CASE NO.

7689

APPlication, Transcripts, Small Exhibits,

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MR. STAMETS: We will call next Case

7689.

MR. PEARCE: That is on the application of Tesoro Petroleum Corporation for a tertiary oil recovery project, McKinley County, New Mexico.

MR. KELLAHIN: If the Examiner please,
I'm Tom Kellahin of Santa Fe, New Mexico, appearing in association with David M. Castro, an attorney for Tesoro, on behalf of the applicant, and we have one witness to be sworn.

(Witness sworn.)

TRAVIS B. CROW

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Crow, would you please state your name and occupation?

A. My name is Travis B. Crow. I'm a staff reservoir engineer for Tesoro Petroleum Corporation in San Antonio, Texas.

Mr. Crow, have you previously testified

hafara	1-120	Division?
nerore	une	-DIVISION?

A. Yes, I have.

Q. In your capacity as a petroleum engineer,

Mr. Crow, have you made a study of Tesoro's tertiary oil recovery project in McKinley County, New Mexico?

A. Yes, I have.

Q. And pursuant to that study have you prepared certain exhibits?

A. Yes, sir, I have.

MR. KELLAHIN: Mr. Stamets, we submit Mr. Crow as an expert petroleum geologist -- engineer.

MR. STAMETS: He is considered qualified.

Mr. Crow, let me direct your attention to what we have marked as Applicant Exhibit Number One, which is a map of your area of review, and have you specifically locate for us the waterflood project that is the subject of this application.

A. Yes, sir. Exhibit One is a well status map which outlines the area of review, which is defined as a one-half mile circle around the proposed injection wells.

The project area consists of the Hospah Sand Unit, which is within Section 1 of Township 17 North, Range 9 West, and Section 36 of Township 18 North, Range 9 West. Also, the unit is located within Section 31 of Township

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2 18 North, Range 8 West. 3 The outline shown within those sections is the unit outline and the proposed project will occur with-5 in the boundaries of that unit. 6 Would you summarize briefly what has been 7 the history of this project, Mr. Crow? 8 The Oil Conservation Division, by Orders Numbers R-2797 and R-2797-A, established the Hospah Upper 9 Sand Oil Pool and later defined the Hospah Sand Unit Area by 10 11 Orders Numbers R-2807, 2807-A, and 2807-B. 12 The field was discovered in 1927 and de-13 veloped over a period range from 1938 to 1946. Development 14 halted at that time; was not resumed until 1965, when the 15 Sand Unit was formed and waterflood operations were initiated 16 What has been the cumulative production Q. 17 as of that time from the project? 18 Up until that time 4,568,532 barrels of 19 oil had been produced. 20 And commencing in December of 1965, water 21 injection was initiated and through July 31st of this year 22 the project had produced 7,153,784 barrels of oil. 23 What does the field currently produce, 24 Mr. Crow? 25 It's presently producing 314 barrels of

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of oil a day. Along with that oil production is 6763 barrels of water per day.

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Q How many current water injection wells do you have for your flood?

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Me're currently injecting into 17 water wells at a total rate of 8139 barrels of water per day.

¥.

What is your range of injection pressures?

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The pressures at the wellhead are ranging

It has three primary objectives:

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from 30 pounds to 742 pounds.

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Q. What's the purpose of the application be-

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fore the Division today?

A.

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A. The purpose is to propose to operate a polymer augmented waterflood within the Upper Hospah Sand in

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the Hospah Sand Unit Area.

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to stabilize water sensitive clays; two, to improve vertical

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efficiency at injection wells; and three, to improve the

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mobility ratio against the areal sweep efficiency of the

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reservoir fluid systems.

21 22 Q In addition you're requesting certification of this project as a tertiary recovery projecte, per-

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mitted under the Crude Oil Windfall Profit Tax Act, are you

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not?

A.

That's correct.

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...

All right, sir, let's turn to Exhibit Number Two and have you identify that exhibit for us.

A. Exhibit Two is a description of the leases as they have been defined and approved by the Conservation Division by Order Number R-2797-A.

All right, sir, and Exhibit Three?

A. Exhibit Three is a map showing the structure of the Upper Hospah Sand in the project area, and as you can see from the map, the reservoir is a north/south trending anticline, which is limited by a sealing fault to the south and southeast.

Along the eastern, western, and northern flanks the reservoir is limited by an oil/water contact.

Q. In your opinion, Mr. Crow, is the project area fairly delineated and confined by the outline of the structure indicated on Exhibit Number Three?

A. Yes, the entire Hospah Sand reservoir is located within the boundaries of the Hospah Sand Unit.

Q All right, sir, let's turn to Exhibit

Number Four and have you identify that for us.

A. Exhibit Four is an Isopach map of the Upper Hospah Sand, shwoing the net pay of the Upper Hospah Sand reservoir within the Hospah Sand Unit Area.

It shows thickness varying from zero at

the oil/water contact to greater than 50 feet in the thickest part of the reservoir.

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What are the sands that you propose to subject to the polymer augmented flood?

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A. We propose to inject polymer augmented water into the Upper Hospah Sand. The Hospah Sand is a local

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name for a series of Gallup age sand bodies that occur in

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sand shelf sequences in the area. The Hospah is further

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divided into an upper and lower sand, these being separated

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by a very thin, tight sand streak, which form a vertical

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permeability barrier between the two sands.

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Q Do you propose to drill any additional

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injector wells for purposes of the polymer flood?

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A. We have no specific proposals to drill additional wells; however, this requirement may change as

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the project develops. We might anticipate add tional injection

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the project develops. He might untilorpate dua front in the

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and production wells in order to maximize recovery from the

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field.

Q. Would you describe generally what you

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will do to establish the polymer augmented flood?

2223

A. Yes. WE propose to commence operations on or about October 15th of 1982. The general plan will con-

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sist of three -- the injection of three specific chemicals.

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Initially we would use a spearhead of about 40,000 pounds of

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cationic polyacrylamide. This ionic polymer is used to stabilize any mobile fines or clays that exist between the sand. This material bonds itself to these clays, in effect locking them in place, preventing their migration.

It also provides a bonding surface for the chemical which follows, which is an anionic polyacrylamide. The anionic polyacrylamide will then be chemically bonded to the cationic polyacrylamide. The effect of this will be to form a restrictive chemical, which is locked within the pores of the sand.

In addition, the anionic polyacrylamide will be injected sequentially with aluminum citrate. The aluminum citrate acts as a cross-linking agent which will form in the reservoir as a gel. This we refer to as in situ gelling.

By injecting the anionic polymer and aluminium citrate in several stages, resistance is developed in layers of successfully lower permeability, thereby reducing the overall permeability variation. This results in the displacing fluid being diverted into the tighter, poorly drained portions of the reservoir.

In all we anticipate approximately 491,000 pounds of anionic polymer and 624,000 pounds of aluminum citrate to be injected.

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Q How do you propose to inject the polymer augmented water into the flood?

A. We propose to use the existing water injection system, which includes the 17 active injection wells at a total rate of 3600 barrels a day.

Q What's the source of your injection water

A. The primary source will be produced water; however, it is possible that make-up water will be required, in which case we would obtain additional water from the Morrison formation at a depth of about 3100 - 3200 feet.

Q. All right, sir, let's turn to Exhibit Five now and have you identify that for me.

A. Exhibit Five is a graph showing the recent history of production from the Hospah Sand Unit Waterflood.

You can see that production has averaged slightly over 10,000 barrels a month for thelast -- for a period of the last two years.

It shows that we project that continuing the waterflood would result in a steady decline of production and this decline rate is approximately 11 percent per year.

The graph also shows our projection under polymer flood conditions, in which case we would expect the monthly rate to increase to about 16,000 - 17,000 barrels per month and then decline.

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Q. Do you have an opinion, Mr. Crow, as to the amount of additional oil recovery that could be anticipated from the use of the polymer augmented flood?

Yes, sir, we have used a mathematical model which utilizes a stratified layer concept, to predict recovery by the polymer augmented process. This model accounts for changes in -- or the effective mobility between the water front and the oil bank which precedes the water front. model calculated an additional recovery of 906,000 stock tank barrels, or 3.4 percent of the original oil in place.

If we continue to produce the waterflood as currently operating, that is, with straight water injection, we are anticipating to recover ultimately 8,200,000 stock tank barrels or 31 percent of the original oil in place.

In your opinion, then, Mr. Crow, is the project as you've described it involved in this application, one of the tertiary methods approved by the DOE regulations?

Yes, sir, it is. It is a polymer augmented waterflood, which is one of the approved tertiary methods.

And in your opinion will the polymer augmented waterflood result in more than an insignificant increase in the amount of crude oil which will ultimately be recovered?

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Yes, sir, we do. Λ.

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Number Six and have you identify that.

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Exhibit Number Six is a tabulation of all wells within the area of review which was described on the well status map, or Exhibit One, wells which penetrate the formation in which we propose to inject.

All right, sir, let's turn to Exhibit

The tabulation shows the well name and operator, location, well status, gives mechanical information on the wells, and for which wells which are included as injection wells in this project it also shows tubing and packer data, as required by the Commission.

In your opinion, Mr. Crow, is the water Q. injected into this project remaining confined within the vertical limits of the sands being flooded?

Yes, it is. The Hospah Sand is within what is known as the Mancos Shale. This shale is a rather extensive shale which forms a vertical barrier to any other water or hydrocarbon bearing sands in the area.

I have an exhibit, which is the type log, which is Exhibit Nine. As you can see from this exhibit, the Mancos Shale does extend over a significant vertical distance from the Hospah Sand and does provide a geologic barrier to vertical migration. The migration through wellbores will be

2 controlled mechanically where indicated.

Mail right, sir, let's go back and have you identify the package of schematics, numbered Exhibit
Seven.

Exhibit Seven is a group of wellbore schematics which describe the plugged and abandoned wells within the area of review. These schematics show the original well depth as well as any casing that was left in the holes, what the plugging material is, the location of the plugging material. All of this data was taken from our own records or from public records, where available.

Q. Did you find any indication of plugged and abandoned wells that might be the source of allowing water introduced into the Hospah to migrate out of the Hospah?

A. No, sir, I did not.

Q Let's turn to Exhibit Eight, then, and have you identify those schematics.

Exhibit Eight is a group of wellbore schematics showing the wells which will be used for water injection in this project.

Q These are the seventeen injection wells that you referred to earlier?

A. That's correct.

Mr. Crow, would you please now turn to

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Exhibit Number Ten and identify that exhibit?

A. Exhibit Ten is a tabulation of recent test data for the active injection wells in the Hospah Sand Unit.

The tabulation includes average injection rate for the month of July, 1982, average wellhead pressure, and cumulative injection into each of those wells at that time.

As you can see, the injection rate ranged from a low of 22 barrels a day in Well No. 69, to a high of 1050 barrels a day in Well No. 61. As stated before, wellhead pressures range from 30 pounds to 742 pounds.

well No. 60 exhibits the highest cumulative injection volume, which is 6,626,600 barrels. Well No. 92, which was recently drilled, has received 169,305 barrels of water.

Q. All right, sir, let's turn to Exhibit 11 and have you identify that.

A. Exhibit Eleven is a water analysis conducted on a water sample from the water supply well within the Hospah Sand Unit. The well produces from the Morrison formation at a depth of 31 to 3200 feet. It indicates that this water contains total dissolved solids of 774 milligrams per liter and that there is no hydrogen sulphide present and that it has a very low concentration of calcium magnesium components. This water is used, incidentally, as potable

water by the Sand Unit Area operation.

Q. Mr. Crow, would you turn to Exhibit
Number Twelve and identify that exhibit?

A. Exhibit Twelve is a report on water analysis of a sample taken from a fresh water well operated by Tenneco Oil Company in the South Hospah Field. The source of this water is the Seven Lakes Sand, which occurs at a depth of about 3 to 500 feet in the area.

This sand is used as fresh water supply by Tenneco and as far as I'm able to determine, this is the only sand shallower than the Upper Hospah Sand, which produces fresh water.

Q Turn to Exhibit Number Thirteen and identify that.

Exhibit Thirteen is a plot of cumulative permeability from core samples taken within the Upper Hospah Sand in the Hospah Sand Unit Area. The significance of this plot is that it establishes a permeability variation of 0.6 for this sand. The Permeability variation is an indicator of the vertical efficiency that will be exhibited by the flood. As this variation increases then the vertical efficiency of the waterflood will decrease. It's the objective of the polymer flood to reduce this variation thereby increasing the vertical efficiency of the flood process.

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In your opinion, Mr. Crow, will the injection of polymers into the waterflood cause any damage or waste in the reservoir?

A. No, sir, it will not. The effect of the polymer will be restricted to the flood area and it is expected that recovery will be improved by the process.

Q. In your opinion is the recovery process designed in accordance with sound engineering principles?

A. Yes, it is.

Q Let's turn to Exhibit Fourteen, then, and have you identify that exhibit.

A. Exhibit Fourteen is a table comparing a number of polymer augmented waterfloods which are in various stages of completion.

The first project is in Sage Spring Creek
Field in Wyoming, Natrona County, Wyoming. The formation is
the Dakota sandstone. The table lists formation properties
there but I would point out to you that the process involved is
identical to the process that we are proposing, that is the
chemicals injected would consist of both cationic and anionic
polymers, using ammonium citrate as a cross-linking agent.

This particular water -- polymer flood is expected to recover an additional 25.4 barrels per acre foot for an increase in ultimate recovery of four percent by

the polymer augmented process.

This particular flood has -- or this

particular recovery has been well established by field performance.

The next example is Stewart Ranch Field in Campbell County, Wyoming. The formation is Minnelusa. The project consists entirely of anionic polymer. You can see from the tabulation that the expected recovery here will be improved by 72.2 barrels per acre foot or 7.9 percent of the original oil in place. This particular project has established reserves which are based on field performance.

The next example is West Simlick (sic)

Field in Crook County, Wyoming. Again, this is a Minnelusa

project. It utilizes both cationic and anionic polymers.

No cross-linking agent is used, and by comparing the project

area with a very similar -- well, let me rephrase that.

This particular field is divided into two areas by a permeability barrier. On one side of the barrier the field has a very active water drive; on the other side of the barrier the field has no water drive at all and has produced by a solution gas drive.

We are able to project waterflood recoveries for the solution gas drive portion of the reservoir by standard engineering calculations and compare -- in addition

to that we can make waterflood calculations of that same area.

These waterflood calculations then can be compared with the portion of the field which is under water drive and by matching the two segments of the field we get indication of expected

waterflood recovery.

Since polymer injection was initiated performance has established that recovery from this field by polymer flood will exceed that recovery seen in the water drive area and we expect that the incremental recovery by polymer will be 4.4 barrels per acre foot. I'm sorry, 48.2 barrels per acre foot, which is 4.4 percent of the original oil in place.

So in this particular field we do have performance to substantiate the ultimate recovery.

The next example is the Okay Field in Campbell County, Wyoming, which is a Minnelusa flood. It utilizes the same process we are proposing, which is cationic, anionic and cross linking agent. There is no performance to substantiate the calculations but the calculated recovery will be improved by 35.1 barrels per acre foot or 3.4 percent of the oil in place.

The next example is the Hand Field in Campbell County, Wyoming. This project has well established ultimate reserves of 109,9 barrels per acre foot over primary

1 19 and secondary depletion. This represents 8.6 percent of 2 3 original oil in place. The last example is the Cummerfeld Field 5 in Crook County, Wyoming. It utilizes the same project --6 process that we are proposing and performance has shown that 7 recovery here will be improved by 51.7 stock tank barrels 8 per day per foot or 6.1 percent of the original oil in place. Q These numbers, these recoveries, compare 10 favorably with what we're projecting for the Hospah polymer 11 augmented waterflood. 12 Mr. Crow, will the tertiary recovery 13 project beginning date be after May of 1979? 14 Yes, it will. 15 Were Exhibits One through Fourteen pre-16 pared by you or compiled under your direction and supervision? 17 Yes, sir, 18 MR. KELLAHIN: Mr. Stamets, proof of 19 notice to the offset operators and the surface owners has been 20 made and I'd like to present that to you subsequent to the 21 hearing. 22 MR. STAMETS: That will be fine. 23 MR. KELLAHIN: That concludes my examin-24 ation of Mr. Crow.

We'd move the introduction of Tesoro Ex-

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hibits One through Fourteen.

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MR. STAMETS: These exhibits will be

admitted.

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CROSS EXAMINATION

7 BY MR. STAMETS:

Q. Mr. Crow, there's a lot of material here.

Exhibit Six has many pages and lots of wells which require

some examination subsequent to hearing. I presume Tesoro

would be cooperative in -- reasonably cooperative, at least, in investigation of any wells which look like they might be

potential sources of contamination of ground water in the

area?

A. Yes, sir, we would.

I saw on there one well that looked like it was plugged with nothing but mud. I also saw a couple of wells that said no plugging report. I did not look at every single plugged well that you had in here.

Were you able to find plugging reports eventually on those no plugging reports?

A. No, sir, the ones where we show no plugging report available, we searched public records for that information and were unable to find that data.

I know our District Office, or I think

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our District Office has run a survey in this area and I would think it appropriate if they would take note of that survey.

We discussed that survey with the District It consisted of a survey of wellhead and annulus pressures and to the best of my knowledge did not go beyond just recording those pressures, although we do have that data in hand.

Looking at the list of injection pressures and Well No. 58 seems to be very low compared to the rest of the wells, and when I looked at the cross section of Well No. 58 it did not look like there was any tubing in that Is that in fact the way that's completed?

The records that have been kept in the Hospah Field over the years have in many cases been very poor. Where we have shown that no tubing existed in the wells, this indicates that we were not able to find it in the records.

As part of the project we intend to survey each of the injection wells to establish the injectivity profiles of those wells and to take whatever necessary to make these wells mechanically sound and protect the wellbores from migrating fluids outside of the Hospah interval.

Are you going to make any tests to determine what the fracture gradient is on these wells or --

-

A. Yes. Our intention is to establish the fracture gradient for those wells which exhibit rather high injection pressures. For example, the rule of thumb of .2 psi per foot injection gradient would result in injection pressure of 320 pounds per square inch.

As you can see from the tabulation of Exhibit Ten, there are, in fact, wells producing, or injecting at pressures higher than this.

It is our intention to survey those wells which have pressures significantly less than 320 pounds to determine if in fact injection is entering only the Hospah Sand. In those cases where there appears to be channeling outside of the Hospah Sand we will take action to remedy that situation.

For those wells which exhibit an injection pressure greater than 320 pounds we propose to run a series of step rate tests in order to determine the fracture gradient of each individual well. Once that fracture gradient has been determined, we intend to limit the injection pressure to 50 pounds less than the established fracture pressure at the wellhead.

Q I would assume that you'd be willing to work with our District Office on this and to keep them advised?

1	23	
2	A. Certainly.	
3	Okay. You gave us a water sample on	one
4	well which belonged to the unit. What's the location of	that
5	well?	
6	A. Let's see, I believe that is if you	u'11
7	look at Exhibit Number One, which is the well status map,	in
8	Section 36, which is the northern half of the unit, in the	≥
9	southwest quarter of the southeast quarter, Well No. 53 is	3
10	the location of the water supply well.	
11	Q I seem to recall from looking at that	
12	exhibit and the next, that the deeper water is in that	
13	area, at least is somewhat better than the shallower wa	ater
14	A Apparently that's correct. There seem	ns
15	to be some sulphide present in the shallow water which is	
16	not present in the deeper water.	
17	MR. STAMETS: Are there any other ques	5 -
18	tions of this witness? He may be excused.	
19	Anything further in this case?	
20	MR. KELLAHIN: No, sir.	
21	MR. STAMETS: The case will be taken	·
22	under advisement.	
23		
24	(Hearing concluded.)	
25		

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CERTIFICATE

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

Sally W. Boyd COR

I do hereby certify that the foregoing is to complete record of the proceedings in the Exeminer hearing of Case No. 7688. Creard by me on 9-29 1982

Wehard d. Stumb, Examiner

Oil Conservation Division

BRUCE KING GOVERNOF. LARRY KEHOE SECRETARY

STATE OF NEW MEXICO

ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION

POST OFFICE BOX 2088 STATE LAND OFFICE BUILDING SANTA FE, NEW MEXICO 87501 (505) 827-2434

October 28, 1982

Mr.	Th	oma	8	Ke I	l 1 a	hin
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Re:	CASE NO.	7689
	ORDER NO.	R-280 7-C

Applicant:

Tesoro Petroleum Corporation

Dear Sir:

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

Yours very truly,

JOE D. RAMEY
Director

JDR/fd

Copy of order also sent to:

Hobbs OCD x
Artesia OCD x
Aztec OCD x

Other____

STATE OF NEW MEXICO HERGY AND MINERALS DEPARTMENT GOL CONSERVATION DIVISION

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

CASE NO. 7689 Order No. R-2807-C

APPLICATION OF TESORO PETROLEUN CORPORATION FOR AMENDMENT OF DIVISION ORDER NO. R-2807 TO INCLUDE A FOLYMER-AUGMENTED WATERFLOOD AND FOR APPROVAL OF A QUALIFIED TERTIARY OIL RECOVERY PROJECT DEDER THE CRUDE OIL WINDFALL PROFITS TAX ACT OF 1980, MCKINLEY COUNTY, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 9 a.m. on September 29, 1982, at Santa Fe, New Mexico, before Examiner Richard 6. Stamets.

