AD-756 643

SURVEY OF INDUSTRIAL WASTE INJECTION WELLS. VOLUME III

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Prepared for:

Geological Survey
Advanced Research Projects Agency

June 1972

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SURVEY OF INDUSTRIAL WASTE INJECTION WELLS

VOLUME III

by
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June 1972

Sponsored by the
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Contract No. 14-08-0001-12280
Under ARPA Order No. 1684

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WELL FILE NUMBER WDW-1 (STATE) Tx-1 (UMR)

I. Operating Company & General Well Location

Monsanto Chemical Co.
1401 S. Coast Bldg.
Houston, Texas

II. Well location (legal description)

Site: Perry & Austin League 2, AB. 107, 10,708 ft. west of the east line & 4,179 ft. north of the south line of the Monsanto Plant site, Brazoria Co., Texas.

III. History; system planning, construction & operation.

Drilling was completed on November 29, 1961. Injection commenced on August 15, 1970 and the well is still in operation. This well is to be used alternately with Tx-2 in the disposal operation.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on the west Gulf Coastal Plain and the regional dip in this area is 10 to 40 feet per mile. The stratigraphic section consists of sands, clays, and shales of Tertiary and Quaternary ages.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included--yes ____; no X).

(Ground elevation _____) (Total well depth 6413 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thick-ness	Lithologic Description
Beaumont & Lissie	Pleistocene			clay with sand
Willis Sand	Pliocene			calcareous sand
Goliad	Pliocene			sand
Lagarto Clay	Pliocene			clay with sand lenses
Oakville	Miocene			sandstone
Catahoula	Miocene			predominantly tuff with some clay and sandstone

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
Catahoula	Miocene	6098 to 6312 ft.	214 ft.	sand

D. Engineering description of injection units

1. Porosity: _____
2. Permeability: 150 to 2400 md.
3. Original Reservoir Pressure: _____
4. Reservoir Temperature: _____
5. Chemical Character of Formation Water: _____
6. Reservoir Fracture Pressure: _____

IV. Geology & Geohydrology, continued

E. Geohydrology, fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Beaumont		combined	clay	usable for municiple
Lissie		thickness	sand & gravel	water supplies
		- 1000'		

These two formations are often referred to collectively as the Gulf Coast aquifer.

F. Mineral Resources (oil and gas, coal, brines, etc.)

There are oil wells in the immediate area many of which are abandoned. All abandoned wells are adequately plugged.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing: Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface			16	in. 20ft.	
Intermed.		H-40 40lb./ft.	10 3/4	in. 2011ft.	860 sks to surface
		J-55 26lb./ft.	7	in. 6320ft.	1600 sks Pozmix + 4% Gel
Injection		J-55 4.7lb./ft.	2 3/8	in. 6174 ft.	

Other

Describe bottom hole completion method: perforated completion at 6098 ft. to 6312 ft.

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc:

3 gas valve lifts at 841.20 ft., 1256 ft., 1256 ft., & 1661.90 ft.

Packer (Baker Model D) at 3541'.

VI. Description of surface equipment

A. Holding tanks & flow lines 50,000 gal. sludge tank, pH mixing tank, and a 300,000 gal. surge tank.

B. Filters filter in feed tank, 3 pressure sand filters

C. Pumps Centrifugal - 400 gpm @ 1500 psi

D. Other

VII. Cores, samples, & Logs

A. Coring

From	5010'	to 5039'	Recovery
"	6272'	6292'	
"	6065'	6082'	
"	4619'	4651'	
"			
"			

B. Drilling Logs

____Drillers Log

____Sample log

____Drilling time

____Other:

VII. -- Cores, samples, & logs, continued

C. Other logs run

____Resistivity	____Gamma ray-neutron
____SP	____Temperature
_X_ Caliper	____Cement bond
____Other	

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Chemical manufacturing (Cumene phenol)

B. Physical & chemical Description

suspended matter	- 49 mg/l.	K	7 mg/l.
phenol	- 2,200 mg/l.	Na	74 mg/l.
COD	- 16,400 mg/l.	Cl	136 mg/l.
Oils	100 mg/l.	SO_4	- 1,890 mg/l.
Total Alkalinity	- 950 mg/l.	pH	7.5
Phosphates	1 mg/l.	Brown color	
Fe	3 mg/l.		

C. Volume 15,000 bpd

IX. Preinjection waste treatment Gravity sedimentation, pH control, and filtration

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
Injection	--	perforated zone	--

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s) July 1970 Average 77 gpm Maximum 225 gpm

" " " "

" " " "

" " " "

2. Pressure (well head X bottom hole)

Date(s) July 1970 Average 410 psi Maximum 880 psi

" " " "

" " " "

" " " "

" " " "

X. Well operation & operating history

D. Description of operating programs: This well was to be used alternately with Tx-2 in the disposal operation. However, Tx-2 was never drilled.

E. Operating problems: No operating problems have been reported.

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating procedure

XII. Economics

A. Total and unit costs of construction _____

B. Operating costs _____

XIII. Source(s) of Information and Published References _____

Texas Water Quality Board, Austin, Texas

WELL FILE NUMBER WDW-3 / STATE Tx-2 / UMR

I. Operating Company & General Well Location

Potash Company of America, well is on plant site - 5 miles north of Dumas, Texas

II. Well location (legal description)

Site: 1050 ft. from the south line and 850 ft. from the east line of Section 362, Black 44, H & TC R. R. Company Survey, five miles noth of Sumas, Moore COunty, Texas.

III. History; system planning, construction & operation.

Shamrock Oil Co. has three disposal wells in the general vicinity. Well was completed, November, 1964 and is still in operation. The total depth of the well is 1,265 ft.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on the west flank of the Anarko Basin in the Texas High Plains. The regional dip is toward the northeast. The stratigraphic sections consists of sand, shale, gypsum, and dolomite of Permian to Recent age.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes ____; no X).

(Ground elevation _____) (Total well depth 1265 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thick-ness	Lithologic Description
		0	400 ft.	sand and caliche
Red Beds	Permian	400ft.	700 ft.	shale and gypsum
Glorieta	Permian	1125ft.	500 ft.	fine sand and dolomite

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
Glorietta Fm	Permian		500 ft.	sandstone & fine grained dolomite

- injection zone 1131 ft. to 1231 ft.

D. Engineering description of injection units

1. Porosity:
2. Permeability:
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water: brackish water
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Ogallala Fm.		800 ft.	Sandstone	High TDS

F. Mineral Resources (oil and gas, coal, brines, etc.)

No mineral resources are reported in the vicinity of the disposal well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing. Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface	12 1/4"	24#/ft. J-55	8 5/8"	1057ft.	1
Intermed.					
Injection					
Other	plastic		3 1/2"	1113-1013ft.	264.4 gal.

Hydromite Cement plug

Describe bottom hole completion method: Completed by perforation at 1131' to 1231' and gravel packed.

1) 900 cu. ft. of Pozmix with 2% $CaCl_2$

V. Well design and construction, continued 4.

B. Packers, Centralizers, well head equipment, etc:

3 packers used

Well head equipment: (see attachment)

VI. Description of surface equipment

A. Holding tanks & flow lines

B. Filters

C. Pumps

D. Other

VII. Cores, samples, & Logs

A. Coring

From to Recovery

" " "

" " "

" " "

" " "

B. Drilling Logs

___Drillers Log ___Drilling time

_X_Sample log ___Other:

VII. -- Cores, samples, & logs, continued

C. Other logs run

___Resistivity ___Gamma ray-neutron

___SP ___Temperature

___Caliper ___Cement bond

___Other

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Excess waste of the conversion of potassium chloride to potassium sulfate.

B. Physical & chemical Description 20° Baume' hydrochloric acid a 31.45% HCl solution having a specific gravity of 1.1600

C. Volume Maximum - 30,000 gpd (14 gpm) 180-320,000 gal/month - Injected intermittently

IX. Preinjection waste treatment None

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s)	1966	Average	40 mpm	Maximum	50 mpm
"	1965	"	40 mpm	"	50 mpm
"	1964	"	40 mpm	"	50 mpm
"		"		"	
"		"		"	

2. Pressure (well head ____ X ____ bottom hole ____)

Date(s)		Average	Gravity	Maximum	
"		"		"	
"		"		"	
"		"		"	
"		"		"	

X. Well operation & operating history

D. Description of operating programs: _____

E. Operating problems: No problems were reported.

XI. Regulatory aspects.

A. Construction requirements _____

B. Monitoring requirements _____

C. Restrictions on operating procedure _____

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Written communication -

Texas Water Quality Board

WELL FILE NUMBER WDW-4 / STATE Tx-3 / UMR

I. Operating Company & General Well Location

E. I. Dupont deNemours & Co.
4 miles NW of
Bloomington, Texas

II. Well location (legal description)

Located on the Victoria plant site, 4100 ft. from the NW line and 18,700 ft. from the NE line of the Desiderio Garcia League, 4 mi. NW of Bloomington, Victoria County, Texas.

III. History, system planning, construction & operation.

On June 13, 1963 the well was utilized in disposal of a by-product brine from the manufacture of adipontrile, a nylon intermediate. Three other wells are being used for the same purpose on the plant site. The well was used continually except for the period of October 15, 1965 to February 18, 1966 when it was idle. Total depth - 4800 ft.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located in the west Gulf Coastal Plain and the regional dip is to the southeast at 80 ft. per mile. The stratigraphic section consists of various sediments of Teriary and Quaternary age with the Pleistocene Beaumont Clay outcropping at the well site.

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes____; no X).
(Ground elevation_____) (Total well depth 4800 ft.)
Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thick-ness	Lithologic Description
Alluvium	Recent			sand, clay and gravel
Beaumont	Pleistocene			clay
Lissie	Pleistocene			sand and gravel
Goliad	Pliocene			sand and sandstone
Lagarto	Miocene			clay
Oakville	Miocene	3000ft.	700ft.	sandstone
Catahoula	Miocene	3700ft.	500ft.	sandstone and tuff
Greta	Miocene	4200ft.	700ft.	sandstone

C. Geologic Description of injection units & possible units not in use

Rock Unit Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
Oakville ss	Miocene		700ft.	sandstone
Catahoula Tuff	Miocene		500ft.	tuff and sandstone
Greta Sand	Miocene		700ft.	sand

D. Engineering description of injection units

1. Porosity:
2. Permeability:
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Beaumont		combined	clay and sand	fresh water
Lissie		thickness-1000ft.	sand and gravel	with high TDS
				concentration

V. Mineral Resources (oil and gas, coal, brines, etc.)

No apparent mineral resources although two abandon oil wells are located in the vicinity, one of which required replugging.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & Grade	Size	Depth Set	Type & Amount of Cement
Surface	15"	J-55	10 3/4"	[illegible]	1000 sacks + 4% Gel
Intermed.		J-55	7 "	[illegible]	
Injection					
Multiple Stage Cement Job				[illegible]	[illegible]
Other tubing		4.70/ft. J-55 [illegible]	2 "	[illegible]	

Describe bottom hole completion methods:

V. Well design and construction, continued 4.

B. Packers, Centralizers, well head equipment, etc:

Bottom joint of 10 3/4" J-55 will be connected with a Centralizer

VI. Description of surface equipment

A. Holding tanks & flow lines

B. Filters

C. Pumps

D. Other

VII. Cores, samples, & Logs

A. Coring

From		to		Recovery	
3731 ft.		3736 ft.		shale and 5 ft. sand	
• 3733	•	3741	•	8 ft. sand	
• 4076	•	4081	•	5 ft. sand & shale	
• 4084	•	4091	•	10 ft. sand	
• 4094	•	4099	•	3 ft. sand	
• 4112	•	4116	•	1 ft. shale & sand	
• 4469	•	4479	•	1 ft. sand	

B. Drilling time

1 Drillers log

Sample log

Drilling time

Other:

VII. -- Cores, samples, & logs, continued

C. Other logs run

X Resistivity

X SP

X Caliper

X Other Formation density log

___ Gamma ray-neutron

___ Temperature

___ Cement bond

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

By product brine from the manufacture of adiponitrile, a brine by product.

B. Physical & chemical Description Based on composite samples:

NaCl [illegible] by wt. pH (@25°C) - 7.5 to 8.5

Copper [illegible] ppm Density - 1.12 - 1.14

Cyanide [illegible] ppm

Water remainder

Trace quantities of nitrate type organic compounds may be present. The brine is clear, normally light yellow, & will be will be injected at [illegible]°C

C. Volume [illegible] gal./year

IX. Preinjection waste treatment None

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
Injection	1 hrs.	4374ft. 4384ft.	40,000#/hr.-plant brine unacceptable
"	1/2 "	4422ft. 4432ft.	38,000 " " " "
"	3 hr.	at 4636ft.	40,000#/hr. " "
"	3 "		60,000#/hr. " "
"	3 "		119,000#/hr. " " "

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
4079' - 4124ft.	Perforation	Schlumberger - crack jet charges
4582' - 4608ft.	"	" " " "
4583' - 4608ft.	Acid	Haliburton - Super HF (10-12% HCl) with waste brine (6% HF)
In o Creta		

C. Injection rates and pressures

1. Rate

Date(s)	Average	Maximum
"	120 gpm	180 gpm
"	125 gpm	200 gpm
"	155 gpm	220 gpm
"	170 gpm	225 gpm
Dec. 1964	120 gpm	200 gpm

2. Pressure (well head X bottom hole X)

Date(s)	Average	Maximum
"	130 psi	215 psi (bottom-hole)
"		
"		
"		

X. Well operation & operating history

D. Description of operating programs: _____

E. Operating problems: The Greta Fm. in this area doesn't appear to be capable of accepting injection waste at acceptable rate or pressure due to its softness & tendency to compact with pressure. The Catahoula is capable of accepting the waste at the desired rates and pressures, and therefore the majority of the injected goes into the Catahoula.

XI. Regulatory aspects.

A. Construction requirements _____

B. Monitoring requirements _____

C. Restrictions on operating procedure _____

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

Texas Water Commission - Bulletin 6409, 1964

WELL FILE NUMBER WDW-5 / STATE Tx-4 / UIC

I. Operating Company & General Well Location

Northern Natural Gas Company

well site - 8 miles SE pf Spearman, Ochiltree County, Texas

II. Well location (legal description)

Location: 350 ft. north of the south property line and 400 ft. west of the E. property line on the 5 1/2, SW 1/4 section 23, Block R, B & B Survey, Ochiltree County, Texas. - On the Northern Natural Gas Process Plant.

III. History, system planning, construction & operation.

The well was completed May 16, 1963 the well was made to dispose of waste from a combination Natural Gas Compressor & Purification Plant. This is the only disposal well existing at the plant site (1965) while there are three water wells. The operation of the well began in January 1964. The total depth of the well is 4050 ft.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on the west flank of the Anadarko Basin in the Texas High Plains. The regional dip is toward the northwest. The stratigraphic section consists of sand, shale, dolomite, & clay of Permian to Recent age.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes____; no____).

(Ground elevation_____) (Total well depth 4050 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thick-ness	Lithologic Description

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
Brown Dolomite	Permian		3550-3650	porous dolomite with anhydrite

D. Engineering description of injection units

1. Porosity:_____
2. Permeability:_____
3. Original Reservoir Pressure:_____
4. Reservoir Temperature:_____
5. Chemical Character of Formation Water:_____
6. Reservoir Fracture Pressure:_____

IV. Geology & Geohydrology, continued

E. Geohydrology, Fresh water aquifers in vicinity

Name	Depth	Thick-ness	Character	Chemical Quality
Ogallala	400ft.	800ft.	sandstone	371 ppm Dissolved solids, total hardness 250 ppm

F. Mineral Resources (oil and gas, coal, brines, etc.)

No oil - 14 gas wells with a 2 1/2 mile radius

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface		32#,seamless H-40	8 5/8"	400ft.	700 sacks Pozmix
Intermed.		15.5#,J-55 seamless	5 1/2"	5100ft.	250 sacks Pozmix
Injection					
Other tubing			2 7/8"	3688	

Describe bottom hole completion method:

V. Well design and construction, continued 4.

B. Packers, Centralizers, well head equipment, etc: Halliburton Model D packer at 3518 Ft. – Centralizers at 823 ft., 888 ft., 971 ft., 3268 ft., 3367 ft., 3464, 3563, 3661, 3760, 3858, 3957, 4042.

VI. Description of surface equipment

A. Holding tanks & flow lines storage and surge tank with 1000 bbl. capacity

B. Filters

C. Pumps

D. Other

VII. Cores, samples, & Logs

A. Coring

From	to	Recovery
"		
"		
"		
"		
"		
"		

B. Drilling Logs

___X___ Drillers log

_____ Sample log

_____ Drilling time

_____ Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

___ Resistivity	_X_ Gamma ray-neutron
___ SP	___ Temperature
___ Caliper	___ Cement bond
_X_ Other Lateralog, Sonic Log	

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Derived from a Natural Gas compressor & purification plant.

B. Physical & chemical Description Water is from: cooling tower blowdown, water softener regeneration, boiler blowdown, scrubbers & separator blowdown, ball run receivers, & building floor drains.

Iron	1.02 ppm	Sulfate	1150 ppm
Nitrate	0.26 ppm	Chloride	470 ppm
Phosphate	2.6 ppm	Total Solids	4606 ppm (disolved)
Silca	360 ppm	pH	7.5

C. Volume average - 500 bbl/day

maximum - 1000 bb./day

IX. Preinjection waste treatment Waste water is collected in a settling basin and any oil is skimmed off.

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
Injection	.67 hrs.	@ 3688 ft.	waste - 85 barrels
Casing test	1 hr.	@ each cement seal	@ 1000 psi

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
@ 3688 ft.	Acidization	required 1400 psi to break formation

C. Injection rates and pressures

1. Rate

Date(s)	Average	Maximum
initial	14.8 gpm	
Dec. 1964	7.7 gpm	3.4 to 14.8 gpm
"	"	"
"	"	"
"	"	"

2. Pressure (well head _____ bottom hole _____)

Date(s)	Average	Maximum
"	"	"
"	"	"
"	"	"
"	"	"

X. Well operation & operating history

D. Description of operating programs: _____

E. Operating problems: No problems were reported.

XI. Regulatory aspects.

A. ~~Construction~~ Casing requirements Prosal requirement: 1 hr. casing test at 1000 psig at each cement seal

B. ~~Monitoring~~ Cementing requirements Same as above

C. Restrictions on operating procedure _____

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER [illegible] [illegible]

I. Operating Company & General Well Location

Pan American Petroleum Corporation - West Yantis Plant, 4 1/2 miles northwest of Yantis, Wood County, Texas.

II. Well location (legal description)

(Plat included in Texas Water Commission report) well site: on the plant site, 5175 feet from the East line and 1935 ft. from the north line of the [illegible] Survey, A-[illegible], 4 1/2 miles N. W. of Yantis, Wood Co., Texas.

III. History, system planning, construction & operation.

This injection commenced in May, 1961 and is still in operation. The total well depth is [illegible] ft.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on the west flank of the East Texas Embayment. The [illegible] section consists primarily of sands and clays of [illegible] and Tertiary age. Alluvium covers the land surface at the well site. The regional dip is to the southeast.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well
Rock Out. (Geologic Column included yes___; no X).
(Ground elevation________) (Total well depth 5721 ft.)
Datum for depth measurement Ground Level

Name	Age	Depth (Top)	Thickness	Lithologic Description

C. Geologic Description of injection units & possible units not in use

Rock Outs

Name	Age	Depth (Top)	Thickness	Character and Areal Distribution
Woodbine Group			4775'-5102'	medium grained porous sand

D. Engineering description of injection units

1. Porosity:
2. Permeability: 500 md. from core samples
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure

IV. Geology & Geohydrology, continued

E. Geohydrology, fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Wilcox Group		base at 350 ft.	Sand	

F. Mineral Resources (oil and gas, coal, brines, etc.)

Oil and gas occurs in the area. The extent is not known. All wells are stated to be sufficiently plugged.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing: Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface	[illegible]		10 3/4"	460'	ground level (top of surface
Intermed.	[illegible]		7 "	4700'	970 sacks
Injection					
[illegible] tubing	[illegible]	plastic	4 1/2"	4700'	

Describe bottom hole completion method:

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: Packer set just above woodbine sand at 4700 ft. Perforations were made in 7 in. casing from 5040 to 5090 ft.

VI. Description of surface equipment

A. Holding tanks & flow lines

B. Filters

C. Pumps

D. Other

VII. Cores, samples, & Logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

____ Drillers Log

____ Sample log

____ Drilling time

____ Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

____Resistivity ____Gamma ray-neutron

____SP ____Temperature

____Caliper ____Cement bond

____Other_____

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Cooling tower blowdown and boiler blowdown

B. Physical & chemical Description Fresh water with dissolved minerals at 5 times their original concentration plus chromates and phosphates. Total dissolved solids will probably not exceed 8,000 ppm.

C. Volume average 3500 barrels per day

IX. Preinjection waste treatment None

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s) _____ Average 100 pgm Maximum 160 gpm

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

2. Pressure (well head X bottom hole _____)

Date(s) _____ Average 145 psi Maximum 300 psi

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

X. Well operation & operating history

D. Description of operating programs: _____

E. Operating problems: No problems were reported.

XI. Regulatory aspects.

A. Construction requirements _____

B. Monitoring requirements _____

C. Restrictions on operating procedure _____

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER WDW-7 (STATE) Tx-6 (UMR)

I. Operating Company & General Well Location

Western Ammonia Corporation, 2 miles SE of Dimmit, Castro County, Texas.

II. Well location (legal description)

Well location: NE Corner of section 22, Block 22, Block M-10-A approximately 2 miles SE of Dimmit, Costro County, Texas. Flat, featureless topography (plot included in the Texas Water Commission report).

III. History; system planning, construction & operation.

Previously, waste was placed into unlined surface pits. This is the only disposal well in the Santa Rosa ss but oil companies have been injecting brine into it for some time.

This well was completed before October, 1964 when it was permitted. Injection commenced in August, 1964 and is still in operation. The total well depth is 4,600 ft.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is approcimately 60 miles NE of the axis of a large syncline which is associated with the Matador Arch. The Pliocene Ogallala formation outcrops in the area. The strata are of Upper Permian to Recent age.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes___; no X).

(Ground elevation_____) (Total well depth 4600 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
Ogallala	Pliocene			sandstone
Red Beds	Pliocene			red & gray shale
Chinle	Triassic			sand & gravel
Santa Rosa	Triassic			sandstone

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Santa Rosa	Triassic		440ft.	sandstone with silt

D. Engineering description of injection units

1. Porosity: 10%
2. Permeability:
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water: 25,000 ppm dissolved solids, of which 20,000 ppm is Na and Cl ions.
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Ogallala	Pliocene	350 to 425	thick, clay, silt sand, gravel, claiche	

F. Mineral Resources (oil and gas, coal, brines, etc.)

Extensive oil production in the area & numerous deep oil tests.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing: Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface	14"	30.33#/ft.	14"	417ft.	aka Pozmic-surface
Intermed.	12 1/2"	J-55 36lb/ft.	9 5/8"	1082ft.	25 Gel 300 aka Pozmix surface
Injection					
Other tubing	12 1/2"	2.1#/ft.	fiberglass-3 in.	-930 ft.	

Describe bottom hole completion method:

V. Well design and construction, continued 4.

B. Packers, Centralizers, well head equipment, etc: Baker tension packer set at 930 ft. 55 gallons of Dowell "Corbon" corrosive inhibitor was used on the tubing-casing annulus

VI. Description of surface equipment

A. Holding tanks & flow lines

B. Filters

C. Pumps

D. Other

VII. Cores, samples, & Logs

A. Coring

From_____ to_____ Recovery_____

"

"

"

"

"

B. Drilling Logs

____Drillers log

____Sample log

____Drilling time

____Other:_____

VII. -- Cores, samples, & logs, continued

C. Other logs run

____Resistivity
____SP
____Caliper
____Other

X Gamma ray-neutron
____Temperature
____Cement bond

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Cooling tower blowdown and water-treating plant waster.

B. Physical & chemical Description

SiO_2	- 108 ppm	F	5.6	ppm	Total hardness - 620
Ca	- 125 ppm	NO_3	5.5	ppm	Acidity as $CaCO_2$ - 154
Mg	- 75 ppm	NH_3	22	ppm	Spec. Conductance - 2,950
Na	- 280 ppm	CrO_4	22.3	ppm	pH - 3.0
K	- 50 ppm	TDS	- 2,300 ppm		
SO_4	- 1500 ppm				
Cl	- 46 ppm				

C. Volume

IX. Preinjection waste treatment

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results

C. Injection rates and pressures

1. Rate

Date(s)	Average	Maximum
Sept. 1964	30 gpm	40 gpm
April 1965	50 gpm	

2. Pressure (well head ~~Inj. Oper.~~ X bottom hole)

Date(s)	Average	Maximum
	270 psi	450 psi

X. Well operation & operating history

D. Description of operating program: _____

E. Operating problems: Possible water quality problems. The waste might reach the aquifers or fluids formation by migration upward, channeling of injection fluids behind the casing, development of a pressure gradient or leakage through old wells or seismic holes.

XI. Regulatory aspects.

A. Construction requirements: _____

B. Monitoring requirements: _____

C. Restrictions on operating procedure: _____

VII. Economics

A. Total and unit costs of conservation

B. Operating costs

VIII. Source(s) of information and technical references

Texas Water Quality Board

WELL FILE NUMBER ~~WW-8~~ Tx-7 ~~Unk~~

I. Operating Company & General Well Location.

Celanese Chemical Corporation, 7 1/2 miles SW of Bay City, Matagorda County, Texas

II. Well location (legal description)

Location: 2590 ft. south & 2420 Ft. west of the northwest corner of Celanese Chem. Co. property in the James Moore League, A-62, Matagorda County, Texas.

III. History, system planning, construction & operation.

Previous to the disposal will, holding pond were used to dispose of water liquid, also a large rice field was used. The well was completed and began operation in August, 1964 and is operating to the present time. The total well depth is 3,750 ft.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located in the west Gulf Coastal Plain and the regional dip in this area is 30 feet per mile to the east. The stratigraphic section consists of sand, clay, and shale of Tertiary and Quaternary ages with the Pleistocene Beaumont Clay outcropping at the well site.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes____; no X).

(Ground elevation_____) (Total well depth 3750 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thick-ness	Lithologic Description
Beaumont	Pleistocene			clay with sand
Lissie	Pleistocene			sand with shale
---	Tertiary	1300ft.	11000ft.	sand, clay, and shale

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
---	Tertiary		11000ft.	well sorted, fine grained sand - considerable areal extent

* injection zone - 3400ft. to 3600ft. - from ground surface

D. Engineering description of injection units

1. Porosity: 30 - 35%
2. Permeability:
3. Original Reservoir Pressure: 1500 psi
   fluid static head - 3,450 ft.
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Beaumont Clay-Pleistocene			sand, clay, shale	over 400,000 gpy
Lissie Fm	-	"	sand, clay, shale	over 400,000 gpy
			municipal use	-- small sodium bicarbonate content

F. Mineral Resources (oil and gas, coal, brines, etc.)

There are oil and gas wells in the area. Some of these are produced and some are abandon and plugged

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing: Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface		J-55	10 3/4in.	1500ft.	
Intermed.		J-55	7 5/8in.	3750in.	
Injection		J-55	5 1/2in.	3600in.	
Other					

Describe bottom hole completion method:

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: 40 - 7 inch wall scratchers

VI. Description of surface equipment

A. Holding tanks & flow lines

B. Filters

C. Pumps

D. Other

VII. Cores, samples, & Logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

____Drillers Log ____Drilling time

____Sample log ____Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

____Resistivity	____Gamma ray-neutron
____SP	____Temperature
____Caliper	____Cement bond

____Other_____

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Cooling tower and boiler waste

B. Physical & chemical Description Sp. Grav. = 1.008

pH	7.5	Na	- 2940 ppm
Acidity	18,200mg/l.	SO_4	- 69 ppm
Suspended solids-.45 microns		Total hardness - 340 ppm	
TDS	660mg/l.	Specific Conductance 10,280 ppm	
Cl	1950 ppm		
Ca	69 ppm	Waste effluent is dark brown	
Mg	41 ppm	with a strong purgent odor	

C. Volume 417,000 to 576,000 gpd

IX. Preinjection waste treatment None

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s)	Jan. 1965	Average	170 gpm	Maximum	180 gpm
"		"	160 gpm	"	198 gpm
"		"		"	
"		"		"	
"		"		"	

2. Pressure (well head 175 psi bottom hole 200 psi)

Date(s)		Average		Maximum	
"		"		"	
"		"		"	
"		"		"	
"		"		"	

X. Well operation & operating history

D. Description of operating programs: _____

E. Operating problems: None reported

XI. Regulatory aspects.

A. Construction requirements _____

B. Monitoring requirements _____

C. Restrictions on operating procedure _____

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER WDW-9 (STATE) Tx-8 (UIC)

I. Operating Company & General Well Location

Atlantic Refining Company
six miles NE of Port Arthur
Jefferson County, Texas

II. Well location (legal description)

Site - 6 miles NE of Port Arthur, Jefferson County in the Hiram Brown Survey, A-6 Relatively flat area - maximum relief - 5 ft.

III. History; system planning, construction & operation.

Well was completed in September 1964 at a depth of 3,417 ft. The well is presently not in use. It was shut down May 11, 1966.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on Gulf Coastal Plain where sands, clays, and shales of Miocene to Pleistocene age make up the stratigraphic section. The regional dip at the well site is 10 feet per mile.

IV. Geology & Geohydrology, continued 2.

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes___; no X).

(Ground elevation_____) (Total well depth 3417 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thick-ness	Litholoric Description
Beaumont Clay	-Pleistocene-	outcrops in area-		alternating beds of sand, silt clay
Lissie Fm	-Pliocene	-base 1500 ft.		-
- - -	-Miocene	-base 8500 ft.		-undiff. sed. of sand, sandstone shale, silt, & clay-strike NE dip SE

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
Catahoula	-Miocene		3500 ft.	unconsolidated sands which are large in areal extent.

D. Engineering description of injection units

1. Porosity:_____
2. Permeability:_____
3. Original Reservoir Pressure:_____
4. Reservoir Temperature:_____
5. Chemical Character of Formation Water:_____
6. Reservoir Fracture Pressure:_____

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Lissie Fm.	600ft.	600ft.	sand and gravel	

F. Mineral Resources (oil and gas, coal, brines, etc.)

There are no oil wells near the site but there are numerous producing gas wells in the area.

V. Well design and construction [Diagram attached]

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface	8 3/4"	J-55 23lb/ft.	7"	2036ft.	450 sks Lite-wat. to surface
Interred.					
Injection					
Other tubing		6 1/2" Fiberglass	2 1/2"		

Describe bottom hole completion method:

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: Otis type RA packer at 1455 ft. 5" OD guide at 534 ft. Plug at 2907 ft. Abrasive jetted perforations at 2750; 2763; 2826; and 2834.

Well Head Equipment: Equipped with pressure gauge and new Teflon lined ball valve.

VI. Description of surface equipment

A. Holding tanks & flow lines surge tank

B. Filters

C. Pumps 2 pumps

D. Other

VII. Cores, samples, & Logs

A. Coring

From	to	Recovery

B. Drilling Logs

___Drillers log ___Drilling time

___Sample log ___Other:

VII. -- Cores, samples, & logs. continued

C. Other logs run

___Resistivity ___Gamma ray-neutron

___SP ___Temperature

___Caliper ___Cement bond

___Other _____

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Acidic liquid waste from a hydrocarbon refinery plant

B. Physical & chemical Description

Hydrogen chloride 150,000ppm Water

Benzene 1,000ppm 15% acid waste

Chloride 2,000ppm Specific Gravity 1.06

Chlorinated Hydrocarbons 5%ppm Temperature 120°F

Salt 6%ppm

Sulfates 7%ppm

Suspended Solids 4ppm

C. Volume 1340 barrels/day

IX. Preinjection waste treatment

3. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
Injection			Waste-failure of 2 1/2" tubing at 854 ft.

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results

C. Injection rates and pressures

1. Rate

Date(s)	Average	Maximum
"	"	"
"	"	"
"	"	"
"	"	"

2. Pressure (well head _____ bottom hole _____)

Date(s)	Average	Maximum
"	"	"
"	"	"
"	"	"
"	"	"

X. Well operation & operating history

D. Description of operating programs: _____

E. Operating problems: The initial injection test caused failure of the 2 1/2" fiberglass tubing. This was corrected by cutting above the failure and installing 2 1/2 inch tubing which tapered to 1 inch tubing.

XI. Regulatory aspects.

A. Construction requirements _____

B. Monitoring requirements _____

C. Restrictions on operating procedure _____

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER WDW-10 / STATE Tx-9 / UMR

I. Operating Company & General Well Location

Pan American Petroleum Co.

3 miles east of Edgewood

Van Zandt County, Texas

II. Well location (legal description)

Site - 1800 ft. from the SW line and 5100 ft. from the SE line of the Zion Roberts Property A, 702, Van Zandt County, Texas

III. History; system planning, construction & operation.

The well was permitted July 1964 and went into operation in August 1964. The total well depth is 4,900 ft. The well is still in operation.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on the west flank of the East Texas embayment. The regional dip is to the southeast. The stratigraphic section consists of sands and clays of Tertiary and Cretaceous age.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included--yes____; no X).

(Ground elevation_____) (Total well depth 4900 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thick-ness	Lithologic Description
Wilcox	Tertiary			sand
Midway	Tertiary			sand and clay
Navarro	Cretaceous			
Taylor	Cretaceous			chalk
Austin	Cretaceous			clay and marl
Eagle Ford	Cretaceous			sand and clay
Woodbine Group	Cretaceous			sandstone

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
Woodbine Group	Cretaceous		250ft.	sandstone - large areal extent

D. Engineering description of injection units

1. Porosity:
2. Permeability:
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Wilcox	Tertiary		sandstone	low in dissolved solids

F. Mineral Resources (oil and gas, coal, brines, etc.)

Oil and gas wells are producing in the area. All wells are stated to be properly protected or plugged.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing: Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface					
Intermed.					
Injection					
Other					

Describe bottom hole completion method:

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc:_____

VI. Description of surface equipment

A. Holding tanks & flow lines _____

B. Filters _____

C. Pumps _____

D. Other _____

VII. Cores, samples, & Logs

A. Coring

From_____to_____Recovery_____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

____Drillers Log ____Drilling time

____Sample log ____Other:_____

VII. -- Cores, samples, & logs, continued

C. Other logs run

____Resistivity ____Gamma ray-neutron

____SP ____Temperature

____Caliper ____Cement bond

____Other _____

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Cooling tower and boiler blowdown with process water and small amounts of produced soft water.

B. Physical & chemical Description Not available

C. Volume Estimated at 100,000,000 barrels over the next 25 years

IX. Preinjection waste treatment _____

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s) Nov. 1964 Average 125 gpm Maximum 205 gpm

" " " " " "

" " " " " "

" " " " " "

2. Pressure (well head X bottom hole)

Date(s) Nov. 1964 Average 20 psi Maximum 50 psi

" " " " " "

" " " " " "

" " " " " "

" " " " " "

X. Well operation & operating history

D. Description of operating programs: _____

E. Operating problems: None reported

XI. Regulatory aspects.

A. Construction requirements _____

B. Monitoring requirements _____

C. Restrictions on operating procedure _____

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

Texas Water Commission - Bulletin 6307, 1963

WELL FILE NUMBER WDW-11 / STATE Tx-10 / UMR

I. Operating Company & General Well Location

Service Pipeline Company
Six miles SE of Sundown
Hockley, County

II. Well location (legal description)

Site - 444 ft. NL x 970 ft. EL. NE/4 Section 11 Block X, PSL Survey, Hockley County, Texas.

III. History, system planning, construction & operation.

The well was permitted on July 23, 1964 and went into operation during September 1964 with a total well depth of 2150 ft. The operation ceased in 1967 and no waste has been injected since that time. The reason for the shut-down is not known.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is situated in the Texas High Plains where the strata dips to the southeast at 10 ft. per mile. The well is also in the Brazos River drainage basin. Strata are from Permian to Pliocene Ogallala outcropping in the area.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes___; no X).

(Ground elevation_____) (Total well depth 2150 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thick-ness	Lithologic Description

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
Santa Rosa ss	Tertiary	1700'-2150'		massive cross bedded sandstone and conglomerate with shale and sandy shale

D. Engineering description of injection units

1. Porosity:_____

2. Permeability:_____

3. Original Reservoir Pressure: 350 psi - fluid static level - 800 ft. above the reservoir

4. Reservoir Temperature:_____

5. Chemical Character of Formation Water:_____

6. Reservoir Fracture Pressure:_____

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Ogallala Fm.		500ft.	sand, gravel, & clay	
High Plains Fm.				

F. Mineral Resources (oil and gas, coal, brines, etc.)

Oil is produced in the vicinity of the wells

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing. Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface			20 "	475ft.	
Intermed.			13 3/8"	2260"	
			8 5/8"	2345"	
Injection			5 1/2"	2775"	
Other					

Describe bottom hole completion method:

V. Well design and construction, continued 4.

B. Packers, Centralizers, well head equipment, etc:

VI. Description of surface equipment

A. Holding tanks & flow lines

B. Filters

C. Pumps

D. Other

VII. Cores, samples, & Logs

A. Coring

From to Recovery

" " "

" " "

" " "

" " "

B. Drilling Logs

X Drillers Log

Sample log

Drilling time

Other:

VII. -- Cores, samples, & logs, continued

C. Other logs run

___Resistivity	_X_Gamma ray-neutron
___SP	___Temperature
_X_Caliper	___Cement bond

___Other_____

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Saturated brine produced from washing of LPG storage cavity wells.

B. Physical & chemical Description brine water with a specific gravity from 1.000 to 1.185.

C. Volume _____

IX. Preinjection waste treatment _____

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
Injection			water-400gpm @700psi

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
Santa Rosa ss	Acid	Fe acid injection & water flushing

C. Injection rates and pressures

1. Rate

before acid	Date(s)		Average 161. gpm	Maximum	186.6gpm
	"		" 24.2gpm	"	60.0gpm
after acid	"		" 532.4gpm	"	679.0gpm
	"		"	"	
	"		"	"	

2. Pressure (well head _____ bottom hole _____)

	Date(s)		Average	Maximum	
	"		"	"	
	"		"	"	
	"		"	"	
	"		"	"	

X. Well operation & operating history

D. Description of operating programs: _____

E. Operating problems: None reported

XI. Regulatory aspects.

A. Construction requirements _____

B. Monitoring requirements _____

C. Restrictions on operating procedure _____

XII. Economics

A. Total and unit costs of construction :

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER WDW-12 STATE Tx-11 UMR

I. Operating Company & General Well Location

E. I. duPont deNemours & Co.
P. O. Box 1089
Orange, Texas 77630

II. Well location (legal description)

Location: 300 ft. southwest of the northeast line and 643 ft. southeast of the most easterly northwest line of the W. H. Stark Survey, AB. 505, Orange County, Texas.

III. History; system planning, construction & operation.

The well was permitted August 6, 1964 and began operating on August 28, 1965. The total well depth is 5,200 ft. The well was to be used only for temporary or emergency use.

Prior to construction of the well, the waste was discharged into surface bio-oxidation lagoons, then into the Sabine River.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on the Gulf Coastal Plain where the stratigraphic section consists of Tertiary and Quaternary sands, clays, and shales. The Pleistocene Beaumont Clay outcrops in the vicinity of the well.

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes____; no X).

(Ground elevation_____) (Total well depth 5200 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
Beaumont	Pleistocene	Ground	900ft.	clay, silt, sand, & gravel
Lissie	Pleistocene	Level		sand with silt
Willis	Pliocene			sand
Oakville	Miocene			sandstone
Catahoula	Miocene			sandstone

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Catahoula	Miocene		300ft.	poorly consolidated sand

*injection zone - 5090 ft. to 5180 ft.

D. Engineering description of injection units

1. Porosity:_____
2. Permeability:_____
3. Original Reservoir Pressure:_____
4. Reservoir Temperature: 55°C
5. Chemical Character of Formation Water:_____
6. Reservoir Fracture Pressure:_____

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	(Top) Depth	Thick-ness	Character	Chemical Quality
Beaumont	oft	combined	clay	slightly saline (TDS 1-3000 ppm)
Lissie		thickness	sand & gravel	
		950 ft.		

