STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO

7 October 1987

EXAMINER HEARING

IN THE MATTER OF:

Application of Conoco, Inc., for an exceptioin to Division Order No. R-3221, as amended, Lea County, New Mexico. CASE 9235

BEFORE: Michael E. Stogner, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Division: Jeff Taylor
Attorney at Law
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For Conoco, Inc.: W. Thomas Kellahin
Attorney at Law
KELLAHIN, KELLAHIN & AUBREY
P. O. Box 2265
Santa Fe, New Mexico 87504

I N D E X

E X H I B I T S

MR. STOGNER: Call next Case Number 9235.

MR. TAYLOR: Application of Conoco, Incorporated, for an exception to Division Order No. R-3221, as amended, Lea County, New Mexico.

MR. STOGNER: Call for apppearances.

MR. KELLAHIN: If the Examiner please, I'm Tom Kellahin of Santa Fe, New Mexico, appearing on behalf of the applicant, and I have two witnesses to be sworn.

MR. STOGNER: Are there any other appearances in this matter?

Will the witnesses please stand and be sworn?

(Witnesses sworn.)

MR. STOGNER: Okay, please continue.

MR. KELLAHIN: Mr. Examiner, we'll have two witnesses for you, Mr. Hugh Ingram, who is petroleum landman with Conoco and Mr. Jerry Hoover is a petroleum engineer.

I'd like to call Mr. Ingram as our first witness at this time.

HUGH INGRAM,

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q For the record, Mr. Ingram, would you please state your name and occupation?

A My name is Hugh Ingram. I'm Conservation Coordinator for Conoco for the Hobbs Division, which covers all of New Mexico.

Q Mr. Ingram, have you previously testified before the Division as Conservation Coordinator for your company and as a petroleum landman?

A Yes, I have.

MR. KELLAHIN: We tender Mr. Ingram as an expert witness.

MR. STOGNER: Mr. Ingram is so qualified.

Q Mr. Ingram, let's take a moment, sir, and utilizing Exhibit Number One, would you summarize what Conoco seeks to accomplish and identify for the Examiner the

property in question?

A Yes. Exhibit Number One is an area map depicting the area in which Conoco seeks an exception to NMOCD Order No. R-3221, whereby we propose to dispose of water produced along with oil and gas from our recently drilled Buffalo Federal Well No. 1 into unlined pits.

Q What is indicated by the red arrow?

A The red arrow indicates the location of the well and the battery pad and where the pits will be situated in that quarter section.

Q Would you identify for us, Mr. Ingram, the Conoco lease that is involved and dedicated to this well?

A The 40-acre tract composed of the northwest quarter of the southwest quarter will be dedicated to this oil well.

Q And what type of lease are you drilling on?

A This is Federal acreage. The circle drawn around the well is the required half mile circle that's required by the OCD regulations and all of the acreage within that half mile circle is owned by the Federal government.

Q What type of formation was penetrated and is to be produced from the Buffalo Federal Well No. 1?

A This will be Conoco's first well in this area and it will be a Delaware producer from the East Shugart Field at a depth of about 5540 feet.

Q Is there other Delaware production in this area, Mr. Ingram?

A Yes, there is. There is quite a bit of Delaware production, most of which is to the south and west and some also to the north and west of our location.

Q While we're looking at this exhibit, would you identify for me the significance of the change in line as we move to the west side of this section and before we get to the east side of Section 13?

A Section 18? Oh, 13, yes, that heavy hatched line down the middle of the exhibit there, running north to south, is the Eddy County-Lea County line, and we're only 330 feet from the Eddy County or from that county line.

Q Eddy County is to the left of the line and Lea County is to the right?

A That's right.

MR. KELLAHIN: For the record, Mr. Examiner, I'd like to state that we have caused the Division newspaper publication notices to be verified and in fact publications for this hearing did occur in both the Eddy County and the Lea County newspapers.

A I might also state for the record the exact location of this well to be 330 from the west line, 1650 feet from the south line, Section 18, Township 18 South, Range 32 East, Lea County, New Mexico.

Q To what purpose is the unlined surface pit to be put?

A The unlined pits, we propose at this time to have probably two pits approximately 20 feet by 65 feet and they will be situated on the tank battery pad on which the well is also located. There will be no additional surface acreage used as a result of these pits.

Q Let's talk, Mr. Ingram, about what, if any, notifications you caused to be made for this hearing in compliance with the Division regulations notice rule?

A As I mentioned earlier, the Division notice rule required notification of the landowners within a half mile. If you will refer to Exhibit Number Two it is a letter that I wrote to the Bureau of Land Management in Carlsbad notifying them of this application and asking for their approval and while I have not received written notification, I have been informed by Linda Rundell (sic), who is Assistant District Supervisor in Carlsbad, as well as Dick Manus (sic), the Supervisor of the Carlsbad BLM office, that they would have no objection to the installation of these pits.

8 Have you sought to notify any of the BLM other lessees of properties in this area?

A No, I have not.

Q Have you had conversations with or notifications to Fay Klein?

A I have not talked with Fay Klein directly but I have talked to others who have talked with her and I do know of her concerns. I don't know specifically what they are but I do know that she does have concerns.

Q Let's take a moment, Mr. Ingram, and have you relate to the Examiner, based upon your studies of public document files of the Oil Conservation Division, the offices of the State Engineer and the BLM records, so that he has an understanding of at least your recollection of Mrs. Klein's concern, can you identify for us approximately where you believe she holds grazing leases?

A If you'll refer back to Exhibit Number One, it is my understanding that Mrs. Klein has a fresh water well in the southwest quarter of Section 17, adjoining our Section 18 just to the east.

Q To your knowledge, she is a Federal --

A Surface lessee.

Q -- Federal grazing lessee from the BLM?

A That's right, and we did have some dealings with her while we were building a road into this loca-

tion and although she does not own any surface, we are acquainted with her because of her being a surface lessee from the BLM.

Q Have you made an examination and physically walked the surface in this area?

A Yes, I have. As a matter of fact, I just last Friday on my way up to Santa Fe, I went looking for her water well in the southwest quarter, which I understood is where it is. I did not find it. I don't doubt that it's there but I didn't find it.

Q Did you see any windmill or stock tanks or other indications that fresh water is being ponded in that southwest quarter?

A No, I didn't see any evidence of any fresh water. I did, however, notice an unlined salt water pit in that same quarter section that I had not known about previously.

There is a fresh water well in the southeast quarter of Section 7 to the northeast of us. I have not heard of any objections or opposition from the surface lessee there to this application. that is Klein's

Q Have you made an examination or caused an examination to be made of the State Engineer's records with regards to the availability of any fresh water sources in the immediate area?

A Yes, we have. A phone call was made to the State Engineer's office in Roswell and he gave us some of the information that we have about the fresh water wells that I do know about.

It's my understanding that a fresh water well in Section 7 is approximately 250 (500) feet deep. It is less than 10,000 parts per million.

The fresh water well in the southwest quarter of Section 17 is approximately 450 feet deep. Now that is from when they were drilled. What their depths are now, I don't know and I understand that that well is also less than 10,000 parts per million.

Q In making your search for available data with regards to fresh water in the area, have you obtained from the Geologic Survey what is identified as Exhibit Number Three?

A Exhibit Number Three is a copy of a map that was prepared by the United States Department of Interior, Geological Survey. I took this map from an exhibit in Case Number 8629, I believe, just a second. Yes, in Case Number 8629, I took this exhibit, and it does show the chlorides contents of the waters in that general vicinity.

The green arrow on this map points to what is -- what identifies the edge of the Capitan Reef and

in talking to many, many people about the Capitan Reef, we know that it is high in chlorides toward the edge. It doesn't get anywhere near fresh until you get well down into the interior of the reef toward Carlsbad.

Q We're looking at the Capitan Reef as we look to the south and west --

A That's right.

Q -- of the line identified with the green arrow?

A That's right.

Q And as we move then to the north and east of that line, we are beyond the limits of the Capitan Reef.

A There are no known aquifers to the north of that line.

Q What's the significance of the red arrow?

A The red arrow is the location of the pit that we propose to install.

Q Can you use Exhibit One, Mr. Ingram, to show us what the subject matter was of the OCD Case 8629 that was heard on October 7th of '87?

