1R - 279

REPORTS

DATE:

1989 - 1988

VACUUM FIELD WATERFLOW COMMITTEE

1988 TECHNICAL REPORT

and

1989 CONTINGENCY PLAN

Injection Project Operators:

ARCO OIL AND GAS COMPANY

MOBIL EXPLORATION AND PRODUCING U.S.

PHILLIPS PETROLEUM COMPANY

TEXACO, INC.

LIST OF APPENDICES

APPENDIX A

1. 1989 Contingency Plan for Subsurface Environmental Protection
2. 1988 Monitoring and Testing Data

In accordance with the 1988 Contingency Plan for Subsurface Environmental Protection, the Vacuum Field Waterflow Technical Committee has monitored all active and accessible Vacuum Field fresh water wells during 1988. It is the Committee's intention to continue the data collection as outlined in the 1989 Contingency Plan (Appendix A). The companies actively participating in Committee work are ARCO, Mobil, Phillips and Texaco.

Over the past year, no significant changes were noted in either the pressures of the five Salado monitor wells or the chloride contents of all previously identified active fresh water wells. The SPS Well No. 28 increased in chlorides due to circumstances not believed related to the Salado waterflow situation (reference Phillips Petroleum Company's summary).

Well surveys, sorted by operator, are summarized in the table below. Also listed are the number of Vacuum Field wells drilled in 1988.

		Surveys		
Operator	Wells Examined	Falloffs	Temp. Profiles	Vacuum Wells Drld
ARCO	0	0	0	0
Mobil	9	5	4	1
Phillips	16	16	0	10
Texaco	25	25	0	5
TOTALS	50	46	4	16

A map prior to Appendix A highlights the above drilling activity and details casing point information, particularly Rustler leak-off test data. Those wells with casing set in the Rustler were drilled out (10 + ') and pressured until fluid leak-off or to a predetermined surface pressure limit as a means of quantifying the anhydrite's integrity. Also, any waterflows encountered are so noted.

Individual company activity summaries follow.

ARCO OIL AND GAS COMPANY

ARCO's involvement in addressing the Vacuum waterflow problem is primarily as a nonoperating working interest owner. However, ARCO does operate the State Vacuum Unit and the Sinclair Vacuum salt water disposal well. The State Vacuum Unit is a small 800 acre waterflood on the western edge of the field and the Sinclair disposal well is on the southern edge. ARCO has operated a monitor well, the Cole Darden Hale State #1, on the State Vacuum Unit since 1977. The monitoring well has not encountered significant water flows or pressure changes (+/-500 psi) in the evaporite section during this period. During 1988, ARCO has injected only produced water at the State Vacuum Unit and injection pressure has declined from 1500 psi (9/87) to 240 psi (11/88). ARCO injects +/-2300 BWPD at 1850 psi in the Sinclair Vacuum disposal well.

ARCO ceased injection into the State Vacuum Unit No. 1 and No. 2, two offset injectors to our monitor well, the Cole Darden Hale State No. 1, on August 4, 1987. The Hale State No. 1 has been monitored for over a year with the offset injectors shut-in. There has been no change in the Hale State No. 1 well, therefore, ARCO plans to request approval to plug and abandon the Hale State No. 1.

ARCO Oil and Gas Company fully supports the work of the Vacuum Waterflow Committees in their efforts to monitor and solve the waterflow problem.

MOBIL EXPLORATION AND PRODUCING U.S.

As a member of the Vacuum Waterflow Committee, Mobil is committed to the preservation of the water quality of the Ogalalla Aquifer. To monitor the condition of the waterflow within the salt section, Mobil conducted tests in seven technical categories during 1988.

At the end of each quarter, twelve active water supply wells on Mobil acreage were sampled for chloride content. To date, the recorded chloride levels do not indicate any fresh water contamination. A monitor well (Bridges St #6) was completed in 1987 to record any fluid movement within the salt. During 1988, a consistent 825 psi surface pressure was recorded with 0 psi on the casing annulus.

Mobil ran four injection profile logs during 1988 to check wellbores for packer leaks, fluid migration around the casing shoe, and placement of water within the unitized zone. Of these logs, one was run on an Abo injector (NVAU #206) while the remaining three were run on San Andres injectors (Bridges St #186, 187, 188). To date, no casing leaks have been found and no water channeling has been indicated above the casing shoe. Also run on San Andres injection wells were pressure fall-off tests. The purpose was to screen wells for further study based upon the calculated volume of wellbore storage. Fall-off tests were initially run on five injectors. Equipment changes were made and the tests repeated for more accurate data. Due to scatter in the data, no storage volumes could be calculated with any certainty. Presently, several tools are being evaluated for greater accuracy in fall-off testing.