F. Mineral Resources (oil and gas, coal, brines, etc.)

29 Oil & gas tests have pnetrated all or parts of disposal intervals within a radius of 2 miles, 9 of these tests are within a 1 mile radius.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing: Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface	15"	H-40	10 5/8"		
Intermed.	8 5/8"	Solid stainless steel	5 1/2"		
Injection					
perforations = 5090 - 5180 ft.					
Other					

Describe bottom hole completion method:

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: Centralizers - 1 on bottom joint of 9 5/8" casing

VI. Description of surface equipment

A. Holding tanks & flow lines 2 surge tanks, 1 stainless steel holdup tank, 6" stainless steel line

B. Filters 2 diatomaceous earth pressure filters

C. Pumps

D. Other

VII. Cores, samples, & Logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

____Drillers Log

____Sample log

____Drilling time

____Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

X Resistivity	X Gamma ray-neutron
X SP	___ Temperature
X Caliper	___ Cement bond
___ Other	

VIII. Waste Characteristics

A. Industrial Process from which waste is derived
Chemical plant wastes

B. Physical & chemical Description Water containing 0.7% nitric acid., 2% straight chain organic acids 54-60°C., clear to yellow color

C. Volume 400 gpm - 200,000,000 gal/year this waste was discharged into surface bio-oxidation lagoons, thence into the Sabine River.

IX. Preinjection waste treatment

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results

C. Injection rates and pressures

1. Rate

Date(s)		Average	400 gpm	Maximum	420 gpm
"		"		"	
"		"		"	
"		"		"	
"		"		"	

2. Pressure (well head X bottom hole)

Date(s)		Average	300 psi	Maximum	780 psi
"		"		"	
"		"		"	
"		"		"	
"		"		"	

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems: None reported

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating procedure

XII. Economics

A. Total and unit costs of construction _____

B. Operating costs _____

XIII. Source(s) of Information and Published References _____

Texas Water Quality Board

WELL FILE NUMBER STATE: TDW-13 UNR: Tx-12

I. Operating Company & General Well Location

Monsanto Co., P. O. Box 711, Alvin, Texas 77511

Chocolate Bayou Area, Brazoria County

II. Well location (legal description)

Location: Perry and Austin League 2, Abstract No. 107

Brazoria County, Texas

III. History; system planning, construction & operation.

The well was permitted June 15, 1965 and was drilled and completed in 1961. The well began operation in 1965 and is still operating. The total well depth is 6330 ft.

IV. Geology & Geohydrology

A. Regional geologic setting: Beds dip gently to the southeast. The topography of the area is relatively flat.

IV. Geology & Geohydrology, continued 2.

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included--yes___; no X).

(Ground elevation_____) (Total well depth 6330 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
	Miocene	to-1410	0-1425	fresh water sands & shales
	"	-2890	1425-2905	interbedded sand & shales
	"	-2940	2095-2955	shale
	"	-6389	2955-6400	sands w/some shales (brine saturated)

C. Geologic Description of injection units & possible units not in use

Rock Unit Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Catahoula	Miocene			salt water sand between 2700' - 6000"

D. Engineering description of injection units

1. Porosity: _____
2. Permeability: _____
3. Original Reservoir Pressure: _____
4. Reservoir Temperature: _____
5. Chemical Character of Formation Water: _____
6. Reservoir Fracture Pressure: _____

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
	0-1400			

F. Mineral Resources (oil and gas, coal, brines, etc.)

There are several large oil and gas accumulations in the vicinity of the disposal well.

V. Well design and construction

A. Casing, Tubing, and Cement

6,330' T.D. 15' elev.

	Hole Size	Casing or Tubing. Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface			1[illegible] 3/4"	0-2000'	
Intermed.					
Injection			7 "	0-6200'	
Perforations		8 1/2" per ft. between 6,045' - 6,294'			
Other					

Describe bottom hole completion method:

V. Well design and construction, continued 4.

B. Packers, Centralizers, well head equipment, etc: _____

VI. Description of surface equipment

A. Holding tanks & flow lines 85,000 gal. storage wet well, paddle - type mixing basin, circular vacuum sludge pickup-type clarifer (detention time- 2 1/2 hrs.), and 53,000 gal. surge tank between sludge clarifier and sand filter.

B. Filters 3 conventional pressure sand filters at a design flow rate of 2 gpm/sq/ft/

C. Pumps 2 10-stage, 1000 psi centrifugal pumps with a combined capacity of 300 gpm

D. Other waste is metered, sampled automatically, pressure-recorded, and pumped about 7,000 ft. to the well

VII. Cores, samples, & Logs (fluid samples obtained from salt water sands)

A. Coring

From 2700 ft. to 6200 ft. Recovery 400 "

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

____Drillers Log ____Drilling time

____Sample log ____Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

X Resistivity	X Gamma ray-neutron
X SP	Temperature
Caliper	Cement bond
Other	

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Petrochemical Production - cumene phenol, acrylonitrile,

B. Physical & chemical Description

phenolic wastes 300 gpm

nitrile, sulfate-type wastes-upto 650 gpm

oily-water waster - 1000 gpm

sour water - 300 gpm

toxic wastes (acetonitriles, related cyanides,

C. Volume 2,200 gpm total

IX. Preinjection waste treatment Brine and a polyelectrolytic coagulant aid can be added along with acid for a reduction in plf. Scums + sludges are picked up in a circular vacuum - type clarifier, pumped to large storage vessel where they are recycled or lagooned.

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s)		Average	395 gpm	Maximum	480 gpm
"	Jan-June	"	425 gpm	"	480 gpm
"	1966	"	470 gpm	"	512 gpm
"		"	540 gpm	"	512 gpm
"		"	540 gpm	"	640 gpm
		X	616 gpm		736 gpm

2. Pressure (well head ____ X ____ bottom hole ____)

Date(s)		Average	393-463	Maximum	470-500 psi
"		"		"	
"		"		"	
"		"		"	
"		"		"	

X. Well operation & operating history

D. Description of operating programs: _____

E. Operating problems: None reported

XI. Regulatory aspects.

A. Construction requirements _____

B. Monitoring requirements _____

C. Restrictions on operating procedures _____

XII. Economics

A. Total and unit costs of construction _____

B. Operating costs including fixed charges (taxes, depreciation, insurance, etc.) - $750,000/year

XIII. Source(s) of Information and Published References _____

Texas Water Quality Board

WELL FILE NUMBER WDW-14 / STATE Tx-13 / UMR

I. Operating Company & General Well Location

Celanese Chemical Co.
P. O. Box 509
Bay City, Texas

II. Well location (legal description)

Location: James Moore League, Ab. 62, 5230 ft. south & 2220 ft. west of the most northerly northeast corner of Celanese plant properly, Matagordo Co., Texas.

III. History, system planning, construction & operation.

The well was permitted on June 28, 1965 and began operation on February 20, 1965. The well is still in operation.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on the west Gulf Coast Plain and the regional dip in the area is 30 ft. per mile to the east. The stratigraphic section consists of sands, clays, and shales of Tertiary and Quaternary ages with the Pleistocene Beaumont Clay outcropping in the area.

IV. Geology & Geohydrology, continued 2.

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included--yes ___; no X).

(Ground elevation 31.5ft.) (Total well depth 3780ft.)

Datum for depth measurement MSL

Name	Age	Depth (top)	Thickness	Lithologic Description
Beaumont	Pleistocene		3,000ft.	clay
Lissie	Pleistocene			sand, sandstone, & clay
---	Tertiary		11,000ft.	sand and shale

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
---	Tertiary	1300'	11,000ft.	unconsolidated sand and shale

* injection zone - 3520 ft. to 3550 ft.

D. Engineering description of injection units

1. Porosity: 35%
2. Permeability:
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology, fr[illegible] water aquifers in vicinity

Name	Depth	Thick. ness	Character	Chemical Quality
Beaumont oft		1300 ft.	sand, clay,	
Lissie			and gravel	

F. Mineral Resources (oil and gas, coal, brines, etc.)

There are numerous producing oil and gas wells in the area.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing. Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface		H-40	13 3/8in	1,357ft.	660sks + 16% Gel.
Intermed.			9 5/8in.	3,750ft.	1,002sks + 2% Gel.
Injection		J-55	7	in. 3,520ft.	
Other					

Describe bottom hole completion method: The 9 5/8in. casing is jet perforated from 3520 ft. to 3550 ft.

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc:

20 Centralizers on 9 5/8in. casing

37 Scratchers on 9 5/8in. casing

VI. Description of surface equipment

A. Holding tanks & flow lines lined steel treatment tank and a carbon filter tank

B. Filters carbon filters

C. Pumps

D. Other

VII. Cores, samples, & Logs

A. Coring (Sidewall)

At ~~XXXX~~	3683 ft.	to 3388 ft.	Recovery 3002 ft.
"	3668 ft.	3381 ft.	2872 ft.
"	3658 ft.	3380 ft.	2864 ft.
"	3404 ft.	3026 ft.	
"	3400 ft.	3016 ft.	
"	3392 ft.	3008 ft.	

B. Drilling Logs

X Drillers Log

____ Sample log

____ Drilling time

____ Other:

VII. -- Cores, samples, & logs, continued

C. Other logs run

X Resistivity	X Gamma ray-neutron
X SP	Temperature
Caliper	X Cement bond
Other	

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Chemical manufacturing

B. Physical & chemical Description temperature 120°F

Composite waste pH - 9.1

COMPOUND	WT. %	COMPOUND	WT. %		
Hexanol	0.10	Nitric Acid	.13	Methanol	.02
Hexamethylene	0.14	Valeric Acid	.09	Water	95.20
Ammonia	0.05	Nylon Salt	.12	Unknown	2.40
Cyclohexane	0.02	Sodium Nitrite	.70		
Anyl Alcohol	.06	Sodium Nitrate	.60		
		Sodium Bicarbonate	.31		

C. Volume 95 gpm

IX. Preinjection waste treatment Clarified, carbon filtered, & pH controlled

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
Perforated zone	Acidization	successful in increasing the porosity and permeability of the receiving zone

C. Injection rates and pressures

1. Rate

Date(s) Dec. 1970 Average 283gpm Maximum 326gpm

" " " "

" " " "

" " " "

" " " "

2. Pressure (well head X bottom hole)

Date(s) Dec. 1970 Average 452psi Maximum 522psi

" " " "

" " " "

" " " "

" " " "

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems: Possible problems may occur in the future due to the deep oil and gas tests in the vicinity of the well although nothing of this nature has occured yet.

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating procedures

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER WDW-16 / STATE — Tx-14 / UMR

I. Operating Company & General Well Location

El Paso Natural Gas Products Co.

P. O. Box 1346

Odessa, Texas

II. Well location (legal description)

Location: 719.5 ft. east of the central line of section 38 and 1497.3 ft. north of the south line of Sec. 38, Block 42, T25, Texas and Pacific RR. Co. Survey, Ector County, Texas.

III. History, system planning, construction & operation.

The well was permitted on December 29, 1966 while injection commenced November 30, 1965.

Prior to the well operation, the waste fluid was used by Pan American Petroleum for secondary recovery purposes. In 1965, Pan Am. cut back their need for the fluid, which required another means of disposal, thus the injection well.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on the western flank of the Midland Basin. The regional dip is toward the northeast. The stratigraphic section consists of Permian to Quaternary sediments consisting of limestones, dolomites, sands, and shales.

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included--yes____; no____).

(Ground elevation_____) (Total well depth 5800 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
---	Tertiary		125ft.	alluvium
Comanche	Cretaceous			sand and limestone
Dockum	Triassic	1000ft.	500ft.	sandstone
Ochoa	Permian			limestone and dolomite
Guadalupe	Permian			limestone and dolomite
San Andres	Permian	4800ft.	1000ft.	limestone and dolomite

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
San Andres	Permian	4800ft.	1000ft.	limestone and dolomite

D. Engineering description of injection units

1. Porosity: 12%
2. Permeability: 7 md
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Comanche		125ft.	Sand	TDS + 3000 ppm

F. Mineral Resources (oil and gas, coal, brines, etc.)

There is oil and gas produced in the vicinity of the well site. The Grayburg Dolomite, which overlies the San Andres is undergoing water flooding 3 miles west of the well. The Ellenburger is also undergoing water flooding 4 miles northeast. The San Andres is not being used for any flooding, injection, or production in the area of the well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing. Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface	17 in.	61lb/ft.	13 3/8in.	502 ft.	500sks - Neat
Intermed.	12 1/4in.	J-55	9 5/8in.	5000ft.	820sks Incor + 12% Gel.
Injection		fiberglass	6in I.D.		
Other					

Describe bottom hole completion method: Open hole from 5000 ft. to 5800 ft.

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: 4 Centralizers at 494 ft., 406 ft., 342 ft., and 45 ft.

VI. Description of surface equipment

A. Holding tanks & flow lines 50,000 gal. holding pond which is lined with asbestos and cements

B. Filters

C. Pumps

D. Other

VII. Cores, samples, & Logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

____Driller's Log ____Drilling time

____Sample log ____Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

____Resistivity ____Gamma ray-neutron

____SP ____Temperature

____Caliper ____Cement bond

____Other

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

The waste is derived from a petro-chemical process.

B. Physical & chemical Description TDS - 5,000 to 10,000 ppm There are traces of chromate, phosphate, iron, heavy minerals, organics, and alcohol.

C. Volume

IX. Preinjection waste treatment clarification

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results

C. Injection rates and pressures

1. Rate

Date(s)		Average	900 gpm	Maximum	1500 gpm
"		"		"	
"		"		"	
"		"		"	
"		"		"	

2. Pressure (well head X bottom hole)

Date(s)		Average		Maximum	860 psig
"		"		"	
"		"		"	
"		"		"	
"		"		"	

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems: Problems are expected in reservoir pressure build up due to previous experience with the San Andres. Nothing of this nature has occured during operation to the present.

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating procedure

XII. Economics

A. Total and unit costs of construction _____

B. Operating costs _____

XIII. Source(s) of Information and Published References _____

Texas Water Quality Board

WELL FILE NUMBER WDW-17 (STATE) Tx-15 (UMR)

I. Operating Company & General Well Location

Gulf Oil Corporation
P. O. Box 1635
Houston, Texas 77001

II. Well location (legal description)

Location: 1527 ft. from the north line and 510 ft. from the east line of Nacogdoches University Survey, Ab. 703, Hopkins County, Texas

III. History, system planning, construction & operation.

Wells used for disposal in the area are at West Yantis Plant and Edgewood Plant of Pan American Petroleum.

The well was permitted on May 14, 1965 and began operation during the same month. The total well depth is 5200ft. The well is still in operation.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on the west flank of the East Texas Embayment. The stratigraphic section consists of sands and clays of Cretaceous and Tertiary ages. The regional dip is to the southeast.

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes ____; no X).

(Ground elevation _____) (Total well depth 5200 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
Wilcox Gp.	Eocene	-60ft. base	420ft.	shale & sandstone
Navarro Fm.	Cretaceous	top - 840ft.	700ft.	shale
Taylor Fm	Cretaceous	top -1540ft.	900ft.	shale with limestone
Austin	Cretaceous	top -2440ft.	1000ft.	shale with sandstone & lime
Eagle Ford	Cretaceous	top -3440ft.	600ft.	shale, limestone, sand- ston
Woodbine	Cretaceous	top -4000ft.	700ft.	massive sandstone ston
Washita	Cretaceous	top -4700ft.	1700ft.	limestone with some shale

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Woodbine	Cretaceous		700ft.	sandstone

D. Engineering description of injection units

1. Porosity: _____
2. Permeability: 4000 md
3. Original Reservoir Pressure: _____
4. Reservoir Temperature: 1600 psia static fluid level - 1100 ft. above Woodbine
5. Chemical Character of Formation Water: _____
6. Reservoir Fracture Pressure: _____

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Wilcox	-60 ft. M.S.L.	420ft.	sand, sandstone, & clay	Low in dissolved solids

F. Mineral Resources (oil and gas, coal, brines, etc.)

Oil production began in 1947, production is from the Coker sand at 4200 ft. depth. 1954 - oil was produced from the Sub-Clarkaville at 4000 ft. Tremendous sour gas reserves occur in the Jurassic Smackover Limestone at 13,000 ft. and some gas is found in the Bodessa Formation.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing: Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface	12 1/4in.	H-40 24#/ft.	8 5/8in.	190.8ft.	715 sks + 2%
Intermed.			5 1/2in.	5200"	Gel.
			2 1/2in.	4800"	Surface - 4000
Injection					
Other					

Describe bottom hole completion method:

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: 5 Centralizers on 8 5/8in; 1 every 12 joints

VI. Description of surface equipment

A. Holding tanks & flow lines

B. Filters

C. Pumps

D. Other

VII. Cores, samples, & Logs

A. Coring

From	to	Recovery

B. Drilling Logs

___Drillers log

___Sample log

___Drilling time

___Other:

VII. -- Cores, samples, & logs, continued

C. Other logs run

X Resistivity	___ Gamma ray-neutron
X SP	___ Temperature
___ Caliper	___ Cement bond

___ Other ___

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Waste is from the Como Gas Treating, Processing, and Sulfur Recovery Plant.

B. Physical & chemical Description

Na	38,941 ppm
Ca	13,684 ppm
Mg	4,442 ppm
$(CO_3)_2$	146 ppm
Cl	97,160 ppm
SO_4	47 ppm
TS	154,420

C. Volume

IX. Preinjection waste treatment None

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results

C. Injection rates and pressures

1. Rate

Date(s)	Average	3 barrels /minute	Maximum	6 barrels / minute
"	"		"	
"	"		"	
"	"		"	
"	"		"	

2. Pressure (well head ____ / ____ bottom hole ____)

Date(s)	Average 100 psig	Maximum 2,900 psig
"	"	"
"	"	"
"	"	"
"	"	"

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems: As the injection pressure reached 2900 psig, fractures were induced in the formation which in this case is undesirable and againt the ruling of the TWC

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating procedure Operating surface injection pressure should be limited to a maximum of 1500 psi. The casing should be tested at 1000 psi for 12 hrs.

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER WDW-18 / STATE Tx-16 / UMR

I. Operating Company & General Well Location

Shell Oil Co. - NW Ozona Gas Plant

P. O. Box 1509

Midland, Texas

- 2 miles NW of Ozona, Texas

II. Well location (legal description)

Location: 700 ft. south of the north line and 1750 ft. west of the east line of Sec. 46, F. R. Henderson Lease, G. C. & S. F. R. R. Survey, Crockett County, Texas

III. History, system planning, construction & operation.

The well was permitted on June 14, 1965 and began operating in May, 1965. The well is still in operation.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on the southern flank of the Ozona Arch. The regional dip is toward the south. The stratigraphic section consists of Permian limestone, dolomites, sandstone, and anhydrite.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes____; no X).

(Ground elevation_____) (Total well depth 1750 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thick-ness	Lithologic Description
Comanche	Cretaceous			sand and sandstone
Whitehorse	Permian		250ft.	sand and shale
San Andres		1000ft.	1500ft.	limestone and dolomite

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
San Andres	Permian		1500ft.	limestone and dolomite

D. Engineering description of injection units

1. Porosity: 15%
2. Permeability:
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure: .64 psi/ft. of depth

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Edwards			limestone	TDS - 400 ppm

F. Mineral Resources (oil and gas, coal, brines, etc.)

Oil is produced from the Canyon Group at 6675 ft. of depth.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing. Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface		J-55 9.5lb	4 1/2 in.	1094ft.	200 sacks
Intermed.					
Injection			1 in.	1084ft.	
Other					

Describe bottom hole completion method: open hole 1084 ft. to 1750 ft.

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: _____

VI. Description of surface equipment

A. Holding tanks & flow lines 35 ft. x 27 ft. polyvinly-lined settling pit plus 300 feet of plastic tubing

B. Filters _____

C. Pumps _____

D. Other _____

VII. Cores, samples, & Logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

___Drillers Log ___Drilling time

___Sample log ___Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

___Resistivity ___Gamma ray-neutron

___SP ___Temperature

___Caliper ___Cement bond

___Other_____

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Ozona Gas Plant - cooling tower blowdown and zeolite regeneration wash water.

B. Physical & chemical Description 25 ppm Ca, 15 ppm Mg, 580 ppm Na, 1285 ppm Bicarbonate, 104 ppm SO_4, 130 ppm Cl, 5 ppm 75 ppm Si, 2230 ppm TDS, pH - 8.5

C. Volume 8000 m/d

IX. Preinjection waste treatment Sedimentation

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s) Dec. 1970 Average 7.5 gpm Maximum _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

2. Pressure (well head X bottom hole _____)

Date(s) Dec. 1970 Average 500 psi Maximum _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

X. Well operation & operating history.

D. Description of operating programs: Continuous operation

E. Operating problems: No problems were reported

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating procedure Surface injection pressure is limited to 650 psi

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER WDW-19 Tx-17

I. Operating Company & General Well Location

Amarillo Oil Co.
P. O. Box 151
Amarillo, Texas 79105

II. Well location (legal description)

Location: 300 ft. east of the west line and 1100 ft. north of the south line of Sec. 96, Block B-2, H. & G. N. R.R. Survey, Gray Co., Texas.

III. History, system planning, construction & operation.

The well was permitted on June 4, 1965. The well was operational in late 1965 and was used until August 7, 1967 when it was abandon and plugged. The reason for abandoning the well was that it was no longer necessary.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located in the Texas High Plains and structurally located on the southwest flank of the Anadarko Basin. The stratigraphic section consists of sands, clays, gypsum, anhydrite, and shales of Permian to Quaternary age. The Pliocene Ogallala sandstone outcrops in the area of the well.

IV. Geology & Geohydrology, continued 2.

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes____; no X).

(Ground elevation_____) (Total well depth 1000 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
Ogallala	Pliocene	0	500ft.	sandstone
Blaine Gypsum	Triassic	630ft.	160ft.	gypsum
Glorieta	Permian	800ft.	120ft.	poorly sorted sandstone and shale

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Glorieta	Permian	800ft.	120ft.	coarse sand

D. Engineering description of injection units

1. Porosity:
2. Permeability:
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology, fresh water aquifers in vicinity

Name	Depth	Thick.	Character	Chemical Quality
Ogallala		500ft.	sandstone	fresh water - but considerably hard

F. Mineral Resources (oil and gas, coal, brines, etc.)

There are no mineral resources reported in the vicinity of the disposal well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface		J-55 20lb/ft.	7 in.	1000'	500sks Pozmix with 4% Gel and 2% $CaCl_2$ to surface
Intermed.					
Injection					
Other					

Describe bottom hole completion method: Open hole completion

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: Two Centrallizers were used on the

VI. Description of surface equipment

A. Holding tanks & flow lines 100,000 bbl asphalt lined surface pit

B. Filters

C. Pumps

D. Other

VII. Cores, samples, & Logs

A. Coring

From____ to____ Recovery____

"____ ____ ____

"____ ____ ____

"____ ____ ____

"____ ____ ____

"____ ____ ____

B. Drilling Logs

____Drillers Log ____Drilling time

____Sample log ____Other:

VII. -- Cores, samples, & logs, continued

C. Other logs run

X Resistivity	___ Gamma ray-neutron
X SP	___ Temperature
___ Caliper	___ Cement bond
X Other Radiation Log	

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Brine from washout of a salt cavity for the storage of natural gas.

B. Physical & chemical Description

Cl	-	159,000	ppm		
Si	-	14	ppm	Fl	- 3.8 ppm
Ca	-	1,350	ppm	NO_3	- .4 ppm
Mg	-	1,980	ppm	Br	- 75 ppm
Na	-	99,800	ppm	Sn	- 40 ppm
K	-	1,900	ppm	TDS	- 270,000 ppm
$(CO_3)_2$	-	251	ppm	Total hardness	- 11,500 ppm
SO_4	-	7,430	ppm	pH	- 7.1

C. Volume Total 700,000 barrels

IX. Preinjection waste treatment None

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
Injection	30min.	894ft. to 1002ft.	fresh water was injected

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results

C. Injection rates and pressures

1. Rate

Date(s) _____ Average _____ Maximum _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

2. Pressure (well head _____ bottom hole _____)

Date(s) _____ Average _____ Maximum _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems:

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating procedure The permit only authorized 300 psi - bottom hole injection pressure.

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER MDW-20 STATE Tx-18 UMR

I. Operating Company & General Well Location

The Shamrock Oil and Gas Corporation
P. O. Box 631
Amarillo, Texas 79105

II. Well location (legal description)

Location: Section 399, Block 44, H & TC R. R. Survey, Moore County, Texas 1053 ft. from the north line and 1,980 ft. from the west line of said survey.

III. History; system planning, construction & operation.

The well was permitted on May 24, 1965 and injection began in 1966. The total well depth is 1620 ft. The well is still in operation.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on the western flank of the Anadarko Basin in the Texas High Plains. The stratigraph section consists of sands, shale, gypsum, and anhydrite of Triassic to Recent age.

IV. Geology & Geohydrology, continued 2.

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes___; no X).

(Ground elevation_____) (Total well depth 1620 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thick-ness	Lithologic Description
Alluvium	Recent			alluvium
Ogallala	Pliocene			sandstone with silt
Dockum Gp.	Triassic			red and green shale
Blaine	Triassic			Gypsum and anhydrite

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
Glorieta	Permian			sand, sandstone, and silt

D. Engineering description of injection units

1. Porosity:_____

2. Permeability:_____

3. Original Reservoir Pressure:_____

4. Reservoir Temperature:_____

5. Chemical Character of Formation Water:_____

6. Reservoir Fracture Pressure:_____

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Ogallala		900ft.	sandstone	high TDS

F. Mineral Resources (oil and gas, coal, brines, etc.)

Oil and gas is produced from numerous wells in the area of the well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing. Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface		H-40	11 3/4in.	603 ft.	400 cu. ft. Pozmix
Intermed.		32.3lb/ft. H-40	9 5/8in.	1551ft.	450 sacks
Injection		J-55 20lb/ft.	7 in.	1620ft.	
Other					

Describe bottom hole completion method:

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc:

Packer at 1089 ft.

VI. Description of surface equipment

A. Holding tanks & flow lines

B. Filters

C. Pumps

D. Other

VII. Cores, samples, & Logs

A. Coring

From to Recovery

" " "

" " "

" " "

" " "

" " "

B. Drilling Logs

___Drillers Log ___Drilling time

___Sample log ___Other:

VII. -- Cores, samples, & logs, continued

C. Other logs run

___Resistivity	___Gamma ray-neutron
___SP	___Temperature
___Caliper	___Cement bond

___Other_____

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Cooling tower and boiler blowdown

B. Physical & chemical Description

Si	55	ppm	(CO_3)	88	ppm
Ca	156	ppm	$(CO_3)_2$	267	ppm
Mg	74	ppm	SO_4	760	ppm
Na	170	ppm	Cl	160	ppm
NH_3	80	ppm	Fl	2.5	ppm
(CrO_3)	.02	ppm	NO_3	4.4	ppm
CO_3	88	ppm	pH	8.8	ppm

C. Volume 20 to 24.5 million gallons per month

IX. Preinjection waste treatment Clarification and gravity settling.

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results

C. Injection rates and pressures

1. Rate

Date(s)	Dec. 1970	Average	500-550 gpm	Maximum	840 gpm
"		"	185 gpm	"	210 gpm
"		"		"	
"		"		"	
"		"		"	

2. Pressure (well head ___ X ___ bottom hole ___)

Date(s)	Dec. 1970	Average	178 psi	Maximum	210 psi
"		"		"	
"		"		"	
"		"		"	
"		"		"	

X. Well operation & operating history.

D. Description of operating programs: _____

E. Operating problems: No problems were reported.

XI. Regulatory aspects.

A. Construction requirements _____

B. Monitoring requirements _____

C. Restrictions on operating rates _____

XII. Economics

A. Total and unit costs of construction _____

B. Operating costs _____

XIII. Source(s) of Information and Published References _____

Texas Water Quality Board

WELL FILE NUMBER WDW-21 STATE Tx-10 USE

I. Operating Company & General Well Location

Mobil Chemical Company

P. O. Box 621

Amarillo, Texas 79105

II. Well location (legal description)

Location: 4,560ft from the north line and 3,480ft from the west line of the W. H. Sigler Survey, Ab. 48, Jefferson County, Texas.

III. History, system planning, construction & operation.

The well was permitted in June, 1965 and was drilled and completed in August, 1965. This well operated soon after completion until it was abandon and plugged July 13, 1970. The well was abandon due to extensive corrosion of the casing.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on the Gulf Coastal Plain in a region with a stratigraphic sequence which consists of Tertiary and Quaternary sands, shales, clays, and silts.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes ____; no X).

(Ground elevation _____) (Total well depth 6000ft ____)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
Beaumont	Pleistocene		1000ft.	sand and clay
Lissie	Pleistocene			
Willis	Pliocene			sand
Goliad	Pliocene			
Catahoula	Miocene	3500ft.		sand, gravel, silt

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Catahoula	Miocene	2500ft.	3200ft.	sand and silt

D. Engineering description of injection units

1. Porosity: 32.5 - 34.2%
2. Permeability: 2360 to 4220 md
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

E. Geohydrology, fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Beaumont		600ft.	Sand and Clay	Fresh water for municiple use.

F. Mineral Resources (oil and gas, coal, brines, etc.)

There are numerous oil and gas wells in the general area of the disposal well. Exact details concerning these producing wells were not reported.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface			[illegible]	1218ft.	765sks. Trinity Lite Wate
Intermed.			7 5/8in.	5299ft	1800sks 50/50 Poz. 2% Gel.
Injection		Arman Seal Lock Tubing	4 1/2in.	5950ft.	900sks. Poz. & 2% Gel.
Other					

Describe bottom hole completion method: Perforated at 5468ft. to 5493 ft. to 5722ft. & 5835ft. to 5896 ft.

V. Well design and construction, continued

B. Packers, Centralizers, Well head equipment, etc: _____

VI. Description of surface equipment

A. Holding tanks & flow lines _____

B. Filters _____

C. Pumps _____

D. Other _____

VII. Cores, samples, & Logs

A. Coring

From 5640ft. to 5656ft. Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

X Drillers Log ___ Drilling time

___ Sample log ___ Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

X Resistivity	X Gamma ray-neutron
X SP	___ Temperature
___ Caliper	___ Cement bond
X Other D. I. Lateralog	

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

The waste fluid comes from the manufacture of terephthalic acid (TPA)

B. Physical & chemical Description Acetic Acid 2240 ppm Terephthalic acid 150 ppm, Xylene 55 ppm, Methyl Ethyl Keton 50 ppm, Paratoluic acid 40 ppm, other hydrocarbons 24 ppm, and Benzoic acid 20 ppm.

C. Volume 240 gpm

IX. Preinjection waste treatment pH control, biological treatment, BOD removal, and settling

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
Injection		Perforated zones	Salt water at 1600 to 2050 psig
Injection		Perforated zones	Salt water at 50 to 600 psig

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
Perforated zones	Acidization	7,000 gal. of 3% HF & 15% HCl

C. Injection rates and pressures

1. Rate

Date(s) May, 1968 Average 101 gpm Maximum

" " " "

" " " "

" " " "

2. Pressure (well head X bottom hole)

Date(s) May, 1968 Average 850 psi Maximum

" " " "

" " " "

" " " "

X. Well operation & operating history

D. Description of operating programs: _____

E. Operating problems: Corrosion of the liner caused the well to be abandon.

XI. Regulatory aspects.

A. Construction requirements _____

B. Monitoring requirements _____

C. Restrictions on operating procedures _____

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER NEW 22 STATE Tx-20 USGS

I. Operating Company & General Well Location

Mr. B. C. Aughtry-Aughtry Flowers

802 S Clements

Gainsville, Texas 76240

II. Well location (legal description)

Location: 2400ft. from the south line and 800ft. from the east line of the M. E. Clark Survey, Ab. 231, Cooke County, Texas

III. History, system planning, construction & operation.

The well was permitted on July 26, 1965. The well was drilled and began operation, but later the operation was suspended and the permit was cancelled.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located in shallow cretaceous alluvial deposits of the Gulf Coasted Plain. The well is situated on the southwest flank of the Sherman syncline and the regional dip is to the northeast. The stratigraphic section consists of sands, shales, clays, & gravels of Cretaceous to Recent age.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes____; no X).

(Ground elevation_____) (Total well depth 30 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
Denton Clay	Cretaceous		50ft.	Clay

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Denton Clay				

D. Engineering description of injection units

1. Porosity:
2. Permeability:
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
None				

F. Mineral Resources (oil and gas, coal, brines, etc.)

There are no mineral resources reported in the area of the proposed disposal well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & Grade	Size	Depth Set	Type & Amount of Cement
Surface		Steel		20ft.	
Intermed.					
Injection					
Other					

Describe bottom hole completion method:

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: _____

VI. Description of surface equipment

A. Holding tanks & flow lines _____

B. Filters _____

C. Pumps _____

D. Other _____

VII. Cores, samples, & Logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____ _____

" _____ _____ _____

_____ _____ _____

" _____ _____ _____

' _____ _____ _____

B. Drilling Logs

___Drillers Log ___Drilling time

___Sample log ___Other: _____

_____

VII. -- Cores, samples, & logs, continued

C. Other logs run

___Resistivity ___Gamma ray-neutron

___SP ___Temperature

___Caliper ___Cement bond

___Other

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Treated water from greenhouse operation

B. Physical & chemical Description

Ca	3 ppm	Mg	1 ppm
Hardness	3 ppm	Na	542 ppm
Alkalinity	4 ppm	CO_3	104 ppm
pH	9.3 ppm	HCO_3	188 ppm
		SO_4	38 ppm
		Cl	12 ppm
		TDS	598 ppm

C. Volume 345 - 600 gallons per month

IX. Preinjection waste treatment

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results

C. Injection rates and pressures

1. Rate

Date(s) Dec. 1970 Average 171 gpm Maximum 171 gpm

" " " "

" " " "

" " " "

" " " "

2. Pressure (well head X bottom hole)

Date(s) Dec. 1970 Average Gravity Maximum

" " " "

" " " "

" " " "

" " " "

X. Well operation & operating history

D. Description of operating programs: This well injects highly acidic waste into a shallow zone where it is neutralized by limestone.

E. Operating problems:

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating pressure

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER WDW-23 (State) Tx-21 (USGS)

I. Operating Company & General Well Location

E. I. duPont DeNemours and Co.
P. O. Box 1089
Orange, Texas 77630

II. Well location (legal description)

Location: 440 ft. from the southwest line and 343 ft. from the southeast line of O. M. Thomas Survey, Ab. 433, Orange County, Texas.

III. History; system planning, construction & operation.

The well was permitted on August 30, 1965. Operation began on April 29, 1966. The well operated for six days and plugged with sand. The perforations were plugged and another set of perforations were made above the original perforations. The well is still in operation.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located in the Quaternary deposits of the Gulf Coastal Plain. The beds in the area are relatively flat and dip to the southeast at 10 ft. per mile. The Pleistocene Beaumont Clay outcrops in the area at the well.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes____; no X).

(Ground elevation_____) (Total well depth 5230 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
Beaumont	Pleistocene	oft	combined	clay
Lissie	Pleistocene		thickness-1000ft.	sand & gravel
Willis	Pliocene			sand
Oakville	Miocene			sandstone
Catahoula	Miocene	4550	100ft.	sandstone

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Catahoula	Miocene	4550	800ft.	sandstone

injection zones in the Catahoula - 4550 ft. to 4660 ft.

4710 ft. to 4735 ft.

D. Engineering description of injection units

1. Porosity:
2. Permeability:
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Beaumont		combined	sand & clay	
Lissie		thickness - 1000 ft.		

These two formations are often referred to as the Gulf Coast aquifer. Only a 400 ft. section of these two formations contains fresh water with 3000 ppm TDS

F. Mineral Resources (oil and gas, coal, brines, etc.)

Oil and gas is produced near the well from the Phoenix Lake Field three miles east, and the Orange Field, three miles west of the well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing. Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface	15in.		9 5/8in.	1631 ft.	
Intermed.	8 3/4in.	stainless steel	5 1/2in.	5204 ft.	
Injection					
Other					

Describe bottom hole completion method: perforated completion in three zones below 4735 ft. The perforations are 0.1 in. in diameter and 16 holes per foot.

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc:

A bridge plug was set at 4930 ft. - just above the lower perforations.

VI. Description of surface equipment

A. Holding tanks & flow lines

B. Filters

C. Pumps

D. Other

VII. Cores, samples, & Logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

____Drillers Log ____Drilling time

____Sample log ____Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

____Resistivity ____Gamma ray-neutron

____SP ____Temperature

____Caliper ____Cement bond

____Other _____

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Chemical plant wastes

B. Physical & chemical Description The waste fluid contains 1% Nitric Acid, 2.3% organic acids, and 0.01% Heavy metal salts.

C. Volume 340 cpm

IX. Preinjection waste treatment None reported

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s) December 1970 Average 255 gpm Maximum 355 gpm

" " " " " "

" " " " " "

" " " " " "

2. Pressure (well head X bottom hole)

Date(s) December 1970 Average 723 psi Maximum 830 psi

" " " " " "

" " " " " "

" " " " " "

" " " " " "

X. Well operation & operating history

D. Description of operating programs: _____

E. Operating problems: The only operating problem incountered was the sanding up of the bottom injection zone.

XI. Regulatory aspects.

A. Construction requirements _____

B. Monitoring requirements _____

C. Restrictions on operating procedures _____

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

Texas Water Commission - Bulletin 6307, 1963

WELL FILE NUMBER WDW-35 Tx-22

I. Operating Company & General Well Location

Mobil Oil Co.

P. O. Box 633

Midland, Texas

II. Well location (legal description)

Location: 2090 ft. from the north line and 721 ft. from the south line of Sec. 48, Block OW, T. T. Ry, Survey, Pecos Co., Texas.

III. History, system planning, construction & operation.

The well was permitted on January 24, 1967 and injection commenced January 19, 1968. The well is still in operation.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is on the northwest flank of the Val Verde Basin where the regional dip is toward the southeast. The stratigraphic section consists of Paleozoic, Mesozoic and Cenozoic

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column Included--yes____; no____).

(Ground elevation_____) (Total well depth 6250 ')

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
Rustler	Permian	1825 ft.	2200 ft.	Anhydrite
Lamar	Permian	4680 ft.	60 ft.	Limestone
Bell Canyon	Permian	4740 ft.	300 ft.	
Cherry Canyon	Permian	5631 ft.	600 ft.	Sandstone and dolomite

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Cherry Canyon	Permian	5631	500 ft.	Sandstone and dolomite

D. Engineering description of injection units

1. Porosity:
2. Permeability:
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology, fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Alluvium			sand and gravel	
Rustler	1850	400 ft.	sandstone	

F. Mineral Resources (oil and gas, coal, brines, etc.)

Oil and gas is produced in five zones from 4700 ft. to 15,700 ft. in the vicinity at the disposal well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & Grade	Size	Depth Set	Type & Amount of Cement
Surface			8 5/8 in.	1855ft.	986 sks to surface
Intermed.		J-55	5 1/2	5245ft.	1740 sks to surface
Injection		J-55 [illegible]#/ft	2 3/8in.	5086ft.	
Other					

Describe bottom hole completion method. The well was perforated at 5168 ft. to 5594 ft. and 5673 ft. to 6046 ft.

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: Packer (Brown Oil Tool Hursley Type) at 5,086'

VI. Description of surface equipment

A. Holding tanks & flow lines

B. Filters

C. Pumps

D. Other

VII. Cores, samples, & Logs

A. Coring

From to Recovery

" " "

" " "

" " "

" " "

B. Drilling Logs

___Drillers Log ___Drilling time

___Sample log ___Other:

VII. -- Cores, samples, & logs, continued

C. Other logs run

X Resistivity	___ Gamma ray-neutron
X SP	___ Temperature
___ Caliper	___ Cement bond
X Other Sonic Log	

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Effluent from gas treating plant

B. Physical & chemical Description Soecific Gravity 1.0318 at 60°F, total alkalinity 552 ppm, total hardness 4240 ppm, Ca 932 ppm, Mg 1308 ppm, K 13,421 ppm, SO_4 366 ppm, Cl 39,987 ppm, Fe 15.2 ppm, CO_2 28 ppm.

C. Volume 200 bbl/day

IX. Preinjection waste treatment None

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s) December 1970 Average 58 gpm Maximum 58 gpm

" " " "

" " " "

" " " "

2. Pressure (well head X bottom hole)

Date(s) December 1970 Average 770 psi Maximum 770 psi

" " " "

" " " "

" " " "

" " " "

X. Well operation & operating history

D. Description of operating programs: _____

E. Operating problems: No problems were reported

XI. Regulatory aspects.

A. Construction requirements Water-bearing strata must be protected to 2150-ft.

B. Monitoring requirements _____

C. Restrictions on operating procedure _____

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER ~~[illegible]~~ Tx-23

I. Operating Company & General Well Location.

Phillips Petroleum Co.
P. O. Box 1967
Houston, Texas

II. Well location (legal description)

Five feet east of the west line which trends N1°25'W of a 2.48 acre tract in west part of Sec.48, Block 16, T & P RR Company Survey, Jones Co., Texas

III. History; system planning, construction & operation.

The well was permitted on July 26, 1966 but it was drilled long before that time. It was originally a water well which was abandon and then recompleted as a disposal well during February. The well is still in operation.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on roughly horizontal strata which is referred to as the Eastern Shelf and is associated with the Permian Basin. The stratigraphic section consists primarily of Permian limestone, sandstone, and dolomite.