You said this Exhibit Three was taken from that case file. What ws the subject of that case?

A The subject of that case was a Ray West-all case where he sought approval of open, unlined pits for some leases that he operates to the south and the west of

our location.

Q Can we find those if we look on Exhibit Number Four?

A Yes. If you'll refer to Exhibit Number Four, some of those pits, not -- not all of them, but some of those pits are identified by the red arrows and I just identified those that are closest to our pit.

Our proposed pit is designated by the furthermost right, furthermost arrow, and with a little square.

The red arrow directly to the left is a Harvey Yates pit in the southeast quarter of Section 13. It was permitted by the OCD in Order No. -- let me see if I can find that.

Q I believe it's 8432.

A 8432, that's right.

Q All right, sir.

A The two red arrows below that are the Ray Westall pits.

Q And the Ray Westall pits were the subject of a hearing by which you've obtained Exhibit Number Three.

A That's right.

Q Let's take a further moment --

MR. STOGNER: Do you have an R order on those two pits?

A On the Ray Westall pits?

MR. STOGNER: Yeah.

A Let's see, Order No. R-7984 dated 6-19-85.

MR. STOGNER: And that approved both of those arrows.

A That approved several of his, Mr. Examiner, not only those but some others as well.

Now the red arrows to the top left of Exhibit Number Four designate pits that have been approved for Howard E. Yates.

MR. STOGNER: Were those all approved on one order?

A They were all approved by one order, No. 8432. I think that was in April of this year.

THE REPORTER: Did you say Howard E. Yates?

A Yes, Howard E. Yates.

MR. STOGNER: Howard or Harvey?

A Harvey, excuse me, I'm sorry, Harvey E. Yates. I'm sorry about that, Sally, thanks for the correction.

MR. KELLAHIN: We have taken out of that Ray Westall case file, Mr. Examiner, an Exhibit Number Three, which is a tabulation of other orders issued

by the Division in this area approving unlined pits and for your reference I'll simply give you a copy of that tabulation from that case file.

MR. STOGNER: And that's Case Number 8629 and 8630, is that correct?

MR. KELLAHIN: Yes, sir, and if you'll take administrative notice of that particular exhibit.

MR. STOGNER: We shall do so.

MR. KELLAHIN: The arrows indicated on our Exhibit Number Four are for wells in addition to and supplementing those found on Mr. Westall's exhibit from the prior case.

Q Based upon your research of the files, Mr. Ingram, and conversations with the Conoco personnel, can you approximate for the Examiner the anticipated levels of produced water that would disposed of in the unlined pit?

A We have two other well locations on this lease. In fact we're building location right now. We're moving in on a location that would be a direct east offset of this well, and we have another location southeast. So the northeast quarter of the southwest quarter and the southeast quarter of the southwest quarter are both potential well locations that we could drill.

The approximate water production in that

field runs anywhere from 5 barrels of water a day per well to as high as maybe 50 or 60 barrels of water per well per day, and naturally we'd try to get into the low end of that volume, but -- so we don't really know at this time, we don't have a test on our well yet to know just what the exact water volume will be, nor do we know what it will be after completion of the other two wells, but we do intend to take the production from the other wells drilled on that lease to this same battery, disposing of it into the same pits.

I might add that there are also some pits that have not been designated on Exhibit Number 4 that are directly to the east, southeast, of our location that are operated by Siete Oil Company and I don't have the order number but I do know that they have been approved by the Oil Conservation Division as well.

MR. KELLAHIN: Mr. Examiner, that concludes my examination of Mr. Ingram.

We would move the introduction of Exhibits One through Four.

MR. STOGNER: Exhibits One through Four will be admitted into evidence.

CROSS EXAMINATION

BY MR. STOGNER:

Q Mr. Ingram, those last pits that you just referred to that have not been approved yet, were -- are they pending approval from us or --

A Those Siete pits?

Q Yes.

A They have been approved, Mr. Examiner.

Q Oh, they have.

A I just don't have the order number approving them.

Q Okay, and what sections are they in? Are they on a --

A Well, one of them is designated by an arrow there but -- in the south -- no, in the northeast quarter of Section 24. There's a Siete pit there that's been approved but I was not able to find in the OCD records the order number, but I --

Q Oh, the one in the north?

A Yes, the northeast quarter of Section 24 in Eddy County.

Q Okay.

A I looked --

Q Now -- I'm sorry.

A I looked for an order number in the of-

fice in Artesia but I didn't find it, and I'm sure it's there but I just -- it hasn't been recorded yet, apparently, in the index.

Q Okay. You mentioned there was another pit in Section 17?

A Yes, sir.

Q Where at?

A I don't know the exact location but I do know that it's in the southeast or southwest quarter of Section 17.

Q Okay, now when I look at Exhibit Number One I show a road that goes up there and bends around in that particular southeast quarter, or the southwest quarter. Is it to the north or to the south of that road?

A It's to the east of that road.

Q To the east, before it makes the bend or after it makes the bend?

A After.

Q After, okay. Now, then, --

A It could -- Mr. Examiner, it could possibly be in the northwest of 20. I just -- I didn't get a location of it. I just saw it there as a I drove in on a lease road.

In fact, it very well might be in Section 20, in the northwest of 20.

Q Now the subject pit is to be used in disposing of, the way I count them, you have one well that's already in existence --

A That's right.

Q -- and you propose two more.

A That's right.

Q All righty. What is the name of that lease?

A Buffalo Federal.

Q Buffalo Federal, and that incorporates the north half of the southwest quarter and then the southeast quarter of the southwest quarter?

A That's right, yes, sir.

Q Okay, so that little 120-acre --

A Yes, sir, that's right.

Q -- area.

A We farmed out the southwest quarter to Siete.

Q And that's primarily Delaware production, is that correct?

A Yes, sir.

Q Okay. Are there any other zones of interest out there?

A No, not that I'm aware of. This is called the East Shugart Delaware. The Shugart Delaware Pool

is to the southwest and to the south but there's not -- I'm not aware -- there are other wells out there even to the north and east and west but I'm not familiar with them.

Q I'm trying to pinpoint some of the water wells that you were talking about. You said you observed one in the south half of Section 7?

A Yes, sir, in the southeast quarter of Section 7.

Q Okay, can you be a little more specific about maybe a quarter quarter section or is it a windmill?

A Oh, I just -- I drove into it from that highway, let me see, I would -- I would estimate that it's in the -- let's see, there's some oil wells close by.

Q Well, was it -- was it a windmill?

A No, there are two old broken down windmills there that are not used any longer and it has an electric small pumping unit on it now.

Q And this is used for stock.

A Stock watering. There's a cattle pen near it.

MR. KELLAHIN: Are those documented wells by the State Engineer?

A Yes. What we intend to show, Mr. Examiner, by the next witness is that these wells are small pockets existing in the Redbed and that there's no danger of

contamination.

Q Now you're talking about the water wells.

A That's right.

Q Okay.

A The next witness will cover that testimony.

Q All right. But as far as the scope of this map here, is there any other water wells besides the one in Section 7 and possibly the one in Section 17?

A Not that I'm aware of.

Q Okay.

MR. STOGNER: Ms. Bailey, do you have any questions?

MS. BAILEY: Mr. Ingram, I'd like to point out that our State Engineer records which may have been available to you, also indicate a domestic well in the southeast of the northwest of Section 20 (not clearly understood).

A Southeast of the northwest of 7?

MS. BAILEY: Of 20.

A Of 10?

MR. KELLAHIN: Of 20.

MS. BAILEY: 20.

A 20, oh, down here.

MS. BAILEY: Uh-huh.

A Okay. That would be, what, over a mile away?

MS. BAILEY: Just barely outside.

MR. STOGNER: Ms. Bailey, do you have any other questions or comments?

MS. BAILEY: No, sir.

MR. STOGNER: For the record would you state your name and your affiliation, Ms. Bailey?

MS. BAILEY: Jami Bailey with the OCD.

MR. STOGNER: Are there any other questions of Mr. Ingram?

MR. KELLAHIN: No, sir.

MR. STOGNER: He may be excused.

Mr. Kellahin?

MR. KELLAHIN: Thank you, Mr. Examiner, we'll call at this time Mr. Jerry Hoover.

