

**KELLAHIN AND KELLAHIN**

ATTORNEYS AT LAW

EL PATIO BUILDING

117 NORTH GUADALUPE

POST OFFICE BOX 2265

SANTA FE, NEW MEXICO 87504-2265

W. THOMAS KELLAHIN\*

\*NEW MEXICO BOARD OF LEGAL SPECIALIZATION  
RECOGNIZED SPECIALIST IN THE AREA OF  
NATURAL RESOURCES-OIL AND GAS LAW

JASON KELLAHIN (RETIRED 1991)

TELEPHONE (505) 982-4285

TELEFAX (505) 982-2047

May 6, 1997

**HAND DELIVERED**

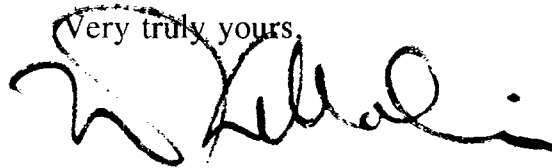
Mr. William J. LeMay, Director  
Oil Conservation Division  
2040 South Pacheco  
Santa Fe, New Mexico 87505

**Re: NMOCD Case 11779  
Application of Conoco Inc.  
for approval of its Hardy "36" State Unit Pressure  
Maintenance Project and for the  
Enhanced Oil Recovery Tax Credit  
Lea County, New Mexico**

Dear Mr. LeMay:

On behalf of Conoco, Inc., please find enclosed our application for approval of its Hardy State "36" Pressure Maintenance Project which is currently docketed for May 15, 1997 but which we request be continued and heard on May 29, 1997.

Very truly yours,



W. Thomas Kellahin

cc: Conoco, Inc.  
Attn: Jerry Hoover

**STATE OF NEW MEXICO  
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT  
OIL CONSERVATION DIVISION**

**IN THE MATTER OF THE APPLICATION  
OF CONOCO INC. FOR APPROVAL OF ITS  
HARDY 36 STATE LEASEHOLD PRESSURE  
MAINTENANCE PROJECT AND TO QUALIFY  
SAID PROJECT FOR THE RECOVERED OIL TAX  
RATE PURSUANT TO THE "NEW MEXICO  
ENHANCED OIL RECOVERY ACT,"  
LEA COUNTY, NEW MEXICO**

**CASE NO** 11779

**A P P L I C A T I O N**

Comes now Conoco Inc. ("Conoco"), by its attorneys, Kellahin & Kellahin, and pursuant to the New Mexico "Enhanced Oil Recovery Act" and to Division Rule 701(G) applies to the New Mexico Oil Conservation Division for approval of its Hardy 36 State Pressure Maintenance Project and for the recovered oil tax rate for enhanced oil recovery for the use of enhanced oil recovery technology within said pressure maintenance project, a new EOR project and in support states:

(1) Conoco is the proposed operator of the proposed Hardy 36 State Leasehold Pressure Maintenance Project ("new EOR Project") for water injection in the Tubb formation of the North Hardy-Tubb-Drinkard Pool.

(2) The Project Area contains 240-acres with one injection well and four producing wells within the following described area:

Township 20 South, Range 37 East, NMPM  
Section 36: NE/4NE/4  
              S/2NE/4  
              N/2SE/4  
              NE/4SW/4

(3) Current primary oil recovery from the Area has been 142,700 barrels of oil from five wells. Under the current primary production phase (without pressure maintenance), ultimate oil recovery is estimated to be approximately 260,000 barrels of oil.

(4) The Project is currently producing at 83 BOPD and 28 BWPD from five active producers. Approximately 120,000 barrels of oil remain to be recovered under the current mode of operations.

(5) Conoco seeks to increase ultimate oil recovery in this Project by means of a significant change in the process used for the displacement of crude by the initiation of the injection of water under the following described method: pressure maintenance.

(6) The estimated amount of recoverable oil attributable to a Positive Production Response from the use of enhanced oil recovery technology for this EOR Project is 135,000 barrels of additional oil.

(7) In accordance with Division Order R-9708, the following is submitted:

a. Operator's name and address:

Conoco Inc.  
10 Desta Drive Ste 100W  
Midland, Texas 79705

b. Description of the Use area:

(1) Plat outlining Use area:

See Exhibit "A"

(2) Description of the Use Area:

T20S, R37E NMPM  
Sec 36: NE/4NE/4; S/2NE/4; N/2SE/4; NE/4SW/4

(3) Total acres in Use Area:

240 acres, more or less

(4) Name of the subject Pool and formation:

Tubb formation of the North  
Hardy-Tubb-Drinkard Pool

c. Status of operations in the project area:

(1) N/A

[if unitized, name of unit, date of  
unit approval and order number]

(2) N/A

[if application for unit approval  
pending supply date of filing]

(3) Hardy 36 State Lease:

Section 36, T20S, R37E

d. Method of recovery to be used:

(1) injected fluids: water

(2) N/A

[order/dates of prior approvals]

(3) May 6, 1997

[if project not approved provide  
date application was filed]

e. Description of the Use Area:

(1) a list of producing wells:

See Exhibit "B"

- (2) a list of injection wells:  
See Exhibit "B"

- (3) Capital cost of additional facilities:

\$30,000.

