1R - 279

REPORTS

DATE:

2000

Highlander Environmental Corp.

Midland, Texas

December 15, 2000

Mr. William C. Olson, Hydrogeologist
Environmental Bureau
Oil Conservation Division
Energy, Minerals and Natural Resources Department
2040 S. Pacheco
Santa Fe, New Mexico 87505

Re: Annual Groundwater Monitoring Report – (2000) Semi-Annual Groundwater Monitoring at the Texaco, Buckeye Vacuum Field Unit, Lea County, New Mexico

Dear Mr. Olson:

Introduction

Highlander Environmental Corp. (Highlander) has been requested by Texaco Exploration and Production, Inc. (TEPI) to continue to conduct semi-annual monitoring of groundwater from eight monitoring wells and two extraction wells at the Vacuum Field Unit, located in Buckeye, Lea County, New Mexico. The Site is located in Section 1, Township 18 South, Range 34 East. The Site location is shown in Figure 1. The monitored wells are shown in Figure 2. This report presents the results of groundwater monitoring activities conducted at the Site during 2000.

Background

As approved, a total of sixteen (16) monitor wells have been plugged at this site, leaving ten (10) monitor wells and two (2) extraction wells at the Site. The plugging documentation was presented in the Annual Groundwater Monitoring Report (1999). In 1999, Highlander Environmental performed quarterly sampling of ten (10) monitor wells and two (2) extraction wells at the Site. The results of the sampling are shown in Table 1. Based on the results of the 1999 sampling, a total of six (6) monitor wells and two (2) extraction wells were sampled on a semi-annual basis for 2000.

Groundwater Monitoring Activities

Prior to sampling, static water levels were collected from the monitor wells and an attempt was made to collect pumping levels from the two extraction wells, however, due to cascading water

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in the wells, water levels could not be obtained. Table 3 shows the cumulative water level data. A water table map is shown in Figure 3. The water table map shows flow towards the pumping extraction wells. The hydrographs for each well gauged are shown in Appendix A.

On November 21, 2000, monitor wells TW-11, TW-14, TW-15, TW-17 and TW-23 were purged using an electric submersible pump. Monitor well TW-19 was not sampled, due to damage to the top of the casing on the well. The two extraction wells were pumping at the time of sampling. A minimum of three (3)-casing volumes of groundwater were removed from each well and contained in a portable tank. The water was transported to the Buckeye Plant, formerly owned by Texaco, for disposal in the plant sump. Following purging, groundwater samples were collected from the discharge from the pump. At the time of sampling, pH, specific conductivity and temperature of the groundwater samples were measured and recorded in a bound field book. The groundwater samples were carefully transferred to appropriate containers, preserved, and transported under chain-of-custody control to Trace Analysis, Inc., Lubbock, Texas. The samples were analyzed for chloride by method EPA SM 4500 Cl-B. Appendix B presents the laboratory report.

Laboratory Analysis and Results

Referring to Table 2, the chloride levels from the monitor wells were all below the WQCC standard of 250 mg/l, with the exception of TW-15 and TW-23. Monitor well TW-15 has shown a consistent chloride concentration of 260 mg/l in the last two sampling events. The chloride level in TW-23 showed an increase from 830 mg/l to 2,300 mg/l. Referring to the TW-23 hydrograph and chloride concentration graphs in Appendix A, the chloride concentration graph shows a trend with the water level fluctuations. The increasing chloride levels correlate with the decreasing water level and may be related to concentration of residual chloride present. Based on the chloride levels detected in surrounding monitor wells and two recovery wells, the chloride level encountered in TW-23 appears to be confined and shows no indication of horizontal migration.

Conclusions

1. The chloride levels were below the WQCC standard of 250 mg/l in samples from wells TW-11, TW-14, TW-17 and the two extraction wells (#1 and #2) from both sampling events conducted in 2000. Monitor well TW-19 was not sampled during November 2000, due to damage to the top of the casing on the well, however, the sample taken in April, 2000 indicated a very low chloride level. TW-15 showed a consistent chloride level for both sampling events of 260 mg/l.

2. TW-23 continues to show a fluctuating chloride concentration. The most recent sampling results showed an increase in chloride to 2,300 mg/l. The increasing chloride levels correlate with the decreasing water level and may be related to concentration of residual chloride present. Based on the chloride levels detected in surrounding monitor wells and two recovery wells, the chloride level encountered in TW-23 appears to be confined and shows no indication of horizontal migration.

Recommendations

Based on the chloride levels detected in TW-23, Highlander proposes to monitor the Site for one additional year. Semi-annual monitoring is proposed on wells TW-11, TW-14, TW-15, TW-17 and TW-19, as well as extraction wells #1 and #2 for chloride evaluation. Due to the chloride fluctuation, quarterly sampling is proposed on TW-23. Additionally, it is recommended that a pump be installed and a pumping profile be performed on this monitor well. A yearly report will be prepared and submitted for review.

Highlander appreciates the opportunity to support Texaco on this project. Please call if you have questions.

Sincerely,
Highlander Environmental Corp.

Ike Tavarez
Geologist/Project Manager

CC: Rodney Bailey - Texaco Exploration and Production, Inc.

Texaco Exploration and Production, Inc.
Texaco, Buckeye Vacuum Field Unit

Chronology of Events

1989	Texaco and NMOCD installed twenty-three (23) monitor wells (TW-1 through TW-23) and two extraction wells (#1 and #2) to locate the source and define the extent of chloride contamination.
2-19-90	Unichem International sampled monitor wells (TW-1 through TW-23) for chloride.
3-26-90	Unichem International sampled monitor wells (TW-1 through TW-23) for chloride.
5-1-90	Unichem International sampled monitor wells (TW-1 through TW-23) for chloride.
1-7-98	Highlander personnel performed groundwater monitoring. Sampled monitor wells (TW-1 through TW-23) and two (2) extraction wells (#1 and #2) for chloride.
2-24-98	Highlander resampled monitor well TW-23.
4-7-98	Highlander performed groundwater monitoring. Sampled monitor wells (TW-1 through TW-23) and two (2) extraction wells (#1 and #2) for chloride.
May 1998	Highlander submitted Report " Results of Groundwater Monitoring" to the NMOCD. The report contained recommendations for monitor well plugging and future closure of the Site.
8-19-98	NMOCD response letter requested BTEX samples from all (23) monitor wells and (2) extraction wells.
9-2-98	Highlander performed groundwater monitoring. Sampled monitor wells (TW-1 through TW-23) and two (2) extraction wells (#1 and #2) for chloride and BTEX.
October 1998	Highlander submitted "Groundwater Monitoring Report" to NMOCD. Proposed to plug sixteen (16) monitor wells and continue to monitor seven (7) monitor wells and two (2) extraction wells (#1 and #2) on a quarterly basis for 1 year.

1-29-98	NMOCD response letter approved recommendation to monitor the seven (7) monitor wells listed in the Groundwater Monitoring Report. However, three additional monitor wells, TW-10, TW-13, and TW-20, were included in the quarterly monitoring program. NMOCD requested a work plan for the plugging and abandonment of the monitor wells.
2-22-99	Highlander performed 1st quarter monitoring, sampling ten (10) monitor wells, and two extraction wells (#1 and #2) at the Site.
4-14-99	Highlander submitted "Workplan for Plugging of Monitor wells" to plug 13 monitor wells.
5-26-99	Highlander performed 2nd quarter monitoring, sampling ten (10) monitor wells, and two extraction wells (#1 and #2) at the Site.
6-14-99	NMOCD response letter approved the workplan for plugging (13) monitor wells
7-22-99 11-18-99	Scarborough Drilling Inc. plugged (13) monitor wells. (TW-1, TW-2, TW-3, TW-4, TW-5, TW-6, TW-7, TW-8, TW-12, TW-16, TW-18, TW-21, and TW-22)
8-19-99	Highlander performed 3rd quarter monitoring, sampling ten (10) monitor wells, and two extraction wells (#1 and #2) at the Site.
9-21-99	Highlander sampled TW-23 (monthly basis).
10-25-99	Highlander sampled TW-23 (monthly basis).
11-22-99	Highlander performed 4th quarter monitoring, sampling ten (10) monitor wells, and two extraction wells (#1 and #2) at the Site.
12-22-99	Surveyed current monitor wells and extraction wells.
4-26-00	Highlander performed semi-annual monitoring, sampling (6) monitor wells, and two extraction wells (#1 and #2) at the Site.
11-21-00	Highlander performed annual monitoring, sampling (6) monitor wells, and two extraction wells (#1 and #2) at the Site.

TABLES

Table 1
Texaco Exploration and Production, Inc.
Cumulative Groundwater Sample Results
Buckeye, Vacuum Field Unit
Lea County, New Mexico

Sample ID	1st Quarter	2nd Quarter	3rd Quarter	Monthly Monitoring	Monthly Monitoring	4th Quarter
	2/22/99	5/26/99	8/19/99	9/21/99	10/25/99	11/22/99
	Chloride (mg/l)					
TW-9	370	290	200	-	-	170
TW-10	36	23	44	-	-	29
TW-11	40	26	42	-	-	32
TW-13	83	45	72	-	-	57
TW-14	42	64	45	-	-	43
TW-15	120	120	170	-	-	180
TW-17	29	23	36	-	-	34
TW-19	27	22	36	-	-	32
TW-20	31	26	20	-	-	33
TW-23	1,100	1,400	2,400	1,000	1,300	1,400
Ex. Well #1	190	160	190	-	-	170
Ex. Well #2	200	150	200	-	-	180

Not Sampled (-)

Table 2
Texaco Exploration and Production, Inc.
2000 Semi-Annual and Annual Sampling
Buckeye, Vacuum Field Unit
Lea County, New Mexico

Sample ID	Semi-Annual Sampling 4/26/00 Chloride (mg/l)	Annual Sampling 11/21/00 Chloride (mg/l)
TW-9	-	-
TW-10	-	-
TW-11	43	33
TW-13	-	-
TW-14	39	38
TW-15	260	260
TW-17	29	190
TW-19	36	-
TW-20	-	-
TW-23	830	2,300
Ex. Well #1	170	170
Ex. Well #2	200	200

Not Sampled (-)

Table 3
Texaco Exploration and Production, Inc.
Cumulative Groundwater Water Level Data
Buckeye, Vacuum Field Unit
Lea County, New Mexico

Monitoring Date	TW-9	TW-10	TW-11	TW-13	TW-14	TW-15	TW-17	TW-19	TW-20	TW-23	EW-1	EW-2
2/22/99	-	-	-	-	-	-	-	-	-	-	-	-
05/26/99	129.97	129.49	130.29	130.20	128.19	124.04	125.26	124.69	130.25	125.82	-	-
08/19/99	130.15	129.74	130.50	130.44	128.46	124.23	125.46	124.90	130.42	126.00	-	-
11/22/99	129.72	129.25	130.70	129.70	128.03	123.94	125.30	124.55	129.99	125.66	-	-
*12/22/99	129.93	129.58	130.37	130.20	128.23	124.06	125.38	124.77	130.21	125.89	-	**138.6
4/26/00	-	-	129.33	-	127.12	123.46	124.62	123.80	-	124.78		
11/21/00	129.97	129.51	130.37	130.34	128.21	124.05	125.32	-	130.31	125.82	-	-