JERRY HOOVER,

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Mr. Hoover, for the record would you please state your name and occupation?

A My name is Jerry Hoover. I'm a Senior Reservoir Engineer with Conoco, Incorporated, in the Hobbs Division.

Q Mr. Hoover, have you previously testified as an engineer before this Division?

A Yes, I have.

Q Have you made an examination of the information available in the area (inaudible due to tape changing.)

A Yes, I have.

MR. KELLAHIN: We tender Mr. Hoover as an expert petroleum engineer.

MR. STOGNER: Mr. Hoover is so qualified.

Q What is your opinion on that subject, Mr. Hoover?

A Well, I'd like to refer first of all to Exhibit Number Five.

Q All right, sir. Let me see if I've got one.

A This is a log section.

Q All right, go ahead.

A Exhibit Five is a copy of Schlumberger's open hole porosity log which was run recently in the drilled Buffalo Federal No. 1 Well on October the 1st of 1987.

This log shows the Triassic Redbeds formation as notated on the left edge of the log. These Redbeds consist of an impermeable shale formation and are typically 850 to 900 feet thick in this area. I feel it's valid to call these impermeable beds, since permeability measurements have been in the range of 10 to the -12 millidarcies for this formation.

Q Now at the base of the Redbeds we find the Rustler anhydrite shown at about 900 feet on this log. The Redbeds are overlain on the surface by semi-stabilizied dunes and alluvium of the Quarternary age.

This impermeable formation, the Redbed shales, as documented by this log, will protect any fresh water which might exist in random, isolated pockets within the Redbeds or beneath it from any contamination from surface disposal.

Q Can you characterize the wells that Mr. Ingram has identified in the southeast quarter of 7, as well as the one in the southwest of 17, as wells that would be within the -- that would produce water from the Triassic Redbeds?

A I understand the well in Section 7 is at about 250 feet in depth. This puts it down into the Redbed shale.

The one in Section 17 is at 450 feet depth, which is also in the middle of this formation.

Q Have you made any -- reached an opinion with regards to the potential to have fluids disposed of in the unlined pits migrate down and either vertically and/or horizontally in a direction that would pose a threat of contamination to any of the small fresh water sources being utilized from the water available in the redbeds?

A Yes, I have, and I think the next Exhibit Number Six will help explain that.

Q All right, sir, let's turn to that exhibit.

A All right.

Q What is the source of that information?

A This -- State Engineer's office has furnished this map.

This map shows movement of groundwater in this area. The area shown on the map is the eastern edge of Eddy County. You'll see our location indicated with a red arrow about midway up on the county line.

You'll notice, though, the arrows marked across the map, most of them moving in a southerly direc-

tion, some in a southwest direction. This is an indication that groundwater in this area moves toward the Pecos River to the southwest, which is in the opposite direction of the fresh water wells that are located north and east of our location.

Q Ms. Bailey has indicated the existence in files available to her of a fresh water source, a domestic supply, at approximately 200 feet in the northwest quarter of Section 20. I believe she specifically said the southeast of the northwest.

A Yes. That would be southeast of our location.

Q Based upon the groundwater movement display shown in Exhibit Number Six, what opinion do you have with regards to the potential of the Conoco unlined pit to cause contamination problems for that domestic source of water?

A Well, Mr. Ingram has previously testified, looking at Exhibit Three, that there are no identified aquifers underneath our location and that the Capital Reef aquifer, which lies to the south and the west, is the only active aquifer near our location as well as near these fresh water sources, and so we don't feel like that there are any active aquifers in order to migrate surface water from this area.

Q Let's turn to the specifics now, Mr. Hoover, of how the pit is to be constructed, and as a display, let me direct your attention to Conoco Exhibit Number Seven.

A Yes. Exhibit Seven is a simple drawing to illustrate how the pits will be constructed. You'll note that they will be diked around the perimeter in order to prevent migrating rainwater from collecting in the pits. They will be covered with wire netting for the protection of water fowl, and fenced to prohibit access by cattle.

These pits will be approximately 20 feet by 65 feet by 8 feet deep.

Q In your opinion are these pits adequate in order to dispose of the volumes of produced water that are anticipated from the original producing well as well as additional wells that might be drilled on the (unclear)?

A Yes, they should be. Production from three wells if all are successfully completed should be less than on the average 100 barrels of water a day.

Q In order to approve this application the Examiner must conclude based upon the record that the use of this proposed disposal pit does not constitute a hazard to fresh water sources.

Based upon your studies, Mr. Hoover, what is your recommendation and opinion to the Examiner on that

issue?

A My opinion is that it will pose no hazard to usable water sources in the area.

Q Do you have reasons upon which you have reached or based that opinion?

A Yes. I'd like to kind of summarize those reasons now.

There are apparently no significant groundwater accumulations in the shallow alluvium deposits in the first 50 to 100 feet from the surface and such accumulations down in the Triassic Redbeds are random pockets several hundred feet deep; therefor there are no continuous aquifers through the upper 900 feet of deposits in this area and for all practical purposes this thick, impermeable Redbed shale will prevent any significant downward percolation of surface water beyond the shallow alluvium deposits. Even the more -- even more remote is the possibility of horizontal movement of fluids. Should there be even a minimal horizontal flow or movement of fluids it's an established fact that movement would be expected to be in a southwest direction away from the established, useable water sources that have been discussed; however, the extreme low permeability of the Redbed shale would undoubtedly require hundreds of years to move water significantly beyond our location, much less over a mile away.

Since the closest known useable water wells are more than a mile away, and our proposed pit location, the wells are up in Section 7 and 17 to the northeast and east from our pit location and since their sources lie several hundred feet below overlying impermeable deposits, I believe there will be no danger of contamination of these established water wells by our proposed operation.

MR. KELLAHIN: That concludes my examination of Mr. Hoover.

We would move the introduction of Exhibits Five and Six.

MR. STOGNER: Five and Six will be admitted into evidence at this time.

I'm sorry, there's Exhibit Seven, too.

MR. KELLAHIN: Three, we had an extra one, Five, Six, Seven.

MR. STOGNER: Five, Six, and Seven, which were all covered, will be admitted into evidence at this time.

CROSS EXAMINATION

BY MR. STOGNER:

Q Mr. Hoover, if I look at Exhibit Number Five, which is your log, let me make sure I understand this

right.

These isolated pockets of water in which the -- and there again I assume that you're referring to wells such as the one up in Section 7.

A Yes.

Q That water well, it's an actual pocket within the Triassic Redbed or is it the lower part or is there a little depression up at the top of the Triassic Redbeds overlain by the sands that accumulate?

Please enlighten me.

A Well, apparently, since these wells which are just about a mile apart, one is at 250 feet and the other 450, it looks like there are several levels or intervals. It doesn't appear to be a continuous zone across there that appears to hold these accumulations.

We don't have any records showing that there is any continuity across there. There are waters available in that formation but not in a -- a consistent interval.

Q Okay. Well, for me to visualize it, is it a lens within the Triassic?

A That would be my understanding of it, as best as I can grasp it.

Q Now you said that the Traissic had a permeability about 10 to the minus 12 millidarcies. Does that hold true

where these water accumulations are or do we see a sand lens, an actual sand lens, or --

A I don't have any data from those wells and what were drilled into to really answer that.

Q Well, let's talk generalities.

A Obviously, there's got to be some -- something other than the big, dense porosity that we talk about in the matrix of the formation in order to hold the water, but I don't know the source of how it was formed.

Q How would it have gotten there?

A No.

Q Do you know how it would have gotten there or anything?

A No, I don't know the source of the accumulations.

MR. INGRAM: Mr. Examiner, I might go off the record for just a moment, just for information, if you like.

MR. STOGNER: Is it pertinent to these kind of questions?

MR. INGRAM: I think so.

MR. STOGNER: Well, why do we need to go off the record?

MR. INGRAM: Well, I can take my discussion with our geologist in Hobbs on this subject,

who has had experience in -- in subsurface water, and he told me that the waters found in the Redbed are just where you find them. There's no way to predict where they will be. There's no migration of that water. It's just a pocket that you'll find spotted and wherever you find it, and it's not -- it's not going anywhere and he didn't -- don't know how it was laid down, but -- but it's just there, and he said there's no predictability as to, you know, necessarily where it will be found but it is -- it is not moving, not going anywhere.

