AP - 022

STAGE 1 & 2 WORKPLANS

DATE:

Feb. 15, 2005

AP 22

Yates Petroleum Company
Amended Stage 1 Abatement Plan
Proposal and Work Plan
Williams Pit Site (AP-22)

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

February 15, 2005

Prepared for:

Yates Petroleum Company
105 South 4th Street
Artesia, New Mexico 88210

By:

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(505) 397-0510

AP22
AP23
AP24
AP25

MARTIN YATES, III
1912 - 1985
FRANK W. YATES
1936 - 1986

YATES PETROLEUM CORPORATION

105 SOUTH FOURTH STREET
ARTESIA, NEW MEXICO 88210-2118
TELEPHONE (505) 748-1471

S. P. YATES
CHAIRMAN OF THE BOARD
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RANDY G. PATTERSON
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DENNIS G. KINSEY
TREASURER

02-15-05

Mr. Ed Martin
Environmental Bureau
New Mexico Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

RE: Stage 1 Abatement Plan Proposals
Williams Pit Site (AP-22)
Lattion Pit Site (AP-23)
Inex Pit Site (AP-24)
Scripps Pit Site (AP-25)

Dear Mr. Martin:

Enclosed please find the amended Stage 1 Abatement Plan Proposals for the above sites. The New Mexico Oil Conservation Division (NMOCD) has required submittal of abatement plans for the subject sites. Preliminary site investigation reports dated June 2003 were previously submitted to the Division. On October 6, 2004, the OCD responded with a letter stating that a review of the reports showed that the extent of groundwater contamination at the sites had not been determined. The letter requested that work plans 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 you December 17, 2004.

While the amended abatement plan proposals are under review, Yates will monitor water levels quarterly or more frequently as necessary to determine groundwater flow direction. Additionally, the monitor wells will be sampled for BTEX, chlorides and TDS on a quarterly basis.

If you have any questions on the submittals, please contact me at 505-748-4181.

Sincerely,

Dan Dolan, CWC
Environmental Regulatory Agent

TABLE OF CONTENTS

I. Company Contacts

Name, Company	Telephone	E-mail
Bob Allen, SESI	505-397-0510	ballen@sesi-nm.com
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Dan Dolan, Yates	505-748-4181	ddolan@ypcnm.com

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 Williams battery approximate to Unit letter C, 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 Williams battery. The pit has since been closed.

III. Background

The New Mexico Oil Conservation Division (NMOCD) has required submittal of an abatement plan (AP-22) for the subject site. A "Preliminary Site Investigation Report" 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.

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 occupied an area with exterior dimensions of approximately 240 ft. by 240 ft. or 57,600 sq. ft. (1.3 acres) (Figure 2).

V. Vertical and Horizontal Extent of Contamination

Vertical and horizontal delineation was performed during the preliminary site investigation reported in June 2003. Soil borings drilled during the investigation documented hydrocarbon contamination to a depth of 10 ft. in the boring that penetrated the pit (MW-4). That boring was free of hydrocarbons at 29 ft. Hydrocarbons were absent in all other borings from surface to total depth (Table 1). Elevated chlorides were found in all borings at all depths. Generally, chloride concentrations were less in the borehole that penetrated the pit and higher in the other monitor well boreholes.

VI. Groundwater

Groundwater at the site is at a depth of approximately 28-30 ft. below the surface (Table 2). Groundwater flow is generally from north to south. However mapping of recent measurements shows variation of the direction of movement; direction of flow varied from south-southeast to south-southwest in measurements taken in November and December 2004. The variation is most likely due to recharge from relatively large precipitation events that occurred in the fourth quarter of 2004. Measurements from MW-4 appear anomalous compared to the other wells and were generally not plotted on the maps.

Water quality of the groundwater is poor with chlorides in the monitor wells sampled in November 2004 ranging between 6,100 mg/L (MW-4) and 36,000 mg/L (MW-3). Water quality in the three wells outside the pit averaged 27,660 mg/L chlorides and 37,670 mg/L total dissolved solids (TDS). Water quality was worst in the upgradient well (MW-3) and best in the pit well (MW-4). However all concentrations greatly exceed water quality standards for human or animal use (Table 2). Benzene and ethylbenzene were detected in MW-4 at a concentration of 0.002 mg/L which is below the regulatory standard for both constituents (0.010 and 0.750 mg/L, respectively).

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].

VII. Action Plan

Based on evaluation of the existing information, the conditions at this site appear to be related to natural mineralization of the soil and groundwater rather than contamination by the pit. To verify if that is the situation, we propose the following work:

1. Resurvey monitor well elevations.
   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.
2. Install an additional monitor well.
   An additional monitor well will be installed upgradient of the site 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 area will be to the north or northeast of the pit location. At least three soil samples will be collected during drilling and analyzed for chlorides.
3. Plug monitoring well MW-4.
   This well was drilled through the center of the pit. Water quality in the well is noticeably different and somewhat better than the surrounding wells indicating possible downward migration from above. Dissolved BTEX was detected at the reporting level for two constituents, benzene and ethylbenzene during the November 2004 sampling. It is unknown whether drilling of the well provided a vertical pathway for contaminant migration, however it would be best to plug the well and monitor groundwater quality from outside the pit boundaries. We propose to plug the well by injecting pressurized bentonite/cement mix grout down the casing and through the screen. We will remove the steel protection box and cut off the casing below the surface.
4. Measure water levels and monitor groundwater quality.
   Water levels and groundwater quality will be sampled in all remaining monitor wells following installation of the new monitor well. Analyses will include BTEX and major cations and anions.

