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REPORTS

DATE:

11/93 - CLOSURE REPORT

RITTER ENVIRONMENTAL & GEOTECHNICAL SERVICES
119 N. Colorado, Suite 201, Midland, Texas 79701
Bus: (915) 682-7404 • Metro: (915) 570-6007 • Fax: (915) 682-7440

FINAL CLOSURE REPORT

UNLINED SURFACE IMPOUNDMENT CLOSURE

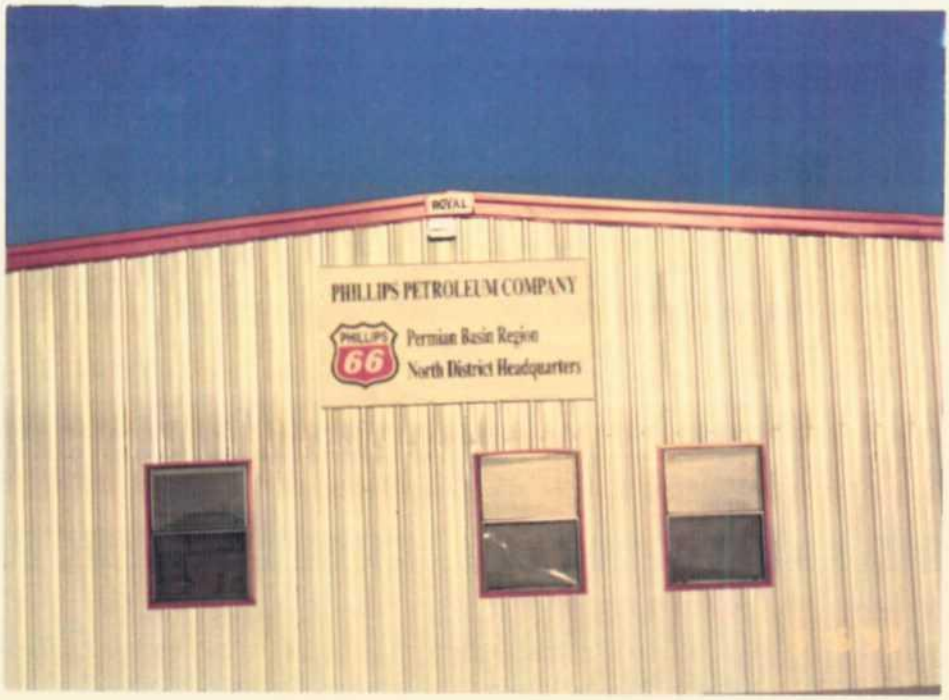
PHILLIPS PETROLEUM COMPANY

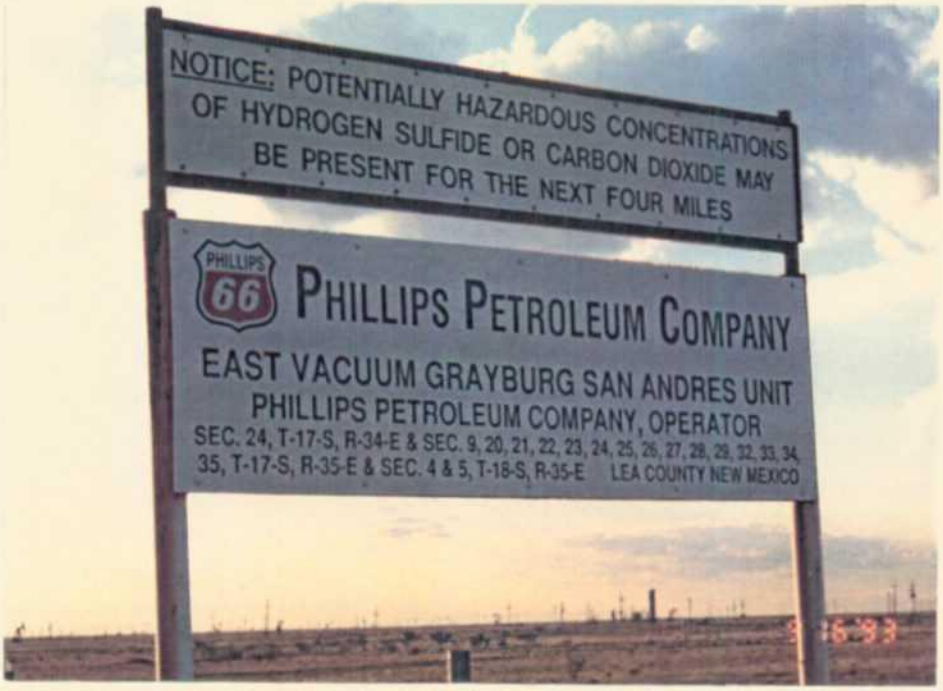
VACUUM FIELD IMPOUNDMENTS
SECTIONS 19, 20, 22, 24, 28
TOWNSHIP 17 SOUTH, RANGE 35 EAST
LEA COUNTY, NEW MEXICO

NOVEMBER 1993

PREPARED BY:

RITTER ENVIRONMENTAL & GEOTECHNICAL SERVICES (REGS)


ROYAL
PHILLIPS PETROLEUM COMPANY
PHILLIPS 66
Permian Basin Region
North District Headquarters


NOTICE: POTENTIALLY HAZARDOUS CONCENTRATIONS OF HYDROGEN SULFIDE OR CARBON DIOXIDE MAY BE PRESENT FOR THE NEXT FOUR MILES
PHILLIPS 66
PHILLIPS PETROLEUM COMPANY
EAST VACUUM GRAYBURG SAN ANDRES UNIT
PHILLIPS PETROLEUM COMPANY, OPERATOR
SEC. 24, T-17-S, R-34-E & SEC. 9, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 32, 33, 34, 35, T-17-S, R-35-E & SEC. 4 & 5, T-18-S, R-35-E LEA COUNTY NEW MEXICO

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I. INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

Ritter Environmental & Geotechnical Services (REGS) was contracted by Phillips Petroleum Company to properly address the closure of six (6) unlined surface impoundments located on Phillips operated leases in Lea County, New Mexico. These impoundments were located in Sections 19, 20, 22, 24 and 28 of Township 17 South Range 35 East of the East Vacuum Grayburg San Andres Unit currently operated by Phillips Petroleum Company. The following is a listing of each impoundment name and location:

1.	Polaris Amerada	22-17S-35E
2.	Penrose	24-17S-35E
3.	Pennzoil	28-17S-35E
4.	Bettis, Boyle & Stovall	19-17S-35E
5.	Crown Central	20-17S-35E
6.	Millard Deck	20-17S-35E

It was the aim of Phillips Petroleum Company to achieve permanent closure of the subject impoundments while adhering to the published guidelines for impoundment closure set forth by the New Mexico Oil Conservation Division (NMOCD) in February 1993. This report will document the events and the subsequent results of the remedial efforts achieved in the process of permanent closure of the above impoundments. The accompanying analytical documentation (see Section III of this report) will provide substantiated evidence that the recommended levels of remediation set forth in the guidance document have been achieved by Phillips Petroleum Company.

1.2 BACKGROUND

The impoundments have been in use for various periods of time beginning as early as 1960 to 1965. All of the impoundments were established and utilized by previous independent oil operators. The impoundments were discovered by Phillips Petroleum personnel subsequent to unitizing the field and the naming of Phillips Petroleum Company as the unit operator. Each impoundment's condition varied somewhat; however, all contained residual tars, asphaltines, waxes and crude oil primarily from what appeared to be excess crude and tank bottom residuals left in the impoundment when the leases were abandoned by the previous operators. **None of the impoundments appeared to have received any wastes other than produced crude oil and/or tank bottoms.**

The impoundment contents were analyzed for Total Petroleum Hydrocarbon (TPH) levels prior to treatment. The TPH level was measured at 563,000 ppm in a sample taken directly from the Pennzoil lease impoundment.

1.3 HYDROGEOLOGY & SURFACE CONDITIONS

The East Vacuum Grayburg San Andres Unit is located on the Llano Estacado of the High Plains. The Llano Estacado is an isolated mesa covering a large part of eastern New Mexico and western Texas. The Llano Estacado is locally called the Caprock and is a depositional surface of low relief which slopes southeastward. The Caprock is comprised of a thick layer of resistant caliche (limestone). The High Plains surface is almost uniformly flat. Most rainfall runoff is trapped in shallow surface depressions, locally called "buffalo wallows", where evaporation and downward percolation occur.

The primary source of drinking water in the area is the Ogallala formation. The Ogallala ranges in thickness from 100 to 250 feet. Recharge of the aquifer is exclusively from precipitation and subsequent downward percolation, primarily from the buffalo wallows.

Depth to water ranges from 50 to 100 feet in the general vicinity of the impoundments. The Ogallala is the sole source aquifer in the area. No fresh water drinking sources were located adjacent to any of the impoundments (within 1,000 feet). A buffalo wallow is located approximately 1500 feet south of the Pennzoil impoundment and can be identified on the topographic map included in the appendix of this report.

Near surface geological site conditions varied between locations. Generally, a moderately dense but well consolidated caliche lime layer underlay most of the locations from a depth of three to fifteen feet. The moderately dense caliche was intermittently overlain by a hard dense layer of limestone which at times prevented the deepening of the treatment cells beyond the dense layer. All locations were overlain by a thin veneer of soil composed of silty to sandy clay that ranged in depth from a few inches to four feet.

Surface vegetation cover primarily consists of native prairie grasses including blue gramma, side oats gramma and black gramma. Occasional mesquite and cactus also are found. Mesquite is more dense on the eastern most portion of the field near the Penrose impoundment.

The near surface limestone layer, in conjunction with relatively low annual rainfall amounts, effectively limited the downward migration of the hydrocarbons contained in the impoundments. Visually clean soils were identified in each impoundment after excavation of the impoundment contents. Thus, the vertical limits of affected soil was determined during the excavation and treatment process. All affected soil and impoundment contents were treated by the process of solidification.

A water well survey was conducted to determine the proximity, location, depth and water level of any fresh water wells located in the vicinity of the impoundments. Eleven water wells were identified in the proximity of the impoundments. All of the identified wells were drilled to provide fresh water for industrial usage (oil well drilling and potash exploration).

No domestic sources of potable water were identified within 1,000 feet of any impoundment. Copies of the well records obtained from the State Engineers office are included in the appendix of this report.

1.4 TREATMENT METHODOLOGY

Solidification refers to a treatment system which is designed to improve the handling and physical characteristics of wastes, to decrease the surface area across which the transfer or loss of waste characteristics can occur and to limit the solubility of those waste characteristics. This process effectively limits the lechate process and prevents the material from entering the subsurface soils and groundwater. Solidification is achieved by the addition of proprietary mixtures of cementious materials to the waste to form a monolithic block of concrete type material. Solidification occurs through a process that includes micro-encapsulation of the waste material.

II. SCOPE OF WORK

The scope of work for the Vacuum project included the necessary operations to address the remediation by solidification of six unlined surface impoundments and the oily sludges contained in those impoundments. Both olfactory and visual means were utilized to identify the limits of affected soils. In this report, each impoundment will be addressed separately.

2.1 IMPOUNDMENT #1 POLARIS/AMERADA

The Polaris/Amerada impoundment was located in the southwest quarter of Section 22, Township 17 South, Range 35 East. The impoundment was an earthen containment and level with the ground surface. No berm was associated with this impoundment. The surface dimensions of the impoundment were approximately 100 feet by 100 feet.

Impoundment contents included weathered heavy asphaltines, tars, waxes, tank bottoms and crude oil. Several years of weathering had obscured portions of the impoundment by covering with air borne sand and soil. The remedial operations began on August 17, 1993.

The initial operations consisted of the placement of two trenches positioned perpendicular north/south and east/west across the limits of the center of the impoundment. This was performed in order to establish the vertical limits of affected soil and to determine if pockets or pools of otherwise unobserved substances were involved. The average depth of affected soil was limited to no more than five feet. No other liquids or solid materials were identified in this assessment phase. A mass of highly viscous black liquid was sealed below a three to five inch thick crust. After the vertical definition of the affected soil depth was established, a perimeter trench was excavated to delineate the outer limits of the impoundment.

After the vertical and horizontal limits of the impoundment and affected soil were determined, four treatment cells were excavated around the established area. Reagent chemical was placed into the cells prior to mixing with the impoundment contents and the affected soil. The sludge materials and the affected soil were physically mixed with fresh water and solidification reagent to accomplish the reaction in which the solidification process occurs. The mixed materials were allowed a minimum of two weeks to harden and cure. Each cell was core sampled after mixing to assure thorough mixing had taken place. Proper sampling techniques and protocol were utilized in the acquisition, handling and transport of all samples. Representative samples were submitted for analyses to determine the degree of effectiveness of the solidification process. Analytical results are presented in the Section III of this report.

SPECIAL NOTE: It should be noted that materials from the Penrose impoundment have been transported to the Polaris/Amerada impoundment for treatment. This

was done due to the fact that the ground surface at the Penrose would not allow the construction of below grade treatment cells due to near surface conditions. Please refer to the special note in the Penrose portion of this report for a detailed description of the events concerning the transfer and treatment of the Penrose materials.

2.2 IMPOUNDMENT #2 PENROSE

The Penrose impoundment was located in the southwest quarter of Section 24, Township 17 South, Range 35 East. The impoundment consisted of an earthen berm elevated above ground level to an approximate height of two feet. The impoundment contents included very weathered and mostly dried heavy hydrocarbon materials including heavy asphaltines, tars, waxes, tank bottoms and crude oil. The surface dimensions of the impoundment were approximately 30 feet by 30 feet. The depth of the impoundment was determined by excavation to be approximately three feet below the bermed surface. Visually clean soil was identified in the bottom portion of the excavated impoundment after the removal of the materials and affected soils. Operations began on August 23, 1993.

SPECIAL NOTE : Please note that on August 20, 1993 Mr. Don Thorpe with Phillips Petroleum Company contacted via telephone Mr. Jerry Sexton with the Hobbs Office of the New Mexico Oil Conservation Division (NMOCD) and received verbal approval to remove the impoundment & contents from the Penrose Lease and to treat and remediate those materials at the location of the Polaris/Amerada lease.

The initial operations consisted of the removal of the impoundment and it's contents by loading the materials onto transport vehicles and transferring those materials to the Polaris/Amerada for treatment. This was done due to the fact that the impervious ground surface around the Penrose impoundment would not allow the construction of below grade cells for treatment. A single cell was constructed at the Polaris/Amerada to receive

the materials from the Penrose impoundment. The materials were thoroughly mixed by mechanical blending with appropriate portions of the reagent chemicals and fresh water to accomplish the solidification process.

Photographic documentation of the Penrose impoundment condition after removal of the materials is included in the appendix of this report (see Photograph #11). The impoundment location was brought back to grade with fresh top soil and levelled to contour with the surrounding terrain.

2.3 IMPOUNDMENT #3 PENNZOIL

The Pennzoil impoundment was located in the northeast quarter of Section 28, Township 17 South, Range 35 East. The impoundment consisted of an earthen berm elevated above ground level to an approximate height of three feet. The impoundment contents included weathered heavy hydrocarbon materials including asphaltines, tars, waxes, tank bottoms and crude oil. The surface dimensions of the impoundment were approximately 35 feet by 35 feet. The depth of the impoundment was determined by excavation to be approximately eight feet below the bermed surface. Visually clean soil was identified in the bottom portion of the excavated impoundment after the removal of the materials and affected soil. Operations were commenced on August 21, 1993.

Preliminary operations consisted of preparation of a treatment cell in a "y" shaped configuration. Near surface site conditions dictated the location and configuration of the treatment cell due to the presence of a dense layer of limestone that would not allow cell construction on the east and south sides of the impoundment, as would have normally been done. The majority of the impoundment contents were in a liquid state and contained trapped fresh water. The trapped water along with the sludge was solidified. After the liquid contents were solidified, the remaining affected soil was treated by the solidification process until only unaffected soil remained at the bottom of the excavation.

The empty impoundment was utilized as a separate treatment cell for the remaining untreated soil.

2.4 IMPOUNDMENT #4 BETTIS, BOYLE AND STOVALL

The Bettis, Boyle and Stovall impoundment was located in the southeast quarter of Section 19, Township 17 South, Range 35 East. The impoundment consisted of an earthen berm elevated above ground level to an approximate height of four feet. The impoundment contents included weathered heavy hydrocarbon materials including asphaltines, tars, waxes, tank bottoms and crude oil contained in a heavy black viscous sludge. The surface dimensions of the impoundment were approximately 125 feet by 100 feet. The depth of the impoundment was determined by excavation to be approximately eight feet below the bermed surface. Visually clean soil was identified in the bottom portion of the excavated impoundment after the removal of the materials and affected soils. Operations were commenced on August 24, 1993.

Preliminary operations consisted of the construction of below grade treatment cells on the north, south and west sides of the impoundment. Approximately three fourths (3/4) of the impoundment contents were treated in the three cells. The remaining one fourth (1/4) was treated in the original impoundment. As before, fresh water was mechanically mixed with the impoundment contents and the solidification reagent to perform the treatment process. Fresh water, trapped in the impoundment contents, and affected soils were treated by the solidification process.