IV. Geology & Geohydrology, continued 2.

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes___; no___).

(Ground elevation_____) (Total well depth 400 ft.___)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
Clear Fork Gp.	Permian			Red & gray shales
Wichita Gp.	Permian			Limestone and shale

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Talpa Limestone of the Wichita Gp.	Permian	400ft.	20ft.	Limestone

D. Engineering description of injection units

1. Porosity:
2. Permeability:
3. Original reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology, fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Potable ground water does not exist in the area				

F. Mineral Resources (oil and gas, coal, brines, etc.)

Oil is produced 1 mile north of the well site in the Sayles Field at a depth of approximately 2,000 ft.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface		[illegible]	[illegible]	400ft.	100 sacks to the surface
Intermed.					
Injection					
Other					

Describe bottom hole completion method: 1/2in. perforations at 400ft.

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: _____

VI. Description of surface equipment

A. Holding tanks & flow lines _____

B. Filters _____

C. Pumps _____

D. Other _____

VII. Cores, samples, & Logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

____Drillers Log ____Drilling time

____Sample log ____Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

___Resistivity ___Gamma ray-neutron

___SP ___Temperature

___Caliper ___Cement bond

___Other

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Effluent from truck washing facilities

B. Physical & chemical Description

		Si	3 ppm
Ca	6 ppm	Fl	.6 ppm
Mg	1 ppm	NO_3	.4 ppm
Na	163 ppm	TDS	343 ppm
CO_3	0 ppm	pH	7.8 units
$(CO_3)_2$	133 ppm		
SO_4	64 ppm		
Cl	140 ppm		

C. Volume 3,300 gpd

IX. Preinjection waste treatment chlorinated, filtered, and softened

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s) _____ Average _____ Maximum _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

2. Pressure (well head _____ bottom hole _____)

Date(s) _____ Average _____ Gravity _____ Maximum _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

X. Well operation & operator training

D. Description of operating programs: _____

E. Operating problems: No problems were reported

XI. Regulatory aspects.

A. Construction requirements _____

B. Monitoring requirements _____

C. Restrictions on operating rates _____

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

Holmguest, Harold, "Deep Pays in the Delaware and Val Verde Basin", Fluids in Subsurface Environments, 1965

WELL FILE NUMBER nDW-27 STATE Tx-24 USGS

I. Operating Company & General Well Location

Calallen School District
Office of the Superintendent
4602 Cornell Drive
Corpus Shristi, Texas 78410

II. Well location (legal description)

510ft. west of the line and 307ft. nother of the south line of the 30 acre tract of the F. J. Smith 225.2 acre tract, in the Wright Partition, Herrera Grant, Neuces Co., Texas

III. History; system planning, construction & operation.

The well began operation in 1958 and was permitted on September 19, 1966. The well is still in operation.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located in the west Gulf Coastal Plain and the regional dip in this area is 10 to 30 feet per mile to the east. The stratigraphic section consists of sands, clays, and silts of Tertiory and Quaternary ages. There is a large regional fault west of the well site.

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes____; no X).

(Ground elevation 50 ft.) (Total well depth 349 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thick-ness	Lithologic Description
Beaumont	Pleistocene	oft	350ft.	clay with sand & silk
Lissie	Pleistocene			sand
Goliad	Pliocene	350ft.	150ft.	sand

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
Goliad	Pleistocene	[illegible] ft.	[illegible] ft.	unconsolidated sand and clay

D. Engineering description of injection units

1. Porosity:
2. Permeability:
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology, fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Beaumont	oft	300ft.	sand & clay	
Lissie			sand & gravel	

F. Mineral Resources (oil and gas, coal, brines, etc.)

Oil is produced in the area in numerous nearby wells. Details of those producing wells are not given.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & grade	Type	Depth Set	Type & Amount of Cement
Surface			in.	34½ft.	to surface
Intermed.					
Injection		tubing	in.	349ft.	
Other					

Describe bottom hole completion method: open hole

V. Well design and construction, continued

B. Packers, centralizers, well head equipment, etc: _____

Packer on 2 in. tubing at 203 ft.

VI. Description of surface equipment

A. Holding tanks & flow lines 2 - 9,700 gal. septic tanks

B. Filters _____

C. Pumps Cylinder piston pump - 4 in. x 5 in.

D. Other _____

VII. Cores, samples, & logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

X Drillers log ____ Drilling time

____ Sample log ____ Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

X Resistivity	___ Gamma ray-neutron
X SP	___ Temperature
___ Caliper	___ Cement bond

___ Other _____

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Sewerage effluent from elementary school

B. Physical & chemical Description pH 8.3

Phenol Alkalinity 10 ppm

Total Alkalinity 256 ppm

Chlorides 2200 ppm

Hardness 316 ppm

The waste has a large bacterial content

C. Volume 4600 gpd

IX. Preinjection waste treatment Sedimentation

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s)	Average	Maximum
"	"	"
"	"	"
"	"	"
"	"	"

2. Pressure (well head X bottom hole)

Date(s)	Daily Average 10 psi	Maximum
"	"	"
"	"	"
"	"	"
"	"	"

X. Well operation & operating history.

D. Description of operating programs:

E. Operating problems: No problems were reported

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions or operating procedures

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

Texas Water Commission - Bulletin 6409, 1964

WELL FILE NUMBER WDW-2[illegible] (STATE) TX-25 ([illegible])

I. Operating Company & General Well Location.

E. I. DuPont DeNemours & Co.
P. O. Box 2626
Victoria, Texas 77901

II. Well location (legal description)

Location: 3,835 ft. from the northwest line and 21,340 ft. from the northeast line of the Desiderio Garcia League Survey, Victoria County, Texas.

III. History, system planning, construction & operation.

The well was permitted on August 28, 1969. The well originally completed in January, 1957. The well is presently in operation.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located in the west Gulf Coastal Plain and the regional dip is approximately 80 ft. per mile to the southeast. The stratigraphic section consists of various sediments of Tertiary and Quaternary age with the Pleistocene Beaumont Clay outcropping in the area.

B. Geologic Description of rock units penetrated by well

Rock Unit (Geologic Column included yes___; no_X_).

(Ground elevation [illegible] ft.) (Total well depth 4200 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
[illegible]	Pleistocene	[illegible]	combined	sand and clay
Lissie	Pleistocene		thickness-1000ft.	sand and gravel
Goliad	Pliocene			sand & sandstone
Lagarto	Miocene			clay
Oakville	Miocene	3000ft.	700ft.	sandstone
Catahoula	Miocene	3700ft.	600ft.	tuff & sandstone

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Oakville	Miocene	3000ft.	700ft.	sandstone
Catahoula	Miocene	3700ft.	[illegible]	sandstone & tuff

injection zones - 1) 3520ft. to 4027ft.

2) 4074ft. to [illegible]

D. Engineering description of injection units

1. Porosity: [illegible]
2. Permeability: [illegible] to 1500 md.
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water: Specific Gravity 1.052, pH 6.9, [illegible] equivalent NaCl, 71,000 ppm. TDS
6. Reservoir Fracture Pressure:

IV. Geology & Hydrogeology (Continued)

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Beaumont		1000ft	clay	fresh water
Lissie			sand	

F. Mineral Resources (oil and gas, coal, brines, etc.)

There are no mineral resources reported in the area.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & Grade	Size	Depth Set	Type & Amount of Cement
Surface	1[illegible]in.	[illegible]		[illegible]ft.	[illegible] sks to surface
Intermed.	8 [illegible]/[illegible]in.	[illegible]ft. [illegible]	[illegible]	[illegible]ft.	1000 sks - [illegible]oz.

Injection

Other

Describe bottom hole completion method: Perforated at [illegible] ft. to [illegible] ft. and [illegible] ft. to [illegible] ft.

V. Well design and construction, continued

B. Packers, centralizers, well head equipment, etc. ____________

VI. Description of surface equipment

A. Holding tanks & flow lines ____________

B. Filters [illegible]

C. Pumps ____________

D. Other ____________

VII. Cores, samples & logs

A. Coring

From 0 to [illegible] ft. Recovery ____________

B. Drilling Logs

X Drillers log

___ Sample log

___ Drilling time

___ Other: ____________

VII. -- Cores, samples, & logs, continued

C. Other logs run

X Resistivity	___ Gamma ray-neutron
X SP	___ Temperature
X Caliper	___ Cement bond
X Other Fluid Travel Log (Welex)	

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Chemical plant wastes

B. Physical & chemical Description

Nitric Acid	.6 (wt. %)	Remainder-water
Organic Acid	1.0 (wt. %)	pH 1-4
Na salts	.1-1.0 (wt. %)	Temperature 50-60°C
Cl	- Trace	Color-clear, greenish yellow
Cu	- Trace	
Va	- Trace	
Ti	- Trace	

C. Volume 300 gpm

IX. Preinjection waste treatment Filtration

X. Well operation & operating history.

A. Tests

Type	Duration	Zones tested	Description of test results

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
3920'-4020'	acidization	
4074'-4092'	acidization	

C. Injection rates and pressures

1. Rate

Date(s) December, 1970 Average 200 gpm Maximum 260 gpm

" " " " " "

" " " " " "

" " " " " "

2. Pressure (well head / bottom hole)

Date(s) December, 1970 Average 150 psi Maximum 200 psi

" " " " " "

" " " " " "

" " " " " "

" " " " " "

X. Well operation & operating history.

D. Description of operating programs:

E. Operating problems: No problems were reported

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating practices

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

Texas Water Commission - [illegible] 1974

WELL FILE NUMBER [illegible] Tx-26 UMP

I. Operating Company & General Well Location.

E. I. DuPont De Nemours & Co.

P. O. Box 2626

Victoria, Texas 77901

II. Well location (legal description)

Location: 3835ft. from NW line and 22,340 ft. from NE line of Desiderio Garcia League Survey, Victoria Co., Texas.

III. History, system planning, construction & operation.

The well was permitted on November 30, 1966 and completed on January 30, 1967. The well has been in operation since completion.

IV. Geology & Hydrology

A. Regional geologic setting: The well is located on the west [illegible] approxi- mately [illegible] consists of various [illegible] with the Pleistocene [illegible] at the well site.

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included yes ___ ; no X).

(Ground elevation _____) (Total well depth 4227 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
Beaumont	Pleistocene	eft	combined	clay
Lissie	Pleistocene		thickness-1000ft.	sand & gravel
Goliad	Pliocene			sand
Lagarto	Miocene			clay
Oakville	Miocene	3000ft.	700ft.	sandstone
Catahoula	Miocene	3700ft.	600ft.	tuff and sandstone

C. Geologic Description of injection units & possible units not in use

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Oakville	Miocene	3000ft.	700ft.	sandstone
Catahoula	Miocene	3700ft.	600ft.	tuff and sandstone

*injection zones 1) 3915' to 3940'

2) 3950' to 4010'

3) 4084' to 4116'

D. Engineering description of injection units

1. Porosity: 30%
2. Permeability: 1045 to 1560 md
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Beaumont	oft	1000ft.	clay and sand	fresh water for
Lissie			sand and gravel	municiple & industrial use

F. Mineral Resources (oil and gas, coal, brines, etc.)

The are no mineral resources reported in the area at the disposal well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & grade	Depth Set	Type & Amount of Cement
Surface	15in.	32lb/ft.	20[illegible]3ft.	1117 sks
Intermed.	8 5/8in.	17lb/ft.	4205ft.	965 sks Pos. + 44 Gel
Injection				
Other				

Describe bottom hole completion method: Perforation at 3915' to 3940', 3950' to 4010', and 4024' to 4116' - gravel packed

V. Well design and construction, continued

B. Packers, Centralizers, Well head equipment, etc: _____

VI. Description of surface equipment

A. Holding tanks & flow lines _____

B. Filters _____

C. Pumps _____

D. Other _____

VII. Cores, samples, & Logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

____ Drillers Log ____ Drilling time

____ Sample log ____ Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

X Resistivity	___ Gamma ray-neutron
X SP	___ Temperature
X Caliper	X Cement bond
X Other Fluid Travel log (Welex)	

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Same as Tx-28

B. Physical & chemical Description Same as Tx-28

C. Volume 500 gpm

IX. Preinjection waste treatment None

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
All Perforated zones	Acidization	

C. Injection rates and pressures

1. Rate

Date(s) December 1970 Average 195 gpm Maximum 265 gpm

" " " " " "

" " " " " "

" " " " " "

2. Pressure (well head X bottom hole)

Date(s) December 1970 Average 170 psi Maximum 195 psi

" " " " " "

" " " " " "

" " " " " "

" " " " " "

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems: Some channelling occurred outside of the 5 1/2 in. casing

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating procedure

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

Texas Water Commission - Bulletin 6409, 1964

WELL FILE NUMBER WDW-30 / STATE Tx-27 / UMP

I. Operating Company & General Well Location.

E. I. DuPont DeNemours & Co.

P. O. Box 2626

Victoria, Texas

II. Well location (legal description)

location: 4215 ft. from the NW line and 19,740 from the NE line of Desiderio Garcia League Survey, Victoria Co., Texas.

III. History, system planning, construction & operation.

The well was permitted on November 30, 1966 and was completed January 15, 1969. The well has not yet commenced injection. (January 1971).

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on the west Gulf Coastal Plain and the regional dip in that area is approximately 80ft. per mile. The stratigraphic section consists of various sediments of Tertiory and Quaternary ages with the Pleistocene Beaumont Clay outcropping at the well site.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes ____; no X).

(Ground elevation 11.0ft.) (Total well depth 4700ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thick-ness	Lithologic Description
Beaumont	Pleistocene	oft	1000ft.	clay
Lissie	Pleistocene			sand & gravel
Goliad	Pliocene			sand
Lagarto	Miocene			clay
Oakville	Miocene	3000ft.	700ft.	sandstone
Catahoula	Miocene	3700ft.	600ft.	tuff & sandstone

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
Oakville	Miocene	3000ft.	700ft.	sandstone
Catahoula	Miocene	3700ft.	600ft.	tuff & sandstone

*injection zone - 4350 ft. to 4700 ft.

D. Engineering description of injection units

1. Porosity: 30%
2. Permeability: 1045 to 1546 md.
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Beaumont	oft	1000ft.	clay & sand	
Lissie			sand & gravel	

F. Mineral Resources (oil and gas, coal, brines, etc.)

There are no mineral resources reported in the area of the disposal well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing. Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface		H-40 32lb/ft	9 5/8in.	2002ft.	1150sks-Trinity type H + 4% Gel
Intermed.		J-55 ns	5 1/2in.	8356.45ft.	960sks Poz. mix + 4% Gel.
Injection					
Other					

Describe bottom hole completion method: open hole completion

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: _____

VI. Description of surface equipment

A. Holding tanks & flow lines _____

B. Filters parallel leaf filters

C. Pumps _____

D. Other _____

VII. Cores, samples, & Logs

A. Coring

From _____ to _____ Recovery _____

B. Drilling Logs

___Drillers Log ___Drilling time

___Sample log ___Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

X Resistivity	___ Gamma ray-neutron
X SP	___ Temperature
X Caliper	___ Cement bond
___ Other	

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Same as Tx-28

B. Physical & chemical Description Same as Tx-28

C. Volume

IX. Preinjection waste treatment filtration

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s)_____ Average_____ Maximum_____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

2. Pressure (well head _____ bottom hole_____)

Date(s)_____ Average_____ Maximum_____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

X. Well operation & operating history.

D. Description of operating programs: The well is not yet in operation

E. Operating problems:

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating procedure

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Wuality Board

Texas Water Commission - Bulletin 6409, 1964

WELL FILE NUMBER WDW-31 (STATE) Tx-28 (UMR)

I. Operating Company & General Well Location

Mobil Chemical Co.
P. O. Box 3868
Beaumont, Texas 77704

II. Well location (legal description)

Location: 4100ft. from the west line & 5430ft. from the north line of Williams Sigler survey, A-48, Jefferson Co., Texas.

III. History, system planning, construction & operation.

The well was permitted on November 30, 1966 and was drilled and completed in July, 1967. The well is still in operation

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on the Gulf Coastal Plain. The stratigraphic section consists sands, shales, clays and gravels of Miocene to Pleistocene age which dip slightly to the southeast. Pleistocene clay outcrops at the well site.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes ___; no X).

(Ground elevation _____) (Total well depth 6030 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thick-ness	Lithologic Description
Beaumont	Pleistocene	oft	1000ft.	sand and clay
Lissie	Pleistocene			sand
Willis	Pliocene			sand and silt
Goliad	Pliocene			sand
Catahoula	Miocene	3500ft.		sand, silt, & clay

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
Catahoula	Miocene	3500ft.	3200ft.	sand and silt

*injection zone 5932' to 5978ft.

D. Engineering description of injection units

1. Porosity: 34%
2. Permeability: 2360 to 4220 md.
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thick-ness	Character	Chemical Quality
Beaumont	0ft.	100ft.	sand, clay & gravel	fresh water
Lissie				for municiple use

F. Mineral Resources (oil and gas, coal, brines, etc.)

There are no mineral resources reported in the area of the disposal well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing. Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface		J-55 24lb/ft.	8 5/8in.	2521ft.	1
Intermed.		ss 17lb/ft.	5 1/2in.		2
Injection					
Other					

Describe bottom hole completion method: Perforated at 5932 ft. to 5978 ft.

1) 630 sx class H + 8% Gel + 100 sx Densified Incor + .5% CF 12-2, spotted 100 sx Common + 2% CaClz from 100' to surface.
2) 1800 sx Densified Incor + 1% CF12-2 + .2% HR-4.

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: stainless steel wellhead

VI. Description of surface equipment

A. Holding tanks & flow lines 2-10,000 bbl Holding tanks and a concrete catch basin

B. Filters fixed bed anthracite filter

C. Pumps centrifugal injection pump

D. Other

VII. Cores, samples, & Logs

A. Coring

From_____ to_____ Recovery_____

"_____ _____ _____

"_____ _____ _____

"_____ _____ _____

"_____ _____ _____

"_____ _____ _____

B. Drilling Logs

____Drillers Log

_X_ Sample log

____Drilling time

____Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

___ Resistivity	___ Gamma ray-neutron
___ SP	___ Temperature
X Caliper	___ Cement bond
X Other Induction	

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Waste fluid is derived from the production of terephthalic acid.

B. Physical & chemical Description Same as Tx-21

C. Volume 500 gpm

IX. Preinjection waste treatment filtration and settling

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
Injection		Perforated Zone	

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s) December 1970 Average 300 gpm Maximum 342 gpm

" " " "

" " " "

" " " "

" " " "

2. Pressure (well head _____ bottom hole _____)

Date(s) December 1970 Average 660 psi Maximum 710 psi

" " " "

" " " "

" " " "

" " " "

X. Well operation & operating history

D. Description of operating programs: _____

E. Operating problems: No operating problems were reported.

XI. Regulatory aspects.

A. Construction requirements _____

B. Monitoring requirements _____

C. Restrictions on operating procedure _____

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

Texas Water Commission - Bulletin 6305, 1963

WELL FILE NUMBER WDW-32 (STATE) Tx-29 (UMR)

I. Operating Company & General Well Location

Celanese Chemical Co.
P. O. Box 509
Bay City, Texas 77414

II. Well location (legal description)

4,292 ft. south and 2,029 ft. west of a point marked by a 1 1/4 inch galvanized iron pipe located in the NW corner of Celanese Chem. Co. property on the north line of James Moore League, Ab. 62, Matagorda Co., Texas.

III. History; system planning, construction & operation.

The well was permitted on July 3, 1967 and completed during the same month. Due to a poor cement bond, a squeeze job was required. This was done during August, 1967. The operation of the well turned out to be inadequate, and the well was reworked in May, 1969. The well was plugged and redrilled using a whipstock at 3250 ft.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on the west Gulf Coastal Plain and the regional dip in this area is 30 ft. per mile to the east. The stratigraphic section consists of sands, clays and shales of Tertiary and Quaternary ages with the Pleistocene Beaumont clay outcropping in the area.

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included yes___; no X).

(Ground elevation_____) (Total well depth 3553 ')

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
Beaumont	Pleistocene		1300ft.	clay
Lissie	Pleistocene			sand, sandstone and clay
---	Tertiary	1300ft.	11000ft.	sand and shale

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
---	Tertiary	1300ft.	11000ft.	sand and shale

Open hole injection at approximately 3500ft. of depth within the massive Tertiary strata

D. Engineering description of injection units

1. Porosity: 32%
2. Permeability:
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thick. near	Character	Chemical Quality
Beaumont	1300ft.		sand & clay	usable fresh water
Lissie			sand	

F. Mineral Resources (oil and gas, coal, brines, etc.)

There are some producing oil and gas wells in the vicinity of the disposal well. All are reported to be adequately protected.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing. Weight & Grade	Size	Depth Set	Type & Amount of Cement
Surface		H-40-48lb/ft	13 3/8in.	1292ft.	to surface
Intermed.		J-55 40lb/ft	9 5/8in.	3245ft.	
		SS screen	4 1/2in.	3553ft.	gravel packed
Injection		J-55	5 1/2in.		
Other					

Describe bottom hole completion method: Open hole with screen

V. Well design and construction, continued

B. Packers, Centralizers, well-head equipment, etc: stainless steel packer on 9 5/8" at 3,302 ft. TIW "S" Packers on 9 5/8" at 3195'

VI. Description of surface equipment

A. Holding tanks & flow lines 90' x 30' x 8' contaminated water skimmer, 400 million gal surge tank

B. Filters sand filters, polish filters

C. Pumps

D. Other

VII. Cores, samples, & Logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

___Drillers Log ___Drilling time

___Sample log ___Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

___ Resistivity	X Gamma ray-neutron
___ SP	___ Temperature
X Caliper	X Cement bond
X Other Induction log Acoustilog	

VIII. Waste Characteristics

A. Industrial process from which waste is derived

Chemical plant wastes

B. Physical & chemical Description

Compound	wt. %
$C_1 - C_6$	.3
Cyclohexane	.03
Ammonia	.05
HNO_3	.13
$C_1 - C_5$ Mono. Acids	.15
Nylon Salt	.12
Sodium Nitrite	.70
Sodium Nitrate	.60
Sodium Bicaborate	.31
Sodium Carbonate	.06
Saturated Hydrocarb.	.50
Water	97.00
Temp.	100°F
pH	6.5 - 7.5

C. Volume 400 gpm

IX. Preinjection waste treatment pH is adjusted to 7.0, the waste liquid is skimmed and filtered.

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
Injection	7 hr.	Perforated zone	

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s) December 1970 Average 274 gpm Maximum 359 gpm

" " " "

" " " "

" " " "

2. Pressure (well head X bottom hole)

Date(s) December 1970 Average 406 psi Maximum 441 psi

" " " "

" " " "

" " " "

" " " "

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems: No problems were reported

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating procedure

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER WDW-33 / STATE Tx-30 / UMR

I. Operating Company & General Well Location

Celanese Chemical Co.
121 Beta Bldg.
16915 ElCamino Real
Houston, Texas

II. Well location (legal description)

George B. McKinstry Harris Co., Texas
Abstract A-47 - 10,200' from east line, 2,850 from south line, Elev. 19' k.b. 31', 2000' inland from end of Bayport Deepwater Port of Houston Ship Channel.

III. History, system planning, construction & operation.

Application made April 26, 1967
Permit issued July 27, 1967
Drilling begun August 3, 1967; Surface Casing run on August 5, T.D. 5512 on August 8, 1967
Operation began October 31, 1967

IV. Geology & Geohydrology

A. Regional geologic setting: Strata dip east at the well location. The Clear Lake field 1 1/2 miles west is situated on a complexly faulted salt dome. Geologic cross sections and a structure map are in Water Quality Board Files.

B. Geologic description of rock units penetrated by well Rock Unit (Geologic Column included -yes____; no____).
(Ground elevation_____) (Total well depth_____)
Datum for depth measurement_____

Name	Age	Depth (top)	Thick-ness	Lithologic Description
Beaumont Clay	Pleistocene	outcrops		outcrop - clayey soil
Altaloma	"			sand
Lissie	"			interbedded sand, sandy clay and clay
	Pliocene & Miocene (well T.D. 5,512in Miocene sands)			
Frio	Oligocene	6050 to 6450		oil producing sand

C. Geologic Description of injection units & possible units not in use

Rock Unit Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
	Miocene	5250-5550		sands - the 1000ft. of strata immediately above the base of the Miocene contains several hundred ft. of sands. The sandy zone is widely distributed, but individual beds are not regionally correlatable.

D. Engineering description of injection units

1. Porosity: ~ 30%
2. Permeability: ~ 330 md
3. Original Reservoir Pressure: DST with packer 5,163-5,178 final shut in pressure 2,327 psi
4. Reservoir Temperature:
5. Chemical Character of Formation Water: From Clear Lake Field 1944 TDS 105,300ppm; Cl^- 63,000ppm; Na^+ 35,200ppm, Ca^{++} 3,500ppm; Mg^{++} 930ppm; pH 7.5
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology, fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
	to 1450'		Unconsolidated sand of Pleistocene and Pliocene age	Fresh to slighely saline may be hard and contain iron

F. Mineral Resources (oil and gas, coal, brines, etc.)

Clear Lake oil field is 1 1/2 miles west. Occurs on a salt dome.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & Grade	Size	Depth Set	Type & Amount of Cement
Surface	15 "	32.75# H-40 STC	10 3/4"	1575'	550s.Howco Lt.Wt.
Intermed.	9 7/8"	23# J-55 LT&C	7 "	5512"	860s. Mary Neal Inc. 50/50 with Pozmix A ~~Circulated to surfa~~
Injection		Liner-Carpenter#20	4 1/2"OD	5201-5450"	30s. cement
Other		Fibercast Chemical heavy Wall	1/2"	5149'	
~~Other~~		~~Conductor~~	20 "		

Describe bottom hole completion method:

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: 4 Permoco type # Centralizers, cemented w/650 sacks Howco Lt. Wt. cement + 100 sacks common weight cement, 2% $CaCl_2$ in both cements.

46 scratchers + 23 Centralizers

VI. Description of surface equipment

A. Holding tanks & flow lines

B. Filters Diatomaceous earth plate cartridge filter

C. Pumps 1 for normal use, 1 booster, + 1 spare

D. Other All equipment will be of 1) alloy 20 stainless, 2) Epoxy coated fiberglass, 3) Polypropolene, 4) teflon, 5) penton.

VII. Cores, samples, & Logs

A. Coring

From 4557 to 5460 Recovery

" 43 sidewall cores

"

"

"

"

B. Drilling Logs

Drillers Log

Sample log

Drilling time

Other:

VII. -- Cores, samples, & logs, continued

C. Other logs run

___ Resistivity	_X_ Gamma ray-neutron Q-1447
___ SP	___ Temperature
___ Caliper	_X_ Cement bond Q-1446
___ Other Sonic; Induction; (schlumberger)	

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Production of acetaldehyde & other petrochemicals

B. Physical & chemical Description pH ~5

water 96.6%

chlorinated aldehydes 1.9%

chlorinated acetic acid 1.3%

chlorinated acetaldehye 0.2%

C. Volume 72,000 - 500,000 gpd

Proposed IX. Preinjection waste treatment adjust pH to 5: filter through diatomaceous earth plate filter; filter through cartridge filter

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
5349-5389	perforated	160 shots
"	acidized perfs	
	sand fractured	

C. Injection rates and pressures

1. Rate

Date(s)	Oct. '67	Average	82gpm	Maximum	60-295gpm
	Jun. '70	"	218gpm	"	140-251gpm
"		"		"	
"		"		"	
"		"		"	

2. Pressure (well head _____ bottom hole _____)

Date(s)	Oct. '67	Average	125psig	Maximum	150-495psi
"	Jun. '70	"	321psig	"	249-433psi
"		"		"	
"		"		"	
"		"		"	

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems: Well sanded up after perforating and was alternately washed and tested from 9/10-9/24/67 until it was cleaned out. The well was then sand fractured.

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating pressure: 1. Authorization is for use of Miocene sands at 4500-5400 ft. 2. Max. surface pressure 1,500 psig. 3. The annulus will be kept at a pressure slighly above the injection pressure and monitored. 4. A monitoring well will be completed in the Miocene sands for pressure monitoring. 6. Bottom hole pressure tests will be conducted at 6 month intervals.

XII. Economics

A. Total and unit costs of construction _____

B. Operating costs _____

XIII. Source(s) of Information and Published References _____

Texas Water Development Board File No. Q-1446 & 47

WELL FILE NUMBER WDW-34 (STATE) Tx-31 (UMR)

I. Operating Company & General Well Location

GAF Corporation

P. O. Box 2141

Texas City, Texas 77011

II. Well location (legal description)

Location: John Lytle Survey-Galveston County, Texas. 2800 ft. from the north line and 2060 ft. from the east line.

III. History, system planning, construction & operation.

The well was permitted on October 16, 1967 and the long string was run January 5, 1968. Operation began in April 1968 and has continued to the present.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on the Gulf Coastal Plain and the regional dip in the area is 125 ft. per mile to the southeast. The stratigraphic section consists of Tertiary and Quaternary sands, shales, and clays.

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes____; no____).
(Ground elevation 7 ft.) (Total well depth 4145 ft.)
Datum for depth measurement M. S. L.

Name	Age	Depth (top)	Thickness	Lithologic Description
Beaumont	Pleistocene	943ft.	950ft.	sand and clay
Lissie	Pleistocene		750ft.	massive sand
Goliad	Pliocene			sand
Lagarte	Miocene			clay
Oakville	Miocene		400ft.	sandstone

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Oakville	Miocene		400ft.	massive, widespread sands

D. Engineering description of injection units

1. Porosity: 30%
2. Permeability: 23 to 1478 md.
3. Original Reservoir Pressure: 1835 lb. @ 4060 at.
4. Reservoir Temperature:
5. Chemical Character of Formation Water: Connate water: + DS - 116, 832 ppm, pH = 6.87, Cl^- = 71,000 Na^+ 40,330, Mg^{++} 986, Specific Gravity = 1.08
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Beaumont	943ft.	950ft.	sand & clay	TDS - 905 ppm

F. Mineral Resources (oil and gas, coal, brines, etc.)

Dickinson - Gillock Oil Field - 2-3 miles west is producing from Frio Fm. below 8,000 ft.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface		48lb/ft	[illegible]/8in.	1043ft.	520sks + 39 gel.
Intermed.		H-40 + J-55	9 5/8in.	3624"	717sks + 54 gel.
		*Carbon Steel	4 1/2"	3351"	
Injection		Stainless Steel	5 9/16"	3370-4070'	
		Screen-234ft. @	3686-3757, 3767-3807, 3816-3838', 3927-3948', 3996'-4016'		
Other		*Bottom 40 ft. of 9 5/8 in. casing			

Describe bottom hole completion method: Gravel packed screen

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: 20 hinged centralizers, 2 positive grip stop collars in 9 5/8", and 50 pipe wipers on 13 3/8 inch. Well head - standard christmas tree with pressure gauges.

VI. Description of surface equipment

A. Holding tanks & flow lines Small holding pond lined with hydromat

B. Filters Polishing filter

C. Pumps Centrifugal - size unknown

D. Other

VII. Cores, samples, & Logs

A. Coring - Sidewall

AT	3712'	TO 3891'	Recovery Full
"	3735'	3952'	
"	3755'	4005	
"	3793'	4035'	
"	3809'	10 other cores	
"	3845'	taken-no descript	

B. Drilling Logs

X Drillers Log

Sample log

Drilling time

Other:

VII. -- Cores, samples, & logs, continued

C. Other logs run

X Resistivity	___ Gamma ray-neutron
X SP	___ Temperature
___ Caliper	___ Cement bond
X Other Microlog	

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Chemical plant

B. Physical & chemical Description Water - 98.7% All in ppm - Ammonia 2642, Butyric Acid 11, Tetrahydrofuron 518, Butyrolactone 425, Butonediol 918, Butgl Alcohol 92.4, Benzene 420, Methanel 2305, Propargy Alcohol 499, Formaldehyde 500, Acetglene 96.1, Pyrolidone 268, vinyl pyrrolidone 498, Lights 104, C_2S 122, NaOH 1297, H_2SO_4 2397, HCl 25.8, Gunk 114

C. Volume 140 gpm

IX. Preinjection waste treatment Filtering and pH control

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
Injection	22 1/2hr.	3686-4118ft.	fresh water test
Injection	10	3686-4118ft.	fresh water test
Injection	25	3686-4118ft.	effluent

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s)	Average	Maximum
September 1970	75 gpm	100 gpm
October 1970	124 gpm	200 gpm
November 1970	120 gpm	200 gpm
December 1970	120 gpm	200 gpm
"	"	"

2. Pressure (well head X bottom hole)

Date(s)	Average	Maximum
December 1970	500	500
"	"	"
"	"	"
"	"	"
"	"	"

H. Well operation & operating history

D. Description of operating programs: ...

E. Operating problems: No operating problems were reported.

I. Regulatory aspects.

A. Construction requirements Casing 1) One string (new) through fresh water strata. 2) One string to top of injection zone. 3) Injection tubing. 4) 1000 psi pressure test. 5) Two strings cemented to surface.

B. Monitoring requirements

C. Restrictions on operating procedure Injection - less than 1500 psig. Pressure gauges required

XII. Economics

A. Total and unit costs of construction _____

B. Operating costs _____

XIII. Source(s) of Information and Published References _____

Texas Water Quality Board

WELL FILE NUMBER WDW-35 STATE TX-32 UMR

I. Operating Company & General Well Location

Phillips Petroleum Company
P.O. Box 358
Phillips, Texas

II. Well location (legal description)

Location: 84.16 ft. from the west line and 836.22 ft. from the South line of Texas & New Orleans R.R. Survey, Block 2-T, Sec. 38, Moore Co., Texas

III. History; system planning, construction & operation.

The well was permitted on February 29, 1968 and was completed and began operating during July, 1969. Due to extensive corrosion of the long string, the well was abandoned and plugged on September 17, 1970. The permit was then cancelled.

IV. Geology & Geohydrology

A. Regional geologic setting:

The topography is the rolling plains of northern Texas. Tertiary beds outcrop in the area in the form of limy caliche and coarse grained sand.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes x ; no).

(Ground elevation) (Total well depth 4270 ft)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thick-ness	Lithologic Description
see attachment				

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
Council Grove		3862 ft.	400 ft.	crystalline limestone and shale

D. Engineering description of injection units

1. Porosity:
2. Permeability:
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Extremely high nitrate concentrations in the fresh water				

F. Mineral Resources (oil and gas, coal, brines, etc.)

Brown Dolomite, a gas producing formation, is found at 3,100 ft. in the area of the disposal well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing: Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface	13 3/4 in.	J-55 40.5lb/ft.	10 3/4	1617 ft.	to surface
Intermed.	9 7/8 in.	J-55 20lb/ft	7 in	4270 ft.	to 3050 ft.
Injection	2.116/ft.	fiberglass	3 1/2 in.	3975 ft.	
Other					

Describe bottom hole completion method:

Perforated at 3932' to 3960', 3990' to 4000', 4052' to 4076', 4126' to 4144', and 4204' to 4220'

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: Packer at 3800 ft.

VI. Description of surface equipment

A. Holding tanks & flow lines

B. Filters

C. Pumps

D. Other

VII. Cores, samples, & Logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

x Drillers Log

___ Sample log

___ Drilling time

___ Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

x Resistivity	___ Gamma ray-neutron
x SP	___ Temperature
x Caliper	x Cement bond
x Other Sonolog	

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Chemical plant waste

B. Physical & chemical Description

Ca	57 mg/l	Si	22 mg/l
Mg	25 "	Cl	99 "
Na	21 "	SO_4	35 "
K	4 "	Fl	1.2 "
NH_3	977 "	Nitrate	4400 "
P	50.2 "	pH	7.2
$(CO3)_2$	183 "	TDS	5730

C. Volume

IX. Preinjection waste treatment

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results

C. Injection rates and pressures

1. Rate

Date(s)		Average		Maximum	
	Jan. 1970		52.0 gpm		89.5 gpm
	Feb. 1970		44.5 "		82.0 "
"	Mar. 1970	"	21.0 "	"	63.0 "
"	Apr. 1970	"	25.0 "	"	69.0 "
"	May 1970	"	18.8 "	"	24.0 "

2. Pressure (well head x bottom hole)

Date(s)		Average		Maximum	
	May 1970		Gravity		
"	Jan 1970	"	Gravity	"	
	Feb 1970	"	Gravity	"	
	March 1970	"	Gravity	"	
	April 1970	"	Gravity	"	

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems:

The 7 inch long string collapsed from extensive corrosion

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

Restrictions on operating procedure

XII. Economics

A. Total & unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER WDW-36 / STATE TX-33 / UMR

I. Operating Company & General Well Location

Arco Chemical Company (formerly Sinclair Petrochemicals, Inc.)
P.O. Box 777
Channelview, Texas 77530

II. Well location (legal description)

Location: 2000 ft. east of the west corner of the Amy White Survey, Ab. 81, along the south line of John Jones Survey, Ab. -483, then north at a right angle 1,720 ft. to a point in the Jones survey, Harris, County.

III. History, system planning, construction & operation.

The well was permitted on March 29, 1968 after a field inspection during February, 1968. It was completed and began operation in March 1969 and is still in operation. The permitted zone is 5550 ft to 6950 ft. The zones used for injection are 6750 ft. to 6772 ft. 6865 ft. to 6875 ft., and 6706 ft. to 6778 ft.

IV. Geology & Geohydrology

A. Regional geologic setting:

The well is located on the Gulf Coastal Plain. Beds dip regionally toward the southeast at 50 to 60 ft. per mile, with many smaller structures superimposed on the regional monocline. Beds at the surface are Quaternary age, with a thick underlying sequence of Tertrary strata.

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes ___; no x).

(Ground elevation _____) (Total well depth 7100 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
Beaumont-Lissie	Pleistocene		1000 ft.	Sand and Clay
Willis	Pliocene			Sand
Goliad	Pliocene			Sand and Clay
Lagarto	Miocene			Clay
Oakville	Miocene			Sand
Catahoula	Miocene	4100 ft.	200 ft.	Sand and Clay
Frio	Eocene	4300 ft.	2600 ft.	Sand and Clay

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Frio	Eocene	4300 ft.	2600 ft.	Sand and Clay

D. Engineering description of injection units

1. Porosity: 28-30% (see attachment)
2. Permeability: 400 to 500 md (see attachment)
3. Original Reservoir Pressure: _____
4. Reservoir Temperature: 145°F
5. Chemical Character of Formation Water: _____

Salt water bearing sand

6. Reservoir Fracture Pressure: _____

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Beaumont-Lissie	0	1000 ft.	Sand & Clay	Usable fresh water
Willis	3200 ft.		Sand	Usable fresh water

F. Mineral Resources (oil and gas, coal, brines, etc.)

Oil is produced in the area in the North Channelview Oil Field located approximately one mile southeast of the original well site.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing. Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface	22 in.	J-55 65 lb/ft	16 in.	2013 ft.	cemented to surfac
Intermed.	14 3/4 in	J-55 45.5 lb/ft	10 3/4	3850 ft.	cemented to surfac
	9 3/4 in	N-80 29.7 lb/ft	7 5/8	6960 ft.	cemented to surfac
Injection	Hydril		4 1/2	6494 ft.	

Other

Describe bottom hole completion method:

perforated completion

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc:

Baker Model "DA" packer set at 6740 ft.

Pressure gauges in well head, annulus, and tubing

VI. Description of surface equipment

A. Holding tanks & flow lines

API separator, 200 ft. x 200 ft. holding pond with a secondary skimmer, and a coagulator

B. Filters

2 sand filters with 78.5 square feet per filter

C. Pumps 785 gpm backwash pump

D. Other All equipment is constructed of Alloy 20 or fiberglass. The system has cathodic protection.

VII. Cores, samples, & Logs

A. Coring - sidewall - see attachment

From	to	Recovery
"		
"		
"		
"		
"		

B. Drilling Logs

____Drillers Log ____Drilling time

____Sample log ____Other:

VII. -- Cores, samples, & logs, continued

C. Other logs run

x Resistivity	x Gamma ray-neutron
x SP	___ Temperature
___ Caliper	___ Cement bond
x Other Formation Density	

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Waste liquid from a petrochemical plant operation

B. Physical & chemical Description

Sodium hydroxide 645 ppm, Sulfuric Acid 506 ppm, sodium carbonate 367 ppm, sodium acetate 1936 ppm, acetic acid 163 ppm, sodium phthalate 233 ppm, methyl ethyl ketone 248 ppm, water and other organics make up the remainder.

