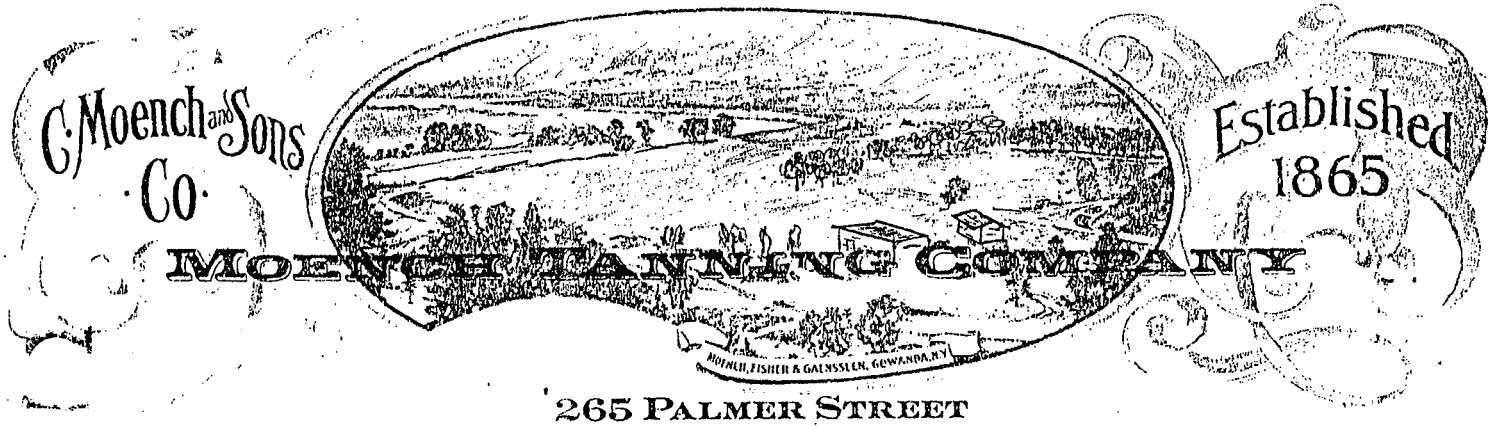
ANNUAL GROUND WATER QUALITY MONITORING REPORT FOR 1997CALENDAR YEAR AT PALMER STREET LANDFILL

MOENCH COMPANY
GOWANDA, NEW YORK

JANUARY 1998

J. Smith



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MOENCH COMPANY
PALMER STREET LANDFILL
1997 ANNUAL GROUNDWATER MONITORING REPORT....

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1.0 INTRODUCTION

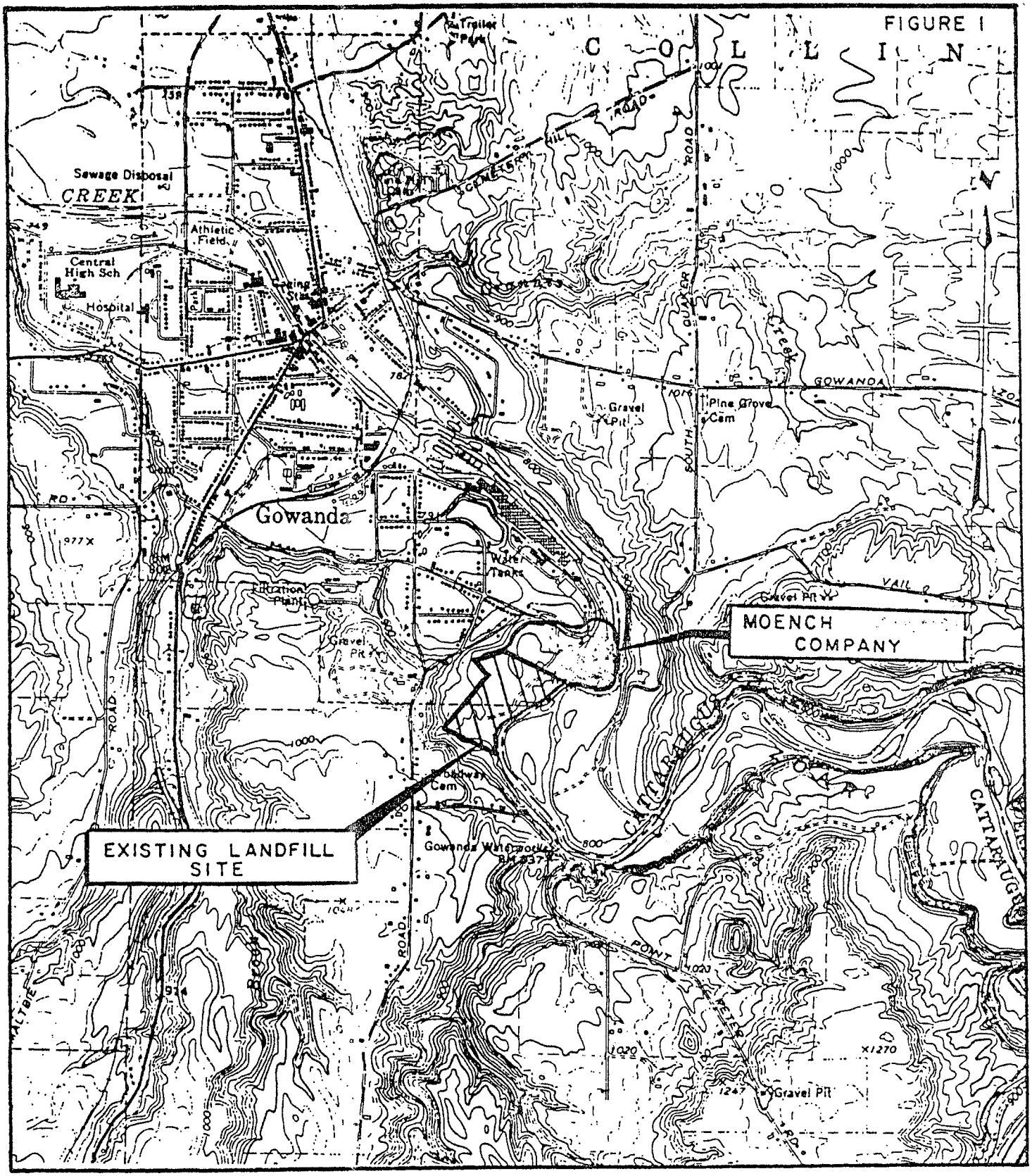
1.1 BACKGROUND

THE MOENCH COMPANY, A DIVISION OF BROWN GROUP, INC. IS LOCATED NEAR THE SOUTHEAST CORNER OF THE VILLAGE OF GOWANDA, CATTARAUGUS COUNTY, NEW YORK (FIGURE 1). THE PALMER STREET LANDFILL WHICH WAS OPERATED BY MOENCH TANNING FROM 1900 THROUGH JULY 1983, LIES IMMEDIATELY SOUTHWEST OF THE TANNERY COMPLEX ON AN APPROXIMATELY 25-ACRE PARCEL OF LAND. A VARIETY OF WASTE GENERATED BY MOENCH TANNING WERE DISPOSED OF AT THE PALMER STREET LANDFILL SITE. THESE WASTES INCLUDED SOLE LEATHER EXTRACT, RENDERING WASTE, SPRAY BOOTH CLEAN UP WASTE, WASTE FINISH, WASTE HAIR/LEATHER SCRAPS, WASTEWATER TREATMENT PLANT SLUDGE, AND OCCASIONAL CONSTRUCTION DEBRIS.

MOENCH TANNING HAS CLOSED THE PALMER STREET LANDFILL. ACCORDINGLY, THE CLOSURE/POST-CLOSURE PLAN (REFERENCE 1), IS BEING PERFORMED. THE LONG-TERM POST CLOSURE MONITORING PROGRAM HAS BEEN APPROVED & IMPLEMENTED. (JULY 1993, REVISED MARCH 1994)

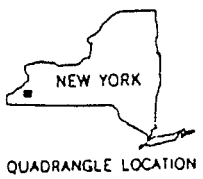
1.2 PUPOSE AND SCOPE

SAMPLES ASSOCIATED WITH ALL THREE ROUND OF WATER QUALITY MONITORING FOR 1997 YEAR, WERE COLLECTED IN APRIL, AUGUST & NOVEMBER.. THE PURPOSE OF THIS REPORT IS TO PROVIDE A SUMMARY OF THE DATA GENERATED FOR THE PALMER STREET LANDFILL SITE DURING THIS ANNUAL (97) MONITORING EVENT ...



{FIGURE 1}

NOTE:
TOPOGRAPHY TAKEN FROM 1963 GOWANDA, N.Y.
U.S.G.S. QUADRANGLE 7.5 MIN. SERIES
SCALE: 1" = 2000'



QUADRANGLE LOCATION

SITE LOCATION MAP
PALMER STREET LANDFILL
GOWANDA, N.Y.

6-94

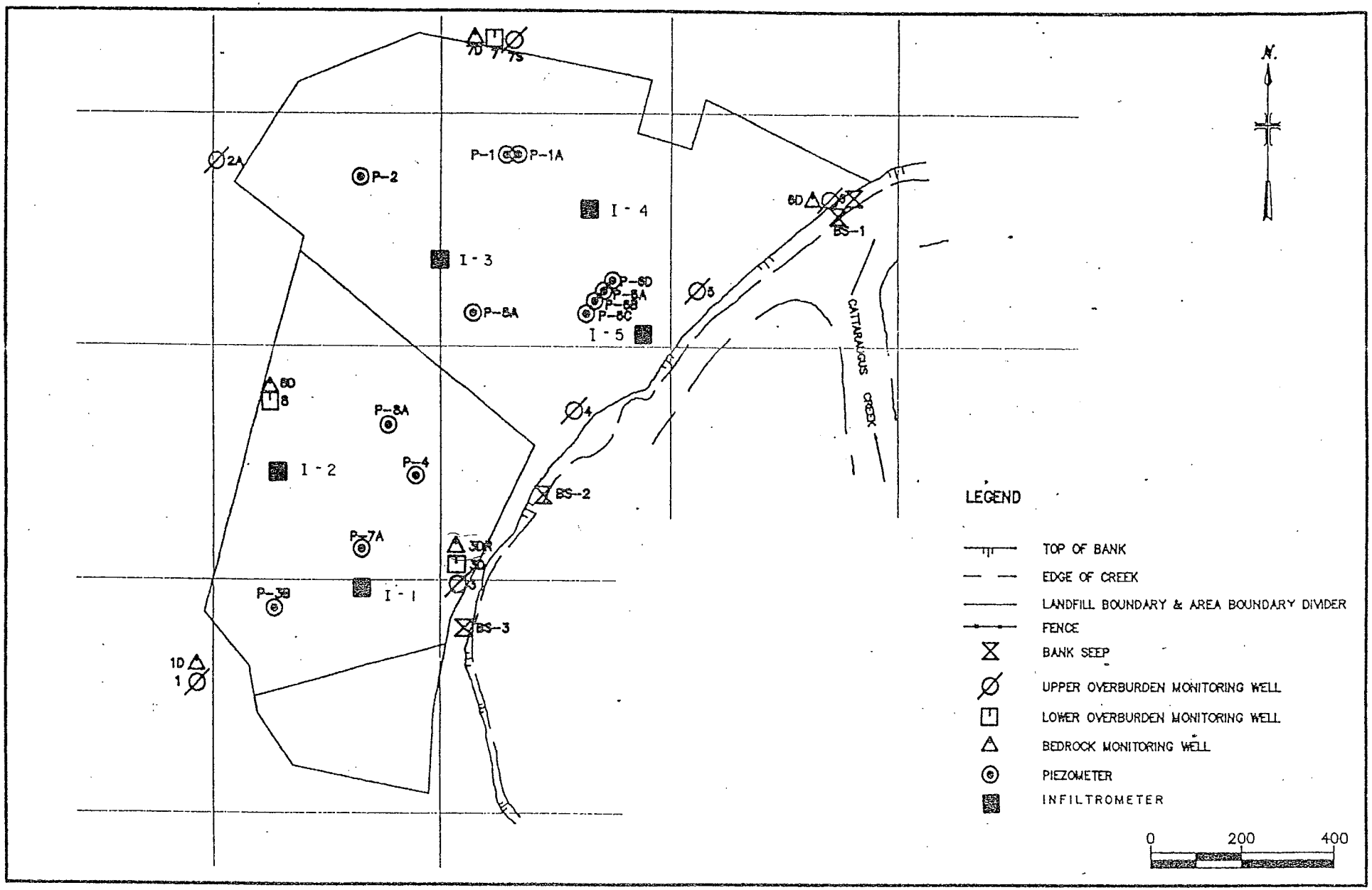
MOENCH Co.

2.0 MONITORING SYSTEM

SEVEN(7)) GROUNDWATER MONITORING WELLS AT THE PALMER STREET LANDFILL ARE MONITORED IN ACCORDANCE WITH THE LONG TERM POST CLOSURE MONITORING PLAN APPROVED FOR THE SITE. THESE WELLS ARE DESIGNATED AS FOLLOWS:

UPGRADIANT UPPER BEDROCK	DOWN GRADIANT UPPER BEDROCK	UPPER BEDROCK PIEZOMETER P-6D
MW-1D	MW-3DR	LOWER OVERBURDEN
MW-7D	MW-4D	PIEZOMETER P-6B
MW-8D(ANNUAL)	MW-6D	

IN ADDITION TO THE WELLS, NYSDEC ALSO REQUIRES THE MONITORING OF TWO (2) BANK SEEPS DESIGNATED AS BS-1 AND BS-3, RESPECTIVELY. THE ABILITY TO OBTAIN SAMPLES FROM THESE BANKSEEPS IS SPORADIC DUE TO VARYING WEATHER/MOISTURE CONDITIONS. TO AID IN THE EVALUATION OF COVER PERFORMACE, WATER LEVELS FROM FIVE (5) INFILTROMETERS ARE ALSO MONITORED. LOCATIONS OF MONITORING POINTS ARE SHOWN ON FIGURE 2.



MALCOLM PIRNIE

MOE - 23

Figure 2

PALMER STREET LANDFILL

MONITORING LOCATIONS

MOENCH TANNING COMPANY JULY 1992

FIGURE 2

3.0 MONITORING METHODS

3.1 GROUNDWATER MONITORING

SAMPLES COLLECTED DURING THE ANNUAL 1997 MONITORT EVENTS WERE COLLECTED BY MOENCH COMPANY PERSONNEL AND ANALYZED BY COLUMBIA ANALYTICAL SERVICES INC., ROCHESTER N.Y. THIS IS A CHANGE IN LABORATORIES, DUE TO THE CLOSING OF MALCOLM PIRNIE'S LAB, IN TARRYTOWN NEW YORK. THE LAB IS USED BY MALCOLM PIRNIE'S ORCHARD PARK, NY OFFICE. THE ANALYSIS IS PERFORMED IN ACCORDANCE WITH THE SAMPLING PLAN/QUALITY ASSURANCE PLAN FOR THE PALMER STREET LANDFILL (REFERENCE 5). LABORATORY ANALYSES WERE PERFORMED IN ACCORDANCE WITH THE USEPA SW-846, 3RD EDITION (REFERENCE 6). THE MONITORING PARAMETERS ARE LISTED IN TABLE 1. SAMPLES WERE COLLECTED FROM EACH OF THE SEVEN (7) MONITORING LOCATIONS IDENTIFIED IN SECTION 2.0.

PRIOR TO SAMPLING, STATIC WATER LEVEL ELEVATIONS WERE MEASURED IN THE MONITORING WELLS AND THE WELLS WERE PURGED (SEE TABLE 2 . GROUNDWATER ELEVATIONS WERE ALSO MEASURED IN THE PIEZOMETERS, INFILTROMETERS, AND WELLS ON-SITE.

FIELD SAMPLES WERE COLLECTED AND MEASURED FOR THE FIELD PARAMETERS IDENTIFIED IN TABLE 1. THE FIELD MEASUREMENTS WERE SUBMITTED IN THE PREVIOUS INDIVIDUAL MONITORING REPORTS.

3.2 INFILTROMETER MONITORING

FIVE INFILTROMETERS HAVE BEEN INSTALLED BENEATH THE LANDFILL CAP TO AID IN THE ASSESSMENT OF PERFORMANCE OF THE CAP. DURING EACH SAMPLING EVENT, WATER LEVELS IN THE INFILTROMETER ARE MEASURED AND THE AMOUNT OF WATER INFILTRATING CALCULATED.

THE CALCULATED INFILTRATION RATES ARE PRESENTED ON TABLE 4.. .CALCULATED INFILTRATION RATES ARE LESS THAN THE DESIGN INFILTRATION RATE OF 1X10(-7) CM/SEC.
A SCHEMATIC SHOWING THE DESIGN AND DIMENSIONS OF THE INFILTROMETERS IS PRESENTED IN ATTACHMENT "B".

TABLE 1

MOENCH COMPANY
PALMER STREET LANDFILL

ROUTINE GROUNDWATER QUALITY MONITORING PARAMETERS

Soluble Arsenic
Soluble Chromium
Soluble Lead

Volatile Organics[2][3]

pH[1]

Conductivity[1]
Turbidity[1] VISUAL ONLY
Groundwater Elevation[1]
Temperature[1]

All samples collected for analysis of soluble metals will be pressure-filtered in the field immediately upon sample collection.

NOTES:

1. All field parameters (i.e., pH, specific conductance, temperature and turbidity) will be measured in the field. No analysis of these parameters will be required by the laboratory.

2. Volatile organic compounds will be those compounds determined by SW-846, Method 8260.

TABLE 4 (2)

MOENCH TANNING COMPANY
PALMER STREET LANDFILL
4-14-97 MONITORING EVENT

INFILTROMETER MEASUREMENTS

Infiltrometer	Static Water Level 11-7-96 (ft)	Static Water Level 4-14-97 (ft)	Δ Depth (ft)	# Days Between Readings (#)	Infiltration Rate		Approx. Total Rainfall This Period (ft)	Infiltration (%)
					gal/day.ft²	(cm/sec)		
I-1	4.38	4.35	.03	158	.00009	4.2×10^{-9}	1.57	.13 %
I-2	8.02	7.98	.04	"	.00013	6.1×10^{-9}	"	.17
I-3	6.73	6.92	-.19	"	**	**	"	**
I-4	8.06	8.50	-.44	"	**	**	"	**
I-5	7.25	6.52	.73	"	.0023	1.1×10^{-7}	"	3.1 %

Note:
** Negative ΔD precludes calculation of meaningful data.

TABLE ~~X~~ (3)

MOENCH COMPANY
PALMER STREET LANDFILL
8-15-97 MONITORING EVENT

INFILTROMETER MEASUREMENTS

Infiltrometer	Static Water Level 5-14-97 (ft)	Static Water Level 8-15-97 (ft)	Δ Depth (ft)	# Days Between Readings (#)	Infiltration Rate		Approx. Total Rainfall This Period (ft)	Infiltration (%)
					gal/day.ft²	(cm/sec)		
I-1	5.21	4.88	.33	92	.0018	9.0×10^{-8}	.65	1.9
I-2	8.00	8.00	-0-	"	**	**	**	**
I-3	7.00	6.92	.08	"	.0004	2.0×10^{-8}	.65	.5
I-4	DRY-8.96	8.23	.73	"	.0040	1.9×10^{-7}	.65	4.1
I-5	7.13	6.74	.39	"	.0021	1.0×10^{-7}	.65	2.2

Note:
** Negative ΔD precludes calculation of meaningful data. (OR NO CHANGE)

TABLE 4

MOENCH [illegible] COMPANY
PALMER STREET LANDFILL
7- NOV. '97 MONITORING EVENT

INFILTROMETER MEASUREMENTS

Infiltrometer	Static Water Level (ft) 8-15-97	Static Water Level (ft) 11-7-97	Δ Depth (ft)	# Days Between Readings (#)	Infiltration Rate		Approx. Total Rainfall This Period (ft)	Infiltration (%)
					gal/day.ft²	(cm/sec)		
I-1	4.88	4.56	.32	84	.0012	5.5×10^{-8}	1.02	1.9
I-2	8.00	8.00	-0-	"	—	—	—	—
I-3	6.92	6.80	.12	"	.0006	2.9×10^{-8}	1.02	.7
I-4	8.23	DRY	-0-	"	—	—	—	—
I-5	6.74	6.65	.09	"	.0004	2.0×10^{-8}	1.02	.5

Note:
** Negative ΔD precludes calculation of meaningful data.

12/31/97

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4.0 GROUNDWATER QUALITY MONITORING RESULTS:

4.1 EVALUATION OF GROUNDWATER ELEVATION DATA:

GROUNDWATER ELEVATION MEASUREMENTS WERE TAKEN AT EACH OF THE ACCESSILBE ON-SITE MONITORING WELLS, PIEZOMETERS, AND WELL POINTS DURING THE ANNUAL 19977 MONITORING EVENT . THE DATA ARE SUMMARIZED IN TABLE 6.

PLOTS OF THE GROUNDWATER ELEVATIONS MEASURED IN THE MONITORING WELLS WITH RESPECT TO TIME ARE PRESENTED IN FIGURE 3,4, AND 5, FOR THE SHALLOW OVERBURDEN, DEEP OVERBURDEN AND BEDROCK WELLS, RESPECTIVELY. AS SHOWN IN FIGURES 3 AND 4, OVERBURDEN GROUNDWATER ELEVATIONS WERE GENERALLY CONSISTENT THROUGHOUT THE MONITORING PERIOD. WATER LEVELS HAVE STABLIZED, AFTER THREE YEARS OF INCREASES.('92-'94). THIS OCCURRED DUE TO CESSATION OF VILLAGE AND TANNERY PUMPING OF THE DEEP AQUIFERS. SOME SLIGHT SEASONAL FLUCTUATION DOES OCCUR.