2.5 IMPOUNDMENT #5 CROWN CENTRAL

The Crown Central impoundment was located in the northwest quarter of Section 20, Township 17 South, Range 35 East. The impoundment consisted of an earthen berm elevated above ground level to an approximate height of four feet. A near surface

impervious limestone caused significant difficulty in excavation of the treatment cells around the periphery of the impoundment.

The contents included weathered heavy hydrocarbon materials including asphaltines, tars, waxes, tank bottoms and crude oil contained in a heavy black viscous sludge. The surface dimensions of the impoundment were originally calculated to be approximately 50 feet by 50 feet by visual inspection; however, upon excavation of the contents it was discovered that the walls of the impoundment had leaked horizontally to the east and to the south. This leakage had occurred beneath the current surface surrounding the impoundment. As a result, the overall dimensions of the affected area increased to approximately 75 feet by 75 feet. The depth of the impoundment was determined by excavation to be approximately 10 feet below the bermed surface. Visually clean soil was identified in the bottom portion of the excavated impoundment after the removal of the materials and affected soils. Operations were commenced on August 24, 1993.

Preliminary operations consisted of the construction of below grade treatment cells on the east, south and west sides of the impoundment. It was during the construction of the treatment cells that the leakage was discovered from the original impoundment. Upon the excavation of the east and south cells, free liquids were entering the newly constructed cells from the direction of the impoundment. Photographic documentation of these events are provided in the appendix of this report (see Photograph #25). It was determined that all affected soils and liquids in the impoundment and the bordering walls would require treatment by solidification. A significant amount of fresh water was trapped in the impoundment and required treatment in addition to the liquid sludges. Fresh water was mechanically mixed with the impoundment contents and the solidification reagent to perform the treatment process. The empty impoundment was utilized to provide the treatment cell for the solidification of the east and south wall affected soils and interstitial liquid materials.

2.6 IMPOUNDMENT #6 MILLARD DECK

The Millard Deck impoundment was located in the northwest quarter of Section 20, Township 17 South, Range 35 East. The impoundment consisted of an earthen berm elevated above the ground level to an approximate height of three feet. A near surface impervious limestone caused significant difficulty in the excavation of treatment cells around the periphery of the impoundment. The contents included weathered heavy hydrocarbon materials including asphaltines, tars, waxes, tank bottoms and crude oil contained in a heavy black viscous sludge.

The surface dimensions of the impoundment were approximately 50 feet by 50 feet. The depth of the impoundment was determined by excavation to be approximately four feet below the bermed surface. Visually clean soil was identified in the bottom portion of the excavated impoundment after the removal of the materials and affected soils. Operations were commenced on August 30, 1993.

Three treatment cells were excavated around the perimeter of the impoundment to provide a mixing area for the solidification reagent. These cells were constructed to the north, south and east of the impoundment. Fresh water was mechanically mixed with the impoundment contents and the solidification reagent to perform the treatment process. The empty impoundment was demolished and distributed over the site after the removal of all affected soils and contents.

2.7 FINAL CLOSURE AND COVER

The solidified impoundments and treatment cells were allowed approximately two to three weeks time to cure prior to covering. Each treatment cell was constructed with a two to three foot freeboard that allowed for the placement of top soil over the cell area. Clean topsoil was transported from local sources to cover the impoundments. A two to three

foot layer of top soil was placed over the top of the closed impoundments and solidified cells. The top soil was contoured to match the surrounding terrain with a gentle slope away from the center of the treatment area to prevent ponding and accumulation of rainwater over the treatment area. Operations were completed on September 16, 1993.

III. ANALYTICAL

Analyses of the solidified impoundment contents were conducted to determine the effectiveness of the treatment. Each impoundment was core sampled immediately after treatment. Samples were taken to represent a general cross section of that particular impoundment's levels of constituents to be analyzed. Sample protocol adhered to US EPA recommended methodology. Samples were collected by a clean stainless steel core sampling device, placed in a laboratory cleaned glass sample container and sealed with a lid containing a teflon lined septum. After collection, each sample was placed on ice and chilled to approximately 4 °C until transported to the laboratory for analyses. Proper chain of custody documentation is provided in the appendix of this report. Lab QA/QC data is provided along with the formal signed laboratory reports in the appendix of this report. The core samples were analyzed by US EPA approved methodologies according to SW 846 published methods. The samples were analyzed for Total Petroleum Hydrocarbons (TPH), Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX). A seven day lechate test was also performed on each sample. The seven day lechate test simulates actual undisturbed conditions (as would normally be encountered with the buried mass). This method allows the sample to remain in a partially water filled glass container for seven days to simulate subsurface conditions. The lechate liquid is then measured for the particular analyte of interest such as TPH and/or BTEX. The test was originally designed to evaluate landfill leachate.

The analytical results were as follows:

TCLP ANALYSES

LEASE	TPH mg/kg	TOTAL BTEX mg/L	BENZENE mg/L	TOLUENE mg/L	ETHYL BENZENE mg/L	XYLENES mg/L	7-DAY LEACHATE TPH mg/L
Polaris Amerada	22	0.077	0.017	0.060	<0.004	<0.004	.73
Pennzoil	30	0.088	0.012	0.027	0.014	0.035	1.6
Penrose	26	0.183	0.004	0.034	0.054	0.091	.53
Bettis, Boyle, Stovall	48	0.039	<0.004	0.035	<0.004	0.041	.57
Crown Central	46	0.107	0.010	0.034	0.022	0.041	1.0
Millard Deck	30	0.068	<0.004	0.046	<0.004	0.018	.63

IV. CONCLUSIONS

Evaluation of the above analytical results verifies that remediation of the six impoundments found in the East Vacuum Grayburg San Andres Unit of Lea County, New Mexico has been successfully completed. Review of the data supports the use of solidification as an environmentally safe and sound technology to control and remediate the sludges and affected soils found within the impoundments. The encapsulation/solidification process effectively limits the leachability of the hydrocarbons previously left in the impoundments and allows the land surface to return to a productive state. Locking up the hydrocarbons by solidification prevents downward migration and the potential adverse effects on the groundwater supply in the vicinity of the impoundments. Solidification allows the surface to blend in with natural surroundings and permits grazing of livestock to reestablish itself without fear of animal mortality or endangerment.

The six surface impoundments have been properly closed in accordance with the NMOCD published guidelines for "Unlined Surface Impoundment Closure" dated February 1993. No further actions are recommended or anticipated at this site.

RITTER ENVIRONMENTAL & GEOTECHNICAL SERVICES

Mitchell R. Ritter, Managing Partner

1. POLARIS AMERADA
Defining limits of affected soil

2. POLARIS AMERADA
Showing clean soil at bottom of excavation

3. POLARIS AMERADA
After solidification

PREPARED BY:
Ritter Environmental & Geotechnical Services

4. POLARIS AMERADA
Showing solidified impoundment and cells

5. POLARIS AMERADA
Treatment cell

6. Penrose treatment cell at Polaris Amerada

7. POLARIS AMERADA TREATMENT CELL

8. POLARIS AMERADA AFTER RECLAMATION

9. PENROSE
Pre treatment

10. PENROSE
After removal of impoundment contents

11. PENROSE
After reclamation

12. PENNZOIL
Pre treatment

13. PENNZOIL
Treatment cell

14. PENNZOIL
After reclamation

15. PENROSE AFTER RECLAMATION

16. PENNZOIL AFTER RECLAMATION

17. BETTIS BOYLE & STOVALL
Pumping solification material

18. BETTIS BOYLE & STOVALL
Solidified impoundment materials

19. BETTIS BOYLE & STOVALL
Showing clean impoundment floor after removal of contents

20. BETTIS BOYLE & STOVALL -- BEFORE TREATMENT

21. BETTIS BOYLE AND STOVALL -- BEFORE TREATMENT, IMPOUNDMENT CONTENTS

22. BETTIS BOYLE & STOVALL
AFTER RECLAMATION

23. CROWN CENTRAL
Prior to treatment

24. CROWN CENTRAL
During treatment

25. CROWN CENTRAL
Showing subsurface leakage
of contents

26. CROWN CENTRAL SHOWING TREATMENT CELLS

27. CROWN CENTRAL AFTER SOLIDIFICATION

28. CROWN CENTRAL AFTER RECLAMATION

29. MILLARD DECK PRE TREATMENT

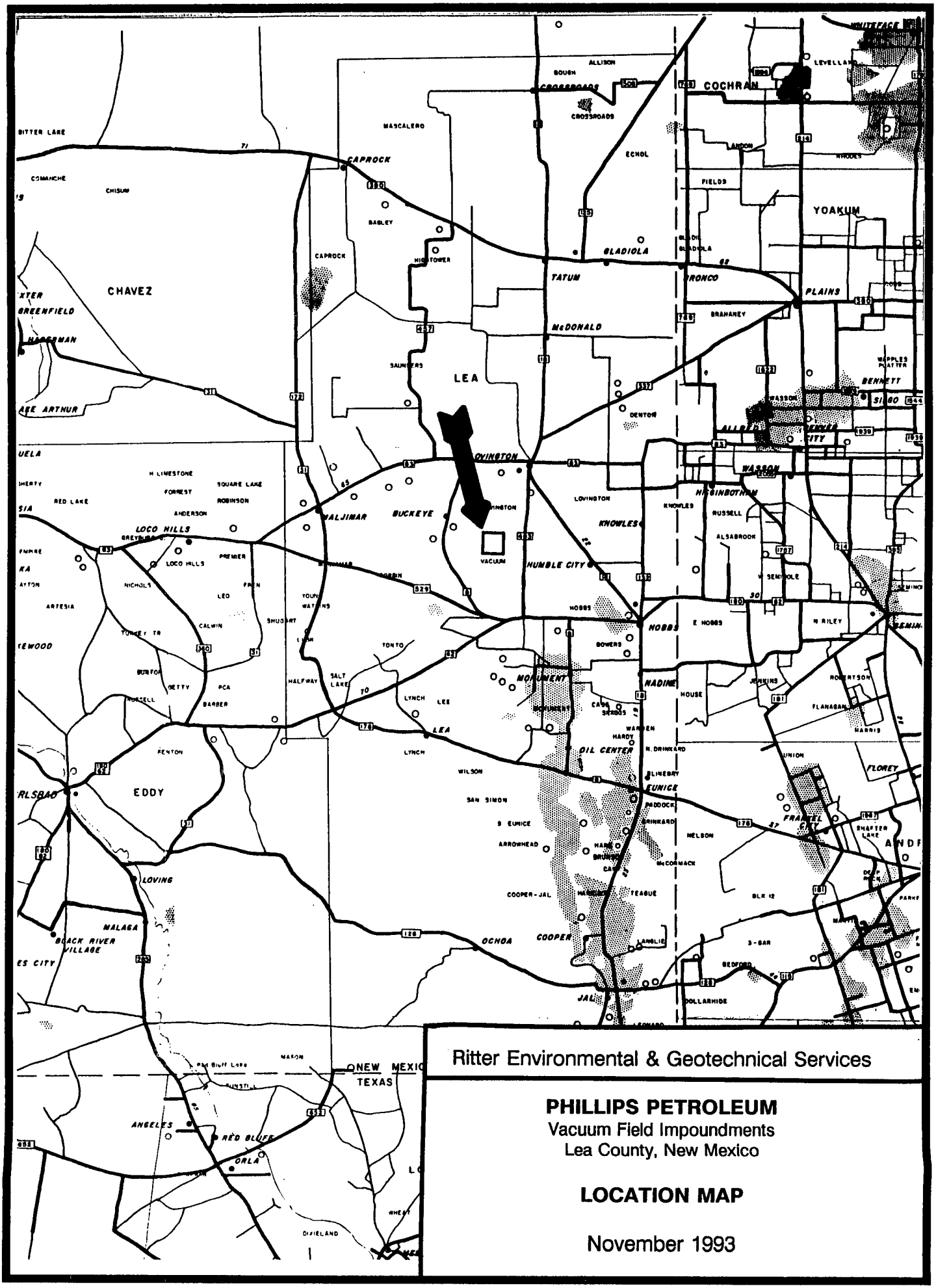
PREPARED BY:

30. MILLARD DECK
Impoundment contents

31. MILLARD DECK
Freshly solidified cell

32. MILLARD DECK
Showing clean soil below impoundment

33. MILLARD DECK
AFTER RECLAMATION



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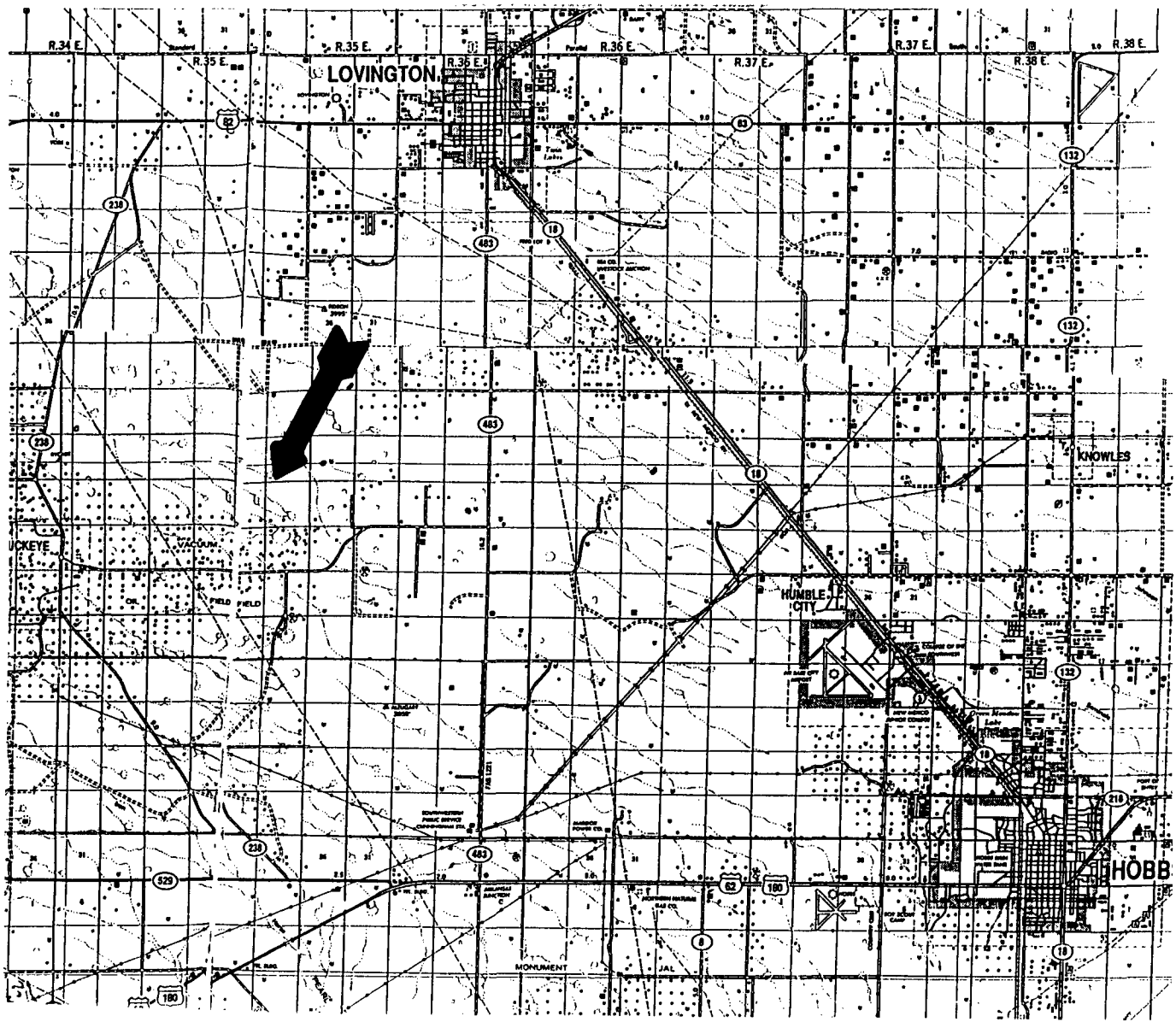
PHILLIPS PETROLEUM

