OIL CONSERVATION DIVISION 2040 South Pacheco Street Santa Fe, New Mexico 87505 (505) 827-7131

ADMINISTRATIVE ORDER SWD-680

APPLICATION OF WILLOW PIPELINE CORPORATION FOR SALT WATER DISPOSAL, CHAVES COUNTY, NEW MEXICO.

ADMINISTRATIVE ORDER OF THE OIL CONSERVATION DIVISION

Under the provisions of Rule 701(B), Willow Pipeline Corporation made application to the New Mexico Oil Conservation Division on September 8, 1997, for permission to complete for salt water disposal its O'brien Fee '19' Well No.8 located 330 feet from the South line and 990 feet from the East line (Unit P) of Section 19, Township 8 South, Range 29 East, NMPM, Chaves 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.
 - (5) The application should be approved.

IT IS THEREFORE ORDERED THAT:

The applicant herein, is hereby authorized to complete its O'brien Fee '19' Well No.8 located 330 feet from the South line and 990 feet from the East line (Unit P) of Section 19, Township 8 South, Range 29 East, NMPM, Chaves County, New Mexico, in such manner as to permit the injection of salt water for disposal purposes into the San Andres formation at approximately 2,680 feet to 2,798 feet through 2 3/8-inch plastic-lined tubing set in a packer located at approximately 2,580 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 536 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 San Andres formation. 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 20th day of October, 1997.

WILLIAM J. LEMAY, Director

SEAL

WJL/BES

xc: Oil Conservation Division - Artesia





September 7, 1997

William LeMay, Director NM Oil Conservation Div. 2040 South Pacheco Santa Fe, NM 87505

1997

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Dear Mr. LeMay:

Enclosed are one original and one copy of Willow Pipeline Company's application to convert the O'Brien Fee 19-8 oil well to a water disposal well.

Please call me if you have any questions.

Sincerely,

Brian Wood

cc (w/ encl.): Artesia OCD

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ABOVE THIS LINE FOR DIVISION USE ONLY

NEW MEXICO OIL CONSERVATION DIVISION

- Engineering Bureau -

								
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	[E]	Y For all	of the above	e, Proof of l	Notification	n or Publica	ation is Attach	ed, and/or,

[3] INFORMATION / DATA SUBMITTED IS COMPLETE - Statement of Understanding

☐ Waivers are Attached

I hereby certify that I, or personnel under my supervision, have read and complied with all applicable Rules and Regulations of the Oil Conservation Division. Further, I assert that the attached application for administrative approval is accurate and complete to the best of my knowledge and where applicable, verify that all interest (WI, RI, ORRI) is common. I further verify that all applicable API Numbers are included. I understand that any omission of data, information or notification is cause to have the application package returned with no action taken.

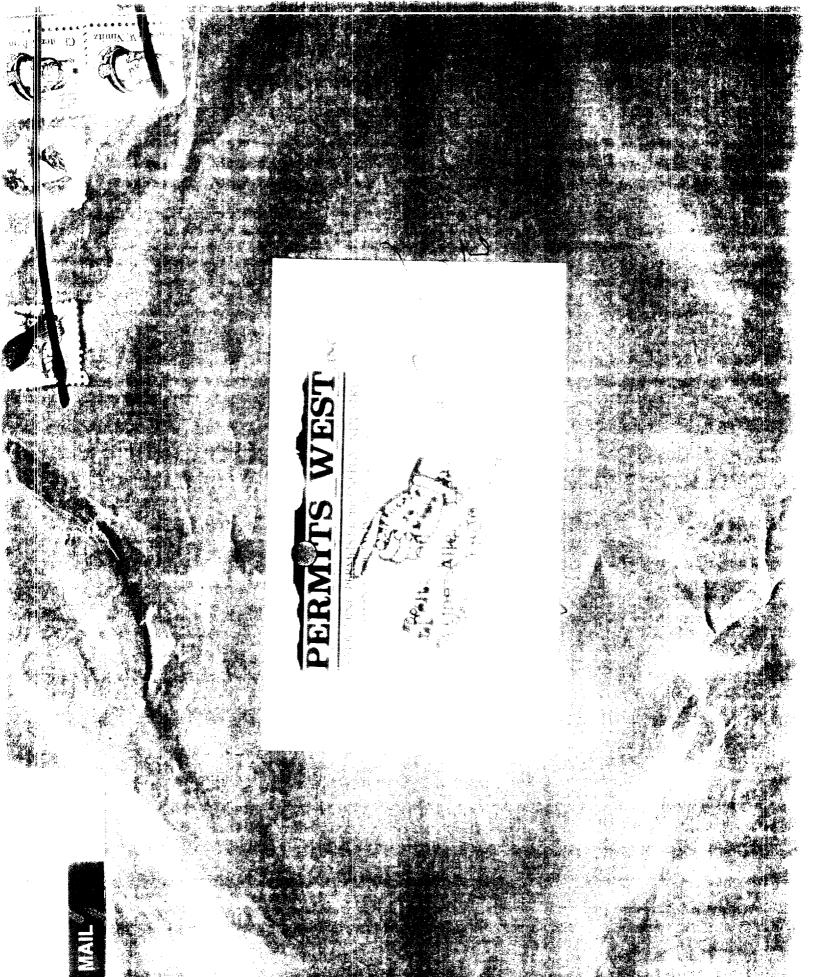
Note: Statement must be completed by in individual with supervisory capacity.

BRIAN Wrow

[F]

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9-7-97



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. **Altach this form to the front of the maliplece, or on the back if space does not permit and the maliplece below the article number. **Altach this form to the front of the maliplece, or on the back if space does not permit form to the front of the maliplece below the article number. **Altach this form to the front of the maliplece below the article number. **Addressee's Address of the analyse of the article number. **Addressee's Address of the analyse of the article number. **Analyse form the front of the maliplece below the article number. **Addressee's Address of the analyse of the article number. **Addressee's Address. **Addressee's Address. **Addressee's Address. **Addressee's Address. **Addressee's Address. **Andressee's Address. **Addressee's Address. **Andressee's Addressee's Address. **Andressee's Addressee's Addressee's Address. **Andressee's Addressee's Addressee's Address. **Andressee's Addressee's Addressee's Address	5. Received By: (Print Name) 8. Addressee's Address (Only if requested and fee is paid) 8. Addressee's Address (Only if requested and fee is paid) 8. Addressee's Address (Only if requested and fee is paid) 8. Addressee's Address (Only if requested and fee is paid) 8. Addressee's Address (Only if requested and fee is paid) 9. X	SENDER: Scomptes terms 1 and/or 2 for additional services. Complete terms 3, 4a, and 4b. Soft your name and address on the reverse of this form so that we can return this collowing services (for an extract this form to the front of the maliplece, or on the back if space does not permit. Attach this form to the front of the maliplece below the article number. While Receipt will show to whom the article was delivered and the date delivery. 3. Article Addressed to: A. Article Addressed to: A. Article Number Consult postmaster for fee. 4a. Article Number Consult postmaster for fee. 4b. Service Type Ab. Service Type Ab. Service Type Ab. Service Type Return Receipt for Merchandise CoD To Date of Delivery Ab. Service Type Consult postmaster for fee. Ab. Service Type Return Receipt for Merchandise CoD To Date of Delivery Ab. Service Type B. Addressee's Address (Only if requested and fee is paid) Service Type Consult postmaster for fee. 1. Addressee's Address (Consult postmaster for fee. 1. Addressee's Address (Consult postmaster for fee. 2. Ab. Service Type Consult postmaster of fee. 1. Basic wish to receive the following services (for an extra fee): 1. Addressee's Address (Consult postmaster for fee. 2. Ab. Service Type Consult postmaster for fee. Ab. Service Type Return Receipt for Merchandise CoD 7. Date of Delivery Ab. Service Type Return Receipt for Merchandise CoD Ab. Service Type Consult postmaster for fee. 1. Addressee's Address (Only if requested and fee is paid) 8. Addressee's Address (Only if requested and fee is paid) 8. Addressee's Address (Only if requested and fee is paid)
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AFFIDAVIT OF PUBLICATION

County of Chaves State of New Mexico

I, Fran Saunders, Legal Clerk

Of the Roswell Daily Record, a daily newspaper published at Roswell, New Mexico, do solemnly swear that the clipping hereto attached was published once a week in the regular and entire issue of said paper and not in a supplement thereof for a period

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weeks

beginning with issue	dated
August 27th	1997
and ending with the	issue dated
August 27th	1997

Fran Saunders Clerk

Sworn and subscribed to before me

this 27th

day of

August

,1997

Notary Public

My Commission expires

July 25, 1998

(SEAL)

Publish August 27, 1997

Willow Pipeline Company Is applying to convert the O'Brien Fee 19 #8 oil well to a water disposal well. Contact is Brian Wood, Permits West, Inc., 37 Verano Loop, Santa Fe, NM 87505. Phone number is (505) 466-8120. The O'Brien Fee 19 #8 is located at 330' FSL & 990" FEL, Sec. 19, T. 8 S., R. 29 E., Chaves County, NM. The well will dispose of water produced from surrounding oil wells into the San Andres formation at a depth of 2,680' to 2,798' at a maximum rate of 250 barrels of water per day and at a maximum pressure of 1,000 psi. Interested parties must file objections or requests for hearing with the NM Oil Conservation Division, P.O. Box 2088, Santa Fe, NM 87504-2088 within 15 days.

