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LLNL Experimental Test Site 300 Compliance Monitoring Report for Waste Discharge Requirements 96-248

Annual/Fourth Quarter Report
2005

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List of Abbreviations and Acronyms

BOD	biochemical oxygen demand
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
COC	constituent of concern
CVRWQCB	Central Valley Regional Water Quality Control Board
DMSO	dimethyl sulfoxide
DO	dissolved oxygen
DSWP	sewage percolation pond influent sampling location
EC	electrical conductivity or specific conductance
est	estimated (concentration)
ESWP	sampling location within sewage evaporation pond
HDPE	high-density polyethylene
HMX	octahydro-1, 3, 5, 7-tetranitro-1, 3, 5, 7-tetrazocine (also cyclo-tetramethylene-tetranitramine)
HPLC	high-performance liquid chromatography
ISWP	sewage pond influent sampling location
LCRS	leachate collection and removal system
LCS	laboratory control sample
LL	lower limit (for dissolved oxygen analyses only)
LLNL	Lawrence Livermore National Laboratory
m	meters
MDL	method detection limit
MPN	most probable number (of bacteria)
MRP	Monitoring and Reporting Program
MS	matrix spike
MSD	matrix spike duplicate
NA	not applicable
NAFL	not available from laboratory
ND	not detected

NL	no limit
NR	analysis not required by permit
NS	not sampled
PCE	tetrachloroethene (tetrachloroethylene, perchloroethylene)
PETN	pentaerythritol tetranitrate
PL	Permit Limit
QA	quality assurance
Qal	Quaternary Age alluvium
QC	quality control
RDX	hexahydro-1, 3, 5-trinitro-1, 3, 5-triazine (also cyclo-1, 3, 5-trimethylene 2, 4, 6-trinitramine)
RL	reporting limit
SL	statistical test limit
STLC	soluble threshold limit concentration
SVOC	semi-volatile organic compound
TATB	2, 4, 6-trinitro-1, 3, 5-benzenetriamine
TCE	trichloroethene (trichloroethylene)
TIC	tentatively identified compound
$Tnbs_1$	Tertiary Age, Neroly Formation Lower Blue Sandstone (the regional aquifer)
$Tnbs_2$	Tertiary Age, Neroly Formation Upper Blue Sandstone
$Tnsc_1$	Tertiary Age, Neroly Formation Lower Siltstone/Claystone
TNT	2, 4, 6-trinitrotoluene (also 2-methyl-1, 3, 5-trinitrobenzene)
VOC	volatile organic compound
WDR	Waste Discharge Requirements (Permit)

EXECUTIVE SUMMARY

This report contains the elements required by Waste Discharge Requirements (WDR) 96-248 (Permit) for the combined 2005 fourth quarter and annual report. This is the tenth annual report prepared under this Permit and the last report that will contain data on the Class II surface impoundments (surface impoundments). LLNL completed clean closure of the surface impoundments on November 3, 2005. Compliance monitoring networks discussed in the report include:

- Process wastewater discharged into the surface impoundments (in **Section 2.2**)
- Leak detection monitoring (including leachate collection and removal system monitoring, and ground water monitoring) for the surface impoundments (in **Section 2.3**)
- Wastewater monitoring for the sewage evaporation and percolation ponds (in **Section 3.2**)
- Ground water monitoring for the sewage evaporation and percolation ponds (in **Section 3.3**)
- Observations at the percolation pits (in **Section 4.0**).

The annual report elements are incorporated into this annual/fourth quarter report. Brief narrative summaries of each compliance network lead each section. These narrative summaries discuss compliance issues and significant incidents that occurred during 2005. Annual summaries of monitoring data are presented in graphical and tabular form in **Appendices A**, **B**, **C**, and **D**. Methods used to determine statistical test limits (SLs) for ground water constituents of concern (COCs) are summarized in **Appendix E**. Fourth quarter quality assurance and quality control (QA/QC) data are summarized in **Appendix F**.

All discharges into the surface impoundments were in compliance with the Permit during 2005. Discharges into the surface impoundments were discontinued after the second quarter in preparation for clean closure of the surface impoundments that was achieved in November 2005.

