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

6 September 1989

EXAMINER HEARING

IN THE MATTER OF:

Application of Wallen Production Company for a water flood project, Lea County, New Mexico. CASE 9736

BEFORE: Michael E. Stogner, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Division: Robert G. Stovall
Attorney at Law
Legal Counsel to the Division
State Land Office Building
Santa Fe, New Mexico

For Wallen Production Corporation: 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: We'll call next Case 9736, which is the application of of Wallen Production Company for a waterflood project, Lea County, New Mexico.

At this time I'll call for appearances.

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 to be sworn.

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

Will the witness please stand and be sworn? Raise your right hand.

(Witness sworn.)

MR. STOGNER: Mr. Kellahin?

MR. KELLAHIN: Thank you, Mr. Examiner.

WALTER W. KRUG,

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. Krug, would you please state your name and occupation?

A My name is Walter W. Krug. I'm an engineer.

Q Mr. Krug, on prior occasions have you testified before the Oil Conservation Division as a petroleum engineer?

A Yes, I have.

Q What is your relationship with Wallen Production Company?

A I'm an engineer/ owner.

Q Pursuant to your duties as the engineer/ owner of this company, Mr. Krug, and as a petroleum engineer, have you made an evaluation of the feasibility of instituting a waterflood project for this particular area?

A Yes, I did.

Q And have you completed your study?

A Yes, I have.

Q As part of your study have you prepared and compiled the information required by the Division for the Commission Form C-108 filings?

A Yes, I did.

MR. KELLAHIN: At this time,

Mr. Examiner, we tender Mr. Krug as an expert petroleum engineer.

MR. STOGNER: Mr. Krug is so qualified.

Q Mr. Krug, let me ask you, sir, to turn to Exhibit Number One. Would you identify that for us, sir?

A That's a structure map based on the top of the Yates, which is the formation we propose to waterflood, with your approval.

Q When you look at that exhibit, would you identify for us the wells that will be within the waterflood project?

A Yes, it's the wells that you see with the exception of Wells 1, 3 and 5. Those are the Seven Rivers Reef producers. They will not be in the waterflood.

MR. STOGNER: Okay, I'm sorry, what will not be in the waterflood? I have --

A Wells listed as Number 1, 3 and 5. Those are in the central contours that you see there.

MR. STOGNER: Okay. Well, I'm having a problem here with the ad. I had that the Wallen Hondo Lease, underlying the southwest quarter, the north half of the southeast quarter and the southeast quarter of the southeast quarter of Section 30 --

A That's correct.

Q MR. STOGNER: -- was the -- was the application today.

A Yes, sir.

MR. STOGNER: And then when I look at Exhibit Number One, all of the yellow is the south half.

MR. KELLAHIN: That's right. The yellow shaded area is not the project area.

MR. STOGNER: Oh, I'm sorry.

MR. KELLAHIN: Nor is it the unit area. The area that Mr. Krug proposes to subject to waterflood is the south half of the section exclusive of the 40-acre tract where you see the dry hole.

MR. STOGNER: Okay, I'm sorry about that. I just --

MR. KELLAHIN: We led you to a conclusion --

MR. STOGNER: -- got excited there, and sorry for the interruption. You may continue.

Q What type of leases are involved in this project area, Mr. Krug? Are they State, Federal, fee acreage?

A No, they're Federal acreage.

Q All Federal acreage?

A Yes, sir.

Q And are you the working interest owner of the Federal leases?

A Yes, sir.

Q The initial injector for the project area is which well, Mr. Krug?

A Well No. 7.

Q Why have you selected that as your initial injection well for the project area?

A It's the lowest on the structure.

Q Describe for the Examiner, what is your proposed plan of operation and further development of the area using the waterflood method of secondary recovery.

A Well, we are proposing to put the water in Well No. 7 and monitor it by 6 and 8, and then go from there. Not all waterfloods are -- act alike, and we thought we'd do one at a time.

Q Have you satisfied yourself that the conversion to waterflood project utilizing the No. 7 Well as the injector well will result in recovery of additional oil that will not otherwise be recovered by primary means?

A Yes, indeed.

Q The source of the water to be used for the waterflood project is what?

A The Yates water and the water from the

Seven Rivers Reef.

Q Is this water produced within the consolidated lease area that you operate?

A Yes.

Q Let me have you turn to Exhibit Number Two now, Mr. Krug, which is the cross section.

A Uh-huh.

Q Show us the two wells that you have placed on your cross section so that we can orient ourselves as to their placement in the waterflood project.

A All right. There's a small map here to correspond with this map you were just looking at and it clearly labels Wells 7 and 6.

Q When you look at Well No. 7, the Tonto No. 7, on the cross section, will you identify for the Examiner the disposal interval, or the flood interval?

A Yes, it's the interval between -- if you'll look at the A-A' the shoe is that triangle that you see sitting inside the (unclear), from there to TD is open hole with two porosity sections, the upper and the lower sands, both of which are perforated on No. 6, as shown in red.

Q The approximate location of the shoe on the injector well is about 2900 feet, is it not?

A Yes, sir, 29 -- I don't remember that,

2904, I think is right.

Q And then the total depth of the well, the open hole interval, is at 3113?

A 3113, that's correct.

Q Okay. Let's turn now to Exhibit Number Three, which has been marked as Exhibit Three.

MR. KELLAHIN: It's the C-108 information, Mr. Stogner. We have separately numbered the pages to help facilitate the explanation of the information.

Q Let me have you turn to page number 3, Mr. Krug.

A I'm there, uh-huh.

Q All right. Have you examined the information available for all the wells that penetrated through the injection formation within the half mile radius circle?

A Yes, I do.

Q And in making that investigation, do you find any of those wellbores that are improperly cemented or cased?

A No, not in my records.

Q Do you find any indication that there is any open faulting whereby injection fluids place in the Yates Seven Rivers Pool would migrate out of that pool into other formations?

A No. I saw no indication of that at all.

Q Your page 4 is -- corresponds to part of the C-108 filings and you're proposing some rates as well as some surface pressures for the project area.

MR. KELLAHIN: Mr. Examiner, the surface injection rate, if you use the top of the show of the disposal or the injector well, would convert to a pressure limitation of about 580 pounds.

Q Mr. Krug, do you anticipate that you will be able to confine your surface pressure limitation to 580 pounds surface pressure and still have a successful waterflood project?

A No.

Q Why not, sir?

A I don't think I'll get in enough water to do a decent job.

Q How do you propose to document the volume of -- or the pressure rate that you need in order to make your project successful?

A Well, after we've injected for awhile to where we know what we're doing, we'll run some step rate tests and submit them to the OCD for perusal and approval, possible approval.

Q Have you estimated the average range of barrels of water per day you will need to inject into your

injection well in order to make it feasible?

A We estimate that 200, 250 would be adequate.

Q Page five is simply the information on the injection interval, Mr. Krug.

Page six is part of the log that you've already described.

Let's -- let's go to the data, page seven and eight, that shows the schematic and then the information on the injection well.

A All right.

Q Would you describe for us how the well is currently completed?

A Yes. This was by special approval. The potash in this area is owned by Noranda, a Canadian outfit. I got together with them on what they would approve as a -- as a casing program and then submitted it to the Oil Conservation Commission for approval, which entailed cementing the production string to the surface, among other things.

Q Is the well currently completed as you have shown on the schematic on page 8?

A Yes, sir, it certainly is.

Q Turn to page 9 now. Is this your tabulation of the wellbore information within the half mile radius area?

A Yes, it is.

Q And did you either measure or calculate the top of the cement for each of the wells?

A Yes, that's in the last column on the righthand side.

Q Do you see any of those wells that are cemented in such a fashion that they constitute a risk to injection of water into the flooded interval?

A No. There's none there.

Q Pages 10 through 14 represent what, Mr. Krug?

A Those are schematics of the -- of that tabulated form that you just looked at.

Q Do you have any plugged and abandoned wells within the half mile radius that have penetrated the injection formation?

A Yes.

Q And have you prepared schematics for those wells?

A Yes, there are.

Q Do you see any of the plugged and abandoned wells that are improperly plugged and abandoned?

A No, there is no indication.

Q Have you also enclosed for the Examiner water analysis on the produced water?

A Yes, indeed.

Q Is that found on page 15?

A Yes, it is.

Q Do you anticipate any type of incompatibilities with the waters and re-introducing them into the flood zone?

A No, I had those analyzed by two people, both the Treat-O-Lite and by Martin Water Lab.

Q And what was the conclusion?

A That they were compatible. There was no problems at all; very lucky.

Q Let me turn now to page 17. Does that represent an accurate list of the offset operators within the half mile radius and the owners of the surface within the waterflood area?

A Yes, that's all there was.

Q The next information in the Exhibit Number Three is information found on 18, 19 and 20. Would you describe what you're doing with that information?

A I'm trying to show that we will get additional oil out of the formation by secondary recovery through flood injection.

Q Using standard engineering calculations and method of analysis have you satisfied yourself that utilization of the No. 7 Well for injection will increase

ultimate recovery from the project area?

A Yes.

Q Have you been able to quantify that volume?

A Yes, I did that through engineering practices.

Q Okay, and what did you conclude?

A That I should get what's shown here, 63,700 additional barrels of oil by the one injector.

Q That's shown in graphical format on page 20?

A Yes, it is.

Q And that assumes use of only one injection well.

A That's correct.

Q Following that, from pages 21 through page 30 of Exhibit Number Three, what is included in that portion of the exhibit?

A Oh, what I'm doing with the salt water now?

Q Yes, sir, from pages 21 through 30, what is that, sir?

A That's from a report that has been previously given to the OCD.

Q And who prepared that report?

A Ed Reed, the hydrologist from Midland.

Q Did Mr. Reed -- did you hire Mr. Reed to perform that hydrologic study for you?

A Yes, that was at the Minerals Management's behest.

Q And what was the purpose of having that study made?

A To show that there would be no contamination through salt water disposal in the pit that I had.

Q And that pit is located within what portion of Section 30?

A The -- roughly the southeast center. In other words, just off the southeast, the center southeast.

Q And did Mr. Reed conclude that there was any risk or jeopardy to any fresh water sources by utilizing an unlined surface pit in the section?

