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REPORTS

DATE:

1/96

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RECOVERY WELL INSTALLATION
AT THE
SOUTH FOUR LAKES TANK BATTERY

PHILLIPS PETROLEUM COMPANY
SOUTH FOUR LAKES UNIT
LEA COUNTY, NEW MEXICO
***SECOR* PROJECT NO. B0106-001-02**

Prepared for
Phillips Petroleum Company
North American Production
Permian Profit Center
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Odessa, Texas 79762

Prepared by
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355 Union Boulevard, Suite 200
Lakewood, Colorado 80228-1500

January 29, 1996

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1.0 INTRODUCTION

1.1 BACKGROUND

This report summarizes the recovery well installation of recovery wells RW-1 and RW-2 completed during January, 1996, at the Phillips Petroleum Company (Phillips) South Four Lakes Unit (the Unit). Phillips owns and operates the Unit, located in Lea County, New Mexico, just north of U. S. Highway 380 and approximately 10 miles northwest of the town of Tatum (Figure 1). The Unit is an oil lease containing three active oil producing wells, one saltwater disposal well, and an associated production tank battery. The tank battery covers approximately five acres of the lease and is owned by the State of New Mexico. The tank battery is surrounded by relatively flat grazing lands. Regionally and locally, the topography gently slopes to the east-southeast and is sparsely vegetated.

Recovery well installation of the two wells follows the installation of sixteen monitoring wells in December 1994, and October 1995. These activities are summarized in reports prepared by SECOR International Incorporated (*SECOR*), entitled *Soil and Groundwater Assessment Report*, dated March 13, 1995, and *Supplemental Environmental Investigation of the South Four Lakes Tank Battery*, dated November 28, 1995.

As part of a corrective action program requested by the State of New Mexico, Phillips submitted a remedial action plan (RAP) to the New Mexico Energy, Minerals and Natural Resources Department, Oil Conservation Division (OCD) on July 27, 1995. The RAP recommended the installation of two free product recovery wells to be installed at the Unit. Approval of the RAP was granted by the OCD on August 18, 1995.

1.2 PURPOSE AND SCOPE

The purpose of the recovery wells installation was to allow for recovery of free phase petroleum hydrocarbon beneath the Unit. This work was performed in accordance with Section 2.0, Soil and Groundwater Remediation, Subsection 2.2, Free Product Recovery, of the RAP. This activity included the drilling of two separate soil borings and installing a nested pair of recovery wells within each of the two boreholes.

2.0 FIELD PROGRAM

Field activities were performed on January 4 and 5, 1996, and included the installation of two nested recovery well systems and measurement of free phase petroleum levels in monitoring wells MW-1, MW-6 and MW-12. Monitoring well MW-8 and recovery well RW-11 were destroyed and abandoned during the pit solidification and closure activities, and therefore, could not be gauged. The recovery wells were located to intercept the maximum thickness of the free phase petroleum beneath the Unit.

A pre-positioning walk-through of the Unit was conducted on January 4, 1996. A safety meeting was conducted to explain the hazards of Hydrogen Sulfide (H_2S) gas and the required H_2S monitoring.

2.1 SOIL BORING AND RECOVERY WELL INSTALLATION

Field activities included two soil borings completed as nested 4-inch recovery well systems. Prior to drilling activities, a safety meeting was held and below-grade utilities were cleared by Phillips. Pool Environmental Drilling of Roswell, New Mexico, was contracted by *SECOR* to drill and install two recovery wells. Boring locations were staked and drilling operations began at the soil boring location for recovery well RW-1. The locations of the soil borings and associated recovery wells are shown on Figure 2.

Borings were drilled utilizing hollow stem auger techniques with a truck-mounted CME 75 drill rig. The two boring locations were drilled with 12.25-inch augers to a maximum depth of 44 feet below ground surface (bgs) for recovery well RW-1 and 40 feet bgs for recovery well RW-2. A description of the cuttings for each recovery well is provided on the as-built diagrams provided in Appendix A.