- (4) Total Project Costs:

\$40,000.

- (5) Estimated total value of the additional  
production that will be recovered:

An additional 135,000 barrels of  
oil with a current undiscounted  
value of \$1,215,000 dollars

- (6) Anticipated date of commencement of  
injection:

as soon as possible after  
OCD approval, if granted.

- (7) the type of fluid to be injected and the anticipated volumes:

produced water from the North Hardy Tubb-  
Drinkard Pool producing wells to be injected at  
an estimated rate of 350 BWPD/1st yr.

250 BWPD/2nd yr

150 BWPD/subsequent years

(estimated 500,000 barrels of total water).

- (8) Explanation of changes in technology:

- (a) See Exhibit "B" for proposed well  
status

(b) [summary of changes in technology and the process to be used for displacement of oil]

pressure maintenance by injection of water into the Hardy 36 State Well No 3 and with production from the Hardy State 36 Wells No. 2, 4, 18, & 19.

f. Production data: See Exhibit "C"

[attach graphs, charts and supporting data to show the production history and production forecast of oil, gas, casinghead gas and water from the project area]

g. Division Form C-108 (attached).

Wherefore, Applicant requests that this application be set for hearing and that after said hearing, the Division enter its order approving this application.

Respectfully submitted

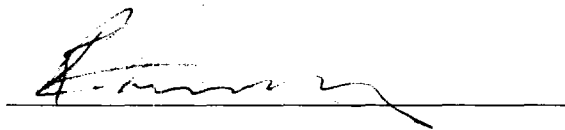
A handwritten signature in black ink, appearing to read 'W. Thomas Kellahin', written over a horizontal line.

W. Thomas Kellahin  
KELLAHIN & KELLAHIN  
P.O. Box 2265  
Santa Fe, New Mexico 87504  
(505) 982-4285

C E R T I F I C A T I O N

STATE OF TEXAS       )  
                                  )SS.  
COUNTY OF MIDLAND)

I, Ray Hinchliff, having been first duly sworn, state that I am a petroleum engineer, a duly authorized representative of Conoco Inc. have knowledge of the facts herein and therefor certify that the facts set forth in this Application are true and accurate to the best of my own knowledge and belief.

A handwritten signature in dark ink, appearing to read 'Ray Hinchliff', is written over a horizontal line.

