

Annual Groundwater Quality and Capture Report for 1995

Prepared for
Onalaska Municipal Landfill

MARCH 1996



CH2M HILL

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ANNUAL GROUNDWATER QUALITY AND CAPTURE REPORT FOR 1995

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Introduction

Purpose

The primary objectives of the quarterly groundwater monitoring program at the Onalaska Municipal Landfill are to:

- Provide data to determine if groundwater contaminant concentrations in the aquifer between the landfill and the Black River are being reduced by the extraction system.
- Provide data to determine if groundwater contaminant concentrations in the aquifer have been reduced to below the cleanup criteria.
- Provide data to verify that a hydraulic gradient is being maintained by the extraction system in order to contain and collect contaminated groundwater.
- Monitor water levels in the wetlands adjacent to the site to make sure that the extraction system is not lowering water levels to adversely affect the wetlands.

The quarterly sampling will also identify any seasonal fluctuations in groundwater quality and provide information on background water quality.

Groundwater Monitoring Program

Groundwater samples from the seven monitoring wells, extraction wells EW-1, EW-3, and EW-5, and two residential wells will be collected at the end of March, June, September, and December. The residential wells are at the Hubley and Ackerman homes. Extraction wells EW-2 and EW-4 will be sampled biannually in June and December. The rationale for selection of each well and piezometer is summarized in Table 1. Additional monitoring wells at the landfill periphery and in the center of the landfill may be included in the groundwater network as the plume is reduced in size or as warranted.

Sampling and Observations

Quarterly groundwater samples and groundwater elevation measurements were collected on March 22–23, June 28–29, September 26–27, and December 13–14, 1995. The locations of the monitoring points are shown on attached Figure 5.

The samples were sent by overnight courier to ATEC Laboratory in Indianapolis, Indiana, for testing of select volatile organic compounds, metals and wet chemistry parameters.

Table 1
Monitoring Well Network Rationale
Sheet 1 of 2

Well Designation	Rationale
PZ-01	Monitor groundwater level west of westernmost extraction well to determine if necessary capture zone is being attained
PZ-02 (New)	Monitor groundwater level between wetlands and extraction system to determine if wetlands water levels are being lowered
PZ-03	Monitor groundwater level between wetlands and extraction system to determine if wetlands water levels are being lowered
PZ-04	Monitor groundwater level between wetlands and extraction system to determine if wetlands water levels are being lowered
PZ-05 (New)	Monitor groundwater level east of easternmost extraction well to determine if necessary capture zone is being attained
PZ-06 (New)	Monitor groundwater level east of easternmost extraction well to determine if necessary capture zone is being attained
MW-1S	Monitor shallow background groundwater quality upgradient of the landfill and the extraction system to allow statistical evaluation of background groundwater characteristics
MW-6S	Monitor shallow groundwater quality and water levels downgradient of landfill and extraction system to determine if reduction in groundwater concentration occurs over time (compliance point for Wisconsin PALs)
MW-6M	Monitor intermediate groundwater quality and water levels downgradient of landfill and extraction system to determine if reduction in groundwater concentration occurs over time (compliance point for Wisconsin PALs)
MW-8S	Monitor shallow groundwater quality and water levels downgradient of landfill and extraction system to determine if contaminated groundwater has been captured (compliance point for Wisconsin PALs)

Table 1
Monitoring Well Network Rationale
Sheet 2 of 2

Well Designation	Rationale
MW-8M	Monitor intermediate groundwater quality and water levels downgradient of landfill and extraction system to determine if contaminated groundwater has been captured (compliance point for Wisconsin PALs)
MW-12S	Monitor shallow groundwater quality and water levels east of easternmost extraction well to determine if necessary capture zone is being attained and whether contaminated groundwater has been captured (compliance point for Wisconsin PALs)
MW-14S	Monitor shallow groundwater quality and water levels west of westernmost extraction well to determine if necessary capture zone is being attained and whether contaminated groundwater has been captured (compliance point for Wisconsin PALs)
EW-1	Groundwater extraction well—water quality monitored to determine if reduction in groundwater concentration occurs over time (compliance point for Wisconsin PALs)
EW-2	Groundwater extraction well—water quality monitored to determine if reduction in groundwater concentration occurs over time (compliance point for Wisconsin PALs).
EW-3	Groundwater extraction well—water quality monitored to determine if reduction in groundwater concentration occurs over time (compliance point for Wisconsin PALs).
EW-4	Groundwater extraction well—water quality monitored to determine if reduction in groundwater concentration occurs over time (compliance point for Wisconsin PALs)
EW-5	

The monitoring wells were sampled in accordance with the procedures described in the Groundwater Monitoring Plan. The following nonroutine observations were made and actions taken during the sampling events:

- During the first three quarters of the quarterly sampling events, the bentonite seals had expanded above the top of the casing on all the flush mounted wells (MW-14S, MW-8S, and MW-8M). The expanded bentonite had to be cleaned out.
- A hydrocarbon odor and sheen was apparent in groundwater collected from MW-14S in all four quarterly sampling events.
- The groundwater collected from MW-8M appeared to be cloudy and brown in the third quarter sampling event.
- During the first quarter of sampling it was noted that the dedicated purge pump in MW-12S was removed and disposed of due to holes in the tubing. The dedicated sample bailer was also removed and the larger portable stainless steel bailer was used to reduce purging and bailing time.
- The water level at PZ-02 was not measured in the second quarter sampling event. This piezometer was installed only days before sampling and a key was not available.

Presentation of Results

Analytical Results

The analytical results are presented in Appendix A. The baseline monitoring results and groundwater cleanup standards are provided for comparison. Results exceeding cleanup standards are shaded. QA/QC qualifiers resulting from the EPA Region V validation have been added to the tables. Table 2 summarizes the results of the validation.

The EPA Region V validation included a comparison of the contents of the data packages and QA/QC results to the requirements described in the Special Analytical Service (SAS) methods. CH2M HILL reviewed the data validation to determine if project objectives and intended data usage requirements were met. All EPA-assigned qualifiers were maintained with the exception of the "R" qualifiers for turbidity, odor and total organic carbon (TOC) which CH2M HILL changed to "J" (estimated) qualifiers because the data met project objectives and was usable.

In Appendix B, the graphs show the volatile organic compounds (VOCs), metals, and wet chemistry results for each quarter of sampling. Results that were qualified as rejected (R) during validation were not plotted. All detected VOCs were plotted due to the low number of detected VOCs. Undetected metals results were plotted as one half the detection limit in cases where the metal had been detected in at least one of the other four quarters. Undetected wet chemistry results were plotted as 0.

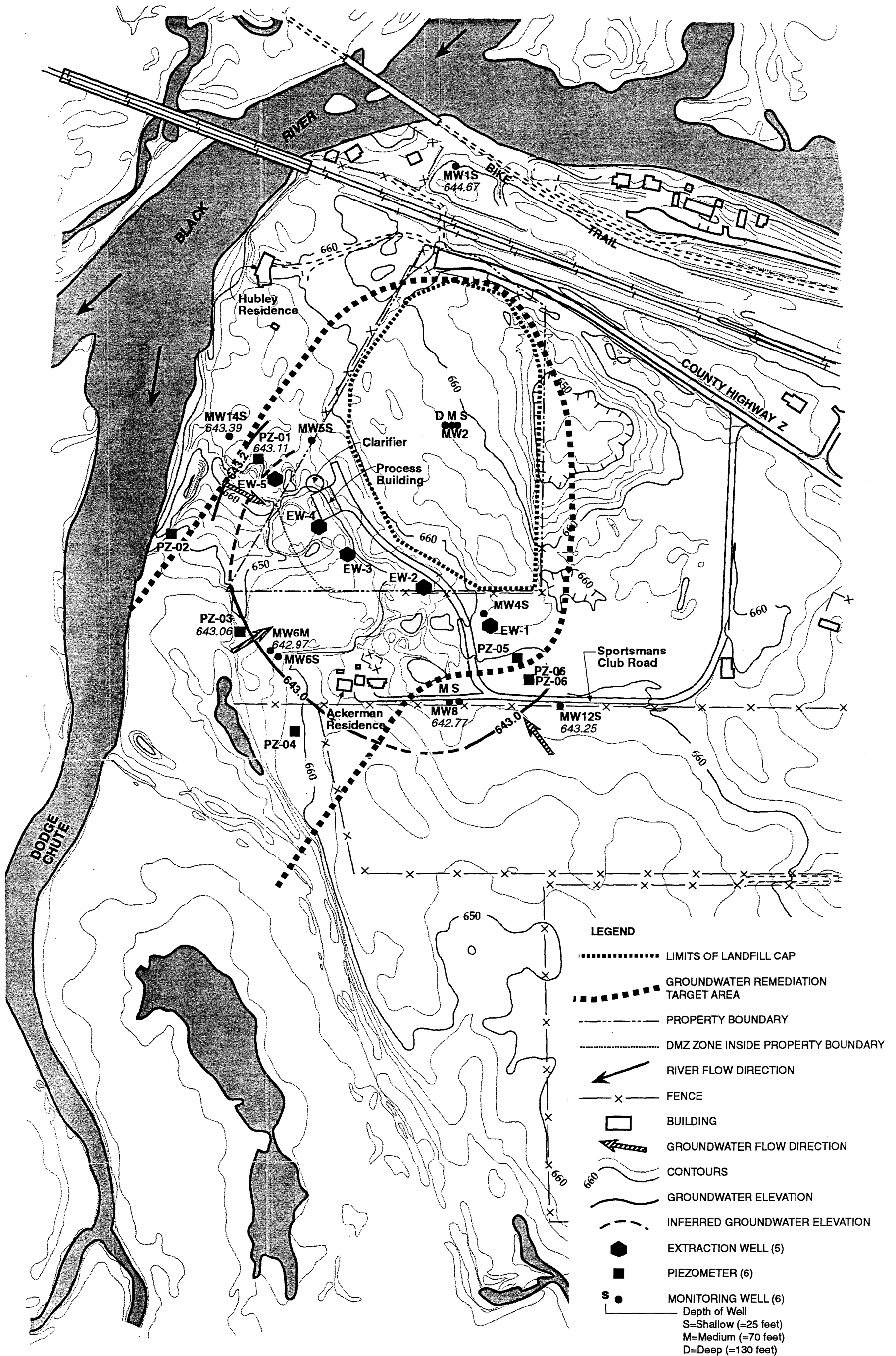
Groundwater Elevation and Capture Analysis

Quarterly groundwater elevation data is summarized in Table 3. This data was used to plot groundwater elevations on Figures 1 through 4 and evaluate whether a hydraulic gradient is being maintained in order to contain and collect contaminated groundwater.

TABLE 2
Onalaska Municipal Landfill
Groundwater Monitoring Analyses 1995
Summary of U.S. EPA Region 5 Validation

PARAMETER	Quarter	SAS#	EPA QUALIFIER	EPA VALIDATION COMMENTS
Alkalinity	1	95ZC16	R	Hold time (HT) exceeded; Incorrect titrant used per SAS
	2	95ZC18	J	Incorrect titrant used per SAS
	3	95ZC23	J	Incorrect titrant used per SAS
	4	96ZC05	R	HT exceeded; Lack of QC audits per SAS
COD	1	95ZC16	R	Incorrect SAS method used
	2	95ZC18	R	Incorrect SAS method used
	3	95ZC23	R	Incorrect SAS method used
Turbidity	1	95ZC16	J	Lack of QC audits per SAS
	1	95ZC16	R	Samples # 1,8,9 turbidity >40NTU, not rerun with dilutions per SAS
	2	95ZC18	J	Samples # 3,7,10-12,15 turbidity >40NTU, not rerun with dilution; Poor duplicate RPD
	3	95ZC23	J	Poor lab duplicate RPD
O & G	1	95ZC16	R	0 mg/L standard not analyzed in calibration curve per SAS; Incorrect cell path used per SAS
	2	95ZC18	R	0 mg/L standard not analyzed in calibration curve per SAS; Incorrect cell path used per SAS
	3	95ZC23	J	Samples # 1 and 3 thru 10- blank contamination from Field Blank (FB) @ 1.4mg/L O&G
	4	96ZC05	J	All samples except # 6- blank contamination from FB @ 0.5 mg/L O&G
Odor	1	95ZC16	R	Lack of QC audits; sample volumes not recorded per SAS
	3	95ZC23	UJ	Lack of QC audits (duplicates & blanks) per SAS
TOC	1	95ZC16	J	5-point calibration curve not run per SAS; Method Blank (MB) subtraction incorrectly applied
	2	95ZC18	R	5-point calibration curve not run per SAS; Method Blank (MB) subtraction incorrectly applied
	3	95ZC23	J	0 mg/L standard not analyzed in calibration curve per SAS; Contamination of FB & Calibration Bik (CB)
Color	1	95ZC16	J	Non-SAS method used; Lack of QC audits per SAS
	2	95ZC18	J	Non-SAS method used; Poor duplicate RPD
	3	95ZC23	J	Lack of QC audits (esp. blanks) per SAS
TDS	1	95ZC16	J	Poor field duplicate RPD
	2	95ZC18	J	Samples # 2-5 HT exceeded
	3	95ZC23	J	Sample # 9- contamination from FB @ 28 mg/L TDS
	4	96ZC05	J	Poor field duplicate RPD
Chloride	1	95ZC16	J	Poor field duplicate RPD
	3	95ZC23	UJ	Samples # 5,11,14,15-incorrect calibration curve; Poor %rec of MSpk
	3	95ZC23	J	Remaining samples-incorrect cal curve; Poor %recovery of Matrix Spike (MS)
Hardness	1	95ZC16	J	HT exceeded; Lack of QC audits per SAS
	2	95ZC18	J	Non-SAS method used
	3	95ZC23	J	Lack of QC audits; Contamination of FB @ 180 mg/L
	4	96ZC05	J	Poor field duplicate RPD
Iron	1	95ZC16	J	Samples # 1,4-7, 12,13,15-contamination of CB @ 38ug/L
	2	95ZC18	J	Poor field duplicate RPD & poor % recovery of MS
Manganese	1	95ZC16	J	Poor %recovery of MS & PB contamination @ 1.3ug/L
Lead	4	96ZC05	J	Samples # 2,4,6,8-11,18,19,21,22-contamination of FB @ 1.6ug/L
Toluene	4	96ZC05	J	Sample # 17-MS/MSD low recoveries

Table 3 Water Elevation Data				
Well	Mar 95	Jun 95	Sep 95	Dec 95
Shallow Monitoring Wells and Piezometers				
MW01S	644.67	642.29	642.63	642.86
MW06S	642.97	641.13	641.48	641.45
MW08S	642.77	641.14	641.55	641.38
MW12S	643.25	641.71	642.04	642.05
MW14S	643.39	641.28	641.58	641.64
PZ01	643.11	641.14	641.41	641.35
PZ02	--	--	641.95	641.92
PZ03	643.06	641.16	641.52	--
PZ04	--	641.18	641.52	--
PZ05	--	641.09	641.55	641.57
PZ06	--	641.21	641.57	--
Medium-Depth Wells				
MW06M	643.09	641.26	641.57	641.54
MW08M	642.77	641.35	641.43	641.36
-- indicates no water level information for this date and location				



- LEGEND**
- LIMITS OF LANDFILL CAP
 - GROUNDWATER REMEDIATION TARGET AREA
 - PROPERTY BOUNDARY
 - DMZ ZONE INSIDE PROPERTY BOUNDARY
 - ← RIVER FLOW DIRECTION
 - x FENCE
 - BUILDING
 - GROUNDWATER FLOW DIRECTION
 - CONTOURS
 - GROUNDWATER ELEVATION
 - INFERRED GROUNDWATER ELEVATION
 - EXTRACTION WELL (5)
 - PIEZOMETER (6)
 - S MONITORING WELL (6)
 Depth of Well
 S=Shallow (=25 feet)
 M=Medium (=70 feet)
 D=Deep (=130 feet)

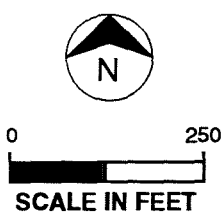


FIGURE 1
1st QUARTER GROUNDWATER ELEVATIONS
MARCH 1995
 ONALASKA

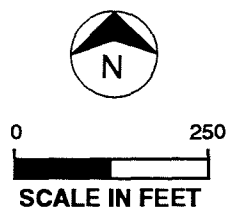
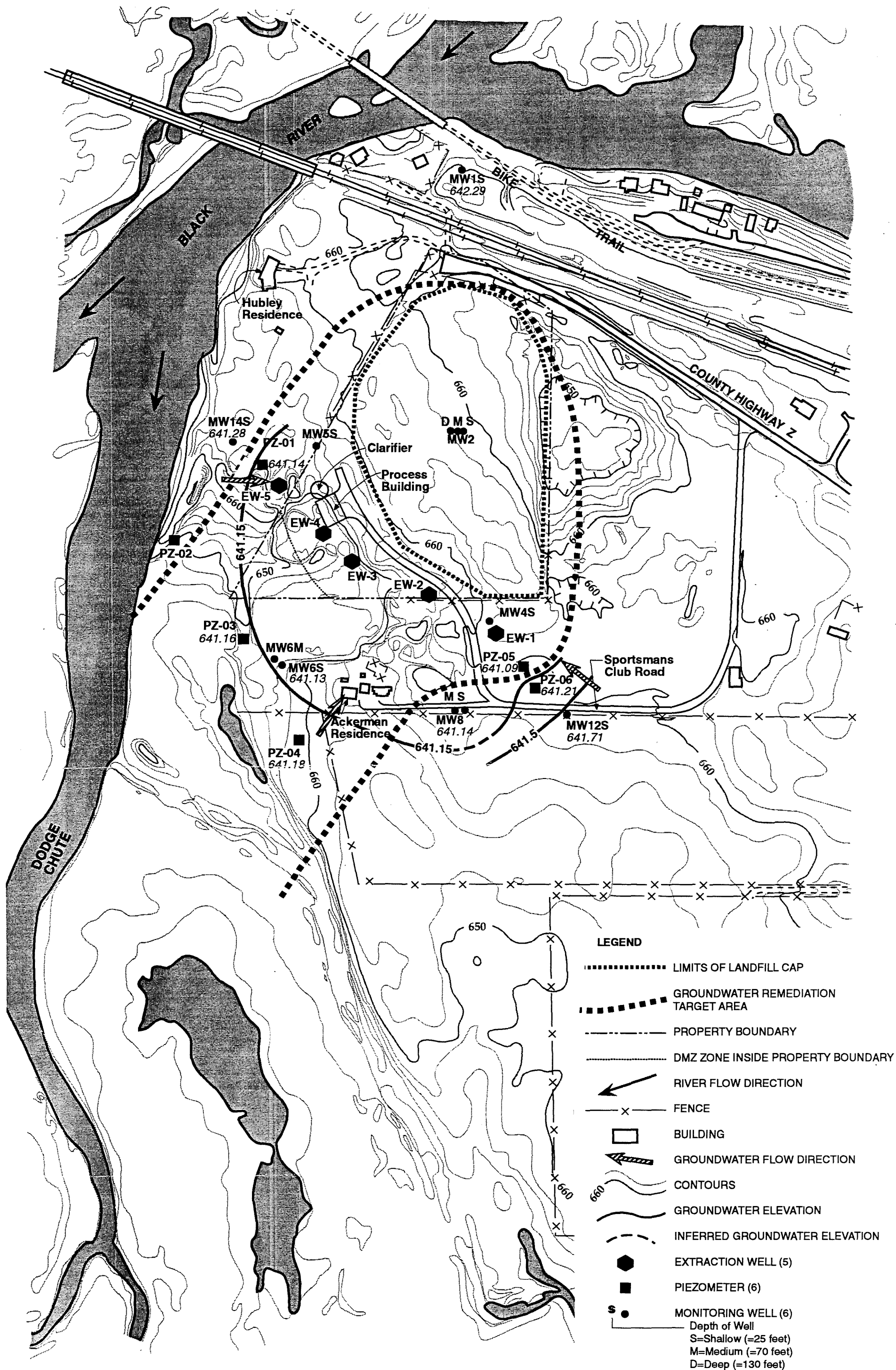


FIGURE 2
2nd QUARTER GROUNDWATER ELEVATIONS
JUNE 1995
 ONALASKA

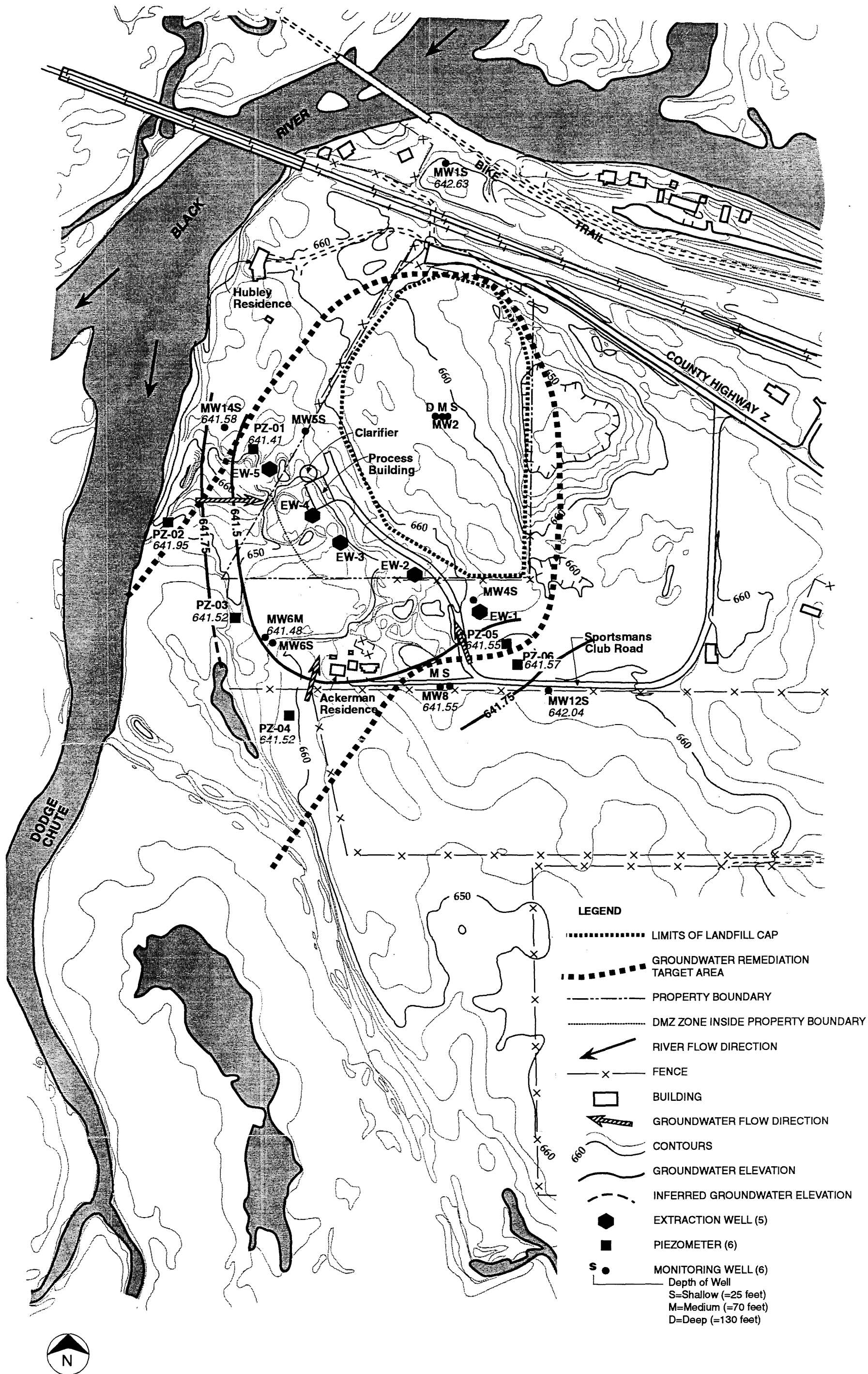


FIGURE 3
3rd QUARTER GROUNDWATER ELEVATIONS
SEPTEMBER 1995
 ONALASKA

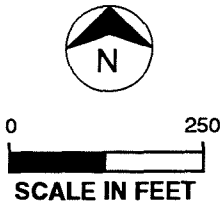
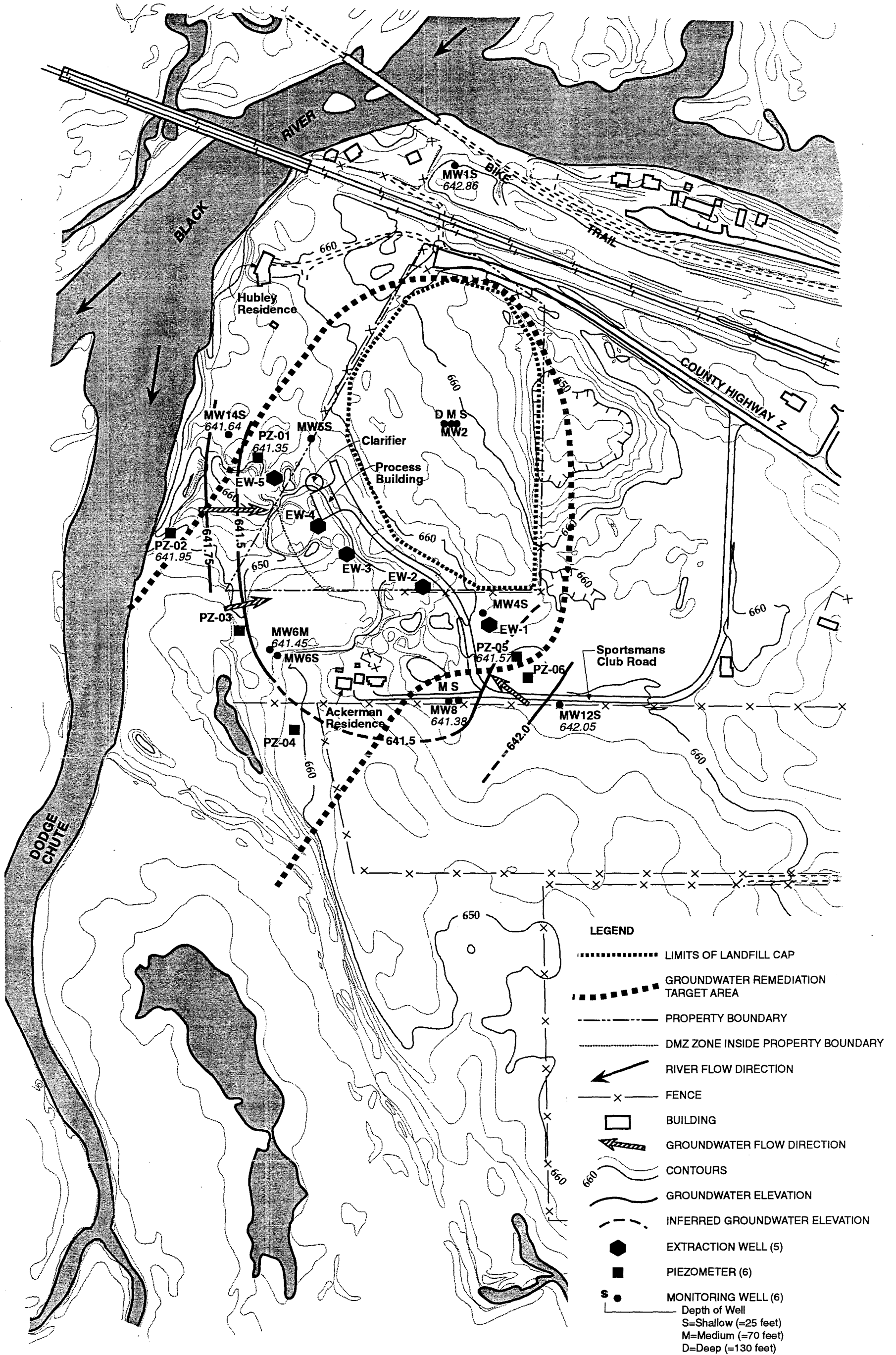
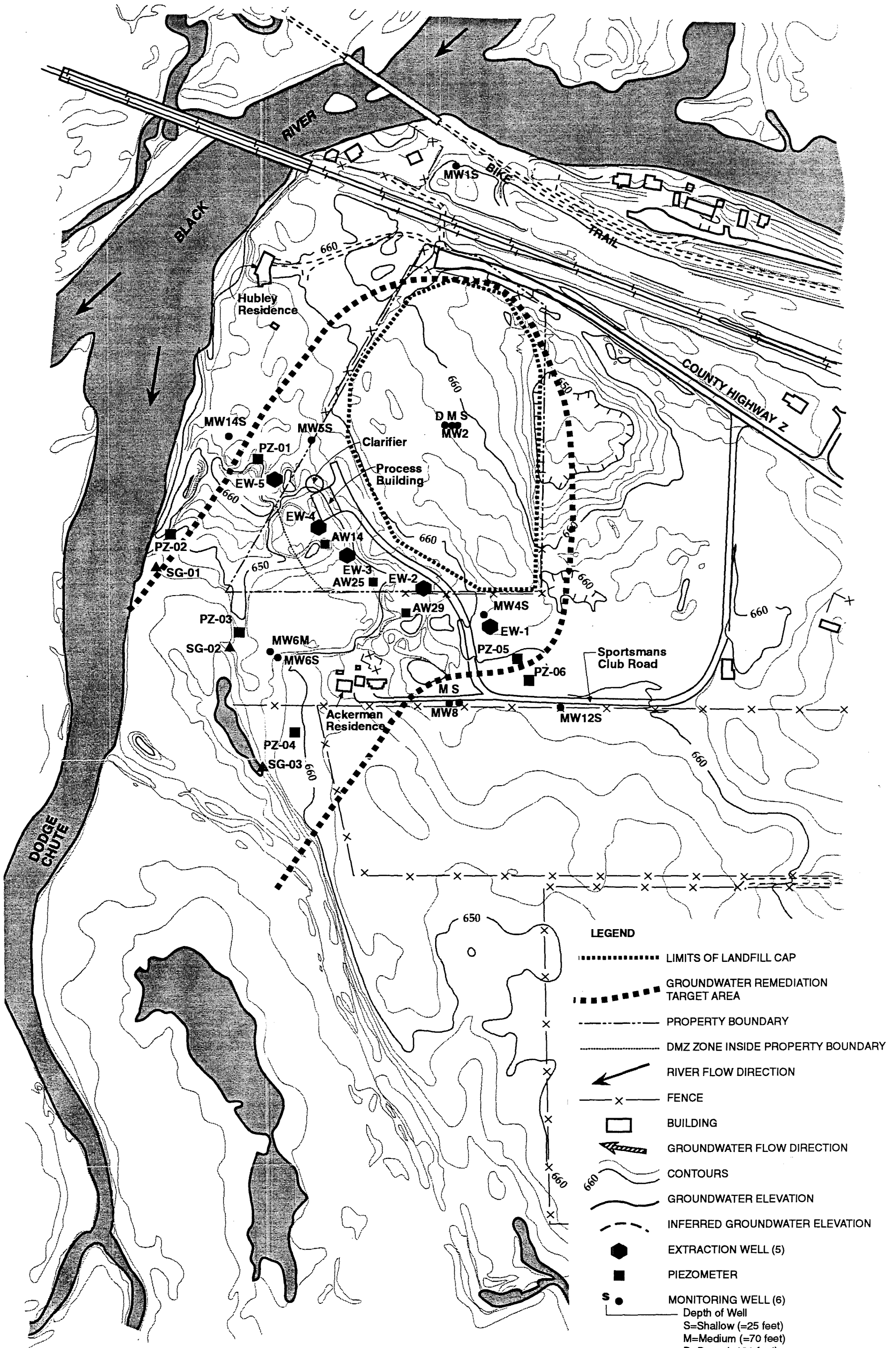


FIGURE 4
4th QUARTER GROUNDWATER ELEVATIONS
DECEMBER 1995
 ONALASKA



- LEGEND**
- LIMITS OF LANDFILL CAP
 - GROUNDWATER REMEDIATION TARGET AREA
 - PROPERTY BOUNDARY
 - DMZ ZONE INSIDE PROPERTY BOUNDARY
 - ← RIVER FLOW DIRECTION
 - x— FENCE
 - BUILDING
 - ← GROUNDWATER FLOW DIRECTION
 - CONTOURS
 - GROUNDWATER ELEVATION
 - INFERRED GROUNDWATER ELEVATION
 - EXTRACTION WELL (5)
 - PIEZOMETER
 - MONITORING WELL (6)
 Depth of Well
 S=Shallow (=25 feet)
 M=Medium (=70 feet)
 D=Deep (=130 feet)
 - ▲ PROPOSED STAFF GAGE

FIGURE 5
PROPOSED ADDITIONAL GROUNDWATER
MONITORING LOCATIONS
 ONALASKA

Analytical Summary of Results

VOCs

The attached graphs show the concentrations of detected VOCs for each quarter of sampling. VOCs were detected in monitoring wells MW-6S, MW-6M, MW-8M, MW-12S, and MW-14S and in all five extraction wells EW-1 through EW-5. No VOCs were detected in MW-1S and MW-8S or in the Hubley and Ackerman residential wells. Based on 1995 monitoring, the concentrations of VOCs are below PALs in monitoring wells and above PALs at times in extraction wells EW-3 and EW-4.

VOC concentrations are significantly less than measured during the Remedial Investigation (RI). During the RI, the sum of chlorinated VOCs in the shallow groundwater to the southwest of the landfill was in the range of 500 to 1000 ug/L. During 1995, the sum of chlorinated VOCs were 5 ug/L or less in the extraction wells and 30 ug/L or less in monitoring wells MW-6S and MW-6M where concentrations of 1,1 -dichloroethane ranged from 3 to 30 ug/L. During the RI, the sum of benzene, toluene, ethylbenzene, and xylene (BTEX) compounds in the shallow groundwater to the southwest of the landfill was generally in the range of 100 to 1000 ug/L with localized concentrations as high as 40,000 ug/L. During 1995 the sum of BTEX compounds were less than 3 ug/L in the monitoring wells and ranged from 50 to 425 ug/L in the extraction wells. During third and fourth quarters the highest sum of BTEX compounds measured in an extraction well was 151 ug/L.

The lower concentrations are thought to be attributable to successful removal of the more highly contaminated groundwater and dilution of contaminated water with less contaminated water. The dilution occurs as less contaminated water is drawn toward the extraction system. Some dilution of the more contaminated shallow groundwater may also occur in the extraction wells which draw from both the shallow groundwater and less contaminated intermediate depth groundwater. During the Feasibility Study (FS), the amount of groundwater flowing through the sand and gravel aquifer beneath the site was estimated at 350,000 gallons per day (gpd). The groundwater extraction system typically removed between 864,000 and 1,152,000 gpd during 1995. The high extraction rates are necessary to create a hydraulic gradient toward the extraction wells in order to capture and contain the plume of contaminated groundwater. This results in a high rate of flushing and dilution. Although, concentrations measured in 1995 were significantly less than measured during the RI, concentrations would be expected to increase somewhat if the system were turned off. This would likely occur as contaminants leach from the landfill and soil without the dilution action noted above. The concentrations of contaminants are also expected to be higher at more interior locations to the landfill such as monitoring wells MW-2S, MW-4S, and MW-5S. These locations are to be monitored as concentrations decrease below preventive action limits (PALs) in the more outer monitoring wells.

Benzene

Benzene was present at a concentration above the PAL in extraction well EW-3. As can be seen from the Benzene graph, the concentration of benzene in EW-3 decreased to the detection limit of 0.5 ug/L in the third and fourth quarter samples.

Toluene

Toluene was present at a concentration above the PAL in extraction wells EW-3 and EW-4. As can be seen from the Toluene Group 2 graph, the highest toluene concentrations occurred in the second quarter samples from extraction wells EW-3 and EW-4. The toluene concentration in these extraction wells decreased back below the PAL in the third quarter samples but rose above the PAL in EW-4 and to just below the PAL in EW-3 in the fourth quarter.

Other Detected VOCs

None of the other VOCs were present at concentrations above the PAL. However, based on the graphs there appear to be a few trends. There appears to be a decreasing trend for 1,1-dichloroethane concentrations in monitoring wells MW-6S and MW-6M and an increasing trend for total xylene concentrations in extraction wells EW-1 and EW-3. It is difficult to discern definite trends for other VOCs.

Metals

The attached graphs show the concentrations of metals for each quarter of sampling. Metals were detected at concentrations above PALs in all monitoring wells, residential wells, and extraction wells. Iron, lead, and manganese were reported at concentrations above PALs in MW-1S located upstream of the landfill. The iron and lead concentrations in MW-1S were above the PAL in only one of the four 1995 quarterly samples while manganese was significantly above the PAL in all four quarters. The reported lead concentration in MW-1S of 81 ug/L was nearly 25 times higher than any other well sampled during the year. This indicates a source of lead contamination upstream of the landfill, field or laboratory contamination, or laboratory error. The possibility of contamination or laboratory error is supported by the detection of lead in the field blank. Due to the uncertainty of the lead results, additional analysis was requested of the lab. The additional analysis was done on remaining sample (unpreserved) originally collected for wet chemistry analyses (i.e. sample collected from MW-1S at the same time as the suspect sample). The concentration of lead in this sample was below the 1.5 ug/L detection limit. This indicates the high lead concentration was a result of either laboratory error or laboratory or field contamination of the sample. First quarter 1996 samples will provide a better indication of whether lead is present at concentrations above the PAL in these wells. Because of the presence of iron, lead, and manganese upstream of the landfill, the presence of these metals in other wells may be partially attributed to background concentrations (or an error in the case of lead) rather than contamination from the landfill.

A definite decreasing concentration gradient was apparent to either side of the center of the groundwater remediation target area. EW-3, located in the center of the contaminated groundwater plume, had metals concentrations that were consistently higher than the other extraction wells. Extraction wells EW-2 and EW-4 consistently had the next highest metals concentrations and the outer extraction wells EW-1 and EW-5 consistently had the lowest metals concentrations of the extraction wells.