Vacuum Field Impoundments
Lea County, New Mexico

LOCATION MAP

November 1993



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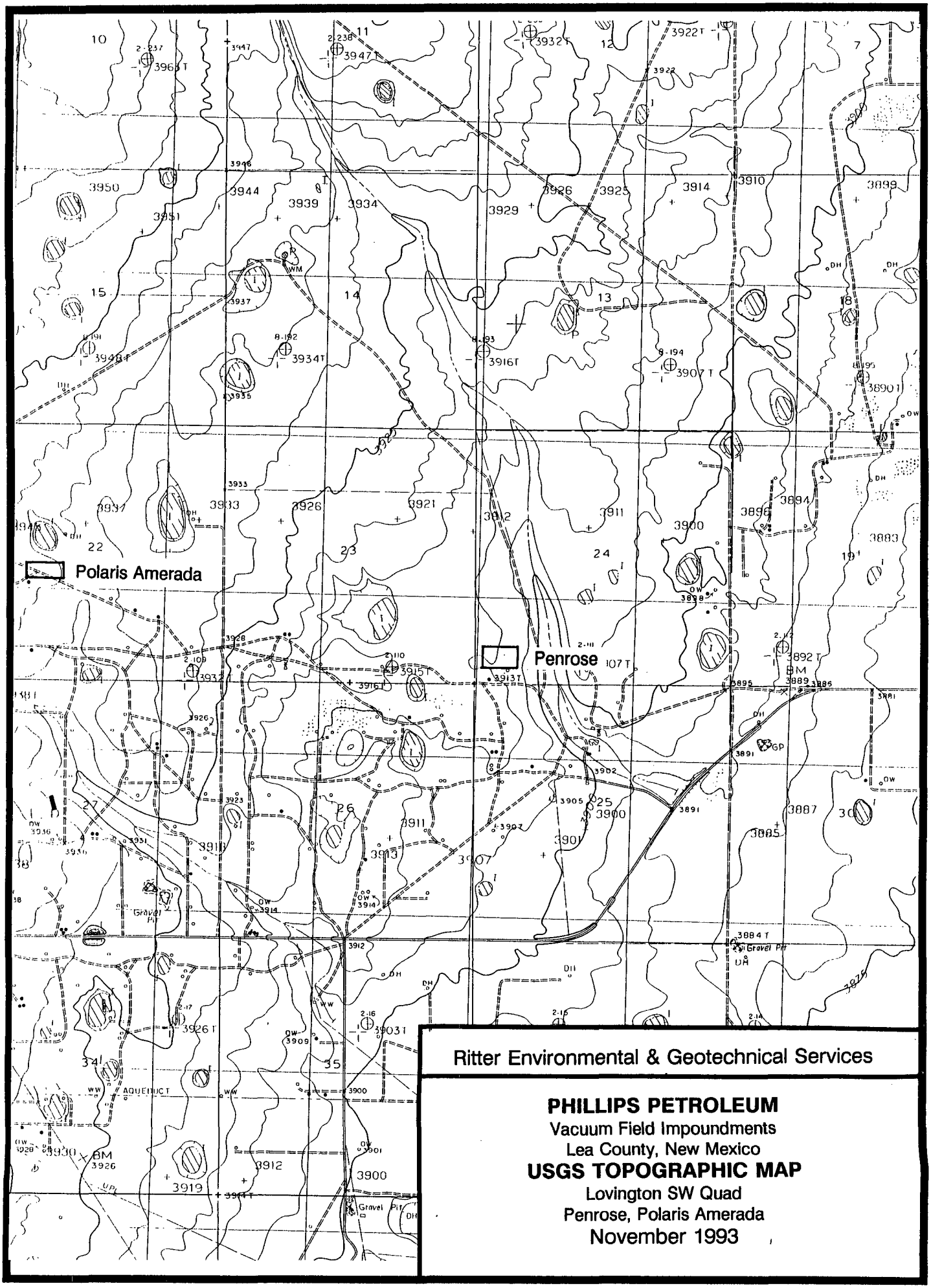
Vacuum Field Impoundments
Lea County, New Mexico

ROAD MAP

November 1993



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Vacuum Field Impoundments

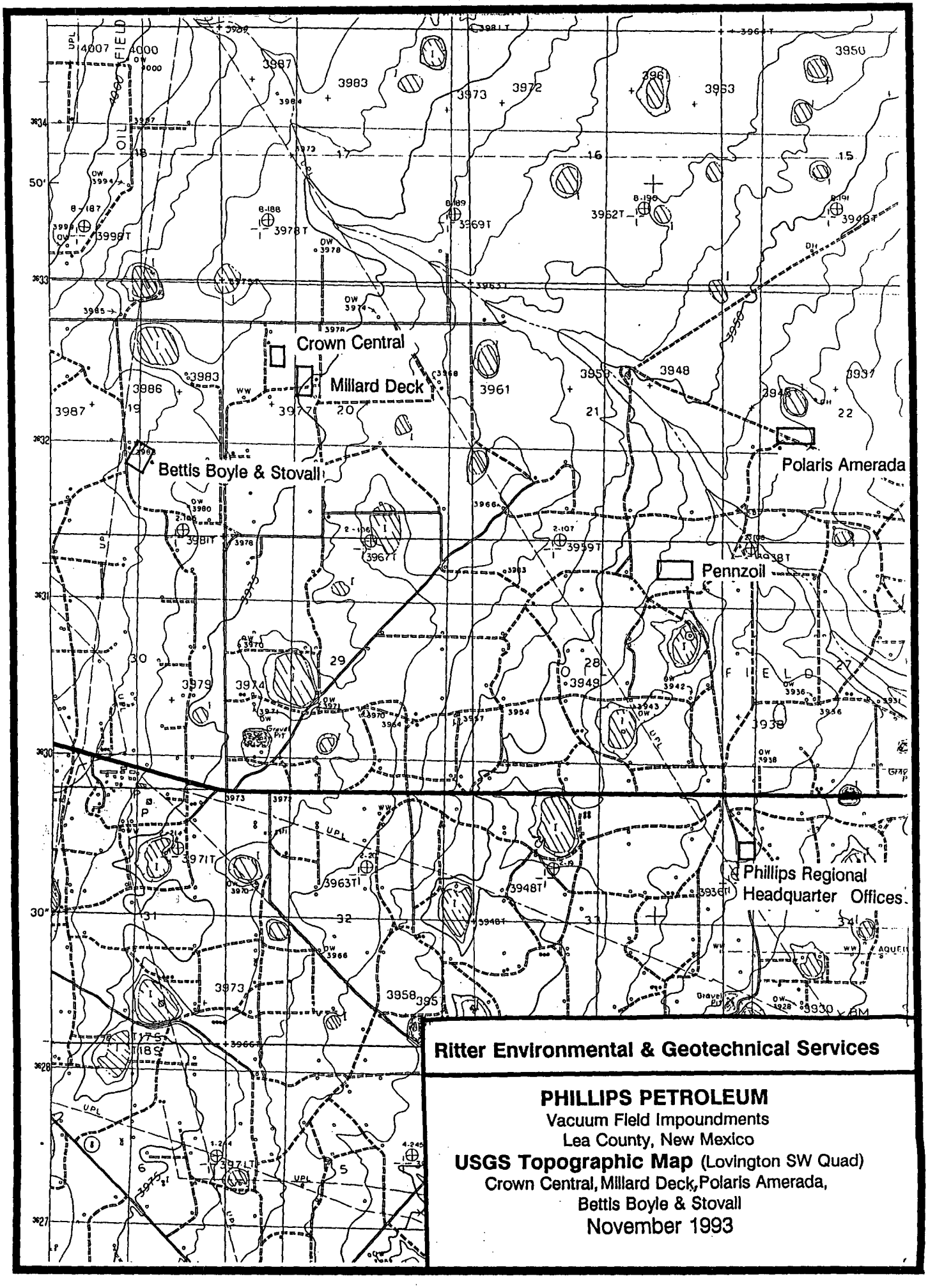
Lea County, New Mexico

USGS TOPOGRAPHIC MAP

Lovington SW Quad

Penrose, Polaris Amerada

November 1993



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Vacuum Field Impoundments

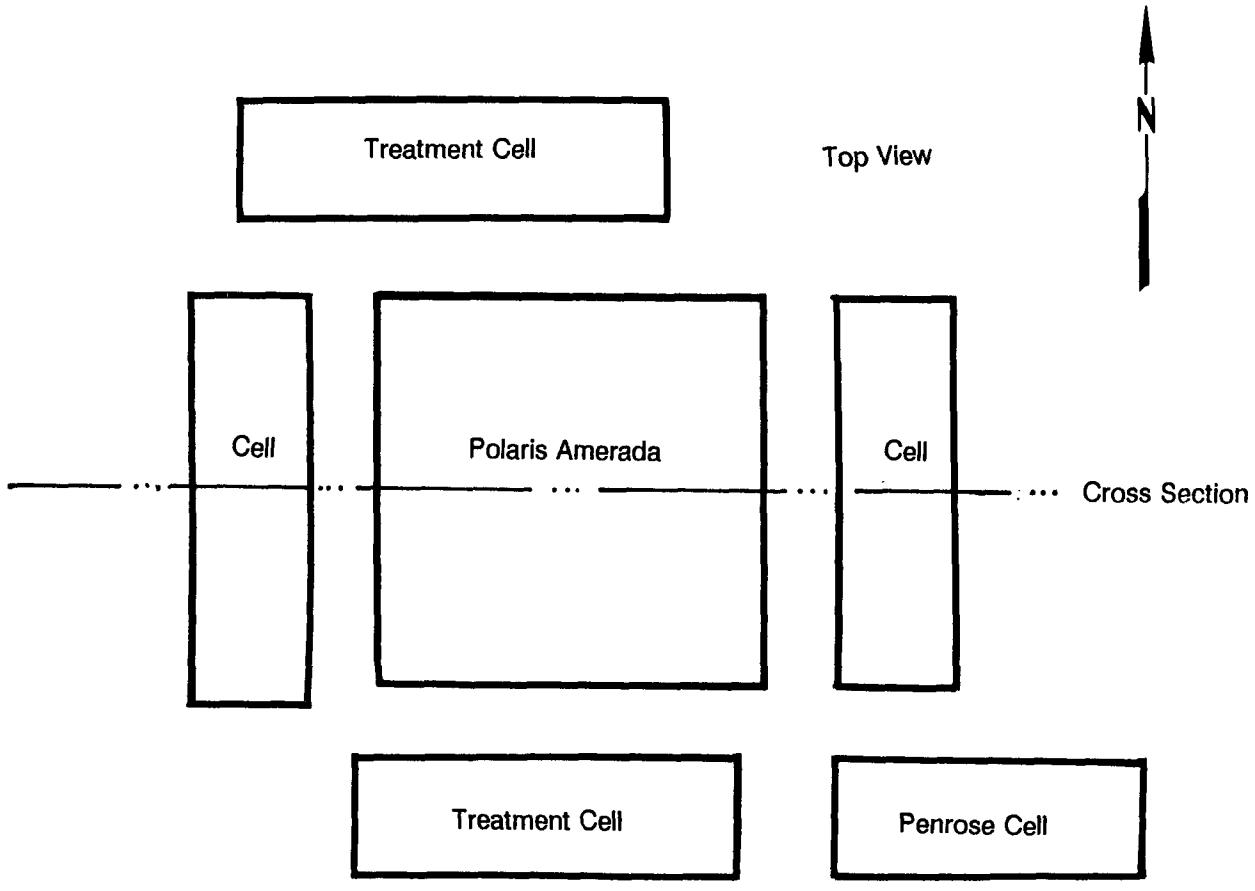
Lea County, New Mexico

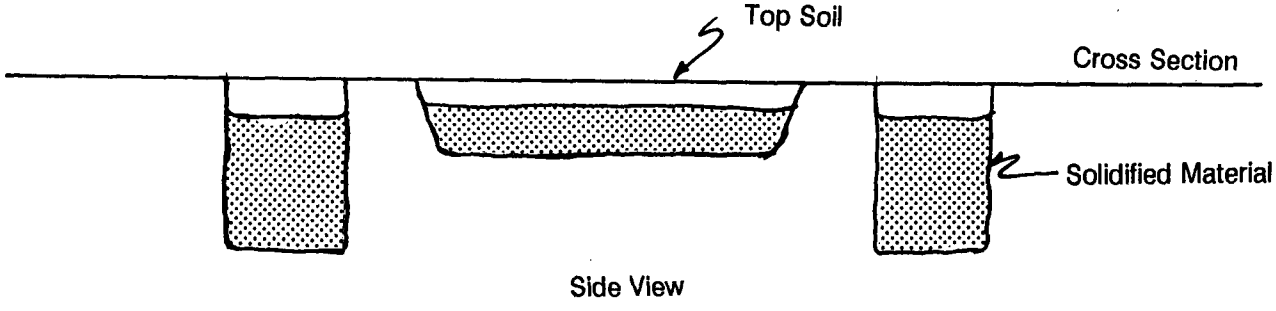
USGS Topographic Map (Lovington SW Quad)

Crown Central, Millard Deck, Polaris Amerada,

Bettis Boyle & Stovall

November 1993





Side View

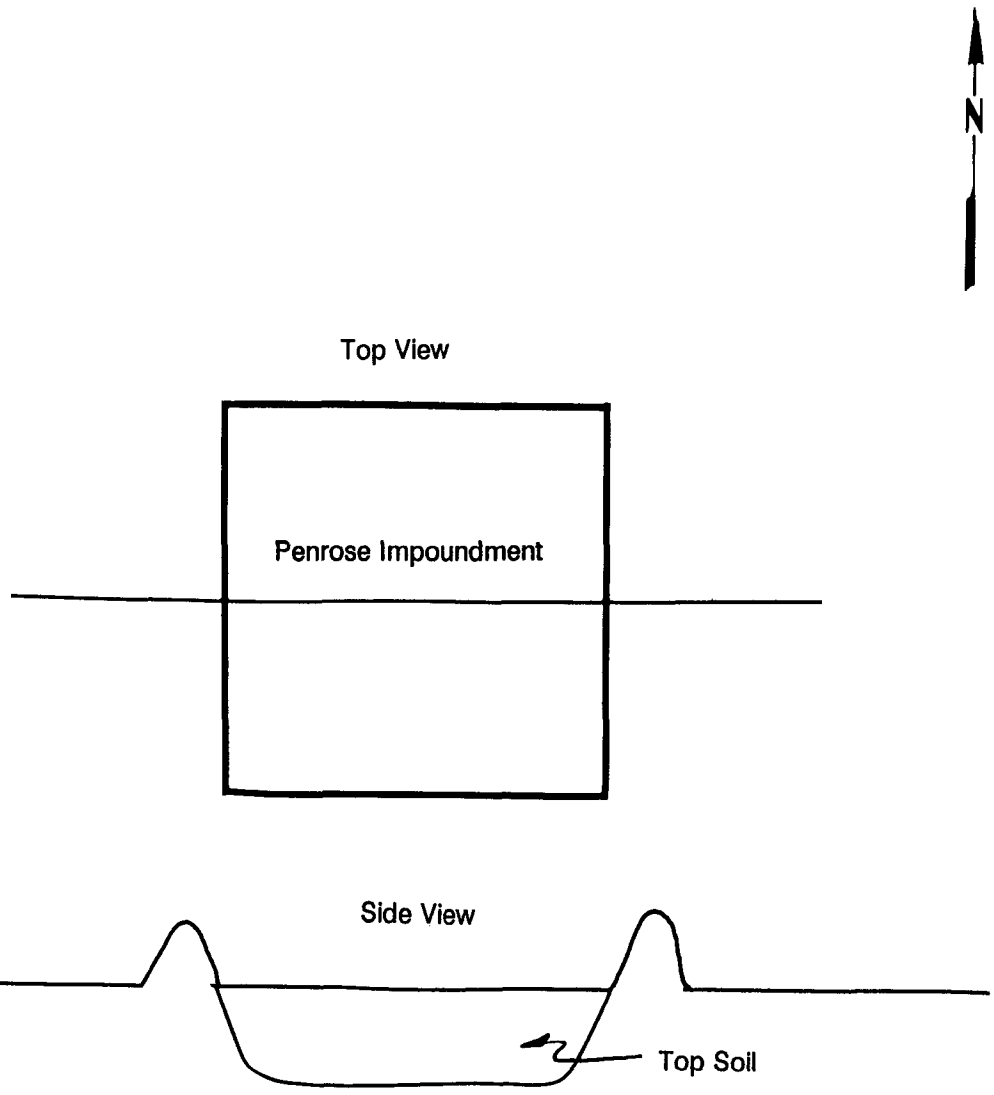
Ritter Environmental & Geotechnical Services

PHILLIPS PETROLEUM

SITE DIAGRAM

Polaris Impoundment #1 (22-17-35)
Horizontal Scale 1" = 50' (No Vertical Scale)