After advancement and removal of the augers at recovery well RW-1, flowing sands were encountered which prohibited the installation of the original casing design utilizing 8-inch, Schedule 40 PVC casing. As the augers were withdrawn to allow the casing to be set, heaving sands prevented the 8-inch casing to be set at the proper depth. Maximum depth allowed was 28 feet bgs. Therefore, the 8-inch casing was subsequently removed and a supplemental design was initiated to install two separate well casings within the same boring, one water recovery and one product recovery, utilizing 4-inch, Schedule 40 PVC casing. Recovery well RW-1 was redrilled and the water recovery well casing was installed to a depth of 38 feet bgs, utilizing five feet of 0.010 machine slotted, Schedule 40 PVC screen and 40 feet of flush

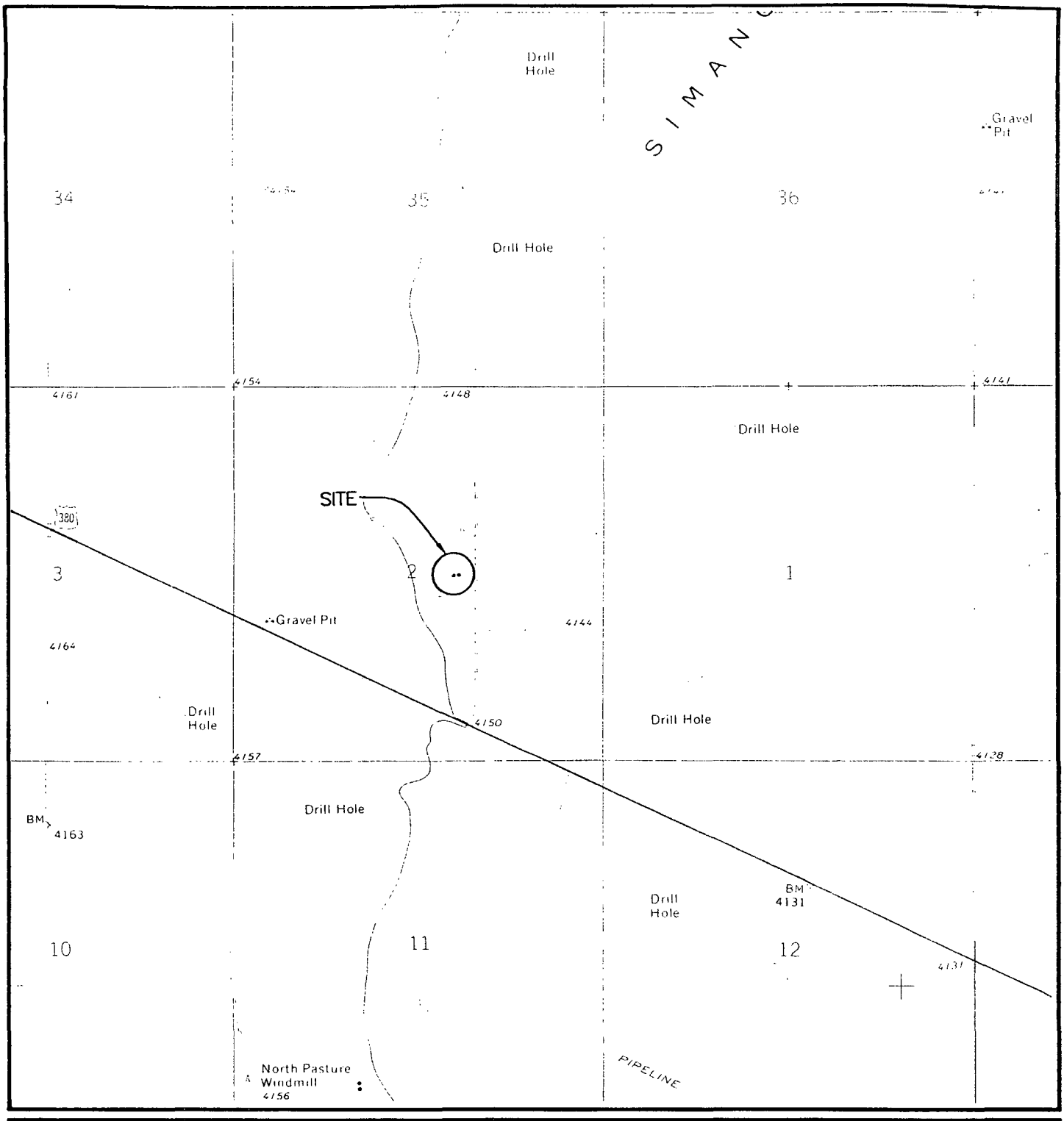
thread PVC blank riser. The casing was lowered inside the hollow stem augers to the total depth of 38 feet, leaving 5½ feet of PVC casing stickup. A filter pack was installed incrementally in the annulus around the recovery well screen as the augers were withdrawn. The filter pack consisted of clean 8/16 sand and was installed from the bottom of the borehole to 1½ to 2½ feet above the top of the screen. To prevent bridging, a weighted tape measure was used continuously to monitor the filter pack installation. The augers were then removed and the product recovery well casing was installed in the open hole from a depth of 33 feet bgs, utilizing 15 feet of 0.020 machine slotted, Schedule 40 PVC screen and 20 feet of flush thread PVC blank riser casing. Heaving sands were encountered at 30 feet bgs, but the casing was pushed to a total depth of 33 feet bgs. Additional sand filter pack was added four feet above the screen in the well bore. Bentonite chips were added to within two feet of the ground surface and hydrated with five gallons of potable water at five-foot increments.