Manganese and lead were present at concentrations above the PALs in the Hubley residential well. The lead concentration was above the PAL in only the fourth quarter sample while manganese was significantly above the PAL in all four quarters. The lead concentration of 3.5 ug/L was above the 1.5 ug/L PAL but below the 15 ug/L maximum

contamination levels (MCL) drinking water standard. As noted above, the lead results in the fourth quarter samples are questionable. First quarter 1996 samples will provide a better indication of whether lead is present at concentrations above the PAL in these wells. Although the concentration of manganese in the Hubley residential well was above the PAL in all four quarters, the concentrations are similar to MW-1S concentrations and well below manganese concentrations downstream of the landfill. Therefore, the manganese concentrations in the Hubley residential well appear to be fully attributable to background levels. There is no MCL drinking water standard for manganese.

Iron and manganese were present at concentrations above PALs in the Ackerman residential well. Although the iron concentrations of 241 ug/L and 783 ug/L were above the 150 ug/L PAL, there is no MCL drinking water standard for iron. As with the manganese concentrations in the Hubley residential well, the manganese concentrations in the Ackerman residential well appear to be fully attributable to background levels.

Arsenic

Arsenic was present at concentrations above PALs in all five extraction wells. There appears to be a decreasing trend for arsenic concentrations in all of the extraction wells.

Barium

Barium was present at concentrations above PALs in extraction wells EW-1, EW-2, EW-3, and EW-4, and monitoring well MW-6M. The highest concentrations consistently occurred at monitoring well MW-6M. Concentrations of barium were relatively constant between quarters at all wells.

Iron

Iron was present at concentrations above the PAL in all five extraction wells, monitoring wells MW-1S, MW-8S, MW-12S, and MW-14S, and the Ackerman residential well. Iron concentration ranged from approximately 10 to 15 mg/L in extraction well EW-3, 6 to 11 mg/L in extraction wells EW-2 and EW-4, 3 to 11 mg/L in monitoring well MW-14S, 0.5 to 5 mg/L in extraction well EW-1, 0.1 to 2 in extraction well EW-5, and 0.5 to 2 mg/L in monitoring well MW-8S. There appears to be a trend for decreasing iron concentrations in extraction wells EW-1, EW-2, EW-4, EW-5, and monitoring well MW-8S. Concentrations in extraction well EW-3 and monitoring well MW-14S were erratic.

Lead

Based on reported lead concentrations from fourth quarter samples, lead may have been present at concentrations above PALs in monitoring wells MW-1S, MW-6M, MW-8S, MW-12S, and MW-14S, extraction wells EW-2, EW-3, EW-4, and EW-5, and in the Hubley residential wells. However, all reported concentrations are estimated values due to detection of lead in the field blank. As noted above, detection of lead in the fourth quarter samples indicate either a source of lead contamination upstream of the landfill or field or laboratory contamination. Except for the fourth quarter sample from MW-1S, all lead concentrations were well below the 15 ug/L MCL drinking water standard. First quarter 1996 samples will provide a better indication of whether lead is present at concentrations above PALs in these wells.

Manganese

Manganese was detected at concentrations above PALs in all monitoring wells, residential wells, and extraction wells except monitoring well MW-12S. Based on monitoring well MW-1S, manganese concentrations in the Hubley and Ackerman residential wells appear to be attributable to background concentrations. Concentrations were highest in monitoring wells MW-6S, MW-8S, MW-6M and extraction well EW-3. There appears to be a decreasing trend for manganese concentrations in these wells. The manganese concentration increased significantly between first and second quarter samples from monitoring well MW-14S. A similar increase occurred with iron between these quarters in monitoring well MW-14S. Concentrations of manganese were relatively constant between quarters at the other wells.

Wet Chemistry

The attached graphs show the wet chemistry results for each quarter of sampling. PALs exist for chloride, color, and odor. Chloride was consistently well below the PAL. Color was generally above the PAL in all extraction wells, monitoring wells, and residential wells for all four quarters. Because of the presence of color in monitoring well MW-1S upstream of the landfill, the presence of color in other wells may be partially attributed to background concentrations rather than contamination from the landfill. Odor was also above the PAL in some of the monitoring wells and extraction wells sampled second and fourth quarter.

pH

pH values generally ranged between 6.5 and 8 and followed similar variations to background well MW-1S. However, the pH of groundwater in MW-14S was consistently lower than other wells. As can be seen in the pH Group 1 graph, MW-14S pH ranged from 5.7 to slightly above 6.5 while the pH in nearby wells ranged from 6.5 to 8. The sharp pH increase in the third quarter results for Hubley and MW-6S are also noteworthy since the pH decreased that quarter in background well MW-1S.

Alkalinity

Alkalinity was analyzed to comply with Wisconsin Department of Natural Resources (WDNR) monitoring requirements downgradient from sanitary landfills. First and fourth quarter results are not plotted because the results were rejected during data validation. Background alkalinity concentrations in MW-1S ranged from 130 to 140 mg/L. Alkalinity concentrations in the wells ranged from approximately 90 to 240 mg/L in all samples except for alkalinity in MW-6S which ranged from approximately 320 to 360 mg/L.

TOC

The TOC analyses were to be used to evaluate the organic strength of the groundwater and to help monitor the diminishing contaminant concentrations in the plume. Background TOC concentrations in MW-1S ranged from 4.6 to 5.7 mg/L. The majority of the TOC results were between 0.3 and 6.3 mg/L and generally followed the small TOC variations of background well MW-1S. MW-6M, the Hubley residential well, MW-14S, EW-2, EW-4, and EW-3 had values above 6.3 mg/L. The highest TOC was 10.2 mg/L in EW-3. The low TOCs indicate that the landfill is not significantly contributing to the TOC in most of the wells. This is consistent with the low concentrations of VOC contaminants which sum up to less than 1 mg/L in the most contaminated wells.

COD

Chemical oxygen demand (COD) was analyzed to comply with WDNR monitoring requirements downgradient from sanitary landfills. Only fourth quarter results are plotted because the results for the first three quarters were rejected during data validation. The background COD concentration in MW-1S was 7.5 mg/L. The majority of the COD results were less than 10 mg/L. The only exceptions were EW-1 and MW-8M at 12 mg/L and MW-14S at 15 mg/L. As with the low TOC concentrations, the low COD concentrations indicate that the landfill is not significantly contributing to the COD in most of the wells. This is consistent with the low concentrations of VOC contaminants which sum up to less than 1 mg/L in the most contaminated wells.

Chloride

Chloride was analyzed to comply with WDNR monitoring requirements downgradient from sanitary landfills. Chloride concentrations were well below the 125 mg/L PAL in all monitoring wells, residential wells, and extraction wells. Chloride concentrations in background MW-1S ranged from 5.5 to 8.1 mg/L. As can be seen from the graphs, the chloride concentrations in the extraction wells were slightly higher indicating a slight contribution from the landfill. However, the chloride concentrations in the extraction wells were 15 mg/L or less which is only slightly above background concentrations and well below the PAL.

Color

Color was present at values above the PAL in MW-1S located upstream of the landfill. As can be seen from the Color Group 3 graph, the highest color values occurred in the second quarter samples from extraction wells EW-2 and EW-4. Based on the concentrations in MW-1S, it appears that the landfill contributes to color in EW-2, EW-3, and EW-4 and that color reported in other wells is a result of background color levels.

Hardness

Hardness was analyzed to comply with WDNR monitoring requirements downgradient from sanitary landfills. Hardness was present at concentrations between 160 and 260 mg/L in background well MW-1S. The hardness was generally about the same in other wells with the exception of MW-6S where hardness ranged between 180 and 350 mg/L. The hardness for one of the MW-12S fourth quarter field duplicates measured 660 mg/L. However, the other field duplicate measured 280 mg/L. Therefore, the high value is suspect.

Odor

Odor was consistently below the PAL in background well MW-1S. Odor was above the PAL in monitoring wells MW-6S, MW-6M, and MW-14S and extraction wells EW-1, EW-2, EW-3, and EW-4. The higher values occurred in the second and fourth quarter samples. The highest laboratory measured odor values occurred in MW-14S. As noted under Sampling and Observations, a hydrocarbon odor and sheen was observed during all four quarterly sampling events in MW-14S. Based on the location of MW-14S it is possible that localized contamination in this area is not a direct result of the landfill.

Oil and Grease

Oil and Grease concentrations decreased significantly in fourth quarter samples versus the reported concentrations in the third quarter samples at monitoring wells MW-6M, MW-6S, MW-8M, MW-1S ; the Hubley residential well, and extraction wells EW-1, EW-3 and EW-5. Because of the presence of oil and grease upstream of the landfill, the presence of oil and grease in other wells may be partially attributed to background concentrations rather than contamination from the landfill. The concentrations in the extraction wells were nearly identical to background concentrations. However, the third quarter concentrations in MW-6S, MW-6M, MW-8M, MW-14S, the Hubley residential well, and the Ackerman residential well were significantly greater than background concentrations. Additional monitoring will be required to determine if the second quarter results were an anomaly.

TDS

Total dissolved solids (TDS) analyses are used to indicate the relative strength of the leachate contributed by the landfill. The TDS concentrations in most wells ranged between 200 and 400 mg/L and were relatively constant between quarters. This is below the esthetic and taste based recommended concentration limit of 500 mg/L. The largest deviation occurred in background monitoring well MW-1S which spiked at approximately 1800 mg/L in the second quarter.

Specific Conductance

Specific conductance was analyzed to comply with WDNR monitoring requirements downgradient from sanitary landfills. Specific conductance at most wells ranged between 150 and 400 umhos/cm. The highest values of 450 and 480 umhos/cm were recorded at MW-6S. Specific conductivity readings appeared to be elevated above background well MW-1S at MW-6S, MW-6M, MW-8S, MW-12S, the Ackerman residential well, EW-1, EW-2, EW-3, and EW-4. The specific conductance did not correlate well with any of the concentration variations observed for TDS.

Turbidity

Turbidity values were above 5 mg/L at all but MW-6S. Turbidity in background well MW-1S ranged between 58 and 240 mg/L. Turbidity concentrations were highest in monitoring wells MW-1S, MW-8M, MW-12S, MW-14S and extraction well EW-3. A sharp turbidity increase occurred in the second quarter in MW-1S, MW-14S, and EW-3 and in the third quarter in MW-8M and MW-12S. Because of the high turbidity upstream of the landfill, the high turbidity in other wells may be partially attributed to background rather than contamination from the landfill.

Groundwater Elevation and Capture Analysis

Summary of Results

Objectives

- Evaluate the effectiveness of the Onalaska groundwater extraction system's hydraulic gradient control and collection of contaminated groundwater within the aquifer during pumping in 1995

- Determine if groundwater extraction lowered water levels in adjacent wetlands during pumping in 1995

Available Data

Available data consists of water elevation data for four quarters in 1995. Water level data were collected at 13 monitoring locations (shallow wells MW-1S, MW-6S, MW-8S, MW-12S, and MW-14S; piezometers PZ-01 through PZ-06; and intermediate wells MW-6M and MW-8M). Water elevation data are summarized in Table 3. Previous data indicate that groundwater at the Onalaska site flows from the north toward the south-southwest except during high river stages in the spring when groundwater flows to the south-southeast.

Groundwater Capture Evaluation

Methodologies

The groundwater extraction system at the Onalaska site consists of five extraction wells located south of the landfill in a line that extends roughly from the west-northwest to the east-southeast (Figure 5). The objective of the groundwater extraction system is to capture groundwater flowing south of the landfill in the area defined by the groundwater remediation target area, shown as a dashed line on Figures 1 through 5. The effectiveness of the groundwater extraction system in capturing the groundwater was determined by examining the groundwater flow directions based on groundwater elevations during the four quarters of 1995.

Groundwater elevations were calculated by subtracting the water levels taken from the top of each well casing from the well casing elevation. These data were plotted for four quarterly monitoring periods (March, June, September, and December of 1995). The groundwater elevations were evaluated to determine if groundwater was flowing toward the extraction system wells from the east, west, and south of the extraction system within the groundwater remediation area (Figures 1 through 4). Groundwater flow in this direction would indicate that the extraction system was effectively capturing groundwater in the groundwater remediation target area. Medium depth wells (MW-6M and MW-8M) were not used in the horizontal flow direction assessment but were used to determine the level of vertical groundwater flow.

Conclusions

During all four quarters of 1995 the groundwater flow is generally from the monitoring locations toward the extraction wells, indicating capture of groundwater in the target area by the extraction system. The March and December 1995 potentiometric surfaces (Figures 1 and 4) show higher groundwater elevations at perimeter wells (MW-14S and PZ-03) than at interior wells (PZ-01 and MW-6S), indicating groundwater flow toward the extraction system and capture within the south and western portion of the groundwater remediation area. Due to a lack of water level data near MW-8S, the 1995 first and fourth quarters (March and December) groundwater flow direction from the south toward the extraction system is not well defined, but appears to be toward the extraction system based on the relative levels at MW-8S and MW-12S (Figures 1 and 4). Groundwater elevation data during the 1995 second and third quarters (June and September) show the groundwater flow direction is from the west, south, and east toward the extraction wells (Figures 2 and 3). The flow

direction near MW-8S for these quarters is inferred from higher groundwater elevations at PZ-04 and MW-12S.

Pumping Effects on Wetlands

Piezometers PZ-02, PZ-03, and PZ-04 are located in wetlands to the south and west of the Onalaska Landfill site. The objective of collecting water levels at these locations was to quantify the effects of groundwater extraction at the pumping area on water levels in the wetlands. Water levels were measured in some or all of these wetland monitoring locations during the four quarters of 1995. The response in the wetland piezometers due to pumping is not conclusive due to the lack of data at nearby surface water bodies. Additional data collection to allow better evaluation of potential effects on the wetlands are proposed below.

Recommended Adjustments to the Monitoring Program

VOCs

Continued quarterly sampling in the extraction wells is necessary since certain VOCs were detected above cleanup standards (PALs) in some extraction wells. Continued quarterly sampling in the monitoring wells is recommended to allow better determination of trends and to verify VOC concentrations will remain below PALs. However, elimination of VOC analysis in 1997 from the currently sampled monitoring wells may be advisable if all the 1996 VOC results in these monitoring wells remain below PALs. Since VOC concentrations were below PALs in the monitoring wells and below PALs for all but benzene and toluene in a few of the extraction well samples, it is recommended that VOC monitoring be initiated in MW-4S and MW-5S for 1996 quarterly sampling.

Three VOCs, 1,1-dichloroethene, 1,1,1-trichloroethane, and 1,1,2,2-tetrachloroethane were not detected at a significant concentration in any of the samples. However, elimination of these compounds will not result in cost savings since the analyses for the other VOCs includes these compounds. Furthermore, two of these compounds are on the list of chemicals of concern and may be present at MW-4S and MW-5S.

Metals

Continued quarterly sampling in all the wells is necessary since certain metals were detected above cleanup standards (PALs) in all wells. It is recommended that metals analysis in wells MW-4S and MW-5S be deferred until metals concentrations in the other monitoring wells decrease to PAL or background concentrations.

Wet Chemistry

Continued quarterly sampling in all the wells is necessary for color and odor which were detected above cleanup standards (PALs) in all wells. Except for the parameters noted below, continued quarterly sampling of wet chemistry parameters is recommended for 1996. It is recommended that wet chemistry analysis in wells MW-4S and MW-5S be deferred until monitoring can be eliminated or reduced in the currently sampled wells. This can occur when all wet chemistry parameters are consistently below PALs or background concentrations. Elimination of the parameters noted below is recommended to reduce laboratory cost, data management cost, and data evaluation cost.

Elimination of chloride, alkalinity, hardness, COD, and specific conductance are recommended. Chloride was measured to evaluate the relative strength of leachate contributed by the landfill. Based on 1995 results, chloride is not a problem at any of the locations sampled. Chloride was not detected at significant concentrations in any of the samples and was well below the PALs in all wells.

Alkalinity, hardness, iron, COD, specific conductance, manganese, color, and turbidity were required to be monitored by WDNR. The need for continued analysis of alkalinity, hardness, COD, and specific conductance will be discussed with WDNR. Elimination of these parameters would not affect evaluation of the impacts of the landfill on groundwater quality or groundwater cleanup. Based on TOC, COD, and VOCs, the organic contamination in the wells is low level. The VOC and TOC measurements are more reliable at these low levels and provide sufficient information about organic contamination. Alkalinity and hardness are general water characteristic parameters and are not contaminants. No unusual values of alkalinity and hardness were measured. The measurement of VOCs, metals, and certain other wet chemistry parameters provide a large number of parameters to evaluate the affects of the landfill on groundwater without there additional parameters.

Groundwater Levels

Adding water level measurement locations to the network would enhance evaluation of water flow direction. Measurement of groundwater levels in air injection wells AW-14 (between EW-3 and EW-4), AW-25 (between EW-2 and EW-3), and AW-29 (southwest of EW-2) near the extraction wells would add more definition to the groundwater contours (Figure 5).

The first, second, and fourth quarter 1995 water elevation data sets were incomplete since water levels were not collected at all 13 monitoring locations. Three of the piezometers were not installed until after first quarter groundwater level measurement. Three of the piezometers were not accessible during the fourth quarter sampling due to an early heavy snow cover. Additionally, rusted locks prevented measurement in two of the piezometers during 1995. In order to improve the completeness of the data set in the future, the piezometers will be marked with flags and a lock cutter used if a lock cannot be opened.

Current data in the wetlands to the west and south of the extraction wells do not facilitate the determination of whether groundwater extraction is affecting wetlands groundwater levels. The interaction between groundwater and surface water needs to be defined in these wetland areas. To enhance the understanding of the surface water-groundwater interaction at the wetlands and their response to groundwater extraction, a staff gage should be installed in a surface water body near each wetland piezometer at areas suggested in Figure 5 (exact locations to be determined by field personnel). These proposed staff gages, in combination with a better-defined water table and a better understanding of vertical gradients (as more data is accumulated over time), will help to determine the type of wetland being considered and whether the wetlands are being affected by groundwater declines associated with groundwater removal at the extraction wells.

APPENDIX A
1995 Annual Groundwater Monitoring Results Tables

**Onalaska Municipal Landfill
Groundwater Monitoring Results**

Field Sample Identification:	MW01S	MW01S	MW01S	MW01S					
Date of Sample Collection:	3/22/95	6/28/95	9/26/95	12/13/95					
Laboratory Sample Identification:	95ZC16001	95ZC18003	95ZC23001	96ZC05001	Baseline	Baseline	PAL	MCL	MCLG
Quarter Number:	1	2	3	4	Avg Conc	Max Conc	Conc	Conc	Conc
Wet Chemistry (mg/L)									
pH	7.16	7.19	6.7	7.57	7.53	7.60	NA	NA	NA
Alkalinity	130 R	140 J	130 J	130 R	104	106	NA	NA	NA
Carbon, Total Organic	4.6 J	5.3 J	4.6 J	5.7	4	4	NA	NA	NA
Chemical Oxygen Demand	22 R	15 R	5 R	7.5	10	12	NA	NA	NA
Chloride	6.4 J	5.5	8.1 J	5.5	4	8	125	NA	NA
Color (CU)	35 J	65 J	31 J	65	8	10	7.5	NA	NA
Hardness	160 J	260 J	190 J	220 J	170	189	NA	NA	NA
Odor (TON)	1 J	1	1 J	1 U	0	0	1.5	NA	NA
Oil and Grease	0.4 R	0.5 R	1.8 J	0.6 J	5	5	NA	NA	NA
Solids, Total Dissolved	200 J	1700 J	220	180 J	158	158	NA	NA	NA
Specific Conductance (micromhos/cm)	260	219	205	250	205	220	NA	NA	NA
Turbidity (NTU)	58 J	240 J	184 J	98	NA	NA	NA	NA	NA
VOCs (µg/L)									
1,1-Dichloroethene	1 U	1 U	1 U	1 U	0.39	0.39	0.7	7	7
1,1-Dichloroethane	1 U	1 U	1 U	1 U	0.36	0.36	85	NA	NA
1,1,1-Trichloroethane	1 U	1 U	1 U	1 U	0.2	0.2	40	200	200
Trichloroethene	1 U	1 U	1 U	1 U	0.05	0.05	0.5	5	0
Benzene	1 U	1 U	1 U	1 U	0.08	0.08	0.5	5	0
1,1,2,2-Tetrachloroethane	1 U	0.5 U	0.5 U	0.5 U	0.29	0.29	0.5	5	0
Toluene	1 U	1 U	1 U	1 U	0.07	0.07	68.6	1,000	1,000
Ethylbenzene	1 U	1 U	1 U	1 U	0.04	0.04	140	700	700
Total Xylenes	1 U	1 U	1 U	1 U	0.06	0.06	124	10,000	10,000
Inorganic Analytes (µg/L)									
Arsenic, Dissolved	3.3 U	5 U	5 U	5 U	2	2	5	50	50
Barium, Dissolved	34.4 J	200 U	200 U	200 U	22	22	400	2,000	2,000
Iron, Dissolved	64 J	100 U	237	100 U	30	38	150	NA	NA
Lead, Dissolved	1.5 U	1.5 U	1.5 U	81.6	0.97	0.97	1.5	15	0
Manganese, Dissolved	884 J	698	178	267	44	50	25	NA	NA

NA Not applicable NS Not sampled d Field duplicate

U Not detected. Analyte was not detected at a concentration equal to or greater than method detection limits.

J Estimated. Analyte was detected; however, either the value is below the report limit or quality control results indicate that the reported value may not be accurate.

R Rejected. The data are unusable; analyte may or may not be present.

Results exceeding cleanup standards

**Onalaska Municipal Landfill
Groundwater Monitoring Results**

Field Sample Identification:	MW06S	MW06Sd	MW06S	MW06S					
Date of Sample Collection:	3/22/95	3/22/95	6/29/95	9/27/95					
Laboratory Sample Identification:	95ZC16005	95ZC16007	95ZC18018	95ZC23014	Baseline Avg Conc	Baseline Max Conc	PAL Conc	MCL Conc	MCLG Conc
Quarter Number:	1	1	2	3					
Wet Chemistry (mg/L)									
pH	6.58	NA	7.32	7.92	7.63	7.70	NA	NA	NA
Alkalinity	280 R	340 R	320 J	350 J	208	210	NA	NA	NA
Carbon, Total Organic	7 J	5.4 J	6.6 J	5.9 J	4	4	NA	NA	NA
Chemical Oxygen Demand	15 R	26 R	41 R	9.6 R	5	6	NA	NA	NA
Chloride	5 U	9 J	11	5 UJ	3	3	125	NA	NA
Color (CU)	5 J	5 J	15 J	60 J	1	1	7.5	NA	NA
Hardness	290 J	290 J	310 J	180 J	204	206	NA	NA	NA
Odor (TON)	1 J	1 J	1	1 J	3	5	1.5	NA	NA
Oil and Grease	0.4 R	0.4 R	0.4 R	15	5	5	NA	NA	NA
Solids, Total Dissolved	290 J	330 J	390	340	133	208	NA	NA	NA
Specific Conductance (micromhos/cm)	450	NA	480	39 R	298	300	NA	NA	NA
Turbidity (NTU)	4 J	1.8 J	1.8 J	2.9 J	NA	NA	NA	NA	NA
VOCs (µg/L)									
1,1-Dichloroethene	1 U	1 U	1 U	1 U	0.39	0.39	0.7	7	7
1,1-Dichloroethane	10	10.8	2.9	5.6	7	7	85	NA	NA
1,1,1-Trichloroethane	1 U	1 U	1 U	1 U	0.2	0.2	40	200	200
Trichloroethene	1 U	1 U	1 U	0.2 J	0.14	0.22	0.5	5	0
Benzene	1 U	1 U	1 U	1 U	0.5	0.62	0.5	5	0
1,1,2,2-Tetrachloroethane	1 U	1 U	0.5 U	0.5 U	0.29	0.29	0.5	5	0
Toluene	1 U	1 U	1 U	1 U	2	2	68.6	1,000	1,000
Ethylbenzene	1 U	1 U	1 U	1 U	0.04	0.04	140	700	700
Total Xylenes	1 U	1 U	1 U	1 U	0.10	0.12	124	10,000	10,000
Inorganic Analytes (µg/L)									
Arsenic, Dissolved	3.3 U	3.3 U	5 U	5 U	2	2	5	50	50
Barium, Dissolved	240	234	250	221	160	161	400	2,000	2,000
Iron, Dissolved	75.1 J	103 J	100 U	100 U	59	64	150	NA	NA
Lead, Dissolved	1.5 U	1.5 U	1.5 U	1.5 U	0.97	0.97	1.5	15	0
Manganese, Dissolved	4540 J	4640	5110	4410	3113	3120	25	NA	NA

NA Not applicable NS Not sampled d Field duplicate
 U Not detected. Analyte was not detected at a concentration equal to or greater than method detection limits.
 J Estimated. Analyte was detected; however, either the value is below the report limit or quality control results indicate that the reported value may not be accurate.
 R Rejected. The data are unusable; analyte may or may not be present.
 Results exceeding cleanup standards

**Onalaska Municipal Landfill
Groundwater Monitoring Results**

Field Sample Identification: MW06S Date of Sample Collection: 12/13/95 Laboratory Sample Identification: 96ZC05003 Quarter Number: 4		Baseline Avg Conc	Baseline Max Conc	PAL Conc	MCL Conc	MCLG Conc
Wet Chemistry (mg/L)						
pH	7.09	7.63	7.70	NA	NA	NA
Alkalinity	250 R	208	210	NA	NA	NA
Carbon, Total Organic	7.1	4	4	NA	NA	NA
Chemical Oxygen Demand	10	5	6	NA	NA	NA
Chloride	5 U	3	3	125	NA	NA
Color (CU)	15	1	1	7.5	NA	NA
Hardness	350 J	204	206	NA	NA	NA
Odor (TON)	4	3	5	1.5	NA	NA
Oil and Grease	0.5 J	5	5	NA	NA	NA
Solids, Total Dissolved	570 J	133	208	NA	NA	NA
Specific Conductance (micromhos/cm)	345	298	300	NA	NA	NA
Turbidity (NTU)	3.7	NA	NA	NA	NA	NA
VOCs (µg/L)						
1,1-Dichloroethene	1 U	0.39	0.39	0.7	7	7
1,1-Dichloroethane	2.8	7	7	85	NA	NA
1,1,1-Trichloroethane	1 U	0.2	0.2	40	200	200
Trichloroethene	0.2 J	0.14	0.22	0.5	5	0
Benzene	1 U	0.5	0.62	0.5	5	0
1,1,2,2-Tetrachloroethane	0.5 U	0.29	0.29	0.5	5	0
Toluene	1 U	2	2	68.6	1,000	1,000
Ethylbenzene	1 U	0.04	0.04	140	700	700
Total Xylenes	1 U	0.10	0.12	124	10,000	10,000
Inorganic Analytes (µg/L)						
Arsenic, Dissolved	5 U	2	2	5	50	50
Barium, Dissolved	239	160	161	400	2,000	2,000
Iron, Dissolved	100 U	59	64	150	NA	NA
Lead, Dissolved	1.5 U	0.97	0.97	1.5	15	0
Manganese, Dissolved	3260	3113	3120	25	NA	NA

NA Not applicable **NS** Not sampled **d** Field duplicate
U Not detected. Analyte was not detected at a concentration equal to or greater than method detection limits.
J Estimated. Analyte was detected; however, either the value is below the report limit or quality control results indicate that the reported value may not be accurate.
R Rejected. The data are unusable; analyte may or may not be present.
Results exceeding cleanup standards

**Onalaska Municipal Landfill
Groundwater Monitoring Results**

Field Sample Identification:	MW06M	MW06M	MW06M	MW06M					
Date of Sample Collection:	3/22/95	6/29/95	9/27/95	12/13/95					
Laboratory Sample Identification:	95ZC16006	95ZC18019	95ZC23015	96ZC05002	Baseline Avg Conc	Baseline Max Conc	PAL Conc	MCL Conc	MCLG Conc
Quarter Number:	1	2	3	4					
Wet Chemistry (mg/L)									
pH	6.83	7.69	7.7	7.6	7.58	7.63	NA	NA	NA
Alkalinity	300 R	240 J	240 J	240 R	269	273	NA	NA	NA
Carbon, Total Organic	3.6 J	7 J	3.4 J	4	4	4	NA	NA	NA
Chemical Oxygen Demand	11 R	44 R	5 R	7.5	10	13	NA	NA	NA
Chloride	5 U	5 U	5 UJ	5 U	7	7	125	NA	NA
Color (CU)	5 J	15 J	65 J	15	2	5	7.5	NA	NA
Hardness	250 J	240 J	200 J	220 J	250	252	NA	NA	NA
Odor (TON)	1 J	1	1 J	4	7	13	1.5	NA	NA
Oil and Grease	0.4 R	0.4 R	16	0.5 J	5	5	NA	NA	NA
Solids, Total Dissolved	300 J	280	350	540 J	282	286	NA	NA	NA
Specific Conductance (micromhos/cm)	360	365	360	340	340	365	NA	NA	NA
Turbidity (NTU)	3.6 J	25 J	20 J	4.5	NA	NA	NA	NA	NA
VOCs (µg/L)									
1,1-Dichloroethene	1 U	1 U	1 U	1 U	0.39	0.39	0.7	7	7
1,1-Dichloroethane	30.4	13.7	20.7	11.7	4.92	4.98	85	NA	NA
1,1,1-Trichloroethane	1 U	1 U	1 U	1 U	0.2	0.2	40	200	200
Trichloroethene	1 U	1 U	0.2 J	0.2 J	0.27	0.34	0.5	5	0
Benzene	1 U	1 U	0.1 J	1 U	0.79	0.8	0.5	5	0
1,1,2,2-Tetrachloroethane	1 U	0.5 U	0.5 U	0.5 U	0.29	0.29	0.5	5	0
Toluene	1 U	1 U	1 U	1 U	0.07	0.07	68.6	1,000	1,000
Ethylbenzene	1 U	1 U	1 U	1 U	0.81	0.83	140	700	700
Total Xylenes	1 U	1 U	1 U	1 U	1.06	1.14	124	10,000	10,000
Inorganic Analytes (µg/L)									
Arsenic, Dissolved	3.3 U	5 U	5 U	5 U	2	2	5	50	50
Barium, Dissolved	1800	1680	2020	1800	2150	2180	400	2,000	2,000
Iron, Dissolved	107 J	100 U	100 U	100 U	36	63	150	NA	NA
Lead, Dissolved	1.5 U	1.5 U	1.5 U	2.5 J	0.97	0.97	1.5	15	0
Manganese, Dissolved	3830 J	3500	4140	3390	4747	4800	25	NA	NA

NA Not applicable NS Not sampled d Field duplicate
 U Not detected. Analyte was not detected at a concentration equal to or greater than method detection limits.
 J Estimated. Analyte was detected; however, either the value is below the report limit or quality control results indicate that the reported value may not be accurate.
 R Rejected. The data are unusable; analyte may or may not be present.
 Results exceeding cleanup standards

**Onalaska Municipal Landfill
Groundwater Monitoring Results**

Field Sample Identification:	MW08S	MW08S	MW08S	MW08S					
Date of Sample Collection:	3/22/95	6/29/95	9/27/95	12/13/95					
Laboratory Sample Identification:	95ZC16003	95ZC18013	95ZC23010	96ZC05004	Baseline	Baseline	PAL	MCL	MCLG
Quarter Number:	1	2	3	4	Avg Conc	Max Conc	Conc	Conc	Conc
Wet Chemistry (mg/L)									
pH	6.47	7.31	6.73	8.00	7.00	7.18	NA	NA	NA
Alkalinity	240 R	180 J	210 J	200 R	190	205	NA	NA	NA
Carbon, Total Organic	2 J	0.5 U	2.1 J	2.4	4	5	NA	NA	NA
Chemical Oxygen Demand	19 R	32 R	24 R	5	12	19	NA	NA	NA
Chloride	6.4 J	8.8	9.4 J	6.5	7	9	125	NA	NA
Color (CU)	25 J	25 J	60 J	15	30	50	7.5	NA	NA
Hardness	200 J	200 J	180 J	190 J	163	167	NA	NA	NA
Odor (TON)	1 J	1	1 J	1 U	7	17	1.5	NA	NA
Oil and Grease	0.4 R	0.4 R	1.9 J	0.6 J	5	5	NA	NA	NA
Solids, Total Dissolved	270 J	260	670	110 J	199	213	NA	NA	NA
Specific Conductance (micromhos/cm)	340	300	318	315	283	300	NA	NA	NA
Turbidity (NTU)	7.6 J	30 J	26 J	7.1	NA	NA	NA	NA	NA
VOCs (µg/L)									
1,1-Dichloroethene	1 U	1 U	1 U	1 U	0.39	0.39	0.7	7	7
1,1-Dichloroethane	1 U	1 U	1 U	1 U	1	1	85	NA	NA
1,1,1-Trichloroethane	1 U	1 U	1 U	1 U	0.2	0.2	40	200	200
Trichloroethene	1 U	1 U	1 U	1 U	0.05	0.05	0.5	5	0
Benzene	1 U	1 U	1 U	1 U	0.36	0.49	0.5	5	0
1,1,2,2-Tetrachloroethane	1 U	0.5 U	0.5 U	0.5 U	0.29	0.29	0.5	5	0
Toluene	1 U	1 U	1 U	1 U	0.1	0.11	68.6	1,000	1,000
Ethylbenzene	1 U	1 U	1 U	1 U	0.30	0.44	140	700	700
Total Xylenes	1 U	1 U	1 U	1 U	0.09	0.10	124	10,000	10,000
Inorganic Analytes (µg/L)									
Arsenic, Dissolved	3.3 U	5 U	5 U	5 U	3	3	5	50	50
Barium, Dissolved	196 J	200 U	200 U	243	268	281	400	2,000	2,000
Iron, Dissolved	1800	1180 J	656	629	2467	2750	150	NA	NA
Lead, Dissolved	1.5 U	1.5 U	1.5 U	2.3 J	0.97	0.97	1.5	15	0
Manganese, Dissolved	4330 J	3480	3230	3220	5247	5380	25	NA	NA

NA Not applicable NS Not sampled d Field duplicate

U Not detected. Analyte was not detected at a concentration equal to or greater than method detection limits.

J Estimated. Analyte was detected; however, either the value is below the report limit or quality control results indicate that the reported value may not be accurate.

R Rejected. The data are unusable; analyte may or may not be present.