At present, there are thirty-nine shut in wells in the Bridges State San Andres Waterflood. Mobil has initiated a program to remove the production equipment and temporarily abandon the wells with a bridge plug and cement. The purpose of this program is to protect the casing from corrosion and possible fluid migration to other formations. To date, seven wells have been temporarily abandoned.

Mobil presented a plan in 1987 to reduce water injection in the Bridges State San Andres Waterflood to a volume no greater than the volume of produced water. The State Sec 27 #2, a disposal well candidate, was tested for disposal capacity in the Devonian. A disposal permit application was filed with the OCD. An OCC hearing was held in which an offset landowner objected to the permit application. The permit was issued. An appeal was filed in District Court by the objecting landowner. A court hearing date has been set for March 20, 1989.

For 1989, Mobil will continue with all testing procedures used during 1988. Pending a favorable decision concerning the State Sec 27 #2, Mobil plans to install the pipeline and necessary facilities.

PHILLIPS PETROLEUM COMPANY

Phillips actively supports the monitoring of our East Vacuum Grayburg/San Andres Unit, Hale, Mable and Lea Lease wells to identify any Vacuum Field waterflow problems. To date, Phillips has seen no significant changes in the identified fresh water well chlorides and is continuing with testing and operation practices needed to preserve the integrity of the Ogallala fresh water sands.

In March of this year, Phillips plugged and abandoned the two Lea Lease wells monitoring the Queen waterflows. After termination of the North E.K. Queen Unit, the flows, and consequently, the need for these wells ceased. Monitoring of those fresh water wells initially identified has continued with no significant chloride changes to note.

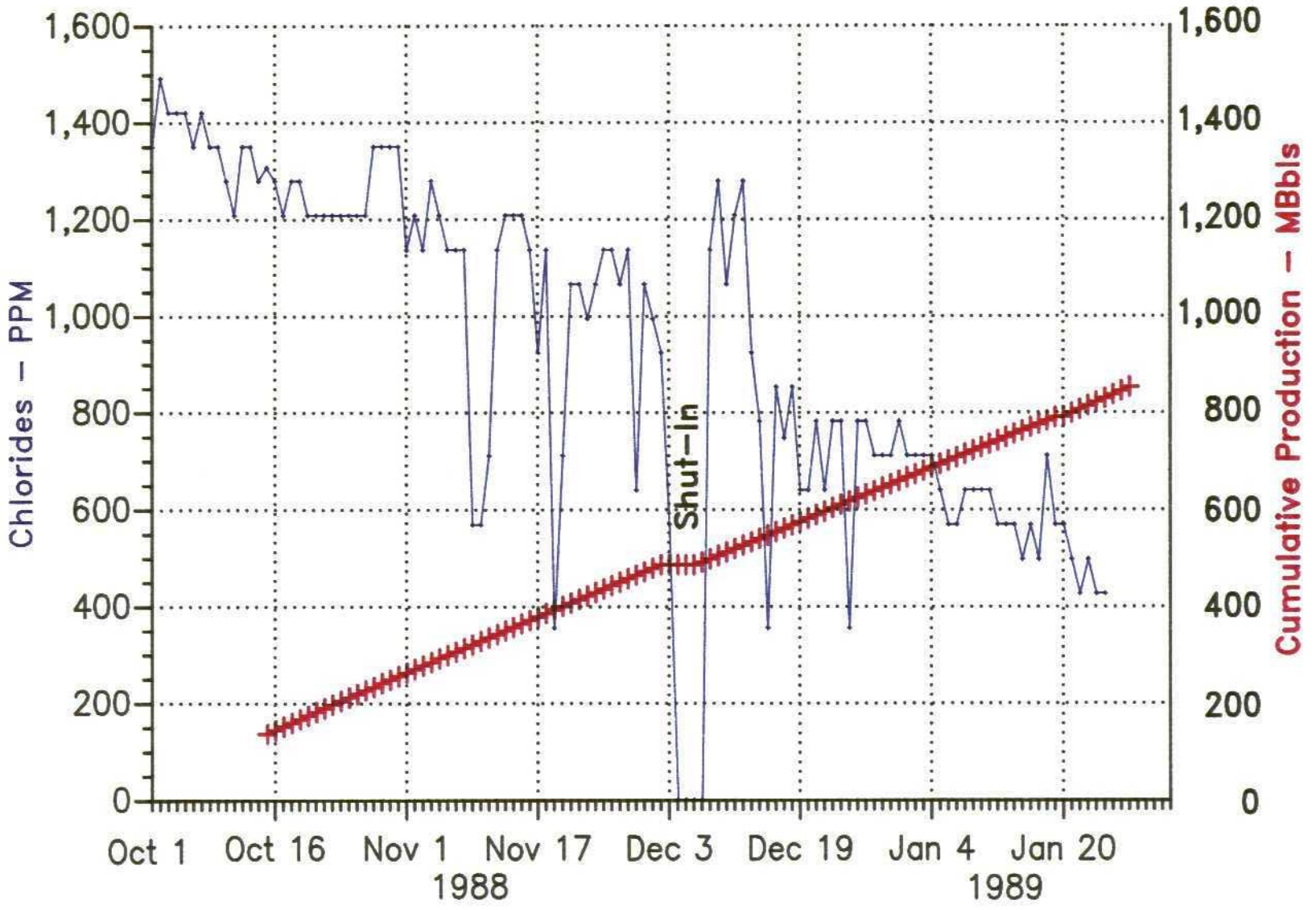
Phillips continued drilling in the Vacuum Field with a total of ten new wells this year. Of these, only one Salado waterflow was encountered with this particular location being in the known flow area. The Rustler leak-off test on this well, EVGSAU 3127-009, surpassed the 2000 psi surface pressure limit as did the tests on the other new EVGSAU wells. One Lea well was tested to actual leak-off.