Recovery well RW-2 was drilled to a total depth of 40 feet bgs and completed utilizing the same technique and materials as recovery well RW-1. Heaving sands were not encountered in this borehole during completion of the recovery well. As-built drawings for recovery well RW-2 are presented in Appendix A.

3.0 RESULTS

Visual observations of the sediment from soil borings (Appendix A) indicate the recovery wells are within the free phase plume.

FIGURES



NEW MEXICO

QUADRANGLE LOCATION

U.S.G.S. 7.5 MINUTE SERIES (TOPOGRAPHIC)

SIMANOLA VALLEY QUADRANGLE
NEW MEXICO

2,000 0 2,000

SCALE: 1" = 2,000'
CONTOUR INTERVAL: 5 FEET
PHOTO DATE: 1970

N

Figure 1
Site Location Map

PHILLIPS PETROLEUM COMPANY
South Four Lakes Unit
Lea County, New Mexico

SECOR
355 Union Boulevard
Suite 200
Lakewood, Colorado 80228

DWN	SDP
APPR	TES
DATE	02/14/95
JOB NO.	b0106-001-01

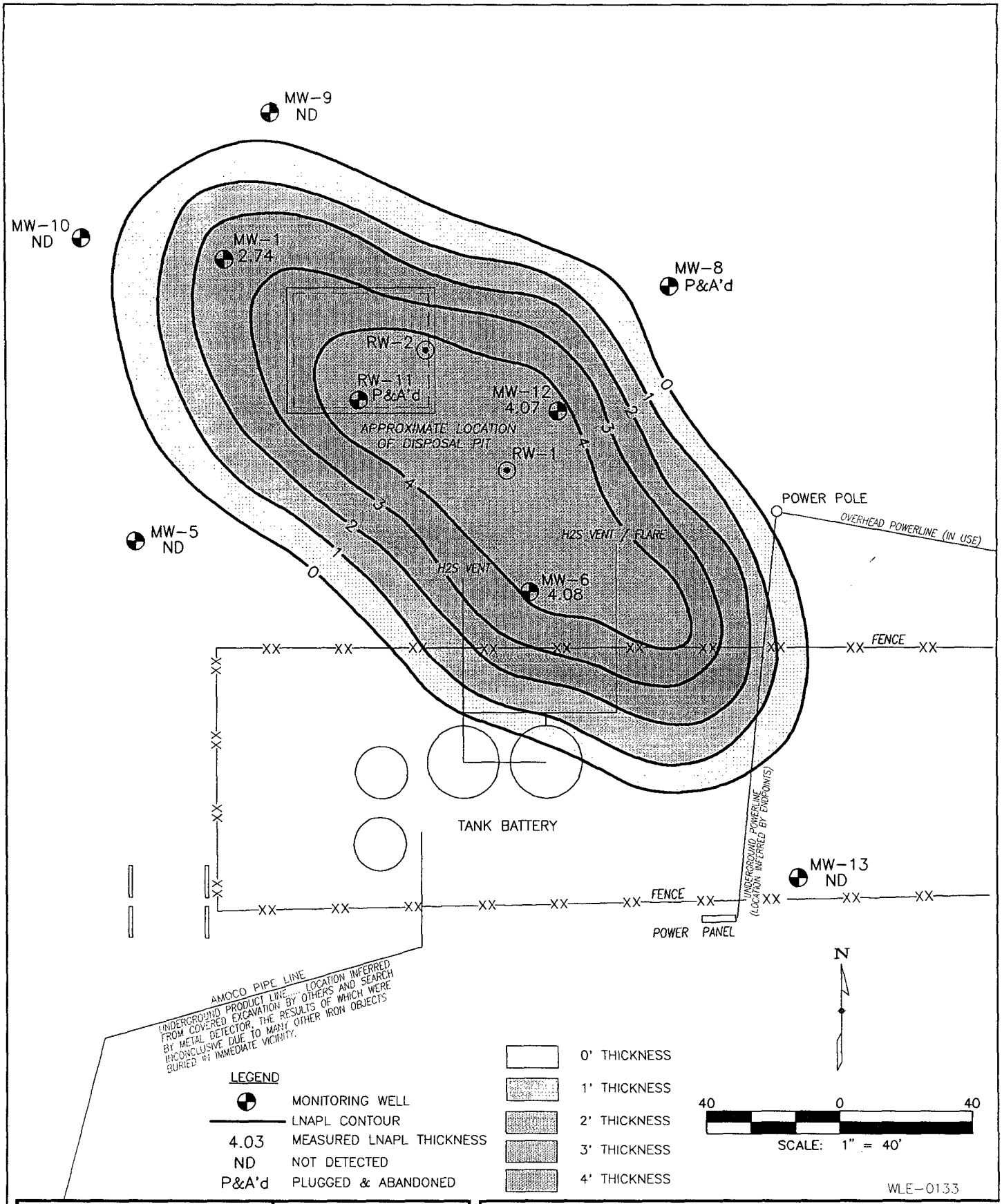


Figure 2

LNAPL Thickness and Approximate Location of RW-1 and RW-2 January 4, 1996

Phillips Petroleum Co.

South Four Lakes Unit
Lea County, New Mexico

SECOR
355 Union Boulevard
Suite 200
Lakewood, Colorado 80228

DWN	MTH
APPR	TRS
DATE	01/15/96
JOB NO.	B0106-001-02

TABLES

TABLE 1
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SUMMARY OF GROUNDWATER LEVEL MEASUREMENTS
PHILLIPS PETROLEUM COMPANY
SOUTH FOUR LAKES UNIT
LEA COUNTY, NEW MEXICO
SECOR PROJECT NO. B0106-001-02 SA 0511