Results exceeding cleanup standards

**Onalaska Municipal Landfill
Groundwater Monitoring Results**

Field Sample Identification: MW08Sd		Baseline Avg Conc	Baseline Max Conc	PAL Conc	MCL Conc	MCLG Conc
Date of Sample Collection: 12/13/95						
Laboratory Sample Identification: 96ZC05018						
Quarter Number: 4						
Wet Chemistry (mg/L)						
pH	NS	7.00	7.18	NA	NA	NA
Alkalinity	NS	190	205	NA	NA	NA
Carbon, Total Organic	2.1	4	5	NA	NA	NA
Chemical Oxygen Demand	NS	12	19	NA	NA	NA
Chloride	NS	7	9	125	NA	NA
Color (CU)	NS	30	50	7.5	NA	NA
Hardness	NS	163	167	NA	NA	NA
Odor (TON)	NS	7	17	1.5	NA	NA
Oil and Grease	0.8 J	5	5	NA	NA	NA
Solids, Total Dissolved	NS	199	213	NA	NA	NA
Specific Conductance (micromhos/cm)	NS	283	300	NA	NA	NA
Turbidity (NTU)	NS	NA	NA	NA	NA	NA
VOCs (µg/L)						
1,1-Dichloroethene	1 U	0.39	0.39	0.7	7	7
1,1-Dichloroethane	1 U	1	1	85	NA	NA
1,1,1-Trichloroethane	1 U	0.2	0.2	40	200	200
Trichloroethene	1 U	0.05	0.05	0.5	5	0
Benzene	1 U	0.36	0.49	0.5	5	0
1,1,2,2-Tetrachloroethane	0.5 U	0.29	0.29	0.5	5	0
Toluene	1 U	0.1	0.11	68.6	1,000	1,000
Ethylbenzene	1 U	0.30	0.44	140	700	700
Total Xylenes	1 U	0.09	0.10	124	10,000	10,000
Inorganic Analytes (µg/L)						
Arsenic, Dissolved	5 U	3	3	5	50	50
Barium, Dissolved	267	268	281	400	2,000	2,000
Iron, Dissolved	1230	2467	2750	150	NA	NA
Lead, Dissolved	1.6 J	0.97	0.97	1.5	15	0
Manganese, Dissolved	3420	5247	5380	25	NA	NA

NA Not applicable NS Not sampled d Field duplicate
 U Not detected. Analyte was not detected at a concentration equal to or greater than method detection limits.
 J Estimated. Analyte was detected; however, either the value is below the report limit or quality control results indicate that the reported value may not be accurate.
 R Rejected. The data are unusable; analyte may or may not be present.
 Results exceeding cleanup standards

**Onalaska Municipal Landfill
Groundwater Monitoring Results**

Field Sample Identification:	MW08M	MW08M	MW08M	MW08M					
Date of Sample Collection:	3/22/95	6/29/95	9/27/95	12/13/95					
Laboratory Sample Identification:	95ZC16004	95ZC18014	95ZC23011	96ZC05005	Baseline	Baseline	PAL	MCL	MCLG
Quarter Number:	1	2	3	4	Avg Conc	Max Conc	Conc	Conc	Conc
Wet Chemistry (mg/L)									
pH	6.72	7.44	7.46	7.45	7.45	7.50	NA	NA	NA
Alkalinity	220 R	170 J	120 J	160 R	251	253	NA	NA	NA
Carbon, Total Organic	3.9 J	2.6 J	2.6 J	4	4	4	NA	NA	NA
Chemical Oxygen Demand	19 R	47 R	14 R	12	9	10	NA	NA	NA
Chloride	5 U	5 U	5 UJ	5 U	7	7	125	NA	NA
Color (CU)	15 J	20 J	55 J	25	4	5	7.5	NA	NA
Hardness	180 J	230 J	170 J	160 J	241	243	NA	NA	NA
Odor (TON)	1 J	1	1 J	1 U	1	1	1.5	NA	NA
Oil and Grease	0.4 R	0.4 R	17	0.5 J	5	5	NA	NA	NA
Solids, Total Dissolved	250 J	200	240	270 J	241	244	NA	NA	NA
Specific Conductance (micromhos/cm)	360	240	220	260	340	350	NA	NA	NA
Turbidity (NTU)	21 J	22 J	540 J	32	NA	NA	NA	NA	NA
VOCs (µg/L)									
1,1-Dichloroethene	1 U	1 U	1 U	1 U	0.39	0.39	0.7	7	7
1,1-Dichloroethane	1 U	1 U	0.2 J	0.1 J	0.76	0.91	85	NA	NA
1,1,1-Trichloroethane	1 U	1 U	1 U	1 U	0.2	0.2	40	200	200
Trichloroethene	1 U	1 U	0.4 J	0.4 J	0.49	0.58	0.5	5	0
Benzene	1 U	1 U	1 U	1 U	0.35	0.4	0.5	5	0
1,1,2,2-Tetrachloroethane	1 U	0.5 U	0.5 U	0.5 U	0.29	0.29	0.5	5	0
Toluene	1 U	1 U	1 U	1 U	0.06	0.07	68.6	1,000	1,000
Ethylbenzene	1 U	1 U	1 U	1 U	0.04	0.04	140	700	700
Total Xylenes	1 U	1 U	1 U	1 U	0.06	0.06	124	10,000	10,000
Inorganic Analytes (µg/L)									
Arsenic, Dissolved	3.3 U	5 U	5 U	5 U	2	2	5	50	50
Barium, Dissolved	436	374	405	453	461	475	400	2,000	2,000
Iron, Dissolved	62.3 J	100 U	100 U	100 U	41	64	150	NA	NA
Lead, Dissolved	1.5 U	1.5 U	1.5 U	1.5 U	0.97	0.97	1.5	15	0
Manganese, Dissolved	2180 J	1750	1630	1750	2757	2810	25	NA	NA

NA Not applicable NS Not sampled d Field duplicate
 U Not detected. Analyte was not detected at a concentration equal to or greater than method detection limits.
 J Estimated. Analyte was detected; however, either the value is below the report limit or quality control results indicate that the reported value may not be accurate.
 R Rejected. The data are unusable; analyte may or may not be present.
 Results exceeding cleanup standards

**Onalaska Municipal Landfill
Groundwater Monitoring Results**

Field Sample Identification:	MW12S	MW12S	MW12S	MW12Sd					
Date of Sample Collection:	3/23/95	6/29/95	9/26/95	9/26/95					
Laboratory Sample Identification:	95ZC16012	95ZC18015	95ZC23003	95ZC23004	Baseline	Baseline	PAL	MCL	MCLG
Quarter Number:	1	2	3	3	Avg Conc	Max Conc	Conc	Conc	Conc
Wet Chemistry (mg/L)									
pH	6.82	7.68	7.13	NA	7.67	7.73	NA	NA	NA
Alkalinity	180 R	200 J	160 J	160 J	109	109	NA	NA	NA
Carbon, Total Organic	0.6 J	0.5 U	1.3 J	0.6 J	1	2	NA	NA	NA
Chemical Oxygen Demand	19 R	44 R	5 R	5 R	5	5	NA	NA	NA
Chloride	6.5 J	35	33 J	33 J	2	2	125	NA	NA
Color (CU)	5 J	20 J	38 J	44 J	1	1	7.5	NA	NA
Hardness	170 J	240 J	180 J	190 J	112	112	NA	NA	NA
Odor (TON)	1 J	1	1 J	1 J	0.33	1	1.5	NA	NA
Oil and Grease	0.4 R	0.4 R	2.9 J	2.2 J	5	5	NA	NA	NA
Solids, Total Dissolved	220 J	280	280	270	130	148	NA	NA	NA
Specific Conductance (micromhos/cm)	360	350	332	NA	150	150	NA	NA	NA
Turbidity (NTU)	28 J	140 J	240 J	360 J	NA	NA	NA	NA	NA
VOCs (µg/L)									
1,1-Dichloroethene	1 U	1 U	1 U	1 U	0.39	0.39	0.7	7	7
1,1-Dichloroethane	1 U	1 U	1 U	1 U	0.36	0.36	85	NA	NA
1,1,1-Trichloroethane	1 U	1 U	1 U	1 U	0.23	0.28	40	200	200
Trichloroethene	1 U	1 U	1 U	1 U	0.05	0.05	0.5	5	0
Benzene	1 U	1 U	1 U	1 U	0.08	0.08	0.5	5	0
1,1,2,2-Tetrachloroethane	1 U	0.5 U	0.5 U	0.5 U	0.29	0.29	0.5	5	0
Toluene	1 U	1 U	1 U	1 U	0.07	0.07	68.6	1,000	1,000
Ethylbenzene	1 U	1 U	1 U	1 U	0.04	0.04	140	700	700
Total Xylenes	1 U	1 U	1 U	1 U	0.06	0.06	124	10,000	10,000
Inorganic Analytes (µg/L)									
Arsenic, Dissolved	3.3 U	5 U	5 U	5 U	2	2	5	50	50
Barium, Dissolved	16.8 J	200 U	200 U	200 U	8	9	400	2,000	2,000
Iron, Dissolved	180 J	100 U	100 U	100 U	29	54	150	NA	NA
Lead, Dissolved	1.5 U	1.5 U	1.5 U	1.5 U	0.97	0.97	1.5	15	0
Manganese, Dissolved	9.1 J	10 U	10 U	10 U	0.86	1	25	NA	NA

NA Not applicable NS Not sampled d Field duplicate
 U Not detected. Analyte was not detected at a concentration equal to or greater than method detection limits.
 J Estimated. Analyte was detected; however, either the value is below the report limit or quality control results indicate that the reported value may not be accurate.
 R Rejected. The data are unusable; analyte may or may not be present.
 Results exceeding cleanup standards

**Onalaska Municipal Landfill
Groundwater Monitoring Results**

Field Sample Identification: MW12S MW12Sd			Baseline Avg Conc	Baseline Max Conc	PAL Conc	MCL Conc	MCLG Conc
Date of Sample Collection: 12/13/95 12/13/95							
Laboratory Sample Identification: 96ZC05021 96ZC05022							
Quarter Number: 4 4							
Wet Chemistry (mg/L)							
pH	7.51	NA	7.67	7.73	NA	NA	NA
Alkalinity	57 R	170 R	109	109	NA	NA	NA
Carbon, Total Organic	1.4	1.4	1	2	NA	NA	NA
Chemical Oxygen Demand	7.5	10	5	5	NA	NA	NA
Chloride	15	16	2	2	125	NA	NA
Color (CU)	60	60	1	1	7.5	NA	NA
Hardness	660 J	280 J	112	112	NA	NA	NA
Odor (TON)	1 U	1	0.33	1	1.5	NA	NA
Oil and Grease	0.6 J	0.8 J	5	5	NA	NA	NA
Solids, Total Dissolved	290 J	380 J	130	148	NA	NA	NA
Specific Conductance (micromhos/cm)	280	NA	150	150	NA	NA	NA
Turbidity (NTU)	85	76	NA	NA	NA	NA	NA
VOCs (µg/L)							
1,1-Dichloroethene	1 U	1 U	0.39	0.39	0.7	7	7
1,1-Dichloroethane	1 U	1 U	0.36	0.36	85	NA	NA
1,1,1-Trichloroethane	1 U	1 U	0.23	0.28	40	200	200
Trichloroethene	1 U	1 U	0.05	0.05	0.5	5	0
Benzene	1 U	1 U	0.08	0.08	0.5	5	0
1,1,2,2-Tetrachloroethane	0.5 U	0.5 U	0.29	0.29	0.5	5	0
Toluene	1 U	0.3 J	0.07	0.07	68.6	1,000	1,000
Ethylbenzene	1 U	1 U	0.04	0.04	140	700	700
Total Xylenes	1 U	0.3 J	0.06	0.06	124	10,000	10,000
Inorganic Analytes (µg/L)							
Arsenic, Dissolved	5 U	5 U	2	2	5	50	50
Barium, Dissolved	200 U	200 U	8	9	400	2,000	2,000
Iron, Dissolved	100 U	100 U	29	54	150	NA	NA
Lead, Dissolved	4.6 J	5 J	0.97	0.97	1.5	15	0
Manganese, Dissolved	10 U	10 U	0.86	1	25	NA	NA

NA Not applicable NS Not sampled d Field duplicate
 U Not detected. Analyte was not detected at a concentration equal to or greater than method detection limits.
 J Estimated. Analyte was detected; however, either the value is below the report limit or quality control results indicate that the reported value may not be accurate.
 R Rejected. The data are unusable; analyte may or may not be present.
 Results exceeding cleanup standards

**Onalaska Municipal Landfill
Groundwater Monitoring Results**

Field Sample Identification:	MW14S	MW14S	MW14S	MW14S					
Date of Sample Collection:	3/23/95	6/29/95	9/27/95	12/13/95					
Laboratory Sample Identification:	95ZC16011	95ZC18007	95ZC23006	96ZC05006	Baseline	Baseline	PAL	MCL	MCLG
Quarter Number:	1	2	3	4	Avg Conc	Max Conc	Conc	Conc	Conc
Wet Chemistry (mg/L)									
pH	6.4	6.31	5.8	6.68	6.85	7.20	NA	NA	NA
Alkalinity	100 R	140 J	95 J	100 R	148	150	NA	NA	NA
Carbon, Total Organic	3.2 J	5 J	8.2 J	6.5	8	9	NA	NA	NA
Chemical Oxygen Demand	22 R	53 R	24 R	15	27	32	NA	NA	NA
Chloride	5 U	7.5	11 J	5 U	6	6	125	NA	NA
Color (CU)	5 J	15 J	15 J	25	23	30	7.5	NA	NA
Hardness	84 J	180 J	180 J	180 J	122	129	NA	NA	NA
Odor (TON)	1 J	6	1 J	8	14	16	1.5	NA	NA
Oil and Grease	0.4 R	0.8 R	2.7 J	7.1	5	5	NA	NA	NA
Solids, Total Dissolved	120 J	200	210	370 J	197	215	NA	NA	NA
Specific Conductance (micromhos/cm)	182	260	230	210	256	260	NA	NA	NA
Turbidity (NTU)	9.8 J	110 J	90 J	48	NA	NA	NA	NA	NA
VOCs (µg/L)									
1,1-Dichloroethene	1 U	1 U	0.1 J	1 U	0.39	0.39	0.7	7	7
1,1-Dichloroethane	1 U	1 U	1 U	1 U	0.36	0.36	85	NA	NA
1,1,1-Trichloroethane	1 U	1 U	1 U	1 U	0.2	0.2	40	200	200
Trichloroethene	1 U	1 U	0.2 J	1 U	0.07	0.08	0.5	5	0
Benzene	1 U	1 U	0.1 J	1 U	0.06	0.08	0.5	5	0
1,1,2,2-Tetrachloroethane	1 U	0.5 U	0.5 U	0.5 U	0.29	0.29	0.5	5	0
Toluene	1 U	1 U	0.2 J	0.1 J	0.17	0.24	68.6	1,000	1,000
Ethylbenzene	1 U	1 U	0.7 J	0.5 J	0.03	0.04	140	700	700
Total Xylenes	1 U	1.6	1.8	1.8	1.42	2.63	124	10,000	10,000
Inorganic Analytes (µg/L)									
Arsenic, Dissolved	3.3 U	5 U	5 U	5 U	2	2	5	50	50
Barium, Dissolved	70.7 J	200 U	200 U	200 U	100	103	400	2,000	2,000
Iron, Dissolved	2760	10500 J	7980	5870	6850	7800	150	NA	NA
Lead, Dissolved	1.5 U	1.5 U	1.5 U	1.7 J	0.97	0.97	1.5	15	0
Manganese, Dissolved	570 J	1790	1820	1460	1647	1750	25	NA	NA

NA Not applicable NS Not sampled d Field duplicate
 U Not detected. Analyte was not detected at a concentration equal to or greater than method detection limits.
 J Estimated. Analyte was detected; however, either the value is below the report limit or quality control results indicate that the reported value may not be accurate.
 R Rejected. The data are unusable; analyte may or may not be present.
 Results exceeding cleanup standards

**Onalaska Municipal Landfill
Groundwater Monitoring Results**

Field Sample Identification:	EW1	EW1	EW1	EW1					
Date of Sample Collection:	3/23/95	6/29/95	9/27/95	12/13/95					
Laboratory Sample Identification:	95ZC16008	95ZC18008	95ZC23009	96ZC05007	Baseline	Baseline	PAL	MCL	MCLG
Quarter Number:	1	2	3	4	Avg Conc	Max Conc	Conc	Conc	Conc
Wet Chemistry (mg/L)									
pH	6.43	7.36	6.36	7.08	NS	NS	NA	NA	NA
Alkalinity	180 R	180 J	200 J	180 R	NS	NS	NA	NA	NA
Carbon, Total Organic	2.4 J	2.4 J	3.2 J	2.6	NS	NS	NA	NA	NA
Chemical Oxygen Demand	7.5 R	50 R	19 R	12	NS	NS	NA	NA	NA
Chloride	7.7 J	11	12 J	13	NS	NS	125	NA	NA
Color (CU)	5 J	25 J	50 J	65	NS	NS	7.5	NA	NA
Hardness	170 J	190 J	180 J	250 J	NS	NS	NA	NA	NA
Odor (TON)	1 J	2	1 J	2	NS	NS	1.5	NA	NA
Oil and Grease	0.4 R	0.4 R	2 J	0.6 J	NS	NS	NA	NA	NA
Solids, Total Dissolved	210 J	230	84 J	630 J	NS	NS	NA	NA	NA
Specific Conductance (micromhos/cm)	310	352	280	340	NS	NS	NA	NA	NA
Turbidity (NTU)	47 J	66 J	55 J	52	NS	NS	NA	NA	NA
VOCs (µg/L)									
1,1-Dichloroethene	1 U	1 U	1 U	1 U	NS	NS	0.7	7	7
1,1-Dichloroethane	1 U	1 U	0.2 J	1 U	NS	NS	85	NA	NA
1,1,1-Trichloroethane	1 U	1 U	1 U	0.2 J	NS	NS	40	200	200
Trichloroethene	1 U	1 U	1 U	1 U	NS	NS	0.5	5	0
Benzene	1 U	1 U	1 U	1 U	NS	NS	0.5	5	0
1,1,2,2-Tetrachloroethane	1 U	0.5 U	0.5 U	0.5 U	NS	NS	0.5	5	0
Toluene	30.8	28.9	19.8	22	NS	NS	68.6	1,000	1,000
Ethylbenzene	2.4	3.4	2.9	3.3	NS	NS	140	700	700
Total Xylenes	20.8	31.5	28	25.8	NS	NS	124	10,000	10,000
Inorganic Analytes (µg/L)									
Arsenic, Dissolved	8.9	11	5 U	5 U	NS	NS	5	50	50
Barium, Dissolved	511	540	484	559	NS	NS	400	2,000	2,000
Iron, Dissolved	2980	5180 J	568	404	NS	NS	150	NA	NA
Lead, Dissolved	2.5	1.5 U	1.5 U	1.5 U	NS	NS	1.5	15	0
Manganese, Dissolved	1550 J	1500	1490	1560	NS	NS	25	NA	NA

NA Not applicable NS Not sampled d Field duplicate

U Not detected. Analyte was not detected at a concentration equal to or greater than method detection limits.

J Estimated. Analyte was detected; however, either the value is below the report limit or quality control results indicate that the reported value may not be accurate.

R Rejected. The data are unusable; analyte may or may not be present.

Results exceeding cleanup standards

**Onalaska Municipal Landfill
Groundwater Monitoring Results**

Field Sample Identification: EWId Date of Sample Collection: 12/13/95 Laboratory Sample Identification: 96ZC05017 Quarter Number: 4		Baseline Avg Conc	Baseline Max Conc	PAL Conc	MCL Conc	MCLG Conc
Wet Chemistry (mg/L)						
pH	NS	NS	NS	NA	NA	NA
Alkalinity	NS	NS	NS	NA	NA	NA
Carbon, Total Organic	NS	NS	NS	NA	NA	NA
Chemical Oxygen Demand	NS	NS	NS	NA	NA	NA
Chloride	NS	NS	NS	125	NA	NA
Color (CU)	NS	NS	NS	7.5	NA	NA
Hardness	NS	NS	NS	NA	NA	NA
Odor (TON)	NS	NS	NS	1.5	NA	NA
Oil and Grease	NS	NS	NS	NA	NA	NA
Solids, Total Dissolved	NS	NS	NS	NA	NA	NA
Specific Conductance (micromhos/cm)	NS	NS	NS	NA	NA	NA
Turbidity (NTU)	NS	NS	NS	NA	NA	NA
VOCs (µg/L)						
1,1-Dichloroethene	1 U	NS	NS	0.7	7	7
1,1-Dichloroethane	1 U	NS	NS	85	NA	NA
1,1,1-Trichloroethane	0.2 J	NS	NS	40	200	200
Trichloroethene	0.1 J	NS	NS	0.5	5	0
Benzene	1 U	NS	NS	0.5	5	0
1,1,2,2-Tetrachloroethane	0.5 U	NS	NS	0.5	5	0
Toluene	28.6 J	NS	NS	68.6	1,000	1,000
Ethylbenzene	4	NS	NS	140	700	700
Total Xylenes	31.7	NS	NS	124	10,000	10,000
Inorganic Analytes (µg/L)						
Arsenic, Dissolved	NS	NS	NS	5	50	50
Barium, Dissolved	NS	NS	NS	400	2,000	2,000
Iron, Dissolved	NS	NS	NS	150	NA	NA
Lead, Dissolved	NS	NS	NS	1.5	15	0
Manganese, Dissolved	NS	NS	NS	25	NA	NA

NA Not applicable **NS** Not sampled **d** Field duplicate
U Not detected. Analyte was not detected at a concentration equal to or greater than method detection limits.
J Estimated. Analyte was detected; however, either the value is below the report limit or quality control results indicate that the reported value may not be accurate.
R Rejected. The data are unusable; analyte may or may not be present.
Results exceeding cleanup standards

**Onalaska Municipal Landfill
Groundwater Monitoring Results**

Field Sample Identification:	EW2	EW2	EW2	EW2					
Date of Sample Collection:	NA	6/29/95	NA	12/13/95					
Laboratory Sample Identification:	NA	95ZC18010	NA	96ZC05008	Baseline	Baseline	PAL	MCL	MCLG
Quarter Number:	1	2	3	4	Avg Conc	Max Conc	Conc	Conc	Conc
Wet Chemistry (mg/L)									
pH	NS	7.35	NS	7.00	NS	NS	NA	NA	NA
Alkalinity	NS	220 J	NS	200 R	NS	NS	NA	NA	NA
Carbon, Total Organic	NS	7.2 J	NS	4.4	NS	NS	NA	NA	NA
Chemical Oxygen Demand	NS	56 R	NS	5	NS	NS	NA	NA	NA
Chloride	NS	13	NS	14	NS	NS	125	NA	NA
Color (CU)	NS	250 J	NS	150	NS	NS	7.5	NA	NA
Hardness	NS	210 J	NS	200 J	NS	NS	NA	NA	NA
Odor (TON)	NS	2	NS	6	NS	NS	1.5	NA	NA
Oil and Grease	NS	0.4 R	NS	0.7 J	NS	NS	NA	NA	NA
Solids, Total Dissolved	NS	540	NS	250 J	NS	NS	NA	NA	NA
Specific Conductance (micromhos/cm)	NS	415	NS	375	NS	NS	NA	NA	NA
Turbidity (NTU)	NS	130 J	NS	100	NS	NS	NA	NA	NA
VOCs (µg/L)									
1,1-Dichloroethene	NS	1 U	NS	1 U	NS	NS	0.7	7	7
1,1-Dichloroethane	NS	1 U	NS	1 U	NS	NS	85	NA	NA
1,1,1-Trichloroethane	NS	1 U	NS	1 U	NS	NS	40	200	200
Trichloroethene	NS	1 U	NS	1 U	NS	NS	0.5	5	0
Benzene	NS	1 U	NS	0.1 J	NS	NS	0.5	5	0
1,1,2,2-Tetrachloroethane	NS	0.5 U	NS	0.5 U	NS	NS	0.5	5	0
Toluene	NS	31.8	NS	9	NS	NS	68.6	1,000	1,000
Ethylbenzene	NS	3.2	NS	1.8	NS	NS	140	700	700
Total Xylenes	NS	44	NS	22.4	NS	NS	124	10,000	10,000
Inorganic Analytes (µg/L)									
Arsenic, Dissolved	NS	14	NS	7.8	NS	NS	5	50	50
Barium, Dissolved	NS	860	NS	827	NS	NS	400	2,000	2,000
Iron, Dissolved	NS	10900 J	NS	6030	NS	NS	150	NA	NA
Lead, Dissolved	NS	1.5 U	NS	3.1 J	NS	NS	1.5	15	0
Manganese, Dissolved	NS	2210	NS	2280	NS	NS	25	NA	NA

NA Not applicable NS Not sampled d Field duplicate
 U Not detected. Analyte was not detected at a concentration equal to or greater than method detection limits.
 J Estimated. Analyte was detected; however, either the value is below the report limit or quality control results indicate that the reported value may not be accurate.
 R Rejected. The data are unusable; analyte may or may not be present.
 Results exceeding cleanup standards

**Onalaska Municipal Landfill
Groundwater Monitoring Results**

Field Sample Identification:	EW3	EW3	EW3	EW3					
Date of Sample Collection:	3/23/95	6/29/95	9/27/95	12/13/95					
Laboratory Sample Identification:	95ZC16009	95ZC18011	95ZC23007	96ZC05009	Baseline	Baseline	PAL	MCL	MCLG
Quarter Number:	1	2	3	4	Avg Conc	Max Conc	Conc	Conc	Conc
Wet Chemistry (mg/L)									
pH	6.22	7.32	5.96	7.33	NS	NS	NA	NA	NA
Alkalinity	170 R	220 J	190 J	200 R	NS	NS	NA	NA	NA
Carbon, Total Organic	6.2 J	10.2 J	6.4 J	6.2	NS	NS	NA	NA	NA
Chemical Oxygen Demand	22 R	76 R	51 R	10	NS	NS	NA	NA	NA
Chloride	13 J	15	15 J	15	NS	NS	125	NA	NA
Color (CU)	5 J	250 J	55 J	150	NS	NS	7.5	NA	NA
Hardness	170 J	96 J	180 J	250 J	NS	NS	NA	NA	NA
Odor (TON)	1 J	2	1 J	2	NS	NS	1.5	NA	NA
Oil and Grease	0.4 R	0.4 R	1.8 J	0.7 J	NS	NS	NA	NA	NA
Solids, Total Dissolved	230 J	260	260	350 J	NS	NS	NA	NA	NA
Specific Conductance (micromhos/cm)	410	395	348	380	NS	NS	NA	NA	NA
Turbidity (NTU)	99 J	180 J	150 J	140	NS	NS	NA	NA	NA
VOCs (µg/L)									
1,1-Dichloroethene	1 U	1 U	1 U	1 U	NS	NS	0.7	7	7
1,1-Dichloroethane	1 U	1	0.5 J	0.9 J	NS	NS	85	NA	NA
1,1,1-Trichloroethane	1 U	1 U	1 U	1 U	NS	NS	40	200	200
Trichloroethene	1 U	1 U	1 U	1 U	NS	NS	0.5	5	0
Benzene	1.1	1.1	0.5 J	0.5 J	NS	NS	0.5	5	0
1,1,2,2-Tetrachloroethane	1 U	0.5 U	0.5 U	0.5 U	NS	NS	0.5	5	0
Toluene	44.9	312	38.5	67.5	NS	NS	68.6	1,000	1,000
Ethylbenzene	3	5	2.7	2.9	NS	NS	140	700	700
Total Xylenes	28.3	86.9	39.8	50	NS	NS	124	10,000	10,000
Inorganic Analytes (µg/L)									
Arsenic, Dissolved	20.4	25	16	18.3	NS	NS	5	50	50
Barium, Dissolved	1130	1130	974	1020	NS	NS	400	2,000	2,000
Iron, Dissolved	10900	14900 J	10100	12800	NS	NS	150	NA	NA
Lead, Dissolved	1.5 U	1.5 U	1.5 U	3.3 J	NS	NS	1.5	15	0
Manganese, Dissolved	2910 J	2530	2440	2480	NS	NS	25	NA	NA

NA Not applicable NS Not sampled d Field duplicate
 U Not detected. Analyte was not detected at a concentration equal to or greater than method detection limits.
 J Estimated. Analyte was detected; however, either the value is below the report limit or quality control results indicate that the reported value may not be accurate.
 R Rejected. The data are unusable; analyte may or may not be present.
 Results exceeding cleanup standards

**Onalaska Municipal Landfill
Groundwater Monitoring Results**

Field Sample Identification:	EW4	EW4	EW4	EW4					
Date of Sample Collection:	NA	6/29/95	NA	12/13/95					
Laboratory Sample Identification:	NA	95ZC18012	NA	96ZC05010	Baseline	Baseline	PAL	MCL	MCLG
Quarter Number:	1	2	3	4	Avg Conc	Max Conc	Conc	Conc	Conc
Wet Chemistry (mg/L)									
pH	NS	7.38	NS	7.13	NS	NS	NA	NA	NA
Alkalinity	NS	160 J	NS	140 R	NS	NS	NA	NA	NA
Carbon, Total Organic	NS	7.7 J	NS	5.3	NS	NS	NA	NA	NA
Chemical Oxygen Demand	NS	53 R	NS	5	NS	NS	NA	NA	NA
Chloride	NS	11	NS	11	NS	NS	125	NA	NA
Color (CU)	NS	300 J	NS	100	NS	NS	7.5	NA	NA
Hardness	NS	130 J	NS	170 J	NS	NS	NA	NA	NA
Odor (TON)	NS	2	NS	2	NS	NS	1.5	NA	NA
Oil and Grease	NS	0.5 R	NS	0.7 J	NS	NS	NA	NA	NA
Solids, Total Dissolved	NS	220	NS	270 J	NS	NS	NA	NA	NA
Specific Conductance (micromhos/cm)	NS	290	NS	280	NS	NS	NA	NA	NA
Turbidity (NTU)	NS	93 J	NS	63	NS	NS	NA	NA	NA
VOCs (µg/L)									
1,1-Dichloroethene	NS	1 U	NS	1 U	NS	NS	0.7	7	7
1,1-Dichloroethane	NS	1	NS	1 U	NS	NS	85	NA	NA
1,1,1-Trichloroethane	NS	1 U	NS	1 U	NS	NS	40	200	200
Trichloroethene	NS	1 U	NS	1 U	NS	NS	0.5	5	0
Benzene	NS	1 U	NS	0.1 J	NS	NS	0.5	5	0
1,1,2,2-Tetrachloroethane	NS	0.5 U	NS	0.5 U	NS	NS	0.5	5	0
Toluene	NS	415	NS	94.9	NS	NS	68.6	1,000	1,000
Ethylbenzene	NS	10.4	NS	5.1	NS	NS	140	700	700
Total Xylenes	NS	96.9	NS	51.2	NS	NS	124	10,000	10,000
Inorganic Analytes (µg/L)									
Arsenic, Dissolved	NS	18	NS	10.7	NS	NS	5	50	50
Barium, Dissolved	NS	711	NS	647	NS	NS	400	2,000	2,000
Iron, Dissolved	NS	10600 J	NS	5930	NS	NS	150	NA	NA
Lead, Dissolved	NS	1.5 U	NS	3.3 J	NS	NS	1.5	15	0
Manganese, Dissolved	NS	2160	NS	2070	NS	NS	25	NA	NA

NA Not applicable NS Not sampled d Field duplicate

U Not detected. Analyte was not detected at a concentration equal to or greater than method detection limits.

J Estimated. Analyte was detected; however, either the value is below the report limit or quality control results indicate that the reported value may not be accurate.

R Rejected. The data are unusable; analyte may or may not be present.

Results exceeding cleanup standards

**Onalaska Municipal Landfill
Groundwater Monitoring Results**

Field Sample Identification:	EW5	EW5	EW5	EW5					
Date of Sample Collection:	3/23/95	6/29/95	9/27/95	12/13/95					
Laboratory Sample Identification:	95ZC16010	95ZC18009	95ZC23008	96ZC05011	Baseline	Baseline	PAL	MCL	MCLG
Quarter Number:	1	2	3	4	Avg Conc	Max Conc	Conc	Conc	Conc
Wet Chemistry (mg/L)									
pH	6.49	7.53	6.32	7.39	NS	NS	NA	NA	NA
Alkalinity	440 R	140 J	90 J	140 R	NS	NS	NA	NA	NA
Carbon, Total Organic	3.7 J	4 J	4.4 J	4.8	NS	NS	NA	NA	NA
Chemical Oxygen Demand	19 R	50 R	34 R	7.5	NS	NS	NA	NA	NA
Chloride	13 J	13	11 J	8.8	NS	NS	125	NA	NA
Color (CU)	5 J	25 J	45 J	35	NS	NS	7.5	NA	NA
Hardness	130 J	120 J	180 J	110 J	NS	NS	NA	NA	NA
Odor (TON)	1 J	1	1 J	1	NS	NS	1.5	NA	NA
Oil and Grease	0.4 R	0.4 R	1.6 J	0.5 J	NS	NS	NA	NA	NA
Solids, Total Dissolved	180 J	220	200	230 J	NS	NS	NA	NA	NA
Specific Conductance (micromhos/cm)	250	237	195	220	NS	NS	NA	NA	NA
Turbidity (NTU)	9.2 J	9.2 J	4.9 J	4.4	NS	NS	NA	NA	NA
VOCs (µg/L)									
1,1-Dichloroethene	1 U	1 U	1 U	1 U	NS	NS	0.7	7	7
1,1-Dichloroethane	1 U	1 U	1 U	1 U	NS	NS	85	NA	NA
1,1,1-Trichloroethane	1 U	1 U	1 U	1 U	NS	NS	40	200	200
Trichloroethene	1 U	1 U	1 U	1 U	NS	NS	0.5	5	0
Benzene	1 U	1 U	1 U	1 U	NS	NS	0.5	5	0
1,1,1,2-Tetrachloroethane	1 U	0.5 U	0.5 U	0.5 U	NS	NS	0.5	5	0
Toluene	4.1	1 U	0.2 J	1.9	NS	NS	68.6	1,000	1,000
Ethylbenzene	1 U	1 U	1 U	0.2 J	NS	NS	140	700	700
Total Xylenes	2.9	1.1	0.8 J	2.6	NS	NS	124	10,000	10,000
Inorganic Analytes (µg/L)									
Arsenic, Dissolved	10.5	10	5 U	5.1	NS	NS	5	50	50
Barium, Dissolved	372	310	286	318	NS	NS	400	2,000	2,000
Iron, Dissolved	1790	840 J	100 U	461	NS	NS	150	NA	NA
Lead, Dissolved	1.5 U	1.5 U	1.5 U	3.7 J	NS	NS	1.5	15	0
Manganese, Dissolved	1120 J	890	815	904	NS	NS	25	NA	NA

NA Not applicable NS Not sampled d Field duplicate

U Not detected. Analyte was not detected at a concentration equal to or greater than method detection limits.

J Estimated. Analyte was detected; however, either the value is below the report limit or quality control results indicate that the reported value may not be accurate.

R Rejected. The data are unusable; analyte may or may not be present.

Results exceeding cleanup standards

**Onalaska Municipal Landfill
Groundwater Monitoring Results**

Field Sample Identification:	HUBLEY	HUBLEY	HUBLEY	HUBLEY				
Date of Sample Collection:	3/23/95	6/28/95	9/27/95	12/13/95				
Laboratory Sample Identification:	95ZC16013	95ZC18002	95ZC23012	96ZC05019	Nov. '93	PAL	MCL	MCLG
Quarter Number:	1	2	3	4	Conc.	Conc	Conc	Conc
Wet Chemistry (mg/L)								
pH	6.88	6.45	8.13	7.64		NA	NA	NA
Alkalinity	180 R	120 J	120 J	140 R	237	NA	NA	NA
Carbon, Total Organic	4.9 J	9.1 J	4.8 J	5.3	1U	NA	NA	NA
Chemical Oxygen Demand	19 R	19 R	7.2 R	5 U	5U	NA	NA	NA
Chloride	5.6 J	6.6	7.2 J	6.5	8	125	NA	NA
Color (CU)	5 J	20 J	60 J	10	1U	7.5	NA	NA
Hardness	180 J	120 J	190 J	190 J	97	NA	NA	NA
Odor (TON)	1 J	1	1 J	1 U	1	1.5	NA	NA
Oil and Grease	0.4 R	0.6 R	13	0.5 J	5.2U	NA	NA	NA
Solids, Total Dissolved	210 J	120 J	170	160 J	255	NA	NA	NA
Specific Conductance (micromhos/cm)	270	232	162	200		NA	NA	NA
Turbidity (NTU)	2.5 J	1.3 J	1 U	12	NS	NA	NA	NA
VOCs (µg/L)								
1,1-Dichloroethene	0.6 U	0.2 U	0.2 U	0.2 U	0.39U	0.7	7	7
1,1-Dichloroethane	0.2 U	0.1 U	0.1 U	0.1 U	0.36U	85	NA	NA
1,1,1-Trichloroethane	0.4 U	0.1 U	0.1 U	0.1 U	0.2U	40	200	200
Trichloroethene	0.95 U	0.1 U	0.1 U	0.1 U	0.05U	0.5	5	0
Benzene	0.2 U	0.5 U	0.5 U	0.5 U	0.08U	0.5	5	0
1,1,2,2-Tetrachloroethane	0.2 U	0.1 U	0.1 U	0.1 U	0.29U	0.5	5	0
Toluene	0.55 U	0.5 U	0.5 U	0.5 U	0.07U	68.6	1,000	1,000
Ethylbenzene	0.3 U	0.1 U	0.1 U	0.1 U	0.04U	140	700	700
Total Xylenes	0.25 U	0.2 U	0.2 U	0.2 U	0.06U	124	10,000	10,000
Inorganic Analytes (µg/L)								
Arsenic, Dissolved	3.3 U	5 U	5 U	5 U	2U	5	50	50
Barium, Dissolved	127 J	200 U	200 U	200 U	64.7B	400	2,000	2,000
Iron, Dissolved	99.3 J	100 U	100 U	100 U	3.8U	150	NA	NA
Lead, Dissolved	1.5 U	1.5	1.5 U	3.5 J	0.97U	1.5	15	0
Manganese, Dissolved	540 J	350	300	324	271	25	NA	NA

NA Not applicable NS Not sampled d Field duplicate
 U Not detected. Analyte was not detected at a concentration equal to or greater than method detection limits.
 J Estimated. Analyte was detected; however, either the value is below the report limit or quality control results indicate that the reported value may not be accurate.
 R Rejected. The data are unusable; analyte may or may not be present.
 Results exceeding cleanup standards

**Onalaska Municipal Landfill
Groundwater Monitoring Results**

Field Sample Identification:	ACKERMAN	ACKERMAN	ACKERMANd	ACKERMAN	ACKERMAN			
Date of Sample Collection:	NA	6/28/95	6/28/95	9/27/95	NA			
Laboratory Sample Identification:	NA	95ZC18004	95ZC18005	95ZC23013	NA	PAL	MCL	MCLG
Quarter Number:	1	2	2	3	4	Conc	Conc	Conc
Wet Chemistry (mg/L)								
pH	NS	7.44	7.44	7.91	NS	NA	NA	NA
Alkalinity	NS	240 J	240 J	220 J	NS	NA	NA	NA
Carbon, Total Organic	NS	0.5 U	0.5 U	0.7 J	NS	NA	NA	NA
Chemical Oxygen Demand	NS	11 R	5 R	5 R	NS	NA	NA	NA
Chloride	NS	8.4	8.4	8.6 J	NS	125	NA	NA
Color (CU)	NS	65 J	65 J	65 J	NS	7.5	NA	NA
Hardness	NS	230 J	220 J	180 J	NS	NA	NA	NA
Odor (TON)	NS	1	1	1 J	NS	1.5	NA	NA
Oil and Grease	NS	0.4 R	0.4 R	13	NS	NA	NA	NA
Solids, Total Dissolved	NS	400 J	400 J	310	NS	NA	NA	NA
Specific Conductance (micromhos/cm)	NS	381	381	33 R	NS	NA	NA	NA
Turbidity (NTU)	NS	29 J	31 J	20 J	NS	NA	NA	NA
VOCs (µg/L)								
1,1-Dichloroethene	NS	0.2 U	0.2 U	0.2 U	NS	0.7	7	7
1,1-Dichloroethane	NS	0.1 U	0.1 U	0.1 U	NS	85	NA	NA
1,1,1-Trichloroethane	NS	0.1 U	0.1 U	0.1 U	NS	40	200	200
Trichloroethene	NS	0.1 U	0.1 U	0.15 B	NS	0.5	5	0
Benzene	NS	0.5 U	0.5 U	0.5 U	NS	0.5	5	0
1,1,2,2-Tetrachloroethane	NS	0.1 U	0.1 U	0.1 U	NS	0.5	5	0
Toluene	NS	0.5 U	0.5 U	0.5 U	NS	68.6	1,000	1,000
Ethylbenzene	NS	0.1 U	0.1 U	0.1 U	NS	140	700	700
Total Xylenes	NS	0.2 U	0.2 U	0.2 U	NS	124	10,000	10,000
Inorganic Analytes (µg/L)								
Arsenic, Dissolved	NS	5 U	5 U	5 U	NS	5	50	50
Barium, Dissolved	NS	200 U	200 U	200 U	NS	400	2,000	2,000
Iron, Dissolved	NS	526	783	241	NS	150	NA	NA
Lead, Dissolved	NS	1.5 U	1.5 U	1.5 U	NS	1.5	15	0
Manganese, Dissolved	NS	93	94	107	NS	25	NA	NA

