CASE 6446: TAG-REDTERN OIL COMPANY SALT MATER DESPOSAL, LEA COUNTY, NEW MEXICO

CASE NO.

646

APPlication,
Transcripts,
Small Exhibits,

ETC.



STATE OF NEW MEXICO ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION

JERRY APODACA

NICK FRANKLIN SECRETARY

March 6, 1979

POST OFFICE BOX 2088 STATE LAND OFFICE BUILDING SANTA FE, NEW MEXICLL R7501 (505) 827-2434

6446 CASE NO. Mr. Jason Kellahin ORDER NO. R-5932 Kellahin & Kellahin Attorneys at Law Post Office Box 1769 Applicant: Santa Fe, New Mexico Flag-Redfern Oil Company

Dear Sir:

Enclosed herewith are two copies of the above-referenced Division order recently entered in the subject case.

Yours very truly, JOE D. Director

JDR/fd

Copy of order also sent to:

Hobbs OCC Artesia OCC Aztec OCC

Other

STATE OF NEW MEXICO ENERGY AND MINERALS DEPARTMENT OIL CONSERVATION DIVISION

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

> CASE NO. 6446 Order No. R-5932

APPLICATION OF FLAG-REDFERN OIL COMPANY FOR SALT WATER DISPOSAL, LEA COUNTY, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 9 a.m. on February 14, 1979, at Santa Fe, New Mexico, before Examiner Daniel S. Nutter.

NOW, on this 28th day of February, 1979, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

- (1) That due public notice having been given as required by law, the Division has jurisdictioned this cause and the subject matter thereof.
- (2) That the applicant, Flag-Medfern Oil Company, is the owner and operator of the Santa Fe Well No. 2, located in Unit D of Section 35, Township 10 South, Range 36 East, MEPM, Dickinson-San Andres Pool, Lea County, New Mexico.
- (3) That the applicant proposes to utilise said well to dispose of produced salt water into the San Andres formation, with injection into the perforated interval from approximately 4,969 fact to 4,984 feet.
- (4) That the injection should be accomplished through 2 3/8-inch plastic lined tubing installed in a packer set at approximately 4900 feet; that the casing-tubing annulus should be filled with an inert fluid; and that a pressure gauge or approved leak detection device should be attached to the annulus in order to determine leakage in the casing, tubing, or packer.

-2-Case No. 64-6 Order No. R-3932

- (5) That the injection well or system should be equipped with a pressure limiting switch or other acceptable device which will limit the wellhead pressure on the injection well to no more than 1308 psi.
- (6) That the operator should notify the supervisor of the Hobbs district office of the Division of the date and time of the installation of disposal equipment so that the same may be inspected.
- (7) That the operator should take all steps necessary to ensure that the injected water enters only the proposed injection interval and is not permitted to escare to other formations or onto the surface.
- (8) That approval of the subject application will prevent the drilling of unnecessary wells and otherwise prevent waste and protect correlative rights.

IT IS THEREFORE ORDERED:

(1) That the applicant, Flag-Redfern Oil Company, is hereby authorized to utilize its Santa Fe Well No. 2, located in Unit D of Section 35, Township 10 South, Range 36 East, NMPM, Dickinson-San Andres Pool, Lea County, New Mexico, to dispose of produced salt water into the San Andres formation, injection to be accomplished through 2 3/8-inch tubing installed in a packer set at approximately 4900 feet, with injection into the perforated interval from approximately 4,969 feet to 4,984 feet;

PROVIDED HOWEVER, that the tubing shall be plastic-lined; that the casing-tubing annulus shall be filled with an inert fluid; and that a pressure gauge shall be attached to the annulus or the annulus shall be equipped with an approved leak detection device in order to determine leakage in the casing, tubing, or packer.

- (2) That the injection well or system shall be aquipped with a pressure limiting switch or other acceptable device which will limit the wellhead pressure on the injection well to me more than 1308 psi.
- (3) That the operator shall notify the supervisor of the Hobbs district office of the Division of the date and time of the installation of disposal equipment so that the same may be inspected.

Case No. 6446 Order No. R-5932

- (4) That the operator shall immediately notify the supervisor of the Division's Hobbs district office of the failure of the tubing, casing, or packer, in said well or the leakage of water from or around said well and shall take such steps as may be timely and necessary to correct such failure or leakage.
- (5) That the applicant shall submit monthly reports of its disposal operations in accordance with Rules 704 and 11.20 of the Division Rules and Regulations.
- (6) That jurisdiction of this cause is retained for the entry of such further orders as the Division may deem necessary.

DCNE at Santa Pe, New Mexico, on the day and year hereinabove designated.

OIL CONSERVATION DIVISION

JOE D. RAMEY

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Dockets Nos. 7-79 and 8-79 are tentatively set for hearing on February 28 and March 14, 1979. Applications for hearing must be filed at least 22 days in advance of hearing date.

DOCKET: EXAMINER HEARING - WEDNESDAY - FEBRUARY 14, 1979

9 A.M. - OIL CONSERVATION DIVISION CONFERENCE ROOM, STATE LAND OFFICE BUILDING, SANIA FE, NEW MEXICO

The following cases will be heard before Daniel S. Nutter, Examiner, or Richard L. Stamets, Alternate Examiner:

- ALLOWABLE: (1) Consideration of the allowable production of gas for March, 1979. from fifteen prorated pools in Les, Eddy, and Chaves Counties, New Mexico.
 - (2) Consideration of the allowable production of gas for March, 1979, from four prorated pools in San Juan, Rio Arriba, and Sandova) Counties, New Mexico.
 - (3) Consideration of purchaser's mominations for the one year period beginning April 1, 1979, for both of the above areas.
- CASE 6445: In the matter of the hearing called by the 0il Conservation Division on its own motion to permit Consolidated Minerals Development Corporation, American Surety Company, and all other interested parties to appear and show cause they the Sarah "S" Well No. 1 located in Unit J of Section 26, Township 31 North, Range 23 East, Colfax County, New Mexico, should not be plugged and abandoned in accordance with a Division-approved plugging program.
- CASE 6446: Application of Flag-Redfern Oil Company for salt water disposal, lea County, New Mexico.

 Applicant, in the above-styled cause, seeks authority to dispose of produced salt water into the San Andres formation through the perforated interval from 4,969 feet to 4,984 feet in its Santa Fe Well No. 2 located in Unit D of Section 35, Township 10 South, Range 36 East, Dickinson-San Andres Pool, Lea County, New Mexico.
- CASE 6447: Application of Atlantic Richfield Company for approval of infill drilling and an unorthodox well location, Lea County, New Mexico. Applicant, in the above-styled cause, seeks a finding that the drilling of its J. R. Phillips "B" Well No. 6 to be located at an unorthodox location 990 feet from the North line and 1650 feet from the West line of Section 31, Township 19 South, Range 37 East, Eumont Gas Pool, Lea County, New Mexico, is necessary to effectively and efficiently drain that portion of the previously approved 160-acre non-standard proration unit which cannot be so drained by the existing unit well.
- CASE 6448: Application of Sam H. Snoddy for amendment of Order No. R-5521, Lea County, New Mexico.

 Applicant, in the above-styled cause, seeks the amendment of Order No. R-5521 to change the 160acre non-standard provation unit to a 320-acre non-standard provation unit comprising the SW/4 of
 Section 25 and the NW/4 of Section 36, both in Township 20 South, Range 32 East, South Salt Lake
 Field, Lea County, New Mexico.
- CASE 644: Application of The Superior Oil Company for downhole commingling, Eddy County, New Mexico.

 Applicant, in the above-styled cause, seeks approval for the downhole commingling of Strawn and Morrow production in the wellbore of its Ryan Com. Well No. 1 located in Unit D of Section 5, Township 23 South, Range 27 East, South Carlsbad Field, Eddy County, New Mexico.
- CASE 6450: Application of Sun Oil Company for a unit agreement, Eddy County, New Mexico Applicant, in the above-styled cause, seeks approval for its East Millman 2001 Unit Area comprising 920 acres, more or less, of Federal and state lands in Township 19 South, Range 28 East, Eddy County, New Mexico.
- CASE 6451: Application of Burleson & Huff for approval of infill drilling and an unorthodox well location, Lea County, New Mexico. Applicant, in the above-styled cause, seeks a finding that the drilling of its Coll A Well No. 2 to be located at an unorthodox location 1980 feet from the North line and 330 feet from the East line of Section 29, Township 25 South, Range 37 East, Jalmat Gas Pool, Lea County, New Mexico, is necessary to effectively and efficiently drain that portion of the previously approved 160-acre non-standard proration unit which cannot be so drained by the existing unit well.
- CASE 6452: Application of Burleson & Huff for approval of infill drilling, Lea County, " Mexico.

 Applicant, in the above-styled cause, seeks a finding that the recompletion of its Harrison Well

 No. 2 located in Unit N or, in the alternative, the drilling of its Harrison Well No. 4 to be located
 in Unit L, both in Section 25, Township 24 South, Range 36 East, Jalmat Gas Pool, Les County, New

 Mexico, is necessary to effectively and efficiently drain that perties of the previously approved
 160-acre non-standard provation unit which cannot be so drained by the existing unit well.
- CASE 6453: Application of Moranco for downhole commingling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the downhole commingling of Blinebry and Drinkard production in the wellbore of its EM Eiliott Well No. 1 located in Unit E of Section 35, Township 21 South, Range 37 East, Lea County, New Mexico.

STATE OF NEW MEXICO ENERGY AND MINERALS DEPARTMENT OIL CONSERVATION DIVISION State Land Office Building Santa Fe, New Mexico 14 February 1979

EXAMINER HEARING

IN THE MATTER OF:

Application of Flag-Redfern Oil Company for salt water disposal, Lea County, New

CASE 5446

BEFORE: Daniel S. Nutter

TRANSCRIPT OF HEARING

APPEARANCES

For the Oil Conservation Division:

Lynn Teschendorf, Esq. Legal Counsel for the Division State Land Office Bldg. Santa Fe, New Mexico 87503

For the Applicant:

Jason Kellahin, Esq. KELLAHIN & KELLAHIN 500 Don Gaspar Santa Fe, New Mexico 87501

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INDEX

STEVE ROSSLER Direct Examination by Mr. Kellahin Cross Examination by Mr. Nutter EXHIBITS

Applicant Exhibit One, C-108 Applicant Exhibit Two, Log

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MR. NUTTER: Call next Case 6446.

MS. TESCHENDORF: Case 6446. Application of Flag-Redfern Oil Company for salt water disposal, Lea County, New Mexico.

MR. KELLAHIN: If the Examiner please, Jason Kellahin, appearing on behalf of the applicant. We have one witness to be sworn.

(Witness sworn.)

STEVE ROSSLER

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Would you state your name, please?

A. My name is Steve Rossler. I'm employed by Flag-Redfern Oil Company in Midland, Texas, as a petroleum engineer.

A. Yes, sir, I have.

Q And your qualifications are a matter of record?

A Yes, sir.

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MR. KELLAHIN: Are the witness' qualification acceptable, Mr. Nutter?

MR. NUTTER: Yes, they are.

- (Mr. Kellahin continuing.) Mr. Rossler, are you familiar with the application of Flag-Redfern in Case Number 5446?
 - A. Yes, sir, I am.
 - What does the applicant propose in this case?
- We propose to apply for a permit for salt water disposal in our Dickinson-San Andres Field, Lea County New Mexico.
- And would you give the location of the subject well?
- Okay. The subject well is located in Unit D, 660 feet from the north line, 660 feet from the west line, Section 35, Township 10 South, Range 36 East, Lea County, New Mexico.
- Now, you are referring at the moment to what has been marked as Flag-Redfern's Exhibit Number One, is that correct?
 - That is correct. It's on page two.
 - What other information is shown on that?
- Okay. Other information shown on page two, which is the application to dispose, or New Mexico Form C-108, also shows all the casing strings in the well, cemen

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calculated tops of cement and circulated cops of cement, my proposed injection zone, top of the formation, current perforations, squeezed off perforations, my anticipated injection volume of salt water, minimum/maximum, my approximate pressure. There is a discrepancy in this 1308 figure, which I will wish to talk about as we progress. And then, of course, the offset operators and the surface owner notification.

So the offset operators have all been notified in this case, is that correct?

Yes, sir, that's correct. The offset operators have been notified and on page nine through eleven I've got three waivers from Reed and Stevens, Stevens, Incorporated, from Lawrence C. Harris, and also from MGF Oil Corporation.

And those are the offset operators, are they · not?

- Yes, sir, that is correct.
- Now, referring to page three of your Exhibit Number One, would you identify that exhibit?
- Okay, page three of the exhibit is just a sheet of pertinent information regarding the application. Of course my the San Andres. I wish to dispose of produced San Andres water through the current perforations which are listed, 4969 to 84. I again repeat,

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my maximum and minimum barrels of disposable fluid per day, and I also list the wells that will be tied into this system, which will consist of five wells. Two wells will be operated by Flag-Redfern Oil Company; the remaining three by Reed and Stevens.

Q. Now what's the status of those wells at the present time?

A At the present time Flag-Redfern Oil Company wells, both are producing, No. 1 and 3. On the Reed and Stevens, Incorporated, they have the one well, the Santa Fe No. 4, which is currently producing and has an allowable. Their other two wells, consisting of the Fawn Cherry No. 1 and the Santa Fe No. 5, these wells are listed as having a temporary completion with suspended operation.

Mow, it is my understanding from talking with Reed and Stevens that these wells will be completed. Right now they are evaluating their completions due to the high water production they have from both wells. It's my firm understanding there that they're waiting to see if they have an economical way to get rid of their disposal water before they complete these two wells.

Q What's currently being done with the produced water?

A The produced water is currently being hauled by commercial sources there to approved brine stations

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there at a cost of \$.95 a barrel.

Now referring to what has been marked as Exhibit Number -- as page number four of Exhibit One, would you identify that?

Page number four is a report of water analysis from the proposed disposal well, the Santa Fe No. 2, and let me emphasize that this water analysis was taken one day after the initial stimulation job on the well, so therefore it shows slight remnants of the acid job performed on the well.

I have page five, which is a current water analysis of the San Andres water from all three wells. This was taken from a stock tank, from the water -- water storage tank, excuse me.

This is the produced water from the subject wells, is this --

- Yes, sir, that is correct.
- Now, page six, what does that show?
- Page six is an area plat showing the proposed disposal well, and all wells within one-half mile radius, and also a two-mile radius.

There are five walls within one-half mile radius, including the disposal well.

Then referring to pages -- page seven, would you identify that for me?

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Page seven is a proposed well profile of the disposal well. It shows all casing strings, cement. It also shows the proposed disposal string, which is 2-3/8ths internally plastic-coated tubing with a Baker Lokset packer, a packer designed to hold pressure from either direction. It shows the depth on the packer setting and also the currently open perforations there.

We do not propose to open up any more zones in this well for disposal.

Now will you inject -- you say it's internally coated tubing set in a packer. Will the annulus be filled with an inert fluid?

The annulus will be filled with an inert fluid. There will also be a pressure gauge on the annulvz, 2-3/8ths by 4-1/2 annulus there, so that packer leakage or tubing holes, holes in tubing, can be noticed quickly.

In your opinion will this well as it is presently completed fully protect any producing lones or fresh water zones?

Yes, sir, I believe it will fully protect those.

Now referring to page eight of the Exhibit One, would you identify that, please?

Page eight is a location plat of the proposed Notice that it says operator, Hanson Oil Corporation.

1000) 411-4403 1000) 411-4403 They applied for the permit but the well was drilled by Flag-Redfern Oil Company once Flag-Redfern Oil Company took over operation; of this Santa Fe lease.

- Q You've already testified as to pages nine, ten, and eleven, as being waivers from the offset operators.
 - A. That is correct.
- Q Referring to page twelve of the Exhibit, would you discuss the information shown on that?

A. Page twelve is the tabular summary of all wells within one-half mile radius of the proposed salt water disposal well. It gives their locations, their total depths, their producing formation and interval. Incidentally, all wells are producing or have completion in the San Andres formation only.

I also show surface casing and cement, production casing and cement, and multi-stage cement jobs.

That consists of page twelve and it continues to page thirteen.

Also I've included the Reed and Stevens
Santa Fe Well No. 4, which is over one-half mile from the
proposed disposal well but it's -- I consider it to be an
integral part of the disposal-affected area.

Now in your opinion will the casing and cementing program on the offsetting wells protect the producing zones and fresh water zones and prohibit any migration

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of fluids into those zones?

- A. Of the --
- Q Could you have a breakthrough as a result of injection, is what I'm saying'r
- A As a result of the injection we should not have a breakthrough in the San Andres zone there. All fluids should be contained to the San Andres zone.
- Q Is there any possibility of migration upward from the wellbores of these offsetting wells as they are completed?
- mention there, which I'm sure the Examiner can see by reading on the two wells by Reed and Stevens there, they have DV tools set in their casing strings but they did not have cement from those DV tools to the surface there, and until they are sure they're going to make a completion there, they're going to leave the DV -- not DV's, it's a multistage cement tool uncemented there.

MR. NUTTER: Well, that's on the two wells, the No. 1 and 5, they do -- they have two-staged a couple of the other wells, though, haven't they?

A. Yes, sir. Their completion, they have second-staged it and they have protected all zones from the Rustler anhydrite to the surface, so fresh water will be protected there.

Now, in the event these --

MR. NUTTER: And you've two-staged your Santa Fe No. 3, apparently, too.

Yes, sir. At the time, apparently when the regulations were changed there to include protection from the Rustler anhydrite to the surface is when we applied and drilled for this Well No. 3, and that's -- that's the reason for that well being circulated to the surface.

MR. NUTTER: I just noticed that the subject well, as well as the Flag-Redfern No. 1, do not have any cement across the salt.

> That is correct. MR. NUTTER: Okay, go ahead.

(Mr. Kellahin continuing.) Now, turning to Q page fourteen on the Exhibit, would you discuss the information on that, please?

Page fourteen is a fracture gradient table which was prepared from the results of initial stimulation of all six wells in the immediate area.

Now, I'm listing the wells, the top perforations in the San Andres, date of stimulation, surface pressure required to break formation. Now this is the pressure with acid on the formation face that the zone finally accepts the fluid. The job was done and the next column, instant shut-in pressure was the minute the pumps were shut

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SALLY WALTON BO CHIPPE SHORTH, IS RETO 9110 Than Blance (21), 111. Brink Pt. You Widoo 11 down there; this gives an instant shut-in pressure, which by using this figure there and being able to calculate the hydrostatic head of the fluid in the tubing, I'm able to come up with a formation fracture pressure, next column.

I've listed this for each of the six wells.

The next column is the formation fracture gradient, which is nothing more than the fracture pressure divided by the depth to the top of the perforation in psi per foot.

Okay, my next column, assuming that I have

San Andres disposal water in my tubing instead of the two

percent KCL water and/or oil, as was displaced in the acid

jobs on the wells, my calculated surface shut-in pressure

for each well is listed, starting from the disposal well at

1100 -- I'm sorry, 1,116 to 2214. This is the pressure that

I will have on the surface there for a column of produced

San Andres salt water in the tubing before I breakdown -
before I fracture the San Andres formation.

The next column is the surface shut-in gradier that this pressure on the surface will yield.

What I've done, I've taken a field average, including the five wells within the one-half mile area. I have left out the sixth well, Santa Fe Well No. 4, because not only -- it's out of the half-mile radius, but also it has a much higher formation fracture pressure than any of

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the other wells.

I've taken this field average to -- which calculates out that my formation fracture pressure average for the half-mile area is 4,027 pounds; formation fracture pressure of .813 psi per foot, which means for an average well before the formation is fractured under static shut-in pressure conditions I will have 1550 pount the tubing. That would give me a surface shut-in grad)

The next item is I go back to the disposal well because the depth is different than the average depth to the top of the Sar Andres in the field, and I've taken the same formation fracture pressure, 4,027, and I've come up with, under static conditions, before the San Andres formation is fractured, with a full load of San Andres water in my tubing, I have shut-in tubing pressure of 1547 psig, which gives me a gradient of .311 psi per foot, which in my understanding is over what is allowed without a hearing in New Mexico.

Now, page fifteen covers the information you've just discussed, does it not?

- Yes, it does.
- Do you have anything to add to that?
- No, sir.
- Now turning to page sixteen of the Exhibit, would you discuss that information, please?

SALLY WALTON BOYD
STRINGS SHORTHAND REPORTER
188 Place Blance (616) 471 4483
State Fe, Now Mexico 8181

A. Page sixteen is my friction table. What I'm showing on this table is, on the very lefthand column my injection rate in barrels per minute, I list rates from 1/4 barrel a minute to 1-3/4 barrels per minute.

The next three columns are calculations and variables, which I'll explain on the next page, to arrive at my last column on the extreme right, which is my friction pressure that will be incurred under the various disposal rates listed that they correspond to.

In other words, what I'm saying there, is
I'm going to have six pounds pressure there at the surface
when I'm disposing of 1/4 barrel a minute, and I'll have
an extra 223 pounds at the surface if my disposal rate is
1-3/4 barrels per minute.

This friction pressure has nothing to do with bottom hole formation pressure there. It's energy loss there and therefore I've calculated out to show that with an increase in surface injection pressure, by this friction pressure I don't modify the formation pressure at all.

Now, page seventeen-A, would you discuss that information? Is that just an explanation of how you arrived at the figures on page sixteen?

A Yes, sir. Page seventeen-A, I'm showing how I calculated my friction losses, using the Fanning

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friction equation, which is listed, and also I calculated Reynolds numbers for each disposal rate there. I list my reference, and these two calculations are the third and the fourth columns listed on page sixteen.

Seventeen-B is the friction curve there that
I used applying my Fanning friction factors in my reference.

Q. And that is the source of your tabulation on page sixteen?

A. Yes, sir, that is correct.

Q Now turn to page eighteen, would you identify that, please?

A. Page eighteen is my calculated surface injection pressure. This is really one of my -- this is really
the whole gist of the application. This is what I'm asking
for.

I've listed my injection rates in barrels

per minute. It ranges from 1/4 to 1-3/4 barrels per minute.

The next column is my calculated friction pressure, which we just previously talked about.

The next column is my calculated instant shut-in surface pressure, which comes from my fracture gradient table on page fourteen.

The last column is my calculated surface injection pressure in psig. This table shows the various disposal rates, what my wellhead -- what my disposal well-

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head pressure should be before the San Andres formation is fractured.

Q This is your surface pressure, is that correct?

A This is my surface pressure. That is correct.

Now, what surface pressure do you anticipate using in this particular well, or do you want to reserve that until later?

A. I will make just a few comments on it. This well has produced 60,000 barrels total fluid. Of that, 58,000 is water. Now, when disposal operations are started there, I don't anticipate even having to dispose at 1000 pounds, due to the void in the formation, but as I start filling the void left from the production of the well there, my pressures will start to climb there, and the reason I'm asking for these pressures here, these are — these are the maximum pressures that I think should ever be imposed upon the well before — maximum pressures; otherwise, I fracture the San Andres formation there.

To ask for a lower pressure at this time as have to come back six months later and ask for another increase in pressure would require another hearing, so I'm asking for the complete pressure now.

Now, you're talking about disposing of 50 to

SALIY WALT CERTIFIED BEORTH 3/15 0 Plant Plant Bestin Po, Now B

SALLY WALTON BO CHRITTIN SHORTHURD REPORT 1914 Plans Report 114 Seets 114, Now Morton 173 100 barrels of water per day. Why do you need that excessive -- higher rate of pressure; not excessive?

A I need the higher rate of disposal in barrels per minute due to the fact that this field is not under electrification, so my disposal pump will be run by natural gas engine and I propose to dispose of my fluid during the three hours that my pumper for the lease is there, so that he can see any problems with the system, or leaks, or anything else there. The system will not be automated, so therefore I propose to dispose of my fluid in a short period of time.

I will have a kill switch attached to this gas engine there that will be operated off of high pressure there, which will limit my wellhead pressure and also, of course, low tank level, low tank level fluids.

Q Then in the operation of this lease you'll accumulate the produced water in tanks and then dispose of it on a daily basis for a short period of time. Is this what you're saying?

A Yes, sir, that is correct.

Q It will just be an intermittent injection and not the regular straight injection?

A No, sir, it will not be a steady injection as in waterflood.

Q. And in your opinion, as I understand your

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testimony, the surface pressures which you're proposing to use will not fracture the formation?

- A They will not fracture the formation.
- Now turning to page nineteen of your Exhibit, will you discuss that information, please?
- A Page nineteen is the structure map contoured on the top of the PI zone, San Andres PI zone, for the Dickinson Field.

The PI zone is a marker that's approximately
170 feet above the San Andres porosity.

- Q Page twenty of the exhibit?
- A. Page twenty is a north-south cross section for the Dickinson-San Andres Field. Opening up the cross section, you'll see by the index map where the line of section goes. The disposal well is the second from the left, and on this cross section I am showing top of the San Andres PI zone, which I described on the structure map, and also the top of the San Andres porosity, which the wells are completed in, the top of their completions.
- Q Now Exhibit Number 21, would you identify that exhibit?
- A Exhibit 21 is a west-east cross section for this same field, showing the same data. The disposal well is the first log, first well on the left.

I'm sorry, it's the center.

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Q Okay. Now referring to Exhibit Number 22, would you identify that exhibit, please?

A Exhibit 22 is a production history of Flag-Redfern Oil Company's Santa Fe lease from the time the first well was drilled up until January of '79. It shows barrels of oil, Mcf of gas, barrels of water.

- Q And Exhibit 23, page twenty-three?
- A. Exhibit page 23 is production histof for the proposed disposal well, the Santa Fe Well No. 2. It shows the same data, oil production, gas production, and water production.
 - Q And page twenty-four?
- A. Page twenty-four is a graph of the production history of the Santa Fe lease. It's just -- it's a graph of page twenty-two.
 - 0 And then page twenty-five?
- A Twenty-five is a graph of the production of the proposed disposal well, showing the same information described on page twenty-three.
- Now, referring to page twenty-six of the Exhibit, and subsequent pages, what are they designed to show?
- A Page twenty-six through page thirty-one, while is the last of my exhibit, show the treating reports there for the initial stimulation of the wells in a 1/2-mile circle.

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Let me note that I had the actual report on Flag-Redfern's wells, wells which is on 26, 27, 28. The Reed and Stevens wells, the only report I have is on their daily drilling report.

with my instant shut-in -- where I took my instant shut-in pressures there to calculate my fracture, formation fracture table.