Ray Hinchliff

# EXHIBIT A

26

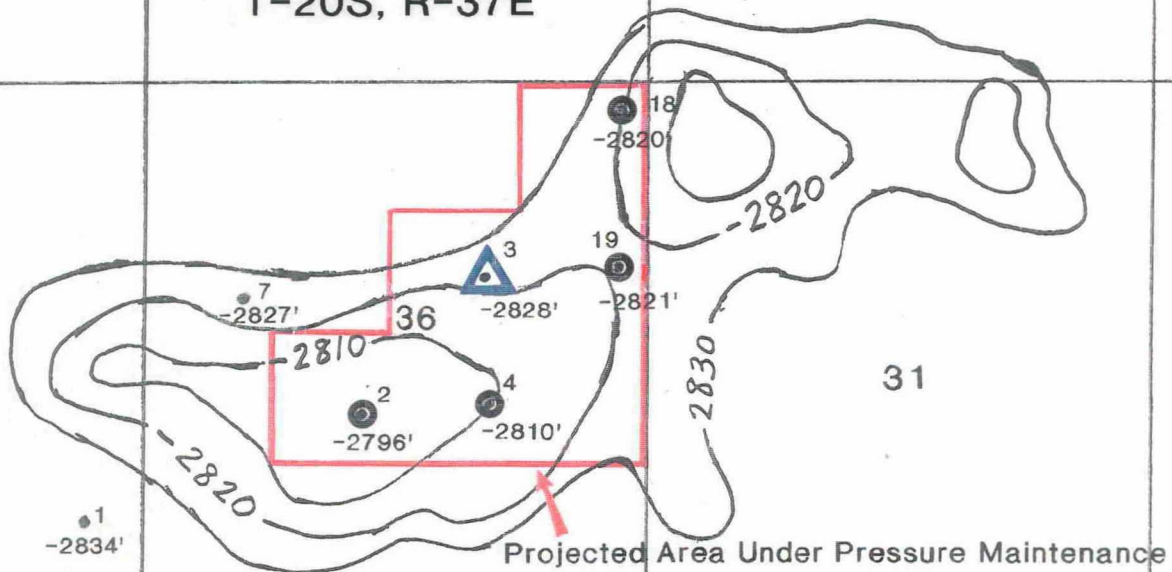
25

30

T-20S, R-37E

35

31



Projected Area Under Pressure Maintenance

1

6

5



Tubb Injection Well



Tubb Production Well

STRUCTURE MAP

TOP TUBB MARKER  
HARDY 36 STATE AREA

Pressure Maintenance Project



## EXHIBIT B

### HARDY 36 STATE PRESSURE MAINTENANCE PROJECT

#### WATER INJECTION WELL:

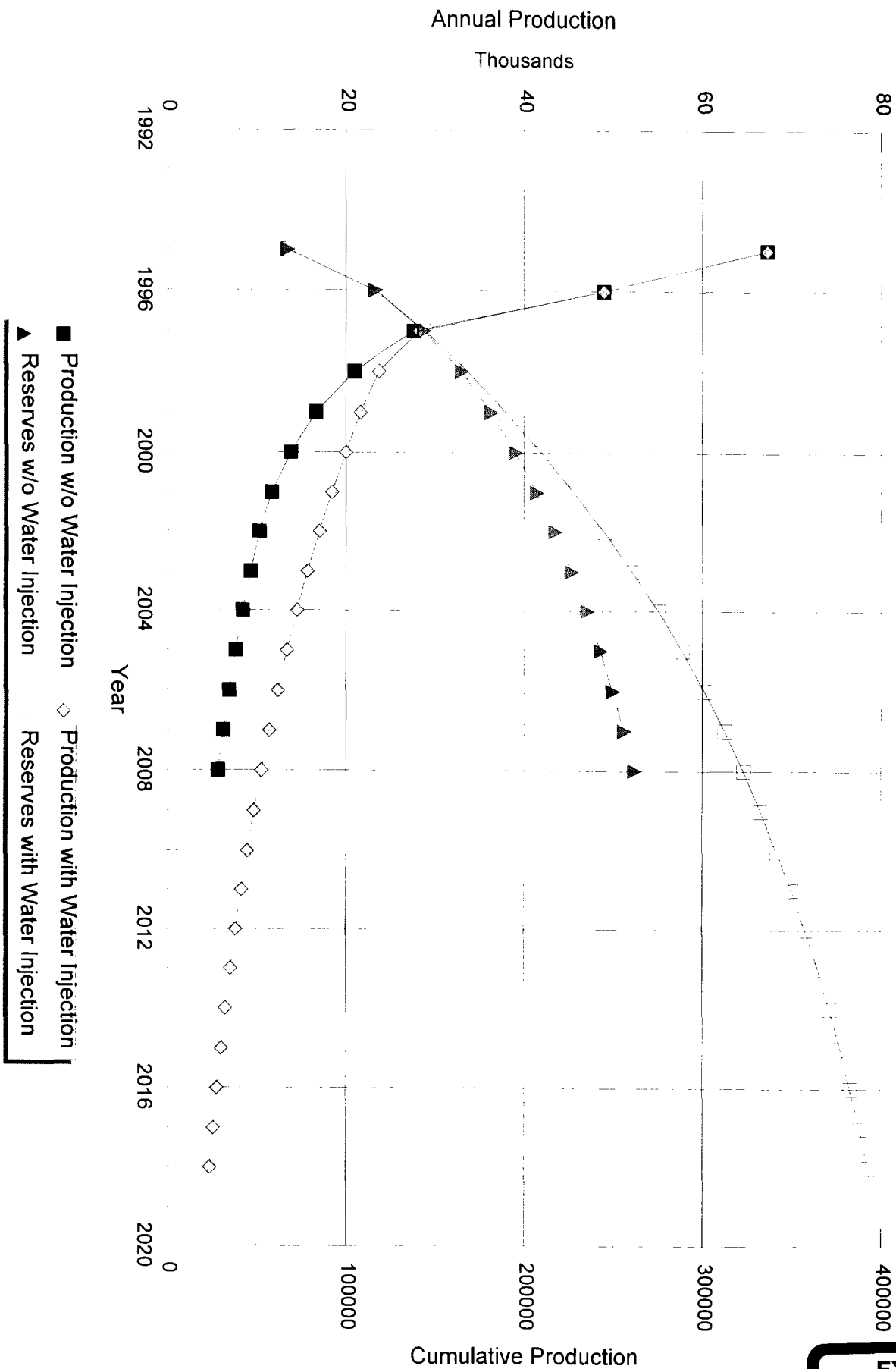
<u>Well Name</u>	<u>Location</u>
Hardy 36 State No. 3	2080' FNL & 1730' FEL, Sec. 36, T-20S, R-37E

#### PRODUCING WELLS:

<u>Well Name</u>	<u>Location</u>
Hardy 36 State No. 2	1876' FSL & 2230' FWL, Sec. 36, T-20S, R-37E
Hardy 36 State No. 4	1880' FSL & 1680' FEL, Sec. 36, T-20S, R-37E
Hardy 36 State No. 18	330' FNL & 330' FEL, Sec. 36, T-20S, R-37E
Hardy 36 State No. 19	1950' FNL & 330' FEL, Sec. 36, T-20S, R-37E