OIL CONSERVATION DIVISION PO BOX 2088 SANTA FE, NM 87504-2088



APPLICATION FOR AUTHORIZATION TO INJECT

I.	PURPOSE: Secondary Recovery Pressure Maintenance Disposal Storage Application qualifies for administrative approval?
II.	OPERATOR: WILLOW PIPELINE COMPANY
	P.O. BOX 131, WEATHERFORD, OK. 73096
	CONTACT PARTY: BRIAN WOOD C/O PERMITS WEST, INC. PHONE: 505 466-8120
III.	WELL DATA: Complete the data required on the reverse side of this form for each well processed 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:
	 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/1 or less) overlying the proposed injection zone as well as any such sources 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: BRIAN WOOD TITLE: CONSULTANT
	SIGNATURE: DATE: 8-24-97
	If the information required under Sections VI, VIII, X, and XI above has been previously submitted, it need not be 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 Cil Conservation Division, PO Box 2088, Santa Fe, NM 87504-2088 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 day; from the date this application was mailed to them.

WELL DATA

11.

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.

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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
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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

Cemented with 4 cu yd (Redimix_{3x}. Š. Cemented with 125 (50/50 Poz)sx. feet determined by Visual & log feet determined by Bond Log RANGE feet feet determined by Well Construction Data Cemented with 2,840' (PBTD 2,798') 330' FSL & 990' FEL 19-8s-29e 2,798 (perforated or open-hole; indicate which) Hole Size 7-7/8" (0' - 2,840') TOWNSHIP O'Brien Fee 19 11" (0' - 120') 5-1/2" feet to Surface 8-5/8" 1,900, Intermediate Casing Injection Interval Surface Casing SECTION Hole Size 2,680, Total Depth Long String Hole Size Size **T**0C Size **TOC** 200 LEASE Size PBTD is 2,798' TD is 2,840' string is 1,900' TOC for surface FOOTAGE LOCATION TOC for long casing is GL Willow Pipeline Company O'Brien Fee 19-8 is 2,680' to 2,798' all in San Andres Disposal Interval OPERATOR WELL NO.

INJECTION WELL DATA SHEET

æ					Andres oil well.			Associated	etween 2,722'&		is 3,287' north,	pool within 2 mile radius.
set in a	feet				as San				vals and rated l		area. which	Within
steel (plastic lined)	(type of internal coating) packer at 2,580'	applicable N/A		ıjection? Yes X No	If no, for what purpose was the well originally drilled? Drilled & produced as San	3-96 due to poor economics.	San Andres dolomite	Icable) Twin Lakes San Andres	rated in any other zone(s)? List all such perforated intervals and ks of cement or plug(s) used. San Andres perforated between 2,722'	& 2,686' with 4 shots per foot.	Give the names and depths of any over or underlying oil of gas zones (pools) in this area. Top of Fussleman is 6,852'. Nichols Lynx #1 well, which is 3,287'	produces from that zone. Only other oil or gas pool w
Tubing Size 2-3/8" 6.5#	Baker Hi-Par	Other type of tubing / casing seal if a	<u>Other Data</u>	Is this a new well drilled for injection?	If no, for what purpose was th	SI since at least 3	Name of the injection formation	Name of Field or Pool (if applicable)	Has the well ever been perfora give plugging detail, i.e., sacks	2,724 and 2,680'	Give the names and depths of Top of Fussleman	produces from tha
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I. Purpose is water disposal.

11. Operator is: Willow Pipeline Company

Phone is: (405) 772-1111

Address is: P.O. Box 131, Weatherford, Ok. 73096

Contact is: Brian Wood (Permits West, Inc.). Phone is (505) 466-8120.

- III. A. (1) Lease is 320 acre fee oil and gas lease which comprises all of the S2 of Section 19, T. 8 S., R. 29 E. Well name and number is O'Brien Fee 19 #8. Well is at 330' FSL and 990' FEL Sec. 19, T. 8 S., R. 29 E.
 - A. (2) Surface casing (8-5/8", 20#) was set at 120' in an 11" hole and cemented to the surface (visually observed and bond log run) with 4 cubic yards Redi-mix. Production casing (5-1/2", 14#) was set at 2840' in a 7-7/8" hole and cemented to \approx 1,900' (bond log run) with 125 sx 50/50 Poz mix.
 - A. (3) Tubing will be 2-3/8" 6.5# plastic lined injection string. It will be set at $\approx 2,716$ ' (disposal interval will be from 2,680' to 2,798').
 - A. (4) Baker Hi-Par packer will be set at 2,580'.
 - B. (1) Disposal zone will be San Andres dolomite.
 - B. (2) Disposal interval will be 2,680' to 2,798'. It was originally perforated (0.44") with four shots per foot from 2,680' to 2,686' and from 2,722' to 2,724' in 1981. Additional similar perforations will be shot in same formation and same overall interval (2,680' to 2,798').
 - B. (3) Well was spudded in July, 1981 and completed in October, 1981 as an oil well in the Twin Lakes San Andres Associated field and pool.
 - B. (4) San Andres dolomite was perforated (0.44") with four shots per foot from 2,680' to 2,686' and from 2,722' to 2,724' for a total of 40 perforations.
 - B. (5) Top of San Andres dolomite is at 2,050'. Oil and gas are produced in same and adjoining fields from this formation. Closest well



producing from San Andres is Willow's own O'Brien Fee 19-2 and 19-7 wells which are 1,320' west and 1,980' north respectively. Both are currently shut-in, but will return to producing oil well status upon OCD C-104 approval (as will all other Willow wells). Top of Queen is at 1,565'. Queen has been found productive elsewhere in the basin. There will be minimum 630' intereval between highest injection perforation and bottom of Queen. Nichol's Lynx #1 (SWNE 19-8s-29e) produces from the Fusselman. Top of that producing interval is 6,852'. That well is 3,287' north. It is the only oil well within a 2 mile radius which produces from any zone other than the San Andres.

- IV. This is not an expansion of an existing injection project.
- V. A map is attached showing all wells within a half mile (just 4 oil wells and all are operated by Willow), closest wells are Willow's O'Brien Fee 19-2 and 19-7 wells which are 1,980' west and north respectively) and within two miles (23 water injection + 47 oil + 13 P&A). A star marks the O'Brien Fee 19-8 well. Based on a USGS Water Resources Div. data base search on July 16, 1997 and a July 24, 1997 field inspection, there are no water wells within two miles. Details on the 83 wells are below.

<u>OPERATOR</u>	WELL	<u>LOCATION</u>	TYPE
Stevens	Huber State 1	SESW 16-8s-29e	P&A
Rhymes	O'Brien 19-1	SWNW 19-8s-28e	P&A
Rhymes	O'Brien 19-2	NENW 19-8s-28e	P&A
Rhymes	O'Brien 19-3	SWNE 19-8s-28e	P&A
Stevens	Red Lake Ridge #1	NENW 21-8s-29e	P&A
American	O'Brien 24-1	NWSE 24-8s-28e	P&A
Larue & Muncy	Sidney 1	SESW 24-8s-28e	P&A
Larue & Muncy	Sidney 2	SENW 24-8s-28e	P&A
Stevens	O'Brien R-3	NWNE 28-8s-29e	P&A
Marbob	TLSAU 33	SENE 31-8s-29e	P&A



Pelto Pelto	TLSAU 31 O'Brien N-3	SENW 31-8s-29e SWNW 32-8s-29e	P&A P&A
Sweeney	O'Brien 2	NWSE 32-8s-29e	P&A
<u>OPERATOR</u>	WELL	LOCATION	TYPE
Marbob	TLSAU 4	NESE 25-8s-28e	WIW
Marbob	TLSAU 9	SWSW 25-8s-28e	WIW
Marbob	TLSAU 11	SWSE 25-8s-28e	WIW
Marbob	TLSAU 17	NENW 36-8s-28e	WIW
Marbob	TLSAU 19	NENE 36-8s-28e	WIW
Marbob	TLSAU 27	SWNE 36-8s-28e	WIW
Marbob	TLSAU 38	NESE 36-8s-28e	WIW
Avra	O'Brien LLL-1	SWSE 21-8s-29e	WIW
Avra	O'Brien P-1	NENW 28-8s-29e	WIW
Marbob	TLSAU 2	SWNW 30-8s-29e	WIW
Marbob	TLSAU 2	SWNW 30-8s-29e	WIW
Marbob	TLSAU 6	NESW 30-8s-29e	WIW
Marbob	TLSAU 13	SWSW 30-8s-29e	WIW
Marbob	TLSAU 15	SWSE 30-8s-29e	WIW
Marbob	TLSAU 21	NENW 31-8s-29e	WIW
Marbob	TLSAU 23	NENE 31-8s-29e	WIW
Marbob	TLSAU 30	SWNW 31-8s-29e	WIW
Marbob	TLSAU 32	SWNE 31-8s-29e	WIW
Marbob	TLSAU 40	NESW 31-8s-29e	WIW
Marbob	TLSAU 42	NESE 31-8s-29e	WIW
Marbob	TLSAU 50	SWSE 31-8s-29e	WIW
Marbob	TLSAU 43	NWSW 32-8s-29e	WIW
Marbob	TLSAU 52	SWSW 32-8s-29e	WIW
OPERATOR	WELL	LOCATION	TYPE
Willow	O'Brien 13-1	SESE 13-8s-28e	Oil
Willow	O'Brien 24-2	NESE 24-8s-28e	Oil
Willow	O'Brien 24-2	NENE 24-8s-28e	Oil
Marbob	O'Brien 25-2	SESE 25-8s-28e	Oil
Marbob	O'Brien 25-4	NWSE 25-8s-28e	Oil
Marbob	O'Brien F-1	SWSW 25-8s-28e	Oil
Marbob	O'Brien F-2	SESW 25-8s-28e	Oil
Marbob	O'Brien F-4	NESW 25-8s-28e	Oil
Marbob	O'Brien F-9	SENW 25-8s-28e	Oil
Sandco	Sandco 2	SWNE 25-8s-28e	Oil
Sandco	Sandco 3	NENE 25-8s-28e	Oil



