KENNECOTT GREENS CREEK MINING COMPANY

FRESH WATER MONITORING PROGRAM
ANNUAL REPORT

WATER YEAR 2004

(October 1, 2003 through September 30, 2004)

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DEDICATION

Steve Hutson, who worked as an Environmental Technician from the 1995 through the 2004 Water Year passed away in April -2005 after a valiant fight against lung cancer. During Steve's tenure at Greens Creek he became an integral part of the FWMP program, either through collecting the data in rain, shine, snow and ice or by his thorough follow-up to ensure the data and samples collected in the field were recorded properly for the annual report. Many diverse individuals from Greens Creek, state and federal agencies and private groups interacted with Steve as part of the FWMP. While he may be gone, part of him remains at each sample site and will be there long after the mine is gone.

INTRODUCTION

This annual report for water year 2004 (October 1, 2003 through September 30, 2004) provides the information required by the Fresh Water Monitoring Program (FWMP) for Kennecott Greens Creek Mining Company (KGCMC). It is separated into several sections, the first of which provides general information applicable to the entire program, followed by a comprehensive analysis of the data for each specific site.

To avoid confusion data values reported by the laboratory as being below the Method Detection Limit (MDL) are assigned a value of zero for plotting purposes. This is done so that the values below MDL are visually distinct and thus can be properly interpreted. On several of the graphs presented, changes have occurred in MDL over the period shown. This may lead to the visual impression that an upward trend exists when in fact the older analysis had MDL greater than ambient background levels. For the current water year's data the actual MDLs for non-detect values are listed in each sites table of results in the interpretative discussion of this report. For prior water year's historic MDLs please refer to GPO Appendix 1, Table 8-2.

The monitoring schedule varies from site to site and was modified under the most recent revision of GPO Appendix 1 that was implemented at the start of water year 2002. Different sites are monitored for different analytes on different months of the year. At times throughout the year sites scheduled for sampling may not be available due to weather or more rarely operational reasons. Copies of the water year 2004 sampling log are included on page 6 of this section and any variations from scheduled sampling events are noted on each site's table of results presented in the interpretive section.

The adjacent table outlines the requested Statistical Information Goals (SIGs) for each site sampled during the 2004 Water Year. A comparison to Alaska Water Quality Standards (AWQS) is required for all sites. In Appendix A the specific water quality criteria used for each comparison are summarized. Trend analysis is carried out by two different methods. The first method is a visual trend analysis for each analyte. For each site sampled a series of time-concentration graphs are constructed for the previous five years of data collected. The second method is a non-parametric statistical method, Mann-Kendall seasonal trend analysis that is routinely done for conductivity, pH, alkalinity, and dissolved zinc. These are the key

Site	Description	AWQS Comparison	Trend Visual	Trend Calc	Calculate Median	Median Comparison
48	Upper GC	x	x	+	x	
6	Middle GC	x	x	+	x	48 vs 6
54	Lower GC	x	x	+	x	6 vs 54
49	Upper Bruin Crk	x	x	+	x	
46	Lower Bruin Crk	x	x	+	x	49 vs 46
13	1350 Audit	x	x	+	x	
57	MW-23-00-03	x	x	+	x	
56	MW-D-00-01	x	x	+	x	57 vs 56
58	MW-T-00-01C	x	x		x	**
27	MW-2S	x	x		x	**
29	MW-3S	x	x		x	**
32	MW-5S	x	x		x	**
59	MW-T-00-1A	x	x		x	**
28	MW-2D	x	x		x	**

+: Addional statitical trend analysis done for conductivity, pH, alkalinity, dissolved z

**: Insufficiant Data for a robust statistical evaluation parameters along with sulfate that can be strongly affected by ARD. Sulfate was added back into the required list of analytes in the 2002 water year and thus currently there is insufficient data to conduct a robust statistical trend analysis. KGCMC anticipates adding a non-parametric analysis for trend in the sulfate data set in the 2006 water year report for appropriate sites. Median calculation is shown in the annual table of results for each site. Finally, for all down gradient sites that are paired with an upgradient reference site, which are monitored with a frequency greater than 4 times per year, a comparison of medians is presented for each specific site. These down gradient sites (upgradient site in parenthesis) include Site 6 (Site 48), Site 54 (Site 6), Site 46 (Site 49), and Site 58 (Site 57). For each of these sites, the statistical information goals requested a comparison of medians for total alkalinity, pH, conductivity, sulfate and dissolved-zinc. The statistical test utilized is a non-parametric Seasonal Mann-Whitney-Wilcox rank sum test. A brief summary of the two main statistical procedures, the Wilcoxon-Mann-Whitney rank sum test and the Mann-Kendall seasonal trend are given below.

Statistical Tests

The Mann-Kendall seasonal trend test is a non-parametric test for zero slope of a linear regression of time-ordered data verse time. Briefly the test consists of tabulating the Mann-Kendall statistic S_k (k=1 to 12, for each month) and its variance VAR(S) for data from each season (month). The S_k statistic is simply the sum of the number of positive differences minus the number of negative differences for time ordered data pairs. Any seasonal trend is removed by only considering data pairs taken within the same month. The individual monthly Mann-Kendall statistics (S_k) are tested for homogeneity of trend which is used to determine if it is reasonable to combine the monthly S_k statistics into an overall annual statistic (ΣS_k). If the test for monthly homogeneity is rejected the annualize statistic is not meaningful. However, the individual monthly Mann-Kendall statistics can still be tested for trend and a Sen's slope estimator can be calculated for each month (noted as Q_m in the interpretive section) with a significant trend.

The advantages of the Seasonal Kendall trend test is that it is a rank-based procedure especially suitable for non-normally distributed data, censored data, data containing outliers and non-linear trends. The null hypothesis (H_0) states that the data(x_1, .., x_n) are a sample of n independent and identically distributed random variables. The trend test statistic Z is used as a measure of trend magnitude, or of its significance. A positive Z value indicates an upward trend while a negative value indicates a downward trend. However, the Z statistic is not a direct quantification of trend magnitude. For trend of significant magnitude a separate statistic, Sen's slope estimator, is calculated by computing the seasonally adjusted (monthly) median value for the slope. For datasets which fail the homogeneity test, individual monthly S_k statistics are compared to a theoretical probability distribution of S derived by Mann and Kendall (Table A18 in Gilbert, 1987). Further guidance and background on these statistical methods can be found in Gilbert (1987) or Helsel and Hirsch (1992).

The Wilcoxon-Mann-Whitney comparison of medians is a non-parametric, rank-sum test. Wilcoxon originally developed the test method in 1945. Mann and Whitney developed an equivalent test at approximately the same time and thus the name Wilcoxon-Mann-Whitney rank-sum test is used. In general terms the rank-sum test is a test for whether one group of data tends to produce larger observations than a second group. The rank-sum test makes no assumptions about the nature of the data distribution and thus is considered more robust when applied to non-normally distributed data sets. The robust nature of the test is critical when applied to the varied distributions typically found in water quality data that commonly include positive skewness, non-normal distributions, censored data due to finite instrument detection limits, seasonality, autocorrelation, and dependence on other uncontrolled variables such as flow rate. All of the aforementioned attributes have been observed in various water-quality data collected under the FWMP.

The rank-sum tests as applied in this report determine if two groups of data come from the same population as measured by the median value. If both groups of data are from the same population, about half of the time an observation from either group could be expected to be greater than a data point from the second data set. Further guidance and background can be found in one of the following references: Section 3.3.3.1 of the EPA document "Guidance for Data Quality Assessment" EPA/600/R-96/084, Gilbert (1987), or Helsel and Hirsch (1992).

Additional Summary Data Tables

KGCMC utilizes a custom-built Microsoft Access database (WDMS) for the storage, retrieval, and utilization of all data collected under the FWMP, as well as many other environmental monitoring programs being conducted at KGCMC. This database incorporates many different report-generating functions, and several of them have been utilized for the preparation of this report. These individual summary reports have a variety of uses, and the terms used within them are generic. The following explanations clarify the terms used and the information contained in the summary reports utilized for the site-specific data analysis.

Qualified Data by QA Reviewer reports are generated to provide a summary for each site section of data limitations found in the monthly QA reviews. They list all data for that site that was qualified by the QA Reviewer for water year 2004 along with the reason for qualification. These data are all included in the data analyses, unless also identified as an outlier in the WDMS Qualified Data Summary.

INTERVENTIONS

This section identifies below any procedural changes, natural phenomena, mine operational changes, or other interventions that could possibly have affected data during water year 2004. Results of any visual data analyses to detect evident effects of these interventions are so indicated.

Prior interventions (and negotiated mid-year program modifications such as changes to laboratories, methods, detection limits, and reporting limits), and anything else which may affect data comparability and quality which occurred during previous water years, are documented in the "General History" section of the FWMP and in previous annual reports.

No flow conditions prohibited sample collection during this water year in the following months at these scheduled sites: Site 46, July 2004 and August 2004.

The 2000 FWMP revision changed the suite of analytes to be monitored and added sulfate into the list of analytes. Through an oversight by KGCMC the addition of sulfate into the suite list was not identified until February 2003 when immediate remedial action was taken. The samples taken during November 2002 through February 2003 were still available at Battelle Marine Sciences Laboratory that has been the laboratory utilized for sample analyses since October 1996. The samples were sent to Analytica Alaska for sulfate analyses since Battelle does not have the necessary instrumentation for this analyte. The sulfate concentrations for the prior month's samples were determined on March 12, 2003 and reported to KGCMC. Sulfate has a twenty-eight day holding time and thus all the data collected prior to that time are qualified for expired periods. For the remainder of the 2003 water year sulfate samples were routinely collected and analyzed as per the methods and procedures outlined in the FWMP program. For the 2004 water year, all scheduled sulfate samples were taken and analyzed as described in GPO Appendix 1.

MID-YEAR MODIFICATIONS

No other mid-year modifications occurred during water year 2004.

FWMP SAMPLE LOG

Water Year October 2003 Through September 2004

Annual Water Quality Monitoring Schedule-Laboratory Samples

Site	Site Name	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
6	Middle Greens Creek	10-9 P	11-6 P	12-17 Q	1-14 P	2-11 Q	3-23 P	4-27 P	5-19 P	6-16 P	7-20 7-21 P,R	8-19 P	9-22 P
9	Tributary Creek-Lower										7-21 R		
13	Mine Adit Discharge East	10-9 Q	11-6 Q					4-27 Q	5-19 Q	6-16 Q	7-20 Q	8-19 Q	9-22 Q
27	Monitoring Well 2S								5-18 Q				9-21 Q
28	Monitoring Well 2D								5-18 Q				9-21 Q
29	Monitoring Well 3S								5-18 Q				9-21 Q
32	Monitoring Well 5S								5-18 Q				9-21 Q
46	Lower Bruin Creek	10-9 P	11-6 P	12-17 Q	1-14 P	2-11 Q	3-23 P	4-27 P	5-19 P	6-16 P	7-20 P	8-19 P	9-22 P
48	Upper Greens Creek	10-9 P	11-6 P	12-17 Q	1-14 P	2-11 Q	3-23 P	4-27 P	5-19 P	6-16 P	7-20 7-22 P,R	8-19 P	9-22 P
49	Control Site Upper Bruin Creek	10-9 P	11-6 P	12-17 Q	1-14 P	2-11 Q	3-23 P	4-27 P	5-19 P	6-16 P	7-20 P	8-19 P	9-22 P
54	Greens Creek below D-Pond	10-9 P	11-6 P	12-17 Q	1-14 P	2-11 Q	3-23 P	4-27 P	5-19 P	6-16 P	7-20 P	8-19 P	9-22 P
56	Monitoring Well -D-00-01	10-9 Q	11-6 Q					4-27 Q	5-19 Q	6-16 Q	7-20 Q	8-19 Q	9-22 Q
57	Monitoring Well -23-00-03	10-9 Q	11-6 Q					4-27 Q	5-19 Q	6-16 Q	7-20 Q	8-19 Q	9-22 Q
58	Monitoring Well -T-00-01C								5-18 Q				9-21 Q
59	Monitoring Well -T-00-01A								5-18 Q				9-21 Q

Key	Description
Sample Date Suite	
Sample Date Suite	Monthly Field Blank taken at this site
Sample Date Suite	No Sample taken due to ice
Sample Date Suite	No Sample taken due to lack of access (snow).
Sample Date Suite	No Sample taken due to lack of flow

SAMPLE SUITES

Suite P

(Surface water only)

Conductivity
pH
Temperature
Hardness
Sulfate
Total Alkalinity
Dissolved Arsenic
Dissolved Cadmium
Dissolved Copper
Dissolved Lead
Dissolved Mercury
Dissolved Zinc

Suite Q

(Groundwater and surface water twice a year)

Conductivity
pH
Temperature
Hardness
Sulfate
Total Alkalinity
Dissolved Arsenic
Dissolved Barium
Dissolved Cadmium
Dissolved Chromium
Dissolved Copper
Dissolved Lead
Dissolved Mercury
Dissolved Nickel
Dissolved Selenium
Dissolved Silver
Dissolved Zinc

PERSONNEL INVOLVED

USFS

Susan Malthaller,, Monument Manager
USFS
Pete Griffen, JRD Ranger
USFS
Jeff Defreest
USFS
Steve Hohensee
USFS
David Cox
USFS
Pete Schneider
USFS
Laurie Thorpe
USFS

KGCMC

Rich Heig, General Manager
KGCMC
Bill Oelklaus, Environmental Manager
KGCMC
Kerry Lear, Geologist
KGCMC
Steve Hutson, Environmental Technician
KGCMC
Ted Morales, Environmental Technician
KGCMC
Jim Akins, Environmental Technician
KGCMC
Pete Condon, Geochemist
KGCMC

Biomonitoring

James Durst
ADNR
Alan Townsend
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James Cariello
ADNR
Laura Jacobs
ADNR
William Morris
ADNR
Robert McLean
ADNR
Jack Winters
ADNR
Nora Foster
Private Contractor
Dr. Joe Margraf
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Laboratory and Data Review

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Environmental Synectics, Inc.
Evin McKinney , Senior Scientist
Environmental Synectics, Inc.
Leticia Sangalang, Senior Scientist
Environmental Synectics, Inc.
Linda Bingler, Project Coordinator
Battelle Marine Sciences Laboratory
Sally Wanstall, Project Manager
Analytica Alaska

USF&WS

Deborah Rudis
USFWS

PROPOSED PROGRAM MODIFICATIONS

No modifications are proposed at this time.

BIBLIOGRAPHY

Environmental Protection Agency (1998). *EPA Guidance for Data Quality Assessment.* EPA QA/G-9, EPA/600-R-96/084.
U.S. Environmental Protection Agency, Office of Research and Development, Washington, D.C. 219 pp.

Gilbert, Richard O. (1987). *Statistical Methods for Environmental Pollution Monitoring.* Van Nostrand Reinhold, New York. 320 pp.

Helsel, D.R., and Hirsch, R.M. (1992). *Statistical methods in water resource.* Elsevier Publishers, Amsterdam. 510 pp.

INTERPRETIVE REPORT
SITE 48 "UPPER GREENS CREEK"

The data collected during the current water year are listed in the following "Table of Results for Water Year 2004" report. The table includes all the data, field and lab, collected for the current water year and a series of flags keyed to the summary report "Qualified Data by QA Reviewer". The QA report lists any associated data limitations found during the monthly QA reviews of laboratory data for this site. Median values for all analytes have been calculated and are shown in the right-most column of the table of results. Any value reported as less than MDL has been replaced with a value of zero for the purpose of median calculation.

All data collected at this site for the past five years are included in the data analyses with the exception of one outlier shown on the table below. During the current year no data points were flagged as outliers.

Sample Date	Parameter	Value	Qualifier	Notes
12/5/2001	Cond Field, umho	37.0	RR	Suspected field instrument malfunction

The data for water year 2004 have been compared to the strictest fresh water quality criterion for each applicable analyte. No results exceeding these criteria have been identified as listed in the table below.

Sample Date	Parameter	Value	Standard	Standard Type
No exceedances have been identified by KGCMC for the period of Oct-03 though Sept-04.				

X-Y plots have been generated to graphically present the data for each of the analytes requested in the Statistical Information Goals for this site. These plots have been visually analyzed for the appearance of any trend in concentration. No obvious trends are apparent except for a general upward trend in pH from mid-2001 through the end of the current water year. A non-parametric statistical analysis for trend was preformed for conductivity, pH, Alkalinity, and dissolved zinc. Calculation details of the Seasonal Mann-Kendall analyses are presented in detail on the pages following this interpretive section. The table below summarizes the results on the data collected between Oct-98 and Sep-04 (WY1999-WY2004). For data sets with a statistically significant trend ($\alpha<5\%$) a Seasonal-Sen's Slope estimate statistic has also been calculated. The datasets for conductivity and total alkalinity failed the test for seasonal (monthly) homogeneity. Conductivity showed significant upward trends in October (S_k=11, Q_m=6.3 umhos/cm•yr) and June (S_k=11, Q_m=3.8 umhos/cm•yr) and a significant downward trend in September (S_k=-11, Q_m=-3.5 umhos/cm•yr). Total Alkalinity showed significant upward trends in June (S_k=12, Q_m=2.7 ml/L•yr), July (S_k=11, Q_m=3.2 mg/L•yr) and August (S_k=13, Q_m=3.0 mg/L•yr) and a significant downward trend in

		Mann-Kendall test statistics			Sen's slope estimate	
Parameter	n*	Z	Trend	a**	Q	Q(%)
Conductivity, Lab	6	Fails monthly homogenity test (p=0.002)				
pH, Lab	6	3.00	+	**0.999**	0.07	0.9
Alkalinity, Total	6	Fails monthly homogenity test (p=0.002)				
Zinc, Dissolved	6	1.66	+	**0.951**	0.08	3.3

*: Number of years **:Significance level

January (S_k=-11, Q_m=-4.8 mg/L•yr). Since Site 48 is a background reference site, natural variation is the most probable cause given the mixture of trend directions and magnitudes. The visual trend in pH is confirmed by the Seasonal Mann-Kendall analyses with a significant (p=0.999) upward trend of 0.07 su/yr over the last 6 years. Dissolved zinc also has a statistically significant trend (p=0.951) and the Sen's slope estimate is 0.08 $\mu g \cdot L^{-1} \cdot yr^{-1}$ or an 5% upward trend over the last 6 years. Given the low absolute magnitudes of the change in pH and dissolved zinc and the fact that Site 48 is used as a background reference, these changes are also considered due to natural variation.

Table of Results for Water Year 2004

Site48 "Upper Greens Creek"

Sample Date/Parameter	10/9/2003	11/6/2003	12/17/2003	1/14/2004	2/11/2004	3/23/2004	4/27/2004	5/19/2004	6/16/2004	7/20/2004	8/19/2004	9/22/2004	**Median**
Water Temp (°C)	7.9	1.8	1.6	0.9	2.1	1.1	3.2	5.4	7.4	11.1	12.5	7.8	4.3
Conductivity-Field(μmho)	97	123	141	74	98	128	88	81	83	118	139	94	97
Conductivity-Lab (μmho)	132	129	137	68	100 J	148 J	96	84	86 J	116	136	90	108
pH Lab (standard units)	7.90	7.86	7.79	7.59 J	7.43	7.94	7.89	7.74	7.92 J	8.11 J	7.86	8.17	7.89
pH Field (standard units)	7.11	7.94	7.78	7.54	7.80	7.88	7.79	7.94	7.83	8.03	8.13	7.20	7.82
Total Alkalinity (mg/L)	50.6	51.2	51.6	27.3 J	37.9	53.6	38.1	35.4	39.6 J	45.3	53.5	35.0	42.5
Total Sulfate (mg/L)	13.1	12.8	15.2	5.6	9.0	16.9	7.6	7.3	6.8	12.9	16.0	7.2	10.9
Hardness (mg/L)	65.5	60.5	64.1	33.4	46.8	72.7	47.0	40.1	42.2	55.3	68.7	45.0	51.2
Dissolved As (ug/L)	0.115	0.206	<0.051	0.325 U	0.139 J	0.180	0.165	0.124 J	0.161	0.178	0.262	0.204	0.172
Dissolved Ba (ug/L)			25.9		21.1								23.5
Dissolved Cd (ug/L)	0.054	0.035 J	<0.023 UJ	0.059 J	0.038 J	0.036 J	0.032 J	0.030 J	0.037 J	0.034	0.042	0.028	0.036
Dissolved Cr (ug/L)			0.489		0.189								0.339
Dissolved Cu (ug/L)	0.346	0.268	0.291 U	0.855	0.699	0.369	0.607	0.230	0.340	0.219	0.401	0.610	0.358
Dissolved Pb (ug/L)	0.1180 U	0.0282 J	<0.0110 U	0.0894 U	<0.0110 J	<0.0110 U	0.0146 J	<0.0110	<0.0110	0.0104 U	0.0348 U	0.0139 J	0.0122
Dissolved Ni (ug/L)			0.234		0.617								0.426
Dissolved Ag (ug/L)			<0.009		<0.009 J								0.005
Dissolved Zn (ug/L)	4.91	2.07	2.50 U	3.46 U	2.99 J	2.25 U	2.39 UJ	1.73 UJ	1.78	1.95	2.04 UJ	2.06	2.16
Dissolved Se (ug/L)			1.190 UJ		<0.080 J								0.615
Dissolved Hg (ug/L)	0.000768 J	0.000589 U	0.000810 U	0.003000	0.001700 U	0.000824 U	0.002920	0.000617 U	0.000626 U	0.000812 U	0.000793 U	0.001270 U	0.000811

For individual sample/analyte qualifier descriptions see "Qualified Data by QA Reviewer" table.

Values reported as less than MDL are replaced by 1/2 MDL for median calculation purposes.

Shaded data has been qualified as an outlier by KGCMC and removed from any further analysis and is not included into the calculation of the median

Qualified Data by QA Reviewer

Date Range: 10/01/2003 to 09/30/2004

Site No.	Sample Date	Sample Time	Parameter	Value	Qualifier	Reason for Qualifier
48	01/14/2004	12:16:00 PM				
			pH Lab, su	7.59	J	Hold Time
			Alk Tot, mg/l	27.3	J	Below Quantitative Range
			As Diss, ug/l	0.325	U	Field Blank Contamination, LC
			Cd Diss, ug/l	0.0594	J	Below Quantitative Range
			Pb Diss, ug/l	0.0894	U	Field Blank Contamination
			Zn Diss, ug/l	3.46	U	Field Blank Contamination
48	10/09/2003	2:25:00 PM				
			Pb Diss, ug/l	0.118	U	Field Blank Contamination
			Hg Diss, ug/l	0.000768	J	Duplicate Sample RPD
48	11/06/2003	2:00:00 PM				
			Cd Diss, ug/l	0.0347	J	Below Quantitative Range
			Pb Diss, ug/l	0.0282	J	Below Quantitative Range
			Hg Diss, ug/l	0.000589	U	Field Blank Contamination
48	12/17/2003	12:50:00 PM				
			Cd Diss, ug/l	-0.023	UJ	LCS Recovery
			Cu Diss, ug/l	0.291	U	Field Blank Contamination
			Pb Diss, ug/l	-0.011	UJ	LCS Recovery
			Zn Diss, ug/l	2.5	U	Field Blank Contamination
			Se Diss, ug/l	1.19	UJ	Method Blank Contamination,
			Hg Diss, ug/l	0.00081	U	Field Blank Contamination
48	02/11/2004	1:25:00 PM				
			Cond Lab, umho	100	J	Below Quantitative Range
			As Diss, ug/l	0.139	J	Below Quantitative Range, L
			Cd Diss, ug/l	0.0376	J	Below Quantitative Range
			Pb Diss, ug/l	-0.011	J	Below Quantitative Range
			Ag Diss, ug/l	-0.009	J	Below Quantitative Range
			Zn Diss, ug/l	2.99	J	LCS Recovery
			Se Diss, ug/l	-0.08	J	Below Quantitative Range, L
			Hg Diss, ug/l	0.0017	U	Field Blank Contamination

Qualifier	Description
J	Positively Identified - Approximate Concentration
N	Presumptive Evidence For Tentative Identification
NJ	Tentatively Identified - Approximate Concentration
R	Rejected - Cannot Be Verified
U	Not Detected Above Quantitation Limit
UJ	Not Detected Above Approximate Quantitation Limit

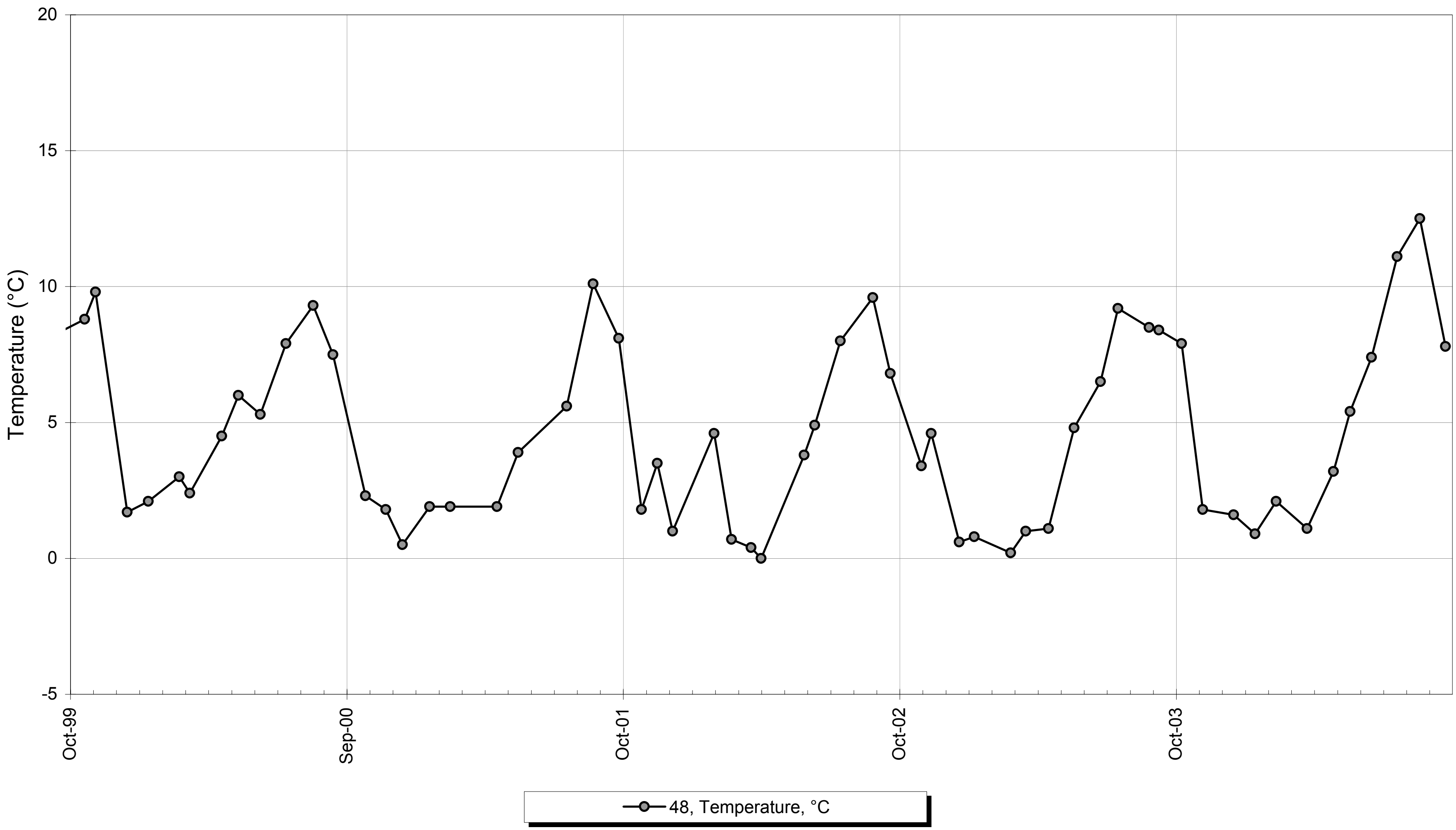
Qualified Data by QA Reviewer

Date Range: 10/01/2003 to 09/30/2004

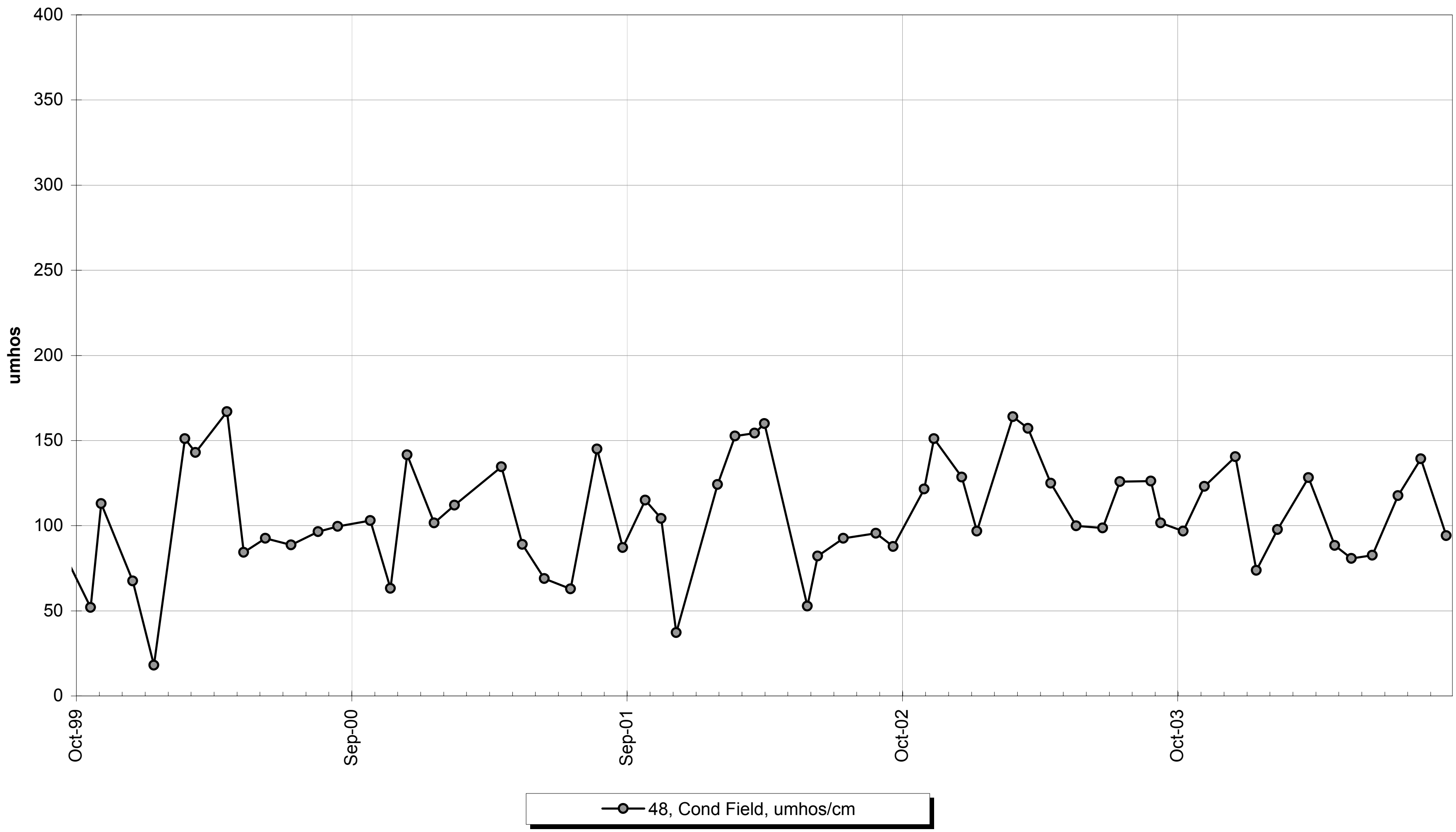
Site No.	Sample Date	Sample Time	Parameter	Value	Qualifier	Reason for Qualifier
48	03/23/2004	12:08:00 PM				
			Cond Lab, umho	148	J	Below Quantitative Range
			Cd Diss, ug/l	0.0364	J	Below Quantitative Range
			Pb Diss, ug/l	-0.011	U	Below Quantitative Range, Fi
			Zn Diss, ug/l	2.25	U	Field Blank Contamination
			Hg Diss, ug/l	0.000824	U	Method Blank Contamination
48	04/27/2004	12:48:00 PM				
			Cd Diss, ug/l	0.0316	J	Below Quantitative Range
			Pb Diss, ug/l	0.0146	J	Below Quantitative Range
			Zn Diss, ug/l	2.39	UJ	Field Blank Contamination, LC
48	05/19/2004	12:52:00 PM				
			As Diss, ug/l	0.124	J	Below Quantitative Range
			Cd Diss, ug/l	0.0298	J	Below Quantitative Range
			Zn Diss, ug/l	1.73	UJ	LCS Recovery, Field Blank C
			Hg Diss, ug/l	0.000617	U	Method Blank Contamination
48	06/16/2004	1:20:00 PM				
			Cond Lab, umho	86.3	J	Sample Temperature
			pH Lab, su	7.92	J	Hold Time
			Alk Tot, mg/l	39.6	J	Sample Temperature
			Cd Diss, ug/l	0.037	J	Below Quantitative Range
			Hg Diss, ug/l	0.000626	U	Method Blank Contamination
48	07/20/2004	2:58:00 PM				
			pH Lab, su	8.11	J	Hold Time
			Pb Diss, ug/l	0.0104	U	Field Blank Contamination
			Hg Diss, ug/l	0.000812	U	Method Blank Contamination
48	08/19/2004	12:38:00 PM				
			Pb Diss, ug/l	0.0348	U	Field Blank Contamination
			Zn Diss, ug/l	2.04	UJ	Field Blank Contamination, C
			Hg Diss, ug/l	0.000793	U	Method Blank Contamination
48	09/22/2004	9:50:00 AM				
			Pb Diss, ug/l	0.0139	J	Below Quantitative Range
			Hg Diss, ug/l	0.00127	U	Field Blank Contamination

Qualifier	Description
J	Positively Identified - Approximate Concentration
N	Presumptive Evidence For Tentative Identification
NJ	Tentatively Identified - Approximate Concentration
R	Rejected - Cannot Be Verified
U	Not Detected Above Quantitation Limit
UJ	Not Detected Above Approximate Quantitation Limit

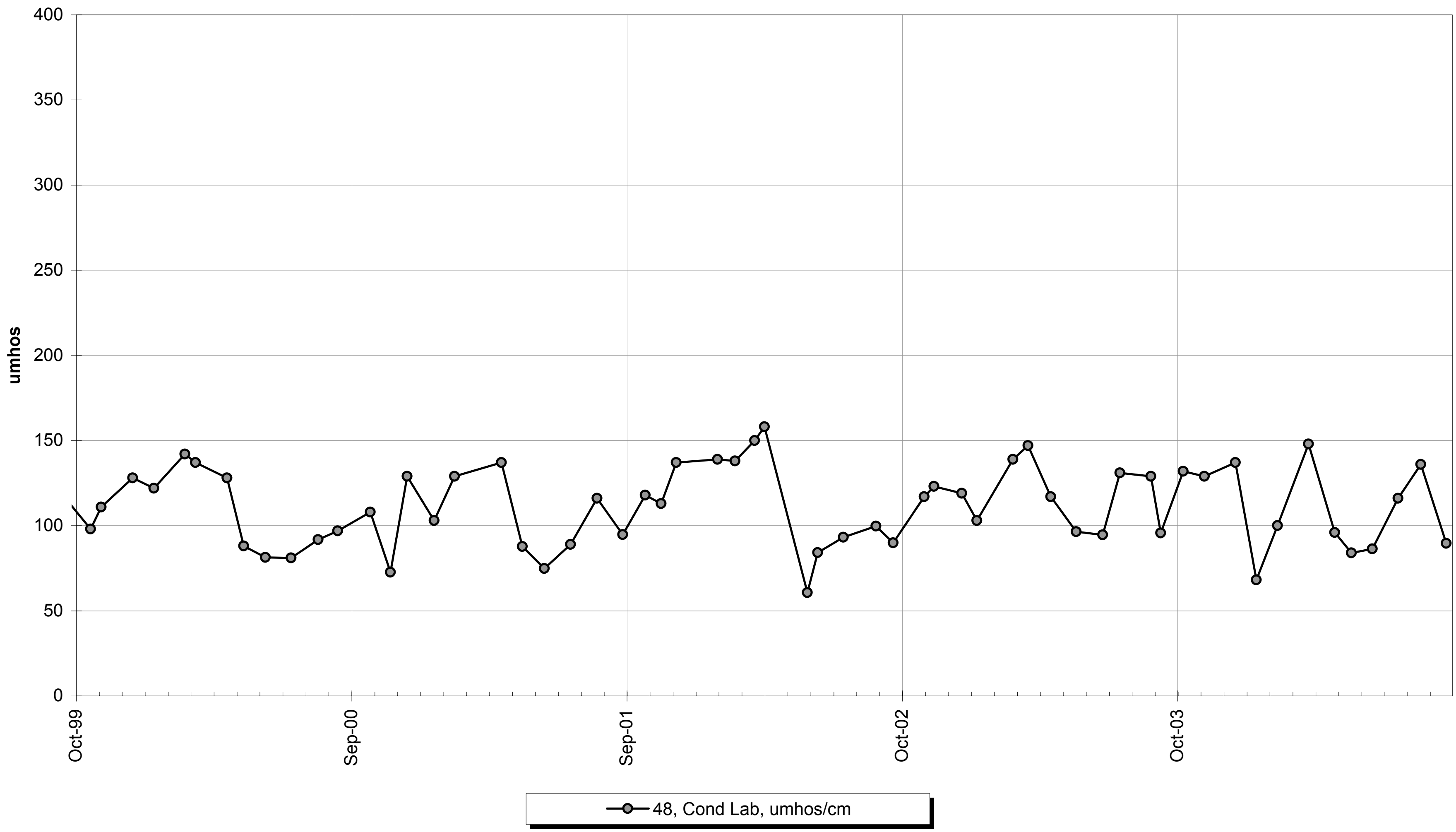
Site 48 -Water Temperature

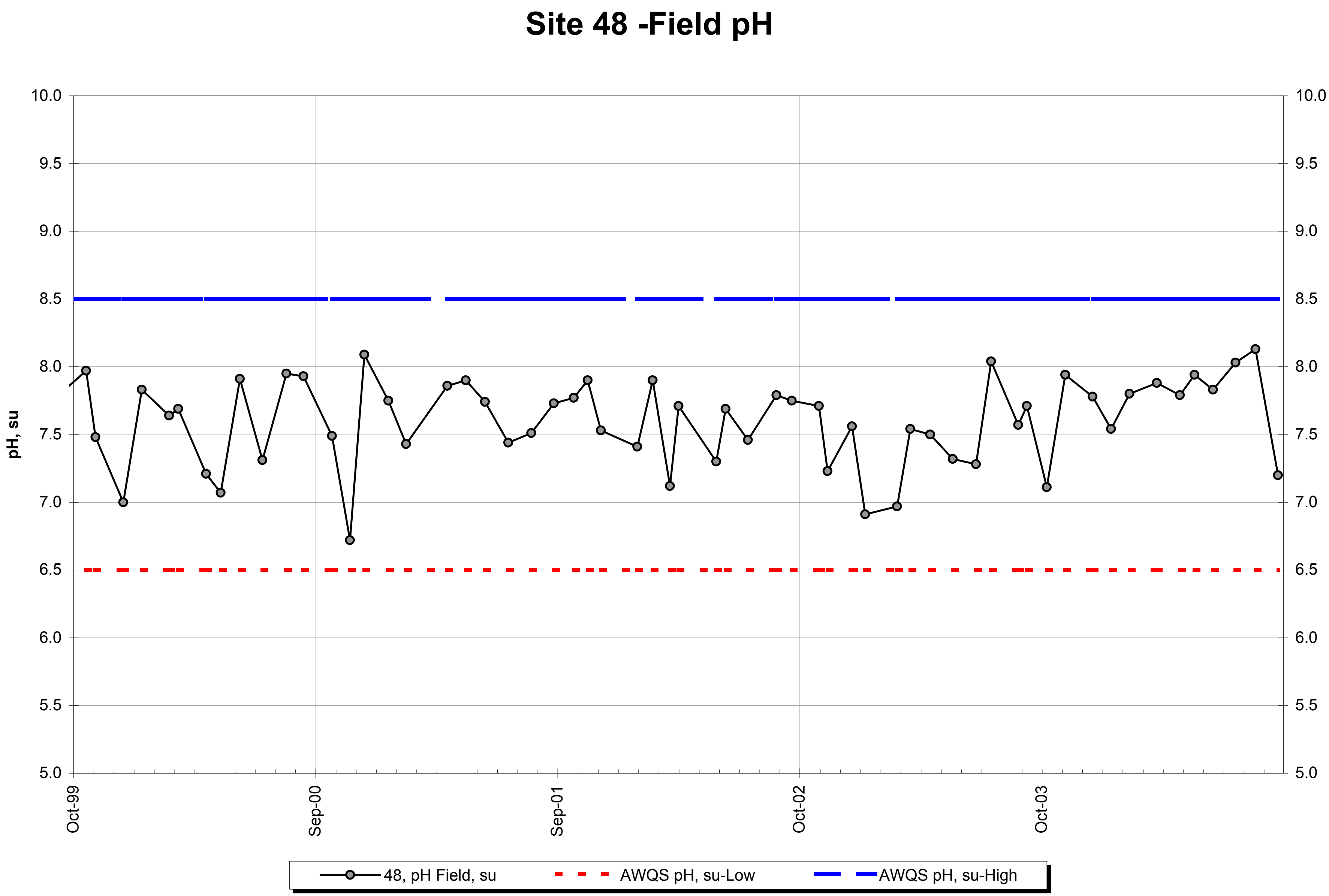


Site 48 -Conductivity-Field

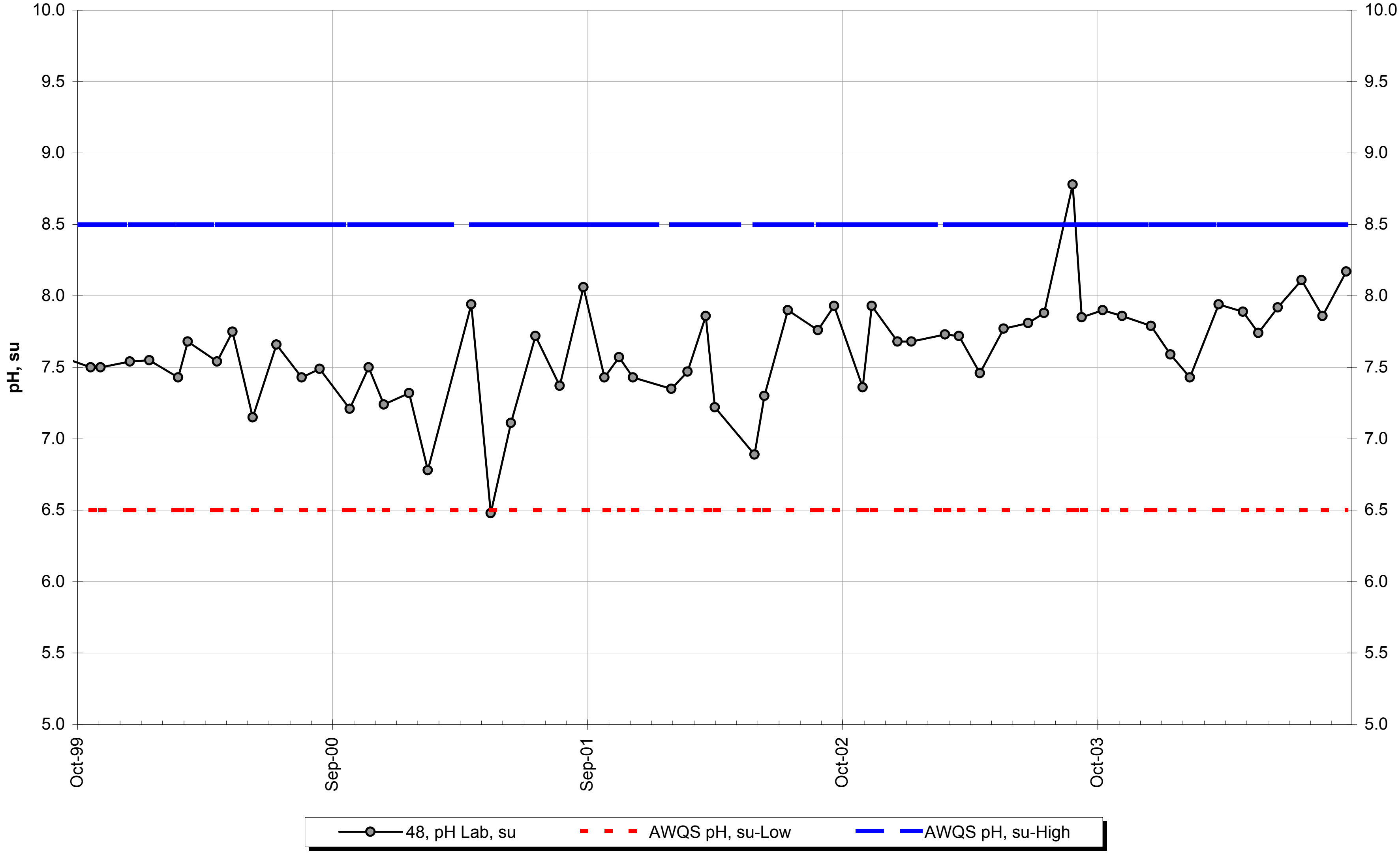


Site 48 -Conductivity-Lab

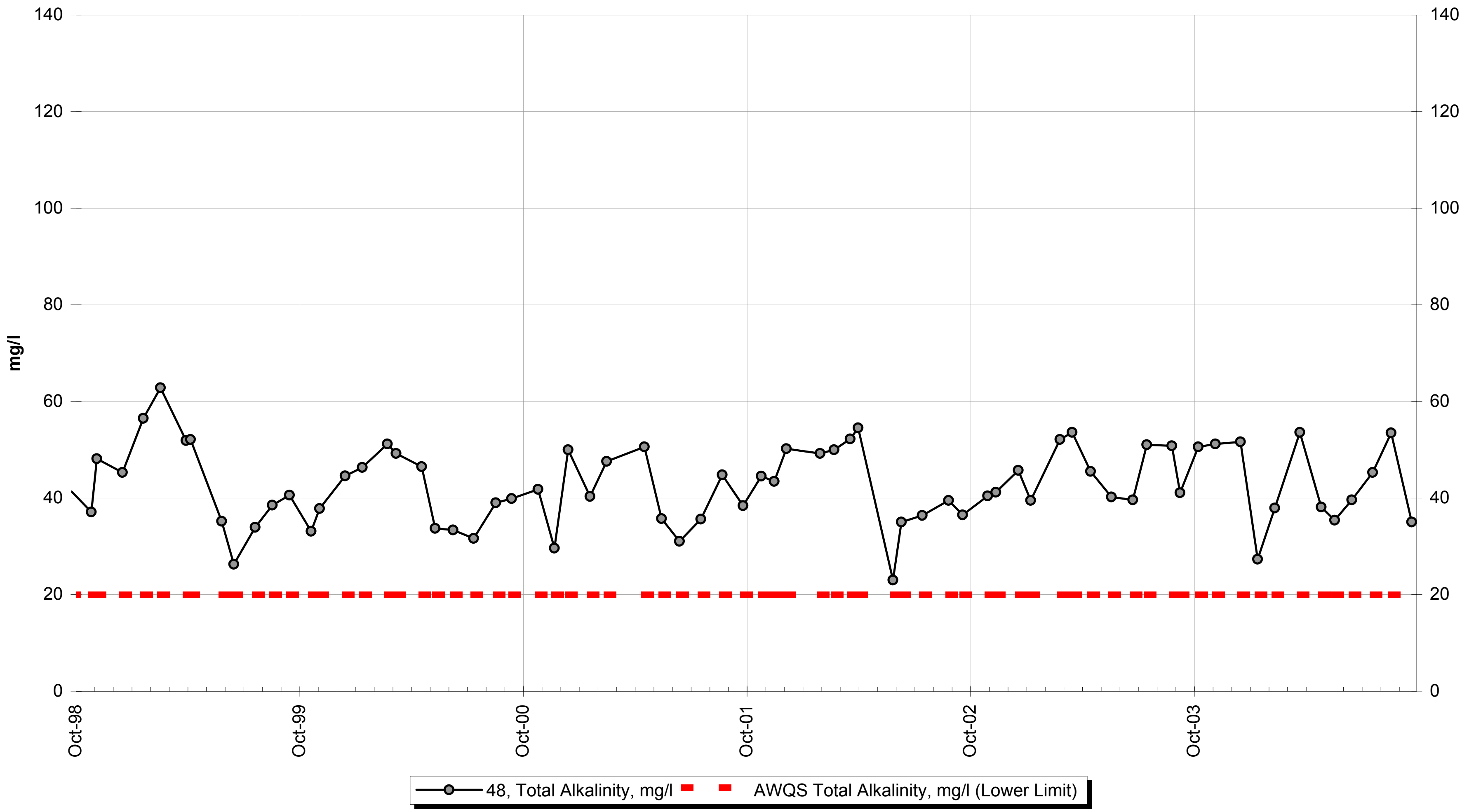



Site 48 -Field pH
pH, su
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
48, pH Field, su
AWQS pH, su-Low
AWQS pH, su-High

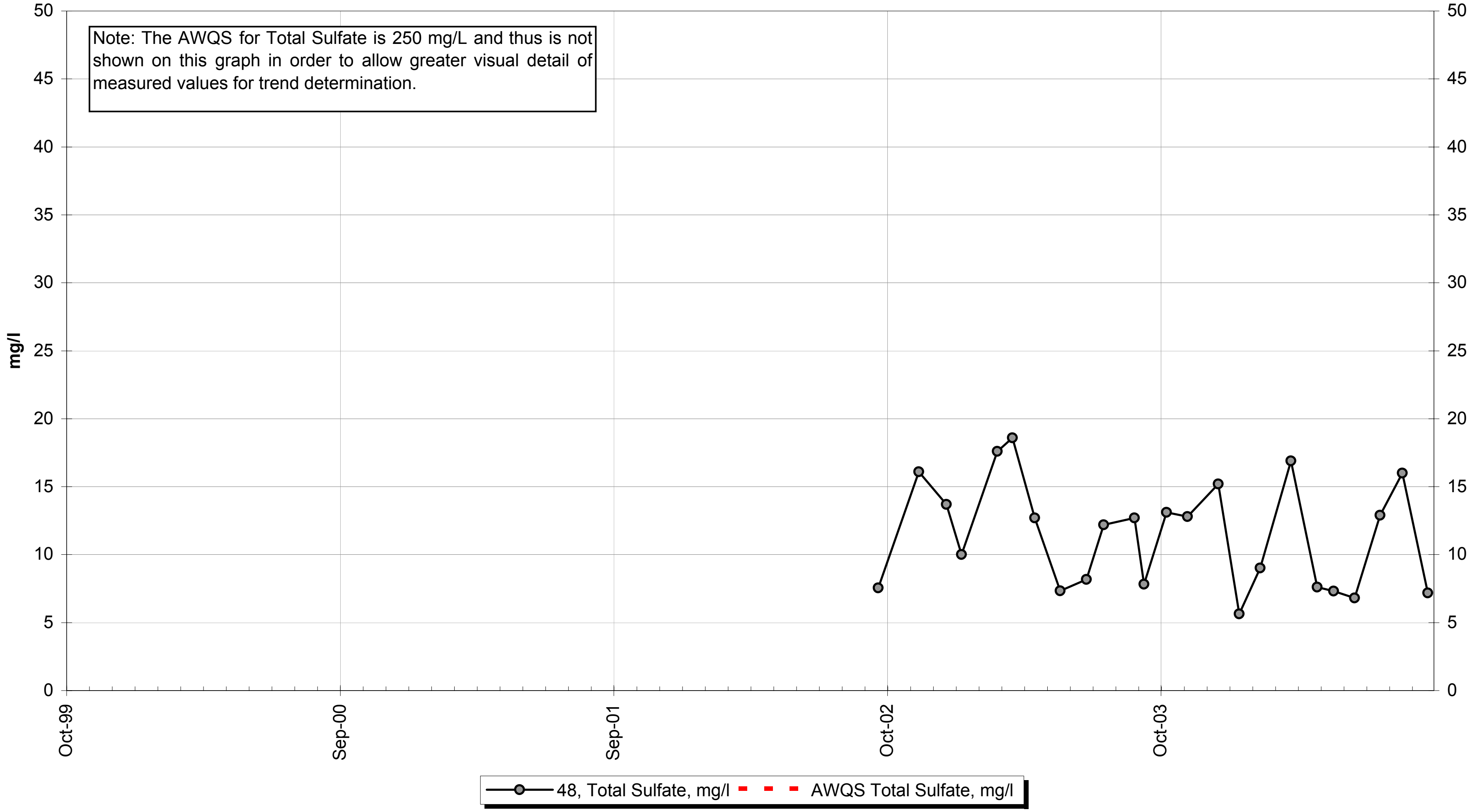
Site 48 -Lab pH



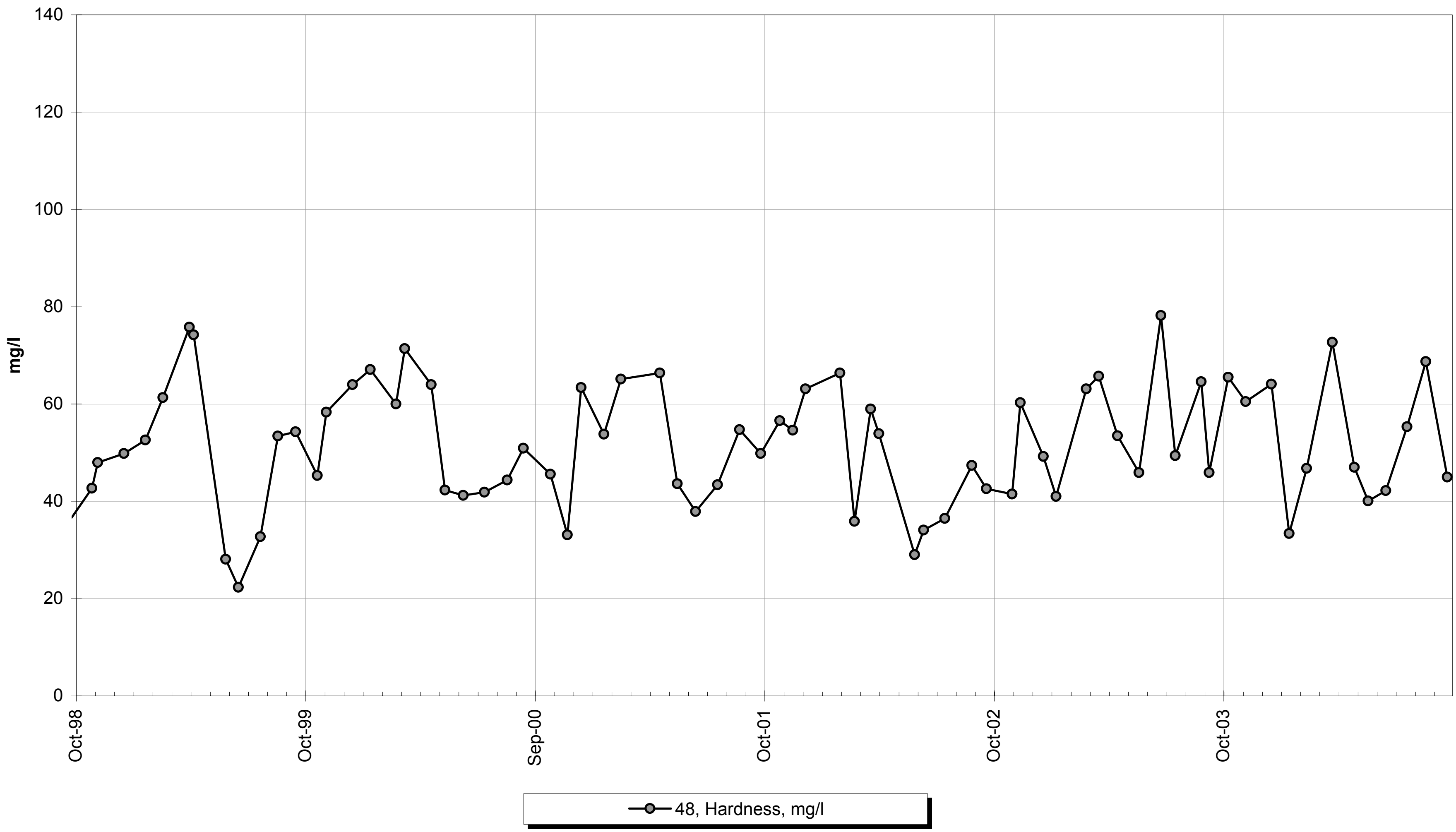
Site 48 -Total Alkalinity



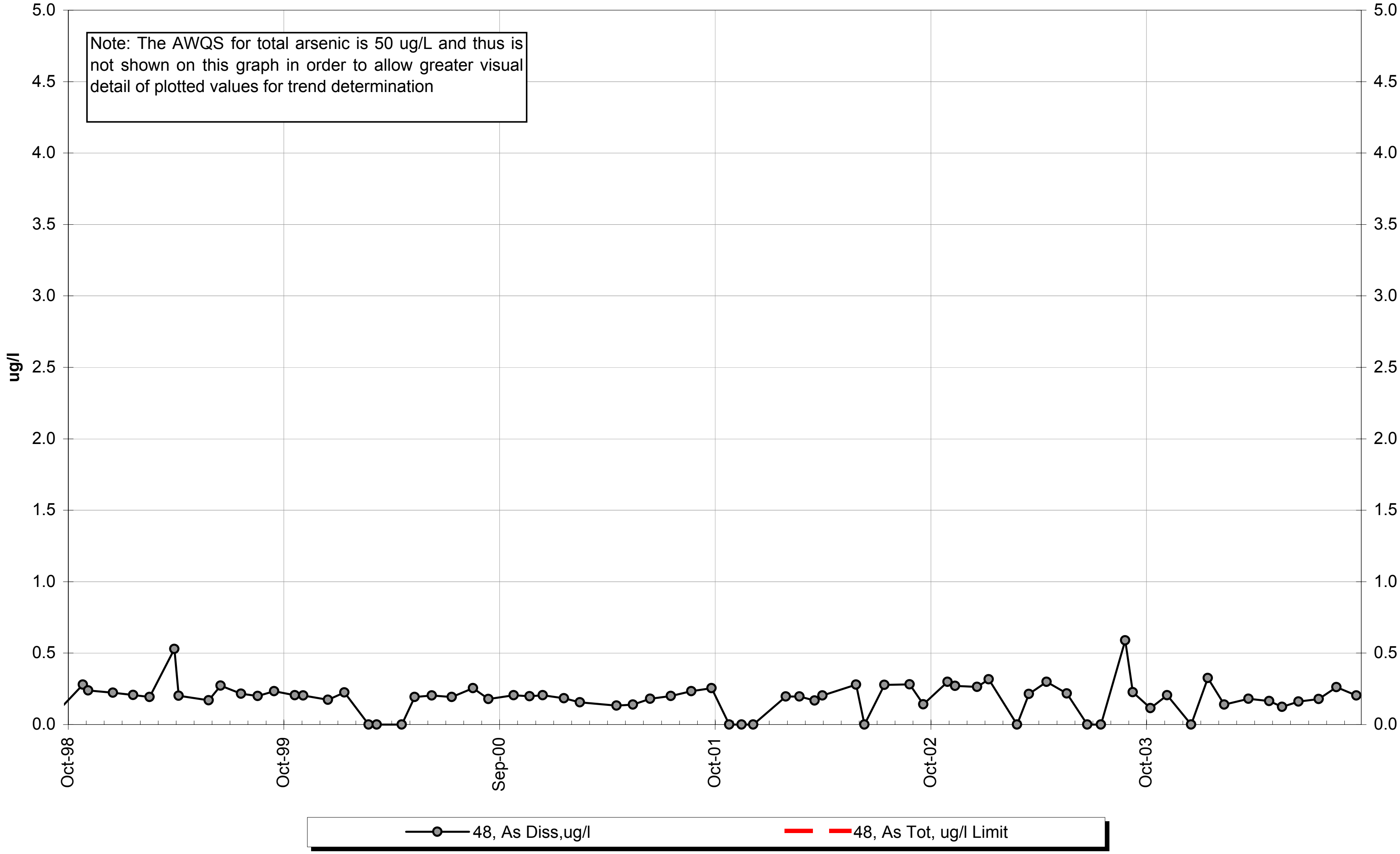
Site 48 -Total Sulfate



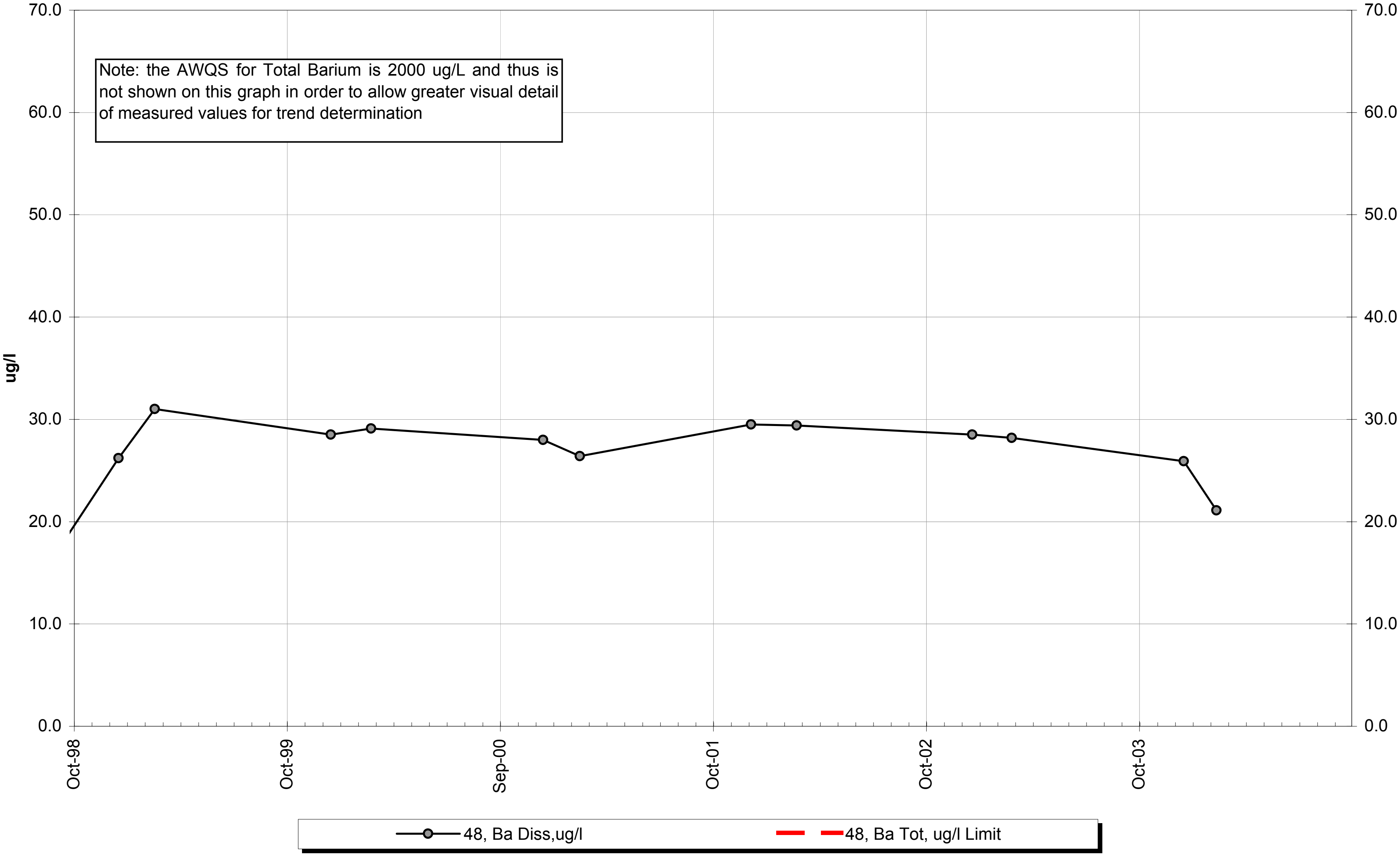
Site 48 -Hardness



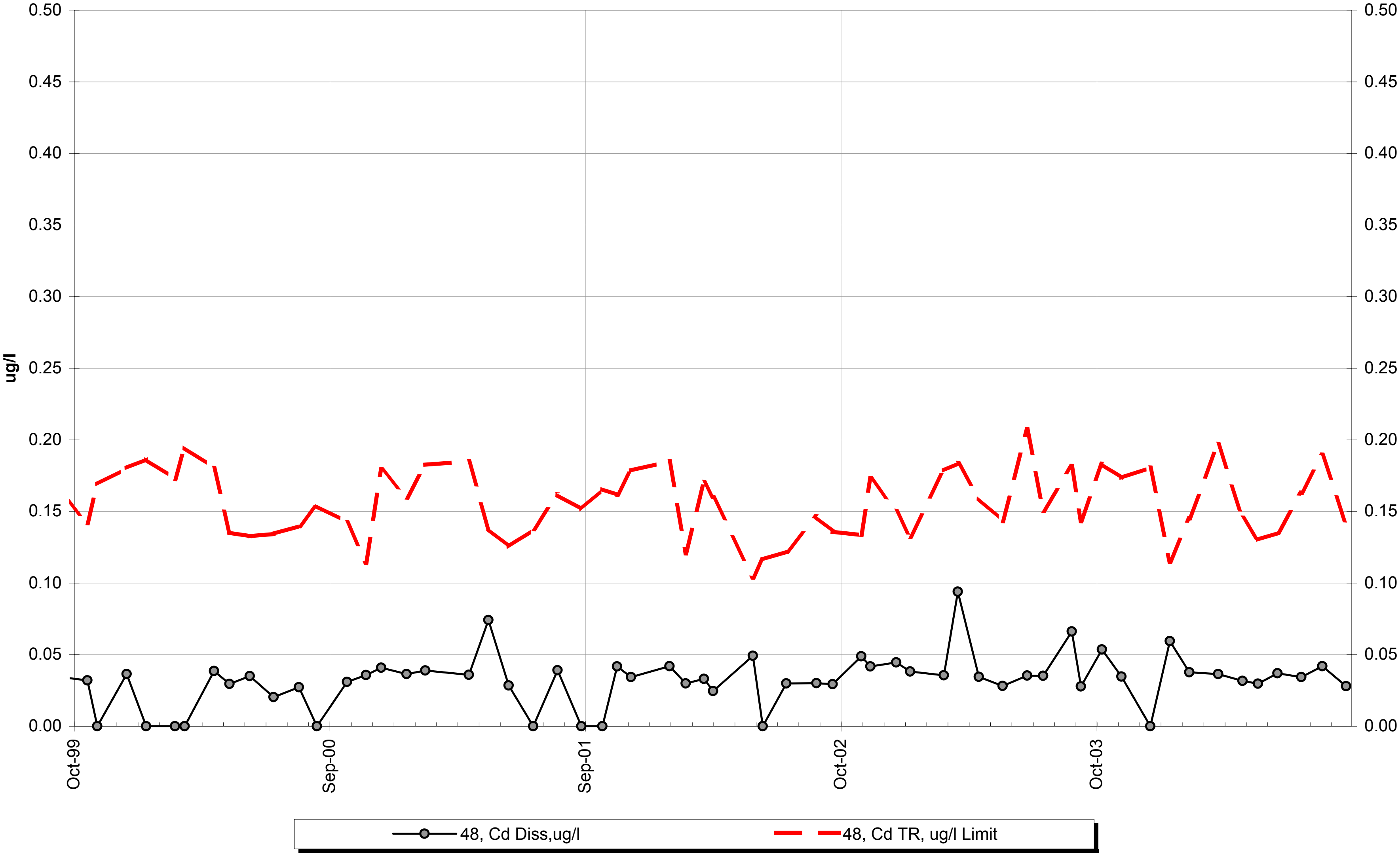
Site 48 -Dissolved Arsenic

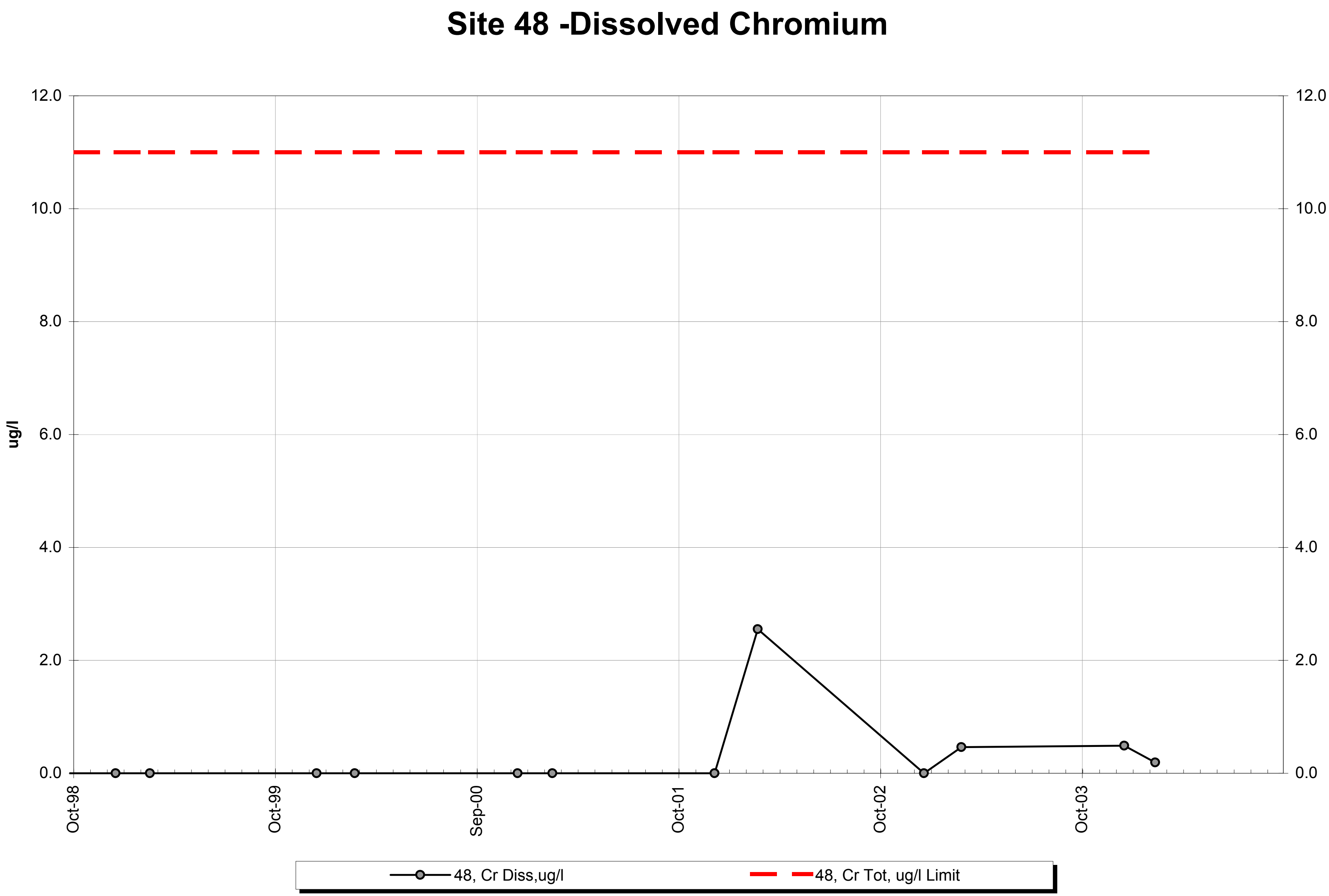


Site 48 -Dissolved Barium

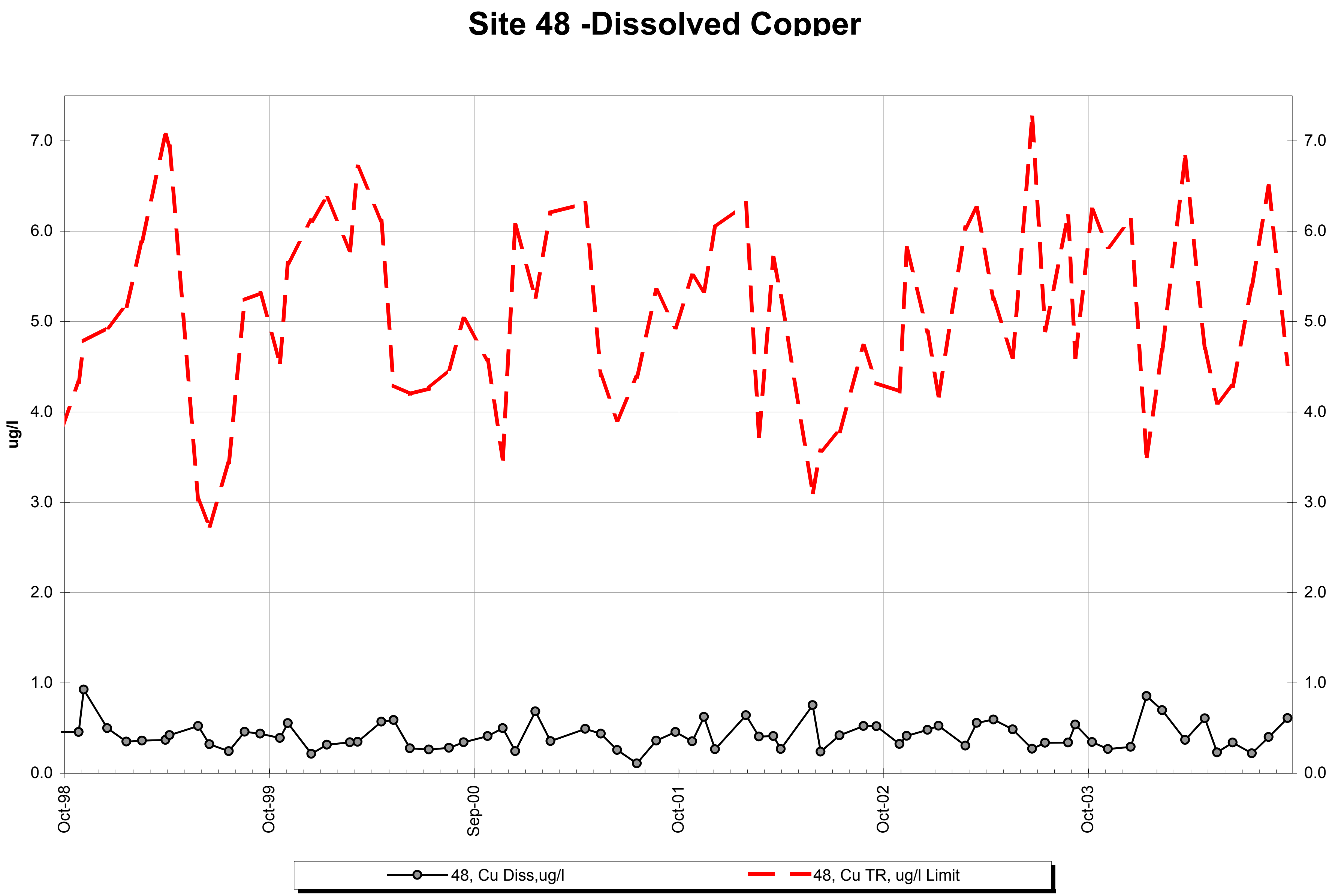


Site 48 -Dissolved Cadmium

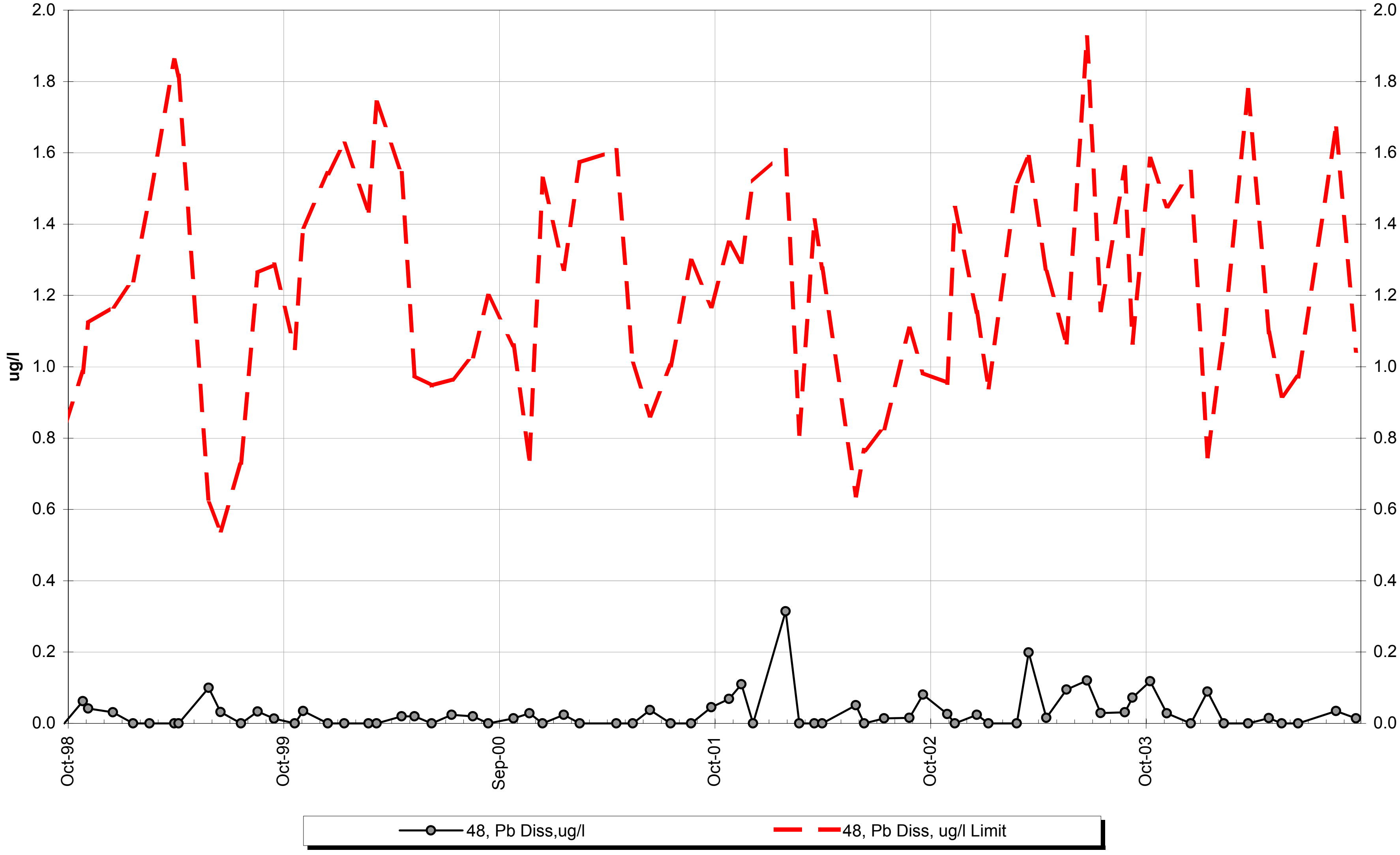




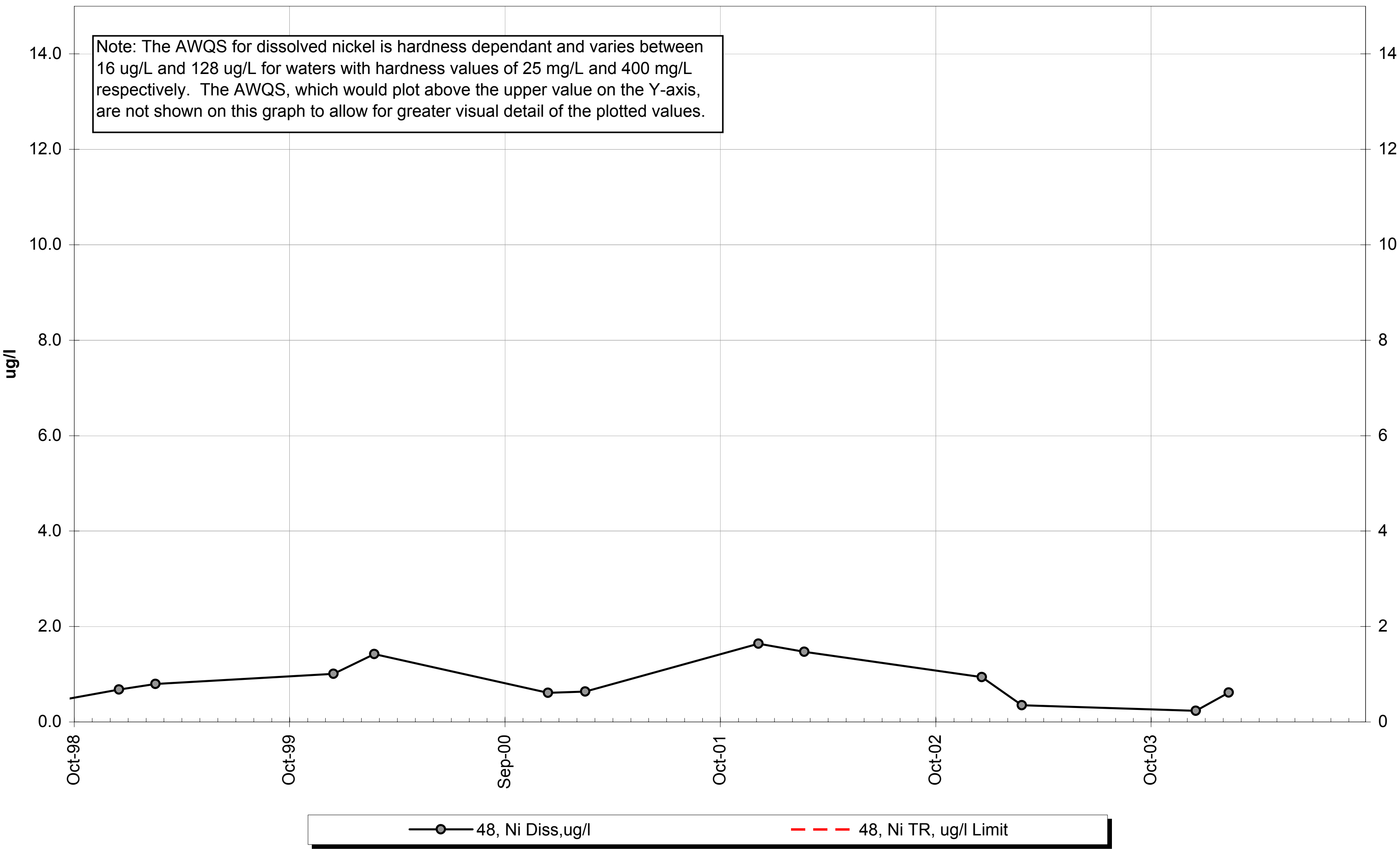
Site 48 -Dissolved Chromium
ug/l
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
48, Cr Diss,ug/l
48, Cr Tot, ug/l Limit

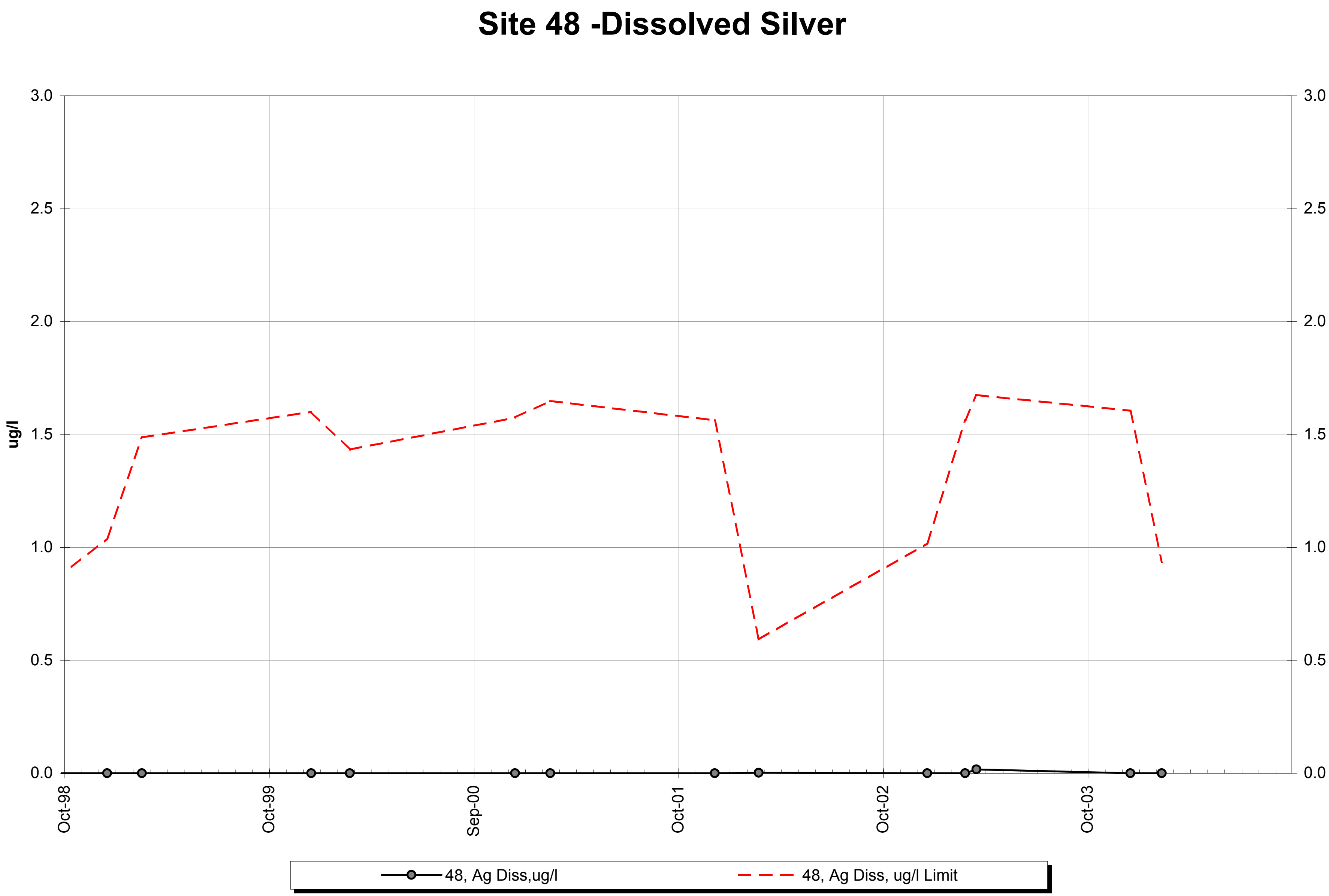

Site 48 -Dissolved Copper
ug/l
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
48, Cu Diss,ug/l
48, Cu TR, ug/l Limit

Site 48 -Dissolved Lead

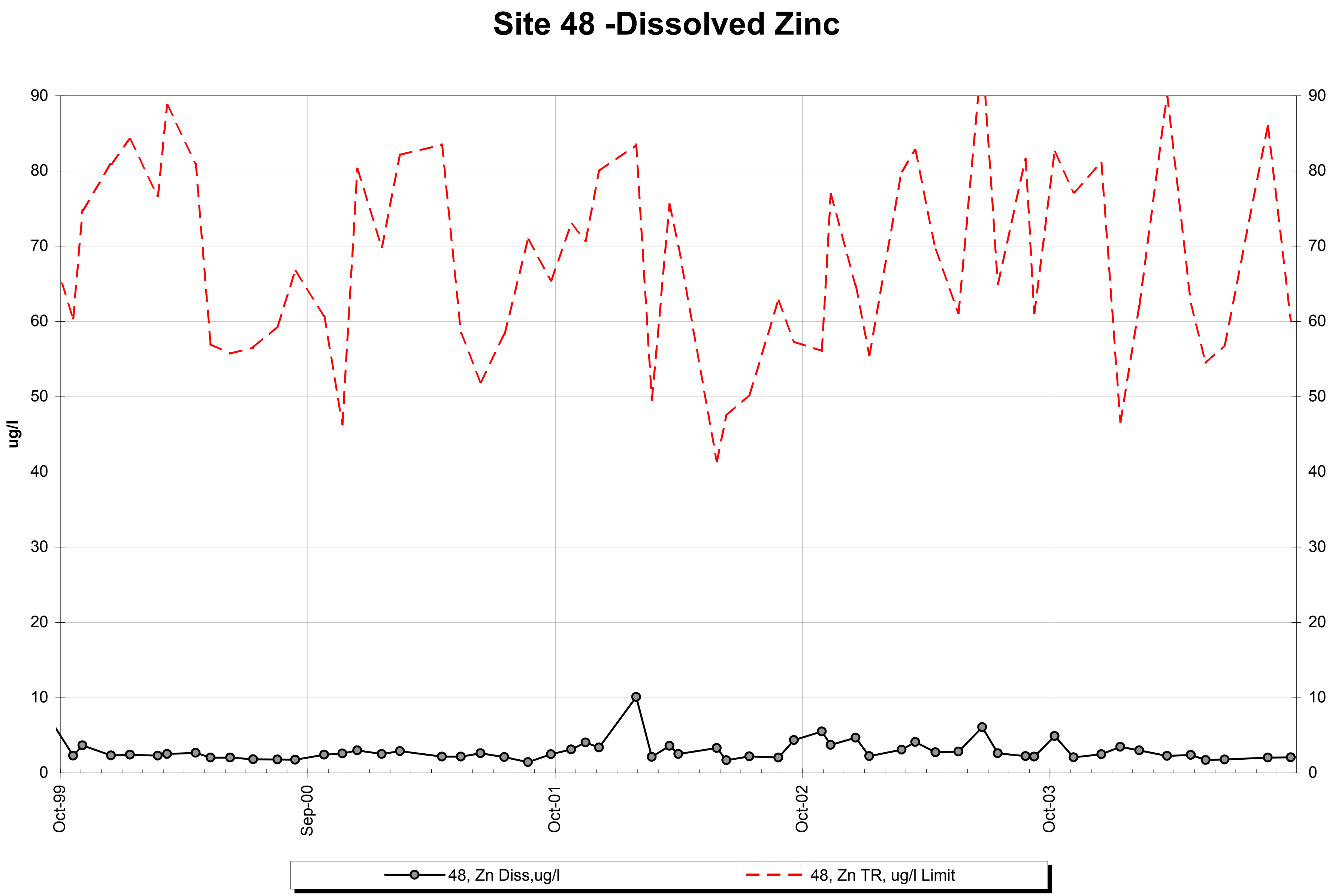


Site 48 -Dissolved Nickel

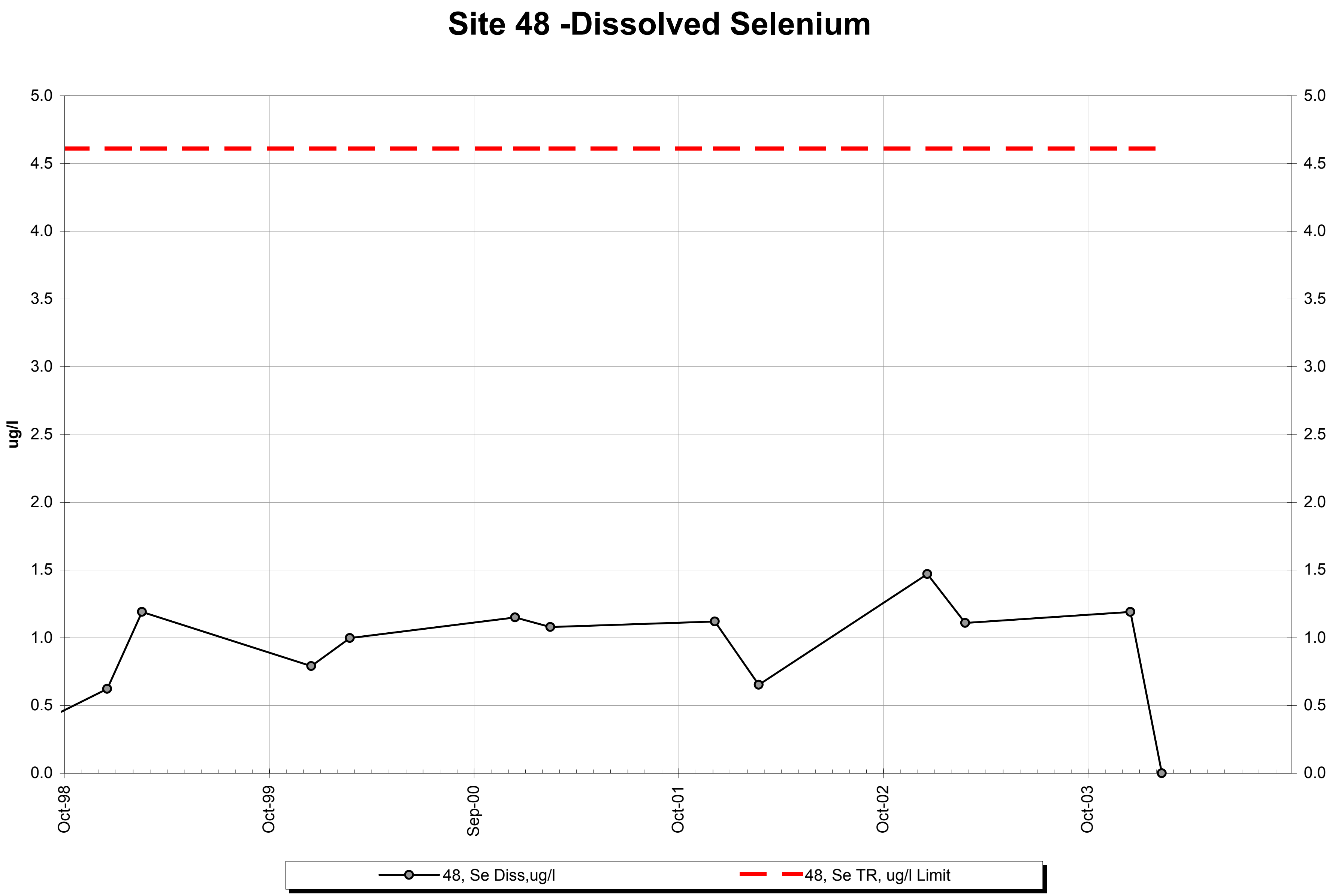




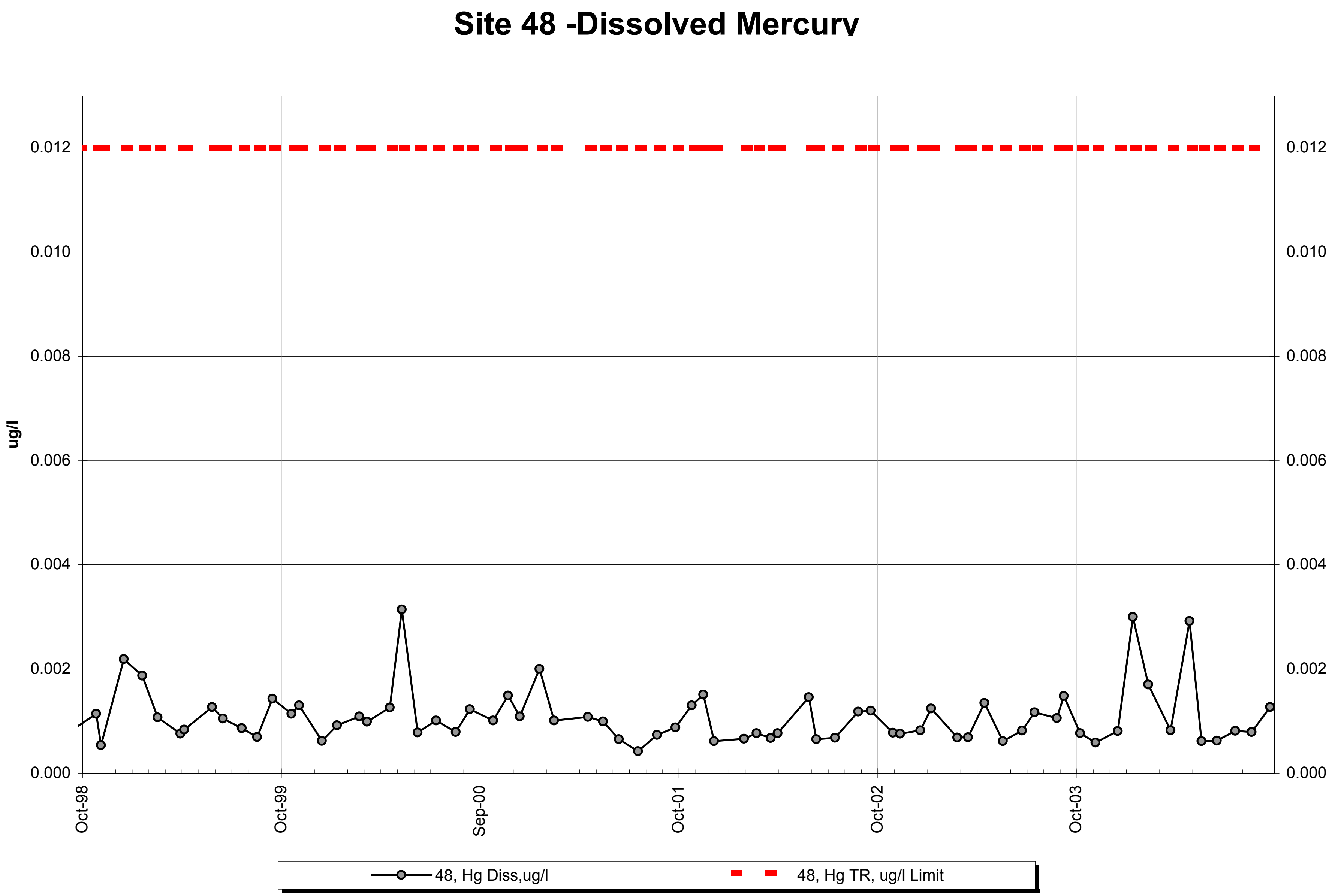
Site 48 -Dissolved Silver
ug/l
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
48, Ag Diss,ug/l
48, Ag Diss, ug/l Limit



Site 48 -Dissolved Zinc
ug/l
90
80
70
60
50
40
30
20
10
0
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
48, Zn Diss,ug/l
48, Zn TR, ug/l Limit



Site 48 -Dissolved Selenium
ug/l
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
48, Se Diss,ug/l
48, Se TR, ug/l Limit



Site 48 -Dissolved Mercury
ug/l
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
48, Hg Diss,ug/l
48, Hg TR, ug/l Limit

Site **#48** Seasonal Kendall analysis for Specific Conductance, Lab (umhos/cm @ 25°C)

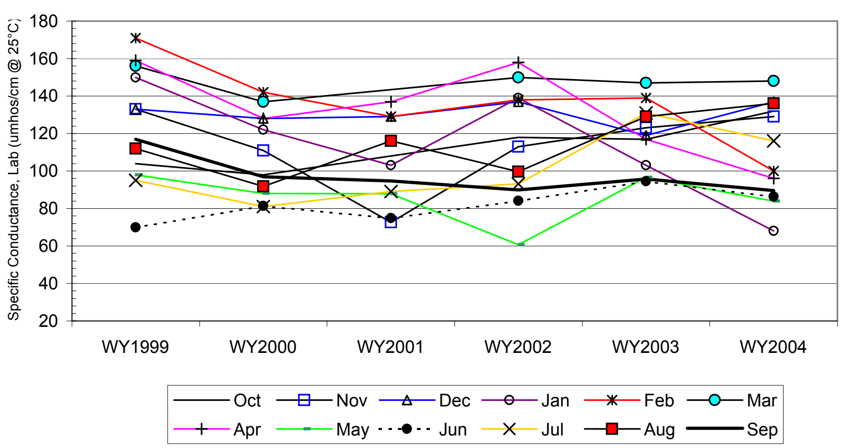
Row label	Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	**WY1999**	104.0	133.0	133.0	150.0	171.0	156.0	159.0	98.0	70.0	95.0	112.0	117.0
b	**WY2000**	98.0	111.0	128.0	122.0	142.0	137.0	128.0	88.0	81.3	81.0	91.8	97.0
c	**WY2001**	108.0	72.7	129.0	103.0	129.0		137.0	87.8	74.9	89.0	116.0	94.7
d	**WY2002**	118.0	113.0	137.0	139.0	138.0	150.0	158.0	60.6	84.1	93.2	99.7	90.0
e	**WY2003**	117.0	123.0	119.0	103.0	139.0	147.0	117.0	96.5	94.6	131.0	129.0	95.7
f	**WY2004**	132.0	129.0	137.0	68.1	100.0	148.0	96.0	84.0	86.3	116.0	136.0	89.6
	n	6	6	6	6	6	5	6	6	6	6	6	6
	t_1	0	0	1	1	0	0	0	0	0	0	0	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a	-1	-1	-1	-1	-1	-1	-1	-1	1	-1	-1	-1
	c-a	1	-1	-1	-1	-1		-1	-1	1	-1	1	-1
	d-a	1	-1	1	-1	-1	-1	-1	-1	1	-1	-1	-1
	e-a	1	-1	-1	-1	-1	-1	-1	-1	1	1	1	-1
	f-a	1	-1	1	-1	-1	-1	-1	-1	1	1	1	-1
	c-b	1	-1	1	-1	-1		1	-1	-1	1	1	-1
	d-b	1	1	1	1	-1	1	1	-1	1	1	1	-1
	e-b	1	1	-1	-1	-1	1	-1	1	1	1	1	-1
	f-b	1	1	1	-1	-1	1	-1	-1	1	1	1	-1
	d-c	1	1	1	1	1		1	-1	1	1	-1	-1
	e-c	1	1	-1	0	1		-1	1	1	1	1	1
	f-c	1	1	1	-1	-1		-1	-1	1	1	1	-1
	e-d	-1	1	-1	-1	1	-1	-1	1	1	1	1	1
	f-d	1	1	0	-1	-1	-1	-1	1	1	1	1	-1
	f-e	1	1	1	-1	-1	1	-1	-1	-1	-1	1	-1
	S_k	11	3	2	-10	-9	-2	-9	-7	11	7	9	-11
	Qm	6.3								3.8			-3.5
	σ^2_S=	28.33	28.33	28.33	28.33	28.33	16.67	28.33	28.33	28.33	28.33	28.33	28.33
	$Z_k = S_k/\sigma_S$	2.07	0.56	0.38	-1.88	-1.69	-0.49	-1.69	-1.32	2.07	1.32	1.69	-2.07
	Z^2_k	4.27	0.32	0.14	3.53	2.86	0.24	2.86	1.73	4.27	1.73	2.86	4.27

ΣZ_k=	-1.05
ΣZ^2_k=	29.08
Z-bar=$\Sigma Z_k/K$=	-0.09

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	2	0	0	0	0

Σn	71
ΣS_k	-5

$\chi^2_h=\Sigma Z^2_k-K(\text{Z-bar})^2$=	28.98	@α=5% $\chi^2_{(K-1)}$=	19.68	Test for station homogeneity	
p	**0.002**			$\chi^2_h<\chi^2_{(K-1)}$	**REJECT**
ΣVAR(S_k)	Z_{calc} -0.22	@α/2=2.5% Z=	1.96	**H_0** (No trend)	NA
328.33	p **0.413**			**H_A** (± trend)	NA



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Slope	Upper Limit
0.010	-3.00		3.07
0.050	-2.00	**-0.20**	2.00
0.100	-1.72		1.26
0.200	-1.00		1.00

Site **#48** Seasonal Kendall analysis for pH, Lab, Standard Units

Row label	Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	**WY1999**	7.9	7.5	7.1	7.7	7.9	7.9	7.8	7.6	7.6	7.6	7.8	7.6
b	**WY2000**	7.5	7.5	7.5	7.6	7.4	7.7	7.5	7.8	7.2	7.7	7.4	7.5
c	**WY2001**	7.2	7.5	7.2	7.3	6.8		7.9	6.5	7.1	7.7	7.4	8.1
d	**WY2002**	7.4	7.6	7.4	7.4	7.5	7.9	7.2	6.9	7.3	7.9	7.8	7.9
e	**WY2003**	7.4	7.9	7.7	7.7	7.7	7.7	7.5	7.8	7.8	7.9	8.8	7.9
f	**WY2004**	7.9	7.9	7.8	7.6	7.4	7.9	7.9	7.7	7.9	8.1	7.9	8.2
	n	6	6	6	6	6	5	6	6	6	6	6	6

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
t_1	0	0	0	0	1	0	0	0	0	0	0	0
t_2	0	1	0	0	0	0	0	0	0	0	0	0
t_3	0	0	0	0	0	0	0	0	0	0	0	0
t_4	0	0	0	0	0	0	0	0	0	0	0	0
t_5	0	0	0	0	0	0	0	0	0	0	0	0

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
b-a	-1	0	1	-1	-1	-1	-1	1	-1	1	-1	-1
c-a	-1	0	1	-1	-1		1	-1	-1	1	-1	1
d-a	-1	1	1	-1	-1	-1	-1	-1	-1	1	-1	1
e-a	-1	1	1	1	-1	-1	-1	1	1	1	1	1
f-a	1	1	1	-1	-1	1	1	1	1	1	1	1
c-b	-1	0	-1	-1	-1		1	-1	-1	1	-1	1
d-b	-1	1	-1	-1	1	1	-1	-1	1	1	1	1
e-b	-1	1	1	1	1	1	-1	1	1	1	1	1
f-b	1	1	1	1	0	1	1	-1	1	1	1	1
d-c	1	1	1	1	1		-1	1	1	1	1	-1
e-c	1	1	1	1	1		-1	1	1	1	1	-1
f-c	1	1	1	1	1		-1	1	1	1	1	1
e-d	-1	1	1	1	1	-1	1	1	1	-1	1	-1
f-d	1	1	1	1	-1	1	1	1	1	1	1	1
f-e	1	-1	1	-1	-1	1	1	-1	1	1	-1	1
S_k	-1	10	11	1	-2	2	-1	3	7	13	5	7

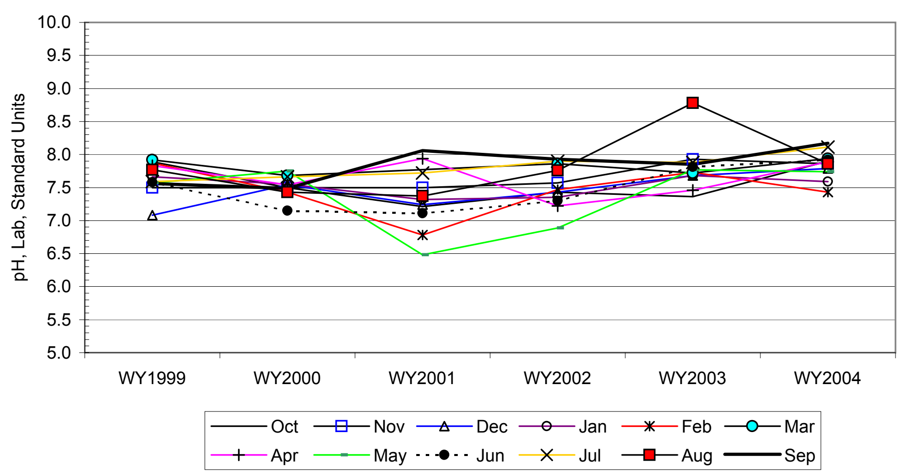
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
σ^2_S=	28.33	24.67	28.33	28.33	28.33	16.67	28.33	28.33	28.33	28.33	28.33	28.33
$Z_k = S_k/\sigma_S$	-0.19	2.01	2.07	0.19	-0.38	0.49	-0.19	0.56	1.32	2.44	0.94	1.32
Z^2_k	0.04	4.05	4.27	0.04	0.14	0.24	0.04	0.32	1.73	5.96	0.88	1.73

ΣZ_k= 10.58
ΣZ^2_k= 19.44
Z-bar=ΣZ_k/K= 0.88

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	1	1	0	0	0

Σn 71
ΣS_k 55

$\chi^2_h=\Sigma Z^2_k - K(\text{Z-bar})^2$=	10.10	@α=5% $\chi^2_{(K-1)}$= 19.68	Test for station homogeneity
p	**0.521**		$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$ 324.67	Z_{calc} 3.00	@α/2=2.5% Z= 1.96	H_0 (No trend) REJECT
p	**0.999**		H_A (± trend) ACCEPT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Slope	Upper Limit
0.010	0.01		0.11
0.050	0.03	**0.07**	0.09
0.100	0.04		0.09
0.200	0.05		0.07

0.9%

Site **#48** Seasonal Kendall analysis for Total Alk, (mg/l)

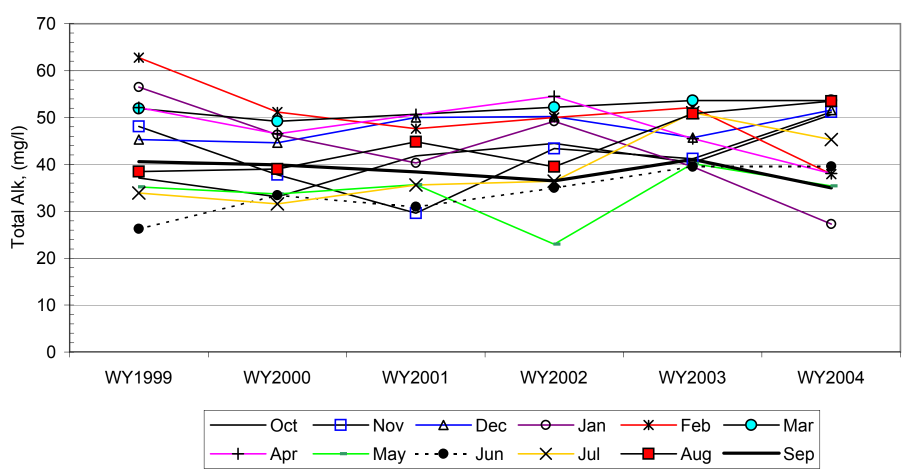
Row label	Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	**WY1999**	37.1	48.1	45.3	56.5	62.8	51.9	52.1	35.2	26.3	33.9	38.5	40.6
b	**WY2000**	33.1	37.8	44.6	46.3	51.2	49.2	46.5	33.7	33.4	31.6	39.0	39.9
c	**WY2001**	41.8	29.6	50.0	40.3	47.6		50.6	35.7	31.0	35.6	44.8	38.4
d	**WY2002**	44.5	43.4	50.2	49.2	50.0	52.2	54.5	23.0	35.0	36.4	39.5	36.5
e	**WY2003**	40.4	41.2	45.7	39.5	52.1	53.6	45.5	40.2	39.6	51.0	50.8	41.1
f	**WY2004**	50.6	51.2	51.6	27.3	37.9	53.6	38.1	35.4	39.6	45.3	53.5	35.0
	n	6	6	6	6	6	5	6	6	6	6	6	6
	t_1	0	0	0	0	0	1	0	0	1	0	0	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a	-1	-1	-1	-1	-1	-1	-1	-1	1	-1	1	-1
	c-a	1	-1	1	-1	-1		-1	1	1	1	1	-1
	d-a	1	-1	1	-1	-1	1	1	-1	1	1	1	-1
	e-a	1	-1	1	-1	-1	1	-1	1	1	1	1	1
	f-a	1	1	1	-1	-1	1	-1	1	1	1	1	-1
	c-b	1	-1	1	-1	-1		1	1	-1	1	1	-1
	d-b	1	1	1	1	-1	1	1	-1	1	1	1	-1
	e-b	1	1	1	-1	1	1	-1	1	1	1	1	1
	f-b	1	1	1	-1	-1	1	-1	1	1	1	1	-1
	d-c	1	1	1	1	1		1	-1	1	1	-1	-1
	e-c	-1	1	-1	-1	1		-1	1	1	1	1	1
	f-c	1	1	1	-1	-1		-1	-1	1	1	1	-1
	e-d	-1	-1	-1	-1	1	1	-1	1	1	1	1	1
	f-d	1	1	1	-1	-1	1	-1	1	1	1	1	-1
	f-e	1	1	1	-1	-1	0	-1	-1	0	-1	1	-1
	S_k	9	3	9	-11	-7	7	-7	3	12	11	13	-7
	Qm				-4.8					2.7	3.2	3.0	
	σ^2_S=	28.33	28.33	28.33	28.33	28.33	16.67	28.33	28.33	28.33	28.33	28.33	28.33
	Z_k = S_k/σ_S	1.69	0.56	1.69	-2.07	-1.32	1.71	-1.32	0.56	2.25	2.07	2.44	-1.32
	Z^2_k	2.86	0.32	2.86	4.27	1.73	2.94	1.73	0.32	5.08	4.27	5.96	1.73

ΣZ_k= 6.97
ΣZ^2_k= 34.07
Z-bar=ΣZ_k/K= 0.58

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	2	0	0	0	0

Σn 71
ΣS_k 35

$\chi^2_h=\Sigma Z^2_k-K(\text{Z-bar})^2$=	30.02	@α=5% $\chi^2_{(K-1)}$= 19.68	Test for station homogeneity	
p	**0.002**		$\chi^2_h<\chi^2_{(K-1)}$	**REJECT**
ΣVAR(S_k) 328.33	Z_{calc} 1.88	@α/2=2.5% Z= 1.96	**H_0** (No trend)	NA
	p **0.970**		**H_A** (± trend)	NA



Seasonal-Kendall Slope Confidence Intervals

α	**Lower Limit**	**Slope**	**Upper Limit**
0.010	-0.52		1.89
0.050	0.08	**0.62**	1.42
0.100	0.19		1.25
0.200	0.33		0.84

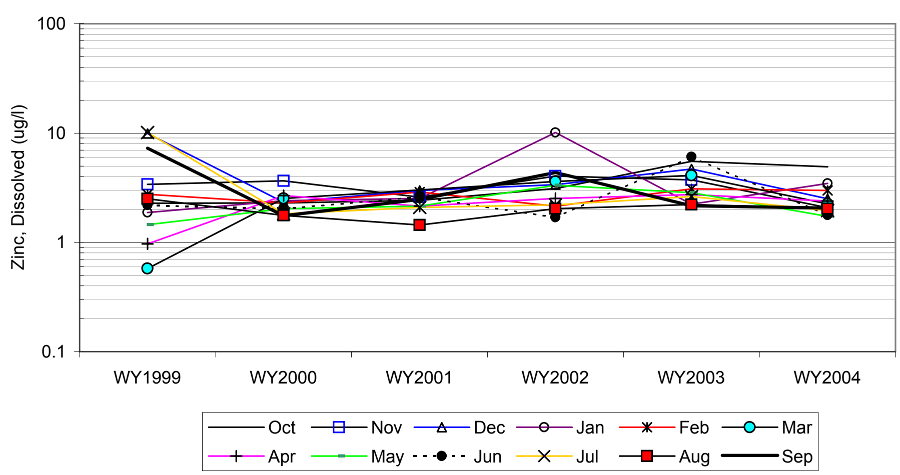
Site	#48	Seasonal Kendall analysis for Zinc, Dissolved (ug/l)											
Row label	**Water Year**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
a	**WY1999**	2.3	3.4	9.9	1.9	2.8	0.6	1.0	1.5	2.2	10.1	2.5	7.3
b	**WY2000**	2.3	3.7	2.3	2.4	2.3	2.5	2.7	2.0	2.0	1.8	1.8	1.8
c	**WY2001**	2.4	2.6	3.0	2.5	2.9		2.2	2.2	2.6	2.1	1.4	2.5
d	**WY2002**	3.1	4.1	3.4	10.1	2.1	3.6	2.5	3.3	1.7	2.2	2.0	4.4
e	**WY2003**	5.5	3.7	4.7	2.2	3.1	4.1	2.7	2.8	6.1	2.6	2.2	2.2
f	**WY2004**	4.9	2.1	2.5	3.5	3.0	2.3	2.4	1.7	1.8	2.0	2.0	2.1
	n	6	6	6	6	6	5	6	6	6	6	6	6
	t_1	0	0	0	0	0	0	0	0	0	0	0	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a	1	1	-1	1	-1	1	1	1	-1	-1	-1	-1
	c-a	1	-1	-1	1	1		1	1	1	-1	-1	-1
	d-a	1	1	-1	1	-1	1	1	1	-1	-1	-1	-1
	e-a	1	1	-1	1	1	1	1	1	1	-1	-1	-1
	f-a	1	-1	-1	1	1	1	1	1	-1	-1	-1	-1
	c-b	1	-1	1	1	1		-1	1	1	1	-1	1
	d-b	1	1	1	1	-1	1	-1	1	-1	1	1	1
	e-b	1	1	1	-1	1	1	1	1	1	1	1	1
	f-b	1	-1	1	1	1	-1	-1	-1	-1	1	1	1
	d-c	1	1	1	1	-1		1	1	-1	1	1	1
	e-c	1	1	1	-1	1		1	1	1	1	1	-1
	f-c	1	-1	-1	1	1		1	-1	-1	-1	1	-1
	e-d	1	-1	1	-1	1	1	1	-1	1	1	1	-1
	f-d	1	-1	-1	-1	1	-1	-1	-1	1	-1	1	-1
	f-e	-1	-1	-1	1	-1	-1	-1	-1	-1	-1	-1	-1
	S_k	13	-1	-1	7	5	4	5	5	-1	-1	1	-5
	σ^2_S=	28.33	28.33	28.33	28.33	28.33	16.67	28.33	28.33	28.33	28.33	28.33	28.33
	Z_k = S_k/σ_S	2.44	-0.19	-0.19	1.32	0.94	0.98	0.94	0.94	-0.19	-0.19	0.19	-0.94
	Z^2_k	5.96	0.04	0.04	1.73	0.88	0.96	0.88	0.88	0.04	0.04	0.04	0.88

ΣZ_k=	6.05
ΣZ^2_k=	12.36
Z-bar=ΣZ_k/K=	0.50

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	0	0	0	0	0

Σn	71
ΣS_k	31

χ^2_h=ΣZ^2_k-K(Z-bar)^2=		9.31	@α=5% $\chi^2_{(K-1)}$=	19.68	Test for station homogeneity	
	p	**0.594**			χ^2_h<$\chi^2_{(K-1)}$	ACCEPT
ΣVAR(S_k)	Z_{calc}	1.66	@α/2=2.5% Z=	1.96	**H_0** (No trend)	ACCEPT
328.33	p	**0.951**			**H_A** (± trend)	REJECT



Seasonal-Kendall Slope Confidence Intervals

α	**Lower Limit**	**Slope**	**Upper Limit**
0.010	-0.07		0.26
0.050	-0.02	**0.08**	0.20
0.100	0.03		0.18
0.200	0.04		0.13

INTERPRETIVE REPORT
SITE 6 “MIDDLE GREENS CREEK”

The data collected during the current water year are listed in the following “Table of Results for Water Year 2004” report. The table includes all the data, field and lab, collected for the current water year and a series of flags keyed to the summary report “Qualified Data by QA Reviewer”. The QA report lists any associated data limitations found during the monthly QA reviews of laboratory data for this site. Median values for all analytes have been calculated and are shown in the right-most column of the table of results. Any value reported as less than MDL has been replaced with a value of zero for the purpose of median calculation.

All data collected at this site for the past five years are included in the data analyses with the exception of one outliers shown on the table below. During the current year no new data point were flagged as outliers after review by KGCMC.

Sample Date	Parameter	Value	Qualifier	Notes
12/5/2001	Cond Field, umho	37.0	RR	Suspected field instrument malfunction

The data for Water Year 2004 have been compared to the strictest fresh water quality criterion for each applicable analyte. One result exceeding these criteria has been identified as listed in the table below. The result is for dissolved lead value for a sample from Jan-2004 with a value of 0.915 µg/l that exceeds the hardness dependant AWQS standard of 0.901 µg/l. KGCMC notified the USFS and ADEC of this exceedance during a March 26, 2004 site visit. KGCMC feels the most likely source for the elevated dissolved lead is for Stormwater discharge from Pond C located approximately 600 ft upstream from Site 6. KGCMC has implemented several stormwater and sediment control measures to alleviate this problem.

Sample Date	Parameter	Value	Hardness (mg/L)	Standard	Standard Type
01/14/04	Lead, Dissolved ug/L	0.915	39.4	0.901	Aquatic Life, chronic

X-Y plots have been generated to graphically present the data for each of the analytes requested in the Statistical Information Goals for this site. These plots have been visually analyzed for the appearance of any trend in concentration. No visually obvious trends are apparent. A non-parametric statistical analysis for trend was preformed for conductivity, pH, Alkalinity, and dissolved zinc. Calculation details of the Seasonal Mann-Kendall analyses are presented in detail on the pages following this interpretive section. The adjacent table summarizes the results on the data collected between Oct-98 and Sep-04

		Mann-Kendall test statistic			Sen's slope estimate	
Parameter	n*	Z	Trend	a**	Q	Q(%)
Conductivity, Lab	6	Fails monthly homogenity test (p=0.002)				
pH, Lab	6	1.84	+	0.967		
Alkalinity, Total	6	Fails monthly homogenity test (p=0.003)				
Zinc, Dissolved	6	Fails monthly homogenity test (p=0.033)				

*: Number of years **:Significance level

(WY1999-WY2004). The datasets for conductivity, total alkalinity, and dissolved zinc failed the test for seasonal (monthly) homogeneity. Conductivity showed significant upward trends in October (S_k=11, Q_m=6.0 umhos/cm•yr) and June (S_k=11, Q_m=3.4 umhos/cm•yr) and a significant downward trend in January (S_k=-11, Q_m=-14.8 umhos/cm•yr). Total alkalinity showed significant upward trends in June (S_k=13, Q_m=2.3 ml/L•yr), July (S_k=11, Q_m=2.9 mg/L•yr) and August (S_k=13, Q_m=3.2 mg/L•yr) and a significant downward trend in January (S_k=-11, Q_m=-4.1 mg/L•yr). Dissolved zinc showed significant upward trends in October (S_k=11, Q_m=0.43 ug/l•yr), January (S_k=11, Q_m=0.93 ug/l•yr) , and September (S_k=15, Q_m=1.15 ug/l•yr). The Seasonal Mann-Kendall analysis for pH shows no statistically significant (p=0.967) trends for the two-tailed ($\alpha/2$=0.025) test. However, at a lower threshold of ($\alpha/2$=0.05) the H_0 would be rejected in favor of an increasing trend with a Sen's slope of 0.4 su/yr. Overall the trends, either by individual month in the case of conductivity and total alkalinity or overall for the entire water-year in the case of pH, are similar in magnitude and direction with trends identified at Site 48, the upgradient control site and are interrupted to part of the same natural variation. With respect to dissolved zinc, Site 6 shows several months that are similar to Site 48 where an overall slowly increasing, seasonally adjusted trend was identified. However, Site 6 also has three months (November, March, and May) that show generally decreasing trends. However, the trends are not statistically significant at α=5%. Thus, the trends identified at Site 6 are similar to the natural variation found at Site 48 or in the case of decreasing dissolved zinc are opposite to any indication of any increase in dissolved load due to Greens Creek's activies upstream from Site 6.

A statistical comparison between Site 6 and Site 48 of median values for alkalinity, lab pH, specific conductance, sulfate, and dissolved zinc have been conducted as specified in the Statistical Information Goals for Site 6. Calculation details of the non-parametric rank sum tests are presented in detail on the pages following this interpretive section. The adjacent table summarizes the results of the large sample approximation to the Wilcoxon-Mann-Whitney rank sum test as performed on the Water Year 2004 data set. For alkalinity, pH, and conductivity there is no statistical difference between the measured median values at a significance level of $\alpha/2$=0.025 for a two-tailed test. The dissolved zinc concentrations are statistically different, which has been previously noted in prior water years. A visual inspection of the dissolved zinc X-Y plot with Site 48 and Site 6 data continue to show the different concentrations appears to display a distinct seasonal trend where summer flow conditions typically show the smallest difference of approximately 1 µg/l, while winter flow conditions show the largest difference of approximately 3-5 µg/l. The current water-year mimics this trend with the large difference in Jan-04 of 11.2 ug/l for Site 6 verses 3.46 ug/l for Site 48 due to the same storm event that resulted in the high dissolved Pb noted above in the discussion concerning AWQS.

Parameter	Rank Sum Test p-value	Site #48 median	Site #06 median
Conductivity, Lab	0.77	108	115
pH, Lab	0.41	7.88	7.85
Alkalinity, Total	0.58	42.5	42.2
Sulfate, Total	0.90	10.9	12.9
Zinc, Dissolved	**1.00**	2.16	5.56

KGCMC believes that no additional monitoring is warranted at this time due to the consistent differences in dissolved zinc concentrations between the two sites. The current FWMP program is sufficient to monitor any changes at Site 6. The sampled concentrations for dissolved zinc are typically more than one order of magnitude below the strictest AWQS, currently the level does not approach or endanger water quality values. Second, as documented by the above analysis, differences of as little as 2 μg/l are effectively monitored and documented with the current program. Thus, if an as yet undetected upward trend in dissolved zinc at Site 6 should occur, the current program is able to identify the change before any water quality values are impaired.

Table of Results for Water Year 2004

Site 6 "Middle Greens Creek"

Sample Date/Parameter	10/9/2003	11/6/2003	12/17/2003	1/14/2004	2/11/2004	3/23/2004	4/27/2004	5/19/2004	6/16/2004	7/20/2004	8/19/2004	9/22/2004	**Median**
Water Temp (°C)	8.6	1.7	1.8	0.9	2.1	1.1	2.9	4.1	5.8	11.1	12.5	6.9	3.5
Conductivity-Field(μmho)	108	130	155	89	106	139	94	82	87	121	147	100	107
Conductivity-Lab (μmho)	137	137	153	83	109 J	159 J	102	85	89 J	120	143	91	115
pH Lab (standard units)	7.92	8.08	7.84	8.31 J	7.58	7.77	7.86	7.69	7.83 J	7.91 J	7.88	7.83	7.85
pH Field (standard units)	7.98	7.79	7.75	7.58	7.71	7.90	7.75	7.87	7.65	7.97	8.17	7.59	7.77
Total Alkalinity (mg/L)	50.5	51.8	48.5	30.2	38.5	54.0	38.7	35.7	39.3 J	45.1	55.3	37.7	42.2
Total Sulfate (mg/L)	15.1	15.2	20.3	8.8	11.7	21.4	9.5	7.7	7.6	14.0	18.6	8.6	12.9
Hardness (mg/L)	69.0	64.3	71.5	39.4	50.4	86.3	50.4	43.0	43.1	60.2	73.0	47.1	55.3
Dissolved As (ug/L)	0.138	0.194	<0.051	0.259 U	0.154 J	0.306	0.169	0.130 J	0.319	0.194	0.269	0.201	0.194
Dissolved Ba (ug/L)			26.5		22.0								24.3
Dissolved Cd (ug/L)	0.054	0.041 J	0.030 J	0.097	0.072	0.046 J	0.051 J	0.029 J	0.060 J	0.042	0.044	0.058	0.048
Dissolved Cr (ug/L)			0.384		0.171								0.278
Dissolved Cu (ug/L)	0.369	0.328	0.386 U	0.973	0.791	0.469	0.689	0.198	0.503	0.259	0.424	0.684	0.447
Dissolved Pb (ug/L)	<0.0290	0.0126 J	0.6370 J	0.9150	0.0885 U	0.0315 U	0.1180	<0.0110	<0.0110	0.0115 U	0.0184 U	0.3570	0.0250
Dissolved Ni (ug/L)			0.443		0.843								0.643
Dissolved Ag (ug/L)			<0.009		<0.009 J								0.005
Dissolved Zn (ug/L)	5.96	3.75	7.67	11.30 U	8.26 J	5.15 U	7.07 J	2.00 UJ	3.44	2.51	2.80 UJ	7.57	5.56
Dissolved Se (ug/L)			1.150 UJ		0.457 U								0.804
Dissolved Hg (ug/L)	0.000813 J	0.000752 U	0.000778 U	0.002970	0.001720 U	0.000803 U	0.001730	0.000702 U	0.000659 U	0.000692 U	0.000858 U	0.001390 U	0.000808

For individual sample/analyte qualifier descriptions see "Qualified Data by QA Reviewer" table.

Values reported as less than MDL are replaced by 1/2 MDL for median calculation purposes.

Shaded data has been qualified as an outlier by KGCMC and removed from any further analysis and is not included into the calculation of the median

Qualified Data by QA Reviewer

Date Range: 10/01/2003 to 09/30/2004

Site No.	Sample Date	Sample Time	Parameter	Value	Qualifier	Reason for Qualifier
6	01/14/2004	11:12:00 AM				
			pH Lab, su	8.31	J	Hold Time
			As Diss, ug/l	0.259	U	Field Blank Contamination, LC
			Zn Diss, ug/l	11.3	U	Field Blank Contamination
6	10/09/2003	12:45:00 PM				
			Hg Diss, ug/l	0.000813	J	Duplicate Sample RPD
6	11/06/2003	11:20:00 AM				
			Cd Diss, ug/l	0.0405	J	Below Quantitative Range
			Pb Diss, ug/l	0.0126	J	Below Quantitative Range
			Hg Diss, ug/l	0.000752	U	Field Blank Contamination
6	12/17/2003	11:20:00 AM				
			Cd Diss, ug/l	0.0301	J	Below Quantitative Range, L
			Cu Diss, ug/l	0.386	U	Field Blank Contamination
			Pb Diss, ug/l	0.637	J	LCS Recovery
			Se Diss, ug/l	1.15	UJ	Method Blank Contamination,
			Hg Diss, ug/l	0.000778	U	Field Blank Contamination
6	02/11/2004	12:01:00 PM				
			Cond Lab, umho	109	J	Below Quantitative Range
			As Diss, ug/l	0.154	J	LCS Recovery
			Pb Diss, ug/l	0.0885	U	Field Blank Contamination
			Ag Diss, ug/l	-0.009	J	Below Quantitative Range
			Zn Diss, ug/l	8.26	J	LCS Recovery
			Se Diss, ug/l	0.457	U	Field Blank Contamination, LC
			Hg Diss, ug/l	0.00172	U	Field Blank Contamination
6	03/23/2004	11:04:00 AM				
			Cond Lab, umho	159	J	Below Quantitative Range
			Cd Diss, ug/l	0.0455	J	Below Quantitative Range
			Pb Diss, ug/l	0.0315	U	Below Quantitative Range, Fi
			Zn Diss, ug/l	5.15	U	Field Blank Contamination
			Hg Diss, ug/l	0.000803	U	Method Blank Contamination

Qualifier	Description
J	Positively Identified - Approximate Concentration
N	Presumptive Evidence For Tentative Identification
NJ	Tentatively Identified - Approximate Concentration
R	Rejected - Cannot Be Verified
U	Not Detected Above Quantitation Limit
UJ	Not Detected Above Approximate Quantitation Limit

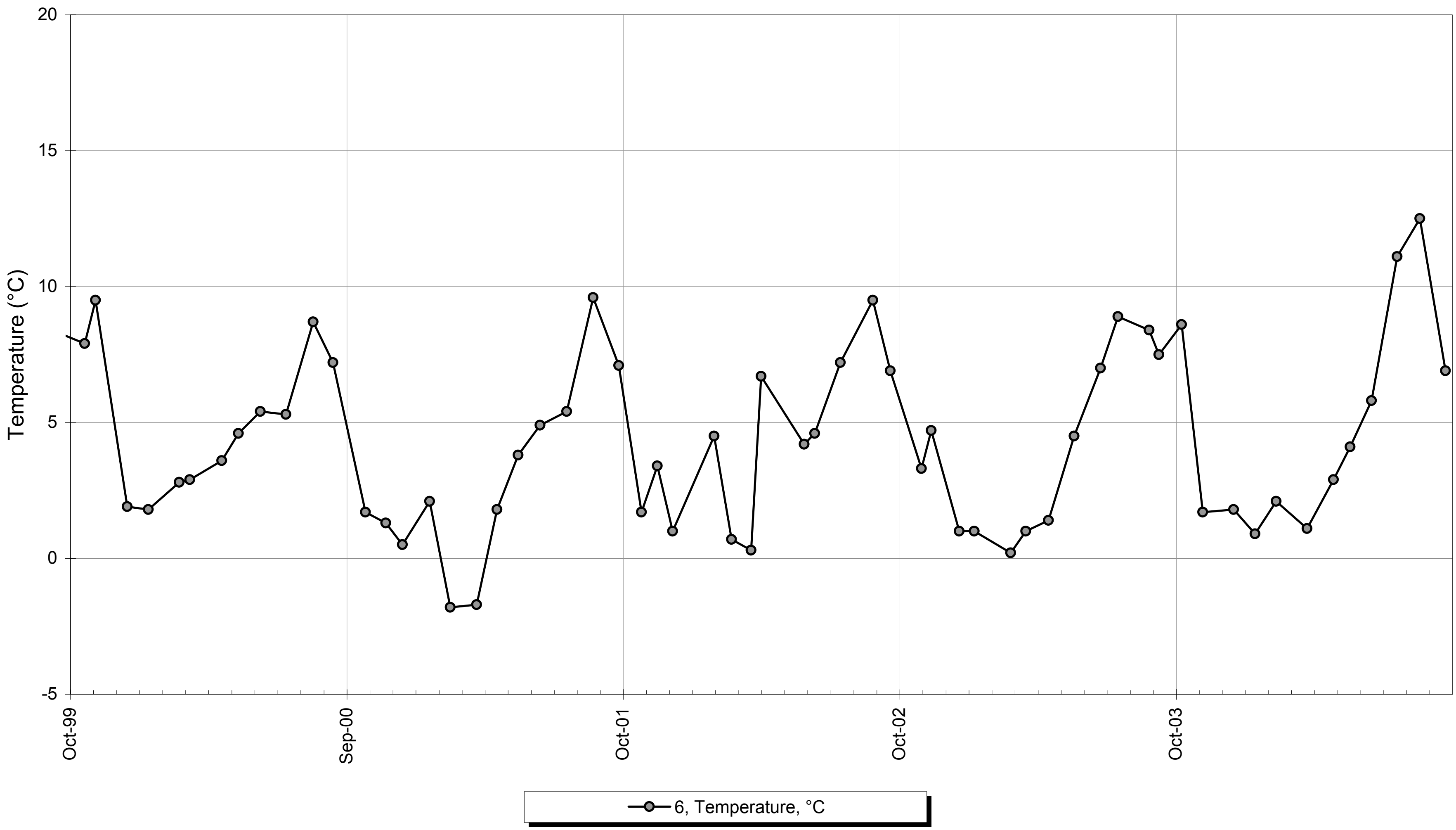
Qualified Data by QA Reviewer

Date Range: 10/01/2003 to 09/30/2004

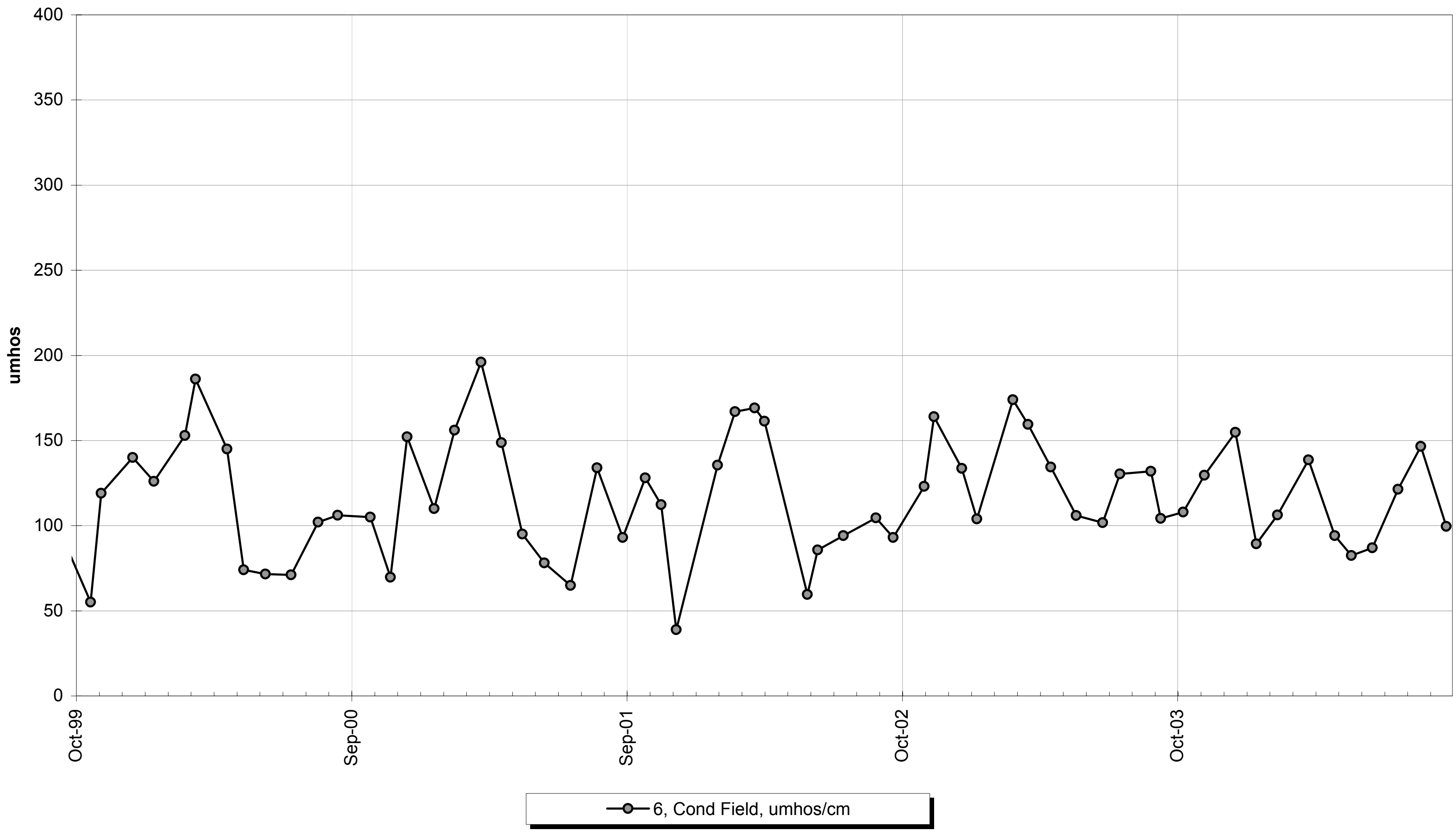
Site No.	Sample Date	Sample Time	Parameter	Value	Qualifier	Reason for Qualifier
6	04/27/2004	10:43:00 AM				
			Cd Diss, ug/l	0.0514	J	Below Quantitative Range
			Zn Diss, ug/l	7.07	J	LCS Recovery
6	05/19/2004	10:04:00 AM				
			As Diss, ug/l	0.13	J	Below Quantitative Range
			Cd Diss, ug/l	0.0292	J	Below Quantitative Range
			Zn Diss, ug/l	2	UJ	LCS Recovery, Field Blank C
			Hg Diss, ug/l	0.000702	U	Method Blank Contamination
6	06/16/2004	10:40:00 AM				
			Cond Lab, umho	88.8	J	Sample Temperature
			pH Lab, su	7.83	J	Hold Time
			Alk Tot, mg/l	39.3	J	Sample Temperature
			Cd Diss, ug/l	0.0603	J	Below Quantitative Range
			Hg Diss, ug/l	0.000659	U	Method Blank Contamination
6	07/20/2004	1:40:00 PM				
			pH Lab, su	7.91	J	Hold Time
			Pb Diss, ug/l	0.0115	U	Field Blank Contamination
			Hg Diss, ug/l	0.000692	U	Method Blank Contamination
6	08/19/2004	10:59:00 AM				
			Pb Diss, ug/l	0.0184	U	Field Blank Contamination
			Zn Diss, ug/l	2.8	UJ	Field Blank Contamination, C
			Hg Diss, ug/l	0.000858	U	Method Blank Contamination
6	09/22/2004	8:45:00 AM				
			Hg Diss, ug/l	0.00139	U	Field Blank Contamination

Qualifier	Description
J	Positively Identified - Approximate Concentration
N	Presumptive Evidence For Tentative Identification
NJ	Tentatively Identified - Approximate Concentration
R	Rejected - Cannot Be Verified
U	Not Detected Above Quantitation Limit
UJ	Not Detected Above Approximate Quantitation Limit

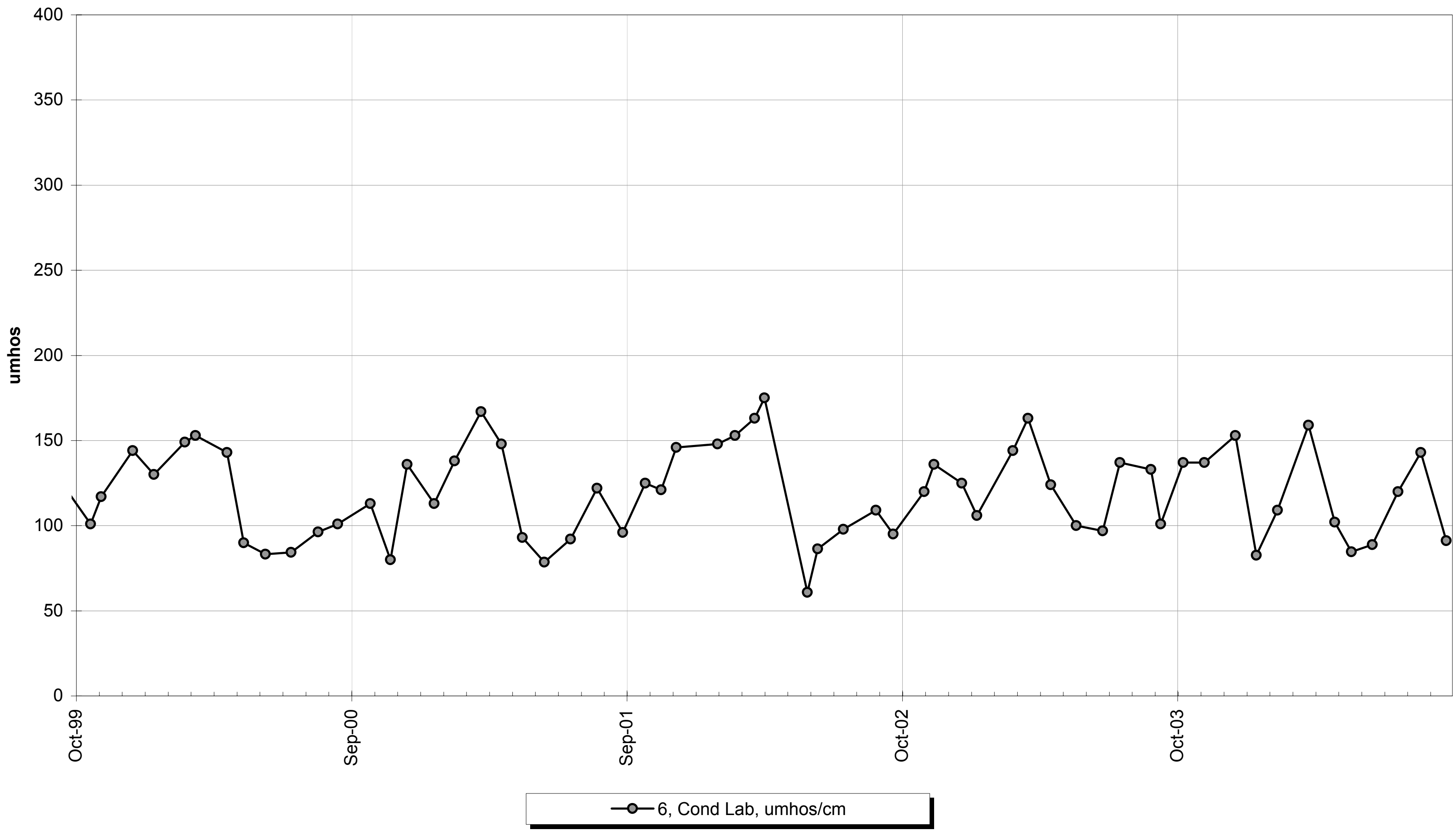
Site 6 -Water Temperature

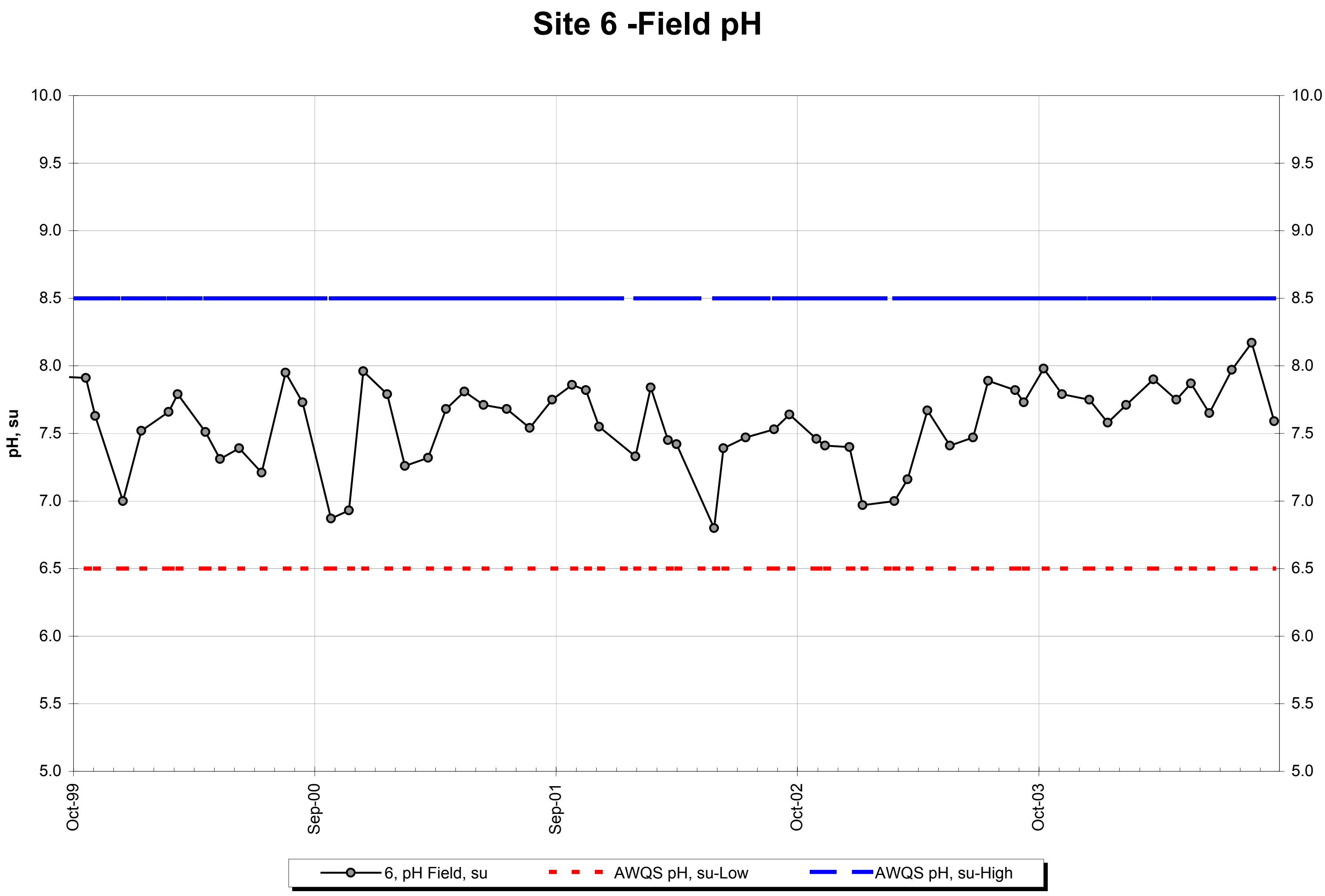


Site 6 -Conductivity-Field



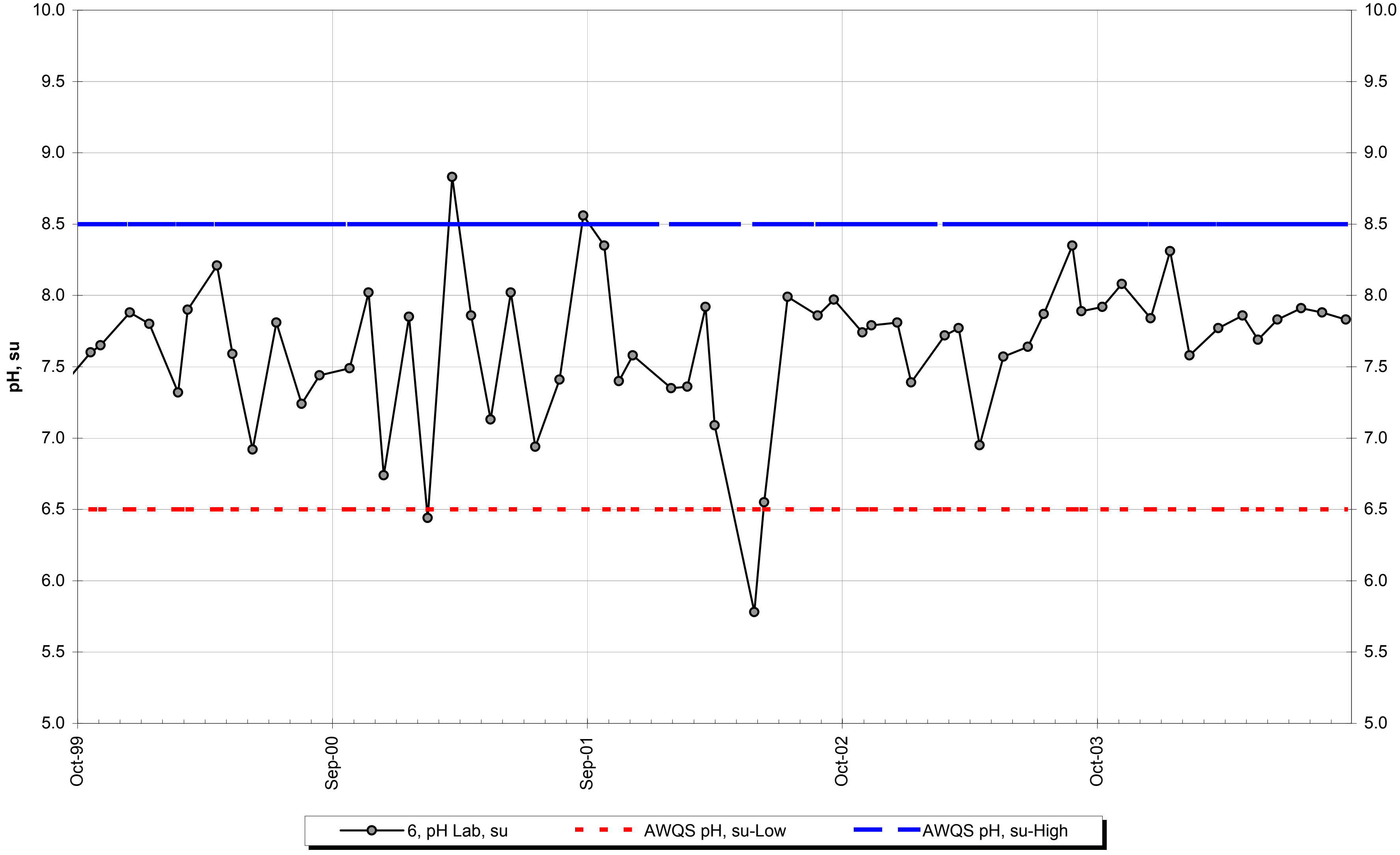
Site 6 -Conductivity-Lab





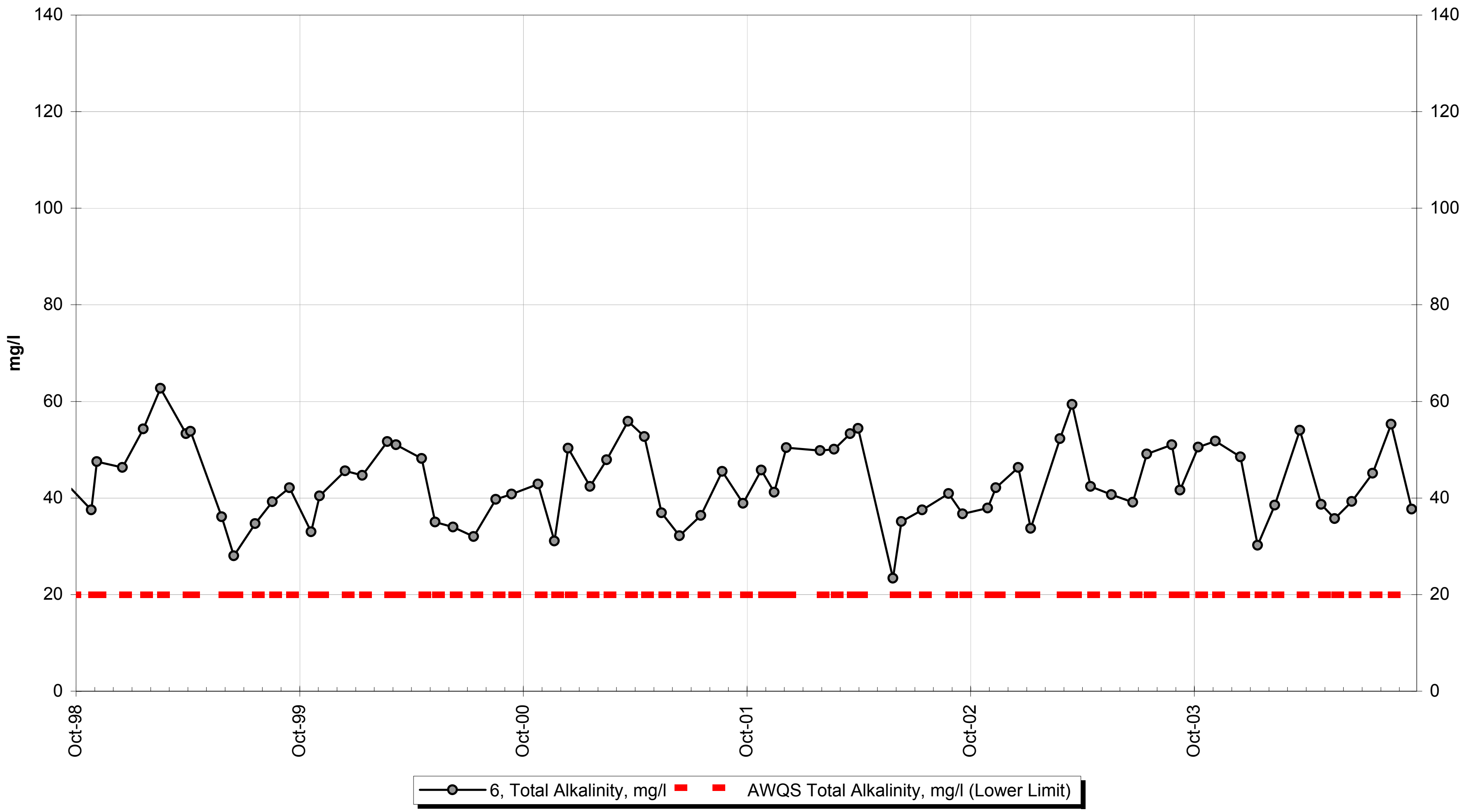
Site 6 -Field pH
pH, su
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
6, pH Field, su
AWQS pH, su-Low
AWQS pH, su-High

Site 6 -Lab pH

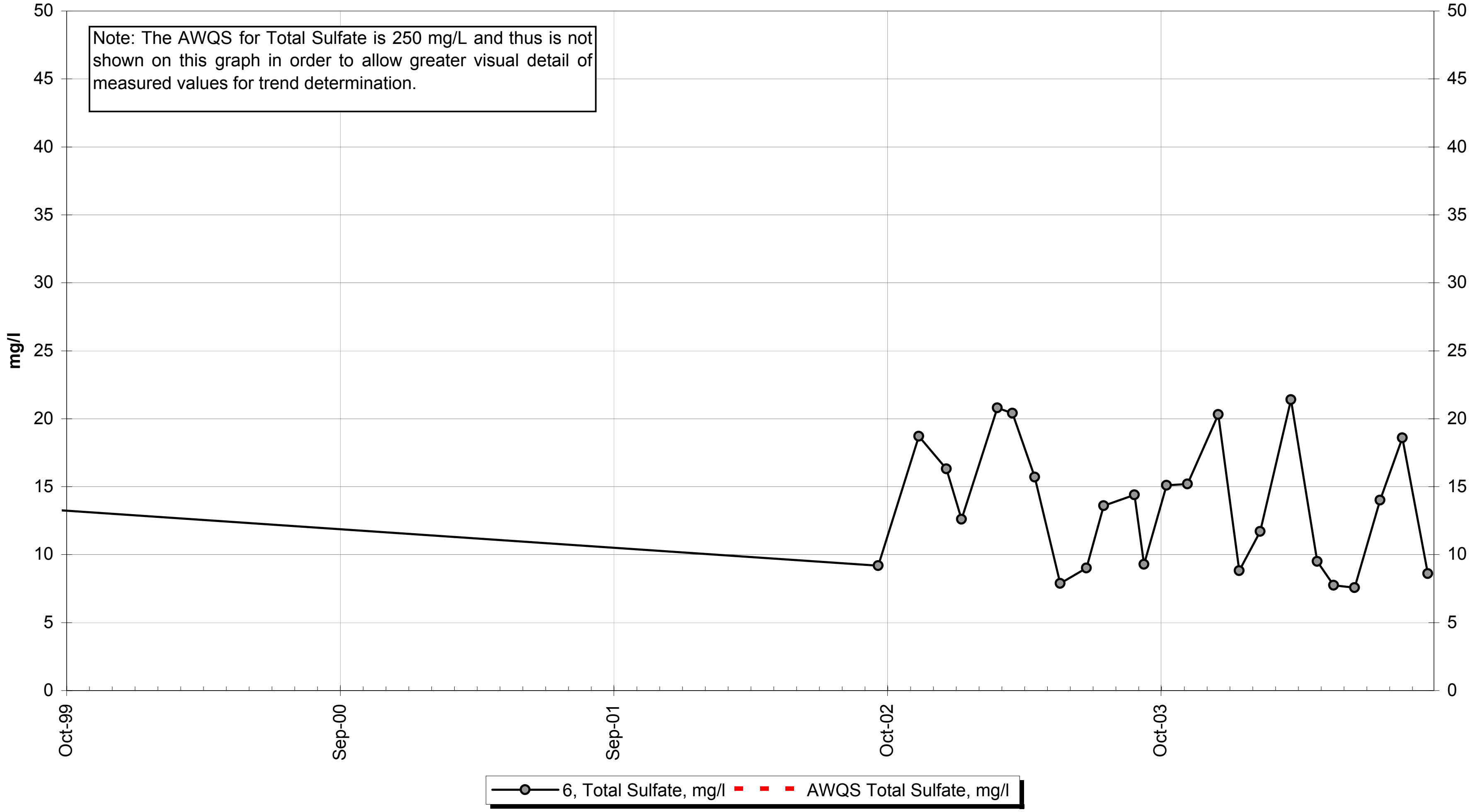


10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
pH, su
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
6, pH Lab, su
AWQS pH, su-Low
AWQS pH, su-High

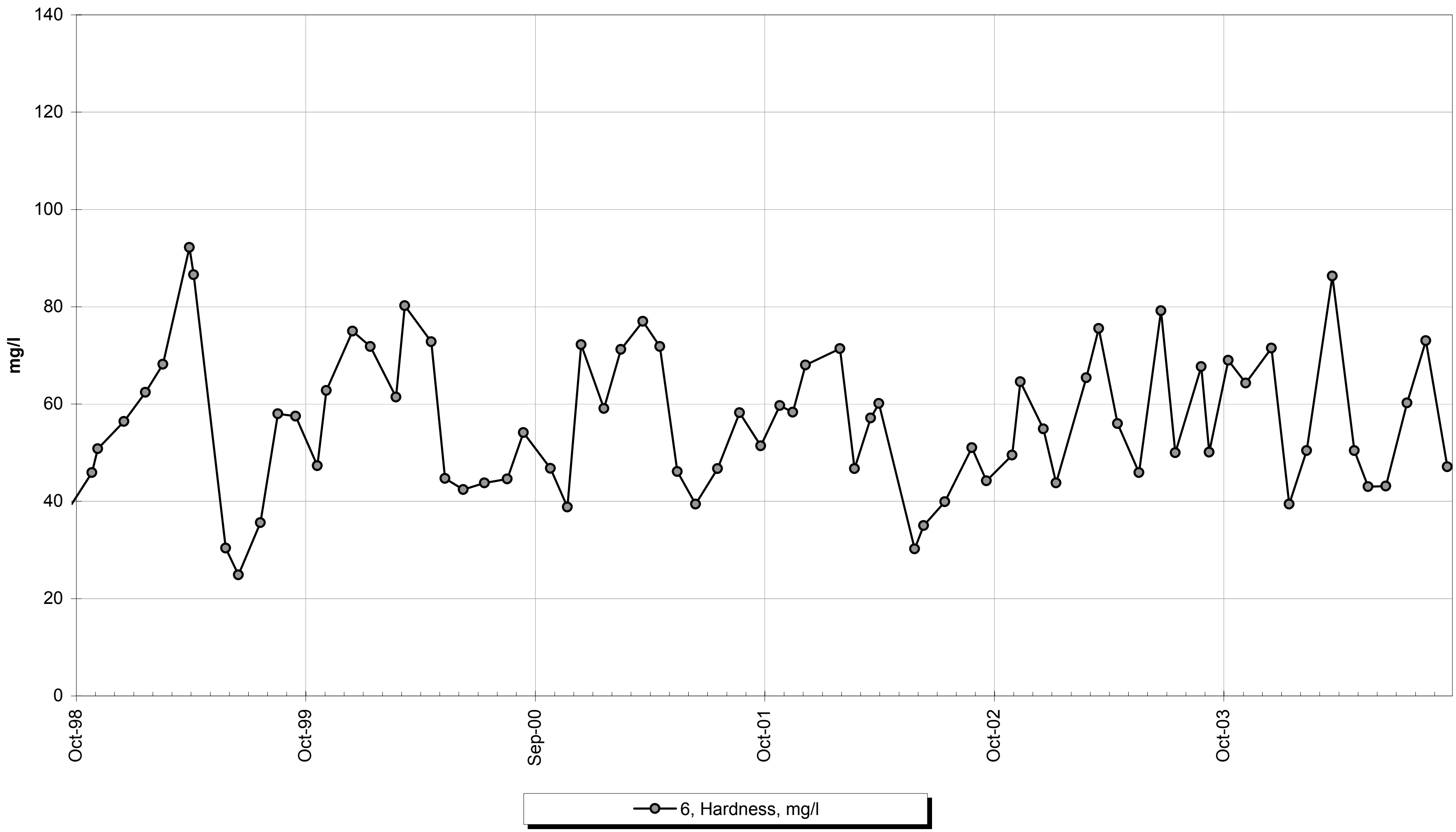
Site 6 -Total Alkalinity



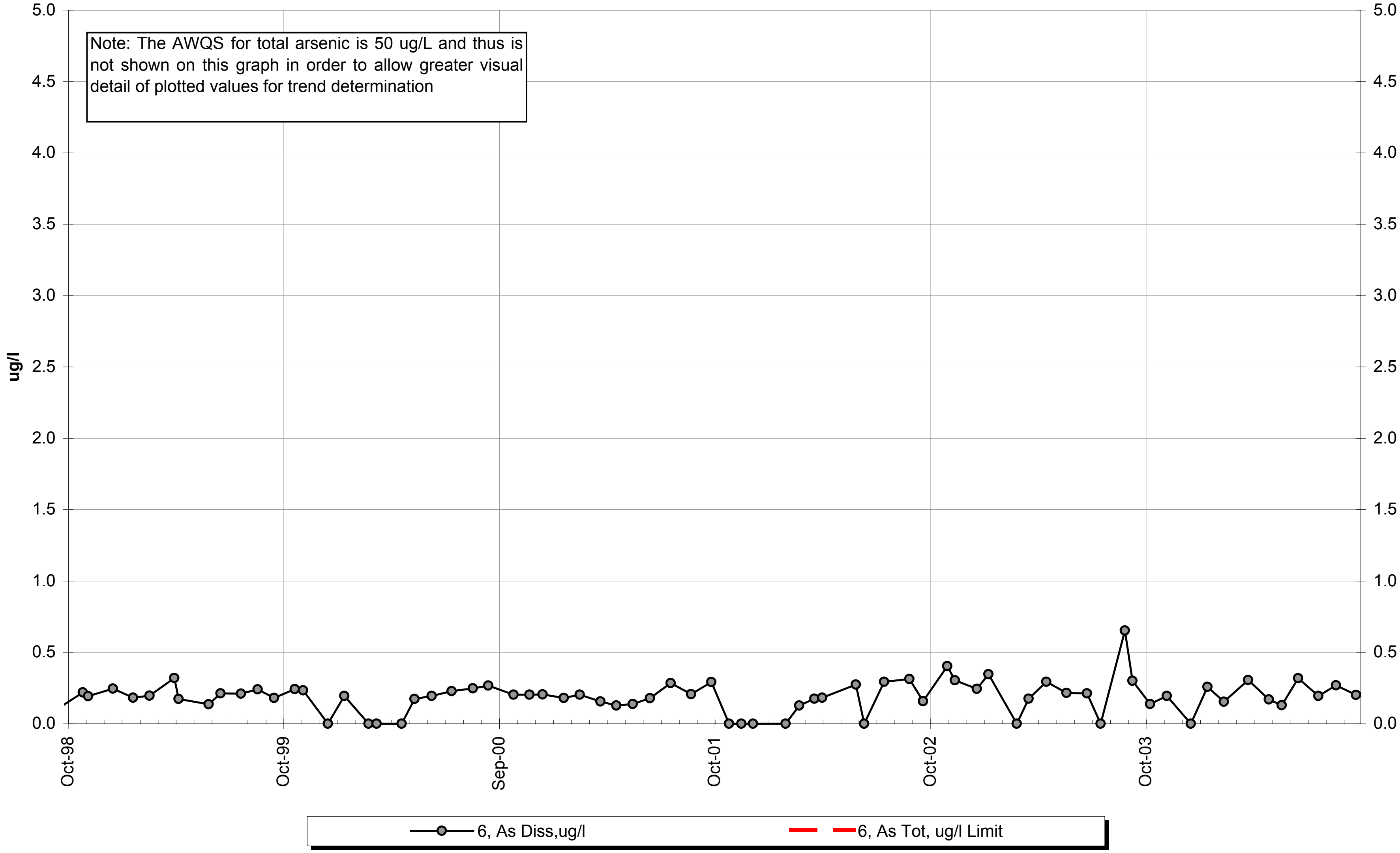
Site 6 -Total Sulfate

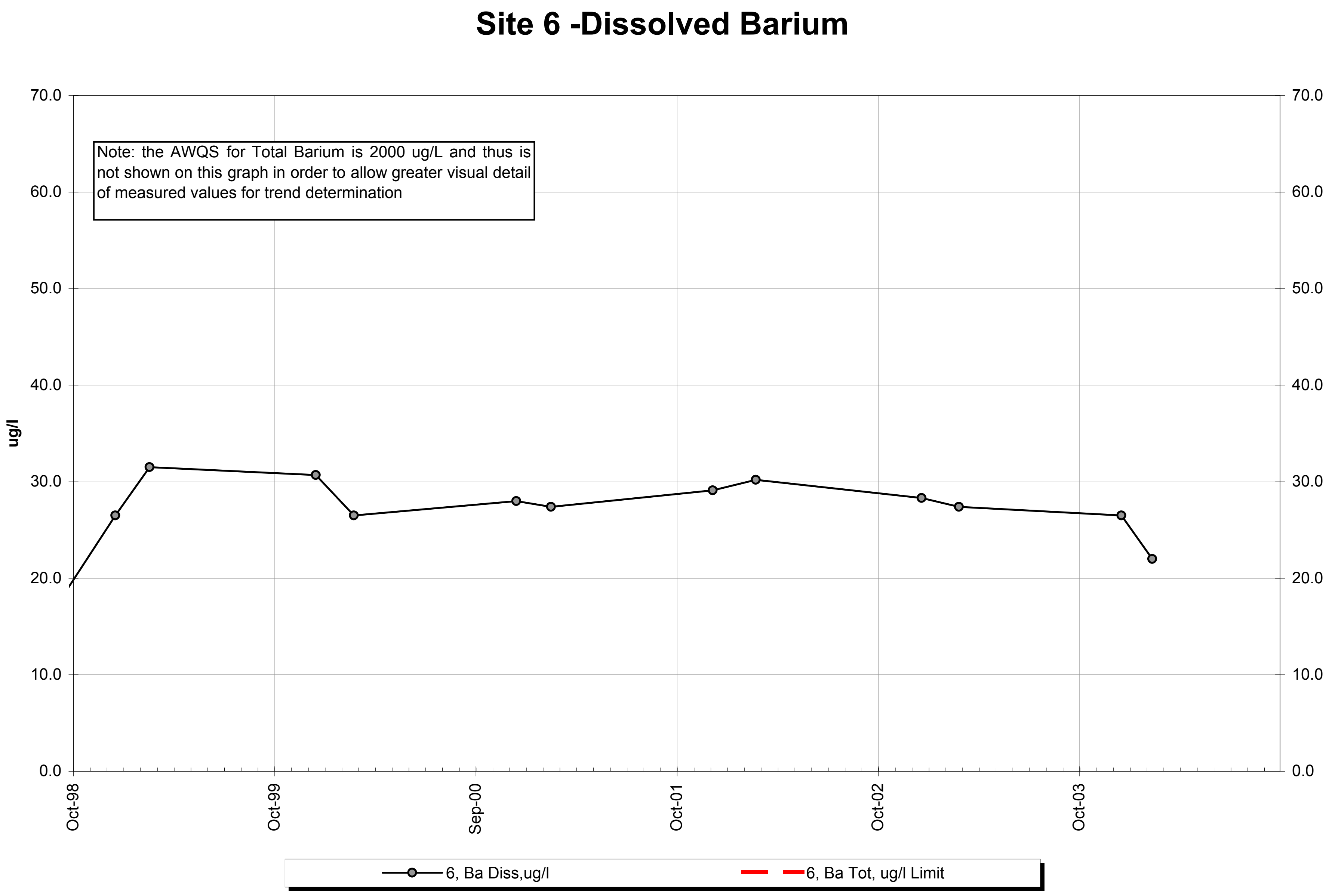


Site 6 -Hardness

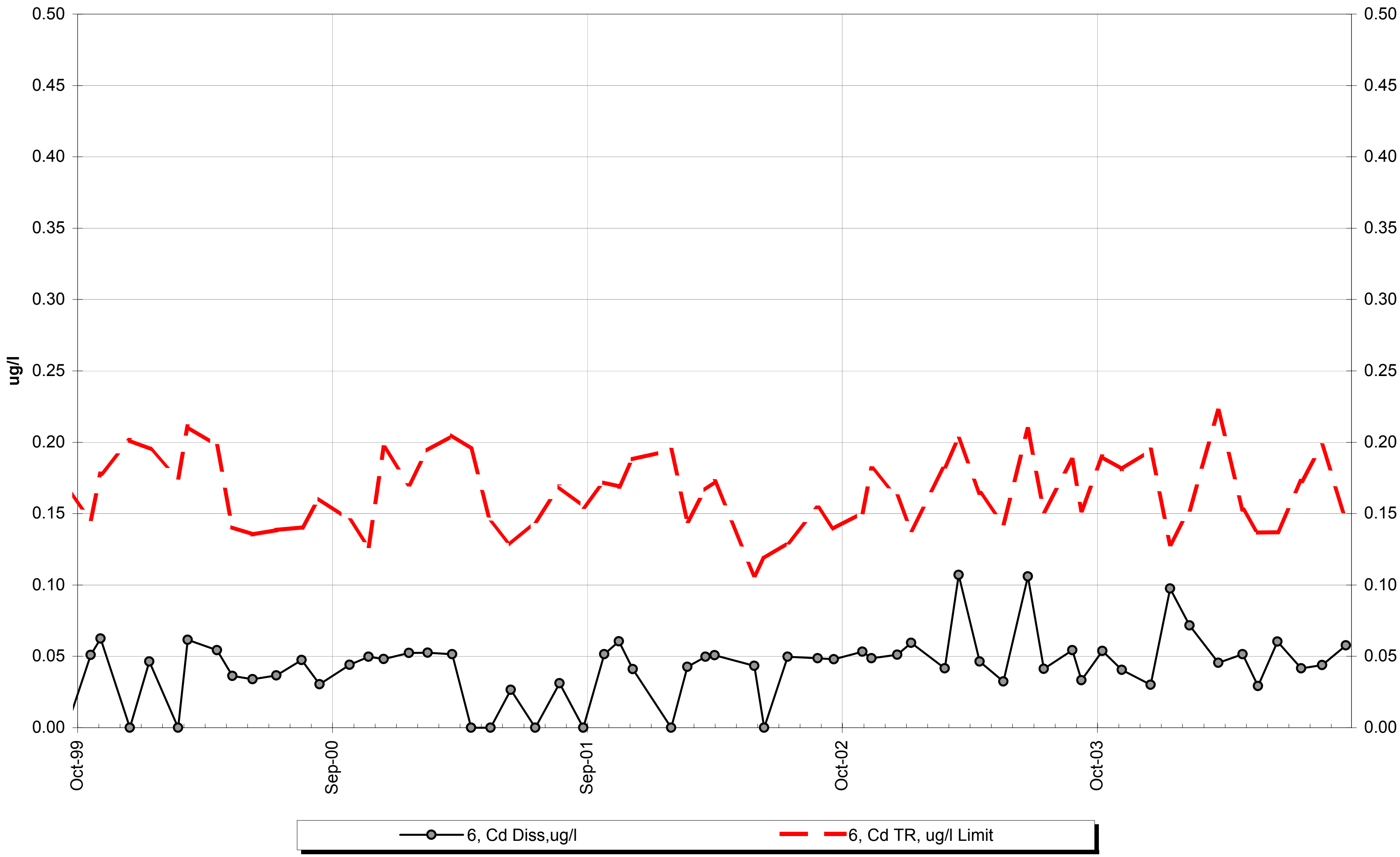


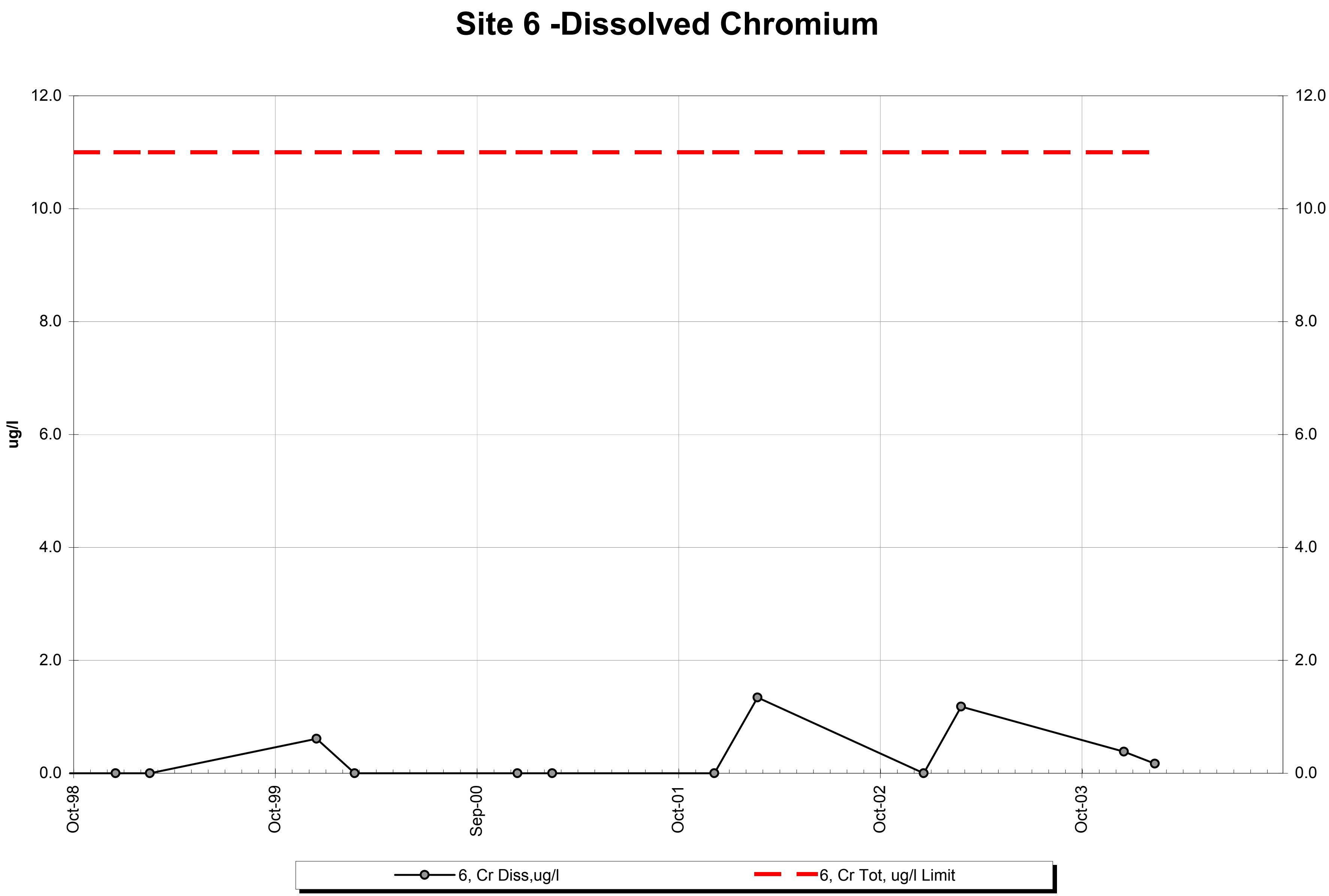
Site 6 -Dissolved Arsenic

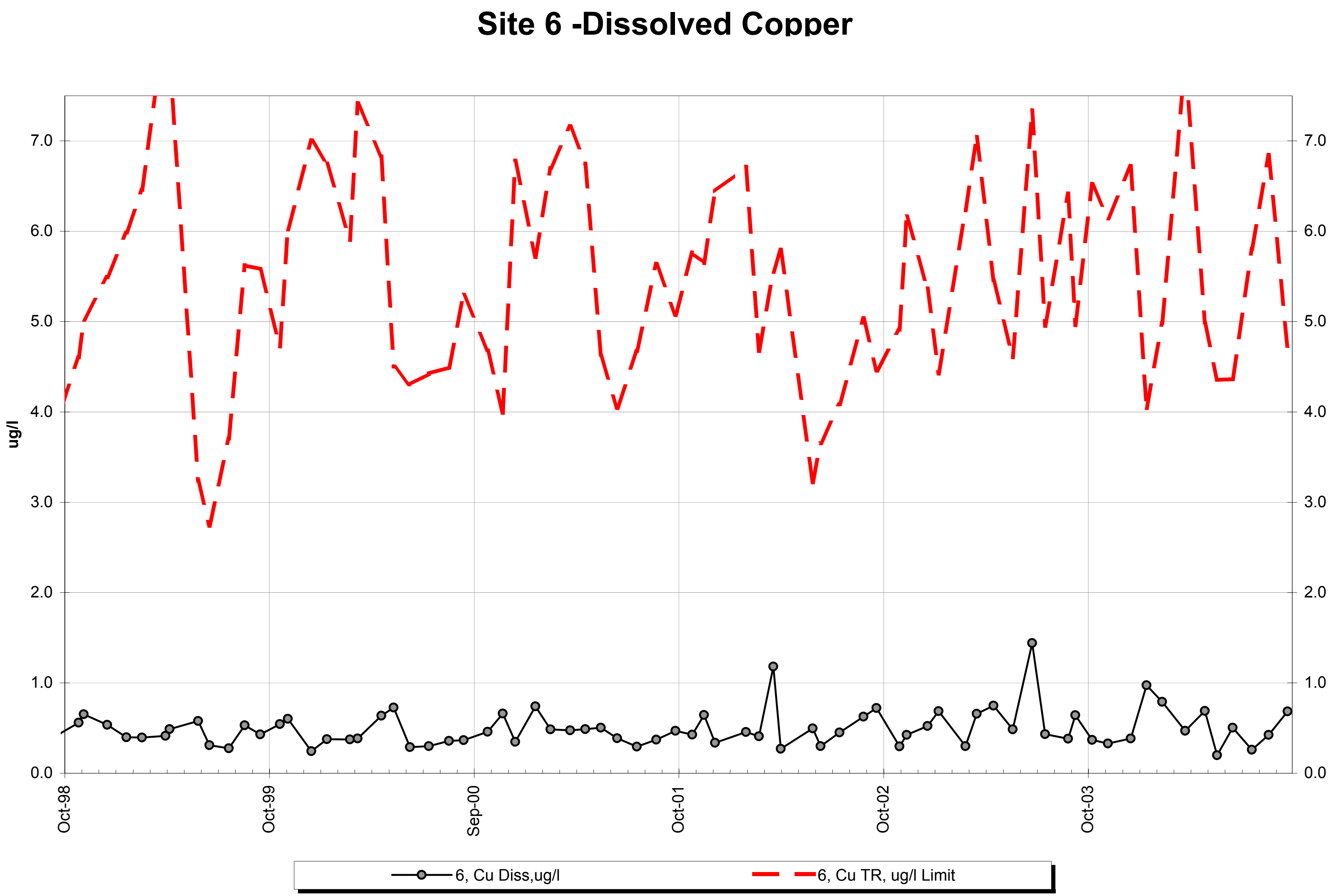



Site 6 -Dissolved Barium
Note: the AWQS for Total Barium is 2000 ug/L and thus is not shown on this graph in order to allow greater visual detail of measured values for trend determination
ug/l
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
6, Ba Diss,ug/l
6, Ba Tot, ug/l Limit