No liquids were discovered in the leachate collection and removal systems (LCRS) during weekly monitoring.

Required ground water monitoring parameters for the surface impoundments were below the specified SLs throughout 2005, except as identified in **Table 1**.

Table 1. COC concentrations confirmed as exceeding their SLs in 2005.

COC exceeding SL (confirmed by retest)	Down gradient Wells		
	W-817-02	W-817-03	W-817-04
Ammonia	1st quarter[a] (1/27/2005)[b]	3rd quarter[a] (1/27/2005)[b]	1st and 3rd quarters[a] (1/24/2002)[b]
Manganese	Did not exceed SL	Did not exceed SL	3rd quarter (7/2/2001)[b]

[a] Ammonia was also detected in the field blank samples. (See also Brown 2005a & Brown 2005b)
[b] Date of original letter report to the CVRWQCB.

Because sporadic detections of ammonia had occurred in ground water samples collected from up gradient well W-817-01 and from the three down gradient wells since 2001, LLNL had proposed a new SL of 0.080 mg/L for the down gradient monitor wells in 2002 (Brown 2002). Concentrations of ammonia have remained below that proposed SL, except for occasional spikes.

Concentrations of dissolved manganese have been observed sporadically above the SL of 0.01 mg/L in down gradient monitor well W-817-04 since the second quarter of 2001. The concentrations of dissolved manganese have remained consistent with the SL of 0.036 mg/L that LLNL proposed in 2002 (Brown 2002) and remain below that SL.

Monitoring data indicated compliance with the limits for the wastewater at the sewage evaporation and percolation ponds. None of the permitted mechanical equipment percolation pits overflowed during 2005.

During the review and preparation of the annual report, LLNL staff identified some irregularities with data from the sewage ponds ground water network that were not discovered during the preparation of the 2005 first and third quarter reports for this network. We discovered additional data points that were not previously reported. Some of these data indicate positive detections of fecal and total coliform in the samples from two wells. LLNL has initiated corrective actions, including immediately collecting ground water samples from suspect well W-26R-11. Neither fecal nor total coliform bacteria were detected in the samples collected from either of these two wells in the first quarter of 2006 (see **Table 2**), indicating that the first quarter 2005 results were either not characteristic of the ground water, or indicated at worst a transient effect that was not seen in other down gradient monitor wells.

Table 2. Coliform bacteria analytical results from two sewage pond wells, 2005 - 2006.

Well	Sample date	Fecal coliform (MPN[a]/100 mL)	Total coliform (MPN/100 mL)
W-35A-04	23-Feb-05	5.1	12
(cross gradient)	1-Mar-05	1.1	1.1
	2-Mar-05	<2	2
	4-Aug-05	<2	<2
	25-Jan-06	<2	<2
W-26R-11	8-Feb-05	<1.1	<1.1
(down gradient)	9-Feb-05	23	23
	2-Aug-05	<2	8
	19-Jan-06	<2	<2
	21-Feb-06	<2	<2

[a] MPN = Most probable number (of organisms).

1.0 Introduction

This report satisfies the 2005 fourth quarter and annual monitoring and reporting requirements of the Central Valley Regional Water Quality Control Board's (CVRWQCB's) Waste Discharge Requirements 96-248 (the Permit). It details the results of compliance monitoring networks in the Explosives Process Area and the General Services Area and visual observations at a third percolation pit system at the Experimental Test Site (Site 300).

The Explosives Process Area compliance network monitors ground water beneath, and process wastewater influent discharged into, two connected Class II surface impoundments where the process wastewater is evaporated. The General Services Area network monitors ground water beneath, and wastewater discharged into, the sewage evaporation and percolation ponds (sewage ponds) where sanitary waste is treated. The percolation pit network entails visual monitoring of five percolation pits that receive mechanical equipment wastewater.

Site 300, operated by LLNL, is located in the Altamont Hills approximately 13 kilometers (8 miles) southwest of the city of Tracy, California. **Figure 1** shows the locations of the surface impoundments within the Explosives Process Area and of the sewage ponds in the General Services Area of Site 300.