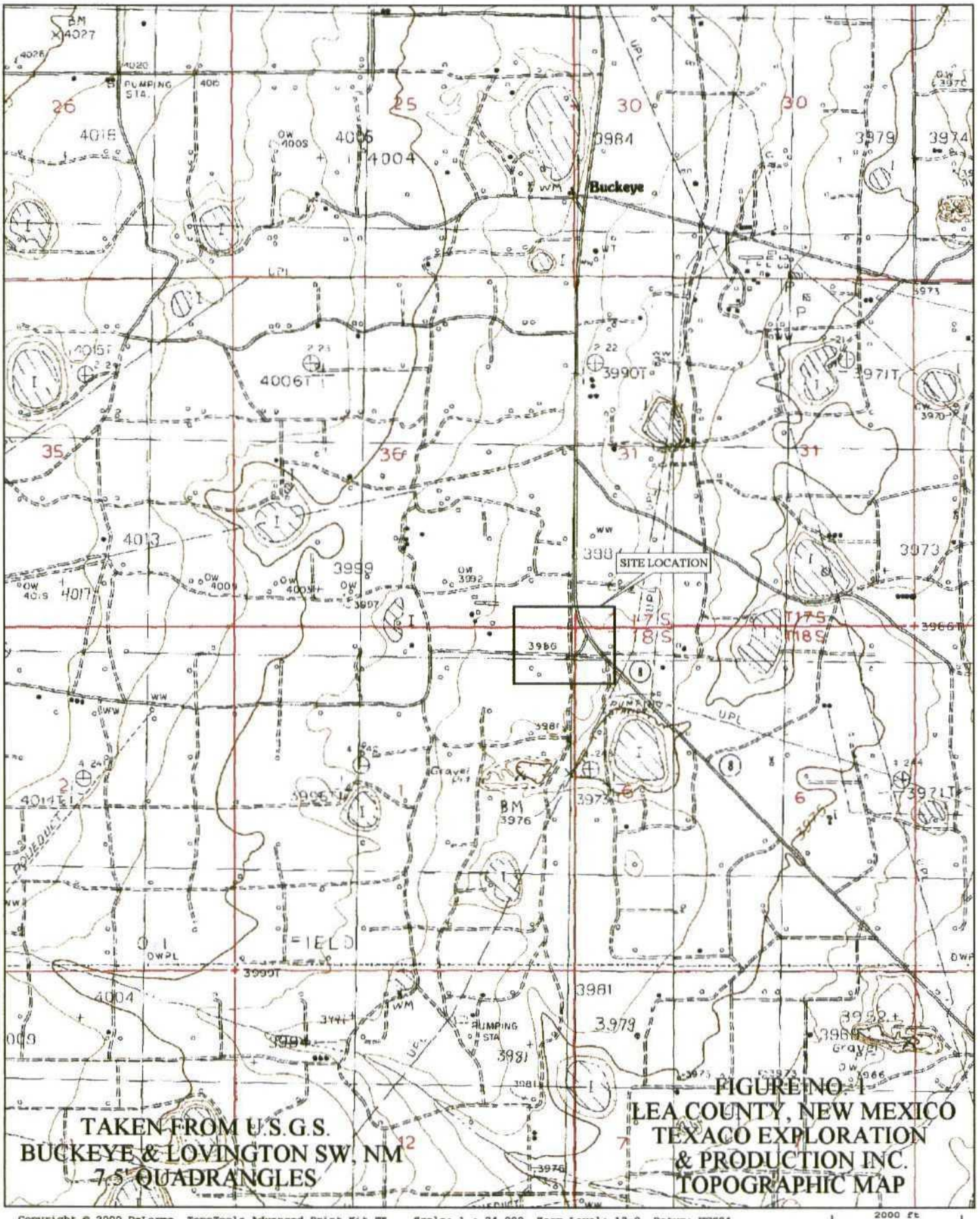
Measurements collected top of casing

** Pumping level

Elevation of Top of Casing (ft)	TW-9	TW-10	TW-11	TW-13	TW-14	TW-15	TW-17	TW-19	TW-20	TW-23	EW-1	EW-2
	3988.60	3987.77	3989.14	3988.70	3986.67	3984.07	3985.22	3983.73	3988.39	3984.76	3986.90	3986.99
Elevation of Top of Groundwater (ft)	3858.63	3858.26	3858.77	3858.36	3858.46	3860.02	3859.90	-	3858.08	3858.94	-	-

Ground water elevations calculated using the 11-21-00 water level data

FIGURES



TAKEN FROM U.S.G.S.
BUCKEYE & LOVINGTON SW, NM
7.5' QUADRANGLES

FIGURE NO. 1
LEA COUNTY, NEW MEXICO
TEXACO EXPLORATION
& PRODUCTION INC.
TOPOGRAPHIC MAP

 Scale: 1 : 24,000 Zoom Level: 13-0 Datum: WGS84

2000 ft

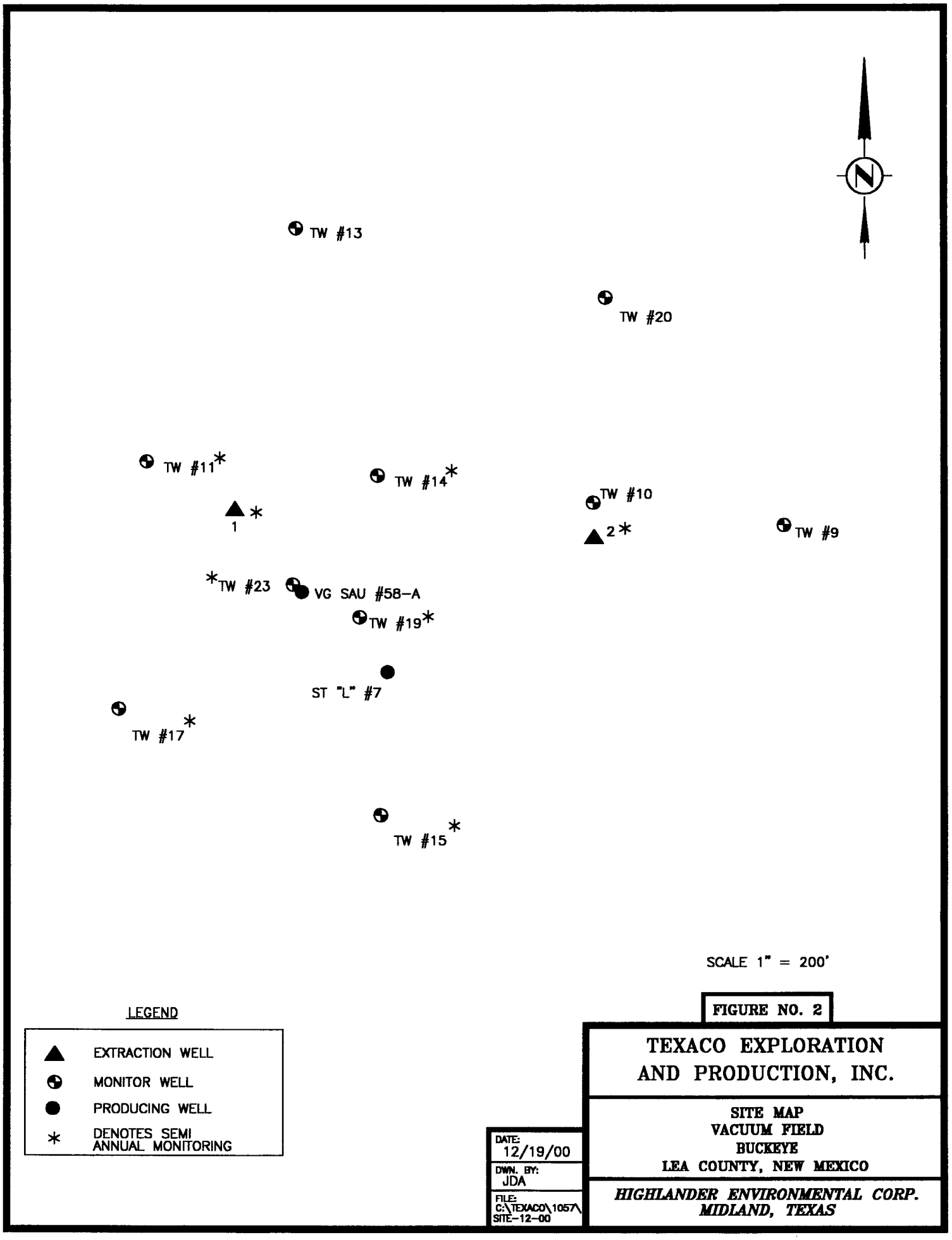


FIGURE NO. 2

TEXACO EXPLORATION AND PRODUCTION, INC.

SITE MAP
VACUUM FIELD
BUCKEYE
LEA COUNTY, NEW MEXICO

DATE: 12/19/00
DWN. BY: JDA
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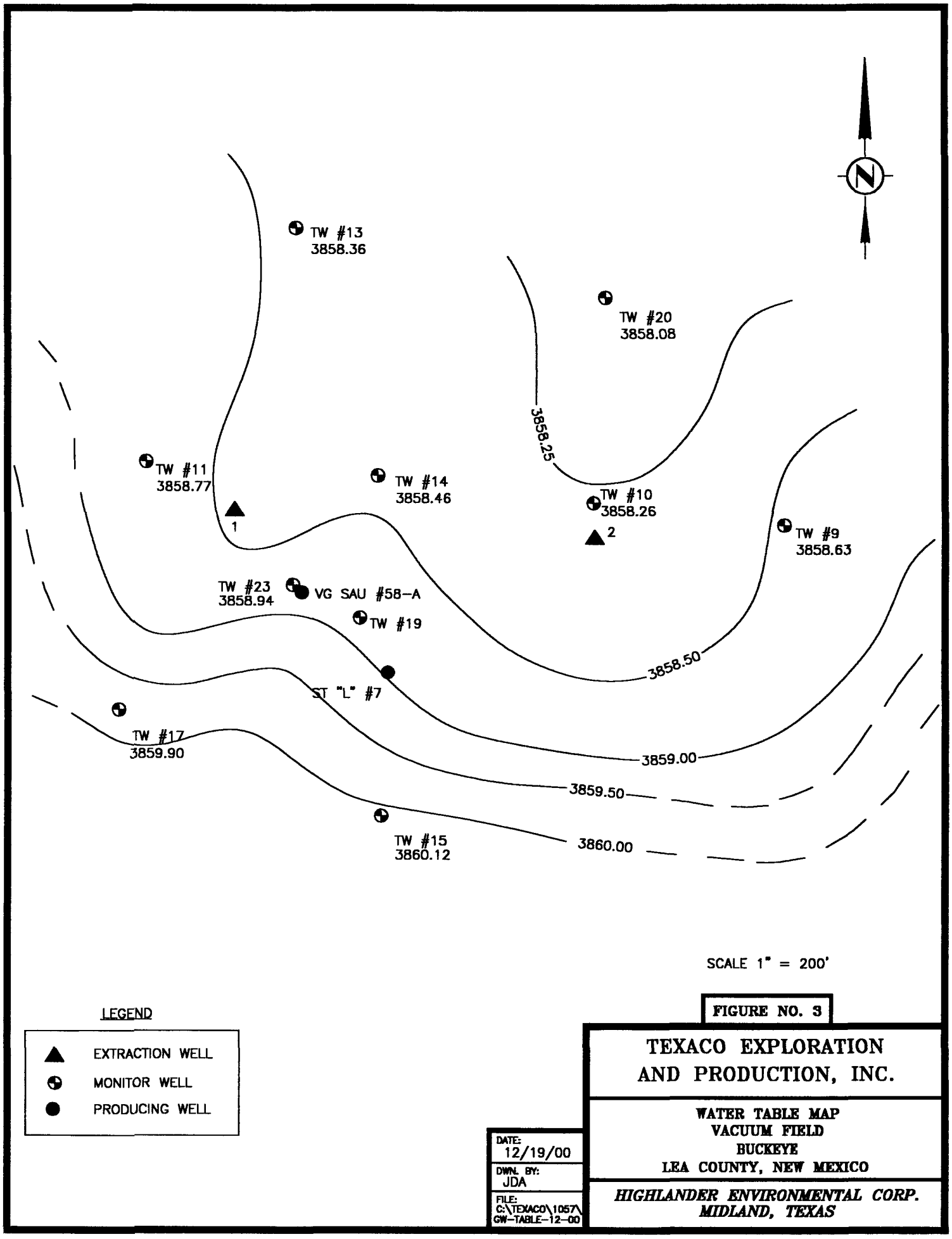
HIGHLANDER ENVIRONMENTAL CORP.
MIDLAND, TEXAS