C. Volume 400 gpm

IX. Preinjection waste treatment

pH control, filtration skimming of oil, and addition of Sinclair S-11 to prevent calcium and borium sulfate scale.

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
Frio	Buffer injection	fresh water
see operating problems		

C. Injection rates and pressures

1. Rate

Date(s)	12-1970	Average	297 gpm	Maximum	320 gpm
"	7-1970	"	152 gpm	"	450 gpm
"	4-1970	"	259 gpm	"	295 gpm
"	1-1970	"	237 gpm	"	295 gpm
"	7-1969	"	76 gpm	"	80 gpm

2. Pressure (well head x bottom hole)

Date(s)		Average	920 psi	Maximum	1360 psi
"		"		"	
"		"		"	
"		"		"	
"		"		"	

X. Well operation & operating history

D. Description of operating programs:

Injection is constant with the rate varying

E. Operating problems:

The pressure increased requiring acidization as follows: June 11, 1969 acid frac., March 5, 1970-acid, 3000 gal. 15% HCl and 3000 gal. 3% HF, July 27, 1970-600 gal. N-Hexanol, 1000 gal. HCl and s000 gal. HF, September 21, 1970- 3000 gal of 20% citric acid, 1000 gal 3% HF, 1000 gal HCl, and October 30. 1970-3000 gal. 15% HCl, 3000 gal. 3%

XI. Regulatory aspects.

A. Construction requirements

Surface and intermediate casing must be cemented to the surface

B. Monitoring requirements

Restrictions on operating proced

Injection rate is limited to 400 gpm.

XII. Economics

A. Total & unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER WDW-38 (STATE) TX-34 (UMR)

I. Operating Company & General Well Location

Coastal State Gas Producing Co.
Lincoln Liberty Building
Houston, Texas 77002

II. Well location (legal description)

Location: 1,600 ft. from the west line and 2325 ft from the south line of the David White Survey, Ab. 884, Harris County, Texas. (Within Houston city limits; on Almeda Rd, 1 1/2 mi. SW of Pierce Junction at the intersection. At the Intersection of Holmes & Almeda

III. History, system planning, construction & operation.

The well was permitted on April 19, 1968 and was completed May 15, 1968. The first injection test was performed on the well on July 30, 1968. The well has been in operation since completion.

IV. Geology & Geohydrology

A. Regional geologic setting:

The well is located on a structural uplift created by a salt piercement dome. The dome has a cap rock that consists of dolomite, limestone, gypsum, and anhydrite.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included--yes____; no x).

(Ground elevation_____) (Total well depth 950 ft.)

Datum for depth measurement Ground surface

Name	Age	Depth (top)	Thickness	Lithologic Description
Beaumont Clay	Pleistocene	surface	800 ft.	Sand & shale with the fresh water base at 500'

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Caprock		800 ft.	300 ft.	dolomite, limestone, and anhydrite

D. Engineering description of injection units

1. Porosity: High
2. Permeability: High
3. Original Reservoir Pressure:
4. Reservoir Temperature: 90°F.
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
	0-500 ft.		lenticular beds of medium to fine grained sand.	

F. Mineral Resources (oil and gas, coal, brines, etc.)

Oil and gas are produced on the flanks of the dome below 3800 ft. The disposal well is 1/4 mile from the nearest producing well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing: Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface		Conductor pipe	16 in.	40 ft	Driven
Intermed.	15 in		10 3/4"	810 ft	Cemented to Surface
Injection	9 7/8 in.	810' - 950'	7 5/8"		
Other					

Describe bottom hole completion method:

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: _____

Tubing packer set at 790 ft. inside 10 3/4

VI. Description of surface equipment

A. Holding tanks & flow lines _____

B. Filters _____

C. Pumps _____

D. Other _____

VII. Cores, samples, & Logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

___Drillers Log ___Drilling time

___Sample log ___Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

x Resistivity	___ Gamma ray-neutron
___ SP	___ Temperature
x Caliper	___ Cement bond
x Other Nuclear fluid interface log	

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Leaching operation into the salt to create space for LPG storage

B. Physical & chemical Description

	Min.	May
Calcium Bicarbonate	920 ppm	920 ppm
Calcium Sulfate	2000 "	8000 "
Magnesium Sulfate	300 "	600 "
Magnesium Chloride	1700 "	6000 "
Sodium Chloride	985,000 "	995000 "

C. Volume Average 420 gpm

Maximum 560 gpm

IX. Preinjection waste treatment

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
810 ft to 950 ft.	Acidization	1000 gal. of 23% HCl

C. Injection rates and pressures

1. Rate

Date(s)	Average	Maximum
"	"	"
"	"	"
"	"	"
"	"	"

2. Pressure (well head _____ bottom hole _____)

Date(s)	Average	Maximum
"	"	"
"	"	"
"	"	"
"	"	"

X. Well operation & operating history

D. Description of operating programs: The well is to operate as long as salt is being dissolved out of the LPG storage cavity. Therefore, the well should be temporary.

E. Operating problems:

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

Restrictions on operating procedure: 1) Surface injection pressure is limited to 275 psi 2) Bottom hole pressure tests must be conducted every 6 months

XII. Economics

A. Total & unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

ELL FILE NUMBER WDW-39 (STATE) Tx-35 (UMR)

I. Operating Company & General Well Location

San Patricio Municipal Water District

P. O. Drawer S. Ingleside, Texas

II. Well location (legal description)

Location: 2,300 ft. from north line & 30 ft. from the west line, T. T. Williamson Survey, Abstract 293, San Patricio County, Texas. About 2 1/2 miles WNW of Ingleside, Texas

II. History, system planning, construction & operation.

The well was permitted on June 11, 1969 and is presently in operation.

V. Geology & Geohydrology

A. Regional geologic setting: Formations dip southwest, toward Corpus Christi Bay, which is about 3/4 mile south. Dips range from 10 to 40 ft./mile.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes____; no____).

(Ground elevation_____) (Total well depth 20 ft.____)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
Dune deposits	Recent	Surface	Combined	Sand and Clay
Beaumont	Pleistocene?		Thickness 20 ft.	

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Dune deposits	Recent		Combined	Sand & Clay
Beaumont Clay	Pleistocene		Thickness 20 ft.	Lenticular sands with clay & grave

D. Engineering description of injection units

1. Porosity:
2. Permeability:
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
No known fresh water in the immediate vicinity				

F. Mineral Resources (oil and gas, coal, brines, etc.)

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing: Weight & grade	Depth Set	Type & Amount of Cement
Surface	24 in.	4 in I.D. perforated	20'	None*
Intermed.		casing		
Injection				
Other	* Casing-annulus is filled with very coarse aggregate			

Describe bottom hole completion method: open hole completion

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: Cast iron cover over the well. The effluent enters the well through cast iron pipe below ground.

VI. Description of surface equipment

A. Holding tanks & flow lines

B. Filters

C. Pumps

D. Other

VII. Cores, samples, & Logs

A. Coring

From ____ to ____ Recovery ____

" ____ ____ ____

" ____ ____ ____

" ____ ____ ____

" ____ ____ ____

" ____ ____ ____

B. Drilling Logs

___Drillers Log

___Sample log

___Drilling time

___Other: ____

VII. -- Cores, samples, & logs, continued

C. Other logs run

____Resistivity ____Gamma ray-neutron

____SP ____Temperature

____Caliper ____Cement bond

____Other _____

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Wash down operation in water treatment plant

B. Physical & chemical Description

Fresh water which will occasionally contain some excess chlorine that may spill from the chlorinator

C. Volume < 50 gpd

IX. Preinjection waste treatment None

X. Well operation & operating History

A. Tests

Type	Duration	Zones tested	Description of test results

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results

C. Injection rates and pressures

1. Rate

Date(s) March 18, 1970 Average 40 gpd Maximum 50 gpd

" " " " " "

" " " " " "

" " " " " "

" " " " " "

2. Pressure (well head _____ bottom hole _____)

Date(s) _____ Average _____ Maximum _____

" " " " " "

" " " " " "

" " " " " "

" " " " " "

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems:

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

Restrictions on operating procedure

Authorization is for use of Recent dunes or Beaumont Clay Fm. at 0-20 ft.

XII. Economics

A. Total & unit costs of construction

B. Operating costs

III. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER WDW 41 (STATE) Tx-36 (UMR)

I. Operating Company & General Well Location

Duvall Corp.
P. O. Box 1507
Fort Stockton, Texas 79735

II. Well location (legal description)

Location: 1500 ft. north of south line and 1077.8 ft. west of the east line, sec. 589, G.C. & S.F. R.R. Survey, Abstract 3008, Pecos County, Texas

III. History, system planning, construction & operation.

The well was permitted on August 23, 1968 and began operating soon after it was permitted. The well is presently in operation.

IV. Geology & Geohydrology

A. Regional geologic setting:

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes____; no X).
(Ground elevation_____) (Total well depth 650 ft.)
Datum for depth measurement Ground Surface

Name	Age	Depth (top)	Thick-ness	Lithologic Description
Pecos Aquifer	Cret.	Surface	188'	Sand, caliche, & gravel
Red Beds	Permian	188'	112'	Red shale
Rustler	Permian	300'	125'	Anhydrite and limestone
Castile	Permian	425'	213'	Cavernous limestone and sulfur

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
Castile	Permian	425'	213"	Porous limestone and sulfur

D. Engineering description of injection units

1. Porosity:
2. Permeability:
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water: Abundant sulfur compounds in solution
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
No fresh water in the immediate vicinity				

F. Mineral Resources (oil and gas, coal, brines, etc.)

Production of oil in 4 nearby Fields; 1) Heiner field-1/2 mile N.W. 2) Heiner Sould Field -3/4 mile south 3) Pecos Valley Field-1 1/2 mile N. E. & 4) Henderson-Pecos Field-3 miles west.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing: Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface		J-55 28lb/ft. T&C	8 5/8in.	400ft.	cemented to surface
Intermed.					
Injection		J-55 24lb/ft. T&C	6 5/8in.	425ft	
Other					

Describe bottom hole completion method: open hole completion

V. Well design and construction, continued

B. Packers, Centralizers, Well head equipment, etc: _____

Packer set at 395ft. in 6 5/8in. casing.

VI. Description of surface equipment

A. Holding tanks & flow lines _____

B. Filters _____

C. Pumps _____

D. Other _____

VII. Cores, samples, & Logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

____Drillers Log

____Sample log

____Drilling time

____Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

___Resistivity	___Gamma ray-neutron
___SP	___Temperature
___Caliper	___Cement bond

___Other_____

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Water softening operations - water from San Andreas Limestone.

B. Physical & chemical Description Water is a slurry consisting of an estimated 10-20% $CaCO_3$ precipitate in suspension. Principle constituents are in the table on the back of page 5.

C. Volume 350 to 400 gpm

12,000-13,700 bpd for an estimated 10 years

IX. Preinjection waste treatment Soda Ash is mixed to precipitate dissolved calcium as $CaCO_3$. Sodium sulfate is the soluble by-product. The process decreases the hardness but does not significantly lower the total dissolved solids.

Analysis of Slurry
ppm

pH	7.9
Total Dissolved Solids	5100
Total hardness as $CaCO_3$	1170
Silica	17
Calcium	66
Magnesium	246
Sodium	1330
Bicarbonate	353
Sulfate	2300
Chloride	980
Fluoride	1.5
Nihate	<0.4
Spec. Cond. (micromhos/cm^3)	6350
Total Suspenable Solids	32900

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results

C. Injection rates and pressures

1. Rate

Date(s)	Average	Maximum
"	"	"
"	"	"
"	"	"

2. Pressure (well head _____ bottom hole _____)

Date(s)	Average	Maximum
"	"	"
"	"	"
"	"	"
"	"	"

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems: Plugging occurred after 45 minutes of injection - reason was not given.

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

Restrictions on operating [illegible] 1) Authorization only for Castile Fm. 2) [illegible] fresh water 3) Bottom hole pressure tests will be conducted every 6 months.

II. Economics

A. Total and unit costs of construction _____

B. Operating costs _____

III. Source(s) of Information and Published References _____

Texas Water Quality Board

WELL FILE NUMBER WDW 44 (STATE) Tx-37 (UMR)

I. Operating Company & General Well Location

U.S. Peroxygen Division, Argus Chemical Corp., Subsidary of Witco Chemical Co., Inc. P. O. Box 458, Marshall Texas 75670

II. Well location (legal description)

Location: 2883 ft. from the east line and 500 ft. from the south line of J. E. Fields Survey, Harrison County, Texas

III. History; system planning, construction & operation.

The well was permitted on September 30, 1968 and completed during October 1968. The injection began during November, 1968 and has continued to the present.

IV. Geology & Geohydrology

A. Regional geologic setting: Tertiary and cretaceous sediments dip to the N. W. toward the axis of the East Texas Basin. The dip is 50-60 ft./mile.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes ____; no X).
(Ground elevation _____) (Total well depth 3900 ft.)
Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thick-ness	Lithologic Description
Nacatoch	U. Cret.		1560 +	soft, chalky, glauconiticy fine to med. ss - fossil.
Blossom	U. Cret.		2410'-2440'	soft, coarse ss with calc. cement & interbeded sh.
Lower Paluxy	L. Cret.		3770'-3810	hard sand interspersed with sh. and ved beds

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
Nacatoch	U. Cret.		1560 +	soft, chalky, glauconiticy fine to med. ss - fossil.
Blossom	U. Cret.		2410'-2440'	soft, coarse ss with calc. cement & interbeded sh.
Lower Paluxy	L. Cret.		3770'-3810	hard sand interspersed with sh. and ved beds

D. Engineering description of injection units

1. Porosity: Nacatoch-(20-25%)Blossom(25%)L.Paluxy(25%)
2. Permeability: Nacatoch(.1-100md)Blossom(very high)L.Pal.(25
3. Original Reservoir Pressure: _____
4. Reservoir Temperature: Nacatoch 105°F Blossom 120°F L. Paluxy 145°F
5. Chemical Character of Formation Water: _____
6. Reservoir Fracture Pressure: Gradient range from .62 psi/ft - /73 psi/ft

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Wilcox	387ft.			usable water @ 400,000 9pd

F. Mineral Resources (oil and gas, coal, brines, etc.)

The plant site is located in the Woodlawn Gas Field. All wells within 2 1/2 mile radius are equipped with adequate surface casing which protects the fresh water strata.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing. Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface		J-55 20lb/ft.	[illegible] in	670ft	285 sks-[illegible]-2% Ca[illegible]
Intermed.		J-55 14lb/ft.	5 1/2in	3922ft	950 sks-50-50 Pozmix (to [illegible]
Injection tubing		J-55 E.U.E. 4.7lb	2in	3663ft	
		5 1/2in 17lb/ft internally coated with TK-75 from 2312 to 2567' and from 3625' to 3621ft.			
Other					

Describe bottom hole completion method: perforated completion

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc:
Packer-Baker Model "AD" fiberglass hybrid tension at 3922ft.

VI. Description of surface equipment

A. Holding tanks & flow lines Polymer storage tanks (3)
The disposal tank has a liquid level control switch.

B. Filters Clear filter

C. Pumps

D. Other

VII. Cores, samples, & Logs

A. Coring - sidewall

ATX Frac	2990'	to 2490'	Recovery
"	3892.5'	[illegible]	
"	3843'	[illegible]	
	3805'	[illegible]	
"	3613'		
"	3513'		

B. Drilling Logs

___ Drillers log ___ Drilling time

___ Sample log ___ Other:

VII. -- Cores, samples, & logs, continued

C. Other logs run

____Resistivity ____Gamma ray-neutron

____SP ____Temperature

____Caliper ____Cement bond

____Other

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Water by-products of a peroxide manufacturing process.

B. Physical & chemical Description Volume of water = 1 liter

Organic Peroxide	126.3 grams
Mixed Salts	148.3 grams
30% H_2O_2	107.5 grams
95% H_2SO_4	175.0 grams
pH	Zero

See back of page 5

C. Volume .262bpm - average @ 0-100 psig

.714bpm - maximum @ 800 psig

IX. Preinjection waste treatment Oil skimmer and clear filter

Composition & Character of the Waste

Chemical	Annual lb/day	Average ppnn.	24 Hr. lb/day	Max. pym.
Inorganic				
water	123810		260906	
sodium Chloride	5325	43000	11440	92500
sodium sulfate	6554	53000	34285	277000
sulfunic acid	2575	20800	9600	77500
hydrochloxic acid	1100	8800	6028	48700
hydrogen peroxide	1000	8080	3381	27300
Total Inorganic	16554	133760	Not Additive	
Organic				
Ketones	154	1245	1380	11300
Esters	32	240	240	1940
Alcohol	694	5280	2320	18770
Organic Peroxide	805	6500	4060	32800
Organic Acids	3244	26240	5800	46900
Other	155	1252	5232	42200
Total Organics	5274	42560	Not Additive	
TOTAL NON-AQUEOUS	21830	176320		

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
Injection		3834'-3836'	
"		3842'-3850'	1.5 bpm of 250 lb.
		3852'-3860'	surface pressure

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results

C. Injection rates and pressures

1. Rate

Date(s) January, 19[illegible] Average 30 gpm Maximum

" December, 19[illegible] " " "

" January, 19[illegible] " " "

" " " "

" " " "

2. Pressure (well head bottom hole)

Date(s) Average Maximum

" " "

" " "

" " "

" " "

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems:

XI. Regulatory aspects.

A. Construction requirements 1) Surface casing tested at 1000 psi for 12 hours after cementing 2) Long string - at 1500 psi for 12 hours

B. Monitoring requirements

Restrictions on operating procedure Limits on injection pressure: 1) 1500 psig - Paluxy (3600') 2) 1000 psig - Blossom (2800') 3) 700 psig for the Nacatoch (1600')

XII. Economics

A. Total & unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER WDW-45 (STATE) Tx-38 (UMR)

I. Operating Company & General Well Location

Celanese Chemical Co.
P. O. Box 58009
Houston, Texas 77058
Well No. 2

II. Well location (legal description)

Location: 10,400 ft. southwest along the SE line and 3750 ft. north on George B. McKinstry Survey, Abstract 47, Harris County, Texas. Elevation 19 ft.

III. History, system planning, construction & operation.

The well was permitted December 9, 1968 and injection began in June, 1969. The well is still in operation.

IV. Geology & Geohydrology

A. Regional geologic setting: Same as Tx-33

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included--yes____; no____).

(Ground elevation 19 ft.) (Total well depth 5560 ft.)

Datum for depth measurement Mean Sea Level

Name	Age	Depth (top)	Thickness	Lithologic Description
Same as Tx-33				

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Catahoula	Miocene	4600ft.	800ft.	well developed sand

D. Engineering description of injection units

1. Porosity: 28-33%
2. Permeability: 400-500 md
3. Original Reservoir Pressure: 2395 psig
4. Reservoir Temperature: 133°
5. Chemical Character of Formation Water: TDS-105,300ppm, Cl^- 63,000ppm, Na^+ 35,200ppm, Ca^{++} 35,000ppm, Mg^{++} 930ppm, pH 7.5
6. Reservoir Fracture Pressure:

E. Geohydrology, fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality

F. Mineral Resources (oil and gas, coal, brines, etc.)

Clear Lake oil field is 1 1/2 miles west. The petroleum and natural gas from this field is produced from a salt dome.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing. Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface	18 5/8"	H-40	54 lb/ft	1362 ft.	(1)
Intermed	12 1/2"	J-55	40.5 lb/ft	5130 ft.	(2)
	12 1/2"	Carpenter 20	8 5/8"	5191 ft	476 sacks
Injection		Fiberglass casing	6 5/8"	5140 ft.	
Liner	14 "	5140' - 5230 '	4 1/2"		
		5230' - 5429 '	Carpenter		

Other

Describe bottom hole completion method:

1 1100 sacks of Howco Lite Mate + 2% CaCl
2 1100 sacks of Pozmix A + 2% CaCl

V. Well design and construction, continued 4.

B. Packers, centralizers, well head equipment, etc:

2-8 5/8" Genco centralizers @ 5189 ft. & 5150 ft.

14 Turbilizer centralizers on 7 5/8" casing

1 TIW Cap 20 Packer for 4 1/2" liner at 5140.65 ft.

VI. Description of surface equipment

A. Holding tanks & flow lines

All material: 1) Alloy 20 stainless steel or 2) Epoxy coated fiberglass or 3) polypropene, or 4)Teflon, or 5) Perton or 6) Carbon steel or 7) No. 316 Stainless steel.

B. Filters

1) filter coated with diatomaceous earth

2) Cartridge type

C. Pumps

) - one for manual flow, one as a booster, and one as a spare

D. Other

VII. Cores, samples, & logs

A. Coring

From	to	Recovery
"		
"		
"		
"		
"		

B. Drilling logs

Drillers log

Sample log

Drilling time

Other:

VII. -- Cores, samples, & logs, continued

C. Other logs run

x Resistivity	1,573 ft to	___Gamma ray-neutron
___SP	5,551 ft	___Temperature
___Caliper		___Cement bond
___Other		

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Production of acetaldehyde and other petrochemicals

B. Physical & chemical Description

CHEMICAL COMPOUND	% COMPOSITION
Acetaldehyde	0.2
Acetic Acid	0.41
Chlorinated Acetaldehyde	0.66
Water	98.76
Miscellaneous Hydrocarbons	Trace

C. Volume

Average 150 gpm @ 200-300 psig-surface

Maximum 600" @ 800 psig surface

IX. Preinjection waste treatment

1) pH adjusted to 5

2) Waste will be filtered by two different filters

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested		Description of test results
DST	25 min.	1,374 ft. to 1,456 ft		fresh water
Injection	BPM	T.P. (lb)	C.P. (lb)	
	9	600	1000	
	11	900	1300	
	3.7	400	525	
	11	900	130	

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results

C. Injection rates and pressures

1. Rate

Date(s)	June 1969	Average	121 gpm	Maximum	205 gpm
"	Jan. 1970	"	104 gpm	"	159 gpm
"	June 1970	"	86 gpm	"	106 gpm
"	Dec. 1970	"	126 gpm	"	204 gpm
"		"		"	

2. Pressure (well head x bottom hole)

Date(s)	June 1969	Average	550 psig	Maximum	630 psig
"	Jan. 1970	"	338 psig	"	485 psig
"	June 1970	"	333 psig	"	431 psig
"	Dec. 1970	"	443 psig	"	670 psig
"		"		"	

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems:

No operating problems were reported

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

Restrictions on operating procedure

Surface injection pressure should not exceed 1500 psig

XII. Economics

A. Total & unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

I. Operating Company & General Well Location

Mobil Chemical Company
P.O. Box 3868
Beaumont, Texas 77704

II. Well location (legal description)

Location: 2370 ft. from the west line and 4240 ft. from the north line of William S. [illegible] Survey, Abstract 48, Jefferson County, Texas

III. History, system planning, construction & operation.

The well was permitted on January 15, 1969 and was placed in operation on March 8, 1970. The well is still in operation.

IV. Geology & Geohydrology

A. Regional geologic setting:

Same as TX-31 and TX-33

B. Geologic description of rock units penetrated by well
Rock Unit (Geologic Column included -yes ___; no X).
(Ground elevation _____) (Total well depth 4000 ft.)
Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
Beaumont Clay	Pleist.	Surface	100-1000 ft.	
"	Pliocene (?)	1000 ft.	3000 ft.	Sand, sandstone
	Pliocene Unknown			Clay and shale

C. Geologic description of injection units & confining units
not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Catahoula	Miocene-Pliocene		5,500 ft.	Alternate beds of clay and shale, and sandstone.

D. Engineering description of injection units

1. Porosity: 22 %
2. Permeability: 567 md.
3. Original Reservoir Pressure: .8-.9psi/ft
4. Injection Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

E. Geohydrology, fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Base of fresh water - 1200 ft.				

F. Mineral Resources (oil and gas, coal, brines, etc.)

Oil and gas is produced from numerous wells in the area of the disposal well.

V. Well Design and Construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & Grade	[illegible]	Depth Set	Type & Amount of Cement
Surface	12 1/4"	[illegible] 24 lb/ft	[illegible]	1535 ft.	1
Intermediate					
Injection	7 7/8 in. hole [illegible] 5 1/2"				
	[illegible]				
Other					

[illegible]

Describe bottom hole completion method:

3020

1 [illegible] Sacks of Class [illegible] with [illegible] Gel and [illegible] Sacks of [illegible] [illegible] with [illegible]

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: _____

40 Centralizers on the 5 1/2" tubing

VI. Description of surface equipment

A. Holding tanks & flow lines _____

B. Filters _____

C. Pumps _____

D. Other _____

VII. Cores, samples, & Logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

X Drillers Log ___ Drilling time

___ Sample log ___ Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

____Resistivity ____Gamma ray-neutron

____SP ____Temperature

____Caliper ____Cement bond

____Other_____

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Waste from Terephthalic Acid (TPA) production

B. Physical & chemical Description

W aste is free of undissolved solids.

Net Acetic Acid	2240 ppm	Benzoic Acid	20 ppm
TPA	150 ppm	Cobalt Acetate	20 ppm
Xylene	55 ppm	PCB	8 ppm
Methyl Ethyl Ketone	50 ppm	pH	3-4
Paratolmic Acid	40 ppm	TDS	2000-3000ppm
Other Hydrocarbons	24 ppm	All compounds-water soluble	

C. Volume 400 gpm average at 1000 psig surface pressure

IX. Preinjection waste treatment

None

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results

C. Injection rates and pressures

1. Rate

Date(s)_____ Average_____ Maximum_____

" " " "

" " " "

" " " "

" " " "

2. Pressure (well head _____ bottom hole_____)

Date(s)_____ Average_____ Maximum_____

" " " "

" " " "

" " " "

" " " "

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems:

Continued plugging

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

Restrictions on operating procedure

Pressure limited to 2000 psig

XII. Economics

A. Total & unit costs of construction

B. Operating costs

(III. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER ~~MW-40~~ STATE ~~Tx-40~~ USGS

I. Operating Company & General Well Location

Celanese Chemical Co.
P. O. Box 509
Bay City, Texas

II. Well location (legal description)

Matagorda Co. Texas, beginning at the SW corner of the James Moore League, Ab.#62, proceed 2500'N and then 1631.7'W at a right angle, (which is the SW corner of Celanese Chem. plant) from this point, proceed N88°37'W for 4096' & then N1°23'W for 480 ft. to the well site.

III. History, system planning, construction & operation.

The well was permitted on April 8, 1969 and was completed on June 7, 1969. The well began operating soon after completion and is still in operation.

IV. Geology & Geohydrology

A. Regional geologic setting: Same as Tx-32

B. Geologic description of rock units penetrated by well
Rock Unit (Geologic Column included -yes___; no X).
(Ground elevation_____) (Total well depth 3630 ft.)
Datum for depth measurement Ground Surface

Name	Age	Depth (top)	Thickness	Lithologic Description
Beaumont	Tertiary	surface	1300 ft.	sand and clay
Lissie		?	Combined thickness	
Sand	Tertiar	1300 ft.	base not reached	sandstone and sand

C. Geologic Description of injection units & possible units not in use
Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
---	Tertiary	3368	262'	well developed, fine grained sand with saline water

D. Engineering description of injection units
1. Porosity: 30-34%
2. Permeability: 1000-1500 md
3. Original Reservoir Pressure: 1500 psi
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Beaumont Clays	Surface	about 1250'	sand and clay	usable fresh water

F. Mineral Resources (oil and gas, coal, brines, etc.)

Oil production in the Buckeye field, 1 1/2 miles north of the well site.

V. Well design and construction

A. Casing, Tubing, and Cement See attached diagram

	Hole Size	Casing or Tubing. Weight & grade			Depth Set	Type & Amount of Cement
Surface	15"	32.75#	H-40	10 3/4"	1389'	1
Interred.	9 5/8"	36.4 #	J-55	7 5/8"	3368'	2
		Steel casing		5 1/2"	3316'	
Inconcel Liner		316 Stainless steel		4 1/2'	3372'-3579'	

1. 525 sks of Howco Lt. wt. + 200 sks common with 2% $CaCl_2$

2. 481 sks Lone Star Incor + 200 sks Howco Lt. wt.

Other

Describe bottom hole completion method: Screened and gravel packed 3368 to 3630 ft.

V. Well design and construction, continued 4.

B. Packers, Centralizers, well head equipment, etc:

Centralizer - Baker Model "m"

Packer - 316 T 1W Type "S" with Teflon pack element - SEE ATTACHED SKETCH

I. Description of surface equipment

A. Holding tanks & flow lines

B. Filters 2 - primer filter & polishing filter single filter system for wells WDW 14, 32, & 49

C. Pumps

D. Other

II. Cores, samples, & Logs

A. Coring

From	to	Recovery
"		
"		
"		
"		
"		

B. Drilling Logs

X Drillers Log

____ Sample log

____ Drilling time

____ Other:

VII. -- Cores, samples, & logs; continued

C. Other logs run

X Resistivity	____Gamma ray-neutron
____SP	____Temperature
____Caliper	____Cement bond

____Other_____

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Chemical plant waste

B. Physical & chemical Description See back of page 5

C. Volume 200-400 gpm average

650 gpm - maximum

IX. Preinjection waste treatment Filtration

WASTEWATER COMPOSITION

Chemical Compounds	Typical Composition (weight %)
C_1 thur C_6 Alchals	0.30
Cyclohexane	.03
Ammonia	.05
Nitric Acid	.13
C_1 thur C_5 Mono Functional Acids	.15
Nylon Salt	.19
Sodium Nitrite	.70
Sodium Nitrate	.60
Sodium Bicarbonate	.31
Sodium Carbonate	.04
C_4, C_5 and C_6 Di Functional Acids	.05
Hexamethelene Diamine	Trace
Saturated Hydrocarbons	Trace
Methyl and Ethyl Acetate	Trace
Unidentified Compounds	.50
Water	97.00
Total	100.00 %

Average Waste temp. 100°F
Adjusted Waste pH 6.5 - 7.5

3. Well operation & operating history

A. Tests:

Type	Duration	Zones tested	Description of test results
Injection	3 1/2 hr.	[illegible]	[illegible] gpm @ [illegible] psi (before acidization)
Injection	2 1/2 hr.	[illegible]	[illegible] gpm @ [illegible] psi (after acid)

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
[illegible] ft - [illegible] ft	Acidization	[illegible] gal. [illegible]

C. Injection rates and pressures

1. Rate

Rate (s)	[illegible]	Average	[illegible] gpm	Maximum	[illegible] gpm
"	[illegible]	"	[illegible] gpm	"	[illegible] gpm
"	[illegible]	"	[illegible] gpm	"	[illegible] gpm
"	[illegible]	"	[illegible] gpm	"	[illegible] gpm
"		"		"	

2. Pressure (well head ____ bottom hole ____)

Value(s)	[illegible]	Average	[illegible] psig	Maximum	[illegible]
"	[illegible]	"	[illegible] psig	"	[illegible]
	[illegible]	"	[illegible] psig	"	[illegible]
	[illegible]	"	[illegible] psig	"	[illegible]
		"		"	

V. Well operation & operating history

D. Description of operating program:

E. Operating problems: No operating problems were reported

VI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

Restrictions on operating pressure: Maximum allowable surface injection pressure is 1200 psig

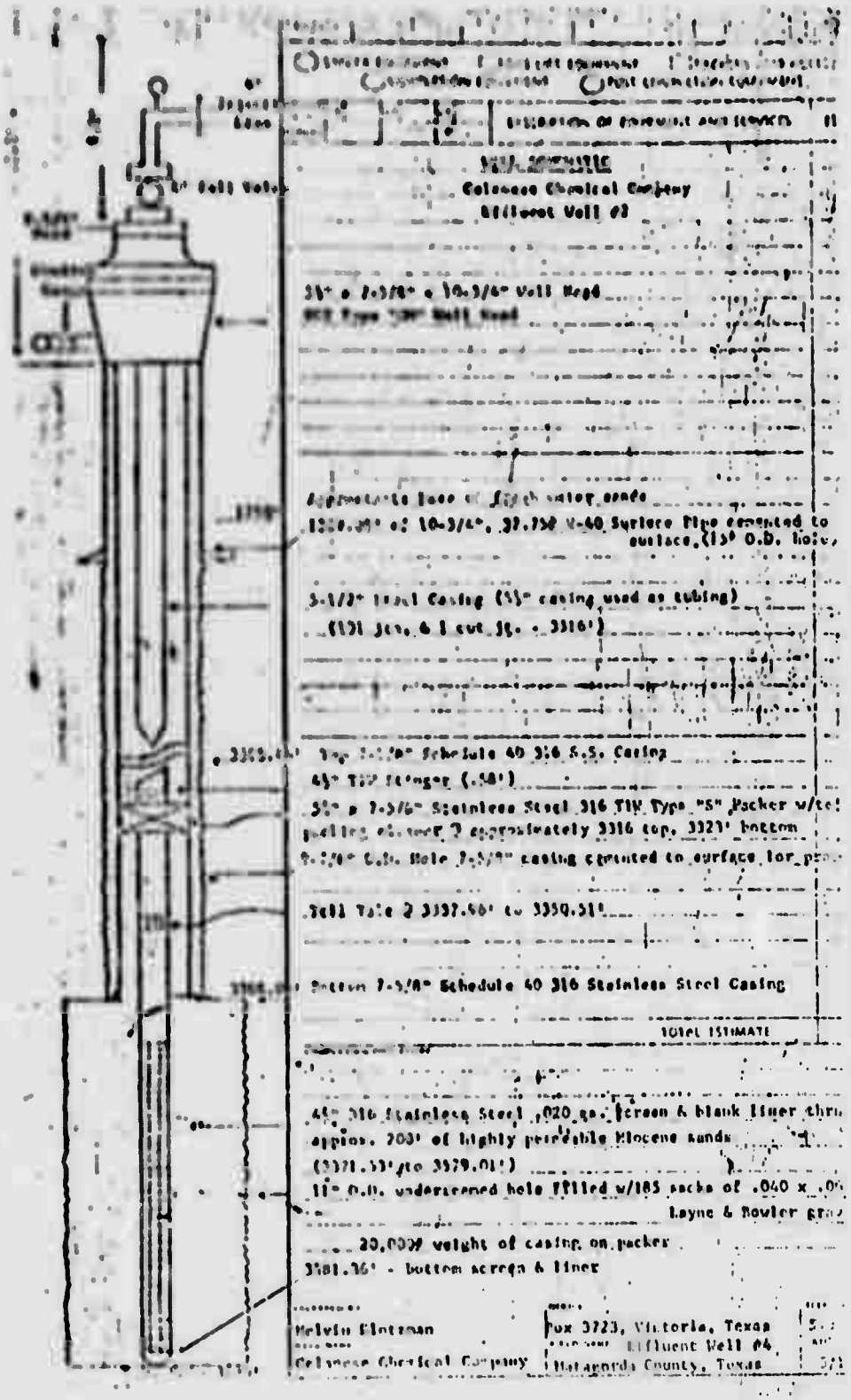
VII. Remarks

A. Total & unit costs of construction

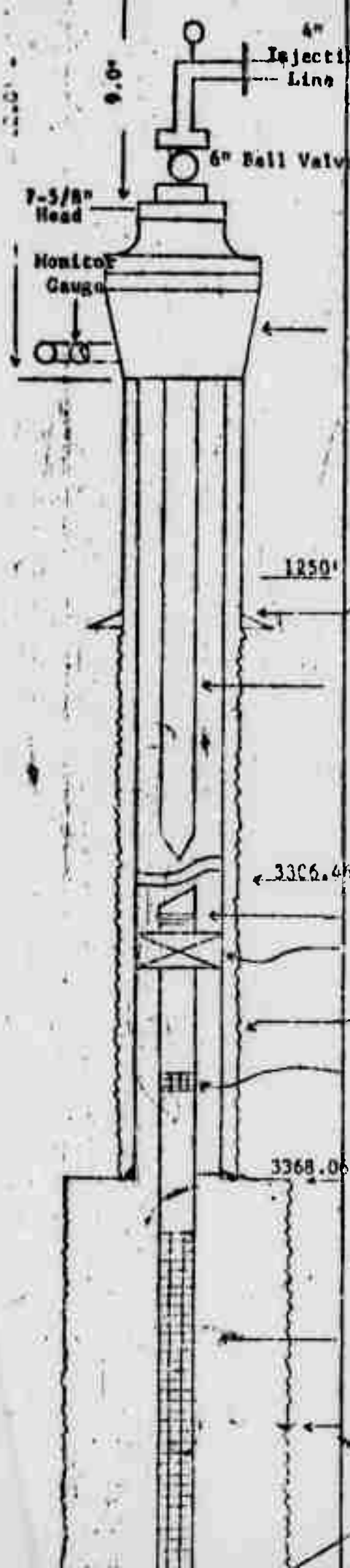
B. Operating costs

VIII. Source(s) of Information and Published References

Upper Potter County Study



See the following pages
for greater details



SAFETY EQUIPMENT ○ GAS LIFT EQUIPMENT ○ PACKERS AND ACCESS
○ COMPLETION EQUIPMENT ○ POST COMPLETION EQUIPMENT

SIZE	WT	GR	LT	DESCRIPTION OF EQUIPMENT AND SERVICES	EST
THREAD					

WELL SCHEMATIC

Celanese Chemical Company
Effluent Well #2

5½" x 7-5/8" x 10-3/4" Well Head
OCT Type "CM" Well Head

Approximate base of fresh water sands

1269.06' of 10-3/4", 32.75# H-40 Surface Pipe cemented to surface. (15" O.D. hole)

5-1/2" Steel Casing (5½" casing used as tubing)
(101 jts. & 1 cut jt. - 3316')

Top 7-5/8" Schedule 40 316 S.S. Casing

4½" TIW Stinger (.58')

5½" x 7-5/8" Stainless Steel 316 TIW Type "S" Packer w/tef packing element @ approximately 3316 top, 3323' bottom

9-7/8" O.D. Hole 7-5/8" casing cemented to surface for prod

Tell Tale @ 3337.96' to 3350.51'

Bottom 7-5/8" Schedule 40 316 Stainless Steel Casing

TOTAL ESTIMATE

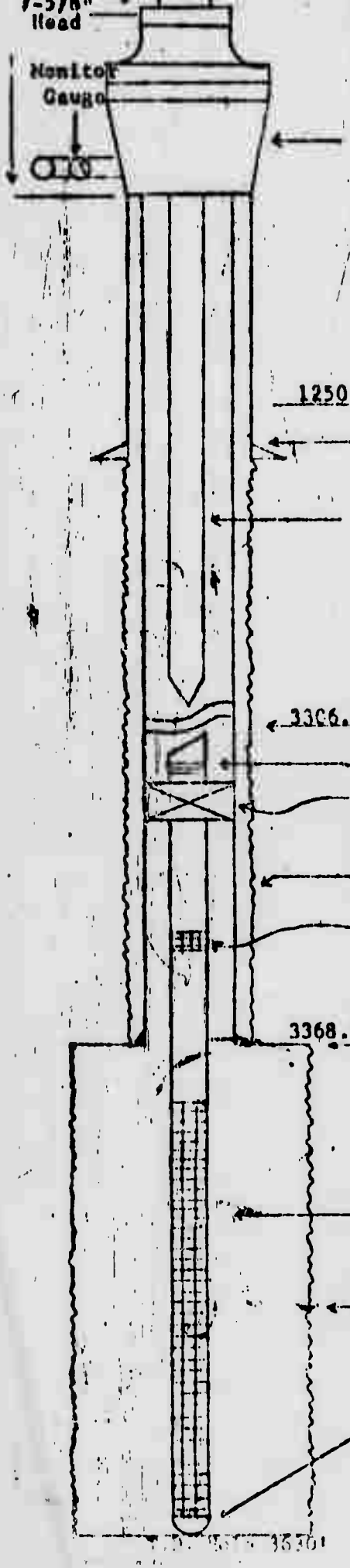
COMPLETION PROCEDURE

4½" 316 Stainless Steel .020 ga. screen & blank liner thru approx. 200' of highly permeable Miocene sands
(3371.53' to 3579.01')

11" O.D. underreamed hole filled w/185 sacks of .040 x .06 Layne & Bowler gravel

20,000# weight of casing on packer

3581.36' - bottom screen & liner



5½" x 7-5/8" x 10-3/4" Well Head
OCT Type "CM" Well Head

Approximate base of fresh water sands

1269.06' of 10-3/4", 32.75# H-40 Surface Pipe cemented to surface. (15" O.D. hole,

5-1/2" Steel Casing (5½" casing used as tubing)
(101 jts. & 1 cut jt. - 3316')

Top 7-5/8" Schedule 40 316 S.S. Casing

4½" TIW Stinger (.58')

5½" x 7-5/8" Stainless Steel 316 TIW Type "S" Packer w/tef
packing element @ approximately 3316 top, 3323' bottom

9-7/8" O.D. Hole 7-5/8" casing cemented to surface for prod

Teli Tale @ 3337.96' to 3350.51'

Bottom 7-5/8" Schedule 40 316 Stainless Steel Casing

TOTAL ESTIMATE

COMPLETION PROCEDURE

4½" 316 Stainless Steel .020 ga. Screen & blank liner thru
approx. 200' of highly permeable Miocene sands
(3371.53' to 3579.01')
11" O.D. underreamed hole filled w/185 sacks of .040 x .0
Layne & Bowler grav

20,000# weight of casing on packer

3581.36' - bottom screen & liner

PREPARED BY Melvin Klotzman	ADDRESS Box 3723, Victoria, Texas	STATE
WELL NAME Celanese Chemical Company	FIELD NAME Effluent Well #4 Matagorda County, Texas	API 5

WELL FILE NUMBER WDW 51 / STATE Tx-41 / UMR

I. Operating Company & General Well Location

Dow Badishe Company
602 Copper Road
Freeport, Texas 77541

II. Well location (legal description)

Brazoria Co., Texas in the Alexander Calvit League, Abstract 49, beginning at the NW corner of said league, proceed 6805.08 ft. south along the west line and turn 90° east and proceed 2807.24 ft. to the site.