- And they are your supporting data for your fracture information and pressure information?
 - A Yes, sir, that is correct.
- Now, in your opinion, Mr. Rossler, will the approval of this application result in the production of oil that would not otherwise be recovered?
- A There is a good possibility that this salt water disposal project, while it's being applied for as a disposal well, is actually a pilot waterflood, because it is disposing of water into the same zone that the surrounding wells produce from, so I do expect, if nothing is fractured, to see a reasonable response from my disposal operation.
- 9 But if you have to continue trucking water at \$.90 a barrel, would that cause premature abandonment of this lease?
- A. Yes, sir, that is definitely correct there.

 That is what's keeping Reed and Stevens right now from pro-

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ducing their wells.

Q Now, if -- is it a practical solution to set up some kind of injection system that operated full time at lower pressures?

A At this time it would not be practical to set up such a system there due to the fact there that we need to bring electricity on the lease there and we're -- we're only applying for one well now and unless future conditions change, we'll just have one disposal well in the field. I think at this time it would be unwise there to try to actually waterflood this formation with a strict adherence to constant injection rates.

Q Now, turning to what has been marked as Exhibit Number Two, would you identify that exhibit?

A Exhibit Number Two is a log of the proposed disposal well, the Santa Fe No. 2. I have the perforations marked on the small scale, 1-inch scale, and the perforations marked on the detailed 5-inch scale.

These are perforations that are currently open in the well and these are perforations we propose to dispose through.

Q Were Exhibits One and two prepared by you or under your supervision?

A. Yes, sir, they were.

MR. KELLAHIN: At this time I'll offer Ex-

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hibits One and Two.

MR. NUTTER: Applicant's Exhibits One and Two will be admitted in evidence.

Q Do you have anything to add, Mr. Rossler?

A Just on -- with the enclosed packet on your left the first page is just describing the docket. The second page is the whole -- a short summary of the entire application there. It's reiterating there that I'm asking for a surface injection pressure of .311 psi per foot.

And it's also showing my range of disposal rates and pressure.

Q But your present request is for pressure gradient of .311.

A Yes, sir, that is correct, surface injection pressure gradient.

MR. KELLAHIN: That's all we have, Mr. Nutter.

CROSS EXAMINATION

BY MR. NUTTER:

of your Exhibit Number One, I don't understand the bottom.

line here. We know that the actual formation fracture pressure in this Santa Pe No. 2 is 3596. Now how do you arrive at the 4027 down at the bottom?

A Okay, how I arrived here, I've taken each of

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the wells in the area there and based on the formula on the next page there, and from their instant shut-in pressures from the initial stimulation, which is when I'm going to get the best data that I'm going to get on that well I determined that, yes.

- Okay, you've got instantaneous shut-ins on all of the wells.
 - A. Yes, sir.
- And you have calculated the formation fracture pressure on all the wells.
 - Yes, sir.
 - But you average it and come out with 4027.
 - Yes, sir. That's for the
 - Now --
- That's for the -- that's my average with all five wells taken together there.
- I understand that. Okay, then you come over to your next column, which is the .813. Now I'm reading the second line from the bottom.
 - Oh, okay, yes, sir.
- Excluding the Santa Fe Well No. 4, your average is .813 for the gradient, is that correct?
 - Right. Yes, sir, that's correct.
- Now what is this next line down here, this .810, how is that derived?

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Okay, how that's derived, the last line, my disposal well, the depth to the top of the San Andres perforations is lower than the average depth to the top of the perforations for the other five wells; therefore, when you divide the formation fracture pressure 4027 by 4969, you get .810.

In other words, you're taking the -- you're taking the average formation fracture pressure and then decreasing that average because your injection well is less than average.

Well, I'm decreasing it there just due to the fact of the 17 foot difference --

Uh-huh.

-- in the top of the disposal zone in the proposed well, San Andres,

Now, isn't it a fact, however, that of these six wells that we've got in the pool, the formation fracture pressure in the subject well is the smallest of all? It's the lowest of all;

That is correct.

And isn't that where the injection is going to take place?

That is correct, yes, sir.

Shouldn't we be looking at the formation in the vicinity of the injection well rather than looking at

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 the formation in the vicinity of a well that's a mile away?

A. Yes, sir. Initially that area around the well is the only well that will be affected, but as the disposal progresses there, in years there, assuming no fracture around the wellbore of this Santa Fe No. 2, this disposal front is going to start influencing on the other wells of the field there.

Q How can we be sure that there will be no fracturing if we're going to exceed the fracture pressure at the wellbore?

A Okay, at the wellbore, as I believe I commented on earlier, it won't -- we're not looking at even 1500 pounds there initially when we start off disposing there at less pressure.

Q Mr. Rossler, have you taken the figures that you've obtained here for the top line, being the fracture pressure and the gradient and the calculated shut-in pressure and the shut-in gradient for the Santa Fe No. 2 and gone through all of these formulas that you've got on pages sixteen through -- fifteen through eighteen, I guess it is, and come up with a calculated surface pressure for the injection well only?

A. Yes, sir, I'm sorry I didn't come back to it; that's on page two, which is the Form C-108, which is 1308 psi.

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So that's where that 1303 came from.

A. Yes, sir, that's -- that's the discrepancy right there.

- And that calculates the --
- A. That will include the friction.
- A Does that include the friction?
- A It includes friction, yes, sir.
- So instead of having 1771, I think it was, we'd have 1308 for the injection well itself.
 - A For the injection well itself, yes, sir.
- And you're anticipating a necessity for going up to the 1771 because you'll be disposing of 101 barrels of water in approximately three hours rather than on a 24-hour basis?

A Mr. Examiner, 1-3/4 barrels a minute will be the maximum rate that will ever be disposed down that well.

0 How much water could you get in at 1771 at 1-3/4 barrels per minute in three hours?

A You'll get all the water in there before an hour's gone, a 100 barrels.

Within ah hour?

A Yes, sir. Why I've looked at these varying disposal rates ranging from a quarter to one and three-quarter there, we don't have as of yet purchased a disposal pump there and I'm trying to leave myself enough leeway.

--

I'm estimating there that we're going to be disposing between one and one and a quarter barrels a minute, is what I'm estimating there.

MR. NUTTER: Are there any further questions of Mr. Rossler? He may be excused.

Do you have anything further, Mr. Kellahin?

MR. KELLAHIN: That's all we have, Mr.

Nutter. Thank you.

MR. NUTTER: Does anyone have anything they wish to offer in Case Number 6446?

We'll take the case under advisement.
(Hearing concluded.)

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REPORTER'S CERTIFICATE

I, SALLY W. BOYD, a Court Reporter, DO HEREBY CERTIFY that the attached and foregoing Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability, skill, and knowledge, from my notes taken at the time of the hearing.

Sally W. Boyd, C.S.R.

I do hereby certify that the foregoing is a complete re the Examinar Examiner Oil Conservation Division

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STATE OF NEW MEXICO ENERGY AND MINERALS DEPARTMENT OIL CONSERVATION DIVISION State Land Office Building Santa Fe, New Maxico 14 February 1979

EXAMINER HEARING

IN THE MATTER OF:

Application of Flag-Redfern Oil Company for salt water disposal, Lea County, New Mexico.

CASE 6446

BEFORE: Daniel S. Nutter

TRANSCRIPT OF HEARING

APPEARANCES

For the Oil Conservation Division:

Lynn Teschendorf, Esq. Legal Counsel for the Division State Land Office Bldg. Santa Pe, New Mexico 87503

For the Applicant:

Jason Kellahin, Esq. KELLAHIN & KELLAHIN 500 Don Gaspar Santa Pe, New Mexico 87563

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STEVE ROSSLER

Direct Examination by Mr. Kellahin 3

Cross Examination by Mr. Nutter 22

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EXHIBITS

Applicant Exhibit Two, Log 22

Applicant Exhibit Two, Log 22

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MR. NUTTER: Call next Case 6446.

MS. TESCHENDORF: Case 6446. Application of Flag-Redfern Oil Company for salt water disposal, Lea County, New Mexico.

MR. KELLAHIN: If the Examiner please, Jason Kellahin, appearing on behalf of the applicant. We have one witness to be sworn.

(Witness sworn.)

STEVE ROSSLER

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

- Q Would you state your name, please?
- A. My name is Steve Rossler. I'm employed by Flag-Redfern Oil Company in Midland, Texas, as a petroleum engineer.
- O Have you ever testified before the Oil

 Conservation Division or one of its examiners, Mr. Rossier?
 - A Yes, sir, I have.
- And your qualifications are a matter of record?
 - A Yes, sir.

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MR. KELLAHIN: Are the witness' qualification acceptable, Mr. Nutter?

MR. NUTTER: Yer, they are.

(Mr. Kellanin continuing.) Mr. Rossler, are you familiar with the application of Flag-Redfern in Case Number 6446?

- Yes, sir, I am.
- What does the applicant propose in this case?
- We propose to apply for a permit for salt water disposal in our Dickinson-San Andres Field, Lea County New Mexico.
- And would you give the location of the subject well?
- Okay. The subject well is located in Unit D, 660 feet from the north line, 660 feet from the west line, Section 35, Township 10 South, Range 36 East, Lea County, New Mexico.
- Now, you are referring at the moment to ... what has been marked as Flag-Redfern's Exhibit Number One, is that correct?
 - That is correct. It's on page two.
 - What other information is shown on that?
- Okay. Other information shown on page two, which is the application to dispose, or New Mexico Form C-108, also shows all the casing strings in the well, cement,

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calculated tops of cement and circulated tops of cement, my proposed injection zone, top of the formation, current perforations, squeezed off perforations, my anticipated injection volume of salt water, minimum/maxi.mum, my approximate pressure. There is a discrepancy in this 1308 figure, which I will wish to talk about as we progress. And then, of course, the offset operators and the surface owner notification.

So the offset operators have all been notified in this case, is that correct?

Yes, sir, that's correct. The offset operators have been notified and on page nine through eleven I've got three waivers from Reed and Stevens, Stevens, Incorporated, from Lawrence C. Harris, and also from MGP Oil Corporation.

And those are the offeet operators, are they not?

Yes, sir, that is correct.

Now, referring to page three of your Exhibit Number One, would you identify that exhibit?

Okay, page three of the exhibit is just a sheet of pertinent information regarding the application. Of course my disposal cone is in the San Andres. I wish to dispose of produced San Andres water through the current perforations which are listed, 4969 to 84. I again repeat,

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my maximum and minimum barrels of disposable fluid per day, and I also list the wells that will be tied into this system, which will consist of five wells. Two wells will be operated by Flag-Redfern Oil Company; the remaining three by Reed and Stevens.

Q Now what's the status of those wells at the present time?

At the present time Flag-Redfern Oil Company wells, both are producing, No. 1 and 3. On the Reed and Stevens, Incorporated, they have the one well, the Santa Fe No. 4, which is currently producing and has an allowable. Their other two wells, consisting of the Fawn Cherry No. 1 and the Santa Fe No. 5, these wells are listed as having a temporary completion with suspended operation.

Now, it is my understanding from talking with Reed and Stevens that these wells will be completed. Right now they are evaluating their completions due to the high water production they have from both wells. It's my firm understanding there that they're waiting to see if they have an economical way to get rid of their isposal water before they complete these two wells.

Q What's currently being done with the produced water?

The produced water is currently being hauled by commercial sources there to approved brine stations

there at a cost of \$.95 a barrel.

Now referring to what has been marked as Exhibit Number -- as page number four of Exhibit One, would you identify that?

Page number four is a report of water analysis from the proposed disposal well, the Santa Fe No. 2, and let me emphasize that this water analysis was taken one day after the initial stimulation job on the well, so therefore it shows slight remnants of the acid job performed on the well.

I have page five, which is a current water analysis of the San Andres water from all three wells. This was taken from a stock tank, from the water -- water storage tank, excuse me.

This is the produced water from the subject wells, is this --

- Yes, sir, that is correct.
- Now, page six, what does that show?
- Page six is an area plat showing the proposed disposal well, and all wells within one-half mile radius, and also a two-mile radius.

There are five wells within one-half rile radius, including the disposal well.

Then referring to pages -- page seven, would you identify that for me?

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SALLY WALTON BOY CHITTED SHORTHAME REPORT 1910 Plan Blaim 6415 471 -Best Pt, New Marker 1711 A Page seven is a proposed well profile of the disposal well. It shows all casing strings, cement. It also shows the proposed disposal string, which is 2-3/8ths internally plastic-coated tubing with a Baker Lokset packer, a packer designed to hold pressure from either direction. It shows the depth on the packer setting and also the currently open perforations there.

We do not propose to open up any more zones in this well for disposal.

Now will you inject -- you say it's internally coated tubing set in a packer. Will the annulus be filled with an inert fluid?

A The annulus will be filled with an inert fluid. There will also be a pressure gauge on the annulus, 2-3/8ths by 4-1/2 annulus there, so that packer leakage or tubing holes, holes in tubing, can be noticed quickly.

Q In your opinion will this well as it is presently completed fully protect any producing zones or fresh water zones?

A Yes, sir, I believe it will fully protect those.

Q Now referring to page eight of the Exhibit
One, would you identify that, please?

A Page eight is a location plat of the proposed well. Notice that it says operator, Hanson Oil Corporation.

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They applied for the permit but the well was drilled by Flag-Redfern Oil Company once Flag-Redfern Oil Company took over operations of this Santa Fe lease.

- Q. You've already testified as to pages nine, ten, and eleven, as being waivers from the offset operators.
 - A That is correct.
- Q Referring to page twelve of the Exhibit, would you discuss the information shown on that?
- A Page twelve is the tabular summary of all wells within one-half mile radius of the proposed salt water disposal well. It gives their locations, their total depth their producing formation and interval. Incidentally, all wells are producing or have completion in the San Andres formation only.

I also show surface casing and cement, production casing and cement, and multi-stage cement jobs.

That consists of page twelve and it continues to page thirteen.

Also I've included the Reed and Stevens
Santa Fe Well No. 4, which is over one-half mile from the
proposed disposal well but it's -- I consider it to be an
integral part of the disposal-affected area.

Q Now in your opinion will the casing and cementing program on the offsetting wells protect the producing zones and fresh water zones and prohibit any migration

of fluids into those zones?

A Of the --

Q Could you have a breakthrough as a result of injection, is what I'm saying?

A As a result of the injection we should not have a breakthrough in the San Andres zone there. All fluids should be contained to the San Andres zone.

Is there any possibility of migration upward from the wellbores of these offsetting wells as they are completed?

mention there, which I'm sure the Examiner can see by reading on the two wells by Reed and Stevens there, they have DV tools set in their casing strings but they did not have cement from those DV tools to the surface there, and until they are sure they're going to make a completion there, they're going to leave the DV -- not DV's, it's a multistage cement tool uncemented there.

MR. NUTTER: Well, that's on the two wells, the No. 1 and 5, they do -- they have two-staged a couple of the other wells, though, haven't they?

Yes, sir. Their completion, they have second-staged it and they have protected all zones from the Rustler anhydrite to the surface, so fresh water will be protected there.

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Q Now, in the event these --

MR. NUTTER: And you've two-staged your Santa Fe No. 3, apparently, too.

Yes, sir. At the time, apparently when the regulations were changed there to include protection from the Rustler anhydrite to the surface is when we applied and drilled for this Well No. 3, and that's -- that's the reason for that well being circulated to the surface.

MR. NUTTER: I just noticed that the subject well, as well as the Flag-Redfern No. 1, do not have any cement across the salt.

That is correct.

MR. NUTTER: Okay, go ahead.

(Mr. Kellahin continuing.) Now, turning to page fourteen on the Exhibit, would you discuss the information on that, please?

Page fourteen is a fracture gradient table which was prepared from the results of initial stimulation of all six wells in the immediate area.

Now, I'm listing the wells, the top perforations in the San Andres, date of stimulation, surface pressure required to break formation. Now this is the pressure with acid on the formation face that the zone finally accepts the fluid. The job was done and the next column, instant shut-in pressure was the minute the pumps were shut

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down there; this gives an instant shut-in pressure, which by using this figure there and being able to calculate the hydrostatic head of the fluid in the tubing, I'm able to come up with a formation fracture pressure, next column.

I've listed this for each of the six wells.

The next column is the formation fracture gradient, which is nothing more than the fracture pressure divided by the depth to the top of the perforation in psiper foot.

Okay, my next column, assuming that I have
San Andres disposal water in my tubing instead of the two
percent KCL water and/or oil, as was displaced in the acid
jobs on the wells, my calculated surface shut-in pressure
for each well is listed, starting from the disposal well at
1100 -- I'm sorry, 1,116 to 2214. This is the pressure that
I will have on the surface there for a column of produced
San Andres salt water in the tubing before I breakdown -before I fracture the San Andres formation.

The next column is the surface shut-in gradients that this pressure on the surface will yield.

What I've done, I've taken a field average, including the five wells within the one-half mile area. I have left out the sixth well, Santa Fe Well No. 4, because not only -- it's out of the half-mile radius, but also it has a much higher formation fracture pressure than any of

the other wells.

 I've taken this field average to -- which calculates out that my formation fracture pressure average for the half-mile area is 4,027 pounds; formation fracture pressure of .813 psi per foot, which means for an average well before the formation is fractured under static shut-in pressure conditions I will have 1550 pounds on the tubing. That would give me a surface shut-in gradient of .314.

well because the depth is different than the average depth to the top of the San Andres in the field, and I've taken the same formation fracture pressure, 4,027, and I've come up with, under static conditions, before the San Andres formation is fractured, with a full load of San Andres water in my tubing, I have shut-in tubing pressure of 1547 psig, which gives me a gradient of .311 psi per foot, which in my understanding is over what is allowed without a hearing in New Mexico.

- Now, page fifteen covers the information you've just discussed, does it not?
 - A. Yes, it does.
 - Do you have anything to add to that?
 - A. No. sir.
- Q Now turning to page sixteen of the Exhibit, would you discuss that information, please?

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Page sixteen is my friction table. What I'm showing on this table is, on the very lefthand column my injection rate in barrels per minute, I list rates from 1/4 barrel a minute to 1-3/4 barrels per minute.

The next three columns are calculations and variables, which I'll explain on the next page, to arrive at my last column on the extreme right, which is my friction pressure that will be incurred under the various disposal rates listed that they correspond to.

In other words, what I'm saying there, is I'm going to have six pounds pressure there at the surface when I'm disposing of 1/4 barrel a minute, and I'll have an extra 223 pounds at the surface if my disposal rate is 1-3/4 barrels per minute.

This friction pressure has nothing to do with bottom hole formation pressure there. It's energy loss there and therefore I've calculated out to show that with an increase in surface injection pressure, by this friction pressure I don't modify the formation pressure at all.

Now, page seventeen-A, would you discuss that information? Is that just an explanation of how you arrived at the figures on page sixteen?

Yes, sir. Page seventeen-A, I'm showing how I calculated my friction losses, using the Fanning

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Reynolds numbers for each disposal rate there. I list my reference, and these two calculations are the third and the fourth columns listed on page sixteen.

Seventeen-B is the friction curve there that I used applying my Fanning friction factors in my reference.

- And that is the source of your tabulation on page sixteen?
 - A Yes, sir, that is correct.
- Q Now turn to page eighteen, would you identify that, please?
- A Page eighteen is my calculated surface injection pressure. This is really one of my -- this is really
 the whole gist of the application. This is what I'm asking
 for.

I've listed my injection rates in barrels per minute. It ranges from 1/4 to 1-3/4 barrels per minute.

The next column is my calculated friction pressure, which we just previously talked about.

The next column is my calculated instant shut-in surface pressure, which comes from my fracture gradient table on page fourteen.

The last column is my calculated surface injection pressure in psig. This table shows the various disposal rates, what my wellhead -- what my disposal well-

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head pressure should be before the San Andres formation is fractured.

- Q This is your surface pressure, is that correct?
- A. This is my surface pressure. That is correct.
- Q Now, what surface pressure do you anticipate using in this particular well, or do you want to reserve that until later?

A. I will make just a few comments on it. This well has produced 60,000 barrels total fluid. Of that, 58,000 is water. Now, when disposal operations are started there, I don't anticipate even having to dispose at 1000 pounds, due to the void in the formation, but as I start filling the void left from the production of the well there, my pressures will start to climb there, and the reason I'm asking for these pressures here, these are — these are the maximum pressures that I think should ever be imposed upon the well before — maximum pressures; otherwise, I fracture the San Andres formation there.

To ask for a lower pressure at this time and have to come back six months later and ask for another increase in pressure would require another hearing, so I'm asking for the complete pressure now.

Now, you're talking about disposing of 50 to

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100 barrels of water per day. Why do you need that excessive -- higher rate of pressure; not excessive?

A I need the higher rate of disposal in barrels per minute due to the fact that this field is not under electrification, so my disposal pump will be run by natural gas engine and I propose to dispose of my fluid during the three hours that my pumper for the lease is there, so that he can see any problems with the system, or leaks, or anything else there. The system will not be automated, so therefore I propose to dispose of my fluid in a short period of time.

I will have a kill switch attached to this gas engine there that will be operated off of high pressure there, which will limit my wellhead pressure and also, of course, low tank level, low tank level fluids.

- Q Then in the operation of this lease you'll accumulate the produced water in tanks and then dispose of it on a daily basis for a short period of time. Is this what you're saying?
 - A Yes, sir, that is correct.
- Q It will just be an intermittent injection and not the regular straight injection?
- A No, sir, it will not be a steady injection as in waterflood.
 - And in your opinion, as I understand your

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testimony, the surface pressures which you're proposing to use will not fracture the formation?

- A. They will not fracture the formation.
- Now turning to page nineteen of your Exhibit, will you discuss that information, please?
- A Page nineteen is the structure map contoured on the top of the PI zone, San Andres PI zone, for the Dickinson Field.

The PI zone is a marker that's approximately 170 feet above the San Andres porosity.

- Q Page twenty of the exhibit?
- A Page twenty is a north-south cross section for the Dickinson-San Andres Field. Opening up the cross section, you'll see by the index map where the line of section goes. The disposal well is the second from the left, and on this cross section I am showing top of the San Andres PI zone, which I described on the structure map, and also the top of the San Andres porosity, which the wells are completed in, the top of their completions.
- Q. Now Exhibit Number 21, would you identify that exhibit?
- A Exhibit 21 is a west-east cross section for this same field, showing the same data. The disposal well is the first log, first well on the left.

I'm sorry, it's the center.

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Q Okay. Now referring to Exhibit Number 22, would you identify that exhibit, please?

Redfern Oil Company's Santa Fe lease from the time the first well was drilled up until January of '79. It shows barrels of oil, Mcf of gas, barrels of water.

- Q And Exhibit 23, page twenty-three?
- A Exhibit page 23 is production history for the proposed disposal well, the Santa Fe Well No. 2. It shows the same data, All production, gas production, and water production.
 - And page twenty-four?
- A Page twenty-four is a graph of the production history of the Santa Fe lease. It's just -- it's a graph of page twenty-two.
 - And then page twenty-five?
- A Twenty-five is a graph of the production of the proposed disposal well, showing the same information described on page twenty-three.
- 1 Now, referring to page twenty-six of the Exhibit, and subsequent pages, what are they designed to show?
- A Page twenty-six through page thirty-one, while is the last of my exhibit, show the treating reports there for the initial stimulation of the wells in a 1/2-mile circle.

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Let me note that I had the actual report on Flag-Redfern's wells, wells which is on 26, 27, 28. The Reed and Stevens wells, the only report I have is on their daily drilling report.

These treating reports is where I came up with my instant shut-in -- where I took my instant shut-in pressures there to calculate my fracture, formation fracture table.

- Q And they are your supporting data for your fracture information and pressure information?
 - A Yes, sir, that is correct.
- Now, in your opinion, Mr. Rossler, will the approval of this application result in the production of oil that would not otherwise be recovered?
- A. There is a good possibility that this salt water disposal project, while it's being applied for as a disposal well, is actually a pilot waterflood, because it is disposing of water into the same zone that the surrounding wells produce from, so I do expect, if nothing is fractured, to see a reasonable response from my disposal operation.
- Q But if you have to continue trucking water at \$.90 a barrel, would that cause premature abandonment of this lease?
- A. Yes, sir, that is definitely correct there.

 That is what's keeping Reed and Stevens right now from pro-

SALLY WALTON BOY CRITICAL BHORTHAID REPORT 1885 Flow Bloom (G15) 111-6 Sents Pt. How MixEdo 111-6

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SALLY WALTON BOY STITUTED SHORTHAND REPORT 110 Plank Rhings (615) 471-4: Statis (70, New Meadon 5710 ducing their wells.

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Q Now, if -- is it a practical solution to set up some kind of injection system that operated full time at lower pressures?

A At this time it would not be practical to set up such a system there due to the fact there that we need to bring electricity on the lease there and we're --- we're only applying for one well now and unless future conditions change, we'll just have one disposal well in the field. I think at this time it would be unwise there to try to actually waterflood this formation with a strict adherence to constant injection rates.

Q Now, turning to what has been marked as Exhibit Number Two, would you identify that exhibit?

A Exhibit Number Two is a log of the proposed disposal well, the Santa Fe No. 2. I have the perforations marked on the small scale, 1-inch scale, and the perforations marked on the detailed 5-inch scale.

These are perforations that are currently open in the well and these are perforations we propose to dispose through.

Q. Were Exhibits One and Two prepared by you or under your supervision?

A. Yes, sir, they were.

MR. KELLAHIN: At this time I'll offer Ex-

hibits One and Two.

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MR. NUTTER: Applicant's Exhibits One and Two will be admitted in evidence.

- Do you have anything to add, Mr. Rossler?
- Just on -- with the enclosed packet on you? left the first page is just describing the docket. The second page is the whole -- a short summary of the entire application there. It's reiterating there that I'm asking for a surface injection pressure of .311 psi per foot.

And it's also showing my range of disposal rates and pressure.

But your present request is for pressure gradient of .311.

Yes, sir, that is correct, surface injection pressure gradient.

MR. KELLAHIN: That's all we have, Mr. Nutter.

CROSS EXAMINATION

BY MR. NUTTER:

Mr. Rossler, with respect to page fourteen of your Exhibit Number One, I don't understand the bottom line here. We know that the actual formation fracture pressure in this Santa Pe No. 2 is 3596. Now how do you arrive at the 4027 down at the bottom?

Okay, how I arrived here, I've taken each of

SALLY WALTON BOYD
CERTIFIED SKAINAGE GESS 451-446
SERVE BEARS GESS 451-446
SERVE BEARS GESS 451-446

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Okay, how that's derived, the last line, my disposal well, the depth to the top of the San Andres perforations is lower than the average depth to the top of the perforations for the other five wells; therefore, when you divide the formation fracture pressure 4027 by 4969, you get .810.

In other words, you're taking the -- you're taking the average formation fracture pressure and then decreasing that average because your injection well is less than average.

A Well, I'm decreasing it there just due to the fact of the 17 foot difference --

Q th-huh.