# HARDY 36 STATE

## Tubb Water Injection Profile



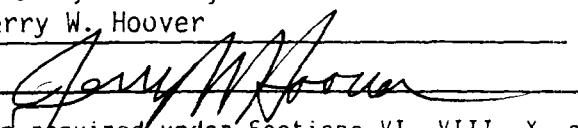
EXHIBIT

C

ENERGY

Case 11779

APPLICATION FOR AUTHORIZATION TO INJECT

- I. Purpose: ☐ Secondary Recovery ☒ Pressure Maintenance ☐ Disposal ☐ Storage  
Application qualifies for administrative approval? ☒ yes ☐ no
- II. Operator: Conoco Inc.  
Address: 10 Desta Dr. Ste. 100W, Midland, TX 79705  
Contact party: Jerry W. Hoover Phone: (915) 686-6548
- III. Well data: Complete the data required on the reverse side of this form for each well proposed for injection. Additional sheets may be attached if necessary.
- IV. Is this an expansion of an existing project? ☐ yes ☒ no  
If yes, give the Division order number authorizing the project \_\_\_\_\_.
- V. Attach a map that identifies all wells and leases within two miles of any proposed injection well with a one-half mile radius circle drawn around each proposed injection well. This circle identifies the well's area of review.
- \* VI. Attach a tabulation of data on all wells of public record within the area of review which penetrate the proposed injection zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of completion, and a schematic of any plugged well illustrating all plugging detail.
- VII. Attach data on the proposed operation, including:
1. Proposed average and maximum daily rate and volume of fluids to be injected;
  2. Whether the system is open or closed;
  3. Proposed average and maximum injection pressure;
  4. Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and
  5. If injection is for disposal purposes into a zone not productive of oil or gas at or within one mile of the proposed well, attach a chemical analysis of the disposal zone formation water (may be measured or inferred from existing literature, studies, nearby wells, etc.).
- \*VIII. Attach appropriate geological data on the injection zone including appropriate lithologic detail, geological name, thickness, and depth. Give the geologic name, and depth to bottom of all underground sources of drinking water (aquifers containing waters with total dissolved solids concentrations of 10,000 mg/l or less) overlying the proposed injection zone as well as any such source known to be immediately underlying the injection interval.
- IX. Describe the proposed stimulation program, if any.
- \* X. Attach appropriate logging and test data on the well. (If well logs have been filed with the Division they need not be resubmitted.)
- \* XI. Attach a chemical analysis of fresh water from two or more fresh water wells (if available and producing) within one mile of any injection or disposal well showing location of wells and dates samples were taken.
- XII. Applicants for disposal wells must make an affirmative statement that they have examined available geologic and engineering data and find no evidence of open faults or any other hydrologic connection between the disposal zone and any underground source of drinking water.
- XIII. Applicants must complete the "Proof of Notice" section on the reverse side of this form.
- XIV. Certification
- I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.
- Name: Jerry W. Hoover Title Sr. Conservation Coordinator  
Signature:  Date: March 4, 1997
- \* 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. \_\_\_\_\_

## 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 schematic form and shall include:

- (1) Lease name; Well No.; location by Section, Township, and Range; and footage location within the section.
- (2) Each casing 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.

B. 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

Publication proof will be forwarded when received

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.

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

# INJECTION WELL DATA SHEET

## HARDY 36 STATE NO. 3

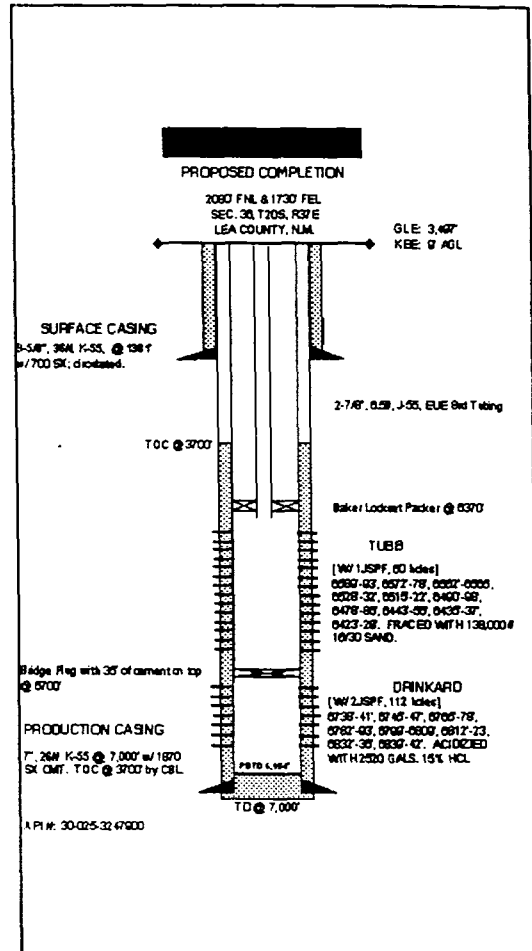
### III

Operator: Conoco Incorporated  
 Lease: Hardy 36 State  
 Well No: 3  
 Footage Location: 2080' FNL, 1730' FEL  
 Section: 36  
 Township: T-20-S  
 Range: R-37-E