NOW, on this 28th day of October, 1982, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises.

FINDS:

- (1) That due public notice having been given as required by law, the Division has jurisdiction of this cause and the subject matter thereof.
- (2) That the applicant, Tesoro Petroleum Corporation, seeks the amendment of Division Order No. R-2807, to include the injection of polymer-augmented water in its previously authorized waterflood project in the Hospah Field, for conversion of existing injector wells to polymer-augmented water injector wells, and for the approval of the Tesoro Hospah Sand Unit as a qualified tertiary recovery project under the Crude Oil Windfall Profits Tax Act of 1980.
- (3) That the waterflood project lies within the Hospah Upper Sand Oil Pool, McKinley County, New Mexico.

-2-Case No. 7689 Order No. R-2807-C

- (4) That this oil field was discovered in 1927 and developed during the period from 1938 through 1946, with waterflooding being initiated in December, 1965.
- (5) That the Tesoro Petroleum Corporation Hospah Sand Unit Waterflood Project consisting of approximately 1,225 acres was approved by maid Division Order No. R-2807 on November 24, 1964, and water injection was commenced within said project during December, 1965.
- (6) That the applicant now seeks approval for the injection of polymer-augmented water into seventeen (17) project wells as shown on Exhabit "A" attached to this order and the designation of its Edpah Sand Unit Project as a qualifying tertiary recovery project.
- (7) The proposed Qualifying Tertiary Project Area (QTP Area) lies wholly within the Hospah Sand Unit and consists of the following described acreage:

TOWNSHIP 17 NORTH, RANGE 9 WEST, NMPM
Section 1: NW/4; W/2 SW/4; NE/4 SW/4;
W/2 NE/4; NE/4 NE/4;
NW/4 NW/4 SE/4;
NW/4 SE/4 SW/4;
W/2 SE/4 NE/4;
NE/4 SE/4 NE/4; and
Lot 1 and N/2 Lot 6

TOWNSHIP 18 NORTH, RANGE 8 WEST, NARM Section 31: SW/4 and SW/4 NW/4

TOWNSHIP 18 NORTH, RANGE 9 WEST, NMPM Section 36: S/2; S/2 N/2; NE/4 NW/4; and NW/4 NE/4

- (8) That the QTP Area is adequately delineated and that the entire area will be affected.
- (9) That the New Mexico Oil Conservation Division has been designated by the Governor of the State of New Mexico as the appropriate agency to approve qualified tertiary recovery projects in New Mexico for purposes of the Crude Oil Windfall Profits Tax Act of 1980.
- (10) That the tertiary oil recovery method used in the Tesoro QTP Area is a polymer-augmented waterflood method which is a recognized tertiary oil recovery method described

-3-Case No. 7689 Order No. R-2807-C

in Section 212.78 (c) of the Department of Energy Regulations in effect in June, 1979.

- (11) That the actual primary production from the Tesoro QTP Area prior to waterflooding was 4.56 million barrels and that waterflooding secondary recovery operations will recover an additional 3.64 million barrels.
- (12) That an estimated 200,000 to 906,000 barrels of additional oil will be recovered as a result of the tertiary recovery operations, which is more than an insignificant increase in the amount of crude oil which will ultimately be recovered.
- (13) That the QTP Area tertiary recovery operations beginning date was October 15, 1982.
- (14) That the QTP Area tertiary recovery operations beginning date is after May, 1979.
- (15) That the proposed tertiary recovery operations within the QTP Area meet all requirements of Section 4993 of the Internal Revenue Code.
- (16) That the Tesoro QTP Area project is designated in accordance with sound engineering principles.
- (17) That the waterflood injection wells currently in use are injecting water at a surface pressure of 750 psig or less.
- (18) That Tesoro should survey all injection wells that exhibit injection pressures significantly less than 320 psig.
- (19) That within 180 days of this order, Tesoro should conduct step-rate tests on those wells with injection pressures greater than 320 psig in order to establish the fracture gradient for those wells, which should be a maximum sufficient to fracture the formation.
- (20) That the project area contains producing wells and plugged and abandoned wells for which insufficient data is available upon which to make a determination that such wells are not capable of serving as conduits for fluid migration from the injection zone.
- (21) That as of July 31, 1982, cumulative water injection into wells in said project totalled approximately 36.9 million

-4-Case No. 7689 Order No. R-2307-C

barrels without apparent significant movement of injected fluid out of the injection interval.

- (22) That based upon this injection history there appears to be no urgent need to institute repairs or replugging of any such wells.
- (23) That to assure continued injection within said project without endangerment of underground sources of drinking water the applicant should consult with the supervisor of the Division's district office at Azter to:
 - (a) formulate an inspection plan to facilitate detection of injection well failure and/or out-of-zone injection fluid;
 - (b) repair any injection wellbore showing evidence of fluid channeling or failure of tubular goods or packer;
 - (c) assure that all injection is through tubing under a packer; and
 - (d) establish wellhead injection pressures at approximately 50 pounds less than fracture pressure.
- (24) That Hospah Sand Unit Well No. 69, a tubingless completion, should not be used as an injection well.
- (25) That the approval of this application will prevent waste, protect correlative rights and promote conservation.

IT IS THEREFORE ORDERED:

- (1) That effective October 15, 1982, the Qualifying Tertiary Recovery Project Area, described in Finding No. (7) of this Order, being the Tesoro Petroleum Corporation Hospah Sand Unit Project, Hospah Pool, McKinley County, New Mexico, is hereby certified as a Qualified Tertiary Recovery Project under the Crude Oil Windfall Profits Tax Act of 1980.
- (2) That, with the exception of Unit Well No. 69, the applicant, Tesoro Petroleur Corporation, is hereby authorized to inject polymer-augmented water into the wells listed on Exhibit "A" attached to this Order.

-5-Case No. 7689 Order No. R-2807-C

- (3) That injection into the 16 remaining wells listed on said Exhibit "A" shall be authorized at a surface pressure of up to 750 psig subject to the following:
 - (a) Tesoro shall survey all injection wells with injection pressure significantly less than 320 psig;
 - (b) all injection wells which indicate channeling, failure of tubular goods, or packer failure shall be repaired as required by the supervisor of the Division's district office at Aztec:
 - (c) said supervisor shall approve an inspection plan designed to facilitate the detection of injection well failure and/or out-of-zone injection fluid;
 - (d) within 180 days of this Order, Tesoro shall conduct step-rate tests on those wells which exhibit injection pressures greater than 320 psig in order to establish a fracture gradient for each such well and thereafter each such well shall be limited to a maximum surface injection pressure of 50 psig less than the fracture pressure of the formation; and,
 - (e) the injection wells or system shall be equipped to assure that the pressure limits determined under (d) above are not exceeded.
- (4) 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.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

JOE D. RAMEY Director

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fd/

	spah Sand		* * * * * * * * * * * * * * * * * * * *			**
Un:	it Well No.	roonage	Location	Sec.	-Twp.	-Rng.
	49	330' FNL	1380' FEL	1	17N	9W
	58	30 FSL	2350' FEL	36	18N	9W
	60	2310' FSL	1050' FWL	1	17N	9W
	61	3640' FSL	1000' FWL	1	17N	9W
	62	1900' FSL	1140' FWL	36	18N	9W
	63	1980' FNL	2310' FWL	36	19N	9₩
	64	1650' FNL	660' FEL	36	18N	9W
	65	990' FSL	250' FEL	36	18N	9W
	69	2310' FNL	940' FWL*	36	18N	9W
	70	800' FSL	1800' FWL	36	18N	9W
	84	1475 PNL	2600' FITL	1	17N	9w
	87	925' FNL	2290' FEL	1	17N	9W
:	90	2390' FSL	1475' FEL	36	18N	9W
1	91	1790' FSL	2460' FWL	36	18N	9W
	92	700' FSL	1850' FEL	36	18N	9W
	93	770' FNL	2010' FWL	1	17N	9W
	94	2550 FSL	2400' FWL	1	17N	9W

Exhibit "A" Order No. R-2807-C

Title Staff Reservoir Engineer

Date: September 8,

	STATE LAND CATAL BIRDING BANTATE NEW MERILO 87501
77	and the second of the second o
APPLICA	ATION FOR AUTHORIZATION TO INJECT
1.	Purpose: Storage Pressure Haintenance Disposal Storage Application qualifies for administrative approval? Syes nor
II.	Operator: Tesoro Petroleum Corporation
	Address: 8700 Tesoro Drive, San Antonio, Texas 78286
	Contact party: Travis B. Crow Phone: (512) 828-8484
111.	Well data: Complete the data required on the reverse side of this form for each well proposed for injection. Additional sheets may be attached if necessary.
17.	Is this an expansion of an existing project? x yes n_0 R-2807, A, B If yes, give the Division order number authorizing the project n_0 R-2807, A, B
٧.	Attach a map that identifies all wells and leases within two miles of any proposed injection well with a one-half mile radius circle drawn around each proposed injection well. This circle identifies the well's area of review.
• VI.	Attach a tabulation of data on all wells of public record within the area of review whice penetrate the proposed injection zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of completion, and a schematic of any plugged well illustrating all plugging detail.
VIIL	Attach data on the proposed operation, including:
	 Proposed average and maximum daily rate and volume of fluids to be injected; Whether the system is open or closed; Proposed average and maximum injection pressure; Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and If injection is for disposal purposes into a zone not productive of oil or gas at or within one mile of the proposed well, attach a chemical analysis of the disposal zone formation water (may be measured or inferred from existing literature, studies, nearby wells, etc.).
•VIII.	Attach appropriate geological data on the injection zone including appropriate lithologic detail, geological name, thickness, and depth. Give the geologic name, and depth to bottom of all underground sources of drinking water (aquifers containing waters with total dissolved solids concentrations of 10,000 mg/l or less) overlying the proposed injection zone as well as any such source known to be immediately underlying the injection interval.
ıx.	Describe the proposed stimulation program, if any.
• x.	Attach appropriate logging and test data on the well. (If well logs have been filed with the Division they need not be resubmitted.)
· xı.	Attach a chemical analysis of fresh water from two or more fresh water wells (if available and producing) within one mile of any injection or disposal well showing location of wells and dates samples were taken.
XII.	Applicants for disposal wells must make an affirmative statement that they have examined available geologic and engineering data and find no evidence of open faults or any other hydrologic connection between the disposal zone and any underground source of drinking water.
XIII.	Applicants must complete the "Proof of Notice" section on the reverse side of this form.
XIV.	Certification
21.	I hereby certify that the information submitted with this application is true and correcto the best of my knowledge and belief.

* If the information required under Sections VI, VIII, X, and XI above has been previously submitted, it need not be duplicated and resubmitted. Please show the date and circumstance of the earlier submittal. R-2797, R-2797A: Definition of Hospah Upper Sand

Travis B. Crow

Oil Pool. R-2807, R-2807A, R-2807B: Approval to operate waterflood. DISTRIBUTION: Original and one copy to Santa Fe with one copy to the appropriate Division district office.

III. WELL DATA

- A. The following well data must be submitted for each injection well covered by this application.
 The data must be both in tabular and schemits form and shall include:
 - Lease name; Well No.; location by Section. Township, and Range; and Footage location within the section.
 - (2) Each coaing string used with its size, setting depth, sacks of cement used, hole size, top of cement, and how such top was determined.
 - (3) A description of the tubing to be used including its size, lining material, and setting depth.
 - (4) The name, model, and setting depth of the packer used or a description of any other seal system or assembly used.

Division District offices have supplies of Well Data Sheets which may be used or which may be used as models for this purpose. Applicants for several identical wells may submit a "typical data sheet" rather than submitting the data for each well.

- 8. The following must be submitted for each injection well covered by this application. All items must be addressed for the initial well. Responses for additional wells need be shown only when different. Information shown on schematics need not be repeated.
 - (1) The name of the injection formation and, if applicable, the field or pool name.
 - (2) The injection interval and whether it is perforated or open-hole.
 - (3) State if the well was drilled for injection or, if not, the original purpose of the well.
 - (4) Give the depths of any other perforated intervals and detail on the sacks of cement or bridge plugs used to seal off such perforations.
 - (5) Give the depth to and name of the next higher and next lower oil or gas zone in the area of the well, if any.

XIV. PROOF OF NOTICE

All applicants must furnish proof that a copy of the application has been furnished, by certified or registered mail, to the owner of the surface of the land on which the well is to be located and to each leasehold operator within one-half mile of the well location.

Where an application is subject to administrative approval, a proof of publication must be submitted. Such proof shall consist of a copy of the legal advertisement which was published in the county in which the well is located. The contents of such advertisement must include:

- (1) The name, address, phone number, and contact party for the applicant;
- (2) the intended purpose of the injection well; with the exact location of single wells or the section, township, and range location of multiple wells:
- (3) the formation name and depth with expected maximum injection rates and pressures; and
- (4) a notation that interested parties must file objections or requests for hearing with the Oil Conservation Division, P: O. Box 2088, Santa Fe, New Mexico 87501 within 15 days.

NO ACTION WILL BE TAKEN ON THE APPLICATION UNTIL PROPER PROOF OF NOTICE HAS BEEN SUBMITTED.

NOTICE: Surface owners or 39ffset operators must file any objections or requests for hearing of administrations applications within 15 days from the date this application was mailed to them.

SEP 27 1982

PROPOSAL FOR A POLYMER-AUGMENTED WATERFLOOD HOSPAH FIELD

Tesoro Petroleum Corporation proposes to operate a polymeraugmented waterflood in the Hospah field, McKinley County, New Mexico. The purpose of the proposed project is to increase the ultimate recovery from the Upper Hospah sand reservoir. The objectives of the process are:

- 1) To stabilize water-sensitive clays.
- 2) To improve vertical efficiency of the injection wells.
- 3) To improve the mobility ratio and hence the areal sweep efficiency of the reservoir fluid systems.

The project area includes the Hospah Upper Sand Oil Pool as defined by the Oil Conservation Division of the Energy and Minerals Department of the State of New Mexico (Order No. R-2797 as amended by Order No. R-2797A). The area is further described in Exhibit 2.

The Hospah field currently produces from the Upper Hospah sand of Upper Cretaceous age. Tesoro operates the field as the Hospah Sand Unit waterflood (Order No. R-2807 as amended by Order No. R-2807A and R-2807B). The field was discovered in 1927 and developed during the period from 1938 through 1946. Development resumed in 1965 with the formation of the Hospah Sand Unit and the initiation of waterflood operations. Water injection into the Upper Hospah sand commenced in December, 1965. Cumulative production at that time was 4,568,532 bbl of oil. By July 31, 1982, the field had produced 7,153,784 bbl of oil. Cumulative water injection was 36,916,744 bbl. The field currently produces from 44 wells at a rate of 314 BOPD and 6,763 BWPD. There are 17 water injection wells which have a total rate of 8,139 BPD. Injection pressures range from 30 psig to 742 psig (Exhibit 10).

The Hospah sands in the southwestern portion of the San Juan Basin of northwestern New Mexico are a part of the Gallup formation of Upper Cretaceous age. The Gallup is overlain by the Upper Mancos shale and underlain by the Lower Mancos shale, which form a vertical separation between these sands and any other formations in the area capable of producing either water or hydrocarbons. The Upper and Lower Hospah sands are also typically separated from each other by a relatively thin, tight, sandy shale section.

The Upper Hospah sand reservoir occurs at a depth of about 1,600 ft and is controlled by a north-south trending anticline limited by a scaling fault to the south and southeast and an oil-water contact along the eastern, northern and western flanks of the structure. The entire reservoir is contained within the Hospah Sand Unit area. Exhibits 3 and 4 are structure and isopach maps of the producing zone.

The Upper Hospah sand has an average porosity of 24.7 percent and an average permeability of 467 md. Core data indicate that the reservoir sand has a permeability variation of 0.60 (Exhibit 13). The initial water saturation was 33 percent. The reservoir contains 13 cp viscosity oil which has a gravity of 30° API. The initial oil in place was 1,246.5 STB/acre-ft or 26,442 MSTB.

By continuing the existing waterflood operation, this field is expected to recover 8,200 MSTB or 31.0 percent of the original oil in place. Projections of oil recovery and produced water:oil ratio by the polymer-augmented waterflood process have been made utilizing a stratified layer model (Stiles type) to account for the polymerfront mobility. The model calculates additional oil recovery of 906 MSTB or 3.4 percent of the original oil in place and a reduction in the amount of produced water of more than four million barrels. This additional recovery is the result of improving vertical efficiency by unifying the permeability variation and of improving areal efficiency by reducing the mobility ratic of the water to oil. Exhibit 14 compares the performance of several Wyoming polymer augmented waterflood projects with the proposed Hospah project. The incremental recoveries by chemical flood over waterflood are expected to range from 3.4 to 8.6 percent of the original oil in place for these projects or an average of 5.8 percent. From these data, the calculated incremental recovery of 906 MSTB appears to be reasonable. based on statistical studies of waterfloods and common rules-of-thumb, Tesoro estimates for planning purposes that the polymer augmented process will increase recovery by about 200 MSTB, for an ultimate recovery of 8,400 MSTB. Exhibit 5 illustrates recent production history and the projected future production for the proposed project.

It is estimated that the polymer augmented waterflood project will commence on October 15, 1982. A program of staged injection is anticipated which will be spearheaded by the injection of 40,000 lb

of cationic polyacrylamide. This material stabilizes any mobile clays near the injection wells and also forms a bonding surface for the anionic polymer which follows. Anionic polyacrylamide is used as the mobility control agent. This polymer is injected sequentially with aluminum citrate. The aluminum citrate cross-links the anionic polymer within the formation, forming a gel which restricts flow through the more permeable layers of the reservoir. This process is referred to as "in-situ gelling." By injecting the anionic polymer and aluminum citrate in several stages, resistance is developed in layers of successively lower permeability, thereby reducing the overall permeability variation. This results in the displacing fluid being diverted to the tighter, poorly drained portions of the reservoir. In all, 491,000 lb of anionic polymer and 264,000 lb of aluminum citrate would be injected.

The polymer augmented water will be injected into the existing water injection wells through an open system at a total rate of 8,600 bbi/day. Produced water will be reinjected. Make-up water will be taken from the Morrison formation at a depth of 3,100 to 3,200 ft. A typical water analysis of this aquifier is shown by Exhibit 11. This water has been used for the Hospah unit waterflood with no adverse effect on the formation.

Unless already established by recent testing, all injection wells will be surveyed for behind-pipe channeling into adjacent zones or will be tested to establish the fracture gradient. It is intended that the total daily volume of 8,600 barrels of water be distributed among the injection wells in a ratio that will optimize the volumetric sweep of the flood. In order to accomplsih the desired distribution, it is possible that the required injection pressures of certain wells will exceed a gradient of 0.2 psi/ft or a surface pressure of 320 psig. Those wells which exhibit injection pressures significantly less than 320 psig will be surveyed for channeling. Where it is determined that a channel exists, the wellbore will be repaired in such a way as to restrict fluid entry into the Upper Hospah sand only. "Steprate" tests will be conducted on those wells which exhibit injection pressures greater than 320 psig in order to establish the fracture gradients of the wells. Once established, these wells will be limited

to a maximum injection pressure of 50 psi less than that sufficient to fracture the formation. Exhibit 10 gives recent operating conditions of the existing injection wells.

