



ADMINISTRATIVE ORDER SWD-679

***APPLICATION OF POGO PRODUCING COMPANY FOR SALT WATER DISPOSAL,
EDDY COUNTY, NEW MEXICO.***

**ADMINISTRATIVE ORDER
OF THE OIL CONSERVATION DIVISION**

Under the provisions of Rule 701(B), Pogo Producing Company made application to the New Mexico Oil Conservation Division on July 24, 1997, for permission to complete for salt water disposal its Cedar Canyon '28' Well No.4 located 1980 feet from the South line and 1980 feet from the West line (Unit K) of Section 28, Township 24 South, Range 29 East, NMPM, Eddy County, New Mexico.

THE DIVISION DIRECTOR FINDS THAT:

- (1) The application has been duly filed under the provisions of Rule 701(B) of the Division Rules and Regulations;
- (2) Satisfactory information has been provided that all offset operators and surface owners have been duly notified;
- (3) The applicant has presented satisfactory evidence that all requirements prescribed in Rule 701 will be met; and
- (4) No objections have been received within the waiting period prescribed by said rule.

IT IS THEREFORE ORDERED THAT:

The applicant herein, Pogo Producing Company is hereby authorized to complete its Cedar Canyon '28' Well No.4 located 1980 feet from the South line and 1980 feet from the West line (Unit K) of Section 28, Township 24 South, Range 29 East, NMPM, Eddy County, New Mexico, in such manner as to permit the injection of salt water for disposal purposes into the Bell Canyon, Upper and Middle Cherry Canyon formations at approximately 2950 feet to 4216 feet through 2 7/8-inch plastic-lined tubing set in a packer located at approximately 2850 feet.

IT IS FURTHER ORDERED THAT:

The operator shall take all steps necessary to ensure that the injected water enters only the proposed injection interval and is not permitted to escape to other formations or onto the surface.

Prior to commencing injection operations into the well, the casing shall be pressure tested from the surface to the packer setting depth to assure the integrity of said casing.

The casing-tubing annulus shall be loaded with an inert fluid and equipped with a pressure gauge at the surface or left open to the atmosphere to facilitate detection of leakage in the casing, tubing, or packer.

The injection well or system shall be equipped with a pressure limiting device which will limit the wellhead pressure on the injection well to no more than 590 psi.

The Director of the Division may authorize an increase in injection pressure upon a proper showing by the operator of said well that such higher pressure will not result in migration of the injected fluid from the Bell Canyon, Upper or Middle Cherry Canyon formations. Such proper showing shall consist of a valid step-rate test run in accordance with and acceptable to this office.

The operator shall notify the supervisor of the Artesia district office of the Division of the date and time of the installation of disposal equipment and of the mechanical integrity test so that the same may be inspected and witnessed.

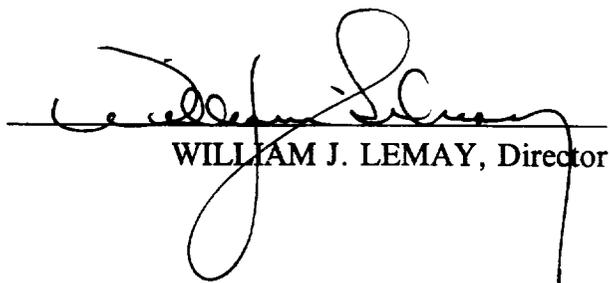
The operator shall immediately notify the supervisor of the Artesia district office of the Division of the failure of the tubing, casing, or packer in said well and shall take such steps as may be timely and necessary to correct such failure or leakage.

PROVIDED FURTHER THAT, jurisdiction of this cause is hereby retained by the Division for the entry of such further order or orders as may be deemed necessary or convenient for the prevention of waste and/or protection of correlative rights; upon failure of the operator to conduct operations in a manner which will ensure the protection of fresh water or in a manner inconsistent with the requirements set forth in this order, the Division may, after notice and hearing, terminate the injection authority granted herein.

The operator shall submit monthly reports of the disposal operations in accordance with Rule Nos. 706 and 1120 of the Division Rules and Regulations.

The injection authority granted herein shall terminate one year after the effective date of this order if the operator has not commenced injection operations into the subject well, provided however, the Division, upon written request by the operator, may grant an extension thereof for good cause shown.

Approved at Santa Fe, New Mexico, on this 15th day of October, 1997.