Monitoring Well No.	Date of Measurement	Casing Elevation	Depth to Groundwater (ft)	Groundwater Elevation (ft)	Free Product Thickness (ft)
MW-1	01/04/95	4149.13	26.05	4124.33	1.55
	01/17/95		26.37	4124.34	1.96
	10/10/95		NM	NM	NM
	01/04/96		27.40	4123.93	2.74
MW-2	01/04/95	4151.50	26.64	4124.86	ND
	01/17/95		26.61	4124.89	ND
	10/10/95		26.98	4124.52	ND
	01/04/96		NM	NM	NM
MW-3	01/04/95	4146.80	NM	NM	ND
	01/17/95		25.74	4121.06	ND
	10/10/95		26.13	4120.67	ND
	01/04/96		NM	NM	NM
MW-4	01/04/95	4148.58	25.14	4123.44	ND
	01/17/95		25.18	4123.40	ND
	10/10/95		25.54	4123.04	ND
	01/04/96		NM	NM	NM
MW-5	01/04/95	4150.40	26.04	4126.36	ND
	01/17/95		25.98	4124.42	ND
	10/10/95		26.33	4124.07	ND
	01/04/96		NM	NM	NM
MW-6	01/04/95	4149.90	28.88	4123.99	3.68
	01/17/95		28.93	4124.04	3.81
	10/10/95		NM	NM	NM
	01/04/96		29.53	4123.64	4.08
MW-7	01/04/95	4149.16	24.85	4124.31	ND
	01/17/95		24.85	4124.31	ND
	10/10/95		25.17	4123.99	ND
	01/04/06		NM	NM	NM
MW-8	01/04/95	4148.81	24.66	4124.15	ND
	01/17/95		24.66	4124.15	ND
	10/10/95		NM	NM	NM
	01/04/96		P&A'd	P&A'd	P&A'd

TABLE 1
(Page 2 of 2)

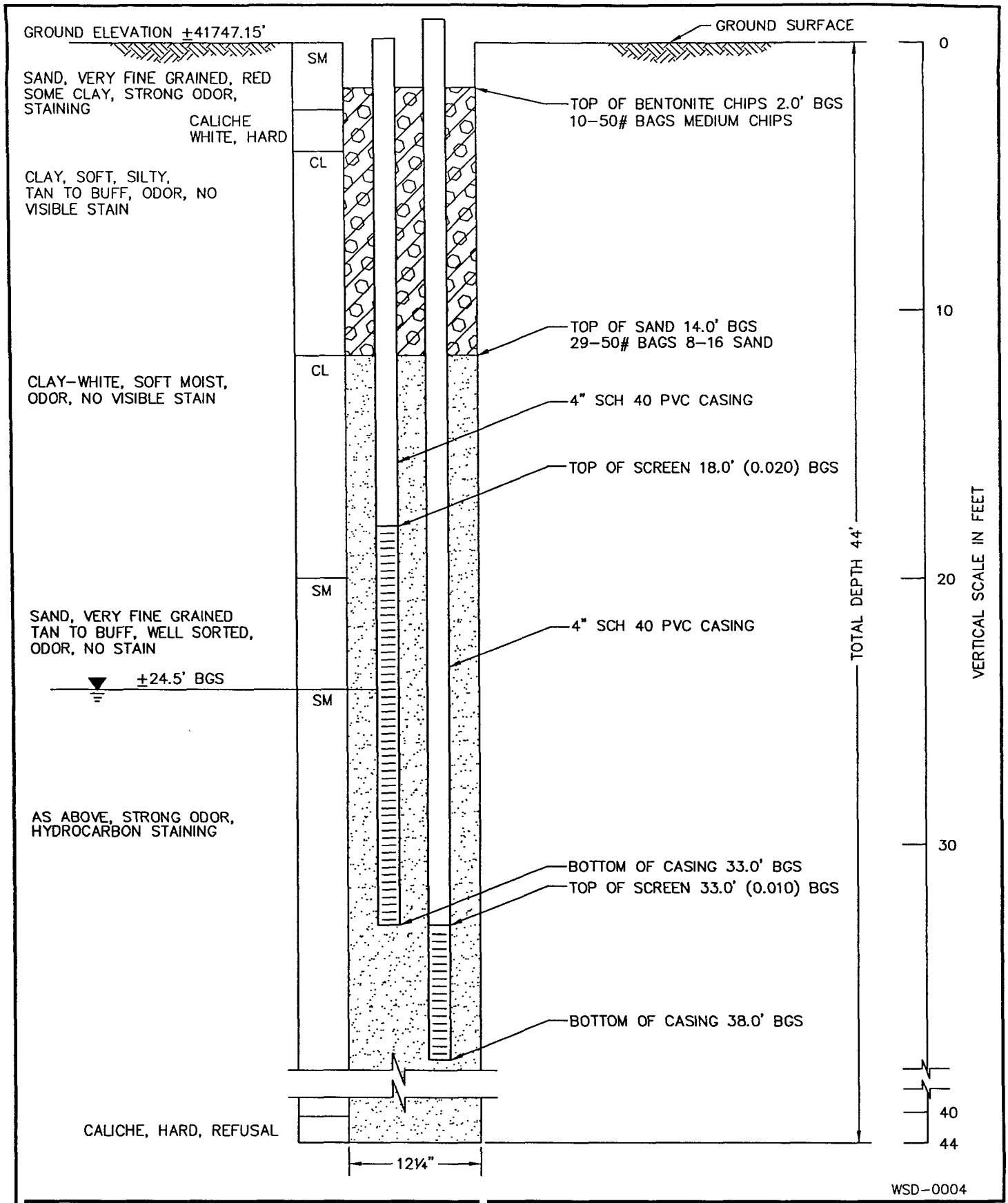
SUMMARY OF GROUNDWATER LEVEL MEASUREMENTS
PHILLIPS PETROLEUM COMPANY
SOUTH FOUR LAKES UNIT
LEA COUNTY, NEW MEXICO
SECOR PROJECT NO. B0106-001-02 SA 0511