A No, there was no -- no surface water here at all -- no fresh water here at all.

Q Have you found any fresh water sources independent from Mr. Reed?

A No.

Q To the best of your knowledge there, in fact, are none, are there?

A No, and we drilled the well there to use that core to verify there wasn't.

Q If you go back to Exhibit Number One, which is your structure map, Mr. Krug, if the Examiner approves the use of the No. 7 Well as the initial injection well for the project area, can you show him other likely candidates for injection purposes should you convert other producers for injection?

A Yes, I can.

Q All right, sir, what are they?

A No. 8 and unless I miss my guess, we'll probably have to drill two when it comes to the four that we have anticipated would do the job.

Q What's the purpose of utilizing those wells for injection?

A They're low on the structure. We will lose less oil that way.

These wells were drilled with a cable tool so I have very itemized -- I have that water zone very well pinned down.

Q Were the geologic displays prepared under your direction and supervision?

A Yes, they were.

Q In your opinion, Mr. Krug, will approval of this application be in the best interest of conservation, the prevention of waste and the protection of correlative rights?

A Oh, definitely, yes, I do.

MR. KELLAHIN: Mr. Examiner, I believe Exhibit Number Four is our certificate of mailing, indicating that we have sent certified mailings to the parties listed on Mr. Krug's Exhibit Number Three, as shown on I believe it was page 14. No, sir, I misspoke, it's page 17, is the list of parties that we notified.

We would move the introduction of Exhibits One through Four.

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

MR. KELLAHIN: This concludes our examination of Mr. Krug.

CROSS EXAMINATION

BY MR. STOGNER:

Q Mr. Krug, who owns the potash lease in this area?

A Noranda did at the time but I don't know if there's any changes or not.

Q And when were you in contact with Noranda?

A Before I started drilling the first well.

Q And when was that?

A 19 -- latter part of 1972.

Q Referring to Order Number R-111P, which is the oil/potash area and you're within that area, are you not, Mr. Krug?

A Yes, sir, I believe I am.

Q Has your proposal or plan been reviewed by our District Office in Hobbs? This is in Lea County, right?

A That's correct.

Q Okay, has it been reviewed with Mr. Sexton down in Hobbs?

A I'm not sure of that.

MR. KELLAHIN: Mr. Examiner, we submitted to Mr. Sexton when the application was filed.

Q Now, on page 8, this is your proposed injection well, right, and I believe your testimony, you had talked about you had spoken with Noranda about how this well was completed and this was a result of that conversation.

A Yes.

Q Okay. Now, are there any other injection wells or disposal wells within this area, that you know of?

A None that I know of. I'm putting my salt water presently into a pit, an approved pit.

Q Now, I'm looking at page 9, which is your completion and records of the wells within an area. Is this within the half mile radius?

A Yes, sir. To my knowledge this is all of them.

Q And your injection interval is -- I know I'm repeating a bunch but I'm to establish something here -- the open hole interval from 2900?

A Yes, in this particular well.

Q Okay, when I look at the third well from the top, that is the Edward (unclear) Signal Rock Federal No. 6, you had a top of cement at 2810, is that correct?

A Yes, sir.

Q And that well is presently abandoned, correct?

A Yes.

Q Okay, now that leaves less than 80 feet between the injection interval and the top of cement in this well.

A Yes, sir, that cement come up inside.

Q Inside what?

A Let me double check here. I think it's itemized on page 11.

Q On page 11?

A Yes, sir, I think that's right, Signal

Ross Federal Well No. 6.

Q So there was a 70-foot cement plug on top of the stub at 2810 and you have measured cement from the bottom of that casing up to the stub.

A Yes, sir. I found no problems where at all.

Q Okay. Now when I look at your Exhibit Number One, the wells that will have immediately -- immediate influence, will be the No. 6 and 8, is that correct?

A That's what we estimated, yes, sir.

Q And what is the present production rate on those two wells?

A Less than 6 barrels a day.

Q How about the No. 5?

A The No. 5 is about 8, but that's out of the Seven Rivers Reef.

Q Now your injection is only in the upper portion, is that correct?

A In the Yates, yes, sir.

Q In the Yates. Do you have any plans at this time or maybe in the future to inject in the Seven Rivers portion?

A No, sir. I do anticipate in the future to drill a little deeper. We're in kind of a sub-reef here. We never have reached the main reef.

Q And that main reef is down totally in the Seven Rivers?

A Below that, way below, another 150 feet below, we estimate.

Q Okay. Now the rest of the wells that are presently producing in the southwest quarter, what is the average rate of production in those wells, would you say?

A 4, 4 barrels a day.

Q Are any of those from the Seven Rivers formation?

A Only the 3 that I named in the central and the No. 2 on the extreme west.

Q Okay.

A And we're going to perforate that one into the zones that we're talking about here.

Q When were the notice mailed to the lease operators, your notice?

MR. KELLAHIN: Yes, sir, the certificate will show that they were sent on July 26th.

MR. STOGNER: Okay, July 26.

MR. KELLAHIN: This case has been continued from a prior docket.

MR. STOGNER: That's what I thought.

Q Okay. Was the potash lessee notified of this filing today, other than your conversations with Noranda on the completion method?

A No, they were not.

Q Let's talk about the --

A I didn't know that was necessary.

Q Well, I don't know if it is or not. I just -- just wanted to establish a record.

In your conversations with Noranda, who did you talk to and when did these conversations take place?

A I talked to, originally, the geologist in charge here and he in turn got hold of his boss in Tennessee. They have other leaseholds, chemical leaseholds in this country, and then I worked with the geologist in charge who had his instructions from his boss.

Q Do you remember any of the names of any of the geologists you had talked to or any of the names of --

A I have records of them. I didn't know that was going to come up so I didn't --

Q What kind of records do you have?

A Complete; that is --

Q I mean letters, conversations?

A Yes, indeed.

MR. STOGNER; Subsequent to this hearing can we have copies of those, Mr. Kellahin?

MR. KELLAHIN: Be happy to provide them to you, Mr. Examiner.

A After we established what casings they wanted, we had a hearing to be sure it was with the State's approval.

Q A hearing with who?

A With the OCD.

Q When was this?

A Oh, that's been some time ago and you had to approve the casing.

Q Okay. Now are you talking about the casing exception requirements in Order R-111 or an exception to that?

A Yes, sir, this was not the casing that was approved by the State. I had to get approval that that was proper; that you would approved that casing program.

Q Would this be Order No. R-5731, by chance, Mr. Krug?

A Oh, heavens, I have no idea.

Q How about the application of Walter W. Krug, doing business as Wallen Production Company, for special casing/cementing rules in the potash/oil area, Lea County, New Mexico.

A That sounds like the one.

Q About -- it was heard on April 19th, 1978?

A '78?

Q Yes, sir.

A I thought it was before that. It could very well be right.

Q And in that particular order it appears that special cable tool casing and cementing rules and regulations promulgated by the North Lynch Yates Seven Rivers Pool by Commission Order 4253 are hereby extended to encompass Sections 20, 21, 27, 28, 33 and 34 of 20, 34, and that's where we're at today, isn't it?

A Yes, sir.

MR. STOGNER: I'll take administrative notice of both Order Number R-5731 in that case file and Order No. R-4253, whatever case that involved, and make that a part of this record, Mr. Kellahin.

MR. KELLAHIN: Do you still desire the correspondence with Noranda?

MR. STOGNER: Yeah, let's have that as part of the record. We are talking about an injection program and with what your client said today, that he does plan to request additional pressure, we should have as much of that type of information on record since we're in

an area of potash concern and there has been a lot of activity between the oil producers and the potash. Let's have as much on the record as we can, and I think this will be very helpful to supplement your request today.

MR. KELLAHIN: All right, sir.

MR. STOGNER: So, Mr. Kellahin, if you would have that information subsequently sent to me, we'll make that a part of the record.

I have no other questions of Mr. Krug at this time.

Are there any other questions of this witness?

If not, he may be excused.

Is there anything further in Case Number 9736?

In that case, we'll hold the record open until the additional information is submitted.

MR. KELLAHIN: All right, sir, thank you.

(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. 9736, heard by me on 6 September 1957.

, Examiner
Oil Conservation Division

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION
POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501

FORM C-108
Revised 7-1-81

APPLICATION FOR AUTHORIZATION TO INJECT

I. Purpose: ☐ Secondary Recovery ☐ Pressure Maintenance ☒ Disposal ☐ Storage
Application qualifies for administrative approval? ☐ yes ☒ no

II. Operator: Wallen Production Company
Address: P.-O. Box 1960 Midland, Texas 79702
Contact party: Walter W. Krug Phone: 915-683-2600

III. Well data: Complete the data required on the reverse side of this form for each well proposed for injection. Additional sheets may be attached if necessary.

IV. Is this an expansion of an existing project? ☐ yes ☒ no
If yes, give the Division order number authorizing the project _____.

V. Attach a map that identifies all wells and leases within two miles of any proposed injection well with a one-half mile radius circle drawn around each proposed injection well. This circle identifies the well's area of review.

* VI. Attach a tabulation of data on all wells of public record within the area of review which penetrate the proposed injection zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of completion, and a schematic of any plugged well illustrating all plugging detail.

VII. Attach data on the proposed operation, including:

1. Proposed average and maximum daily rate and volume of fluids to be injected;
2. Whether the system is open or closed;
3. Proposed average and maximum injection pressure;
4. Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and
5. If injection is for disposal purposes into a zone not productive of oil or gas at or within one mile of the proposed well, attach a chemical analysis of the disposal zone formation water (may be measured or inferred from existing literature, studies, nearby wells, etc.).

*VIII. Attach appropriate geological data on the injection zone including appropriate lithologic detail, geological name, thickness, and depth. Give the geologic name, and depth to bottom of all underground sources of drinking water (aquifers containing waters with total dissolved solids concentrations of 10,000 mg/l or less) in the proposed injection zone as well as any such source known to be immediately underlying the injection interval.

BEFORE EXAMINER STOGNER
OIL CONSERVATION DIVISION
W Allen EXHIBIT NO. 3
CASE NO. 9736

IX. Describe the proposed stimulation program, if any.

* X. Attach appropriate logging and test data on the well. (If well logs have been filed with the Division they need not be resubmitted.)