WILLIAM J. LEMAY, Director

WJL/BES

xc: Oil Conservation Division - Artesia

CHECKLIST for ADMINISTRATIVE INJECTION APPLICATIONS

Operator: Petro Services Co. Well: PERMAN CANYON 20' No 1

Contact: Tommy Galt Title: LANDMAN Phone: 715-657-6500

DATE IN 7-29 RELEASE DATE 8-8 DATE OUT 10-15-97

Proposed Injection Application is for: WATERFLOOD Expansion Initial

Original Order: R- Secondary Recovery Pressure Maintenance

SENSITIVE AREAS SALT WATER DISPOSAL Commercial Well

WIPP Capitan Reef

Data is complete for proposed well(s)? YES Additional Data Req'd _____

AREA of REVIEW WELLS

2 Total # of AOR 2 # of Plugged Wells
 Tabulation Complete Schematics of P & A's
 Cement Tops Adequate AOR Repair Required

INJECTION FORMATION

Injection Formation(s) PERMAN CANYON, JARDINE & MUD CREEK MEMBER Compatible Analysis YES

Source of Water or Injectate AREA DRAWN ARE PRODUCTION

PROOF of NOTICE

Copy of Legal Notice Information Printed Correctly
 Correct Operators Copies of Certified Mail Receipts
 Objection Received Set to Hearing _____ Date

NOTES: _____

APPLICATION QUALIFIES FOR ADMINISTRATIVE APPROVAL? YES

COMMUNICATION WITH CONTACT PERSON:

1st Contact:	Telephoned	Letter	Date	Nature of Discussion
2nd Contact:	Telephoned	Letter	Date	Nature of Discussion
3rd Contact:	Telephoned	Letter	Date	Nature of Discussion



POGO PRODUCING COMPANY

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

July 14, 1997

To: Offset Leasehold Operators and
Surface Owner
(See Attached List)

Re: Cedar Canyon Prospect NM-615
Eddy County, New Mexico
Application for Administrative
Approval to Inject Saltwater
into the Cedar Canyon "28" Federal No. 4 Well
located 1980' FSL & 1980' FWL Section 28,
T-24-S, R-29-E, N.M.P.M.

Gentlemen:

Pogo Producing Company has applied to the New Mexico Oil Conservation Division for Administrative Approval to inject saltwater into the captioned well.

A copy of the Form C-108 submitted by Pogo to the Division is enclosed.

If you object to and/or request that a hearing be held pertaining to this Application, you must notify the Division within fifteen (15) days from the date of Pogo's Application.

If you have any questions, please contact the undersigned or Mr. Richard L. Wright.

Very truly yours,

POGO PRODUCING COMPANY


Terry Gant
Senior Landman

TG:lf/c:SWD.89

Enclosure

✓ cc: New Mexico Oil Conservation Division
2040 South Pacheco Street
Santa Fe, New Mexico 87505
Attention: Mr. David R. Catanach

Attached to Notification Letter dated July 14, 1997
regarding Pogo's Application for Administrative Approval
to Inject Saltwater into the Cedar Canyon "28" Federal No. 4 Well

Bureau of Land Management
P. O. Box 27115
Santa Fe, New Mexico 87502-0115

Penwell Energy, Inc.
600 N. Marienfeld, Suite 1100
Midland, Texas 79701
Attention: Mr. Mark Wheeler

Enron Oil & Gas Company
P. O. Box 2267
Midland, Texas 79702
Attention: Mr. Pat Tower

Bettis Brothers, Inc.
500 West Texas, Suite 830
Midland, Texas 79701
Attention: Mr. John Bettis

CNG Producing Company
Four Greenspoint Plaza
16945 Northchase Drive, Suite 1750
Houston, Texas 77060
Attention: Ms. Donna Mullen

Nearburg Exploration Company, L.L.C.
3300 North "A", Building 2, Suite 120
Midland, Texas 79705
Attention: Mr. Bob Shelton

SENDER:

- Complete items 1 and/or 2 for additional services.
- Complete items 3, 4a, and 4b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

3. Article Addressed to:

Bureau of Land Management
 P.O. Box 27115
 Santa Fe, NM 87502-0115

4a. Article Number

P 389 505 760

4b. Service Type

- Registered
- Express Mail
- Return Receipt for Merchandise
- Certified
- Insured
- COD

7. Date of Delivery

11/18

8. Addressee's Address (Only if requested and fee is paid)

Cedar Canyon Fed #4

5. Received By: (Print Name)

Tom

6. Signature: (Addressee or Agent)

[Signature]

PS Form 3811, December 1994

Domestic Return Receipt

Thank you for using Return Receipt Service.

