AP - 25

STAGE 1 & 2 WORKPLANS

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Environmental Bureau

Yates Petroleum Company
Amended Stage 1 Abatement Plan Proposal, Scripps Pit Site (AP-25)

Unit M, Section 25, Township 18S, Range 26E
Eddy County, New Mexico

August 19, 2005

Prepared for:

Yates Petroleum Company
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By:

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II. Purpose

The purpose of this amended abatement plan is to propose additional investigatory work to delineate the extent of possible groundwater contamination at the subject site located at the Yates Scripps battery approximate to Unit letter M, Section 25, Township 18S, Range 26E Eddy County, New Mexico (Figure 1). Possible contamination could have resulted from a pit associated with oil and gas exploration and production activities at the Scripps battery. The pit has since been closed.

III. Background

The New Mexico Oil Conservation Division (NMOCD) has required submittal of an abatement plan (AP-25) for the subject site. A Stage 1 Abatement Plan Proposal dated July 2, 2001, prepared by Harding ESE, was submitted to the OCD on July 31, 2001. The Harding ESE report documented conditions at the site from 1997 through 2000 including sampling of soil and groundwater at the pit. Results of that sampling indicated concentrations of contaminants that exceed OCD soil guidelines and groundwater standards. The Harding ESE report is included as an appendix to this amended plan.

The Stage 1 Abatement Plan was approved with conditions on February 1, 2002. Subsequently, a "Preliminary Site Investigation Report" prepared by Environmental Technology Group, Inc. (ETGI) dated June 2003 was submitted to the Division. The report provided information on groundwater elevations, direction of flow and water quality. On October 6, 2004, the OCD responded with a letter stating that a review of the report showed that the extent of groundwater contamination at the site had not been determined. The letter requested that a work plan for further delineation be submitted by December 31, 2004. A 45 day extension to February 15 was requested for submittal of the work plan, which was approved by Ed Martin of the OCD in Santa Fe on December 17, 2004. The Amended Stage 1 Abatement Plan Proposal was submitted to OCD on February 15, 2005.

The Harding ESE July 2001 submittal included reference to earlier work performed at the site including work by Bioremediation Contractors & Consultants, Inc. in 1998 and drilling of soil borings by ETGI in October 2000 with a report completed in November 2000. ETGI is no longer in business and copies of the earlier work by either party are not available at this time. A search will be made of OCD files to obtain the referenced reports so that a complete submittal can be made in the Stage 1 report.

On July 18, 2005 the OCD responded to the amended proposal and required that amended workplan be revised to enable Yates to completely characterize the release at the Scripps pit site and to provide data necessary to select and design an effective abatement option for a Stage 2 Abatement Plan. The letter also denied the Yates request to plug and abandon MW-4 on the site.

Additionally, since transmittal of the February 15, 2005 document, the location of the pit has been determined to be in Unit letter M of Section 25 (SW1/4 of the SW1/4 Section 25). This report and subsequent reports will reflect the correct unit letter of the pit location.

IV. Contaminants and Size of Area

The suspected contaminants at the location are inorganic chlorides and total dissolved solids, and dissolved phase hydrocarbons (benzene, toluene, ethylbenzene and xylenes, i.e. BTEX) from produced water and/or other oilfield wastes from the battery which may have been placed in the now-closed pit. These wastes are considered RCRA-exempt oilfield wastes. The former pit was reported to have dimensions of 40 ft. by 40 ft. (Harding ESE report). The 2003 ETGI report shows it occupied an area with maximum exterior dimensions of approximately 180 ft. by 180 ft. or 32,400 sq. ft. (0.74 acres) (Figure 2). Before drilling additional borings an attempt will be made to determine the actual location and approximate dimensions of the pit within the 180 by 180 sq. ft. area using aerial photographs.

V. Vertical and Horizontal Extent of Contamination

Information on the vertical and horizontal extent of contamination which may be available in the November 2000 ETGI report is not available to SESI for inclusion in this submittal. However, the June 2003 ETGI preliminary site investigation report provides some information on the vertical and horizontal extent of contamination. Monitor well soil borings drilled during the investigation documented hydrocarbon contamination to a depth of 20 ft. in the boring that penetrated the pit (MW-4). That boring was free of hydrocarbons at 45 ft. Hydrocarbons were absent in all other borings from surface to total depth (Table 1).

Chlorides elevated above the NMOCD guideline of 250 mg/Kg were found in all but two soil samples (MW-1, 30 ft. and MW-2, 25 ft.). Chlorides were highest in samples taken from MW-4 (drilled in the pit). Chloride concentrations averaged 4,000 mg/Kg and were evenly distributed through out the borehole. Analysis of boring samples from MW-2 and MW-3 showed one or more samples exceeding 1,000 mg/Kg chloride.

VI. Groundwater

Groundwater at the site is at a depth of approximately 40 ft. below ground surface (bgs) (Table 2). Groundwater flow direction, as mapped in November and December 2004, is generally from east to west. Based on the flow direction from those dates, there are no monitor wells upgradient or downgradient from the pit. Also, water levels from the pit monitor well, MW-4, are slightly lower relative to the other three monitor wells which could indicate a downward vertical gradient. Generally, MW-4 was not plotted on the groundwater elevation maps.

Water quality of the groundwater is poor. Chlorides in the three monitor wells outside the pit that were sampled in November 2004 ranged between 4,000 mg/L (MW-1) and 5,100 mg/L (MW-3). Water quality in these three wells averaged 8,000 mg/L total dissolved solids (TDS). Water quality was worst in the pit well (MW-4) with chloride at 33,000 mg/L and TDS at 44,400 mg/L. However all concentrations greatly exceed water quality standards for human or animal use (Table 3). Benzene and ethylbenzene were detected in MW-4 at a concentration

of 0.051 mg/L and 0.005 mg/L, respectively. Benzene exceeds the regulatory standard (0.010 mg/L) while ethylbenzene is well below the standard (0.750 mg/L) and just above the detection level.

Shallow groundwater in bottomland areas immediately west of the Pecos River is known to be brackish. Cooperative studies performed by the NM State Engineer Office and the US Geological Survey document increased sodium chloride mineralization mainly due to natural upward discharge of groundwater followed by evapotranspiration especially by phreatophytes such as salt cedar and mesquite[1].

Based on evaluation of the existing information, elevated chloride and TDS concentrations at this site (except for MW-4) appear to be related to natural mineralization of the soil and groundwater rather than contamination by the pit. However, concentrations of chloride and TDS at MW-4 may be due to vertical migration from the pit. To determine if such concentrations are from the pit, to determine offsite impacts on groundwater, and to satisfy the Stage 1 Abatement plan requirements, the additional work described below is proposed.

VII. Revised Abatement Plan

The purpose of the Stage 1 abatement plan is "to design and conduct a site investigation that will adequately define site conditions, and provide the data necessary to select and design an effective abatement option." Pursuant to OCD Rule 19.E.3, a Stage 1 abatement plan may include but not be limited to information as needed to select and implement an abatement option. Accordingly, Yates will generate and include the following information and data in the report to be submitted following such site investigation as necessary to determine abatement options. Information previously generated and included with this report is expected to satisfy some to the investigation report requirements.

a. *Descriptions of the site, including a site map, and of site history including the nature of the release that caused the water pollution, and a summary of previous investigations.*

   Information satisfying some of this requirement is submitted herein, including the attached appendix. It will be updated as necessary for submittal with the Stage 1 report. As mentioned above, the Harding ESE July 2001 submittal included reference to earlier work performed at the site including drilling of soil borings by ETGI in October 2000. This information is not available at this time and a search will be made of OCD files to obtain the referenced reports so that they can be included in the Stage 1 report.

b. *Additional site investigation to define (i) site geology and hydrogeology, the vertical and horizontal extent and magnitude of vadose-zone and groundwater contamination, subsurface hydraulic conductivity, transmissivity, storativity, and rate and direction of contaminant migration, inventory of water wells inside and within one (1) mile from the perimeter of the three dimensional body where the standards set forth in [the rule] are exceeded, and location and number of such wells actually or potentially affected by the pollution; and (ii) surface-water hydrology, seasonal stream flow characteristics, groundwater/surface-water relationships, ... [Etc.].*

1 Mower, R.W., Hood, J.W., Cushman, R.L., Borton, R.L., and Galloway, S.E., 1964. "An Appraisal of Potential Ground-Water Salvage Along the Pecos River between Acme and Artesia, New Mexico", US Geological Water-Supply Paper 1659, Washington, D.C.

Additional investigation is necessary to fill gaps in data already collected at the site, including the drilling of additional boreholes, installation of additional monitor wells, and measurement of aquifer properties. Current information available to SESI is insufficient to provide geologic/lithologic cross-sections as requested in the July 18, 2005 letter. An inventory of water wells will be conducted within one mile of the perimeter of the site and wells that potentially could be affected by the contamination identified.

A minimum of four soil borings will be advanced in the pit interior. If necessary, additional borings will be drilled to characterize the vertical and horizontal extent of soil impacts. The actual locations will be determined following review of aerial photographs and whatever information may be present in the November 2000 ETGI report. Drilling will be performed using a hollow-stemmed auger rig with a continuous core sampler. Samples will be collected every 5 ft. from the surface to the water table at about 40 ft. They will be analyzed for TPH and BTEX using EPA methods 8015M and 8021B, respectively. Following extraction of the samples, the boreholes will be plugged to ground surface with bentonite and hydrated. The boreholes will be located with GPS equipment with so their placement can be plotted on future maps.

