR. G. BUELL: If it please the Examiner, I again move that Exhibit Number Five be entered into evidence.

MR. DAY: Mr. Examiner, may I ask further questions?

MR. STAMETS: Yes.

FURTHER CROSS EXAMINATION

BY MR. DAY:

Q. Mr. Currens, refer to the Exhibit Number Five.

A. Yes, sir.

Q. Well, let me take them in the order of their color. Is the Pan Am 1-C graphed on true vertical?

A. I have made no check on the completion interval of any wells shown on this exhibit, I simply copied them from Exhibit Number Nine in the prior hearing. I have accepted those as being valid depths. I don't know if they are true vertical, measured depths, or what.

MR. RAMEY: With the exception of the Cox well?

A. Yes, sir, with the exception of the Cox well.

MR. DAY: Mr. Examiner, we further urge our objection. Mr. Guy Buell has referred to wells, the old EA-1 and 2. They are not even on this exhibit, if he had wanted to put

them on he could have. The only testimony that the witness Cox has shown is that this is a true composite, that there is one true vertical on here, which is the Cox well, according to his testimony.

MR. STAMETS: Mr. Day, I believe we will sustain your objection to the exhibit and the exhibit will not be admitted.

MR. DAY: Thank you.

MR. STAMETS: Any questions of this witness?

MR. Day: I have one further question. I was examining him on other matters.

Q. (Mr. Day continuing.) Mr. Currens, in your opinion, is there oil under the Cox lease?

A. My understanding is that he has had oil production from this location, from this bottom-hole location as a current completion, and as far as I know he is now producing, therefore, if it is ten feet from the line there must be some oil on that lease right now.

Q. Do you have an opinion whether or not there is oil there under the Cox lease?

A. Based on the understanding that it is producing oil, yes.

Q. And if that oil is not produced by Cox it will be produced by the unit?

A. Yes, sir.

MR. DAY: Thank you, Mr. Currens.

MR. STAMETS: Any other questions of this witness? He may be excused.

(THEREUPON, the witness was excused.)

MR. STAMETS: Anything further, Mr. Buell?

MR. G. BUELL: No, Mr. Examiner, that concludes our direct presentation.

MR. STAMETS: Mr. Sumner Buell, do you have anything further?

MR. S. BUELL: We will have four more witnesses, but they should be brief, Mr. Examiner.

MR. STAMETS: You may proceed.

MR. S. BUELL: We would recall Mr. Ratts, please.

MR. STAMETS: You may proceed.

MR. S. BUELL: Thank you.

DIRECT EXAMINATION OF ROBERT V. RATTS

BY MR. S. BUELL:

Q. Mr. Ratts, you have seen what is marked as Amoco's Exhibit Number One up there that shows five times that the Dyna-drill was run in this hole during the drilling process?

A. No, sir, it was run seven times.

Q. It was run seven and not five times?

A. That is correct, sir.

Q. So to that extent, that exhibit is in error, since

it shows five Dyna-drill runs.

A. May I look at it and see how many they have on there?

Q. Certainly, please.

A. That is in error, yes, sir.

Q. What the five, or --

A. There were seven Dyna-drill runs made in that well.

Q. And that exhibit only shows five runs?

A. That is correct.

Q. Now, Mr. Ratts, let me ask you this: Why were there delays between running the Dyna-drill runs, were you looking for something in particular, and they weren't run more often?

A. Yes, we were looking for a soft spot in the formation so we could make a Dyna-drill run and turn the hole.

Q. And did you find those soft spots that you were looking for where you thought that you might find them?

A. In one place, along about thirty-eight, fifty-four we found a place that was fairly soft.

Q. Did you have much success there?

A. Yes, we did pretty good. We turned it around to the north, a little over three degrees and also got somemore slope so we could get away from our stuff.

Q. Okay, let me ask you this, and this may be barely articulate, but maybe you will help me out. When you are

angling a Dyna-drill you are trying for both angle and drift, is that not correct?

A. That is correct. Let me make something clear here. I think it should be brought out. This hole got completely away from us, we were fighting this west drift, we were also fighting the increased angle from the true vertical. In fact we got up to eleven and three-quarter degrees from the true vertical and when you set a Dyna-drill to correct for both direction and to change your true vertical, you can't change them both. In other words, when you change them both, you are not getting maximum direction in either way. In other words, if you are trying to turn it to the north and trying to drop angle at the same time, there is only one way to do it, and that's to turn half way in between so that you can gain both northward direction and also drop slope.

Q. In your experience, as an experienced driller, with over a hundred and fifty wells in your career, do you know what any other efforts a reasonable, prudent operator could have taken in this situation, considering time, and money and expenses with the circumstances that were involved, to help bring that back to the north and east?

A. No, I sure don't. We spent plenty of money on it and we made every possible effort to turn that well to the north and east.

MR. S. BUELL: I have nothing else from Mr. Ratts.

MR. STAMETS: Any questions of Mr. Ratts?

MR. G. BUELL: Sorry, Mr. Examiner.

CROSS EXAMINATION

BY MR. G. BUELL:

Q. Mr. Ratts, I'm standing here by our Exhibit Number One, where do you think the hole got completely away from you, that you testified to?

A. I think it got completely away from us when we got out to, let's say about forty -- around forty-three hundred.

Q. About forthy-three hundred. Was that because, I'm going to quote you as accurately as I can, "because we were fighting the natural west drift."

A. That is correct.

Q. Can you see this exhibit from where you are?

A. Not from where I am.

Q. In this old hole it wasn't fighting the natural drift, it was going with it, where did it encounter this strong drift to the west, what depth?

A. About fifty-four hundred, it seems to be here.

Q. Actually do you think you would be fighting a stronger natural drift to the west in your deviated hole than you did in this old hole that you just let go?

A. Apparently that's what happened.

Q. Gosh, Mr. Ratts, how can you account for that?

A. I can't account for it.

Q. You can't account for it?

A. No, sir.

Q. I believe you also testified that in all of your experience, you had never known anyone who made a more determined effort or spent more money than you all did on this well?

A. I can vouch for that, yes, sir.

Q. And earlier you told me this was your first experience ever with a directionally drilled and controlled well.

A. That's true.

Q. So I guess since it is your only experience, you haven't experienced where anyone has gone to more pains, is that what you meant?

A. That is what I'm saying, yes, sir. I don't know how anybody could go to anymore expense than we went on this well.

MR. G. BUELL: Thank you, Mr. Ratts, that's all.

MR. STAMETS: Anymore questions of this witness? He may be excused.

(THEREUPON, the witness was excused.)

MR. S. BUELL: We call Mr. Cox.

DIRECT EXAMINATION OF ROGER G. COX

BY MR. S. BUELL:

Q. Mr. Cox, I hand you what has been marked for identification as Applicant's Exhibit Number Eleven and would you just briefly describe what the cover letter is and then explain what the attachment is?

A. It was a letter to Bob Ratts concerning reappraisal of Bocoats' target area and discussed it with some other engineers.