Is your RETURN ADDRESS completed on the reverse side?

SENDER:

- Complete items 1 and/or 2 for additional services.
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3. Article Addressed to:

Penwell Energy Inc.
 600 N. Marienfeld, Ste. 1100
 Midland, TX 79701
 Attn: Mr. Mark Wheeler

4a. Article Number

P 389 505 761

4b. Service Type

- Registered
- Express Mail
- Return Receipt for Merchandise
- Certified
- Insured
- COD

7. Date of Delivery

7/15

8. Addressee's Address (Only if requested and fee is paid)

Cedar Canyon "28" Fed #4

5. Received By: (Print Name)

[Signature]

6. Signature: (Addressee or Agent)

[Signature]

PS Form 3811, December 1994

Domestic Return Receipt

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- The Return Receipt will show to whom the article was delivered and the date delivered.

3. Article Addressed to:

Enron Oil & Gas Company
 P.O. Box 2267
 Midland, TX 79702
 Attn: Mr. Pat Tower

4a. Article Number

P 389 505 762

4b. Service Type

- Registered Certified
- Express Mail Insured
- Return Receipt for Merchandise COD

7. Date of Delivery

JUL 15 1997

8. Addressee's Address (Only if requested and fee is paid)

Cedar Canyon "28" Fed #4

5. Received By: (Print Name)

X *[Signature]*

Addresssee or Agent

PS Form 3811, December 1994

Domestic Return Receipt

Thank you for using Return Receipt Service.

is your RETURN ADDRESS completed on the reverse side?

SENDER:

- Complete items 1 and/or 2 for additional services.
- Complete items 3, 4a, and 4b.
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- The Return Receipt will show to whom the article was delivered and the date delivered.

3. Article Addressed to:

Bettis Brothers, Inc.
 500 W. Texas, Ste. 830
 Midland, TX 79701
 Attn: Mr. John Bettis

4a. Article Number

P 389 505 763

4b. Service Type

- Registered Certified
- Express Mail Insured
- Return Receipt for Merchandise COD

7. Date of Delivery

[Signature]

8. Addressee's Address (Only if requested and fee is paid)

Cedar Canyon "28" Fed #4

5. Received By: (Print Name)

X *[Signature]*

Addresssee or Agent

PS Form 3811, December 1994

Domestic Return Receipt

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SENDER:

- Complete items 1 and/or 2 for additional services.
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- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

3. Article Addressed to:

CNG Producing Company
 Four Greenspoint Plaza
 16945 Northchase Dr, Ste. 1750
 Houston, TX 77060
 Attn: Ms. Donna Mullen

5. Received By: (Print Name)

6. Signature: (Addressee or Agent)

X M Roth

PS Form 3811, December 1994

I also wish to receive the following services (for an extra fee):

- Addressee's Address
 - Restricted Delivery
- Consult postmaster for fee.

4a. Article Number

P 389 505 764

4b. Service Type

- Registered
 - Express Mail
 - Return Receipt for Merchandise
 - COD
 - Certified
 - Insured
7. Date of Delivery

8. Addressee's Address (Only if requested and fee is paid)

Cedar Canyon "28" Fed #4

Domestic Return Receipt

Thank you for using Return Receipt Service.

Is your RETURN ADDRESS completed on the reverse side?

SENDER:

- Complete items 1 and/or 2 for additional services.
- Complete items 3, 4a, and 4b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

3. Article Addressed to:

Nearburg Exploration Co., L.L.C.
 3300 N. "A", Bldg. 2, Ste. 120
 Midland, TX 79705
 Attn: Mr. Eob Shelton

5. Received By: (Print Name)

6. Signature: (Addressee or Agent)

X Eob Shelton

PS Form 3811, December 1994

I also wish to receive the following services (for an extra fee):

- Addressee's Address
 - Restricted Delivery
- Consult postmaster for fee.

4a. Article Number

P 389 505 765

4b. Service Type

- Registered
 - Express Mail
 - Return Receipt for Merchandise
 - COD
 - Certified
 - Insured
7. Date of Delivery

8. Addressee's Address (Only if requested and fee is paid)

Cedar Canyon "28" Fed #4

Domestic Return Receipt

Thank you for using Return Receipt Service.