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.

5. Prepare an updated site investigation report.
   This report will be prepared and submitted to the NMOCD within 60 days of completion of the field work. It will present the data collected and summarize the results of the investigation.

VIII. Tables and Figures

Table 1. Soil Sampling Results, Williams 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	15	851	<0.025	<0.025	<0.025	<0.025	<0.025	<10.0	<10.0	<10.0
08/28/02	25	6,760	<0.025	<0.025	<0.025	<0.025	<0.025	<10.0	<10.0	<10.0
	30	7,270	<0.025	<0.025	<0.025	<0.025	<0.025	<10.0	<10.0	<10.0
MW-2	20	5,940	<0.025	<0.025	<0.025	<0.025	<0.025	<10.0	<10.0	<10.0
08/28/02	30	14,100	<0.025	<0.025	<0.025	<0.025	<0.025	<10.0	<10.0	<10.0
MW-3	15	8,680	<0.025	<0.025	<0.025	<0.025	<0.025	<10.0	<10.0	<10.0
09/06/02	25	11,000	<0.025	<0.025	<0.025	<0.025	<0.025	<10.0	<10.0	<10.0
	35	5,320	<0.025	<0.025	<0.025	<0.025	<0.025	<10.0	<10.0	<10.0
MW-4	5	4,250	8.11	2.81	20.3	34.1	65.3	1,380	9,720	11,100
09/06/02	10	7,440	3.08	1.18	12.4	20.0	36.7	467	4,550	5,017
	29	2,750	<0.025	<0.025	<0.025	<0.025	<0.025	<10.0	<10.0	<10.0

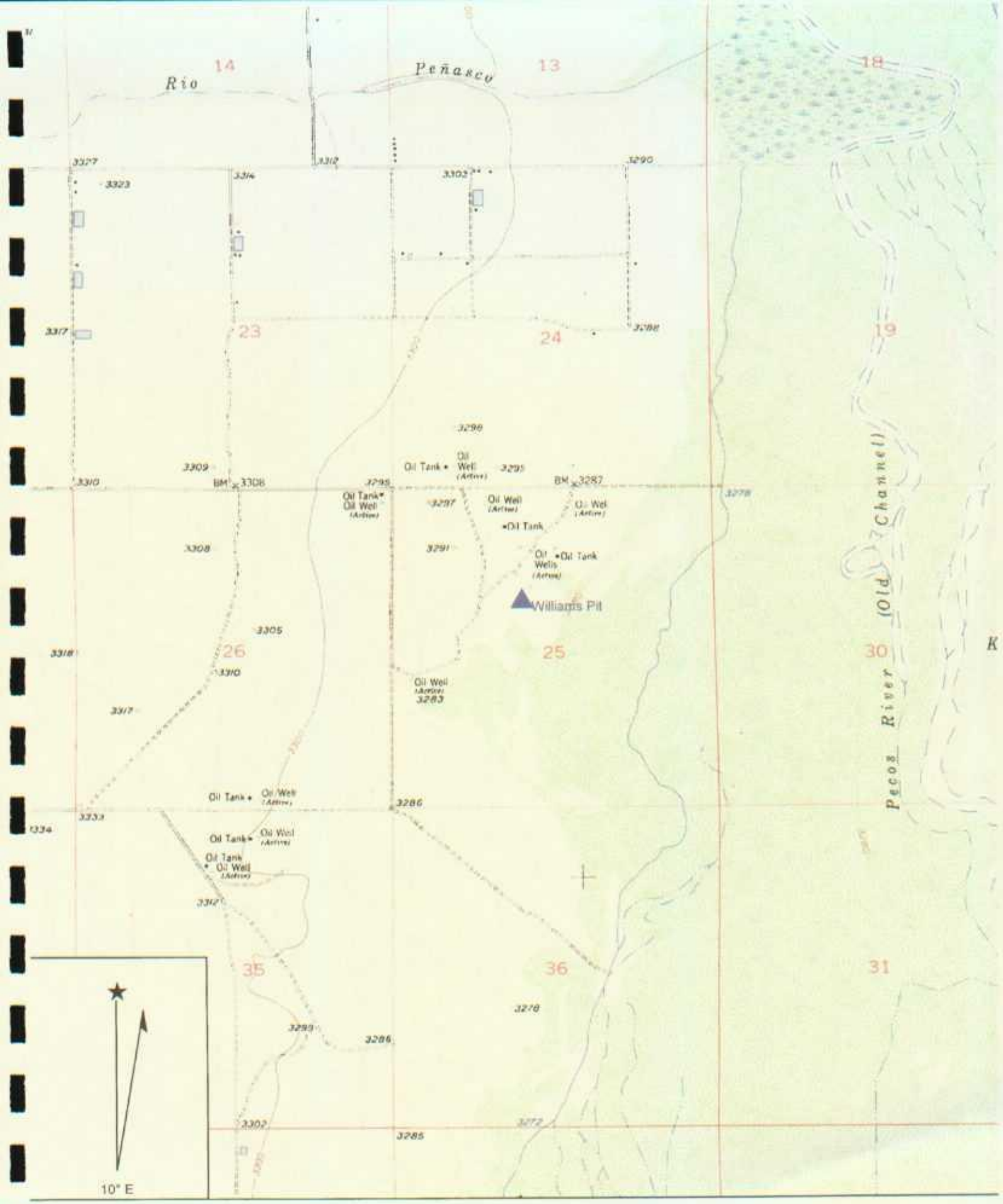
Table 2. Water Level Measurements, Williams Pit Site, 2002-2004