* XI. Attach a chemical analysis of fresh water from two or more fresh water wells (if available and producing) within one mile of any injection or disposal well showing location of wells and dates samples were taken.

XII. Applicants for disposal wells must make an affirmative statement that they have examined available geologic and engineering data and find no evidence of open faults or any other hydrologic connection between the disposal zone and any underground source of drinking water.

XIII. Applicants must complete the "Proof of Notice" section on the reverse side of this form.

XIV. Certification

I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.

Name: W. Thomas Kellahin Title Attorney

Signature: _____ Date: July 24, 1989

* If the information required under Sections VI, VIII, X, and XI above has been previously submitted, it need not be duplicated and resubmitted. Please show the date and circumstance of the earlier submittal. _____

DISTRIBUTION: Original and one copy to Santa Fe with one copy to the appropriate Division district office.

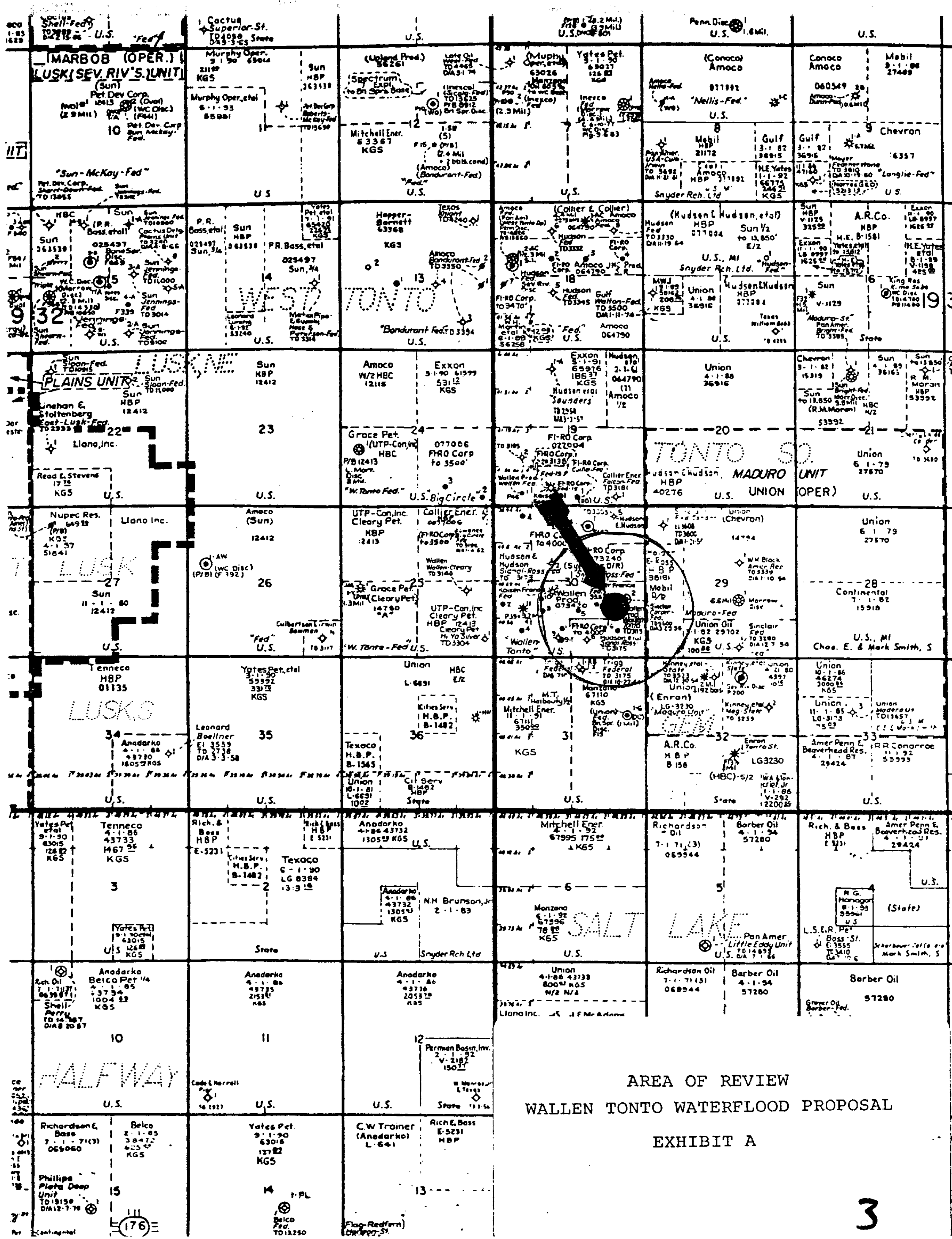
1

WALLEN PRODUCTION COMPANY

Proposed Wallen Tonto Waterflood
Wallen Tonto #7 WIW
Section 30, T19S, R33E
Lea County, New Mexico

List of Exhibits - Form C-108

Exhibit A	Map required by Paragraph V
Exhibit B	Tabular Summary required by Paragraph VI
Exhibit C	Data Sheet required by Paragraph VII
Exhibit D	Geological Data - Paragraph VIII
Exhibit E	Log of Injection Well
Exhibit F	Data Sheet on Proposed Injection Well
Exhibit G	Schematic of Proposed Injection Well
Exhibit H	Schematic of P&A Wells within Area of Review
Exhibit I	Water Analysis Produced Water to be re-injected
Exhibit J	Statement per Paragraph XII
Exhibit K	Notice Requirements



AREA OF REVIEW

WALLEN TONTO WATERFLOOD PROPOSAL

EXHIBIT A

3

WALLEN PRODUCTION COMPANY

Proposed Wallen Tonto Waterflood
Wallen Tonto #7 WIW
Section 30, T19S, R33E
Lea County, New Mexico

Exhibit C

Data on Proposed Operation

1. Proposed average and maximum daily rate and volume of fluids to be injected:

   Average daily rate of 200 BWIPD
   Maximum daily rate of 400 BWIPD

2. System is closed.

3. Proposed Average Injection Pressure: 600 psig
   Proposed Maximum Injection Pressure: 1000 psig

   The proposed average and maximum injection pressures are to be determined from step rate tests to be run after the well is re-entered.

4. (A) Source of injection fluid:
   Produced water from South Tonto Yates Seven Rivers Pool.

   (B) Analysis of formation fluid:
   Not applicable - re-injected produced water.

5. Zone of disposal is productive of oil and gas within one mile of proposed disposal well.

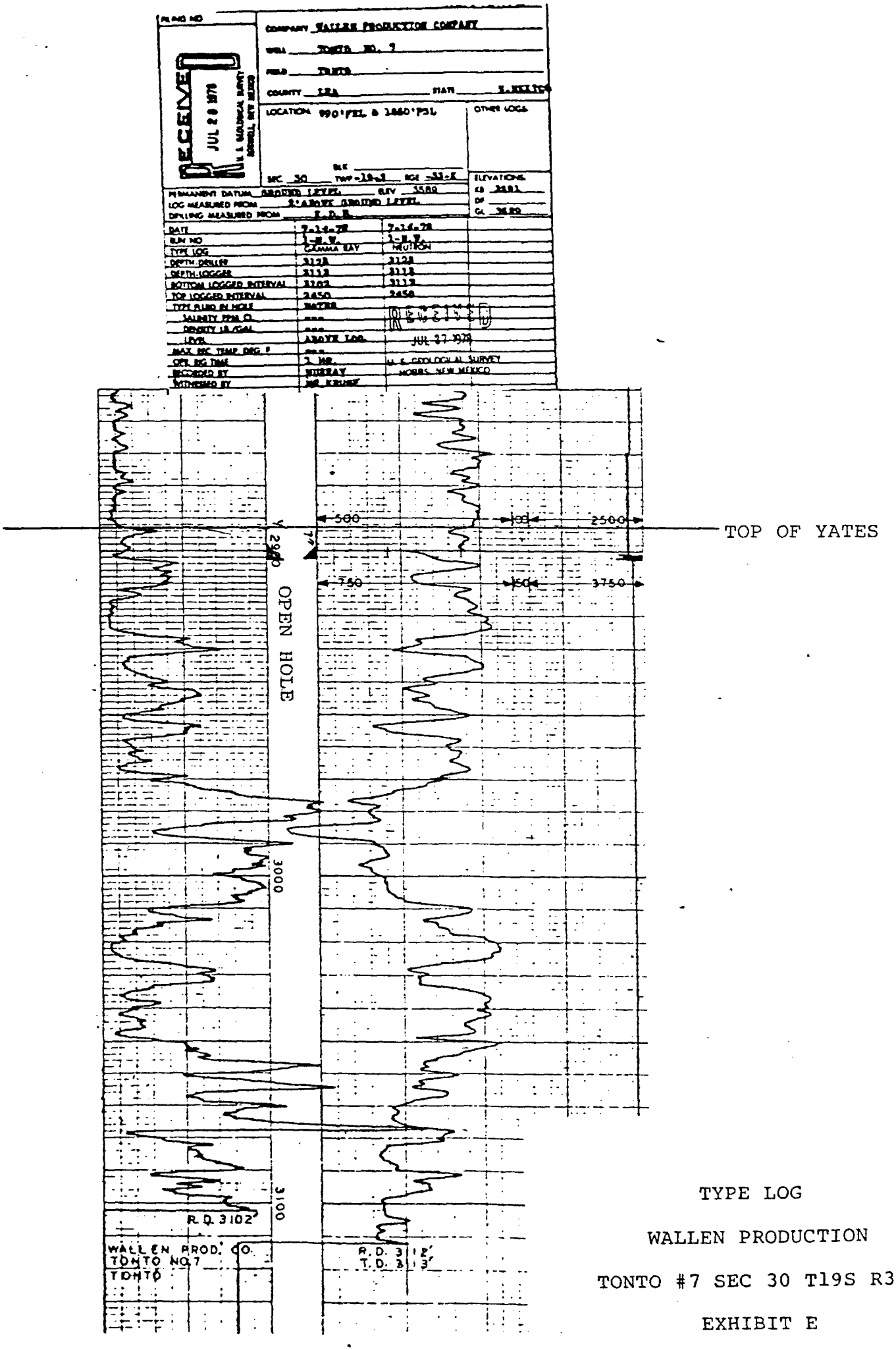
WALLEN PRODUCTION COMPANY

Proposed Wallen Tonto Waterflood
Wallen Tonto #7 WIW
Section 30, T19S, R33E
Lea County, New Mexico