A -- in the top of the disposal zone in the proposed well, San Andres.

Now, isn't it a fact, however, that of these six wells that we've got in the pool, the formation fracture pressure in the subject well is the smallest of all? It's the lowest of all?

A That is correct.

And isn't that where the injection is going to take place?

A That is correct, yes, sir.

Q Shouldn't we be looking at the formation in the vicinity of the injection well rather than looking at

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the formation in the vicinity of a well that's a mile away?

Yes, sir. Initially that area around the Α. well is the only well that will be affected, but as the disposal progresses there, in years there, assuming no fracture around the wellbors of this Santa Fe No. 2, this disposal front is going to start influencing on the other wells of the field there.

How can we be sure that there will be ro fracturing if we're going to exceed the fracture pressure at the wellbore?

Okay, at the wellbore, as I believe I commented on earlier, it won't -- we're not looking at even 1500 pounds there initially when we start off disposing there at less pressure.

Mr. Rossler, have you taken the figures that you've obtained here for the top line, being the fracture pressure and the gradient and the calculated shut-in pressure and the shut-in gradient for the Santa Fe No. 2 and gone through all of these formulas that you've got on pages sixteen through -- fifteen through eighteen, I guess it is, and come up with a calculated surface pressure for the injection well only?

Yes, sir, I'm sorry I didn't come back to it, that's on page two, which is the Form C-108, which is 1308 psi.

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Q So that's where that 1303 came from.

A Yes, sir, that's -- that's the discrepancy right there.

- And that calculates the --
- A That will include the friction.
- Q Does that include the friction?
- A It includes friction, yes, sir.
- Q So instead of having 1771, I think it was, we'd have 1308 for the injection well itself.
 - A For the injection well itself, yes, sir.
- And you're anticipating a necessity for going up to the 1771 because you'll be disposing of 101 barrels of water in approximately three nours rather than on a 24-hour basis?
- A. Mr Examiner, 1-3/4 barrels a minute will be the maximum rate that will ever be disposed down that well.
- Q How much water could you get in at 1771 at 1-3/4 barrels per minute in three hours?
- A. You'll get all the water in there before an hour's gone, a 100 barrels.
 - Q Within an hour?
- A Yes, sir. Why I've looked at these varying disposal rates ranging from a quarter to one and three-quarter there, we don't have as of yet purchased a disposal pump there and I'm trying to leave myself enough leeway.

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I'm estimating there that we're going to be disposing between one and one and a quarter barrels a minute is what I'm estimating there.

MR. NUTTER: Are there any further questions of Mr. Rossler? He may be excused.

> Do you have anything further, Mr. Kellahin? MR. KELLAHIN: That's all we have, Mr.

Nutter. Thank you.

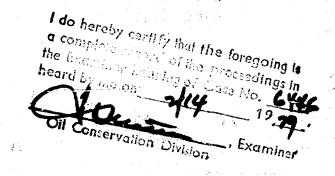
MR. NUTTER: Does anyone have anything they wish to offer in Case Number 6446?

> We'll take the case under advisement. (Hearing concluded.)

REPORTER'S CERTIFICATE

I, SALLY W. BOYD, a Court Reporter, DO HEREBY
CERTIFY that the attached and foregoing Transcript of
Hearing before the Oil Conservation Division was reported
by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of
my ability, skill, and knowledge, from my notes taken at
the time of the hearing.

Sally W. Boyd, C.S.R.



ALLY WALTON BOYD

TOTAL BANKTHING REPORTE

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DOCKET NO. 6-79 EXAMINER HEARING FEBRUARY 14, 1979 **CASE 6446**

Application of Flag-Redfern Oil Company for salt water disposal, Lea County, New Mexico. Applicant, in the above - styled cause, seeks authority to dispose of produced salt water into the San Andres formation through the perforated interval from 4,969 feet to 4,984 in its Santa Fe Well No. 2 located in Unit D of Section 35, Township 10 South, Range 36 East, Dickinson - San Andres Pool, Lea County, New Mexico.

Examiner: Daniel S. Nutter Alternate Examiner: Richard L. Stamets

Hag-Refer Ex 1
Cs 6446

CASE 6446

Flag-Redfern Oil Company requests approval to dispose of produced San Andres salt water back into the San Andres formation through its Santa Fe Well No. 2. Permission is also requested to dispose at a surface injection pressure gradient of 0.311 PSI per foot of depth to the top of the injection zone, based upon the surrounding average San Andres fracture gradient for the Dickenson (San Andres) Field which is calculated to be 0.810 PSI per foot of depth. This would allow for a maximum surface injection pressure ranging from 1554 PSIG @ 1/4 BPM to 1771 PSIG @ 1-5/4 BPM.

It should be noted that this application, while being requested for salt water disposal purposes, also has the characteristics of being a pilot waterflood injection well as the disposal zone and the field's producing zone are the same. Therefore, favorable response to this disposal operation should result in an increase in oil production in offsetting wells.

In addition, at a later date Flag-Redfern Oil Company may wish to increase its daily water disposal volume by the addition of more San Andres wells to this disposal system.

Flag-Redfern Gil Company Representative - Steve Rossler New Mexico Attorney at Law - Tom Kellahin

TABLE OF CONTENTS

r.	Letter of Application for Salt Water Disposal	1
2.	NMOCC Form C-108	2
3.	Santa Fe Well #2 Pertinent Information	3
4.	Water Analysis	4
5.	Area Plat	6
6.	Well Profile of Proposed Disposal Well	7
7.	Santa Fe Well #2 Location Plat	8
-8.	Waivers from Offset Operators	9
9.	Tabular Summary of Surrounding Wells	12
10.	Fracture Gradient Table	14
11.	Friction Table	16
12.	Surface Injection Pressure Table	18
13.	Structure Map	19
14.	Cross Sections a) South - North Cross Section b) West - East Cross Section	20 21
15.	Production History of Proposed Salt Water Disposal Well a) Table b) Graph	22 24
16.	Acid Stimulation Reports	் 26



Flag-Redfern Oil Company

1200 WALL TOWERS WEST . MIDLAND, TEXAS 79701 . PHONE (915) 683-5184

Mailing address: P. O. Box 23 Midland, Texas 79702

January 26, 1979

File

New Hexico Oil Conservation Commission P. O. Box 2088 State Land Office Building Santa Fe, New Mexico 87501

Attention: Mr. D. S. Nutter

Chief Engineer

Re: Confirmation of Hearing

Application for Salt Water

Disposal Permit Sante Fe Well #2

Fee Lease

Dickinson (San Andres) Field

Lea, County, New Mexico

Dear Mr. Nutter:

This letter will serve to confirm Flag-Redfern Oil Company's request for a hearing for a salt water disposal permit for the above captioned well. Attached is Form C-108 with all necessary attachments.

It is our understanding that the hearing will be on February 14, 1979. Please advise us of the time and location where this hearing is to occur.

Thank you for your cooperation in this matter.

Sincerely,

Steve Rossler Petroleum Engineer

There Parker

SWR/dlp

NEW MEXICO OIL CO! SERVATION COMMISSION

APPLICATION TO DISPOSE OF SALT WATER BY INJECTION INTO A POROUS FORMATION

GPERATOR			ADDRESS				
Flag-Redfern Oil Com	pany		P. O.	Box 23	Midland,	Texas	79702
LEASE HAME	<u> </u>	WELL NO.	FIELD				COUNTY
Sante Fe		2	Dicki	nson (S	San Andres)		Lea
	D	66	50		North		660
UNIT LETTER	; w	ELL IS LOCATED	PECT P	ROM THE		INE AND	FEET FROM
West LINE, SECTION	35 to	WHSHIP 10-S	RANGE 36		MPM.		
NAME OF STRING	·	,	AND TUBING DA	···			
BURFACE CASING	SIZE	SETTING DEPTH	SACKS CEME	NT	TOP OF CEME	NT	TOP DETERMINED BY
	8-5/8"	415	250	· .	Surface		Cement Circulated
INTERMEDIATE		7.2					0-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
	None						er en
LONG STRING	2		-		50.00		Calculated using
? Publing	4-1/2"	5085'	250	DEPTH OF T	4060 t		Log Caliper
•	 2-3 [*] /8"	4934	Baker Lok-				
NAME OF PROPOSED INJECTION FORMS		1 4734 1	TOP OF FOR	MATION	= 6 4300	BOTTO	M OF FORMATION
San Andres			4213'	D.F.		Not	drilled thru
IS INJECTION THROUGH TUBING, CASIN	GOR ANNULUS?	PERFORATIONS	OR OPEN HOLE! P			CTION	
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ANSWER YES ON NO WHETHER THE FOL ERALIZET TO SUCH A DEGREE AS TO S	100	Closed WATER	TO BE DISPOSED OF	HATURAL	CESSUTE	ARE WA	TER ANALYSES ATTACHED!
ERALIZED TO BUCH A DEGREE AS TO B STOCK, IRRIGATION, OF CTHER GENERI	C UNFIT FOR DOMES! L USE _	Ye.	28	SAL ZONE	Yes	Ye	8
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Harding Burris, Box				<u> </u>			
LIST NAMES AND ADDRESSES OF AL'.					44	• • • · ·	. 00001
Read & Stevens, Inc.	- Box 2126	, 314 Securit	y Nat'I BK	Kost	vell, New M	exico	9 00201
Lawrence C. Harris -	Box 1714 -	Roswell. New	Mexico 882	201			
Distriction Of Interes		100000, 1000					
Holly Energy Inc	2001 Bryan ?	Tower, Suite	2680 - Dall	as, TX	75201		
	** 1			-			
MCF Oil Corp 700	Vaughn Bldg	., Midland, T	X 79701				
					*		
MAVE COPIES OF THIS APPLICATION SE	EN SURFACE OWN	ER	EACH OPERAT	NIHTIW NO	ONE-HALF MILE	-	MEXICO STATE ENGINEER
	Yes		Yes	-		Yes	
THE FOLLOWING STEMS ATTACHED (MER APPLICATION (MER RULE 701-8)	TO PLAT'OF AREA		ELECTRICAL	L 06		١	MMATE SKETCH OF WELL
	Yes		Yes	·	·	Yes	to some
I hereby certify that the information above is true and complete to the best of my knowledge and belief.							
This Real	ha.	Pat vola	um Engineer	•		1-	·26-7 9
ATTURE INSIE		Leriole	OF CHATHERI	·			~~ / / ×

The Rosler	Petroleum Engineer	1-26-79
(Signature)	(Title)	(Date)

NOTE: Should waivers from the State Engineer, the surface owner, and all operators within one-half mile of the proposed injection well not accompany this application, the New Mexico Oil Conservation Commission will hold the application for a period of 15 days from the date of receipt by the Commission's Santa Fe office. If at the end of the 15-day waiting period no protest has been received by the Santa Fe office, the application will be processed. If a protest is received, the application will be set for hearing,

SANTE FE WELL #2

Pertinent Information

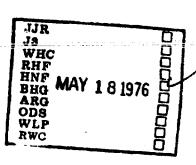
- 1.) Disposal Zone: San Andres
- 2.) Depth of Disposal Zone: 4969' 4984'
- 3.) Type of Disposal Fluid: Produced San Andres Water
- 4.) Anticipated Disposal Volumes:

 Minimum = 50 Bbls water per day

 Maximum = 100 Bbls water per day
- 5.) Source of Disposal Fluid:
 - a. Flag-Redfern Oil Company:
 Sante Fe
 1F 35 10S 36E 14 BWPD
 3E 35 10S 36E 21 BWPD
 Total Lease = 35 BWPD
 - b. Read and Stevens Inc.
 Fawn Cherie
 1M 26 10S 36E 25 BWPD Est.*
 Sante Fe
 4% 35 10S 36E 16 BWPD
 5C 35 10S 36E 25 BWPD Est.*
 Total Read & 66 BWPD
 Stevens

These 2 wells have been assigned a temporary completion and currently have suspended operations. When they are completed the produced San Andres water that they produce will be disposed in the proposed Sante Fe #2 Salt Water Disposal Well.

REPORT OF WATER ANALYSIS



Company Flag-Redfern Oil Company Analys	s Date May 15, 1976
Sample marked Santa Po MO	
Milligrams Per Liter	
Chloride (NaCi) 194,000	Calcium (Ca++)
Total Hardness (CaCO3) 73,000	Magnesium (Mg++)
Calcium Hardness (CaCO3) 41,000	Sodium (NA++)
Total Alkalinity (CaCO3)	Carbonate (Co3-)
Acidity to Phenolphthalein (CaCO3) 300	Bicarbonate (HCo ₃)
Sulfate (Na2SO4) 1,985	Sulfate (SO ₄)
Total fron (Fe) 9.2	Iron (Fe)
P. H. 6.5 Specific Gravity 1.165	Chloride (CL-)
Remarks Indicates formation water.	
	Rufus L. Morgan



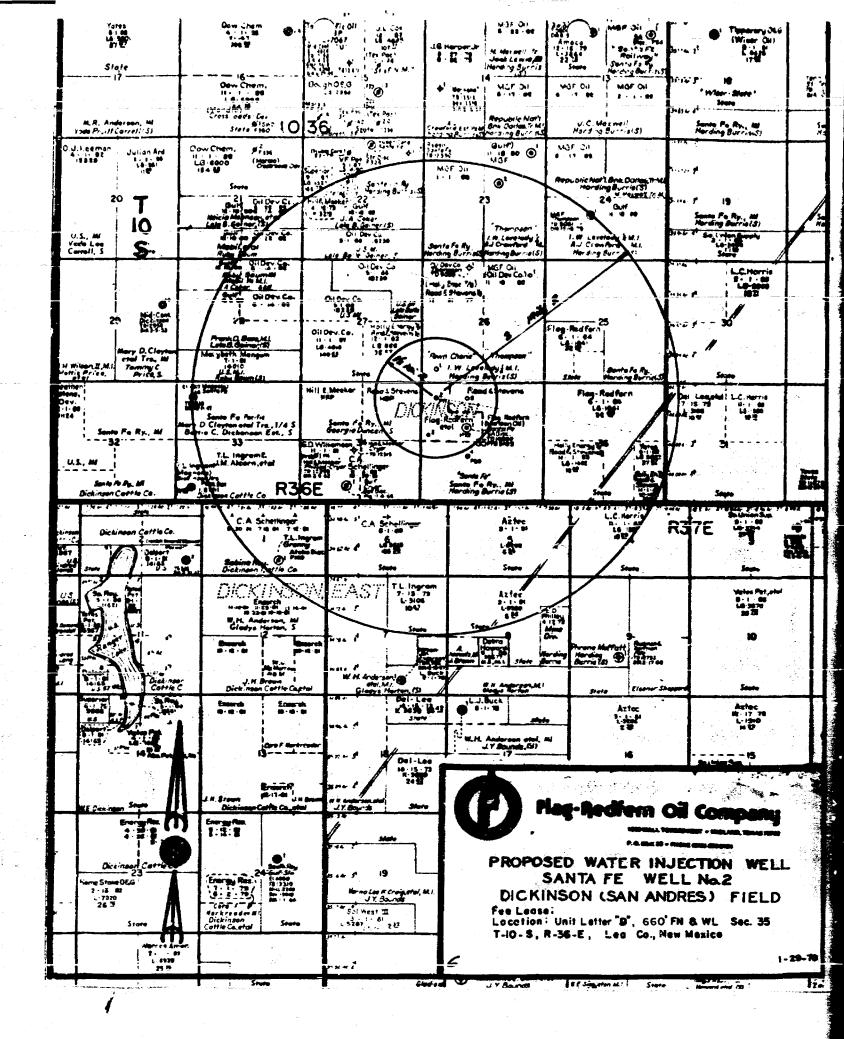
			ACCT	ם
COMPANY Flag-Redfern 011 Company	ADDRESS_Tat	tum, N.M.	DATE:	1-31-79
SOURCE Santa Fee # 2 Analysis	DATE SAMPLED	1-29-79 Mg/L = PPM	ANALYSIS — NO.—— 'Még/L	13682
1. pH <u>6.52</u>		mg/L = 7 / / /	med, c	•
2. H ₂ S (Qualitative) Pos. 3. Specific Gravity 1.150				
4. Dissolved Solids	_205	5,366		
5. Suspended Solids 6. Phenolphthalein Alkalinity (CaCO ₃)				
7. Methyl Orange Alkalinity (CaCO ₃)	_620)	7	
8. Bicarbonate (HCO3)	HCO, _756	÷61	12.4	HCO;
9. Chlorides (CI)	CI	÷35.	5 3,462	CI
10. Sulfates (SO ₄)	so, $\frac{2,2}{}$:25 ÷48	46	so,
11. Calcium (Ca)	Co _4,0	900 ÷20	200	Ca
12. Magnesium (Mg)	Mg 972	÷ 12.	2 80	Мд
13. Total Hardness (CaCO ₃)	_14,	000		
14. Total Iron (Fe)	7.0)		
15. Barium (Qualitative)				
16. Strontium *Milli equivalents per liter PROBABLE MINE	RAL COMPOSI	TION		
Fa ← HCO ₃	Compound	Equiv. Wt.	X Meq/L	= Mg/L
200 12.4	Ca (HCO ₃) ₂	81.04	12.4	1.004
80 Mg	Ĉa ŜŌ₄	68.07	46	3,133
3,240 No CI 3,462	Ca Cl ₂	55.50	142	7,881
Saturation Values Distilled Water 20°C	Mg (HCO ₃) ₂	73.17		
Ca CO ₃ I3 Mg/L	Mg SO4	60.19		
Ca \$0.4 • 2H2O 2,090 Mg/L	Mg Cl ₂	47.62	80	3,808
Mg CO ₃ 103 Mg/L	Na MCO ₈	84.00		<u> </u>
	Na ₂ \$O ₄	71.03		
	Na Cl	58.46	3,240	189,540

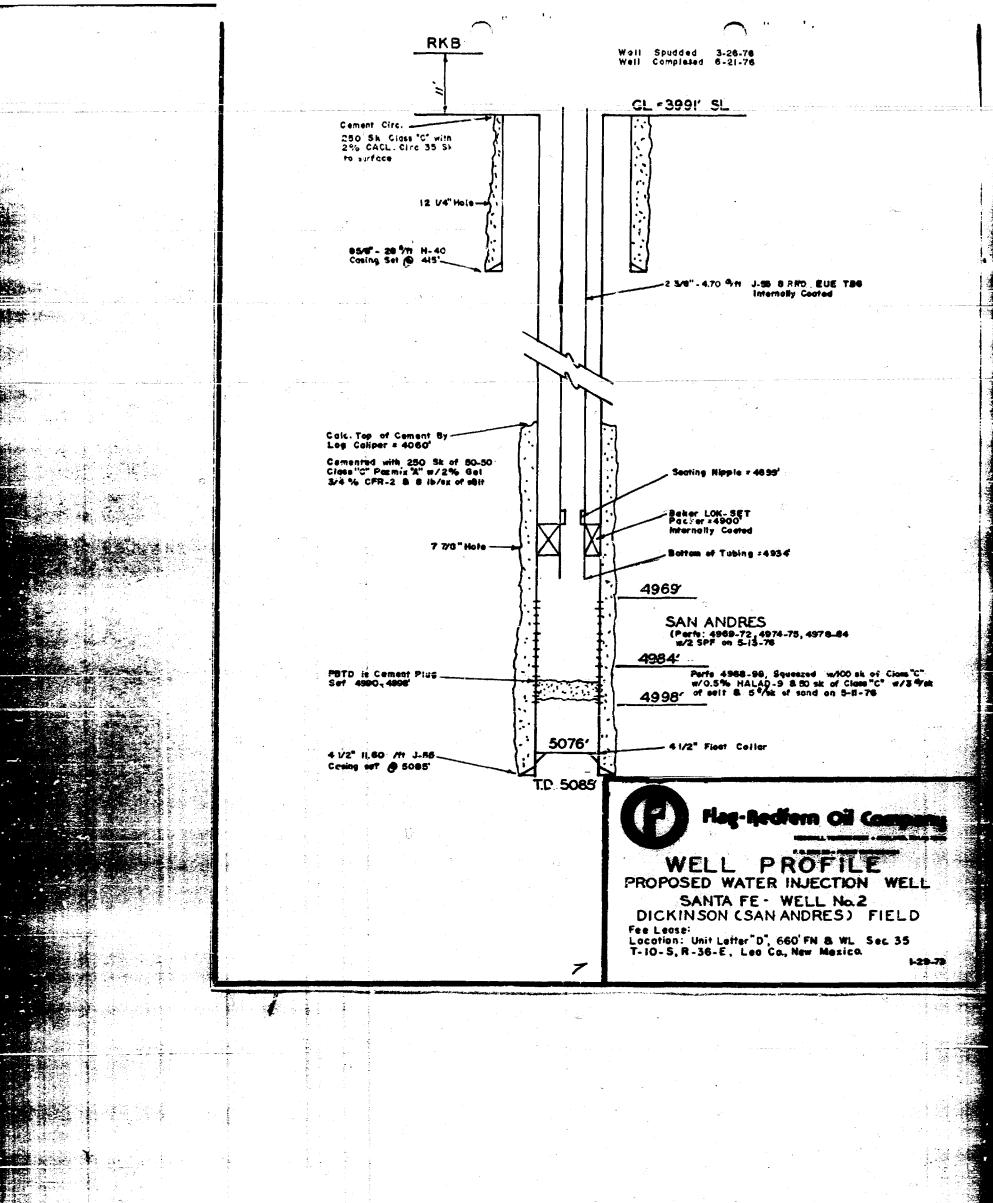
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(2) Rossier

Respectfully submitted TRETOLITE COMPANY

Ray Shaffner





NEW XICO OIL CONSERVATION COMMISSION WELL LUCATION AND ACREAGE DEDICATION PLAT

All distances must be from the outer boundaries of the Section

Operator			Lease				Well No.
	il Corporatio		The second secon	anta Fe			<u> </u>
	Section'	Township	Ro	•	County		
D	35	10 South		36 East	Lea		
Actual Footage Local	ion of Well:						
660	feet from the	North line one		660 tee	t from the	West	lin●
Ground Level Elev.	Producing F	ormation	Pool				Dedicated Acreage:
3990.7	Ì		1				4
	aanaan dadia	ated to the subject v		-1			Acres
	n one lease i	*** **** *****************************					hereof (both as to working
dated by cor	mmunitization, No If ('no,' list the	unitization, force-pool	ing. etc?	lidation			all owners been consoli-
No allowable	will be assign	ned to the well until a e) or until a non-standa	ll interes	ts have been c	ons olidated interests,	l (by com has been	munitization, unitization, approved by the Commis-
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I have no objections to Flag-Redfern Oil Company's proposed salt water application for their Sante Fe Well #2 in the Dickenson (San Andres) Field, Lea County, New Mexico

St gnature

2/5/79

Date

Read & Stevens, Inc.

ġ

I have no objections to Flag-Redfern Oil Company's proposessalt water application for their Sante Fe Well #2 in the Dickenson (San Andres) Field, Lea County, New Mexico.

W. Mine Co &

2-5-79 Date

Company

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I have no objections to Flag-Redfern Oil Company's proposed salt water application for their Sante Fe Well #2 in the Dickenson (Jan Andres) Field, Lea County, New Mexico.

Signature

Date

Company

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TAISULAR SUMMARY OF ALL WELLS WITHIN ONE-HALF MILE OF FLAG-REDFERN OIL COMPANY'S SANTE FE WELL #2 PROPOSED SALT WATER DISPOSAL WELL

4½" set @ 5085'. Cemented vof 50-50 Class "C" - Posmix Gel, 3/4% CPk-2 & 8 lb/sx of Top of cement @ 4060', calcufrom Log Caliper.	8-5/8" set @ 415' Cemented w/250 sx Class "C" w/2% CaCl. Circ 25 sx to surface.	San Andres 4669 - 4984' (Sub-sea = -967 to -982') (Sub-sea = -967 to -982') Perfs 4963' - 4998' were previously squeezed off with 150 ax of Class "C"	5085' RKB EL.= 4002'	660' FN & WL Unit Latter D Sec. 35, T-10-S, R-36-E	Flag-Redfern Oil Co. Sante Fe Well #2 Proposed Disposal Well	
Production Casing	Surface Casing	Producing Formation and Interval	Total Depth	Location	Operator & Well Name	e e

by Hanson Oil Corp.) Sante Fe Well #1
(Previously operated Field Discovery Well Flag-Redfern Oil Co.

Unit Letter F to Proposed Disposal Southeast Offset Sec. 35, T-10-S, 1980' FN & WL R-36-E

RKB EL.=

10,800'
PBTD = 4952'

Sec. 35, T-10-S, South Offset to 330' FWIL & 2310' FNL R-26-E Unit Letter E

RKB EL.=

4953 - 49821

San Andres

(Sub-sea = -951 to -980')

Proposed Disposal

Flag-Redfern Oil Co.
Sante Fe Well #3

of Class "C" - 3-9-77.
Perfs 4935 - 4957' EZSV Cement Retainer set @ 4962'. Perfs 4936 -Class "C" - 3-13-77. squeezed w/100 sx of 5020' squeezed w/150 sx (Sub-sea = -934 to -946')4933 - 4945' San Andres

Cemented w/250 sx of Class "H" w/2% CaCl. Circulated 8-5/8" set @ 360". 50 sx to surface.

"H" w/2% CaCl. Circ 50 sx to surface. 8-5/8" sat @ 4300'. Cemented of cement = 1970', cal-culated using 70% fillup. Wt. w/8#/sx of Salt followed by 200 sx of Class "C" w/2% CaCl. Top w/300 sx of Halli Lt. mented w/410 ex of Class 12-3/4" set @ 370'.

of Salt. culated x "A" w/2%

w/250 ax

Cement Flugs in uncased 7-7/8" hole:

1) 35 sx from 9400'-9295' (105')

2) 35 sx from 9140'-9035' (105')

3) 35 sx from 7754'-7649' (105')

4) 35 sx from 5680'-5584' (99')

5½" casing set @ 5103'. Cemented

w/325 sx of Class "C" w/0.4% CFR-2. from Log Caliper. Top of cament @ 3196', calculated

4½" set @ 4985'. Cemented with 250 sx of Class "H" w/2% Gel, 0.75% CFR-2 and 8#/sx of Salt. Top of cement @ mented w/550 sx of Halli Lt. Wt. w/ 0.4% CFR+2 & 8#/sx of Salt. Circulated 75 ax to surface. 43" Multi stage Tool @ 2260'. Ce-4155, calculated from Log Caliper.