4.2 THE GROUNDWATER AND SURFACE WATER QUALITY RESULTS FOR THE ANNUAL 1997 MONITORING EVENTS AT THE PALMER STREET LANDFILL ARE PRESENTED IN TABLES #7 THROUGH #10. .
. IT SHOULD BE NOTED THAT THESE TABLES INCLUDE ONLY THOSE PARAMETERS WHICH WERE DETECTED ABOVE ANALYTICAL DETECTION LIMITS AT A MINIMUM OF ONE LOCATION. COMPARISON OF THE MONITORING EVENT DATA TO THE NYSDEC CLASS "GA" GROUNDWATER QUALITY STANDARDS/GUIDANCE VALUES IS ALSO PRESENTED THESE TABLES.

BOTH THE SOIL AND WASTE AT THE PALMER STREET LANDFILL CONTAIN METALS-OF-INTEREST AS A COMPONENT OF THE SOIL OR WASTE PARTICLES (REFERENCE 5). THEREFORE, THE SEDIMENT (OR TURBIDITY) CONTENT OF ANY GROUNDWATER OR SURFACE WATER QUALITY SAMPLES WILL DIRECTLY IMPACT THE TOTAL METAL CONCENTRATION OF THE SAMPLES. THE TURBIDITY CONTENT OF THE GROUNDWATER SAMPLES COLLECTED AT THE SITE IS EXTREMELY VARIABLE AND RELATIVELY HIGH BECAUSE THE SOIL AND WASTE FILL BOTH CONTAIN HIGH PERCENTAGES OF FINE-GRAINED PARTICLES. AS NYSDEC HAS PREVIOUSLY AGREED, IN ORDER TO AVOID MISINTERPRETATION OF WATER QUALITY DATA, TOTAL METALS WILL NO LONGER SAMPLED FOR GROUNDWATER QUALITY
STANDARDS OR EVALUATIONS OF GROUNDWATER QUALITY IMPACTS WILL BE BASED ON SOLUBLE METAL CONCENTRATIONS.

ALSO TOTAL NOR SOLUABLE BARIUM WILL NO LONGER BE SAMPLED FOR IN THE AGREEMENT WITH NYSDEC, AS THE ELEMENT IS NATURALLY HIGH IN CONCENTRATION IN NATIVE SOIL.

THE SUMMARY OF THE SAMPLING RESULTS IS AS FOLLOWS:

MONITORING WELL MW-6D EXCEEDED CLASS "GA" STANDARDS FOR m,p XYLENE, FOR ALL THREE MONITOR EVENTS. ALSO, "PH" FOR THE 8/97 MONITORING EVENT, WAS BASIC, ABOVE THE LIMIT.

MONITORING WELL MW-4D EXCEEDED CLASS "GA" STANDARDS FOR TRICHLOROETHENE(11/97) AND METHYLENE CHLORIDE(4/97), VERY SLIGHTLY. THIS IS A RARE DETECTION.

MONITORING WELL MW-1D EXCEEDED THE "GUIDANCE VALUE" FOR ACETONE. THIS IS A RARE DEETECTION. THIS WELL IS ALSO AN UPGRADIANT WELL.

SOLUBLE LEAD WAS DETECTED, DURING THE 8/97 SSAMPLING EVENT, IN THE P-6B, CREEK SAMPLE, MW-1D(UPGRADIENT), AND MW-7D(UPGRADIENT) LOCATIONS.

AGAIN IT SHOULD BE NOTED THAT A CHANGE IN ANALYTICAL LABS HAS OCCURRED, AND REPORTING LIMITS MAY VARY SLIGHTLY.

NO OTHER PARAMETERS WERE EXCEEDED FOR EITHER METALS OR VOLATILES.

MALCOLM PIRNIE'S RECENT "COVER SYSTEM PERFORMANCE EVALUATION" REFERENCE #6, SUPPORTS THE LOW IMPACT OF THE LANDFILL ON THE SURROUNDING ENVIRONMENT.

TABLE 5 (A)

PALMER STREET LANDFILL
SUMMARY OF GROUNDWATER ELEVATIONS[1]

Location	Dates of Measurement							
	1/27/92	5/12/92	7/27/92	10/23/92	2/2/93	5/3/93	7/21/93	11/10/93
MW-1	819.38	820.40	819.43	819.98	820.32	820.74	819.36	819.55
MW-1D	756.42	757.54	776.43	795.15	797.55	800.57	802.17	806.79
MW-2A	*	807.60	808.07	808.06	807.97	807.77	807.62	807.81
MW-3	793.40	793.81	793.43	793.17	793.95	793.98	793.11	793.69
MW-3D	778.03	778.53	779.45	781.27	784.20	786.88	789.03	791.33
MW-3DR	777.13	776.57	778.11	782.77	786.32	789.40	791.77	793.86
MW-4SR	**							787.34
MW-4D	**							787.95
MW-5	783.35	783.58	783.78	783.20	783.45	783.65	782.45	783.40
MW-6	783.57	783.68	784.23	784.34	783.98	784.04	784.38	784.18
MW-6D	781.18	781.35	781.89	782.08	781.23	781.34	780.83	781.48
MW-7S	792.84	792.98	792.32	792.18	793.25	793.16	791.83	792.68
MW-7	793.30	791.75	793.30	793.45	792.67	791.57	792.20	793.33
MW-7D	793.92	792.44	792.24	793.46	793.27	792.21	789.94	793.19
MW-8D	772.56	772.25	776.41	785.99	790.41	793.73	796.33	798.31
P-1	795.26	795.23	794.97	794.89	794.85	795.10	795.55	794.15
P-1A	796.29	796.13	796.09	795.95	795.58	795.87	795.81	795.01
P-2	797.38	799.47	796.99	796.97	799.91	800.64	796.50	799.19
P-3B	815.18	816.14	815.39	815.62	816.32	816.84	815.57	816.22
P-4	795.98	796.41	796.22	795.92	800.98	796.60	796.94	796.10
P-6A	791.45	791.80	791.64	791.84	791.99	792.06	791.77	791.42
P-6B	791.75	790.85	790.33	790.23	790.28	789.93	789.35	790.49
P-6C	791.82	792.31	791.87	791.81	792.50	792.66	792.36	791.98
P-6D	789.93	789.73	789.52	789.27	789.26	789.28	788.90	788.67
P-7A	794.61	795.19	794.56	794.29	795.43	795.69	795.72	795.02
P-8A	792.77	792.35	792.13	Dry	Dry	Dry	Dry	Dry
WP-1	812.97	812.83	812.08	Dry	812.65	813.01	812.91	813.41
WP-4	792.73	792.99	792.42	791.69	789.21	793.66	792.31	792.56

Notes:
(1) Measured in feet; distance above sea level.
* Well locked; unable to open.
** Wells added to program prior to November 1993 event.
MW = Monitoring Well P = Piezometer WP = Well Point

TABLE 5 (B)

PALMER STREET LANDFILL
SUMMARY OF GROUNDWATER ELEVATIONS[1]

Location	Dates of Measurement							
	3-31-94	6-7-94	9-19-94	12-13-94	3-9-95	6-19-95	9-22-95	12-18-95
MW-1	821.38	821.30	822.35	822.35	822.75	822.16	821.47	820.95
MW-1D	810.57	809.82	810.32	812.77	814.07	808.77	810.47	811.67
MW-2A	781.87	—	807.92	807.87	808.17	807.22	807.97	808.08
MW-3	794.31	794.14	793.51	793.81	794.01	793.31	793.06	793.96
MW-3D	792.73	793.56	794.73	796.73	797.63	797.28	797.02	797.28
MW-3DR	796.97	796.72	798.92	799.12	800.32	799.72	799.34	797.97
MW-4SR	791.83	791.08	789.22	790.75	790.65	790.35	789.79	790.45
MW-4D	790.26	789.18	791.13	791.83	792.93	792.93	792.51	787.73
MW-5	785.85	783.35	783.25	784.47	784.35 MUD	784.05 MUD	784.05 MUD	MUD
MW-6	783.81	783.48	783.48	783.98	784.15	782.88	783.27	783.68
MW-6D	783.80	780.38	781.53	782.30	782.53	781.33	781.40	778.83
MW-7S	785.55	792.21	791.38	791.63	794.18	791.48	790.68	793.38
MW-7	791.75	790.75	793.30	793.75	792.50	792.30	793.80	793.78
MW-7D	791.72	790.64	792.99	793.84	793.84	793.39	793.89	794.59
MW-8D	802.31	803.39	804.21	804.44	804.79	804.79	803.97	804.54
P-1	DRY	797.35	794.17	794.40	794.65	797.85	802.70	MUD
P-1A	DRY	795.74	795.76	795.31	795.36	795.41	795.11	MUD
P-2	800.94	800.52	798.24	799.36	799.69	797.04	795.56	799.84
P-3B	817.90	819.07	819.54	819.42	819.67	819.37	818.69	818.07
P-4	796.62	796.62	796.39	796.44	796.79	796.54	797.27	796.84
P-6A	791.70	791.62	791.57	791.69	791.83	791.27	791.10	791.71
P-6B	790.10	DRY	789.35	789.89	790.10	789.65	789.68	790.25
P-6C	792.86	792.30	792.01	792.26	792.46	792.11	791.28	792.26
P-6D	789.30	DRY	788.80	789.17	789.67	789.75	789.76	788.20
P-7A	795.84	795.67	794.92	795.52	795.30	794.54	794.11	795.52
P-8A	DRY	DRY	DRY	DRY	DRY	DRY	DRY	
WP-1	813.83	802.16	812.00	813.96	814.01	DRY	DRY	DRY
WP-4	789.56	CAN'T OPEN	CAN'T OPEN	CAN'T OPEN	*	*	*	*

Notes:
(1) Measured in feet; distance above sea level.
* Well locked; unable to open.
** Wells added to program prior to November 1993 event.
MW = Monitoring Well P = Piezometer WP = Well Point

TABLE 5 (c)

PALMER STREET LANDFILL
SUMMARY OF GROUNDWATER ELEVATIONS[1]

Location	Dates of Measurement					
	4-22-96	8-16-96	11-7-96	4-14-97	8-15-97	11-7-97
MW-1	821.35	820.67	821.56	821.53	821.09	821.05
MW-1D	812.90	813.49	814.44	815.26	816.05	816.32
MW-2A	808.12	807.93	808.12	807.26	807.83	807.97
MW-3	795.86	798.86	797.56	793.96	793.81	794.26
MW-3D	798.63	801.23	798.56	798.73	799.10	799.33
MW-3DR	800.51	799.64	801.24	801.46	801.68	802.02
MW-4SR	790.08	795.83	790.79	791.53	790.55	793.08
MW-4D	794.85	793.87	794.47	794.46	794.72	794.59
MW-5	MUD	DRY	DRY	787.10	786.97	787.05
MW-6	784.35	783.48	786.60	784.47	785.40	783.98
MW-6D	782.46	781.96	782.65	782.36	781.63	782.56
MW-7S	793.88	791.63	794.05	793.18	791.57	792.64
MW-7	794.17	793.67	794.42	793.50	794.31	795.25
MW-7D	794.59	794.39	794.39	795.16	795.18	795.49
MW-8D	804.93	804.97	805.43	805.90	806.81	807.74
P-1	MUD	801.45	801.77	* 797.53	801.77	800.47
P-1A	MUD	795.53	797.62	795.20	795.08	795.27
P-2	801.19	799.44	802.19	FRZ. LOCK	*	800.84
P-3B	818.17	817.84	818.24	818.28	818.49	818.37
P-4	798.29	796.71	798.46	FRZ. LOCK	*	796.99
P-6A	791.68	791.62	791.90	791.72	791.56	791.75
P-6B	790.27	789.56	790.04	792.42	789.95	790.35
P-6C	792.48	792.48	792.86	790.53	791.98	792.36
P-6D	790.49	790.38	790.55	791.03	790.77	790.92
P-7A	798.22	795.27	799.92	795.50	795.39	796.82
P-8A	DRY	DRY	DRY	DRY	DRY	DRY
WP-1	742.06	742.16	744.74	*	*	*
WP-4	*	*	*	*	*	*

Notes:
(1) Measured in feet; distance above sea level.
* Well locked; unable to open.
** Wells added to program prior to November 1993 event.
MW = Monitoring Well P = Piezometer WP = Well Point

PL /ELV.XLC

PALMER STREET LANDFILL
MOENCH COMPANY
GROUNDWATER ELEVATION vs TIME (FEET ABOVE SEA LEVEL)
SHALLOW OVERBURDEN MONITOR WELLS

	Jan-90	Apr-90	Jul-90	Oct-90	Jan-91	May-91	Jul-91	Oct-91	Jan-92	May-92	Jul-92	Oct-92	Feb-93	May-93	Jul-93
MW-1	818	819	817	817	819	817	818	818	819	820	818	820	820	821	819
MW-3	796	796	794	793	794	793	792	792	793	794	793	793	794	794	793
MW-5	785	785	784	784	786	784	782	782	783	784	784	783	783	784	782
MW-6	784	784	783	784	785	784	784	784	784	784	784	783	784	784	784
MW-7S	795	795	793	795	795	794	792	792	793	793	792	792	793	793	792
MW-4SR															

PLRGWELV.XLC

Oct-93	Mar-94	Jun-94	Sep-94	Dec-94	Mar-95	Jun-95	Sep-95	Dec-95	Apr-96	Aug-96	Nov-96	Apr-97	Aug-97	Nov-97
820	821	821	822	822	823	822	821	821	821	821	822	822	821	821
794	794	794	794	794	794	793	793	794	796	799	798	794	794	794
783	786	783	783	784	784	784	784	782 DRY	DRY	DRY		787	787	787
784	784	783	783	784	784	783	783	784	784	783	787	785	785	784
793	786	792	791	792	794	791	791	793	794	792	794	793	792	793
787	792	791	789	791	791	790	790	790	790	796	791	792	791	793

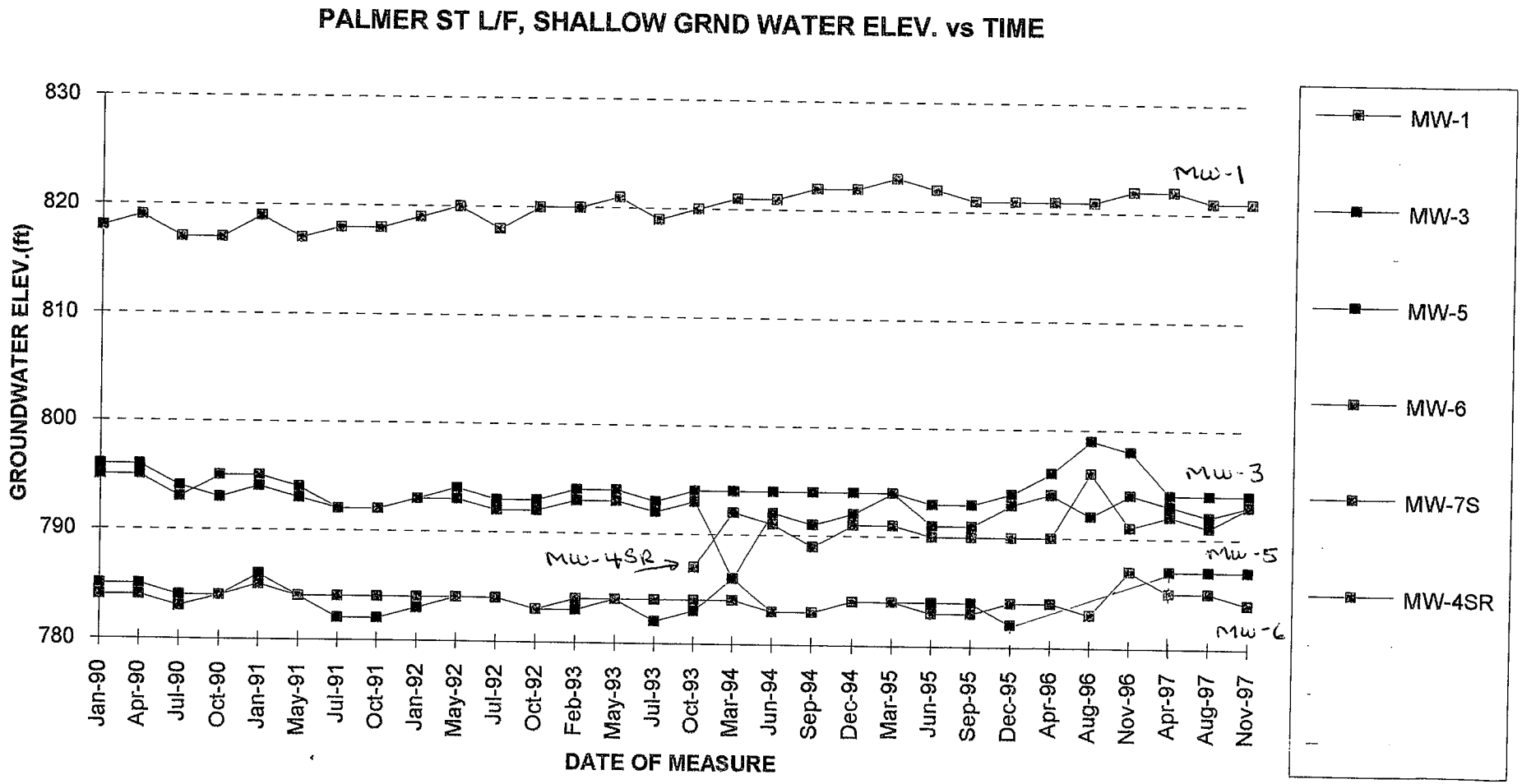
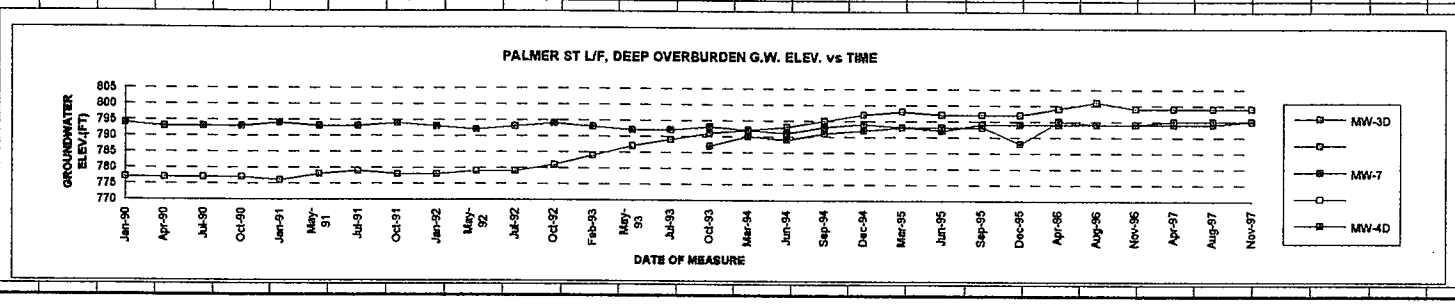

PALMER ST L/F, SHALLOW GRND WATER ELEV. vs TIME
GROUNDWATER ELEV.(ft)
830
820
810
800
790
780
Jan-90
Apr-90
Jul-90
Oct-90
Jan-91
May-91
Jul-91
Oct-91
Jan-92
May-92
Jul-92
Oct-92
Feb-93
May-93
Jul-93
Oct-93
Mar-94
Jun-94
Sep-94
Dec-94
Mar-95
Jun-95
Sep-95
Dec-95
Apr-96
Aug-96
Nov-96
Apr-97
Aug-97
Nov-97
DATE OF MEASURE
MW-1
MW-3
MW-5
MW-6
MW-7S
MW-4SR
Mw-1
Mw-3
Mw-4SR
Mw-5
Mw-6

Figure #3

PLM. ALC

PALMER STREET LANDFILL
MOENCH COMPANY
GROUNDWATER ELEVATION vs TIME(FEET ABOVE SEA LEVEL)
DEEP OVERBURDEN MONITOR WELLSS

	Jan-90	Apr-90	Jul-90	Oct-90	Jan-91	May-91	Jul-91	Oct-91	Jan-92	May-92	Jul-92	Oct-92	Feb-93	May-93	Jul-93	Oct-93	Mar-94	Jun-94	Sep-94	Dec-94	Mar-95	Jun-95	Sep-95	Dec-95	Apr-96	Aug-96	Nov-96	Apr-97	Aug-97	Nov-97
MW-3D	777	777	777	777	776	778	779	778	778	779	779	781	784	787	789	791	792	793	795	797	798	797	797	797	799	801	799	799	799	799
MW-7	794	793	793	793	794	793	793	794	793	792	793	794	793	792	792	793	792	791	793	794	793	792	794	794	794	794	794	794	794	795
MW-4D																787	790	789	791	792	793	793	793	788	795	794	794	795	795	795



(enlarged graph, next page)