Exhibit D

Geological Data on Injection Zone

Pool:	South Tonto Yates Seven Rivers
Formation:	Yates Seven Rivers
Geological Name:	Yates
Thickness:	@200 feet
Depth:	@2900 feet
Injection Interval:	2900 to 3113 feet



TOP OF YATES

TYPE LOG

WALLEN PRODUCTION

TONTO #7 SEC 30 T19S R33E

EXHIBIT E

WALLEN PRODUCTION COMPANY

Proposed Wallen Tonto Waterflood
Wallen Tonto #7 WIW
Section 30, T19S, R33E
Lea County, New Mexico

Exhibit F

Well Data on Injection Well

Stimulation Program: 2000 gallons 15% NE-FE Acid

Location: 1650' FSL & 990' FEL
Section 30, T19S, R33E
Lea County, New Mexico

Casing: 13 3/8" @225' cmtd w/300 sx
7" @2900' cmtd w/200 sx

Tubing: 2 3/8" @2850' - Plastic Coated

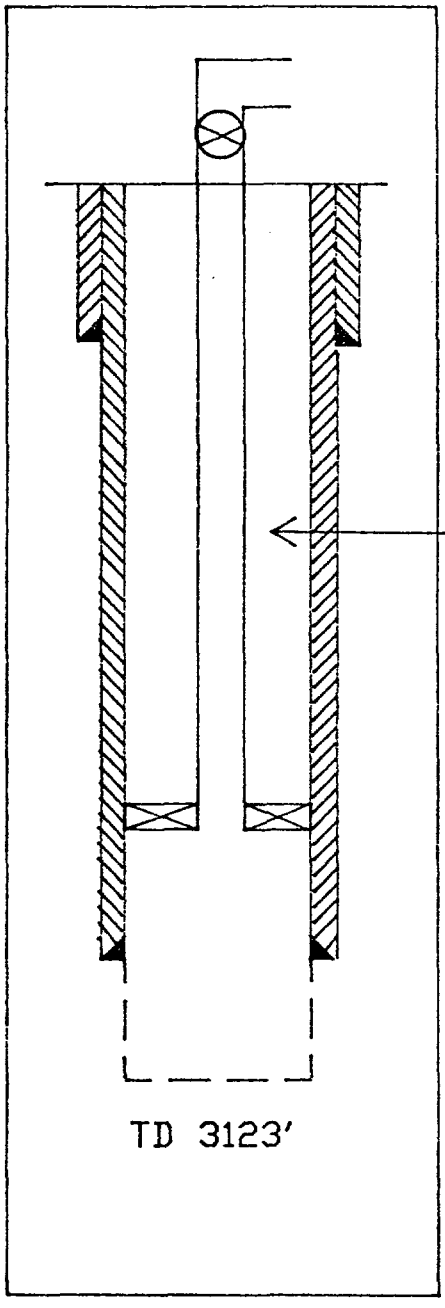
Packer: Halliburton R4 Injection Packer

Injection Formation: Yates in the South Tonto Yates-Seven Rivers Pool.

Injection Interval: 2900' to 3113' Open Hole

Well was originally drilled as oil producer. Currently P&A.

Wallen Production Company
Wallen-Tonto Well No. 7
990' FEL & 1650' FSL
Sec. 30, T19S, R33E



13 3/8" Casing
@ 225' w/300 sx
Cmt Circ

Packer Fluid

Injection Packer
@ 2800'

7" Casing
@ 2900' w/200 sx
Cmt Circ

TD 3123'

Injection Interval
2900-3123' OH

Open Hole

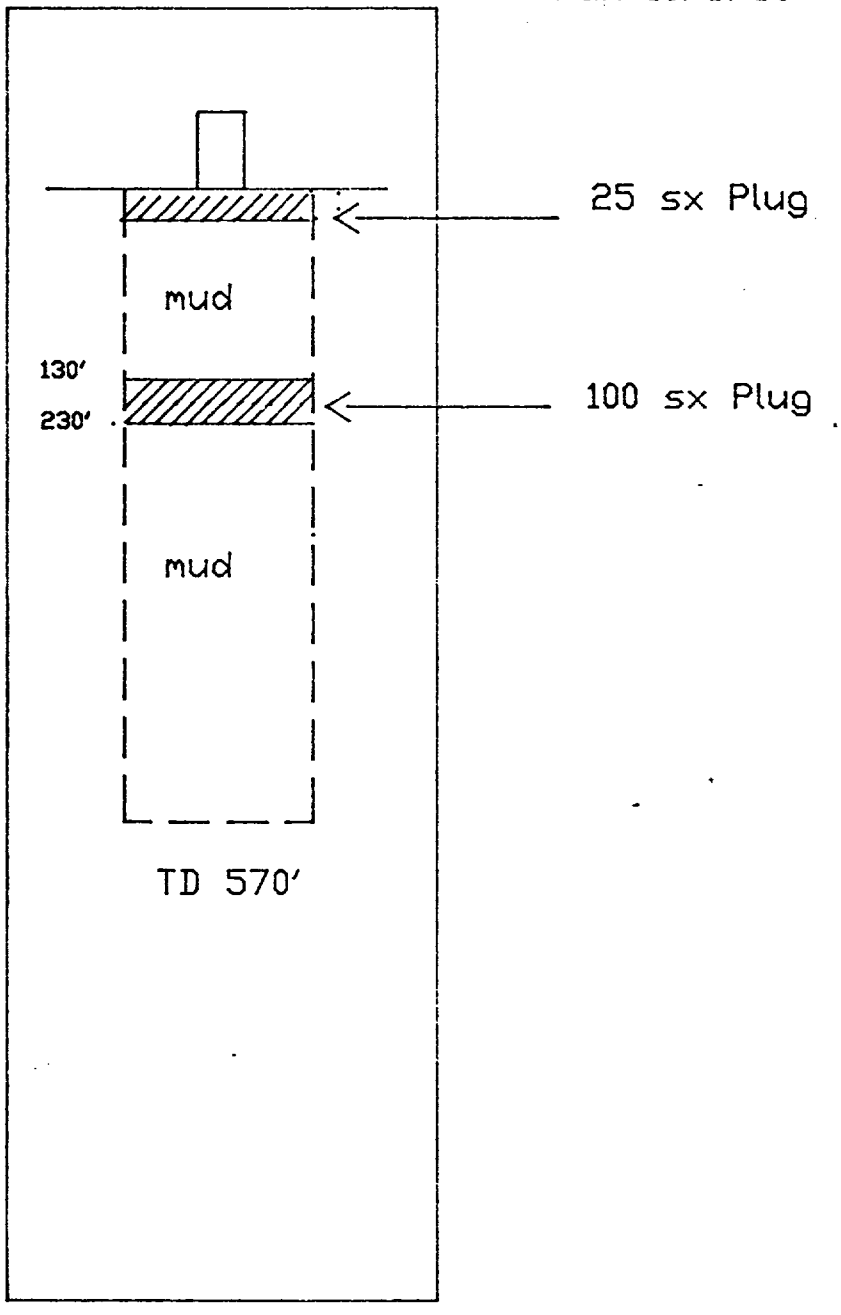
Casing

Exhibit B

Operator Well Name, Number	Location: Unit, Sec., Twp., Range	Type	Date Spudded	Date Completed	Depth TD	Depth PBD	Zone(s)	Record of Completion Perfs and Well Construction	TOC
Aminoil USA Federal 30 Well No. 1	I, Sec 30, T19S, R33E 1980' FSL & 760' FEL	Gas	6/19/81	9/21/81	13712	13670	Morrow	Perfs: 13244-561 Casing: 13 3/8 @ 1276'/775 sx 9 5/8 @ 5310'/3440 sx 5 1/2 @ 13712'/2150 sx	surf-calc surf-calc 2038-calc
Aminoil USA Federal 30 Well No. 2	K, Sec 30, T19S, R33E 2310' FSL & 1980' FWL	Gas	12/18/81	3/4/83	13800	13753	Morrow	Perfs: 13372-440 Casing: 13 3/8 @ 1315'/1050 sx 9 5/8 @ 5315'/3181 sx 5 1/2 @ 13800'/2360 sx	surf-calc surf-calc 1263-calc
Edward Hudson Signal Ross-Fed Well No. 6	O, Sec 30, T19S, R33E 660' FSL & 1980' FEL	D&A	2/10/64 P&A 3/12/64	-	3127	-	Yates Svn Rvrs	Perfs: Not reported Casing: 13 3/8 @ 65'/100 sx 5 1/2 @ 3115'/30 sx	surf-calc 2810-stub
Sinclair O&G Co. Carder-Federal Well No. 2	I, Sec 30, T19S, R33E 1980' FSL & 660' FEL	P&A	2/14/56 P&A 3/29/56	-	5600	-	Delaware	Perfs: Open Hole Casing: 10 3/4 @ 305'/250 sx	surf-calc
John H. Trigg Federal RB 31 Well No. 1	B, Sec 31, T19S, R33E 330' FNL & 2310' FEL	J&A	9/18/64 P&A 10/2/64	-	700	-	---	Perfs: NA Casing: 13 3/8 @ 85'/50 sx	surf-calc
John H. Trigg Federal RB 31 Well No. 1X	B, Sec 31, T19S, R33E 335' FNL & 2223' FEL	D&A	10/3/64 P&A 10/27/64	-	3175	-	Svn Rvrs	Perfs: NA Casing: 10 3/4 @ 497' - pulled 8 5/8 @ 940' - pulled	
Wallen Prod. Co. Wallen-Tonto Well No. 7	I, Sec 30, T19S, R33E 1650' FSL & 990' FEL	D&A	5/17/78 P&A 7/18/78	-	3123	-	Svn Rvrs	Perfs: NA Casing: 13 3/8 @ 225'/300 sx 7 @ 2900'/200sx	circ circ
Wallen Prod. Co. Wallen-Tonto Well No. 8	J, Sec 30, T19S, R33E 1790' FSL & 1710' FEL	OIL	10/16/81	2/20/82	3120	3115	Svn Rvrs	Perfs: 2981-3110 Casing: 13 3/8 @ 115'/500 sx 7 @ 2940'/1000 sx 4 1/2 @ 2612-3120'/60 sx	circ circ 2625-temp
Wallen Prod. Co. Wallen-Tonto Well No. 5	J, Sec 30, T19S, R33E 1650' FSL & 2310' FEL	OIL	6/30/77	8/25/77	3094	3094	Svn Rvrs	Perfs: Open Hole Casing: 13 3/8 @ 227'/300 sx 7 @ 2884'/1000 sx	circ circ
Wallen Prod. Co. Wallen-Tonto Well No. 3	K, Sec 30, T19S, R33E 1650' FS & WL	OIL	8/31/77	10/21/77	3073	3073	Svn Rvrs	Perfs: Open Hole Casing: 13 3/8 @ 220'/300 sx 7 @ 2850'/1000 sx	circ circ
Wallen Prod. Co. Wallen-Tonto Well No. 6	P, Sec 30, T19S, R33E 990' FS & EL	OIL	2/8/78	4/28/78	3096	3085	Svn Rvrs	Perfs: 2986-3080 Casing: 13 3/8 @ 210'/300 sx 7 @ 2901'/1420 sx 4 1/2 @ 2600-3096'/60 sx	circ circ 2600-circ
Wallen Prod. Co. Wallen-Tonto Well No. 1	N, Sec 30, T19S, R33E 990' FSL & 2310' FWL	OIL	10/15/76	12/5/76	3082	3082	Svn Rvrs	Perfs: Open Hole Casing: 13 3/8 @ 225'/100 sx 7 @ 2896'/1000 sx	circ circ
Wallen Prod. Co. Wallen-Tonto Well No. 9	N, Sec 30, T19S, R33E 600' FSL & 2300' FWL	J&A	9/20/80 P&A 10/8/80	-	570	-	---	Perfs: NA Casing: NA	
Wallen Prod. Co. Wallen-Tonto Well No. 9Y	N, Sec 30, T19S, R33E 660' FSL & 2300' FWL	OIL	10/12/80	3/18/81	3086	3086	Svn Rvrs	Perfs: 2981-3110 OH 3084-86 Casing: 10 3/8 @ 225'/450 sx 7 @ 2800'/1100 sx 4 1/2 @ 2617-3083'/60 sx	circ circ 2617-circ