That's John McCarty, our geologist in Hobbs told me that.

MR. STOGNER: Okay, thank you, Mr. Ingram.

Q Let's refer to Exhibit Number Six. I'm going to ask some questions now about more regional or local type of topography out there. Does it go along with the regional or whenever we -- I guess county-wide groundwater movement, as your Exhibit Number Six is showing?

A Yeah, it's general county-wide movement.

Q Now the way I visualize it, there is going to be a little bit of horizontal -- I mean vertical --

A Percolation.

Q Yeah, percolation down.

A There's bound to be some. You've got

sand dunes, loose deposits, right on the surface.

Q And -- but it will quit at the Triassic Redbeds, right?

A Essentially it should, yes.

Q Okay.

A That kind of impermeable layer.

Q And then we start talking about this underground movement or -- or horizontal movement, if you will. Okay.

A There are no established aquifers or flows even in that upper alluvium section, so --

Q We'd have to talk about tremendous amount of water, I assume, is what you're -- to get this kind of a movement.

A Right.

Q Does the Triassic Redbeds break the surface anywhere in this part of the area?

A Not in this area.

Q Okay. So as far as is there any danger of it percolating down, moving horizontally and all of a sudden it's over here and you have a little pond --

A No.

Q -- between some sand dunes?

A No. In fact, there's a -- there's a kind of a cross section in this groundwater report put out by the

State Bureau of Mines and Mineral Resources which shows how these formations are laid down in that area and they show no outcrop.

Q Okay.

MR. STOGNER: Would you like me to take administrative notice of that, Mr. Kellahin?

MR. KELLAHIN: Certainly, that would be fine.

MR. STOGNER: Okay, what is the publication again?

A The publication is Groundwater Report No. 3, State Bureau of Mines and Mineral Resources, New Mexico Institute of Mining Technology, Socorro.

Q And what edition is that?

A Published 1952.

Q Thank you, Mr. Hoover.

In referring to Exhibit Number Seven you said this area would be fenced. So I can better visualize it, are these pits real close together, side by side, or they at somewhat of a distance from each other?

A (Not clearly understood) I assume.

MR. INGRAM: Most of the pits that are out there now are close together. I'd say most of them are 20 to 30 feet wide, anywhere from 40 to 70-80 feet long, and they're probably not more than 3 feet apart. At

this point in time, we're thinking more in terms of putting them a little bit farther apart because we don't really see the advantage to really separate pits, and give it more surface, more evaporative (unclear).

Q Thank you. Is there any particular reason why two pits, I mean are you going to fill up one and then put in the other, or are you going to distribute it evenly?

MR. INGRAM: Some of them do have spillovers, you know, so that if one did fill up it would flow into the other.

Q As far as the fenced area, I guess it's off of the embankment.

MR. INGRAM: Be off the dike in order to keep cattle away from the dike and away from the pits.

Q Okay. Is this wire netting a Federal requirement or is it something that Conoco does to --

MR. INGRAM: It's a Federal requirement to protect water fowl.

MR. STOGNER: Ms. Bailey, do you have any questions?

MS. BAILEY: Yes, I do. I did not understand what the quality of this produced water will be, what the TDS and chloride content would be.

MR. KELLAHIN: We have a list of those, just a minute.

(There followed a discussion off the record.)

MR. INGRAM: Oh, from the oil wells. No, we don't have a water analysis.

MS. BAILEY: Okay, so we don't know what the quality of water into those pits will be?

MR. KELLAHIN: I thought we were talking about produced fresh water and we've got some notes on that but the produced water from the oil well, I don't believe we have an analysis of that yet.

We'd be happy to get you one.

MR. STOGNER: Yes, that's --

MR. INGRAM: It's the same water that's being produced into all the other pits around there. It's all Delaware.

MR. KELLAHIN: We'll supply you one, Mr. Examiner.

MR. STOGNER: Please do. Would that be adequate, Ms. Bailey?

MS. BAILEY: Yes.

MR. STOGNER: Any other questions?

MR. INGRAM: We just now completed this well (not clearly understood.)

MS. BAILEY: On Exhibit Five, am I -- I understand that that neutron log is not going to penetrate through that surface casing, but for the gamma ray log, am I wrong in interpreting some of that as silty shale that may have some permeable zones into that?

A I've not done that detailed analysis on that to determine if it might be silty.

MS. BAILEY: Okay, you really don't know if you encountered any waters prior to setting the surface casing?

A I don't have any record of encountering any waters.

MS. BAILEY: Okay, but (not clearly understood). So there could be permeable zones within that surface area.

A I don't have any information to tell me that there are permeable zones there.

MS. BAILEY: That's all.

MR. STOGNER: Are there any other questions of Mr. Hoover?

If not, he may be excused.

Mr. Kellahin, is there anything further in this case?

MR. KELLAHIN: No, sir, that's it.

MR. STOGNER: Does anybody have anything further in Case Number 9235?

MR. TAYLOR: Yes, sir. I have the -- there is in the record or there will be in the record an objection of the surface lessees in the area, Mrs. Velma Linam Weber and Fay Linam Klein, and they say they are the owners of the south half of Section 7, 18, 32, and which is the section, I think, directly north of the section we've involved -- we're interested in here today.

And they lease -- they are surface lessees of the BLM of the area where the pits are proposed to be located and they will for the record file a written objection. They were here and had to leave, so I told them that I'd put their objection into the record.

And they said they have a fresh water well within a mile but they didn't tell me where it was at, so I don't know if that's -- they didn't say what it was used for, whether it's -- whether they live in the area or whether it's for cattle, or what, I'm not sure.

MR. STOGNER: Both of these ladies objections will be noted in the record.

Anything further in this case?

MR. KELLAHIN: No, sir.

MR. STOGNER: Case Number 9235 will be take under advisement.

(Hearing concluded.)

C E R T I F I C A T E

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

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 9235, heard by me on 7 October 1987.

Michael E. Stogner, Examiner
Oil Conservation Division

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO

~~16~~ 2 December 1987

EXAMINER HEARING

IN THE MATTER OF:

Application of Conoco, Inc. for an exception to Division Order No. R-3221, as amended, Lea County, New Mexico. CASE 9235

BEFORE: ~~David R. Catanach,~~ Michael E. Stogner Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Division: Jeff Taylor
Attorney at Law
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant: W. Thomas Kellahin
Attorney at Law
KELLAHIN, KELLAHIN & AUBREY
P. O. Box 2265
Santa Fe, New Mexico 87504,2265

MR. STOGNER: Call Case Number 9235.

MR. TAYLOR: Application of Conoco, Inc., for and exception to Division Order No. R-3221, as amended, Lea County, New Mexico.

I assume the applicant wants to continue that case.

MR. KELLAHIN: If you please.

MR. STOGNER: Okay, Case Number 9235, which is being reopened, will be continued to the Examiner's hearing scheduled for December 16th, 1987.

(Hearing concluded.)

C E R T I F I C A T E

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

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 9235, heard by me on 2 December 1987.

Michael E. Stogner, Examiner
Oil Conservation Division

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO

16 December 1987

EXAMINER HEARING

IN THE MATTER OF:

Application of Conoco, Inc. for an exception to Division Order No. R-3221, as amended, Lea County, New Mexico.	CASE 9235

BEFORE: David R. Catanach, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Division: Jeff Taylor
Attorney at Law
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant: W. Thomas Kellahin
Attorney at Law
KELLAHIN, KELLAHIN & AUBREY
P. O. Box 2265
Santa Fe, New Mexico 87504,2265

I N D E X

JOHN EDWARD McCARTY

E X H I B I T S

MR. CATANACH: Call next Case 9235.

MR. TAYLOR: The application of Conoco, Inc., for an exception to Division Order No. R-3221, as amended, Lea County, New Mexico.

MR. CATANACH: Are there appearances in this case?

MR. KELLAHIN: Mr. Examiner, I'm Tom Kellahin of the Santa Fe law firm of Kellahin, Kellahin & Aubrey, appearing on behalf of the applicant and I have one witness.