Figure #4

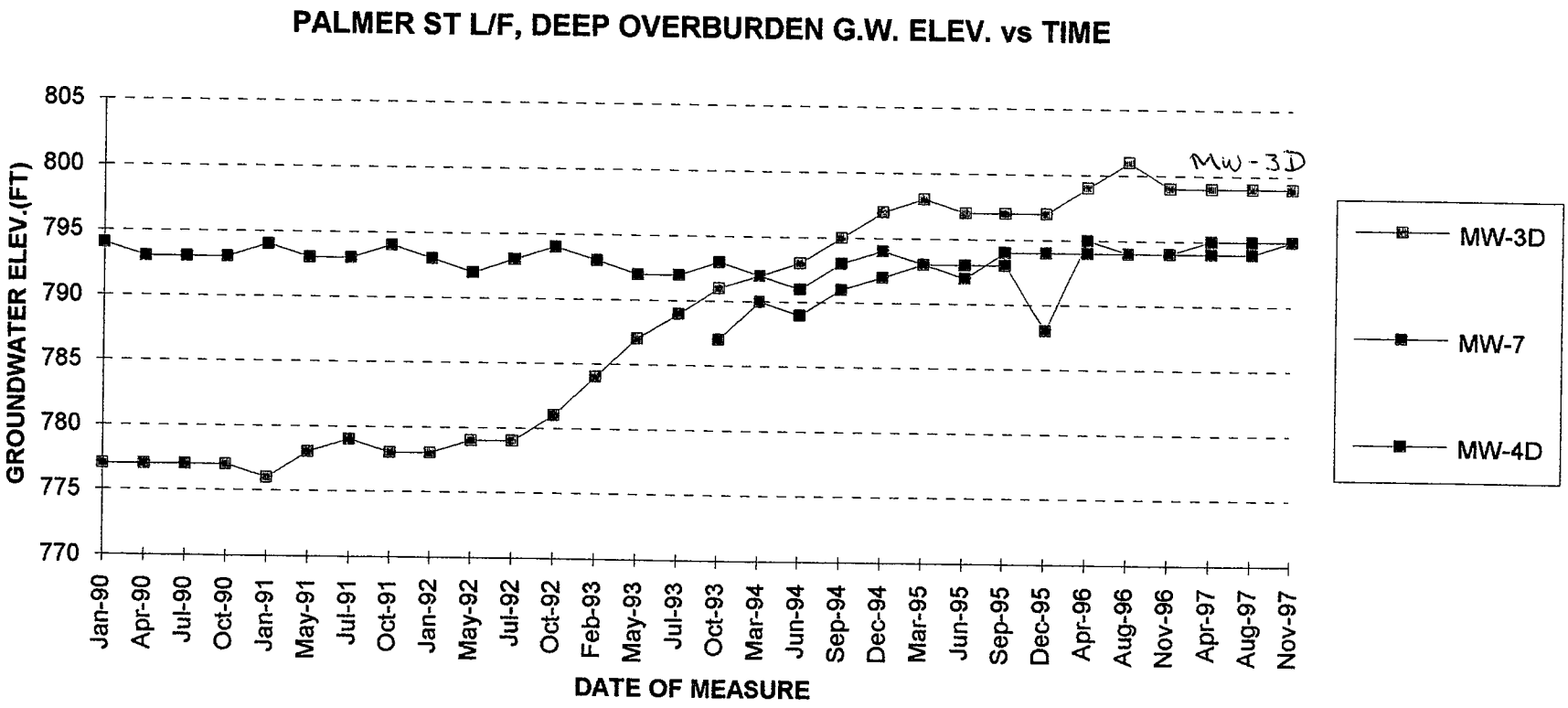

PALMER ST L/F, DEEP OVERBURDEN G.W. ELEV. vs TIME
GROUNDWATER ELEV.(FT)
805
800
795
790
785
780
775
770
Jan-90
Apr-90
Jul-90
Oct-90
Jan-91
May-91
Jul-91
Oct-91
Jan-92
May-92
Jul-92
Oct-92
Feb-93
May-93
Jul-93
Oct-93
Mar-94
Jun-94
Sep-94
Dec-94
Mar-95
Jun-95
Sep-95
Dec-95
Apr-96
Aug-96
Nov-96
Apr-97
Aug-97
Nov-97
DATE OF MEASURE
MW-3D
MW-7
MW-4D

Figure #4

PALMER STREET LANDFILL
MOENCH COMPANY
GROUNDWATER ELEVATION vs TIME
BEDROCK MONITOR WELLS & PIEZOMETERS

	Jan-90	Apr-90	Jul-90	Oct-90	Jan-91	May-91	Jul-91	Oct-91	Jan-92	May-92	Jul-92	Oct-92	Feb-93	May-93	Jul-93
MW-3DR	773	773	773	773	772	775	787	775	777	777	778	783	786	789	792
MW-7D	795	794	794	795	795	794	794	795	793	792	792	793	793	792	790
MW-8D	766	766	767	767	763	770	773	771	773	772	776	786	790	794	796
MW-1D					743	762	765	752	756	758	776	795	798	801	802
MW-6D					783	781	787	781	781	781	782	782	781	781	781
P-6D					790	790	790	790	790	790	790	789	789	789	789

	Oct-93	Mar-94	Jun-94	Sep-94	Dec-94	Mar-95	Jun-95	Sep-95	Dec-95	Apr-96	Aug-96	Nov-96	Apr-97	Aug-97	Nov-97
MW3DR →	794	797	797	799	799	800	800	799	798	801	800	801	801	802	802
MW7D	793	792	791	793	794	794	793	794	795	795	794	794	795	795	796
MW 8D	798	802	803	804	804	805	805	804	805	805	805	805	806	807	808
MW 1D	807	811	810	810	813	814	809	810	812	813	813	814	815	816	816
MW 6D	782	784	780	782	782	784	781	781	779	782	782	783	782	782	783
P-6D	789	789	DRY	789	789	790	790	790	788	790	790	791	791	791	791

Figure #5

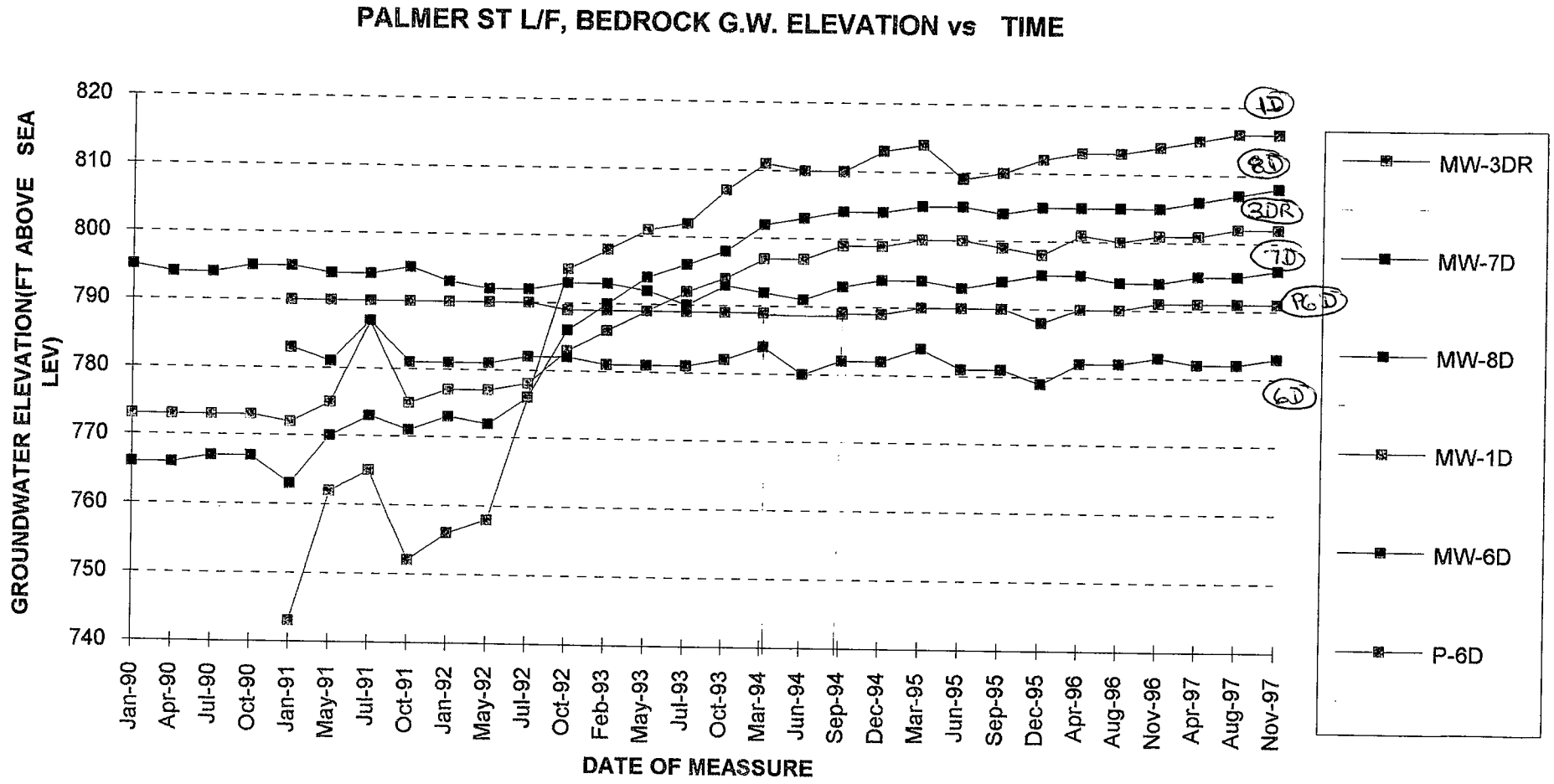

PALMER ST L/F, BEDROCK G.W. ELEVATION vs TIME
GROUNDWATER ELEVATION(FT ABOVE SEA LEV)
820
810
800
790
780
770
760
750
740
Jan-90
Apr-90
Jul-90
Oct-90
Jan-91
May-91
Jul-91
Oct-91
Jan-92
May-92
Jul-92
Oct-92
Feb-93
May-93
Jul-93
Oct-93
Mar-94
Jun-94
Sep-94
Dec-94
Mar-95
Jun-95
Sep-95
Dec-95
Apr-96
Aug-96
Nov-96
Apr-97
Aug-97
Nov-97
DATE OF MEASSURE
1D
8D
3DR
7D
P6D
6D
MW-3DR
MW-7D
MW-8D
MW-1D
MW-6D
P-6D

Figure #5

TABLE ~~X~~ 6

MOENCH TANNING COMPANY
PALMER STREET LANDFILL
4/16 - 4/22/97 MONITORING EVENT[1]

SUMMARY OF ANALYTICAL RESULTS

	Quantitation Limit	MW-1	MW-3DR	MW 4D	MW 6D	P-6B	P-6D	BLIND DUPLICAT.	Class "GA" Std.[2]
Metals (mg/l):									
Arsenic - Soluble	0.005	<.01	<.01	<.01	<.01	<.01	<.01	<.01	0.025
									-
Chromium - Soluble	0.005	<.01	<.01	<.01	<.01	<.01	<.01	<.01	0.05
Lead - Soluble	0.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	0.025
Volatiles (mg/l):									
		<.005	<.005	-	-	<.005	<.005	<.005	.005
m,p XYLENE		-	-	-	.007	-	-	-	.005
METHYLENE CHLOR.		-	-	.008	-	-	-	-	.005

TABLE ~~8~~ 6 (Continued)

MOENCH TANNING COMPANY
PALMER STREET LANDFILL
4/16 - 4/22/97 MONITORING EVENT[1]

SUMMARY OF ANALYTICAL RESULTS

Parameter	Quantitation Limit	MW-7D	MW-8D (ANNUAL)	BS-1	BS-3	Trip Blank[3]	Class "GA" Std.[2]
Metals (mg/l):							
Arsenic - Soluble	0.005	<.01	–	<.01	<.01	–	0.025
							~~.10~~ –
Chromium - Soluble	0.005	<.01	–	<.01	<.01	–	0.05 –
Lead - Soluble	0.005	<.005	–	<.005	<.005	–	0.025
Volatiles (mg/l):							
		<.005	–	<.005	<.005	<.005	.005

NOTES:
(1) Only those parameters found at a concentration above laboratory detection limits at a minimum of one location are shown.
(2) NYSDEC Class "GA" Ground Water Quality Standards, 6NYCRR Part 703, Revised October 1993.
(3) Trip blanks were analyzed for only volatile organic compounds.
(4) MW-8D sampled only once annually (Reference 6).
(5) ~~Monitor wells 3D and 7 are monitored quarterly, sampled annually.~~
J Estimated value due to limitations identified in the quality control review.

(8) LIKELY LAB CONTAMINATION.

TABLE ~~X~~ (7)

MOENCH [illegible] COMPANY
PALMER STREET LANDFILL
8/25 - 8/27/97 MONITORING EVENT[1]

SUMMARY OF ANALYTICAL RESULTS

	Quantitation Limit	MW-1D	MW-3PR	MW 4D	MW 6D	P-6B	P-6D	MW-6D BLIND DUPLICAT.	Class "GA" Std.[2]
Metals (mg/l):									
Arsenic - Soluble	0.005	<.01	<.01	<.01	<.01	<.01	<.01	<.01	0.025
									-
Chromium - Soluble	0.005	<.01	<.01	<.01	<.01	<.01	<.01	<.01	0.05
									-
Lead - Soluble	0.005	.066	.008	<.005	<.005	.029	<.005	<.005	0.025
Volatiles (mg/l):									
		ND	ND	ND		ND	ND	ND	
m+p XYLENE					.0051				.005

TABLE ~~8~~ (7) (Continued)

MOENCH [illegible] COMPANY
PALMER STREET LANDFILL
8/25 - 8/27/97 MONITORING EVENT[1]

SUMMARY OF ANALYTICAL RESULTS

Parameter	Quantitation Limit	MW-7D	MW-8D (ANNUAL)	BS-1 (5)	BS-3 (6)	Equipment ~~Trip~~ Blank[3]	Class "GA" Std.[2]
Metals (mg/l):							
Arsenic - Soluble	0.005	<.01	<.01	<.01	.012	<.01	0.025
							1.0
Chromium - Soluble	0.005	<.01	<.01	<.01	<.01	<.01	0.05
Lead - Soluble	0.005	.214	<.005	<.005	.200	<.005	0.025
Volatiles (mg/l):		ND	ND	ND	ND	ND	

NOTES:
(1) Only those parameters found at a concentration above laboratory detection limits at a minimum of one location are shown.
(2) NYSDEC Class "GA" Ground Water Quality Standards, 6NYCRR Part 703, Revised October 1993.
(3) Trip blanks were analyzed for only volatile organic compounds.
(4) MW-8D sampled only once annually (Reference 6). UPGRADIENT
(5) ~~Monitor wells 3D and 7 are monitored quarterly, sampled annually.~~
J Estimated value due to limitations identified in the quality control review.

(5) TOO DRY FOR BANK SEEP. SAMPLE CREEK DOWNSTREAM OF LANDFILL
(6) TOO DRY FOR BANK SEEP. SAMPLE SURFACE RUNOFF AREA #2 + 3.
(8) LIKELY LAB CONTAMINATION.

TABLE ~~X~~ (8)

MOENCH [illegible] COMPANY
PALMER STREET LANDFILL
11/10 - 11/17/97 MONITORING EVENT[1]

SUMMARY OF ANALYTICAL RESULTS

	Quantitation Limit	MW-1D	MW-3DR	MW 4D	MW 6D	P-6B	P-6D	BLIND DUPLICAT.	Class "GA" Std.[2]
Metals (mg/l):									
Arsenic - Soluble	0.005	<.01	<.01	<.01	<.01	<.01	<.01	<.01	0.025
									–
Chromium - Soluble	0.005	<.01	<.01	<.01	<.01	<.01	<.01	<.01	0.05
Lead - Soluble	0.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	0.025
Volatiles (mg/l):									
M+P XYLENE		–	ND	–	.005	ND	ND	ND	
TRICHLOROETHENE		–		.0053	–				
ACETONE		.053							

TABLE (8) (continued)

MOENCH [illegible] COMPANY
PALMER STREET LANDFILL
11/10 - 11/17/97 MONITORING EVENT[1]

SUMMARY OF ANALYTICAL RESULTS

Parameter	Quantitation Limit	MW-7D	MW-8D (ANNUAL) (DID 8/97)	BS-1	BS-3	Trip Blank[3]	Class "GA" Std.[2]
Metals (mg/l):							
Arsenic - Soluble	0.005	<.01		<.01	<.01	NA	0.025 –
						"	1.0 –
Chromium - Soluble	0.005	<.01		<.01	<.01	"	0.05 –
Lead - Soluble	0.005	<.005		<.005	<.005	"	0.025
Volatiles (mg/l):		ND		ND	ND	ND	

NOTES:
(1) Only those parameters found at a concentration above laboratory detection limits at a minimum of one location are shown.
(2) NYSDEC Class "GA" Ground Water Quality Standards, 6NYCRR Part 703, Revised October 1993.
(3) Trip blanks were analyzed for only volatile organic compounds.
(4) MW-8D sampled only once annually (Reference 6).
(5) ~~Monitor wells 3D and 7 are monitored quarterly, sampled annually.~~
J Estimated value due to limitations identified in the quality control review.

(8) LIKELY LAB CONTAMINATION.

PALMER ST L/F, MOENCH COMPANY
"PH" vs TIME
MONITOR POINTS & BANK SEEP

	Jan-90	Apr-90	Jul-90	Oct-90	Jan-91	May-91	Jul-91	Oct-91	Jan-92	May-92	Jul-92	Oct-92	Feb-93	May-93	Jul-93
MW-1D	8.2	7.5	7.7	7.9	7.4	7.9	7.8	8	7.8	7.9	7.6	8	8.3	8.3	7.3
P-6D	START 94														
MW-3DR	8.3	8	7.2	8.1	7.5	8	8.5	8.2	8.4	8	8.2	7.8	7.7	8.8	7.6
MW-5	7	7.3	7	7	7.2	7	7	7.1	7.3	7.1	7	6.9	7.3	7.4	6.8
MW-6D	6.6	6.7	6.7	6.7	6.7	6.7	8	6.9	6.9	6.7	6.7	6.5	6.9	7	6.6
MW-4SR	START93														
MW-4D	6.8				6.9	7	6.8								

	Nov-93	Mar-94	Jun-94	Sep-94	Dec-94	Mar-95	Jun-95	Sep-95	Dec-95	Apr-96	Aug-96	Nov-96	Apr-97	Aug-97	Nov-97
MW-1D	7.5	7	7.1	7	6.9	7.2	7.2	7.1	7.2	7.9	7.9	8.1	7.6	8.1	8.3
P-6D		7.3		7.1	7	7.7	7.7	7.7	7.6	7.8	7.8	8.4	7.8	8.5	8.4
MW-3DR	8	7.2	7.2	7.2	7	7.6	7.6	7.5	7.7	8.1	8.2	8.3	8.1	8.5	8.4
MW-5	7.2														
MW-6D	6.7	7.1	7.4	7.5	7.2	7.6	7.6	7.5	7.8	7.8	8.2	8.2	8	8.6	8.5
MW-4SR	6.8														
MW-4D		7.2	7.2	7.5	7	7.7	7.7	7.4	7.4	7.9	8.2	8.2	7.9	8.4	8.5

PLMRGW4.XLC Chart 2

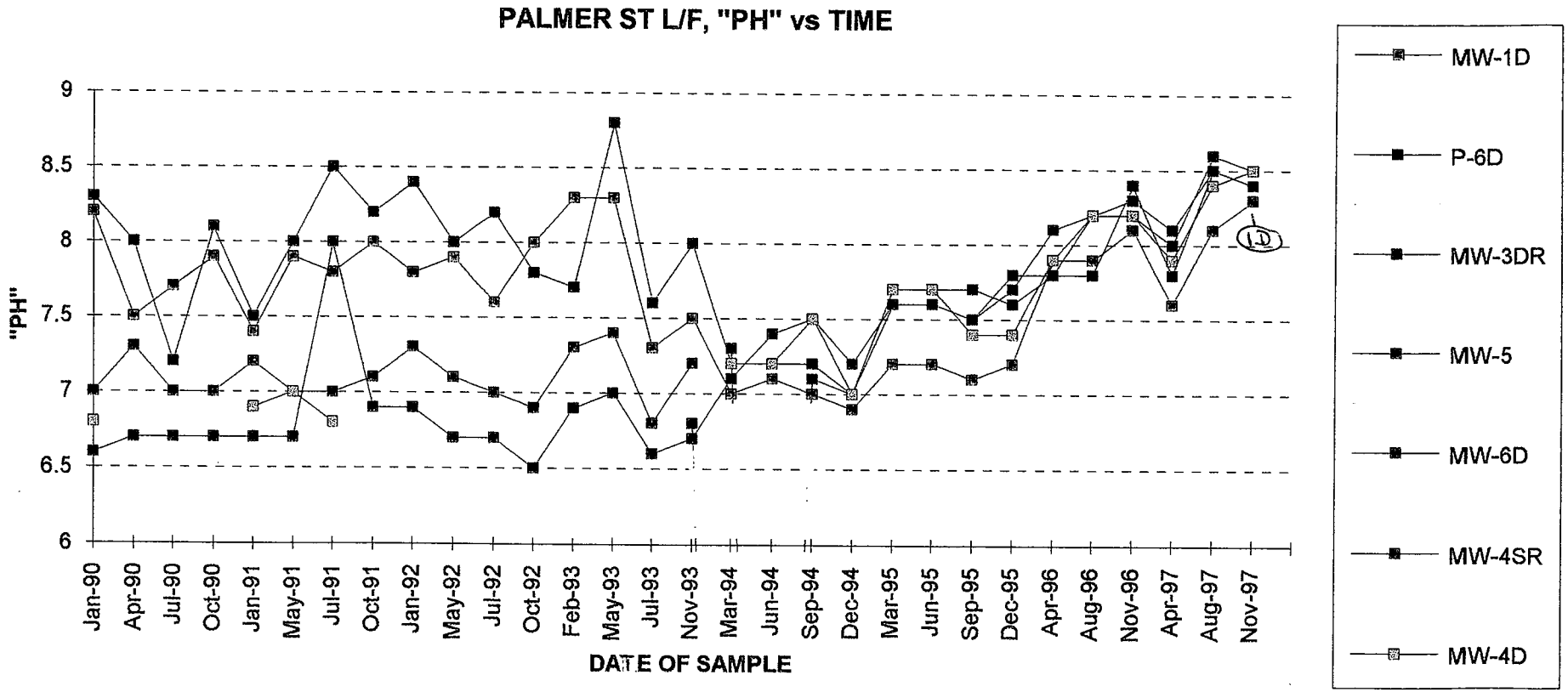


Figure #6

PALMER ST L/F, MOENCH COMPANY
"PH" vs TIME
MONITOR POINTS & BANK SEEPS

P-6B	START94	Apr-90	Jul-90	Oct-90	Jan-91	May-91	Jul-91	Oct-91	Jan-92	May-92	Jul-92	Oct-92	Feb-93	May-93	Jul-93
MW-7D	7.7	7.8	7.9	8	7.5	7.8	7.8	7.8	7.8	8.2	8.2	7.9	7.8	8.3	7.8
MW-8D	10	9.2	9	9.5	9	9.3	9.1	8.6	8.8	8.7	8.8	8.6	8.8	8.6	8.1
BS-1	7.1	7.3	6.7	6.9	7.4	7			8.5	7.7	7.6	7.8	8.1	7.5	
BS-3	7	7.3	7.1	7.3	7.1	7.3		7.9	7.6	7.2	7.1	7.4	7.1	7.8	