III. History; system planning, construction & operation.

The well was permitted on June 9, 1969 and was completed on October 8, 1969. The well was put in service on April 26, 1970 and is still in operation.

IV. Geology & Geohydrology

A. Regional geologic setting: The area is structurally and stratigraphically associated with the Gulf Coast Geosynclibe. The area is complicated by normal faulting and numerous salt domes. The stratigraphic section consists of alternating sans, shalesm and clays at Miocene to Recent age.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes____; no X).

(Ground elevation_____) (Total well depth 6200 ft.)

Datum for depth measurement Ground Surface

Name	Age	Depth (top)	Thick-ness	Lithologic Description
	Recent	Surface	300ft	
	Pleistocene	300 ft	2800ft	base of fresh water at
	Pliocene	3100 ft	940ft	1300 ft.
	Miocene	4040 ft	1010ft	
Amphistegina B zone)	Miocene	5050 ft	250ft	clay

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
"A" Sand	Lower Miocene	5300ft +	200ft	Has substantial areal extent. Is overlain by the Amphistegina "B" zone and contains non-commercial saline formation water

D. Engineering description of injection units

1. Porosity: 28-32%
2. Permeability: 200-1000 md.
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Beaumont Clay				Usuable water - 1000ppm dissolved solids

F. Mineral Resources (oil and gas, coal, brines, etc.)

Nearest production is found in the Stratton Ridge South Field located 3 miles east. Production is from 4500 - 5700 ft. in depth

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing. Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface		32.75lb/ft H-40 STC	10 3/4"	1327ft	1
[illegible]					
Long		23lb/ft J-55 STC	7"	6195ft	2
[illegible]					
Injection		9.5lb/ft J-55 STC	4 1/2"		
Liner		Stainless steel wire wrapped on ribbed 4" OD 11.6#/ft	4"	Top - 6046 Bo-tom 61841	
Other					

Describe bottom hole completion method: 6134' - 6184 was gravel packed and acidized prior to injection.

1. 528 sacks of Trinity Lite Wate + 280 sacks of Class H with 2% $CaCl_2$.
2. 345 sacks TCW and 325 sacks of class B

V. Well design and construction, continued 4.

B. Packers, centralizers, well head equipment, etc: 5 Centralizers and 5 scratchers on 10 3/4 in. 17 Centralizers and 23 wipers on 7 in. Baker Model "A-2" Lok-set Packer on 4 1/2-in.

VI. Description of surface equipment

A. Holding tanks & flow lines

B. Filters

C. Pumps

D. Other Long string annulus is filled with salt water and carbon - 130.

VII. Cores, samples, & Logs

A. Coring

From	to	Recovery

B. Drilling Logs

X Drillers Log

Sample log

Drilling time

Other:

VII. -- Cores, samples, & logs, continued

C. Other logs run

X Resistivity	___Gamma ray-neutron
X SP	___Temperature
___Caliper	___Cement bond
X Other Formation density log	

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Waste from chemical plant processes

B. Physical & chemical Description 1)8% Na-salts of dibasic organic acid 2)4% dibase organic acid 3)1% caprolactam 4) 1/2% Alcohols (butonal) 5)1/2% Aromatic compounds (benzene & cyclohexane)

Sp. Grav. 1

Viscosity 1cp

pH 7.0

C. Volume 150 cum initially

300 cum maximum

IX. Preinjection waste treatment Sedimentation or filtration

. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
Injection	-See attachments		

B. Treatments or Stimulation

Zones Treated	Treatment Method	DATE	Description of Treatment and Results
rforated Interval	Acid	7-16-69	2000 gal. Mud. Acid
" "	"	7-20	" " " "
" "	"	7-28	" " " "
" "	"	8-18	" " " "
" "	"	10-9	840 " " "
" "	"	7-13-70	4500 " 15% HCl
" "	Ammonia water	10-21-70 & 11-3-70	10-12% Concentration

C. Injection rates and pressures

1. Rate

Date(s)	Average	Maximum
June 1970	117 gpm	147 gpm
December 1970	63 gpm	94 gpm
"	"	"
"	"	"
"	"	"

2. Pressure (well head X bottom hole)

Date(s)	Average	Maximum
June 1970	490 psig	686 psig
December 1970	367 psig	663 psig
	"	"
	"	"
	"	"

X. Well operation & operating history

D. Description of operating programs: Copy of injection tests are attached

E. Operating problems: No operating problems were reported

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

Restrictions on operating pressure: Surface injection pressure is not to exceed 2500 psi.

XII. Economics

A. Total & unit costs of construction

B. Operating costs

III. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER [illegible] [illegible]

I. Operating Company & General Well Location

Phillips Petroleum Co.

P. O. Box [illegible]

Borger, Texas [illegible]

II. Well Location (Legal Description)

[illegible] from the east line and [illegible] south of [illegible] Survey, Block [illegible], Section [illegible], Hutchinson County, Texas.

III. History, system planning, construction & operation.

The well was permitted on June [illegible], 19[illegible] and was drilled through the [illegible] to a total depth of [illegible] ft. during July, 19[illegible]. The [illegible] was found to be too thin for adequate disposal operations and the well was abandoned and plugged on August [illegible], 19[illegible]. The permit was then cancelled on January [illegible], 19[illegible].

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located [illegible] on the [illegible] flank of the [illegible]. The [illegible], which consists of sands, shales, clays and gravels of [illegible] age, dips [illegible] toward the [illegible]. The [illegible] Ogallala sand [illegible] at the well site.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well
Rock Unit (Geologic Column included yes___; no X).
(Ground elevation________) (Total well depth [illegible] ft.)
Datum for depth measurement Ground surface

Name	Age	Depth (Top)	Thickness	Lithologic Description
Granite Wash	Permian	[illegible] ft.		granite
[illegible]	Permian	[illegible]		sand and shale

C. Geologic description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (Top)	Thickness	Character and Areal Distribution
Granite Wash	Permian	[illegible] ft.	120ft.	Detrital granite

D. Engineering description of injection units

1. Porosity [illegible]
2. Permeability [illegible]
3. Original Reservoir Pressure [illegible]
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Hydrogeology, continued

E. Hydrogeology, fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
[illegible]		[illegible] ft.	sandstone	fresh water with a high TDS concentration

F. Mineral Resources (oil and gas, coal, brines, etc.)

One oil well is found within a 2 1/2 mile radius. The well penetrates the [illegible] zone and is plugged at [illegible]' to [illegible]' with cement.

V. Well Design and Construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & Grade	Size	Depth Set	Type & Amount of Cement
Surface					
Intermed.					
Injection					
Other					

Describe bottom hole completion method: The well was plugged back with 50 sacks [illegible] cement from [illegible] ft. to [illegible] ft.

V. Well design and construction, continued

B. Packers, Centralizers, Well head equipment, etc: _____

VI. Description of surface equipment

A. Holding tanks & flow lines _____

B. Filters _____

C. Pumps _____

D. Other _____

VII. Cores, samples, & Logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

____Drillers Log

____Sample log

____Drilling time

____Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

____Resistivity	____Gamma ray-neutron
____SP	____Temperature
____Caliper	____Cement bond

____Other_____

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Waste is from Plains Butadiene Plant

B. Physical & chemical Description See back of page 5

C. Volume 15,000 bpd minimum
25,000 bpd maximum

IX. Preinjection waste treatment Pretreatment filter system was planned to be phenolic lined and piping was planned to be asbestos cement pipe.

Plant waste water analysis

	Brine Waste Water	Oxy-Dehydro Unit Water Water
Total hardness	3440 ppm	3 ppm
Bicarbonates & calcium carbonate	144 ppm	---
Calcium	2470 ppm	2 ppm
Magnesium	970 ppm	---
Sulfats	1874 ppm	---
Disolved Solids	33150 ppm	5 ppm
Silica	20 ppm	---
Iron	1.1 ppm	---
Sodium Chloride	229640 ppm	---
*Organic hydrocarbons	---	3000 ppm
pH	7.3	4
Specific Gravity	1.2	1

*Composition of organic hydrocarbons in ppm:
actealdehyde 750, propanol 100, acetone 350, acrolein 100, butanol 150, meltyl ethyl kitone 300, vinyl method ketone 600, cyclobutanone 600, and 14 droxane 50

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
Injection	- - -	Granite Wash	unsuccessful

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s) _____ Average _____ Maximum _____

" " "

" " "

" " "

" " "

2. Pressure (wellhead _____ bottom hole _____)

Date(s) _____ Average _____ Maximum _____

" " "

" " "

" " "

" " "

X. Well operation & operating history

D. Description of operating programs: _____

E. Operating problems: The Granite Wash disposal zone proved to be inadequate for disposal operations.

XI. Regulatory aspects.

A. Construction requirements _____

B. Monitoring requirements _____

C. Restrictions on operating procedures Permit was cancelled

II. Economics

A. Total and unit costs of construction

B. Operating costs

III. Source(s) of Information and Published References

Texas Water Quality Board

Texas Water Commission - Bulletin 6306, 1963

WELL FILE NUMBER WDW 14 73-13
STATE U[illegible]

I. Operating Company & General Well Location

E. I. DuPont De Nemours & Co.

Box 1089

Orange, Texas 77630

II. Well location (legal description)

Location: Beginning at the SW corner of the W.P. Starkey Survey, Ab. 585, proceed due west [illegible] ft. and then north at a right angle for [illegible] ft. to a point in the Stephen Jett Survey, Ab. 16, Orange County, Texas.

III. History, system planning, construction & operation.

A permit was issued August 7, 1969, the well was completed December 13, 1969, and [illegible] casing shoe was set in the well. They plan to drill [illegible] the open hole to 20 in. and run the [illegible] 1/2 in. liner and screen at the time the well is put into use.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on the Gulf Coastal Plain. The stratigraphic section consists of Tertiary and Quaternary sands, clays, and shales which have a regional dip of 100 ft. per [illegible] ft. The Pleistocene Beaumont Clay outcrops in the area of the well.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included yes ___; no X).

(Ground elevation _____) (Total well depth 3000 ft.)

Datum for depth measurement Ground surface

Name	Age	Depth (top)	Thickness	Lithologic Description
Beaumont	Pleistocene		combined thickness	clay
Lissie	Pleistocene		of 1000 ft.	sand and gravel
Willis	Pliocene			sand
Oakville	Miocene			sandstone
Catahoula	Miocene	400ft.		sandstone

C. Geologic Description of injection units & possible units not in use

Rock Unit Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Oakville & Catahoula	Miocene	400ft.	700ft.	Poorly consolidated sand

D. Engineering description of injection units

1. Porosity: 30.5%
2. Permeability: 2100 md.
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water: Brine with 1.05 Specific gravity. Calcium in the formation may combine with sulfates in the waste water and ppt. at the interface causing a decrease in permeability.
6. Reservoir Fracture Pressure:

E. Geohydrology, fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Beaumont Clay	1000'			1000 ppm TDS up to
Lissie Fm				720'
				1000-3000 ppm from
				720' to 1000'

F. Mineral Resources (oil and gas, coal, brines, etc.)

Production of oil in the area is found at approximately [illegible]' to [illegible]' in the Phoenix Lake Field, three miles east of the well. Orange Field is three miles west of the well.

V. Well design and Construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & Grade	Size	Depth Set	Type & Amount of Cement
Surface		[illegible]	[illegible]	[illegible]	1
Intermediate					
Long		[illegible]	[illegible]	[illegible]	2
Injection		[illegible]	[illegible]		
Injection		[illegible]	[illegible]		
Other					

Describe bottom hole completion method: Will be [illegible]

314

1) 1100 sacks of 50/50 Pozmix + 2% Gel + 3% $CaCl_2$ + 155 sacks of Class H.

2) 1705 sacks of Pozmix + 50 sacks of LR-11

B. Packers, centralizers, well head equipment, etc:

7 S-1 Centralizers on 13 3/8 in.

26 S-1 Centralizers on 9 5/8 in.

D. V. Tool at [illegible] ft.

VI. Description of surface equipment

A. Holding tanks & flow lines

B. Filters Pre-coated with diatomaceous earth.

C. Pumps

D. Other

VII. Cores, samples, & Logs

A. Coring [illegible]

From [illegible] ft. to [illegible] ft. Recovery [illegible] Cores

B. Drilling Logs

X Drillers log

___ Sample log

___ Drilling time

___ Other:

VII. -- Cores, samples, & logs, continued

C. Other logs run

X Resistivity ____ Gamma ray-neutron

X SP ____ Temperature

X Caliper ____ Cement bond

X Other Formation density log

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Adiponitrile plant waste

B. Physical & chemical Description A dilute aqueous solution of ammonium sulfate, sulfuric acid, and trace quantities of hydrogen cyanide and organic nitriles.

Ammonium sulfate	[illegible]	Nitric Acid	[illegible]
H_2SO_4	[illegible]	Organic Acids	Trace
Hydrogen Cyanide	Trace	Water	[illegible]
Nitriles	Trace	Temp.	[illegible]

C. Volume [illegible] gpm @ [illegible] psig – ave.

[illegible] gpm @ [illegible] psi

IX. Preinjection waste treatment [illegible] which will be used to hold up [illegible] days, then through [illegible] filters.

[illegible]. Well Operation & Operating History

A. Tests

Type	Duration	Zones Tested	Description of Test Results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection Rate and Pressure

1. Rate

Date(s)	Average	Maximum
	175 gpm	

2. Pressure (Well Head ______ Bottom Hole ______)

Date(s)	Average	Maximum
	215 psi	

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems: No problems were reported

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating regime: Surface injection pressure is limited to [illegible] psig

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER WDW-55 STATE Tx-44 UMR

I. Operating company - General Well Location

E. I. DuPont De Nemours & Co.

P. O. Box 1089

Orange, Texas 77630

II. Well location (legal description)

Orange Co., Texas, beginning at the SW corner of W. H. Stark Survey, Ab. 505, proceed west 2842' and then north 126' to a point in the Stephen Jett Survey, A-16.

III. History, system planning, construction & operation.

The well was permitted on August 7, 1969.

The well is presently awaiting drilling of the casing shoe and cement and installation of liner (5 1/2in.) in the open well.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on the Gulf Coastal Plain. The beds are of Tertiary and Quaternary age and dip toward the southeast. The Pleistocene Beaumont Clay outcrops at the well site.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes___; no X).
(Ground elevation_____) (Total well depth 5000 ft.)
Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thick-ness	Lithologic Description
Beaumont	Pleistocene	oft.	900ft.	sand and
Lissie	Pleistocene			clay
Willis	Pliocene			sand
Oakville	Miocene			sandstone
Catahoula	Miocene	4400ft.		sandstone

C. Geologic description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
Oakville &	Miocene	4300ft.	700ft.	Poorly consolidated
Catahoula				sandstone

D. Engineering description of injection units

1. Porosity: 33.1%
2. Permeability: 2102 md.
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Beaumont	0	900ft.	1000 ppm	TDS up to 720 ft.
Lissie			1000 to 3000 ppm	up to 1000 ft.

These two formations are sometimes referred to as the Gulf Coast aquifer. At the well site, only to 400 ft. thick section contains fresh water with 3000 ppm TDS.

F. Mineral Resources (oil and gas, coal, brines, etc.)

Nearby oil production in the Phoenix Lake Field, 3 miles east. Orange Field is 3 miles west of the disposal well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface		54.5lb/ft J-55 ST	[illegible]3/8in.	1616ft.	1
Intermed.		40lb/ft. J-55 LTC	[illegible]in.	4882ft.	2
Injection					
Other	bottom 120 ft. of casing is made up of carpenter casing				

Describe bottom hole completion method:

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1) 1345 sacks of Pozmix + 155 sacks common + 2% Gel + 3% $CaCl_2$

2) 1595 sacks of Pozmix + 50 sacks of LR-11 + 3/4% of CFR-2

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc:

7 S-3 Centralizers on 13 3/8 in. casing

26 S-3 Centralizers on 9 5/8 in. casing

D.V. Tool at 3876'

VI. Description of surface equipment

A. Holding tanks & flow lines

B. Filters Pre-coated with diatomaceous earth

C. Fuses

D. Other

VII. Cores, samples, & logs

A. Coring

From to Recovery

B. Drilling logs

Drillers log

Sample log

Drilling time

Other:

VII. -- Cores, samples & logs, continued

C. Other logs run:

_X_ Resistivity
_X_ SP
_X_ Caliper
___ Other

___ Gamma ray-neutron
___ Temperature
___ Cement bond

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Adiponitrile Plant waste

B. Physical & chemical Description Same as Tx-54

C. Volume Same as Tx-54

IX. Preinjection waste treatment: Same as Tx-54

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s)	Average	Maximum
"	"	"
"	"	"
"	"	"
"	"	"

2. Pressure (well head _____ bottom hole _____)

Date(s)	Average	Maximum
"	"	"
"	"	"
"	"	"
"	"	"

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems: No problems were reported

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating procedure Surface injection pressure is limited to 1500 psig

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

Texas Water Commission - Bulletin 6307, 1963

WELL FILE NUMBER [illegible] [illegible]

I. Operating Company & Central Well Location

E. I. DuPont DeNemours & Co.

P. O. Box 1089

Orange, Texas 77630

II. Well location (legal description)

Location. Orange Co., Texas, beginning at the SW corner of the F. B. Stark Survey, A. [illegible], proceed west [illegible] ft. and [illegible] ft. north to a point in the Stephen Jett Survey, Ab. 16.

III. History, system planning, construction & operation.

The well was permitted on August 7, 1964 and was completed on December 24, [illegible]. [illegible] to go back and drill out the casing [illegible], [illegible] the open hole to 11 in. for 10 ft. and then install a [illegible] in. liner, before initiating injection operations.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is situated on the Gulf Coastal Plain. Strata consists of southeast dipping Tertiary and Quaternary formations. The topography is relatively flat with the Pleistocene Beaumont Clay outcropping in the area of the well.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included yes ___; no X).

(Ground elevation _____) (Total well depth 4750 ft.)

Datum for depth measurement Ground surface

Name	Age	Depth (top)	Thickness	Lithologic Description
Beaumont	Pleistocene	surface	combined thickness	sand and clay
Lissie	Pleistocene			sand and gravel
Willis	Pliocene		1000 ft.	sand
Oakville	Miocene			sandstone
Catahoula	Miocene	4460ft.		sandstone

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Oakville & Catahoula	Miocene	4460ft.	700ft.	poorly consolidated sand

D. Engineering description of injection units

1. Porosity: 33%
2. Permeability: 2[illegible] md.
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water: Brine with 1.05 Sp. Grav.
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology, fresh water aquifers in vicinity

Name	Depth	Yield - GPM	Character	Chemical Quality
[illegible] Clay		Confined	[illegible] ppm [illegible] to 720 ft.	
[illegible] Fm.		[illegible] 1000 ft.	1000 to 3000 ppm - 720 ft. to 1055 ft.	

F. Mineral Resources (oil and gas, coal, brines, etc.)

Nearby production of oil [illegible] at 7005' to 8105' in the Phoenix Lake Field [illegible] miles east. The [illegible] Field is 3 miles west of the well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & Grade	Size	Depth Set	Type & Amount of Cement
Surface			[illegible] in.	160 ft.	---
Intermed.		[illegible]	[illegible]	[illegible] in.	3627 ft.	1) to surface
Injection		[illegible]	[illegible]	[illegible] 1/2 in. corrosion resist casing		
Other					

Describe bottom hole completion method:

1) 1385 sacks of [illegible] + 36 sacks of LR-11 + 3/4% of CFR2.

V. Well design and construction, continued

B. Packers, centralizers, well head equipment, etc:

28 S-3 Centralizers on 5 1/2 in.

D. V. Tool at 3675 ft.

VI. Description of surface equipment

A. Holding tanks & flow lines

B. Filters Pressure filter

C. Pumps

D. Other

VII. Cores, samples, & logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____

" _____ _____

" _____ _____

" _____ _____

" _____ _____

B. Drilling logs

____ Drillers log ____ Drilling time

____ Sample log ____ Other: _____

VII. -- Cores, samples, logs, continued

C. Other logs run

___ Resistivity ___ Gamma ray-neutron

_X_ SP ___ Temperature

_X_ Caliper ___ Cement bond

___ Other _____

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Waste from petrochemical plant

B. Physical & chemical description Same as TX-46

C. Volume average 1 to 10 gpm

maximum 50 gpm

IX. Preinjection waste treatment Same as TX-46

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s) _____ Average 5 gpm Maximum 10 gpm

" " " "

" " " "

" " " "

" " " "

2. Pressure (well head X bottom hole)

Date(s) _____ Average Gravity Maximum _____

" " " "

" " " "

" " " "

" " " "

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems: No problems were reported

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating [illegible] surface injection pressure limited to [illegible] psig.

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

Texas Water Commission - Bulletin 6307, 1963

WELL FILE NUMBER WDW-59 STATE Tx-46 UMR

I. Operating Company & General Well Location

Dow Chemical Company

P. O. Box 2463

Houston, Texas 77001

II. Well location (legal description)

Location: 10467.01 ft. southerly along the west line from the northwest corner of the Alexander Calvit League, Ab. 49, then 1 mi east at a right angle for 3819.69 ft., in Brazoria County, Texas.

III. History, system planning, construction & operation.

The well was permitted on August 21, 1969. Injection commenced on August 5, 1970. Prior to waste injection, 17 million gallons of fresh water was injected into the well. The well is presently in operation.

IV. Geology & Hydrology

A. Regional geologic setting: The well location is associated with the Gulf Coast salt dome basin. The structure within the area is complicated by normal faulting and numerous salt domes. The regional dip is to the southeast of Miocene to Recent sands, clays, and shales.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column Included--yes ___ ; no X).

(Ground elevation _____) (Total well depth 5380 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
	Recent		0ft	310ft.
	Pleistocene	310ft.	2790ft.	
	Pliocene	3100ft.	950ft.	
	Upper Miocene	4050ft.	1050ft.	
Amphistegina "B"	Lower Miocene	5050ft.	250ft.	sand

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
"a" Sand	Miocene	5300	100ft.	unconsolidated sand at a large area extent

D. Engineering description of injection units

1. Porosity: 2% to 32%
2. Permeability: 200 to 1000 md.
3. Original Reservoir Pressure: 2850 psi at 6100 ft.
4. Reservoir Temperature: 178° at 6100 ft.
5. Chemical Character of Formation Water: _____
6. Reservoir Fracture Pressure: .85 psi/ft.

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thick-ness	Character	Chemical Quality
Alluvium	Recent			
Beaumont	Pleistocene		clay	base at 1300 ft.

F. Mineral Resources (oil and gas, coal, brines, etc.)

The nearest petroleum production is at depths from 4500 ft. to 5700 ft. in the Stratton Ridge, South Field, 3 1/2 miles east of the disposal well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & Grade	Size	Depth Set	Type & Amount of Cement
Surface	17 1/2in.	[illegible]	[illegible]	13[illegible]5ft.	1-to surface
Intermed.	12 1/4in.	[illegible]	[illegible]	[illegible]78ft.	2
Injection		[illegible]	[illegible]	5676ft.	

Other Ribbed screen from 5496 to 5864 ft. with ss wire

Describe bottom hole completion method: open hole completion

1) 675 sacks of Trinity Lite Wate + 360 sacks of Lone Star Class "A" + 2% CaCl2.

2) 1st stage - 63[illegible] sacks of Trinity Lite Wate + 370 sacks Texcore E
2nd stage - 55[illegible] sacks of Trinity Lite Wate

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: BOT hydraulic set Huskey H-1 Packer set at 5677.89 ft.

VI. Description of surface equipment

A. Holding tanks & flow lines A surge tank is used to hold the fluid and control the rate of flow to the injection pumps.

B. Filters

C. Pumps

D. Other

VII. Cores, samples, & Logs

A. Coring

From 4881 ft. to 5862 ft. Recovery 18 cores

"

"

"

"

"

B. Drilling Logs

X Drillers Log

____ Sample log

____ Drilling time

____ Other:

VII. -- Cores, samples, & logs, continued

C. Other logs run

X Resistivity	___ Gamma ray-neutron
___ SP	___ Temperature
___ Caliper	___ Cement bond
X Other Sonic log	

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Waste fluid is from the manufacture of glycerine.

B. Physical & chemical Description pH 11.7 at 77°F, Specific Gravity 1.026 at 175°F

See Attachment.

C. Volume 3250 cum

IX. Preinjection waste treatment Sedimentation, filtration, and the addition of anhydrous hydrochloric acid to reduce the pH to 7.

D E S C R I P T I O N O F W A S T E

A. Inorganic Constituents

NaOH	1,700	ppm
Na_2CO_3	400	ppm
NaCl	64,500	ppm
Calcium	5	ppm
Magnesium	1	ppm
Aluminum	.2	ppm
Silicon	15	ppm
Sodium	25,400	ppm

B. Organic Constituents

Glycerine	750	ppm
Epichlorohydrin	15	ppm
Tetrachlorohexene	20	ppm
Bis dichloropropyl ethers	50	ppm

C. Remainer Constituents is water

Water is an aqueous, milky appearing solution.

X. Well operation & operation history

A. Tests

Type	Duration	Zones tested	Description of test results
See Attached			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
5778ft. to 5864ft.	Acidization	475 bbl. of 15% HCl

C. Injection rates and pressures

1. Rate

Date(s) August 1970 Average 790 gpm Maximum 960 gpm

" November 1970 " gpm " 1115 gpm

" December 1970 " gpm " 1152 gpm

" " " " " "

" " " " " "

2. Pressure (well head / bottom hole)

Date(s) August 1970 Average 790 psi Maximum 974 psi

" November 1970 " 630 psi " 700 psi

" December 1970 " 630 psi " 650 psi

" " " " " "

" " " " " "

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems: No operating problems were reported.

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating pro[illegible] 1) Surface injection pressure is limited to 2,500 psig. 2) Reports of the quantity and quality of the waste will be submitted every 6 months.

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

Texas Water Commission - Bulletin 6310

WELL FILE NUMBER FDW-60 STAFF Gx-47 USR

I. Operating Company & General Well Location

Duval Corporation

P. O. Box 1512

Pecos, Texas

II. Well location (legal description)

Location: 1262 ft. northerly along the west line of Sec. 19, Block 111, PSL Survey - then easterly at a right angle 1300 ft., Culberson County, Texas.

III. History, system planning, construction & operation.

The well was permitted on August 25, 1969 and was completed June 30, 1968. The well has been on stand by status since June 12, 1978 and has not been in operation.

IV. Geology & Hydrology

A. Regional geologic setting: The well is located on the northern flank of the Delaware Basin and the regional dip in this area is to the south. The stratigraphic section consists of Cambrian to Permian sand, shale, limestones, and dolomite.

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes ___; no X).

(Ground elevation 3255 ft.) (Total well depth 2948 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
Alluvium	Recent	0ft.	70ft.	
Rustler	Permian	70ft.	525ft.	porous limestone & dolomit
Ochoa	Permian	595ft.	285ft.	crystalline anhydrite
Castile	Permian	880ft.	1290ft.	anhydrite & limstone
Delaware Gp.	Permian	2170	869ft.	sand, sandstone, and shale

C. Geologic description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Cherry Canyon	Permian	2700ft.	25ft.	friable, well sorted, quartzite sand

D. Engineering description of injection units

1. Porosity: 2%
2. Permeability: 1000 md
3. Original reservoir pressure: 1125 lb.
4. Reservoir Temperature
5. Chemical Analysis of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology: fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Alluvium	0ft.	70ft.	sand & gravel	poor quality
Mattlier	70ft.	525ft.	sand & limestone	

F. Mineral Resources (oil and gas, coal, timber, etc.)

There are numerous oil and gas wells reported in the area of the injection well. Sulfur mining operation are associated with the injection well. (French process)

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing. Weight & grade	Type	Depth Set	Type & Amount of Cement
Surface				700ft.	150sx - surface
Intermed.				6ft.	240sx
Injection		4 1/2in.		2100ft.	cemented from 1700ft. to 2100ft.
Other					

Describe bottom hole completion method: open hole completion

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: .....

VI. Description of surface equipment.

A. Holding tanks & flow lines: 440 ft. x 440 ft. x 10 ft. sedimentation basin.

B. Filters: .....

C. Pumps .....

D. Other .....

VII. Cores, samples, & logs

A. Coring

From	To	Recovery
"		
"		
"		
"		
"		

B. Drilling logs

___ Electric log ___ Drilling time

___ Sample log ___ Other: .....

VII. -- Cores, samples, & logs, continued

C. Other logs run

____Resistivity ____Gamma ray-neutron

____SP ____Temperature

____Caliper ____Cement bond

____Other_____

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Sulfur mining plant (Frasch process) bleed water from the Rustler Formation

B. Physical & chemical Description See Attachment

C. Volume 1000 gpm

IX. Preinjection waste treatment Sedimentation

	Rustler (Waste)	Delamane (injection zone)
	(mgl)	(mgl)
Calcium	480	440
Magnesium	243	129
Sodium	13082	7360
Bicarbonate	2295	88
Carbonate		5
Sulfate	490	1824
Chloride	20063	15060
Total dissolved solids	35481 (calc)	24862 (calc)

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
Injection		Cherry Canyon	1000 gpm at 302 psi

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s) _____ Average _____ Maximum _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

2. Pressure (well head _____ bottom hole _____)

Date(s) _____ Average _____ Maximum _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

H. Well operation & operating history

D. Description of operating programs:

E. Operating problems: None reported

I. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating pressure Surface injection pressure is limited to 1200 psig.

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER WDW-57 / STATE Tx-48 / UMR

I. Operating Company & General Well Location

E. I. duPont deNeMours and Company
P. O. Box 1089
Orange, Texas

II. Well location (legal description)

Location: 2998 ft. west of the southwest corner of the W. H. Stark Survey and then due north for 349 ft. to a point in the Stephen Jett Survey, Ab. - 16, Orange County, Texas.

III. History, system planning, construction & operation.

The well was permitted on August 7, 1969 and was completed on December 7, 1969. The well began operating soon after completion and is still in operation.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is situated on the Gulf Coastal Plain. The beds dip to the southeast toward the Gulf at 100 ft. per 3500 ft. The stratigraphic section consists of sands, clays, and shales of Tertiary and Quaternary age with the Pleistocene Beaumont Clay outcropping in the area.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included--yes ____; no X).

(Ground elevation _____) (Total well depth 4750 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
Beaumont	Pleistocene	oft	combined ~~thickness~~	sand and clay
Lissie	Pleistocene		of 1000ft.	sand and gravel
Willis	Pliocene			sand
Oakville	Miocene			sandstone
Catahoula	Miocene	4400ft.		sandstone

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Catahoula	Miocene	4410ft.	400ft.	brine sands

injection zone - 4630 ft. to 4750 ft.

D. Engineering description of injection units

1. Porosity: 32.1%
2. Permeability: 2109 md
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology, fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Beaumont	oft	combined	clay	
Lissie		thickness-1000ft.	sand and gravel	

These two formations are often referred to as the Gulf Coast aquifer. Only a 400 ft. section of the two formations contains fresh water of less than 3000 ppm TDS.

F. Mineral Resources (oil and gas, coal, brines, etc.)

There are several oil and gas wells in the vicinity of the injection well. The Phoenix Lake Field is three miles east of the well and the Orange Field is three miles west of the well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing. Weight & Grade	Size	Depth Set	Type & Amount of Cement
Surface		H-40 32.3lb/ft.	[illegible]	1637ft.	1
Intermed.	8 5/8in.	J-55 17lb/ft.	5 1/2in.	4630ft.	2
Injection					
Other	bottom 120 ft. - 5 1/2 in. screen				

Describe bottom hole completion method: open hole completion

1) 1000 sacks of 50/50 Pozmix + 2% Gel + 3% $CaCl_2$ + 155 sacks of class A common - to surface.
2) 1st stage - 235 sacks of common and 30 sacks of LR-11
2nd stage - 1400 sacks of Pozmix + 5% gilsonite.

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc:

7 Centralizers on the 9 5/8in. casing

28 Centralizers on the 5 1/2in. casing

VI. Description of surface equipment

A. Holding tanks & flow lines

B. Filters Pressure filters

C. Pumps

D. Other

VII. Cores, samples, & logs

A. Coring

From ft. Recovery

" "

" "

" "

" "

" "

B. Drilling logs

X Drillers log Drilling time

Sample log Other

VII. -- Cores, samples, & logs, continued

C. Other logs run

X Resistivity	____Gamma ray-neutron
____SP	____Temperature
X Caliper	____Cement bond
____Other	

VIII. Waste Characteristics

A. Industrial Process from which waste is derived
Waste from an adiponitrile plant

B. Physical & chemical Description Mixed organic nitriles 90%, Organic nickel and phosphorus compounds 10%, Temperature 50°C, and Appearance - clear, dark brown.

C. Volume 10 gpm

IX. Preinjection waste treatment Boiling water from the manufacturing operation will be mixed with another distillate waste stream to control viscosity. The mixture is sent to a hold-up tank where it is pressure filtered and injected.

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s)_____ Average_____ Maximum_____

2. Pressure (well head_____ bottom hole_____)

Date(s)_____ Average_____ Maximum_____

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems: No operating problems were reported.

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating procedures: Surface injection pressure is limited to 1,200 psig.

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER WDW-61 / STATE Tx-49 / UMR

I. Operating Company & General Well Location

Duval Corporation

P. O. Box 1512

Pecos, Texas

II. Well location (legal description)

Location: 660 ft. south of the north line corner and 660 ft. east of the west line of Sec. 2, Block III, PSL Survey, Culberson County, Texas.

III. History; system planning, construction & operation.

The well was permitted on August 25, 1969 and was completed August 1, 1969. The well is to be used as a stand by well and has not yet been in operation.

IV. Geology & Geohydrology

A. Regional geologic setting: Same as Tx-60

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included--yes ___; no X).

(Ground elevation _____) (Total well depth 3546 ft.)

Datum for depth measurement _____

Name	Age	Depth (top)	Thickness	Lithologic Description
Same as Tx-60				

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Same as Tx-60				

D. Engineering description of injection units

1. Porosity: 25%
2. Permeability: 3000 md
3. Original Reservoir Pressure: 1495 psi
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Same as Tx-60				

F. Mineral Resources (oil and gas, coal, brines, etc.)

Same at Tx-60

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing: Wt. & Grade	Size	Depth Set	Type & Amount of Cement
Surface			22 in.	150ft.	to surfa
Intermed.			1[illegible] in.	730ft.	400 sks to surfa
			[illegible]:n.	7161ft.	250 sks
Injection			7 in.	7150ft.	
Other					

Describe bottom hole completion method: open hole completion

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: _____

VI. Description of surface equipment

A. Holding tanks & flow lines 440 ft. x 440 ft. x 15 ft. sedimentation tank

B. Filters _____

C. Pumps _____

D. Other _____

VII. Cores, samples, & Logs

A. Coring

From _____ to _____ Recovery _____

B. Drilling logs

___Drillers log ___Drilling time

___Sample log ___Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

___Resistivity ___Gamma ray-neutron
___SP ___Temperature
___Caliper ___Cement bond
___Other_____

VIII. Waste Characteristics

A. Industrial process from which waste is derived
Sulfur mining plant (Frasch process)

B. Physical & chemical Description Same as Ix-6D

C. Volume 1200 c'n

IX. Preinjection waste treatment Sedimentation

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones treated	Treatment Utilized	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s) _____ Average _____ Maximum _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

2. Pressure (well head _____ bottom hole _____)

Date(s) _____ Average _____ Maximum _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems:

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating procedure Surface injection pressure is limited to 1000 psi.

XII. Economics

A. Total & unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER WDW-63 / STATE Tx-50 / UNR

I. Operating Company & General Well Location

Duval Corporation
P. O. Box 1512
Pecos, Texas

II. Well location (legal description)

Location: 1000 ft. south of the north line and 2050 ft. east of the west line of Sec. 16, Block 111, PSL Survey, Culberson County, Texas.

III. History; system planning, construction & operation.

The well was permitted on August 25, 1969 and has been drilled but is not in operation.

IV. Geology & Geohydrology

A. Regional geologic setting: Same as Tx-60

B. Geologic description of rock units penetrated by well

Rock Units (Geologic column included -yes___; no X).

(Ground elevation_____) (Total well depth 1700 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
Same as Tx-60				

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Castile	Permian	1111ft.	589ft.	limestone and anhydrite

D. Engineering description of injection units

1. Porosity: angular
2. Permeability:
3. Original *reservoir pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

E. Geohydrology, fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Same as Tx-[illegible]				

F. Mineral Resources (oil and gas, coal, lignite, etc.)

Same as Tx-[illegible]

V. Well Design and Construction

A. Casings, Tubing, and Packers

	Hole Size	Casing or Tubing Weight & Grade	Size	Depth Set	Type & Amount of Cement
Surface			[illegible] in.	[illegible] ft.	1
Intermediate			[illegible] in.	[illegible] ft.	2
Injection			[illegible] in.	[illegible] ft.	3

Other

Describe bottom hole completion method-

1) [illegible] sacks of Pozmix + [illegible] Gel, to surface
2) [illegible] sacks of Pozmix + [illegible] Gel, to [illegible] ft.
3) [illegible] sacks of Pozmix + [illegible] Gel,

[illegible]

VII. -- Cores, samples & logs, continued

C. Other logs run

___Resistivity ___Gamma ray-neutron

___SP ___Temperature

___Caliper ___Cement bond

___Other___

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Sulfur mining operation (Frasch process)

B. Physical & Chemical Description Same as TX-60

C. Volume [illegible]

IX. Preinjection waste treatment Sedimentation

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
Injection	---	Castile	1200 gpm at 125 psig
Injection	---	Castile	1025 gpm at 120 psig

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s)	Average	Maximum
	"	"
"	"	"
"	"	"
"	"	"

2. Pressure (well head _____ bottom hole _____)

Date(s)	Average	Maximum
"	"	"
	"	"
	"	"
	"	"

. Well operation & operating history

D. Description of operating programs: The well is not yet in operation.

E. Operating problems:

I. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating procedure Surface injection pressure is limited to 700 psi.

VII. Economics

A. Total & unit costs of construction

B. Operating costs

III. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER — WDW-64 (STATE) — Tx-51 (UIC)

I. Operating Company & General Well Location

Duval Corporation
P. O. Box 1507
Fort Stockton, Texas 79735

II. Well location (legal description)

Location: 126.4 ft. north of the south line and 154 ft. east of the west line of Sec. 589, G. C. and S. F. R. R. Survey, Ab. 3008, Pecos County, Texas.

III. History, system planning, construction & operation.

The well was permitted on August 28, 1969 but is not yet completed as an injection well. It was originally a water supply well.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on the northwest flank of the Val Verde Basin where the regional dip is toward the southeast. The stratigraphic section consists primarily of Permian shale and sandstone.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well Rock Unit (Geologic Column included--yes___; no X). (Ground elevation_____) (Total well depth 2200 ft.) Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thick-ness	Lithologic Description
Alluvium	Recent	0ft.	60ft.	sand and gravel
Comanche Park	Permian	60'	140'	limestone
Rustler	Permian	200'	110'	sandstone
Salado	Permian	310'	300'	
Tansill	Permian	610'	150'	
Yates	Permian	760'	830'	
Grayburg	Permian	1590'	160'	limestone
San Andres	Permian	1750'	450'	limestone

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
Grayburg	Permian	1590ft.	160ft.	limestone
San Andres	Permian	1750ft.	450ft.	limestone

D. Engineering description of injection units

1. Porosity:
2. Permeability:
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology: fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Hustler	200ft.	100ft.	sandstone	

F. Mineral Resources (oil and gas, coal, brines, etc.)

Production of oil and gas in the area is found at depths of 4900 ft. to 5600 ft. in the Heiner field, located 1 1/2 miles from the injection well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing: Weight & Finish	Size	Depth Set	Type & Amount of Cement
Surface			16 in.	305ft.	350 sks-surface
Intermed.			8 5/8in.	1650ft.	150 sks
Injection					
Other					

Describe bottom hole completion method: open hole completion 1650 to 2200 ft.

