ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

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

FORM C-108
Revised 7-1-81

APPLICATION FOR AUTHORIZATION TO INJECT

I. PURPOSE: ____ Secondary Recovery ____ Pressure Maintenance XXX ____ Disposal ____ Storage
Application qualifies for administrative approval? XXX Yes ___ No

II. OPERATOR: WILLOW PIPELINE COMPANY

ADDRESS: 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 XXX ___ 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/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: Brian Wood 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. IN OCD FILES

DISTRIBUTION: Original and one copy to Santa Fe with one copy to the appropriate District Office

WELL DATA

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.

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.

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 [illegible]

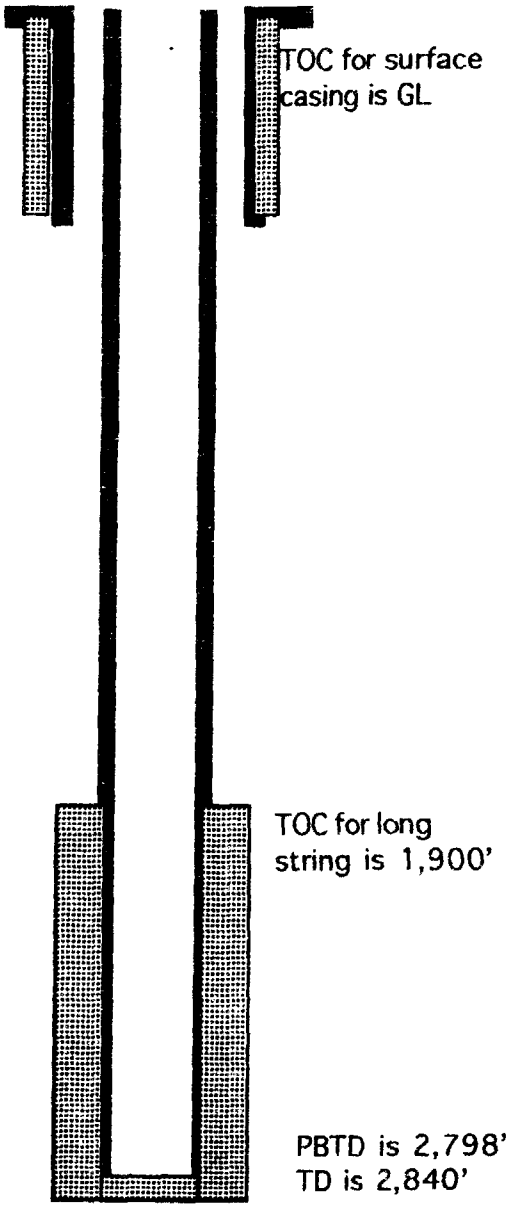
OPERATOR Willow Pipeline Company

LEASE O'Brien Fee 19

WELL NO. O'Brien Fee 19-8

FOOTAGE LOCATION 330' FSL & 990' FEL

SECTION 19 TOWNSHIP 8s RANGE 29e



Well Construction Data

Surface Casing

Size 8-5/8" • Cemented with 4 cu yd (Redimix) sx.

TOC Surface feet determined by Visual & log

Hole Size 11" (0' - 120')

Intermediate Casing

Size ____ • Cemented with ____ sx.

TOC ____ feet determined by ____

Hole Size ____

Long String

Size 5-1/2" • Cemented with 125 (50/50 Poz) sx.

TOC 1,900' feet determined by Bond Log

Hole Size 7-7/8" (0' - 2,840')

Total Depth 2,840' (PBTD 2,798')

Injection Interval

2,680' feet to 2,798' feet

(perforated or open-hole; indicate which)

INJECTION WELL DATA SHEET

Tubing Size 2-3/8" 6.5# lined with steel (plastic lined) set in a
(type of internal coating)
Baker Hi-Par packer at 2,580' feet

Other type of tubing / casing seal if applicable N/A

Other Data

1. Is this a new well drilled for injection? ____ Yes __X__ No

   If no, for what purpose was the well originally drilled? Drilled & produced as San Andres oil well. SI since at least 3-96 due to poor economics.

2. Name of the injection formation San Andres dolomite

3. Name of Field or Pool (if applicable) Twin Lakes San Andres Associated

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail, i.e., sacks of cement or plug(s) used. San Andres perforated between 2,722' & 2,724 and 2,680' & 2,686' with 4 shots per foot.

5. 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' north, produces from that zone. Only other oil or gas pool within 2 mile radius.

Willow Pipeline Company
O'Brien Fee 19 #8
330' FSL & 990' FEL
Sec. 19, T. 8 S., R. 29 E.
Chaves County, New Mexico

I. Purpose is water disposal.

II. 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 ≈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 ≈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.

OPERATOR	WELL	LOCATION	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

Willow Pipeline Company
O'Brien Fee 19 #8
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Sec. 19, T. 8 S., R. 29 E.
Chaves County, New Mexico

Pelto	TLSAU 31	SENW 31-8s-29e	P&A
Pelto	O'Brien N-3	SWNW 32-8s-29e	P&A
Sweeney	O'Brien 2	NWSE 32-8s-29e	P&A

OPERATOR	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:

AREA	LESSEE
N2 19-8s-29e	N. Dale Nichols
S2 19-8s-29e	Willow Pipeline Company
SW4 20-8s-29e	Stevens Operating
NW4 20-8s-29e	Joseph Ortschid (Open-Lessor)
W2 29-8s-29e	Pelto Oil
NE4, N2NW4, & SWNW 30-8s-29e	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.

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

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):

Parameter	K-1	K-3	K-4	K-5	13-1	18-3	18-5	18-6	19-1	19-4	25-5
pH	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 100,000

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	Top	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.