Willow	O'Brien 25-5	SENE 25-8s-28e	Oil
Marbob	TLSAU 122	SENE 36-8s-28e	Oil
Marbob	Citgo A State 6	NWNE 36-8s-28e	Oil
Marbob	Citgo A State 7	SWNE 36-8s-28e	Oil
Marbob	Citgo A State 8	SENE 36-8s-28e	Oil
Willow	O'Brien Deming 1	NENW 17-8-29e	Oil
Willow	O'Brien 18-1	SWSW 18-8s-29e	Oil
Willow	O'Brien 18-2	SWSE 18-8s-29e	Oil
Willow	O'Brien 18-3	SESW 18-8s-29e	Oil
Willow	O'Brien 18-4	NWSW 18-8s-29e	Oil
Willow	O'Brien 18-5	NESW 18-8s-29e	Oil
Willow	O'Brien 18-6	NWSE 18-8s-29e	Oil
Nichols	Lynx 1	SWNE 19-8s-29e	Oil
Willow	O'Brien 19-1	SESW 19-8s-29e	Oil
Willow	O'Brien 19-2	SWSE 19-8s-29e	Oil
Willow	O'Brien 19-3	SWSW 19-8s-29e	Oil
Willow	O'Brien 19-4	NWSW 19-8s-29e	Oil
Willow	O'Brien 19-5	NESW 19-8s-29e	Oil
Willow	O'Brien 19-6	NWSE 19-8s-29e	Oil
Willow	O'Brien 19-7	NESE 19-8s-29e	Oil
Avra	O'Brien LLL 1	SESW 21-8s-29e	Oil
Avra	O'Brien R 1	SWSE 21-8s-29e	Oil
Avra	O'Brien P 2	NWNW 28-8s-29e	Oil
Avra	O'Brien P 3	SWNW 28-8s-29e	Oil
Marbob	O'Brien K 2	NWSW 30-8s-29e	Oil
Marbob	TSLSAU 14	SESW 30-8s-29e	Oil
Willow	Kucheman 1	NWNW 30-8s-29e	Oil
Willow	Kucheman 3	NeNW 30-8s-29e	Oil
Willow	Kucheman 4	SENW 30-8s-29e	Oil
Willow	Kucheman 5	SWNE 30-8s-29e	Oil
Marbob	O'Brien I 1	NWNW 31-8s-29e	Oil
Marbob	O'Brien I 3	NESW 31-8s-29e	Oil
Marbob	O'Brien J 2	NWSE 31-8s-29e	Oil
Marbob	O'Brien J 6	SESE 31-8s-29e	Oil
Marbob	O'Brien J 8	NWNE 31-8s-29e	Oil
Marbob	TLSAU 123	SENW 31-8s-29e	Oil

A map also shows all leases within a half mile (all fee) and within two miles (all fee or state). The only state leases are in 36-8s-28e and 16-8s-29e. A star marks the O'Brien Fee 19-8 well. Details on those leases



within a half mile are:

<u>AREA</u>
N2 19-8s-29e
S2 19-8s-29e
SW4 20-8s-29e
NW4 20-8s-29e
W2 29-8s-29e
NE4, N2NW4, & SWNW 30-8s-29e

LESSEE
N. Dale Nichols
Willow Pipeline Company
Stevens Operating
Joseph Ortschid (Open-Lessor)
Pelto Oil
Willow Pipeline Company

VI. There are four wells within a half mile. All are operated by Willow, all are in the south half of Section 19, and all are currently shut-in oil wells. Copies of the four completion reports are attached.

<u>Well</u>	Surf. Casing	Prod. Casing	<u>Date</u>	<u>Where</u>	<u>TD</u>	Completion
19-1	20#, 308'	14#, 2796'	1978	SESW	2,800'	Perf: 2,629'-2,674'
	150 sx cmt	100 sx cmt				
19-2	20#, 122'	14#, 2794'	1979	SWSE	2,800'	Perf: 2,632'-2,680'
	75 sx cmt	175 sx cemt				
19-6	20#, 125'	14#, 2787'	1981	NWSE	2,800'	Perf: 2,641'-2,672'
	4 cu yd cmt	125 sx cmt				
19-7	20#, 126'	14#, 1868'	1981	NESE	2,845'	Perf: 2,660'-2,687'
	4 cu yd cmt	100 sx cmt				
	-	11#, 1,051'				
		265 sx cmt				
		9#, 1759'				

- VII. 1. Average injection rate = 175 bwpd. Maximum rate = 250 bwpd.
 - 2. System will initially be open (trucked to well). Depending on volume, pipeline may be laid later.
 - 3. Average injection pressure=200 psi. Maximum pressure=1,000 psi.
 - 4. Water source will be Willow's 27 other wells producing from San Andres. Eleven water analyses are attached. Water produced from the San Andres dolomite will be disposed of into the San Andres dolomite. A summary follows (K = Kucheman, all others = OBrien):



<u>Parameter</u>	<u>K-1</u>	<u>K-3</u>	<u>K-4</u>	<u>K-5</u>	<u> 13-1</u>	<u> 18-3</u>	<u> 18-5</u>	<u> 18-6</u>	<u> 19-1</u>	<u> 19-4</u>	<u> 25-5</u>
pН	5.9	5.9	5.9	6.3	6.1	5.9	6.8	6.5	5.9	5.9	6.2
H2S	0	0	0	0	0	0	0	0	0	0	0
TDS*	2.12	2.11	2.30	2.31	2.29	1.99	1.87	2.22	2.25	2.41	2.24
Calcium	12,224	14,028	7,615	6,513	8,016	3,307	3,307	2,104	16,032	16,733	1,503
Magnesium	2,917	3,161	2,188	1,884	3,829	1,033	1,520	912	5,349	5,713	790
Sodium*	0.65	0.63	0.79	0.81	0.75	0.73	0.67	0.83	0.63	0.68	0.84
Bicarbonate	366	454	308	1,800	669	483	722	620	527	473	781
Sulfate	950	750	1,450	1,800	1,500	3,500	4,100	5,100	700	600	5,100
Chloride*	1.30	1.30	1.40	1.40	1.40	1.18	1.10	1.30	1.40	1.50	1.31
Iron	15	49	468	2,900	7	23	1,600	13	1,300	23	65
Hardness*	0.43	0.48	0.28	0.24	0.36	0.13	0.15	0.09	0.62	0.65	0.07
* x 100,00	0										

- 5. The San Andres dolomite is productive. The 19-8 well initially produced 10 bopd and 5 Mcfd from the San Andres dolomite when completed in 1981. There are four existing oil wells within a half mile which produce from the San Andres dolomite. There are 46 oil wells within two miles which produce from the San Andres dolomite.
- VIII. The San Andres Formation is mainly dolomite with some anhydrite and limestone. It is at least 157' thick in the 19-8 wellbore. (Nichol's Lynx well which is 2/3 of a mile northwest recorded a 1,244' thick anhydrite, limestone, dolomite sequence.) Top is 2,680' and bottom is ≈2,837'. There is a 630' thick layer of anhydrite with some shale and dolomite above the San Andres in the 19-8 well. Strata beneath the San Andres, as recorded in the Lynx well, are (from shallow to deep):

Rock Type	<u>Top</u>	Bottom	Thickness
Sandstone, dolomite, anhydrite	3,296'	4,708'	1,412'
Sandstone, ahydrite	4,708'	5,413'	705'
Red shale	5,413'	6,174'	761'
Limestone	6,174'	6,604'	430'
Limestone	6,604'	6,770'	166'
Limestone	6,770'	6,849'	79'
Dolomite	6,849	7,491'	642'