TW #13
3858.36
TW #20
3858.08
3858.25
TW #11
3858.77
TW #14
3858.46
TW #10
3858.26
TW #9
3858.63
1
2
TW #23
3858.94
VG SAU #58-A
TW #19
ST "L" #7
3858.50
TW #17
3859.90
3859.00
3859.50
TW #15
3860.12
3860.00
N
SCALE 1" = 200'
LEGEND
EXTRACTION WELL
MONITOR WELL
PRODUCING WELL
FIGURE NO. 3
TEXACO EXPLORATION AND PRODUCTION, INC.
WATER TABLE MAP
VACUUM FIELD
BUCKEYE
LEA COUNTY, NEW MEXICO
HIGHLANDER ENVIRONMENTAL CORP.
MIDLAND, TEXAS
DATE: 12/19/00
DWN. BY: JDA
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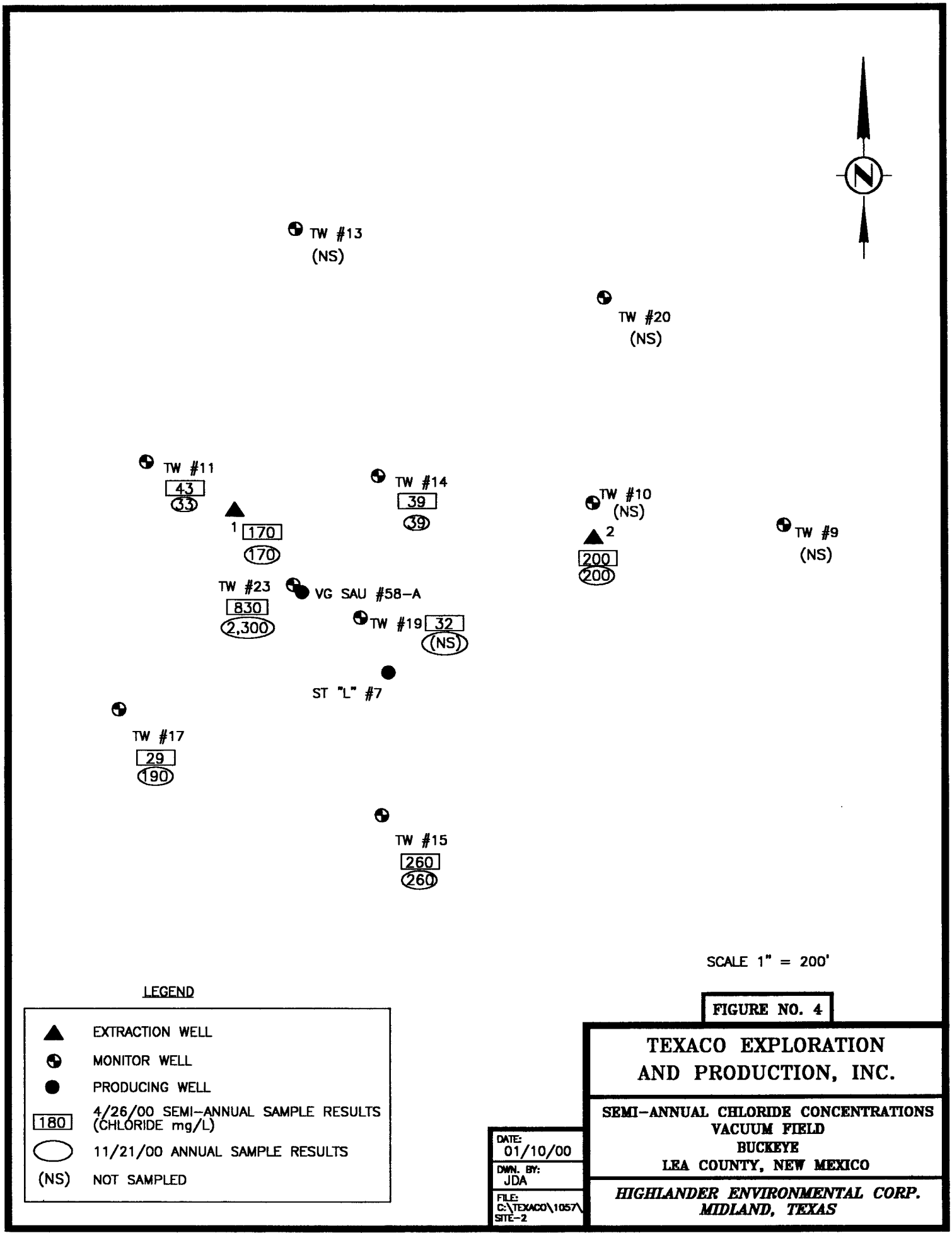


FIGURE NO. 4

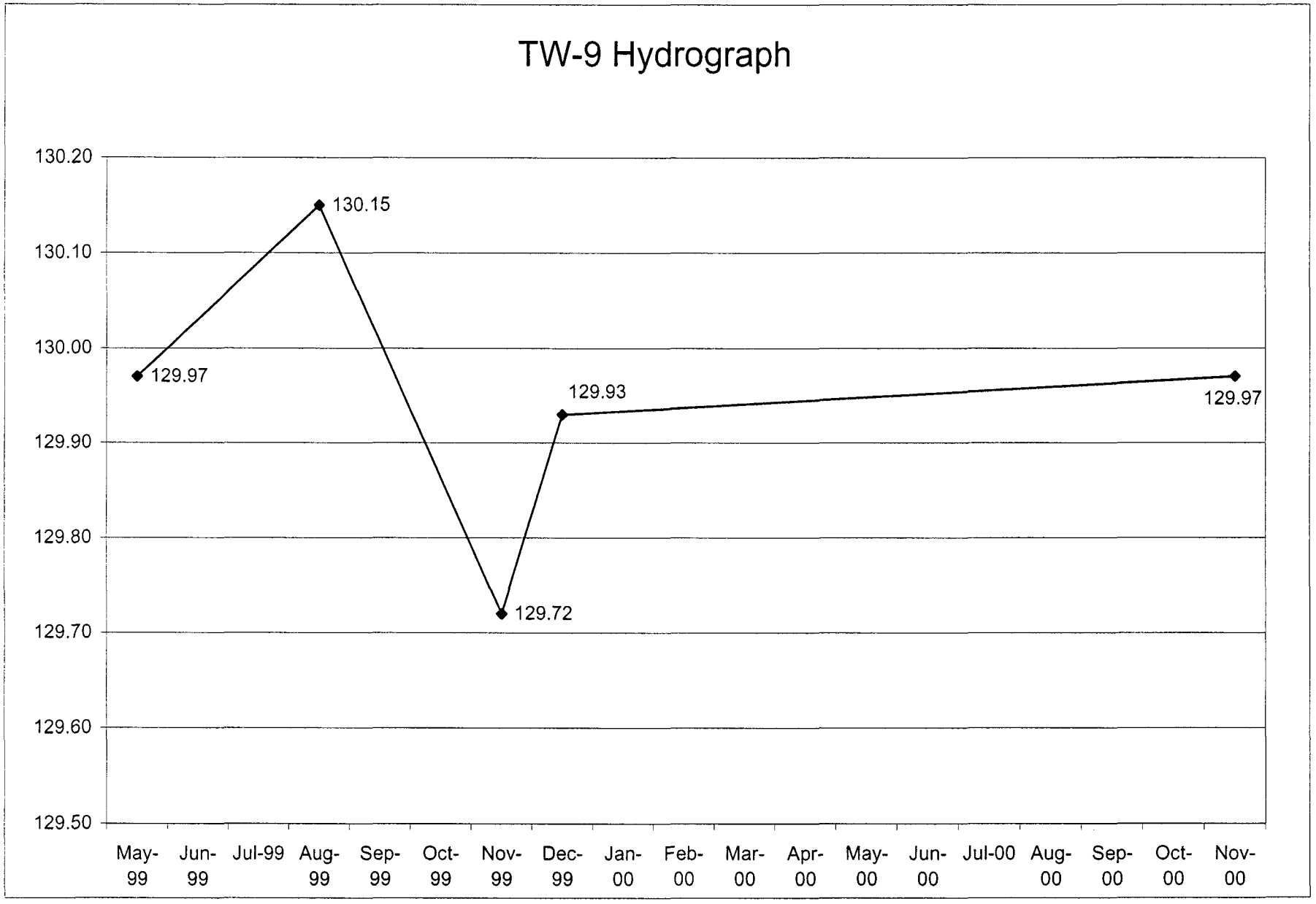
TEXACO EXPLORATION AND PRODUCTION, INC.

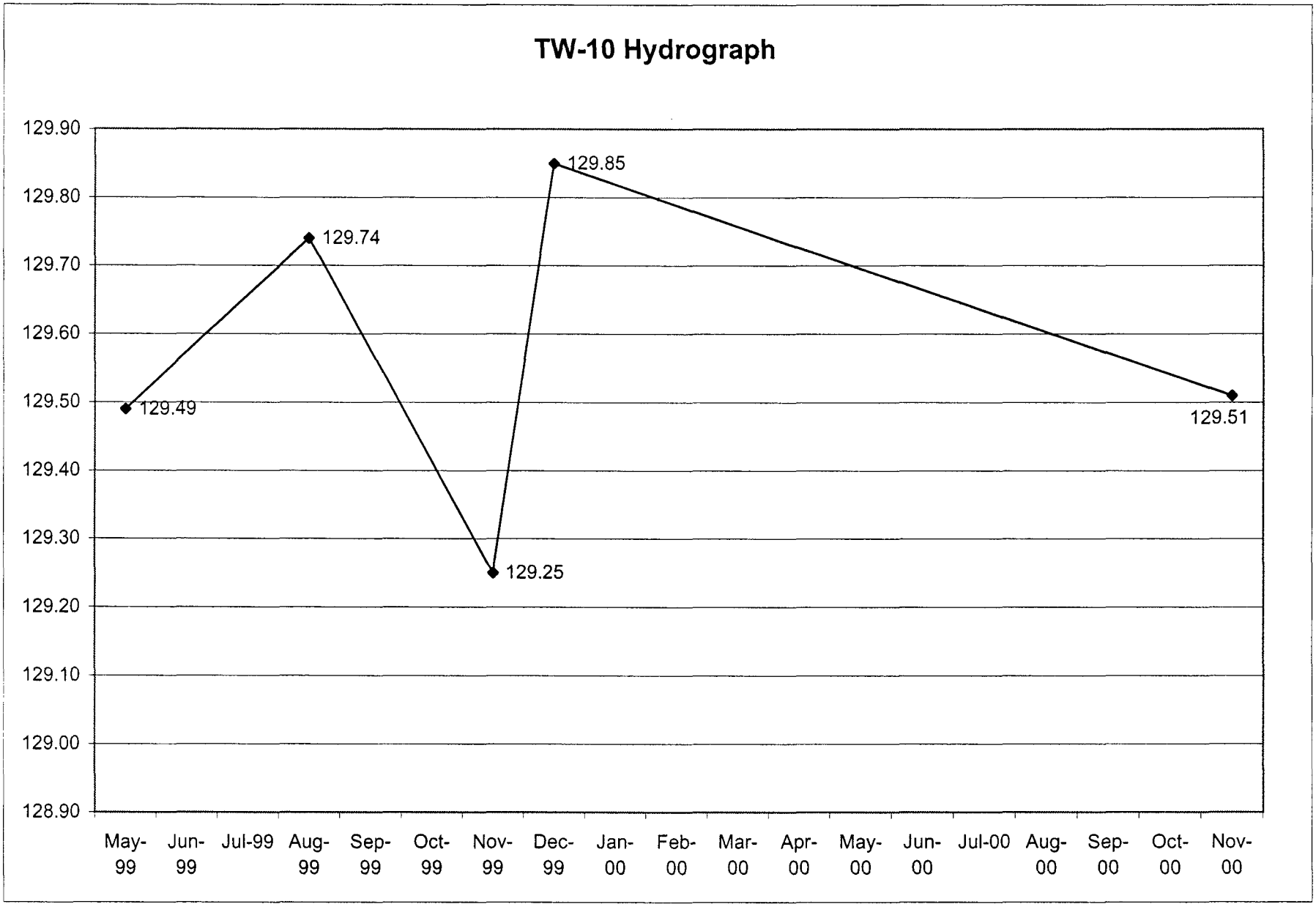
SEMI-ANNUAL CHLORIDE CONCENTRATIONS
VACUUM FIELD
BUCKEYE
LEA COUNTY, NEW MEXICO

HIGHLANDER ENVIRONMENTAL CORP.
MIDLAND, TEXAS

APPENDIX "A"

Hydrographs


TW-9 Hydrograph
130.20
130.10
130.00
129.90
129.80
129.70
129.60
129.50
129.97
130.15
129.72
129.93
129.97
May-99
Jun-99
Jul-99
Aug-99
Sep-99
Oct-99
Nov-99
Dec-99
Jan-00
Feb-00
Mar-00
Apr-00
May-00
Jun-00
Jul-00
Aug-00
Sep-00
Oct-00
Nov-00