Surface Casing:  
 Size: 9-5/8" Depth: 1381'  
 Cement Sacks: 700  
 TOC: Surface determined by cement returns  
 Hole Size: 12-1/4"

Production Casing:  
 Size: 7" Depth: 7000'  
 Cement Sacks: 1870  
 TOC: 3700' determined by CBL  
 Hole Size: 8-5/8"

Tubing Size: 2-7/8" set at 6400'  
 Packer: Baker Lockset set at 6370'



Injection Interval: Tubb  
 Pool Name: Hardy; Tubb-Drinkard, North Pool  
 Injection Interval: 6423' - 6593' (perforated, cased hole)

The well was not drilled as an injector. It was originally drilled as a Tubb/Drinkard producer.

Other Perforated Intervals: Drinkard 6738' - 6842'  
 This zone will be plugged via a bridge plug set at 6700' with 35' of cement placed on top of the bridge plug. The cement bond log dated 05/20/94 shows good cement isolation between the Tubb completion and the Drinkard perforations.

Next overlying oil or gas pool: Eumont at 3700'

**WELLS WITHIN 1/2 MILE RADIUS OF PROPOSED HARDY 36 STATE NO. 3 INJECTION WELL**  
**Section 36 T20S R37E**  
**Lea County, New Mexico**  
**Wells That Penetrated The Zone of Injection**

API #	Operator	Well Name	Type	Section	Township	Range	Footage	Date Drilled	Total Depth (Ft)	Completion (Perfs)	Casing Size	SG Depth (Ft)	Cement (SX)	TOC (Ft)
30025 - 3212	Conoco	Hardy 36 State # 1	OPU	36	20S	37E	2230' FWL 1980' FSL	11/15/93	10625'	9940 - 1028	13-3/8" 9-5/8" 7"	533 3900 10625	525 1890 2100	1620 by CBL
30025 - 3247	Conoco	Hardy 36 State # 2	OFL	36	20S	37E	2230' FWL 1876' FSL	03/18/95	7027'	6302 - 6482 6740 - 6810	8-5/8" 5-1/2"	1525 7027	920 1300	2982 by CBL
30025 - 3247	Conoco	Hardy 36 State # 3	OPU	36	20S	37E	2080' FNL 1730' FEL	04/25/94	7000'	6423 - 6593 6738 - 6842	9-5/8" 7"	1381 7000	700 1870	3690 by CBL*
30025 - 3251	Conoco	Hardy 36 State # 4	OFL	36	20S	37E	1880' FSL 1680' FEL	05/28/95	6960'	6316 - 6478	8-5/8" 5-1/2"	1500 6960	800 1220	3604 by CBL
30025 - 3253	Conoco	Hardy 36 State # 7	SI	36	20S	37E	2220' FNL 990' FWL	09/25/94	10890'	3998 - 4204	13-3/8" 9-5/8" 7"	518 3850 10890	525 1400 1895	3750 by CBL*
30025 - 3302	Conoco	Hardy 36 State # 18	OPU	36	20S	37E	330' FNL 330' FEL	08/09/95	6990'	6440 - 6518	8-5/8" 5-1/2"	1500 6990	920 1180	1542 by CBL
30025 - 3320	Conoco	Hardy 36 State # 19	OPU	36	20S	37E	1950' FNL 330' FEL	01/30/96	6960'	6442 - 6536	8-5/8" 5-1/2"	1515 6960	920 970	2210 by Cement Volumes

**Notes:**

1. All Eumont Hardy Unit Wells (Lynx Petroleum) within the area of review were drilled only to the Grayburg formation (average depth of 3804'), and do not penetrate the proposed injection interval.
2. There are no plugged wells in the Area of Review.
3. Top of cement reported for the Hardy 36 State No. 3 and 7 wells was the shallowest depth recorded by the CBL. Actual TOC is above stated cement tops.

## **SUPPLEMENT TO APPLICATION FOR AUTHORIZATION TO INJECT HARDY 36 STATE NO. 3**

### **VII. Proposed Operations:**

1. During the first year of the project we intend to inject an average of 350 BWPD in order to provide early pressure maintenance. Injection rate is anticipated at 250 BWPD in the second year and 150 BWPD in all subsequent years. Total injection over the life of the project is estimated at 500,000 BW.
2. The planned injection system is closed.
3. Average injection pressure is expected to be approximately 1000 psi, with the maximum injection pressure not to exceed 1280 psi (0.2 psi/ft at a depth of 6423' to the top perforation).
4. Plans are to re-inject produced water from the Hardy 36 State Production Battery.
5. Not applicable.

### **VIII. Reservoir and Geological Information:**

The reservoir into which water will be injected occurs in the Tubb Formation, a Permian carbonate encountered at a depth of approximately 6400' on the subject lease. The Tubb reservoir interval is approximately 280 feet in thickness, and is composed predominantly of Dolomite with average porosities of 10 - 15% and average permeabilities of 1 - 6 md.