Q. Now let me interrupt you. This Bocoats' target area is Amoco's Exhibit Number Two, is that correct?

A. I'm not familiar with all of the exhibits that have been put on today.

Q. It is the blue line graph.

A. Okay. In discussing this with some engineers who had been involved in directional drilling, I suggested that we attempt to go off in a northerly or northeasterly direction, red line, the dip will catch us and the radius will go to the northwest anyway, as indicated by the curved blue line.

Q. I don't need you to read it, just explain what the cover letter is. I'm more interested in that than the attachment.

A. I'm telling him to turn to the -- go off to the north-northeast, and we will eventually end up in the quadrant that I wanted to end up in.

Q. Now turning to the attachment attached to that letter, will you briefly describe what that is?

A. Well, this circle --

Q. Which circle are you referring to?

A. I'm referring to this particular circle here, it's a hundred and fifty foot radius.

MR. STAMETS: We would like to have a copy of that down here, please.

(THEREUPON, a discussion was held off the record.)

Q. (Mr. S. Buell continuing.) All right, now, would you identify the circle that you were just referring to?

A. The circle one, it's a hundred and fifty foot radius around the bottom of the hole in Well Number 2, this one here. That was an area which we felt like it suffered stimulation influence and we could stimulate back into the old hole.

Q. Now this circle generally tends to be in the lower righthand corner of that diagram, does it not?

A. Right. In that circle is a circle to the left of it, in the lower part of the diagram, which is a hundred and fifty foot radius to the bottom hole or the zone we attempted to complete in in the Number 1 Well and that's an area of possible stimulation influence in the Federal EA Number 1.

The line was marked in blue, this is just a copy out of my file, it's marked in blue. I suggested that we go off in a north-northeasterly direction.

Q. This is generally a line that runs straight north from the takeoff point at about four thousand feet?

A. Forty-one hundred feet.

Q. Okay, and it is a heavy straight line going approximately north, slightly northeast?

A. Uh-huh.

Q. And you have two outer circles there drawn parallel to one another that generally stretch across the top of the page?

A. One would be roughly from the takeoff point, a hundred and fifty feet, outer limits would be two hundred feet.

Q. And I notice that you have an area there colored lightly in yellow and it says, prospective area?

A. That is correct.

Q. Was this the general direction in which you proposed to drill this well at the time you undertook to drill it? To deviate it?

A. Yes, yes, when we undertook to deviate it. When we got the stub out, or got the casing out of the hole.

Q. This was your proposed completion area in that yellow zone?

A. That's right.

Q. And that was your intention at the time?

A. Right.

Q. Now, would you go to the wall, please, and review Arco's Exhibits Four and Five, I have some questions for you on that?

A. Okay. Is this Arco's Exhibit Number Four?

Q. Just a minute, Mr. Cox.

(THEREUPON, a discussion was held off the record.)

Q. (Mr. S. Buell continuing.) All right, Mr. Cox, going up there by Exhibit Number Four, which is generally a northwest-southeast cross section. Let me ask you a few general questions first. I notice that in the previous testimony your well has been hung on what has been lightly referred to as the true vertical. Is that how you recall it? The log on your well?

A. The log on my well is basically Abo right here.

Q. But they said they adjusted your well to a position on the cross section to reflect true vertical, is that correct?

A. That's what they said, I would have to take their computations --

Q. Is that your recollection of what they said?

A. Yes, it is.

Q. Now, on this south flank of the Abo reef, with the generally northwest to the southeast dip of the formation, is it common knowledge that most wells in that area drift to the northwest?

A. Yes, sir.

Q. These are the so-called random drilled wells that Mr. Guy Buell was referring to?

A. Yes, sir.

Q. And essentially it is common knowledge that all of them are, although not intentionally, they do deviate to the northwest?

A. Correct.

Q. Do you know of your own knowledge whether any of the other wells shown on that cross section are adjusted for true vertical?

A. I don't know that. I'm not sure -- I just got this log today. I haven't had a chance to evaluate it for true vertical. With the totcos they gave me which I would have to use to reconstruct what the horizontal and the vertical was, I don't know anything about the vertical depths on here. I have no evidence.

Q. So generally what you can say about that exhibit is that the one log on there that is adjusted for true vertical is yours and the others which are random probably drifted to the northwest?

A. Right.

Q. And we don't know whether they are hung on true vertical or not?

A. No.

Q. Which means that the net result is where your picks are, move up thirty feet on their interpretation, and we don't know where theirs are relatively speaking?

A. That is correct.

Q. Theirs could move up or down, depending on which way their well went?

A. Yes, sir.

Q. And how many true vertical wells do you know of in your existence, to your knowledge?

A. Very few. I know that Humble and Arco are presently attempting to drill a well as close to the vertical as possible.

Q. Going over to Exhibit Number Five which is the east-west cross section, do we run into the same difficulty over there with your well being the only one hung on true vertical and the rest of the logs to be left hanging slowly in the breeze as far as their relative depths?

A. I believe so. I haven't had a chance to go over their cross section in detail to see how it correlates with mine, but as far as the top of the Abo, this is the top of the Abo, how it is hung in regard to the twenty-four, twenty-five foot subsea level, I don't know.

Q. But according to their own testimony, the only log on there that is hung on true vertical is the one on the Cox Federal EA Number 1?

A. That's correct.

Q. The rest of them we don't know where they are as far as true vertical is concerned, is that correct?

A. That's correct. I do know, I believe it is on the Humble Number 5, according to the bit records, it has two hundred and forty degrees, I mean forty feet of horizontal displacement and possibly twenty-three feet plus the vertical displacement.

Q. So we know it is displaced to some degree?

A. Right.

Q. So that one is already in question?

A. Yes.

Q. And we already know that on this south flank of the Abo reef with the severe dip that is involved, most of these wells do go crooked?

A. Right. They have attempted to drill them with square drill collars, reamers and stabilizers when they are drilling inside locations within the forty-acre pattern.

Q. Most of these wells are crooked, are they not, and towards the southwest?

A. That is my understanding from talking to Amoco and Arco engineers.

Q. Okay. By the way, are you aware of the bottom-hole pressures in the well north of you?

A. I asked Mr. Christianson outside briefly, what the bottom-hole pressures were in the field and he said they

range between twelve hundred and thirteen hundred pounds.

Q. And between the October hearing and today, did you have a bottom-hole pressure calculated on your well?

A. Yes, I did.

Q. And what was that bottom-hole pressure?

A. It was run on a twenty-four hour shut in, actually it was a forty-eight hour shut in. The pumper thought they would run tests and check --

Q. What was the bottom-hole pressure?

A. Seventeen hundred and seventy-three pounds.

Q. Considerably higher than what was in the rest of the unit?

A. Yes.

Q. When you put that well back on production, what type of production start up did you experience?

A. The pumper said we got twenty-two barrels the first day.

Q. Twenty-two barrels of what?

A. Oil, and about a hundred and twenty to twenty-five barrels of water. I haven't talked to him since.

Q. So when you did start up your production again you were down on your oil production and up on your water production?

A. Yes.

Q. Which is some indication of what you had feared if

you were required to shut in the well for an extended period of time?