Polymer augmented waterflooding is a qualified tertiary enhanced recovery technique as described by the June, 1979, energy regulations (10 C.F.R. 212.78). The proposed project will meet the following specific requirements of Sec. 4993 (c)(2) of the Internal Revenue Code of 1954 as amended by the Crude Oil Windfall Profit Tax Act of 1980:

Requirement (A)

The project involves the application (in accordance with sound engineering principles) of a tertiary recovery method which can reasonably be expected to result in more than an insignificant increase in the amount of crude oil which will ultimately be recovered.

Requirement (B)

The project beginning date is after May, 1979.

Requirement (C)

The portion of the property to be affected by the project is delineated as the Hospah Upper Sand Oil Pool within the boundaries of the Hospah Sand Unit area as described in Exhibit 2.

LIST OF EXHIBITS

PROPOSAL FOR A POLYMER AUGMENTED WATERFLOOD

HOSPAH FIELD

- 1. Well Status Map Showing Area of Review
- 2. Description of Hospah Sand Unit Area
- 3. Structure Map, Top of Upper Hospah
- 4. Upper Hospah, Original Net Pay Isopach Map
- 5. Production History and Forecast
- 6. Tabular Summary of Wells in Area of Interest
- 7. Wellbore Schematics of Plugged Wells in the Area of Interest
- 8. Wellbore Schematics of Injection Wells
- 9. Type Log, Hospah Sand
- 10. Recent Tests of Injection Wells
- 11. Water Analysis of Supply Water
- 12. Water Analyses of Fresh Water Sands
- 13. Permeability Distribution, Upper Hospah Sand
- 14. Comparisons of Polymer Augmented Waterfloods

EXHIBIT 2

EXHIBIT 2

LEASE DESCRIPTION

Santa Fe (Hurst) Lease (No. 3487)

Oil and Gas Lease dated November 23, 1923, by and between the Santa Fe Pacific Railroad Company, a corporation, Lessor, and Paul C. Hancock, Lessee, INSOFAR as said lease covers the following described lands situated in McKinley County, New Mexico, to-wit:

All of Lots One (1), Two (2), Three (3), Four (4) and Five (5), the North Half (N/2) of Lot Six (6), the North Half and Southwest Quarter (N/2 and SW/4) of Lot Seven (7), the Southwest Quarter of the Northeast Quarter (SW/4 NE/4), the South Half of the Northwest Quarter (S/2 NW/4), the Northwest Quarter of the Northwest Quarter of the Southeast Quarter (NW/4 NW/4 SE/4), the North Half of the Southwest Quarter (N/2 SW/4), the Southwest Quarter of the Southwest Quarter (NW/4 SE/4 SW/4) ALL in Section One (1), Township Seventeen (17) North, Range Nine (9) West of the New Mexico Meridian.

Santa Fe (Osborne) Lease (No. 7668)

Oil and Gas Lease dated February 1, 1938, by and between the Santa Fe Pacific Railroad Company, a corporation, Lessor, and Clarence B. Osborne et al., Lessee, covering 189.47 acres situated in McKinley County, New Mexico, to-wit:

All of Lots Two (2), Three (3) and Four (4), and the East half of the Southwest Quarter (E/2 SW/4) of Section Thirty-one (31), Township Eighteen (18) North, Range Eight (8) West of the New Mexico Meridian.

State of New Mexico (No. 662) Lease

Oil and Gas Lease dated October 20, 1922, by and between the State of New Mexico (acting through its Commissioner of Public Lands), Lessor, and Theo N. Espe, Lessee, insofar and only insofar as said Lease covers 440 acres of land situated in McKinley County, New Mexico, to-wit:

The Southeast Quarter of the Southwest Quarter (SE/4 SW/4) and the Southwest Quarter of the Southeast Quarter (SW/4 SE/4), the South half of the Northeast Quarter (S/2 NE/4) and the North half of the Southeast Quarter (N/2 SE/4) and the Southeast Quarter of the Southeast Quarter (SE/4 SE/4), the South half of the Northwest Quarter (S/2 NW/4) and the Northwest Quarter of the Northeast Quarter (NW/4 NE/4) and the Northeast Quarter of the Northwest Quarter (NE/4 NW/4) ALL in Section Thirty-

six (36), Township Eighteen (18) North, Range Nine (9) West of the New Mexico Meridian.

State of New Mexico (B-1276) Lease

Oil and Gas Lease dated October 20, 1932, by and between the State of New Mexico (acting through its Commissioner of Public Lands), Lessor, and P. L. Nichol, Lessee, insofar and only insofar as said Lease covers 120 acres of land situated in McKinley County, New Mexico, to-wit:

The West half of the Southwest Quarter (W/2 SW/4) and the Northeast Quarter of the Southwest Quarter (NE/4 SW/4) ALL in Section Thirtysix (36), Township Eighteen (18) North, Range Nine (9) West of the New Mexico Meridian.

EXHIBIT 5

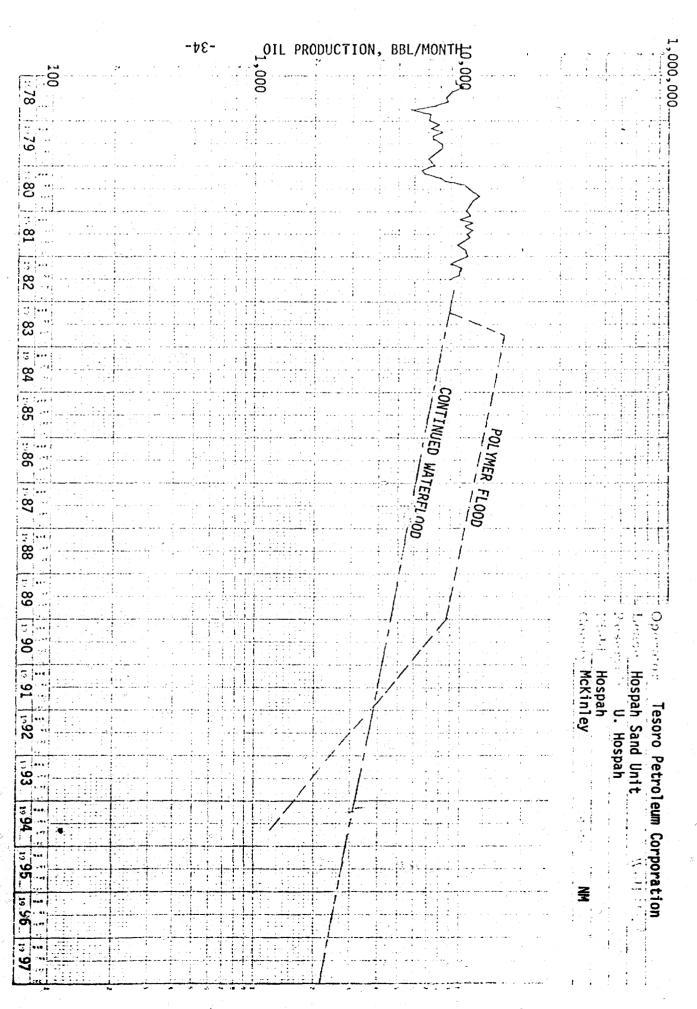


EXHIBIT 6

No. 96	No. 92	vo. 92	No. 92	No. 39	No. 38	No. 94	NO. 42	No. 31	¥.	Santa Fe K.R. "A" No. 73	Tesoro Perroleum Corp. Hospah Vederal No. 1	Tenneco Hotchkiss No. 1	Producers & Refiners State No. 1	Pet. Prod. Co. No. 24	Mantillan & White No. 1-X	NeMillan & White Chase No. 1	Operator Leans - Mell
730 FSL & 1,860 FEL 1-178-98	810 FSL & 1,550 FEL	1,060 FSL & 1,550 FEL 1-176-94	705 FSL & 1,650 FEL 1-17N-9H	336 FSL & 2,450 FEL	1.140 PSL & 895 FEL	5 881 % 2,900 EEL	1-17X-94 1-17X-94	550 881 & 2,090 881	330 PSL 4 2,300 PEL	350 EST & 2,000 EET	 330 NE & 1,050 PM	3,015 SNL & 330 FED 2117-14	220 FSC & 2,420 FEL 23-100-94	1,650 FML & 330 PEL 2-17N-94	2-27N-90 2-27N-90	200 FML & 200 FML 6-17X-8M	Locarion
Prod.	Prod.	Š	Prod.	Frod.	Prod.	Inj.	P70d.	Prod.	Prod.	Prod.	ţ	***	ğ	%	1,26	28	Well Status
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1,682	1,700 PB 1,663	1,846	1,682 B 1,637	1,769 PR 1.750	1,670 PB 1,609	1.656	1,548	1,635	1,624	1,665	1,746	2,890	1,945	No deteil available.	1.802	1.675	Total Depth.
12-1/4	12-1/4 7-7/8	12-1/4 7-7/8	12-1/4 7-7/8	12-1/4	12-1/4	12-1/4 8-3/4	12-1/4 7-7/8	12-1/4 7-7/8	12-1/4 7-7/8	12-1/4	.2-1/4	7-7/8	;	ilable.	ł	ì	Hole Siza, in.
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42 1,682	38 1,688	3.1	43 1.676	1.769	103	95 1,639	73 1,525	62CL 1,642.3	67 1,589	63CL 1,639CL	183	76 2,890	;		100	100	Dace Depth,
30 0 100 1,047	30 0 80 1,180	30 0 50 1,780-1, 20 60-0	30 0 80 1,168	100 1,134	100 0 100 1,025	100 0	50 0 100 890	50 1.009	50 0 50 1,272	40 0 75 1,277	135 0	175 1,779	10 sx es on wood pluss @ 1.846; 1.788; 1.530; 1.520		75 0 Mud in hole	100 0 75 1.642 50 sx on bottom.	Sacks Top, Sacks Top,
Circ. Volume	Volume Volume	0 Circ. 1,780-1,650 Plu8 60-0 Plu8	Volume Volume	Volume Volume	Volume Volume	Volume Volume	Volume Volume	Volume Volume	Volume Volume	Circ. Volume	Ciro.	Circ. Volume	• •	*	Volume	Ctrc. Com. 4 ax @ 226'	Coment Data Top, How ft Determines
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YABULATION OF WELLS IN AREA OF REVIEW PULLYHER AUGMENTED MATERPLOOD HOSTVIH FIELD MAKINELY COUNTY, NIM MENIOD

No. 17	No. 16	No. 15	No. 14	No. 13	No. 12	No. 117	No. 11	No. 10	9 .cx	ž. «	No. 7	¥0. 6	%. 5	, s.	×0. 4	× 0, 0	¥.	Hospin Sand Unit No. 18	Glerator Glerator
1,650 FNL & 330 FEL	1,050 FNL & 2,310 FEL 36-184-94	2,310 FNL & 50 FEL 36-18N-9W	330 FHL & 2,711 FEL 1-17N-9W	2,613 ENC & 1,980 EWL 1-17N-9W	1-178-96	2,110 ENL & 2,345 EWL 1-17N-94	2.310 FML & 2.310 FML 1-17N-9#	30-18N-92	330 ENC & 990 FEL 1-17N-94	2,310 PSL & 2,310 FUL 1-17N-92	2.310 FHE & 330 FWE 30-185-96	130 FNL & 25 FWL 1-17N-9W	990 FNL & 1,650 FWL 1-17N-9#	530 FKL & 2,560 FWL 1-17N-9W	330 ENL & 2,970 FEL 1-17N-92	5H 1/4-SE 1/4-SH 1/4 36-16N-3H	1-17X-9K 1-17X-9K	925 FNL & 1,330 FEL 1-174-96	Lycacton
Prod.	Prod.	Prod.	P&A	Prod.	\$,1.	Prod.	<u> </u>	Prod,	Prod.	**	Prou.	Prod.	Prod.	Prod.	Paa	Prod.	Prod.	Prod.	Well Status
9/41	8/41	7/41	:	10/40	9/40	9/11	9/40	7/40	7/40	!	6/40	1/39	11/38	9/71	9/38	8/27		, 9/71	Date Drilled M/Y
1,713	1,663	1,677 PB1,674	1,609	1,561	1,5%	1,563	1,560	1,666	1,570	1,578	1,659 PB1,656	1,590 PB1,561	1,604	1,581	1,611	1,640	3,282 PB1,556),613	Toral Depth,
: :	8-3/4	8-3/4	:	11	٠	12-1/4 7-7/8	° !	٠;	°;	;;	٠;	15-1/2 9-5/8	::	12-1/4 7-7/8	:	i	ı	12-1/4 7-7/8	Hole Size
5-3/8 2-7/8	5-1/:	7	6-5/8 2-7/8	70	7	8-5/8 5-1/2	12 7	12-1/2	70	12-1/2	12-1/2	7	6-5/8	8-5/8 5-1/2	7	6-5/8	8-5/8	8-5/s 5-1/2	Size, Depth,
1,622 1,646	1,623	1.626	1,562	22 1,530	21 1,535	73 · 1,538	.22 1,527	18 1,630	1,535	22 1,533	1,508	20 1,538	80 1,604	74 1,556	1,611	1,609	1,528	72 1,588	Data Depth,
75	130	8	125	82	412	150	50	64	00	20	50 10	70 15	75 75	150	8	75	75	100	Sacks Used
1,270 250	810	1,190	1,150	1,300	1,320	590	1,280	0 1,420	1,350	1,300	1,390	1,230	1,300	620	1,400	1,300	1,340	953	Coment Data Top, 1
Volume Volume	Volume	Volume	Volume Cire.	Circ. Volume	Circ. Volume	Circ. Volume	Cira. Volume	Circ. Volume	Circ.	Circ. Volume	Volume Volume	Circ. Volume	Volume Volume	Circ. Volume	Volume	Volume	Volume	Volume Volume	Data How Deturnined
1,646-81	1,623-63	1,626-66	ţ	1,530-61	1,535-84	1,538-63 0.H.	;	1,630-66	1,535-70 0.H.	1 -	1.608-56 0.H.	1,538-61 0.H.	1,552-65	1,556-1,581 O.H.	:	1,609-40 O.H.	1,528-56	1.589-1,613 0.H.	Producing Interval,
U. Hoapah	U. Hompah	U. Hospah	•	U. Hospen	U. Hospah	U. Hospah	•	U. Hospah	U. Hospah		U. Kospah	U. Hospah	U. Hoapah	U. Hospah	ì	U. Hospah	U. Hospah	U. Hospah	Producing Form tion
		r		-															in i

TABULATION OF UELLS IN AREA OF REVIEW
POLYMER ANCHENIED WATERFLOOD
INSTANT FIELD
MCKERLEY COUNTY, NEW MEXICO

Packer or feel Assambly

TAIRLATEN OF HELLS IN AREA OF REVIEW ROLANER AUCHENTED WATERFLOOD HONNAH PTELD NCKINHEY COUNTY, NEW MEXICO

Total Depth,

Producing Producing fr Pormation

Size,

Tubing Date*
Depth, Type of ft Lining

Packer or Sad Aspently .
Dupth, Description

																		• •	• •	1 2
×0.	No.	No.	No.	No.	No.	×o.	No.	š	×6	No.		No.	No.	yo,	×0.	No.	No.	··· «	Hospah Sand Unit No.	Operator Well
. 37	. 36	35	٠	No. 33	%	31	No. 30-A	No. 30	No. 29	No. 26	No. 27	8	No. 24A	្ល ដ	. 22	No. 21	No. 20	No. 19	i a	
390 FCL & 990 FEL 36-18N-9W	1,650 FSL & 1,650 FEL 36-18N-94	330 FNE & 310 FEL 36-18N-9W	2,310 PSL & 2,310 PEL 36-18N-94	2,310 FSL & 1,650 FEL 36-18N-34	2,970 FRL & 950 FEL 36-16N-94	36-15N-9H 36-15N-9H	SE 1/4 = NE 1/4 30-18N-94	SE 1/4 - NE 1/4	36-15N-9#	SSO MEL & SSOPME	990 PSL & 1,550 PEL . 36-18N-92	950 FSL 6 950 FML 36-15N-9W	990 FNL & 630 FEL	1-178-90 1-178-90 1-178-90	330 FNL & 660 FEL 1-17N-9W	1,650 FML & 1,980 FWL 1-17N-9W	1-17N-94	330 FSL & 1,980 FEL 36-18N-9H	1.850 PSL & 2,310 FWL 36-18N-9W	!ocation
Prod.	Prod.	Prod.	Prod.	P&A	S.I.	Dáx	P&A	P6.A	Prod.	Prod.	Prod.	Prod.	Prod.	Prod.	Prod.	Prod.	Prod.	Prod.	På	Well Status
8/24	8/44	2/44	4/44	5/41	3/42	:		1	9/42	\$/42	2/42	2/42	1/42	12/41	12/41	12/41	4/42	:	:	Drilled N/Y
1,730	1,704	1,733	1.780	1,790	1,788	1,763	1,781	1,801	1, 792	1,753	1,630	1,646	1,560	1,570	1,596	1,591	1,601	1,632	1,710	Depth,
:	;	;;	1	:	;	1	:	:	:	;	8-3/4	8-3/4	::	8-3/4	8-3/4	;	; ;	1	•	Hole Sizo,
5-1/2	5-1/2	; 4-1/2	7	5-1/2	5-3/8	None	5-3/8	5-1/2	5-1/2	5-3/8	7	7	7 5-3/8	7 5-3/8	7	. 4	5-3/4	5-1/2	7 5-3/8	Castu Sice.
1,710	1,694	1,717	1, 765	1,775	1,770		1,760	1,779	1,786	1,728	1,611	1,621	36 1,512	32 1,528	1,553	1,547	1,553 1,553	1,584	1,698 1,705	Sice, Depch,
150	:	73 205	150	150	75	ноле	ş	50	150	75	50	50	z:	75 :	4	40	75 20	100	71 71	Sacks
960	;	1,420 0	1,010	1,020	1,420	filled with	1,450	1,430	910	1,380	2,410	1,420	1,190	1,200	1,360	1,360	1,200	960	1,330	Top,
Volume		Volumo Circ.	Volume	Volume	Volume	ith mud,	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume Volume	Volume	Volume Volume	Top, How ft Determined
1.710-30 0.H.	1,694-1,704	1,723-30	1,765-80 0.h.	*	1,770-88 0.H.	:	1	ŧ	1,784-92	1,728-53 0.H.	1,611-1,630 0.H,	1,621-46 0.H.	1,512-52 0.H.	1,528-70 O.H.	1,553-95 0.H.	1,547-85 0.H.	1;553-1,601 o.:l.	1,584-1,632 0.H.	ı	Producing Interval
U. Hospeh	U. Hospah	U. Hospah	U. Hospah	:	U. Hospah	:	•	:	U. Ho*pah	U. Nospah	U: Hospah	U. Hospah	U. Hospah	U. Hospah	U. Hospah	U. Hospah	U. Hospah	U. Hospeh	;	Producing Pormation

HCKINIA COUNTY, NEM HEXICO POLYMEN AUGUSTAN FIELD MATERIADO OF HEALTS IN ANTA OF REVIEW TABLICATION OF HEALTS IN ANIA OF REVIEW

No. 55 30 FEL 1nj. 9/69 1,631 12-3/4 8-5/8 70 50 0 Circ. 1,582-1,631 U. Hospah No tuning 36-155:-72	1-175-94 2,800 8-5/8 123 110 0 volume 5-1/2 1,698 140	No. 55 1,520 FML 6 2,450 PEL Prod. 1/70 2,730 12-1/4 8-5/8 302 200 0 Circ, 1,514-42KB U, Kompah 1-17X-9% PB1,648 7-7/8 5-1/2 1,694 140 268 Volume	No. 54 NW 1/4 NW 1/4 T.A. 10/65 No detail resilable.	No. 53Y 525 FSL 4.2.175 FEL 48Z 2/71 3,240 15 10-3/4 140 150 0 CIrc. 3,114-3,200 Morrison 30-18X-92 PBS,202 9 7 3,236 250 2,390 Volume	35-158-54 Prod. 2/47 3,105 13-3/8 10-3/4 131 30 0 Volume 1,594.1,620	No. 32 2,330 FML & Z,970 FML Prod. 8/46 1,526 7 1,514 50 1,330 Volume 1,514-26 U, Hospah C-17x-92 O.H.	SG. 21 060 NNL & 3,300 FWL Prod. 9/46 1,576 7 1,532 50 1,340 Volume 1,532-76 U, Hompah 0,H.	No. 50 330 MSE & 660 FEEL Prod. 8/46 1,614 5-1/2 1,592 53 1,290 Volume 1,592-1,614 U, Hospan O.H.	No. 45 330 FML 6 1,650 FCL Inj. 8/46 1,586 5-1/2 1,550 55 1,210 Volume 1,550-84 U. Hompah 2-3/8 1,533 1-17N-94 O.H.	No. 48Y 530 FSC & 1,440 FEL Prod. 8/72 1,625 12-1/2 8-5/8 78 50 0 Cfrc. 1,614-25 U, Hospah 36-15N-PK 7-7/8 5-1/2 1,614 150 662 Volume O.M.	NO. 48 330 ESE & 1,220 Feb. 8/46 1,615 7-7/8 5-1/2 1,579 75 1,110 Volume	No6 320 FSL 6 1,650 FML D6A 4/47 1,642 No plugging report	No. 45 1,020 FSt & 1,312 FMt PcA 6/45 1,818 5-1/2 1,634 85 50 1,214 in cag	No4 1,312 PKL 6 1,680 PSL P6A 1,572 5-1/2 1,554 75 1-176-594 in ces	No. 39 1.980 PKL 6 1.980 PKL Prod. 9/44 1.558 5-1/2 1.551 75 1.551-58 U. Hospah O.H.	Easts Petroleum Corp. Hospah Sand Unit No. 38 2,030 ENL & 1,970 EWL Prod. 9/44 1,565	well tocation status giv it in the lead ft Determined ft formation in, ft
C. Konneh					320					U, Hospah	.1	i	1	•	и. новраћ	W. Hospah	Formation.
o Euding	Plugged v/15 ax cnt 1.513-1,644; 30 ax cmc 745-883; 10 mm @ must. 5-1/2-in, ceg shot off 0825 ft.																

winjection wells only.