NA Not applicable NS Not sampled d Field duplicate
 U Not detected. Analyte was not detected at a concentration equal to or greater than method detection limits.
 J Estimated. Analyte was detected; however, either the value is below the report limit or quality control results indicate that the reported value may not be accurate.
 R Rejected. The data are unusable; analyte may or may not be present.
 B Blank contaminated. Analyte was detected in the sample and in the associated method, field or trip blank. The quantitation of the analyte is biased high by the presence of the contaminant.
 Results exceeding cleanup standards

**Onalaska Municipal Landfill
Groundwater Monitoring Results**

Field Sample Identification:	FBI	TBI	TB2	TBI	TB2	TB3	TB4	TB5
Date of Sample Collection:	3/23/95	3/17/95	3/23/95	6/28/95	6/28/95	6/29/95	6/29/95	6/29/95
Laboratory Sample Identification:	95ZC16015	95ZC16002	95ZC16014	95ZC18001	95ZC18006	95ZC18016	95ZC18017	95ZC18020
Quarter Number:	1	1	1	2	2	2	2	2
Wet Chemistry (mg/L)								
Alkalinity	5 U	NA	NA	NA	NA	NA	NA	NA
Carbon, Total Organic	13	NA	NA	NA	NA	NA	NA	NA
Chemical Oxygen Demand	5 U	NA	NA	NA	NA	NA	NA	NA
Chloride	5U U	NA	NA	NA	NA	NA	NA	NA
Color (CU)	0	NA	NA	NA	NA	NA	NA	NA
Hardness	1	NA	NA	NA	NA	NA	NA	NA
Odor (TON)	1	NA	NA	NA	NA	NA	NA	NA
Oil and Grease	0.4 U	NA	NA	NA	NA	NA	NA	NA
Solids, Total Dissolved	20 U	NA	NA	NA	NA	NA	NA	NA
Turbidity (NTU)	1 U	NA	NA	NA	NA	NA	NA	NA
VOCs (µg/L)								
1,1-Dichloroethene	1 U	0.6 U	1 U	0.2 U	0.2U	1U	1U	1U
1,1-Dichloroethane	1 U	0.2 U	1 U	0.1 U	0.1U	1U	1U	1U
1,1,1-Trichloroethane	1 U	0.4 U	1 U	0.1 U	0.1U	1U	1U	1U
Trichloroethene	1 U	0.95 U	1 U	0.1 U	0.1U	1U	1U	1U
Benzene	1 U	0.2 U	1 U	0.5 U	0.5U	1U	1U	1U
1,1,2,2-Tetrachloroethane	1 U	0.2 U	1 U	0.1 U	0.1U	0.5U	0.5U	0.5U
Toluene	1 U	0.55 U	1 U	0.5 U	0.5U	1U	1U	1U
Ethylbenzene	1 U	0.3 U	1 U	0.1 U	0.1U	1U	1U	1U
Total Xylenes	1 U	0.25 U	1 U	0.2 U	0.2U	1U	1U	1U
Inorganic Analytes (µg/L)								
Arsenic, Dissolved	3.3 U	NA	NA	NA	NA	NA	NA	NA
Barium, Dissolved	2 J	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	59.3 J	NA	NA	NA	NA	NA	NA	NA
Lead, Dissolved	1.5 U	NA	NA	NA	NA	NA	NA	NA
Manganese, Dissolved	3.9 J	NA	NA	NA	NA	NA	NA	NA
NA Not applicable NS Not sampled FB Field Blank TB Trip Blank U Not detected. Analyte was not detected at a concentration equal to or greater than method detection limits. J Estimated. Analyte was detected; however, either the value is below the report limit or quality control results indicate that the reported value may not be accurate. R Rejected. The data are unusable; analyte may or may not be present. Results exceeding cleanup standards								

**Onalaska Municipal Landfill
Groundwater Monitoring Results**

Field Sample Identification:	TB6	FB1	FB1	TB1	TB2	TB3	TB1	TB2	FB1
Date of Sample Collection:	6/29/95	6/29/95	9/27/95	9/26/95	9/27/95	9/27/95	12/14/95	12/14/95	12/13/95
Laboratory Sample Identification:	95ZC18022	95ZC18021	95ZC23005	95ZC23002	95ZC23016	95ZC23017	96ZC05012	96ZC05013	96ZC05020
Quarter Number:	2	2	3	3	3	3	4	4	4
Wet Chemistry (mg/L)									
Alkalinity	NA	2 U	90	NA	NA	NA	NA	NA	2U
Carbon, Total Organic	NA	3.3	0.5	NA	NA	NA	NA	NA	0.5U
Chemical Oxygen Demand	NA	5	5 U	NA	NA	NA	NA	NA	5
Chloride	NA	5 U	5 U	NA	NA	NA	NA	NA	5U
Color (CU)	NA	10	50	NA	NA	NA	NA	NA	15
Hardness	NA	1 U	180	NA	NA	NA	NA	NA	1U
Odor (TON)	NA	1	1	NA	NA	NA	NA	NA	1U
Oil and Grease	NA	0.4 U	1.4	NA	NA	NA	NA	NA	0.5
Solids, Total Dissolved	NA	20 U	28	NA	NA	NA	NA	NA	20U
Turbidity (NTU)	NA	1 U	1 U	NA	NA	NA	NA	NA	1U
VOCs (µg/L)									
1,1-Dichloroethene	1 U	1 U	1 U	1 U	1U	0.2U	1U	0.2U	1U
1,1-Dichloroethane	1 U	1 U	1 U	1 U	1U	0.1U	1U	0.1U	1U
1,1,1-Trichloroethane	1 U	1 U	1 U	1 U	1U	0.1U	1U	0.1U	1U
Trichloroethene	1 U	1 U	1 U	1 U	1U	0.1	1U	0.1U	1U
Benzene	1 U	1 U	1 U	1 U	1U	0.5U	1U	0.5U	1U
1,1,2,2-Tetrachloroethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5U	0.1U	0.5U	0.1U	0.5U
Toluene	1 U	1 U	1 U	1 U	1U	0.5U	0.5J	0.5U	1U
Ethylbenzene	1 U	1 U	1 U	1 U	1U	0.1U	1U	0.1U	1U
Total Xylenes	1 U	1 U	1 U	1 U	1U	0.2U	1U	0.2U	1U
Inorganic Analytes (µg/L)									
Arsenic, Dissolved	NA	5 U	5 U	NA	NA	NA	NA	NA	5U
Barium, Dissolved	NA	200 U	200 U	NA	NA	NA	NA	NA	200U
Iron, Dissolved	NA	100 U	100 U	NA	NA	NA	NA	NA	100U
Lead, Dissolved	NA	1.5 U	1.5 U	NA	NA	NA	NA	NA	1.6
Manganese, Dissolved	NA	10 U	10 U	NA	NA	NA	NA	NA	10U

NA Not applicable NS Not sampled FB Field Blank TB Trip Blank

U Not detected. Analyte was not detected at a concentration equal to or greater than method detection limits.

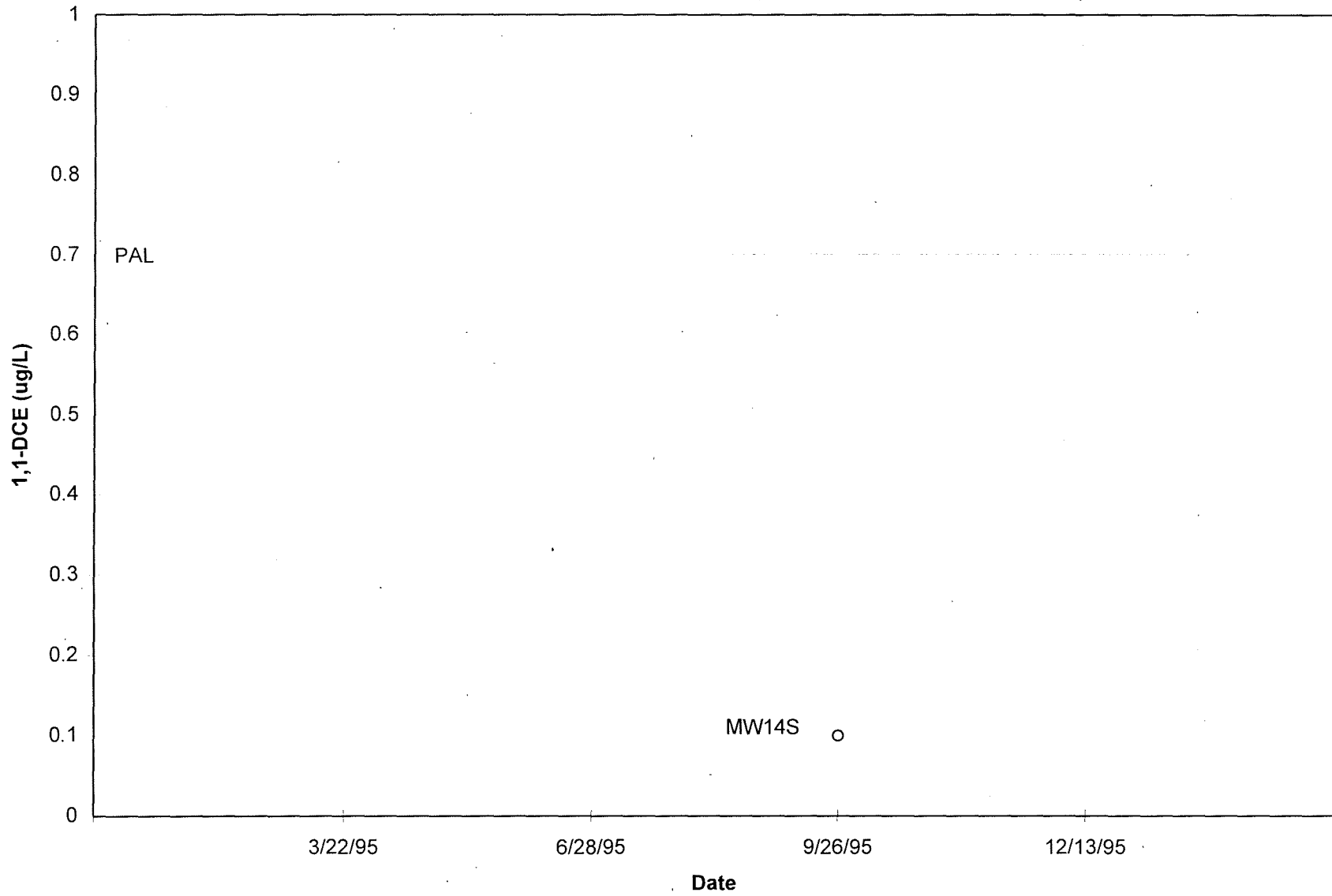
J Estimated. Analyte was detected; however, either the value is below the report limit or quality control results indicate that the reported value may not be accurate.

R Rejected. The data are unusable; analyte may or may not be present.

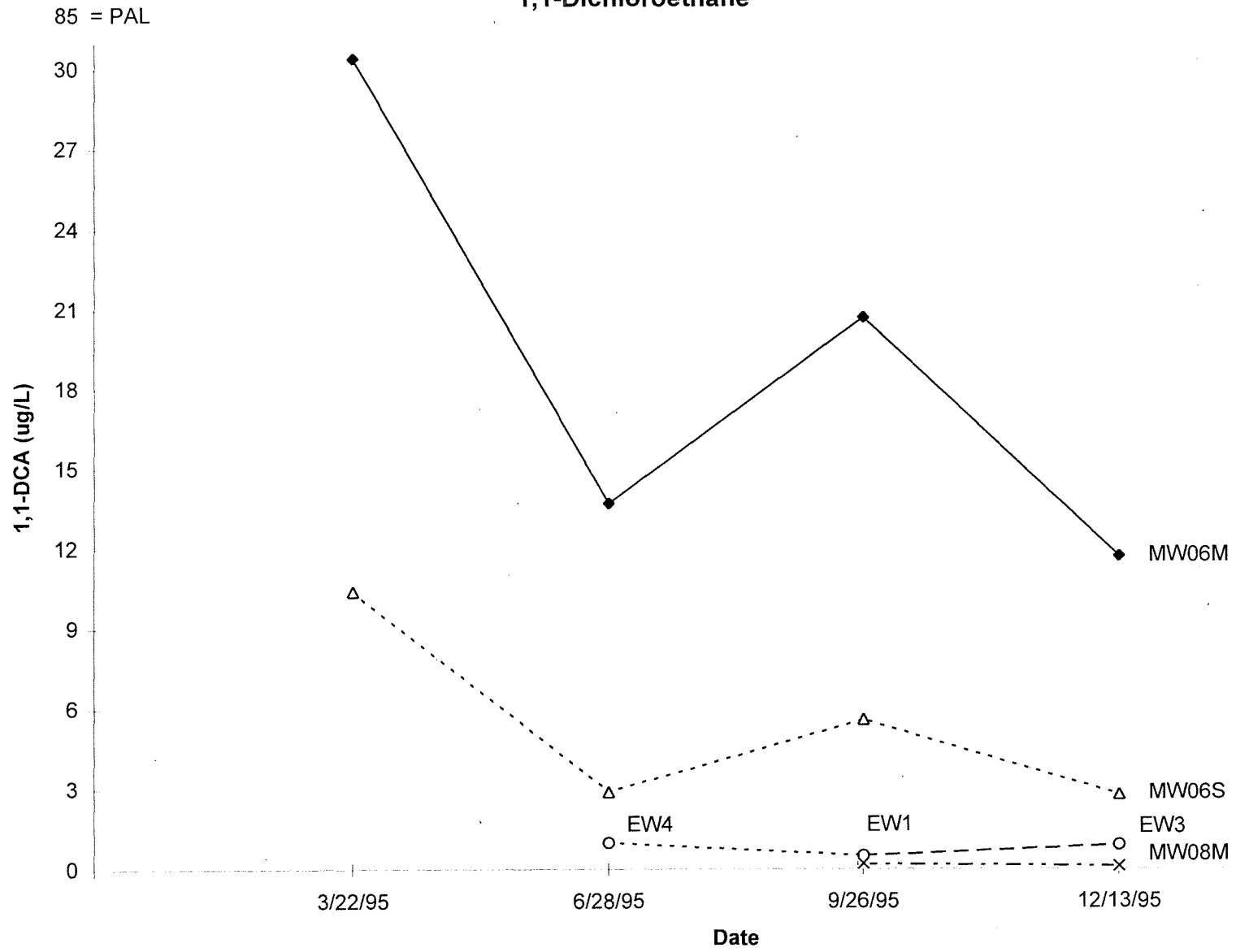
Results exceeding cleanup standards

APPENDIX B
Graphs of Parameters

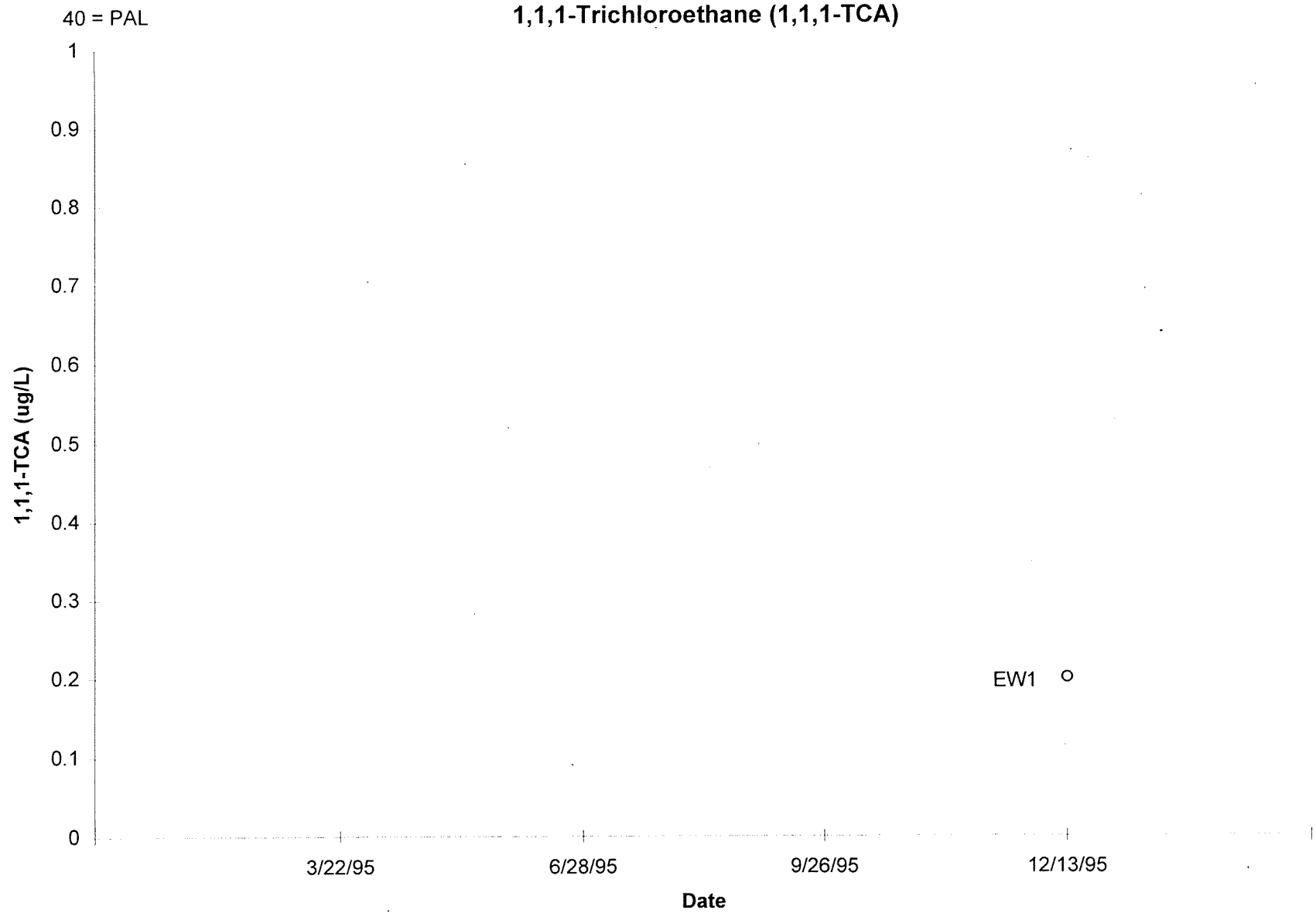
1,1-Dichloroethene



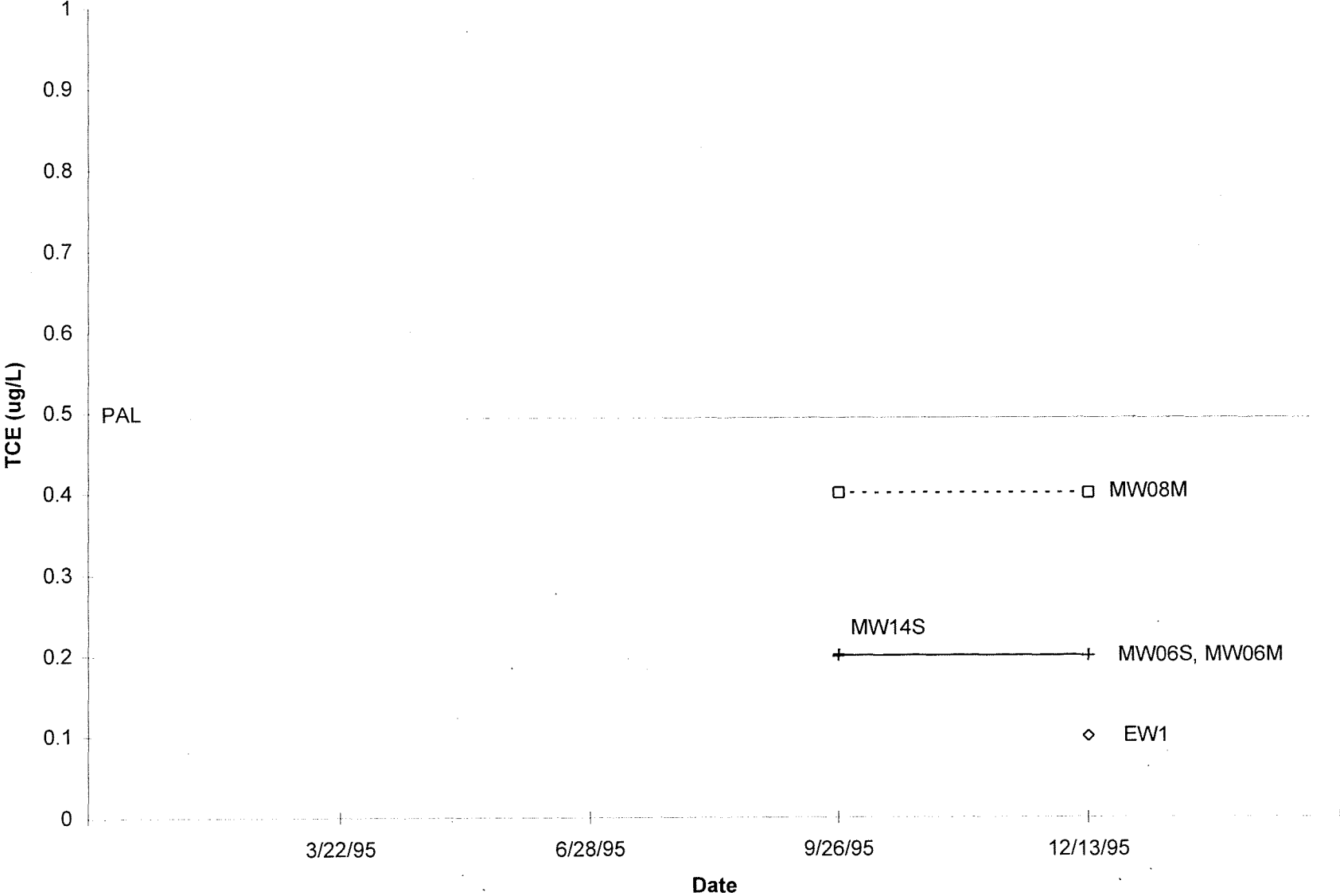
1,1-Dichloroethane



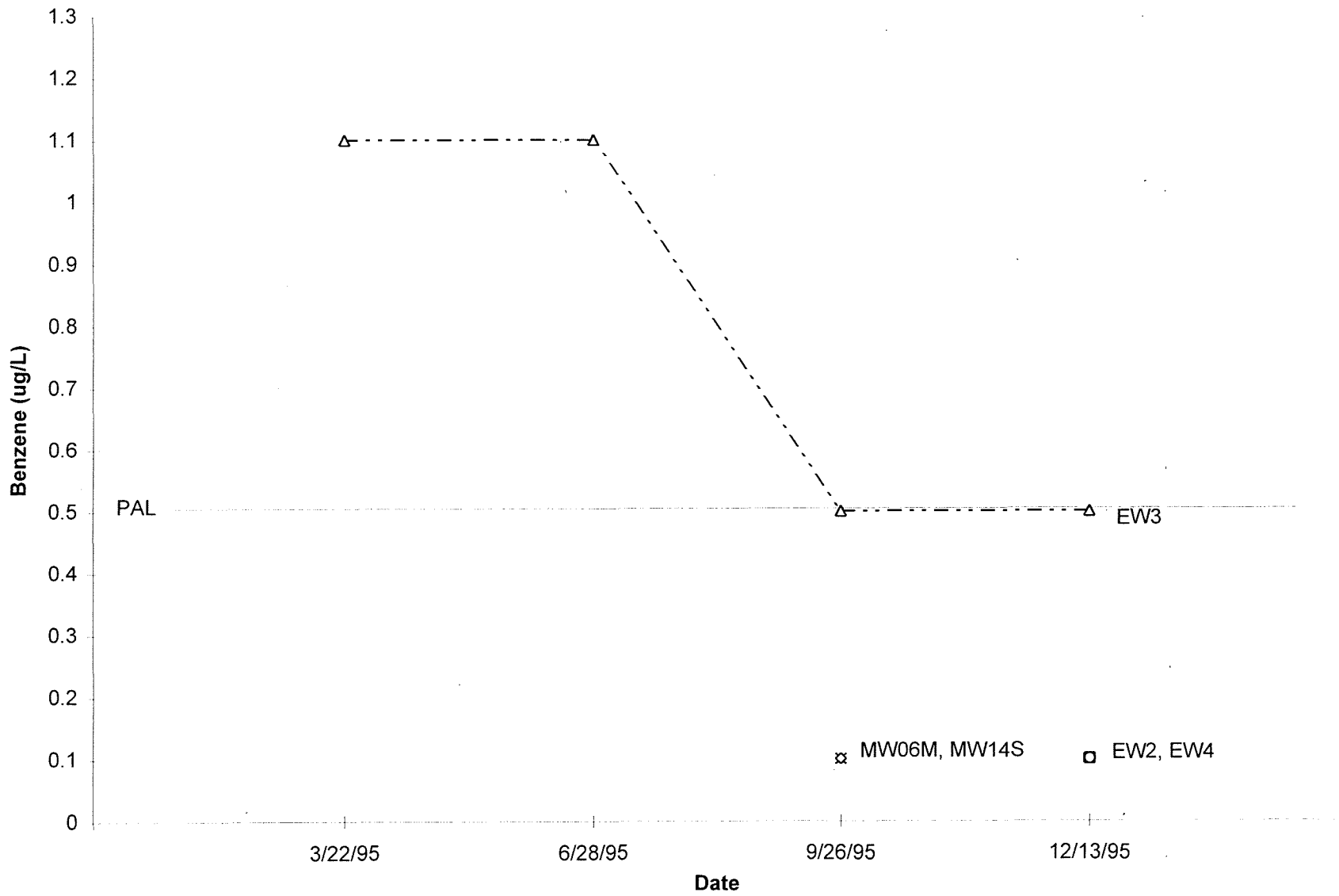
1,1,1-Trichloroethane (1,1,1-TCA)



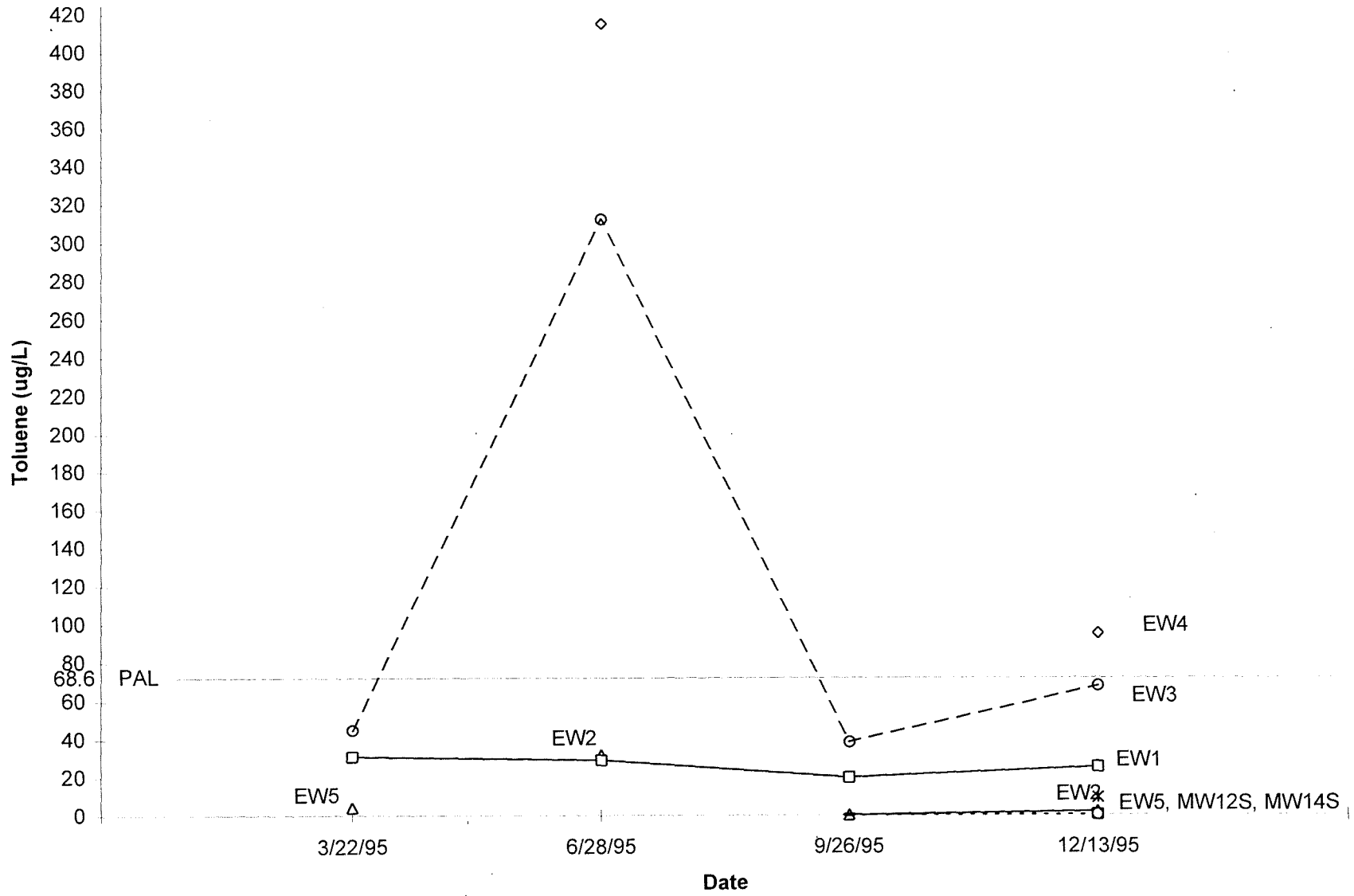
Trichloroethene (TCE)