TW-10 Hydrograph
129.90
129.80
129.70
129.60
129.50
129.40
129.30
129.20
129.10
129.00
128.90
129.49
129.74
129.25
129.85
129.51
May-99
Jun-99
Jul-99
Aug-99
Sep-99
Oct-99
Nov-99
Dec-99
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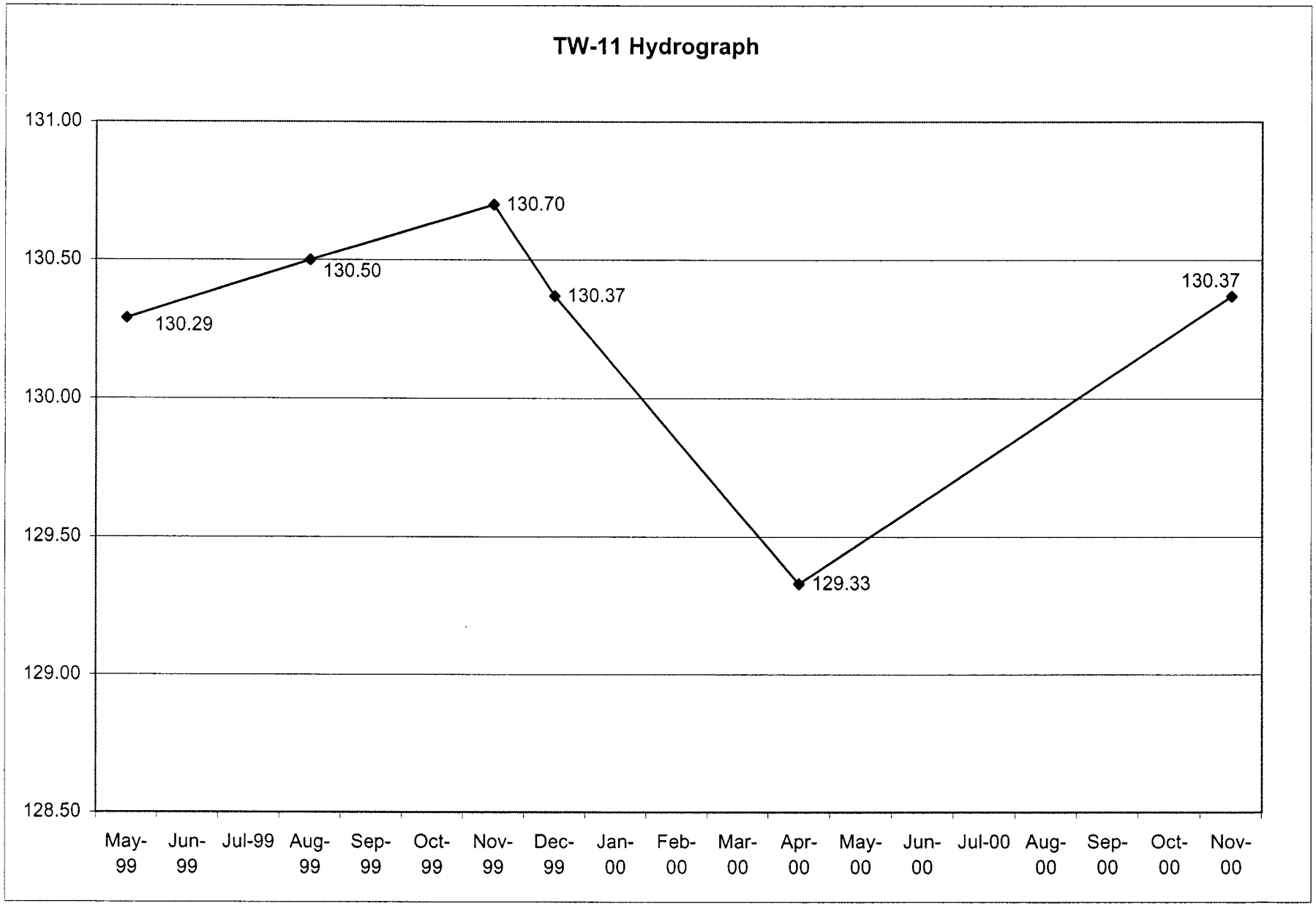
Mar-00
Apr-00
May-00
Jun-00
Jul-00
Aug-00
Sep-00
Oct-00
Nov-00


TW-11 Hydrograph
131.00
130.50
130.00
129.50
129.00
128.50
130.29
130.50
130.70
130.37
129.33
130.37
May-99
Jun-99
Jul-99
Aug-99
Sep-99
Oct-99
Nov-99
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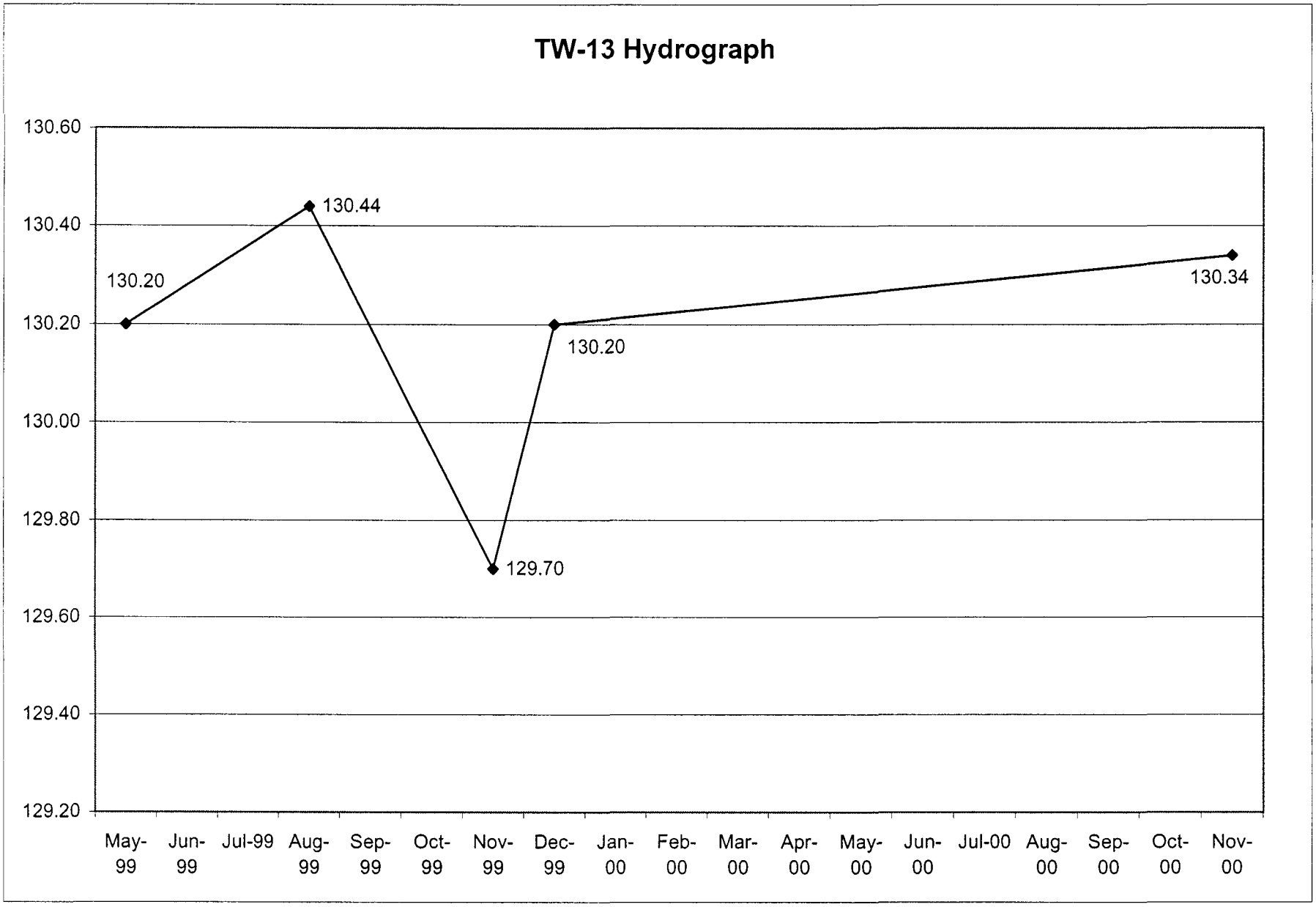
Jun-00
Jul-00
Aug-00
Sep-00
Oct-00
Nov-00


TW-13 Hydrograph
130.60
130.40
130.20
130.00
129.80
129.60
129.40
129.20
130.20
130.44
129.70
130.20
130.34
May-99
Jun-99
Jul-99
Aug-99
Sep-99
Oct-99
Nov-99
Dec-99
Jan-00
Feb-00
Mar-00
Apr-00
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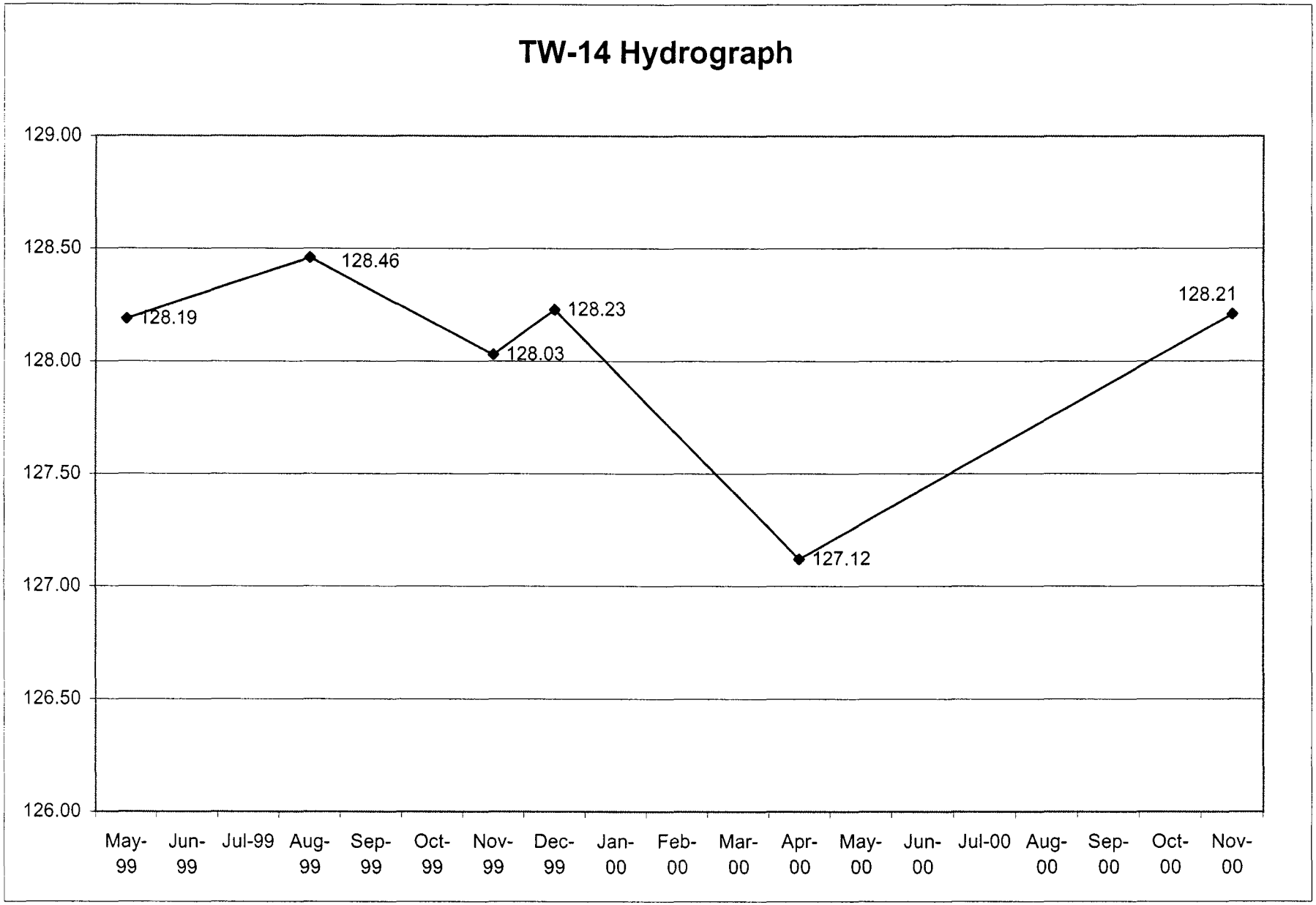
Jun-00
Jul-00
Aug-00
Sep-00
Oct-00
Nov-00