APPLICATION FOR AUTHORIZATION TO INJECT

Cedar Canyon "28" Federal No. 4

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

II. Operator: POGO PRODUCING COMPANY

Address: P. O. BOX 10340, Midland, Texas 79702

Contact party: Richard L. Wright Phone: 915/682-6822

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: Bill F. Halepeska Title Agent, P. E.

Signature: Bill Halepeska Date: 6/17/97

* 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

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:

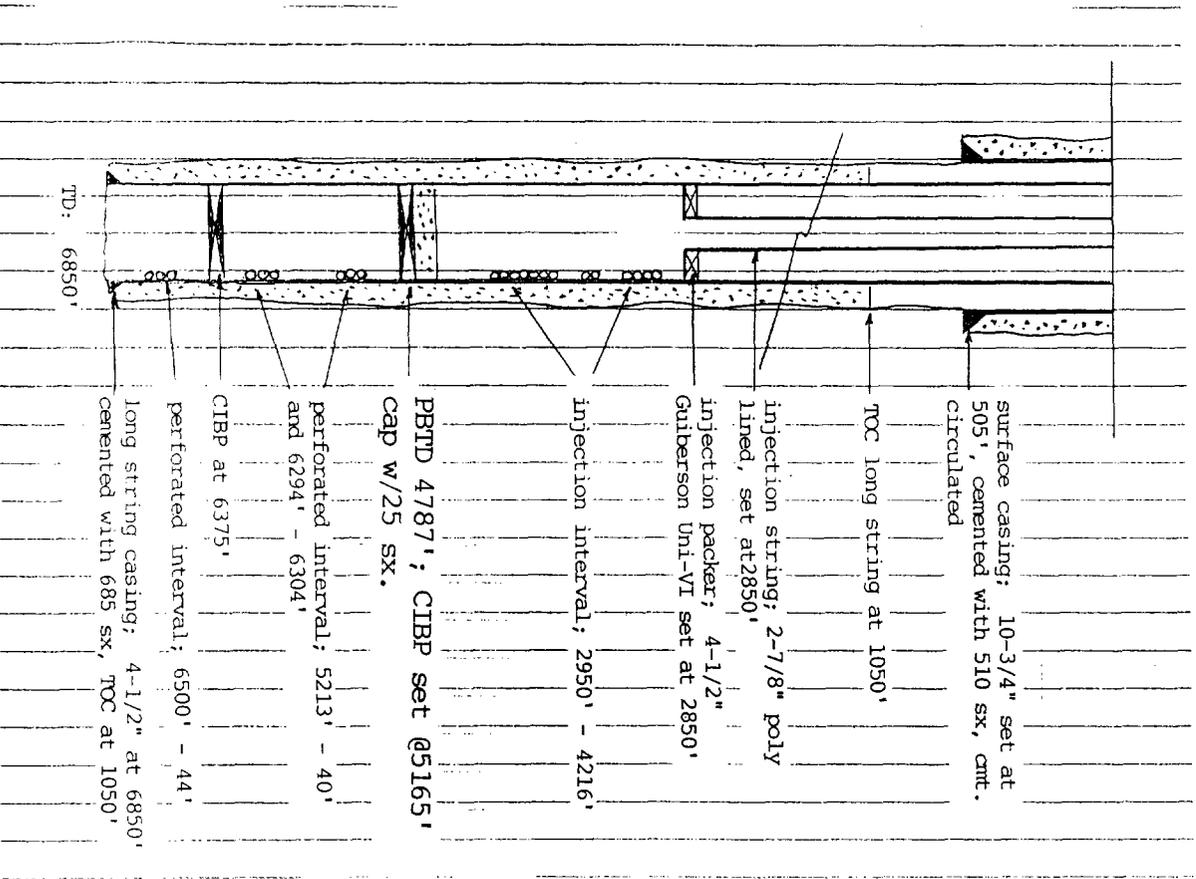
- (1) The name, address, phone number, and contact party for the applicant;
- (2) the intended purpose of the injection well; with the exact location of single wells; or the section, township, and range location of multiple wells;
- (3) the formation name and depth with expected maximum injection rates 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 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

SCHEMATIC



TABULAR DATA

(1). LEASE: Cedar Canyon "28" Federal Well # 4
 LOCATION: Sec. 28 TWP 24-S Range 29-E
 County Eddy
 Footage 1980' FSL & 1980' FWL