Monitoring Well No.	Date of Measurement	Casing Elevation	Depth to Groundwater (ft)	Groundwater Elevation (ft)	Free Product Thickness (ft)
MW-9	01/04/95	4149.63	25.20	4124.43	ND
	01/17/95		25.16	4124.47	ND
	10/10/95		25.52	4124.11	ND
	01/04/96				
MW-10	01/04/95	4149.98	25.45	4124.53	ND
	01/17/95		25.45	4124.53	ND
	10/10/95		25.79	4124.19	ND
	01/04/96		NM	NM	NM
RW-11	01/04/95	4149.86	28.40	4124.06	3.22
	01/17/95		28.76	4124.07	3.69
	10/10/95		NM	NM	NM
	01/04/96		P&A'd	P&A'd	P&A'd
MW-12	01/04/95	4149.15	25.30	4124.13	0.35
	01/17/95		25.58	4124.16	0.73
	10/10/95		NM	NM	NM
	01/04/96		28.70	4123.71	4.07
MW-13	01/04/95	4150.31	26.42	4123.89	ND
	01/17/95		26.39	4123.92	ND
	10/10/95		26.76	4123.55	ND
	01/04/96		NM	NM	NM
MW-14	10/11/95	NM	28.93	UNK	ND
	01/04/96		NM	NM	NM
MW-15	10/11/95	NM	27.47	UNK	ND
	01/04/96		NM	NM	NM
MW-16	10/11/95	NM	28.59	UNK	ND
	01/04/96		NM	NM	NM

Notes
ND = Not detected
NM = Not measured
P&A'd = Plugged and abandoned
UNK = Unknown
Correction equation for free-phase: Casing Elevation - Depth to Water +(0.802 x Product Thickness)