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	3,282.57	09/18/02	31.92	3,250.65	10.1	- -
42.05		09/19/02	32.05	3,250.52	10.0	-0.13
		11/08/04	30.99	3,251.58	11.1	1.06
		12/01/04	30.40	3,252.17	11.7	0.59
		12/15/04	30.08	3,252.49	12.0	0.32
		12/21/04	29.99	3,252.58	12.1	0.09
		12/30/04	29.73	3,252.84	12.3	0.26
MW-2	3,282.34	09/18/02	32.08	3,250.26	12.7	- -
44.81		09/19/02	31.85	3,250.49	13.0	0.23
		11/08/04	30.76	3,251.58	14.1	1.09
		12/01/04	30.42	3,251.92	14.4	0.34
		12/15/04	30.20	3,252.14	14.6	0.22
		12/21/04	30.03	3,252.31	14.8	0.17
		12/30/04	29.88	3,252.46	14.9	0.15
MW-3	3,282.98	09/18/02	32.35	3,250.63	6.2	- -
38.50		09/19/02	32.38	3,250.60	6.1	-0.03
		11/08/04	31.06	3,251.92	7.4	1.32
		12/01/04	30.00	3,252.98	8.5	1.06
		12/15/04	30.10	3,252.88	8.4	-0.10
		12/21/04	29.98	3,253.00	8.5	0.12
		12/30/04	29.96	3,253.02	8.5	0.02
MW-4	3,282.70	09/18/02	31.70	3,251.00	8.5	- -
40.18		09/19/02	31.72	3,250.98	8.5	-0.02
		11/08/04	30.89	3,251.81	9.3	0.83
		12/01/04	31.16	3,251.54	9.0	-0.27
		12/15/04	30.23	3,252.47	10.0	0.93
		12/21/04	30.12	3,252.58	10.1	0.11
		12/30/04	29.94	3,252.76	10.2	0.18
(Table updated 01/03/05)						

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

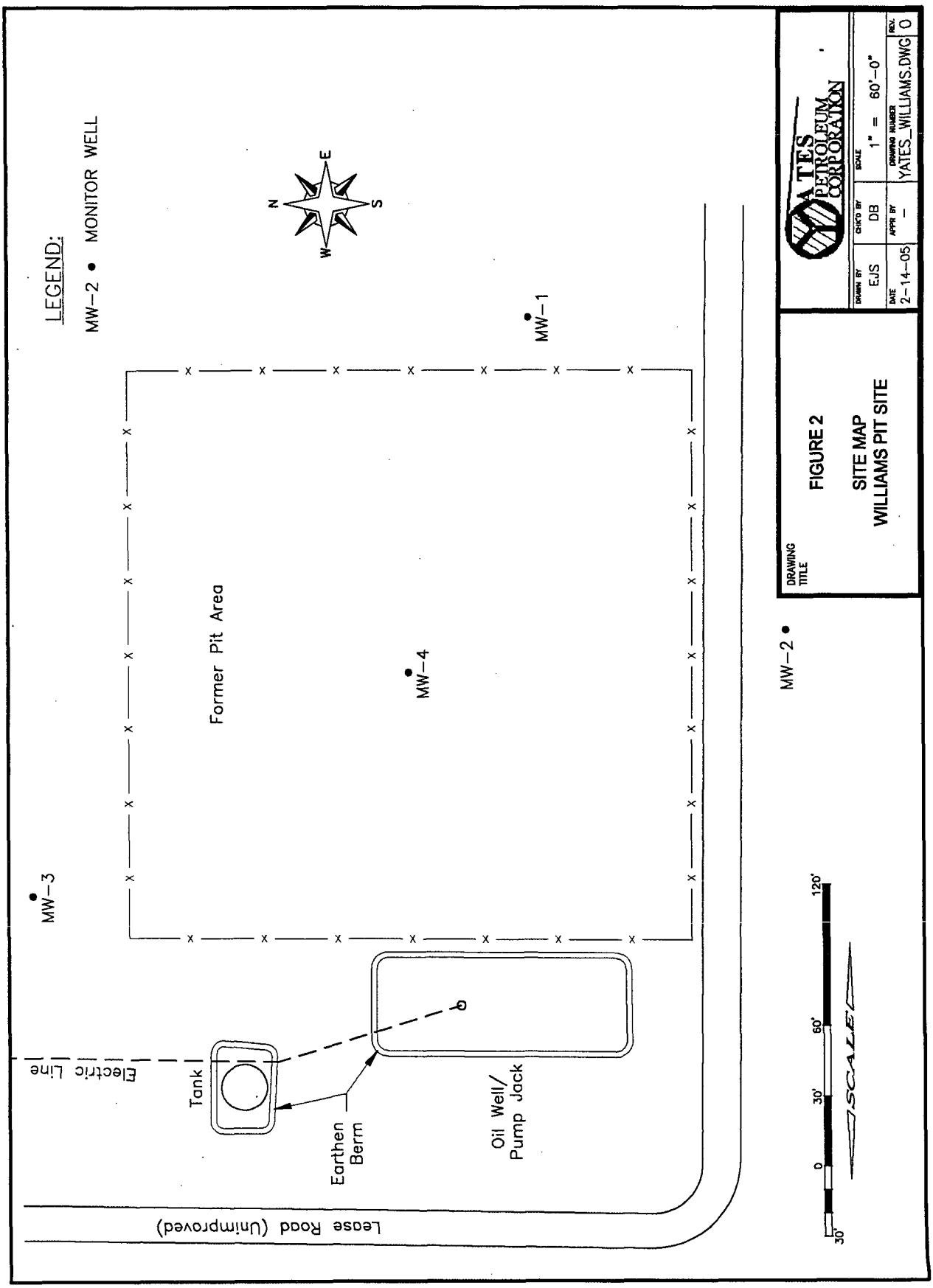
Sample Location	Date	Chloride (mg/L)	TDS (mg/L)	Benzene (mg/L)	Toluene (mg/L)	Ethyl-benzene (mg/L)	Total Xylenes (mg/L)
MW-1	09/19/02	26,600	36,800	<0.001	<0.001	<0.001	<0.001
	11/08/04	26,992	33,500	<0.002	<0.002	<0.002	<0.006
MW-2	09/19/02	13,300	22,500	<0.001	<0.001	<0.001	<0.001
	11/08/04	19,994	25,000	<0.002	<0.002	<0.002	<0.006
MW-3	09/19/02	33,700	50,100	0.002	<0.001	<0.001	<0.001
	11/08/04	35,989	54,500	<0.002	<0.002	<0.002	<0.006
MW-4	09/19/02	8,150	14,700	0.142	<0.001	<0.001	0.006
	11/08/04	6,098	10,800	0.002	<0.002	0.002	<0.006
NM WQCC Groundwater		250	1,000	0.010	0.750	0.750	0.650