TW-14 Hydrograph
129.00
128.50
128.00
127.50
127.00
126.50
126.00
128.19
128.46
128.03
128.23
127.12
128.21
May-99
Jun-99
Jul-99
Aug-99
Sep-99
Oct-99
Nov-99
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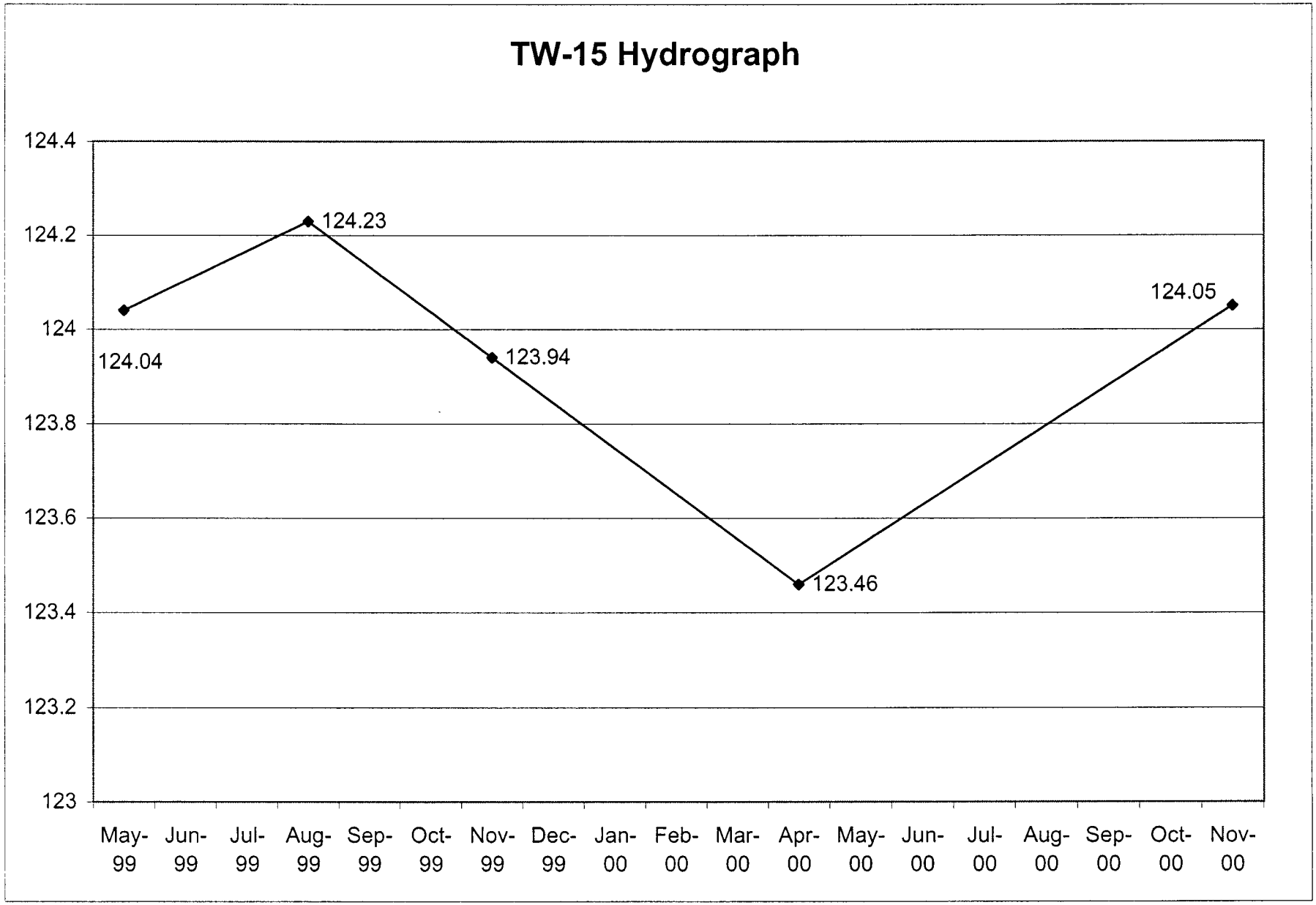
Jun-00
Jul-00
Aug-00
Sep-00
Oct-00
Nov-00


TW-15 Hydrograph
124.4
124.2
124
123.8
123.6
123.4
123.2
123
124.04
124.23
123.94
123.46
124.05
May-99
Jun-99
Jul-99
Aug-99
Sep-99
Oct-99
Nov-99
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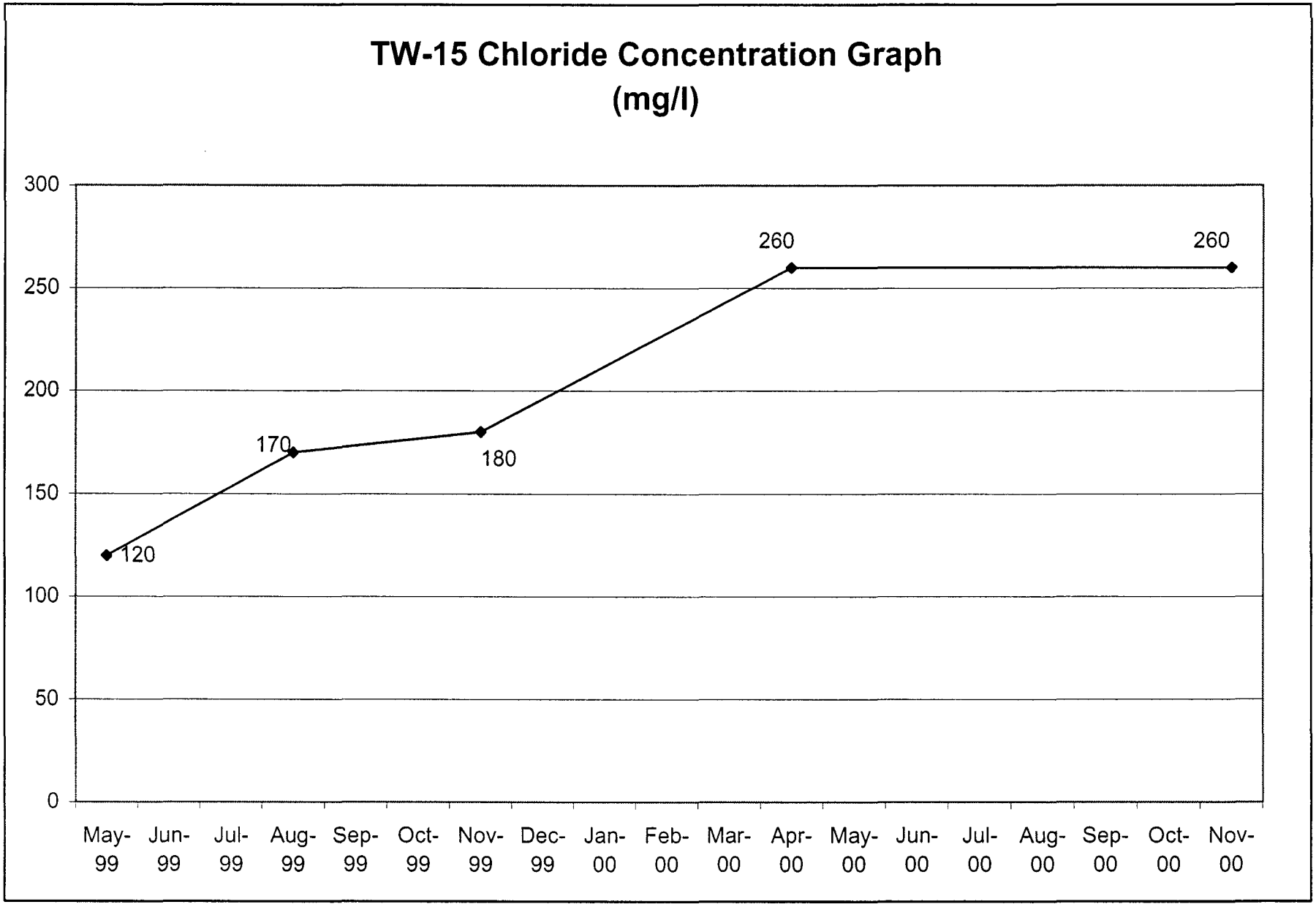
Jun-00
Jul-00
Aug-00
Sep-00
Oct-00
Nov-00


TW-15 Chloride Concentration Graph
(mg/l)
300
250
200
150
100
50
0
120
170
180
260
260
May-99
Jun-99
Jul-99
Aug-99
Sep-99
Oct-99
Nov-99
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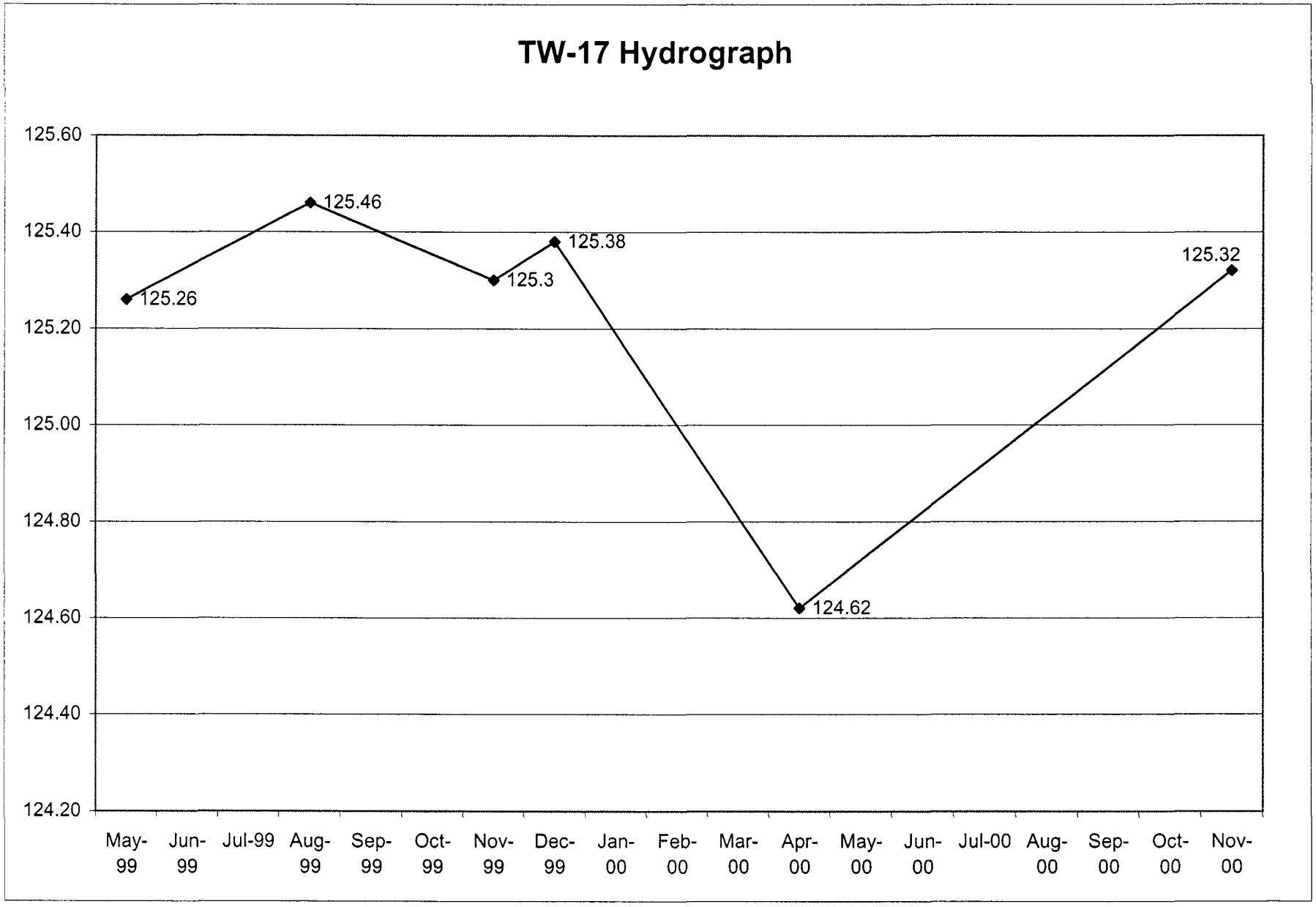
Jun-00
Jul-00
Aug-00
Sep-00
Oct-00
Nov-00