ķ	2		*	ž	· ·	· ×	æ	*		2.	20	2	×	. ·	22	27.	2	Temoro Petrolrum Corp. Hompah Sind Coit No. 60	Of acor - Well
So. 90	2 3 3 4	86 88	No. 87	No. 36	No. 55	9.	No. 71	No. 70	NG - 64	80. CG	No. 67	No. 66	No. 63	no. 64	No. 63	No. 62	No. 61	8	
2.390 FSL & 1,475 FEL 30-188-99	1-178-99 600 PSC & 1,960 FEL	1,260 fst & 2,020 fet 3u-)5n-ya	925 PML & 2,290 FEI 1-170-96	2:470 FSL & 1.650 FEL 36-168-52	1,500 PNL & 1,925 PEL 1+176090	THE PART & 2,600 FAIL	1,310 FSL & 2,000 F4L 36-16X-94	800 PSE & 1,800 FAE 26-185-92	2,310 FNL & 940 FEL 36-les, 92	990 PNC & 2,310 FEL 3c-1855-99	2,070 FNL 6 1,590 FKL	330 PKL 4 330 PEL 1-17N-94	990 FSL 6 250 PEL 30-15N-9W	1,650 FNI & 660 721	1,980 FNE & 2,310 FME 36-18N-9M	1,900 RST 8 1,140 PWL	3,040 FSL & 1,000 FAL	2,310 PSL 6 1,050 FML 1-178-92	Docarton
TV.	Š	Prod.	Int.	Š	Frad,	Inj.	Prod,	īnj.	Inj.	lajS.I.	P	In)5,I,	inj.	Inj.	Inj.	*n).	Inj.	Inj.	Status Status
8/80	:	3/80	3/80	1	8/73	5/72	11/65	5/12	11/65	11/65	11/65	11/65	11/65	11/65	11/65	11/65	11/55	11/64	Date Drilled
1,840 PB 1,824	7,852	1,720 Ps 1,695	1,590 YB 1,570	2,918	1,568	1,5%	1,787	1,683	1,790 Ps 1,751	1,845	1,636	1,704	1,746	1.854 PB 1,814	1,844 PS 1,770	1,767	1,715 Pm 1,665	1,640	forel bepth,
15-1/4	::	12-1/4	7-7/8	12-1/4 7-7/8	12-3/4	12-1/4	9-3/4	12-1/4	5-3/4 6-1/4	9-3/4 6-1/-	4-3/4 6-1/4	9-3/4	9-3/4	9-3/4 6-1/4	9-3/4	9-3/4 6-1/2	9-3/4 6-1/4	9-3/4 6-1/4	Size,
8-5/8 5-1/2	13-3/8 9-5/8	6-5/8 5-1/2	8-5/8 5-1/2	8-5/8 5-1/2	8-5/8 5-1/2	8-5/8 4-1/2	1-1/2	8-5/8	7 2-7/8	2-7/8	7 4-1/2	7-1/2	7 4-1/2	7 4-1/2	7 4-1/2	7-1/2	4-1/2	7 4-1/2	Cast Size,
42 1,839	207 278-3,317	53 1,719	53 1,590	1.860	102 1,535	70 1,536	75 1,785	72 1,636	82 1,768	1,833	82.8 1,634	7.7 1.704	80 1,745	76 1,852	1,843	76 1,766	80 1.715	1. 84	Casing Deca Size, Depth, in, ft.
123	150 325	35 120	120	% 000 100	831	120 120	88	120	633	88	83	88	४४	88	50 70	88	88	838	Sacke Used
1,020	2,400	1,100	0 0	1,400	6 05	679	1,160	1,0%0	1,450	1,313	1,09%	1,230	1,119	1,020	1,270	1,136	1,087	1,013	Top.
Circ,	Circ, Volume	Circ. Volume	Circ, Volume	Circ. Volume	Circ. Volume	Circ. Volume	Circ.	Circ. Volume	Circ. Volume	Circ.	Circ. Volume	Circ, Volume	CRC.	Circ. Volume	Circ. Volume	Circ, Volume	Circ. Volume	Cire,	Cement Data Top, Now ft Determined
1,760-95	;	1,665-80	1,035-55	i	1,535-68 O.H.	1,536-74 0,H,	1,667.1,717	1,536-83 0.H.	1,696-1,734	1,760-80	No plugging decail,	1,616-54	1,64492	1,774-28 1.798-1,800	1,732-42	1,666.98	1,640-56	1,559-1,601	Producing Interval
U. Hospsh	Dakota	U. Hospsh	U. Hospsh	1	U, Hospah	U. Hospah	U, Hospah	U. Hospeh	U. Hoepsh	U. Hoepsh	111,	U. Koepsh	U, Hospah	U, Hospah	U. Mospeh	U. Hospah	U. Hospah	U, Hospah	Producing Formation
2-3/8	Flugged w/II		2-3/8	Plugged		2-3/8		2-3/6	Jubingle	Tubing la			2-3/8	2-3/8	No tubing,	2-3/8	2-3/8	2-3/6	Size,
1,744	v/10 ex et		1,521	v/30 ex cm		1,484		1,611	res completi	se completi			1,549	1,767	•	1,653	1,629	1,515	Jubing tieces Depth,
Ī	@ 7,050; 5		X ena	: 1,700-1,8		Kone		None	on using fi	on veing fi			None	Morg	÷	Hone	Mone	None	Type of Lintag
1.744	,500; 5,100		1,521	60; 25 sx @	•	1,48888		1,615	Jubingless completion using fibergless pipe.	Tubingless completion using fibergless pipe.			1,547	1,767		1,653	:,629	1,515	packer of
Beker AD-1	Plugged w/10 ex et @ 7,050; 5,500; 5,100; 4,800; 3,750; 3,314; 275; end eurface		Saker AD-1	Plugged w/70 ax one 1,700-1,860; 25 ax @ 70-150; 15 ex @ swrf.		Beker Lok-Set		Baker Lok-Set	1	*			Sales AD-1	Heer		Unknown	Seizer D-A	Baker AD-1	Packer of Seel Assembly s Description
	, 275;											4.1	:						

"Injection wells only.

rinjection wells only.

х о , 98	No. 97	No. 96	No. 95	No. 9	×o. 93	No. 92	Tracto Petrolam Corp. Hospat Sand Unit No. 91	Operato: lunge - Well
1-1 N-4-	97 1,975 ENL & 2,000 FEL 1-178-92	96 1,850 FSL & 1,875 FWL 36-189-94	95 350 FNL & 2.550 FEL 1-17%-9%	94 2.550 PSL & 2,400 PML 1-17X-94	93 770 FNL 6 2,010 FML 1-17%-94	92 700 FSL & 1,850 FEL 35-15N-92	91 1,790 FSL & 2,460 FWL 36_19N_9W	1,0011an
Prod.	Frod.	Pr 02.	Prod.	in).	Inj.	inj.	žnj.	Status 1411
7/82	7/82	8/81	7/80	8/80	8/86	8/80	8/80	Dete Drilled
1,602	1,578	1,740 PB 1,753	1,639 PB 1.605	1,635 PB 1,602	1,605 PG 1,584	1,655 PB 1,636	1,765 PB 1,742	Total Depth,
11.	11	12-:/4		:2-:/4 7-1/8	12-1/4	12-1/4	12-1/4	Hola Siza.
8-5/8 5-1/2	8-5/8 5-1/2	8-5/8 5-1/2	%-5/8 5-1/2	8-5/8 5-1/2	8-5/8 5-1/2	8-5/8 5-:/2	\$ 5/8 \$ 1/2	Caste, Size,
1,602	42 1,577	42 1,789	1,647GL	1,634	23	1,654	1.764	Casing Deta Size, Repth, in. ft
30 100	100	88	123	125	125	35 125	ឌីដ	Sacks
880)40 0	1,400	650	850	950	850	950	Comment Data Top, Ho ft Deter
Circ, CBL	Circ.	Circ. Volume	Circ,	Circ. Volume	Circ.	Circ. Volume	Circ. Volume	Data How Determined
1,570-1,602	1,512-48	1,686-98	1,558-78	1,516-36	1,540-60	1,604-19	1,705-24	Producing Interval
1,570-1,602 U. Hospah	U. Hospah	U. Hospah	U. Hospah	U. Nospah	U. Hompah	U. Hospah	U. Hoepah	Producing Formation
				2-3/8	2-3/8	2-3/8	2-3/6	S.ze,
				1,500	1,525	1,590	1,680	Tubing Date Depth, ft
				N Sque	None	None	Yone	Schull 20 edd.
				1,500	1,525	1,590	1,680	Packer o
				Baker AD-1	Baker AD-1	baker AD-1	Defeat AD-1	Packer or Seal Aspenblys Depth ft Description

TABULYTION OF NELLS IN AREA OF REVIEW POLYMER ANNUMENTED WATERFLOOD HOSEAU PERLED NEW PEXICO

EXHIBIT 7

D + A 8/53

GROUND LEVEL

12-1/2-IN. CSG @ 100 FT 75 SX CMT CIRCULATED TO SURFACE

HOLE FILLED W/MUD

TD 1,802 FT

Wellbore Schematic
Plugged and Abandoned Well
McMillan and White
Well No. 1-X
345' FNL & 330' FEL
Sec. 2-Tl7N-R9W
McKinley County, New Mexico

D & A 12/52

12-1/2-IN. CSG @ 100 FT 100 SX CMT CIRCULATED TO SURFACE 4 SX CMT @ 226 FT

GROUND LEVEL

PLA VI/50 EX CMT ON BTM TOP OF SMT @ 1,425 FT ±

TOP OF CMT @ 1,612 FT 1

7-1N. CSG @ 1,672 FT

Wellbore Schematic
Plugged and Abandoned Well
McMillan & White
Chase No. 1
200' FNL & 200' FWL
Sec. 6-T17N-R8W
McKinley County, New Mexico

le faculti Livet.

TEACH PLUG L.
COHETAT Z. OF
A WOODEN PLUG
AND TO SN CMT

11,520 FT

H. Sho Fi

1,788 61

1,846 FT

TO LOAS.

Wellbore Schematic
Plugged and Abandoned Well
Producers and Refiners
State No. 1
220' FSL & 2,420' FEL
Sec. 25-T18N-R9W
McKinley County, New Mexico

6 \$ 1. 1/70

GROUND LEVEL

| 8-7/6-1N. CSG @ 74 FT | | PLUGGED | W/10 SY CMT | | @ SURFACE

PLUSSED WAS EX CMT

COG CEMENTEL W/175 EX TOP OF CIME G 1,779 FT ! PLUGGE D V/ 10 EX CMT @ 2,452 FT

TO 2,590.FT

Wellbore Schematic
Plugged and Abandoned Well
Tenneco Oil Company
Hotchkiss No. 1
3,015' FNL & 330' FEL
Sec. 2-T17N-R9W
McKinley County, New Mexico

D & A 7/81

GROUND LEYEL

12- MA-IN. CEG G 42 FT 20 SX CMT CIRCULATED TO SURFACE

PLUGGED W/20 EX CINT

PLUGGED W/50 SX CMT

TD 1,846 FT

Wellbore Schematic Plugged and Abandoned Well Santa Fe R.R. "A" No. 94 South Hospah Field McKinley County, New Mexico P. + A . 9/14/71

	6. A	10' cement plug e top of esg.	Well: Hospah Sand Unit # 1 Field: Hospah Location: NE INE Sec 1 -1 17 N -1 9W Location: NE INE Sec 1 -1 17 N -1 9W
		Wellhead:	Lounty: McKinlag State: N. M. Zero Elevation: ft. (AGL) GL: TD: 1610 ft. PBTD: 1t.
		Tubing String:	
		Centralizers:	
		- No surface casin	GR. THRD. SX (FT3) cmt. CMT. CLASS-ADDITIVES:
	6 0		Squeezed ut 85 sx ce ment.
!		25 sk. cement plu	
		5 3/6 "OD LB @ 1557 FT. W/ 75 in" HOLE (C	SX (FT ³) cmt. CMT. CLASS-ADDITIVES:
	4	T.O.C. @ _/250'	BY:

UPDATED BY: KTK DATE: Julia

د موجي ا	P ! 1 · 9/14/11
iai à l'o cement plug à la rai top of csg.	Well: Hospah Sand Unit #4 Field: Hospah
top of csg.	Field: Hospak Location: NE NW Sec -1 17N -189W County: McKinley State: N. Pl. Zero Llevation: ft. (AGL) GL: TD: 1611 ft. PBfD: ft.
Wellhead:	
Tubing String:	
	The second secon
Wo Surface Casing "OD LB OFT. W/ in "hole	GR. THRD. SX (F13) cmt. (CMT. CLASS-ADDITIVES:
T.O.C. @)
Parlianted Queg'	Squeezed w/80 sx cement.
Cement Top insid	le csq. @ 277
1.0	plug: 1610-1481. B GR IHRD.
0 . Q /6// FT. W/ 7/	
T.O.C. @ 1400'	
TD-1611	

	D		Venent Plug in Hell: Hospah Sand Unit # B Field: Hospah Location: NE I Sw Sec 1-117N - R County: McKinley State: N. M. Zero Llevation: Tt. (AGL) GL: 10: 1578 [t. PRID:]	9 W
			TO: 1578 (t. PRID: 1	
			Tubing String:	
			Tubing String:	
	·		Centralizers:	
	a.		12½ "OD LB GR. THRD.	
			12% "OD LB GR. THRD. @	٠
		3	Perforated Q 570'. Squeezed w/1305x cement. Cement Top incide 7" csg. is 300'	
) (1-2) 2		
			30 sk cement Plug: 1578-1450'	
			7 "00 20 LB GR THRD. 0.533 FJ. W/ 50 SX (FT3) cmt. in	
,			T.O.C. @ /300 BY:	

UPDATED BY: KTK . DATE: 5.4

		P : A - 3/14/71
6.3.	70 /0	rement plug @ Moll: Mospah Sand Unit # 11 Field: Mospah Location: se / Mw Sec / -1 17N -R 9W County: mcKinley State: M. M. Zero Llevation: ft. (MGL) SL: TD: 1550 ft. PBID: 1t.
		Wellhead:
		Tubing String:
A.		Centralizers:
	· · · · · ·	/2 "OD LB GR. THRD. @ 22 FT. W/ /2 SX (FT3) cmt. in _/5 " hole (CMT. CLASS-ADDITIVES: T.O.C. @ _surface BY:
i i i	, i	Perforated Q 430. Squeczed w/ 80 sx cement
		Cement top inside 7" csg. is 277' 25 sk cement plug: 1550'- 1416'
0		7 "OD LB GR JIHRD. 8 1522 FT. W/ 50 SX (FT3) cmt. in 976 " HOLE (CMT, CLASS-ADDITIVES: T.O.C. 0 1280 BY:
		TD-1550

UPDATED BY: KTK DATE: 1/21/20

	P : A : 1/14/11
انتلسطينا	Well: Hospah Sand Unit #14
0 0	Field: Hascale
	Field: Hospak Location: NW NE Sec / -1 /7N -R 9W County: M. Male: N. W.
131.181	County: Me Coler State: M. m. Zero Llevation: ft. (AGL) GL: TD: 1609 ft. PBID: ft.
1 7	Zero Llevation: ft. (AGL) GL:
	TD: 1609 It. PBID: 1t.
17.4	
147.69	Wellhead:
8 P	Section and the section of the secti
	Total Same Classes
	Tubing String:
0.0	Security of the control of the contr
19 78	Building and the contract of t
3.	
1.	Centralizers:
11.16	Williams and the first the state of the stat
1, 19	
. ₆	District Control of the Control of t
1. Alc	
	"OD LB GR. THRD. O FT. W/ SX (FT3) cmt. in "hole (CMT. CLASS-ADDITIVES:
14, 14	0 FI, W/ SX (FI3) cmt.
	in "hole (CMT, CLASS-ADDITIVES:
15 2 18	T.O.C. @
	Perforated @ 585. Squeezed w/ 80 sx cement.
1.11.2	perforated e s & s. squee Eea w/ bo sx cement.
	Left 2 1/8" +bg. full of cement
1:4-1	
0 0	
i e	
	276" +bg. set @ 1551 W/125 sx cement. Cement Top: surface.
	2% 75g. set @ 1357 m/ 123 32 content
9 9	
8 4	25 sk. cement Plug: 1609 - 868
1	12 3K. CEMENT PINT. 1905
4	
	656 "OD LB GR JIRD.
国家国	@ 156.2 FT. W/ 100 SX (IT3) cmt.
	in 978 " HOLE (CHT. CLASS-ADDITIVES:
	T.O.C. @BY:
4	1.0.0. 6
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	
{·*;}	보다 보고 있는데 사람들이 되었다. 그 사람들이 되었다. 제공 사람들이
1:4.	
Ley	
	TD-1609

UPDATED BY: K.J.K. DATE: 1/21/80

0.4	Well: Hospah Sand Unit # 18 Field: Hospah Location: NE I SW Sec 36 -1 18N -18 9W County: McKinter State: N. m. Zero Clevation: It. (NGL) GL: 10: 1710
	Wellhead:
	Tubing String:
	Centralizers:
	+ No Surface Csq.
	"00 LB GR. THRU. 0 FT. W/ SX (FT3) cmt. in "hole (CMT. CLASS-AUDITIVES:
	T.O.C. 0 BY:
	30 sx cement plug: 1710'- 1413'
4	30 SX CEMENT PIUG. 1110 - 1413
4.	7 "OD LB GR THRD. 0 /698 FT. w/ 50 SX (FT ³) cmt. in " HOLE (CMT. CLASS-ADDITIVES:
	T.O.C. @ /330' BY:
	5 3/16" Liner set @ 1705 to 1327' W/ 71 sx cement D-1710'