Other tests run on Vacuum Field wells include the 16 pressure fall-offs conducted on the Hale and Mable Leases and on EVGSAU. Four of these tests used both surface and bottomhole data recorders to verify the use of surface-only data; no discrepancies have been identified between the two recorders' data. Test results do not indicate the presence of any significantly large storage volumes.

Operationally, Phillips identified three wells with casing leaks in the Vacuum Field; all leaks occurred within the Salado section. Two of these wells were successfully squeezed and returned to production with no adverse results; the third well is in the process of repair.

The Southwest Public Service Ogallala Well No. 28 is located within the boundary of the East Vacuum Unit and showed increased chlorides to >2000 ppm in July. A buried injection line leak near this well was located and repaired. All surrounding supply wells were shut-in and Well No. 28 was connected to the EVGSAU injection system. Continued pumping has reduced chlorides to 700 ppm. The cause of the increased chlorides is being investigated and there is no indication such resulted from fluid migration from lower horizons.

Southwestern Public Service Company
Well No. 28
Vacuum Field Area, Lea County, New Mexico



TEXACO, INC.

Texaco's 1988 work in conjunction with the Vacuum Field Waterflow Technical Committee follows. To date, Texaco has identified ninety eight (98) wells which meet the committee's definition as target. Target wells are those wells that have injected at or above 900 psi surface pressure either currently or historically. Sixty six (66) of these target wells have been investigated by one or more of the methods adopted by the committee as a viable technique for determining communication with the evaporite section.

Twenty-five new wells were examined through pressure fall-off testing during 1988. All tests were run with the highly sensitive electronic surface memory gauges. Three wells exhibited anomalously high wellbore storage volumes, four others show medium storage, twenty-three wells show low or insignificant storage volumes, and one test was uninterpretable.

Six additional wells identified in 1987 as having medium or high wellbore storage volumes (VGSAU 49, CVU 60, CVU 72, CVU 73, CVU 81 and CVU 141) were investigated further.

VGSAU 49 historically exhibited storage volumes in excess of 100,000 barrels. Injection pressure was reduced for the first six months of 1988 and a subsequent fall-off indicated a storage volume of 2000 bbls. Plans are to run a step rate test and determine if the initial pressure was above fracture pressure. TDT, tracers and temperature profiles did not indicate communication with the salt section.

Other wells categorized as having medium or high storage volumes (CVU 60, CVU 72, CVU 73, CVU 81 and CVU 141) in 1987 were retested using the more sensitive surface recorders. All five wells calculated storage volumes falling into the insignificant or low storage categories with the availability of the better early time data.

The seven possibly suspect wells identified during 1988 to have medium or high storage will be repeat tested for verification along with the one bad test. Should these wells exhibit similar characteristics, the other testing procedures outlined by the Technical Committee (i.e., tracer, temperature and TDT logs) will be employed to test for communication. In addition, further investigation of target wells will be pursued. Texaco plans to continue quarterly reporting of pressure on monitor wells and testing chlorides on active fresh water wells. Leak off tests will be run on any wells drilled testing the structural integrity of the Rustler Anhydrite.