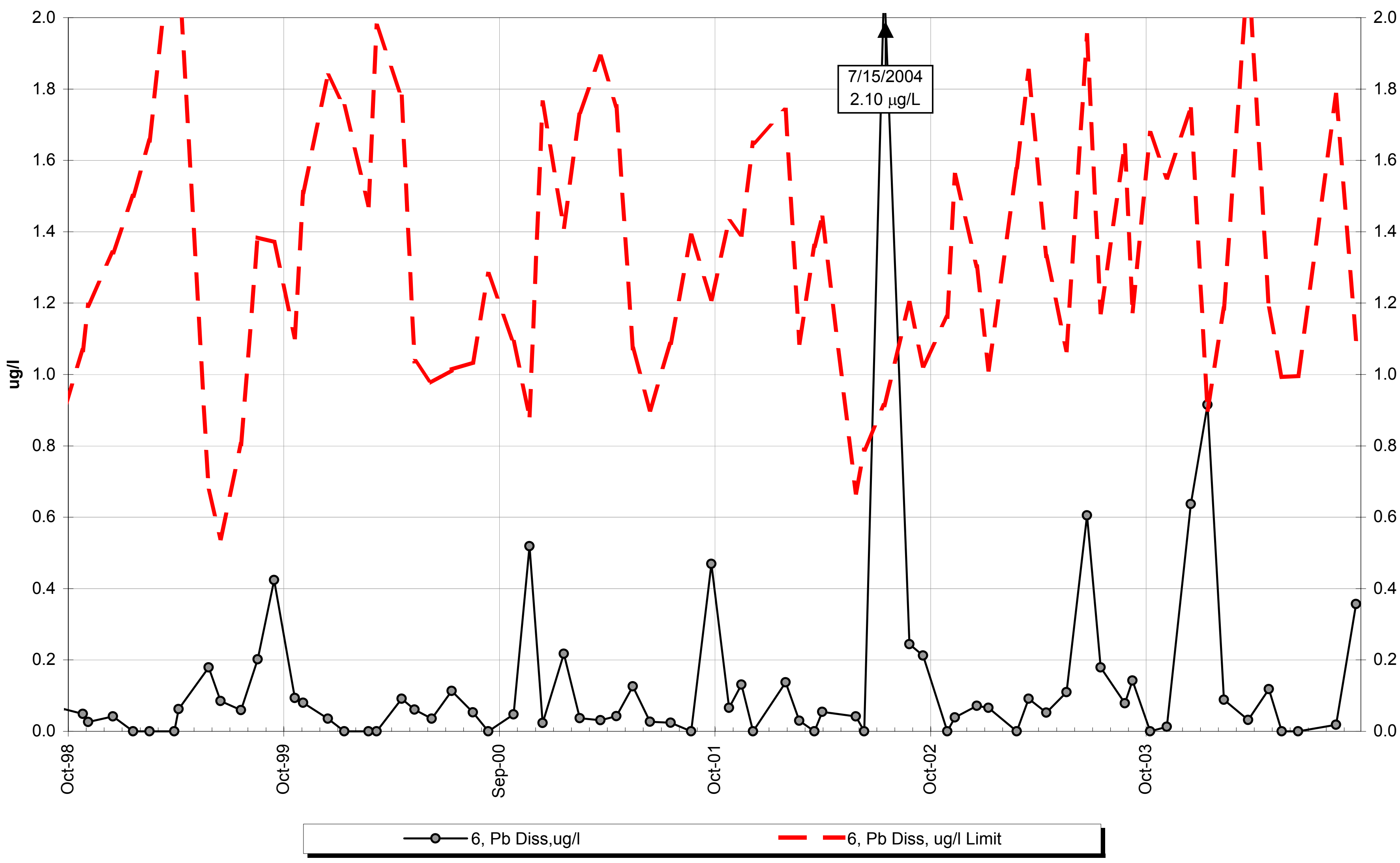
Site 6 -Dissolved Cadmium



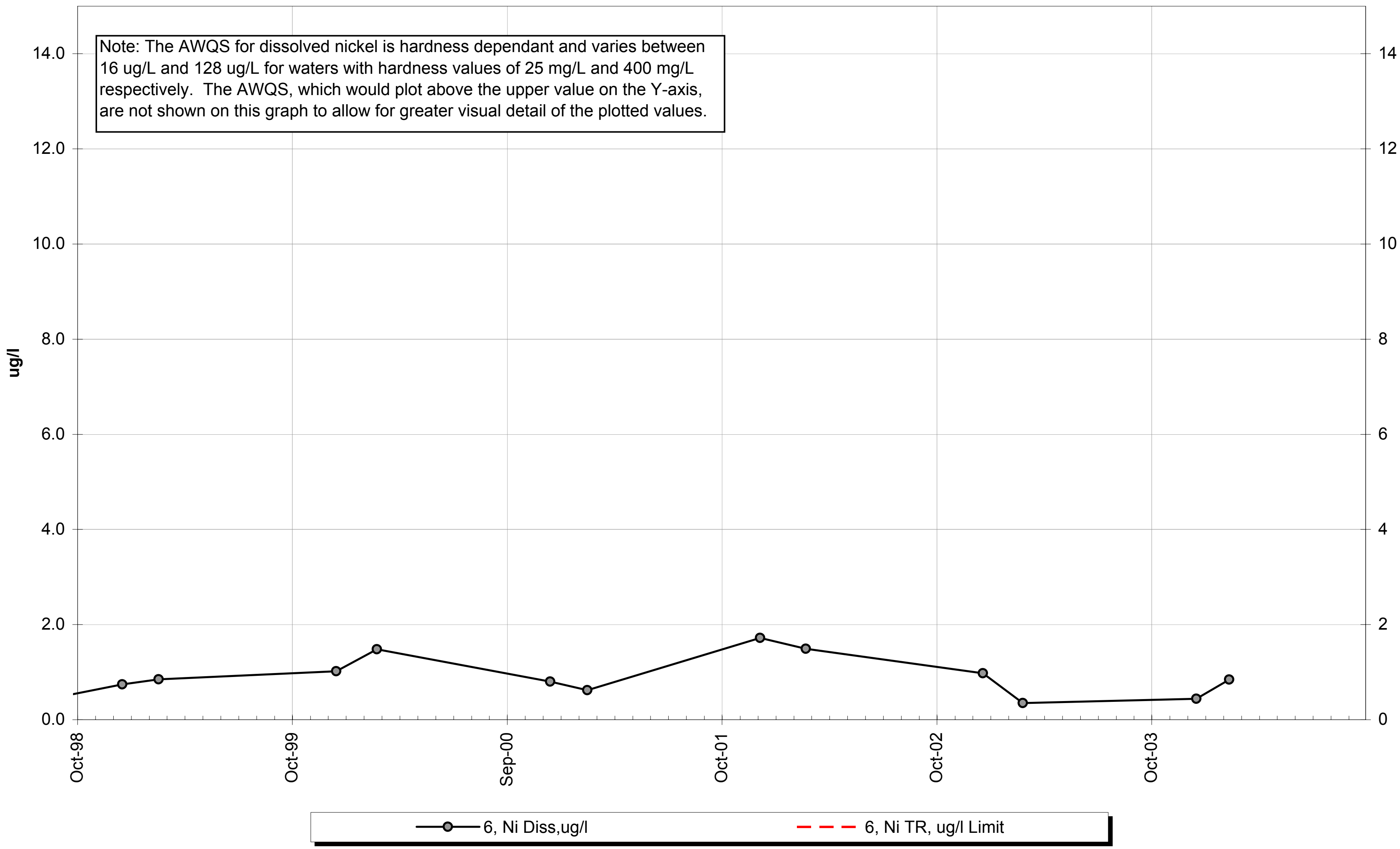

Site 6 -Dissolved Chromium
ug/l
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
6, Cr Diss,ug/l
6, Cr Tot, ug/l Limit

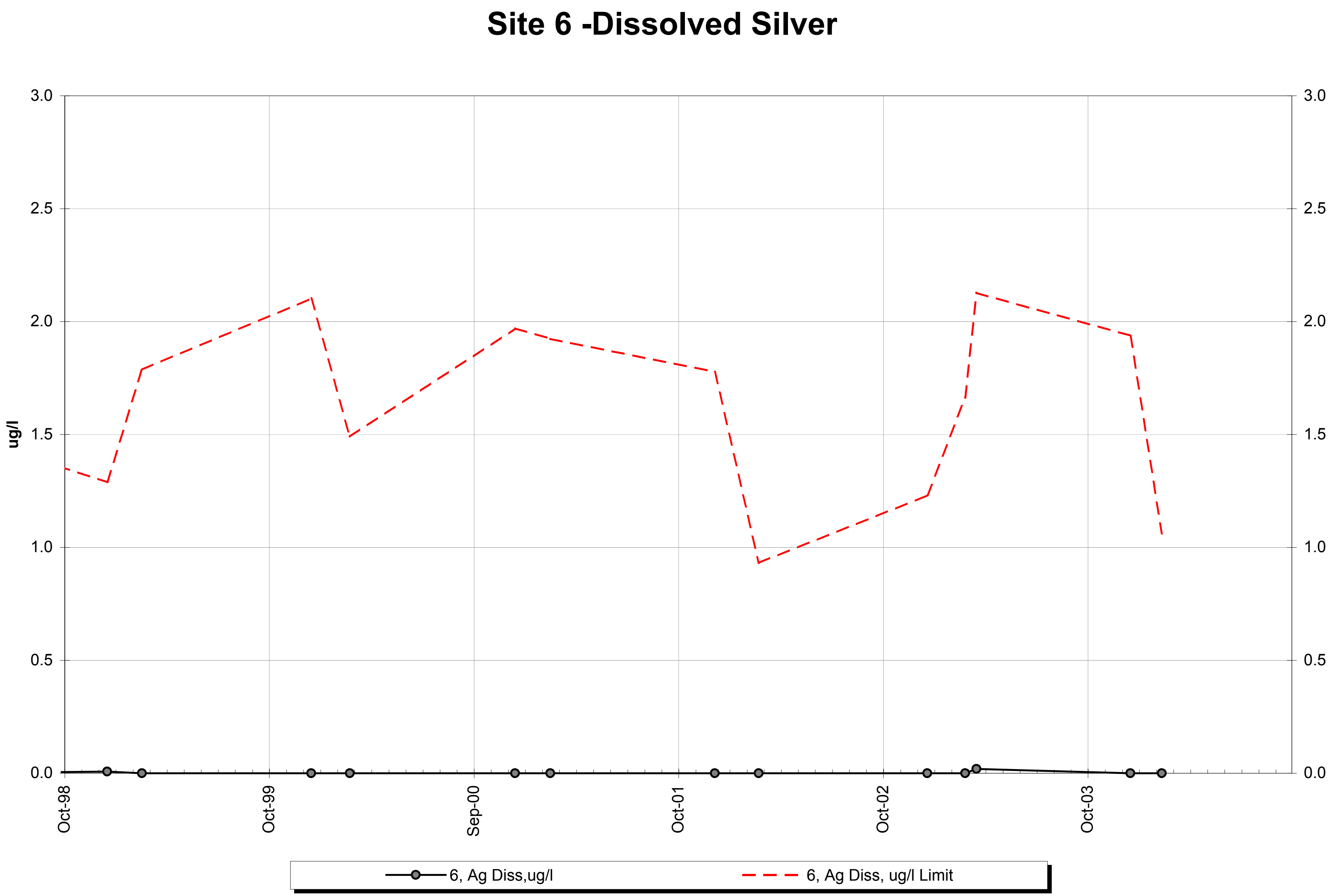

Site 6 -Dissolved Copper
ug/l
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
6, Cu Diss,ug/l
6, Cu TR, ug/l Limit

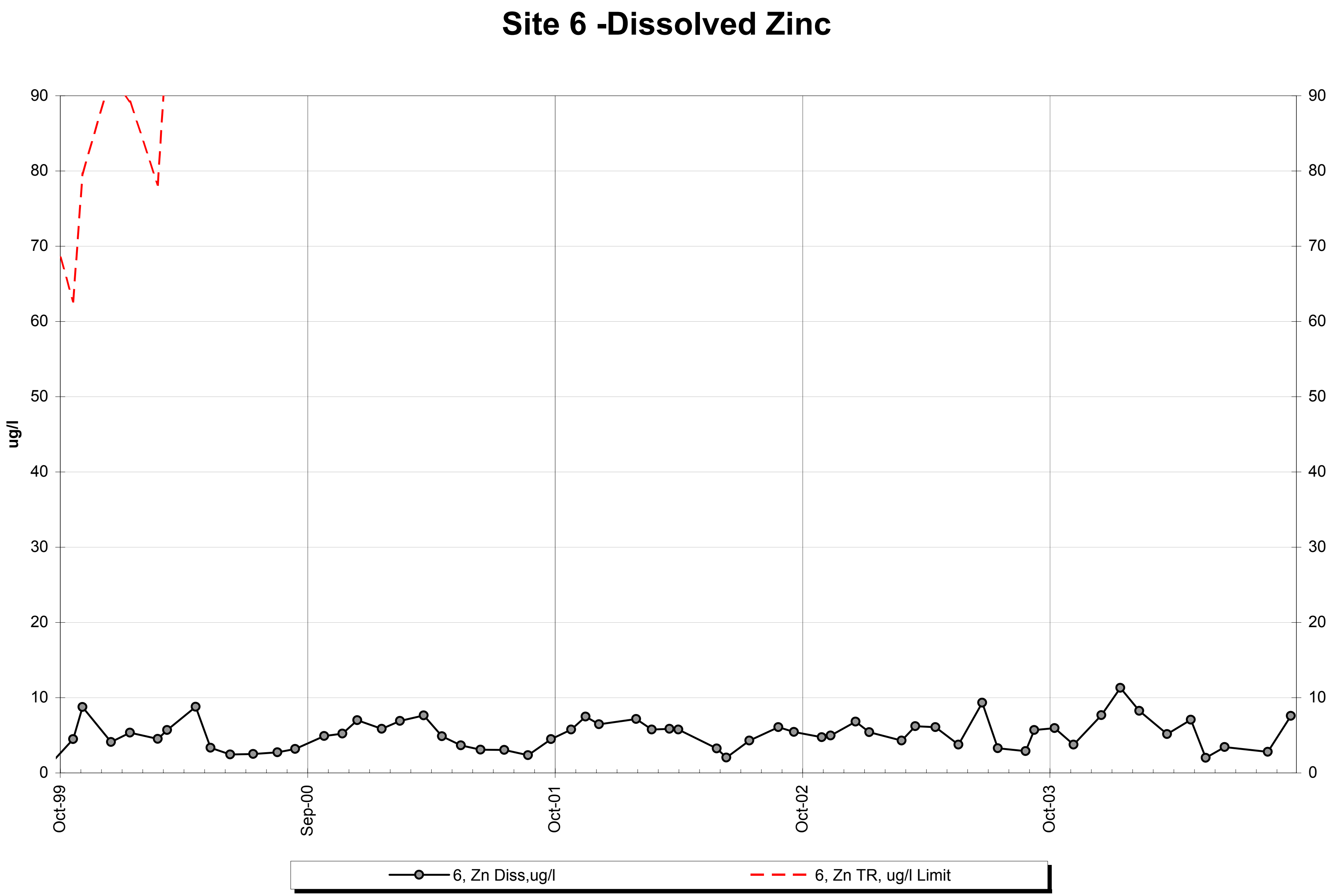
Site 6 -Dissolved Lead



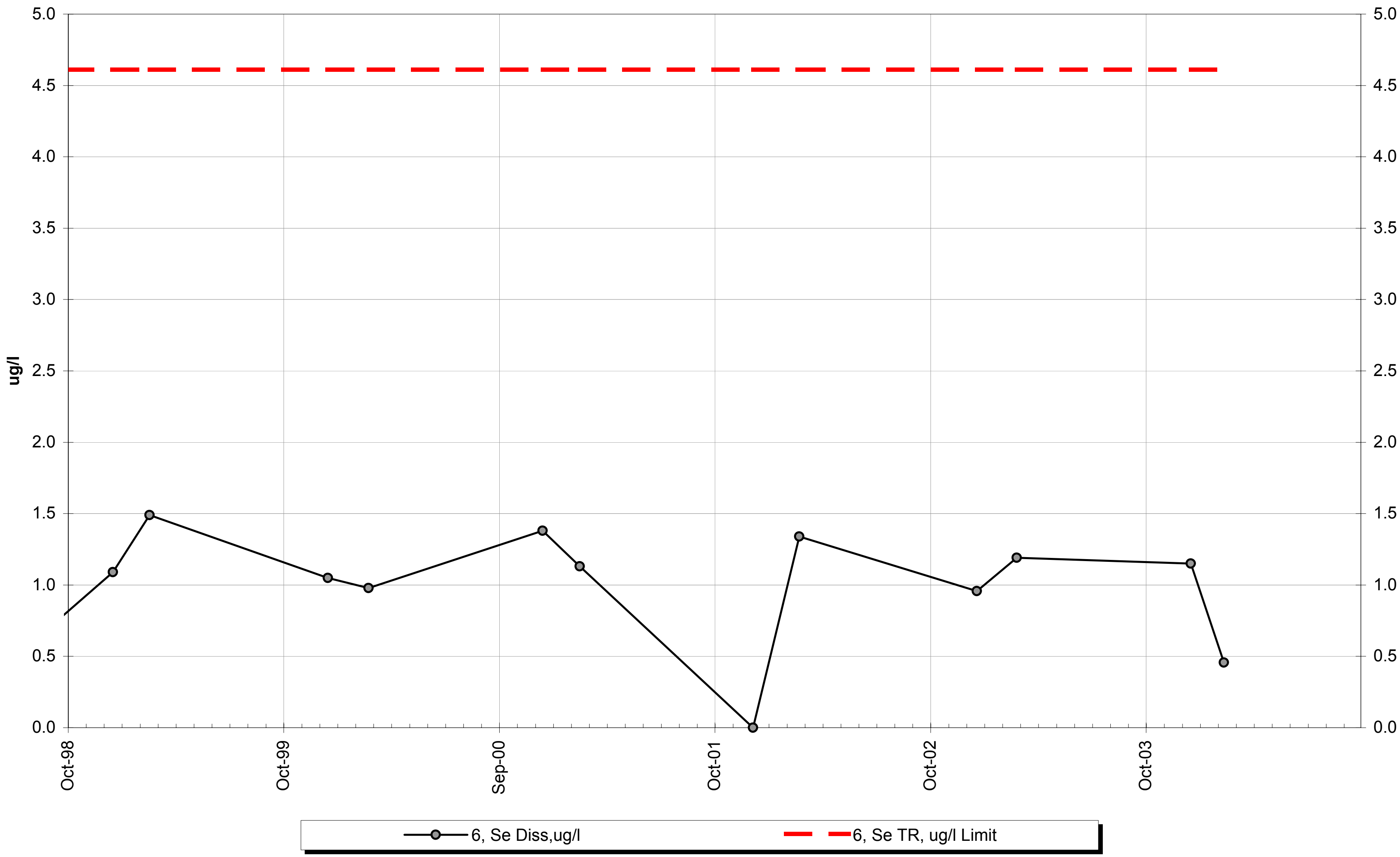
Site 6 -Dissolved Nickel

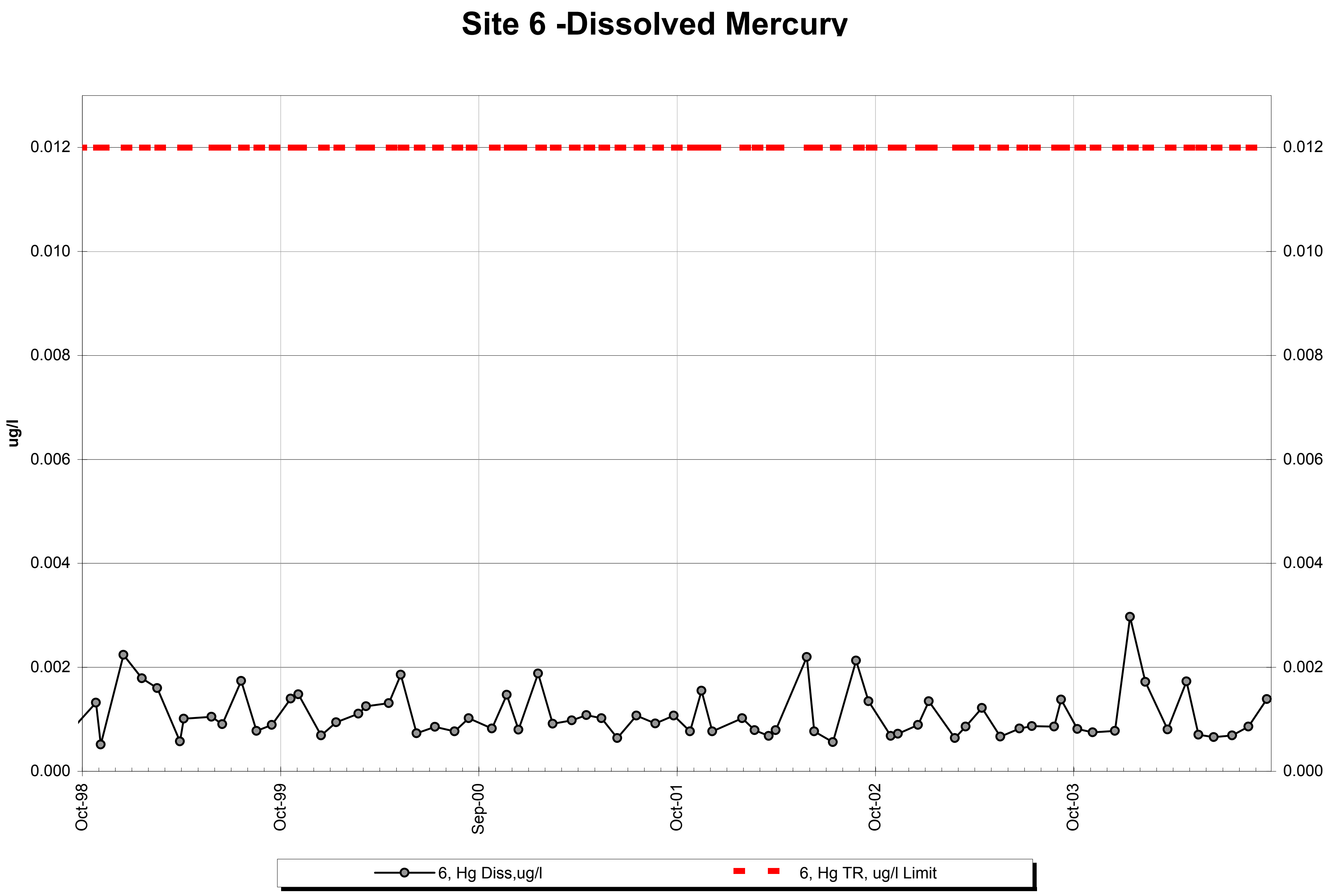



Site 6 -Dissolved Silver
ug/l
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
6, Ag Diss,ug/l
6, Ag Diss, ug/l Limit


Site 6 -Dissolved Zinc
ug/l
90
80
70
60
50
40
30
20
10
0
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
6, Zn Diss,ug/l
6, Zn TR, ug/l Limit

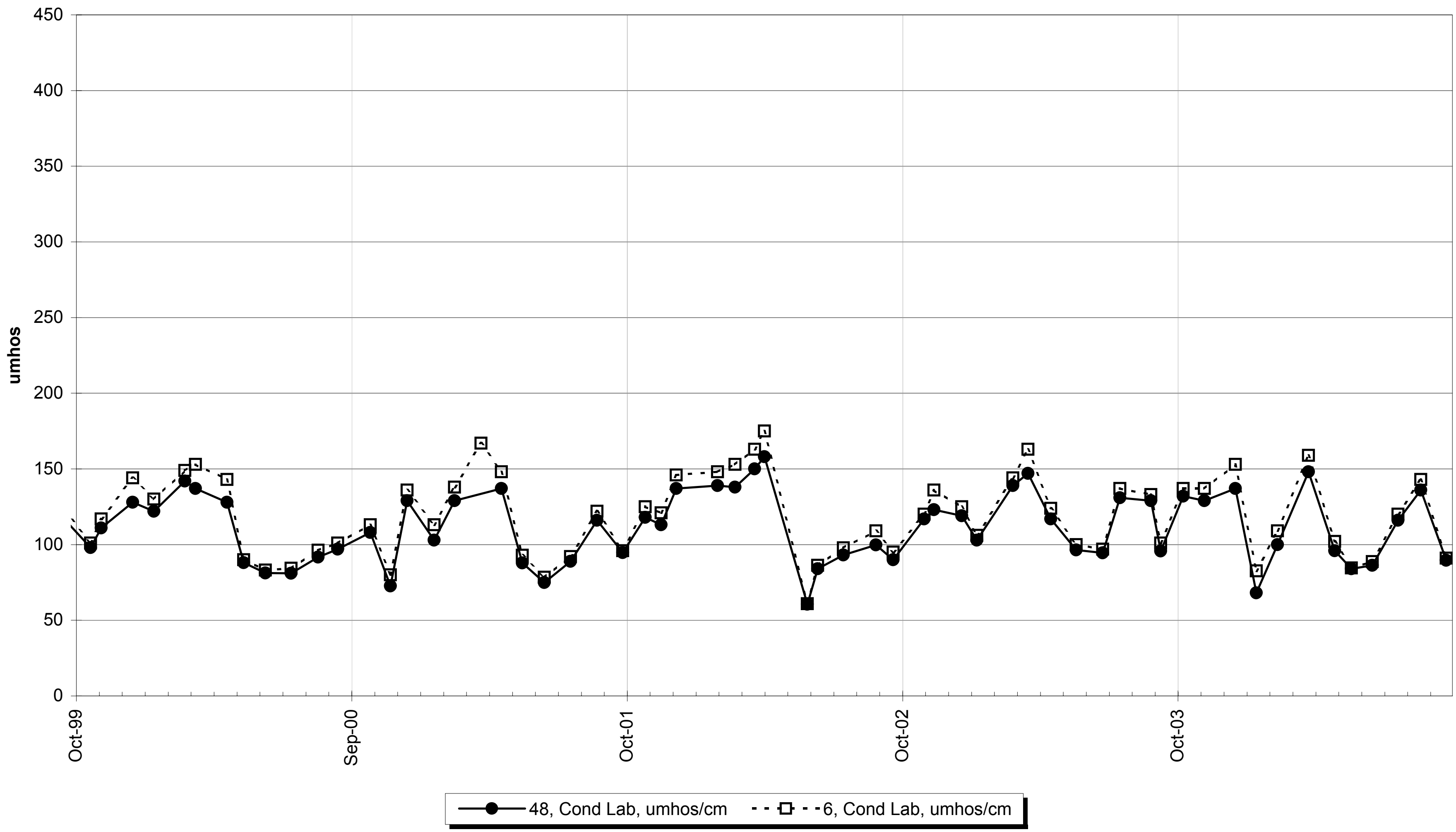
Site 6 -Dissolved Selenium

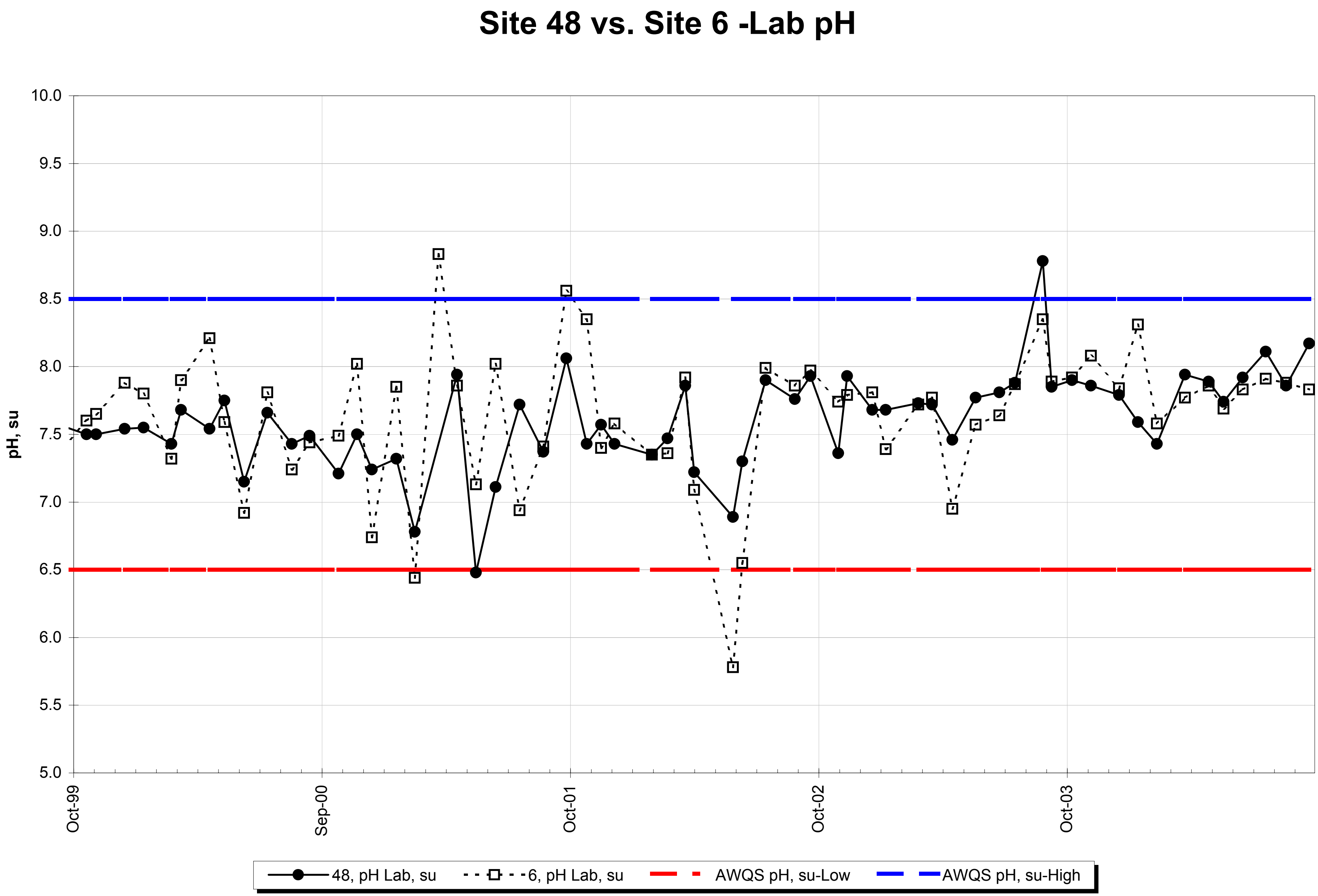




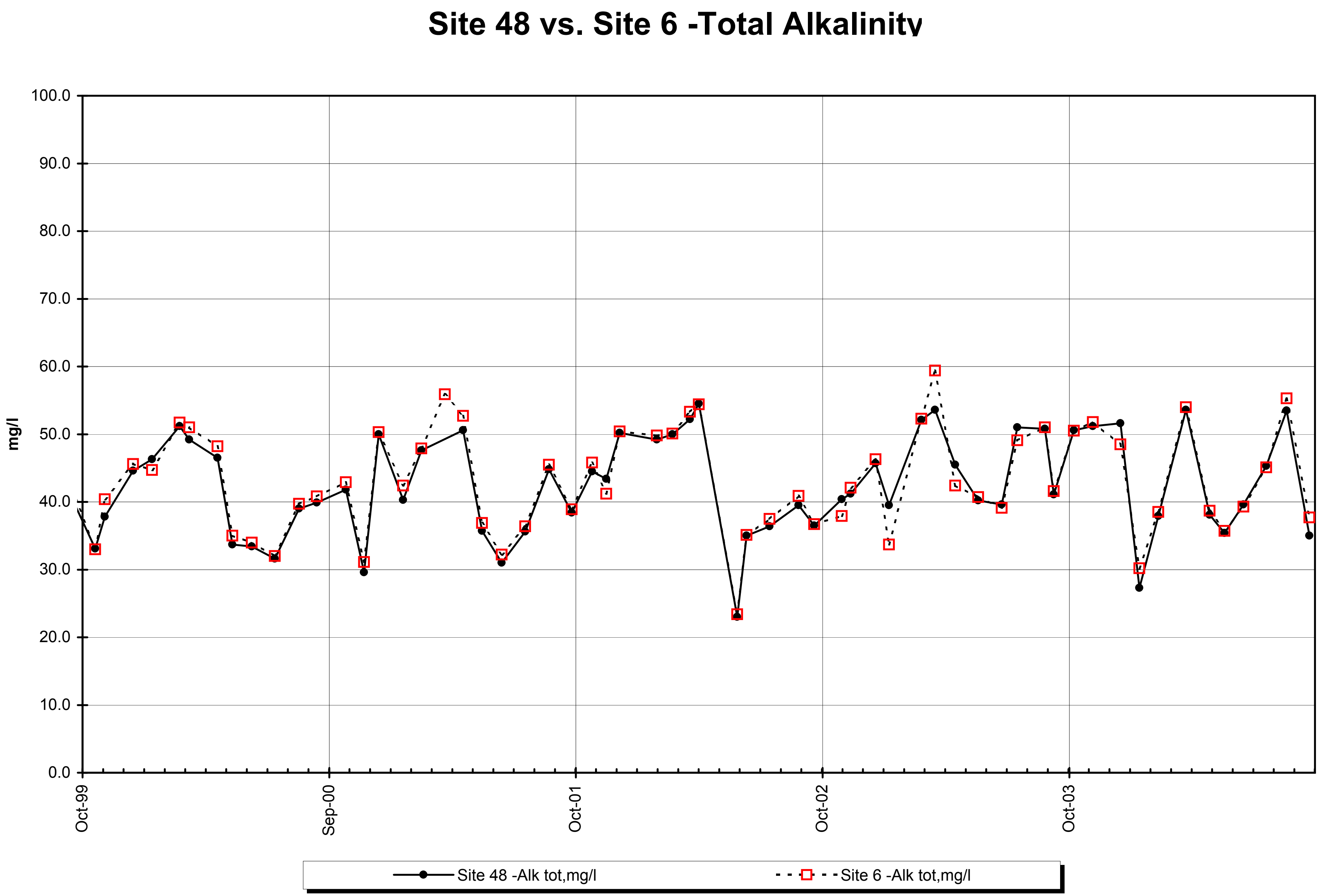
Site 6 -Dissolved Mercury
ug/l
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
6, Hg Diss,ug/l
6, Hg TR, ug/l Limit

Site 48 vs Site 6 -Conductivity

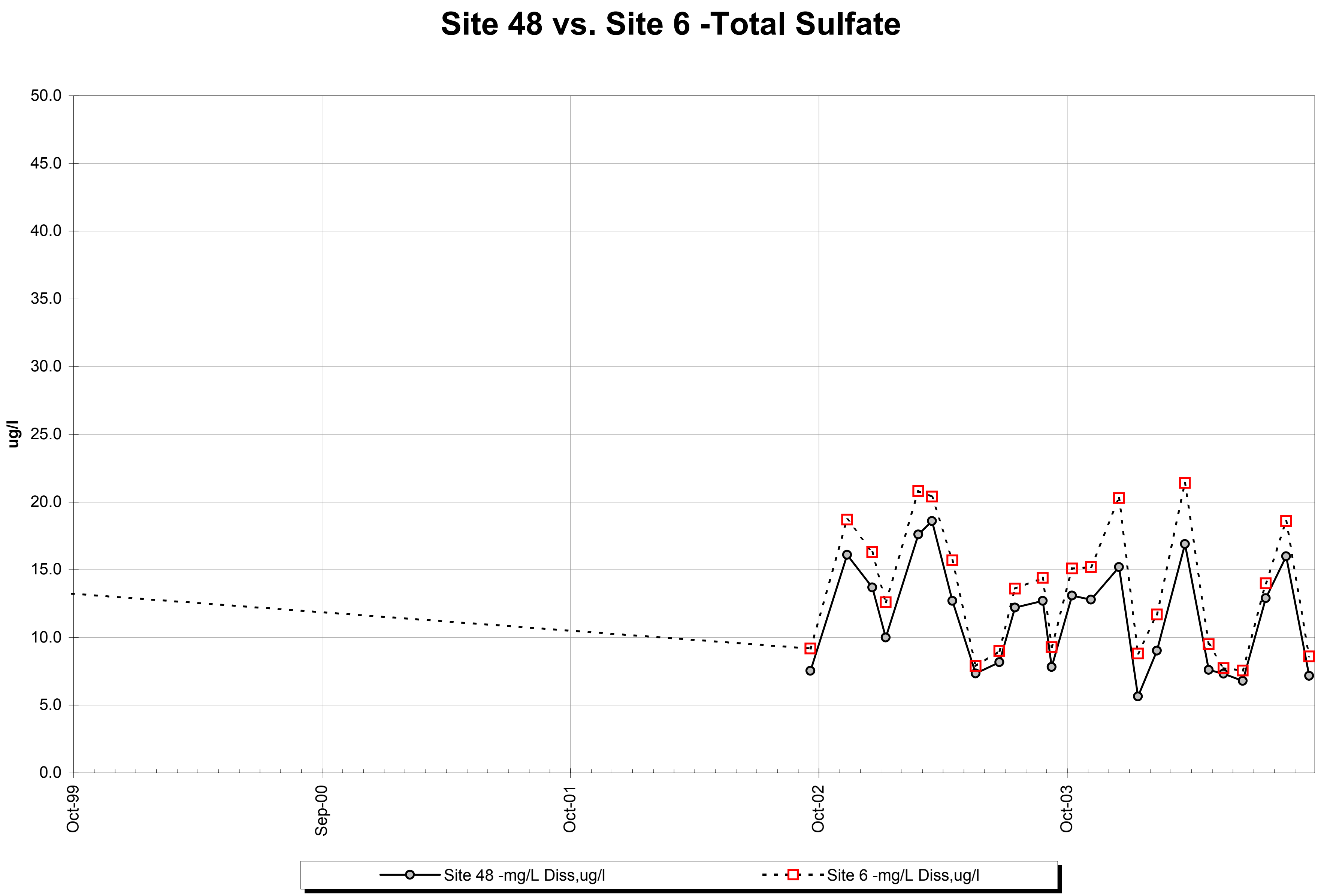




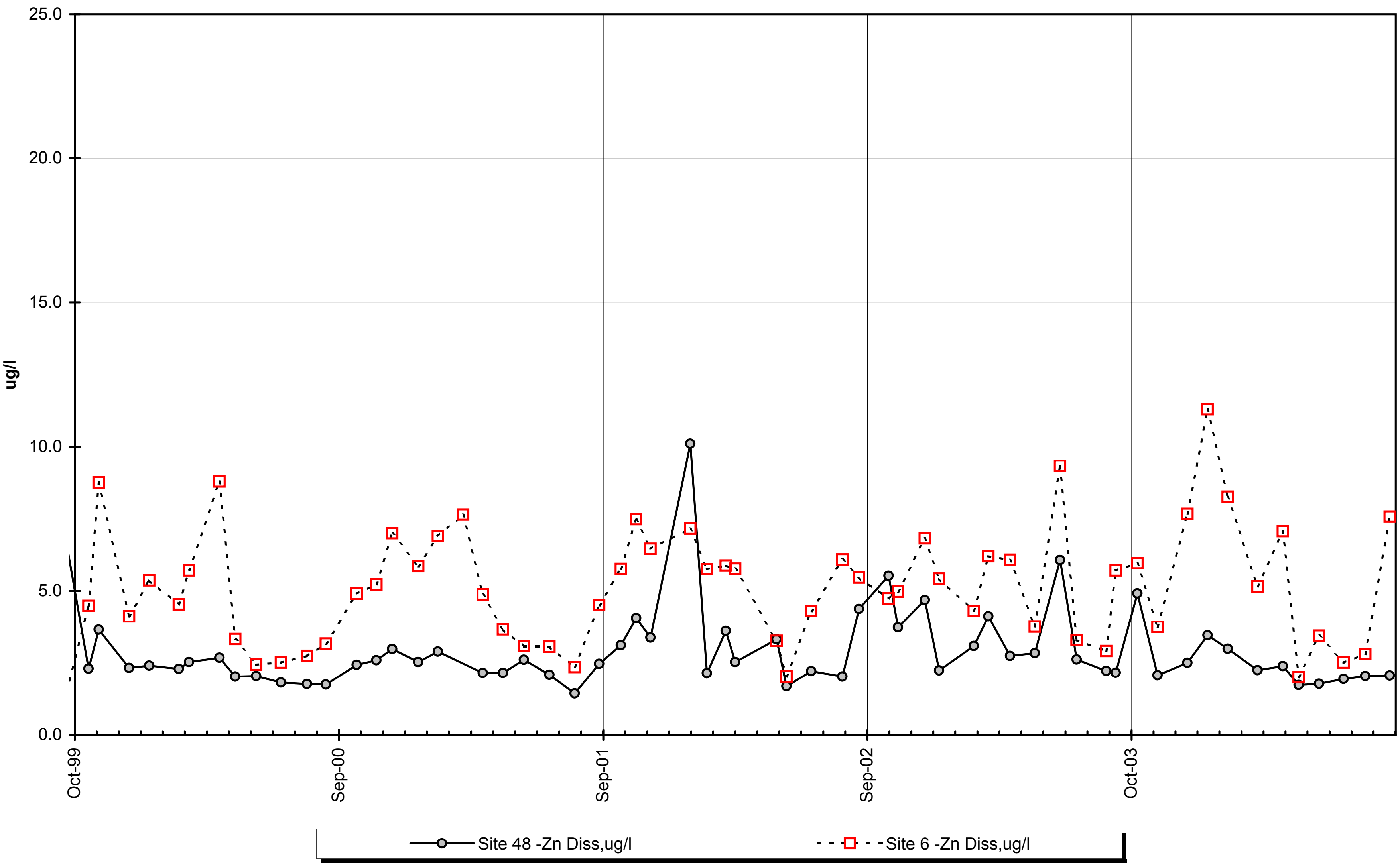
Site 48 vs. Site 6 -Lab pH
pH, su
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
48, pH Lab, su
6, pH Lab, su
AWQS pH, su-Low
AWQS pH, su-High



Site 48 vs. Site 6 -Total Alkalinity
mg/l
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
Site 48 -Alk tot,mg/l
Site 6 -Alk tot,mg/l


Site 48 vs. Site 6 -Total Sulfate
ug/l
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
Site 48 -mg/L Diss,ug/l
Site 6 -mg/L Diss,ug/l

Site 48 vs. Site 6 -Dissolved Zinc



Site **#6** Seasonal Kendall analysis for Specific Conductance, Lab (umhos/cm @ 25°C)

Row label	Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	**WY1999**	107.0	129.0	140.0	165.0		185.0	183.0	104.0	75.0	99.0	118.0	123.0
b	**WY2000**	101.0	117.0	144.0	130.0	149.0	153.0	143.0	90.0	83.2	84.4	96.3	101.0
c	**WY2001**	113.0	80.0	136.0	113.0	138.0	167.0	148.0	93.0	78.5	92.1	122.0	96.0
d	**WY2002**	125.0	121.0	146.0	148.0	153.0	163.0	175.0	60.9	86.3	97.9	109.0	95.0
e	**WY2003**	120.0	136.0	125.0	106.0	144.0	163.0	124.0	100.0	96.9	137.0	133.0	101.0
f	**WY2004**	137.0	137.0	153.0	82.6	109.0	159.0	102.0	84.6	88.8	120.0	143.0	91.1
	n	6	6	6	6	5	6	6	6	6	6	6	6

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
t_1	0	0	0	0	0	1	0	0	0	0	0	1
t_2	0	0	0	0	0	0	0	0	0	0	0	0
t_3	0	0	0	0	0	0	0	0	0	0	0	0
t_4	0	0	0	0	0	0	0	0	0	0	0	0
t_5	0	0	0	0	0	0	0	0	0	0	0	0

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
b-a	-1	-1	1	-1		-1	-1	-1	1	-1	-1	-1
c-a	1	-1	-1	-1		-1	-1	-1	1	-1	1	-1
d-a	1	-1	1	-1		-1	-1	-1	1	-1	-1	-1
e-a	1	1	-1	-1		-1	-1	-1	1	1	1	-1
f-a	1	1	1	-1		-1	-1	-1	1	1	1	-1
c-b	1	-1	-1	-1	-1	1	1	1	-1	1	1	-1
d-b	1	1	1	1	1	1	1	-1	1	1	1	-1
e-b	1	1	-1	-1	-1	1	-1	1	1	1	1	0
f-b	1	1	1	-1	-1	1	-1	-1	1	1	1	-1
d-c	1	1	1	1	1	-1	1	-1	1	1	-1	-1
e-c	1	1	-1	-1	1	-1	-1	1	1	1	1	1
f-c	1	1	1	-1	-1	-1	-1	-1	1	1	1	-1
e-d	-1	1	-1	-1	-1	0	-1	1	1	1	1	1
f-d	1	1	1	-1	-1	-1	-1	1	1	1	1	-1
f-e	1	1	1	-1	-1	-1	-1	-1	-1	-1	1	-1
S_k	11	7	3	-11	-4	-6	-9	-5	11	7	9	-10
Qm	6.0			-14.8					3.4			
σ^2_S=	28.33	28.33	28.33	28.33	16.67	28.33	28.33	28.33	28.33	28.33	28.33	28.33
$Z_k = S_k/\sigma_S$	2.07	1.32	0.56	-2.07	-0.98	-1.13	-1.69	-0.94	2.07	1.32	1.69	-1.88
Z^2_k	4.27	1.73	0.32	4.27	0.96	1.27	2.86	0.88	4.27	1.73	2.86	3.53

ΣZ_k= 0.34

ΣZ^2_k= 28.95

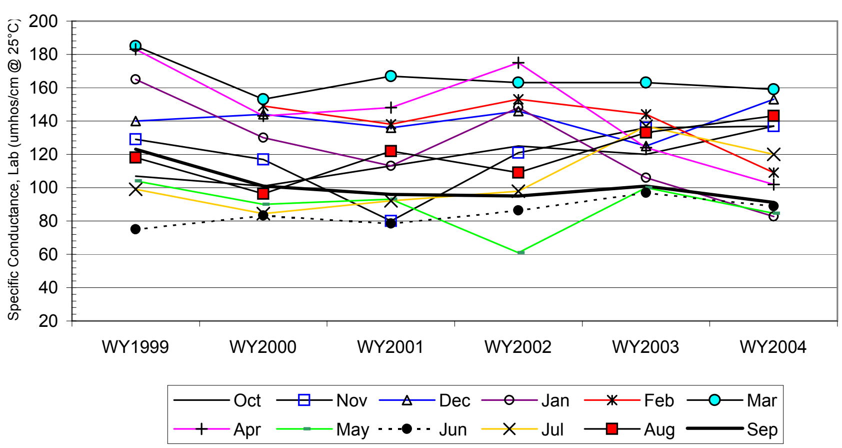
Z-bar=$\Sigma Z_k/K$= 0.03

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	2	0	0	0	0

Σn 71

ΣS_k 3

$\chi^2_h=\Sigma Z^2_k-K(\text{Z-bar})^2$=	28.94	@α=5% $\chi^2_{(K-1)}$= 19.68	Test for station homogeneity	
p	**0.002**		$\chi^2_h<\chi^2_{(K-1)}$	**REJECT**
$\Sigma VAR(S_k)$ 328.33	Z_{calc} 0.11	@α/2=2.5% Z= 1.96	H_0 (No trend)	NA
	p **0.544**		H_A (± trend)	NA



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Slope	Upper Limit
0.010	-3.64		3.30
0.050	-2.67	**1.00**	2.54
0.100	-2.05		2.00
0.200	-1.70		1.75

Site **#6** Seasonal Kendall analysis for pH, Lab, Standard Units

Row label	Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	**WY1999**	7.5	7.5	7.5	7.3	7.9	7.7	7.9	7.9	7.2	7.6	7.9	7.4
b	**WY2000**	7.6	7.7	7.9	7.8	7.3	7.9	8.2	7.6	6.9	7.8	7.2	7.4
c	**WY2001**	7.5	8.0	6.7	7.9	6.4	8.8	7.9	7.1	8.0	6.9	7.4	8.6
d	**WY2002**	8.4	7.4	7.6	7.4	7.4	7.9	7.1	5.8	6.6	8.0	7.9	8.0
e	**WY2003**	7.7	7.8	7.8	7.4	7.7	7.8	7.0	7.6	7.6	7.9	8.4	7.9
f	**WY2004**	7.9	8.1	7.8	8.3	7.6	7.8	7.9	7.7	7.8	7.9	7.9	7.8
	n	6	6	6	6	6	6	6	6	6	6	6	6

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
t_1	0	0	0	0	0	1	1	0	0	0	1	0
t_2	0	0	0	0	0	0	0	0	0	0	0	0
t_3	0	0	0	0	0	0	0	0	0	0	0	0
t_4	0	0	0	0	0	0	0	0	0	0	0	0
t_5	0	0	0	0	0	0	0	0	0	0	0	0

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
b-a	1	1	1	1	-1	1	1	-1	-1	1	-1	1
c-a	-1	1	-1	1	-1	1	-1	-1	1	-1	-1	1
d-a	1	-1	1	1	-1	1	-1	-1	-1	1	-1	1
e-a	1	1	1	1	-1	1	-1	-1	1	1	1	1
f-a	1	1	1	1	-1	1	-1	-1	1	1	0	1
c-b	-1	1	-1	1	-1	1	-1	-1	1	-1	1	1
d-b	1	-1	-1	-1	1	1	-1	-1	-1	1	1	1
e-b	1	1	-1	-1	1	-1	-1	-1	1	1	1	1
f-b	1	1	-1	1	1	-1	-1	1	1	1	1	1
d-c	1	-1	1	-1	1	-1	-1	-1	-1	1	1	-1
e-c	1	-1	1	-1	1	-1	-1	1	-1	1	1	-1
f-c	1	1	1	1	1	-1	0	1	-1	1	1	-1
e-d	-1	1	1	1	1	-1	-1	1	1	-1	1	-1
f-d	-1	1	1	1	1	-1	1	1	1	-1	1	-1
f-e	1	1	1	1	-1	0	1	1	1	1	-1	-1
S_k	7	7	5	7	1	0	-8	-3	3	7	6	3

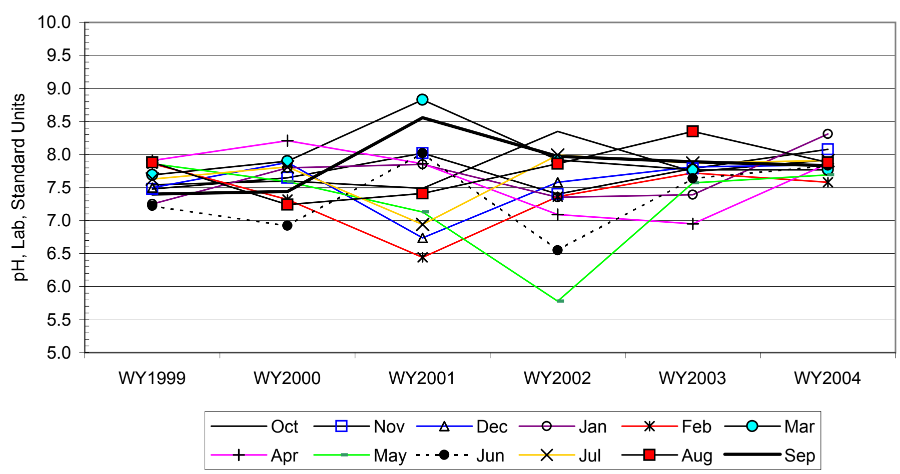
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
σ^2_S=	28.33	28.33	28.33	28.33	28.33	28.33	28.33	28.33	28.33	28.33	28.33	28.33
$Z_k = S_k/\sigma_S$	1.32	1.32	0.94	1.32	0.19	0.00	-1.50	-0.56	0.56	1.32	1.13	0.56
Z^2_k	1.73	1.73	0.88	1.73	0.04	0.00	2.26	0.32	0.32	1.73	1.27	0.32

ΣZ_k= 6.58
ΣZ^2_k= 12.32
Z-bar=$\Sigma Z_k/K$= 0.55

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	3	0	0	0	0

Σn 72
ΣS_k 35

$\chi^2_h = \Sigma Z^2_k - K(\text{Z-bar})^2$=	8.71	@α=5% $\chi^2_{(K-1)}$= 19.68	Test for station homogeneity	
p	**0.648**		$\chi^2_h < \chi^2_{(K-1)}$	ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} 1.84	@α/2=2.5% Z= 1.96	**H_0** (No trend)	ACCEPT
340.00	p **0.967**		**H_A** (± trend)	REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Slope	Upper Limit
0.010	-0.01		0.12
0.050	0.01	**0.04**	0.09
0.100	0.02		0.08
0.200	0.03		0.06

Site **#6**

Seasonal Kendall analysis for Total Alk, (mg/l)

Row label	Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	**WY1999**	37.5	47.5	46.3	54.3	62.7	53.3	53.8	36.1	28.0	34.7	39.2	42.1
b	**WY2000**	33.0	40.4	45.6	44.7	51.7	51.0	48.2	35.0	34.0	32.0	39.7	40.8
c	**WY2001**	42.9	31.1	50.3	42.4	47.9	55.9	52.7	36.9	32.2	36.4	45.5	38.9
d	**WY2002**	45.8	41.2	50.4	49.8	50.1	53.3	54.4	23.4	35.1	37.5	40.9	36.7
e	**WY2003**	37.9	42.1	46.3	33.7	52.3	59.4	42.4	40.7	39.1	49.1	51.0	41.6
f	**WY2004**	50.5	51.8	48.5	30.2	38.5	54.0	38.7	35.7	39.3	45.1	55.3	37.7
	n	6	6	6	6	6	6	6	6	6	6	6	6
	t_1	0	0	1	0	0	1	0	0	0	0	0	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a	-1	-1	-1	-1	-1	-1	-1	-1	1	-1	1	-1
	c-a	1	-1	1	-1	-1	1	-1	1	1	1	1	-1
	d-a	1	-1	1	-1	-1	0	1	-1	1	1	1	-1
	e-a	1	-1	0	-1	-1	1	-1	1	1	1	1	-1
	f-a	1	1	1	-1	-1	1	-1	-1	1	1	1	-1
	c-b	1	-1	1	-1	-1	1	1	1	-1	1	1	-1
	d-b	1	1	1	1	-1	1	1	-1	1	1	1	-1
	e-b	1	1	1	-1	1	1	-1	1	1	1	1	1
	f-b	1	1	1	-1	-1	1	-1	1	1	1	1	-1
	d-c	1	1	1	1	1	-1	1	-1	1	1	-1	-1
	e-c	-1	1	-1	-1	1	1	-1	1	1	1	1	1
	f-c	1	1	-1	-1	-1	-1	-1	-1	1	1	1	-1
	e-d	-1	1	-1	-1	1	1	-1	1	1	1	1	1
	f-d	1	1	-1	-1	-1	1	-1	1	1	1	1	1
	f-e	1	1	1	-1	-1	-1	-1	-1	1	-1	1	-1
	S_k	9	5	4	-11	-7	6	-7	1	13	11	13	-7
	Qm				-4.1					2.3	2.9	3.2	
	σ^2_S=	28.33	28.33	28.33	28.33	28.33	28.33	28.33	28.33	28.33	28.33	28.33	28.33
	$Z_k = S_k/\sigma_S$	1.69	0.94	0.75	-2.07	-1.32	1.13	-1.32	0.19	2.44	2.07	2.44	-1.32
	Z^2_k	2.86	0.88	0.56	4.27	1.73	1.27	1.73	0.04	5.96	4.27	5.96	1.73

ΣZ_k= 5.64

ΣZ^2_k= 31.27

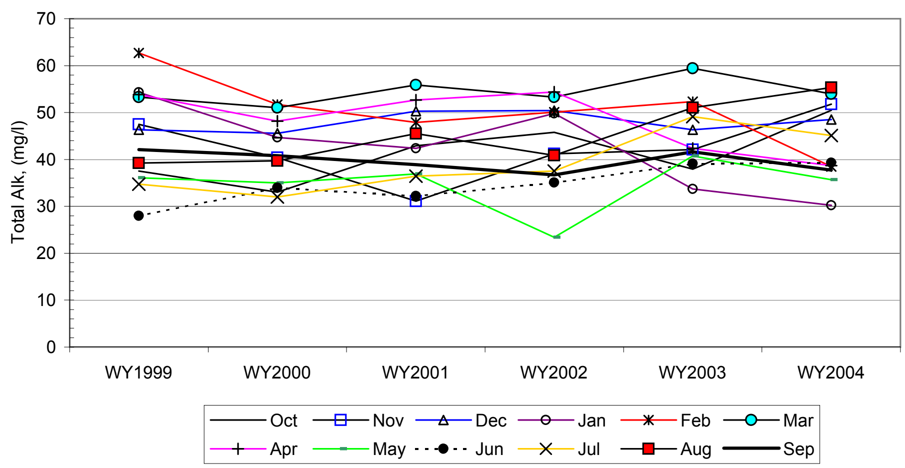
Z-bar=ΣZ_k/K= 0.47

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	2	0	0	0	0

Σn 72

ΣS_k 30

$\chi^2_h=\Sigma Z^2_k-K(\text{Z-bar})^2$=	28.62	@α=5% $\chi^2_{(K-1)}$=	19.68	Test for station homogeneity	
p	**0.003**			$\chi^2_h<\chi^2_{(K-1)}$	**REJECT**
$\Sigma VAR(S_k)$	Z_{calc} 1.57	@α/2=2.5% Z=	1.96	H_0 (No trend)	NA
340.00	p **0.942**			H_A (± trend)	NA



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Slope	Upper Limit
0.010	-0.61		1.70
0.050	-0.01	**0.50**	1.30
0.100	0.11		1.07
0.200	0.20		0.83

Site **#6** Seasonal Kendall analysis for Zinc, Dissolved (ug/l)

Row label	Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	**WY1999**	3.0	3.8	9.7	4.4	4.7	9.8	5.4	4.6	1.6	2.5	4.1	1.1
b	**WY2000**	4.5	8.8	4.1	5.4	4.5	5.7	8.8	3.3	2.4	2.5	2.7	3.2
c	**WY2001**	4.9	5.2	7.0	5.9	6.9	7.6	4.9	3.7	3.1	3.1	2.4	4.5
d	**WY2002**	5.8	7.5	6.5	7.2	5.8	5.9	5.8	3.3	2.0	4.3	6.1	5.5
e	**WY2003**	4.7	5.0	6.8	5.4	4.3	6.2	6.1	3.8	9.3	3.3	2.9	5.7
f	**WY2004**	6.0	3.8	7.7	11.3	8.3	5.2	7.1	2.0	3.4	2.5	2.8	7.6
	n	6	6	6	6	6	6	6	6	6	6	6	6

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
t_1	0	0	0	0	0	0	0	0	0	1	0	0
t_2	0	0	0	0	0	0	0	0	0	0	0	0
t_3	0	0	0	0	0	0	0	0	0	0	0	0
t_4	0	0	0	0	0	0	0	0	0	0	0	0
t_5	0	0	0	0	0	0	0	0	0	0	0	0

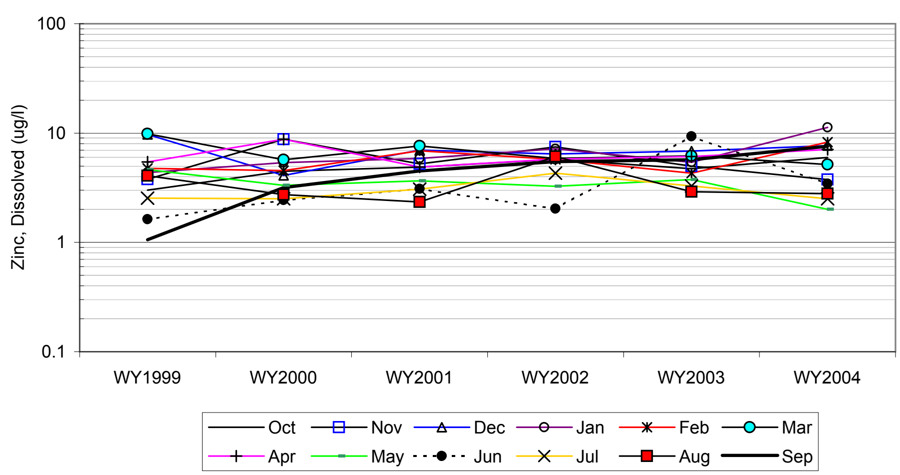
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
b-a	1	1	-1	1	-1	-1	1	-1	1	-1	-1	1
c-a	1	1	-1	1	1	-1	-1	-1	1	1	-1	1
d-a	1	1	-1	1	1	-1	1	-1	1	1	1	1
e-a	1	1	-1	1	-1	-1	1	-1	1	1	-1	1
f-a	1	-1	-1	1	1	-1	1	-1	1	-1	-1	1
c-b	1	-1	1	1	1	1	-1	1	1	1	-1	1
d-b	1	-1	1	1	1	1	-1	-1	-1	1	1	1
e-b	1	-1	1	1	-1	1	-1	1	1	1	1	1
f-b	1	-1	1	1	1	-1	-1	-1	1	0	1	1
d-c	1	1	-1	1	-1	-1	1	-1	-1	1	1	1
e-c	-1	-1	-1	-1	-1	-1	1	1	1	1	1	1
f-c	1	-1	1	1	1	-1	1	-1	1	-1	1	1
e-d	-1	-1	1	-1	-1	1	1	1	1	-1	-1	1
f-d	1	-1	1	1	1	-1	1	-1	1	-1	-1	1
f-e	1	-1	1	1	1	-1	1	-1	-1	-1	-1	1
S_k	11	-5	1	11	3	-7	5	-7	9	2	-1	15
Qm	0.4			0.9								1.1
σ^2_S=	28.33	28.33	28.33	28.33	28.33	28.33	28.33	28.33	28.33	28.33	28.33	28.33
$Z_k = S_k/\sigma_S$	2.07	-0.94	0.19	2.07	0.56	-1.32	0.94	-1.32	1.69	0.38	-0.19	2.82
Z^2_k	4.27	0.88	0.04	4.27	0.32	1.73	0.88	1.73	2.86	0.14	0.04	7.94

ΣZ_k= 6.95
ΣZ^2_k= 25.09
Z-bar=ΣZ_k/K= 0.58

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	1	0	0	0	0

Σn 72
ΣS_k 37

$\chi^2_h=\Sigma Z^2_k - K(\text{Z-bar})^2$=	21.07	@α=5% $\chi^2_{(K-1)}$= 19.68	Test for station homogeneity	
p	**0.033**		$\chi^2_h<\chi^2_{(K-1)}$	**REJECT**
ΣVAR(S_k) 340.00	Z_{calc} 1.95	@α/2=2.5% Z= 1.96	H_0 (No trend)	NA
	p **0.975**		H_A (± trend)	NA



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Slope	Upper Limit
0.010	-0.03		0.57
0.050	0.05	**0.25**	0.38
0.100	0.09		0.35
0.200	0.12		0.32

Large Sample Approximation

Wilcoxon-Mann-Whitney Rank Sum Test

Variable: Specific Conductance, Lab (umhos/cm @ 25°C)

Site	#48	#6	Ranks	
Year	WY2004	WY2004	**A**	**B**
Oct	132.0	137.0	16	19
Nov	129.0	137.0	15	19
Dec	137.0	153.0	19	23
Jan	68.1	82.6	1	2
Feb	100.0	109.0	10	12
Mar	148.0	159.0	22	24
Apr	96.0	102.0	9	11
May	84.0	84.6	3	4
Jun	86.3	88.8	5	6
Jul	116.0	120.0	13	14
Aug	136.0	143.0	17	21
Sep	89.6	91.1	7	8
Median	108.0	114.5		

N= 24

ΣR 137 163

	n	**m**
	12	12

W= 85

w_α 18

Upper 126

Lower 18

μ_W= 150

σ_W= 17.31

Z_{rs}= 0.72

p-test

0.7650

$\alpha/2$

0.025

H_0

$(\mu_A=\mu_B)$

ACCEPT

Large Sample Approximation
Wilcoxon-Mann-Whitney Rank Sum Test
Variable: **pH, Lab, Standard Units**

Site	#48	#6	Ranks	
Year	WY2004	WY2004	**A**	**B**
Oct	7.90	7.92	16	18.5
Nov	7.86	8.08	12	21
Dec	7.79	7.84	7	10
Jan	7.59	8.31	3	24
Feb	7.43	7.58	1	2
Mar	7.94	7.77	20	6
Apr	7.89	7.86	15	12
May	7.74	7.69	5	4
Jun	7.92	7.83	18.5	8.5
Jul	8.11	7.91	22	17
Aug	7.86	7.88	12	14
Sep	8.17	7.83	23	8.5
Median	7.88	7.85		

N= 24

ΣR	154.5	145.5
	n	**m**
	12	12

W= 67.5

w_{α} 18

Upper 126

Lower 18

μ_W= 150

σ_W= 17.30

Z_{rs}= -0.23

p-test

0.4086

$\alpha/2$

0.025

H_0

(μ_A=μ_B)

ACCEPT

Large Sample Approximation

Wilcoxon-Mann-Whitney Rank Sum Test

Variable: **Total Alk, (mg/l)**

Site	#48	#6	Ranks	
Year	WY2004	WY2004	**A**	**B**
Oct	50.6	50.5	17	16
Nov	51.2	51.8	18	20
Dec	51.6	48.5	19	15
Jan	27.3	30.2	1	2
Feb	37.9	38.5	7	9
Mar	53.6	54.0	22	23
Apr	38.1	38.7	8	10
May	35.4	35.7	4	5
Jun	39.6	39.3	12	11
Jul	45.3	45.1	14	13
Aug	53.5	55.3	21	24
Sep	35.0	37.7	3	6
Median	42.45	42.20		

N= 24

ΣR 146 154

	n	**m**
	12	12

W= 76

w_α 18

Upper 126

Lower 18

μ_W= 150

σ_W= 17.32

Z_{rs}= 0.20

p-test

0.5801

$\alpha/2$

0.025

H_0

$(\mu_A=\mu_B)$

ACCEPT

Large Sample Approximation

Wilcoxon-Mann-Whitney Rank Sum Test

Variable: **Sulfate, Total (mg/l)**

Site	#48	#6	Ranks	
Year	WY2004	WY2004	**A**	**B**
Oct	13.1	15.1	15	17
Nov	12.8	15.2	13	18.5
Dec	15.2	20.3	18.5	23
Jan	5.6	8.8	1	9
Feb	9.0	11.7	10	12
Mar	16.9	21.4	21	24
Apr	7.6	9.5	6	11
May	7.3	7.7	4	7
Jun	6.8	7.6	2	5
Jul	12.9	14.0	14	16
Aug	16.0	18.6	20	22
Sep	7.2	8.6	3	8
Median	10.9	12.9		

N= 24

ΣR 127.5 172.5

	n	**m**
ΣR	127.5	172.5
	12	12

W= 94.5

w_α 18

Upper 126

Lower 18

μ_W= 150

σ_W= 17.32

Z_{rs}= 1.27

p-test

$\boxed{0.8980}$

$\alpha/2$

$\boxed{0.025}$

H_0

$(\mu_A=\mu_B)$

ACCEPT

Large Sample Approximation
Wilcoxon-Mann-Whitney Rank Sum Test
Variable: **Zinc, Dissolved (ug/l)**

Site	#48	#6	Ranks	
Year	WY2004	WY2004	**A**	**B**
Oct	4.91	5.96	17	19
Nov	2.07	3.75	7	16
Dec	2.50	7.67	10	22
Jan	3.46	11.30	15	24
Feb	2.99	8.26	13	23
Mar	2.25	5.15	8	18
Apr	2.39	7.07	9	20
May	1.73	2.00	1	4
Jun	1.78	3.44	2	14
Jul	1.95	2.51	3	11
Aug	2.04	2.80	5	12
Sep	2.06	7.57	6	21
Median	2.16	5.56		

N= 24

ΣR 96 204

	n	**m**
	12	12

W= 126
w_α 18
Upper 126
Lower 18

μ_W= 150
σ_W= 17.32
Z_{rs}= 3.09

p-test
0.9990

$\alpha/2$
0.025

H_0
$(\mu_A=\mu_B)$
REJECT

INTERPRETIVE REPORT
SITE 54 "LOWER GREENS CREEK"

The data collected during the current water year are listed in the following "Table of Results for Water Year 2004" report. The table includes all the data, field and lab, collected for the current water year and a series of flags keyed to the summary report "Qualified Data by QA Reviewer". The QA report lists any associated data limitations found during the monthly QA reviews of laboratory data for this site. Median values for all analytes have been calculated and are shown in the right-most column of the table of results. Any value reported as less than MDL has been replaced with a value of zero for the purpose of median calculation.

All data collected at this site for the past five years are included in the data analyses with the exception of one outlier shown on the table below. During the current year no new data point were flagged as outliers after review by KGCMC.

Sample Date	Parameter	Value	Qualifier	Notes
12/5/2001	Cond Field, umho	46.0	R	Suspected field instrument malfunction

The data for water year 2004 have been compared to the strictest fresh water quality criterion for each applicable analyte. No results exceeding these criteria have been identified as listed in the table below.

Sample Date	Parameter	Value	Standard	Standard Type
No exceedances have been identified by KGCMC for the period of Oct-03 though Sept-04.				

X-Y plots have been generated to graphically present the data for each of the analytes requested in the Statistical Information Goals for this site. These plots have been visually analyzed for the appearance of any trend in concentration. No visually obvious trends are apparent. A non-parametric statistical analysis for trend was preformed for conductivity, pH, Alkalinity, and dissolved zinc. Calculation details of the Seasonal Mann-Kendall analyses are presented in detail on the pages following this interpretive section. The table below summarizes the results on the data collected between Oct-98 and Sep-04 (WY1999-WY2004). No statistically significant (α=5%) trends are present in the data for pH and dissolved zinc. The datasets for conductivity and total alkalinity failed the test for seasonal (monthly) homogeneity. Conductivity showed a significant upward trend in October (S_k=11, Q_m=5.7 umhos/cm•yr) and significant downward trends in February (S_k=-11, Q_m=-11.3 umhos/cm•yr) and September (S_k=-11, Q_m=-4.0 umhos/cm•yr. Total alkalinity showed significant upward trends in June (S_k=11, Q_m=2.3 ml/L•yr), July (S_k=11, Q_m=2.9 mg/L•yr) and August (S_k=11, Q_m=3.2 mg/L•yr). These

		Mann-Kendall test statistic			Sen's slope estimate	
Parameter	n*	Z	Trend	a**	Q	Q(%)
Conductivity, Lab		Fails monthly homogenity test (p=0.001)				
pH, Lab	6	1.49	+	0.93		
Alkalinity, Total	6	Fails monthly homogenity test (p=0.006)				
Zinc, Dissolved	6	0.99	+	0.84		

*: Number of years **:Significance level

individual monthly trends are all similar in magnitude and direction to those identified at upgradient Site 6. Additional X-Y plots have been generated for alkalinity, pH, conductance, sulfate, and dissolved zinc that co-plot data from Site 54 and Site 6, the upstream control site, to aid in the comparison between those two sites.

Median values for alkalinity, pH, specific conductance, sulfate, and dissolved zinc from site 54 have been compared to those of Site 6. The comparisons were done utilizing a two-tailed, large sample approximation to the Wilcoxon-Mann-Whitney rank sum test with a significance level of $\alpha/2=0.025$. Rank-sum test calculation details can be found in subsequent pages of this section and a summary of the test results is shown in the table below. For all analytes except pH there are no statistically significant differences between the medians at the $\alpha/2=0.025$ significance level. The laboratory data for pH as shown in the comparison graph and the data table for the rank sum test indicate that Site 54 pH was consistently higher, albeit by typically less than 0.3 su, than the complementary pH at Site 6. The same comparisons when done with field pH yields a much smaller, 0.07 su, difference and a rank sum comparison that is not statistically significant ($p=0.1362$). Finally is should be noted that several of the laboratory pHs are tied (4 pairs or 33% of the dataset). Typically, tied data reduce the power of a rank sum test, e.g. the test is less able to reject the H_0 hypothesis even when it is false. Given the small magnitude of the differences and the lack of a statistically significant difference in the field pH medians between the two sites, KGCMC feels that the results of the rank sum test for laboratory do not indicate a fundamental change in the water chemistry between Site 54 and Site 6 and thus should be confirmed by future sampling based on the regularly scheduled samples collected under the FWMP program. If future sampling indicates significant differences in both field and laboratory pH additional monitoring may be warranted.

Parameter	Rank Sum Test p-value	Site #6 median	Site #54 median
Conductivity, Lab	0.64	115	118
pH, Lab	**0.01**	7.85	7.70
Alkalinity, Total	0.76	42.2	42.8
Sulfate, Total	0.59	12.9	13.0
Zinc, Dissolved	0.35	5.56	5.58

Table of Results for Water Year 2004

Site 54 "Lower Greens Creek"

Sample Date/Parameter	10/9/2003	11/6/2003	12/17/2003	1/14/2004	2/11/2004	3/23/2004	4/27/2004	5/19/2004	6/16/2004	7/20/2004	8/19/2004	9/22/2004	**Median**
Water Temp (°C)	8.4	1.6	1.8	0.9	2.0	1.0	2.9	4.0	5.6	11.2	12.6	7.0	3.5
Conductivity-Field(μmho)	124	133	156	94	109	141	97	83	88	124	147	102	116
Conductivity-Lab (μmho)	139	138	153	87	112	162	105	85	87	123	146	94	118
pH Lab (standard units)	7.92	7.86	7.72	7.63	7.47	7.68	7.82	7.39	7.27	7.79	7.74	7.63	7.70
pH Field (standard units)	7.41	7.73	7.67	7.64	7.68	7.88	7.68	7.80	7.58	7.89	8.09	7.66	7.68
Total Alkalinity (mg/L)	51.1	52.7	54.9	32.9	40.1	55.3	39.8	35.7	40.2	45.4	56.9	38.5	42.8
Total Sulfate (mg/L)	15.2	15.2	20.1	9.1	11.8	21.5	9.6	7.7	7.6	14.1	18.6	8.9	13.0
Hardness (mg/L)	67.9	64.2	70.4	40.6	50.4	79.2	49.1	43.2	43.5	60.1	73.3	47.6	55.3
Dissolved As (ug/L)	0.135	0.189	<0.051	0.438	0.160	0.174	0.159	0.106	0.165	0.182	0.240	0.220	0.170
Dissolved Ba (ug/L)			26.2		21.5								23.9
Dissolved Cd (ug/L)	0.040	0.037	<0.023	0.073	<0.023	0.046	0.059	0.032	0.044	0.039	0.048	0.056	0.042
Dissolved Cr (ug/L)			0.181		0.227								0.204
Dissolved Cu (ug/L)	0.315	0.310	0.334	0.915	0.782	0.411	0.715	0.222	0.359	0.302	0.457	0.779	0.385
Dissolved Pb (ug/L)	0.1710	0.0116	0.6610	0.6810	0.0939	0.0280	0.1240	0.0273	<0.0110	0.0154	0.0297	0.1110	0.0618
Dissolved Ni (ug/L)			0.335		0.758								0.547
Dissolved Ag (ug/L)			<0.009		<0.009								0.005
Dissolved Zn (ug/L)	6.60	3.71	6.30	9.43	7.48	4.86	6.93	2.12	2.41	2.49	3.00	7.69	5.58
Dissolved Se (ug/L)			1.100		<0.080								0.570
Dissolved Hg (ug/L)	0.000763	0.000809	0.000750	0.002800	0.001950	0.000829	0.001850	0.000734	0.000711	0.000764	0.000911	0.001440	0.000819

For individual sample/analyte qualifier descriptions see "Qualified Data by QA Reviewer" table.

Values reported as less than MDL are replaced by 1/2 MDL for median calculation purposes.

Shaded data has been qualified as an outlier by KGCMC and removed from any further analysis and is not included into the calculation of the median

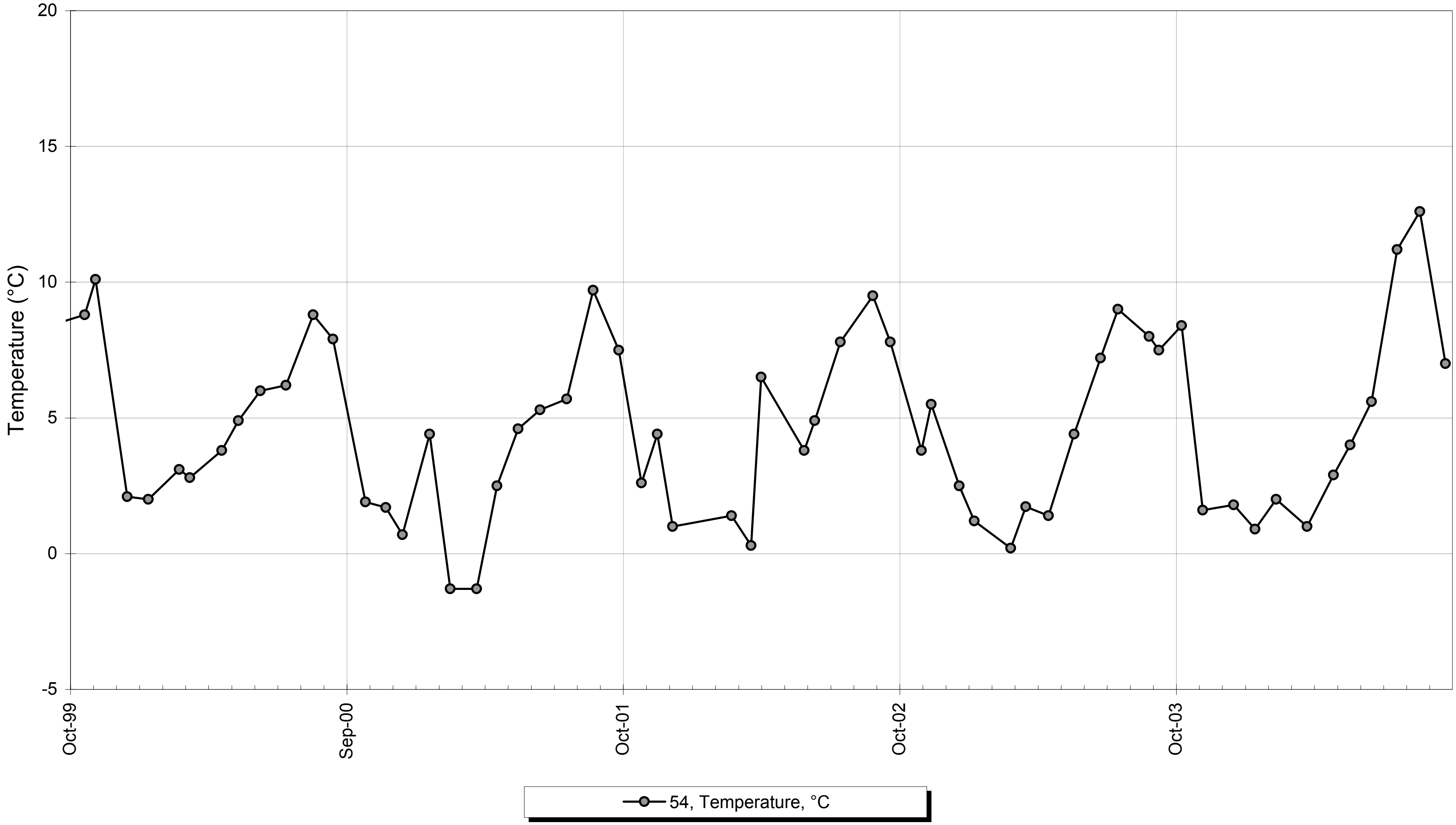
Qualified Data by QA Reviewer

Date Range: 10/01/2003 to 09/30/2004

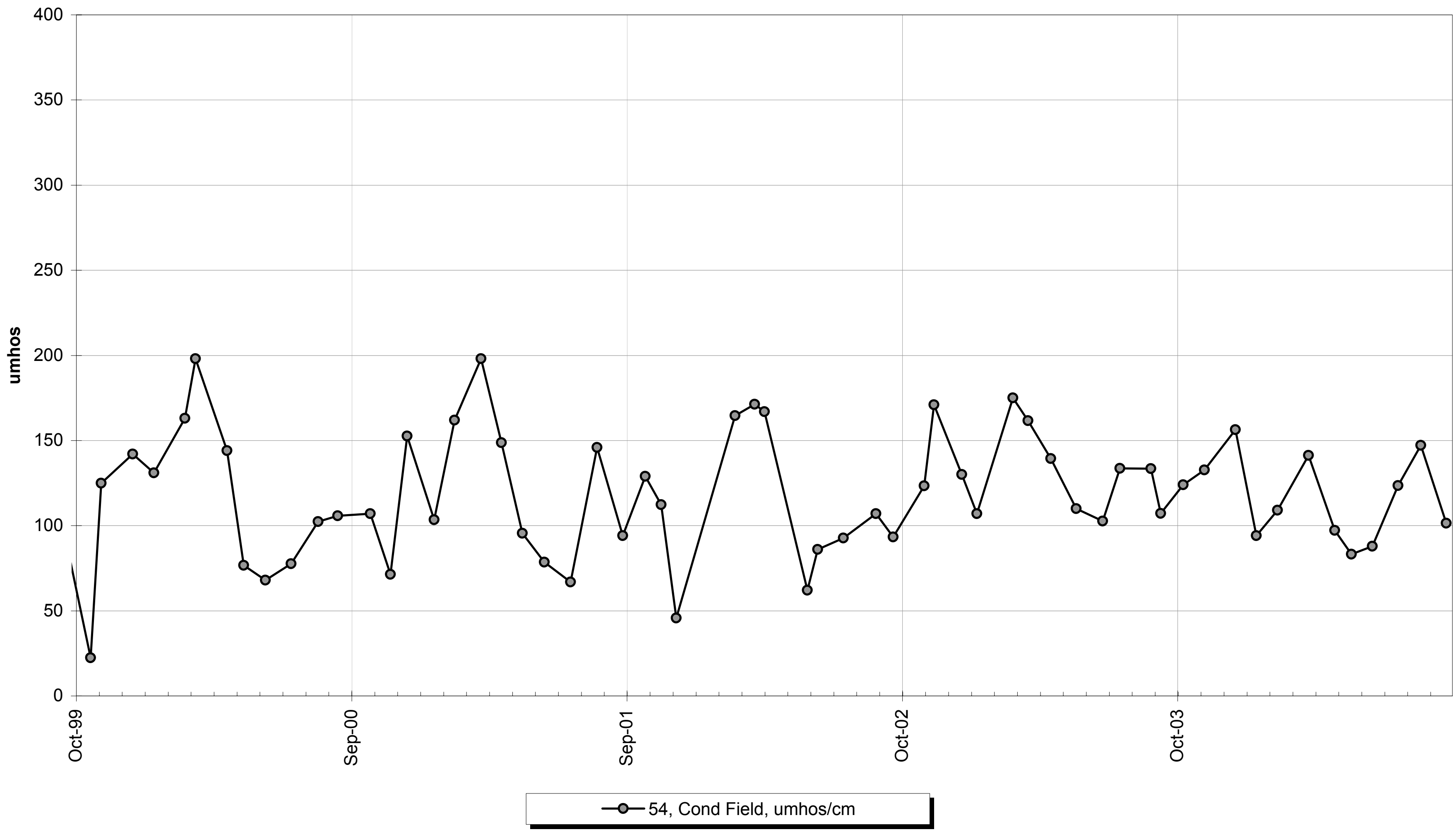
Site No.	Sample Date	Sample Time	Parameter	Value	Qualifier	Reason for Qualifier
			#Error			

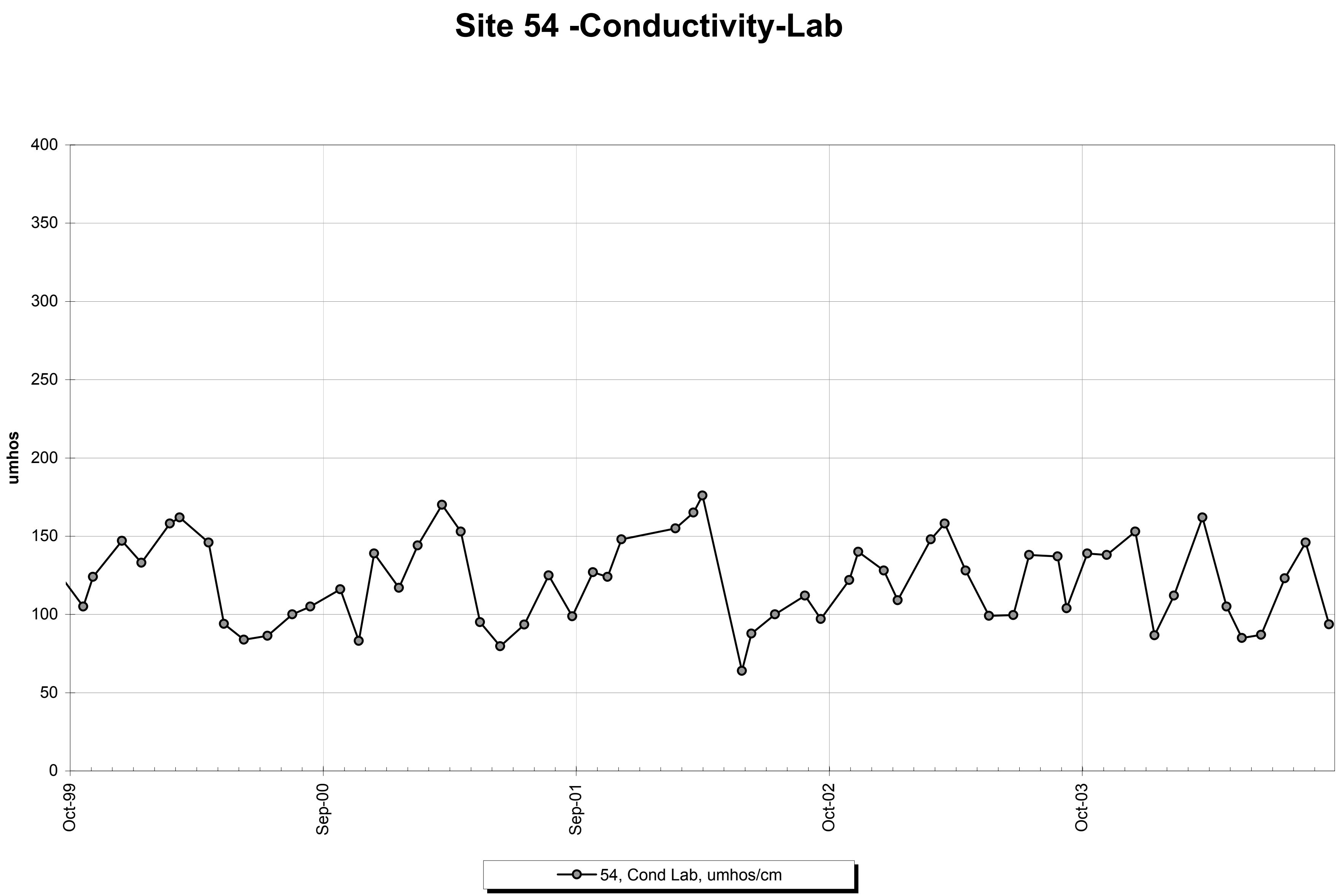
Qualifier	Description
J	Positively Identified - Approximate Concentration
N	Presumptive Evidence For Tentative Identification
NJ	Tentatively Identified - Approximate Concentration
R	Rejected - Cannot Be Verified
U	Not Detected Above Quantitation Limit
UJ	Not Detected Above Approximate Quantitation Limit

Site 54 -Water Temperature

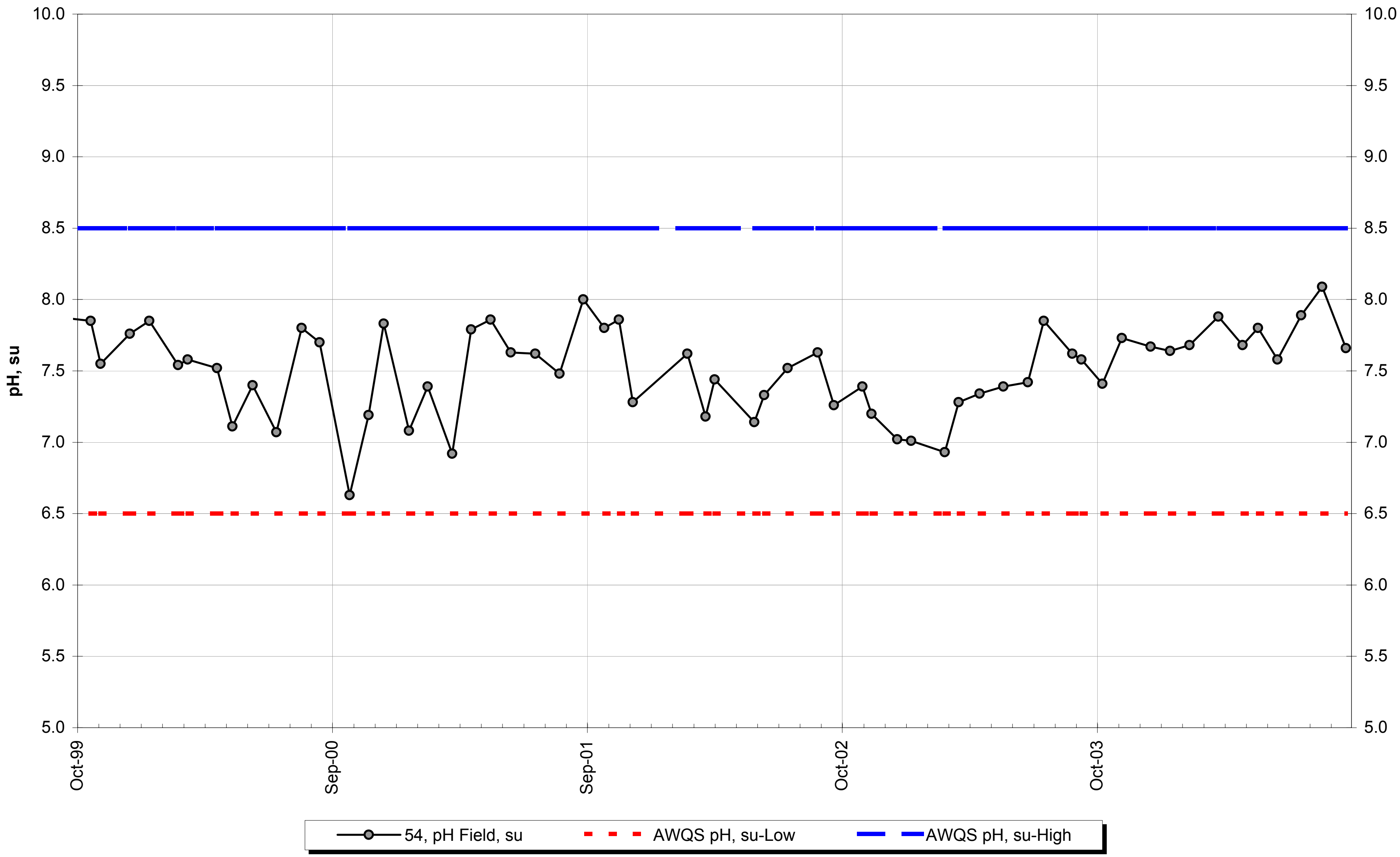


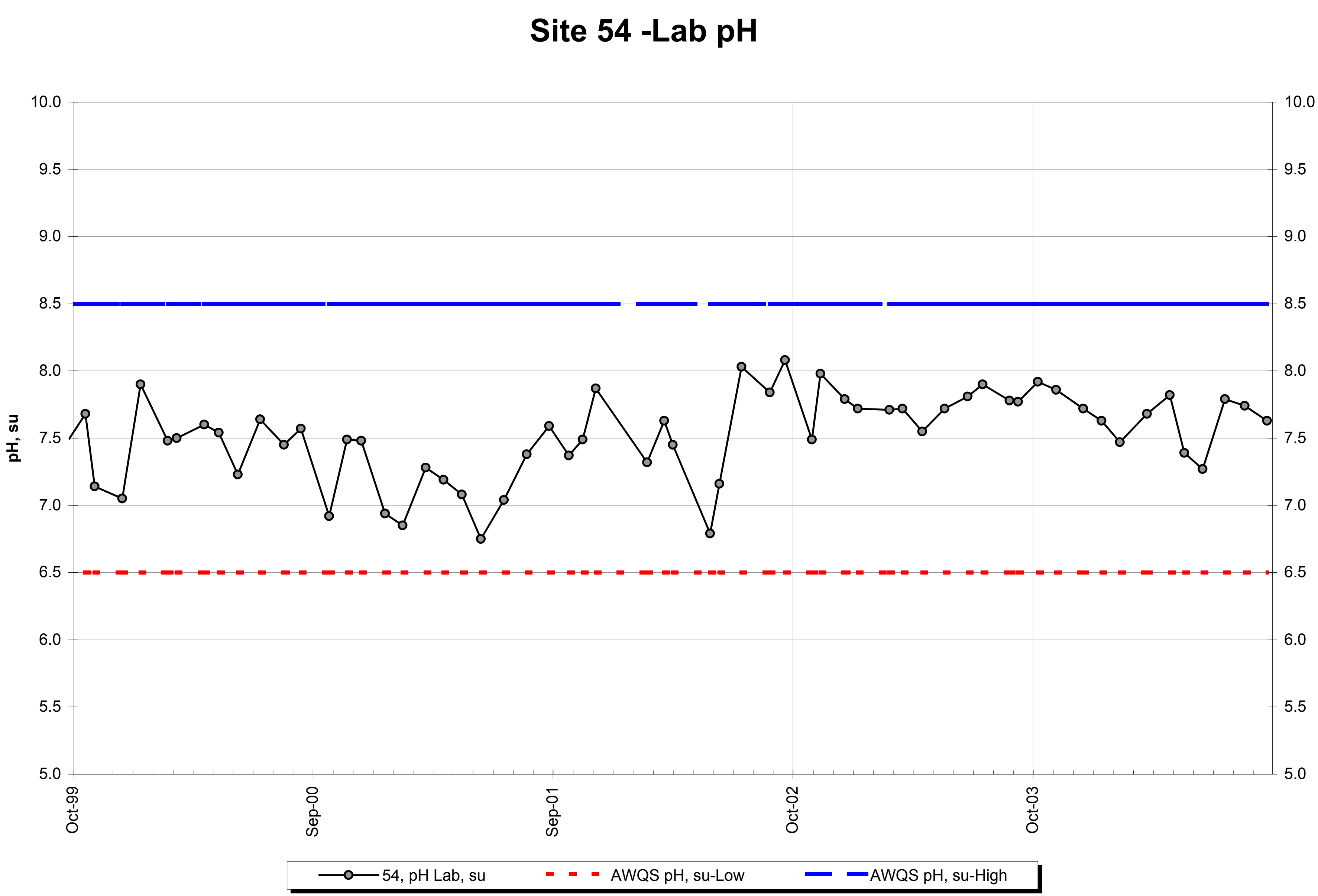
Site 54 -Conductivity-Field




Site 54 -Conductivity-Lab
umhos
400
350
300
250
200
150
100
50
0
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
54, Cond Lab, umhos/cm

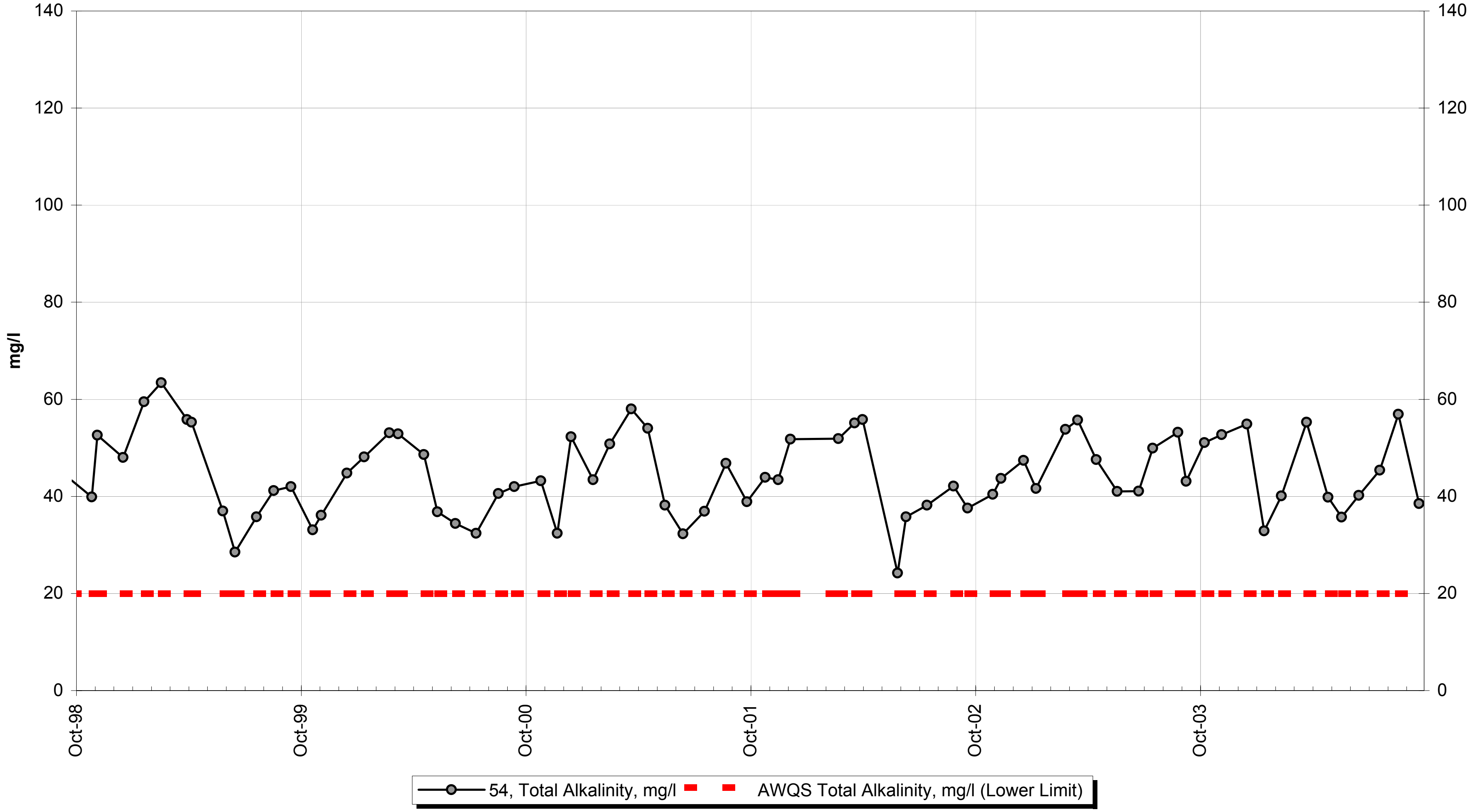
Site 54 -Field pH



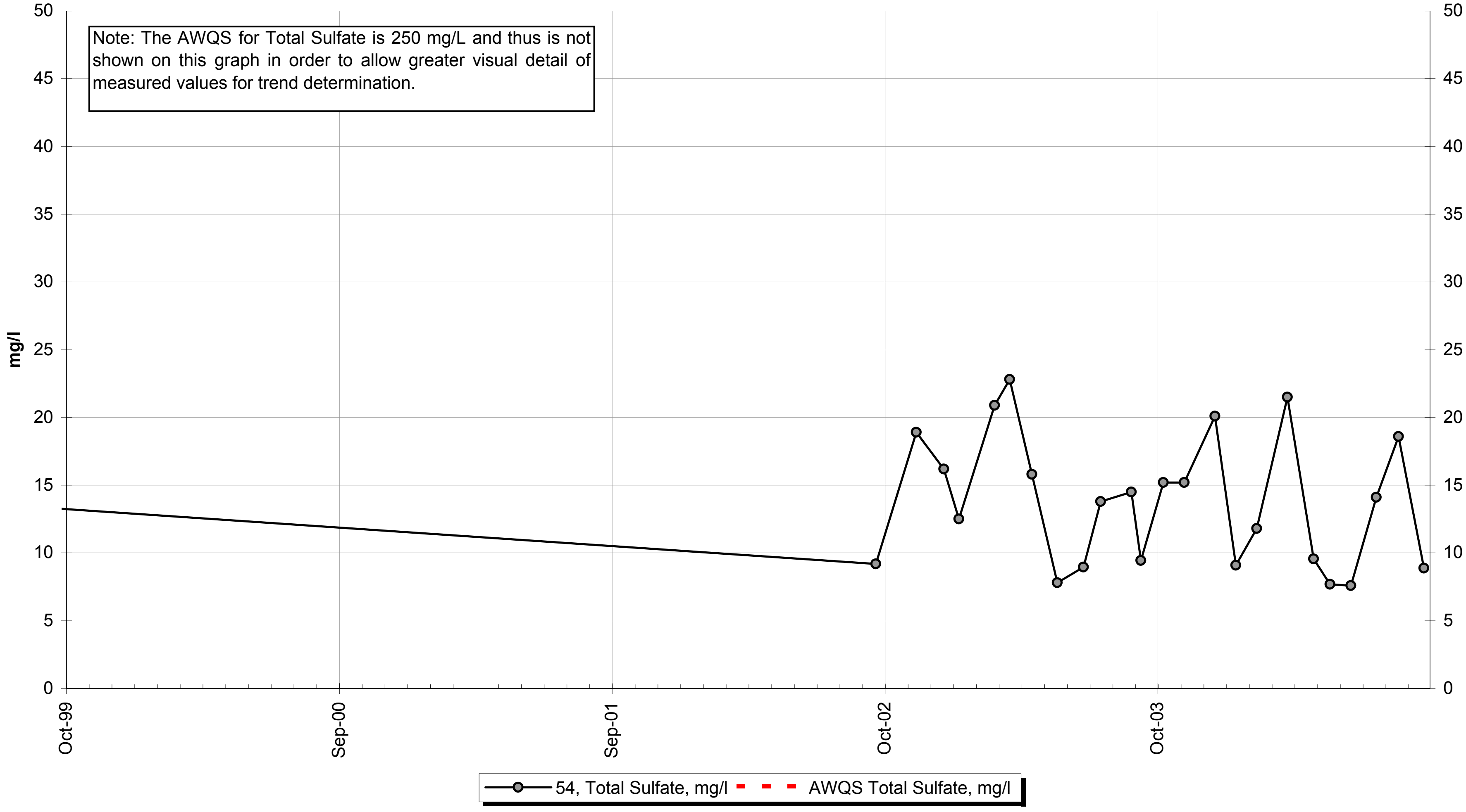


Site 54 -Lab pH
pH, su
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
54, pH Lab, su
AWQS pH, su-Low
AWQS pH, su-High

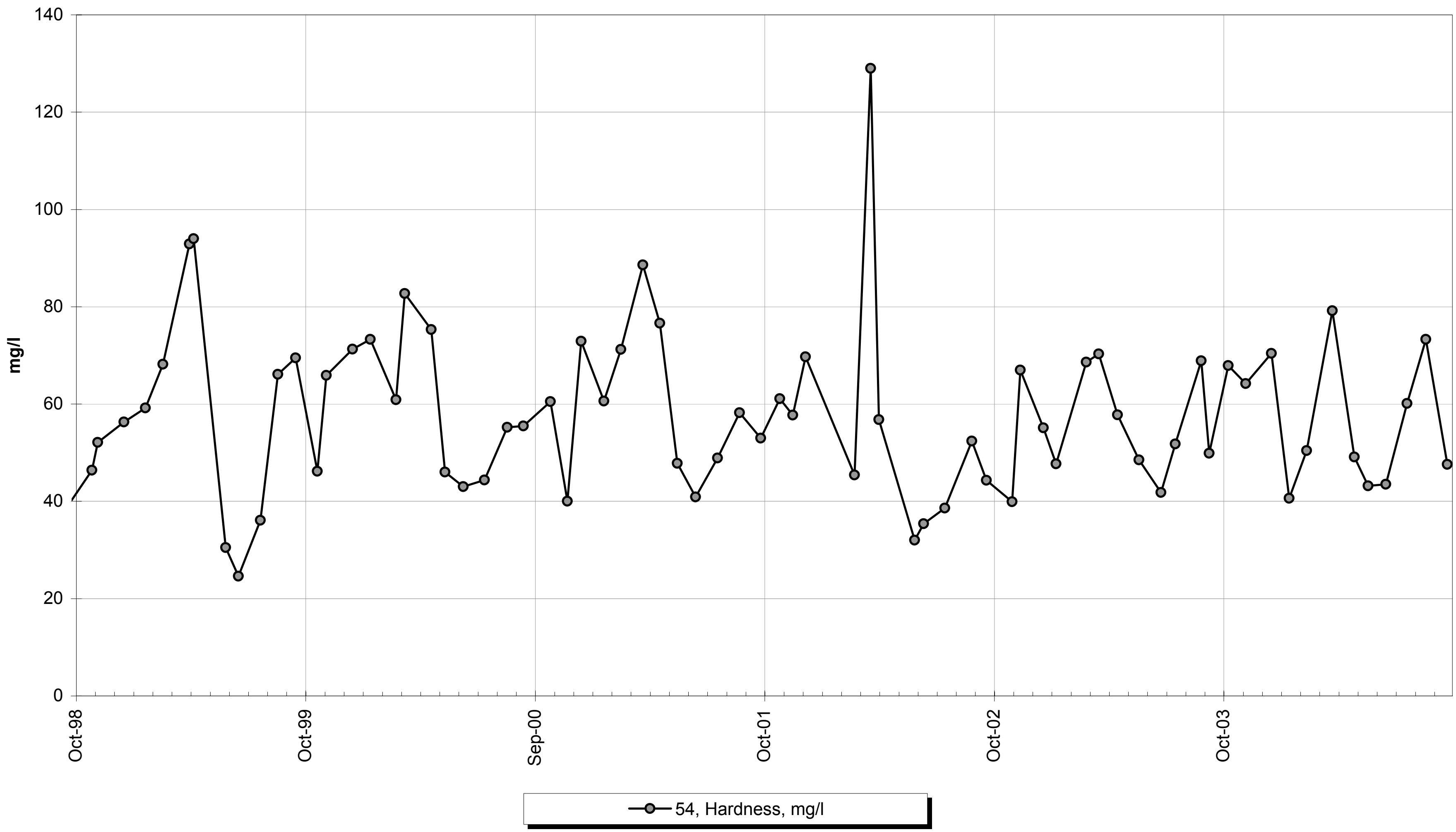
Site 54 -Total Alkalinity



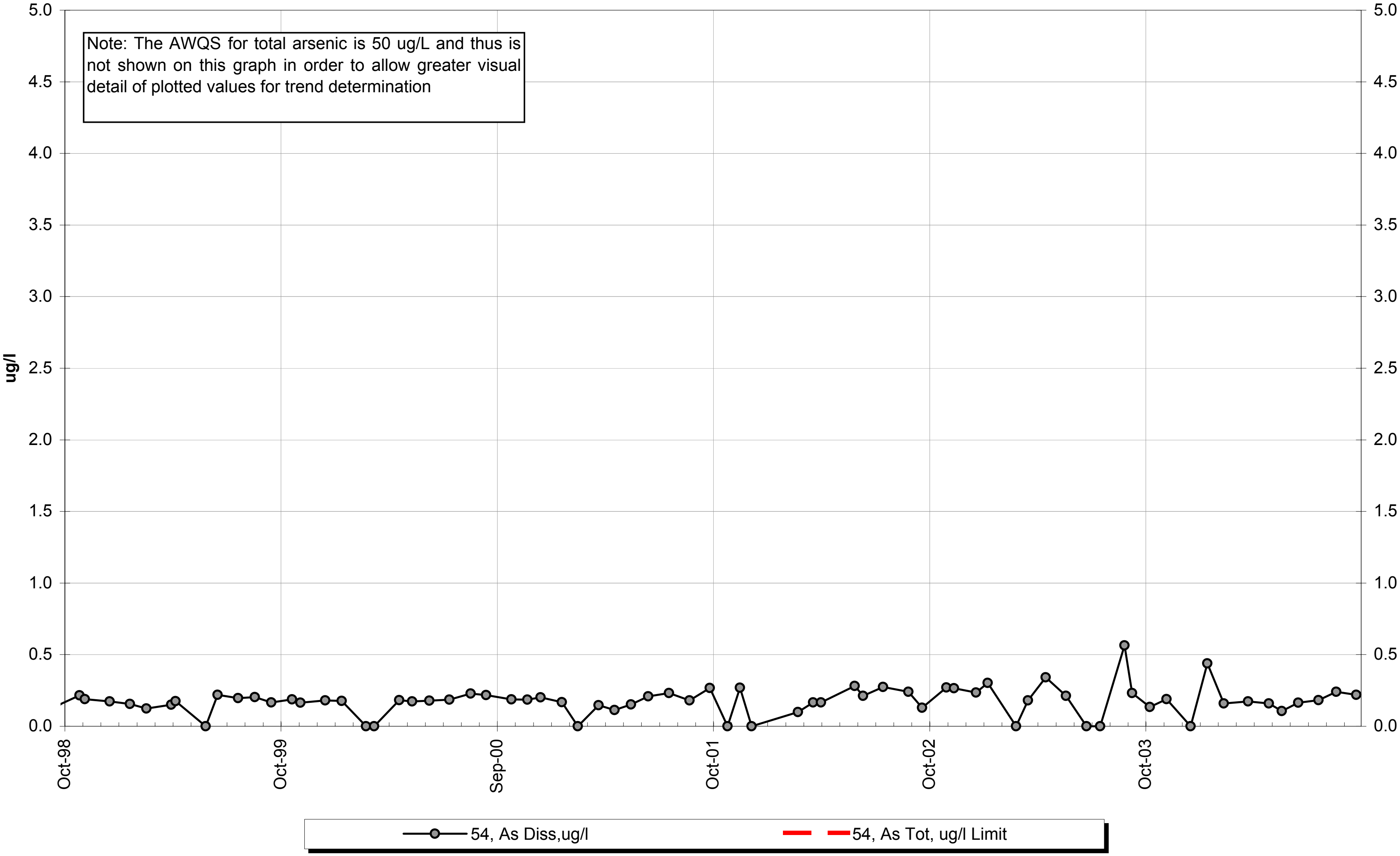
Site 54 -Total Sulfate



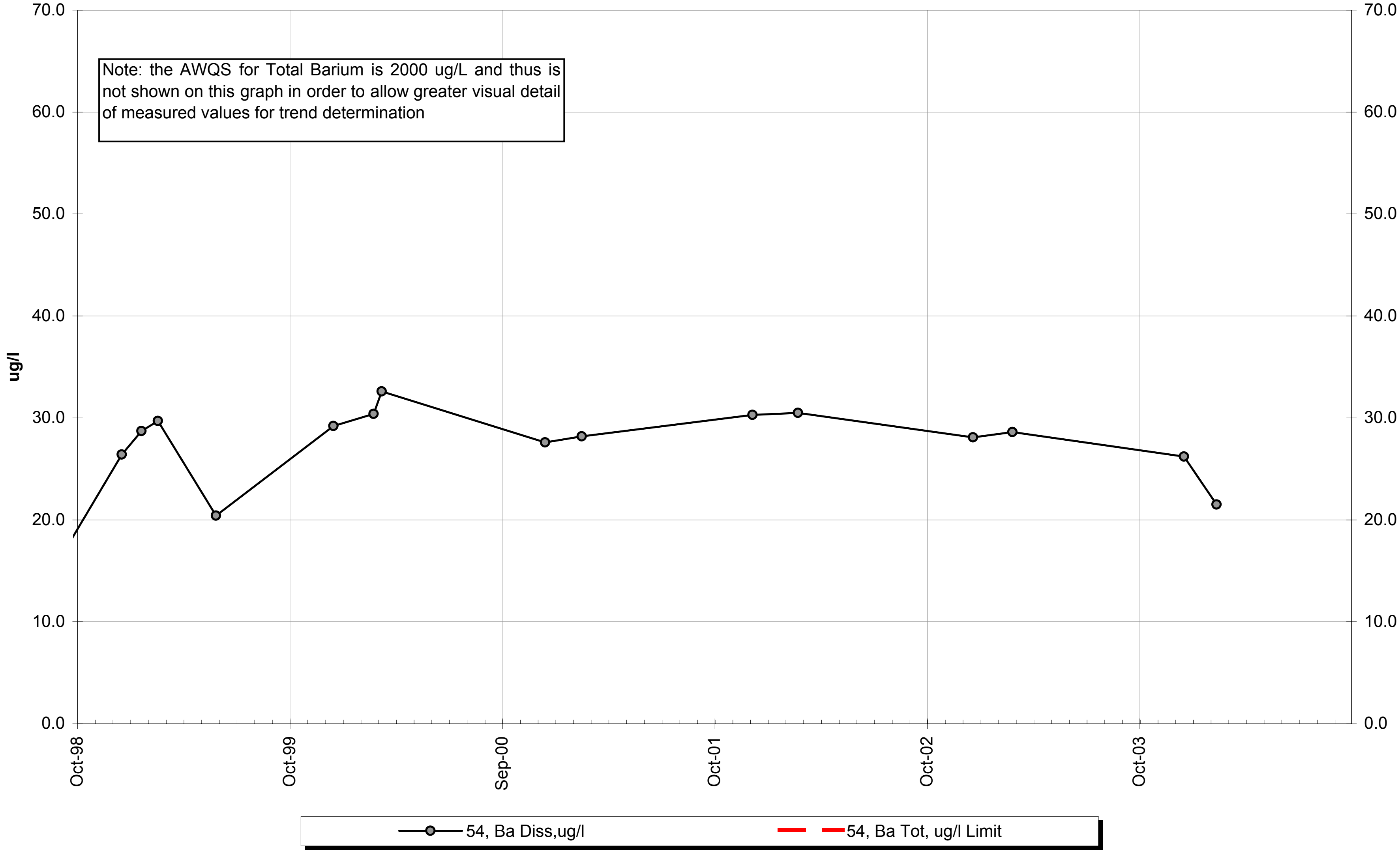
Site 54 -Hardness



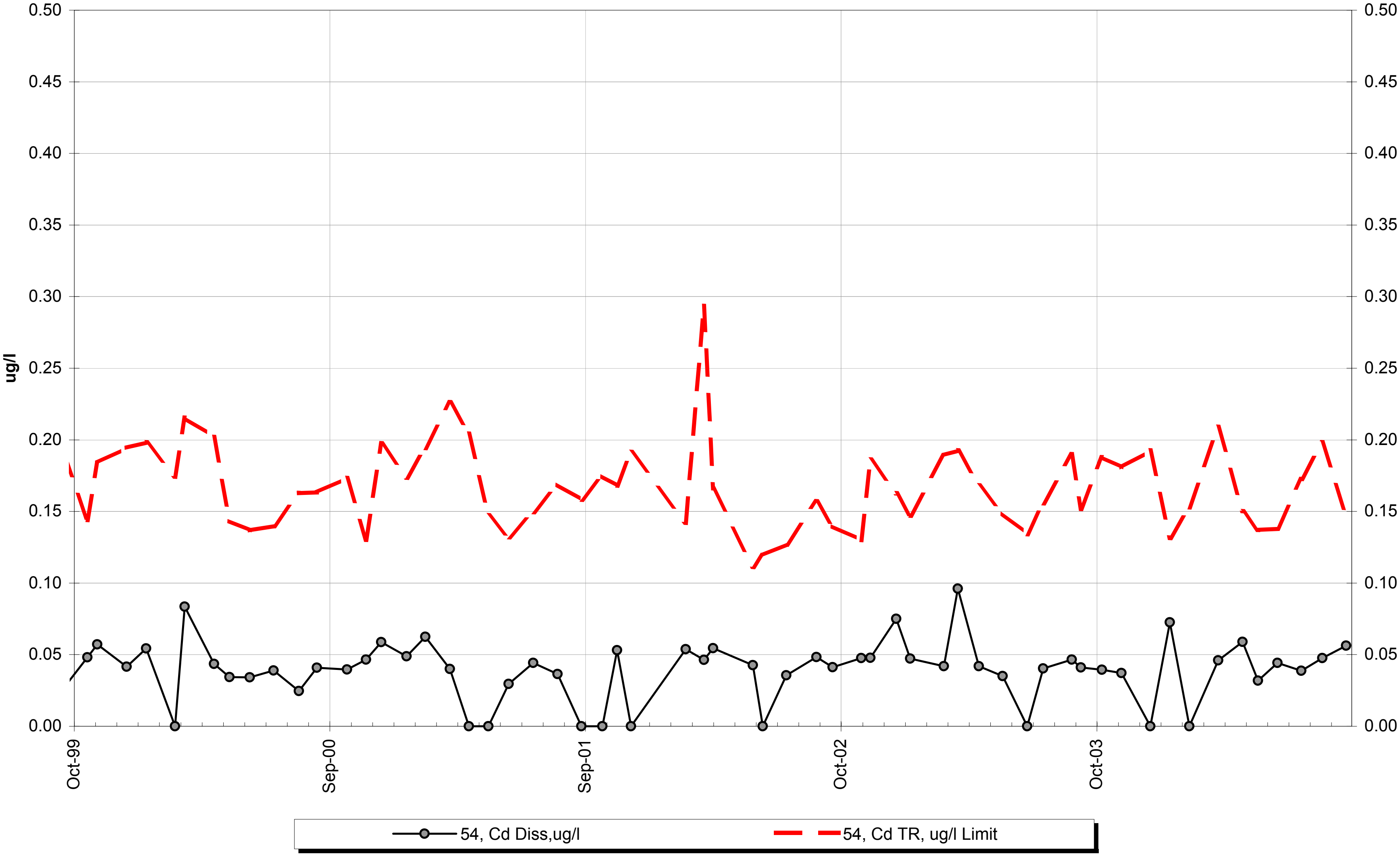
Site 54 -Dissolved Arsenic



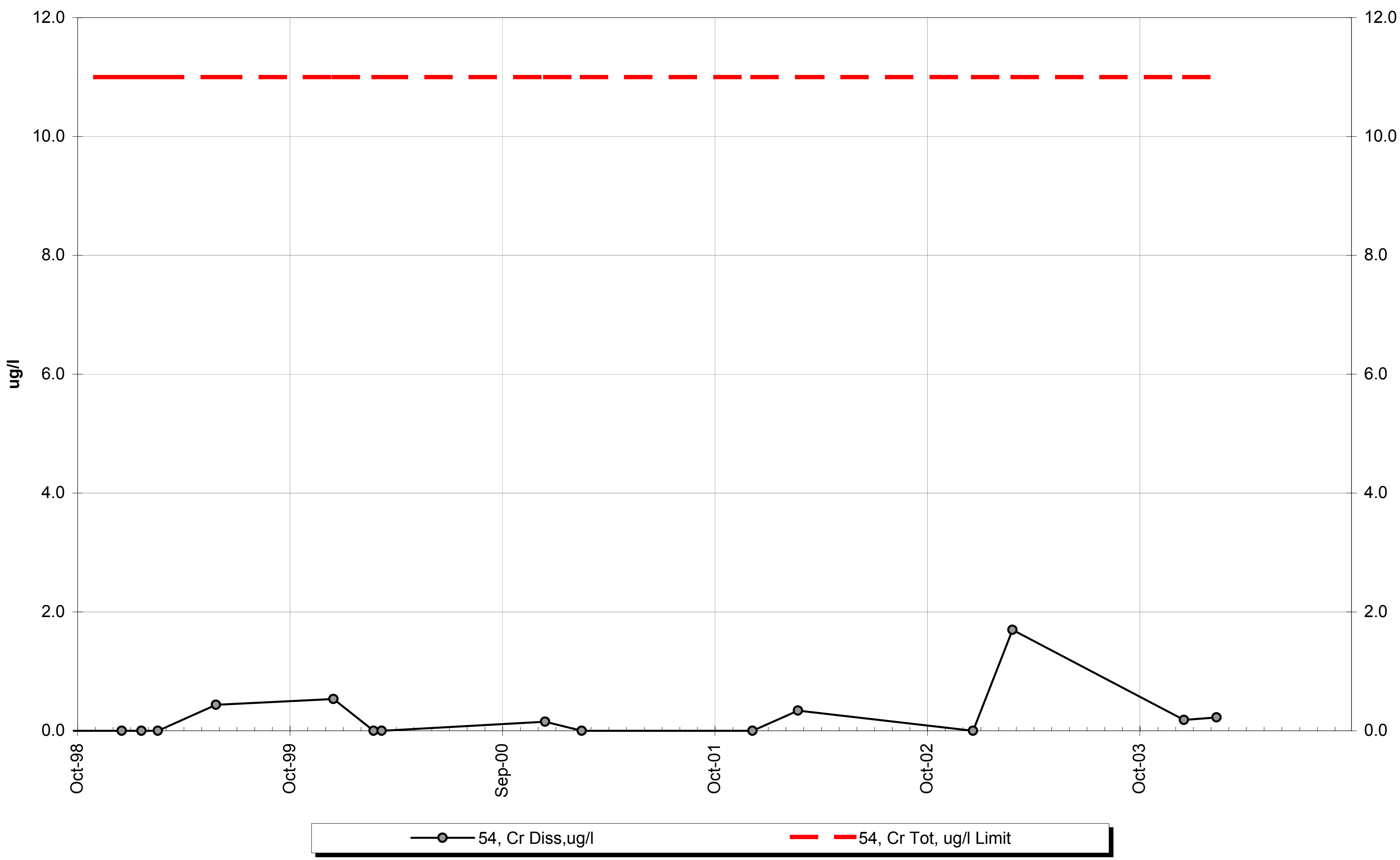
Site 54 -Dissolved Barium

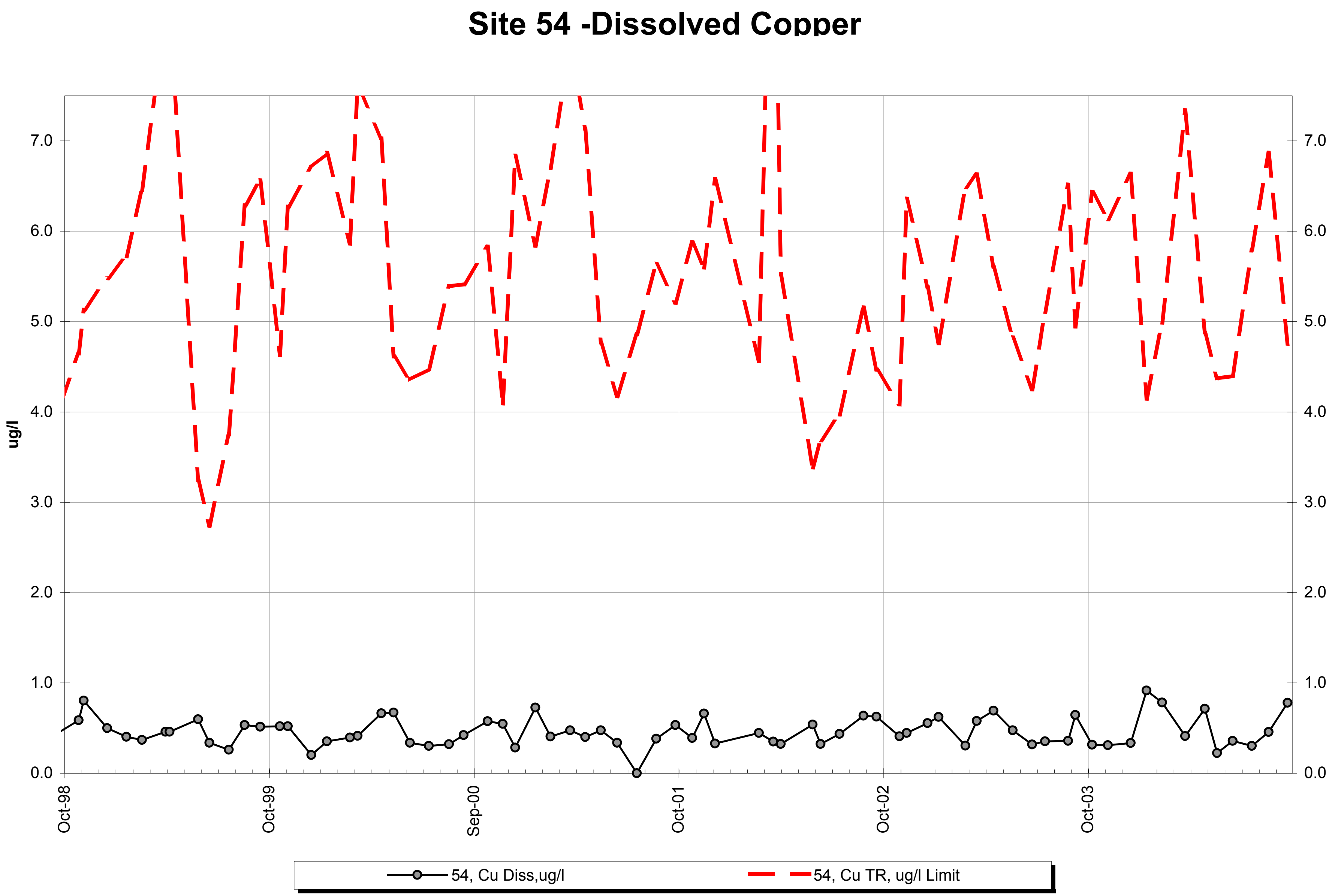


Site 54 -Dissolved Cadmium

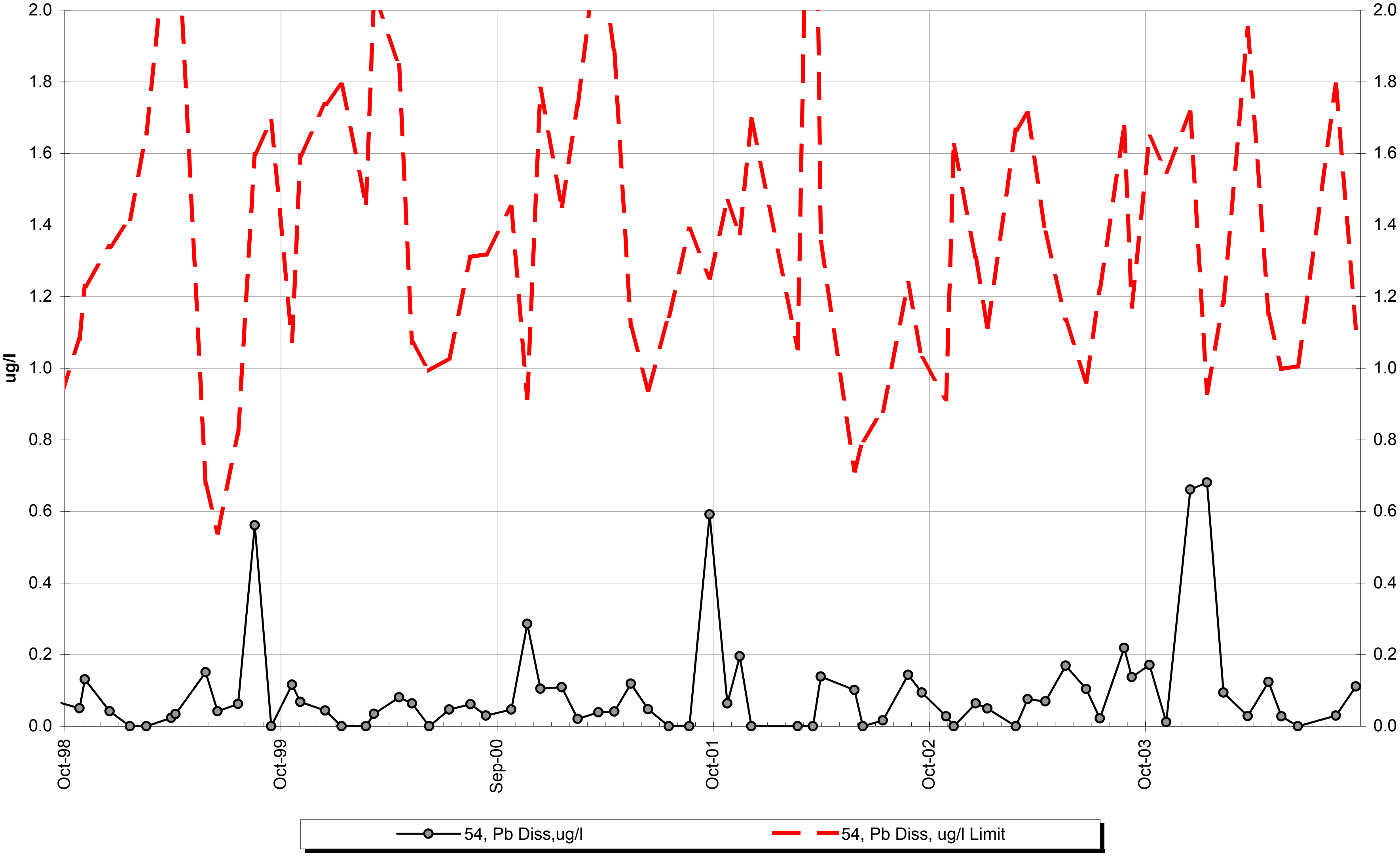


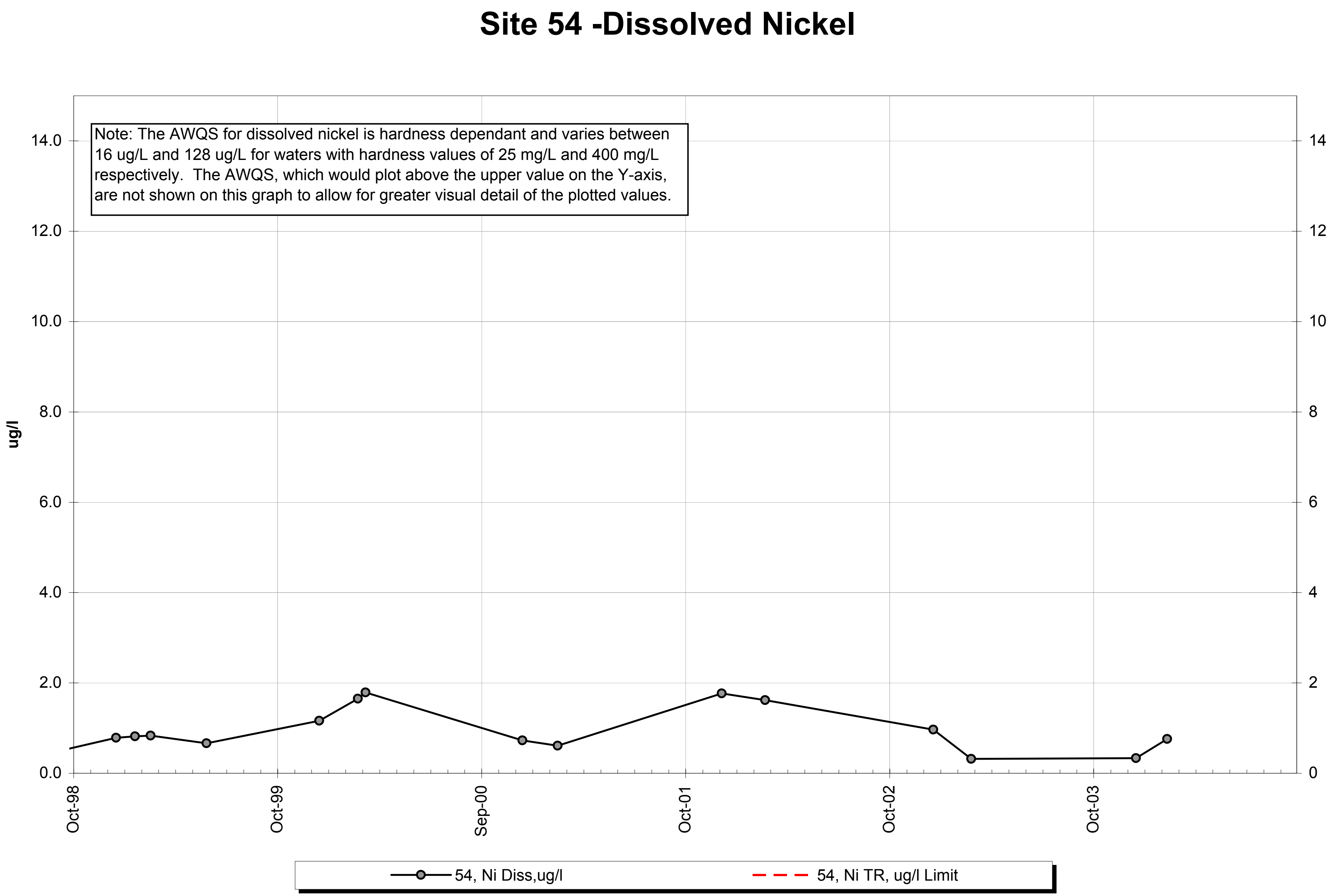
Site 54 -Dissolved Chromium




Site 54 -Dissolved Copper
ug/l
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
54, Cu Diss,ug/l
54, Cu TR, ug/l Limit

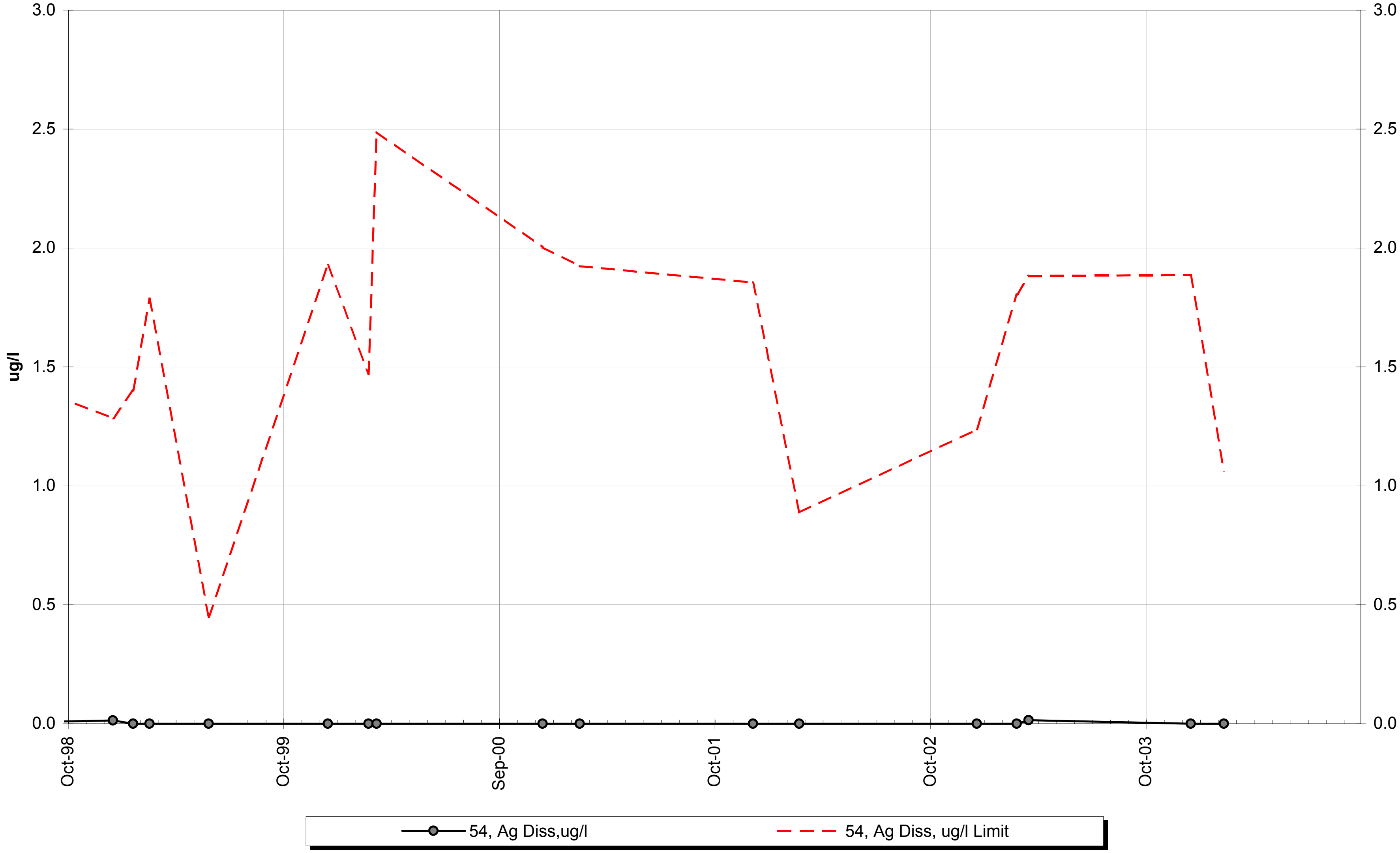
Site 54 -Dissolved Lead



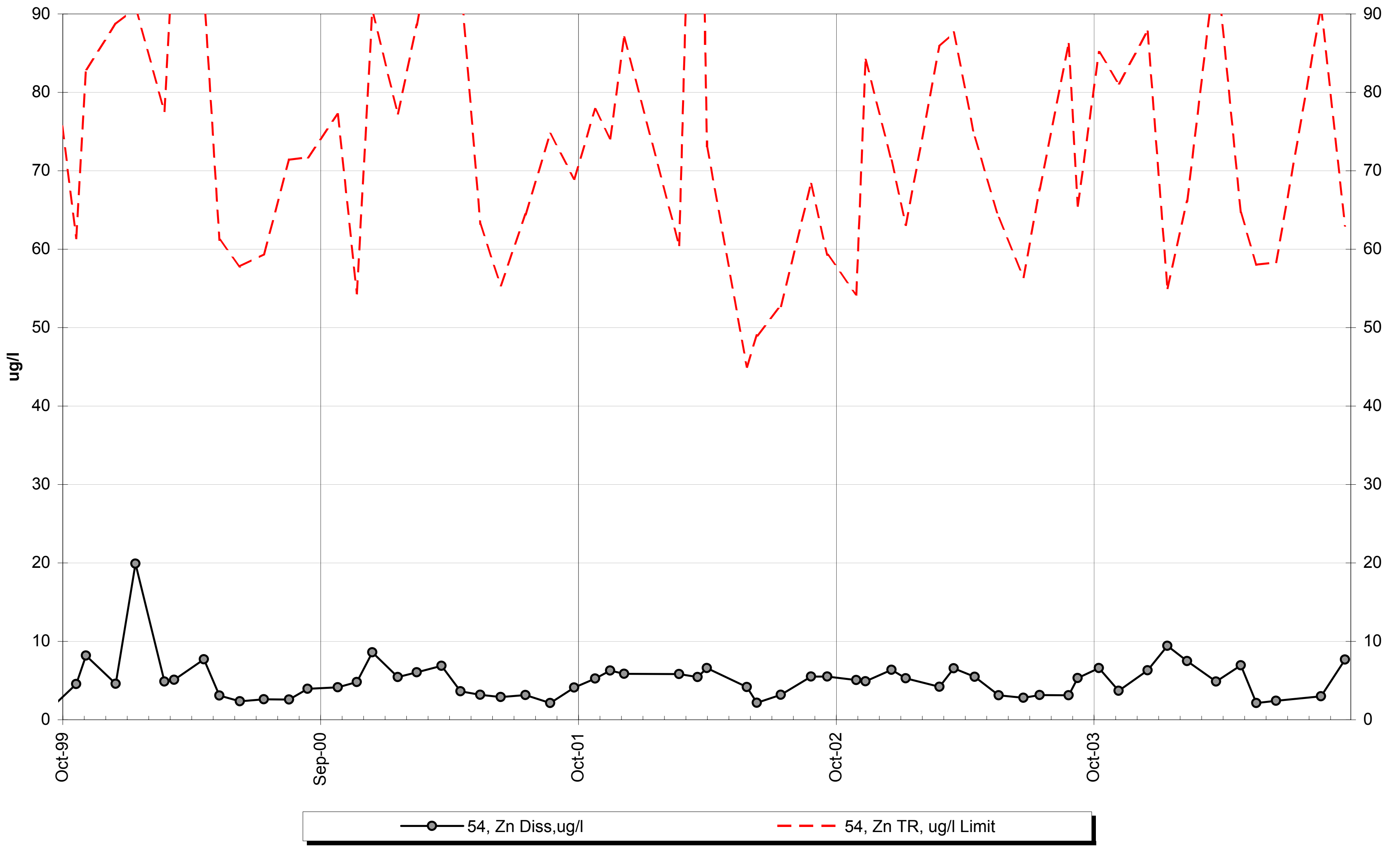


Site 54 -Dissolved Nickel
Note: The AWQS for dissolved nickel is hardness dependant and varies between 16 ug/L and 128 ug/L for waters with hardness values of 25 mg/L and 400 mg/L respectively. The AWQS, which would plot above the upper value on the Y-axis, are not shown on this graph to allow for greater visual detail of the plotted values.
ug/l
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
14
12
10
8
6
4
2
0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
54, Ni Diss,ug/l
54, Ni TR, ug/l Limit

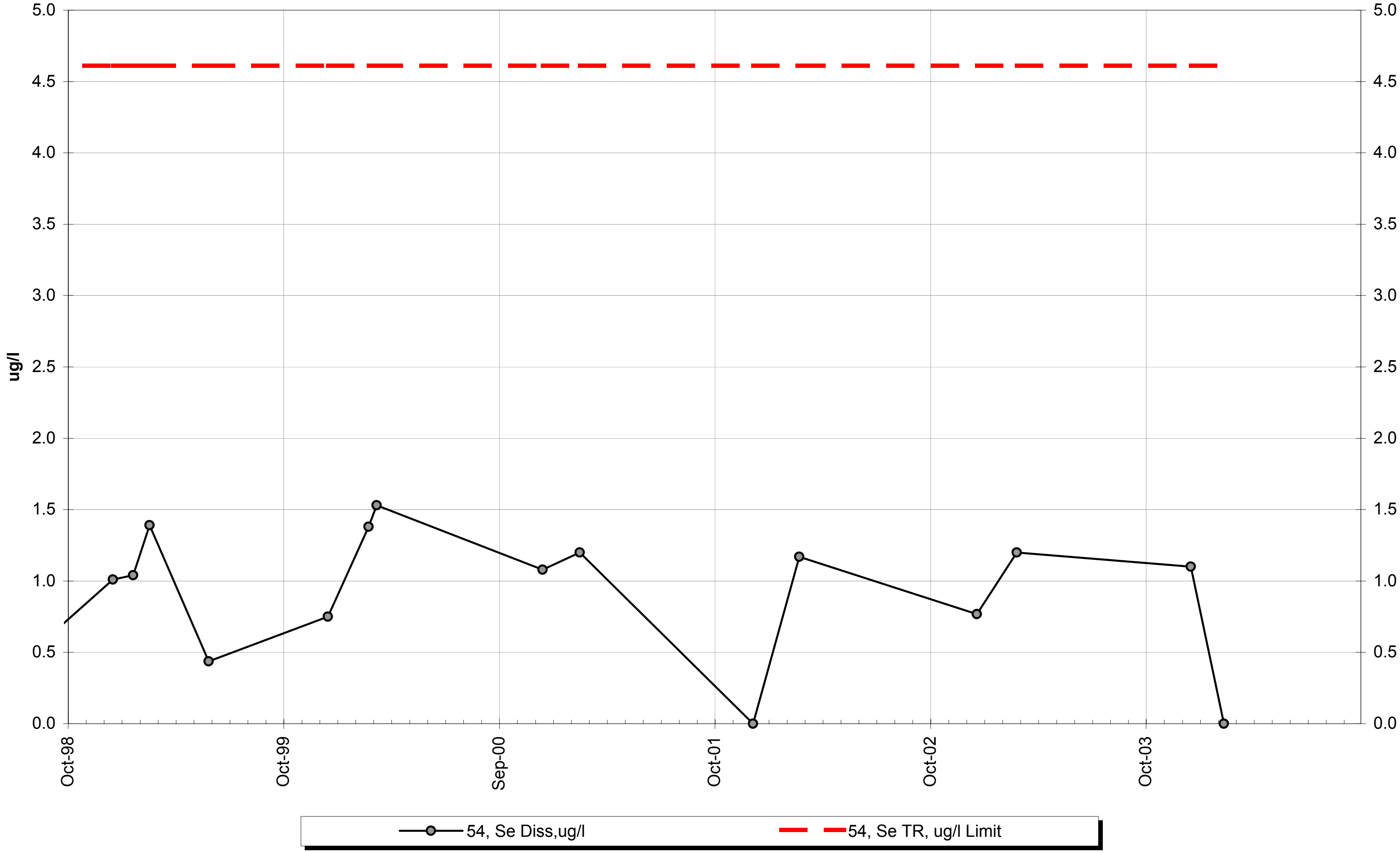
Site 54 -Dissolved Silver



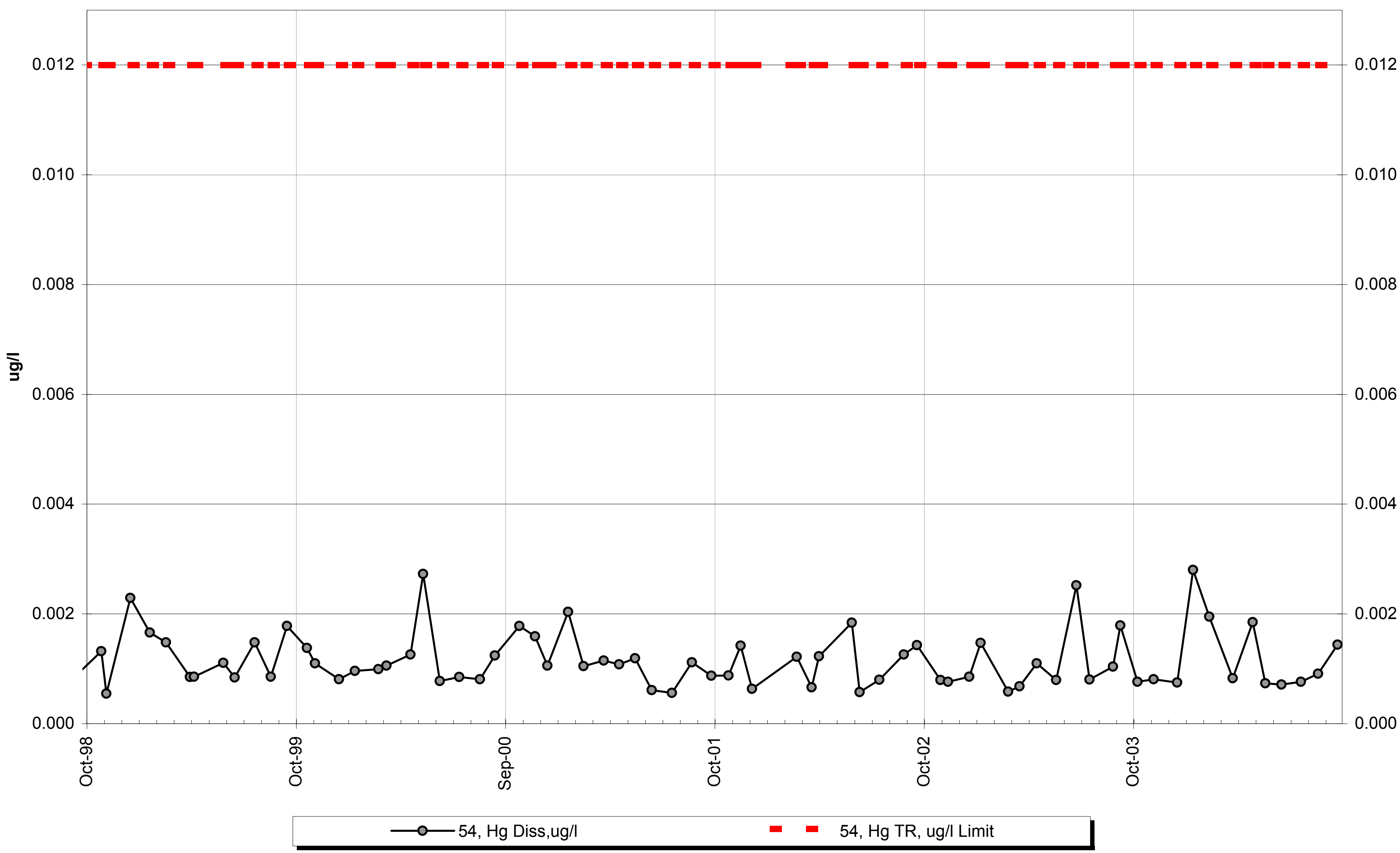
Site 54 -Dissolved Zinc

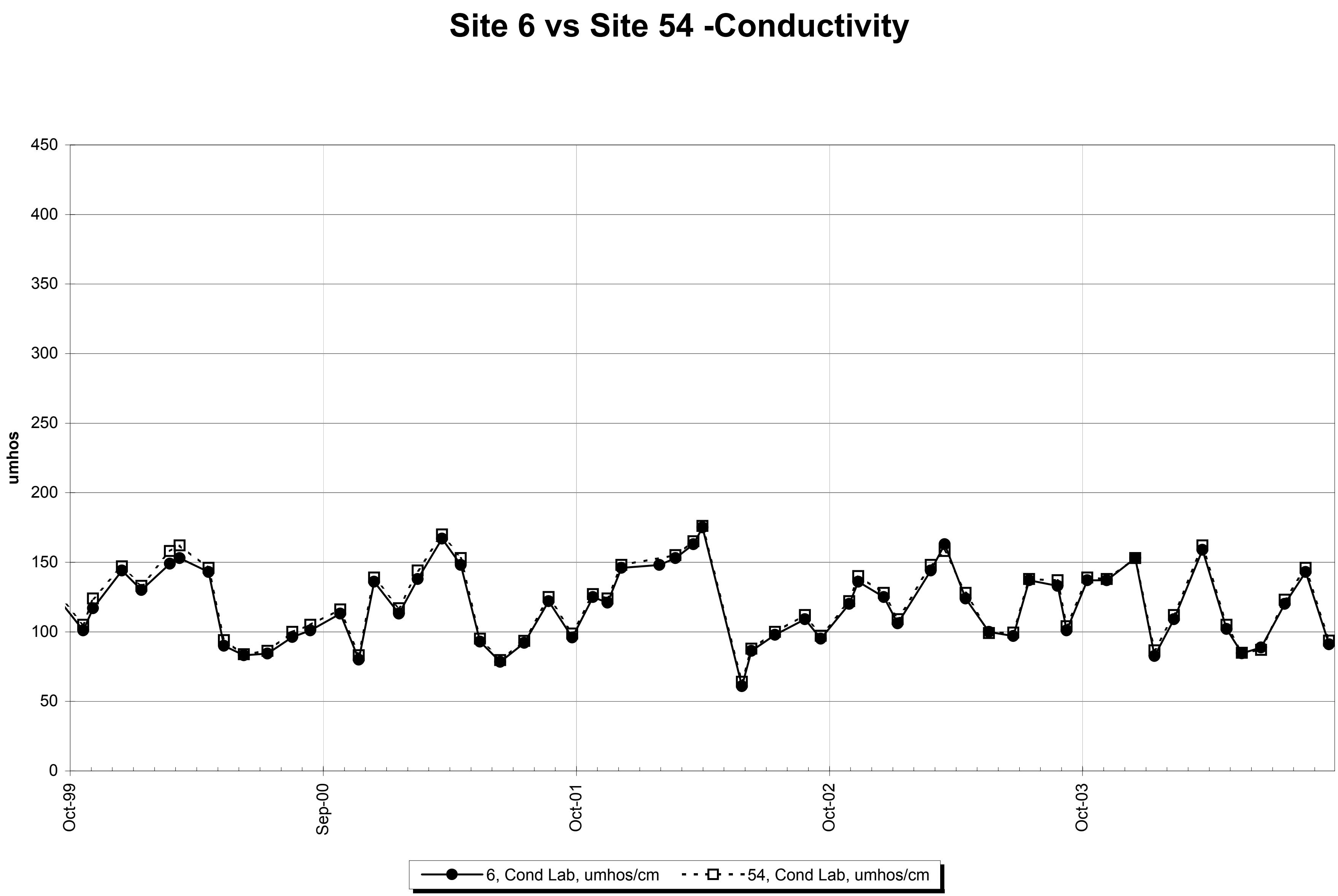


Site 54 -Dissolved Selenium

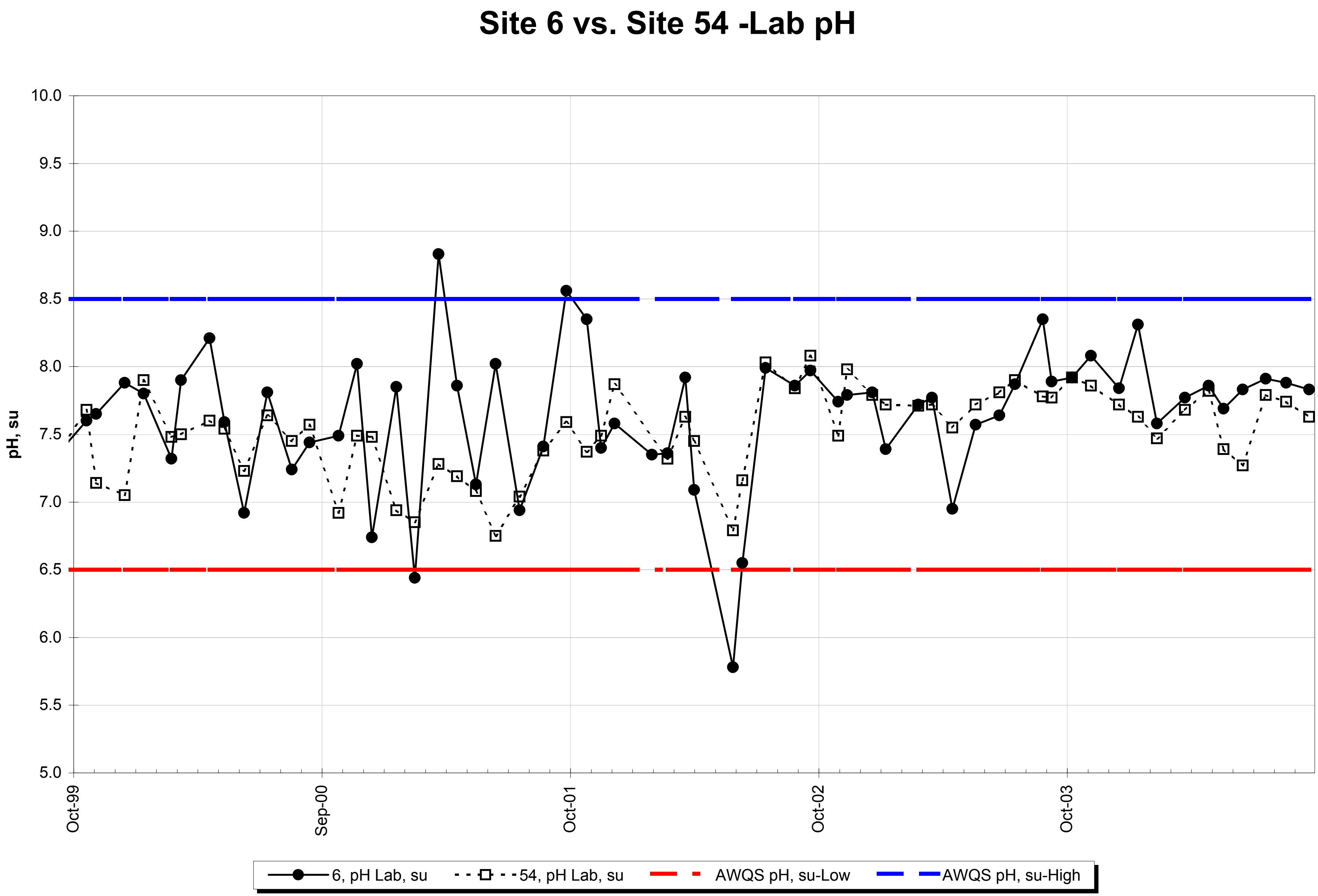


Site 54 -Dissolved Mercury

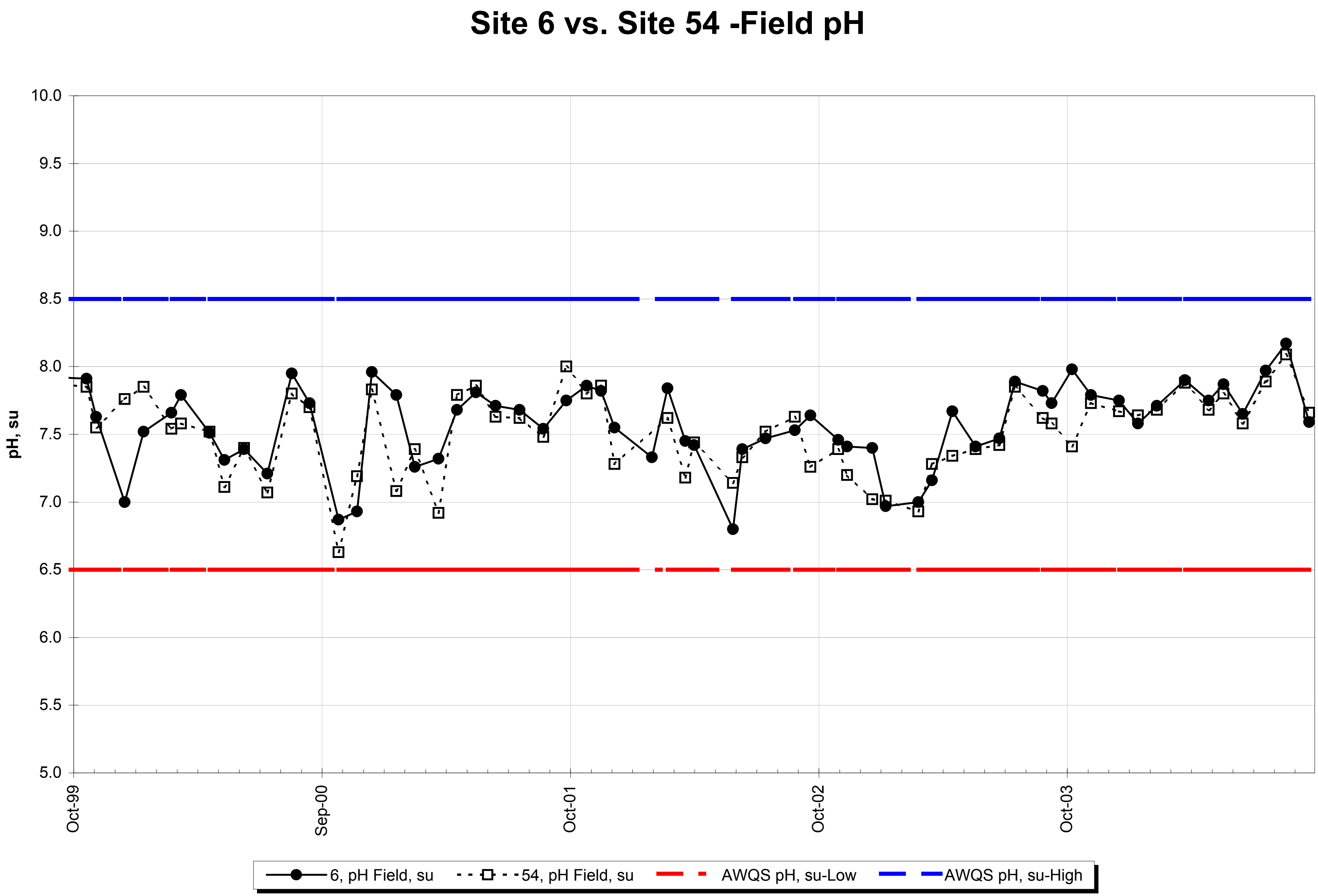


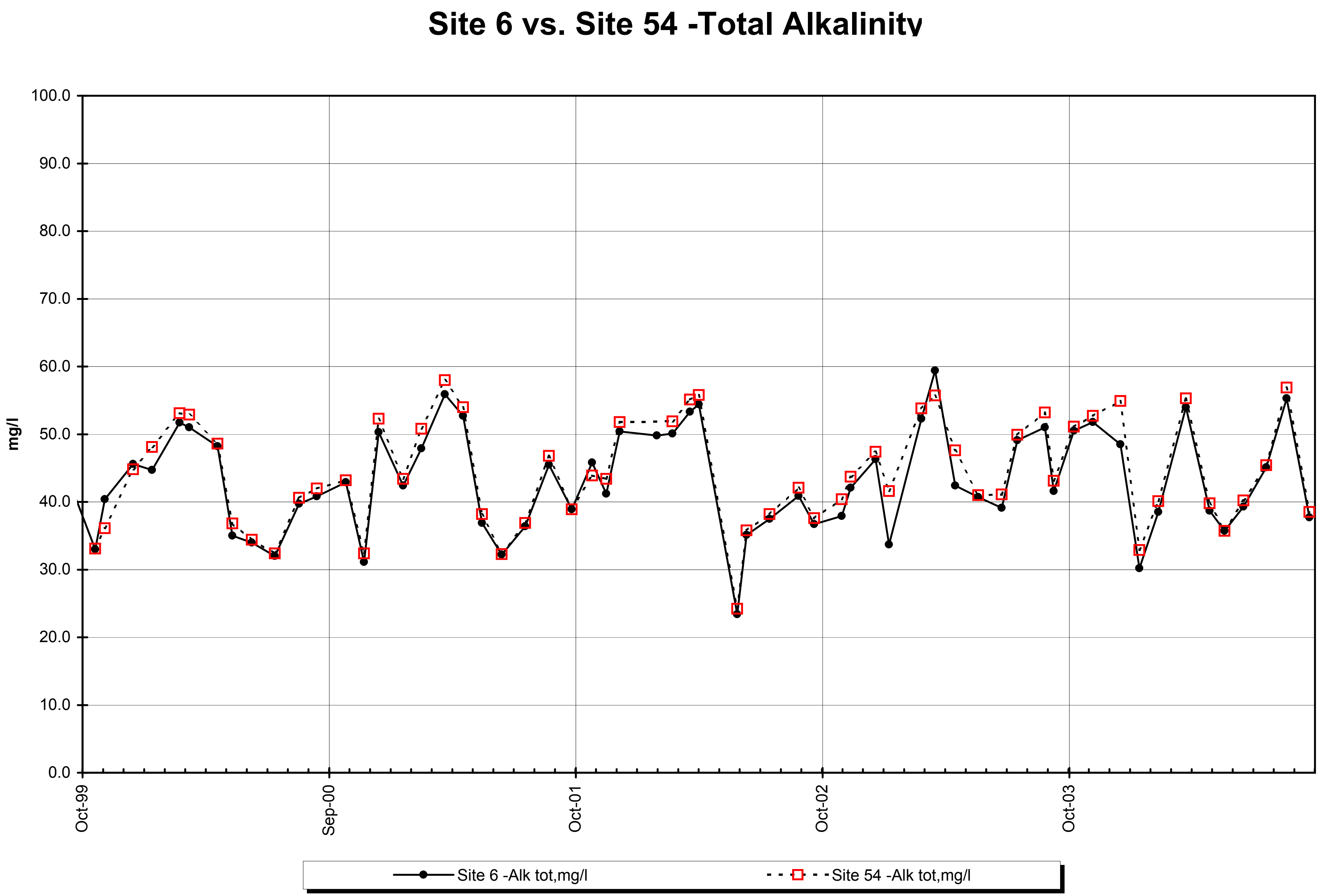


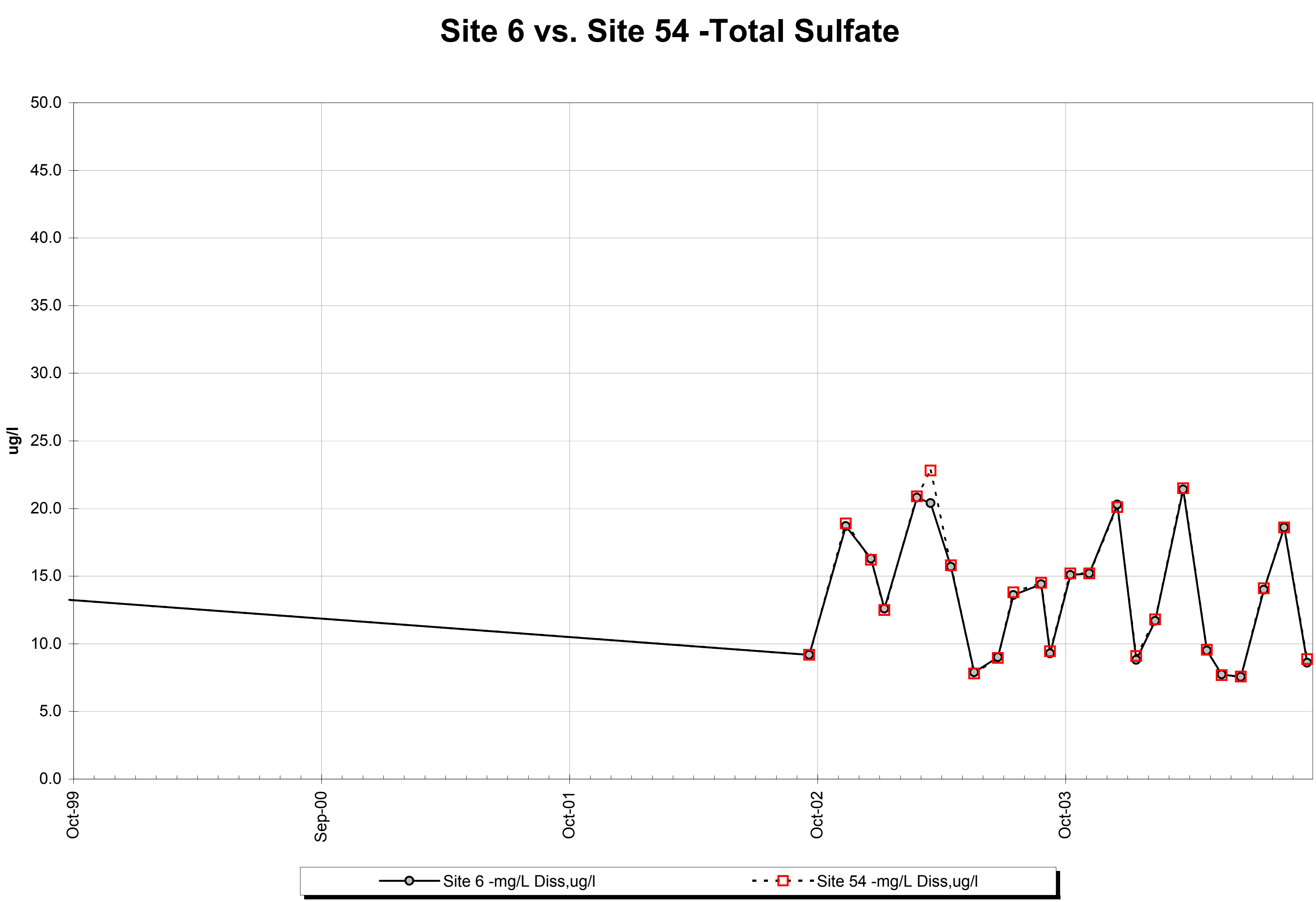
Site 6 vs Site 54 -Conductivity
umhos
450
400
350
300
250
200
150
100
50
0
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
6, Cond Lab, umhos/cm
54, Cond Lab, umhos/cm



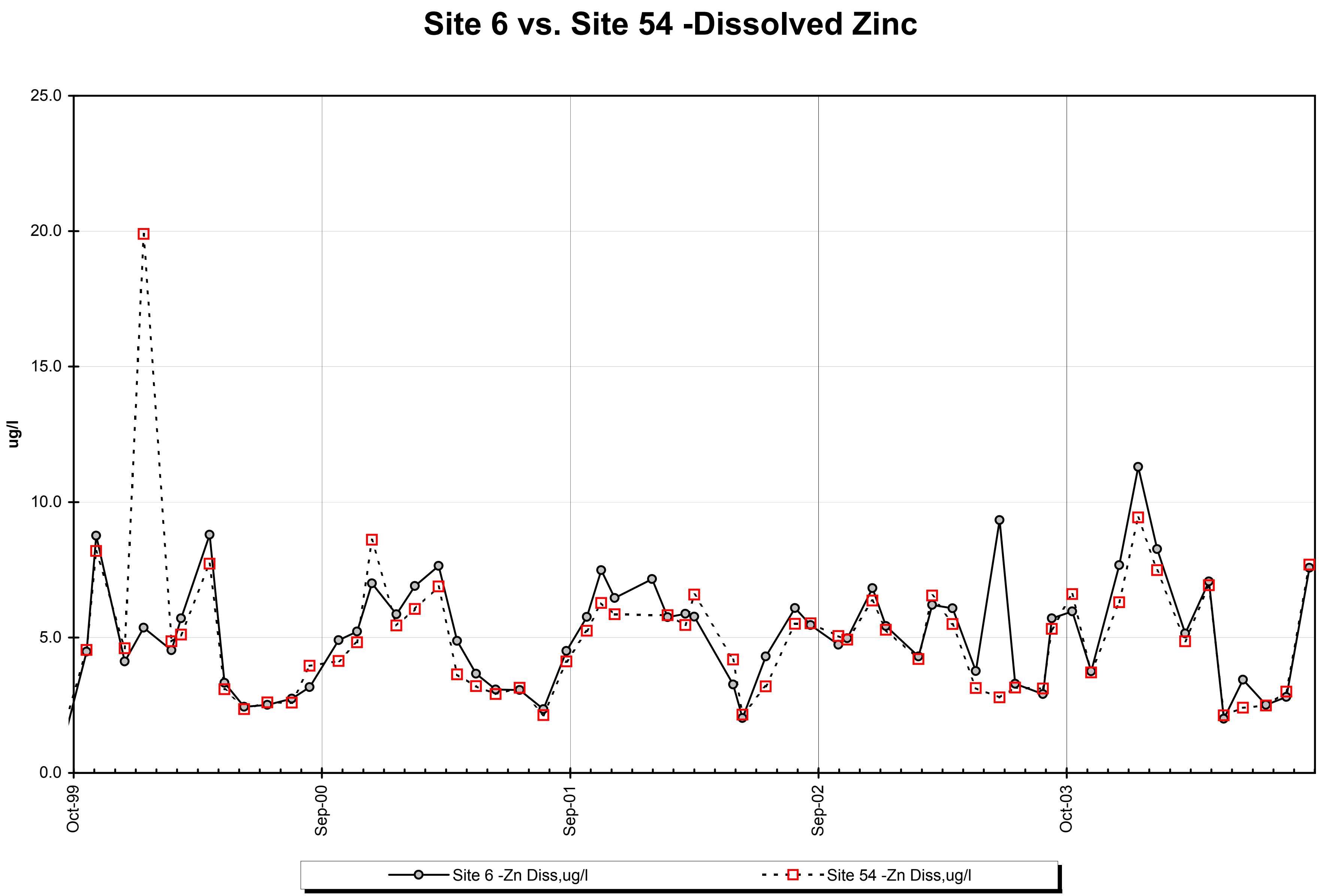
Site 6 vs. Site 54 -Lab pH
pH, su
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
6, pH Lab, su
54, pH Lab, su
AWQS pH, su-Low
AWQS pH, su-High


Site 6 vs. Site 54 -Field pH
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
pH, su
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
6, pH Field, su
54, pH Field, su
AWQS pH, su-Low
AWQS pH, su-High


Site 6 vs. Site 54 -Total Alkalinity
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
mg/l
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
Site 6 -Alk tot,mg/l
Site 54 -Alk tot,mg/l



Site 6 vs. Site 54 -Total Sulfate
ug/l
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
Site 6 -mg/L Diss,ug/l
Site 54 -mg/L Diss,ug/l



Site 6 vs. Site 54 -Dissolved Zinc
25.0
20.0
15.0
10.0
5.0
0.0
ug/l
Oct-99
Sep-00
Sep-01
Sep-02
Oct-03
Site 6 -Zn Diss,ug/l
Site 54 -Zn Diss,ug/l

Site **#54** Seasonal Kendall analysis for Specific Conductance, Lab (umhos/cm @ 25°C)

Row label	Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	**WY1999**	115.0	135.0	152.0	172.0	189.0	188.0	191.0	106.0	77.0	102.0	123.0	126.0
b	**WY2000**	105.0	124.0	147.0	133.0	158.0	162.0	146.0	94.0	83.8	86.3	100.0	105.0
c	**WY2001**	116.0	83.1	139.0	117.0	144.0	170.0	153.0	95.1	79.7	93.5	125.0	98.8
d	**WY2002**	127.0	124.0	148.0		155.0	165.0	176.0	64.0	87.8	100.0	112.0	97.1
e	**WY2003**	122.0	140.0	128.0	109.0	148.0	158.0	128.0	99.1	99.5	138.0	137.0	104.0
f	**WY2004**	139.0	138.0	153.0	86.6	112.0	162.0	105.0	84.9	87.0	123.0	146.0	93.6
	n	6	6	6	5	6	6	6	6	6	6	6	6

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
t_1	0	1	0	0	0	1	0	0	0	0	0	0
t_2	0	0	0	0	0	0	0	0	0	0	0	0
t_3	0	0	0	0	0	0	0	0	0	0	0	0
t_4	0	0	0	0	0	0	0	0	0	0	0	0
t_5	0	0	0	0	0	0	0	0	0	0	0	0

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
b-a	-1	-1	-1	-1	-1	-1	-1	-1	1	-1	-1	-1
c-a	1	-1	-1	-1	-1	-1	-1	-1	1	-1	1	-1
d-a	1	-1	-1		-1	-1	-1	-1	1	-1	-1	-1
e-a	1	1	-1	-1	-1	-1	-1	-1	1	1	1	-1
f-a	1	1	1	-1	-1	-1	-1	-1	1	1	1	-1
c-b	1	-1	-1	-1	-1	1	1	1	-1	1	1	-1
d-b	1	0	1		-1	1	1	-1	1	1	1	-1
e-b	1	1	-1	-1	-1	-1	-1	1	1	1	1	-1
f-b	1	1	1	-1	-1	0	-1	-1	1	1	1	-1
d-c	1	1	1		1	-1	1	-1	1	1	-1	-1
e-c	1	1	-1	-1	1	-1	-1	1	1	1	1	1
f-c	1	1	1	-1	-1	-1	-1	-1	1	1	1	-1
e-d	-1	1	-1		-1	-1	-1	1	1	1	1	1
f-d	1	1	1		-1	-1	-1	1	-1	1	1	-1
f-e	1	-1	1	-1	-1	1	-1	-1	-1	-1	1	-1
S_k	11	4	-1	-10	-11	-8	-9	-5	9	7	9	-11
Qm	5.7				-11.3							-4.0
σ^2_S=	28.33	27.33	28.33	16.67	28.33	28.33	28.33	28.33	28.33	28.33	28.33	28.33
$Z_k = S_k/\sigma_S$	2.07	0.77	-0.19	-2.45	-2.07	-1.50	-1.69	-0.94	1.69	1.32	1.69	-2.07
Z^2_k	4.27	0.59	0.04	6.00	4.27	2.26	2.86	0.88	2.86	1.73	2.86	4.27

ΣZ_k= -3.38

ΣZ^2_k= 32.88

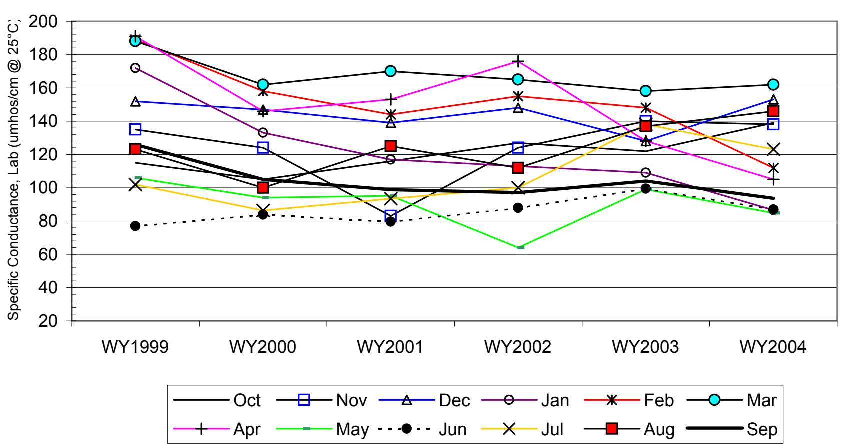
Z-bar=$\Sigma Z_k/K$= -0.28

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	2	0	0	0	0

Σn 71

ΣS_k -15

$\chi^2_h = \Sigma Z^2_k - K(\text{Z-bar})^2$=	31.93	@α=5% $\chi^2_{(K-1)}$= 19.68	Test for station homogeneity	
p	**0.001**		$\chi^2_h < \chi^2_{(K-1)}$	**REJECT**
ΣVAR(S_k) 327.33	Z_{calc} -0.77	@α/2=2.5% Z= 1.96	**H_0** (No trend)	NA
	p **0.220**		**H_A** (± trend)	NA



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Slope	Upper Limit
0.010	-5.11		1.73
0.050	-4.15	**-1.50**	1.04
0.100	-3.69		0.51
0.200	-2.90		0.00

Site **#54** Seasonal Kendall analysis for pH, Lab, Standard Units

Row label	Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	**WY1999**	7.5	7.4	7.7	7.5	7.6	8.0	8.0	7.6	8.5	7.6	7.7	7.4
b	**WY2000**	7.7	7.1	7.1	7.9	7.5	7.5	7.6	7.5	7.2	7.6	7.5	7.6
c	**WY2001**	6.9	7.5	7.5	6.9	6.9	7.3	7.2	7.1	6.8	7.0	7.4	7.6
d	**WY2002**	7.4	7.5	7.9		7.3	7.6	7.5	6.8	7.2	8.0	7.8	8.1
e	**WY2003**	7.5	8.0	7.8	7.7	7.7	7.7	7.6	7.7	7.8	7.9	7.8	7.8
f	**WY2004**	7.9	7.9	7.7	7.6	7.5	7.7	7.8	7.4	7.3	7.8	7.7	7.6
	n	6	6	6	5	6	6	6	6	6	6	6	6

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
t_1	0	1	1	0	0	0	0	0	0	1	0	0
t_2	0	0	0	0	0	0	0	0	0	0	0	0
t_3	0	0	0	0	0	0	0	0	0	0	0	0
t_4	0	0	0	0	0	0	0	0	0	0	0	0
t_5	0	0	0	0	0	0	0	0	0	0	0	0

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
b-a	1	-1	-1	1	-1	-1	-1	-1	-1	0	-1	1
c-a	-1	1	-1	-1	-1	-1	-1	-1	-1	-1	-1	1
d-a	-1	1	1		-1	-1	-1	-1	-1	1	1	1
e-a	-1	1	1	1	1	-1	-1	1	-1	1	1	1
f-a	1	1	0	1	-1	-1	-1	-1	-1	1	1	1
c-b	-1	1	1	-1	-1	-1	-1	-1	-1	-1	-1	1
d-b	-1	1	1		-1	1	-1	-1	-1	1	1	1
e-b	-1	1	1	-1	1	1	-1	1	1	1	1	1
f-b	1	1	1	-1	-1	1	1	-1	1	1	1	1
d-c	1	0	1		1	1	1	-1	1	1	1	1
e-c	1	1	1	1	1	1	1	1	1	1	1	1
f-c	1	1	1	1	1	1	1	1	1	1	1	1
e-d	1	1	-1		1	1	1	1	1	-1	-1	-1
f-d	1	1	-1		1	1	1	1	1	-1	-1	-1
f-e	1	-1	-1	-1	-1	-1	1	-1	-1	-1	-1	-1
S_k	3	10	4	0	-1	1	-1	-3	-1	4	3	9

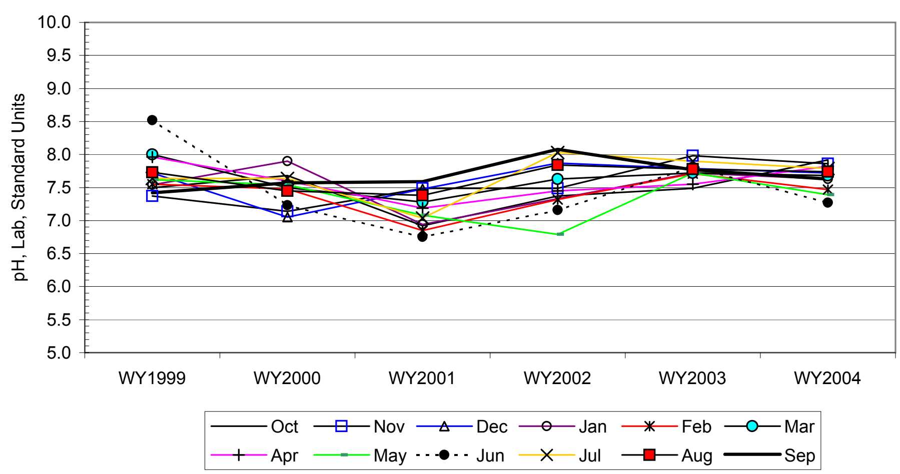
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
σ^2_S=	28.33	27.33	28.33	16.67	28.33	28.33	28.33	28.33	28.33	28.33	28.33	28.33
$Z_k = S_k/\sigma_S$	0.56	1.91	0.75	0.00	-0.19	0.19	-0.19	-0.56	-0.19	0.75	0.56	1.69
Z^2_k	0.32	3.66	0.56	0.00	0.04	0.04	0.04	0.32	0.04	0.56	0.32	2.86

ΣZ_k= 5.29
ΣZ^2_k= 8.74
Z-bar=$\Sigma Z_k/K$= 0.44

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	3	0	0	0	0

Σn 71
ΣS_k 28

$\chi^2_h=\Sigma Z^2_k-K(\text{Z-bar})^2$=	6.41	@α=5% $\chi^2_{(K-1)}$= 19.68	Test for station homogeneity	
p	**0.845**		$\chi^2_h<\chi^2_{(K-1)}$	ACCEPT
$\Sigma VAR(S_k)$ Z_{calc}	1.49	@α/2=2.5% Z= 1.96	H_0 (No trend)	ACCEPT
327.33 p	**0.932**		H_A (± trend)	REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Slope	Upper Limit
0.010	-0.04		0.08
0.050	0.00	**0.04**	0.07
0.100	0.00		0.06
0.200	0.01		0.05

Site **#54** Seasonal Kendall analysis for Total Alk, (mg/l)

Row label	Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	**WY1999**	39.9	52.6	48.0	59.5	63.4	55.8	55.3	37.0	28.5	35.8	41.2	42.0
b	**WY2000**	33.1	36.1	44.8	48.1	53.1	52.9	48.6	36.8	34.4	32.4	40.6	42.0
c	**WY2001**	43.2	32.4	52.3	43.4	50.8	58.0	54.0	38.2	32.3	36.9	46.8	38.9
d	**WY2002**	43.9	43.4	51.8		51.9	55.1	55.8	24.2	35.8	38.2	42.1	37.6
e	**WY2003**	40.4	43.7	47.4	41.6	53.8	55.7	47.6	41.0	41.1	49.9	53.2	43.1
f	**WY2004**	51.1	52.7	54.9	32.9	40.1	55.3	39.8	35.7	40.2	45.4	56.9	38.5
	n	6	6	6	5	6	6	6	6	6	6	6	6

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
t_1	0	0	0	0	0	0	0	0	0	0	0	1
t_2	0	0	0	0	0	0	0	0	0	0	0	0
t_3	0	0	0	0	0	0	0	0	0	0	0	0
t_4	0	0	0	0	0	0	0	0	0	0	0	0
t_5	0	0	0	0	0	0	0	0	0	0	0	0

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
b-a	-1	-1	-1	-1	-1	-1	-1	-1	1	-1	-1	0
c-a	1	-1	1	-1	-1	1	-1	1	1	1	1	-1
d-a	1	-1	1		-1	-1	1	-1	1	1	1	-1
e-a	1	-1	-1	-1	-1	-1	-1	1	1	1	1	1
f-a	1	1	1	-1	-1	-1	-1	-1	1	1	1	-1
c-b	1	-1	1	-1	-1	1	1	1	-1	1	1	-1
d-b	1	1	1		-1	1	1	-1	1	1	1	-1
e-b	1	1	1	-1	1	1	-1	1	1	1	1	1
f-b	1	1	1	-1	-1	1	-1	-1	1	1	1	-1
d-c	1	1	-1		1	-1	1	-1	1	1	-1	-1
e-c	-1	1	-1	-1	1	-1	-1	1	1	1	1	1
f-c	1	1	1	-1	-1	-1	-1	-1	1	1	1	-1
e-d	-1	1	-1		1	1	-1	1	1	1	1	1
f-d	1	1	1		-1	1	-1	1	1	1	1	1
f-e	1	1	1	-1	-1	-1	-1	-1	-1	-1	1	-1
S_k	9	5	5	-10	-7	-1	-7	-1	11	11	11	-4
Qm									2.3	2.9	3.2	
σ^2_S=	28.33	28.33	28.33	16.67	28.33	28.33	28.33	28.33	28.33	28.33	28.33	28.33
$Z_k = S_k/\sigma_S$	1.69	0.94	0.94	-2.45	-1.32	-0.19	-1.32	-0.19	2.07	2.07	2.07	-0.75
Z^2_k	2.86	0.88	0.88	6.00	1.73	0.04	1.73	0.04	4.27	4.27	4.27	0.56

ΣZ_k= 3.56

ΣZ^2_k= 27.53

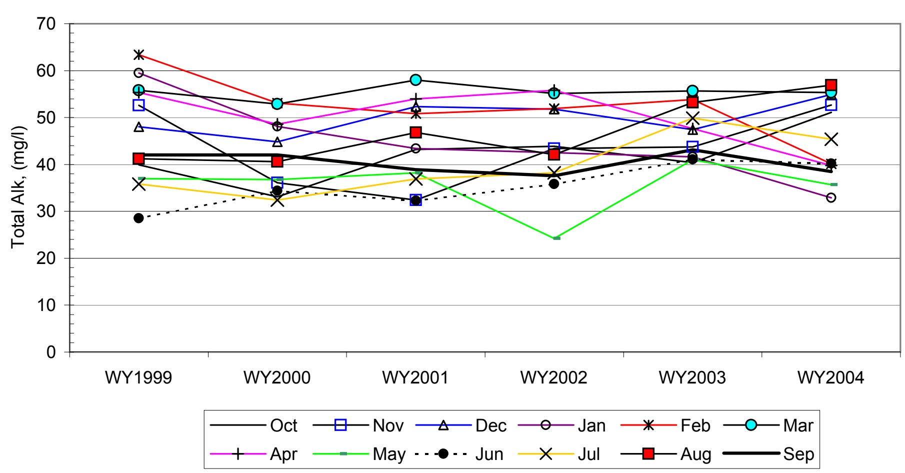
Z-bar=ΣZ_k/K= 0.30

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	1	0	0	0	0

Σn 71

ΣS_k 22

$\chi^2_h=\Sigma Z^2_k-K(\text{Z-bar})^2$=	26.47	@α=5% $\chi^2_{(K-1)}$= 19.68	Test for station homogeneity	
p	**0.006**		$\chi^2_h<\chi^2_{(K-1)}$	**REJECT**
ΣVAR(S_k) 328.33	Z_{calc} 1.16	@α/2=2.5% Z= 1.96	H_0 (No trend)	NA
	p **0.877**		H_A (± trend)	NA



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Slope	Upper Limit
0.010	-0.46		1.40
0.050	-0.17	**0.55**	1.17
0.100	-0.03		1.01
0.200	0.12		0.81

Site **#54** Seasonal Kendall analysis for Zinc, Dissolved (ug/l)

Row label	Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	**WY1999**	3.2	3.9	8.0	4.3	4.1	10.4	4.9	3.8	2.0	23.8	4.6	1.6
b	**WY2000**	4.5	8.2	4.6	19.9	4.9	5.1	7.7	3.1	2.4	2.6	2.6	4.0
c	**WY2001**	4.1	4.8	8.6	5.4	6.1	6.9	3.6	3.2	2.9	3.1	2.1	4.1
d	**WY2002**	5.3	6.3	5.9		5.8	5.5	6.6	4.2	2.2	3.2	5.5	5.5
e	**WY2003**	5.1	4.9	6.4	5.3	4.2	6.6	5.5	3.1	2.8	3.2	3.1	5.3
f	**WY2004**	6.6	3.7	6.3	9.4	7.5	4.9	6.9	2.1	2.4	2.5	3.0	7.7
	n	6	6	6	5	6	6	6	6	6	6	6	6

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
t_1	0	0	0	0	0	0	0	0	0	0	0	0
t_2	0	0	0	0	0	0	0	0	0	0	0	0
t_3	0	0	0	0	0	0	0	0	0	0	0	0
t_4	0	0	0	0	0	0	0	0	0	0	0	0
t_5	0	0	0	0	0	0	0	0	0	0	0	0

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
b-a	1	1	-1	1	1	-1	1	-1	1	-1	-1	1
c-a	1	1	1	1	1	-1	-1	-1	1	-1	-1	1
d-a	1	1	-1		1	-1	1	1	1	-1	1	1
e-a	1	1	-1	1	1	-1	1	-1	1	-1	-1	1
f-a	1	-1	-1	1	1	-1	1	-1	1	-1	-1	1
c-b	-1	-1	1	-1	1	1	-1	1	1	1	-1	1
d-b	1	-1	1		1	1	-1	1	-1	1	1	1
e-b	1	-1	1	-1	-1	1	-1	1	1	1	1	1
f-b	1	-1	1	-1	1	-1	-1	-1	1	-1	1	1
d-c	1	1	-1		-1	-1	1	1	-1	1	1	1
e-c	1	1	-1	-1	-1	-1	1	-1	-1	1	1	1
f-c	1	-1	-1	1	1	-1	1	-1	-1	-1	1	1
e-d	-1	-1	1		-1	1	-1	-1	1	-1	-1	-1
f-d	1	-1	1		1	-1	1	-1	1	-1	-1	1
f-e	1	-1	-1	1	1	-1	1	-1	-1	-1	-1	1
S_k	11	-3	-1	2	7	-7	3	-5	5	-5	-1	13

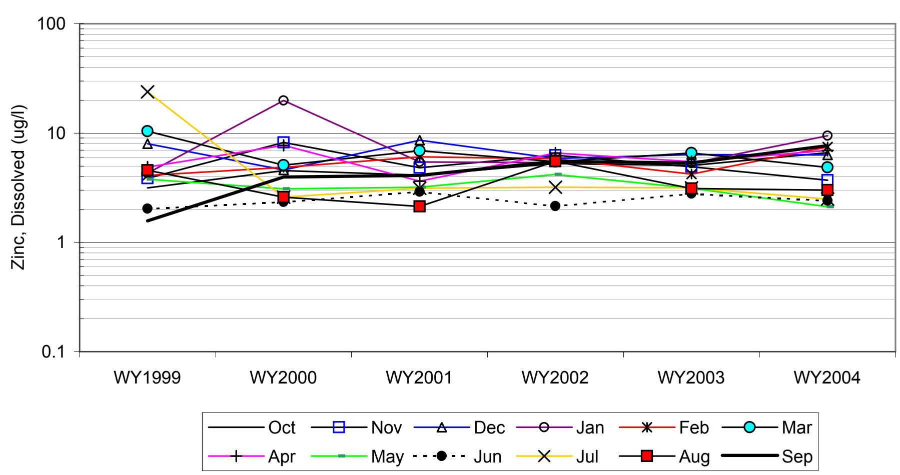
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
σ^2_S=	28.33	28.33	28.33	16.67	28.33	28.33	28.33	28.33	28.33	28.33	28.33	28.33
$Z_k = S_k/\sigma_S$	2.07	-0.56	-0.19	0.49	1.32	-1.32	0.56	-0.94	0.94	-0.94	-0.19	2.44
Z^2_k	4.27	0.32	0.04	0.24	1.73	1.73	0.32	0.88	0.88	0.88	0.04	5.96

ΣZ_k= 3.68
ΣZ^2_k= 17.29
Z-bar=$\Sigma Z_k/K$= 0.31

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	0	0	0	0	0

Σn 71
ΣS_k 19

$\chi^2_h = \Sigma Z^2_k - K(\text{Z-bar})^2$=	16.16	@α=5% $\chi^2_{(K-1)}$= 19.68	Test for station homogeneity
p	**0.135**		$\chi^2_h < \chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} 0.99	@α/2=2.5% Z= 1.96	**H_0** (No trend) ACCEPT
328.33	**p** **0.840**		**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Slope	Upper Limit
0.010	-0.17		0.39
0.050	-0.06	**0.11**	0.28
0.100	-0.04		0.19
0.200	0.01		0.17

Large Sample Approximation
Wilcoxon-Mann-Whitney Rank Sum Test

Variable: Specific Conductance, Lab (umhos/cm @ 25°C)

Site	#6	#54	Ranks	
Year	WY2004	WY2004	**A**	**B**
Oct	137.0	139.0	15.5	18
Nov	137.0	138.0	15.5	17
Dec	153.0	153.0	21.5	21.5
Jan	82.6	86.6	1	4
Feb	109.0	112.0	11	12
Mar	159.0	162.0	23	24
Apr	102.0	105.0	9	10
May	84.6	84.9	2	3
Jun	88.8	87.0	6	5
Jul	120.0	123.0	13	14
Aug	143.0	146.0	19	20
Sep	91.1	93.6	7	8
Median	114.5	117.5		

N= 24

ΣR: 143.5 (A), 156.5 (B)

	n	**m**
	12	12

W= 78.5

w_α 18

Upper 126

Lower 18

μ_W= 150

σ_W= 17.31

Z_{rs}= 0.35

p-test

0.6355

$\alpha/2$

0.025

H_0

$(\mu_A=\mu_B)$

ACCEPT

Large Sample Approximation

Wilcoxon-Mann-Whitney Rank Sum Test

Variable: **pH, Lab, Standard Units**

Site	#6	#54	Ranks	
Year	WY2004	WY2004	**A**	**B**
Oct	7.92	7.92	21.5	21.5
Nov	8.08	7.86	23	17.5
Dec	7.84	7.72	16	9
Jan	8.31	7.63	24	5.5
Feb	7.58	7.47	4	3
Mar	7.77	7.68	11	7
Apr	7.86	7.82	17.5	13
May	7.69	7.39	8	2
Jun	7.83	7.27	14.5	1
Jul	7.91	7.79	20	12
Aug	7.88	7.74	19	10
Sep	7.83	7.63	14.5	5.5
Median	7.85	7.70		

N= 24 ΣR 193 107

	n	**m**
	12	12

W= 29

w_α 18

Upper 126

Lower 18

μ_W= 150

σ_W= 17.31

Z_{rs}= -2.46

p-test

0.0070

$\alpha/2$

0.025

H_0

($\mu_A=\mu_B$)

REJECT

Large Sample Approximation
Wilcoxon-Mann-Whitney Rank Sum Test
Variable: **pH, Field, Standard Units**

Site	#6	#54	Ranks	
Year	WY2004	WY2004	**A**	**B**
Oct	7.98	7.41	22	1
Nov	7.79	7.73	15	12
Dec	7.75	7.67	13.5	8
Jan	7.58	7.64	2.5	5
Feb	7.71	7.68	11	9.5
Mar	7.90	7.88	20	18
Apr	7.75	7.68	13.5	9.5
May	7.87	7.80	17	16
Jun	7.65	7.58	6	2.5
Jul	7.97	7.89	21	19
Aug	8.17	8.09	24	23
Sep	7.59	7.66	4	7
Median	7.89	7.85		

N= 24

ΣR 169.5 130.5

	n	**m**
	12	12

W= 52.5
w_α 18
Upper 126
Lower 18

μ_W= 150
σ_W= 17.31
Z_{rs}= -1.10

p-test
$\boxed{0.1362}$
$\alpha/2$
$\boxed{0.025}$

H_0
$(\mu_A=\mu_B)$
ACCEPT

Large Sample Approximation
Wilcoxon-Mann-Whitney Rank Sum Test
Variable: **Total Alk, (mg/l)**

Site	#6	#54	Ranks	
Year	WY2004	WY2004	**A**	**B**
Oct	50.5	51.1	16	17
Nov	51.8	52.7	18	19
Dec	48.5	54.9	15	21
Jan	30.2	32.9	1	2
Feb	38.5	40.1	6.5	11
Mar	54.0	55.3	20	22.5
Apr	38.7	39.8	8	10
May	35.7	35.7	3.5	3.5
Jun	39.3	40.2	9	12
Jul	45.1	45.4	13	14
Aug	55.3	56.9	22.5	24
Sep	37.7	38.5	5	6.5
Median	42.20	42.80		

N= 24

ΣR 137.5 162.5

	n	**m**
	12	12

W= 84.5

w_α 18

Upper 126

Lower 18

μ_W= 150

σ_W= 17.31

Z_{rs}= 0.69

p-test

0.7559

$\alpha/2$

0.025

H_0

($\mu_A=\mu_B$)

ACCEPT

Large Sample Approximation
Wilcoxon-Mann-Whitney Rank Sum Test

Variable: **Sulfate, Total (mg/l)**

Site	#6	#54	Ranks	
Year	WY2004	WY2004	**A**	**B**
Oct	15.1	15.2	15	17
Nov	15.2	15.2	17	17
Dec	20.3	20.1	22	21
Jan	8.8	9.1	6	8
Feb	11.7	11.8	11	12
Mar	21.4	21.5	23	24
Apr	9.5	9.6	9	10
May	7.7	7.7	4	3
Jun	7.6	7.6	1	2
Jul	14.0	14.1	13	14
Aug	18.6	18.6	19.5	19.5
Sep	8.6	8.9	5	7
Median	12.9	13.0		

N= 24

	n	m
ΣR	145.5	154.5
	12	12

W= 76.5

w_α 18

Upper 126

Lower 18

μ_W= 150

σ_W= 17.30

Z_{rs}= 0.23

p-test

$\boxed{0.5914}$

$\alpha/2$

$\boxed{0.025}$

H_0

$(\mu_A=\mu_B)$

ACCEPT

Large Sample Approximation

Wilcoxon-Mann-Whitney Rank Sum Test

Variable: **Zinc, Dissolved (ug/l)**

Site	#6	#54	Ranks	
Year	WY2004	WY2004	**A**	**B**
Oct	5.96	6.60	13	15
Nov	3.75	3.71	10	9
Dec	7.67	6.30	20	14
Jan	11.30	9.43	24	23
Feb	8.26	7.48	22	18
Mar	5.15	4.86	12	11
Apr	7.07	6.93	17	16
May	2.00	2.12	1	2
Jun	3.44	2.41	8	3
Jul	2.51	2.49	5	4
Aug	2.80	3.00	6	7
Sep	7.57	7.69	19	21
Median	5.56	5.58		

N= 24 ΣR 157 143

	n	**m**
	12	12

W= 65

wα 18

Upper 126

Lower 18

μ_W= 150

σ_W= 17.32

Z_{rs}= -0.38

p-test

$\boxed{0.3537}$

$\alpha/2$

$\boxed{0.025}$

H_0

($\mu_A=\mu_B$)

ACCEPT

INTERPRETIVE REPORT
SITE 49 "UPPER BRUIN CREEK"

The data collected during the current water year are listed in the following "Table of Results for Water Year 2004" report. The table includes all the data, field and lab, collected for the current water year and a series of flags keyed to the summary report "Qualified Data by QA Reviewer". The QA report lists any associated data limitations found during the monthly QA reviews of laboratory data for this site. Median values for all analytes have been calculated and are shown in the right-most column of the table of results. Any value reported as less than MDL has been replaced with a value of zero for the purpose of median calculation.