Wallen Production Company
Wallen-Tonto Well No. 9
2300' FWL & 600' FSL
Sec. 30, T19S, R33E

P&A 10/8/80

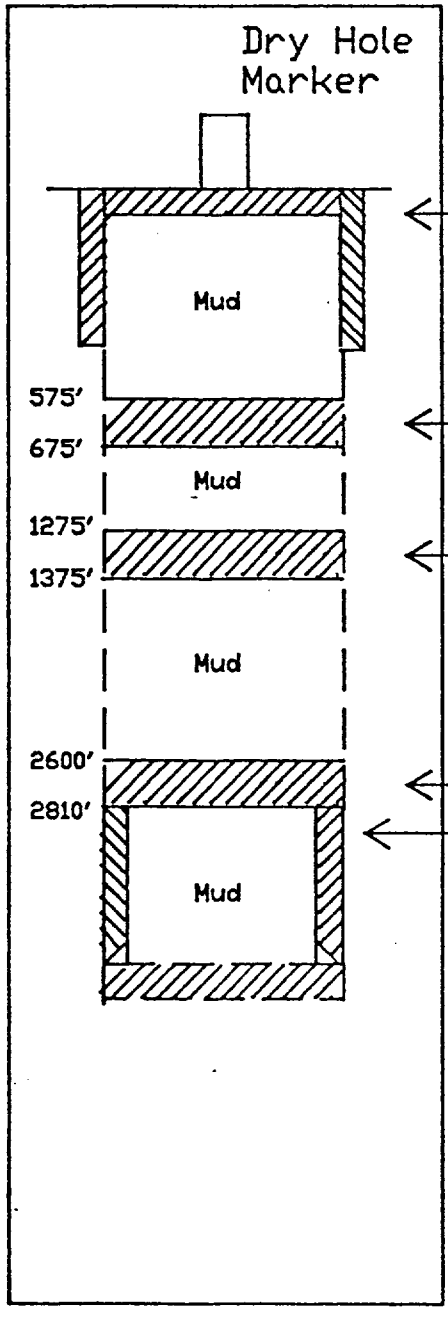


Open Hole

Casing

Edward Hudson
Signal Ross_Fed. Well No. 6
660' FSL & 1980' FEL
Sec. 30, T19S, R33E

P&A 3/12/64



15' Cmt Plug

13 3/8" Casing
@ 65'
Cmt w/100sx Circ

30 sx Cmt Plug

35 sx Cmt Plug

70 sx Cmt Plug

5 1/2" Casing Stub
@2810'

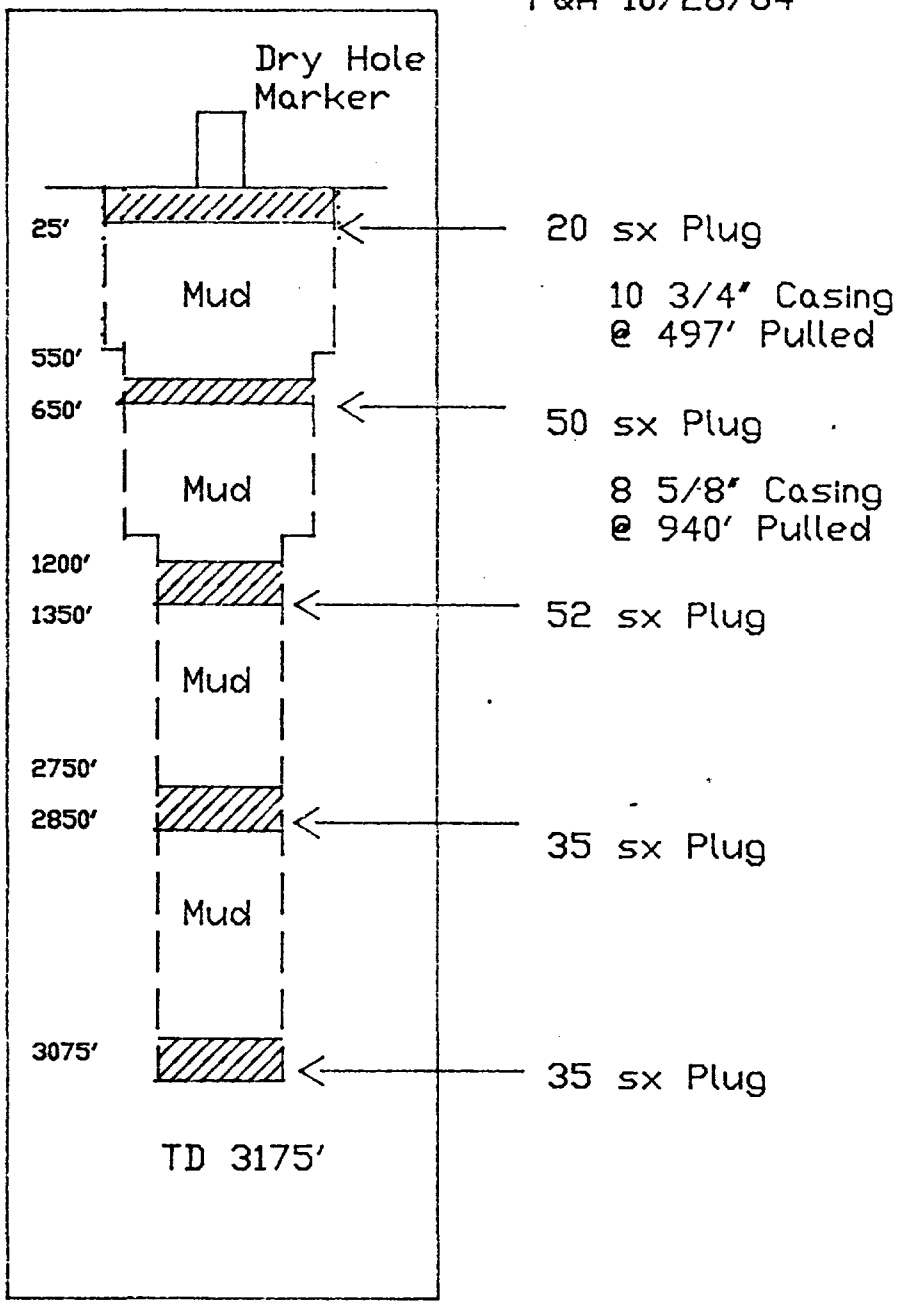
5 1/2" Casing
@ 3115'
Cmt w/30 sx

Open Hole

Casing

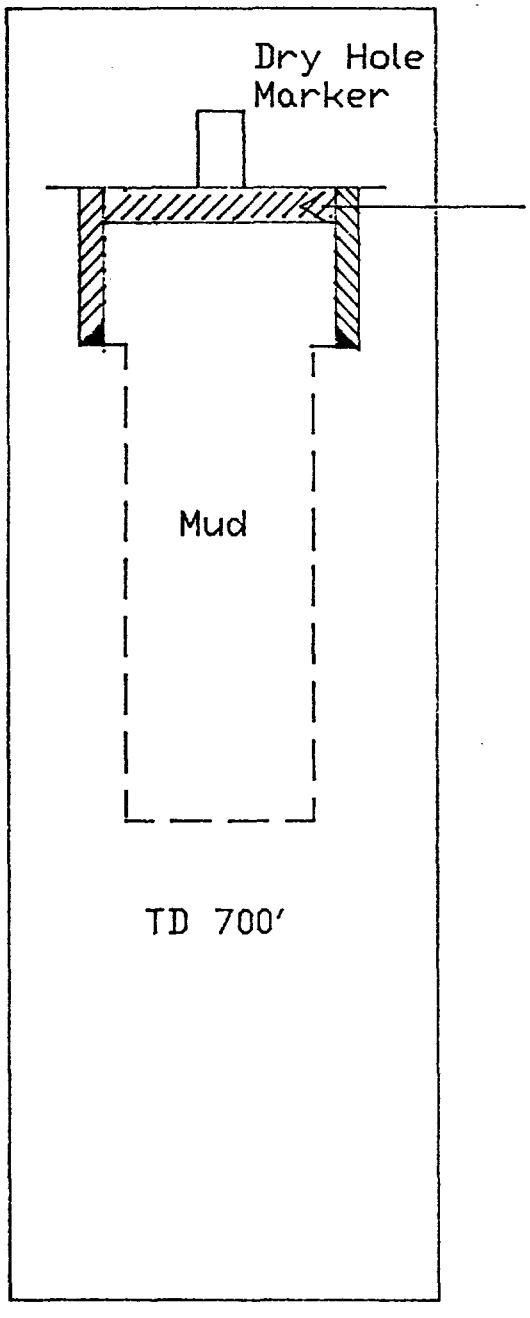
John H. Trigg
Federal "RB" 31 Well No. 1X
335' FNL & 2223' FEL
Sec. 31, T19S, R33E