The only underground source of drinking water in the vicinity is the Ogalalla Formation, a Tertiary unit consisting of caliche, sand and gravel which extends from the surface to a depth of approximately 200'.

### **IX. Stimulation Program:**

No additional stimulation work is proposed for this well. The original Tubb completion included perforations from 6423' - 6593', and a 138,000 lb sand fracture stimulation.

### **X. Log Data:**

Presently on file with the State of New Mexico.

XI. Fresh Water Analysis:

Conoco operates two fresh water wells located in Section 35, T20S, R37E. Water analyse from these wells are attached. The legal location of these wells are:

Fresh Water Well No. 2 SE/SE, Section 35, T20S, R37E

Fresh Water Well No. 3 NE/SE, Section 35, T20S, R37E

XII. Faulting:

There are no indications of open faults or other hydrological connections between the proposed injection intervals and the shallower fresh water zones.

XIV. Other Operators within the 1/2 Mile Radius of the Hardy 36 State No. 3:

Lynx Petroleum  
P.O. Box 1979  
Hobbs, NM 88241

Surface Owner  
State of New Mexico



PETROLITE

Petrolite Corporation  
422 West Main Street  
Artesia, NM 88210-2041

## TRETOLITE DIVISION

(505) 746-3588  
Fax (505) 746-3580

## WATER ANALYSIS REPORT

Reply to:  
P.O. Box 1140  
Artesia, NM  
88211-7531

Company : CONOCO INC.  
Address : HOBBS NORTH  
Lease : HARDEE  
Well : FRESH WATER #2  
Sample Pt. : DISCHARGE LINE

Date : 11/22/96  
Date Sampled : 11/22/96  
Analysis No. : 001

ANALYSIS		mg/L	* meq/L
-----		----	-----
1. pH	7.2		
2. H <sub>2</sub> S	1 PPM		
3. Specific Gravity	1.000		
4. Total Dissolved Solids		1923.7	
5. Suspended Solids		NR	
6. Dissolved Oxygen		NR	
7. Dissolved CO <sub>2</sub>		5 PPM	
8. Oil In Water		NR	
9. Phenolphthalein Alkalinity (CaCO <sub>3</sub> )			
10. Methyl Orange Alkalinity (CaCO <sub>3</sub> )			
11. Bicarbonate	HCO <sub>3</sub>	268.0	HCO <sub>3</sub> 4.4
12. Chloride	Cl	852.0	Cl 24.0
13. Sulfate	SO <sub>4</sub>	125.0	SO <sub>4</sub> 2.6
14. Calcium	Ca	100.0	Ca 5.0
15. Magnesium	Mg	24.4	Mg 2.0
16. Sodium (calculated)	Na	552.6	Na 24.0
17. Iron	Fe	1.8	
18. Barium	Ba	NR	
19. Strontium	Sr	NR	
20. Total Hardness (CaCO <sub>3</sub> )		350.0	

## PROBABLE MINERAL COMPOSITION

*milli equivalents per Liter	Compound	Equiv wt X meq/L	= mg/L
+-----+	+-----+		
5   *Ca <----- *HCO <sub>3</sub>   4	Ca (HCO <sub>3</sub> ) <sub>2</sub>	81.0	4.4 356
-----  /----->  -----	CaSO <sub>4</sub>	68.1	0.6 41
2   *Mg -----> *SO <sub>4</sub>   3	CaCl <sub>2</sub>	55.5	
-----  <-----/  -----	Mg (HCO <sub>3</sub> ) <sub>2</sub>	73.2	
24   *Na -----> *Cl   24	MgSO <sub>4</sub>	60.2	2.0 121
+-----+	+-----+		
	MgCl <sub>2</sub>	47.6	
Saturation Values Dist. Water 20 C	NaHCO <sub>3</sub>	84.0	
CaCO <sub>3</sub> 13 mg/L	Na <sub>2</sub> SO <sub>4</sub>	71.0	NR 0
CaSO <sub>4</sub> * 2H <sub>2</sub> O 2090 mg/L	NaCl	58.4	24.0 1405
BaSO <sub>4</sub> 2.4 mg/L			

## REMARKS:

----- DON CANADA



SCALE TENDENCY REPORT  
-----

Company	: CONOCO INC.	Date	: 11/22/96
Address	: HOBBS NORTH	Date Sampled	: 11/22/96
Lease	: HARDEE	Analysis No.	: 001
Well	: FRESH WATER #2	Analyst	: DON CANADA
Sample Pt.	: DISCHARGE LINE		

STABILITY INDEX CALCULATIONS  
(Stiff-Davis Method)  
CaCO<sub>3</sub> Scaling Tendency

S.I. = -0.1 at 60 deg. F or 16 deg. C  
S.I. = -0.0 at 80 deg. F or 27 deg. C  
S.I. = NR at 100 deg. F or 38 deg. C  
S.I. = 0.1 at 120 deg. F or 49 deg. C  
S.I. = 0.2 at 140 deg. F or 60 deg. C