All data collected at this site for the past five years are included in the data analyses. As shown in the table below, there were no data outliers.

Sample Date	Parameter	Value	Qualifier	Notes
No outliers have been identified by KGCMC for the period of Oct-99 though Sept-04.				

The data for Water Year 2004 have been compared to the strictest fresh water quality criterion for each applicable analyte. One result exceeding these criteria has been identified as listed in the table below. The result is for a field pH value of 8.53 and is just above the AWQS upper limit of 8.5 su. The corresponding lab pH was 8.07 su.

Sample Date	Parameter	Value	Standard	Standard Type
09/22/04	pH Field, su	8.53	6.5 - 8.5	Aquatic Life

X-Y plots have been generated to graphically present the data for each of the analytes requested in the Statistical Information Goals for this site. These plots have been visually analyzed for the appearance of any trend in concentration. No obvious visual trends are apparent except for the lab-pH. The lab-pH does appear to have a step increase of approximately 0.3 su from a pH of 7.5 to 7.8 that occurs after June-2002. The visual trend analysis was followed-up with an additional non-parametric statistical analysis for trend. In addition to pH; conductivity, alkalinity, and dissolved zinc were also subject to a Seasonal Mann-Kendall analyses, of which the calculation details are presented on the pages following this interpretive section. The table below summarizes the results on the data collected between Oct-98 and Sep-04 (WY1999-WY2004). For data sets with a statistically significant trend (α=5%) a Seasonal-Sen's Slope estimate statistic has also been calculated. Dissolved zinc is the only analyte that has an overall statistically significant trend (p=0.99) and the Sen's slope estimate is 0.15 ug$\cdot$L$^{-1}\cdot$yr^{-11} or an 6.8% upward trend over the last 6 years. The datasets for conductivity and total alkalinity failed the test for seasonal (monthly) homogeneity. Conductivity showed

		Mann-Kendall test statistics			Sen's slope estimate	
Parameter	n*	Z	Trend	a**	Q	Q(%)
Conductivity, Lab	6	Fails monthly homogenity test (p=0.001)				
pH, Lab	6	1.72	+	0.96		
Alkalinity, Total	6	Fails monthly homogenity test (p=0.039)				
Zinc, Dissolved	6	2.52	+	0.99	0.15	6.8

*: Number of years **:Significance level

significant upward trends in October (S_k=11, Q_m=6.3 umhos/cm•yr) and June (S_k=11, Q_m=9.7 umhos/cm•yr) and a significant downward trend in January (S_k=-11, Q_m=-4.6 umhos/cm•yr). Total alkalinity showed significant upward trends in June (S_k=11, Q_m=5.8 ml/L•yr) and July (S_k=11, Q_m=7.1 mg/L•yr). Given the low absolute magnitude of the change and the fact that site is used as a background reference, the change is considered due to natural variation. Additional, several of the same trends were also noted at Site 48, the upgradient control site on Greens Creek.

Table of Results for Water Year 2004

Site 49 "Upper Bruin Creek"

Sample Date/Parameter	10/9/2003	11/6/2003	12/17/2003	1/14/2004	2/11/2004	3/23/2004	4/27/2004	5/19/2004	6/16/2004	7/20/2004	8/19/2004	9/22/2004	**Median**
Water Temp (°C)	8.6	2.0	1.8	0.9	1.6	1.4	3.2	5.3	7.8	11.8	12.9	7.3	4.3
Conductivity-Field(μmho)	137	148	158	107	130	152	120	87	111	186	194	130	134
Conductivity-Lab (μmho)	160	157	155	99	134 J	177 J	133	89	116 J	188	193	121	145
pH Lab (standard units)	8.02	8.01	7.77	7.57 J	7.63	7.82	8.01	7.48	7.92 J	8.01 J	7.99	8.07	7.96
pH Field (standard units)	7.42	7.95	7.86	7.79	7.95	7.99	7.98	7.98	7.84	8.15	8.42	8.53	7.97
Total Alkalinity (mg/L)	70.8	69.9	66.3	42.9	56.5	73.8	58.4	43.0	55.8 J	81.6	85.8	55.2	62.4
Total Sulfate (mg/L)	11.0	10.5	11.5	6.5	8.5	13.6	8.0	5.1	6.9	16.6	17.1	7.6	9.5
Hardness (mg/L)	83.7	76.4	76.3	51.1	65.1	91.5	66.0	47.1	59.8	96.1	101.0	64.6	71.2
Dissolved As (ug/L)	0.048 J	0.163	<0.051	0.472 U	0.117 J	0.155	0.144 J	0.068 J	0.102 J	0.155	0.248	0.103 U	0.131
Dissolved Ba (ug/L)			8.9		8.4								8.7
Dissolved Cd (ug/L)	0.036 J	0.030 J	<0.023 UJ	0.039 J	<0.023 J	<0.023 J	0.030 J	0.026 J	0.032 J	0.033	0.033	0.033	0.031
Dissolved Cr (ug/L)			0.844		0.534								0.689
Dissolved Cu (ug/L)	0.397	0.351	0.399 U	0.896	0.613	0.350	0.494	0.268	0.516	0.402	0.538	0.749	0.448
Dissolved Pb (ug/L)	0.0755 U	0.0110 J	<0.0110 U	0.0913 U	<0.0110 J	<0.0110 U	0.0168 J	<0.0110	<0.0110	0.0055 U	0.0154 U	0.0185	0.0083
Dissolved Ni (ug/L)			0.472		1.080								0.776
Dissolved Ag (ug/L)			<0.009		<0.009 J								0.005
Dissolved Zn (ug/L)	3.19	1.99	1.84 U	3.87 U	2.56 J	1.79 U	2.61 UJ	1.63 UJ	1.75	1.65	1.28 UJ	2.46	1.92
Dissolved Se (ug/L)			1.010 UJ		<0.080 J								0.525
Dissolved Hg (ug/L)	0.001580 J	0.001070 U	0.001540	0.004080	0.002360 U	0.001140	0.002030	0.001050	0.001420	0.001270	0.001750	0.002120	0.001560

For individual sample/analyte qualifier descriptions see "Qualified Data by QA Reviewer" table.

Values reported as less than MDL are replaced by 1/2 MDL for median calculation purposes.

Shaded data has been qualified as an outlier by KGCMC and removed from any further analysis and is not included into the calculation of the median

Qualified Data by QA Reviewer

Date Range: 10/01/2003 to 09/30/2004

Site No.	Sample Date	Sample Time	Parameter	Value	Qualifier	Reason for Qualifier
49	01/14/2004	11:42:00 AM				
			pH Lab, su	7.57	J	Hold Time
			As Diss, ug/l	0.472	U	Field Blank Contamination, LC
			Cd Diss, ug/l	0.039	J	Below Quantitative Range
			Pb Diss, ug/l	0.0913	U	Field Blank Contamination
			Zn Diss, ug/l	3.87	U	Field Blank Contamination
49	10/09/2003	2:49:00 PM				
			As Diss, ug/l	0.0476	J	Below Quantitative Range
			Cd Diss, ug/l	0.0357	J	Below Quantitative Range
			Pb Diss, ug/l	0.0755	U	Below Quantitative Range, Fi
			Hg Diss, ug/l	0.00158	J	Duplicate Sample RPD
49	11/06/2003	12:05:00 PM				
			Cd Diss, ug/l	0.0296	J	Below Quantitative Range
			Pb Diss, ug/l	0.011	J	Below Quantitative Range
			Hg Diss, ug/l	0.00107	U	Field Blank Contamination
49	12/17/2003	12:10:00 PM				
			Cd Diss, ug/l	-0.023	UJ	LCS Recovery
			Cu Diss, ug/l	0.399	U	Field Blank Contamination
			Pb Diss, ug/l	-0.011	UJ	LCS Recovery
			Zn Diss, ug/l	1.84	U	Field Blank Contamination
			Se Diss, ug/l	1.01	UJ	Method Blank Contamination,
49	02/11/2004	12:41:00 PM				
			Cond Lab, umho	134	J	Below Quantitative Range
			As Diss, ug/l	0.117	J	Below Quantitative Range, L
			Cd Diss, ug/l	-0.023	J	Below Quantitative Range
			Pb Diss, ug/l	-0.011	J	Below Quantitative Range
			Ag Diss, ug/l	-0.009	J	Below Quantitative Range
			Zn Diss, ug/l	2.56	J	LCS Recovery
			Se Diss, ug/l	-0.08	J	Below Quantitative Range, L
			Hg Diss, ug/l	0.00236	U	Field Blank Contamination

Qualifier	Description
J	Positively Identified - Approximate Concentration
N	Presumptive Evidence For Tentative Identification
NJ	Tentatively Identified - Approximate Concentration
R	Rejected - Cannot Be Verified
U	Not Detected Above Quantitation Limit
UJ	Not Detected Above Approximate Quantitation Limit

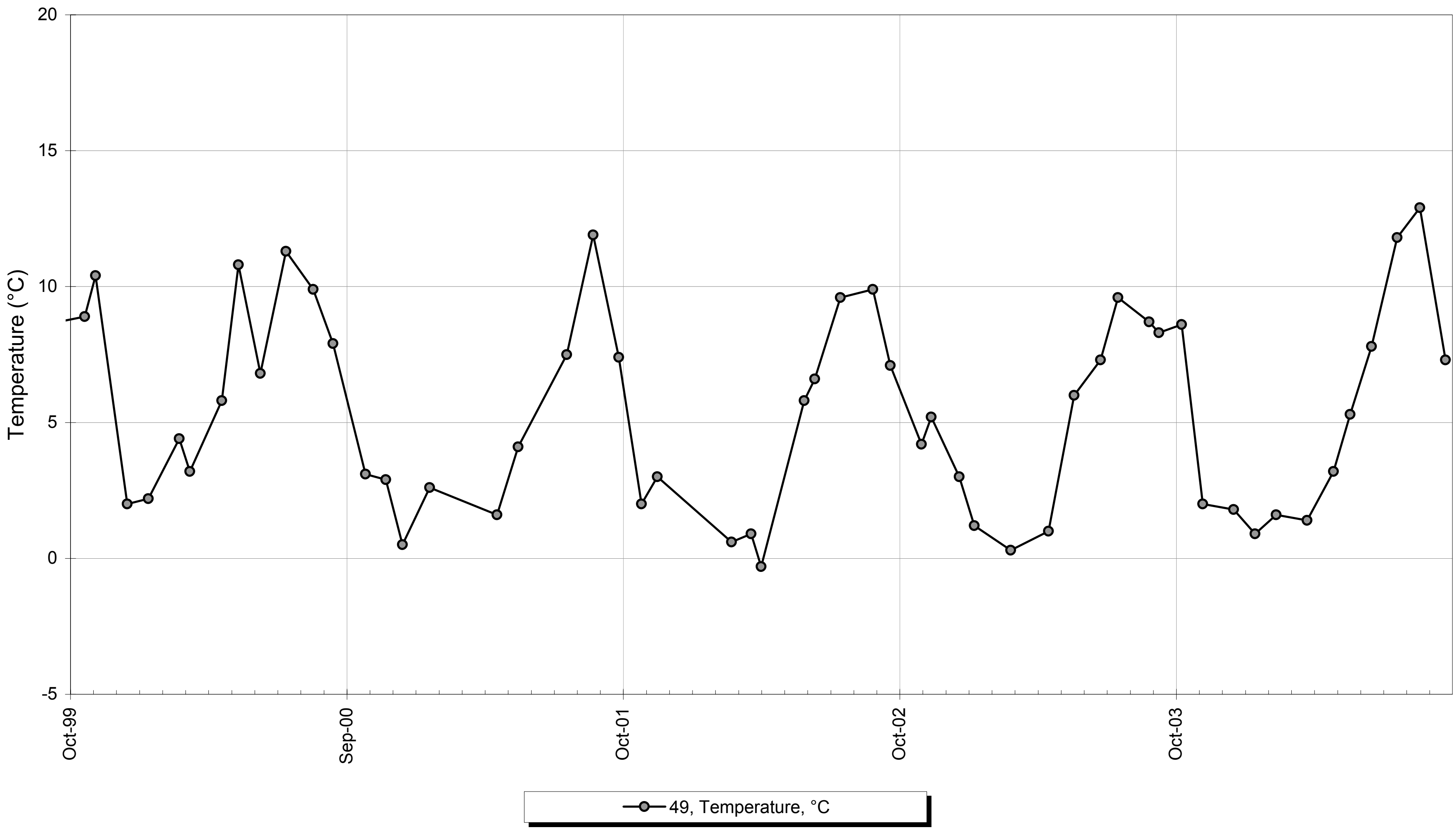
Qualified Data by QA Reviewer

Date Range: 10/01/2003 to 09/30/2004

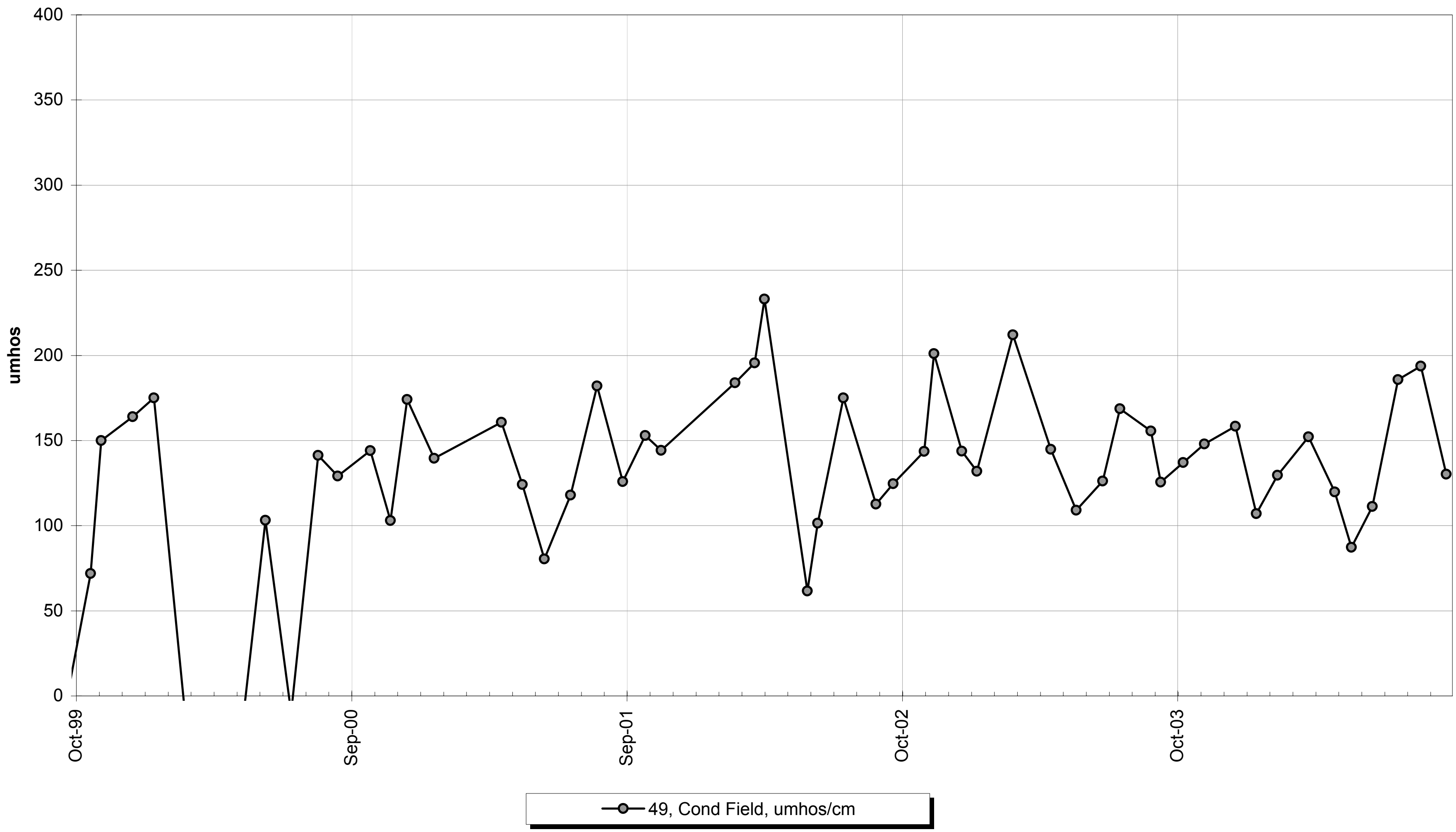
Site No.	Sample Date	Sample Time	Parameter	Value	Qualifier	Reason for Qualifier
49	03/23/2004	11:38:00 AM				
			Cond Lab, umho	177	J	Below Quantitative Range
			Cd Diss, ug/l	-0.023	J	Below Quantitative Range
			Pb Diss, ug/l	-0.011	U	Below Quantitative Range, Fi
			Zn Diss, ug/l	1.79	U	Field Blank Contamination
49	04/27/2004	11:52:00 AM				
			As Diss, ug/l	0.144	J	Below Quantitative Range
			Cd Diss, ug/l	0.0303	J	Below Quantitative Range
			Pb Diss, ug/l	0.0168	J	Below Quantitative Range
			Zn Diss, ug/l	2.61	UJ	Field Blank Contamination, LC
49	05/19/2004	11:09:00 AM				
			As Diss, ug/l	0.0679	J	Below Quantitative Range
			Cd Diss, ug/l	0.026	J	Below Quantitative Range
			Zn Diss, ug/l	1.63	UJ	LCS Recovery, Field Blank C
49	06/16/2004	11:15:00 AM				
			Cond Lab, umho	116	J	Sample Temperature
			pH Lab, su	7.92	J	Hold Time
			Alk Tot, mg/l	55.8	J	Sample Temperature
			As Diss, ug/l	0.102	J	Below Quantitative Range
			Cd Diss, ug/l	0.0322	J	Below Quantitative Range
49	07/20/2004	3:49:00 PM				
			pH Lab, su	8.01	J	Hold Time
			Pb Diss, ug/l	0.00554	U	Field Blank Contamination
49	08/19/2004	2:20:00 PM				
			Pb Diss, ug/l	0.0154	U	Field Blank Contamination
			Zn Diss, ug/l	1.28	UJ	Field Blank Contamination, C
49	09/22/2004	10:25:00 AM				
			As Diss, ug/l	0.103	U	Field Blank Contamination

Qualifier	Description
J	Positively Identified - Approximate Concentration
N	Presumptive Evidence For Tentative Identification
NJ	Tentatively Identified - Approximate Concentration
R	Rejected - Cannot Be Verified
U	Not Detected Above Quantitation Limit
UJ	Not Detected Above Approximate Quantitation Limit

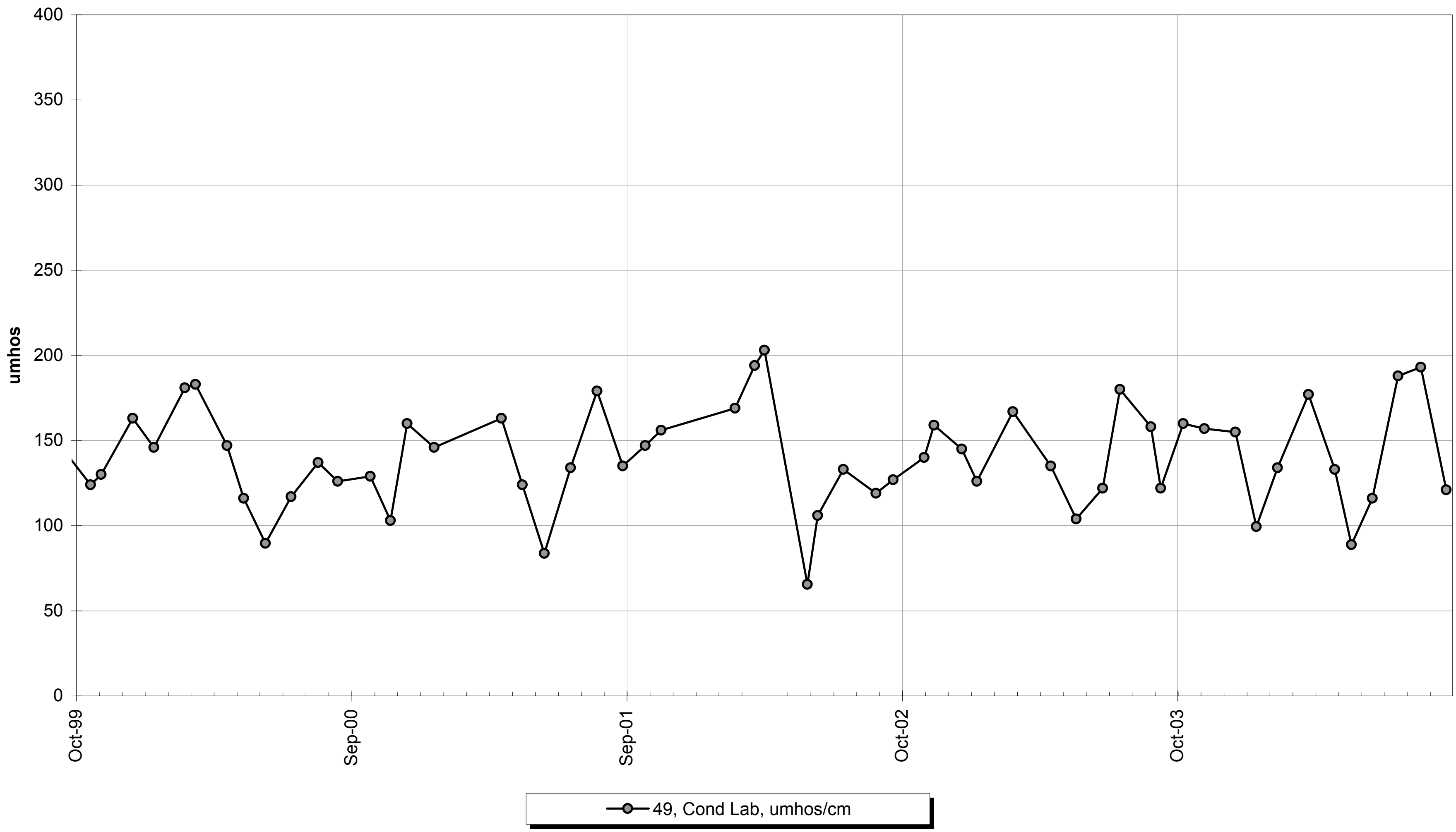
Site 49 -Water Temperature

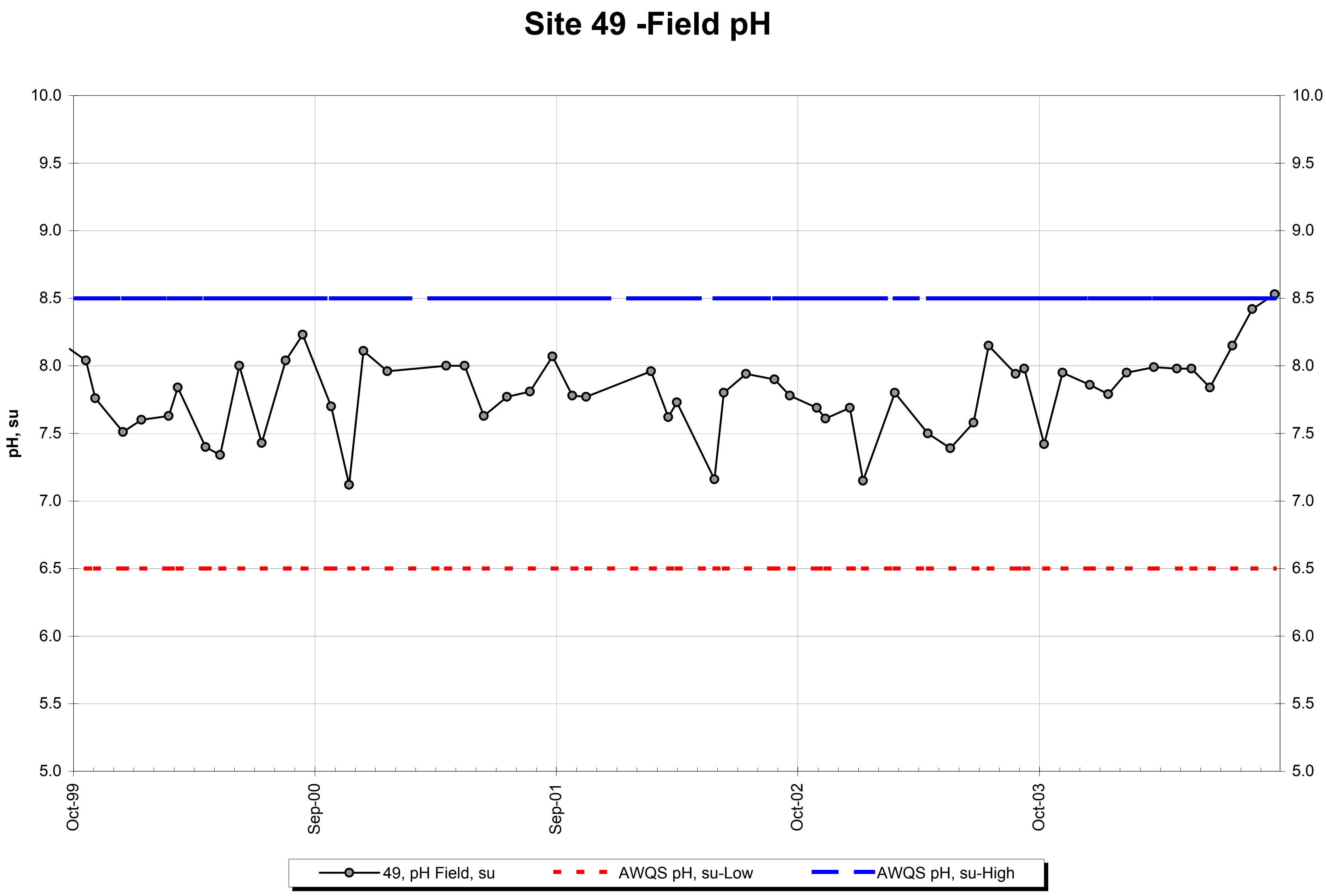


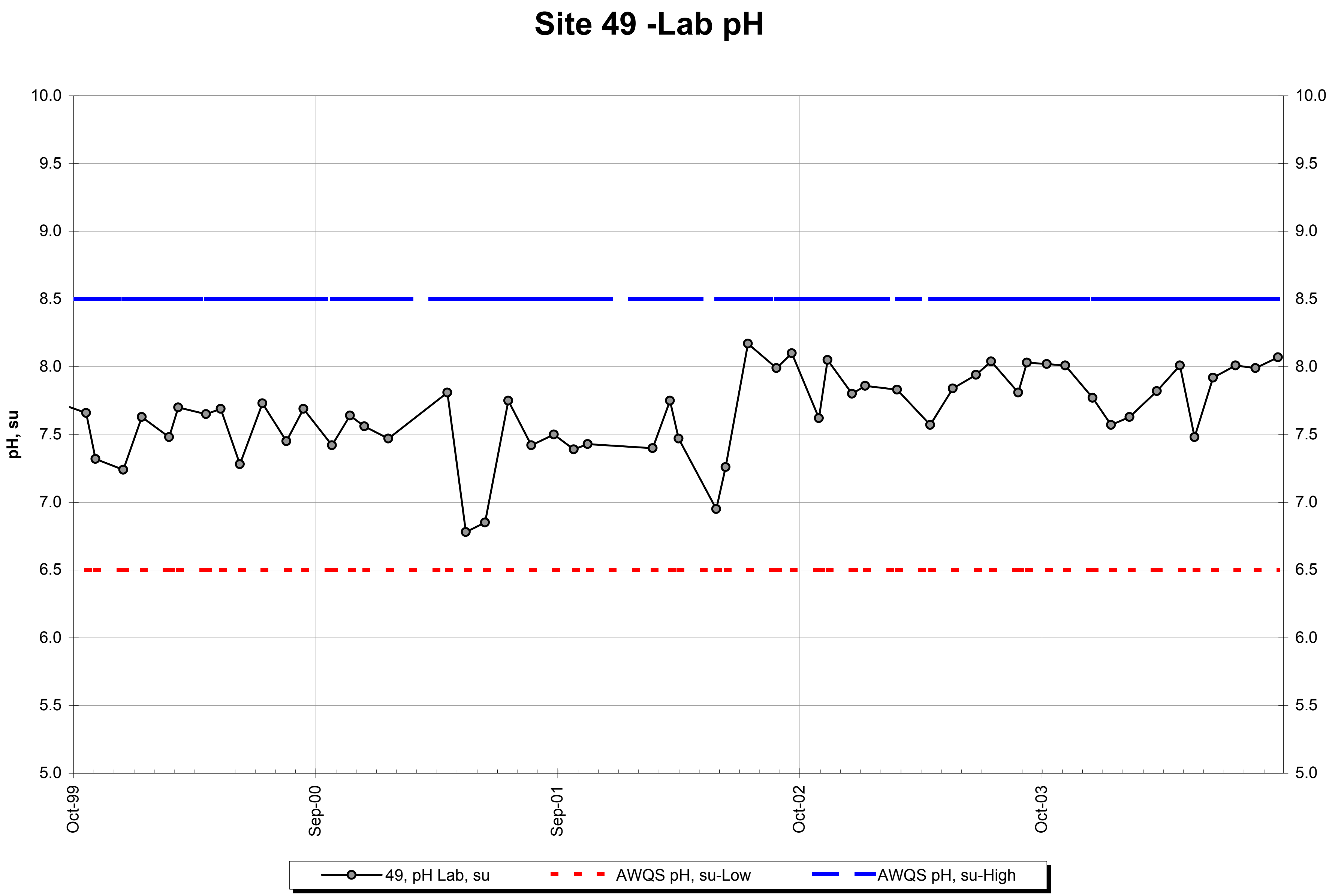
Site 49 -Conductivity-Field



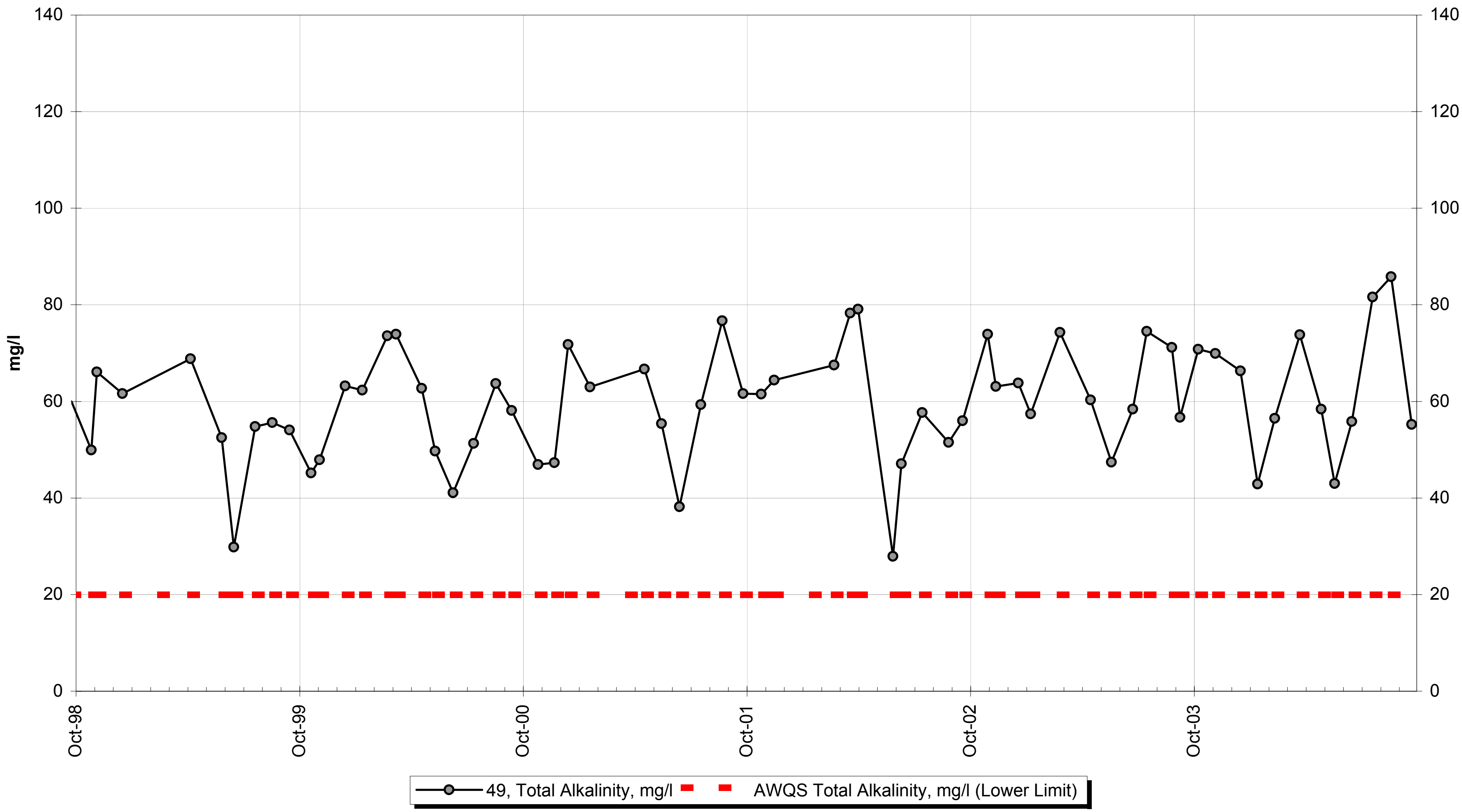
Site 49 -Conductivity-Lab



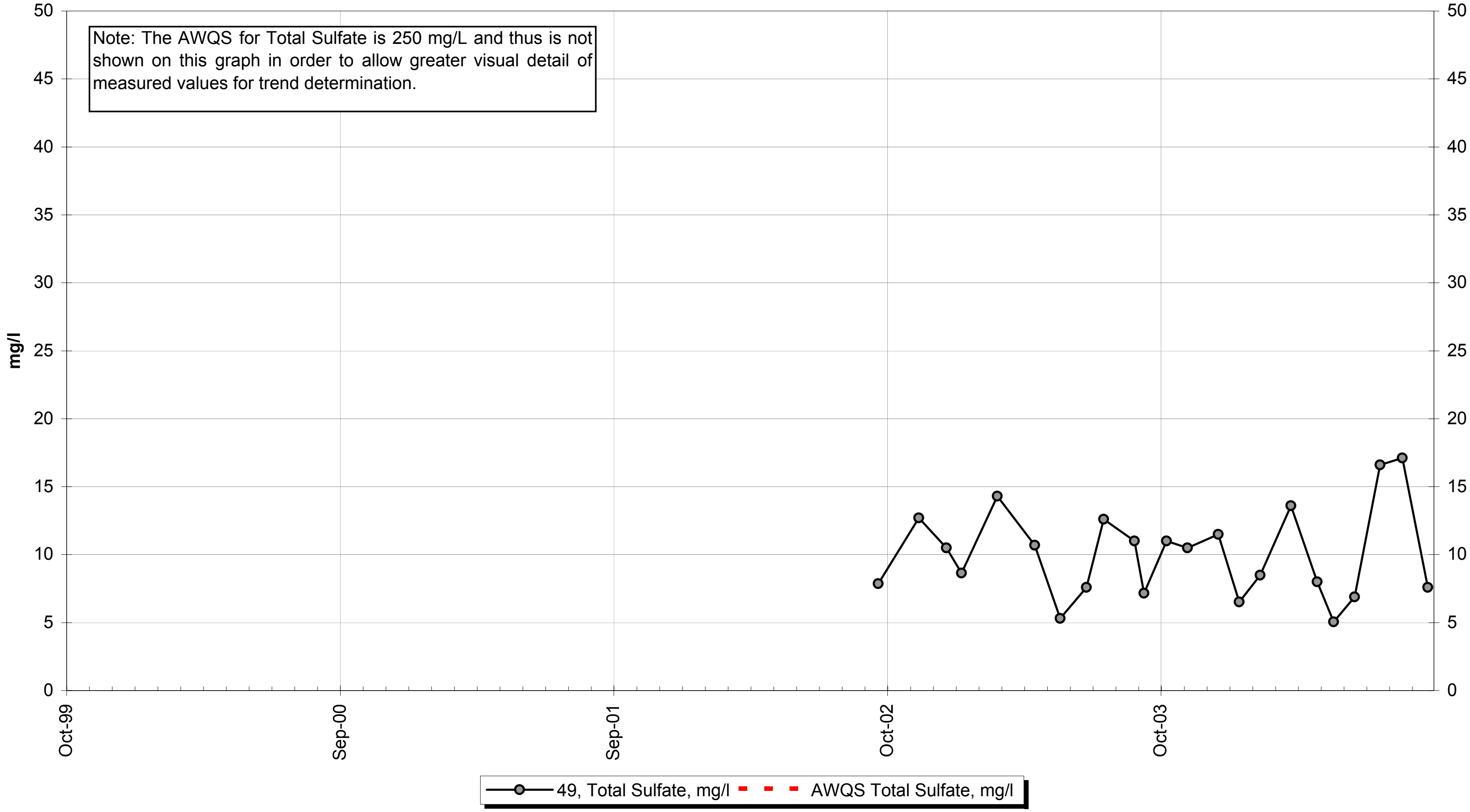

Site 49 -Field pH
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
pH, su
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
49, pH Field, su
AWQS pH, su-Low
AWQS pH, su-High

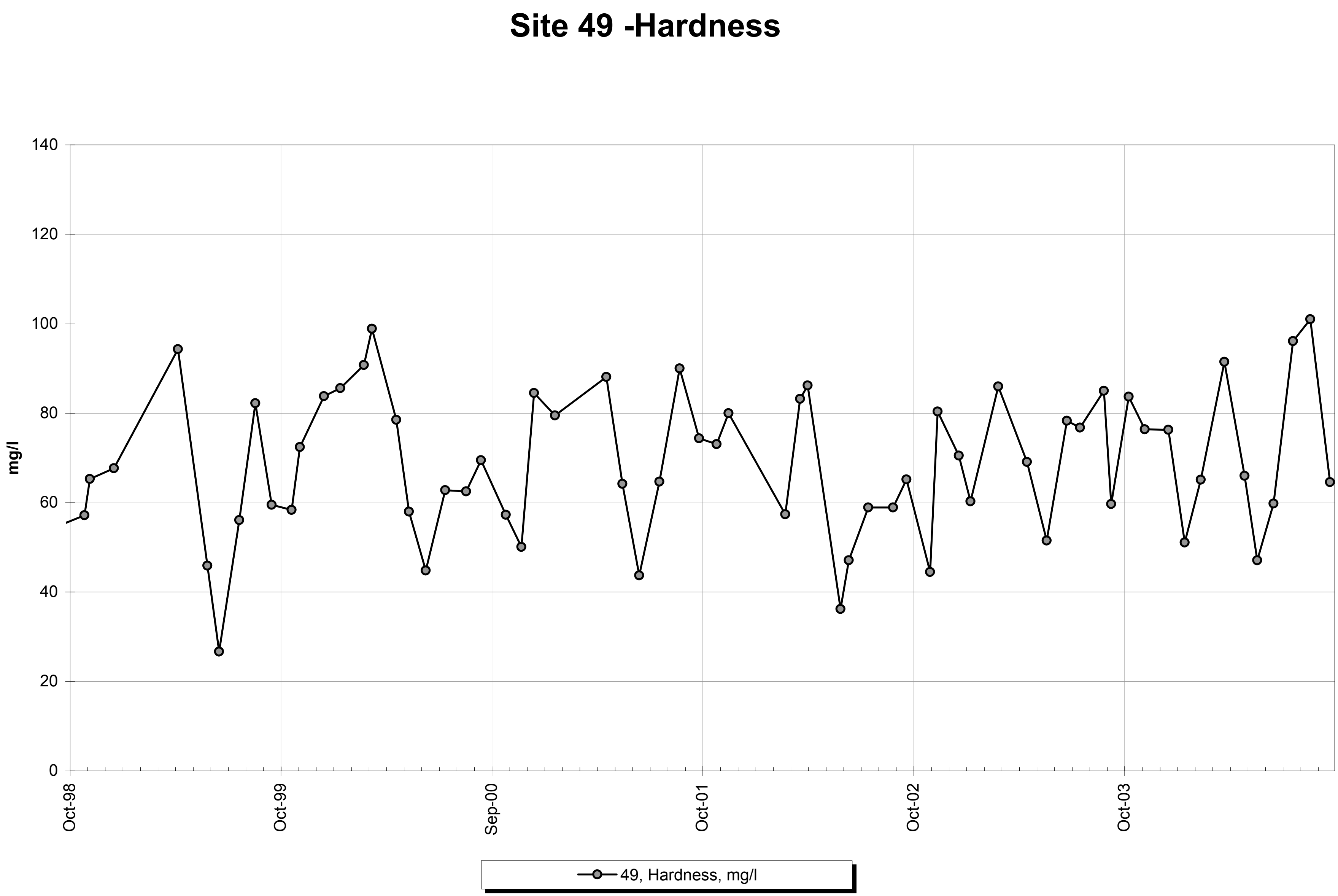

Site 49 -Lab pH
pH, su
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
49, pH Lab, su
AWQS pH, su-Low
AWQS pH, su-High

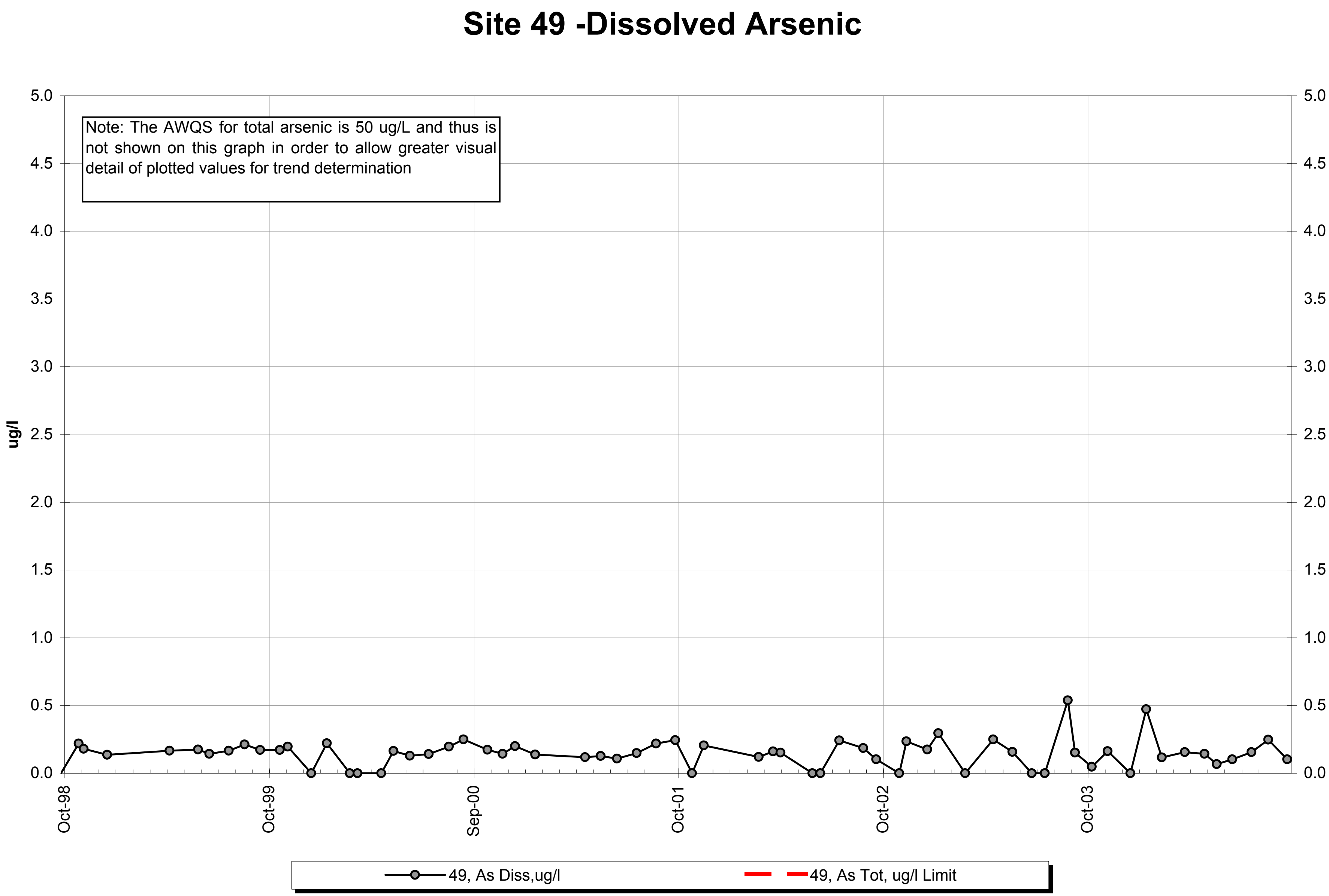
Site 49 -Total Alkalinity



Site 49 -Total Sulfate

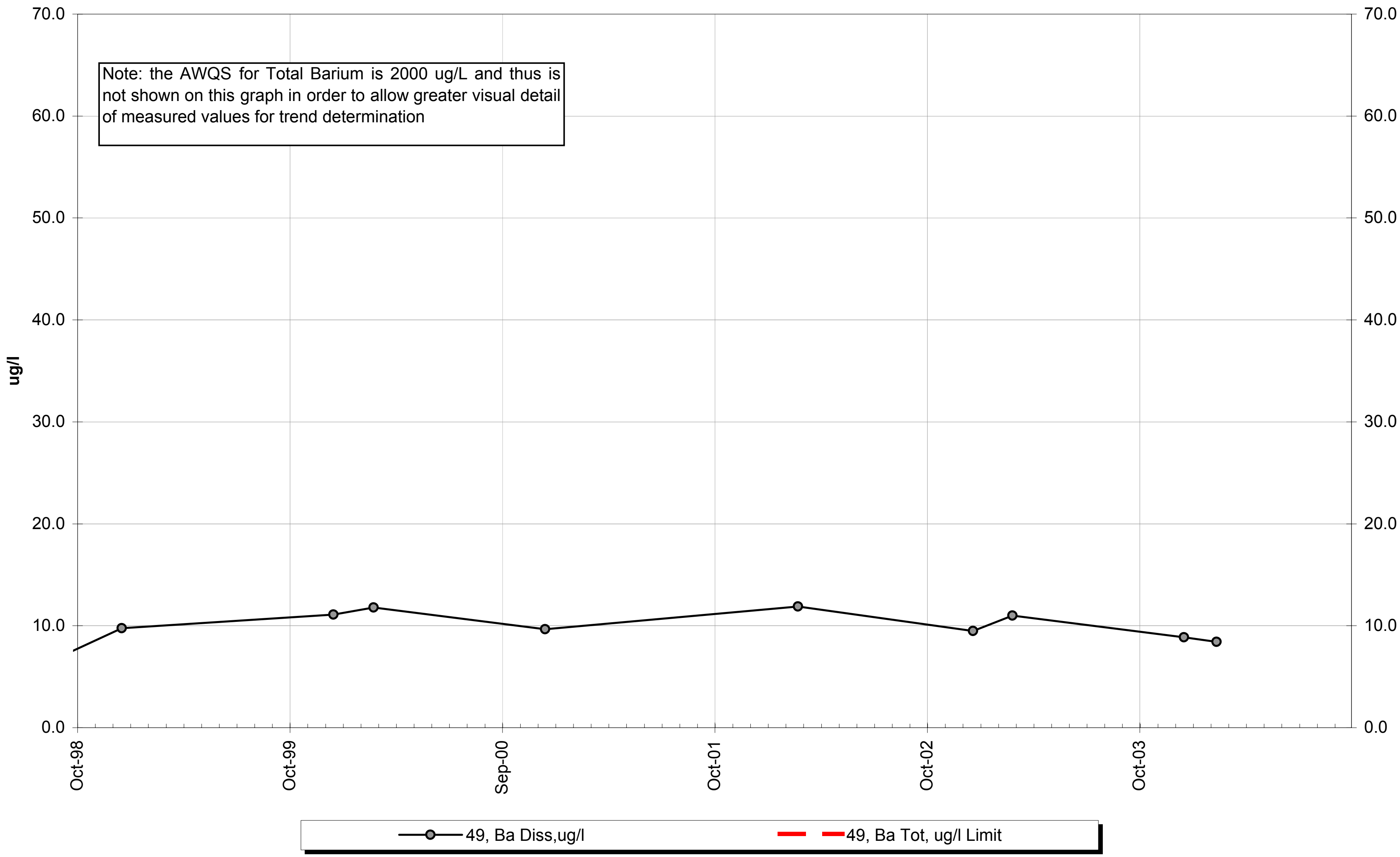


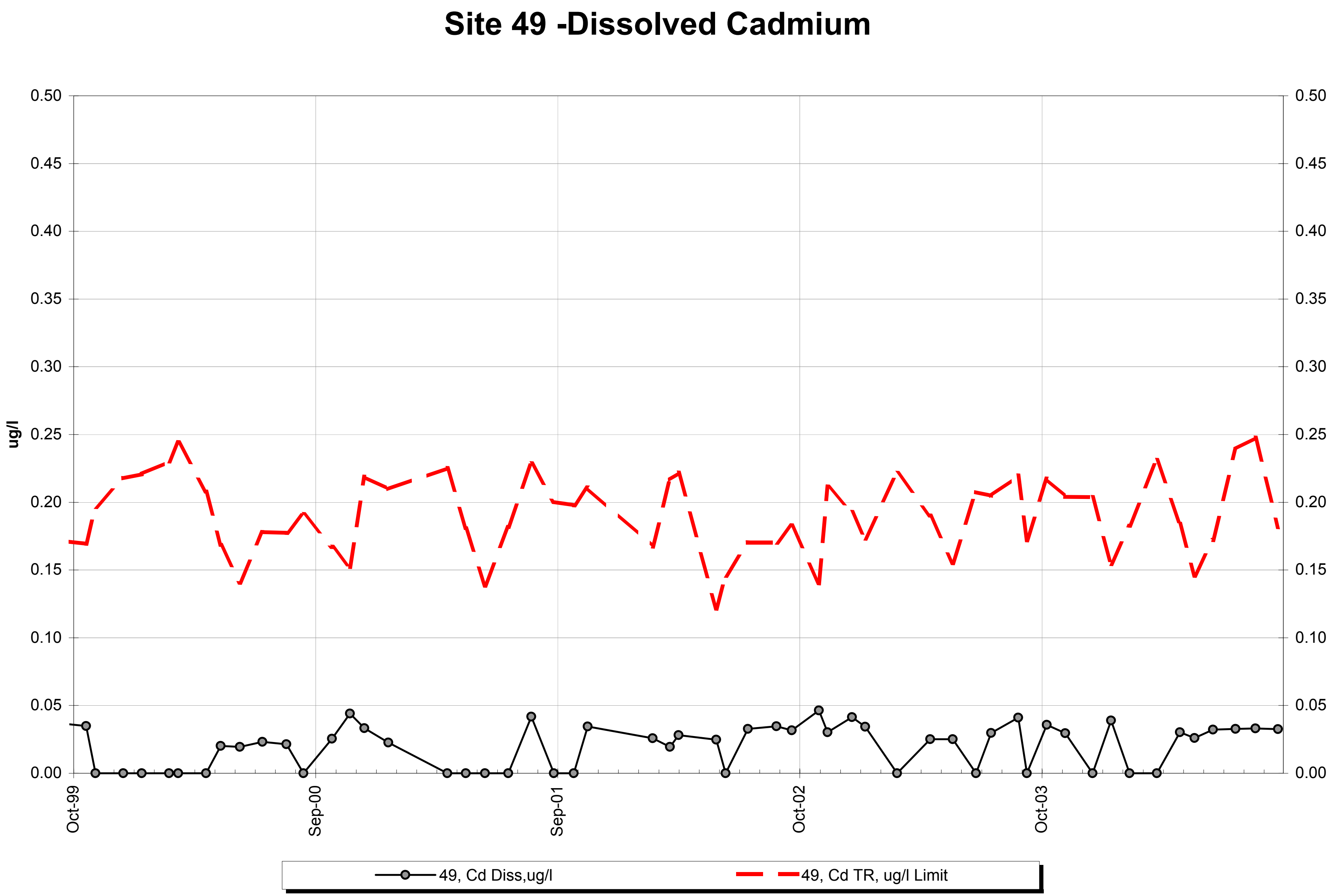

Site 49 -Hardness
mg/l
0
20
40
60
80
100
120
140
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
49, Hardness, mg/l



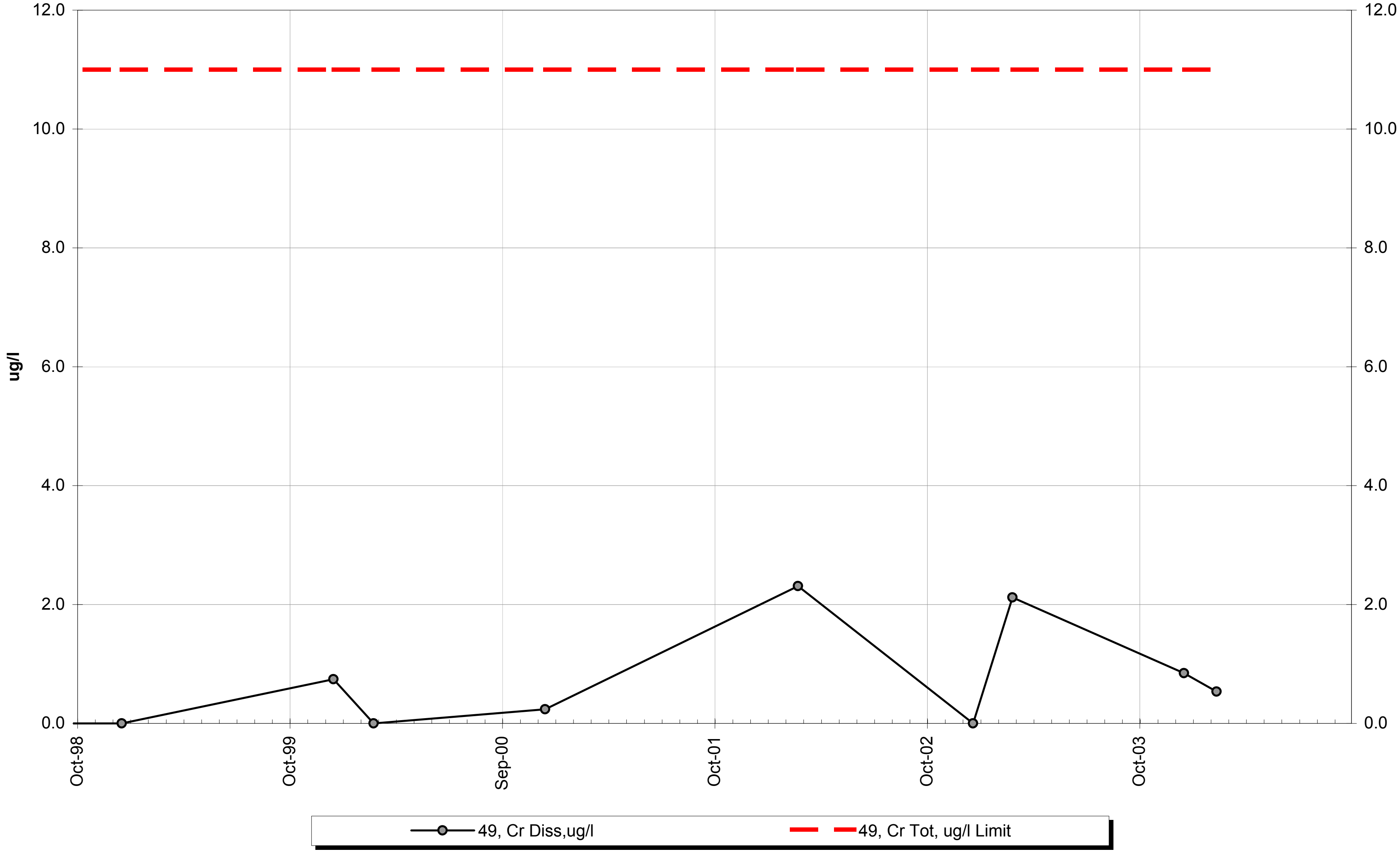
Site 49 -Dissolved Arsenic
Note: The AWQS for total arsenic is 50 ug/L and thus is not shown on this graph in order to allow greater visual detail of plotted values for trend determination
ug/l
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
49, As Diss,ug/l
49, As Tot, ug/l Limit

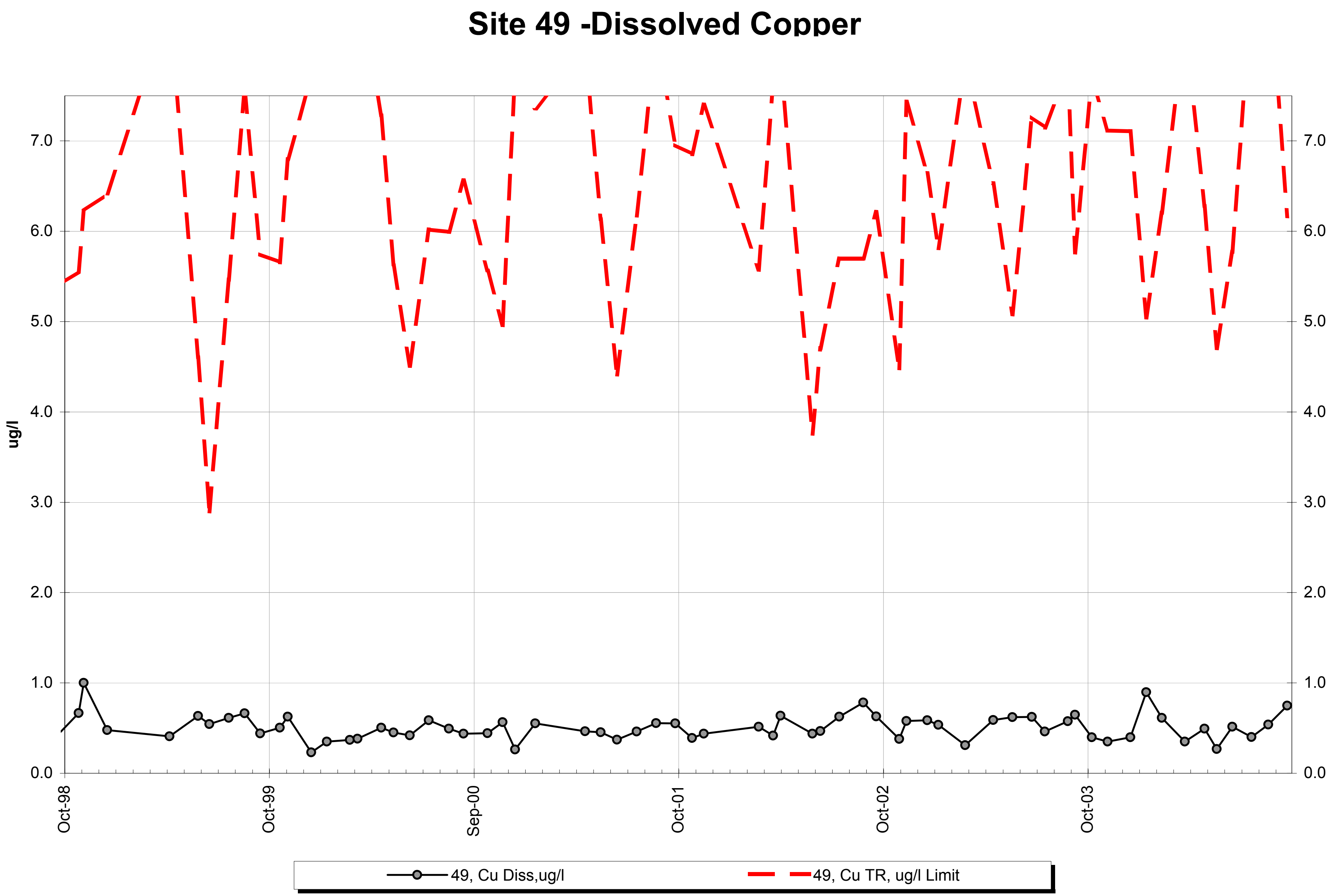
Site 49 -Dissolved Barium



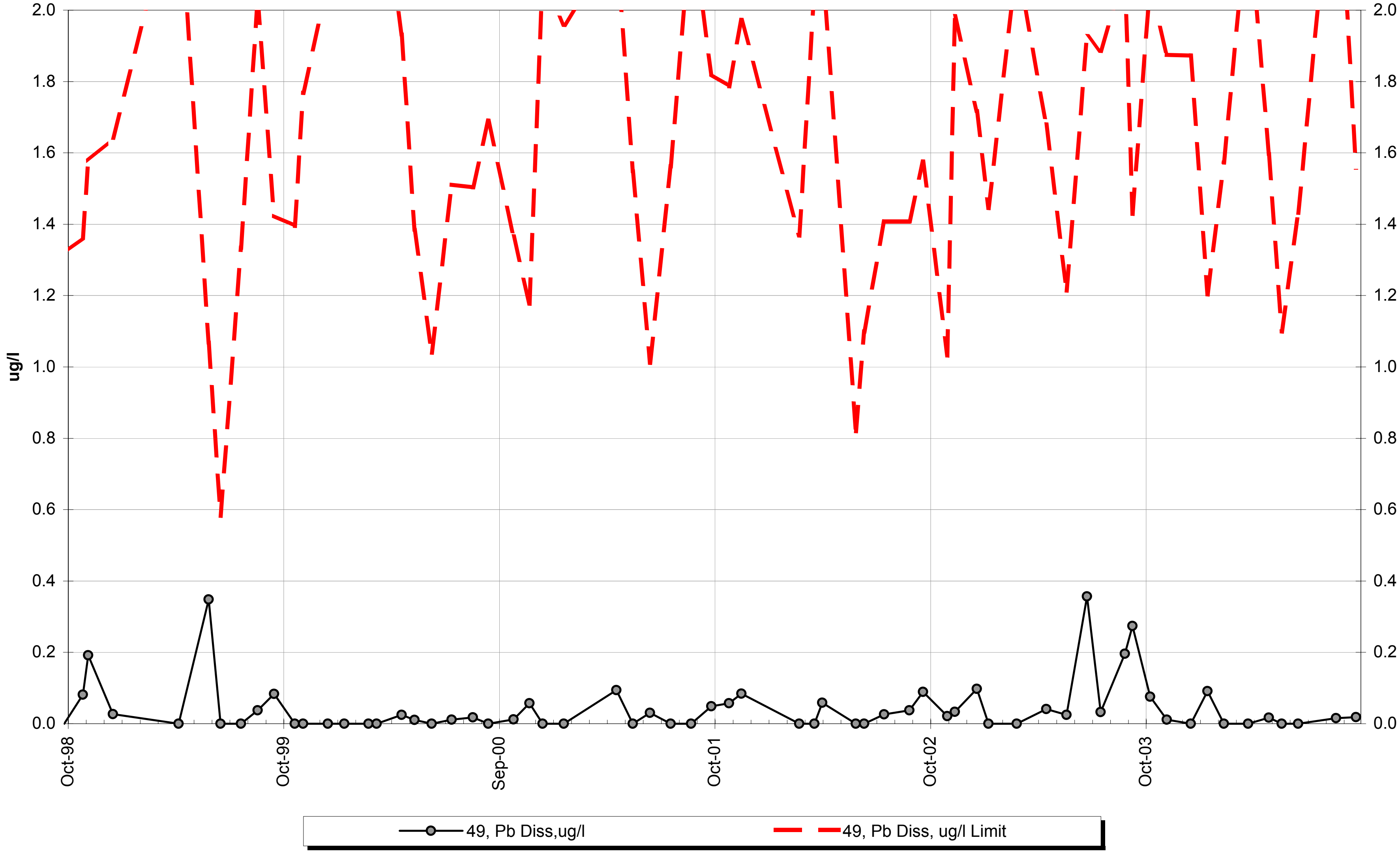

Site 49 -Dissolved Cadmium
ug/l
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
49, Cd Diss,ug/l
49, Cd TR, ug/l Limit

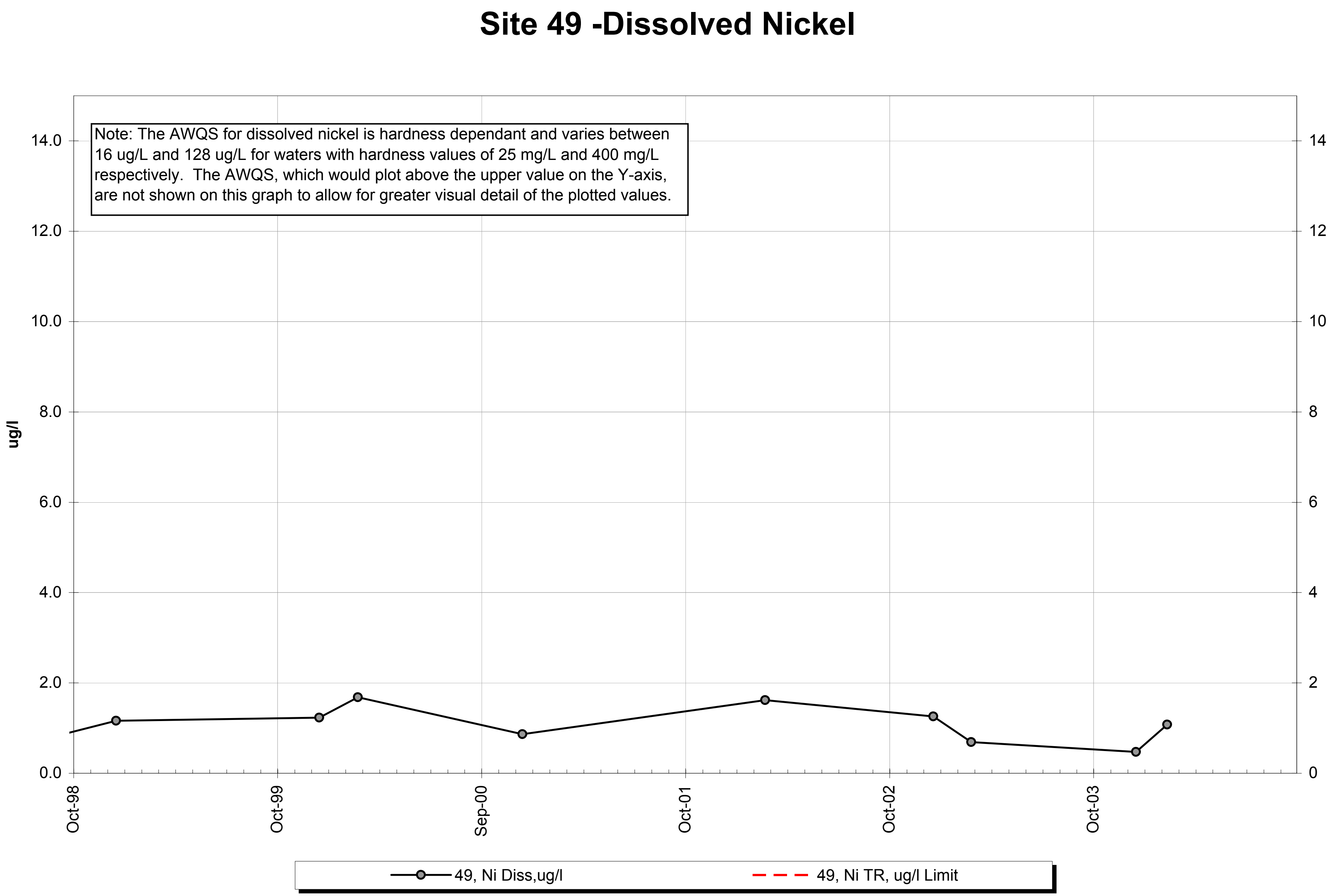
Site 49 -Dissolved Chromium



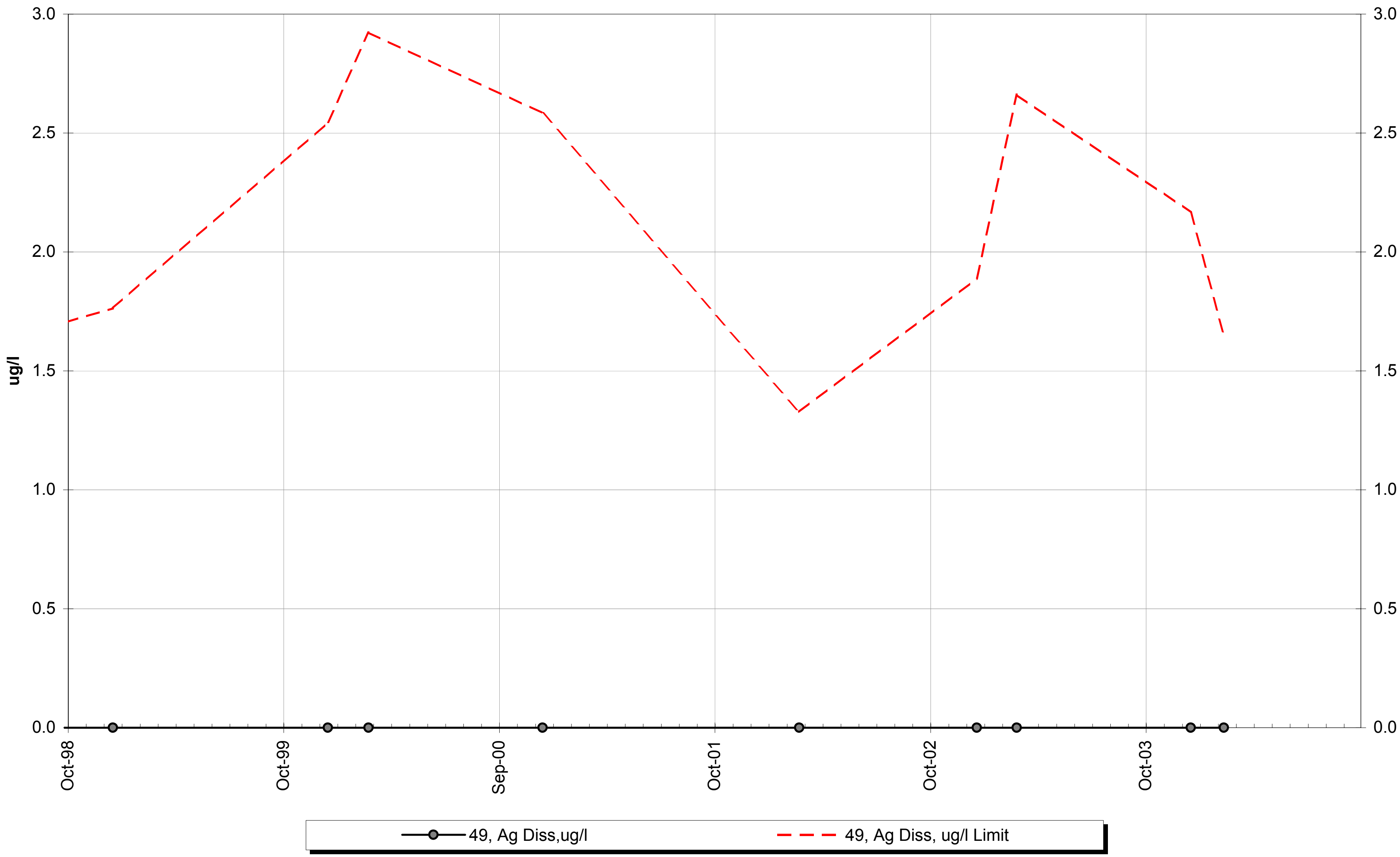

Site 49 -Dissolved Copper
ug/l
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
49, Cu Diss,ug/l
49, Cu TR, ug/l Limit

Site 49 -Dissolved Lead

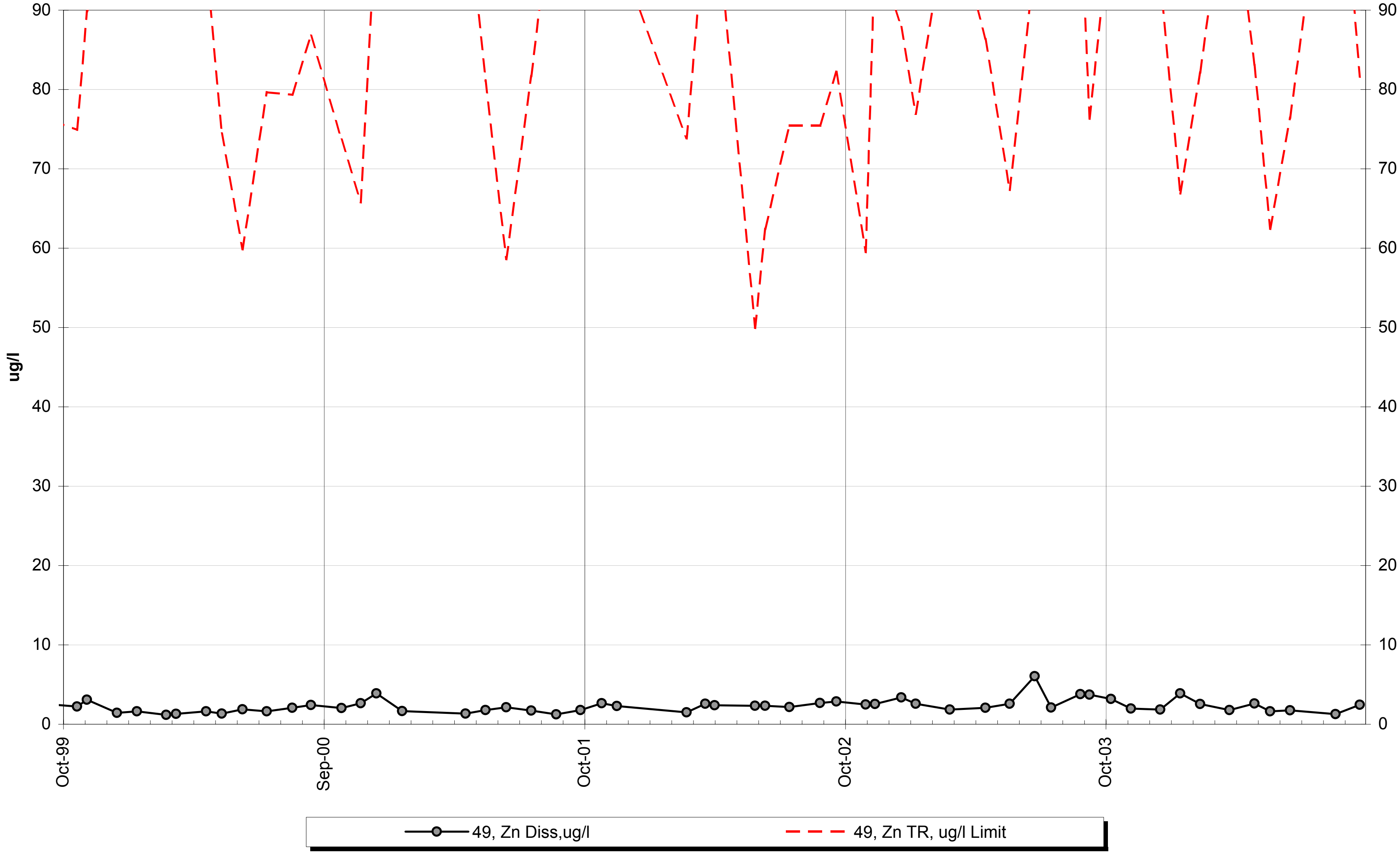


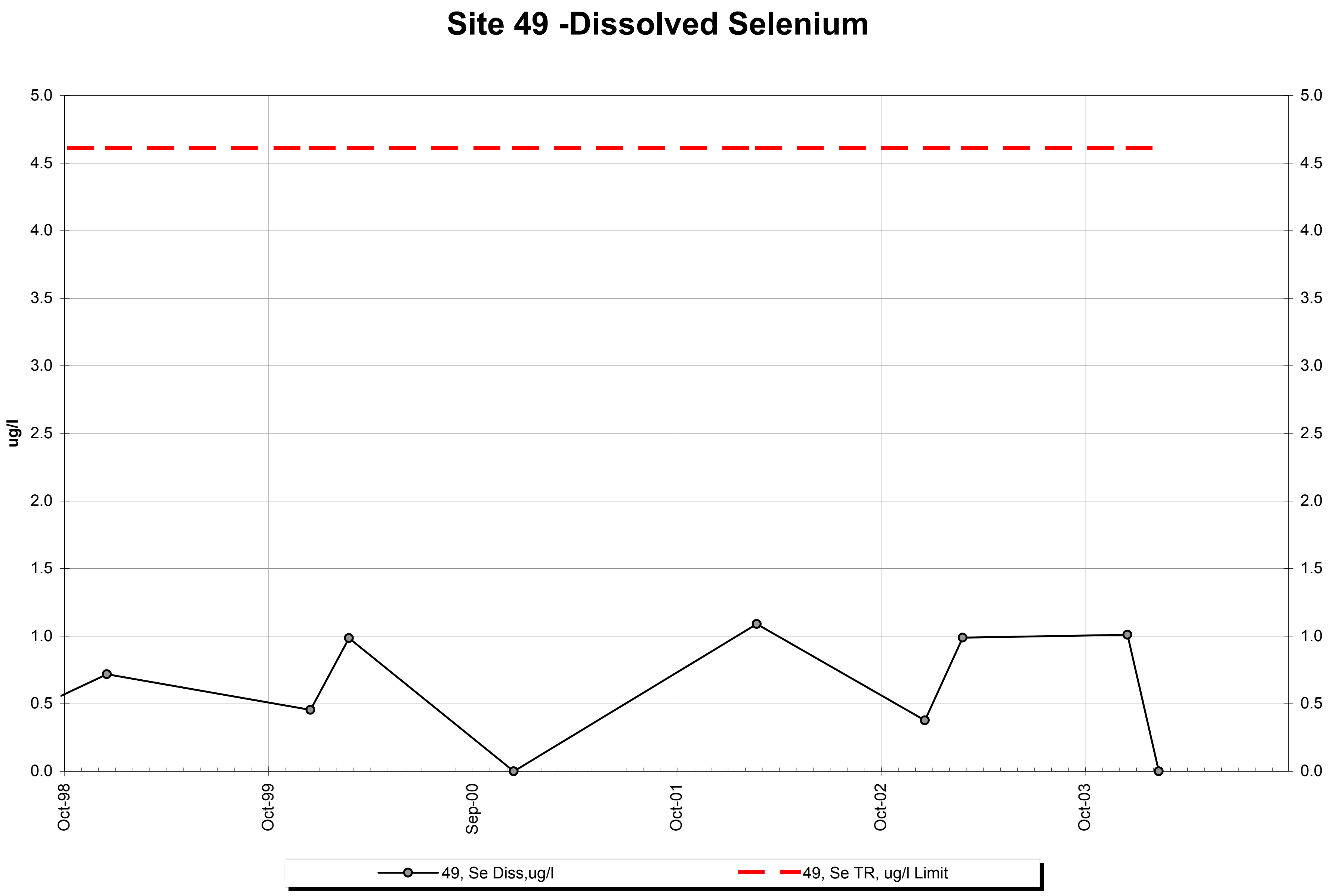

Site 49 -Dissolved Nickel
Note: The AWQS for dissolved nickel is hardness dependant and varies between 16 ug/L and 128 ug/L for waters with hardness values of 25 mg/L and 400 mg/L respectively. The AWQS, which would plot above the upper value on the Y-axis, are not shown on this graph to allow for greater visual detail of the plotted values.
ug/l
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
14
12
10
8
6
4
2
0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
49, Ni Diss,ug/l
49, Ni TR, ug/l Limit

Site 49 -Dissolved Silver



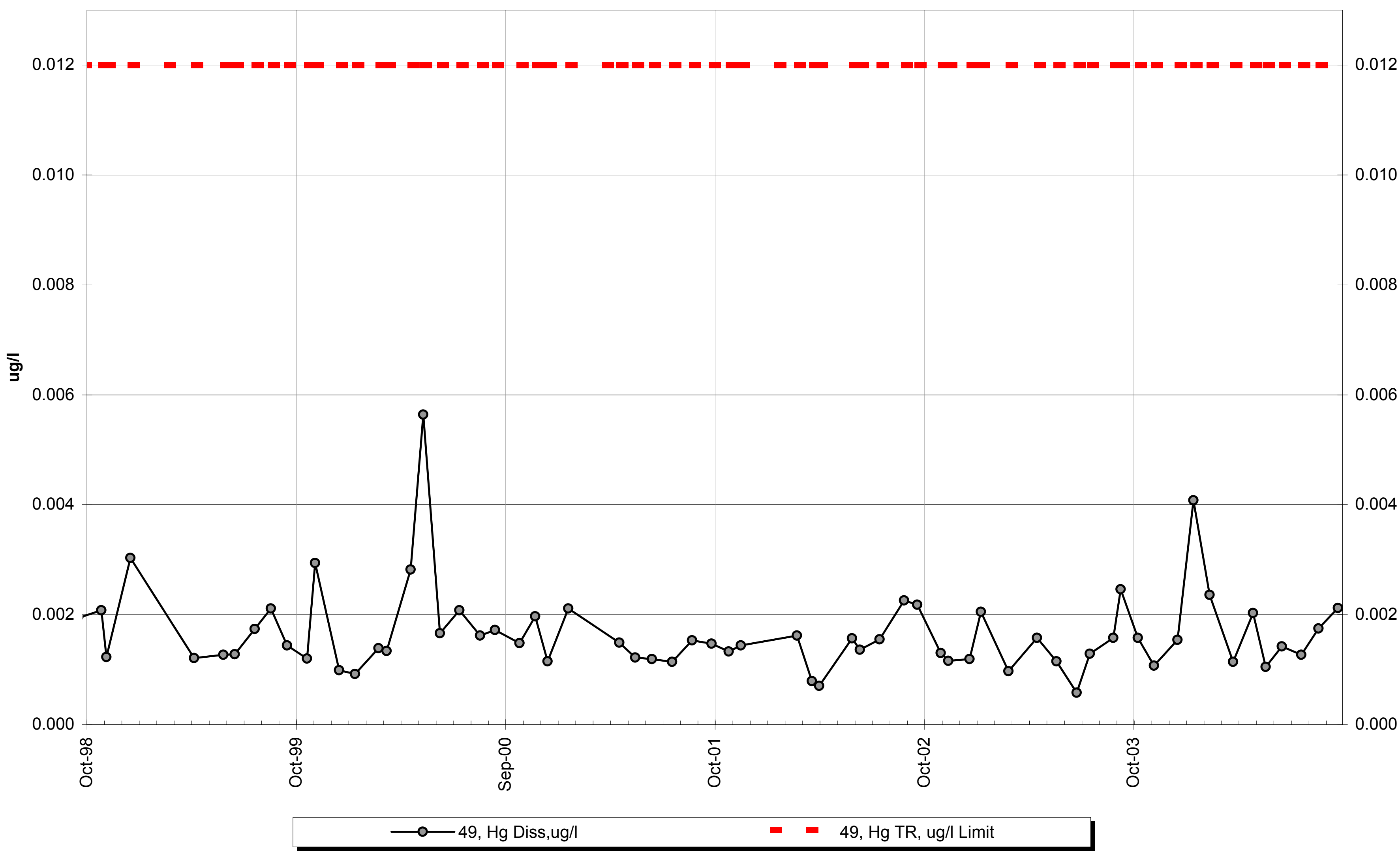
Site 49 -Dissolved Zinc





Site 49 -Dissolved Selenium
ug/l
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
49, Se Diss,ug/l
49, Se TR, ug/l Limit

Site 49 -Dissolved Mercury



Site **#49** Seasonal Kendall analysis for Specific Conductance, Lab (umhos/cm @ 25°C)

Row label	Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	**WY1999**	128.0	150.0	163.0				198.0	138.0	77.0	141.0	147.0	144.0
b	**WY2000**	124.0	130.0	163.0	146.0	181.0	183.0	147.0	116.0	89.6	117.0	137.0	126.0
c	**WY2001**	129.0	103.0	160.0	146.0			163.0	124.0	83.7	134.0	179.0	135.0
d	**WY2002**	147.0	156.0			169.0	194.0	203.0	65.5	106.0	133.0	119.0	127.0
e	**WY2003**	140.0	159.0	145.0	126.0	167.0		135.0	104.0	122.0	180.0	158.0	122.0
f	**WY2004**	160.0	157.0	155.0	99.4	134.0	177.0	133.0	88.8	116.0	188.0	193.0	121.0
	n	6	6	5	4	4	3	6	6	6	6	6	6

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
t_1	0	0	1	1	0	0	0	0	0	0	0	0
t_2	0	0	0	0	0	0	0	0	0	0	0	0
t_3	0	0	0	0	0	0	0	0	0	0	0	0
t_4	0	0	0	0	0	0	0	0	0	0	0	0
t_5	0	0	0	0	0	0	0	0	0	0	0	0

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
b-a	-1	-1	0				-1	-1	1	-1	-1	-1
c-a	1	-1	-1				-1	-1	1	-1	1	-1
d-a	1	1					1	-1	1	-1	-1	-1
e-a	1	1	-1				-1	-1	1	1	1	-1
f-a	1	1	-1				-1	-1	1	1	1	-1
c-b	1	-1	-1	0			1	1	-1	1	1	1
d-b	1	1			-1	1	1	-1	1	1	-1	1
e-b	1	1	-1	-1	-1		-1	-1	1	1	1	-1
f-b	1	1	-1	-1	-1	-1	-1	-1	1	1	1	-1
d-c	1	1					1	-1	1	-1	-1	-1
e-c	1	1	-1	-1			-1	-1	1	1	-1	-1
f-c	1	1	-1	-1			-1	-1	1	1	1	-1
e-d	-1	1			-1		-1	1	1	1	1	-1
f-d	1	1			-1	-1	-1	1	1	1	1	-1
f-e	1	-1	1	-1	-1		-1	-1	-1	1	1	-1
S_k	11	7	-7	-5	-6	-1	-7	-9	11	7	5	-11
Qm	6.3								9.7			-4.6
$\sigma^2_S=$	28.33	28.33	16.67	8.67	8.67	3.67	28.33	28.33	28.33	28.33	28.33	28.33
$Z_k = S_k/\sigma_S$	2.07	1.32	-1.71	-1.70	-2.04	-0.52	-1.32	-1.69	2.07	1.32	0.94	-2.07
Z^2_k	4.27	1.73	2.94	2.88	4.15	0.27	1.73	2.86	4.27	1.73	0.88	4.27

$\Sigma Z_k=$ -3.34

$\Sigma Z^2_k=$ 31.99

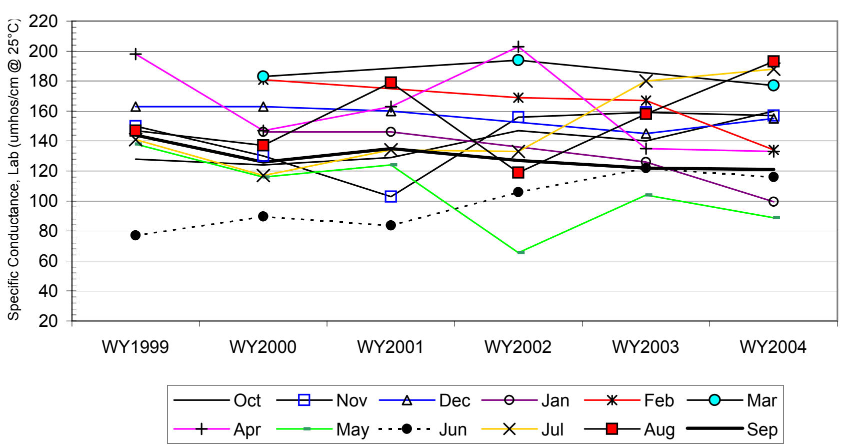
Z-bar=$\Sigma Z_k/K=$ -0.28

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	2	0	0	0	0

Σn 64

ΣS_k -5

$\chi^2_h=\Sigma Z^2_k-K(\text{Z-bar})^2=$		31.06	@α=5% $\chi^2_{(K-1)}=$ 19.68	Test for station homogeneity	
	p	**0.001**		$\chi^2_h<\chi^2_{(K-1)}$	**REJECT**
ΣVAR(S_k)	Z_{calc}	-0.25	@α/2=2.5% Z= 1.96	H_0 (No trend)	NA
264.33	**p**	**0.403**		H_A (± trend)	NA



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Slope	Upper Limit
0.010	-4.50		5.40
0.050	-3.44	**-1.00**	3.00
0.100	-2.61		2.23
0.200	-2.00		0.81

Site **#49** Seasonal Kendall analysis for pH, Lab, Standard Units

Row label	Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	**WY1999**	8.0	7.8	7.5				8.0	7.8	7.5	7.8	7.9	7.7
b	**WY2000**	7.7	7.3	7.2	7.6	7.5	7.7	7.7	7.7	7.3	7.7	7.5	7.7
c	**WY2001**	7.4	7.6	7.6	7.5			7.8	6.8	6.9	7.8	7.4	7.5
d	**WY2002**	7.4	7.4			7.4	7.8	7.5	7.0	7.3	8.2	8.0	8.1
e	**WY2003**	7.6	8.1	7.8	7.9	7.8		7.6	7.8	7.9	8.0	7.8	8.0
f	**WY2004**	8.0	8.0	7.8	7.6	7.6	7.8	8.0	7.5	7.9	8.0	8.0	8.1
	n	6	6	5	4	4	3	6	6	6	6	6	6

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
t_1	0	0	0	0	0	0	0	1	0	0	1	0
t_2	0	0	0	0	0	0	0	0	0	0	0	0
t_3	0	0	0	0	0	0	0	0	0	0	0	0
t_4	0	0	0	0	0	0	0	0	0	0	0	0
t_5	0	0	0	0	0	0	0	0	0	0	0	0

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
b-a	-1	-1	-1				-1	-1	-1	-1	-1	-1
c-a	-1	-1	1				-1	-1	-1	-1	-1	-1
d-a	-1	-1					-1	-1	-1	1	1	1
e-a	-1	1	1				-1	0	1	1	-1	1
f-a	1	1	1				1	-1	1	1	1	1
c-b	-1	1	1	-1			1	-1	-1	1	-1	-1
d-b	-1	1			-1	1	-1	-1	-1	1	1	1
e-b	-1	1	1	1	1		-1	1	1	1	1	1
f-b	1	1	1	-1	1	1	1	-1	1	1	1	1
d-c	-1	-1					-1	1	1	1	1	1
e-c	1	1	1	1			-1	1	1	1	1	1
f-c	1	1	1	1			1	1	1	1	1	1
e-d	1	1			1		1	1	1	-1	-1	-1
f-d	1	1			1	1	1	1	1	-1	0	-1
f-e	1	-1	-1	-1	-1		1	-1	-1	-1	1	1
S_k	-1	5	6	0	2	3	-1	-2	3	5	4	5

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
σ^2_S=	28.33	28.33	16.67	8.67	8.67	3.67	28.33	28.33	28.33	28.33	28.33	28.33
$Z_k = S_k/\sigma_S$	-0.19	0.94	1.47	0.00	0.68	1.57	-0.19	-0.38	0.56	0.94	0.75	0.94
Z^2_k	0.04	0.88	2.16	0.00	0.46	2.45	0.04	0.14	0.32	0.88	0.56	0.88

ΣZ_k= 7.10

ΣZ^2_k= 8.82

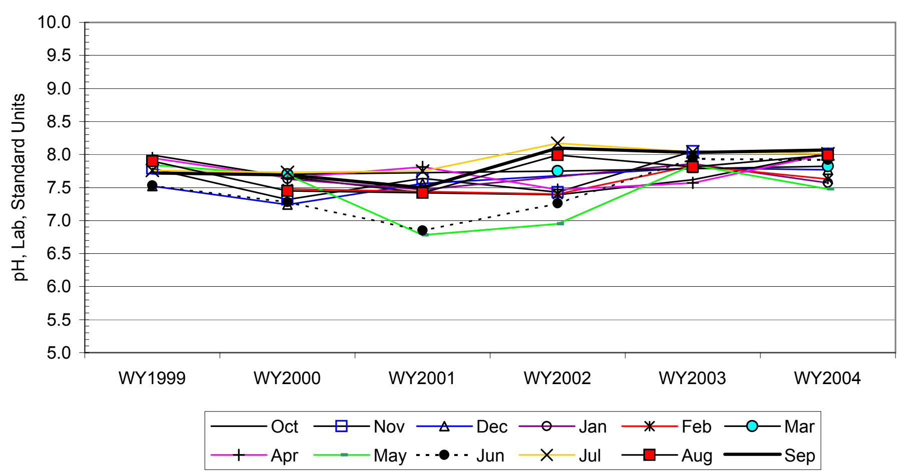
Z-bar=$\Sigma Z_k/K$= 0.59

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	2	0	0	0	0

Σn 64

ΣS_k 29

$\chi^2_h=\Sigma Z^2_k - K(\text{Z-bar})^2$=		4.62	@α=5% $\chi^2_{(K-1)}$= 19.68	Test for station homogeneity	
	p	**0.948**		$\chi^2_h<\chi^2_{(K-1)}$	ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	1.72	@α/2=2.5% Z= 1.96	H_0 (No trend)	ACCEPT
264.33	p	**0.957**		H_A (± trend)	REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Slope	Upper Limit
0.010	-0.01		0.10
0.050	0.00	**0.05**	0.08
0.100	0.02		0.07
0.200	0.03		0.07

Site **#49**

Seasonal Kendall analysis for Total Alk, (mg/l)

Row label	Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	**WY1999**	49.9	66.1	61.6				68.8	52.5	29.8	54.8	55.6	54.1
b	**WY2000**	45.2	47.9	63.2	62.3	73.6	73.9	62.7	49.7	41.1	51.3	63.7	58.1
c	**WY2001**	46.9	47.3	71.8	63.0			66.7	55.4	38.2	59.3	76.7	61.6
d	**WY2002**	61.5	64.4			67.5	78.3	79.1	27.9	47.1	57.7	51.5	56.0
e	**WY2003**	73.9	63.1	63.8	57.4	74.3		60.3	47.4	58.4	74.5	71.2	56.7
f	**WY2004**	70.8	69.9	66.3	42.9	56.5	73.8	58.4	43.0	55.8	81.6	85.8	55.2
	n	6	6	5	4	4	3	6	6	6	6	6	6

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
t_1	0	0	0	0	0	0	0	0	0	0	0	0
t_2	0	0	0	0	0	0	0	0	0	0	0	0
t_3	0	0	0	0	0	0	0	0	0	0	0	0
t_4	0	0	0	0	0	0	0	0	0	0	0	0
t_5	0	0	0	0	0	0	0	0	0	0	0	0

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
b-a	-1	-1	1				-1	-1	1	-1	1	1
c-a	-1	-1	1				-1	1	1	1	1	1
d-a	1	-1					1	-1	1	1	-1	1
e-a	1	-1	1				-1	-1	1	1	1	1
f-a	1	1	1				-1	-1	1	1	1	1
c-b	1	-1	1	1			1	1	-1	1	1	1
d-b	1	1			-1	1	1	-1	1	1	-1	-1
e-b	1	1	1	-1	1		-1	-1	1	1	1	-1
f-b	1	1	1	-1	-1	-1	-1	-1	1	1	1	-1
d-c	1	1					1	-1	1	-1	-1	-1
e-c	1	1	-1	-1			-1	-1	1	1	-1	-1
f-c	1	1	-1	-1			-1	-1	1	1	1	-1
e-d	1	-1			1		-1	1	1	1	1	1
f-d	1	1			-1	-1	-1	1	1	1	1	-1
f-e	-1	1	1	-1	-1		-1	-1	-1	1	1	-1
S_k	9	3	6	-4	-2	-1	-7	-7	11	11	7	-1
Qm									5.8	7.1		
σ^2_S=	28.33	28.33	16.67	8.67	8.67	3.67	28.33	28.33	28.33	28.33	28.33	28.33
$Z_k = S_k/\sigma_S$	1.69	0.56	1.47	-1.36	-0.68	-0.52	-1.32	-1.32	2.07	2.07	1.32	-0.19
Z^2_k	2.86	0.32	2.16	1.85	0.46	0.27	1.73	1.73	4.27	4.27	1.73	0.04

ΣZ_k= 3.79

ΣZ^2_k= 21.68

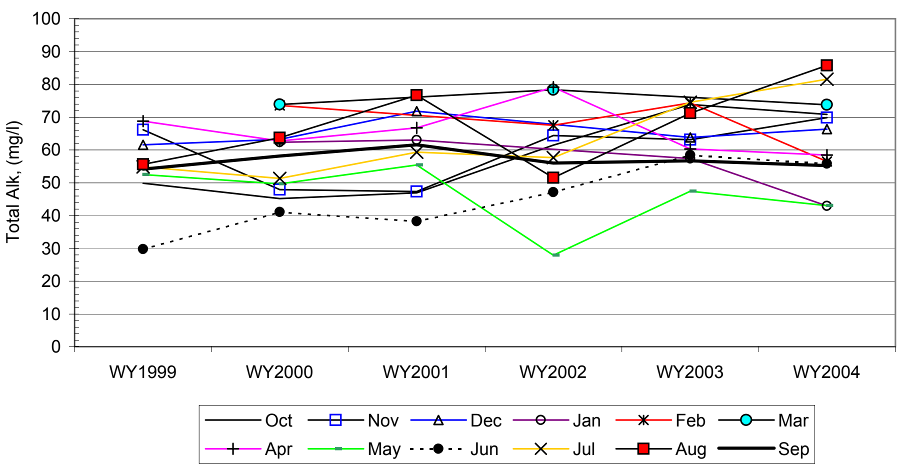
Z-bar=ΣZ_k/K= 0.32

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	0	0	0	0	0

Σn 64

ΣS_k 25

$\chi^2_h=\Sigma Z^2_k$-K(Z-bar)^2= 20.48	@α=5% $\chi^2_{(K-1)}$= 19.68	Test for station homogeneity	
p **0.039**		$\chi^2_h<\chi^2_{(K-1)}$	**REJECT**
ΣVAR(S_k) 264.33	Z_{calc} 1.48	@α/2=2.5% Z= 1.96	H_0 (No trend)	NA
	p **0.930**		H_A (± trend)	NA



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Slope	Upper Limit
0.010	-0.76		4.07
0.050	-0.35	**1.45**	3.65
0.100	0.22		3.19
0.200	0.64		2.59

Site **#49** Seasonal Kendall analysis for Zinc, Dissolved (ug/l)

Row label	Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	**WY1999**	2.2	2.5	10.1				1.1	0.9	1.5	2.0	2.6	2.5
b	**WY2000**	2.2	3.1	1.4	1.6	1.2	1.3	1.6	1.4	1.9	1.6	2.1	2.4
c	**WY2001**	2.0	2.7	3.9	1.7			1.3	1.8	2.1	1.7	1.2	1.8
d	**WY2002**	2.7	2.3			1.5	2.6	2.4	2.3	2.3	2.2	2.7	2.9
e	**WY2003**	2.5	2.6	3.4	2.6	1.9		2.1	2.6	6.1	2.1	3.8	3.7
f	**WY2004**	3.2	2.0	1.8	3.9	2.6	1.8	2.6	1.6	1.8	1.7	1.3	2.5
	n	6	6	5	4	4	3	6	6	6	6	6	6

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
t_1	1	0	0	0	0	0	0	0	0	0	0	0
t_2	0	0	0	0	0	0	0	0	0	0	0	0
t_3	0	0	0	0	0	0	0	0	0	0	0	0
t_4	0	0	0	0	0	0	0	0	0	0	0	0
t_5	0	0	0	0	0	0	0	0	0	0	0	0

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
b-a	0	1	-1				1	1	1	-1	-1	-1
c-a	-1	1	-1				1	1	1	-1	-1	-1
d-a	1	-1					1	1	1	1	1	1
e-a	1	1	-1				1	1	1	1	1	1
f-a	1	-1	-1				1	1	1	-1	-1	-1
c-b	-1	-1	1	1			-1	1	1	1	-1	-1
d-b	1	-1			1	1	1	1	1	1	1	1
e-b	1	-1	1	1	1		1	1	1	1	1	1
f-b	1	-1	1	1	1	1	1	1	-1	1	-1	1
d-c	1	-1					1	1	1	1	1	1
e-c	1	-1	-1	1			1	1	1	1	1	1
f-c	1	-1	-1	1			1	-1	-1	-1	1	1
e-d	-1	1			1		-1	1	1	-1	1	1
f-d	1	-1			1	-1	1	-1	-1	-1	-1	-1
f-e	1	-1	-1	1	1		1	-1	-1	-1	-1	-1
S_k	8	-7	-4	6	6	1	11	9	7	1	1	3

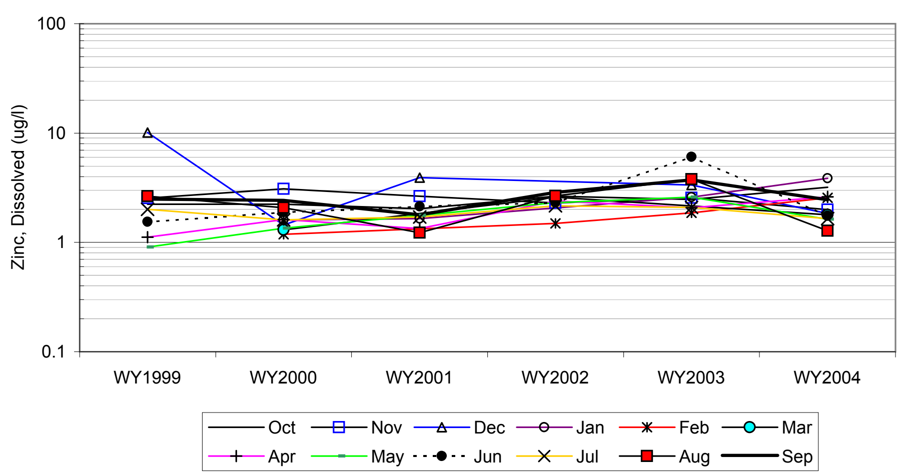
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
$\sigma^2_S=$	28.33	28.33	16.67	8.67	8.67	3.67	28.33	28.33	28.33	28.33	28.33	28.33
$Z_k = S_k/\sigma_S$	1.50	-1.32	-0.98	2.04	2.04	0.52	2.07	1.69	1.32	0.19	0.19	0.56
Z^2_k	2.26	1.73	0.96	4.15	4.15	0.27	4.27	2.86	1.73	0.04	0.04	0.32

$\Sigma Z_k=$ 9.82
$\Sigma Z^2_k=$ 22.78
Z-bar=$\Sigma Z_k/K=$ 0.82

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	1	0	0	0	0

Σn 64
ΣS_k 42

$\chi^2_h=\Sigma Z^2_k-K(\text{Z-bar})^2=$	14.74	@α=5% $\chi^2_{(K-1)}=$ 19.68	Test for station homogeneity	
p	**0.195**		$\chi^2_h<\chi^2_{(K-1)}$	ACCEPT
ΣVAR(S_k) 264.33	Z_{calc} 2.52	@α/2=2.5% Z= 1.96	H_0 (No trend)	REJECT
	p **0.994**		H_A (± trend)	ACCEPT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Slope	Upper Limit
0.010	0.01		0.26
0.050	0.04	**0.15**	0.24
0.100	0.06		0.22
0.200	0.09		0.20

6.8%

INTERPRETIVE REPORT
SITE 46 “LOWER BRUIN CREEK”

The data collected during the current water year are listed in the following “Table of Results for Water Year 2004” report. The table includes all the data, field and lab, collected for the current water year and a series of flags keyed to the summary report “Qualified Data by QA Reviewer”. The QA report lists any associated data limitations found during the monthly QA reviews of laboratory data for this site. Median values for all analytes have been calculated and are shown in the right-most column of the table of results. Any value reported as less than MDL has been replaced with a value of zero for the purpose of median calculation.

All data collected at this site for the past five years are included in the data analyses. As shown in the table below, there were no data outliers.

Sample Date	Parameter	Value	Qualifier	Notes
No outliers have been identified by KGCMC for the period of Oct-99 though Sept-04.				

The data for water year 2004 have been compared to the strictest fresh water quality criterion for each applicable analyte. No results exceeding these criteria have been identified as listed in the table below.

Sample Date	Parameter	Value	Standard	Standard Type
No exceedances have been identified by KGCMC for the period of Oct-03 though Sept-04.				

X-Y plots have been generated to graphically present the data for each of the analytes requested in the Statistical Information Goals for this site. These plots have been visually analyzed for the appearance of any trend in concentration. No visually obvious trends are apparent except for an intermittent-variable increase in dissolved lead. Dissolved-lead appears to increase starting in Oct-01 and continues through the end of the prior water-year with several individual spikes. The current water-year’s dissolved lead has returned to the generally low levels near the MDL (approx. 0.01 ug/l for the 2004WY) similar to the period prior to Oct-01. The detection limit for lead has not changed significantly over the period covered by the graph (average MDL of 0.02 ug/l for datasets from 2000-2004WY.

		Mann-Kendall test statistic			Sen's slope estimate	
Parameter	n*	Z	Trend	a**	Q	Q(%)
Conductivity, Lab	6	Fails monthly homogenity test (p=0.022)				
pH, Lab	6	2.01	+	**0.978**	0.05	0.6
Alkalinity, Total	6	0.59	+	0.72		
Zinc, Dissolved	6	1.34	+	0.91		

*: Number of years **:Significance level

Similar to analysis done for other sites with monthly sampling schedules a non-parametric statistical analysis for trend was preformed for conductivity, pH, alkalinity, and dissolved zinc. Calculation details of the Seasonal Mann-Kendall analyses are presented in detail on the pages following this interpretive section. The table above summarizes the results on the data collected between Oct-98 and Sep-04 (WY1999-WY2004). The dataset for conductivity failed the test for seasonal (monthly) homogeneity. Conductivity showed significant upward trends in October (S_k=11, Q_m=6.6 umhos/cm•yr) and June (S_k=11, Q_m=7.7 umhos/cm•yr) and a significant downward trend in January (S_k=-12, Q_m=-4.6 umhos/cm•yr). A trend in pH is identified by the Seasonal Mann-Kendall analyses with a significant (p=0.978) upward trend of 0.05 su/yr over the last 6 years. Given the lack of any other associated upward trends in analytes associated with waste rock (e.g. sulfate and dissolved zinc) the slight upward trends noted for Site 46 are interpreted to be associated with the same, probably natural, mechanism that is affecting site 49 and 48. Additional X-Y plots have been generated for alkalinity, pH, conductance, sulfate, and dissolved zinc that co-plot data from Site 49 and Site 46, the upstream control site, to aid in the comparison between those two sites.

Median values for alkalinity, pH, specific conductance, and dissolved zinc from site 46 have been compared to those of site 49. The comparisons were done utilizing a two-tailed, Wilcoxon-Mann-Whitney rank sum test with a significance level of $\alpha/2$=0.025. Rank-sum test calculation details can be found in subsequent pages of this section and a summary of the test results is shown in the table below. For all analytes there are no statistically significant differences between the medians at the $\alpha/2$=0.025 significance level.

Parameter	Rank Sum Test p-value	Site #49 median	Site #46 median
Conductivity, Lab	0.43	145	136
pH, Lab	0.37	7.96	7.89
Alkalinity, Total	0.41	62.4	58.7
Sulfate, Total	0.27	9.5	8.2
Zinc, Dissolved	0.15	1.92	1.72

Table of Results for Water Year 2004

Site 46 "Lower Bruin Creek"

Sample Date/Parameter	10/9/2003	11/6/2003	12/17/2003	1/14/2004	2/11/2004	3/23/2004	4/27/2004	5/19/2004	6/16/2004	7/20/2004	8/19/2004	9/22/2004	**Median**
Water Temp (°C)	8.5	1.7	1.6	0.9	1.6	1.3	3.2	5.2	7.8			7.4	2.5
Conductivity-Field(μmho)	130	151	165	118	133	149	123	88	113			132	131
Conductivity-Lab (μmho)	163	159	162	108 J	136 J	173 J	135	90	117 J			122	136
pH Lab (standard units)	7.94	8.02	7.76	7.84 J	7.57	7.72	7.98	7.83	8.01 J			7.96	7.89
pH Field (standard units)	7.75	7.95	7.82	7.85	7.90	7.78	7.99	7.97	7.73			7.66	7.84
Total Alkalinity (mg/L)	71.1	71.2	69.5	47.0	57.9	72.9	59.5	43.1	55.9 J			55.3	58.7
Total Sulfate (mg/L)	10.3	10.5	11.7	7.2	8.4	12.8	8.0	5.1	6.9			7.8	8.2
Hardness (mg/L)	84.6	77.0	79.3	54.9	66.0	89.1	70.0	46.4	61.2	NO FLOW	NO FLOW	65.7	68.0
Dissolved As (ug/L)	0.139	0.199	<0.051	0.247 U	0.186 J	0.150 J	0.209	0.093 J	0.152 J			0.196	0.169
Dissolved Ba (ug/L)			10.3		9.3								9.8
Dissolved Cd (ug/L)	0.046	0.023 J	<0.023 UJ	0.039 J	0.036 J	<0.023 J	0.026 J	0.035 J	0.035 J			0.030	0.033
Dissolved Cr (ug/L)			0.149		0.794								0.472
Dissolved Cu (ug/L)	0.493	0.371	0.387 U	0.842	0.592	0.419	0.532	0.240	0.569			0.770	0.513
Dissolved Pb (ug/L)	0.1560 U	0.0110 J	0.0230 J	0.1360 U	<0.0110 J	<0.0110 U	0.0154 J	0.0131 J	<0.0110			0.0178	0.0143
Dissolved Ni (ug/L)			0.413		0.943								0.678
Dissolved Ag (ug/L)			<0.009		<0.009 J								0.005
Dissolved Zn (ug/L)	4.80	1.54	1.70 U	2.57 U	2.05 J	1.09 U	1.73 UJ	1.29 UJ	1.37			1.99	1.72
Dissolved Se (ug/L)			0.651 UJ		<0.080 J								0.346
Dissolved Hg (ug/L)	0.001510 J	0.001040 U	0.001290 U	0.003900	0.002200 U	0.001070	0.002010	0.000898	0.001490			0.002480	0.001500

For individual sample/analyte qualifier descriptions see "Qualified Data by QA Reviewer" table.

Values reported as less than MDL are replaced by 1/2 MDL for median calculation purposes.

Shaded data has been qualified as an outlier by KGCMC and removed from any further analysis and is not included into the calculation of the median

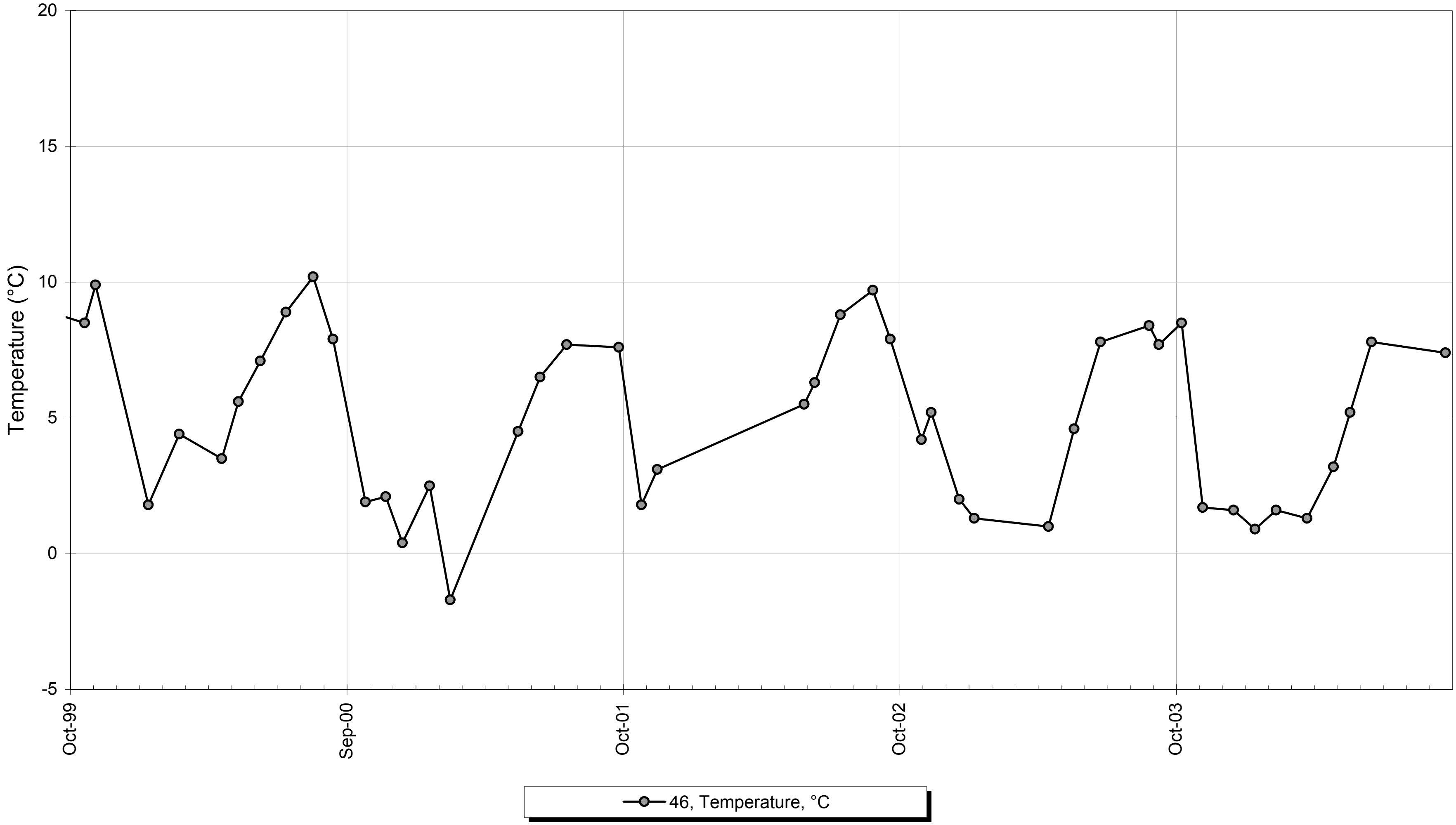
Qualified Data by QA Reviewer

Date Range: 10/01/2003 to 09/30/2004

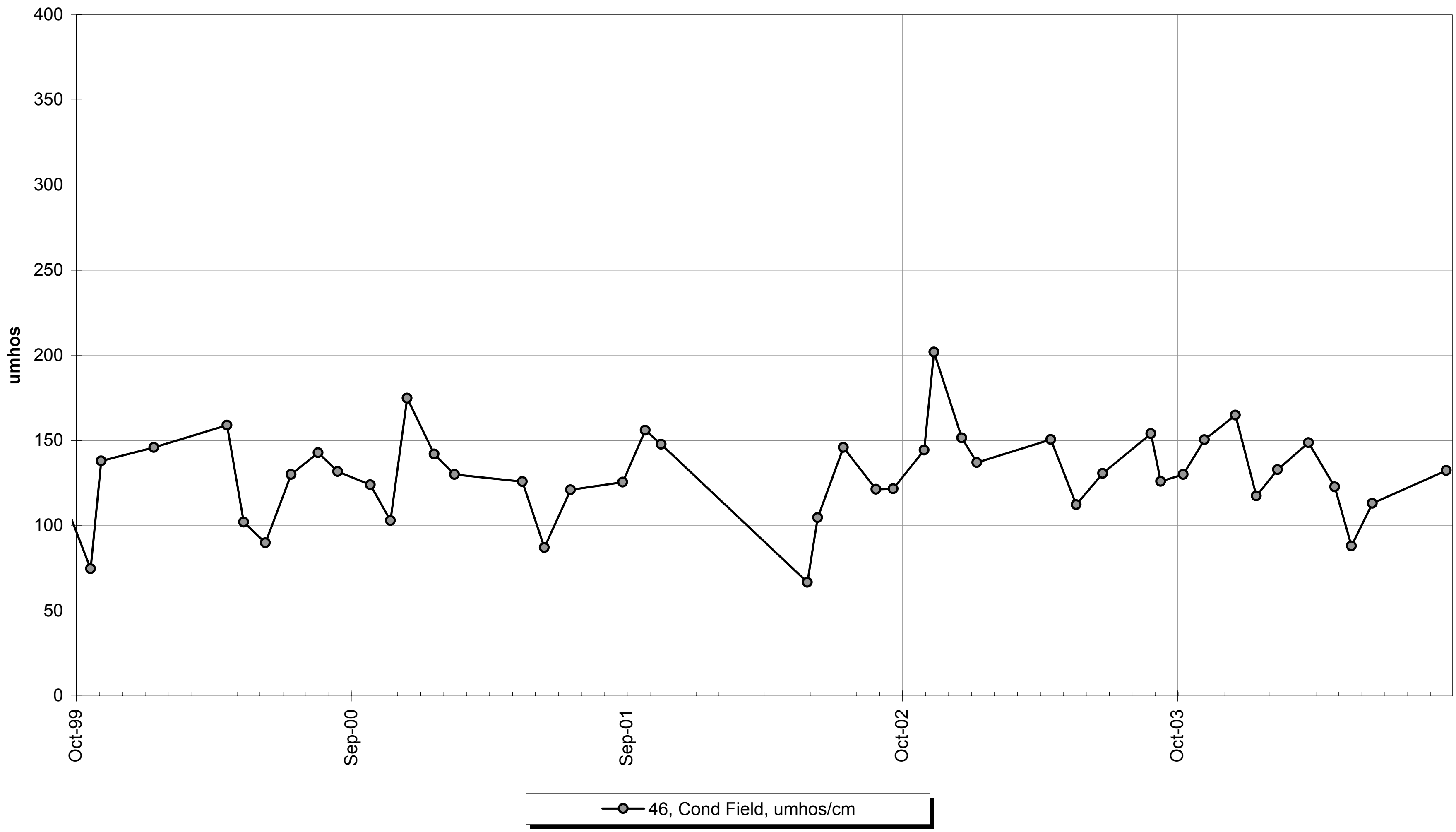
Site No.	Sample Date	Sample Time	Parameter	Value	Qualifier	Reason for Qualifier
			#Error			

Qualifier	Description
J	Positively Identified - Approximate Concentration
N	Presumptive Evidence For Tentative Identification
NJ	Tentatively Identified - Approximate Concentration
R	Rejected - Cannot Be Verified
U	Not Detected Above Quantitation Limit
UJ	Not Detected Above Approximate Quantitation Limit

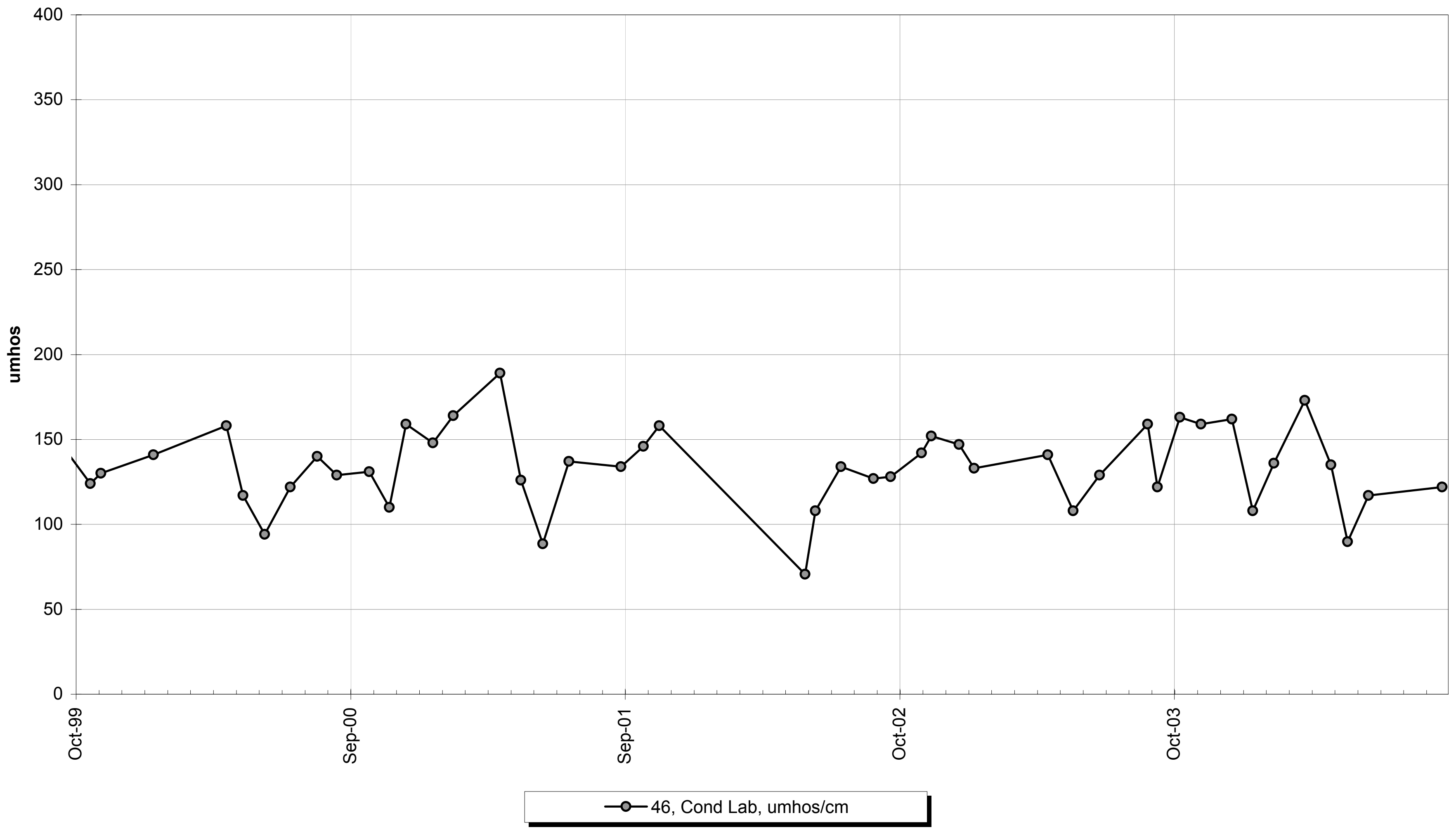
Site 46 -Water Temperature

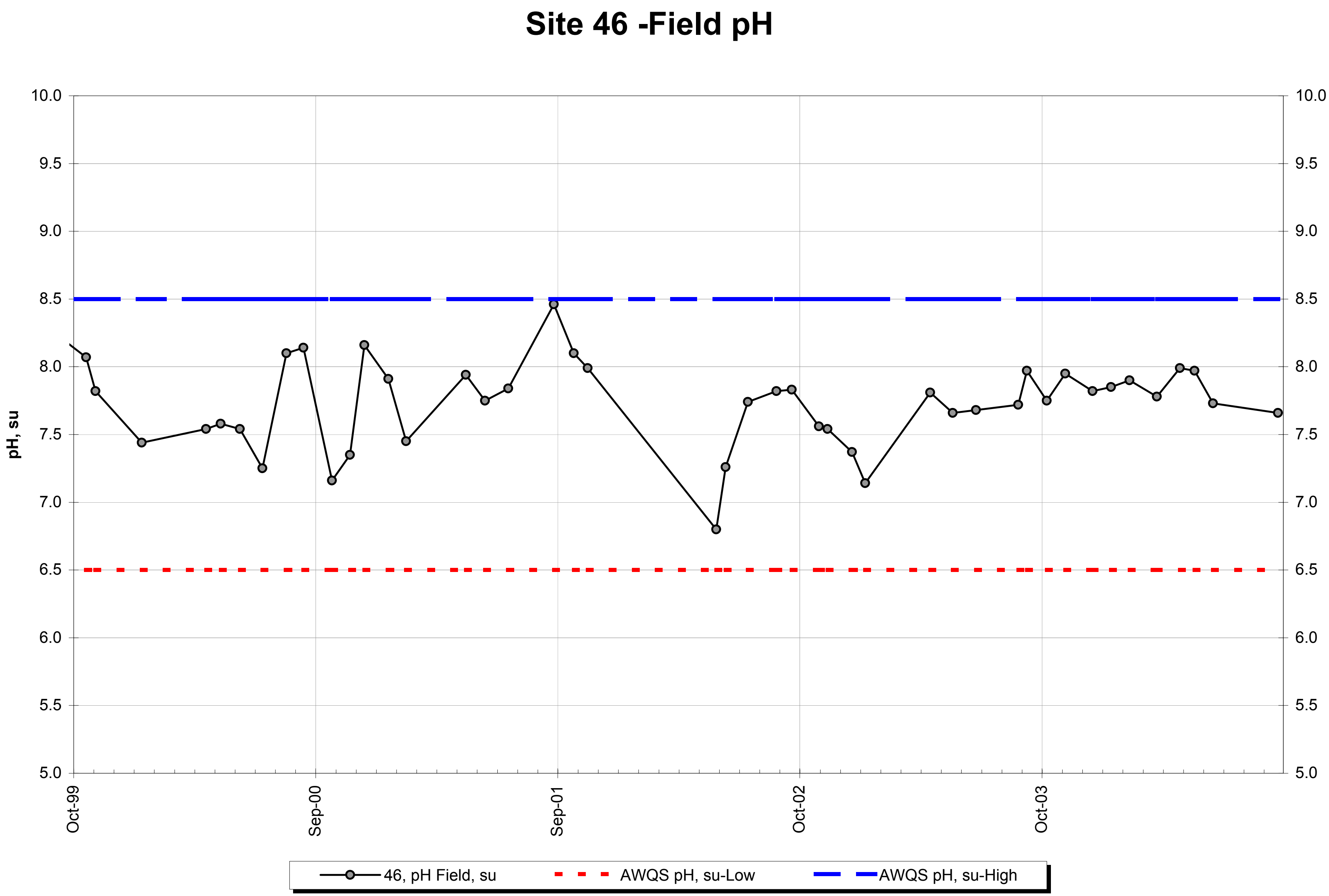


Site 46 -Conductivity-Field

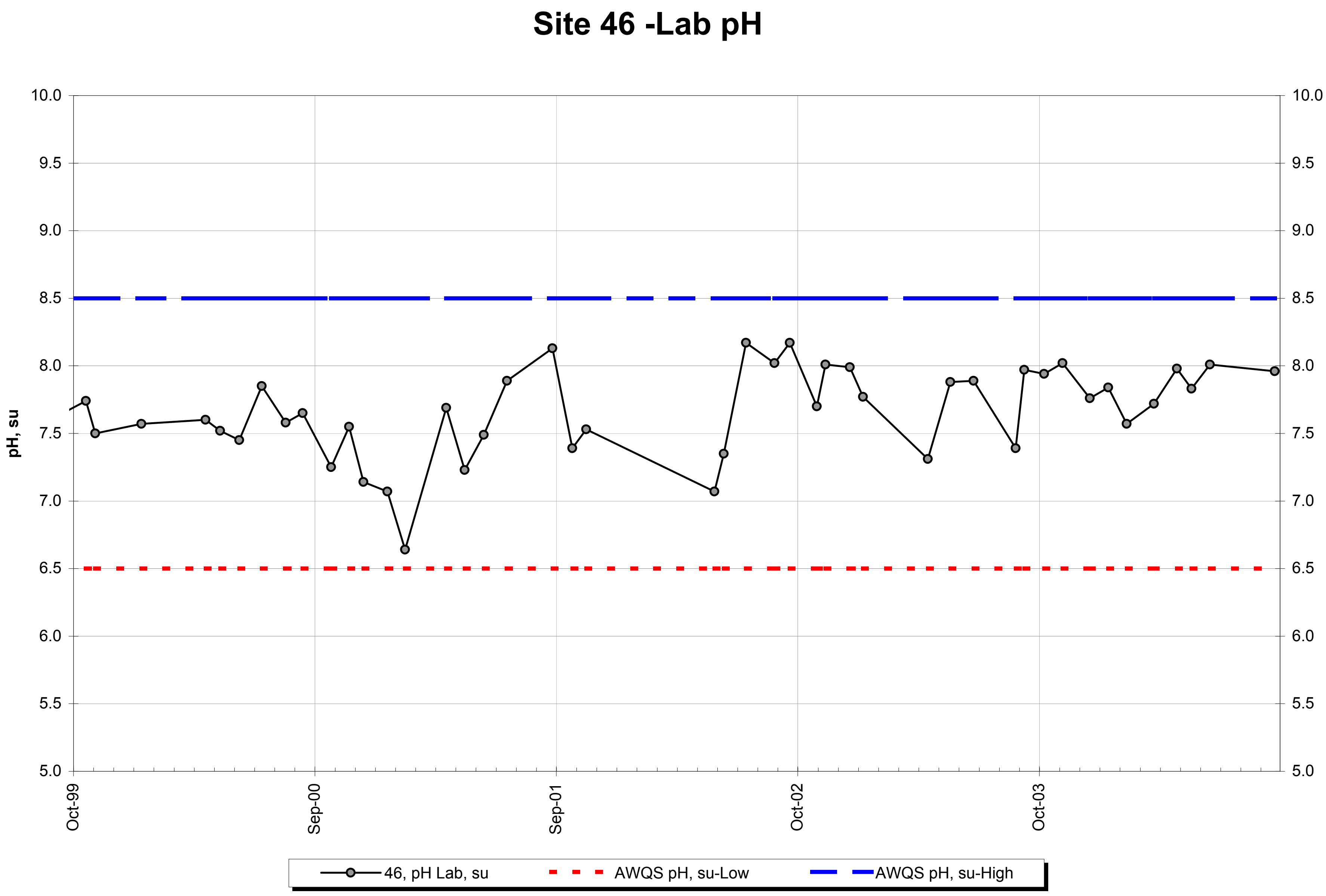


Site 46 -Conductivity-Lab

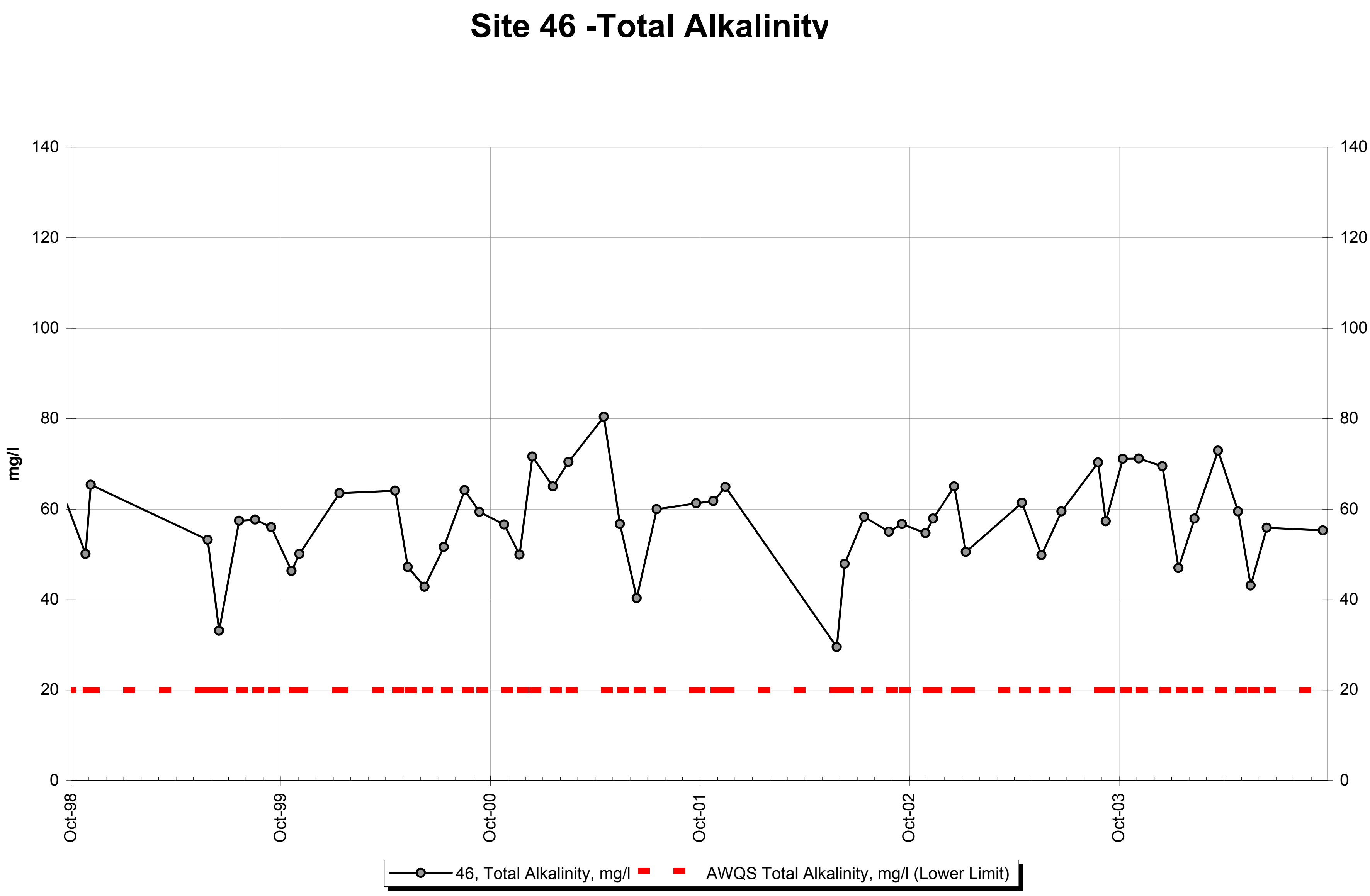




Site 46 -Field pH
pH, su
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
46, pH Field, su
AWQS pH, su-Low
AWQS pH, su-High

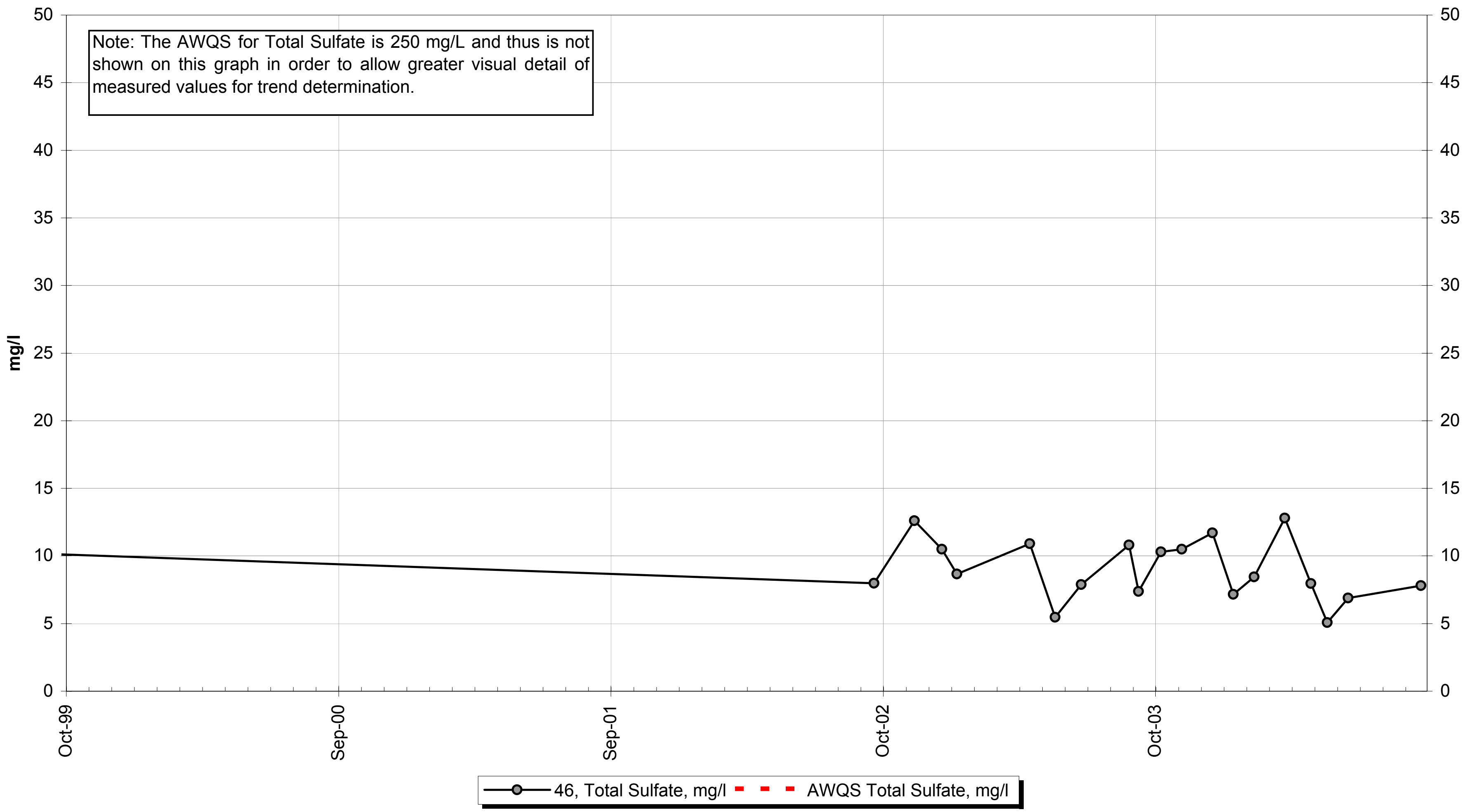


Site 46 -Lab pH
pH, su
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
46, pH Lab, su
AWQS pH, su-Low
AWQS pH, su-High

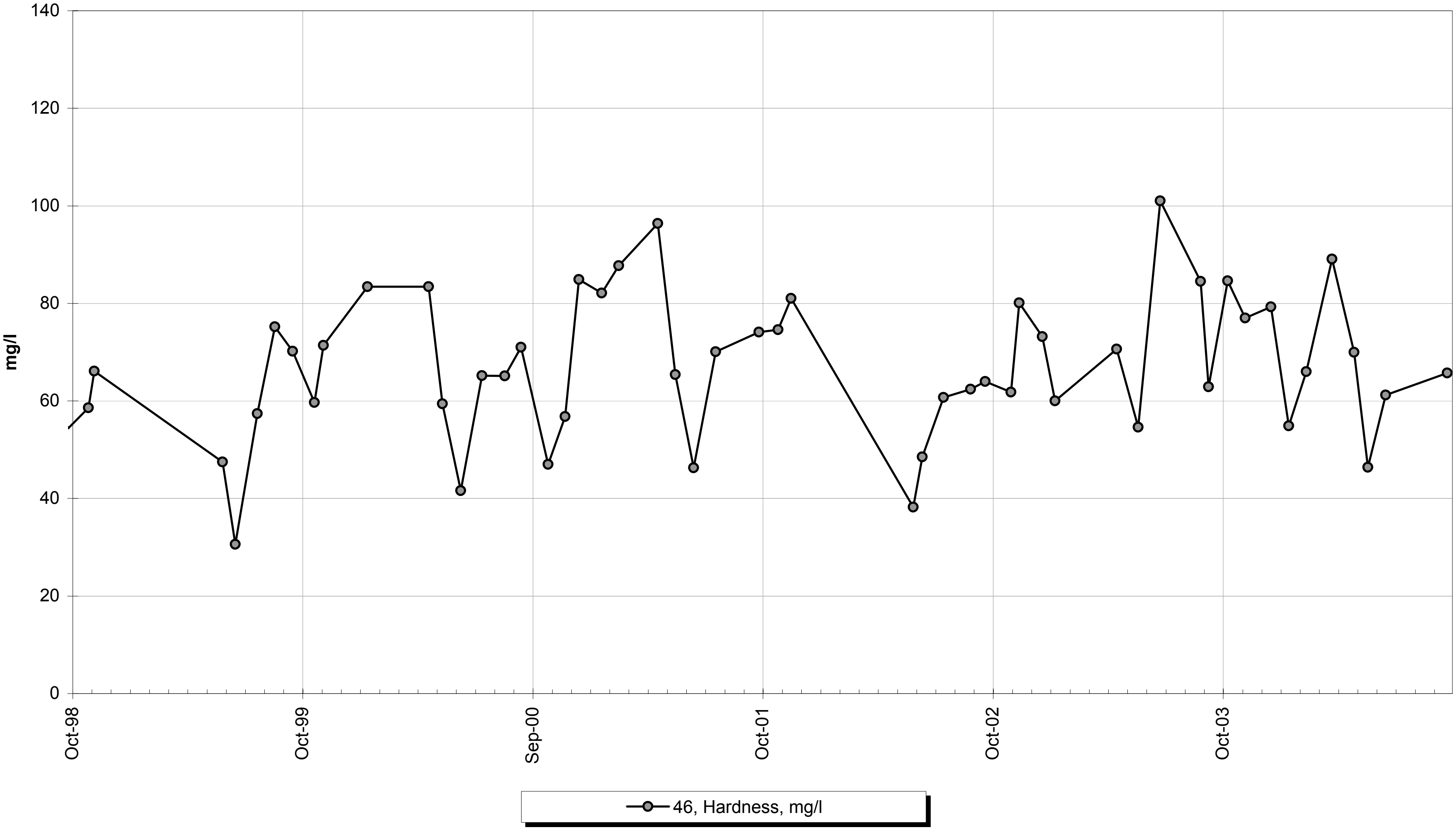


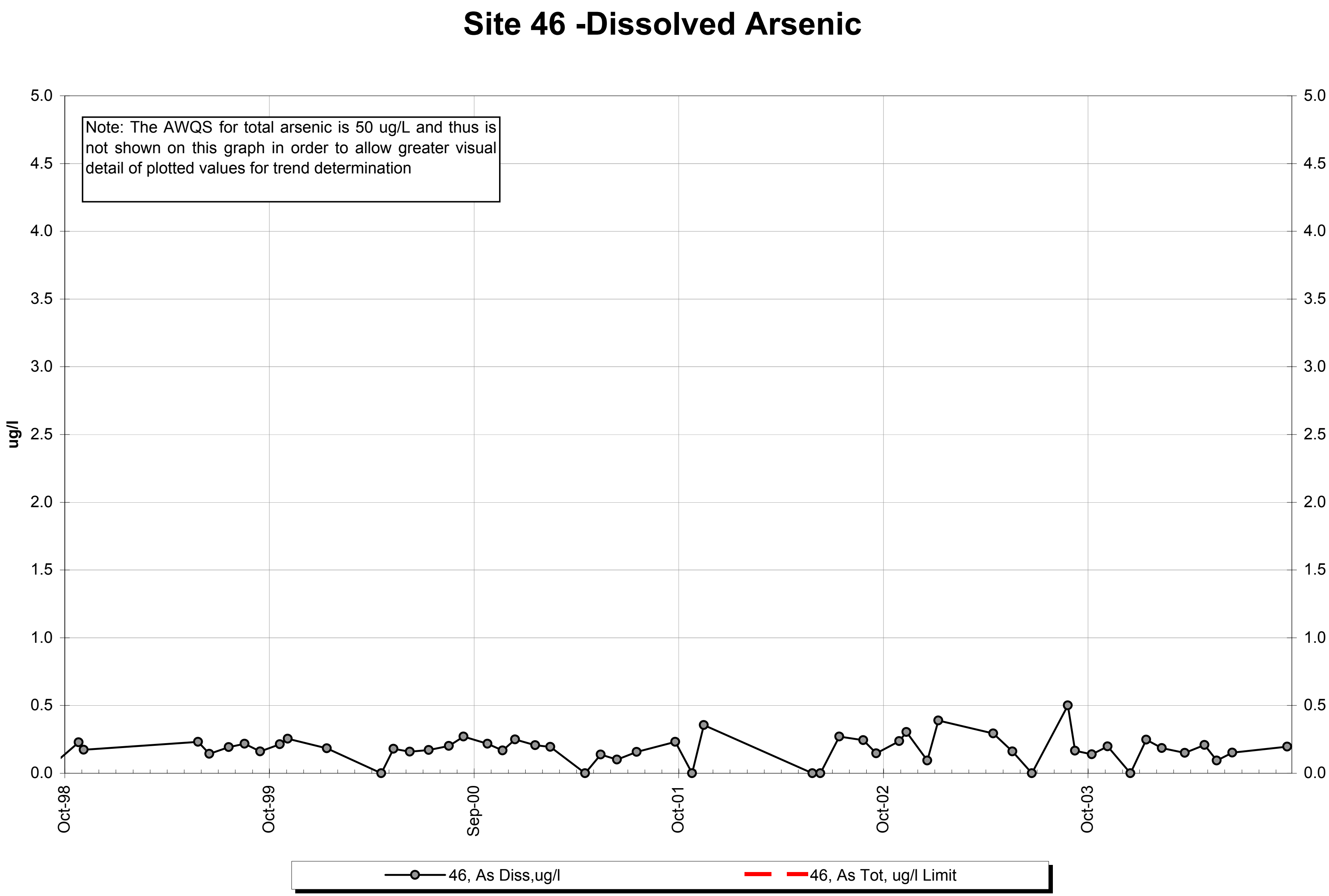
Site 46 -Total Alkalinity
mg/l
140
120
100
80
60
40
20
0
Oct-98
Oct-99
Oct-00
Oct-01
Oct-02
Oct-03
46, Total Alkalinity, mg/l
AWQS Total Alkalinity, mg/l (Lower Limit)

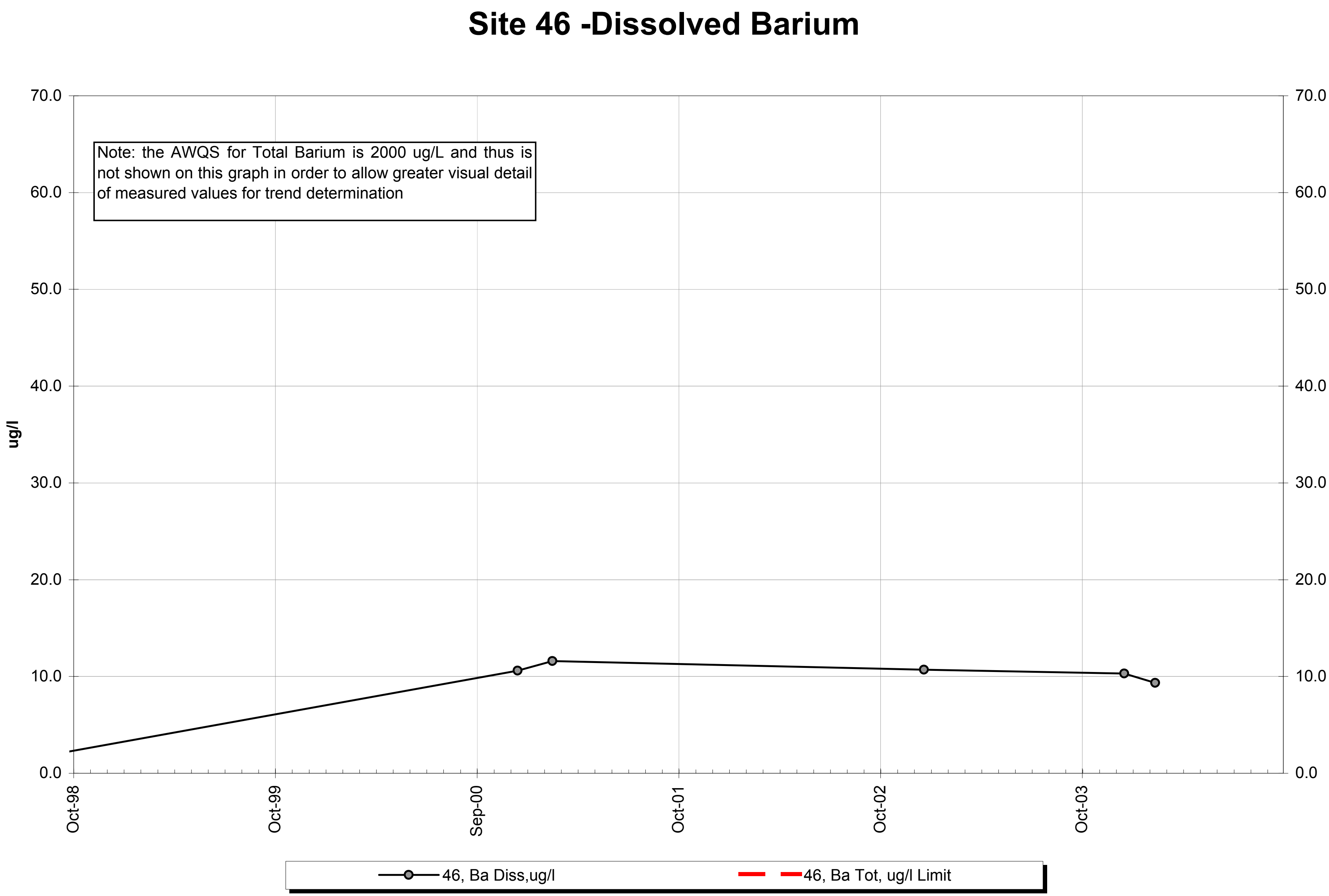
Site 46 -Total Sulfate

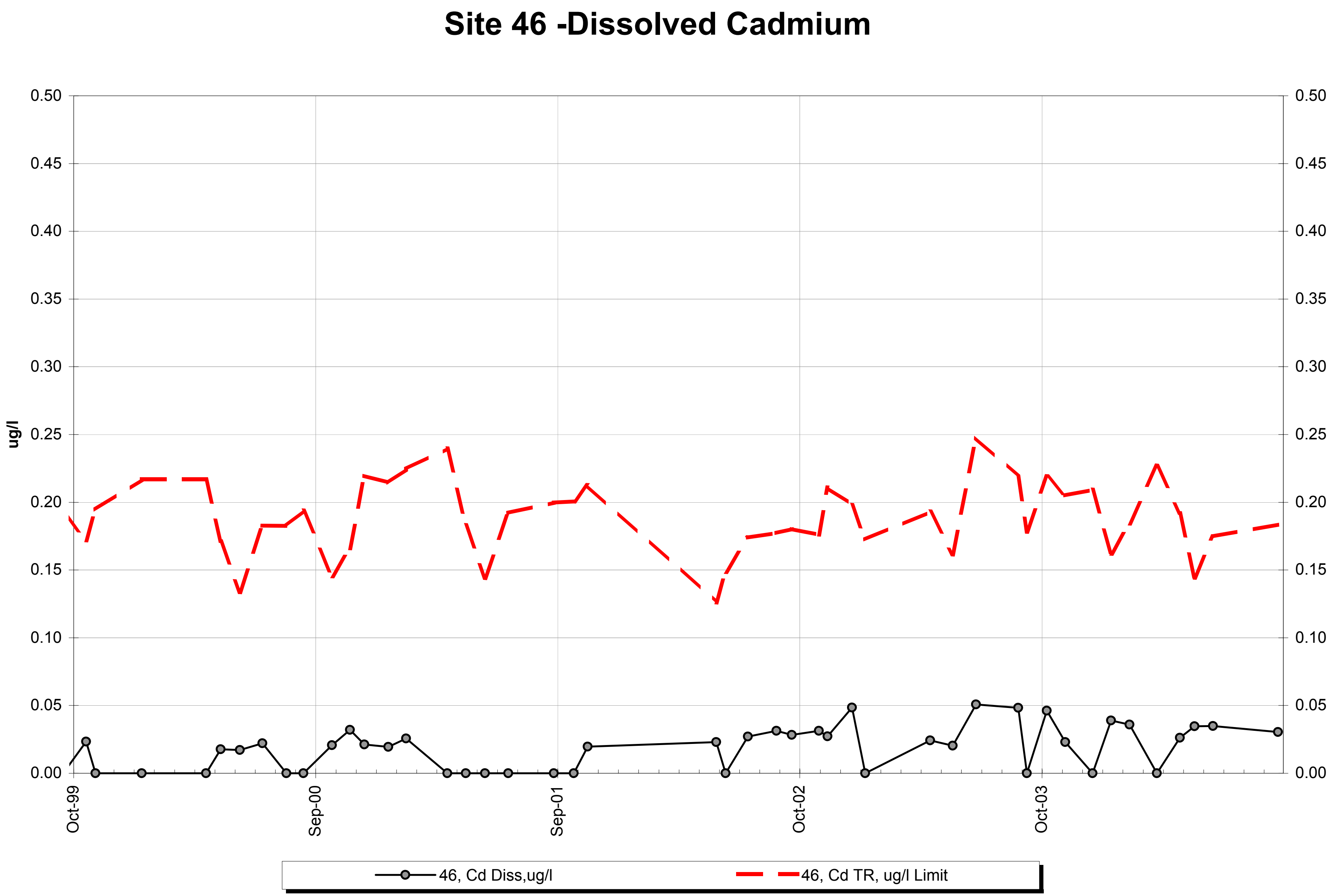


Site 46 -Hardness



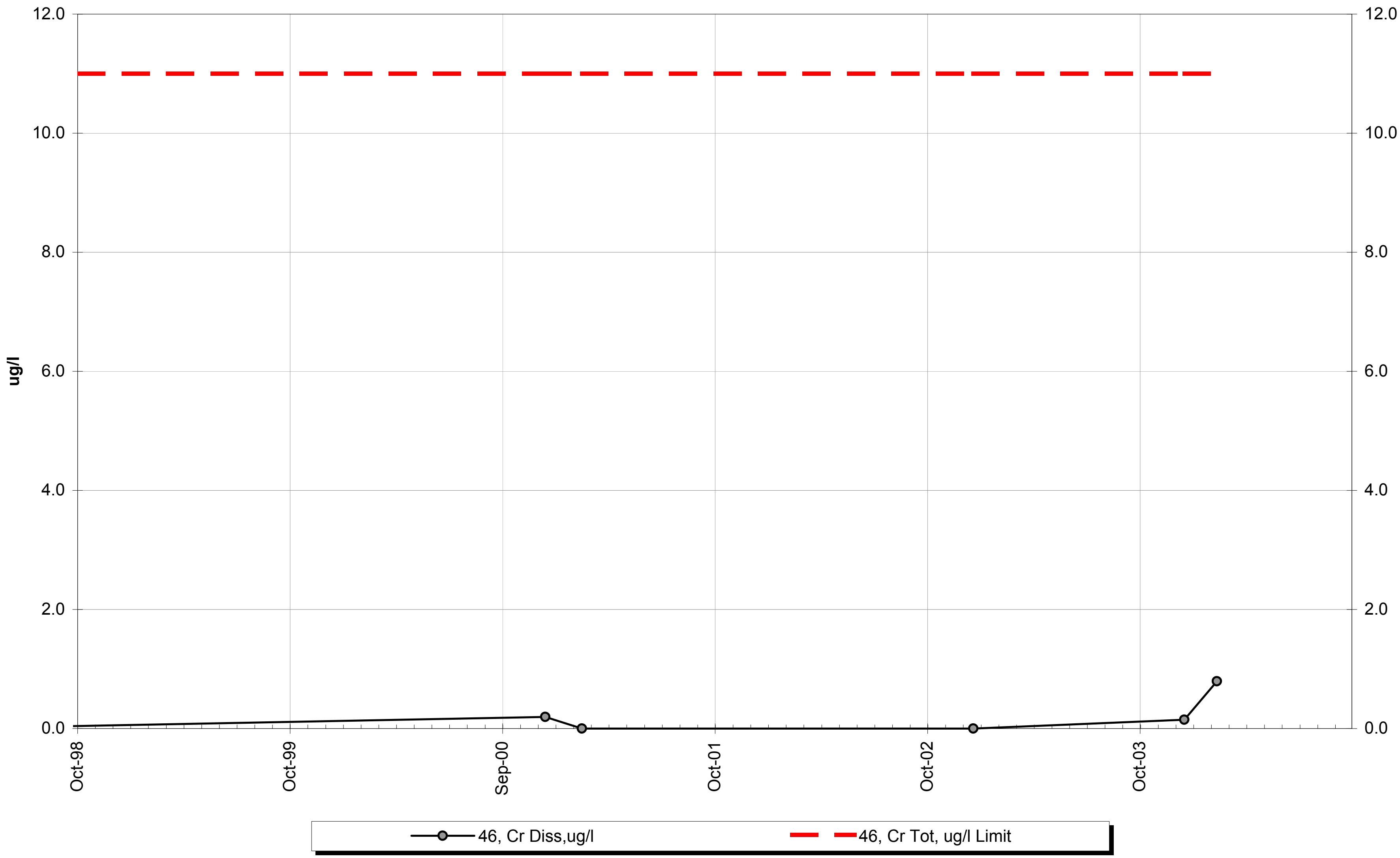

Site 46 -Dissolved Arsenic
Note: The AWQS for total arsenic is 50 ug/L and thus is not shown on this graph in order to allow greater visual detail of plotted values for trend determination
ug/l
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
46, As Diss,ug/l
46, As Tot, ug/l Limit


Site 46 -Dissolved Barium
Note: the AWQS for Total Barium is 2000 ug/L and thus is not shown on this graph in order to allow greater visual detail of measured values for trend determination
ug/l
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
46, Ba Diss,ug/l
46, Ba Tot, ug/l Limit

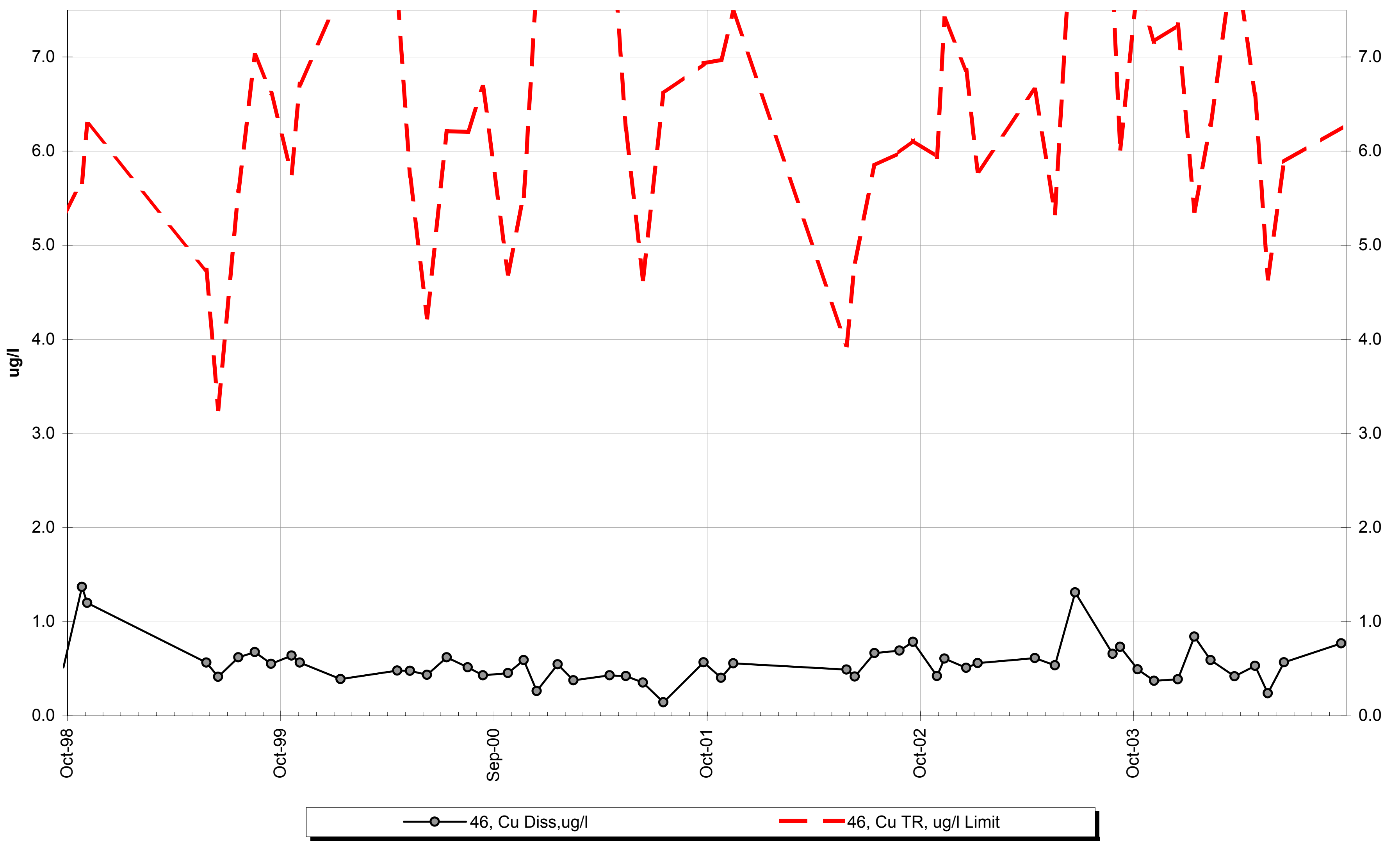


Site 46 -Dissolved Cadmium
ug/l
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
46, Cd Diss,ug/l
46, Cd TR, ug/l Limit