A. That is correct.

Q. As I understand your testimony from the previous hearing in October, it was your testimony that the offset wells to the north and the west were producing from what was generally called either the F or the J zone, is that correct?

A. That is correct.

Q. And is it also my understanding from your previous testimony at the previous hearing that you could fairly well identify the F and J zone in the well, in the Cox EA Federal Number 1 and those two zones were barren of oil or simply not productive?

A. That is correct.

Q. So your production is not from whatever zone they were in?

A. That is correct.

Q. Is there anything else you would like to add to your testimony?

A. Just to question some of the picks in regard to their top of the Abo. I believe they picked the top of the Abo at sixty-two, seventy and on the other sample log they picked it at sixty-two, ninety. We had only one copy of this log and it was cut off at sixty-two, fifty, right in here. I had a study of this made by Walt Eichmeyer, who was

a log analist for thirty some odd years with Schlumberger.

MR. G. BUELL: Please, Mr. Examiner, I think we are getting more hearsay testimony and I think we have had about all this record can stand and I'm going to object unless this thirty-year expert is in the room and we can test his qualifications and his expertness.

MR. S. BUELL: I would agree essentially with Mr. Buell's objection. It is hearsay, but I won't fight it if he will stop testifying, too.

MR. G. BUELL: I resent the inference that I ever testified, Mr. Examiner.

MR. STAMETS: Objection is sustained.

Q. (Mr. S. Buell continuing.) Mr. Cox, have you had a chance to examine just very briefly the Amoco Diamond Federal Number 1 Well?

A. Yes, I did.

Q. Do you see any correlation in that well between information contained in the Cox EA Federal Well?

A. I belive the top of the Abo reef is at about right here at sixty-one, eighty-six. The top of my Abo is at sixty-one, they guessed that it was about sixty-two hundred, but we had oil shows in the top of the Abo and I calculated it on the top of the log, and I believe this particular zone right in here.

Q. Right in where?

A. At sixty-two, sixty-five on down to sixty-three hundred on the compensated density log, it suggests that it has got good porosity, it's pretty clean, suggesting good dolomite. The other log that they gave us, it was an induction log, the induction log suggested that it had over four to five hundred ohms. Resistance was suggested and it had low-water saturation, but I am not a log analyst by trade, I'm not a jack-of-all-trades like Mr. Buell, but not a master of anything, so --

Q. Mr. Cox, are you saying then that on your preliminary investigation it looks like that zone you just identified from the Diamond Federal well correlates with your zone in which you are producing in the Cox EA Federal Number 1?

A. That is correct.

Q. So that your zone extends on to the south out across the lease area?

A. Right.

Q. Okay. By the way, Mr. Day used some figures as to gas-oil ratio on some wells that were gathered in August. I believe he used the M-16, twelve, eighty-one; the L-17, ten, thirty-one; the L-18, ten, fifty-six. Where did those figures come from, do you know?

A. They came out of the New Mexico Oil Engineering Committee monthly report.

Q. And you are the one that copied them out of there?

A. Yes, I am.

Q. And that was an accurate transcription and copy?

A. Right, well, I hope it is accurate, I tried to make it accurate.

Q. Did you testify that you had seventeen hundred and some odd pounds bottom-hole pressure calculated?

A. Yeah, the calculated bottom-hole pressure.

Q. And you did testify that Mr. Christianson mentioned to you that in the field it was some twelve hundred pounds?

A. Twelve to thirteen hundred. We had some drill stem tests that were recently run, within the last six months, of twelve hundred and ninety-two shut in pressure, after a two hour shut in and drill stem test.

Q. Where?

A. Just to the north of us about a mile or a mile-and-a-half.

Q. Within the unit?

A. Yes, within the unit.

Q. Does that indicate to you that you may be in a separate stringer that is not in direct communication with the remainder of the Abo formation in the unit?

A. It strongly suggests it.

MR. S. BUELL: Okay. I have nothing else.

MR. STAMETS: Any questions of Mr. Cox?

MR. G. BUELL: Mr. Examiner, I have one or two.

MR. STAMETS: Mr. Buell.

CROSS EXAMINATION

BY MR. G. BUELL:

Q. Mr. Cox, the letter that you identified as your Exhibit Number Eleven, apparently was a letter from you to Mr. Ratts, is that correct?

A. That is correct.

Q. Is that the letter from you that he never received?

A. That is correct. He received it, yes, sir.

Q. He received it, when did he receive it?

A. August the -- I mean July when he come back in from the well. He had been out on the well from July 7th to July 31st.

Q. Did you ever convey to any representative of Eastman out on the well that the target area of the north-west corner of the lease that you had orignally agreed on had been changed?

A. Did I convey to anybody, no, sir.

Q. You didn't tell Eastman that you had changed your mind?

A. I told him to get off to the east when I got out there. Well, I told them that earlier. I told them that Cactus had called me at forty-five hundred and as I testified I told Mr. Ratts to turn it to the east, northeast. When

I arrived on the location I told them to get it back as far to the east as they could and that is when they made their last Dyna-drill run.

Q. So then you disagree with the testimony of Mr. Vickers that every orientation that was made with the Dyna-drill, after you got out of the hole was made on his recommendation?

A. No, that's the only time I made -- I made it to Mr. Ratts, not to Mr. Vickers.

Mr. Vickers testified that he made the decisions on his own.

Q. All right, let me see if I can get this straight. I know it's late and we're all tired and I'm having a hard time getting this. Did you or did you not ever convey to anyone with Eastman that you had changed the target area you had set for them?

A. No, sir.

Q. All right, thank you. Now, Mr. Cox, you talk and say as if it is dogma that all wells in this area that are drilled randomly drift to the northwest. So far in this hearing we have seen three directional surveys, is it not a fact that the only one that drifted in a true northwest direction is the directionally controlled EA Number 1?

A. Do you want an answer from me on that?

Q. If you know and you submitted these, they are

your exhibits so you should know.

A. I could probably subpoena enough people to come to this hearing to fill a coliseum if I subpoened them all who told me that it goes to the northwest.

Q. Mr. Cox, you are getting away from my question. We had three directional surveys in this record. It is obvious that your directionally controlled well drifted from the beginning to the northwest. Do the other two directional surveys that are in this record show this phenomona that you testified about?

A. No.

Q. They do not, do they?

A. No.

Q. As a matter of fact, with all of this northwest drift, the old bottom-hole location of the Number 1 Well is south of the surface location, isn't it?

A. That's right, it turned northwest when it hit the top of the Abo.

Q. You talk about northwest drift as if it starts the minute you start drilling the well, and that's not the case, is it?

A. The dip on the shallower beds are to the northeast so the bit naturally is going to migrate and the upper beds above the Abo are to the southwest. Okay, it hits the top of the Abo pay, all right, we have a change in dip from the

northwest to the southeast. Okay, then the bit migrates there. We were fighting the bit. I'm no authority on it, so I'll admit that I'm no authority.

Q. I take them as they come and you testified as if you were an authority, you have thrown northwest dip around like you invented it.

A. It's invented, it's there. I'm saying they took off to the north and anticipating that we were going to hit the Abo at fifty-three hundred and migrate to the northwest.