The existing monitor well elevations will be resurveyed. No information was provided in the report as to when the survey was performed or who did it. Because of the closeness of the monitor wells and because water levels for MW-4 appear anomalous compared to the other wells, a current elevation survey is necessary to determine more accurately groundwater flow direction.

Following the resurvey of the wells and analysis of the data, a minimum of two additional monitor wells will be drilled. One well will be installed upgradient of the site a sufficient distance to determine if background shallow water quality is as poor as indicated by the analytical results for the existing wells. The well will be installed in an area which shows no evidence of disturbance. The most likely location to drill the well will be to the east of the lease road. However, the actual location will be determined following resurvey of the wells and re-plotting of the water level measurements. The second well will be drilled approximately 100 ft. downgradient of the pit as determined by measurements following the resurvey of existing wells. Additional downgradient wells will be installed as necessary to allow detection and monitoring of any release from the pit. Soil samples from the well borings will be collected at 5 ft. intervals and analyzed for TPH and BTEX as above.

To determine the hydraulic conductivity and transmissivity of the sediments, groundwater slug-tests will be conducted on the monitor wells and the drawdown and recovery data analyzed with procedures commonly utilized for this purpose. Determination of storativity usually requires installation of closely spaced monitor wells so that one can serve as an observation well for the pumping well. At this location with a shallow water table, storativity can be estimated from technical publications and a separate monitor well solely for this purpose is not necessary.

The impact, if any, on releases from the pit on intermittent, ephemeral or permanent sources of surface-water are present in the area of the release will be examined.

c. *Monitoring program, including sampling stations and frequencies, for the duration of the abatement plan that may be modified, after approval by the Director, as additional sampling stations are created.*

Following installation of the monitoring wells, they will be developed to remove any mud, silt and sand inadvertently introduced during the drilling process. The well locations and elevations will be located and surveyed by a registered professional surveyor. Initially Water levels will be measured quarterly and wells will be sampled quarterly for BTEX organic constituents and naphthalene, WQCC metals, and major cations and anions including chloride, sulfate and TDS. Sampling will be performed following purging to ensure a fresh sample.

d. *Quality assurance plan, consistent with the sampling and analytical techniques listed in [the Water Quality Control Commission regulations] for all work to be conducted pursuant to the abatement plan.*

   Samples will be collected and handled in accordance with appropriate protocols for collection, preservation and transport of samples including maintaining a chain-of-custody and record keeping. The analytical laboratory selected to perform the analyses will be monitored for compliance with the applicable QA/QC standards.

e. *A schedule for all Stage 1 abatement plan activities, including the submission of summary quarterly progress reports, and the submission, for approval by the Director, of a detailed final site investigation report.*

   It is expected that all investigation work proposed within the Stage 1 abatement plan will be completed within four months of the date of approval. Quarterly progress reports will be submitted within 30 days following the end of the previous quarter. The report will include work performed and analytical results of from testing of water quality in new and existing monitor wells. A final report will be prepared and submitted within 60 days of the completion of the work.

f. *Any additional information that may be required to design and perform an adequate site investigation.*

   The information necessary to design and perform an adequate site investigation is included in the above paragraphs.

VIII. Tables and Figures

Table 1. Monitor Well Soil Sampling Results, Scripps Pit Site, August-September 2002

Sample Location, Date	Depth (ft.)	Chloride (mg/Kg)	Benzene (mg/Kg)	Toluene (mg/Kg)	Ethyl-benzene (mg/Kg)	Total Xylenes (mg/Kg)	Total BTEX (mg/Kg)	GRO (C6-C12) (mg/Kg)	DRO (>C12-C35) (mg/Kg)	TPH (C6-C35) (mg/Kg)
MW-1	10	993	<0.025	<0.025	<0.025	<0.025	<0.025	<10.0	<10.0	<10.0
09/06/02	20	443	<0.025	<0.025	<0.025	<0.025	<0.025	<10.0	<10.0	<10.0
	30	106	<0.025	<0.025	<0.025	<0.025	<0.025	<10.0	<10.0	<10.0
MW-2	10	1,220	<0.025	<0.025	<0.025	<0.025	<0.025	<10.0	<10.0	<10.0
08/30/02	25	<20.0	<0.025	<0.025	<0.025	<0.025	<0.025	<10.0	<10.0	<10.0
	45	2,980	<0.025	<0.025	<0.025	<0.025	<0.025	<10.0	<10.0	<10.0
MW-3	15	390	<0.025	<0.025	<0.025	<0.025	<0.025	<10.0	<10.0	<10.0
08/30/02	30	2,760	<0.025	<0.025	<0.025	<0.025	<0.025	<10.0	<10.0	<10.0
	45	319	<0.025	<0.025	<0.025	<0.025	<0.025	<10.0	<10.0	<10.0
MW-4	10	4,430	0.269	0.342	0.957	3.44	5.01	321	2,920	3,241
08/30/02	20	3,510	1.74	0.573	9.26	11.8	23.4	591	2,150	2,741
	42	4,080	<0.025	<0.025	<0.025	<0.025	<0.025	<10.0	<10.0	<10.0

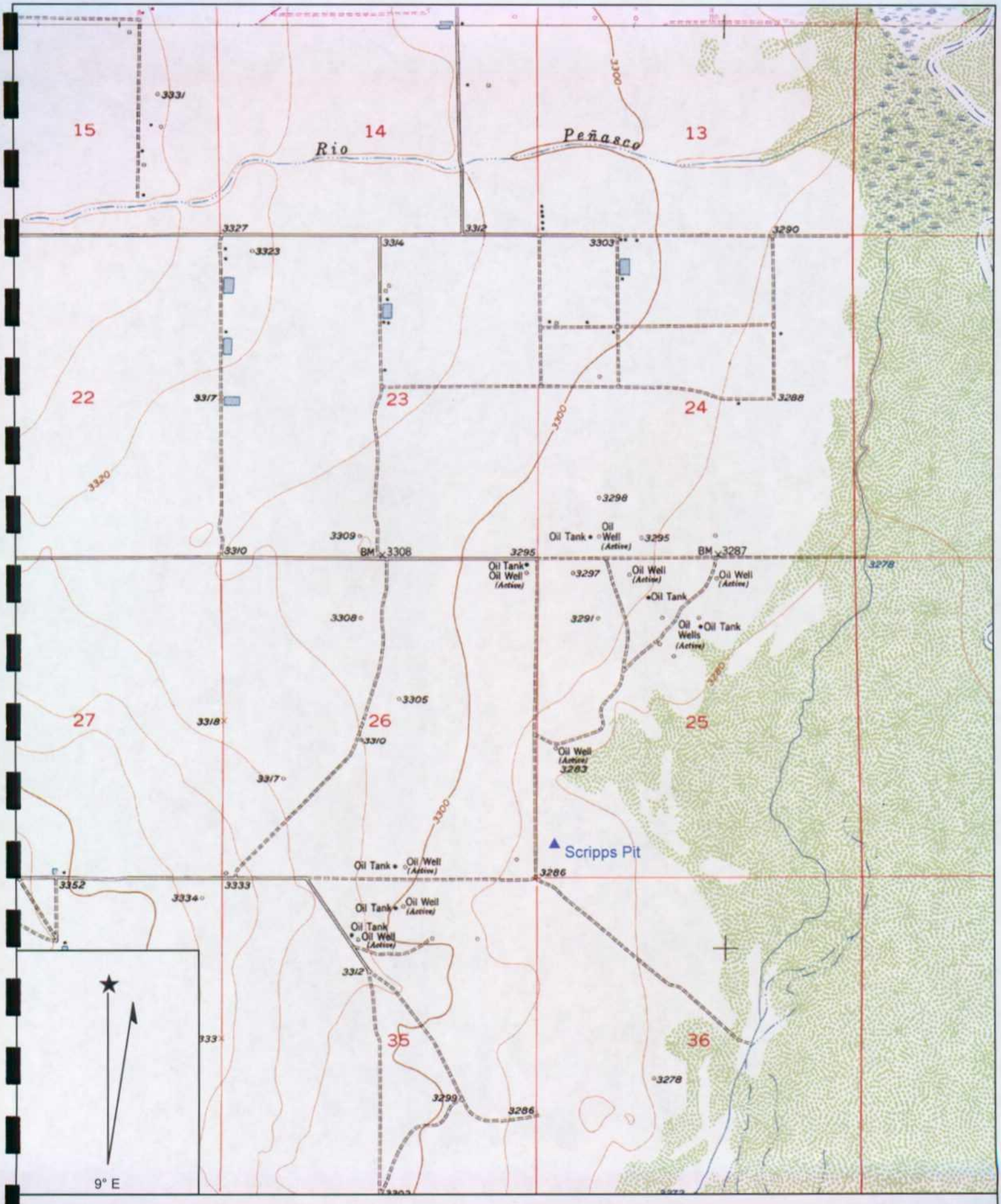
Table 2. Water Level Measurements, Scripps Pit Site, 2002-2004