2.0 Class II Surface Water Impoundments

2.1 Compliance Monitoring Program

The Monitoring and Reporting Program in the Permit as modified in 1998 (MRP 96-248, Revision 1) specifies the required environmental monitoring for operation of the surface impoundments (Cohen 1998). These specifications include monitoring of process wastewater discharges to the surface impoundments and leak detection systems.

Process wastewater discharged to the surface impoundments was monitored for constituents found (or likely to be found) in materials used in operations conducted at buildings discharging to the surface impoundments. The monitoring program included collecting and analyzing samples from: photographic process rinse water from Building 823 (**Table A-1**) (wastewaters from retention tanks at Buildings 801, 850, and 851 were not discharged into the surface impoundments in 2005); chemistry wastewater from Buildings 825, 826, and the Building 827 Complex (827A, 827C/D, and 827E) (**Tables A-2.1** through **A-2.4**) and explosives process wastewater from Buildings 806/807, and 817 (**Tables A-3.1** and **A-3.2**). All discharges to the surface impoundments were discontinued in the third quarter of 2005; all wastewaters from those processes are now evaporated in permanent tanks.

Leak detection system monitoring includes monitoring of the leachate collection and removal systems (LCRSs) and ground water. LCRSs installed between the clay liners of the surface impoundments were inspected weekly for the presence of moisture that might indicate a leak in the HDPE liner.