MR. CATANACH: Are there any other appearances in this case?

Will the witness please stand and be sworn in?

(Witness sworn.)

JOHN EDWARD McCARTY,

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Mr. McCarty, would you please identify yourself?

A My name is John Edward McCarty. I'm a Geological Adviser with Conoco.

Q Mr. McCarty, have you testified as a geologist before the Division?

A No, I have not.

Q Would you summarize for the Examiner when and where you received your degree in geology?

A I received a Bachelor of Science degree in 1969 from the University of Southern Mississippi; a Master's degree in 1973 in geology from the University of Southern Mississippi.

Q After you obtained your Master's degree, were you employed as a geologist?

A Yes, I was.

Q Would you describe when and where you were so employed?

A From 1972 to 1974 I was employed by the State Geological Survey for the State of Mississippi. I was a groundwater geologist.

Q What did you do for them as a groundwater

geologist?

A I did subsurface analysis of groundwater, pumping tests, aquifer studies, and county studies for groundwater availability; did site locations for small towns for their water wells supplies, and also in some cases looked at certain areas of certain counties that had pit disposal problems and studied contamination of pit disposal.

Q What was the general responsibility of that agency with whom you were employed insofar as that state was concerned?

A Would you clarify that?

Q Yes, sir. What did that agency -- what function did that agency perform for that state?

A Our function was, I guess, to improve the knowledge of the geology of the area of the state; do anything that was useful for improving the use of geology and in my case groundwater for the State, for the people, but we were not an enforcement agency, we were strictly a fact-finding agency and a public records organization.

Q All right, sir. What other work experience do you have as a geologist, Mr. McCarty?

A I worked for six years with Gulf Oil Company. I worked two years in Gulf Research in Harmarville (sic) Pennsylvania.

I worked two years as an Exploration Geo-

logist in Houston, and I also worked two years as a Development Geologist in Houston, doing primarily reservoir geology.

Q You're now located with Conoco in Hobbs?

A Yes. I left Gulf after six years. I went with Conoco.

I spent two years doing special projects which consisted of exploration for heavy oil, tar sands, and oil shale in the western United States.

I then, with the decline in oil prices, was moved back into exploration in Houston, where I spent approximately two years doing exploration and development work in the Texas Gulf Coast, east Texas and south Texas, and for the last two and a half years I've been in Hobbs, New Mexico as a Development Geologist, working southeast New Mexico primarily but I have had some experience in northwest New Mexico.

Q Your company, Conoco, is seeking from the Division approval to utilize an unlined surface pit for producing water disposal in a portion of Section 18, Township 18 South, Range 32 East, of Lea County, New Mexico.

Are you familiar with that application, Mr. McCarty?

A Yes.

Q What have -- what functions or studies

have you performed for your company with regards to that application?

A I was asked to examine the geology and hydrology of the proposed pit site and the area immediately surrounding the proposed site.

Q Have you done that?

A Yes, I have.

MR. KELLAHIN: We tender Mr. McCarty as an expert geologist.

MR. CATANACH: He is so qualified.

Q Mr. McCarty, among your exhibits, perhaps let me direct your attention to an exhibit out of order, and let's locate Exhibit Number Fifteen.

A It's the very last one.

Q All right. Would you take a moment and without going through the details of all fhe tabulation of data on this exhibit, simply identify Exhibit Number Fifteen?

A Number Fifteen is a map of the area and the area immediately surrounding the proposed pit site, that shows shot points as squares numbered 1, 2, 3, and 4, numbered right to left on the map, and water wells that I have found from the State Engineer's office in the area, numbered 1 through 6, with one being 4A and 4B, numbered left to

right through the area of the map. This is additional data that I will present at a later time in addition to the electric logs from the wells in the area.

Q Let's first start with the red arrow that identifies the red circle. That is the proposed site for the unlined surface pit --

A Yes, sir.

Q -- that Conoco wants to utilize?

A Yes. That's the approximate location of the proposed pit site which would be in the northwest quarter of the southwest quarter of Section 18.

Q So that Mr. Catanach will understand the information on the exhibit, would you take a moment and tell him what is indicated by shot point, and I see you've numbered each of the shot points from 1 through --

A 4.

Q -- 4.

A Okay. These four shot points were found in the State Engineer's office. At the time an oil company shoots the seismic survey through an area, if they use dynamite they drill shot holes to some depth and you'll notice the depths are varying with these four wells from 300 to 480 feet.

It is normal for the driller of the shot hole to log the geology or the way he recognizes any samples

as they're drilled.

It's also normal in my experience for a driller shot records to also log water when they encounter it in their records, so that you can see if they're having water problems in certain horizons. If the water would flow into the borehole they would mention it in their shot records as a normal thing.

Q You've utilized the shot point information in part of your study of the hydrology?

A Yes, I have.

Q Identify for us each of the water wells. It says water well. We have numbered thsoe from Water Well Number 1 through 6?

A Yes.

Q And the information on those wells is obtained from what source, Mr. McCarty?

A State Engineer's office in Roswell, New Mexico.

Q Has an examination been made of the surface by Conoco personnel to determine whether or not there are any other water wells or windmills that are not otherwise documented with the State Engineer's office?

A It is my understanding that Mr. Hugh Ingram has made such an examination.

Q Are you aware of any other available in-

formation either from a surface examination or from data from any other source, that shows fresh water wells other than as you've displayed it on this exhibit?

A I have found no record of such.

Q Let's go back to the purpose of your study, Mr. McCarty. You've indicated you were asked to examine available data to determine whether or not the -- in your opinion this pit ought to be utilized for the disposal of produced water.

A Yes.

Q Approximately what volumes of produced water were you told would be disposed of into the pit?

A We have one well that's producing 35 barrels of oil and 50 barrels of water a day, so that one well would approximately 50 barrels of water.

We have a second well which might produce as much.

So we're looking at a maximum of 100 barrels of water per day, currently.

Q This is water produced from the lease and it's not a commercial disposal pit.

A Yes, it's from the lease.

Q What information did you study or examine in order to reach opinions and evaluations on the utilization of this pit for disposal?

A I used the published State geologic and hydrologic reports for Lea and Eddy County; data available from the State Engineer's office on water levels and chemical tests.

I also got redundant data from the U. S. Geological Survey in Albuquerque on water levels and also used our in-house electric logs and information we had.

Q Do you have an opinion as to whether or not that data that's available is sufficient upon which to form opinions and reach conclusions about the suitabiity of this pit for disposal?

A Yes.

Q And what is that opinion?

A I have found that there's sufficient information in searching the public record for data to answer my questions; that I am confident in the accuracy of the data and I believe my conclusion is reliable.

Q Do you have an opinion, Mr. McCarty, as to whether or not there is a presence of water classified as fresh water under the State Engineer regulations and statutes that requires or needs protection?

A Yes, I do have an opinion.

Q And what is that?

A I do not believe there is.

Q Do you have an opinion as to whether or not the produced water introduced into the pit will migrate from the pit area and result in potential contamination or degradation of the quality of any fresh water sources?

A I have an opinion and it is that it will not.

Q Let's talk generally, then, by going back to Exhibit Number Eight-A.

A If I could, I'd like to address Eight-A and Eight-B together.

Q All right, sir. Before we talk about the significance and the meaning of each of those exhibits, Eight-A and Eight-B, would you take a moment and simply identify those exhibits and the source of that information?

A Exhibit Eight-A is a map of the geology of Eddy County, New Mexico. It was obtained from the Groundwater Report No. 3 available from the State, and on it is located a red arrow with a dot approximating the location of the pit that we propose.

Q And what is Eight-B?

A Eight-B is a geologic map of Lea County, specifically southern Lea County. It comes from the State Groundwater Report No. 6, dealing with Lea County, available from the State, and it also has a red dot, a red arrow, locating the approximate pit location.

Q Are both of these displays documents that are utilized by geologists and hydrologists to study groundwater in these areas of Lea County and Eddy County, New Mexico?

A Yes.

Q And based upon your studies have they proved to be reliable and accurate?

A I believe that Eight-A is reliable and accurate insomuch as one small problem, they do not show the QAL which is available in Eight-B. You can see that in Eight-B but not in Eight-A.