Monitor Well Name, Total Depth Below TOC (ft.)	Elevation Top of Casing (feet)	Measure-ment Date	Depth to Water Below TOC (feet)	Water Level Elev. (feet)	Water Saturated Thickness (feet)	Water Level Change (ft)
MW-1	3,287.52	09/18/02	41.18	3,246.34	1.2	- -
42.34		09/19/02	41.25	3,246.27	1.1	-0.07
		11/08/04	41.16	3,246.36	1.2	0.09
		12/01/04	41.00	3,246.52	1.3	0.16
		12/15/04	40.91	3,246.61	1.4	0.09
		12/21/04	40.87	3,246.65	1.5	0.04
		12/30/04	40.84	3,246.68	1.5	0.03
MW-2	3,287.91	09/18/02	41.95	3,245.96	12.5	- -
54.45		09/19/02	41.95	3,245.96	12.5	0.00
		11/08/04	42.00	3,245.91	12.5	-0.05
		12/01/04	41.81	3,246.10	12.6	0.19
		12/15/04	41.73	3,246.18	12.7	0.08
		12/21/04	41.72	3,246.19	12.7	0.01
		12/30/04	41.68	3,246.23	12.8	0.04
MW-3	3,288.79	09/18/02	42.84	3,245.95	10.2	- -
53.08		09/19/02	42.86	3,245.93	10.2	-0.02
		11/08/04	42.90	3,245.89	10.2	-0.04
		12/01/04	42.73	3,246.06	10.4	0.17
		12/15/04	42.65	3,246.14	10.4	0.08
		12/21/04	42.58	3,246.21	10.5	0.07
		12/30/04	42.52	3,246.27	10.6	0.06
MW-4	3,288.25	09/18/02	41.28	3,246.97	14.7	- -
55.99		09/19/02	42.32	3,245.93	13.7	-1.04
		11/08/04	42.37	3,245.88	13.6	-0.05
		12/01/04	42.26	3,245.99	13.7	0.11
		12/15/04	42.15	3,246.10	13.8	0.11
		12/21/04	42.12	3,246.13	13.9	0.03
		12/30/04	42.08	3,246.17	13.9	0.04
(Table updated 01/03/05)						

Table 3. Water Quality Sampling Results, Scripps Pit Site, 2002-2004

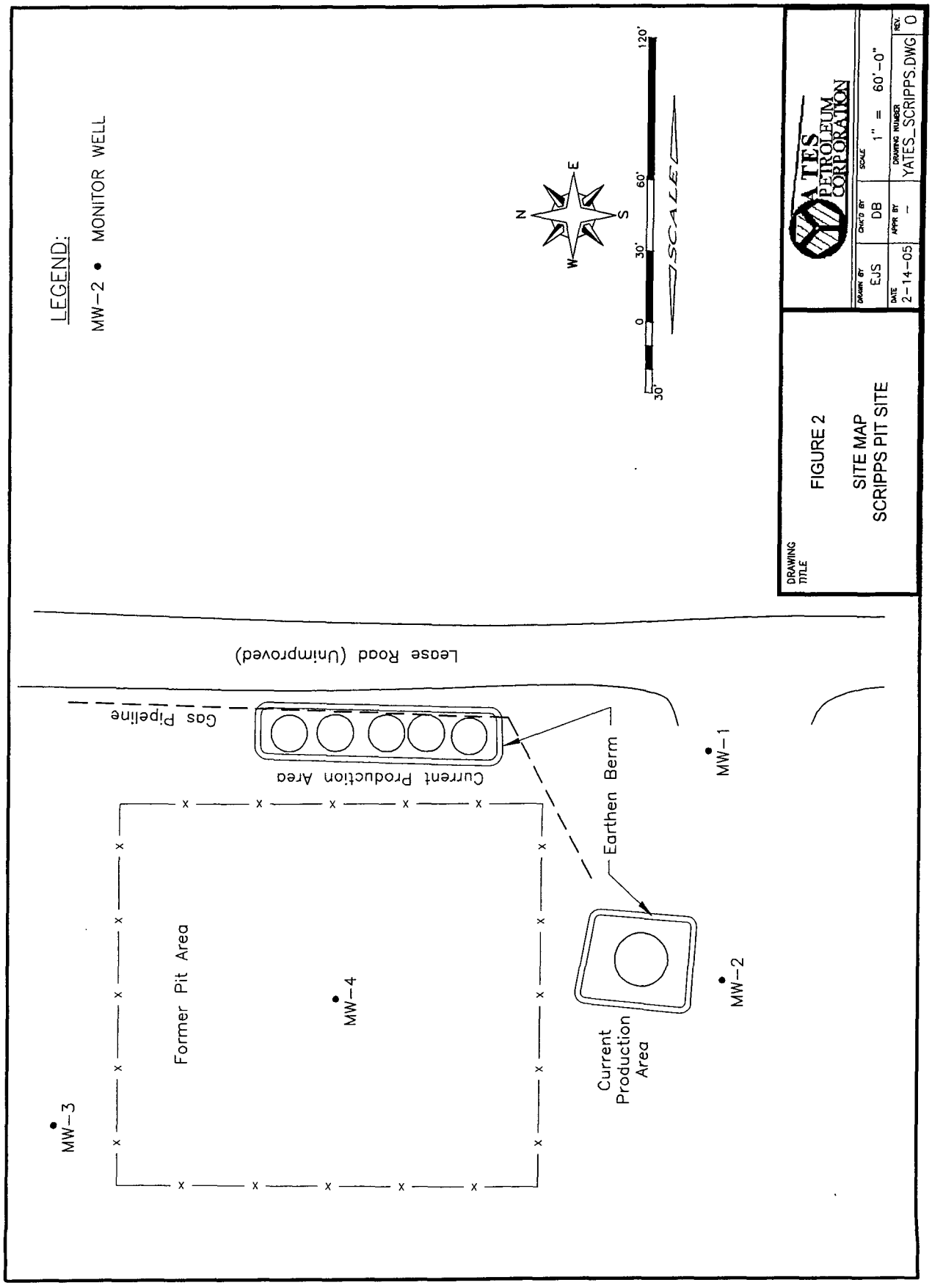
Sample Location	Date	Chloride (mg/L)	TDS (mg/L)	Benzene (mg/L)	Toluene (mg/L)	Ethyl-benzene (mg/L)	Total Xylenes (mg/L)
MW-1	09/19/02	8,150	18,400	<0.001	<0.001	<0.001	<0.001
	11/08/04	3,999	7,800	<0.002	<0.002	<0.002	<0.006
MW-2	09/19/02	6,560	14,800	<0.001	<0.001	<0.001	<0.001
	11/08/04	4,699	9,400	<0.002	<0.002	<0.002	<0.006
MW-3	09/19/02	4,700	10,700	<0.001	<0.001	<0.001	<0.001
	11/08/04	5,098	6,800	0.004	<0.002	<0.002	<0.006
MW-4	09/19/02	38,100	57,400	0.069	0.008	0.010	0.016
	11/08/04	32,990	44,400	0.051	<0.002	0.005	<0.006
NM WQCC Groundwater		250	1,000	0.010	0.750	0.750	0.650

Figure 1. Vicinity Map, Scripps Pit Site



Name: LAKE MC MILLAN NORTH
Date: 8/19/2005
Scale: 1 inch equals 2000 feet

Location: 032° 43' 26.54" N 104° 20' 42.64" W
Caption: Yates Petroluem
Sec 26, T18S, R26E
Eddy County, New Mexico


LEGEND:
MW-2 • MONITOR WELL
N
E
S
W
0
30'
60'
120'
SCALE
YATES PETROLEUM CORPORATION
DRAWN BY EJS
CHK'D BY DB
APPR BY -
SCALE 1" = 60'-0"
DATE 2-14-05
DRAWING NUMBER YATES_SCRIPPS.DWG
REV. 0
DRAWING TITLE
FIGURE 2
SITE MAP
SCRIPPS PIT SITE
Lease Road (Unimproved)
Gas Pipeline
Current Production Area
Earthen Berm
MW-1
MW-2
MW-3
MW-4
Former Pit Area
Current Production Area