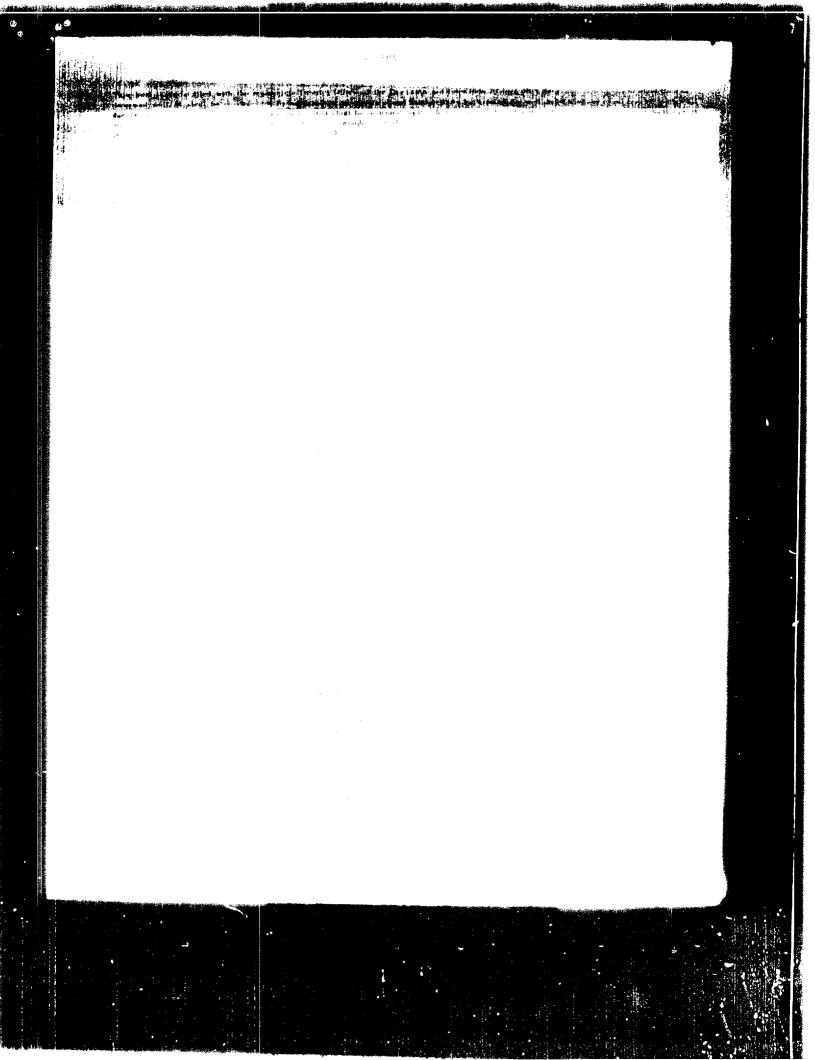


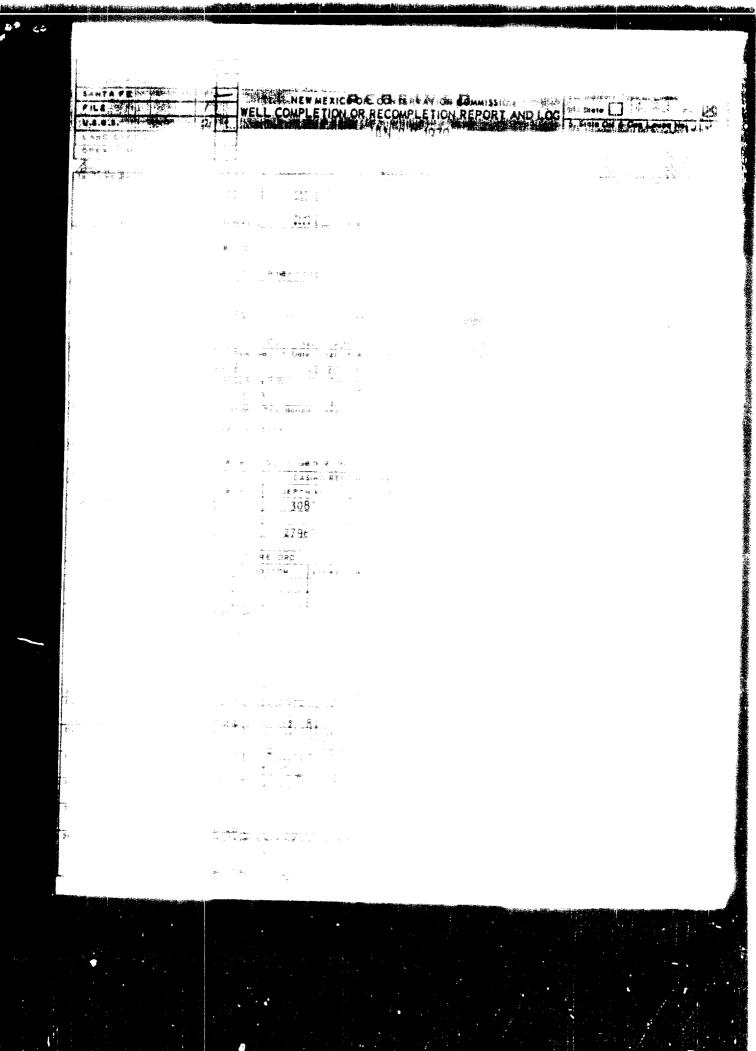
No drinking water bearing zones are known be above or below the San Andres within a two mile radius.

- IX. Stimulation will include an acid job.
- X. DL & ML, G-R SN, and cement bond logs were run and are on file.
- XI. Based on a USGS Water Resources Div. data base search on July 16, 1997 and a July 24, 1997 field inspection, there are no water wells within two miles.
- XII. Well files have been examined and a field inspection made. No evidence of open faults or other hydrologic connection between the San Adnres and any underground source of water has been found.
- XIII. Notice (this application) has been sent to the surface owner (QSTS Ranch Partnership) and N. Dale Nichols, Joseph Ortschid, Pelto Oil, and Stevens Operating. N. Dale Nichols, Joseph Ortschid, Pelto Oil, Stevens Operating, and Willow Pipeline Company are the operators of all leases within a half mile.