In reading the write-up of Eddy County Report, the author mentions that the Chinle is covered by a thin layer of stabilized windblown sands but he did not place it on his map.

Exhibit Eight-B has QAL labeled. This is stabilized windblown sand deposits.

Q To what purpose have you put these two exhibits?

A I used these specifically to locate the geology that I was going to be studying, trying to determine where I was in the geologic column, and give me reference to start studying the specific formations available.

Q Let me have you describe the significance of each of these exhibits in that study that you've made and

then further describe the specifics of the geology as you find it to exist from the surface through the subsurface at the site of the pit.

A The surface is windblown sand deposits that have been stabilized by vegetation. They are in this case labeled QAL, biternium alluvium.

Within the sands there are some caliche of varying thicknesses. At the base of the sand at the junction of the sand with the underlying Triassic Chinle formation, there are some gravels that have been reported that could be anywhere from a foot to four feet thick. These gravels, I believe, are a result of plasticene glasiation where this area was undergoing erosion before these sands were later deposited.

So this is a remnant erosional surface.

The Chinle is the upper portion of the Dockum Group. It's composed of thick layers or -- or I should say massive layer of clay with some shale, very fine grained sand, and siltstone. The siltstones and fine grained sands are deposited, if you will, as layer cake geology. They're very flat. They tend to form these isolated pods within the clays.

And then below this is the Triassic Santa Rosa, which is normally described in driller's reports as Redbeds. These are large, very thick, red sands that are

anywhere from fine grained to coarse grained sands. There are some gravels within this interval. There are also some clays, but predominantly the Santa Rosa is described as massive red sands.

Q When we look at Exhibit Eight-B, would you orient us as to the relationship of the pit site to Laguna Gatuna and Laguna Plata?

A The pit site is approximately, I would say 10 miles north/northwest of Laguna Plata and approximately 12 miles north/northwest of Laguna Gatuna.

The black contours on the map, if you will look over in the upper righthand corner, it says, "contours on the Redbed surface, dashed where approximate are inferred."

Now Redbed in here I take it to mean the Chinle, because that would correlate to the proper Chinle elevation.

You're at the -- at the red dot you're at approximately 3740 feet elevation and looking at this contour, you're at about 3660 or 70 feet, so you're looking at, let's say, 60 to 100 feet of sand in the immediate area overlying the Chinle. This surface, the water that would be moving along the surface of the Chinle would move in a south/southeasterly direction towards Laguna Plata and Laguna Gatuna, based on looking at this map here.

Q To what use is Laguna Gatuna being put?

A It will be used as a surface disposal site.

Q And is currently being used as a disposal site for Pollution Control?

A Yes.

Q All right, Mr. McCarty, let's turn to Exhibit Number Nine. Would you identify for us Exhibit Number Nine?

A Exhibit Number nine is a map of wells and springs and the availability of groundwater in Eddy County, New Mexico, and it also comes from Groundwater Report No. 3.

Q And this is information available up through what period of time, Mr. McCarty?

A This was published in 1952 or 1953. I do not remember which.

Q Do what use have you placed this exhibit?

A This exhibit was used strictly to show that in the eastern part of Eddy County they labeled the groundwater, availability of groundwater by areas, and they labeled the area 5-C, which 5-C says that the groundwater is for stock and domestic supplies available at depths less than 300 feet and Triassic Redbeds; quality generally fair but locally can be impotable.

Q You have made other investigations and

further studies other than utilization of this map showing the available --

A Yes.

Q -- showing the availability of groundwater?

A Yes. This was -- this was one of the maps I used to preliminarily -- to place me in the area and to see what had been done previously.

Q This is not the sole document upon which you made the conclusion --

A No.

Q -- that there is no groundwater --

A No, this is --

Q -- in the area?

A -- just a -- one small piece of evidence that I feel supports what I have said.

Q Let's turn to Exhibit Ten. All right, sir, would you identify Exhibit Ten?

A Exhibit Ten is a map highlighting the general direction of movement of groundwater in Eddy County, New Mexico.

Q To what purpose do you put this exhibit?

A The purpose of this exhibit was just to give me a feel for general groundwater movement. What I was trying to determine, would groundwater move north, south,

east, west, what general direction.

From this I determined that in the area of the pit, which is located by the red dot with the red arrow, we should expect ground movement in a southerly direction, southerly, southeasterly/southwesterly, but this was just to get me oriented on what direction I felt like groundwater would move in this area.

Q Again, you've made further studies and prepared other exhibits that show the site specific ground movement in the immediate area?

A Yes.

Q All right, sir, would you identify Exhibit Number Eleven for us?

A Exhibit Number Eleven is a map of the groundwater of southern Lea County, New Mexico. It comes from the county or the State Report No. 6 and is available from the State.

Q What's the purpose of this exhibit insofar as your study is concerned?

A The purpose of this exhibit, the red dot and red arrow highlight the approximate location of the proposed pit.

The dark lines with the large dots, if you'll look up under explanation, says the water table or (not clearly understood) contour on the water body in Trias-

sic aquifers, so I believe this would be a map on the water within the Chinle as far as they've been able to determine. I would like to point that the well locations that they have on here that have water depths are outside of the range of my later map, being over six miles away in any general direction, but what is important here is that the contours, the water would move perpendicular to these contours, and if you take a perpendicular line to those contours through the pit, they would probably drain directly into Laguna Plata and the general movement or direction of the groundwater being a south/southeasterly direction from the pit.

So groundwater would not move north, northeast, northwest, or east.

Q All right, sir, let's turn to Exhibit Number Twelve.

A Exhibit Number Twelve-A and Twelve-B together.

Q Would you identify Exhibit Twelve-A and Twelve-B?

A Exhibit Twelve-A is a temperature and precipitation study for the Maljamar area. It comes from the New Mexico Department of Agriculture in Las Cruces.

Q What's the purpose of this information in terms of your study, Mr. McCarty?

A Okay, Exhibit Twelve-B is from the U. S.

Department of Commerce, and shows free water surface evaporation throughout southwestern United States.

The reason I submitted these was from the south half of Exhibit Twelve-A, the annual summary of precipitation belwo the month of December it says, annual, for a 42-year period the annual precipitation in the Maljamar area is 13.66 inches of rain a year.

Although there are highs and low varying with winter, summer, spring, and fall, winter having more precipitation, summer having less, the evaporation in the area is within the contour of 80 inches evaporation a year. So if you just say that evaporation tends to be 80 inches a year, the rainfall is 14 inches a year, we're looking at 66 inches of evaporation per unit area per year, in excess over rainfall.

So the purpose of this was just to show that we're in extremely arid environment where very little ground actually -- where very little rain actually enters into the subsurface.

Q All right, sir, let me direct your attention now to Exhibit Number Thirteen.

Would you identify Exhibit Number Thirteen?

A Exhibit Thirteen is two topographic maps from the U. S. Geological Survey that have been spliced

together. These are modified from Larry Brooks' Exhibit Two-A and Two-B from Case 9059, presented in December of 1986.

Q What was Case 9059?

A This was Heyco -- Yates' request for disposal pits in seven locations in Eddy County, New Mexico.

Q And what was the outcome of that application?

A They were successful.

Q And have you identified the pits that Mr. Brooks was requesting approval for surface disposal?

A Yes, I have.

Q How are those shown?

A The handwritten in squares are seven squares just northwest and west of the red dot and arrow. These are the seven 40-acre areas that were allowed for pit disposal. In addition, this was modified from his original display, which the heavier, darker lines were the exceptions that had been granted previously to his case, and the red dot and arrow, of course, are where our proposed pit location is, so you can see our pit is almot being directly offset to the southwest by a 40-acre area where Yates has two surface pits right now.

Q And each of the other areas represent Oil Conservation Division order numbers, commencing with the

letter R --

A Yes.

Q -- in which previously -- well, the orders previously approved the discharge of produced water on the surface.

A Yes.

Q Would you identify Exhibit Fourteen for us?

A Exhibit Fourteen consists of right to left a map with a scale of one inch to 4000 feet, highlighting the wells in East Shugart Fields with the two cross sections that I have, cross section A-A' and cross section B-B'.

In the center is cross Section B-B' and to the left is cross section A-A'.