	Nov-93	Mar-94	Jun-94	Sep-94	Dec-94	Mar-95	Jun-95	Sep-95	Dec-95	Apr-96	Aug-96	Nov-96	Apr-97	Aug-97	Nov-97
P-6B		7.1	7.1	7	7	7.1	7.1	7.2	7.2	7.6	7.8	8.2	7.6	8.4	8.4
MW-7D	8.3	7.1	7.2	7.1	7	7.6	7.6	7.4	7.6	7.9	8.2	8.2	7.8	8.4	8.4
MW-8D				7.8				7.8				8.2		8.5	
BS-1	8.1	7.7	7.1	7.1	7.1	7.2	7.1	7.1	7.1	7		9	7	8.2	8.3
BS-3	7.9	7.3	6.6	6.8	6.9	6.7	7.3	6.9	7.3	8.1		8.3	8.2	8.3	8.1

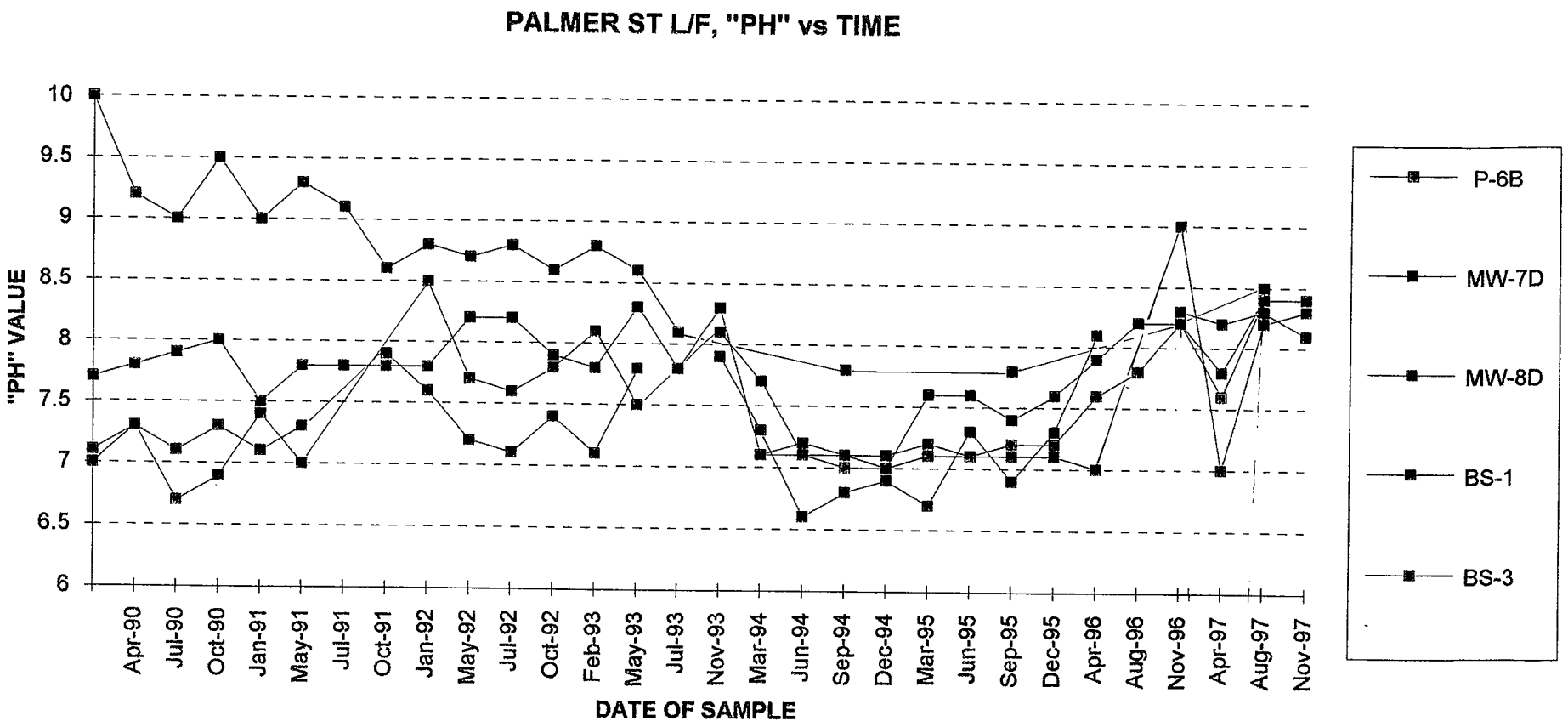

PALMER ST L/F, "PH" vs TIME
"PH" VALUE
10
9.5
9
8.5
8
7.5
7
6.5
6
Apr-90
Jul-90
Oct-90
Jan-91
May-91
Jul-91
Oct-91
Jan-92
May-92
Jul-92
Oct-92
Feb-93
May-93
Jul-93
Nov-93
Mar-94
Jun-94
Sep-94
Dec-94
Mar-95
Jun-95
Sep-95
Dec-95
Apr-96
Aug-96
Nov-96
Apr-97
Aug-97
Nov-97
DATE OF SAMPLE
P-6B
MW-7D
MW-8D
BS-1
BS-3

Figure #6

P' `SC1.XLC

PALMER SST L/F, MOENCH COMPANY
SPECIFIC CONDUCTIVITY vs TIME
MONITOR WELLS & BANK SEEPS

	Jan-90	Apr-90	Jul-90	Oct-90	Jan-91	May-91	Jul-91	Oct-91	Jan-92	May-92	Jul-92	Oct-92	Feb-93	May-93	Jul-93
MW-1D	0.6	0.8	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
P-6B	START94														
MW-3DR	0.6	0.8	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.6
MW-5	3.8	2.7	1.5	1.7	1.9	5	3	4.2	5.8	4.2	4.1	4.2	4	6.8	3.3
MW-6D	5.3	5.4	4.9	3.1	3.5	3.6	3.2	4.9	4.1	3.3	2.8	2.8	2.7	4.3	3.8
MW-4SR	ONLY93														
MW-4D															

PLMRSC1.XLC

	Nov-93	Mar-94	Jun-94	Sep-94	Dec-94	Mar-95	Jun-95	Sep-95	Dec-95	Apr-96	Aug-96	Nov-96	Apr-97	Aug-97	Nov-97
MW-1D	0.5	1	1	0.8	0.9	0.8	0.8	0.8	0.8	1	0.8	0.9	0.9	0.9	1
P-6B		0.7	0.6	0.6	0.9	0.4	0.7	0.6	0.6	0.4	0.5	0.6	0.5	0.5	0.5
MW-3DR	0.7	0.7	0.6	0.4	0.8	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.5	0.7
MW-5	3.7														
MW-6D	3.3	1	0.9	1.1	1.1	1	0.9	0.9	0.9	1	1.1	1	1.2	1	1.9
MW-4SR	0.8														
MW-4D	2.6	0.6	0.8	0.7	0.8	0.7	0.7	0.9	0.7	0.8	0.7	0.9	0.8	0.7	0.8

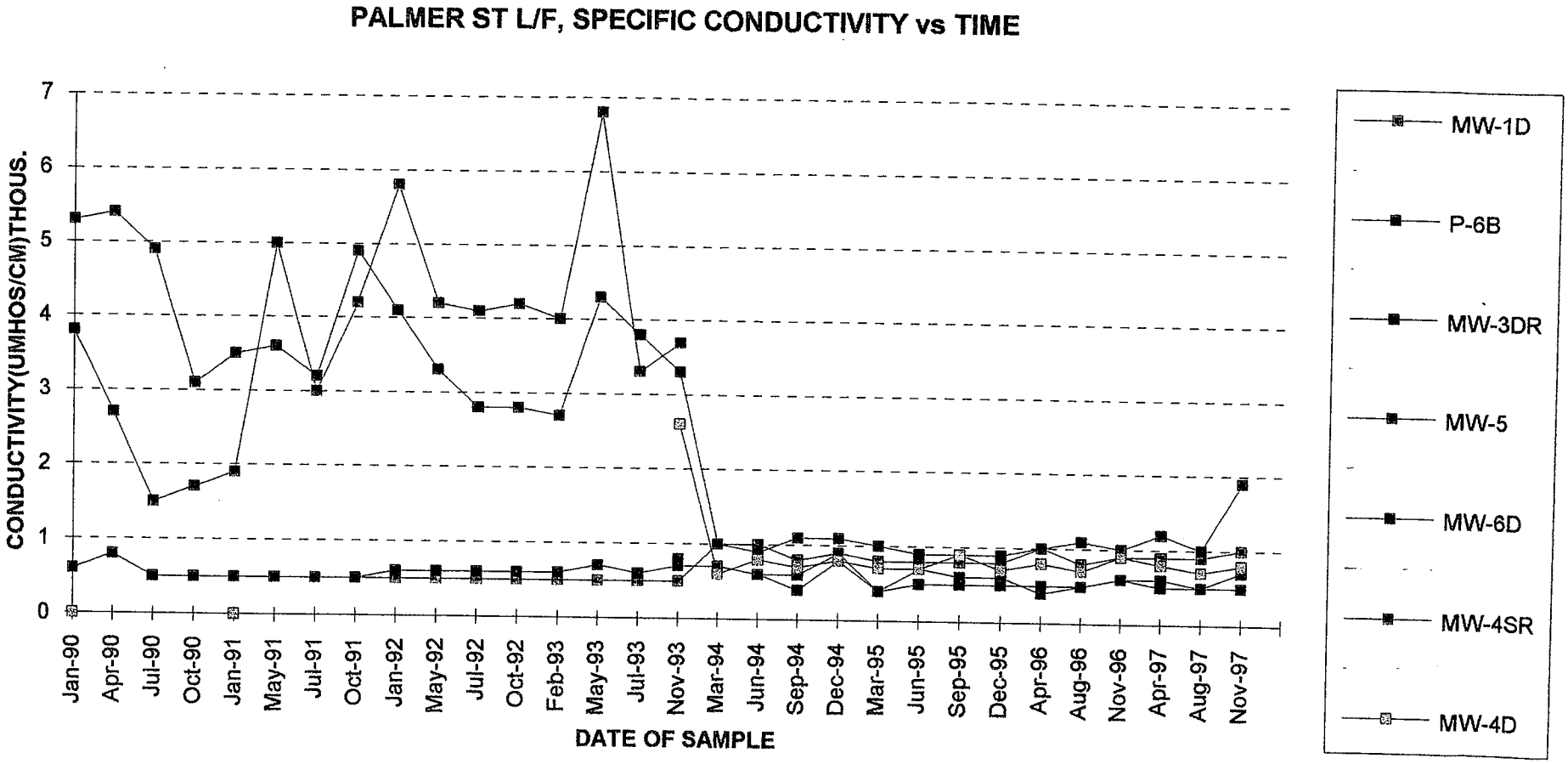

PALMER ST L/F, SPECIFIC CONDUCTIVITY vs TIME
CONDUCTIVITY(UMHOS/CM)THOUS.
0
1
2
3
4
5
6
7
Jan-90
Apr-90
Jul-90
Oct-90
Jan-91
May-91
Jul-91
Oct-91
Jan-92
May-92
Jul-92
Oct-92
Feb-93
May-93
Jul-93
Nov-93
Mar-94
Jun-94
Sep-94
Dec-94
Mar-95
Jun-95
Sep-95
Dec-95
Apr-96
Aug-96
Nov-96
Apr-97
Aug-97
Nov-97
DATE OF SAMPLE
MW-1D
P-6B
MW-3DR
MW-5
MW-6D
MW-4SR
MW-4D

Figure #7

PLMR .XLC

PALMER ST. LANDFILL, MOENCH COMPANY
SPECIFIC CONDUCTIVITY vs TIME (umhos/CM)(THOUSANDS)
MONITOR WELLS & BANK SEEPS

P-6D	Jan-90 STRT-94	Apr-90	Jul-90	Oct-90	Jan-91	May-91	Jul-91	Oct-91	Jan-92	May-92	Jul-92	Oct-92	Feb-93	May-93	Jul-93
MW-7D	1	1	0.7	0.8	0.5	0.7	0.8	0.7	0.5	0.8	0.6	0.6	0.6	0.7	0.9
MW-8D	0.5	0.6	0.3	0.3	0.2	0.2	0.2	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.4
BS-1	2.7	2.9	3	2.9	1	1.6		1.3	1.3	1.3	0.6	0.6	0.6	0.7	
BS-3	2.8	2.9	1.8	1.8	1	1.8		1.1	0.9	0.9	1.1	0.5	0.5	0.7	

PLMR2SC.XLC

	Nov-93	Mar-94	Jun-94	Sep-94	Dec-94	Mar-95	Jun-95	Sep-95	Dec-95	Apr-96	Aug-96	Nov-96	Apr-97	Aug-97	Nov-97
P-6D		0.6	0.7	0.9	0.9	0.5	0.6	0.6	0.4	0.6	0.6	0.7	0.6	0.6	0.6
MW-7D	0.7	0.7	0.7	0.7	1	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.6	0.7
MW-8D								0.3				0.3		0.3	
BS-1	0.8	0.7	0.6		0.8	1.1	0.7	1		1	0.7	0.3	1.5	0.5	0.5
BS-3	0.7	0.6	1	0.6	0.9	1.2	0.5	1.4	0.5	0.2	0.5	0.5	0.5	0.6	0.8

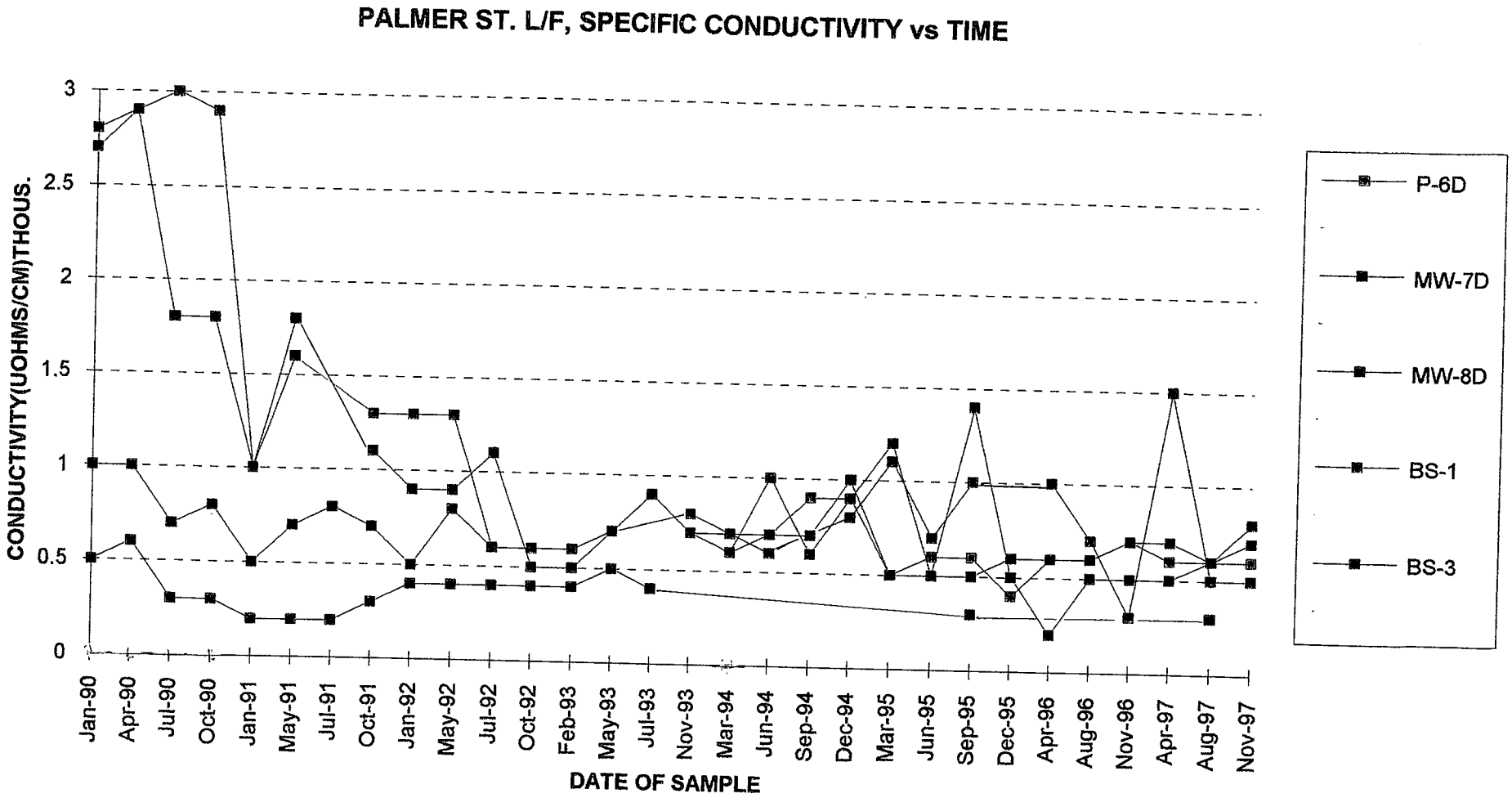


Figure #7 (continued)

4.3 RATE OF CONTAMINANT MIGRATION

Contaminant migration and potential environmental impacts for the Palmer Street Landfill are discussed in detail in the report entitled "Palmer Street Landfill - Evaluation of Alternative Cover Systems" prepared by Malcolm Pirnie, Inc., January 1989 (Reference 7). As described in the above-mentioned report, groundwater migrates from the landfill through the shallow water-bearing zone along both the eastern and northern boundaries of the waste/fill area. A reasonable assumption in determining the rate of contaminant migration across the site is the rate of contaminant migration is equivalent to the rate at which groundwater leaves the site. This latter calculation can be performed through the application of Darcy's Law which is expressed as:

$$V = \frac{ki}{\theta}$$

where: V = velocity of shallow groundwater flow (feet/day)
k = hydraulic conductivity of the shallow water bearing zone (feet/day)
i = hydraulic gradient (dimensionless)
θ = average porosity of the shallow water bearing zone (dimensionless

Values for k and θ were previously determined (see Reference 2) as 4.1 ft/day and 0.35, respectively. The hydraulic gradient (i) is measured perpendicular to the primary direction of groundwater flow (viz., to the east toward Cattaraugus Creek - see Section 5.0) using average water level elevations as measured in MW-1 and MW-3 and elevation as measured in MW-2A and MW-5 during the 1993 monitoring year. The hydraulic gradient for MW-1 and MW-3 is thus:

$$\frac{\Delta H}{\Delta X} = \frac{26.3}{600} = 0.044$$

where

Δ H = difference in average groundwater elevations between MW-1 and MW-3 (feet)
Δ X = distance between MW-1 and MW-3 (feet)

Upon inserting this value into the Darcy's Law expression for velocity, the following result is obtained:

$$V = \frac{ki}{\theta} \quad \frac{(4.1)(0.044)}{0.35} = 0.52 \ ft/day$$

Thus, the rate of contaminant migration across the site is approximately 0.52 feet/ day between monitoring wells MW-1 and MW-3.

The hydraulic gradient for MW-2A and MW-5 is as follows:

$$\frac{\Delta H}{\Delta X} = \frac{24.5}{1085} = 0.022$$

Δ H = difference in average groundwater elevations between MW-2A and MW-5 (feet)

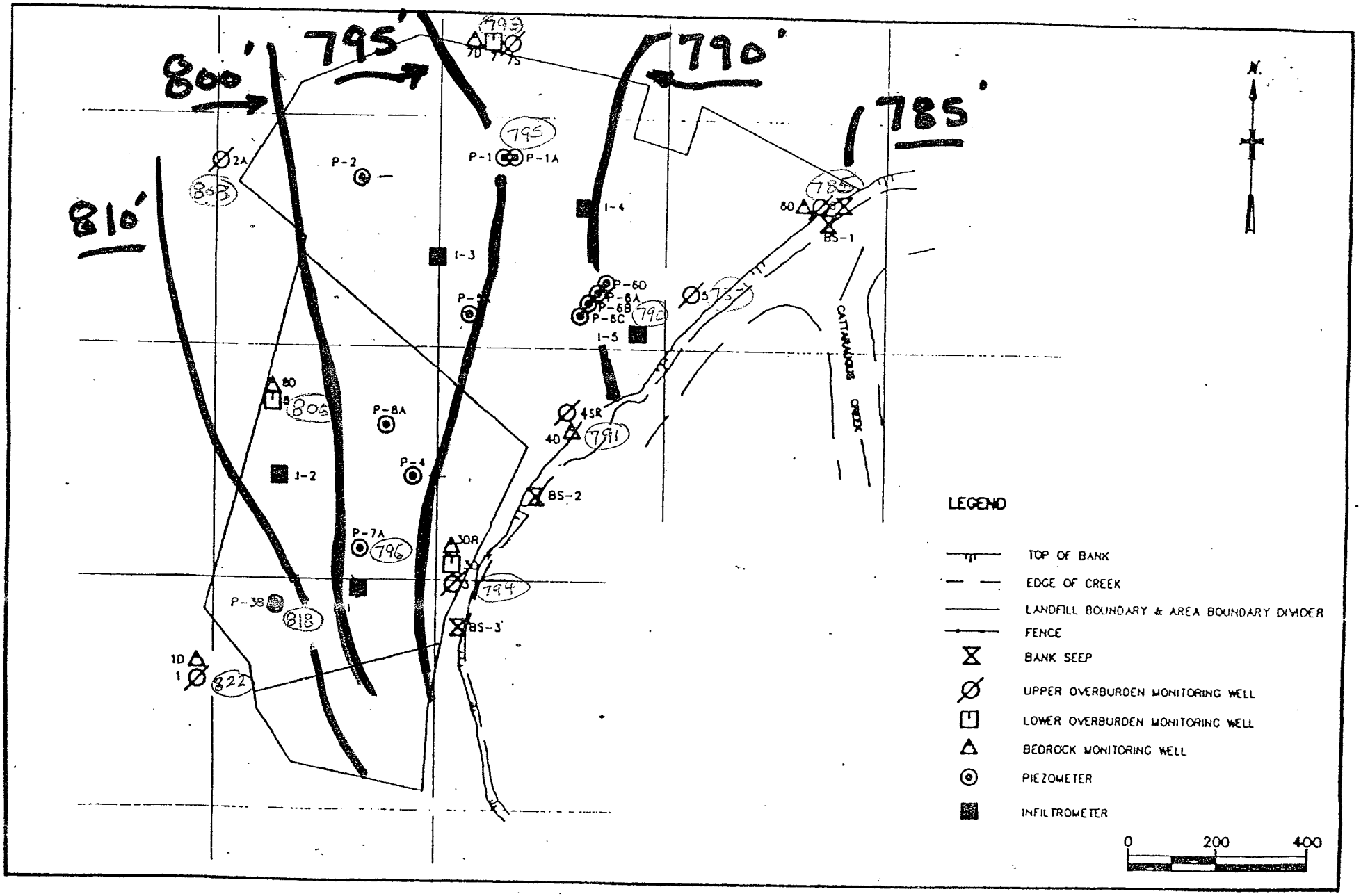
Δ X = distance between MW-2A and MW-5 (feet)

$$V = \frac{ki}{\theta} \quad \frac{(4.1)(0.022)}{0.35} = 0.26 \ ft/day$$

The rate of contaminant migration across the site is approximately 0.26 ft/day between monitoring wells MW-2A and MW-5.