Q. Mr. Cox, I'm directing your attention to Amoco's Exhibit One, upon which is plotted, and I think we can assume accurately since it hasn't been challenged, the directional survey you ran on old Number 1, drilled randomly without any control and I'm going to ask you whether or not you see any northwest dip in this directional survey, except for the last six hundred and fifty feet of the hole?

A. No, sir, I don't.

Q. And doesn't your directional survey on Well Number 2, your well, that's in this record, generally show the same thing as this?

A. It shows, but not to this degree. To some degree it is the same, yes.

Q. So the only thing in this record that shows a well goes to the northwest from the minute you start it until you complete it, is the directional survey on your deviated

and directionally controlled well?

A. That's right, we admitted that all along, Mr. Buell.

Q. That's what I thought I was asking you.

A. Yeah.

Q. Now let's talk a little about your bottom-hole pressure. Did you invite any of the offset operators to witness it?

A. No.

Q. Did you invite the Commission to witness it?

A. No.

Q. I believe you said it was a calculated bottom-hole pressure, is that correct?

A. That's correct.

Q. I believe you also said it was shut in twenty-four and might have been shut in forty-eight hours?

A. Could I elaborate?

Q. Isn't that what you testified to?

A. I didn't have a chance to elaborate on it.

Q. You can elaborate on redirect with Sumner Buell. I'm getting tired. Do you know what kind of bomb was used?

A. It was run by Pecos Valley Oil Industries, Box 195, Artesia, New Mexico, requisition order by John E. Gray, so on and so forth. Shot fluid level after twenty-four hour shut in, seventy-nine joints of fluid, a hundred and eighty pounds of pressure.

Q. Well, this is a sonic pressure, it isn't even a bottom pressure.

A. We told you that at the other hearing. We weren't asked for a bottom pressure.

Q. Well, you said you didn't want a bottom pressure because you didn't want to shut your well in and now you just testified that it was shut in twenty-four or forty-eight hours.

A. Mr. Buell, we said we would have to pull the tubing and the pump and the rods in order to run a bomb in the well, I mean a static fluid level survey, and run a bomb in the hole, but we could run a fluid level shot by finding out where our fluid was in the borehole and computing the weight of the fluid and the weight of the surface pressure when it was shut in and arriving at an approximate bottom-hole pressure.

Q. Have you had much experience with sonic pressure, Mr. Cox?

A. You mean bottom-hole pressures like this?

Q. Yes, sir. Isn't that commonly referred to as a sonic bottom-hole pressure?

A. Yes, sir.

Q. Have you ever seen examples where a sonic bottom-hole pressure was taken and run in the well to make a comparison as to the accuracy of the sonic pressure?

A. A lot of times a well is pumped down and we feel like we have bottom-hole pressure in it, but we run a bomb into it to check our bottom-hole pressure and we might have good bottom-hole pressure which means we've got a very low permeability, we don't have enough feed into the wellbore.

In this particular case our static fluid level after two days of swabbing was around seventeen hundred feet, I mean seventeen hundred feet from the surface, and it pumped at the rate of thirty-four barrels of oil and a hundred and ten to a hundred and twenty-five barrels of water. Our fluid level dropped to -- there has been two other sonic surveys on it prior to this one, we went over about eighty-eight or eighty-nine joints down fluid.

Q. Explain to the record, will you briefly, how you obtain a sonic pressure, Mr. Cox?

A. I'm no authority on that, Mr. Buell, I can't explain to the record.

Q. Generally it is through sound waves, is it not?

A. Yes, they shoot off either a --

Q. They fire this projectile and then they record the sound waves as they are reflecting back?

A. That's right.

Q. Have you ever heard of foaming distorting the reading you get on a sonic attempt in obtaining a bottom-hole pressure?

A. Well, I'm sure there all kinds of engineering --

Q. What I asked you was if you ever heard of foaming phenomena in a well adversely affecting the accuracy of a sonic pressure?

A. What do you mean by foaming, Mr. Buell?

Q. Well, it is obvious that you don't know what I mean by foaming -- a pumping well that is making oil and water, and you can't answer the question I asked you so I'll go on to something else.

Mr. Cox, you said that you had discovered porosity in our Diamond Federal Well, it looked like it was producing, may I say from the Cox zone so that will identify it for the record, the zone that your EA Number 1 is producing in?

A. I said that it looked like there were indications of porosity and low-water saturation, I'm not an evaluation engineer.

Q. You didn't give us the benefit of what you thought the significance of that was?

A. Well the significance of it, Mr. Buell, is I believe that there is a strong possibility that our zone extends on down to where your Amerada Diamond Federal well is.

Q. Do you think there is a possiblity, Mr. Cox, that the productive Cox zone extends down into and would be productive in the Amoco Diamond Federal Well?

A. I think there is a possibility.

Q. You think that is a distinct possibility?

A. I think it is a possibility.

Q. Let me ask you this, and in connection with this I'm going to direct you to our Exhibit Four, the orientation map. It has located thereon the location of the Amoco Diamond Federal dry hole. This is on a scale. You can see the scale there. Approximately how far south is that at the surface location from your Number 1 Well?

A. I think it is around sixteen hundred feet.

Q. Mr. Cox, let me ask you this: If the Cox zone is productive all the way south into the Diamond Federal Well, why in the world do you need a location sixty feet from your north line and ten feet from your west line to produce that Cox zone oil?

A. Could I have a copy of that letter to Mr. Day to answer that question?

Mr. Buell, would you restate that so I can have it full in my mind, why did we have to go up there instead of going down here?

Q. No, I'm saying this: You are saying the Cox zone is productive all the way south, six hundred feet south, that's over six hundred feet.

A. Sixteen hundred feet.

Q. Sixteen hundred feet south to the location of the Amoco Diamond Federal well, I say if that is the case, if all

of your lease is productive in the Cox zone, why do you need to crowd ten feet from our line for your Cox zone completion?

A. Because I did not have that information until today. Could I read a letter to you dated August 23rd, 1973? (Reading.) Dear Mr. Day. 1412 Main Street, Dallas Texas. Regard Lease three, oh, seven, seven, two, oh, U.S.A., Eddy County, New Mexico. Please refer to your letter of August 7th wherein you requested copies of logs for the Diamond Federal gas unit Number 1 Well being drilled on the northwest quarter of Section 12, Township 18 South, Range 27 East. It is our understanding that you are requesting logs for Mr. Cox. Your request was forwarded to our producing department who is responsible for drilling this well and we have been advised to inform you that it is not Amoco's policy to provide non-working interest owners with copies of our logs. It is our suggestion that you obtain the desired logs from a log service company. (End of reading.)

I have in here, it's dated eleven, eleven, seventy-five, if I want to go through all of this paraphernalia that you never released the log or the data.

Q. We've gone all over all of that before, Mr. Cox, I don't know why you are bringing that up?

A. I didn't know what was in the well until I just got a copy of the log.

Q. Well, are you testifying now that you ordered the bottoming of this well ten feet from our line?

A. No.

Q. Now that you know that it is productive down to the Diamond Federal, why do you need this well ten feet from our line to produce the Cox zone?