TABULAR SUPMARY OF ALL WELLS WITHIN ONE-HALF MILE OF FLAG-REDFERN OIL COMPANY'S SANTE FE WELL #2 PROPOSED SALT WATER DISPOSAL WELL

Operator & Well Name	Location .	Total Depth	Producing Formation and Interval	Surface Casing	Production Casing
Read & Stevens Inc. Fawn Cherie Well #1	Unit Letter M Sec. 26, T-10-S, R-36-E North Offset to Proposed Disposal Well	5013' RKB EL.= 4004'	San Andres 4955'-5013' O.H. (Sub-sea = -951 to -1009)	8-5/8" set @ 360' Cemented w/225 sx of Class "C" w/2% CaCl. Circ 89 sx to surface	5½" set @ 4955'. Cemented w/100 sxs of C"H" w/0.75% CFR-2. Calculated Top of Cemusing 70% Fillup efficiency = 4497'. Milstage cement tool set @ 2025'.
Read & Stevens Inc. Sante Fe Well #5	Unit Letter C Sec. 35, T-10-S, R-36-E East Offset to Proposed Disposal Well	4991' RKB EL = 3991'	San Andres 4950'-4991' O.H. (Sub-sea = -959 to -1000')	8-5/8" set @ 373' Cemented w/225 sx of Class "C" w/2% CaCl. Circ 34 sx to surface.	5½" set @ 4950'. Comented w/100 sx of Cla"H" w/0.75% CFR-2. Calculated Top of Comusing 70% Fillup efficiency = 4492'. Mult stage cement tool seit @ 2196'.
Read & Stevens Inc. Sante Fe Well #4	1980' FS & WL Unit Letter K Sec. 35, T-10-S, R-36-E Over % mi. South- east from Proposed Disposel Well	5000' RKB EL.= 3999'	San Andres 4960'-5000' O.H. (Sub-sea = .961' to -1001')	8-5/8" set @ 348" Cemented w/225 sx of Class "C" w/2% CaCl. Circ 25 sx to surface.	5½" set @ 4960'. Cemented w/100 ax of Cla "C" cement w/0.75% CFR-2. Calculated Top Cement using 70% Fillup efficiency = 4447' Multi-stage cement tool set @ 2200'. Ceme w/450 ax of Halliburton Light Weight w/8#/ of Salt and 0.75% CfR-2. Circulated 79 as

Cemented w/8#/ex 79 ex cement

PACTURE GRADIENTS - SAN ANDRES FORMATION (SAN ANDRES) FIELD

Di Fie	San Wel	San Wel	Favn Well	Sat Wel	Saı We]	Sante Prope Well	¥e.
Field Average Disposal Well	Sante Fe Well #4	Sante Fe Well #5	Favm Cherle Well #1	Sante Fe Well #3	Sante Fa Well ≠1	Sante Fe Well #2 Proposed Disposal Well	Well Name
4952' 4969'	4960'	4950	4955'	4953	4933'	4969	Top Perforation
(Excluding S	12-3-77	5-16-78	3-24-78	11-5-76	3-16-77	5-14-76	(1) Date of Acid Stim lation
(Excluding Sante Fe Well #4 due to its } mile from proposed Disposal Well.)	2300	2200	Unknown	1950	1700	1350	Surface Pressure Required to Break Formation PSIG
to its being over ell.)	2700	2450	2200	1950	1600	1400	Instant Shut-In Press. PSIC
4027 4027	4689	4435	4187	4139	3780	3596	(2) Formation Fracture Press. PSIG
0.813	0.945	0.896	0.845	0.836	0.766	0.724	Formation Fracture Gradient-PSI
1556 1547 PSIG	22:14	1965	1714	1667	1318	1116	San Andres Calc. Surface Shut In Press-PSIC*
0.314 0.311 PSI	0.446	0,397	0.346 ¥	0.337	0.267	0.225	Disposal Water Surface Shut In Gradient-PSI Ft.

NOTE: This Table is based on Static (No Injection) Conditions.
For Friction Pressure, See Friction Table

(Based on Shut In conditions with Tubing Loaded with San Andres Disposal Water)

EXPLANATION OF FRACTURE GRADIENT TABLE

- 1. All acid jobs were performed based on the Matrix stimulation technique and hydraulic fracturing was purposely avoided to prevent treating out of zone and stimulating the San Andres water zone, which is encountered 15 feet below the lowest oil productive San Andres zone in these wells.
- 2. Calculation of the San Andres formation fracture pressures were based on the following formula:

P_{ISI} = P_{BF} - P_H

Where:

PIST = Instant ShuteIn Pressure - psig
PBF = Bottom Hole Fracturing Pressure - psig

PH = Hydrostatic Pressure - psig

Reference:

Howard and Fast, <u>Hydraulic Fracturing</u>, Monograph Volume 2. "Mechanics of Hydraulic Fracturing", pg. 100. American Petroleum Institute of Mining, Metalurgical and Petroleum Engineers; Dallas, Texas 1970.

San Andres Disposal Water Specific Gravity = 1.150 Fluid Gradient = 0.499 psi f+

FRICTION TABLE

2-3/8" - 4.70 Lb/Ft Internally Plastic Coated Tubing

INJECTION F VELO Bb1/Min	CITY Ft/Sec. Down Tubing	REYNOLD NUMBER	FANNING FRICTION FACTOR	FRICTION* PRESSURE
BO 1/MIN	Donit Idolink			
0.25 BFM	1.077	2.15×10^4	0.00625	6.7 PSI
0.50 "	2.154	4.29 x 10,	0.00550	23.6 PSI
0.75 "	3.230	6.44 x 10 ⁴	0.00500	48.3 "
1.00 "	4.307	8.58×10^{4}	0.00475	81.6 "
1.25 "	5.384	1.07×10^{5}	0.00450	120.8 "
1.50 "	6.461	1.29 X 10 ⁵	0.00440	170.0 "
1.75 BPM	7.537	1.50 x 10 ⁵	0.00425	223.5 PSI

^{*} This friction pressure (friction loss) is the differential pressure that will be realized from surface to the top of the disposal zone (4969') when the San Andres disposal water is injected down the 2-3/8" internally plastic coated tubing at the various rates listed above. In other words, with no increase in bottom hole disposal pressure, the surface injection pressure will be increased due to friction by the pressures listed above for their corresponding injection rates.

EXPLANATION OF CALCULATED FRICTION PRESSURE VALUES

1. All friction pressures were calculated using the Fanning Friction Equation* which is:

Apg = \$1.0 m2

17:07

where:

Friction loss for turbulent flow - PSI, see friction table

S = Penning friction factor - see (2.) below

Depth of tubing = 4969 Ft.
Density of fluid = 9.59 lb/gal

= Velocity of disposal fluid - Ft/Sec, see friction table

= Internal diameter of plastic coated tubing = 1.995 in.

2. Fanning friction factor (f) is obtained from the attached curve on "Friction factors for clean steel pipe" *using the curve for smooth tubing which is the same as internally plastic coated tubing. In order to utilize this curve, the Reynolds Number must be calculated for each disposal rate. The Reynolds Number Equation* is as follows:

NR = 928 de 10 P

where:

NR = Reynolds number - see friction table

A = Viscosity of San Andres disposal water = 0.891 centipoises

* REFERENCE:

Craft, Holden and Graves, <u>WELL DESIGN</u>: <u>DRILLING AND PRODUCTION</u>, Chapter Crae - Fluid Flow in Pipes pp. 13 - 23 Prentice - Hall Inc., Englewood Cliffs, New Jersey 1963.

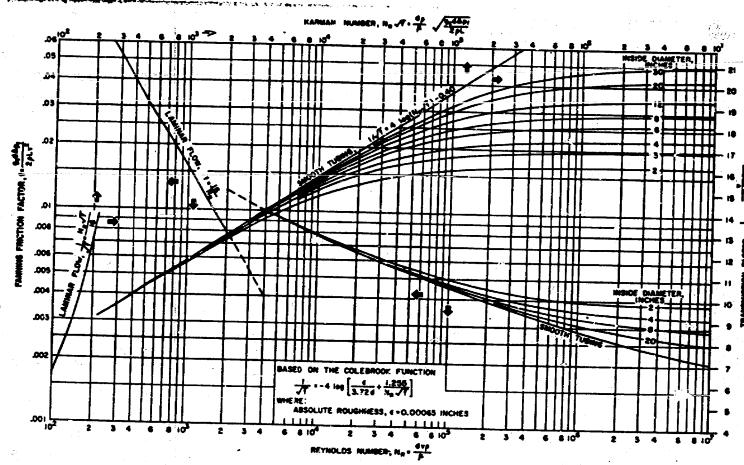


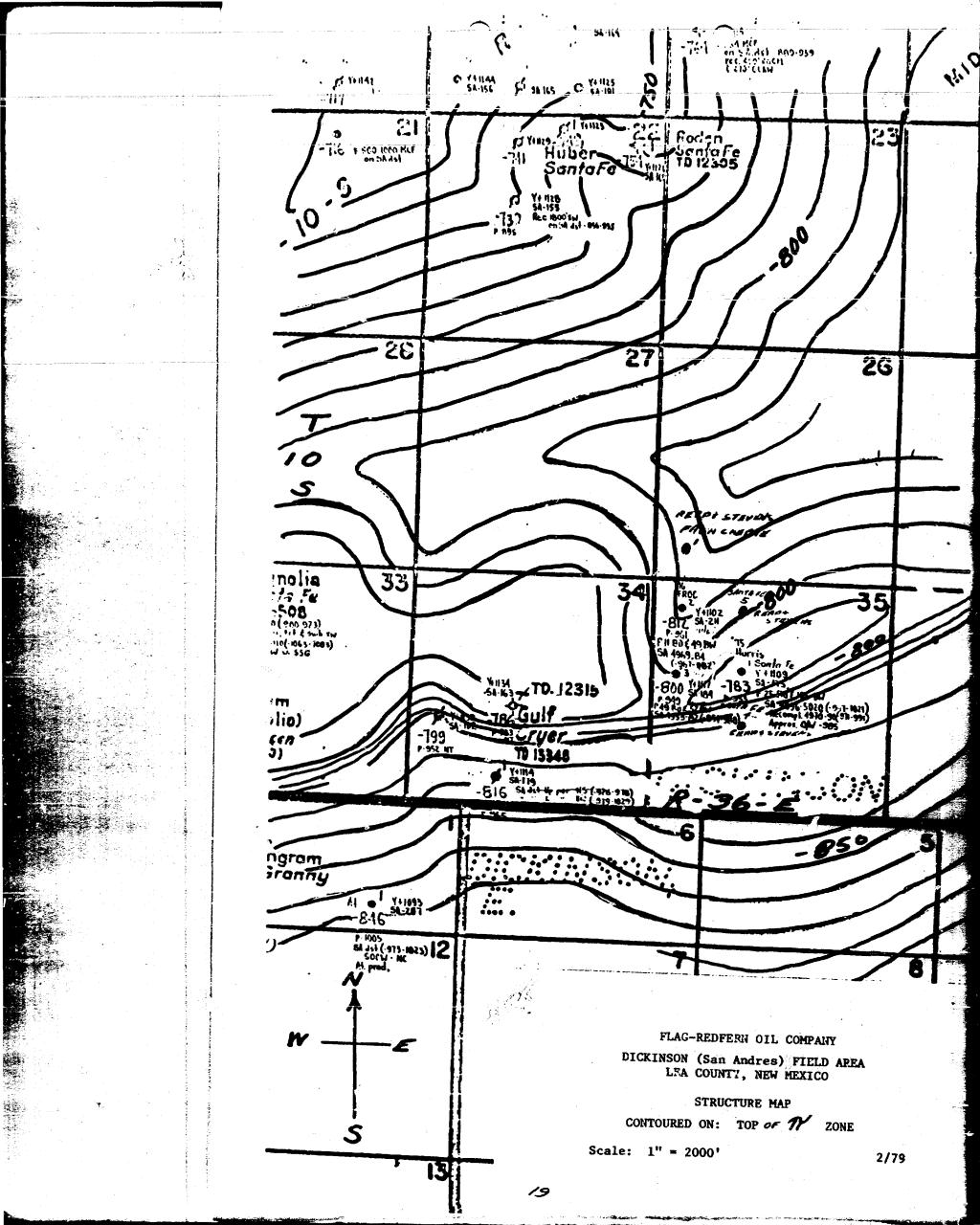
Fig. 1.4 Friction factors for clean steel pipe.

* REFERENCE:

Craft, Holden and Graves, <u>WELL DESIGN</u>: <u>DRILLING AND PRODUCTION</u>, Chapter One - Fluid Flow in Pipes pp. 18 - 23 Prentice - Hall Inc., Englewood Cliffs, New Jersey 1963.

CALCULATED SURFACE INJECTION PRESSURES
PROPOSED DISPOSAL WELL
SANTA FE WELL #2
DICKENSON (SAN ANDRES) FIELD
LEA COUNTY, NEW MEXICO

	INJECTION	CALCULATED	CALCULATED	CALCULATED
	RATE - BPM	FRICTION	INSTANT	SURFACE
-		PRESSURE	SHUT-IN	INJECTION
		to the control of	SURFACE	the state of the s
	• , .	PSI	PRESSURE - PSIG	PRESSURE - PSIG
	0.25	7	1547	1554
-	0.50	24	1547	1571
	0.75	48	1547	1595
-	1.00	82	1547	1629
	1.25	121	1547	1668
	1.50	170	1547	1717
	1.75	224	1547	1771



SANTA FE LEASE DICKENSON (SAN ANDRES) FIELD LEA COUNTY, NEW MEXICO

PRODUCTION HISTORY

TIME	OIL PROD. BBL/MO.	GAS PROD. MCF/MO.	WATER PROD. BBL/MO.	REMARKS
Jan. 1975	243	178 Lst.	486	1 vell Henson
Feb.	290	213 "	580	
March	41	30 "	82	0il Co. Operator
Apri1	160	117 "	320	
May	226	166 "	452	
June	96	70 "	192	
July	128	94 11	256	
Aug.	45	33 "	90	
Sept.	143	105 "	286	
Oct.	41	30 "	82	
Nov.	61	48 "	122	
Dec.	5	4 "	10	
Jan. 1976	77	57 "	154	
Feb.	55	40 "	110	
March	33 ,	24 "	66	
April	233	171 "	466	
May	0	0		
June	Ö	. 0	0	Shut-in
Ju1y	376	308 Actual	0	Shut-in
Aug.	180	147	1519	
Sept.	96	79	1519	
Oct.	184	151	1470	Well #1 now oper
Nov.	370		1519	ated by Flag Red
Dec.	946	200	2940	Fern Oil Co.
Jan. 1977	941	433	3038	3 wells
Feb.	757	431	3038	
March	685	346	2744	
April	894	244	2759	
May	713	369	3090	
June	713 780	427	3193	
July	696	467	3090	
Aug.	756	417	3193	
Sept.	560	452	3193	
Oct.	588	336	3090	
Nov.	474	353	3193	
Dec.		284	3090	
Jan. 1978	588 51,7	350	3193	
Feb.	420	310	3193	
March	346	250	2884	
April	441	208	3193	
May	395	265	3090	
June		231	3193	
July	370 272	233	3098	
Aug.	199	171	3193	
Sept.	266	113	3193	
Oct.	303	177	3090	
Nov.		182	3193	
Dec.	303 182	182	3193	
Jan. 1979	182	109	3193	
Jau, 17/7	303	182	3193	
TOTALS	16,778 BBL OIL	9887 MCF	93,524 BBL WAT!	R

SANTA FE WELL #2 DICKINSON (SAN ANDRES) FIELD LEA COUNTY, NEW MEXICO

PRODUCTION HISTORY

TIME	OIL PROD. BBL/MO.	GAS PROD. MCF/MO.	WATER PROD. BBL/MO.
July 1976	376	308	1519
Aug. 1976	180	147	1519
Sept 1976	96	79	1470
Oct. 1976	184	151	1519
Nov. 1976	105	86	1470
Dec. 1976	62	51	1519
Jan. 1977	62	51	1519
Feb. 1977	50	41	372
March 1977	60	8	2 78
April 1977	62	<u>1</u>	2040
May 1977	45	ī	2108
June 1977	50	1	2040
July 1977	45	1	2108
Aug. 1977	49		2108
Sept. 1977	36	· ī	2040
Oct. 1977	38	ī	2108
Nov. 1977	31	i	2040
Dec. 1977	39	1	2108
Jan. 1978	33	î	2108
Feb. 1978	28	î	1904
Mar. 1978	23	î	2108
April 1978	28		2040
May 1978	29	i	2108
June 1978	23	ī	2040
July 1978	15	ī	2108
Aug. 1978	16	ī	2108
Sept. 1978	21	i	2040
Oct. 1978	21	ī	2108
Nov. 1978	21		2108
Dec. 1978	13	1	2108
Jan. 1979	21		2108
TOTALS	1863 BBL OIL	960 MCF	59,711 BBL WIR.

Acid	50	n gallo	nsMH-7	Univers	sal Treating Co., Inc.
				Box 1146	UNIVERSAL ACIDIZING INC.
t Acid				A. A.	1 Acid Jobs In The Cit Patch
nice!					Unen Hole
					TREATING LOG
	,	19-			TREATING LOG
трапу —	1	_			2 2016 19/3
ese					We11
					SetOpen Hole
					Shots per ft Pecker
					Tbg. DepthTbg.
_					nt
e Treat					on via tubing with 500 gallons 20% MH-72 acid. Plush
		with tr			
	······································		·		
			·	T	
Time	Ybg. PSI	Cag. PSI	Rate B,P.M.	Tetal Bbls, In Form.	
12:15	q	0		<u> </u>	Start water via tubing.
12:30	200	NG			60 bbl water, Start acid to spot.
12:37	200				All acid. Start flush.
12:45	200	NG			Acid on spot. Pressure for ation 1000 PSI.
12:46		1000			
1:00	1000	1000			Pressure formation to 1000 PSI.
1:35	1200	1200	.06	3	Pressure formation to 1200 PSI.
1:50	1200	1200	.1	4.5	Pressure formation to 1200 PSI.
1:55	1350	1350			Pressure formation to 1350 PSI.
t t	1250	1250	.14	6.5	Formation break 50 PSI While pumping.
2:09	1400	1400			Speed pump slightly.
2:12	1500	1500	.25	9	Slow pump.
2:14	1400	1450			Speed pump.
2:18	1450	1450	.5	12	All flush. Shut down.
2:18	1400	1400			Instant Shut Down Pressure.
2:23	475	475	-		5 minute shut down.
í				. 1	Pressure Maximum 1500 Minimum 1000 Awarage 1175
					Injection RAte Maximum .5 Minimum 06 Average .13
		ļ	-	-	Total load to recover 84 bbl
				1	Instant Shut Down Pressure 1400
					Thank you

D. Russell

Treatment Ordered by .

Joe Richardson

CARDINAL CHEMICAL, INCORPORATED

					SERVICE REPORT
DISTRICT_	3-Area-	1	STA	TION_	Hobbs, New Mexico DATE November 5, 1976
LEASE	Santa Fe	9			WELL NO 3 POOL Dickson
COMPANY REP	RESENTATIVES.	Mr. Doy	al Russ	e11	STATE New Mexico COUNTY Lea WELL NO 3 POOL Dickson CARDINAL ENGINEERS HOlland
					WELL DATA
	CASING, TU	BING & PACKE	R DATA		COMPLETION DATA
CASING O.D.4	1/2 wr. 9	5 DPT		CEMENT	TT YES DATE DRILLED 10-76 FORMATION San Andres
1	WT				PAY SECTION FROM 4953 TO 4982
4	.3/8				· · · · · · · · · · · · · · · · · · ·
TUBING SIZE_		PERF'S OR OPE	N END		
HYD. HOLD DO	OWN ANCHOR: P	CEND	DE	PTH	PRESENT PROD: OIL GAS WATER
UPPER PACKE	R TYPE: Wat:	son	DE	РТН	ACID AND/OR FRAC DATE
LOWER PACKE	R TYPE:		DE	PTH	ACID AND/OR FRAC DATE
\$	DRATED W/24SH				· · · · · · · · · · · · · · · · · · ·
	TRT				
	RT				
OPEN HOLE SE	2E:	FROM		70	TYPE FLUID IN TBGIN CSG
		VOLUMES			SERVICES USED
TBC19 2 B	BBLS. CSG	BRIS OPE	N HOLE		BBLS 1,500 GALS 20% NM Stabilized TYPI
	OF PAY ZONE:				2 GALS NM-225 TYPE
	L				
	FLUSH 20.7				
	MATION:				10-7/8 LBS Balls (RCN) MATERIAL
					PUMPS USED ON TBG.
OIL TANK GAU	GES: START	FIN	ISH		PUMPS USED ON CSG
				DETAILS	S OF SERVICES PERFORMED
	PRESSURES			22	REMARKS CARDINAL CONNECTIONS TESTED TO
	ing Tubing				TBG_2000_PSI. CSGPS
8:00		ARRIVED ON I	OCATION.		Rig up Cardinal Equipment
	_ 	BARRELS OF	PULLIN DI	(MARED	
				Per	
8:50 50	00	Formation F	. O	Minute	PSI casing.
8:55 50	00 0				Start acid down tubing.
	00 500			1,3	
	50 900		2	1.0	Inject 5 ball sealers.
9:29 4	50 1100		5	,5	Inject 5 ball sealers.
	00 2000	16	<u> </u>		All acid, start flush, discontinue balls.
	00 2000				After shooting 10 due to slow rate.
	00 2000				
	00 2000	37	21	,2	All flush, shut down.
	00 1950				ISIP 1950#
	00 1550				5 min. 1550#,
	00 1400				10 min, 1400#,
					57 bbls. total load.
					37 buis, total load.
 ** <u></u> **.					
					
					
70	00 1950	`			ADD FOR SAND DISPLACEMENT INSTANTANEOUS SHUT-IN PRESSURES

Read & Hevens, Inc.

#1 Fawn Cherie Page 3

- 3-21-78 TD 5000' dolo., prep to drill to 5003' and run log.
- 3-22-78 TD 5003' dolo., prep to run tubg. and pkr. and swab test. Ran Welex Radioactivity log. Note correction on casing setting: Set 5½" @ 4945' due to apparent 18' fillup at time of running casing. Have 7 7/8" hole from 4945' to 4963' and 4 3/4" hole from 4963' to 5003'. When reverse unit drilling commenced bit went to 4963' with no weight. Apparently rotary rig drilling depth was in error.
- 3-23-78 TD 5003' dolo., prep to a cidize. Ran tubg. and pkr. w/pkr. set @ 4900' and tubg. to 4995'. Swab hole dry and waited 1 hr. Ran swab and hole still dry. Shut down overnight. At 8:00 AM, had 600' fluid in hole. Swabbed hole dry and rec. oily emulsion.
- 3-24-78 TD 5003' dolo., prep to swab. Acidized open hole 4945'=5003' w/2000 gals. 15% NE acid and flushed w/oil. Acid treatment max. treat. press. 2200#, min. treat. press. 1200#, aver. inj. rate 1½ BPM. Oil flush max. press. 3000#, min. press 1200#, aver. press. 2200#. ISDP 2200#, 5 min. SIP 2000#, 10 min. SIP 1950#, 15 min. SIP 1900#. Total load 68 bbls. Bled off press. and swab 64 bbls. load in 4½ hrs. Had 1400' fluid in hole last swab run.
- 3-25-78 TD 5003' dolo. prep to swab. At 8:00 AM, FL 2400' FS. Swab 3 hrs. and lower FL to 4600' FS. Shut down 2½ hrs. to change out sond line and FL back up to 3200' FS. Swabbed total 4 bbls. load and 37 bbls. formation fluid, oil and water.
- 3-26-78 TD 5003' dolo., shut down. At 8:00 AM, FL 3000'FS. Swab 39 bbls. fluid in 9 hrs., est. 40% oil and 60% SW.
- 3-27-78 TD 50031, dolo., prep to run rods and pump. Shut down for Sunday.
- 3-28-78 TD 5003' dolo., prep to pull tubg. & pkr. and run rods & pump. Swabbed 30 bbls. fluid in 10 hrs. No est. of oil-water cut.
- 3-29-78 TD 50031 dolo., prep to spaceout pump. Ran tubg., rods and pump.
- 3-30-78 TD 5003' dolo., prep to install pumping unit. Taking run as follows: 159 joints 2 3/8", 8 rd., 4.7#, J-55, total of 4991.96', set at 5002' RKB w/ seating nipple at 4967' RKB. Ran rods and 2"x1\frac{1}{2}" x 16'-pump.
- 3-31-78 TD 5003' dolo., rigging up pump.
- 4-1-78 TD 5003' dolo., rigging up pump.
- 4-2-78 TD 5003' dolo., started pumping @ 4:00 PM, 4-1-78.
- 4-3-78 TD 5003' dolo., testing. Pumped 34 bbls. load oil in 16 hrs.

- 5-8-78 TD 4950' lm., moving out rotary rig.
- 5-9-78 TD 4950 1m., WOCU.
- 5-10-78 TD 4950', lm., WOCU. Set anchors and moved-in test tank.
- 5-11-78 TD 4950' lm., WOCU. Welded on bell nipple & moved-in tubg. Completion unit broke down one mile from location.
- 5-12-78 TD 4952' lm., prep to re-run tubg. & circulate hole with oil.
 Rigged up Pool Co. unit & ran 2 3/8" tubg. w/ 12 drill collars
 and 4 3/8" Walker bit. Tagged cement and drilled plug, insert
 float, 27' of cement, guide shoe and 2' of formation. Pulled tubg.
 to change bit. Shut down overnight.
- 5-13-73 TD 4984', dolo., prep to drill. Re-ran tubg., collars and Hughes. J-55, 4 3/4" bit. Drilled from 4952' to 4984'.
- 5-14-78 TD 4991' dolo., shut down. Drilled from 4984' to 4991'. Circulated hole clean. Ran Dresser Atlas Gamma Ray, Compensated Neutron log.
- 5-15-78 TD 4991' dolo., prep to re-run tubg. and swab test.
- 5-16-78 TD 4991' dolo., prep to swab. Ran 156 joints 2 3/8" tubg. w/RTTS pkr. Set tubg. @ 4965' RKB w/pkr. set @ 4874' RKB. Swabbed tubg. capacity plus est. 2 bbls. formation oil. Broke off bottom part of swab mandrel. Pulled and re-ran tubg. and pkr. @ same depth setting. Recovered broken swab. Spotted acid over open hole. Acidized w/2000 gals. 15% N.E. acid. Formation began taking fluid @ 2200# and increased rate to 2.5 BPM @ 2750#. Max. treat. press. 3100# (on flush), min. treat. press. 2200#, aver. treat. press. 2670#, aver. inj. rate 2.17 BPM. ISDP 2450#, 5 min. SIP 2400#, 10 min. SIP 2350#, 15 min. SIP 2250#. Total load 70 bbls. (20 bbls. oil & 46 bbls. acid). Shut-in overnight.
- 5-17-78 TD 4991' dolo., prep to swab. At 8:00 AM, SITP Of. Hole full of fluid. Swabbed 22 BLO & 20 BLW in 8½ hrs. Lack 28 BLW. FL 4700' FS lost swab run. Well making some gas with each swab run.
- 5-18-78 TD 4991' dolo., testing. Swabbed 12 BO & 11 BLW in 8½ hrs. Lack 17 BLW.