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L. Type Elected and Other Logs No LL, N-IL, S-N, G-R, Bond 1. CASING RECORD (Repeat all strings set in well) 1. CASING SIZE WEIGHT LO./FY. CCPYINSET MOLE SIZE CEMENTING RECORD AMOUNT FULLED 8 5 8" 20" 126" 17" 4 yds None 5 1 2" 14# 1868 7 7 /8" 100 sx None 14" 0 D 11# 1051! 4 3 /4" 265 None CombString 9# 1759 None 1. LINER RECORD 30. TURING RECORD 1. LINER RECORD 30. TURING RECORD 1. SIZE TOP BOTTOM SACRS CEMENT SCREEN SIZE OEPTH SET PACKER SET 2. 3'8 EU 2596 None 1. Performation Increase (Internal, size and humber) 2. 3'8 EU 2596 None 1. Performation Increase (Internal, size and humber) 2. 3'8 EU 2596 None 1. PRODUCTION 1. Con-Oll Institute 2. Cond of April Plant of Feel, seared, ric.) 3. Cold to Mapco Production Co 1. Livit Altertainment 1. Livit Altertainment 1. Livit Altertainment 1. Livit Altertainment 1. Livit Altertainment shown on booth sides of the pure is used and emplets on the boat of a phenometry and boa	4	i, Producing Interval	a), al this completic	en — Tep, Bolle	m, Namo							
L. Type Elected and Other Logs No LL, MLL, S-N, G-R, Bond 1. CASING RECORD (Repeat all strings set in well) CASING SIZE WEIGHT LD./FT. CCPTH SET MOLE SIZE CEMENTING RECORD AMOUNT FULLED B 5 'B' 20" 126" 11" 4 yds None 5 'Z' 14" 1868 7 7 'B' 100 sx None 14' 0 D 11" 1051! 4 3'4" 265 None CombString 9" 1759' None LINKE RECORD 38. TUBING RECORD SIZE TOP BOTTOM SACES CEMENT SCREEN SIZE OFFTH SET PACKER SET	200	Sari Andre	26	60-8	7							No
CASING RECORD (Report oil strings set in wall) CASING SIZE SEIGHT Le./FT. OFFTH SET MOLE SIZE CEMENTIAC RECORD AMOUNT FULLED B 5 'B' 20// 126 11'' 4 yds None 5 1 'Z' 14// 1868' 7 7 'B' 100 sx None 4' 0 0 11// 1051' 4 3 'b' 265 None CombString 9// 1759' None LIMER RECORD 30. TUDING RECORD SIZE TOP GOTTON SACRS CEMENT SCREEN SIZE DEPTH SET PACKER SET	1	L. Type Elecute and C					<u>-</u> .				27, ¥e	e Well Cared
CASHMO SIZE		LL, MLL,	S-N, G-R, Bo	nd								No
8 5 78		t.		CA	SING RECO	RD (Hop	att all skings	001 in w	ell)			
1									CEMENTI			
4' 0 D 11# 1051' 4 3'4' 265 None CombString 9# 1759' None LINER RECORD 19. TUBING RECORD SIZE TOP GOTTOM SACKS CEMENT SCREEN 19. TUBING RECORD SIZE TOP GOTTOM SACKS CEMENT SCREEN 19. TUBING RECORD NONE Postessistan linease (Internal, size and humber) 23. ACID, SHIDT, FRACTURE, CEMENT SQUEEZE, LTC. 1769-68 44.13 4 Shorts ft 2682-87 1 11 2660-87 500g MCA 2660-												+
LINER RECORD SIZE TOP BOTTOM SACKS CEMENT SCREEN SIZE DEPTH SET PACKER SET 2 3'8 EU 2596 None Profession fiscos (Internal, size and hamber) 32. ACID, SHOT, FRACTURE, CEMENT SOUECZE, LTC. DEPTH INTERNAL AMOUNT AND KIND MATERIAL USED 1769-68 11413 4 SHOTS 2682-87 11 11 2660-87 5000 MGA 2660-87 5000 MGA 2660-87 5000 MGA 2660-87 5000 MG Fe, N3 5 balls 2660-87 60000 Ne Fe, N3 6 balls PRODUCTION The First Production bestend (First ag, gas lift, pumping — Size and type pump) 10'30'81 Pumping The First Production bestend (First ag, gas lift, pumping — Size and type pump) The First Production bestend (First ag, gas lift, pumping — Size and sype pump) The First Production bestend (First ag, gas lift, pumping — Size and sype pump) The First Production bestend (First ag, gas lift, pumping — Size and sype pump) The First Production bestend (First ag, gas lift) The First Production bestend (First ag, gas lift) The First Production bestend (First ag, gas lift) The First Production (First ag,						7						
SIZE TOP BOTTOM SACRS CEMENT SCREEN SIZE DEPTH SET PACKER SET 2 3'8 EU 2596 None 32. ACID, SHOT, FRACTURE, CEMENT SOUEZEE, LTC. 1767-68 (M.J.) * SHOUS ** 2682-87 11 2660-87 500g MCA 2660-87 500g MCA 2660-87 1000g Ne Fe, 35 balls 1. PRODUCTION 10 30'81 Preduction Section Production Section Production Section Production Section Production 10'30'81 Pumpling 10'30'81 Pumpling 11'16'81 24 None 11'16'81 24					 		3 1 47 1			95		
SIZE TOP BOTTOM SACRS CEMENT SCREEN SIZE DEPTH SET PACKER SET 2 3'8 EU 2596 None 32. ACID, SHIDT, FRACTURE, CEMENT SOUECEE, ETC. 3769-68-144, 3-4-3405-44 2682-87 11 11 2674-76 11 11 2660-87 500g MCA 2660-87 500g MCA 2660-87 2000g Ne Fe, 35 balls 2660-87 6000g Ne Fe, Ng & balls 1. PRODUCTION PRODUCTION Prod 30'81 Pumping - 3100 and type pumping - 3100		COMBString						10.		TURING	RECO	
Perfection liscosed (Internal, size and humber) 32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC. 3682-87		512.5			SACES CE	MENT	SCREEN		SIZE			Y
Perference linearies, size and himber) 1769-68 14113 Shots 14 2682-87 11 2674-76 11 2660-62 11 11 2660-62 11 11 2660-87 2000g Ne Fe, 35 balls 2660-87 6000g Ne Fe, 35 balls 2660-87 6000g Ne Fe, Ne & balls 10 '30 '81 Production bestend (firewell, pumping - 2000 and type pump) 10 '30 '81 Production bestend (firewell, pumping - 2000 and type pump) 11 '16 '81 11 '16 '81 24 None 11 '16 '81 24 None 24 Sold to Mapco Production Co Less of Authorized to College Processor 10 '10 '10 '10 '10 '10 '10 '10 '10 '10 '											`	
DEPTH INTERVAL 2682-87 II II 2660-87 SOUGHA 2660-87							•					
2682-87 11 11 2660-87 500g MCA 2660-62 11 11 2660-87 500g MCA 2660-87 2000g Ne Fe, 35 balls 2660-87 6000g Ne Fe, Ng & balls 1. PRODUCTION The first invaluation production bestered if it was, goe lift, pumping - 3 see and type groups best was first for the first		, Perference Hecord (Interval, size and h	umber)	. 1 .	, , ,	32.	ACID, SII	OT, FRAC	TURE, CEMENT	soul	EZE, ETC.
2682-87 11 11 2660-87 500g MCA 2660-62 11 11 2660-87 2000g Ne Fe, 35 balls 2660-87 6000g Ne Fe, Ng & balls PRODUCTION The effect frequence between the between t		1364-KR		444		3 1) <140	MATERIAL USED
2674-76 2660-62 11 2660-62 11 2660-62 11 2660-87 2600-87 2660-87						ī						
2660-62 1 2500-87 2660-87 6000q Ne Fe, No & balls PRODUCTION The first irreduction beauting if it was, got lift, pumping - Dies and type pumping 10 '30 '81 Pumping Pumping Prod Chebt Size Prod., for Oil - Wall. Got - MCF Water - Wall. Got - Oil Italia 11 '16 '81 24 Hone Production of the first of the fir			11 11									
PRODUCTION The First Production Desired of Firming, gos life, pumping — Size and type pump) 10 '30 '81 Pumping Production Desired of Firming, gos life, pumping — Size and type pump) Prod		2660-62	11 11 12	-		71. /						
Production bothed if it was, gos lift, pumping — Size and type pumping — Production bothed if it was, gos lift, pumping — Size and type pumping — Production bothed if it was, gos lift, pumping — Size and type pumping — Production in the pumping — Size and type pumping — Production in the pumping — Size and type pumping — Production in the pumping — Size and type pumping — Production in the pumping — Size and type pumping — Size and type pumping — Production in the pumping — Size and type pumpi								<u></u>	[60	DDg Ne Fe,	N ₂	& balls
Pumping The of Test House Tested Choke Size Province for OH - Ball. Case - BCF Water - Hall. Case - OH Halle 11'16'81 24 Hone Test Precised 2 4 2 2000 In Tables Press. Casing Pressure Call and 2 4 2 2 2 2000 Lest Tables Press. 22# 22# 24 32 24 L. Disposition of Goo Sold, and for fuel, seared, size, j Sold to Mapoo Production Co Rick Likens Logs 1 sted above, 104, 116 FERC 121 Deviation Report L. I deres a carrify that the information shown so both gives of the form 15 time and amplies to the best of my decodedge and balls for the formation shown so both gives of the form 15 time and amplies to the best of my decodedge and balls for the formation shown so both gives of the form 15 time and amplies to the best of my decodedge and balls for the formation shown so both gives of the form 15 time and amplies to the best of my decodedge and balls for the formation and amplies to the best of my decodedge and balls for the formation and amplies to the best of my decodedge and balls for the formation and amplies to the best of my decodedge and balls for the formation and amplies to the best of my decodedge and balls for the formation and amplies to the best of my decodedge and balls for the formation and amplies to the best of my decodedge and balls for the formation and amplies to the best of my decoded and balls for the formation and amplies to the best of my decoded and balls for the formation and amplies to the best of my decoded and balls for the formation and amplies to the best of my decoded and balls for the formation and amplies the ball for the formation and amplies the formation an),	Tanza -					4200 = =		15.0.5		Bond on the said
Tot Willow Process 11'16'81 24 Plane Plan	•					r. remp	-7 - 3111 EW	17P# P -	~//	.		rime or statistic
11'16'81 24 None Testing 2 4 j2 2000 but Tubing Press. Casing Pressure 2 14 j2 2000 22# 22# 22# 22 15	;				l'int's.	-	DH = 451.	Cas	- MCF			Con - Ott Harte
22# 22# 32 24 L Disposition at Coo (Soll, and Jor Just, varied, siz.) Sold to Mapco Production Co L List of Attachmenta Logs 1 sted above, 104, 116 FERC 121 Deviation Report L I develop acting that the information above no both sides of the firm to time and samples to the best of my decoded and belief		11 '16 '81	24	None	Tool For		2		4	2ر		2000
Logs listed above, 104, 116 FERC 121 Deviation Report Listed above, 104, 116 FERC 121 Deviation Report Listed above and an experimental actions are the second and accordance to the second and accordance and actions are the second actions.			· .	t'ulculated 14 Huw Hate		ł.			Value :		011 6	
Sold to Mapco Production Co List of Attachments Logs listed above, 104, 116 FERC 121 Deviation Report List of the defining them so both sides of this from 10 time and sampless to the best of my boundedge and ballogs				reated. etc.)				*			- L	
Logs listed above, 104, 116 FERC 121 Deviation Report Light of the information above policy from 10 time and complete to the best of my boundedge and bulled	11"				•						•	•
L. I briefy certify that the terrimental about an built ander of this from an ince and complete we the best of any boundaries and bulliof	4		.,									
L. I briefy certify that the terrimental about an built ander of this from an ince and complete we the best of any boundaries and bulliof	4	Logs liste	d above. 104	4. 116 FER	C 121 D	evlat	ion Repoi	·t				
	1	I known comity that	Me telemente che	na pa buit side	• of the he	- 11 400	-	w 140 be	/ -, 4	www.de and ba	1.06	
waves 165 22 Sout MR LaFon Freduction Engineer 11 25/81		000	17									•
And a hard before the second contract and co	16.	Mones 45	Carpine 1	A LaFon	. 1114	·	duction !	raire	e -	^***	11	25 /81

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Permian Treating Chemicals WATER ANALYSIS REPORT

SAMPLE

Oil Co. : Willow Pipeline

Lease : Kuchaman

Salesman:

Well No.: # 1

Sample Loc.

Date Reported: 21-May-1996

EQ. WT.

*MEQ/L

Date Sampled:

MG/L

ANALYSIS

pH Specific Gravity 60/60 F. CaCO₃ Saturation Index @ 5.900 . 1.159 80 F. +0.692 140 F. +2.112

Dissolved Gasses

Hydrogen Sulfide Carbon Dioxide Dissolved Oxygen Not Present Not Determined Not Determined

Cations

7. 8.	Calcium Magnesium	(Ca++) (Mg++) (Na+)	12,224 2,917	/ 20.1 = / 12.2 =	608.16 239.10
9. 10.	Sođium Barium	(Nă+) (Ba++)	(Calculated) 65,333 Not Determined	/ 23.0 =	2,840.57

Aniona

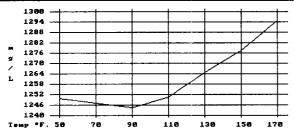
<u>~</u>	IIIOIIB						
11. 12. 13. 14. 15.	Hydroxyl Carbonate Bicarbonate Sulfate Chloride	(OH ⁻) (CO ₃ =) (HCO ₃ -) (SO ₄ =) (Cl ⁻)	0 0 366 950 129,971	7	17.0 30.0 61.1 48.8 35.5	=	0.00 0.00 5.99 19.47 3,661.15
16. 17. 18. 19.	Total Dissol Total Iron Total Hardne	(Fe) ss As CaCO2	211,761 15 42,538		18.2		0.82
1.9.	Kesiscivica	w /J r. (Carcuraced)	0.001 / Ciii.				

LOGARITHMIC WATER PATTERN

HIIIII HCO3 SO4 10000 1000 100 10 100 1000 10000 1 10

*meq/L.

Calcium Sulfate Solubility Profile



PROBABI COMPOUND	LE MINERAL EQ. WT. X		
$Ca(HCO_3)_2$	81.04	5.99	485
CaSO ₄	68.07	19.47	1,325
CaCl ₂	55.50	582.70	32,340
$Mg(HCO_3)_2$	73.17	0.00	0
MgSO ₄	60.19	0.00	0
${\tt MgCL}_2$	47.62	239.10	11,386
NaHCO3	84.00	0.00	0
NaSO ₄	71.03	0.00	0
NaCl *Milli	58.46 2 Equivalen	•	•

Permian Treating Chemicals WATER ANALYSIS REPORT

SAMPLE

Oil Co. : Willow Pipeline

Lease : Kuchaman Well No.: # 3-C

Salesman:

Sample Loc.

Date Reported: 21-May-1996

EQ. WT.