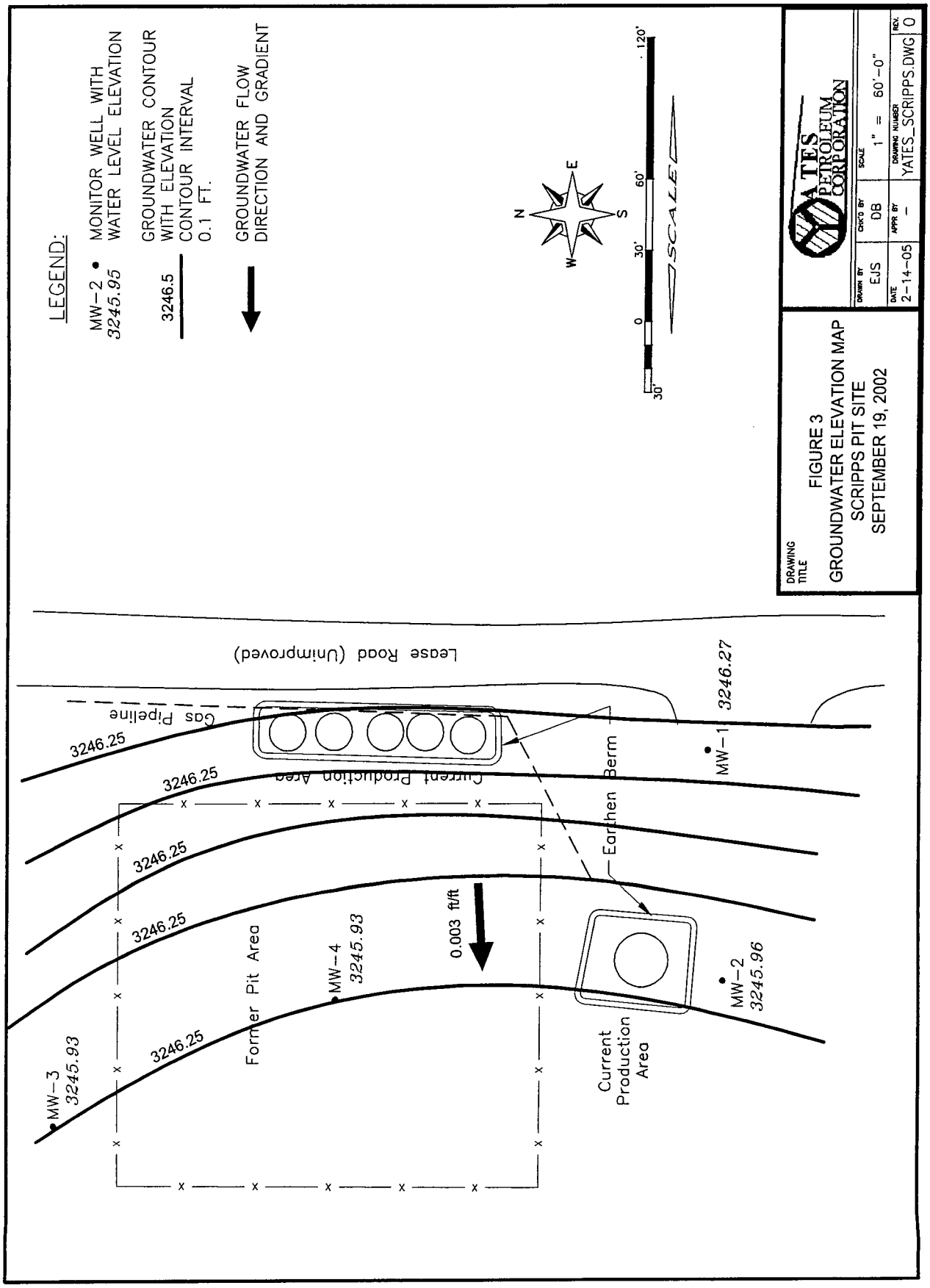

LEGEND:
MW-2 • 3245.95 MONITOR WELL WITH WATER LEVEL ELEVATION
3246.5 GROUNDWATER CONTOUR WITH ELEVATION CONTOUR INTERVAL 0.1 FT.
GROUNDWATER FLOW DIRECTION AND GRADIENT
N E S W
0 30' 60' 120'
SCALE
YATES PETROLEUM CORPORATION
DRAWN BY EJS
CHK'D BY DB
SCALE 1" = 60'-0"
DATE 2-14-05
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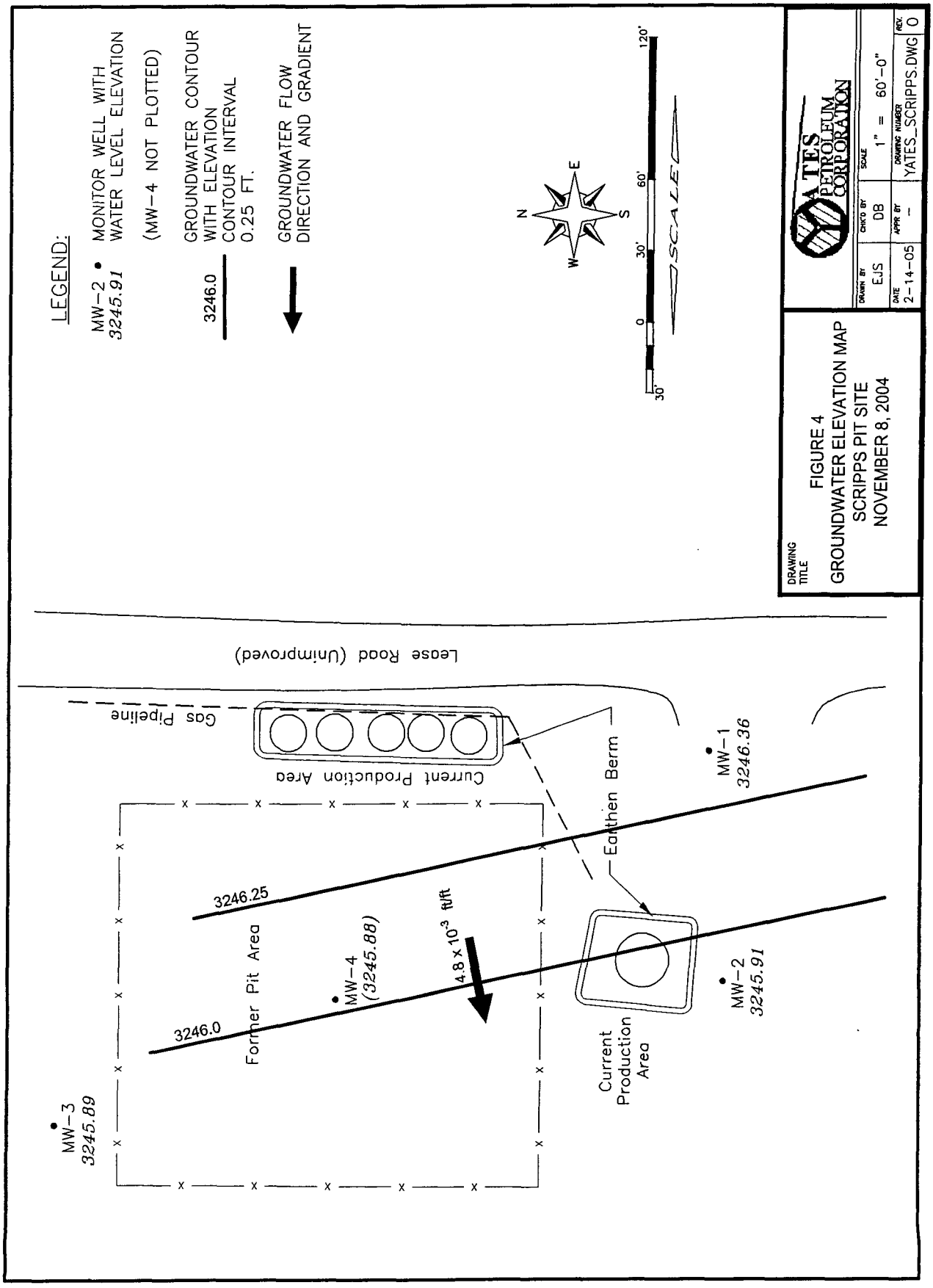
FIGURE 3
GROUNDWATER ELEVATION MAP
SCRIPPS PIT SITE
SEPTEMBER 19, 2002
Lease Road (Unimproved)
Gas Pipeline
Current Production Area
Earthen Berm
Former Pit Area
MW-1 3246.27
MW-2 3245.96
MW-3 3245.93
MW-4 3245.93
3246.25
0.003 ft/ft