- 12-3-77 TD 5000', dolo., prep. to swab. Acidized open hole 4960'5000' w/ 2000 gals. 15% NE acid. Formation began feeding
 @ 1/4 BPM @ 2300 #, increased rate to 1 BPM & press, increased
 to 2600 #, increased rate to 1 3/4 BPM & press, increased
 to 3000 #. Formation did not break. ISDP 2700 #, 5 min. SIP
 2300 #, 10 min. SIP 2100 #, 15 min. SIP 1900 #. Total load
 68 bbls. Began swabbing @ 3:00 PM. Swab 43 bbls. load in
 1 1/2 hrs. Shut down overnight.
- 12-4-77 TD 5000' dolo., shut down. At 7:30 AM, 12-3-77, FL 1300' FS. Swab 107 bbls. fluid in 9 hrs. being 25 bbls. load & 82 bbls. new oil. Last hour swabbed 9 BO, no water w/FL 3000' FS. Shut down till Monday morning.
- 12-5-77 TD 5000' dolo., prep to cement upper stage of production casing. At 7:30 AM, FL 2500' FS. Swab 47 BO in 4 hrs. Last hour (10:30 AM to 11:30 AM) swabbed 8 BO, no water w/ small amount of gas.
- 12-6-77 TD 5000' dolo., WOC. Pulled tubg. & pkr. Ran bridge plug & tool to shift DV tool. Set BP @ 2285' & spotted 2 sx. sand on top of BP. Opened DV tool @ 2195'. Broke circulation & cemented w/ 450 sx. HOWCO lite cement w/ 3/4 of 1% CFR-2 & 8# salt per sx. Circulated 79 sx. cement. Closed DV tool & press. tested csg. to 1500# for 30 min., held OK. Reversed sand off BP, retrieved BP and pulled tubg.
- 12-7-77 TD 5000' dolo., prep to run rods & pump. Ran 161 joints 2 3/8", 4.7#, upset tubg. (4950.54'), 1 seating nipple (1.10'), 1 perf. jt. (3.00') & 1 jt. tubg for mud anchor (3162'), total of 4986.26', set @ 4994.26' RKB.
- 12-8-77 TD 5000' dolo. Ran rods & pump.
- 12-9-77 TD 5000' dolo. Moved in & set-up tanks.
- 12-10-77 TD 50001 dolo. Set pumping unit.
- 12-11-77 TD 5000' dolo. Shut -down.
- 12-12-77 TD 5000' dolo. Laying flow lines & hooking up tank battery.
- 12-13-77 TD 5000' dolo. Hooking up tank battery.
- 12-14-77 TD 5000' dolo. Hooking up tank battery.
- 12-15-77 TD 5000 dolo. Sand Hasted and coated tanks.

TABLE OF CONTENTS

1.	Letter of Application for Salt Water Disposal	1
2.	MOCC Form C-108	2
3.	Santa Fe Well #2 Pertinent Information	3
4.	Water Analysis	4
5.	Area Plat	· 6
6.	Well Profile of Proposed Disposal Well	Ź
7	Santa Fe Well #2 Location Plat	8
8.	Waivers from Offset Operators	9
9.	Tabular Summary of Surrounding Wells	12
10.	Fracture Gradient Table	14
11.	Friction Table	16
12.	Surface Injection Pressure Table	18
13.	Structure Map	19
14.	Cross Sections a) South - North Cross Section b) West - East Cross Section	20 21
15.	Production History of Proposed Salt Water Disposal Well a) Table b) Graph	22 24
16.	Acid Stimulation Reports	26

Exhibit 1 Case 6446



Flag-Redfern Oil Company

1200 WALL TOWERS WEST . MIDLAND, TEXAS 79701 . PHONE (915) 683-5184

Mailing address: P. O. Box 23 Midland, Texas 79702

January 26, 1979

File

New Mexico Oil Conservation Commission P. O. Box 2088 State Land Office Building Santa Fe, New Mexico 87501

Attention: Mr. D. S. Nutter Chief Engineer

Re: Confirmation of Hearing
Application for Salt Water
Disposal Permit
Sante Fe Well #2
Fee Lease
Dickinson (San Andres) Field
LeasCounty, New Mexico

Dear Mr. Nutter:

This letter will serve to confirm Flag-Redfern Oil Company's request for a hearing for a salt water disposal permit for the above captioned well. Attached is Form C-108 with all necessary attachments.

It is our understanding that the hearing will be on February 14, 1979. Please acvise us of the time and location where this hearing is to occur.

Thank you for your cooperation in this matter.

Sincerely,

There farler

Steve Rossler Petroleum Engineer

SWR/dlp

NEW MEXICO OIL CONSERVATION COMMISSION

APPLICATION TO DISPOSE OF SALT WATER BY INJECTION INTO A POROUS FORMATION

OPERATOR		reservir alar kirkeriskan saari sereda. Manje dia seredak abagira mejangan	TARBETT	Term - department of the same of			
Flag-Redfern Oil Compa	anv			Enw 23	Midland,	Tava	79709
CEASE HAVE	111111111111111111111111111111111111111	WELL NO.	- inica	טיא בי	ilia falla	1 70 70 70	COUNTY
Sante Fe		2	Dicki	neon (Si	en Andres)	······································	Lea
	n	660	n	-	Nonth		660
UNIT LETTER	<u>D</u> , *	ELF IR COCALIO "		POLITHE	NOTEH	INE AND.	FEET FROM T
West LINE, SECTION	35 10	whenle 10-S	**** 36	- E	apu.		
			NO TUBING DA				
NAME OF STRING	#12E	SETTING DEPTH	BACKS CEM	ENT	TOP OF CEME	NY	TOP DETERMINED BY
BURFACE CASING							
	8-5/8"	415	250		Surface		Cement Circulated
INTERMEDIATE							
	None						·
LONG STRING				-			Calculated using
TU STNG	4-1/2"	5085'	250	N. B. S. C. A. S. C.	4060'		Log Caliper
		1					
WAME OF PROPOSES INJECTION FOR MATTE	2-3/8"	4934'	Baker Lok		t @ 4900'	807764	OF FORMATION
							The state of the s
San Andres To Indection through tusing, casing,	M ANGULUST	PERFORATIONS o	4213'		ERVAL(B) OF INJE		drilled thru
Through Tubing		Perforati	ione	4969	' - 4984'		
Through Tubing	IF ANSWER 16	HO, FOR WHAT PURPOSE				HAS WE	LL EVER BEEN PERFORATED IN A PHER THAN THE PROPOSED INJEC-
No	For Di	1 Production				TION ZO	THER THAN THE PROPOSED INJEC-
LIST ALL SUCH PERFORATED INTERVALS	AND SACES OF C	EMENT USED TO SEAL OF	F OR SQUEEZE EAC	н		-	
4968 - 4998 squeezed w	/150 sx o	f Class "C"					
DEPTH OF SCTTOM OF DEEPEST PRESH WATER ZONE IN THIS AREA	· · · · · · · · · · · · · · · · · · ·	DEPTH OF BOTTOM OF H	EXT HIGHER		DEPTH OF TOP	OF NEX	LOWER
Triassic @ 1200'		None within		dius	1010 011 012	274E 144 71	11,263
ANTICIPATED BAILT MINIMUM	MAXIMUM	SPEN ON CLOSED	TYPE SYSTEM	IS INJECTI	ON TO BE BY GRAV	/1TY 09	APPROX. PRESSURE (PS)
**************************************	100	Closed		Pre	essure	_ /	1308
ANSWER YES OR NO WKETHER THE FOLLO ENALIZED TO SUCH A DEGREE AS TO BE U STOCK, GRRISATION, OR STHER GENERAL	WIRE WATERS AR	E MIN- WATER T	O BE DISPOSED OF	HATURAL Y	MATER IN DISPO-	ARE WA	TE AMALYSES ATTACHED?
		, 101			Yes	' Ye	8
NAME AND ADDRESS OF SURFACE OWNER							
Harding Burris, Box 97	Elida,	New Mexico 881	116				
					.		00001
Read & Stevens, Inc	BOX 2126	, 314 Security	Nat'I BK	. Roswe	ell, New M	exico	88201
: 	1716	Danuall Man	Manual 001	201			
Lawrence C. Harris - E	OX 1/14 -	KORMSII, NEW	MEXICO 00	201			
Holly Energy Inc 20	M1 Beven	Tower Suite	2680 - Doll	lee TY	75201		
mary mersy inc 20	AT DESERT	Tower, Durce t	LVV - Dal	Luo, IA	7,72,72		· · · · · · · · · · · · · · · · · · ·
MGF 011 Corp 700 Va	ughn Ride	Midland. TY	79701				
		.,					
MAYE COPIES OF THIS APPLICATION SEEN DENT TO EACH OF THE POLLOWING?	SURFACE OWN	ER	EACH OPERAT		ME-HALF MILE	THE NEY	MEXICO STATE ENGINEER
	Yes	· ·	Yes			Yes	
ME THE POLLOWING ITEMS ATTACHED TO MISS APPLICATION (SEE MALE 701-8)	PLAT OF AREA		ELECTRICAL	L06 .	1	DIAGRAN	IMATIC SKETCH OF WELL
	Yes		Yes			Yes	
I hereby certi	fy that the inf	ormation above is tru	e and complete	to the be	st of my knowle	edge an	d belief.
						_	
Mus Koos	w	Petroleu	m Engineer	<u> </u>		1-	26-79
(Signature)			(Title)				(Date)

The leasely	Petroleum Engineer	1-26-79	1 4
(Signature)	(Title)	(Date)	

NOTE: Should watvers from the State Engineer, the surface owner, and all operators within one-half mile of the proposed injection well. not accompany this application, the New Mexico Oil Conservation Commission will hold the application for a period of 15 days from the date of receipt by the Commission's Santa Fe office. If at the end of the 15-day waiting period no protest has been received by the Santa Fe office, the application will be processed. If a protest is received, the application will be set for hearing, if the applicant so requests, SEE RULE 701.

SANTE FE WELL #2

Pertinent Information

- 1.) <u>Disposal Zone</u>: San Andres
- 2.) Depth of Disposal Zone: 4969' 4984'
- 3.) Type of Disposal Fluid: Produced San Andres Water
- 4.) Anticipated Disposal Volumes:

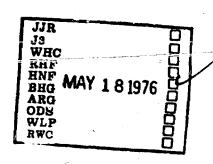
 Minimum = 50 Bbls water per day

 Maximum = 100 Bbls water per day
- 5.) Source of Disposal Fluid:
 - a. Flag-Redfern Oil Company:
 Sante Fe
 1F 35 10S 36E 14 BWPD
 3E 35 10S 36E 21 BWPD
 Total Lease = 35 BWPD
 - b. Read and Stevens Inc.
 Fawn Cherie
 1M 26 10S 36E 25 BWPD Est.*
 Sante Fe
 4K 35 10S 36E 16 BWPD
 5C 35 10S 36E 25 BWPD Est.*
 Total Read & 66 BWPD
 3tevens

* These 2 wells have been assigned a temporary completion and currently have suspended operations. When they are completed the produced San Andres water that they produce will be disposed in the proposed Sante Fe #2 Salt Water Disposal Well.

UNIVERSAL TREATING COMPANY Inc. BOX 1146 LEVELLAND, TEXAS

REPORT OF WATER ANALYSIS



Company Flag=Redfern Oil Comp	Analys	is Date May 15, 1976	
Sample marked Santa Fe 19			· .
	e Harana		
	Milligrams Per Litèr	* *	Milligrams Per Liter
Chloride (NaCl)	194,000	Calcium (Ca++)	
Total Hardness (CaCO3)	73,000	Magnesium (Mg++)	
Calcium Handriess (CaCO3)	41,000	Sodium (NA++)	
Total Alkalinity (CaCO3)	300	Carbonate (Co3-)	
Acidity to Phenolphthalein (CaCO3)_	360	Bicarbonate (HCo ₃)	
Sulfate (Na2SO4)	1,985	Sulfate (SO ₄)	
Total Iron (Fe)	9.2	Iron (Fe)	
P. H. 5.5 Specific Gravity	1.165	Chloride (CL-)	· · · · · · · · · · · · · · · · · · ·
Remarks Indicates formation water	r.		

		Rufus L. Morgi Analysi	an

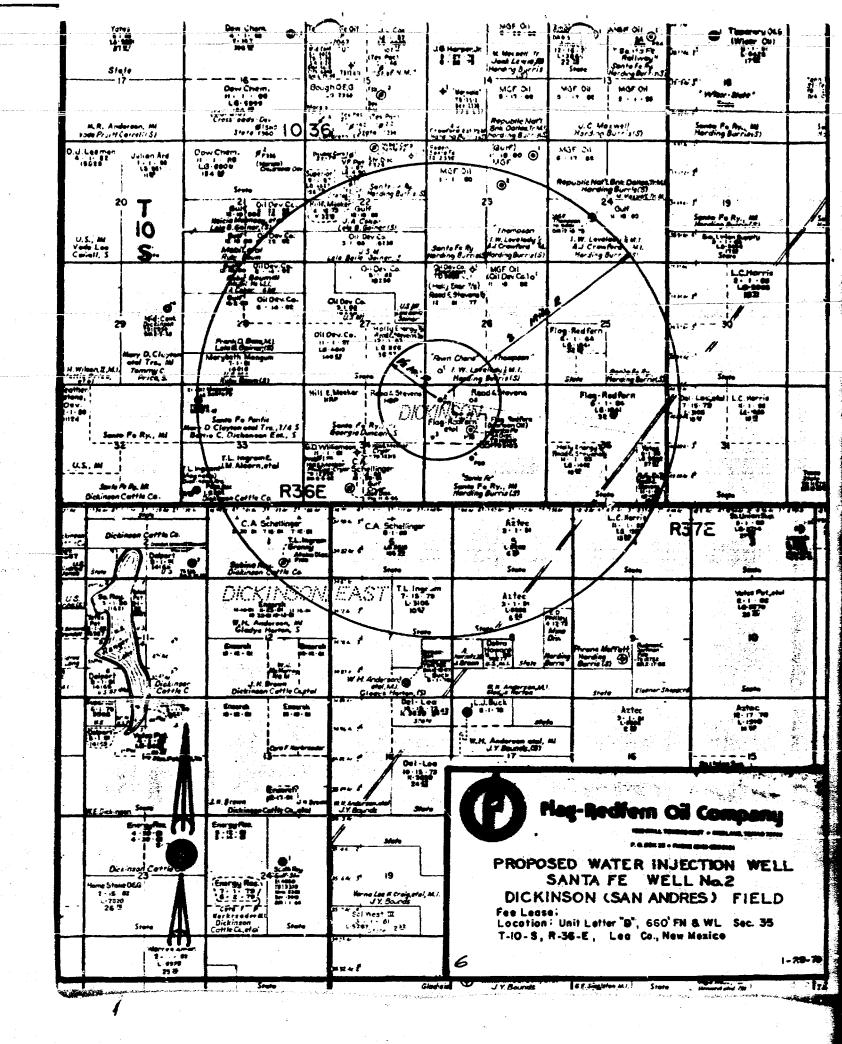


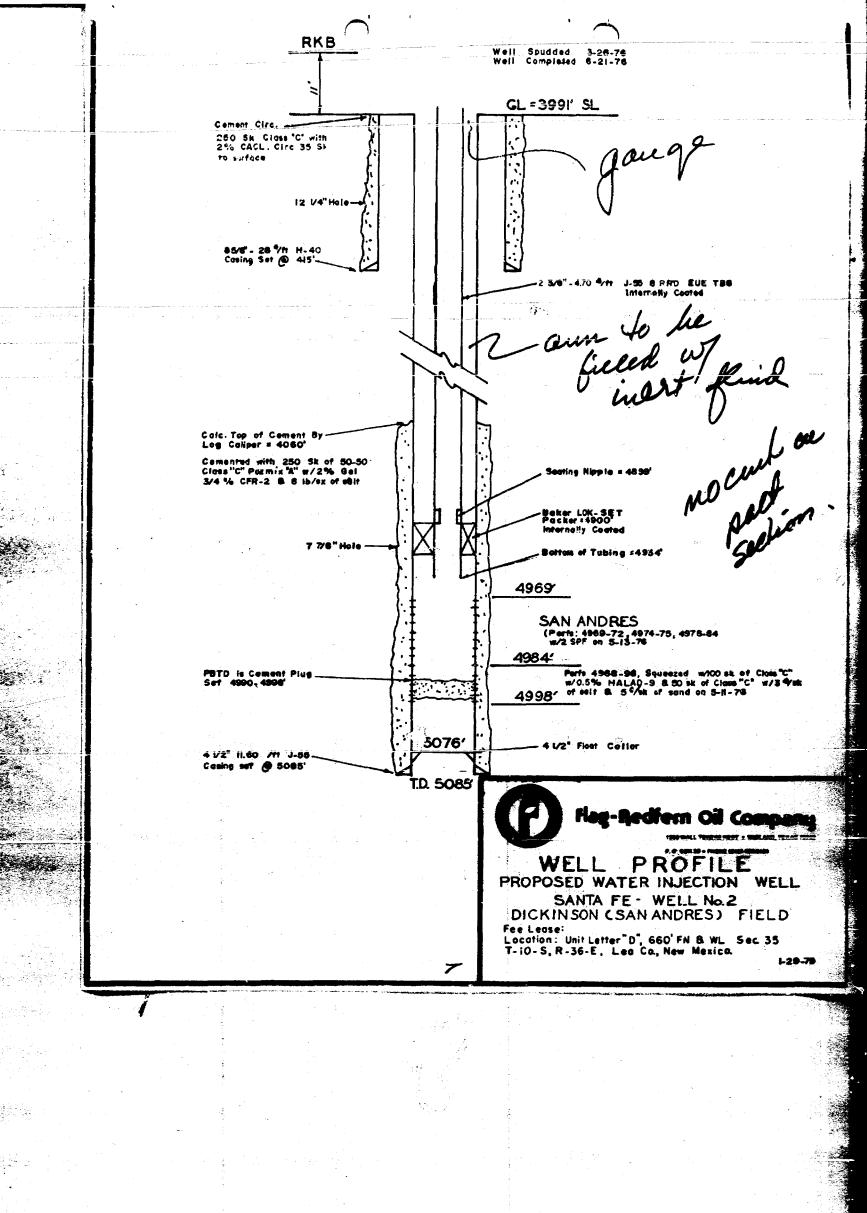
TRETOLITE DIVISIO 369 Marshalf Avenue / Saint Louis, Missouri 63118 (314) WO 1-3500/TWX 910-780-1860/Telez 44-2417

. 0 0 0 0 0 0 JIII USB ENG TEB 1 1979 GEO LDL ACCT

WATER ANALYSIS REPORT

COMPANY Flag-Redfern Oil C	Company	ADDRESS	Tatum, N.	м	DATE:	1-31-79
SOURCE Santa Fee # 2			MPLED1-29		ANALYSIS	13682
Analysis		UAIE SA		= PPM	NO 'Meq/l	13002
1. pH6.5	32		-		·	
2. H ₂ S (Qualitative) Pos			. ,		and the second	W1 1 2
						
			205,366			
4. Dissolved Solids 5. Suspended Solids			_205,500	- -		
						
6. Phenolphthalein Alkalinity	4.	•	620			
7. Methyl Orange Aikalinity (C	CoCO ₃)		756			
8. Bicarbonate (HCO ₃)		HCO,		÷61:	12.4	HCO;
9. Chlorides (CI)	-	CI	122,897		3,462	CI
10. Sulfates (SO ₄)		so.	2,225	÷48	46	so,
11. Calcium (Ca)	•	Co	4,000	÷20	200	Co
12. Magnesium (Mg)	est ^{er}	Mg	972	÷12.2	80	Mg
13. Total Hardness (CaCO ₁)	~		14,000			
14. Total Iron (Fe) 15. Barium (Qualitative) 16. Strontium			7.0			
14. Total Iron (Fe) 15. Barium (Qualitative)	PROBABLE MIN	IERAL COM				
14. Total Iron (Fe) 15. Barium (Qualitative) 16. Strontium *Milli equivalents per liter	•	IERAL COM	POSITION		(Meq/L	= Mg/L
14. Total Iron (Fe) 15. Barium (Qualitative) 16. Strontium	PROBABLE MIN		POSITION d Equi	v. Wt. X	Meq/L 12.4	= Mg/L _1,004
14. Total Iron (F6) 15. Barium (Qualitative) 16. Strontium *Milli equivalents per liter	HCO ₃ 12.4	Compound	POSITION d Equi			
14. Total Iron (Fe) 15. Barium (Qualitative) 16. Strontium *Milli equivalents per liter Ca Mg Mg	HCO ₃ 12.4 SO ₄ 46	Compound Ca (HCO ₃	POSITION d Equi	11.04	12.4	1,004
14. Total Iron (Fe) 15. Barium (Qualitative) 16. Strontium *Milli equivalents per liter 200 80 3,240 Na	HCO ₃ 12.4 SO ₄ 46 CI 3.462	Compound Ca (HCO ₃ Ca SO ₄	POSITION d Equi	81.04 58.07	12.4	
14. Total Iron (Fe) 15. Barium (Qualitative) 16. Strontium *Milli equivalents per liter 200 80 Mg Na Na	HCO ₃ 12.4 SO ₄ 46 CI 3.462	Compound Ca (HCO ₃ Ca SO ₄ Ca Cl ₂	POSITION d Equi	11.04 58.07 55.50	12.4	
14. Total Iron (Fe) 15. Barium (Qualitative) 16. Strontium *Milli equivalents per liter 200 80 Mg 3,240 Na Saturation Values Distilled (Ce CO ₂ 13 A	HCO ₃ 12.4 SO ₄ 46 CI 3.462	Compound Ca (HCO ₃) Ca SO ₄ Ca Cl ₂ Mg (HCO ₃)	POSITION d Equi	11.04 58.07 55.50 73.17	12.4	
14. Total Iron (Fe) 15. Barium (Qualitative) 16. Strontium *Milli equivalents per liter 200 80 3,240 Na Saturation Values Distilled (Ce CO ₂ 13 A	HCO ₃ 12.4 46 3.462 Water 20°C	Compound Ca (HCO ₃) Ca SO ₄ Ca Cl ₂ Mg (HCO ₃)	POSITION d Equi	31.04 38.07 35.50 73.17 60.19	12.4 46 142	
14. Total Iron (Fe) 15. Barium (Qualitative) 16. Strontium *Milli equivalents per liter 200 80 3,240 Na Saturation Values Distilled (Ce CO ₂ 13 A Ca SO ₄ • 2H ₂ O 2,090	HCO ₃ 12.4 46 3.462 Water 20°C Mg/L 0 Mg/L	Compound Ca (HCO ₃ Ca SO ₄ Ca Cl ₂ Mg (HCO ₃ Mg SO ₄ Mg Cl ₂	POSITION d Equi	31.04 58.07 55.50 73.17 60.19	12.4 46 142	
14. Total Iron (Fe) 15. Barium (Qualitative) 16. Strontium *Milli equivalents per liter 200 80 3,240 Na Saturation Values Distilled (Ce CO ₂ 13 A Ca SO ₄ • 2H ₂ O 2,090	HCO ₃ 12.4 50 ₄ 46 3.462 Water 20°C Mg/L 0 Mg/L	Compound Ca (HCO ₃) Ca SO ₄ Ca Cl ₂ Mg (HCO ₃) Mg SO ₄ Mg Cl ₂ Na MCO ₃	POSITION d Equi	31.04 58.07 55.50 73.17 60.19 77.62	12.4 46 142	
14. Total Iron (Fe) 15. Barium (Qualitative) 16. Strontium *Milli equivalents per liter 200 80 3,240 Na Saturation Values Distilled Ce CO ₂ 13 A Ca SO ₄ • 2H ₂ O 2,099 Mg CO ₃ 103	HCO ₃ 12.4 50 ₄ 46 3.462 Water 20°C Mg/L 0 Mg/L	Compound Ca (HCO ₃) Ca SO ₄ Ca Cl ₂ Mg (HCO ₃) Mg SO ₄ Mg Cl ₂ Na MCO ₃	POSITION d Equi	\$1.04 \$8.07 \$5.50 \$3.17 \$0.19 \$7.62 \$4.00	12.4 46 142 80	
14. Total Iron (Fe) 15. Barium (Qualitative) 16. Strontium *Milli equivalents per liter 200 80 3,240 Na Saturation Values Distilled Ce CO ₂ 13 A Ca SO ₄ • 2H ₂ O 2,099 Mg CO ₃ 103	HCO ₃ 12.4 50 ₄ 46 3.462 Water 20°C Mg/L 0 Mg/L	Compound Ca (HCO ₃) Ca SO ₄ Ca Cl ₂ Mg (HCO ₃) Mg SO ₄ Mg Cl ₂ Na MCO ₃	POSITION d Equi	\$1.04 \$8.07 \$5.50 \$3.17 \$0.19 \$7.62 \$4.00	12.4 46 142 80	
14. Total Iron (Fe) 15. Barium (Qualitative) 16. Strontium *Milli equivalents per liter 200 80 Mg 3,240 Na Saturation Values Distilled (Ce CO ₂ 13 A Ca SO ₄ • 2H ₂ O 2,096 Mg CO ₃ 103 REMARKS (2) Rossiler	HCO ₃ 12.4 46 3.462 Water 20°C Mg/L 0 Mg/L Mg/L	Compound Ca (HCO ₃) Ca SO ₄ Ca Cl ₂ Mg (HCO ₃) Mg SO ₄ Mg Cl ₂ Na MCO ₃	POSITION d Equi	\$1.04 \$8.07 \$5.50 \$3.17 \$0.19 \$7.62 \$4.00	12.4 46 142 80	
14. Total Iron (Fe) 15. Barium (Qualitative) 16. Strontium *Milli equivalents per liter 200 80 3,240 Na Saturation Values Distilled (Ce CO ₃ 13 A Ca SO ₄ • 2H ₂ O 2,096 Mg CO ₃ 103	HCO ₃ 12.4 46 3.462 Water 20°C Mg/L 0 Mg/L Mg/L	Compound Ca (HCO ₃) Ca SO ₄ Ca Cl ₂ Mg (HCO ₃) Mg SO ₄ Mg Cl ₂ Na MCO ₃	POSITION d Equi	\$1.04 \$8.07 \$5.50 \$3.17 \$0.19 \$7.62 \$4.00 \$1.03 \$8.46	12.4 46 142 80	





All distances must be from the outer boundaries of the Section Operator Well No. Hanson Oil Corporation Santa Fe Township Unit Letter County 10 South 36 East D Lea Actual Footage of Well: 660 North 660 West leet from the Ground Level Elev. Producing Formation Dedicated Acreage: 3990.7 1. Outline the acreage dedicated to the subject well by colored pencil or hachure marks on the plat below. 2. If more than one lease is dedicated to the well, outline each and identify the ownership thereof (both as to working interest and royalty). 3. If more than one lease of different ownership is dedicated to the well, have the interests of all owners been consolidated by communitization, unitization, force-pooling. etc? If answer is "yes," type of consolidation. Yes No If answer is "no," list the owners and tract descriptions which have actually been consolidated. (Use reverse side of this form if necessary.). No allowable will be assigned to the well until all interests have been consolidated (by communitization, unitization, forced-pooling, or otherwise) or until a non-standard unit, eliminating such interests, has been approved by the Commis-CERTIFICATION I hereby certify that the information contained harein is true and complete to the best of my knowledge and belief. Position Date February 22, 1976

I have no objections to Flag-Redfern Oil Company's proposed salt water application for their Sante Fe Well #2 in the Dickenson (San Andres) Field, Lea County, New Mexico.