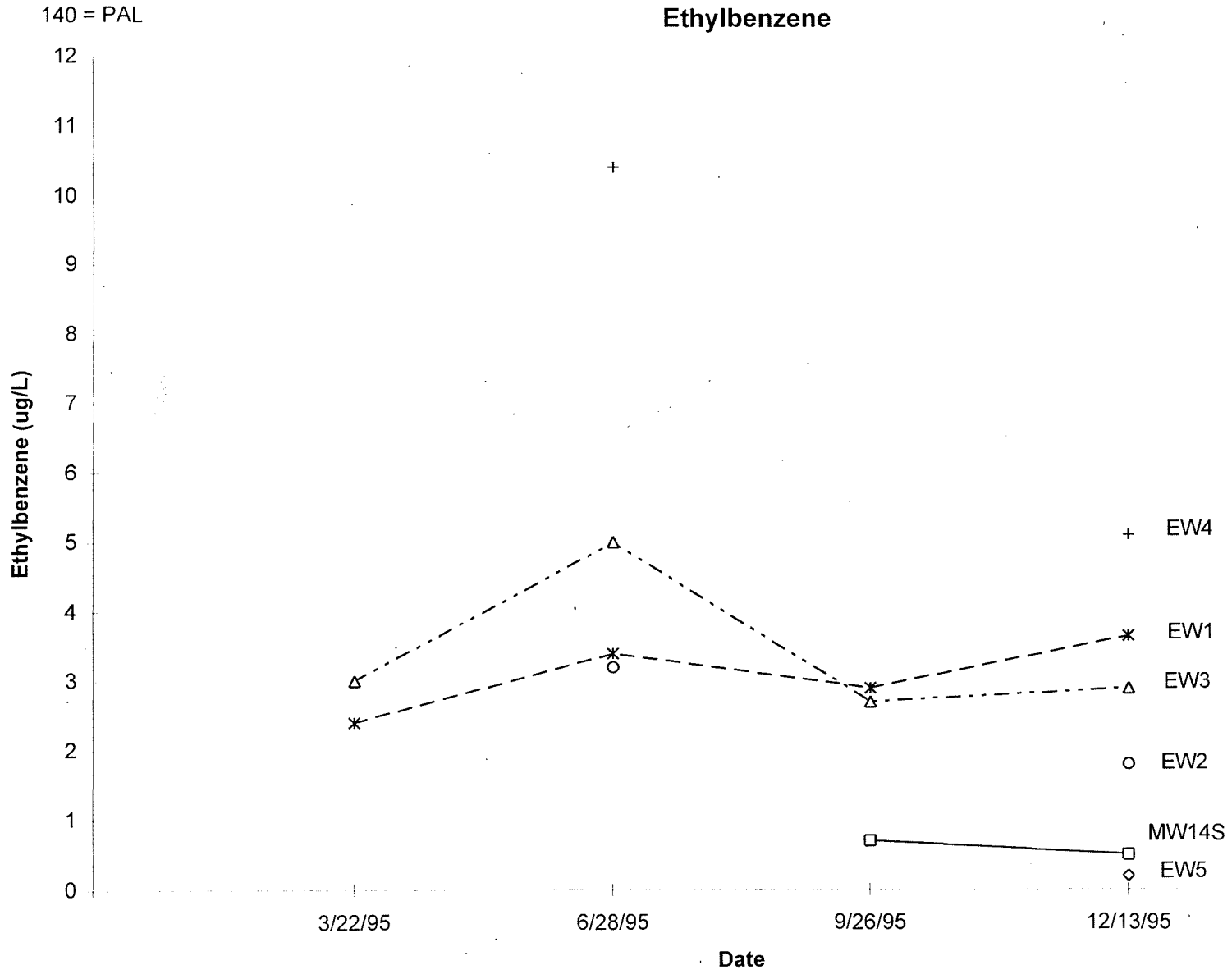
Benzene



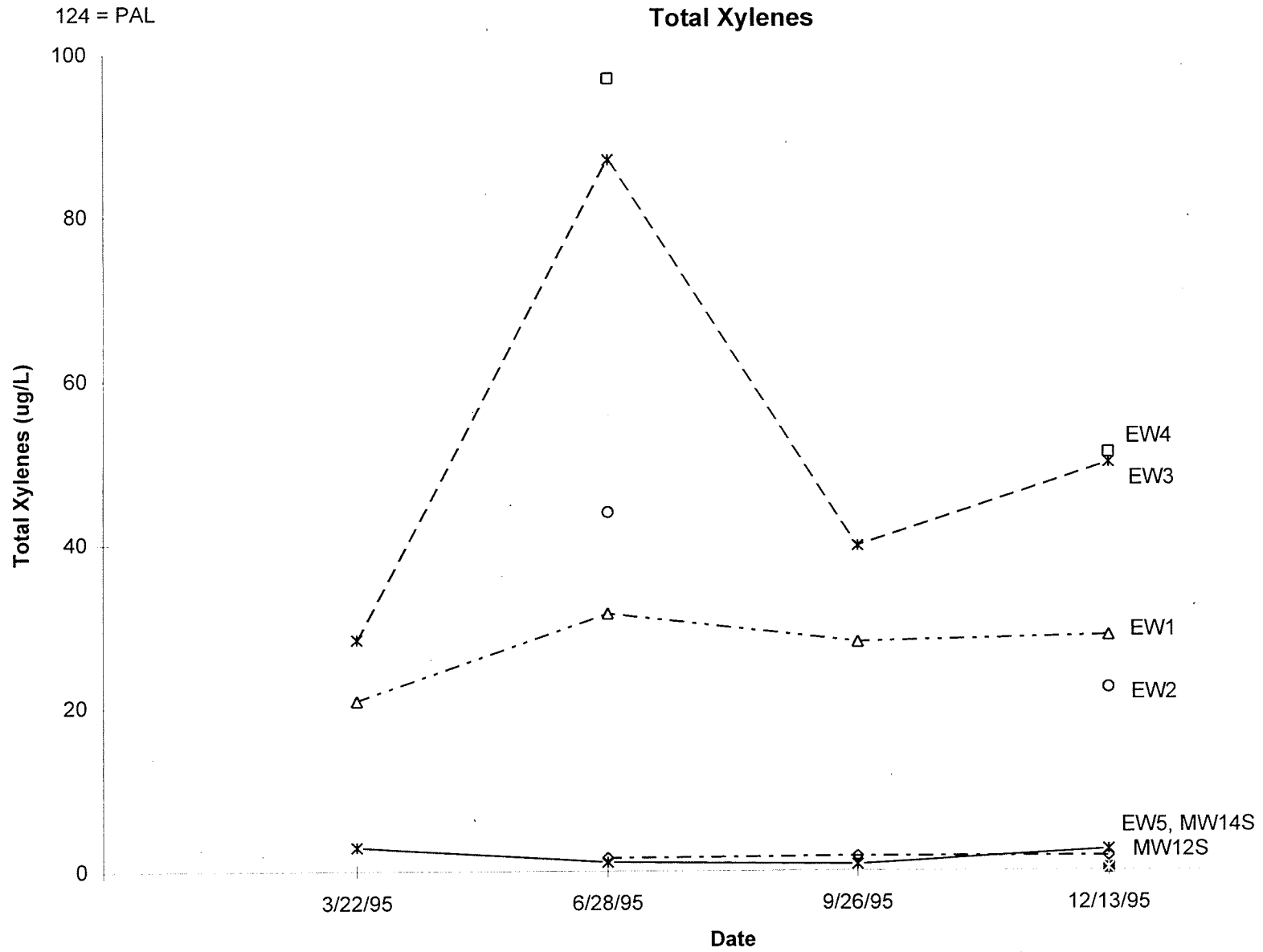
Toluene



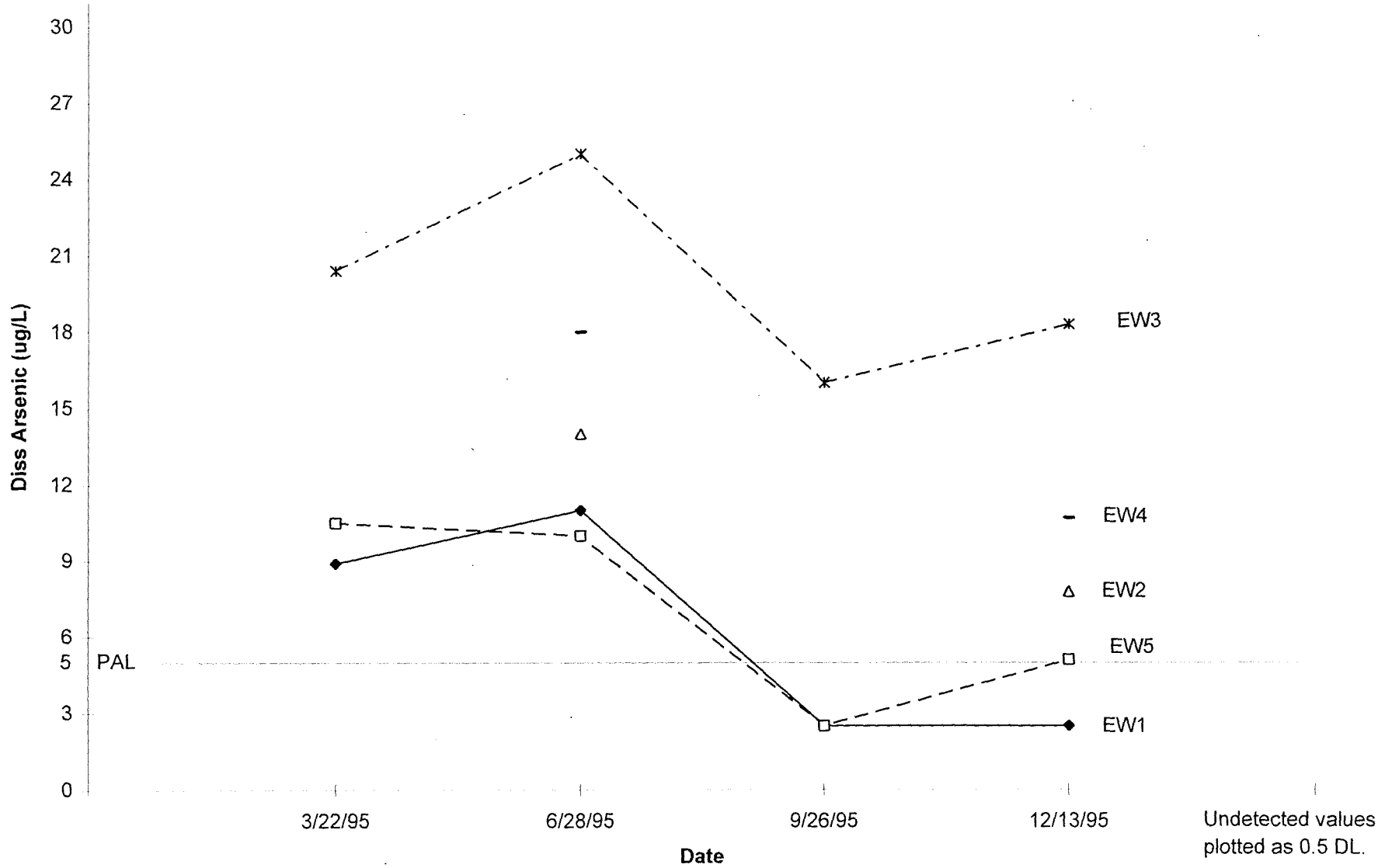
Ethylbenzene



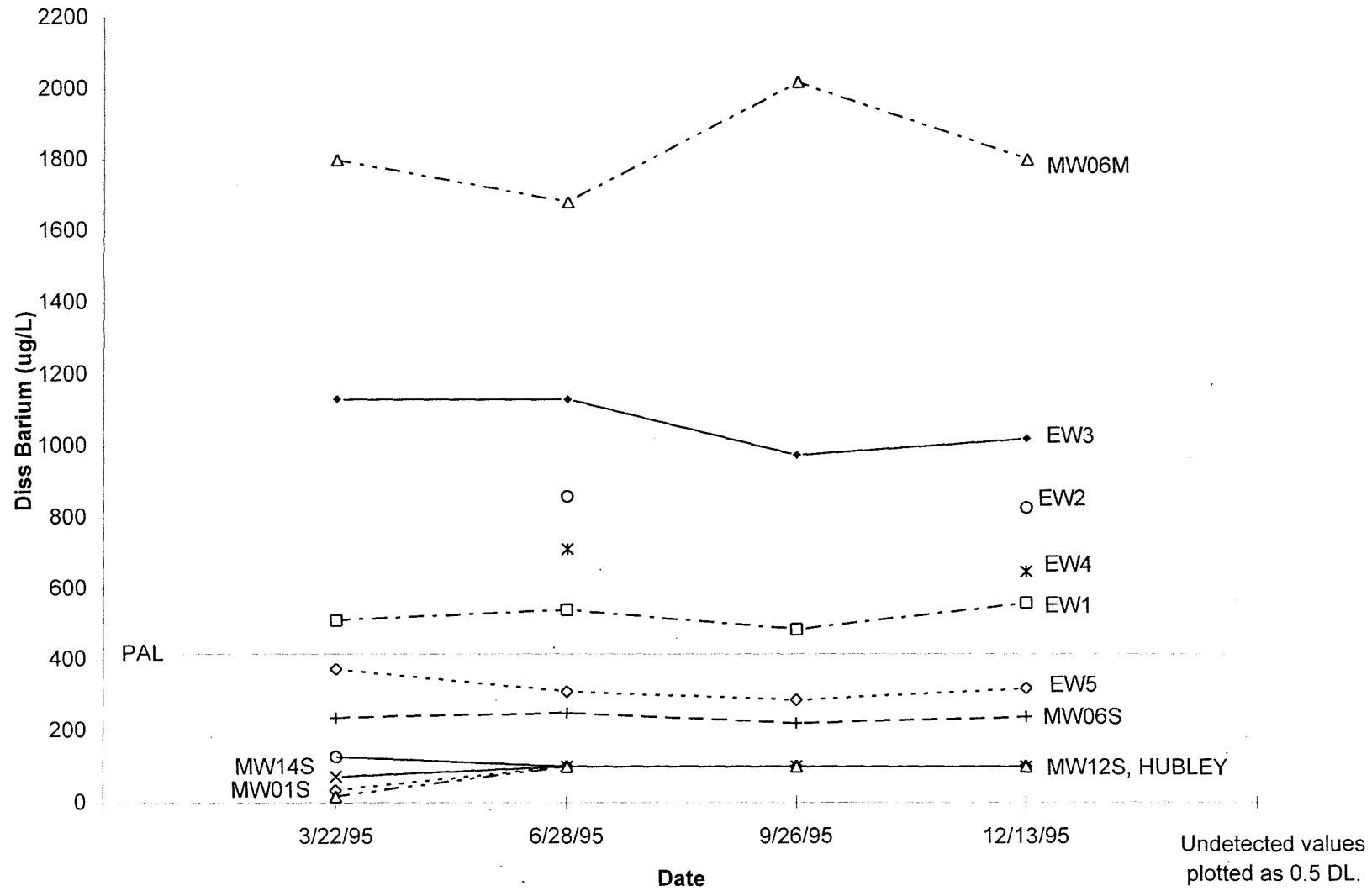
Total Xylenes



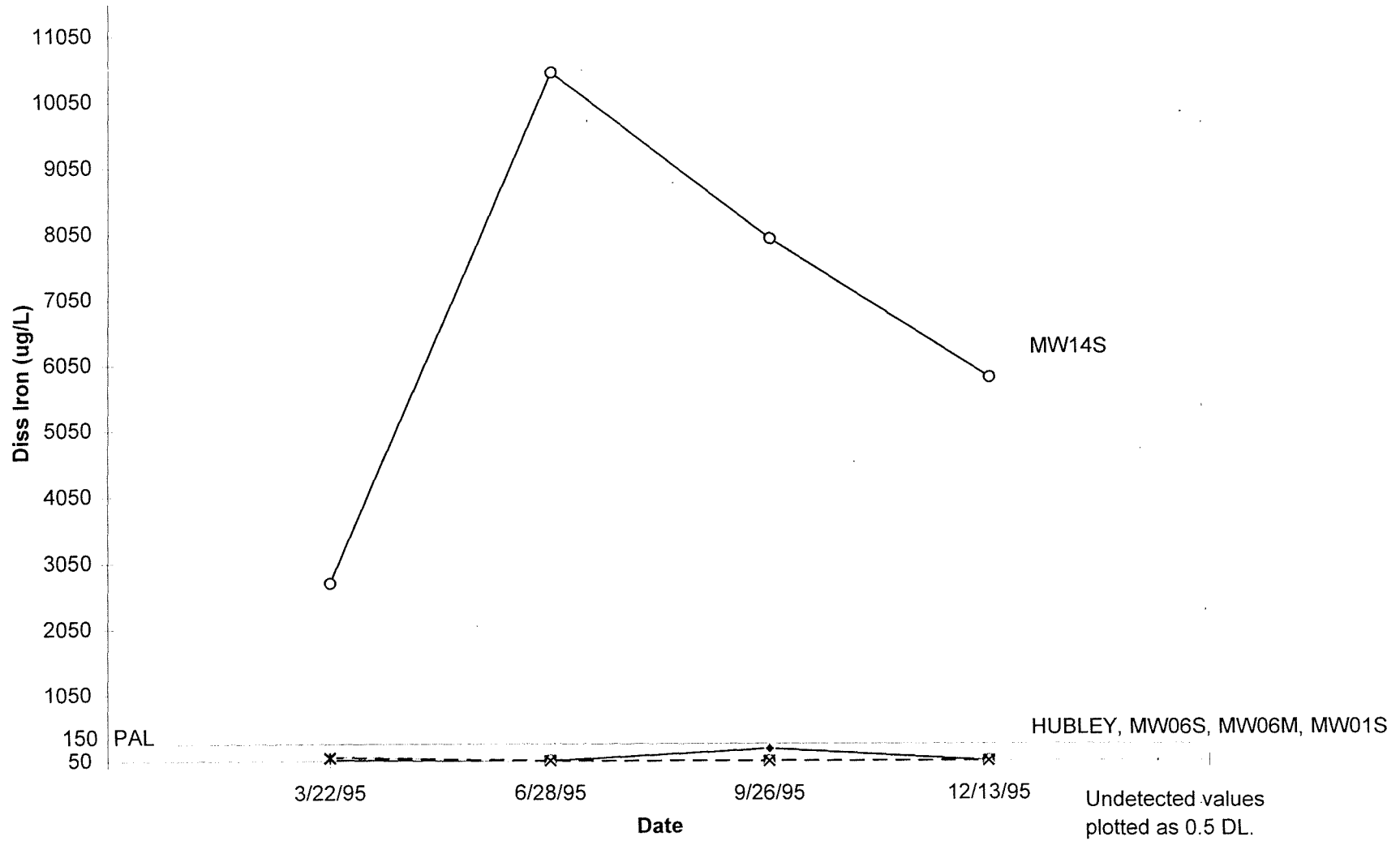
Dissolved Arsenic



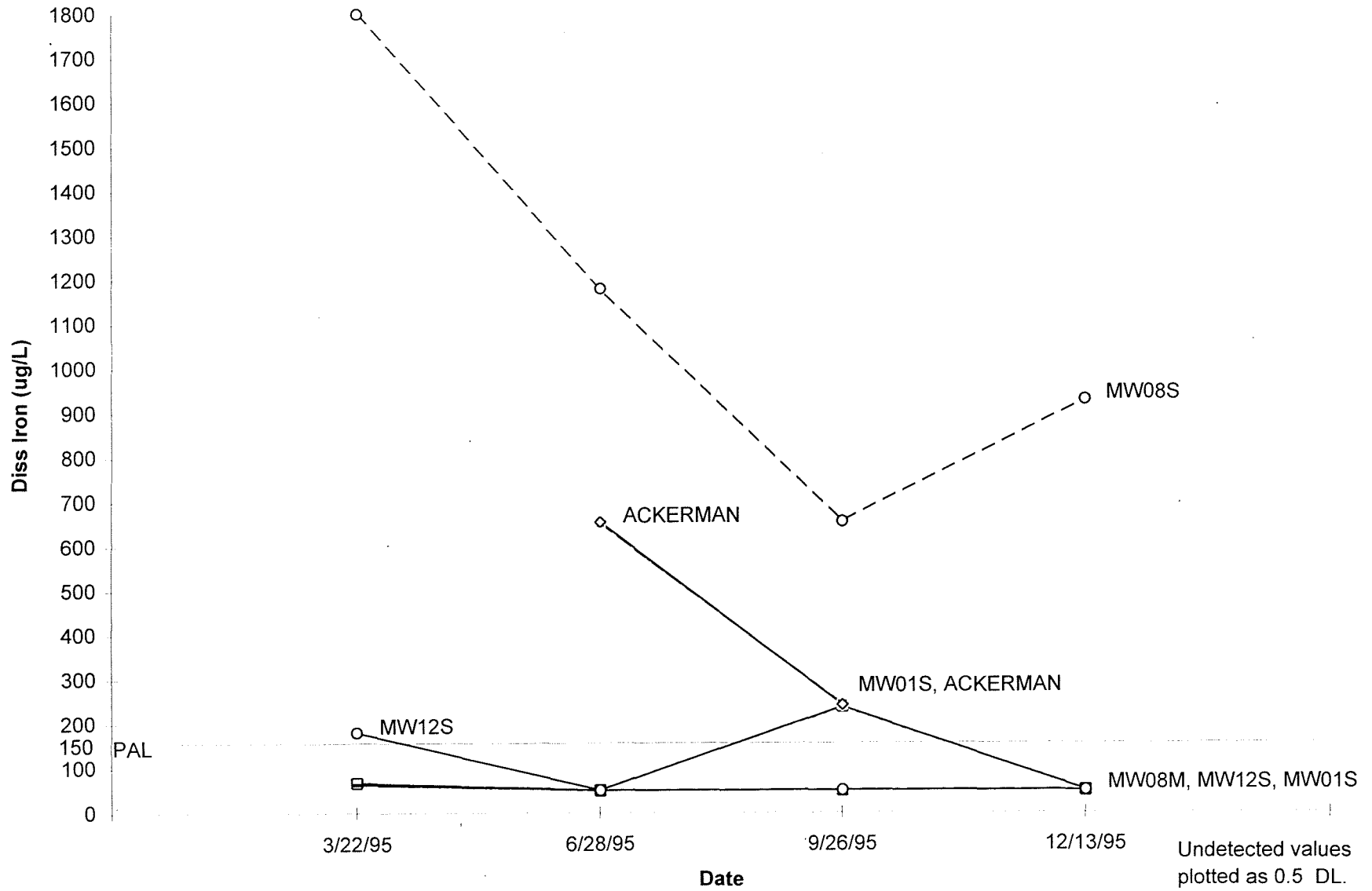
Dissolved Barium



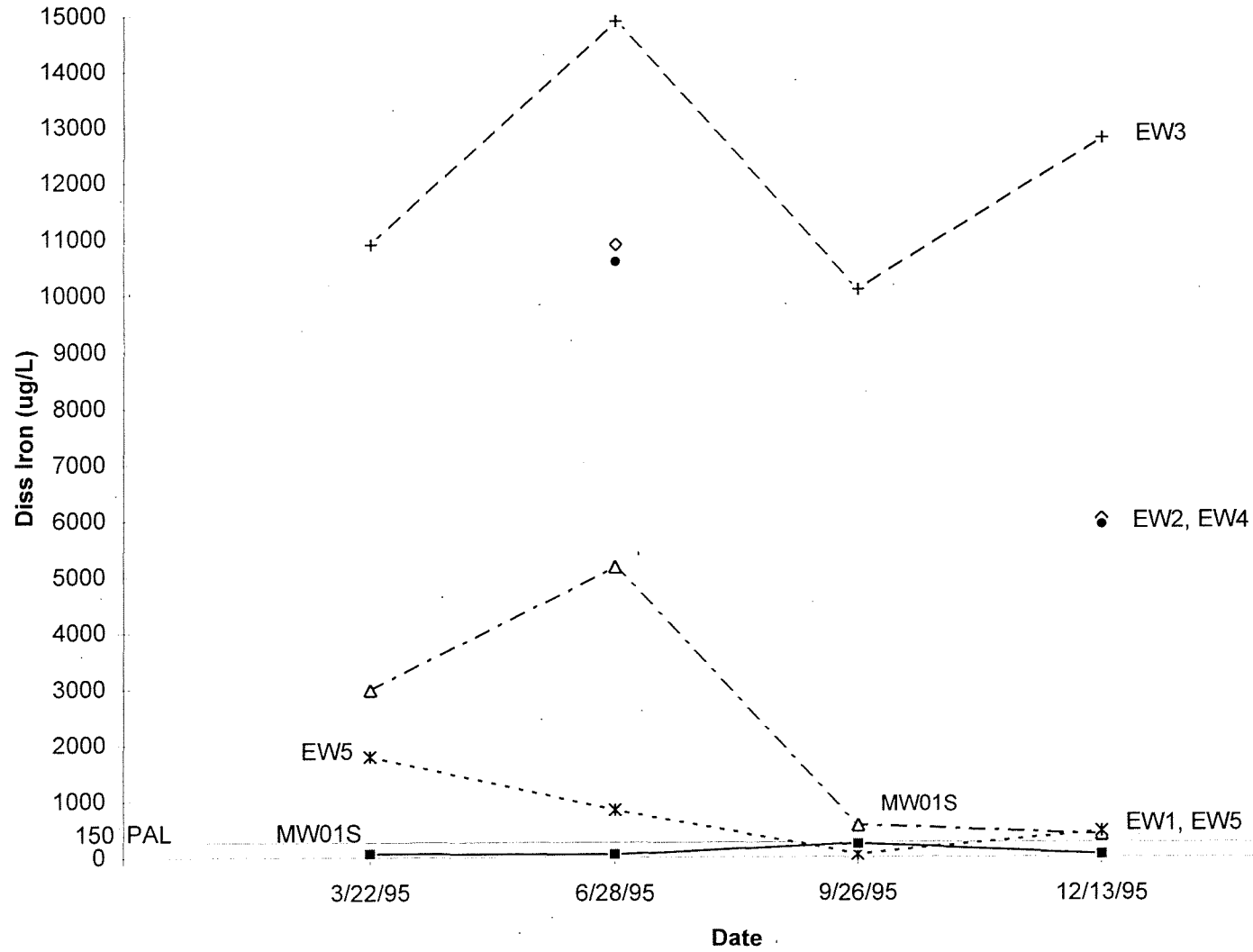
Dissolved Iron Group 1



Dissolved Iron Group 2

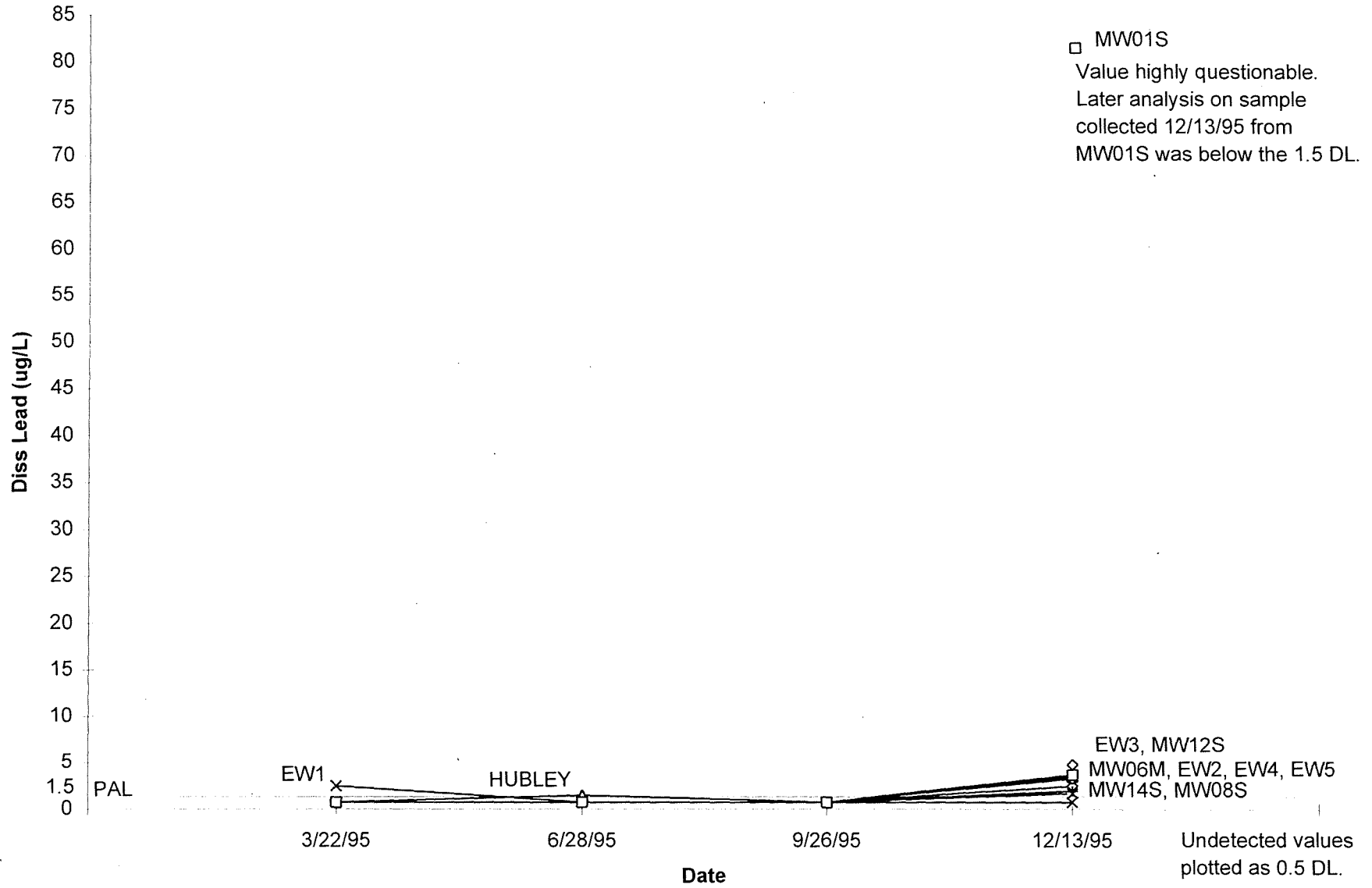


Dissolved Iron Group 3

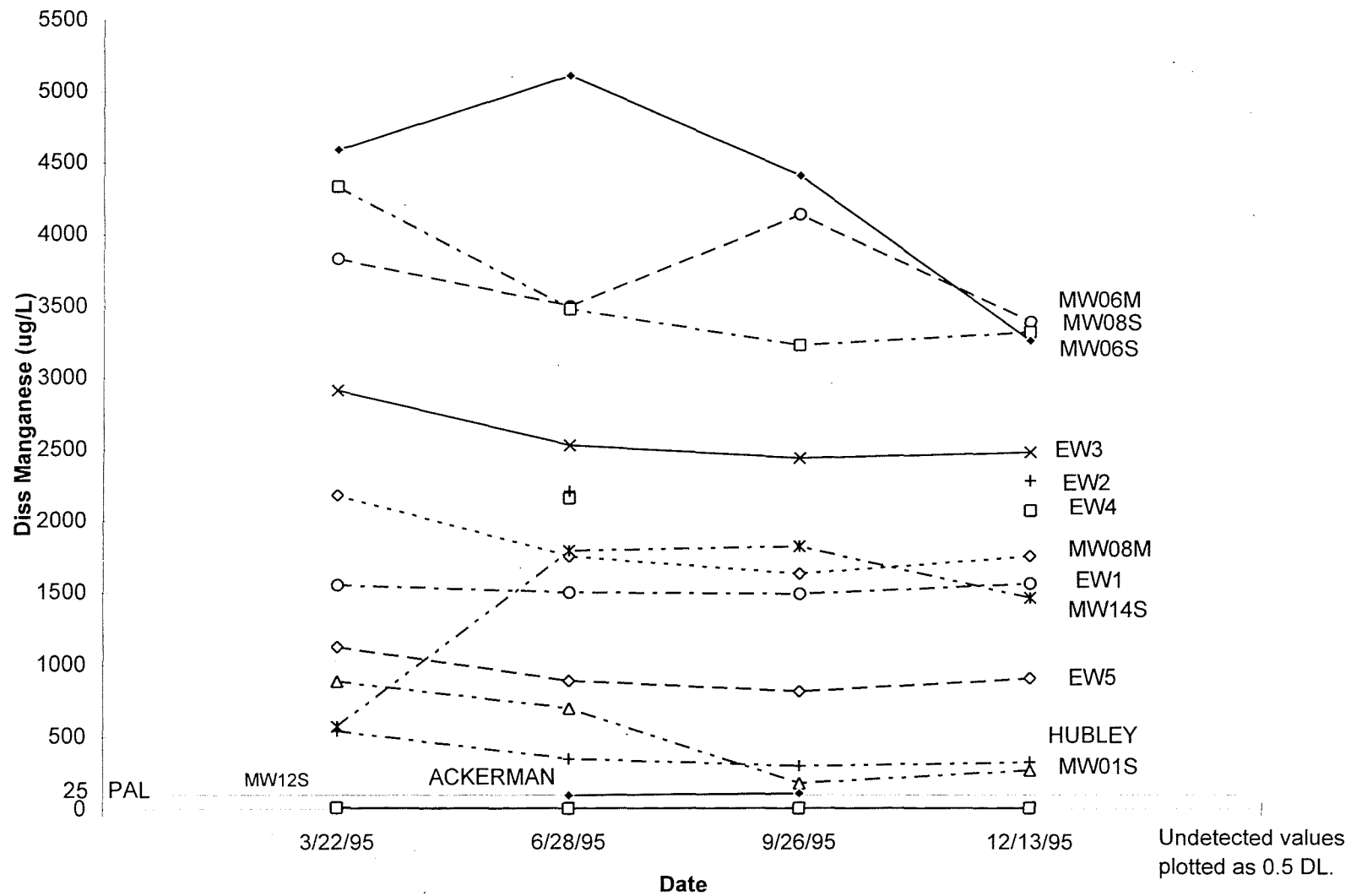


Undetected values plotted as 0.5 DL.