These are at a scale of vertical one inch to 100 feet and horizontal scale of one inch to 200 feet or a vertical tabulation of 2 in the cross section.

Q What were you trying to investigate or determine from this type of display?

A I was trying to determine the thickness of the Chinle, the thickness of the alluvium, the regional structural style, where the -- which direction are we looking at for surface pit of the Chinle, so I could determine which direction groundwater might move in the

area.

Q And what did you find?

A I found that the alluvium in the immediate area of our proposed pit is approximately 100 feet thick. The Chinle is 200 to 200+ feet thick. Then underlying that is about 600 feet of Santa Rosa overlying the Rustler, which is an anhydrite formation.

Q You earlier expressed the opinion that the disposal of produced water at the proposed pit site would not cause those discharged waters to percolate into the ground and to migrate horizontally into any other source of fresh water or any other producing aquifer.

A Right.

Q Can you demonstrate for us from this exhibit and from your knowledge of the area what has caused you to reach that opinion?

A Based on this opinion -- this opinion is based partly on these cross sections. The base of the alluvium is the pick on gamma ray logs which approximates 100 feet of thickness.

The data I will show in Exhibit Fifteen shows that some of these areas it's approximately 60 feet deep.

My electric picks for the base of the alluvium were based -- I did not have a full log suite all the

way to the surface, so I made the best approximation of where I thought the alluvium would be based on gamma ray response, so there might be some small discrepancies between electric log response and drillers logs.

The alluvium is an unsaturated sand. It's not charged with water. There might be low surfaces within the alluvium, if you will, small catchments, were water might be trapped on the top of the Chinle.

The subequent Exhibit Fifteen, I think, will show that where these have been produced they tend to be low yield and are depleted very quickly. Recharge is extremely difficult.

The Chinle is uniformly approximately 200 feet thick in this area. It is a clay that has some interbedded siltstones, very find grained sands. They tend to be irregular, both laterally and vertically, so that there's no interconnectiveness to the -- what sands are produced out of the Chinle tend to be isolated pods.

So therefore, once these zones are depleted, there is no more water to be obtained from that pod or that isolated interval. The recharge would take place over geologic time, which is a lot more than just mere centuries.

So the recharge of these will be an extremely slow process once they're depleted.

The -- based on these cross sections, I can see that the Chinle from A-A', which is an east/west cross section, has a very slight eastern dip to it. It's -- this is based on subsea, I have a 3000 foot above sea level line marked on both cross sections, so you can see how they are in relationship to sea level. These are not hung stratigraphically but are hung structurally.

So there is a slight eastward compnent to dip at the top of the Chinle and cross section B-B', which based on the map is a north/south cross section, the dip is a little bit stronger to the south than it is to the east, so I would say that the water that is trapped at the top of the Chinle would tend to move at an east or a south/south-east direction.

Q Let me direct your attention now, Mr. McCarty, to Exhibit Number Fifteen.

We've already discussed this exhibit generally. Let me direct your attention to some specifics.

The first area of inquiry is whether or not in your opinion it is necessary to drill monitoring wells or other wells at which -- in close proximity to the pit in order to determine the presence or absence of fresh water sources?

A I do not believe it is necessary based on seismic shot points Number 2 and 3, the squares just below

the red dot. If you look down at the bottom of the seismic shot points, Number 2 was drilled by Shell in 1952, there is approximately 70 feet of stabilized sand and what they call sand rock, before they hit the clay, which is Chinle.

There was no record with the State Engineer's office on the records they kept on these shot points, that they encountered any water encroachment underneath the borehole at all at any time drilling those wells.

Also Number 3, which was drilled by Shell, date unknown, encountered the Chinle at 60 feet. Here again it hit sand, caliche, sand and gravel at the base, and here again there was no mention whatsoever of any water encroached into the borehole while they were drilling.

So they did not encounter any -- any water as far as their records show in the drilling of these shot points.

Q Let me direct your attention to the information on water wells in the area and have you start with the water source or the water well in Section 20 that's labeled Water Well No. 5. What have you found about that well?

A Okay, The one in Section 20 was a Eumont Oil Well. It was drilled in 1986. It is currently abandoned and it reached a depth of 270 feet. I think that 1986

is a typo. I think it should be 1968.

It reached 270 feet. It's completed -- was completed in the Chinle and then I have the water level and the month and year on which they were examined. In March of '68 the depth to water was 217 feet. In '71 it rose to 179 feet. In '76 it had risen to 174 feet. In '81 it was measured twice, both at 168, and in 1986 it was measured at 166 feet depth.

The measurements, the chemical measurements on this well have been taken twice. In September, 1981, it had a specific conductance of 1200 at 25 degrees Centigrade, and in October it had a specific conductance of 1100. The PPMs in September were 253 PPM chloride, and in October, 226 PPM chloride.

The water tends to be rising somewhat with time in the borehole but the well was abandoned shortly after, I think the abandonment mark was wither with the '71 or the '76 record in the State with the water level records I was able to obtain from the State in Roswell.

So this well has never really been produced other than for a very brief period of time.

Q When we look at the tabulation of water wells that you have found in the State Engineer's office, of the six wells idenitified there appears to be only one well that's still an active water well.

A There's only one active water well; that's the one labeled 4-B on Lynam (sic) Ranch.

Q Let's find that one. It's in Section 7 on the I think they say Lynam.

A Lynam, it's directly northeast of the red dot. There is a --

Q Describe that one.

A The (not understood) was 4-A, 4-B. 4-B is still active. It was drilled in 1985. It was drilled to 540 feet in the Santa Rosa. The water level measured in January of '85 was 460 feet. There has been no chemical analysis on this well that I can find but I did talk to the driller, who is located in Hobbs. Outside of approximately 60 feet of surface sands, this well drilled entire clay to 498 feet. At 498 feet it encountered 12 feet of sands and gravels and then from 510 feet to 540 feet it drilled only clay.

The only water he encountered in the entire well was that 12 foot interval and he has it tested on pump at 12 gallons per minute flow rate.

Q Do you have an opinion as to whether the disposal of produced water at the proposed site serves as a source by which there may be impairment to the quality of water being produced on the Lyman Ranch in Section 7 at the location of fresh water well 4-B?

A I do. I do not believe they will have any impact. One, the groundwater will tend to move south/southeasterly not north/northeasterly.

Two, this well is producing from the Santa Rosa, which is protected by several hundred feet of Chinle clay. There is no way the water would ever percolate down to that level.

Q Mr. McCarty, I show you a copy of a memorandum, Oil Conservation Division memorandum dated October 22nd, 1985, and direct your attention to page five of that memorandum and to subparagraph C, which says that the applicant can attempt to demonstrate that the groundwater present is not of sufficient volume to provide a reliable water supply for beneficial use, including domestic or stock use. This could occur if the shallow water was located in a discontinuous stratigraphic zone, or lens of limited areal extent.

With regards to that memorandum and that proof of the volume of water available in the area for a reliable source of water supply either for domestic or stock water use, do you have an opinion as to whether such a source of supply exists in this immediate area?

A Yes, I do have an opinion.

Q And what is that opinion?

A That no source exists in this area. The

two wells on this map that are labeled as formation completed in the alluvium, No. 4-A, the Lyman Ranch, was drilled in 1965 to a depth of 83 feet. The water level in 1976 was 81 feet, so there was only two feet of water in the well in 1976. We measured in 1982, the water depth was 82 feet, so there was only one foot of water in this well.

The chemical analysis, although of extremely unusual purity, 19 parts per million chlorides in 1965 and 6 parts per million chlorides in 1981, although the water is extremely fresh, it really is miniscule, if you will, it cannot be produced in any quantities and for that reason I feel that it was abandoned.

The other well that was drilled into the alluvium, or completed from the alluvium, that I could find is Well No. 6, approximately 2-1/2 miles east of the proposed site. It's labeled No. 6. I could not find the owner. It was drilled in 1968 and abandoned. It was drilled to 100 feet. The water measured in 1968 was 84 feet, so there was 16 feet of water in the borehole. The well was abandoned but it was later remeasured by the State in 1976 and it was labeled dry.