5.0 GROUNDWATER FLOW

A WATER TABLE ISOPOTENTIAL MAP, BEDROCK ISOPOTENTIAL MAP AND A BEDROCK WATER LEVEL HYDROGRAPH HAVE BEEN PREPARED FOR THE PALMER STREET LANDFILL AND ARE PRESENTED IN FIGURES 3,4 AND 5, RESPECTIVELY. GROUNDWATER ELEVATIONS MEASURED THRU 1997 WERE USED IN PREPARING THE WATER TABLE AND BEDROCK ISOPOTENTIAL MAP INDICATED THAT THE SHALLOW GROUNDWATER FLOW IS PRIMARILY TO THE EAST TOWARD CATTARAUGUS CREEK. THE BEDROCK ISOPOTENTIAL MAP AND THE BEDROCK WATER LEVEL HYDROGRAPH ILLUSTRATE A "LEVELING OFF" AFTER 3 YEARS('92-94) OF RISING GROUNDWATER LEVELS AT WELLS MW-1D, MW-3DR AND MW-8D. MW-1D AND MW-8D, WHICH WERE FORMERLY DOWNGRADIENT WELLS ARE NOW UPGRADIENT OF THE LANDFILL.

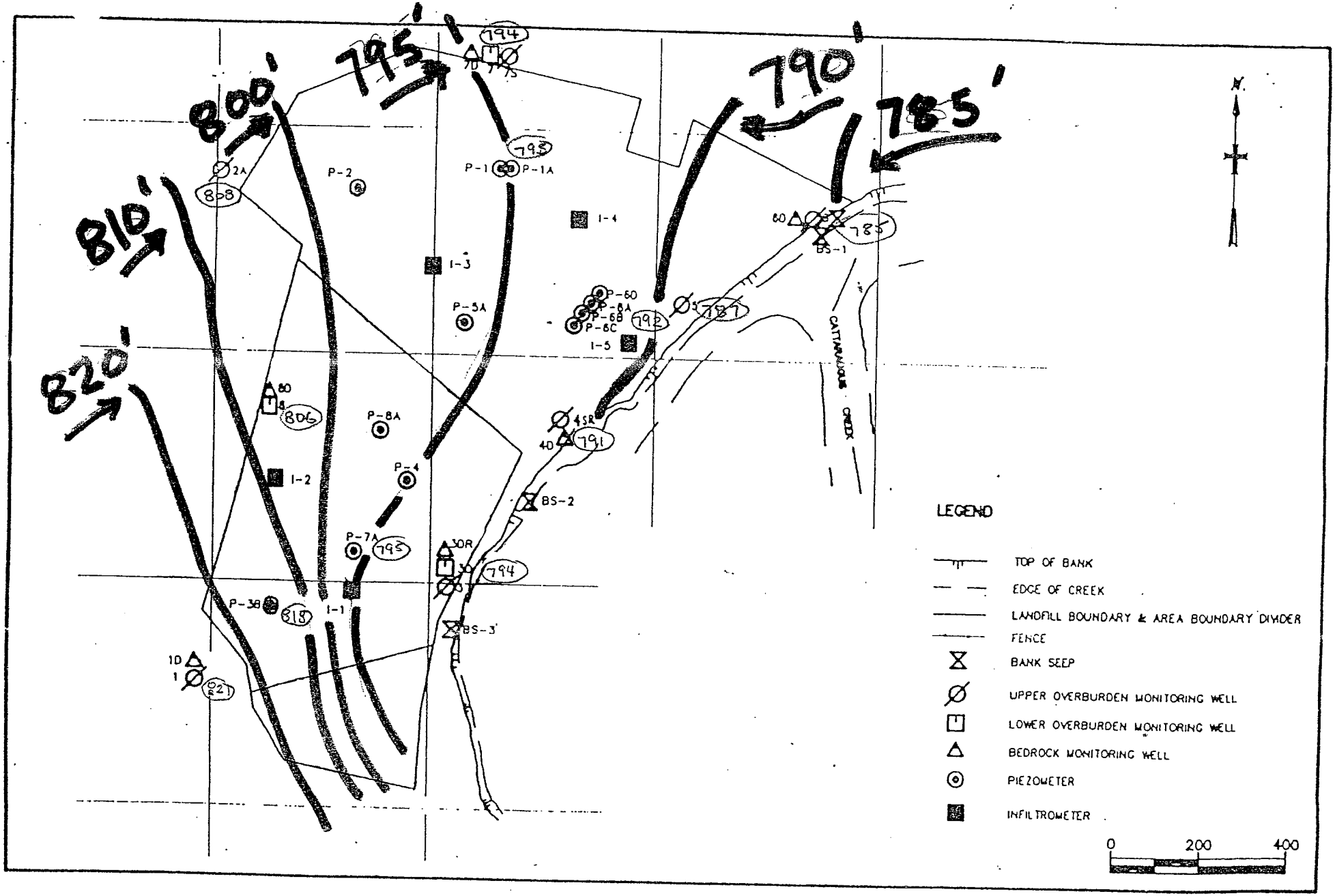


PALMER STREET LANDFILL
WATERTABLE ISOPOTENTIAL MAP
4-14-97 MONITORING EVENT

MOENCH [illegible] COMPANY JULY 1992

FIG. # 8

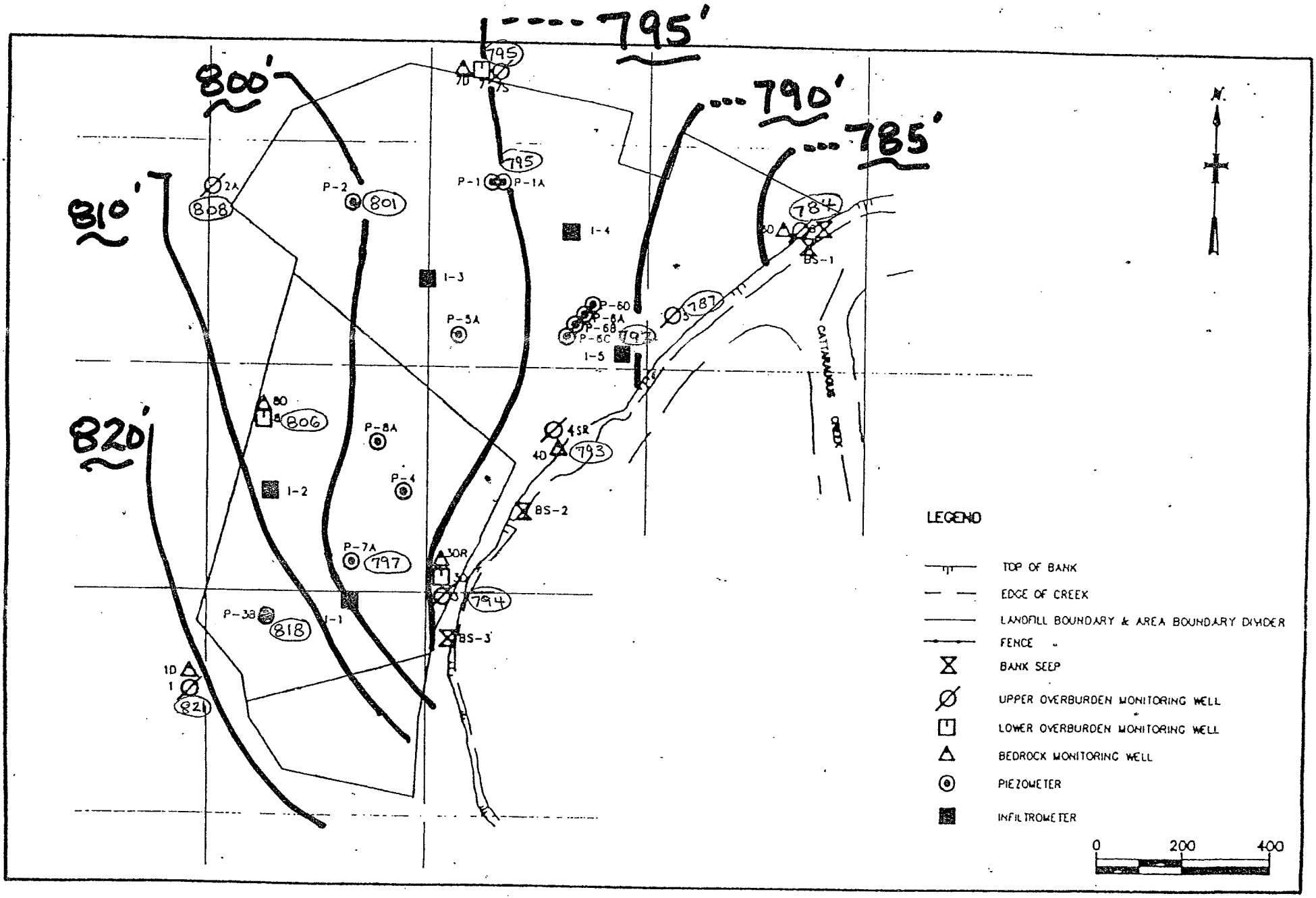
FIGURE



PALMER STREET LANDFILL
WATERTABLE ISOPOTENTIAL MAP
8-15-97 MONITORING EVENT

MOENCH [illegible] COMPANY JULY 1992

FIGURE # 9

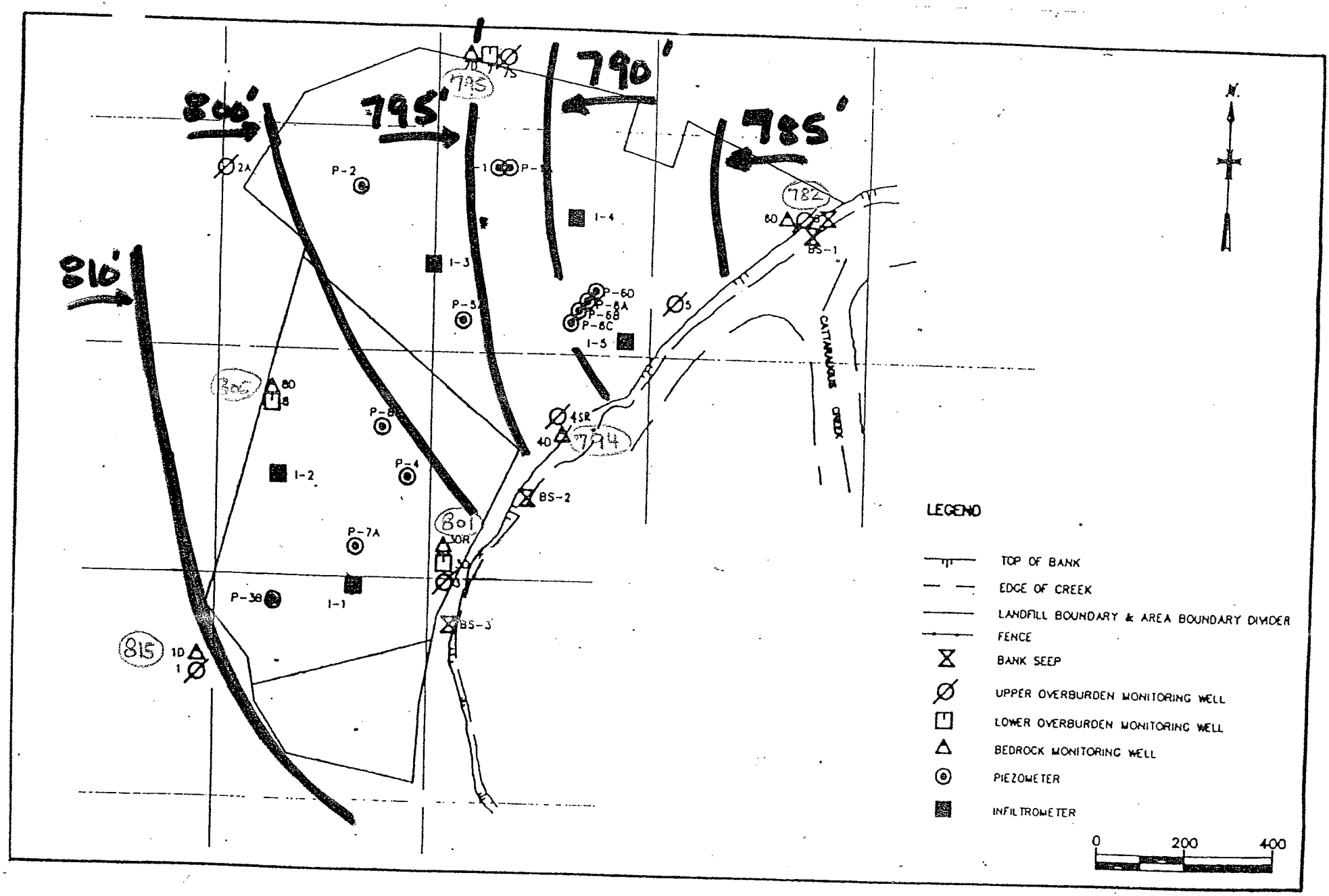


PALMER STREET LANDFILL
WATER TABLE ISOPOTENTIAL MAP
11-7-97 MONITORING EVENT

MOENCH [illegible] COMPANY JULY 1992

FIG. # 10

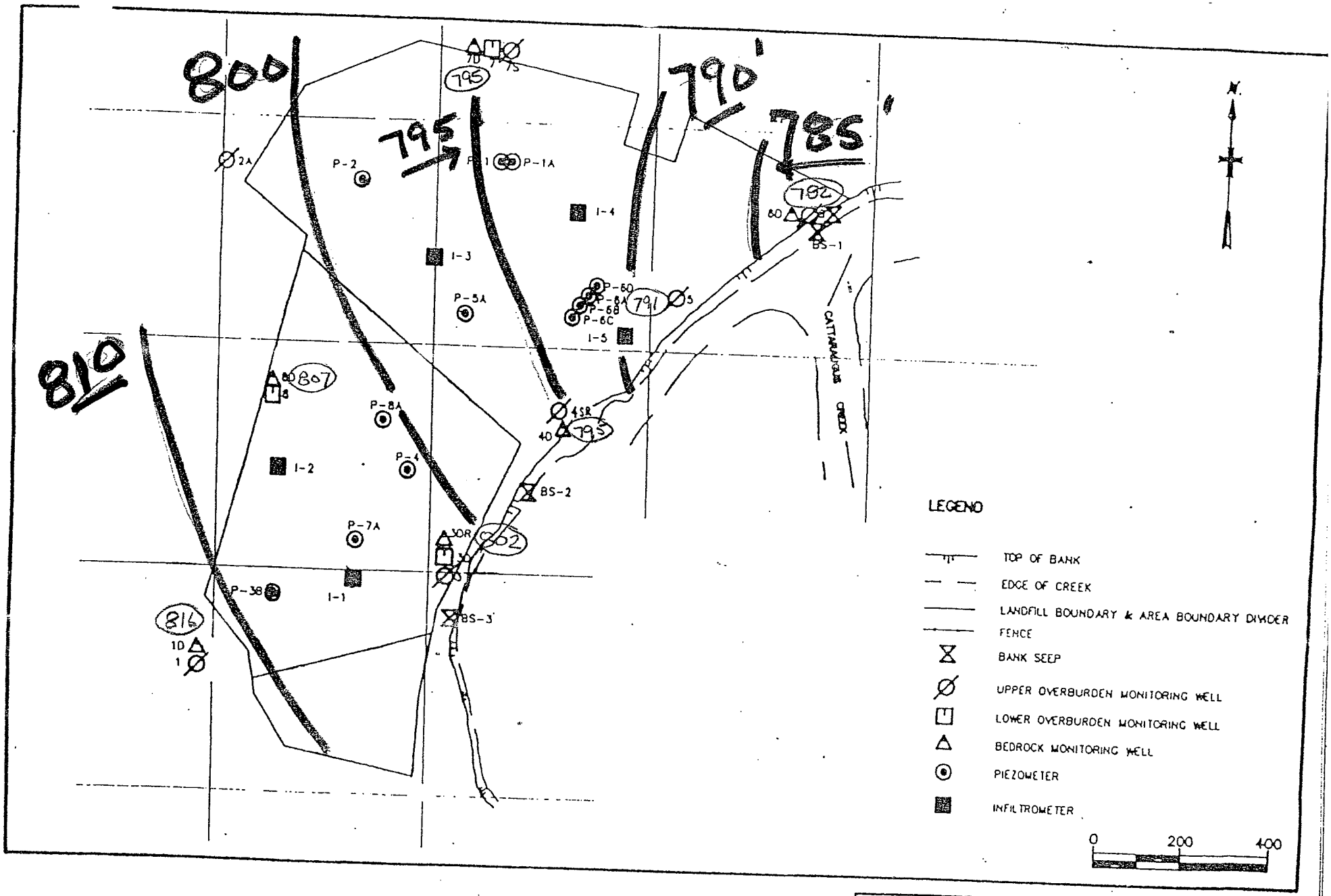
FIGURE



PALMER STREET LANDFILL
BEDROCK ISOPOTENTIAL MAP
4-14-97 MONITORING EVENT
MOENCH TANNING COMPANY JULY 1992

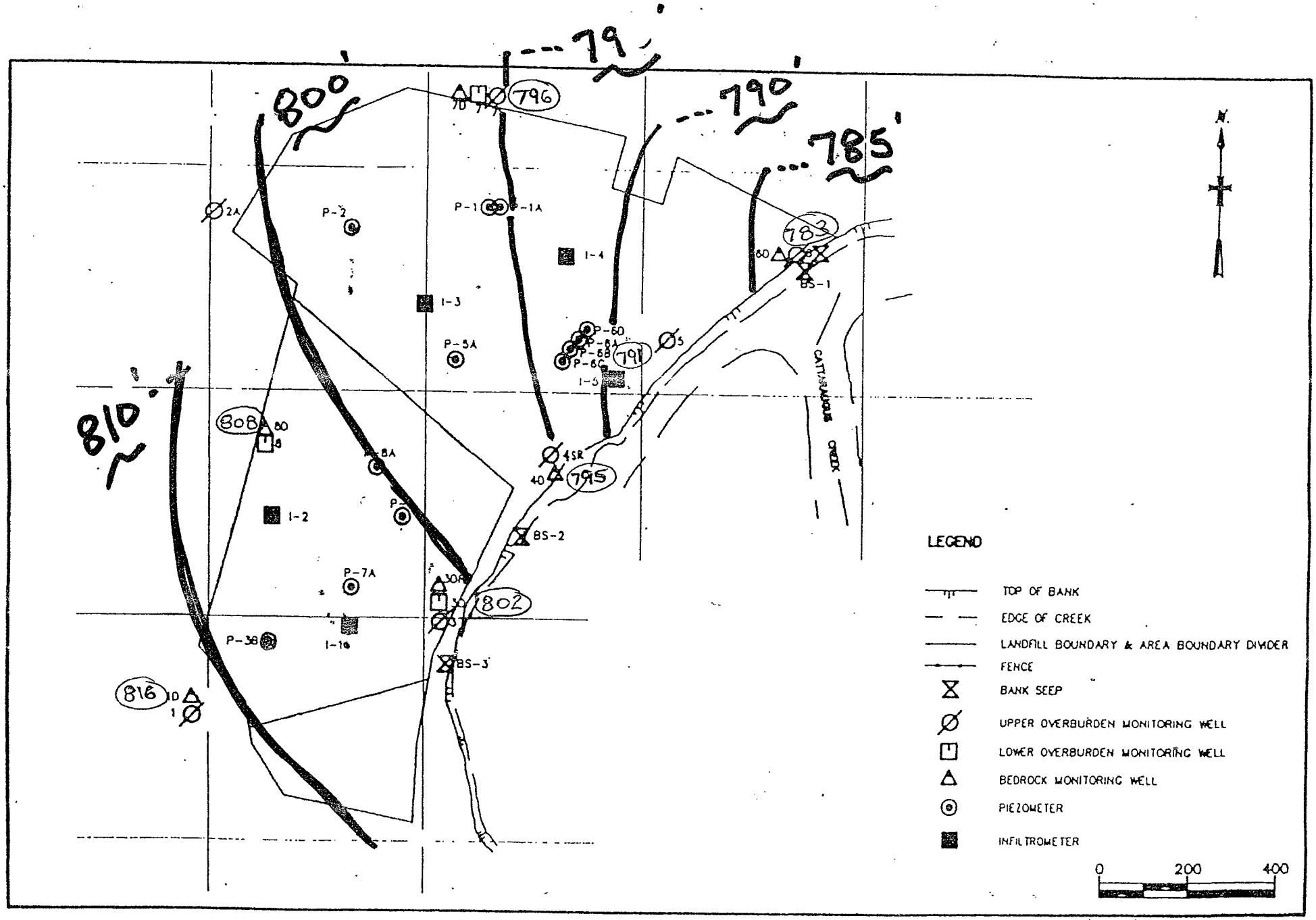
FIGURE

FIG. # 11



PALMER STREET LANDFILL
BEDROCK ISOPOTENTIAL MAP