V. Well design and construction, continued 4.

B. Packers, centralizers, well head equipment, etc: _____

VI. Description of surface equipment

A. Holding tanks & flow lines _____

B. Filters _____

C. Pumps _____

D. Other _____

VII. Cores, samples, & logs

A. Coring

From _____ to _____ Recovery _____

B. Drilling logs

Drilling log

Sample log

Drilling time

Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

____Resistivity
____SP
____Caliper
____Other

____Gamma ray-neutron
____Temperature
____Cement bond

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Sulfur mining (Frasch process) - bleed water from the Salado formation.

B. Physical & chemical Description See attachment

C. Volume 1800 gpm

IX. Preinjection waste treatment See attachment

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s) _____ Average _____ Maximum _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

2. Pressure (well head _____ bottom hole _____)

Date(s) _____ Average _____ Maximum _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

X. Well operation & operating history

D. Description of operating programs: The well is not yet in operation.

E. Operating problems:

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating practices

VII. Economics

A. Total 4 mill costs of construction

B. Operating costs

VIII. Source(s) of information and Pertinent References

Texas Water Quality Board

[illegible] FOR RECOVERY OF [illegible]

In the [illegible] mining operations, water is withdrawn from wells drilled into the ore body in the Silver Peak region to control inflow of the [illegible] water and maintain pressures. In the [illegible] of chemical analyses [illegible] with the [illegible], concentrations of constituents are listed for samples of [illegible] from the Bluecastle and the composite samples of Manhattan from the mining area. The concentrations of dissolved solids in these eight Bluecastle samples range from [illegible] to 3,150 ppm. The dissolved constituents in these eight samples of Salda water are essentially the ordinary ions of sodium and calcium and the anions of sulfate, chloride, and bicarbonate. Some exceptions do occur. The average percent cation in the eight samples of Bluecastle from the Salda is Ca.

In the process for extracting water at the Salda plant, most of the solution and materials in solution remain [illegible] the [illegible], and possibly to [illegible] some Salda water, is replaced by [illegible]. Caustic soda (Na_2O) and soda ash (Na_2CO_3) are used in this process. A [illegible] of the [illegible] amount is not obtained by this process. In time, reference wells [illegible] the [illegible] pressures in the ore production [illegible] will [illegible] with [illegible] from the Salda. It is anticipated that the present action in the Bluecastle will be [illegible] by this [illegible].

The [illegible] reports that two [illegible], [illegible], an organic phosphate, and [illegible], a [illegible] polymer, [illegible] are being used in the water treatment. At the present time very small quantities of these [illegible] apparently are being used.

As the quality of Manhattan from the Salda and the water supply from the Bluecastle are so similar, blending of these waters can [illegible] be planned. If blending and reuse is possible, the average [illegible] rate of [illegible] water in the [illegible] at this time. However, should blending [illegible] be [illegible] because complete [illegible] of Bluecastle, the [illegible] rate would be about 1,500 gpm [illegible] gpm normally or 2,400 [illegible] gpm [illegible]. The [illegible] plan [illegible] will be a well in the [illegible] well. In case well No. 1 or well No. 2 are [illegible] in the [illegible] zone, [illegible] well No. 3 or well No. 4 will be used as a [illegible] well. In case both No. 1 and No. 2 are [illegible] in the [illegible] zone, normally only one of the three wells will be used for injection at a time.

I. Operating Company & General Well Location

Duval Corporation

P. O. Box 1[illegible]

Fort Stockton, Texas 797[illegible]

II. Well Location (Legal description)

Location: [illegible] ft. east of the west line and [illegible] ft. south of the north line of Sec. 1[illegible], Block 1[illegible], G. C. and S. F. R. R. Survey, A-[illegible], Pecos County, Texas.

III. History, service planning, construction & operation.

The well was completed on August 28, 1969. It was originally a water supply well which is now being converted to a disposal well. The well is not yet in operation.

IV. Geology & Hydrology

A. Regional geologic setting: The well is located on the northwest flank of the Val Verde basin where the regional dip is toward the southeast. The stratigraphic section consists primarily of Permian shales and sandstones.

17. Geology & Geophysics, continued 2.

B. Geologic description of rock units penetrated by well

Rock Units (Geologic Column included--yes ___; no X).

(Ground elevation _____) (Total well depth 2820 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
Same as Tx-1				

C. Geologic description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Same as Tx-5				

D. Engineering description of injection units

1. Porosity: _____
2. Permeability: _____
3. Original Reservoir Pressure: _____
4. Reservoir Temperature: _____
5. Chemical Character of Formation Water: _____
6. Reservoir Fracture Pressure: _____

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Same as Tx-51				

F. Mineral Resources (oil and gas, coal, brines, etc.)

Same as Tx-51

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing, Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface			13 3/8in.	410ft.	surface
Intermed.			8 5/8in.	1655ft.	
Injection					
Other					

Describe bottom hole completion method: open hole completion (1650 ft. to 2820 ft.)

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: _____

VI. Description of surface equipment

A. Holding tanks & flow lines _____

B. Filters _____

C. Pumps _____

D. Other _____

VII. Cores, samples, & Logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

Drillers Log ____ Drilling time

Sample log ____ Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

____Resistivity ____Gamma ray-neutron

____SP ____Temperature

____Caliper ____Cement bond

____Other_____

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Same as Tx-51

B. Physical & chemical Description See attachment

C. Volume 1800 gpm

IX. Preinjection waste treatment See attachment

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s)	Average	Maximum
		"
"	"	"
"	"	"
"	"	"

2. Pressure (well head _____ bottom hole _____)

Date(s)	Average	Maximum
"	"	"
"	"	"
"	"	"
"	"	"

X. Well operation & operating history

D. Description of operating programs: _____

E. Operating problems: _____

XI. Regulatory aspects.

A. Construction requirements _____

B. Monitoring requirements _____

Restriction on operation, rates, etc. _____

XII. Economics

A. Total & unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

CHARACTER AND VOLUME OF WASTE

In the sulphur mining operations, water is withdrawn from wells drilled into the ore body in the Salado formation to control inflow of low temperature water and formation pressures. In the table of chemical analyses submitted with the applications, concentrations of constituents are listed for samples of bleedwater from six bleedwells and for composite samples of bleedwater from two mining areas. The concentration of dissolved solids in these eight bleedwater samples range from 5000 to 5750 ppm. The dissolved constituents in these eight samples of Salado water are essentially the cations of sodium and calcium and the anions of sulfate, chloride, and bicarbonate. Some magnesium is present. The average percent sodium in the eight samples of bleedwater from the Salado is 67.

In the process for softening water at the Duval plant, most of the calcium and magnesium in native water from the San Andres, and possibly to include some Salado water, is replaced by sodium. Caustic soda (Na OH) and soda ash (Na_2CO_3) are used in this process. A decrease in the dissolved-solids content is not obtained by this process. In time, softened water that is injected into the Salado formation in the ore extraction process will mix with bleedwater from the Salado. It is anticipated that the percent sodium in the bleedwater will be increased by this mixing.

The applicant reports that two inhibitors, N-13, an organic phosphate, and N-153, a cellulose polymer, (Natrosol) are being used in the water treatment. At the present time very small quantities of these inhibitors reportedly are being used.

As the quality of bleedwater from the Salado and the water supply from the San Andres are so similar, blending of these waters for reuse is planned. If blending and reuse is possible, the average injection rate of Salado water is not known at this time. However, should blending become impossible as other factors require complete injection of bleedwater, the maximum rate would be about 1,800 gpm (gallons per minute) or 2,600,000 gpd (gallons per day). The applicant also states that well No. 4 will be used as a standby well, in case well No. 5 or well No. 9 are shut in for some reason. In other words, normally only two of the three wells will be used for injection at a time.

ELL FILE NUMBER WDW-66 STATE Tx-53 UWR

I. Operating Company & General Well Location

Duval Corporation

P. O. Box 1507

Fort Stockton, Texas

II. Well location (legal description)

Location: 2151.3 ft. north of the south line and 664 ft. east of the west line of Sec. 589, G. C. & S. F. R. R. Survey Ab. 3008, Pecos County, Texas.

II. History; system planning, construction & operation.

The well was permitted on August 28, 1969. The well was originally drilled as a water supply well and is presently being converted for injection. The well has not yet been in operation.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on the northwest flank of the Val Verde Basin. The regional dip in this area is toward the southeast. The stratigraphic section consists primarily of Permian shales and sandstones.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included--yes____; no X).

(Ground elevation_____) (Total well depth 2500 ft.)

Datum for depth measurement_____

Name	Age	Depth (top)	Thick-ness	Lithologic Description
Same as Tx-51				

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
Same as Tx-51				

D. Engineering description of injection units

1. Porosity:
2. Permeability:
3. Original reservoir pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued 3.

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Same as Tx-51				

F. Mineral Resources (oil and gas, coal, brines, etc.)

Same as Tx-51

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface			---	410.57ft.	400sks-surface
Intermed.			11 3/4in.	1553ft.	275sks
Injection					
Other					

Describe bottom hole completion method: open hole completion (1551 to 2520 ft.)

V. Well design and construction, casing 4.

B. Packers, centralizers, well head equipment, etc: _____

VI. Description of surface equipment

A. Fueling tanks & flow lines _____

B. Filters _____

C. Pumps _____

D. Other _____

VII. Cores, samples, & logs

A. Coring

From _____' to _____' Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

Drillers log _____ Drilling time

Sample log _____ Other: _____

II. -- Cores, samples, & logs, continued

C. Other logs run

___Resistivity ___Gamma ray-neutron

___SP ___Temperature

___Caliper ___Cement bond

___Other ___

III. Waste Characteristics

A. Industrial Process from which waste is derived

Same as II-[illegible]

B. Physical & chemical description: See attachment

C. Volume: [illegible]

IV. Preinjection waste treatment: See attachment

9. Well operation & corrosion history

A. Tests

Type Tests	Date(s)	Zones tested	Description of test results
None			

B. Treatments of Stimulation

Zones Treated	Treatment Used	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s) _____ Average _____ Maximum _____

2. Pressure (well head _____ bottom hole _____)

Date(s) _____ Average _____ Maximum _____

X. Well operation & operating history

D. Description of operating programs: _____

E. Operating problems: No problems were reported.

XI. Regulatory aspects.

A. Construction requirements _____

B. Monitoring requirements _____

Restrictions on operating procedure _____

XII. Economics

A. Total & unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

CHARACTER AND VOLUME OF WASTE

In the sulphur mining operations, water is withdrawn from wells drilled into the ore body in the Salado Formation to control inflow of low temperature water and formation pressures. In the table of chemical analyses submitted with the applications, concentrations of constituents are listed for samples of bleedwater from six bleedwells and for composite samples of bleedwater from two mining areas. The concentration of dissolved solids in these eight bleedwater samples range from 5000 to 5780 ppm. The dissolved constituents in these eight samples of Salado water are essentially the cations of sodium and calcium and the anions of sulfate, chloride, and bicarbonate. Some magnesium is present. The average percent sodium in the eight samples of bleedwater from the Salado is 67.

In the process for softening water at the Duval plant, most of the calcium and magnesium in native water from the San Andres, and possibly to include some Salado water, is replaced by sodium. Caustic Soda (Na OH) and soda ash (Na_2CO_3) are used in this process. A decrease in the dissolved-solids content is not obtained by this process. In time, softened water that is injected into the Salado Formation in the ore extraction process will mix with bleedwater from the Salado. It is anticipated that the percent sodium in the bleedwater will be increased by this mixing.

The applicant reports that two inhibitors, H-35, an organic phosphate, and RD-153, a cellulose polymer, (Baroid) are being used in the water treatment. At the present time very small quantities of these inhibitors reportedly are being used.

As the quality of bleedwater from the Salado and the water supply from the San Andres are so similar, blending of these waters for reuse is planned. If blending and reuse is possible, the average injection rate of Salado water is not known at this time. However, should blending become impossible or other factors require complete injection of bleedwater, the maximum rate would be about 1,800 gpm (gallons per minute) or 2,600,000 gpd (gallons per day). The applicant also states that well No. 4 will be used as a standby well, in case well No. 5 or well No. 9 are shut in for some reason. In other words, normally only two of the three wells will be used for injection at a time.

WELL FILE NUMBER WDW-67 (STATE) Tx-54 (UIC)

I. Operating Company & General Well Location

Phillips Petroleum Company
Box 358
Barber, Texas

II. Well location (legal description)

Location: 6714 ft. north of the south line and 1177 ft. east of the west line of Sec. 70, Block 46, H. & T. C. Survey, Hutchinson County, Texas.

II. History, system planning, construction & operation.

The well was permitted on December 2, 1969. The well is presently in operation.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on the northeast flank of the subsurface Amarillo Uplift. The strata, which consists of sands, shales, clays, and granite of Permian to Recent age, dips northeast toward the Anadarko Basin.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included yes____; no X).

(Ground elevation_____) (Total well depth 5075 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thick-ness	Lithologic Description
Granite Wash	Permian	3800ft.	1200ft.	detrital granite

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
Granite Wash	Permian	3800ft.	1200ft.	detrital granite

injection zone - 3843 ft. to 4071 ft.

D. Engineering description of injection units

1. Porosity: High
2. Permeability: High
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Ogallala		700ft.	sandstone	fresh water with a high concentration of TDS

F. Mineral Resources (oil and gas, coal, brines, etc.)

There are numerous oil and gas wells reported in the area. All producing or abandon wells are suitably protected from any communication with the disposal well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface	20 in.	J-55 75lb/ft.	16 in.	700ft.	to surface
Intermed.	14 3/4in.	J-55 [illegible]lb/ft.	10 3/4 in.	5074ft.	1
Injection		J-55 20lb/ft.	6 5/8in.	3805	
		internally plastic coated.			

Other

Describe bottom hole completion method: perforated completion with 1864 hole from 3843 ft. to 4971 ft.

1) 1st stage - 660 sacks of Incor + 1 lb. of latex/sack + 10% NaCl.
2nd stage - 625 sacks of Class H + 20% Diacel d and 2% $CaCl_2$.

V. Well design and construction, continued 4.

B. Packers, centralizers, well head equipment, etc: Baker Model 190 - DA-75 at 3737 ft.

VI. Description of surface equipmen

A. Holding tanks & flow lines

B. Filters

C. Pumps

D. Other

VII. Cores, samples, & Logs

A. Coring

From ____ to ____ Recovery ____

" ____ ____ ____

" ____ ____ ____

" ____ ____ ____

" ____ ____ ____

" ____ ____ ____

B. Drilling Logs

X Drillers Log

Sample log

____ Drilling time

____ Other: ____

VII. -- Cores, samples & logs: continued

C. Other logs run

___Resistivity
___SP
___Caliper
_X_Other Formation density
___Gamma ray-neutron
___Temperature
___Cement bond

VIII. Waste Characteristics

A. Industrial Process from which waste is derived
Waste fluid from a butadiene plant.

B. Physical & chemical Description A mixture of brine waste water and organic waste from an oxy-dehydro unit. See attachment.

C. Volume 35,000 bwd

IX. Preinjection waste treatment Pressure filter system.

BRINE WASTE WATER

		Oxy - Dehydro Unit - Waste Water
Total Hardness	3440 ppm	3 ppm
Bicarbonate & Calcium carbonate	144 ppm	---
Calcium	2470 ppm	2 ppm
Magnesium	970 ppm	---
Sulfates	1874 ppm	---
Dissolved Solids	331500 ppm	5 ppm
Silica	20 ppm	---
Iron	1.1 ppm	---
Sodium chloride	229640 ppm	---
*Organic Hydrocarbons	---	3000 ppm
pH	7.1	4 ppm
Sp. gr.	1.2	1 ppm

* Composition of organic hydrocarbons in ppm:
acetaldeyde 750, propanol 100, acetone 340, acrolein 100, butanol 150, methyl ethyl ketone 300, vinyl methol ketone 600, cydobutanone 600, and 1-4 dioxane 50.

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Fluid	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s) July [illegible] Average [illegible] gpm Maximum 150 gpm
" Nov. [illegible] " [illegible] gpm " 305 gpm
" " " " " "
" " " " " "
" " " " " "

2. Pressure (well head X bottom hole)

Date(s) July [illegible] Average (-7) psig Maximum 0 psig
" Nov. [illegible] " 0 psig " 55 psig
" " " " " "
" " " " " "
" " " " " "

I. Well operation & operating history

B. Description of operating programs:

E. Operating problems: There was an annulus leak which required removal and repairing the 6 5/8in. tubing. This job was completed on December 16, 1979.

II. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

Restrictions on operating procedures: Surface injection pressure is limited to 1700 psig.

VII. Economics

A. Total & unit costs of construction

B. Operating costs

VIII. Source(s) of information and Published References

Texas Water Quality Board

Texas Water Commission - Bulletin 6304, 1963

WELL FILE NUMBER ~~NMW-48~~ ~~STATE~~ ~~Tx-55~~ ~~USGS~~

I. Operating Company & General Well Location

Phillips Petroleum Company

Box 358

Borger, Texas

II. Well location (legal description)

Location: 7003 ft. from the south line and 153 ft. from the west line of Sec. 73, Block 44, H. & T. C. Survey, Hutchinson County, Texas.

III. History, system planning, construction & operation.

The well was completed on December 2, 1969 and began operating on May 10, 1970. The well is still in operation.

IV. Geology & Geohydrology

A. Regional Geologic setting: Same as Tx-54

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well
Rock Unit (Geologic Column included -yes ___; no X).
(Ground elevation _____) (Total well depth 4977 ft.)
Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
See attachment				

C. Geologic Description of injection units & possible units not in use
Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Same as Tx-54				

D. Engineering description of injection units

1. Porosity: High
2. Permeability: High
3. Original Reservoir Pressure: _____
4. Reservoir Temperature: _____
5. Chemical Character of Formation Water: _____
6. Reservoir Fracture Pressure: _____

IV. Geology & Geohydrology, continued

E. Geohydrology, fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Same as Tx-54				

F. Mineral Resources (oil and gas, coal, brines, etc.)

Same as Tx-54

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & Grade	Size	Depth Set	Type & Amount of Cement
Surface	20 in.		16 in.	720ft.	1
Intermed.	14 3/4in.		10 3/4in.	5074ft.	2
			6 5/8in.	3780ft.	
Injection	Duel-lined				
Other					

Describe bottom hole completion method: perforated - 3858 ft. to 4949 ft. with 1476 holes

1) 865 sacks Incor + 2% $CaCl_2$.
2) 1st stage - 680 sacks Incor + 10% NaCl and 1 lb. powdered latex per sack
   2nd stage - 625 sacks of Class H + 2% $CaCl_2$.

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: Baker Model 190-DA-75 packer on injection string

VI. Description of surface equipment

A. Holding tanks & flow lines

B. Filters

C. Pumps

D. Other

VII. Cores, samples, & Logs

A. Coring

From ____ to ____ Recovery ____

"

"

"

"

"

B. Drilling Logs

X Drillers Log

____ Sample log

____ Drilling time

____ Other:

VII. -- Cores, samples, & logs, continued

C. Other logs run

____Resistivity ____Gamma ray-neutron

____SP ____Temperature

____Caliper ____Cement bond

__X__Other Formation density

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Same as Tx-67

B. Physical & chemical Description

Same as Tx-67

C. Volume 25000 bbl

IX. Preinjection waste treatment pressure filter system

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s)	July 1970	Average	610 gpm	Maximum	720 gpm
"	Nov. 1970	"	416 gpm	"	905 gpm
"		"		"	
"		"		"	
"		"		"	

2. Pressure (well head X bottom hole)

Date(s)	July 1970	Average	6 psig	Maximum	74 psig
"	Nov. 1970	"	-2 psig	"	0 psig
		"		"	
		"		"	
		"		"	

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems: An annulus leak required the removal and repair of the 6 5/8 in. string.

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating procedure Surface injection pressure is limited to 1250 psig.

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

Texas Water Comission - Bulletin 6306, 1964.

WELL FILE NUMBER WDW-70 STATE Tx-56 USGS

I. Operating Company & General Well Location

International Pollution Control, Inc.

4903 Tippicanoe Drive

Evansville, Indiana

The well is 3 miles southwest of Corpus Christi

II. Well location (legal description)

Location: 3020 ft. from the north line and 260 ft. from the east line of Sec. 15, Boheman Colony Lands Subdivision, Nueces County, Texas.

III. History; system planning, construction & operation.

The well was permitted on December 2, 1969. The well has been completed and should begin operation in late 1971.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is situated on the Gulf Coast Homocline and the regional dip is to the east at 20 ft. to 30 ft. per mile. The stratigraphic section consists of various sediments of Tertiary and Quaternary age with the Pleistocene Beaumont Clay outcropping at the well site.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well
Rock Unit (Geologic Column included -yes ___; no X).
(Ground elevation _____) (Total well depth 4770 ft.)
Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
Beaumont	Pleistocene	0ft.	400ft.	sand and clay
Lissie	Pleistocene			
Willis	Pliocene		1500ft.	sand
Goliad	Pliocene			sand and shale
Lagarto	Miocene			sand
Oakville	Miocene		2800ft.	sand and sandstone
Catahoula	Miocene			tuff

C. Geologic Description of injection units & possible units not in use

Rock Unit Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Oakville & Catahoula	Miocene	4530ft.	200ft.	thick unconsolidated sand beds

D. Engineering description of injection units

1. Porosity: 30.7% from cores
2. Permeability: 1821 md from cores
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology, fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Beaumont	0ft.	400ft.	clay & sand	fresh water for
Lissie			sand & gravel	municiple and industrial use

F. Mineral Resources (oil and gas, coal, brines, etc.)

There are several oil and gas wells reported in the vicinity of the disposal well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing. Weight & Grade	Size	Depth Set	Type & Amount of Cement
Surface		H-40 32lb/ft.	10 3/4in.	586ft.	1
Intermed.		J-55 [illegible]/ft.	7 in.	4770ft.	2
Injection		fiberglass 1.95lb/ft.	2 7/8in.	4770ft.	
Other					

Describe bottom hole completion method: open hole completion

1) 350 sacks of Lite Pozmix + 2% $CaCl_2$ + 100 sacks of Class H to the surface

2) 1000 sacks of Lite Pozmix + 18% NaCl + 750 gallons of resin cement - to surface

V. Well design and construction, continued

B. Packers, Centralizers, Well head equipment, etc: _____

VI. Description of surface equipment

A. Holding tanks & flow lines _____

B. Filters _____

C. Pumps _____

D. Other _____

II. Cores, samples, & Logs

A. Coring

From 4567 ft. to 4573 ft. Recovery 11 ft.

" 4630 ft. to 4[illegible] ft. 58 ft.

" _____ to _____

" _____ to _____

" _____ to _____

" _____ to _____

B. Drilling Logs

____Drillers Log

____Sample log

____Drilling time

____Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

___Resistivity ___Gamma ray-neutron

___SP ___Temperature

___Caliper ___Cement bond

___Other

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Waste from several industries: 2 streams with a ratio of 3:2 = stream 1: stream 2

B. Physical & chemical Description See Attachment

C. Volume 5 gpm

IX. Preinjection waste treatment Equilization oil skimming and filtration

Stream I

pH	1
Sp. gr.	1.067
H_2SO_4, Vol. %	7.0
Na, ppm	1,500
Ca, ppm	500
Fe, ppm	200
Cu, ppm	50
Acidic Acid	100
Oil, ppm	5
TDS	72,000

Stream II

pH	14
Sp. gr.	1.050
Sod. Hydroxide, Wt. %	4.0
Sod. fludide, Wt. %	2.8
Dissolved organic compounds, ppm	2,000
C.O.D	0

K. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s) _____ Average _____ Maximum _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

2. Pressure (well head _____ bottom hole _____)

Date(s) _____ Average _____ Maximum _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

X. Well operation & operating history

D. Description of operating programs: The well is not yet in operation.

E. Operating problems:

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating procedures 1) Surface injection pressure is not to exceed 1200 psig. 2) Injection rate shall not exceed 50 gpm.

H. Economics

A. Total and unit costs of construction

B. Operating costs

I. Source(s) of Information and Published References

Texas Water Quality Board

Texas Water Commission - Bulletin 6409 - 1964

WELL FILE NUMBER WDW-71 (STATE) Tx-57 (UMR)

I. Operating Company & General Well Location

Dow Chemical Company
P. O. Box 22463
Houston, Texas 77027

II. Well location (legal description)

Location: 9565.7 ft. from the north line and 1.3 ft. from the west line of Alexander Calvit Survey, Ab. 49, Brazoria County, Texas.

III. History, system planning, construction & operation.

The well was permitted on February 27, 1970 and began operation on March 19, 1971. The well is still in operation.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on the Gulf Coastal Plain and is within the Brazos River drainage basin. The stratigraphic section consists of sands, clays, and shales of Miocene to Recent age with alluvial sands, silts, and clays outcropping in the area.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes____; no X).

(Ground elevation_____) (Total well depth 6322 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
Same as Tx-59				

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Catahoula	Pliocene - Miocene	3300ft.	3000ft.	numerous permeable sand

D. Engineering description of injection units

1. Porosity: 28 - 32%
2. Permeability: 1000 md
3. Original Reservoir Pressure: 2800 psi at 6200 ft.
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Alluvium	0ft.	300ft.	TDS - 1000 ppm	- public use
Beaumont	1250ft.	950ft.	TDS - 1000-3000 ppm	- public use

F. Mineral Resources (oil and gas, coal, brines, etc.)

There are several producing oil and gas wells reported in the vicinity of the disposal wells.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing: Weight & Grade	Size	Depth Set	Type & Amount of Cement
Surface		H-40 [illegible] 75lb/ft.	10 [illegible]in.	1359ft.	1
Intermed.		J-55 23 [illegible]/ft.	7 [illegible]in.	6323ft.	2
Injection		J-55 9.5 lb/ft.	4 1/2in.	6322ft.	
Other					

Describe bottom hole completion method: open hole completion

1) 590 sacks of Trinity Lite Wate and 200 sacks of Class A neat cement - to the surface
2) 1st stage - 742 sacks of Trinity Lite Wate and 200 sacks of Type H
   2nd stage - 405 sacks of Trinity Lite Wate

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: Baker Lock set packer at the base of the injection tubing.

VI. Description of surface equipment

A. Holding tanks & flow lines

B. Filters

C. Pumps

D. Other

I. Cores, samples, & Logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

____Drillers Log ____Drilling time

____Sample log ____Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

X Resistivity	___ Gamma ray-neutron
___ SP	___ Temperature
___ Caliper	___ Cement bond

___ Other ___

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Organic and inorganic fluid waste from the manufacture of glycerine.

B. Physical & chemical Description NaOH 15,000 ppm, $NaCO_3$ 53,947 ppm, NaCl 130,592 ppm, Glycerine 5,033 ppm, Epichlorohydrin 4,638 ppm, Epoxy resin 1,875, Phenol 3,224 ppm, pH 11.2, Specific Gravity 1.25, Viscosity 3.24 at 77°F.

C. Volume 50 gpm

IX. Preinjection waste treatment Sedimentation

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s)	Average	Maximum
"	"	"
"	"	"
"	"	"
"	"	"

2. Pressure (well head _____ bottom hole _____)

Date(s)	Average	Maximum
"	"	"
"	"	"
"	"	"
"	"	"

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems: No problems were reported.

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating procedures: Surface injection pressure is limited to 2510 psi.

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER WDW-72 STATE Tx-58 UMR

I. Operating Company & General Well Location

Petronila School, Bishop Consolidated School Dist.
Box 788
Bishop, Texas 78343
6 wells

II. Well location (legal description)

Location: 6 wells in the southeast quarter of Section 9, Roberts and White Subdivision of the Hoffman Ranch Tract, Neuces County, Texas.

III. History; system planning, construction & operation.

The wells were permitted on May 27, 1970 and are presently in operation.

IV. Geology & Geohydrology

A. Regional geologic setting: The wells are found in the alluvial sands of the west Gulf Coastal Plain. The regional dip in the area is 30 to 40 feet per mile.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included--yes____; no X).

(Ground elevation_____) (Total well depth N 20 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thick-ness	Lithologic Description
Alluvium	Recent	15ft.	20ft.	Sand

C. Geologic Description of injection units & possible units not in use

Rock Unit Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution

D. Engineering description of injection units

1. Porosity:
2. Permeability:
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
None				

F. Mineral Resources (oil and gas, coal, brines, etc.)

There are no mineral resources reported in the area of the disposal well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing: Weight & Grade	Size	Depth Set	Type & Amount of Cement
Surface		perforated pipe	[illegible] in.	20ft.	None
Intermed.					
Injection					
Other	All pipe is gravel packed.				

Describe bottom hole completion method: perforated completion

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: _____

I. Description of surface equipment

A. Holding tanks & flow lines _____

B. Filters _____

C. Pumps _____

D. Other _____

I. Cores, samples, & Logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

____Drillers Log ____Drilling time

____Sample log ____Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

____Resistivity ____Gamma ray-neutron

____SP ____Temperature

____Caliper ____Cement bond

____Other_____

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Treated sewerage from the school.

B. Physical & chemical Description Treated domestic sewerage effluent containing not more than 20 mg/l. BOD and 20 mg/l suspended solids. The effluent will be chlorinated.

C. Volume 10,000 gpd

IX. Preinjection waste treatment

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s)	Average	Maximum
April 1970	5.72 gpm	9.37 gpm
Dec. 1970	6.95 gpm	6.95 gpm
"	"	"
"	"	"
"	"	"

2. Pressure (well head X bottom hole)

Date(s)	Average Gravity	Maximum
"	"	"
"	"	"
"	"	"
"	"	"

Well operation & operating history

D. Description of operating programs:

E. Operating problems: No operating problems were reported.

Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating procedures: Surface injection pressure shall be limited to gravity flow.

II. Economics

A. Total and unit costs of construction

B. Operating costs

III. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER WDW-73 / STATE Tx-59 / UMR

I. Operating Company & General Well Location

Malone Service Company, Inc.
P. O. Box 709
Texas City, Texas 77590

II. Well location (legal description)

Location: 5500 ft. from the north line and 11,900 ft. from the west line of Samuel C. Bundich Survey, Ab. 7, Galveston County, Texas.

III. History, system planning, construction & operation.

The well was permitted on February 18, 1970 and began operation on April 28, 1971. The well is presently in operation.

IV. Geology & Geohydrology

A. Regional geologic setting. The well is located on the Gulf Coastal Plain and the regional dip is toward the southeast. The topography of the area is relatively flat. The stratigraphic section consists of Tertiary and Quaternary sands, clays, and shales.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well
Rock Unit (Geologic Column included- -yes____; no X).
(Ground elevation_____) (Total well depth 5124 ft.)
Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thick-ness	Lithologic Description
Beaumont	Pleistocene	0ft.	1100ft.	sand and clay
Lissie	Pleistocene			
Willis	Pliocene	1100ft.	3900ft.	undifferentiated beds
Goliad	Pliocene			of sand, clay, & shale
Lagarto	Miocene			sandstone
Oakville	Miocene			

C. Geologic Description of injection units & possible units not in use

Rock Unit Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
---	Miocene	4000ft.	1000ft.	massive sands

D. Engineering description of injection units

1. Porosity [illegible]
2. Permeability: [illegible] md from sidewall cores
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Beaumont	1100ft.	400ft.	clay & sand	fresh water for both domestic and industrial use

F. Mineral Resources (oil and gas, coal, brines, etc.)

Petroleum is produced at 5100 ft. from the Hitchcock Field which is three miles west of the disposal well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing. Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface		H-40 32.75lb/ft.	10 3/4in.	1213ft.	1 surface
Intermed.		J-55 26 lb/ft.	7 in.	5120ft.	2 surface
Injection		J-55 10.2 lb/ft.	3 1/2in.		

Other

Describe bottom hole completion method: perforated completion (4912 ft. to 4995 ft.

1) 490 sacks of Class A + 12% Gel and 2% $CaCl_2$.

2) 1120 sacks of Class A + 10% NaCl + 8% Gel.

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc:

Otis retrievable packer at 4865 ft.

15 Centralizers on the 7 in. casing

VI. Description of surface equipment

A. Holding tanks & flow lines

B. Filters Filters are used - type unknown

C. Pumps

D. Other

VII. Cores, samples, & Logs

A. Coring

From 3934 ft. to 5055 ft. Recovery 30 cores

"

"

"

"

"

B. Drilling Logs

____Drillers Log

____Sample log

____Drilling time

____Other:

VII. -- Cores, samples, & logs, continued

C. Other logs run

X Resistivity	X Gamma ray-neutron
___ SP	___ Temperature
X Caliper	___ Cement bond
X Other Microlog	

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

The waste effluent is from the operation of a petrochemical plant.

B. Physical & chemical Description Sulfates 8800 mg/l., chlorides 8568 mg/l, Calcium 637 mg/l, Magnesium 209 mg/l, Sodium 9170 mg/l., Iron 97 mg/l, Specific gravity 1.025

C. Volume 1000 - 5000 bpd

IX. Preinjection waste treatment Filtration and pH control

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
Injection	--	Perforated zone	salt water 1.5 bpm at 1900 psi

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
4912ft. to 4995ft.	Acidization	2000 gal - 15% HCl and 1000 gal. of HF

C. Injection rates and pressures

1. Rate

Date(s) Dec. 1970 Average 60 BPD Maximum 125 BPD

" " " "

" " " "

" " " "

2. Pressure (well head & bottom hole)

Date(s) Dec. 1970 Average 120 psig Maximum 175 psig

" " " "

" " " "

" " " "

" " " "

X. Well operation & operating history

D. Description of operating programs: _____

E. Operating problems: No problems were reported.

XI. Regulatory aspects.

A. Construction requirements _____

B. Monitoring requirements _____

C. Restrictions on operating rates 1) Surface injection pressure is limited to 750 psig. 2) Injection rate is limited to 150 gpm.

XII. Economics

A. Total and unit costs of construction _____

B. Operating costs _____

XIII. Source(s) of Information and Published References _____

Texas Water Quality Board

ELL FILE NUMBER WDW-74 / STATE Tx-60 / UMR

I. Operating Company & General Well Location

City of Lamesa
City Hall
Lamesa, Texas 79331

I. Well location (legal description)

Location: 2375 ft. from the west line and 280 ft. from the south line of Section 7, Block 35, T5N, Dawson County, Texas.

I. History; system planning, construction & operation.

The well was permitted June 16, 1970. The well is presently in operation.

V. Geology & Geohydrology

A. Regional geologic setting: The well is located on the west flank of the Midland Basin and the regional dip is to the east. The stratigraphic section consists of Permian limestone, sandstone, and dolomite.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included--yes____; no X).
(Ground elevation_____) (Total well depth 205 ft.)
Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
---	Permian	0ft.	200ft.	sand, clay, shale, and caliche

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
---	Permian	170ft.	35ft.	limestone

D. Engineering description of injection units

1. Porosity:
2. Permeability:
3. Original Reservoir Pressure
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thick-ness	Character	Chemical Quality
Ogallala			sandstone	fresh water for municiple & industrial use

F. Mineral Resources (oil and gas, coal, brines, etc.)

No mineral resources were reported in the area of the injection well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface			[illegible]	205 ft.	from surface to 50ft.
Intermed.					
Injection					
Other	The bottom 155 ft. of casing will be gravel packed.				

Describe bottom hole completion method: perforated completion - bottom 35 ft.

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: _____

VI. Description of surface equipment

A. Holding tanks & flow lines _____

B. Filters _____

C. Pumps _____

D. Other _____

VII. Cores, samples, & logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling logs

___Drillers log ___Drilling time

___Sample log ___Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

___Resistivity ___Gamma ray-neutron

___SP ___Temperature

___Caliper ___Cement bond

___Other

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Rain water

B. Physical & chemical Description Ca 24ppm, Mg 2ppm, Na 1ppm, K 3ppm, (CO_3), 72 ppm, Cl 14ppm, SO_4 20ppm, F less, pH 6.8, C.O.D. 26.7 m/l.

C. Volume 160 cm

IX. Preinjection waste treatment None

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s)		Average		Maximum	
	October 1970		[illegible] gpm		
	November 1970	"	[illegible] gpm	"	
"		"		"	
"		"		"	
"		"		"	

2. Pressure (well head X bottom hole)

Date(s)		Average		Maximum	
	October 1970		Gravity		
"	November 1970	"	Gravity	"	
"		"		"	
"		"		"	
"		"		"	

I. Well operation & operational history

D. Description of operating programs: The injection operation is for 10 days each cycle.

E. Operating problems: No problems were reported.

II. Regulatory aspects.

A. Construction permits: _____

B. Monitoring requirements: _____

C. Restrictions on operating rates: _____

I. Economics

A. Total and unit costs of construction

B. Operating costs

II. Source(s) of information and Technical References

Texas Water Quality Board

WELL FILE NUMBER WDW-75 / STATE Tx-61 / UMR

I. Operating Company & General Well Location

Pan American Petroleum Corporation
P. O. Box 3092
Houston, Texas 77001

II. Well location (legal description)

Location: 3507 ft. from the south line and 542 ft. from the east line of the James Smith Survey, Ab. 176, Galveston County, Texas.

III. History, system planning, construction & operation.

The well was permitted on April 3, 1970 and injection began on April 23, 1970, in the form of injection tests. Further tests are pending. The well was drilled in 1957 as a water supply well and recently was converted to a waste disposal well.

IV. Geology & Geohydrology

A. Regional geologic setting The well is situated on the Gulf Coastal Plain and the regional dip is to the southeast at 40 ft. per mile. The stratigraphic section consists of Tertiary and Quaternary sands, clays, and shales.

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included--yes ___; no X).

(Ground elevation _____) (Total well depth 9780 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thick-ness	Lithologic Description
Beaumont	Pleistocene	0ft.	1100ft.	fine grained sand
Lissie	Pleistocene			
Willis	Pliocene		5080ft.	sands and clays
Goliad	Pliocene			

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
Goliad	Miocene	6180ft.	20ft.	salt water sands

D. Engineering description of injection units

1. Porosity: 34%
2. Permeability: 2000md
3. Original Reservoir Pressure: 2550 psi at 6500 ft.
4. Reservoir Temperature: 165°F
5. Chemical Character of Formation Water: _____
6. Reservoir Fracture Pressure: _____

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Beaumont	0	1100ft.	sand & clay	fresh water for municiple & industrial use

F. Mineral Resources (oil and gas, coal, brines, etc.)

There are several oil and gas wells reported in the area of the injection well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing. Weight Grade	Size	Depth Set	Type & Amount of Cement
Surface			[illegible]	1626ft.	1
Intermed.			[illegible]	9767ft.	2
Injection					
Other					

Describe bottom hole completion method: perforated completion 6180ft. to 6190 ft.

1) 820 sacks of common cement with 10% Gel.
2) 310 sacks of 5/0 Set cement with 7.2% Gel.

V. Well design and construction, continued 4.

B. Packers, Controllers, well head equipment, etc. _____

VI. Description of surface equipment

A. Holding tanks & flow lines _____

B. Filters _____

C. Pumps _____

D. Other _____

VII. Cores, samples, & logs

A. Coring

From _____ to _____ Recovery _____

B. Drilling logs

___Drillers log

___Sample log

___Drilling time

___Other: _____

VII. -- Tests, samples, & logs, continued

C. Other logs run

___Resistivity ___Gamma ray-neutron

___SP ___Temperature

___Caliper ___Cement bond

___Other

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

The waste is from a petroleum refinery operation.

B. Physical & chemical Description

Sodium	2300 mg/l	Specific gravity 1.0[illegible]
Calcium	3 mg/l	at [illegible]°F
Magnesium	5 mg/l	
Chloride	17 mg/l	
Bicarbonate	[illegible] mg/l	
Phenolic	2750 mg/l	
pH	9.8	

C. Volume [illegible]

IX. Pre-injection waste treatment pH control

5. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
Injection	---	[illegible] ft.	[illegible] of effluent

B. Stimulation or [illegible]

Zones treated	Treatment [illegible]	Description of treatment and results
None		

C. Injection rates and pressures

1. Rate

Date(s) ______ Average ______ Maximum ______

2. Pressure (Well head ______ Bottom hole ______)

Date(s) ______ Average ______ Maximum ______

[illegible] Well operation & operating history

D. Description of operating program: The well is on a temporary standby status while awaiting further tests.

E. Operating problems:

I. Regulatory aspects.

A. Construction requirements:

B. Monitoring requirements:

C. Restrictions on well use [illegible]: Surface injection pressure is limited to [illegible]

. Economics

A. Total and unit costs of construction _____

B. Operating costs _____

C. Source(s) of Information and Published References _____

Texas Water Quality Board

WELL FILE NUMBER ~~WDW-76~~ ~~STATE~~ ~~Tx-62~~ ~~EPA~~

I. Operating Company & General Well Location

Dow Chemical Co., Oyster Creek Division
P. O. Box [illegible]
Houston, Texas 77027

II. Well location (legal description)

Location: 4220 ft. north of the west-central interior corner and 1068 ft. east of the west survey line of the Maurice Henry Survey, Ab. Ab-[illegible], Brazoria County, Texas.