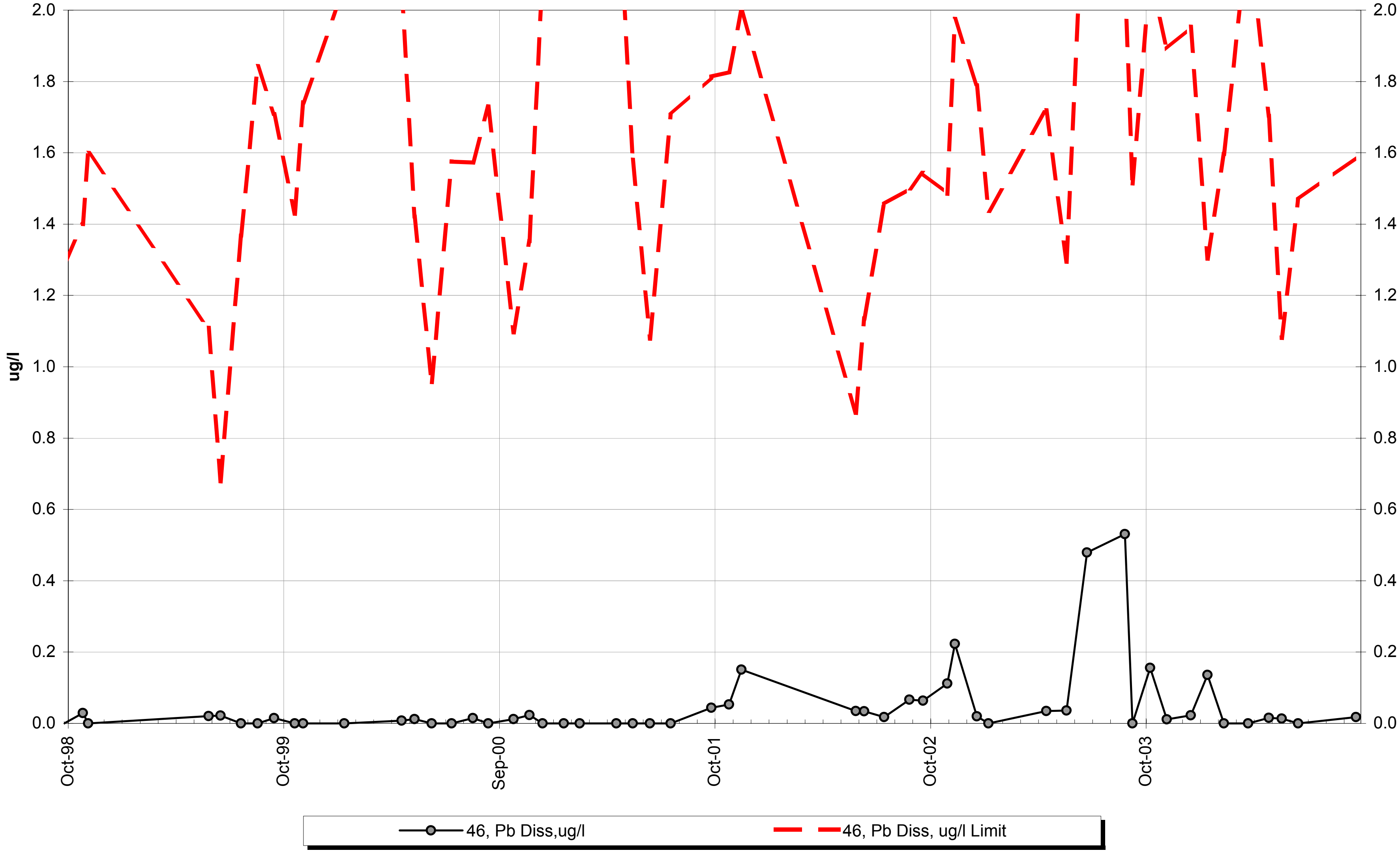
Site 46 -Dissolved Chromium



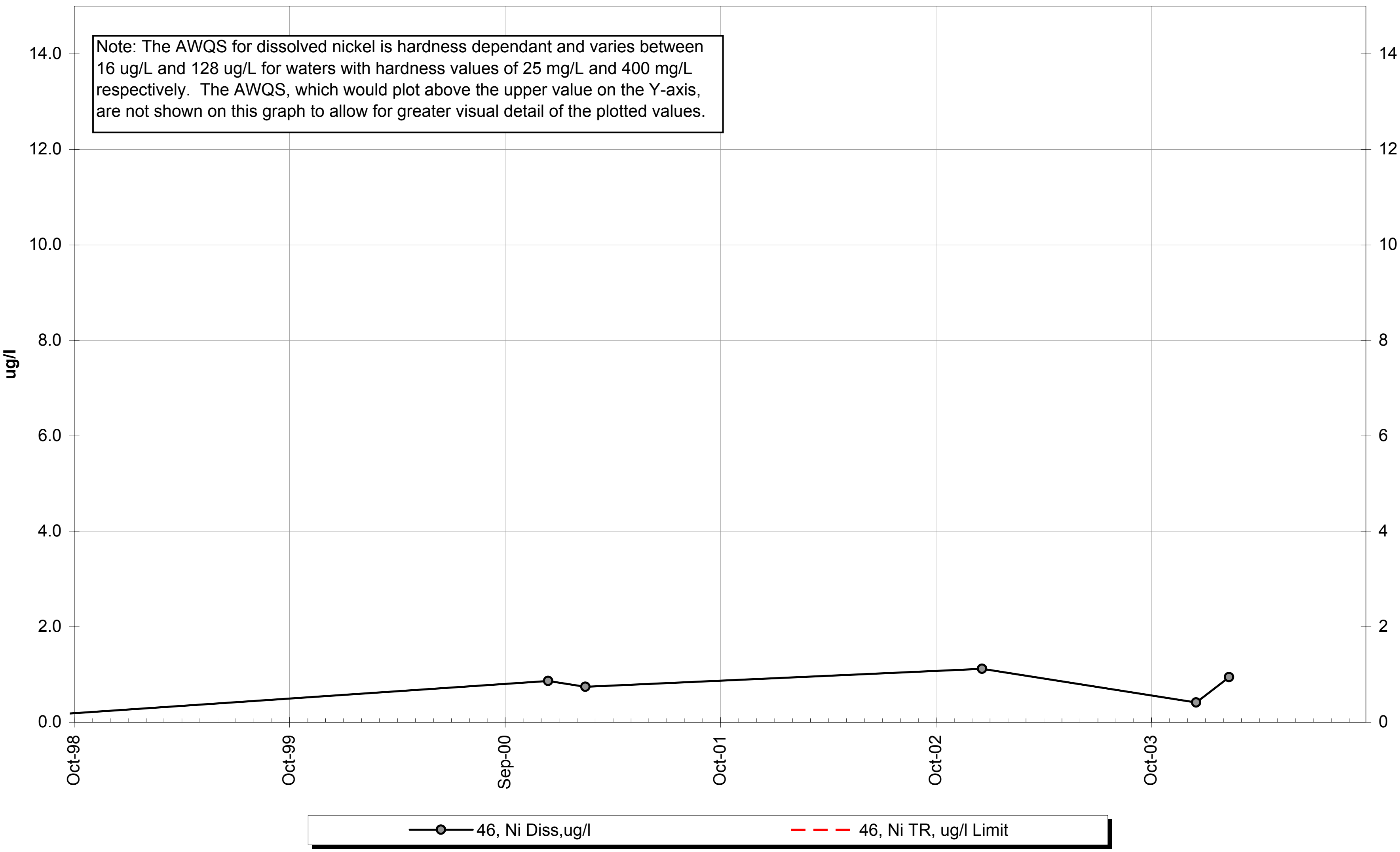
Site 46 -Dissolved Copper



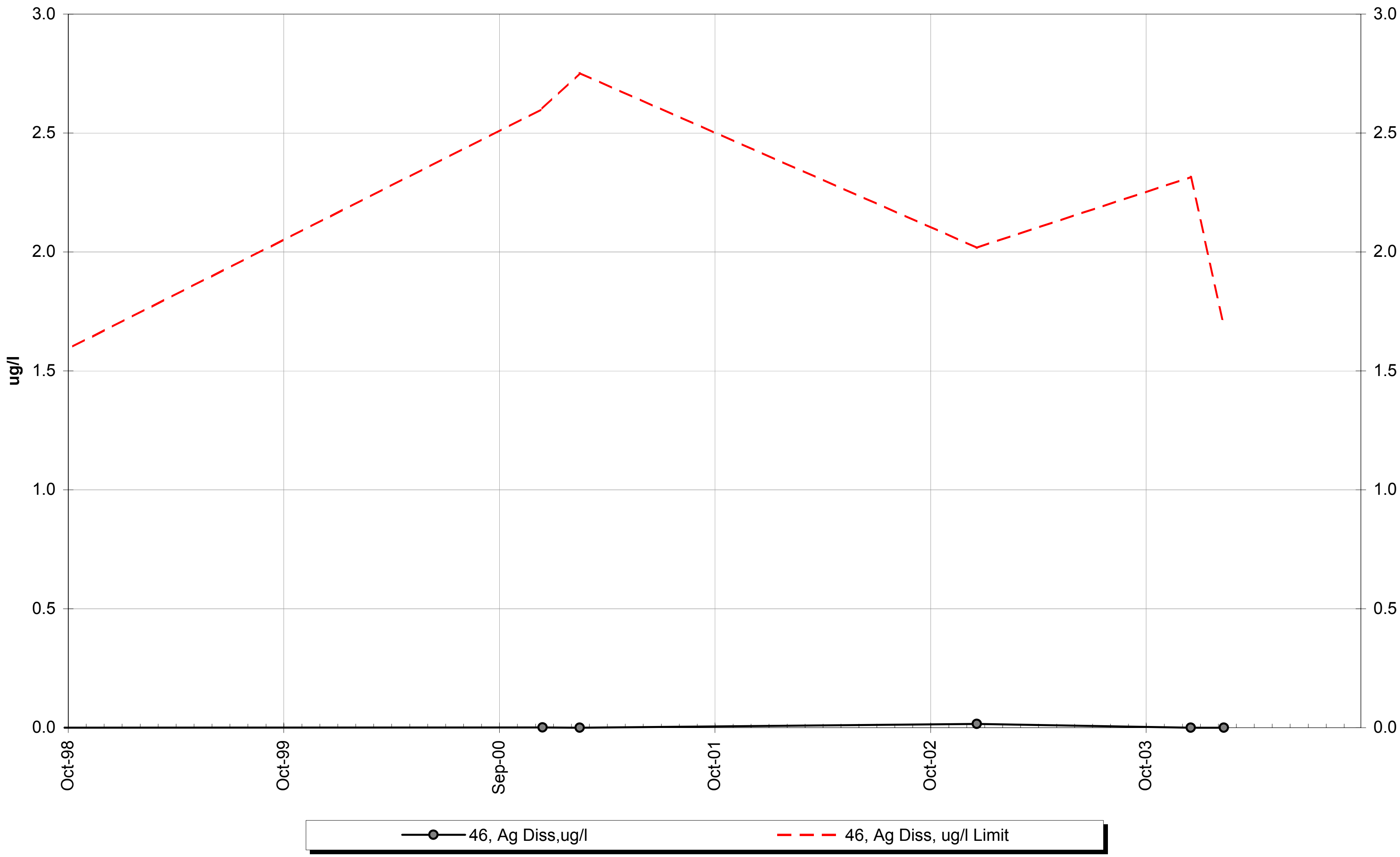
Site 46 -Dissolved Lead

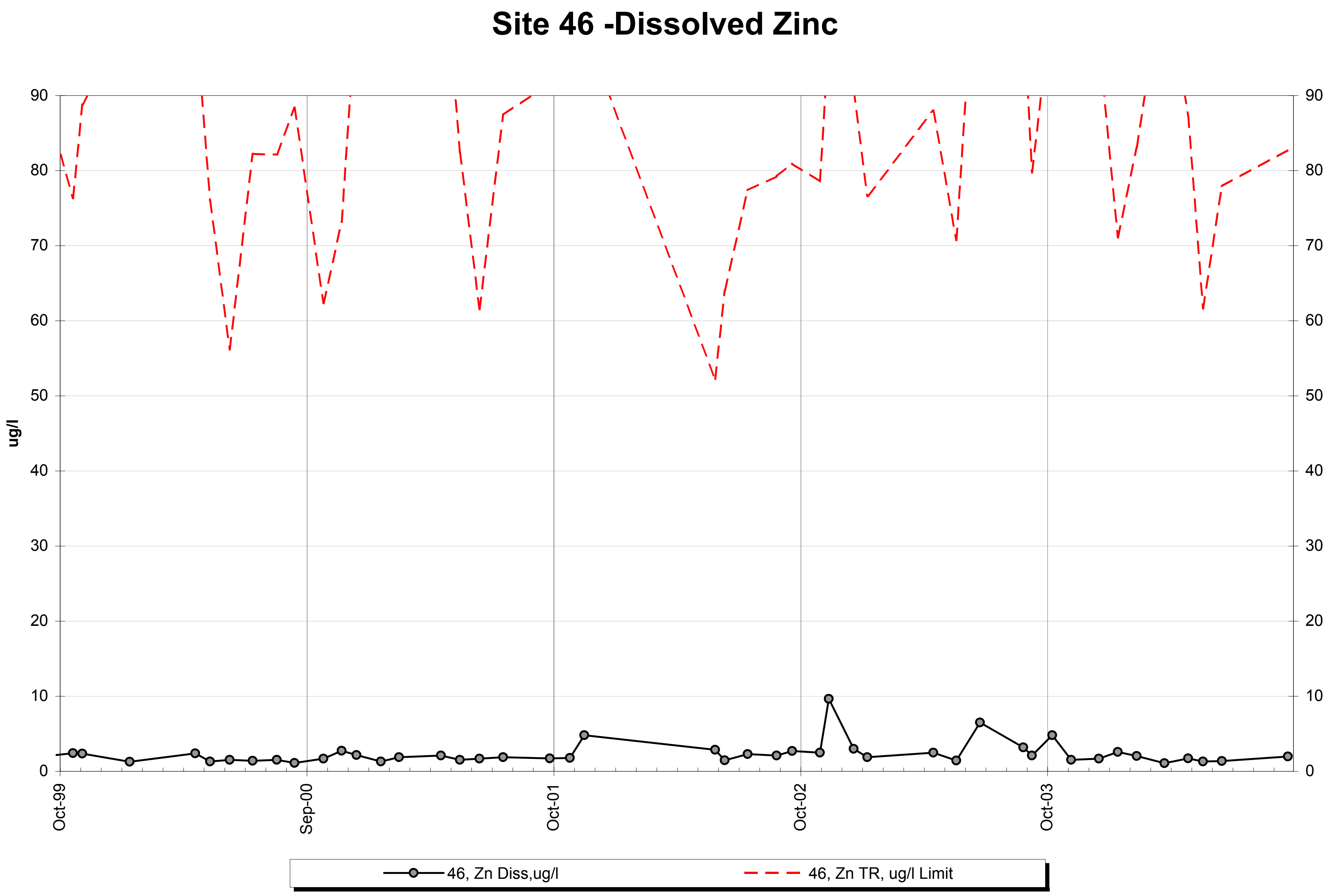


Site 46 -Dissolved Nickel

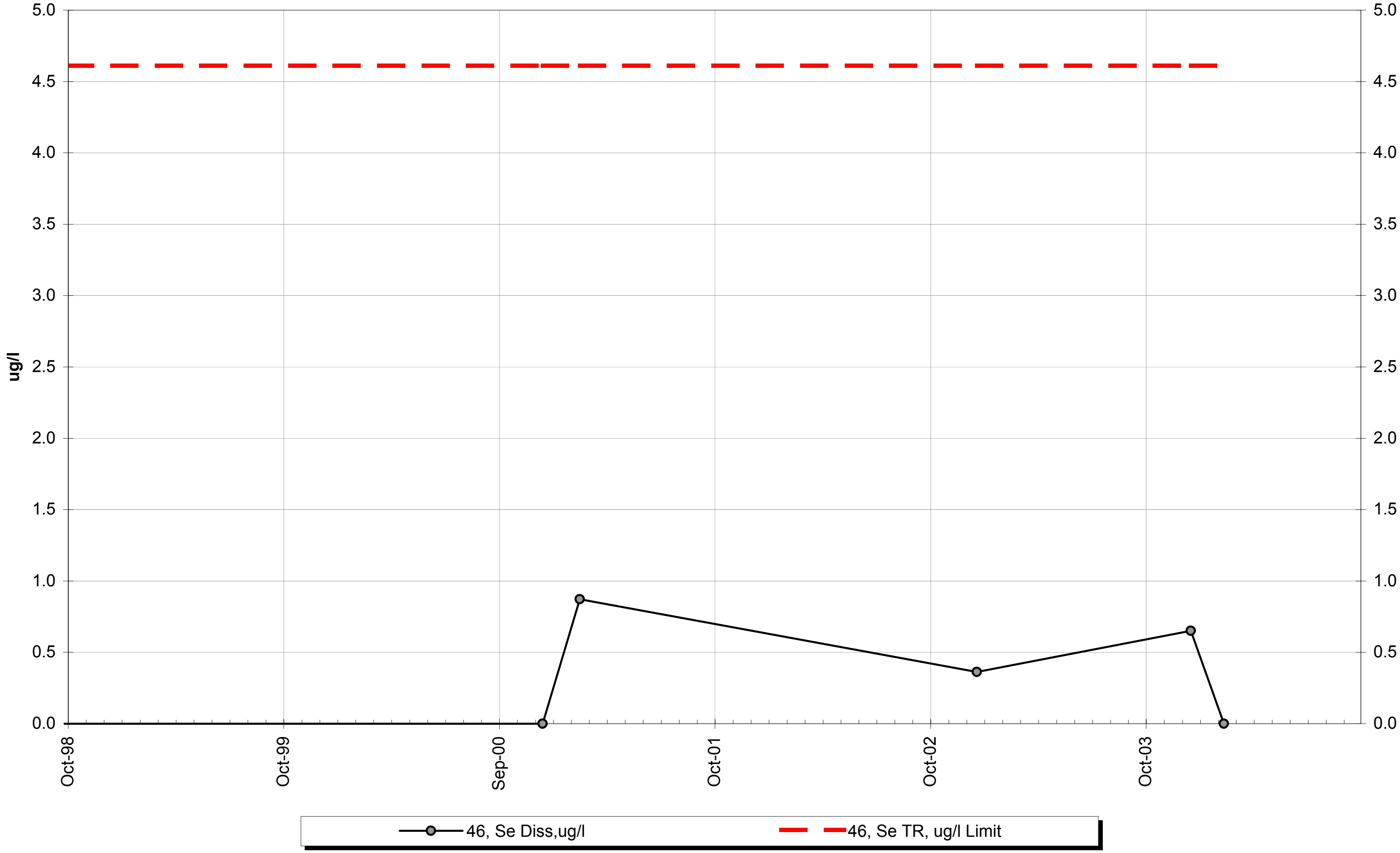


Site 46 -Dissolved Silver

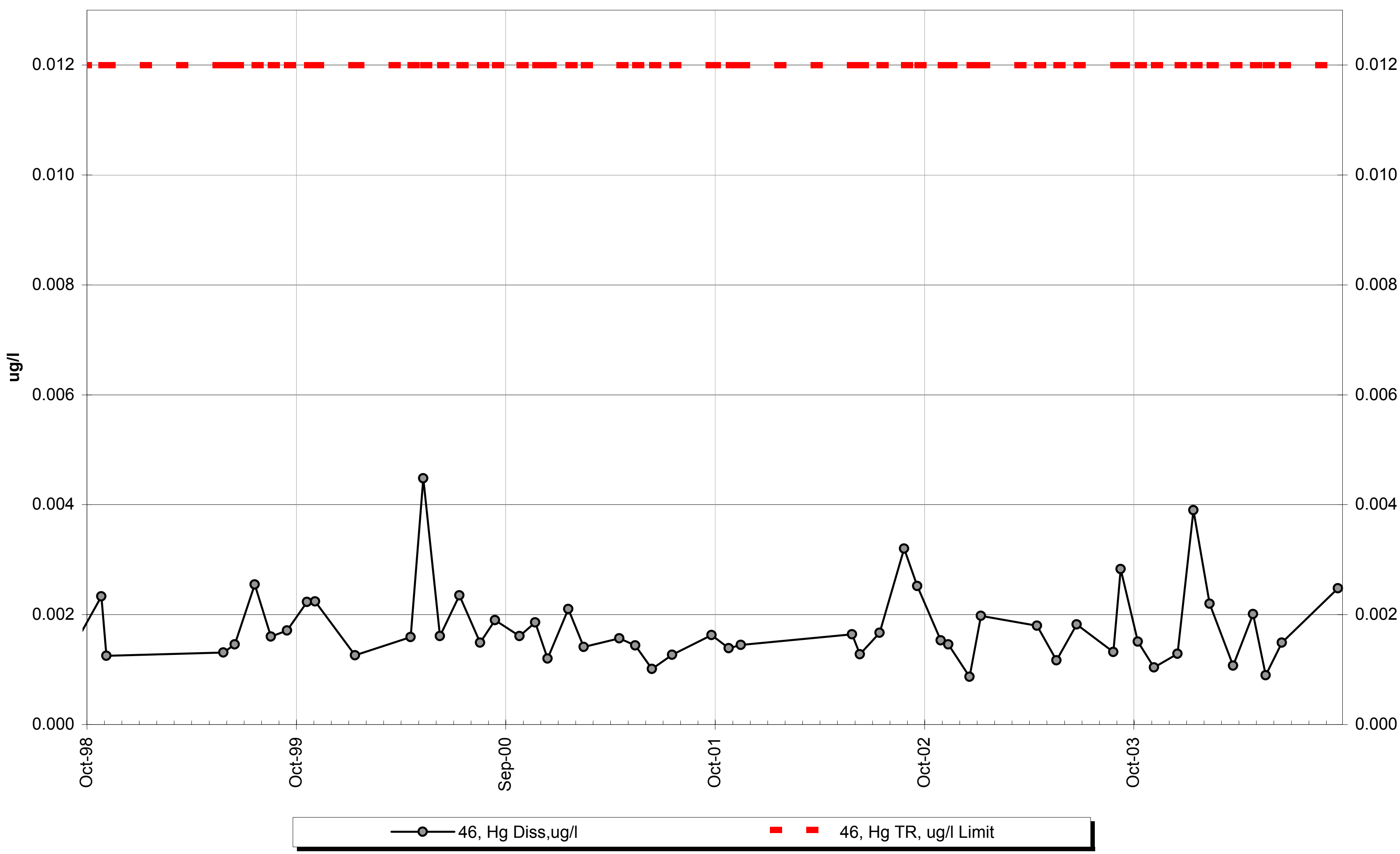



Site 46 -Dissolved Zinc
ug/l
90
80
70
60
50
40
30
20
10
0
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
46, Zn Diss,ug/l
46, Zn TR, ug/l Limit

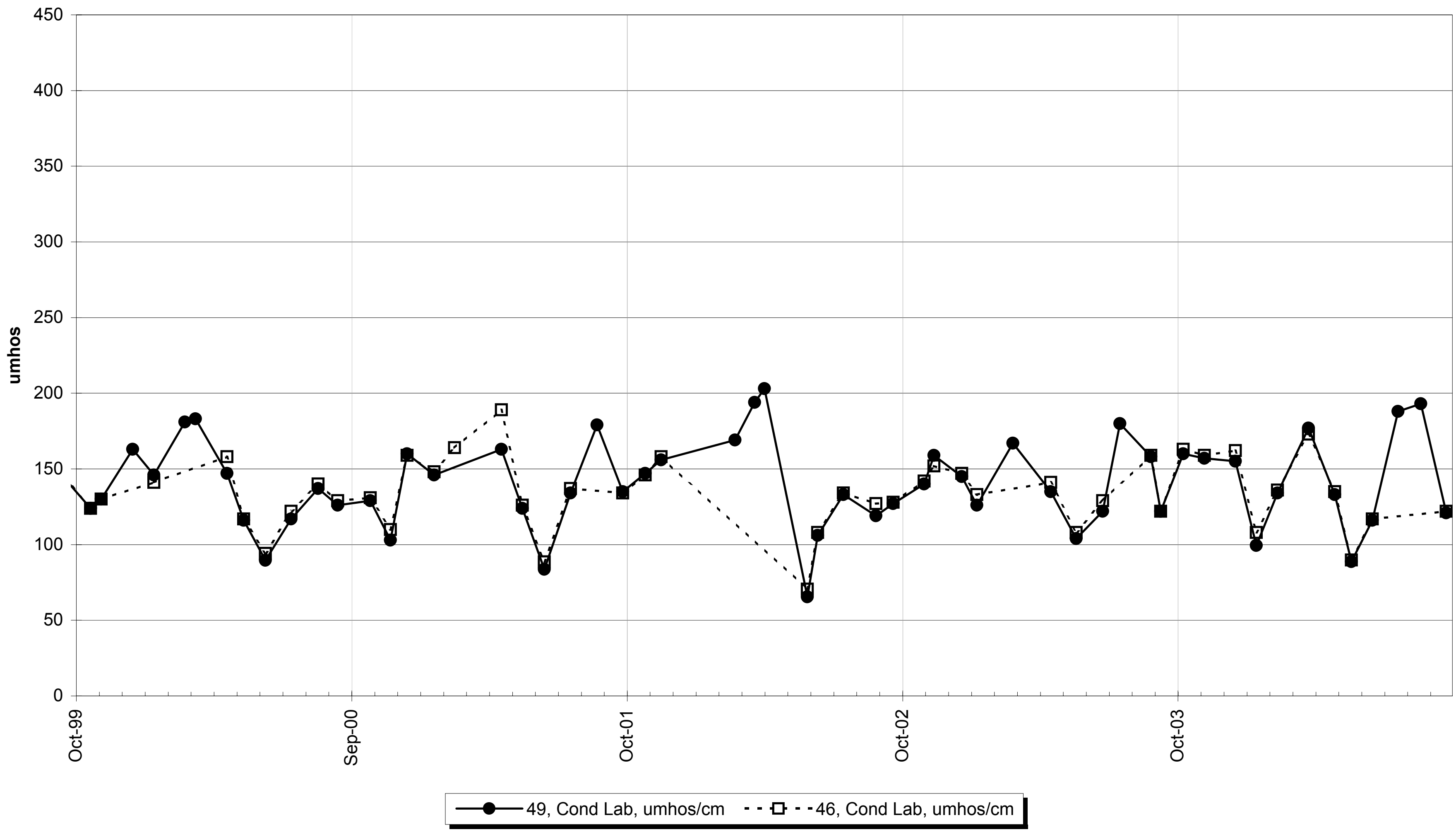
Site 46 -Dissolved Selenium

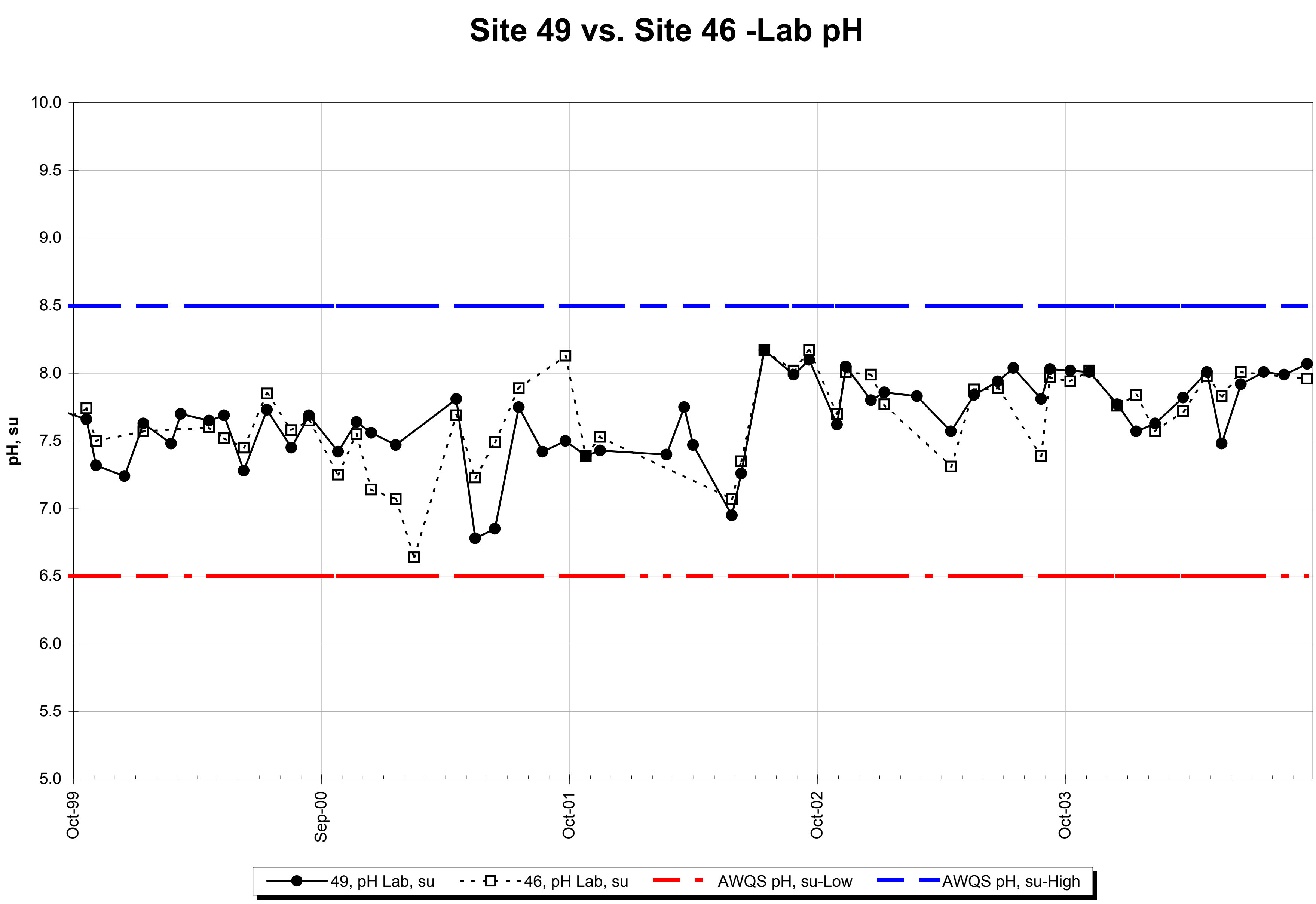


Site 46 -Dissolved Mercury

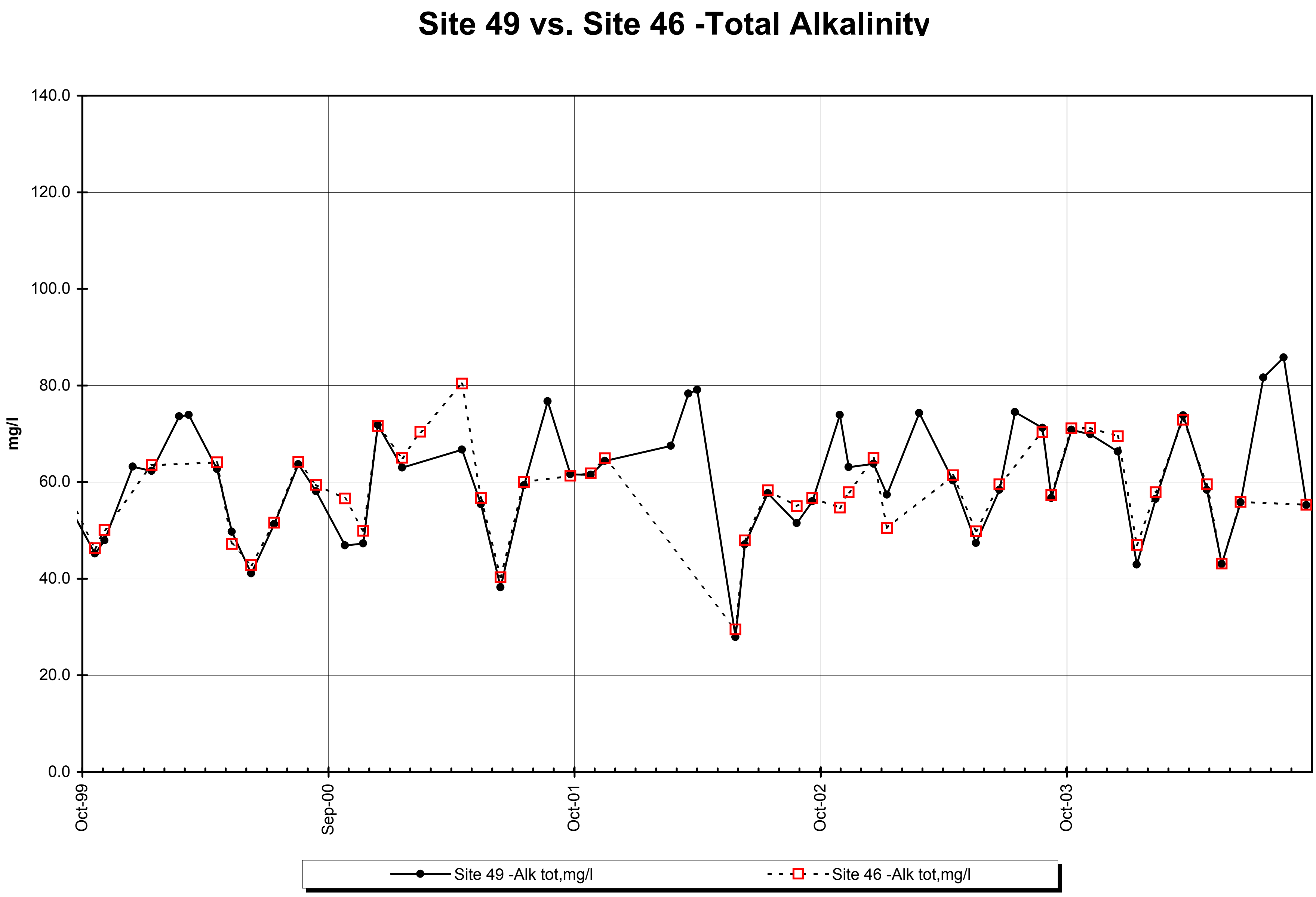


Site 49 vs Site 46 -Conductivity



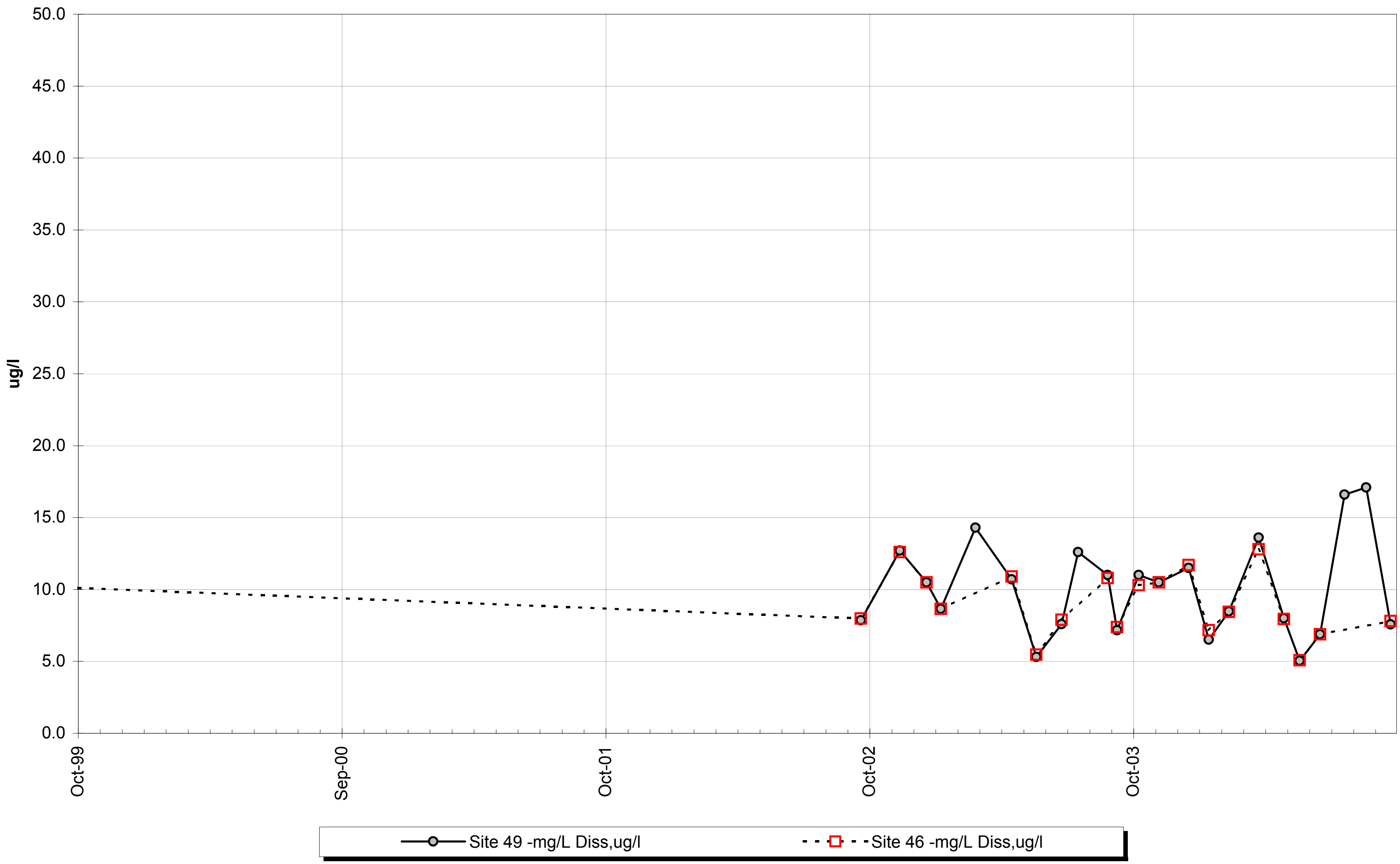


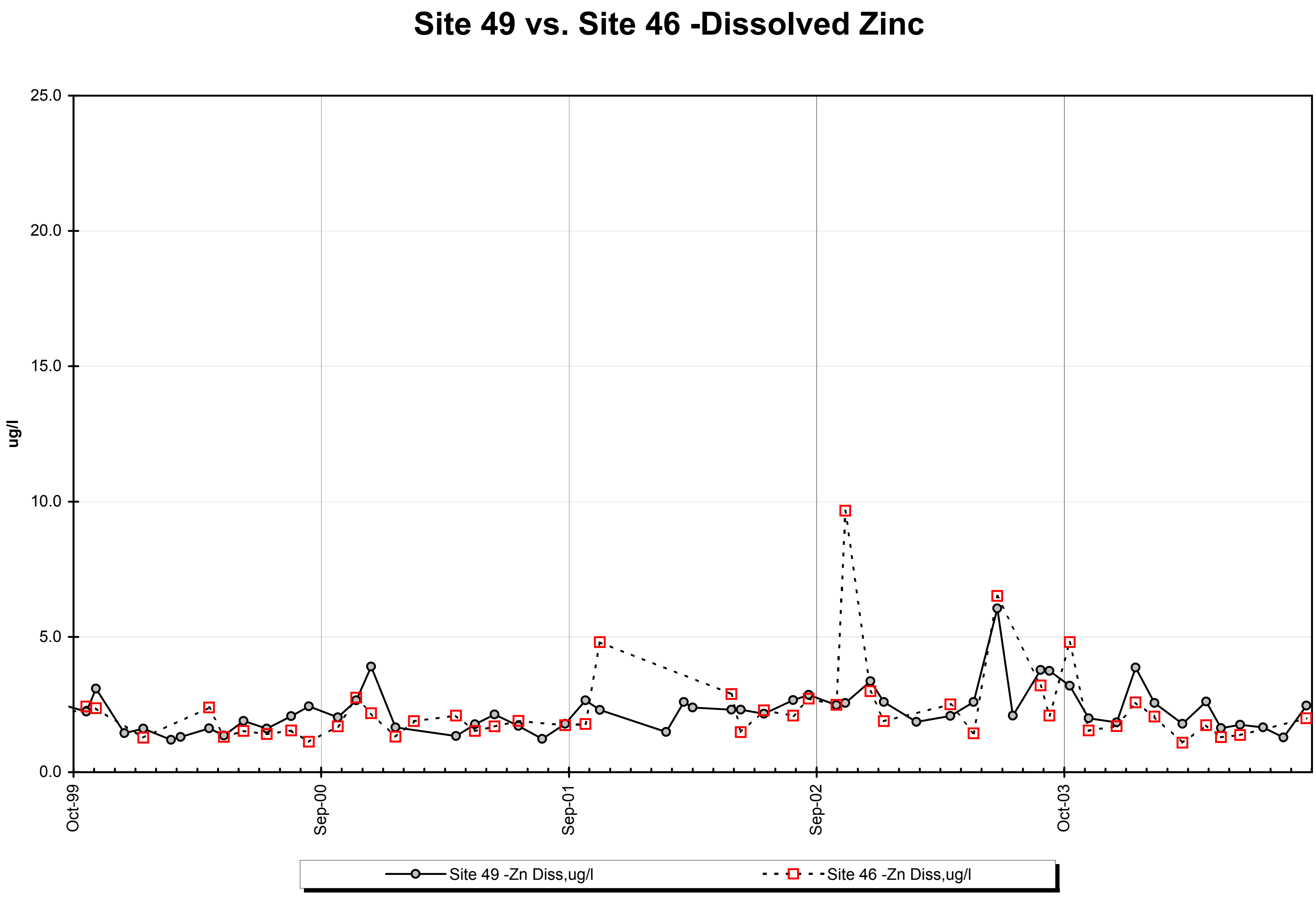
Site 49 vs. Site 46 -Lab pH
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
pH, su
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
49, pH Lab, su
46, pH Lab, su
AWQS pH, su-Low
AWQS pH, su-High



Site 49 vs. Site 46 -Total Alkalinity
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
mg/l
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
Site 49 -Alk tot,mg/l
Site 46 -Alk tot,mg/l

Site 49 vs. Site 46 -Total Sulfate




Site 49 vs. Site 46 -Dissolved Zinc
25.0
20.0
15.0
10.0
5.0
0.0
ug/l
Oct-99
Sep-00
Sep-01
Sep-02
Oct-03
Site 49 -Zn Diss,ug/l
Site 46 -Zn Diss,ug/l

Site **#46** Seasonal Kendall analysis for Specific Conductance, Lab (umhos/cm @ 25°C)

Row label	Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	**WY1999**	130.0	163.0						138.0	85.0	147.0	149.0	145.0
b	**WY2000**	124.0	130.0		141.0			158.0	117.0	94.2	122.0	140.0	129.0
c	**WY2001**	131.0	110.0	159.0	148.0	164.0		189.0	126.0	88.6	137.0		134.0
d	**WY2002**	146.0	158.0						70.6	108.0	134.0	127.0	128.0
e	**WY2003**	142.0	152.0	147.0	133.0			141.0	108.0	129.0		159.0	122.0
f	**WY2004**	163.0	159.0	162.0	108.0	136.0	173.0	135.0	89.8	117.0			122.0
	n	6	6	3	4	2	1	4	6	6	4	4	6

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
t_1	0	0	0	0	0	0	0	0	0	0	0	1
t_2	0	0	0	0	0	0	0	0	0	0	0	0
t_3	0	0	0	0	0	0	0	0	0	0	0	0
t_4	0	0	0	0	0	0	0	0	0	0	0	0
t_5	0	0	0	0	0	0	0	0	0	0	0	0

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
b-a	-1	-1						-1	1	-1	-1	-1
c-a	1	-1						-1	1	-1		-1
d-a	1	-1						-1	1	-1	-1	-1
e-a	1	-1						-1	1		1	-1
f-a	1	-1						-1	1			-1
c-b	1	-1		1			1	1	-1	1		1
d-b	1	1						-1	1	1	-1	-1
e-b	1	1		-1			-1	-1	1		1	-1
f-b	1	1		-1			-1	-1	1			-1
d-c	1	1						-1	1	-1		-1
e-c	1	1	-1	-1			-1	-1	1			-1
f-c	1	1	1	-1	-1		-1	-1	1			-1
e-d	-1	-1						1	1		1	-1
f-d	1	1						1	1			-1
f-e	1	1	1	-1			-1	-1	-1			0
S_k	11	1	1	-4	-1	0	-4	-9	11	-2	0	-12
Qm	6.6								7.7			-4.6
σ^2_S=	28.33	28.33	3.67	8.67	1.00		8.67	28.33	28.33	8.67	8.67	28.33
$Z_k = S_k/\sigma_S$	2.07	0.19	0.52	-1.36	-1.00		-1.36	-1.69	2.07	-0.68	0.00	-2.25
Z^2_k	4.27	0.04	0.27	1.85	1.00		1.85	2.86	4.27	0.46	0.00	5.08

ΣZ_k= -3.50

ΣZ^2_k= 21.94

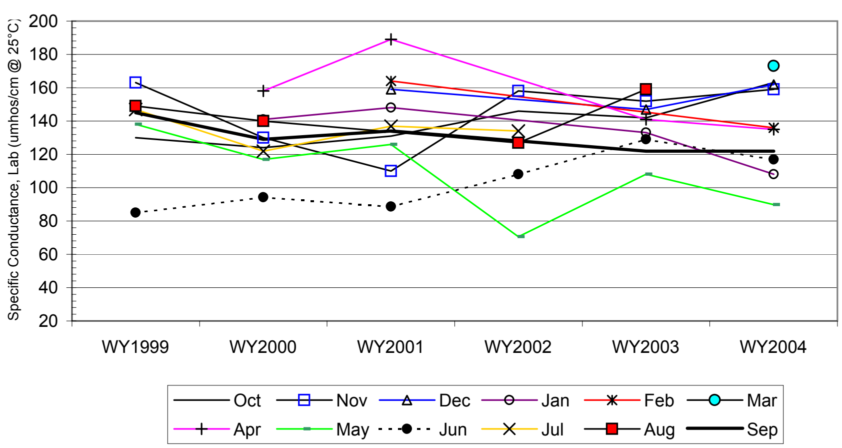
Z-bar=$\Sigma Z_k/K$= -0.32

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	1	0	0	0	0

Σn 52

ΣS_k -8

$\chi^2_h=\Sigma Z^2_k-K(\text{Z-bar})^2$=	20.83	@α=5% $\chi^2_{(K-1)}$= 18.31	Test for station homogeneity	
p	**0.022**		$\chi^2_h<\chi^2_{(K-1)}$	**REJECT**
ΣVAR(S_k) 181.00	Z_{calc} -0.52	@α/2=2.5% Z= 1.96	**H_0** (No trend)	NA
	p **0.301**		**H_A** (± trend)	NA



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Slope	Upper Limit
0.010	-5.75		5.74
0.050	-5.28	**-1.75**	3.85
0.100	-4.37		1.88
0.200	-3.16		0.50

Site **#46** Seasonal Kendall analysis for pH, Lab, Standard Units

Row label	Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	**WY1999**	7.8	7.9						7.8	7.6	7.8	7.9	7.7
b	**WY2000**	7.7	7.5		7.6			7.6	7.5	7.5	7.9	7.6	7.7
c	**WY2001**	7.3	7.6	7.1	7.1	6.6		7.7	7.2	7.5	7.9		8.1
d	**WY2002**	7.4	7.5						7.1	7.4	8.2	8.0	8.2
e	**WY2003**	7.7	8.0	8.0	7.8			7.3	7.9	7.9		7.4	8.0
f	**WY2004**	7.9	8.0	7.8	7.8	7.6	7.7	8.0	7.8	8.0			8.0
	n	6	6	3	4	2	1	4	6	6	4	4	6

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
t_1	0	0	0	0	0	0	0	0	0	0	0	1
t_2	0	0	0	0	0	0	0	0	0	0	0	0
t_3	0	0	0	0	0	0	0	0	0	0	0	0
t_4	0	0	0	0	0	0	0	0	0	0	0	0
t_5	0	0	0	0	0	0	0	0	0	0	0	0

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
b-a	-1	-1						-1	-1	1	-1	0
c-a	-1	-1						-1	-1	1		1
d-a	-1	-1						-1	-1	1	1	1
e-a	-1	1						1	1		-1	1
f-a	1	1						-1	1			1
c-b	-1	1		-1			1	-1	1	1		1
d-b	-1	1						-1	-1	1	1	1
e-b	-1	1		1			-1	1	1		-1	1
f-b	1	1		1			1	1	1			1
d-c	1	-1						-1	-1	1		1
e-c	1	1	1	1			-1	1	1			-1
f-c	1	1	1	1	1		1	1	1			-1
e-d	1	1						1	1		-1	-1
f-d	1	1						1	1			-1
f-e	1	1	-1	1			1	-1	1			-1
S_k	1	7	1	4	1	0	2	-1	5	6	-2	4

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
σ^2_S=	28.33	28.33	3.67	8.67	1.00		8.67	28.33	28.33	8.67	8.67	28.33
Z_k = S_k/σ_S	0.19	1.32	0.52	1.36	1.00		0.68	-0.19	0.94	2.04	-0.68	0.75
Z^2_k	0.04	1.73	0.27	1.85	1.00		0.46	0.04	0.88	4.15	0.46	0.56

ΣZ_k= 7.92

ΣZ^2_k= 11.44

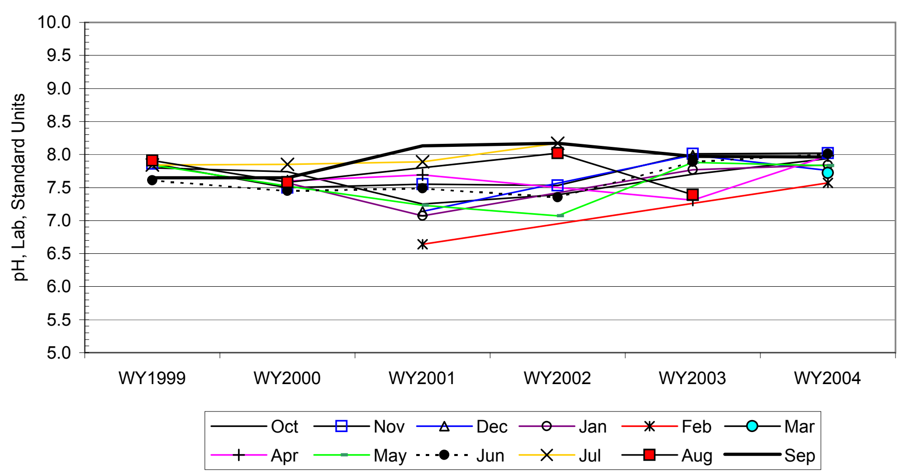
Z-bar=ΣZ_k/K= 0.72

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	1	0	0	0	0

Σn 52

ΣS_k 28

$\chi^2_h=\Sigma Z^2_k-K(\text{Z-bar})^2$= 5.73	@α=5% $\chi^2_{(K-1)}$= 18.31	Test for station homogeneity	
p **0.837**		$\chi^2_h<\chi^2_{(K-1)}$	ACCEPT
ΣVAR(S_k) 181.00	Z_{calc} 2.01	@α/2=2.5% Z= 1.96	**H_0** (No trend)	REJECT
	p **0.978**		**H_A** (± trend)	ACCEPT



Seasonal-Kendall Slope Confidence Intervals

α	**Lower Limit**	**Slope**	**Upper Limit**
0.010	-0.01		0.12
0.050	0.01	**0.05**	0.09
0.100	0.02		0.08
0.200	0.04		0.07

0.6%

Site **#46** Seasonal Kendall analysis for Total Alk, (mg/l)

Row label	Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	**WY1999**	50.1	65.4						53.2	33.1	57.4	57.7	56.0
b	**WY2000**	46.3	50.1		63.5			64.1	47.2	42.8	51.6	64.2	59.4
c	**WY2001**	56.6	49.9	71.6	65.0	70.4		80.4	56.7	40.3	60.0		61.3
d	**WY2002**	61.8	64.9						29.5	47.9	58.3	55.0	56.7
e	**WY2003**	54.7	57.9	65.0	50.5			61.4	49.8	59.5		70.3	57.3
f	**WY2004**	71.1	71.2	69.5	47.0	57.9	72.9	59.5	43.1	55.9			55.3
	n	6	6	3	4	2	1	4	6	6	4	4	6

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
t_1	0	0	0	0	0	0	0	0	0	0	0	0
t_2	0	0	0	0	0	0	0	0	0	0	0	0
t_3	0	0	0	0	0	0	0	0	0	0	0	0
t_4	0	0	0	0	0	0	0	0	0	0	0	0
t_5	0	0	0	0	0	0	0	0	0	0	0	0

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
b-a	-1	-1						-1	1	-1	1	1
c-a	1	-1						1	1	1		1
d-a	1	-1						-1	1	1	-1	1
e-a	1	-1						-1	1		1	1
f-a	1	1						-1	1			-1
c-b	1	-1		1			1	1	-1	1		1
d-b	1	1						-1	1	1	-1	-1
e-b	1	1		-1			-1	1	1		1	-1
f-b	1	1		-1			-1	-1	1			-1
d-c	1	1						-1	1	-1		-1
e-c	-1	1	-1	-1			-1	-1	1			-1
f-c	1	1	-1	-1	-1		-1	-1	1			-1
e-d	-1	-1						1	1		1	1
f-d	1	1						1	1			-1
f-e	1	1	1	-1			-1	-1	-1			-1
S_k	9	3	-1	-4	-1	0	-4	-5	11	2	2	-3

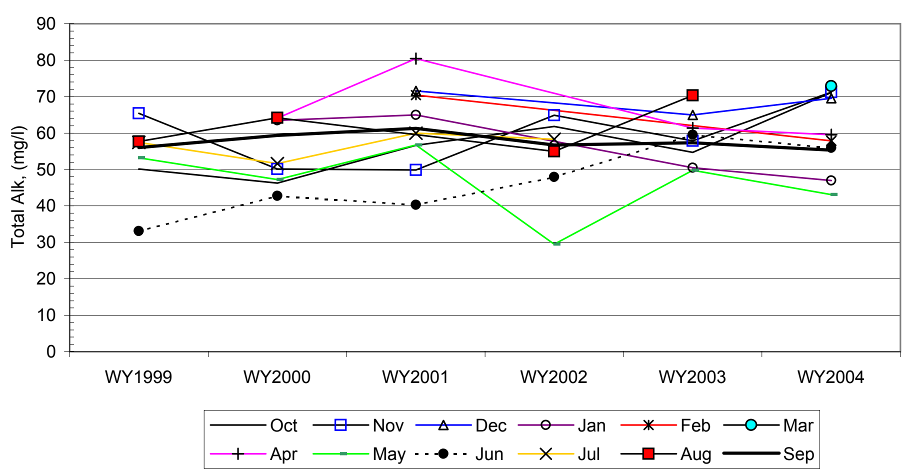
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
σ^2_S=	28.33	28.33	3.67	8.67	1.00		8.67	28.33	28.33	8.67	8.67	28.33
$Z_k = S_k/\sigma_S$	1.69	0.56	-0.52	-1.36	-1.00		-1.36	-0.94	2.07	0.68	0.68	-0.56
Z^2_k	2.86	0.32	0.27	1.85	1.00		1.85	0.88	4.27	0.46	0.46	0.32

ΣZ_k= -0.06
ΣZ^2_k= 14.54
Z-bar=ΣZ_k/K= -0.01

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	0	0	0	0	0

Σn 52
ΣS_k 9

$\chi^2_h=\Sigma Z^2_k-K(\text{Z-bar})^2$=	14.53	@α=5% $\chi^2_{(K-1)}$= 18.31	Test for station homogeneity	
p	**0.150**		$\chi^2_h<\chi^2_{(K-1)}$	ACCEPT
ΣVAR(S_k) 181.00	Z_{calc} 0.59	@α/2=2.5% Z= 1.96	**H_0** (No trend)	ACCEPT
	p **0.724**		**H_A** (± trend)	REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Slope	Upper Limit
0.010	-1.04		3.29
0.050	-0.88	**0.87**	2.73
0.100	-0.70		2.56
0.200	-0.17		1.77

Site **#46** Seasonal Kendall analysis for Zinc, Dissolved (ug/l)

Row label	Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	**WY1999**	2.2	3.5						0.8	2.0	1.6	2.7	2.1
b	**WY2000**	2.4	2.4		1.3			2.4	1.3	1.5	1.4	1.5	1.1
c	**WY2001**	1.7	2.8	2.2	1.3	1.9		2.1	1.5	1.7	1.9		1.7
d	**WY2002**	1.8	4.8						2.9	1.5	2.3	2.1	2.7
e	**WY2003**	2.5	9.7	3.0	1.9			2.5	1.4	6.5		3.2	2.1
f	**WY2004**	4.8	1.5	1.7	2.6	2.1	1.1	1.7	1.3	1.4			2.0
	n	6	6	3	4	2	1	4	6	6	4	4	6

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
t_1	0	0	0	0	0	0	0	0	0	0	0	0
t_2	0	0	0	0	0	0	0	0	0	0	0	0
t_3	0	0	0	0	0	0	0	0	0	0	0	0
t_4	0	0	0	0	0	0	0	0	0	0	0	0
t_5	0	0	0	0	0	0	0	0	0	0	0	0

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
b-a	1	-1						1	-1	-1	-1	-1
c-a	-1	-1						1	-1	1		-1
d-a	-1	1						1	-1	1	-1	1
e-a	1	1						1	1		1	1
f-a	1	-1						1	-1			-1
c-b	-1	1		1			-1	1	1	1		1
d-b	-1	1						1	-1	1	1	1
e-b	1	1		1			1	1	1		1	1
f-b	1	-1		1			-1	-1	-1			1
d-c	1	1						1	-1	1		1
e-c	1	1	1	1			1	-1	1			1
f-c	1	-1	-1	1	1		-1	-1	-1			1
e-d	1	1						-1	1		1	-1
f-d	1	-1						-1	-1			-1
f-e	1	-1	-1	1			-1	-1	-1			-1
S_k	7	1	-1	6	1	0	-2	3	-5	4	2	3

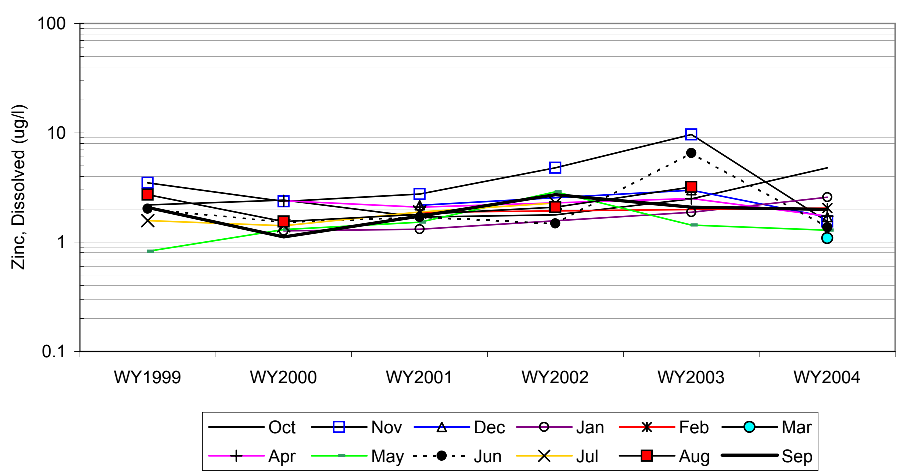
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
σ^2_S=	28.33	28.33	3.67	8.67	1.00		8.67	28.33	28.33	8.67	8.67	28.33
$Z_k = S_k/\sigma_S$	1.32	0.19	-0.52	2.04	1.00		-0.68	0.56	-0.94	1.36	0.68	0.56
Z^2_k	1.73	0.04	0.27	4.15	1.00		0.46	0.32	0.88	1.85	0.46	0.32

ΣZ_k= 5.57
ΣZ^2_k= 11.48
Z-bar=$\Sigma Z_k/K$= 0.51

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	0	0	0	0	0

Σn 52
ΣS_k 19

$\chi^2_h=\Sigma Z^2_k - K(\text{Z-bar})^2$=	8.66	@α=5% $\chi^2_{(K-1)}$= 18.31	Test for station homogeneity	
p	**0.564**		$\chi^2_h<\chi^2_{(K-1)}$	ACCEPT
ΣVAR(S_k) 181.00	Z_{calc} 1.34	@α/2=2.5% Z= 1.96	**H_0** (No trend)	ACCEPT
	p **0.910**		**H_A** (± trend)	REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Slope	Upper Limit
0.010	-0.08		0.32
0.050	-0.02	**0.09**	0.23
0.100	0.00		0.22
0.200	0.04		0.18

Large Sample Approximation
Wilcoxon-Mann-Whitney Rank Sum Test

Variable: Specific Conductance, Lab (umhos/cm @ 25°C)

Site	#49	#46	Ranks	
Year	WY2004	WY2004	**A**	**B**
Oct	160.0	163.0	16	18
Nov	157.0	159.0	14	15
Dec	155.0	162.0	13	17
Jan	99.4	108.0	3	4
Feb	134.0	136.0	10	12
Mar	177.0	173.0	20	19
Apr	133.0	135.0	9	11
May	88.8	89.8	1	2
Jun	116.0	117.0	5	6
Jul	188.0		21	
Aug	193.0		22	
Sep	121.0	122.0	7	8
Median	144.5	135.5		

N= 22 ΣR 141 112

	n	**m**
	12	10

W= 57

w_α 18

Upper 102

Lower 18

μ_W= 115

σ_W= 15.17

Z_{rs}= -0.16

p-test

0.4345

$\alpha/2$

0.025

H_0

($\mu_A=\mu_B$)

ACCEPT

Large Sample Approximation
Wilcoxon-Mann-Whitney Rank Sum Test
Variable: **pH, Lab, Standard Units**

Site	#49	#46	Ranks	
Year	WY2004	WY2004	**A**	**B**
Oct	8.02	7.94	20.5	12
Nov	8.01	8.02	17.5	20.5
Dec	7.77	7.76	7	6
Jan	7.57	7.84	2.5	10
Feb	7.63	7.57	4	2.5
Mar	7.82	7.72	8	5
Apr	8.01	7.98	17.5	14
May	7.48	7.83	1	9
Jun	7.92	8.01	11	17.5
Jul	8.01		17.5	
Aug	7.99		15	
Sep	8.07	7.96	22	13
Median	7.96	7.89		

N= 22 ΣR 143.5 109.5

	n	**m**
	12	10

W= 54.5
wα 18
Upper 102
Lower 18

μ_W= 115
σ_W= 15.11
Z_{rs}= -0.33

p-test
0.3704
$\alpha/2$
0.025

H_0
($\mu_A=\mu_B$)
ACCEPT

Large Sample Approximation

Wilcoxon-Mann-Whitney Rank Sum Test

Variable: **Total Alk, (mg/l)**

Site	#49	#46	Ranks	
Year	WY2004	WY2004	**A**	**B**
Oct	70.8	71.1	16	17
Nov	69.9	71.2	15	18
Dec	66.3	69.5	13	14
Jan	42.9	47.0	1	4
Feb	56.5	57.9	9	10
Mar	73.8	72.9	20	19
Apr	58.4	59.5	11	12
May	43.0	43.1	2	3
Jun	55.8	55.9	7	8
Jul	81.6		21	
Aug	85.8		22	
Sep	55.2	55.3	5	6
Median	62.35	58.70		

N= 22

ΣR 142 111

n	**m**
12	10

W= 56

w_{α} 18

Upper 102

Lower 18

μ_W= 115

σ_W= 15.17

Z_{rs}= -0.23

p-test

0.4087

$\alpha/2$

0.025

H_0

$(\mu_A=\mu_B)$

ACCEPT

Large Sample Approximation
Wilcoxon-Mann-Whitney Rank Sum Test
Variable: **Sulfate, Total (mg/l)**

Site	#49	#46	Ranks	
Year	WY2004	WY2004	**A**	**B**
Oct	11.0	10.3	16	13
Nov	10.5	10.5	14.5	14.5
Dec	11.5	11.7	17	18
Jan	6.5	7.2	3	6
Feb	8.5	8.4	12	11
Mar	13.6	12.8	20	19
Apr	8.0	8.0	10	9
May	5.1	5.1	1	2
Jun	6.9	6.9	4.5	4.5
Jul	16.6		21	
Aug	17.1		22	
Sep	7.6	7.8	7	8
Median	9.5	8.2		

N= 22 ΣR 148 105

	n	**m**
	12	10

W= 50

w_{α} 18

Upper 102

Lower 18

μ_W= 115

σ_W= 15.16

Z_{rs}= -0.63

p-test

0.2654

$\alpha/2$

0.025

H_0

$(\mu_A=\mu_B)$

ACCEPT

Large Sample Approximation
Wilcoxon-Mann-Whitney Rank Sum Test
Variable: **Zinc, Dissolved (ug/l)**

Site	#49	#46	Ranks	
Year	WY2004	WY2004	**A**	**B**
Oct	3.19	4.80	20	22
Nov	1.99	1.54	13.5	5
Dec	1.84	1.70	12	8
Jan	3.87	2.57	21	18
Feb	2.56	2.05	17	15
Mar	1.79	1.09	11	1
Apr	2.61	1.73	19	9
May	1.63	1.29	6	3
Jun	1.75	1.37	10	4
Jul	1.65		7	
Aug	1.28		2	
Sep	2.46	1.99	16	13.5
Median	1.92	1.72		

N= 22 ΣR 154.5 98.5

	n	**m**
	12	10

W= 43.5

w_α 18

Upper 102

Lower 18

μ_W= 115

σ_W= 15.16

Z_{rs}= -1.06

p-test

0.1456

$\alpha/2$

0.025

H_0

$(\mu_A=\mu_B)$

ACCEPT

INTERPRETIVE REPORT
SITE 57 "MONITORING WELL 23-00-03"

The data collected during the current water year are listed in the following "Table of Results for Water Year 2004" report. The table includes all the data, field and lab, collected for the current water year and a series of flags keyed to the summary report "Qualified Data by QA Reviewer". The QA report lists any associated data limitations found during the monthly QA reviews of laboratory data for this site. Median values for all analytes have been calculated and are shown in the right-most column of the table of results. Any value reported as less than MDL has been replaced with a value of zero for the purpose of median calculation.

Sampling at this site was added to the FWMP in October-2001 to monitor upgradient groundwater quality at Site 23/D. All data collected at this site since it's inception into the FWMP are included in the data analyses with the exception of one outlier shown on the table below. During the current year no new data points were flagged as outliers after review by KGCMC.

Sample Date	Parameter	Value	Qualifier	Notes
7/17/2003	Alkalinity, Total mg/L	35.3	RR	Suspected sample contamination

The data for Water Year 2004 have been compared to the strictest fresh water quality criterion for each applicable analyte. Fifteen results exceeding these criteria have been identified: (6) for dissolved cadmium, (8) for dissolved lead, and (1) for dissolved zinc. All 15 results are listed in the table below. The dissolved cadmium exceedances occurred from April-2004 through Sept-2004 (the end of the water year). The values appeared to be distinctly elevated from the prior water year's sampled which ranged between <0.023 µg/l and 0.175 µg/l. However, during the first year of sampling at this site (Oct-2001 through Sept-2002), two (2) elevated values of 3.38 µg/l and 0.825 µg/l were recorded. Thus the current water year's exceedances while elevated with respect to the prior water years results are within the range of historical measurements for the short duration of record at this site. The dissolved lead values include all (8) samples taken at this site during the 2004 Water Year. The previous discussion regarding dissolved cadmium applies to dissolved lead with generally lower values observed for the prior sampling record but an initial elevated value of 21.9 µg/l noted in Nov-2001. Dissolved zinc has only one result, June-04, exceeding AWQS but shows a similar trend to Cd and Pb with elevated levels occurring from April-04 through Oct-04 as compared to the prior water-year. This site is the upgradient groundwater site used for comparison purposes to monitor any influence from Site 23/D. Thus, while all the values are elevated and appear erratic when compared to the 2003WY results, the variances are interpreted to be within the natural range for this site.

Sample Date	Parameter	Value	Hardness (mg/L)	Standard	Standard Type
04/27/04	Cadmium Dissolved ug/L	0.632	195	0.39	Aquatic Life, chronic
05/19/04	Cadmium Dissolved ug/L	0.663	204	0.40	Aquatic Life, chronic
06/16/04	Cadmium Dissolved ug/L	1.51	200	0.40	Aquatic Life, chronic
07/20/04	Cadmium Dissolved ug/L	0.739	205	0.40	Aquatic Life, chronic
08/19/04	Cadmium Dissolved ug/L	0.509	199	0.40	Aquatic Life, chronic
09/22/04	Cadmium Dissolved ug/L	0.476	202	0.40	Aquatic Life, chronic
10/09/03	Lead, Dissolved ug/L	8.11	213	5.67	Aquatic Life, chronic
11/06/03	Lead, Dissolved ug/L	8.65	192	5.08	Aquatic Life, chronic
04/27/04	Lead, Dissolved ug/L	21.7	195	5.16	Aquatic Life, chronic
05/19/04	Lead, Dissolved ug/L	15.6	204	5.42	Aquatic Life, chronic
06/16/04	Lead, Dissolved ug/L	28.3	200	5.31	Aquatic Life, chronic
07/20/04	Lead, Dissolved ug/L	15.3	205	5.45	Aquatic Life, chronic
08/19/04	Lead, Dissolved ug/L	7.71	199	5.28	Aquatic Life, chronic
09/22/04	Lead, Dissolved ug/L	11.1	202	5.36	Aquatic Life, chronic
06/16/04	Zinc, Dissolved ug/L	288	200	212.55	Aquatic Life, chronic

X-Y plots have been generated to graphically present the data for each of the analytes requested in the Statistical Information Goals for this site. These plots have been visually analyzed for the appearance of any trend in concentration. Except for dissolved cadmium and dissolved lead no obvious long term trends were apparent. As noted above in the discussion concerning AWQS, dissolved lead and cadmium show a marked increase for the same period. Given the erratic nature of the trends and the number of different analytes involved, the changes in water chemistry may reflect a change in the character of the ground water at this site. As noted in the “Site 23/D Hydrogeology and Geochemistry Analysis” report (EDE, 2004) Site 57 may sample one of multiple perched water lenses. Thus, if Site 57 samples a relatively small aquifer it may be more susceptible to short term variations in recharge rate. The changes noted at Site 57 are thus interpreted to mostly likely be the result of the limited aquifer sampled at this site. No statistical analysis for trend was performed on the Site 57 data. For a robust analysis of trend at least 5 years of data is required. KGCMC anticipates adding this component into the Water Year 2006 annual report for this site.

Table of Results for Water Year 2004

Site 57 "MW-23-00-03"

Sample Date/Parameter	10/9/2003	11/6/2003	Dec-03	Jan-04	Feb-04	Mar-04	4/27/2004	5/19/2004	6/16/2004	7/20/2004	8/19/2004	9/22/2004	**Median**
Water Temp (°C)	6.8	5.5					6.5	6.1	7.3	8.7	6.6	5.7	6.6
Conductivity-Field(µmho)	411	403					353	419	424	413	423	380	412
Conductivity-Lab (µmho)	415	376					343	376	377 J	382	387	311	377
pH Lab (standard units)	7.54	7.55					7.41	7.28	7.52 J	7.57 J	7.56	7.70	7.55
pH Field (standard units)	7.27	7.51					7.39	7.58	7.35	7.72	7.32	8.30	7.45
Total Alkalinity (mg/L)	159.0	148.0					131.0	150.0	158.0 J	155.0	165.0	126.0	150.0
Total Sulfate (mg/L)	113.0	50.4					47.7	51.4	50.5	54.3	55.9	48.9	51.0
Hardness (mg/L)	213.0	192.0					195.0	204.0	200.0	205.0	199.0	202.0	201.0
Dissolved As (ug/L)	0.676	0.677	NOT SCHEDULED FOR SAMPLING				0.818	0.888	1.830	0.713	0.657	0.696	0.705
Dissolved Ba (ug/L)	33.5	30.5					32.7	28.5	64.8	29.9	28.6	31.1	30.8
Dissolved Cd (ug/L)	0.209	0.204					0.632	0.663	1.510	0.739	0.509	0.476	0.571
Dissolved Cr (ug/L)	0.079	1.950					0.264	2.160 J	2.130 J	0.307	0.633	0.252	0.470
Dissolved Cu (ug/L)	0.249 J	0.206					0.751	0.701	3.630	0.421	0.492	0.204	0.457
Dissolved Pb (ug/L)	8.1100 U	8.6500					21.7000	15.6000	28.3000	15.3000	7.7100	11.1000	13.2000
Dissolved Ni (ug/L)	1.280	1.840					0.925	1.660 J	6.680	0.570 J	2.150	1.280	1.470
Dissolved Ag (ug/L)	<0.003	0.009 J					<0.009	<0.009 UJ	0.013 J	<0.002	<0.002	0.004 J	0.004
Dissolved Zn (ug/L)	10.70	7.04					64.50 J	80.00 J	288.00	94.50	55.90 J	70.70	67.60
Dissolved Se (ug/L)	0.360 J	0.927					0.887 UJ	0.792 J	2.180 UJ	0.909	0.832	0.808	0.860
Dissolved Hg (ug/L)	0.000374 U	0.000333 U					0.000718 U	0.000303 UJ	0.000548 U	0.000566 U	0.000867 U		0.000548

For individual sample/analyte qualifier descriptions see "Qualified Data by QA Reviewer" table.

Values reported as less than MDL are replaced by 1/2 MDL for median calculation purposes.

Shaded data has been qualified as an outlier by KGCMC and removed from any further analysis and is not included into the calculation of the median

Qualified Data by QA Reviewer

Date Range: 10/01/2003 to 09/30/2004

Site No.	Sample Date	Sample Time	Parameter	Value	Qualifier	Reason for Qualifier
57	10/09/2003	3:08:00 PM				
			Cu Diss, ug/l	0.249	J	Below Quantitative Range
			Pb Diss, ug/l	8.11	U	Field Blank Contamination
			Se Diss, ug/l	0.36	J	Below Quantitative Range, L
			Hg Diss, ug/l	0.000374	U	Method Blank Contamination,
57	11/06/2003	12:30:00 PM				
			Ag Diss, ug/l	0.009	J	Below Quantitative Range
			Hg Diss, ug/l	0.000333	U	Below Quantitative Range, Fi
57	04/27/2004	11:21:00 AM				
			Zn Diss, ug/l	64.5	J	LCS Recovery
			Se Diss, ug/l	0.887	UJ	LCS Recovery
			Hg Diss, ug/l	0.000718	U	Method Blank Contamination
57	05/19/2004	10:26:00 AM				
			Cr Diss, ug/l	2.16	J	CCV Recovery
			Ni Diss, ug/l	1.66	J	CCV Recovery
			Ag Diss, ug/l	-0.009	UJ	MS Recovery
			Zn Diss, ug/l	80	J	LCS Recovery
			Se Diss, ug/l	0.792	J	Below Quantitative Range, L
			Hg Diss, ug/l	0.000303	UJ	Below Quantitative Range, M
57	06/16/2004	11:40:00 AM				
			Cond Lab, umho	377	J	Sample Temperature
			pH Lab, su	7.52	J	Hold Time
			Alk Tot, mg/l	158	J	Sample Temperature
			Cr Diss, ug/l	2.13	J	Duplicate RDP
			Ag Diss, ug/l	0.0132	J	Below Quantitative Range
			Se Diss, ug/l	2.18	UJ	LCS Recovery
			Hg Diss, ug/l	0.000548	U	Method Blank Contamination
57	07/20/2004	3:33:00 PM				
			pH Lab, su	7.57	J	Hold Time
			Ni Diss, ug/l	0.57	J	CCV Recovery
			Hg Diss, ug/l	0.000566	U	Method Blank Contamination

Qualifier	Description
J	Positively Identified - Approximate Concentration
N	Presumptive Evidence For Tentative Identification
NJ	Tentatively Identified - Approximate Concentration
R	Rejected - Cannot Be Verified
U	Not Detected Above Quantitation Limit
UJ	Not Detected Above Approximate Quantitation Limit

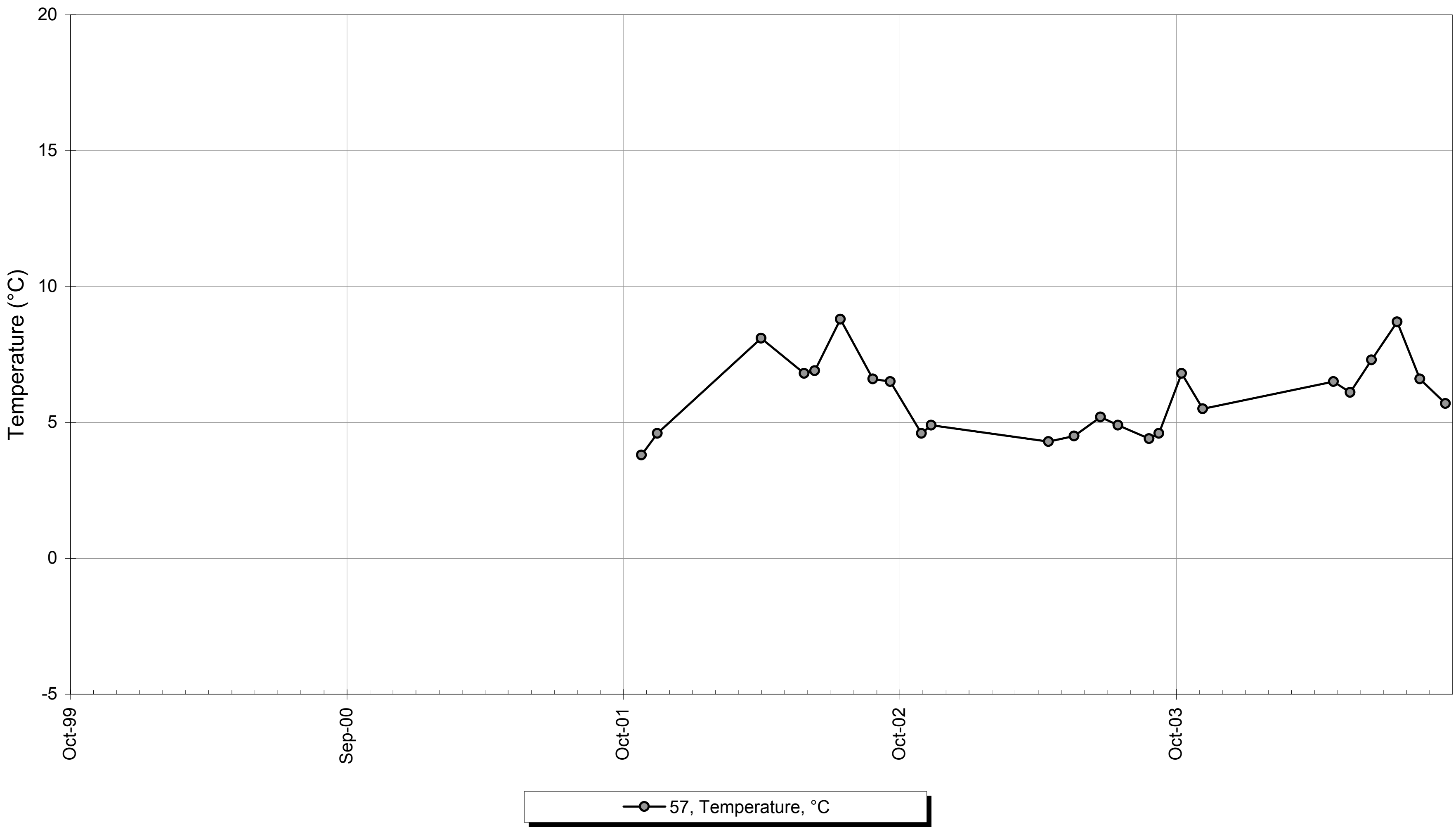
Qualified Data by QA Reviewer

Date Range: 10/01/2003 to 09/30/2004

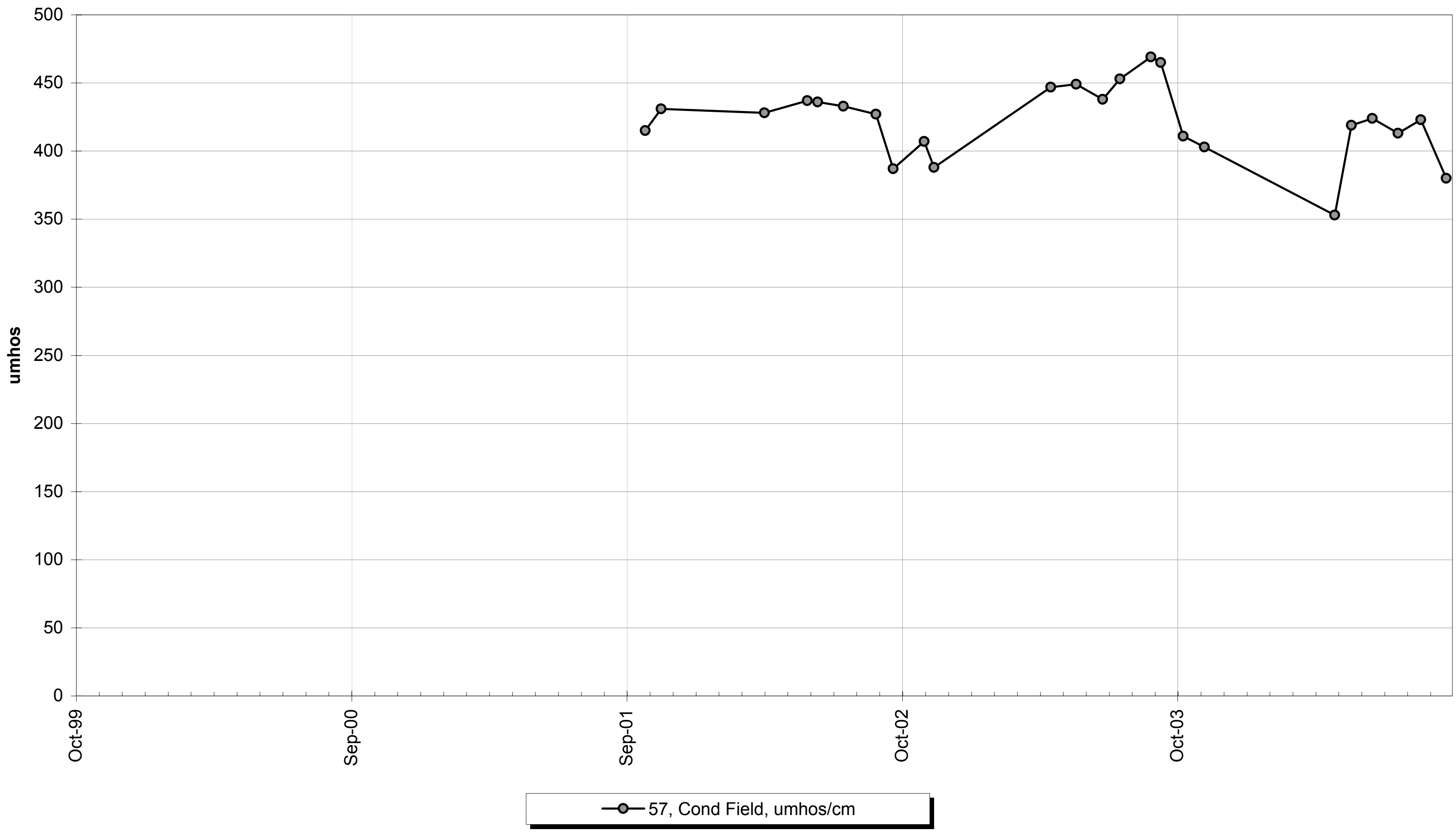
Site No.	Sample Date	Sample Time	Parameter	Value	Qualifier	Reason for Qualifier
57	08/19/2004	1:58:00 PM				
			Zn Diss, ug/l	55.9	J	CCV Recovery
			Hg Diss, ug/l	0.000867	U	Method Blank Contamination
57	09/22/2004	10:50:00 AM				
			Ag Diss, ug/l	0.00401	J	Below Quantitative Range
			Hg Diss, ug/l	0.000928	U	Field Blank Contamination

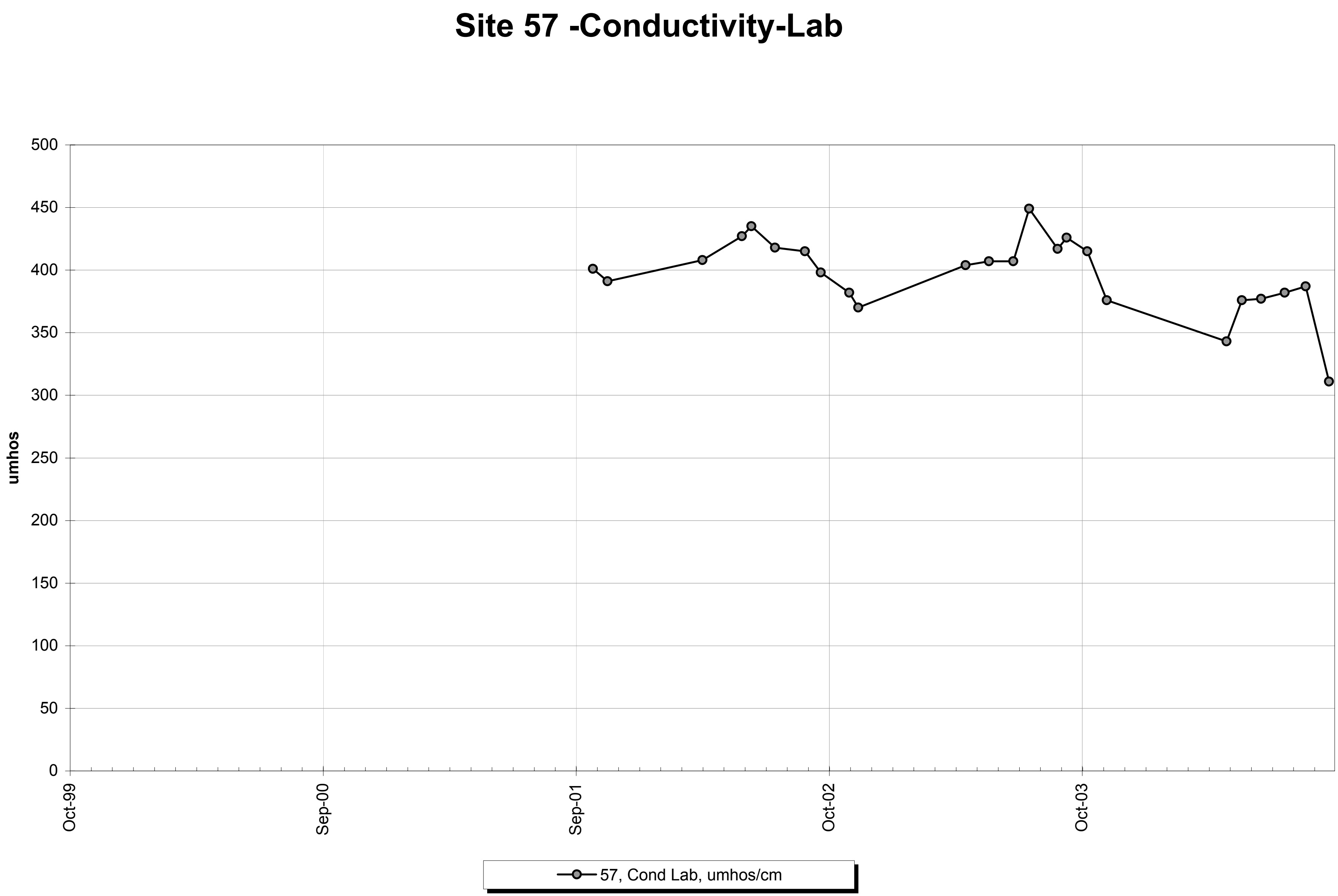
Qualifier	Description
J	Positively Identified - Approximate Concentration
N	Presumptive Evidence For Tentative Identification
NJ	Tentatively Identified - Approximate Concentration
R	Rejected - Cannot Be Verified
U	Not Detected Above Quantitation Limit
UJ	Not Detected Above Approximate Quantitation Limit

Site 57 -Water Temperature

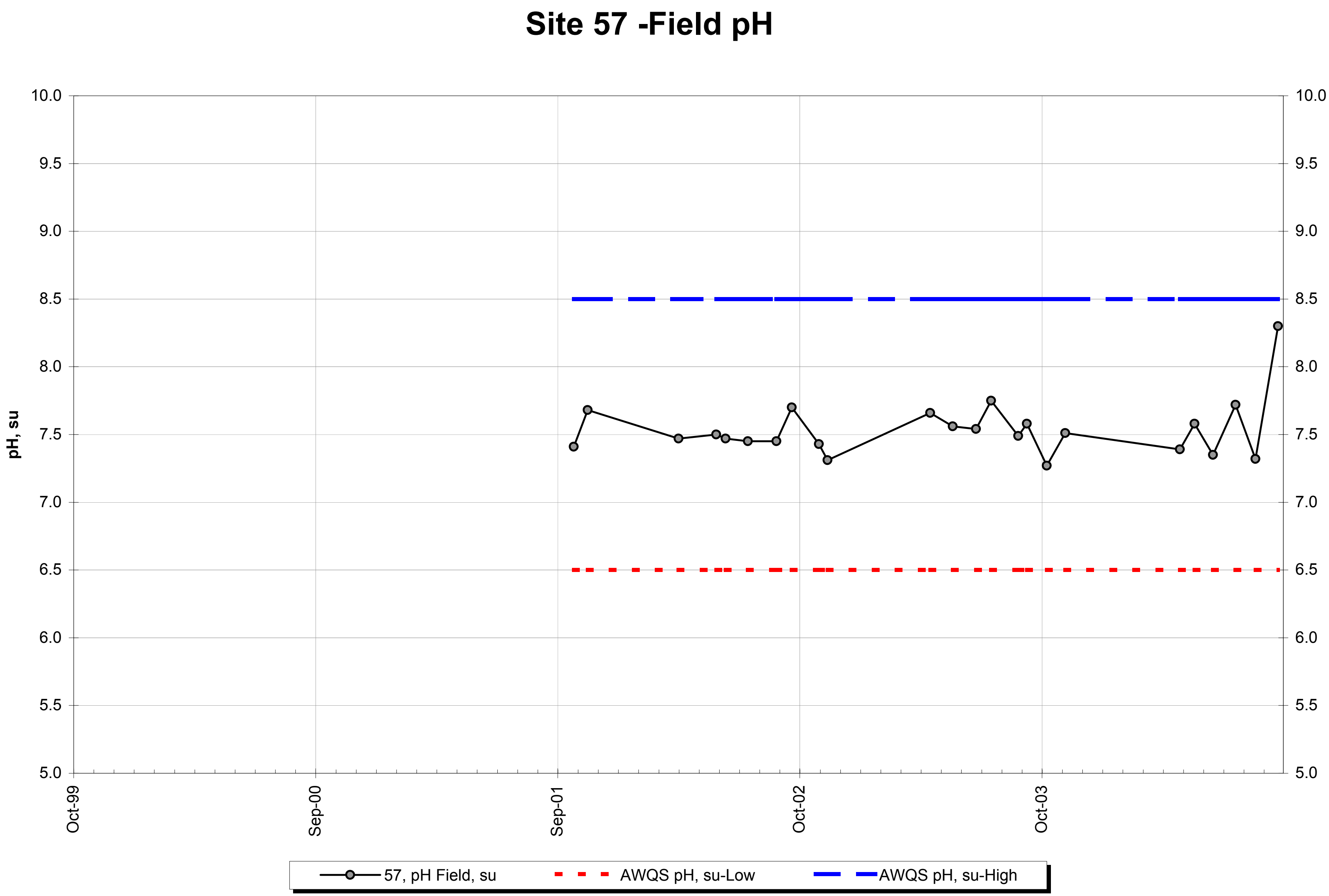


Site 57 -Conductivity-Field

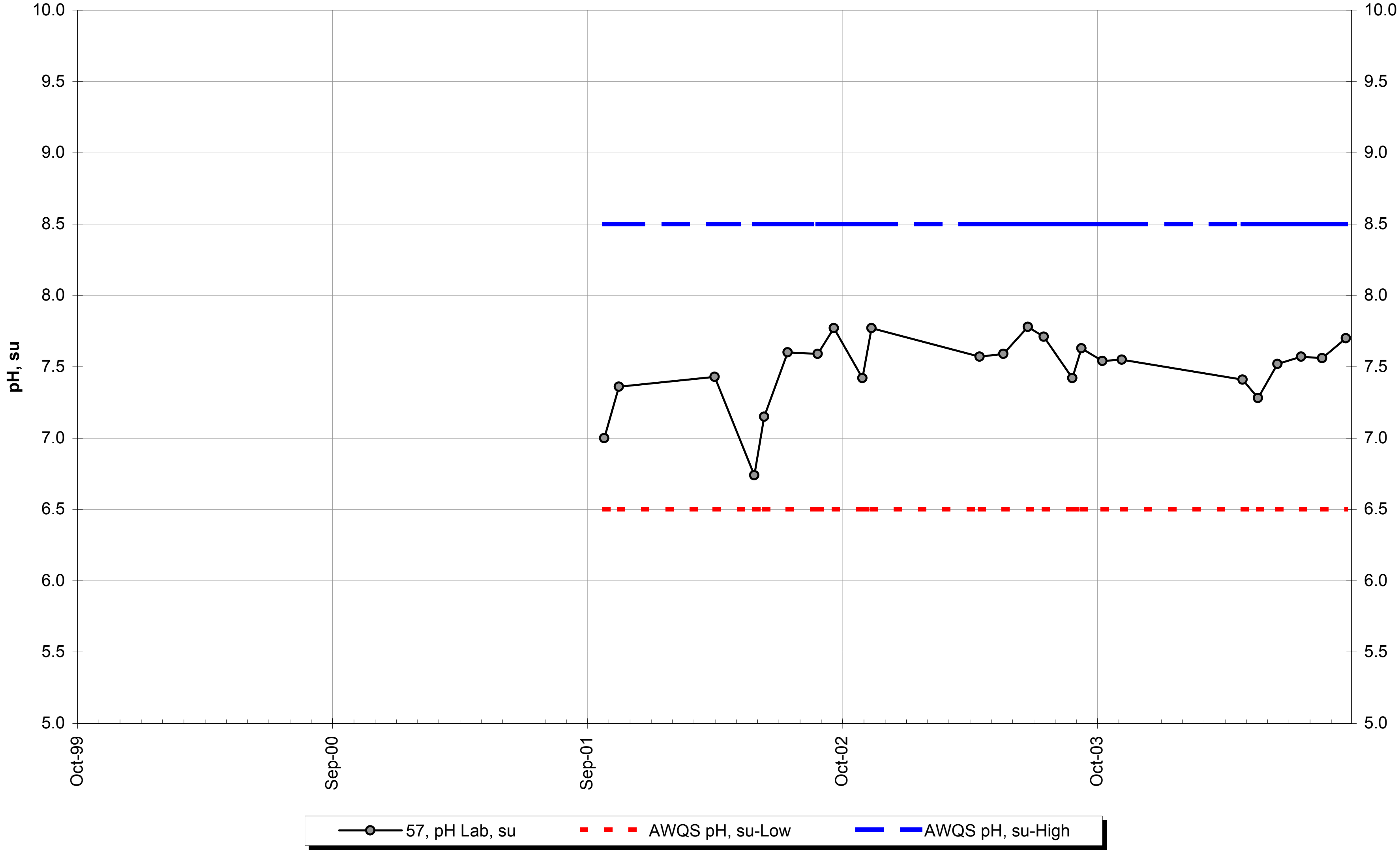




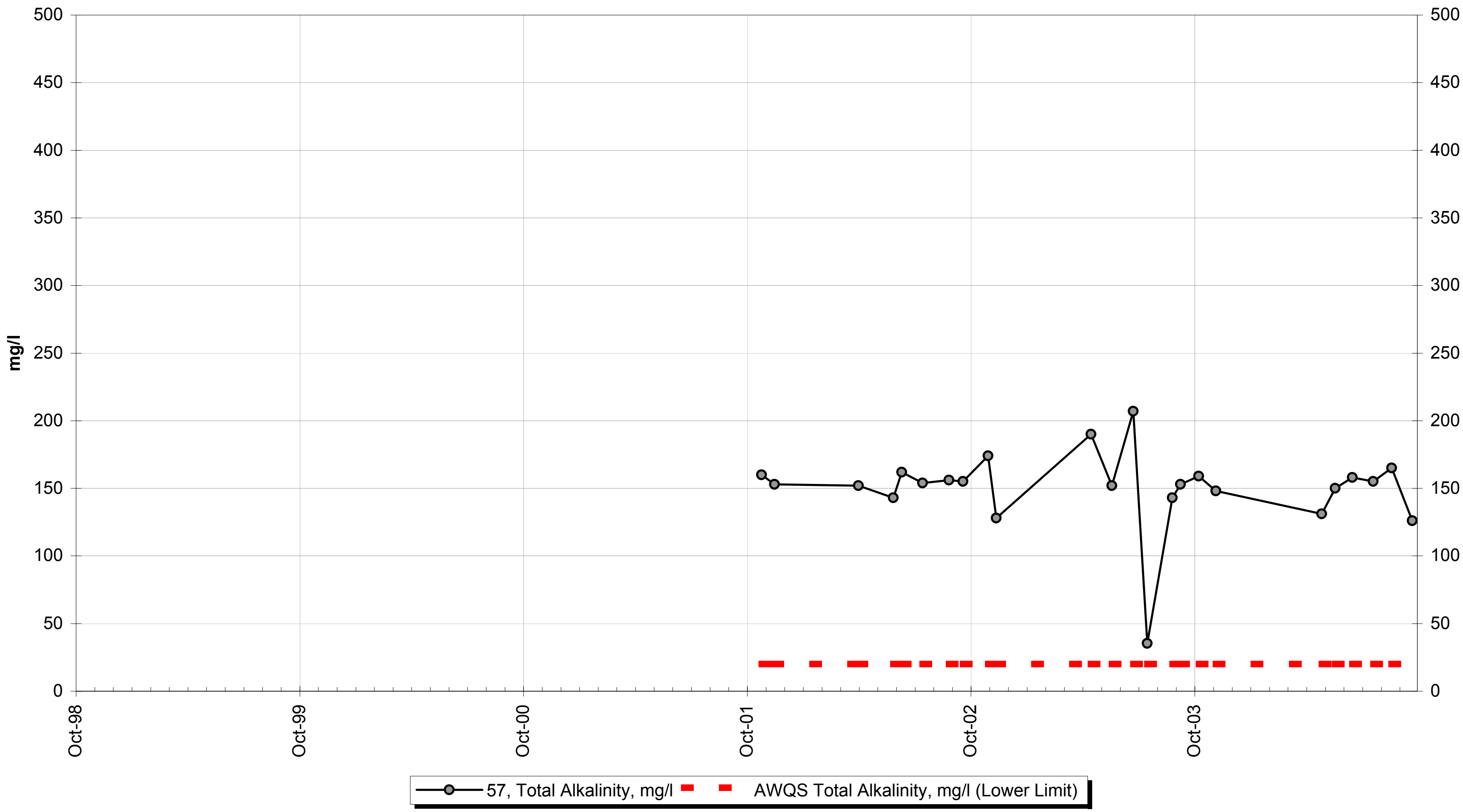
Site 57 -Conductivity-Lab
umhos
500
450
400
350
300
250
200
150
100
50
0
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
57, Cond Lab, umhos/cm


Site 57 -Field pH
pH, su
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
57, pH Field, su
AWQS pH, su-Low
AWQS pH, su-High

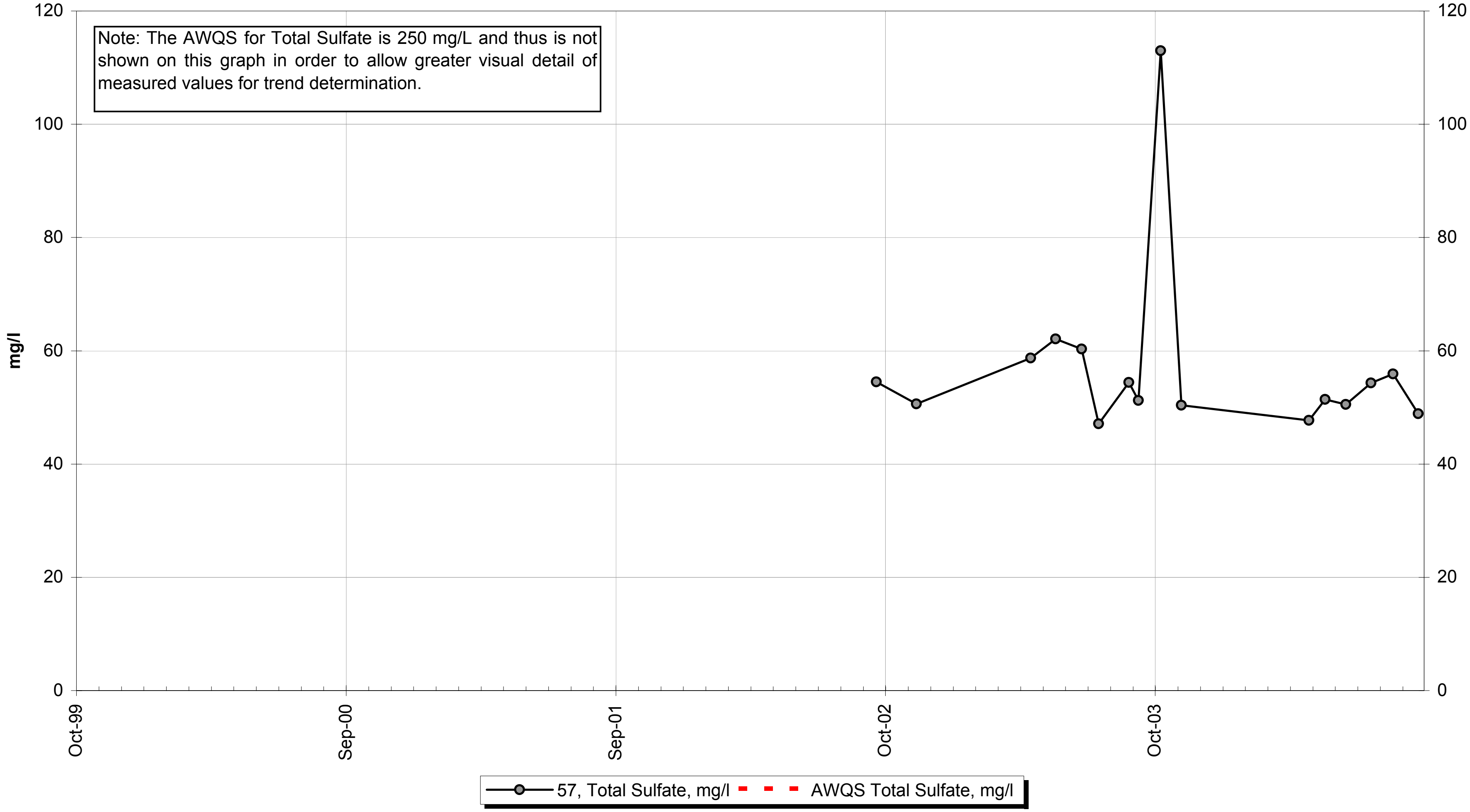
Site 57 -Lab pH



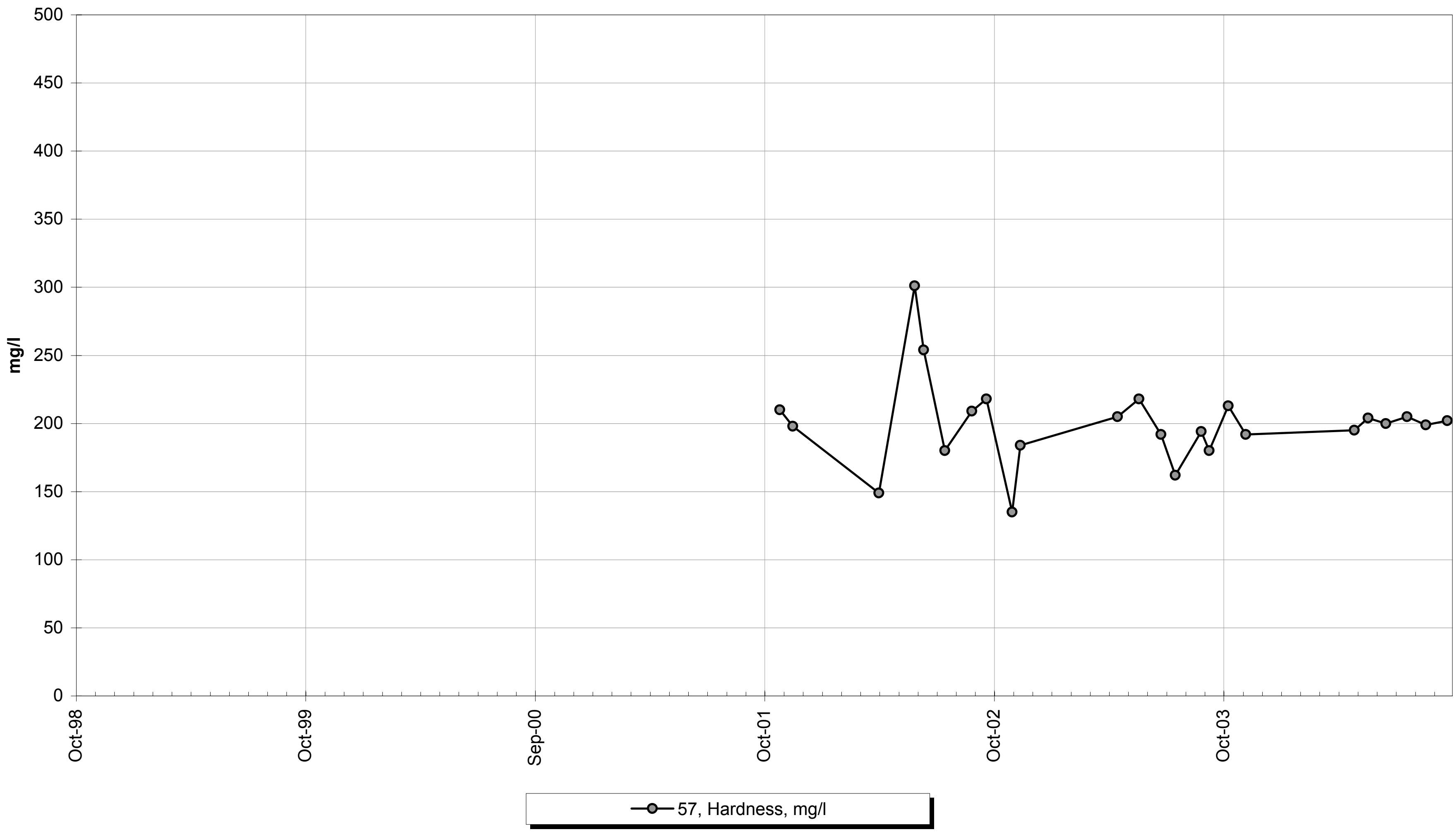
Site 57 -Total Alkalinity



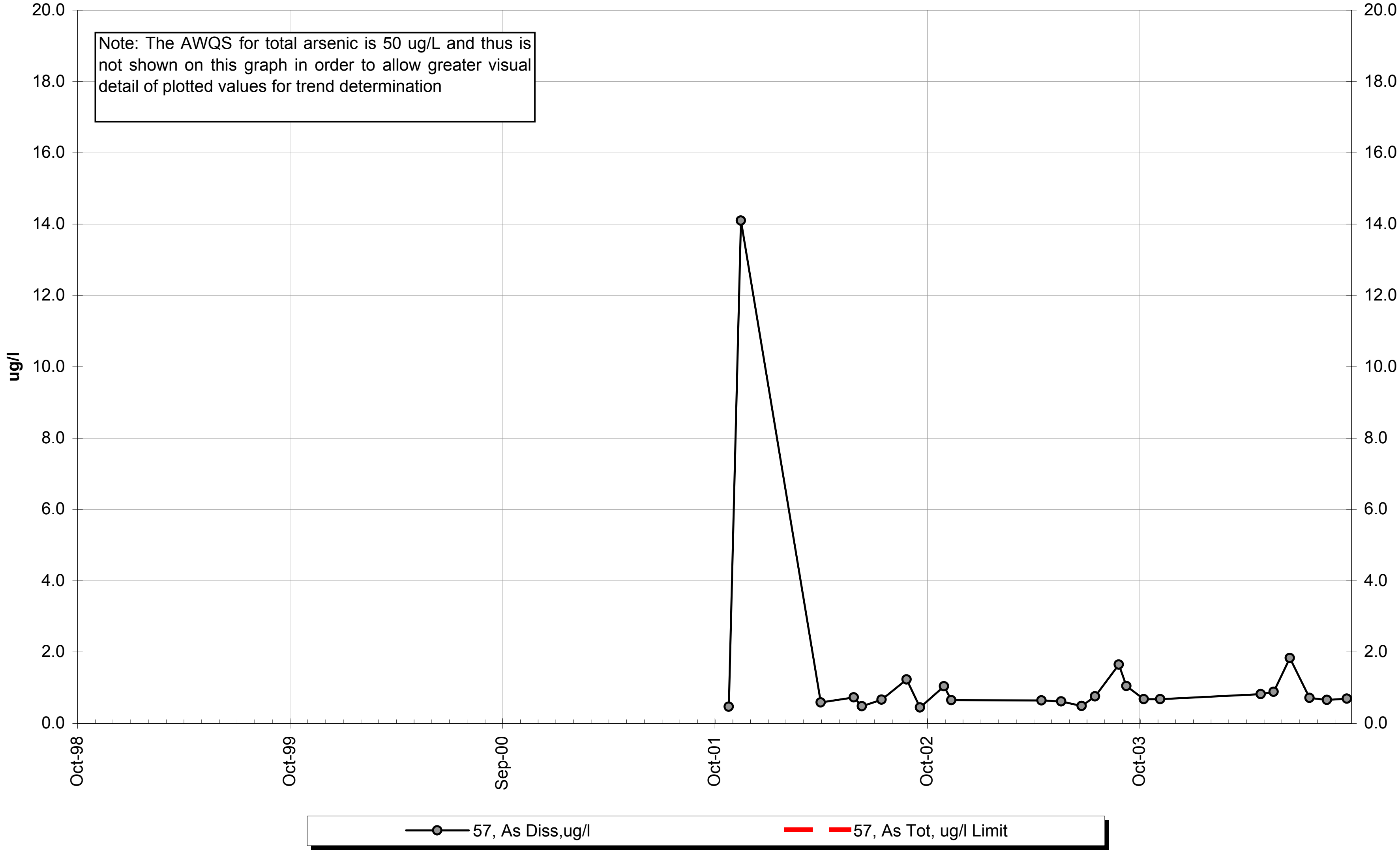
Site 57 -Total Sulfate

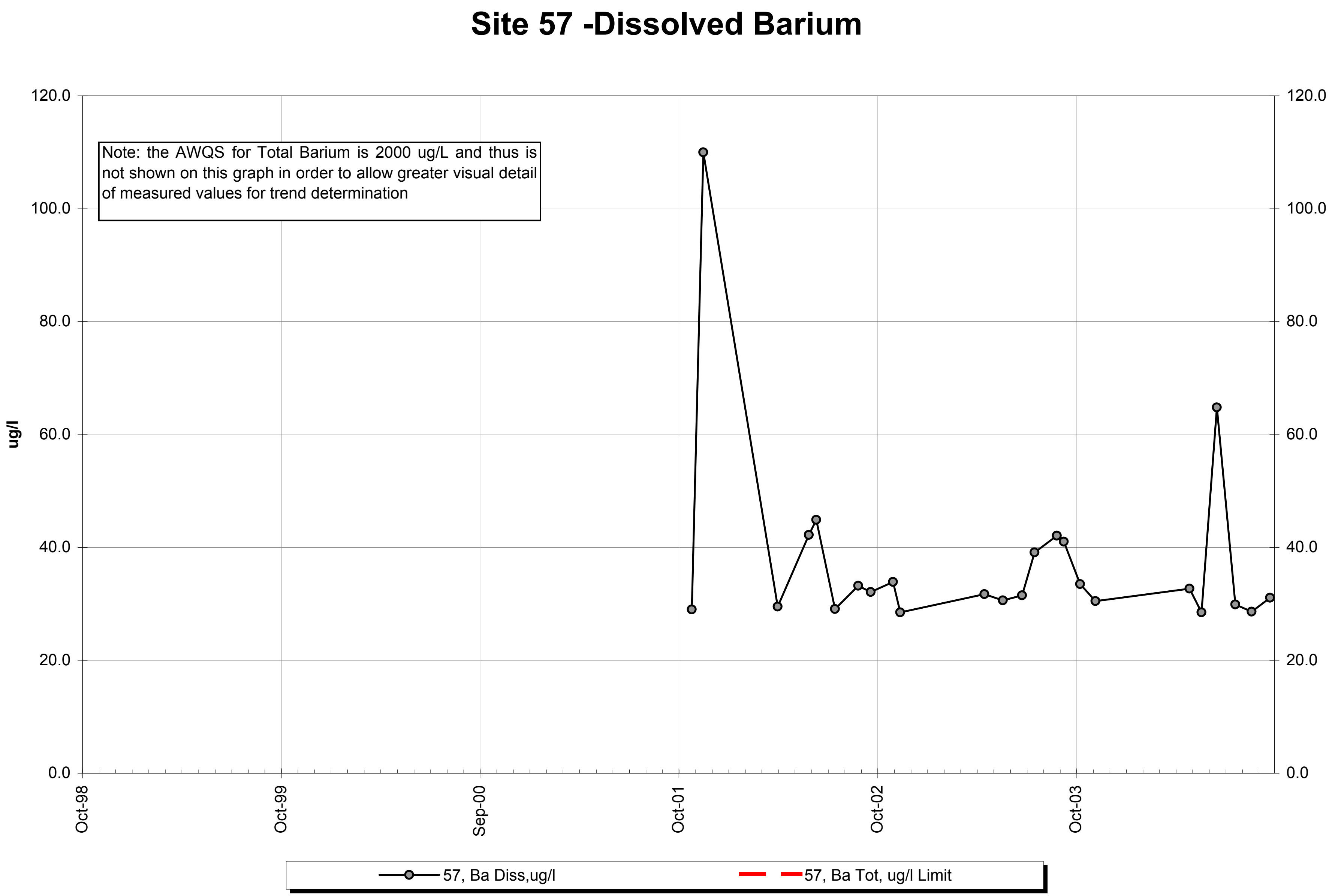


Site 57 -Hardness



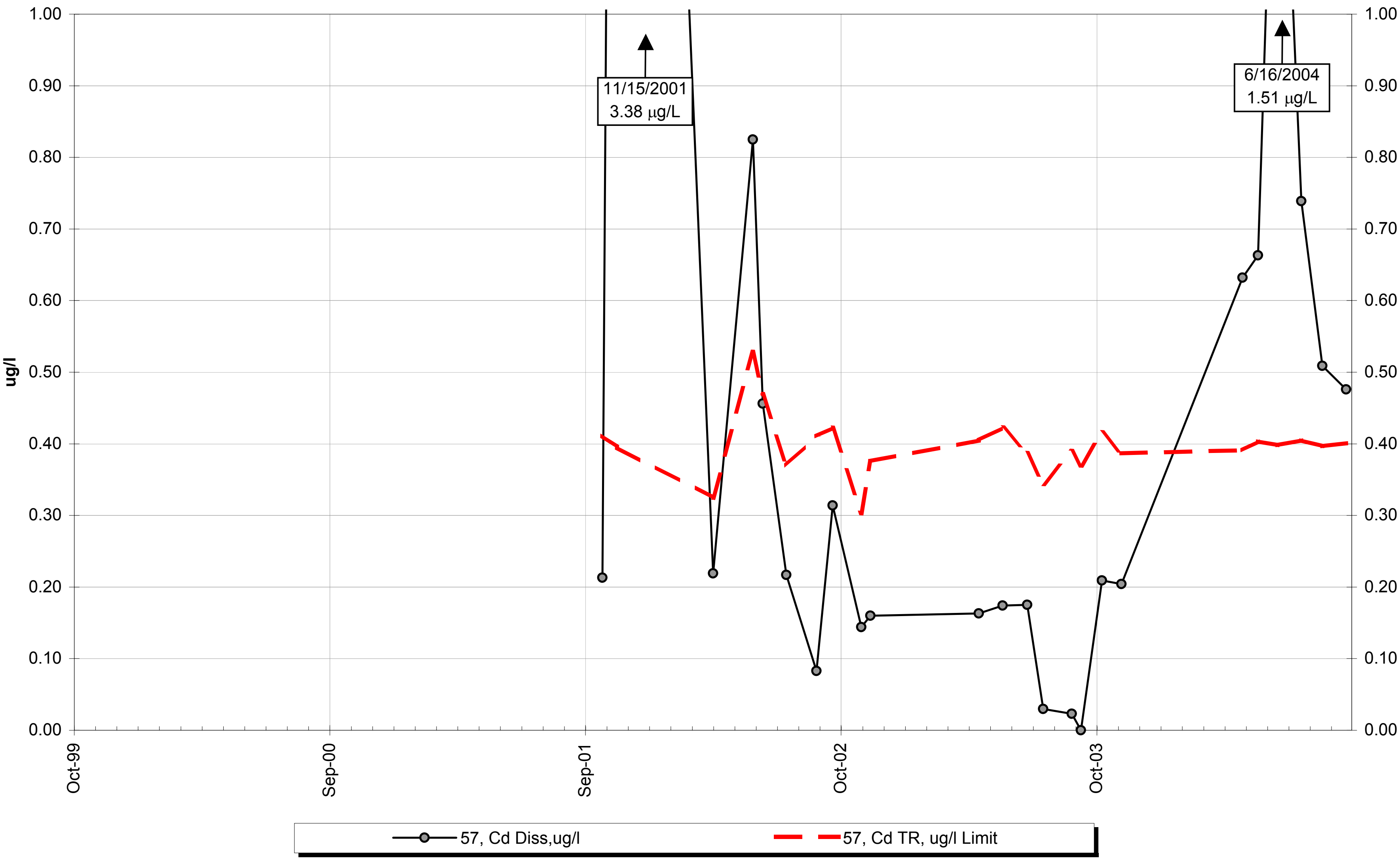
Site 57 -Dissolved Arsenic



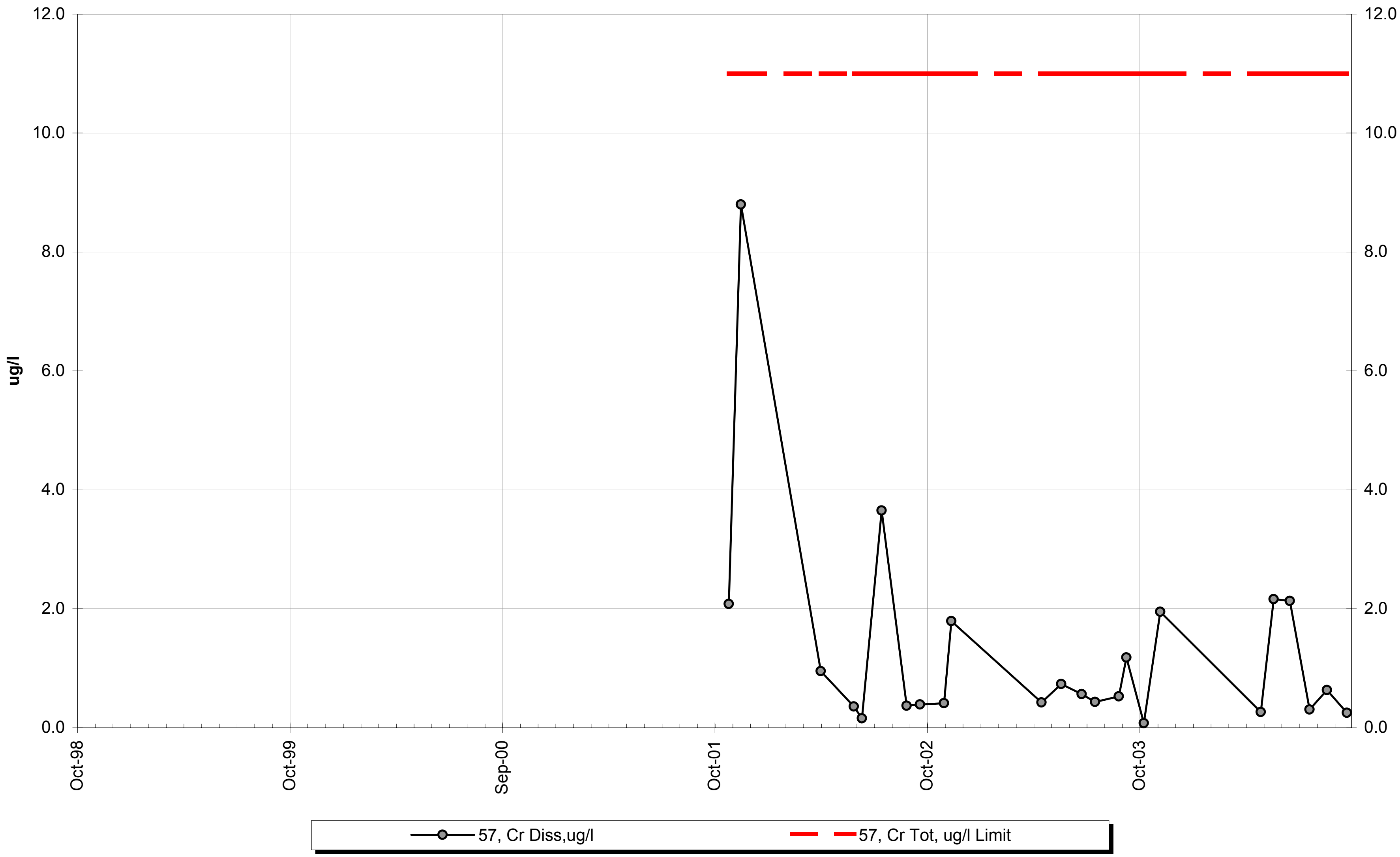


Site 57 -Dissolved Barium
Note: the AWQS for Total Barium is 2000 ug/L and thus is not shown on this graph in order to allow greater visual detail of measured values for trend determination
ug/l
120.0
100.0
80.0
60.0
40.0
20.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
57, Ba Diss,ug/l
57, Ba Tot, ug/l Limit

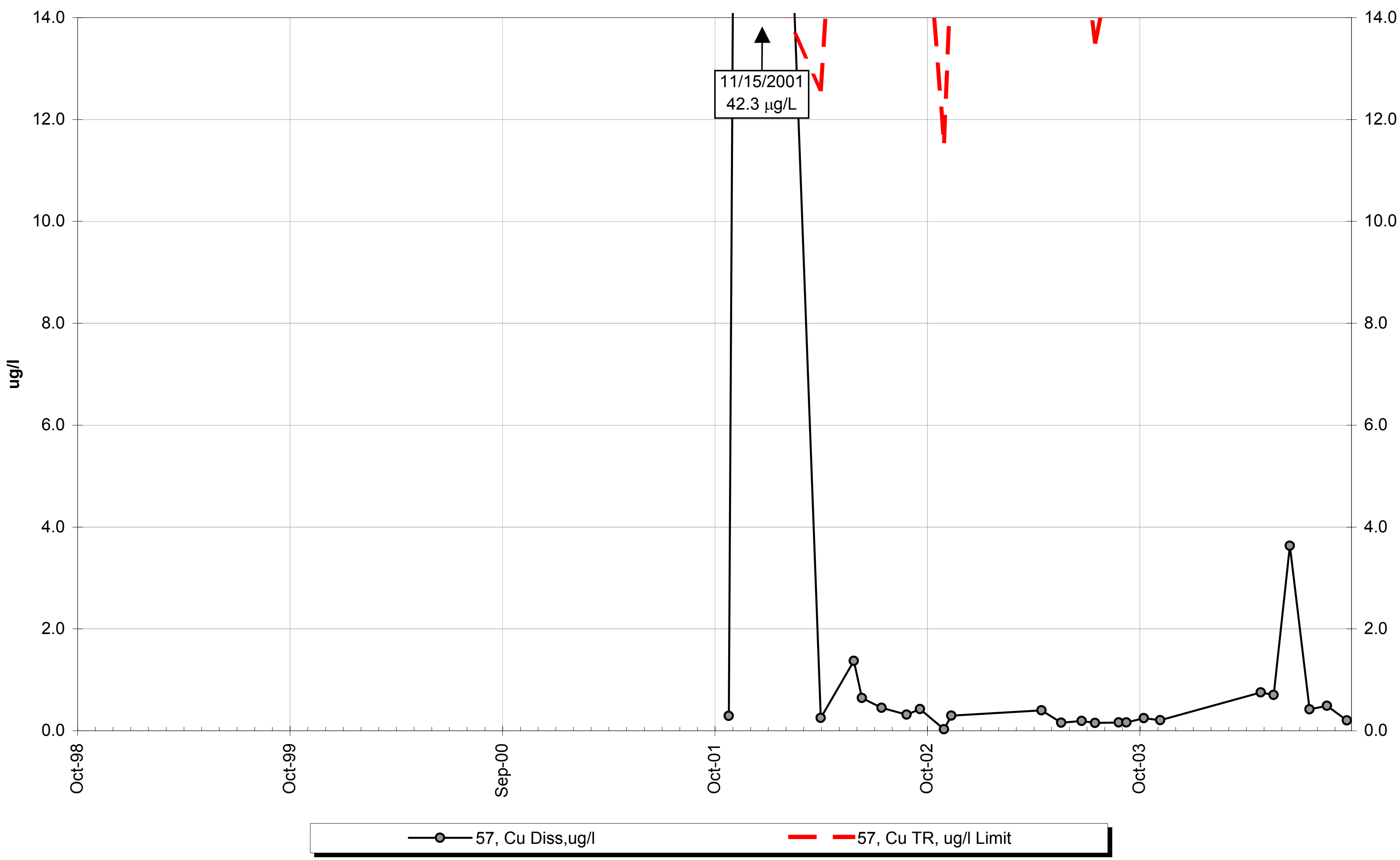
Site 57 -Dissolved Cadmium

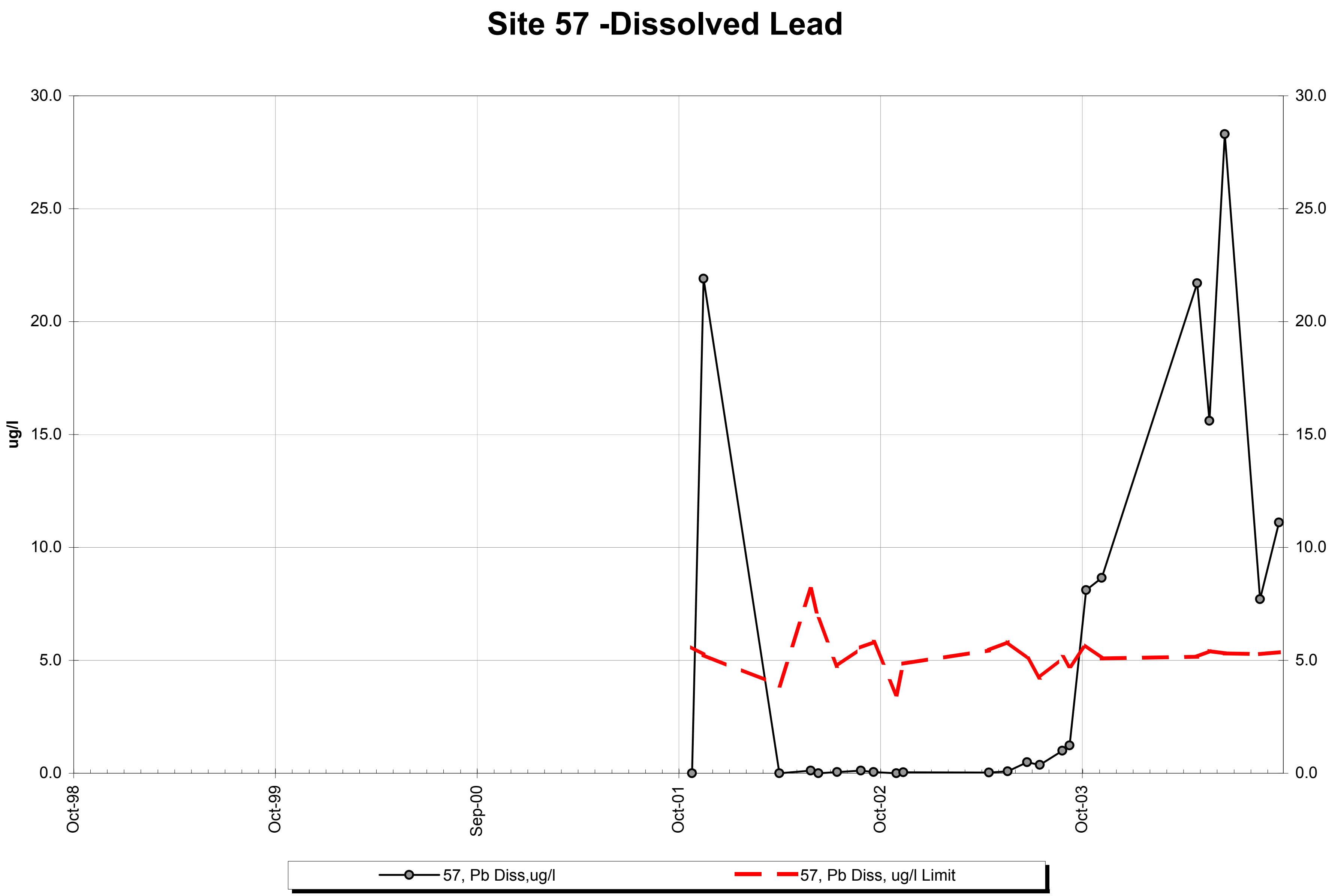


Site 57 -Dissolved Chromium

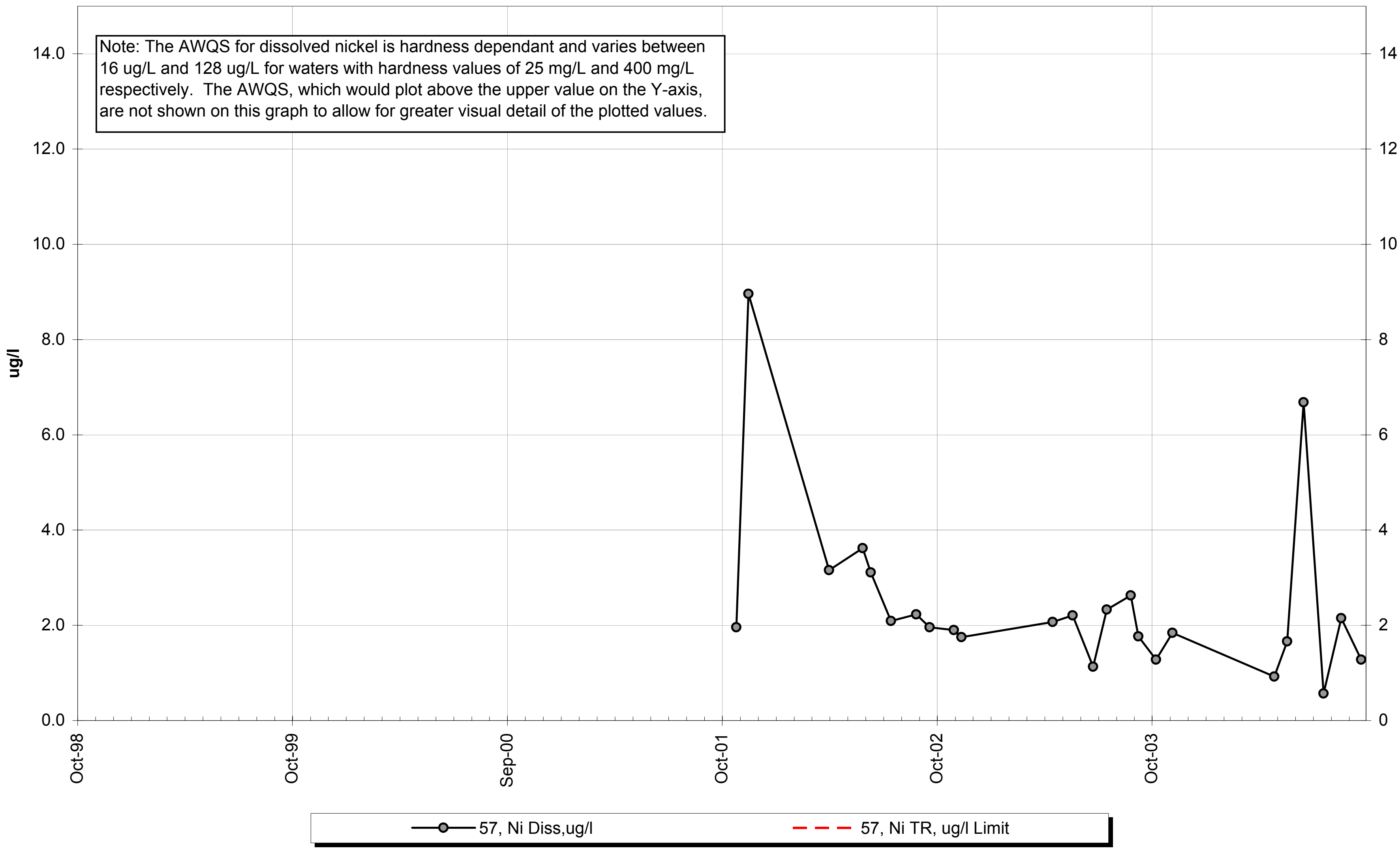


Site 57 -Dissolved Copper

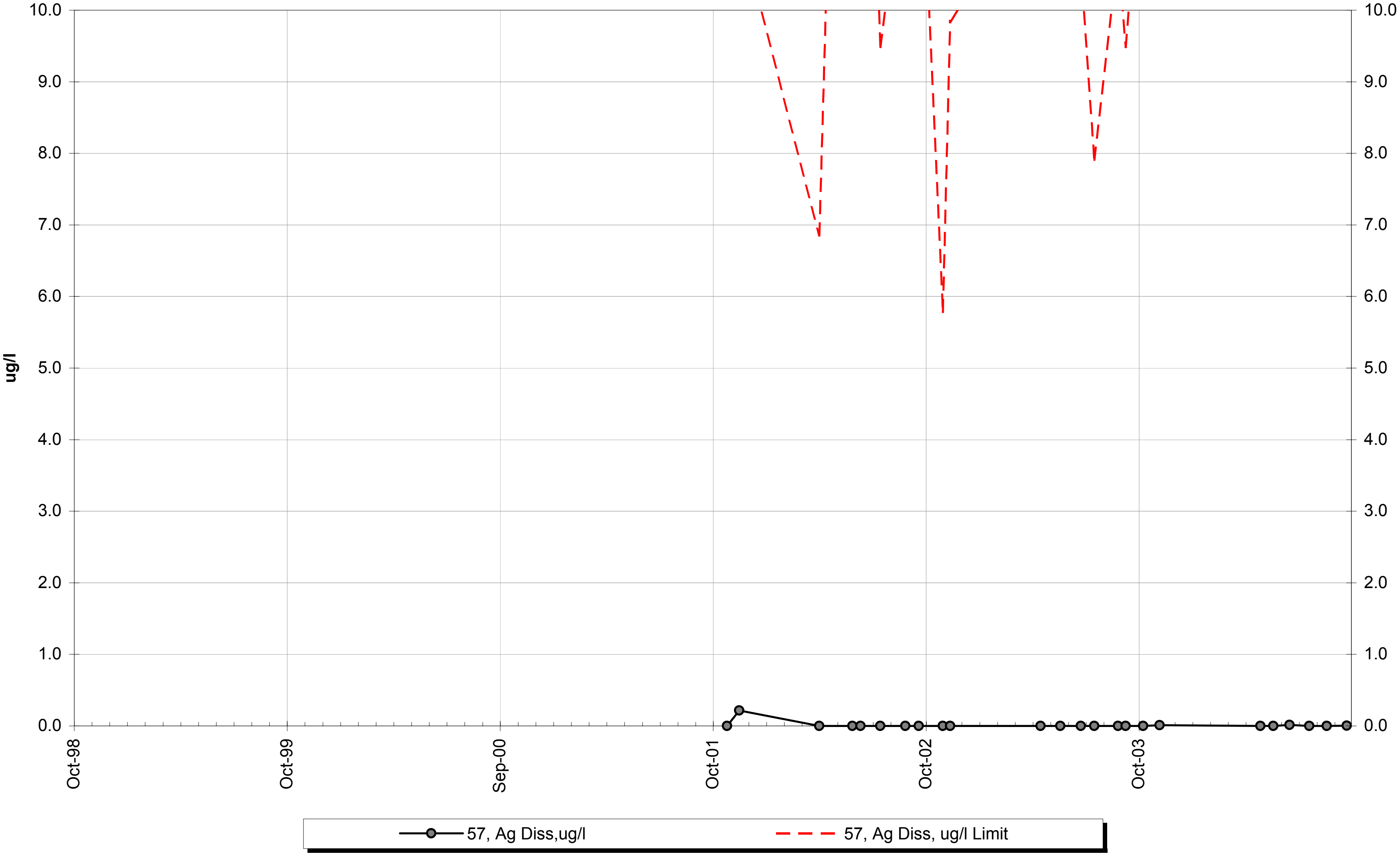



Site 57 -Dissolved Lead
ug/l
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
57, Pb Diss,ug/l
57, Pb Diss, ug/l Limit

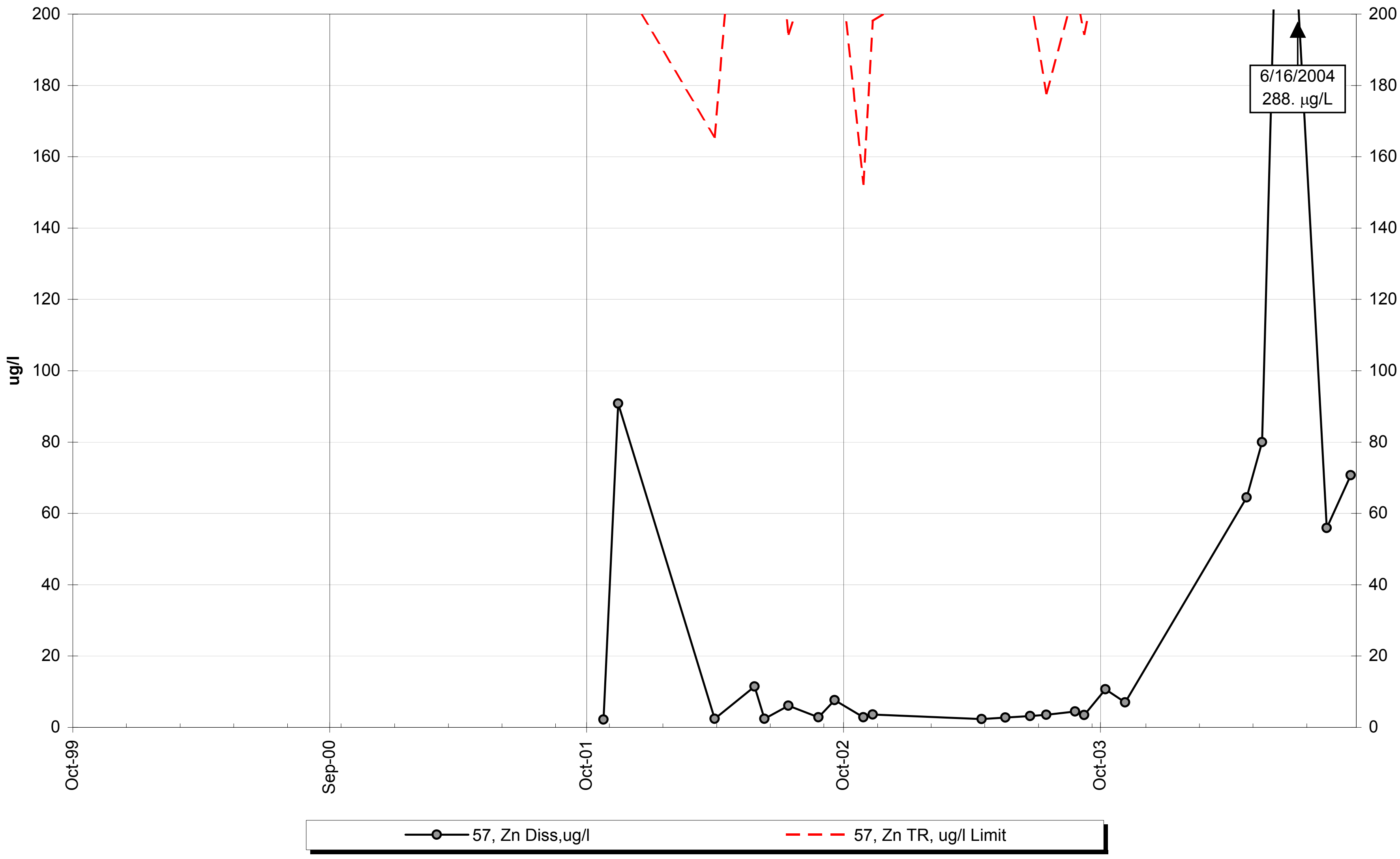
Site 57 -Dissolved Nickel



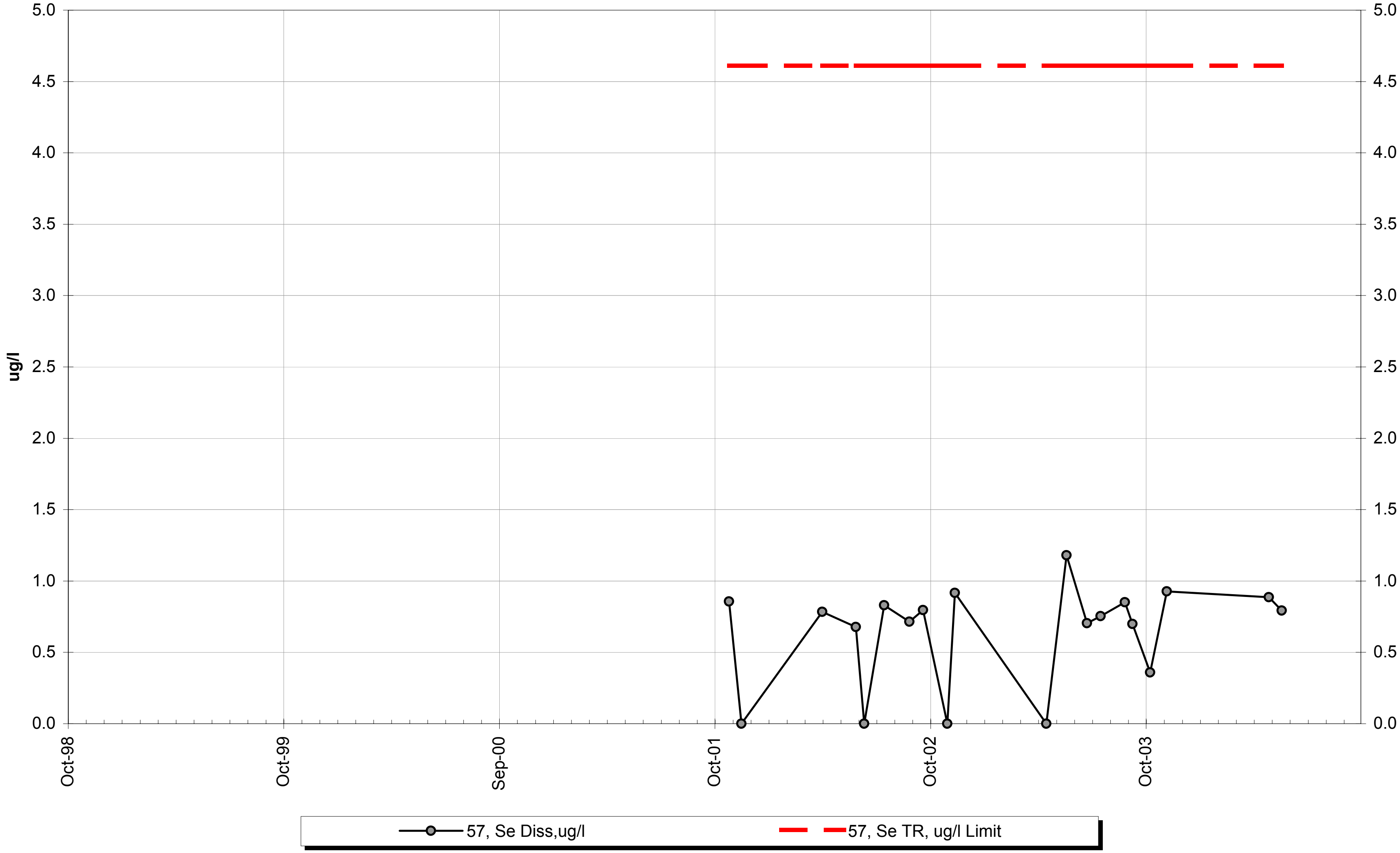
Site 57 -Dissolved Silver



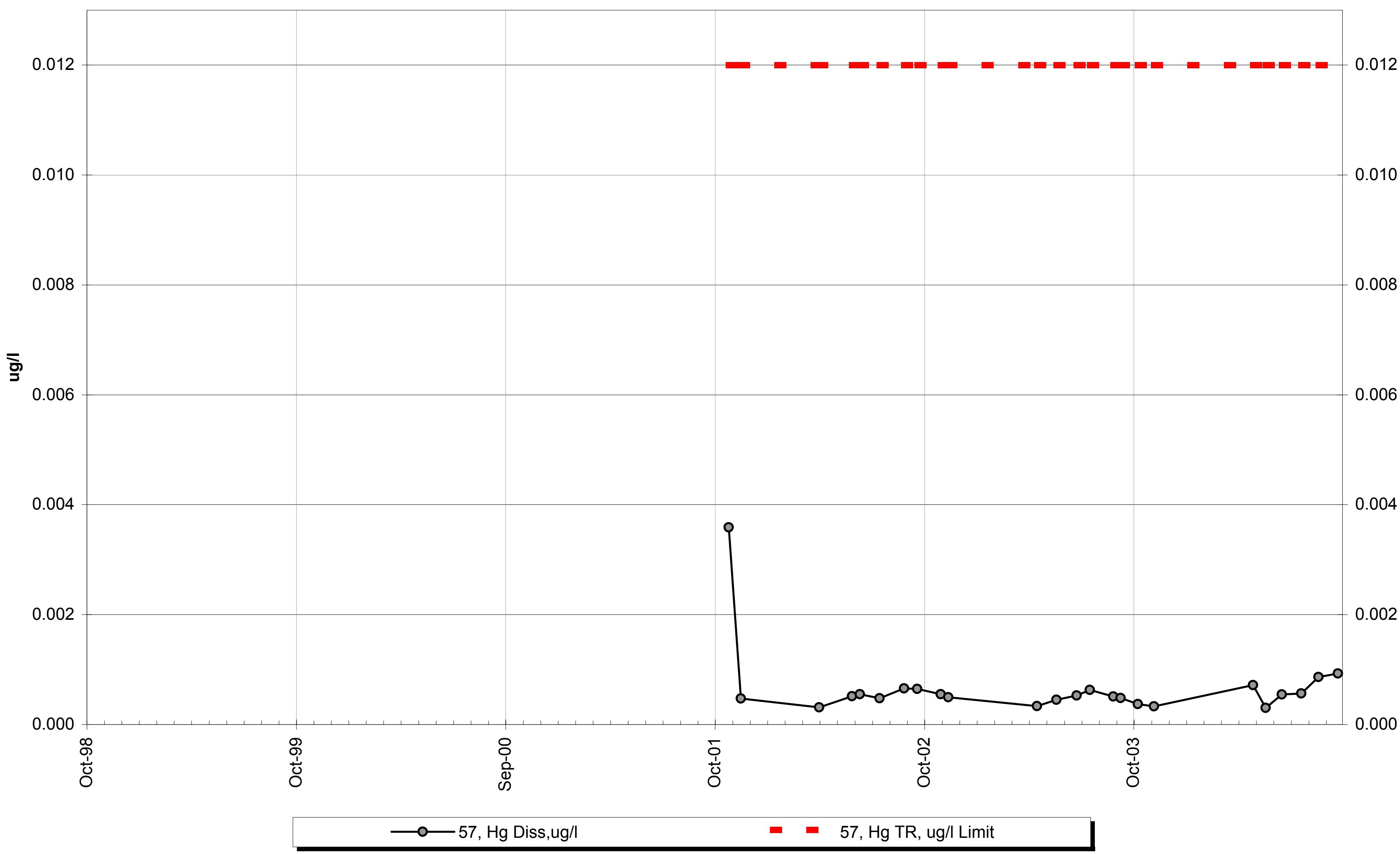
Site 57 -Dissolved Zinc



Site 57 -Dissolved Selenium



Site 57 -Dissolved Mercury



INTERPRETIVE REPORT
SITE 56 "MONITORING WELL D-00-01"

The data collected during the current water year are listed in the following "Table of Results for Water Year 2004" report. The table includes all the data, field and lab, collected for the current water year and a series of flags keyed to the summary report "Qualified Data by QA Reviewer". The QA report lists any associated data limitations found during the monthly QA reviews of laboratory data for this site. Median values for all analytes have been calculated and are shown in the right-most column of the table of results. Any value reported as less than MDL has been replaced with a value of zero for the purpose of median calculation.

Sampling at this site was added to the FWMP in October-2001. All data collected at this site since it's inception into the FWMP are included in the data analyses with the exception of the (3) outliers shown on the table below. During the current year no new data points were flagged as outliers after review by KGCMC.

Sample Date	Parameter	Value	Qualifier	Notes
8/27/2003	Cond Lab, umho	6.0	RR	Statistical outlier, not collaborated by field measurements.
8/27/2003	pH Lab, su	2.1	RR	Suspected sample contamination
8/27/2003	Alkalinity, Total mg/L	<0.0	RR	Suspected sample contamination

The data for water year 2004 have been compared to the strictest fresh water quality criterion for each applicable analyte. No results exceeding these criteria have been identified as listed in the table below.

Sample Date	Parameter	Value	Standard	Standard Type
No exceedances have been identified by KGCMC for the period of Oct-03 though Sept-04.				

X-Y plots have been generated to graphically present the data for each of the analytes requested in the Statistical Information Goals for this site. These plots have been visually analyzed for the appearance of any trend in concentration. Except for the annual mid-summer water temperature, no obvious trends were apparent. Over the short span of monitoring at this site the highest annual water temperature, which typical occurs in July or August, has increased by over 2°C. This is most likely due to the unusually warm, clear weather that occurred during the summer of 2004. While not forming a trend, there was a distinctive spike in dissolved mercury, 0.0096 ug/l, in the Aug-03 sample. This appears to have been a unique event since values have returned to normal levels in subsequent months sampling. Additional X-Y plots have been generated for alkalinity, pH, conductance, sulfate, and dissolved zinc that co-plot data from Site 56 and Site 57, the up-gradient control site, to aid in the comparison between those two sites.

Median values for alkalinity, pH, specific conductance, sulfate, and dissolved zinc from Site 56 have been compared to those of Site 57. The comparisons were done utilizing a two-tailed, exact Wilcoxon-Mann-Whitney rank sum test with a significance level of

$\alpha/2=0.025$. Rank-sum test calculation details can be found in subsequent pages of this section and a summary of the test results is shown in the table below. For all analytes except pH there were statistically significant differences between the medians at the

	N		Median Values		π Ranks		Exact Test Bounds		$H_0:u_{57}=u_{56}$
Parameter	**#57**	**#56**	**#57**	**#56**	**#57**	**#56**	**Lower**	**Upper**	
Conductivity, Lab	8	8	377	146	100	36	49.0	87.0	**REJECT**
pH, Lab	8	8	7.55	7.51	69	68	49.0	87.0	ACCEPT
Alkalinity, Total	8	8	152.5	64.2	100	36	49.0	87.0	**REJECT**
Sulfate, Total	8	8	51	8.9	100	36	49.0	87.0	**REJECT**
Zinc, Dissolved	8	8	67.60	0.66	100	36	49.0	87.0	**REJECT**

$\alpha/2=0.025$ significance level. The statistically significant difference of most of the constituents analyzed in these two wells is likely the result of several inherent differences between the two sites.

The two major differences between the sites are the unit of completion and the hydrological setting. The up-gradient control site, Site 57, is in an area away from the influence of any major surface flow. The screened interval is in the colluvial unit that underlies most of Site-23 production rock area and samples 63 to 68 feet below the surface. The aquifer sampled by the screened interval may be one of multiple perched aquifers located below Site 23 as noted in the "Site 23/D Hydrogeology and Geochemistry Analysis" report (EDE, 2004). The down-gradient well, Site 56, is to the southeast of the Site-23/D production rock areas and is located approximately 40 ft. west of the lower reaches of Bruin Creek. The screened interval was originally interpreted as the same colluvial unit as Site 57, but recent drilling information suggests the completion is in the alluvial sands which underlie most of Site-D. The sampled interval is at a depth of 14 to 19 feet. The difference in the unit of completion may have an effect on the resulting water quality. The colluvium is characterized as a fine to coarse sand with angular to sub-rounded, partially weathered chloritic rock with localized residual pyrite. The alluvial sand is characterized as a fine to coarse sand with subangular to rounded gravel and is composed of well-weathered clasts with a more stable mineral assemblage. Thus the colluvial material, being less deeply weathered, would typically generate a higher leachable load of dissolved salts that would be reflected in the chemistry of the associated ground water. Additionally, the proximity of Site 56 to Bruin Creek and Greens Creek and its shallow completion depth suggest there would be a much greater influence of a surface water component relative to Site 57. The water temperature data for Site 56 reflects this by showing a very strong seasonal variation that is very similar to the data collected at the nearby surface sites 46 and 6. In contrast the Site 57 water temperature data shows a much lower variation that is indicative of groundwater with a minor seasonal surface component. The surface water recharge to the local aquifer would tend to act as a diluent with respect to the more concentrated dissolved fraction of groundwater. Finally, if Site 57 does sample a localized, perched aquifer it would probably be more strongly influenced by seasonal and/or annual variations in recharge rate since the area of capture would be more limited than for Site 56. In summary, the combined effects of the difference in completion units and the different hydrological regimes likely explain the disparity in analyte concentrations found at the two sites.

Table of Results for Water Year 2004

Site 56 "MW-D-00-01"

Sample Date/Parameter	10/9/2003	11/6/2003	Dec-03	Jan-04	Feb-04	Mar-04	4/27/2004	5/19/2004	6/16/2004	7/20/2004	8/19/2004	9/22/2004	**Median**
Water Temp (°C)	9.0	4.0					3.4	5.6	8.3	12.1	12.8	8.6	8.5
Conductivity-Field(μmho)	128	141					127	91	108	174	174	137	132
Conductivity-Lab (μmho)	158	152					139	94	111 J	171	181	127	146
pH Lab (standard units)	7.44	7.51					7.76	7.50	7.58 J	7.47 J	7.34	7.70	7.51
pH Field (standard units)	7.31	7.36					7.62	7.55	7.09	7.32	7.56	7.26	7.34
Total Alkalinity (mg/L)	69.1	67.1					61.2	45.3	52.8 J	73.4	80.8	54.1	64.2
Total Sulfate (mg/L)	9.6	9.9					8.2	4.9	6.2	14.5	14.9	8.2	8.9
Hardness (mg/L)	80.6	73.2					71.8	50.6	53.5	75.2	96.3	67.5	72.5
Dissolved As (ug/L)	0.053 J	0.138 J	NOT SCHEDULED FOR SAMPLING				0.131 J	<0.051	0.145 J	0.264	0.180	0.102 U	0.135
Dissolved Ba (ug/L)	11.9	10.5					10.1	5.4	10.2	15.7	15.1	10.3	10.4
Dissolved Cd (ug/L)	0.028 J	0.023 J					<0.023	<0.023	0.028 J	0.031	0.022	0.015 J	0.023
Dissolved Cr (ug/L)	0.627	0.570					0.251	0.405 J	0.523 J	0.354	1.270	<0.016	0.464
Dissolved Cu (ug/L)	0.551	0.464					0.645	0.388	0.759	0.805	0.542	0.964	0.598
Dissolved Pb (ug/L)	0.0706 U	0.0115 J					<0.0110	<0.0110	0.1130	0.2230	0.0055 U	0.0774	0.0411
Dissolved Ni (ug/L)	0.277	0.752					0.252	0.208 UJ	0.796	0.366 J	0.963	0.712	0.539
Dissolved Ag (ug/L)	<0.003	0.009 J					<0.009	0.013 J	<0.009	0.003 J	0.000 J	0.004 J	0.004
Dissolved Zn (ug/L)	1.55	0.36 U					0.18 UJ	0.20 UJ	1.10	3.00	0.43 UJ	0.90	0.66
Dissolved Se (ug/L)	0.320 J	0.539					0.510 UJ	<0.496 UJ	<0.496 UJ	0.665	0.992	0.375	0.443
Dissolved Hg (ug/L)	0.001030 J	0.000720 U					0.001940	0.001250	0.001780	0.001300	0.001210 U	0.002340	0.001275

For individual sample/analyte qualifier descriptions see "Qualified Data by QA Reviewer" table.

Values reported as less than MDL are replaced by 1/2 MDL for median calculation purposes.