November 1993



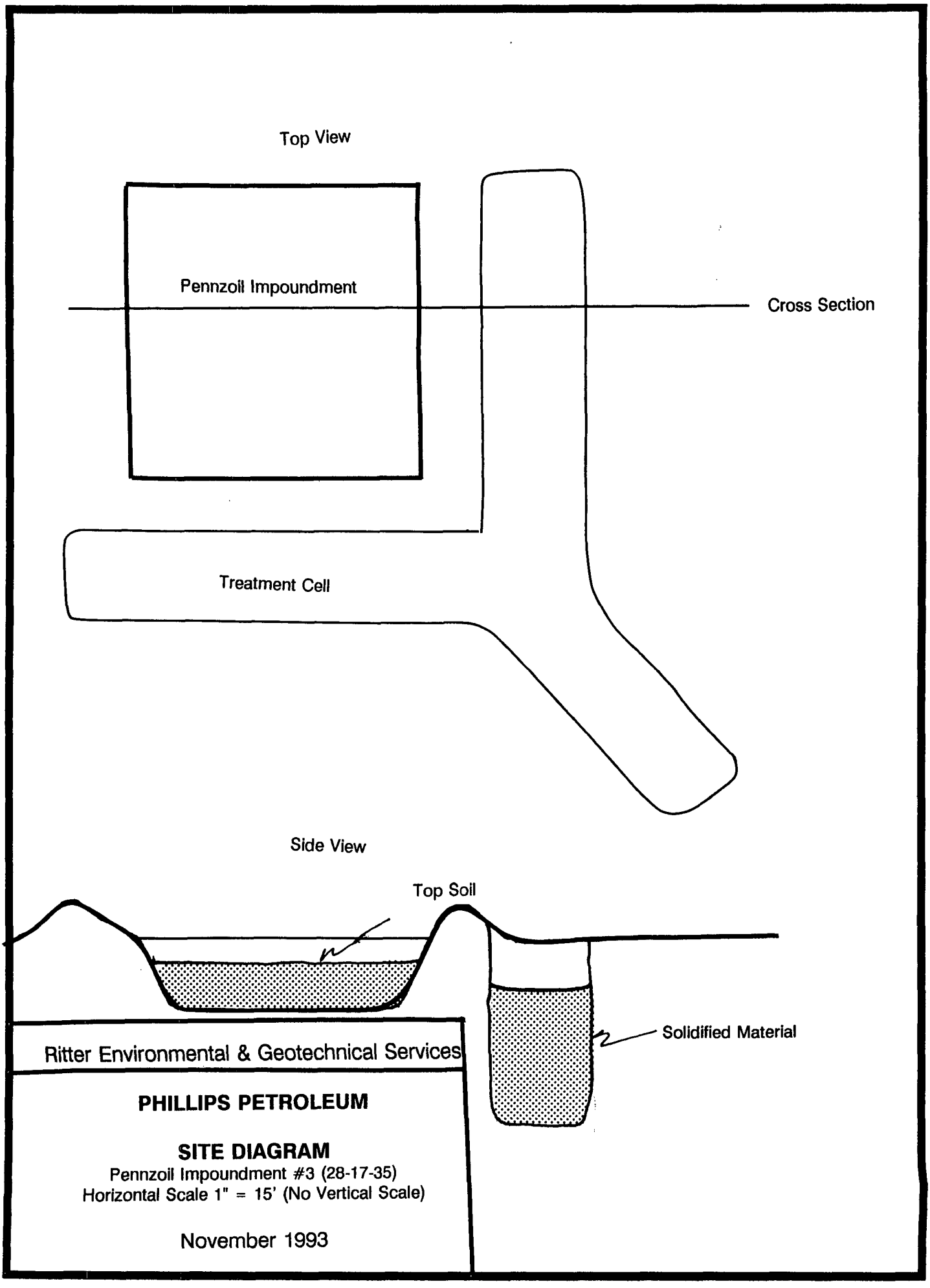
Ritter Environmental & Geotechnical Services

PHILLIPS PETROLEUM

SITE DIAGRAM

Penrose Impoundment #2 (24-17-35)
Horizontal Scale 1" = 15' (No Vertical Scale)

November 1993



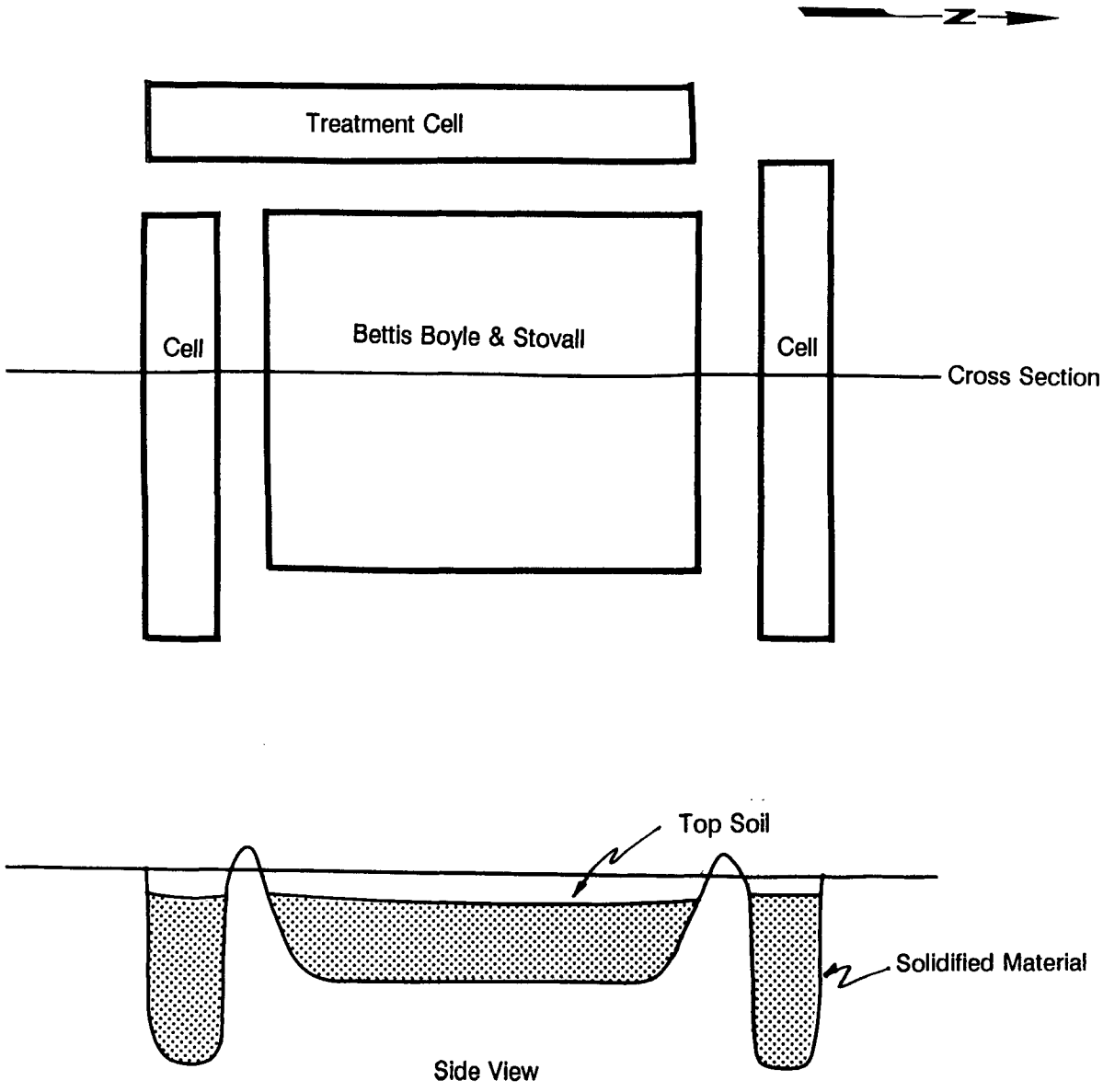
Ritter Environmental & Geotechnical Services

PHILLIPS PETROLEUM

SITE DIAGRAM

Pennzoil Impoundment #3 (28-17-35)
Horizontal Scale 1" = 15' (No Vertical Scale)

November 1993



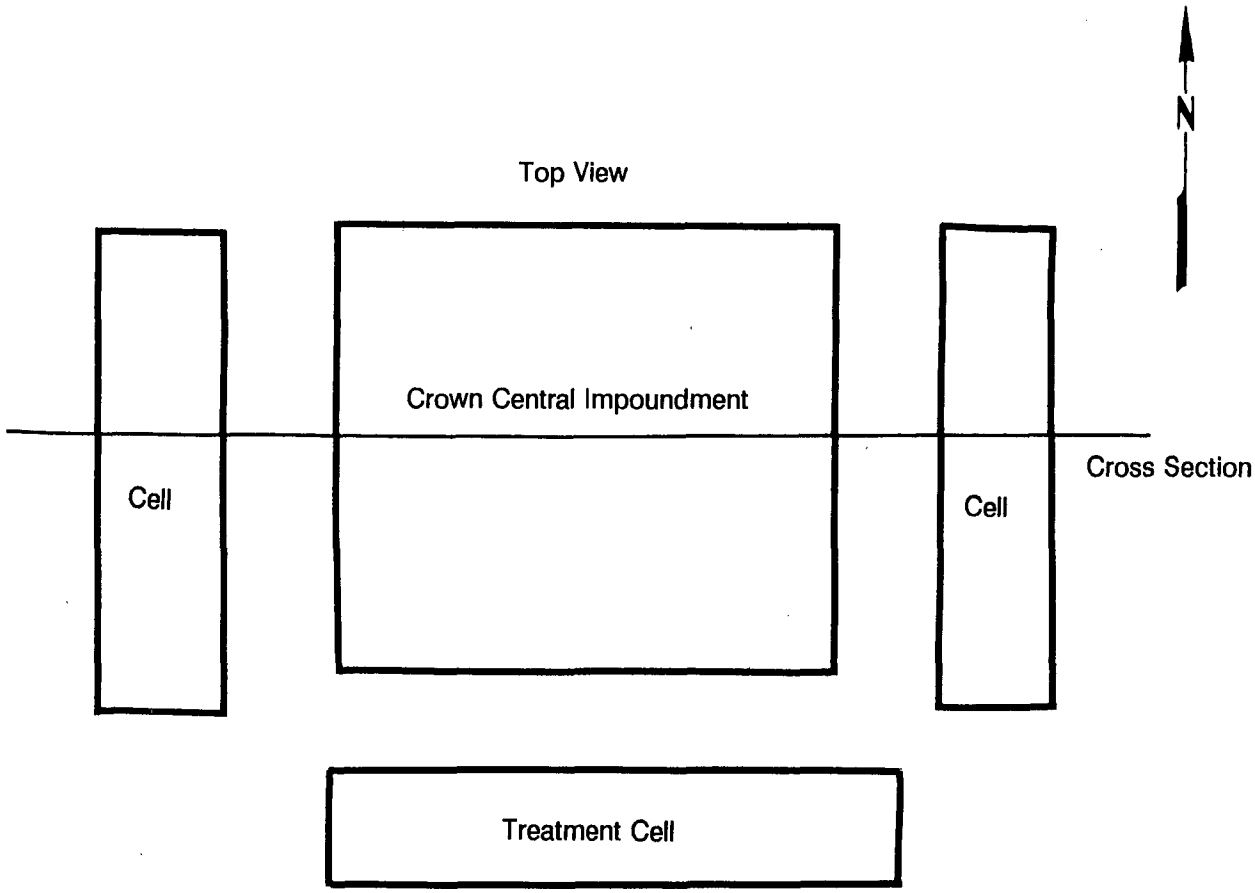
Ritter Environmental & Geotechnical Services

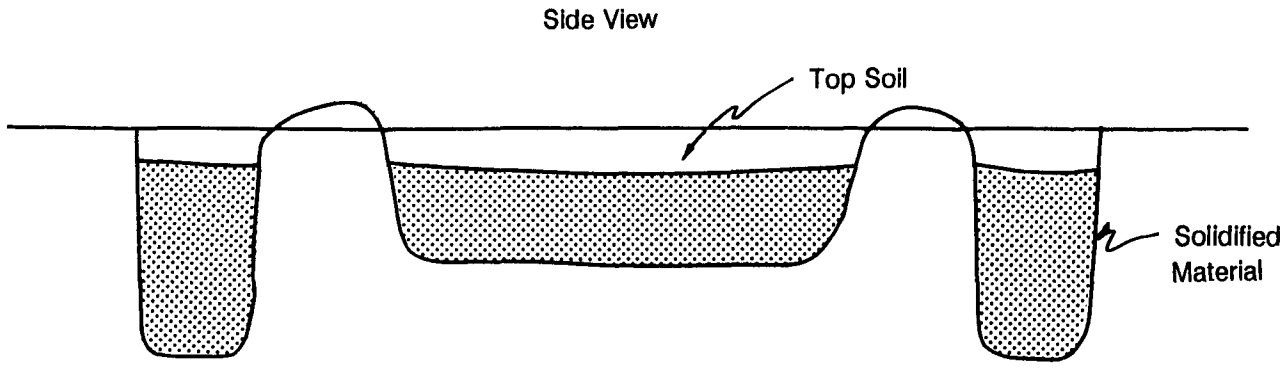
PHILLIPS PETROLEUM

SITE DIAGRAM

Bettis Boyle & Stovall Impoundment #4 (19-17-35)
Horizontal Scale 1" = 50' (No Vertical Scale)

November 1993





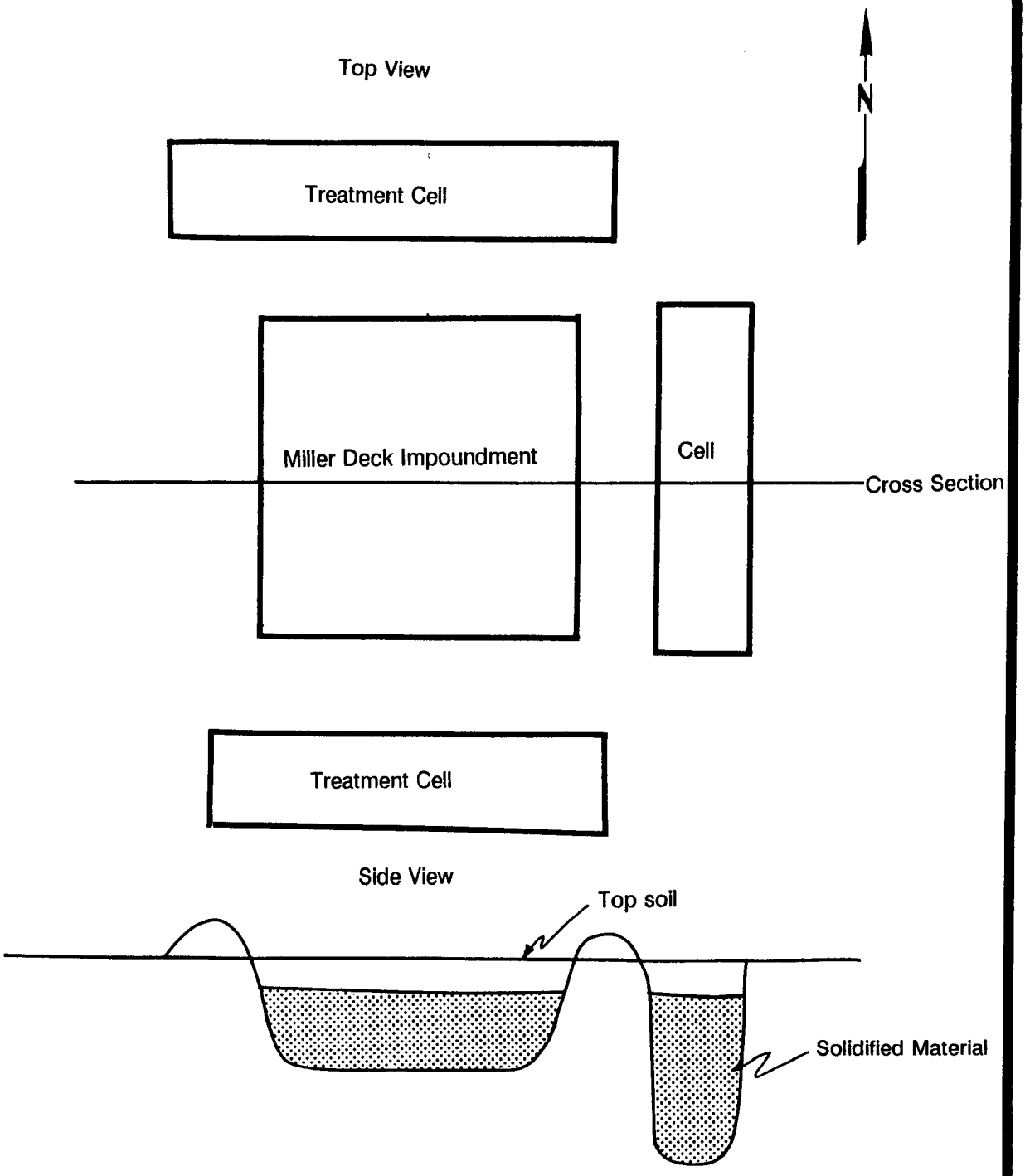
Ritter Environmental & Geotechnical Services

PHILLIPS PETROLEUM

SITE DIAGRAM

Crown Central Impoundment #5 (20-17-35)
Horizontal Scale 1" = 25' (No Vertical Scale)