TW-17 Hydrograph
125.60
125.40
125.20
125.00
124.80
124.60
124.40
124.20
125.26
125.46
125.3
125.38
124.62
125.32
May-99
Jun-99
Jul-99
Aug-99
Sep-99
Oct-99
Nov-99
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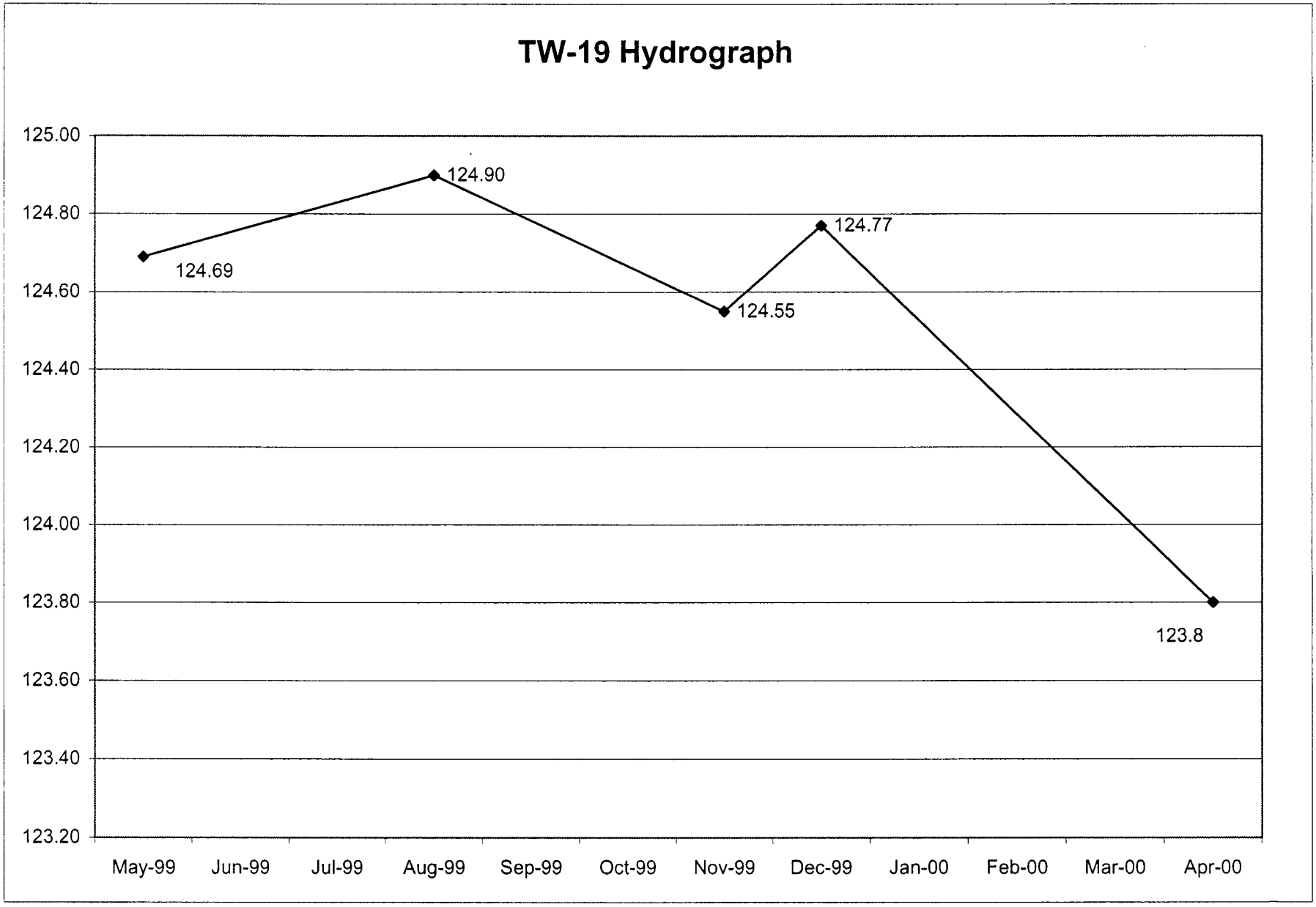
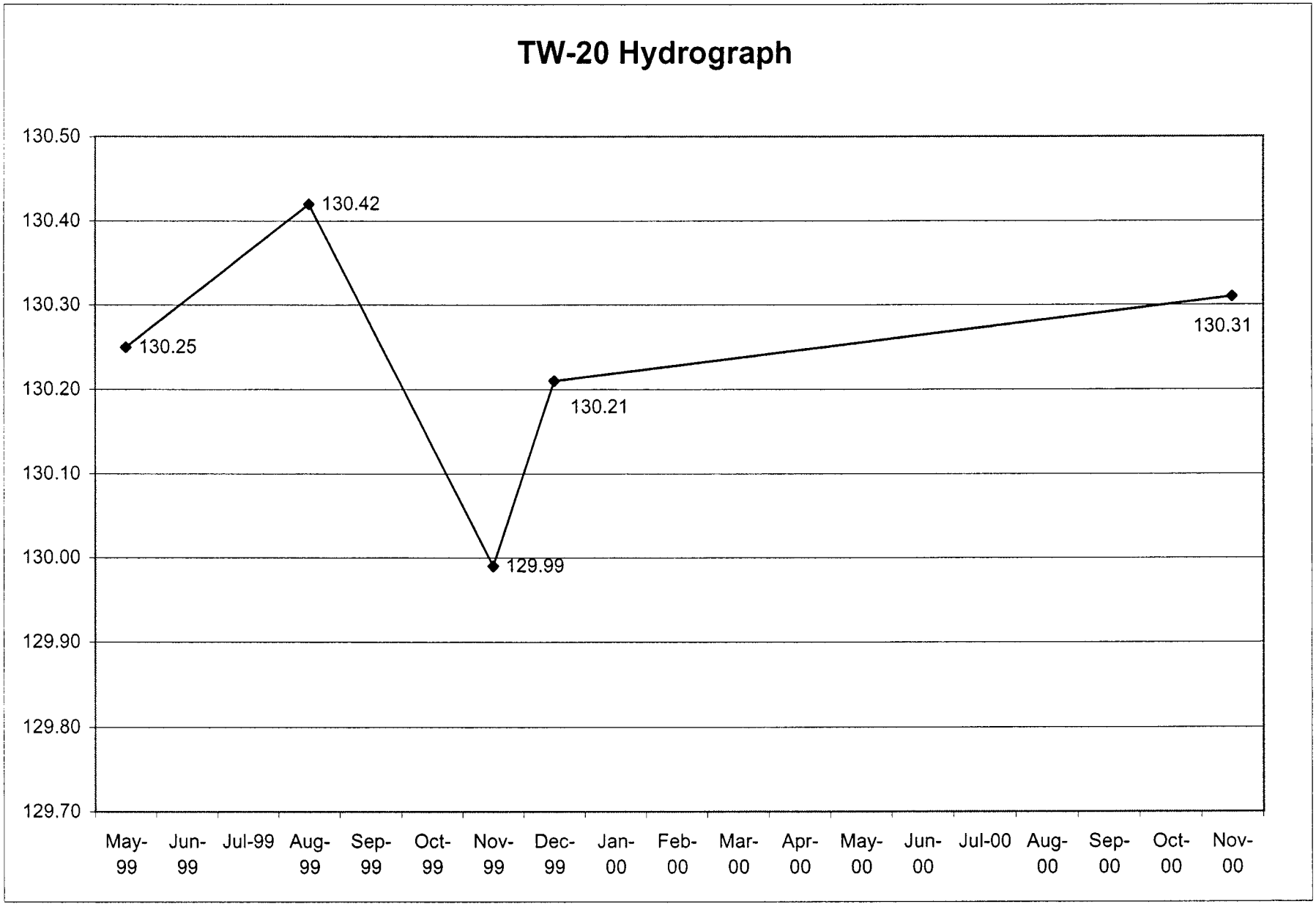
Jun-00
Jul-00
Aug-00
Sep-00
Oct-00
Nov-00


TW-19 Hydrograph
125.00
124.80
124.60
124.40
124.20
124.00
123.80
123.60
123.40
123.20
124.69
124.90
124.55
124.77
123.8
May-99
Jun-99
Jul-99
Aug-99
Sep-99
Oct-99
Nov-99
Dec-99
Jan-00
Feb-00
Mar-00
Apr-00


TW-20 Hydrograph
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130.40
130.30
130.20
130.10
130.00
129.90
129.80
129.70
130.25
130.42
129.99
130.21
130.31
May-99
Jun-99
Jul-99
Aug-99
Sep-99
Oct-99
Nov-99
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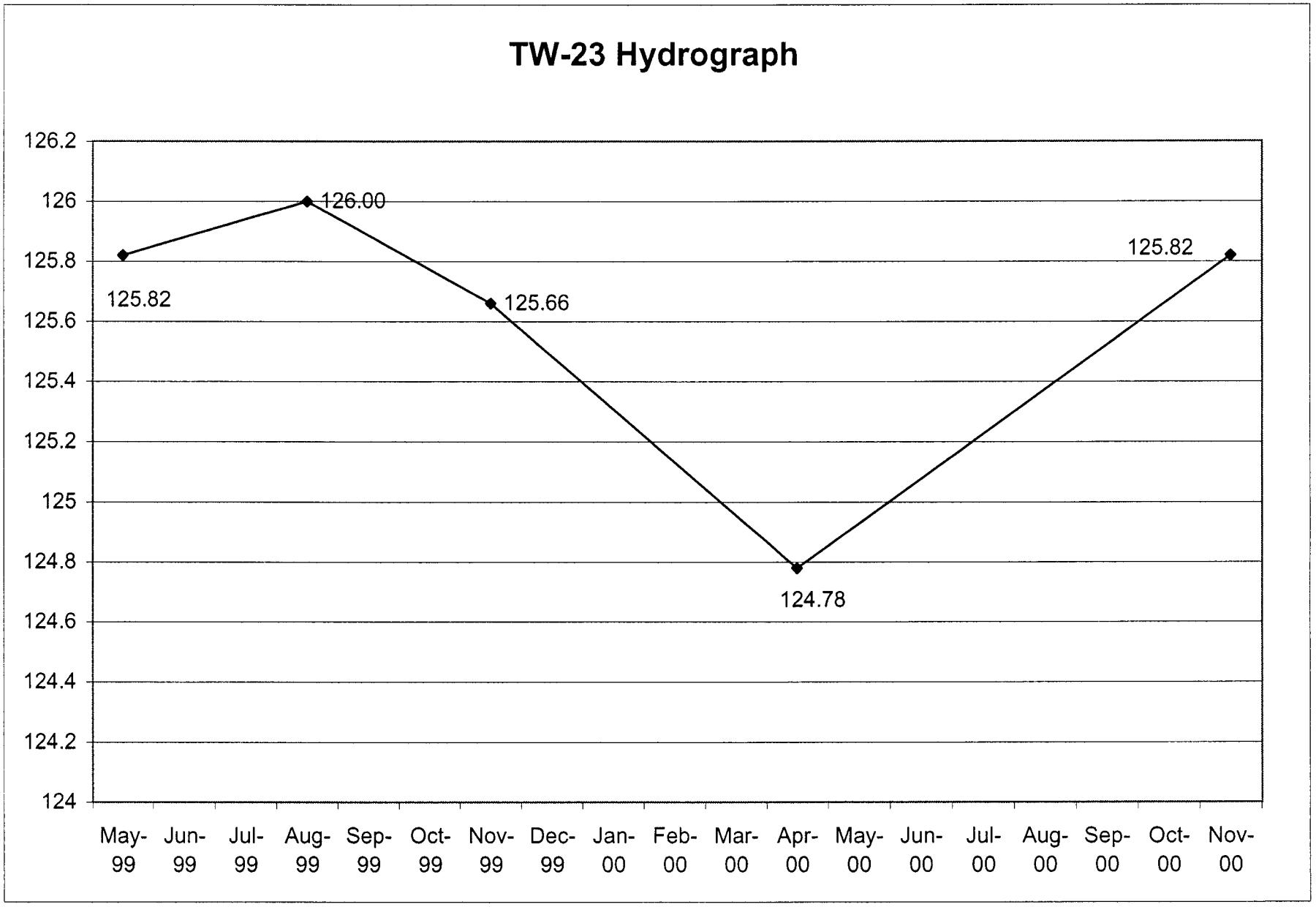
Jun-00
Jul-00
Aug-00
Sep-00
Oct-00
Nov-00