*MEQ/L

Date Sampled:

MG/L

ANALYSIS

1. pH 2. Specific Gravity 60/60 F. 1.155 3. CaCO₃ Saturation Index @ 80 F. +0.835 @ 140 F. +2.255

		
4. 5.	Hydrogen Sulfide Carbon Dioxide Dissolved Oxygen	Not Present Not Determined Not Determined

Cations

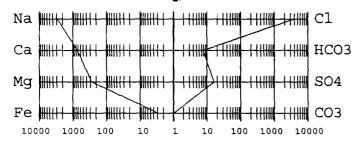
Dissolved Gasses

7. 8. 9.	Calcium Magnesium Sodium Barium	(Ca++) (Mg++) (Na+) (Ba++)	14,028 3,161 (Calculated) 62,740	/ 20.1 = / 12.2 = / 23.0 =	697.91 259.10 2,727.83
10.	Barium	(Ba++)	Not Determined		

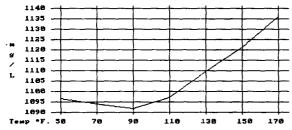
Anions

11. 12. 13. 14. 15.	Hydroxyl (OH ⁻) Carbonate (CO ₃ =) Bicarbonate (HCO ₃ ⁻) Sulfate (SO ₄ =) Chloride (Cl [±])	0 0 454 750 129,971	/ 17.0 = / 30.0 = / 61.1 = / 48.8 = / 35.5 =	0.00 0.00 7.43 15.37 3,661.15
16. 17.	Total Dissolved Solids Total Iron (Fe)	211,104		·
18. 19.	Total Hardness As CaCO3 Resistivity @ 75 F. (Calculate	48.043	/ 18.2 =	2.69

LOGARITHMIC WATER PATTERN *meq/L.



Calcium Sulfate Solubility Profile



, , , , , , , , , , , , , , , , , , , ,			
PROBABI COMPOUND	E MINERAL EQ. WT. X		
Ca (HCO3) 2	81.04	7.43	602
CaSO ₄	68.07	15.37	1,046
CaCl ₂	55.50	675.11	37,469
$Mg(HCO_3)_2$	73.17	0.00	0
MgSO ₄	60.19	0.00	0
${\tt MgCL}_2$	47.62	259.10	12,338
NaHCO3	84.00	0.00	0
NaSO ₄	71.03	0.00	0
NaCl *Milli	58.46 2 Equivalen	=	

WATER ANALYSIS REPORT

SAMPLE

Oil Co. : Willow Pipeline

Lease : Kicheman

Well No.: # 4 Salesman:

Sample Loc.

MG/L

Formation

Date Analyzed: 01-July-1996

EQ. WT.

*MEQ/L

NALYSIS

1.	Hq			5.900
2.	Specific Gravity	60/60	F.	1.148
3.	Specific Gravity CaCO ₃ Saturation	Index	@ 80	F. +0.472
	J		@ 140	F +1.972

Hydrogen Sulfide Carbon Dioxide Not Present Not Determined Dissolved Oxygen Not Determined

Cations

Dissolved Gasses

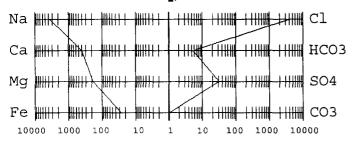
7.	Calcium	(Ca++)	7,615	/ 20.1 =	378.86
8.	Magnesium	(Mg++)	2,188	/ 12.2 =	179.34
9.	Sođium	(Nă+)	(Calculated) 78,700	/ 23.0 =	3,421.74
10	Barium	(Ba++)	Not Determined	•	

Anions

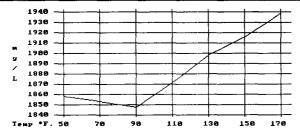
19.

11. 12. 13. 14. 15.	Hydroxyl (OH ⁻) Carbonate (CO ₃ ⁻) Bicarbonate (HCO ₃ ⁻) Sulfate (SO ₄ ⁻) Chloride (Cl ⁻)	0 0 308 1,450 139,968	/ 17.0 = / 30.0 = / 61.1 = / 48.8 = / 35.5 =	0.00 0.00 5.04 29.71 3,942.76
16.	Total Dissolved Sol		,	.,
17. 18.	Total Iron (Fe) Total Hardness As	468	/ 18.2 =	25.71

LOGARITHMIC WATER PATTERN *meq/L.



Calcium Sulfate Solubility Profile



Resistivity @ 75 F. (Calculated)	0.001 /cm.			
LOGARITHMIC WATER PATTERN *meq/L.		E MINERAL EQ. WT. X		
## ################################## #####	$Ca(HCO_3)_2$	81.04	5.04	409
HHH HO3	CaSO ₄	68.07	29.71	2,023
1111 1111 1111 1111 1111 1111 SO4	CaCl ₂	55.50	344.10	19,098
#### ##### ##### CO3	$Mg(HCO_3)_2$	73.17	0.00	0
cium Sulfate Solubility Profile	MgSO ₄	60.19	0.00	0
1946	${\tt MgCL}_2$	47.62	179.34	8,540
1928 1918 1900	NaHCO3	84.00	0.00	0
1890	NaSO4	71.03	0.00	0
1860 1850 1840 4p °F. 50 70 90 110 130 150 170	NaCl *Milli	58.46 3 Equivalent	,419.31 t s per L	

Permian Treating Chemicals WATER ANALYSIS REPORT

SAMPLE

Oil Co. : Willow Pipeline

Lease : Kuchaman

Well No.: # 5 Salesman: Sample Loc. :

Date Reported: 21-May-1996

EQ. WT.

*MEQ/L

Date Sampled :

MG/L

ANALYSIS

1. pH 2. Specific Gravity 60/60 F. 1.154 3. CaCO₃ Saturation Index @ 80 F. +0.937 @ 140 F. +2.437

4. Hydrogen Sulfide Not Present 5. Carbon Dioxide Not Determined 6. Dissolved Oxygen Not Determined

Cations

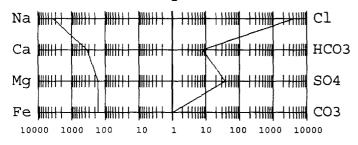
Dissolved Gasses

_						
7.	Calcium	(Ca++)		6,513	/ 20.1 =	324.03
8.	Magnesium	(Mg++) (Na+)		1,884	/ 12.2 =	154.43
9.	Sodium	(Nă+)	(Calculated)	80,763	/ 23.0 =	3,511.43
10.	Barium	(Ba++)	Not Det	ermined	·	-

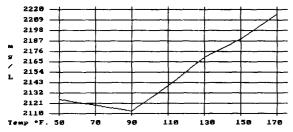
Anions

11.	Hydroxyl (OH-) Carbonate (CO ₃ =) Bicarbonate (HCO ₃ -) Sulfate (SO ₄ -) Chloride (Cl-)	0	/ 17.0 =	0.00
12.		0	/ 30.0 =	0.00
13.		459	/ 61.1 =	7.51
14.		1,800	/ 48.8 =	36.89
15.		139,968	/ 35.5 =	3,942.76
16. 17. 18. 19.	Total Dissolved Solids Total Iron (Fe) Total Hardness As CaCO ₃ Resistivity @ 75 F. (Calculated)	231,387 2,900 24,021 0.001 /cm.	/ 18.2 =	159.34

LOGARITHMIC WATER PATTERN *meq/L.



Calcium Sulfate Solubility Profile



PROBABI COMPOUND	LE MINERAL EQ. WT. X		
Ca(HCO ₃) ₂	81.04	7.51	609
CaSO ₄	68.07	36.89	2,511
CaCl ₂	55.50	279.63	15,520
$Mg(HCO_3)_2$	73.17	0.00	0
MgSO ₄	60.19	0.00	0
${\tt MgCL}_2$	47.62	154.43	7,354
NaHCO3	84.00	0.00	0
NaSO4	71.03	0.00	0
NaCl *Milli	58.46 3 Equivalen	-	•

WATER ANALYSIS REPORT

SAMPLE

Oil Co. : Willow Pipeline

Lease : O'Brien

Well No.: 13-1 Salesman: Sample Loc.

Date Reported: 21-May-1996

EO. WT.

*MEQ/L

Date Sampled:

ANALYSIS

pH
 Specific Gravity 60/60 F.
 CaCO₃ Saturation Index @ 80 F. +1.070
 @ 140 F. +2.680

D	issolved Gasses	MG/L
4. 5. 6.	Hydrogen Sulfide Carbon Dioxide Dissolved Oxygen	Not Present Not Determined Not Determined
	ations	

7. Calcin

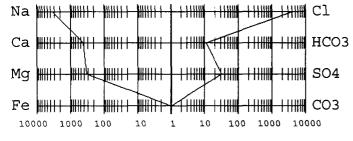
7.	Calcium	(Ca++)		8,016	/ 20.1 =	398.81
8.	Magnesium	(Mg++)		3,829	/ 12.2 =	313.85
9.	Sodium	(Nă+)	(Calculated)	75,296	/ 23.0 =	3,273.74
10	Rarium	(Ba++)	Not Det	ermined	•	-

Anions

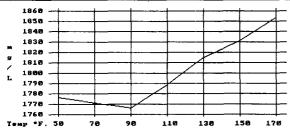
11.	Hydroxyl	(OH-)	0	/ 17.0 =	0.00
12. 13.	Carbonate Bicarbonate	(HCO ₃ -)	669	/ 30.0 = / 61.1 =	0.00 10.95
14. 15.	Sulfate Chloride	(SO42)	1,500 139,968	/ 48.8 = / 35.5 =	30.74 $3,942.76$
		(CI /		/ 33.3 -	3,942.10
16. 17.	Total Dissolv Total Iron Total Hardrey	(Fe)	229,278 7 35,782	/ 18.2 =	0.38

18. Total Hardness As CaCO₃ 35,782 19. Resistivity @ 75 F. (Calculated) 0.001 /cm.

LOGARITHMIC WATER PATTERN *meq/L.