Figure 1. Vicinity Map, Williams Pit Site



Name: LAKE MC MILLAN NORTH
Date: 1/28/105
Scale: 1 inch equals 2000 feet

Location: 032° 43' 15.4" N 104° 20' 12.0" W
Caption: Yates Petroleum
Sec 25, T18S, R26E
Eddy County, New Mexico


LEGEND:
MW-2 • MONITOR WELL
N
E
S
W
MW-1
MW-2
MW-3
MW-4
Former Pit Area
Electric Line
Tank
Earthen Berm
Oil Well/ Pump Jack
Lease Road (Unimproved)
SCALE
0
30'
60'
120'
DRAWING TITLE
FIGURE 2
SITE MAP
WILLIAMS PIT SITE
DRAWN BY EJS
CHK'D BY DB
APPR BY –
DATE 2-14-05
SCALE 1" = 60'-0"
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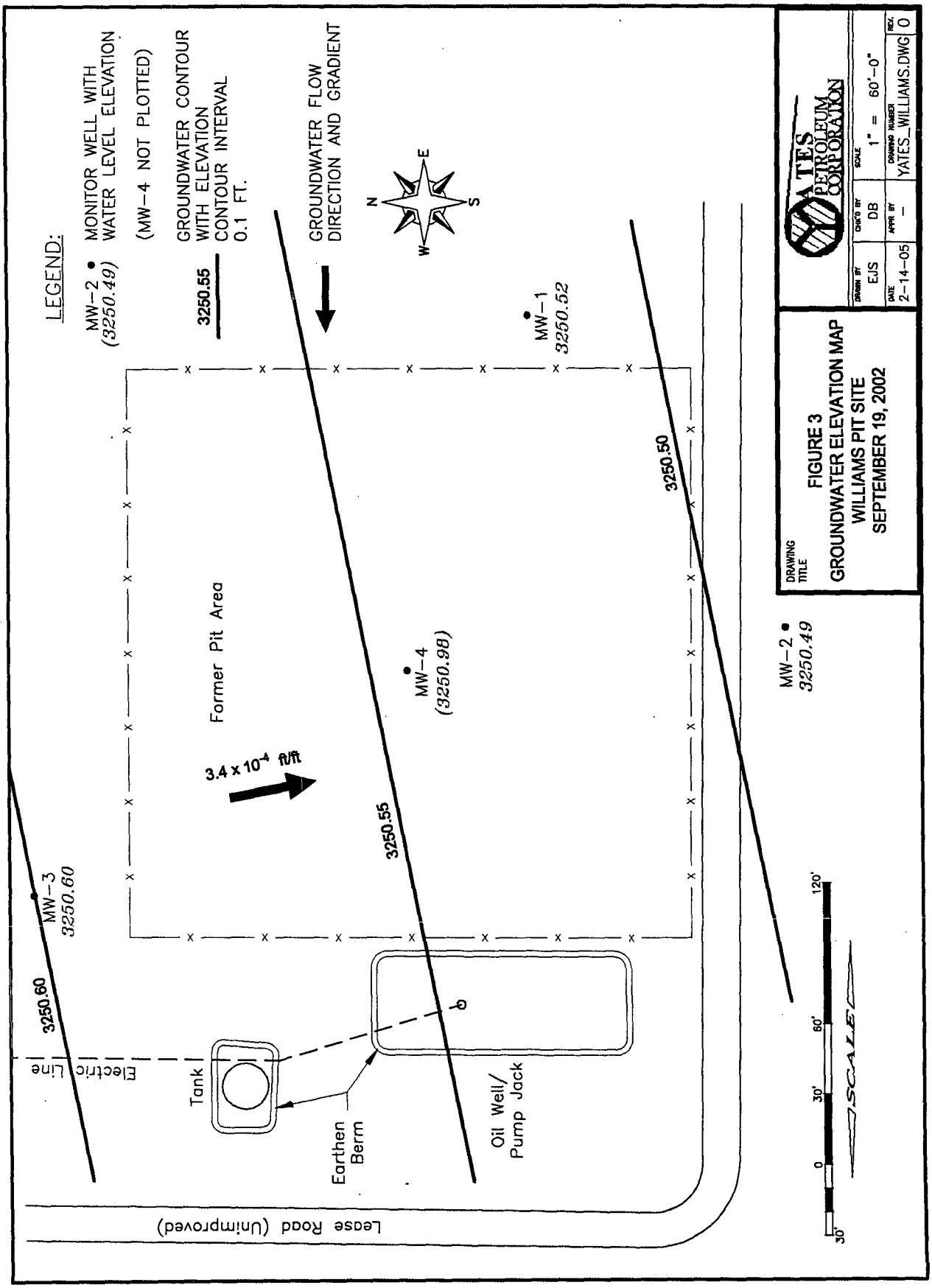
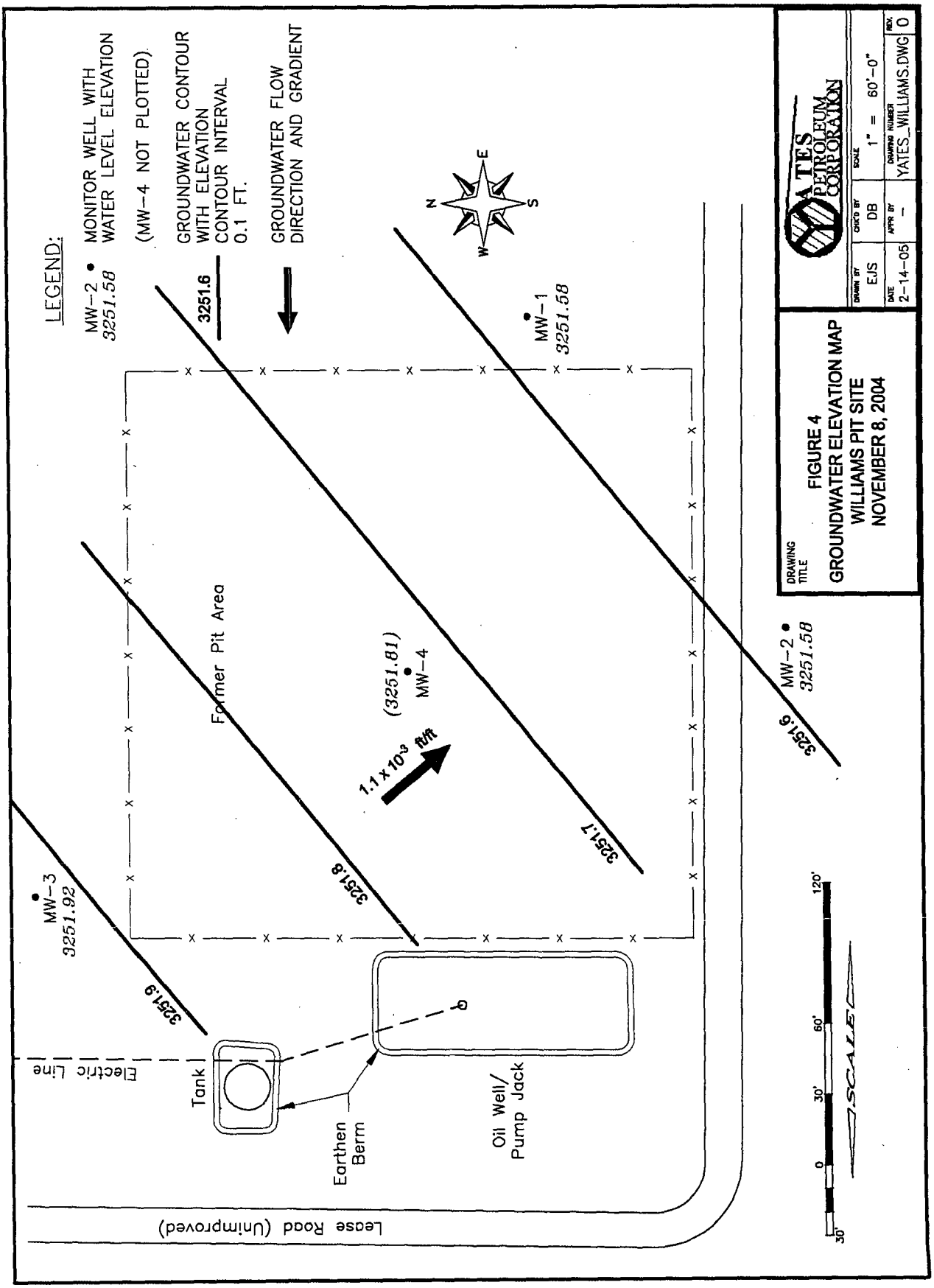
REV. 0


LEGEND:
MW-2 • (3250.49) MONITOR WELL WITH WATER LEVEL ELEVATION
(MW-4 NOT PLOTTED)
3250.55 GROUNDWATER CONTOUR WITH ELEVATION CONTOUR INTERVAL 0.1 FT.
GROUNDWATER FLOW DIRECTION AND GRADIENT
N
E
S
W
MW-1 3250.52
MW-4 (3250.98)
MW-2 3250.49
MW-3 3250.60
Former Pit Area
3.4 x 10-4 ft/ft
3250.55
3250.50
3250.60
Electric Line
Tank
Earthen Berm
Oil Well/ Pump Jack
Lease Road (Unimproved)
0
30'
60'
120'
SCALE
DRAWING TITLE
FIGURE 3
GROUNDWATER ELEVATION MAP
WILLIAMS PIT SITE
SEPTEMBER 19, 2002
YATES PETROLEUM CORPORATION
DRAWN BY EJS
CHK'D BY DB
SCALE 1" = 60'-0"
DATE 2-14-05
APPR BY -
DRAWING NUMBER YATES_WILLIAMS.DWG
REV. 0