A. Because I'm in the Cox zone.

Q. Why do you need a well ten feet from our line to produce the Cox zone if it is productive over your entire lease?

A. I don't know that. Did I say it was productive over my entire lease?

Q. You said it was productive down to the Diamond Federal.

A. I did not say that. I said there was a possibility.

MR. STAMETS: Are there other questions of this witness? Mr. Hinkle.

CROSS EXAMINATION

BY MR. HINKLE:

Q. Mr. Buell asked you some questions about the pressure in your well, the tests that you made, and this was computed through the pressure on account of the fluids in the well?

A. Right.

Q. How did you determine what gradient to use in computing the pressure in your well when you had both water and oil in the well?

A. We got our gradients from Dowel Water Supply, samples from the Empire-Abo field.

Q. They are the ones who determined the gradient to use?

A. Yes.

Q. So you didn't have anything to do with that?

A. No.

Q. Now in your previous testimony you said that you were under pressure to complete your well by August 31st because your lease was going to expire this year?

A. That's right.

Q. Now Order R-4561 is dated June 25th, 1973, you had all of the time in the world, didn't you, between 1973 and the expiration date to go ahead and do this directional drilling?

A. Yes, I believe it is in the testimony that was presented on October 8th, if I have to reiterate it again tonight I will. I suggested that the reason for it was that we were attempting to acquire a drilling contractor after we got the order to deviate.

Q. And you couldn't acquire one?

A. I couldn't acquire one, but we were still trying to

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acquire one that was going to be in by August 1st and we got word that Amoco had moved a rig in on our lease where we had the rights from the surface down to sixty-two, fifty or to the base of the Abo, and I called Jim Knauf at the Commission and he said, "That is correct." He said that they were three or four thousand feet down, he said you won't have to -- you'll have to perpetuate your lease past the expiration date for two years, so we were hopeful of getting information off of the Amoco well that would help us in establishing a program. We could never get information off of the Amoco well.

Q. I see. I just wondered what this timing in between was.

MR. HINKLE: That's all I have.

MR. S. BUELL: I've got a few more, if I may.

MR. STAMETS: Let me ask you hopefully a short question.

CROSS EXAMINATION

BY MR. STAMETS:

Q. Mr. Cox, I'm looking at what has been identified as your Exhibit Number Eleven and I'm pointing now to the surface location of the Number 1 Well, then there are two lines on here and one is vertical and the other is running off slightly to the lefthand side and they go up to what is

the prospective area, I presume that is where you intended Mr. Ratts to drill to.

A. That's what I call the fat part of the reef.

Q. All right, now I have simply taken a little piece of yellow paper here and drawn off the scale off the top and as I lay this on the surface location and out to the end line of these two straight lines, I come up with something like two hundred and thirty feet, two hundred and fifty feet from the surface location out into the prospective area. Would you agree with those figures, more or less?

A. They are probably correct, how far they are from the --

Q. So this would show your intent was that Mr. Ratts drill more than a hundred feet away from the surface location of this well?

A. Let's see we're taking off from -- well the surface location, I'm forgetting about that.

Q. Well, I think we have to go back and look at what the original order said. Order One permitted Mr. Cox to bottom well in the Empire-Abo pool at a point within one hundred feet of the surface location.

A. I agree I'm outside the surface location.

Q. What you intended to do was complete the well outside that one-hundred-foot circle? Thank you, Mr. Cox.

MR. STAMETS: Mr. Buell.

REDIRECT EXAMINATION

BY MR. S. BUELL:

Q. I would like to clarify something, Mr. Cox, I think you got caught in the fast-moving cross examination of Mr. Buell and I don't recall his entire question because it moved too fast, but I believe the question was something like, "When did you first change your mind not to use the target area not as shown on Arco's Exhibit Number Two, but the one that is shown on what has been marked for identification as Applicant's Exhibit Number Eleven?" Did you ever intend to go to that little fifty foot square circle up in the northwest corner or were you trying to go to the yellow area as marked on Applicant's Exhibit Number Eleven?

A. My intent was to go to the yellow area.

Q. From the very start?

A. Yes.

MR. S. BUELL: At this time, Mr. Examiner, I would move the introduction of Applicant's Exhibits Ten and Eleven. Ten is the participation parameters supplied by Arco and Eleven is that letter with the attachment.

MR. STAMETS: I believe Ten has already been admitted. Any objection to Exhibit Number Eleven?

MR. G. BUELL: No, I have no objection, Mr. Examiner.

MR. STAMETS: Exhibit Eleven will be admitted.

(THEREUPON, Exhibit Number Eleven was admitted

into evidence.)

MR. STAMETS: Are there other questions of this witness? Mr. Ramey.

CROSS EXAMINATION

BY MR. RAMEY:

Q. Just to set the record straight, Mr. Cox, there was some implication made by you and your counsel about crooked holes drilled in this pool, what is your definition of a crooked hole?

A. A deviation, one that doesn't go straight.

Q. It doesn't necessarily fit the definition of the Commission that of being one that deviates more than five degrees in any five-hundred-foot interval?

A. I've heard of them that have, but I don't know of them that have, you know, I know there is.

Q. But you were calling a crooked hole one that deviates a half a degree or one degree?

A. Well, any one that isn't strictly vertical. I know the Commission has a five-degree deviation rule here and if you go over that to six, the Commissioners can ask for a bottom-hole survey of the location. But as long as you keep your Totcos under five you are not going to be asked for one if you can prove that you are within your lease line. I have heard stories of back in the past, you know I've been

in this field, messing around with one of those leases for six years and you pick up a lot of hearsay and information from the pumpers and engineers, geologists and so forth.

But what I actually mean was that there are very few wells that go directly down unless you attempt to.

Q. So your crooked hole might more reasonably be called a hole that deviates from the vertical?

A. Right.

Q. And not necessarily a crooked hole as defined by the Commission?

A. Right.

Q. In Rule 111?

A. Right.

MR. RAMEY: Thank you.

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

(THEREUPON, the witness was excused.)

MR. STAMETS: I believe you have two more witnesses, Mr. Buell?

MR. S. BUELL: Yes, sir.

We would call Mr. Don Benscoter.

DON L. BENSCOTER

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

DIRECT EXAMINATION

BY MR. S. BUELL:

Q. Mr. Benscoter, you have been previously sworn, I believe?

A. Yes, I have.

Q. Would you state your name, your occupation and where you reside?

A. Don. L. Benscoter, B-e-n-s-c-o-t-e-r, 6105 East Sage, S-a-g-e, Scottsdale, Arizona. I am an investor and probably the smallest of the independents because I'm an investor in this well.

Q. When did you first have a contact with this well?

A. Back many years ago when the lease was first acquired by Mr. Jack Diamond and then subsequently sold to myself and several other investors.

Q. And insofar as the actual drilling of the Cox EA Number 1 Well, when did you first have a run-in with the problems that were being encountered, the subsequent events, you might as well narrate it.