P&A 10/28/64



John H. Trigg
Federal "RB" 31 Well No. 1
330' FNL & 2310' FEL
Sec. 31, T19S, R33E

P&A 9/18/64

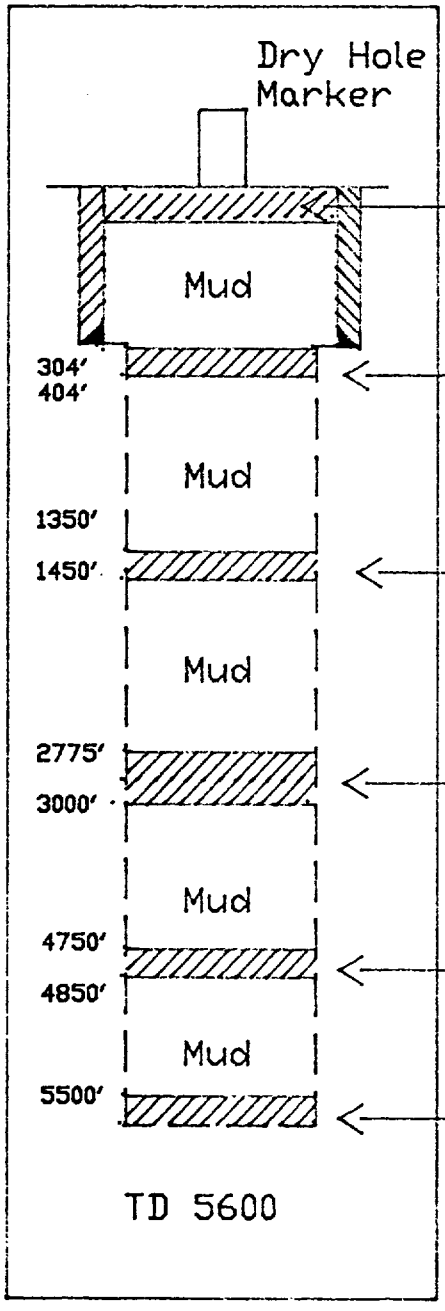


Open Hole

Casing

Sinclair Oil & Gas Company
Carder-Federal Well No. 2
330' FNL & 2310' FEL
Sec. 31, T19S, R33E

P&A 3/29/56



13 sx Plug

13 3/8' Casing @ 305' cmtd w/250 sx

25 sx Plug

25 sx Plug

320 sx Plug

25 sx Plug

25 sx Plug

Open Hole - - - - -

Casing ———

WATER ANALYSIS REPORT
furnished by TRETOLITE CHEMICALS

COMPANY:	WALLEN PRODUCTION
LEASE:	TONTO
SAMPLE POINT:	HEATER TREATER
SAMPLE DATE:	5-27-87
SAMPLE TEMP.:	

pH:	6.5
H2S:	500
SPECIFIC GRAVITY:	1.025

TITRATED AND CALCULATED IONS

	MILLIGRAMS PER LITER	MILLIEQUIVALENTS PER LITER
HCO3	915.00	15.00
Cl	11210.00	315.77
SO4	1250.00	26.04
Ca	2800.00	140.00
Mg	0.00	0.00
Na	4986.78	216.82

IONIC STRENGTH =	0.44
TOTAL HARDNESS =	6000.0 mg/ltr.
TOTAL DISSOLVED SOLIDS =	21155.5 mg/ltr.
TOTAL IRON (Fe) =	3.0 ppm

PROBABLE MINERAL COMPOSITION AND ION PAIRING

	MILLIEQUIVALENTS PER LITER	MILLIGRAMS PER LITER
Ca(HCO3)2	15.00	1215.60
CaSO4	26.04	1772.66
CaCl2	98.96	5492.19
Mg(HCO3)2	0.00	0.00
MgSO4	0.00	0.00
MgCl2	0.00	0.00
NaHCO3	0.00	0.00
Na2SO4	0.00	0.00
NaCl	216.82	12675.08

CALCULATED SCALING TENDENCIES

SCALING INDEX
CaCO3 @ 80 DEG F. = 0.5
CaCO3 @ 120 DEG F. = 1.0

SATURATION POINT
CaSO4 @ 70 DEG F. = 1996.5 MG/LTR.
CaSO4 @ 110 DEG F. = 2020.2 MG/LTR.

(THIS SAMPLE CONTAINED 1772.7 MG/LTR. CaSO4)

WALLEN PRODUCTION COMPANY

Proposed Wallen Tonto Waterflood
Wallen Tonto #7 WIW
Section 30, T19S, R33E
Lea County, New Mexico

Exhibit J

Affirmative Statement

Wallen Production Company has examined available geologic and engineering data and finds no evidence of open faults or any other hydrologic connection between the disposal zone and any underground source of drinking water.

WALLEN PRODUCTION COMPANY

Proposed Wallen Tonto Waterflood
Wallen Tonto #7 WIW
Section 30, T19S, R33E
Lea County, New Mexico

Exhibit K

Notice

Pursuant to Section XIV of Form C-108,

Applicant has mailed copies of the application to the following:

Surface Owners:

Bureau of Land Management
Roswell District Office
P.O. Box 1397
Roswell, New Mexico 88201-1397

Attention: District Manager

Oil Conservation Division
State Land Office
P.O. Box 1148
Santa Fe, New Mexico 87501

Attention: Land Commissioner

Leasehold Operators within one-half mile:

Kaiser-Francis
Rt. Box 208
Odessa, Texas 78765

FI-RO Corporation
P.O. Box 8148
Roswell, New Mexico 88201

Union Oil Company of California
4000 N. Big Spring
Suite 300
Midland, Texas 79702

Wallen Production Company
Wallen Tonto Waterflood
Lea County, New Mexico

DATA SHEET

Reserves

Cumulative Production @ 7/1/89	204100 BO
Projected Cumulative Production @ 1/1/90	209900 BO
Remaining Primary Reserves @ 1/1/90	21300 BO
Estimated Primary Recovery	231200 BO
Projected Secondary Reserves @ 1/1/90	63700 BO
Estimated Ultimate Recovery	294900 BO

Economics

Case 1 Primary Production
Case 2 Primary Production w/ Secondary Response
Case 3 Incremental Secondary Production

	Case 1	Case 2	Case 3
Oil Price, $/BO	16	16	16
Economic Limit, BOPD	24	26	---
Capital Investment	0	60000	60000
Cumulative Net Cash Flow	20900	139800	118900
Net Income/Investment	---	---	3
Payout, Yrs	---	---	2.25

Wallen Prodution Company
Wallen Tonto Waterflood
Lea County, New Mexico

PRIMARY PRODUCTION

Evaluated Interest
W.I. 100.00% Operating Expense $/mo 7500
N.R.I. 69.00%

Year	Gross Production	Net Production	Oil $/BO	Net Revenue	Sev&Adv Taxes	Net Oper Expenses	Capital Cost	Cash Flow	Cum Cash Flow
1990	10275	7090	16	113440	8307	90000	0	15133	15133
1991	9351	6452	16	103230	7559	90000	0	5671	20804
1992	1474	1017	16	16278	1192	15000	0	86	20891