(2). CASING STRINGS:
 Surface Casing
 Size 10-3/4" Depth 505' Cemented w/ 510 sx.
 TOC surface determined by circulated
 Hole size 14-3/4"

Intermediate Casing
 Size _____ Depth _____ Cemented w/ _____ sx.
 TOC _____ Determined by _____
 Hole size _____

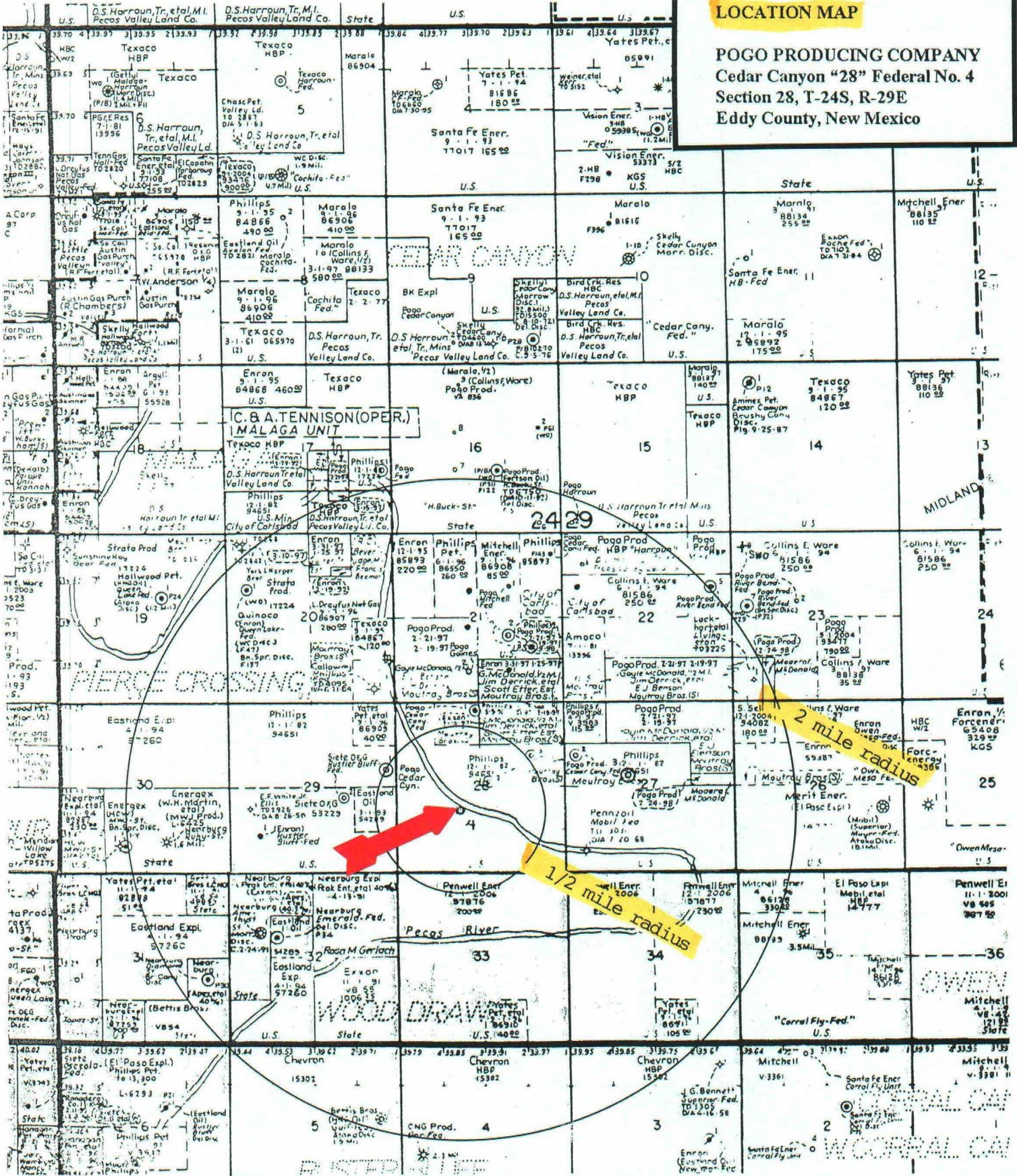
Long String
 Size 4-1/2" Depth 6850' Cemented w/ 685 sx.
 TOC 1050' Determined by CBL
 Hole size 6-3/4"
 Injection interval, from 2950' to 4216' ft.