2/5/79 Date

Read & Stevens, Company

I have no objections to Flag-Redfern Oil Company's proposed salt water application for their Sante Fe Well #2 in the Dickenson (San Andres) Field, Lea County, New Mexico.

May Mune Cotton

2-5-79 Date

Company C. Harris

I have no objections to Flag-Redfern Oil Company's proposed salt water application for their Sante Fe Well #2 in the Dickenson (San Andres) Field, Lea County, New Mexico.

MGF oil cap

TABULAR SUMMARY OF ALL WELLS WITHIN ONE-HALF MILE OF FLAG-REDFERN OIL COMPANY'S SANTE FE WELL #2 PROPOSED SALT WATTER DISPOSAL WELL

Operator & Well Name	Location	Total Depth	Producing Formation and Interval	Surface Casing	Production Casing
Flag-Rediern 0il Co. Sante Fe Well #2 Proposed Misposal Well	660' FN & WL Unit Letter D Sec. 35, T-10-S, R-36-E	5085' RKB EL.≡ 4002'	San Andres 4669 - 4984' (Sub-sea = -967 to -982') Perfs 4968' - 4998' were previously squeezed off with 150 sx of Class "C"	8-5/8" set @ 415' Cemented w/250 sx Class "C" w/2% CaCl. Circ 35 sx to surface.	4½" set @ 5085'. Cemented of 50-50 Class "C" - Posmix Gal, 3/4% CFR-2 & 8 lb/ex o Top of cement @ 4060', calc from Log Caliper.
Flag-Redfern Oil Co. Sante Fe Well #1	1980' FN & WL	10,800'	San Andres 4933 - 4945'	12-3/4" set @ 370". Ce-	Cement Plugs in uncased 7-7
by Hanson Oil Corp.) Field Discovery Well	Nec. 33, I-10-8, R-36-E Southeast Offset to Proposed Disposal Well	4952' RK& EL.= 3999'	(Sub-sea = -934 to -946') EZSV Cement Retainer set @ 4962'. Perfs 4996 - 5020' squeezed w/150 sx of Class "C" - 3-9-77. Perfs 4935 - 4957' squeezed w/100 sx of Class "C" - 3-13-77.	"H" v/2% CaCl. Circ 50 sx to surface. 8-5/8" set @ 4300'. Cemented w/300 sx of Hall1 Lt. Wt. w/8#/sx of Salt followed by 200 sx of Class "C" w/2% CaCl. Top of cement = 1970', calculated using 70% fillup.	2) 35 sx from 9140'-9035'. 3) 35 sx from 7754'-7649'. 4) 35 sx from 5683'-5584'. 5½' casing set @ 5103'. Ces w/325 sx of Class "C" w/0.4? Top of cement @ 3196', calcufrom Log Caliper.
Flag-Redfern 011 Co. Sante Fe Well #3	330' FWL & 2310' FNL Unit Letter E Sec. 35, T-10-S, R-26-E South Offset to Proposed Disposal Well	4985' RKB EL.= 4002'	San Andres 4953 - 4982' (Sub-sea = -951 to -980')	8-5/8" set @ 360'. Cemented w/250 sx of Class "H" w/2% CaCl. Circulated 50 sx to surface.	4½" set @ 4985'. Cemented of sx of Class "H" w/2% Gel, 0 and 8#/sx of Salt. Top of 4155, calculated from Log C 4½" Multi stage Tool @ 2260 mented w/550 sx of Halli Lt 0.4% CFR-2 & 8#/sx of Salt.

d w/250 sx ix "A" w/2% c of Selt. lculated

Cemented
.4% CFR-2. 7/8" hole: (105') (105') (105') (99')

Caliper. 0.75% CFR-2 Ce-

TABULAR SUMMARY OF ALL WELLS WITHIN ONE-HALF MILE OF FLAG-REDFERN OIL COMPANY'S SANTE FE WELL #2 PROPOSED SALT WATER DISPOSAL WELL

Read & Stevens Inc. 1980' 1 Sante Fe Well #4 Unit La R-36-E Over % Dispose	Read & Stevens Inc. 660' Fl Sante Fe Well #5 Unit La R-36-E East Of Fropose Well	Read & Stevens Inc. 660' F: Fawn Cherie Well #1 Unit La Sec. 20 R-36-E North (Propose	Well Name Loca
1980' PS & WL Unit Letter K Sec. 35, T-10-S, R-36-E Over % mi. South- east from Proposed Disposal Well	660' FNL & 1980' FWL Unit Letter C Sec. 35, T-10-S, R-36-E East Offset to Proposed Disposal Well	060' FS & WL Unit Letter M Sec. 26, T-10-S, R-36-E North Offset to Proposed Disposal Well	Location
5000' RKB EL.= 3999'	4991° RKB EL.≔ 3991'	5013' RKB EL.= 4004'	Depth
San Andres 4960'-5000' O.H. (Sub-sea = -961' to -1001')	San Andres 4950'-4991' O.H. (Sub-sea = -959 to -1000')	San Andres 4955'-5013' O.H. (Sub-sea = -951 to -1009)	and Interval
8-5/8" set @ 348' Cemented w/225 sx of Class "C" w/2% CaCl. Circ 25 sx to surface.	8-5/8" set @ 373' Cemented w/225 sx of Class "C" w/2% CaCl. Circ 34 sx to surface.	8-5/8" set @ 360' Cemented w/225 sx of Class "C" w/2% CaCl. Circ 89 sx to surface	Surface Casing
5½" set @ 4960'. Cemented w/100 sx of Class "C" cament w/0.75% CFR-2. Calculated Top of Cement using 70% Fillup efficiency = 4447'. Multi-stage cement tool set @ 2200'. Cemented w/450 sx of Halliburton Light Weight w/8#/sx of Salt and 0.75% CFR-2. Circulated 79 sx cement to surface.	5½" set @ 4950'. Cemented w/100 ax of Class ""H" w/0.75% CFR-2. Calculated Top of Cement using 70% Fillup efficiency = 4492'. Multi-stage cement tool set @ 2196'.	5½" set @ 4955'. Cemented w/100 axe of Class "H" w/0.75% CFR-2. Calculated Top of Cement using 70% Fillup efficiency = 4497'. Multi-stage cement tool set @ 2025'.	Production Casing

ACTURE GRADIENTS - SAN ANDRES FORMATION DICKINSON (SAN ANDRES) FIELD LEA COUNTY, NEW MEXICO

Field Average Disposal Well	Sante Fe Well #4	Sante Fe Well #5	Fawn Cherie Well #1	Sante Fe Well #3	Sante Fe	Sante Fe Well #2 Proposed Disposal Well	Well Name
4952' 4969'	4960'	4950'	4955'	4953'	4933'	4969'	Top Perforation
(Excluding Sa } mile from	12-3-77	5-16-78	3-24-78	11-5-76	3-16-77	5-14-76	(1) Date of Acid Stimulation
Excluding Sante Fe Well #4 due to its have mile from proposed Disposal Well.)	2300	2200	Unknown	1950	1700	1350	Surface Pressure Required to Break Formation PSIG
o its being over	2700	2450	2200	1950	1600	1400	Instant Shut-In Press. PSIG
4027 4027	4689	4435	4187	4139	3780	3596	(2) Formation Fracture Press. PSIG
0.813	0.945	0.896	0.845	0.836	0.766	0.724	Formation Fracture Gradient-PSI
1547 PSIG	2214	1965	1714	1667	1218	1116	San Andres Dis Calc. Surface Su Shut In Press-PSIG*
0.314 0.311 PSI FT.	0.446	0.397	0.346	0.337	0.267	0.225	(3) Disposal Water Surface Shut In Cradient-PSI Pt.

*NOTE: This Table is based on Static (No Injection) Conditions.
For Friction Pressure, See Friction Table

(Based on Shut In conditions with Tubing Loaded with San Andres Disposal Water)

EXPLANATION OF PRACTURE GRADIENT TABLE

- 1. All acid jobs were performed based on the Matrix stimulation technique and hydraulic fracturing was purposely avoided to prevent treating out of zone and stimulating the San Andres water zone, which is encountered 15 feet below the lowest oil productive San Andres zone in these wells.
- 2. Calculation of the San Andres formation fracture pressures were based on the following formula:

PISI = PEF - PH

Where:

PISI = Instant Shut-In Pressure - psig

PBF = Bottom Hole Fracturing Pressure - psig

PH = Hydrostatic Pressure - psig

Reference:

Howard and Fast, Hydraulic Fracturing, Monograph Volume 2. "Mechanics of Hydraulic Fracturing", pg. 100. American Petroleum Institute of Mining, Metalurgical and Petroleum Engineers; Dallas, Texas 1970.

3. San Andres Disposal Water Specific Gravity = 1.150 Fluid Gradient = 0.499 psi

FRICTION TABLE

2-3/8" - 4.70 Lb/Ft Internally Plastic Coated Tubing

VELOCITY Ft/Sec. Bb1/Min Down Tubing		REYNOLD NUMBER	FANNING FRICTION FACTOR	FRICTION* PRESSURE		
0.25 BPM	1.077	2.15 x 104	0.00625	6.7 PST		
0.50 "	2.154	4.29 X 10,	0.00550	23.6 PSI		
0.75 "	3.230	6.44×10^4	0.00500	48.3 "		
1.00 "	4.307	8.58 x 10 ⁴	0.00475	81.6 "		
1.25 "	5.384	1.07 x 10 ²	0.00450	120.8 "		
1.50 "	6.461	1.29 X 105	0.00440	170.0 "		
1.75 BPM	7.537	1.50 x-10 ³	0.00425	223.5 PSI		

* This friction pressure (friction loss) is the differential pressure that will be realized from surface to the top of the disposal zone (4969') when the San Andres disposal water is injected down the 2-3/8" internally plastic coated tubing at the various rates listed above. In other words, with no increase in bottom hole disposal pressure, the surface injection pressure will be increased due to friction by the pressures listed above for their corresponding injection rates.

EXPLANATION OF CALCULATED FRICTION PRESSURE VALUES

1. All friction pressures were calculated using the Fanning Friction Equation* which is:

1/25 = 5/1 No

where:

Friction loss for turbulent flow - PSI, see friction

 \mathcal{F} = Fanning friction factor - see (2.) below

∠ = Depth of tubing = 4969 Ft.

P = Density of fluid = 9.59 1b/gal

V = Velocity of disposal fluid - 7t/Sec, see friction table

Internal diameter of plastic coated tubing = 1.995 in.

property of the second

2. Fanning friction factor (f) is obtained from the attached curve on "Friction factors for clean steel pipe" *using the curve for smooth tubing which is the same as internally plastic coated tubing. In order to utilize this curve, the Reynolds Number must be calculated for each disposal rate. The Reynolds Number Equation* is as follows:

where:

NR = Reynolds number - see friction table

Viscosity of San Andres disposal water = 0.891 centipoises

* REFERENCE:

Craft, Holden and Graves, <u>WELL DESIGN</u>: <u>DRILLING AND PRODUCTION</u>, Chapter One - Fluid Flow in Pipes pp. 18 - 23 Prentice - Hall Inc., Englewood Cliffs, New Jersey 1963.

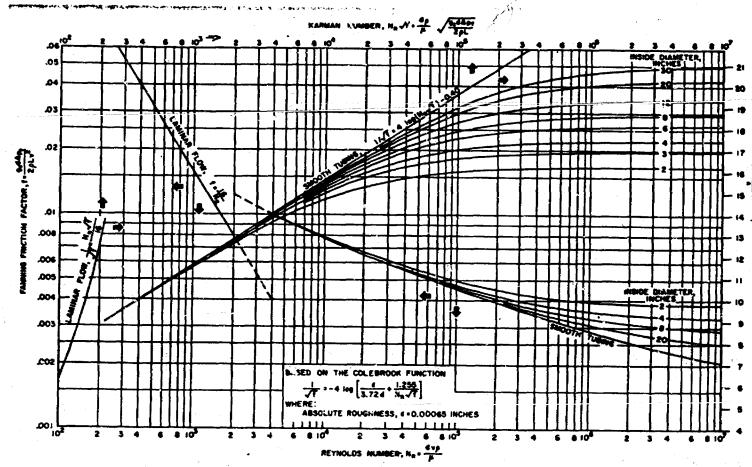


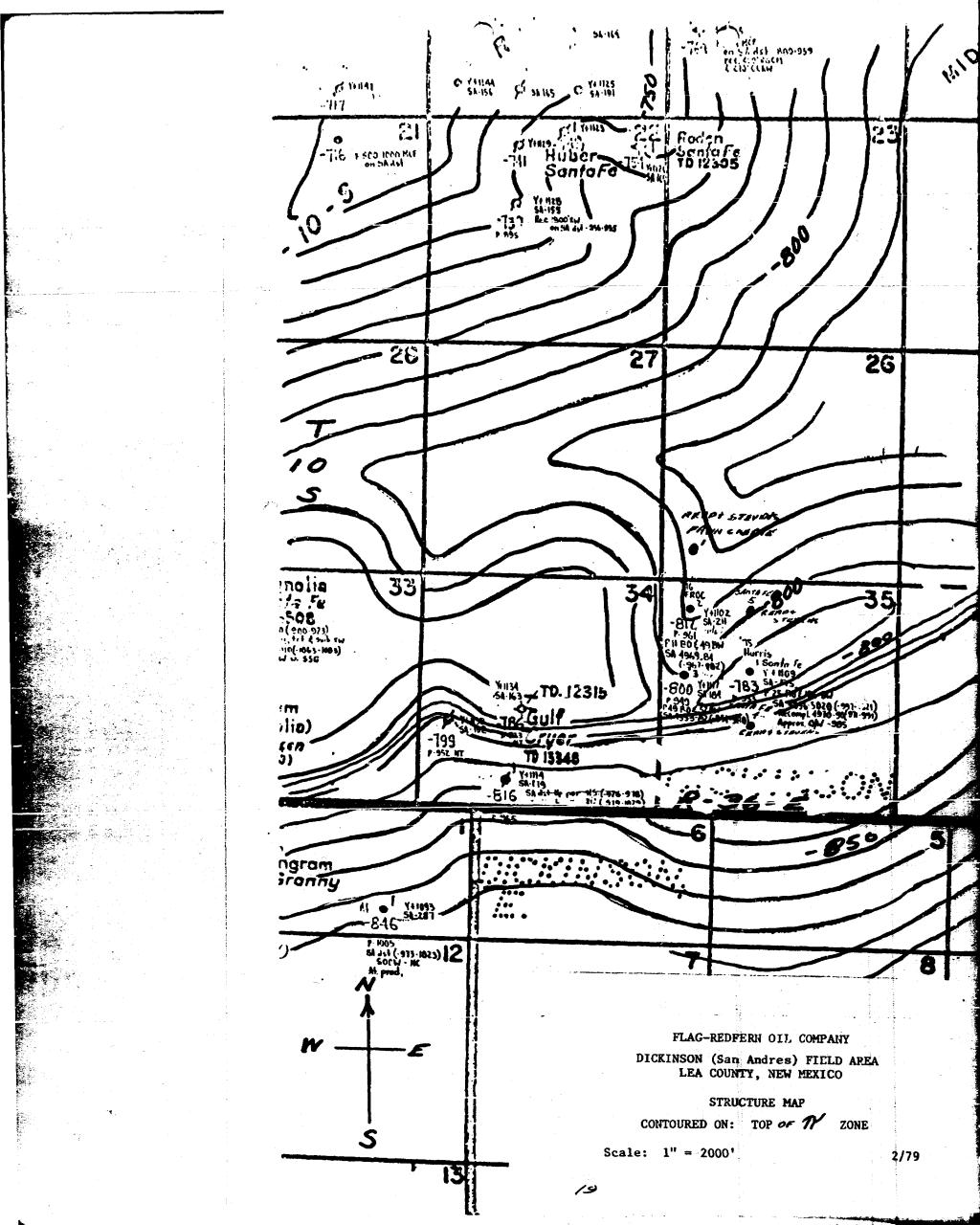
Fig. 1.4 Friction factors for clean steel pipe.

* REFERENCE:

Craft, Holden and Graves, WELL DESIGN: DRILLING AND PRODUCTION, Chapter One - Fluid Flow in Pipes pp. 18 - 23 Prentice - Hall Inc., Englewood Cliffs, New Jersey 1963.

CALCULATED SURFACE INJECTION PRESSURES PROPOSED DISPOSAL WELL SANTA FE WELL #2 DICKENSON (SAN ANDRES) FIELD LEA COUNTY, NEW MEXICO

INJECTION	CALCULATED	CALCULATED	CALCULATED
RATE - bPM	FRICTION	INSTANT	SURFACE
	PRESSURE	SH. T. N	INJECTION
		SURPACE	
-	PSI	PRESSURE - PSIG	PRESSURE - PSIG
0.25	7	1547	1554
0.50	24	1547	1571
0.75	48	1547	1595
1.00	82	1547	1629
1.25	121	1547	1668
1.50	170	1547	1717
1.75	224	1547	1771



SANTA FE LEASE DICKENSON (SAN ANDRES) FIELD LEA COUNTY, NEW MEXICO

PRODUCTION HISTORY

4				
TIME	OIL PROD. BBL/MO.	GAS PROD. MCF/MO.	WATER PROD. BBL/MO.	REMARKS
Jan. 1975	243	178 Est.,	486	1 well Han
Feb.	290	213	580	Oil Co. Op
March	41	30 "	82	orr co. ob
April	160	117 "	320	
May	226	166 "	452	-
June	96	70 "	192	
July	128	94 11	256	
Aug.	45	33 11	90	
Sept	143	105 "	286	
Oct.	41	30 "	82	
Nov.	61	48 19	122	
Dec.	- 5	4 11	10	*
Jan. 1976	77	57 "	154	√.
Feb.	55	40 "	110	1.0
March	33	24 "	66	
April	233	171 "	466	
May	0	0	0	Shut-in
June	0	0	ŏ	Shut-in
July	376	308 Actual	1519	Dilde-III
Aug.	180	147	1519	
Sept.	96	79	1470	Well #1 nov
Set.	184	151	1519	ated by Fla
Mov.	370	200	2940	Fern Oil Co
Dec.	946	433	3038	3 wells
Jan. 1977	941	431	3038	2 Merrs
Feb.	757	346	2744	
March	685	244	2759	
April	894	369	3090	
May	713	427	3193	
June	780	467	3090	
July	696	417	3193	
Aug.	756	452	3193	market en
Sept.	560	336	3090	
Oct.	588	353	3193	
Nov.	474	284	3090	
Dec.	588	350	3193	
Jan. 1978	51,7	310	3193	
Feb.	420	250	2884	
March	346	208	3193	
April	441	265	3090	
May	395	231	3193	
June	370	233	3098	
July	272	171	3193	
Aug.	199	113	3193	
Sept.	266	177	3090	
Oct.	303	182	3193	
Nov.	303	182	3193	And the second of the second
Dec.	182	109	3193	
Jan. 1979	303	182	3193	
\$ 3				
TOTALS	16,778 BBL OIL	9887 MCF	93,524 BBL WAT	ER

SANTA FE WELL #2 DICKINSON (SAN ANDRES) FIELD LEA COUNTY, NEW MEXICO

PRODUCTION HISTORY

TIME	OIL PROD. BBL/MO.	GAS PROD. MCF/MO.	WATER PROD. BBL/MO.
July 1976	376	308	1519
Aug. 1976	180	147	1519
Sept 1976	96	79	1470
Oct. 1976	184	151	1519
Nov. 1976	105	86	1470
Dec. 1976	62	51	1519
Jan. 1977	62	51 ⁽²⁾	1519
Feb. 1977	50	41	1372
March 1977	60	8	2108
April 1977	62	1	2040
May 1977	46	ī	2108
June 1977	50	<u> 1</u>	2040
July 1977	45	ī	2108
Aug. 1977	49	1	2108
Sept. 1977	36	1	2040
Oct. 1977	. 38	1	2108
Nov. 1977	31	1	2040
Dec. 1977	39	1	2108
Jan. 1978	33	1	2108
Feb. 1978	28	1	1904
Mar. 1978	23	1	2108
April 1978	28	1	2040
May 1978	29	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2108
June 1978	23	1	2040
July 1978	15	1	2108
Aug. 1978	16	Ī	2108
Sept. 1978	21	1	2040
Oct. 1978	` 21	1	2108
Nov. 1978	21	1	2108
Dec. 1978	13	1	2108
Jan. 1979	21	1	2138
TOTALS	1863 BBL OIL	960 HCF	59,711 BBL WTR.

id Spot	19	9.45	•	/	Treatment Stage Vo
Acid	50	00 gallo	nsMH-7	ļni vers	sal Treating Co., Inc.
't fold				Box 1146	UNIVERSAL ACIDIZING INC. LEVELLANE, TEXA: Phone 894-8125 Cag. Cap
				The Best	1 Acid Jobs In The Oil Patch
micel					TOPA TIME IOC a
		د			TREATING LUG P
mpany		Tlac Pe	dfarn c	idi Compa	TREATING LOG Date May 14, 1976
	/				We 11 2
tel Dept					SetOpen Hale
					Shots per ftPacker
-	_				Tbg. DepthTbg
					nt
					on via tubing with 500 gallons 20% MR-72 acid. Flus
		with tr			
			Ī		
Time	fbe. PSI	Csg.	Rate B,P.M.	Total Sbis. In Form.	
					Start water via tubing.
12:15 12:30		NG NG			60 bbl water. Start acid to spot.
12:37			 	 	All acid. Start flush.
12:45	200	NG	1		Acid on spot. Pressure formation 1000 PSI.
12:46		1000	 	.;	TROLL ON SPOCE TECNOLOGICAL SOCIAL SO
	1000	1000			Pressure formation to 1000 PSI.
	1200	1200	.06	3	Pressure formation to 1200 PSI.
	1200	1200	.1	4.5	Pressure formation to 1200 PSI.
	1350				Pressure formation to 1350 PSI.
	1250		1	6.5	Formation break 50 PSI While preping.
2:09	1400	1400			Speed pump slightly.
2:12	1500	1500	.25	9	Slow pump.
2:14	1400	1450			Speed pump.
2:18	1450	1450	,5	12	All flush. Shut down.
2:18	1400	1400			Instant Shut Down Pressure.
2123	475	475			5 minute shut down.
					Pressure Faximum 1500 Minimum 1000 Average 117
i				6	Injection Rate Maximum .5 Minimum 06 Average .13
			-		Total load to recover 84 bbl
					Instant Shut Down Pressure 1400
		<u> </u>		 	
				 	Thank you
			L		
 -†		}] /	

pe ≜cid	20%	N.E.	,) N I V C [5	al Treating Co., Inc. Treatment Stage No
't Acid	500			Box 1146 !	LEVELLAND, TEXAS Phone 894-6125 Cag. Cap. 78.
				The Best	Acid Jobs In The Cit Patch Open Hole
				•	TREATING LOG
mpany	F	lag-Red	fern 01	1 Co.	Dete 3-16-77
***		anta Fe			Dete 3-16-77
tel Dopt	h 496	1.5	Ceg.	514 vt.	15.50 Set Thru Open Hole
. Perf.	494	4	to _	4948	Z _{Shots per ft. Pecker None Pecker Tbg. Depth 4959 Tbg. 23g}
				or Treetmen	
e Tresi					00 gallons 20% ###.Non-emulsion Acid
		Spot.	Break fo	<u>ormation</u>	å pub 500 gallons in formation & Swab test.
			Rate	Total Bis. I	
Time	The.	Cap. PSI	8.P.M.	in Form.	
8:30	200				Start Acid to spot
8:45		·			500 gallons Acid in - Start 17.7 bbls. Water
9:00	200				Acid on spot
9:20	1500	1500			Start fromation break
0:00	1600	1600			Continue to pressure formation
0:45	1700	1700			Continue to pressure formation
	1700	1700_			Formation taking fluid
1:50	1700	1600			14 bbls. Flush in - 500 gallons Acid in formation
					M. J
					Maximum PSI 1700 Minimum PSI 1500
					Instant Shut Dom Pressure 1600
					After 15 minutes 800
. 1					Total Fluid 120 bbls.
		3			그 사람은 사람들은 사람들이 되었다. 그는 사람들은 사람들은 사람들은 사람들이 가지 그를 찾는 것 같다.
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CARDINAL CHEMICAL, INCORPORATED SERVICE REPORT

STATION Hobbs, New Mexico

INC. TRI. CO.	COMPANY F	lag-Redfren			STATE New Mexico co	DUNTY Lea
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2 G.11 M-225 TYPE					1.500 20% NM Stabi	lized
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150					3 Cars RD-11	TIPE
10-7/8 LBS Balls (RCN) MATERIAL				1 1	150 the KCL: 2 gals.	LST-5
PUMPS USED ON TBG	and the second s		OVERFLUSH, A.V	احاهط	10-7/8 (Balls (RCN)	
DETAINS GAUGES START PUNISH PUMPS USED ON CSG. PUMPS USED ON C	OTHER INFORMATION	V:	······································		- 	NATERIAL
Time	OII TANK CAUCES S	rt i D'T	FINIEL			
PRESSURES Caims Tabing REMARKS CARDINAL CONNECTIONS TESTED TO THE 2000 PSI CBG PSI	OL TAIR GRODES, S	IANI				
Barrels of Fluid Pumped PSI casing. Start acid down tubing. PSI casing. Start acid down tubing. PSI casing. PSI ca	TIME PRESSU	JRES	DETAIL		KS CARDINAL	
BARRELS OF FLUID PUMPED Per Formation Red in Red in Minute PSI casing	•	•			TBG_200	00 PSI. CSGPSI.
BARRELS OF FLUID PUMPED Per Formation Red in Red in Minute PSI casing	8:00	ARRIVED	ON LOCATION.	Rig u	p Cardinal Equipment	
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8:50 500 Formation Require Minute PSI casing 8:55 500 0						
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Solution After shooting 10 due to slow rate.						balls.
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11:35 700 2000 37 21 ,2 All flush, shut down.					<u> </u>	
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	in the second					

Read & Stevens, Inc.