Wallen Prodution Company
Wallen Tonto Waterflood
Lea County, New Mexico

PRIMARY PRODUCTION
W/PROJECTED WATERFLOOD RESPONSE

Evaluated Interest
W.I. 100.00% Operating Expense $/mo 8100
N.R.I. 69.00%

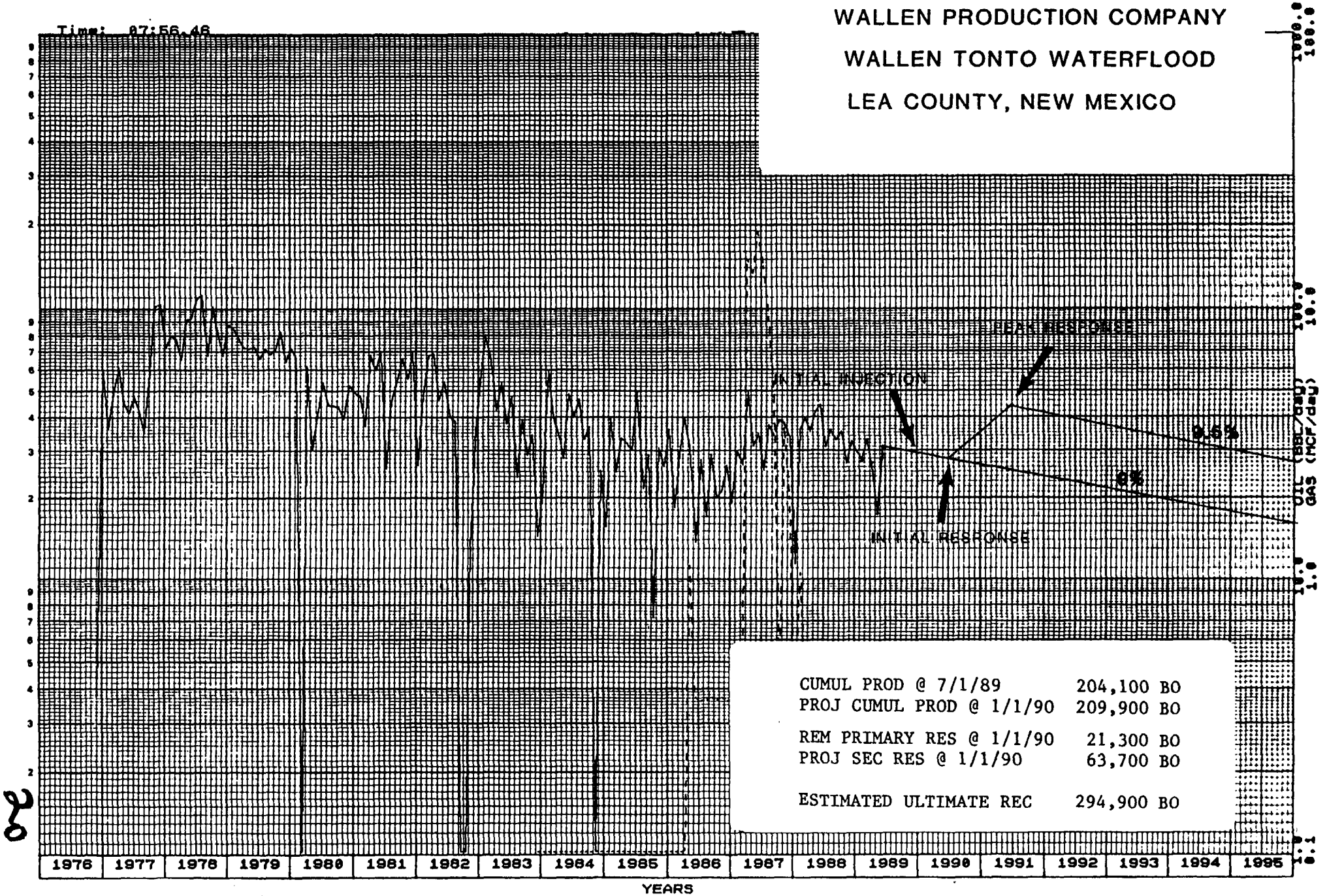
Year	Gross Production	Net Production	Oil $/BO	Net Revenue	Sev&Adv Taxes	Net Oper Expenses	Capital Cost	Cash Flow	Cum Cash Flow
1990	11021	7604	16	121669	8909	100800	60000	-48040	-48040
1991	15092	10414	16	166619	12201	99000	0	55418	7378
1992	14610	10081	16	161291	11811	97200	0	52280	59659
1993	13222	9123	16	145968	10689	97200	0	38080	97738
1994	11966	8256	16	132101	9673	97200	0	25228	122967
1995	10829	7472	16	119552	8754	97200	0	13597	136564
1996	8234	5681	16	90903	6656	81000	0	3247	139811

Wallen Prodution Company
Wallen Tonto Waterflood
Lea County, New Mexico

INCREMENTAL SECONDARY PRODUCTION

Evaluated Interest
W.I. 100.00%
N.R.I. 69.00%

Year	Gross Production	Net Production	Oil $/BO	Net Revenue	Sev&Adv Taxes	Net Oper Expenses	Capital Cost	Cash Flow	Cum Cash Flow
1990	745	514	16	8229	603	10800	60000	-63173	-63173
1991	5742	3962	16	63389	4642	9000	0	49747	-13426
1992	13135	9063	16	145013	10619	82200	0	52194	38768
1993	13222	9123	16	145968	10689	97200	0	38080	76848
1994	11966	8256	16	132101	9673	97200	0	25228	102076
1995	10829	7472	16	119552	8754	97200	0	13597	115673
1996	8234	5681	16	90903	6656	81000	0	3247	118920
	63873	44072		705155	51635	474600	60000		


Time: 07:56.46
WALLEN PRODUCTION COMPANY
WALLEN TONTO WATERFLOOD
LEA COUNTY, NEW MEXICO
PEAK RESPONSE
INITIAL INJECTION
INITIAL RESPONSE
9.5%
8%
CUMUL PROD @ 7/1/89 204,100 BO
PROJ CUMUL PROD @ 1/1/90 209,900 BO
REM PRIMARY RES @ 1/1/90 21,300 BO
PROJ SEC RES @ 1/1/90 63,700 BO
ESTIMATED ULTIMATE REC 294,900 BO
OIL (BBL/day)
GAS (MCF/day)
100.0
10.0
1.0
0.1
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
YEARS

PROPOSAL FOR
SURFACE SALT WATER DISPOSAL

Prepared For
WALLEN PRODUCTION COMPANY
Lea County, New Mexico
3/83

PROPOSAL FOR
SURFACE SALT WATER DISPOSAL
LEA COUNTY, NEW MEXICO

INTRODUCTION

This firm has conducted a geohydrologic investigation for Wallen Production Company near its production in the south half of Section 30, T. 19 S., R. 33 E., in west-central Lea County, New Mexico (Figure 1). Wallen Petroleum proposes to operate a surface salt water disposal system for its leases in Section 30.

This investigation shows that no shallow fresh water is present in the area of the proposed surface salt water disposal site. The deeper Santa Rosa aquifer is isolated from the surface by over 500 feet of impervious red clays. In our opinion, fresh ground water will not be endangered by this disposal operation.

Data presented in this report are from the New Mexico State Engineer's Office, from previous studies by Ed L. Reed & Associates, Inc. and recent field work for the current investigation.

GENERAL GEOLOGY

The area of interest lies in the southern portion of the Querecho Plains, a topographic province in west-central Lea County, New Mexico (Figure 2).

We focused this investigation on geologic formations younger than the Permian because they are the only potential sources of potable ground water in this region. The Permian strata which are comprised largely of anhydrite and salt do not contain fresh water.

The Triassic Dockum Group which lies on undifferentiated Permian and Triassic strata is divided into the Santa Rosa Sandstone and the Chinle Formation. The Santa Rosa Sandstone consists of red to gray, fine to coarse-grained sand which is about 250 feet thick. The Chinle Formation which conformably overlies the Santa Rosa is composed of approximately 500 feet of red to gray shales. The top of the Chinle is marked by an erosional surface.

Quaternary alluvium comprises the surface cover in the Querecho Plains (figure 3). The alluvium ranges in thickness from a few feet to approximately 100 feet. The alluvium consists of dune sand, loosely cemented fine gravel and caliche composed of sand in a calcareous matrix.

LOCAL GEOLOGY

The area covered by this study encompasses most of Townships T. 19 S., R. 32 E.; T. 19 S., R. 33 E.; T. 20 S., R. 32 E.; and T. 20 S., R. 33 E. (Figure 4). The Quaternary alluvium in the study area varies in thickness from 0 to 100 feet. The underlying Chinle Formation is approximately 500 feet thick, and consists of red and gray shales. The top of the Chinle is an erosional surface which also reflects deeper

structural movement and solution slumping. The Santa Rosa is about 250 feet thick and consists of fine to coarse sands.

The Triassic Chinle outcrops along the north side of Laguna Plata and in the Laguna Gatuna area. The Triassic south of the playa lakes gradually rises southward and southeastward. The Santa Rosa outcrops in the southern part of Section 30 and Section 32 of T. 20 S., R. 32 E. The Triassic also outcrops in several Townships in western Lea County and along the eastern side of Eddy County.

Along the north portion of the study area the Triassic strikes east-west and the dip is southward at a rate of approximately 50 feet per mile (figure 4). In the area of the saline playa lakes (Lagunas Plata, Tonto, Gatuna and Toston), the contours show closures from 25 to 50 feet. These closures suggest that the lakes are caused by salt dissolutioning in the Permian with subsequent slumping reflected in the overlying Triassic. San Simon Swale, approximately 15 miles southeast of the playa lakes is also a closed depression caused by the removal of salt by solution in the Permian-Salado strata.

HYDROLOGY

Potable ground water in the four township area is derived solely from the Quaternary alluvium and Triassic Santa Rosa Formation. Water wells in the vicinity of the Wallen Production Company operation are listed on Table 1 and shown on Figure 4. The Quaternary alluvium which is up to 100 feet thick contains water that is normally potable

except in the vicinity of the playa lakes (Tables 1 and 2). The saturated thickness varies from 0 to 30 feet. The alluvial water where potable is used for stock and domestic purposes. Recharge to this aquifer is derived principally from rainfall which averages 9 inches per year. The ground water movement in the alluvium is toward the playa lakes. Ground water within and near the playas is highly saline (Figure 5). We found no evidence of producible alluvial ground water (fresh or saline) in the area of the Wallen Production Company's oil operation in the south half of Section 30, T. 19 S., R. 33 E. Logs of nine cable tool holes on Sections 19 and 30 were checked for alluvial ground water and none indicated saturation above the Triassic.

The Triassic Chinle Formation generally is not a source of ground water because it consists predominantly of clays. The principal aquifer in the Triassic is the Santa Rosa Sandstone. The water quality in this aquifer is poor, usually having a high concentration of sulfates. The Santa Rosa water is used for industrial purposes such as drilling and gasoline plants and is used on a limited basis for stock.

The Santa Rosa aquifer lies at a depth of 300 to 600 feet and is over 200 feet thick. Porosity development in the sandstone is highly variable which results in a net productive sand thickness ranging from 30 to 100 feet. Reported yields from the Santa Rosa range up to 100 gallons per minute. This aquifer is under artesian pressure with a head of approximately 200 feet. Recharge to the Santa Rosa is from

drainage from the Ogallala aquifer to the north and from infiltration from the surface through sand dunes in eastern Eddy County. Ground water movement is toward the southeast along the structural dip.

Because of the poor quality local ground water, ranchers have access to fresh water transmission pipelines which deliver Ogallala water from the east to the potash mines.

One Santa Rosa sandstone well and one Santa Rosa-Chinle well are completed in the SW/4, NW/4 of Section 18, T. 19 S, R. 33 E. These wells, which have water levels 260 feet and 347 feet from the surface, are currently used for drilling rig supply. A sample from the northernmost of the two wells contains 312 milligrams per liter (mg/l) chlorides, 844 mg/l sulfates and total dissolved solids of 2,070 mg/l. An abandoned Santa Rosa well in the SE/4, SW/4 of Section 5, T. 20 S., R. 33 E. has a static water level of 281 feet from the surface. A water sample from this well contained 1,723 mg/l chlorides, 1,094 mg/l sulfates, and total dissolved solids of 4,744 mg/l. An old Santa Rosa well located in the NE/4, NW/4 of Section 18, on the northwest edge of the Laguna Gatuna Lake was examined in 1972. The static water level was 252 feet from the surface. A 1968 chemical analysis of water from this well shows 21,013 ppm chlorides and 3,895 ppm sulfates.