LEA

17S-34E

17S-35E

18S-34E

18S-35E

MOBIL BRIDGES STATE

PHILLIPS EAST VACUUM (GRAYBURG/SAN ANDRES)

TEXACO CENTRAL VACUUM

ARCO STATE VACUUM

TEXACO WEST VACUUM

TEXACO
(GRAYBURG/SAN ANDRES)
UNIT

2555 psi

2520 psi

1795 psi

1839 psi

1810 psi

1794 psi
WATER FLOW AT 1742': 32 BPM
INCREASED TO 52 BPM AT 2020

2812 psi

2802 psi

2609 psi

2796 psi
WATERFLOW AT 1807': 7.1 BPM

2603 psi

2400

2500

2600

2300

2200

2100

Mobil 8b/12/04

0.00 2000.00 FEET

SCALE 1:24000 UNITS FEET NEW MEXICO PROJECTION ZONE 1 .500 IN. GRID
CLARKE 1866 SPHEROID

PRELIMINARY TOP RUSTLER

LAST 5 DIGITS OF API # POSTED ABOVE WELL SYMBOL

RUSTLER STRUCTURE VALUES POSTED BELOW WELL SYMBOL

LEGEND

- OIL & GAS COMP.
- GAS WELL
- DRY HOLE
- OIL WELL
- WATER INJECTION WELL
- JUNKED AND ABANDONED
- UNKNOWN

1988 DRILL WELLS

1988 DRILL WELLS WITH LEAK-OFF TEST RUN (MAXIMUM BOTTOMHOLE PRESSURE OF TEST INDICATED)

1988 DRILL WELLS WITH WATERFLOWS (DEPTH AND VOLUME INDICATED)

VACUUM FIELD WATERFLOW
GEOLOGICAL-GEOPHYSICAL COMMITTEE

VACUUM FIELD AREA
Lea County, New Mexico

PRELIMINARY TOP RUSTLER
C.I. : 20'

WEH 1/89

L-MD-17266-A

APPENDIX A

1989

VACUUM FIELD
LEA COUNTY, NEW MEXICO

CONTINGENCY PLAN FOR SUBSURFACE ENVIRONMENT PROTECTION

PREFACE

To protect the subsurface environment of the Vacuum Field from possible degradation caused by pressured water in the Salado formation, the water injection project operators in the field plan to monitor the integrity of the Ogallala formation water. This monitoring program will promptly identify subsurface problems.

Geological investigations, as well as NMOCD regulated well completion techniques, give evidence that there is minimal likelihood of contamination of the Ogallala formation by the water in the Salado. However, in the unlikely event that the pressured water escapes from the Salado formation, the plan also lays out active steps to confine the problem area, to identify and rectify the cause, and for restoration of the area.

1989

VACUUM FIELD
LEA COUNTY, NEW MEXICO

CONTINGENCY PLAN FOR SUBSURFACE ENVIRONMENT PROTECTION

I. MONITOR

A. Sample and analyze all active and accessible fresh water wells quarterly.

(Attachment No. 1 is a list of the fresh water wells in the Vacuum Field.)

(Attachment No. 2 is the prevoius years -1988- data.)

(Attachment No. 5 is a field plat showing the approximate location of these wells.)

1. Wells will be produced prior to sampling to insure a representative sample is obtained.

2. Analysis will be performed by an independent lab or chemical company.

B. Conduct quarterly surface pressure checks of monitor wells completed in the Salado Section (Attachment No. 3).

C. Report drilling activity quarterly, specifically as to the existence or nonexistence of waterflows and their shut-in surface pressure. Rustler leak-off test data will also be reported (Attachment No. 4).

D. Submit all data to the Technical Committee for compilation and comparison. A quarterly report will be sent to the OCD Director, the Hobbs District Supervisor of the OCD and the Management Committee members.

VACUUM FIELD
LEA COUNTY, NEW MEXICO

CONTINGENCY PLAN FOR SUBSURFACE ENVIRONMENT PROTECTION

II. ACTION

If a fresh water sample shows an abnormal increase in chlorides, the following actions are to be taken:

A. Notify OCD and all Field Project Operators.

B. Begin producing contaminated water at maximum rate and retest for verification.

C. Sample and shut in all uncontaminated offset fresh water wells; obtain shut-in fluid level.

D. Reduce surface fluid injection pressures on all injection wells within a half-mile radius to O psi.

E. Begin testing the areal extent of the contamination and searching for the source.

Options available:

1. Perforate existing nearby wellbores opposite Ogallala.

2. Drill test wells.

F. Identify source and repair or eliminate.

G. Deplete area of contaminated water:

1. Produce to surface with following disposal options:

a. Existing disposal wells and systems.

b. Current injection projects.

c. Perforate existing wellbores in the lower San Andres for additional disposal capacity.

2. Subsurface depletion and disposal by simultaneous completions in common wellbores of the Ogallala, Santa Rosa, Dewey Lake and/or Salado with the lower San Andres disposal zone.