#1 Fawn Cherie Page 3

- 3-21-78 TD 5000' dolo., prep to drill to 5003' and run log.
- 3-22-78 TD 5003' dolo., prep to run tubg. and pkr. and swab test. Ran Welex Radioactivity log. Note correction on casing setting: Set 5½" @ 4945' due to apparent 18' fillup at time of running casing. Have 7 7/8" hole from 4945' to 4963' and 4 3/4" hole from 4963' to 5003'. When reverse unit drilling commenced bit went to 4963' with no weight. Apparently rotary rig drilling depth was in error.
- 3-23-78 TD 5003' dolo., prep to a cidize. Ran tubg. and pkr. w/ pkr. set @ 4900' and tubg. to 4995'. Swab hole dry and waited 1 hr. Ran swab and hole still dry. Shut down overnight. At 8:00 AM, had 600' fluid in hole. Swabbed hole dry and rec. oily emulsion.
- 3-24-78 TD 5003' dolo., prep to swab. Acidized open hole 4945'-5003' w/
 2000 gals. 15% NE acid and flushed w/ oil. Acid treatment max.
 treat. press. 2200#; min. treat. press. 1200#, aver. inj. rate
 1½ BPM. Oil flush max. press. 3000#, min. press 1200#, aver.
 press. 2200#. ISDP 2200#, 5 min. SIP 2000#, 10 min. SIP 1950#,
 15 min. SIP 1900#. Total load 68 bbls. Bled off press. and swab
 64 bbls. load in 4½ hrs. Had 1400' fluid in hole last swab run.
- 3-25-78 TD 5003' dolo. prep to swab. At 8:00 AM, FL 2400' FS. Swab 3 hrs. and lower FL to 4600' FS. Shut down 2½ hrs. to change out sond line and FL back up to 3200' FS. Swabbed total 4 bbls. load and 37 bbls. formation fluid, oil and water.
- 3-26-78 TD 5003' dolo., shut down. At 8:00 AM, FL 3000'FS. Swab 39 bbls. fluid in 9 hrs., est. 40% oil and 60% SW.
- 3-27-78 TD 50031, dolo., prep to run rods and pump. Shut down for Sunday.
- 3-28-78 TD 5003' dolo., prep to pull tubg. & pkr. and run rods & pump. Swabbed 30 bbls. fluid in 10 hrs. No est. of oil-water cut.
- 3-29-78 TD 5003' dolo., prep to spaceout pump. Ran tubg., rods and pump.
- 3-30-78 TD 5003' dolo., prep to install pumping unit. Taking run as follows:
 159 joints 2 3/8", 8 rd., 4.7#, J-55, total of 4991.96', set at
 5002' RKB w/ seating nipple at 4967' RKB. Ran rods and 2"x12" x 16'
 pump.
- 3-31-78 TD 5003' dolo., rigging up pump.
- 4-1-78 TD 5003' dolo., rigging up pump.
- 4-2-78 TD 5003' dolo., started pumping @ 4:00 PM, 4-1-78.
- 4-3-78 TD 5003! dolo., testing. Pumped 34 bbls. load oil in 16 hrs.

Page 2 #5 Santa Fe

- 5-8-78 TD 4950' lm., moving out rotary rig.
- 5-9-78 TD 4950' lm., WOCU.
- 5-10-78 TD 4950', lm., WOCU. Set anchors and moved-in test tank.
- 5-11-78 TD 4950' 1m., WOCU. Welded on bell nipple & moved-in tubg. Completion unit broke down one mile from location.
- 5-12-78 TD 4952' lm., prep to re-run tubg. & circulate hole with oil.
 Rigged up Pool Co. unit & ran 2 3/8" tubg. w/ 12 drill collars
 and 4 3/8" Walker bit. Tagged cement and drilled plug, insert
 float, 27' of cement, guide shoe and 2' of formation. Pulled tubg.
 to change bit. Shut down overnight.
- 5-13-78 TD 4984', dolo., prep to drill. Re-ran tubg., collars and Hughes.

 J-55, 4 3/4" bit. Drilled from 4952' to 4984'.
- 5-14-78 TD 4991' dolo., shut down. Drilled from 4984' to 4991'. Circulated hole clean. Ran Dresser Atlas Gamma Ray, Compensated Neutron log.
- 5-15-78 TD 4991' dolo., prep to re-run tubg. and swab test.
- TD 4991' dolo., prep to swab. Ran 156 joints 2 3/8" tubg. w/RTTS pkr. Set tubg. @ 4965' RKB w/pkr. set @ 4874' RKB. Swabbed tubg. capacity plus est. 2 bbls. formation oil. Broke off bottom part of swab mandrel. Pulled and re-ran tubg. and pkr. @ same depth setting. Recovered broken swab. Spotted acid over open hole. Acidized w/2000 gals. 15% N.E. acid. Formation began taking fluid @ 2200# and increased rate to 2.5 BPM @ 2750#. Max. treat. press. 3100# (on flush), min. treat. press. 2200#, aver. treat. press. 2670#, aver. inj. rate 2.17 BPM. ISDP 2450#, 5 min. SIP 2400#, 10 min. SIP 2350#, 15 min. SIP 2250#. Total load 70 bbls. (20 bbls. oil & 48 bbls. acid). Shut-in overnight.
- 5-17-78 TD 4991' dolo., prep to swab. At 8:00 AM, SITP Of. Hole full of fluid. Swabbed 22 BLO & 20 BLW in 8½ hrs. Lack 28 BLW. FL 4700' FS lost swab run. Well making some gas with each swab run.
- 5-18-78 TD 4991' dolo., testing. Swabbed 12 BO & 11 BLW in 8½ hrs. Lack 17 BLW.

- 12-3-77 TD 5000', dolo., prep. to swab. Acidized open hole 4960'5000' w/ 2000 gals. 15% NE acid. Formation began feeding
 @ 1/4 BPM @ 2300#, increased rate to 1 BPM & press. increased
 to 2600#, increased rate to 1 3/4 BPM & press. increased
 to 3000#. Formation did not break. ISDP 2700#/5 min. SIP
 2300#, 10 min. SIP 2100#, 15 min. SIP 1900#. Total load
 68 bbls. Began swabbing @ 3:00 PM. Swab 43 bbls. load in
 1 1/2 hrs. Shut down overnight.
- 12-4-77 TD 5000' dolo., shut down. At 7:30 AM, 12-3-77, FL 1300' FS. Swab 107 bbls. fluid in 9 hrs. being 25 bbls. load & 82 bbls. new oil. Last hour swabbed 9 BO, no water w/FL 3000' FS. Shut down till Monday morning.
- 12-5-77 TD 5000' dolo., prep to cement upper stage of production casing. At 7:30 AM, FL 2500' FS. Swab 47 BO in 4 hrs. Last hour (10:30 AM to 11:30 AM) swabbed 8 BO, no water w/ small amount of gas.
- 12-6-77 TD 5000' dolo., WOC. Pulled tubg. & pkr. Ran bridge plug & tool to shift DV tool. Set BP @ 2285' & spotted 2 sx. sand on top of BP. Opened DV tool @ 2195'. Broke circulation & cemented w/ 450 sx. HOWCO lite cement w/ 3/4 of 1% CFR-2 & 8# salt per sx. Circulated 79 sx. cement. Closed DV tool & press. tested csg. to 1500# for 30 min., held OK. Reversed sand off BP, retrieved BP and pulled tubg.
- 12-7-77 TD 5000' dolo., prep to run rods & pump. Ran 161 joints 2 3/8", 4.7#, upset tubg. (4950.54), 1 seating nipple (1.10'), 1 perf. jt. (3.00') & 1 jt. tubg for mud anchor (3L62'), total of 4986.26', set @ 4994.26' RKB.
- 12-8-77 TD 5000' dolo. Ran rods & pump.
- 12-9-77 TD 5000' dolo. Moved in & set-up tanks.
- 12-10-77 TD 5000' dolo. Set pumping unit.
- 12-11-77 TD 5000' dolo. Shut -down.
- 12-12-77 TD 5000' dolo. Laying flow lines & hooking up tank battery.
- 12-13-77 TD 5000' dolo. Hooking up tank battery.
- 12-14-77 TD 5000' dolo. Hooking up tank battery.
- 12-15-77 TD 5000' dolo. Sand blasted and coated tanks.



Flag-Redfern Oil Company

1200 WALL TOWERS WEST • MIDLAND, TEXAS 79701 • PHONE (915) 683-5184

Pret CS NAIL

Mailing address: P. O. Box 23 Midland, Texas 79702

January 26, 1979

File:

Case 6446

New Mexico Oil Conservation Commission P. O. Box 2088 State Land Office Building Santa Fe, New Mexico 87501

Attention: Mr. D. S. Nutter Chief Engineer

Re: Confirmation of Hearing
Application for Salt Water

Disposal Permit Sente Fe Well #2

Sente Fe Well #2
Fee Lease

Dickinson (San Andres) Field Lea County, New Mexico

Dear Mr. Nutter:

This letter will serve to confirm Flag-Redfern Oil Company's request for a hearing for a salt water disposal permit for the above captioned well. Attached is Form C-108 with all necessary attachments.

It is our understanding that the hearing will be on February 14, 1979. Please advise us of the time and location where this hearing is to occur.

Thank you for your cooperation in this matter.

Sincerely,

There Rooke

Steve Roseler Petroleum Engineer

SWR/dlp

NEW MEXICO OIL CONSERVATION COMMISSION

APPLICATION TO DISPOSE OF SALT WATER BY INJECTION INTO A POROUS FORMATION 9

OPERATOR			ADDRESS				
Flag-Redfern Oil Co	mpany		P. O. I	3ox 23	Midland,	Texas	/አ9702
LEASE NAME		WELL NO.	FIELO			Sent	a 13 COUNTY
Sante Fe		2	Dickir	son (San Andres)		Lea
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West LINE, SECTION	35 TO	WNEHIP 10-S	RANGE 36-	-E ,	MPM.		
			AND TUBING DA				
NAME OF STRING	SIZE	SETTING DEPTH	SACKS CEME	NT	TOP OF CEME	NT	TOP DETERMINED BY
SURFACE CASING						}	
INTERMEDIATE	8-5/8"	415	250		Surface		Cement Circulated
	None			i		}	
LONG STRING	None						Calculated using
	4-1/2"	50851	250		4060'		Log Caliper
TUBING		i l	NAME, MODEL AND D				and the second s
NAME OF PROPOSED INJECTION FOR	2-3/8"	49341	Baker Lok-		et @ 4900'	1 400000	OF FORMATION
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San Andres	SING, OR ANNULUST	PERFORATIONS	4213'		ITERVAL(S) OF INJE		drilled thru
Through Tubing	a sa	Perforat	tions	4969	9' - 4384'		
IS THIS A NEW WELL DRILLED FOR DISPOSAL?	IF ANSWER IS	HO, FOR WHAT PURPO		ALLY ORIL	LED?	HAS WEL	L EVER BEEN PERFORATED IN ANY HER THAN THE PROPOSED INJEC-
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NAME AND ADDRESS OF SURFACE OF		, 10		! 	Yes	Yes	3
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Harding Burris, Box	C 9/ ELICA,	New Mexico of	THIS INJECTION WEL	. L	·		
Read & Stevens, Inc					vell. New M	exico	88201
<u>, , , , , , , , , , , , , , , , , </u>		<u>,</u>	<u>,</u>		<u> </u>		-
Lawrence C. Harris	- Box 1714 -	Roswell, New	Mexico 882	201			
Holly Energy Inc	· 2001 Bryan	Tower, Suite	2680 - Dall	as, T	75201	 ·	
MGF 011 Corp 700) Vauchn Pido	. Widland T	r y 79761	-			
MGF OII COIP 700	Agrid Prog	., midiand,	LA 79701	<u>`</u>			
HAVE COPIES OF THIS APPLICATION SENT TO EACH OF THE FOLLOWIT ST	BEEN SURFACE OWN	ER	EACH OPERAT	OR WITHIN	ONE-HALF MILE	THE NEW	MEXICO STATE ENGINEER
	Yes		Yes			Yes	
RE THE FOLLOWING ITEMS ATTACK THIS APPLICATION (SEE RULE 701-	B) ;		ELECTRICAL	L 06	e de la compania del compania del compania de la compania del compania de la compania de la compania del compania de la compania de la compania de la compania del compania		MATIC SKETCH OF WELL
	Yes		Yes			Yes	
I hereby	certify that the infe	ormation above is t	rue and complete	to the b	est of my knowle	edge and	beliaf.
The Par	reker.	Petrole	eum Engineer	•		1-2	26-79
(Signature)			(Title)				(Date)
						. 4	

NOTE: Should waivers from the State Engineer, the surface owner, and all operators within one-half mile of the proposed injection well now accompany this application, the New Mexico Oil Conservation Commission will hold the application for a period of 15 days from the date of receipt by the Commission's Santa Fe office. If at the end of the 15-day waiting period no protest has been received by the Santa Fe office, the application will be processed. If a protest is received, the application will be set for hearing, if the applicant so requests. SEE RULE 701.

SANTE FE WELL #2

Pertinent Information

- 1.) Disposal Zone: San Andres
- 2.) Depth of Disposal Zone: 4969' - 4984'
- Type of Disposal Fluid: Produced San Andres Water 3.) ..
- Anticipated Disposal Volumes:

Minimum = 50 Bbls water per day Maximum = 100 Bbls water per day

- 5.) Source of Disposal Fluid:
 - a. Flag-Redfern Oil Company :

Sante Fe

1F 35 10S 36E - 14 BWPD 3E 35 10S 36E - 21 BWPD Total Lease = 35 BWPD

b. Read and Stevens Inc.

Fawn Cherie

1M 26 10S 36E - 25 BWPD Est.*

Sante Fe

4K 55 10S 36E - 16 BWPD 5C 35 10S 36E - 25 BWPD Est.*

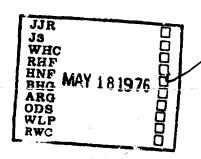
Total Read & 66 BWPD

Stevens

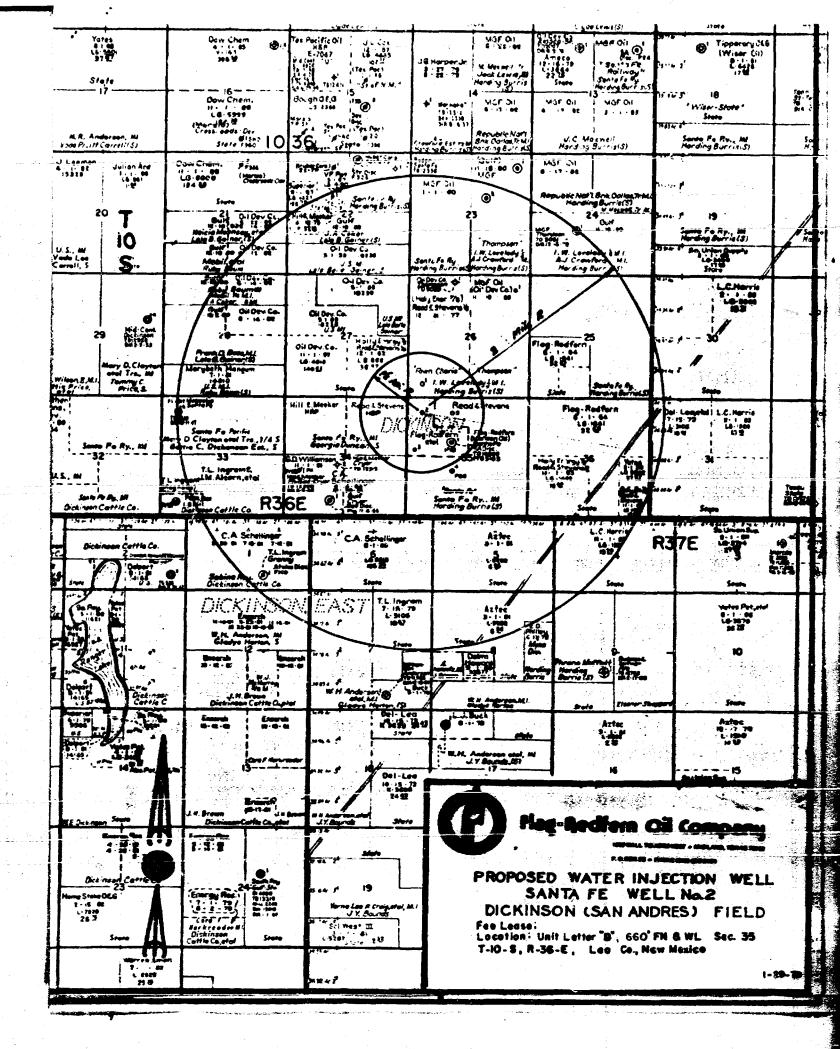
These 2 wells have been assigned a temporary completion and currently have suspended operations. When they are completed the produced San Andres water that they produce will be disposed in the proposed Sante Pe #2 Salt Water Disposal Well.

UNIVERSAL TREATING COMPANY Inc. BOX 1146 LEVELLAND, TEXAS

REPORT OF WATER ANALYSIS



Company Flag=Redfern Oil Com	pany Analys	isD	ate May	15, 1976	
Sample marked Santa Te					
	Milligrams Per Liter		FORM		Milligrams Per Liter
Chloride (NaCI)	194,000	Calcium (Ca++)		· · · · · · · · · · · · · · · · · · ·	
Total Hardness (CaCO3)	73,000	Magnesium (Mg	++)	· .	
Calcium Hardness (CaCO3)	41,000	Sodium (NA++)			
Total Alkalinity (CaCO3)	300	Carbonate (Coj	i-)		
Acidity to Phenolphthalein (CaCO3)	300	Bicarbonate (H	Co3)	· · · · · · · · · · · · · · · · · · ·	
Sulfate (Na2SO4)	1,985	Sulfate (SO ₄)	 	<u> </u>	
Total Iron (Fe)	9.2	iron (Fe)			
P. HSpecific Gravity	1.165	Chloride (CL-)		·	
Remarks Indicates formation water	er.			3	
			Rufus	L. Morgen	



NEW MEXICO OIL CONSERVATION COMMISSION WELL LOCATION AND ACREAGE DEDICATION PLAT

Form C-102 Supersedes C-128 Effective 1-1-65

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Hanson Oil	Comporation	Santa Fe	
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			Company
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		The LEVE	
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Fig. Day

NEW MEXICO OIL CONSERVATION COMMISSION

APPLICATION TO DISPOSE OF SALT WATER BY INJECTION INTO A POROUS FORMATION

OPERATOR			ADDRESS					
Flag-Redfern Oil Comp	any	I WELL NO.	P. O.	Box 23	Midland,	Texas		
							COUNTY	
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lead & Stevens, Inc.	- Box 2126	, 314 Securi	ty Nat'l Bk	. Ros	well, New M	exico	88201	
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awrence C. Harris -	Box 1714 -	Roswell, New	Mexico 88	201			·	
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coived by the Santa Fe office, the application will be processed. If a protest is received, the application will be set for hearing,

SANTE FE WELL #2

Pertinent Information

- 1.) <u>Disposal Zone</u>: San Andres
- 2.) Depth of Disposal Zone: 4969' 4984'
- 3.) Type of Disposal Fluid: Produced San Andres Water
- 4.) Anticipated Disposal Volumes:

 Minimum = 50 Bbls water per day

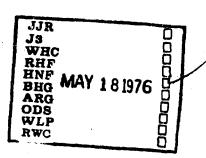
 Maximum = 100 Bbls water per day
- 5.) Source of Disposal Fluid:
 - a. Flag-Redfern Oil Company:
 Sante Fe
 1F 35 10S 36E 14 BWPD
 3E 35 10S 36E 21 BWPD
 Total Lease = 35 BWPD
 - b. Read and Stevens Inc.
 Fawn Cherie
 1M 26 10S 36E 25 BWPD Est.*
 Sante Fe
 4K 35 10S 36E 16 BWPD
 5C 35 10S 36E 25 BWPD Est.*
 Total Read & 66 BWPD
 Stevens

These 2 wells have been assigned a temporary completion and currently have suspended operations. When they are completed the produce: San Andres water that they produce will be disposed in the proposed Sante Fe #2 Salt Water Disposal Well.

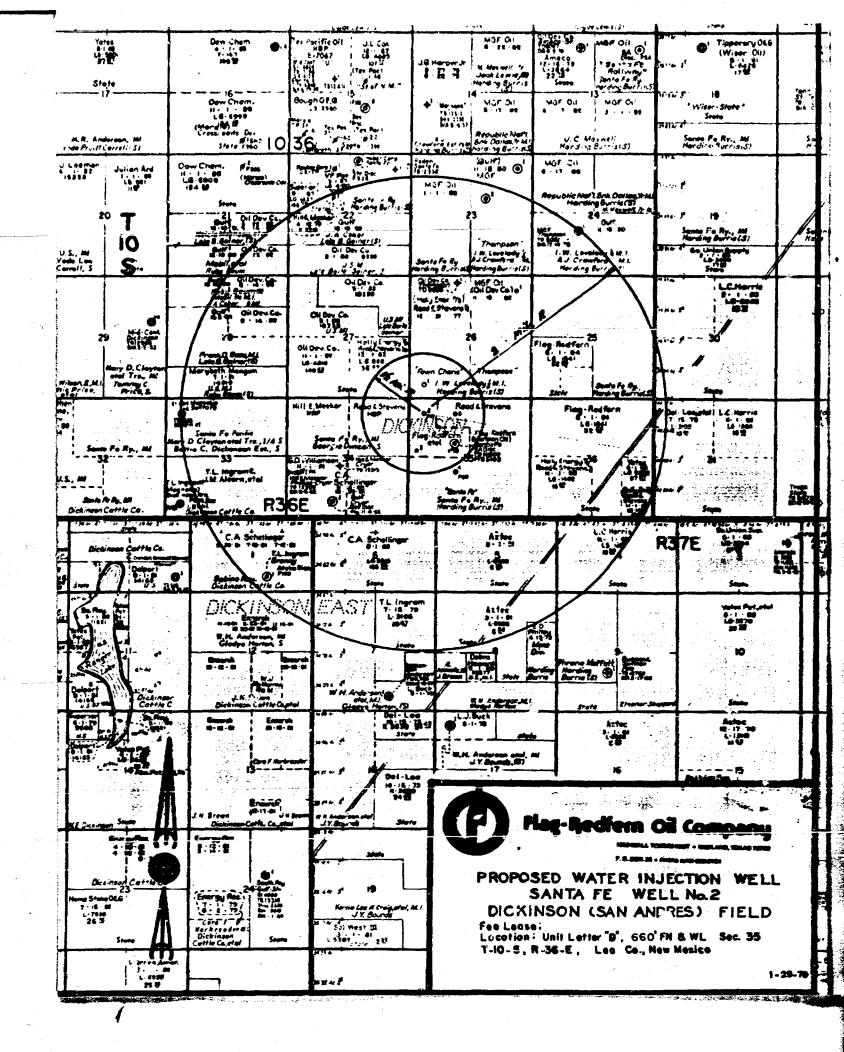
UNIVERSAL TREATING COMPANY Inc.