LEGEND:
MW-2 • 3251.58
MONITOR WELL WITH WATER LEVEL ELEVATION
(MW-4 NOT PLOTTED)
3251.6
GROUNDWATER CONTOUR WITH ELEVATION CONTOUR INTERVAL 0.1 FT.
GROUNDWATER FLOW DIRECTION AND GRADIENT
N
E
S
W
MW-1 3251.58
MW-2 • 3251.58
3251.6
3251.7
3251.8
3251.9
MW-3 3251.92
(3251.81) MW-4
1.1 x 10⁻³ ft/ft
Former Pit Area
Electric Line
Tank
Earthen Berm
Oil Well/ Pump Jack
Lease Road (Unimproved)
0
30'
60'
120'
SCALE
DRAWING TITLE
FIGURE 4
GROUNDWATER ELEVATION MAP
WILLIAMS PIT SITE
NOVEMBER 8, 2004
YATES PETROLEUM CORPORATION
DRAWN BY EJS
CHK'D BY DB
SCALE 1" = 60'-0"
DATE 2-14-05
APPR BY -
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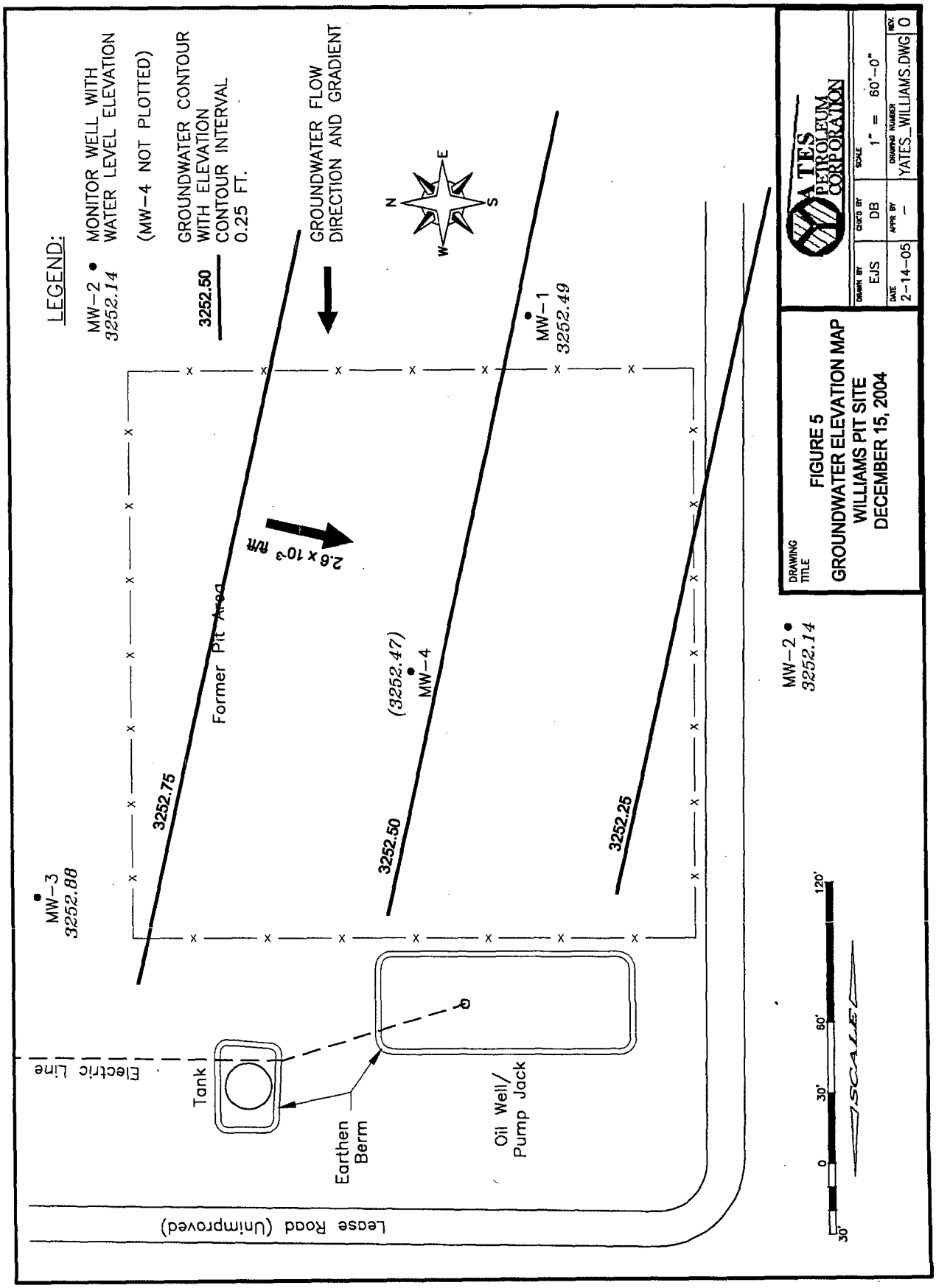
LEGEND:
MW-2 • 3252.14 MONITOR WELL WITH WATER LEVEL ELEVATION
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3252.50 GROUNDWATER CONTOUR WITH ELEVATION CONTOUR INTERVAL 0.25 FT.
GROUNDWATER FLOW DIRECTION AND GRADIENT
N E S W
MW-3 3252.88
MW-1 3252.49
MW-2 • 3252.14
(3252.47) MW-4
3252.75
3252.50
3252.25
Former Pit Area
2.6 x 10-3 ft/ft
Electric Line
Tank
Earthen Berm
Oil Well/ Pump Jack
Lease Road (Unimproved)
0 30' 60' 120'
SCALE
DRAWING TITLE
FIGURE 5
GROUNDWATER ELEVATION MAP
WILLIAMS PIT SITE
DECEMBER 15, 2004
YATES PETROLEUM CORPORATION
DRAWN BY EJS
CHKD BY DB
APPR BY -
DATE 2-14-05
SCALE 1" = 60'-0"
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REV. 0