H. Increase fresh water well sampling frequency in and around the contaminated area.

1989

VACUUM FIELD INJECTION PROJECT OPERATORS

TELEPHONE LIST

ARCO	OFFICE	HOME
1. S. D. Smith	505-392-3551	505-392-1175
2. J. A. Nicholson	915-688-5324	915-686-1809
3. David McGee	915-688-5683	915-697-8705
MOBIL		
1. D. R. Seale	505-393-3315	505-393-1466
2. A. J. Alcott	505-393-9186	505-392-5340
3. G. P. Dalton	915-688-2249	915-687-5247
PHILLIPS		
1. D. T. Thorp	505-397-5595	505-397-1662
2. D. J. Fisher	505-397-5539	505-397-2420
3. W. B. Berry	915-367-1204	915-368-7305
TEXACO		
1. H. Smith	505-393-4031	505-392-5866
2. J. A. Schaffer	505-393-7191	505-392-8387
3. J. E. King	505-393-7191	505-392-2585

ATTACHMENT NO. 1

Fresh Water Wells
Location
Vacuum Field
Lea County, New Mexico 1989

I.D.		Well Description	Approximate Well Location
1.		Texaco VGSAU Supply Well #1	1380' FNL & 1980' FEL Sec 02-18S-34E
2.		Texaco VGSAU Supply Well #2	1120' FNL & 1520' FEL Sec 02-18S-34E
3.		Texaco VGSAU Supply Well #3	1100' FNL & 210' FWL Sec 01-18S-34E
4.		Texaco VGSAU Supply Well #4	700' FSL & 1500' FWL Sec 02-18S-34E
5.		Texaco CVU Supply Well #1	400' FSL & 400' FWL Sec 30-17S-35E
6.		Texaco CVU Supply Well #2	330' FNL & 1980' FWL Sec 06-18S-35E
7.		Texaco CVU Supply Well #3	10' FNL & 160' FWL Sec 06-18S-35E
8.		Texaco Buckeye Office Well	330' FNL & 1980' FEL Sec 01-18S-34E
9.	*	Texaco Gas Plant Water Well	500' FSL & 1900' FEL Sec 36-17S-34E
10.		Buckeye Store Water Well	800' FSL & 300' FEL Sec 25-17S-34E
11.	*	Forklift Ent. Buckeye Station	940' FNL & 380' FWL Sec 30-17S-35E
12.		Ranch Windmill	1980' FNL & 2180' FEL Sec 06-18S-35E
13.		Ranch Windmill	200' FNL & 2640' FWL Sec 12-18S-34E
14.	*	N.M. Potash Corp. Well #1	1320' FSL & 1520' FWL Sec 36-17S-34E
15.	*	N.M. Potash Corp. Well #5	660' FSL & 1680' FEL Sec 34-17S-34E
16.	*	N.M. Potash Corp. Well #6	2400' FNL & 1550' FWL Sec 27-17S-34E
17.	*	N.M. Potash Corp. Well #7	660' FSL & 2180' FWL Sec 22-17S-34E
18.		N.M. Potash Corp. Well #8	1320' FSL & 400' FWL Sec 31-17S-35E
19.	*	Amax Water Well	2500' FNL & 1150' FEL Sec 28-17S-34E
20.	*	Western AG Minerals Well #1	660' FSL & 700' FWL Sec 21-17S-34E
21.	*	Western AG Minerals Well #4	1980' FSL & 300' FEL Sec 21-17S-34E
22.	*	Western AG Minerals Well #5	1700' FNL & 2300' FWL Sec 22-17S-34E
23.	*	Western AG Minerals Well #6	2550' FSL & 1220' FWL Sec 22-17S-34E
24.	*	Western AG Minerals Well #7	400' FSL & 2400' FEL Sec 21-17S-34E
25.	*	Natl. Potash Water Well #7	1650' FSL & 2600' FWL Sec 09-18S-35E
26.	*	Natl. Potash Water Well #2	550' FSL & 2050' FEL Sec 11-18S-34E
27.		Ranch Windmill 'A'	2550' FSL & 1250' FEL Sec 15-17S-34E
28.		Western AG Minerals Well #9	200' FNL & 330' FEL Sec 22-17S-34E
29.		NVAU #100	2000' FSL & 2100' FEL Sec 14-17S-34E
30.		NVAU #101	10' FSL & 330' FWL Sec 11-17S-34E
31.		BS #179	700' FSL & 1320' FEL Sec 14-17S-34E
32.		BS #94	2550' FNL & 2550' FEL Sec 14-17S-34E
33.		Ranch Windmill North	300' FSL & 1600' FEL Sec 22-17S-34E
34.		Amax #7	800' FNL & 1850' FEL Sec 27-17S-34E
35.		Amax #6	900' FNL & 450' FWL Sec 26-17S-34E
36.		Mobil Office Water Well	700' FNL & 2640' FWL Sec 25-17S-34E
37.		N.M. Potash Water Well #9	330' FSL & 330' FEL Sec 27-17S-34E
38.	*	No Name, No Pump	450' FNL & 2250' FEL Sec 24-17S-34E
39.		Ranch Windmill 'M'	660' FSL & 2100' FWL Sec 07-17S-35E
40.	*	No Name, No Pump	600' FSL & 2300' FEL Sec 23-17S-34E
41.	*	Ranch Windmill	2310' FSL & 760' FWL Sec 32-17S-35E
42.	*	Ranch Well	2310' FSL & 560' FWL Sec 32-17S-35E
43.	*	Ranch Well	1090' FNL & 1650' FWL Sec 32-17S-34E
44.	*	Ranch Well	890' FSL & 990' FWL Sec 32-17S-34E