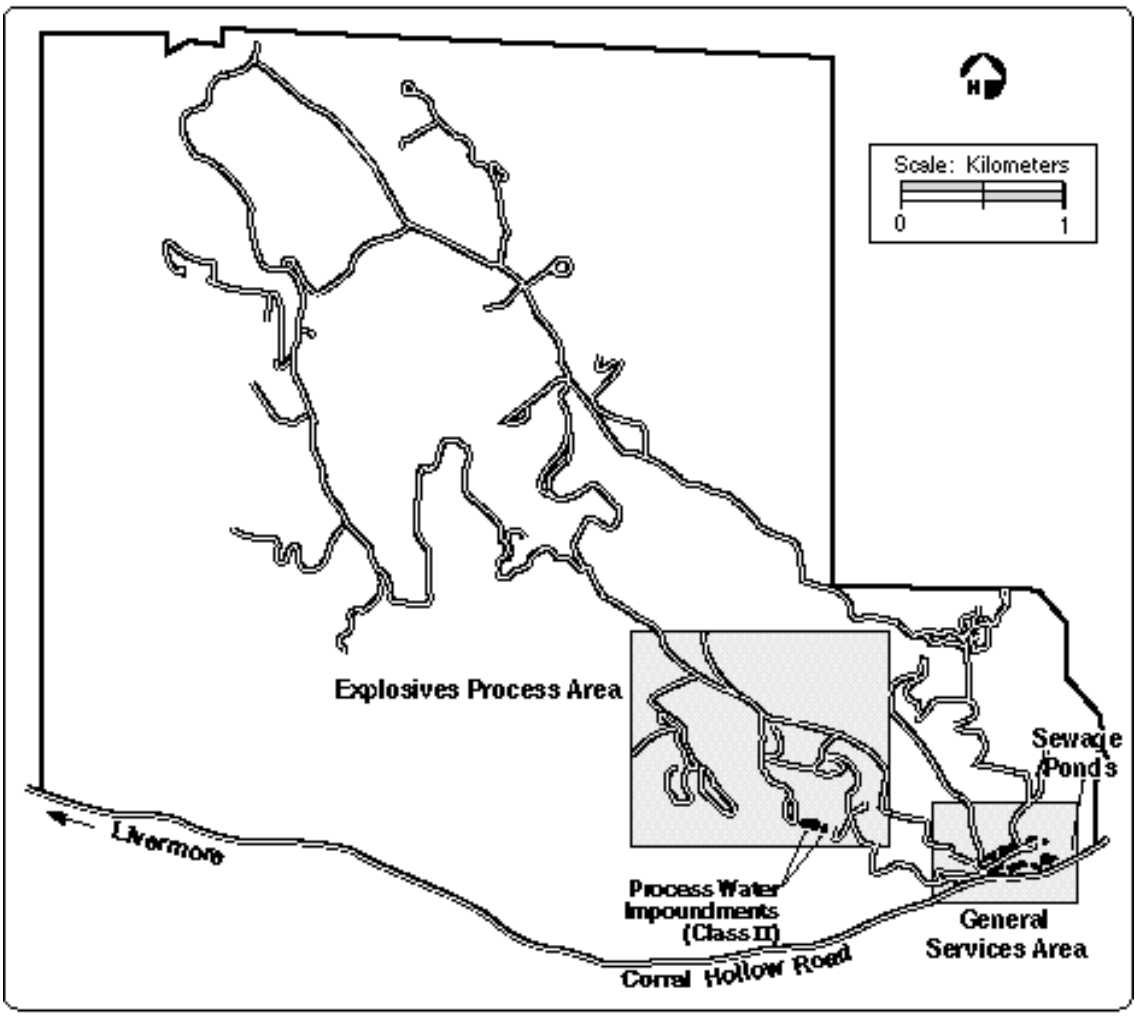

Figure 1. Location of Class II surface water impoundments and sewage evaporation and percolation ponds.

Ground water samples were collected quarterly from monitor wells located up gradient and down gradient of the surface impoundments (**Figure 2**). Ground water analytical results are compared with statistical test limits (SLs) to identify statistical evidence of a release of chemicals into the ground water from the surface impoundments.

The four ground water monitor wells are screened in the Tertiary Age, Neroly Formation Upper Blue Sandstone ($Tnbs_2$). The direction of ground water flow is approximately southeasterly. Monitor well W-817-01 is hydrologically up gradient of the surface impoundments, and monitor wells W-817-02, W-817-03, and W-817-04 are down gradient. LLNL collects ground water samples quarterly from these monitor wells and analyzes them for the COCs specified in MRP 96-248, Revision 1 (Cohen 1998).

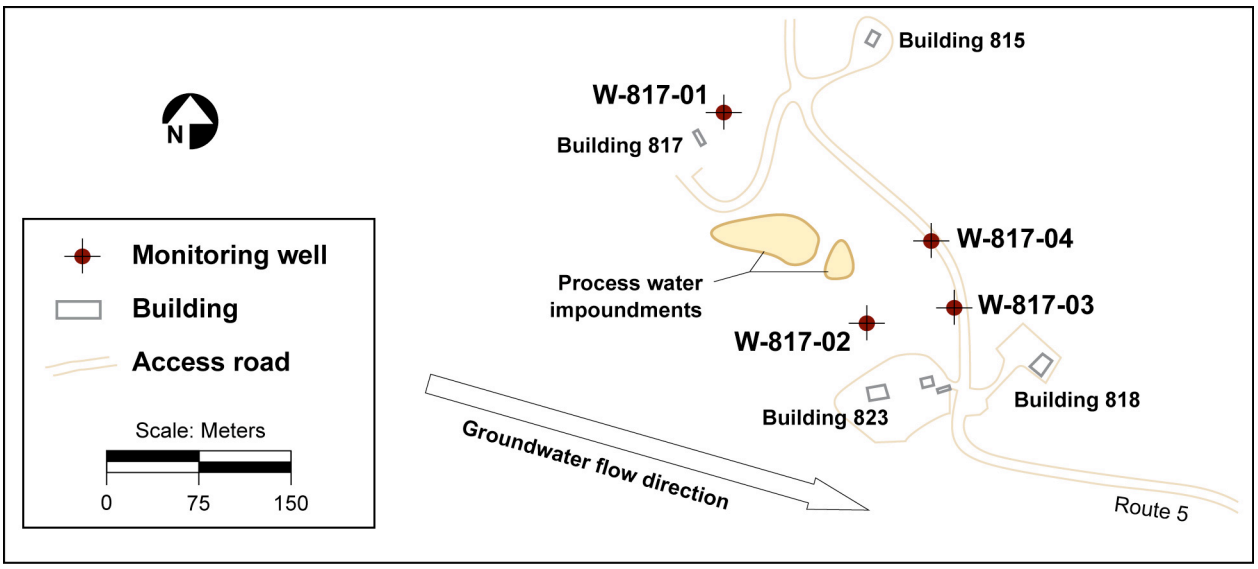

Figure 2. Site 300 Explosives Process Area ground water compliance monitoring locations.