UPDATED BY: K. J. K. DATE: 1/2/80

Location: Se NE. Sec. 36 -1 /AN -18 AW County: Alexinley. State: N.M. Zere Elevation: Tt. PBID: TD: 1897	V.,		se I NE Sec		
Wellhead: Tubing String: Centralizers: No Surface Csq. "OD LB GR. THRD. FT. W/ SX (F13) cmt. in "hole (CMT. CLASS-ADDITIVES: T.O.C. 0 BY: No plugging records available on this well Well was drilled by Petroleum Products in 1942 Str "OD LB GR THRD. 0 1777 FT. W/ SO SX (FT) cmt. in HOLE (CMT. CLASS-ADDITIVES:	1	Zere Hlevat	tion: fl.	(AGE)	GL:
Tubing String: Centralizers: No surface Csq. "OD LB GR. TIRRD. FT. W/ SX (FT3) cmt. in "hole (CMT. CLASS-ADDITIVES: T.O.C. 0 BY: No plugging records available on this well Well was drilled by Petroleum Products in 1942 5/2"OD LB GR TIRD. 0_1779 FT. W/ 50 SX (FT3) cmt. in "HOLE (CMT. CLASS-ADDITIVES:		in inquinter the of Profession of the same	t window by starting a gray on thinks of the starting parties in being an executing / described		and the state of the second state of the sta
Centralizers: No Surface Csq. "OD LB GR. TIRRD. O FT. W/ SX (FT3) cmt. in "hole (CMT. CLASS-ADDITIVES: T.O.C. O BY: No plugging records available on this well Well was drilled by Petroleum Products in 1942 5/2 "OD LB GR JIRD. O 1779 FT. W/ SO SX (FT3) cmt. in _ 72/2 " HOLE (CMT. CLASS-ADDITIVES:	Tubing String:				
Centralizers: No Surface Csq. "OD LB GR. THRD. O FT. W/ SX (F13) cmt. in "hole (CMT. CLASS-ADDITIVES: T.O.C. O BY: No plugging records available on this well Well was drilled by Petroleum Products in 1942 5/2 "OD LB GR IHRD. O 1779 FT. W/ SO SX (FT3) cmt. in _726 " HOLE (CMT. CLASS-ADDITIVES:					
No Surface Csq. "OD LB GR. TIARD. FT. W/ SX (FI3) cmt. in "hole (CMI. CLASS-ADDITIVES: T.O.C. 0 BY: No plugging records available on this well Well was drilled by Petroleum Products in 1942 5/2"OD LB GR TIARD. 0 1779 FT. W/ 50 SX (FT3) cmt. in _ 126 "HOLE (CMT. CLASS-ADDITIVES:)	Centralizers:		e agreement value partie to the consequence of the state	e de la company	
"OD LB GR. THRD. FT. W/ SX (
No plugging records available on this well Well was drilled by Petroleum Products in 1942 5/2 "OD LB GR THRD. 0 1779 FT. W/ 50 SX (FT3) cont. in 22/2 "HOLE (CHT. CLASS-ADDITIVES:	"OD LO @ FT. w/ in " hole		· 1		
Well was drilled by Petroleum Products in 1942 5/2 "OD LB GR JIRD. 0 1779 FT. W/ SO SX (FT3) cmt. in	T.O.C. @	BY:			
Well was drilled by Petroleum Products in 1942 5/2 "OD LB GR JIRD. 0 1779 FT. W/ SO SX (FT3) cmt. in					
5/2 "OD LB GR INRD. 0 /779 FT. W/ 50 SX (FT3) cmt. in _72/8 " HOLE (CMT. CLASS-ADDITIVES:	No plugging	records ava	ilable on t	his well	
0 1779 FT. w/ 50 SX (FT ³) cmt. in _72/8 " HOLE (CMT. CLASS-ADDITIVES:	Well was drill	led by Petr	oleum Produc	ts in 1942	; j
0 1779 FT. w/ 50 SX (FT ³) cmt. in " HOLE (CMT. CLASS-ADDITIVES:					
0 1779 FT. w/ 50 SX (FT ³) cmt. in " HOLE (CMT. CLASS-ADDITIVES:					,
in _22/2 " HOLE (CMT. CLASS-ADDITIVES:	5/2 "00		JURD.		
T.O.C. @ _/430' BY:	in 72/8 " HOLE				
	T.O.C. 0 1430	BY:)		

UPDATED BY: K. J. K. DATE: 1/2:/80

	P: R 1/30/70	
10:0°	Top of csq. Hell: Hospah Sand Unit # 30:18 Field: Hospah Location: SE I NE Sec 36:-1 18:16 County: Mc V. Low State: At 18:18	1 -1 9/1
	Zero Clevation: Ft. (AGI) GL: 1 t.
	Wellhead:	
	Tubing String:	
	Centralizers:	
i	- No Surface Csg "OD LB GR. THRD. O FI. W/ SX (FI3) cmt. in " hole (CMT. CLASS-ADDITIVES: T.O.C. O BY:	
	Perforated @ BIO' Set cement retainer @ 555.' Squeezed w/ 15 sx. cement.	
N.	Sand and Gravel Plus: 1629- 1024	
	20 SK cement plug: 1781 - 1629'	
4 0	5 3/8 "00 LB GR IHRD. 0 1760 FT. W/ 50 SX (FT3) .cmt. in 72/8 " HOLE (CMT. CLASS-ADDITIVES:	
4	T.O.C. 0 1450 BY:	
سن	J TD-1781	

UPDATED BY: KTK. DATE: 1/21/

P & A 11/18/42

Well: Hospah Sand Unit- Field: Hospak Location: sw/sw Sec 36 County: McKinley Stat Zero Elevation: Ft. (TD: 1763 ft. PBID:	-1 18N -18 012
/ Wellhead:	
Tubing String:	
Centralizers:	
No Surface Csg. "OD LB GR. THED. O FT. W/ SX (FT3) cmt. in " hole (CMT. CLASS-ACDITIVES:	
T.O.C. U BY:	
Hole Filled W/ 12 ppg mud	
"OD LB GR THRD.	
in "HOLE (CHT. CLASS-AUDITIVES:	
7.0.C. 0 BY:	
TD-1763	

UPDATED BY: K.J. K.

	P & A - 1/30/70
7. Z	Well: Hospah Sand Unit #33 Field: Hospah Location: NW 1 SE Sec 36 - 1 18 N - 18 9W County: McKintey State: N. M. Zero Llevation: Rt. (AGL) GL: TD: 1790 ft. 1810: 11.
0 0	Wellhead:
8	Tubing String:
	Centralizers:
1	+No surface Ciq. "00 LB GR. THED.
PÁ	"00 LB GR. THRD. 0 FT. v/ SX (FT ³) cmt. in "hole (CMT. CLASS-ADDITIVES: T.O.C. 0 BY:
1: 1	Sand and Gravel Plug: 1635 - 1001

SK. Cement Plug: 1790'- 1635'

5/2 "0D LB GR T @ 1775 FT. W/ 150 SX (FT. in 778 " HOLE (CMT. CLASS-ADDITIVES

T.O.C. @ 1030 BY:

UPDATED BY: K. T.K. MATE: 1/21/80

CEG CEMENTED W/75 SK
TOP OF CEMENT UNKNOWN

PEA 7/46 W/25 SX CMT
TOP OF CMT @ 1,354 FT

5-1/2-IN- CEG @ 1,554 FT

Wellbore Schematic
Plugged and Abandoned Well
Well No. 44
Hospah Field
Mc Kinley County, New Mexico

CSG CEMENTED W/85 SX
TOP OF CEMENT UNKNOWN
PER 11/30/45 W/50 SY CMT
TOP OF CMT @ 1,214 FT

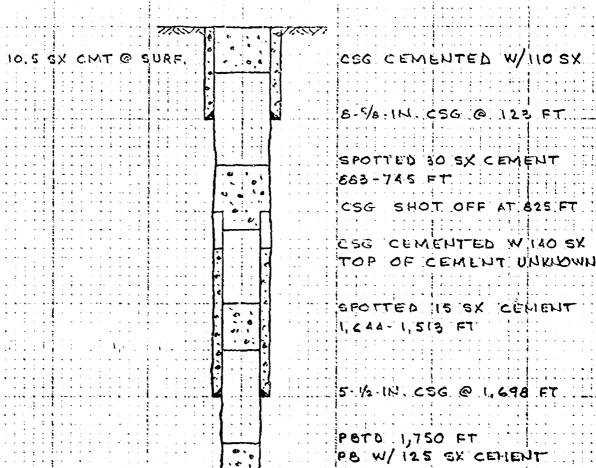
5-1/2-111. CSG @ 1,634 FT

TO 1,818 FT

Wellbore Schematic
Plugged and Abandoned Well
Well No. 45
Hospah Field
Mc Kinley County, New Mexico

•	P : A 10/9/67
J1	10 cement plug @ Well: Hospah Sand Unit # 48 Field: Hospah
	top of csg. Field: Hospah Location: Sw/sE Sec 36 -1 18N -18 9W
j:	County: mckinlay State: N. M.
	Zero Elevation: ft. (AGL.) GL: TD: 1615 ft. PBID: 1t.
	Wellhead:
	Tubing String:
	Tubing String.
8	Centralizers:
	-No Surface Casing
	"OD LB GR. THRD.
	"OD LB GR. THRD. O FT. w/ SX (FT3) cmt. in "hole (CHI. CLASS-ADDITIVES:
	la di Paranta di Santa da San
4	T.O.C. @BY:
—	
	50 sk. plug: 1615 - 1103
	5 1/2 "00 LB GR JIRU. @ 1579 FI. w/ 75 SX (FT) cint.
	in 7 % " HOLE (CHT. CLASS ADDITIVES:
	T.O.C. @ ///O' BY:
\}	
\ . - .	
سما	TD-1615

UPDATED BY: K. J. K. DATE: //c/en



TD 2,800 FT

Wellbore Schematic
Plugged and Abandoned Well
Well No. 57
Hospah Field
Mc Kinley County, New Mexico

• •	P : A - 3/18/24
	Field: Hospah
15 sk. cement pl 0. 5. 6. 9. 0 + op of 8% cs	9.
wermeau;	
Tubing String:	
Security of the second section of the sectio	
Centralizers:	
the same of the sa	
85/8 "00 @ 150 FT. W/	LB GR. THRD. 200 SX (FT ³) cmt. ole (CMT. CLASS-ADDITIVES:
in 1214 " h	ole (CMT. CLASS-ADDITIVES:
1.0.C. 0 SUE	fre by:
Set 25 sk. s	pluq @ bottom et surface Csq: 150-70'
D. 10 d 1350	of 51/2"csq.
Set 30 sK.	cement plug on top of esg. stub: 1350 - 1250
an ex ceme	ent Peug: 1860'- 1700'
5/2 "00	LB GR THRD.
11.4 Q 1860 FT. W/	90 SX () [13) cmt.
	DLE (CMT. CLASS-ADDITIVES:
1.0.C. 0 /s	700 BY:
The state of the s	

UPDATED BY: K. J. K. DATE:

			P 1 11 - 8/7/5			- J.	
		top of asg.	Well: Was Field: Was Location: Ma	oak			•
			Cour Zero Flevatio TD: <u>7852</u>	ily: McKiala	3. State: N.	γ)	
	1. 1.		TD: 7852	181 . 181	D:	16.	
		Wellhead:	Balana d'unifordinamente e dississione Patri de des value (
		Tubing String:					
	}				·		- 5-, 12 - • • • • • • • • • • • • • • • • • • •
		Centralizers:					
		Centralizers:					
							_
		. /	والواقعة المستونية والمستونية والمستونية والمستونية والمستونية والمستونية والمستونية والمستونية والمستونية والمستونية			<i>J</i>	
	\$	1338"00 L8 @ 207 FT. W/ 150 in 1712" hole (GR	THRD.			
		in 17/2 " hole (CMT. CLASS-ADDI	TIVES:			
		T.O.C. @ surfec	e BY:				
		,					
1		lock emile 2		,			
1	1	ese cut & po	alled 6 278				
							-
•				•			
			•				
		95/8"OD L	B GR	ŢIIRD.			
.)		@ 3317FT. W/ 32 sin_/2/4 " NOLE (4.		
			44	IVES:	* 2		, 423
45	6	1.0.C. @ 2400'	BY:				
Γ							
Z.		10 sk cement plug: 3				i di samunian br>Samunian di samunian di sa	100 100 100 100 100 100 100 100 100 100
e e	बर्ग्ड	10 st cement plug: 48	100-4770	1.3			
4	2000	10 sk cement plug: 51	100-5070				
F						•	
	edie /	osk cement plug: 55	00'-4970'				
\cdot \int	. 1						
	رادون	osk cement plug: 705	0-1020				
(~				UPDATED BY:	K.T.K.	DATE: 1/2	1/80

Tesoro Petro WCLL NO. 49	leum Corp.	Hospah Sand Uni	+	
	FOOTAGE LOCATION			
	330' FNL & 1,380' FE	SECTION Sec 1	TUHNSHTP T17N	RANGL R9W
Schema	ti.		Tobular Data	
Jenema		Surface Cooling	^	
1 ([]	•		Cemented with	
			feet determined by	
		Hole size		-
		Intermediate Casino	1	* *
		· Size None	" Comented with	h
 		TOC	feet determined by	-
		Hole size		
	Note: Csg pitted	Long string		
	750 ft to 765 ft.		Cemented with	. 55
1 1 1			feet determined by	
‡ ±		•		
1 1	Note: Holes in csg	Total depth 1,58		•
4 7	from 860 ft GL to 900 ft	•		
	GL.	Injection interval	1.704	
		1,550 fee	t to 1,584 -hole, indicate which)	feet
		•		
		•		
1				
	•			
			·	e de la companya del companya de la companya del companya de la co
		· .		•
		•		•
{ · · · · · · · · · · · · · · · · · · ·	5-½" @ 1,550'			•
4	Note: Junk in open	hole consisting of	bottom seven feet of	2-3/8-in.
	assembly.			
•				
ubing size	2-3/8 lined		aterial)	set in
Guieberson U		•	r at 1,531	feet.
(brand	and model)		. 40	
•	ny other casing-tubing	seal);		-
ther Data		u vaaan		
	e injection formation			
	eld or Pool (if applic			· ·
	new well drilled for i			្រ ដ ្ឋា សារី ស្រុខ
If no, for			led? Drilled for oi	1 production
	to water injection 1	0/20/77.		
Converted Has the we	11 ever been perforate	d in any other zone(a)? List all such per	forated inter
Converted Has the we		d in any other zone(of cement or bridge	a)? List all such per plug(a) used)No	forated inter

51	1E	E	T
	1		•

UPE'RAT	OR				tase				
		oleum Coi			ospah Sand Ur	nit			
			L & 2,350'		Sec 36		TOWNSHIP T18N	HANGE R9W	
	Schem	ntic		Surf	'nce Casing	Inbula	r Dato		
								ith <u>50</u> by <u>Circulatio</u>	
		 		Hole	size 12	2-1/4			
Ш		8-5/8"	' @ 58'	Size		H		th	s x
			·		size	fect	determined t	у	
					string 4-½	# Salar Stephology	Cemented wi	th 180	s×
					883		determined b	y Volume	
					1 depth 1,63		····		
					,582 fe		1,631 indicate whic	feet	
								•	•
					· · · · · · · · · · · · · · · · · · ·		•		
				·	:				
	. 1	, -	1,582' 1,592' cem	ent sheat	h perf w/4 s	pf.		: 4	
	j	TD @ 1	,631'	•					. *
•									-
Tubing	size _	None	1	ined with		material) er at		set in	
		d and mod any other		bing seal					
Other D				් 11	yosnah.			•	
			• 1	ion <u>U</u> plicable)	Hospan Uppe	er Sand O	il Pool		
		•	-3	• ', '-,	on? /7 Yes	· · · · · · · · · · · · · · · · · · ·	No y ste		
ic	no, c	î what bu	rpose was		riginally dri		illed for oi	l production.	
4. Nas	the w	ell ever plugging	been perfo detail (sa	rated in c	any other zone ment or bridge	(a)? Lis plug(a)	t all such poused) NO	erforated inte	rvels
						<u> </u>			
5. Giv	e the	depth to	and name o	fany over	lying and/or	underlyin	g oil or gas	zones (pools)	**

UPERATOR esoro Peti	roleum Corp.		ASE Spah Sand Un	·i+		Marie Carlos Car
	TUDIAGE LUCATION	IIC.	SECTION		TORNSHIP	HANGE
60	2,310' FSL & 1,05	O' FWL	Sec 1		T17N	R9W
Sci	hematle			Tabula	n Data	
******	Andrew Parameter and Andrew Standing	Surfac	ce Casing	100010	1 Ontu	
1611					Company 4 111	35
					Cemented with	
			size 9-		determined by	
		Intern	nediate Casino	1		
		·Size _	None	n	Cemented with	
		TOC	8	fect	determined by	
			ize			
		Long s	tring		ş.	•
	w.	•		**	Cemented with	50
					determined by	11.00
			ize 6-1/4"		decermand by	
	7" @ 65'	*	depth 1,640			
		Inject	ion interval			•
			559 fee		1 601	
	•	(perfo	rated or open	ethoxixex, i	ndicate which)	feet OA
	€ Sqz perfs @ 1,543'	& 1.553 ¹ .	Sazd w/50 s	s x	•	
	1,559'-1,590'; 1,60					
1	= 1,339 -1,390 , 1,00			4		
,	• •					
			•		.	41
	TD 0 1,640'	e e e e e e e e e e e e e e e e e e e				•
	-					
•						
ubing siza	e <u>2-3/8</u> lie	ned with	None			set in
	ker Model AD-1		¥** -	sterial)	3 614 67	
4-2 Da	rand and model)	 	packer	rat	1,514.67	feet
or describ	be any other casing-tub	ing seal).		<i>x</i>		**************************************
ther Dota		11	ing and the second of the seco		•	3
	f the injection formation	or o	lospah			•
. Name o	Field or Pool (if app	licable) _	<u>Hospah Upper</u>	Sand 0	il Pool	
. Is this	s a new well drilled for	rinjection	7 /7 Yes	<u>/X</u> 7 !	No.	
If no.	for what purpose was ti	ne well ori	ginally drill	led? Exi	sting injection	on well.
. Has the	e well ever been perfor:	ited in any	other zeneli	17 116	all such party	arated inter
and give	ve plugging detail (sac	s of cemen	t or bridge p	(e)put	ised) NO	
					i .	