Shaded data has been qualified as an outlier by KGCMC and removed from any further analysis and is not included into the calculation of the median

Qualified Data by QA Reviewer

Date Range: 10/01/2003 to 09/30/2004

Site No.	Sample Date	Sample Time	Parameter	Value	Qualifier	Reason for Qualifier
56	10/09/2003	12:55:00 PM				
			As Diss, ug/l	0.0533	J	Below Quantitative Range
			Cd Diss, ug/l	0.0278	J	Below Quantitative Range
			Pb Diss, ug/l	0.0706	U	Below Quantitative Range, Fi
			Se Diss, ug/l	0.32	J	Below Quantitative Range, L
			Hg Diss, ug/l	0.00103	J	Duplicate Sample RPD
56	11/06/2003	11:32:00 AM				
			As Diss, ug/l	0.138	J	Below Quantitative Range
			Cd Diss, ug/l	0.023	J	Below Quantitative Range
			Pb Diss, ug/l	0.0115	J	Below Quantitative Range
			Ag Diss, ug/l	0.009	J	Below Quantitative Range
			Zn Diss, ug/l	0.362	U	Below Quantitative Range, Fi
			Hg Diss, ug/l	0.00072	U	Field Blank Contamination
56	04/27/2004	10:49:00 AM				
			As Diss, ug/l	0.131	J	Below Quantitative Range
			Zn Diss, ug/l	0.183	UJ	Below Quantitative Range, Fi
			Se Diss, ug/l	0.51	UJ	LCS Recovery
56	05/19/2004	9:26:00 AM				
			Cr Diss, ug/l	0.405	J	CCV Recovery
			Ni Diss, ug/l	0.208	UJ	CCV Recovery, Method Blan
			Ag Diss, ug/l	0.013	J	Below Quantitative Range, M
			Zn Diss, ug/l	0.204	UJ	Below Quantitative Range, L
			Se Diss, ug/l	-0.496	UJ	LCS Recovery
56	06/16/2004	10:48:00 AM				
			Cond Lab, umho	111	J	Sample Temperature
			pH Lab, su	7.58	J	Hold Time
			Alk Tot, mg/l	52.8	J	Sample Temperature
			As Diss, ug/l	0.145	J	Below Quantitative Range
			Cd Diss, ug/l	0.0277	J	Below Quantitative Range
			Cr Diss, ug/l	0.523	J	Duplicate RDP
			Se Diss, ug/l	-0.496	UJ	LCS Recovery

Qualifier	Description
J	Positively Identified - Approximate Concentration
N	Presumptive Evidence For Tentative Identification
NJ	Tentatively Identified - Approximate Concentration
R	Rejected - Cannot Be Verified
U	Not Detected Above Quantitation Limit
UJ	Not Detected Above Approximate Quantitation Limit

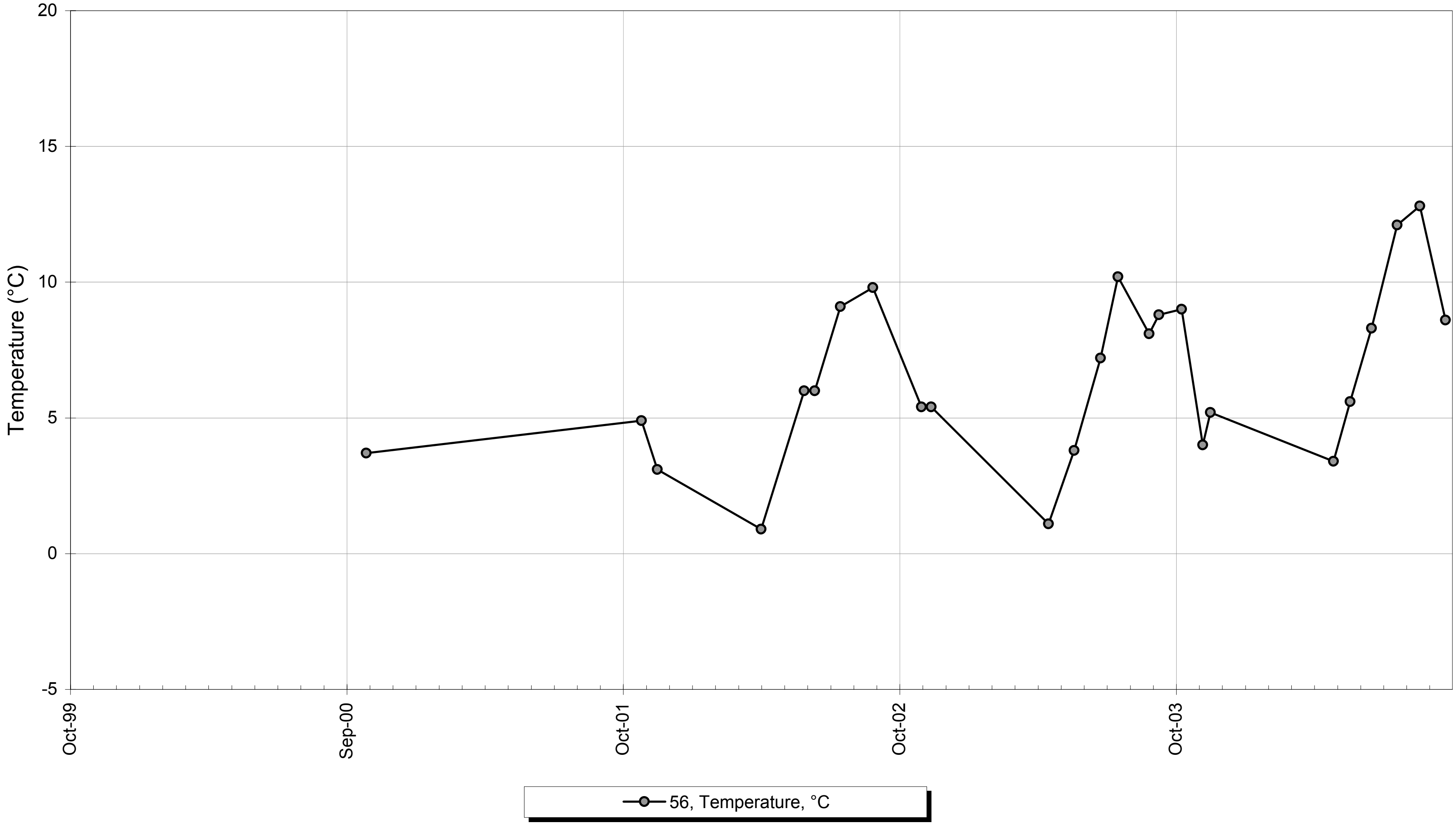
Qualified Data by QA Reviewer

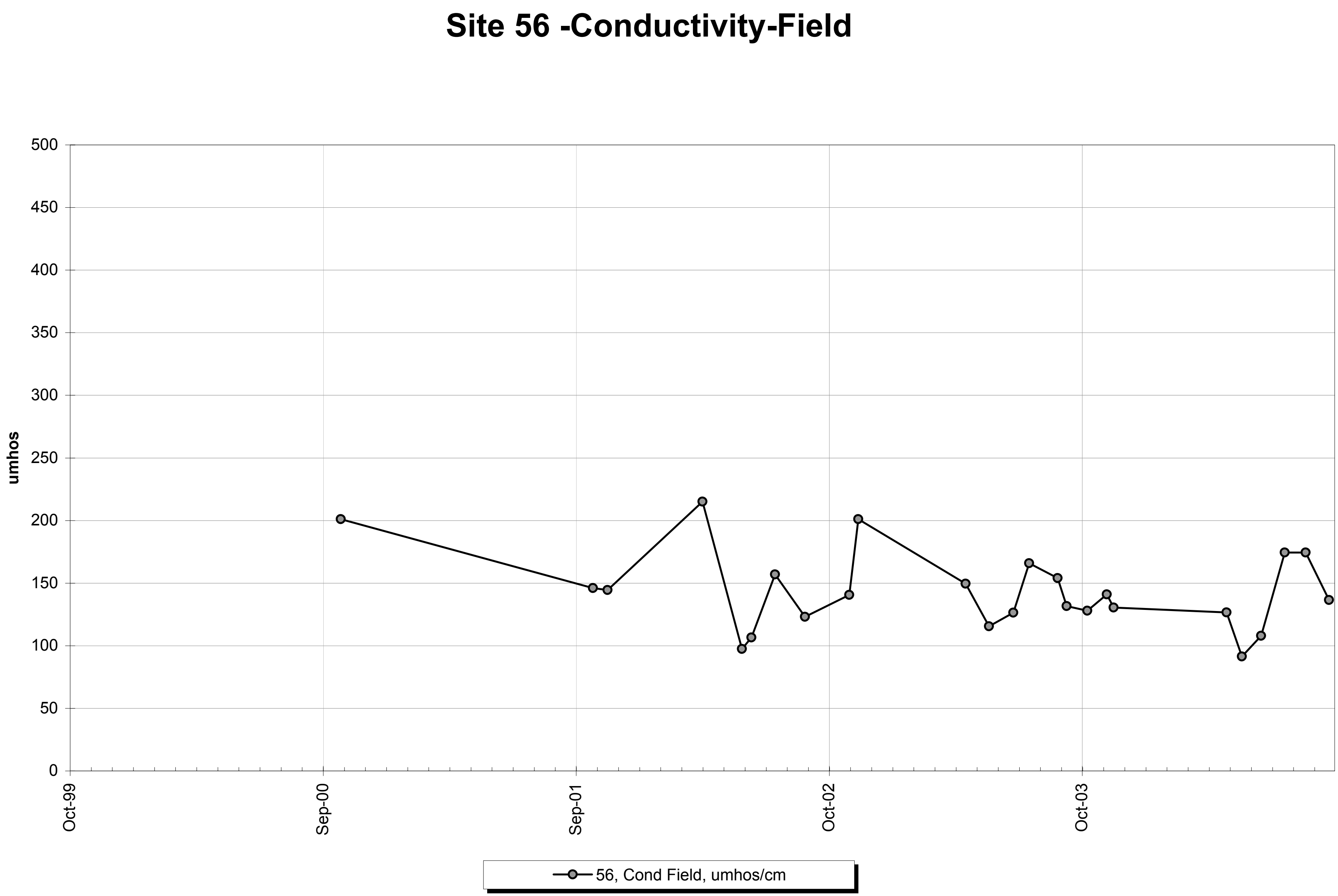
Date Range: 10/01/2003 to 09/30/2004

Site No.	Sample Date	Sample Time	Parameter	Value	Qualifier	Reason for Qualifier
56	07/20/2004	1:56:00 PM				
			pH Lab, su	7.47	J	Hold Time
			Ni Diss, ug/l	0.366	J	CCV Recovery
			Ag Diss, ug/l	0.00288	J	Below Quantitative Range
56	08/19/2004	11:57:00 AM				
			Pb Diss, ug/l	0.00545	U	Field Blank Contamination
			Ag Diss, ug/l	0.000427	J	Below Quantitative Range
			Zn Diss, ug/l	0.426	UJ	Field Blank Contamination, C
			Hg Diss, ug/l	0.00121	U	Method Blank Contamination
56	09/22/2004	2:05:00 PM				
			As Diss, ug/l	0.102	U	Field Blank Contamination
			Cd Diss, ug/l	0.0146	J	Below Quantitative Range
			Ag Diss, ug/l	0.00357	J	Below Quantitative Range

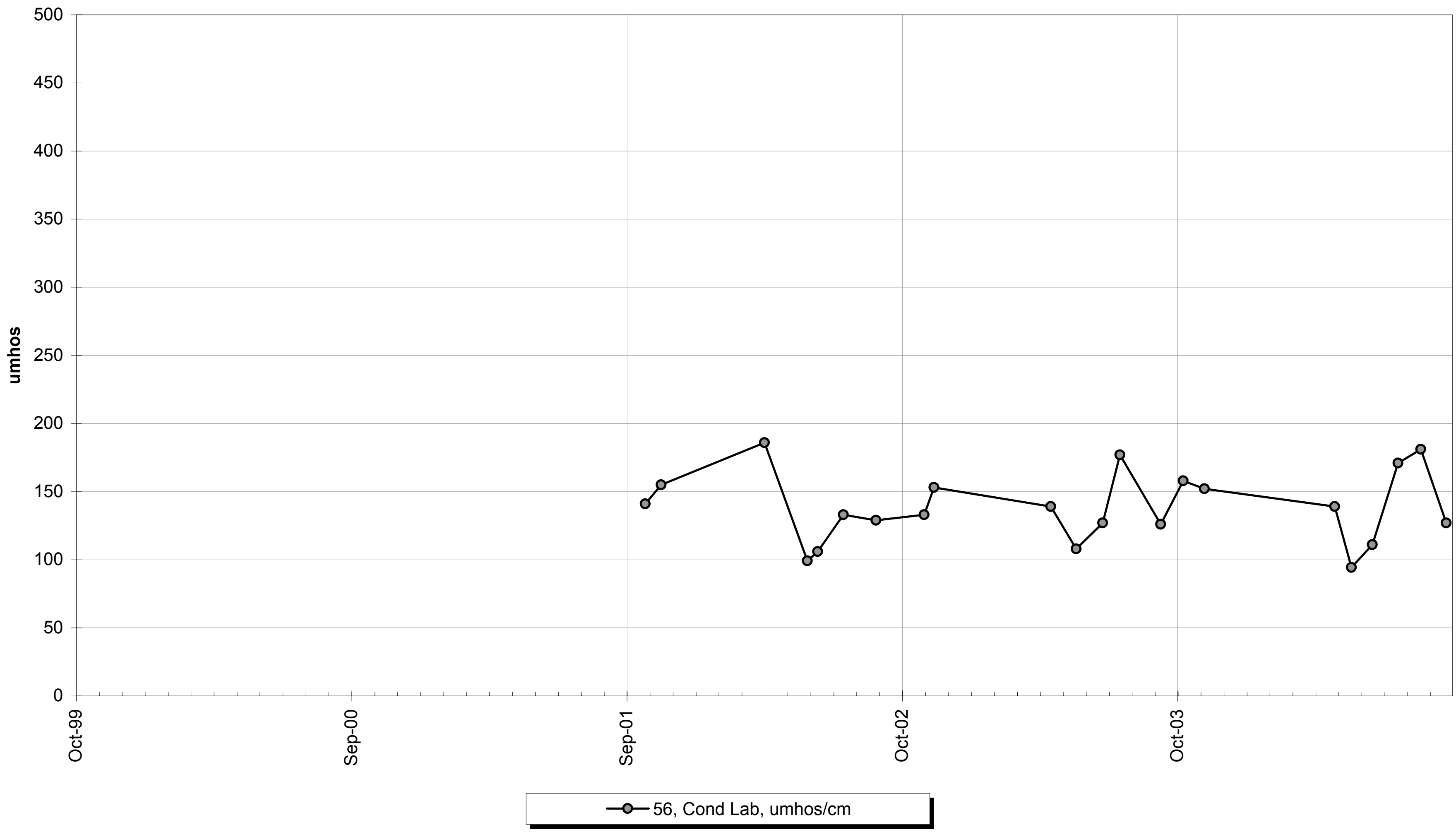
Qualifier	Description
J	Positively Identified - Approximate Concentration
N	Presumptive Evidence For Tentative Identification
NJ	Tentatively Identified - Approximate Concentration
R	Rejected - Cannot Be Verified
U	Not Detected Above Quantitation Limit
UJ	Not Detected Above Approximate Quantitation Limit

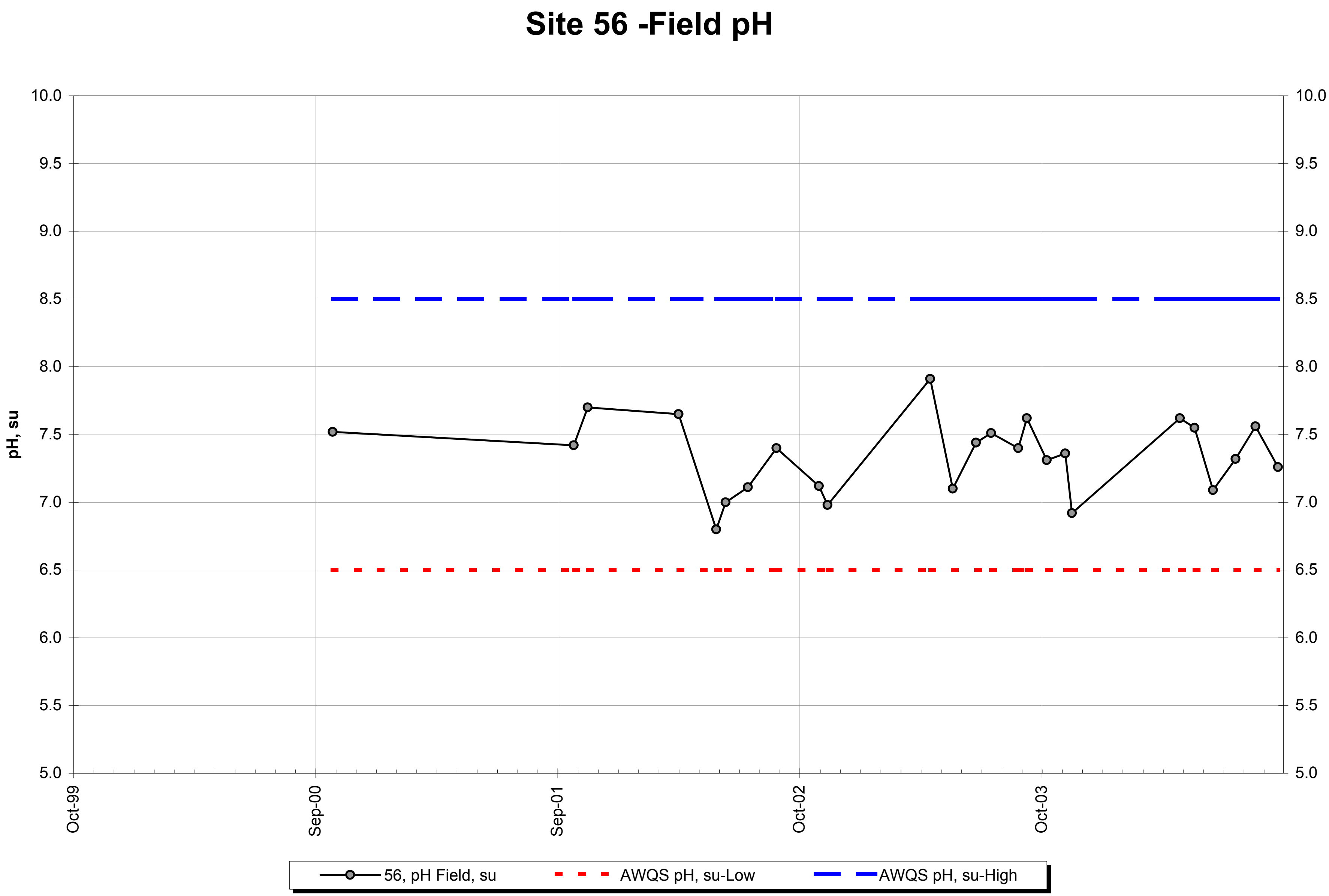
Site 56 -Water Temperature



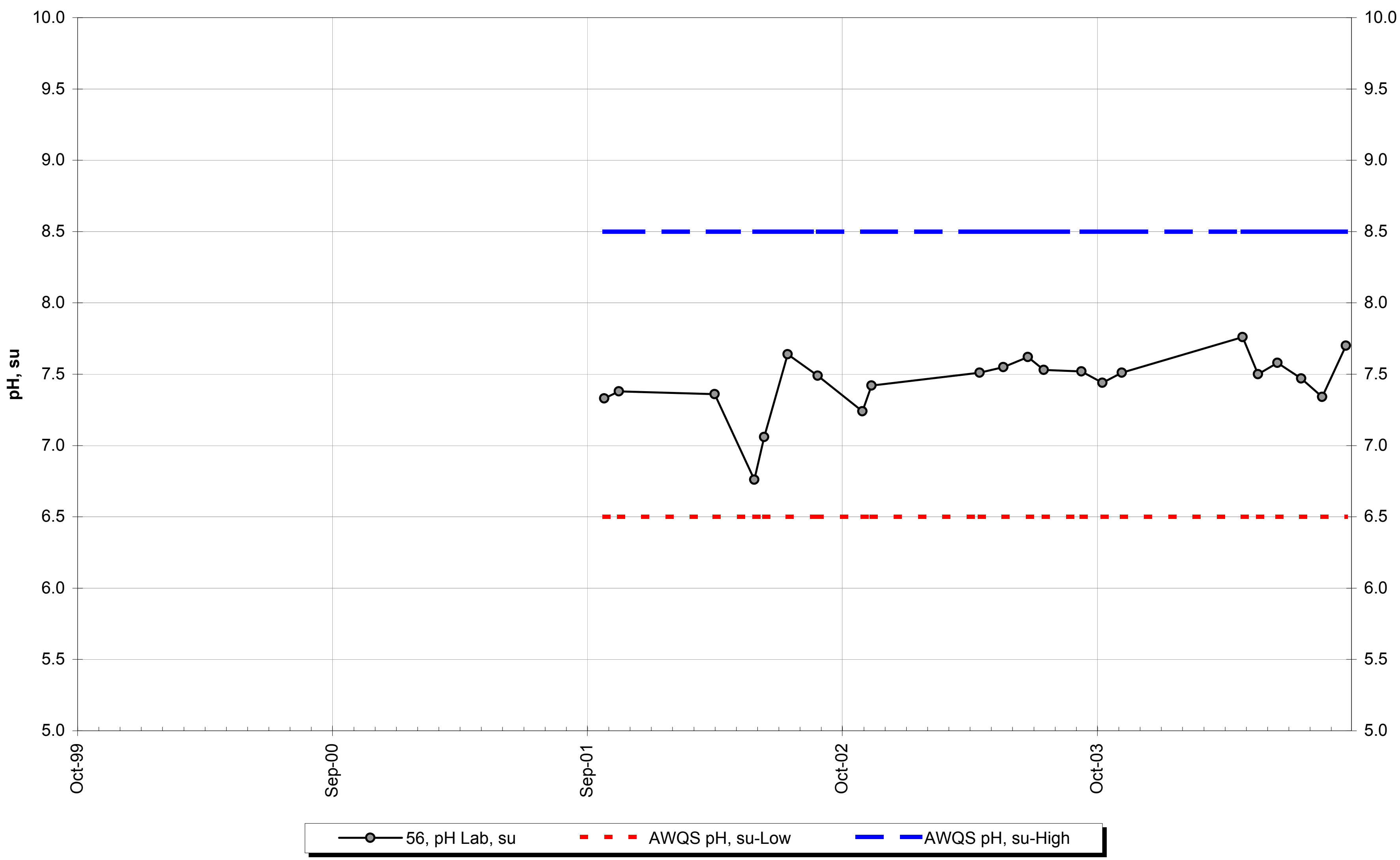

Site 56 -Conductivity-Field
umhos
500
450
400
350
300
250
200
150
100
50
0
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
56, Cond Field, umhos/cm

Site 56 -Conductivity-Lab

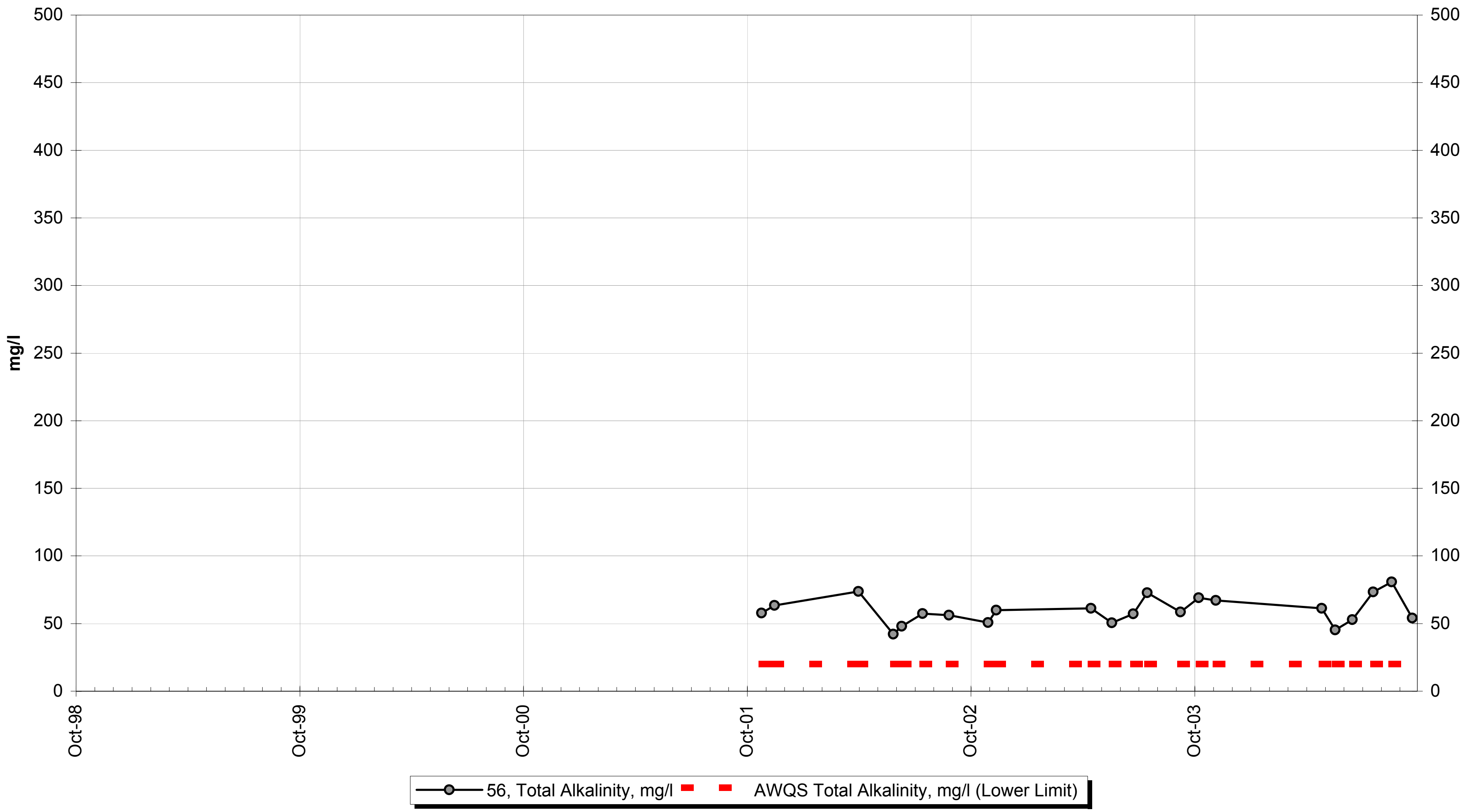



Site 56 -Field pH
pH, su
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
56, pH Field, su
AWQS pH, su-Low
AWQS pH, su-High

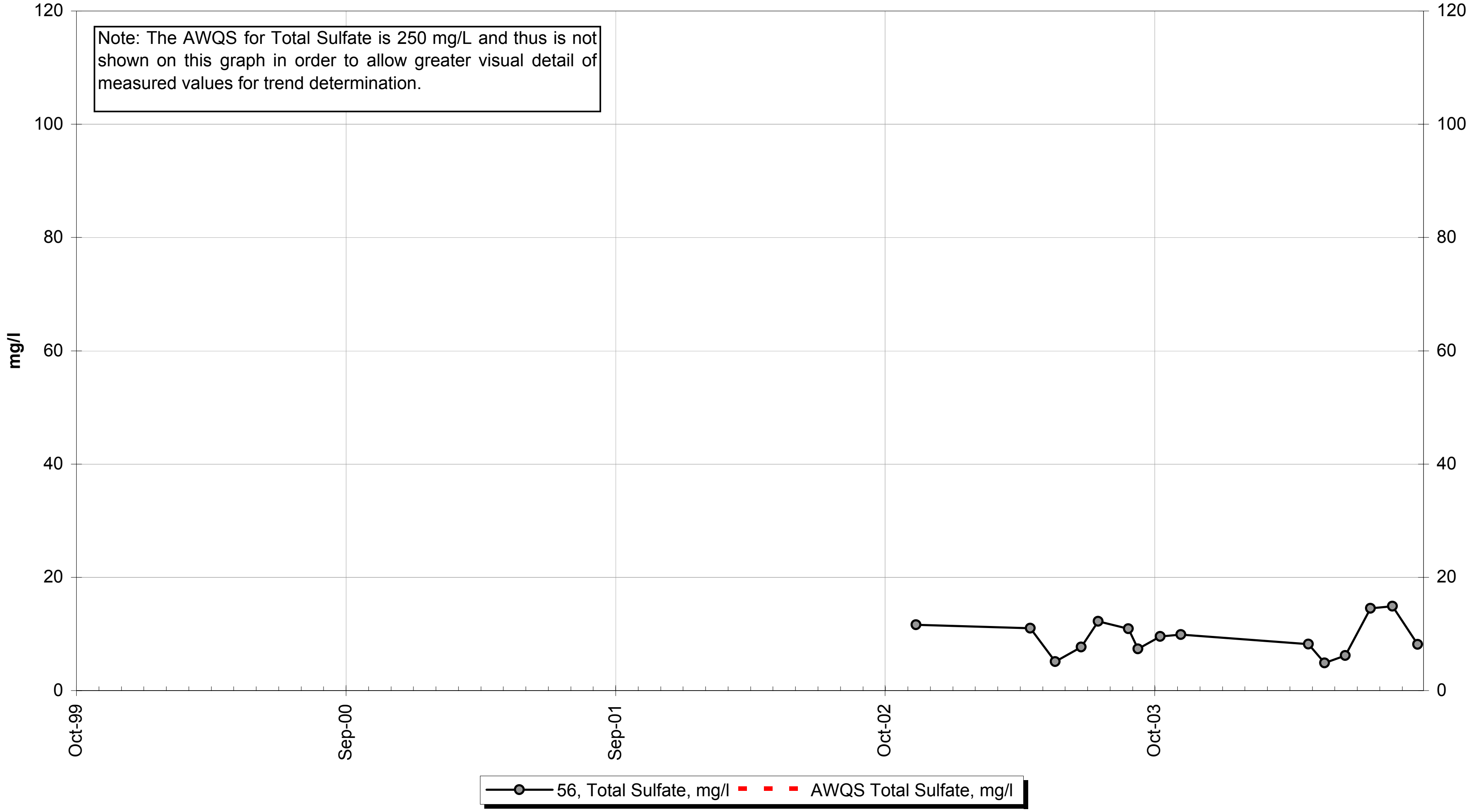
Site 56 -Lab pH

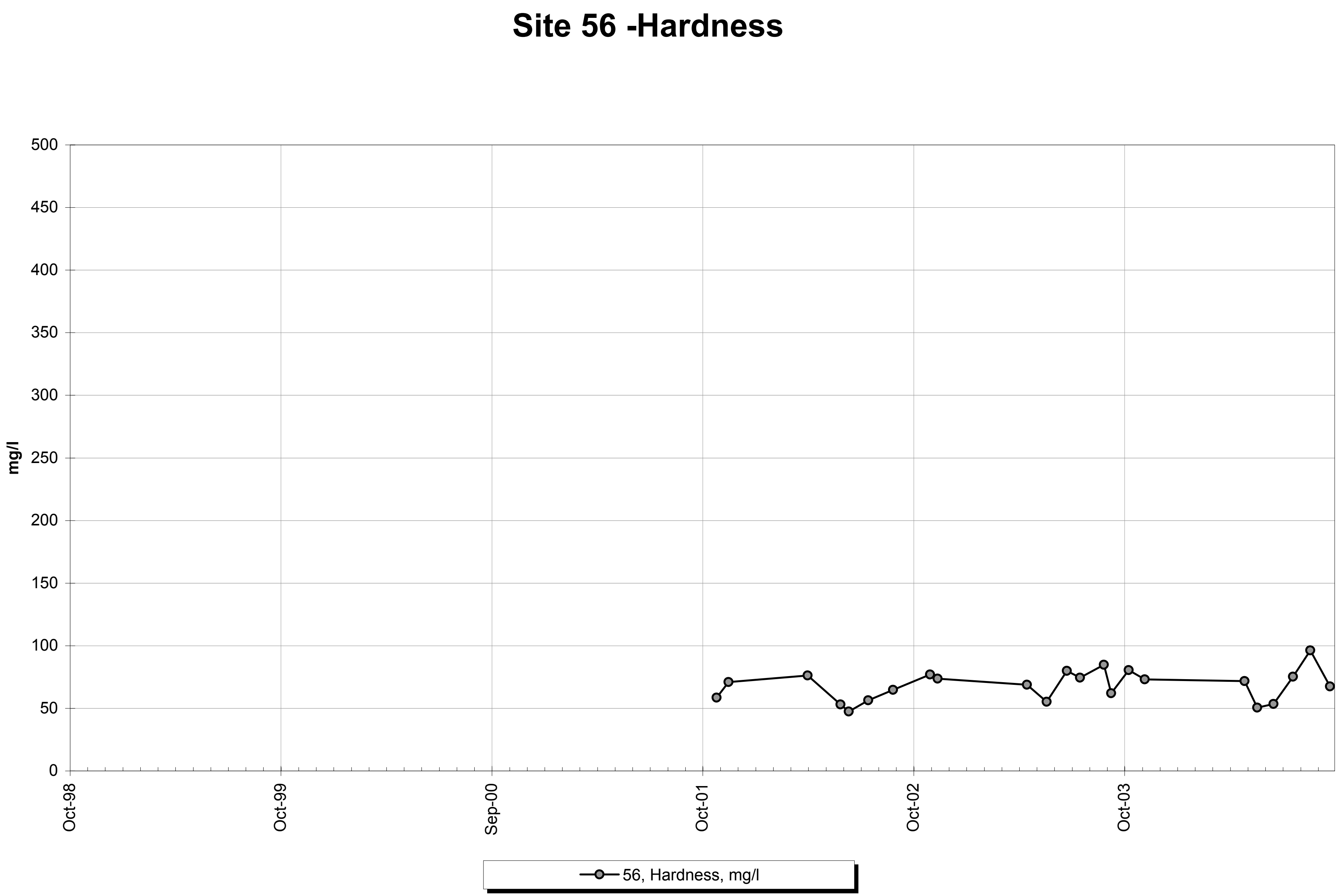


Site 56 -Total Alkalinity

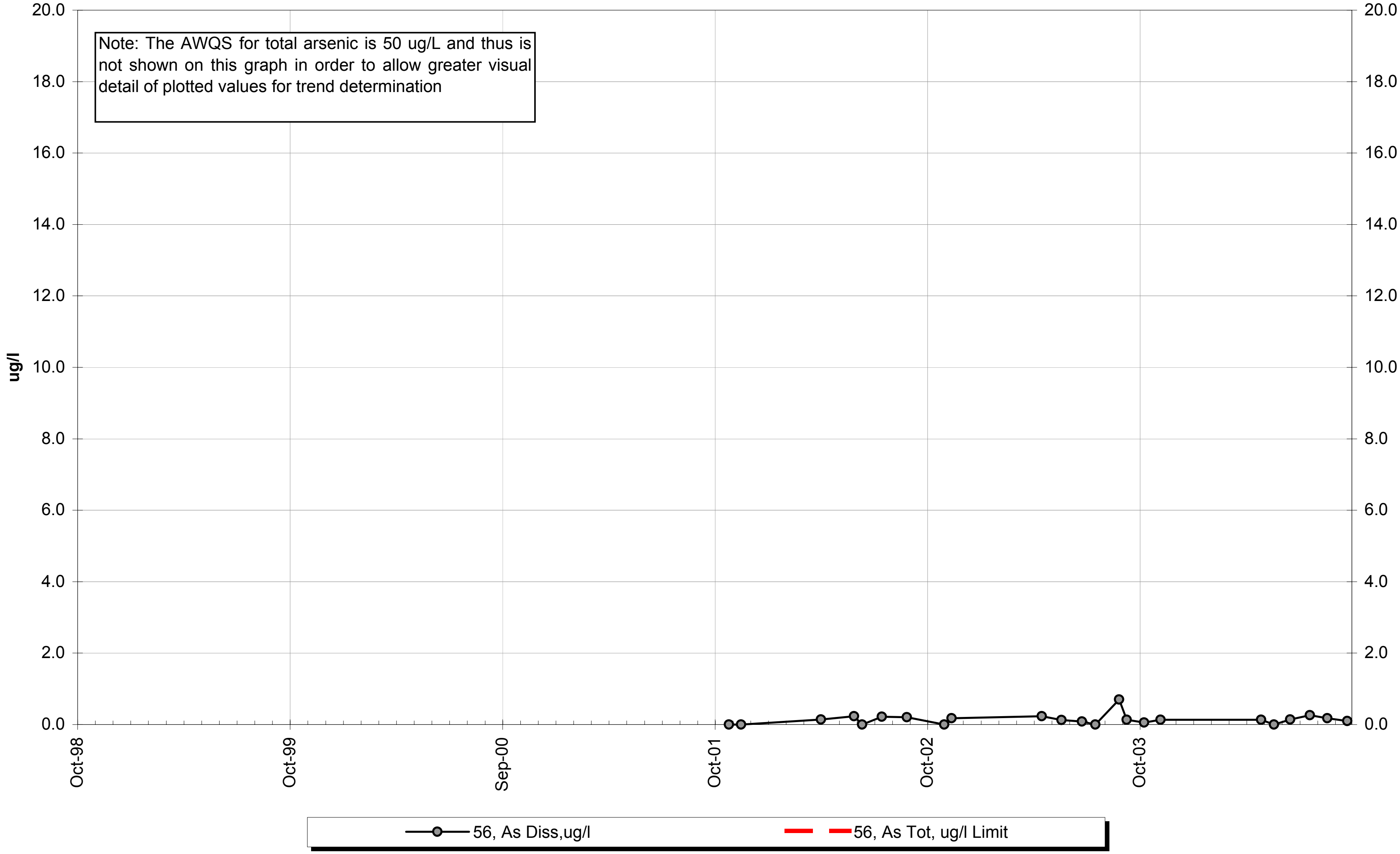


Site 56 -Total Sulfate

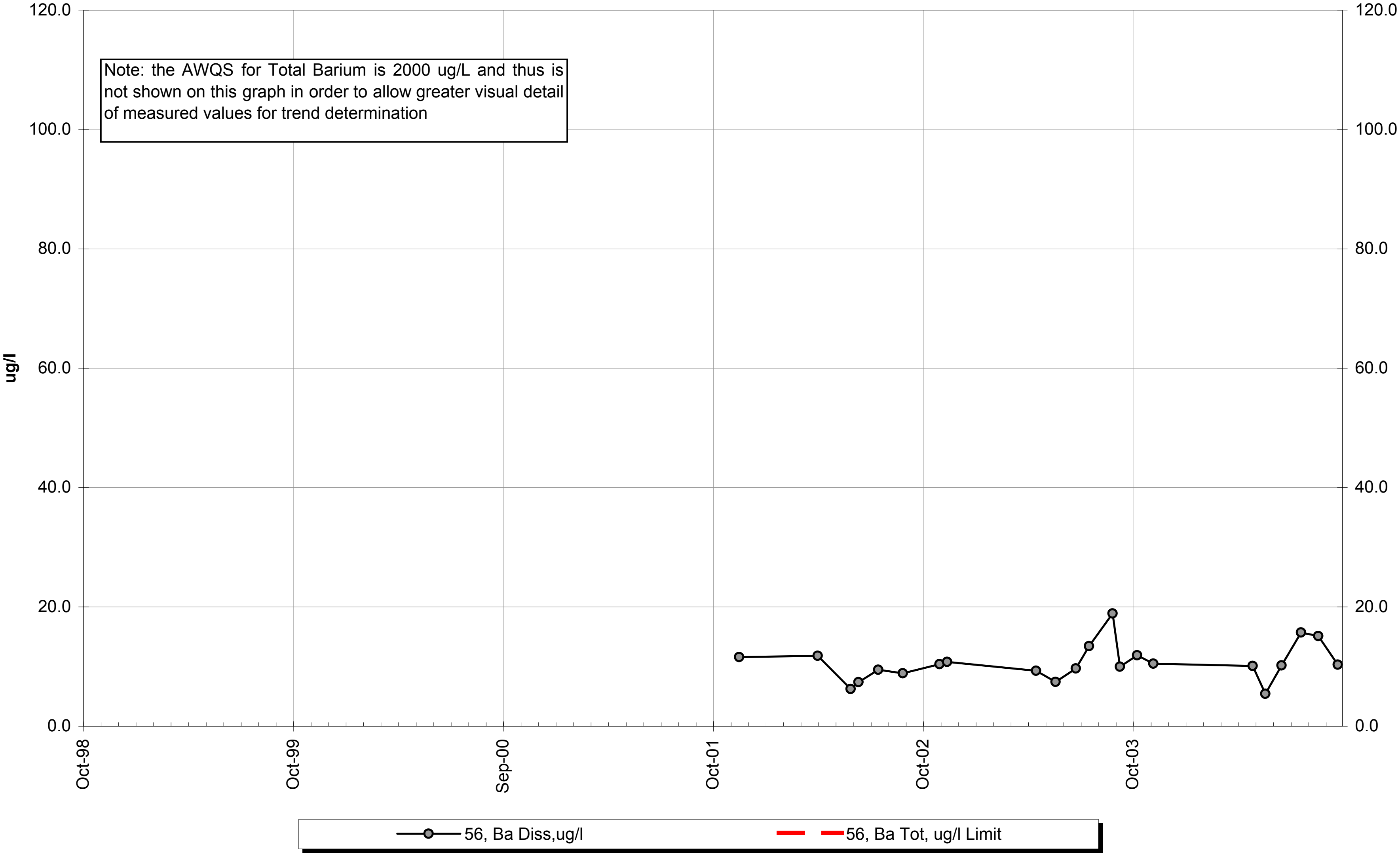



Site 56 -Hardness
mg/l
500
450
400
350
300
250
200
150
100
50
0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
56, Hardness, mg/l

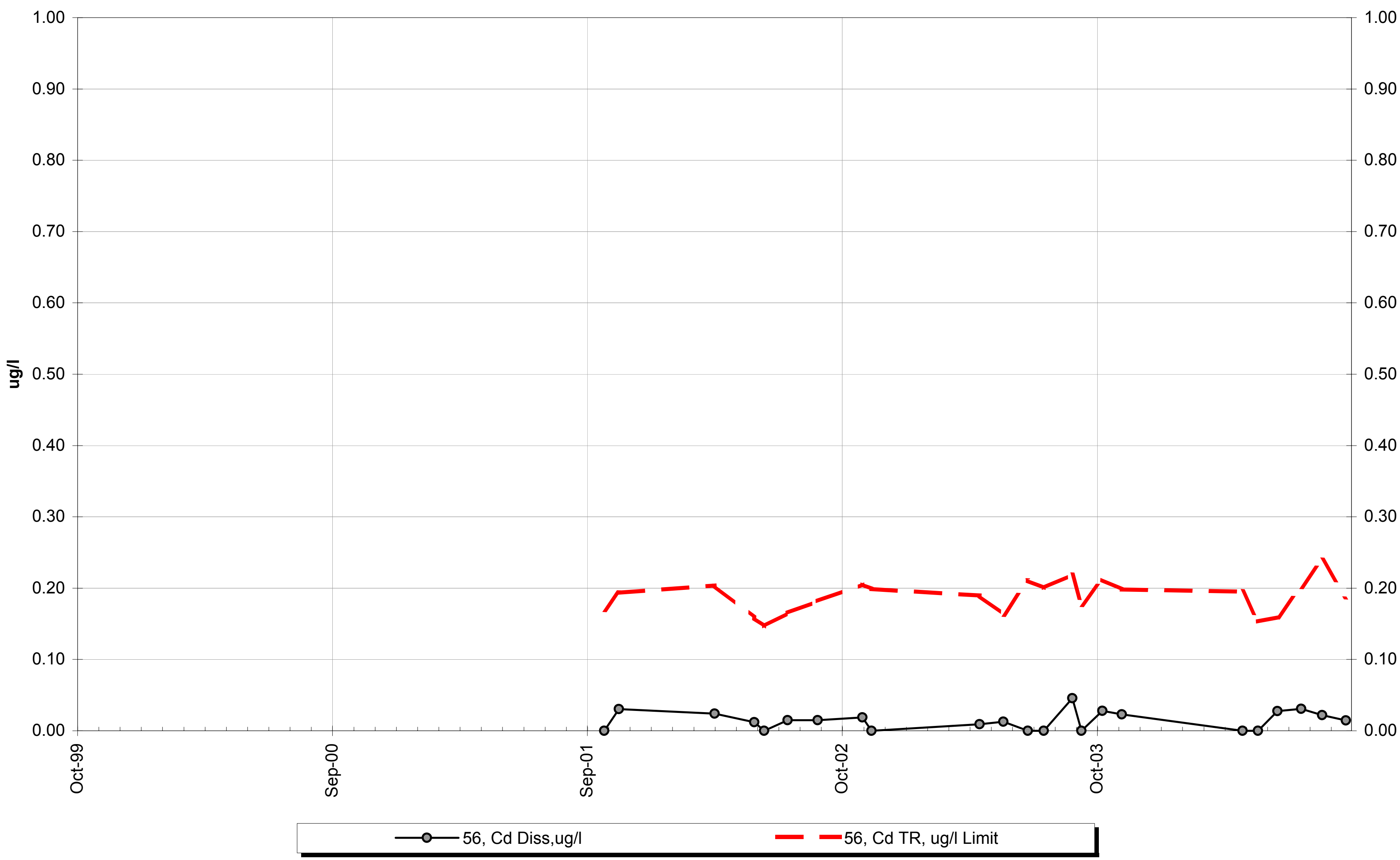
Site 56 -Dissolved Arsenic

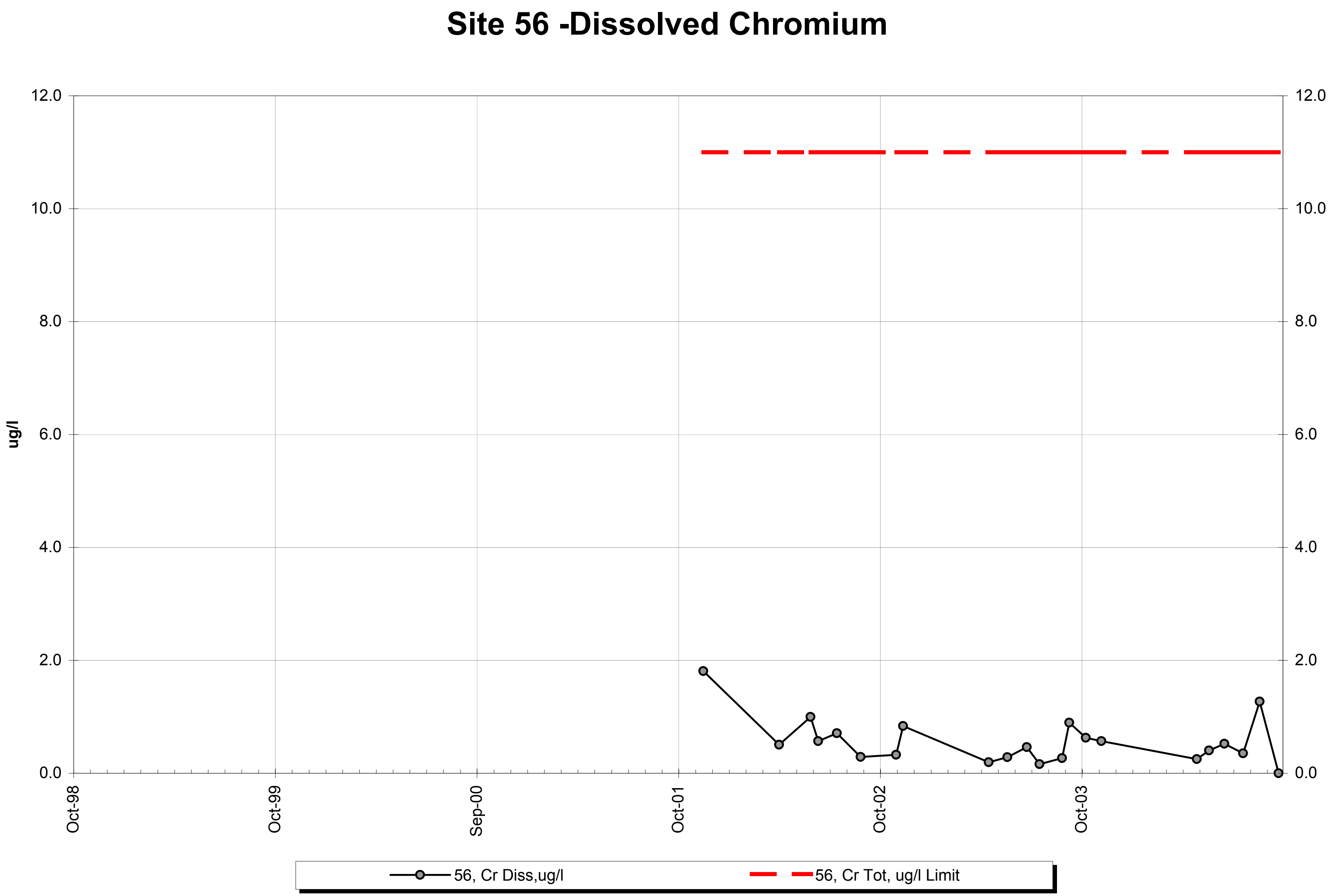


Site 56 -Dissolved Barium



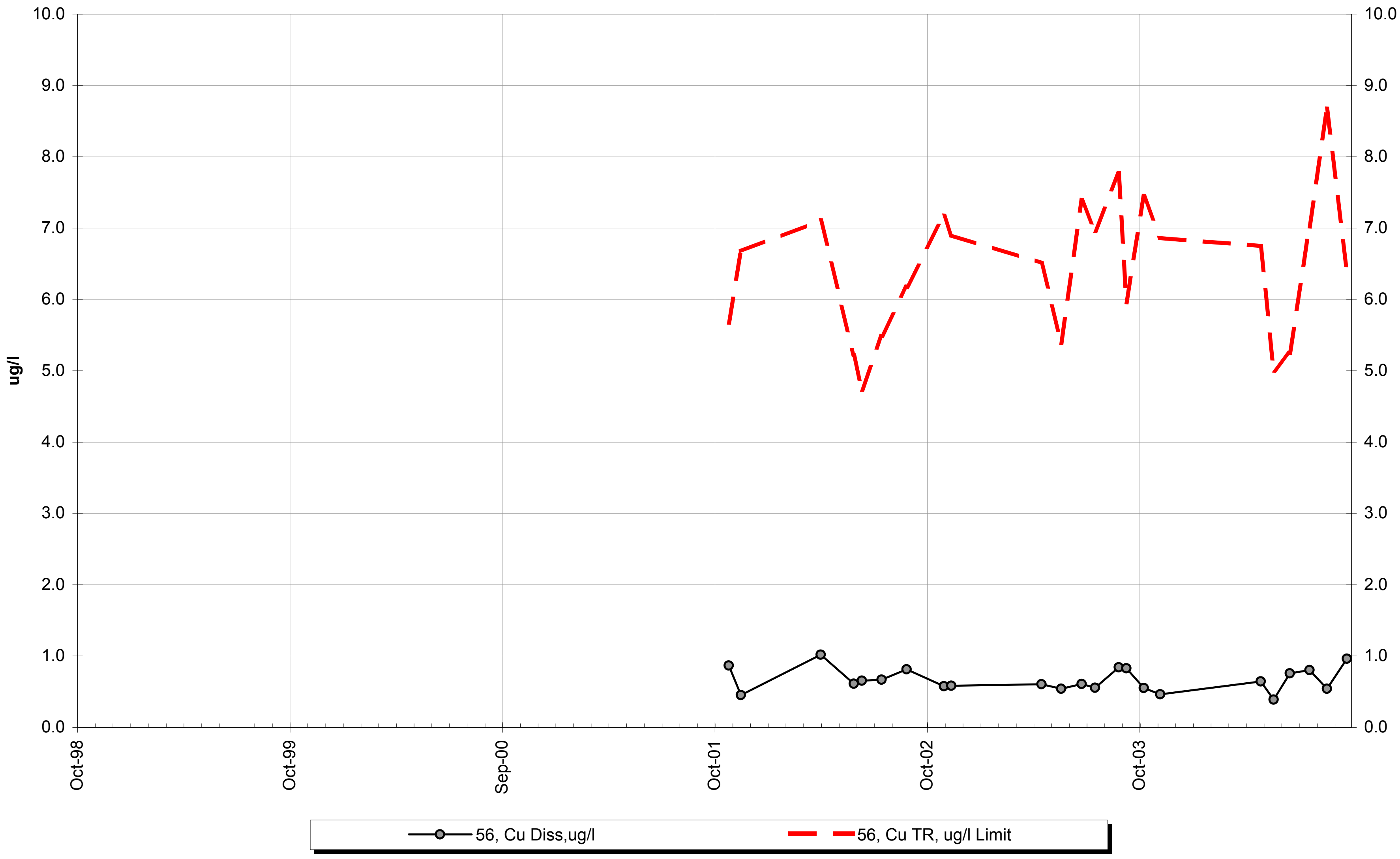
Site 56 -Dissolved Cadmium



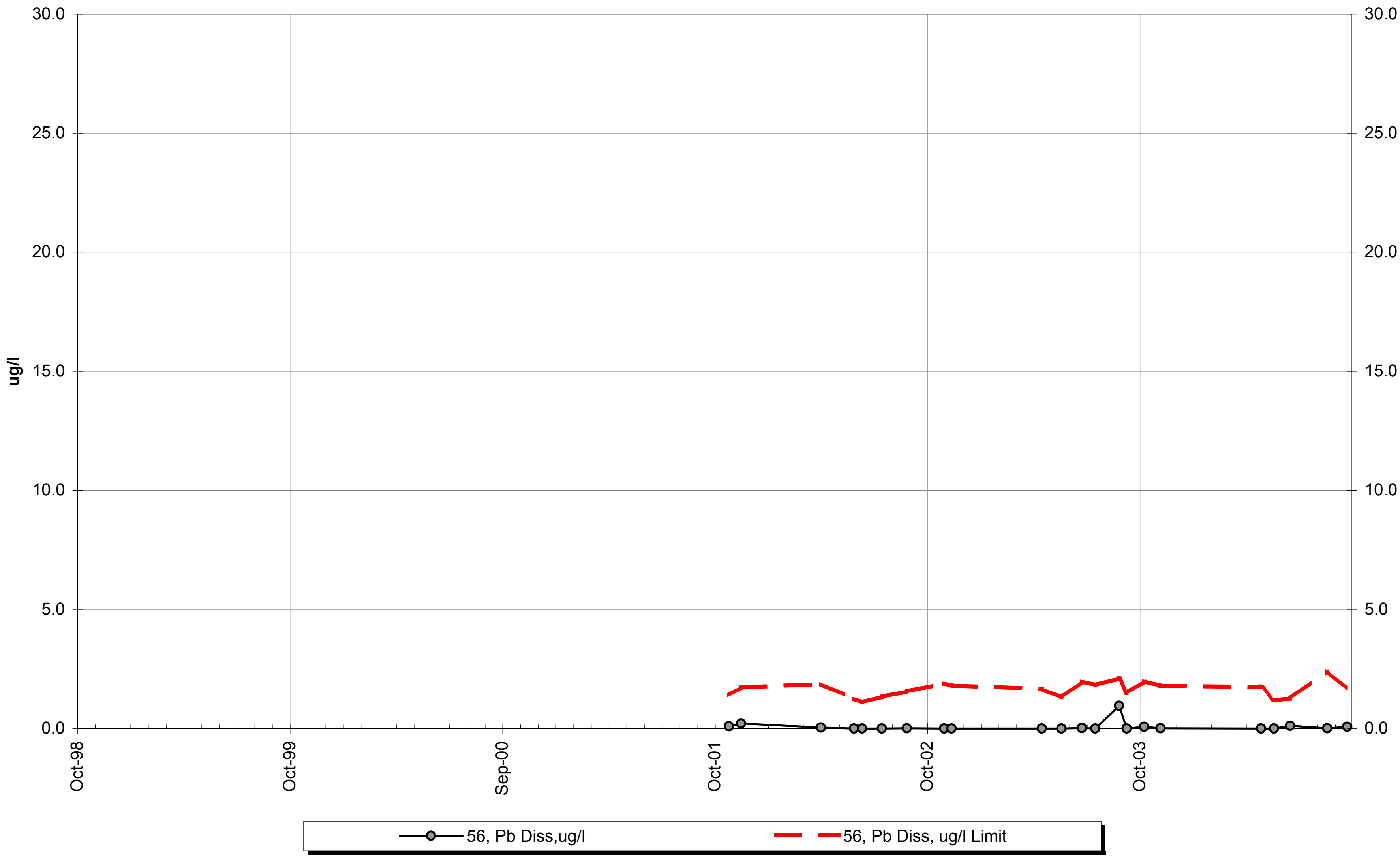


Site 56 -Dissolved Chromium
ug/l
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
56, Cr Diss,ug/l
56, Cr Tot, ug/l Limit

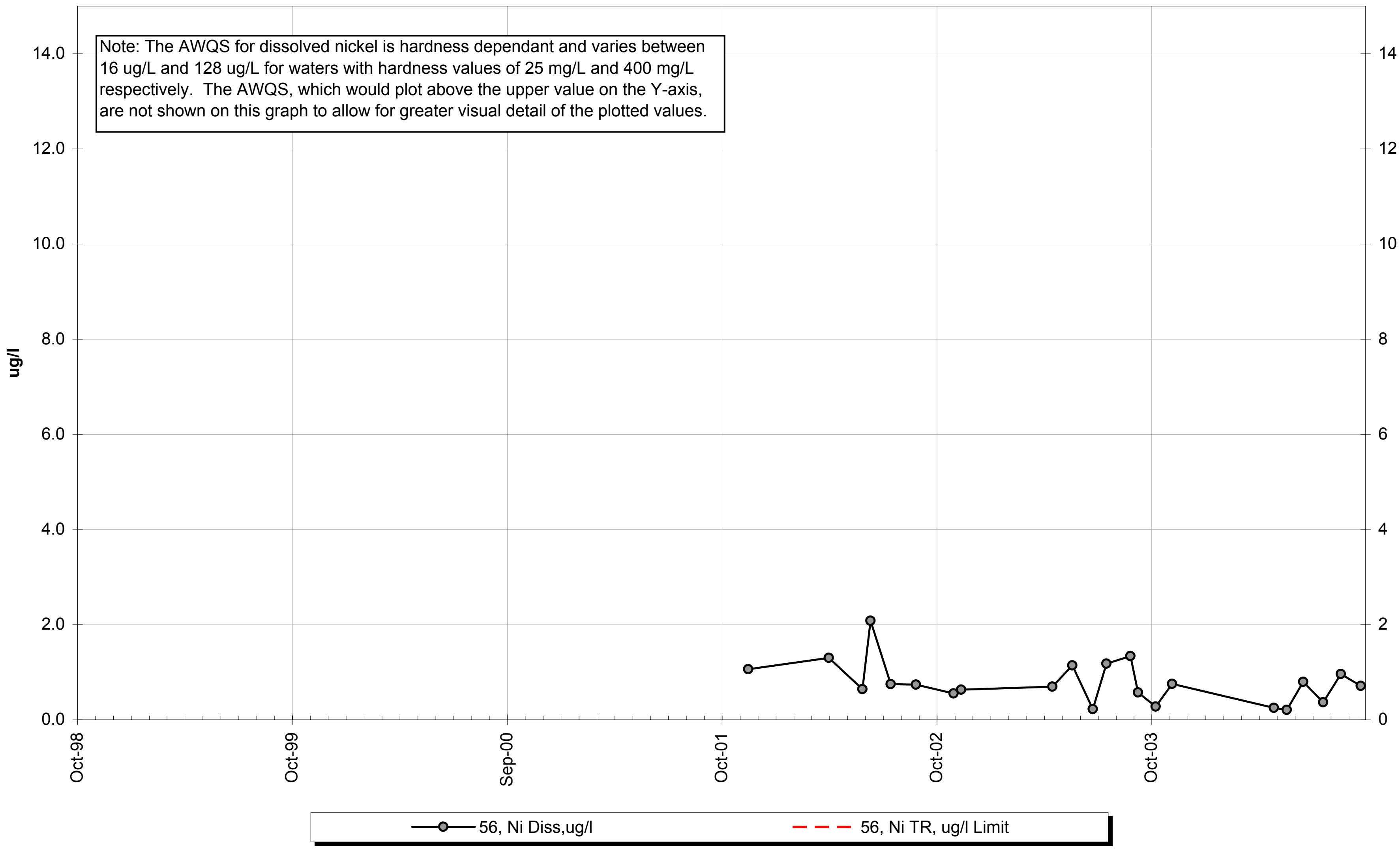
Site 56 -Dissolved Copper



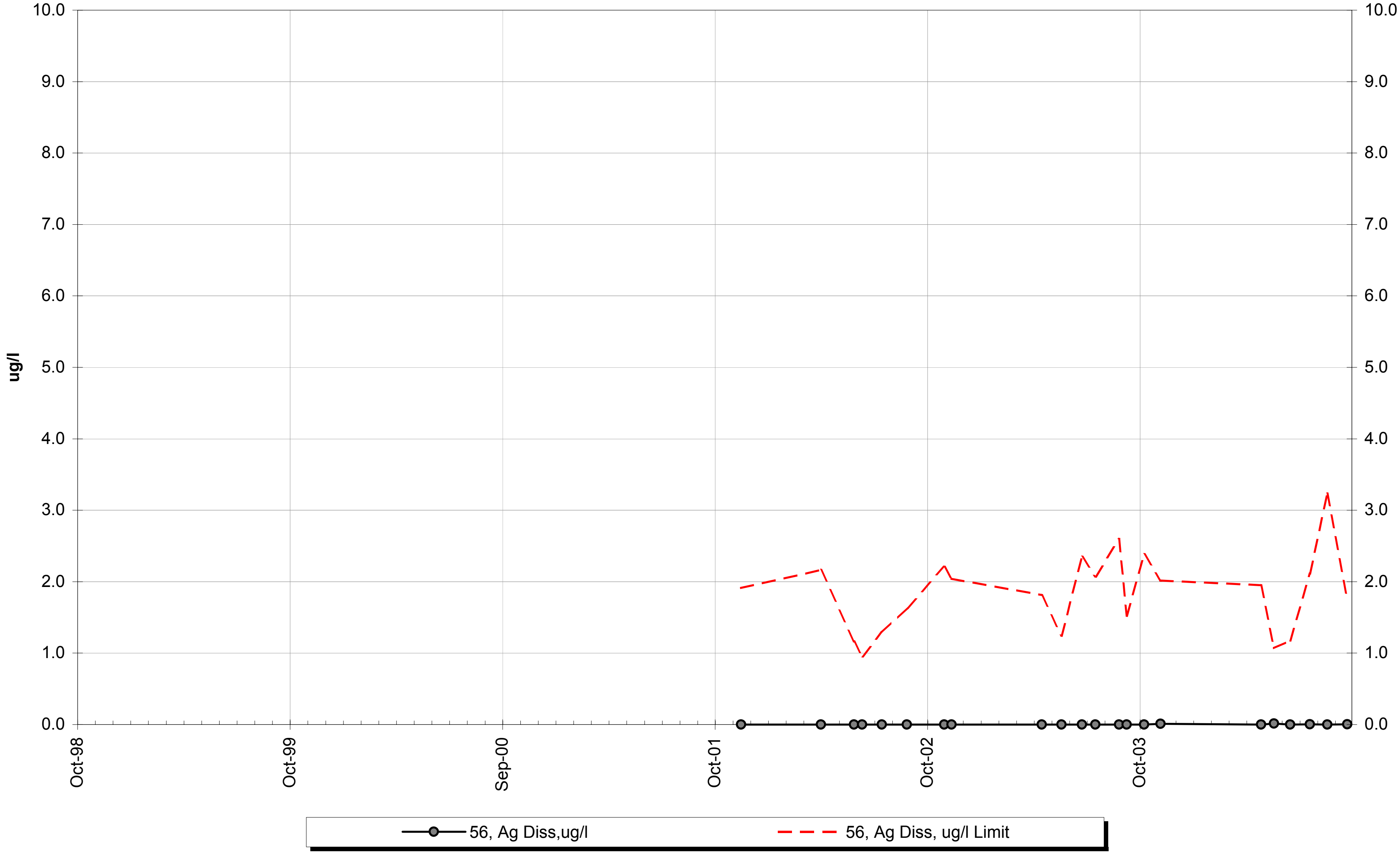
Site 56 -Dissolved Lead

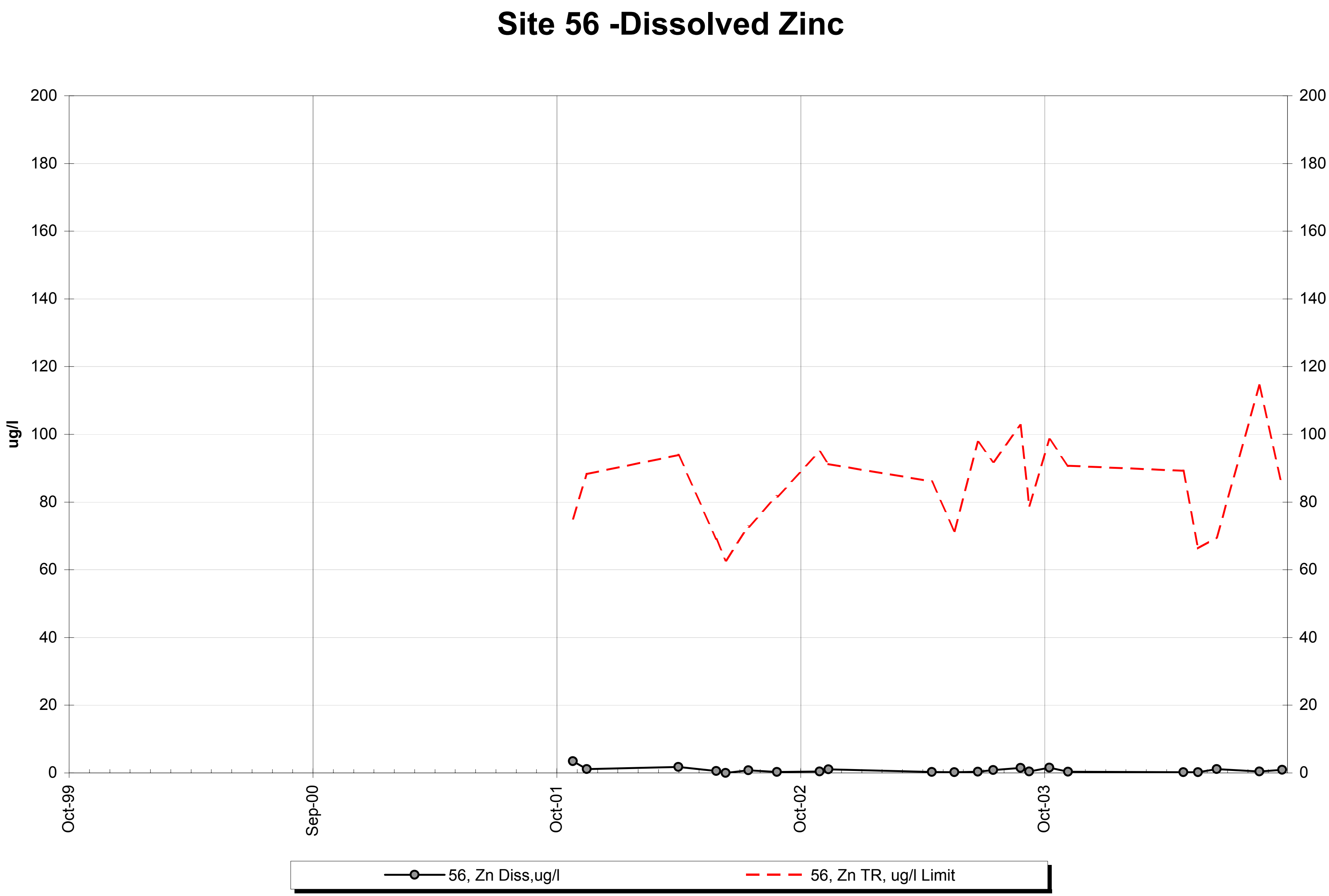


Site 56 -Dissolved Nickel

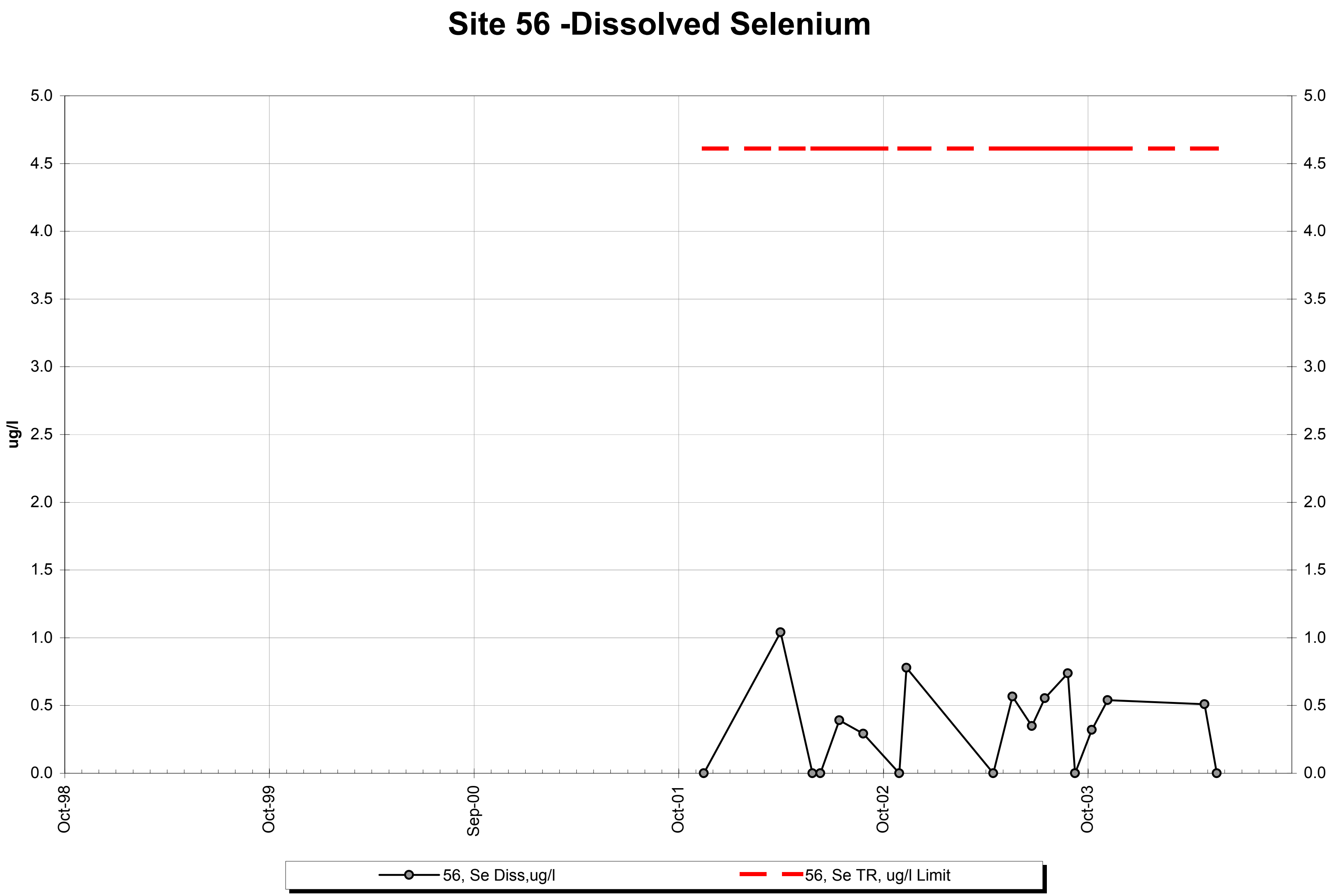


Site 56 -Dissolved Silver

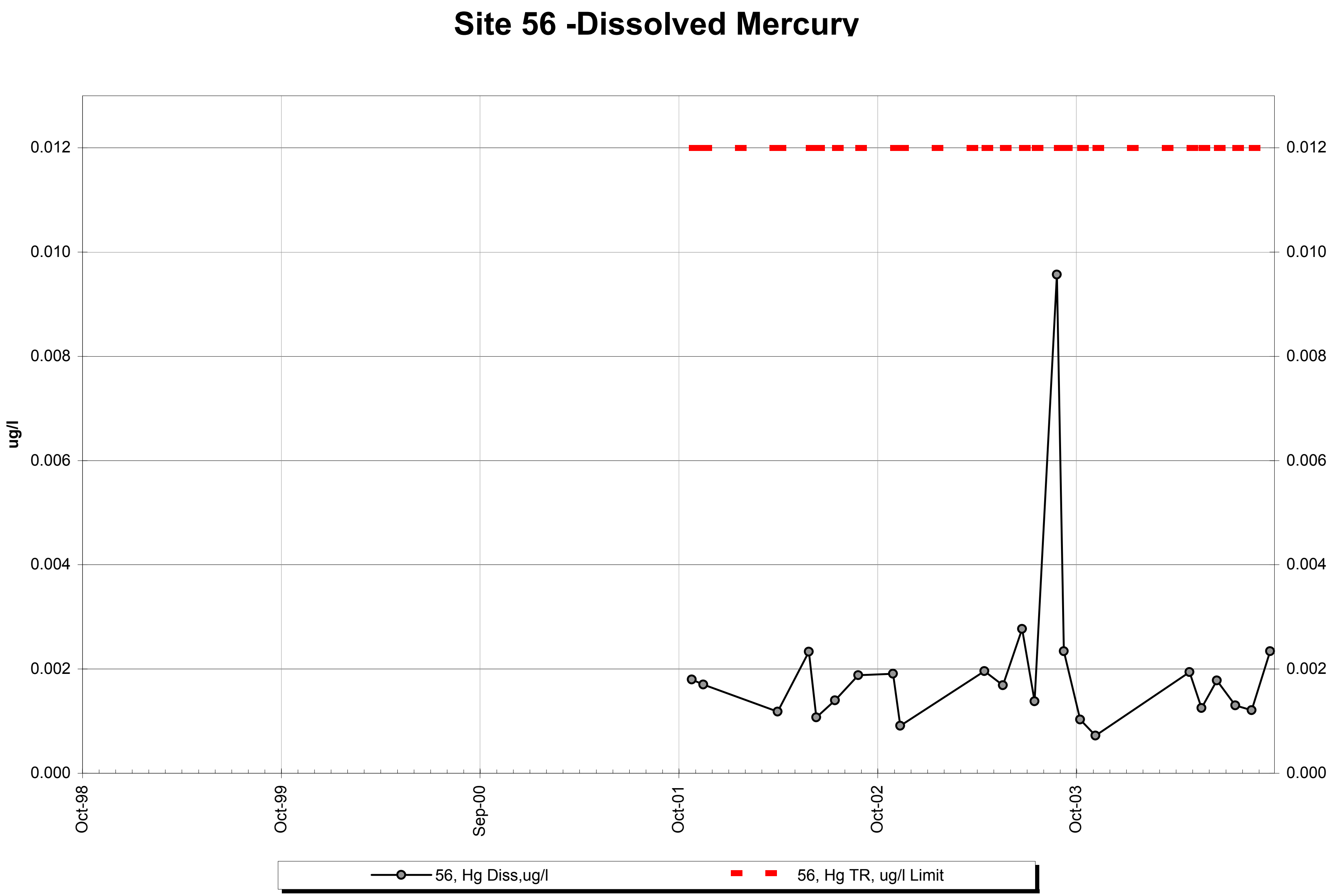




Site 56 -Dissolved Zinc
ug/l
200
180
160
140
120
100
80
60
40
20
0
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
56, Zn Diss,ug/l
56, Zn TR, ug/l Limit

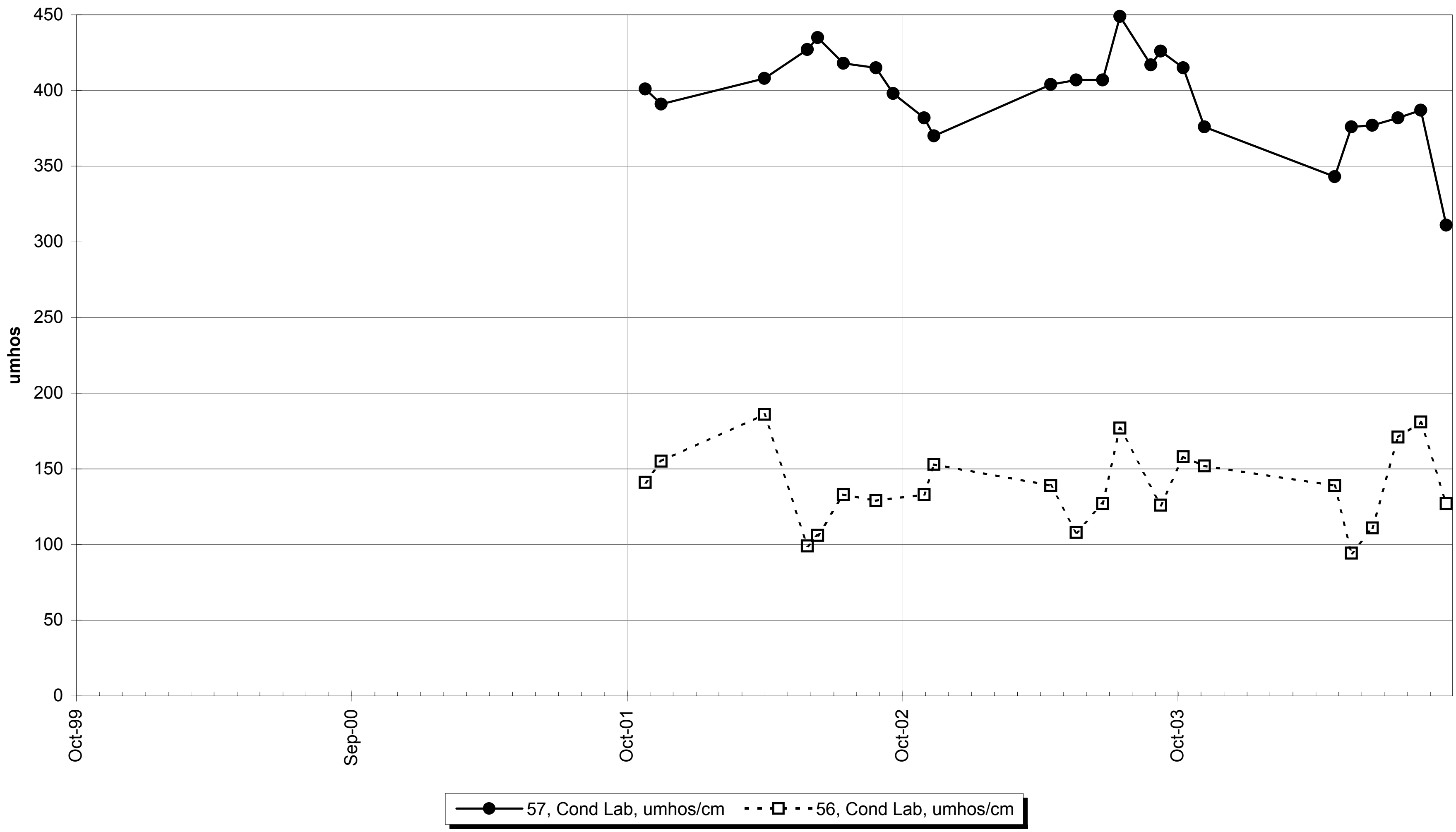


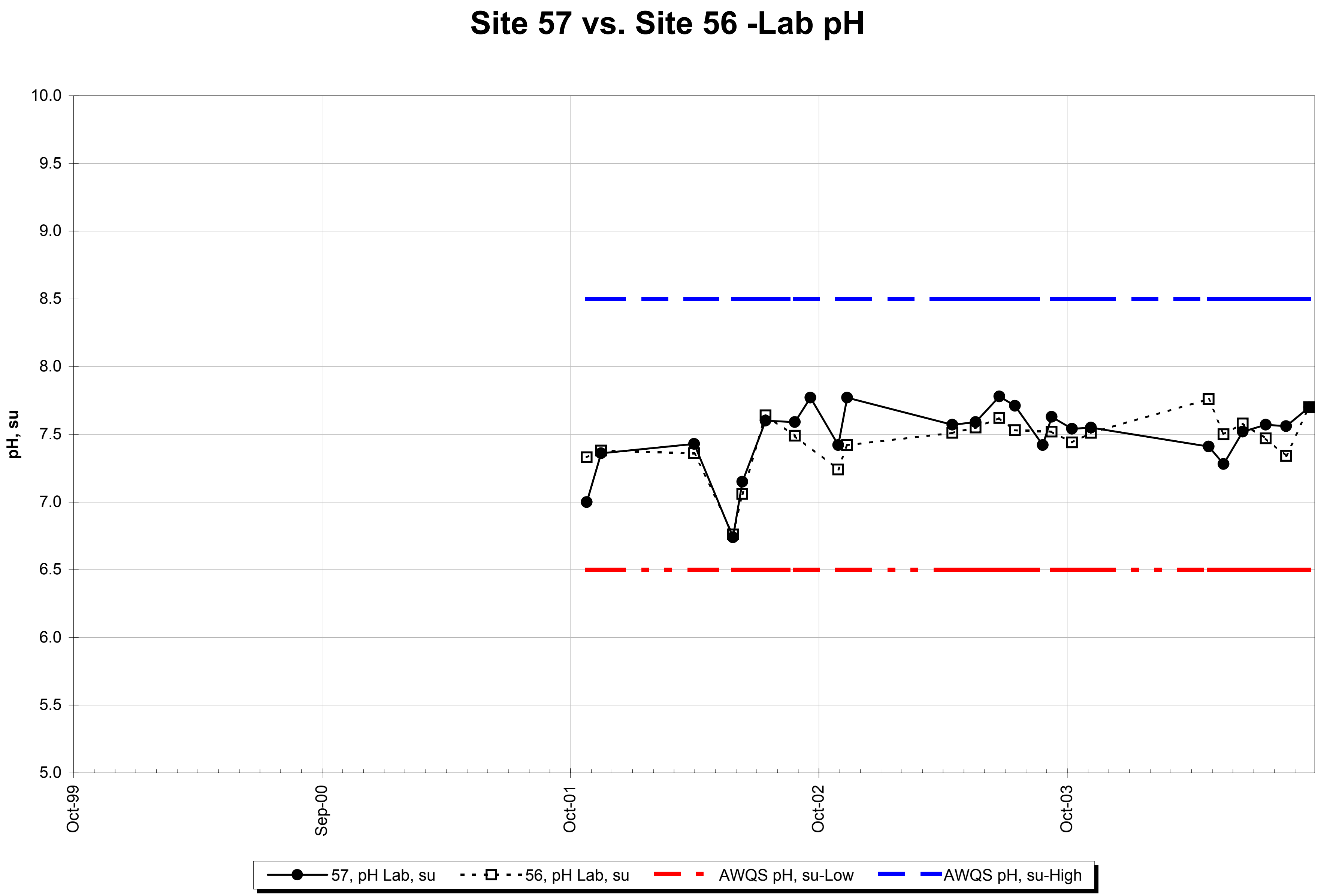
Site 56 -Dissolved Selenium
ug/l
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
56, Se Diss,ug/l
56, Se TR, ug/l Limit



Site 56 -Dissolved Mercury
ug/l
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
56, Hg Diss,ug/l
56, Hg TR, ug/l Limit

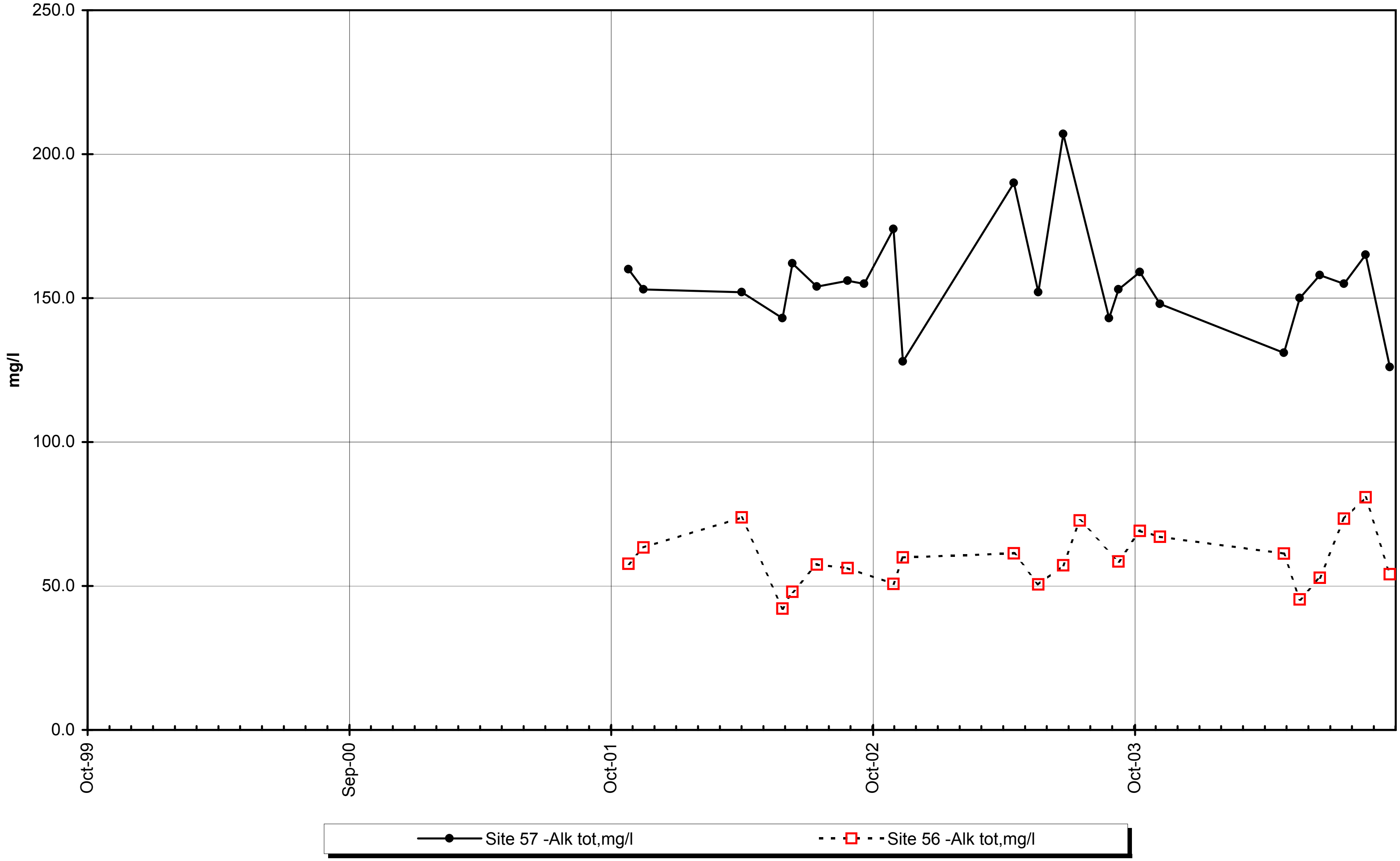
Site 57 vs Site 56 -Conductivity



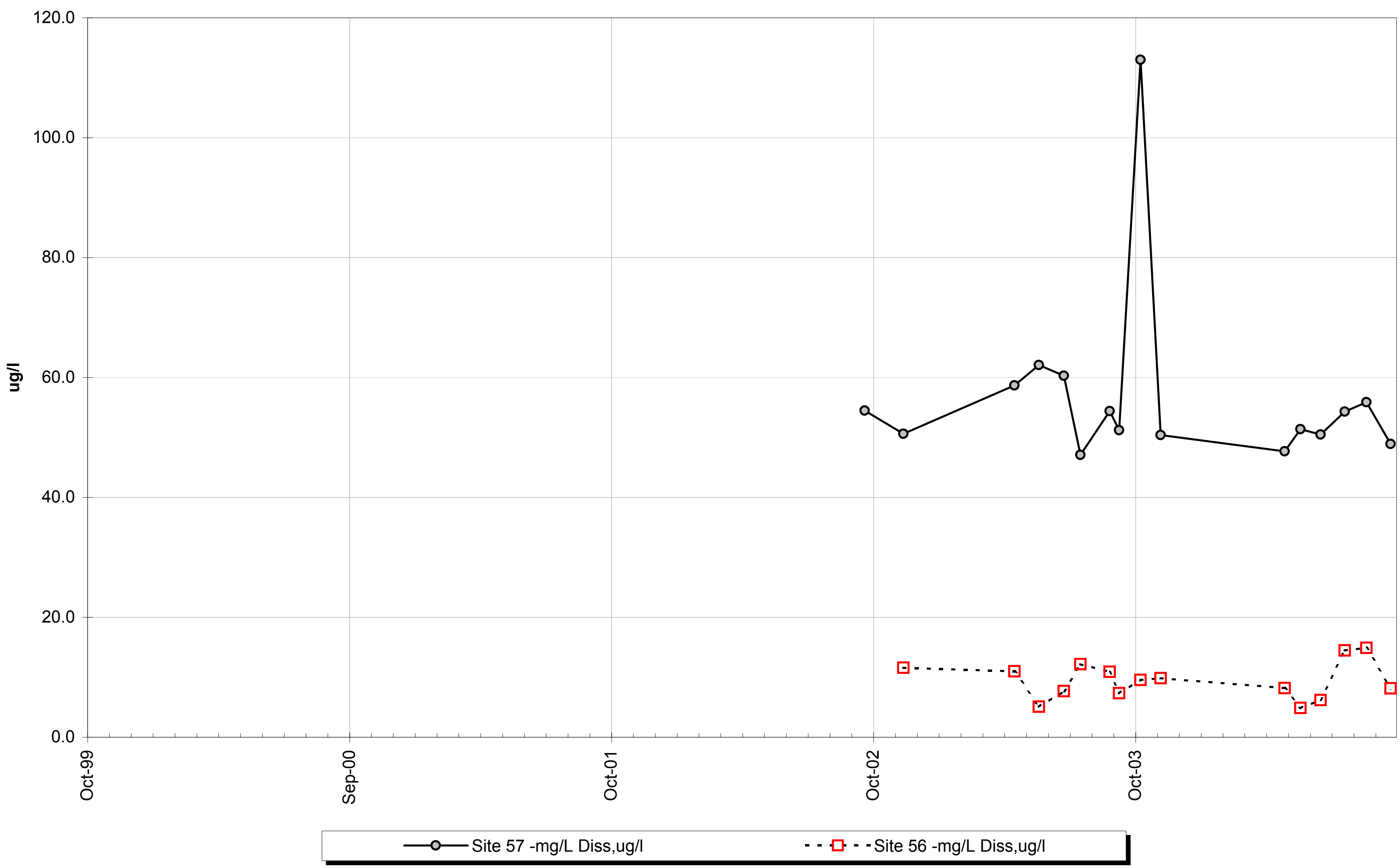


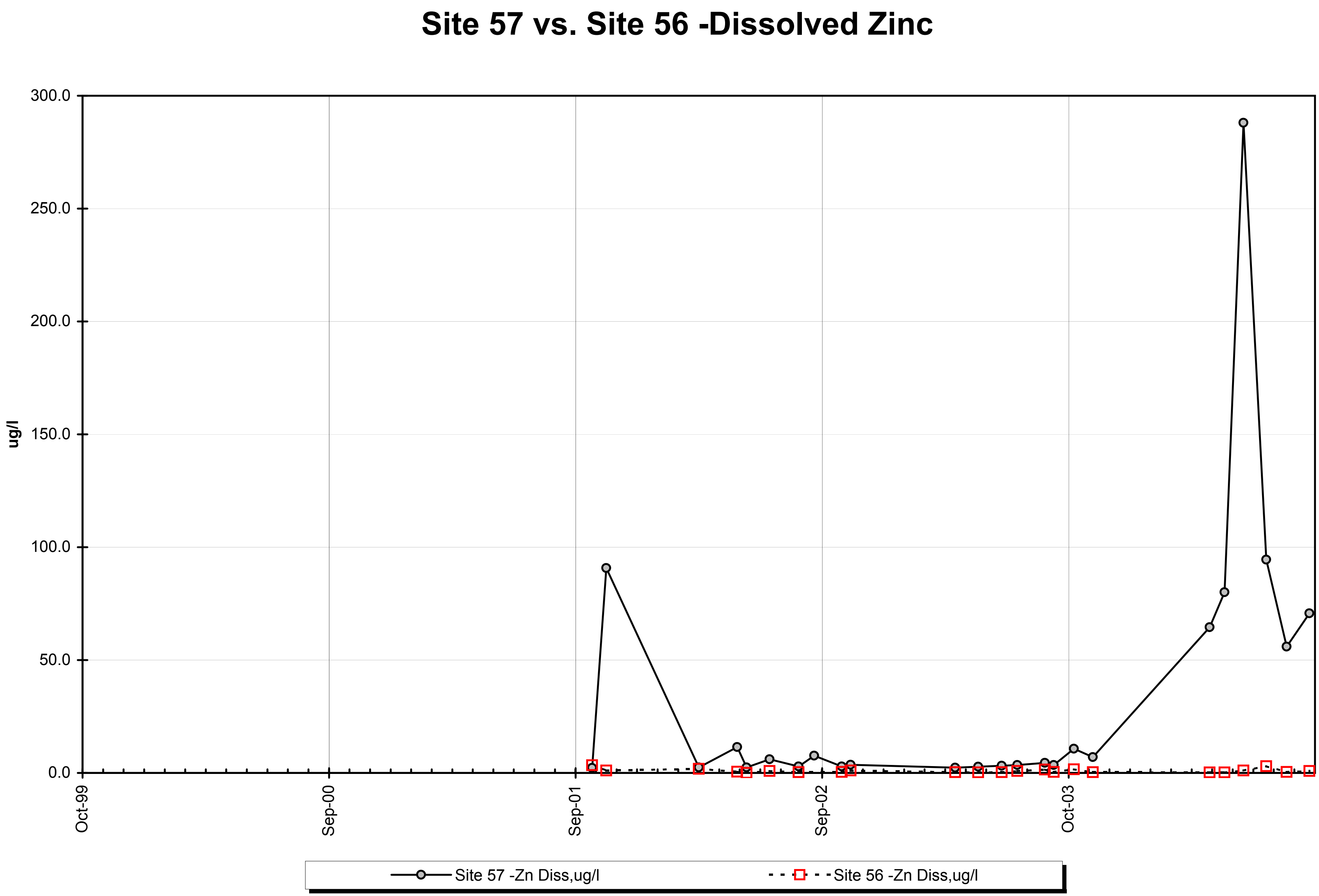
Site 57 vs. Site 56 -Lab pH
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
pH, su
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
57, pH Lab, su
56, pH Lab, su
AWQS pH, su-Low
AWQS pH, su-High

Site 57 vs. Site 56 -Total Alkalinity



Site 57 vs. Site 56 -Total Sulfate




Site 57 vs. Site 56 -Dissolved Zinc
ug/l
300.0
250.0
200.0
150.0
100.0
50.0
0.0
Oct-99
Sep-00
Sep-01
Sep-02
Oct-03
Site 57 -Zn Diss,ug/l
Site 56 -Zn Diss,ug/l

EXACT Wilcoxon-Mann-Whitney Rank Sum Test

Variable: Specific Conductance, Lab (umhos/cm @ 25°C)

Site	#57	#56	Ranks	
Year	WY2004	WY2004	**A**	**B**
Oct	415.0	158.0	16	6
Nov	376.0	152.0	11.5	5
Dec				
Jan				
Feb				
Mar				
Apr	343.0	139.0	10	4
May	376.0	94.3	11.5	1
Jun	377.0	111.0	13	2
Jul	382.0	171.0	14	7
Aug	387.0	181.0	15	8
Sep	311.0	127.0	9	3
Median	376.5	145.5		

N= 16

ΣR	100	36
	n	**m**
	8	8

X(.025,8,8)= 87.0

W_{rs}= **100**

X*(.025,8,8)= 49.0

$\alpha/2$	H_0 ($\mu_A = \mu_B$)
0.025	**REJECT**

Large Sample Approximation
Wilcoxon-Mann-Whitney Rank Sum Test
Variable: **pH, Lab, Standard Units**

Site	#57	#56	Ranks	
Year	WY2004	WY2004	**A**	**B**
Oct	7.54	7.44	9	4
Nov	7.55	7.51	10	7
Dec				
Jan				
Feb				
Mar				
Apr	7.41	7.76	3	16
May	7.28	7.50	1	6
Jun	7.52	7.58	8	13
Jul	7.57	7.47	12	5
Aug	7.56	7.34	11	2
Sep	7.70	7.70	14.5	14.5
Median	7.55	7.51		

N= 16 ΣR 68.5 67.5

n	**m**
8	8

W= 31.5

w_α 18

Upper 46

Lower 18

μ_W= 68

σ_W= 9.51

Z_{rs}= 0.00

p-test

$\boxed{0.5000}$

$\alpha/2$

$\boxed{0.025}$

H_0

$(\mu_A=\mu_B)$

ACCEPT

EXACT Wilcoxon-Mann-Whitney Rank Sum Test

Variable: **Total Alk, (mg/l)**

Site	#57	#56	Ranks	
Year	WY2004	WY2004	**A**	**B**
Oct	159.0	69.1	15	6
Nov	148.0	67.1	11	5
Dec				
Jan				
Feb				
Mar				
Apr	131.0	61.2	10	4
May	150.0	45.3	12	1
Jun	158.0	52.8	14	2
Jul	155.0	73.4	13	7
Aug	165.0	80.8	16	8
Sep	126.0	54.1	9	3
Median	152.50	64.15		

N= 16		ΣR	100	36
			n	**m**
			8	8

X(.025,8,8)= 87.0

W_{rs}= **100**

X*(.025,8,8)= 49.0

$\alpha/2$	H_0 ($\mu_A=\mu_B$)
0.025	**REJECT**

EXACT Wilcoxon-Mann-Whitney Rank Sum Test

Variable: **Sulfate, Total (mg/l)**

Site	#57	#56	Ranks	
Year	WY2004	WY2004	**A**	**B**
Oct	113.0	9.6	16	5
Nov	50.4	9.9	11	6
Dec				
Jan				
Feb				
Mar				
Apr	47.7	8.2	9	4
May	51.4	4.9	13	1
Jun	50.5	6.2	12	2
Jul	54.3	14.5	14	7
Aug	55.9	14.9	15	8
Sep	48.9	8.2	10	3
Median	51.0	8.9		

N= 16 ΣR 100 36

n	**m**
8	8

X(.025,8,8)= 87.0

W_{rs}= **100**

X*(.025,8,8)= 49.0

$\alpha/2$

0.025

H_0

$(\mu_A=\mu_B)$

REJECT

EXACT Wilcoxon-Mann-Whitney Rank Sum Test

Variable: **Zinc, Dissolved (ug/l)**

Site	#57	#56	Ranks	
Year	WY2004	WY2004	**A**	**B**
Oct	10.70	1.55	10	7
Nov	7.04	0.36	9	3
Dec				
Jan				
Feb				
Mar				
Apr	64.50	0.18	12	1
May	80.00	0.20	14	2
Jun	288.00	1.10	16	6
Jul	94.50	3.00	15	8
Aug	55.90	0.43	11	4
Sep	70.70	0.90	13	5
Median	67.60	0.66		

N= 16 ΣR 100 36

n	**m**
8	8

X(.025,8,8)= 87.0

W_{rs}= **100**

X*(.025,8,8)= 49.0

$\alpha/2$

0.025

H_0

$(\mu_A=\mu_B)$

REJECT

INTERPRETIVE REPORT
SITE 13 "MINE ADIT DISCHARGE EAST"

The data collected during the current water year are listed in the following "Table of Results for Water Year 2004" report. The table includes all the data, field and lab, collected for the current water year and a series of flags keyed to the summary report "Qualified Data by QA Reviewer". The QA report lists any associated data limitations found during the monthly QA reviews of laboratory data for this site. Median values for all analytes have been calculated and are shown in the right-most column of the table of results. Any value reported as less than MDL has been replaced with a value of zero for the purpose of median calculation.

All data collected at this site for the past five years are included in the data analyses. As shown in the table below, there were no data outliers.

Sample Date	Parameter	Value	Qualifier	Notes
No outliers have been identified by KGCMC for the period of Oct-98 though Sept-03.				

The data for Water Year 2004 have been compared to the strictest fresh water quality criterion for each applicable analyte. Four results exceeding these criteria have been identified, as listed in the table below. The data are for Total Sulfate and range from 323 - 470 mg/l. The elevated sulfate is likely the result of oxidation of pyrite contained in the production rock storage area located immediately upstream from Site 13. KGCMC plans for the removal of this material are listed in the General Plan of Operation, Appendix 14 –Attachment A, November 2001. It is anticipated that the removal of the waste rock will lower the sulfate concentrations to below AWQS.

Sample Date	Parameter	Value	Standard	Standard Type
10/09/03	Sulfate, Total mg/L	323	250	Water Supply, Drinking
11/06/03	Sulfate, Total mg/L	353	250	Water Supply, Drinking
08/19/04	Sulfate, Total mg/L	298	250	Water Supply, Drinking
09/22/04	Sulfate, Total mg/L	470	250	Water Supply, Drinking

X-Y plots have been generated to graphically present the data for each of the analytes requested in the Statistical Information Goals for this site. These plots have been visually analyzed for the appearance of any trend in concentration. For conductivity and hardness slight upward trends may be present. No other trend were visual apparent. A non-parametric statistical analysis for trend was preformed for conductivity, pH, Alkalinity, dissolved zinc and hardness. Calculation details of the Seasonal Mann-Kendall analyses are presented in detail on the pages following this interpretive section. The table below summarizes the results on the data collected between Oct-98 and Sep-04 (WY1999-WY2004). For data sets with a statistically significant trend (α<5% - one-tailed test for increasing trend only) a Seasonal-Sen's Slope estimate statistic has also been calculated. Total alkalinity and hardness have statistically significant, increasing trends ($p>0.95$ for both) while conductivity which was noted as having an apparent visual trend does not show a statistically significant trend even at the α=10% level. The Sen's slope estimate

		Mann-Kendall test statistics			Sen's slope estimate	
Parameter	n*	Z	Trend	a**	Q	Q(%)
Conductivity, Lab	6	1.06	+	0.855		
pH, Lab	6	-0.53	-	0.298		
Alkalinity, Total	6	1.81	+	**0.965**	9.75	6.6
Zinc, Dissolved	6	-1.36	-	0.087		
Hardness, Total	6	2.8	+	**0.997**	26	5.9
*: Number of years		**:Significance level				

for total alkalinity is 9.75 mg•L^{-1}•yr^{-1} or an 6.6% increase annually while the slope estimate for total hardness is 26.0 mg•L^{-1}•yr^{-1} or an 5.9% increase annually. The increasing trend in hardness, which is probably reflective of carbonate mineral dissolution, along with the adequate alkalinity indicate that there is still ample buffering capacity contained in the waste rock at this site. The overall constituent loading for this site is within the range expected from exposed waste rock.

It is anticipated that upon completion of the planned reclamation of this site constituent loads will return to background levels. Currently, steep slopes preclude constructing an oxygen-limiting soil cover on the site.. Consequently, KGCMC intends to remove the production rock from the site. Hauling the rock back into the mine via the 1350 portal is a feasible alternative, however ventilation and access infrastructure prevent doing so prior to closure of the underground workings. Other more logistically complex alternatives include hauling the material down to the 920 portal or one of the active surface disposal facilities. KGCMC plans to continue to monitor the site and will select an appropriate removal alternative that best suits the site's weathering performance and underground accessibility.

Table of Results for Water Year 2004

Site 13 "Mine Adit Discharge Creek"

Sample Date/Parameter	10/9/2003	11/6/2003	Dec-03	Jan-04	Feb-04	Mar-04	4/27/04	5/19/2004	6/16/2004	7/20/2004	8/19/2004	9/22/2004	**Median**
Water Temp (°C)	8.7	2.8					3.4	7.2	8.4	11.9	13.3	8.2	8.3
Conductivity-Field(μmho)	889	942					576	687	677	745	862	1,100	804
Conductivity-Lab (μmho)	879	896					533	650	626 J	704	839	1,002	772
pH Lab (standard units)	7.21	7.97					7.85	7.77	7.98 J	8.17 J	8.01	7.79	7.91
pH Field (standard units)	7.30	8.04					7.82	7.99	7.83	7.95	8.16	7.74	7.89
Total Alkalinity (mg/L)	172.0	151.0					115.0	174.0	184.0 J	197.0	209.0	139.0	173.0
Total Sulfate (mg/L)	323.0	353.0					180.0	204.0	193.0	222.0	298.0	470.0	260.0
Hardness (mg/L)	531.0	522.0					300.0	387.0	380.0	430.0	508.0	648.0	469.0
Dissolved As (ug/L)	0.141	0.165	NOT SCHEDULED FOR SAMPLING				0.067 J	0.062 J	0.126 J	0.154	0.337	0.222	0.148
Dissolved Ba (ug/L)	35.5	23.3					18.2	16.2	17.9	18.4	27.0	40.0	20.9
Dissolved Cd (ug/L)	0.025 J	0.024 J					0.047 J	<0.023	<0.023	0.014	0.019	0.075	0.021
Dissolved Cr (ug/L)	1.080	0.947					0.056 J	0.645 J	0.207 J	0.423	0.985	0.106	0.534
Dissolved Cu (ug/L)	0.247 J	0.290					0.513	0.595	2.310	1.130	1.440	1.980	0.863
Dissolved Pb (ug/L)	0.1630 U	0.0110 J					0.0182 J	0.0115 J	<0.0110	0.0157 U	0.0078 U	0.0158	0.0136
Dissolved Ni (ug/L)	2.460	2.350					0.688	1.190 J	2.570	0.404 J	2.700	2.690	2.405
Dissolved Ag (ug/L)	<0.003	0.009 J					<0.009	<0.009 UJ	<0.009	<0.002	<0.002	0.004 J	0.004
Dissolved Zn (ug/L)	25.30	9.28					29.00 J	5.47 J	4.81	9.88	4.74 J	40.50	9.58
Dissolved Se (ug/L)	<0.170 UJ	0.226 J					0.403 UJ	<0.496 UJ	<0.496 UJ	0.502	0.574	0.273	0.261
Dissolved Hg (ug/L)	0.000552 J	0.000972 U					0.001420	0.001090	0.000951	0.001300	0.001250 U	0.000760 U	0.001031

For individual sample/analyte qualifier descriptions see "Qualified Data by QA Reviewer" table.

Values reported as less than MDL are replaced by 1/2 MDL for median calculation purposes.

Shaded data has been qualified as an outlier by KGCMC and removed from any further analysis and is not included into the calculation of the median

Qualified Data by QA Reviewer

Date Range: 10/01/2003 to 09/30/2004

Site No.	Sample Date	Sample Time	Parameter	Value	Qualifier	Reason for Qualifier
13	10/09/2003	1:30:00 PM				
			Cd Diss, ug/l	0.0251	J	Below Quantitative Range
			Cu Diss, ug/l	0.247	J	Below Quantitative Range
			Pb Diss, ug/l	0.163	U	Field Blank Contamination
			Se Diss, ug/l	-0.17	UJ	LCS Recovery
			Hg Diss, ug/l	0.000552	J	Duplicate Sample RPD
13	11/06/2003	1:09:00 PM				
			Cd Diss, ug/l	0.0242	J	Below Quantitative Range
			Pb Diss, ug/l	0.011	J	Below Quantitative Range
			Ag Diss, ug/l	0.009	J	Below Quantitative Range
			Se Diss, ug/l	0.226	J	Below Quantitative Range
			Hg Diss, ug/l	0.000972	U	Field Blank Contamination
13	04/27/2004	12:18:00 PM				
			As Diss, ug/l	0.0671	J	Below Quantitative Range
			Cd Diss, ug/l	0.0473	J	Below Quantitative Range
			Cr Diss, ug/l	0.0562	J	Below Quantitative Range
			Pb Diss, ug/l	0.0182	J	Below Quantitative Range
			Zn Diss, ug/l	29	J	LCS Recovery
			Se Diss, ug/l	0.403	UJ	LCS Recovery
13	05/19/2004	12:24:00 PM				
			As Diss, ug/l	0.0622	J	Below Quantitative Range
			Cr Diss, ug/l	0.645	J	CCV Recovery
			Pb Diss, ug/l	0.0115	J	Below Quantitative Range
			Ni Diss, ug/l	1.19	J	CCV Recovery
			Ag Diss, ug/l	-0.009	UJ	MS Recovery
			Zn Diss, ug/l	5.47	J	LCS Recovery
			Se Diss, ug/l	-0.496	UJ	LCS Recovery

Qualifier	Description
J	Positively Identified - Approximate Concentration
N	Presumptive Evidence For Tentative Identification
NJ	Tentatively Identified - Approximate Concentration
R	Rejected - Cannot Be Verified
U	Not Detected Above Quantitation Limit
UJ	Not Detected Above Approximate Quantitation Limit

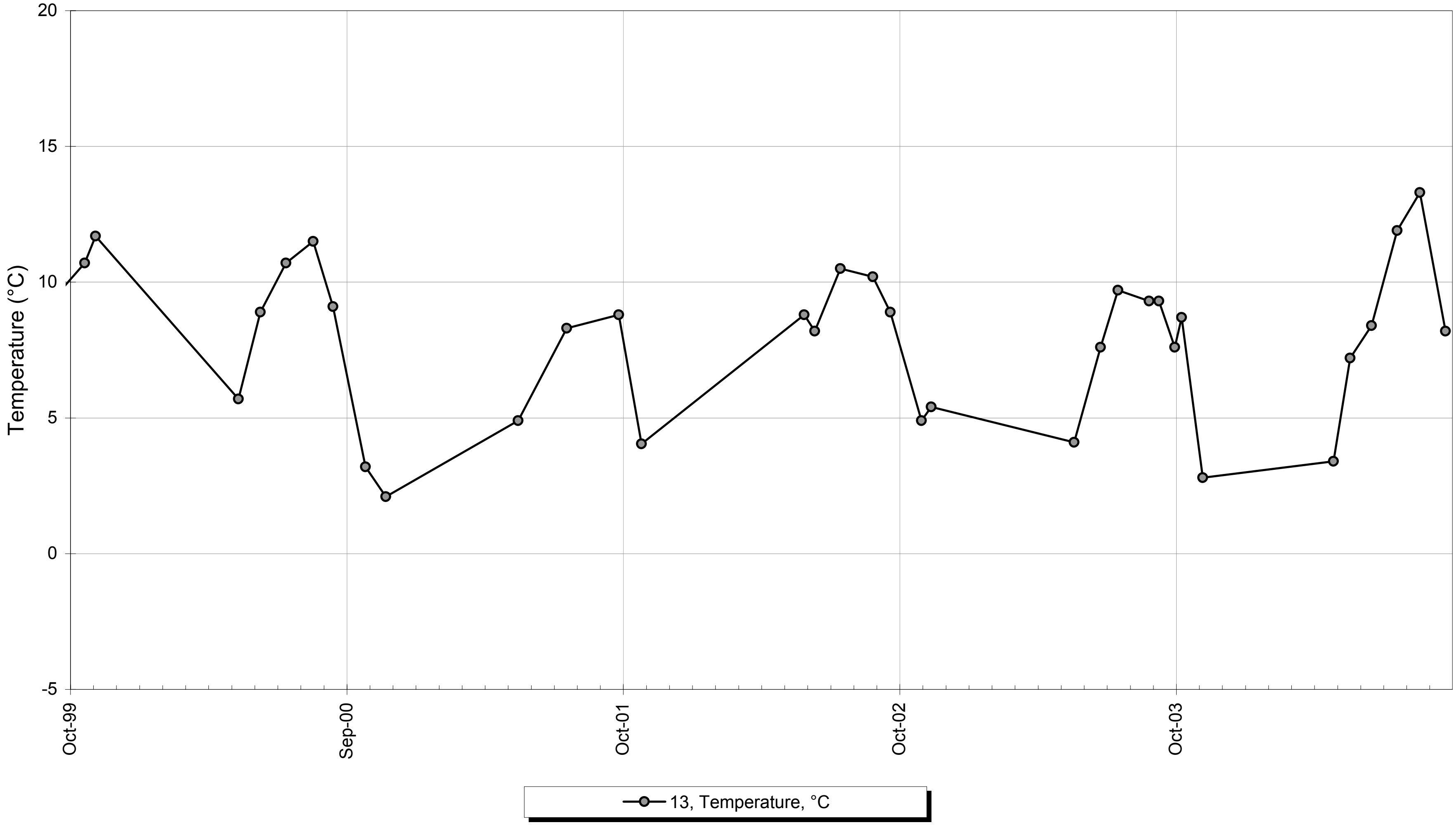
Qualified Data by QA Reviewer

Date Range: 10/01/2003 to 09/30/2004

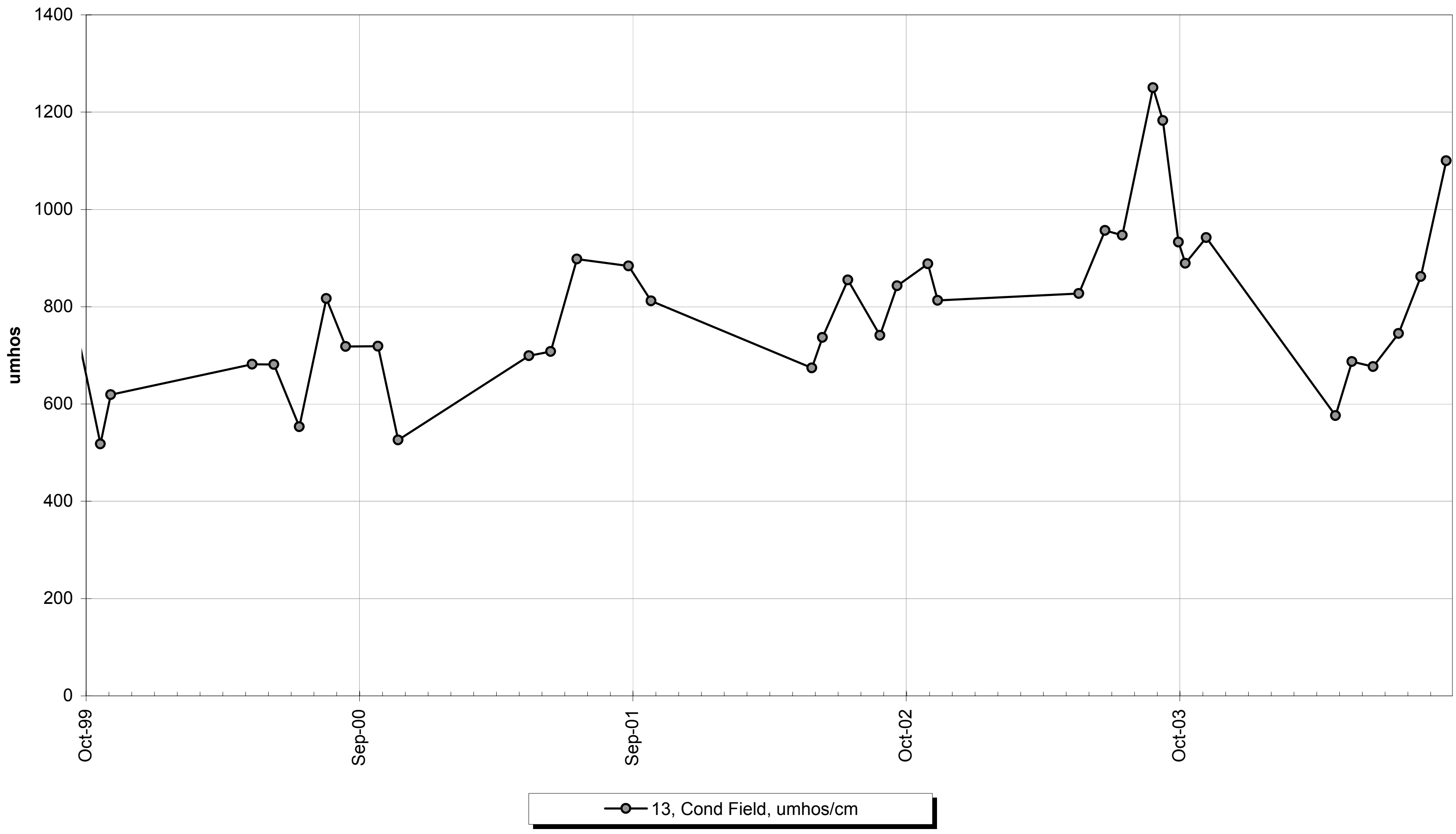
Site No.	Sample Date	Sample Time	Parameter	Value	Qualifier	Reason for Qualifier
13	06/16/2004	12:50:00 PM				
			Cond Lab, umho	626	J	Sample Temperature
			pH Lab, su	7.98	J	Hold Time
			Alk Tot, mg/l	184	J	Sample Temperature
			As Diss, ug/l	0.126	J	Below Quantitative Range
			Cr Diss, ug/l	0.207	J	Duplicate RDP
			Se Diss, ug/l	-0.496	UJ	LCS Recovery
13	07/20/2004	2:31:00 PM				
			pH Lab, su	8.17	J	Hold Time
			Pb Diss, ug/l	0.0157	U	Field Blank Contamination
			Ni Diss, ug/l	0.404	J	CCV Recovery
13	08/19/2004	1:28:00 PM				
			Pb Diss, ug/l	0.00777	U	Field Blank Contamination
			Zn Diss, ug/l	4.74	J	CCV Recovery
			Hg Diss, ug/l	0.00125	U	Method Blank Contamination
13	09/22/2004	9:25:00 AM				
			Ag Diss, ug/l	0.00437	J	Below Quantitative Range
			Hg Diss, ug/l	0.00076	U	Field Blank Contamination

Qualifier	Description
J	Positively Identified - Approximate Concentration
N	Presumptive Evidence For Tentative Identification
NJ	Tentatively Identified - Approximate Concentration
R	Rejected - Cannot Be Verified
U	Not Detected Above Quantitation Limit
UJ	Not Detected Above Approximate Quantitation Limit

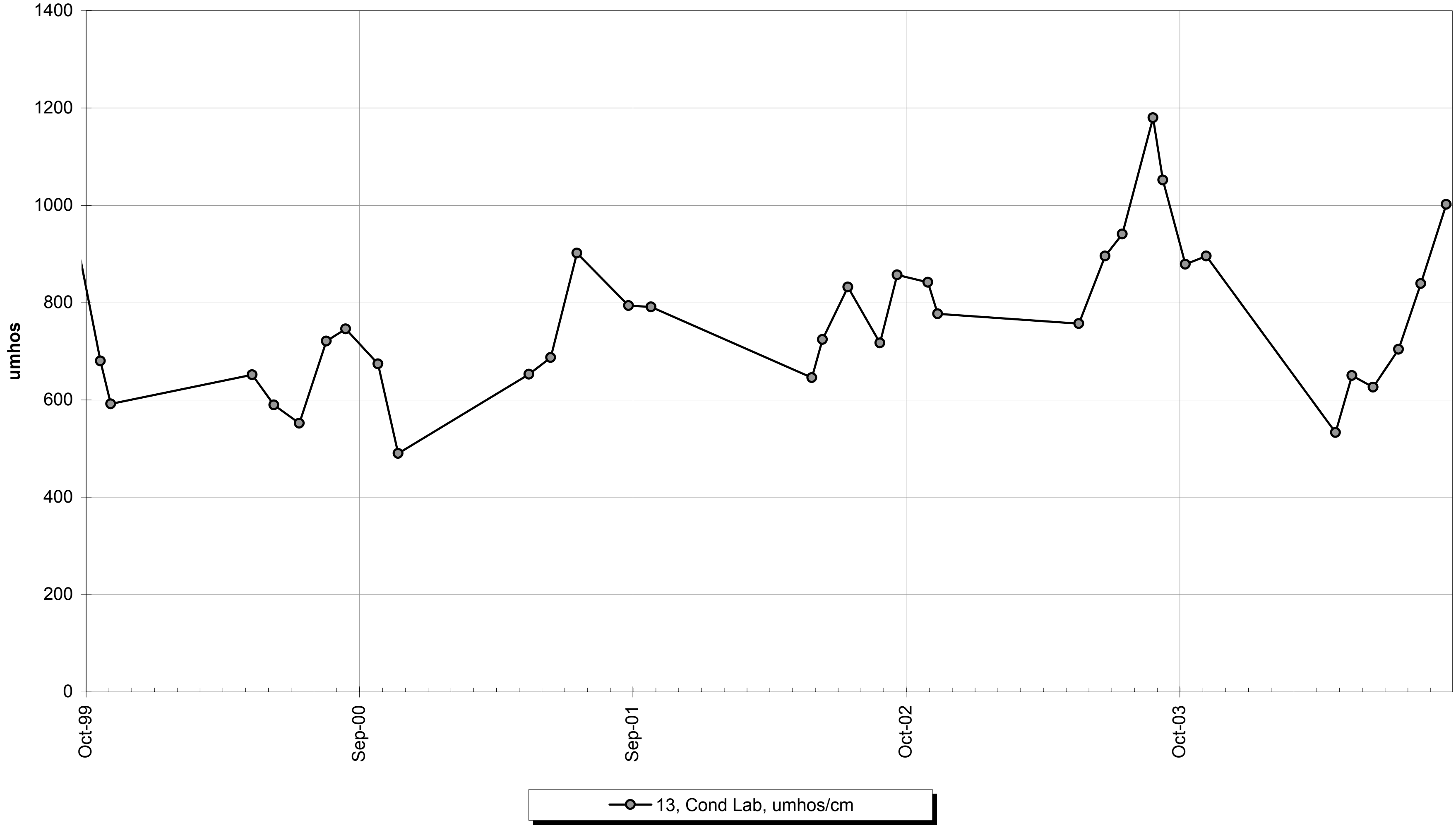
Site 13 -Water Temperature

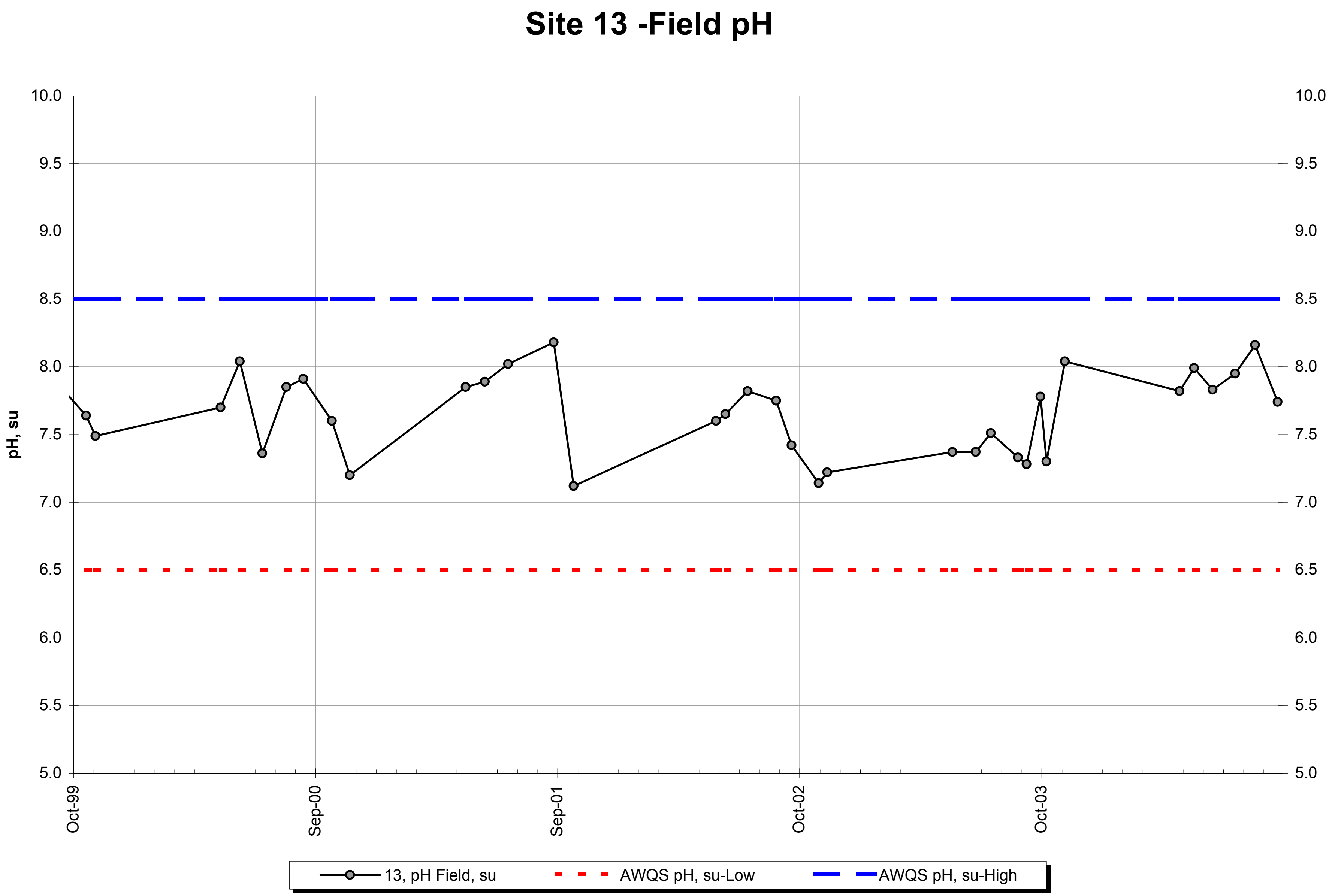


Site 13 -Conductivity-Field

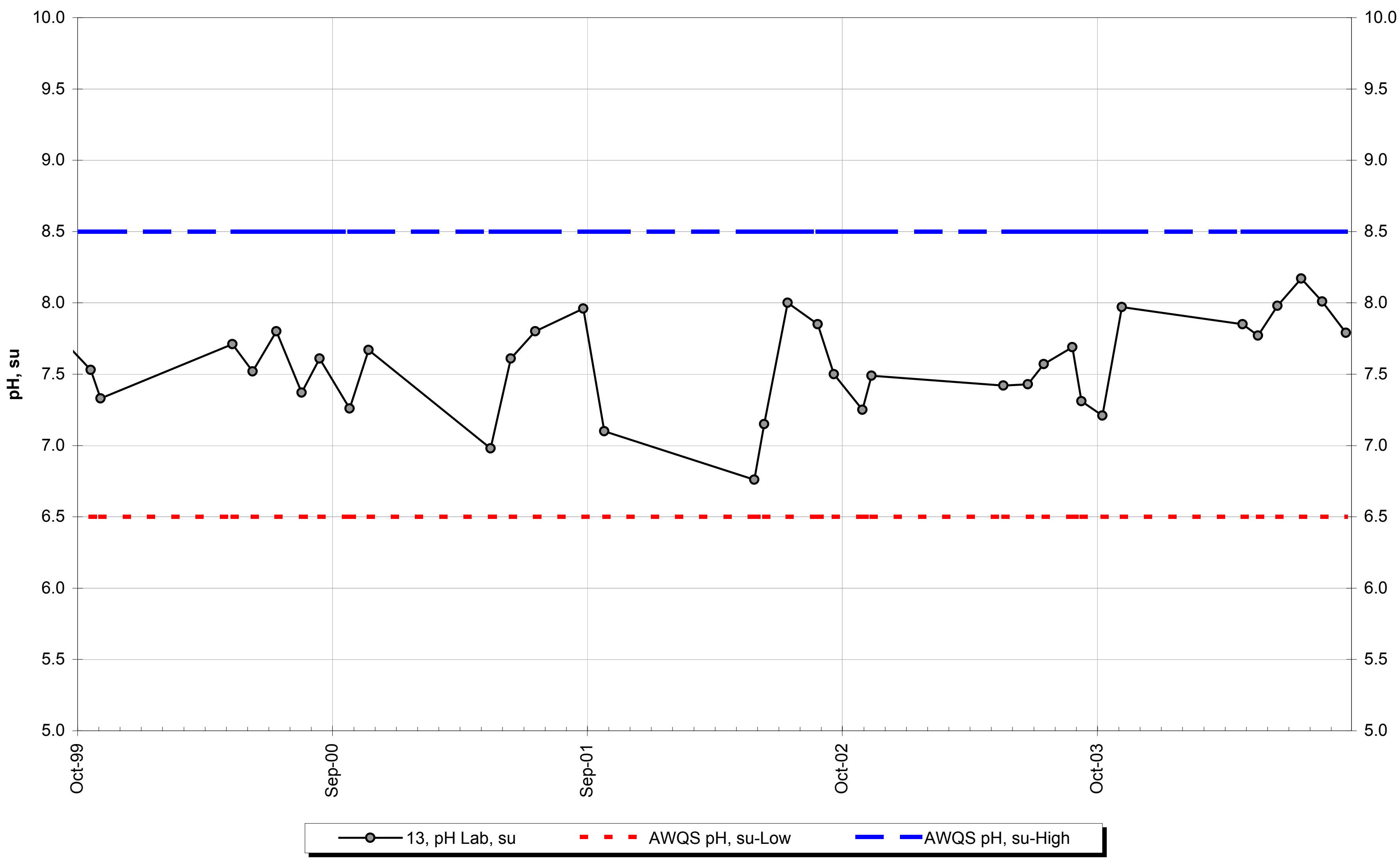


Site 13 -Conductivity-Lab

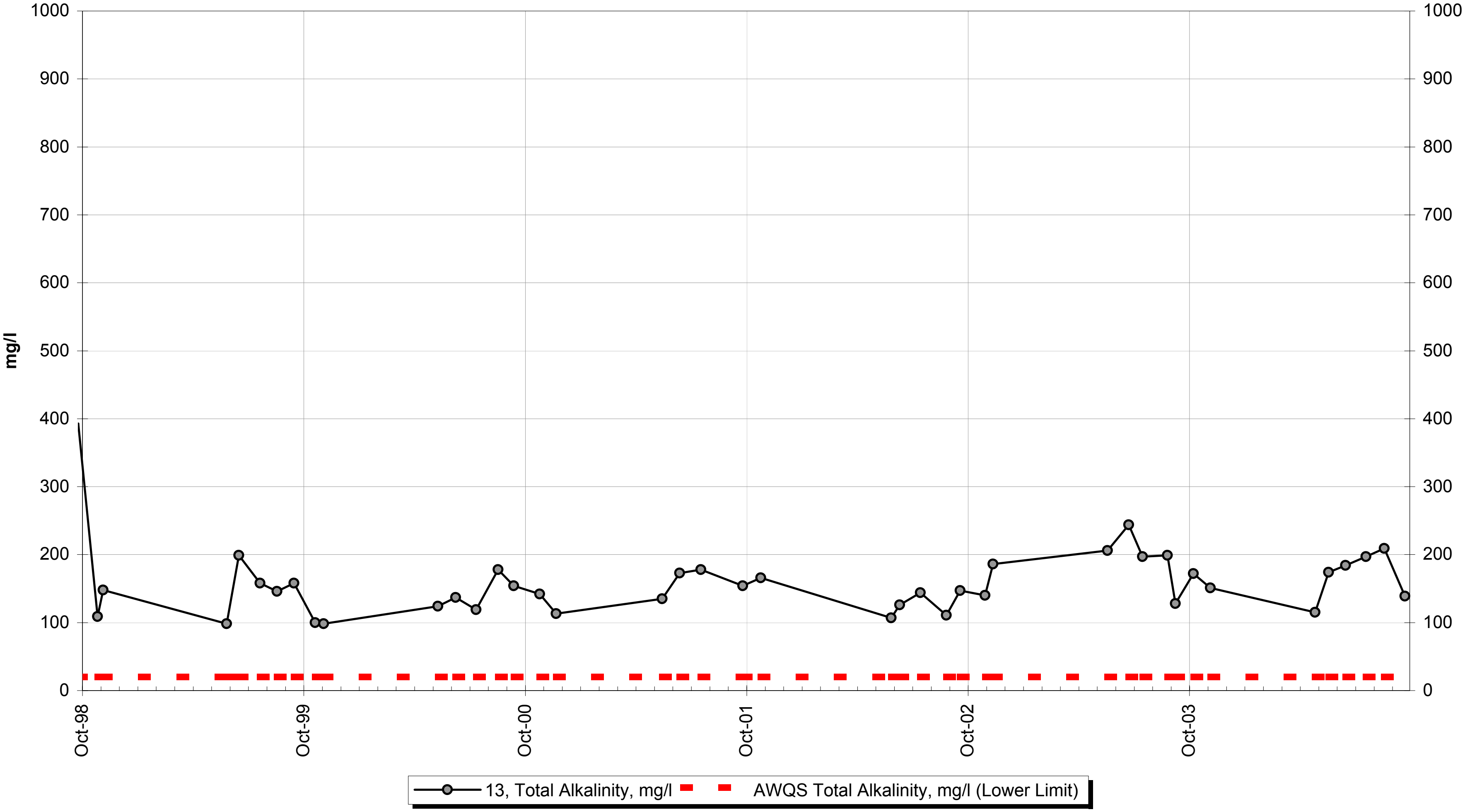


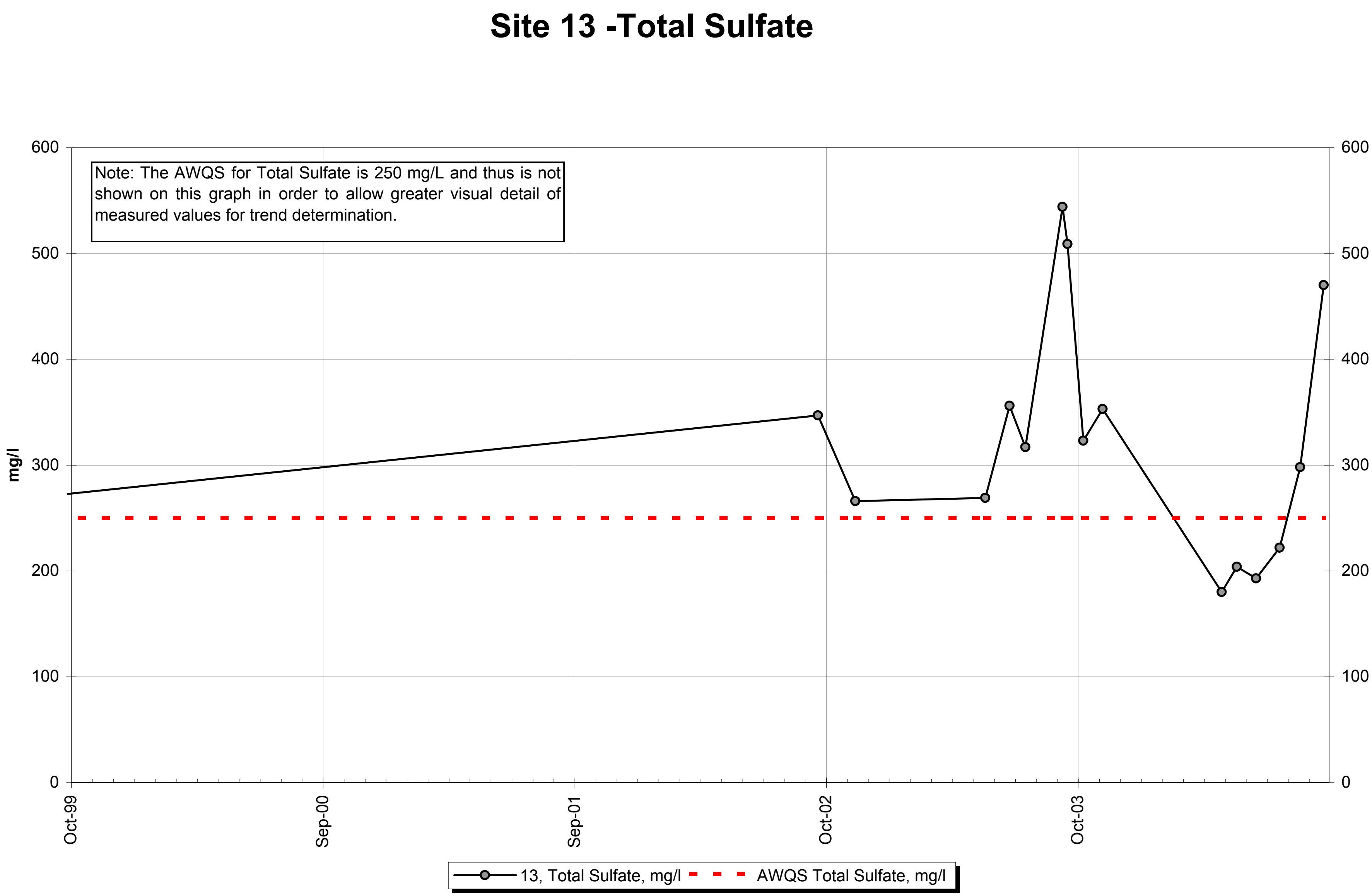

Site 13 -Field pH
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
pH, su
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
13, pH Field, su
AWQS pH, su-Low
AWQS pH, su-High

Site 13 -Lab pH

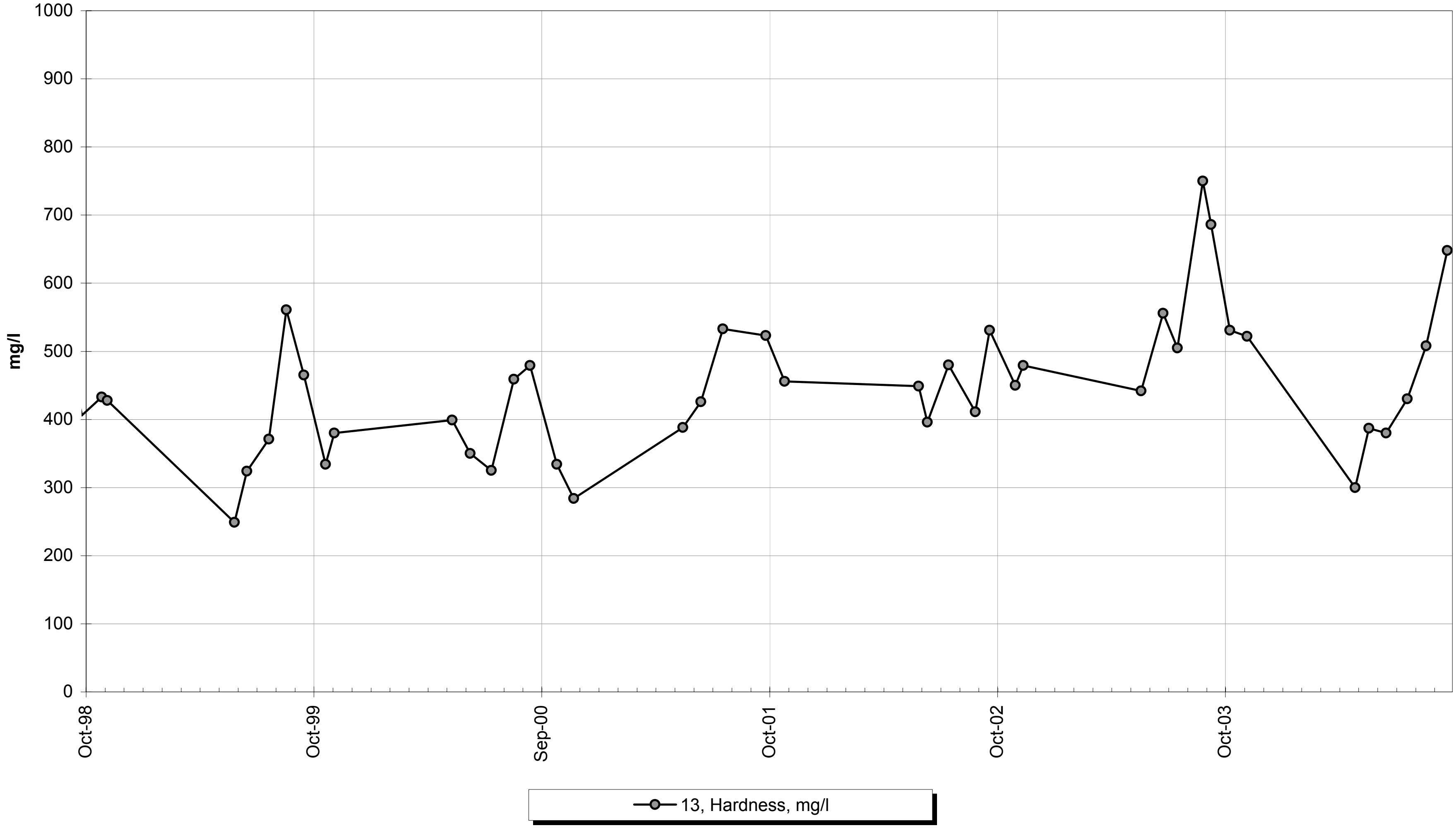


Site 13 -Total Alkalinity

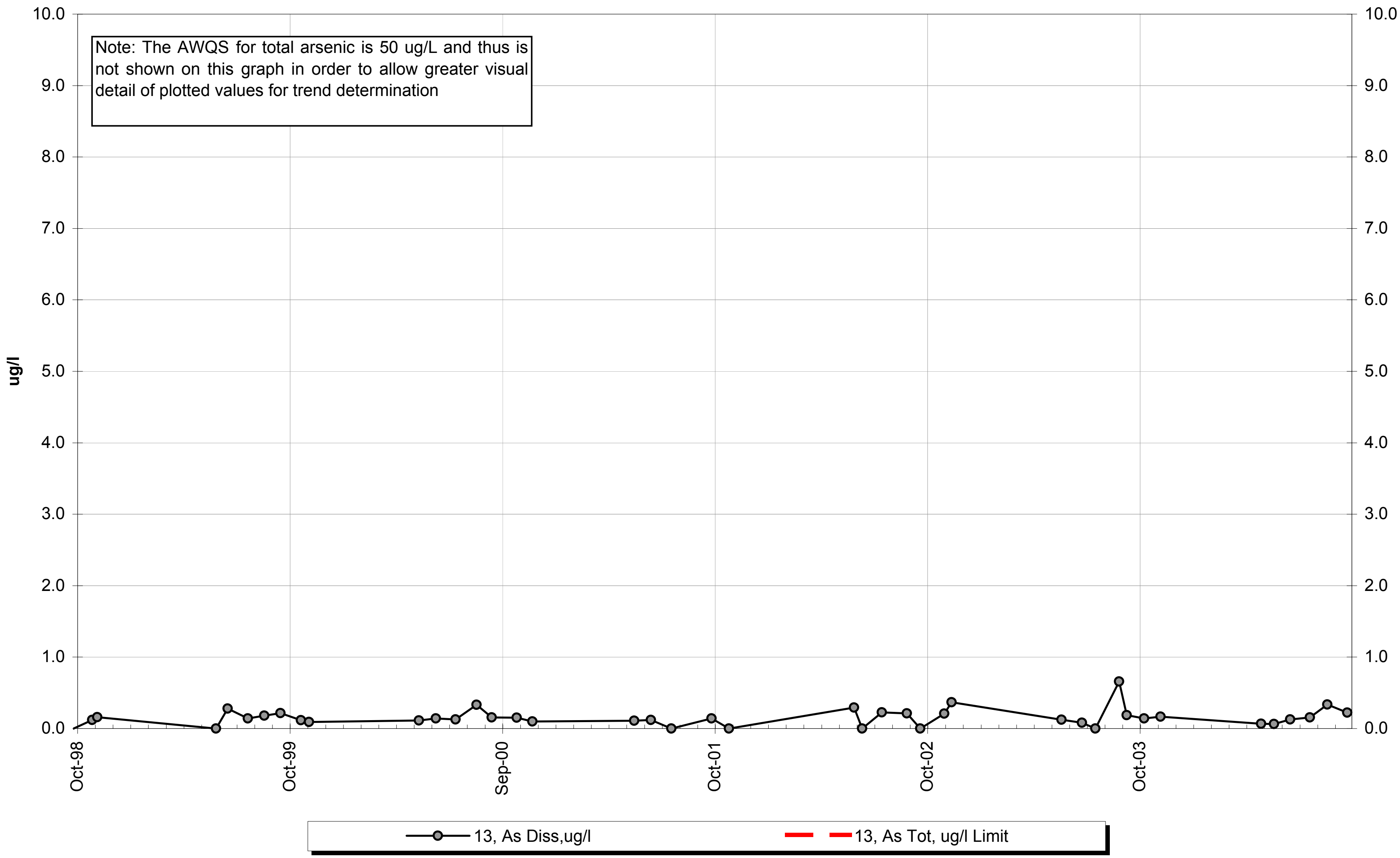



Site 13 -Total Sulfate
Note: The AWQS for Total Sulfate is 250 mg/L and thus is not shown on this graph in order to allow greater visual detail of measured values for trend determination.
mg/l
600
500
400
300
200
100
0
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
13, Total Sulfate, mg/l
AWQS Total Sulfate, mg/l

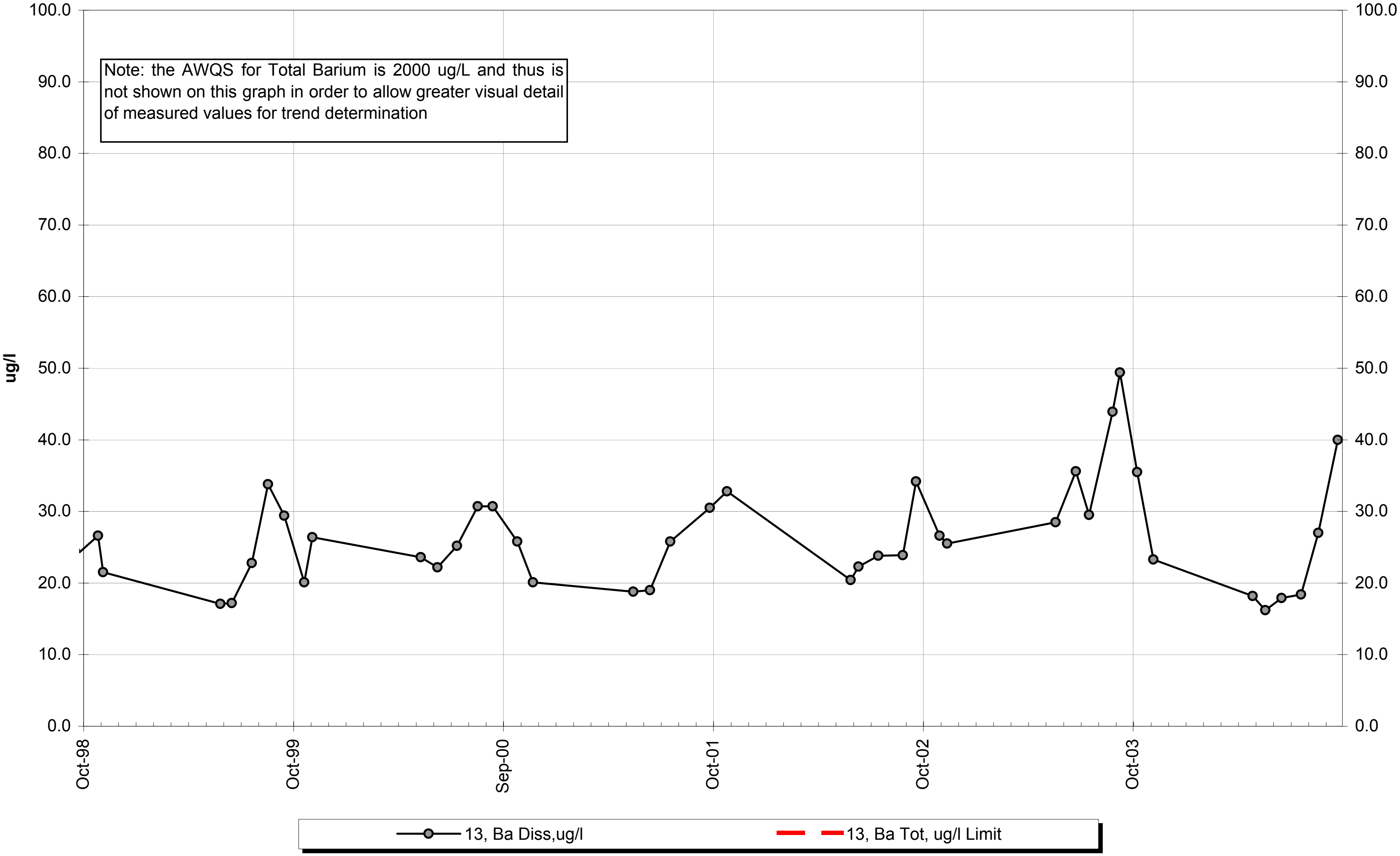
Site 13 -Hardness



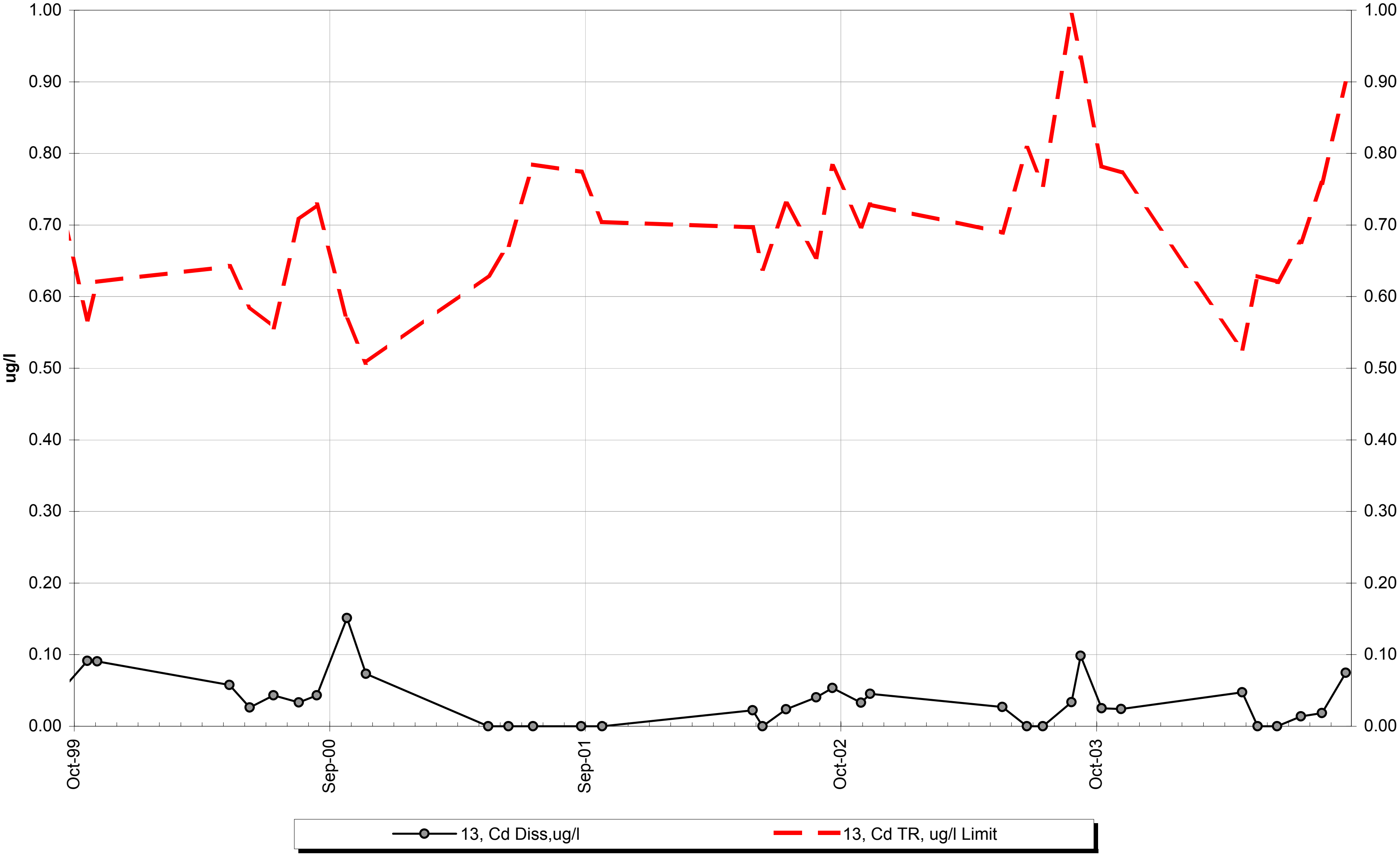
Site 13 -Dissolved Arsenic



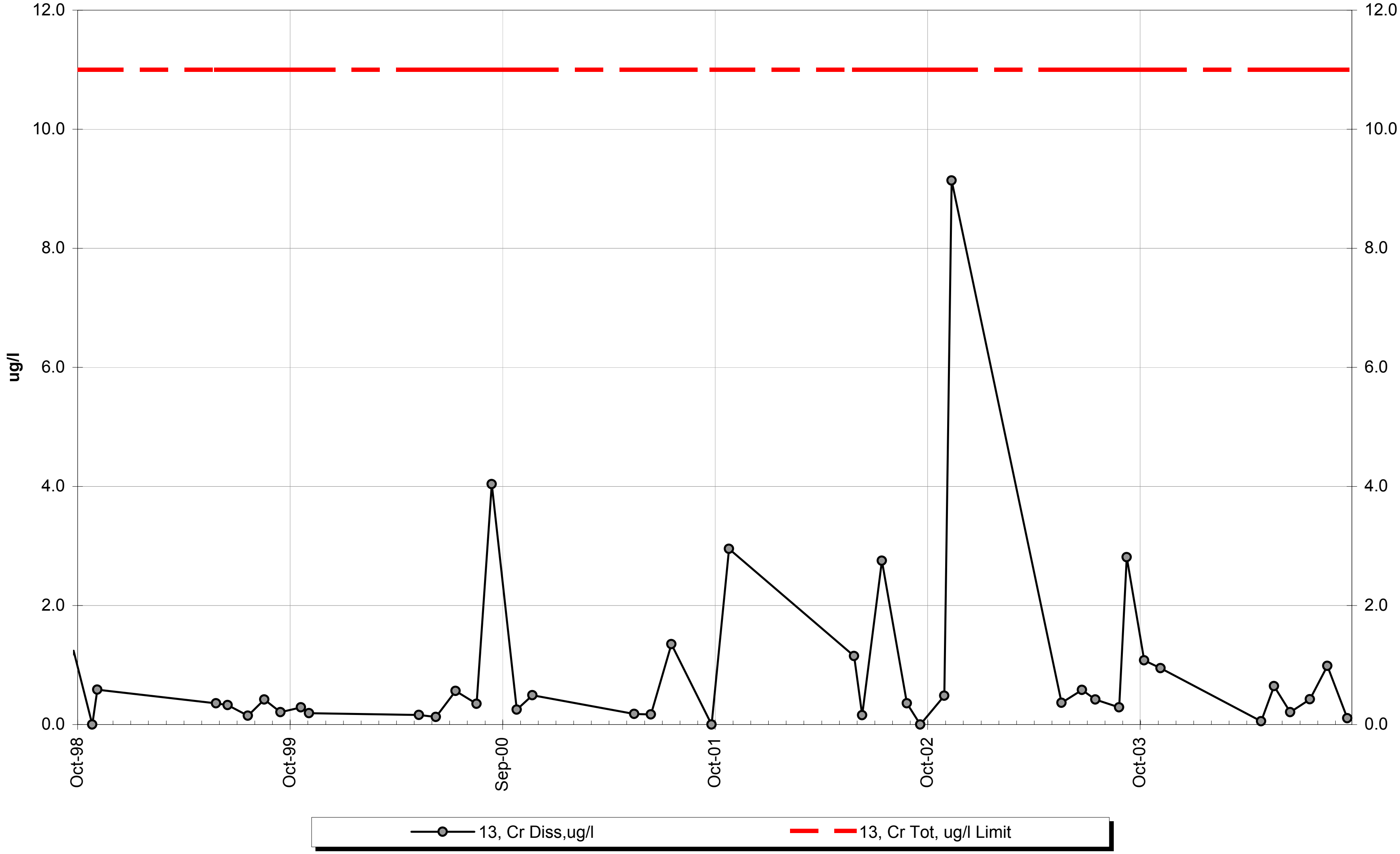
Site 13 -Dissolved Barium



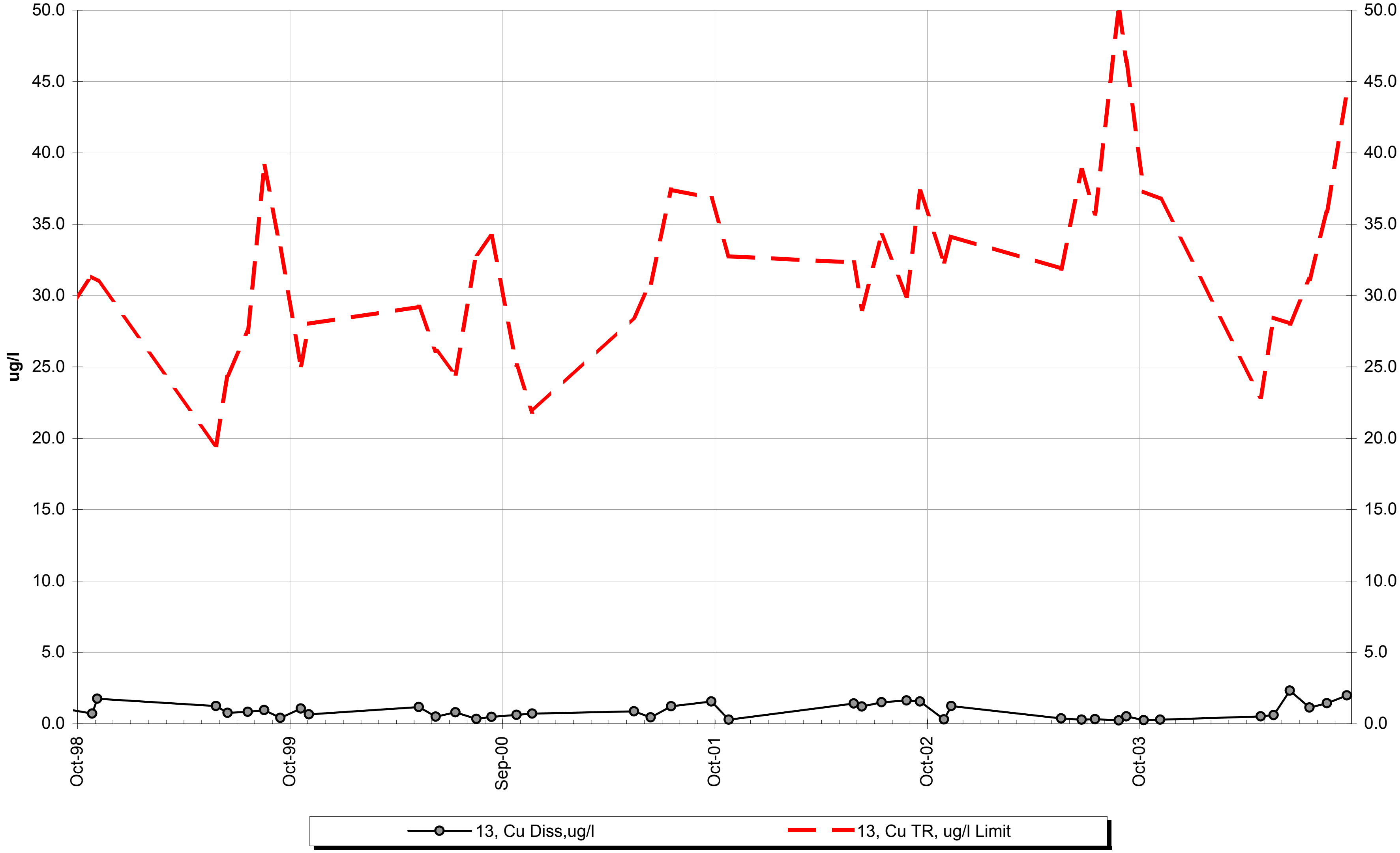
Site 13 -Dissolved Cadmium



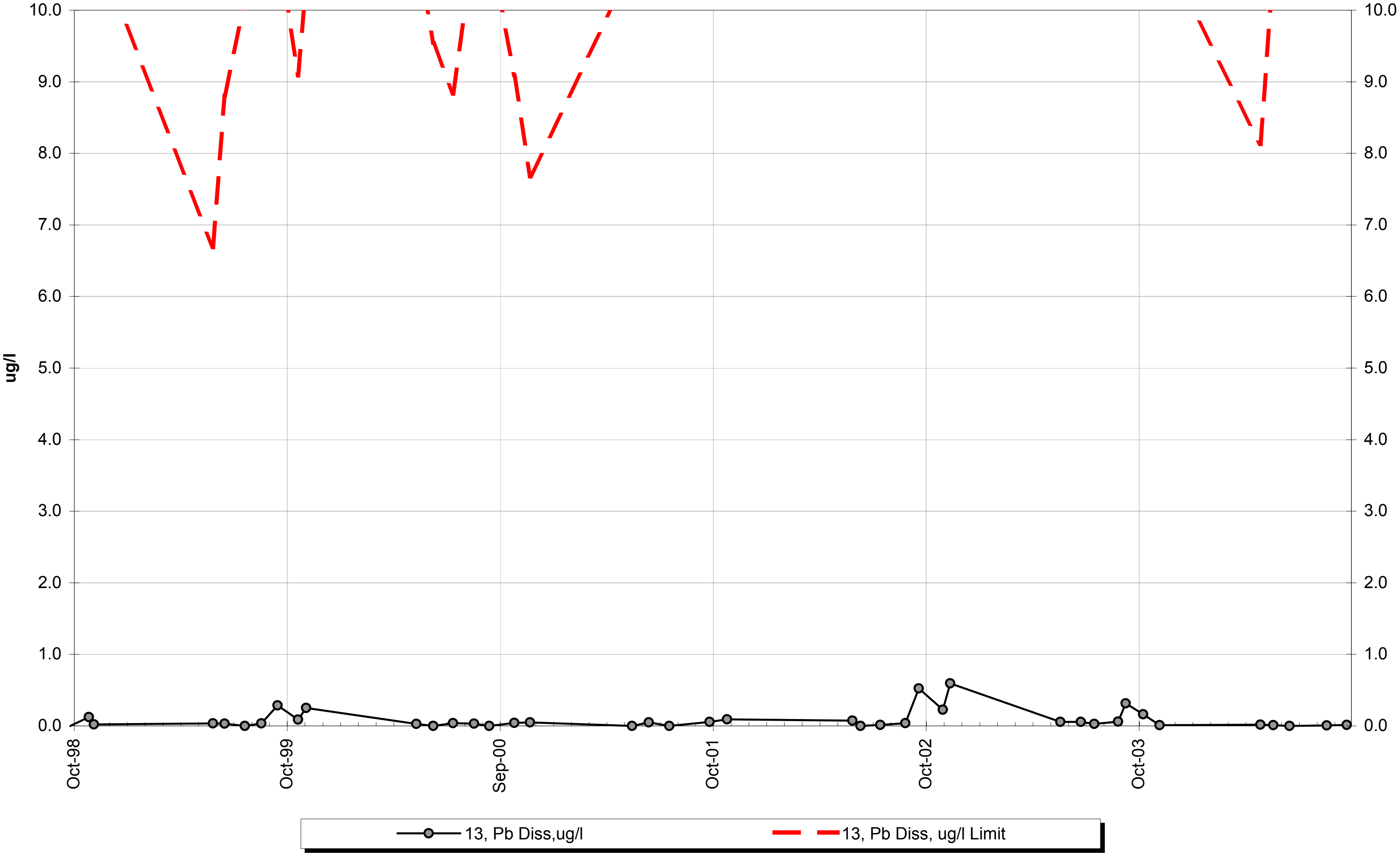
Site 13 -Dissolved Chromium



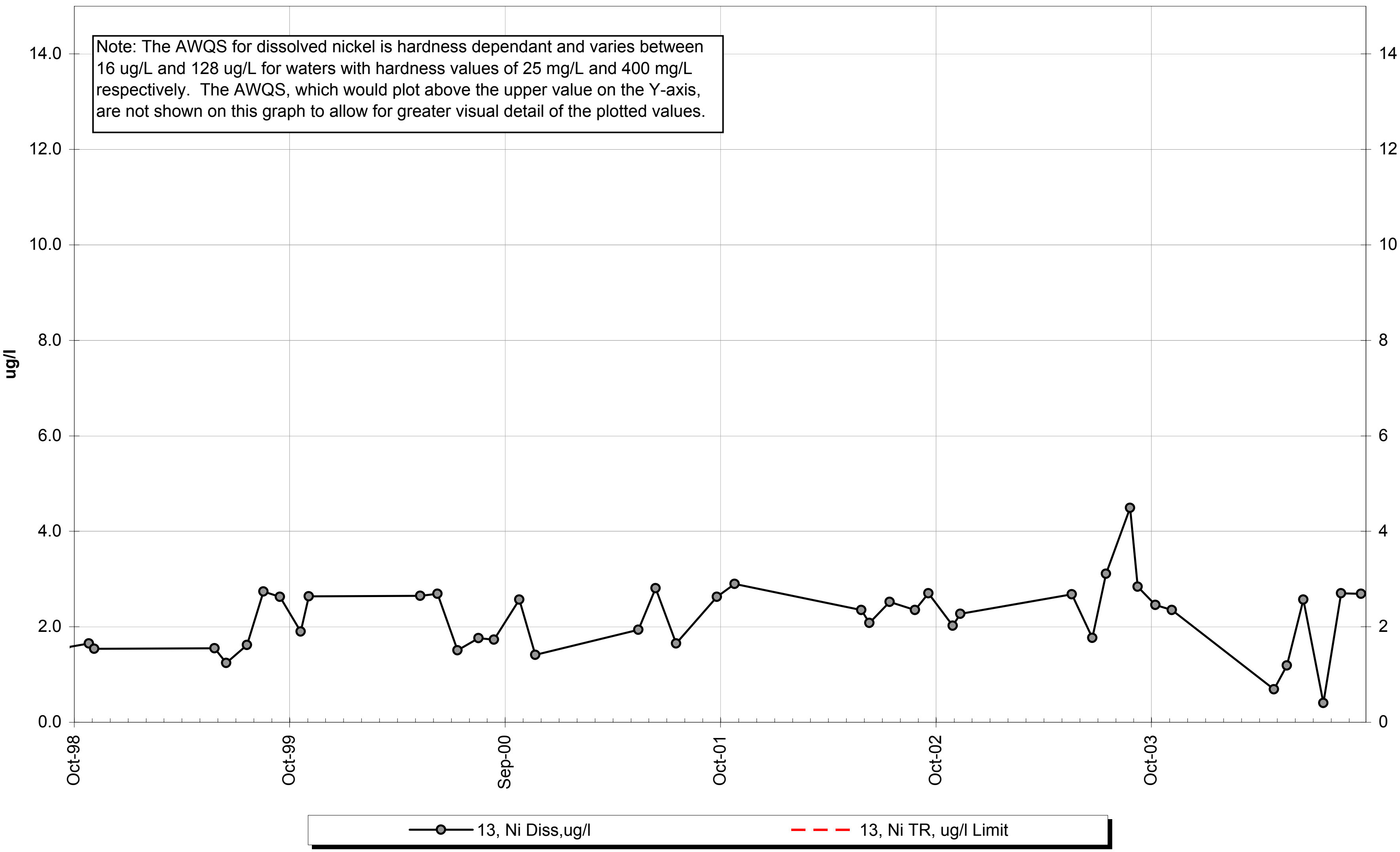
Site 13 -Dissolved Copper

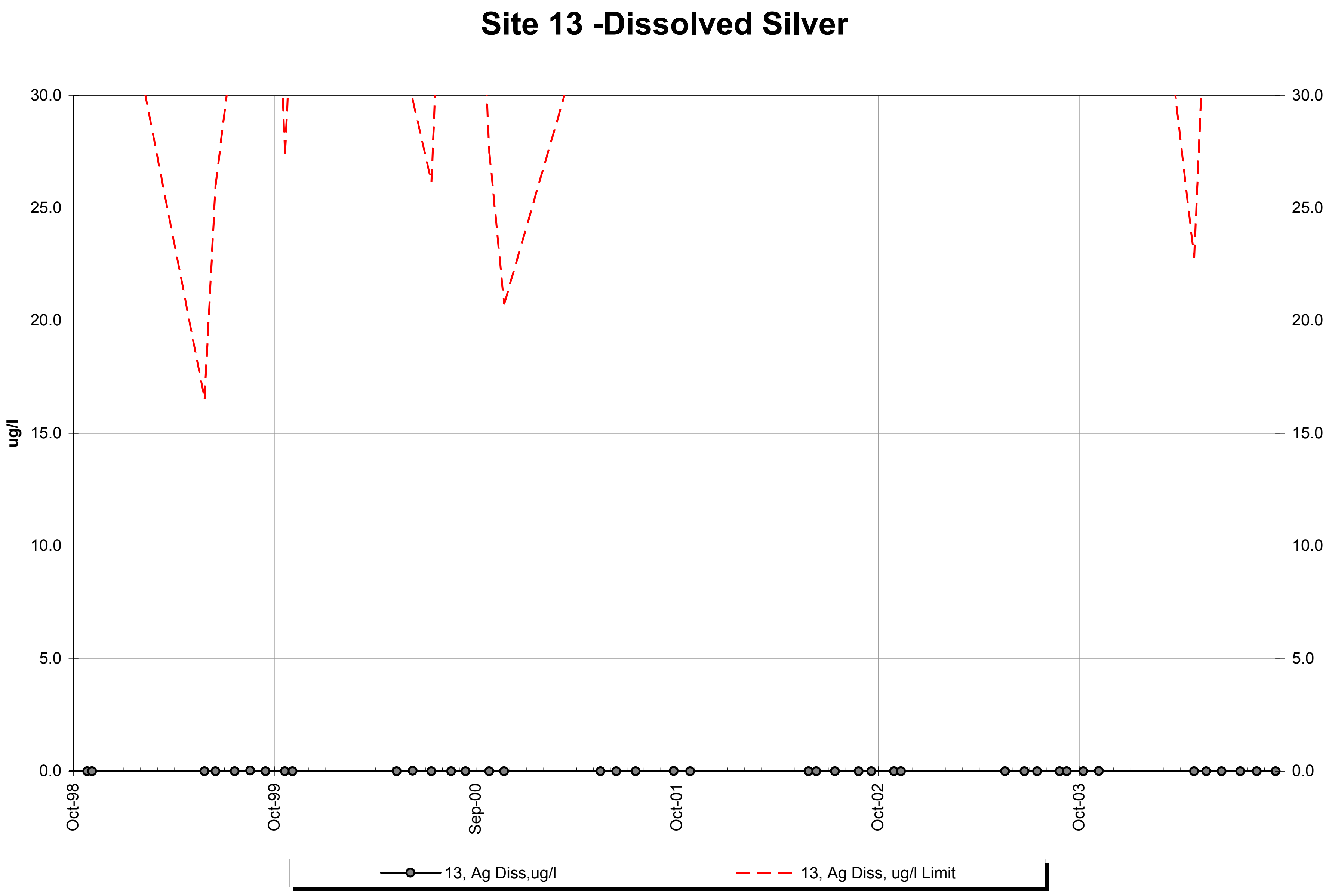


Site 13 -Dissolved Lead



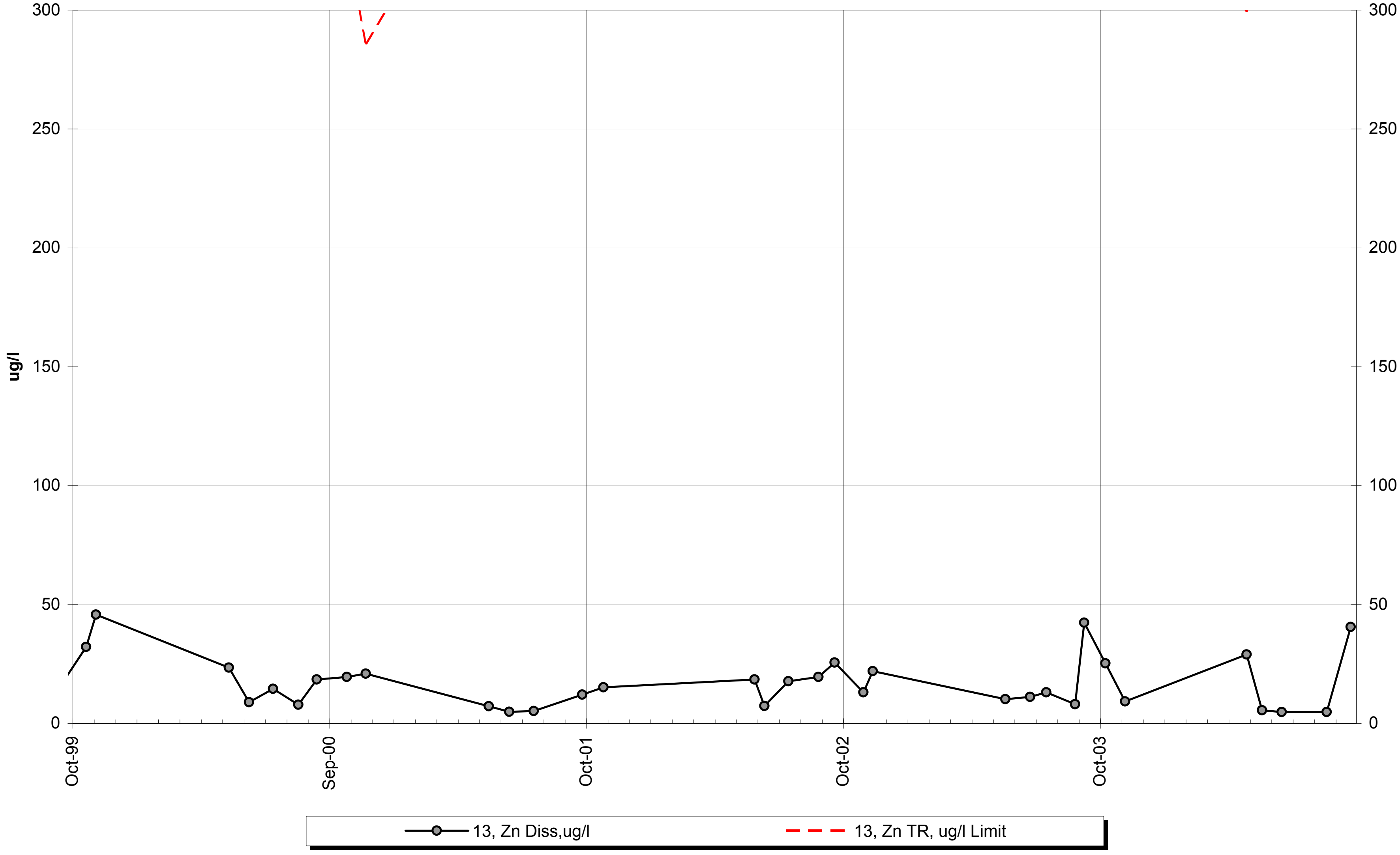
Site 13 -Dissolved Nickel

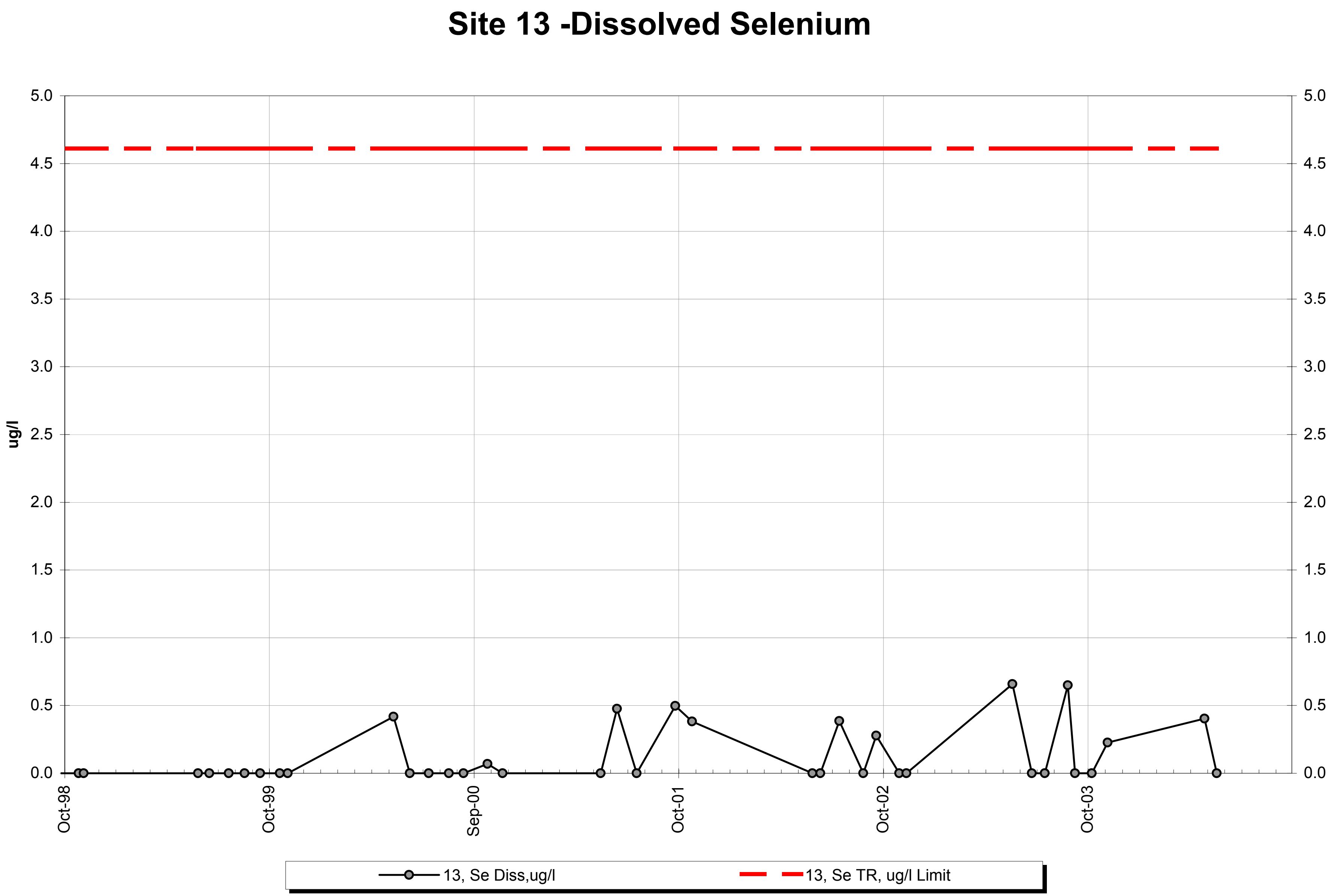


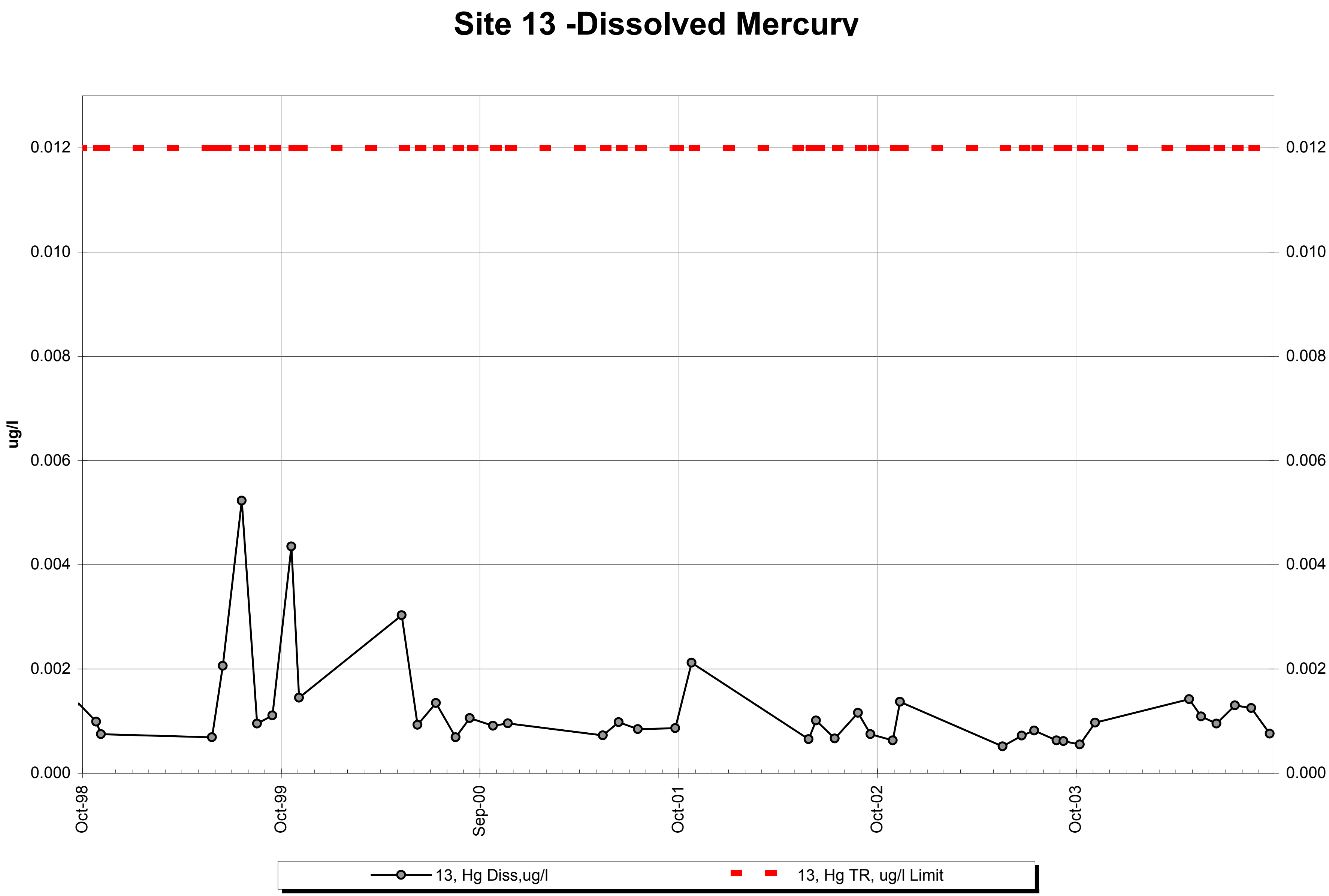


Site 13 -Dissolved Silver
ug/l
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
13, Ag Diss,ug/l
13, Ag Diss, ug/l Limit

Site 13 -Dissolved Zinc




Site 13 -Dissolved Selenium
ug/l
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
13, Se Diss,ug/l
13, Se TR, ug/l Limit



Site 13 -Dissolved Mercury
ug/l
0.000
0.002
0.004
0.006
0.008
0.010
0.012
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
13, Hg Diss,ug/l
13, Hg TR, ug/l Limit

Site **#13** Seasonal Kendall analysis for Specific Conductance, Lab (umhos/cm @ 25°C)

Row label	Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	**WY1999**	939.0	954.0						579.0	772.0	904.0	1100.0	955.0
b	**WY2000**	680.0	592.0						652.0	590.0	552.0	721.0	746.0
c	**WY2001**	674.0	490.0						653.0	687.0	902.0		794.0
d	**WY2002**	791.0							646.0	724.0	832.0	717.0	857.0
e	**WY2003**	842.0	777.0						757.0	896.0	941.0	1180.0	1052.0
f	**WY2004**	879.0	896.0					533.0	650.0	626.0	704.0	839.0	1002.0
	n	6	5	0	0	0	0	1	6	6	6	5	6

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
t_1	0	0	0	0	0	0	0	0	0	0	0	0
t_2	0	0	0	0	0	0	0	0	0	0	0	0
t_3	0	0	0	0	0	0	0	0	0	0	0	0
t_4	0	0	0	0	0	0	0	0	0	0	0	0
t_5	0	0	0	0	0	0	0	0	0	0	0	0

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
b-a	-1	-1						1	-1	-1	-1	-1
c-a	-1	-1						1	-1	-1		-1
d-a	-1							1	-1	-1	-1	-1
e-a	-1	-1						1	1	1	1	1
f-a	-1	-1						1	-1	-1	-1	1
c-b	-1	-1						1	1	1		1
d-b	1							-1	1	1	-1	1
e-b	1	1						1	1	1	1	1
f-b	1	1						-1	1	1	1	1
d-c	1							-1	1	-1		1
e-c	1	1						1	1	1		1
f-c	1	1						-1	-1	-1		1
e-d	1							1	1	1	1	1
f-d	1							1	-1	-1	1	1
f-e	1	1						-1	-1	-1	-1	-1
S_k	3	0	0	0	0	0	0	5	1	-1	0	7

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
σ^2_S=	28.33	16.67						28.33	28.33	28.33	16.67	28.33
$Z_k = S_k/\sigma_S$	0.56	0.00						0.94	0.19	-0.19	0.00	1.32
Z^2_k	0.32	0.00						0.88	0.04	0.04	0.00	1.73

ΣZ_k= 2.82

ΣZ^2_k= 3.00

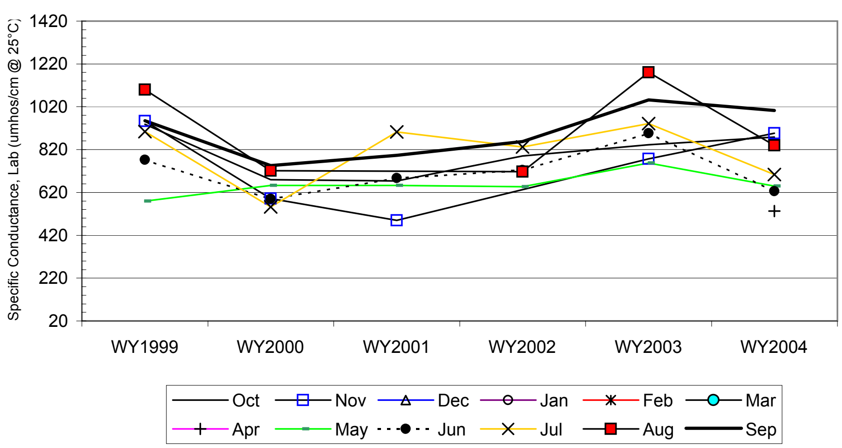
Z-bar=$\Sigma Z_k/K$= 0.40

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	0	0	0	0	0

Σn 41

ΣS_k 15

$\chi^2_h=\Sigma Z^2_k-K(\text{Z-bar})^2$= 1.87	@α=5% $\chi^2_{(K-1)}$= 12.59	Test for station homogeneity	
p **0.932**		$\chi^2_h<\chi^2_{(K-1)}$	ACCEPT
ΣVAR(S_k) 175.00	Z_{calc} 1.06	@α/2=2.5% Z= 1.96	**H_0** (No trend) ACCEPT
	p **0.855**		**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Slope	Upper Limit
0.010	-11.95	**20.00**	51.89
0.050	-2.38		44.19
0.100	-0.99		37.00
0.200	1.93		35.13

Site **#13** Seasonal Kendall analysis for pH, Lab, Standard Units

Row label	Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	**WY1999**	7.6	7.9						7.9	7.8	7.8	7.8	7.7
b	**WY2000**	7.5	7.3						7.7	7.5	7.8	7.4	7.6
c	**WY2001**	7.3	7.7						7.0	7.6	7.8		8.0
d	**WY2002**	7.1							6.8	7.2	8.0	7.9	7.5
e	**WY2003**	7.3	7.5						7.4	7.4	7.6	7.7	7.3
f	**WY2004**	7.2	8.0					7.9	7.8	8.0	8.2	8.0	7.8
	n	6	5	0	0	0	0	1	6	6	6	5	6

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
t_1	0	0	0	0	0	0	0	0	0	0	0	0
t_2	0	0	0	0	0	0	0	0	0	1	0	0
t_3	0	0	0	0	0	0	0	0	0	0	0	0
t_4	0	0	0	0	0	0	0	0	0	0	0	0
t_5	0	0	0	0	0	0	0	0	0	0	0	0

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
b-a	-1	-1						-1	-1	0	-1	-1
c-a	-1	-1						-1	-1	0		1
d-a	-1							-1	-1	1	1	-1
e-a	-1	-1						-1	-1	-1	-1	-1
f-a	-1	1						-1	1	1	1	1
c-b	-1	1						-1	1	0		1
d-b	-1							-1	-1	1	1	-1
e-b	-1	1						-1	-1	-1	1	-1
f-b	-1	1						1	1	1	1	1
d-c	-1							-1	-1	1		-1
e-c	-1	-1						1	-1	-1		-1
f-c	-1	1						1	1	1		-1
e-d	1							1	1	-1	-1	-1
f-d	1							1	1	1	1	1
f-e	-1	1						1	1	1	1	1
S_k	-11	2	0	0	0	0	0	-3	-1	4	4	-3

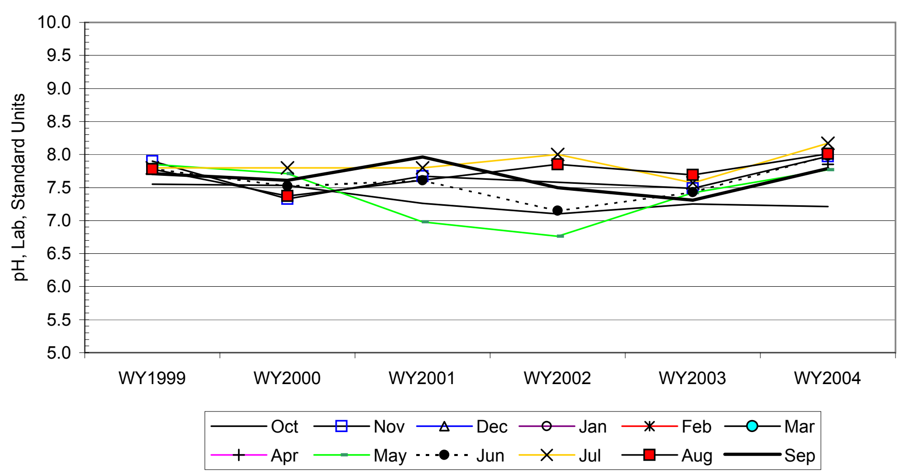
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
σ^2_S=	28.33	16.67						28.33	28.33	27.33	16.67	28.33
$Z_k = S_k/\sigma_S$	-2.07	0.49						-0.56	-0.19	0.77	0.98	-0.56
Z^2_k	4.27	0.24						0.32	0.04	0.59	0.96	0.32

ΣZ_k= -1.15
ΣZ^2_k= 6.73
Z-bar=ΣZ_k/K= -0.16

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	0	1	0	0	0

Σn 41
ΣS_k -8

$\chi^2_h=\Sigma Z^2_k$-K(Z-bar)^2=	6.54	@α=5% $\chi^2_{(K-1)}$= 12.59	Test for station homogeneity
p	**0.366**		$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
ΣVAR(S_k) 174.00	Z_{calc} -0.53	@α/2=2.5% Z= 1.96	**H_0** (No trend) ACCEPT
	p **0.298**		**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Slope	Upper Limit
0.010	-0.09		0.06
0.050	-0.08	**-0.02**	0.04
0.100	-0.07		0.02
0.200	-0.06		0.00

Site **#13** Seasonal Kendall analysis for Total Alk, (mg/l)

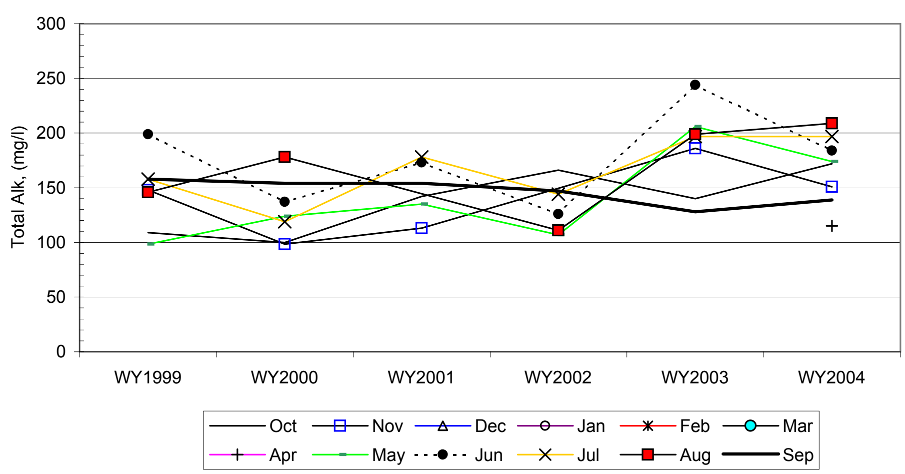
Row label	Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	**WY1999**	109.0	148.0						98.5	199.0	158.0	146.0	158.0
b	**WY2000**	100.0	98.5						124.0	137.0	119.0	178.0	154.0
c	**WY2001**	142.0	113.0						135.0	173.0	178.0		154.0
d	**WY2002**	166.0							107.0	126.0	144.0	111.0	147.0
e	**WY2003**	140.0	186.0						206.0	244.0	197.0	199.0	128.0
f	**WY2004**	172.0	151.0					115.0	174.0	184.0	197.0	209.0	139.0
	n	6	5	0	0	0	0	1	6	6	6	5	6
	t_1	0	0	0	0	0	0	0	0	0	1	0	1
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a	-1	-1						1	-1	-1	1	-1
	c-a	1	-1						1	-1	1		-1
	d-a	1							1	-1	-1	-1	-1
	e-a	1	1						1	1	1	1	-1
	f-a	1	1						1	-1	1	1	-1
	c-b	1	1						1	1	1		0
	d-b	1							-1	-1	1	-1	-1
	e-b	1	1						1	1	1	1	-1
	f-b	1	1						1	1	1	1	-1
	d-c	1							-1	-1	-1		-1
	e-c	-1	1						1	1	1		-1
	f-c	1	1						1	1	1		-1
	e-d	-1							1	1	1	1	-1
	f-d	1							1	1	1	1	-1
	f-e	1	-1						-1	-1	0	1	1
	S_k	9	4	0	0	0	0	0	9	1	8	6	-12
	$\sigma^2_S=$	28.33	16.67						28.33	28.33	28.33	16.67	28.33
	$Z_k = S_k/\sigma_S$	1.69	0.98						1.69	0.19	1.50	1.47	-2.25
	Z^2_k	2.86	0.96						2.86	0.04	2.26	2.16	5.08

$\Sigma Z_k=$	5.27
$\Sigma Z^2_k=$	16.21
Z-bar=$\Sigma Z_k/K=$	0.75

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	2	0	0	0	0

Σn	41
ΣS_k	25

$\chi^2_h=\Sigma Z^2_k-K(\text{Z-bar})^2=$		12.25	@α=5% $\chi^2_{(K-1)}=$	12.59	Test for station homogeneity	
	p	**0.057**			$\chi^2_h<\chi^2_{(K-1)}$	ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	1.81	@α/2=2.5% Z=	1.96	**H_0** (No trend)	ACCEPT
175.00	**p**	**0.965**			**H_A** (± trend)	REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Slope	Upper Limit
0.010	-2.89		13.24
0.050	0.37	**9.75**	12.60
0.100	3.02		12.48
0.200	6.96		11.02

Site **#13**

Seasonal Kendall analysis for Zinc, Dissolved (ug/l)

Row label	Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	**WY1999**	32.9	13.1						31.1	7.5	7.1	18.5	16.5
b	**WY2000**	32.2	45.8						23.5	8.9	14.5	7.9	18.5
c	**WY2001**	19.5	20.9						7.3	4.9	5.2		12.1
d	**WY2002**	15.2							18.5	7.3	17.7	19.5	25.6
e	**WY2003**	13.1	22.0						10.2	11.1	13.1	8.1	42.4
f	**WY2004**	25.3	9.3					29.0	5.5	4.8	9.9	4.7	40.5
	n	6	5	0	0	0	0	1	6	6	6	5	6

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
t_1	0	0	0	0	0	0	0	0	0	0	0	0
t_2	0	0	0	0	0	0	0	0	0	0	0	0
t_3	0	0	0	0	0	0	0	0	0	0	0	0
t_4	0	0	0	0	0	0	0	0	0	0	0	0
t_5	0	0	0	0	0	0	0	0	0	0	0	0

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
b-a	-1	1						-1	1	1	-1	1
c-a	-1	1						-1	-1	-1		-1
d-a	-1							-1	-1	1	1	1
e-a	-1	1						-1	1	1	-1	1
f-a	-1	-1						-1	-1	1	-1	1
c-b	-1	-1						-1	-1	-1		-1
d-b	-1							-1	-1	1	1	1
e-b	-1	-1						-1	1	-1	1	1
f-b	-1	-1						-1	-1	-1	-1	1
d-c	-1							1	1	1		1
e-c	-1	1						1	1	1		1
f-c	1	-1						-1	-1	1		1
e-d	-1							-1	1	-1	-1	1
f-d	1							-1	-1	-1	-1	1
f-e	1	-1						-1	-1	-1	-1	-1
S_k	-9	-2	0	0	0	0	0	-11	-3	1	-4	9

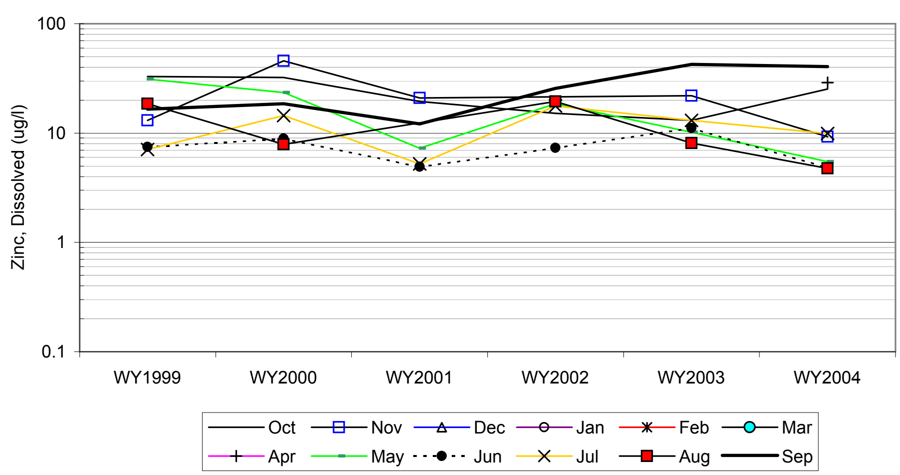
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
σ^2_S=	28.33	16.67						28.33	28.33	28.33	16.67	28.33
$Z_k = S_k/\sigma_S$	-1.69	-0.49						-2.07	-0.56	0.19	-0.98	1.69
Z^2_k	2.86	0.24						4.27	0.32	0.04	0.96	2.86

ΣZ_k= -3.91
ΣZ^2_k= 11.54
Z-bar=$\Sigma Z_k/K$= -0.56

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	0	0	0	0	0

Σn 41
ΣS_k -19

$\chi^2_h=\Sigma Z^2_k-K(\text{Z-bar})^2$=	9.35	@α=5% $\chi^2_{(K-1)}$= 12.59	Test for station homogeneity	
p	**0.155**		$\chi^2_h<\chi^2_{(K-1)}$	ACCEPT
$\Sigma VAR(S_k)$ 175.00	Z_{calc} -1.36	@α/2=2.5% Z= 1.96	H_0 (No trend)	ACCEPT
p	**0.087**		H_A (± trend)	REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Slope	Upper Limit
0.010	-3.82		0.88
0.050	-2.66	**-0.93**	0.17
0.100	-2.20		-0.07
0.200	-1.74		-0.59

INTERPRETIVE REPORT
SITE 58 "MONITORING WELL T-00-01C"

The data collected during the current water year are listed in the following "Table of Results for Water Year 2004" report. The table includes all the data, field and lab, collected for the current water year and a series of flags keyed to the summary report "Qualified Data by QA Reviewer". The QA report lists any associated data limitations found during the monthly QA reviews of laboratory data for this site. Median values for all analytes have been calculated and are shown in the right-most column of the table of results. Any value reported as less than MDL has been replaced with a value of zero for the purpose of median calculation.

Sampling at this site was added to the FWMP in May-2002. All data collected at this site since it's inception into the FWMP are included in the data analyses. As shown in the table below, there were no data outliers.

Sample Date	Parameter	Value	Qualifier	Notes
No outliers have been identified by KGCMC for the period of May-02 though Sept-04.				

The data for Water Year 2004 have been compared to the strictest fresh water quality criterion for each applicable analyte. Four results exceeding these criteria have been identified, as listed in the table below. These data are for pH, both for lab and field. Values for lab and field pH from other wells completed into organic rich peat sediments similar to Site 58 have historically resulted in pH values ranging from 5 to 6 s.u. (e.g. Sites 27, 29, and 32).

Sample Date	Parameter	Value	Standard	Standard Type
05/18/04	pH Lab, su	6.38	6.5 - 8.5	Aquatic Life
05/18/04	pH Field, su	6.42	6.5 - 8.5	Aquatic Life
09/21/04	pH Lab, su	6.21	6.5 - 8.5	Aquatic Life
09/21/04	pH Field, su	6.14	6.5 - 8.5	Aquatic Life

X-Y plots have been generated to graphically present the data for each of the analytes requested in the Statistical Information Goals for this site. The short time frame of monitoring at this site makes visual trend analysis difficult but total sulfate and total hardness have slowly increased for each of the three years of monitoring data. Since this is an upgradient, comparison site these trends are interpreted to be due to natural variation. Futures year's data should provide the necessary context to judge if these changes are significant or are part of the typical variation found at this site.