\*\*\*\*\*

CALCIUM SULFATE SCALING TENDENCY CALCULATIONS  
(Skillman-McDonald-Stiff Method)  
Calcium Sulfate

S = 1301 at 60 deg. F or 16 deg C  
S = 1326 at 80 deg. F or 27 deg C  
S = 1321 at 100 deg. F or 38 deg C  
S = 1312 at 120 deg. F or 49 deg C  
S = 1301 at 140 deg. F or 60 deg C

Petrolite Oilfield Chemicals Group

Respectfully submitted,  
DON CANADA

PETROLITE

Petrolite Corporation  
422 West Main Street  
Artesia, NM 88210-2041

## TRETOLITE DIVISION

(505) 746-3588  
Fax (505) 746-3580

## WATER ANALYSIS REPORT

Reply to:  
P.O. Box 1140  
Artesia, NM  
88211-7531

Company : CONOCO INC.  
Address : HOBBS NORTH  
Lease : HARDEE  
Well : FRESH WATER #3  
Sample Pt. : DISCHARGE LINE

Date : 11/22/96  
Date Sampled : 11/22/96  
Analysis No. : 003

ANALYSIS		mg/L	* meq/L
1.	pH	7.1	
2.	H <sub>2</sub> S	1 PPM	
3.	Specific Gravity	1.000	
4.	Total Dissolved Solids	2249.9	
5.	Suspended Solids	NR	
6.	Dissolved Oxygen	NR	
7.	Dissolved CO <sub>2</sub>	6 PPM	
8.	Oil In Water	NR	
9.	Phenolphthalein Alkalinity (CaCO <sub>3</sub> )		
10.	Methyl Orange Alkalinity (CaCO <sub>3</sub> )		
11.	Bicarbonate	HCO <sub>3</sub> 268.0	HCO <sub>3</sub> 4.4
12.	Chloride	Cl 1065.0	Cl 30.0
13.	Sulfate	SO <sub>4</sub> 100.0	SO <sub>4</sub> 2.1
14.	Calcium	Ca 80.0	Ca 4.0
15.	Magnesium	Mg 12.2	Mg 1.0
16.	Sodium (calculated)	Na 724.7	Na 31.5
17.	Iron	Fe NR	
18.	Barium	Ba NR	
19.	Strontium	Sr NR	
20.	Total Hardness (CaCO <sub>3</sub> )	250.0	

## PROBABLE MINERAL COMPOSITION

*milli equivalents per Liter	Compound	Equiv wt X meq/L	= mg/L
4   *Ca <----- *HCO <sub>3</sub>   4	Ca (HCO <sub>3</sub> ) <sub>2</sub>	81.0	324
-----  /----->  -----	CaSO <sub>4</sub>	68.1	
1   *Mg -----> *SO <sub>4</sub>   2	CaCl <sub>2</sub>	55.5	
-----  <-----/  -----	Mg (HCO <sub>3</sub> ) <sub>2</sub>	73.2	29
32   *Na -----> *Cl   30	MgSO <sub>4</sub>	60.2	36
+-----+	MgCl <sub>2</sub>	47.6	
Saturation Values Dist. Water 20 C	NaHCO <sub>3</sub>	84.0	
CaCO <sub>3</sub> 13 mg/L	Na <sub>2</sub> SO <sub>4</sub>	71.0	105
CaSO <sub>4</sub> * 2H <sub>2</sub> O 2090 mg/L	NaCl	58.4	1756
BaSO <sub>4</sub> 2.4 mg/L			

## REMARKS:

----- DON CANADA

Petrolite Oilfield Chemicals Group

Respectfully submitted,  
DON CANADA

11/25/96

12:33

RV 240 + 915 686 6586

NO. 457

005

SCALE TENDENCY REPORT  
-----

Company	: CONOCO INC.	Date	: 11/22/96
Address	: HOBBS NORTH	Date Sampled	: 11/22/96
Lease	: HARDEE	Analysis No.	: 003
Well	: FRESH WATER #3	Analyst	: DON CANADA
Sample Pt.	: DISCHARGE LINE		

STABILITY INDEX CALCULATIONS  
(Stiff-Davis Method)  
CaCO<sub>3</sub> Scaling Tendency

S.I. =	-0.3	at	60 deg. F	or	16 deg. C
S.I. =	-0.2	at	80 deg. F	or	27 deg. C
S.I. =	-0.2	at	100 deg. F	or	38 deg. C
S.I. =	-0.1	at	120 deg. F	or	49 deg. C
S.I. =	-0.0	at	140 deg. F	or	60 deg. C

\*\*\*\*\*

CALCIUM SULFATE SCALING TENDENCY CALCULATIONS  
(Skillman-McDonald-Stiff Method)  
Calcium Sulfate