III. History, system planning, construction & operation.

The well was permitted on May 13, 1970. The well is presently operating.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on the Gulf Coastal Plain. The stratigraphic section consists of sands, clays, and shales of Miocene to Recent age with alluvial sand, silt, and clay outcropping in the area.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes___; no X).
(Ground elevation_____) (Total well depth 6220 ft.)
Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
Same as Tx-59				

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Catahoula	Pliocene-Miocene	3300ft.	3200ft.	numerous permeable sand zones

D. Engineering description of injection units

1. Porosity: 32%
2. Permeability: .[illegible] to 1000 md
3. Original Reservoir Pressure: 2820 psi to 6500 ft.
4. Reservoir Temperature: [illegible] at 6500 ft.
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure: .85 psi/ft.

IV. Geology & Geohydrology, continued

E. Geohydrology, fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Alluvium			clay & gravel	TDS 1000 ppm
Beaumont		200ft.	sand & clay	fresh water

F. Mineral Resources (oil and gas, coal, brines, etc.)

Oil and gas in the area is produced from salt dome structures of Miocene age. Gas condensate has been obtained from sediments as deep as 18,000 ft. Sulfur is being produced at the nearby Bryan Mound Salt Dome. Salt is being produced from the Stratton Ridge Salt Dome by Dow Chemical who also operates hydrocarbon storage facilities in salt cavities within the Stratton Ridge Dome.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & Grade	Size	Depth ft	Type & Amount of Cement
Surface	15in.	K-40 [illegible]	[illegible]	1297ft.	1
Intermed.			[illegible]	6218ft.	2
Injection					
Other					

Describe bottom hole completion method: open hole completion

1) 590 sacks of Trinity Lite Wate and 200 sacks of Class A cement with 2% $CaCl_2$.
2) 1st stage - 800 sacks of Lite Wate + 200 Common H
2nd stage - 1400 sacks of Lite Wate

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: _____

VI. Description of surface equipment

A. Holding tanks & flow lines Carbon steel tank serves as a surge tank.

B. Filters _____

C. Pumps _____

D. Other _____

VII. Cores, samples, & log:

A. Coring

From	To	Recovery
"		
"		
"		
"		
"		

B. Drilling Logs

X Drillers Log ___ Drilling time

___ Sample log ___ Other: _____

VII. -- Cores, samples, & logs,-continued

C. Other logs run

___Resistivity
___SP
___Caliper
___Other

___Gamma ray-neutron
___Temperature
___Cement bond

VIII. Waste Characteristics

A. Industrial process from which waste is derived

Organic and inorganic effluent from chemical plant operations.

B. Physical & chemical Description See attachment

C. Volume 10 mgm

IX. Pre-injection waste treatment Clarification and filtration

Chemical Analysis of Waste

a. Inorganic Constituents

Sodium Hydroxide	20,000 ppm
Sodium Sulfate	10,000 ppm

b. Organic Constituents

Phenol	10,000 ppm
Acetone	2,000 ppm
Cresol	300 ppm
Sodium Fluoride	15,000 ppm

c. Water

Completion waste pH	= 12	@ 150°F
Sp. Gr.	= 1.0	@ 150°F
Viscosity	= 1.0	@ 150°F

No compatibility problems between injection waste and formation fluids are expected.

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s)_____ Average_____ Maximum_____

" " " "

" " " "

" " " "

" " " "

2. Pressure (well head _____ bottom hole_____)

Date(s)_____ Average_____ Maximum_____

" " " "

" " " "

" " " "

" " " "

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems: No problems were reported.

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating procedure Surface injection pressure is limited to 2500 psig.

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References.

Texas Water Quality Board

Texas Water Commission - Bulletin 6310, 1963

WELL FILE NUMBER [illegible] [illegible]

I. Operating Company & General Well Location

Rohm and Haas Company

P. O. Box [illegible]

Deer Park, Texas

Well - [illegible] miles north of Deer Park

II. Well location (legal description)

Location: [illegible] ft. from the south line and [illegible] ft. from the west line of the [illegible] Survey, Ab.-[illegible], [illegible] County, Texas.

III. History, system planning, construction & operation.

The well was permitted on June [illegible], 1970. The well was originally an oil and gas test well and was converted to a waste disposal well. Injection tests were made on the well and it is presently awaiting operation.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is situated on a fault block in the Gulf Coastal Plain. The regional dip is to the southeast at 15 ft. per mile. The stratigraphic section includes Tertiary and Quaternary sand and clay.

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included yes___; no X).

(Ground elevation________) (Total well depth [illegible] ft.)

Datum for depth measurement Ground level

Name	Age	Depth (Top)	Thickness	Lithologic Description
Beaumont	Pleistocene	[illegible]	[illegible]	clay with sand
Montgomery				
Bentley	Pleistocene	[illegible]	[illegible]	clay, silt, and sand
Willis				sandstone
Goliad	Pliocene	[illegible]	[illegible]	sand and clay
Fleming/Catahoula	Miocene			sandstone
Frio	Oligocene	[illegible]	[illegible]	sandstone

C. Geologic description of injection units & receptive units not in use

Rock Unit

Name	Age	Depth (Top)	Thickness	Character and Areal Distribution
Frio	Oligocene	[illegible]	[illegible]	permeable sand

D. Engineering description of injection units

1. Porosity: [illegible]
2. Permeability: [illegible]
3. Original formation pressure: [illegible]
4. Formation fracture gradient:
5. Chemical character of formation water:
6. Acceptable injection pressure:

IV. Geology & Geohydrology, continued 3.

E. Geohydrology, fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
[illegible]	0	500	sand & clay	

F. Mineral Resources (oil and gas, coal, [illegible], etc.)

Oil and gas wells are reported in the area of the injection well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & Grade	Size	Depth Set	Type & Amount of Cement
Surface		[illegible]	[illegible]	[illegible]	existing casing
Intermediate		[illegible]	[illegible]	[illegible]	1
		[illegible]	[illegible]	[illegible]	2
Injection		[illegible]	3 1/2 in.	[illegible]	

Other

Describe bottom hole completion method: open hole completion

1) [illegible] sacks of cement + [illegible].
2) 1st stage + 175 sacks of [illegible] + [illegible]
2nd stage + 275 sacks of Halliburton lightweight + 100 sacks of cement.

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: [illegible] Packer with [illegible] assembly on the 4 1/2 in. injection string.

VI. Description of surface equipment

A. Holding tanks & flow lines

B. Filters [illegible] graded sand, upflow filter - U. S. Filter Corp., [illegible]

C. Pumps

D. Other

VII. Cores, samples, & logs

A. Coring Sidewall

From [illegible] ft. to [illegible] ft. Recovery 30 cores

B. Drilling Logs

___ Drillers Log

___ Sample log

___ Drilling time

___ Other:

VII. -- Cores, samples, & logs, continued

C. Other logs run

X Resistivity	___ Gamma ray-neutron
___ SP	___ Temperature
___ Caliper	___ Cement bond
X Other Sonic Log	

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

The waste fluid comes from several streams of chemical waste.

B. Physical & chemical Description See attachment

C. Volume 360,000 gpd

IX. Preinjection waste treatment Filtration

Table I

Properties of Ammonium Sulfate Cooling Tower Water[1]

Total Hardness (2)	26 mg/l
Sodium, Na^+ (Calc.)	2,420
Calcium, Ca^{++}	7.5
Magnesium, Mg^{++}	1.8
Iron (total), Fe^{+++}	1.5
Total Alkalinity (2)	5,050
Chloride, Cl^-	170
Sulfate, $SO_4^=$	2.5
Carbonate, $CO_3^=$	0
Bicarbonate, HCO_3^-	6,150
Hydroxide, OH^-	0
Sulfide, $S^=$	0
Chromate, Na_2CrO_4	250
Oxygen, O_2	2.5
Total Dissolved Solids (Calc.)	8,750
Water, H_2O	98%
pH	6.6
Specific Gravity @ 120°F	0.99

This water also contains some water soluble acrylic acid monomers partially neutralized with ammonia.

1) Averages of two analyses obtained on September 24 and 25, 1969.

2) Reported as calcium carbonate.

Table III

Properties of Acid Residue[1]

	B		H	
	Wt%	PPM	Wt%	PPM
Water	38	380,000	69	690,000
Sulfate, $SO_4^=$	50	500,000	23	230,000
Nitrogen, as NH_3	5.6	56,000	5.9	59,000
Total Carbon	1.7	17,000	0.6	6,000
Cyanide	0	0	0.1	1,000
pH	0		0.5	
SG @ 77°F	1.40		1.17	

1) The acid residue waste stream is a mixture of the two streams shown. The mixture may contain from 0-100% of either stream, depending on the plant operation.

Table II

Properties of Ammonium Sulfate Mother Liquor[1]

Overall Composition	Wt%	PPM
Ammonium Sulfate	23	230,000
Water	48	480,000
Organics	29	290,000
Carbon-Nitrogen		
Carbon	11.5	115,000
Nitrogen	7.7	77,000
Heavy Metals		
Phosphorous	ND[2]	
Arsenic	ND[2]	
Flourice	ND[2]	
Iron	.0598	598
Nickel	.0231	231
Lead	5×10^{-5}	0.5
Copper	.0052	52
Chromium	7.4×10^{-4}	7.4
Molybdenum	4×10^{-5}	0.4
Miscellaneous		
pH	4.0	
Specific	1.23	

1) The waste is saturated with ammonium sulfate and contains about 10% organic carbon.

2) Not detectable.

Table IV

Properties of N Distillation Bottoms

	Wt%	PPM
Water	99	990,000
Sulfuric Acid, H_2SO_4	0.5	5,000
Cyanides, CN^-	0.01	100
Total Carbon	0.2	2,000

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
Injection	---	open hole	6 bpm at 100 psi
Injection	---	open hole	7 bpm at 250 psi
Injection	---	open hole	6 bpm at 200 psi

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s)	Average	Maximum
"	"	"
"	"	"
"	"	"
"	"	"

2. Pressure (well head _____ bottom hole _____)

Date(s)	Average	Maximum
"	"	"
"	"	"
"	"	"
"	"	"

C. Well operation & operating history

D. Description of operating programs:

E. Operating problems: No problems were reported.

II. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating proce

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Pertinent References

Texas Water Quality Board

I. Operating Company & General Well Location

American Oil Company

P. O. Box [illegible]

Texas City, Texas [illegible]

II. Well Location (legal description)

Location: [illegible] ft. from the west line and [illegible] ft. from the north line of the [illegible] Survey, A- [illegible], Galveston County, Texas.

III. History, system planning, construction & operation.

The well was permitted on November [illegible], 1973. The well has [illegible] drilled [illegible] in operation.

IV. Geology & Geohydrology

A. Regional geologic setting: Same as TX-[illegible]

17. Geology & Geochemistry, continued

B. Geologic description of rock units penetrated by well bore (Geologic Column included -yes___; no X). (Ground elevation_____) (Total well depth 6950 ft.) Datum for depth measurement Ground Level

Name	Age	Depth (ft)	Thickness	Lithologic Description
From	To			

C. Geologic description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (ft)	Total Thickness	Character and Areal Distribution
Goliad	Miocene	From ft.	To ft.	narative and

D. Engineering description of injection units

1. Formation:
2. Formation type
3. Original reservoir pressure
4. Reservoir temperature
5. Chemical composition of formation water
6. Reservoir fracture pressure

IV. Geology & Geohydrology, continued

E. Geohydrology, fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Beaumont	ors.	1100ft.	sand & clay	fresh water for municiple and industrial use

F. Mineral Resources (oil and gas, coal, brines, etc.)

There are several oil and gas wells in the area of the injection well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & Grade	Depth Set	Type & Amount of Cement
Surface	[illegible]	[illegible]	1486ft.	1
Intermed.	[illegible]	7 5/8in.	6956ft.	2
Injection				
Other				

Describe bottom hole completion method.

1) 560 sacks of Trinity Lite Wate + 4% Gel + 7.5% Salt + 200 sacks of Class H + 2% $CaCl_2$.

2) 1200 sacks of Lite Wate + 510 sacks of 50/50 Pozmix.

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: 26 Centralizers on the long string

VI. Description of surface equipment

A. Holding tanks & flow lines

B. Filters

C. Pumps

D. Other

VII. Cores, samples, & logs

A. Coring

From ____ To ____ Recovery ____

"

"

"

"

"

B. Drilling logs

___Drillers log

___Sample log

___Drilling time

___Other: ____

VII. -- Cores, samples, & logs, continued

C. Other logs run

___ Resistivity ___ Gamma Ray-Neutron

___ SP _X_ Temperature

___ Caliper ___ Cement bond

___ Other ______

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Waste from oil refinery operations

B. Physical & chemical description: Industrial aqueous waste consisting of process water including: [illegible], [illegible] water, and [illegible]

[illegible] water

[illegible]

Sour Water [illegible] gpd

[illegible] water [illegible] gpd

[illegible] [illegible] gpd

C. Volume ______

IX. Pre-injection waste treatment ______

9. Well Operation & [illegible] History

A. Tests

Type	Duration	Zones Tested	Description of Test Results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection Rates and Pressures

1. Rate

Date(s) ______ Average ______ Maximum ______

2. Pressure (Well head ______ Bottom hole ______)

Date(s) ______ Average ______ Maximum ______

[illegible]

X. Well Operation & Monitoring Systems

D. Description of operating program:

E. Operating problems: The waste is not compatible with formation fluids.

XI. Regulatory Aspects

A. Construction Requirements:

B. Monitoring Requirements:

C. Restrictions on operating rules: Surface injection pressure is limited to [illegible] psig.

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER [illegible] STATE — Tx-65 UMR

I. Operating Company & General Well Location

E. I. duPont deNemours Company

P. O. Box 347

LaPorte, Texas 77571

II. Well location (legal description)

Location: 3835 ft. from the north line and 15592 ft. from the west line of the Enoch Brinson League, Ab. - 5, Harris County, Texas.

III. History, system planning, construction & operation.

The well was permitted on October 7, 1970. The well has been completed and tested but it is not yet in operation.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located in the Gulf Coastal Plain and the regional dip is to the southeast at 15 to 20 feet per mile. The stratigraphic section includes sands and clays of Quaternary and Tertiary age. The Frio in this area is faulted and deformed.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes___; no X).

(Ground elevation _____) (Total well depth 5350 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
Beaumont	Pleistocene	0ft.	600ft.	clay
Montgomery	Pleistocene			clay and silt
Bently	Pleistocene	600ft.	600ft.	silt and sand
Willis	Pliocene			sand
Goliad	Pliocene			sand
ville-Catahoula	Miocene	1200 ft.	4150ft.	massive sand
Anahuac	Miocene			sand
Frio	Oligocene			sand and silt

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Oakville-Catahoula	Miocene	4800ft.	1540ft.	massive sand

injection zone 5170 ft. to 5350 ft.

D. Engineering description of injection units

1. Porosity: 30%
2. Permeability: 500md
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Beaumont	0 ft.	combined	clay & sand	
Lissie		thickness-[illegible] ft.	sand & gravel	

F. Mineral Resources (oil and gas, coal, brines, etc.)

There are several oil and gas wells reported in the vicinity of the disposal well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Size & Wt.			Depth Set	Type & Amount of Cement
Surface	16 in.	[illegible]	[illegible]	[illegible]	[illegible] ft.	1
Intermed.	9 5/8 in.	[illegible]	[illegible]	[illegible]	5170 ft.	2

Injection

Other

Describe bottom hole completion method: open hole

1) 500 sacks of Class [illegible] with [illegible] + [illegible] [illegible]; followed by [illegible] sacks of Class H + 2% CaCl₂.
2) 1920 cu. ft. of Pozmix + [illegible].

V. Well design and construction, continued

D. Packers, Centralizers, well head equipment, etc: ____

11 Centralizers on long string

VI. Description of surface equipment

A. Holding tanks & flow lines: All facilities will be stainless steel, fiberglass, or rubber lined.

B. Filters: 3 primary vertical leaf filters

2 secondary polish filters

C. Pumps ____

D. Other ____

VII. Cores, samples, & logs

A. Coring

From	To	Recovery
"		
"		
"		
"		
"		

B. Drilling logs

___ Drillers log ___ Drilling time

___ Sample log ___ Other: ____

VII. -- Cores, samples, & logs, continued

C. Other logs run

_X_ Resistivity

___ SP

_X_ Caliper

___ Other

___ Gamma ray-neutron

___ Temperature

___ Cement bond

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Chemical plant waste

B. Physical & chemical Description See attachment

C. Volume [illegible]

IX. Preinjection waste treatment Sedimentation & filtration

COMPONENT	lb/hr	ppm Concentration
Water	130,273	99 + %
Sodium Acetate	310	2,356
Acetic Acid	45	380
Polyvinyl Alcohol	37	280
Methanol	180	1,370
Versenex 80 [1]	3	23
F-10 Silicone Defoamer [2]	3	123
Hydroquinone Carbonate	13	100
Potassium Carbonate	55	380
Potassium Acetate	7	35
Vinyl Acetate	159	1,170
Methyl Acetate	103	780
Acetaldehyde	61	465
Ethyl Acetate	6	45
T O T A L	131,2[illegible]	7,347

(1) Chelating compound of the [illegible] acetylamine.

(2) Alkyl polysiloxane defoamer.

E. Well Operation & Completion History

A. Tests

Type	Location	Zones Tested	Description of Test Results
Date			

B. Treatments or Stimulation

Zones Treated	Method Used	Description of Treatment and Results
Date		

C. Injection Rate and Pressures

1. Rate

Date(s) ______ Average ______ Maximum ______

2. Pressure (well head ______ bottom hole ______)

Date(s) ______ Average ______ Maximum ______

V. Well operation & monitoring history

D. Description of monitoring programs:

E. Operation problems: No problems were reported.

VI. Regulatory aspects.

A. Construction requirements:

B. Monitoring requirements:

C. Restrictions on operating procedures: Surface injection pressure is limited to [illegible].

XII. Economics

A. Total and Unit Costs of Construction

B. Operating Costs

XIII. Sources of Information and Pertinent References

Texas Water Quality Board

I. Operating Company & Present Well Location

E. I. duPont deNemours Co.

1007 Market Street

Wilmington, Delaware

II. Well Location (Legal description)

Location: 510 ft. from the north line and 1605 ft. from the west line of the [illegible] Williams Survey, A- [illegible], [illegible] County, Texas.

III. History, system planning, construction & operation.

The well was completed on October 7, 1975. The well has been completed and is presently on standby status pending completion of E. I. [illegible] plant.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located in the west Gulf Coastal Plain. [illegible] regional dip in this area is 20 to 35 feet per mile. The stratigraphic section consists of sands, silts, and clays of Tertiary and Quaternary age with the Pleistocene Beaumont Clay outcropping in the area of the well.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well
Rock Unit (Geologic column included: yes ___; no X).
(Ground elevation ________) (Total well depth [illegible] ft.)
Datum for depth measurement Ground Level

Name	Age	Depth (Top)	Thickness	Lithologic Description
Beaumont	Pleistocene		[illegible] ft.	clay
Lissie	Pleistocene			sand and gravel
Willis	Pliocene		[illegible] ft.	sand, silt, and clay
Oakville Upper Miocene				

C. Geologic Description of Injection units & possible units not in use

Rock Unit

Name	Age	Depth (Top)	Thickness	Character and Areal Distribution
Oakville	Miocene	[illegible]	[illegible] ft.	[illegible] sand and sandstone

D. Engineering description of injection units

1. Porosity: [illegible]
2. Permeability: [illegible]
3. Original Reservoir Pressure: [illegible] psi at [illegible] ft.
4. Reservoir Temperature: [illegible]°F at [illegible] ft.
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Hydrology, fresh water aquifers in vicinity

Name	Depth	Thickness	Formation	Chemical Quality
[illegible]	[illegible] ft.	[illegible]	sand and clay	
[illegible]	[illegible] ft.		sand and gravel	

F. Mineral Resources (oil and gas, coal, brines, etc.)

Several oil and gas fields are reported in the area of the disposal well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing: Material & Grade	Size	Depth Set	Type & Amount of Cement
Surface	17 1/2in.	[illegible]	[illegible]	[illegible]ft.	1
Intermed.		[illegible]	[illegible] in.	[illegible]ft.	2
Injection					
Other					

Describe bottom hole completion method.

1) 610 sacks of Pozmix + 2% Gel. and 2% CaCl + 200 sacks of Class H
2) 1780 sacks of Pozmix + [illegible] sacks of [illegible] and 400 gal. of [illegible] Resin.

6. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: _____

7. Description of surface equipment

A. Holding tanks & flow lines _____

B. Filters Polishing filters

C. Pumps Acid resistant injection pump

D. Other _____

8. Cores, samples, & Logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

____Drillers Log ____Drilling time

____Sample log ____Other: _____

_____

VII. -- Cores, samples, & logs, continued

C. Other logs run

X Resistivity	___ Gamma ray-neutron
___ SP	___ Temperature
___ Caliper	___ Cement bond
___ Other	

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Chemical plant waste

B. Physical & chemical Description Highly corrosive 30% HCl with a pH of 1.0

C. Volume 350 gpm

IX. Preinjection waste treatment filtration

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s)	Average	Maximum
"	"	"
"	"	"
"	"	"
"	"	"

2. Pressure (well head _____ bottom hole _____)

Date(s)	Average	Maximum
"	"	"
"	"	"
"	"	"
"	"	"

X. Well operation & operating history

D. Description of operating programs: The well is not yet in operation.

E. Operating problems:

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating proc... Surface injection pressure is limit... to 2000 psig.

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

Texas Water Commission - Bulletin 6409, 1964

WELL FILE NUMBER WDW-83 / STATE Tx-67 / UMR

I. Operating Company & General Well Location

E. I. duPont deNemours Company

P. O. Box 347

LaPorte, Texas 77571

II. Well location (legal description)

Location: 2960 ft. from the north line and 14975 ft. from the west line of the Enoch Brinson League, Ab. - 5, Harris County, Texas.

III. History, system planning, construction & operation.

The well was permitted on October 7, 1970. It has been completed and is awaiting injection.

IV. Geology & Geohydrology

A. Regional geologic setting: Same as 66

V. Geology & Geohydrology, continued 2.

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes ____; no X).

(Ground elevation _____) (Total well depth 5180 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
Same as Tx-66				

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Same as Tx-66				

D. Engineering description of injection units

1. Porosity: 30%
2. Permeability: 500 md
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thick-ness	Character	Chemical Quality
Same as Tx-66				

F. Mineral Resources (oil and gas, coal, brines, etc.)

Same as Tx-66

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & Grade	Depth Set	Type & Amount of Cement
Surface	15 in.	10 [illegible]	1342ft.	1
Intermed.	9 7/8in.	7 [illegible]	5186ft.	2
Injection				
Other				

Describe bottom hole completion method: open hole

1) 900 sacks of Class H + 2% Gel. + 20% $CaCl_2$.
2) 1500 sacks of Pozmix + 6% Nacl + 2% Gel.

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: 11 Centralizers on the 10 3/4in. 19 Centralizers on the 7 5/8in.

VI. Description of surface equipment

A. Holding tanks & flow lines Same as Tx-82

B. Filters Same as Tx-83

C. Pumps

D. Other

VII. Cores, samples, & Logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

____Drillers Log ____Drilling time

____Sample log ____Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run:

___Resistivity ___Gamma ray-neutron

___SP ___Temperature

___Caliper ___Cement bond

___Other _____

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Chemical plant waste

B. Physical & chemical Description Same as Tx-83

C. Volume 260 gpm

IX. Preinjection waste treatment filtration and sedimentation

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s) _____ Average _____ Maximum _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

2. Pressure (well head _____ bottom hole _____)

Date(s) _____ Average _____ Maximum _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

X. Well operation & operating history

D. Description of operating program:

E. Operating problems: None reported

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating procedures: surface injection pressure is limited to 2500 psig

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER [illegible] Tx-68 USR

I. Operating Company & General Well Location

Odessa Natural Corporation
P. O. Box 3086
Odessa, Texas 79760

II. Well location (legal description)

Location: 660 ft. from the north line and 660 ft. from the west line of Sec. 1, Block 42, T. and P. R. R. Co. Survey Ector County, Texas

III. History, water planning, construction & operation.

The well was permitted on December 8, 1970. The well has been completed but is not yet in operation.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on the western flank of the Midland Basin. The regional dip is toward the northeast. The stratigraphic section consists of Permian and Quaternary limestones, dolomites, sandstones, and shales.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes ___; no X).

(Ground elevation _____) (Total well depth 6000 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
Alluvium	Pleistocene			sand and gravel
Comanche	Cretaceous		125ft.	sand and limestone
Dockum	Triassic			sandstone
Fuadalupe	Permian			limestone & dolomite
San Andres	Permian		500ft.	limestone & dolomite

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
San Andres	Permian	4800ft.	900ft.	anhydrite, limestone, and dolomite

D. Engineering description of injection units

1. Porosity: 18%
2. Permeability: 4 md
3. Original Reservoir Pressure: 2347 psi at 5000 ft.
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Comanche		125ft.	sand	TDS + 3000 ppm

F. Mineral Resources (oil and gas, coal, brines, etc.)

There are several oil and gas wells reported in the vicinity of the disposal well.

V. Well design and construction

4. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & Grade	Depth Set	Type & Amount of Cement
Surface		Old casing	229ft.	
Intermed.				
Injection				
Other				

Describe bottom hole completion method:

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: _____

VI. Description of surface equipment

A. Holding tanks & flow lines Plastic lined retention pond

B. Filters _____

C. Pumps _____

D. Other _____

VII. Cores, samples, & Logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

____Drillers Log ____Drilling time

____Sample log ____Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

____Resistivity ____Gamma ray-neutron

____SP ____Temperature

____Caliper ____Cement bond

____Other

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Waste fluid from Butadiene, Olefin, Styrene, and Ammonia plants.

B. Physical & chemical Description See attachment

C. Volume 1000 bpd

IX. Preinjection waste treatment Sedimentation

Chloride	5500 mg/l
Bicarbonate	287 mg/l
Sulfate	850 mg/l
Sulfide	None detected
Total hardness(as $CaCO_3$)	2300 mg/l
Calcium	400 mg/l
Magnesium	352 mg/l
Iron	Trace
Sodium	3036 mg/l

Composite waste pH = 8.5 @ 70°F
Specific gravity = 1.009 @ 70°F
Resitivity = .712 ohm @ 70°F

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s)	Average	Maximum
"	"	"
"	"	"
"	"	"
"	"	"

2. Pressure (well head _____ bottom hole _____)

Date(s)	Average	Maximum
"	"	"
"	"	"
"	"	"
"	"	"

X. Well operation & operating history

D. Description of operating programs: The well is not yet in operation.

E. Operating problems:

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating pro[illegible]e Surface injection pressure is limited to 2000 psig. Injection rate is limited to 10,000 bpd.

II. Economics

A. Total and unit costs of construction

B. Operating costs

II. Source(s) of Information and Published Reference.

Texas Water Quality Board

WELL FILE NUMBER WDW-88 / STATE Tx-69 / UMR

I. Operating Company & Current Well Location

El Paso Products Company

P. O. Box 3986

Odessa, Texas 79760

II. Well location (legal description)

Location: 225 ft. from the west line and 1890 ft. from the south line of Sec. 38, Block 42, T2S, T. & P. R.R. Co. Survey, Ector County, Texas.

III. History, system planning, construction & operation.

The well was permitted on October 22, 1970 and has been operating since March, 1971.

IV. Geology & Geohydrology

A. Regional geological setting: The well is located on the western flank of the Midland Basin. The regional dip in the area is to the northeast. The stratigraphic section consists of Permian and Quaternary sandstone, shales, limestones, and dolomite.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included yes ____; no X).

(Ground elevation _____) (Total well depth 5000 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
Alluvium	Recent			sand & gravel
Comanche	Cretaceous		150ft.	sand
Dockum	Triassic		1250ft.	limestone
Guadalupe	Permian		4100ft.	limestone & dolomite
San Andres	Permian		1000ft.	limestone & dolomite

C. Geologic Description of injection units & possible units not in use

Rock Unit Name	Age	Depth (top)	Thickness	Character and Areal Distribution
San Andres	Permian	4800ft.	1000ft.	anhydrite and dolomite

D. Engineering description of injection units

1. Porosity: 18%
2. Permeability: 4 md
3. Original Reservoir Pressure: 2147 psi at 5000 ft.
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Comanche		125ft.	none	TDS + 300 ppm

F. Mineral Resources (oil and gas, coal, brines, etc.)

There are several oil and gas wells reported in the area.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface	17 1/2in.	H-40 48lb/ft.	13 3/8in.	234ft.	1
Intermed.	12 1/4in.	K-55 40lb/ft.	9 5/8in.	4860ft.	2
Injection		K-55 15.5lb/ft.	5 1/2in.	4793ft.	

Other

Describe bottom hole completion method: open hole completion

1) 250 sacks of Class H
2) 1900 sacks of Litepoz., 700 sacks of Class C, and 4% Gel.

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: _____

VI. Description of surface equipment

A. Holding tanks & flow lines Plastic lined retention pond

B. Filters _____

C. Pumps _____

D. Other _____

VII. Cores, samples, & Logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

___ Drillers Log ___ Drilling time

___ Sample log ___ Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

___ Resistivity	X Gamma ray-neutron
___ SP	___ Temperature
___ Caliper	X Cement bond
X Other Casing Inspection log	

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Petrochemical waste

B. Physical & chemical Description

Cl	5500 mg/l	pH 8.5	
$(CO_3)_2$	287 mg/l	Specific gravity 1.009	
SO_4	850 mg/l		
Ca	400 mg/l		
Mg	352 mg/l		
Fe	Trace		
Na	3036 mg/l		

C. Volume

IX. Preinjection waste treatment Sedimentation

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
Injection	---	San Andres	8 bpm at 700 psi

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s)	Average	Maximum
"	"	"
"	"	"
"	"	"
"	"	"

2. Pressure (well head _____ bottom hole _____)

Date(s)	Average	Maximum
"	"	"
"	"	"
"	"	"
"	"	"

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems: No problems were reported.

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating press: Surface injection pressure is limited to 2000 psi. Maximum daily volume is 40,000 bbl.

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER WDW-85 STATE Tx-70 UMR

I. Operating Company & General Well Location

Warren Petroleum Corp.
P. O. Box 1589
Tulsa, Oklahoma 74102

II. Well location (legal description)

Location: 775 ft. from the east line and 1790 ft. from the north line of the William Bloodgood Argumentation Survey, Ab.-5, Chambers County, Texas.

III. History; system planning, construction & operation.

The well was permitted on October 27, 1970. It was originally completed as a salt water injection well. The well is not yet in operation.

IV. Geology & Gechydrology

A. Regional geologic setting: The well is situated on the Barber's Hill Salt Dome which is within the Gulf Coastal Plain. The stratigraphic section around the dome consists of Miocene to Recent sands and clays.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes ___; no X).

(Ground elevation _____) (Total well depth 1495 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
Beaumont	Pleistocene			sand and clay
Lissie	Pleistocene			
Caprock			120ft.	limestone and dolomite

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Caprock			120ft.	limestone and dolomite

D. Engineering description of injection units

1. Porosity: High

2. Permeability: High

3. Original Reservoir Pressure:

4. Reservoir Temperature:

5. Chemical Character of Formation Water:

6. Reservoir Fracture Pressure:

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Lissie		250ft.	sand	base of fresh water at approximately 1000 ft. MSL

F. Mineral Resources (oil and gas, coal, brines, etc.)

Oil and gas wells are located on the flanks of the dome.

None reported

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & grade	Depth Set	Type & Amount of Cement
Surface		J-55 [illegible]	[illegible]	
Intermed.		[illegible]	[illegible]	
Injection				
Other				

Describe bottom hole completion method: open hole

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: _____

VI. Description of surface equipment

A. Holding tanks & flow lines _____

B. Filters _____

C. Pumps _____

D. Other _____

VII. Cores, Samples, & Logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

___ Drillers log ___ Drilling time

___ Sample log ___ Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

____Resistivity ____Gamma ray-neutron

____SP ____Temperature

____Caliper ____Cement bond

____Other

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Oily disulfide and spent caustic fluid waste.

B. Physical & chemical Description See attachment

The waste can't readily be treated for surface discharge because it is not a miscible fluid. There is also mercaptans in the waste which presents odor problems.

C. Volume 2500 bpd

IX. Preinjection waste treatment pH control at 7.8

COMPOUND	wt.%
Ethyl Disulfide	3.750
Propyl Disulfide	6.375
Butyl Disulfide	13.541
Pentyl Disulfide	14.125
Hexyl Disulfide	3.541
Heptyl Disulfide	.333
NAOH	8.752
N_2O	49.583

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s) _____ Average _____ Maximum _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

2. Pressure (well head _____ bottom hole _____)

Date(s) _____ Average _____ Maximum _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems: No problems were reported.

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements The water level in the caprock must be continually monitored.

C. Restrictions on operating procedures Injection will be under gravity flow.

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

Texas Water Quality Board

WELL FILE NUMBER WDW-92 / STATE Tx-71 / UIC

I. Operating Company & General Well Location

Cities Service Fractionators Inc.

Tulsa, Oklahoma

II. Well location (legal description)

Location: 1875 ft. from the north line and 650 ft. from the west line of the Henry Griffith League, Ab.-12, Chambers County, Texas.

III. History; system planning, construction & operation.

The well was permitted in March 1971 and has been in operation since April, 1971.

IV. Geology & Hydrology

A. Regional geologic setting: The well is over the Barber's Hill Salt Dome.

5940

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes____; no X).

(Ground elevation _____) (Total well depth 2203 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thickness	Lithologic Description
Beaumont	Pleistocene			clay & sand
Lissie	Pleistocene			sand & gravel
Willis	Pliocene			sandstone
Goliad	Pliocene			sandstone

C. Geologic Description of injection units & possible units not in use

Rock Unit Name	Age	Depth (top)	Thickness	Character and Areal Distribution
---		[illegible]	100ft.	sand

D. Engineering description of injection units

1. Porosity: [illegible]
2. Permeability: [illegible]
3. [illegible]
4. Reservoir temperature: [illegible] @ 2100 ft.
5. Chemical [illegible] of Formation Water: _____
6. Reservoir Fracture Pressure: _____

IV. Geology & Geohydrology, continued

E. Geohydrology, fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Beaumont	1600ft.		sand & clay	usuable fresh water

F. Mineral Resources (oil and gas, coal, brines. etc.)

Oil and gas wells are producing in the vicinity of the injection well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing. Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface	12 1/2in.	H-40 24lb/ft.	8 5/	134ft.	1
Intermed.		J-55 14lb/ft.	5 1/	2203ft.	2
Injection		6lb/ft.	2 3/8in.	2030ft.	
Other					

Describe bottom hole completion method: open hole completion

1) 50 sacks of Class A + 2% $CaCl_2$ - to surface
2) 400 sacks of Class H + 4% Gel - to surface

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: _____

VI. Description of surface equipment

A. Holding tanks & flow lines _____

B. Filters _____

C. Pumps _____

D. Other _____

VII. Cores, samples, & Logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____

" _____ _____

" _____ _____

" _____ _____

" _____ _____

B. Drilling logs

____ Driller's log ____ Drilling time

____ Sample log ____ Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

____Resistivity ____Gamma ray-neutron

____SP ____Temperature

____Caliper ____Cement bond

____Other ____

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Petrochemical Plant Waste

B. Physical & chemical Description See following page

C. Volume 2 - 5 gpm

IX. Preinjection waste treatment None

WASTE ANALYSIS

Properties & Composition	Dissulfate Oil
Volume, GPM	2
Sulfu, Wt. Percent	50
Ethyl, Propyl, Butyl groups, Wt. %	50
Sp. gr. at 60°f	.995
Reid Vaper pressure, psi	1.8
Viscosity, SSU @ 100°F	23.7
Boiling Range, °F	
1 BB	280
10	292
50	307
90	329
95	340
EP	360

The waste is not measurable with water. It is expected to be essentially free of suspended material and to contain only traces of alkalinity of any metals. It is not possible to measure the pH of this oily material.

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment - Shot	Description of Treatment and Results
None		

C. Injection rates and pressures

1. Rate

Date(s) 2-19-71 Average 7 rpm Maximum
" 2-25-71 " " "
" 2-26-71 " " "
" 2-27-71 " " "
" 3- 3-71 " 3 rpm "

2. Pressure (well head X bottom hole)

Date(s) 2-19-71 Average 350 psi Maximum
" 2-25-71 " Gravity "
" 2-26-71 " Gravity "
" 2-27-71 " Gravity "
" 3- 3-71 " Gravity "

X. Well operation & operating history

D. Description of operating program

E. Operating problems: No problems were reported.

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating pressure: 1) Surface injection pressure is limited to 700 psig. 2) Bottom hole injection shall not exceed 10,000 psi.

. Economics

A. Total and Unit Costs of Construction

B. Operating Costs

I. Source(s) of Information and Pertinent Reference.

Texas Water Quality Board

WELL FILE NUMBER

STATE

TN-1
UMR

I. Operating Company & General Well Location

E. I. dufont deNemours

P. O. Box 629

New Johnsonville, Tennessee 37134

II. Well location (legal description)

Location: Section 14, T6S, R19E, Humphreys County, Tennessee

General Location: east of Nashville on Highway 70, on the east shore of Kentucky Lake.

III. History, system planning, construction & operation.

The E. I. dufont Company utilizes this injection well to dispose of waste effluent from the production of paint pigment.

The well was drilled and completed on February 20, 1967 and began operating during March, 1967.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on the west flank of the Nashville Dome. There are no subsurface structural closures in the area. The principle drainage is the Tennessee River.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes____; no X).

(Ground elevation 354ft.MSL) (Total well depth 6735 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thick-ness	Lithologic Description
Alluvium	Quaternary	0ft.	240ft.	
	Silurian	240ft.	240ft.	cherty limestone
	Ordovician	480ft.	3100ft.	cherty limestone and shale
	Cambrian	3600ft.		dolomite and shale

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
Knox	Cambrian	2110ft.	3625ft.	crystalline dolomite

D. Engineering description of injection units

1. Porosity: 5-30% fractures and pores interstitial
2. Permeability: 110 md
3. Original Reservoir Pressure:
4. Reservoir Temperature: 70°F
5. Chemical Character of Formation Water: Saline water under artesian conditions at the well bore. 392 ppm Ca, 36 ppm K, 1870 ppm Cl, 16 ppm Fe, 1040 ppm Na, pH - 8.1
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Fort Payne		200ft.	limestone	

F. Mineral Resources (oil and gas, coal, brines, etc.)

No mineral resources are reported in the vicinity of the disposal well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing: Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface	13 in.		10 3/4in.	600ft.	Pozmix-surface
Intermed.	9 5/8in.	Steel	7 in.	1600ft.	
Injection		Chemtube	4 1/2in.	1800ft.	
Other					

Describe bottom hole completion method: open hole completion

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: _____

Packer on 4 1/2in. tubing

VI. Description of surface equipment

A. Holding tanks & flow lines _____

B. Filters _____

C. Pumps _____

D. Other _____

VII. Cores, samples, & Logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

____Drillers Log

____Sample log

____Drilling time

____Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

____Resistivity ____Gamma ray-neutron

____SP ____Temperature

____Caliper ____Cement bond

____Other_____

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Aqueous wastes from manufacturing operation to produce paint pigment.

B. Physical & chemical Description 13% - 15% aqueous solution of ferric chloride with a specific gravity of 1.1 to 1.12 and a pH of 1.5 to 1.6.

C. Volume average 250 gpm

maximum 350 gpm

IX. Preinjection waste treatment sedimentation

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
None			

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
Dese	acidization	15,000 gal - 15% [illegible]

C. Injection rates and pressures

1. Rate

Date(s)		Average		Maximum	
	design		280 gpm		[illegible]
"		"		"	
"		"		"	
"		"		"	
"		"		"	

2. Pressure (well head ____ X ____ bottom hole ____)

Date(s)		Average		Maximum	
			200 psig		220 psig
"		"		"	
"		"		"	
"		"		"	
"		"		"	

V. Well operation & operating history

D. Description of operating programs:

E. Operating problems: Initially - high injection pressures

VI. Regulatory aspects.

A. Construction requirements:

B. Monitoring requirements: [illegible] survey of local water well [illegible]

C. Restrictions on operating program: High injection pressures [illegible]

XII. Economics

A. Total and unit costs of construction $700,000.

B. Operating costs $40,000.

XIII. Source(s) of Information and Published References

Proposal - E. I. duPont

Tennessee Department of Geology

WELL FILE NUMBER STATE TN-2 UMR

I. Operating Company & General Well Location

E. I. duPont deNemours
P. O. Box 629
New Johnsonville, Tennessee 37134

II. Well location (legal description)

Location: SW 1/4, SE 1/4, NW 1/4, Sec. 14, T6S, R19E, Humphreys County, Tennessee.