PERATOR		LEASE			· · · · · · · · · · · · · · · · · · ·	
	oleum Corp.	•	nh Sand Unit			
	3,640' FSL & 1,000'				TOWNSHIP TIZN	HANGE RÖW
······································		******			11/11	NOW
Schema	tic			Tobula	r Data	
	Top of 7" @	Surface	Coolng			
	6' below GL.	Siza	7		Cemented with	35
	,				determined by	
			e 9-3/4			
	3	Intermed	liste Casing		•	
	·				Chankad 141	
	7" @ 70'				Cemented with	
					determined by	
		Hole siz	e			
		Long str	ing		*	
		Size 4	_1,	.	Cemented with	50
					determined by	
		Hole siz	e 6-½"			•
		Total de	pth <u>1,665</u>	PB		
		Injectio	n interval			•
	Saz perfs @ 1.626			•	1 656	
	Sqz perfs @ 1,626 Sqzd w/25 sx	(perfora	ted or waxxx	to ⊮XXX¥, i	ndicate which)	_ feet
\bowtie						
	1					
	Sord nonfo 1 622 6	561 ON D	من و هند داد		C40 FGI	
	Sqzd perfs 1,632-5	56' OA. Dr	rld out & re	perf l,	640-56'.	
	Sqzd perfs 1,632-5	56' OA. Dr	rld out & re	eperf l,	640-56'.	
		56' OA. Dy	rld out & re	eperf l,	640-56'.	
	PBTD @ 1,665'		rld out & re	eperf l,	640-56'.	
			rld out & re	eperf l.	640-56'.	
A	PBTD @ 1,665'		rld out & re	eperf l,	640-56'.	
	PBTD @ 1,665'		rld out & re	eperf l	640-56'.	
	PBTD @ 1,665' Float collar @ 1,6		rld out & re	eperf l,	640-56'.	
A A A A A A A A A A A A A A A A A A A	PBTD @ 1,665'		rld out & re	eperf l	640-56'.	
	PBTD @ 1,665' Float collar @ 1,6		rld out & re	eperf l	640-56'.	
bing size	PBTD @ 1,665' Float collar @ 1,6 4-½" @ 1,715		None		640-56'.	set in
	PBTD @ 1,665' Float collar @ 1,6 4-½" @ 1,715	586'	None (ma	terial)		
Baker D	PBTD @ 1,665' Float collar @ 1,6 4-12" @ 1,715 2-3/8" line A land model)	586'	None	terial)	1,629	set in
Baker D	PBTD @ 1,665' Float collar @ 1,6 4-½" @ 1,715 2-3/8" line	586'	None (ma	terial)		
Baker D	PBTD @ 1,665' Float collar @ 1,6 4-12" @ 1,715 2-3/8" line A land model)	586'	None (ma	terial)		
Baker D (brand r describe a her Data	PBTD @ 1,665' Float collar @ 1,6 4-12" @ 1,715 2-3/8" line A land model)	od with	None (ma packer	terial)		
Baker D (brand r describe a her Data Name of th	PBTD @ 1,665' Float collar @ 1,6 4-½" @ 1,715 2-3/8" line 1-A 1 and model) ny other casing-tubin	od with	None (ma packer	terial)	1,629	
Baker D (brand r describe a her Data Name of th Name of Fi	PBTD 0 1,665' Float collar 0 1,6 4-½" 0 1,715 2-3/8" line A land model) my other casing-tubin me injection formation eld or fool (if appli	od with	None (ma packer ospah spah Upper	terial) at Sand Oi	1,629	
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Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this erem. None

51	ΙĖ	E	T	

Hospah Sand Unit CETCH NO. (NUTACE LOCATION SECTION SCHOOL NAME) 62 1,900' FSL & 1,140' FML Sec 36 T18M R9W Schreate Indular Data Surface Cooling Size 7 Cemented with 35 TOC 9 Feet determined by Circulation Hole size 9-3/4" Intermediate Casing Size 4-b "Cemented with 50 TOC 1,136 Feet determined by Hole size Long string Size 4-b "Cemented with 50 TOC 1,136 Feet determined by Volume Hole size 6-b" Total depth 1,736 PB Injection interval 1,666 Feet to 1,698 (perforsted or open-hole, indicate which) Float collar 0 1,736' When we will depth 1,736 PB Injection interval 1,666 Feet to 1,698 (perforsted or open-hole, indicate which) For 3 PB Injection interval Whome (size 1) PB Injection interval 1,663 Feet Wash of the injection formation U. Hospah Wash of Field or Pool (if applicable) Hospah Upper Sand Oil Pool Is this a new well drillad for injection? The Year XT No If no, for what purpose was the well originally drillad Drillad for oil produced. Converted to water injection formation in any other sone(s)? List ill such perforsted intervand give plugging detail (sacks of cement or bridge plug(s) wasd) No	62	1,900° FS	CATION L & 1,140'	FWL	lospah Sand SCCTION Sec 36	d Unit		_
Schmalls Surface toolog Size 7 Cemented with 35	62	1,900° FS	L & 1,140'	FWL	Sec 36			_
Surface Cooling Size 7 Cemented with 35 TOC 0 feet determined by Circulation Note size 9-3/4" Intermediate Casing Size None Cemented with TOC feet determined by Hole size Long string Size 4-12 Cemented with Total depth 1,736 PB Injection interval 1,666 feet to 1,698 Total depth 1,736 PB Injection of size 1,698 Total depth 1,698 feet Total depth 1,736 PB ,898 Total depth 1,736 PB 1,998 Total depth 1,736 PB 1,998 1,998 Total depth 1,736 PB 1,998 1,998 Total depth 1,736 PB 1,998	Schemat	<u>1c</u>						
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and date broddend netare concerns of comment of piriode brades) assets MO	Has the wel	l ever bec	en perforate	d in a	ny other zo	nc(s)? Li	st all such per	forated inter
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Tesoro Petroleum Corp.	Hospah Sand University	it Tumnsiili	RANGE
63 1,980' FNL & 2,310'		T18N	R9W
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Schematic		Inbular Data	
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		fect determined by	
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	11016 3176 3-0		•
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Tesoro Petroleum Corp. Hospah Sand Unit MILL NO. FUDIAL LUCATION SCETTON IUMISHIP ROW 64 1,650' FML & 660' FEL Sec 36 TIRN ROW Size 7 " Cenented with 25 TOC 0 feet determined by Circulation Hole size 9-3/4" Internediate Casing Size 4-½ " Cenented with 55 TOC 1,020 feet determined by Volume Hole size 6-½" Total depth 1,814 PB Injection interval 1,774 feet to 1,800 feet (perforated or MARKKAKAKA, indicate which) Sqz perfs @ 1,763-64', 1,768'. Sqzd w/50 sx. Tubing size 2-3/8 lined with None set in a	UPERATOR				Jed			
Schoolle Surface Casing Size 7		Petroleum :	Corp.			Unit		
Surface Cooling Size 7 " Cemented with 25 TOC 0 feet determined by Circulation Holo size 9-3/4" Intermediate Pasing Size None " Cemented with 50 TOC feet determined by Hole size Long string Size 4-1/2 " Cemented with 65 TOC 1,020 Feet determined by Volume Hole size 6-1/8" Total depth 1,814 PB Injection interval 1,774 Feet to 1,800 Feet (perforated or MAKKAXXXXXXX, indicate which) Sqz perfs 0 1,763-64', 1,768'. Sqzd w/50 sx.								
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Tubing size 2-3/8 lined with None set in a			* ,	•	•			
Tubing size 2-3/8 lined with None set in a Raker		•						•
Tubing size 2-3/8 lined with None set in a Raker					. ,	•		•
Tubing size 2-3/8 lined with None set in a Raker		•				•		
Raker (material)	14. TG	4-12" @]	,852'	•			· · · · · · · · · · · · · · · · · · ·	•
Raker	•		•				•	
Raker (material)	•••	2-3/8	•		Nona	:	• •	Section 1
Baker packer at 1.767 Cont.	ubing size		lined	with _		terial)		set in a
(brand and model)				. /	packer	at	1,767	feet.
)ther Data					•	· · · · · · · · · · · · · · · · · · ·	
그는 현실 그는 그는 사람들은 그는 그들은 사람들이 되었다. 그는 그들은 그는 그를 모르는 것이 되었다. 그는 그들은 그는 그를 모르는 것이 되었다.	Name of	f the injection	n formation	υ.	Hospah	•		4
Other Data	TO HEME O					Sand Oil	Pool	•
Other Data 1. Name of the injection formation <u>U. Hospah</u>		1 LIGIO OL LOO	abbitc.					
Other Data 1. Name of the injection formation <u>U. Hospah</u> 2. Name of Field or Pool (if applicable) <u>Hospah Upper Sand Oil Pool</u>	2. Name o				n? /7 Yes	/7/ N	0	
Other Data 1. Name of the injection formation <u>U. Hospah</u> 2. Name of Field or Pool (if applicable) <u>Hospah Upper Sand Oil Pool</u>	Name of	s a new well d	rilled for in	njectio	- -			on well
2. Name of Field or Pool (if applicable) Hospah Upper Sand Oil Pool 3. Is this a new well drilled for injection? // Yes // No If no, for what purpose was the well originally drilled? Existing injection well. 4. Has the well ever been perforated in any other some(s)? List all such perforated intervi	2. Name of 3. Is this If no,	s a new well d for what purp	rilled for in	njectio	iginally drill	ed? Exi	sting injecti	
Other Data 1. Name of the injection formationU. Hospah 2. Name of Field or Pool (if applicable)Hospah Upper Sand Oil Pool 3. Is this a new well drilled for injection?	2. Name of S. Is this If no,	s a new well d for what purp	rilled for in	njectio	iginally drill	ed? Exi	sting injecti	
Dither Data 1. Name of the injection formationU. Hospah 2. Name of Field or Pool (if applicable)Hospah Upper Sand Oil Pool 3. Is this a new well drilled for injection?	2. Name of 3. Is this If no,	s a new well d for what purp	rilled for in	njectio	iginally drill	ed? Exi	sting injecti	

UPERATOR		LEASE		
	oleum Corp.	Hospah Sand Uni		
KELL NO. 65	990' FSL & 250' FEL	Sec 36	TUHHSIITP T18N	RANGE R9W
Schen	natic		Tobular Data	
		Surface Coalng		
		Size 7	Cemented with	h 35
	•		feet determined by	
		Hole size 9-3/	<u>4</u> 11	
		Intermediate Casino		· ·
	•	-Size None	Cemented with	b
			feet determined by	
	•	Hole size	~	
		Long string		
			" Cemented with	50
	•		feet determined by	
		Hole size 6-4"		•
		Total depth 1,746		
	► 7"	Injection interval		
-		1,644 fee	1.692	
	•	(perforated or & **	Wolfe, indicate which)	_ feet
		•		•
				•
			•	•
	•		•	
		•	·	
事		* •		
		•	•	
				•
	4-5" @ 1,745'			•
7			•	. •
•				
ubing size	2-3/8" line	d with None (ma	sterial)	set in a
Baker	Model AD-1	•	at 1,547	feet
(prai	nd and model) any other casing-tubing			
ther Data				•
	the injection formation	U. Hospah	•	
	Field or Pool (if applie		Sand Oil Pool	
	new well drilled for		/7/ Na	
· v	or what purpose was the			ion well.
Han the	well ever been perforati	ed in any other zone(:	a)? List all such per	forated interv
· sián cure .				
and give	plugging detail (macks	of cement or bridge (No (base (e) pul	

Give the depth to and name of any overlying and/or underlying oil or gas somes (pools) this area. None

IM	THEEL		•
T		2	
			-

Tesono Pot	troleum Corp.	LEASE		•
	TUOTAGE LOCATION	Hospah Sand Unit	ายหลาย	RANGE
69	2,310 FNL & 940' FWL	Sec 36	TIBN	R9W
Cab.	enotio		V.1. 1 D.1.	
Sche	ematle 11	•	Tobulor Data	
		Surface Caping		
		Size 7		
		TOC 0	_ feet datermined by	y Circulation
		Hole size 9-3/4		•
		Intermediate Casing		•
		-Size None	" Cemented wil	th
•	7" 0 82'	TOC	_ feet determined by	y <u> </u>
		Hole size		
		Long string		
		Size 2-7/8	M Cemonted wit	: th 40
<u> </u>		100 1,450		
		Hole size $6^{-\frac{1}{4}}$ "	,	·
		Total depth 1,757	PB	
,	2			
		Injection interval	3 704	
\		1,696 feet (perforated or **p*********************************	to 1,/34 Kkg, indicate which	feet
	±			
	T			•
		•	•	•
	PBTD @ 1,751			
1 1		•		
		· '.		•
	2 7/01 6 1 7001	• •	· · · · · · · · · · · · · · · · · · ·	•
<u></u>	_ 2-7/8" @ 1,788' TD @ 1,790'	•	•	. •
				•
				•
	completion u	sing fiberglass pipe	•	
uding size			erial)	set in a
-(br	None (Labom bne bne	packer	at	feet.
	e any other casing-tubing	seal).		
ther Data			•	
. Name of	the injection formation	U. Hospah	x *	· ·
. Name of	Field or Pool (if applic	able) <u>Hospah Upper Sa</u>	ind Oil Pool	
. Is this	a new well drilled for is	njection? /7 Yes	/W No	
	for what purpose was the		- N	ion well.
No. the	well ever been perforate	d in any other seeded	2 1 (0) 1 1	riorated interv
und civ	e plugging detail (sacks	of cement or bridge pl	ug(s) used) NO	
				and the Chapter

THE RECEIVE OF THE PROPERTY OF THE PROPERTY WHEN THE PROPERTY OF THE PROPERTY

UPERATOR	3	LEASE			<u>,,,,</u>
Tesoro Pet	roleum Corp.	Hospah, S	and Unit		
พยโป พบ. 70	800' FSL & 1,80	a scc1 00' FWL Sec	Tun 36	TOHNSTILP T18N	HANGE R9W
Sch	ematic		Tobul	or Dota	
		Surface Cas			
		Size 8-5	6/8 _H	Cemented wit	h 50
		roc 0	feat	t determined by	, <u>Circulation</u>
		Hole size	12-1;		
		Intermediat	e Casing		
	8-5/8"@ 72'	-Size Non	е "	Cemented wit	h
			feet		
		Hole size			
		Long string			
	•	Size 4	<u>-1</u> 2 н	Cemented wit	ь 120
	• : .		60 feet		
		Hole size	7-7/8"		•
		Total depth	1,683'	· .	
		Injection in	nterval		
		1,636	feet to _	1,683	feet
		BRRKKANGQ	or open-hole,	indicate which	Γ
				•	
					•
			•		
	• .		• •	•	•
		•	•		
		•		•	•
	4-½" @ 1,636'		•		•
}					
\$					•
				•	•
•		· · · · · · · · · · · · · · · · · · ·			
ubing size	2-3/8	lined with	None (material)	,	set in a
Baker L	ok Set		_ packer at	1,618	feet.
	e any other casing-	tubing seal).	,		
ther Data					•
. Name of	the injection form	nation U. Hospah	<u>.</u>		·
. Name of	Field or Pool (if	applicable) Hospa	h Upper Sand O	il Pool	
. Is this	a new well drilled	for injection?	7 Yes /7	No	
If no,	for what purpose wa	s the well original	ly drilled? E	xisting inject	tion well.
			•		1
. Has the	well ever been per	forated in any other	r zone(s)? Li	st all such per	forated interv
	e plugging detail (sacks of coment or	bridge plug(a)	used) No	
and giv			•	12	
and giv					

SHE	ET	

UPERATOR		LEASI			
	etroleum Corp.		ah Sand Unit		
RELL NO. 84	TOUTAGE LOCALT 1,475' FNL & 2,		Sec 1	TOWNSHIP T17N	HANGE R9W
				. 11/3	Men
<u>5</u> (chematie	w	Tob	ular Data	
	1	Surface	Casing		
		Size	8-5/8 "	Cemented wit	h 50 e
}	·	Toc	0	eet determined by	Circulated
			re 12-¼"		
		Interned	Jiate Casing		
1 1 1	8-5/8" @ 70'	•		Cemented wit	h
]				ect determined by	
1 1 1		Hole siz		, , , , , , , , , , , , , , , , , , ,	***************************************
		•	,		
1 1 1		Long str			
		•		Cemented with	
				eet determined by	Volume
			e 7-7/8"	:	• • • • • • • • • • • • • • • • • • • •
		Total de	pth 1,574		•
		Injectio	n interval	•	
		1,536	feet to	1,574	feet
	•	KXXXXXQQV	xex or open-not	e, indicate which	,
1 1			• •		
					•
			•		•
M 1		. D.	: *	•	
			•	* • •	
	•			•	
		•	÷ -	• Comment	
}	4-½" @ 1,536'				
	~	•		•	* 2
•	. 1			•	
<u> </u>	TD @ 1,574'				
ubing si	ze2-3/8"	lined with	None	•	set in a
	ker Lok Set		(materi	· · · · · ·	
	brand and model)		packer at	1,488	feet-
r descr	ibe any other casing	-tubing seal).			\$ \$
ther Dat	<u>a</u>	e Total			
. Name	of the injection for	mation U. Hosp	ah		
. Name	of Field or Pool (if	applicable)H	ospah Upper Sar	nd Oil Pool	144 A
•	is a new well drille			7 No	2.7 2.75 (1.84)
	, for what purpose w			•	ction well
				LX13C1IIQ_1IIJE	
	he well even have a	rforsted to se-			
0 A	he well ever been pe	(sacks of cement	or bridge plug(s) used) NO	TOLBICO TULCEAC
. Has t and g	ine braddrud detail				
. Has t	ive binddrud gefuit				
. Has t	ive binddrud detail				

Tecomo Da	troleum Corp.	LLASC Vocasta C			
	Troleum Corp.	Hospah S	and Unit	TOWNSHIP	OANOS
	925' FNL & 2,290' FEL			10485811P T17N	RANGE ' ROW
Schr	matic .	Surface Cas		or Doto	
		\$1ze 8-5	/8 *	Cemented with	35 e
				t determined by	
		Hole size			
		Intermediate	Casing		•
	•	Stze Non	9 H	. Cemented with	
. 	8-5/8" @ 53'	TOC	fee	t determined by	
	.	Hole size			•
		Long string			
				Cemented with	
		Toc) fee	determined by	<u>Volume</u>
		Hole size _	7-7/8"		• .
		.Total depth	1,570 PB		
		Injection in	terval		•
		1,535 (perforated	feet to	1,555 indicate which)	feet
-				•	
	X 2				•
X	K	*			
					•
	‡				
		-			
					•
0.0	(ن		•		
4	5-½" 9 1,590'		•		•
		· -			•
•	2 2700		•		
bing size	2-3/8" lines	with	None (material)	set in a
	Model AD-1		packer at	1,521	feet
	and and model) any other casing-tubing	seal).			•
ther Data					
	the injection formation	U. Hosnah			
	Field or Pool (if applie		h Upper Sand	Oil Pool	
,, =	a new well drilled for			No	
-	for what purpose was the				ion wall
5 00 1	int white hathase was the	werr originary	T ourified.	exiseing inject	IUII WE I I.
If no,			*		<u> </u>
If no,			9 399		
. Has the	well ever been perforate plugging detail (sacks			st all such perfo used) NO	orated interva
If no,				st all such perfo used) NO	orated interva

Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this area. None

SHEET

UPERATOR		LEASE				······································
Tesoro Petrole	eum Corp.	Hospah Sar	d Unit		•	
	2,390' FSL & 1,475'			TOHASHIP T18N	RANGE R9W	
Schem	atic		ໂຄນນິໄດ	r Dáto		
1 1 1 1	*	Surface Casing	A	and the second s		
1 1 1 1 1 1				Cemented with	35	• •
	•			determined by		-
		Hola size		_	011 0010 01011	
		Intermediate C			,	
		Size Mone	H	Comented with		a×
				determined by _		
		Hole size		_		
		Long string		4.3		
		Size $5-\frac{1}{2}$	H	Cemented with	125	s x
		roc 1,030	feet	determined by	CBL	
	8-5/8" @ 42'	Hole size	7-7/8"			
		Total depth	1,824 PB			
		Injection inter		•		
		1,780		1 795	_	
		(perforated or	AXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	ndicate which)	feet	
M M	•			· · · · · · · · · · · · · · · · · · ·	•	٠.
					•	
		•		•	•	
T						
	i .	•		: · ·		
			•			
	• • • • • • • • • • • • • • • • • • •	• .	•		•	
45.4	5-½" 0 1,839'	•		,		
				•	•	
	2 2/01					
Tubing size	2-3/8" line	d with	one (material)		set in	а
	Model AD-1	P	acker at	1,744	feet.	
	any other casing-tubin	g seal).	•			
Other Data			•	•		
	he injection formation	U. Hospah	. 			
	ield or Pool (if appli		Unner Sand (il Pool		
	new well drilled for					
			مبت	No Istina injectio	ר ויים א	
2 f 110 f 1 G1	r what purpose was the	Merr acidiustik	oritied, EX	samy injectio	n well.	-+4+ sile)
MESS and profit the regulation of the		Toma mesenta in the stage of the stage of	and the state of t		Acceptance of the second constitution of the sec	
4. Has the w	ell ever been perforat plugging detail (aacks	ed in any other z	onc(s)? Lis	t all such perfo used) NO	rated inter	re la
			·····································	en veren er som er skriver er en er	Sand Service of the s	
	Statement of the statem					
5. Give the	denth to and name of a	NV AUNV1.1	as und-1-1-			
this seen	None	overskind aug/	At Allacttiv	n arr at ase tol	/468 / 31	tak o
	The control of the co	and the state of t	- the property of the contract of the state	100mm 100m	Control of the contro	COLUMN TO

SHEET

		LEASE			
esoro Petr	roleum Corp.	Hospah Sar	nd Unit		
91	3,790' FSL & 2,460' FW	2661106	1	T18N	R8W
Schi	matic		Tabuln	r Data	
		Surface Cooling	1		
		5ize 8-5/8	8 # ·	Cemented with	35
				determined by	
		liole size			
		Intermediate C	oslng		
.	,	Size None	91	Cemented with	:
		TOC	feet	determined by	•
		Hole size			
		Long other			
		Long string	· ·	•	3.5.=
				Cemented with	
				determined by _	Volume
		Hole size		•	•
1 1 1	8-5/8" @ 42'	Total depth _	1,742 PB		
		Injection inter	rval		
		1,709	feet to]	,724	feet
	•	(perforated or	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	ndicate which)	
		•			
				•	•
\square					
			•		
 			•		
			· ·.		
		•	-		· · · · · · · · · · · · · · · · · · ·
24.02	5 1 11 0 7 764		, ?		
13.25	5-½" @ 1,764'		*	*	•
•	•			•	•
bing size		with None			set in a
Baker Mode	1 AD-1		(material)	,680	
(bra	and model)	•	acker at	1,000	Feet
r describe	any other casing-tubing	seal).			•
her Data					•
	the injection formation	U. Hospah		·	· · · · · · · · · · · · · · · · · · ·
Name of	Field or Pool (if applica	ble) Hospah Up	per Sand Oil	Pool	•
			· · · · · · · · · · · · · · · · · · ·		
. Name of	•	ection? /7		10	
Name of	a new well drilled for in			•	tion well
Name of In this If no, f	a new well drilled for in for what purpose was the wall ever been perforated	d in any other z	drilled?	Existing inject	
Name of Is this If no, f	a new well drilled for in	d in any other z	drilled?	Existing inject	
Name of Is this If no, f	a new well drilled for in for what purpose was the wall ever been perforated	d in any other z	drilled?	Existing inject	

OPERATOR	LEASE	**************************************	
esoro Petroleum Corp.	Hospah Sand Unit		· .
WELL NO. FOUTAGE LOCATION 92 700' FSL & 1,850' FEL	SECTION Sec 36	TIBN	HANGE R9W
		7701	NON
Schematte	Tabul	or Data	
	Surface Casing		
	Size 8-5/8 H	Cemented with	35
	TOC fee		
	Hole size 12-14"		
	Intermediate Casing		•
	Size None	Cemented with	
	roc feet	determined by	•
	Hole size		
	Lnng string		
	Size S-12 m	Cemented with	125
	10C <u>850</u> feet		
	Hole size 7-7/8"		•
	Total depth 1,636 PB		
	Injection interval		•
8-5/8" @ 42'	1,604 feet to	1,619	feet
	(perforated or xxxxxxxxxxxx	indicate which)	
			•
			•
		• 1	
	•	· - -	• •
1 \$			•
			•
		V	
5-12" @ 1,654'			•
ubing size 2-3/8" lined	with None	•	set in
Baker Model AD-1	(material	T	
(brand and model)		1,590	feet.
or describe any other casing-tubing	seal).		•
ther Data	II Usanah	e i de la companya d La companya de la co	
. Name of the injection formation			*
. Name of Field or Pool (if application)			· · · · · · · · · · · · · · · · · · ·
. Is this a new well drilled for in		No	
Converted to injection well 6/		rilled for oil i	production.
THE THE PER PER PER PER PER PER PER PER PER PE	UI.		