TW-23 Hydrograph
126.2
126
125.8
125.6
125.4
125.2
125
124.8
124.6
124.4
124.2
124
126.00
125.82
125.66
124.78
125.82
May-99
Jun-99
Jul-99
Aug-99
Sep-99
Oct-99
Nov-99
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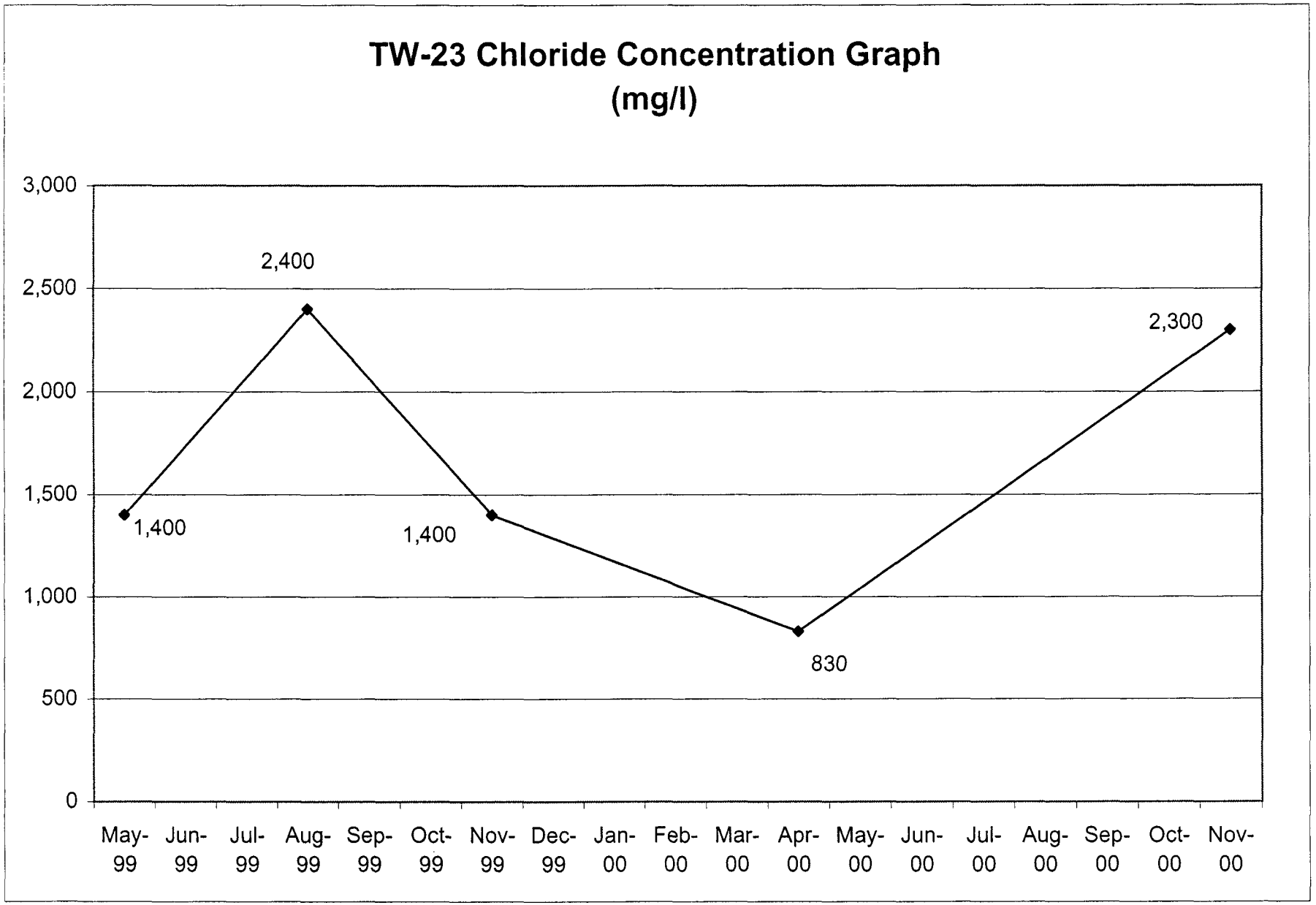
Jun-00
Jul-00
Aug-00
Sep-00
Oct-00
Nov-00


TW-23 Chloride Concentration Graph
(mg/l)
3,000
2,500
2,000
1,500
1,000
500
0
2,400
2,300
1,400
1,400
830
May-99
Jun-99
Jul-99
Aug-99
Sep-99
Oct-99
Nov-99
Dec-99
Jan-00
Feb-00
Mar-00
Apr-00
May-00
Jun-00
Jul-00
Aug-00
Sep-00
Oct-00
Nov-00

APPENDIX "B"

Laboratory Analysis

TRACEANALYSIS, INC.

6701 Aberdeen Avenue, Suite 9 Lubbock, Texas 79424 800•378•1296 806•794•1296 FAX 806•794•1298
4725 Ripley Avenue, Suite A El Paso, Texas 79922 888•588•3443 915•585•3443 FAX 915•585•4944
E-Mail: lab@traceanalysis.com

Analytical and Quality Control Report

Ike Tavarez
Highlander Environmental Services
1910 N. Big Spring St.
Midland, TX 79705

Report Date: 5/3/00

Project Number: 1057
Project Name: Texaco/Texaco-Vacuum Field Bukeye
Project Location: Lea County,New Mexico

Order ID Number: A00042808

Enclosed are the Analytical Results and Quality Control Data Reports for the following samples submitted to TraceAnalysis, Inc. for analysis:

Sample Number	Sample Description	Matrix	Date Taken	Time Taken	Date Received
145372	TW-11	Water	4/26/00	-	4/28/00
145373	TW-14	Water	4/26/00	-	4/28/00
145374	TW-15	Water	4/26/00	-	4/28/00
145375	TW-17	Water	4/26/00	-	4/28/00
145376	TW-19	Water	4/26/00	-	4/28/00
145377	TW-23	Water	4/26/00	-	4/28/00
145378	Extraction Well #1	Water	4/26/00	-	4/28/00
145379	Extraction Well #2	Water	4/26/00	-	4/28/00

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

This report consists of a total of 4 pages and shall not be reproduced except in its entirety, without written approval of TraceAnalysis, Inc.

Dr. Blair Leftwich, Director

Analytical Results Report

Sample Number: 145372
Description: TW-11

Param	Result	Dilution	Analytical Method	Date Prepared	Date Analyzed	Analyst	Prep Batch #	QC Batch #	RDL
Ion Chromatography (IC) (mg/L)									
CL	43	1	E 300.0	5/1/00	5/1/00	JS	PB02031	QC02416	0.5

Sample Number: 145373
Description: TW-14

Param	Result	Dilution	Analytical Method	Date Prepared	Date Analyzed	Analyst	Prep Batch #	QC Batch #	RDL
Ion Chromatography (IC) (mg/L)									
CL	39	1	E 300.0	5/1/00	5/1/00	JS	PB02031	QC02417	0.5

Sample Number: 145374
Description: TW-15

Param	Result	Dilution	Analytical Method	Date Prepared	Date Analyzed	Analyst	Prep Batch #	QC Batch #	RDL
Ion Chromatography (IC) (mg/L)									
CL	260	1	E 300.0	5/1/00	5/1/00	JS	PB02031	QC02417	0.5

Sample Number: 145375
Description: TW-17

Param	Result	Dilution	Analytical Method	Date Prepared	Date Analyzed	Analyst	Prep Batch #	QC Batch #	RDL
Ion Chromatography (IC) (mg/L)									
CL	29	1	E 300.0	5/1/00	5/1/00	JS	PB02031	QC02418	0.5

Sample Number: 145376
Description: TW-19

Param	Result	Dilution	Analytical Method	Date Prepared	Date Analyzed	Analyst	Prep Batch #	QC Batch #	RDL
Ion Chromatography (IC) (mg/L)									
CL	36	1	E 300.0	5/1/00	5/1/00	JS	PB02031	QC02418	0.5

Sample Number: 145377
Description: TW-23

Param	Result	Dilution	Analytical Method	Date Prepared	Date Analyzed	Analyst	Prep Batch #	QC Batch #	RDL
Ion Chromatography (IC) (mg/L)									
CL	830	1	E 300.0	5/1/00	5/1/00	JS	PB02031	QC02418	0.5

Sample Number: 145378
Description: Extraction Well #1

Param	Result	Dilution	Analytical Method	Date Prepared	Date Analyzed	Analyst	Prep Batch #	QC Batch #	RDL
Ion Chromatography (IC) (mg/L)									
CL	170	1	E 300.0	5/1/00	5/1/00	JS	PB02031	QC02418	0.5

Sample Number: 145379
Description: Extraction Well #2

Param	Result	Dilution	Analytical Method	Date Prepared	Date Analyzed	Analyst	Prep Batch #	QC Batch #	RDL
Ion Chromatography (IC) (mg/L)									
CL	200	1	E 300.0	5/1/00	5/1/00	JS	PB02031	QC02418	0.5

Quality Control Report
Method Blanks

Param	Flag	Blank Result	Reporting Limit	Date Analyzed	Prep Batch #	QC Batch #
CL (mg/L)		<0.5	0.5	5/1/00	PB02031	QC02416
CL (mg/L)		<0.5	0.5	5/1/00	PB02031	QC02417
CL (mg/L)		<0.5	0.5	5/1/00	PB02031	QC02418

Quality Control Report
Matrix Spike and Matrix Duplicate Spike

Standard	Param	Sample Result	Dil.	Spike Amount Added	Matrix Spike Result	% Rec.	RPD	% Rec. Limit	RPD Limit	QC Batch #
MS	CL (mg/L)	43	1	62.5	94.25	82		80 - 120	-	QC02416
MSD	CL (mg/L)	43	1	62.5	94.13	82	0	-	0 - 20	QC02416

Standard	Param	Sample Result	Dil.	Spike Amount Added	Matrix Spike Result	% Rec.	RPD	% Rec. Limit	RPD Limit	QC Batch #
MS	CL (mg/L)	39	1	62.5	97.01	93		80 - 120	-	QC02417
MSD	CL (mg/L)	39	1	62.5	96.48	92	1	-	0 - 20	QC02417

Standard	Param	Sample Result	Dil.	Spike Amount Added	Matrix Spike Result	% Rec.	RPD	% Rec. Limit	RPD Limit	QC Batch #
MS	CL (mg/L)	1100	1	625	1707.79	97		80 - 120	-	QC02418
MSD	CL (mg/L)	1100	1	625	1711.96	98	1	-	0 - 20	QC02418

Quality Control Report
Continuing Calibration Verification Standard

Standard	Param	Flag	CCVs TRUE Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed	QC Batch #
ICV	CL (mg/L)		12.5	11.65	93	80 - 120	5/1/00	QC02416
CCV 1	CL (mg/L)		12.5	11.62	93	80 - 120	5/1/00	QC02416

Standard	Param	Flag	CCVs TRUE Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed	QC Batch #
ICV	CL (mg/L)		12.5	11.62	93	80 - 120	5/1/00	QC02417
CCV 1	CL (mg/L)		12.5	11.66	93	80 - 120	5/1/00	QC02417

Standard	Param	Flag	CCVs TRUE Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed	QC Batch #
ICV	CL (mg/L)		12.5	11.66	93	80 - 120	5/1/00	QC02418
CCV 1	CL (mg/L)		12.5	11.60	93	80 - 120	5/1/00	QC02418

145372-379

A0000428C8

Analysis Request and Chain of Custody Record

HIGHLANDER ENVIRONMENTAL CORP.

1910 N. Big Spring St.
Midland, Texas 79705

(915) 682-4559 Fax (915) 682-3946

PAGE: 1 OF: 1

CLIENT NAME: Texaco E&P, Inc. SITE MANAGER: IKE Tavarez

PROJECT NO.: 1057 PROJECT NAME: Texaco/Buckeye Vacuum Field. Lea County, NM.

LAB I.D. NUMBER	DATE	TIME	MATRIX	COMP.	GRAB	SAMPLE IDENTIFICATION	NUMBER OF CONTAINERS	FILTERED (Y/N)	PRESERVATIVE METHOD: HCL	HNO3	ICE	NONE	BTEX 8020/602	MTBE 8020/602	TPH 418.1 8015 MOD. TX1005	PAH 8270	RCRA Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Metals Ag As Ba Cd Cr Pd Hg Se	TCLP Volatiles	TCLP Semi Volatiles	RCI	GC/MS Vol. 8240/8260/624	GC/MS Semi. Vol. 8270/625	PCB's 8080/608	Pest. 608/608	BOD, TSS, pH, TDS, Chloride	Gamma Spec.	Alpha Beta (Air)	PLM (Asbestos)	
145372	4/26/00		W		G	TW-11	1				/	/														X				
73			W		G	TW-14	1				/	/														X				
74			W		G	TW-15	1				/	/														X				
75			W		G	TW-17	1				/	/														X				
76			W		G	TW-19	1				/	/														X				
77			W		G	TW-23	1				/	/														X				
78			W		G	Extraction Well #1	1				/	/														X				
79			W		G	Extraction Well #2	1				/	/														X				

ANALYSIS REQUEST (Circle or Specify Method No.)