III. History; system planning, construction & operation.

This is E. I. duPont second well for the disposal of waste from a paint pigment manufacturing process. The well was completed in February, 1970 and began operating in April, 1970.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on the west flank of the Nashville Dome. The surface rock is predominantly limestone and the primary drainage is the Tennessee River.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included--yes ___; no X).
(Ground elevation 384ft.MSL) (Total well depth 7,461 ft.)
Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thick-ness	Lithologic Description
Alluvium	Quaternary	0ft.	240ft.	
	Silurian	240ft.	240ft.	cherty limestone
	Ordovician	480ft.	3100ft.	limestone and shale
	Cambrian	3600ft.		dolomite and shale

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
Knox	Cambrian	3100ft.	2850ft.	dolomite with very wide geographic distribution

D. Engineering description of injection units

1. Porosity: variable with a high of 10% at 4410 to 4440ft.
2. Permeability: 110 md
3. Original Reservoir Pressure: 2050 to 3000 psi - closed in pressure
4. Reservoir Temperature: 77° to 100°F from drill stem test
5. Chemical Character of Formation Water: Specific Gravity 1.09, pH 5.6 to 7.3, Cl 5100 to 73,950 ppm (drill stem test)
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Fort Payne		200ft.	limestone	

F. Mineral Resources (oil and gas, coal, brines, etc.)

No mineral resources are reported in the vicinity of the disposal well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing. Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface	30 in.	J-55 Steel	24 in.	72ft.	Portland
Intermed.	20 in.	J-55 Steel	16 in.	445ft.	"
	20 in.	" "	13 3/8in.	606ft.	"
~~Injection~~	12 1/2in.	" "	9 5/8in.	4100ft.	bottom 2000ft.
Injection	13 3/4in.	Fibercast	9 5/8in.	4650ft.	latex cement

Other

Describe bottom hole completion method: open hole completion

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: Centralizers - 16" & 13 3/8" - 2 on bottom 4 joints, 1 on every joint above Centralizers - on bottom joint of fibercast, 1 every three joints to 3600; & 1 every 4 joints to surface

VI. Description of surface equipment

A. Holding tanks & flow lines

B. Filters

C. Pumps

D. Other

VII. Cores, samples, & Logs

A. Coring

From	1592'	to 1619	Recovery 27. '
"	1619'	1649	27.5'
"	2350'	2380'	29.4'
"	3753'	3785'	27. '
"	4408'	4426'	18. '
"	4996'	5018'	12. '

+ 4 more coves to 7461'

B. Drilling Logs

____Drillers Log ____Drilling time

____Sample log ____Other:

VII. -- Cores, samples, & logs, continued

C. Other logs run

X Resistivity	___ Gamma ray-neutron
X SP	___ Temperature
X Caliper	___ Cement bond
X Other Formation density - microlog	

VIII. Waste Characteristics

A. Industrial Process from which waste is derived
Waste water from manufacture of paint pigment.

B. Physical & chemical Description 13 to 15 percent aqueous solution of ferric chloride. Specific gravity about 1.1 and pH about 1.5.

C. Volume 450 gpm average (design)

IX. Preinjection waste treatment Reduction of solids at settling pond.

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
Drill Stem	2 1/2hr.	5792'-5809'	156ppm chlorides
" "	3 1/2hr.	5948"-5976"	13,820ppm chlorides
Drill Stem	3 hr.	6995'-6991'	5,100ppm chlorides
" "	2 hr.	4641'-4698'	9,690ppm chlorides
Drill Stem	1 hr.	4757'-4785'	73,950ppm chlorides

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
Injection zone	acidization	15,000gal. HCl
		@ 1000 psi

C. Injection rates and pressures

1. Rate

Date(s)	Average 450 gpm	Maximum
"	"	"
"	"	"
"	"	"
"	"	"

2. Pressure (well head X bottom hole)

Date(s)	Average 500 psi	Maximum 1000 psi
"	"	"
"	"	"
"	"	"
"	"	"

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems: No problems were reported.

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating procedure TDS Can't exceed 10,000 mg/liter

(II. Economics

A. Total and unit costs of construction

B. Operating costs

:III. Source(s) of Information and Published References

Tennessee Dept. of Geology

E. I. duPont - Proposal

WELL FILE NUMBER

STATE TN-3
UMR

I. Operating Company & General Well Location

Stauffer Chemical Co.
Agricultural Chemical Division - Organics Plant
P. O. Box 152
Mount Pleasant, Tennessee 38474

II. Well location (legal description)

Location: Section 16, T125, R28E, Maury County, Tennessee.

III. History, system planning, construction & operation.

Stauffer Chemical Co. designed the well to dispose of a brine carbonate solution derived from their chemical plant operation. The well began operating on February 10, 1969 and is presently in operation.

IV. Geology & Geohydrology

A. Regional geologic setting: The well is situated on Combrian-Ordovician sediments on the northwest flank of the Nashville Dome. The regional dip is less than 1 degree per mile. Principle drainage is the Tennessee River.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes ____; no X).

(Ground elevation 636 ft.) (Total well depth 6473 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thick-ness	Lithologic Description

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
Knox	Cambrian	3150ft.	2500ft.	dolomite with lime-stone, chert, and shale

D. Engineering description of injection units

1. Porosity: variable - vuggy and fractured
2. Permeability:
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water: Brine - 12,000 ppm Cl, 2000 to 8900 ppm TDS
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thick-ness	Character	Chemical Quality

F. Mineral Resources (oil and gas, coal, brines, etc.)

No mineral resources are reported in the vicinity of the disposal well.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing. Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface	17 3/4in.		16 in.	15ft.	Portland-300lb
Intermed.	13 3/4in.		10 3/4in.	1010ft.	" -Stra
	8 3/4in.		7 in.	2956ft.	" - "
Injection			2 7/8in.	2986ft.	None

Other

Describe bottom hole completion method: Open hole completion

V. Well design and construction, continued

B. Packers, centralizers, well head equipment, etc: _____

Packer on 2 7/8" tubing

E. Description of surface equipment

A. Holding tanks & flow lines _____

B. Filters _____

C. Pumps _____

D. Other _____

I. Cores, samples, & logs

A. Coring

From	To	Recovery

B. Drilling Logs

___Drillers Log ___Drilling time

___Sample log ___Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

___Resistivity ___Gamma ray-neutron

_X_ SP ___Temperature

___Caliper ___Cement bond

_X_ Other Dual induction laterolog, Formation density log, sonic log, & Synergetic log

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Chemical plant waste

B. Physical & chemical Description Brine carbonate solution Specific gravity 1.08

NaCl 3 = 1.5%

$NaHCO_3$ 5.2 = 5.5%

Na_2CO_3 .4 = .5%

Para-nitrophenol 1000-1500ppm

C. Volume 25 gpm

IX. Preinjection waste treatment Settled and decanted in 250,000 gal. tank

X. Well operation & operation history

A. Tests

Type	Duration	Zones tested	Description of test results
Injection	---	4300 to 6397ft.	72gpm at 1540psi
"	---	2946 to 6397ft.	231gpm at 1000psi
"	---	2946 to 6397ft.	420gpm at 1300psi

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
Injection	acidization	15,000 gal. 20° Be' HCl

C. Injection rates and pressures

1. Rate

Date(s) Steady Average 25 gpm Maximum _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

2. Pressure (well head X bottom hole _____)

Date(s) _____ Average Gravity Maximum _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

X. Well operation & operating history

D. Description of operating programs: The waste is continually injected into the disposal zone.

E. Operating problems: No problems were reported.

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements 1) Continuous pressure - rate recorders are used. 2) One well, 3500 ft. north, is used as a monitor well.

Restrictions on operating procedure High pressure occurred in the annulus due to oil expansion. This was corrected by installing an inverted nitrogen cylinder for cushion and expansion chamber.

XII. Economics

A. Total and unit costs of construction 200,000

B. Operating costs Minor - 7 1/2hp pump only

XIII. Source(s) of Information and Published References

Written communication - Tennessee Dept. of Conservation

Tennessee Dept. of Geology

WELL FILE NUMBER _____ STATE TN-4 UMR

I. Operating Company & General Well Location

E. I DuPont de Nemours No. 2

New Johnsonville, Tennessee

mailing address P. O. Box 629

New Johnsonville, Tennessee 37134

II. Well location (legal description)

SW 1/4, SE 1/4, NW 1/4, sec. 14, T.6 S., R.19 E.

Humphreys County

III. History; system planning, construction & operation.

Drilling commenced Nov. 1969

Drilling completed Feb. 1970

Injection began April 1970

IV. Geology & Geohydrology

A. Regional geologic setting: The well is located on the east flank of the Nashville dome.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes ___; no X).

(Ground elevation 384') (Total well depth 7,461')

Datum for depth measurement ground level

Name	Age	Depth (top)	Thickness	Lithologic Description
Alluvium	Quaternary	Surf.	240'	unconsolidated sand & gravel
	Silurian	240'	240'	cherty limestone
	Ordovician	480'	3,100	cherty limestone & shale
	Cambrian	3,600		cherty and shaly dolomite

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Knox	Cambrian	4,600'	2,850	dolomite with very wide geographic distribution and highly variable porosity and permeability

D. Engineering description of injection units

1. Porosity: variable but low except 10% from 4410'-4440'
2. Permeability: vuggy and fracture permeability up to 110 md.
3. Original Reservoir Pressure: 2,050 to 3,000 psi in drill stem tests in cores
4. Reservoir Temperature: 77-100° F.
5. Chemical Character of Formation Water: up to 74,000 ppm chlorides in DST samples
6. Reservoir Fracture Pressure: unknown

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Fresh water to 2,500'				

F. Mineral Resources (oil and gas, coal, brines, etc.)

None

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing. Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface	30"	J55 steel	[illegible]"	74'	Portland
Intermed.	20"	J55 steel	16"	445'	Portland
	20"	J55 steel	13 3/8"	606'	Portland
Injection	12 1/2"	J55 steel	9 5/8"	4100'	
Injection	13 3/4"	Fibreglass	9 5/8"	4650'	bottom 2,000' cemented w/ latex base cement
Other					

Describe bottom hole completion method: 7 7/8" open hole

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc:

Centralizers - 16" & 13 3/8" - 2 on bottom 4 joints, 1 on every joint above

Centralizer - on bottom joint of fiberoast, 1 every three joints to 3600' and 1 every 4 joints to surface

VI. Description of surface equipment

A. Holding tanks & flow lines

B. Filters

C. Pumps

D. Other

VII. Cores, samples, & Logs

A. Coring

From	1592'	to 1619'	Recovery 27.'
"	1619'	1649'	27.5'
"	2350'	2380'	29.4'
"	3753'	3785'	27. '
"	4408'	4426'	18. '
"	4996'	5018'	12. '

+ 4 more cores to 7461'

B. Drilling Logs

____Drillers Log ____Drilling time

____Sample log ____Other:

VII. -- Cores, samples, & logs, continued

C. Other logs run

x Resistivity	___ Gamma ray-neutron
x SP	___ Temperature
x Caliper	___ Cement bond
x Other Formation density - microlog	

VIII. Waste Characteristics

A. Industrial Process from which waste is derived
Wastewater from manufacture of paint pigment

B. Physical & chemical Description 12 to 15 percent aqueous solution of ferric chloride. Specific gravity about 1.1 and pH about 1.5

C. Volume 450 gpm average (design)

IX. Preinjection waste treatment Reduction of solids at settling pond

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
drill stem	2 1/2 hr.	5792'-5809'	156 ppm chlorides
drill stem	3 1/2 hr.	5948'-5976'	13,820 ppm chlorides
drill stem	3 hr.	6965'-6991'	5,100 ppm chlorides
drill stem	2 hr.	4641'-4698'	9,690 ppm chlorides
drill stem	1 hr.	4757'-4785'	73,950 ppm chlorides

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
injection zone	acidization	15,000 gal HCl @ <1000 psi

C. Injection rates and pressures

1. Rate

Date(s) _____ Average 450 gpm Maximum _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

2. Pressure (well head _____ bottom hole _____)

Date(s) _____ Average 300-500 psi Maximum 1000 psi

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

X. Well operation & operating history

D. Description of operating programs: _____

E. Operating problems: _____

XI. Regulatory aspects.

A. Construction requirements _____

B. Monitoring requirements _____

C. Restrictions on operating procedure TDS can't exceed 10,000 mg/liter

XII. Economics

A. Total & unit costs of construction

B. Operating costs

(III. Source(s) of Information and Published References

Tennessee Geological Survey

WELL FILE NUMBER W. Va. Permit STATE #3191 W.Va.-1 USGS

I. Operating Company & General Well Location

E. I. duPont de Nemours

Belle, W. Va., Kanawha Co.

II. Well location (legal description)

Location: Section 33, Malden District - DuPont property map 2312 sheets 1 & 2.

III. History, system planning, construction & operation.

Permit application - 11/2/65

Permit granted - 1/7/66

Injection is believed to have began in 1968. The well is still in operation.

IV. Geology & Geohydrology

A. Regional geologic setting: Well is located on the Quaternary alluvium of the Kanawha River. Pennsylvanian age bedrock underlies the site.

B. Geologic description of rock units penetrated by well
Rock Unit (Geologic Column included--yes___; no ✓).
(Ground elevation________) (Total well depth 1800')
Datum for depth measurement________________________

Name	Age	Depth (Top)	Thickness	Lithologic Description

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (Top)	Thickness	Character and Areal Distribution
[illegible] (Pottsville Group)	Pennsylvanian	1520'	250'	sandstone

D. Engineering description of injection units

1. Porosity:
2. Permeability:
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure.

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Water Bearing Zone	Character	Chemical Quality

F. Mineral Resources (oil and gas, coal, brines, etc.)

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing: Weight & grade (new or used)	Size	Depth Set	Type & Amount of Cement
Surface		32.3# H-40	9⅝"	400'	
Intermed.		14# J-55	5½"	1500'	
Injection					
Other					

Describe bottom hole completion method:

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: _____

VI. Description of surface equipment

A. Holding tanks & flow lines _____

B. Filters _____

C. Pumps _____

D. Other _____

VII. Cores, samples, & Logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

✓ Drillers Log

____ Sample log

____ Drilling time

____ Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

____Resistivity ____Gamma ray-neutron

____SP ____Temperature

____Caliper ____Cement bond

____Other_____

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

aqueous wastes from manufacturing operations

B. Physical & chemical Description

sodium and/or calcium chloride 15 to 25%

w/ less than 5,000 ppm soluble organic compounds

C. Volume

IX. Preinjection waste treatment

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results

C. Injection rates and pressures

1. Rate

Date(s)	Oct. '70	Average	67000 gal/day	Maximum	13,605 gal/hr
"	Dec. '71	"	10,788	"	32,600
"	Apr. '72	"	19,000	"	21,000
"		"		"	
"		"		"	

2. Pressure (well head _____ bottom hole _____)

Date(s)	Oct '70	Average	620 psi	Maximum	620 psi
"	Dec '71	"	480	"	530 psi
"	Apr '72	"	645	"	690
"		"		"	
"		"		"	

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems:

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating procedure

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

West Virginia Division of Water Resources

West Virginia Geological & Economic Survey

WELL FILE NUMBER | W. Va. Permit STATE #3326 | W.Va.-2 UMR

I. Operating Company & General Well Location

E. I. duPont de Nemours and Co.
neare Belle W. Va.

II. Well location (legal description)

Location: Kanawha Co., Malden District, Sec. 1 -duPont property map 2312 sheets 1 & 2
4.29 miles west of 81° 30' and 5 miles south of 38° 15'.

III. History, system planning, construction & operation.

Permit application - 2/3/67
Permit granted - 4/19/67
Well Spudded - 11/20/67
Well completed - 2/8/67
The well was probably put into operation in 1970. It is still in operation.

IV. Geology & Geohydrology

A. Regional geologic setting: Well is located on the Quaternary alluvium of the Kanawha River. Pennsylvania bedrock underlies the site, which is about two miles southeast of the Warfield anticline.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included--yes ____; no X).

(Ground elevation 603') (Total well depth 5406')

Datum for depth measurement _____

Name	Age	Depth (top)	Thickness	Lithologic Description
Oriskany	Devonian	≈4450'	≈ 25'	sandstone
Cayugan group	Silurian	≈4660'	≈440'	
Williamsport	Silurian	≈5100'	≈ 75'	sandstone
Newburg	Silurian	≈5175'	≈ 25'	sandstone

The well was originally completed in the Oriskany Sandstone, but was not successful and was recompleted in the Newburg.

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Newburg	Silurian	~5175'	~25'	Sandstone

D. Engineering description of injection units

1. Porosity: _____
2. Permeability: _____
3. Original Reservoir Pressure: _____
4. Reservoir Temperature: _____
5. Chemical Character of Formation Water: _____
6. Reservoir Fracture Pressure: _____

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thick-ness	Character	Chemical Quality

F. Mineral Resources (oil and gas, coal, brines, etc.)

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing: Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface		65# H-40	20"	57'	
Intermed.		45# H-40	13-5/8	1004'	
		40# J-55	9-5/8	4368'	
Injection		18# J-55	5½	5333'	

Other

Describe bottom hole completion method:

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: _____

VI. Description of surface equipment

A. Holding tanks & flow lines _____

B. Filters _____

C. Pumps _____

D. Other _____

VII. Cores, samples, & Logs

A. Coring

From _____ to _____ Recovery _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

✓ Drillers Log

____ Sample log

____ Drilling time

____ Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

- ____Resistivity
- ____SP
- ____Caliper
- ____Gamma ray-neutron
- ____Temperature
- ____Cement bond
- ____Other ____________________

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

aqueous waste from existing manufacturing operation

B. Physical & chemical Description *water containing about 15% Nitric Acid, about 4% dibasic and monobasic organic acids and about .03% heavy metal salts (Cu, V)*

C. Volume *cumulative - as of Sept. '71 [illegible] gal.*

IX. Preinjection waste treatment ____________________

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results

C. Injection rates and pressures

1. Rate

Date(s)	Oct '70	Average	225 g/day	Maximum	270 g/day
"	Sep. '71	"	~~198 g/day~~ 218	"	271 g/day
"		"		"	
"		"		"	
"		"		"	

2. Pressure (well head _____ bottom hole _____)

Date(s)	Oct '70	Average	1068 psi	Maximum	1098 psi
"	Sep '71	"	1045	"	1097 psi
"		"		"	
"		"		"	
"		"		"	

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems:

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating procedure

(II. Economics

A. Total and unit costs of construction _____

_____

_____

_____

_____

_____

B. Operating costs _____

_____

_____

_____

(III. Source(s) of Information and Published References. _____

West Virginia Division of Water Resources

West Virginia Geological & Economic Survey

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_____

WELL FILE NUMBER W. Va. Permit STATE #3234 W.Va.-3 UMR

I. Operating Company & General Well Location

E. I. duPont de Nemours & Co.
near Parkersburg

II. Well location (legal description)

Location: Wood Co., Lubeck District 1931.36ft. N 82° 08'W
of a point 39° 15' 13" N and 81° 40' 3" W

III. History; system planning, construction & operation.

Permit Application - 4/26/66
Permit granted - 7/27/66
Well spudded - 9/9/66
Well completed - 9/30/66
Injection began in March, 1969; the well is still in operation, but is to be phased out.

IV. Geology & Geohydrology

A. Regional geologic setting: Well is located on the flood-plain of the Ohio River. Permian age bedrock of the Dunkard Group underlies the site.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included--yes ____; no X).

(Ground elevation 605) (Total well depth _____)

Datum for depth measurement T.D was 1682' well plugged back to 1490' for completion

Name	Age	Depth (top)	Thickness	Lithologic Description
No log available				

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thickness	Character and Areal Distribution
Pottsville form. ("salt sands")	Pennsyl.	1334	112'	Sandstone - widespread in West Virginia and Southern Ohio

D. Engineering description of injection units

1. Porosity:
2. Permeability:
3. Original Reservoir Pressure:
4. Reservoir Temperature:
5. Chemical Character of Formation Water:
6. Reservoir Fracture Pressure:

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thick-ness	Character	Chemical Quality

F. Mineral Resources (oil and gas, coal, brines, etc.)

V. Well design and construction.

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing: Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface		*not available - no completion record of casing etc.*			
Intermed.		*received by survey*			
Injection					
Other					

Describe bottom hole completion method:

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc: _____

VI. Description of surface equipment

A. Holding tanks & flow lines _____

B. Filters _____

C. Pumps _____

D. Other _____

VII. Cores, samples, & Logs

A. Coring

From 1427' to 1441' Recovery 16'

" 1532' 1557' 24.4'

" 1594' 1615' 21'

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

✓ Drillers Log ____ Drilling time

____ Sample log ____ Other: _____

VII. -- Cores, samples, & logs, continued

C. Other logs run

___ Resistivity	X Gamma ray-neutron
___ SP	___ Temperature
X Caliper	___ Cement bond

___ Other Induction elect, density, tracer, perforating

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Aqueous wastes from teflon manufacturing operations.

B. Physical & chemical Description 6-15% HCL combined with 2 to 5% solution of formic acid and formaldehyde. Waste will contain less than 10,000ppm soluble flurocarbon chemicals and other complex organics.

C. Volume ≈115,000 gal./day - as of May 31, 1972 accumulated vol. was 103,470,710 gal.

IX. Preinjection waste treatment

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results

C. Injection rates and pressures

1. Rate

Date(s)	Oct '70	Average	110,000 B/Day	Maximum	126,720 B/Day
"	Mar. '71	"	104,638	"	119,080
"	May '72	"	104,423	"	149,760
"		"		"	
"		"		"	

2. Pressure (well head _____ bottom hole _____)

Date(s)	Oct '70	Average	580 psi	Maximum	660 psi
"	Mar 71	"	730 "	"	820 "
"	May '72	"	744 "	"	995 "
"		"		"	
"		"		"	

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems:

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating procedure

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

West Virginia Division of Water Resources

West Virginia Geological and Economic Survey

WELL FILE NUMBER | W. Va. Permit STATE #3964 | W.Va.-4 UMR

I. Operating Company & General Well Location

E. I. duPont de Nemours and Co.

Parkersburg, W. Va.

II. Well location (legal description)

Location: Wood Co., Lubeck District 39° 16' 7" N and 81° 40' 34" W

III. History, system planning, construction & operation.

Permit application - 10/22/69

Permit granted - 6/1/70

Well spudded - 8/20/70

Well completed - 10/22/70

Injection started - 3/10/72

Well shut down Mar. 14 - pump leaking - resumed operation Mar. 28. Shut down again Apr. 17 with leak in pump. This well is intended to replace W. Va. - 3.

IV. Geology & Geohydrology

A. Regional geologic setting: Well is located on the flood-plain of the Ohio River. Permian age bedrock of the Dunkard Group underlies the site.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes____; no X__).

(Ground elevation 620') (Total well depth 4105')

Datum for depth measurement _____

Name	Age	Depth (top)	Thick-ness	Lithologic Description

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
Berea	Mississippian	1812		sandstone - widespread
*Onondaga	Devonian	4016	89'	limestone

*Injection zone

D. Engineering description of injection units

1. Porosity: _____
2. Permeability: _____
3. Original Reservoir Pressure: _____
4. Reservoir Temperature: _____
5. Chemical Character of Formation Water: _____
6. Reservoir Fracture Pressure: _____

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
base of fresh water is estimated at approx. 600 ft.				

F. Mineral Resources (oil and gas, coal, brines, etc.)

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing: Weight & grade & type	Size	Depth Set	Type & Amount of Cement
Surface			16	84'	150 sks.
Intermed.			11 3/4	1994'	796 sks.
			8 5/8	4085	
Injection					
Other					

Describe bottom hole completion method:

V. Well design and construction, continued 4.

B. Packers, Centralizers, well head equipment, etc:_____

VI. Description of surface equipment

A. Holding tanks & flow lines _____

B. Filters _____

C. Pumps _____

D. Other _____

VII. Cores, samples, & Logs

A. Coring

From_____to_____Recovery_____

"_____"_____"_____

"_____"_____"_____

"_____"_____"_____

"_____"_____"_____

"_____"_____"_____

B. Drilling Logs

✓ Drillers Log ___ Drilling time

___ Sample log ___ Other:_____

VII. -- Cores, samples, & logs, continued

C. Other logs run

____Resistivity ____Gamma ray-neutron

____SP ____Temperature

____Caliper ____Cement bond

____Other 3-DV, Radioactive tracer

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

aqueous wastes from teflon manufacturing operations

B. Physical & chemical Description 6-15% HCL combined with 2 to 5% solution of formic acid and formaldehyde. Waste will contain less than 10,000ppm soluable fluorcarbon chemicals and other complex organics.

C. Volume total accumulated as of Apr. 17, 1972 2,440,800gal.

IX. Preinjection waste treatment

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results

C. Injection rates and pressures

1. Rate

Date(s)	Apr. 72	Average	144,000 g/d	Maximum	172,000 g/d
"		"		"	
"		"		"	
"		"		"	
"		"		"	

2. Pressure (well head _____ bottom hole _____)

Date(s)	Apr. 72	Average	520 psi	Maximum	560 psi
"		"		"	
"		"		"	
"		"		"	
"		"		"	

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems:

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating procedure

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

West Virginia Division of Water Resources

West Virginia Geological & Economic Survey

WELL FILE NUMBER W. Va. Permit STATE #3477 W.Va.-5 UMR

I. **Operating Company & General Well Location**

Weirton Steel Division of National Steel Corp.
Weirton, West Virginia

II. **Well location (legal description)**

Location: 6.7 miles south of 40° 30' and 4.75 miles west of 80° 30'. Hancock County, Butler District

III. **History, system planning, construction & operation.**

Permit Application - 11/6/67
Permit granted - 12/11/67
Well spudded - 12/19/67
Well completed - 2/15/68
The well was never used for injection - The injection interval was tight, and would not accept desired volumes, therefore, the well has been plugged.

IV. **Geology & Geohydrology**

A. **Regional geologic setting:** Rocks outcropping in the Weirton area range from the Middle Kittanning coal of the Alleghany Series to the Fishpot Ls. of the Monongahela Series.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included--yes ____; no X).

(Ground elevation 686.6) (Total well depth 1520')

Datum for depth measurement _____

Name	Age	Depth (top)	Thick-ness	Lithologic Description

C. Geologic Description of injection units & possible units not in use

Rock Unit Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
Berea	Mississippian	1086'	30'	sandstone-widespread

Also several other thinner sandstones below the Berea down to 1500ft. were considered as possible injection intervals.

D. Engineering description of injection units

1. Porosity: _____
2. Permeability: _____
3. Original Reservoir Pressure: _____
4. Reservoir Temperature: _____
5. Chemical Character of Formation Water: _____
6. Reservoir Fracture Pressure: _____

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality
Alluvial deposits in the Ohio River Valley and its tributary streams are the principal aquifers. Thickness 70 - 130 feet. Some fresh water supplies are obtained from sandstones and limestones of the Conemaugh, Allegheny, & Pottsville Series. Deepest fresh water in area is between 200 and 250 feet.				

F. Mineral Resources (oil and gas, coal, brines, etc.)

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing: Weight & grade & type	Size	Depth Set	Type & Amount of Cement
Surface			16	68'	
Intermed.			13 3/8	127'	
			10 3/4	1092'	
Injection			7	1914'	
Other					

Describe bottom hole completion method:

. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc:_____

. Description of surface equipment

A. Holding tanks & flow lines _____

B. Filters _____

C. Pumps _____

D. Other _____

I. Cores, samples, & Logs

A. Coring

From_____to_____Recovery_____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

✓ Drillers Log attached ___Drilling time

___Sample log ___Other:_____

VII. -- Cores, samples, & logs, continued

C. Other logs run

____Resistivity ____Gamma ray-neutron

____SP ____Temperature

____Caliper ____Cement bond

____Other_____

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Waste from hydrochloric and sulphuric acid steel mill pickling operations.

B. Physical & chemical Description

9000 ppm HCl, 230,000 ppm $FeCl_2$; 50,000 ppm H_2SO_4, 150,000 ppm $FeSO_4$

C. Volume

IX. Preinjection waste treatment

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results

C. Injection rates and pressures

1. Rate

Date(s)	Average	Maximum
"	"	"
"	"	"
"	"	"
"	"	"

2. Pressure (well head _____ bottom hole _____)

Date(s)	Average	Maximum
"	"	"
"	"	"
"	"	"
"	"	"

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems:

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating procedure

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

West Virginia Division of Water Resources

West Virginia Geological & Economic Survey

WELL FILE NUMBER W. Va. Permit STATE #4158 W.Va.-6 UMR

I. **Operating Company & General Well Location**

P P G Industries, Inc.

near Proctor West Virginia

II. **Well location (legal description)**

Location: Marshall Co., Franklin District - 6.55 miles south of 39° 45' and 5.2 miles west of 80° 50'.

III. **History, system planning, construction & operation.**

Permit application - 3/12/71

Permit granted - 4/26/71

Well spudded - 1/20/43

Well completed - 4/13/43

The well was converted from a brine well to disposal well.

IV. **Geology & Geohydrology**

A. **Regional geologic setting:** Well is located on the flood-plain of the Ohio River. Permian age bedrock of the Dunkard Group underlies the well, which is located near axis of Proctor syncline.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included--yes ___; no ✓).

(Ground elevation 664') (Total well depth 6820')

Datum for depth measurement _____

Name	Age	Depth (top)	Thick-ness	Lithologic Description

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
Salina salt	Silu	6720	100'	salt beds - will inject into [illegible] solution cavities

D. Engineering description of injection units

1. Porosity: _____
2. Permeability: _____
3. Original Reservoir Pressure: _____
4. Reservoir Temperature: _____
5. Chemical Character of Formation Water: _____
6. Reservoir Fracture Pressure: _____

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality

F. Mineral Resources (oil and gas, coal, brines, etc.)

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing: Weight & Grade	Size	Depth Set	Type & Amount of Cement
Surface	17½"	J-55	13⅜"	846'	300 sks.
Intermed.	12¼"	J-55	8⅝"	6467'	500 sks.
Injection					
Other					

Describe bottom hole completion method:

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc:_____

VI. Description of surface equipment

A. Holding tanks & flow lines _____

B. Filters _____

C. Pumps _____

D. Other _____

VII. Cores, samples, & Logs

A. Coring

From_____to_____Recovery_____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

" _____ _____ _____

B. Drilling Logs

✓ Drillers Log ____Drilling time

____Sample log ____Other:_____

VII. -- Cores, samples, & logs, continued

C. Other logs run

____Resistivity
____SP
____Caliper
____Other

____Gamma ray-neutron
____Temperature
____Cement bond

VIII. Waste Characteristics

A. Industrial Process from which waste is derived
sludge is derived from brine softening process

B. Physical & chemical Description slurry containing 5% solids in brine solution. The solids will consist of 95.6% $CaCO_3$ and 4.4% magnesium hydroxide. Liquid portion of slurry will contain 25% NaCl, 4,900 ppm of NaOH, 530 ppm Na_2CO_3, & 5,660 ppm of Na_2SO_4 Sp. G. of slurry = 1.20 at 25°C

C. Volume ave. 630 gal/day total as of April 30 1974 = 182 gal.

IX. Preinjection waste treatment

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results

C. Injection rates and pressures

1. Rate

Date(s)	Apr. '72	Average	632 g/d	Maximum	857 g/d
"		"		"	
"		"		"	
"		"		"	
"		"		"	

2. Pressure (well head 0-300 psi bottom hole _____)

Date(s)	Apr. '72	Average	379 psi	Maximum	—
"		"		"	
"		"		"	
"		"		"	
"		"		"	

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems:

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements

C. Restrictions on operating procedure

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

West Virginia Division of Water Resources

West Virginia Geological & Economic Survey

WELL FILE NUMBER W. Va. Permit STATE #4038 W.Va.-7 UMR

I. Operating Company & General Well Location

Allied Chemical Corp.
Moundsville, West Virginia

II. Well location (legal description)

Location: Marshall Co.

III. History, system planning, construction & operation.

Permit application - 8/24/70
Permit granted - 10/1/70
Well completed - June '72
The well has been converted from a brine well to a disposal well. Injection began in 1970.

IV. Geology & Hydrology

A. Regional geologic setting: Well is located on the flood-plain of the Ohio River. Pennsylvanian age bedrock of the Monongahela Series underlies the site.

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included--yes ____; no X).

(Ground elevation _____) (Total well depth 6523')

Datum for depth measurement _____

Name	Age	Depth (top)	Thick-ness	Lithologic Description

C. Geologic Description of injection units & possible units not in use

Rock Unit

Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
Salina Salt Cayugan Series	Upper Silurian	6400'	156'	salt beds-will inject into large artificial solution cavity at 6500'

D. Engineering description of injection units

1. Porosity: _____
2. Permeability: _____
3. Original Reservoir Pressure: _____
4. Reservoir Temperature: _____
5. Chemical Character of Formation Water: NaCl 1.204 sp. gr., at 60° 317.439 gr. of salt per 1. of brine - 2.647 lbs. of salt per gal. of water, Ca 500.ppm, Mg 300.ppm, Fe 1.9ppm, SO. 2,700.ppm, Hg 0.02ppm
6. Reservoir Fracture Pressure: _____

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality

F. Mineral Resources (oil and gas, coal, brines, etc.)

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing: Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface		not available			
Interned.					
Injection					
Other					

Describe bottom hole completion method:

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc:_____

VI. Description of surface equipment

A. Holding tanks & flow lines _____

B. Filters _____

C. Pumps _____

D. Other _____

VII. Cores, samples, & Logs

A. Coring

From_____to_____Recovery_____

"_____"_____"_____

"_____"_____"_____

"_____"_____"_____

"_____"_____"_____

"_____"_____"_____

B. Drilling Logs

____Drillers Log ____Drilling time

____Sample log ____Other:_____

VII. -- Cores, samples, & logs, continued

C. Other logs run

____Resistivity
____SP
____Caliper
____Other

X Gamma ray-neutron
____Temperature
____Cement bond

VIII. Waste Characteristics

A. Industrial Process from which waste is derived

Waste brine solution derived from processing of natural brine for chemical manufacture.

B. Physical & chemical Description NaCl 1.040 sp. gr., at 60° 57.529 gr. of salt per l. of brine 0.480 lbs. of salt per gal. of water, Ca 122.[illegible]. Mg 7.ppm, Fe 0.75ppm, SO4 1000.ppm. Hg 2 to 10ppm.

C. Volume

IX. Preinjection waste treatment

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results

C. Injection rates and pressures

1. Rate

Date(s)	Average	Maximum
Nov. 70	76598 g/d	115200 g/d
Mar. 70	"	"
"	"	"
"	"	"
"	"	"

2. Pressure (well head _____ bottom hole _____)

Date(s)	Average	Maximum
Nov. 70	117 psi	789 psi
Mar. 70	660	698 psi
"	"	"
"	"	"
"	"	"

X. Well operation & operating history

D. Description of operating programs: _____

E. Operating problems: _____

XI. Regulatory aspects.

A. Construction requirements _____

B. Monitoring requirements _____

C. Restrictions on operating procedure _____

XII. Economics

A. Total and unit costs of construction

B. Operating costs

XIII. Source(s) of Information and Published References

West Virginia Division of Water Resources

West Virginia Geological & Economic Survey

WELL FILE NUMBER

STATE

Wy-1
UMR

I. **Operating Company & General Well Location**

Wycon Chemical Company
Cheyenne, Wyoming

II. **Well location (legal description)**

Location: Sec. 16, T13N, R67W, Laramie County, Wyoming

III. **History, system planning, construction & operation.**

The well began operating on March 28, 1969 and is still in operation.

IV. **Geology & Geohydrology**

A. **Regional geologic setting:** The well is located on the west flank of the Denver Basin and the regional dip is to the west. The stratigraphic section consists of various sediments of Cambrian to Tertiary age. The disposal zone is confined by 2000 ft. of marine shale and is pinched out in the Pierre shale to the east.

IV. Geology & Geohydrology, continued

B. Geologic description of rock units penetrated by well

Rock Unit (Geologic Column included -yes ___; no X).

(Ground elevation 6281 ft.) (Total well depth 6305 ft.)

Datum for depth measurement Ground Level

Name	Age	Depth (top)	Thick-ness	Lithologic Description

C. Geologic Description of injection units & possible units not in use

Rock Unit Name	Age	Depth (top)	Thick-ness	Character and Areal Distribution
Hygiene	Cretaceous	5831ft.	400ft.	sandstone

D. Engineering description of injection units

1. Porosity: 10 - 20% intergranular
2. Permeability: probable average 10 - 15 md
3. Original Reservoir Pressure: 2034 psi
4. Reservoir Temperature: _____
5. Chemical Character of Formation Water: 3300 ppm Cl^-

Reservoir Fracture Pressure: _____

IV. Geology & Geohydrology, continued

E. Geohydrology; fresh water aquifers in vicinity

Name	Depth	Thickness	Character	Chemical Quality

F. Mineral Resources (oil and gas, coal, brines, etc.)

No mineral resources were reported.

V. Well design and construction

A. Casing, Tubing, and Cement

	Hole Size	Casing or Tubing Weight & grade	Size	Depth Set	Type & Amount of Cement
Surface	12 1/4in.	H-40 32.3lb/ft.	9 5/8in.	1100ft.	700sks-Class G
Intermed.	9 1/4in.	J-55 23 lb/ft.	7 in.	5831ft.	1360sks-50-50 Pozmix + 4% Gel.
Injection		J-55 10.5lb/ft.	4 1/2in.	5770ft.	

Other annulus filled with inhibitor liquid

Describe bottom hole completion method:

V. Well design and construction, continued

B. Packers, Centralizers, well head equipment, etc:

1) Larkin guide shoe on bottom of 9 5/8in. string

2) Baker multiplex shoe on 7in. string

3) Halliburton D. V. tool at 3711ft.

4) 16 Centralizers on 7in. string

VI. Description of surface equipment

A. Holding tanks & flow lines Surge pond lined with bentonite.

B. Filters

C. Pumps

D. Other

VII. Cores, samples, & Logs

A. Coring - 3 1/2in. dia.

From	3332 ft.	to	3357 ft.	Recovery 25 ft.
"	5814 ft.		5840 ft.	16 ft.
"	6010 ft.		6050 ft.	40 ft.
"				
"				
"				

B. Drilling Logs

____ Drillers Log

X Sample log

X Drilling time

____ Other

VII. -- Cores, samples, & logs, continued

C. Other logs run

___ Resistivity	X Gamma ray-neutron
X SP	___ Temperature
X Caliper	X Cement bond

___ Other CFD, Induction log

VIII. Waste Characteristics

A. Industrial Process from which waste is derived
Chemical plant effluent

B. Physical & chemical Description A good quality water except that it is high in nitrates, sometimes exceeding 1000ppm. The waste has a moderate temperature.

C. Volume

IX. Preinjection waste treatment Filtration and the addition of biocide.

X. Well operation & operating history

A. Tests

Type	Duration	Zones tested	Description of test results
Drill stem	1 hr.	at 3596 ft.	881 psig - recovery of mud & filtrate
Drill stem	1 hr.	at 5781	2034 psig
Injection		injection zone	3 bpm at 1100 psi
"		" "	5 bpm at 1200 psi
"		" "	7 bpm at 1300 psi
"		" "	10 bpm at 1400 psi

B. Treatments or Stimulation

Zones Treated	Treatment Method	Description of Treatment and Results
Injection zone	Acidization	2000 gal. MP fractured with 500 barrels of water at 2700 psi.

C. Injection rates and pressures

1. Rate

Date(s) _____ Average 200 gpm Maximum _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

2. Pressure (well head X bottom hole _____)

Date(s) _____ Average 1100 psi Maximum _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

" _____ " _____ " _____

X. Well operation & operating history

D. Description of operating programs:

E. Operating problems: Fresh water injection tests indicated that the clay fraction in the reservoir was sensitive to fresh water which resulted in lowering the permeability. The problem has not yet become a significant hindrance.

XI. Regulatory aspects.

A. Construction requirements

B. Monitoring requirements: Annular pressure is checked periodically.

C. Restrictions on operating procedure

XII. Economics

A. Total and unit costs of construction $330,000.00

B. Operating costs

XIII. Source(s) of information and Published References

Wyoming Geological Survey