I.D.		Well Description	Approximate Well Location
45.		Lee Plant Supply Well #1	75' FSL & 2425' FEL Sec 30-17S-35E
46.	*	Lee Plant Supply Well #2	75' FSL & 1930' FEL Sec 30-17S-35E
47.		Lee Plant Supply Well #3	825' FNL & 2310' FEL Sec 31-17S-35E
48.		Lee Plant Supply Well #4	1280' FNL & 1320' FWL Sec 31-17S-35E
49.	*	Lee Plant Monitor Well #1	260' FSL & 1668' FEL Sec 30-17S-35E
50.	*	Lee Plant Monitor Well #2	75' FSL & 1426' FEL Sec 30-17S-35E
51.	*	Lee Plant Monitor Well #3	79' FNL & 1542' FEL Sec 31-17S-35E
52.	*	Lee Plant Monitor Well #4	53' FNL & 1647' FEL Sec 31-17S-35E
53.		Hale Mable Supply Well #SO-1	150' FSL & 2065' FWL Sec 31-16S-35E
54.		Hale Mable Supply Well #SO-2	2240' FSL & 2180' FEL Sec 35-17S-34E
55.	*	Ranch Windmill	1100' FNL & 1400' FWL Sec 33-17S-35E
56.	*	Ranch Windmill	450' FSL & 1550' FWL Sec 23-17S-35E
57.		EVGSAU Supply Well #2721-SO4	550' FSL & 1850' FWL Sec 27-17S-35E
58.	*	EVGSAU Supply Well #2941-SO5	1900' FSL & 1900' FWL Sec 29-17S-35E
59.		EVGSAU Supply Well #3366-SO6	2100' FNL & 550' FWL Sec 33-17S-35E
60.		EVGSAU Supply Well #3202-SO7	600' FSL & 1650' FEL Sec 32-17S-35E
61.		EVGSAU Supply Well #2060-SO1	1886' FSL & 2083' FEL Sec 20-17S-35E
62.		EVGSAU Supply Well #2865-SO2	1900' FNL & 600' FWL Sec 28-17S-35E
63.	*	Mobil Supply Well #SO8	300' FNL & 1900' FEL Sec 05-18S-35E
64.	*	Mobil Supply Well #SO9	2300' FNL & 700' FEL Sec 24-17S-34E
65.		Ranch Windmill	2300' FNL & 1300' FEL Sec 22-17S-35E
66.	*	Ranch Windmill	1980' FNL & 660' FEL Sec 21-17S-35E
67.		Ranch Windmill	300' FSL & 2100' FWL Sec 18-17S-35E
68.	*	Water Well	2100' FNL & 660' FWL Sec 20-17S-35E
69.		Chevron Doghouse	500' FNL & 660' FWL Sec 32-17S-35E
70.	*	Exxon Doghouse	500' FNL & 2400' FEL Sec 32-17S-35E
71.		Ranch Windmill	2640' FNL & 2640' FWL Sec 16-18S-35E
72.		State Observation Well #1	850' FNL & 475' FEL Sec 33-17S-35E
73.		State Observation Well #4	860' FSL & 1550' FWL Sec 35-17S-35E
74.		State Observation Well #5	1300' FSL & 840' FWL Sec 34-17S-35E
75.		SW Public Service Well #26	1950' FSL & 185' FEL Sec 34-17S-35E
76.		SW Public Service Well #27	2000' FSL & 2625' FEL Sec 34-17S-35E
77.		SW Public Service Well #28	2055' FSL & 100' FEL Sec 33-17S-35E

*Inactive Well

ATTACHMENT NO. 2

Fresh Water Wells
Chloride Content
Vacuum Field
Lea County, New Mexico — December, 1988