LEGEND:
MW-2 • 3245.91 MONITOR WELL WITH WATER LEVEL ELEVATION
(MW-4 NOT PLOTTED)
3246.0 GROUNDWATER CONTOUR WITH ELEVATION CONTOUR INTERVAL 0.25 FT.
GROUNDWATER FLOW DIRECTION AND GRADIENT
N E S W
SCALE
0 30' 60' 120'
30'
YATES PETROLEUM CORPORATION
DRAWN BY EJS
CHK'D BY DB
SCALE 1" = 60'-0"
DATE 2-14-05
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DRAWING NUMBER YATES_SCRIPPS.DWG
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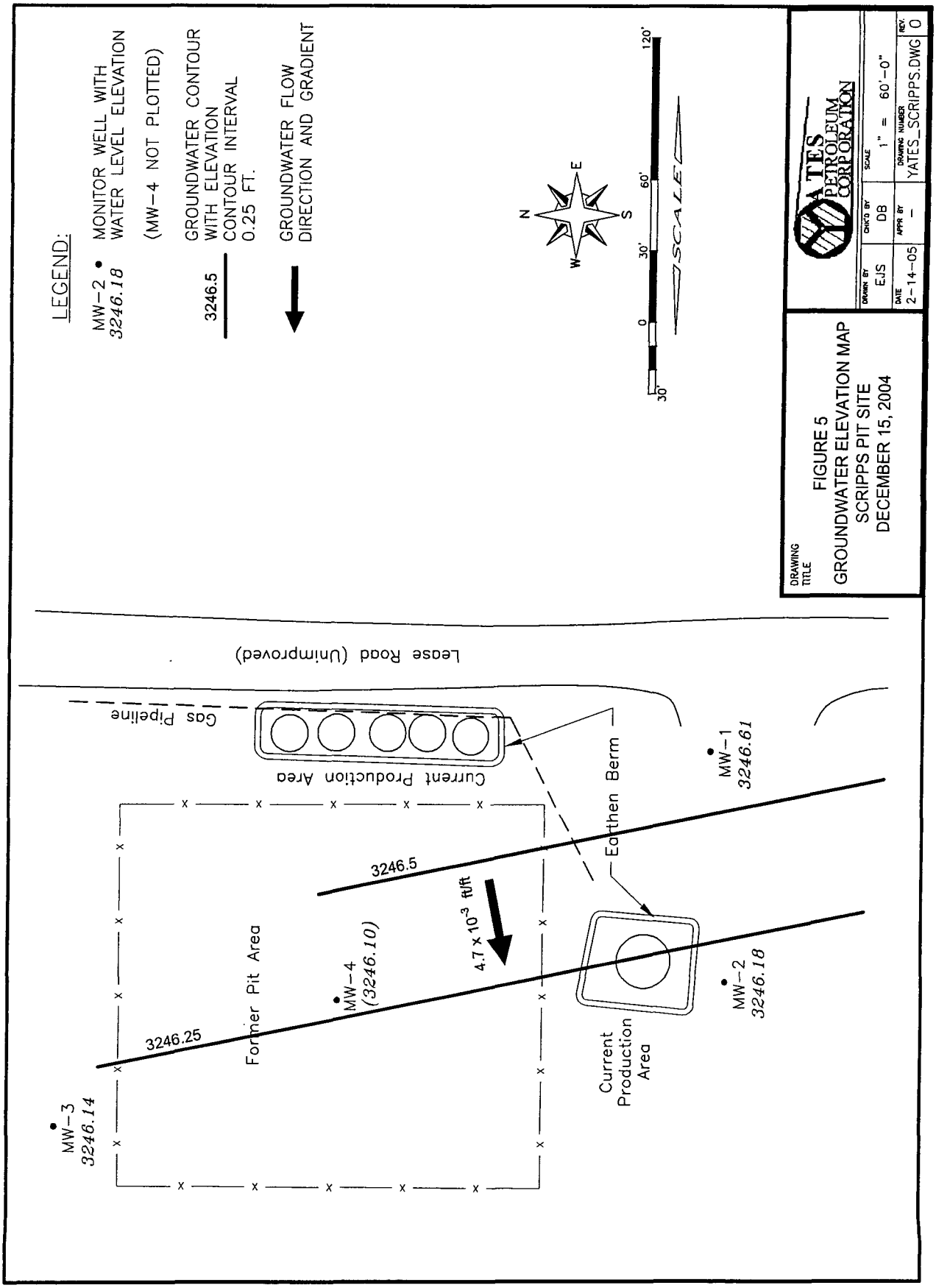
FIGURE 4
GROUNDWATER ELEVATION MAP
SCRIPPS PIT SITE
NOVEMBER 8, 2004
Lease Road (Unimproved)
Gas Pipeline
Current Production Area
Earthen Berm
MW-1 3246.36
3246.25
Former Pit Area
MW-4 (3245.88)
4.8 x 10^-3 ft/ft
3246.0
MW-2 3245.91
Current Production Area
MW-3 3245.89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MW-2 • 3246.18 MONITOR WELL WITH WATER LEVEL ELEVATION
(MW-4 NOT PLOTTED)
3246.5 GROUNDWATER CONTOUR WITH ELEVATION CONTOUR INTERVAL 0.25 FT.
GROUNDWATER FLOW DIRECTION AND GRADIENT
N
E
S
W
SCALE
0
30'
60'
120'
30
YATES PETROLEUM CORPORATION
DRAWN BY EJS
CHK'D BY DB
SCALE 1" = 60'-0"
DATE 2-14-05
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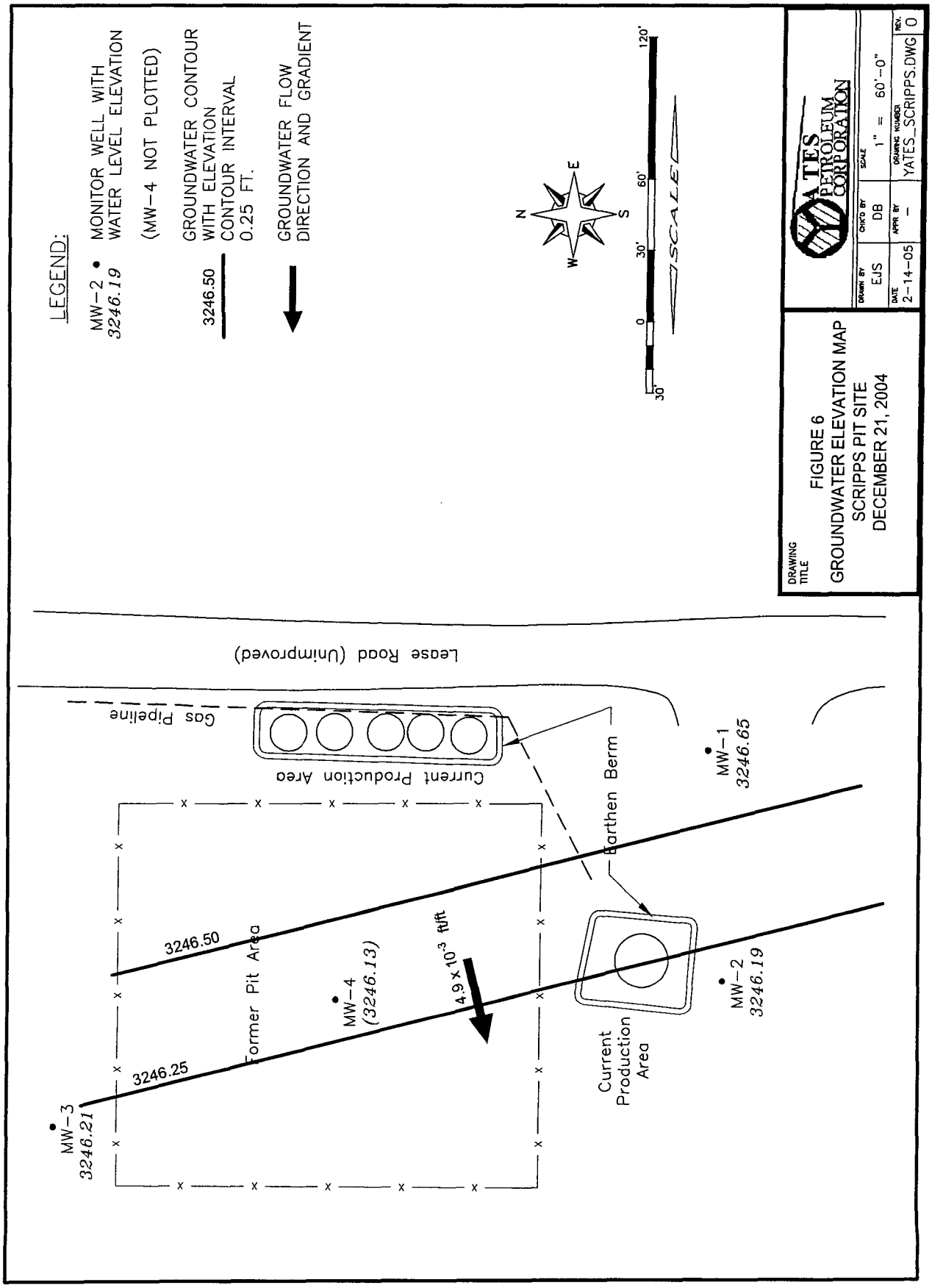
REV. 0
DRAWING TITLE
FIGURE 5
GROUNDWATER ELEVATION MAP
SCRIPPS PIT SITE
DECEMBER 15, 2004
Lease Road (Unimproved)
Gas Pipeline
Current Production Area
Earthen Berm
MW-1 3246.61
3246.5
4.7 x 10-3 ft/ft
Former Pit Area
MW-4 (3246.10)
MW-2 3246.18
3246.25
Current Production Area
MW-3 3246.14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MW–2 • 3246.19 MONITOR WELL WITH WATER LEVEL ELEVATION
(MW–4 NOT PLOTTED)
3246.50 GROUNDWATER CONTOUR WITH ELEVATION
CONTOUR INTERVAL 0.25 FT.
GROUNDWATER FLOW DIRECTION AND GRADIENT
N E S W
0 30' 60' 120'
SCALE
30'
YATES PETROLEUM CORPORATION
DRAWN BY EJS
CHK'D BY DB
SCALE 1" = 60'-0"
DATE 2-14-05
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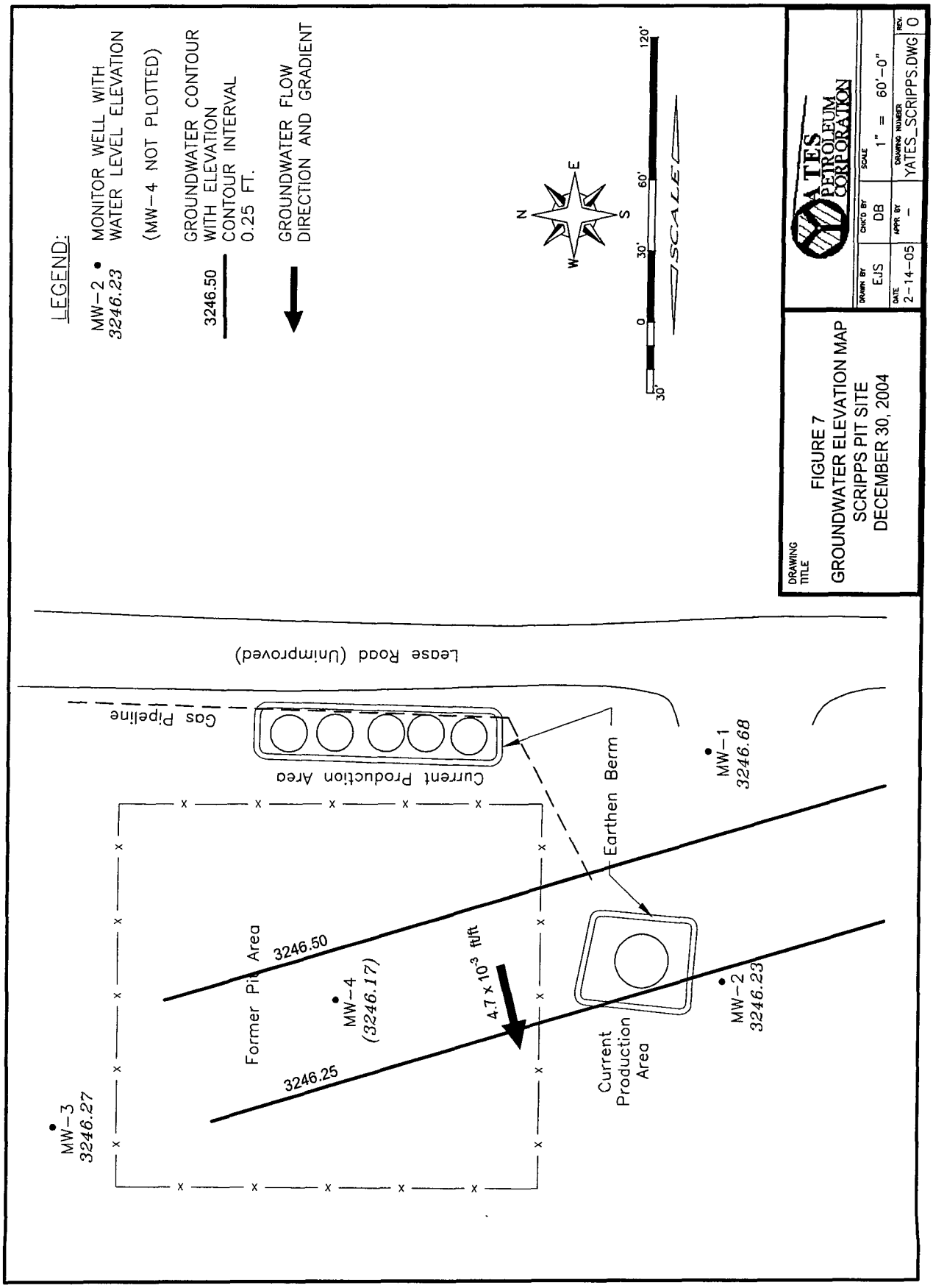
FIGURE 6
GROUNDWATER ELEVATION MAP
SCRIPPS PIT SITE
DECEMBER 21, 2004
Lease Road (Unimproved)
Gas Pipeline
Current Production Area
Earthen Berm
MW–1 3246.65
MW–2 3246.19
MW–3 3246.21
MW–4 (3246.13)
Former Pit Area
3246.50
3246.25
4.9 x 10-3 ft/ft
Current Production Area