(3). INJECTION TUBING STRING:
 Size 2-7/8 in., coated/lined with poly
 Setting depth 2850 ft.

(4) INJECTION PACKER:
 Size 4-1/2 in.; Make/Model Guiberson Uni VI
 Setting depth 2850' ft.

LOCATION MAP

POGO PRODUCING COMPANY
Cedar Canyon "28" Federal No. 4
Section 28, T-24S, R-29E
Eddy County, New Mexico



ITEM 111-B

INJECTION WELL DATA

- (1). Injection formation: Bell Canyon and Up. & Mid. Cherry Canyon (Delaware)
Field/Pool: Cedar Canyon Delaware
- (2). Injection interval, from 2950 Ft. to 4216 Ft.
Perforated XX Open Hole _____
- (3). Original purpose well drilled -- test of Lower Delaware and Bone Spring
- (4). Other perforated intervals; XX Yes _____ No
Squeezed with _____ sx., or isolated by perfs 6500 - 44' isolated with
CIBP @ 6375'; perfs 5213 - 6304' isolated by CIBP set @ 5109', top/25 sx.
- (5). Oil or gas productive zone(s):
Next higher: none
Next lower: Lwr. Cherry Canyon @ +/-5300'

WELL DATA - AREA OF REVIEW

(1). Location: NONE
Operator: _____ Lease: _____ Well # _____
Well type: Oil _____ Gas _____ DSA _____ Total depth _____ ft.
Date drilled: _____
Completion Data: _____

Plugged _____ Date: _____ (Schematic attached)

(2). Location: _____
Operator: _____ Lease: _____ Well # _____
Well Type: Oil _____ Gas _____ DSA _____ Total Depth: _____ ft.
Date Drilled: _____
Completion Data: _____

Plugged _____ Date _____ (Schematic attached)

(3). Location: _____
Operator: _____ Lease: _____ Well # _____
Well Type ; Oil _____ Gas _____ DSA _____ Total Depth: _____ ft.
Date Drilled: _____
Completion Data: _____

Plugged _____ Date _____ (Schematic attached)

ITEM VII

OPERATIONAL DATA

(1). Average expected injection rate: 1000 BWPD; maximum anticipated rate: 3000 BWPD

(2). Closed system

(3). Estimated average injection pressure: 500 psi.
Estimated maximum pressure: 590 psi.

(4). Source of injection water: produced water from nearby POGO
operated wells

Analysis of waters attached. EXHIBITS I & II

(5). Analysis of injection zone water attached. EXHIBIT III
Data source: Herradura Bend Delaware; Roswell Geological
Society Symposium 1988

ITEM V111

GEOLOGICAL DATA

INJECTION ZONE

Lithological description: sandstone, fine - v. fine grained,
lt. tan - gray, poorly consolidated - friable, cal. cementing

Geological name: Delaware (Bell Canyon and Upper & Middle Cherry Cn.

Zone thickness: 1266 ft.; Depth: 4216 ft.

FRESH WATER SOURCES

Geological name: Recent shallow alluvium; none produced nearby

Depth to bottom of zone: 200 ft.

ITEM 1X

STIMULATION PROGRAM (Proposed)

ACIDIZE:

Volume: 2000 Type acid: 7-1/2% HCl/Pentol 100

Rate: 5 BPM; Misc. ball sealers

FRACTURE:

Fluid volume: 55,000 gal.; Type: XL GW

Prop type: 16/30 sand Volume (#): 250,000

Rate: 30 BPM; Conductor: 4-1/2" in.

Misc. _____

EXHIBIT I

Endura Products C

P.O. Box 3394 Midland, Texas 79701
 Phone (915) 684-4233 * Fax (915) 684-4233

FORM C-108
 ITEM VII(4)

ANALYSIS- Bone Spring
 Produced Water

POGO PRODUCING COMPANY
 Cedar Canyon "28" Federal No. 4
 Section 28, T-24S, R-29E
 Eddy County, New Mexico

WATER ANALYSIS

Date 12/11/95 Endura Rep TERRY SOLANSKY
 Sampling Point/Date WELL HEAD - 12/9/95
 Company POGO PRODUCING
 Field Lease RIVERBEND FEDERAL Well #7
 State NEW MEXICO
 County EDDY