A. Well, it's late and instead of going way back, there is, I guess, a whole six-year history on this lease and on this well with frankly Amoco trying to get this lease from the investors. As far as the investors were concerned we were innocent buyers of this lease.

When the unit was being formed the investors, and

I think I can speak of them as a total group and frankly I can only testify as an investor. I'm not technically qualified as a petroleum engineer or a geologist or anything of this type. But what was offered to the investors on this lease in our opinion was grossly unfair and very prejudicial in its smallness, in its ridiculous smallness, when at the same time we had been informed that this was a down dip lease and oil had been produced and there was substantial oil in place in the lease.

Now after the second completion attempt on the EA Number 1, and that subsequently watering out on us because we shut it in to do some work and it watered out. We then drilled EA Number 2. EA Number 2 ended up so it -- what we were informed and my understanding that it was in about the same wellbore damage as had been created in the old Aztec well. We understood that Mr. Cox came to the Commission back in 1973 to get permission to deviate this well and our understanding as investors was that would be a deviation to get away from that wellbore damage. I never saw the, or none of the other investors ever saw the Commission order in any way on it and two years or more has gone by since that time, of course.

We were informed by Mr. Cox that this well soon after that hearing was being drilled on our lease and that we were not given the common courtesy or consideration of

being told that it was going to be drilled on our lease and through our rights so that we could have anyone there to observe or get the logs, that this was a continuation of the same type of thing that had been going on for the previous six years.

I would like to stop there, Mr. Buell, from background and bring it up to this current year of 1975. Mr. Cox had informed us that he hadn't proceeded on this well to deviate it because he did not and was not able to get information on the well to the south so that he couldn't come up with a recommendation to the investors on how he should go out of the hole.

In January Mr. Cox suffered a fire that burned his records. I am an investor in several other indivdual wells that Mr. Cox also handles and has been for quite a few years, as probably as much as seventy-five percent of the investors in this well are.

There were drilling commitments, expiring leases and a gas field to be completed and a pipeline system to be built by Mr. Cox running by himself and one engineer. We, the investors, and principally I will have to say myself, with some very rough and extraordinary pressure on Mr. Cox starting along in March, April and May, that this lease was going to expire. At this point we had in the area of three hundred and some odd thousand dollars invested in the lease as

individuals and we were putting pressure on him that he had to proceed and get a driller and get a directional drilling outfit to move out from the damage area that he had informed us of two years ago that he wanted to get himself away from so that we could get production on this lease. And that pressure to us as individuals when we are talking about some three hundred thousand dollars was a very sizable amount of money.

We approved then, based on estimates that he received from Eastman and from the drilling contractor, I believe it was called Cactus, estimates in the area of around a hundred thousand dollars to reenter this well and get it out of the damaged area from the previous completion trys and where the water had coned up and I know as a personal fact that Mr. Cox is under extraordinary pressure from us particularly because I was putting a lot of it on him. The other investors, many of them were in because I had brought them into some oil and gas investments and they are friends of mine. In addition to the pressure they were putting on me, I had my own sizable investment as between myself and my children's trust we own over a third of this well.

The well commenced, I was on vacation in Hawaii. I received a phone call from Mr. Cox telling me that we had problems on this well and that Eastman trying to come out of the hole hadn't been able to get out and had drilled through

this cement plug that had been put in and that they were going to put another cement plug in and start again. Three or four days later I received another call and he told me that we were already in a position where he was projecting that we were going way over the estimates of re-completing this well. A day after that he called me and said he had received a call from Cactus, from the drilling people saying that they didn't care what our engineer said or what the Eastman people might be saying, the well was out of control and it was going to the west, we were going over the lease line. He requested that I hop in a plane and come to Dallas to meet with him because he knew he was in trouble on this well cost-wise and that it was going to be very rough. I flew into Dallas and then flew over to New Mexico with Mr. Cox and with Mr. Walter Lipski, who was another investor.

I had no idea of any plot plan of where they were supposedly going or what Eastman had in mind. The only thing I knew was we were heading to the west lease line and it appeared like we were going over and couldn't control it.

The reason I came back and I know the date I arrived because it was the day before my birthday which was July 22nd and I had a very upset family because I left them on vacation and my birthday to be on this well.

As I arrived I then saw this chart that showed that we were swinging out and definitely going over the west lease

line. The request from Mr. Cox to myself and to Mr. Lipski was, you know, what are we going to do, are we going to stop here and at this point it looked like instead of a hundred thousand we were going to two hundred or two hundred and fifty thousand because the days of drilling and the number of turns Eastman would be making were running in the area of two to two-and-a-half times the estimates from Eastman of what it would take to turn this, the number of Dyna-drill turns and as a layman I will have to admit that I was rather surprised when I got there and didn't see that they had something up above where they could tell what they were doing down below, I understood that was what directional drilling was with a Dyna-drill. It turned out that wasn't it.

So Mr. Lipski and myself finally approved then on behalf of the other investors, because we did have a majority of the investment, Mr. Cox going ahead and getting to bottom on this, if he could stay within our own lease. Now, I frankly was not and none of the other investors were aware that there was any under-foot limitation. In no way were we questioning Mr. Cox's word or his knowledge either. I've personally been investing with him for many years on many oil wells and he has had nothing but the upmost integrity and honesty in all of the dealings with myself and the other investors.

We stuck our neck out then and knew then we were

going over six hundred thousand dollars of an investment into this lease.

I was told by the Eastman man because I was trying to educate myself enough to be able to talk to the other investors about what was happening. And I was told repeatedly, if you have enough money and time we can turn this back for you and get it turned back to the north and keep it from going over the west line. We had already committed twice as much money as what the investors had agreed to put in and the time we didn't have. Now it was also said, you can go back up the hole and head back to the north to stay away from this westward migration, again if you have enough time and money to do it.

I stayed on the site for five days, until I was given the indication that they were going to keep from going over that west lease line, that they had turned enough and then I headed back over to Hawaii for the rest of my vacation.

Now during that time, my observations and I asked to -- I think I probably talked to Mr. Vickers more than anyone else because I was trying to learn, what are we doing, how are we trying to turn this and I was shown the tool and how you turned it on top and that that tool to try to make it go back to the east, was turned through the north, through the east and all of the way to the southeast, giving it a full two hundred and ten degree torque. And so my impression

as a non-technical investor was, everything was being done to turn that well, and if, you know, going without sleep, putting money into it and trying to fight time, and I realize this Commission doesn't hold an equity, I think there is an equity situation here, though, and I'm confused with all of the technical discussions that have gone on today and when I was here before because I'm not technically competent to understand even ninety percent of it. So it is even later for me, Mr. Guy Buell, than it is for some of the rest of you, because a lot of it is over my head.

But I was trying to educate myself in a very short period of time and to the best of my knowledge there was no intent on Mr. Cox's part and I don't think any of the investors would accuse him of any intent to do anything other than what he thought was right to try to get out from that damaged area.

Now it appears to me from what I have heard today there has been a communication problem also from Mr. Cox to Mr. Ratts and to Eastman and from Eastman back to Mr. Cox. That is just an observation as an outside investor who doesn't really know much technically at all to what I'm listening to.