LEGEND:
MW-2 • 3246.23
MONITOR WELL WITH WATER LEVEL ELEVATION
(MW-4 NOT PLOTTED)
3246.50
GROUNDWATER CONTOUR WITH ELEVATION
CONTOUR INTERVAL 0.25 FT.
GROUNDWATER FLOW DIRECTION AND GRADIENT
N
E
S
W
0
30'
60'
120'
SCALE
YATES PETROLEUM CORPORATION
DRAWN BY EJS
CHK'D BY DB
SCALE 1" = 60'-0"
DATE 2-14-05
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DRAWING TITLE
FIGURE 7
GROUNDWATER ELEVATION MAP
SCRIPPS PIT SITE
DECEMBER 30, 2004
Lease Road (Unimproved)
Gas Pipeline
Current Production Area
Earthen Berm
MW-1 3246.68
MW-2 3246.23
MW-3 3246.27
MW-4 (3246.17)
Former Pit Area
3246.50
3246.25
4.7 x 10-3 ft/ft
Current Production Area

Appendix – Harding ESE Stage 1 Abatement Plan Proposal, Scripps Pit Site, AP-25, July 2, 2001

STAGE 1 ABATEMENT PLAN PROPOSAL
ABATEMENT PLAN AP-25
SCRIPP PIT SITE
EDDY COUNTY, NEW MEXICO

Prepared for: Yates Petroleum Corporation
105 South Fourth Street
Artesia, New Mexico 88210

YATES PETROLEUM CORPORATION

Harding ESE Project No. 53470.1

July 2, 2001

Harding ESE
A MACTEC COMPANY

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1.0 INTRODUCTION

Harding ESE has prepared this Stage I Abatement Plan (Plan) Proposal on behalf of Yates Petroleum Corporation (Yates). This Plan is for the Scripp Pit Site (Site), located in Eddy County, New Mexico. This Plan has been prepared following the Oil Conservation Division (OCD) request of March 7, 2001, requesting that Yates provide this Plan. The purpose of the Plan is to perform a site investigation that will define existing site conditions and provide adequate data to select an effective groundwater abatement option for the Site. The proposed site investigation activities will include a review of the site history including the nature of the release, a search of water wells within a one-mile radius of the site, an onsite review of surface water hydrology and potential impacts the Site may have had on surface water bodies or water wells in the vicinity, and the installation of three onsite groundwater monitoring wells.

1.1 Background

The Site is a former unlined disposal pit located adjacent to the Scripp Tank Battery, south of Artesia in Eddy County, New Mexico. Figure 1 shows the approximate site location. The tank battery consists of three crude oil and natural gas production wells and associated collection, production, and processing equipment. Figure 2 shows the approximate site layout. During its operational life, the Scripp pit was used to contain water and oil from blowdown events, spills, and general operations at the tank battery.

In 1997, Yates purchased production facilities, including the Scripp Tank Battery from H&S Oil Company (H&S). H&S was a small, privately operated oil and gas producer that did not maintain an effective environmental management or compliance program. Since purchasing the facilities, Yates has made a considerable investment of both time and financial resources which has resulted in significant improvement to the environmental condition at the Site. The following photographs show the condition prior to and following Yates' acquisition of the Site.

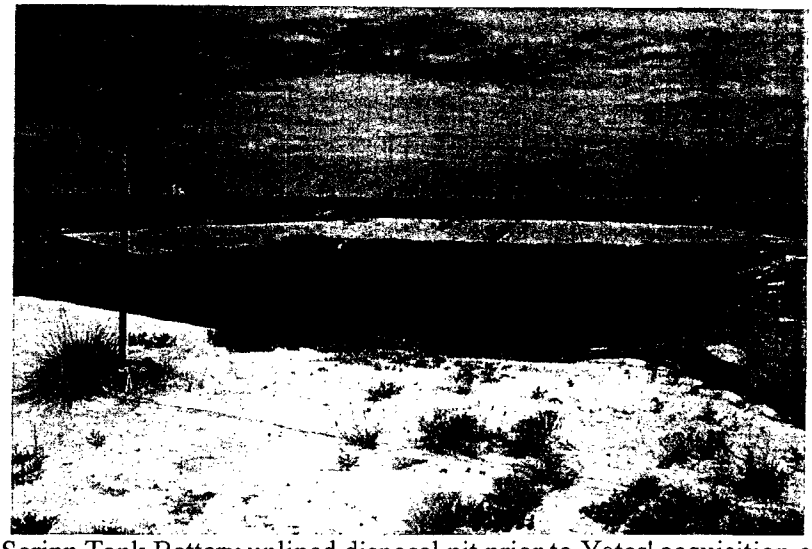

Photo 1: Scripp Tank Battery unlined disposal pit prior to Yates' acquisition of the site.

Photo 2: Scripp Tank Battery pit location following acquisition and closure by Yates.

Harding ESE (formerly Harding Lawson Associates [HLA]) performed a site reconnaissance at the Scripp Tank Battery on September 23, 1997, as part of an Environmental Site Assessment (ESA) for the H & S Oil and Gas properties prior to their acquisition by Yates. This acquisition included the Site. At the time of the field inspection, the Scripp disposal pit was approximately 40 feet by 40 feet in area and contained water and oil with petroleum saturated soils in the pit walls. Harding ESE collected a soil sample of the pit wall from above the liquid level in the pit to determine the petroleum hydrocarbon and benzene, toluene, ethylbenzene, and total xylenes (BTEX) concentrations. The soil collected from the pit wall contained 27,000 parts per million (ppm) of total petroleum hydrocarbons (TPH), exceeding the OCD Soil Guideline of 1,000 ppm. Harding ESE recommended at that time that contaminated soils should be removed or remediated on-site, and the unlined disposal pit should be closed in accordance with OCD guidelines.

On May 20, 1998, Bioremediation Contractors & Consultants, Inc. (BCC) submitted a proposal to Yates to close the pit at the Site. The proposal included all monitoring, documentation, and soil sampling that BCC indicated would be required in order to be in compliance with the OCD. On May 19, 1999, BCC completed the first phase of their plan. Bird netting and debris were cleared from the pit and excess fluids were vacuumed from the pit area. Affected areas were ripped and power tilled to prepare the soil for treatment. The pit was then sprayed with BCC's SOP 3 microbial solution, treated with nutrients, and watered to promote hydrocarbon degradation. According to BCC, sufficient watering as well as periodic tilling were maintained throughout the project. On September 22, 1999, three soil samples were collected from the Scripp Pit by BCC to determine BTEX concentrations in the pit soil. BTEX concentrations in that sample did not exceed OCD Soil Guidelines in any of the samples. On January 11, 2000, three soil samples were again collected for laboratory analysis. Those soil samples did not contain total petroleum hydrocarbons (TPH) at concentrations exceeding the OCD Soil Guideline of 1,000 ppm. On February 28, 2000, BCC submitted a Final Closure Report to the State of New Mexico. Closure of the pit was not granted by the OCD. The OCD indicated the closure request was rejected because the soil and water were not sampled for chlorides, there was inadequate soil sampling done, and there was no site map or narrative explanation of activities provided in the report. On March 31, 2000, BCC

completed the second phase of their plan. The Scripp Pit was treated and watered to prepare it for closure, then layered with 10 inches of manure, backfilled, and smoothed.