8-15-97 MONITORING EVENT
MOENCH TANNING COMPANY JULY 1992

FIGURE # 12



PALMER STREET LANDFILL
BEDROCK ISOPOTENTIAL MAP
11-7-97 MONITORING EVENT
MOENCH TANNING COMPANY JULY 1992

FIG. 13

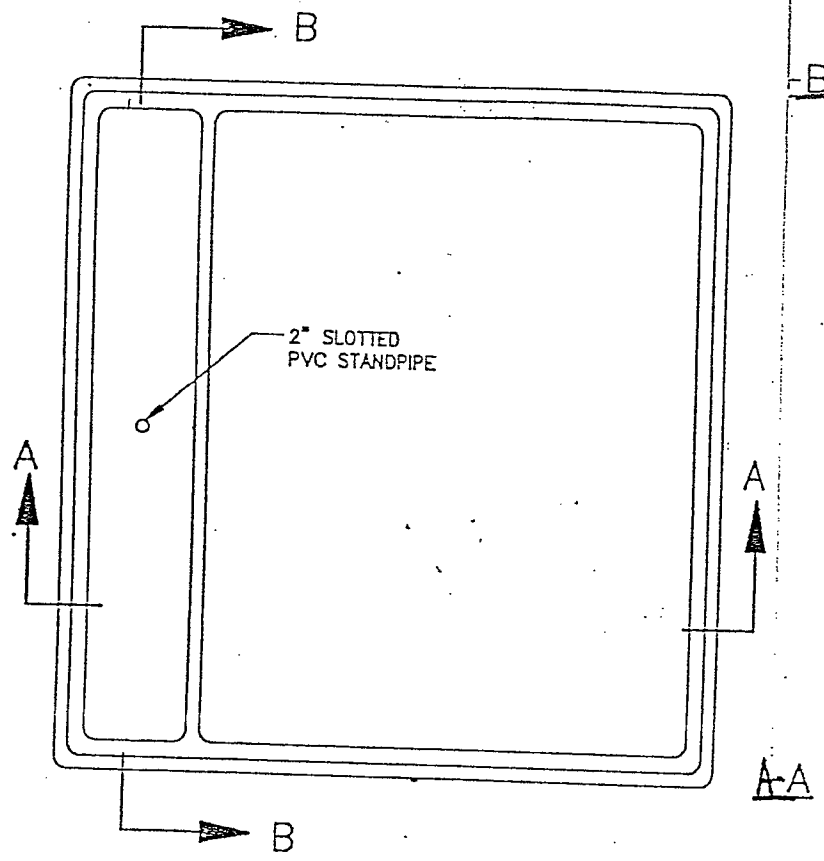
6.0 REFERENCES

1. PALMER STREET LANDFILL CLOSURE/POST CLOSURE PLAN (EPA ID. NYDOO2126910), PREPARED BY MALCOLM PIRNIE, INC. REVISED fEBRUARY 1989.
2. PALMER STREET LANDFILL, SUPPLEMENTAL HYDROGEOLOGIC INVESTIGATION, PREPARED BY MALCOLM PIRNIE, INC. JANUARY 1989.
3. SAMPLING PLAN/QUALITY ASSURANCE PLAN FOR GROUNDWATER MONITORING - PALMER STREET LANDFILL. PREPARED BY MALCOLM PIRNIE, INC., AUGUST 1989.
4. TEST METHODS FOR EVALUATING SOLID WASTE, PHYSICAL/ CHEMICAL METHODS, THIRD EDITION, USEPA OFFICE OF SOLID WASTE AND EMERGENCY RESPONSE, NOVEMBER 1986.
5. PALMER STREET LANDFILL, EVALUATION OF ALTERNATIVE COVER SYSTEMS, PREPARED BY MALCOLM PIRNIE, INC., JANUARY 1989.
6. COVER SYSTEM PERFORMANCE EVALUATION, PALMER STREET LANDFILL; PREPARED BY MALCOLM PIRNIE, INC. OCTOBER 1995.

ATTACHMENT A

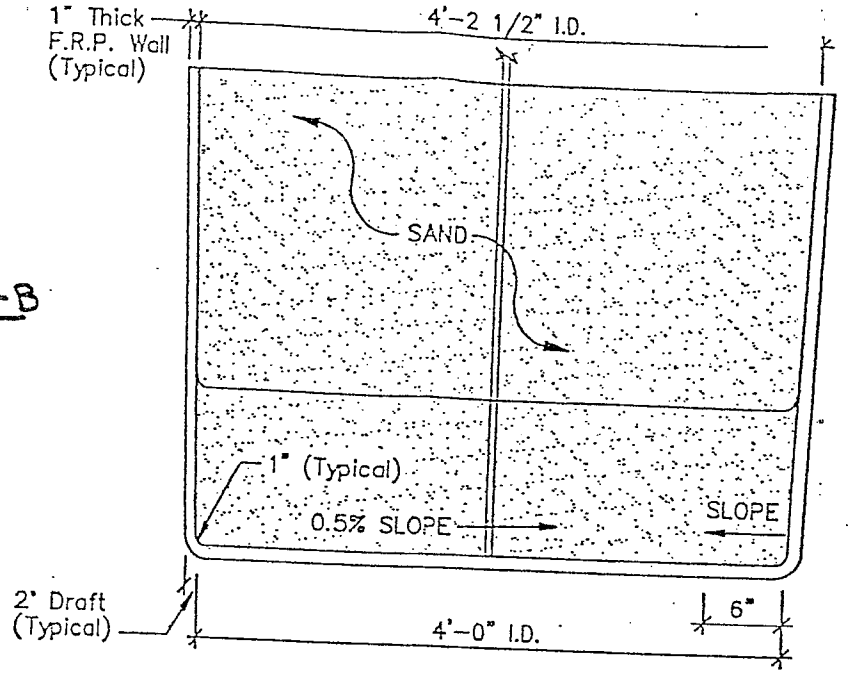
INFILTROMETER DESIGN

PALMER STREET LANDFILL
GROUNDWATER MONITORING REPORT...
4/97, 8/97, 11/97 SAMPLING EVENT..

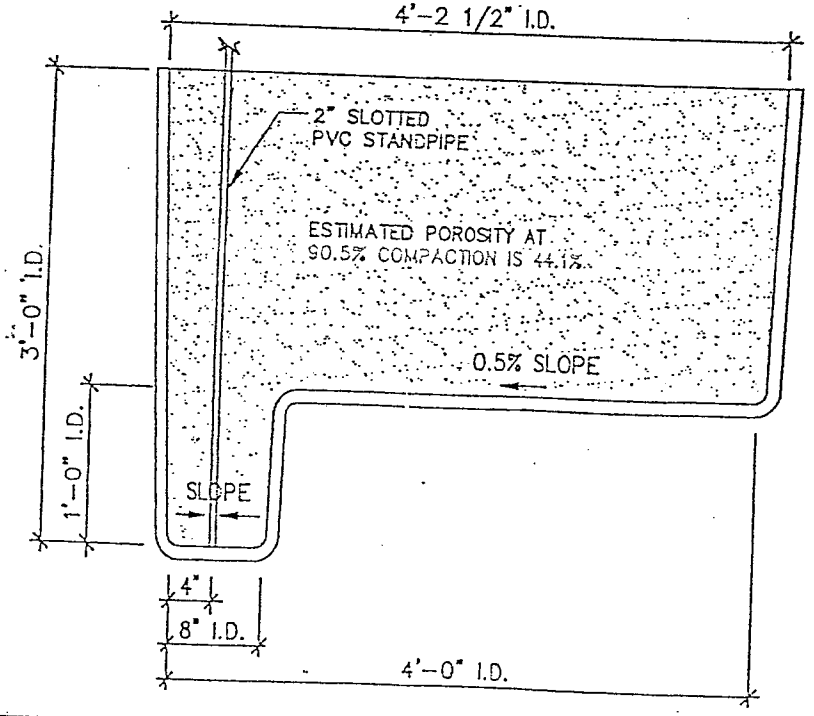


PLAN

B-B



A-A



TYPICAL INFILTROMETER BY HEY'S ENTERPRISES
AS INSTALLED AT PALMER STREET LANDFILL

INFILTROMETER

MTC-23-INF

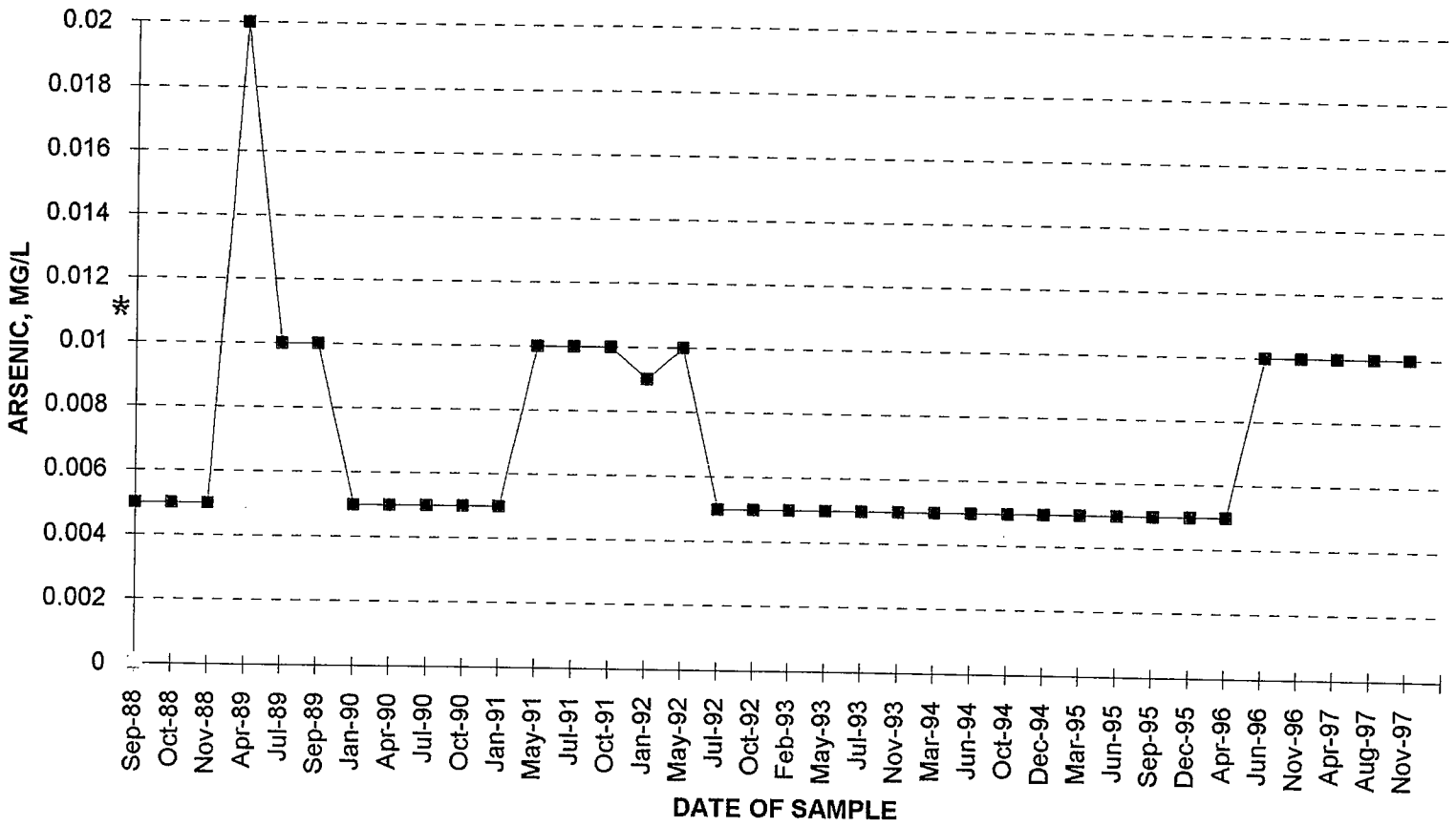
ATTACHMENT "B"

Graph, Metals concentration vs. Time;

grouped by monitoring points ....