Table of Results for Water Year 2004

Site 58 "MW-T-00-01C"													
Sample Date/Parameter	Oct-03	Nov-03	Dec-03	Jan-04	Feb-04	Mar-04	Apr-04	5/18/2004	Jun-04	Jul-04	Aug-04	9/21/2004	**Median**
Water Temp (°C)	NOT SCHEDULED FOR SAMPLING							7.4	NOT SCHEDULED FOR SAMPLING			10.1	8.8
Conductivity-Field(μmho)								99				93	96
Conductivity-Lab (μmho)								89				86	87
pH Lab (standard units)								6.38				6.21	6.30
pH Field (standard units)								6.42				6.14	6.28
Total Alkalinity (mg/L)								40.9				34.1	37.5
Total Sulfate (mg/L)								2.7				5.0	3.9
Hardness (mg/L)								35.7				35.7	35.7
Dissolved As (ug/L)								<0.051				0.144	0.085
Dissolved Ba (ug/L)								5.6				7.9	6.7
Dissolved Cd (ug/L)								<0.023				<0.005	0.007
Dissolved Cr (ug/L)								1.110 J				0.559	0.835
Dissolved Cu (ug/L)								<0.018 U				0.058	0.033
Dissolved Pb (ug/L)								0.0163 J				<0.0050	0.0094
Dissolved Ni (ug/L)								0.057 UJ				0.210	0.134
Dissolved Ag (ug/L)								<0.009 UJ				<0.003	0.003
Dissolved Zn (ug/L)								<0.14 UJ				0.07	0.07
Dissolved Se (ug/L)								<0.496 UJ				0.037	0.142
Dissolved Hg (ug/L)								0.000412 U				0.000438	0.000425

For individual sample/analyte qualifier descriptions see "Qualified Data by QA Reviewer" table.

Values reported as less than MDL are replaced by 1/2 MDL for median calculation purposes.

Shaded data has been qualified as an outlier by KGCMC and removed from any further analysis and is not included into the calculation of the median

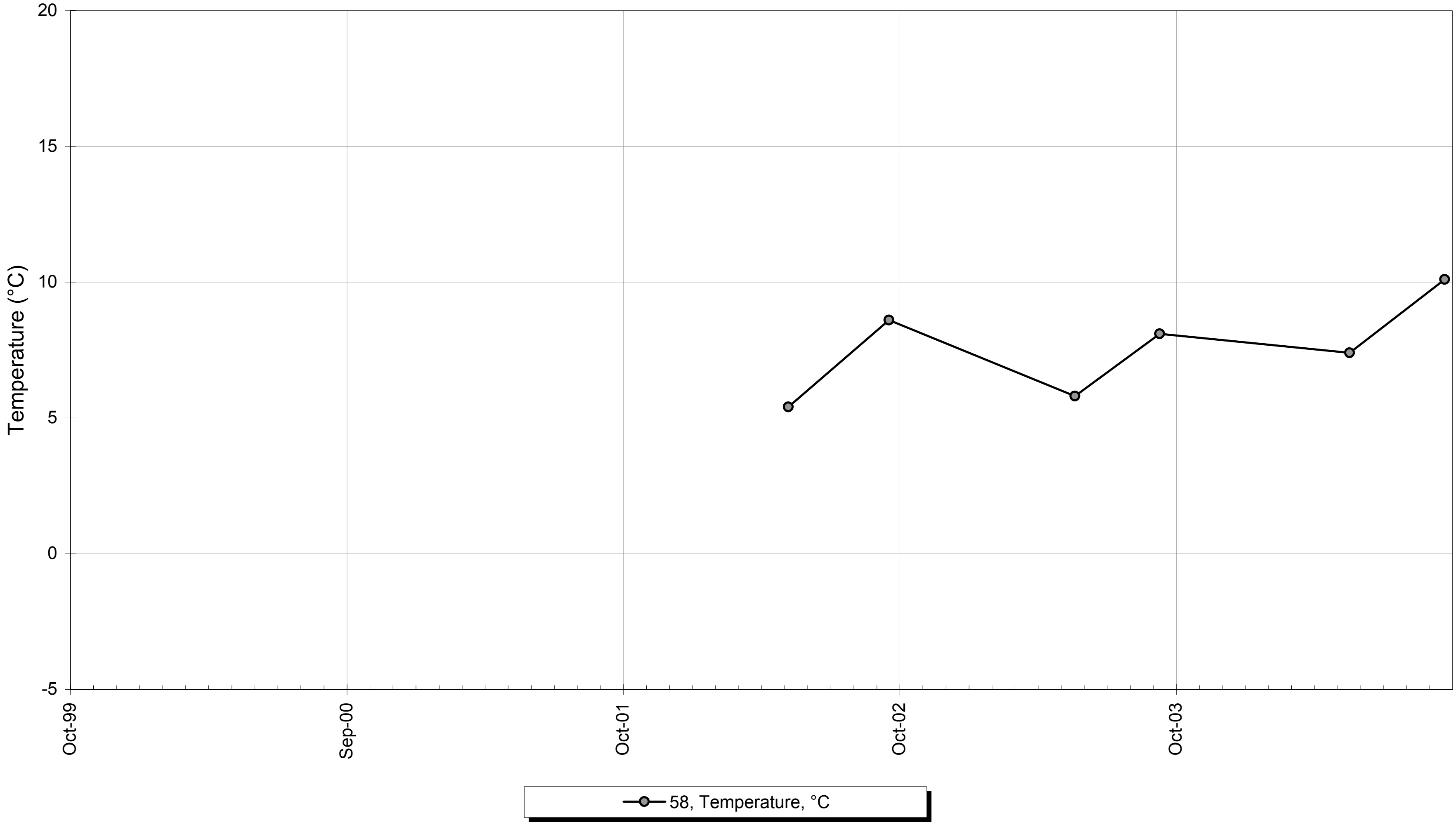
Qualified Data by QA Reviewer

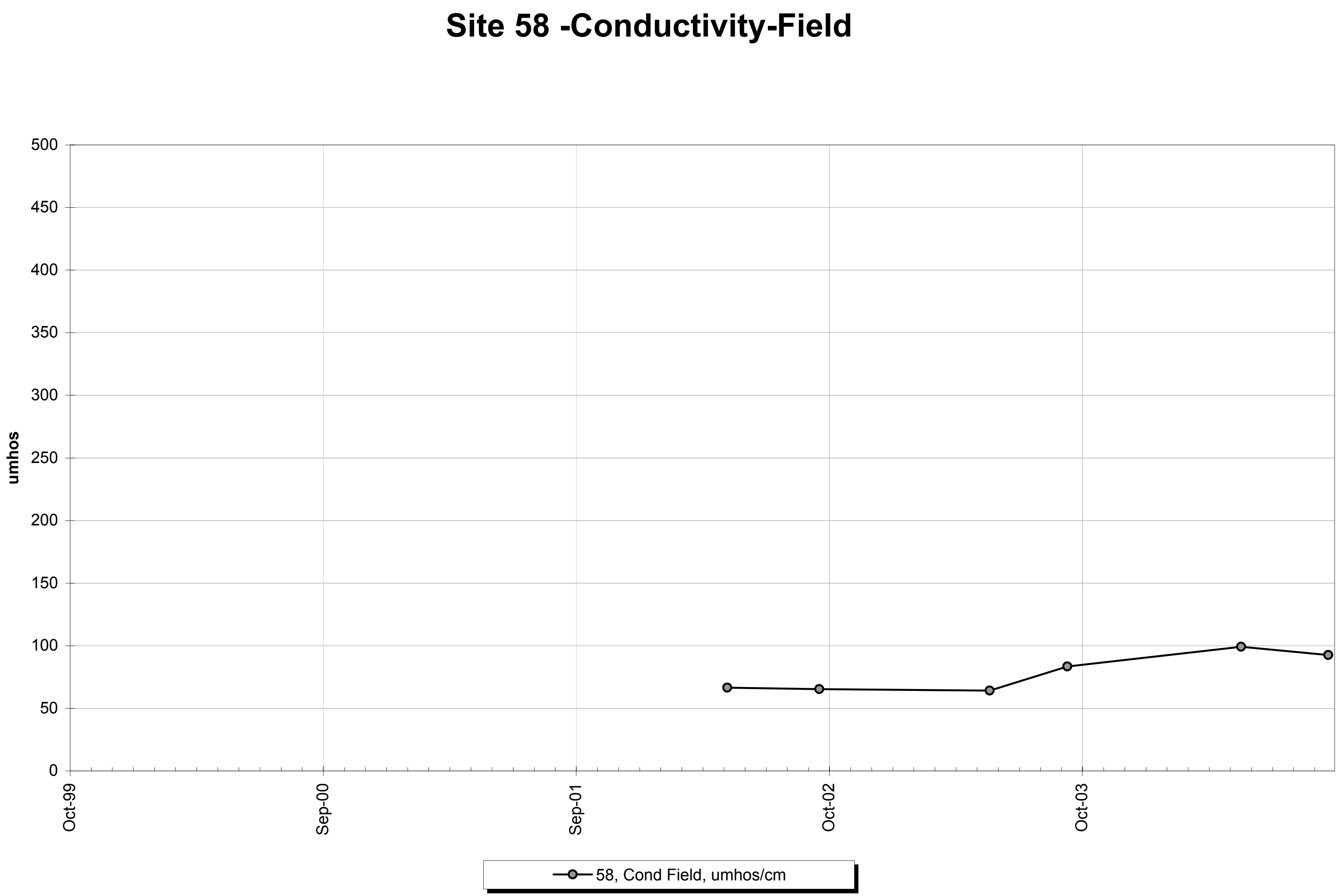
Date Range: 10/01/2003 to 09/30/2004

Site No.	Sample Date	Sample Time	Parameter	Value	Qualifier	Reason for Qualifier
58	05/18/2004	12:55:00 PM				
			Cr Diss, ug/l	1.11	J	CCV Recovery
			Cu Diss, ug/l	-0.018	U	Field Blank Contamination
			Pb Diss, ug/l	0.0163	J	Below Quantitative Range
			Ni Diss, ug/l	0.057	UJ	CCV Recovery, Method Blan
			Ag Diss, ug/l	-0.009	UJ	MS Recovery
			Zn Diss, ug/l	-0.14	UJ	LCS Recovery, Field Blank C
			Se Diss, ug/l	-0.496	UJ	LCS Recovery
			Hg Diss, ug/l	0.000412	U	Method Blank Contamination

Qualifier	Description
J	Positively Identified - Approximate Concentration
N	Presumptive Evidence For Tentative Identification
NJ	Tentatively Identified - Approximate Concentration
R	Rejected - Cannot Be Verified
U	Not Detected Above Quantitation Limit
UJ	Not Detected Above Approximate Quantitation Limit

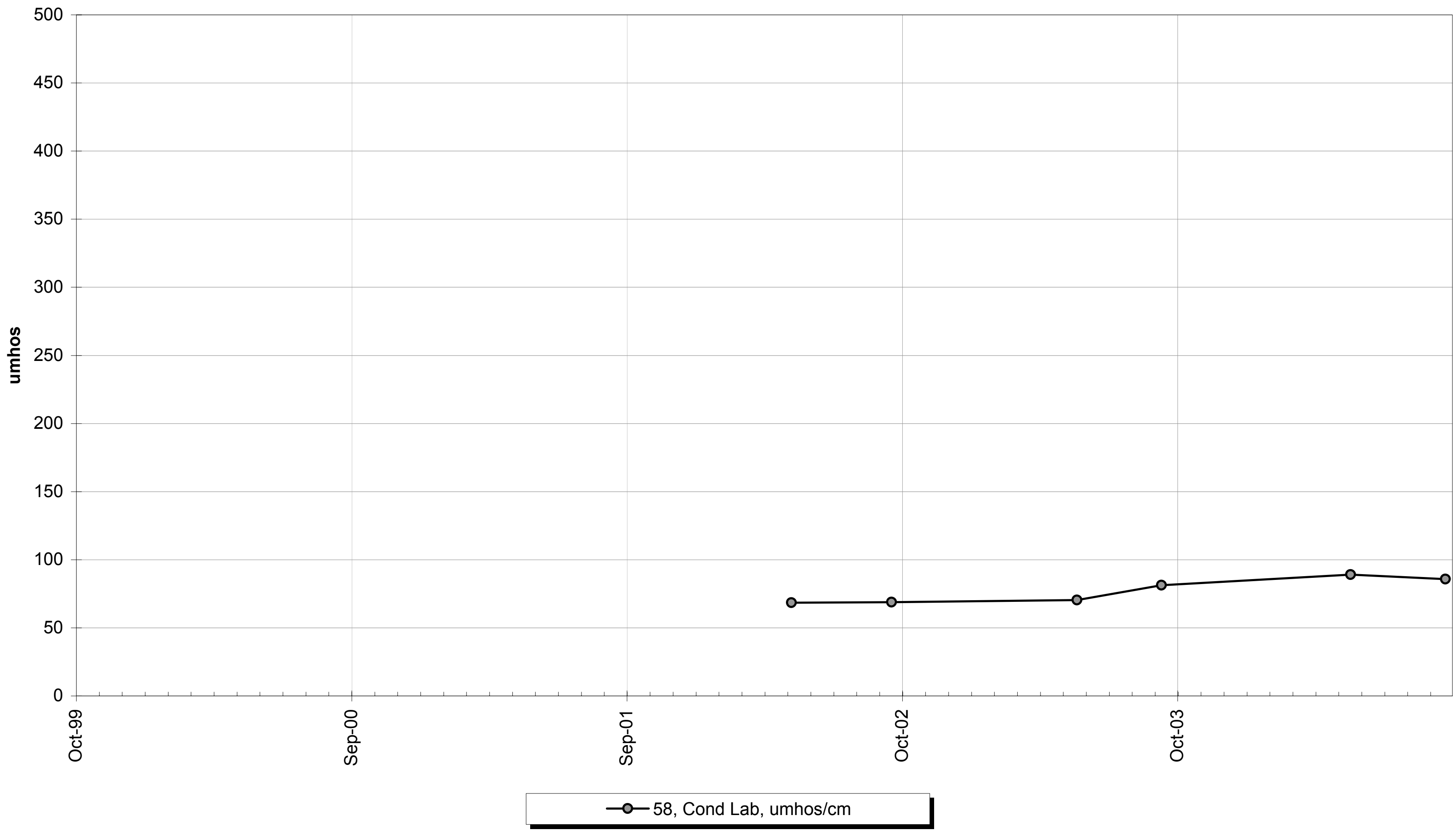
Site 58 -Water Temperature

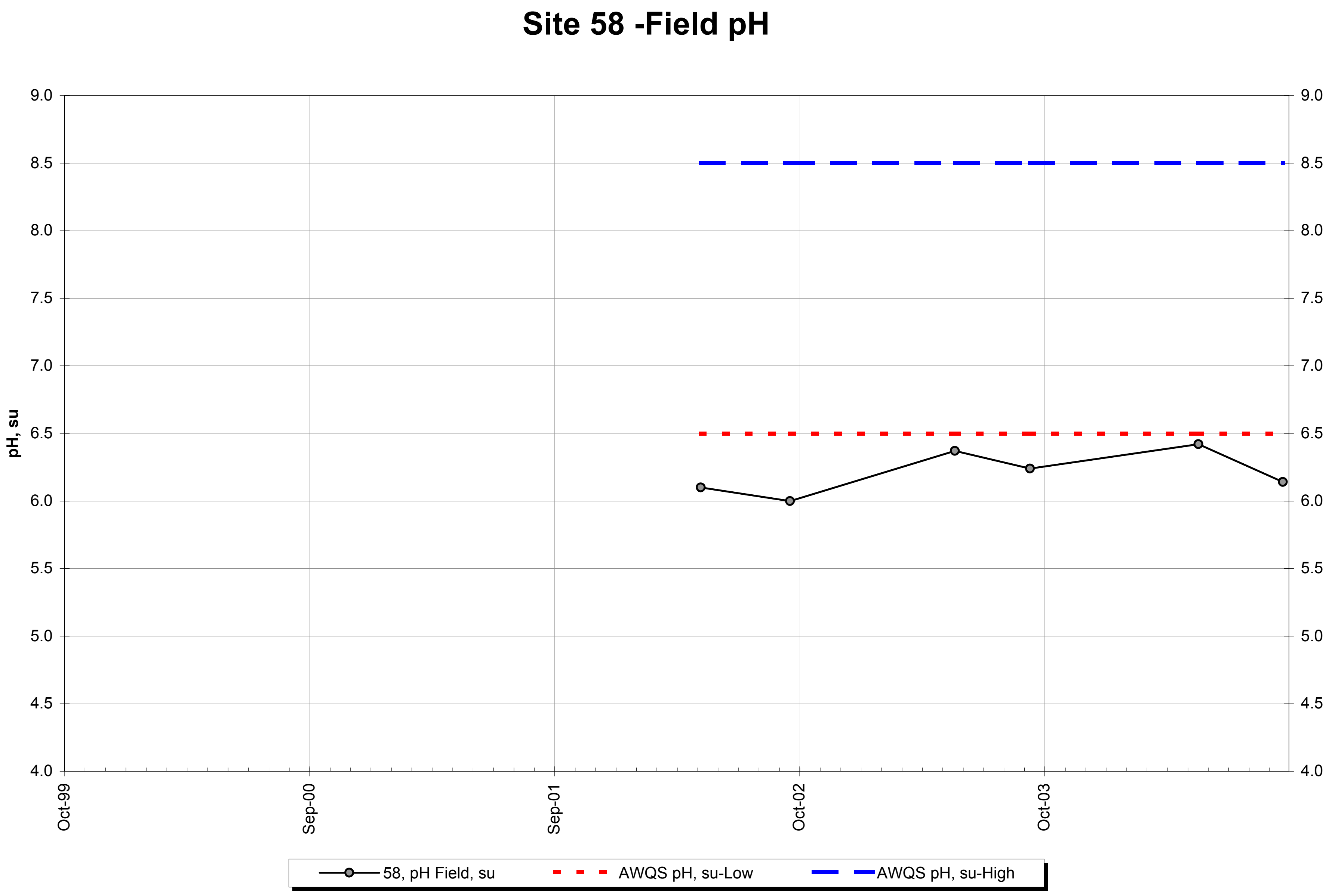




Site 58 -Conductivity-Field
umhos
500
450
400
350
300
250
200
150
100
50
0
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
58, Cond Field, umhos/cm

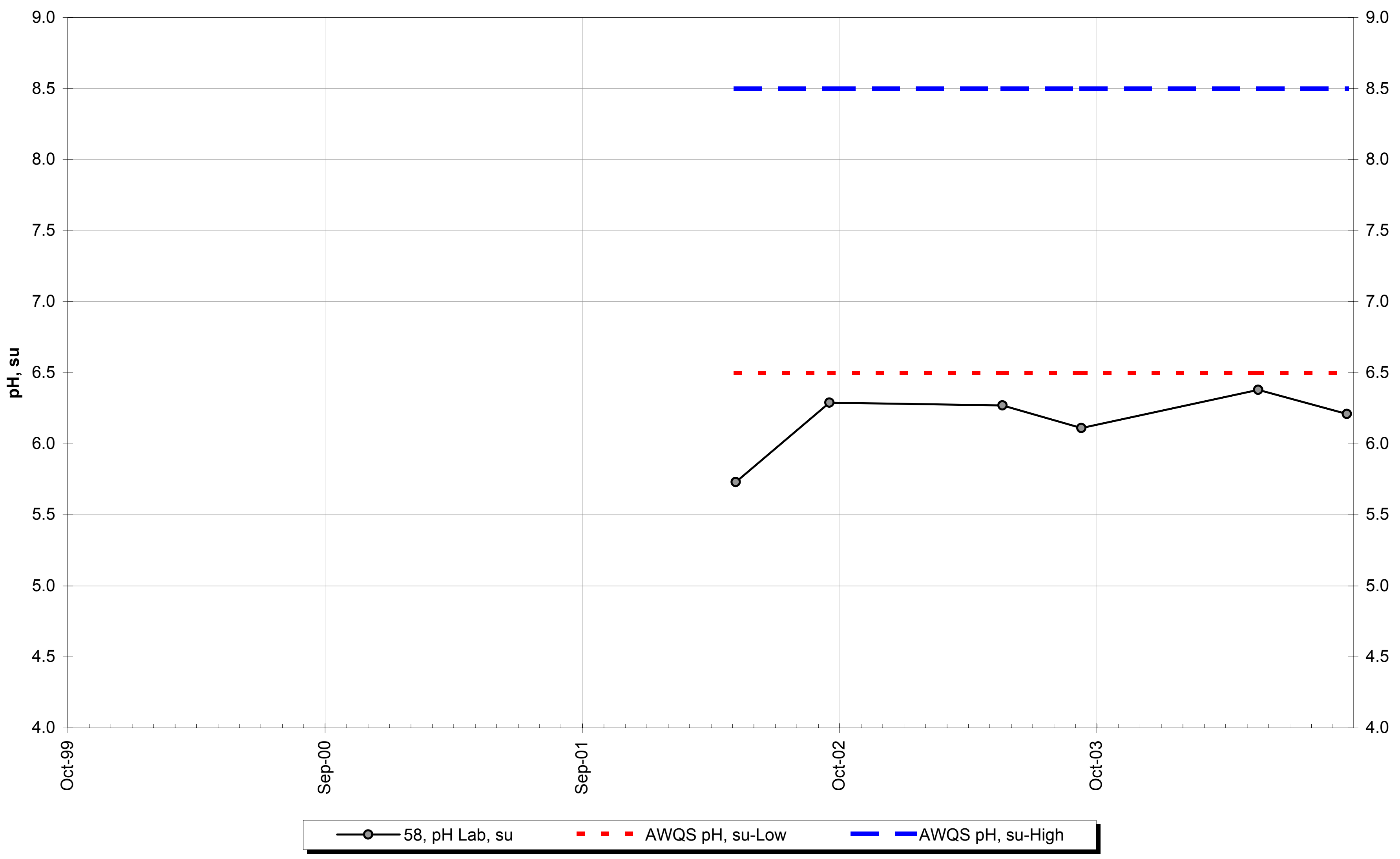
Site 58 -Conductivity-Lab



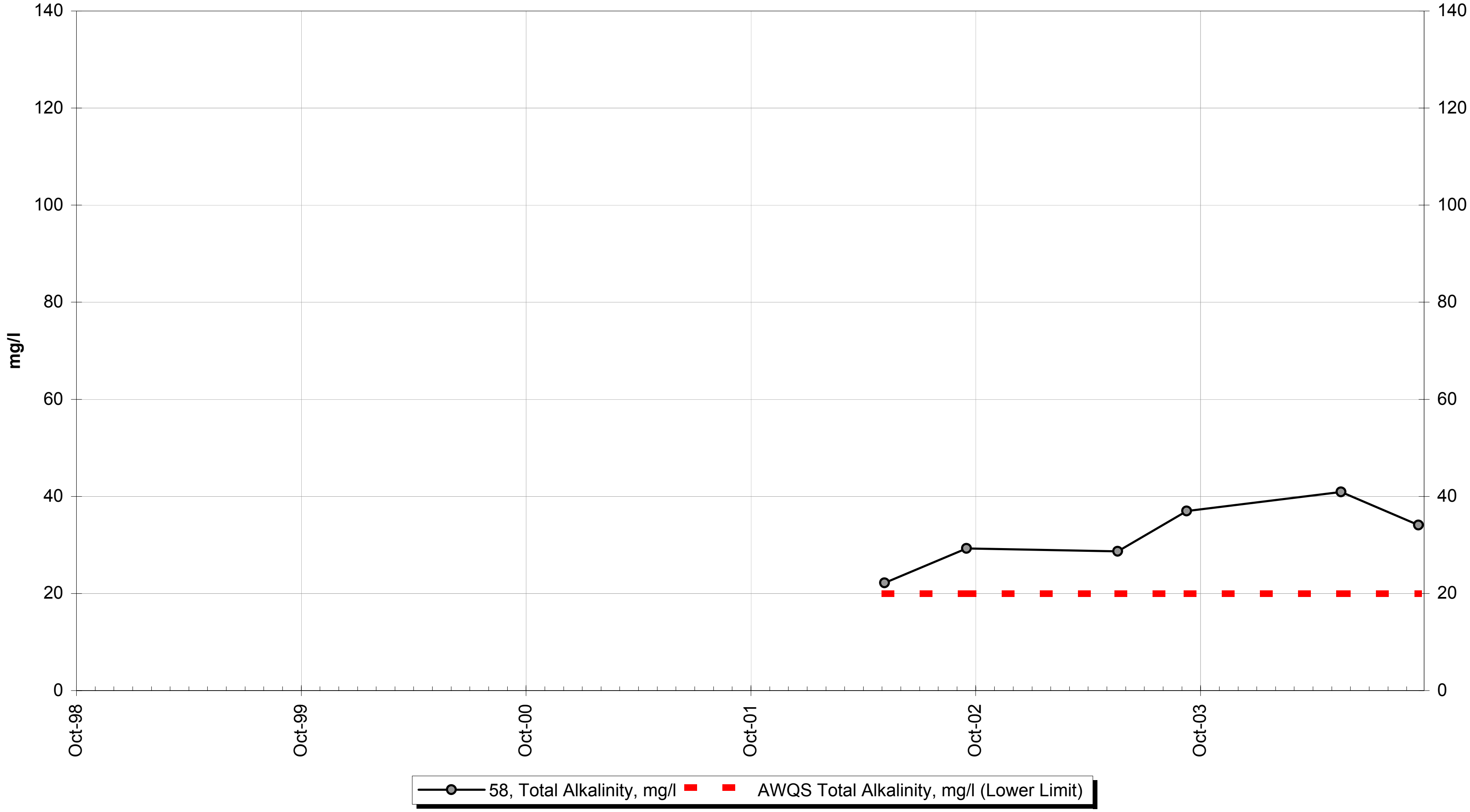


Site 58 -Field pH
pH, su
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
58, pH Field, su
AWQS pH, su-Low
AWQS pH, su-High

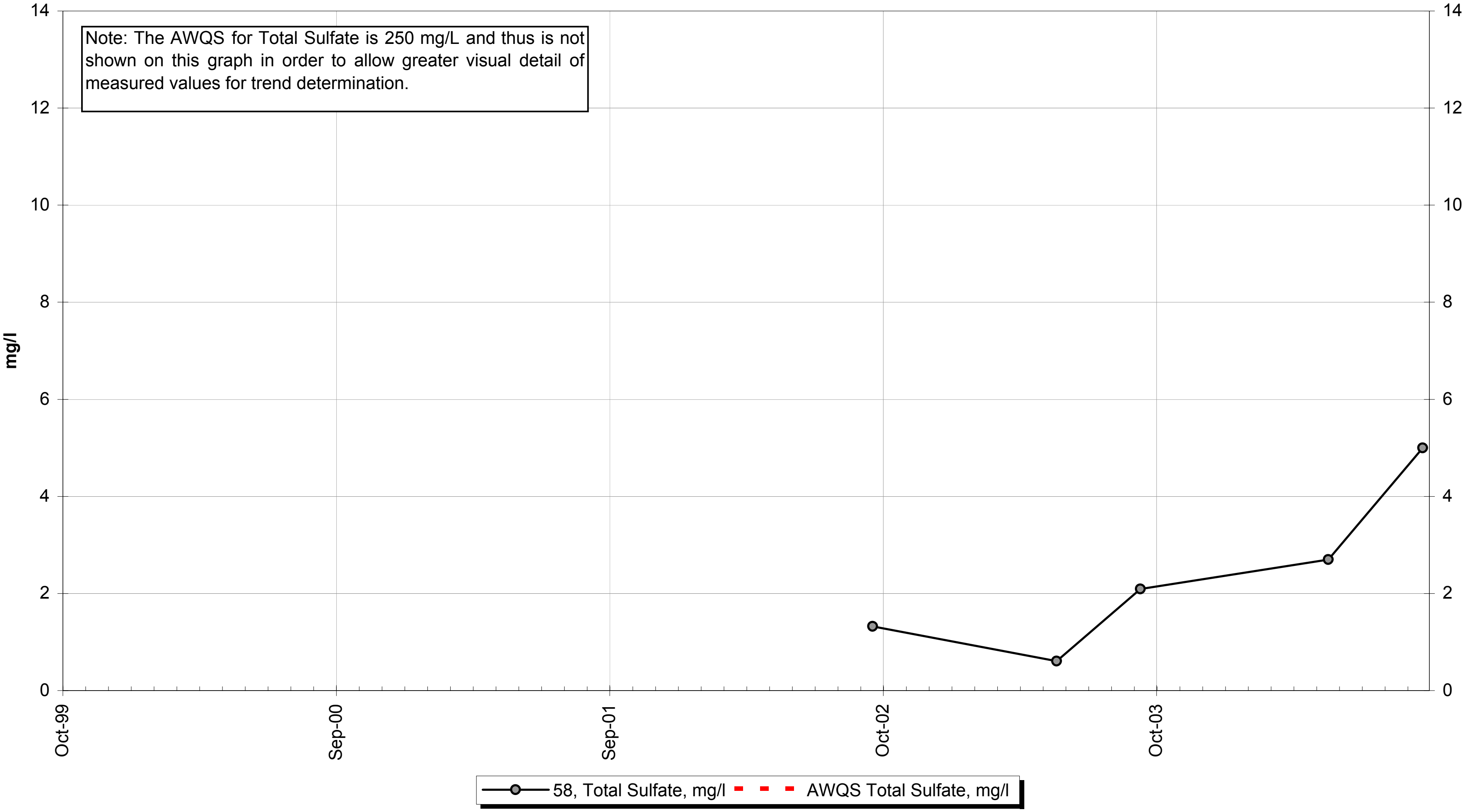
Site 58 -Lab pH

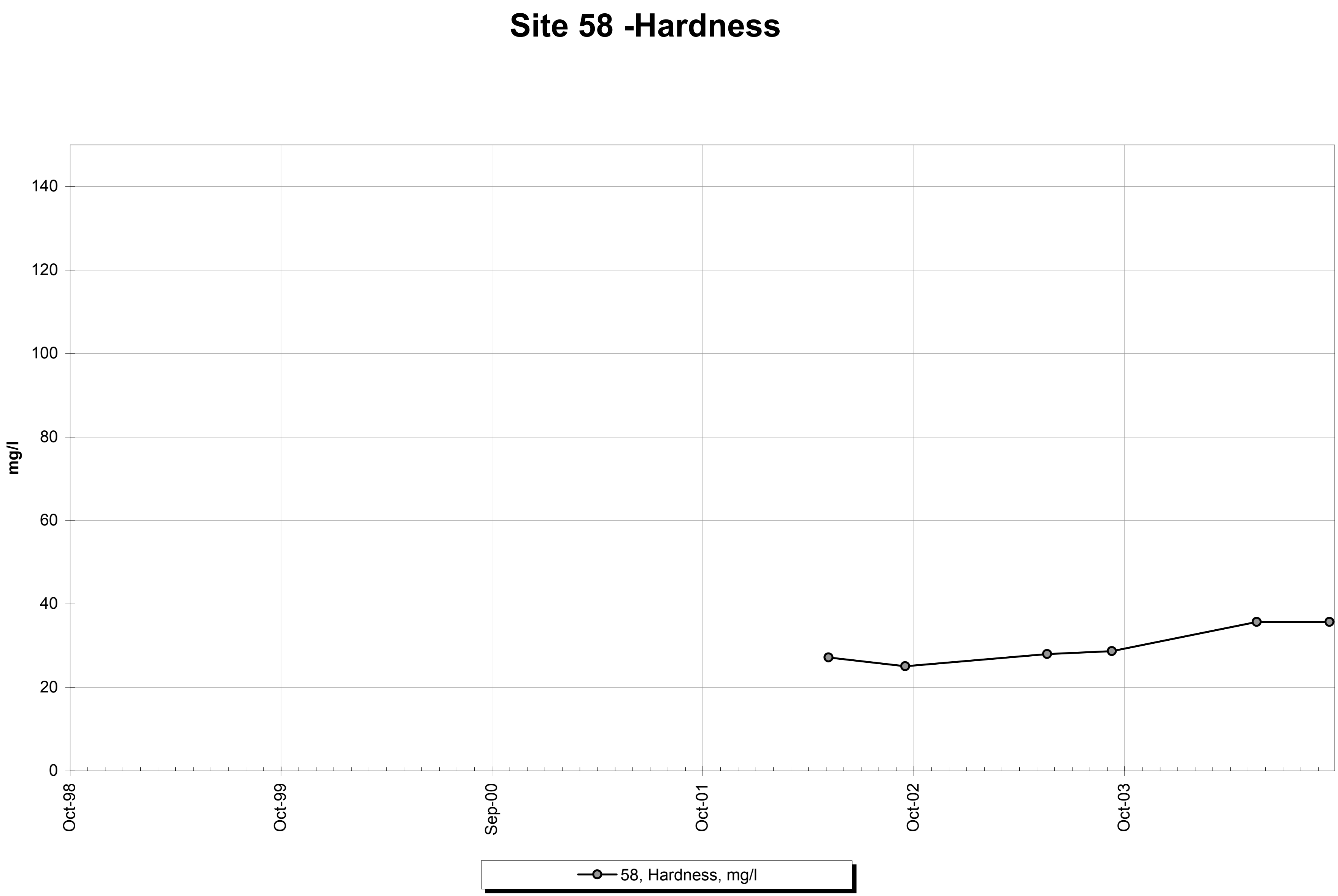


Site 58 -Total Alkalinity



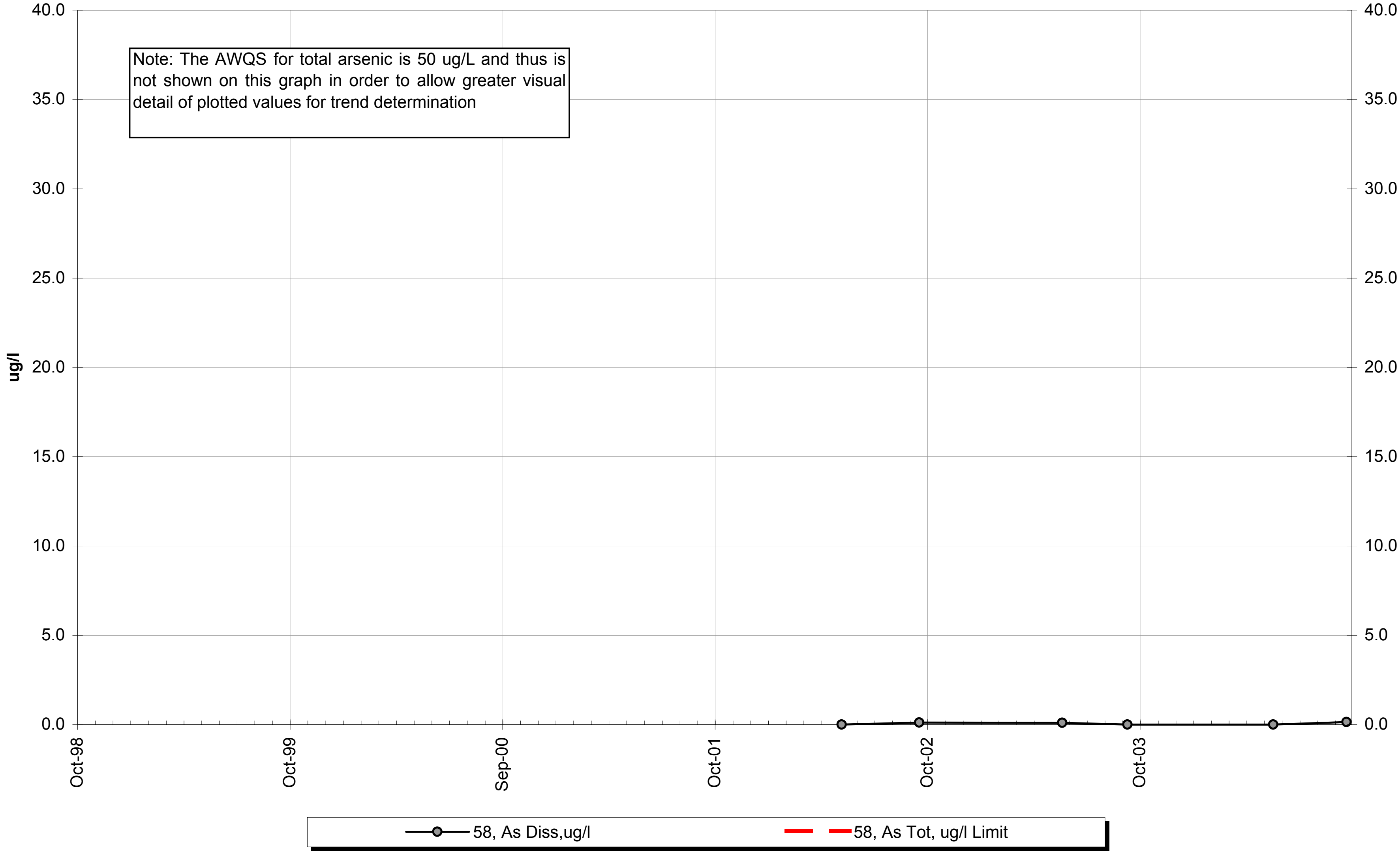
Site 58 -Total Sulfate

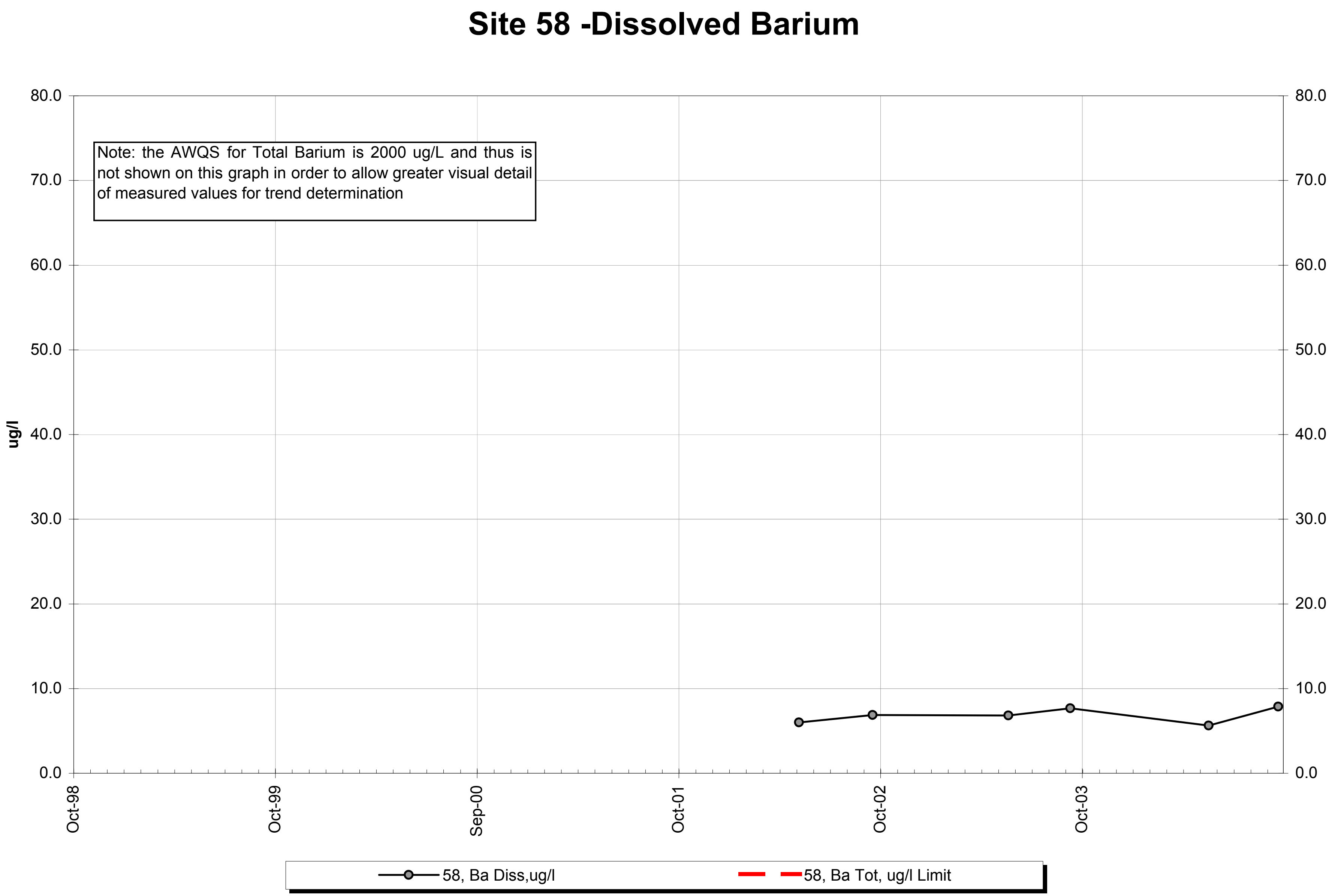




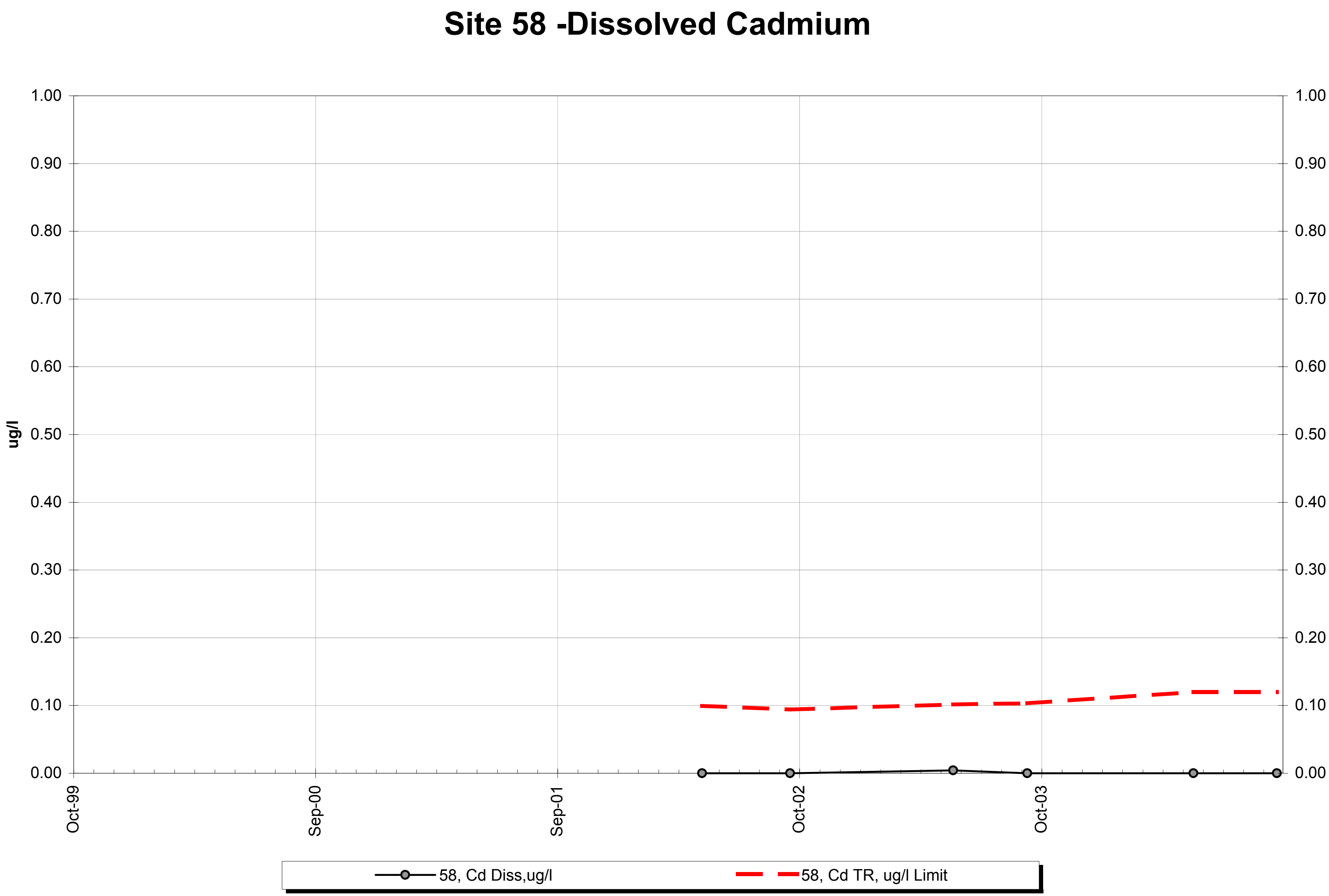
Site 58 -Hardness
mg/l
0
20
40
60
80
100
120
140
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
58, Hardness, mg/l

Site 58 -Dissolved Arsenic

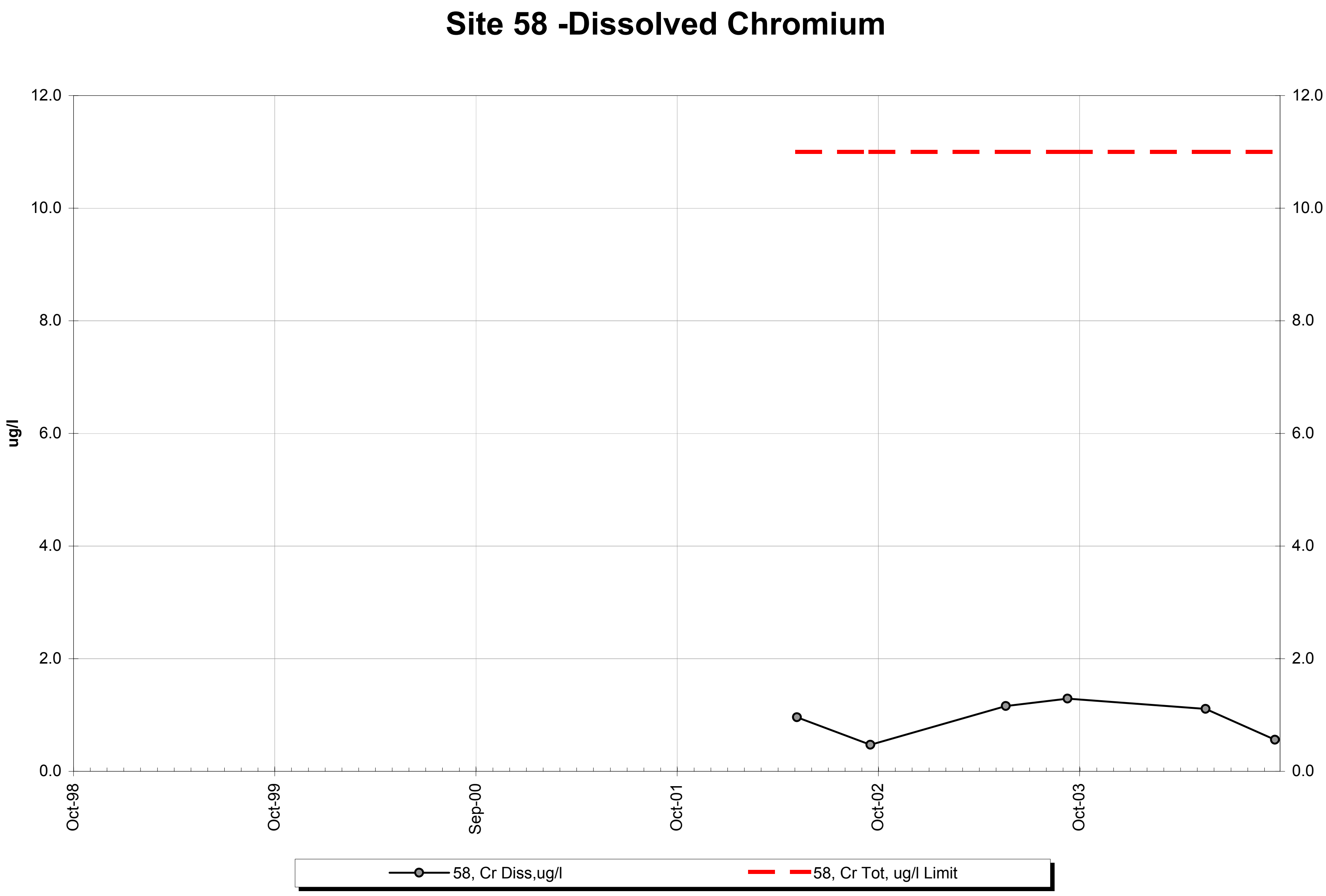




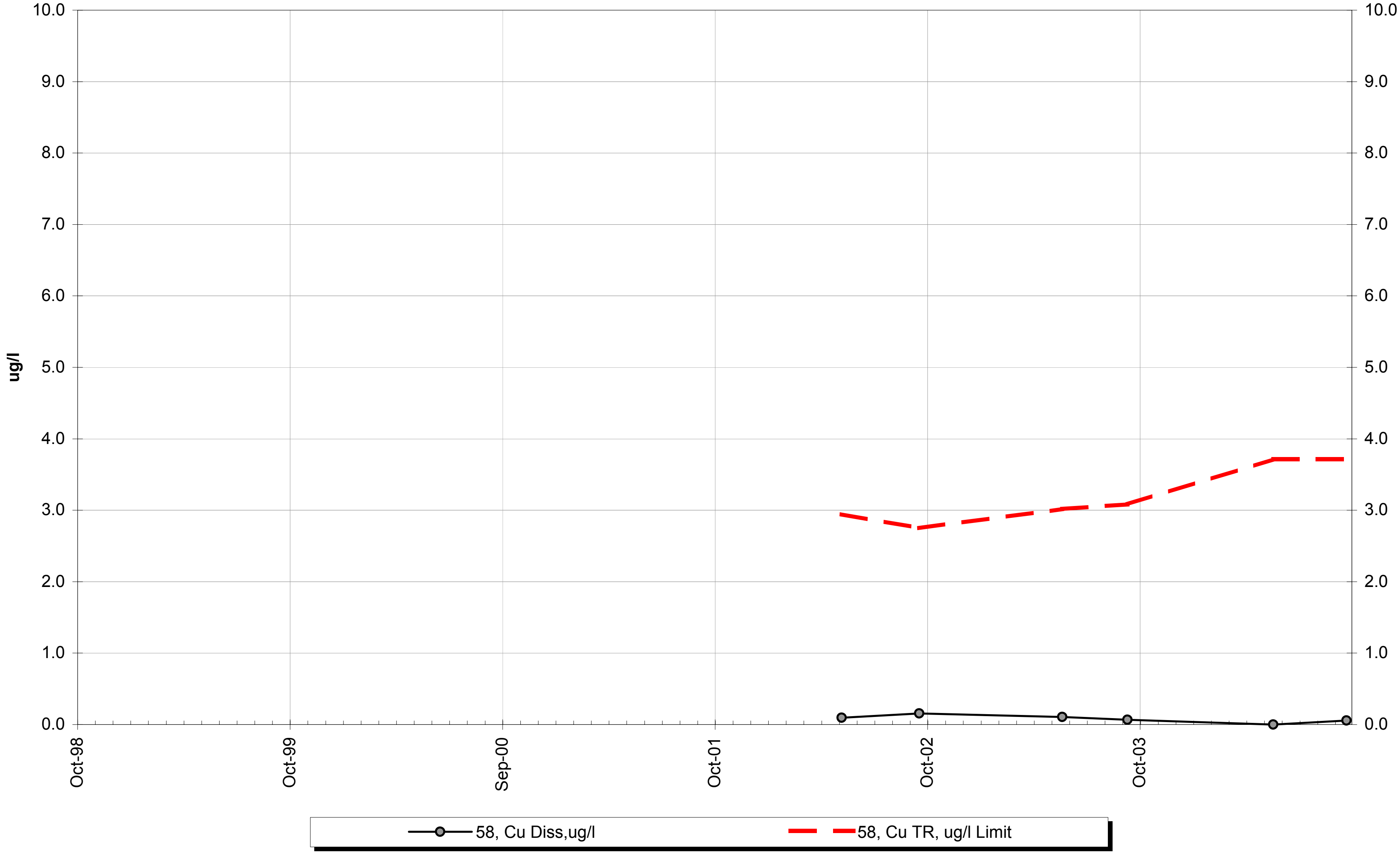
Site 58 -Dissolved Barium
Note: the AWQS for Total Barium is 2000 ug/L and thus is not shown on this graph in order to allow greater visual detail of measured values for trend determination
ug/l
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
58, Ba Diss,ug/l
58, Ba Tot, ug/l Limit

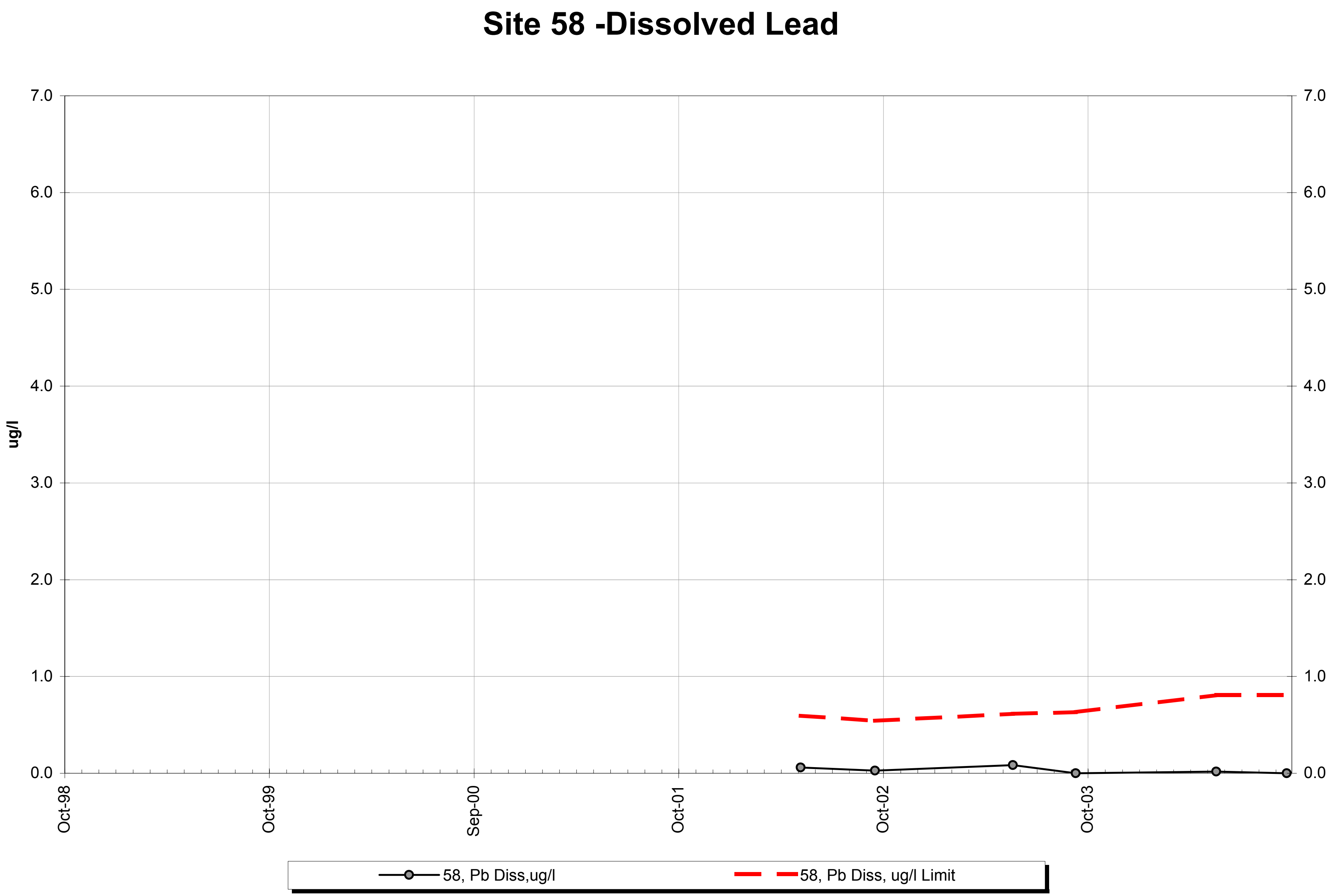


Site 58 -Dissolved Cadmium
ug/l
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
58, Cd Diss,ug/l
58, Cd TR, ug/l Limit


Site 58 -Dissolved Chromium
ug/l
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
58, Cr Diss,ug/l
58, Cr Tot, ug/l Limit

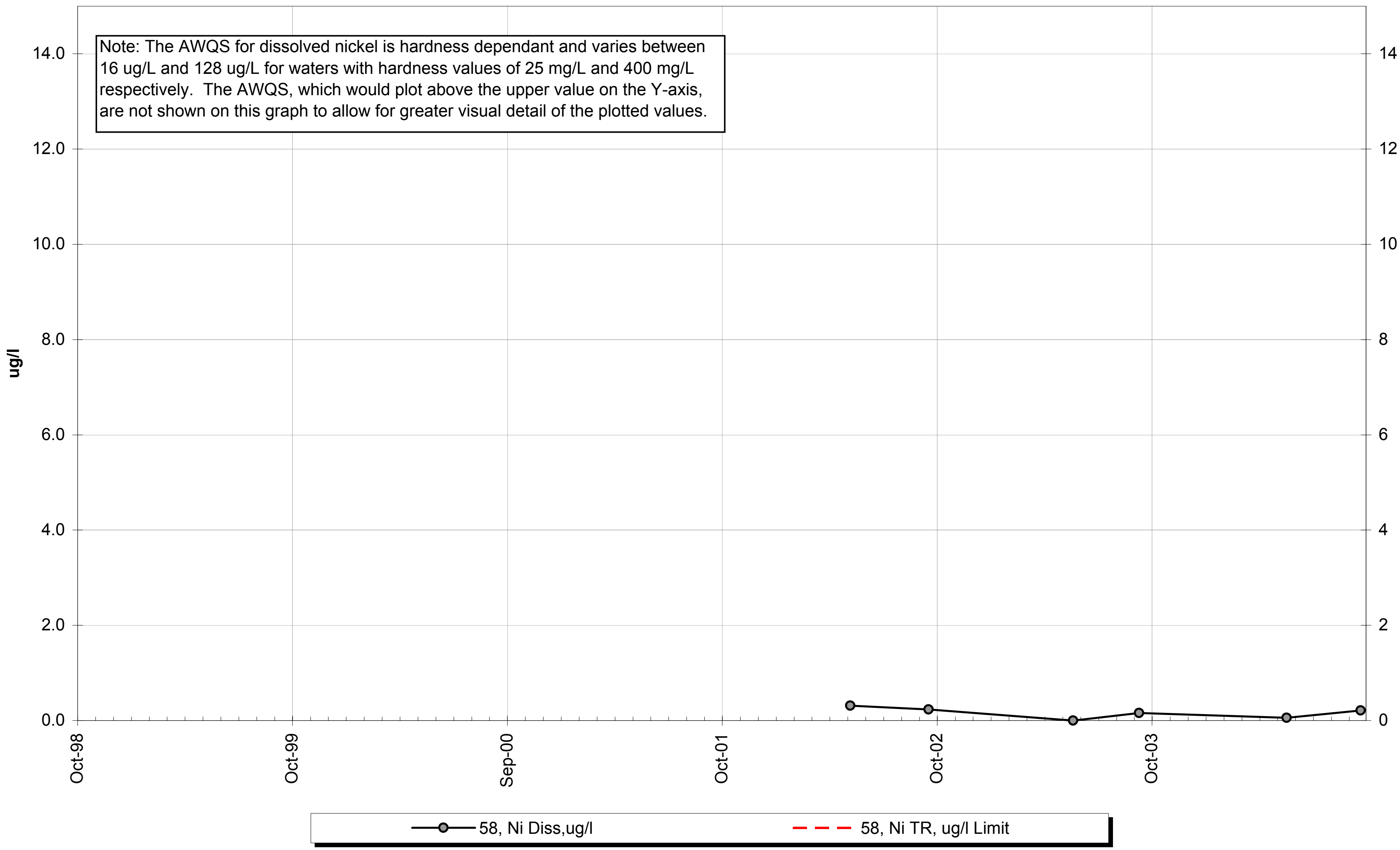
Site 58 -Dissolved Copper

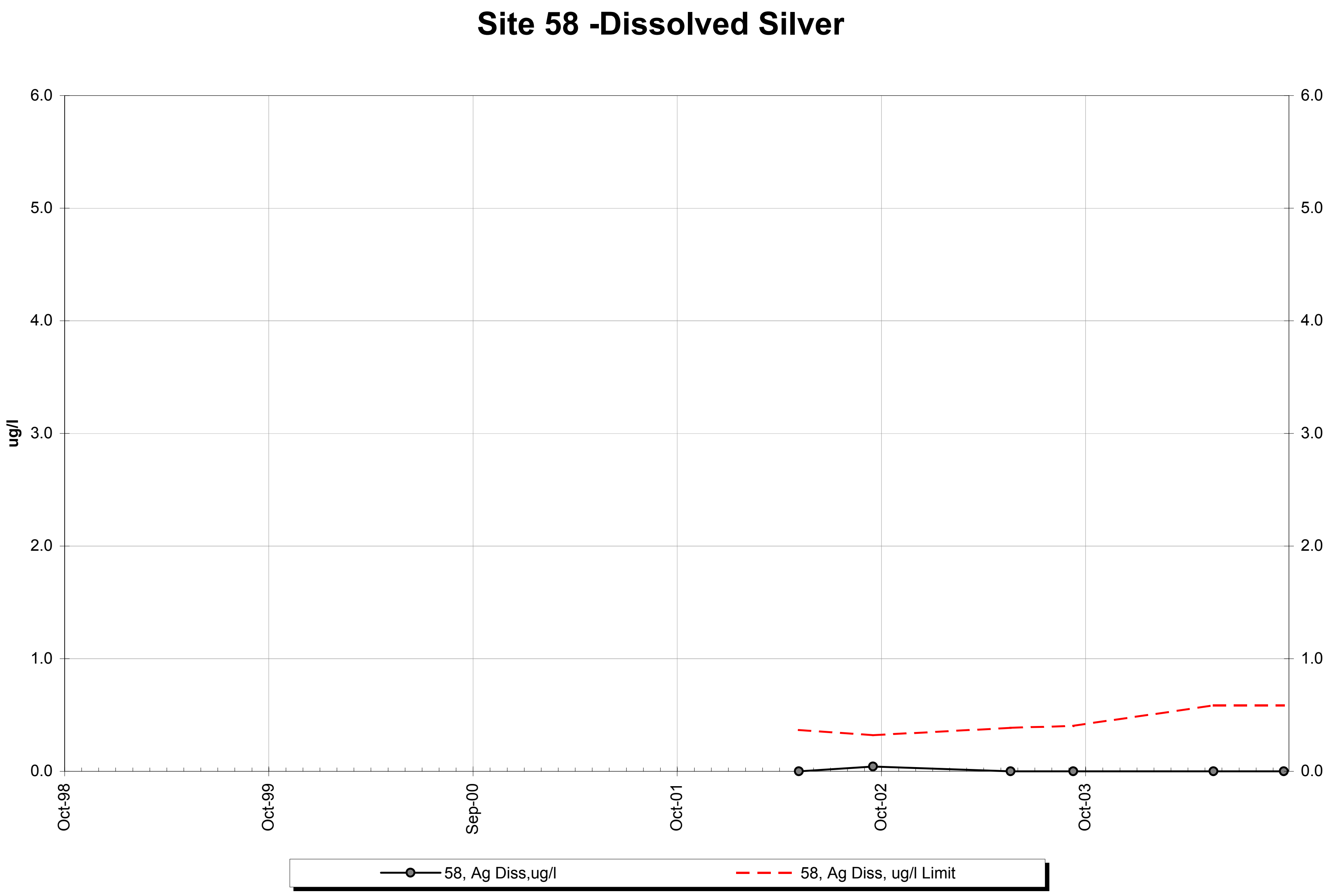




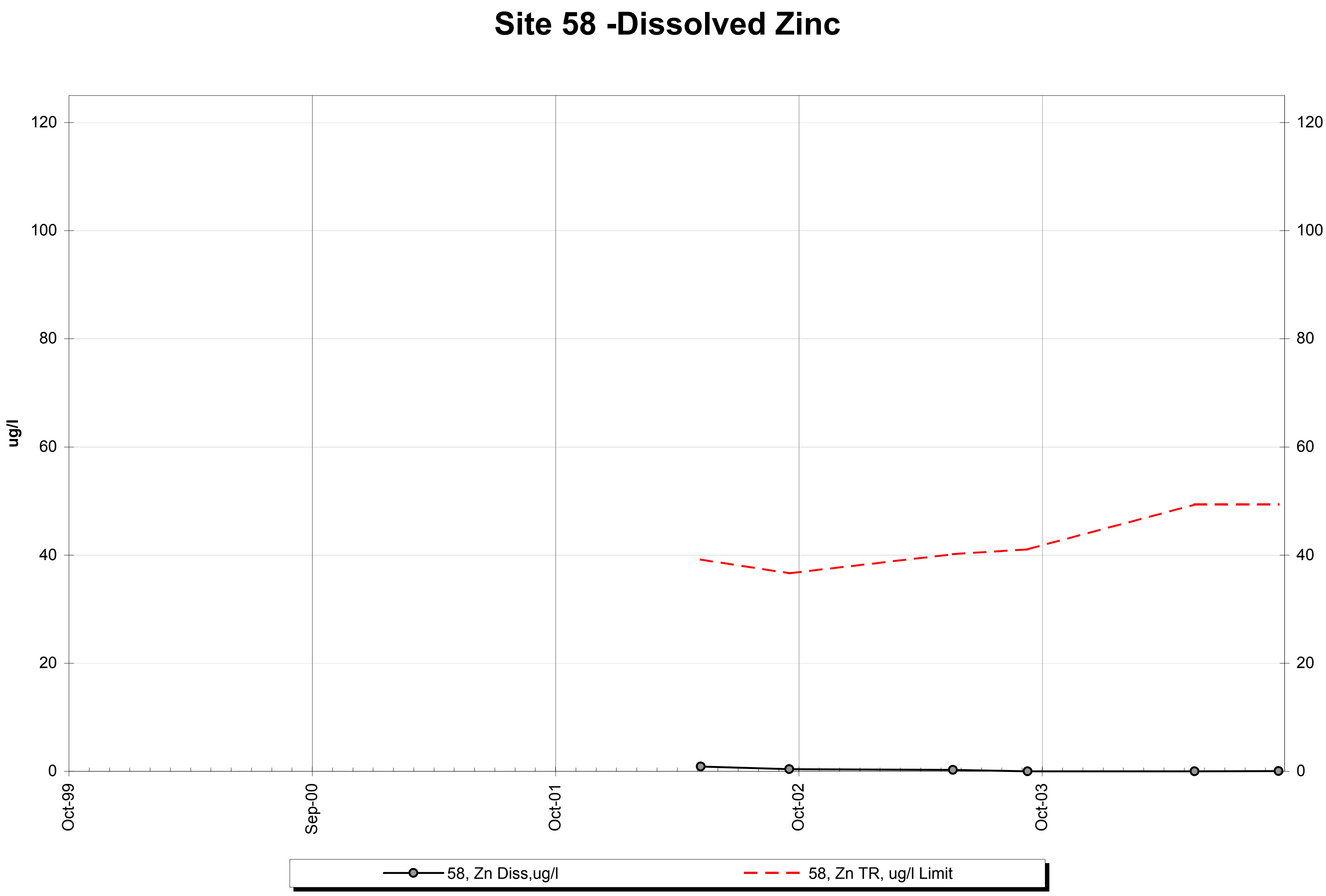
Site 58 -Dissolved Lead
ug/l
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
58, Pb Diss,ug/l
58, Pb Diss, ug/l Limit

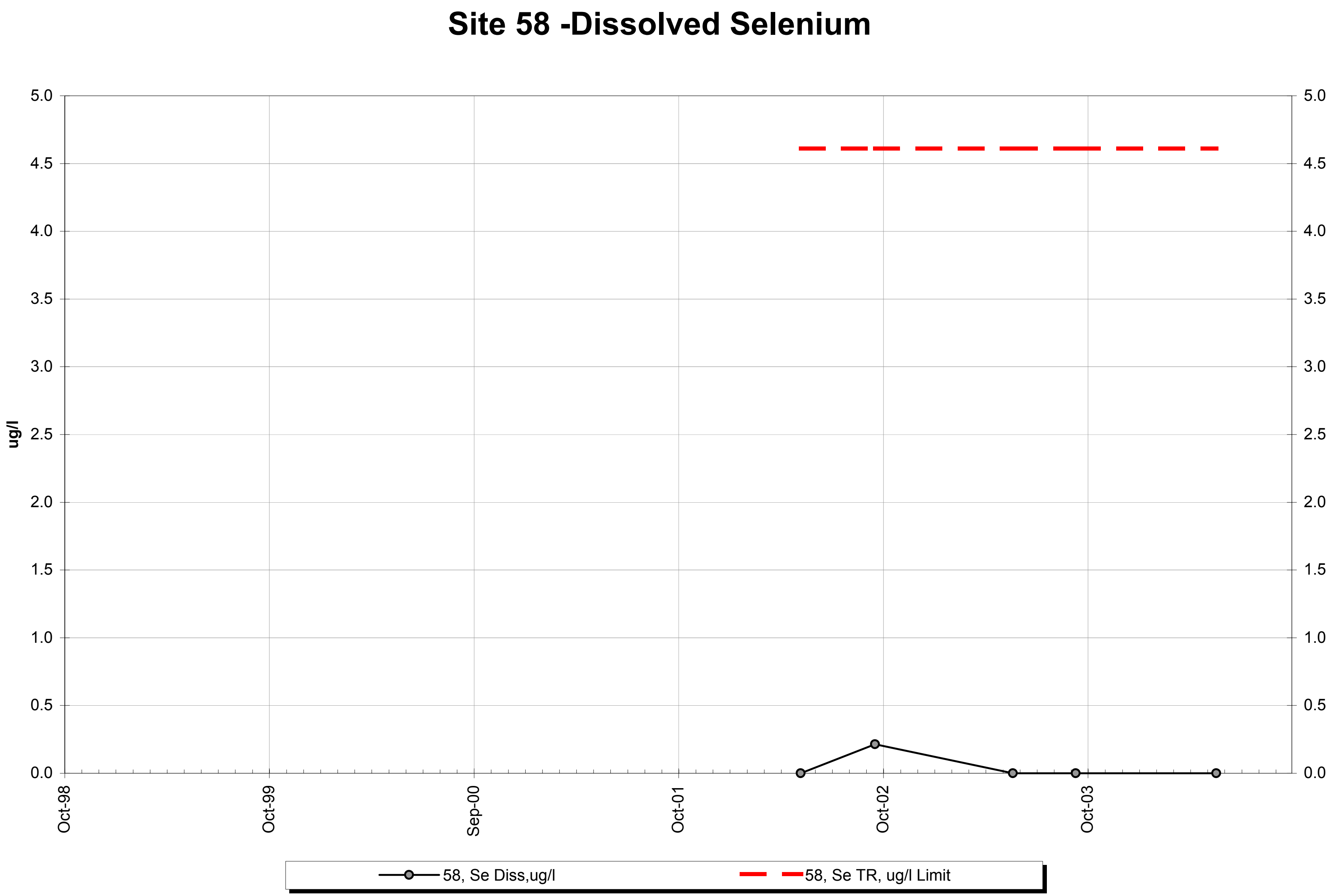
Site 58 -Dissolved Nickel

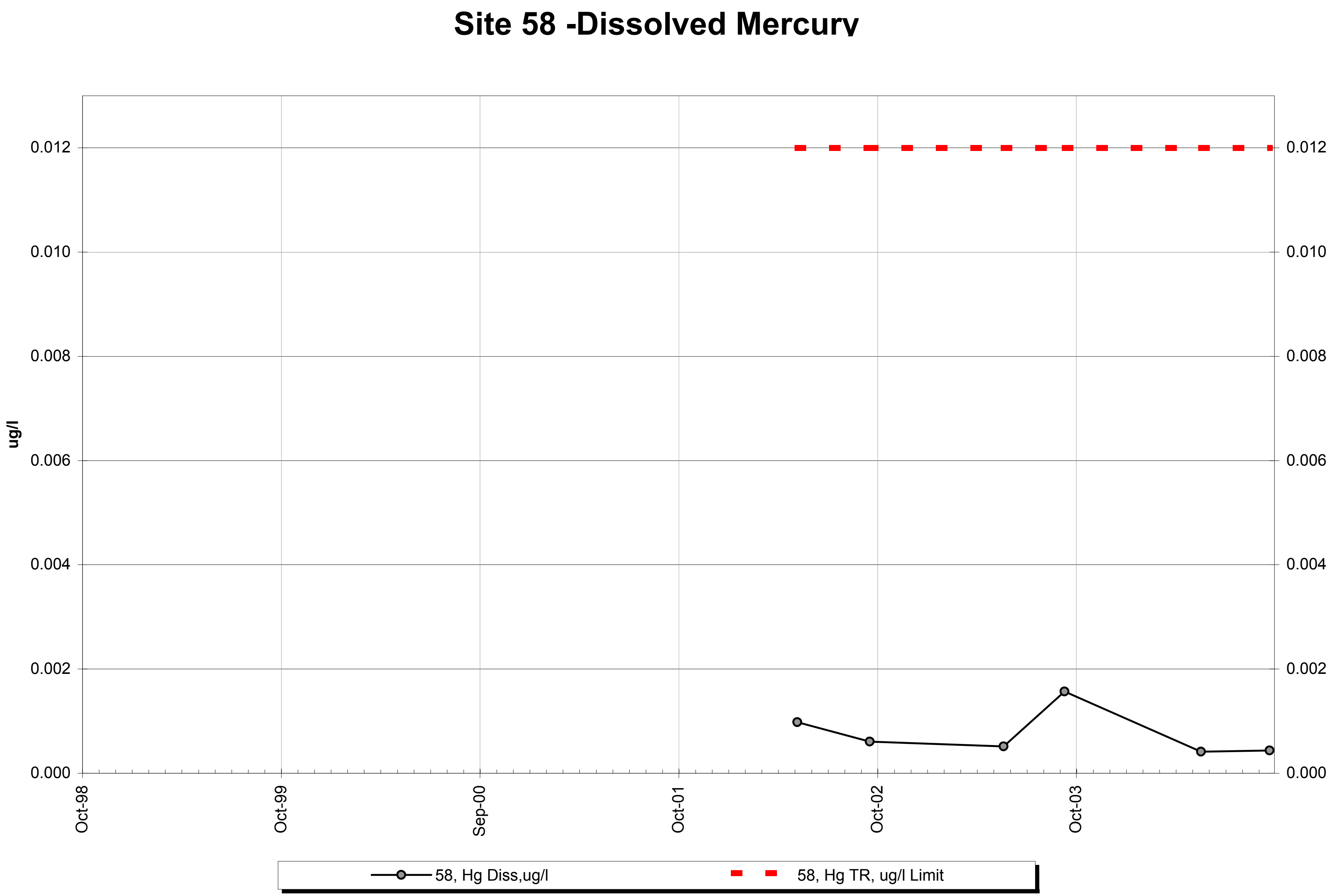




Site 58 -Dissolved Silver
ug/l
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
58, Ag Diss,ug/l
58, Ag Diss, ug/l Limit


Site 58 -Dissolved Zinc
ug/l
120
100
80
60
40
20
0
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
58, Zn Diss,ug/l
58, Zn TR, ug/l Limit


Site 58 -Dissolved Selenium
ug/l
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
58, Se Diss,ug/l
58, Se TR, ug/l Limit


Site 58 -Dissolved Mercury
ug/l
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
58, Hg Diss,ug/l
58, Hg TR, ug/l Limit

INTERPRETIVE REPORT
SITE 27 "MONITORING WELL 2S"

The data collected during the current water year are listed in the following "Table of Results for Water Year 2004" report. The table includes all the data, field and lab, collected for the current water year and a series of flags keyed to the summary report "Qualified Data by QA Reviewer". The QA report lists any associated data limitations found during the monthly QA reviews of laboratory data for this site. Median values for all analytes have been calculated and are shown in the right-most column of the table of results. Any value reported as less than MDL has been replaced with a value of zero for the purpose of median calculation.

All data collected at this site for the past five years are included in the data analyses. As shown in the table below, there were no data outliers.

Sample Date	Parameter	Value	Qualifier	Notes
No outliers have been identified by KGCMC for the period of Oct-99 though Sept-04.				

The data for Water Year 2004 have been compared to the strictest fresh water quality criterion for each applicable analyte. Four results exceeding these criteria have been identified, as listed in the table below. These data are for pH, both for lab and field. Values for lab and field pH from other wells completed into organic rich peat sediments similar to Site 27 have historically resulted in pH values ranging from 5 to 6 su (e.g. Sites 58, 29, and 32).

Sample Date	Parameter	Value	Standard	Standard Type
05/18/04	pH Lab, su	5.65	6.5 - 8.5	Aquatic Life
05/18/04	pH Field, su	5.81	6.5 - 8.5	Aquatic Life
09/21/04	pH Lab, su	6.01	6.5 - 8.5	Aquatic Life
09/21/04	pH Field, su	5.99	6.5 - 8.5	Aquatic Life

X-Y plots have been generated to graphically present the data for each of the analytes requested in the Statistical Information Goals for this site. These plots have been visually analyzed for the appearance of any trend in concentration. No obvious trends were apparent.

Additional X-Y plots have been generated for alkalinity, pH, conductance, sulfate, and dissolved zinc that co-plot data from Site 27 and Site 58, the upgradient control site, to aid in the comparison between those two sites. Total alkalinity, lab conductivity, sulfate and dissolved zinc are all approximately twice the concentration at Site 27 than at Site 58. Lab pH is slightly lower at Site 27 than Site 58. The variation in the two site's water chemistries is a direct result of the inherent differences between the site's hydrogeologies and the affect this has upon the hydrologic conditions at the two sites. Site 58 is located in close proximity to the large bedrock ridge, which defines the eastern geologic and hydrologic boundary of the tails area. The upslope portion of the ridge acts as the major recharge zone to the area aquifer. Along this ridge it is likely that groundwater flow is dominated by shallow or near surface flows due to the steep gradient and thin mineral soil. Thus, the groundwater at Site 58 is typically a mixture of surficial recharge from the immediate area with a component of relatively juvenile groundwater originating from the ridge to the east. In contrast, Site 27 is located in an area of gently sloping muskeg that forms part of the upper Tributary Creek drainage area. The area's groundwater is characterized by diffuse flow through the peat/sand strata that make up the upper portion of the unconsolidated sediment fill in the Tributary Creek valley. Additionally, Site 27 is located in an area identified as a groundwater discharge site into Tributary Creek. Thus, Site 27 samples groundwater that is relatively mature in comparison to Site 58 and may have a higher component of groundwater that has been in contact with a larger variety of strata for a longer period of time. Therefore the groundwater would be expected to have a higher dissolved load. The lower pH would be a due to the greater interaction with organic matter in the muskeg and would promote greater solubility for naturally occurring dissolved metals sampled at this site.

Table of Results for Water Year 2004

Site 27 "MW-2S"													
Sample Date/Parameter	Oct-03	Nov-03	Dec-03	Jan-04	Feb-04	Mar-04	Apr-04	5/18/2004	Jun-04	Jul-04	Aug-04	9/21/2004	**Median**
Water Temp (°C)	NOT SCHEDULED FOR SAMPLING							6.2	NOT SCHEDULED FOR SAMPLING			9.2	7.7
Conductivity-Field(µmho)								96				98	97
Conductivity-Lab (µmho)								68				89	79
pH Lab (standard units)								5.65				6.01	5.83
pH Field (standard units)								5.81				5.99	5.90
Total Alkalinity (mg/L)								28.2				44.7	36.5
Total Sulfate (mg/L)								1.7				1.8	1.8
Hardness (mg/L)								19.1				136.0	77.6
Dissolved As (ug/L)								3.110				10.100	6.605
Dissolved Ba (ug/L)								14.3				57.6	36.0
Dissolved Cd (ug/L)								<0.023				<0.005	0.007
Dissolved Cr (ug/L)								3.630 J				2.380	3.005
Dissolved Cu (ug/L)								0.067 U				0.053	0.060
Dissolved Pb (ug/L)								0.2380				0.0142	0.1261
Dissolved Ni (ug/L)								1.970 J				2.480	2.225
Dissolved Ag (ug/L)								<0.009 UJ				<0.003	0.003
Dissolved Zn (ug/L)								1.36 UJ				0.32	0.84
Dissolved Se (ug/L)								<0.496 UJ				0.188	0.218
Dissolved Hg (ug/L)								0.000859 U				0.000508	0.000684

For individual sample/analyte qualifier descriptions see "Qualified Data by QA Reviewer" table.

Values reported as less than MDL are replaced by 1/2 MDL for median calculation purposes.

Shaded data has been qualified as an outlier by KGCMC and removed from any further analysis and is not included into the calculation of the median

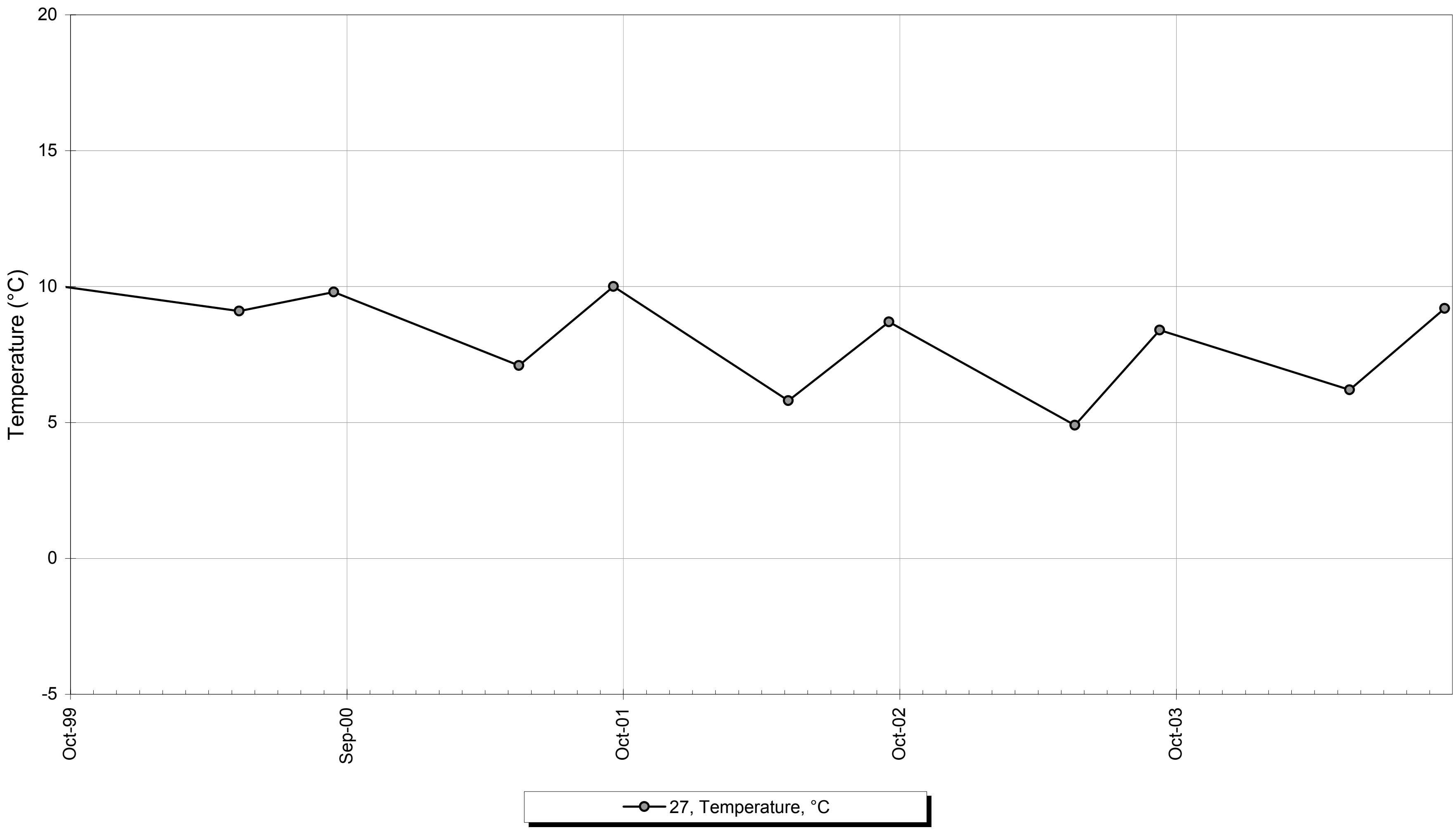
Qualified Data by QA Reviewer

Date Range: 10/01/2003 to 09/30/2004

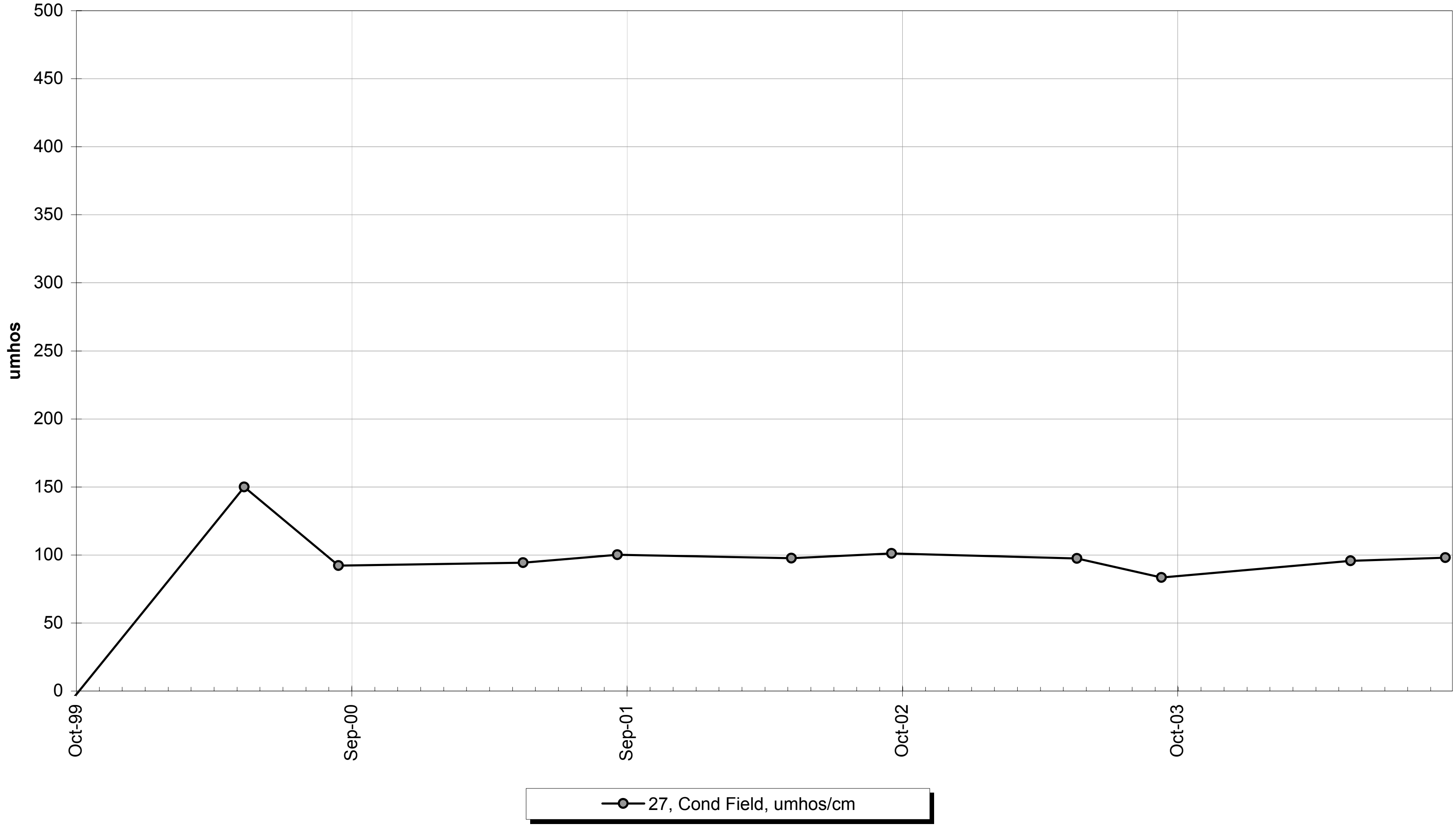
Site No.	Sample Date	Sample Time	Parameter	Value	Qualifier	Reason for Qualifier
27	05/18/2004	10:33:00 AM				
			Cr Diss, ug/l	3.63	J	CCV Recovery
			Cu Diss, ug/l	0.0671	U	Field Blank Contamination
			Ni Diss, ug/l	1.97	J	CCV Recovery
			Ag Diss, ug/l	-0.009	UJ	MS Recovery
			Zn Diss, ug/l	1.36	UJ	LCS Recovery, Field Blank C
			Se Diss, ug/l	-0.496	UJ	LCS Recovery
			Hg Diss, ug/l	0.000859	U	Method Blank Contamination

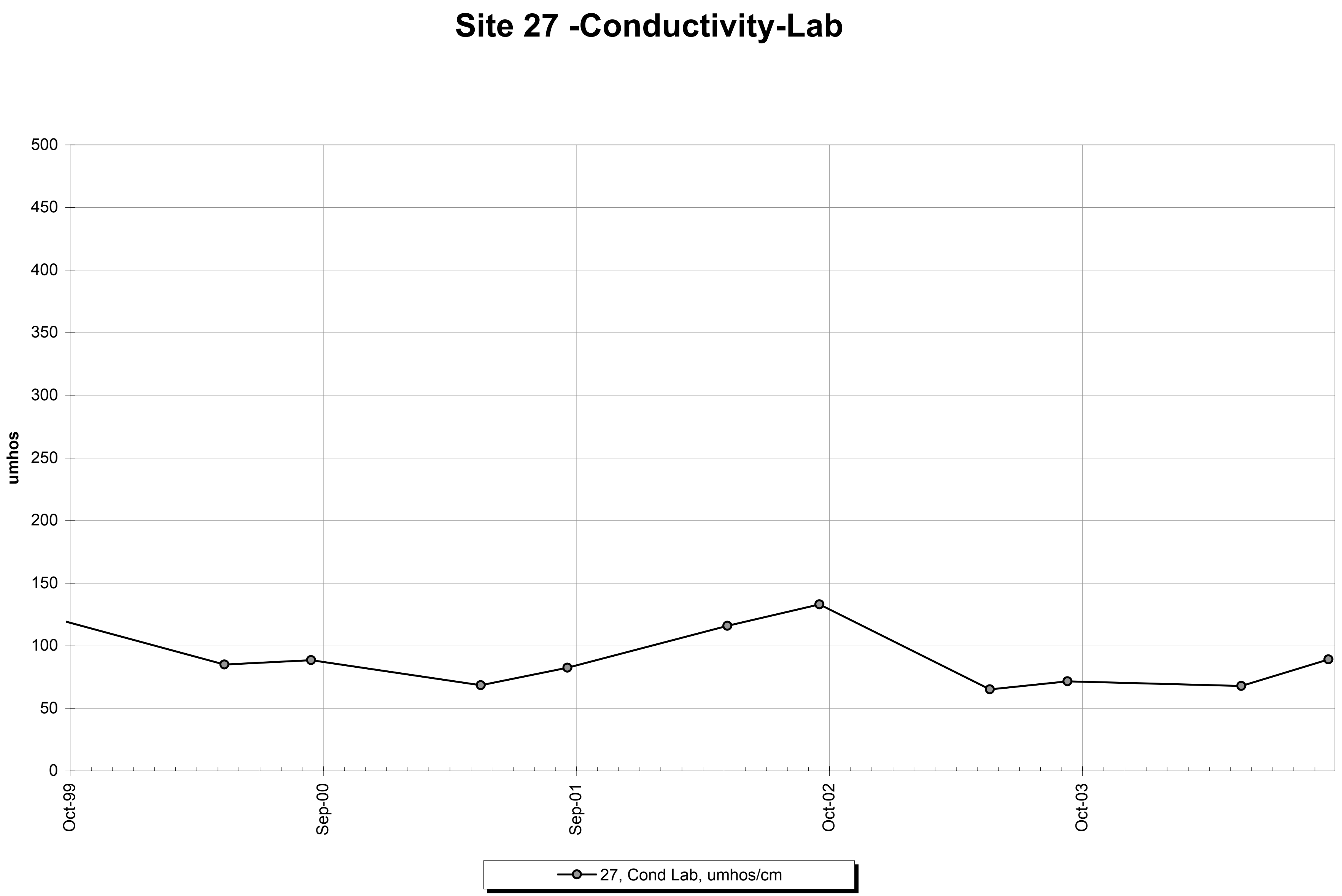
Qualifier	Description
J	Positively Identified - Approximate Concentration
N	Presumptive Evidence For Tentative Identification
NJ	Tentatively Identified - Approximate Concentration
R	Rejected - Cannot Be Verified
U	Not Detected Above Quantitation Limit
UJ	Not Detected Above Approximate Quantitation Limit

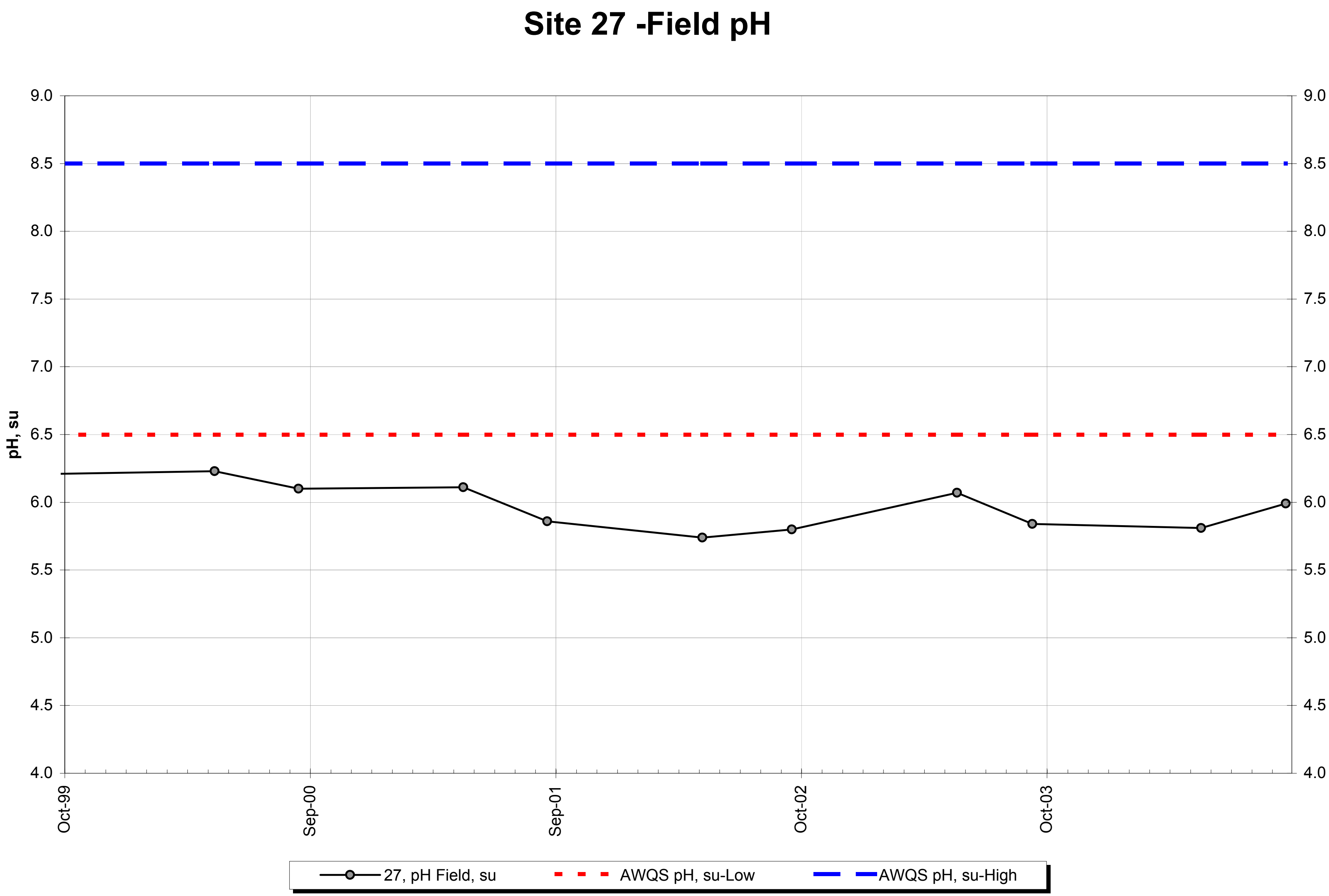
Site 27 -Water Temperature



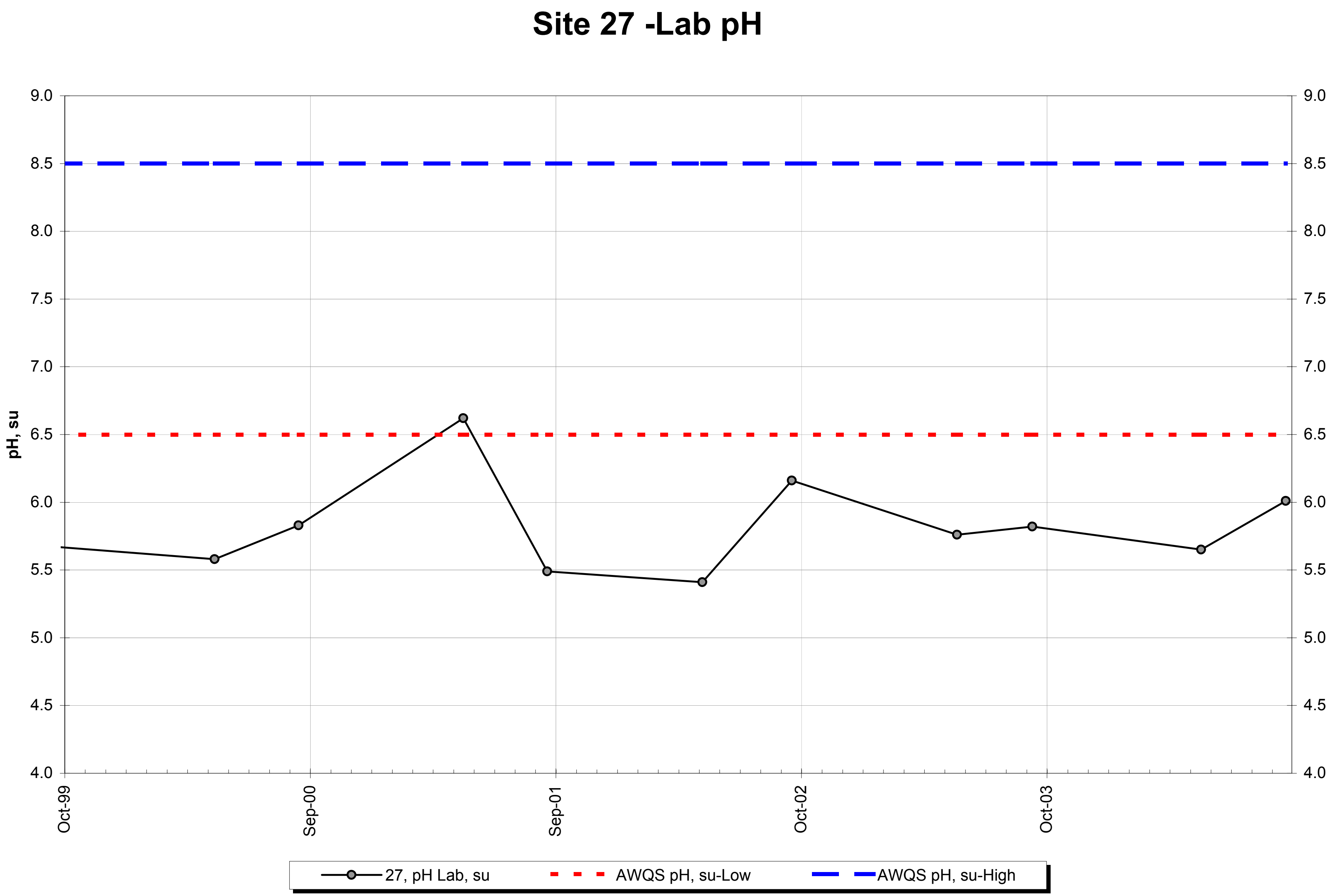
Site 27 -Conductivity-Field

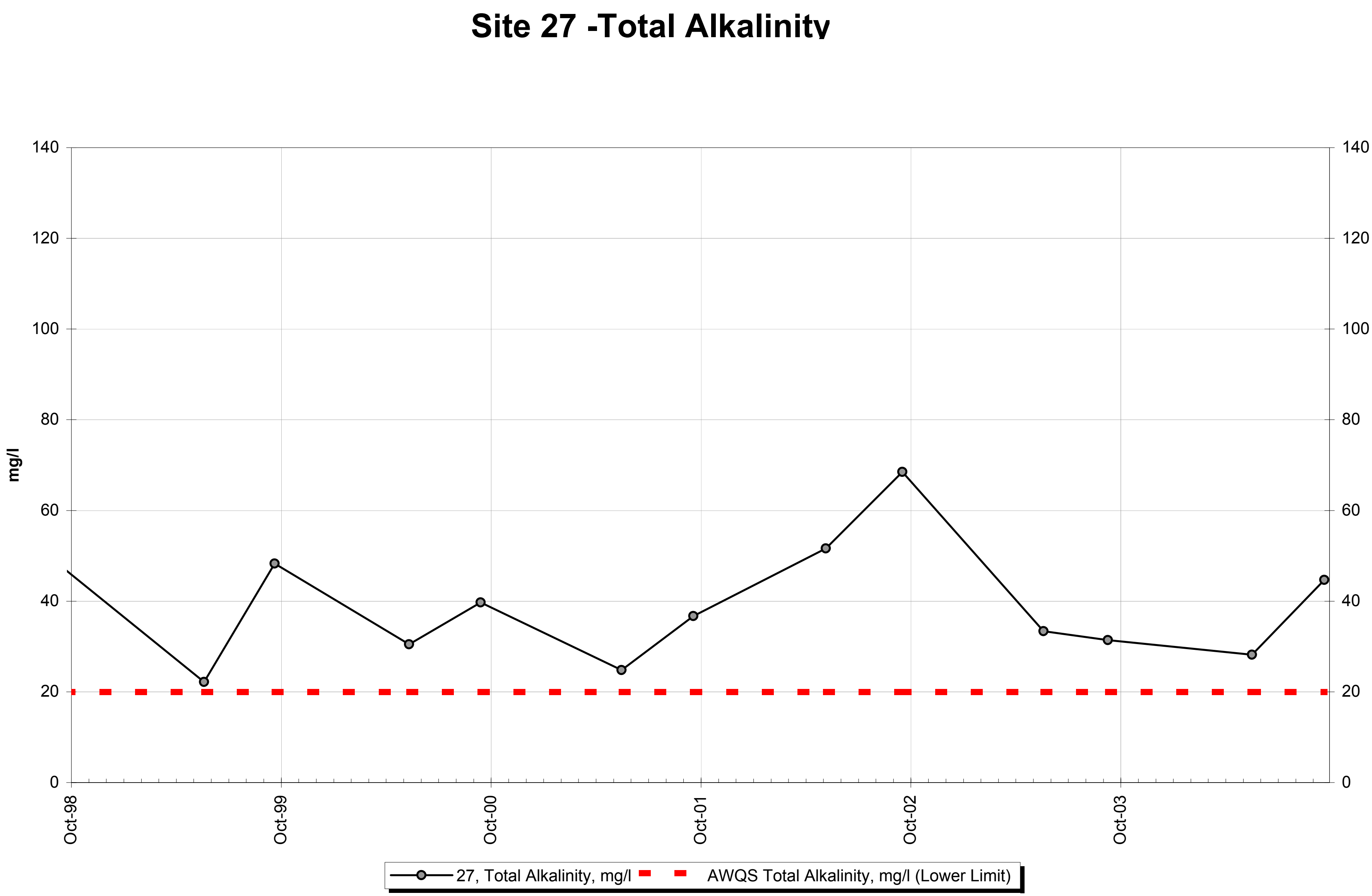



Site 27 -Conductivity-Lab
umhos
500
450
400
350
300
250
200
150
100
50
0
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
27, Cond Lab, umhos/cm



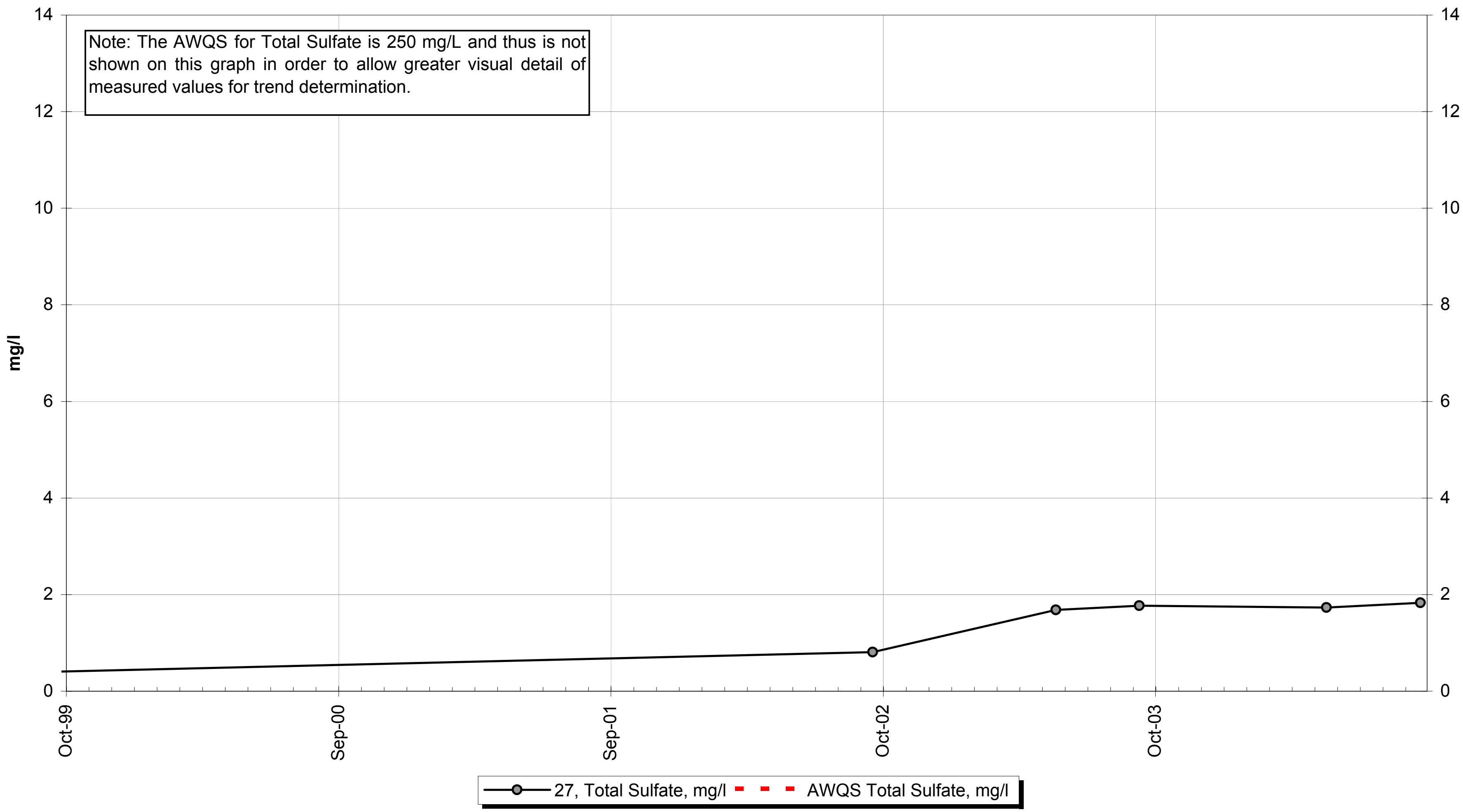
Site 27 -Field pH
pH, su
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
27, pH Field, su
AWQS pH, su-Low
AWQS pH, su-High


Site 27 -Lab pH
pH, su
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
27, pH Lab, su
AWQS pH, su-Low
AWQS pH, su-High

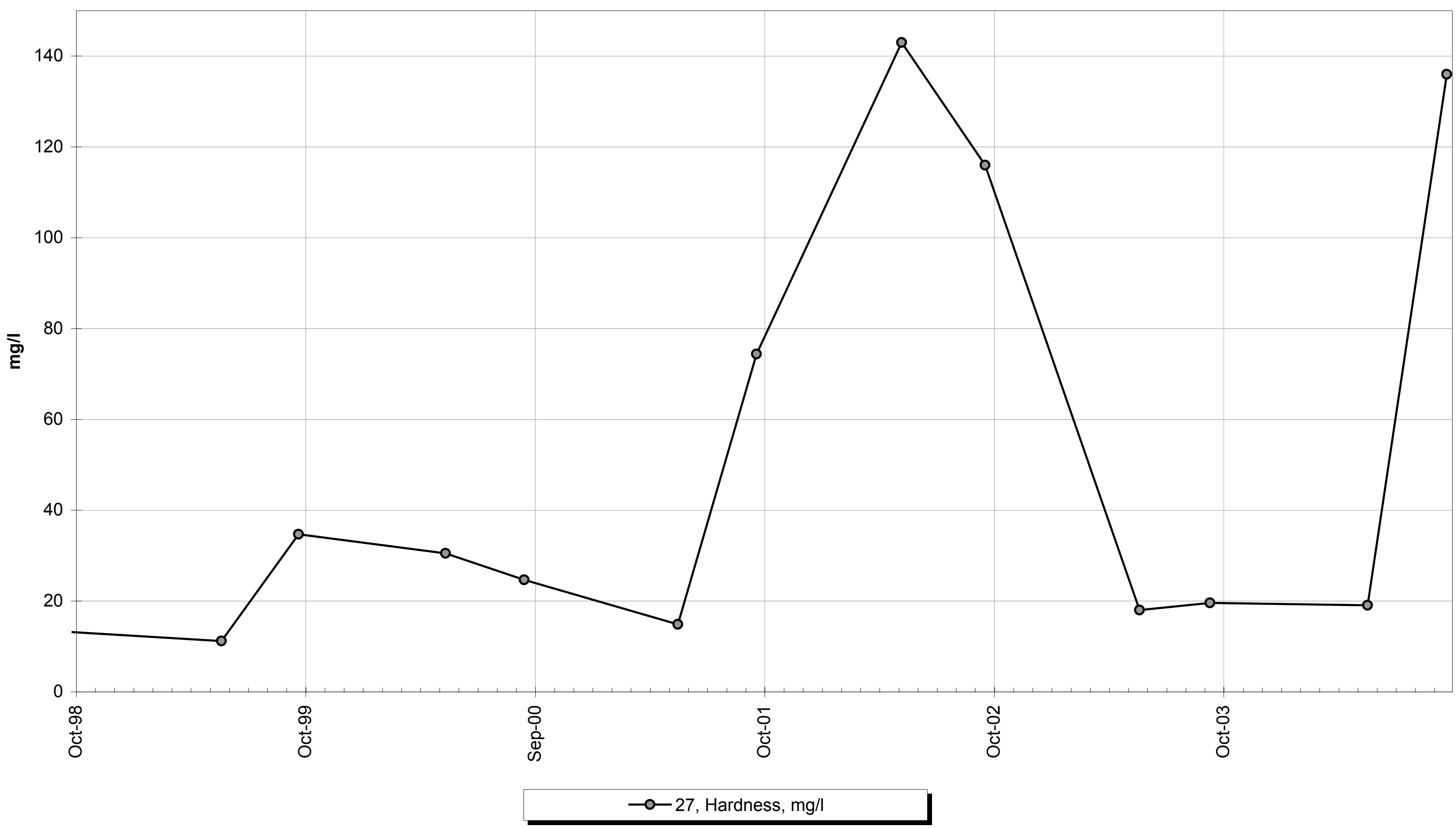


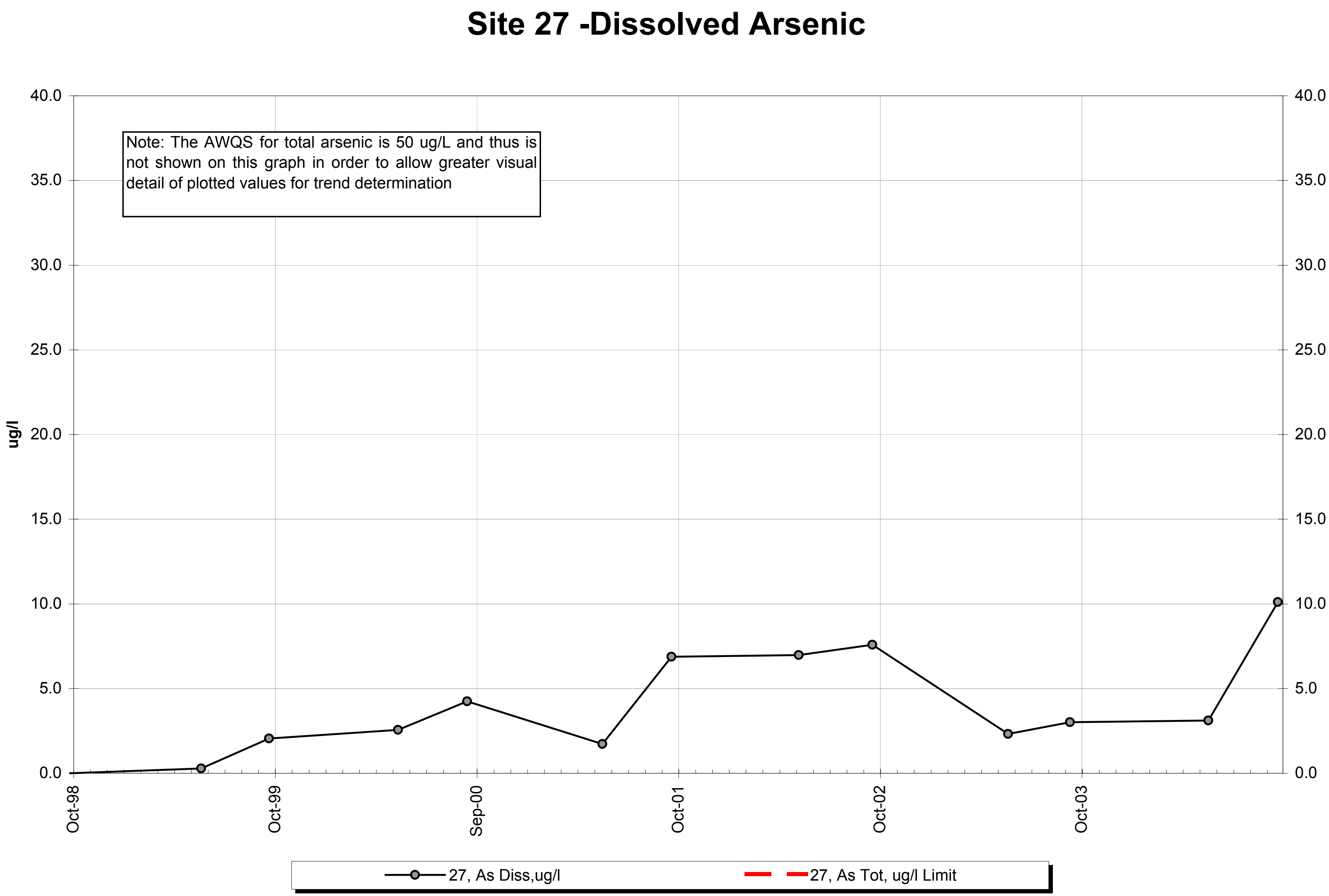
Site 27 -Total Alkalinity
mg/l
140
120
100
80
60
40
20
0
Oct-98
Oct-99
Oct-00
Oct-01
Oct-02
Oct-03
27, Total Alkalinity, mg/l
AWQS Total Alkalinity, mg/l (Lower Limit)

Site 27 -Total Sulfate

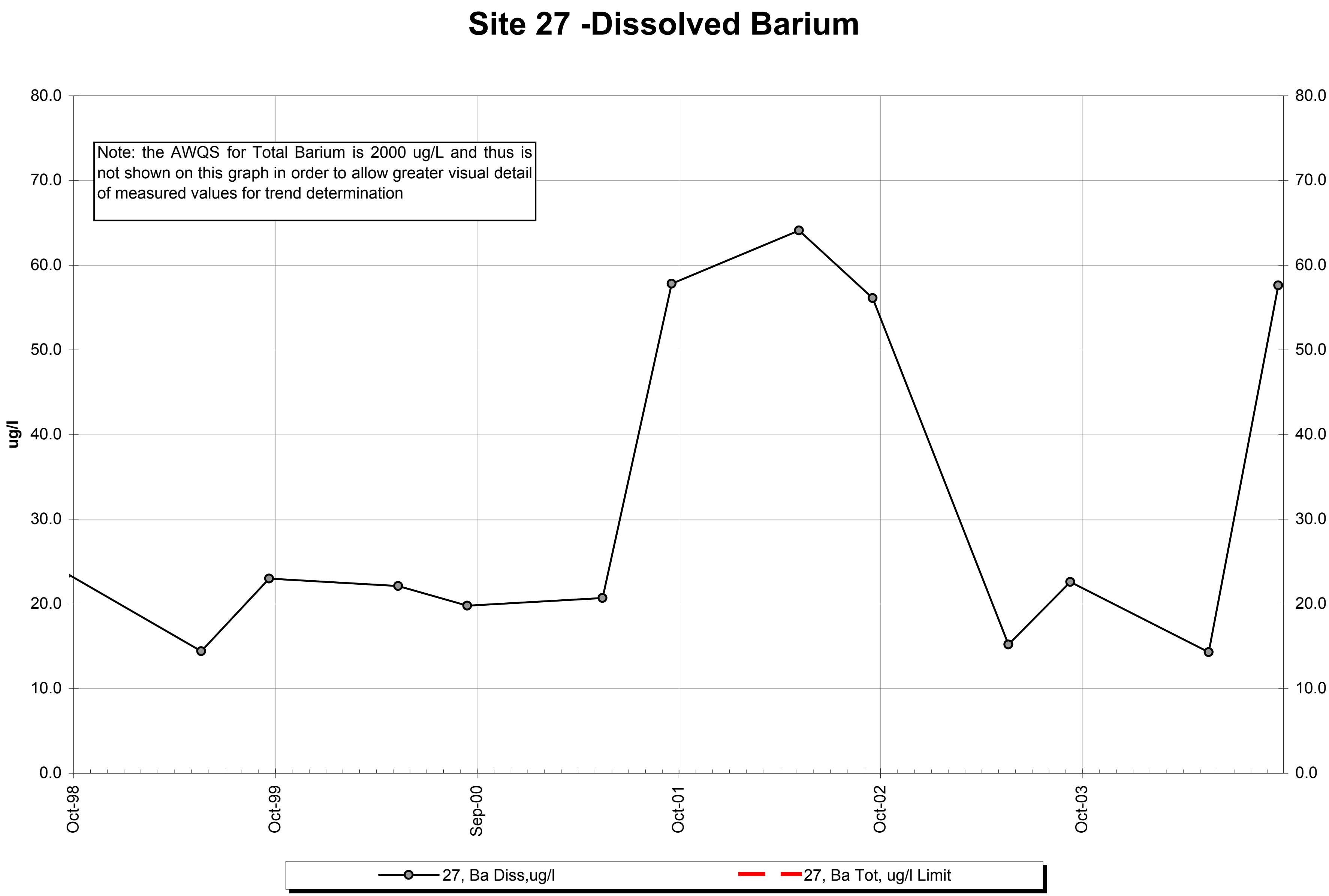


Site 27 -Hardness

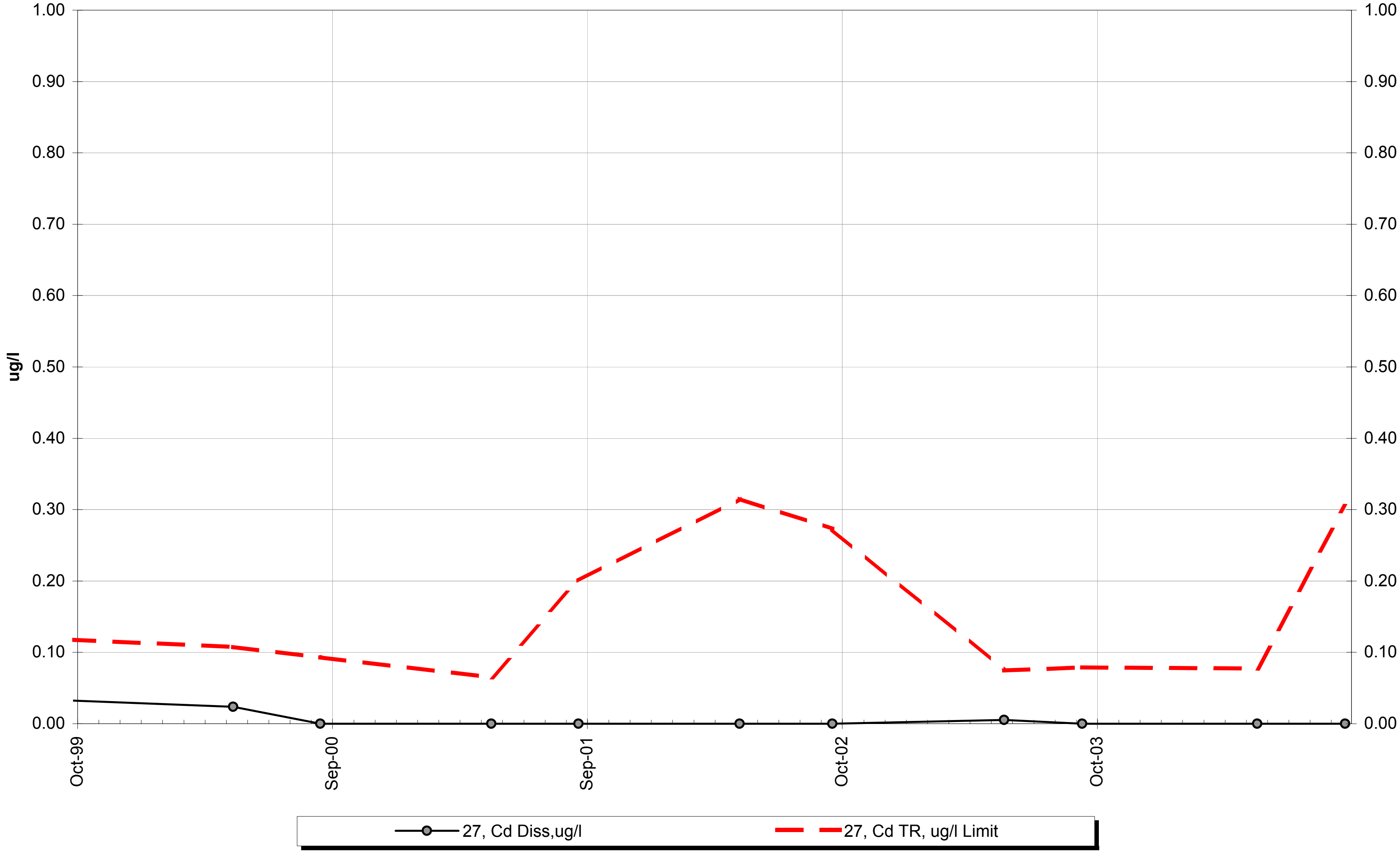


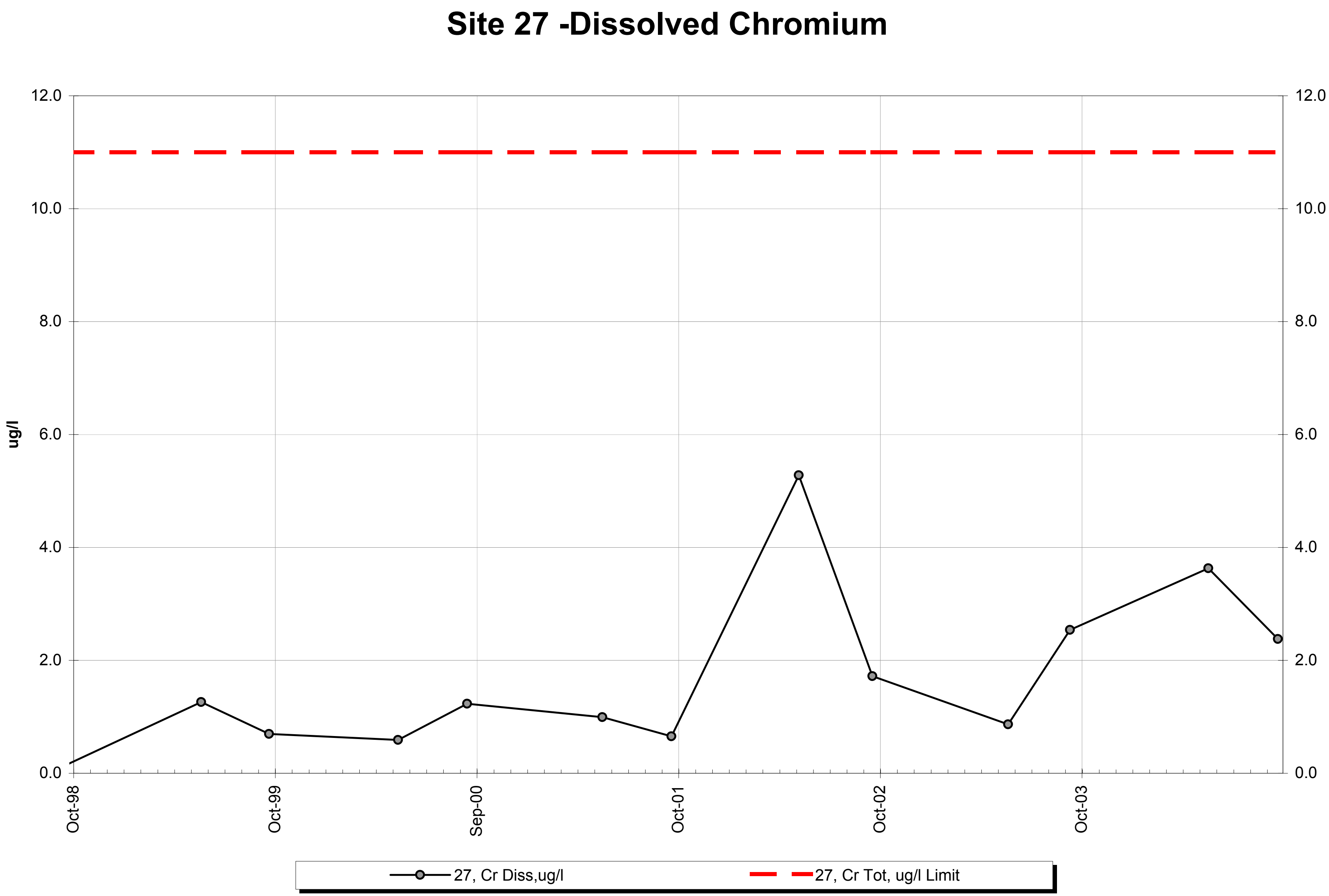


Site 27 -Dissolved Arsenic
Note: The AWQS for total arsenic is 50 ug/L and thus is not shown on this graph in order to allow greater visual detail of plotted values for trend determination
ug/l
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
27, As Diss,ug/l
27, As Tot, ug/l Limit


Site 27 -Dissolved Barium
Note: the AWQS for Total Barium is 2000 ug/L and thus is not shown on this graph in order to allow greater visual detail of measured values for trend determination
ug/l
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
27, Ba Diss,ug/l
27, Ba Tot, ug/l Limit

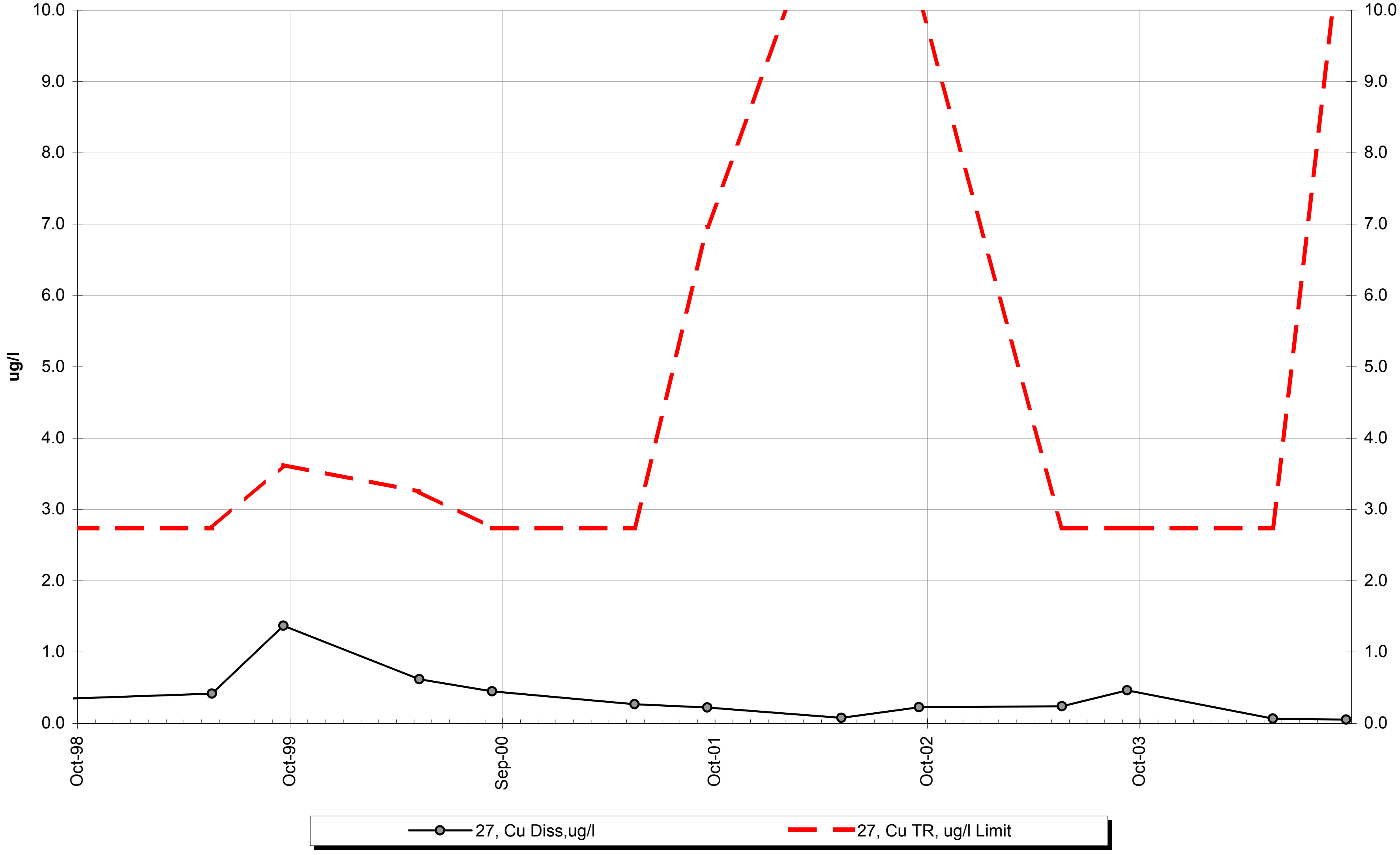
Site 27 -Dissolved Cadmium

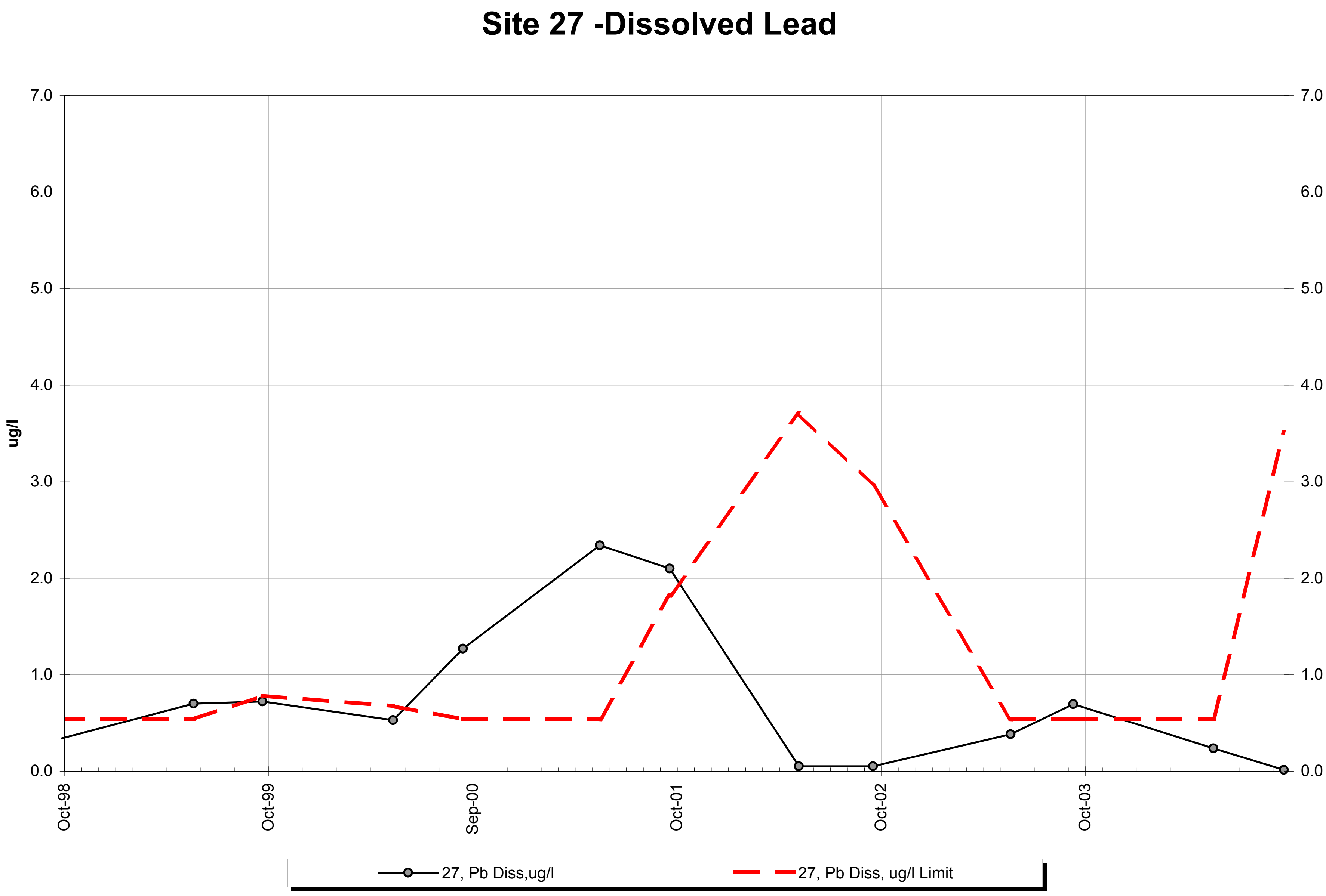




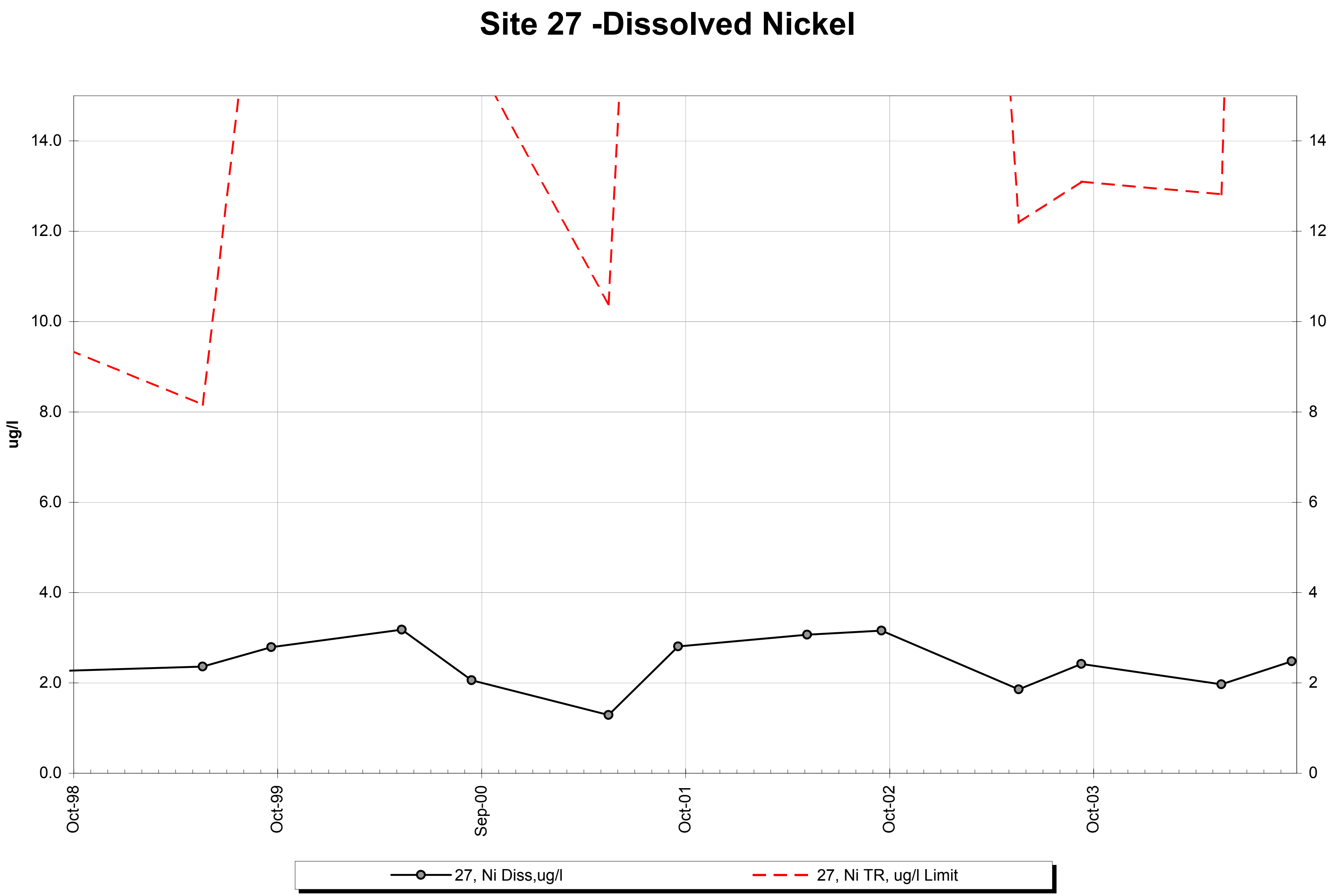
Site 27 -Dissolved Chromium
ug/l
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
27, Cr Diss,ug/l
27, Cr Tot, ug/l Limit

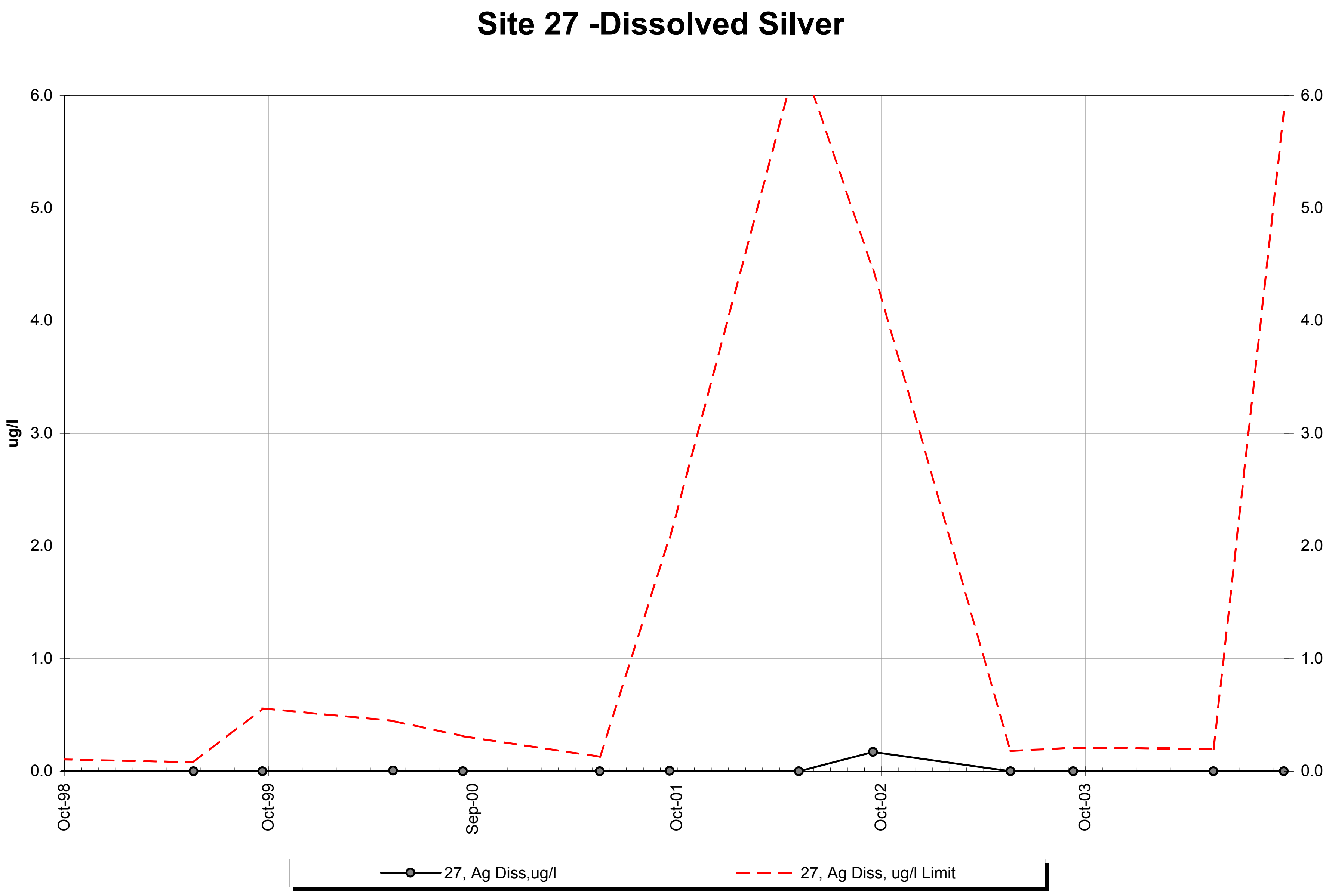
Site 27 -Dissolved Copper





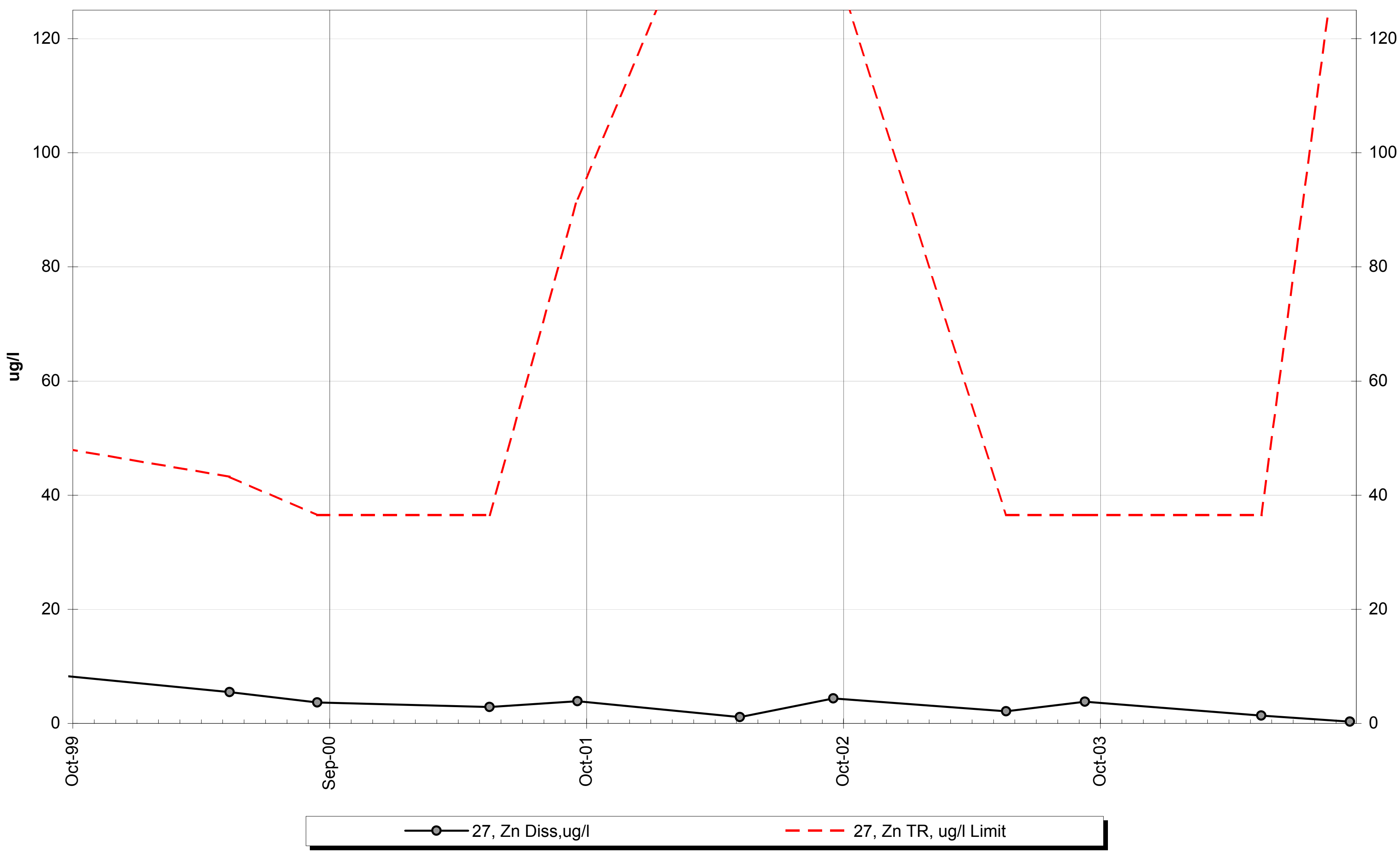
Site 27 -Dissolved Lead
ug/l
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
27, Pb Diss,ug/l
27, Pb Diss, ug/l Limit


Site 27 -Dissolved Nickel
ug/l
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
0
2
4
6
8
10
12
14
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
27, Ni Diss,ug/l
27, Ni TR, ug/l Limit

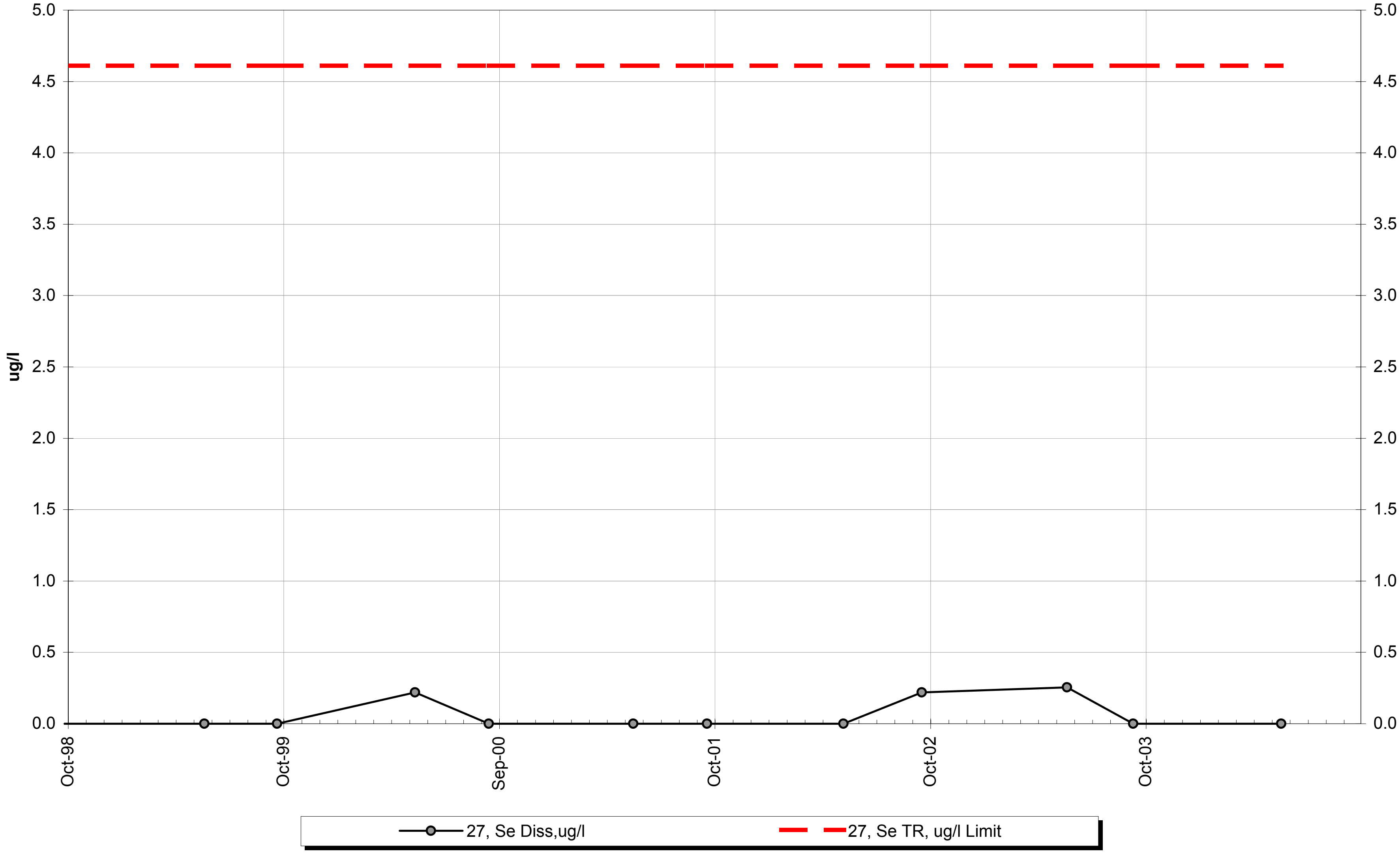


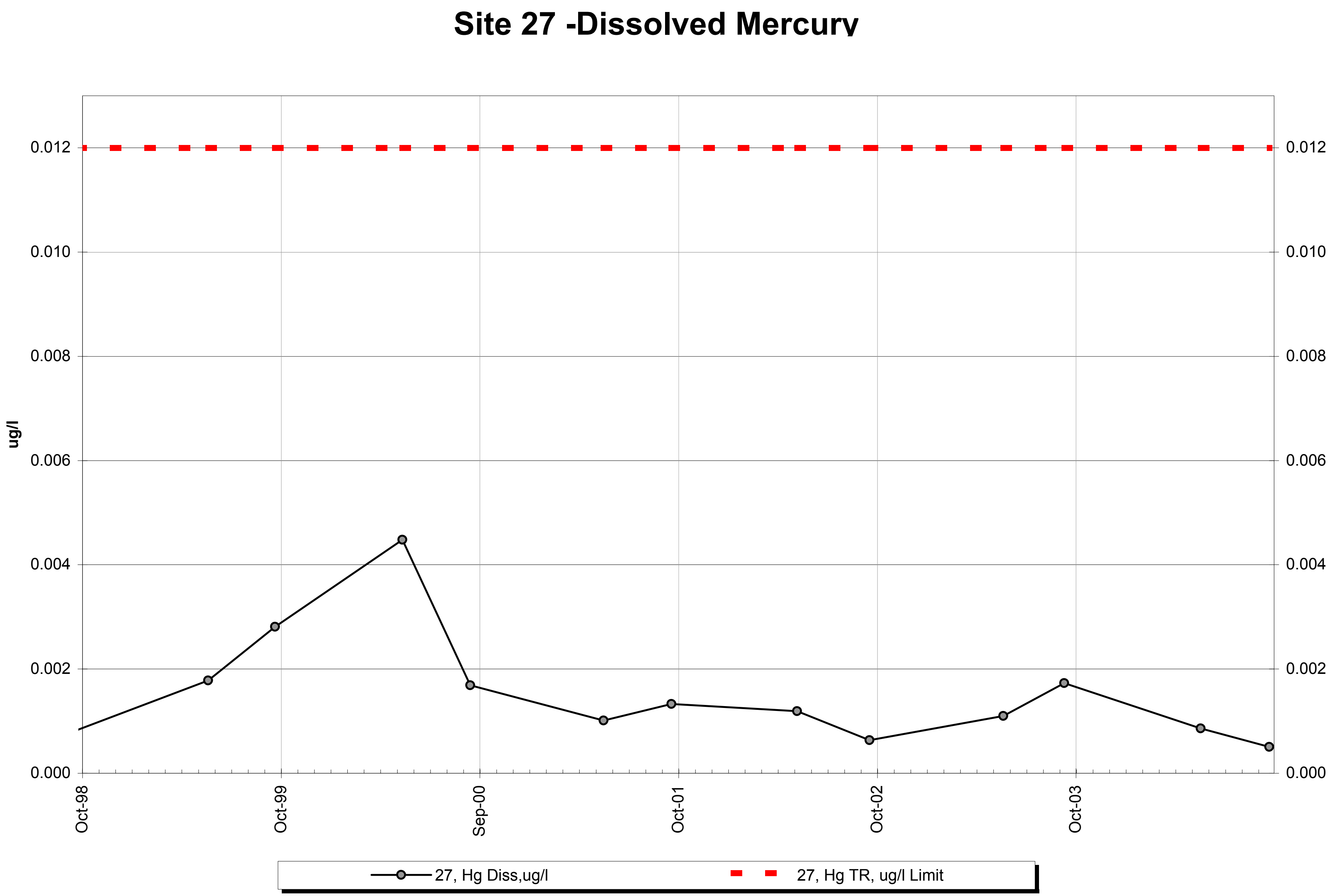
Site 27 -Dissolved Silver
ug/l
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
27, Ag Diss,ug/l
27, Ag Diss, ug/l Limit

Site 27 -Dissolved Zinc

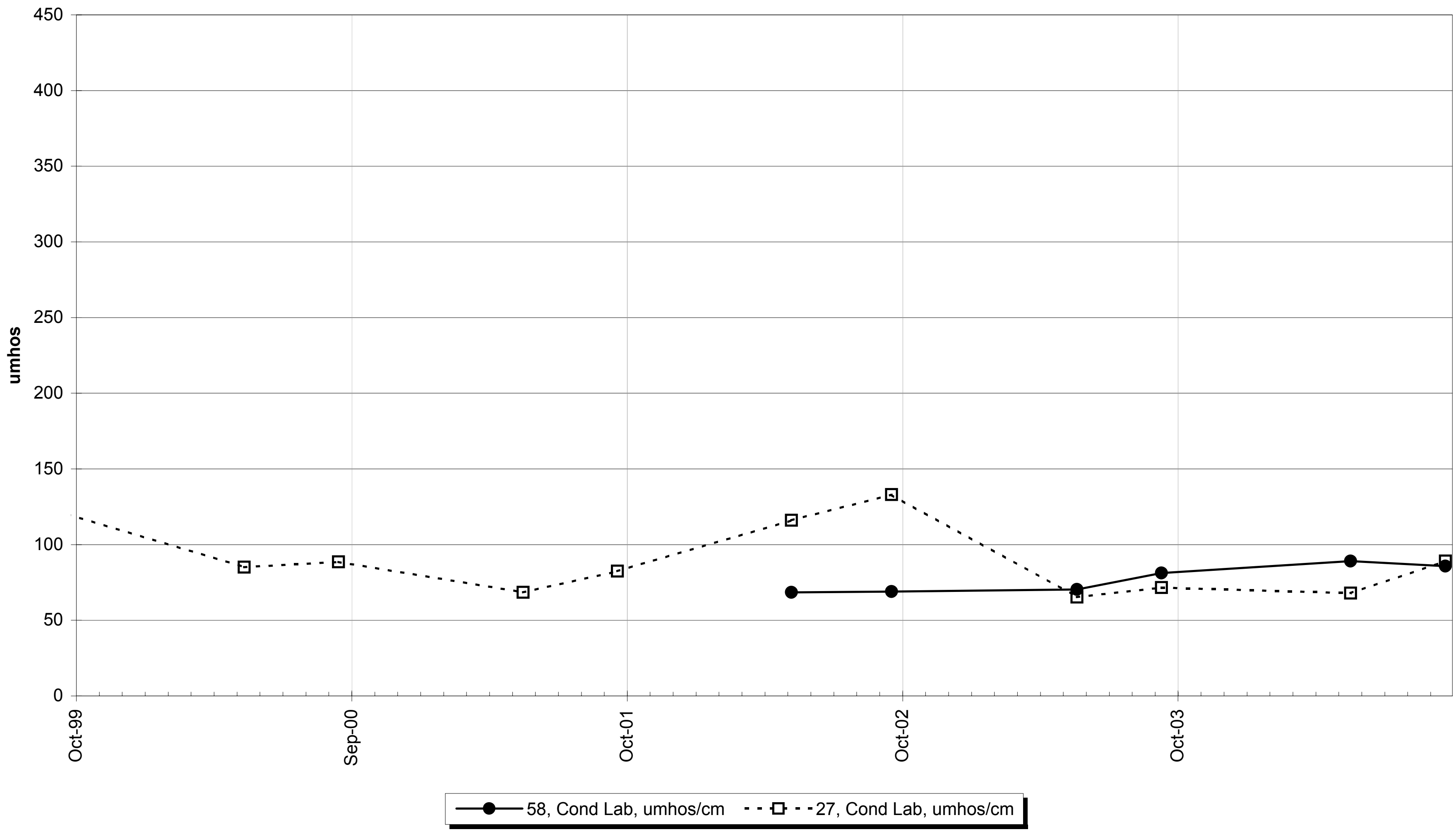


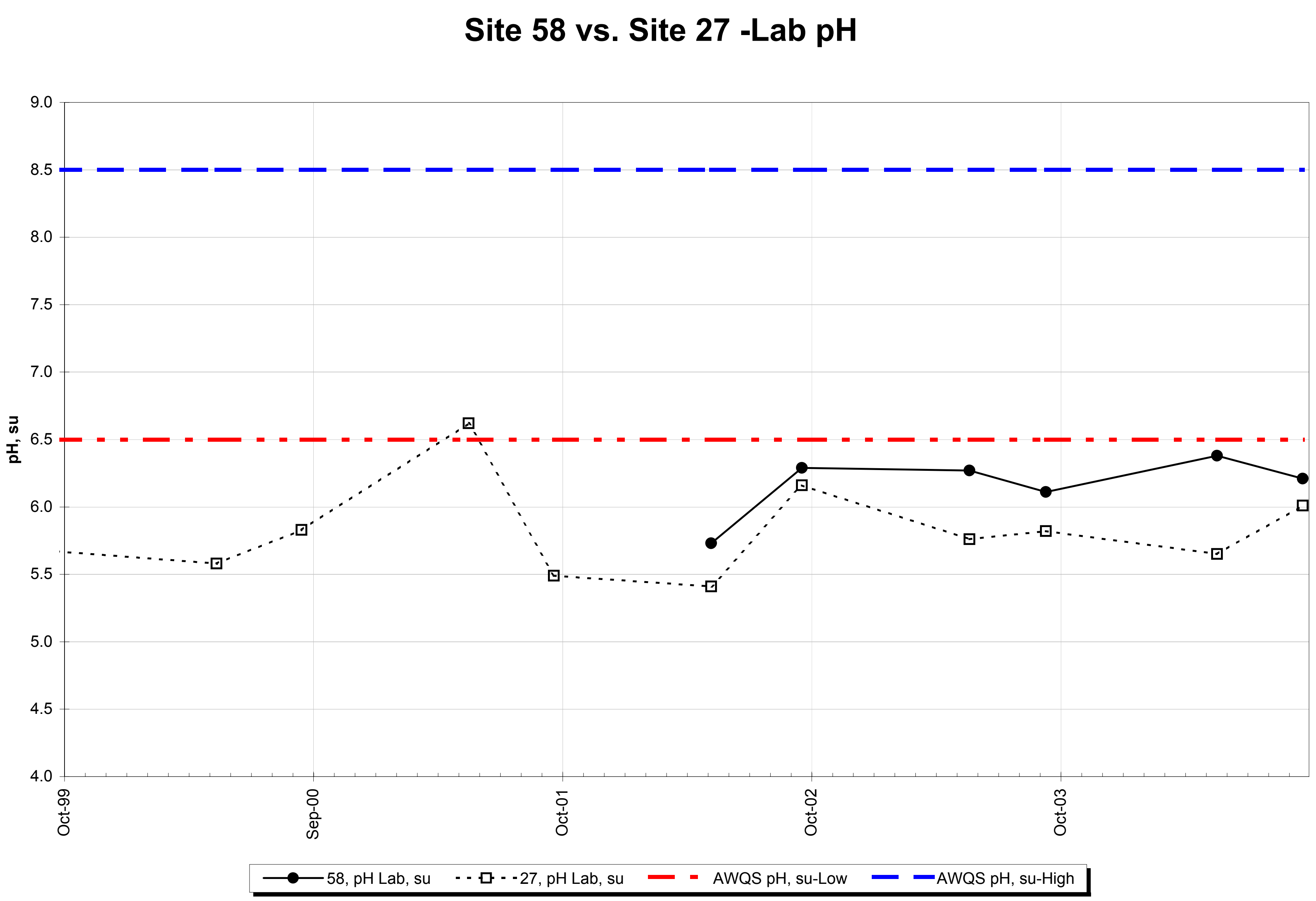
Site 27 -Dissolved Selenium




Site 27 -Dissolved Mercury
ug/l
0.000
0.002
0.004
0.006
0.008
0.010
0.012
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
27, Hg Diss,ug/l
27, Hg TR, ug/l Limit

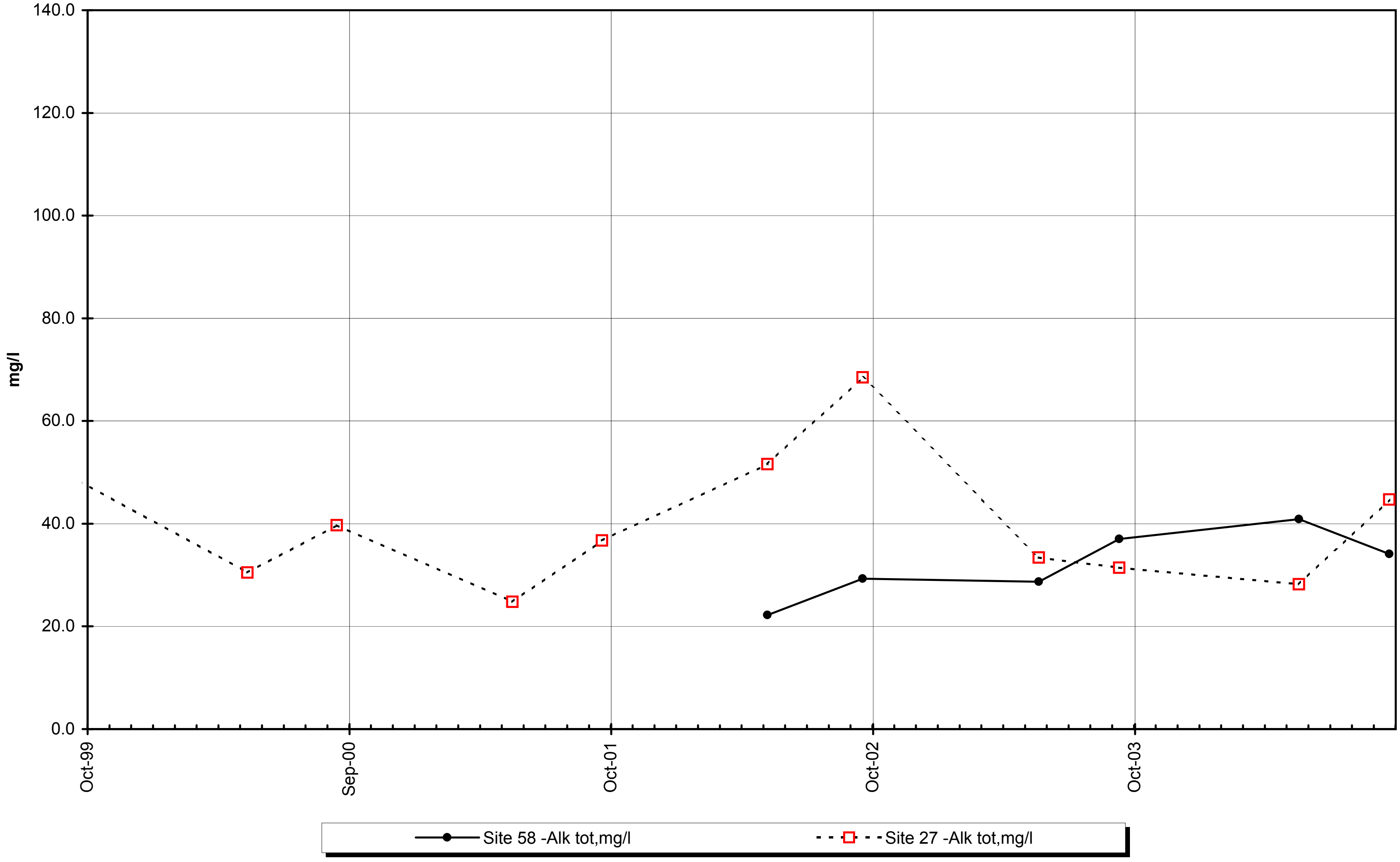
Site 58 vs Site 27 -Conductivity

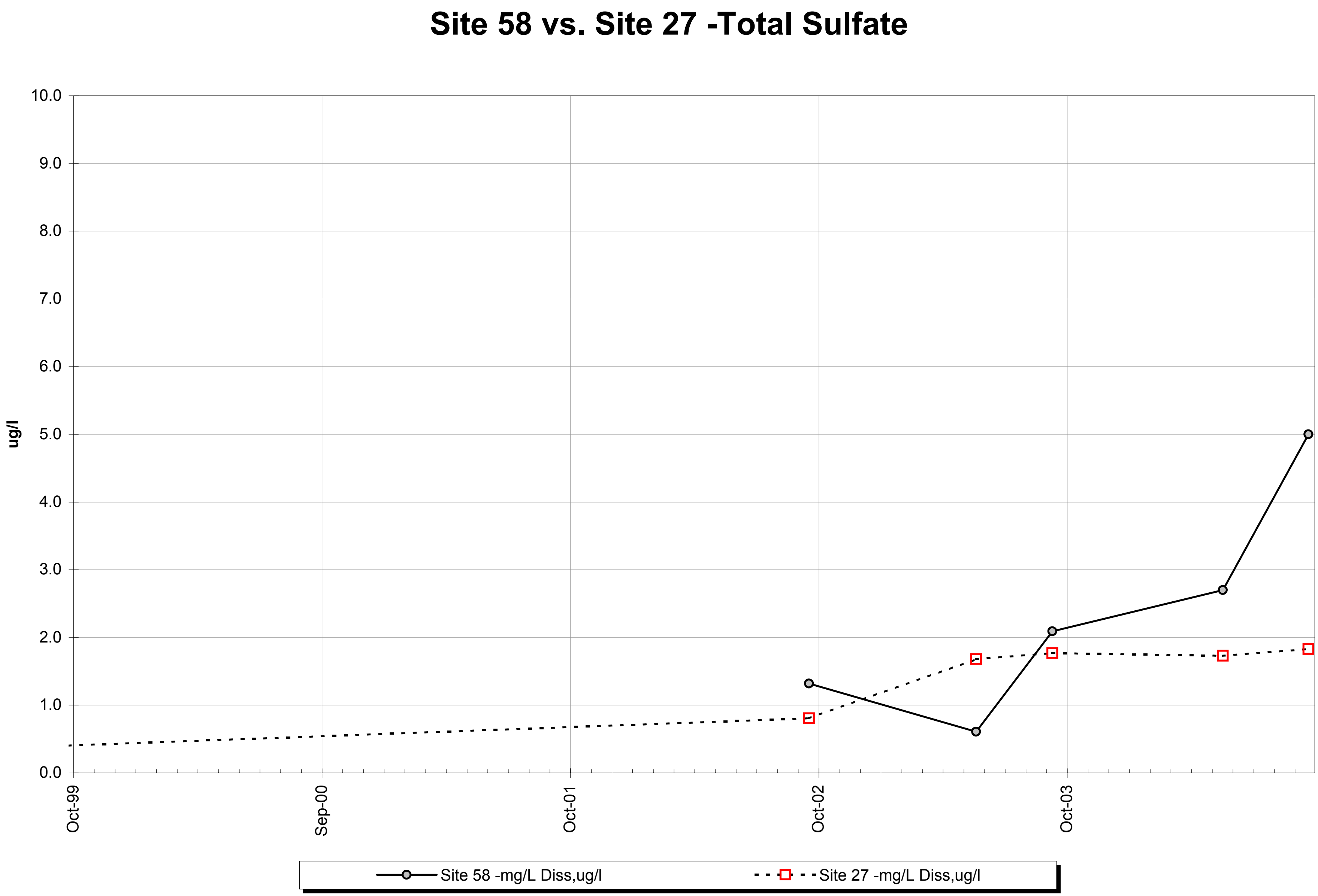




Site 58 vs. Site 27 -Lab pH
pH, su
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
58, pH Lab, su
27, pH Lab, su
AWQS pH, su-Low
AWQS pH, su-High

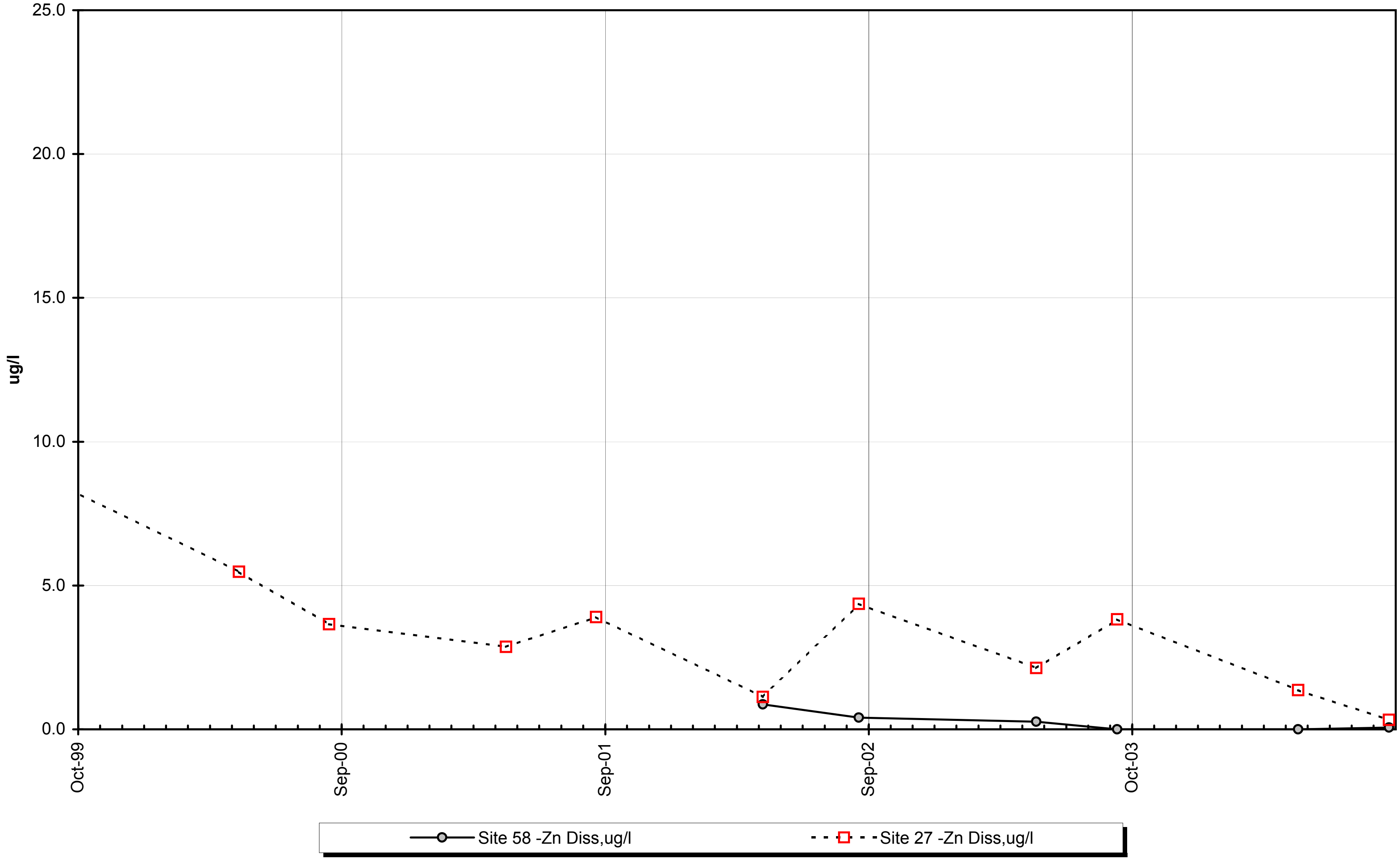
Site 58 vs. Site 27 -Total Alkalinity





Site 58 vs. Site 27 -Total Sulfate
ug/l
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
Site 58 -mg/L Diss,ug/l
Site 27 -mg/L Diss,ug/l

Site 58 vs. Site 27 -Dissolved Zinc



INTERPRETIVE REPORT
SITE 29 "MONITORING WELL 3S"

The data collected during the current water year are listed in the following "Table of Results for Water Year 2004" report. The table includes all the data, field and lab, collected for the current water year and a series of flags keyed to the summary report "Qualified Data by QA Reviewer". The QA report lists any associated data limitations found during the monthly QA reviews of laboratory data for this site. Median values for all analytes have been calculated and are shown in the right-most column of the table of results. Any value reported as less than MDL has been replaced with a value of zero for the purpose of median calculation.

All data collected at this site for the past five years are included in the data analyses. As shown in the table below, there were no data outliers.

Sample Date	Parameter	Value	Qualifier	Notes
No outliers have been identified by KGCMC for the period of Oct-99 though Sept-04.				

The data for Water Year 2004 have been compared to the strictest fresh water quality criterion for each applicable analyte. Four results exceeding these criteria have been identified, as listed in the table below. These data are for pH, both for lab and field. Values for lab and field pH from other wells completed into organic rich peat sediments similar to Site 29 have historically resulted in pH values ranging from 5 to 6 su (e.g. Sites 58, 27, and 32).

Sample Date	Parameter	Value	Standard	Standard Type
05/18/04	pH Lab, su	5.44	6.5 - 8.5	Aquatic Life
05/18/04	pH Field, su	5.50	6.5 - 8.5	Aquatic Life
09/21/04	pH Lab, su	5.56	6.5 - 8.5	Aquatic Life
09/21/04	pH Field, su	5.34	6.5 - 8.5	Aquatic Life

X-Y plots have been generated to graphically present the data for each of the analytes requested in the Statistical Information Goals for this site. These plots have been visually analyzed for the appearance of any trend in concentration. No obvious trends were apparent.

Additional X-Y plots have been generated for alkalinity, pH, conductance, sulfate, and dissolved zinc that co-plot data from Site 29 and Site 58, the up-gradient control site, to aid in the comparison between those two sites. Total alkalinity, lab conductivity and dissolved zinc are all higher at Site 29 than at Site 58. Lab pH is slightly lower at Site 29 than Site 58. These differences are similar to what was noted previously for Site 27 with respect to the comparison with Site 58. The hydrogeologic conditions that exist at Site 29 are similar to Site 27 with the exception that Site 29 is in the headwater region of Further Creek, which drains westward into Hawk Inlet, and is not typically in an active surface discharge zone. Nevertheless, the same reasons for the differences that occur between Site 58 and Site 27 should apply to Site 29 with respect to Site 58.

Table of Results for Water Year 2004

Site 29 "MW-3S"

Sample Date/Parameter	Oct-03	Nov-03	Dec-03	Jan-04	Feb-04	Mar-04	Apr-04	5/18/2004	Jun-04	Jul-04	Aug-04	9/21/2004	**Median**
Water Temp (°C)								7.3				7.9	7.6
Conductivity-Field(μmho)								122				97	110
Conductivity-Lab (μmho)								102				77	89
pH Lab (standard units)								5.44				5.56	5.50
pH Field (standard units)								5.50				5.34	5.42
Total Alkalinity (mg/L)								50.0				35.4	42.7
Total Sulfate (mg/L)								<0.1				<0.1	0.1
Hardness (mg/L)								42.4				36.2	39.3
Dissolved As (ug/L)								16.300		NOT SCHEDULED FOR SAMPLING		14.400	15.350
Dissolved Ba (ug/L)				NOT SCHEDULED FOR SAMPLING				15.5				14.1	14.8
Dissolved Cd (ug/L)								<0.023				<0.005	0.007
Dissolved Cr (ug/L)								6.070 J				2.450	4.260
Dissolved Cu (ug/L)								0.120 U				0.196	0.158
Dissolved Pb (ug/L)								0.3850				0.2560	0.3205
Dissolved Ni (ug/L)								1.520 J				1.740	1.630
Dissolved Ag (ug/L)								<0.009 UJ				0.006	0.005
Dissolved Zn (ug/L)								2.76 UJ				2.38	2.57
Dissolved Se (ug/L)								<0.496 UJ				0.109	0.179
Dissolved Hg (ug/L)								0.007670				0.000646	0.004158

For individual sample/analyte qualifier descriptions see "Qualified Data by QA Reviewer" table.

Values reported as less than MDL are replaced by 1/2 MDL for median calculation purposes.