On October 20, 2000, Environmental Technology Group, Inc. (ETGI) mobilized a drilling rig to the site. Two soil borings, SB-1 and SB-2, were performed. A soil sample was collected from SB-1 at a depth of 19.5-20.5 feet below ground surface (bgs), which was near the boring's total depth. Soil samples were collected from SB-2 at depths of 9-10, 30-33, 35-37, and 39-41 feet bgs. A groundwater sample was collected from SB-2 at a depth of 45 feet bgs, which was the total depth of the boring. The groundwater sample contained 25,170 ppm chlorides, exceeding the WQCC water standard of 250 ppm. Background data for chlorides concentrations in the area, according to the State Engineers' database, are in the range of 400 to 600 ppm. The groundwater sample also contained benzene at a concentration of 15 parts per billion (ppb), exceeding the WQCC benzene water standard of 10 ppb.

ETGI submitted a Site Investigation Report for the Scripp Pit Site to Yates in November 2000. Yates examined this information as well as the field notes and analytical results of BCC and, in a letter to the OCD dated December 15, 2000, again requested closure of the Scripp Pit from the OCD. In a letter to Yates dated March 7, 2001, the OCD again rejected the closure request due to the presence of benzene and chlorides in groundwater underlying the site at concentrations in excess of WQCC standards. The OCD requested that Yates provide this Stage I Abatement Plan pursuant to OCD Rule 19.E.1 and OCD Rule 19.E.3 and 10NMAC 15.A.19.C.1.

1.2 Objectives

The objectives of the Stage I Abatement Plan Investigation are as follows:

1. Respond to the OCD requirement for groundwater abatement.
2. Examine site history, including the nature of the release that caused the water pollution and a summary of previous investigations and pit closure attempts.
3. Take inventory of water wells within a one-mile radius of the Scripp Pit and the location and number of such wells actually or potentially affected by contamination from the site.
4. Examine surface water hydrology at the site and assess any possible impacts pollution from the Scripp Pit may have on surface water and stream sediments in the vicinity.
5. Define site and regional geology.
6. Determine suitable sampling locations and install groundwater monitoring wells to define site hydrogeology and the vertical and horizontal extent of the plume.
7. Recommend additional action, if necessary, based on the findings of the groundwater investigation.

These objectives will be attained by evaluating historical data, performing an onsite field investigation which will include drilling and monitoring well installation, soil and groundwater sampling, evaluating the field results, and preparing a Stage I Abatement Plan Investigation Report.

1.3 Site Location

The Scripp Pit Site is located in the NW 1/4 of the SW 1/4 of Section 25, Township 18 South, Range 26 East in Eddy County, New Mexico, approximately nine miles south of Artesia (Figure 1).

Harding ESE identified three locations where monitoring wells will be installed as part of the Stage I Abatement Plan Investigation (Figure 2). The monitoring wells will be drilled in locations established to

determine groundwater flow direction across the site and define the horizontal extent of the chlorides and benzene in groundwater.

2.0 SCOPE OF WORK

Harding ESE has prepared this scope of work which presents the details of the Stage I Abatement Plan Investigation activities. Harding ESE's scope of work is based on previous investigations and activities at the Site, a site visit conducted by Harding ESE and Yates personnel, and the requirements of the applicable OCD Rules and WQCC Regulations.

2.1 Health and Safety Plan

Prior to initiating field activities, Harding ESE will prepare the Occupational Safety and Health Administration (OSHA) required site-specific health and safety plan (HASP). The HASP will detail specific actions to monitor and assess the potential exposure to petroleum hydrocarbon and other volatile organic compounds at the work site during drilling and sampling field activities. The HASP will also address safety issues such as overhead and buried utilities. In addition, all Harding ESE field personnel assigned to this project have successfully completed the OSHA 40-hour hazardous waste operations and emergency response procedures training course, as well as the OSHA 8-hour hazardous waste site supervisors training course. Harding ESE field personnel assigned to this project are part of Harding ESE's OSHA-required medical monitoring program.

2.2 Notifications, Site Access, and Utility Markout

Prior to field mobilization, Harding ESE will coordinate the field schedule and access to the site with Yates and OCD personnel. Additionally, prior to commencing drilling activities, Harding ESE will notify the New Mexico One-Call System to obtain utility clearances. However, because of the remote location of the site, Harding ESE will also coordinate with the Yates field operator to obtain information on subsurface utility lines at the Site.

2.3 Soil Borings and Soil Sampling

Harding ESE will complete three soil borings as part of the drilling, sampling, and well installation activities at the Site. Figure 2 shows the approximate locations of the soil borings. One soil boring/monitoring well will be located within the limits of the former pit, and two borings/wells will be located slightly downgradient of the former pit. The two downgradient borings/wells are staggered so that groundwater flow direction and gradients can be calculated. The wells will be drilled using a hollow stem auger (HSA) rig. Harding ESE will collect drive samples using split-barrel samplers (split-spoons) every five feet in order to determine specific lithology and perform field screening of the drive samples for organic vapors. The following procedures will be utilized during drilling and soil sample collection activities.

Soil samples will be field analyzed for total volatile hydrocarbons using heated headspace analysis. Heated headspace procedures used by Harding ESE field personnel follow the guidance of Section II.D. of the UST Bureau Soil/Water Sampling and Disposal Guidelines. The following procedures will be utilized to perform the heated headspace method:

- Fill a 16-ounce or larger glass jar half full of the soil sample.
- Seal the top of the jar with clean aluminum foil.

- Ensure that the soil sample is at 60 to 80 degrees Fahrenheit.
- Allow the aromatic volatile hydrocarbon concentrations to develop in the sample jar for 5 to 10 minutes. During this headspace development, the soil sample will be shaken vigorously for one minute.
- Immediately pierce the aluminum foil seal with the probe of the photoionization detector (PID) and read the highest measurement. The instrument will be able to detect total volatile hydrocarbons in the range of 0 to 2,000 ppm.

In addition to the field headspace analysis to be performed on the soil samples, the physical characteristics of the soil samples will be logged by the onsite Harding ESE personnel. Logging of the soil samples shall consist of noting the blow counts, lithology, approximate grain size, approximate moisture content, color, plasticity, odor, and Unified Soil Classification System (USCS) name and symbol. Computer generated logs of the borings will be included in the Report.

The downhole drilling equipment will be decontaminated between boring locations. Wash water from the decontamination operations will be placed onto the ground surface in the former pit location and allowed to evaporate. Harding ESE does not anticipate generating large quantities of decontamination wash water at the Site and does not anticipate containerizing the decontamination fluids.

2.4 Monitoring Well Installation

Groundwater monitoring wells will be installed in each of the three soil borings at the Site. Harding ESE will construct the wells with 20 feet of well screen extending from five feet above the water table to 15 feet below the water table to maximize the well service life, should decreases in the local water table occur. The soil borings will not be disturbed for approximately one hour after reaching the proposed total depth to allow the water level to stabilize before determining screen placement.

Harding ESE will construct the wells using the following materials:

- Twenty feet of two-inch diameter, 0.010-inch slot polyvinyl chloride (PVC) well screen will be placed in the borehole inside the augers. The well screen will be threaded onto two-inch diameter blank PVC casing from the top of the well screen to just above the ground surface.
- A filter pack/formation stabilizer will be placed in the annular space around the well screen from the bottom of the borehole to a height of approximately five feet above the top of the well screen. The sand pack will consist of 10/20 size Colorado Silica Sand or equivalent.
- A bentonite pellet or chip seal will be placed in the annular space in the approximately five foot interval directly above the sand pack. The bentonite pellets or chips will be hydrated with a minimum of ten gallons of potable water and allowed to hydrate for 30 minutes prior to continuing with the well construction.
- Cement/bentonite grout will be placed in the annular space from the top of the bentonite seal to just below the ground surface. Each batch of cement/bentonite grout will be composed of 8 gallons of fresh water, 94 pounds of Class A portland cement, and four percent (3.8 pounds) of sodium bentonite powder.
- A six-inch diameter outer protective casing with a hinged cap will be placed over the well casing and set in concrete. The protective casing will extend from approximately two feet bgs to three feet above ground surface. The PVC well casing will be cut so that the top of the casing is approximately three inches below the top of the protective casing. An expansion cap will be placed on the PVC

casing and tightened. A padlock will be placed on the outer protective casing to prevent unauthorized access into the wells.

Construction details for each well will be provided in the soil boring/well completion logs in the Site Investigation Report.

2.5 Well Development and Groundwater Sampling

Immediately upon completion of the well installation, the wells will be developed by surging and bailing. The wells will be developed until a turbidity-free discharge is obtained or until five well casing volumes of groundwater have been removed. Well development water will be discharged to the ground surface adjacent to the well location. During development, Harding ESE personnel will monitor the pH, temperature and electrical conductivity of the groundwater at a frequency of once per well casing volume.