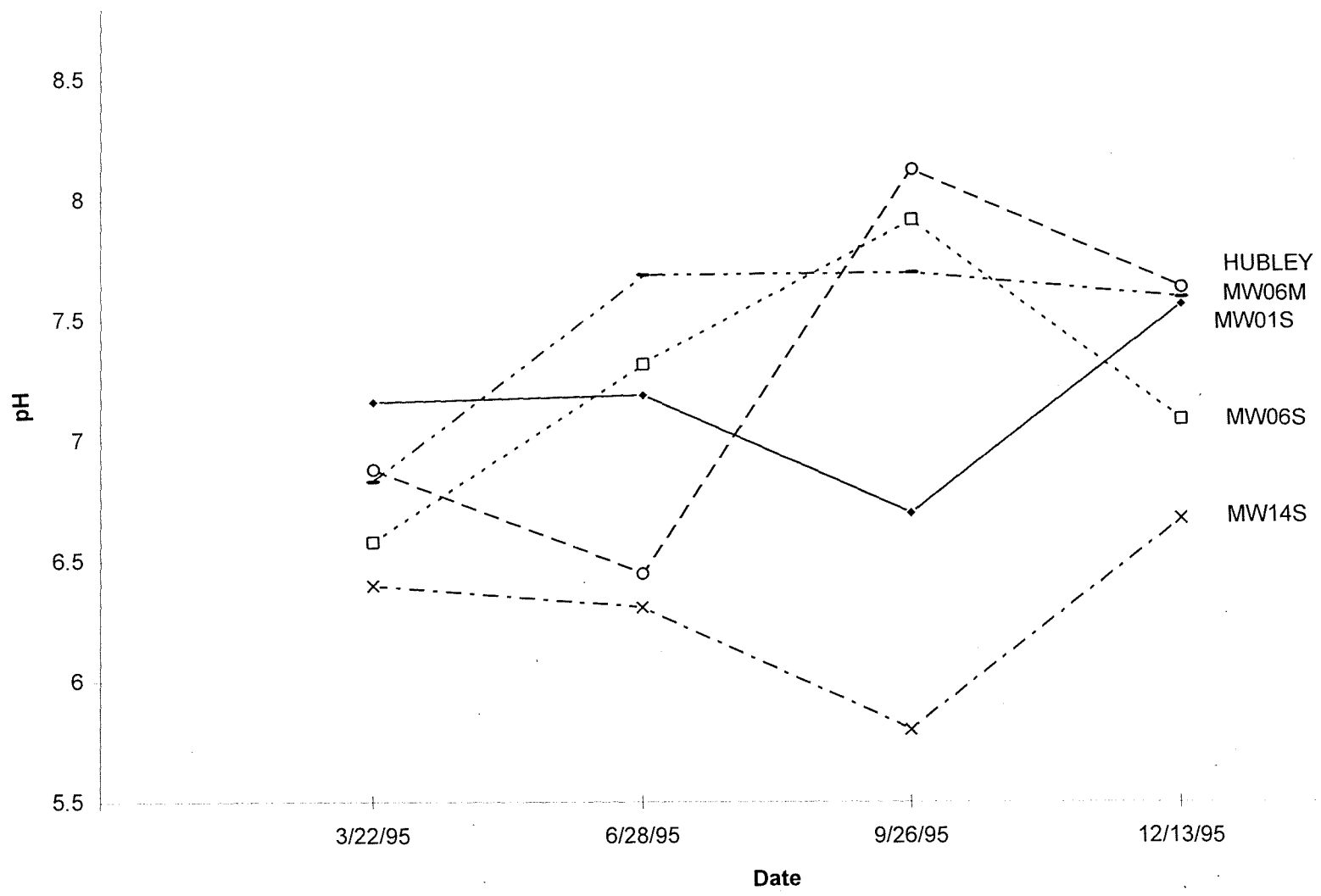
Dissolved Lead



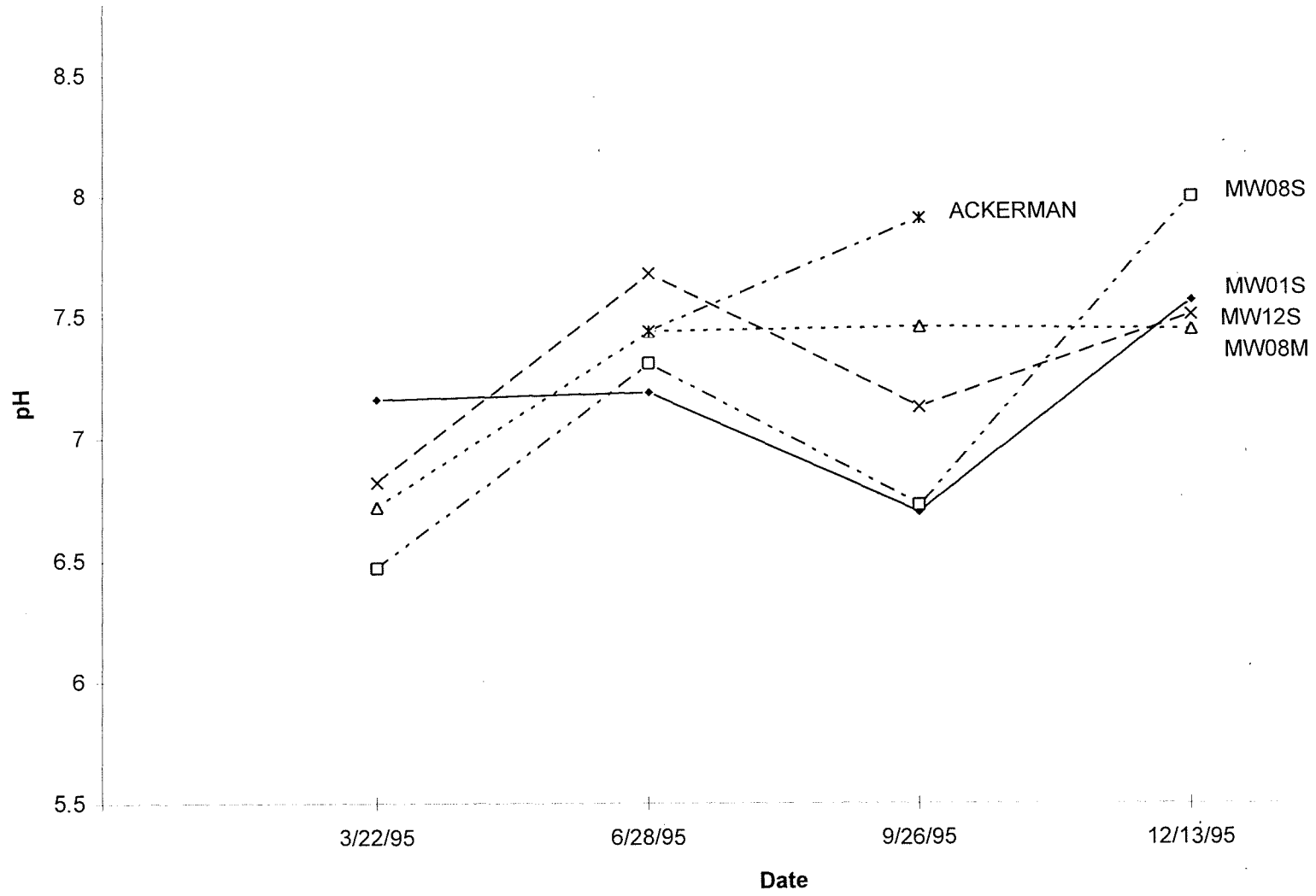
Dissolved Manganese



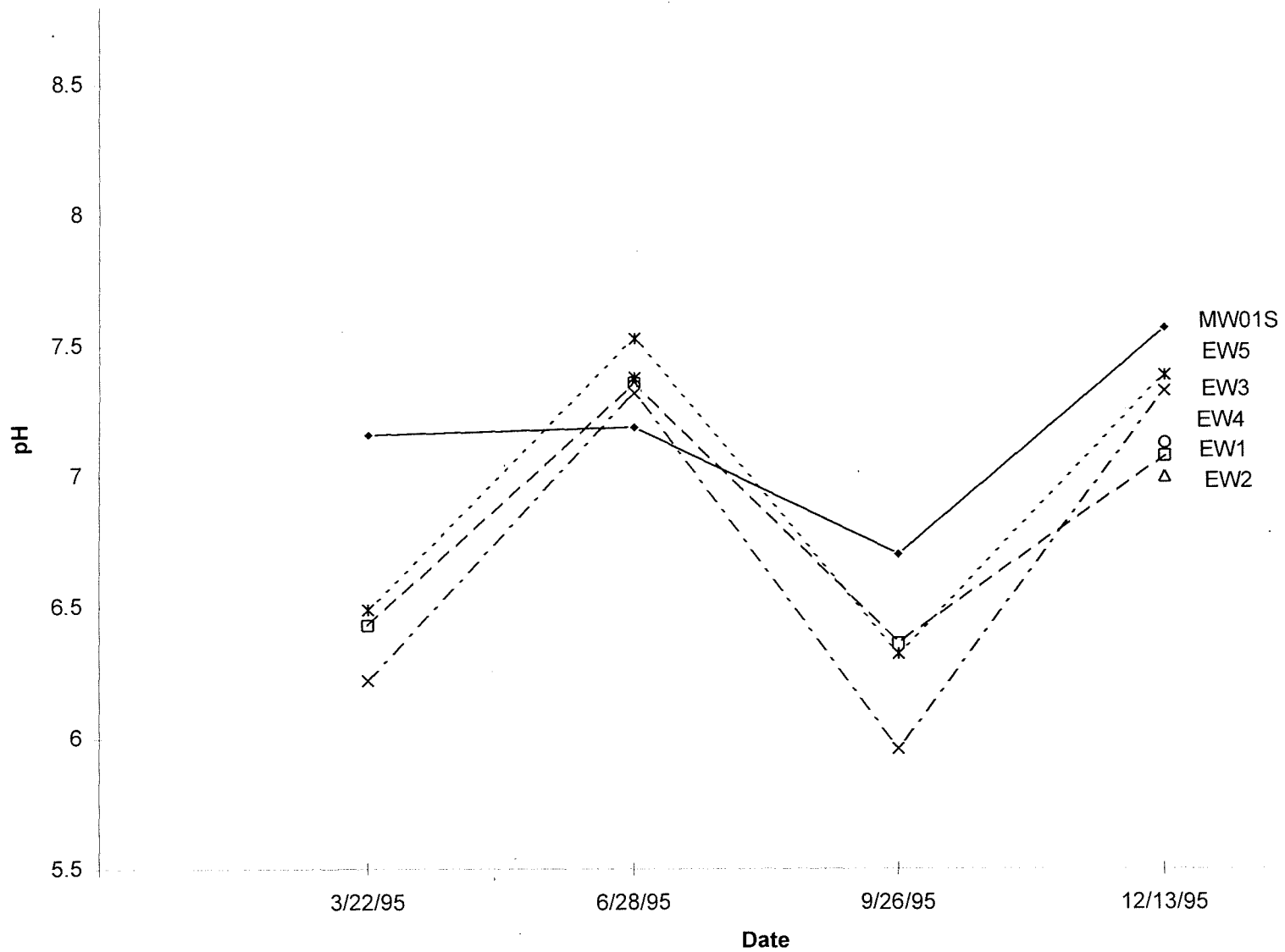
pH Group 1



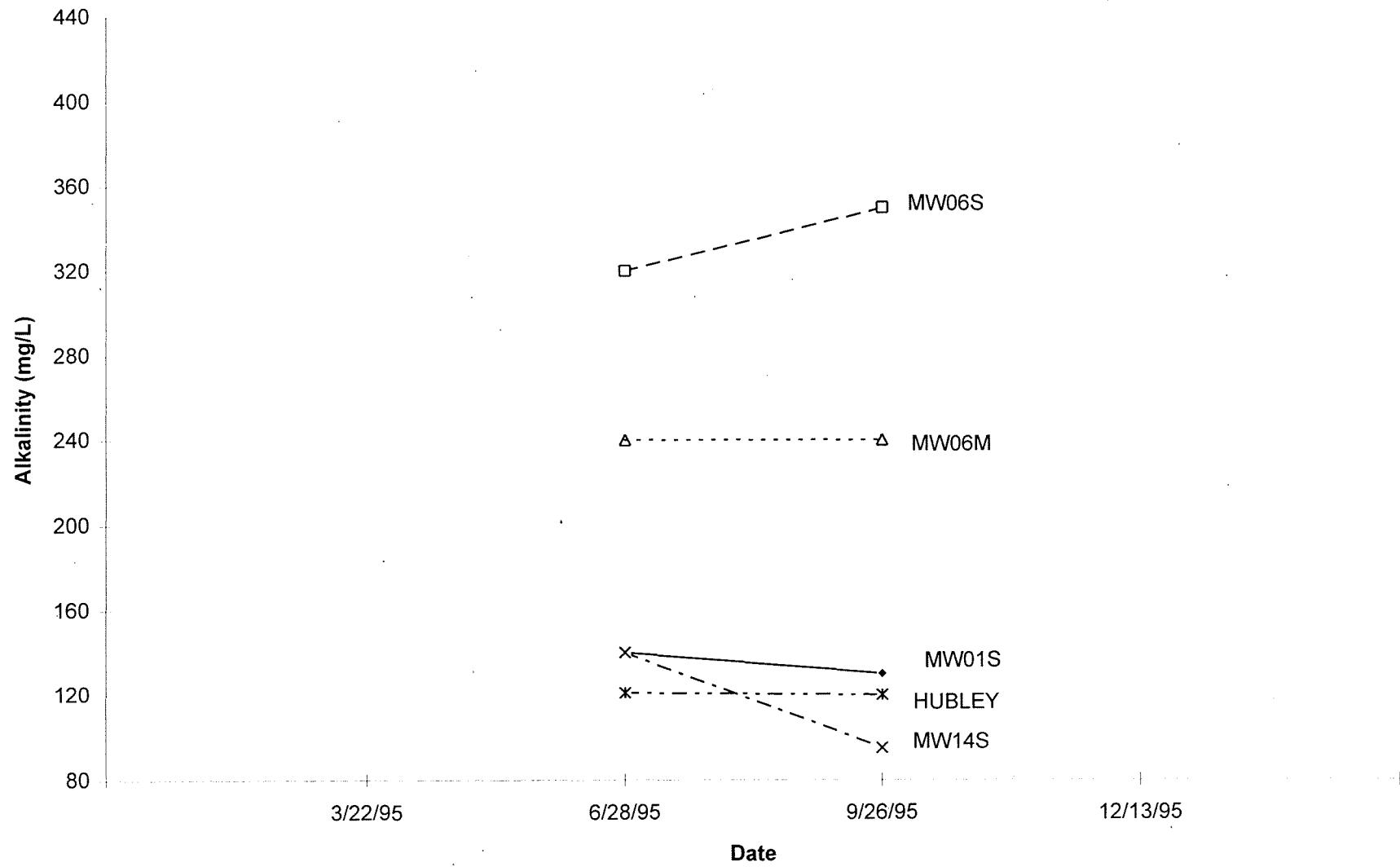
pH Group 2



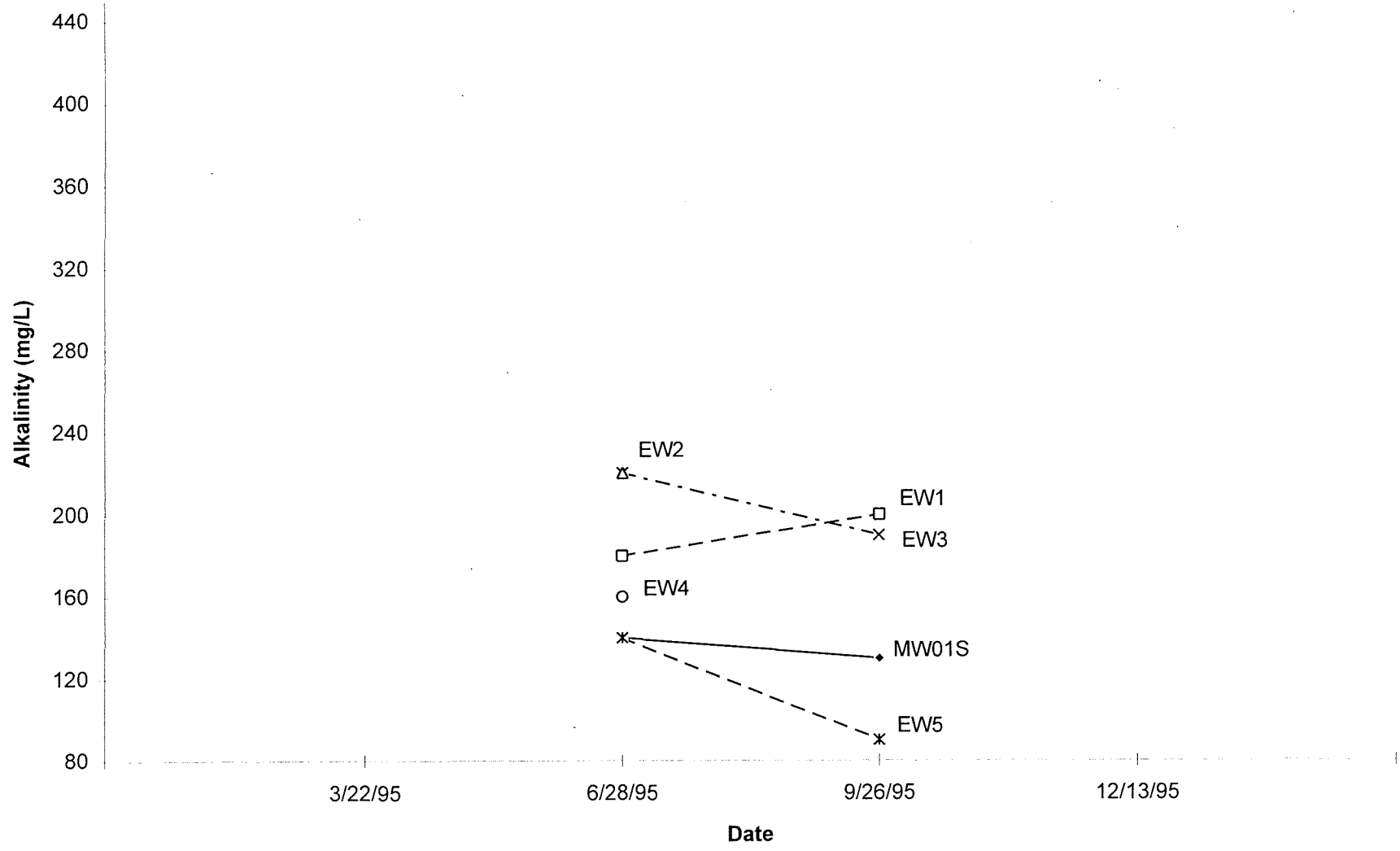
pH Group 3



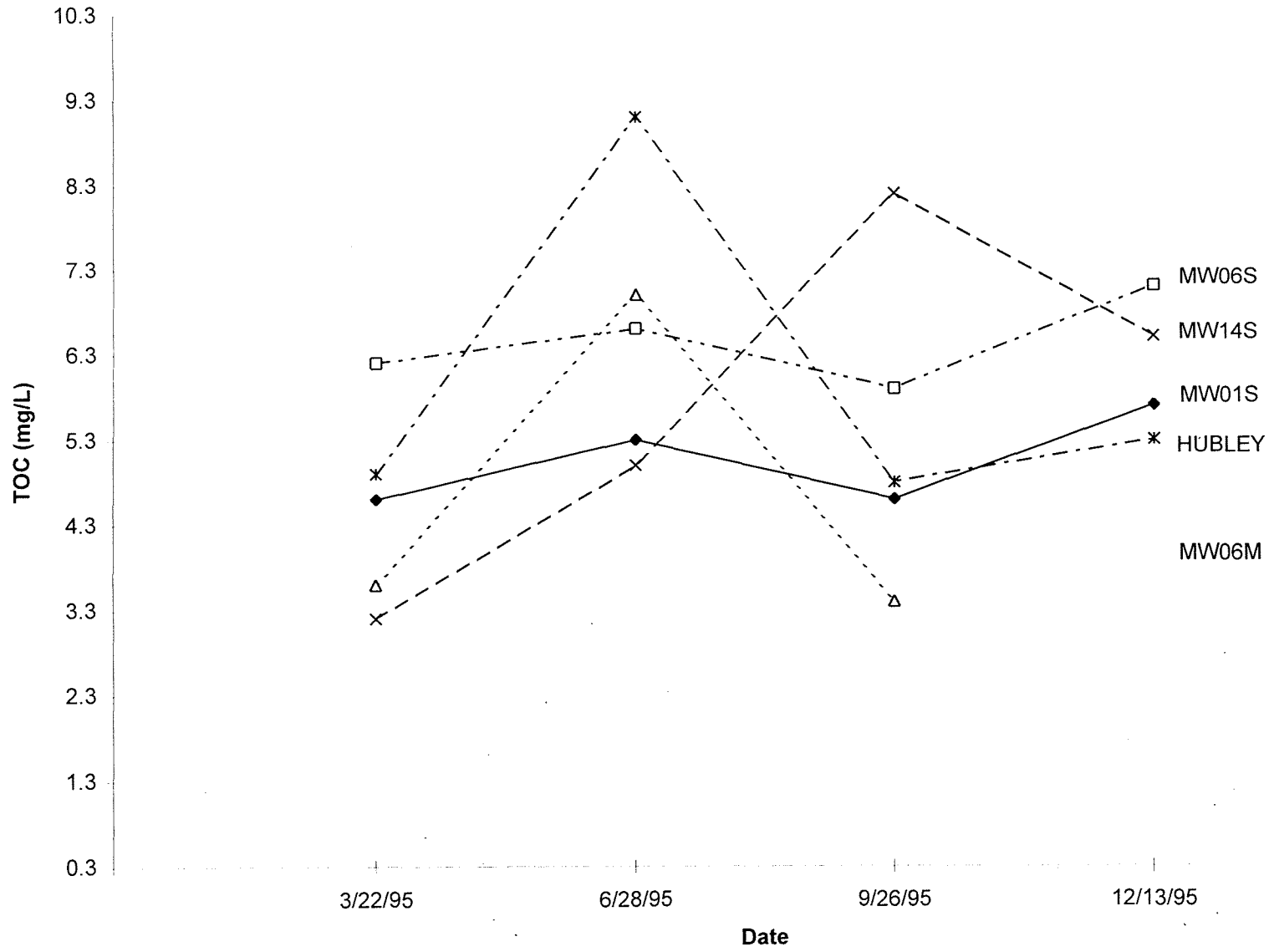
Alkalinity Group 1



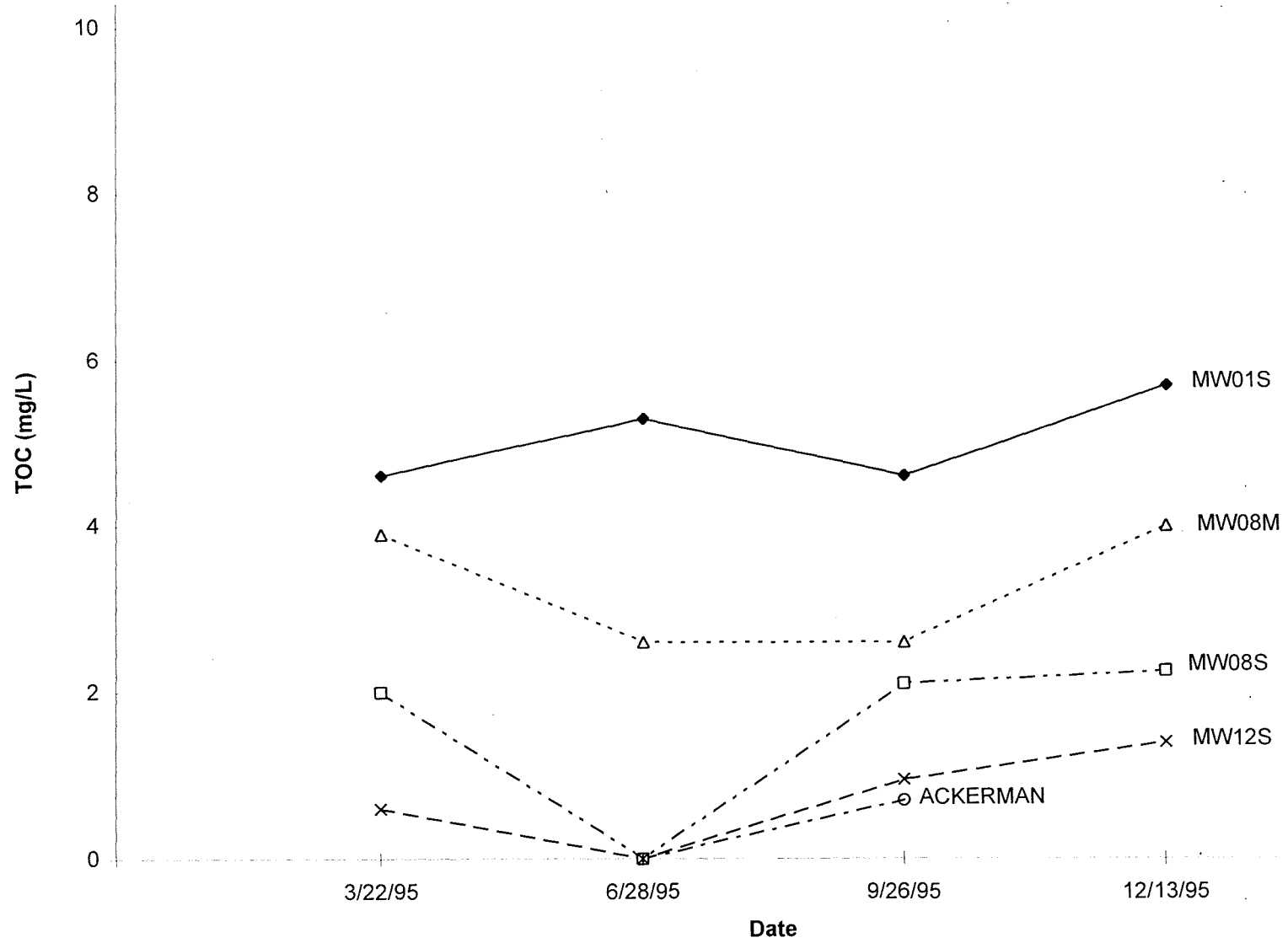
Alkalinity Group 3



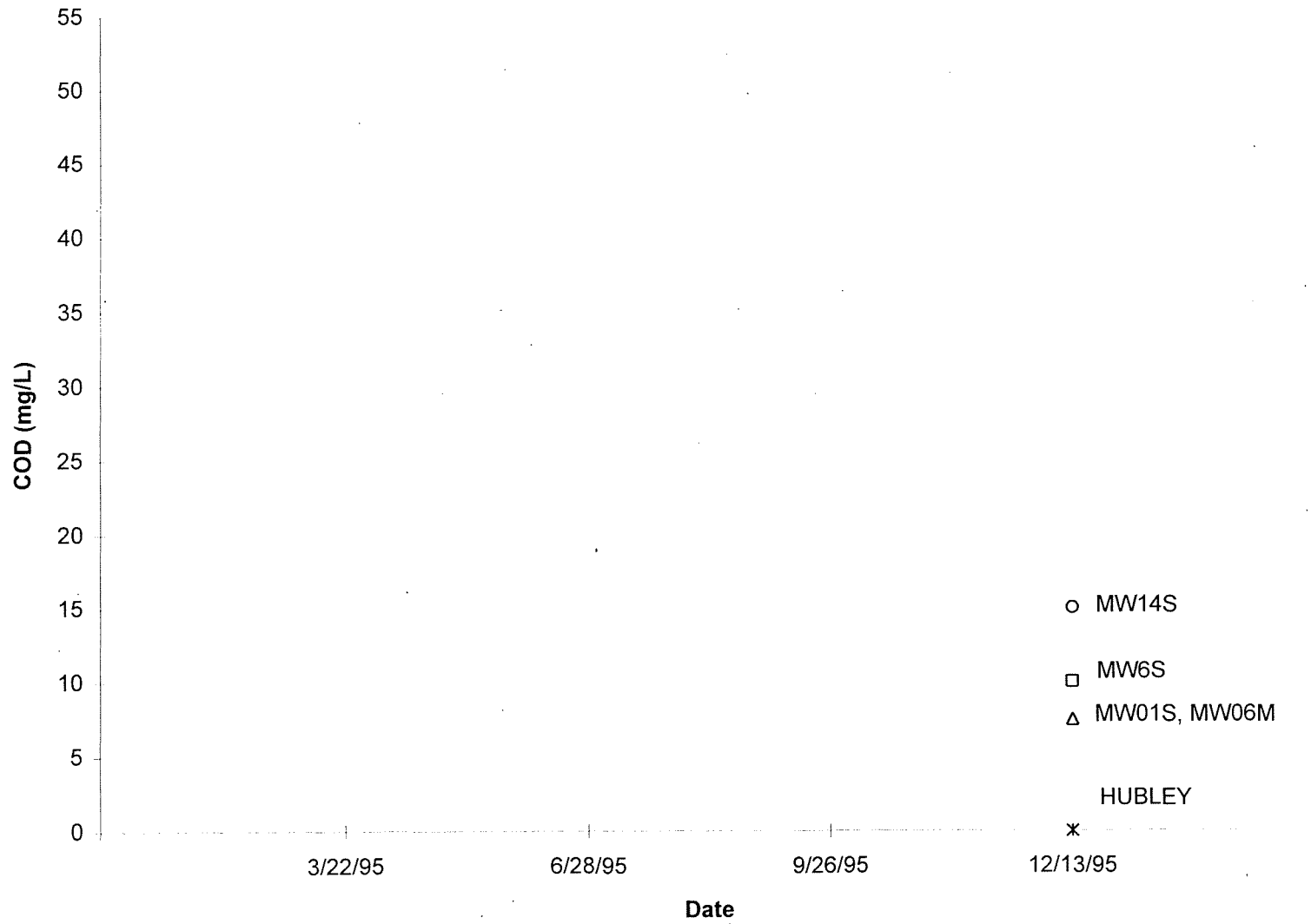
Total Organic Carbon (TOC) Group 1



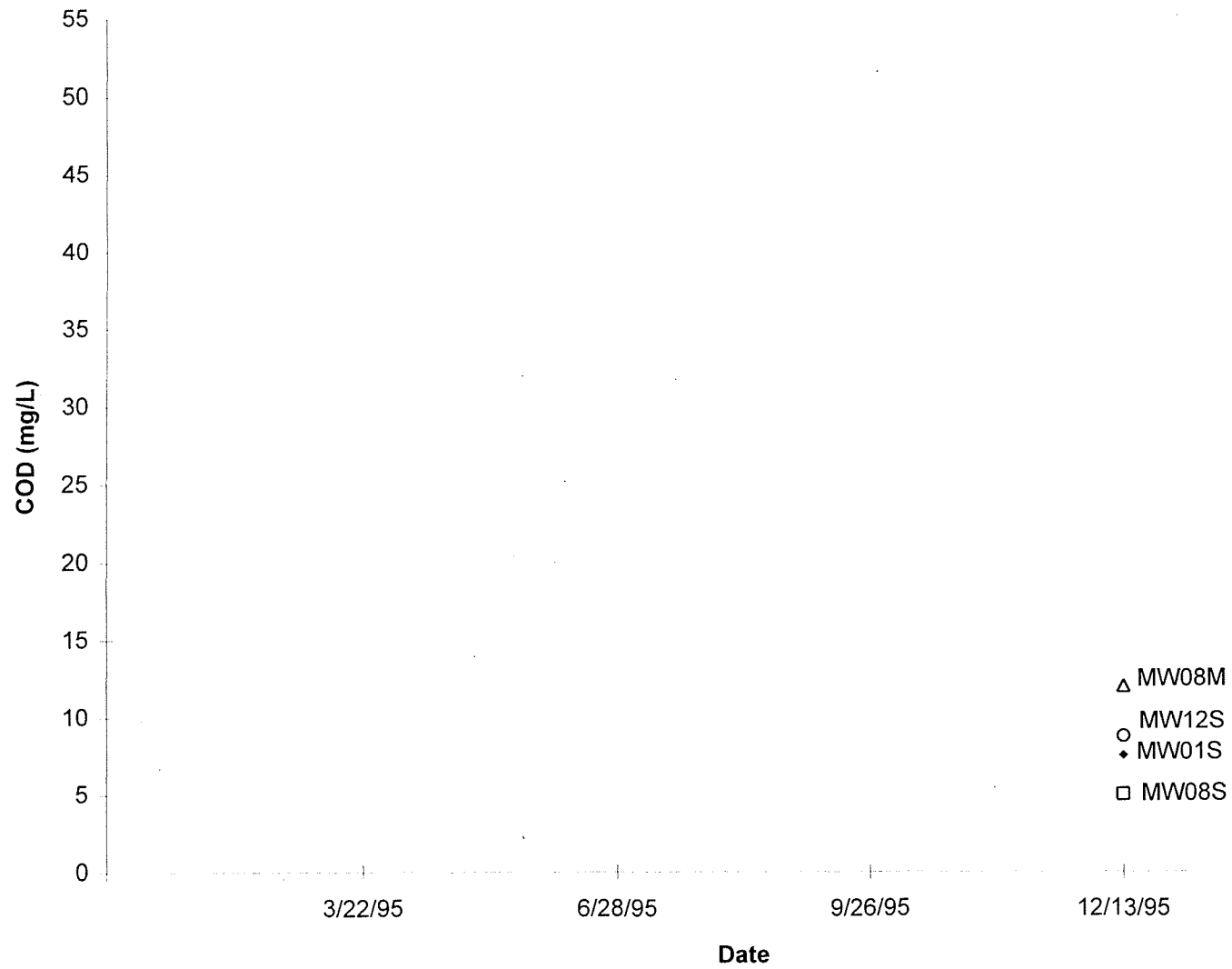
Total Organic Carbon (TOC) Group 2



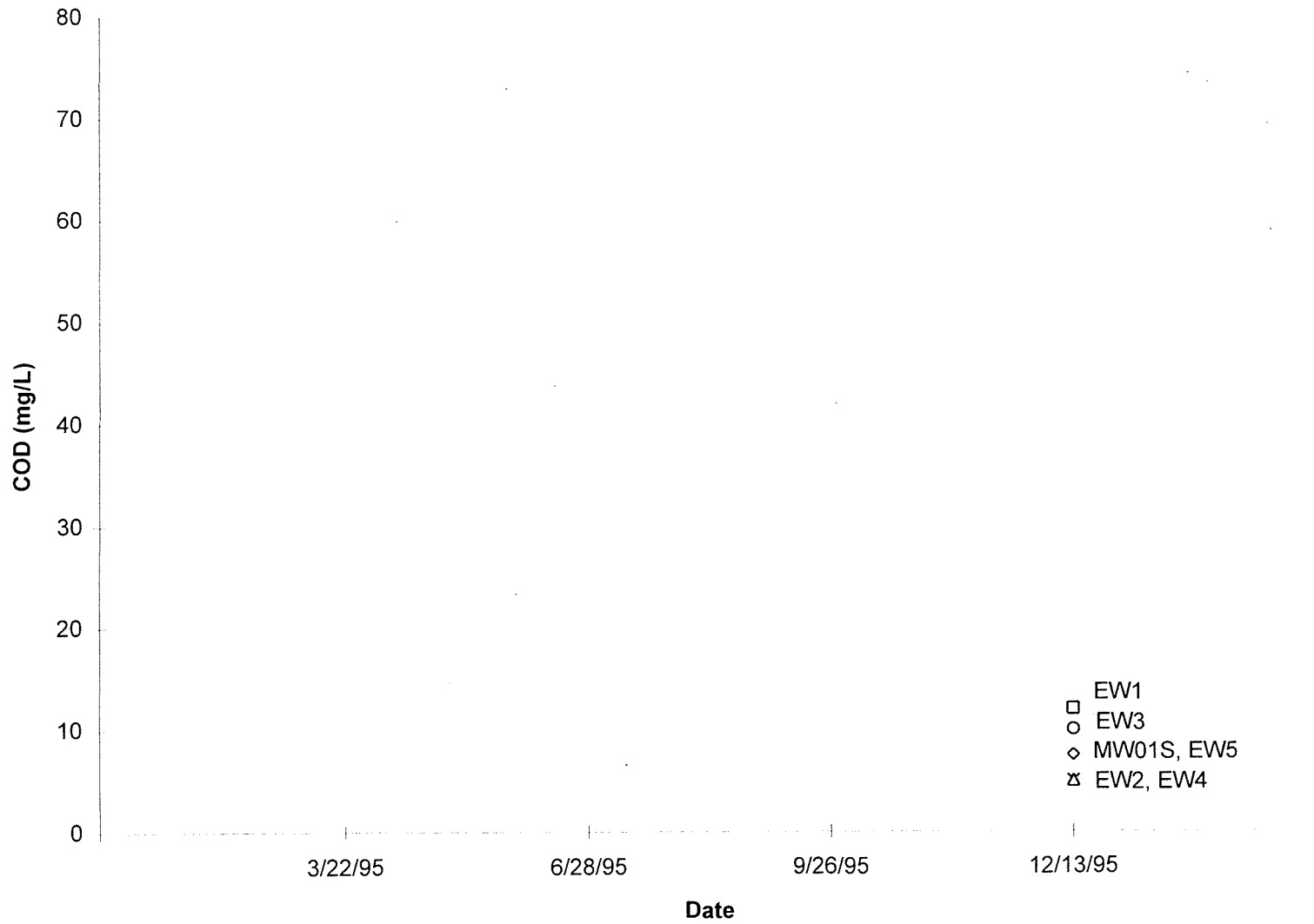
Chemical Oxygen Demand (COD) Group 1



Chemical Oxygen Demand (COD) Group 2

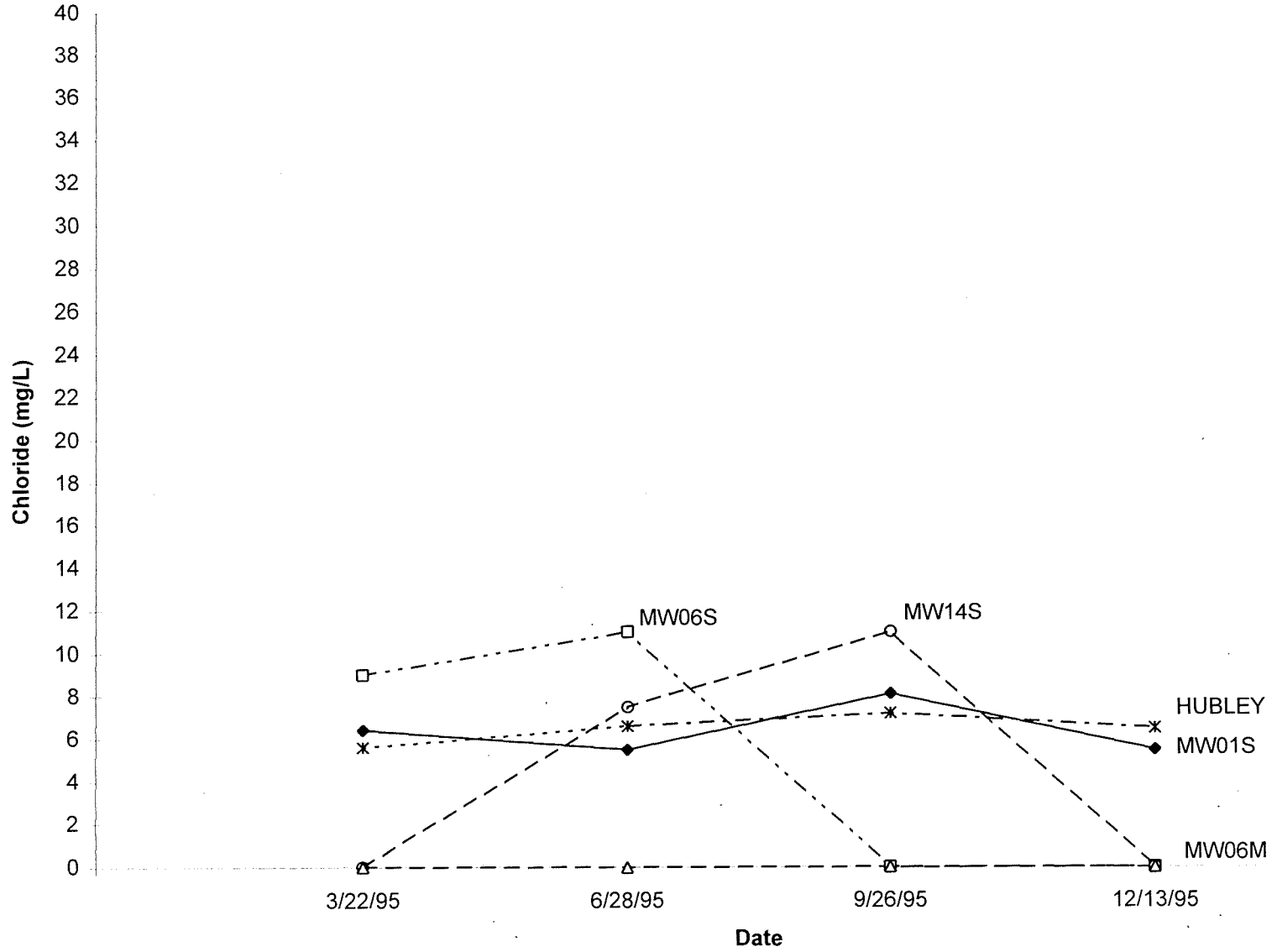


Chemical Oxygen Demand (COD) Group 3