DISSOLVED SOLIDS

<u>CATIONS</u>	mg/l	me/l
Sodium, Na ⁺ (Calc.)	81,949	3,563
Total Hardness as Ca ⁺⁺	5,120	0
Calcium, Ca ⁺⁺	4,600	230
Magnesium, Mg ⁺⁺	317	26
Barium, Ba ⁺⁺	0	0
Iron (Total) Fe ⁺⁺⁺	16	1

ANIONS

Chlorides, Cl ⁻	135,000	3,803
Sulfate, SO ₄ ⁻	280	6
Carbonate, CO ₃ ⁻	0	0
Bicarbonate, HCO ₃ ⁻	659	11
Sulfide, S ⁻	0	0
Total Dissolved Solids (Calc.)	222,821	

OTHER PROPERTIES

pH ⁻	6.360
Specific Gravity, 60-/60 F	1.123
TURBIDITY	300

SCALING INDICIES

<u>TEMP, F</u>	<u>CA CO₃</u>	<u>CASO₄*2H₂O</u>	<u>CA SO₄</u>	<u>BA SO₄</u>
80	0.8303	-0.8962	-1.1875	-29.3893
120	1.2618	-0.9091	-1.0200	-29.5634
160	1.9214	-0.9331	-0.8713	-29.7858

EXHIBIT II

Endura Products Co

P.O. Box 3394 Midland, Texas 797
 Phone (915) 684-4233 * Fax (915) 684-

FORM C-108
 ITEM VII(4)

ANALYSIS -Lower Delaware
 Produced Water

POGO PRODUCING COMPANY
 Cedar Canyon "28" Federal No. 4
 Section 28, T-24S, R-29E
 Eddy County, New Mexico

WATER ANALYSIS

Date 4-17-97 Endura Rep TERRY SOLANSKY
 Sampling Point/Date WELL HEAD / 4-14-97
 Company POGO PRODUCING CO.
 Field

State NEW MEXICO
 County EDDY

Lease RIVERBEND FEDERAL Well #1

DISSOLVED SOLIDS

<u>CATIONS</u>	mg/l	me/l
Sodium, Na ⁺ (Calc.)	77,395	3,365
Total Hardness as Ca ⁺⁺	43,600	0
Calcium, Ca ⁺⁺	36,000	1,800
Magnesium, Mg ⁺⁺	4,634	386
Barium, Ba ⁺⁺	0	0
Iron (Total) Fe ⁺⁺⁺	11	1

ANIONS

Chlorides, Cl ⁻	197,000	5,549
Sulfate, SO ₄ ⁻	63	1
Carbonate, CO ₃ ⁻	0	0
Bicarbonate, HCO ₃ ⁻	146	2
Sulfide, S ⁻	0	0
Total Dissolved Solids (Calc.)	315,249	

OTHER PROPERTIES

pH ⁻	5.700
Specific Gravity, 60°/60 F	1.2
TURBIDITY	320

SCALING INDICIES

<u>TEMP, F</u>	<u>CA CO3</u>	<u>CASO4*2H2O</u>	<u>CA SO4</u>	<u>BA SO4</u>
80	2.0099	-0.3647	-0.8065	-29.5893
120	2.7105	-0.3742	-0.6355	-29.6881
160	3.7638	-0.3656	-0.4543	-29.8776
PERF 'S	5,248' - 5,264'			

EXHIBIT IV

FORM C-108
ITEM XI

ANALYSIS-Fresh Water Source(s)

POGO PRODUCING COMPANY
Cedar Canyon "28" Federal No.4
Section 28, T-24S, R-29E
Eddy County, New Mexico

FRESH WATER SOURCES
WATER QUALITY INFORMATION

Supplied by State Engineers Office, State of New Mexico

<u>USE</u>	<u>LOCATION</u>	<u>CHLORIDES</u>	<u>CONDUCTIVITY</u>	<u>DEPTH</u>	<u>DATE</u>
stk	26.23S.31E	122	3455		12/79
stk	26.23S.31E	150			12/70
stk	26.23S.31E	134	3503		10/76
stk	04.24S.31E	246	3690		07/87
stk	04.24S.31E	310	3680		04/92
irr	11.24S.28E	1180	6240	200	03/92
irr	16.24S.28E	1039	7449	161	05/81
stk	30.24S.28E	490	3830	201	04/92
irr	07.24S.29E	2330	8540	160	03/92
irr	07.24S.29E	2150	8860	160	04/85