Harding ESE will collect a groundwater sample from each of the three monitoring wells following well development. Groundwater samples will be collected by lowering a dedicated, disposable polyethylene bailer into the well to retrieve a sample. Harding ESE will measure the pH, temperature, and conductivity of the sample. The groundwater samples will be shipped to Hall Environmental Analysis Laboratory, Inc. (HEAL), of Albuquerque, New Mexico, for analyses. The groundwater samples will be analyzed for chlorides by EPA Method 300.0 and benzene, toluene, ethylbenzene, and total xylenes (BTEX) by EPA Method 8021. A summary of the laboratory analytical results as well as a copy of the laboratory deliverable package including the chain-of-custody will be included with the Site Investigation Report.

2.6 Site Restoration

Harding ESE will spread drill cuttings onsite, remove all trash associated with drilling activities at the Site, and will restore the site to its approximate original configuration. The only anticipated permanent features will be the three monitoring wells set in concrete pads.

3.0 REPORTING

3.1 Status Reports

Harding ESE's field personnel will be in direct contact with the Yates Environmental Coordinator, and will provide daily verbal updates to the project manager once onsite activities are underway. Harding ESE will notify Yates immediately if any unexpected conditions arise while onsite.

3.2 Final Site Investigation Report

At the completion of the onsite activities, Harding ESE will compile the data and prepare a Stage I Abatement Plan Investigation Report that presents the details of the project activities.

The Report will include:

- site background information;
- a narrative of the field activities;
- a discussion of the results with emphasis on the development of an abatement plan;
- a Groundwater Abatement Plan for the Site based on analytical results and field observations;
- figures presenting monitoring well locations;
- computer-generated soil boring logs with well construction details;
- analytical results data summary tables; and
- copies of the laboratory deliverable packages.

4.0 SUBCONTRACTORS

4.1 Subcontractors

Based on the experience and cost estimates received from potential subcontractors, Harding ESE has selected the following subcontractors to support this investigation, as listed below:

- Drilling and monitoring well installation – Atkins Engineering Associates, Inc., of Roswell.
- Analytical Laboratory – Hall Environmental Analysis Laboratory, Inc., of Albuquerque.

5.0 SCHEDULE

Harding ESE anticipates approximately four field days to complete the drilling and sampling activities. The time to complete the onsite activities includes:

- Mobilization;
- Drilling and soil sample collection;
- Well completion and development;
- Groundwater sample collection;
- Site restoration; and
- Demobilization.

Immediately upon receiving notice to proceed, Harding ESE will prepare the Health and Safety Plan, contact the NM One-Call System, and schedule the field sampling.

DISTRIBUTION

Stage 1 Abatement Plan Proposal
Abatement Plan AP-25
Scripp Pit Site
Eddy County, New Mexico

July 2, 2001

Copies 1-3: Yates Petroleum Corporation
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Artesia, New Mexico 88210
Attn.: Ms. Lisa Norton

Copy 4: New Mexico Energy, Minerals and Natural Resources Department
Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, New Mexico 87505
Attn.: Mr. Roger Anderson

Copy 5: New Mexico Oil Conservation Division
District 2
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Artesia, New Mexico 88210
Attn: Mr. Mike Stubblefield

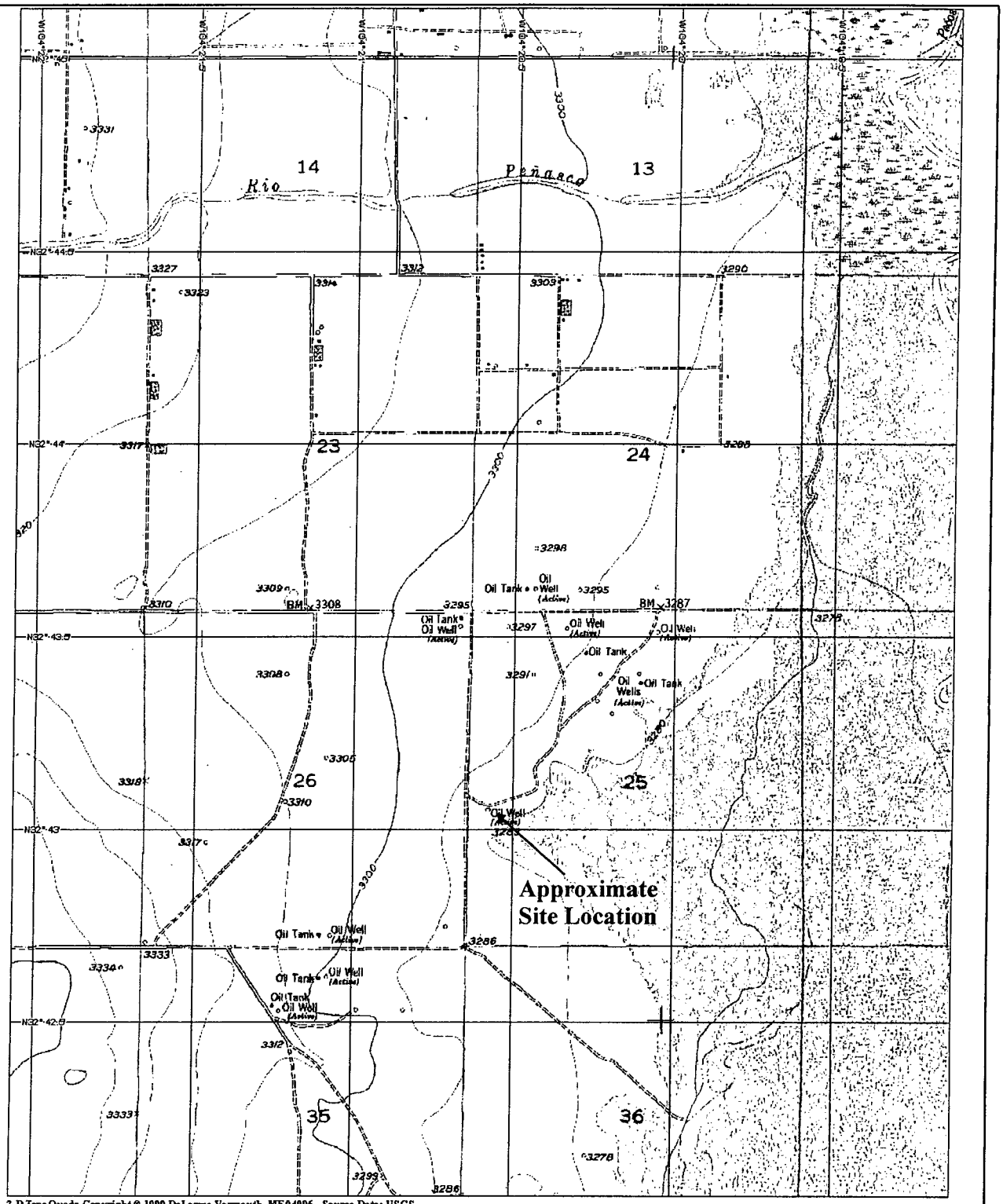
Copies 6-7: Harding ESE Project File 53470.1

Quality Control Reviewer

Jeffrey D. Minchak, P.G.
Senior Project Geologist

FIGURES

(53470\Wp\Scripp Figure 1.cdr)



Harding ESE
A MACTEC COMPANY

Figure 1
Site Location Map
Scripp Pit Site
Lake McMillan North USGS 7.5-Minute Quadrangle
Eddy County, New Mexico

Harding ESE Project No. 53470

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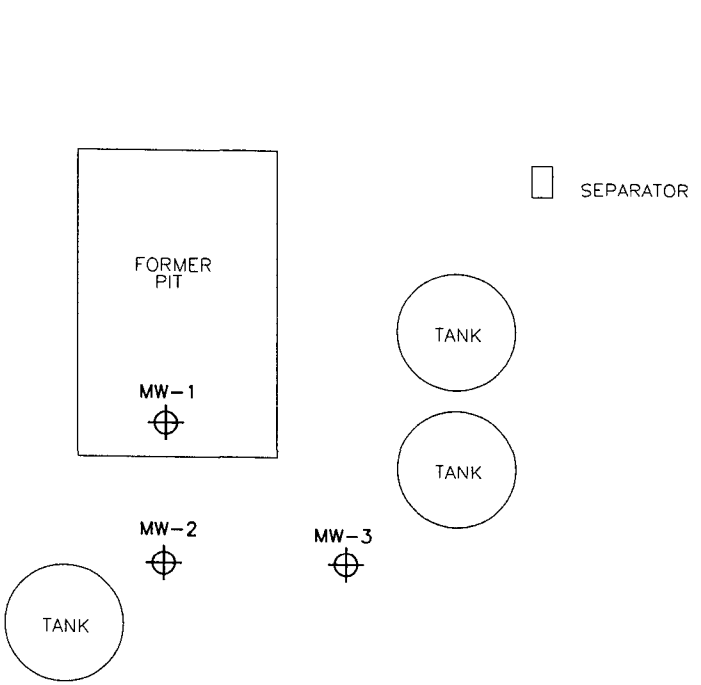

MW-1 ⊕ PROPSED SOIL BORING / MONITORING WELL LOCATIONS

NOT TO SCALE

NO	DATE	REVISIONS	BY	CHK

DRAWN: FSM	PROJECT NO: 53470.1		
SCALE: NTS			
CHECKED: AK	APPROVED:		
DATE: 05/06/01	DATE:		

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SOIL BORING / MONITORING WELL LOCATIONS
SCRIPPS PIT SITE
EDDY COUNTY NEW MEXICO

FIGURE 2