November 1993



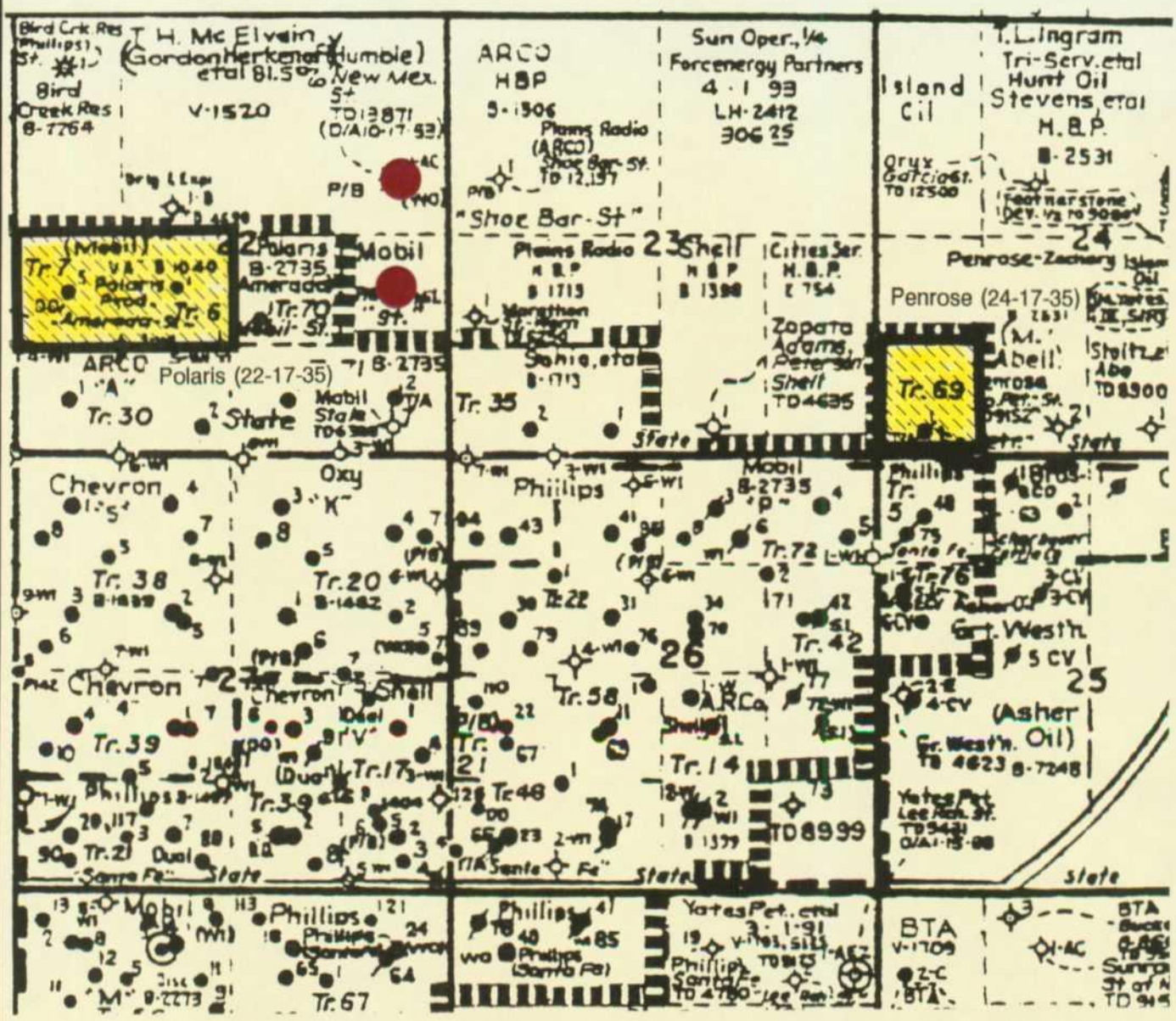
Ritter Environmental & Geotechnical Services

PHILLIPS PETROLEUM

SITE DIAGRAM

Miller Deck Impoundment #6 (20-17-35)
Horizontal Scale 1" = 25' (No Vertical Scale)

November 1993



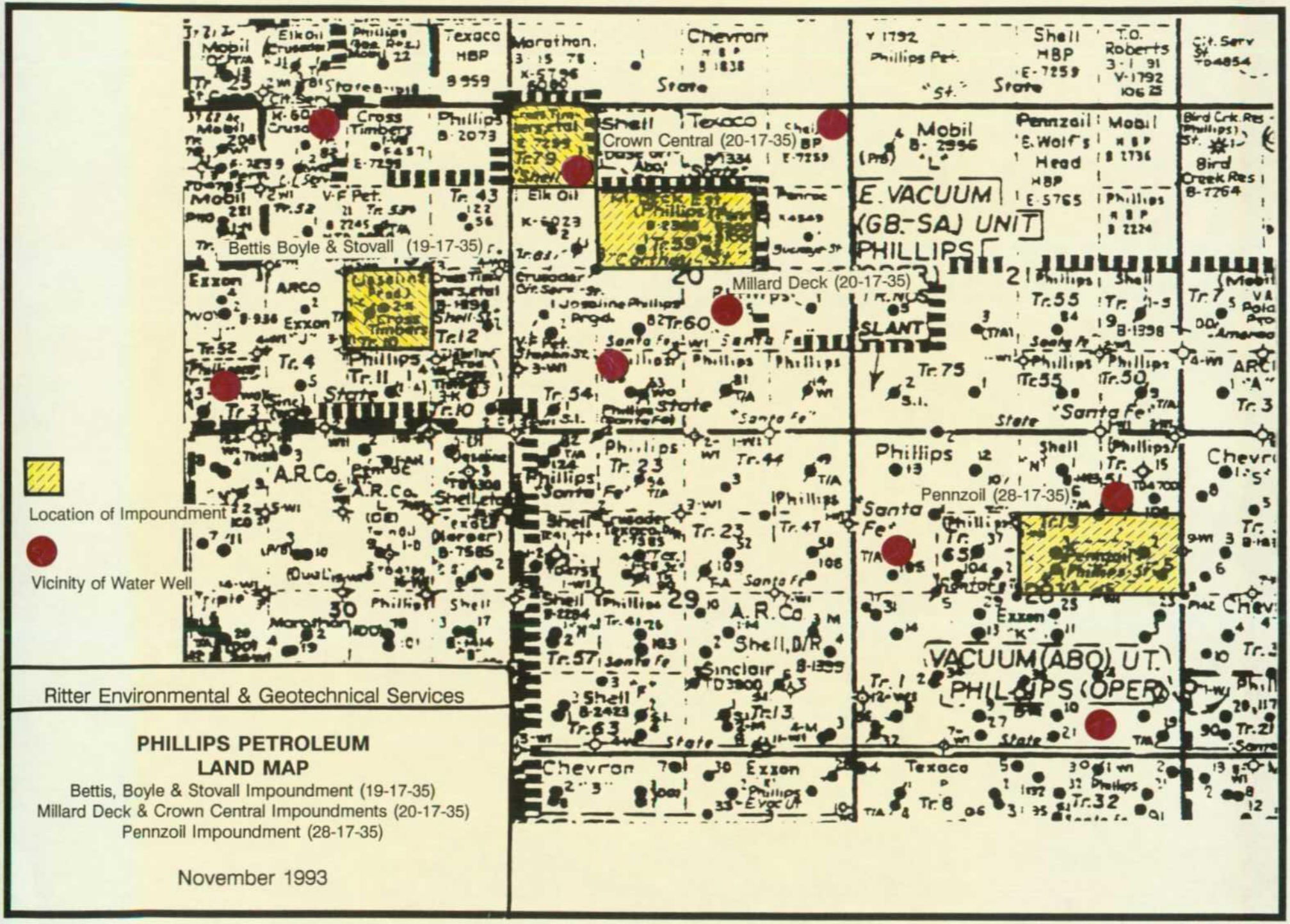
Ritter Environmental & Geotechnical Services

PHILLIPS PETROLEUM

LAND MAP

Polaris Impoundment (22-17-35)
Penrose Impoundment (24-17-35)

November 1993



Ritter Environmental & Geotechnical Services

PHILLIPS PETROLEUM
LAND MAP

Bettis, Boyle & Stovall Impoundment (19-17-35)
Millard Deck & Crown Central Impoundments (20-17-35)
Pennzoil Impoundment (28-17-35)

November 1993

SwL SOUTHWESTERN LABORATORIES

Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services
1703 West Industrial Avenue • P.O. Box 2150 • Midland, Texas 79702

Report of tests on	Soil	**File No.**	6750100
Client	Ritter Environmental & Geotechnical Services	**Report No.**	80622
Delivered by	Mitch Ritter	**Report Date**	05-13-93
		Date Received	March 1993

Identification Phillips Petroleum Co.

REPORT OF TOTAL PETROLEUM HYDROCARBONS

Date of Analysis	05-12-93	**Method**	SW846,3550;EPA 418.1
Analyst	S. Stovall	**MDL**	5.0 mg/kg

Sample Identification	Results, mg/kg
Pennzoil Pit	563000

*Denotes "less than"

Copies: Ritter Environmental & Geotechnical Services
Attn: Mitch Ritter

Reviewed by

SOUTHWESTERN LABORATORIES

SWL SOUTHWESTERN LABORATORIES

1703 West Industrial Avenue * P.O. Box 2150, Midland, Texas 79702 * 915/683-3349

Client REGS
119 N. Colorado Suite 201
Midland, Tx. 79701

Attn: Mitch Ritter

Client No. 6750100
Report No. M3-08-247
Report Date 09/16/93 12:30

Project Polaris - Amerada Pk.

Date Sampled 08/20/93

Sampled By Client

Sample Type Soil

Transported by Mitch Ritter

P.O. # _____

Date Received 08/30/93

Lab No.	Sample Identification
M3-08-247-01	# 1 - Polam - 01

SOUTHWESTERN LABORATORIES

ALLAN B. JOHNSTON

Reviewed By

TEST RESULTS BY SAMPLE

Sample: 01A # 1 - Polam - 01 Collected: 08/20/93 15:21

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
7 DAY TPH	EPA 418.1	0.73	mg/L	0.50	09/15/93	ABJ
TCLP TPH	EPA 418.1	22	mg/kg	5.0	09/11/93	LWD

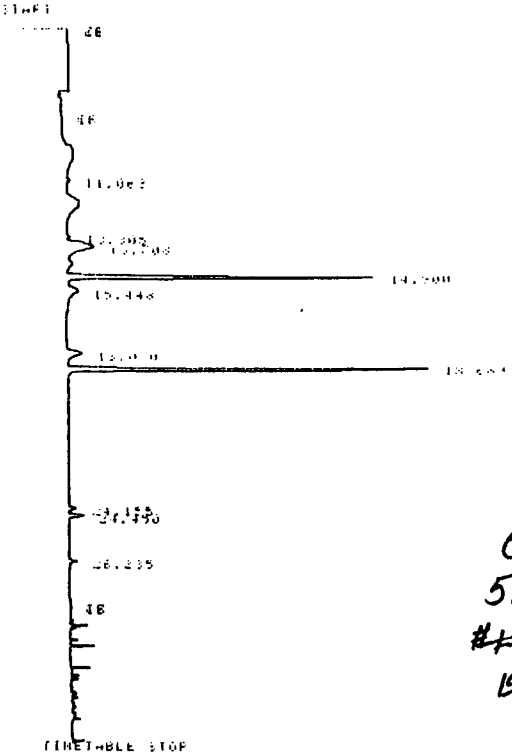
TEST RESULTS BY SAMPLE

Sample Description: # 1 - Polam - 01 Lab No: 01A
Test Description: TCLP BTEX Method: SW-846, 8020 Test Code: BTX_TC
Collected: 08/20/93 15:21

Date Started	09/11/93	Analyst	LWD
Detection Limit	0.004	Units	mg/L
Method	SW-846, 8020		

Compound	Results
BENZENE	0.017
TOLUENE	0.060
ETHYLBENZENE	< 0.004
XYLENE	< 0.004

RUN # [illegible] SEP 11 [illegible]
START



TIMETABLE STOP

Closing signal file [illegible].BNC
Storing processed peaks to [illegible].PKO

RUN# [illegible] SEP 11 [illegible]

SIGNAL FILE: [illegible].BNC
PEAK FILE : [illegible].PKO
AREA%

RT	AREA	TYPE	WIDTH	AREA%	
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[illegible]	[illegible]	PV	.102	.41933	
[illegible]	[illegible]	B	[illegible]	[illegible]	B
14.300	[illegible]	PB	[illegible]	[illegible]	S
[illegible]	[illegible]	PB	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	T
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	E-B
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	MP-X
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	O-X

08 24701
5mL TCLP Ext.
~~#1 Prose -05 01~~
~~19.01g: 380mls~~
#1-Polam-01
11.49g: 230mls

SWL SOUTHWESTERN LABORATORIES

1703 West Industrial Avenue * P.O. Box 2150, Midland, Texas 79702 * 915/683-3349

Client REGS
119 N. Colorado Suite 201
Midland, Tx. 79701

Attn: Mitch Ritter

Client No. 6750100
Report No. M3-08-246
Report Date 09/16/93 12:25

Project Phillips Vacuum Field

Date Sampled 08/23/93 08/30/93

Sampled By Client

Sample Type Soil

Transported by Mitch Ritter

P.O. #

Date Received 08/30/93

Lab No.	Sample Identification
M3-08-246-01	#1 Prose - 03
M3-08-246-02	# 1 Penn - 02
M3-08-246-03	# 1 BBS - 04
M3-08-246-04	# 1 - CC -05
M3-08-246-05	01-MILDEC-06

AMB
Reviewed By

SOUTHWESTERN LABORATORIES

ALLAN B. JOHNSTON

TEST RESULTS BY SAMPLE

Sample: 01A #1 Prose - 03 Collected: 08/23/93 16:06

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
7 DAY TPH	EPA 418.1	0.53	mg/L	0.50	09/15/93	ABJ
TCLP TPH	EPA 418.1	26	mg/kg	5.0	09/11/93	LWD

Sample: 02A # 1 Penn - 02 Collected: 08/23/93 13:51

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
7 DAY TPH	EPA 418.1	1.6	mg/L	0.50	09/15/93	ABJ
TCLP TPH	EPA 418.1	30	mg/kg	5.0	09/11/93	LWD

Sample: 03A # 1 BBS - 04 Collected: 08/26/93 15:45

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
7 DAY TPH	EPA 418.1	0.57	mg/L	0.50	09/15/93	ABJ
TCLP TPH	EPA 418.1	48	mg/kg	5.0	09/11/93	LWD

Sample: 04A # 1 - CC -05 Collected: 08/27/93 18:32

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
7 DAY TPH	EPA 418.1	1.0	mg/L	0.50	09/15/93	ABJ
TCLP TPH	EPA 418.1	46	mg/kg	5.0	09/11/93	LWD

Sample: 05A 01-MILDEC-06 Collected: 08/30/93 15:45

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
7 DAY TPH	EPA 418.1	0.63	mg/L	0.50	09/15/93	ABJ
TCLP TPH	EPA 418.1	30	mg/kg	5.0	09/11/93	LWD

TEST RESULTS BY SAMPLE

Sample Description: #1 Prose - 03
Test Description: TCLP BTEX
Collected: 08/23/93 16:06

Lab No: 01A
Method: SW-846, 8020 Test Code: BTX_TC

Date Started	09/11/93	Analyst	LWD
Detection Limit	0.004	Units	mg/L
Method	SW-846, 8020		

Compound	Results
BENZENE	0.004
TOLUENE	0.034
ETHYLBENZENE	0.054
XYLENE	0.091

TEST RESULTS BY SAMPLE

Sample Description: # 1 Penn - 02 Lab No: 02A
Test Description: TCLP BTEX Method: SW-846, 8020 Test Code: BTX_TC
Collected: 08/23/93 13:51

Date Started	09/11/93	Analyst	LWD
Detection Limit	0.004	Units	mg/L
Method	SW-846, 8020		

Compound	Results
BENZENE	0.012
TOLUENE	0.027
ETHYLBENZENE	0.014
XYLENE	0.035

TEST RESULTS BY SAMPLE

Sample Description: # 1 BBS - 04
Test Description: TCLP BTEX
Collected: 08/26/93 15:45

Lab No: 03A
Method: SW-846, 8020 Test Code: BTX_TC

Date Started	09/11/93	Analyst	LWD
Detection Limit	0.004	Units	mg/L
Method	SW-846, 8020		

Compound	Results
BENZENE	< 0.004
TOLUENE	0.035
ETHYLBENZENE	< 0.004
XYLENE	0.004

TEST RESULTS BY SAMPLE

Sample Description: # 1 - CC -05
Test Description: TCLP BTEX
Collected: 08/27/93 18:32

Lab No: 04A
Method: SW-846, 8020 Test Code: BTX_TC

Date Started	09/11/93	Analyst	LWD
Detection Limit	0.004	Units	mg/L
Method	SW-846, 8020		