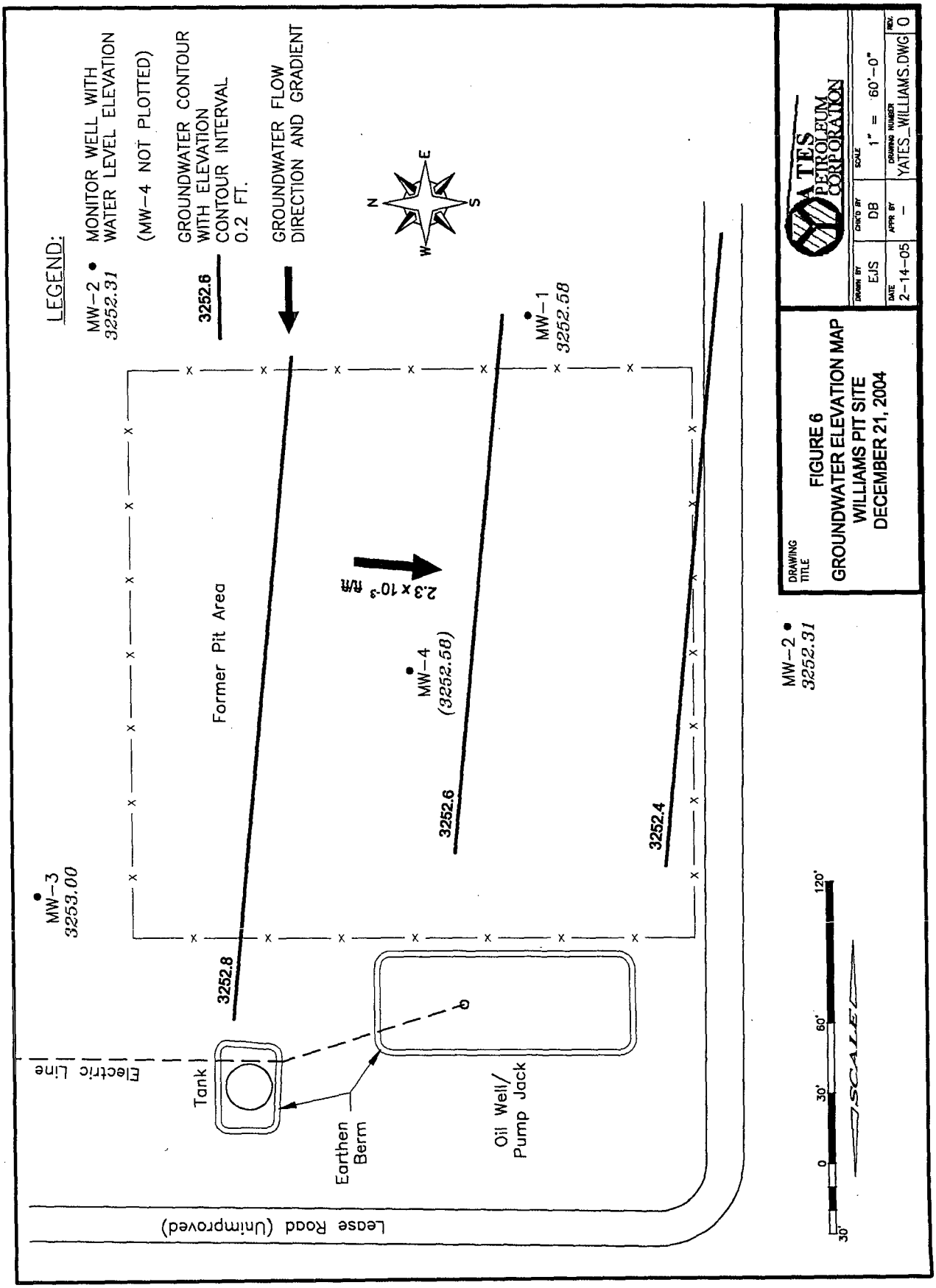
LEGEND:
MW-2 • 3252.31
MONITOR WELL WITH WATER LEVEL ELEVATION
(MW-4 NOT PLOTTED)
3252.6
GROUNDWATER CONTOUR WITH ELEVATION CONTOUR INTERVAL 0.2 FT.
GROUNDWATER FLOW DIRECTION AND GRADIENT
N
E
S
W
MW-1 3252.58
MW-3 3253.00
MW-4 (3252.58)
MW-2 • 3252.31
Former Pit Area
2.3 x 10-3 ft/ft
3252.8
3252.6
3252.4
Electric Line
Tank
Earthen Berm
Oil Well/ Pump Jack
Lease Road (Unimproved)
0
30'
60'
120'
SCALE
YATES PETROLEUM CORPORATION
DRAWN BY EJS
CHK'D BY DB
SCALE 1" = 60'-0"
DATE 2-14-05
APPR BY -
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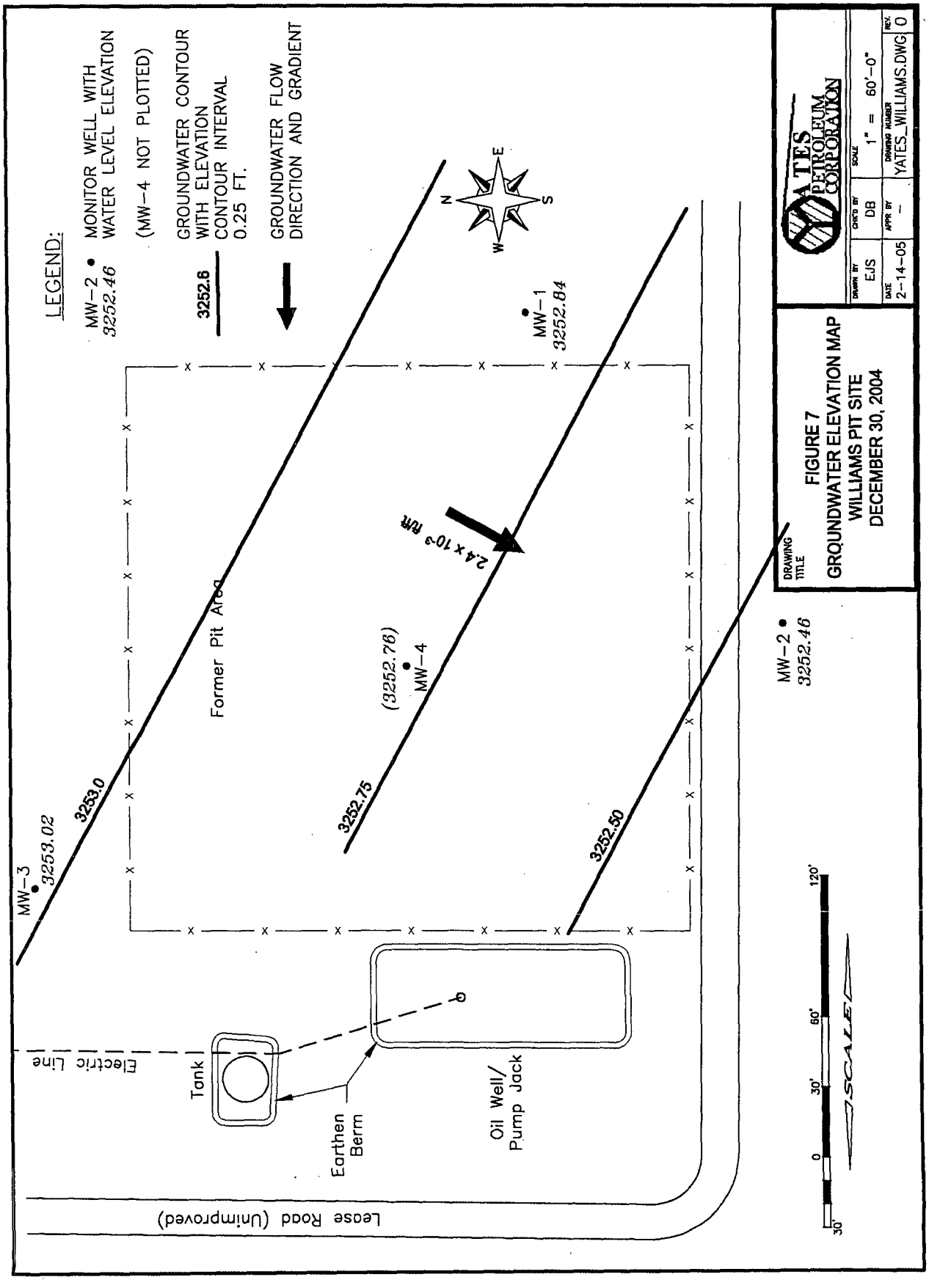
FIGURE 6
GROUNDWATER ELEVATION MAP
WILLIAMS PIT SITE
DECEMBER 21, 2004


LEGEND:
MW-2 • 3252.46
MONITOR WELL WITH WATER LEVEL ELEVATION
(MW-4 NOT PLOTTED)
3252.6
GROUNDWATER CONTOUR WITH ELEVATION
CONTOUR INTERVAL 0.25 FT.
GROUNDWATER FLOW DIRECTION AND GRADIENT
N
E
S
W
MW-1
3252.84
MW-3
3253.02
3253.0
Former Pit Area
(3252.76)
MW-4
3252.75
2.4 x 10-3 ft/ft
3252.50
MW-2 • 3252.46
Electric Line
Tank
Earthen Berm
Oil Well/ Pump Jack
Lease Road (Unimproved)
SCALE
30
0
30'
60'
120'
YATES PETROLEUM CORPORATION
DRAWN BY EJS
CHK'D BY DB
SCALE 1" = 60'-0"
DATE 2-14-05
APPR BY -
DRAWING NUMBER YATES_WILLIAMS.DWG
REV. 0
DRAWING TITLE
FIGURE 7
GROUNDWATER ELEVATION MAP
WILLIAMS PIT SITE
DECEMBER 30, 2004