Monitoring Events 4/14/97, 8/15/97, 11/7/97

PALMER ST. L/F, ARSENIC(SOLUBLE) vs TIME



All below detec
-'on limit
since 7/89

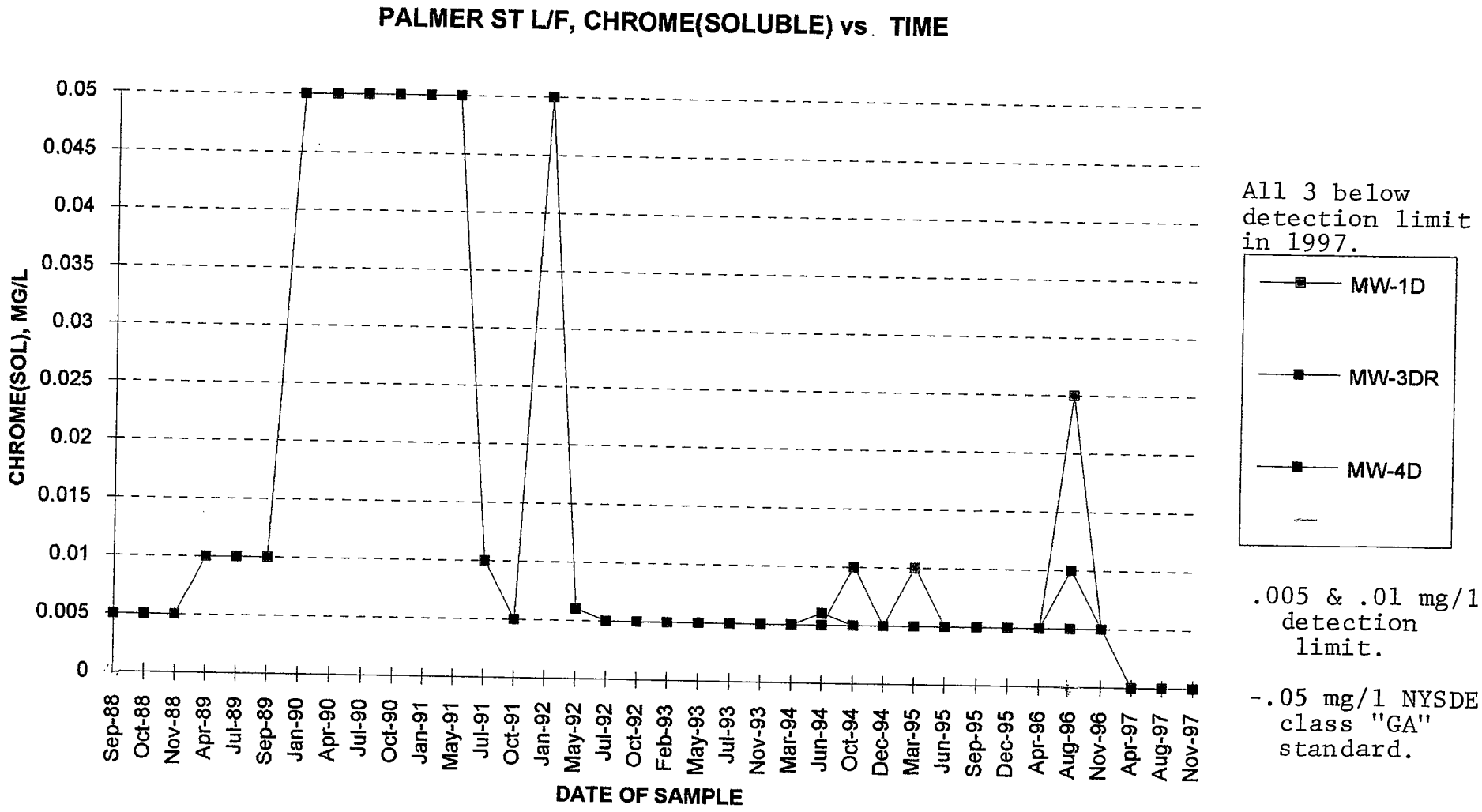
MW-1D

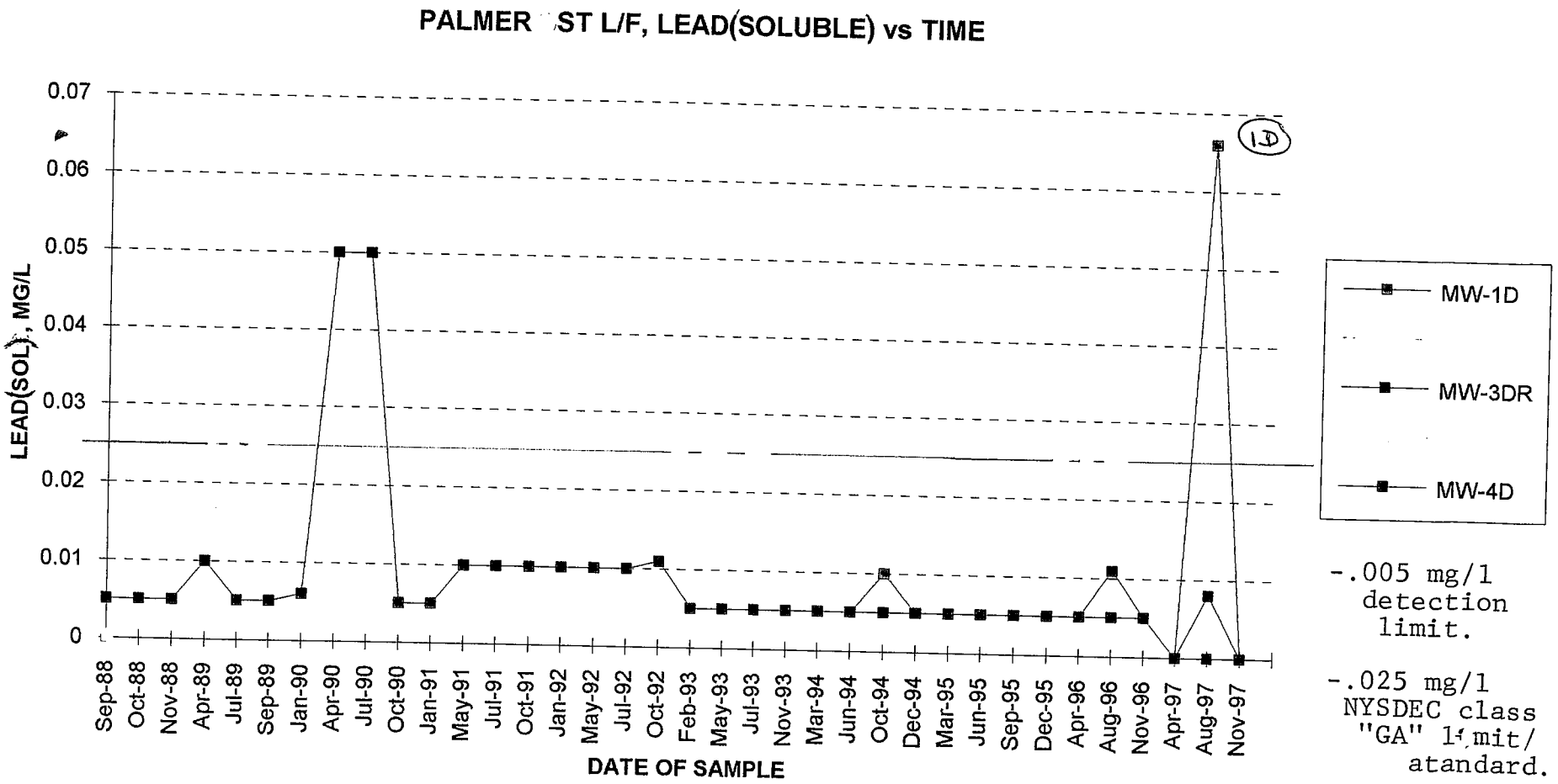
MW-3DR

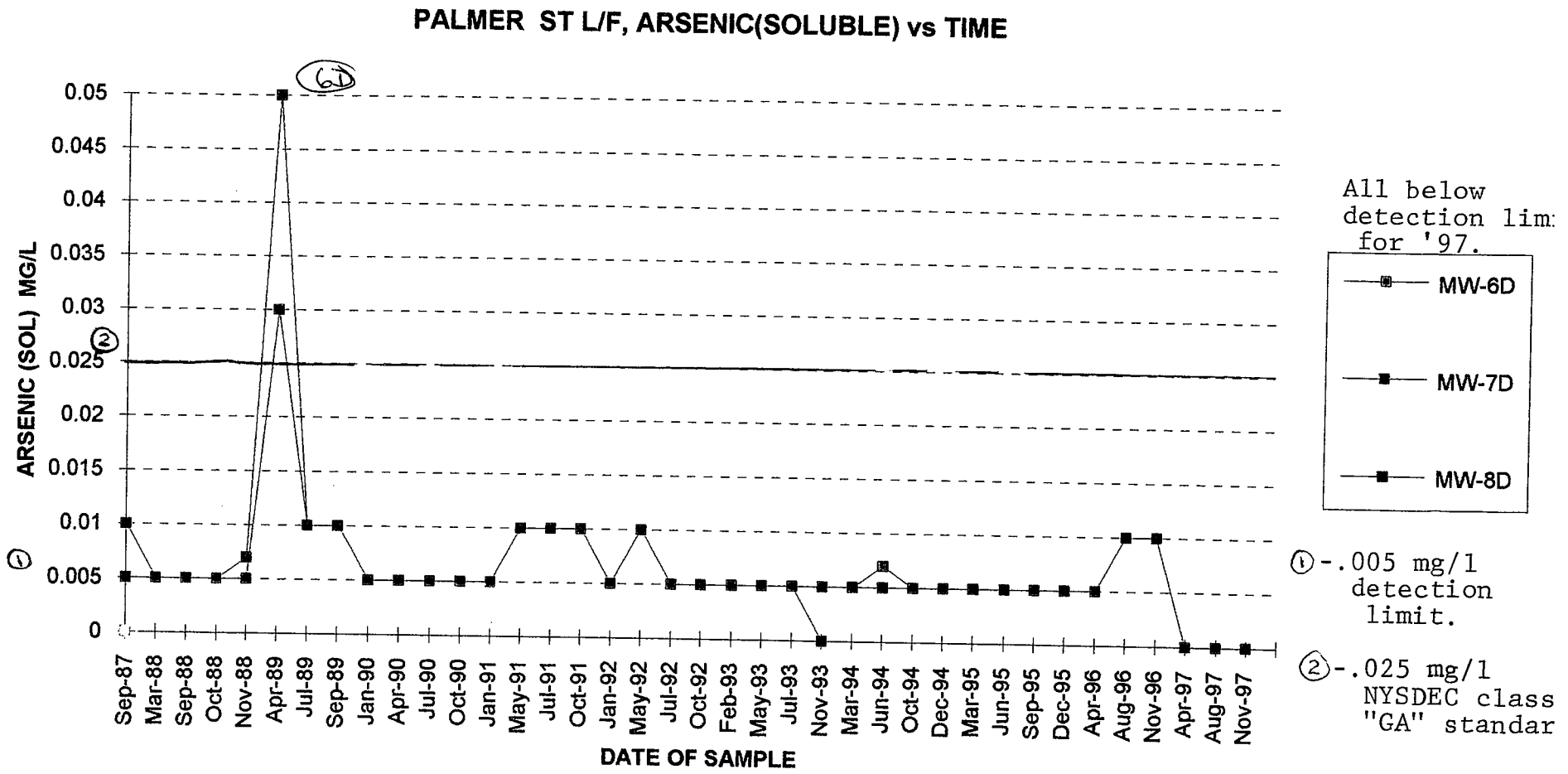
MW-4D

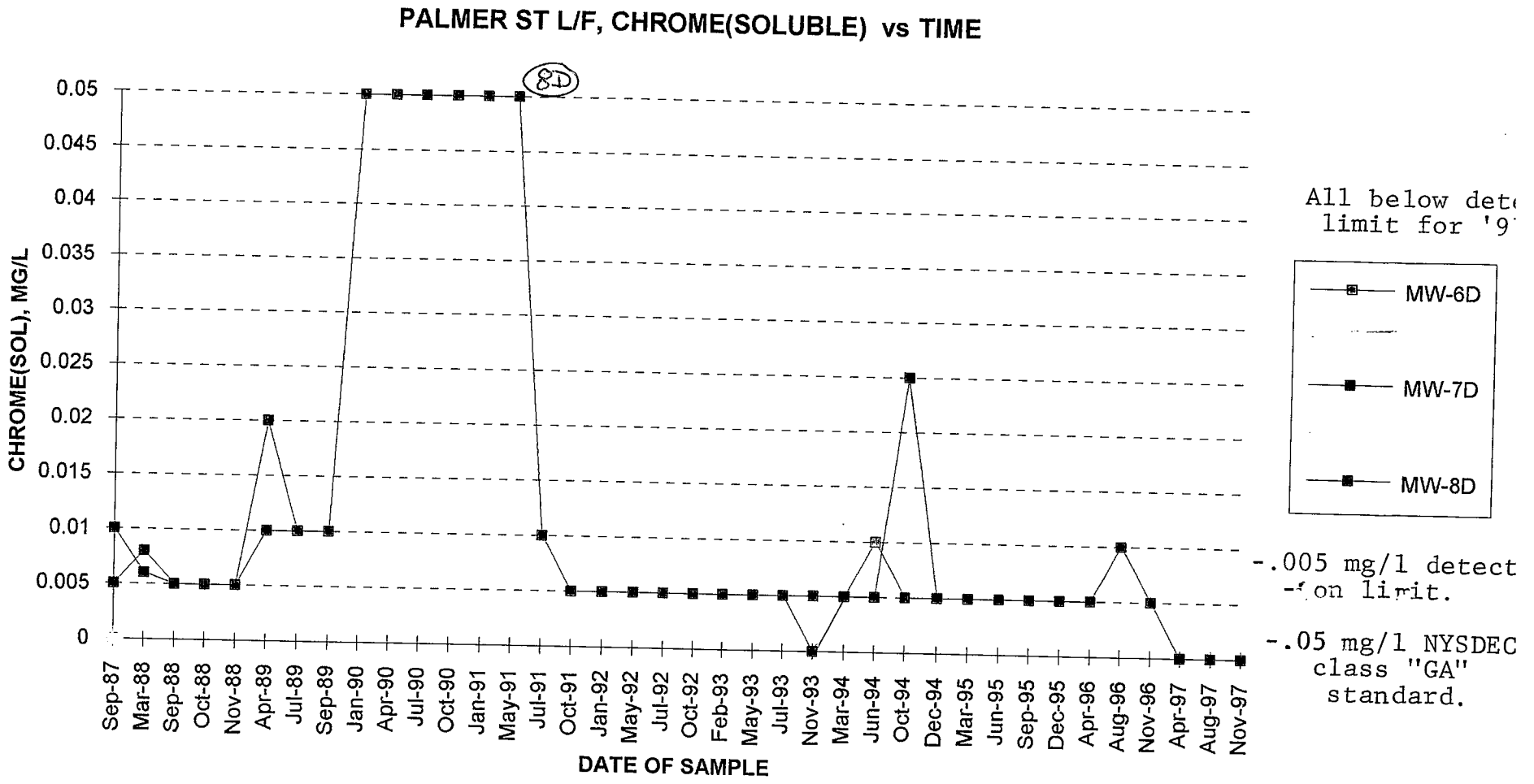
* .005 & .01
mg/l=detectio
limit.

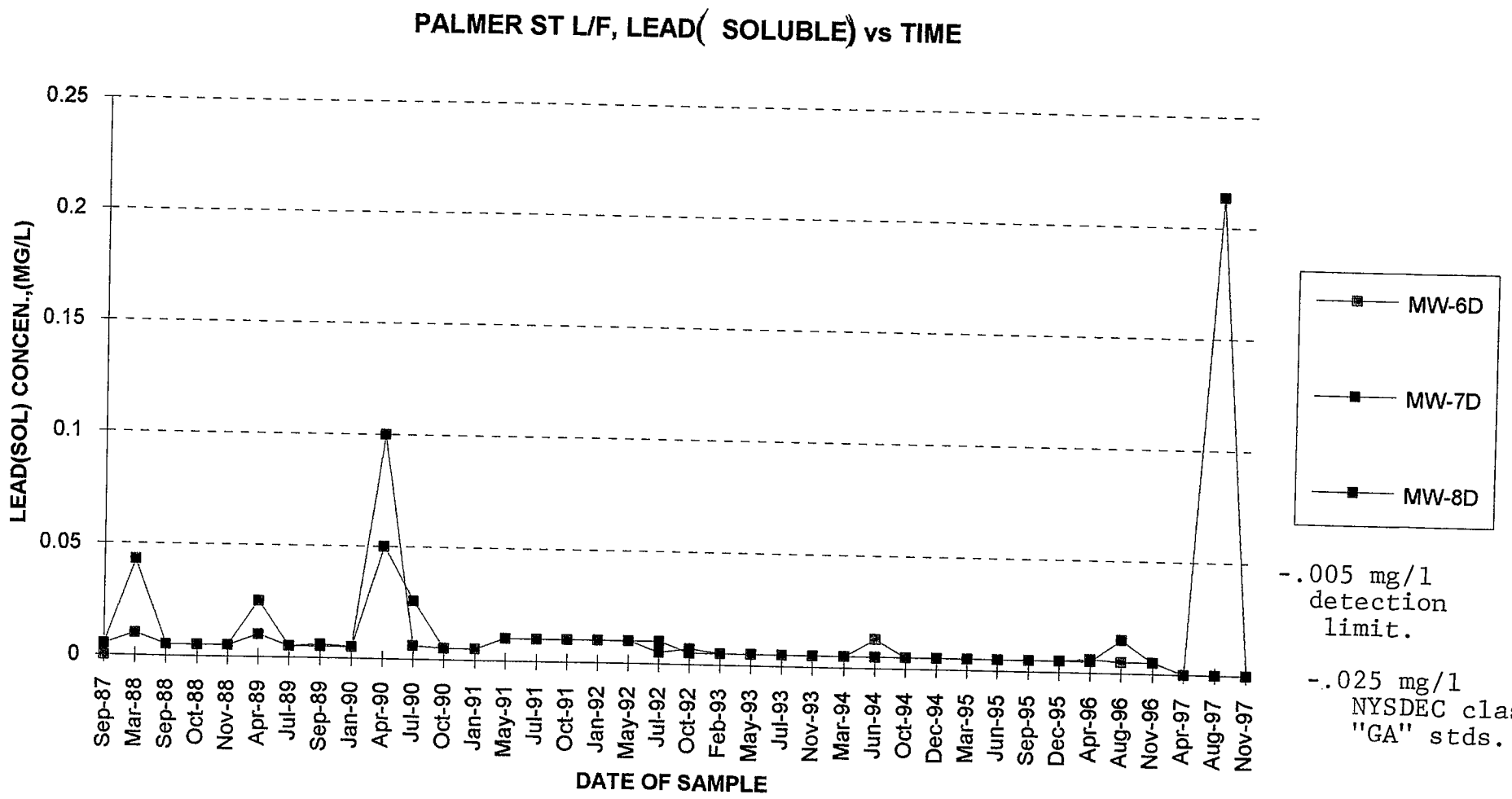
-.025 mg/l NYSD
class "GA"
standard.


PALMER ST L/F, CHROME(SOLUBLE) vs. TIME
CHROME(SOL), MG/L
0.05
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
Sep-88
Oct-88
Nov-88
Apr-89
Jul-89
Sep-89
Jan-90
Apr-90
Jul-90
Oct-90
Jan-91
May-91
Jul-91
Oct-91
Jan-92
May-92
Jul-92
Oct-92
Feb-93
May-93
Jul-93
Nov-93
Mar-94
Jun-94
Oct-94
Dec-94
Mar-95
Jun-95
Sep-95
Dec-95
Apr-96
Aug-96
Nov-96
Apr-97
Aug-97
Nov-97
DATE OF SAMPLE
All 3 below detection limit in 1997.
MW-1D
MW-3DR
MW-4D
.005 & .01 mg/l detection limit.
-.05 mg/l NYSDE class "GA" standard.


PALMER ST L/F, LEAD(SOLUBLE) vs TIME
LEAD(SOL), MG/L
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Sep-88
Oct-88
Nov-88
Apr-89
Jul-89
Sep-89
Jan-90
Apr-90
Jul-90
Oct-90
Jan-91
May-91
Jul-91
Oct-91
Jan-92
May-92
Jul-92
Oct-92
Feb-93
May-93
Jul-93
Nov-93
Mar-94
Jun-94
Oct-94
Dec-94
Mar-95
Jun-95
Sep-95
Dec-95
Apr-96
Aug-96
Nov-96
Apr-97
Aug-97
Nov-97
DATE OF SAMPLE
MW-1D
MW-3DR
MW-4D
-.005 mg/l detection limit.
-.025 mg/l NYSDEC class "GA" limit/ standard.

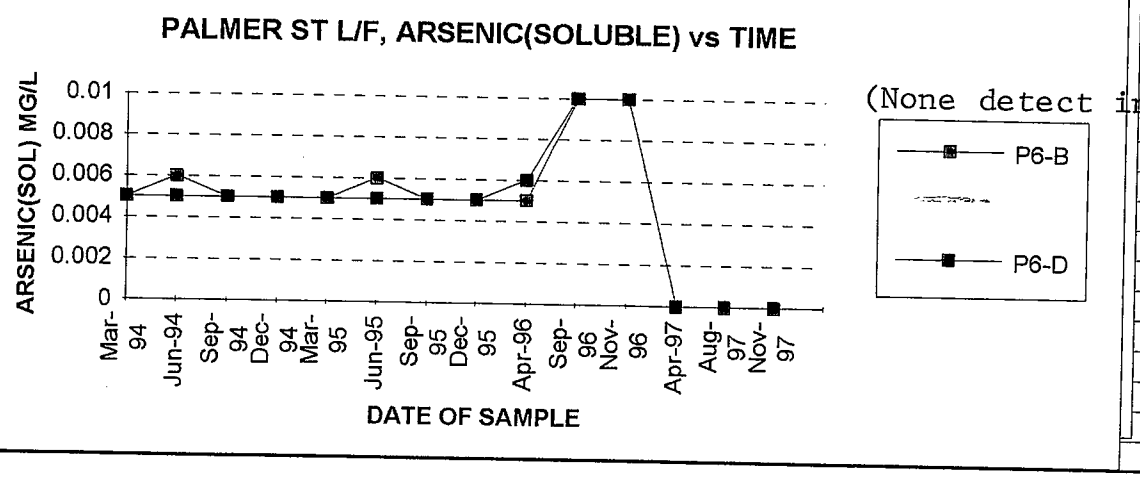

PALMER ST L/F, ARSENIC(SOLUBLE) vs TIME
ARSENIC (SOL) MG/L
0.05
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
Sep-87
Mar-88
Sep-88
Oct-88
Nov-88
Apr-89
Jul-89
Sep-89
Jan-90
Apr-90
Jul-90
Oct-90
Jan-91
May-91
Jul-91
Oct-91
Jan-92
May-92
Jul-92
Oct-92
Feb-93
May-93
Jul-93
Nov-93
Mar-94
Jun-94
Oct-94
Dec-94
Mar-95
Jun-95
Sep-95
Dec-95
Apr-96
Aug-96
Nov-96
Apr-97
Aug-97
Nov-97
DATE OF SAMPLE
MW-6D
MW-7D
MW-8D
All below detection lim for '97.
①-.005 mg/l detection limit.
②-.025 mg/l NYSDEC class "GA" standar


PALMER ST L/F, CHROME(SOLUBLE) vs TIME
8D
CHROME(SOL), MG/L
0.05
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
Sep-87
Mar-88
Sep-88
Oct-88
Nov-88
Apr-89
Jul-89
Sep-89
Jan-90
Apr-90
Jul-90
Oct-90
Jan-91
May-91
Jul-91
Oct-91
Jan-92
May-92
Jul-92
Oct-92
Feb-93
May-93
Jul-93
Nov-93
Mar-94
Jun-94
Oct-94
Dec-94
Mar-95
Jun-95
Sep-95
Dec-95
Apr-96
Aug-96
Nov-96
Apr-97
Aug-97
Nov-97
DATE OF SAMPLE
All below det
limit for '9
MW-6D
MW-7D
MW-8D
-.005 mg/l detect
-ion limit.
-.05 mg/l NYSDEC
class "GA"
standard.


PALMER ST L/F, LEAD(SOLUBLE) vs TIME
LEAD(SOL) CONCEN.,(MG/L)
0.25
0.2
0.15
0.1
0.05
0
Sep-87
Mar-88
Sep-88
Oct-88
Nov-88
Apr-89
Jul-89
Sep-89
Jan-90
Apr-90
Jul-90
Oct-90
Jan-91
May-91
Jul-91
Oct-91
Jan-92
May-92
Jul-92
Oct-92
Feb-93
May-93
Jul-93
Nov-93
Mar-94
Jun-94
Oct-94
Dec-94
Mar-95
Jun-95
Sep-95
Dec-95
Apr-96
Aug-96
Nov-96
Apr-97
Aug-97
Nov-97
DATE OF SAMPLE
MW-6D
MW-7D
MW-8D
-.005 mg/l detection limit.
-.025 mg/l NYSDEC clas "GA" stds.

PALMER ST L/F, MOENCH COMPANY
ARSENIC (SOLUBLE) vs TIME (MG/L)
MONITOR WELLS & BANK SEEPS

	Mar-94	Jun-94	Sep-94	Dec-94	Mar-95	Jun-95	Sep-95	Dec-95	Apr-96	Sep-96	Nov-96	Apr-97	Aug-97	Nov-97
P6-B	0.005	0.006	0.005	0.005	0.005	0.006	0.005	0.005	0.005	0.01	0.01	<.01	<.01	<.01
P6-D	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.006	0.01	0.01	<.01	<.01	<.01

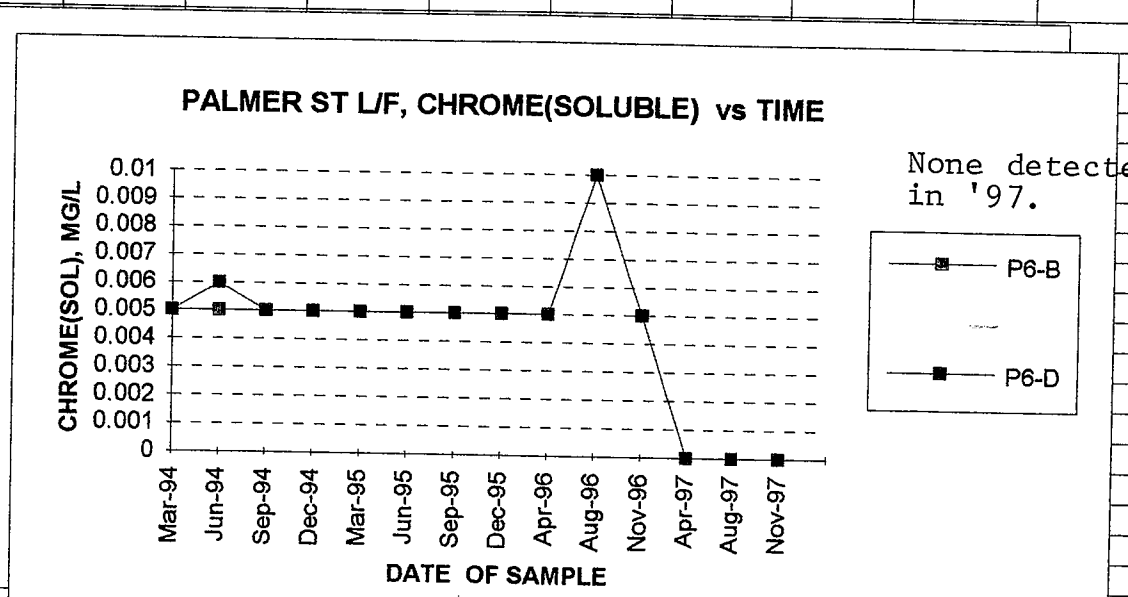


(None detect in '97)

-.005 mg/l detection limit.
-.025 mg/l NYSDEC class "GA" standard.

PALMER ST. L/F, MOENCH COMPANY
CHROME(SOLUBLE) vs TIME (MG/L)
MONITOR WELLS & BANK SEEPS

	Mar-94	Jun-94	Sep-94	Dec-94	Mar-95	Jun-95	Sep-95	Dec-95	Apr-96	Aug-96	Nov-96	Apr-97	Aug-97	Nov-97
P6-B	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.01	0.005	<.01	<.01	<.01
P6-D	0.005	0.006	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.01	0.005	<.01	<.01	<.01



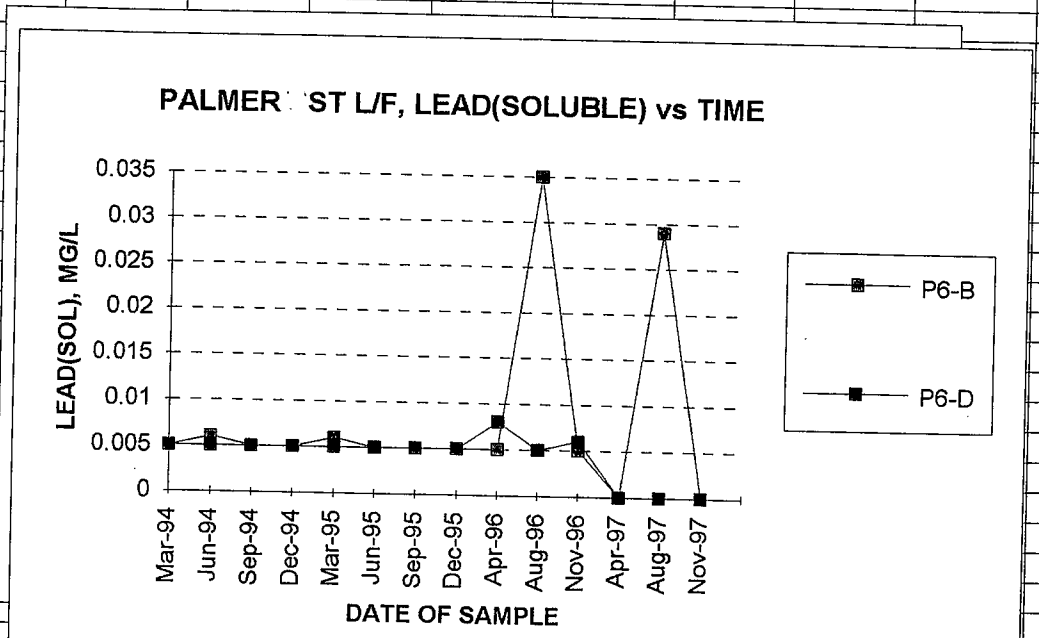
None detected in '97.

-.005 mg/l detection limit..

- .05 mg/l NYSDEC class "GA" std.