2.2 Process Wastewater Monitoring Network

Data discussed in this section are provided in both graphical and tabular form in **Appendix A** (**Table A-1**) for all 2005 data discharged into the surface impoundments (through the second quarter).

2.2.1 Photographic Process Rinsewater Discharges

Photographic process rinsewater from the Building 823 retention tank was discharged automatically to the surface impoundments through the second quarter of 2005. This waste stream was sampled and analyzed once in the first quarter and once in the second quarter to verify that discharges were consistent with the effluent limits specified in the Permit.

All discharges into the Class II surface impoundments from Building 823 were in compliance with the effluent limits during 2005. Metals concentrations in all process rinsewater discharges sampled from retention tanks were in compliance with the Permit's effluent limits during 2005. Historical data for the COCs are plotted in **Appendix A**, and the 2005 analytical results are tabulated in **Table A-1.**

2.2.2 Chemistry Area Wastewater Discharges

Process wastewater generated from the Chemistry Area (Buildings 825, 826, and the Building 827 Complex) was held in retention tanks until evaluation of the analytical results from the samples collected indicated compliance with the Permit's effluent limits. Data were reported for the quarter when the discharge to the surface impoundments occurred, although wastewater samples may actually have been collected in an earlier quarter.

All process wastewater discharges from the Building 827 Complex occurred in the second quarter, and all constituent concentrations were in compliance with the effluent limits. No discharges occurred from the retention tanks at Buildings 825, 826, or 827A during the year. Analytical results for the Chemistry Area wastewater discharges from Buildings 827C/D, and 827E including COCs and additional analytes are presented in **Tables A-2.1**, **A-2.2**, **A-2.3**, and **A-2.4**. Historical data plots are included in **Appendix A**.

2.2.3 Explosives Process Area Wastewater Discharges

Wastewater generated from the Explosives Process Area (Buildings 806/807, 809, and 817) was sampled annually in accordance with MRP 96-248, Revision 1 (Cohen 1998).

The concentrations of COCs in process wastewater discharges sampled during 2005 from the Explosives Process Area were in compliance with the effluent limits. Process discharges associated with Buildings 806/807 were sampled once during the second quarter, and discharges associated with Building 817 were also sampled once during the second quarter. There were no discharges associated with Building 809; there have been no processes operating at Building 809 since construction activities began there in May 2001. Although construction has been completed, Building 809 remains offline until the final certification for the new isostatic press and ovens is complete. Annual analytical results of Explosives Process Area wastewater discharge samples are presented in **Tables A-3.1** and **A-3.2**. Historical data plots are included in **Appendix A**.

2.3 Leak Detection Monitoring Network

2.3.1 Leachate Collection and Removal Systems Monitoring

The two LCRSs were monitored weekly for liquids that would indicate a leak in a surface impoundment liner until they were demolished in the third quarter. Monitoring continued through August 2, 2005, after which the demolition work began to remove the sludge and HDPE liner. No liquid was discovered in these systems.

2.3.2 Ground Water Monitoring

In 2005, the concentrations of two COCs exceeded the respective SLs: ammonia as nitrogen in samples collected from wells W-817-02 and W-817-04 during the first quarter (Brown 2005a), and from wells W-817-03 and W-817-04 during the third quarter; and dissolved manganese in a sample collected from well W-817-04 during the third quarter (Brown 2005b). Concentrations exceeding the SLs were confirmed by at least one retest sample from each well.

LLNL has previously proposed updated SLs for ammonia (0.080 mg/L) in all wells, and for dissolved manganese (0.036 mg/L) in well W-817-04 in Brown 2002. Concentrations of ammonia were not confirmed as exceeding the proposed SL of 0.080 mg/L in any well, nor were concentrations of dissolved manganese confirmed as exceeding the proposed SL of 0.036 mg/L. LLNL believes these concentrations are just natural variations of background, and does not believe these elevated concentrations of either COC (**Table B-1.1**) originated from the surface impoundments.