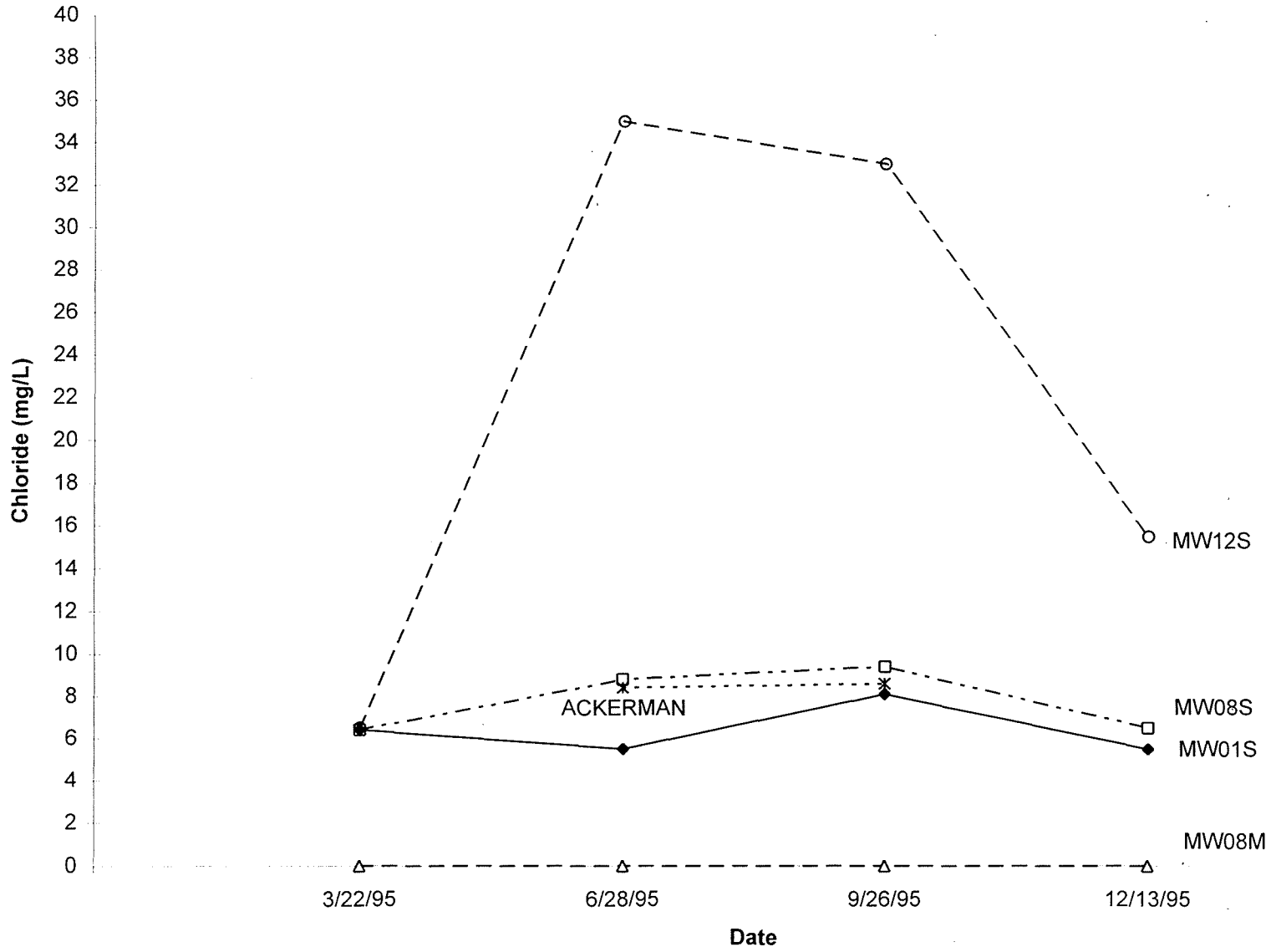
125 = PAL

Chloride Group 1

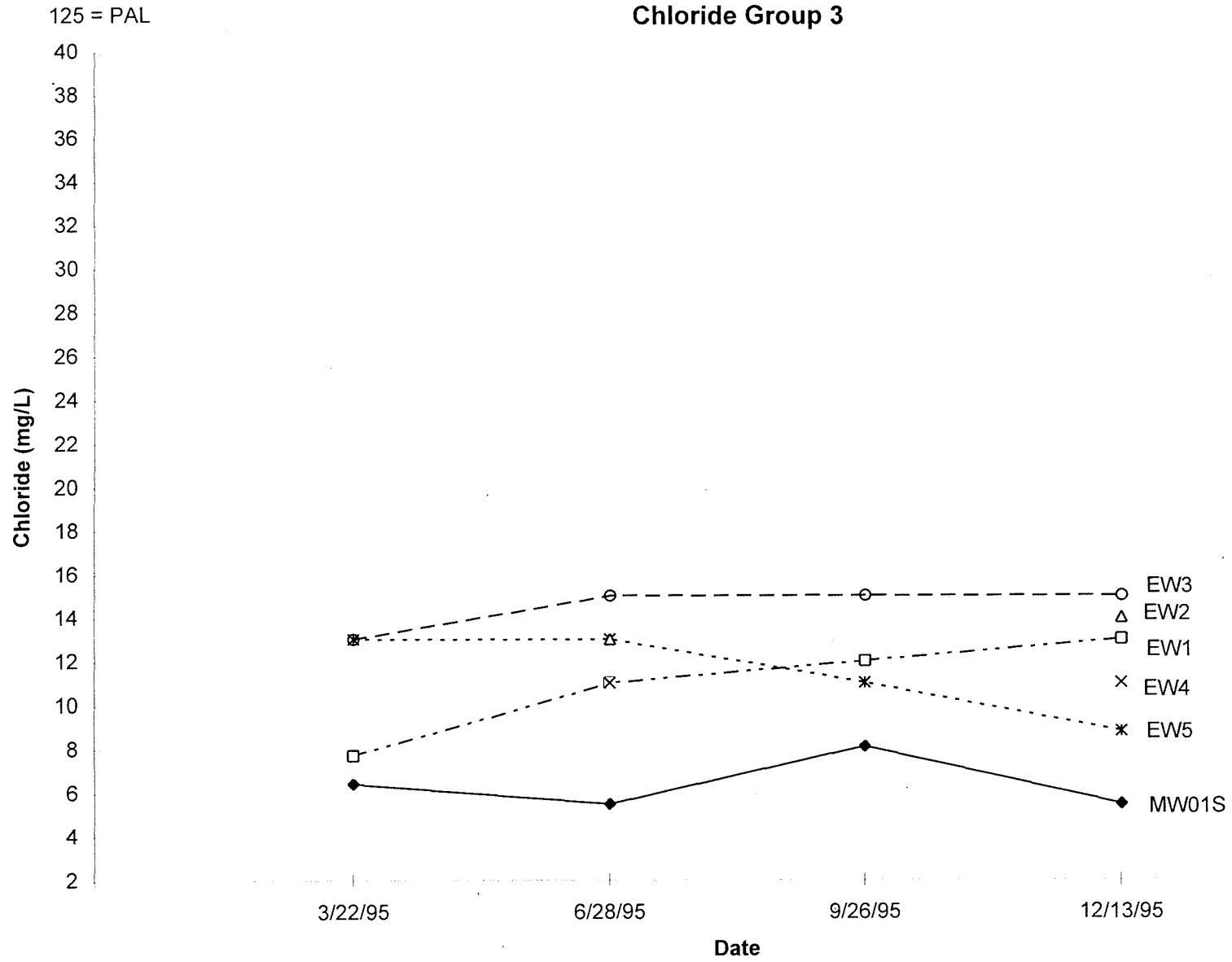


125 = PAL

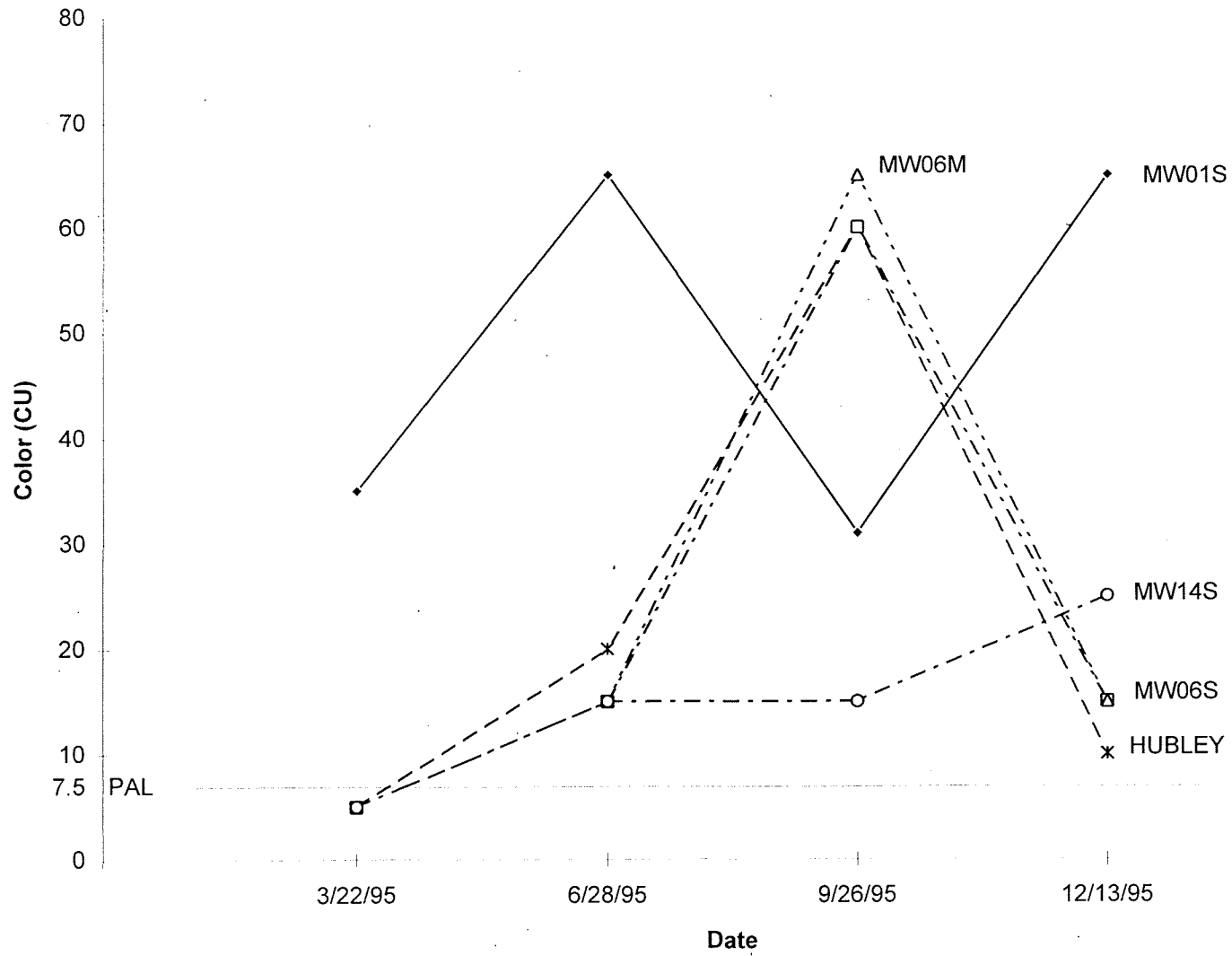
Chloride Group 2



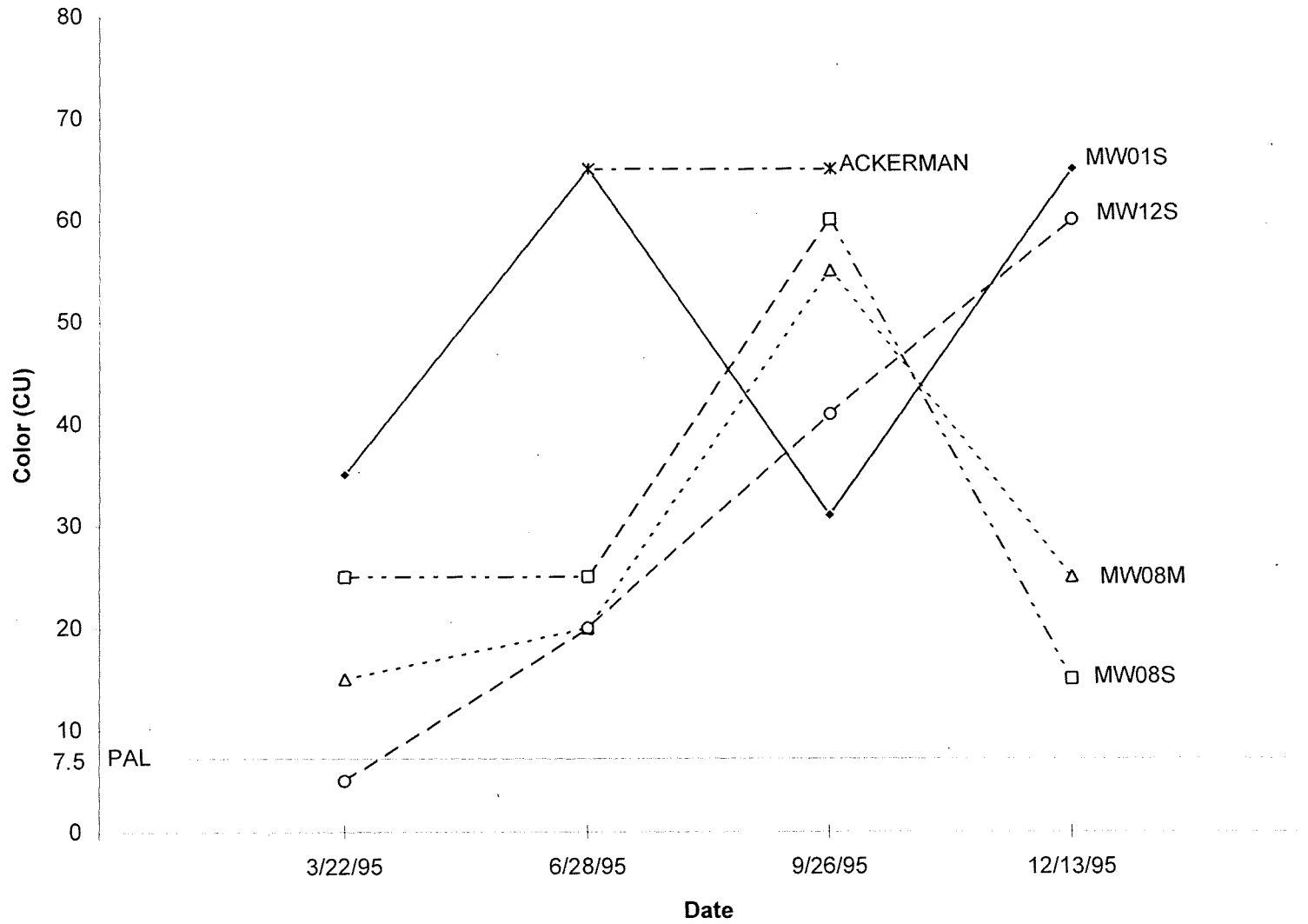
Chloride Group 3



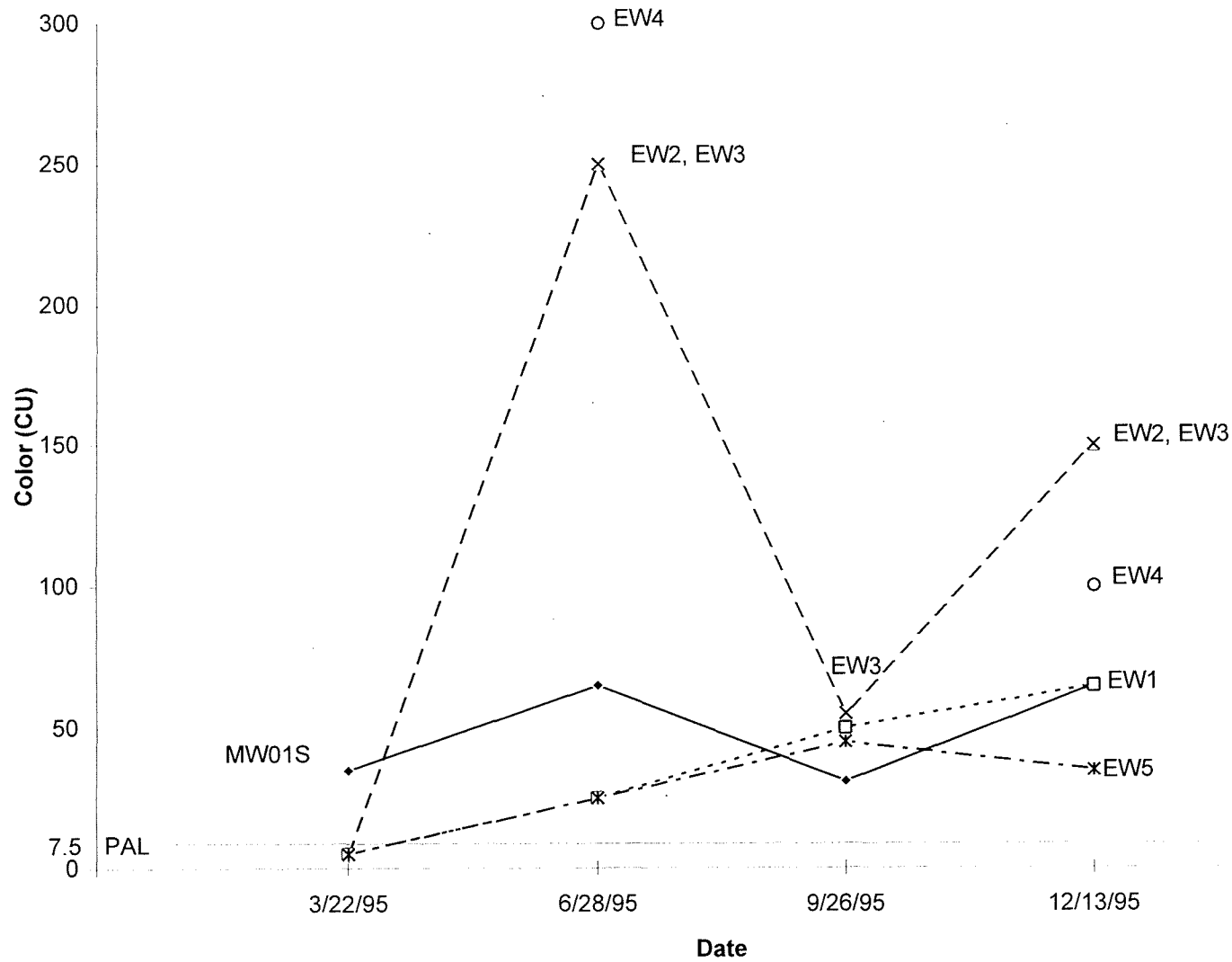
Color Group 1



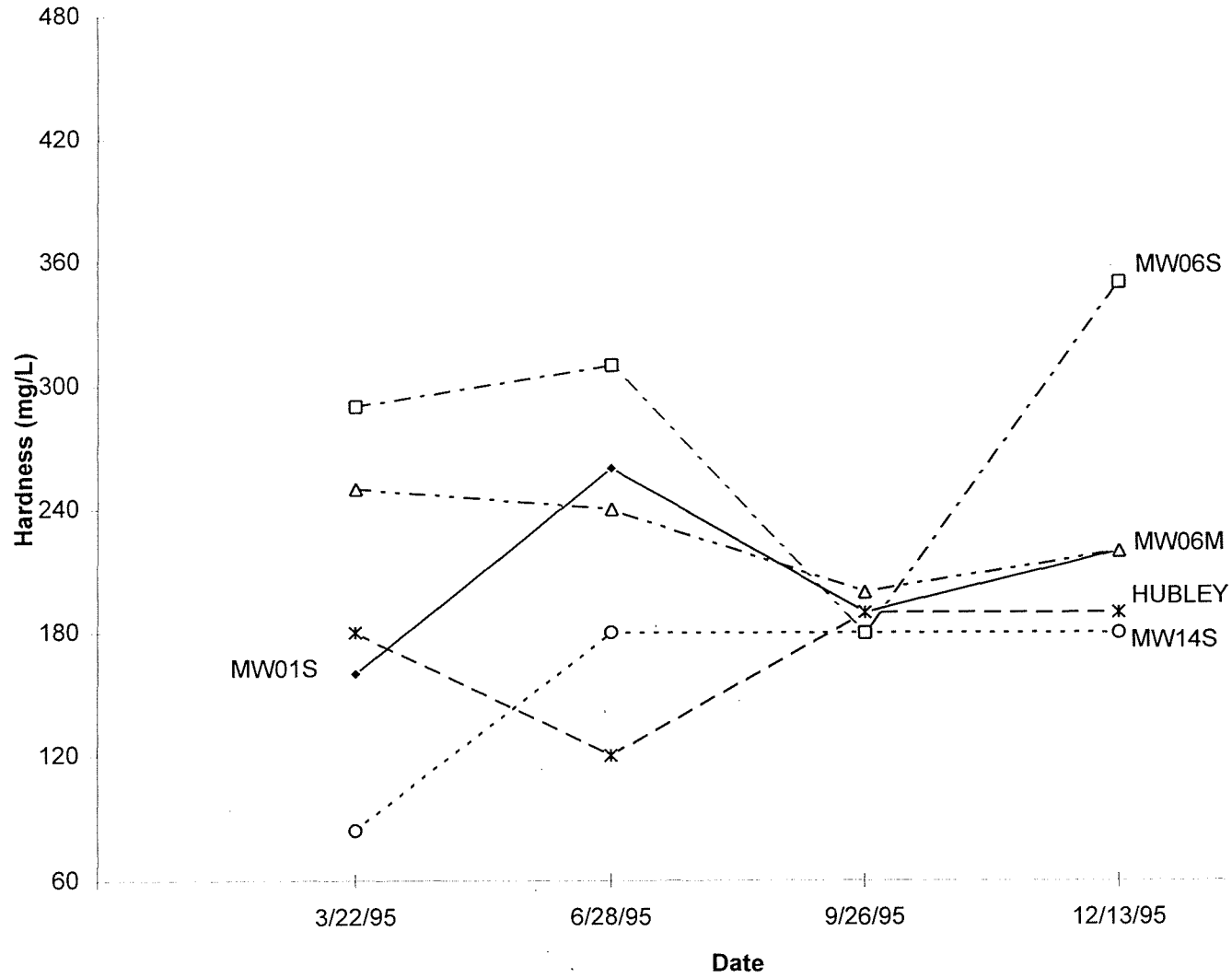
Color Group 2



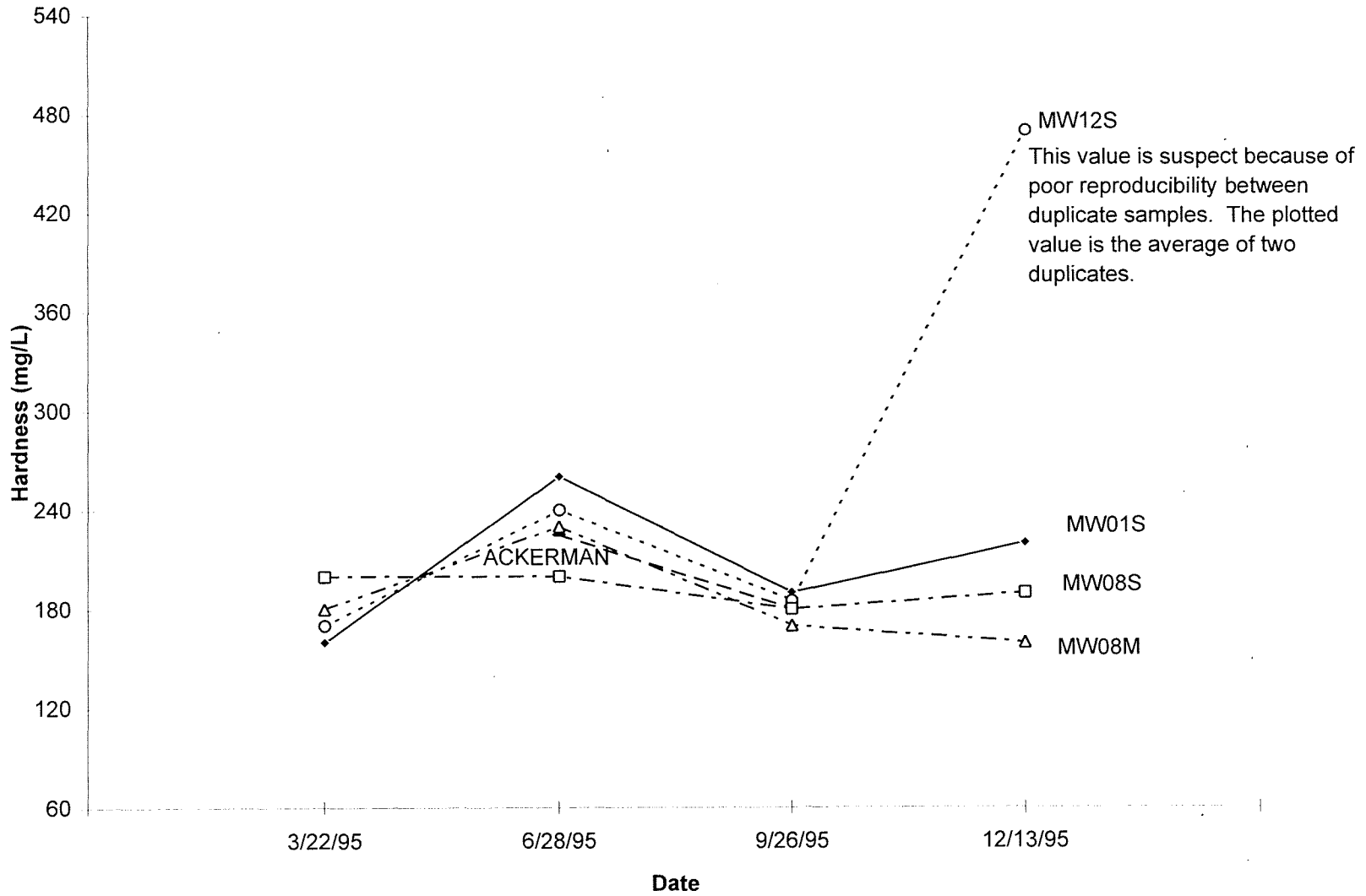
Color Group 3



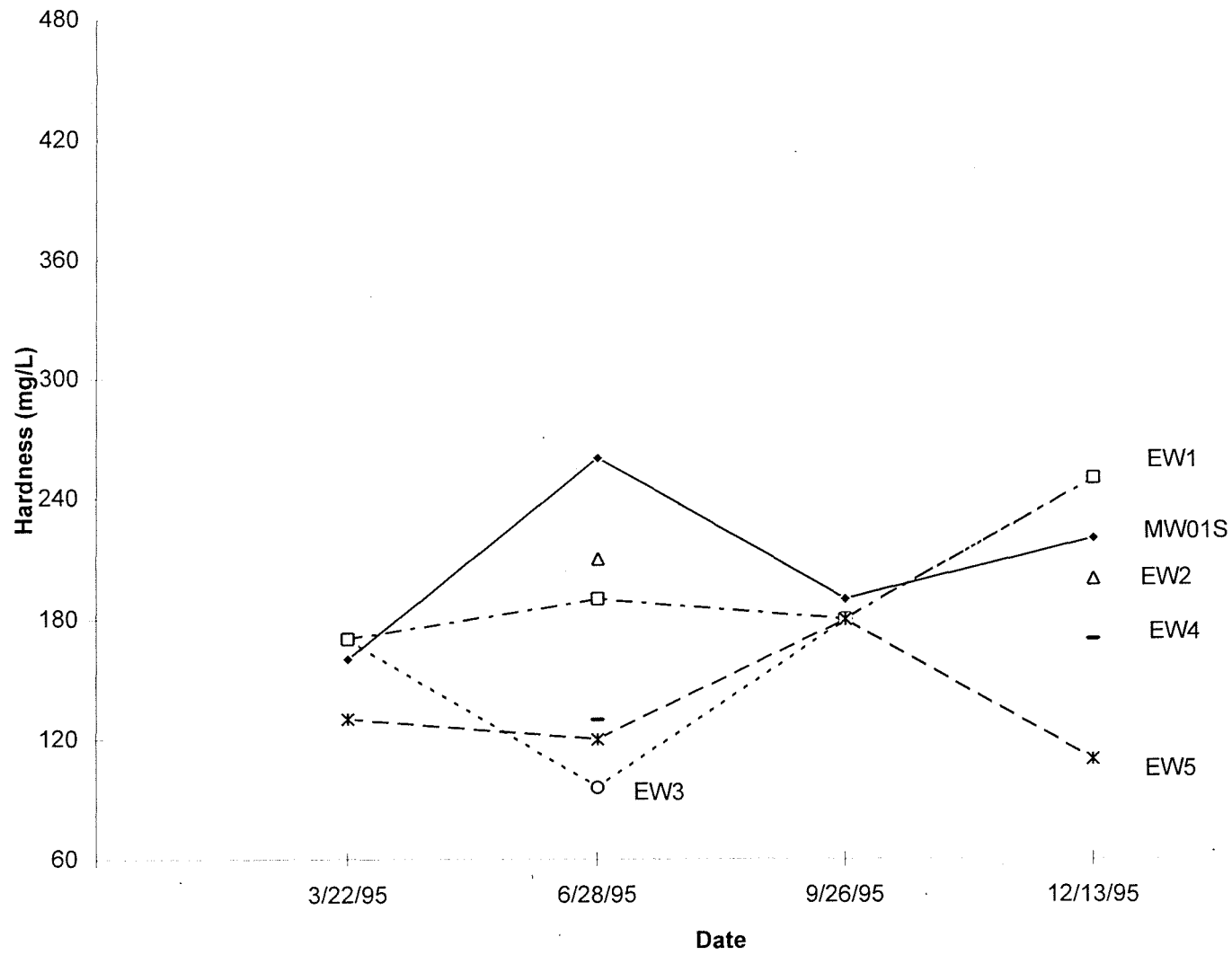
Hardness Group 1



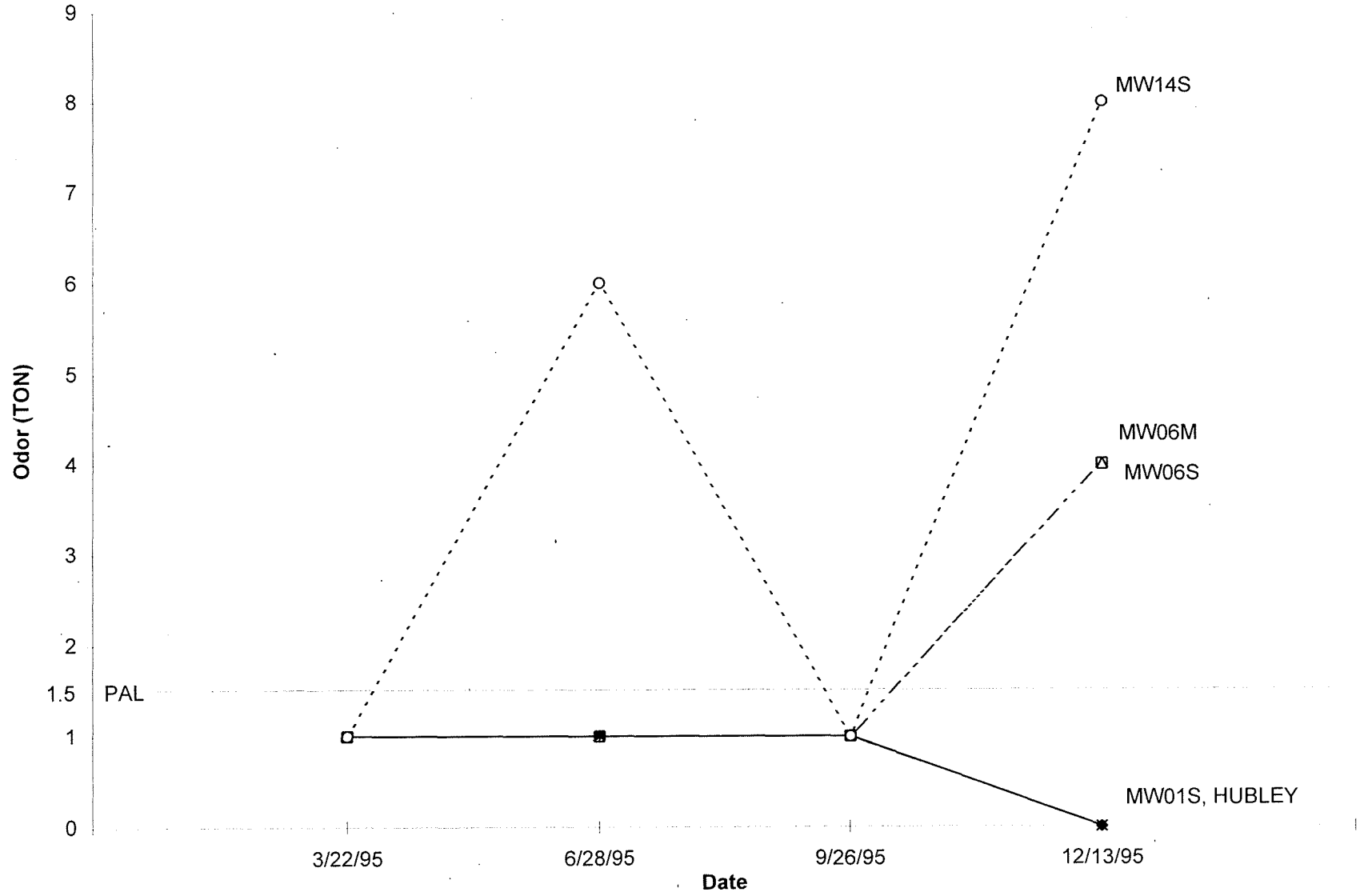
Hardness Group 2



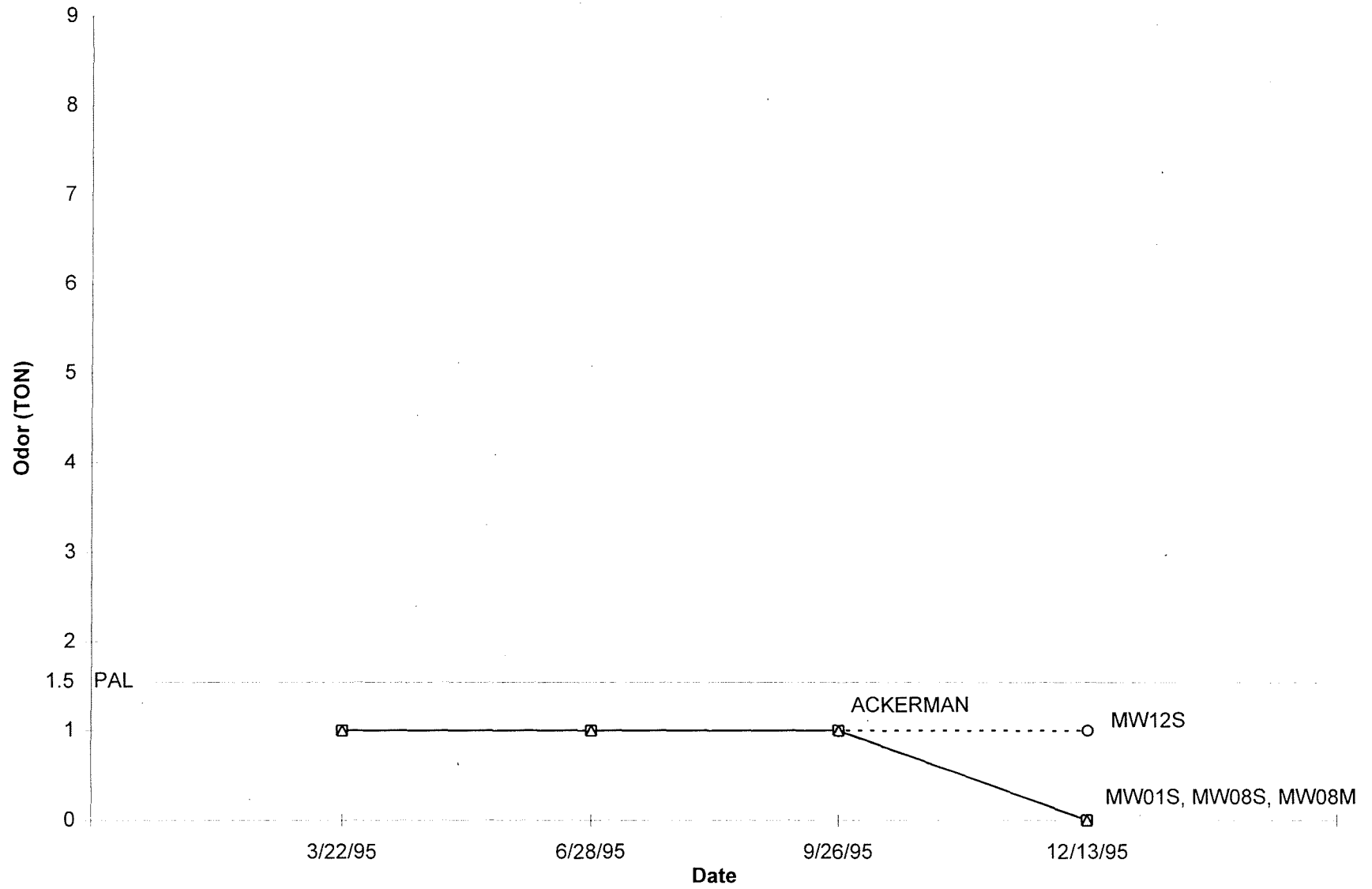
Hardness Group 3



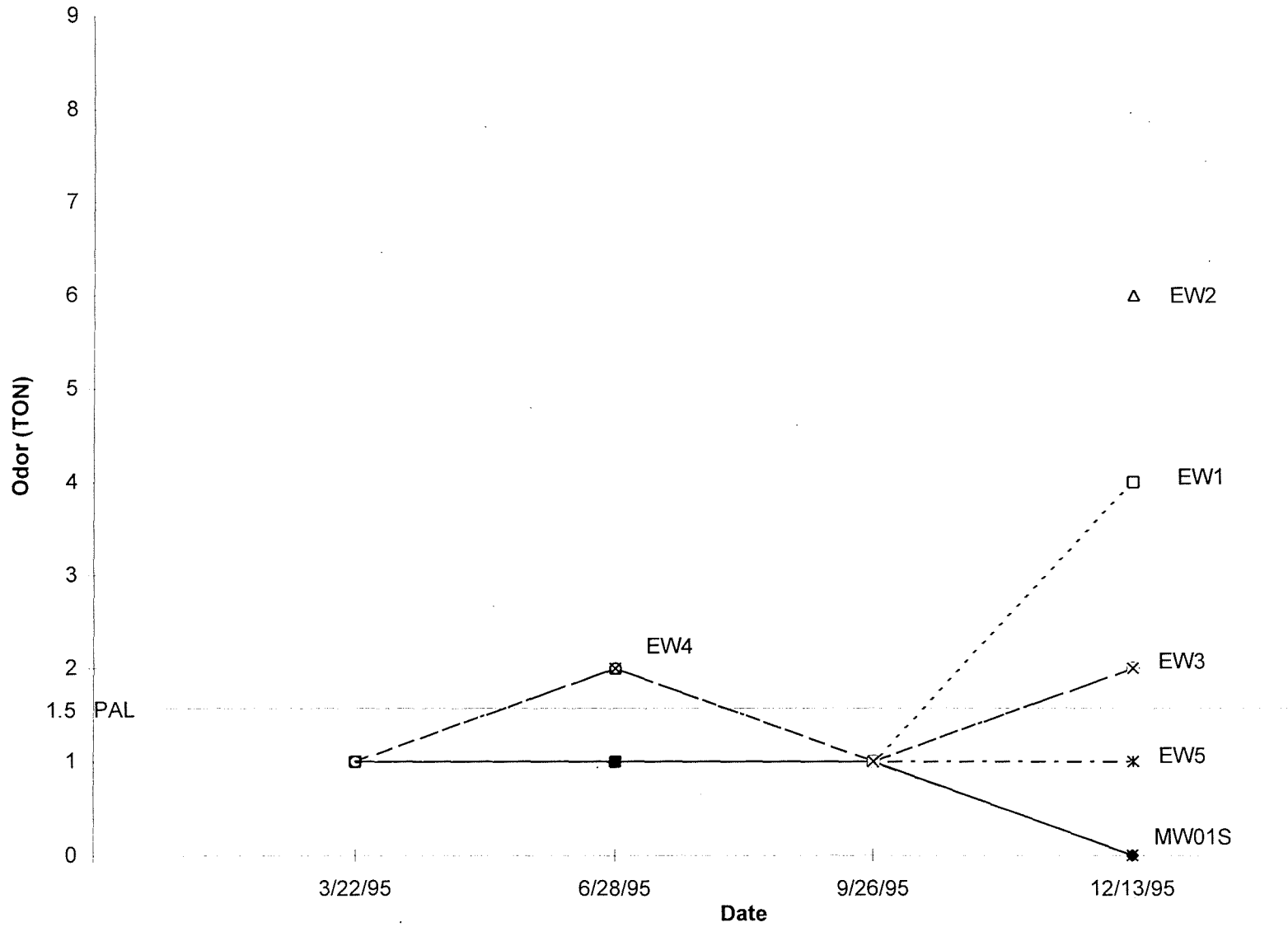
Odor Group 1



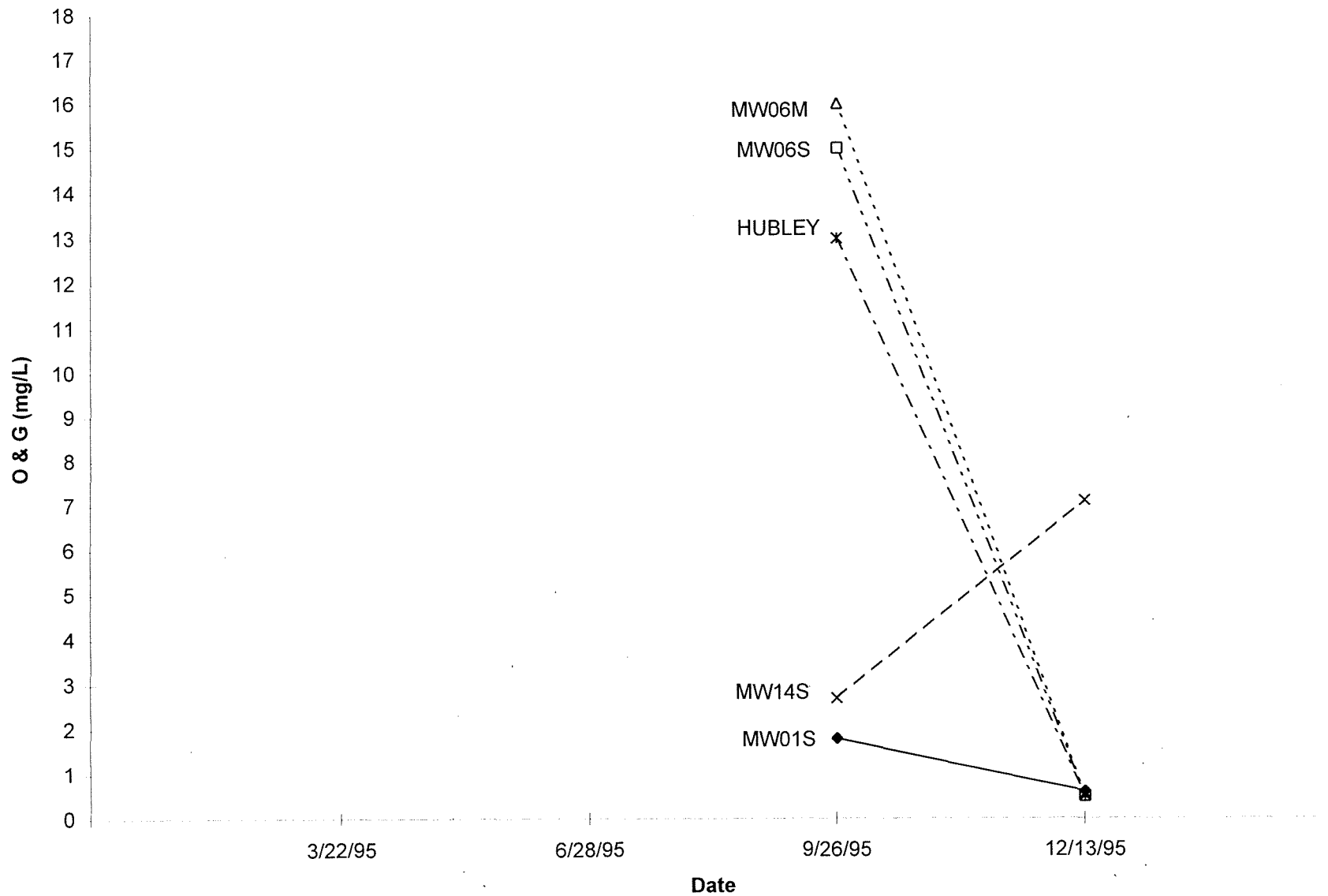
Odor Group 2



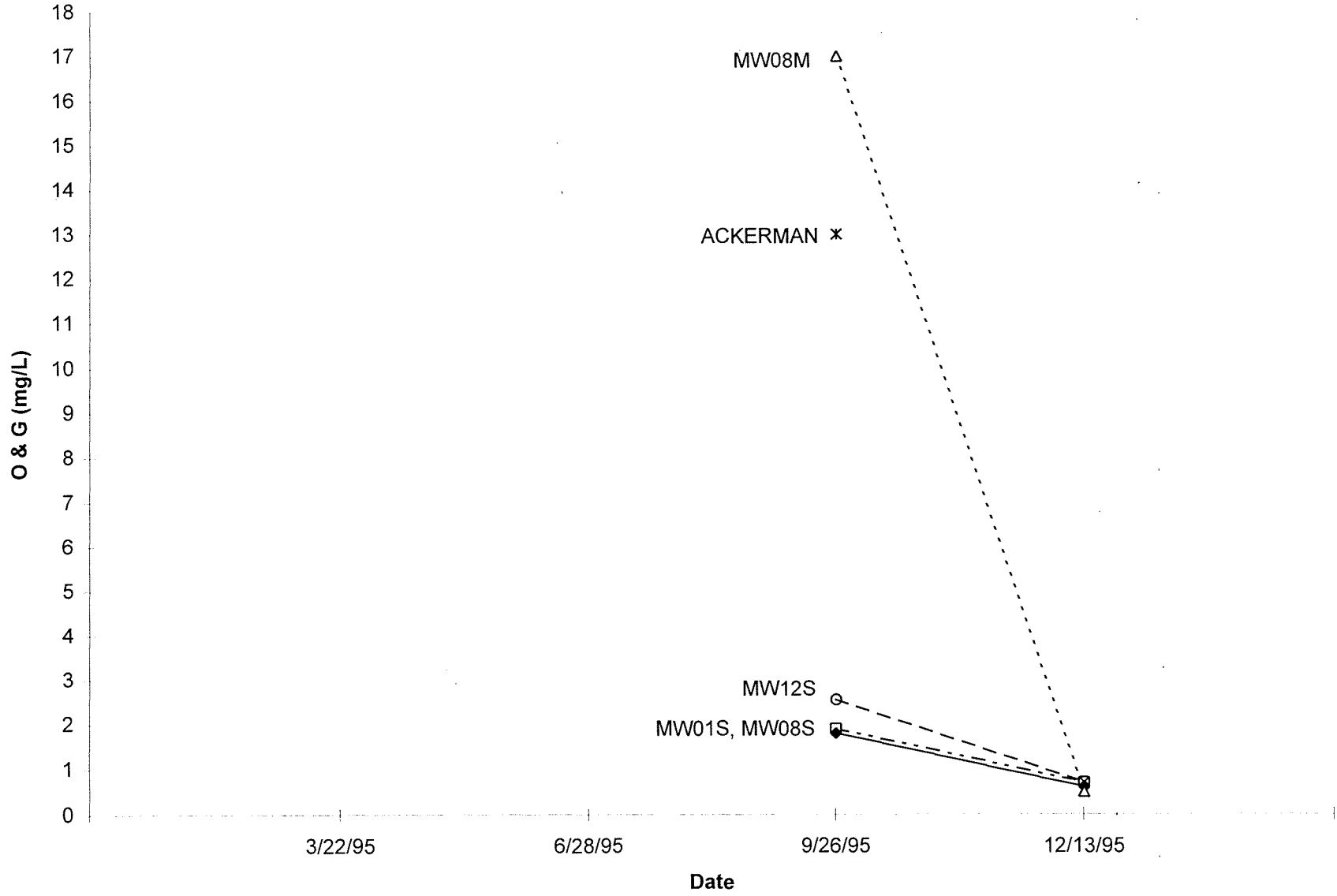