I.D.	Well Description	1988 Chloride Content in PPM 1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
1.	Texaco VGSAU Supply Well #1	156	156	142	165
2.	Texaco VGSAU Supply Well #2			131	
3.	Texaco VGSAU Supply Well #3	153	170	190	213
4.	Texaco VGSAU Supply Well #4	44	45	34	46
5.	Texaco CVU Supply Well #1	554	228	582	668
6.	Texaco CVU Supply Well #2	94	99	92	108
7.	Texaco CVU Supply Well #3	87	79	91	109
8.	Texaco Buckeye Office Well	186	139	108	131
9.	* Texaco Gas Plant Water Well				
10.	Buckeye Store Water Well	70	57	53	55
11.	* Forklift Ent. Buckeye Station				
12.	Ranch Windmill	42	38	36	36
13.	Ranch Windmill	37	33	35	37
14.	* N.M. Potash Corp. Well #1				
15.	* N.M. Potash Corp. Well #5				
16.	* N.M. Potash Corp. Well #6				
17.	* N.M. Potash Corp. Well #7				
18.	N.M. Potash Corp. Well #8	277	291		384
19.	* Amax Water Well				
20.	* Western AG Minerals Well #1				
21.	* Western AG Minerals Well #4				
22.	* Western AG Minerals Well #5				
23.	* Western AG Minerals Well #6				
24.	* Western AG Minerals Well #7				
25.	* Natl. Potash Water Well #7				
26.	* Natl. Potash Water Well #2				
27.	Ranch Windmill 'A'	60	40	36	38
28.	Western AG Minerals Well #9	62	65	62	64
29.	NVAU #100	146	160	146	146
30.	NVAU #101	152	150	142	142
31.	BS #179	56	60	48	55
32.	BS #94	80	85	84	80
33.	Ranch Windmill North	38	45	36	44
34.	Amax #7	64	62	60	60
35.	Amax #6	62	55	52	56
36.	Mobil Office Water Well	46	46	48	44
37.	N.M. Potash Water Well #9	42	42	48	48
38.	* No Name, No Pump				
39.	Ranch Windmill 'M'	38	40	34	38
40.	* No Name, No Pump				
41.	* Ranch Windmill				
42.	* Ranch Well				
43.	* Ranch Well				
44.	* Ranch Well				

I.D.	Well Description	1988 Chloride Content in PPM 1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
45.	Lee Plant Supply Well #1	48		52	
46.	* Lee Plant Supply Well #2				
47.	Lee Plant Supply Well #3			164	192
48.	Lee Plant Supply Well #4	156	170	176	168
49.	* Lee Plant Monitor Well #1				
50.	* Lee Plant Monitor Well #2				
51.	* Lee Plant Monitor Well #3				
52.	* Lee Plant Monitor Well #4				
53.	Hale Mable Supply Well #SO-1	36	80	40	35
54.	Hale Mable Supply Well #SO-2	76	90	62	52
55.	* Ranch Windmill				
56.	* Ranch Windmill				
57.	EVGSAU Supply Well #2721-SO4	40	50	52	60
58.	* EVGSAU Supply Well #2941-SO5				
59.	EVGSAU Supply Well #3366-SO6	42	37	52	62
60.	EVGSAU Supply Well #3202-SO7	28	32	50	
61.	EVGSAU Supply Well #2060-SO1	40	46	48	56
62.	EVGSAU Supply Well #2865-SO2	36	80	50	60
63.	* Mobil Supply Well #SO8				
64.	* Mobil Supply Well #SO9				
65.	Ranch Windmill	36	90		
66.	* Ranch Windmill				
67.	Ranch Windmill	20	50	32	
68.	* Water Well				
69.	Chevron Doghouse		70	50	24
70.	* Exxon Doghouse				
71.	Ranch Windmill	18	20	16	30
72.	State Observation Well #1				57
73.	State Observation Well #4				57
74.	State Observation Well #5				71
75.	SW Public Service Well #26		31	360	43
76.	SW Public Service Well #27		36	109	57
77.	SW Public Service Well #28		48	>2000	700

*Inactive well

Salado Monitor Wells
Vacuum Field Area
Lea County, New Mexico

December, 1988

Operator	Well Name	Well Location	1988 Surface Pressure in PSIG 1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
ARCO	Cole Darden Hale State #1	660' FNL, 660' FEL 31-17-34	500	500	500	500
Mobil	Bridges State #6	1980' FSL, 660' FWL 26-17-34	800	825	825	810
Texaco	Central Vacuum Unit Monitor Well #1	960' FNL, 284' FWL 6-18-35	860	850	850	850
	Central Vacuum Unit Well #91	660' FSL, 1980' FWL 36-17-34	930	940	940	940
	State "P" Well #1	1980' FSL, 1980' FEL 7-18-35	0	0	0	0