RELINQUISHED BY: (Signature) Date: 4/27/00 Time: 4:10 PM
RECEIVED BY: (Signature) Helen Shelton Date: 4/27/00 Time: 4:10 PM

RELINQUISHED BY: (Signature) Helen Shelton Date: 4/27/00 Time: 10:00PM
RECEIVED BY: (Signature) Date: Time:

RELINQUISHED BY: (Signature) Date: Time:
RECEIVED BY: (Signature) Date: Time:

RECEIVING LABORATORY: Trace Lab
ADDRESS:
CITY: STATE: ZIP:
CONTACT: PHONE:
RECEIVED BY: (Signature) Vicki Hensley
DATE: 4-28-00 TIME: 9:00AM

SAMPLED BY: (Print & Sign) IKE T. / Jim Armentrout Date: Time:

SAMPLE SHIPPED BY: (Circle)
FEDEX BUS AIRBILL #
HAND DELIVERED UPS OTHER:

HIGHLANDER CONTACT PERSON: IKE Tavarez

Results by:

RUSH Charges Authorized: Yes No

SAMPLE CONDITION WHEN RECEIVED:

MATRIX: (W-Water) A-Air SD-Solid S-Soil SL-Sludge O-Other

REMARKS:

5/5/00

Please Fill out all copies - Laboratory retains yellow copy - Return original copy to Highlander Enviromental Corp. - Project Manager retains pink copy - Accounting receives Gold copy.

8 samples - HC

TRACEANALYSIS, INC.

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E-Mail lab@traceanalysis.com

Analytical and Quality Control Report

Ike Tavarez
Highlander Environmental Services
1910 N. Big Spring St.
Midland, TX 79705

Report Date: December 12, 2000

Order ID Number: A00112404

Project Number: 1057
Project Name: Buckeye Field, Lea Co.NM
Project Location: Lea Co.,NM

Enclosed are the Analytical Results and Quality Control Data Reports for the following samples submitted to Trace Analysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
159464	MW-11	Water	11/21/00	12:00	11/24/00
159465	TW-17	Water	11/21/00	12:46	11/24/00
159466	TW-14	Water	11/21/00	13:32	11/24/00
159467	TW-15	Water	11/21/00	14:20	11/24/00
159468	TW 23	Water	11/21/00	15:03	11/24/00
159469	EXT. #1	Water	11/21/00	14:39	11/24/00
159470	EXT. #2	Water	11/21/00	14:43	11/24/00

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

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Dr. Blair Leftwich, Director

Analytical and Quality Control Report

Sample: 159464 - MW-11

Analysis: Ion Chromatography (IC) Analytical Method: E 300.0 QC Batch: QC07014 Date Analyzed: 11/30/00
Analyst: JS Preparation Method: N/A Prep Batch: PB06154 Date Prepared: 11/30/00

Param	Flag	Result	Units	Dilution	RDL
CL		33	mg/L	1	0.50

Sample: 159465 - TW-17

Analysis: Ion Chromatography (IC) Analytical Method: E 300.0 QC Batch: QC07014 Date Analyzed: 11/30/00
Analyst: JS Preparation Method: N/A Prep Batch: PB06154 Date Prepared: 11/30/00

Param	Flag	Result	Units	Dilution	RDL
CL		38	mg/L	1	0.50

Sample: 159466 - TW-14

Analysis: Ion Chromatography (IC) Analytical Method: E 300.0 QC Batch: QC07014 Date Analyzed: 11/30/00
Analyst: JS Preparation Method: N/A Prep Batch: PB06154 Date Prepared: 11/30/00

Param	Flag	Result	Units	Dilution	RDL
CL		38	mg/L	1	0.50

Sample: 159467 - TW-15

Analysis: Ion Chromatography (IC) Analytical Method: E 300.0 QC Batch: QC07015 Date Analyzed: 11/30/00
Analyst: JS Preparation Method: N/A Prep Batch: PB06154 Date Prepared: 11/30/00

Param	Flag	Result	Units	Dilution	RDL
CL		190	mg/L	1	0.50

Sample: 159468 - TW-23

Analysis: Ion Chromatography (IC) Analytical Method: E 300.0 QC Batch: QC07015 Date Analyzed: 11/30/00
Analyst: JS Preparation Method: N/A Prep Batch: PB06154 Date Prepared: 11/30/00

Param	Flag	Result	Units	Dilution	RDL
CL		2300	mg/L	1	0.50

Sample: 159469 - EXT. #1

Analysis: Ion Chromatography (IC) Analytical Method: E 300.0 QC Batch: QC07015 Date Analyzed: 11/30/00
Analyst: JS Preparation Method: N/A Prep Batch: PB06154 Date Prepared: 11/30/00

Param	Flag	Result	Units	Dilution	RDL
CL		170	mg/L	1	0.50

Sample: 159470 - EXT. #2

Analysis: Ion Chromatography (IC) Analytical Method: E 300.0 QC Batch: QC07015 Date Analyzed: 11/30/00
Analyst: JS Preparation Method: N/A Prep Batch: PB06154 Date Prepared: 11/30/00

Param	Flag	Result	Units	Dilution	RDL
CL		200	mg/L	1	0.50

Quality Control Report
Method Blank

Sample: Method Blank QCBatch: QC07014

Param	Flag	Results	Units	Reporting Limit
CL		<0.5	mg/L	0.50

Sample: Method Blank QCBatch: QC07015

Param	Flag	Results	Units	Reporting Limit
CL		<0.5	mg/L	0.50

Quality Control Report
Lab Control Spikes and Duplicate Spikes

Sample: LCS QC Batch: QC07014

Param.	Flag	Sample Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec.	RPD	% Rec. Limit	RPD Limit
CL		12.15	mg/L	1	12.50	<0.5	97		80 - 120	25
Sulfate		12.31	mg/L	1	12.50	<0.5	98		80 - 120	20

Sample: LCSD QC Batch: QC07014

Param	Flag	Sample Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec.	RPD	% Rec. Limit	RPD Limit
CL		12.35	mg/L	1	12.50	<0.5	98	2	80 - 120	25
Sulfate		12.50	mg/L	1	12.50	<0.5	100	2	80 - 120	20

Sample: LCS QC Batch: QC07015

Param	Flag	Sample Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec.	RPD	% Rec. Limit	RPD Limit
Bromide		2.50	mg/L	1	2.50	<0.2	100		80 - 120	20
CL		11.85	mg/L	1	12.50	<0.5	94		80 - 120	25
Fluoride		2.43	mg/L	1	2.50	<0.2	97		80 - 120	20
Nitrate-N		2.43	mg/L	1	2.50	<0.2	97		80 - 120	20
Sulfate		12.03	mg/L	1	12.50	<0.5	96		80 - 120	20

Sample: LCSD QC Batch: QC07015

Param	Flag	Sample Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec.	RPD	% Rec. Limit	RPD Limit
Bromide		2.55	mg/L	1	2.50	<0.2	102	2	80 - 120	20
CL		11.92	mg/L	1	12.50	<0.5	95	0	80 - 120	25
Fluoride		2.43	mg/L	1	2.50	<0.2	97	0	80 - 120	20
Nitrate-N		2.43	mg/L	1	2.50	<0.2	97	0	80 - 120	20
Sulfate		11.99	mg/L	1	12.50	<0.5	95	0	80 - 120	20

Quality Control Report
Matrix Spikes and Duplicate Spikes

Sample: MS QC Batch: QC07014

Param	Flag	Sample Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec.	RPD	% Rec. Limit	RPD Limit
CL		77.03	mg/L	1	62.50	19	93		82 - 100	25

Sample: MSD QC Batch: QC07014

Param	Flag	Sample Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec.	RPD	% Rec. Limit	RPD Limit
CL		77.06	mg/L	1	62.50	19	92	1	82 - 100	25

Sample: MS QC Batch: QC07015

Param	Flag	Sample Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec.	RPD	% Rec. Limit	RPD Limit
CL		1672.13	mg/L	1	1250	480	95		82 - 100	25

Sample: MSD QC Batch: QC07015

Param	Flag	Sample Result	Units	Dil.	Spike Amount Added	Matrix Result	% Rec.	RPD	% Rec. Limit	RPD Limit
CL		1661.74	mg/L	1	1250	480	94	1	82 - 100	25

Quality Control Report
Continuing Calibration Verification Standards

Sample: CCV (1) QC Batch: QC07014

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Bromide		mg/L	2.50	2.51	100	80 - 120	11/30/00
CL		mg/L	12.50	12.15	97	80 - 120	11/30/00
Fluoride		mg/L	2.50	2.42	96	80 - 120	11/30/00
Nitrate-N		mg/L	2.50	2.43	97	80 - 120	11/30/00
Sulfate		mg/L	12.50	12.28	98	80 - 120	11/30/00

Sample: ICV (1) QC Batch: QC07014

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Bromide		mg/L	2.50	2.58	103	80 - 120	11/30/00
CL		mg/L	12.50	11.71	93	80 - 120	11/30/00
Fluoride		mg/L	2.50	2.44	97	80 - 120	11/30/00
Nitrate-N		mg/L	2.50	2.43	97	80 - 120	11/30/00
Sulfate		mg/L	12.50	11.98	95	80 - 120	11/30/00

Sample: CCV (1)

QC Batch: QC07015

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Bromide		mg/L	2.50	2.52	100	80 - 120	11/30/00
CL		mg/L	12.50	11.87	94	80 - 120	11/30/00
Fluoride		mg/L	2.50	2.43	97	80 - 120	11/30/00
Nitrate N		mg/L	2.50	2.41	96	80 - 120	11/30/00
Sulfate		mg/L	12.50	12.01	96	80 - 120	11/30/00

Sample: ICV (1)

QC Batch: QC07015

Param	Flag	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Bromide		mg/L	2.50	2.51	100	80 - 120	11/30/00
CL		mg/L	12.50	12.15	97	80 - 120	11/30/00
Fluoride		mg/L	2.50	2.42	96	80 - 120	11/30/00
Nitrate-N		mg/L	2.50	2.43	97	80 - 120	11/30/00
Sulfate		mg/L	12.50	12.28	98	80 - 120	11/30/00

Analysis Request and Chain of Custody Record

HIGHLANDER ENVIRONMENTAL CORP.

1910 N. Big Spring St.
Midland, Texas 79705

(915) 682-4559 Fax (915) 682-3946

PAGE: 1 OF: 1

CLIENT NAME: Texaco

SITE MANAGER: Tim Tavarez

PROJECT NO.: 1057

PROJECT NAME: Buckeye Field, Lea Co, NM

LAB I.D. NUMBER	DATE	TIME	MATRIX	COMP.	GRAB	SAMPLE IDENTIFICATION	NUMBER OF CONTAINERS	FILTERED (Y/N)	PRESERVATIVE METHOD: HCL	HNO3	ICE	NONE	BTEX 8020/602	MTBE 8020/602	TPH 418.1 8015 MOD. TX1005	PAH 8270	RCRA Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Metals Ag As Ba Cd Cr Pd Hg Se	TCLP Volatiles	TCLP Semi Volatiles	RCI	GC.MS Vol. 8240/8260/624	GC.MS Semi. Vol. 8270/625	PCB's 8080/608	Pest. 808/608	BOD, TSS, pH, TDS, Chloride	Gamma Spec.	Alpha Beta (Air)	PLM (Asbestos)
	4/21/00	1200	W		X	MW-11	1				X	X														X			
		1246	W		X	TW-17	1																						
		1352	W		X	TW-14	1																						
		1420	W		X	TW-15	1																						
		1503	W		X	TW-23	1																						
		1547	W		X	Ext. #1	1																						
	↓	1443	W		X	Ext. #2	1				↓	↓														↓			

ANALYSIS REQUEST (Circle or Specify Method No.)

RELINQUISHED BY: (Signature)	Date: 4/22/00 Time: 1335	RECEIVED BY: (Signature)	Date: 4-22-00 Time: 1335	SAMPLED BY: (Print & Sign)	Date: 4/21/00 Time: NA
RELINQUISHED BY: (Signature)	Date: Time:	RECEIVED BY: (Signature)	Date: Time:	SAMPLE SHIPPED BY: (Circle) FEDEX BUS HAND DELIVERED UPS	AIRBILL #: OTHER:
RELINQUISHED BY: (Signature)	Date: Time:	RECEIVED BY: (Signature)	Date: Time:		

RECEIVING LABORATORY: Texas Environmental Lab
ADDRESS:
CITY: Midland STATE: TX ZIP:
CONTACT: PHONE:

RECEIVED BY: (Signature)
DATE: TIME:

HIGHLANDER CONTACT PERSON: Tim Tavarez

Results by:

RUSH Charges Authorized: Yes No

SAMPLE CONDITION WHEN RECEIVED:

MATRIX: (W-Water) S-Soil A-Air SL-Sludge SD-Solid O-Other

REMARKS:

Please Fill out all copies – Laboratory retains yellow copy – Return original copy to Highlander Enviromental Corp. – Project Manager retains pink copy – Accounting receives Gold copy.