Compound	Results
BENZENE	0.010
TOLUENE	0.034
ETHYLBENZENE	0.022
XYLENE	0.041

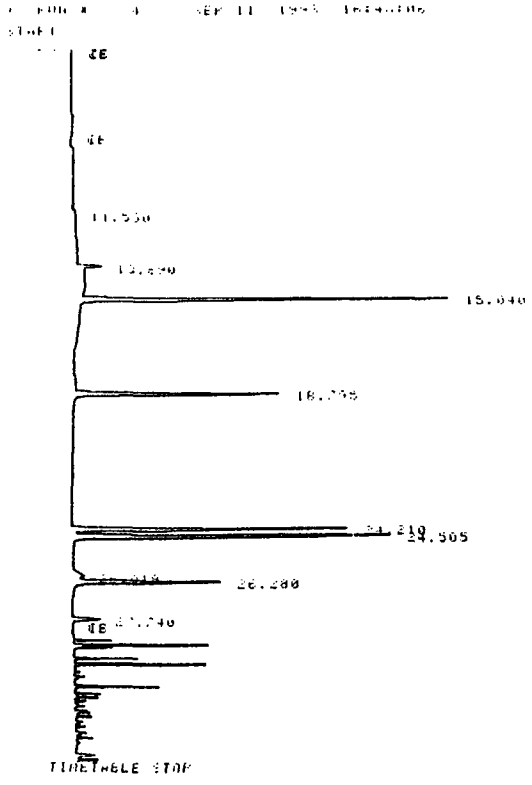
TEST RESULTS BY SAMPLE

Sample Description: 01-MILDEC-06
Test Description: TCLP BTEX
Collected: 08/30/93 15:45

Lab No: 05A
Method: SW-846, 8020 Test Code: BTX_TC

Date Started	09/11/93	Analyst	LWD
Detection Limit	0.004	Units	mg/L
Method	SW-846, 8020		

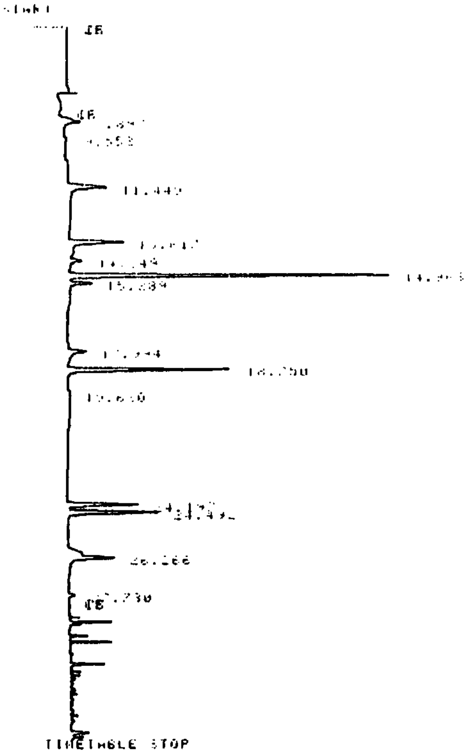
Compound	Results
BENZENE	< 0.004
TOLUENE	0.046
ETHYLBENZENE	< 0.004
XYLENE	0.018



0824601
5m/s TCLP Ext.
~~18.6%: 373m/s~~
19.0%: 380m/s
~~#1 Penn 02~~
#1 Prose -03

B
3
T
E-B
M/P-X
O-X

RUN # 5 SEP 11, 1992 17:41:11
START



TIMETABLE STOP

Closing signal file H:07146588.BNC
Storing processed peaks to H:07146588.PRO

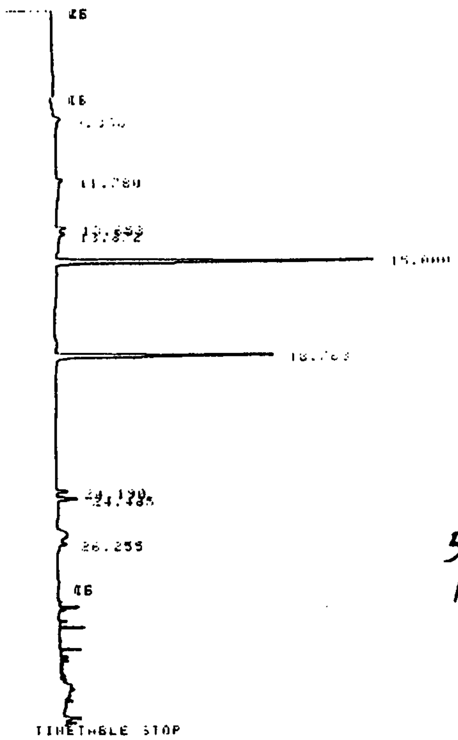
RUN# 5 SEP 11, 1992 17:41:11

SIGNAL FILE: H:07146588.BNC
PEAK FILE : H:07146588.PRO
AREA%

RT	AREA	TYPE	WIDTH	AREA%
3.947	663784	BB	.205	[illegible]
4.553	75016	PB	.116	.45136
11.449	274638	PB	.145	[illegible]
13.617	1047042	PB	.134	[illegible] B
14.149	250871	PB	.121	[illegible]
14.963	[illegible]	BB	.105	[illegible] S
15.289	32457	BB	.106	[illegible]
17.994	519771	BP	.174	3.12498
18.250	2752610	PB	.102	16.5620 T
19.620	61405	PB	.131	.36947
[illegible]	[illegible]	[illegible]	.104	[illegible] E-B
[illegible]	[illegible]	[illegible]	.110	[illegible] M,P-X
[illegible]	[illegible]	[illegible]	[illegible]	[illegible] O-X
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

0824602
5 mls TCLP Ext.
18.64 g : 373 mls

RUN # 6 SEP 11, 199[illegible] 18:39:14
START



0824603
5mls TCLP Ext.
18.71g : 374mls
#1 BBS-04

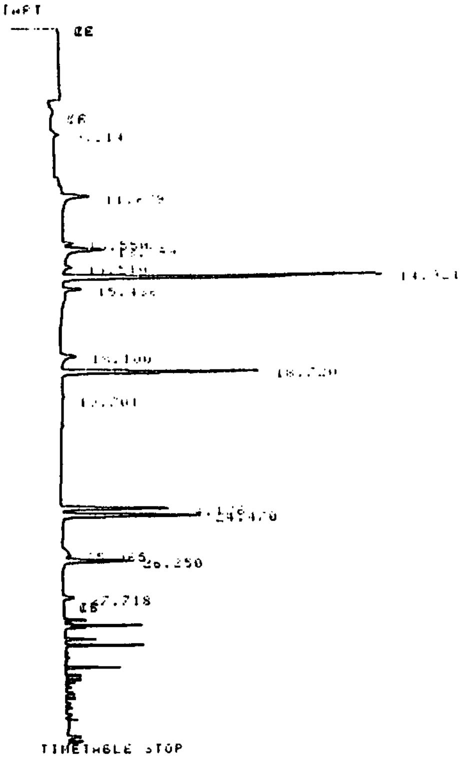
Closing signal file H:07147354.BNC
Storing processed peaks to H:07147354.PRO

RUN# 6 SEP 11, 1995 18:39:14

SIGNAL FILE: H:07147354.BNC
PEAK FILE : H:07147354.PRO
AREA%

RT	AREA	TYPE	WIDTH	AREA%
[illegible]	170846	[illegible]	[illegible]	1.65127
11.780	[illegible]26455	PB	.201	[illegible]11508 B
13.655	209388	BV	.311	1.95[illegible]
13.872	392471	VV	[illegible]	[illegible]
15.000	5466349	PB	[illegible]	51.05545 S
[illegible]	562058	BB	.034	[illegible]456[illegible] T
24.190	154266	[illegible]	[illegible]	1.[illegible]1446 E-B
[illegible]	[illegible]	PB	[illegible]	[illegible] MP-X
[illegible]	[illegible]	[illegible]	[illegible]	[illegible] OI-X

* RUN # 7 SEP 11, 1993 19:34:54
START



TIMETABLE STOP

Closing signal file H107148060.BNC
Storing processed peaks to H107148060.PRO

RUN# 7 SEP 11, 1993 19:34:54

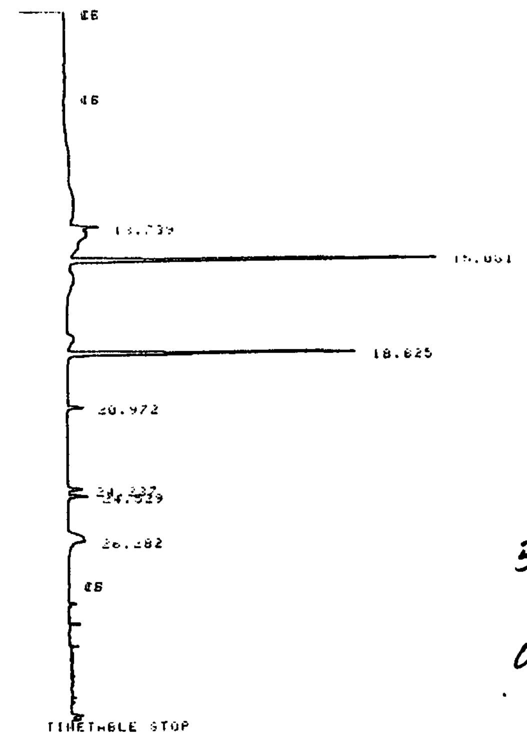
SIGNAL FILE: H107148060.BNC
PEAK FILE : H107148060.PRO
AREA%

RT	AREA	TYPE	WIDTH	AREA%
9.214	159486	PB	.158	.86945
11.679	751407	PB	.161	4.09628
13.550	184435	PV	.105	1.00544
13.799	967137	VB	.151	5.27364 B
14.510	145289	BP	.115	.79114
14.921	5520541	PB	.104	30.09511 S
15.456	[illegible]	VB	.110	1.84003
18.100	[illegible]	BV	.189	2.58233
18.720	[illegible]	VB	.103	[illegible] T
19.701	71112	BB	.154	.38767
24.176	[illegible]	PV	.104	10.21401 E-B
24.470	[illegible]	VB	.110	14.05620 m,p-X
[illegible]	[illegible]	PV	[illegible]	[illegible]
[illegible]	[illegible]	B	[illegible]	[illegible] o-X
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

0824604
5 mls TCLP Ext.
14.24g : 285 mls
#1-CC-05

RUN # 5 SEP 11, 1993 20:26:21

START



0824605
5mb TCLP Ext,
19.2l/g: 384 mls
01-Mildoc-06

Closing signal file HIO714BC6E.BNC
Storing processed peaks to HIO714BC6E.PRO

RUN# 5 SEP 11, 1993 20:26:21

SIGNAL FILE: HIO714BC6E.BNC
PEAK FILE : HIO714BC6E.PRO
AREA%

RT	AREA	TYPE	WIDTH	AREA%	
13.7[illegible]	261696	PB	.077	1.99183	B
15.021	6165178	BB	.102	47.07675	S
1[illegible].625	6557677	PB	.098	[illegible]5.45061	T
20.972	46149	BB	.098	[illegible].02572	E-B
24.227	134828	BV	.103	1.32538	M,P-X
24.529	56520	VB	.108	[illegible]	
[illegible]	[illegible]	PB	[illegible]	[illegible]	O-X

CHAIN OF CUSTODY

PAGE 1 OF 1

RITTER ENVIRONMENTAL & GEOTECHNICAL SERVICES
119 N. Colorado, Suite 201, Midland, Texas 79701
Bus: (915) 682-7404 • Metro: (915) 570-6007 • Fax: (915) 682-7440

REPORT TO	INVOICE TO
COMPANY: REGS	COMPANY: REGS
ADDRESS: 119 N Colorado Suite 201	ADDRESS:
CITY/STATE/ZIP: Midland TX 79701	CITY/STATE/ZIP:
ATTENTION: PHONE #:	ATTENTION: PHONE #:
REMARKS:	TURN AROUND TIME
	☑NORMAL ☐RUSH ☐OTHER

PROJECT/SITE NAME: Phillips Vacuum Field

DATE	TIME	COMP.	GRAB	SAMPLE #	SAMPLE DESCRIPTION	MATRIX	# CONT	REQUESTED ANALYSIS: TCLP TPH	TCLP BTEX	TDS4 Langelier TPH				REMARKS
8/30/93	15:45		✓	01-MLDEC-06	Solidified Pit-MillerDeck	Solid	1							

RELINQUISHED BY: (SIGN)	DATE/TIME:	RECEIVED BY:	DATE/TIME:	SAMPLE CONDITION:	DATE/TIME:
Mitch Ross	9/1/93 11:30	J.H. Burton	9/1/93 11:30		

CHAIN OF CUSTODY

PAGE 1 OF 1

RITTER ENVIRONMENTAL & GEOTECHNICAL SERVICES
119 N. Colorado, Suite 201, Midland, Texas 79701
Bus: (915) 682-7404 • Metro: (915) 570-6007 • Fax: (915) 682-7440

REPORT TO	INVOICE TO
COMPANY: REGS	COMPANY: REGS
ADDRESS: 119 N Colorado St 201	ADDRESS:
CITY/STATE/ZIP: Midland TX 79701	CITY/STATE/ZIP:
ATTENTION: MRR PHONE #: 682-7404	ATTENTION: PHONE #:

PROJECT/SITE NAME:	REMARKS:	TURN AROUND TIME
Phillips - Vacuum Field		☑NORMAL ☐RUSH ☐OTHER

DATE	TIME	COMP.	GRAB	SAMPLE #	SAMPLE DESCRIPTION	MATRIX	# CONT	REQUESTED ANALYSIS: TCLP TPH	TCLP BTEX	7 Day Leachate				REMARKS
8/23	16.06		✓	#1-Prose-03	Solidified Pit Penrose	Solid	2	✓	✓	✓				
8/23	13:51		✓	#1 Penn-02	Solidified Pit - Penzoil	Solid	2	✓	✓					
8/26	15:45		✓	#1-BBS-04	Solidified Pit - Bettis Boyle Stovall	Solid	2	✓	✓	✓				
8/27	16:32		✓	#1-CC-05	Solidified Pit-Crown Central	Solid	2	✓	✓	✓				

RELINQUISHED BY: (SIGN)	DATE/TIME:	RECEIVED BY:	DATE/TIME:	SAMPLE CONDITION:	DATE/TIME:
Michael Ritter	8/28/93 12:00 pm		8/28/93 12:00 pm	Good	8/28/93 12:00 pm
	8/30/93 2:20 pm		8/30/93 2:20 pm	Good	8/30/93 2:20

CHAIN OF CUSTODY

PAGE 1 OF 1

RITTER ENVIRONMENTAL & GEOTECHNICAL SERVICES
119 N. Colorado, Suite 201, Midland, Texas 79701
Bus: (915) 682-7404 • Metro: (915) 570-6007 • Fax: (915) 682-7440

REPORT TO	INVOICE TO
COMPANY: REGS	COMPANY:
ADDRESS:	ADDRESS:
CITY/STATE/ZIP:	CITY/STATE/ZIP:
ATTENTION: PHONE #:	ATTENTION: PHONE #:
PROJECT/SITE NAME:	REMARKS:
Phillips Vacuum Field	
Polaris-Amerada Pit	

TURN AROUND TIME
☐NORMAL ☐RUSH ☐OTHER

DATE	TIME	COMP.	GRAB	SAMPLE #	SAMPLE DESCRIPTION	MATRIX	# CONT	REQUESTED ANALYSIS: TCLP TPH	TCLP BTEX	7 DAY LEACHATE				REMARKS
8/20	3:21p		✓	#1-POLAM-01	Solidified Pit Sludge	Solid	2	✓	✓	✓				

RELINQUISHED BY: (SIGN)	DATE/TIME:	RECEIVED BY:	DATE/TIME:	SAMPLE CONDITION:	DATE/TIME:
M. Ritter	11:01 8/21		11:0Am 8/21	Good	8/21/93 11:01Am
Debra Knight	8/30/93 2:20p		8/30/93 2 PM	Good	8/30/93 2:20Pm

RITTER ENVIRONMENTAL & GEOTECHNICAL SERVICES
119 N. Colorado, Suite 201, Midland, Texas 79701
Bus: (915) 682-7404 • Metro: (915) 570-6007 • Fax: (915) 682-7440

May 13, 1993

Mr. Jerry Sexton
District Manager
New Mexico Oil Conservation Division
P.O. Box 1980
Hobbs, New Mexico 88240

Re: Surface Impoundment Closure - Phillips Petroleum Company/Vacuum Field Lea County, New Mexico

Dear Mr. Sexton:

Pursuant to our telephone conversation the other day, I am writing in reference to your request for a proposal from Ritter Environmental & Geotechnical Services (REGS) to provide our services in connection with the proposed remedial activities on six unlined earthen pits in the Vacuum Field of Lea County, New Mexico.

As these pits are being decommissioned by the operator, Phillips Petroleum Company, it is their desire to adhere to the currently established guidelines for pit (surface impoundment) closure as published by the NMOCD in February 1993 and to address the closure of these pits in a safe and cost effective manner. As an alternative to transporting and landfilling of these wastes (where in only a transfer of the problem occurs) and to long term bioremedial activities that would involve many months and possibly years to accomplish the current remedial guidelines as set forth by the NMOCD, we (REGS) through currently developed solidification techniques propose to treat the waste materials on site by stabilization of the waste through solidification.