Any questions you would like to ask me?

MR. S. BUELL: I have no questions.

MR. STAMETS: Any questions of the witness?

MR. G. BUELL: No questions.

MR. HINKLE: No questions.

CROSS EXAMINATION

BY MR. STAMETS:

Q. Mr. Benscoter, as an investor in this well, I want you to take this question only as it is asked, there is nothing intended. Was it your intention that Mr. Cox drill this well in accordance with the rules and regulations of the State of New Mexico?

A. Certainly, we would have no other intention.

MR. STAMETS: That's all, the witness can be excused.

(THEREUPON, the witness was excused.)

MR. S. BUELL: Mr. Lipski.

WALTER LIPSKI

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

DIRECT EXAMINATION

BY MR. S. BUELL:

Q. Would you state your name, address and occupation?

A. Yes, my name is Walter Lipski, L-i-p-s-k-i. I reside at 4331 Harvest Hill Road, Dallas, Texas. I'm a principal in a mechanical engineering firm in Dallas. The main interest of our engineering firm is particularly

associated to heating, ventilating and air conditioning and energy conservation as applicable to mechanical systems serving buildings today.

Q. Mr. Lipski, when did you first have contact with the EA Number 1 well, insofar as this present drilling program that is under question here today is concerned?

A. My first contact, for the sake of time, I do not have in record, do not have anything to change, alter, what Mr. Benscoter has said historically to the point of where we arrive on the well site. I do concur in that is my experience and relationship in the well as an investor representing twelve-and-a-half percent.

Q. I take it you concur in his remarks that as an investor to your knowledge everything was being done that you know of to turn the well back north and east?

A. Unquestionably.

Q. And I take it to follow the Examiners lead that if you knew that this was being intentionally drilled in violation of Commission orders you would not have concurred in it?

A. No way.

Q. Were you aware of the Commission order?

A. I have not seen it to date, I am just familiar with it what I have heard at the hearing.

MR. S. BUELL: I have no further questions.

MR. STAMETS: Any questions of this witness?

MR. G. BUELL: No questions.

MR. HINKLE: No questions.

MR. STAMETS: He may be excused.

(THEREUPON, the witness was excused.)

MR. S. BUELL: I have nothing further, Mr. Examiner.

MR. STAMETS: Does anyone have anything further in this case?

MR. HINKLE: I would like to present Mr. Christianson back on.

DIRECT EXAMINATION OF MR. CHRISTIANSON

BY MR. HINKLE:

Q. Mr. Christianson, what was the initial reservoir pressure in the Empire-Abo pool?

A. Twenty-three hundred and fifty-five pounds per square inch.

Q. If the well were completed in a virgin, unproduced reservoir what would be its reservoir pressure?

A. About twenty-three, fifty-five pounds per square inch.

Q. Is it possible to get an accurate reservoir pressure using the method that Mr. Cox used and described in his pressure determination?

A. I would say, no, you are fighting the problem that Guy Buell brought up with foam. You are apt to get a

a bounce-back off of a foam level which can indicate that you've got a fluid level much higher than it really is and the way you get your pressure at the bottom hole is to take a gradient, pounds per square inch per foot and multiply it by the depth indicated by the reflection of the Sonalog and you assume then that from the point you get the reflection all of the way to the perforated interval, you've got a column of fluid sitting there and you multiply the gradient times the feet and you get a value and if your Sonalog reflection is off of foam rather than a liquid fluid level you will get a very much higher pressure than the actual pressure. And in a well that is producing both oil and water as this one is, there is no way to tell under static conditions what the proper gradient to use is, you don't know what the mixture of oil and water is standing in the tubing, so you just can't get an accurate value in a situation like this and basically I would say that Mr. Cox's pressure under the conditions as I understand them is utterly worthless in determining what the true reservoir pressure is opposite the perforated interval of his well.

Q. As you heard Mr. Cox's testimony with respect to your Exhibits Four and Five as to the way the measurements were taken and that they did not consider natural deviations in the drilling of these wells, do you have any comment with respect to that?

A. Well, I'll only comment that the ones that I have been aware of, the differences might be in the order of three or four feet because the deviations are very minor. I mean they are on the order of a degree, a degree and a half on the Totcos and when you have this small of a deviation your measured depth is not very much different than your vertical depth. So we would be talking about, if we had had everyone of these wells surveyed, we'd probably be talking about corrections of perhaps three to six feet up, basically, because they would be deviated perhaps in some way or other.

Q. As an overall picture it wouldn't make any material difference?

A. It wouldn't make any difference in the overall picture.

MR. HINKLE: That's all I have.

CROSS EXAMINATION

BY MR. DAY:

Q. You agree then with Mr. Cox that these othere wells are not on a true vertical?

A. Are not what?

Q. On a true vertical depth on your Exhibit Five, Four?

A. That's right because they were not surveyed.

Q. Thank you. On this bottom-hole pressure test, I'm trying to be fast.

A. Right.

Q. If it was on actual liquid level would it give you an accurate reading?

A. Well, not in this well. If you could feel sure that you had bounced off of a true liquid level, what liquid have you got in the hole, you know, you are producing oil and water.

Q. You made a distinction between foam and liquid level?

A. That's right. You know, as you are pumping a well you agitate the fluids and where you've got oil and water mixed you get sort of an emulsion forming there in the hole as you produce it and this is what creates this foam problem that we are talking of that can foul up the reflection of the Sonalog.

Q. Well, I asked you why you made the distinction between foam and liquid level if you are saying that the test is not any good if it is taken either way?

A. Well, I'm just trying to outline the whole problem. You do have at least two problems, one is the indicated level of whatever it was down there could entirely possibly not have been a true liquid level, it could have been simply foam strung up the tubing, and if it were a true liquid level you would still have the problem of what is the true gradient to use to get from this liquid level down to the perforated interval which is what you want to measure.

Q. And you could never do that in this sort of a test?

A. Oh, yeah, in certain situations you could be able to, right.

Q. One matter of curiosity in closing here. This is Exhibit Number Five, isn't it?

A. I believe so.

Q. On the Cox log it shows an up dip to the east?

A. Right. You mean the line called "reef top" moving from the Cox well to the well on the east?

Q. Yes. It shows an up dip to the east?

A. Right.

Q. But over here the same top line shows a down dip to the east and the south?

A. No, that down dip is to the almost south, if you will look on the trace of the cross section. The trace from Mr. Cox's well to the point labeled SE, just a little bit east of south.

Q. So I don't look at the large diagram, I look at the small insert for the down dip on the south or southeast?

A. Yeah, it's dipping from the well immediately north of Mr. Cox to Mr. Cox's well, yeah.

Q. Thank you, Mr. Christianson.

A. You are looking at two different pictures of the reservoir. One of them is slicing through this way, the

other one is going parallel.

MR. STAMETS: Any questions of this witness? The witness may be excused.

(THEREUPON, the witness was excused.)

MR. STAMETS: Anything further in this case?

MR. S. BUELL: I would like to make just a brief closing statement when you get ready for it.