S =	1365	at	60 deg. F	or	16 deg C
S =	1394	at	80 deg. F	or	27 deg C
S =	1392	at	100 deg. F	or	38 deg C
S =	1382	at	120 deg. F	or	49 deg C
S =	1371	at	140 deg. F	or	60 deg C

Petrolite Oilfield Chemicals Group

Respectfully submitted,  
DON CANADA

Z 111 000 234



**Receipt for  
Certified Mail**

No Insurance Coverage Provided  
Do not use for International Mail  
(See Reverse)

Sent to	
Lynx Petroleum	
Street and No.	
P.O. Box 1979	
P.O. State and ZIP Code	
Hobbs, NM 88241	
Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, and Addressee's Address	
TOTAL Postage & Fees	\$
Postmark or Date	
3/4/97	

PS Form 3800, March 1993

Z 111 000 235



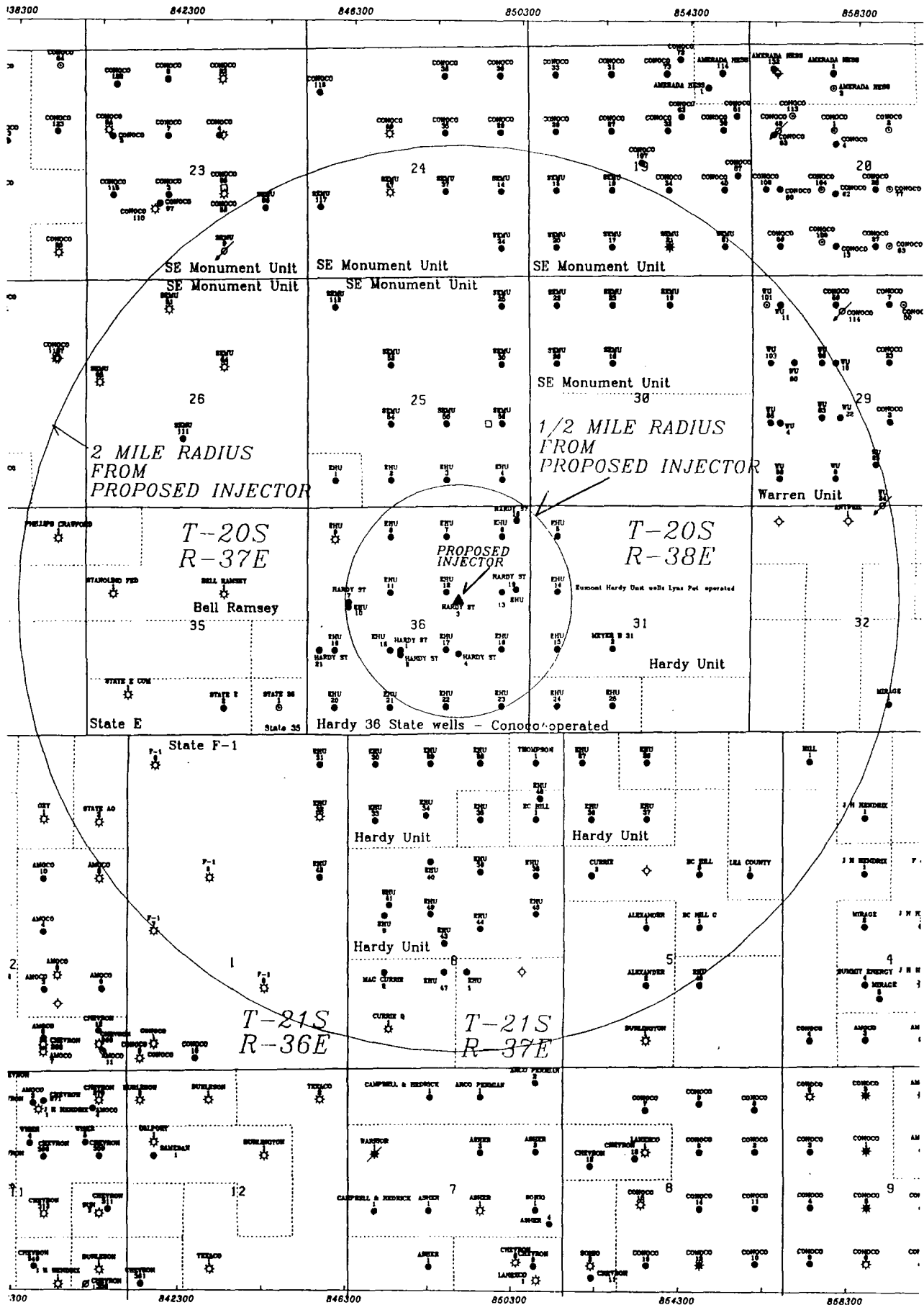
**Receipt for  
Certified Mail**

No Insurance Coverage Provided

Mr. Ray Powell  
Commissioner of Public Lands  
P.O. Box 1148  
Santa Fe, NM 87504-1148

Postage	\$
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TOTAL Postage & Fees	\$
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PS Form 3800, March 1993



Conoco Inc.  
Midland, Tx