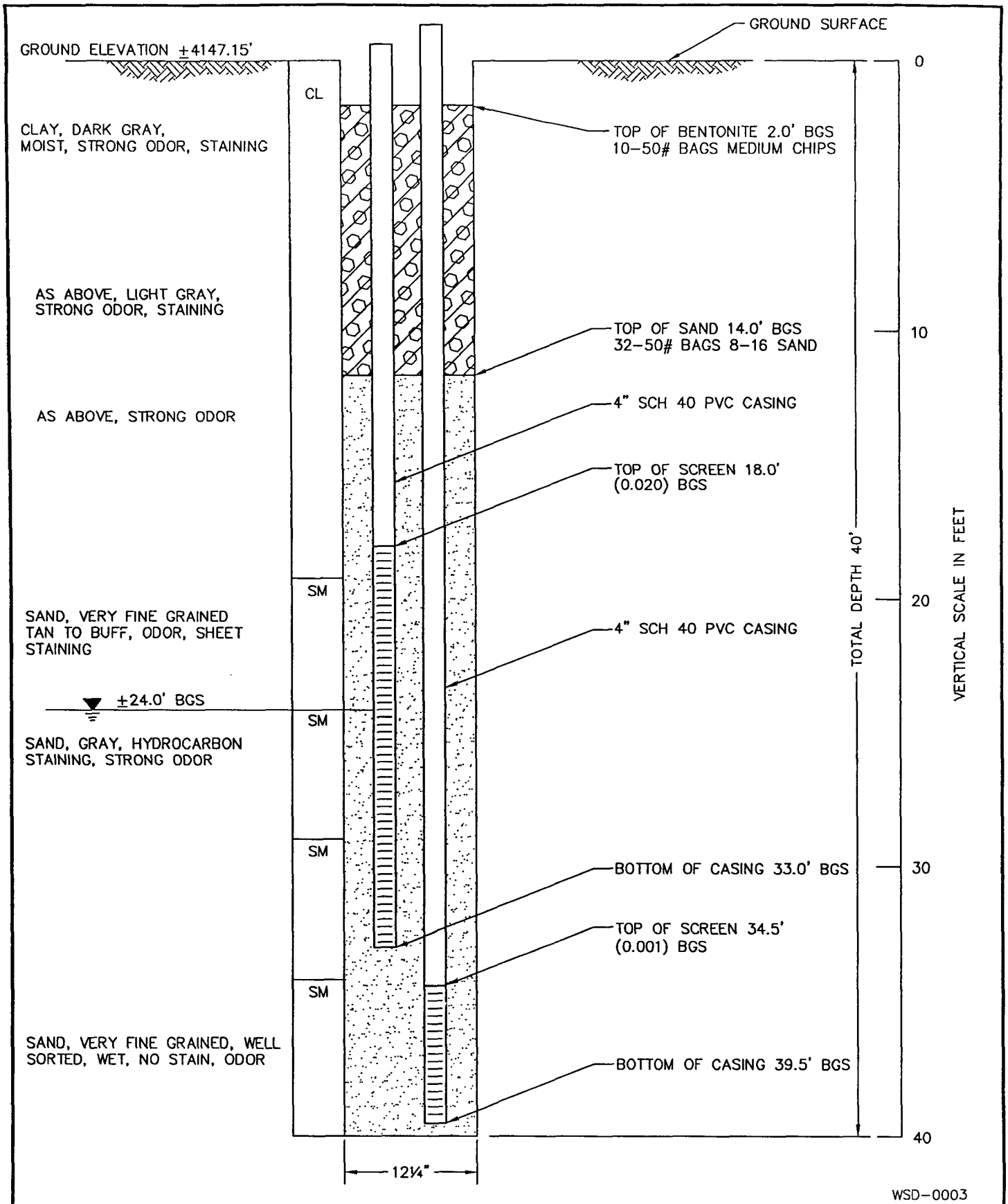
APPENDIX A

RECOVERY WELL
AS-BUILT DIAGRAMS



WSD–0004

Well RW–1 Detail	Phillips Petroleum Co. South Four Lakes Unit Lea County, New Mexico	**SECOR** 355 Union Boulevard Suite 200 Lakewood, Colorado 80228	DWN MTH APPR TRS DATE 01/29/96 JOB NO. B0106–001–02



Well RW–2 Detail	Phillips Petroleum Co. South Four Lakes Unit Lea County, New Mexico	**SECOR** 355 Union Boulevard Suite 200 Lakewood, Colorado 80228	DWN MTH APPR TRS DATE 01/29/96 JOB NO. B0106–001–02