PALMER ST. L/F, MOENCH COMPANY
LEAD (SOLUBLE) vs TIME (MG/L)
MONITOR WELLS & BANK SEEPS

	Mar-94	Jun-94	Sep-94	Dec-94	Mar-95	Jun-95	Sep-95	Dec-95	Apr-96	Aug-96	Nov-96	Apr-97	Aug-97	Nov-97
P6-B	0.005	0.006	0.005	0.005	0.006	0.005	0.005	0.005	0.005	0.035	0.005	<.005	0.029	<.005
P6-D	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.008	0.005	0.006	<.005	<.005	<.005



-.005 mg/l detection limit..

.025 mg/l NYSDEC class "GA" std.

PALMER ST L/F, MOENCH COMPANY
ARSENIC(SOL), CHROME(SOL), LEAD(SOL) vs TIME (MG/L)
BANK SEEPS

ARSENIC	Mar-94	Jun-94	Sep-94	Dec-94	Mar-95	Jun-95	Sep-95	Dec-95	Apr-96	Aug-96	Nov-96	Apr-97	Aug-97	Nov-97
BS-1	0.005	0.005		0.005	0.005	0.005	0.005		0.005	LT .01	LT.01	<.01	<.011	<.01
BS-3	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	LT.025	LT.01	<.01	0.012	<.01
CHROME														
BS-1	0.005	0.005		0.005	0.005	0.006	0.005		0.005	LT.025	0.005	<.01	<.01	<.01
BS-3	0.005	0.008	0.005	0.005	0.005	0.005	0.005	0.005	0.005	LT.025	0.005	<.01	<.01	<.01
LEAD														
.BS-1	0.005	0.005		0.005	0.005	0.005	0.005		0.005	0.005	0.005	<.005	<.005	<.005
BS-3	0.005	0.005	0.007	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	<.005	** 0.2	<.005

(NO GRAPHS GENERATED DUE TO NO OR MINIMAL DETECTION)

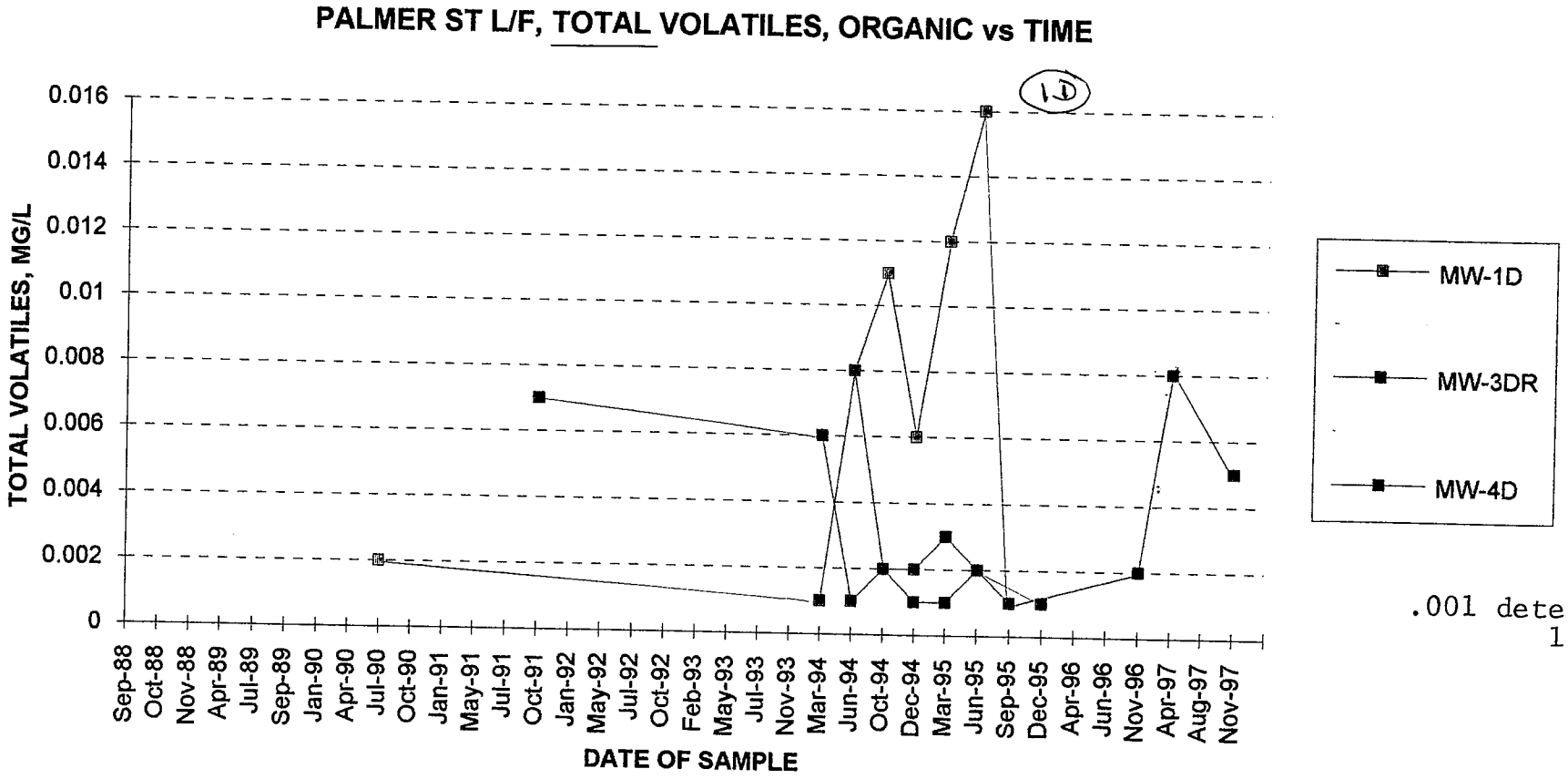
** .2 MG/L IN BS-3, IN AUGUST, EXCEEDS CLASS "ga"" STD. COMMON EVEN IN UPRADIENT WELLS THIS SAMPLE

ATTACHMENT C

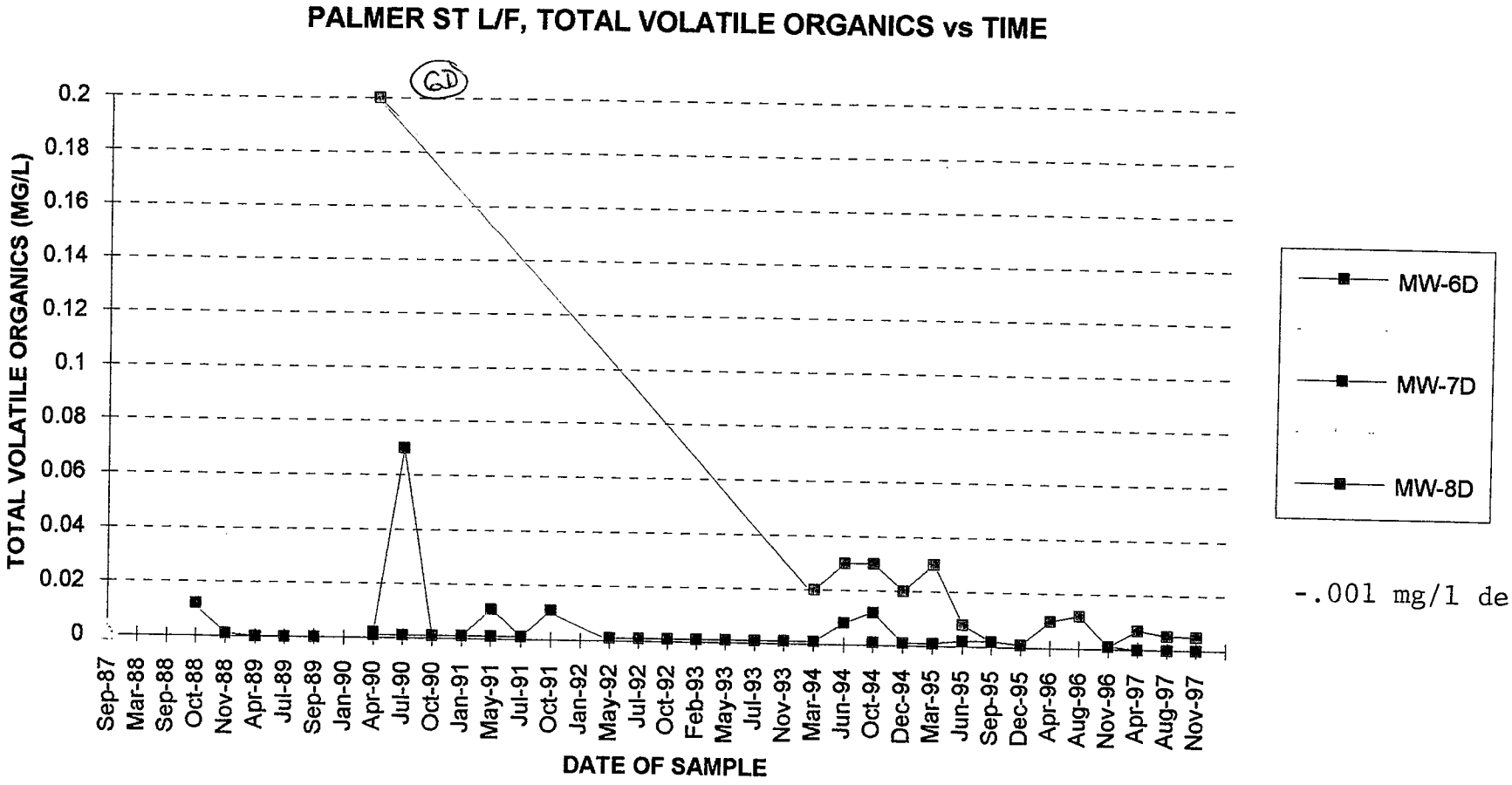
GRAPH.....

TOTAL VOLATILES vs. TIME; grouped by monitor point.

MONITORING EVENTS 4/97, 8/97, 11/97



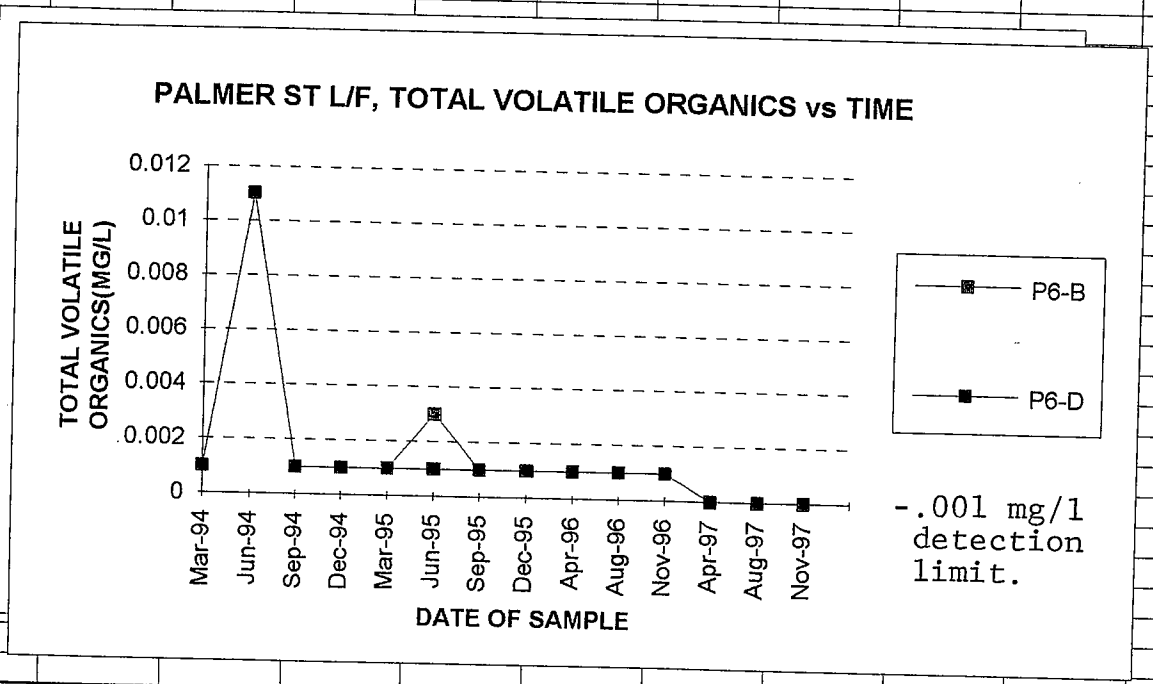
.001 detection limit...



-.001 mg/l detection limit..

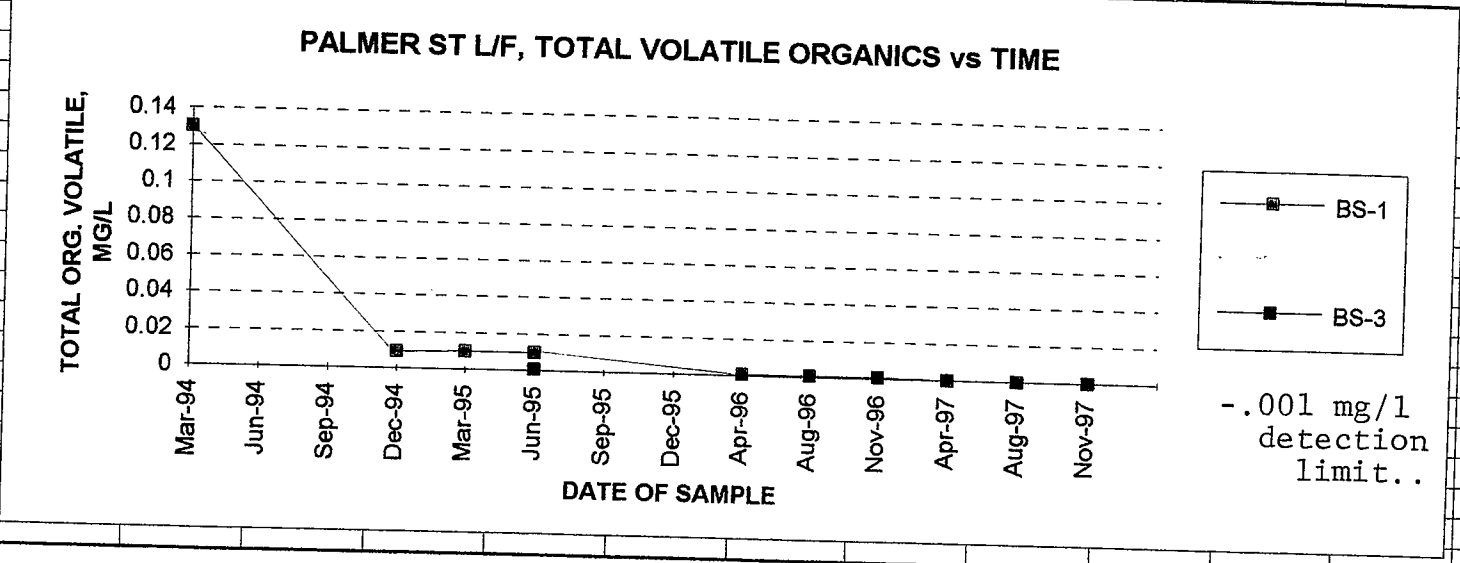
PALMER ST. L/F, MOENCH COMPANY
TOTAL VOLATILE ORGANICS vs TIME (MG/L)
MONITOR WELLS & BANK SEEPS

	Mar-94	Jun-94	Sep-94	Dec-94	Mar-95	Jun-95	Sep-95	Dec-95	Apr-96	Aug-96	Nov-96	Apr-97	Aug-97	Nov-97
P6-B					0.001	0.003	0.001	0.001	0.001	0.001	0.001	<.005	<.005	<.005
P6-D	0.001	0.011	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	<.005	<.005	<.005



PALMER ST. L/F, MOENCH COMPANY
TOTAL VOLATILE ORGANICS vs TIME (MG/L)
BANK SEEPS

	Mar-94	Jun-94	Sep-94	Dec-94	Mar-95	Jun-95	Sep-95	Dec-95	Apr-96	Aug-96	Nov-96	Apr-97	Aug-97	Nov-97
BS-1	0.13			0.009	0.01	0.01			0.001	0.001	0.001	<.005	<.005	<.005
BS-3						0.001			0.001	0.001	0.001	<.005	<.005	<.005



ATTACHMENT "D"

SUMMARY OF "FIELD MEASUREMENTS".
for Trimester reports: 4/97, 8/97, 11/97

Individual sheets submitted in previous individual reports.

TABLE 3

MOENCH TANNING COMPANY
PALMER STREET LANDFILL
4/16 - 4/22/97 MONITORING EVENT

SUMMARY OF FIELD MEASUREMENTS

Location	Sampling Date	Sampling Time	Temp. (°C)	pH (units)	Conductance[1] (umhos/cm)	Turbidity (NTU)	Sample Appearance	Sample Odor
MW-1D*	4/21/97	1120	10.9	7.61	850	—	CLEAR	NO
MW-3DR**	4/21/97	930	12.7	8.05	550	—	CLEAR	NO
MW-4D	4/16/97	1256	13.1	7.88	820	—	CLEAR	NO
MW-6D	4/16/97	912	13.7	7.99	1150	—	CLEAR	NO
MW-7D***	4/21/97	1302	13.2	7.97	670	—	CLEAR	NO
MW-8D***	ANNUAL	—	—	—	—	—	—	—
P-6B	4-16-97	1126	14.4	7.60	530	—	CLEAR	NO
P-6D	4-16-97	1036	13.0	7.80	570	—	CLEAR	NO
BS-1	4-16-97	1003	11.2	6.96	1500	—	ALMOST CLR	NO
BS-3	4-21-97	1047	9.9	8.15	470	—	" "	NO
				6.5 - 8.5 (CLASS "GA" STD)				

NOTES:

(1) Conductivity readings corrected to 25°C.
(2) MW-1 is hydraulically upgradient shallow overburden well.
(3) MW-7D is apparent hydraulically upgradient bedrock well.

* Shallow Overburden Well
** Deep Overburden Well
*** Bedrock Well
BS Bank Seep

TABLE 3

MOENCH COMPANY
PALMER STREET LANDFILL
8/25-8/27/97 MONITORING EVENT

1997

SUMMARY OF FIELD MEASUREMENTS

Location	Sampling Date	Sampling Time	Temp. (°C)	pH (units)	Conductance(1) (umhos/cm)	Turbidity (NTU)	Sample Appearance	Sample Odor
MW-1D*	8/26	1115	12.6	8.07	860	NR	CLEAR	SLIGHT SULFUR
MW-3DR***	8/26	946	13.4	8.48	490	"	CLEAR	NO
MW-4D	8/25	1151	13.1	8.41	710	"	CLEAR	NO
MW-6D(6)	8/25	849	14.1	8.59	1000	"	CLEAR	NO
MW-7D***	8/26	1310	12.1	8.38	620	"	CLEAR	NO
	8/27							
MW-8D***	ANNUAL	853	13.7	8.48	310	"	CLEAR	NO
P-6B	8/25	1027	14.5	8.37	500	"	CLEAR	NO
P-6D	8/25	1001	13.5	8.45	620	"	CLEAR	SLIGHT SULFUR
BS-1(4)	8/25	909	18.6	8.21	520	"	ALMOST CLR	NO
BS-3(5)	8/26	956	18.9	8.31	560	"	SLIGHT TUR.	NO
				6.5-8.5 (CLASS "GA" STD)				

NOTES:

(1) Conductivity readings corrected to 25°C.
(2) MW-1 is hydraulically upgradient shallow overburden well.
(3) MW-7D is apparent hydraulically upgradient bedrock well.

* Shallow Overburden Well
** Deep Overburden Well
*** Bedrock Well
BS Bank Seep

(4) TOO DRY FOR BANK SEEP. TOOK SAMPLE OF CREEK DOWNSTREAM OF LANDFILL.
(5) TOO DRY FOR BANK SEEP. TOOK SAMPLE OF RUN-OFF BETWEEN AREAS #2 + #3.
(6) BLIND DUPLICATE - MW-6D

TABLE 3

MOENCH COMPANY
PALMER STREET LANDFILL
11/10 - 11/17/97 MONITORING EVENT

SUMMARY OF FIELD MEASUREMENTS

Location	Sampling Date	Sampling Time	Temp. (°C)	pH (units)	Conductance[1] (umhos/cm)	Turbidity (NTU)	Sample Appearance	Sample Odor
(1) MW-1D*	11/10/97	1247	11.5	8.33	980	NOT RqD	CLEAR	NO
MW-3DR***	11/10/97	1411	11.8	8.44	740	" "	CLEAR	NO
(6) MW-4D	11/11/97	853	11.3	8.45	750	" "	CLEAR	NO
(5) MW-6D	11/17/97	1024	13.1	8.48	1900	" "	CLEAR	NO
(3) MW-7D ***	11/10/97	1040	11.1	8.41	740	" "	CLEAR	NO
MW-8D***	ANNUAL	DID 8/97				" "		
P-6B	11/11/97	1010	11.2	8.43	450	" "	CLEAR	NO
P-6D	11/17/97	1137	12.1	8.42	580	" "	CLEAR	SLGT. SULFUR
(4) BS-1	11/10/97	928	8.6	8.31	480	" "	ALMOST CLR	NO
BS-3	11/10/97	1015	9.1	8.06	800	" "	SOME IRON	NO
				6.5 - 8.5 (CLASS "GA" STD)				

NOTES:

(1) Conductivity readings corrected to 25°C.
(2) MW-1 is hydraulically upgradient shallow overburden well.
(3) MW-7D is apparent hydraulically upgradient bedrock well.
(4) NO BANK SEEP EVIDENT - SAMPLE OF CREEK 20 FT. FROM MW-6D.

* Shallow Overburden Well
** Deep Overburden Well
*** Bedrock Well
BS Bank Seep

(5) STAN RADON (NYSDEC) + RON VOEKEL (USEPA) PRESENT, SPLIT SAMPLE + OBSERVE.
(6) BLIND DUPLICATE