Calcium Sulfate Solubility Profile



PROBABI COMPOUND	E MINERAL EQ. WT. X		
Ca(HCO ₃) ₂	81.04	10.95	887
CaSO ₄	68.07	30.74	2,092
CaCl ₂	55.50	357.12	19,820
$Mg(HCO_3)_2$	73.17	0.00	0
MgSO ₄	60.19	0.00	0
${\tt MgCL}_2$	47.62	313.85	14,946
NaHCO3	84.00	0.00	0
NaSO4	71.03	0.00	0
NaCl *Milli	58.46 3 Equivalen		

WATER ANALYSIS REPORT

SAMPLE

Oil Co. : Willow Pipeline

Dissolved Gasses

Lease : O'Brien 18

Salesman:

Well No.: # 3

Sample Loc.

Formation

MG/L

Date Analyzed: 01-July-1996

EQ. WT.

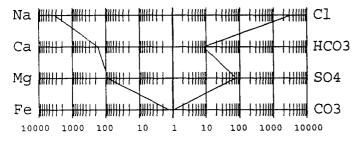
*MEQ/L

ANALYSIS

1.	На			5.930
2.	pH Specific Gravity CaCO ₃ Saturation	60/60	F.	1.135
3.	CaCO ₃ Saturation	Index	@ 80	F0.026
	3		@ 140	F. +1.074

4. 5. 6.	Hydrogen Sul Carbon Dioxi Dissolved Ox	fide .de tygen	Not D	t Present etermined etermined				
7. 8. 9.	ations Calcium Magnesium Sodium	(Ca++) (Mg++) (Na+) (Ba++)	(Calculated)	3,307 1,033 72,610	//	20.1 12.2 23.0	= = =	164.53 84.67 3,156.96
	Barium <u>nions</u> Hydroxyl	(Ba++)	NOT D	etermined 0	/	17.0	=	0.00
12. 13. 14. 15.	Hydroxyl Carbonate Bicarbonate Sulfate Chloride	(CO ₃ =) (HCO ₃ -) (SO ₄ =) (Cl-)		0 483 3,500 117,973		30.0 61.1 48.8 35.5	=======================================	0.00 0.00 7.91 71.72 3,323.18
16	Total Dissol	ved Sol: (Fe) ess As Ca @ 75 F.		198,906 23 12,511 0.001 /cm.		18.2		1.26

LOGARITHMIC WATER PATTERN *meg/L.



Calcium Sulfate Solubility Profile

:	3798 -	+	+				-+-	
:	3784 —	 					_	-/ -
;	3778 —	 		 -				/- -
_	3772 —						/-	
α ;	3766 -	 						
, ;	3760	 					7	
T.	3754 -	 	===				/ -	
	3748 —			7		-17		
	3742 —	1				/		
	3736 —		_					
	3730 — P °F. S	50	78	90	110	130	158	170

PROBABI	E 1	MINERA	\L	COMPOSI	T:	ION
COMPOUND	EQ.	. WT.	X	*meq/L	=	mg/L

COMPOUND	EQ. WT.	X *meq/L	= mg/L.
Ca (HCO3) 2	81.04	7.91	641
CaSO ₄	68.07	71.72	4,882
CaCl ₂	55.50	84.90	4,712
Mg(HCO ₃) ₂	73.17	0.00	0
MgSO4	60.19	0.00	0
${\tt MgCL}_2$	47.62	84.67	4,032
NaHCO3	84.00	0.00	0
NaSO4	71.03	0.00	0
NaCl *Milli		3,153.61 ents per 1	· ·

WATER ANALYSIS REPORT

SAMPLE

Oil Co. : Willow Pipeline

Lease : O'Brien Well No.: 18-5

Salesman:

Sample Loc.

Date Reported: 21-May-1996

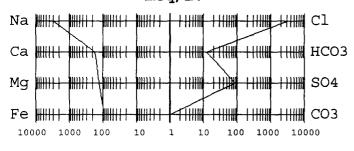
Date Sampled :

ANALYSIS

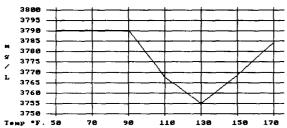
1. pH 2. Specific Gravity 60/60 F. 1.128 3. CaCO₃ Saturation Index @ 80 F. +0.879 @ 140 F. +1.869

issolved Gass	es		MG/L	ΕÇ	IW .	•	*MEQ/L	
Carbon Dioxi	.de	Not I	etermined					
	(~)			, .				
Calcium Magnesium Sodium Barium	(Ca++) (Mg++) (Na+) (Ba++)	(Calculated) Not I	3,307 1,520 66,880 etermined	/ 2	20.1 2.2 23.0	= =	164.53 124.59 2,907.83	
nions								
Carbonate Bicarbonate Sulfate	(OH-) (CO3=) (HCO3-) (SO4=) (C1=)		0 0 722 4,100 109,975	//364/3	7.0 30.0 51.1 88.8 55.5	= = = =	0.00 0.00 11.82 84.02 3,097.89	
Total Dissol Total Iron Total Hardne Resistivity	ved Soli (Fe) ss As Ca @ 75 F.	ids aCO3 (Calculated)	186,504 1,600 14,513 0.010 /cm.				87.91	
	Hydrogen Sul Carbon Dioxi Dissolved Ox ations Calcium Magnesium Sodium Barium nions Hydroxyl Carbonate Bicarbonate Bicarbonate Sulfate Chloride Total Dissol Total Iron Total Hardne	Calcium (Ca++) Magnesium (Mg++) Sodium (Na+) Barium (Ba++) nions Hydroxyl (OH-) Carbonate (CO3=) Bicarbonate (HCO3-) Sulfate (SO4=) Chloride (Cl-) Total Dissolved Solitate (Fe) Total Hardness As Ca	Hydrogen Sulfide Carbon Dioxide Dissolved Oxygen Ations Calcium (Ca++) Magnesium (Mg++) Sodium (Na+) Barium (Ba++) Not D Not D Not D	Hydrogen Sulfide Carbon Dioxide Dissolved Oxygen Ations Calcium (Ca++) Magnesium (Mg++) Sodium (Na+) Sodium (Ba++) Mot Determined (Calculated) (C	Hydrogen Sulfide Carbon Dioxide Dissolved Oxygen Ations Calcium (Ca++) Magnesium (Mg++) Sodium (Na+) Sodium (Ba++) Matherian (Ba++) Not Determined Not Determined 3,307 1,520 1,	Hydrogen Sulfide	Hydrogen Sulfide Carbon Dioxide Dissolved Oxygen Ations Calcium (Ca++) Magnesium (Mg++) Sodium (Na+) Barium (Ba++) Mions Hydroxyl (OH-) Carbonate (CO3=) Bicarbonate (HCO3-) Sulfate (SO4=) Chloride (Cl2) Total Dissolved Solids Total Iron (Fe) Total Hardness As CaCO3 Not Determined Not Present Not Determined 3,307 / 20.1 = 1,520 / 12.2 = 66,880 / 23.0 = 66,8	Hydrogen Sulfide Carbon Dioxide Dissolved Oxygen Calcium Ca++) Magnesium Mod Determined Mod Determined Mod Determined Ations Calcium (Ca++) Magnesium Mod Ma++) Sodium Not Determined Mod Ma++) Sodium Mod Ma++) Not Determined Mod Ma++) Not Determined Mod Ma++ M

LOGARITHMIC WATER PATTERN *meq/L.



Calcium Sulfate Solubility Profile



PROBABI COMPOUND	LE MINERAL EQ. WT. X	COMPOSIT	
Ca(HCO ₃) ₂	81.04	11.82	958
CaSO ₄	68.07	84.02	5,719
$CaCl_2$	55.50	68.69	3,813
$Mg(HCO_3)_2$	73.17	0.00	0
MgSO ₄	60.19	0.00	0
MgCL ₂	47.62	124.59	5,933
NaHCO3	84.00	0.00	0
NaSO4	71.03	0.00	0
NaCl *Milli		2,904.60 1 hts per Li	•

Permian Treating Chemicals WATER ANALYSIS REPORT

SAMPLE

Oil Co. : Willow Pipeline

Lease : O'Brien Well No.: 18-6

Salesman:

Sample Loc. Date Reported: 21-May-1996

Date Sampled :

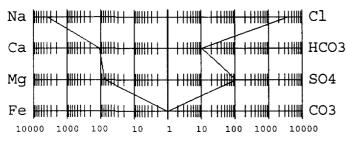
ANALYSIS

1. 2. 3.	pH Specific Gr CaCO ₃ Satur	avity 60 ation In	6.470 0/60 F. 1.149 ndex @ 80 F. +0.606 @ 140 F. +1.886		
	issolved Gas		MG/L	EQ. WT.	*MEQ/L
4. 5.	Hydrogen Su Carbon Diox Dissolved C	ılfide :ide xygen	Not Present Not Determined Not Determined		
C	Cations				
7. 8. 9. 10.	Calcium Magnesium Sodium Barium	(Ca++) (Mg++) (Na+) (Ba++)	2,104 912 (Calculated) 82,817 Not Determined	/ 20.1 = / 12.2 = / 23.0 =	104.68 74.75 3,600.74
P	nions				
11.	Hydroxyl	(OH^-)	0	/ 17.0 =	0.00

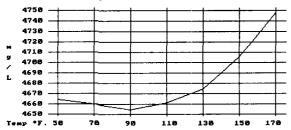
11. 12. 13. 14. 15.	Hydroxyl Carbonate Bicarbonate Sulfate Chloride	(OH ⁻) (CO ₃ =) (HCO ₃ -) (SO ₄ =) (C1-)	620 5,100 129,97		0.00 0.00 10.15 104.51 3,661.15
16. 17. 18.	Total Dissol Total Iron Total Hardne	ved Solids (Fe) ess_As_CaÇO3_	221,524 13 9,008	3 / 18.2 =	0.71

Resistivity @ 75 F. (Calculated) 0.001 /cm. 19.

LOGARITHMIC WATER PATTERN *meg/L.