Shaded data has been qualified as an outlier by KGCMC and removed from any further analysis and is not included into the calculation of the median

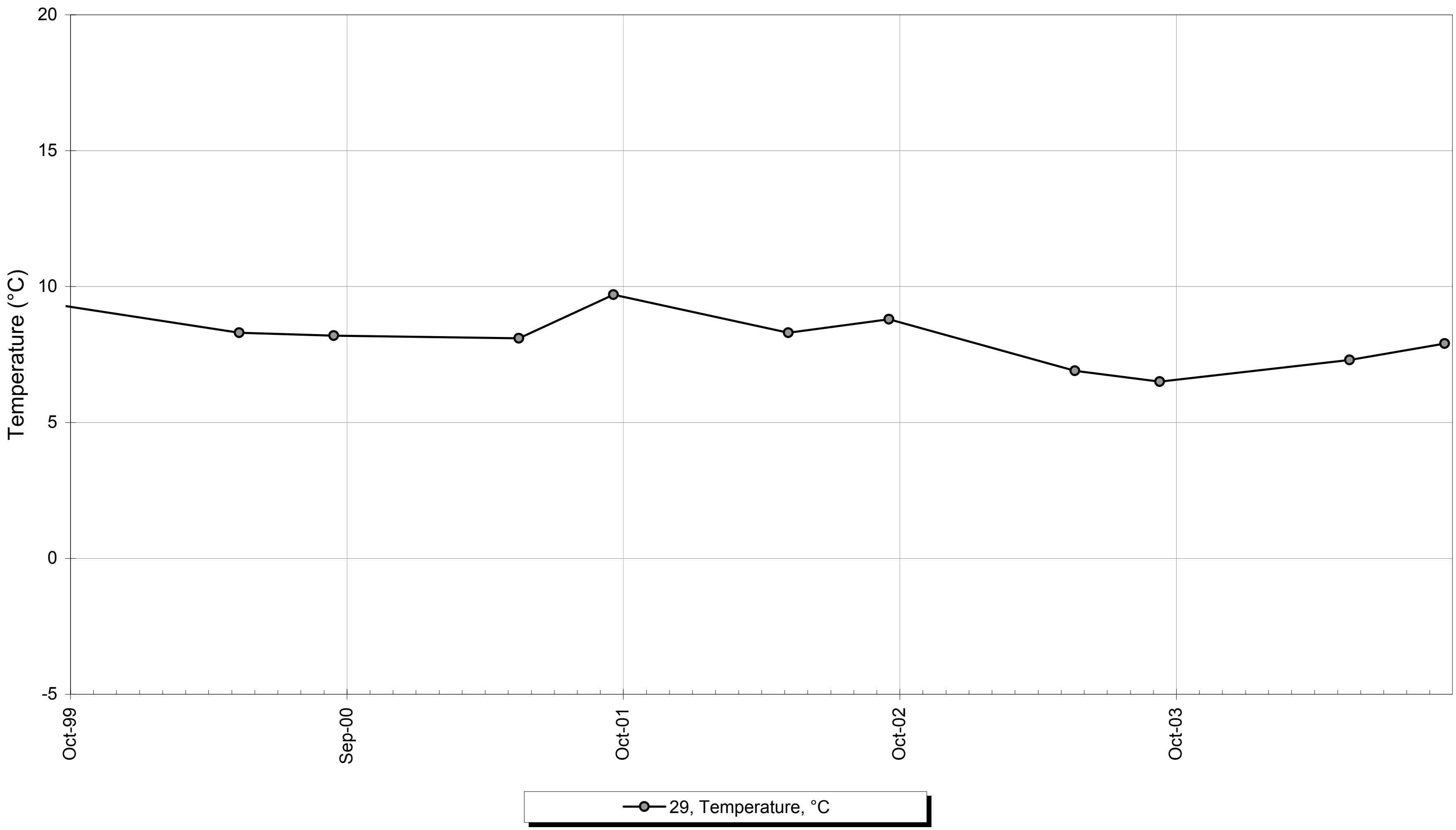
Qualified Data by QA Reviewer

Date Range: 10/01/2003 to 09/30/2004

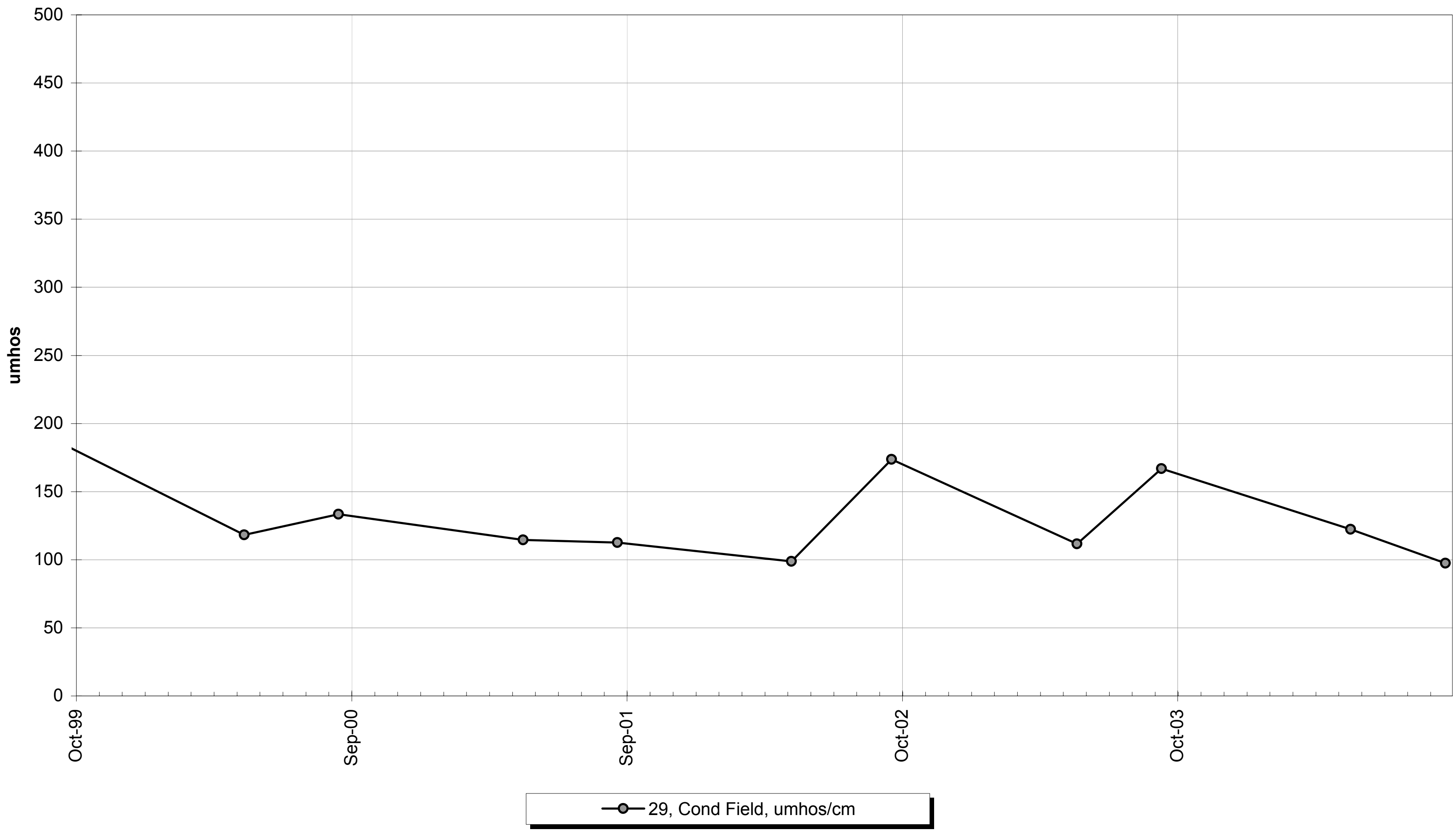
Site No.	Sample Date	Sample Time	Parameter	Value	Qualifier	Reason for Qualifier
29	05/18/2004	11:55:00 AM				
			Cr Diss, ug/l	6.07	J	CCV Recovery
			Cu Diss, ug/l	0.12	U	Field Blank Contamination
			Ni Diss, ug/l	1.52	J	CCV Recovery
			Ag Diss, ug/l	-0.009	UJ	MS Recovery
			Zn Diss, ug/l	2.76	UJ	LCS Recovery, Field Blank C
			Se Diss, ug/l	-0.496	UJ	LCS Recovery

Qualifier	Description
J	Positively Identified - Approximate Concentration
N	Presumptive Evidence For Tentative Identification
NJ	Tentatively Identified - Approximate Concentration
R	Rejected - Cannot Be Verified
U	Not Detected Above Quantitation Limit
UJ	Not Detected Above Approximate Quantitation Limit

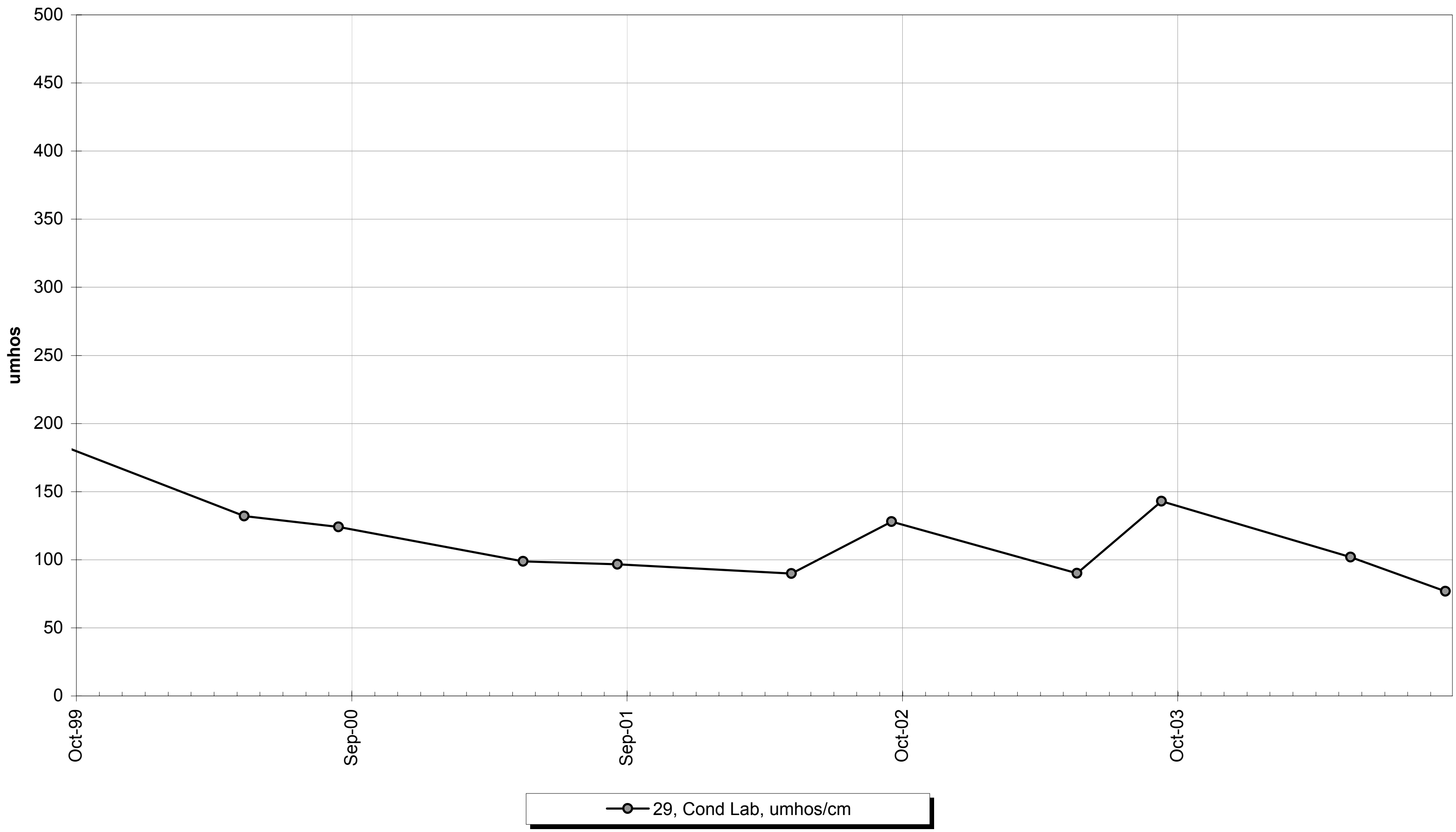
Site 29 -Water Temperature

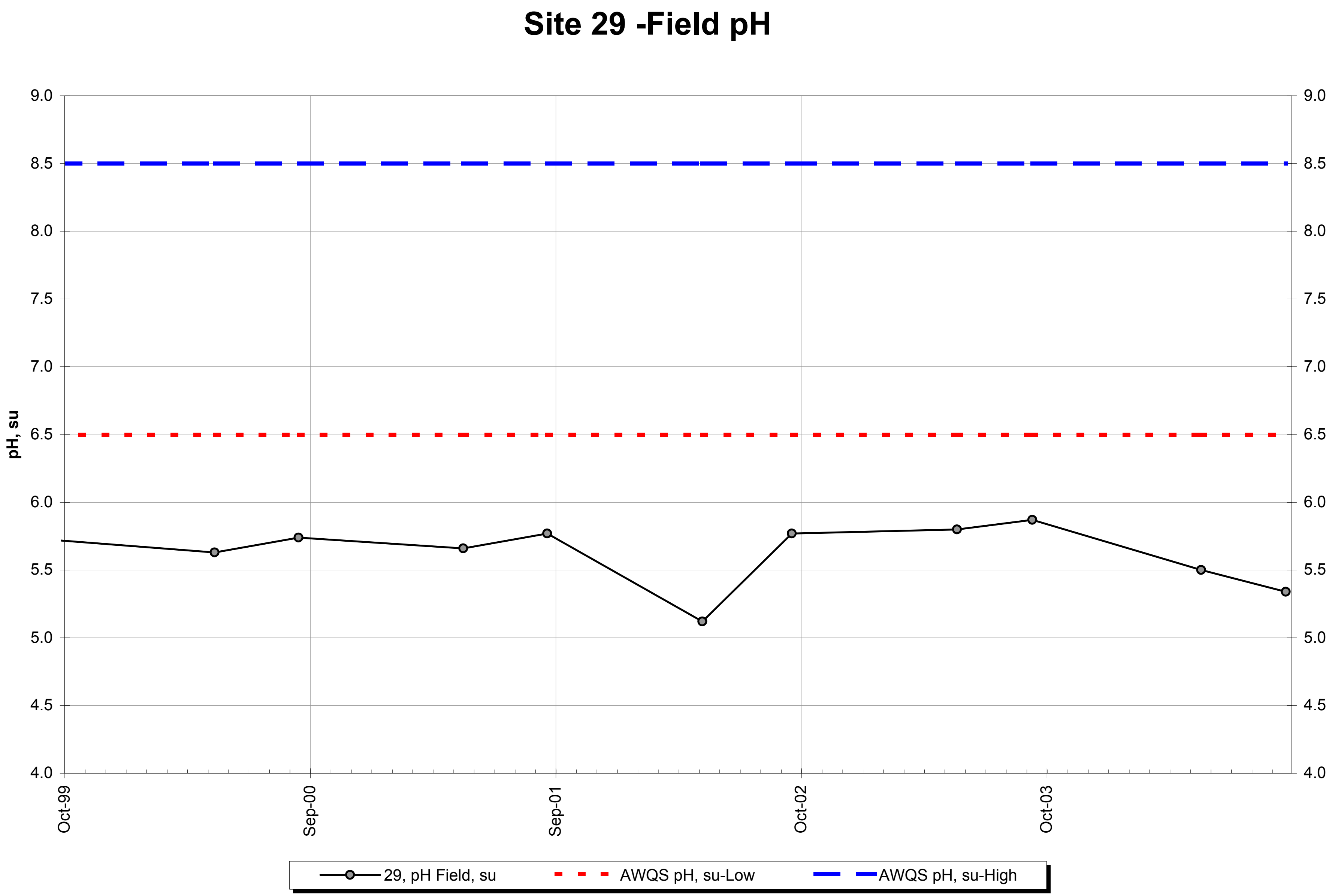


Site 29 -Conductivity-Field

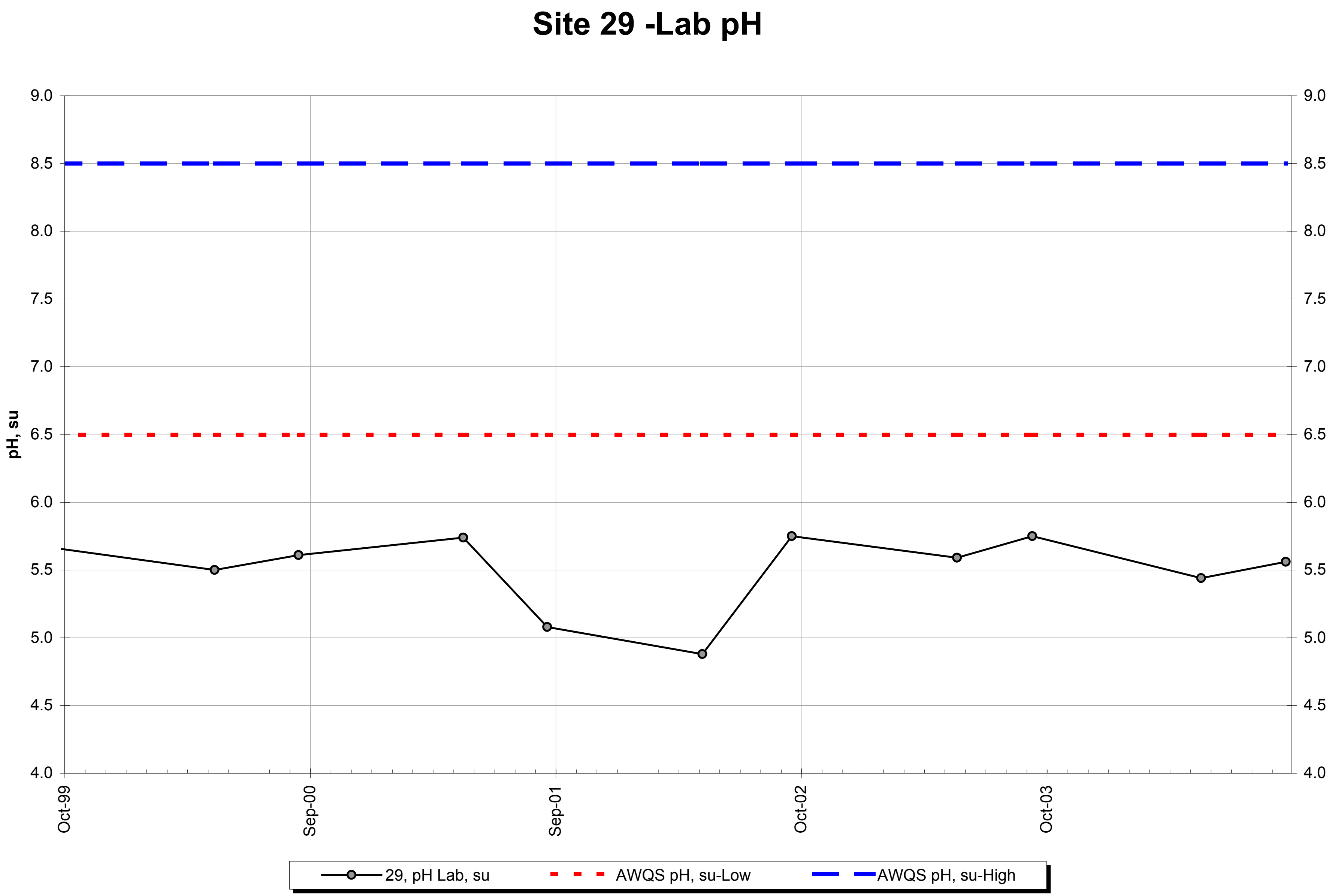


Site 29 -Conductivity-Lab



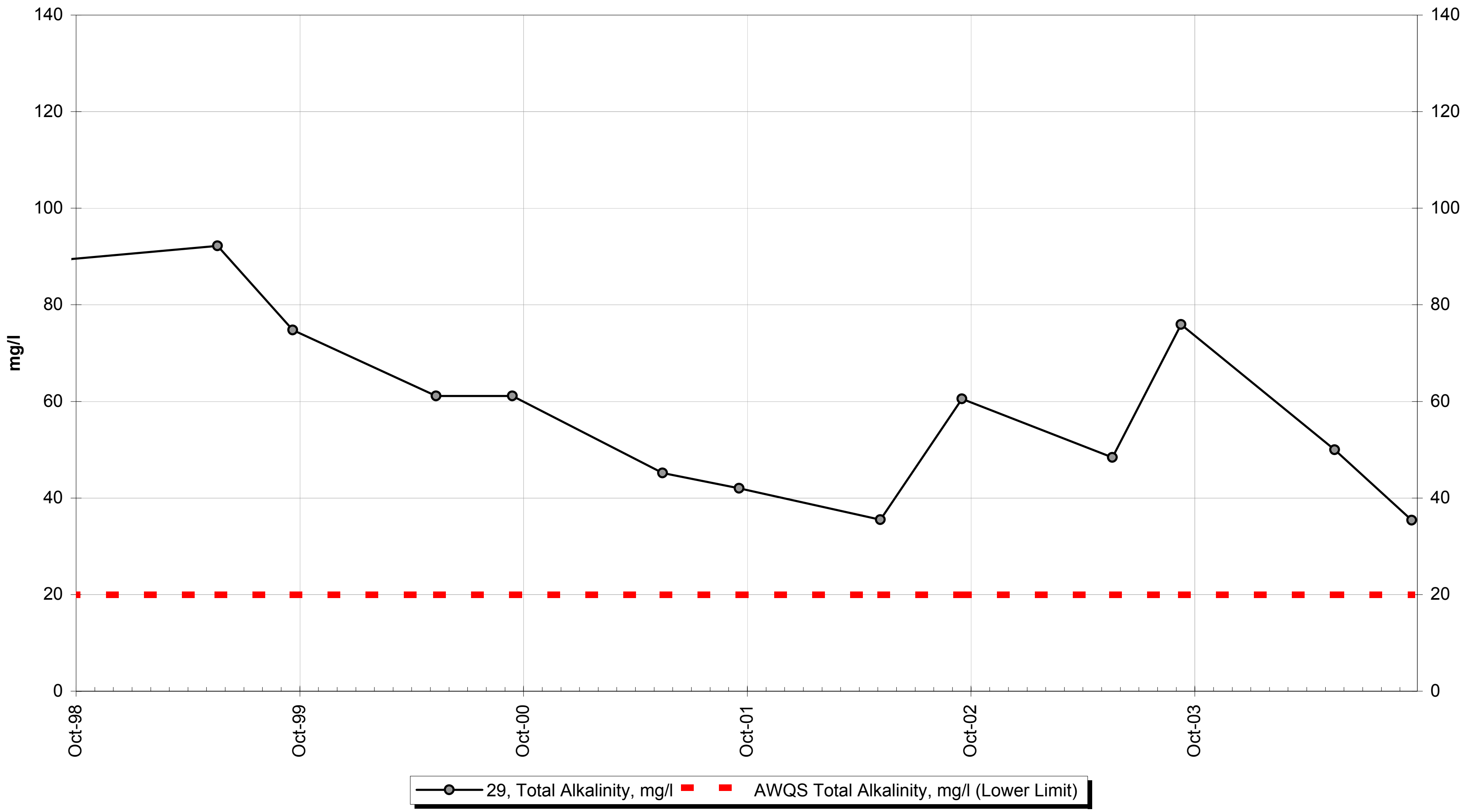


Site 29 -Field pH
pH, su
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
29, pH Field, su
AWQS pH, su-Low
AWQS pH, su-High

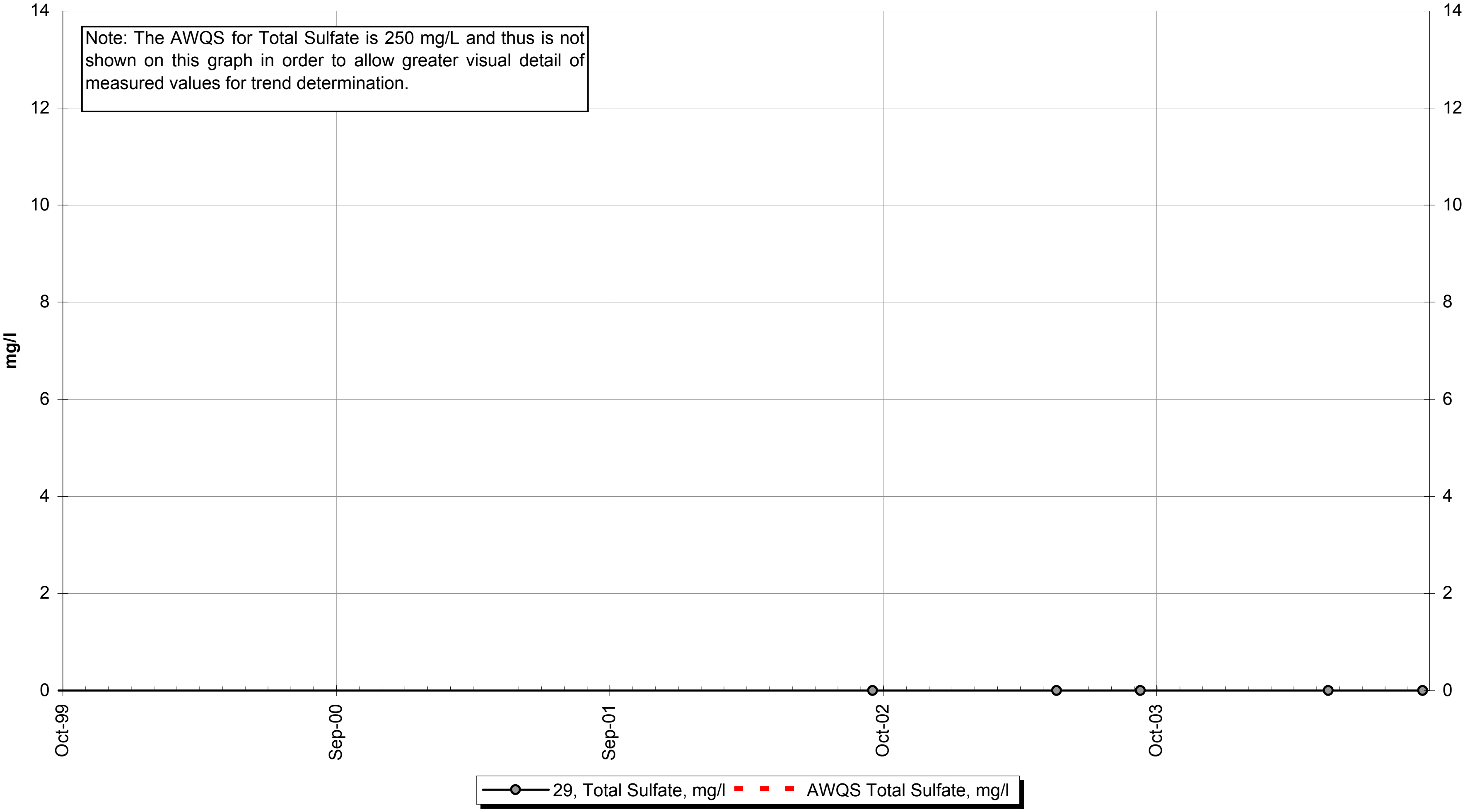


Site 29 -Lab pH
pH, su
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
29, pH Lab, su
AWQS pH, su-Low
AWQS pH, su-High

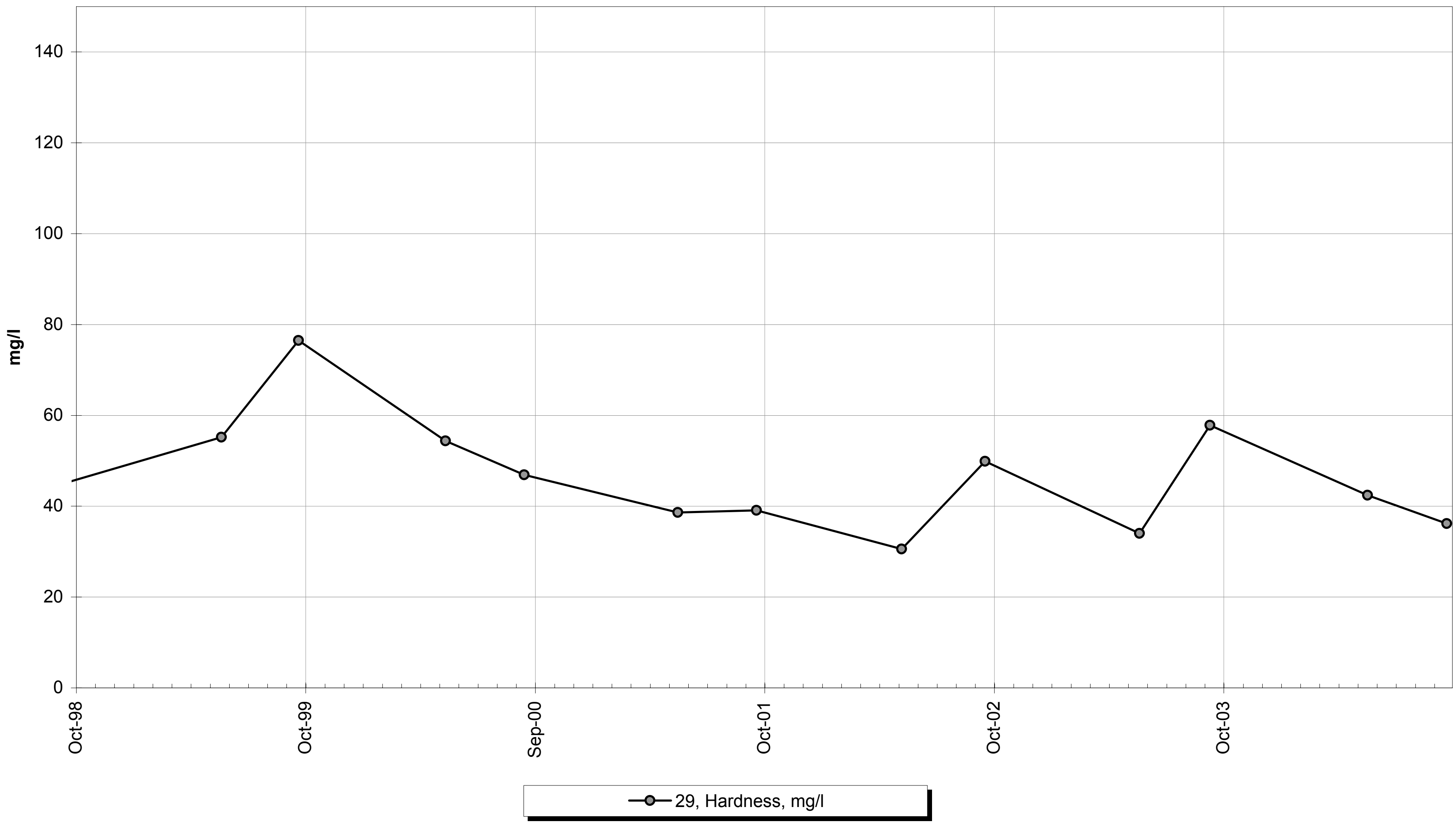
Site 29 -Total Alkalinity

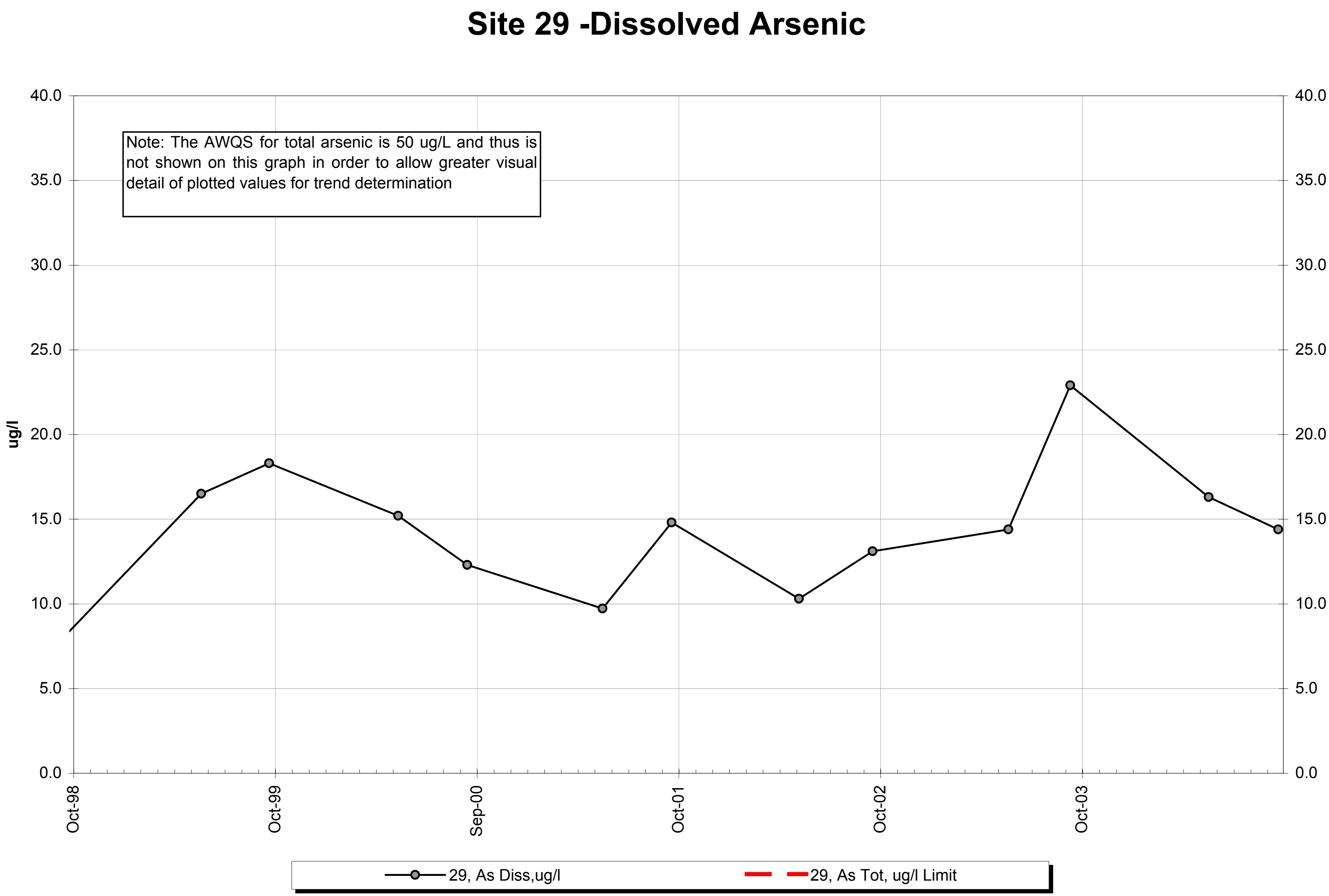


Site 29 -Total Sulfate



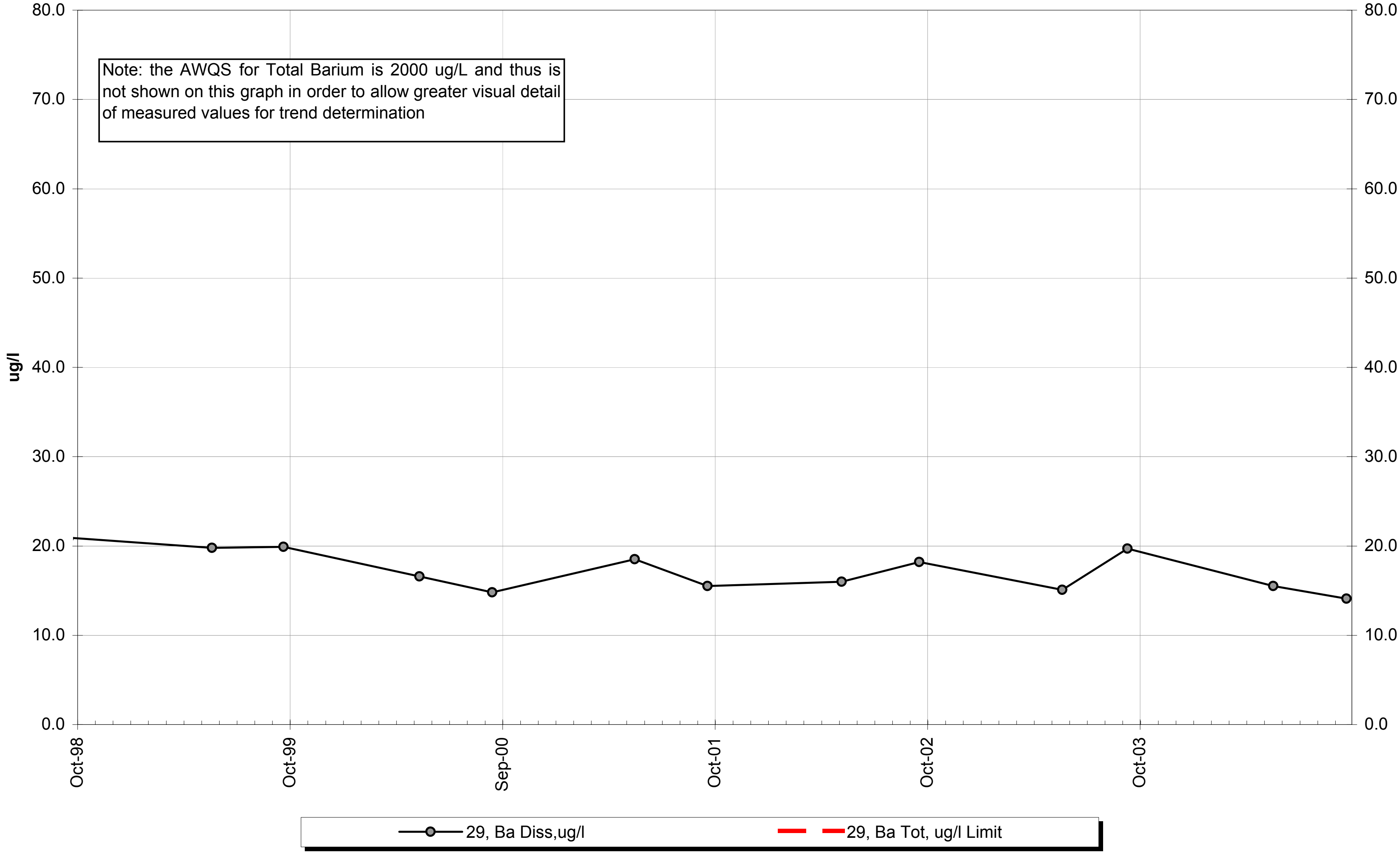
Site 29 -Hardness

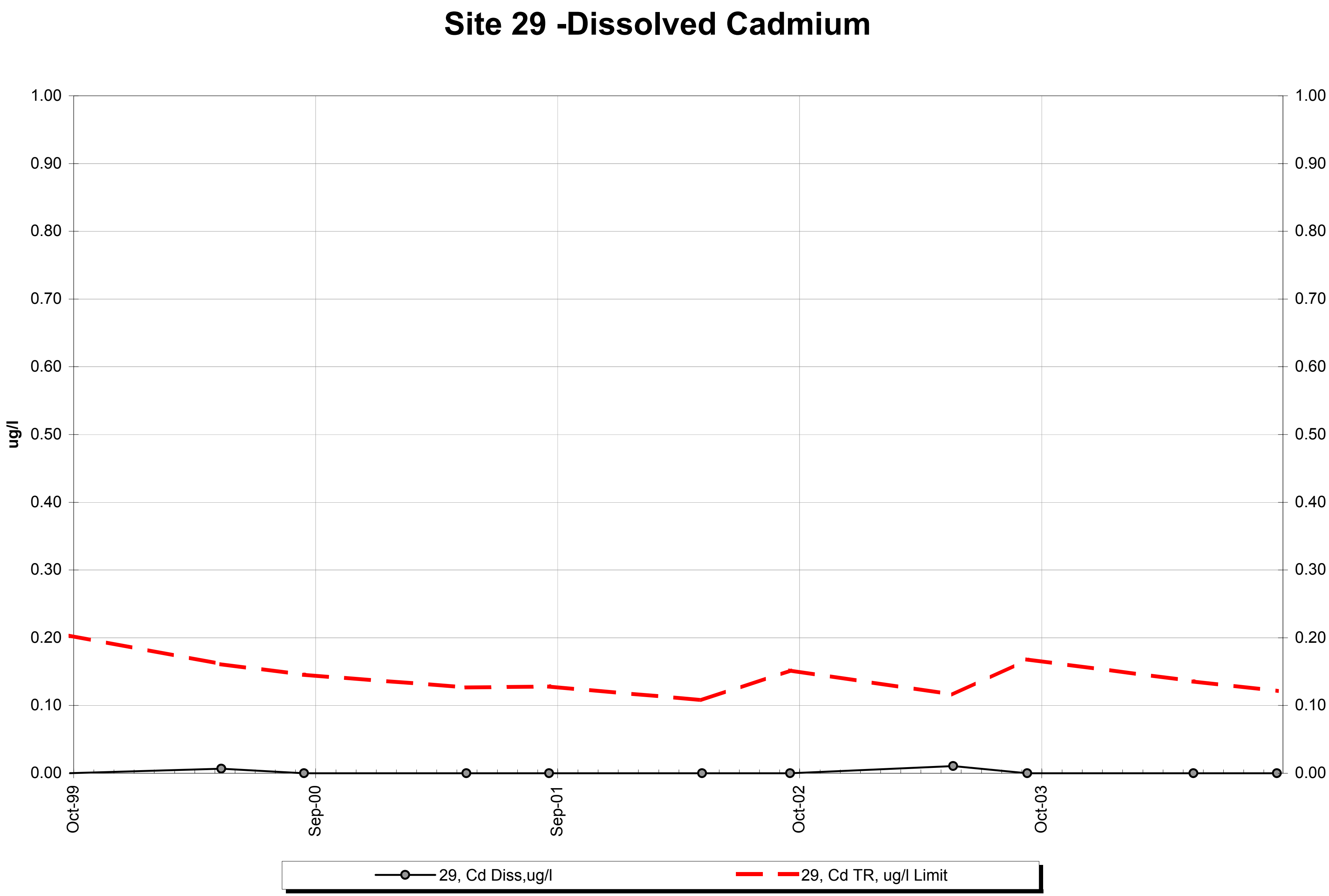




Site 29 -Dissolved Arsenic
Note: The AWQS for total arsenic is 50 ug/L and thus is not shown on this graph in order to allow greater visual detail of plotted values for trend determination
ug/l
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
29, As Diss,ug/l
29, As Tot, ug/l Limit

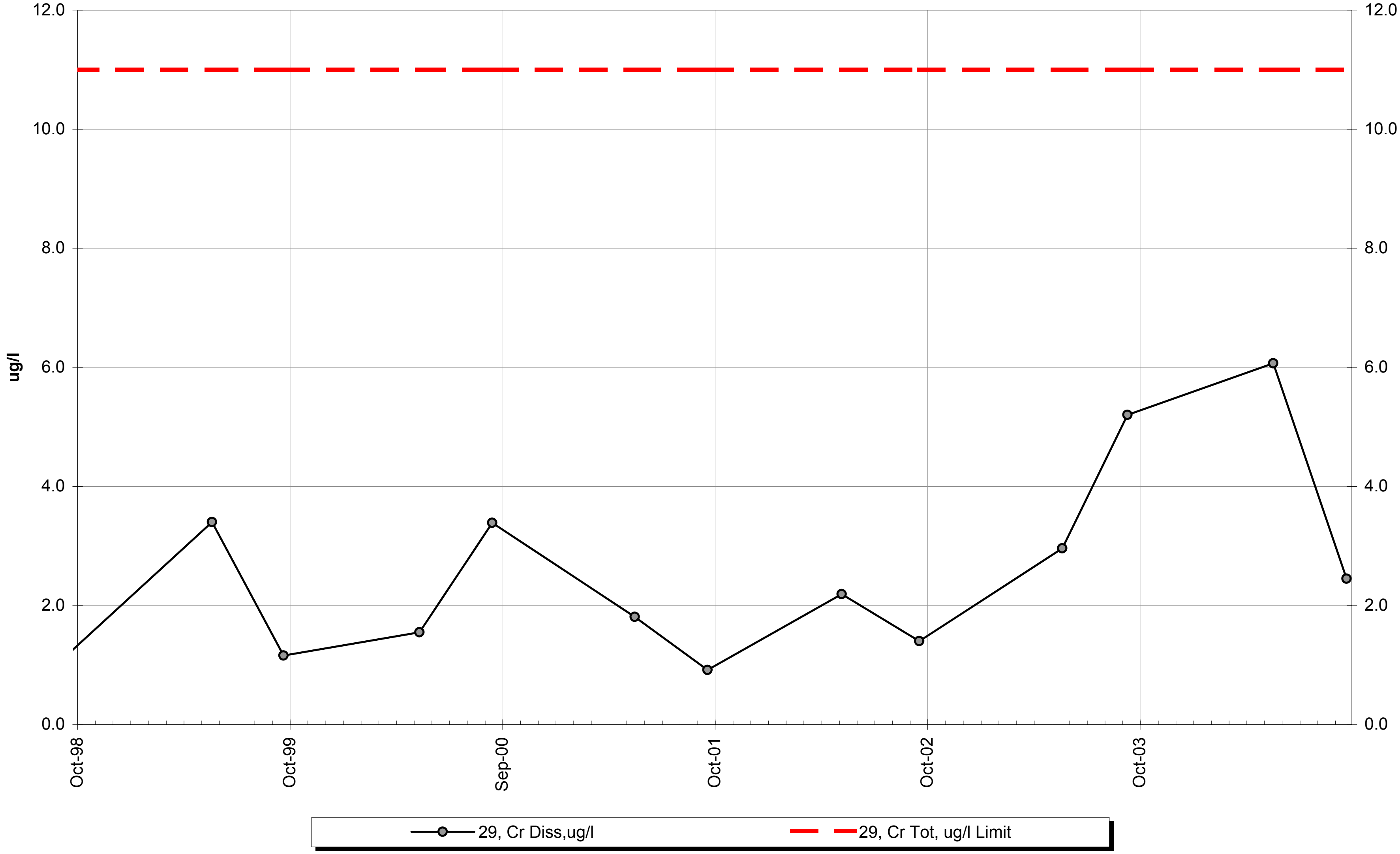
Site 29 -Dissolved Barium



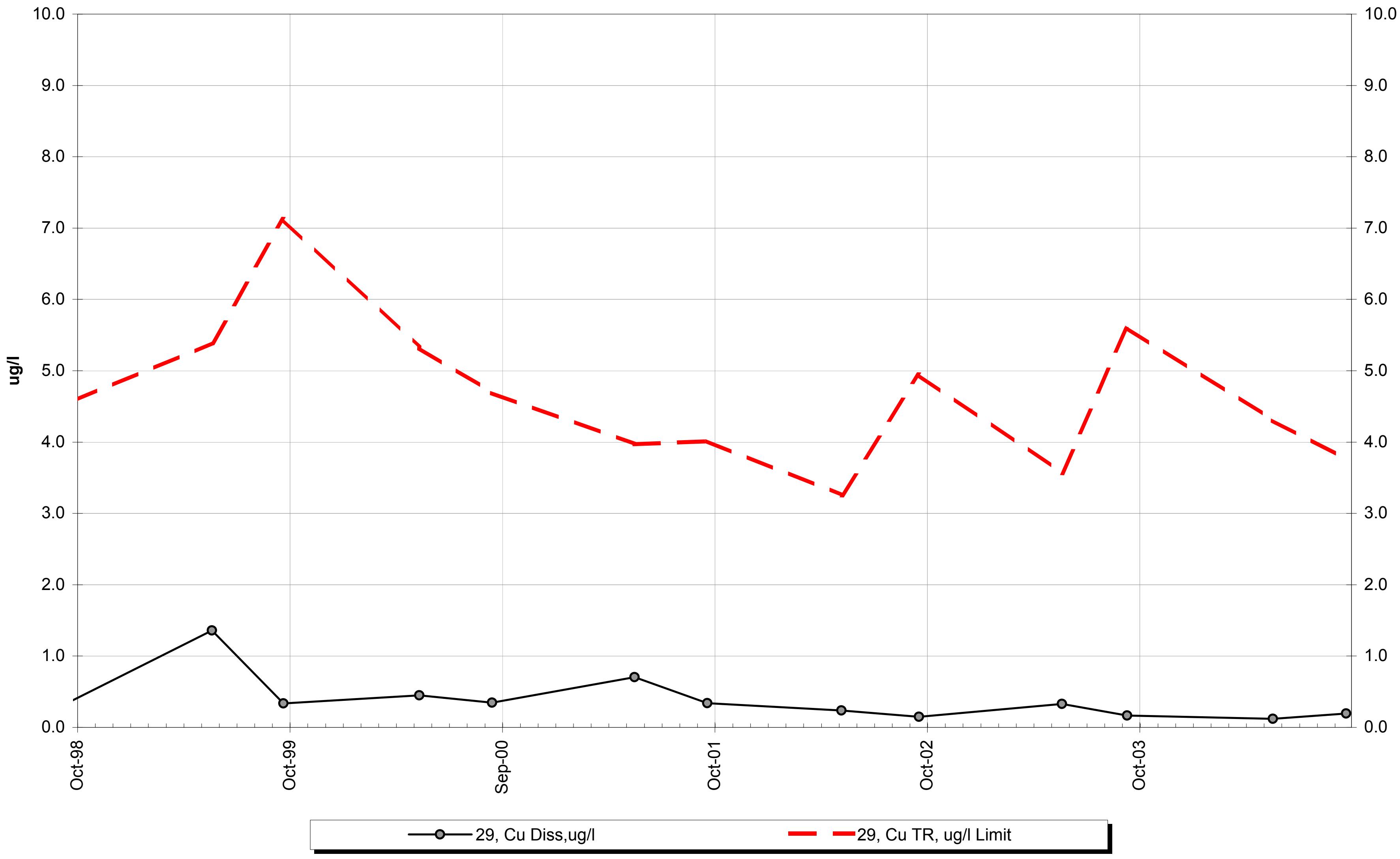


Site 29 -Dissolved Cadmium
ug/l
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
29, Cd Diss,ug/l
29, Cd TR, ug/l Limit

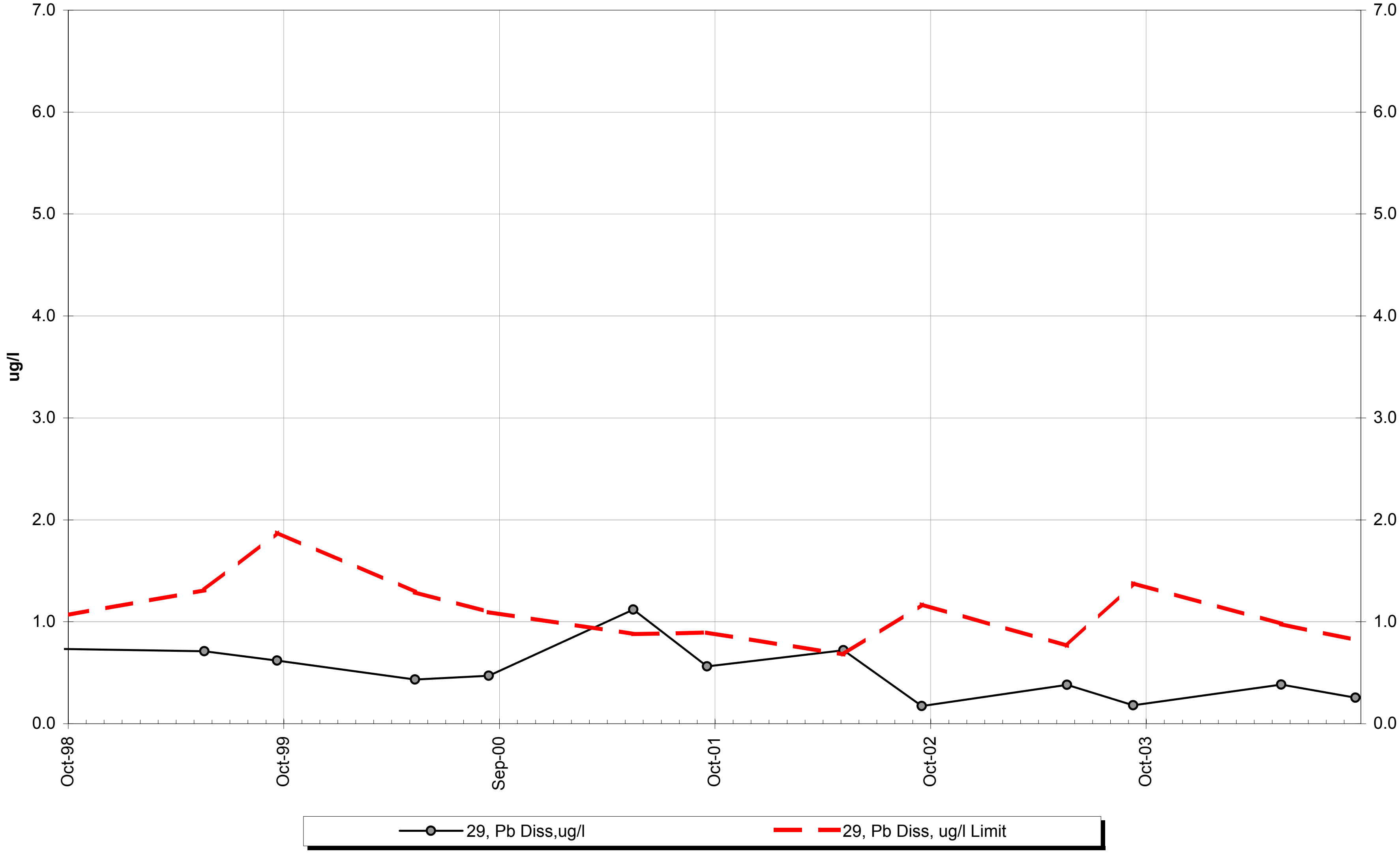
Site 29 -Dissolved Chromium



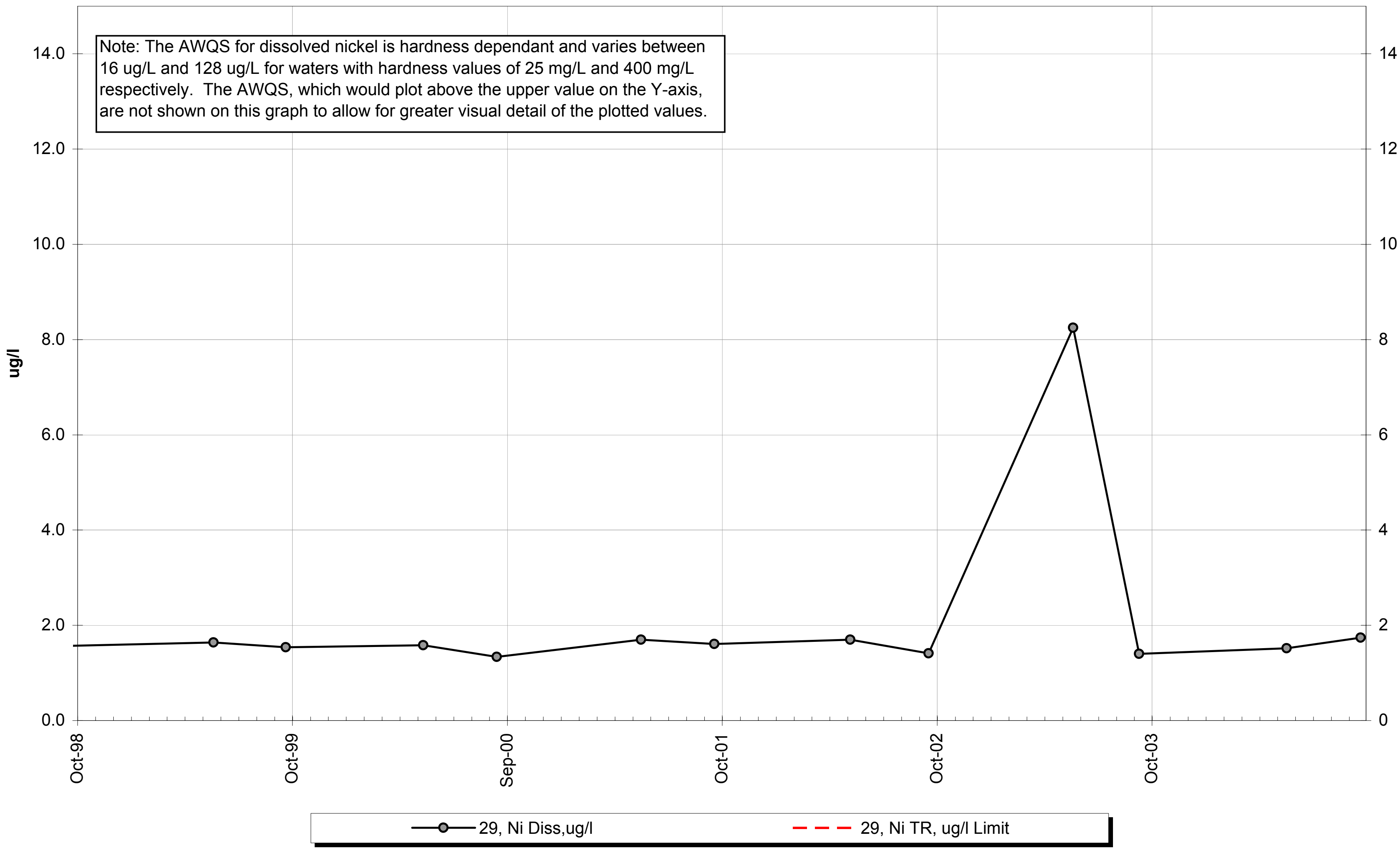
Site 29 -Dissolved Copper

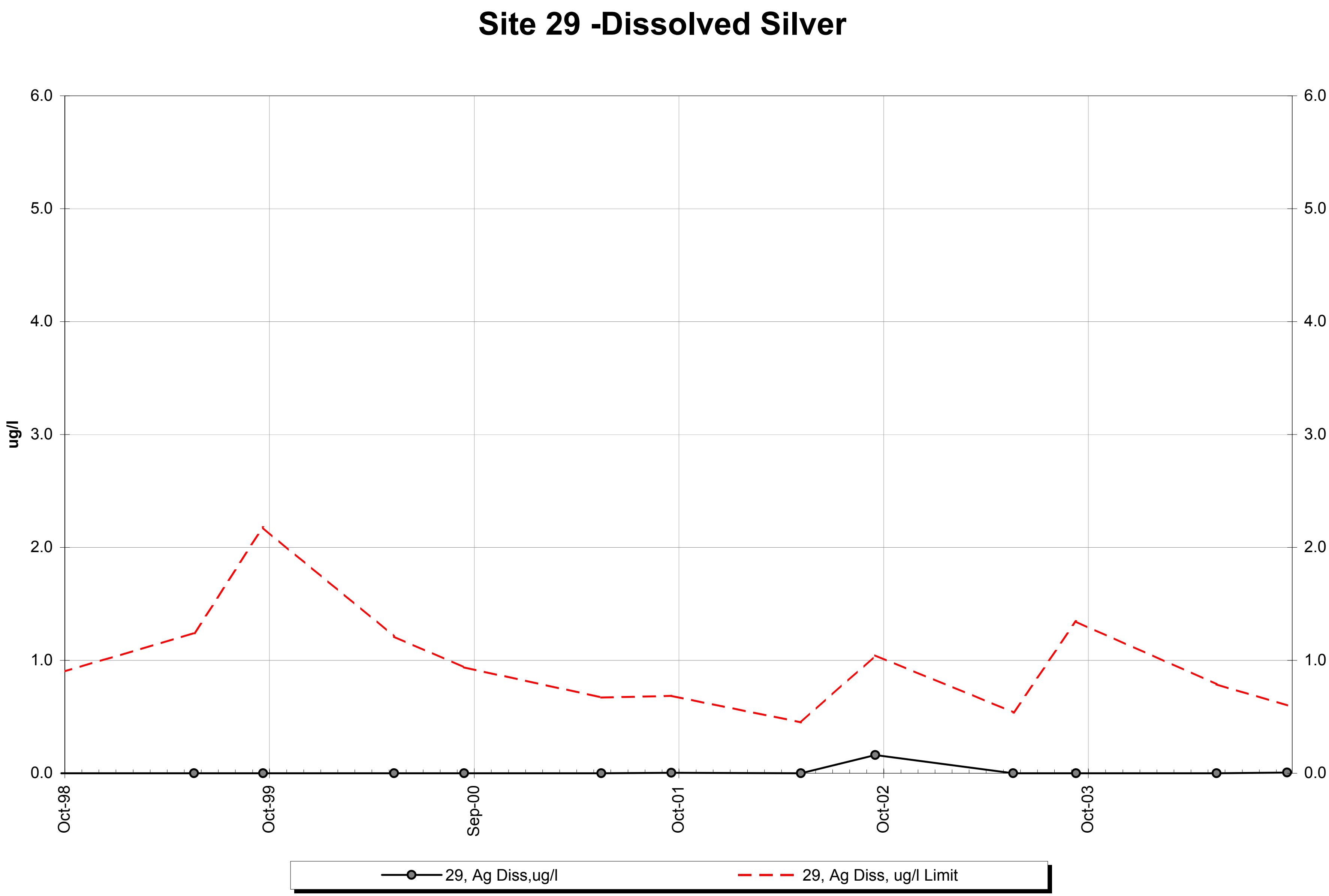


Site 29 -Dissolved Lead



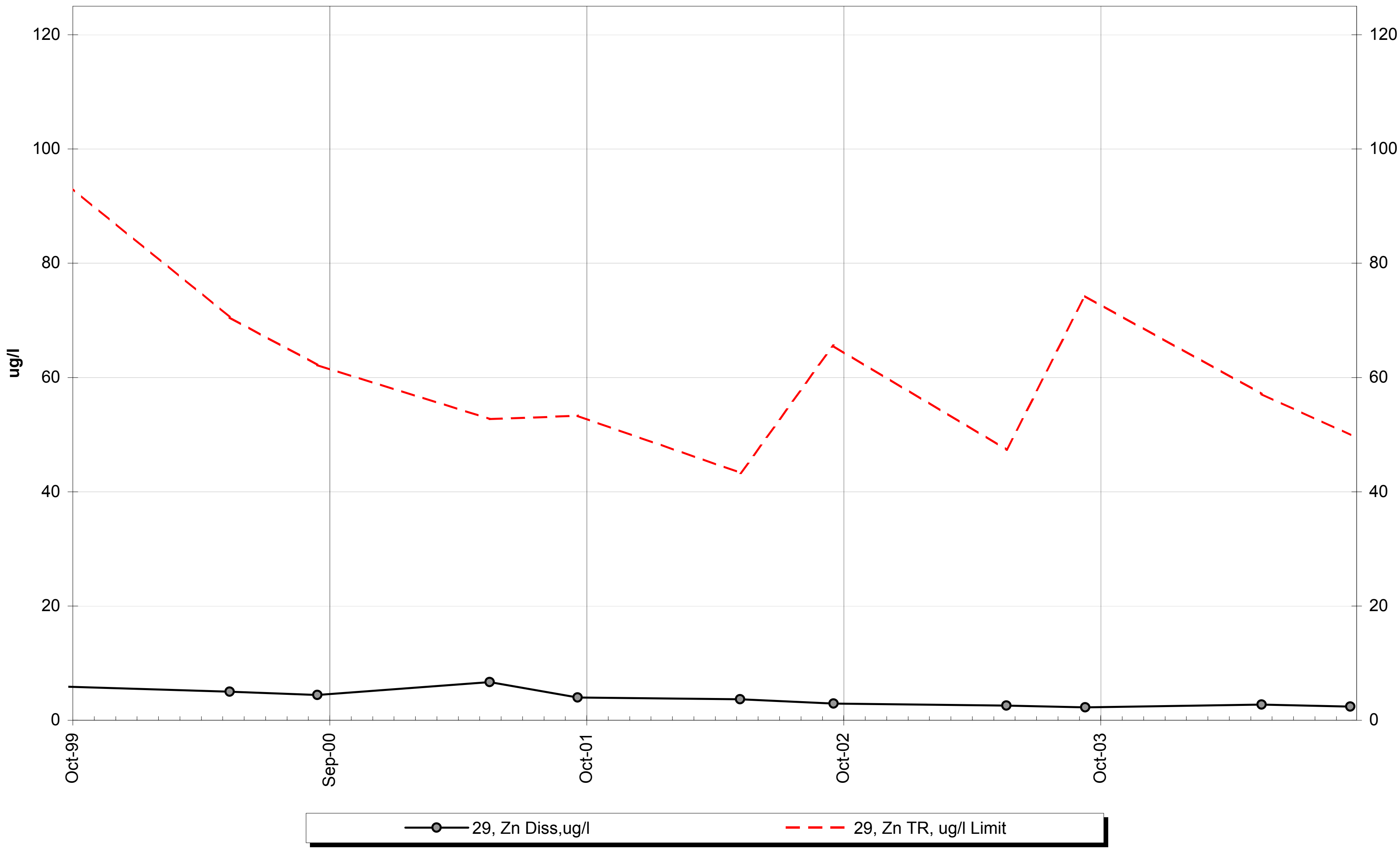
Site 29 -Dissolved Nickel

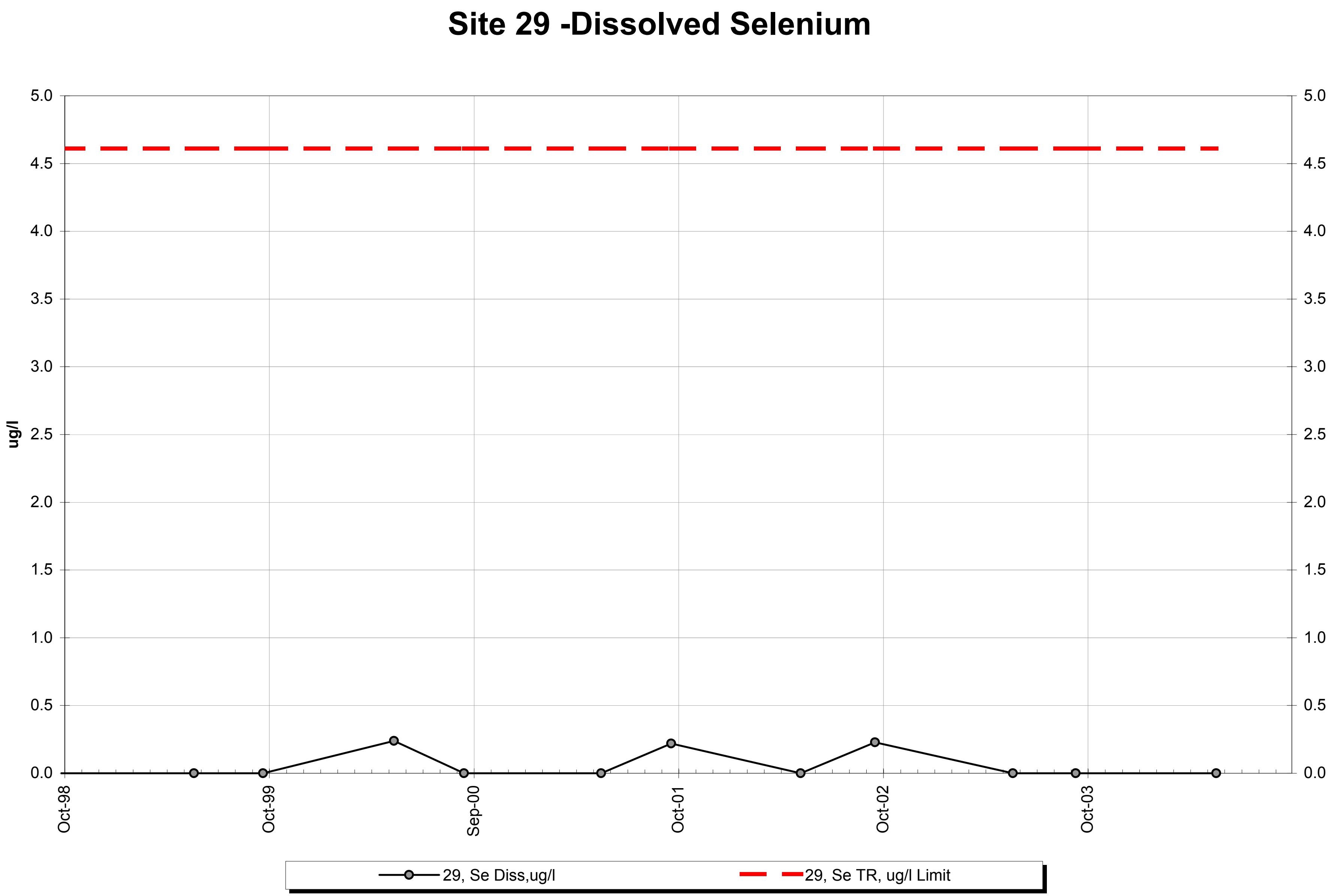




Site 29 -Dissolved Silver
ug/l
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
29, Ag Diss,ug/l
29, Ag Diss, ug/l Limit

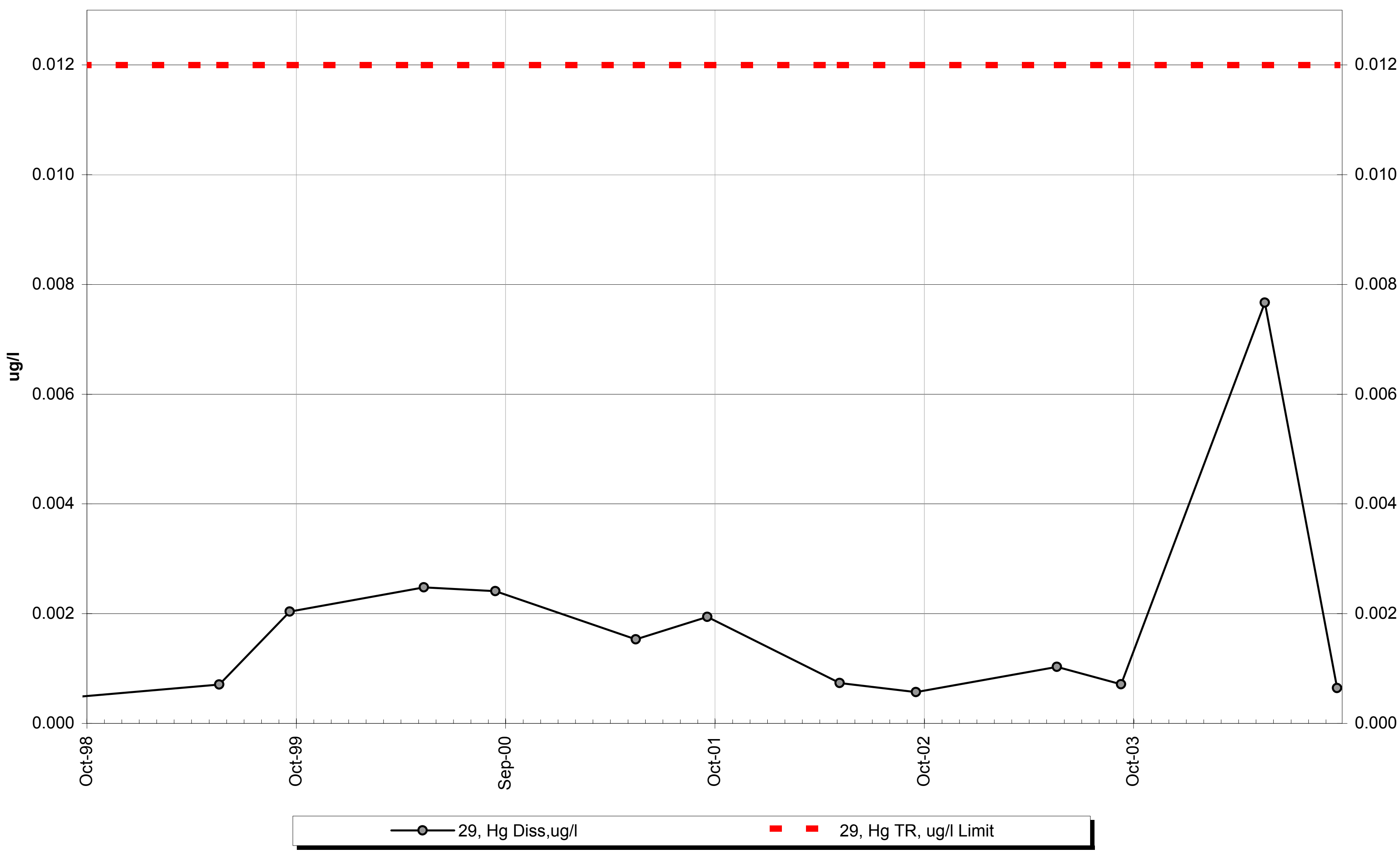
Site 29 -Dissolved Zinc



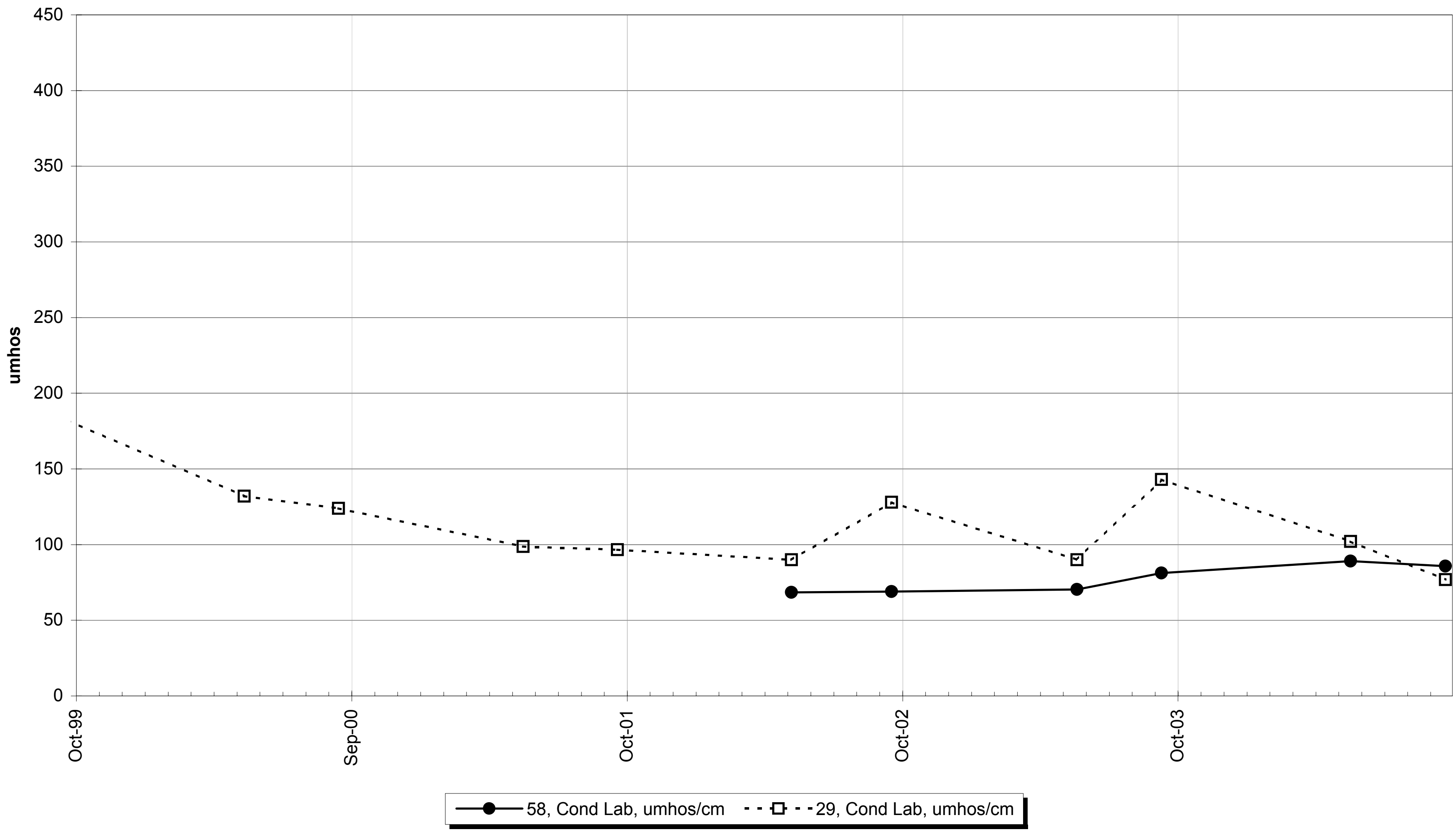


Site 29 -Dissolved Selenium
ug/l
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
29, Se Diss,ug/l
29, Se TR, ug/l Limit

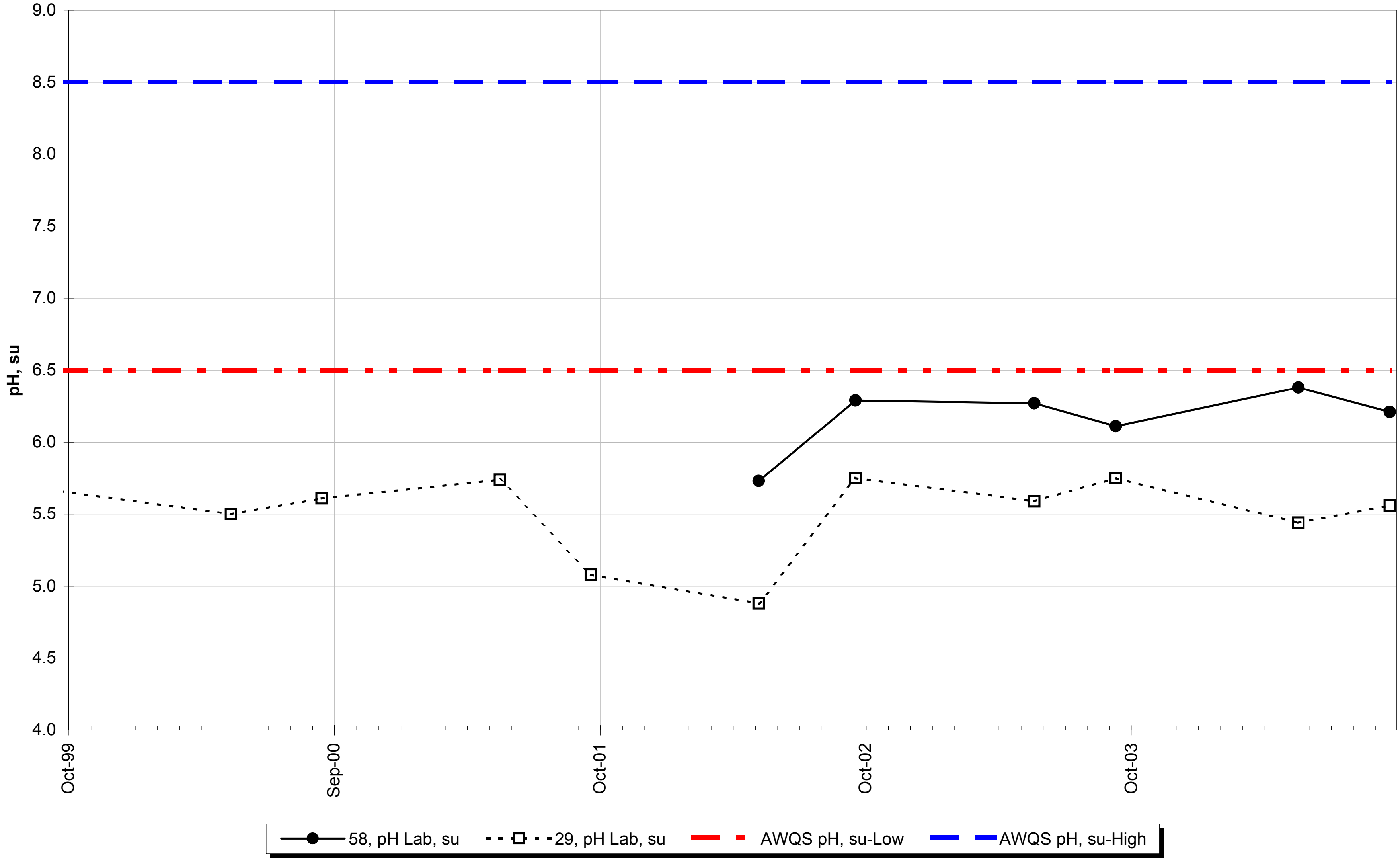
Site 29 -Dissolved Mercury



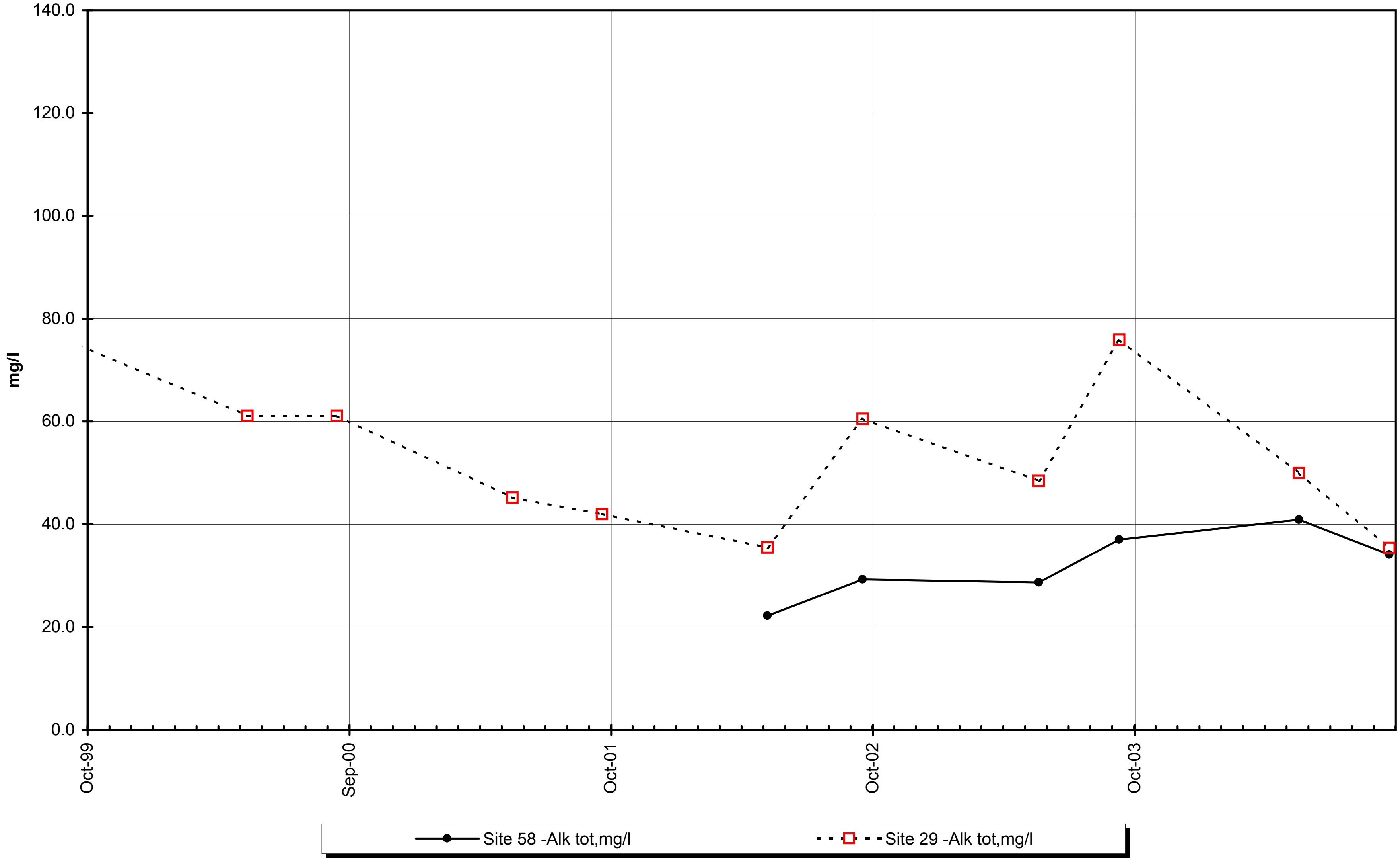
Site 58 vs Site 29 -Conductivity

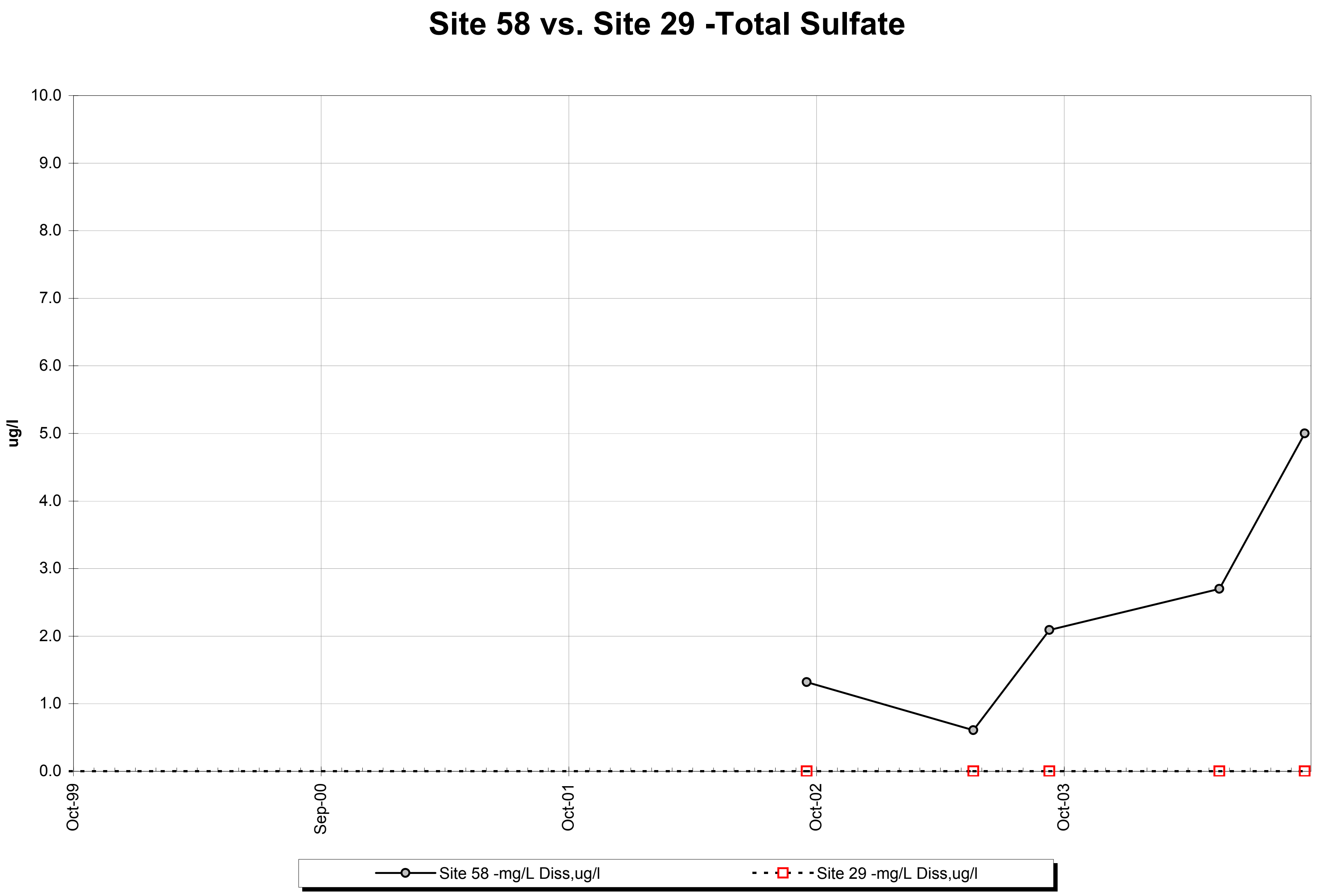


Site 58 vs. Site 29 -Lab pH

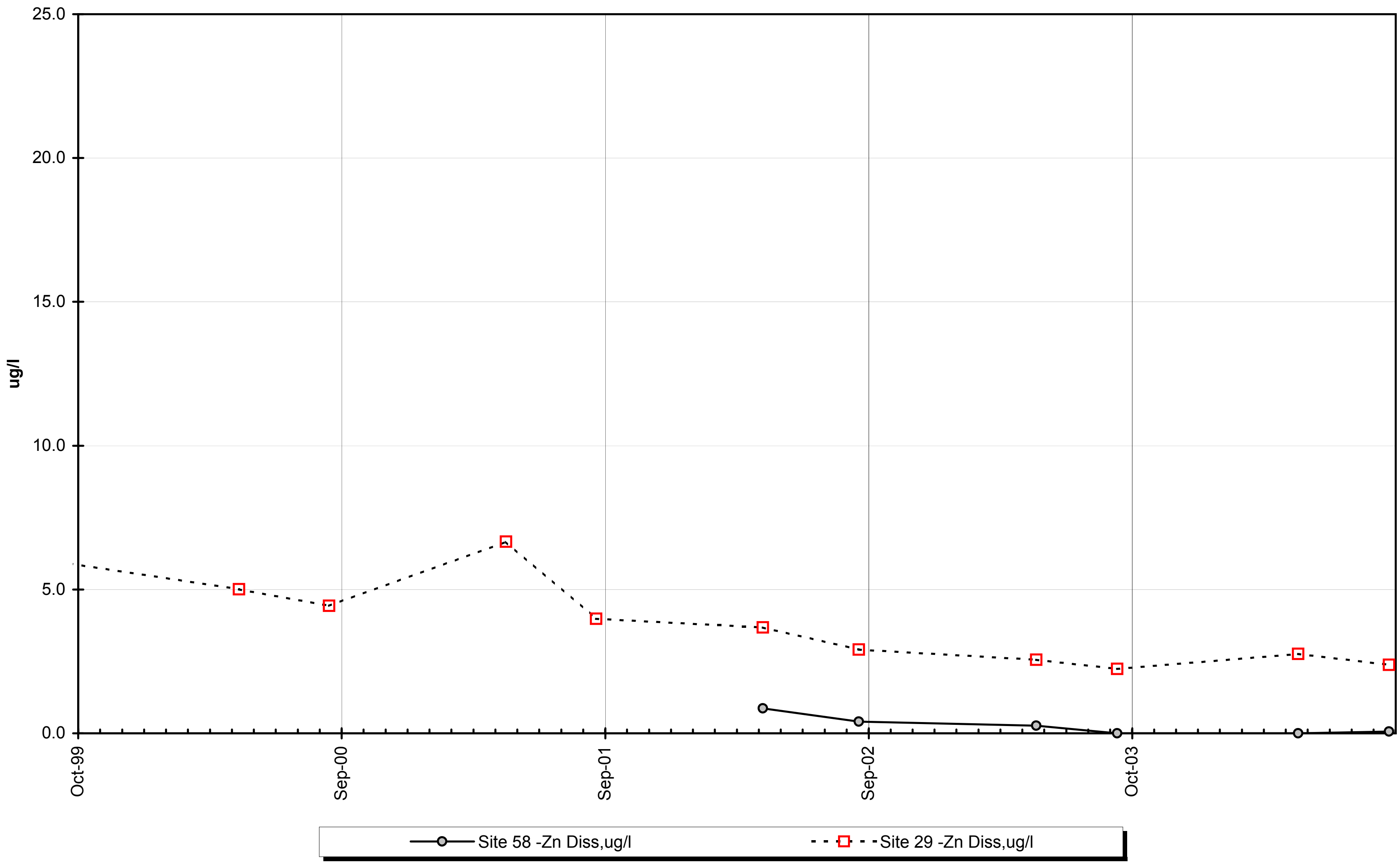


Site 58 vs. Site 29 -Total Alkalinity




Site 58 vs. Site 29 -Total Sulfate
ug/l
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
Site 58 -mg/L Diss,ug/l
Site 29 -mg/L Diss,ug/l

Site 58 vs. Site 29 -Dissolved Zinc



INTERPRETIVE REPORT
SITE 32 "MONITORING WELL 5S"

The data collected during the current water year are listed in the following "Table of Results for Water Year 2004" report. The table includes all the data, field and lab, collected for the current water year and a series of flags keyed to the summary report "Qualified Data by QA Reviewer". The QA report lists any associated data limitations found during the monthly QA reviews of laboratory data for this site. Median values for all analytes have been calculated and are shown in the right-most column of the table of results. Any value reported as less than MDL has been replaced with a value of zero for the purpose of median calculation.

All data collected at this site for the past five years are included in the data analyses. As shown in the table below, there were no data outliers.

Sample Date	Parameter	Value	Qualifier	Notes
No outliers have been identified by KGCMC for the period of Oct-99 though Sept-04.				

The data for Water Year 2004 have been compared to the strictest fresh water quality criterion for each applicable analyte. Five (5) results exceeding these criteria have been identified, as listed in the table below. Two (2) of these datum are for lab pH values below the lower limit of 6.5 su listed in AWQS. Lab pH for Site 32 has historically resulted in values ranging from a pH of 4.5 to 5.5 su which are characteristic for wells completed in organic rich peat sediments. One (1) exceedance for total alkalinity in May-2002 for which Site 32 has a five-year average value of 17.4 mg/l, which is below AWQS of 20 mg/l. The final two exceedances are for dissolved lead concentrations. The May-2002 sample had a dissolved lead concentration of 1.05 µg/l that exceeds the minimum hardness dependent AWQS standard of 0.541 µg/l. The September-2003 sample had a dissolved lead concentration of 0.832 µg/l that exceeds the hardness dependent AWQS standard of 0.541 µg/l. Due to the low hardness for this site 14 of the past 16 samples have returned lead values higher than AWQS but within the same general range of 1.0-3.5µg/l of dissolved lead. The sixteen samples represent all the samples taken since the inception of a lower MDL for lead determinations in June-1998.

Sample Date	Parameter	Value	Hardness (mg/L)	Standard	Standard Type
05/18/04	pH Lab, su	5.13		6.5 - 8.5	Aquatic Life
05/18/04	pH Field, su	4.98		6.5 - 8.5	Aquatic Life
09/21/04	pH Lab, su	5.24		6.5 - 8.5	Aquatic Life
09/21/04	pH Field, su	5.08		6.5 - 8.5	Aquatic Life
05/18/04	Total Alkalinity, mg/L	17.6		>20	Aquatic Life, chronic
09/21/04	Total Alkalinity, mg/L	17.1		>20	Aquatic Life, chronic
05/18/04	Lead, Dissolved ug/L	1.14	10.4	0.541	Aquatic Life, chronic
09/21/04	Lead, Dissolved ug/L	0.848	9.83	0.541	Aquatic Life, chronic

X-Y plots have been generated to graphically present the data for each of the analytes requested in the Statistical Information Goals for this site. These plots have been visually analyzed for the appearance of any trend in concentration. No obvious trends were apparent.

Additional X-Y plots have been generated for alkalinity, pH, conductance, sulfate, and dissolved zinc that co-plot data from Site 32 and Site 58, the upgradient control site, to aid in comparison between those two sites. Lab conductivity, total sulfate, and total alkalinity are slightly higher at Site 58 while lab pH is more basic at Site 58, median pH of 6.24, than at Site 32 with a median pH of 5.2. Dissolved zinc levels are higher at Site 32 than at Site 58. The long-term median value for dissolved zinc since June 1998 is 8.9 μg/l, which is still elevated with respect to Site 58 and the other shallow wells completed into peat (e.g. Site 27 and Site 29). The lower pH at Site 32 with respect to the other shallow wells may account for the elevated zinc concentration found there due to the higher zinc solubility at a lower pH.

Table of Results for Water Year 2004

Site 32 "MW-5S"

Sample Date/Parameter	Oct-03	Nov-03	Dec-03	Jan-04	Feb-04	Mar-04	Apr-04	5/18/2004	Jun-04	Jul-04	Aug-04	9/21/2004	**Median**
Water Temp (°C)								8.0				8.4	8.2
Conductivity-Field(µmho)								70				68	69
Conductivity-Lab (µmho)								56				54	55
pH Lab (standard units)								5.13				5.24	5.19
pH Field (standard units)								4.98				5.08	5.03
Total Alkalinity (mg/L)								17.6				17.1	17.4
Total Sulfate (mg/L)								<0.1				<0.1	0.1
Hardness (mg/L)								10.4				9.8	10.1
Dissolved As (ug/L)								5.080		NOT SCHEDULED FOR SAMPLING		5.240	5.160
Dissolved Ba (ug/L)				NOT SCHEDULED FOR SAMPLING				19.7				17.9	18.8
Dissolved Cd (ug/L)								<0.023				0.014	0.013
Dissolved Cr (ug/L)								3.070 J				2.270	2.670
Dissolved Cu (ug/L)								0.827				0.985	0.906
Dissolved Pb (ug/L)								1.1400				0.8480	0.9940
Dissolved Ni (ug/L)								4.200 J				3.950	4.075
Dissolved Ag (ug/L)								<0.009 UJ				0.006	0.005
Dissolved Zn (ug/L)								7.17 J				6.05	6.61
Dissolved Se (ug/L)								<0.496 UJ				0.265	0.257
Dissolved Hg (ug/L)								0.002520				0.001950	0.002235

For individual sample/analyte qualifier descriptions see "Qualified Data by QA Reviewer" table.

Values reported as less than MDL are replaced by 1/2 MDL for median calculation purposes.

Shaded data has been qualified as an outlier by KGCMC and removed from any further analysis and is not included into the calculation of the median

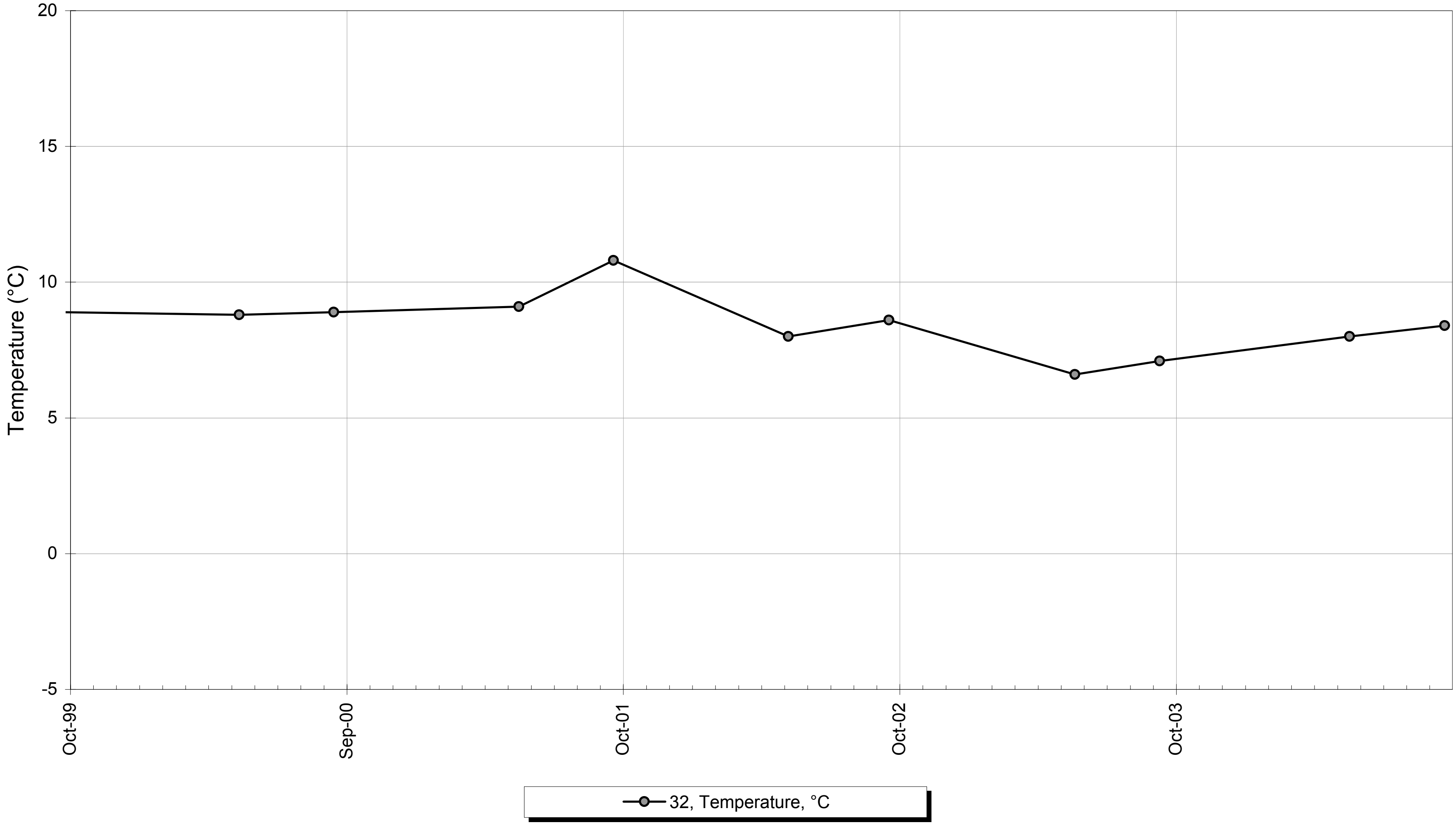
Qualified Data by QA Reviewer

Date Range: 10/01/2003 to 09/30/2004

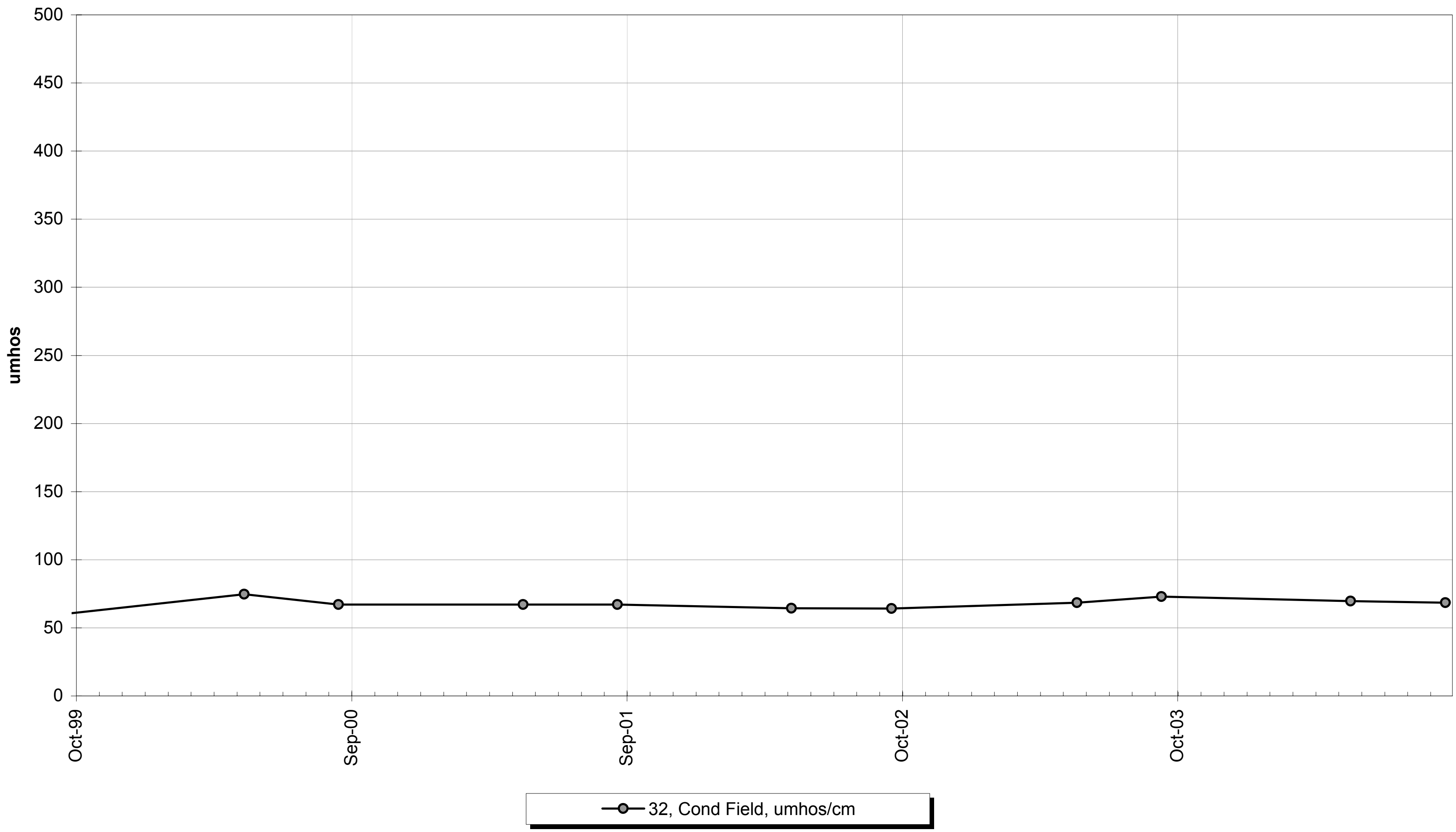
Site No.	Sample Date	Sample Time	Parameter	Value	Qualifier	Reason for Qualifier
32	05/18/2004	11:27:00 AM				
			Cr Diss, ug/l	3.07	J	CCV Recovery
			Ni Diss, ug/l	4.2	J	CCV Recovery
			Ag Diss, ug/l	-0.009	UJ	MS Recovery
			Zn Diss, ug/l	7.17	J	LCS Recovery
			Se Diss, ug/l	-0.496	UJ	LCS Recovery

Qualifier	Description
J	Positively Identified - Approximate Concentration
N	Presumptive Evidence For Tentative Identification
NJ	Tentatively Identified - Approximate Concentration
R	Rejected - Cannot Be Verified
U	Not Detected Above Quantitation Limit
UJ	Not Detected Above Approximate Quantitation Limit

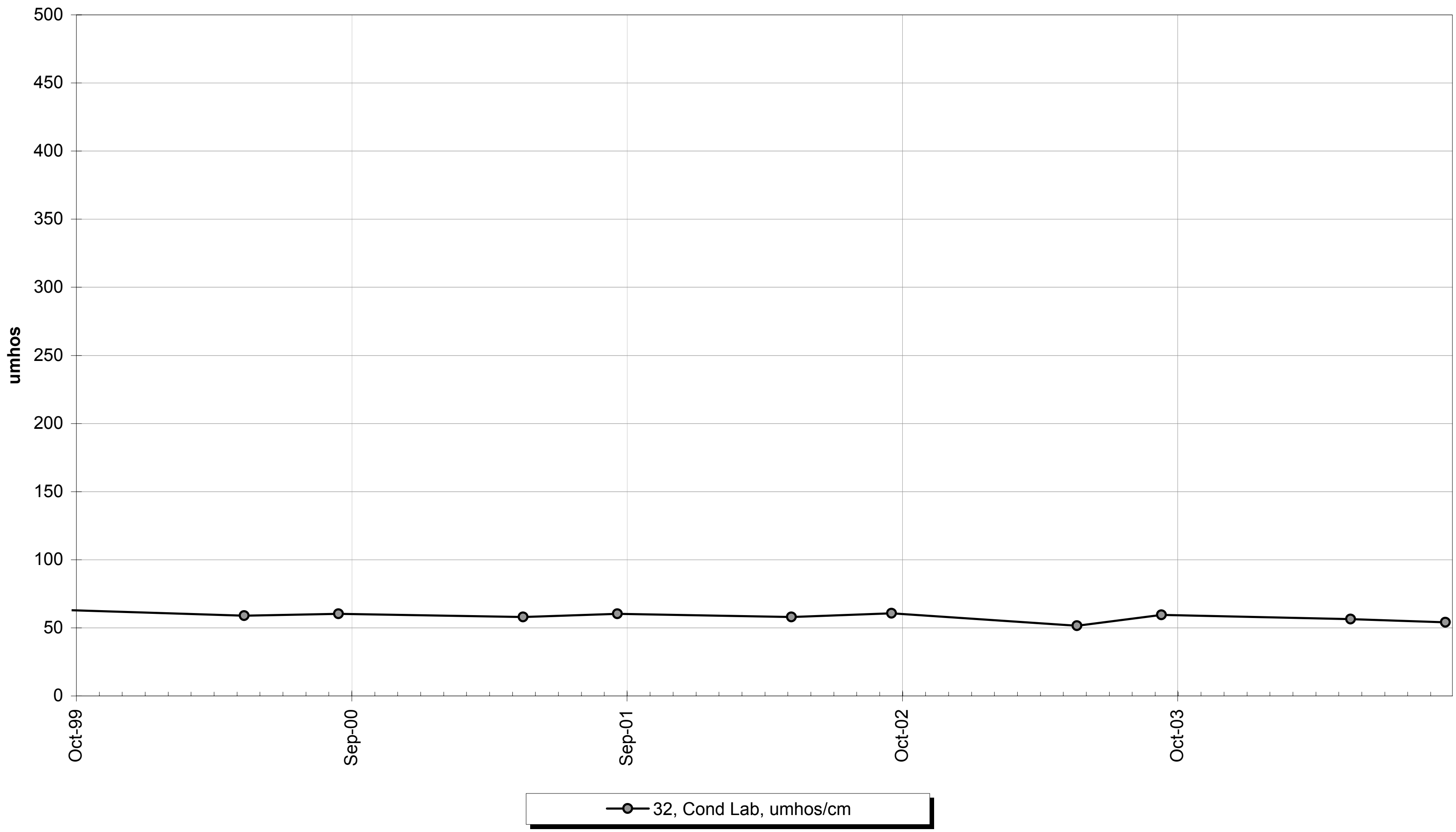
Site 32 -Water Temperature

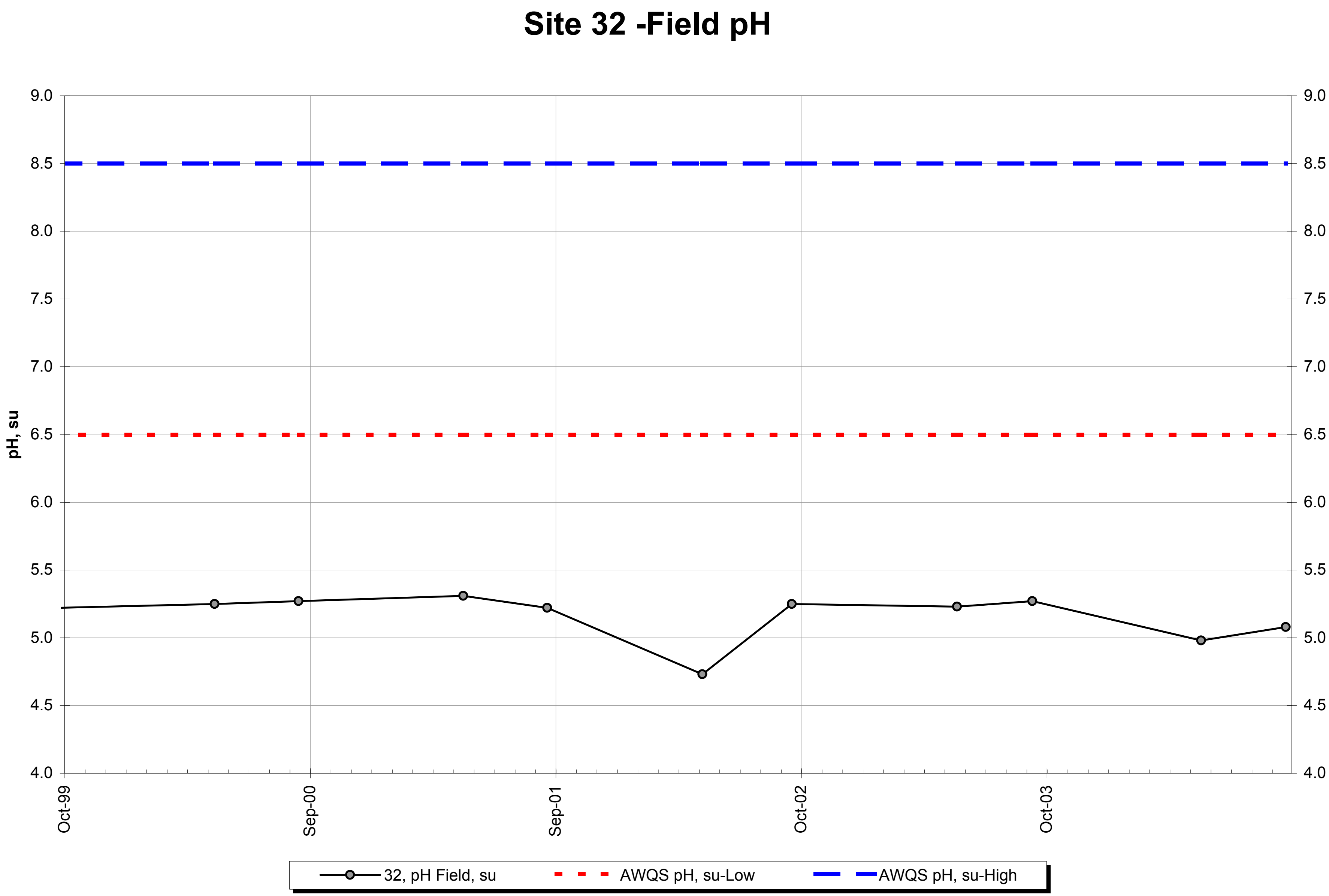


Site 32 -Conductivity-Field



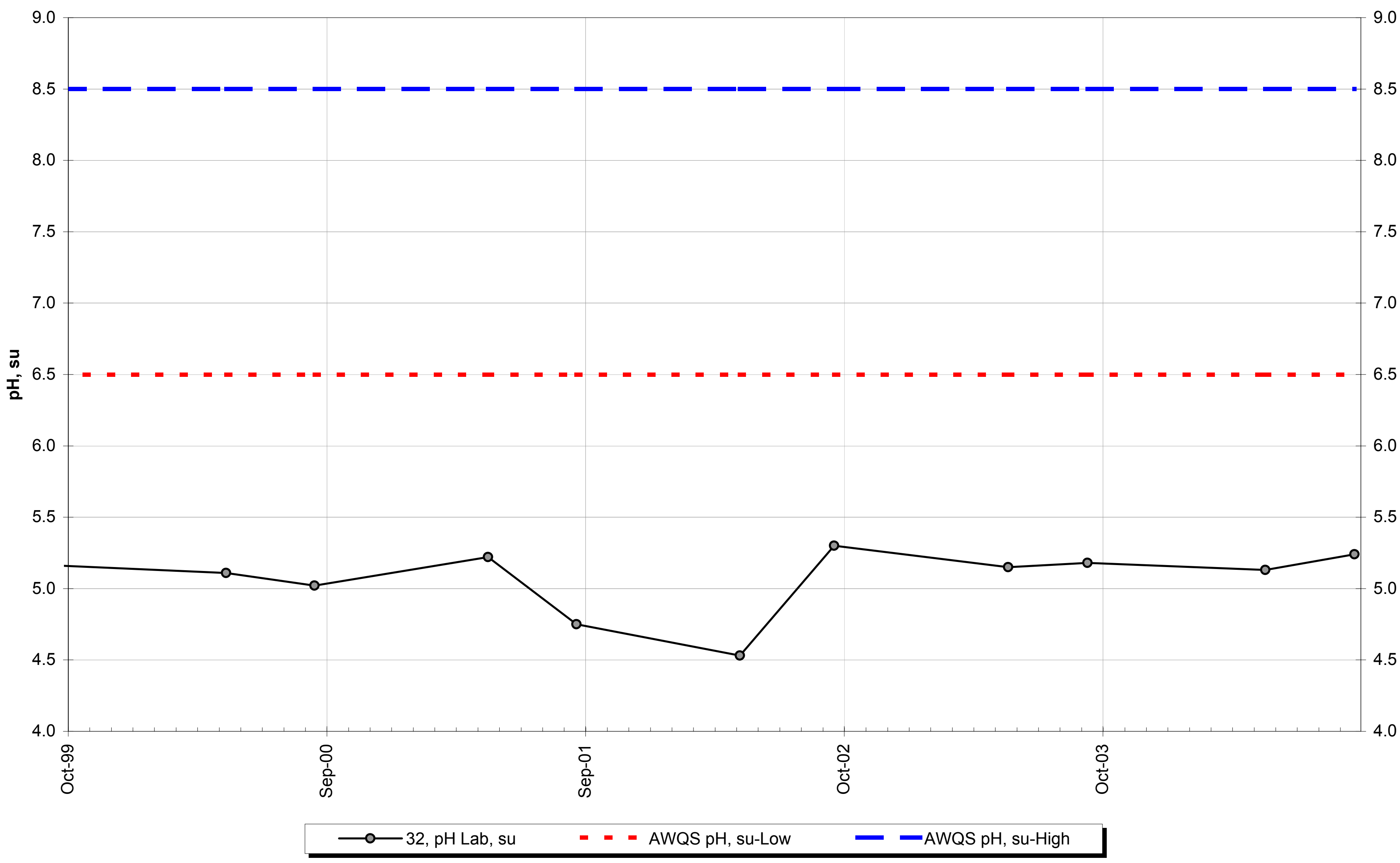
Site 32 -Conductivity-Lab



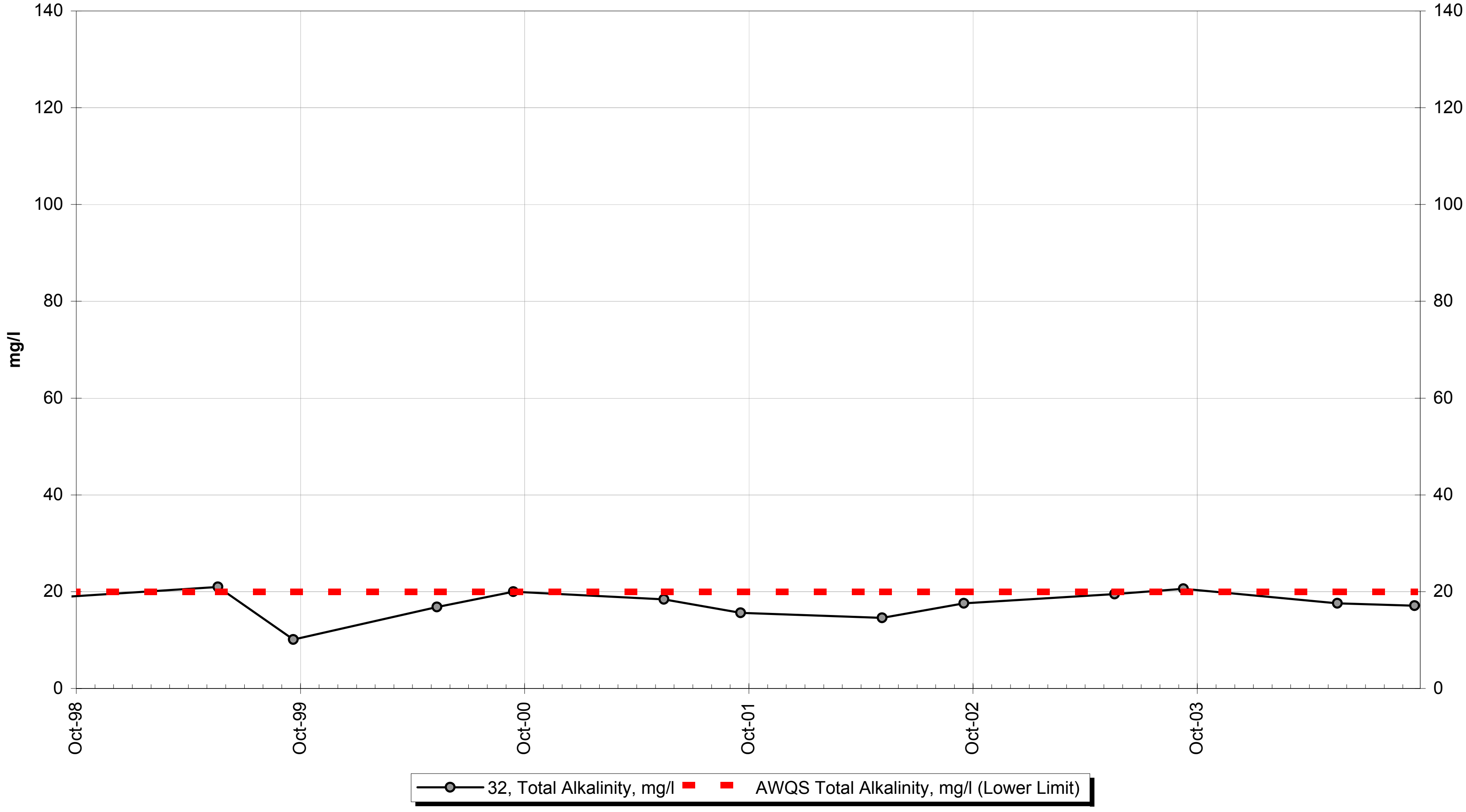


Site 32 -Field pH
pH, su
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
32, pH Field, su
AWQS pH, su-Low
AWQS pH, su-High

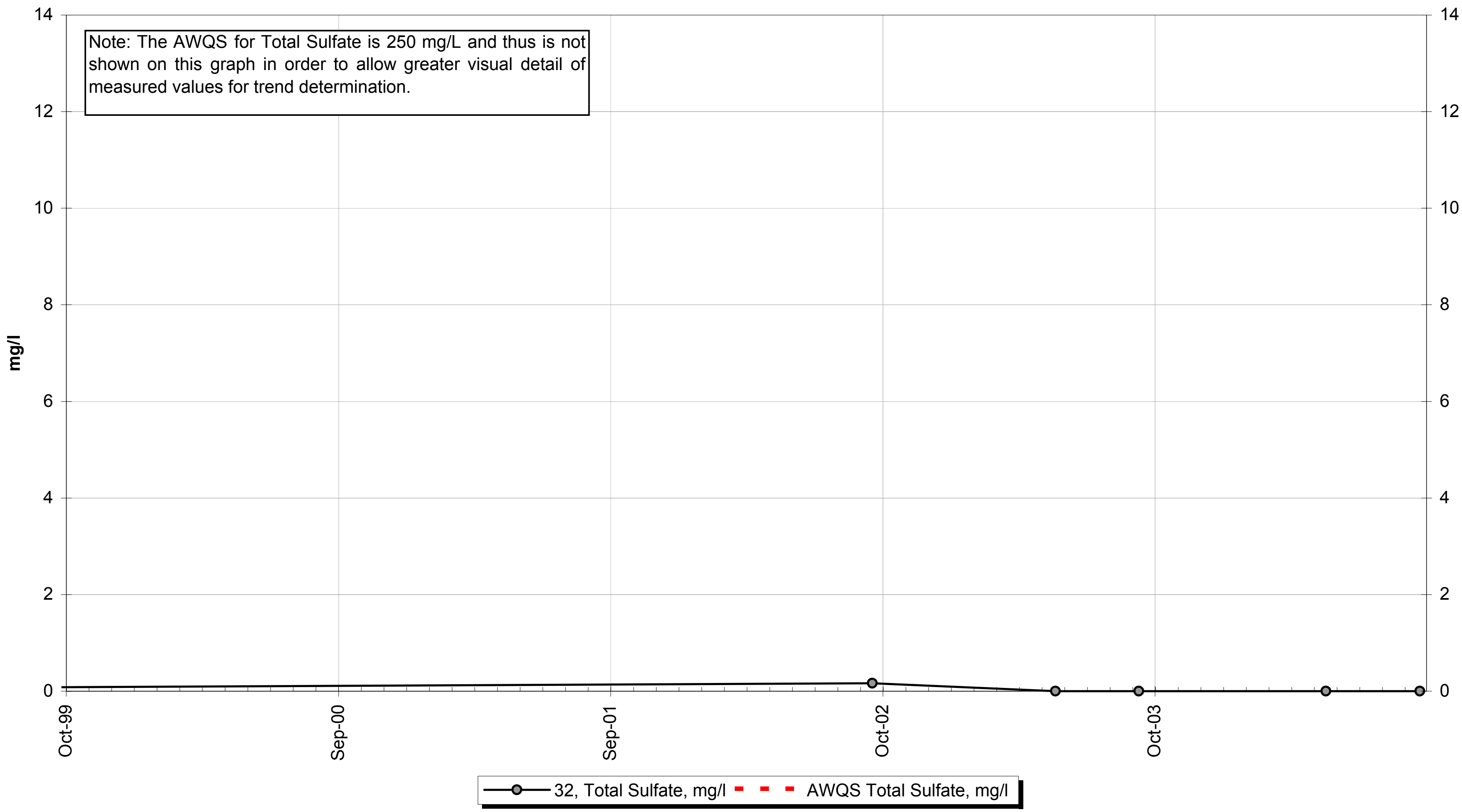
Site 32 -Lab pH



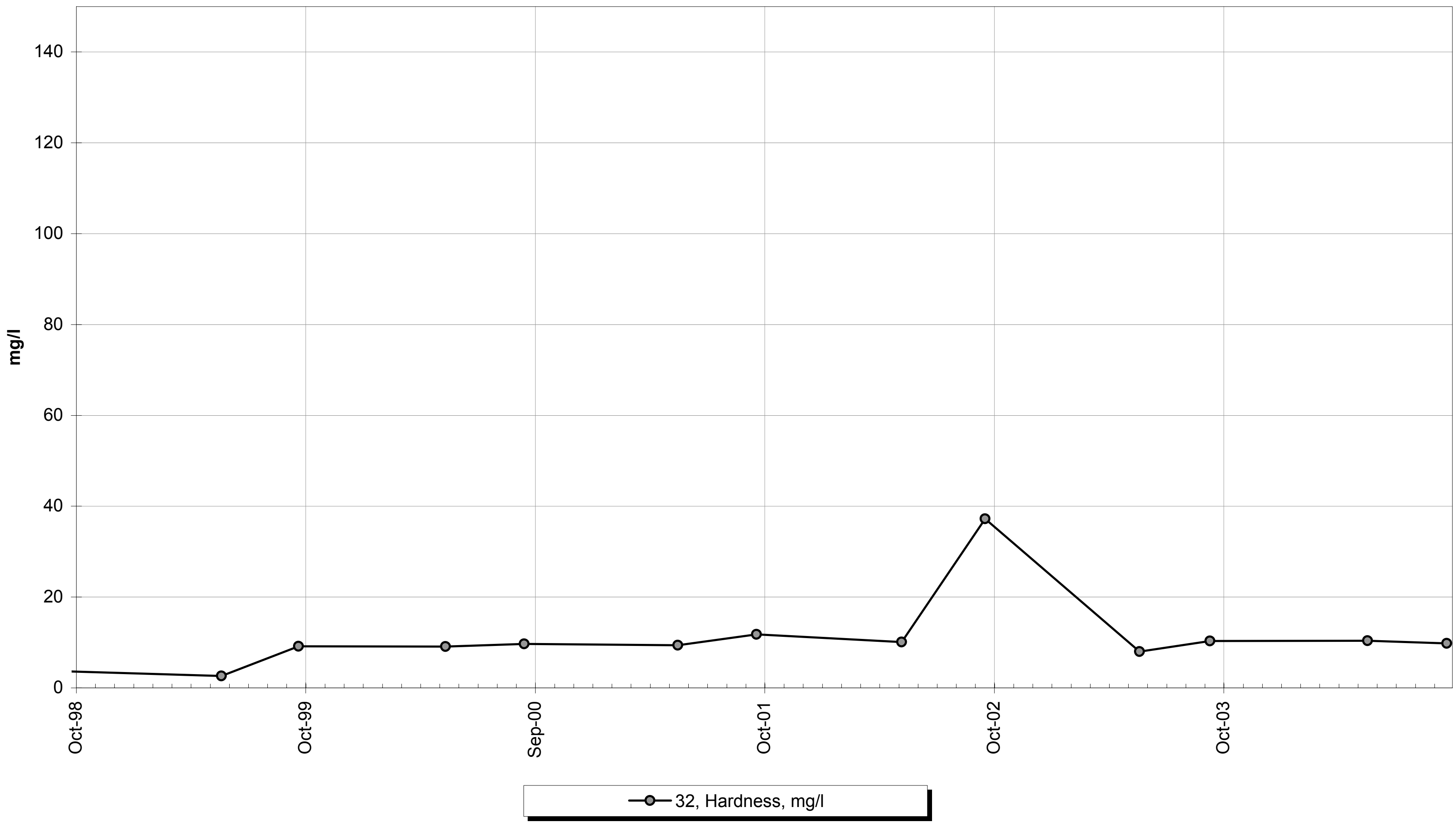
Site 32 -Total Alkalinity

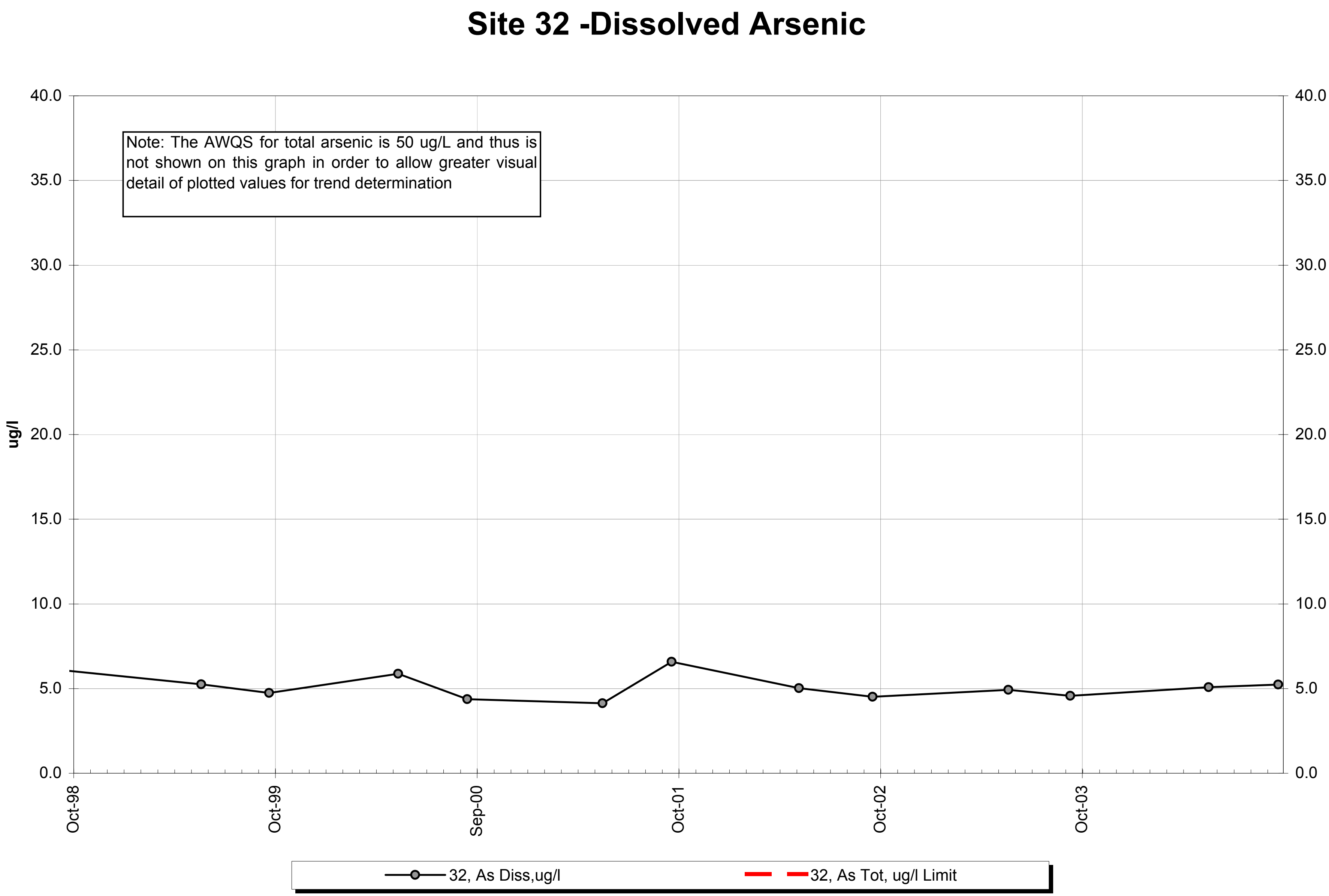


Site 32 -Total Sulfate



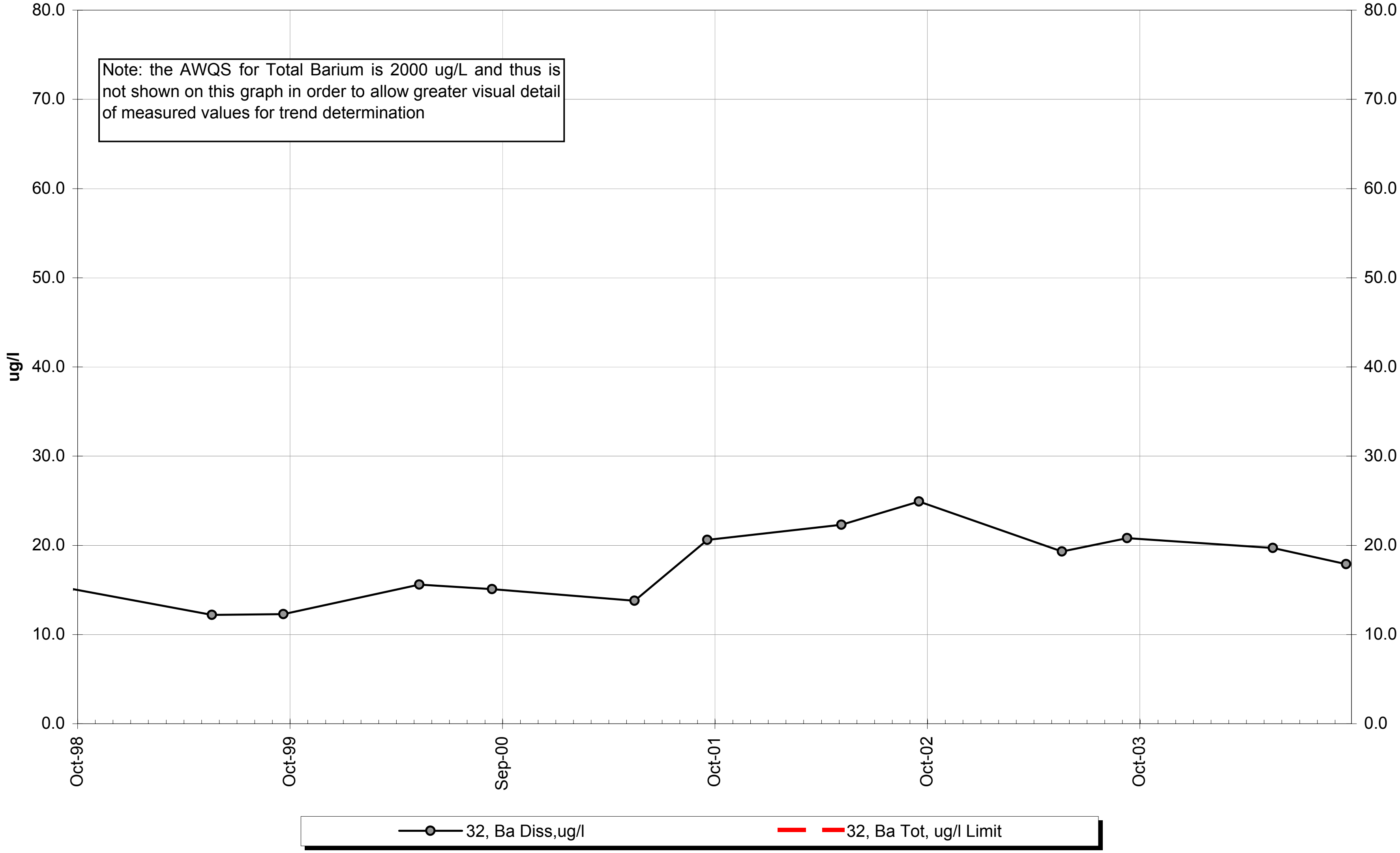
Site 32 -Hardness

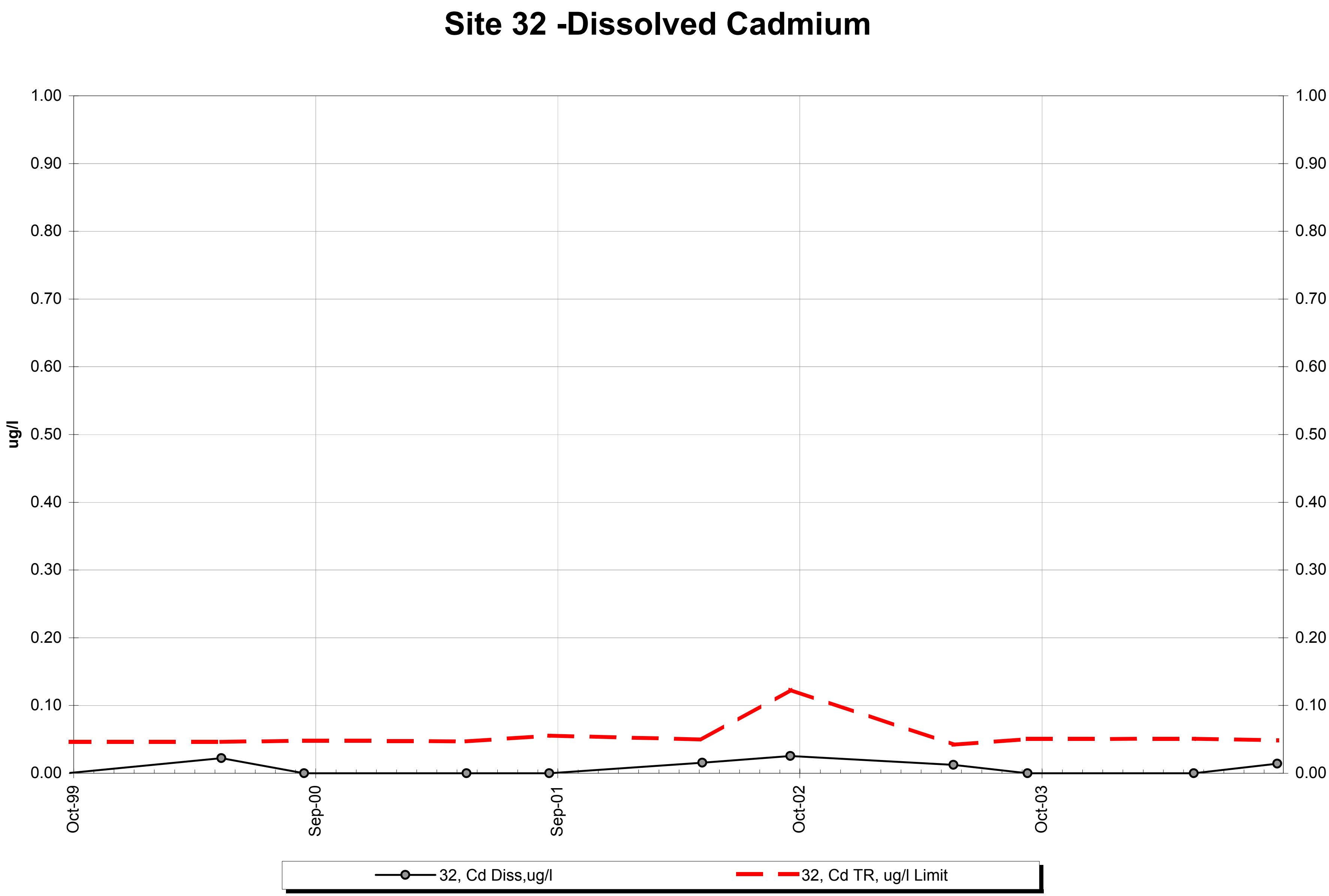


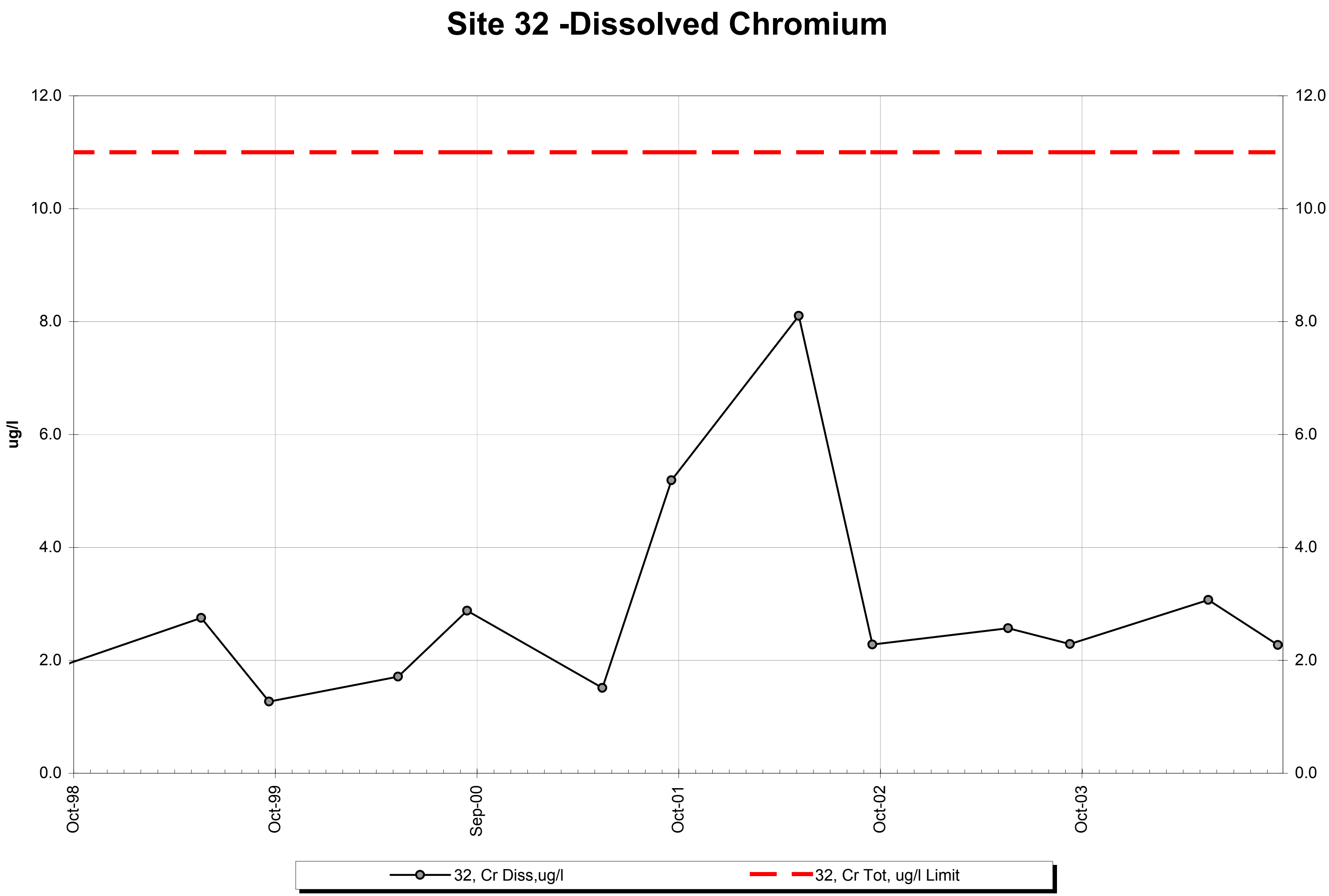


Site 32 -Dissolved Arsenic
Note: The AWQS for total arsenic is 50 ug/L and thus is not shown on this graph in order to allow greater visual detail of plotted values for trend determination
ug/l
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
32, As Diss,ug/l
32, As Tot, ug/l Limit

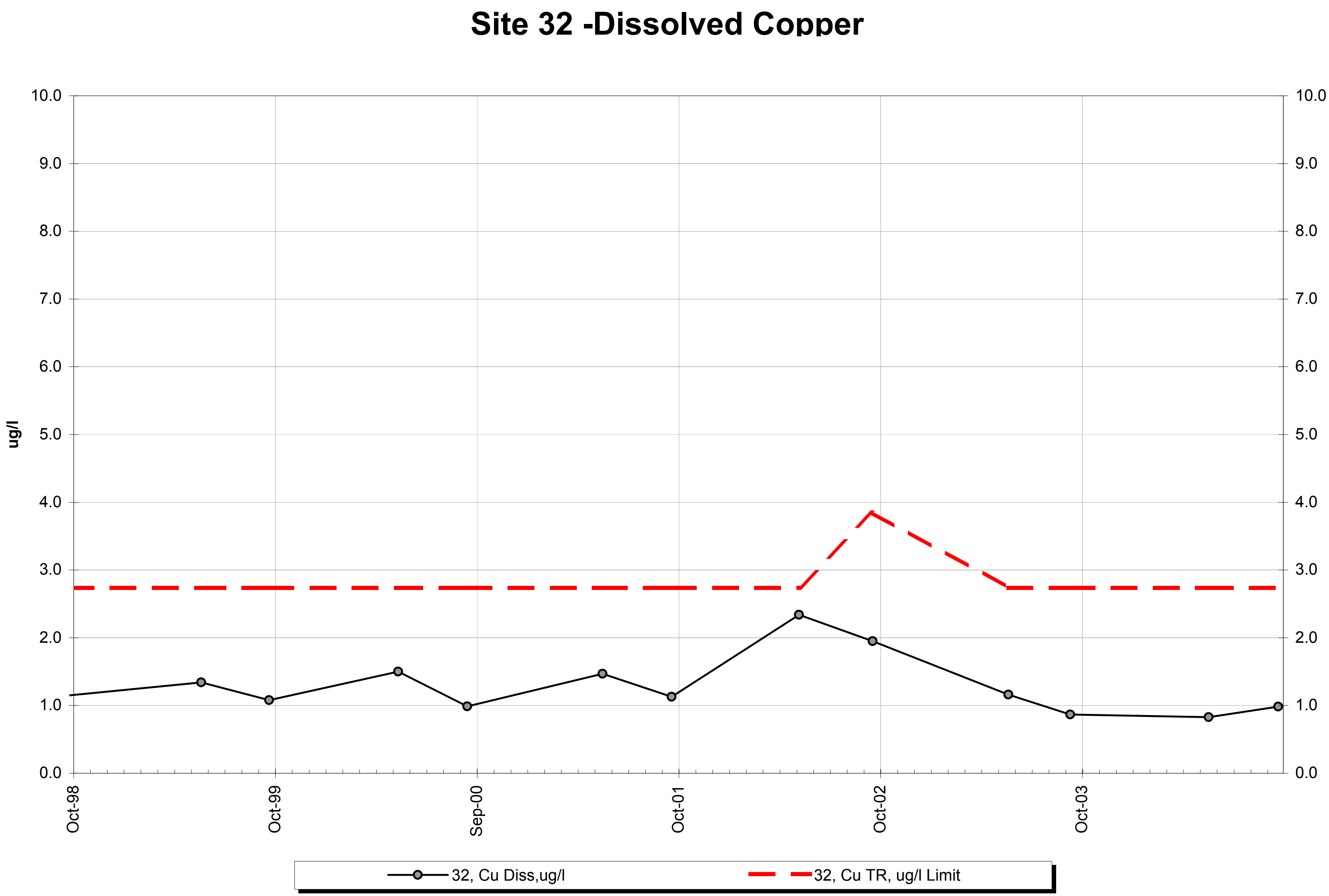
Site 32 -Dissolved Barium




Site 32 -Dissolved Cadmium
ug/l
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
32, Cd Diss,ug/l
32, Cd TR, ug/l Limit

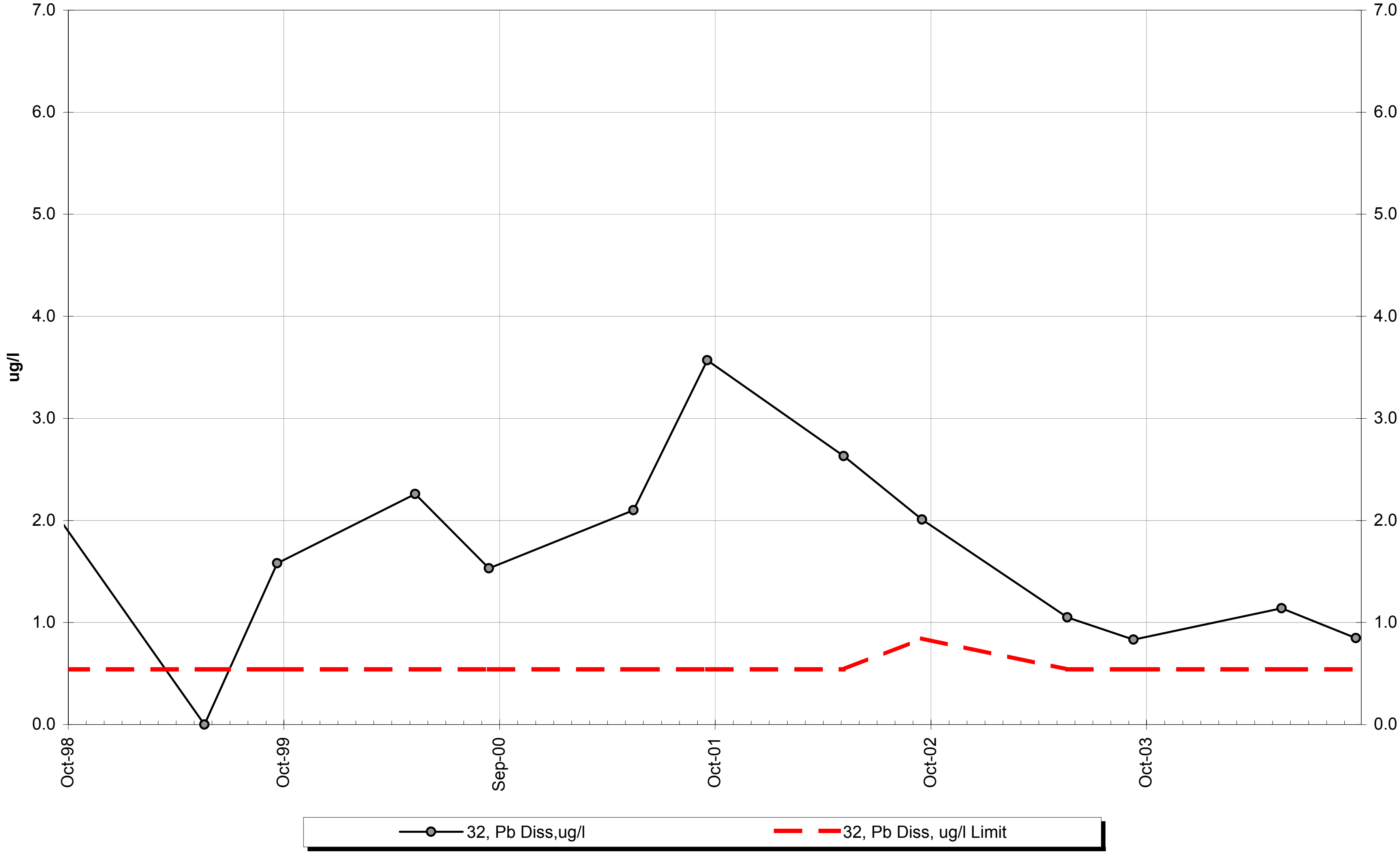


Site 32 -Dissolved Chromium
ug/l
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
32, Cr Diss,ug/l
32, Cr Tot, ug/l Limit

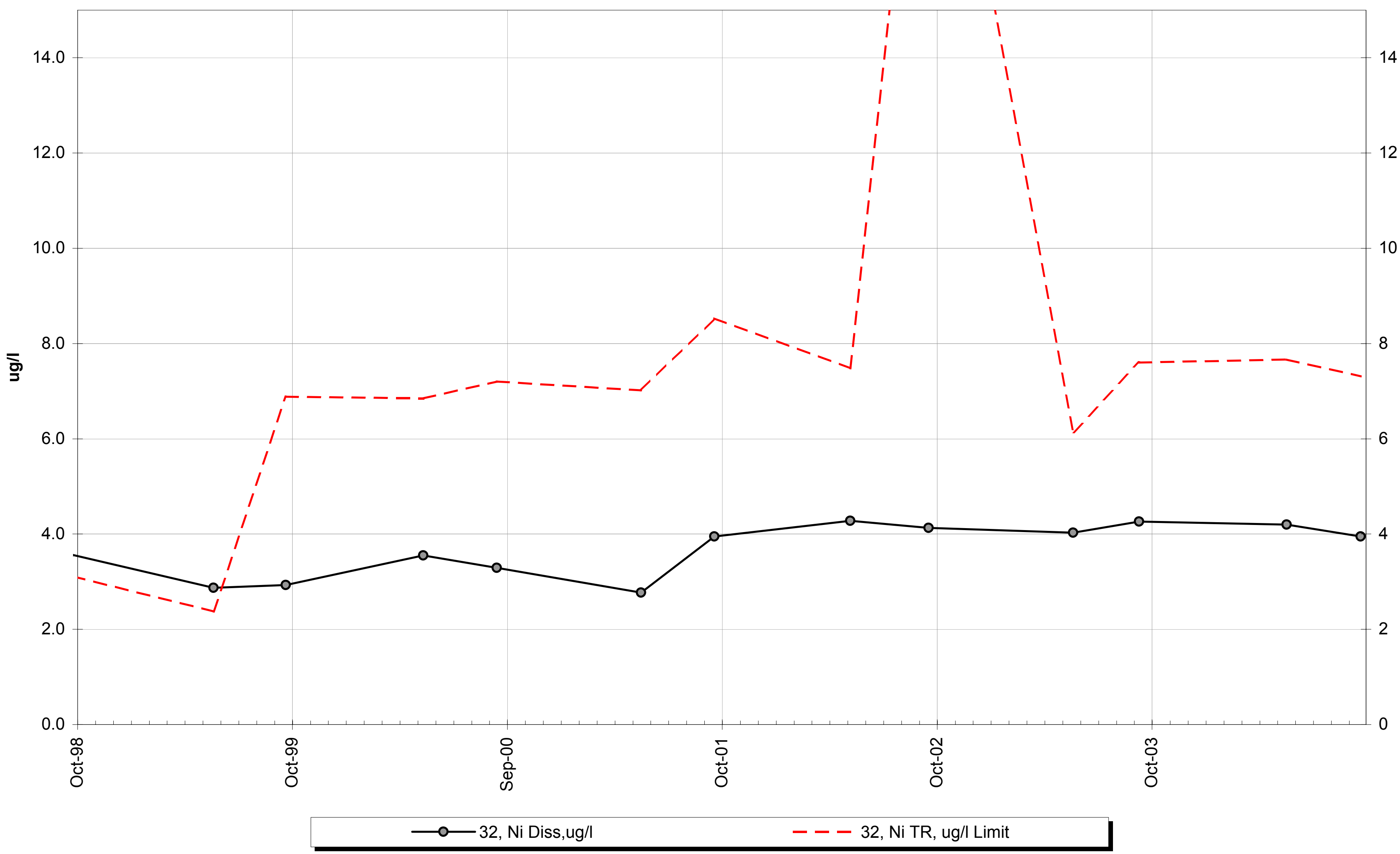


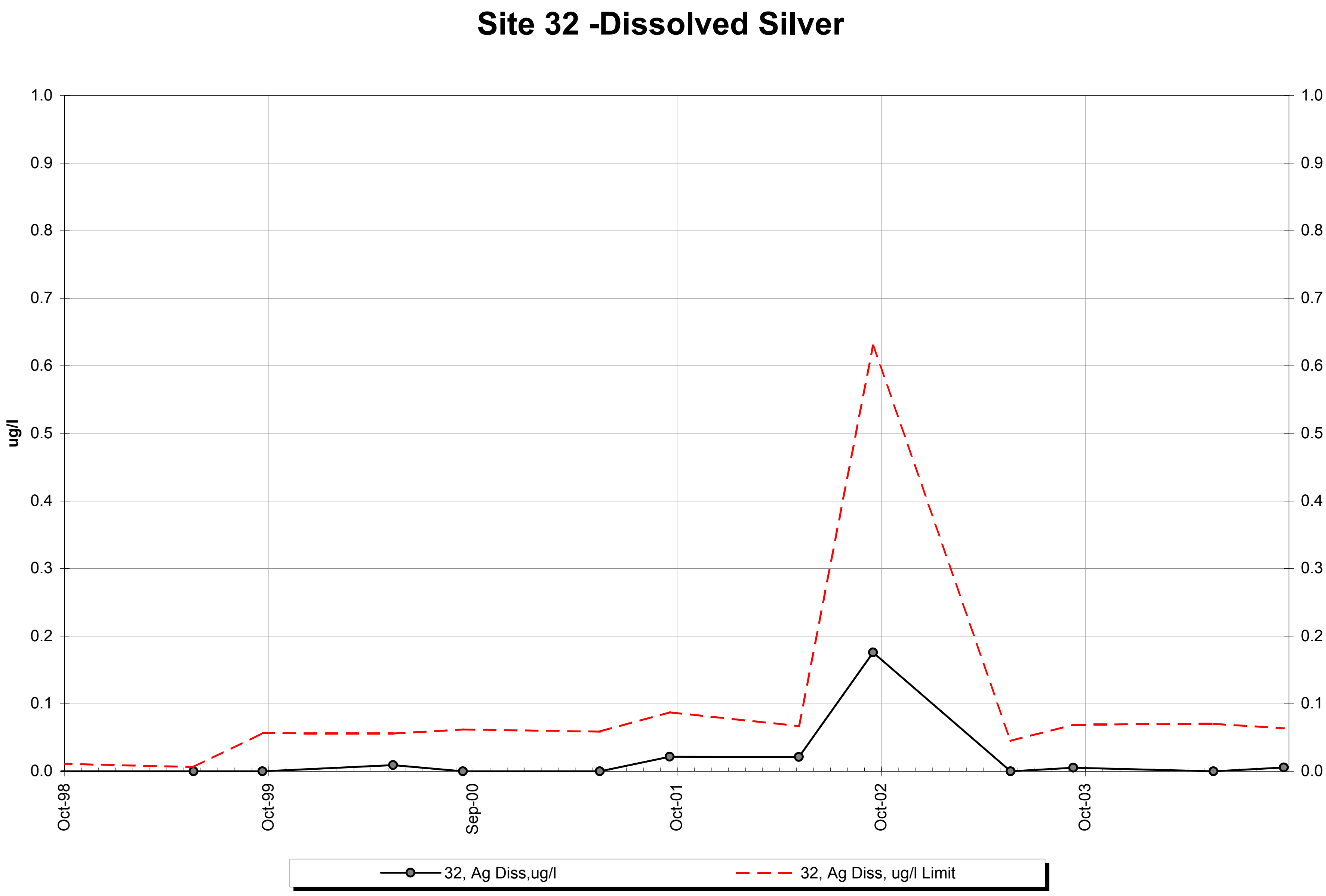
Site 32 -Dissolved Copper
ug/l
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
32, Cu Diss,ug/l
32, Cu TR, ug/l Limit

Site 32 -Dissolved Lead

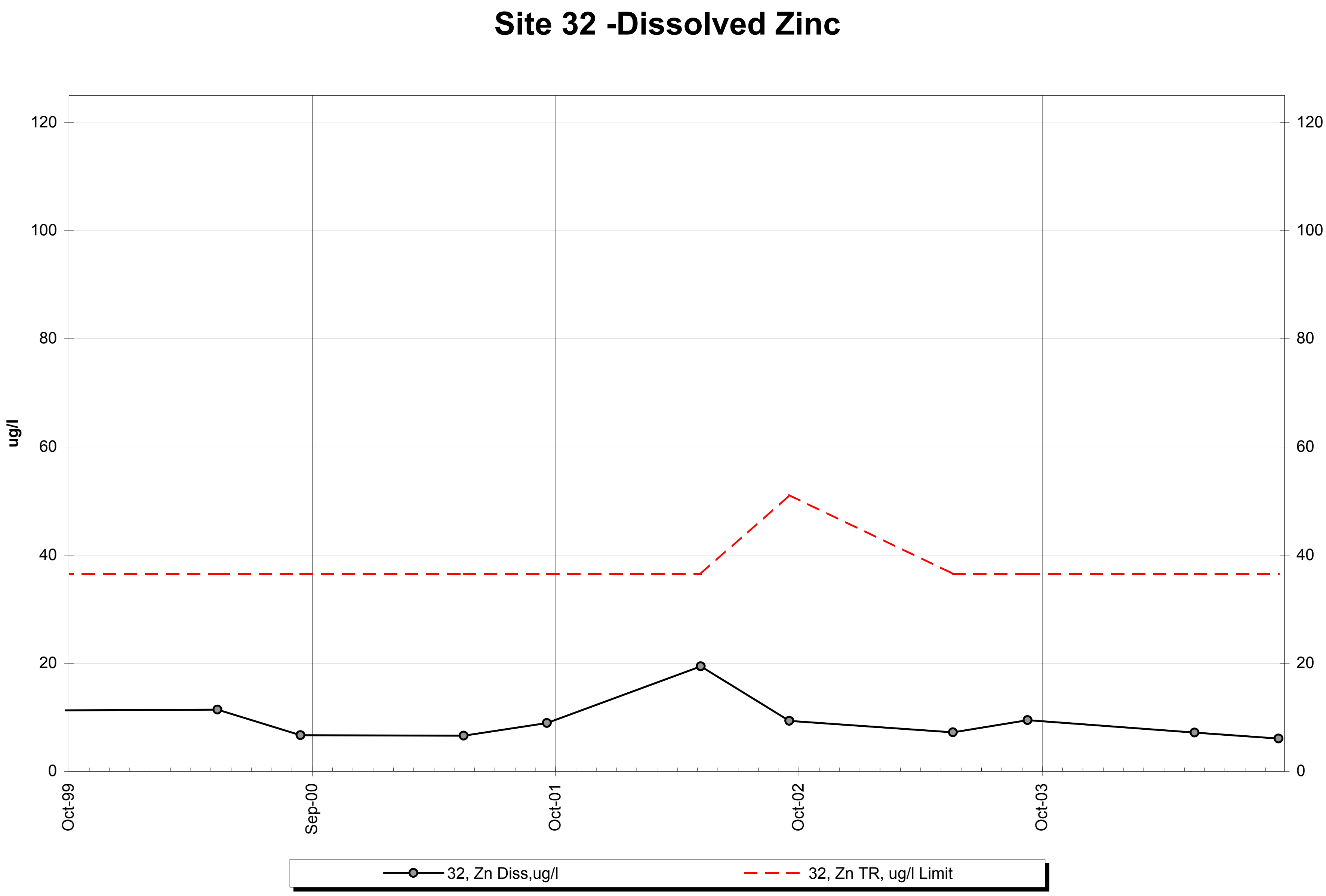


Site 32 -Dissolved Nickel



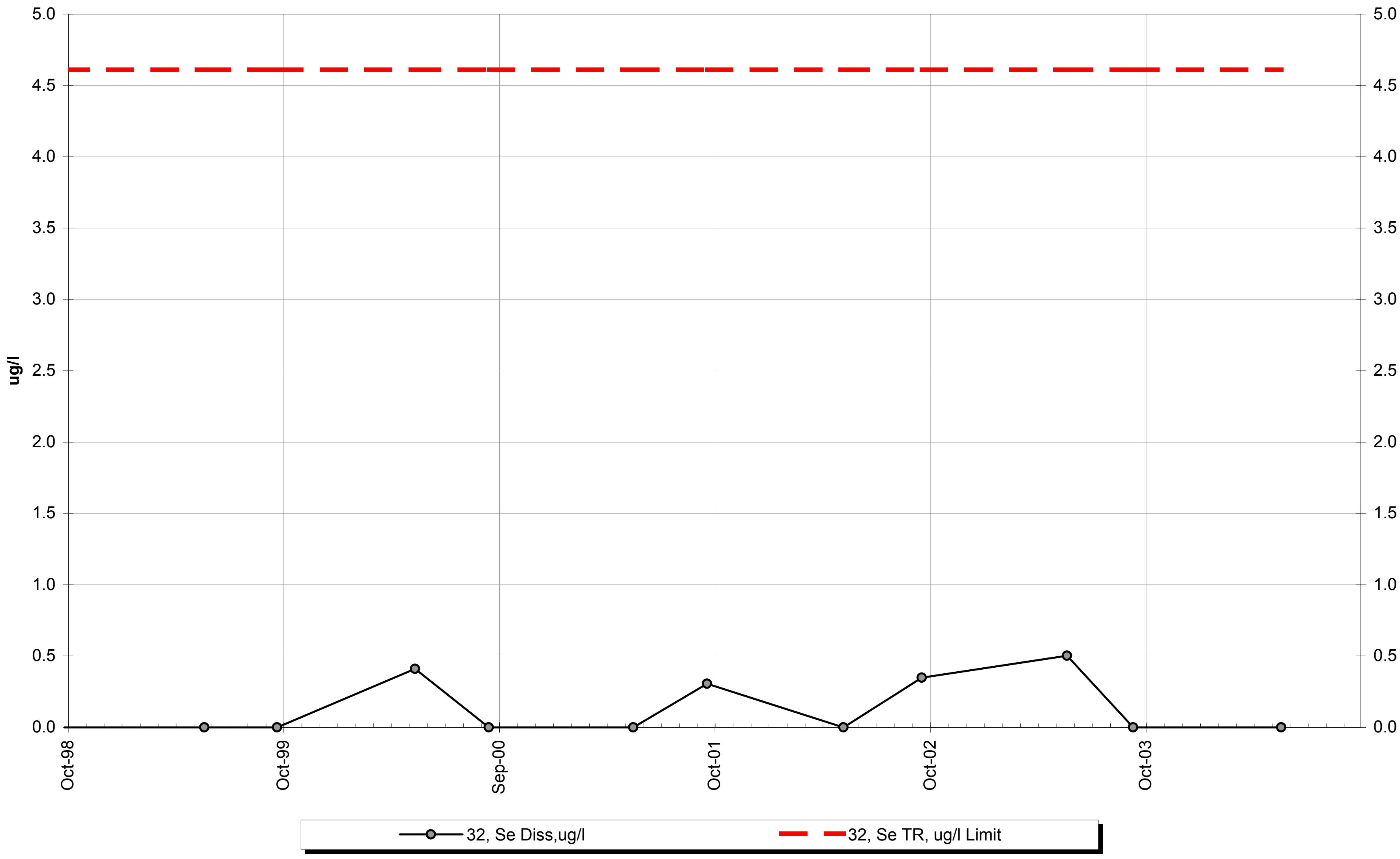


Site 32 -Dissolved Silver
ug/l
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
32, Ag Diss,ug/l
32, Ag Diss, ug/l Limit

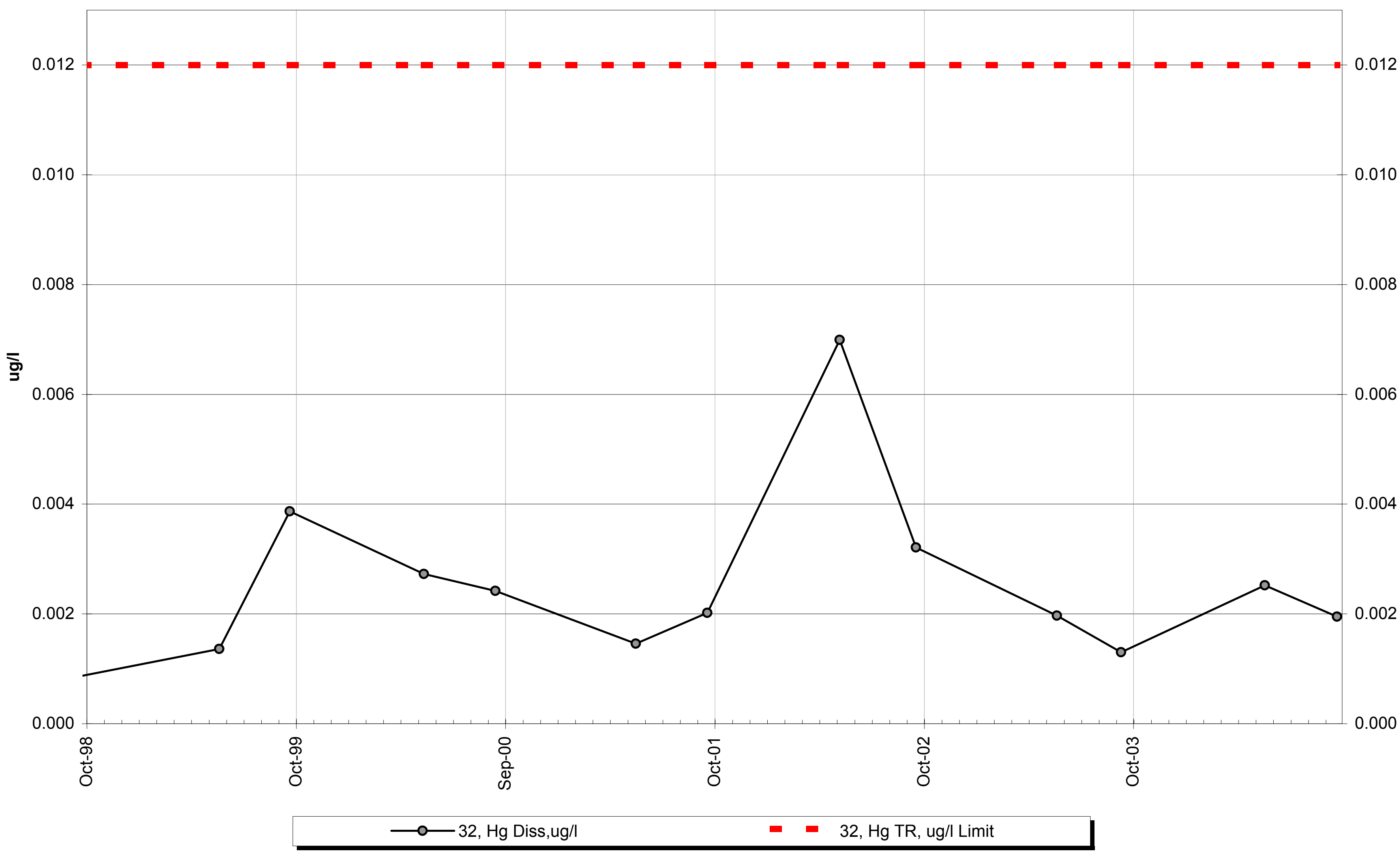


Site 32 -Dissolved Zinc
ug/l
120
100
80
60
40
20
0
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
32, Zn Diss,ug/l
32, Zn TR, ug/l Limit

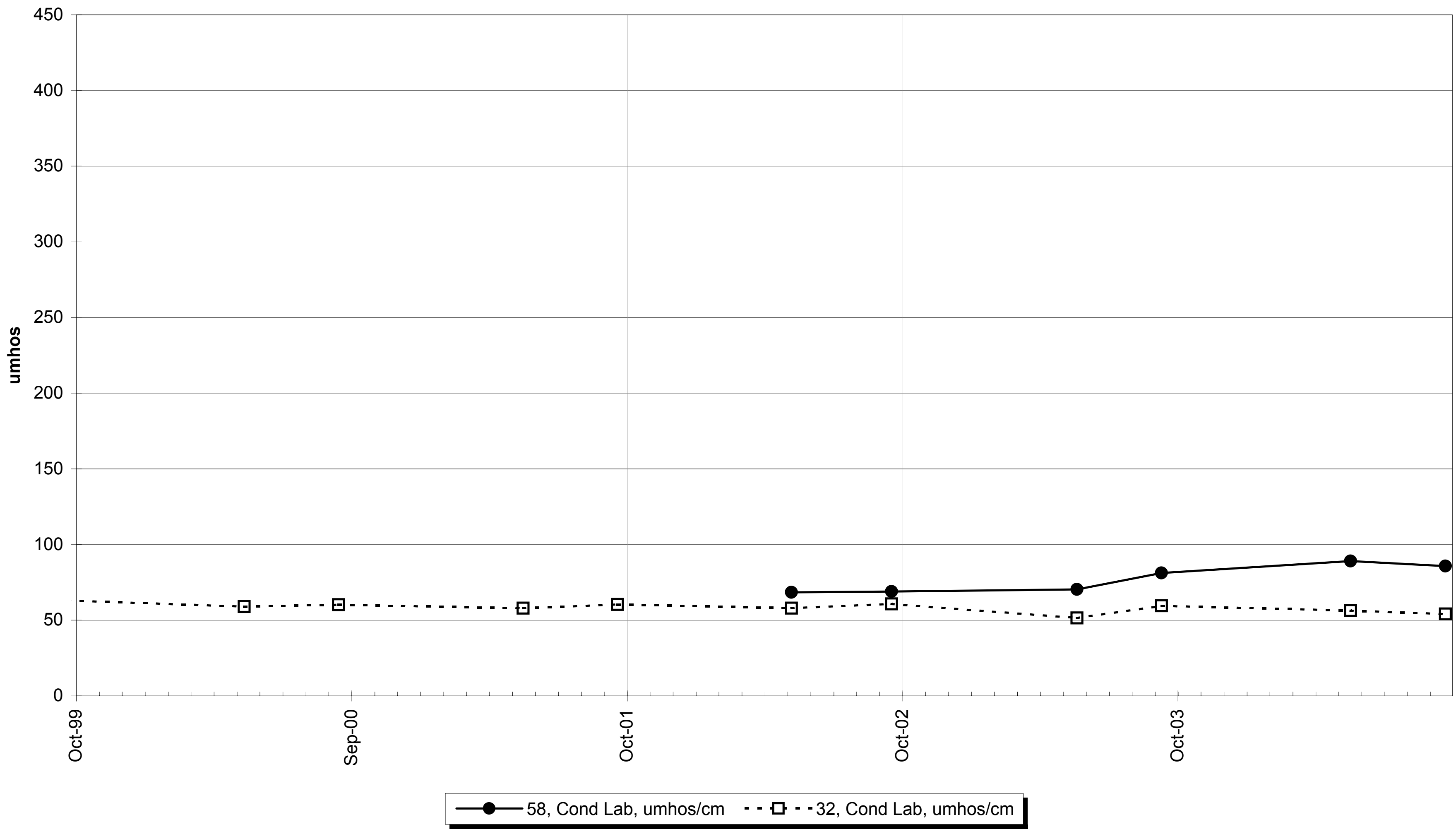
Site 32 -Dissolved Selenium

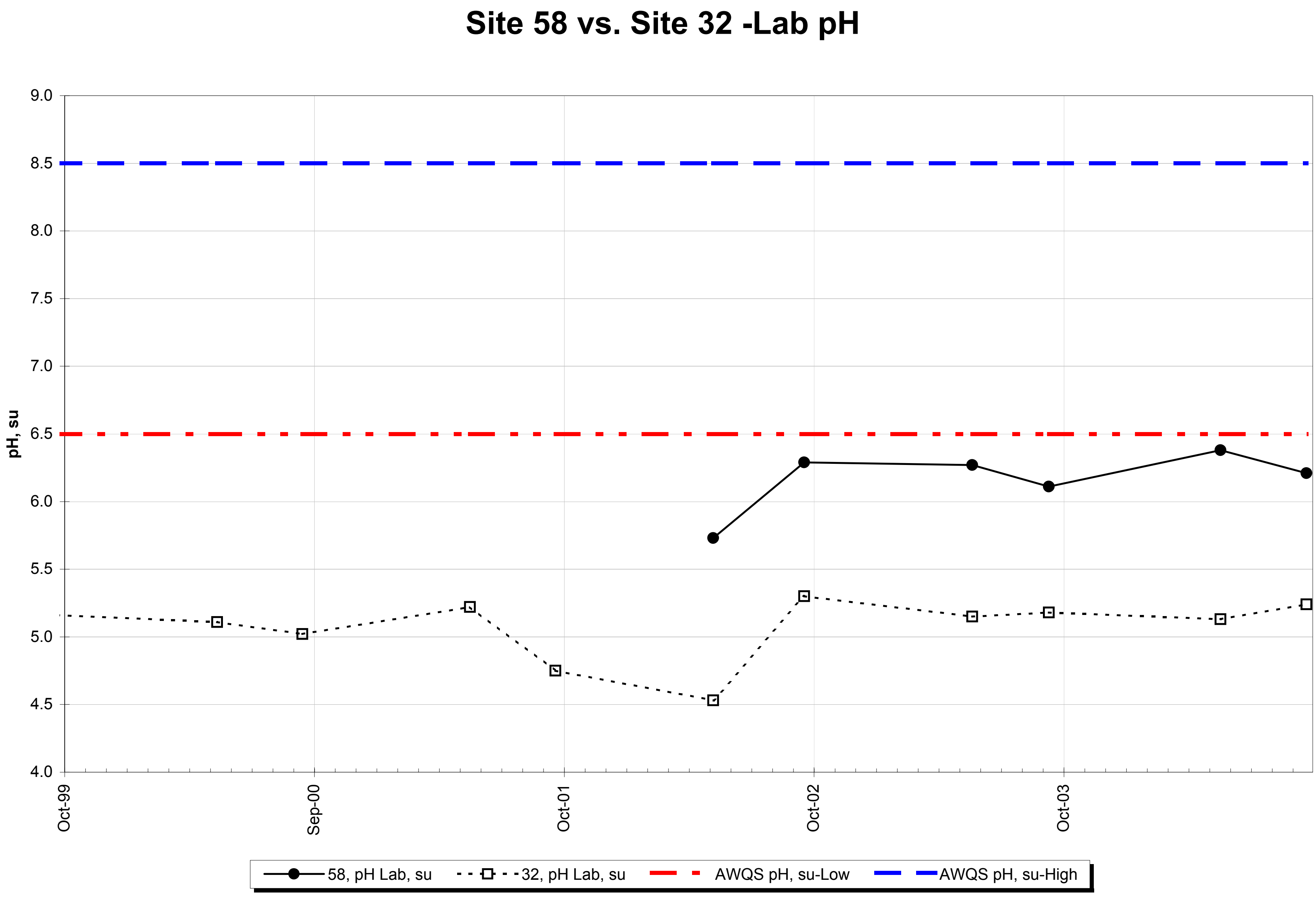


Site 32 -Dissolved Mercury



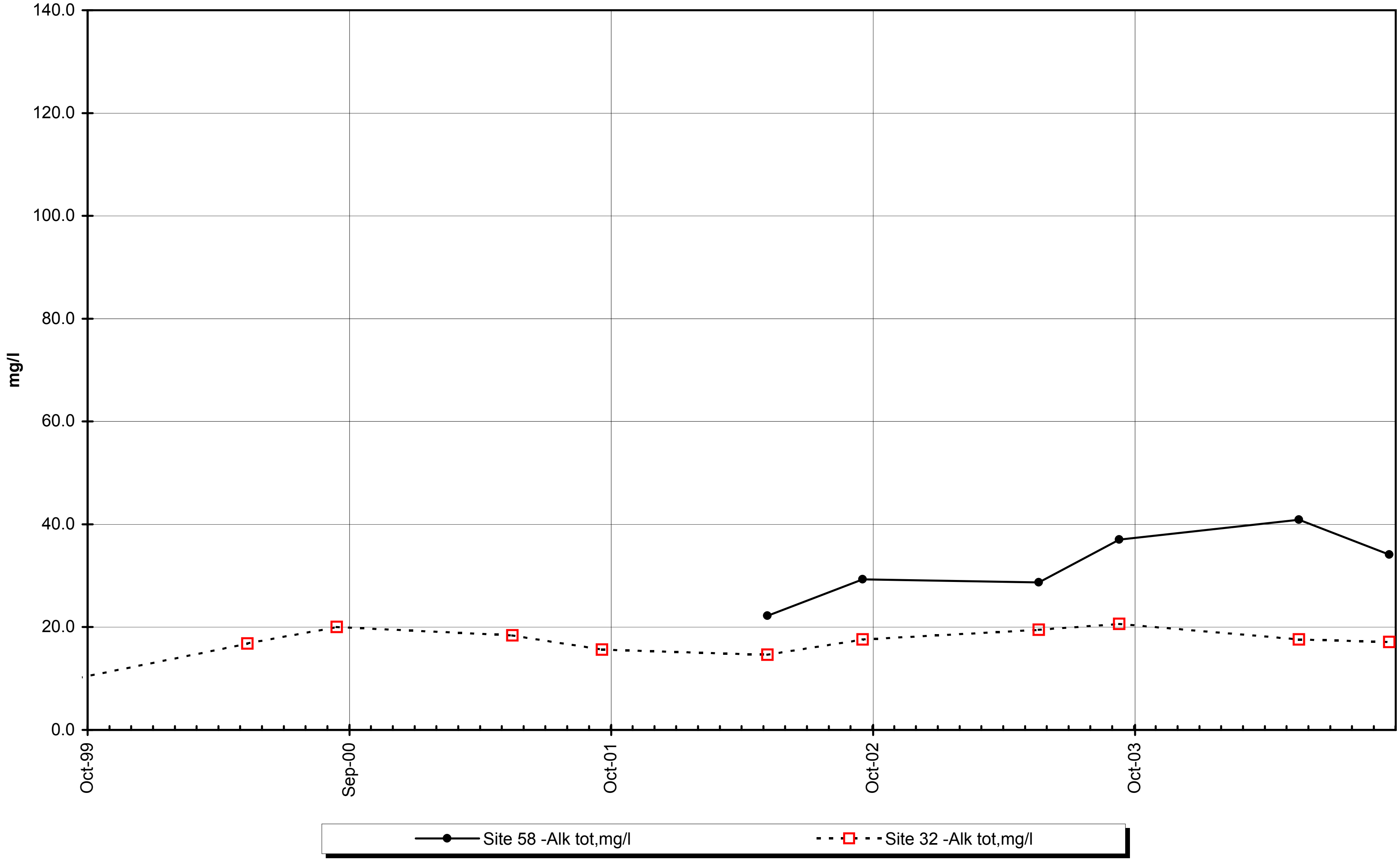
Site 58 vs Site 32 -Conductivity



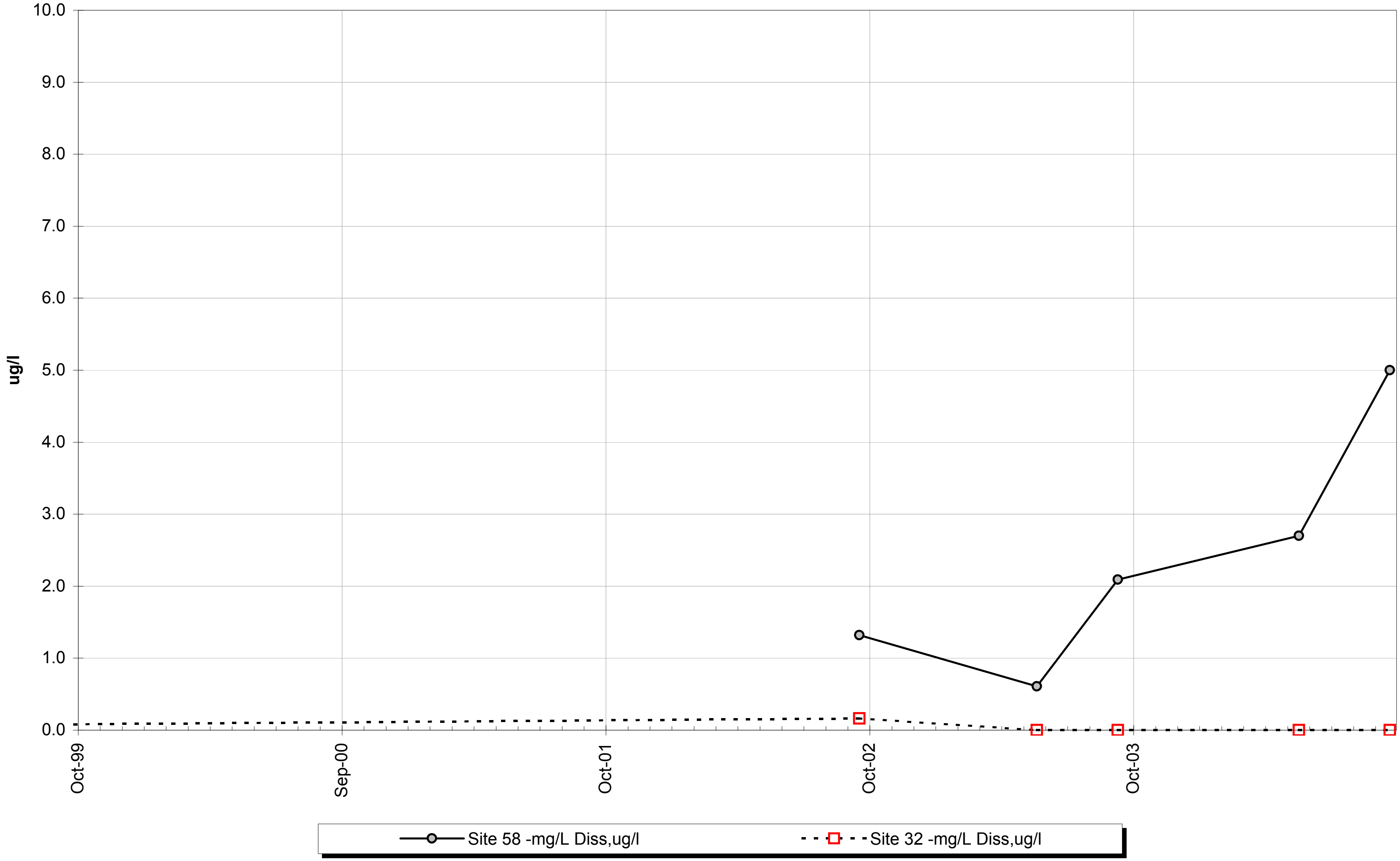


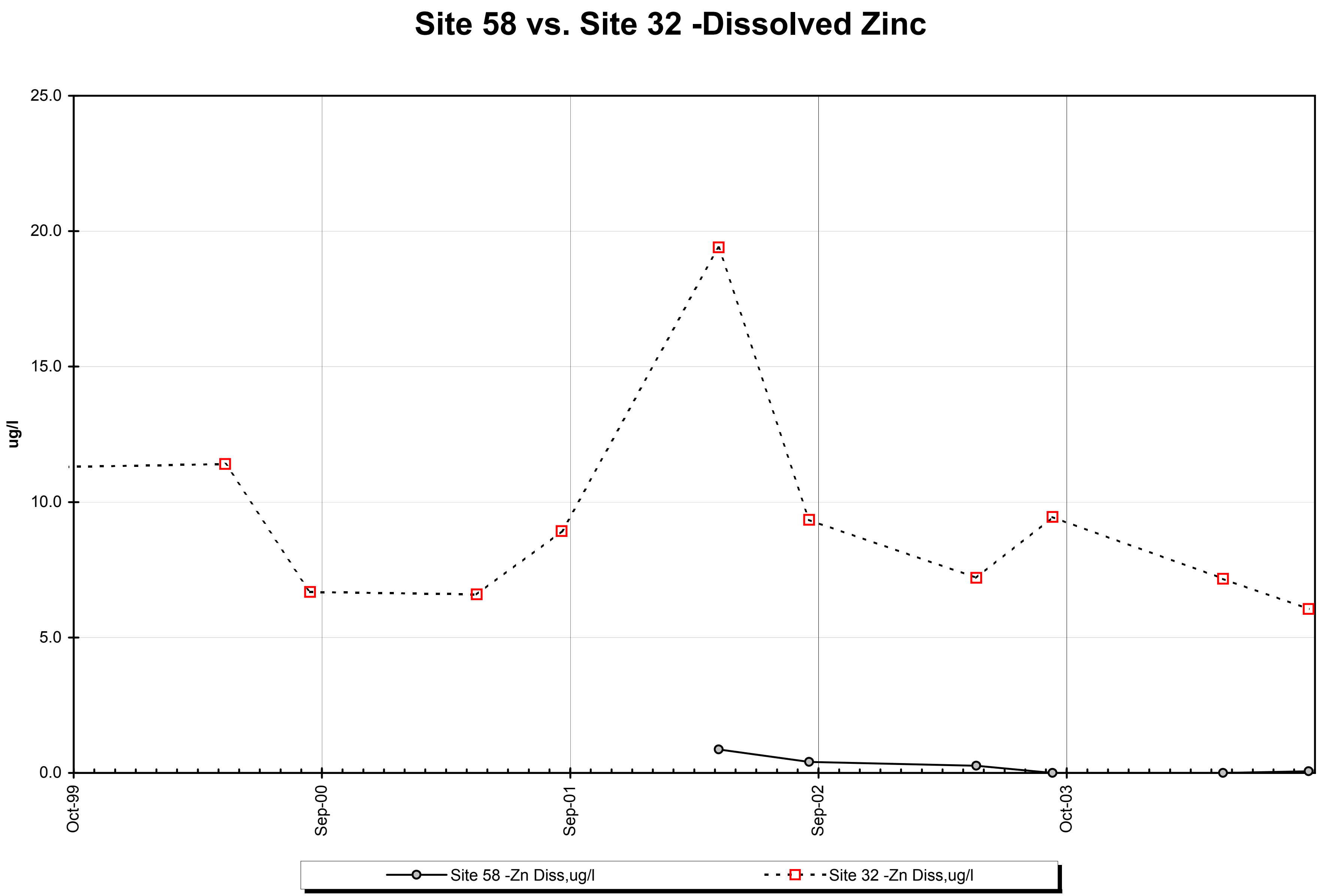
Site 58 vs. Site 32 -Lab pH
pH, su
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
58, pH Lab, su
32, pH Lab, su
AWQS pH, su-Low
AWQS pH, su-High

Site 58 vs. Site 32 -Total Alkalinity



Site 58 vs. Site 32 -Total Sulfate





Site 58 vs. Site 32 -Dissolved Zinc
25.0
20.0
15.0
10.0
5.0
0.0
ug/l
Oct-99
Sep-00
Sep-01
Sep-02
Oct-03
Site 58 -Zn Diss,ug/l
Site 32 -Zn Diss,ug/l

INTERPRETIVE REPORT
SITE 59 "MONITORING WELL T-00-01A"

The data collected during the current water year are listed in the following "Table of Results for Water Year 2002" report. The table includes all the data, field and lab, collected for the current water year and a series of flags keyed to the summary report "Qualified Data by QA Reviewer". The QA report lists any associated data limitations found during the monthly QA reviews of laboratory data for this site. Median values for all analytes have been calculated and are shown in the right-most column of the table of results. Any value reported as less than MDL has been replaced with a value of zero for the purpose of median calculation.