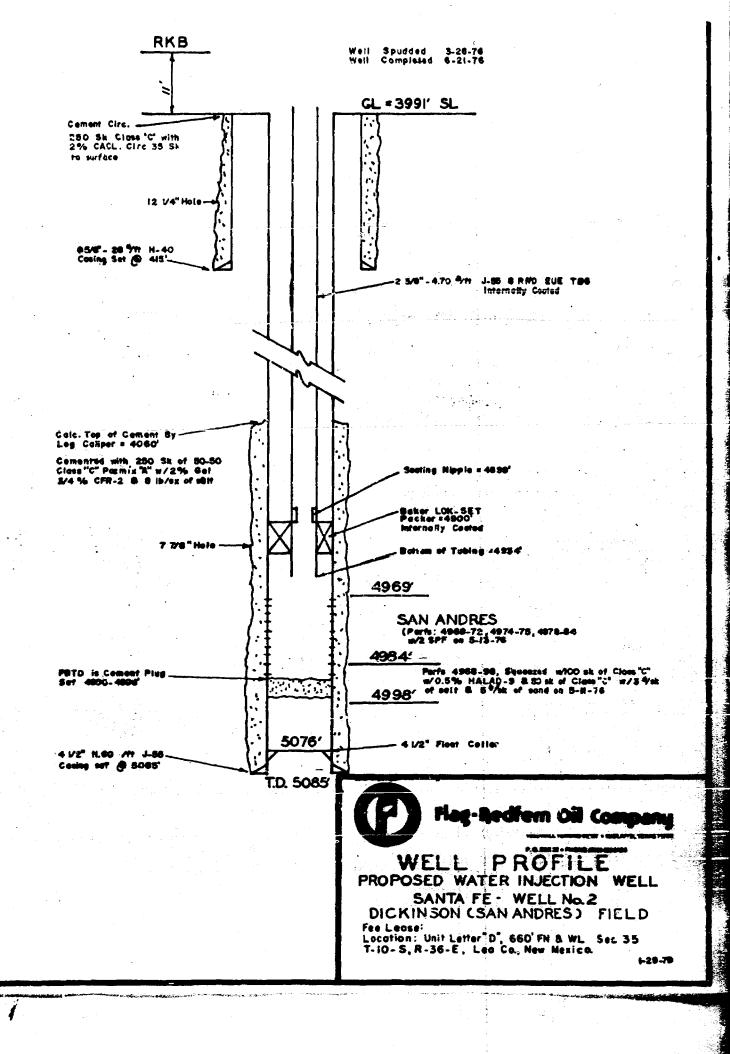
Box 1146 LEVELLAND, TEXAS

REPORT OF WATER ANALYSIS



Company Flag-Redfern Oil Com	pany Analys	sis Date	May 15,	1976	····
Sample marked Santa Fe 192			-		·
			189	er en er	
	Millign a ms Per Liter		ORM		illigrams er Liter
Chloride (NaCl)	194,000	Calcium (Ca++)			
Total Hardness (CaCO3)	73,000	Magnesium (Mg++)		
Calcium Hardness (CaCO3)	41,000	Sodium (NA++)_			
Total Alkalinity (CaCO3)	300	Carbonate (Co3_)			
Acidity to Phenolphthalein (CaCO3)	300	Bicarbonate (HCo	3)		· · · · · · · · · · · · · · · · · · ·
Sulfate (Na2SO4)	1.985	Sulfate (SO ₄)			
Total Iron (Fe)		Iron (Fe)		·	
P. H. 6.5 Specific Gravity	1.165	Chloride (CL-)_	-		
Remarks Indicates formation rate	er.	· .			
			Rufus L. I		





NEW MEXICO OIL CONSERVATION COMMISSION WELL LOCATION AND ACREAGE DEDICATION PLAT

Form C-102 Supersedes C-128 Effective 1-1-65

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NEW MEXICO OIL CONSERVATION COMMISSION 1944

APPLICATION TO DISPOSE OF SALT WATER BY INJECTION INTO A PORDUS FORMATION

OPERATOR			ADDRESS		<u> </u>
Flag-Redfern Oil Com	pany	WELL HO.	P. O. Box	23 Midland,	Texas 79702
Sante Fe	<u> </u>	2	Dickinson	(San Andres	
UNIT LETTER	<u>D</u> : w	ELL IS LOCATED 6	60 FEET FROM T	North	LINE AND FEET FROM
West LINE, SECTION	35 10	wnship 10-S	RANGE 36-E	HMPM.	
		CASING	AND TUBING DATA		
NAME OF STRING	\$12E	SETTING DEPTH	SACKS CEMENT	TOP OF CEM	ENT YOP DETERMINED BY
ITERMEDIATE	8-5/8"	415	250	Surface	Cement Circulate
	None	i	ļ	•	
PNS STRINS	None 4-1/2"	50851	250	4060'	Calculated usin Log Caliper
DING		3003	NAME, MODEL AND DEPTH	1	1 208 042.701
	2-3/3"	4934'	Baker Lok-set	set @ 4900'	
ant of proposed injection forms	**	,	4213 D.F	•	Not drilled thru
ECTION THROUGH TUBING, CASIN	6, OR ANNULUS?	1 2	S OR OPEN HOLET PHOPOSE		ECTION
hrough Tubing	IF ANSWER IS	Perfora	tions 4	969' - 4984'	HAS WELL EVER BEEN PERFORATED IN
NO ST ALL SUCH PERFORATED INTERVA	For 01	1 Production			TION ZONE? Yes
and the second s			OFF OR SQUEEZE EACH		
1968 - 4998 squeezed	W/130 8X 0	DEPTH OF BOTTOM OF	F NEXT HIGHER	DEPTH OF T	OP OF NEXT LOWER
riassic @ 1200		None within	a 2 mi. radius	OIL OR AAS	20NE IN THIS AREA 11, 263
TICIPATED BAILY MINIMUM	100	OPEN OR CLOS	ED TYPE SYSTEM IS IN PRES	NJECTION TO BE BY GR	AVITY OR APPROX. PRESSURE (PSI)
SWER YES OR NO WHETHER THE FOL ALIZED TO SUCH A DEGREE AS TO B OCK, IRRIGATION, OR OTHER GENERA	LOWING WATERS ARE UNFIT FOR DOMES	E MIN- WATER	TO BE DISPOSED OF NATE	JRAL WATER IN DISPO	ARE WATER ANALYSES ATTACHED?
		, I	es ¦	Yes	Yes
ME AND ADDRESS OF SURFACE OWN					
larding Burris, Box	97 Elida,	New Mexico 8	THIS INJECTION WELL		
lead & Stevens, Inc.		•		oswell New	Mexico 88201
tead & Stevens, Inc.	DOX ELEO	, JA+ Occurr	cy lac z ba. k	obverz, new	
awrence C. Harris -	Box 1714 -	Roswell, Ner	w Mexico 88201	·	<u> 25 - 1978 - 19</u>
folly Energy Inc	2001 Bryan	Tower, Suite	2080 - Dallas,	TX 75201	•
GF Oil Corp 700	Vaughn Bldg	., Midland,	rx 79701		
VE COPIES OF THIS APPLICATION SE MT TO EACH OF THE FOLLOWINGS	EN SURFACE OWN	ER	EACH OPERATOR WIT	THIN ONE-HALF MILE	THE NEW MEXICO STATE ENGINEER
	Yes		Yes	<u> </u>	Yes
	TO PLAT OF AREA		CLECTRICAL LOS		DIAGRAMMATIC SECTOR OF WELL
E THE FOLLOWING ITEMS ATTACHED IS APPLICATION , SEE RULE 701-01	Yes		Yes		Yes

(Title)

NOTE: Should waivers from the State Engineer, the surface owner, and all operators within one-half mile of the proposed injection well. not accompany this application, the New Mexico Oil Conservation Commission will hold the application for a period of 15 days from the date of receipt by the Commission's Santa Fe office. If at the end of the 15-day waiting period no protest has been received by the Santa Fe office, the application will be processed. If a protest is received, the application will be set for hearing,

SANTE FE WELL #2

Pertinent Information

- 1.) <u>Disposal Zone</u>: San Andres
- 2.) Depth of Disposal Zone: 49691 49841
- 3.) Type of Disposal Fluid: Produced San Andres Water
- 4.) Anticipated Disposal Volumes:

 Minimum = 50 Bbls water per day

 Maximum = 100 Bbls water per day
- 5.) Source of Disposal Fluid:
 - a. Flag-Redfern Oil Company:
 Sante Fe
 1F 35 10S 36E 14 BWPD
 3E 35 10S 36E 21 BWPD
 Total Lease = 35 BWPD
 - b. Read and Stevens Inc.
 Fawn Cherie
 1M 26 10S 36E 25 BWPD Est.*
 Sante Fe
 4K 35 10S 36E 16 BWPD
 5C 35 10S 36E 25 BWPD Est.*
 Total Read & 66 BWPD
 Stevens

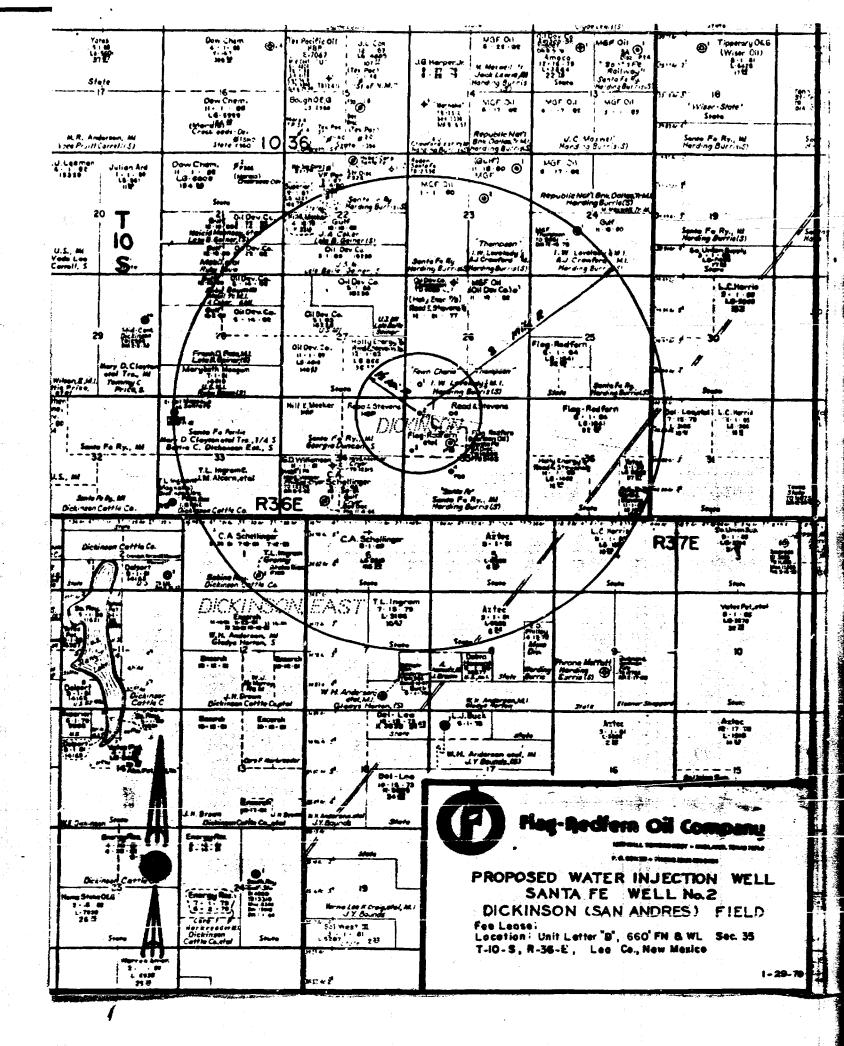
These 2 wells have been assigned a temporary completion and currently have suspended operations. When they are completed the produced San Andres water that they produce will be disposed in the proposed Sante Fe #2 Salt Water Disposal Well.

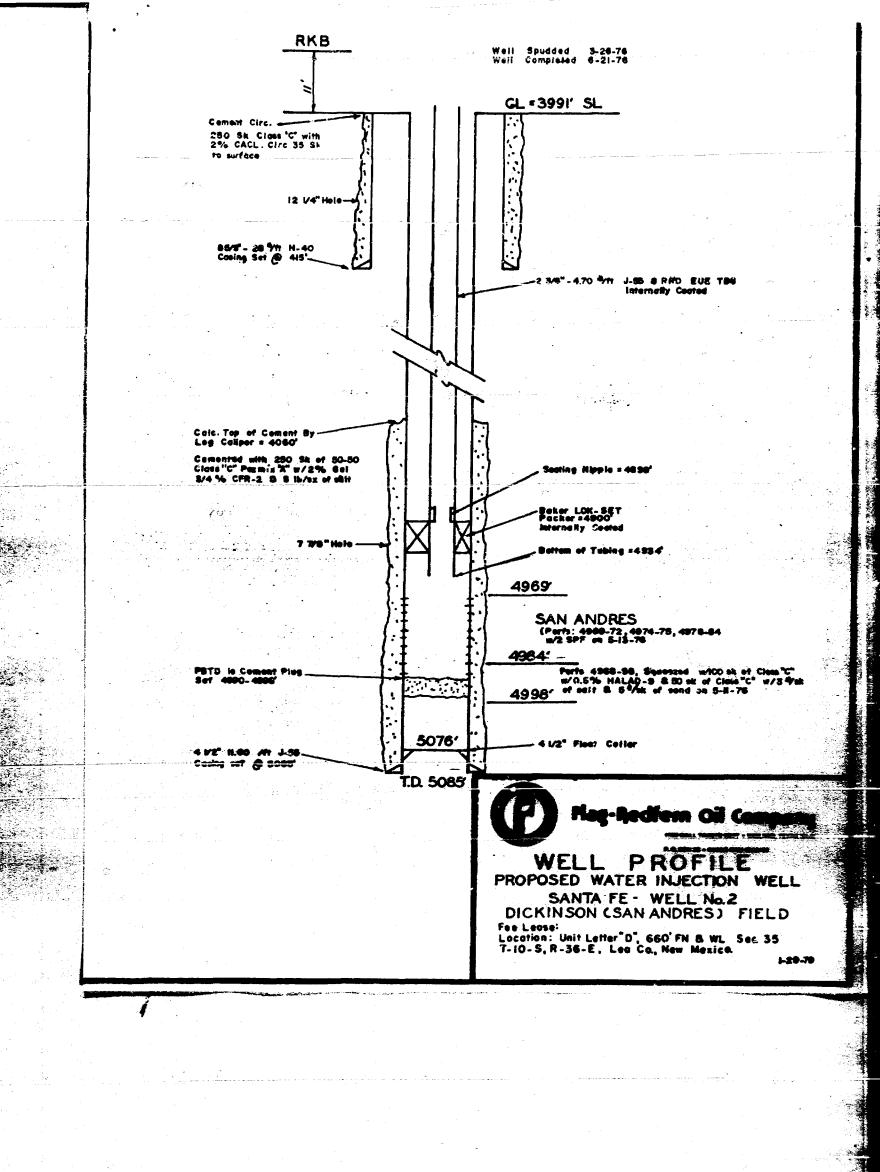
UNIVERSAL TREATING COMPANY Inc. BOX 1146 LEVELLAND, TEXAS

REPORT OF WATER ANALYSIS



Company FlagmRedfern Oil	Company Analys	is Date Hay 15, 1976	· · · · · · · · · · · · · · · · · · ·
Sample marked Santa Fe	<u> </u>		· · · · · · · · · · · · · · · · · · ·
			•
	Milligr a ms Per Liter		Milligrams Per Liter
Chloride (NaCl)	194,000	Calcium (Ca++)	
Total Hardness (CaCO3)	73,000	Magnesium (Mg++)	
Calcium Hardness (CaCO3)	41,000	Sodium (NA++)	
Total Alkalinity (CaCO3)	300	Carbonate (Co3-)	
Acidity to Phenolphthalein (CaC		Bicarbonate (HCo ₃)	
Sulfate (Na2SO4)	1,985	Sulfate (SO _A)	
Total (ron (Fe)	9.2	Iron (Fe)	
P. H. 6.5 Specific Gravit		Chloride (CL-)	
Remarks Indicates formation			
	**		
			ر الله الله الله الله الله الله الله الل
		Rufus L. Morg	an





NEW MEXICO OIL CONSERVATION COMMISSION WELL LOCATION AND ACREAGE DEDICATION PLAT

Form C+102 Supersedes C-128 Effective 1-1-65

All distances must be from the outer boundaries of the Section Hanson Oil Corporation Santa Fe Township County. Unit Letter S.Jaila 10 South Ð 36 East Lea Actual Footage Location of 660 North 660 West feet from the leet from the line Ground Level Elev. Producing Formation Dedicated Acreage: 3990.7 1. Outline the acreage dedicated to the subject well by colored pencil or hachure marks on the plat below. 2. If more than one lease is dedicated to the well, outline each and identify the ownership thereof (both as to working interest and royalty). 3. If more than one lease of different ownership is dedicated to the well, have the interests of all owners been consolidated by communitization, unitization, force-pooling. etc? If answer is "yes," type of consolidation If onswer is "no," list the owners and tract descriptions which have actually been consolidated. (Use reverse side of this form if necessary.). No allowable will be assigned to the well until all interests have been consolidated (by communitization, unitization, forced-pooling, or otherwise) or until a non-standard unit, eliminating such interests, has been approved by the Commis-CERTIFICATION aby certify that the infer est of my knowledge and Solief. February 22, 1000



Flag-Redfern Oil Company

1200 WALL TOWERS WEST A MIDIANO YEARS 78761 ---- PHONE (915) 683-5184

Mailing address: P. O. Box 23 Midland, Texas 79702

January 26, 1979

File:

Case 6446

New Mexico Oil Conservation Commission P. O. Box 2088 State Land Office Building Santa Fe, New Mexico 87501

Attention: Mr. D. S. Nutter

Chief Engineer

Re: Confirmation of Hearing

Application for Salt Water

Disposal Permit Sante Fe Well #2

Fee Lease

Dickinson (San Andres) Field

Lea County, New Mexico

Dear Mr. Nutter:

This letter will serve to confirm Flag-Redfern Oil Company's request for a hearing for a salt water disposal permit for the above captioned well. Attached is Form C-108 with all necessary attachments.

It is our understanding that the hearing will be on February 14, 1979. Please advise us of the time and location where this hearing is to occur.

Thank you for your cooperation in this matter.

Sincerely,

Steve Rossler
Petroleum Engineer

SWR/dlp

NEW MEXICO OIL CONSERVATION COMMISSION

APPLICATION TO DISPOSE OF SALT WATER BY INJECTION INTO A POROUS FORMATION TO THE SALT WATER BY INJECTION INTO A POROUS FORMATION TO THE SALT WATER BY INJECTION INTO A POROUS FORMATION TO THE SALT WATER BY INJECTION INTO A POROUS FORMATION TO THE SALT WATER BY INJECTION INTO A POROUS FORMATION TO THE SALT WATER BY INJECTION INTO A POROUS FORMATION TO THE SALT WATER BY INJECTION INTO A POROUS FORMATION TO THE SALT WATER BY INJECTION INTO A POROUS FORMATION TO THE SALT WATER BY INJECTION INTO A POROUS FORMATION TO THE SALT WATER BY INJECTION INTO A POROUS FORMATION TO THE SALT WATER BY INJECTION INTO A POROUS FORMATION TO THE SALT WATER BY INJECTION INTO A POROUS FORMATION TO THE SALT WATER BY INJECTION INTO A POROUS FORMATION TO THE SALT WATER BY INJECTION INTO A POROUS FORMATION TO THE SALT WATER BY INJECTION INTO A POROUS FORMATION TO THE SALT WATER BY INJECTION INTO A POROUS FORMATION TO THE SALT WATER BY INJECTION INTO A POROUS FORMATION TO THE SALT WATER BY INJECTION TO THE

OFERATOR			TADDRESS				Sonta Fe
Flag-Redfern Oil Com	กลทบ		•	ox 23 N	idland,	Texas	
Flag-Redfern Oil Com	Party	WELL NO.	FIELD	OK 15 1	ira raila,	ICAGO	COUNTY
Sante Fe		2	Dickin	son (Sar	Andres)		Lea
UNIT LETTER	<u>D</u> , w	ELL IS LOCATED 6	60	1 3HT MO	orth	NE AND	660 PEET FROM THE
West LINE, SECTION	35 100	WNSHIP 10-S	_ AANGE 36-	E NMP	м.		
		CASING	AND TUBING DAT	`A			
NAME OF STRING	SIZE	SETTING DEPTH	SACKS CEME	ז זא	OP OF CEME	NT	TOP DETERMINED BY
SURFACE CASING							
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INTERMEDIATE							- resource or the second secon
LONG STRING	Mone To						
A STATE OF THE PARTY OF THE PAR	4-1/2"	50851	250	<u> </u>	060'		Calculated using Log Caliper
TUBING	7 2/2	3003	NAME, MODEL AND D				108 041161
	2-3/8"	49341	Baker Lok-	set set	@ 49001		•
NAME OF PROPOSED INJECTION FORMA	TION	·····	TOP OF FORM	ATION.		BOTTOM	OF FORMATION
San Andres			42131				drilled thru
IS INJECTION THROUGH TUBING, CASIN	GOR ANNULUS?		OR CPEN HOLE! PR	40.00		TION	
Through Tubing	LIF ANSWER IS	Perforat			- 4984'	144 WEI	I FUER REEN BERFARATED IN ANY
NO NO	I	1 Production	THE STATE OF THE S		·	ZONE OT	L EVER BEEN PERFORATED IN ANY HER THAN THE PROPOSED INJEC- IE? Yes
LIST ALL SUCH PERFORATED INTERVAL	S AND SACKS OF CE	MENT USED TO SEAL O	FF OR SQUEEZE EACH	,		L <u>-</u>	169
4968 - 4998 squeezed	w/150 sx o	f Class "C"	•				
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Triassic @ 1200'		None within	a 2 mi. rad	ius	1	,	11,263'
ANTICIPATED CALLY MINIMUM INJECTION VOLUME (88LS.)	I MAXIMUM	OPEN OR CLOS	ED TYPE SYSTEM	IS INJECTION PRESSURE?	TO BE BY GRAV	ITY OR	APPROX. PRESSURE (PSI)
; 50	100	Closed			sure		1308
ANSWER YES OR NO WHETHER THE FOL ERALIZED TO SUCH A DEGREE AS TO BE STOCK, IRRIGATION, OR OTHER GENERA	E UNFIT FOR DOMES	TIC, WATER	TO BE DISPOSED OF	T NATURAL WA I SAL ZONE I	Yes	ARE WAT	ER ANALYSES ATTACHED?
NAME AND ADDRESS OF SURFACE OWNE	R (OR LESSEE, IF S			L	100		
Harding Burris, Box 9	97 Elida.	New Mexico 88	3116				
LIST HAMES AND ADDRESSES OF ALL O	PERATORS WITHIN C	NE-HALF () MILE OF	THIS INJECTION WEL				
Read & Stevens, Inc.	- Box 2126	, 314 Securit	y Nat'1 Bk.	Roswell	1, New M	exico	88201
Lawrence C. Harris -	Box 1714 -	Roswell, New	Mexico 882	01			
	2001 5	Barrar - Ordina	2600 5-11	- my	75201		
Holly Energy Inc	2001 Sryan	lower, Suite	2000 - Dall	as, IX	73201		
MGF 011 Corp 700 V	aughn Bldg	., Midland, T	X 79701				
HAVE COPIES OF THIS APPLICATION OF	EN SURFACE OWN	ER	EACH OPERATE	OR WITHIN ONE	HALF MILE	THE MEW	MEXICO STATE ENGINEER
MAYE COPIES OF THIS APPLICATION BE JEHT TO EACH OF THE POLLOWING?			EACH OPERATE	- wirdla cur			
ARE THE FOLLOWING ITEMS ATTACHED	YES		Yes	06		Yes	MATIC SEPTCH OF WELL
THE APPLICATION (SEE AULE 701-B)	Yes	ing a second of the second of	Yes	··	1	Yes	
				4 - Ab - C	i		
I hereby cer	tury that the info	ormation above is t	rue and complete	to the best	or my knowle	age and	oeuel.

The Rosler	Petrolsum Engineer	1-26-79
(Signature)	(Title)	(Date)

NOTE: Should waivers from the State Engineer, the surface owner, and all operators within one-half mile of the proposed injection well.

not accompany this application, the New Mexico Oil Conservation Commission will hold the application for a period of 15 days from the date of receipt by the Commission's Santa Fe office. If at the end of the 15-day waiting period no protest has been received by the Santa Fe office, the application will be processed. If a protest is received, the application will be set for hearing, if the applicant so requests. SEE RULE 701.

SANTE FE WELL #2

Pertinent Information

- 1.) Disposal Zone: San Andres
- 2.) Depth of Disposal Zone: 4969' 4984'
- 3.) Type of Disposal Fluid. Produced San Andres Water
- 4.) Anticipated Disposal Volumes:

 Minimum = 50 Bbls water per day

 Maximum = 100 Bbls water per day
- 5.) Source of Disposal Fluid:
 - a. Flag-Redfern Oil Company:
 Sante Fe
 1F 35 10S 36E 14 BWPD
 3E 35 10S 36E 21 BWPD
 Total Lease = 35 BWPD
 - b. Read and Stevens Inc.
 Favn Cherie
 1M 26 10S 36E 25 BWPD Est.*
 Sante Fe
 4K 35 10S 36E 16 BWPD
 5C 35 10S 36E 25 BWPD Est.*
 Total Read & 66 BWPD
 Stevens

* These 2 wells have been assigned a temporary completion and currently have suspended operations. When they are completed the produced San Andres water that they produce will be disposed in the proposed Sante Fe #2 Salt Water Disposal Well.

STATE OF NEW MEXICO ENERGY AND MINERALS DEPARTMENT OIL CONSERVATION DIVISION

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

Order No. R- 5732
APPLICATION OF FLAG-REDFERN OIL COMPANY FOR SALT WATER DISPOSAL, LEA COUNTY, NEW MEXICO.
ORDER OF THE DIVISION
BY THE DIVISION:
This cause came on for hearing at 9 a.m. on February 14
19 79 , at Santa Fe, New Mexico, before Examiner Daniel S. Nutt
NOW, on this day of February , 1979 , the Division
Director, having considered the testimony, the record, and the
recomendations of the Examiner, and being fully advised in the
premises,
FINDS:
(1) That due public notice having been given as required by
law, the Division has jurisdiction of this cause and the subject
matter thereof.
(2) That the applicant, Flag-Redfern Oil Company
is the owner and operator of the Santa Fe Well No. 2
located in Unit D of Section 35 , Township 10 South
Range 36 East , NMPM, Dickinson-San Andres Pool
Lea County, New Mexico.
(3) That the applicant proposes to utilize said well to
dispose of produced salt water into the San Andres
formation, with injection into the perforated
interval from approximately 4,969 feet to 4,984 feet.
(4) That the injection should be accomplished through
-inch plastic lined tubing installed in a packer set at approxi-
mately 4900 feet; that the casing-tubing annulus should be

filled with an inert fluid; and that a pressure gauge or approved

leak detection device should be attached to the annulus in order

6446

CASE NO.



to determine leakage in the casing, tubing, or packer.

- with a pop-eff valve or acceptable substitute which will limit the wellhead pressure on the injection well to no more than 1308 psi.
- (6) That the operator should notify the supervisor of the Hobbs district office of the Division of the date and time of the installation of disposal equipment so that the same may be inspected.
- (7) That the operator should take all steps necessary to ensure that the injected water enters only the proposed injection interval and is not permitted to escape to other formations or onto the surface.
- (8) That approval of the subject application will prevent the drilling of unnecessary wells and otherwise prevent waste and protect correlative rights.

IT IS THEREFORE ORDERED:

(1) That the applicant, Flag-Redfern Oil Company
is hereby authorized to utilize its Santa Fe Well No. 2
located in Unit D of Section 35 , Township 10 South
Range 36 East , NMPM, Dickinson-San Andres Pool
Ica County, New Mexico, to dispose of produced salt water
into the San Andres formation, injection to be
into the San Andres formation, injection to be accomplished through -inch tubing installed in a
accomplished through

PROVIDED HOWEVER, that the tubing shall be plastic-lined; that the casing-tubing annulus shall be filled with an inert fluid; and that a pressure gauge shall be attached to the annulus

or the annulus shall be equipped with an approved leak detection device in order to determine leakage in the casing, tubing, or packer.

- (2) That the injection well or system shall be equipped pressure linery switch of acceptable substitute which will limit the wellhead pressure on the injection well to no more than 1308 psi.
- (3) That the operator shall notify the supervisor of the Hobbs district office of the Division of the date and time of the installation of disposal equipment so that the same may be inspected.
- (4) That the operator shall immediately notify the supervisor of the Division's Hobbs district office of the failure of the tubing, casing, or packer, in said well or the leakage of water from or around said well and shall take such steps as may be timely and necessary to correct such failure or leakage.
- (5) That the applicant shall submit monthly reports of its disposal operations in accordance with Rules 704 and 1120 of the Division Rules and Regulations.
- (6) That jurisdiction of this cause is retained for the entry of such further orders as the Division may deem necessary.

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

Memo

Sect wali lip

To

Hag. Redfern Oil Co

Santa Fi Well no 2

D-35-105-36E Fra

perf 4969-4984

San Andres

Dicknison San Andres.

XS pressure

Surf press 1308

Pleve Rossler

The Rossler

The Rossler

(15) 683-5184