So I do not know if this water was a result of some type of unusual seasonal amount of water flushing through the area or if the water has just slowly moved on. For some reason it went from having 16 feet of

water in the hole to being dry and it was not really pumped or produced during that time period, but from this I would say that the sand, the alluvium in the area is not an aquifer; does not contain water except in rare cases where you do see isolated catchments within the topographic lows of the Chinle. I do not believe that this can be anticipated or predicted, so water that would be disposed of in the pit would tend to migrate slowly southeasterly to Laguna Gatuna.

Q Would you summarize now for us, Mr. McCarty, the ultimate conclusions you have reached with regards to your study of the groundwater, the geology in the area, to determine whether or not that in your opinion we may ultimately dispose of produced water as the applicant proposes without the risk of impairment of fresh water sources, and do so in such a way that it will not violate correlative rights or constitute waste?

A In summary, the surface is covered by a veneer of stabilized sand dunes with some interbedded caliche.

The interval in the area studied is 60 to 100 foot thick. The contact of the sands on the underlying Chinle is occasionally associated with gravel, probably a remnant of plasticene glaciation.

Occasional low areas within the surface of the underlying Chinle may serve as small catchments for

groundwater but have a small drainage area, contain small amouants of trapped water and when produced, are quickly depleted.

Given current climatic conditions recharge would take place over probably hundreds of years.

The underlying Chinle is about 200+ feet thick in this area and is composed of a thick series of red shales and clay with some thinly interbedded siltstones and very fine grained sands.

Due to the thick clays this formation is an aquifuge; that is, the clays have no effective interconnected openings and therefor neither absorb nor transmit water.

Where water is produced from the Chinle it would be from flat line, discontinuous pods of very fine grained sands and silts encased in clay. I'd like to point out that the pods would be discontinuous both laterally and vertically. The water is isolated and where productive will produce at low rates in the order of 10 to 15 gallons per minute. When pumped dry, this water will not recharge. Effectively it is a restricted aquifer.

For that reason I believe that the Chinle and the overlying stabilized sand dunes would not be harmed in any way by allowing pit disposal in this area.

MR. KELLAHIN: That concludes

my examination of Mr. McCarty, Mr. Catanach. At this time we would move the introduction of Exhibits Eight through Fifteen.

MR. CATANACH: Exhibits Eight through Fifteen will be admitted into evidence.

Let's give us about ten minutes, Tom, to get some questions ready.

(Thereupon a recess was taken.)

MR. CATANACH: Call the hearing back to order now and we're going to have some questions, Mr. McCarty, by Jami Bailey, a geologist here with the Division.

QUESTIONS BY MS. BAILEY:

Q Mr. McCorty, groundwater flow is towards the southeast.

A South/southeast.

Q South/southeast, so the only water well that could possibly be impacted by the proposed pit would be Water Well No. 5?

A What exhibit are you looking at, Exhibit Number Fifteen?

Q Exhibit Number Fifteen, at Section 20?

A No. 5 would not be impacted as it is in the Chinle and the Chinle is an aquifuge, allowing no water to move through it in a vertical sense.

Q Okay, Water Well No. 5 has an increase in the depth to water over the past years of better than 50 feet.

A Yes.

Q With the Chinle as you say not having any recharge, could you speculate as to the reason behind that increase in water, available water in that well?

A The only way that that could have an increase would be if it was recharging in some form but the source of the recharge I have no answer for because it could not be any recharge through the surface as it would have to come through vast quantities of clay.

It could not come from rainwater. It could not come from surface contamination. I have no answer to that.

Q So there is recharge but we have no idea --

A I don't know -- I don't know how to explain it, other than the fact that the water level has risen in that one well, but I do not believe that you will be contaminating whatsoever from the surface.

Q Okay. The chloride concentration in 1981

was 226 parts per million. That is protectable water under --

A Yes.

Q -- the State Engineer's (inaudible).

Are you aware that most of these water wells in this area are completed open hole; that it is common practice to complete these open hole?

A I'm used to always having cased water wells with PVC pipe, but I can see that if we're going through thick quantities of clay that you could have an open hole.

But, if that being the case, I'd also like to point out that the Well No. 5 is east, well, southeast and water that would move from this well would move, if you will, the No. 19 section number, would probably move west of that point. As water tends to move down a gradient, it would not move laterally. It would tend to move down a gradient, like this. It would not move at an angle to the gradient.

Q With the water level, the last recorded water level, which was last year, at 166 feet and the thickness of the alluvium, as you say, close to 100 feet --

A Yes.

Q -- if this well was completed open hole, then we have approximately 56 feet of Chinle between the al

luvium and the top to --

A Top to the water, yes.

Q -- the water. Looking at the cross sections, Exhibit Fourteen, looking at the top 56 feet approximately of the Chinle, does the gamma ray show that there are cleaner sections than just plain thick, heavy shale?

A There are some interfingered thick sections but they are not continuous.

Q But those cleaner sections could be water, if not bearing, then could allow the passage of water through them?

A The -- by passage of water if you mean as through sand, no, but it would allow movement of water on very, very slow rates, because this will be a very fine grained sand to a siltstone. It will have very low perm and very low porosity, so water that would move through there would tend to move at an extremely slow rate. I would say on the order of inches per decade or feet per decade as opposed to something or sand where you'd have rapid movement.

Q Have you done any calculations for the permeability or the rate of transmission through those?

A No, I have not, but just experience in dealing with siltstone movement, since I base my experience on groundwater movement through siltstones base on Gulf Coast, not on New Mexico.

As I think about it, when you say there is an open hole completion, the potential that No. 5 is open hole complete, if there is some movement of groundwater through the alluvium, say small amounts of rain that are trapped on the surface of the Chinle and are moving, and this is a cased, open hole well, which I had not thought about, then it could act as a hole and water that is moving through the alluvium could move into that hole and be filling it. It is not being pumped out, so this could be a matter of fill of very low levels of groundwater movement, if you're in a low area or a movement where groundwater would be moving from the surfact to the Chinle, it could be active of just filling that hole, like sticking your finger in clay and then allowing water to run along, falling into the hole and filling it up. It's not going to go anywhere.

So what we're seeing here is -- could potentially be water fill from above, not recharge from below, because I do not believe there is recharge in the Chinle.

Q But whatever the source of that water, it is (unclear) to the alluvium, it is protectable water at least if its chlorides are right at 226.

A Yes, but like I say, I also believe that it is outside the movement of groundwater from this interval, and I'd also like to point out that you already have just to the immediate southwest of that dot two large pits

by Heyco, which were approved last year by the State, that are discharging and have discharged large amounts of water for the last year. So we are talking about pollution from a site that's maybe 600 yards northeast of two other sites.

So, could you say that -- could you distinguish between these two pits that are already in existence and the pit we are proposing as saying that the water came from our pit as opposed to the two pits that have already been approved?

You have already approved the pits and you've agreed that the geology is sufficient and the groundwater is sufficient to allow pit disposal within two stones throw away.

CROSS EXAMINATION

BY MR. CATANACH:

Q Mr. McCarty, do you intend to -- you said the maximum rate into the pit was going to be about 100 barrels a day. Is that going to be -- is that ever going to increase, as far as you know?

A I do not think it will.

Q But it could.

A I do not think it will go over 100 barrels because I am assuming that we will double the water production out of the second well that we are currently

testing, but we are -- we feel somewhat optimistic that that production rate will not be as high.

Q And no other wells are planned to be drilled in the area?

A No other wells at this time.

MR. CATANACH: I think that's all we have of the witness at this time.

MR. KELLAHIN: Mr. Catanach, I want to make sure I understood Mr. McCarty's last response.

REDIRECT EXAMINATION

BY MR. KELLAHIN:

Q Based upon your study, Mr. McCarty, do you see any -- any geologic evidence or geologic reasons by which you could distinguish the disposal of fresh water produced and allowed to be disposed of by the Yates Companies in Order 8432, can you distinguish any of that geologically from the proposed Conoco site?

A Indistinguishable.

MR. KELLAHIN: I have nothing further.

MR. CATANACH: The witness may be excused and is there anything further in Case 9235?

MR. KELLAHIN: No, sir.

MR. CATANACH: If not, it will be taken under advisement.

(Hearing concluded.)

C E R T I F I C A T E

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

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 9235, heard by me on December 16 1987.

David R. Catanach, Examiner
Oil Conservation Division