Sampling at this site was added to the FWMP in May-2003. All data collected at this site since it's inception into the FWMP are included in the data analyses. As shown in the table below, there were no data outliers.

Sample Date	Parameter	Value	Qualifier	Notes
No outliers have been identified by KGCMC for the period of Oct-98 though Sept-03.				

The data for water year 2004 have been compared to the strictest fresh water quality criterion for each applicable analyte. No results exceeding these criteria have been identified as listed in the table below.

Sample Date	Parameter	Value	Standard	Standard Type
No exceedances have been identified by KGCMC for the period of Oct-03 though Sept-04.				

X-Y plots have been generated to graphically present the data for each of the analytes requested in the Statistical Information Goals for this site. The inception of sampling at this site commenced in the 2002 water year and thus only four data points are shown on each graph. There are no apparent trends present in the limited data collected to data.

Table of Results for Water Year 2004

Site 59 "MW-T-00-01A"													
Sample Date/Parameter	Oct-03	Nov-03	Dec-03	Jan-04	Feb-04	Mar-04	Apr-04	5/18/2004	Jun-04	Jul-04	Aug-04	9/21/2004	**Median**
Water Temp (°C)	NOT SCHEDULED FOR SAMPLING							7.3	NOT SCHEDULED FOR SAMPLING			9.9	8.6
Conductivity-Field(μmho)								106				102	104
Conductivity-Lab (μmho)								99				93	96
pH Lab (standard units)								6.61				7.15	6.88
pH Field (standard units)								6.66				6.87	6.77
Total Alkalinity (mg/L)								40.6				42.8	41.7
Total Sulfate (mg/L)								3.6				3.8	3.7
Hardness (mg/L)								45.1				42.0	43.6
Dissolved As (ug/L)								0.079 J				0.138	0.109
Dissolved Ba (ug/L)								6.3				4.5	5.4
Dissolved Cd (ug/L)								<0.023				0.006	0.009
Dissolved Cr (ug/L)								4.300 J				2.930	3.615
Dissolved Cu (ug/L)								0.072 U				0.379	0.226
Dissolved Pb (ug/L)								<0.0110				0.0057	0.0056
Dissolved Ni (ug/L)								0.502 J				0.488	0.495
Dissolved Ag (ug/L)								<0.009 UJ				<0.003	0.003
Dissolved Zn (ug/L)								0.52 UJ				1.71	1.12
Dissolved Se (ug/L)								<0.496 UJ				<0.017	0.128
Dissolved Hg (ug/L)								0.000420 U				0.000244	0.000332

For individual sample/analyte qualifier descriptions see "Qualified Data by QA Reviewer" table.

Values reported as less than MDL are replaced by 1/2 MDL for median calculation purposes.

Shaded data has been qualified as an outlier by KGCMC and removed from any further analysis and is not included into the calculation of the median

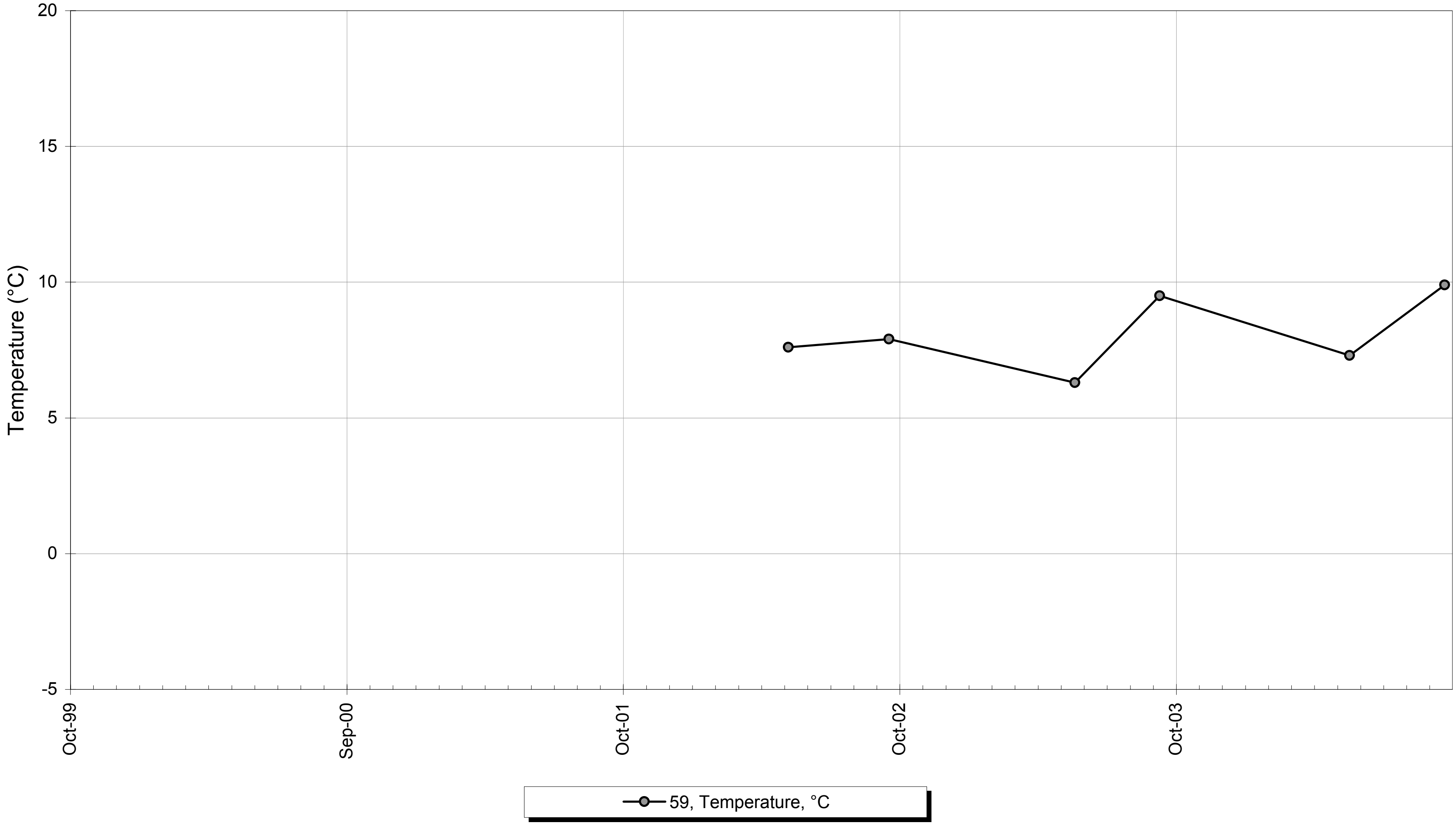
Qualified Data by QA Reviewer

Date Range: 10/01/2003 to 09/30/2004

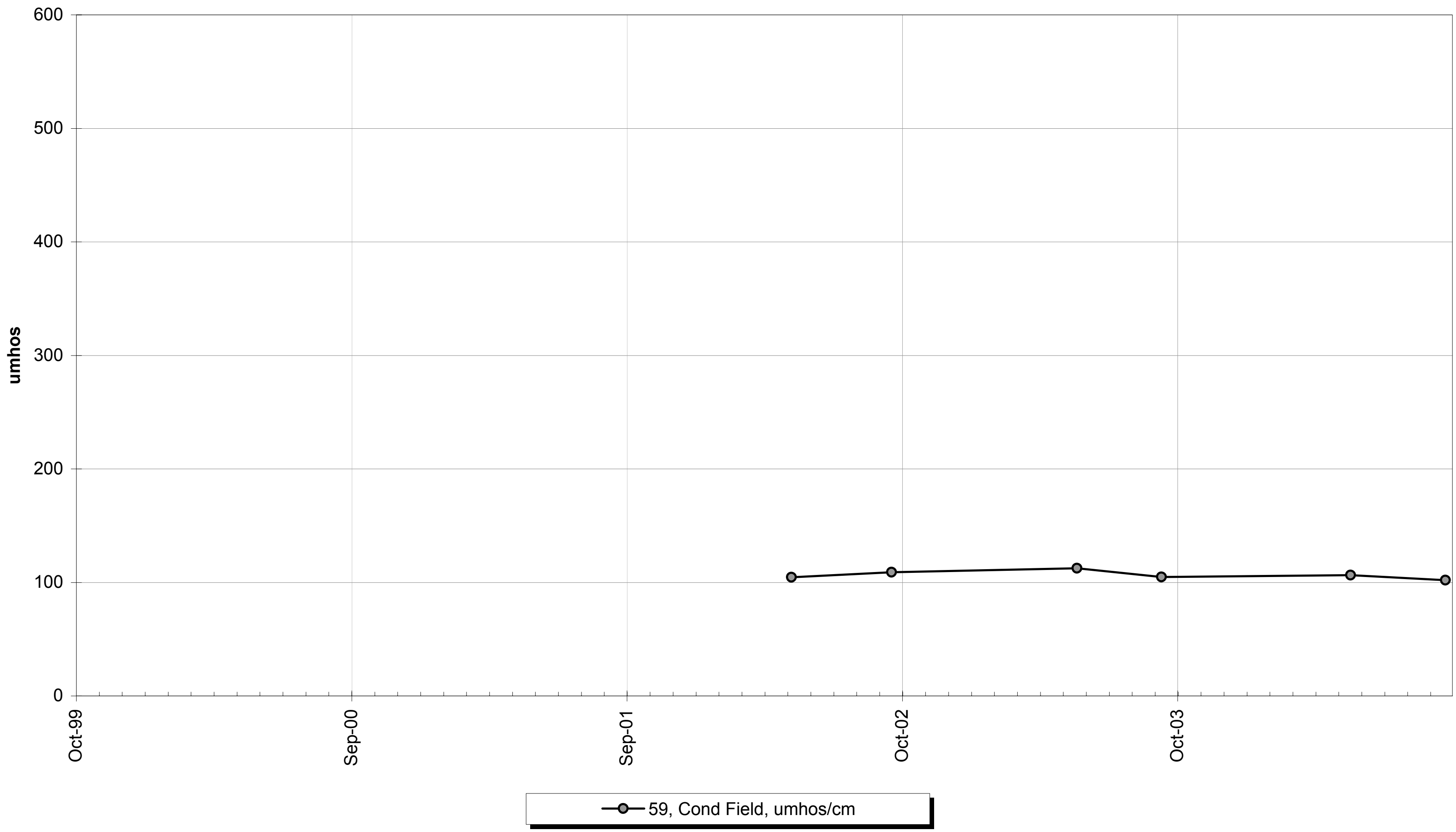
Site No.	Sample Date	Sample Time	Parameter	Value	Qualifier	Reason for Qualifier
59	05/18/2004	1:13:00 PM				
			As Diss, ug/l	0.0791	J	Below Quantitative Range
			Cr Diss, ug/l	4.3	J	CCV Recovery
			Cu Diss, ug/l	0.0722	U	Field Blank Contamination
			Ni Diss, ug/l	0.502	J	CCV Recovery
			Ag Diss, ug/l	-0.009	UJ	MS Recovery
			Zn Diss, ug/l	0.521	UJ	LCS Recovery, Field Blank C
			Se Diss, ug/l	-0.496	UJ	LCS Recovery
			Hg Diss, ug/l	0.00042	U	Method Blank Contamination

Qualifier	Description
J	Positively Identified - Approximate Concentration
N	Presumptive Evidence For Tentative Identification
NJ	Tentatively Identified - Approximate Concentration
R	Rejected - Cannot Be Verified
U	Not Detected Above Quantitation Limit
UJ	Not Detected Above Approximate Quantitation Limit

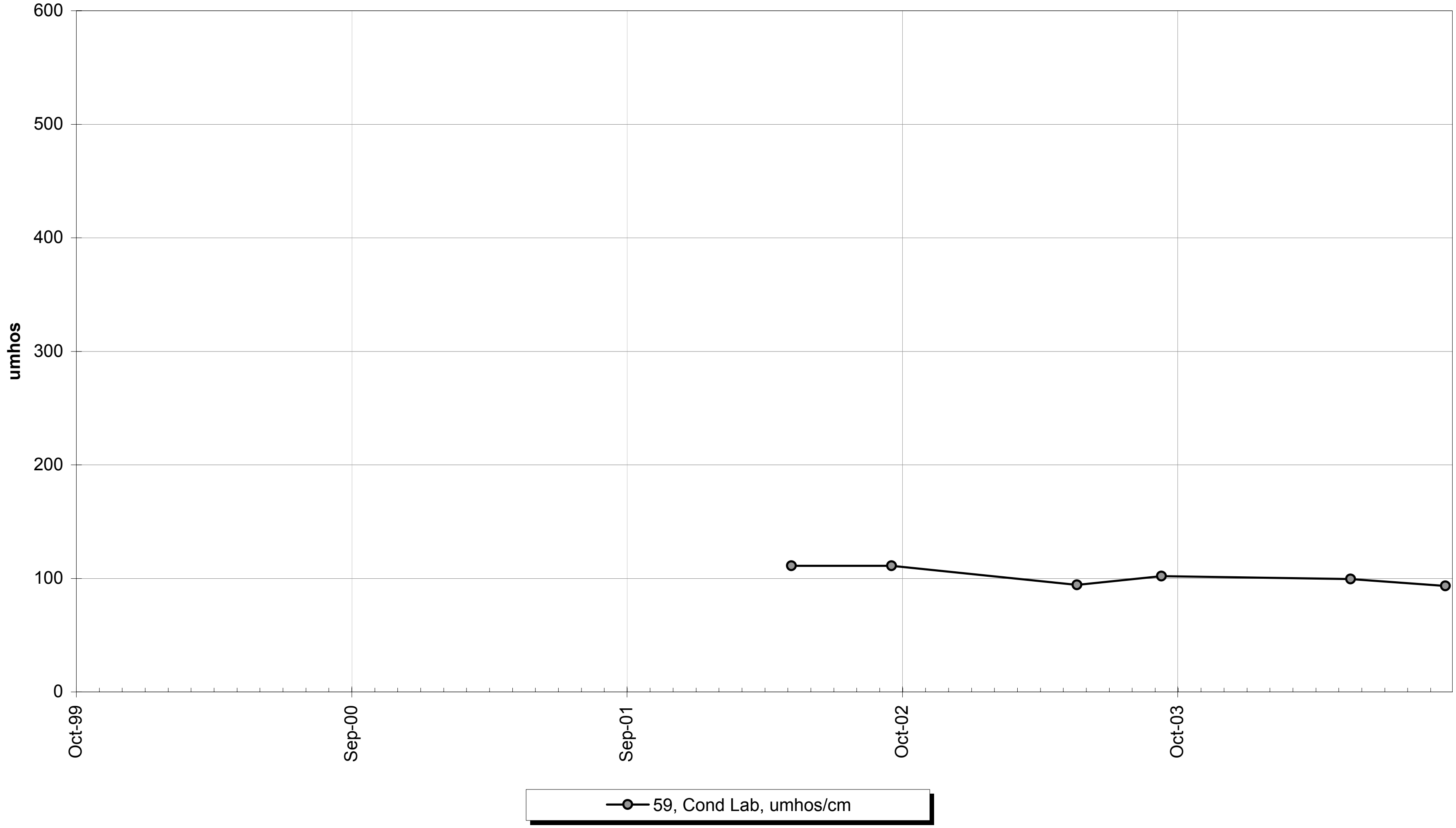
Site 59 -Water Temperature



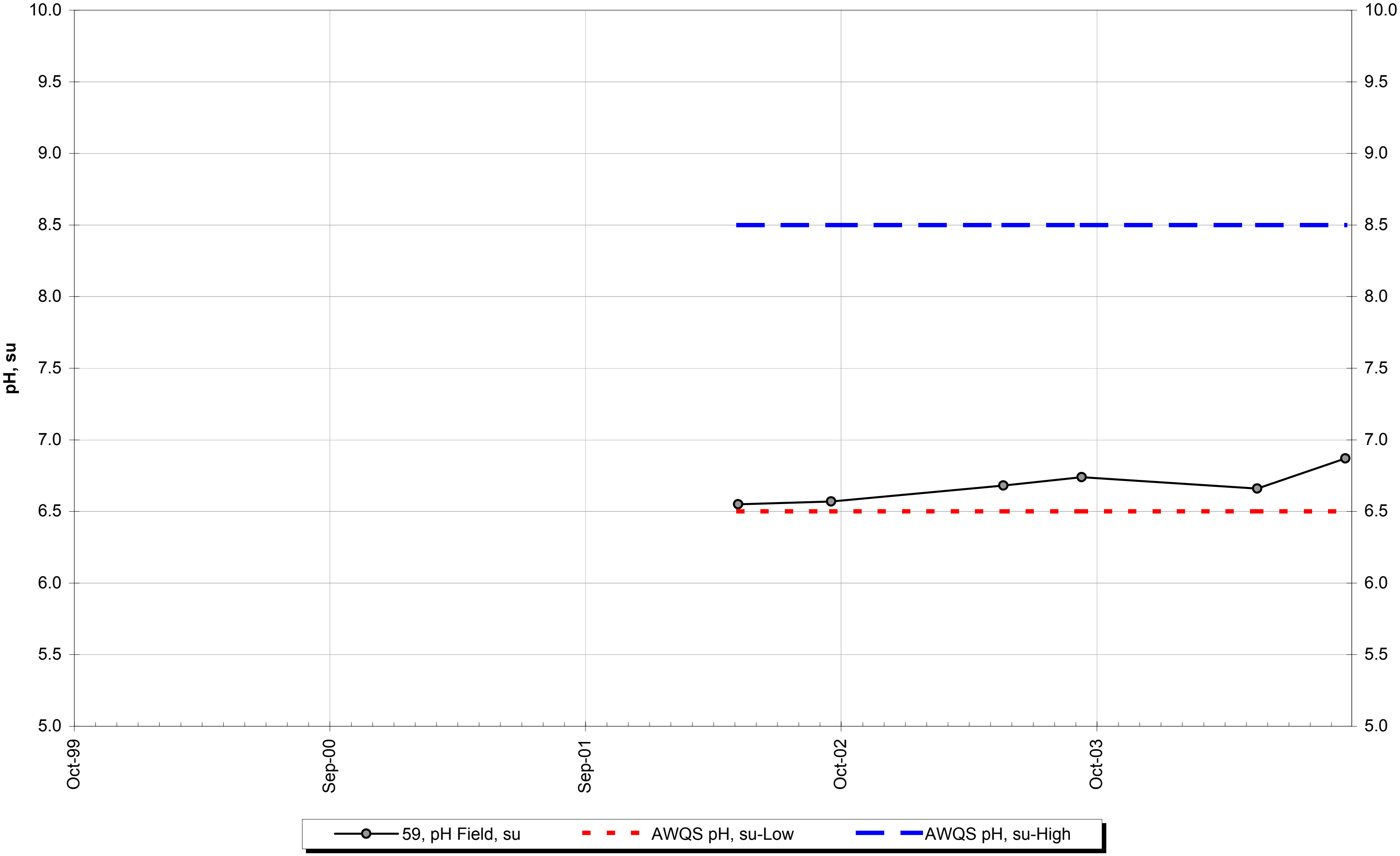
Site 59 -Conductivity-Field

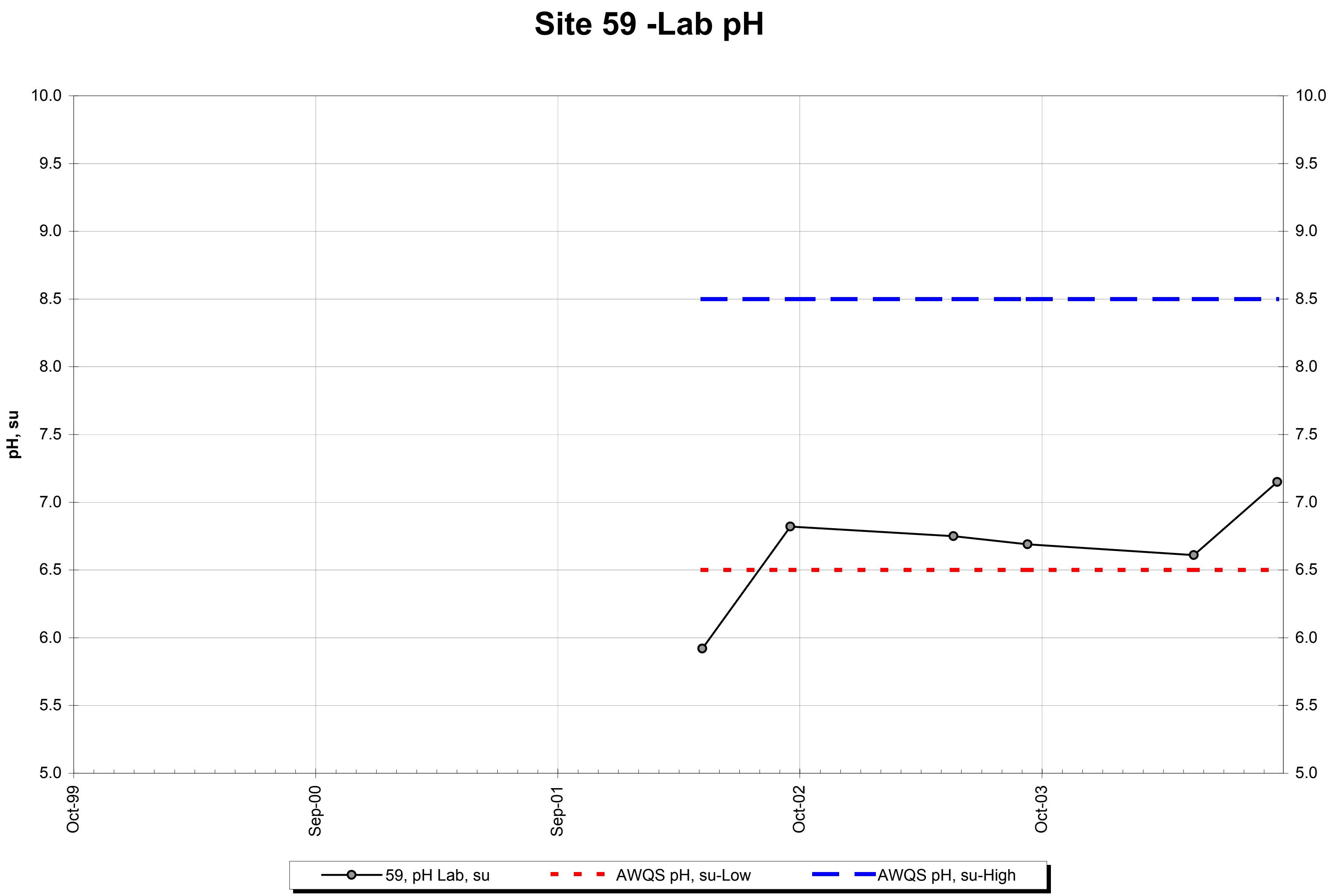


Site 59 -Conductivity-Lab



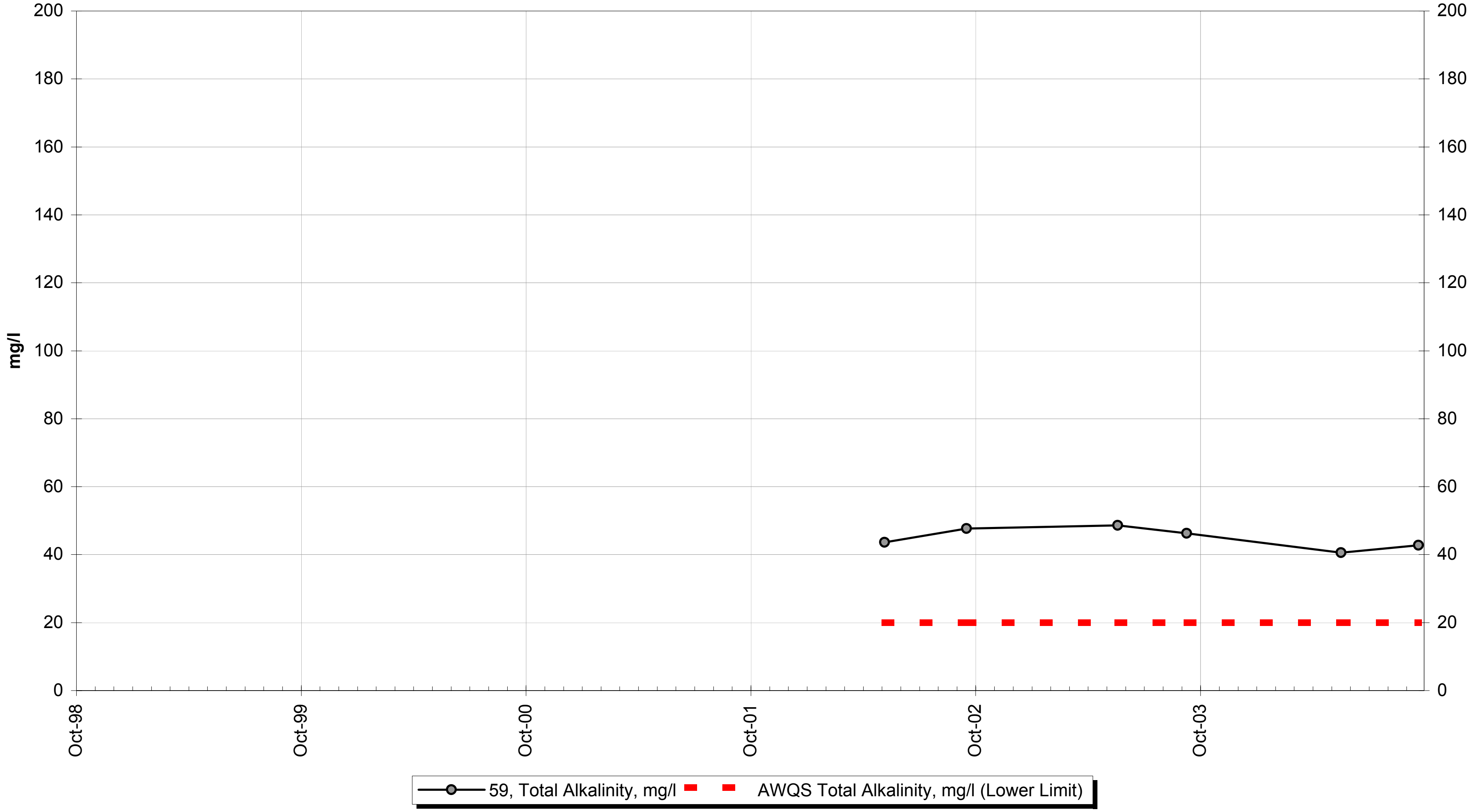
Site 59 -Field pH



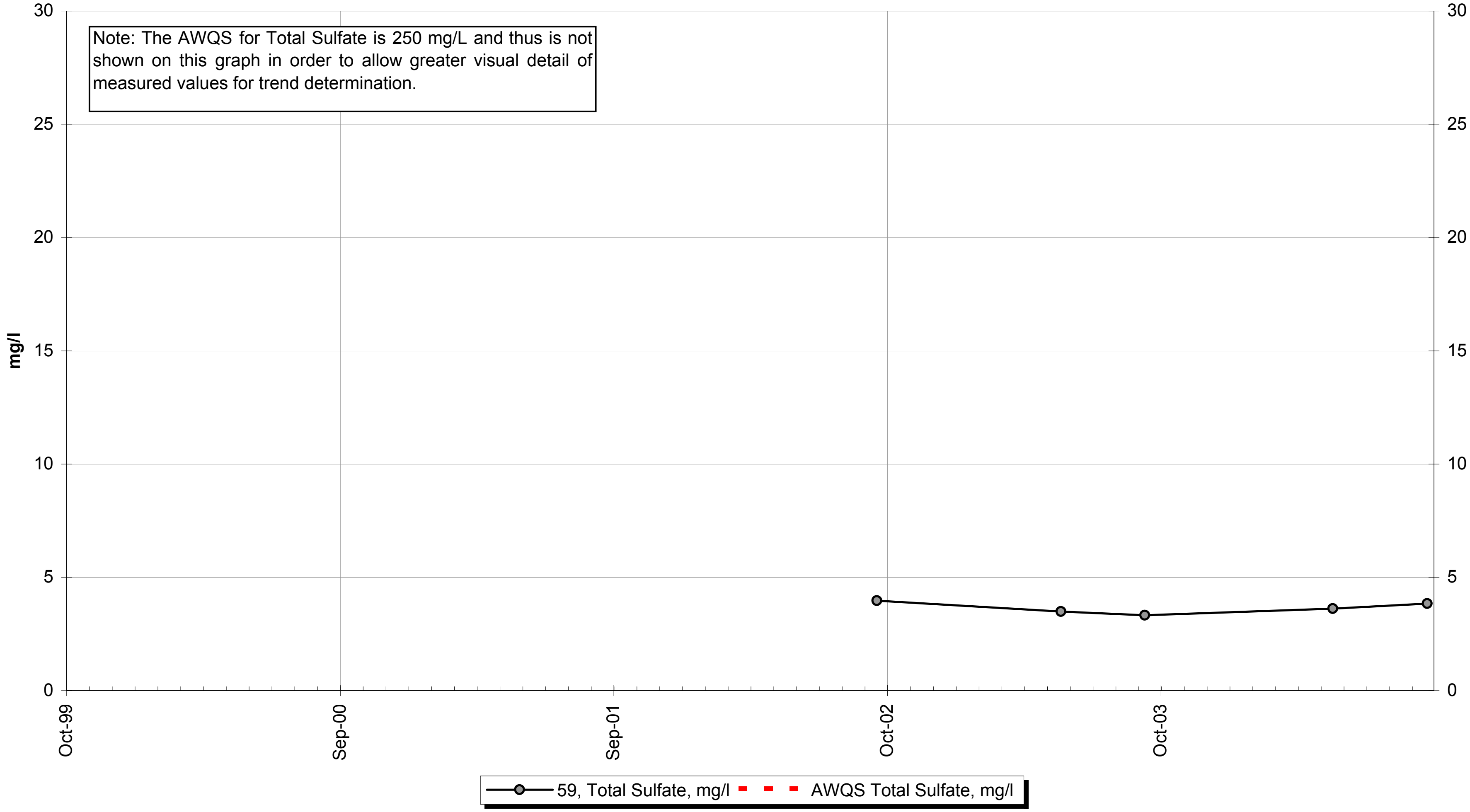


Site 59 -Lab pH
pH, su
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
59, pH Lab, su
AWQS pH, su-Low
AWQS pH, su-High

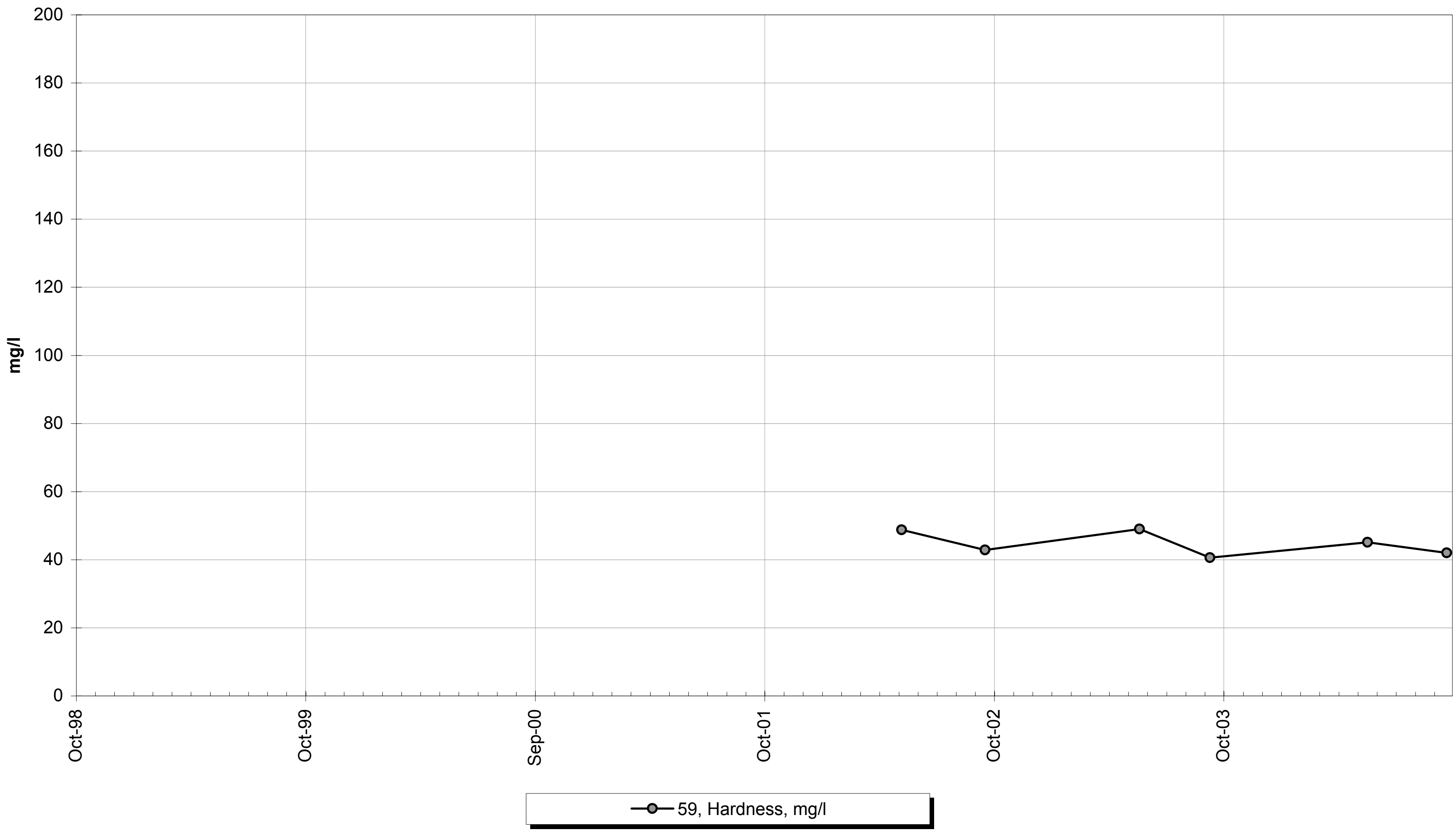
Site 59 -Total Alkalinity

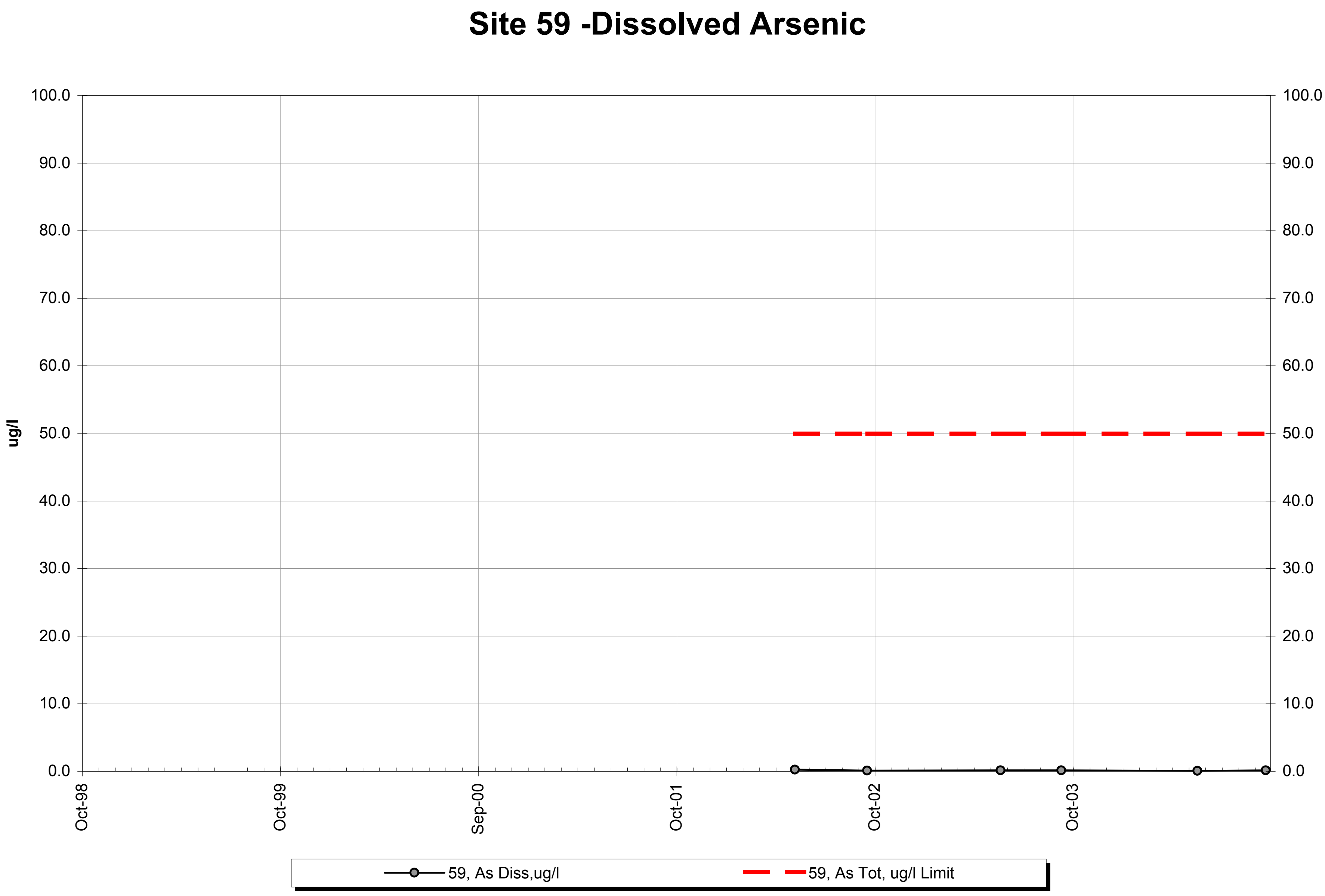


Site 59 -Total Sulfate

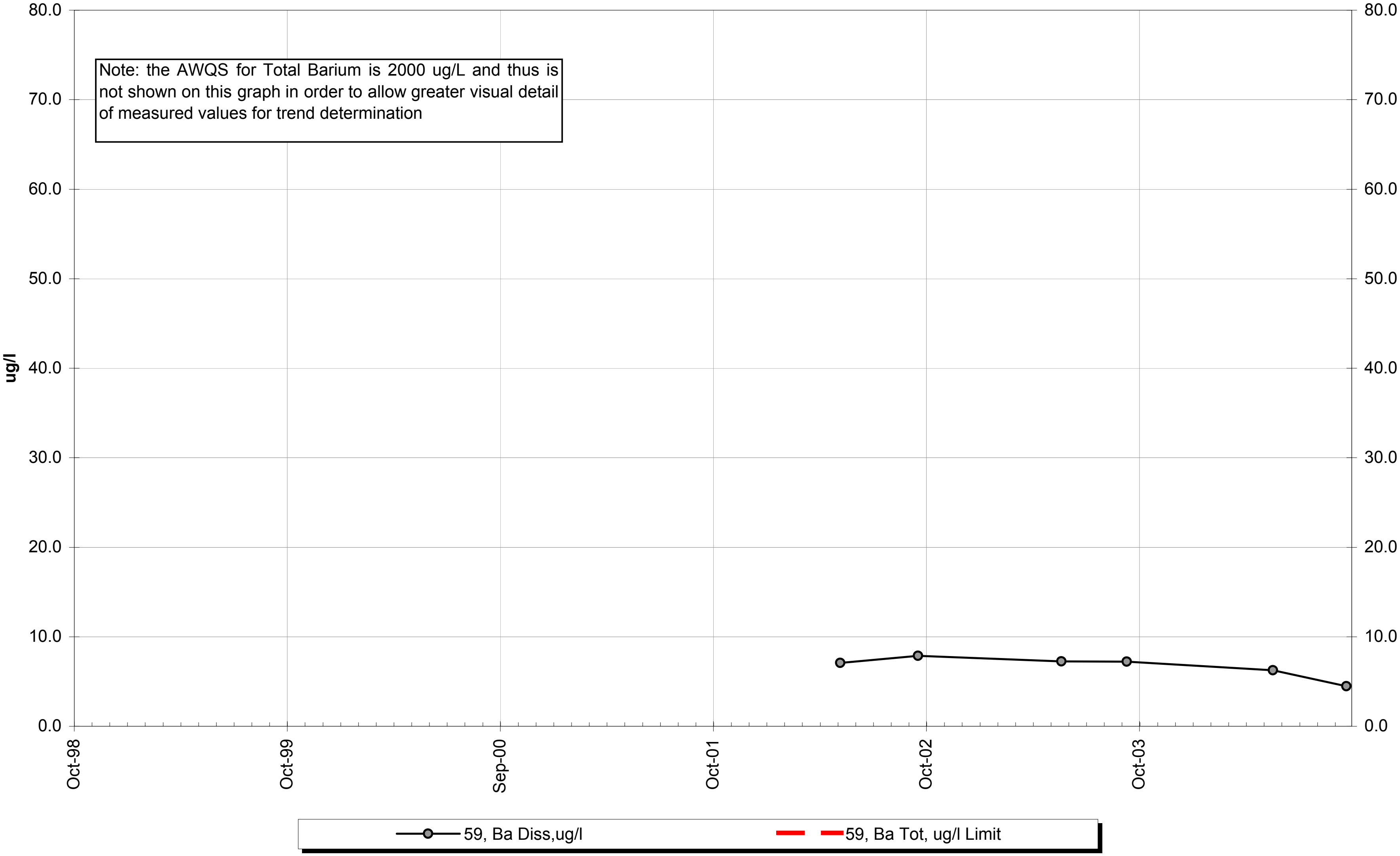


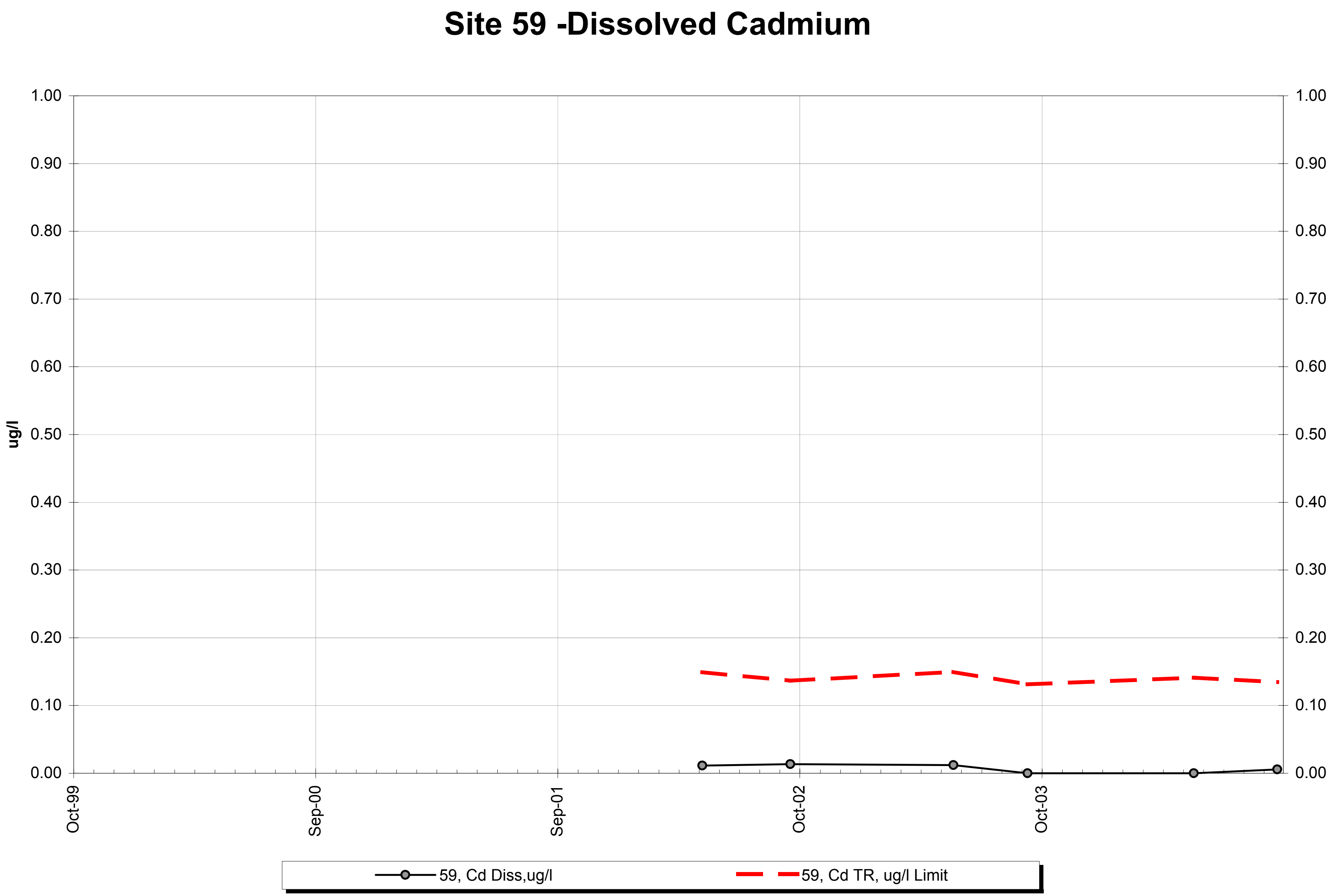
Site 59 -Hardness



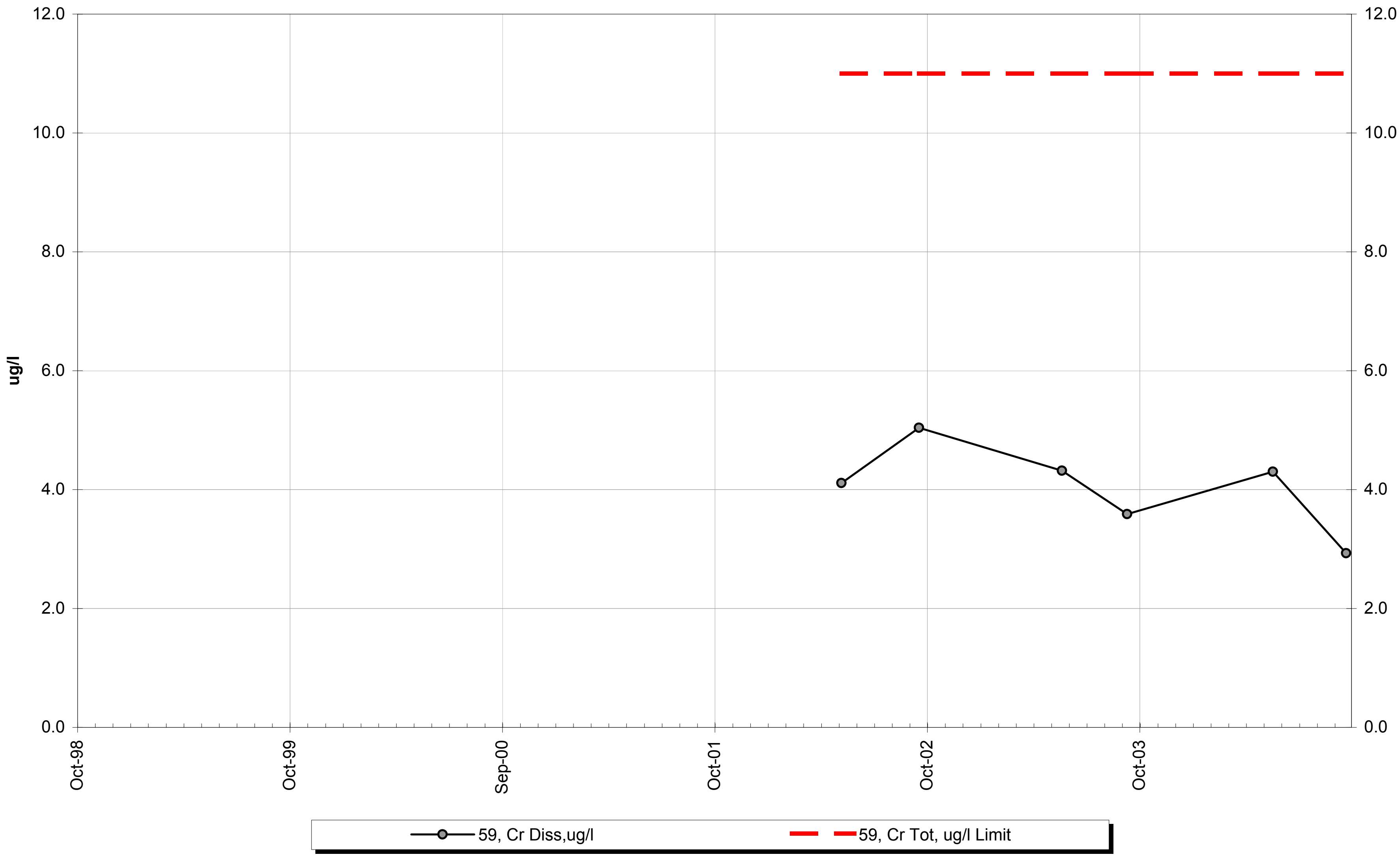

Site 59 -Dissolved Arsenic
ug/l
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
59, As Diss,ug/l
59, As Tot, ug/l Limit

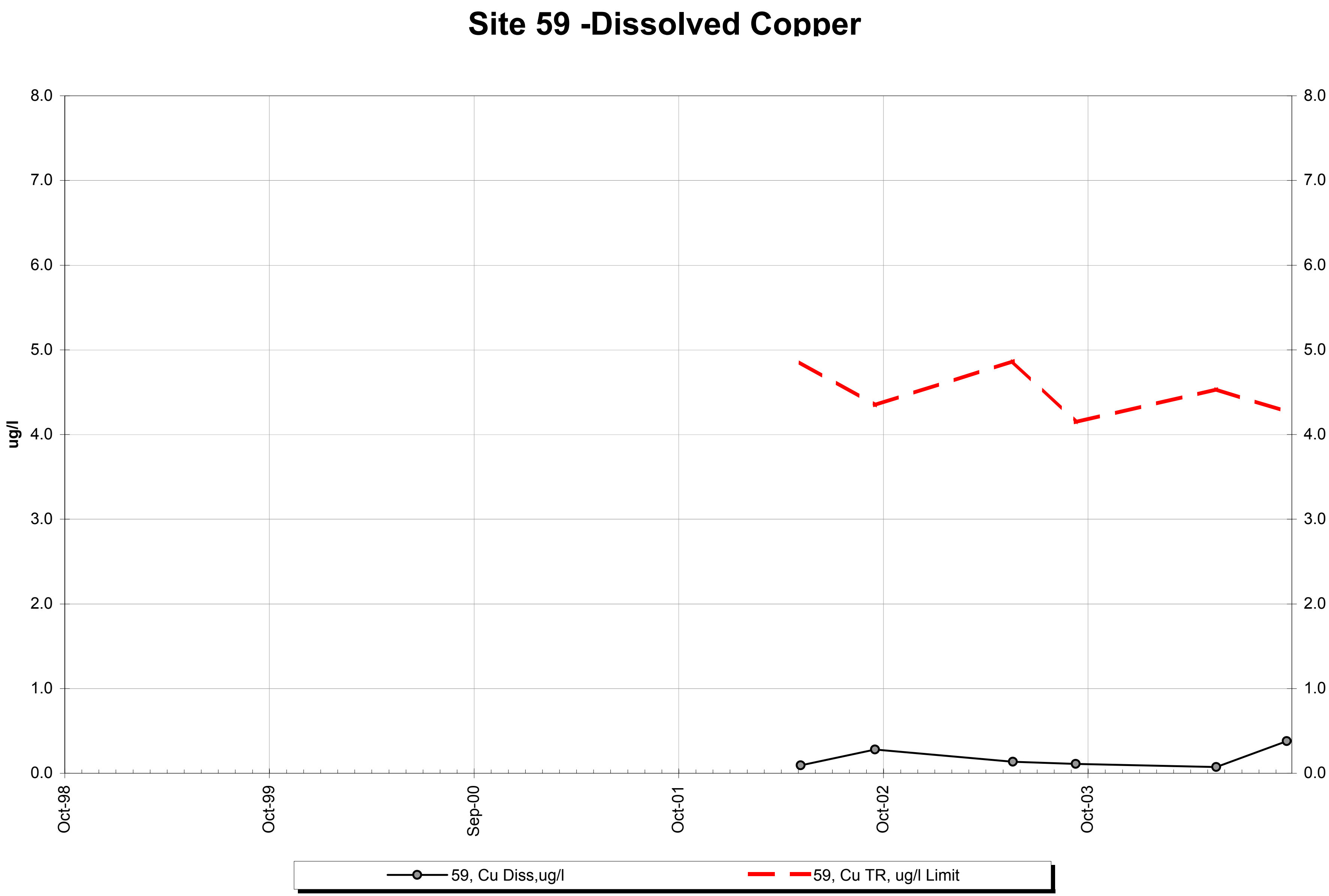
Site 59 -Dissolved Barium




Site 59 -Dissolved Cadmium
ug/l
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
59, Cd Diss,ug/l
59, Cd TR, ug/l Limit

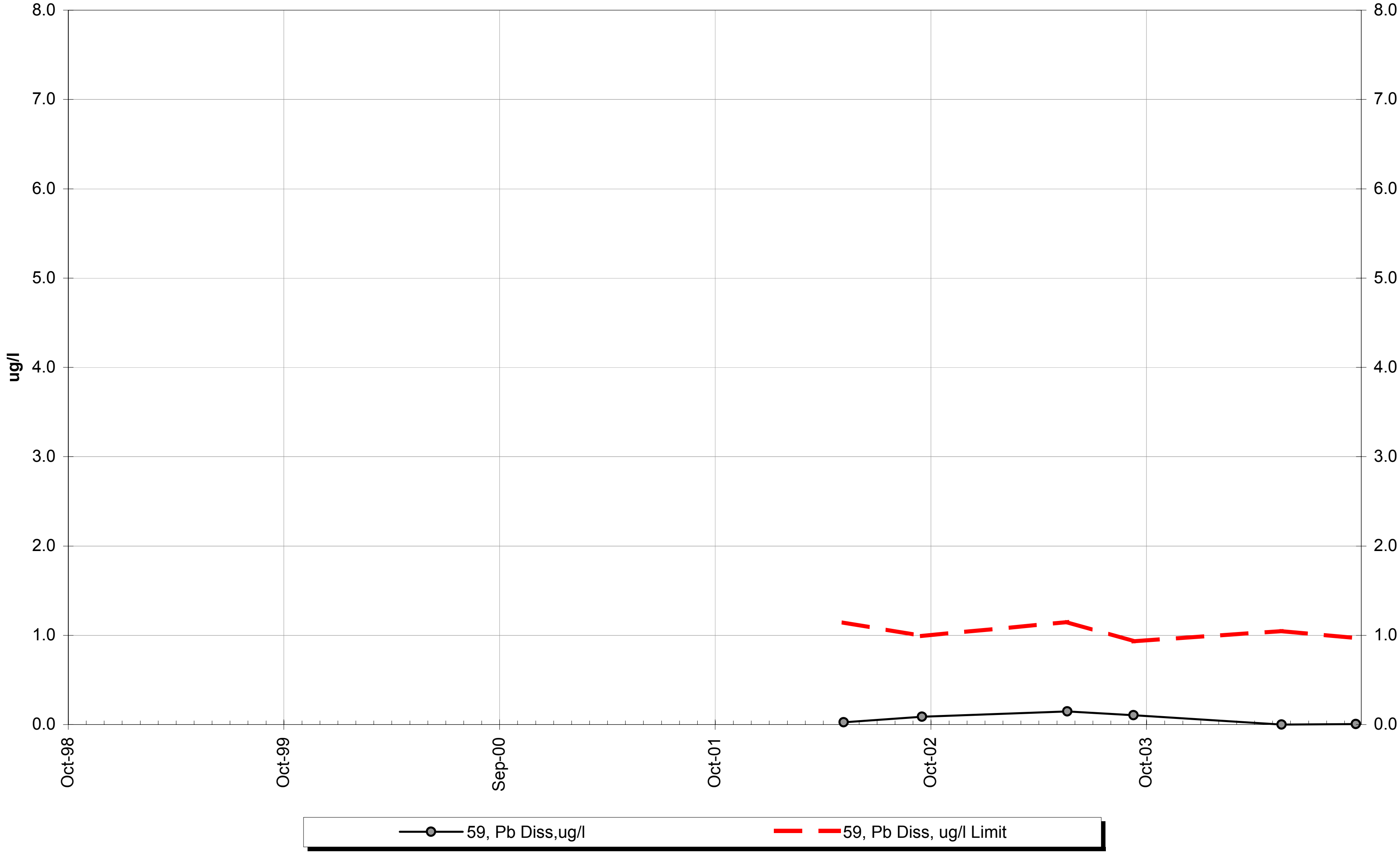
Site 59 -Dissolved Chromium



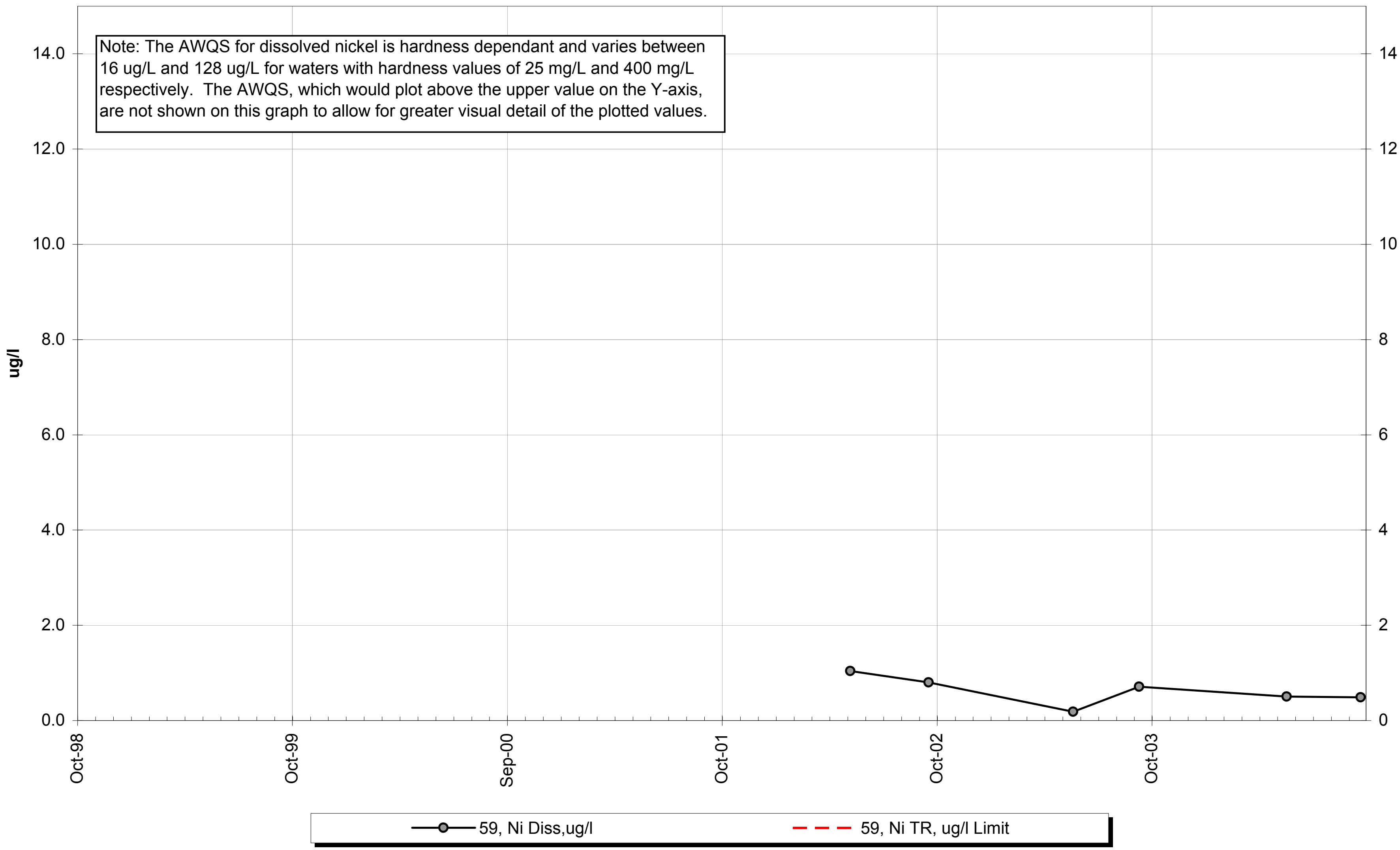


Site 59 -Dissolved Copper
ug/l
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
59, Cu Diss,ug/l
59, Cu TR, ug/l Limit

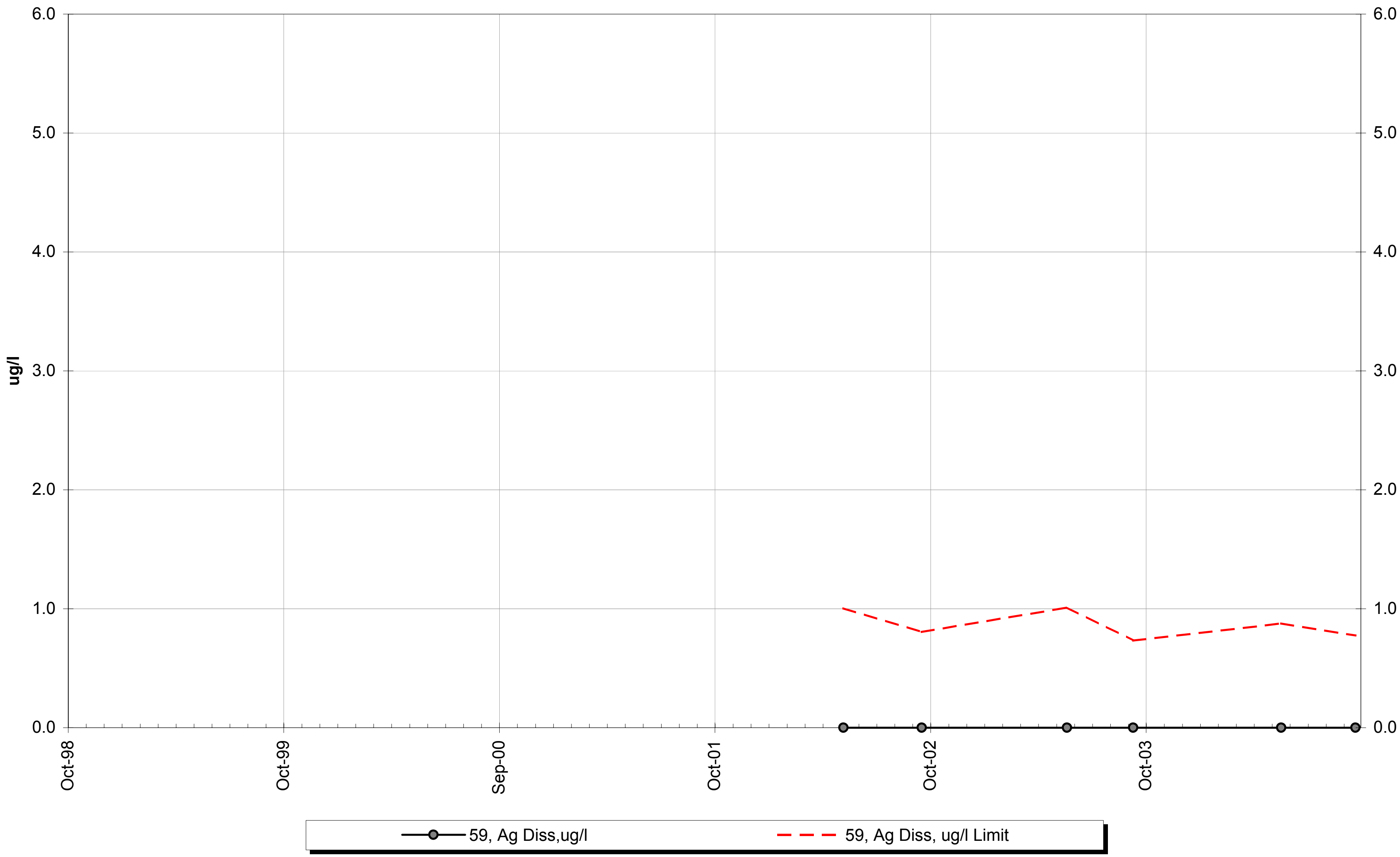
Site 59 -Dissolved Lead



Site 59 -Dissolved Nickel

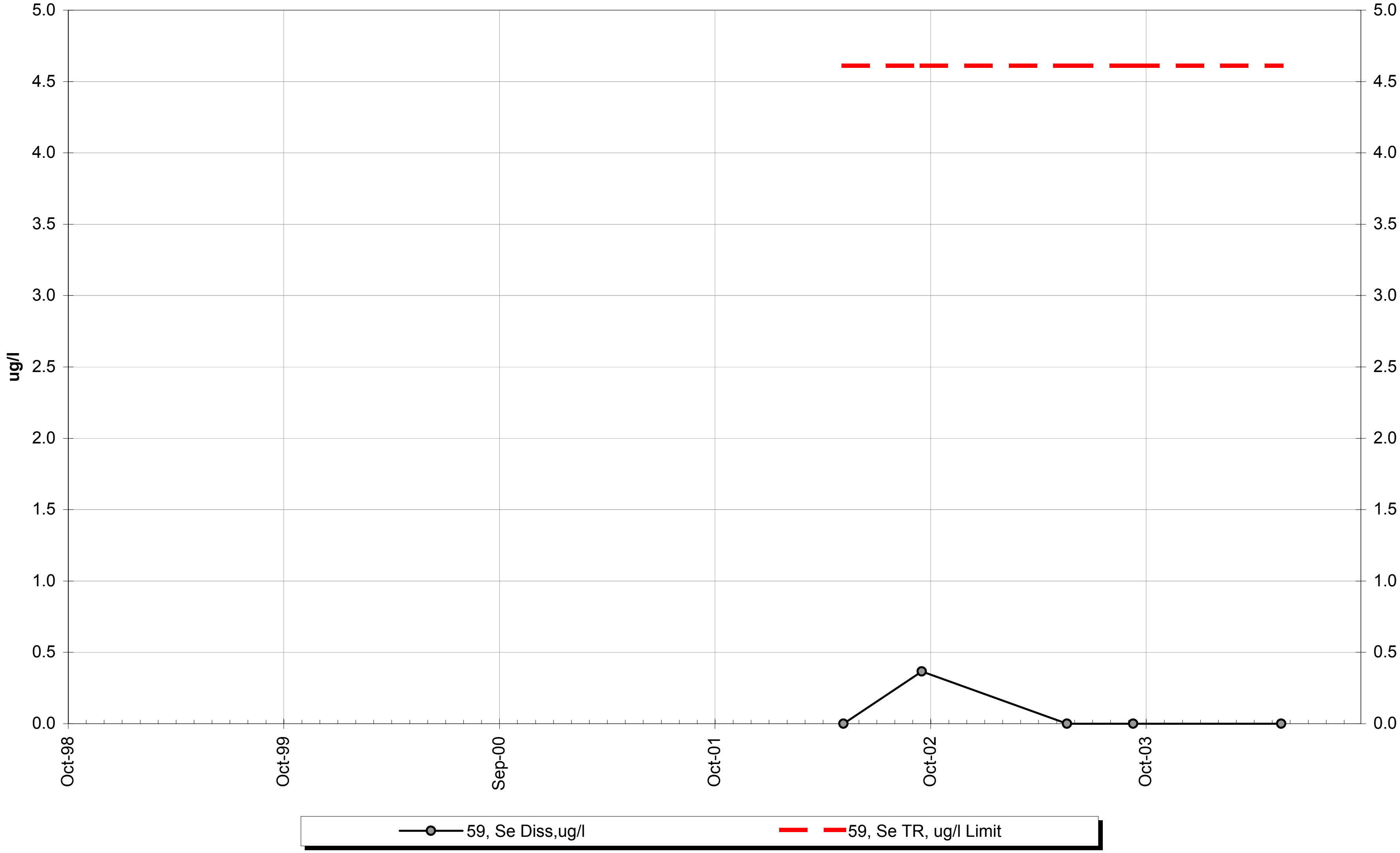


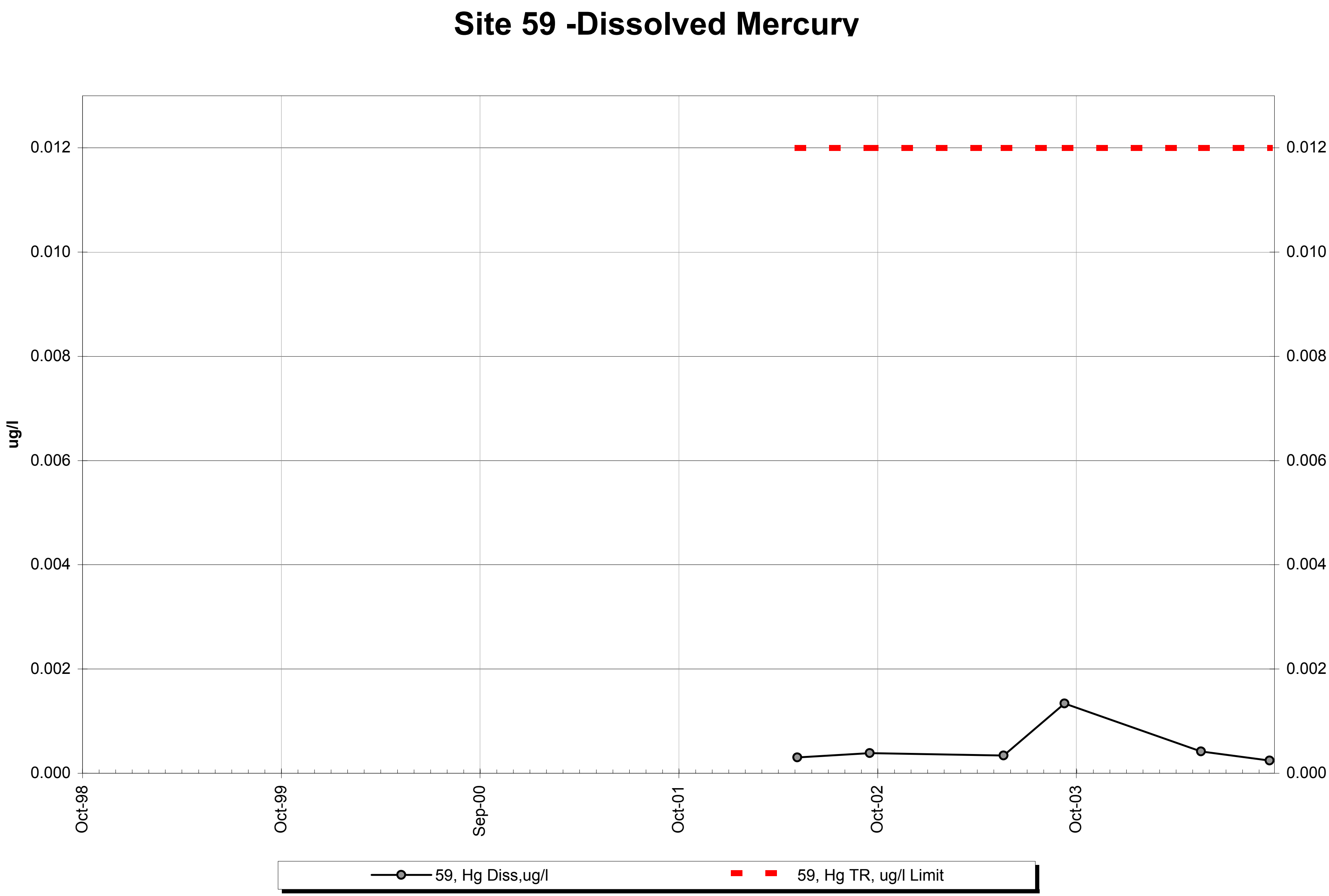
Site 59 -Dissolved Silver



Site 59 -Dissolved Zinc
ug/l
0
10
20
30
40
50
60
70
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
59, Zn Diss,ug/l
59, Zn TR, ug/l Limit

Site 59 -Dissolved Selenium




Site 59 -Dissolved Mercury
ug/l
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
59, Hg Diss,ug/l
59, Hg TR, ug/l Limit

INTERPRETIVE REPORT
SITE 28 "MONITORING WELL 2D"

The data collected during the current water year are listed in the following "Table of Results for Water Year 2004" report. The table includes all the data, field and lab, collected for the current water year and a series of flags keyed to the summary report "Qualified Data by QA Reviewer". The QA report lists any associated data limitations found during the monthly QA reviews of laboratory data for this site. Median values for all analytes have been calculated and are shown in the right-most column of the table of results. Any value reported as less than MDL has been replaced with a value of zero for the purpose of median calculation.

All data collected at this site for the past five years are included in the data analyses. As shown in the table below, there were no data outliers.

Sample Date	Parameter	Value	Qualifier	Notes
No outliers have been identified by KGCMC for the period of Oct-98 though Sept-03.				

The data for Water Year 2004 have been compared to the strictest fresh water quality criterion for each applicable analyte. Three results exceeding these criteria have been identified, as listed in the table below. One datum is for a lab pH value above the upper limit of 8.5 su listed in AWQS. Lab pH for Site 28 has historically resulted in values ranging from a pH of 7.0 to 8.8 su which are characteristic for wells completed in marine sediments. Two datum are for dissolved arsenic values of 75.0 μg/l and 69.7 μg/l for May-2004 and September-2004 respectively which exceed the AWQS of 50 μg/l. This site has routinely returned arsenic values above the AWQS and has a median value of 74.0 μg/l based on sampling since October-1988.

Sample Date	Parameter	Value	Standard	Standard Type
05/18/04	pH Field, su	8.66	6.5 - 8.5	Aquatic Life
05/18/04	Arenic Dissolved ug/L	75	50*	Drinking Water
09/21/04	Arenic Dissolved ug/L	69.7	50*	Drinking Water
	* Standard is for Total Arsenic			

X-Y plots have been generated to graphically present the data for each of the analytes requested in the Statistical Information Goals for this site. These plots have been visually analyzed for the appearance of any trend in concentration. No obvious trends were apparent. Additional X-Y plots have been generated for alkalinity, pH, sulfate, conductance, and dissolved zinc that co-plot data from Site 28 and Site 59, the up-gradient control site, to aid in comparison between those two sites. Lab conductivity, lab pH, sulfate, and total alkalinity are all higher at Site 28 than at Site 59 while the dissolved zinc concentrations are similar. Site 59 and Site 28 are deep completion wells that are each respectively colocated with Site 58 and Site 27. A similar line of reasoning discussed in the section for Site 28 can be applied to explaining the differences in water chemistry between Site 59 and Site 28. Thus, the generally higher concentrations at Site

28 reflect the more mature nature of the groundwater sampled at this site, while the similar values for dissolved zinc are a strong indication of the lack of any influence from tailings contact water.

Table of Results for Water Year 2004

Site 28 "MW-2D"

Sample Date/Parameter	Oct-03	Nov-03	Dec-03	Jan-04	Feb-04	Mar-04	Apr-04	5/18/2004	Jun-04	Jul-04	Aug-04	9/21/2004	**Median**
Water Temp (°C)								6.5				8.0	7.3
Conductivity-Field(µmho)								243				220	232
Conductivity-Lab (µmho)								221				197	209
pH Lab (standard units)								8.14				8.38	8.26
pH Field (standard units)								8.50				8.66	8.58
Total Alkalinity (mg/L)								92.3				85.0	88.7
Total Sulfate (mg/L)								9.2				9.0	9.1
Hardness (mg/L)								74.8				74.5	74.7
Dissolved As (ug/L)								75.000		NOT SCHEDULED FOR SAMPLING		69.700	72.350
Dissolved Ba (ug/L)				NOT SCHEDULED FOR SAMPLING				5.3				7.8	6.5
Dissolved Cd (ug/L)								<0.023				<0.005	0.007
Dissolved Cr (ug/L)								0.640 J				0.052	0.346
Dissolved Cu (ug/L)								0.024 UJ				0.026	0.025
Dissolved Pb (ug/L)								<0.0110				<0.0050	0.0040
Dissolved Ni (ug/L)								0.159 UJ				0.309	0.234
Dissolved Ag (ug/L)								<0.009 UJ				<0.003	0.003
Dissolved Zn (ug/L)								0.09 UJ				0.13	0.11
Dissolved Se (ug/L)								<0.496 UJ				<0.017	0.128
Dissolved Hg (ug/L)								0.003350				0.000239	0.001795

For individual sample/analyte qualifier descriptions see "Qualified Data by QA Reviewer" table.

Values reported as less than MDL are replaced by 1/2 MDL for median calculation purposes.

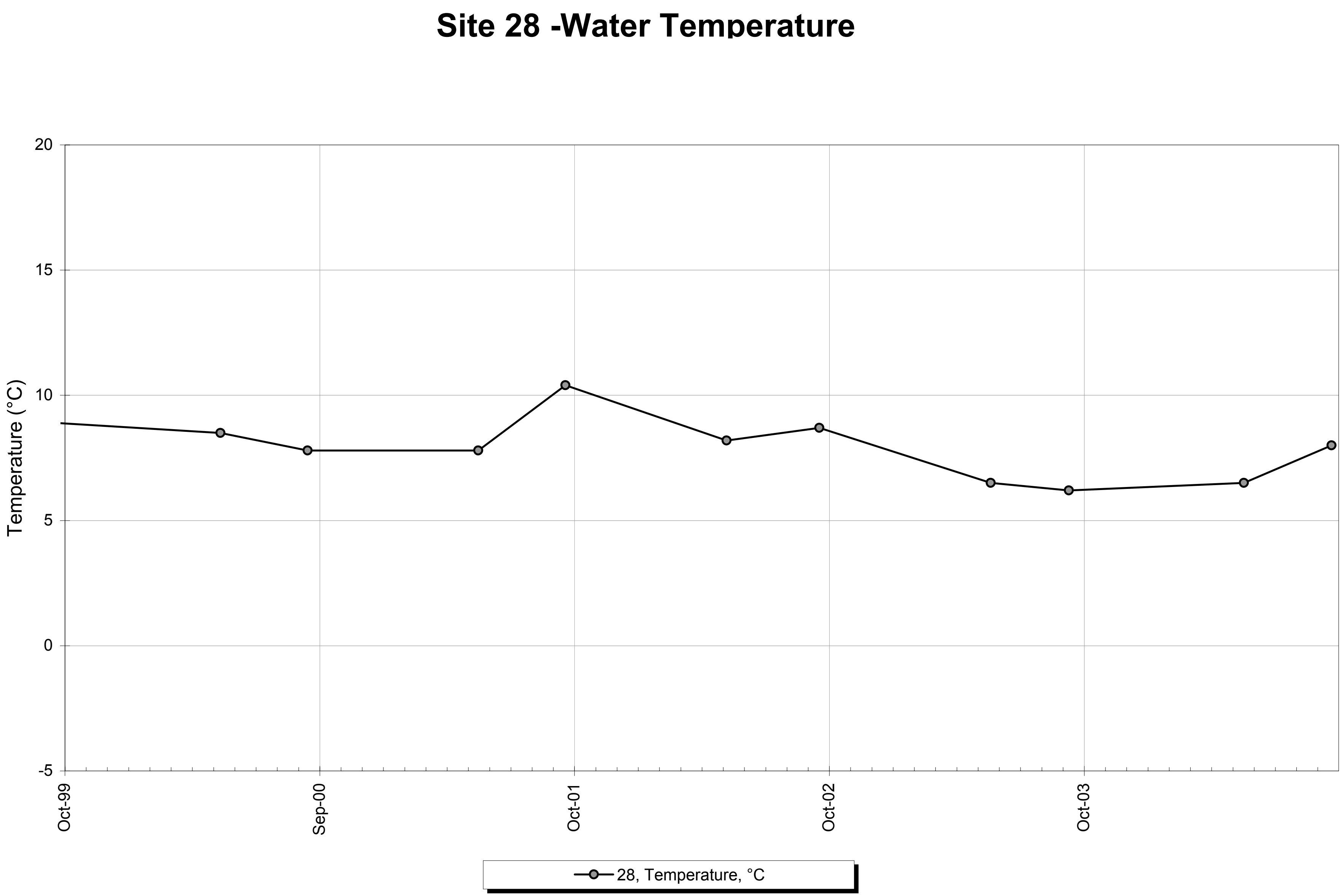
Shaded data has been qualified as an outlier by KGCMC and removed from any further analysis and is not included into the calculation of the median

Qualified Data by QA Reviewer

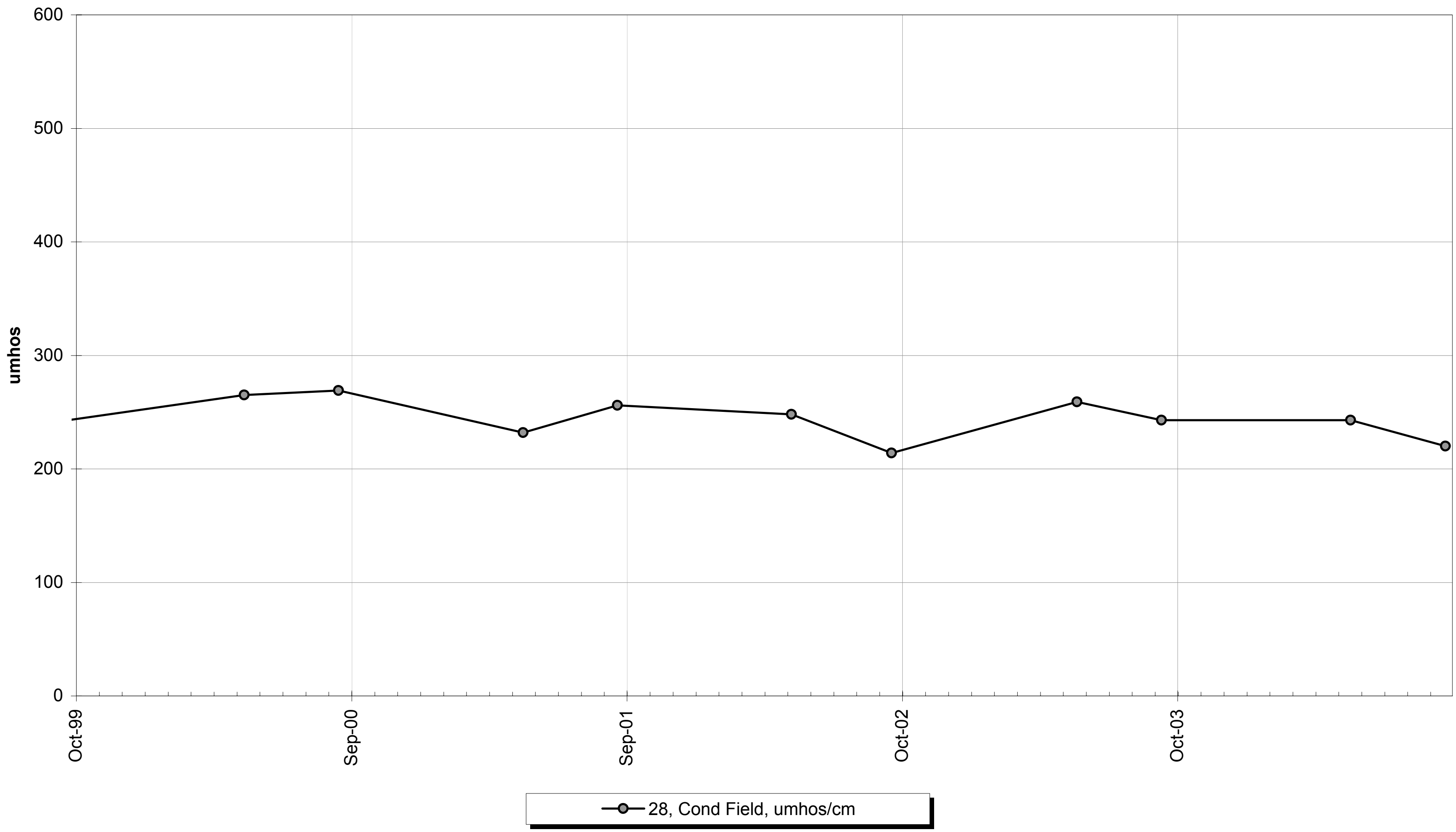
Date Range: 10/01/2003 to 09/30/2004

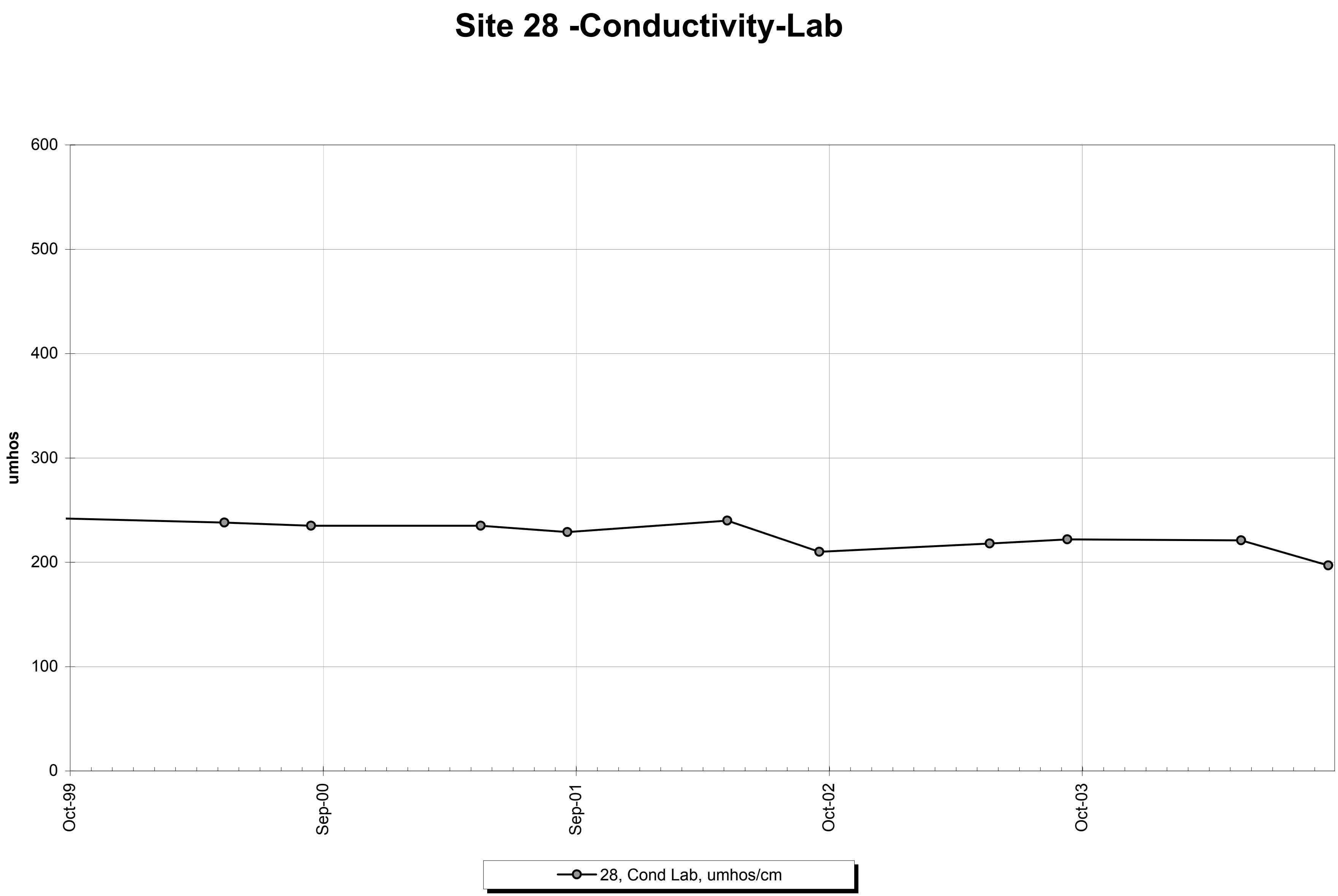
Site No.	Sample Date	Sample Time	Parameter	Value	Qualifier	Reason for Qualifier
28	05/18/2004	11:02:00 AM				
			Cr Diss, ug/l	0.64	J	CCV Recovery
			Cu Diss, ug/l	0.0243	UJ	Below Quantitative Range, Fi
			Ni Diss, ug/l	0.159	UJ	CCV Recovery, Method Blan
			Ag Diss, ug/l	-0.009	UJ	MS Recovery
			Zn Diss, ug/l	0.0902	UJ	Below Quantitative Range, L
			Se Diss, ug/l	-0.496	UJ	LCS Recovery

Qualifier	Description
J	Positively Identified - Approximate Concentration
N	Presumptive Evidence For Tentative Identification
NJ	Tentatively Identified - Approximate Concentration
R	Rejected - Cannot Be Verified
U	Not Detected Above Quantitation Limit
UJ	Not Detected Above Approximate Quantitation Limit

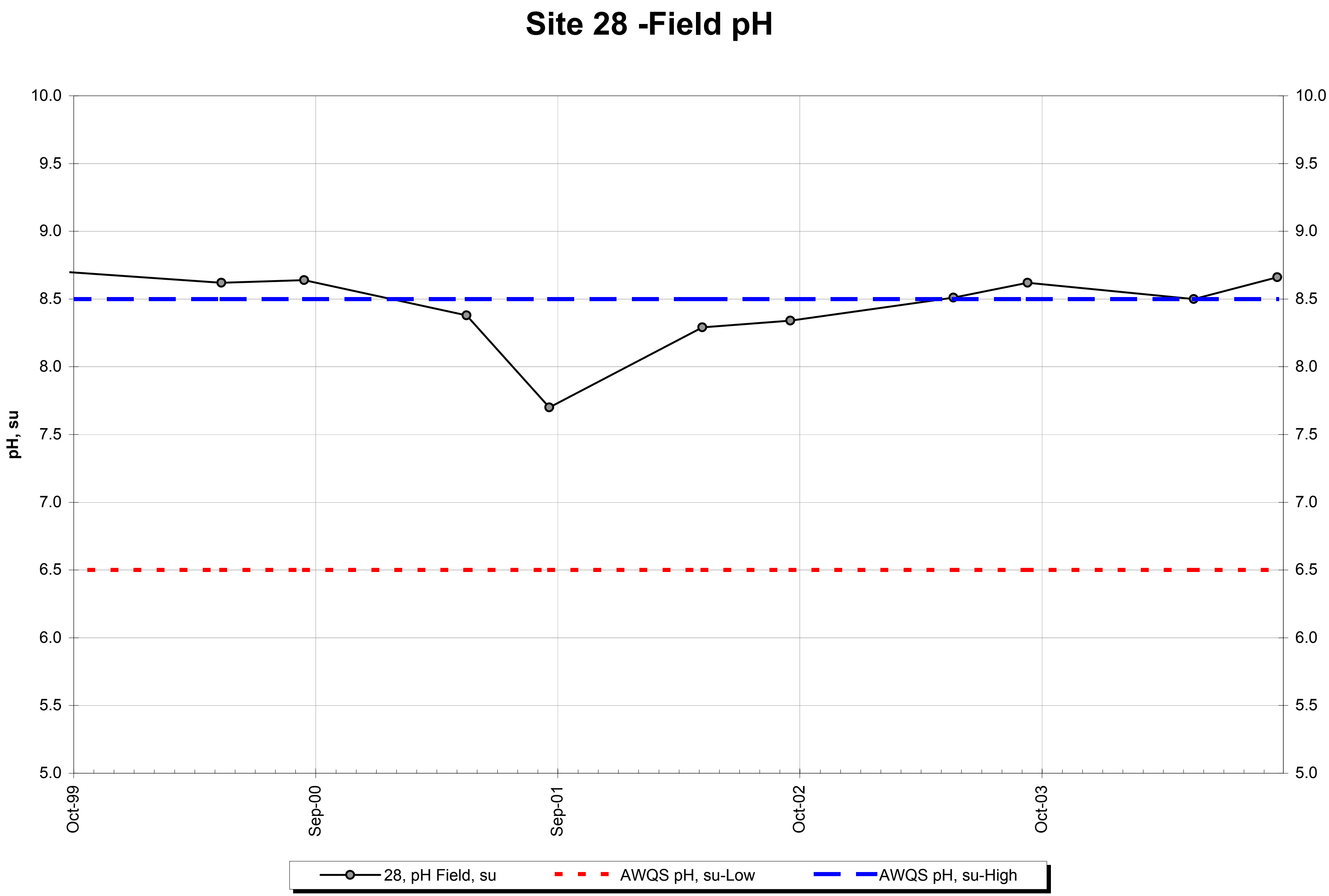

Site 28 -Water Temperature
Temperature (°C)
20
15
10
5
0
-5
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
28, Temperature, °C

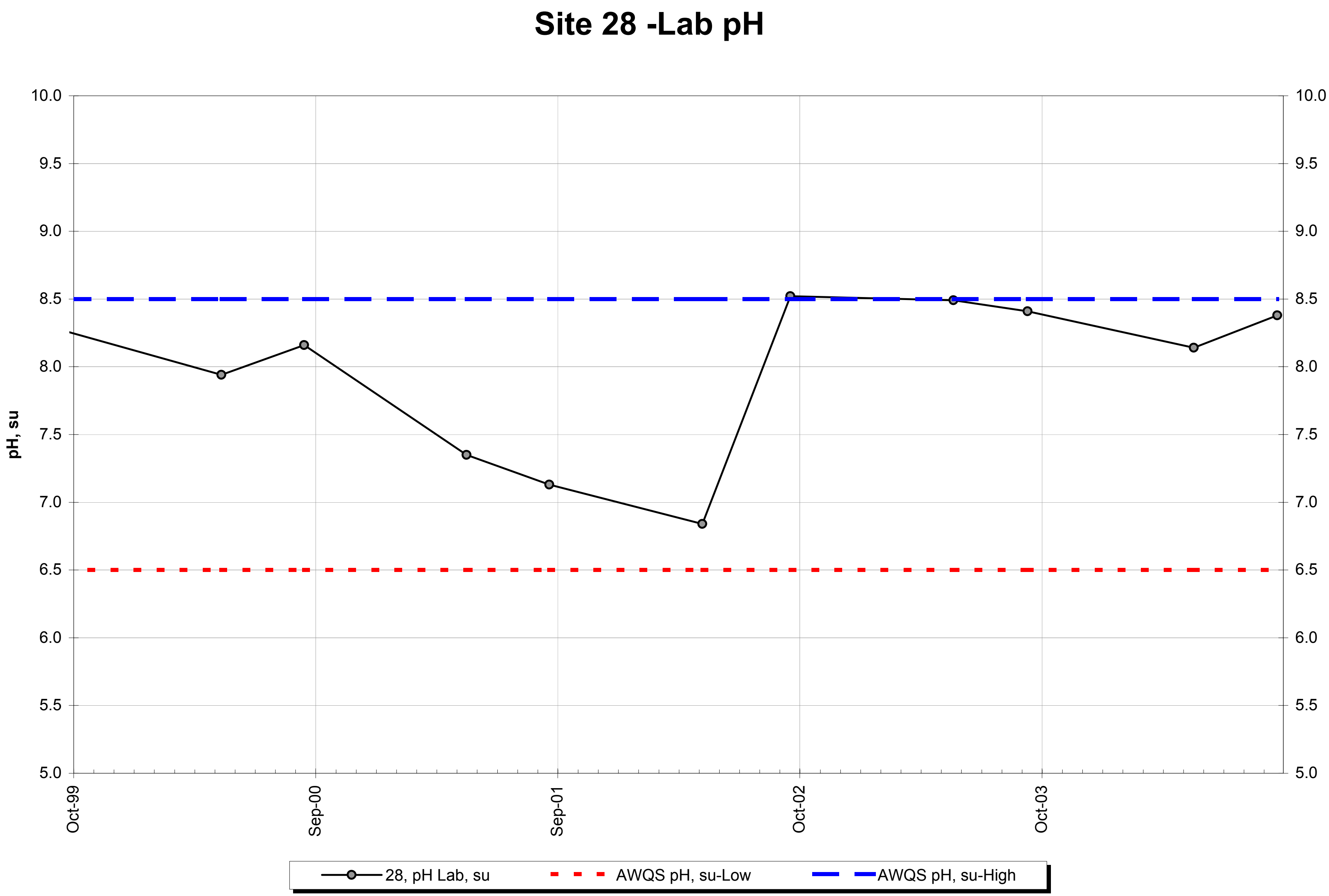
Site 28 -Conductivity-Field





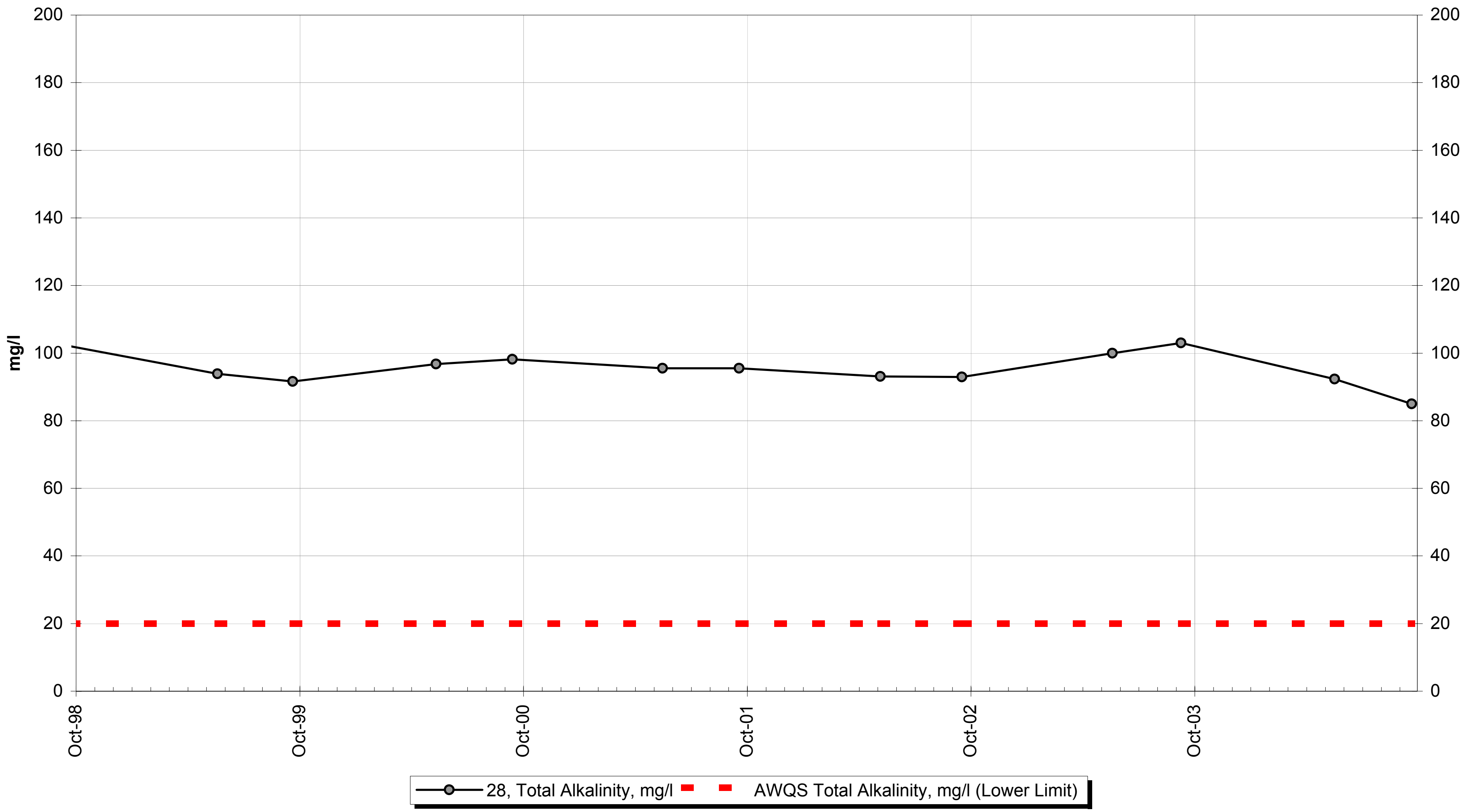
Site 28 -Conductivity-Lab
umhos
600
500
400
300
200
100
0
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
28, Cond Lab, umhos/cm


Site 28 -Field pH
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
pH, su
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
28, pH Field, su
AWQS pH, su-Low
AWQS pH, su-High

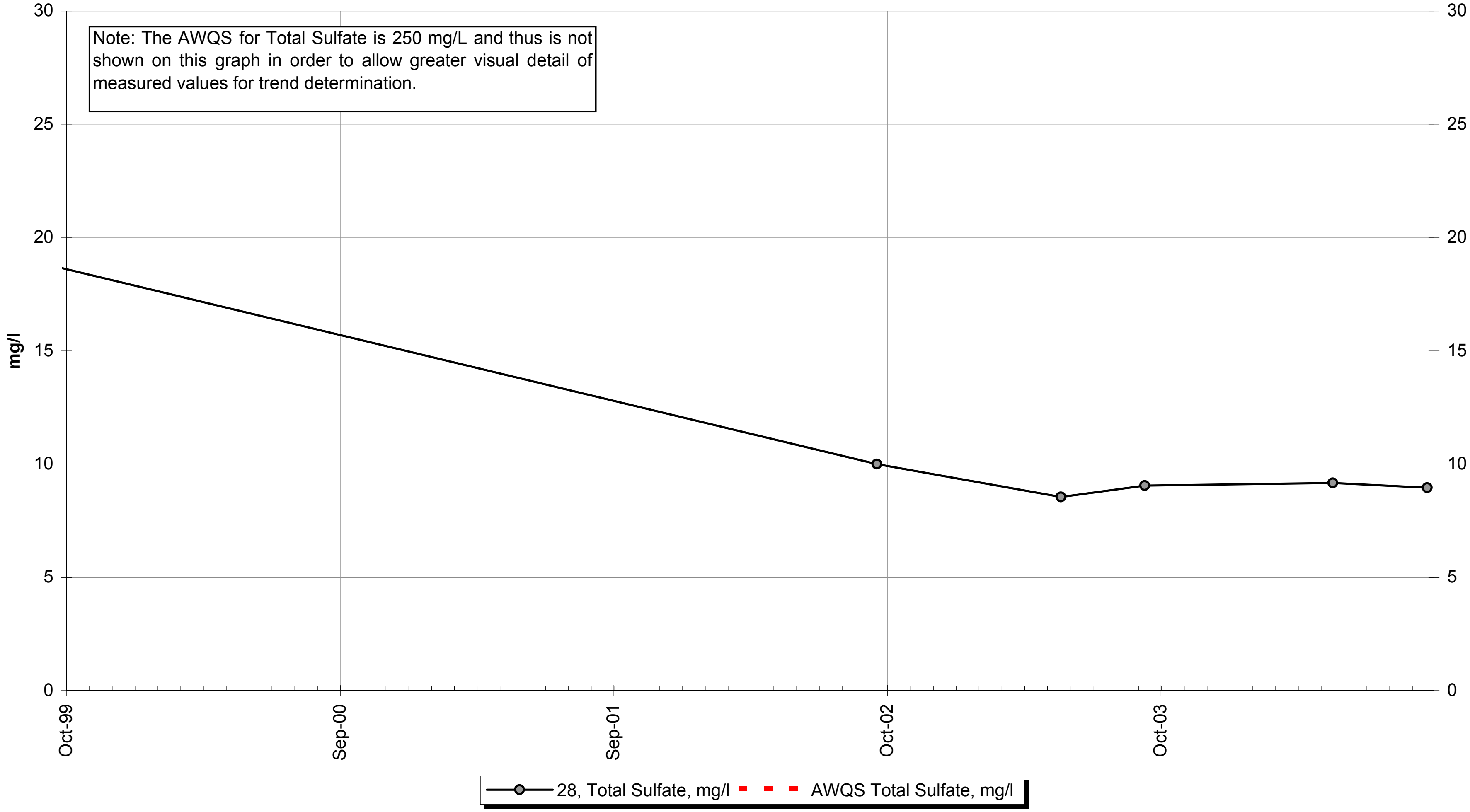


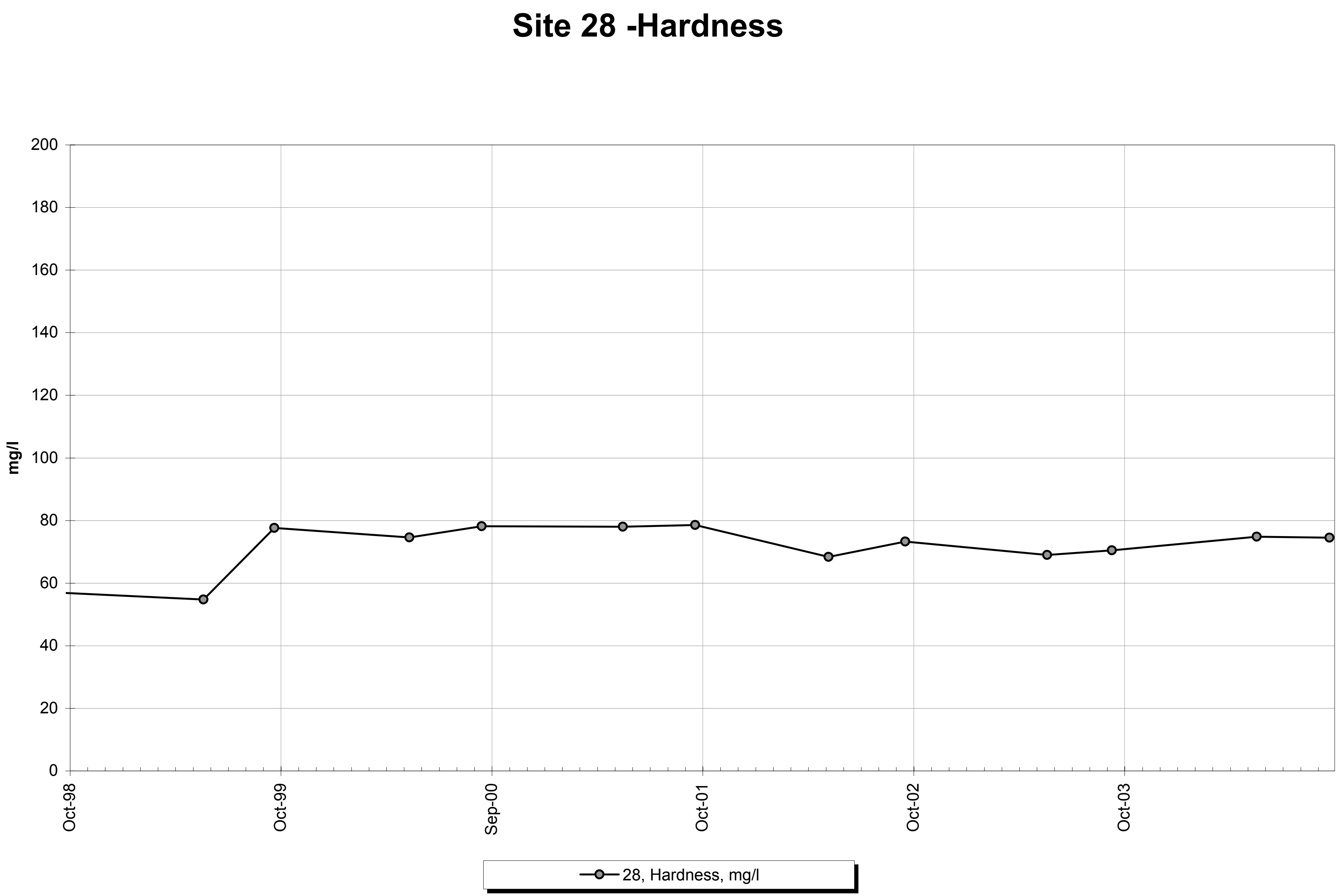
Site 28 -Lab pH
pH, su
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
28, pH Lab, su
AWQS pH, su-Low
AWQS pH, su-High

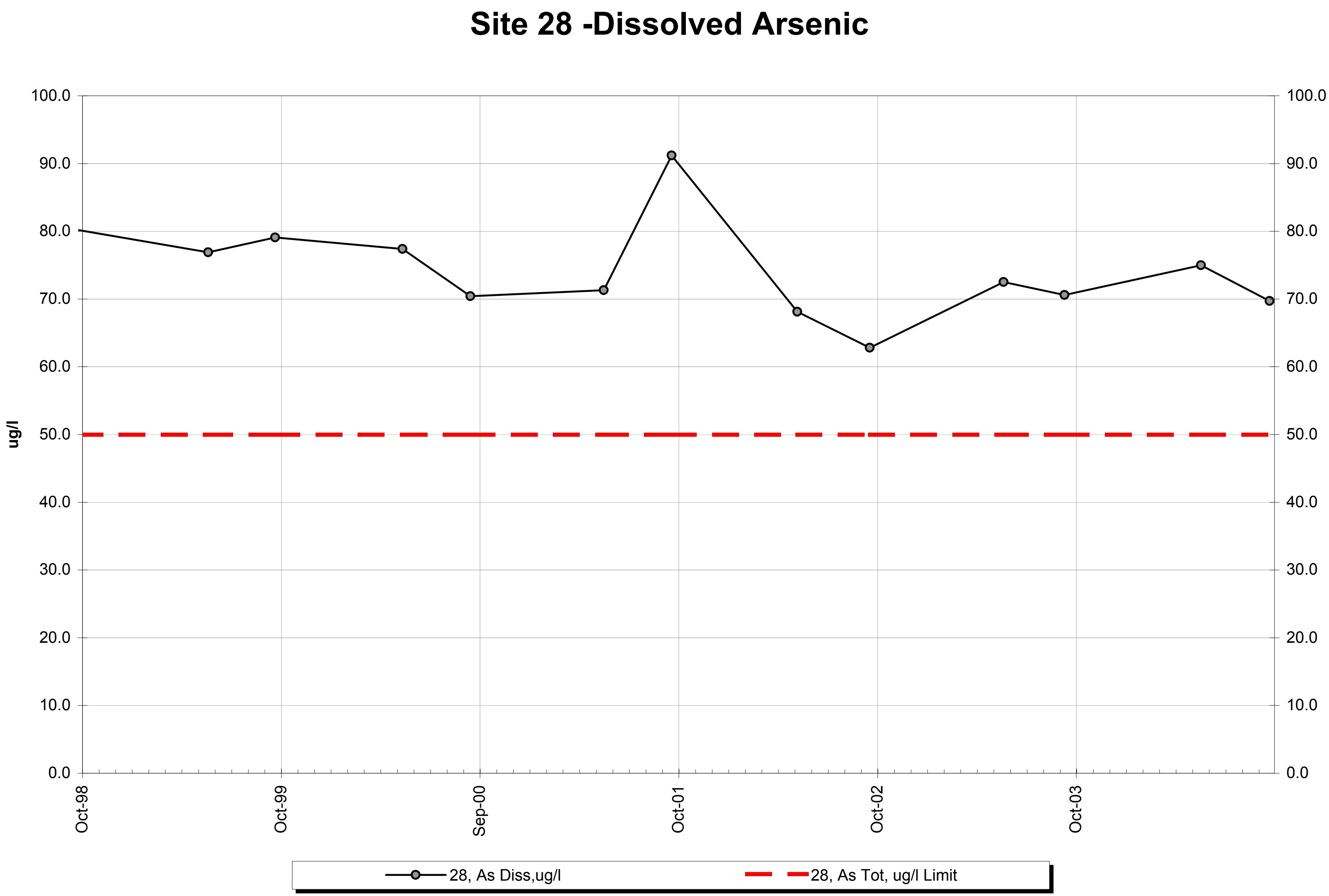
Site 28 -Total Alkalinity



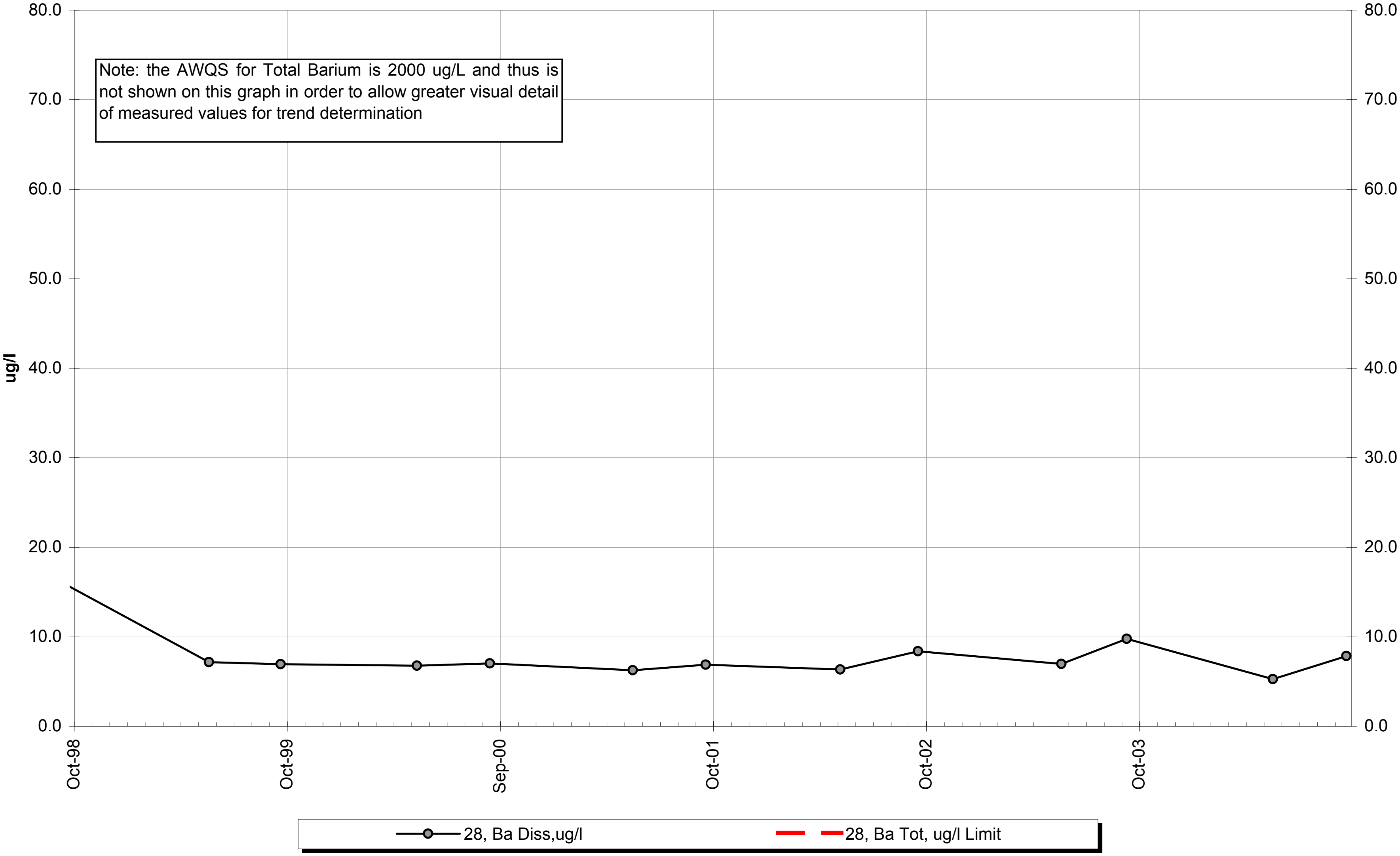
Site 28 -Total Sulfate

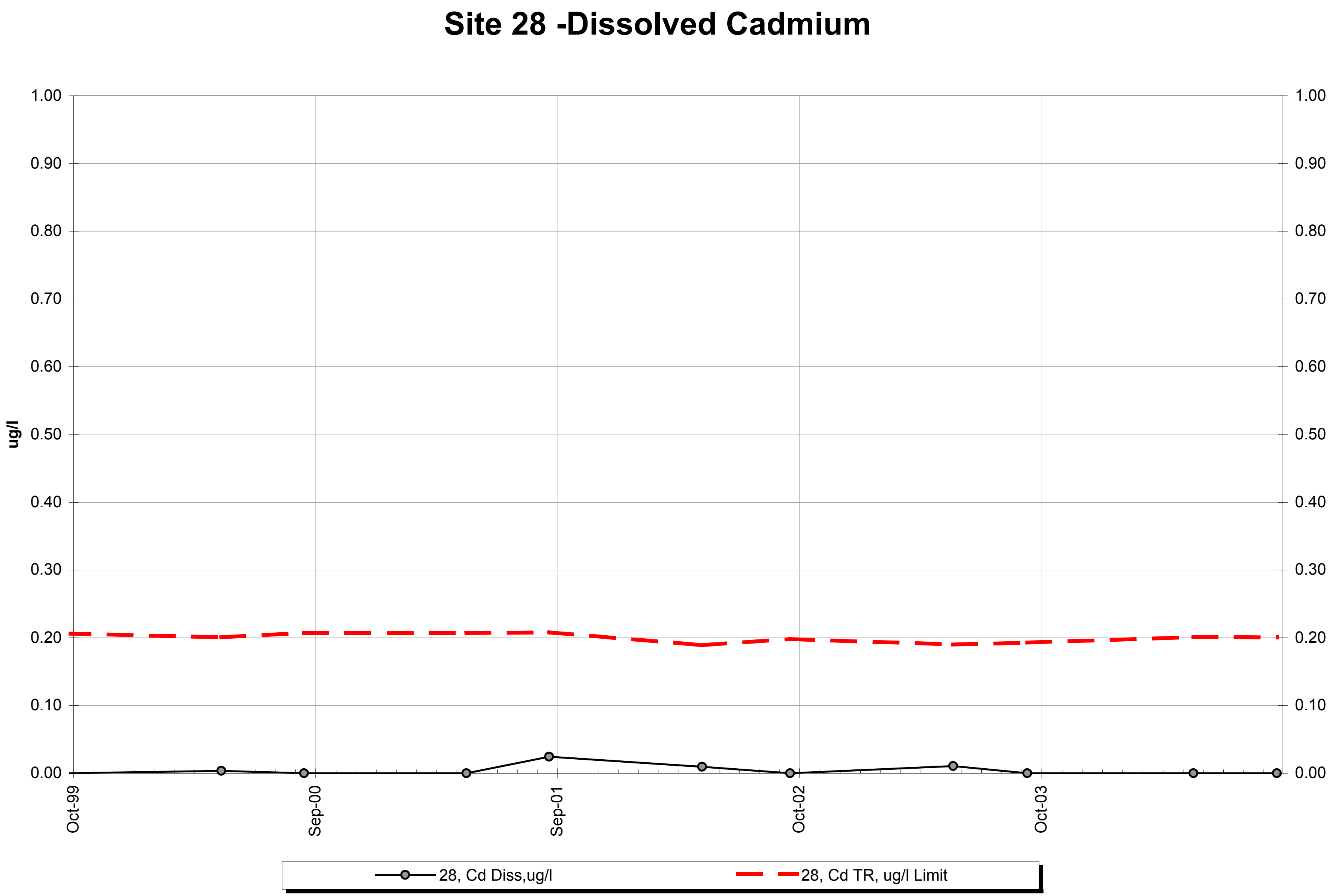



Site 28 -Hardness
mg/l
200
180
160
140
120
100
80
60
40
20
0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
28, Hardness, mg/l

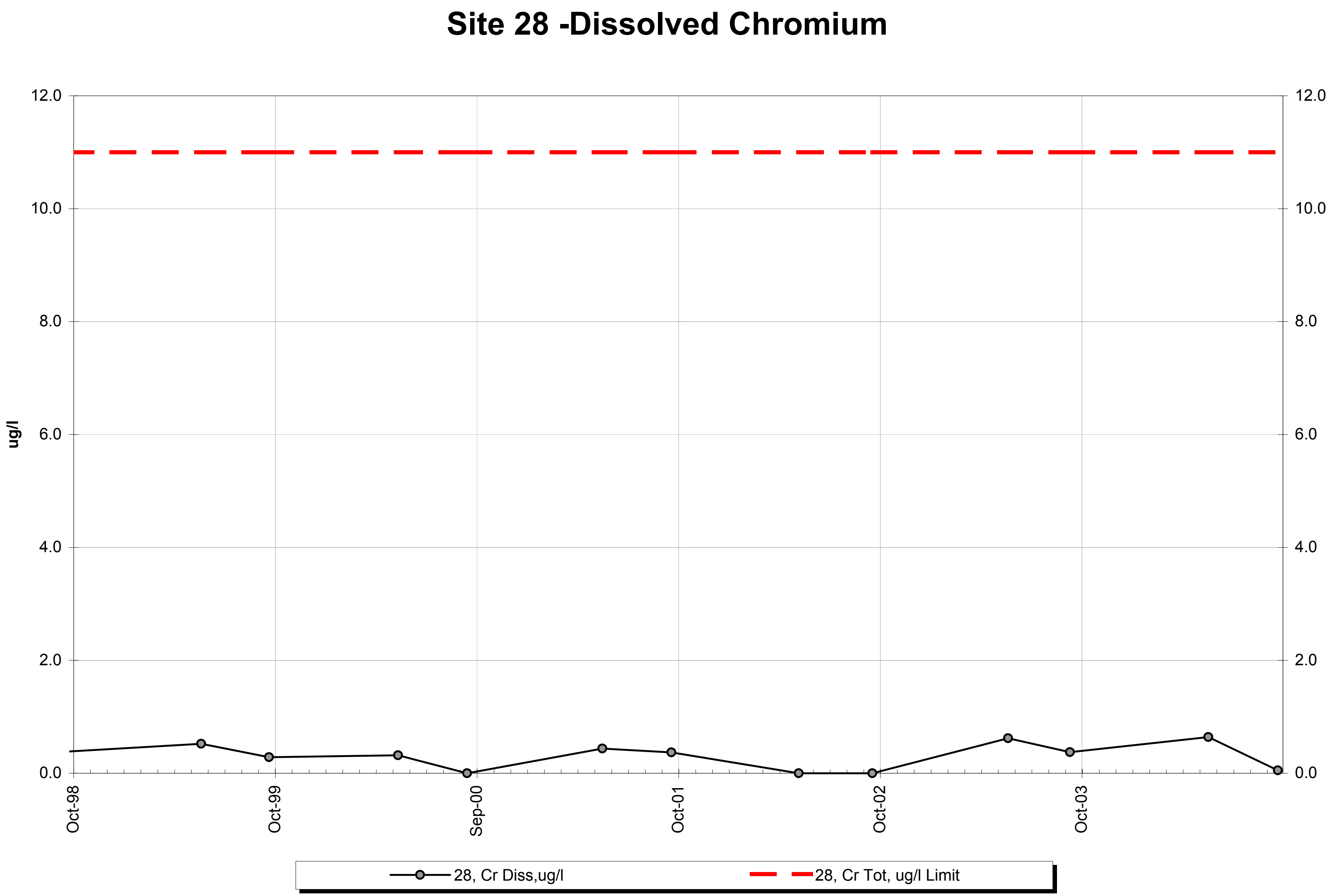

Site 28 -Dissolved Arsenic
ug/l
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
28, As Diss,ug/l
28, As Tot, ug/l Limit

Site 28 -Dissolved Barium

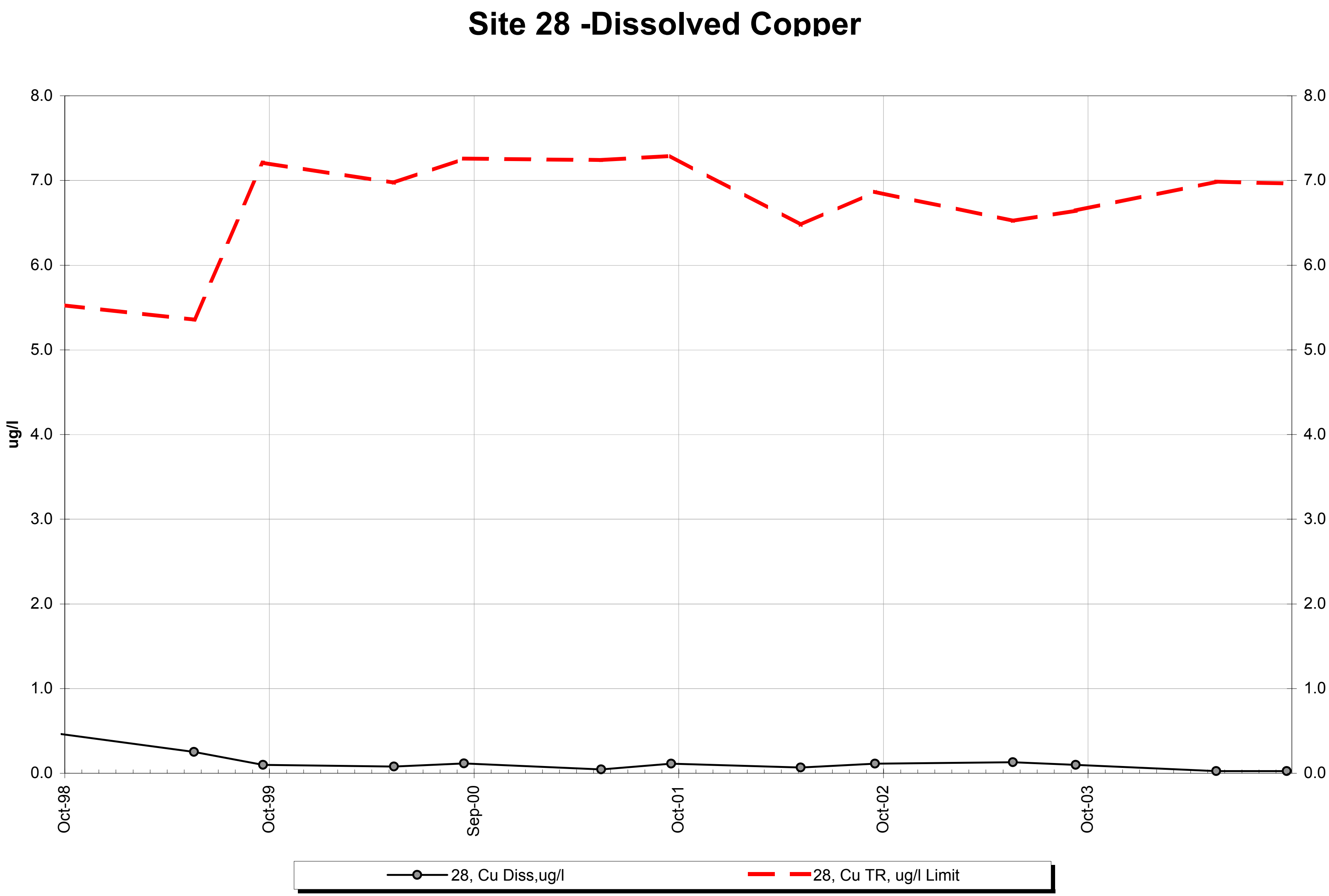


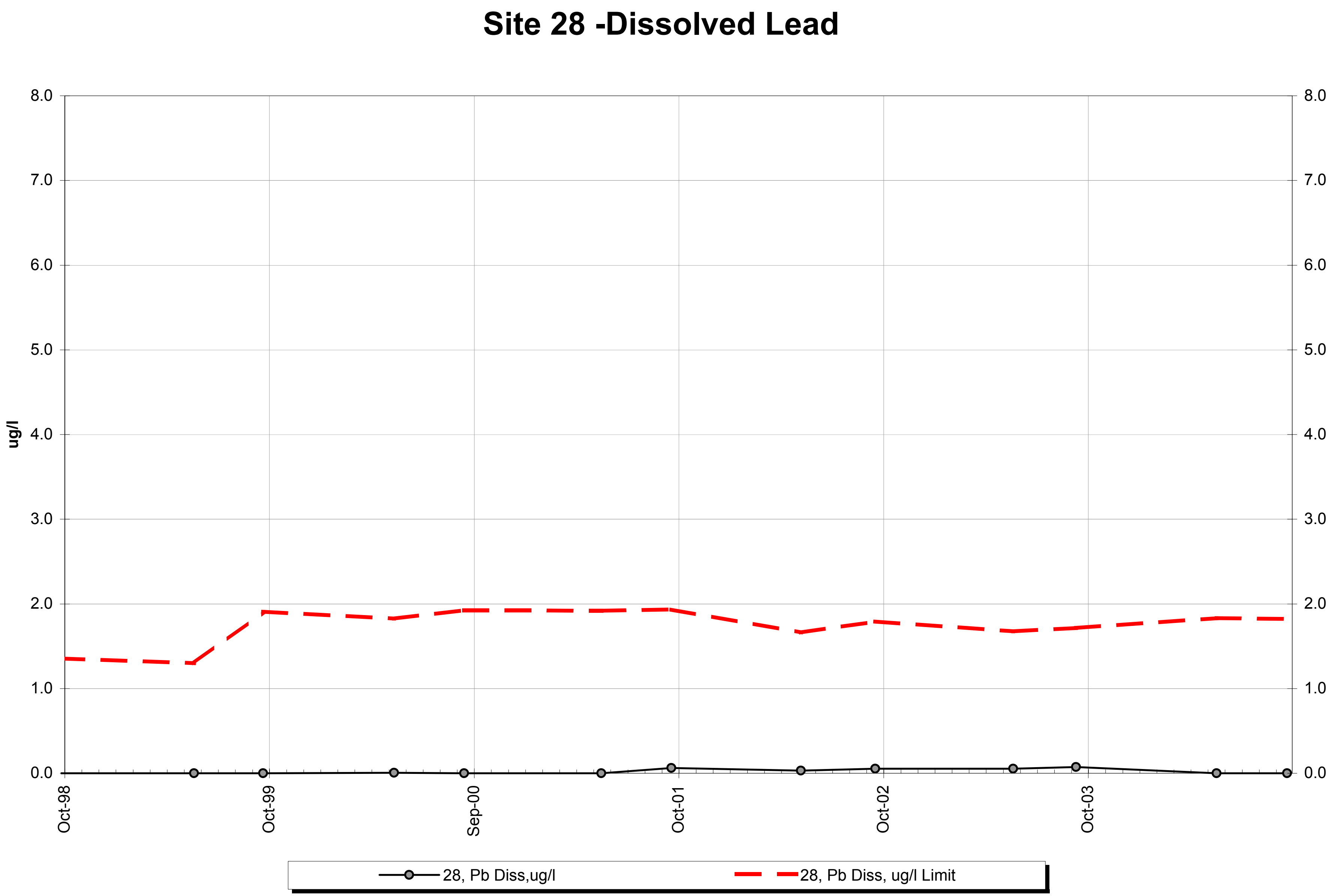


Site 28 -Dissolved Cadmium
ug/l
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Oct-99
Sep-00
Sep-01
Oct-02
Oct-03
28, Cd Diss,ug/l
28, Cd TR, ug/l Limit

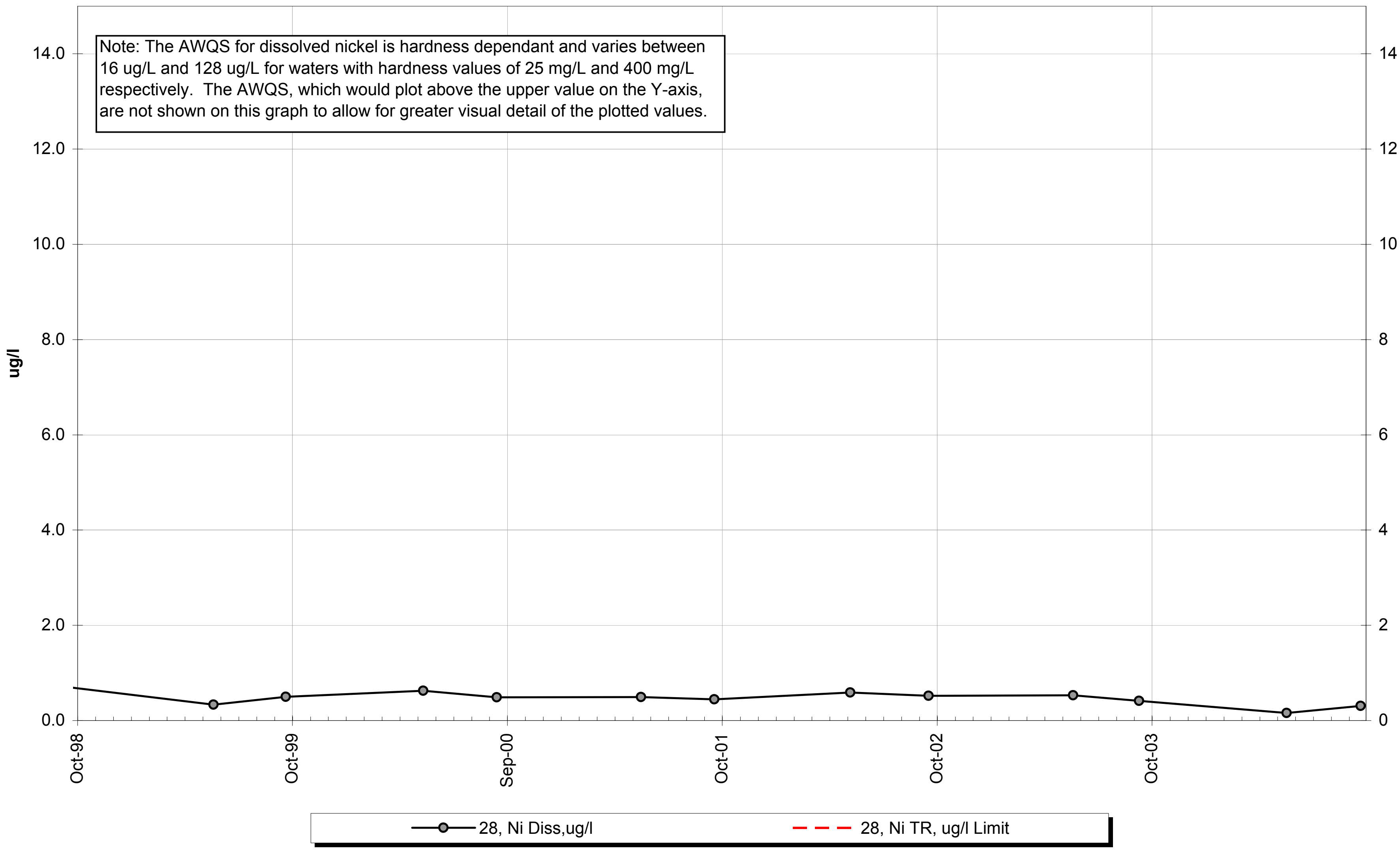


Site 28 -Dissolved Chromium
ug/l
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
28, Cr Diss,ug/l
28, Cr Tot, ug/l Limit

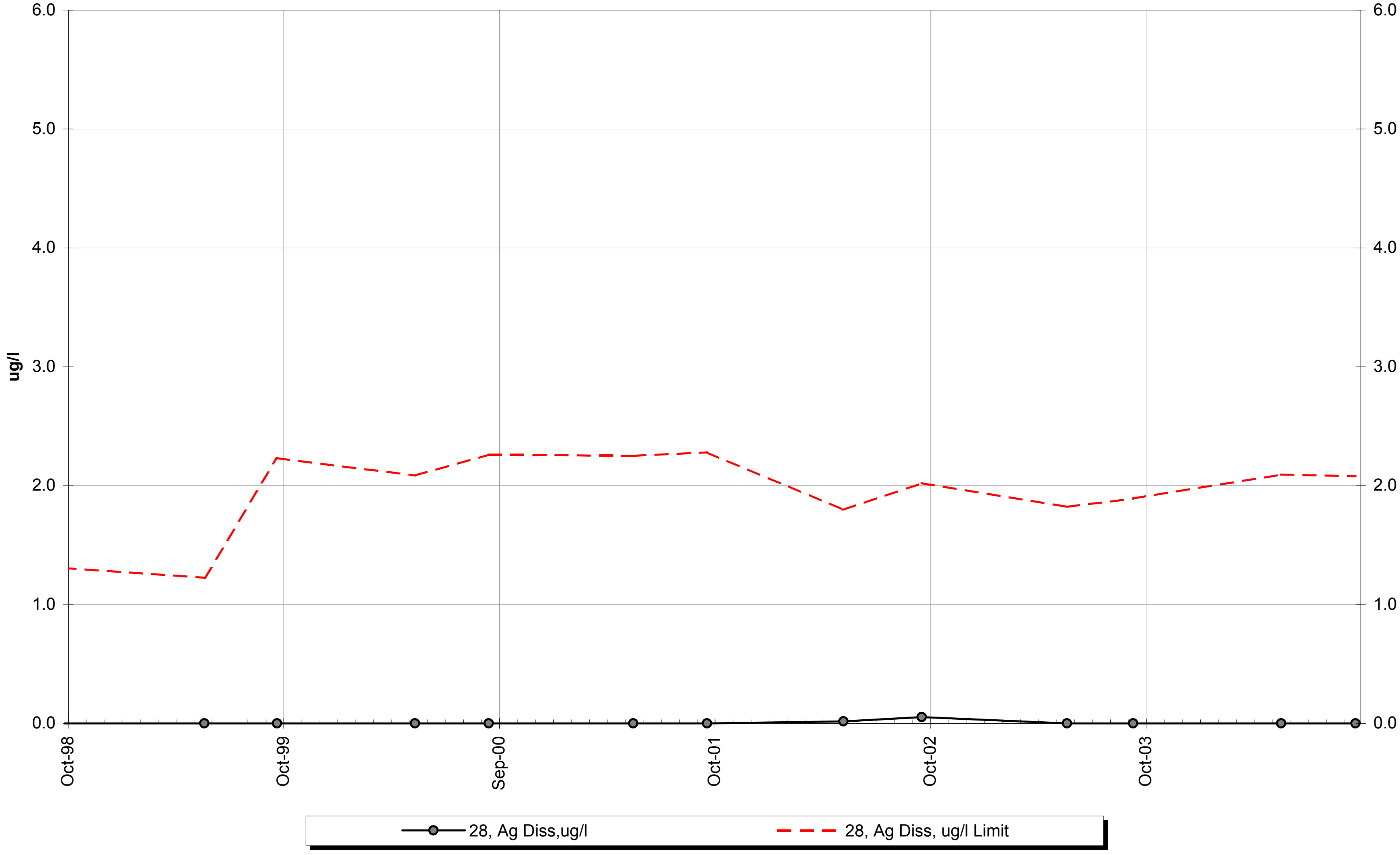

Site 28 -Dissolved Copper
ug/l
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
28, Cu Diss,ug/l
28, Cu TR, ug/l Limit

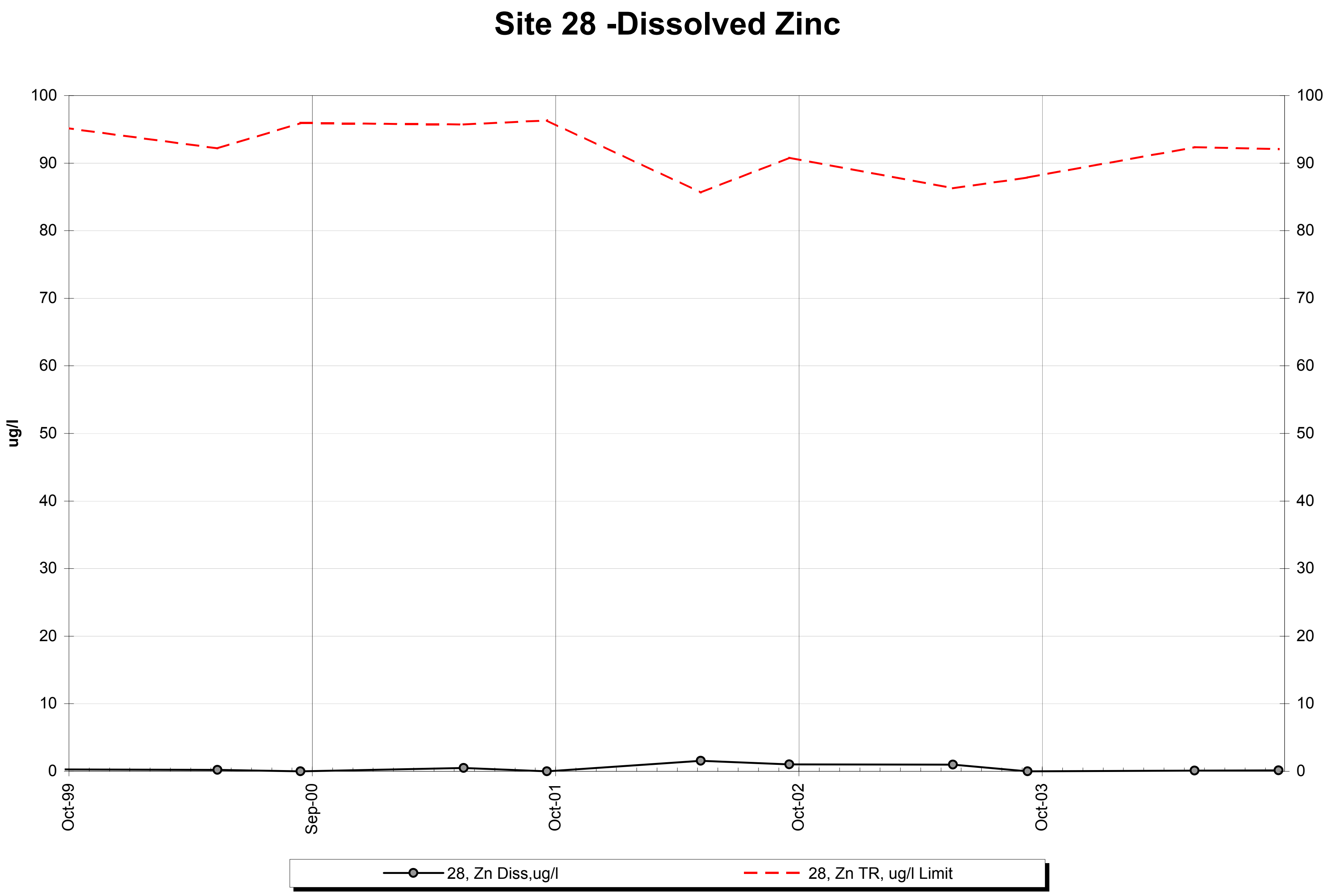

Site 28 -Dissolved Lead
ug/l
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
28, Pb Diss,ug/l
28, Pb Diss, ug/l Limit

Site 28 -Dissolved Nickel

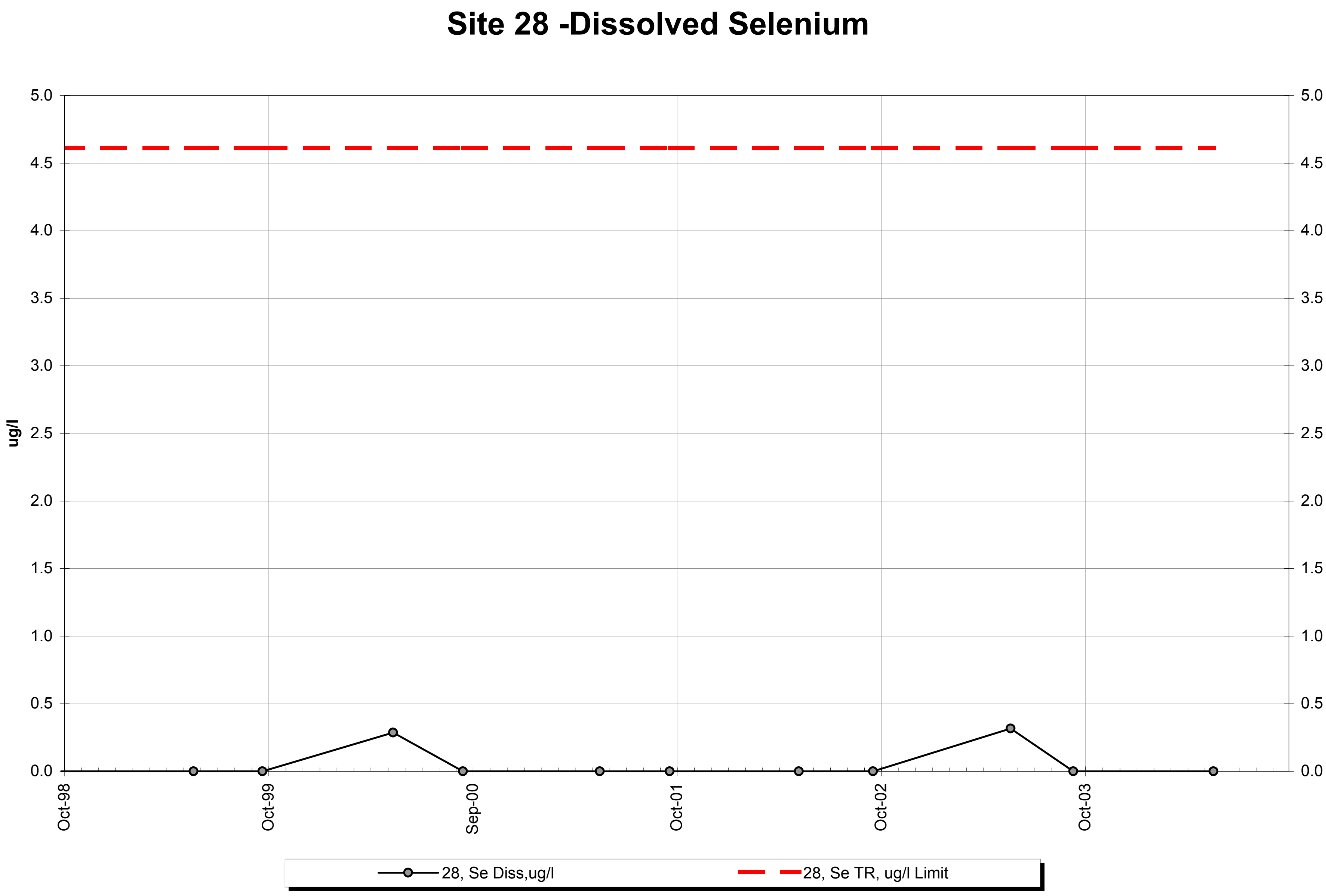


Site 28 -Dissolved Silver



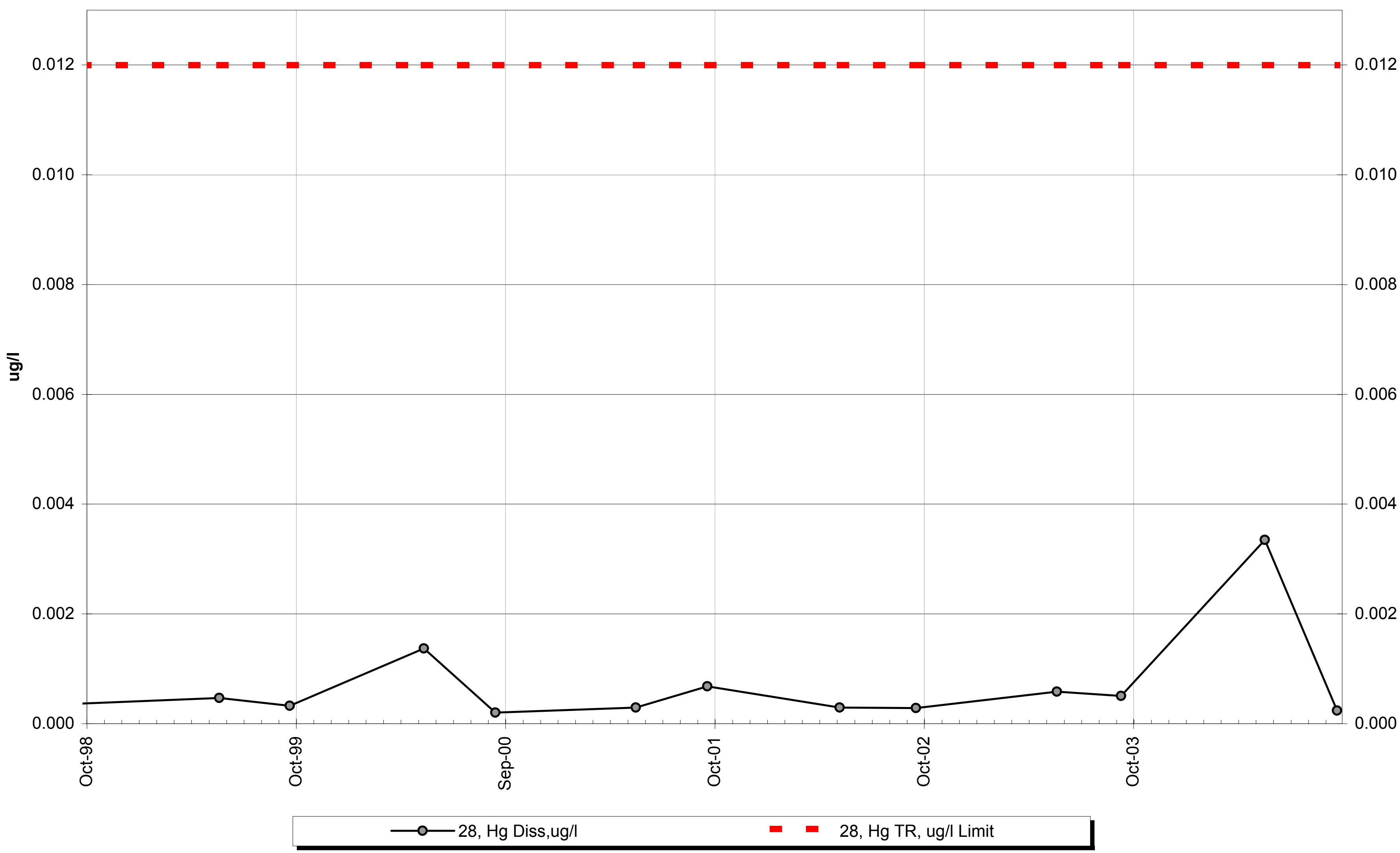


Site 28 -Dissolved Zinc
ug/l
100
90
80
70
60
50
40
30
20
10
0
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
28, Zn Diss,ug/l
28, Zn TR, ug/l Limit

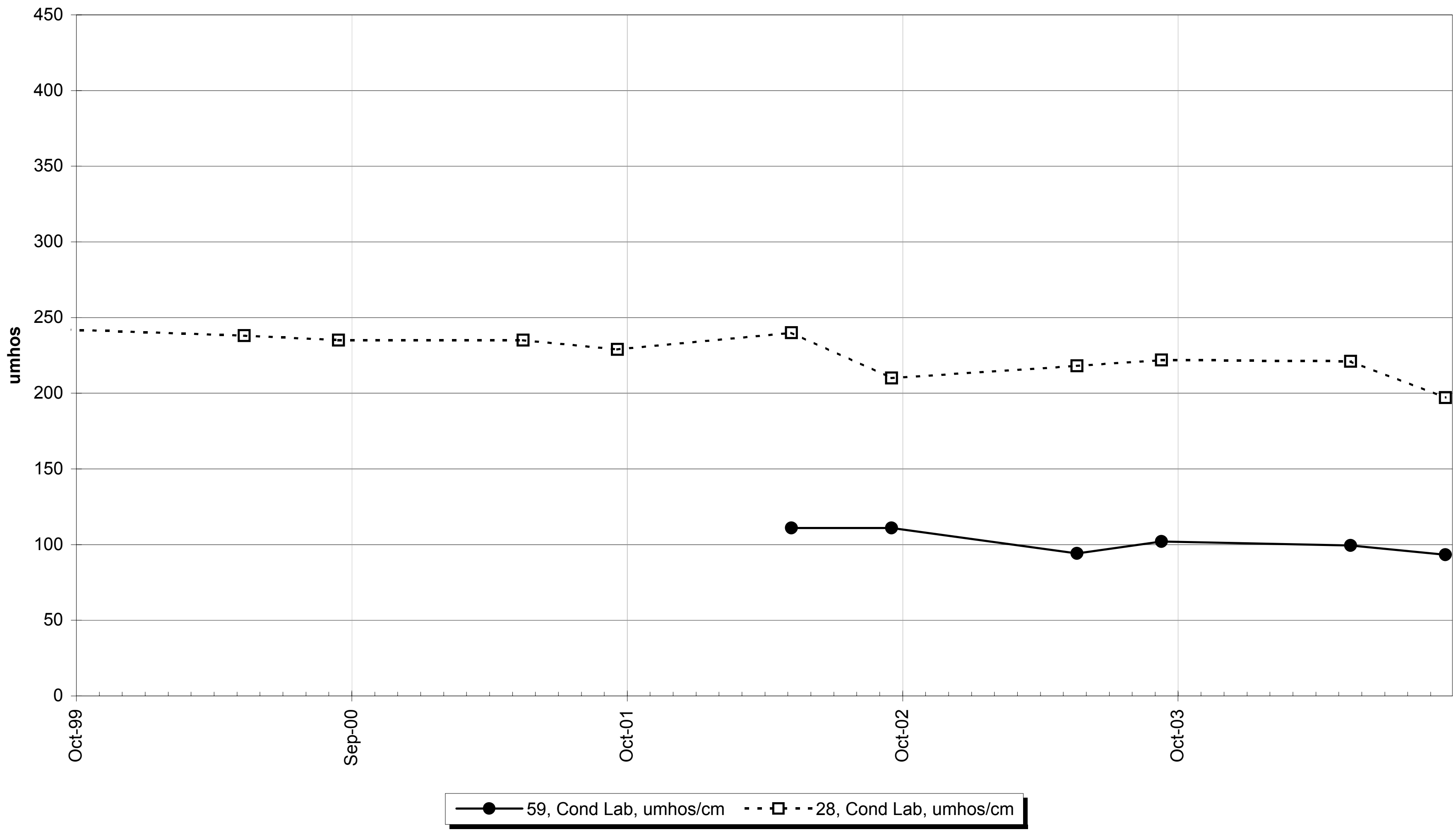


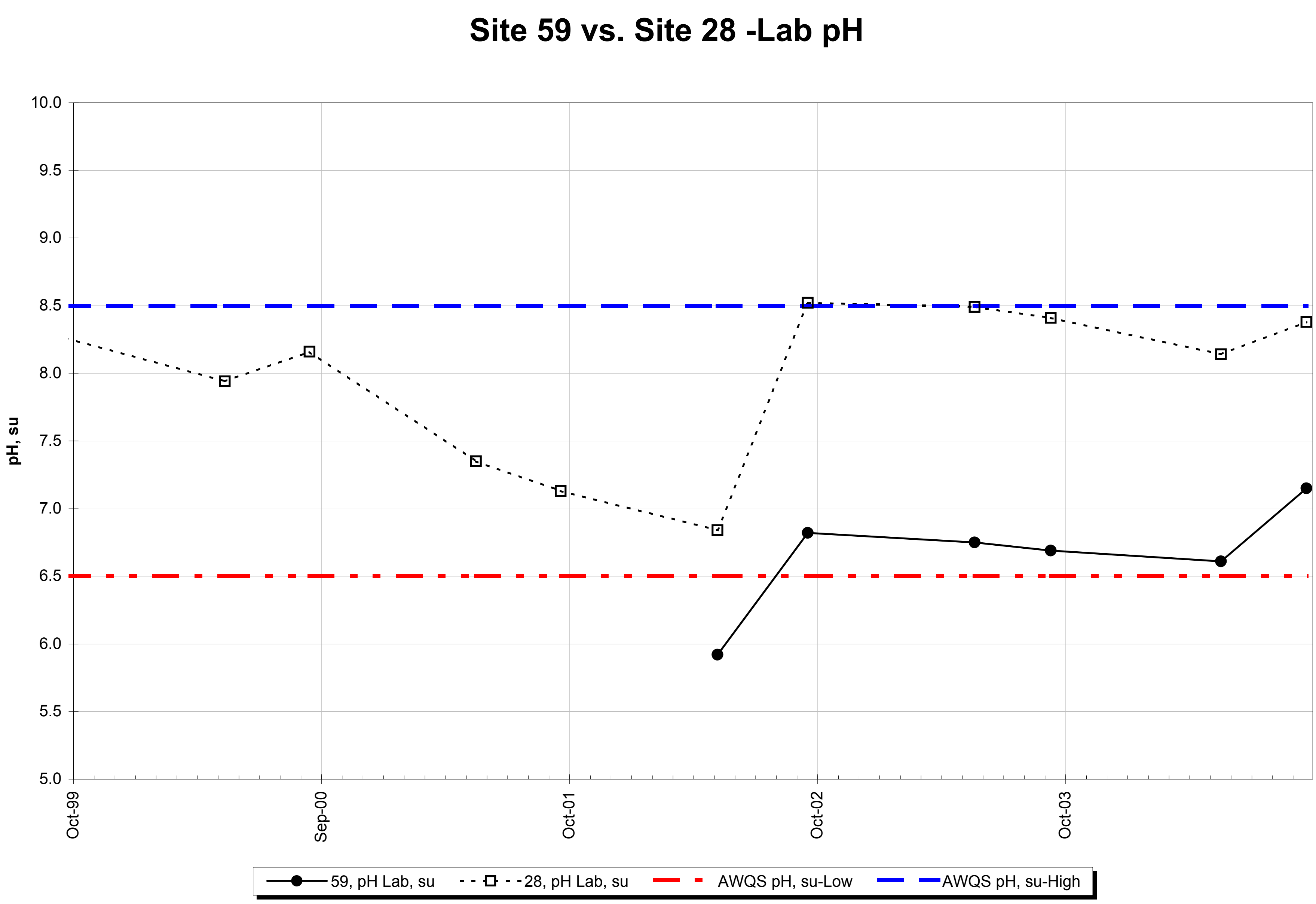
Site 28 -Dissolved Selenium
ug/l
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Oct-98
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
28, Se Diss,ug/l
28, Se TR, ug/l Limit

Site 28 -Dissolved Mercury



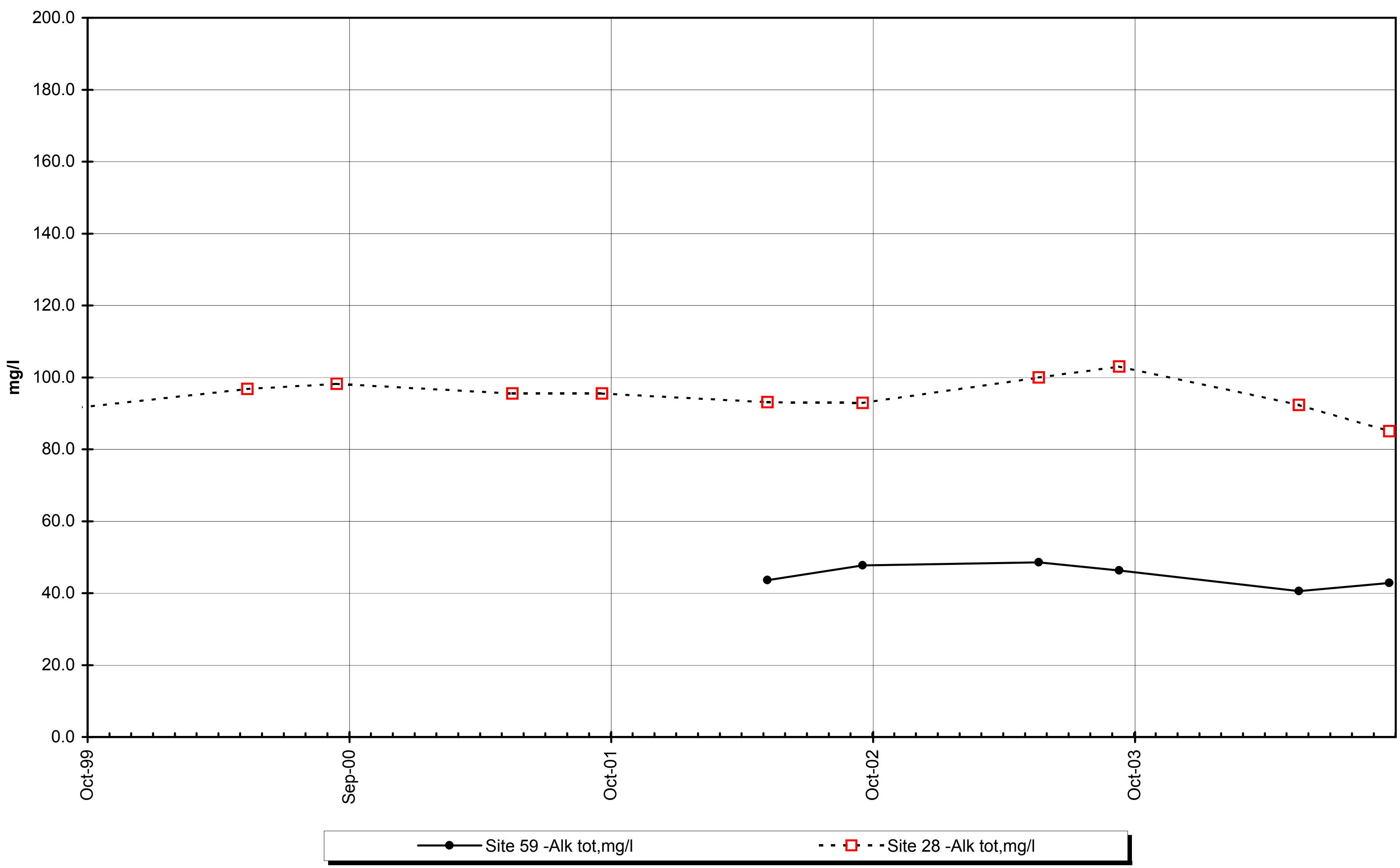
Site 59 vs Site 28 -Conductivity



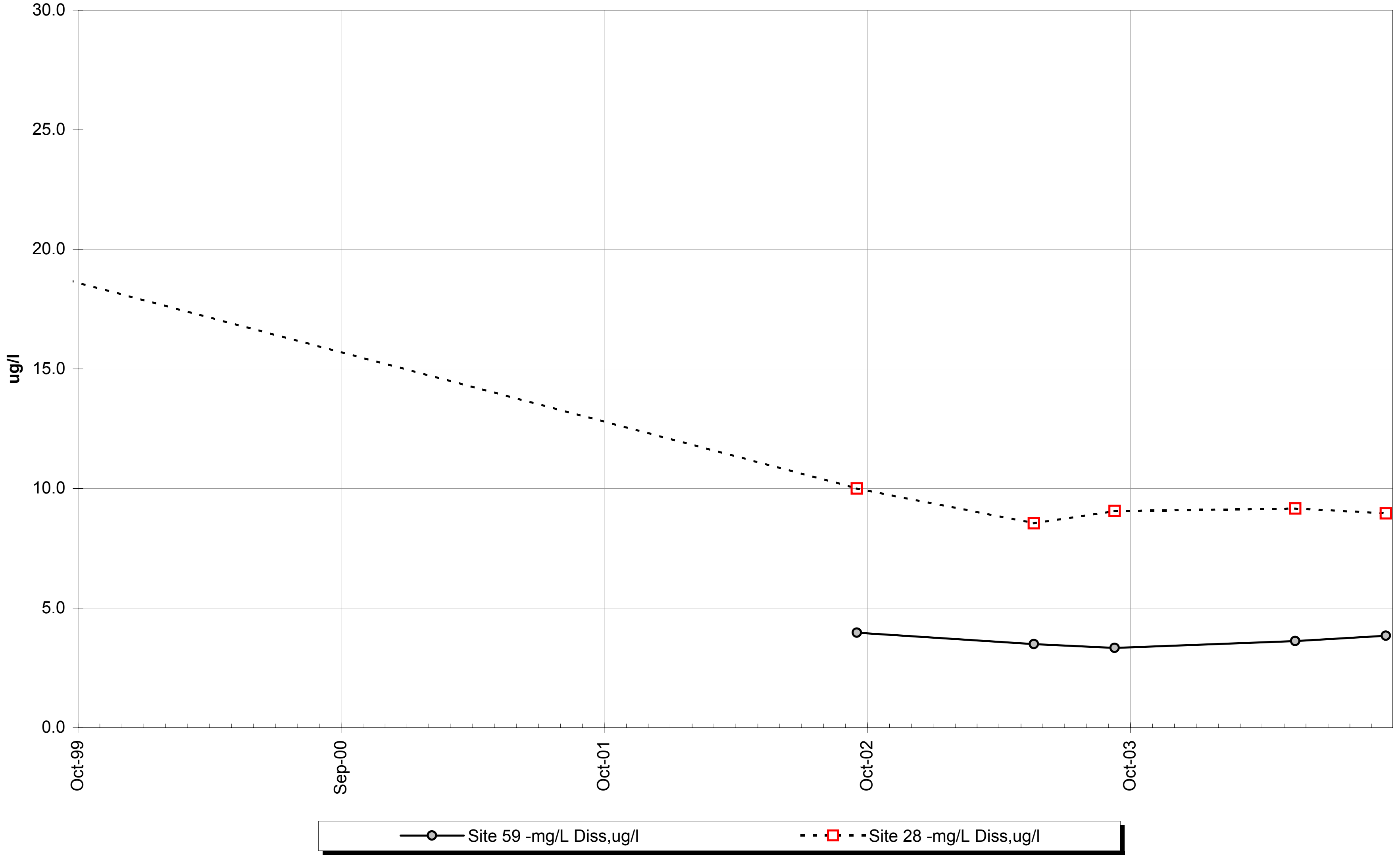


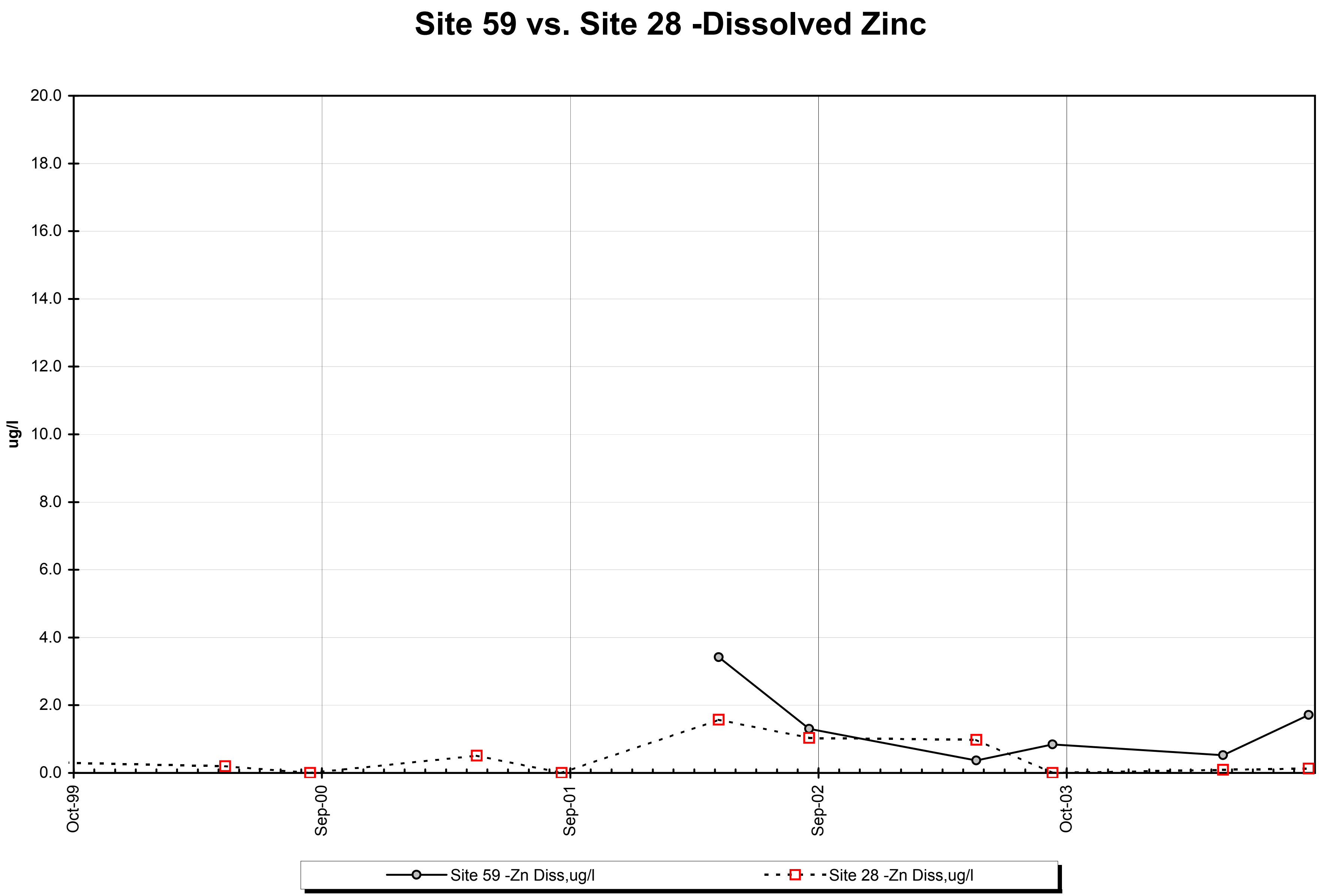
Site 59 vs. Site 28 -Lab pH
pH, su
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
Oct-99
Sep-00
Oct-01
Oct-02
Oct-03
59, pH Lab, su
28, pH Lab, su
AWQS pH, su-Low
AWQS pH, su-High

Site 59 vs. Site 28 -Total Alkalinity



Site 59 vs. Site 28 -Total Sulfate




Site 59 vs. Site 28 -Dissolved Zinc
ug/l
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Oct-99
Sep-00
Sep-01
Sep-02
Oct-03
Site 59 -Zn Diss,ug/l
Site 28 -Zn Diss,ug/l

APPENDIX A

Parameter	Drinking Water	Stockwater	Irrigation Water	Aquatic Life-Fresh Water								Human Health Criteria for NonCarcinogens	
				Acute				Chronic					
				criteria	as	multilply by conversion factor	to convert to	criteria	as	multiply by conversion factor	to convert to	Water + Aquatic Organisms	Aquatic Organisms Only
alkalinity								20,000 minimum					
As	50	50	100	340	TR	1	D	150	TR	1	D		
Ba	2,000												
Cd	5	10	10	e^1.0166(ln hardness)-3.924	TR	.136672-[(ln hardness)(0.041838	D	e^0.7409(ln hardness)-4.719	TR	1.101672-[(ln hardness)(0.041838)]	D		
Cr	100												
Cr(total)			100										
Cr(III)				e^0.819(ln hardness)+3.7256	TR	0.316	D	e^0.819(ln hardness)+0.6848	TR	0.860	D		
Cr(VI)		50		16	D			11	D				
Cu			200	e^0.9422(ln hardness)-1.700	TR	0.960	D	e^0.8545(ln hardness)-1.702	TR	0.960	D	1,300	
Pb		50	5,000	e^1.273(ln hardness)-1.460	TR	1.46203-[(ln hardness)(0.145712)	D	e^1.273(ln hardness)-4.705	TR	1.46203-[(ln hardness)(0.145712)]	D		
Hg	2			1.4	D			0.77	D			0.05	0.051
Ni	100		200	e^0.846(ln hardness)+2.255	TR	0.998	D	e^0.846(ln hardness)+0.0584	TR	0.997	D	610	4,600
Se	50	10	20	1/[([selenite]/185.9)+([selenate]/12.83]	TR	0.922	D	5	TR	0.922	D	170	11,000
Ag				e^1.72(ln hardness)-6.52	TR	0.850	D						
Zn			2,000	e^0.8473(ln hardness)+0.884	TR	0.978	D	e^0.8473(ln hardness)+0.884	TR	0.986	D	9,100	69,000

all units in micrograms per liter (ug/L)

DENOTES STRICTEST CRITERIA

TR total recoverable
D dissolved
H some of the criteria for this parameter are hardness dependant
FWA Fresh Water Acute
FWC Fresh Water Chronic

Source: http://www.dec.state.ak.us/water/wqsar/wqs/toxicsbook.xls
Table formatting was modified by KGCMC to include only parameters include in Suite P and Q and to highlight the strictest standard.

APPENDIX B

Biomonitoring Report