Calcium Sulfate Solubility Profile



PROBABI COMPOUND	E MINERAL EQ. WT. X		
Ca(HCO ₃) ₂	81.04	10.15	822
CaSO ₄	68.07	94.53	6,435
CaCl ₂	55.50	0.00	0
$Mg(HCO_3)_2$	73.17	0.00	0
MgSO ₄	60.19	9.98	601
${\tt MgCL}_2$	47.62	64.78	3,085
NaHCO3	84.00	0.00	0
${\tt NaSO_4}$	71.03	0.00	0
NaCl *Milli		,596.38 2 ts per Li	•

WATER ANALYSIS REPORT

SAMPLE

Oil Co. : Willow Pipeline

Lease : O'Brien Well No.: 19-1

Salesman:

Sample Loc. : Date Reported: 21-May-1996 Date Sampled :

ANALYSIS

1. pH 2. Specific Gravi 3. CaCO ₃ Saturati	5.8 ty 60/60 F. 1.1 on Index @ 80 F.	.60 +1.238			
Dissolved Gasses		MG/L	EQ. WT.	*MEQ/L	
4. Hydrogen Sulfi 5. Carbon Dioxide 6. Dissolved Oxyg	de Not en Not	ot Present Determined Determined			
8. Magnesium (M	(a++) (g++) (a+) (Calculated) (a++) Not	16,032 / 5,349 / 62,789 / Determined	20.1 = 12.2 = 23.0 =	797.61 438.44 2,729.96	
Anions 11. Hydroxyl (Control of the control of the	CO ₃ -) O4-) 11-)	0 / 0 / 527 / 700 / 139,968 / 225,365 1,300 / 62,055 0.001 /cm.	17.0 = 30.0 = 61.1 = 48.8 = 35.5 = 18.2 =		
LOGARITHMIC WA /pem*	TER PATTERN L.	PROBAB COMPOUND	LE MINERA EQ. WT.	L COMPOSII X *meq/L =	NON mg/L.
Na	 	Ca (HCO ₃) ₂	81.04	8.63	699
Ca	HIII HC03	CaSO4	68.07	14.34	976
Mg	########### SO4	CaCl ₂	55.50	774.64	42,993
	HIIII 1111 1111 CO3	Mg(HCO ₃) ₂	73.17	0.00	0
10000 1000 100 10 1		MgSO ₄	60.19	0.00	0

Calcium Sulfate Solubility Profile

934 928			1		1
922	\Box				
916			 	4	
916			 		
904		┪	 /	+	+
898	 	+	 4		
892 886	T				
880					

COMPOUND	EQ. WT.	x *med/r	= mg/L.
Ca(HCO ₃) ₂	81.04	8.63	699
CaSO4	68.07	14.34	976
CaCl ₂	55.50	774.64	42,993
$Mg(HCO_3)_2$	73.17	0.00	0
MgSO ₄	60.19	0.00	0
${\tt MgCL}_2$	47.62	438.44	20,879
NaHCO3	84.00	0.00	0
NaSO ₄	71.03	0.00	0
NaCl *Milli		2,729.68 ents per I	-

Permian Treating Chemicals WATER ANALYSIS REPORT

SAMPLE

Oil Co. : Willow Pipeline

Lease : O'Brien Well No.: 19-4

Salesman:

Sample Loc.

Date Reported: 21-May-1996

1.

Date Sampled :

ANALYSIS

1. pH 2. Specific Gravity 60/60 F. 1.169 3. CaCO₃ Saturation Index @ 80 F. +1.539 @ 140 F. +3.479

Ē	issolved Gasses	MG/L	EQ. WT.	*MEQ/L
4. 5. 6.	Hydrogen Sulfide Carbon Dioxide Dissolved Oxygen	Not Present Not Determined Not Determined		

Cations

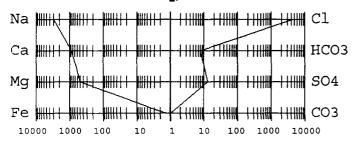
7.	Calcium	(Ca++)	16,733	/ 20.1 =	832.49
8.	Magnesium	(Mg++)	5,713	/ 12.2 =	468.28
9.	Sodium	(Mg++) (Na+)	(Calculated) 67,712	/ 23.0 =	2,944.00
10.	Barium	(Ba++)	Not Determined	•	•

Anions

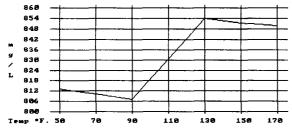
Allions		
11. Hydroxyl (OH ⁻) 12. Carbonate (CO ₃ ⁼) 13. Bicarbonate (HCO ₃ ⁻) 14. Sulfate (SO ₄ ⁼) 15. Chloride (Cl ⁻)	0 / 17.0 = 0 / 30.0 = 473 / 61.1 = 600 / 48.8 = 149,966 / 35.5 =	0.00 0.00 7.74 12.30 4,224.39
16. Total Dissolved Solids 17. Total Iron (Fe) 18. Total Hardness As CaCO2	241,197 23 / 18.2 =	1.26

18. Total Hardness As CaCO3 65,308 19. Resistivity @ 75 F. (Calculated) 0.001 /cm.

LOGARITHMIC WATER PATTERN *meq/L.



Calcium Sulfate Solubility Profile



PROBABI COMPOUND	E MINERAL EQ. WT. X		
Ca(HCO3)2	81.04	7.74	627
CaSO ₄	68.07	12.30	837
CaCl ₂	55.50	812.45	45,091
$Mg(HCO_3)_2$	73.17	0.00	0
MgSO ₄	60.19	0.00	0
${\tt MgCL}_2$	47.62	468.28	22,299
NaHCO3	84.00	0.00	0
NaSO ₄	71.03	0.00	0
NaCl *Milli	58.46 2 Equivalen	-	-

WATER ANALYSIS REPORT

SAMPLE

Oil Co. : Willow Pipeline

Lease : O'Brien

Well No.: 25-5 Salesman:

Sample Loc.

Date Reported: 21-May-1996

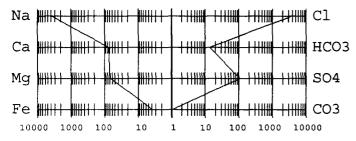
Date Sampled :

ANALYSIS

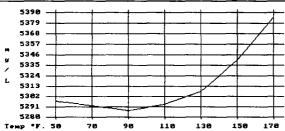
pH Specific Gravity 60/60 F. CaCO₃ Saturation Index @ 6.210 1.153 @ 80 F. +0.300 @ 140 F. +1.580

D	issolved Gass	es	6 110 1. 1	MG/L	EQ. WT	. *MEQ/L
4. 5. 6.	Hydrogen Sul Carbon Dioxi Dissolved Ox	fide de xygen	Not D	t Present Determined Determined		
C	ations					
7. 8. 9. 10.	Calcium Magnesium Sodium Barium	(Ca++) (Mg++) (Na+) (Ba++)	(Calculated)	1,503 790 84,446 Determined	/ 20.1 = / 12.2 = / 23.0 =	74.78 64.75 3,671.57
A	nions					
11. 12. 13. 14. 15.	Hydroxyl Carbonate Bicarbonate Sulfate Chloride	(OH-) (CO3=) (HCO3=) (SO4=)		0 0 781 5,100 130,970	/ 17.0 = / 30.0 = / 61.1 = / 48.8 = / 35.5 =	0.00 0.00 12.78 104.51 3,689.30
16.	Total Dissol	ved Soli (Fe) ess As Ca @ 75 F.	lds 1CO3 (Calculated)	223.590	/ 18.2 =	

LOGARITHMIC WATER PATTERN *meg/L.



Calcium Sulfate Solubility Profile



PROBABI	LE M	INER	ΑL	COMPOSI	T	ON
COMPOUND	EQ.	WT.	X	*meq/L	=	mg/L

COMPOUND	EQ. WT. X	<pre>X *meq/L =</pre>	mg/L.
$Ca(HCO_3)_2$	81.04	12.78	1,036
CaSO ₄	68.07	61.99	4,220
CaCl ₂	55.50	0.00	0
$Mg(HCO_3)_2$	73.17	0.00	0
MgSO ₄	60.19	42.51	2,559
${\tt MgCL}_2$	47.62	22.24	1,059
NaHCO3	84.00	0.00	0
NaSO ₄	71.03	0.00	0
NaCl *Milli	58.46 3	3,667.06 2 nts per L	-

CHECKLIST for ADMINISTRATIVE INJECTION APPLICATIONS Operator: WILLOW PIPELINE CO. Well: O'BRIEN 19-8 Contact: BRIAN WOODS Title: PERRITS WEST (AGENT) Phone: 466.8120 DATE IN 9.8.97 RELEASE DATE 9.23.97 DATE OUT 10.20.97 WATERFLOOD Expansion Initial Proposed Injection Application is for: ✓ Secondary Recovery Pressure Maintenance Original Order: R-____ SALT WATER DISPOSAL Commercial Well SENSITIVE AREAS WIPR ___ Capitan Reef Data is complete for proposed well(s)? 465 Additional Data Req'd ______ AREA of REVIEW WELLS ← Total # of AOR # of Plugged Wells Tabulation Complete Schematics of P & A's ___ Cement Tops Adequate ____ AOR Repair Required INJECTION FORMATION Source of Water or Injectate ARIA PRODUCTION **PROOF of NOTICE** Copy of Legal Notice Information Printed Correctly Correct Operators Copies of Certified Mail Receipts Set to Hearing Date MO Objection Received NOTES: APPLICATION QUALIFIES FOR ADMINISTRATIVE APPROVAL? 4/5 COMMUNIC

ATION WITH CONTACT PERSON:						
1st Contact:	Telephoned	Letter	Date	Nature of Discussion		
2nd Contact:	Telephoned	Letter	Date	Nature of Discussion		
2-10	Tolonkonad	1	Data	Natura of Discussion	-	