Concentrations of the plasticizer compound bis(2-ethylhexyl)phthalate were detected at concentrations just over the SL of 5 μg/L in ground water samples collected from two down gradient wells during the second, third, and fourth quarters. This common laboratory contaminant was also detected, at estimated concentrations of 1.7 to 4.7 μg/L, in method blank and field blank samples during those quarters (**Tables F-1** and **F-2.1**).

Fourth Quarter

Table B-1.2 lists all ground water analytical results, including retest sample results, for the fourth quarter of 2005 for COCs under MRP 96-248, Revision 1 (Cohen 1998). Analytical results from other parameters analyzed in water samples from these wells, which are not required by MRP 96-248, Revision 1, but are part of the analytical laboratory suites, are listed in **Table B-2.1**. **Appendix E** provides a brief description of all statistical methods used to evaluate compliance with the limits established in MRP 96-248, Revision 1 (Cohen 1998). A discussion of the fourth quarter ground water QA/QC data is provided in **Appendix F**, along with the field QA/QC data tables (**Tables F-1.1** and **F-1.2**).

The concentrations of acetone and 2-butanone (methyl ethyl ketone) reported in ground water samples collected on October 11, 2005, from down gradient well W-817-04 were 18 and 810 μg/L, respectively. These concentrations exceeded the respective SLs of 10 and 20 μg/L (**Table B-1.1**). Concentrations exceeding the SLs were not confirmed by results of the retest samples collected from that well on November 11 and 22, 2005 (**Table B-1.2**).

Concentrations of the energetic compound pentaerythritol tetranitrate (PETN) detected in ground water samples collected from down gradient monitor wells W-817-02 (2.35 μg/L) and W-817-04 (2.25 μg/L) in the fourth quarter exceeded the SL of 1.0 μg/L. These concentrations exceeding the SL were not confirmed by retest sample results (**Table B-1.2**). Plots of all COC data over time and tabular annual summaries of the ground water analytical data are included in **Appendix B**.

3.0 Sewage Evaporation and Percolation Ponds

3.1 Compliance Monitoring Program

Monitoring at the sewage evaporation pond (evaporation pond) and the sewage percolation pond (percolation pond) (**Figure 3**) is also specified in the MRP 96-248, Revision 1 (Cohen 1998). Applicable reporting requirements are detailed in the Permit (CVRWQCB 1996).

Quarterly samples of wastewater flowing into the evaporation pond are collected for analysis from a location west of the pond (sampling location ISWP in **Figure 3**). ISWP is a manhole that captures all waste streams before they flow into the pond. The samples are analyzed for electrical conductivity (EC), pH, and biochemical oxygen demand (BOD).

Quarterly wastewater samples are collected from the evaporation pond (sampling location ESWP) and analyzed for pH, EC, and dissolved oxygen (DO). Observations of the pond are made at least monthly for freeboard, color, odor, and levee condition. Any discharge from the evaporation pond to the percolation pond (sampling location DSWP) is sampled and analyzed for BOD, EC, total and fecal coliform, and pH.

Leak detection monitoring at the sewage ponds is accomplished by monitoring the shallow ground water, including the regional aquifer ($Tnbs_1$) beneath and adjacent to the ponds. Ground water monitoring includes semiannual sampling and analysis of the collected

samples. **Table 2** lists each monitor well; and whether it is up gradient, down gradient, or cross gradient of the sewage ponds; and the geological interval(s) over which it is screened. **Figure 3** shows the location of each of the wells.

Table 2. Monitor well location relative to sewage ponds and aquifer monitored.

Monitor well	Location	Screening interval
W-7E	Up gradient	$Tnsc_1/Tnbs_1$
W-7ES	Up gradient	$Qal/Tnsc_1$
W-7PS	Up gradient	Qal
W-35A-04	Cross gradient	Qal
W-26R-01	Down gradient	$Tnbs_1$
W-26R-11	Down gradient	Qal
W-26R-05	Down gradient	$Qal/Tnbs_1$
W-25N-20	Down gradient	$Qal/Tnbs_1$
W-7DS	Down gradient	$Qal/Tnbs_1$

Note: $Tnbs_1$ is the regional aquifer.