5. Give the depth to and name of any overlying und/or underlying oil or gas zones (pools) to this eres. None

PERATOR	***************************************	LEASE	4	
<u>esoro</u> Petro	leum Corp. Tograsc Location	Hospah Sand Uni	t	
ICLL NO. 93	700TAGE LOCATION 770' FNL & 2,610' FWL	SECTION	TOWNSHIP	NANCE
JJ	THE O ZIVIU TWE	Sec 1	T17N	R9W
Schem	2110		Tabular Data	
<u> </u>		Surface D. Louis	1000101 0010	
		Surface Casing		0.5
	•	Size 8-5/8	Cemented with	
			feet determined by	<u>Circulation</u>
		Hole size 12-4"		•
		Intermediate Casing	·	
	•	·Size None	Cemented with	h ·
			fect determined by	
		Hole size		
	•	Long string	•	
		Size <u>5-1</u> ,	Cemented with	125
	•	roc 950	feet determined by	CBL
		Hole size 7-7/8	If	•
	0.5400.0001	Total depth 1,584	РВ	
	►8-5/8" @ 23'	Injection interval	·	
			1 560	_
	•	1,540 feet (perforated or xxxxxx	t to	_ feet
	•			
			•	
		•		
1 4			No.	•
†				
			•	•
				-
4.7.4				•
Aberel	5-½" @ 1,604'		•	
ubing size _	2-3/8" lined	with None		set in
_	odel AD-1	(ma	terial)	
	d and model)	packer	at 1,525	feet.
or describe	any other casing-tubing	seal).		•
ther Data				•
	he injection formation	U. Hospah		
	ield or Pool (if applic		Sand Oil Pool	
. Name of F		4.	/X/ No	
	new welliah for 2		/ I/ NO .	200
. Is this a	new well drilled for i		Evicting inject	ion well.
. Is this a	new well drilled for i		Evicting inject	ion well.
. Is this o	r what purpose was the	well originally, drill	ed? Existing inject	
Is this a lf no, fo		well originally drill	Existing inject	

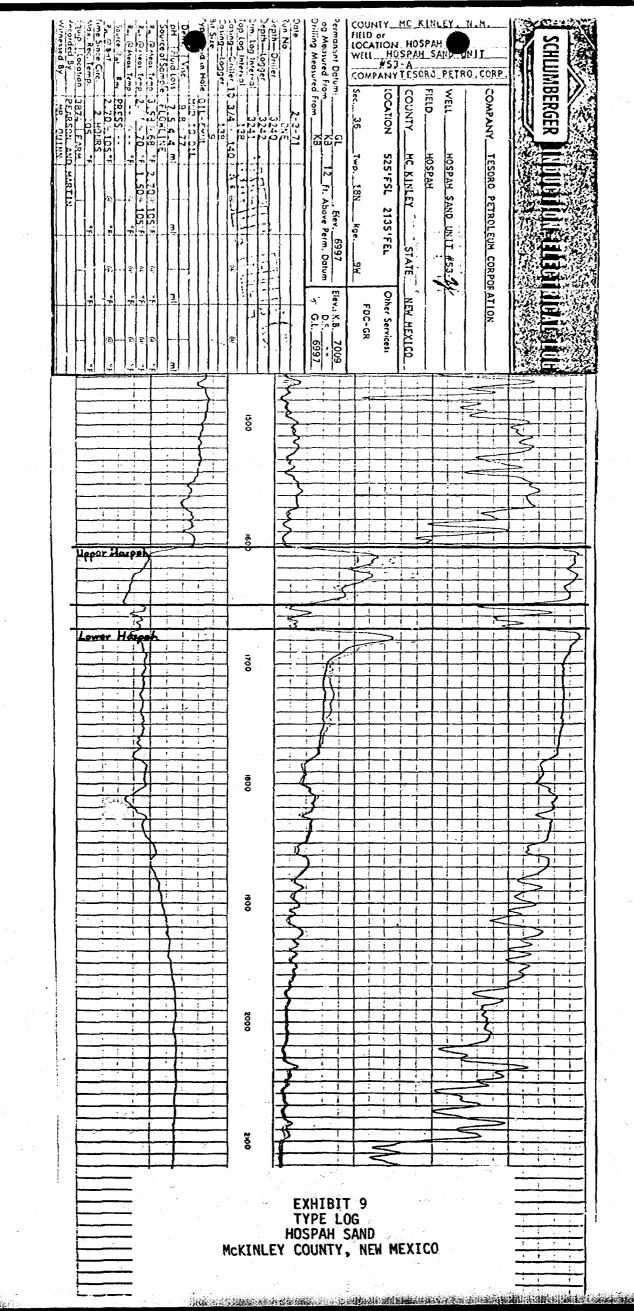
Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this seem. None

Rake	er Model AD-1		packer			feet
ubing si	ze <u>2-3/8"</u> lin	ed with		erial)		set in
· . •	2 2/01		None	•		
उर्देश	5-½" @ 1,634			•		•
					•	
		,				•
		•	• .	-		•
	‡		• •			•
			•			
		•		•		••
					•	
			÷ .	. •	•	•
			•	•		
					•	•
		(perfo	rated or openix	XXXXX indicate	э митси)	•
		1,5	16 feet	to <u>1,536</u>		feet
	8-5/8" @ 42'	Inject	ion interval			
		iotal	depth 1,602	D		
			ize <u>7-7/8"</u>			· xn mue
			850			
		Size	5-12	_ * Cemen	ted with	125
		Long s	tring			
$ \cdot \cdot $		Hole s	ize			
					iveq ph "	
11.11		5176	None	" Cemen	ted with	
		•				•
		Interm	ediate Casing			
		Hole a	lize 12-1-"			
	•	TOC	0	feet determ	ined by	<u>Circulation</u>
		5126	8~5/8	* Cemer	ted with	_35
1		Surfac	paleo2 s			•
5	Schematic			Tabular Data		

	2,550' FSL & 2,400'		- ·	T17N		R9W
ICLL NO.	FOOTAGE LOCATION	1103	SECTION CHIE	Tuntisi	TF.	IIANGE
	etroleum Corp.	_	ISE pah Sand Unit			
PERATOR						

Tubing size 2-3/8"	lined with	None	set in a
Baker Model AD-1		(material) packer at 1,500	feet-
(or describe any other cas	ing-tubing seal).		- Contraction of the Contraction
Other Data	33		•
1. Name of the injection	formation <u>U. Ho</u>	spah	
2. Name of Field or Pool	(if applicable) H	ospah Upper Sand Oil Pool	•
3. Is this a new well dril	lled for injection	Yes X No	
If no, for what purpose	e was the well orig	pinally drilled? _Existing inject	ion well
4. Has the well ever been and give plugging detail	perforated in any 12 (sacks of cement	other zone(s)? List all such per or bridge plug(s) used) NO	forated interval

Give the depth to and name of any overlying and/or underlying oil or gas zones (pools) in this seen. None



INJECTION WELL PERFORMANCE

July, 1982

Hospah Sand Unit McKinley County, New Mexico

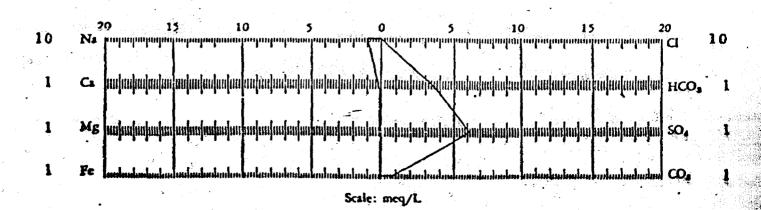
Well No.	Average Inj. Rate BPD	Average WHP, psig	Cumulative Injection, bbl
49	164	742	170,405
58	640	30	5,304,468
60	375	402	6,626,600
61	1,050	728	4,149,091
62	405	120	1,353,598
63	342	656	1,591,052
64	652	638	3,668,576
65	380	688	2,461,922
69	22	734	1,523,601
70	566	413	2,628,094
84	703	× 72	3,959,348
87	614	234	523,758
90	385	246	288,216
91	548	330	322,136
92	395	278	169,305
93	349	116	314,180
94	54 9	211	324,275



CORE LABORATORIES, INC.

Petroleum Reserve Engineering
DALLAS. TEXAS
WATER ANALYSIS

						Page I		
	Petroleum					÷		
Company Corpor	ration	We	I Name Wat	er supply we				
Formation 170	rrison	Depth	3/00'-3:	200'		Hospah s unit 534		
Location	· · · · · · · · · · · · · · · · · · ·	Field		Cour	nty	State_		
Date Sampled		Date Analy	zed3-11	-71	Analyst	RAL		
							~	
		• 4.5				0.9993	@	60° F
Total Dissolved Sol	ids774r	ng/L calculat	ed	S	pecific Gravity_	0.9965	@	74 op
Resistivity 9.097	ohm meters @				lydrogen Sulfid	e_absen	t	
		. P1	н 9.05_@_	7 <u>6 -</u> F.		•		
* Constituents	meq/L .	mg./L		Constituents	meq/L		mg/L	
- Sodium	10.19	234	4	Chloride	0.27	,	9.7	
Calcium	0.24	4.8	•	Bicarbonate	3.51		214	
Magnesium	0.03	0.4		Sulfate	6.12		294	(Grav.)
Iron	0.01	0.33		Carbonate	0.57		17	
Barium	0.0	0.0	(Grav.)	Hydroxide	0.0		0.0	



• All analyses except iron determination performed on a filtered sample.



REPORT OF. WATER ANALYSIS

Company	Tenneco	oil co.	Date NOV 3, 1980 Analysis No.
Somale Mosk	TENNECO	HOSPAH	Sampling Date NOV 3, 1980 Date Sample Rec'd.

DISSOLVED SOLIDS	`		RESULTS AS COMPOUNDS
Cations	mg/l	meq/l	mg/l
Sodium, Na (Calc.)	768.2	33.4	as NaCl
Calcium, Ca	5.6	0.3	25 C2CO3 14
Magnesium, Mg	1.5	* * * * -	as CaCO ₃
Barium, Ba	1,0	0.1	as BaSO ₄
TOTAL HARDNESS			· as cacoz · · · 20
Cations Total	775.3	33.8	,
Anions			
Chloride, Cl	4.8 ب	1.4	as NaCl 80
Sulfate, SO ₄	980	20.4	25 N2 ₂ SO ₄ 1450
Carbonate, CO ₃	31,2	1.0	as CaCO ₃ 52
Bicarbonate, HCO ₃	668.6	11.0	25 C2CO3 548
Anions Total	1728.4	33.8	
		30 1 9	
Total Dissolved Solids (Calc.)	2503. <u>7</u>		
Total Iron, Fe	0.5		ы.Fe 0.5
Acidity to Phenolphthalein, CO ₂	ೆ0		as CaCO ₃
	•		
OTHER PROPERTIES			CaCO3 STABILITY INDEX
pH	8.2		@ 70° F.
Specific Gravity	0, ~		@120° F.
Turbidity (JTU)	a 3		@160° F.
Sulfide as His			Method of Stiff & Davis
Complete to the second with the second secon	0		

High sulfate content for drinking mater.

NALCO CHEMICAL COMPANY
VISCO CHEMICALS
P. O. BOX 87 - SUGAR LAND, TEXAS 77478

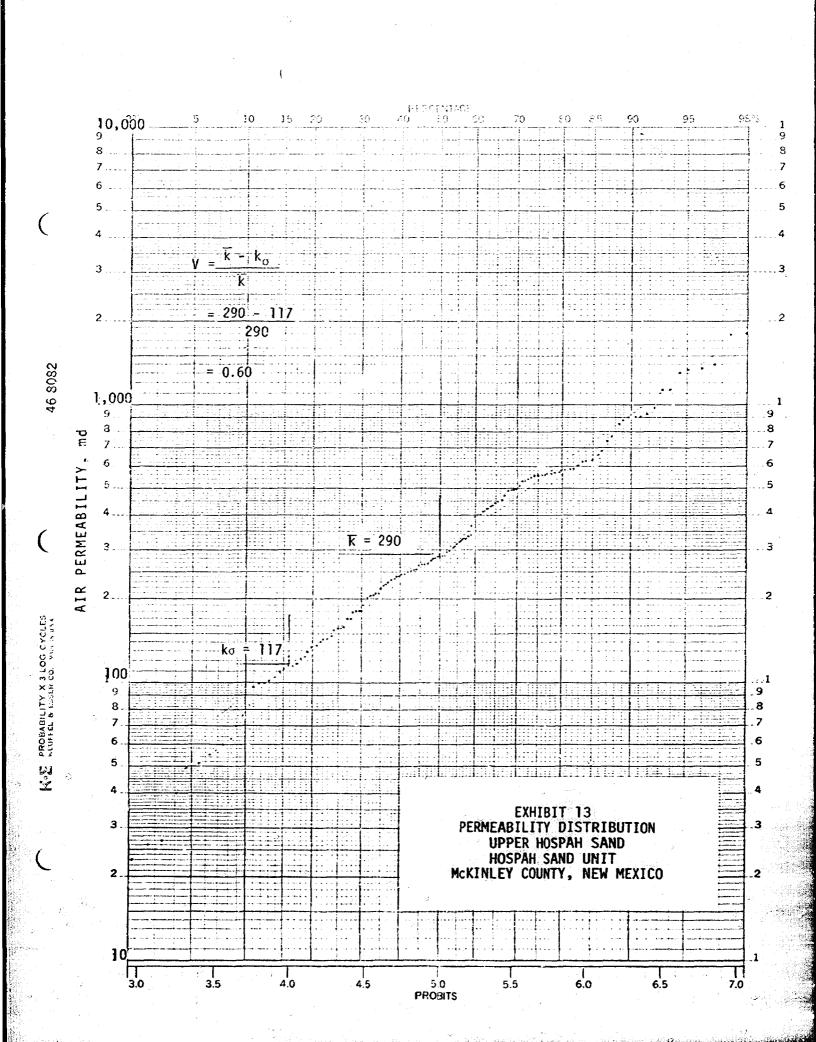


EXHIBIT 14

COMPARISONS OF POLYMER AUGMENTED WATERFLOODS

0.8	6.1	8.6	3.4	4.6	7.9	4.0	% O.C.I.P.
9,4	51.7	108.9	35.1	51.5	72.2	25.4	Incremental, STB/acre-ft
396.0	222.1	N.A.	383.8	394.9	189.4	329.5	Chemical flood, STB/acre-ft
386,6	273.8	N.A.	418.9	446.4	261.6	304.1	Waterflood, STB/acre-ft.
							Ultimate recovery
CP/AP/ISG	CP/AP/ISG	CP/AP/ISG	CP/AP/ISG	CP/AP	AP	CP/AP/ISG	Process
1,246.5	842.0	1,271.9	1,028.0	1,109.1	908.9	622.8	Original oil in place, STB/acre-ft
7.4	18.0	17.3	2.5	8.5	=	2.5	Mobility ratio
0.60	0.71	0.76	0.85	0.81	0.625	0.82	Permeability variation
2.7 - 6,145	15 - 950	1 - 3,000	1 - 3,200	5 - 4,040	6 - 960	1 - 281	Permeability range, md
24.7	16.5	22.5	18.6	20	16.2	13	Porosity, percent
Gal lup	Minnelusa	Minnelusa	Minnelusa	Minnelusa	Minnelusa	Dakota	Formation
New Mexico	Wyoming	Wyoming	Wyoming	Wyoming	Wyoming	Wyoming	State
McKinley	Crook	Campbell	Campbell	Crook	Campbell	Natrona	County
Hospah	Kummerfeld ⁽²⁾	Hamm(2)	0K ⁽²⁾	West ⁽²⁾ Semlek	Stewart(2) Ranch	Sage Spring Cr.(1) Unit "A"	Field

Notes: CP - Cationic Polymer
AP - Anionic Polymer
ISG - In-Situ Gelling

Mack, J. C. and Warren, John: "Performance and Operation of Sage Spring Creek Unit 'A', Natrona County, Wyoming", Paper SPE 10876 presented
at the Rocky Mountain Regional Meeting of SPE, Eillings, MT. (May, 1982). TOT STATE OF TOTAL
Dockets Nos. 32-62 and 33-62 are tentatively set for October 13 and October 27, 1982. Applications for hearing must be filled at least 22 days in advance of hearing date.

DOCKET: EXAMINER HEARING + VECNESCAY - SEPTEMBER 29, 1982

9 A.M. - MORGAN HALL, STATE LAND OFFICE BUILDING, SANTA FE, NEW MEXICO

- The following cases will be heard before Richard L. Stamets, Examiner, or Daniel S. Nutter, Alternate Examiner:
- CASE 7686: In the matter of the hearing called by the Oil Conservation Division on its own motion to permit Energetics Corporation, United States Fidelity and Guaranty Company, and all other interested parties to appear and show cause why the Hanes Corporation Weil No. 1, located in Unit F of Section 9, Township 24 South, Range 2 East, Don Ana County, should not be plugged and abandoned in accordance with a Division-approved plugging program.
- CASE 7687: Application of Amoco Production Company for salt water disposal, Union County, New Mexico.