MR. STAMETS: I'm ready for closing statements.

MR. S. BUELL: Mr. Examiner, I would like to point out two things essentially, or two areas. Number one, we've had a good knock-down-and-drag-out hearing here today. It has taken a long time, but I would like the Examiner to remember that we had a previous hearing. Arco and Amoco were able to put on their case today, our case is now reduced to writing. I would urge your consideration of that case.

In that case we think we have demonstrated that the perforations and the completion in the Cox well are generally lower in the structure than anyone elses in the general offsetting area.

We think also that our evidence, what we had of it as to the offsetting wells, showed that when those wells were tested in what has commonly been referred to as the Cox zone, they were found to be watered out or not commercially feasible. We think the logs have also shown, the best information that we had, that the lithology of the Cox zone

seems to be different from that in the surrounding wells. We think there has been significant oil and gas ratio difference from the offsetting wells and we think there is evidence that there is a water pinch-out running to the northwest of this lease.

We point out that in the log on the Cox well, what seemed to be the J zone which was the production zone from the offsetting wells, was watered out, there were some very small traces of oil, indicating that that area had already been drained, most likely by the offsetting wells.

That, Mr. Examiner, is essentially the technical information that goes into this.

Our other problem is your previous order. I got the impression that some of the questions were aimed at whether we knew we were going to bottom outside of the hundred-foot radius. At all times while this well was being drilled, it was the intention of Mr. Cox to bottom it outside of the hundred-foot radius, but during the time of the drilling because of a combination of human factors, a fire, the length of time between the hearings and everything else, time pressures, Mr. Cox was unaware of the order, had forgotten it, whatever the case may be, it was a case of human frailities. There was no intention to set out to violate, to have a flagrant violation of that order.

All we can say at this point in time is that it has

been done, the hole is in the ground that represents in various increments some six hundred thousand dollars investment. The well is capable of some production. The unit here enjoys some forty-two thousand barrels per day. We have the questionable pleasure of getting thirty-four barrels of oil per day and we have brought down the wrath of two of the major oil companies for our thirty-four barrels. We think something is a little amiss, we think that we should be entitled to produce our well at the allowable if the Examiner agrees with our technical information that this is a separate, unrelated, uncommunicated stringer.

If the Examiner wishes to believe the testimony of Arco and Amoco that we are directly related and in contact with the offsetting wells then I think it is the offsetting wells that are in question, not the entire unit.

Their proposal that a total non-allowable, when by their own admission there is oil under our lease is punitive beyond reason. I have nothing else.

MR. G. BUELL: If you please, Mr. Examiner, I will be very, very brief. The record is extremely clear in this regard. In May of 1973 Mr. Cox made a request to this Commission that if you would permit him to reenter Number 1 and directionally deviate, he would bottom the well under certain conditions. That was also the testimony of his engineer. The Commission entered an order granting his request

that in truth and fact gave him much more flexibilty than he had requested. When we get to the directional drilling of the Federal EA Number 1, we do begin to run into some contradictions and into some communication problems.

Initially back at the October 8th hearing it was the testimony of Mr. Cox that he instructed Eastman to bottom the well within the hundred-foot radius. That testimony was changed today. Eastman has testified here today that they got their target area which was in the extreme northwest corner of the lease, they kicked the well off in that direction, it went to the northwest all of the time. The only time they made corrections was in order to keep the well on the lease.

Applicant's Exhibit Eleven talks about another target area. Eastman says that was never communicated to them. Mr. Cox says he never communicated that to Eastman, so we did have some contradictions, but I would ask the Commission to look at the record, to look at the path the directional hole of the Federal EA Well Number 1 took. It seems to fit, more than anything else, Amoco's Exhibits Two and Three, the plats, one of them, Exhibit Three, the working plat that Mr. Vickers had out at that well every day, the one that he used in his discussions with Mr. Ratts. The whole path of this well indicates the intent to bottom that well in the extreme northwest corner of the lease.

Now while we do have some contradictions in the

record, some apparent communication problems, there is one thing that is crystal clear by Mr. Cox's testimony today. He frankly and honestly admits he had no intention to meet the requirements of the Commission's order.

With regard to the zone he is completed in, what I have called the Cox zone for purposes of identification, I think the record is conclusive that that is not a separate and distinct reservoir, heretofore unproduced by any well. Geological data shows that it isn't. The pressure, the sonic pressure that Mr. Cox has submitted here today, although highly inaccurate, even it didn't show a bottom-hole pressure in this well that even nearly approached what virgin conditions would be.

So I think the record is clear in all regards, one, that this well was bottomed where it is bottomed intentionly and in direct contravention of the order and that the Cox zone is in truth and fact in communication with the Abo reservoir. The record is uncontroverted that from a reservoir engineering standpoint, there is not a bit of difference in that well being ten feet from our line as opposed to being across it. It is going to produce our oil, Mr. Examiner. It will be a gross violation of correlative rights if this well is allowed to produce after it was flagrantly drilled in violation of the Commission order.

Now the gentlemen investors, my heart goes out to

them. They have my deepest sympathy, I understand exactly how they feel. If I were in their shoes I would feel the same way, but, Mr. Examiner, if we can justify the violation of a Commission order simply because of the fact that if you do not weaken the violation or approve the violation people will lose money. If that is a valid reason you will never be able to enforce your rules because in every violation you require correction someone is going to lose some money.

It is our sincere recommendation that this bottom-hole location be plugged and abandoned. If Mr. Cox wants to drill a well at a permitted location, at an authorized location by this Commission to recover the oil in the Abo formation that underlies his tract, Amoco would have no objection just like we had no objection at the May 1973 hearing. But, Mr. Examiner, we can't close our eyes to the fact that that well is ten feet off of our line. We recommend that it be plugged and abandoned.

MR. HINKLE: Mr. Examiner, I think Guy Buell has covered very well our side of the case. I can only add to that and point out that the testimony of the representatives of Mr. Eastman or the Eastman Company are uncontradicted and and it is the best evidence that can possibly come before the Commission as to what was the intention of the sponsor of this well, where it should be bottomed, and their uncontra-dicted evidence is that they had a target area, they were

directed to drill it there, they tried their best to do it and they didn't miss it very far.

As far as being in a separate reservoir is concerned, I think the testimony of Mr. Christianson shows conclusively that this is in the Abo reef, a part of the Empire-Abo unit and as he has testified, you had communication horizontally, and vertically in the reef regardless of where your well is and if the Cox well is completed in the reef and it is bound to be in communication with the Empire-Abo formation that is unitized.

We respectfully submit that the recommendation made by Atlantic Richfield as to this well should be followed.

MR. STAMETS: Anything further in this case? The case will be taken under advisement and the hearing is adjourned.

REPORTER'S CERTIFICATE

I, SIDNEY F. MORRISH, a court reporter, do hereby certify that the foregoing and attached Transcript of Hearing before the New Mexico Oil Conservation Commission was reported by me, and the same is a true and correct record of the said proceedings to the best of my knowledge, skill and ability.

Sidney F. Morrish, Court Reporter

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 5571 heard by me on Nov 19, 1976

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