ATTACHMENT NO. 3

Drilling Activity
Vacuum Field
Lea County, New Mexico

December, 1988

Operator	Well Name	Well Location	1988 Rustler Lead-off Test Results Surface Pres(psi)	Bottom Hole Pres (psi)	Casing Depth(ft)	Actual Test to Leakoff
ARCO	-	-	-	-	-	
Mobil	North Vacuum Abo East Unit 23	660' FSL & 1320' FWL Sec 7-17S-35E	-	-	-	
Phillips	EVGSAU 3127-008	2173' FSL & 1410' FEL Sec 31-17S-35E	2000	2812	1520	no
	EVGSAU 3127-009	1175' FSL & 740' FEL Sec 31-17S-35E	2000	2796	1521	no
	EVGSAU 3202-018	2560' FNL & 680' FEL Sec 32-17S-35E	2000	2809	1545	no
	EVGSAU 3229-012	2630' FSL & 569' FWL Sec 32-17S-35E	2000	2802	1533	no
	EVGSAU 3374-004	1950' FSL & 210' FWL Sec 33-17S-35E	2000	2803	1534	no
	Lea 35	1980' FSL & 660' FWL Sec 29-17S-35E	-	-	-	
	Lea 36	660' FNL & 660' FEL SEc 29-17S-35E	-	-	-	
	Lea 37	1980' FNL & 1980' FWL Sec 19-17S-35E	1750	2555	1535	yes
	Lea 38	1980' FSL & 660' FWL Sec 20-17S-34E	-	-	-	
	Lea 42	660' FSL & 1980' FWL Sec 29-17S-34E	2000	2820	1567	no
Texaco	Central Vacuum Unit Well 223	1821' FSL & 1330' FWL Sec 25-17S-34E	1000	1795	1555	no
	Central Vacuum Unit Well 242	90' FNL & 706' FEL Sec 36-17S-34E	1000	1839	1615	no
	Central Vacuum Unit Well 253	675' FNL & 1330' FWL Sec 36-17S-34E	1000	1810	1575	no
	New Mexico AB State TN 9	538' FSL & 818' FEL Sec 6-18S-35E	1100	2296	1566	no
	New Mexico O State Well 28	1653' FSL & 2309' FEL Sec 36-17S-34E	1000	1794	1540	no

ATTACHMENT NO. 4

R-33-E R-34-E R-35-E

T-17-S

YATES
NORTH VACUUM UNIT

MOBIL
NORTH VACUUM ABO EAST UNIT

MOBIL
BRIDGES STATE

MOBIL
NORTH VACUUM ABO UNIT

TEXACO
NORTH VACUUM ABO WEST UNIT

ARCO
STATE VACUUM UNIT

TEXACO
WEST VACUUM UNIT

TEXACO
CENTRAL VACUUM UNIT

Phillips

TEXACO
VACUUM GB/SA UNIT

PHILLIPS
EAST VACUUM GB/SA UNIT

PHILLIPS
VACUUM ABO UNIT

T-18-S

R-33-E R-34-E R-35-E

VACUUM FIELD
WATERFLOW COMMITTEE
LEA COUNTY, NEW MEXICO

FRESH WATER WELL LOCATIONS

SCALE 1 INCH = 4000'

KEY
ACTIVE
INACTIVE

1989

VACUUM FIELD WATERFLOW MANAGEMENT COMMITTEE

ARCO Oil & Gas Company
Mr. David McGee
P. O. Box 1610
Midland, Texas 79702

Mobil Exploration and Producing U.S.
Mr. Matt Sweeney
P. O. Box 633
Midland, Texas 79702

Phillips Petroleum Company
Mr. Bill Mueller
4001 Penbrook
Odessa, Texas 79762

Texaco, Inc.
Mr. John Schaffer
P. O. Box 728
Hobbs, New Mexico 88240

VACUUM FIELD WATERFLOW TECHNICAL COMMITTEE

ARCO Oil and Gas Company
Mr. Danny Campbell
P. O. Box 1610
Midland, Texas 79702

Mobil Exploration and Producing U.S.
Ms. Donna G. Elwood
P. O. Box 1800
Hobbs, New Mexico 88240

Mobil Exploration and Producing U.S.
Mr. Mark Moshell
P. O. Box 633
Midland, Texas 79702

Phillips Petroleum Company
Ms. Susan Courtright
4001 Penbrook
Odessa, Texas 79762

Phillips Petroleum Company
Mr. Steve Dunstan
4001 Penbrook
Odessa, Texas 79762

Texaco Inc.
Mr. David Cain
P. O. Box 728
Hobbs, New Mexico 88240

Texaco Inc.
HRC (Brian Park)
Mr. George Kokolis
P. O. Box 770070
Houston, Texas 77215-0070

1989

VACUUM FIELD WATERFLOW
GEOLOGICAL-GEOPHYSICAL COMMITTEE

ARCO Oil and Gas Company
Mr. Tim Verseput
2300 West Plano Parkway, PAL 508
Plano, Texas 75075

Mobil Exploration and Producing U.S.
Mr. Dan Burnham
P. O. Box 633
Midland, Texas 79702

Phillips Petroleum Company
Mr. David White
4001 Penbrook
Odessa, Texas 79762

Texaco Inc.
Mr. Ed Horvath
P. O. Box 3109
Midland, Texas 79702