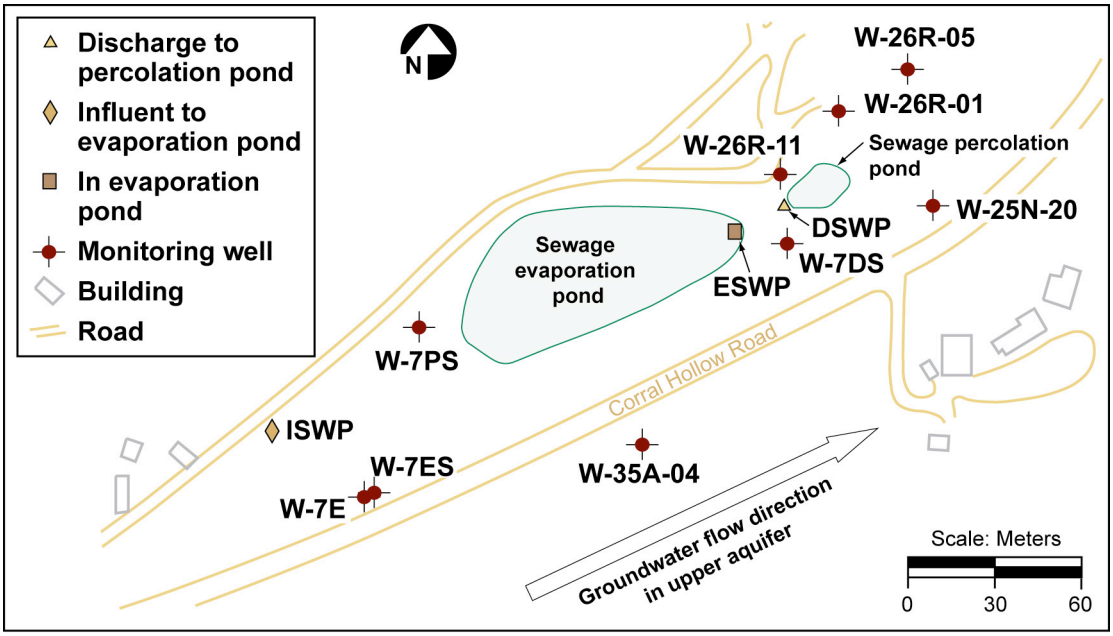

Figure 3. Site 300 sewage pond ground water and surface water compliance monitoring locations

3.2 Wastewater Monitoring

All required wastewater monitoring parameters for the sewage ponds were in compliance with the Permit's provisions and specifications throughout 2005. Continuous discharge occurred during the first quarter (**Table C-4**) from the evaporation pond to the percolation pond (Brown 2005a). Historical plots and tabular summaries of the 2005 data are included in **Appendix C**.

3.3 Ground Water Monitoring

During the review and preparation of the annual report, LLNL staff identified some irregularities with data from the sewage ponds ground water network that were not discovered during the preparation of the first and third quarter reports when those reports were submitted. We discovered additional data points that were not previously reported.

During the first and third quarters multiple samples were collected from all the wells in the network due to a miscommunication with the sampling team. The additional samples were not discovered during the preparation of the first and third quarter reports and therefore were not reported. All data are included in this annual report in **Table D**.

In the first quarter, fecal coliform organisms were detected in four samples from two ground water monitor wells (W-35A-04 and W26R-11). Fecal coliform was not detected in any sample results in the third quarter. Also in the first quarter, total coliform organisms were detected in four samples from the same two ground water monitor wells. In the third quarter, no fecal coliform was detected but total coliform organisms were detected in one sample from well W-26R-11.

WDR 96-248 contains a numeric ground water limitation for fecal coliform; the discharge shall not cause the underlying ground water to exceed 2.2 MPN/100mL for two consecutive quarters. LLNL evaluated the results against the limitation. The two data points in the first quarter, 5.1 MPN/100 mL in well W-35A-04 and 23 MPN/100 mL in well W-26R-11, that were above the ground water limit were not repeated in the next sampling event. The initial results from the first quarter samples of 2006, including two samples collected from well W-26R-11, further indicate that the first quarter 2005 results were either not characteristic of the ground water or at worst a transient effect.

LLNL has initiated several responses and corrective actions to this discovery.