The water level data show that the Santa Rosa ground water movement is toward the southeast. In the vicinity of the saline playas, the Santa Rosa discharges into the Rustler through the collapse structures beneath the playas.

The ground water movement in the alluvium is toward the playas. The alluvial water discharges into the playas as seeps and springs on the playa shores.

CORE BORING

One core boring was completed during this study in the south-central part of the Wallen lease approximately 200 feet south of the current brine pit. This core boring was drilled to examine the alluvial saturation and the physical characteristics of the upper Triassic. A review of seismic test hole and cable tool data shows that the alluvium in this area is less than 50 feet thick. This conclusion is confirmed by the core boring. The boring was jetted after completion to test for the presence of ground water and no evidence of ground water was detected. Several days after completion, water had seeped into the boring. A sample of this water had 6,666 mg/l chlorides, which by calculation would indicate total dissolved solids over 10,000 mg/l.

Cores taken from the upper Chinle were analyzed for permeability and Atterburg Limits (Table 3). These tests show that the upper Chinle is very fine grained (over 70 percent finer than a 200 mesh sieve). The clays are virtually impervious to fluid migration. The permeability of the upper Chinle averages 9.7×10^{-9} cm/sec.

SUMMARY AND CONCLUSIONS

Two formations supply water to wells in the region; shallow

alluvium and the Triassic Santa Rosa. The alluvium in the vicinity of the Wallen lease is thin and contains no potable ground water. Ground water movement in the alluvium is toward the saline playas to the south where it discharges as seeps and springs in the playa margins. The Santa Rosa contains water which is slightly to moderately saline. The Santa Rosa is protected from vertical infiltration by a thick section of impervious Chinle clays.

Disposal of salt water at the surface will, in our opinion, not endanger fresh ground water supplies. The disposed salt water will enter the alluvium and migrate to the top of the Chinle and then southward along the top of the Chinle, to discharge into the saline playa lakes. The Chinle clays will prohibit migration of the brine into the underlying Santa Rosa aquifer.

Respectfully submitted,

ED L. REED & ASSOCIATES, INC.

Chester F. Skrabacz

Chester F. Skrabacz

V. Steve Reed

V. Steve Reed

TABLE 2

QUATERNARY WELLS WITH NON POTABLE WATER

LOCATION	OWNER	ELEV.	WATER LEVEL	TOTAL DEPTH	USE OF WELL	CHEMICAL ANALYSES (In Milligrams/Liter or Parts/Million) CHLORIDES	SULFATES	TOTAL DISSOLVED SOLIDS	ELECTRICAL CONDUCTIVITY	DATE OF ANALYSIS	SAMPLED BY
SW of SE/4 Sec 4 T20S R33E	Scarbauer Cattle Co.	3556'	33' 1968	58'	Abd. Stock	2,382 12,978	- 16,068	- -	10,175 -	11/17/65 10/24/68	State United Chem.
NW NW Sec 21 T20S R33E	-	3536'	35' 1981	52'	Abd. Stock	3,518	905	-	-	10/24/68	United Chem.
SE NW/4 Sec 12 T20S R32E	-	3540'	-	130'	Abd. Stock	9,744	1,878	-	-	1968	United Chem.
NE SW/4 Sec 1 T20S R32E	Salt Lake Rch.	3510'	21.7 1954	30'	Abd. Stock	Reported Salty - 1954 and Dry in 1972					State

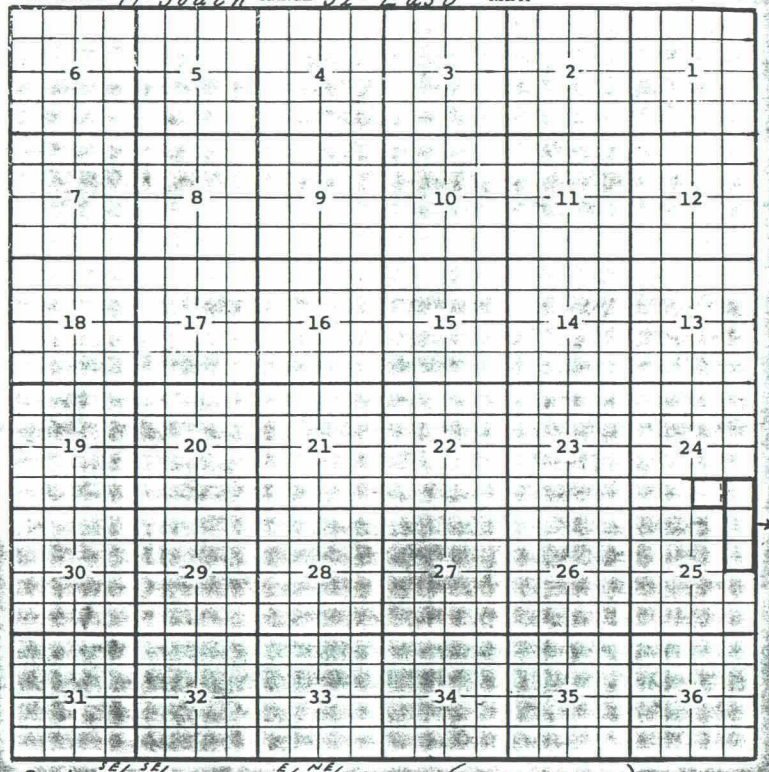
TABLE 1

QUATERNARY WELLS WITH POTABLE WATER

LOCATION	OWNER	ELEV.	WATER LEVEL	TOTAL DEPTH	USE OF WELL	CHEMICAL ANALYSIS (In Milligrams/Liter or Parts/Million) CHLORIDES	SULFATES	TOTAL DISSOLVED SOLIDS	ELECTRICAL CONDUCTIVITY	DATE OF ANALYSIS	SAMPLED BY
						In 1969(reported good quality water)					
NW/NW Sec 17 T19S R33E	Snyder Ranch	3650'	116' 1981	131'	Abd. Stock						
SE NE/4 Sec. 26 T19S R33E	Smith		90.9 1/78	100'	Active Domestic Stock	298 326	996	2134	2560 --	11/17/65 1/16/78	State Reed
SE SE/4 Sec. 23 T20S R32E	Old Halfway Bar	3551'	36.7' 1981	78'	Abd. Dom.	362	309	--	1861	1969	Reed
NW NW Sec 25 T20S R32E	Smith?	3555'	39 1982	65'	Stock	85 42	82 -	-- --	837 750	1969 9/72	Reed State
NE/4 Sec 36 T20S R32E	Bingham Ranch	3501'	44' 1972	50'	Domestic	290	-	--	1930	9/18/72	State
SW/4 Sec 23 T20S R32E	--	3541'	39.8 1981	--	Stock	No Data					
SE NW/4 Sec 27 T20S R32E	S. Frey	3540'	23.9 1972	25'	Industrial	No Data (Field check - fresh water)					
SE NW/4 Sec 30 T20S R32E	--	3505'	9.94 1954	--	Stock	No Data				5/12/82	Reed

COUNTY Lea POOL South Tonto x Yates - Seven Rivers

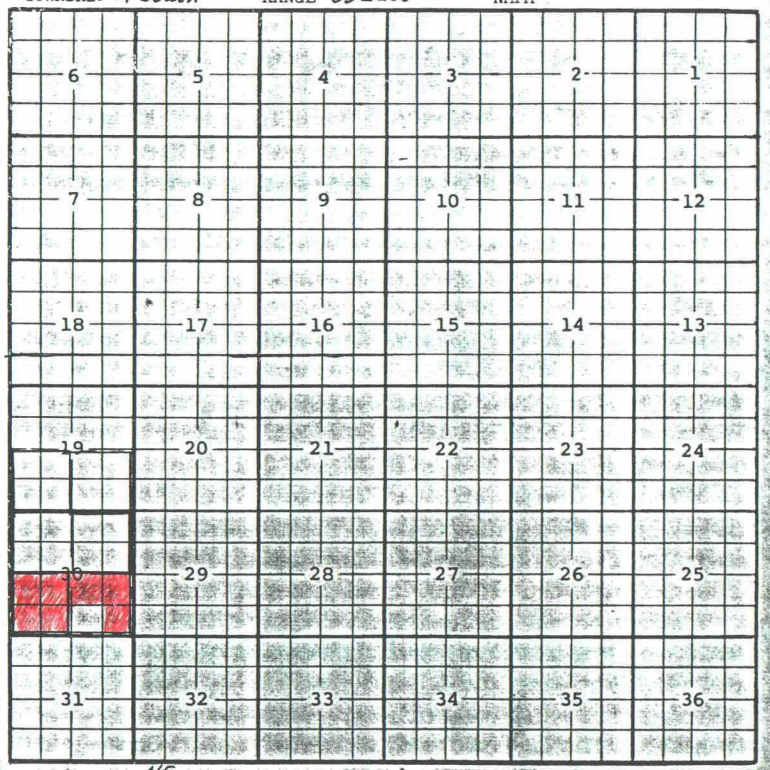
TOWNSHIP 19 South RANGE 32 East NMPM



Ext: SE/4 SE/4 Sec. 24; E/2 NE/4 Sec 25 (R-2427, 3-1-63)
SW/4 SE/4 Sec. 24 (R-2469, 5-1-63) Vertical limits extended to include Seven Rivers Formation (R-5361, 3-1-77)

COUNTY Lea POOL South Tonto x Yates - Seven Rivers

TOWNSHIP 19 South RANGE 33 East NMPM



Description: NE/4 Sec 30 (R-2047, 9-1-61)
Ext: NW/4 Sec 30 (R-2241, 6-1-62) - SW/4 Sec 19 (R-2620, 1-1-64)
Ext: SE/4 Sec 19 (R-5063, 7-1-75) Ext: SW/4 Sec 30, Vertical limits extended to include Seven Rivers Formation (R-5361, 3-1-77)
Ext: SE/4 Sec 30 (R-5609, 1-1-78)