We are currently utilizing combinations or separate application of portland cement, kiln dust and or fly ash to bind the wastes into a hardened monolithic block of concrete type material. Solidification refers to treatment systems which are designed to improve the handling and physical characteristics of such wastes, to decrease the surface area across which the transfer or loss of the waste characteristics can occur and to limit the solubility of those waste characteristics. This treatment effectively limits the leachate process and prevents the materials from entering the subsurface soils and groundwater. Stabilization techniques, such as solidification, have benefits primarily in limiting the solubility of the waste or by detoxifying the waste contaminants, even though the physical characteristics of the waste may or may not appear to be changed. It is intended that the following

procedures will be followed in the performance of our services:

I. **Preliminary Site Evaluation** - Includes a visual inspection (and sampling) of each pit and the surrounding area to determine site specific conditions such as; nearby surface waters, streams, surface soil types and depths, proximity to groundwater supply wells, physical and chemical properties of the contents of each pit and the treatability of those contents.

II. **Treatment/Solidification** - After careful preparation of the site for safe operations the solidification process begins. Solidification begins with the physical addition of the appropriate product(s) in the correct proportions to the type of waste involved. Mechanical mixing methods are utilized to thoroughly blend the waste material and the appropriate solidifying agent(s) with correct proportions of water. At this time, a curing process is allowed to take place for a period of approximately 48 hours. Post treatment core samples will be taken from each pit to determine TCLP parameters for volatile organic compounds (VOC's) such as Benzene and Total BTEX.

III. **Site Reclamation** - After treatment, the site will be reclaimed by placing native soils over the treated area and recontouring the site back to the original grade (if possible).

I have included analytical results of two separate series of bench tests we have performed on actual pit material from the Vacuum field. These tests have generated very pleasing results, wherein we have solidified pit sludge and performed TCLP, BTEX, and TPH analyses on the solidified samples. As you can see, in each case the solidified material renders the levels of BTEX and TPH leachability to acceptable levels in accordance with the NMOCD guidelines.

The first series of analyses dated 4-19-93, report no. 80622 from Southwestern Laboratories revealed very low BTEX levels of treated materials ranging from non-detectable Ethylbenzene and Xylenes to a TPH of 111 to 782 mg/kg. This bench test was run on pit sludge from the Vacuum field samples

A second series of analyses was run and dated 5-3-93. The series labeled B-1 through B-5 are the Buckeye area pit samples from the Vacuum field. Here again the analytical results of the treated pit sludge are within current NMOCD guidelines.

In reference to analytical tests currently run we would like to suggest to the NMOCD an

alternative to testing the pit material after treatment. We have determined through past experience with the solidification process that the TCLP procedure and methodology currently being used for identification of elevated levels of toxic compounds may not be the most appropriate methods for the analysis of actual site conditions post treatment.

We would suggest the adoption of a seven (7) day leachate test in lieu of the TCLP analysis. The seven (7) day leachate test is a non-violent test in which actual sub surface conditions are simulated by submersing the sample to be tested in deionized water for a period of seven (7) days prior to analyses of the water. This test simulates actual saturated groundwater conditions at the site and relates to leachability as opposed to the violent tumbling action the samples are subjected to in the TCLP methodology. Also, approximately the 20 to 1 dilution factor utilized in the TCLP methodology is not utilized in the seven (7) day leachate method.

We have obtained the following results utilizing the seven (7) day leachate test on the same samples previously run for TCLP:

SAMPLE #	TPH mg/l	BENZENE mg/l	ETHLYBENZENE mg/l	TOLUENE mg/l	XYLENE mg/l
B2-2	7.1	.006	.022	.008	.015
B-3	4.0	<.004	<.004	<.004	<.006
B-4	2.8	<.004	.011	<.004	.008

The methodology for the seven (7) day leachate test is as follows and is a part of the accepted methodology utilized by the Texas Water Commission (TWC) for landfill evaluations:

7-Day Distilled Water Leachate Test

This test is intended only for dry, solid wastes, i.e., waste materials without any free liquids.

1. Place a 250 gm. (dry weight) representative sample of the waste material in a 1500 ml. Erlenmeyer flask.
2. Add 1 liter of deionized or distilled water into the flask and mechanically stir the material at a low speed for five (5) minutes.
3. Stopper the flask and allow to stand for seven (7) days.

4. At the end of the seven (7) days, filter the supernatant solution through a .45 micron filter, collecting the supernatant into a separate flask.
5. subject the filtered leachate to the appropriate analysis.

Although we feel the above methodology is more appropriate, we will provide TCLP analyses should the above methodology not be approved.

I have included photographs of pit solidification performed in Southeast Montana, northeast of Wyoming and southwest of Wyoming. These pits were solidified with appropriate state agency approval.

We have also included copies of two excerpts from the Superfund Innovative Technology Evaluation program (SITE) funded and directed by the EPA to evaluate new technologies. These excerpts, although not identical to our process, are similar and provide some insight into the feasibility of our work.

We are hereby requesting your approval to apply and utilize the above described technology in the treatment of the surface impoundments referenced at the beginning of this correspondence. Your response should be directed to me at the letterhead address.

Thank you for taking the time to review this proposal. Your comments and assistance will be greatly appreciated.

Sincerely,

Mitchell Ritter

MRR/bk
cc: Mr. Bill Olson/NMOCD - Santa Fe, New Mexico

RITTER ENVIRONMENTAL & GEOTECHNICAL SERVICES
119 N. Colorado, Suite 201, Midland, Texas 79701
Bus: (915) 682-7404 • Metro: (915) 570-6007 • Fax: (915) 682-7440

May 13, 1993

Mr. Jerry Sexton
District Supervisor
New Mexico Oil Conservation Division
P.O. Box 1980
Hobbs, New Mexico 88240

Re: Phillips Petroleum Company, Vacuum Field, Surface Impoundment Closure

Dear Mr. Sexton:

On May 12, 1993 you were sent correspondence and enclosures concerning surface impoundment closures in the Vacuum and Cabin Lake fields of Lea and Eddy counties, respectively. It has come to my attention that the proposed pit closure in Eddy County is under the jurisdiction of the Artesia offices of the NMOCD and not your district. Therefore, I would like to apologize for the inclusion of the Eddy County pit closure request in your correspondence.

We have rewritten and redirected our proposal to the Artesia NMOCD office for their approval of the pit closure in Eddy County. Enclosed please find an amended and corrected proposal concerning six Vacuum Field pits. You will note the change from four to six pits as we have identified two additional pits we wish to close in the Buckeye area.

I apologize for any confusion. If you have any questions or comments, please contact me at your earliest convenience at (915) 682-7404.

Sincerely,

Mitchell Ritter

MRR/amc
Enclosures

RITTER ENVIRONMENTAL & GEOTECHNICAL SERVICES
119 N. Colorado, Suite 201, Midland, Texas 79701
Bus: (915) 682-7404 • Metro: (915) 570-6007 • Fax: (915) 682-7440

August 13, 1993

Mr. Jerry Sexton
District Manger
New Mexico Oil Conservation Division
P.O. Box 1980
Hobbs, New Mexico 88240

Re: Surface Impoundment Closure - Phillips Petroleum Company - Vacuum Field, Lea County, New Mexico

Dear Mr. Sexton:

Please be advised Ritter Environmental & Geotechnical Services will began solidification operations on approximately seven pits in the Vacuum Field on August 18, 1993. If you would like to observe this process, please contact our office at 915/570-6007.

Should you have any questions, please do not hesitate to contact us.

Sincerely,

Betsy Kerley

BK/s

Form WR-23 SANTA FE STATE ENGINEER OFFICE

WELL RECORD

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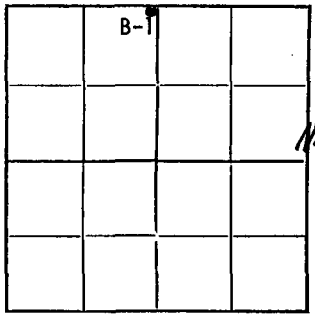
Section 1



(Plat of 640 acres)

(A) Owner of well Kermac Potash Co.
Street and Number P.O. Box 610
City Hobbs State New Mexico
Well was drilled under Permit No. L-5850 and is located in the NE NE ¼ NE ¼ NW ¼ of Section 19 Twp. 17S Rge. 35E
(B) Drilling Contractor Abbott Bros. License No. WD-46
Street and Number P.O. Box 637
City Hobbs State New Mexico
Drilling was commenced Feb. 9 19 66
Drilling was completed Feb. 9 19 66

Elevation at top of casing in feet above sea level ____ Total depth of well 240 feet
State whether well is shallow or artesian shallow Depth to water upon completion hole caved

Section 2 PRINCIPAL WATER-BEARING STRATA

No.	Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation
1	100	235	135	Alternating beds of fine grained sand, silt and gravel
2				
3				
4				
5				

Section 3 RECORD OF CASING

Dia in.	Pounds ft.	Threads in	Depth Top	Depth Bottom	Feet	Type Shoe	Perforations From	Perforations To

Section 4 RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Diameter Hole in in.	Tons Clay	No. Sacks of Cement	Methods Used
0	5	4-1/4		1	

1966 FEB 28 AM 9:36
STATE ENGINEER OFFICE
SANTA FE, N. M.

Section 5 PLUGGING RECORD

Name of Plugging Contractor ____ License No. ____
Street and Number ____ City ____ State ____
Tons of Clay used ____ Tons of Roughage used ____ Type of roughage ____
Plugging method used ____ Date Plugged ____ 19 ____
Plugging approved by:

Basin Supervisor

Cement Plugs were placed as follows:

No.	Depth of Plug From	Depth of Plug To	No. of Sacks Used
1	0	5	1

FOR USE OF STATE ENGINEER ONLY

Date Received ____

STATE ENGINEER OFFICE ✓
1966 FEB 23 AM 8:41

File No. L-5850 Use Expl. Location No. 17.35.19.1222

Section 6

LOG OF WELL

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color	Type of Material Encountered
0	0.5	0.5	dark brown	alluvium
0.5	15	14.5	lt brn	caliche
15	75	60	lt brn	fine grained, poorly cemented sand
75	77	2	white	dense lens with chest stringers
77	80	3	lt brn	fine grained, poorly cemented sand
80	90	10	lt brn	fine grained unconsolidated sand
90	130	40	lt brn	fine grained poorly cemented sand
130	140	10	lt brn	fine grained unconsolidated sand
140	195	55	lt brn	fine to med. poorly cemented sand
195	210	15	red	arenaceous siltstone
210	235	25	variegated	quartz gravel
235	240	5	red	stilstone top Santa Rosa

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well.

A. E. Simpson
Well Driller

Form WR-23 STATE ENGINEER OFFICE

SANTA FE

WELL RECORD

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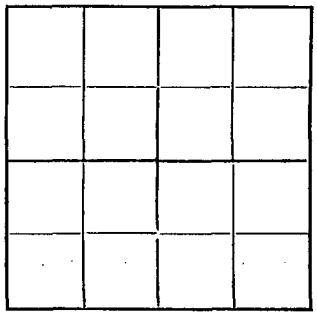
Section 1



(Plat of 640 acres)

(A) Owner of well Phillips Petroleum Company
Street and Number Box 448
City Buckeye, State New Mexico
Well was drilled under Permit No. L-4829A and is located in the
¼ SW ¼ SW ¼ of Section 19 Twp. 17S Rge. 25E
(B) Drilling Contractor O. R. Musslewhite License No. WD99
Street and Number Box 56
City Hobbs, State New Mexico
Drilling was commenced March 25, 19 68
Drilling was completed March 30, 19 68

Elevation at top of casing in feet above sea level Unknown Total depth of well 210
State whether well is shallow or artesian Shallow Depth to water upon completion 70

Section 2 PRINCIPAL WATER-BEARING STRATA

No.	Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation
1	170	205	35	Sand, fine, unconsolidated
2				
3				
4				
5				

Section 3 RECORD OF CASING

Dia in.	Pounds ft.	Threads in	Depth Top	Depth Bottom	Feet	Type Shoe	Perforations From	Perforations To
10 3/4	36	none	0	210	210	none	112	210

Section 4 RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Diameter Hole in in.	Tons Clay	No. Sacks of Cement	Methods Used

Section 5 PLUGGING RECORD

Name of Plugging Contractor License No.
Street and Number City State
Tons of Clay used Tons of Roughage used Type of roughage
Plugging method used Date Plugged 19
Plugging approved by:

Basin Supervisor

Cement Plugs were placed as follows:

No.	Depth of Plug From	Depth of Plug To	No. of Sacks Used

FOR USE OF STATE ENGINEER ONLY

Date Received

File No. L-4829-A Use PPP Location No.

L-2943

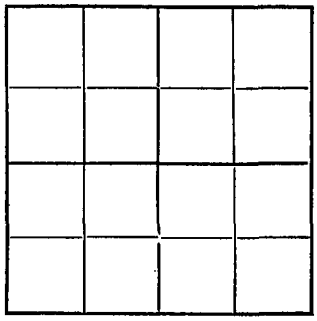
Form WR-23

STATE ENGINEER OFFICE

WELL RECORD

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the nearest district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1A and Section 5 need be completed.

Section 1



(Plat of 640 acres)

(A) Owner of well Cities Service Oil Co. 2943

Street and Number % Bob Webster, 100 Temple Drive

City Hobbs State New Mexico

Well was drilled under Permit No. L-2943 and is located in the

SE ¼ NW ¼ NW ¼ of Section 20 Twp. 17 S Rge. 35 E

(B) Drilling Contractor Ed. B. Burke License No. 111

Street and Number Box 306

City Hobbs State New Mex.

Drilling was commenced July 26 19 55

Drilling was completed July 27 19 55

Elevation at top of casing in feet above sea level ____ Total depth of well 110

State whether well is shallow or artesian Shallow Depth to water upon completion 60

Section 2 PRINCIPAL WATER-BEARING STRATA

No.	Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation
1	60	110	50	Water Sand
2				
3				
4				
5				

Section 3 RECORD OF CASING

Dia in.	Pounds ft.	Threads in	Depth Top	Depth Bottom	Feet	Type Shoe	Perforations From	Perforations To
6 5/8	19	8	0	104	104	none	74	104

Section 4 RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Diameter Hole in in.	Tons Clay	No. Sacks of Cement	Methods Used

RECEIVED AUG 15 1955 OIL CONSERVATION COMM. HOBBS, N. M.

Section 5 PLUGGING RECORD

Name of Plugging Contractor ____ License No. ____

Street and Number ____ City ____ State ____

Tons of Clay used ____ Tons of Roughage used ____ Type of roughage ____

Plugging method used ____ Date Plugged ____ 19 ____

Plugging approved by:

Cement Plugs were placed as follows:

No.	Depth of Plug From	Depth of Plug To	No. of Sacks Used

Basin Supervisor

FOR USE OF STATE ENGINEER ONLY

Date Received AUG 4 1955

OFFICE GROUND WATER SUPERVISOR ROSWELL, NEW MEXICO

File No. L-2943 Use Oil Location No. 17.35.20.114

Section 6

LOG OF WELL

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color	Type of Material Encountered
0	2	2		Soil
2	19	17		Caliche
19	51	32		Tight Sand
51	60	9		Dry Sand
60	110	50		Water Sand

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well.

Edward B Burk

Well Driller

SANTA FE

Form WR-23 STATE ENGINEER OFFICE

WELL RECORD

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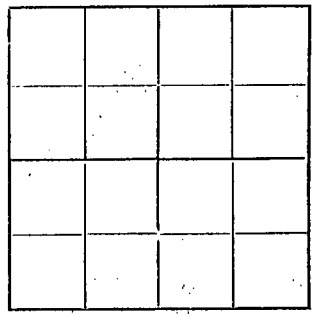
Section 1



(Plat of 640 acres)

(A) Owner of well Marcum Drilling Company

Street and Number Box 5094

City Midland, Texas State

Well was drilled under Permit No. L-6940(E) and is located in the NW ¼ SE ¼ SW ¼ of Section 20 Twp. 17 Rge. 35

(B) Drilling Contractor Abbott Bros. License No. WD-46

Street and Number Box 637

City Hobbs, N.M. State

Drilling was commenced April 28, 1972 19

Drilling was completed April 29, 1972 19

Elevation at top of casing in feet above sea level Total depth of well 135

State whether well is shallow or artesian shallow Depth to water upon completion 85

Section 2 PRINCIPAL WATER-BEARING STRATA

No.	Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation
1	85	135	50	sand water
2				
3				
4				
5				

Section 3 RECORD OF CASING

Dia in.	Pounds ft.	Threads in	Depth Top	Depth Bottom	Feet	Type Shoe	Perforations From	Perforations To
7	23	10	1	126	126	none	70	126

Section 4 RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Diameter Hole in in.	Tons Clay	No. Sacks of Cement	Methods Used

Section 5 PLUGGING RECORD

Name of Plugging Contractor License No.