 Applicant, in the above-styled cause, seeks authority to dispose of produced salt water into the Glorieta formation in the perforated interval from 1718 feet to 1780 feet in its former State FI Well No. 2 (2034 362P) located 660 feet from the South line and 1320 feet from the East line of Section 16, Township 20 North, Range 34 East.
- CASE 7688: Application of Mountain States Petroleum Corporation for an unorthodox gas well location, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox location of a well to be drilled 990 feet from the North and East lines of Section 19, Township 15 South, Range 28 East, Buffalo Valley-Penn Gas Pool, the N/2 of said Section 19 to be dedicated to the well.
- CASE 7689: Application of Tesoro Petroleum Corporation for a tertiary oil recovery project, McKinley County, New Mexico. Applicant, in the above-styled cause, seeks authority to convert its Hospah Sand Unit Waterflood Project to a polymer-augmented waterflood and, pursuant to Section 212.78 of the U.S. Department of Energy Regulations and Section 4993 of the Internal Revenue Code, seeks certification of said project as a qualified tertiary oil recovery project.
- Application of C & K Petroleum, Inc. for compulsory pooling, Lea County, New Mexico.

 Applicant, in the above-styled cause, seeks an order popling all mineral interests in the Pennsylvanian formations underlying the E/2 SW/4 of Section 27, Township 16 South, Range 37 East, Casey-Strawn Pool, to be dedicated to a rell to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well and a charge for risk involved in drilling said well.
- CASE 7679: (Continued from September 15, 1982, Examiner Hearing)

Application of C S X Petroleum, Inc. for the amendment of Order No. R-4857-A and for compulsory pooling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks the amendment of Division Order No. R-4857-A to provide that the lands pooled by said order shall be the W/2 SE/4 of Section 27, Township 16 South, Range 37 East, dedicated to its Shipp 27 Well No. 2 located in Unit O in said Section 27. Applicant, further seeks an order pooling all mineral interests in the Pennsylvanian formation underlying the E/2 SE/4 of the aforesaid Section 27, to be dedicated to a well to be drilled in Unit P of said Section 27. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well and a charge for risk involved in drilling said well.

CASE 7680: (Continued and Readvertised)

Application of Unichem International, Inc. for an exception to Order No. R-3221, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks an exception to Order No. R-3221 to permit the commercial disposal of produced brine into several unlined surface pits located in Section 2, Township 23 South, Range 29 East.

Application of Dugan Production Corporation for compulsory pooling, San Juan County, New Mexico.

Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Basin-Dakota Pool underlying the W/2 of Section 5, Township 24 North, Range 9 West, to be dedicated to a well to be drilled at a standard location thereof. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well and a charge for risk involved in drilling said well.

- (ASE 1691) Application of Porister's Sweatt for an unorthodox well location, Thaves County, New Mexico.

 Applicant, in the above-styled cause, seeks approval of an unorthodox location 390 feet from the North line and 1650 feet from the East line of Section 5s Township 13 South, Range 31 East, Southeast Chaves Queen Gas Area, the E/2 of said Section 5 to be dedicated to the well.
- Application of Forister's Sweatt for compulsory pooling, Chuves County, New Mexico.

 Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Southeast Chaves Queen Gas Area underlying the E/2 of Section 5, Township 13 South, Range 31 East, to be dedicated to a well to be drilled at an unorthodox location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of of applicant, as operator of the well and a charge for risk involved in drilling said well.
- CASE 7681: (Continued from September 15, 1982, Examiner Hearing)

Application of Gibola Energy Corporation for an unorthodox gas well location, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox location of an Ordevician gas well to be drilled 330 feet from the North line and 990 feet from the East line of Section 13, Township 9 South, Range 27 East, the $\rm E/2$ of said Section 13 to be dedicated to the well.

CASE 7682: (Continued from September 15, 1982, Examiner Hearing)

Application of Cibola Energy Corporation for an unorthodox gas well location, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox location of a Mississippian gas well drilled 330 feet from the North line and 330 feet from the West line of Section 34, Township 11 South, Range 28 East, the W/2 of said Section 34 to be dedicated to the well.

Application of Depco, Inc. for compulsory pooling, Chaves County, New Mexico.

Applicant, in each of the following two cases, seeks an order pooling all mineral interests from the surface down through the Abo formation underlying the lands specified in each case, each to form a standard 160-acre gas spacing and proration unit to be dedicated to a well to be drilled at a standard location thereon. Also to be considered in each case will be the cost of drilling and completing said wells and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the wells and a charge for risk involved in drilling said wells:

CASE 7694: NW/4 Section 21; and

CASE 7695: NE/4 Section 21

Both in Township 5 South, Range 25 East.

Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Mississippian through Ellanburger formations underlying the 1/2 of Section 31, Township 20 South, Range 36 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well and a charge for risk involved in drilling said well.

CASES 7528 and 7529: (Continued and Readvertised)

Application of JJ-CC, Limited for compulsory pooling, Chaves County, New Mexico. Applicant, in each of the following two cases, seeks an order pooling all mineral interests down through the Abo formation underlying the lands specified in each case, each to form a standard 160-acre gas spacing and proration unit to be dedicated to a well to be drilled at a standard location thereon. Also to be considered in each case will be the cost of drilling and completing said wells and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the wells and a charge for risk involved in drilling said wells:

CASE 7528: NW/4 Section 4, Township 5 South, Range 24 East

CASE 7529: NE/4 Section 4, Township 5 South, Range 24 East

CASE 7697: Application of Oxoco Production Corp. for designation of a tight formation, San Juan County, New Mexico.

Applicant, in the above-styled cause, seeks the designation of the Mesaverde formation underlying Sections 7, 8, 17, 18, 19 and 20, Township 32 North, Range 3 West, containing 3160 acres, more or less, as a tight formation pursuant to Section 107 of the Natural Gas Policy Act and 18 CFR Section 271.701-705.

KELLAHIN AND KELLAHIN

Attorneys at Law
El Patio - 117 North Guadalupe
Post Office Box 2265
Santa Fe, New Mexico 87501

September 9, 1982

Telephone 982-4285 Area Code 505

Mr. Joe D. Ramey
OIL CONSERVATION DIVISION
P. O. Box 2088
Santa Fe, New Mexico 87501

Re: Tesoro Oil Corporation

Dear Mr. Ramey:

Jason Keltahin

Karen Aubrey

James B. Grant

W. Thomas Kellahin

Please set the enclosed application on behalf of Tesoro Oil Corporation for the Examiner's hearing scheduled for September 29, 1982.

W. Thomas Kellahi

Very try

Case 7684

WTK:rb Enclosure

cc: Mr. Travis Crow-Tesoro/San Antonio

Mr. Frank Chavez-OCD/Aztec

STATE OF NEW MEXICO

DEPARTMENT OF ENERGY AND MINERALS

OIL CONSERVATION DIVISION

IN THE MATTER OF THE APPLICATION OF TESORO PETROLEUM CORPORATION FOR AMENDMENT TO ORDER R-2807
TO INCLUDE A POLYMER-AGUMENTED WATERFLOOD AND FOR APPROVAL OF ITS HOSPAH SAND UNIT PROJECT AS A QUALIFIED TERTIARY OIL RECOVERY PROJECT PURSUANT TO THE CRUDE OIL WINDFALL PROFITS TAX ACT.
McKINLEY COUNTY, NEW MEXICO.

EFP o 1987

APPLICATION

COMES NOW, TESORO PETROLEUM CORPORATION, by and through its attorneys, KELLAHIN & KELLAHIN, and applies to the New Mexico Oil Conservation Division for an Amendment to Order R-2807 to include the injection of Polymer-Augmented water and for approval of its Hospah Sand Unit Project as a qualified tertiary oil recovery project pursuant to the Crude Oil Windfall Profits Tax Act (26 U.S.C. 4993), and in support thereof would show:

- 1. Applicant is the operator of the Hospah Sand Unit Waterflood Project, as approved by the New Mexico Oil Conservation Division in Order R-2807 entered on November 24, 1964, Order R-2807-A entered on September 8, 1969, and Order R-2807-B entered on December 3, 1969.
- 2. In accordance with Division Order R-6702 (Rule 701)
 Applicant has completed and attached Form C-108 for the
 purposes of amending Order R-2807 to allow for polymer injection
 as more fully described therein.

3. The Project area consists of the following described acreage:

Township 17 North, Range 9 West, NMPM

Section 1: NW/4; W/2SW/4; NE/4SW/4; W/2NE/4; NE/4NE/4; NW/4NW/4SE/4 NW/4SE/4SW/4 W/2SE/4NE/4 NE/4SE/4NE/4 Lots 1, 2 & 3

Township 18 North, Range 8 West, NMPM

Section 31: SW/4; SW/4NW/4

Township 18 North, Range 9 West, NMPM

Section 36: S/2 S/2N/2 NE/4NW/4 NW/4NE/4

Consisting of about 1,225 acres in McKinley County, New Mexico.

- 4. Applicant proposes to utilize the following existing injection wells:
 - 1. SFRY "A" Well No. 84: 5' FSL & 2900' FEL 1-17N-9W
 - 2. HSU Well 49-330' FNL & 1650' FEL 1-17N-9W
 - 3. HSU Well 58-30' FSL & 2,350' FEL 36-18N-9W
 - 4. HSU Well 60-2310' FSL & 1050' FWI 1-17N-9W
 - 5. HSU Well 61-3640' FSL & 1000' FWL 1-17N-9W
 - 6. HSU Well 62-1900' FSL & 1140' FWL 36-18N-9W
 - 7. HSU Well 63-1980' FNL & 2310' FWL 36-18N-9W
 - 8. HSU Well 65- 990' FSL & 250' FEL 36-18N-9W
 - 9. HSU Well 64-1650' FNL & 660' FEL 36-18N-9W
 - 10. HSU Well 66-330' FNL & 330' FEL 1-17N-9W
 - 11. HSU Well 68-990' FNL & 2310' FEL 36-18N-9W
 - 12. HSU Well 69-2310' FNL & 940' FEL 36-18N-9W
 - 13. HSU Well 70-800' FSL & 1800' FWL 36-18N-9W
 - 14. HSU Well 84-1475' FNL & 2600' FWL 1-17N-9W
 - 15. HSU Well 87-925' FNL & 2290' FEL 1-17N-9W
 - 16. HSU Well 90-2390' FSL & 1475' FEL 36-18N-9W
 - 17. HSU Well 91-1790' FSL & 2460' FWL 36-18N-9W
 - 18. HSU Well 92-700' FSL & 1850' FEL 36-18N-9W
 - 19. HSU Well 93-770' FNL & 2010' FWL 1-17N-9W
 - 20. HSU Well 94-2550' FSL & 2400' FWL 1-17N-9W

- 5. The Hospah Sand Unit qualifies as a tertiary oil recovery project pursuant to the Crude Oil Windfall Profits Tax Act of 1980 because:
 - (a) The Governor of the State of New Mexico has submitted written notification to the Secretary of the Internal Revenue Service that the New Mexico Oil Conservation Division is the jurisdictional agency in a case of an application involving a tertiary recovery project pursuant to 26 USC 4993.
 - (b) That the Tesoro Project, the Hospah Sand Unit consisting of approximately 1225 acres more or less, of State lands, located in McKinley County, New Mexico and operated as a unit approved by the New Mexico Oil Conservation Division pursuant to Order R-2807 is adequately delineated.
 - (c) That the Hospah Field was discovered 1927. Development was from 1938-1945. The first waterflood project in the field began in 1965.
 - (d) That said unit is in the later stages of primary depletion.
 - (e) That the tertiary recovery project beginning date is after May, 1979.
 - (f) That Polymer-Augmented Waterflood method is a recognized tertiary oil recovery method described in Section 212.78(c) of the Department of Energy Regulations in effect on June 1, 1971.
 - (g) That the Tesoro Unit in the Hospah Pool for Polymer-Augmented injection is well suited as an enhanced recovery process.
 - (h) That the estimated increase in primary production from the Tesoro Project as a result of Ploymer-Augmented Waterflooding is 200,000 barrels of oil or 0.8 percent of the original oil in place.
 - (i) That the project will affect all of the approximate unit area.
 - (j) The project requires that the wells currently used for water injection be converted to water-polymer injectors.

Respectfully submitted,

KELLAHIN & KELLAHIN

W. Thomas Kellahin

P. O. Box 2265

Santa Fe, New Mexico 87501

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STATE OF NEW MEXICO

DEPARTMENT OF ENERGY AND MINERALS

OIL CONSERVATION DIVISION

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

CASE NO. 7689

ORDER NO. R-2807-C

MARKE

APPLICATION OF TESORO PETROLEUM CORPORATION FOR AMENDMENT OF DIVISION ORDER R-2807 TO INCLUDE A POLYMER-AUGMENTED WATERFLOOD AND FOR APPROVAL OF A QUALIFIED TERTIARY OIL RECOVERY PROJECT UNDER THE CRUDE OIL WINDFALL PROFITS TAX ACT OF 1980 MCKINLEY COUNTY, NEW MEXICO.

SK

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 9:00 AM on September 29, 1982, at Santa Fe, New Mexico, before Examiner Richard L. Stamets.

NOW, on this 16th day of October, 1982, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

- (1) That due public notice having been given as required by law, the Division has jurisdiction of this cause and the subject matter thereof.
- (2) That the Applicant, Tesoro Petroleum Corporation, seeks the Amendment of Division Order No. R-2807, to include the injection of Polymer-Augmented Water in its previously authorized waterflood project in the Hospah Field, for

conversion of existing injector wells to polymer-augmented water injector wells, and for the approval of the Tesoro Hospah Sand Unit as a Qualified Tertary Recovery Project under the Crude Oil Windfall Profits Tax Act of 1980.

- (3) That the waterflood project lies within the Hospa! Upper Sand Oil Pool, McKinley County, New Mexico
- (4) That this oil field was discovered in 1927 and developed during the period from 1938 through 1946, with waterflooding being initiated in December, 1965.
- (5) That the Tesoro Petroleum Corporation Hospah waterfield
 Sand Unit Project consisting of approximately 1,225 acres
 was approved by said Division Order R-2807 on November 24,
 1964, and water injection was commenced within said project
 during December, 1965.
- (6) That the Applicant now seeks approval for the injection of ploymer-augmented water into seventeen (17)

 as shown on Cahibi "77" a Hached He this order project wells and the designation of its Hospah Sand Unit Project as a qualifying tertiary recovery project.
- (QTP Area) lies wholly within the Hospah Sand Unit and consists of the following described acreage:

Township 17 North, Range 9 West, NMPM

Township 18 North, Range 8 West, NMPM

Section 31: SW/4 SW/4NW/4

Township 18 North, Range 9 West, NMPM

Section 36: S/2) S/2N/2 ,

S/2N/2, NE/4NW/4, and NW/4NE/4

- (8) That the QTP Area is adequately delineated and that the entire area will be affected.
- (9) That the New Mexico Oil Conservation Division has been designated by the Governor of the State of New Mexico as the appropriate agency to approve Qualified Tertiary REcovery Projects in New Mexico for purposes of the Crude Oil Windfall Profits Tax Act of 1980.
- (10) That the tertiary oil recovery method used in the Tesoro QTP Area is a Polymer-Augmented Waterflood method which is a recognized tertiary oil recovery method described in Section 212.78 (c) of the Department of Energy Regulations in effect in June, 1979.
- (11) That the actual primary production from the Tesoro QTP Area prior to waterflooding was 4.56 million barrels and that water flooding secondary recovery operations will recover an additional 3.64 million barrels.
- (12) That an estimated 200,000 to 906,000 barrels of additional oil will be recovered as a result of the tertiary recovery operations, which is more than an insignificant increase in the amount of crude oil which will ultimately be recovered.
- (14) That the QTP Area tertiary recovery operations beginning date is after May, 1979.
- (13) 14. That the QTP Area tertiary recovery operations beginning date was October 15, 1982.
- (15) That the proposed tertiary recovery operations within the QTP Area meet all requirements of Section 4993 of the Internal Revenue Code.

- (16) That the Tesoro QTP Area project is designated in accordance with sound engineering principles.
- (17) That the waterflood injection wells currently in use are injecting water at a surface pressure of 750 psig or less.
- (18) That Tesoro should survey all injection wells that exhibit injection pressures significantly less than 320 psig.

That Tesoro should coordinate with the Division's District Supervisor for the repair of any injection wellbore that shows indications of channeling so that injection fluids are restricted to entry into the Upper Hospah Sands only.

(19) 20. That within 180 days of this order, Tesoro should conduct step-rate tests on those wells with injection pressures greater than 320 psig in order to establish the fracture gradient for those wells, which should be a maximum sufficient to fracture the formation.

producing wells and plagged and abundanced wells for which insufficient data is available upon which which wells are determination that such wells are not capable of serving as conduite for Lluid migration from the injection zone.

(21) That as of July 31, 1982. comulative
roater injection into said gene wells in said
project to taled approximately 36.9 million
barrels of Cwith AB without apporent
significant of Comparent
beautificant of the Comparent
in towards

(22) That based upon the injection well history there appears to be no urgent need to institute repairs of site busing wells and the Bejorta any such wells. (23) That to assure continued operation injection within said project without of drinking water the applicant should consult with the supervisor of the Division's district office at Antec to (a) formulate an inspection plan to facilitate detection of injection well failure and for out-of zone injection fluid; (b) repair any injection well bore shrwing evidence of fluid channeling or foilure of Company of any injections well bore shrwing or foilure of or packer and injections well to be lar goods or packer and invested; will. (2) assure that all injection is through tubing under a packer; and pressures at approximately 50 pounds less than I messure.

No 69, a tubingless completion, should not be used as an injection well.

(25) That the approval of this Application will prevent waste, protect correlative rights and promote conservation.

IT IS THEREFORE ORDERED:

- 1. That effective October 15, 1982, the Qualifying Tertiary Recovery Project Area, described in Finding (7) of this Order, being the Tesoro Petroleum Corporation Hospah Sand Unit Project, Hospah Pool, McKinley County, New Mexico, is hereby certified as a Qualified Tertiary Recovery Project under the Crude Oil Windfall Profits Tax Act of 1980.
- under the Crude Oil Windfall Profits Tax Act of 1980.

 2. That Athe Applicant, Tesoro Petroleum Corporation, is hereby authorized to inject polymer-augmented water into the seventeen (17) wells listed on Exhibit "A" attached to this Order.

(3) That injection into the 16 remaining wells hoted on said Exhibit "A" shall be authorized at a surface pressure of up to 750 psig subject to the following:

- (a) Tesoro shall survey all injection wells with injection pressure significantly less than 320 psig,
- (b) The all injection wells survived which

 failure of Vaboles goods, or packer failure

 indicate channeling shall be repaired

 as required by the Division's District

 district office of Fate;

 supervisor

(c) that said supervisor soull approve an inspection plan designed to hacilitate the detection of injection well failure and for out-of-zone injection fluid;

shall conduct step-rate tests on those wells which exhibit injection pressures greater than 320 psig in order to establish a fracture gradient for each such well and thereafter each such well shall be limited to a maximum surface injection pressure of 50 psig less than the fracture pressure of the formation; and,

equipped to assure that the pressure limits determined under (d) above are not exceeded.

4. That jurisdiction of this cause is retained for entry of such further orders as the Division may deem necessary.

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

STATE OF NEW MEXICO OIL CONSERVATION DIVISION

Hospah Sand @ Unt Well No Footige Location Sector Tup. D- Ray 10 - 17N- 9W 49 330 FNL 1380 FEL - 18N - 9W 30 FSL 2350 FEL 36 58 2310 FSL 1050 FWL 1 -17N- 9W 60 3640'FSL 1000 FWL -17N - 9W 61 1900 FSL 1140 FWL 62 -18N-9W 36 -18N-9W 63 1980 FNL 23/0 FWL 36 36 - 18N-9W 64 1650 FNL 660 FEL 36 -18N-9W 990 FSL 2501FEL 65 36 -18N-9W 2310 FNL 940 FWL 69 36 -15 N-9W 860 FSL 1800 FWL 20 -17N-9W 1475 FNL 2600 FWL 94 1 -17N-9W 925 FNL 2290 FEL 87 36 -18 N-9W 2390' FS4 1475 FCL 90 1790' FSL 2460 FWL 9/ 36-18N-8W 92 700 FSL 1850 FCL 36-18N-9W 93 1-17N-2W 770' FNL 2010 FWL 1 -17N-9W 94 2550 FSL 2400 FWL

> Exhibit A Order No. R-

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