Odor Group 3



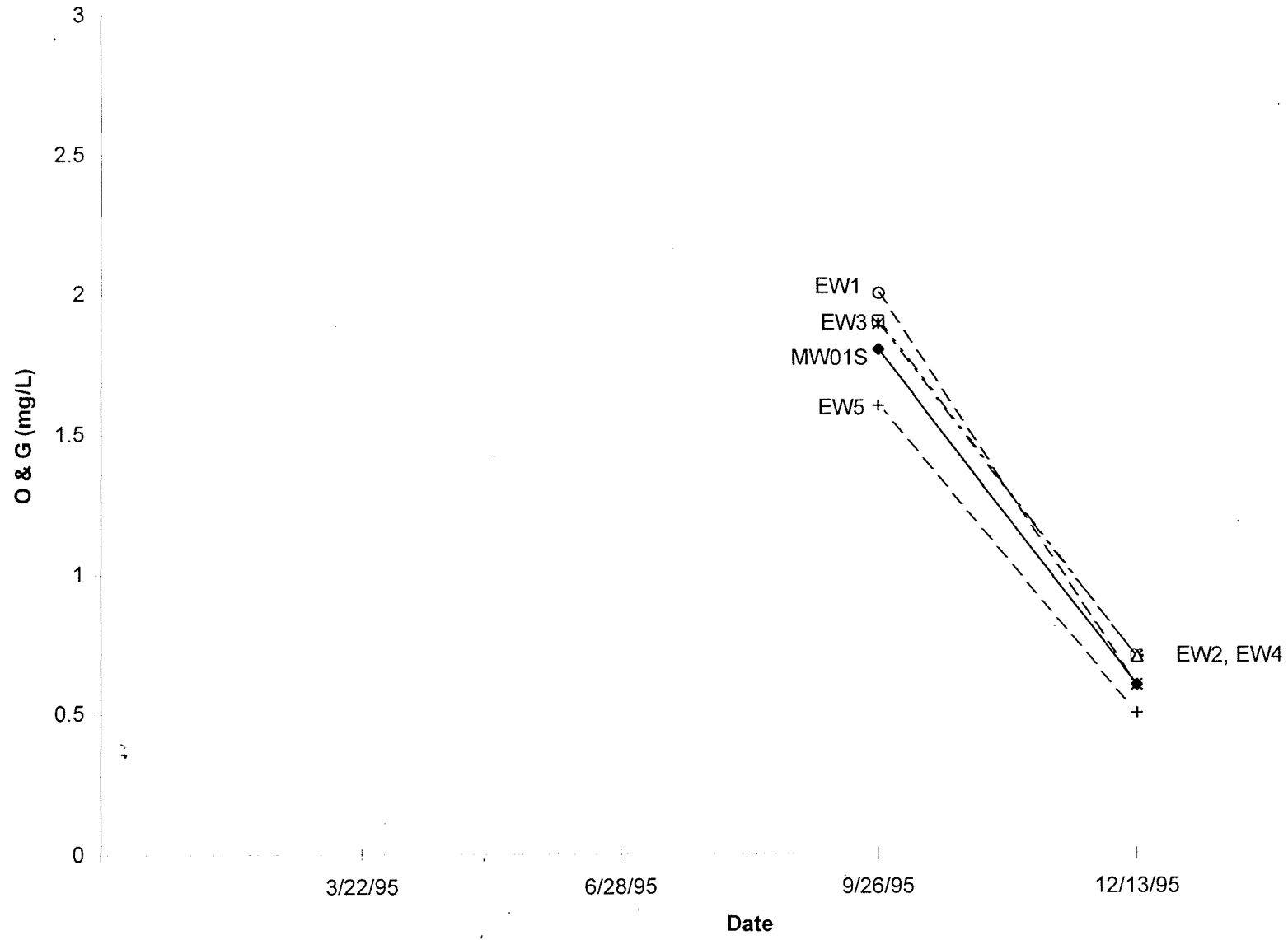
Oil and Grease (O & G) Group 1



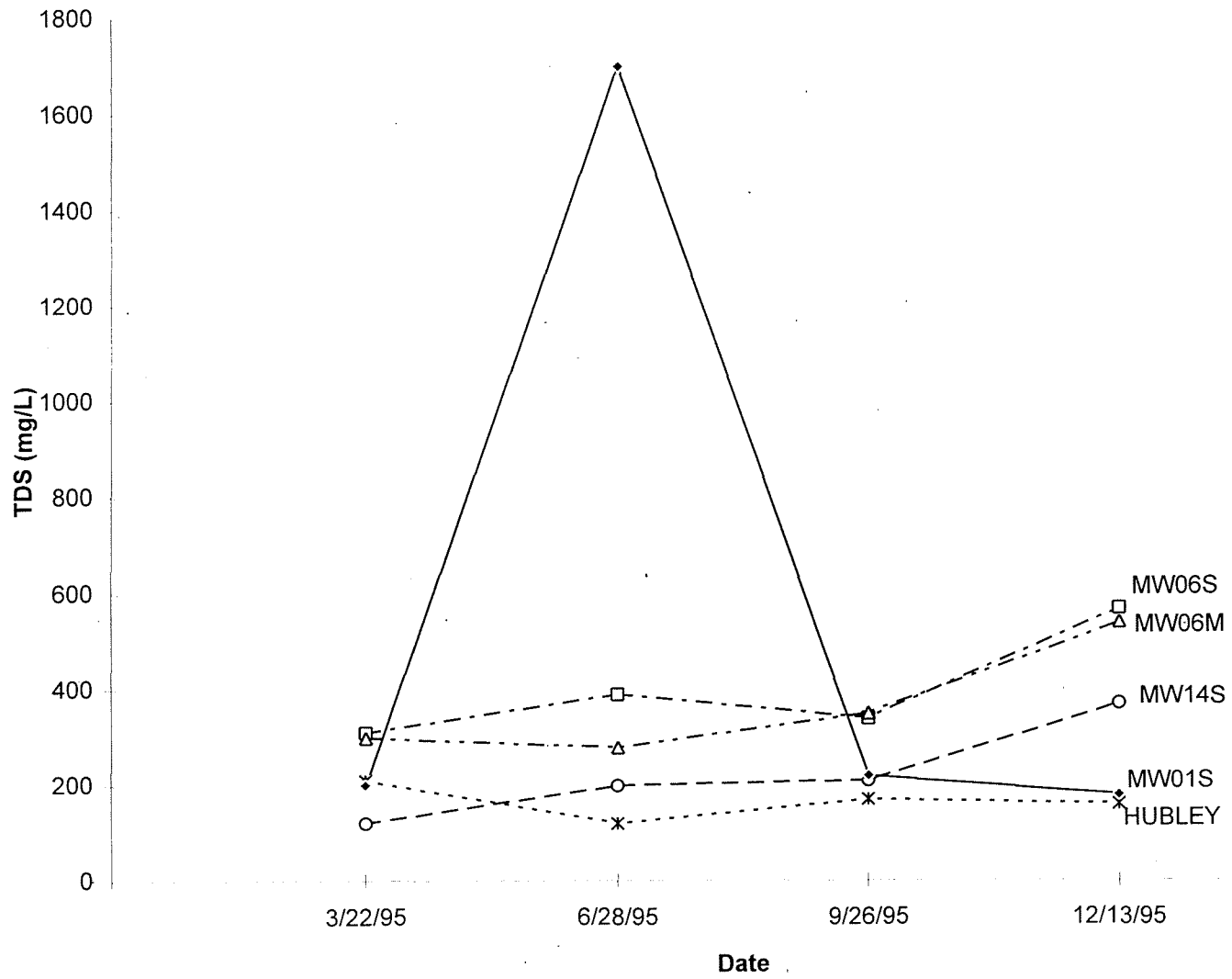
Oil and Grease (O & G) Group 2



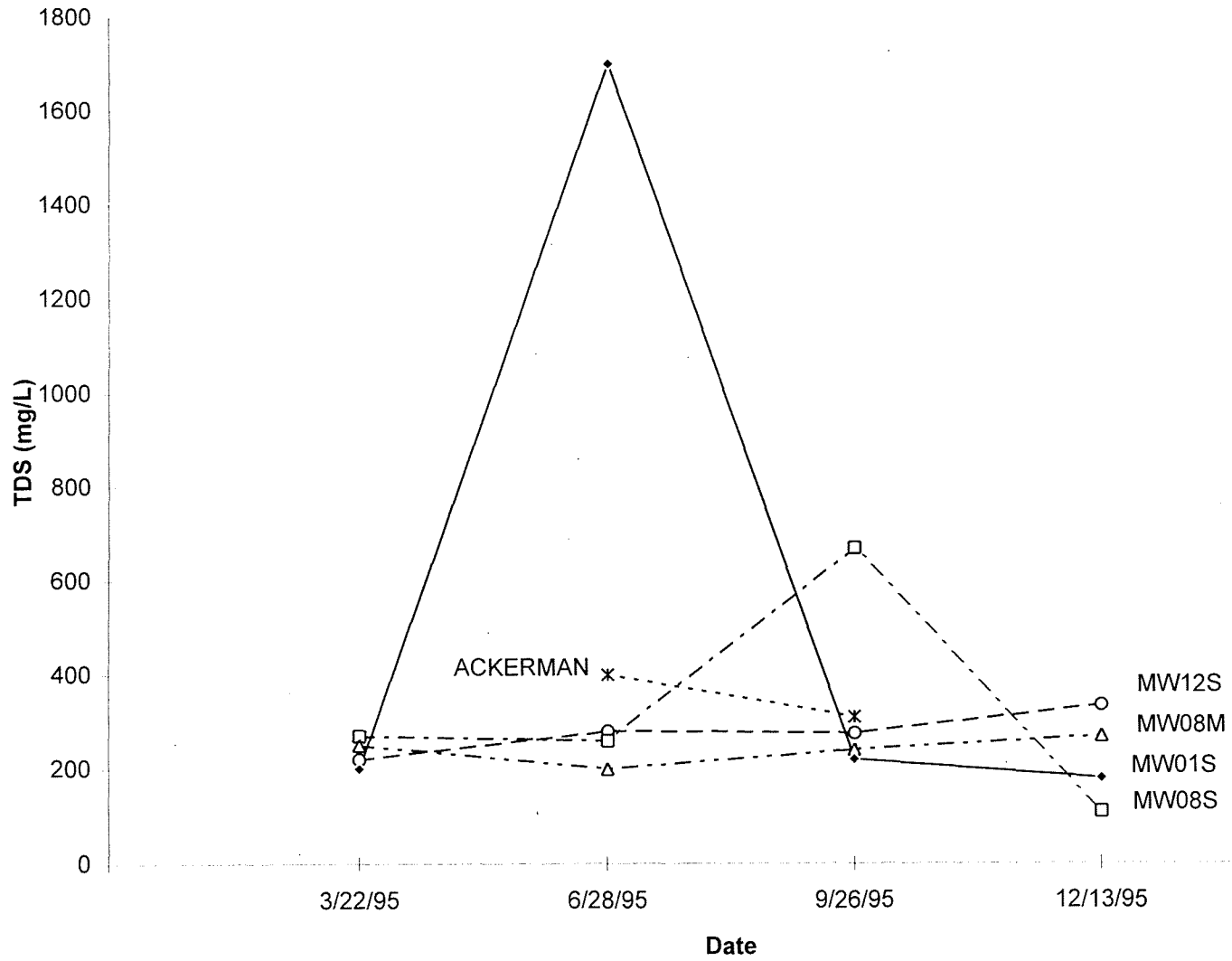
Oil and Grease (O & G) Group 3



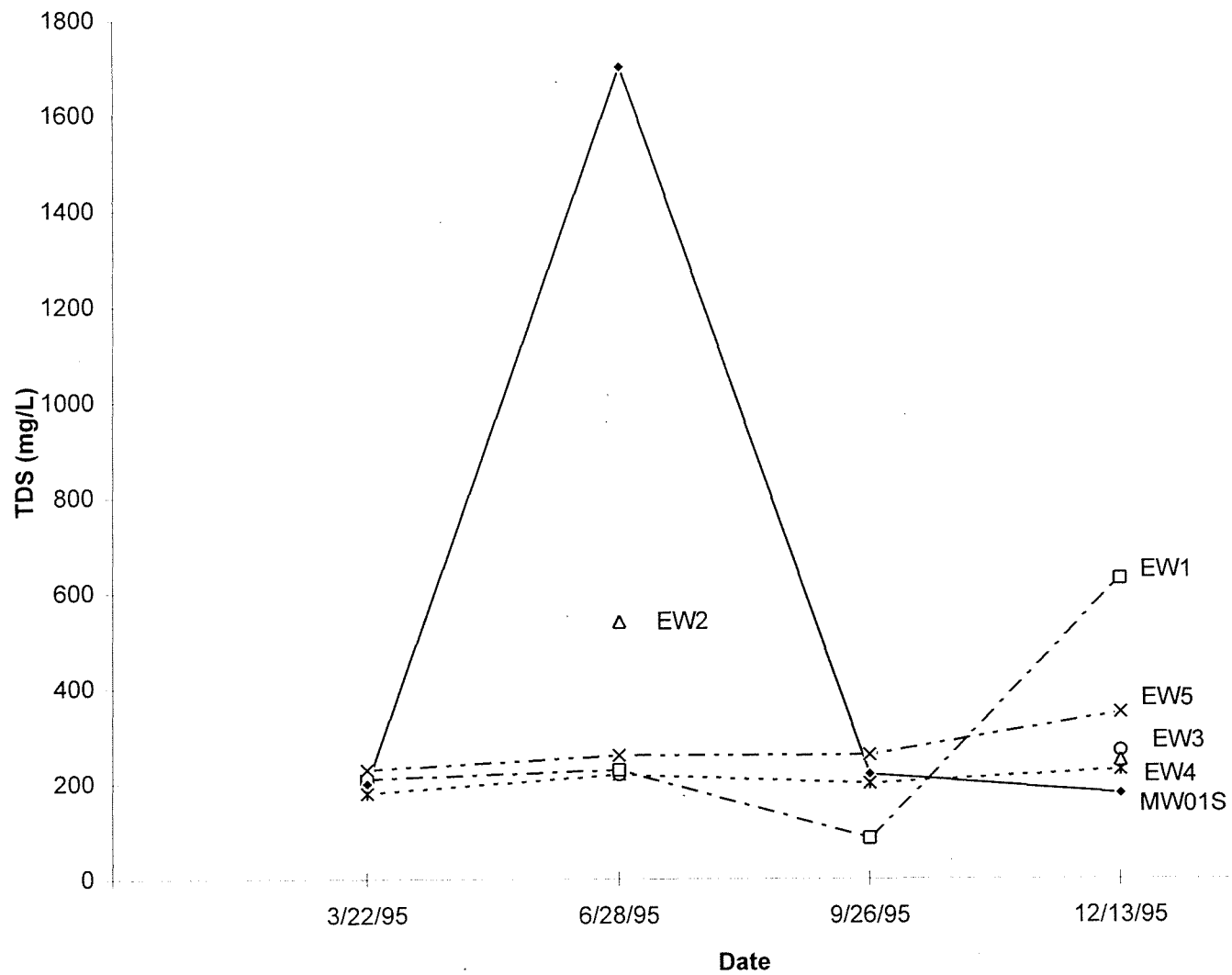
Total Dissolved Solids (TDS) Group 1



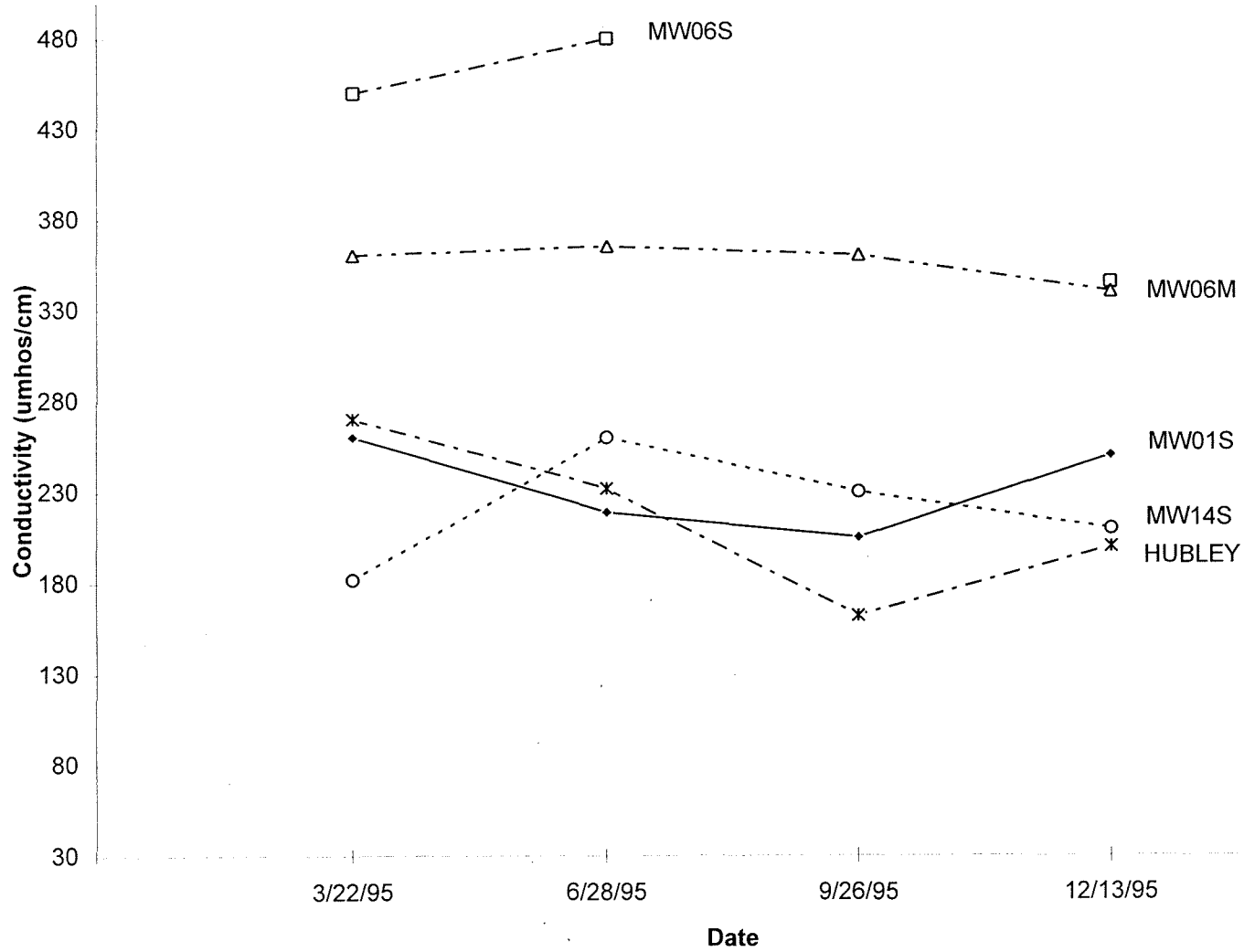
Total Dissolved Solids (TDS) Group 2



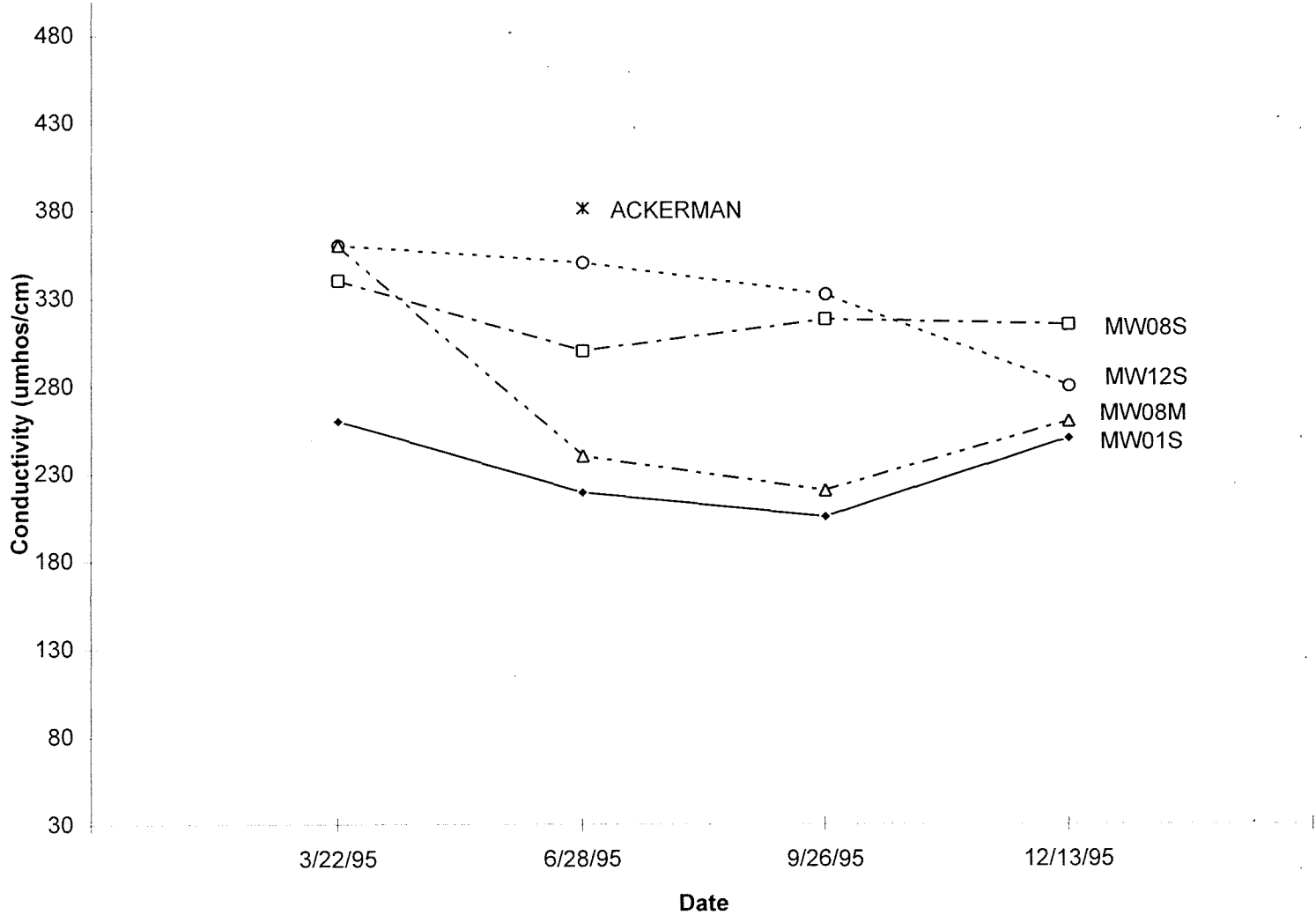
Total Dissolved Solids (TDS) Group 3



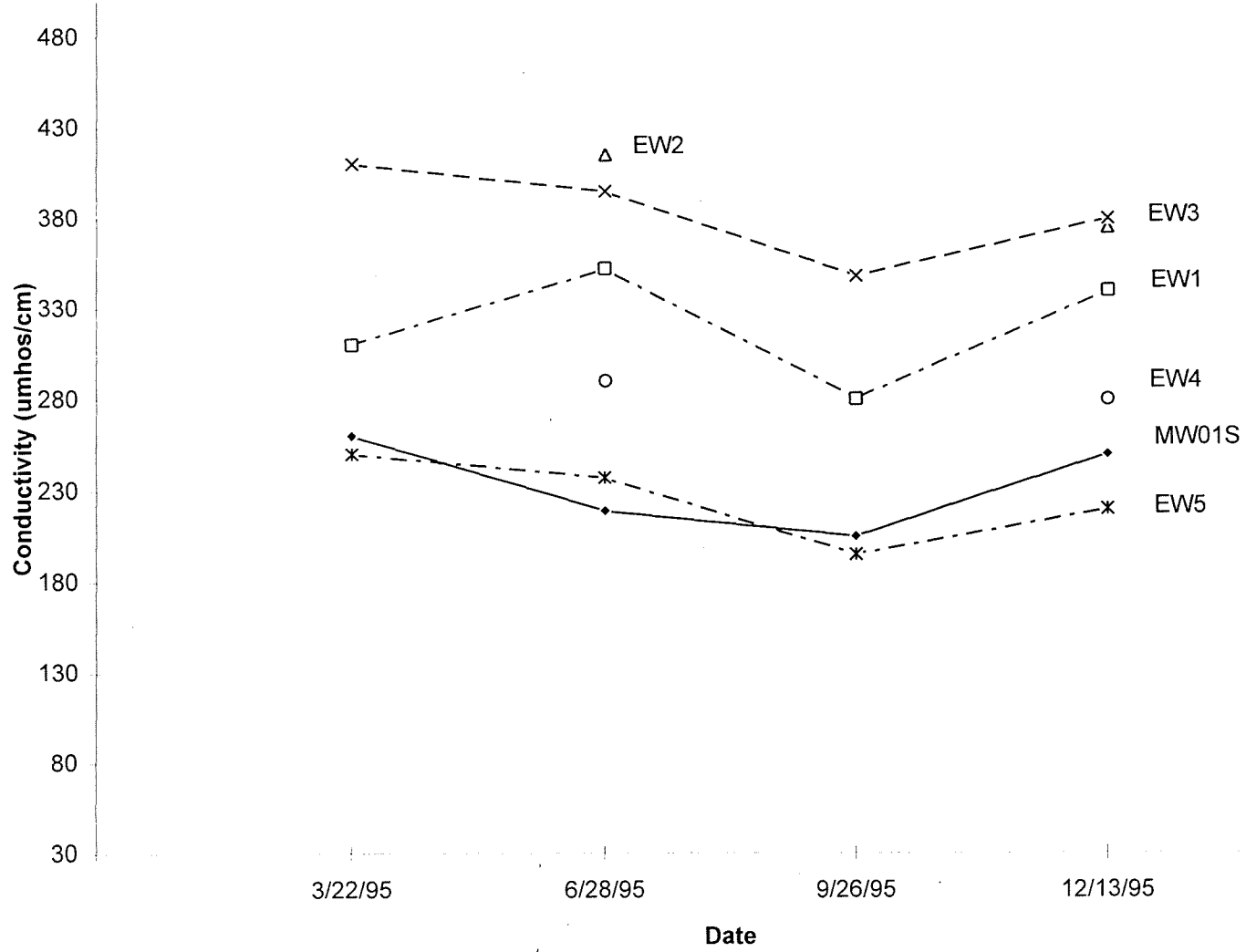
Specific Conductance Group 1



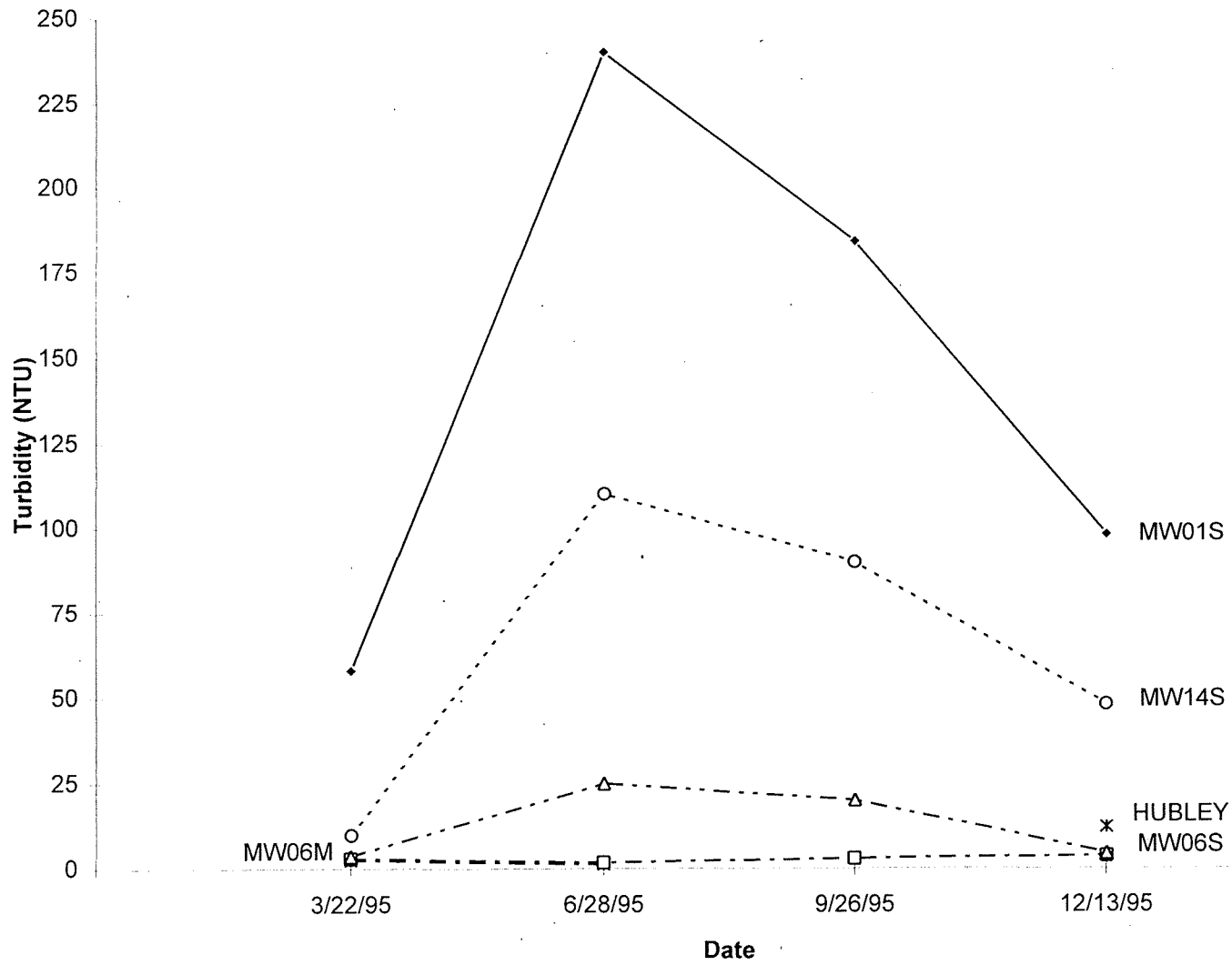
Specific Conductance Group 2



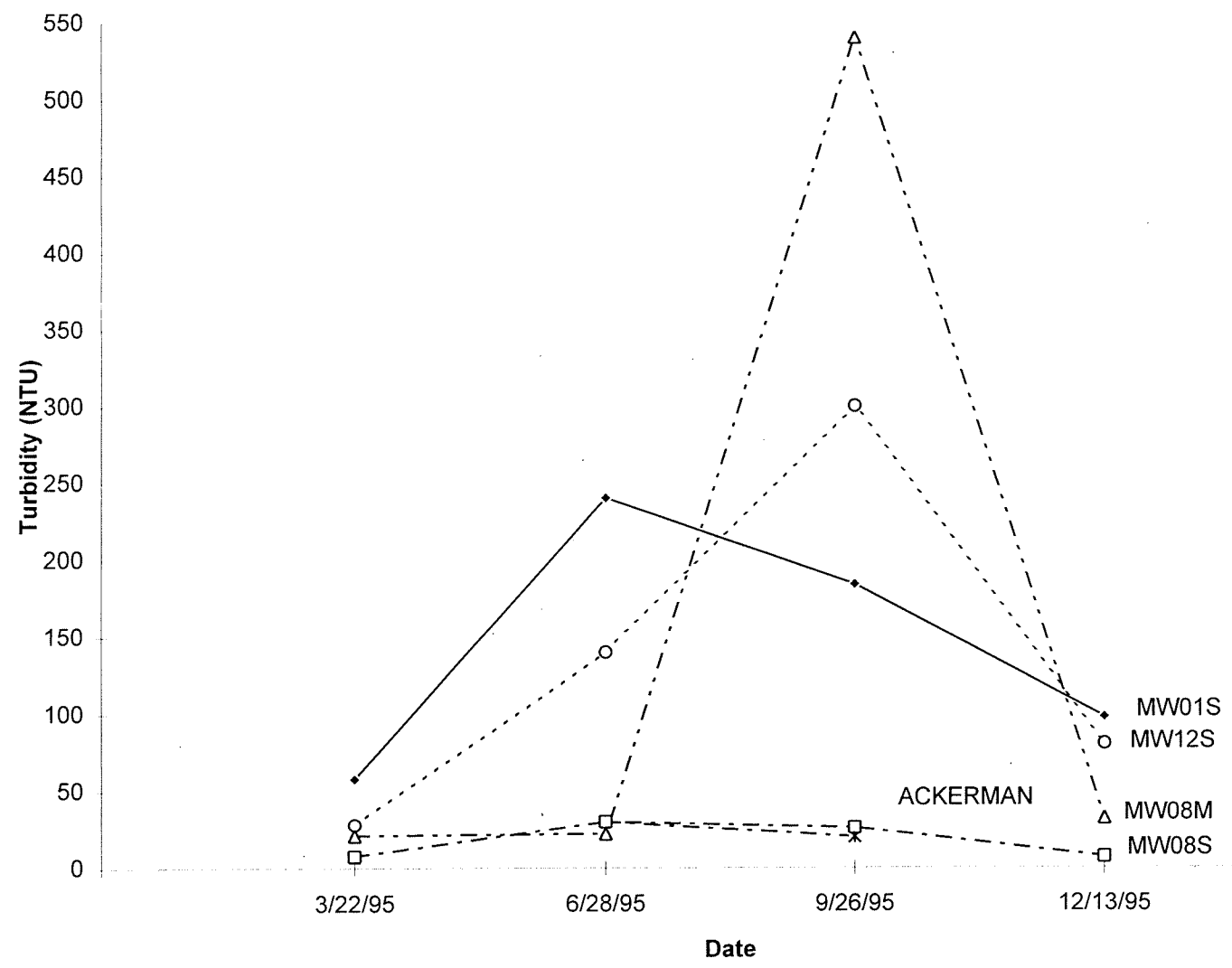
Specific Conductance Group 3



Turbidity Group 1



Turbidity Group 2



Turbidity Group 3