Street and Number City State

Tons of Clay used Tons of Roughage used Type of roughage

Plugging method used Date Plugged 19

Plugging approved by:

Basin Supervisor

Cement Plugs were placed as follows:

No.	Depth of Plug From	Depth of Plug To	No. of Sacks Used

FOR USE OF STATE ENGINEER ONLY

Date Received 1972 MAY -3 AM 8:26 ✓

STATE ENGINEER OFFICE

File No. L-6940 Use OWD Location No. 17.35.20.341

1972 MAY 10 AM 11 22

Section 6

LOG OF WELL

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color	Type of Material Encountered
0	1	1	brown	surface soil
1	22	21	gray	caliche
22	85	63	brown	sand (tight)
85	135	50	brown	sand water

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well.

Darrell Abbott
Well Driller

Form WR-23 STATE ENGINEER OFFICE SANTA FE

WELL RECORD

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Section 1

(Plat of 640 acres)

(A) Owner of well Marcum Drilling Company
Street and Number Box 5094
City Midland, Texas State
Well was drilled under Permit No. L-7024(E) and is located in the NE ¼ NE ¼ NE ¼ of Section 20 Twp. 17 Rge. 35
(B) Drilling Contractor Abbott Bros. License No. WD-46
Street and Number Box 637
City Hobbs, N.M. State
Drilling was commenced Nov. 20, 1972 19
Drilling was completed Nov. 21, 1972 19

Elevation at top of casing in feet above sea level Total depth of well 130
State whether well is shallow or artesian shallow Depth to water upon completion 80

Section 2 PRINCIPAL WATER-BEARING STRATA

No.	Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation
1	80	130	50	water sand
2				
3				
4				
5				

1972 DEC 18 PM 2:31 STATE ENGINEER OFFICE

Section 3 RECORD OF CASING

Dia in.	Pounds ft.	Threads in	Depth Top	Depth Bottom	Feet	Type Shoe	Perforations From	Perforations To
7	23	10	1	130	130	none	80	130

Section 4 RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Diameter Hole in in.	Tons Clay	No. Sacks of Cement	Methods Used

Section 5 PLUGGING RECORD

Name of Plugging Contractor License No.
Street and Number City State
Tons of Clay used Tons of Roughage used Type of roughage
Plugging method used Date Plugged 19
Plugging approved by:

Basin Supervisor

Cement Plugs were placed as follows:

No.	Depth of Plug From	Depth of Plug To	No. of Sacks Used

FOR USE OF STATE ENGINEER ONLY

STATE ENGINEER OFFICE
1972 DEC 11 AM 8:42

Date Received ✓

File No. L-7024 Use OWD Location No. 17.35.20.222

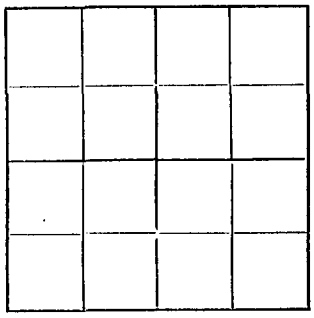
Form WR-23 STATE ENGINEER OFFICE

SANTA FE

WELL RECORD

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the nearest district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1A and Section 5 need be completed.

Section 1



(Plat of 640 acres)

(A) Owner of well Phillips Petroleum Company
Street and Number Box 477
City Buckeye, State New Mexico
Well was drilled under Permit No. L-4829 and is located in the
¼ NW ¼ SE ¼ of Section 20 Twp. 17S Rge. 35E
(B) Drilling Contractor O. R. Musslewhite License No. WD99
Street and Number Box 56
City Hobbs, State New Mexico
Drilling was commenced Nov. 3, 19 66
Drilling was completed Nov. 5, 19 66

Elevation at top of casing in feet above sea level ..... Total depth of well 192
State whether well is shallow or artesian Shallow Depth to water upon completion 60

Section 2 PRINCIPAL WATER-BEARING STRATA

No.	Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation
1	70	185	75	Sand & sand rock
2	180	190	10	Sand
3				
4				
5				

Section 3 RECORD OF CASING

Dia in.	Pounds ft.	Threads in	Depth Top	Depth Bottom	Feet	Type Shoe	Perforations From	Perforations To
10 3/4	28	none	0	192	192	none	76	192

STATE ENGINEER OFFICE
1966 NOV 9 AM 11:03

Section 4 RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Diameter Hole in in.	Tons Clay	No. Sacks of Cement	Methods Used

Section 5 PLUGGING RECORD

Name of Plugging Contractor ..... License No. .....
Street and Number ..... City ..... State .....
Tons of Clay used ..... Tons of Roughage used ..... Type of roughage .....
Plugging method used ..... Date Plugged ..... 19 .....
Plugging approved by:

Basin Supervisor

Cement Plugs were placed as follows:

No.	Depth of Plug From	Depth of Plug To	No. of Sacks Used

FOR USE OF STATE ENGINEER ONLY

STATE ENGINEER OFFICE
DISTRICT II ROSWELL, N. MEX.
1966 NOV 9 AM 8:22

Date Received

File No. L-4829 Use SRO Location No. 17.35.20.410

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

89 FEB 14 PM 1:26

Section 1. GENERAL INFORMATION

(A) Owner of well Mobil Prod. Texas & New Mexico Owner's Well No.
Street or Post Office Address % Glenn's Water Well Service, Inc.
City and State Box 692 Tatum, New Mexico 88267

Well was drilled under Permit No. L- 10,062 and is located in the:

a. ___ ¼ ___ ¼ NE ¼ SE ¼ of Section 22 Township 17-S Range 35-E N.M.P.M.

b. Tract No. ___ of Map No. ___ of the ___

c. Lot No. ___ of Block No. ___ of the ___
Subdivision, recorded in ___ County.

d. X= ___ feet, Y= ___ feet, N.M. Coordinate System ___ Zone in the ___ Grant.

(B) Drilling Contractor Glenn's Water Well Service, Inc. License No. WD - 421

Address Box 692 Tatum, New Mexico 88267

Drilling Began 2-2-89 Completed 2-2-89 Type tools Rotary Size of hole 9 7/8 in.

Elevation of land surface or ___ at well is ___ ft. Total depth of well 142 ft.

Completed well is [X] shallow [ ] artesian. Depth to water upon completion of well 50 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
50	115	65	Sand	120

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet Top	Depth in Feet Bottom	Length (feet)	Type of Shoe	Perforations From	Perforations To
6 5/8	.156		0	143			70	142

Section 4. RECORD OF MUDDING AND [illegible]NTING

Depth in Feet From	Depth in Feet To	Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement

Section 5. PLUGGING R[illegible]

Plugging Contractor ___
Address ___
Plugging Method ___
Date Well Plugged ___
Plugging approved by:

___
State Engineer Representative

	Depth in Feet Top	Depth in Feet Bottom	Cubic Feet of Cement
1			
2			
3			
4			

FOR USE OF STATE EN[illegible] [illegible]NLY

Date Received February 9, 1989

Quad ___ ___ FWL ___ FSL ___

File No. L-10,062 Use OWD Location No. 17.35.22.42321

Section 6. LOG OF HOLE

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color and Type of Material Encountered
0	1	1	Soil
1	13	12	Caleche
13	27	14	Hard Rock
27	50	23	Sand with Rock
50	115	65	Sand (water)
115	140	25	Sand with Red Cl tringers

Section 7. REMARKS AND ADDITIONAL INFORMATION

'89 FEB 9 AM 8 15
STATE ENGINEER OFFICE
ROSWELL, NEW MEXICO

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Corky Glenn
Driller

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled or deepened. When this form is used as a plugging record, only Section 1(a) and Section 5 need be completed.


(This form to be executed in t

WELL RECORD

Date of Receipt January 7, 1953 Permit No. L-1694

Name of permittee, Humble Oil & Refining Company

Street or P.O., P. O. Box 2347, City and State Hobbs, New Mexico

1. Well location and description: The Shallow (shallow or artesian) well is located in SE ¼, NE ¼, ¼ of Section 22, Township 17-S, Range 35E; Elevation of top of casing above sea level, 3930' feet; diameter of hole, 8-1/4 inches; total depth, 105 feet; depth to water upon completion, 48 feet; drilling was commenced December 15, 19 52, and completed December 17, 19 52; name of drilling contractor Abbott Bros.; Address, Box 637, Hobbs, N. M.; Driller's License No. WD 46

2. Principal Water-bearing Strata:

	Depth in Feet From	To	Thickness	Description of Water-bearing Formation
No. 1	55	105	50	Water Sand
No. 2				
No. 3				
No. 4				
No. 5				

3. Casing Record:

Diameter in inches	Pounds per ft.	Threads per inch	Depth of Casing or Liner Top	Bottom	Feet of Casing	Type of Shoe	Perforations From	To
7"	23	10	Surface	105	105	None	55'	105'

4. If above construction replaces old well to be abandoned, give location: ¼, ¼, ¼ of Section, Township, Range; name and address of plugging contractor,

date of plugging, 19; describe how well was plugged:

RECEIVED
FEB 10 1953
STATE ENGINEER
BY

FILED
JAN 13 1953
OFFICE
ARTESIAN WELL SUPERVISOR
ROSWELL, NEW MEXICO

Form WR-23 STATE ENGINEER OFFICE

SANTA FE

Plugging WELL RECORD

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the nearest district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1A and Section 5 need be completed.

Section 1

(Plat of 640 acres)

(A) Owner of well Tri Service Drilling Company

Street and Number

City Midland State Texas

Well was drilled under Permit No. L-4503 and is located in the

¼/NE//¼ NE ¼ of Section 24 Twp. 17S Rge. 35E

(B) Drilling Contractor Stone Drilling Co. License No. WD-134

Street and Number

City Seminole, Texas State Texas

Drilling was commenced 19

Drilling was completed 19

Elevation at top of casing in feet above sea level Total depth of well

State whether well is shallow or artesian Depth to water upon completion

Section 2 PRINCIPAL WATER-BEARING STRATA

No.	Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation
1				
2				
3				
4				
5				

1961 OCT 20 AM 8:04 STATE ENGINEER OFFICE SANTA FE, N. M.

Section 3 RECORD OF CASING

Dia in.	Pounds ft.	Threads in	Depth Top	Depth Bottom	Feet	Type Shoe	Perforations From	Perforations To

Section 4 RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Diameter Hole in in.	Tons Clay	No. Sacks of Cement	Methods Used

Section 5 PLUGGING RECORD

Name of Plugging Contractor E.B. Baker License No. W.D. 274

Street and Number Box 998 City Seminole State Texas

Tons of Clay used none Tons of Roughage used none Type of roughage none

Plugging method used Regular Cement Date Plugged 9-16- 1961

Plugging approved by:

Basin Supervisor

Cement Plugs were placed as follows:

No.	Depth of Plug From	Depth of Plug To	No. of Sacks Used
	0	6	3 sack cement

FOR USE OF STATE ENGINEER ONLY

Date Received

ROSWELL N. MEX. DISTRICT II STATE ENGINEER OFFICE 1961 OCT 18 PM 1:25

File No. L-4503 Use O.W.D. Location No. 17.35.24.200

Section 6

LOG OF WELL

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color	Type of Material Encountered

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well.

E. B. Baker

Well Driller

SANTA FE, N.M. 87501

File Copy

Revised June 1972

SANTA FE

STATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well Phillips Petroleum Company Owner's Well No. L-4829-X-3

Street or Post Office Address P. O. Box 1178

City and State Lovington, New Mexico 88260

Well was drilled under Permit No. L-4829-X-3 and is located in the:

a. ___ ¼ ___ ¼ SW ¼ NW ¼ of Section 28 Township 17S Range 35E N.M.P.M.

b. Tract No. ___ of Map No. ___ of the ___

c. Lot No. ___ of Block No. ___ of the ___ Subdivision, recorded in ___ County.

d. X= ___ feet, Y= ___ feet, N.M. Coordinate System ___ Zone in the ___ Grant.

(B) Drilling Contractor O. R. Musslewhite License No. WD99

Address P. O. Box 56, Hobbs, New Mexico 88240

Drilling Began Sept. 26-75 Completed Nov. 1-75 Type tools ___ Size of hole 15 in.

Elevation of land surface or ___ at well is ___ ft. Total depth of well 215 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 70 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
70	110	40	Sand & sand rock	
120	195	75	" " "	

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet Top	Depth in Feet Bottom	Length (feet)	Type of Shoe	Perforations From	Perforations To
10 3/4	38	none	0	215	215	none	95	210

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement

Section 5. PLUGGING RECORD

Plugging Contractor ___

Address ___

Plugging Method ___

Date Well Plugged ___

Plugging approved by:

___

State Engineer Representative

No.	Depth in Feet Top	Depth in Feet Bottom	Cubic Feet of Cement
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received September 27, 1978

Quad ___ FWL ___ FSL ___

Form WR-23 Original 4-57.

STATE ENGINEER OFFICE Phillips-State No. 28-1

L-3992

WELL RECORD

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the nearest district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1A and Section 5 need be completed.

Section 1

(Plat of 640 acres)

(A) Owner of well Zapata Petroleum Corp.
Street and Number Box 2216
City Midland State Texas
Well was drilled under Permit No. and is located in the
SW ¼ NE ¼ NE ¼ of Section 28 Twp. 17S Rge. 35E
(B) Drilling Contractor Ed Burke License No. WD-111
Street and Number
City Hobbs State New Mexico
Drilling was commenced Sept. 2 1958
Drilling was completed Sept. 2 1958

Elevation at top of casing in feet above sea level 3950 Total depth of well 125
State whether well is shallow or artesian Shallow Depth to water upon completion 65

Section 2 PRINCIPAL WATER-BEARING STRATA

No.	Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation
1	102	125	23	Water Sand
2	65	78	13	Light Water
3				
4				
5				

Section 3 RECORD OF CASING

Dia in.	Pounds ft.	Threads in	Depth Top	Depth Bottom	Feet	Type Shoe	Perforations From	Perforations To
7	20	8	0	120.7	120.7	none	93	120

Section 4 RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Diameter Hole in in.	Tons Clay	No. Sacks of Cement	Methods Used

STATE ENGINEER OFFICE SANTA FE, N. M. 1958 SEP 25 AM 9 28

Section 5 PLUGGING RECORD

Name of Plugging Contractor License No.
Street and Number City State
Tons of Clay used Tons of Roughage used Type of roughage
Plugging method used Date Plugged 19
Plugging approved by:

Basin Supervisor

Cement Plugs were placed as follows:

No.	Depth of Plug From	Depth of Plug To	No. of Sacks Used

FOR USE OF STATE ENGINEER ONLY

Date Received SEP 10 1958

OFFICE GROUND WATER SUPERVISOR ROSWELL, NEW MEXICO

FILED

File No. L-3992 Use OWD Location No. 17.35.28.222

Section 6

LOG OF WELL

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color	Type of Material Encountered
0	1	1		Surface Soil
1	22	21		Caliche
22	55	33		Sand Tight
55	78	23		Sand Soft
78	102	24		Sand Tight
102	125	23		Sand Water

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well.

Edward B Burk

Well Driller

Form WR-23 SANTA FE

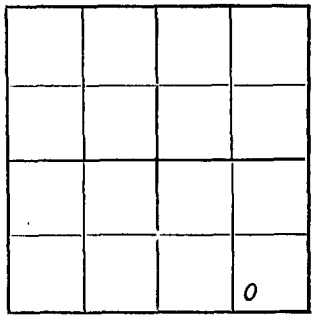
STATE ENGINEER OFFICE

WELL RECORD

Humble State "K"

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the nearest district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1A and Section 5 need be completed.

Section 1



(Plat of 640 acres)

(A) Owner of well HUMBLE OIL AND REFINNING COMPANY

Street and Number P.O. Box 2100

City Hobbs State New Mexico

Well was drilled under Permit No. L-5362 and is located in the SW ¼ SE ¼ SE ¼ of Section 28 Twp. 17 S Rge. 35 E

(B) Drilling Contractor Abbott Brothers License No. WD-46

Street and Number P.O. Box 637

City Hobbs State New Mexico

Drilling was commenced April 2 19

Drilling was completed April 2 19 64

Elevation at top of casing in feet above sea level Total depth of well 140

State whether well is shallow or artesian shallow Depth to water upon completion 80

Section 2 PRINCIPAL WATER-BEARING STRATA

No.	Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation
1	80	140	60	water sand
2				
3				
4				
5				

APR 29 1964

Section 3 RECORD OF CASING

Dia in.	Pounds ft.	Threads in	Depth Top	Depth Bottom	Feet	Type Shoe	Perforations From	Perforations To
7	26	10	0	140	140	open	80	140

Section 4 RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Diameter Hole in in.	Tons Clay	No. Sacks of Cement	Methods Used

Section 5 PLUGGING RECORD

Name of Plugging Contractor License No.

Street and Number City State

Tons of Clay used Tons of Roughage used Type of roughage

Plugging method used Date Plugged 19

Plugging approved by:

Basin Supervisor

Cement Plugs were placed as follows:

No.	Depth of Plug From	Depth of Plug To	No. of Sacks Used

FOR USE OF STATE ENGINEER ONLY

Date Received ✓

APR 16 AM 8:44 1964

File No. L-5362 Use Dom. Location No. 17.35.28.443