- First, upon discovery LLNL collected additional ground water samples for fecal and total coliform from well W-26R-11. The results were total and fecal coliform organisms below the level of detection, that is less that 2 MPN/100mL.

- Second, LLNL has also changed analytical laboratories for the coliform bacteria analyses. Beginning in March 2005, a certified analytical laboratory closer to Site 300 is being used for this work to ensure that the samples can be analyzed as soon as possible after collection. The analytical laboratory is notified in advance of the planned sampling date so that they are ready to analyze the samples as soon as they are delivered. Upon collection of coliform samples, LLNL staff will hand deliver the samples to the analytical laboratory for immediate analysis.

4.0 Percolation Pits

MRP 96-248, Revision 1, requires monthly inspections of the percolation pits at Buildings 806A, 827A, 827C, 827D, and 827E. Sampling and analysis for metals is required whenever an overflow occurs.

During 2005, the percolation pits at Buildings 806A, 827A, 827C, 827D, and 827E operated normally, and no overflows occurred. The percolation pits at both Buildings 827C and 827D contained standing water throughout the fourth quarter.

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U.S. Environmental Protection Agency, Office of Emergency and Remedial Response (1994b), *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA 540/R-94/013).

Webster-Scholten, C. P. (Ed.) (1994), *Final Site-Wide Remedial Investigation Report, Lawrence Livermore National Laboratory Site 300*, Lawrence Livermore National Laboratory, Livermore, CA (UCRL-AR-108131).

Acknowledgements

The compliance monitoring program for WDR 96-248 could not be conducted without the dedicated efforts of many people. Duane Rueppel directed the sewage ponds monitoring efforts, and Shari Brigdon directed the monitoring of discharges to the Class II surface impoundments. LLNL sampling technologists sampled the wastewaters, coordinated by Bob Williams, and the monitoring wells, coordinated by Eric Walter, and packaged the samples for shipment to the off-site analytical laboratories. Off-site analytical support was provided by BC Laboratories, Inc., General Engineering Laboratories, and Caltest Analytical Laboratory. Becky Goodrich, Connie Wells, and Hildy Kiefer performed quality reviews and data table preparation. Monique de Vasconcelos provided essential administrative assistance. We thank James Lane, John Scott, Karen Folks, and Larry Paukert at Site 300 for their cooperation in this effort. A draft of this report was reviewed by LLNL peers, whose suggestions for improvements are incorporated.

Appendix A

Annual Summary Plots and Tables of Surface Impoundments Process Water Monitoring Data

Appendix A

This appendix contains graphical and tabular summaries of the 2005 surface water impoundments influent monitoring. The monitoring requirements of WDR 96-248 began in the fourth quarter of 1996.

Wastewater influent monitoring includes photographic process water from Buildings 801, 823, and 851; the Chemistry Area (Buildings 825, 826, and 827 Complex); and discharges from the Explosives Process Area (Buildings 806, 807, 809, and 817).

Retention tank designations for the photographic process and Chemistry Areas are as follows: 801-R3O1 (old), 801-R3O2 (new), 823-R1U1, 851-R1A1 (photographic process area); and 825-R1A1, 826-R1A1, 827A-R1A1, 827C-R1A1, and 827A-R2A1 (Chemistry Area). Process discharges from the Explosives Process Area are generated from Buildings 806/807 and 817 and are designated as B806/807 and B817, respectively. The plots contain all monitoring data available since LLNL began storing sample results from these retention tanks in 1992. There are no 2005 data for B809 because there have been no operations there since May 2001.

The plots display the pH parameter and concentrations of trace metals, volatile organic compounds, and semi-volatile organic compounds in wastewater influent to the surface water impoundments. The plots begin with the retention tank associated with the lowest building number for each detected analyte always plotted first. Only analytes detected in each retention tank are plotted.

Each two-dimensional graph plots concentration on the vertical axis versus time (years divided into four quarterly sampling periods) on the horizontal axis. Units of measure are given on the vertical axis label and in the header at the top of each page. Values above the analytical reporting limit for each analyte are plotted as solid diamonds, values below the reporting limit are plotted as open inverted triangles, and the estimated values between the reporting limit and method detection limit are plotted as crosses.

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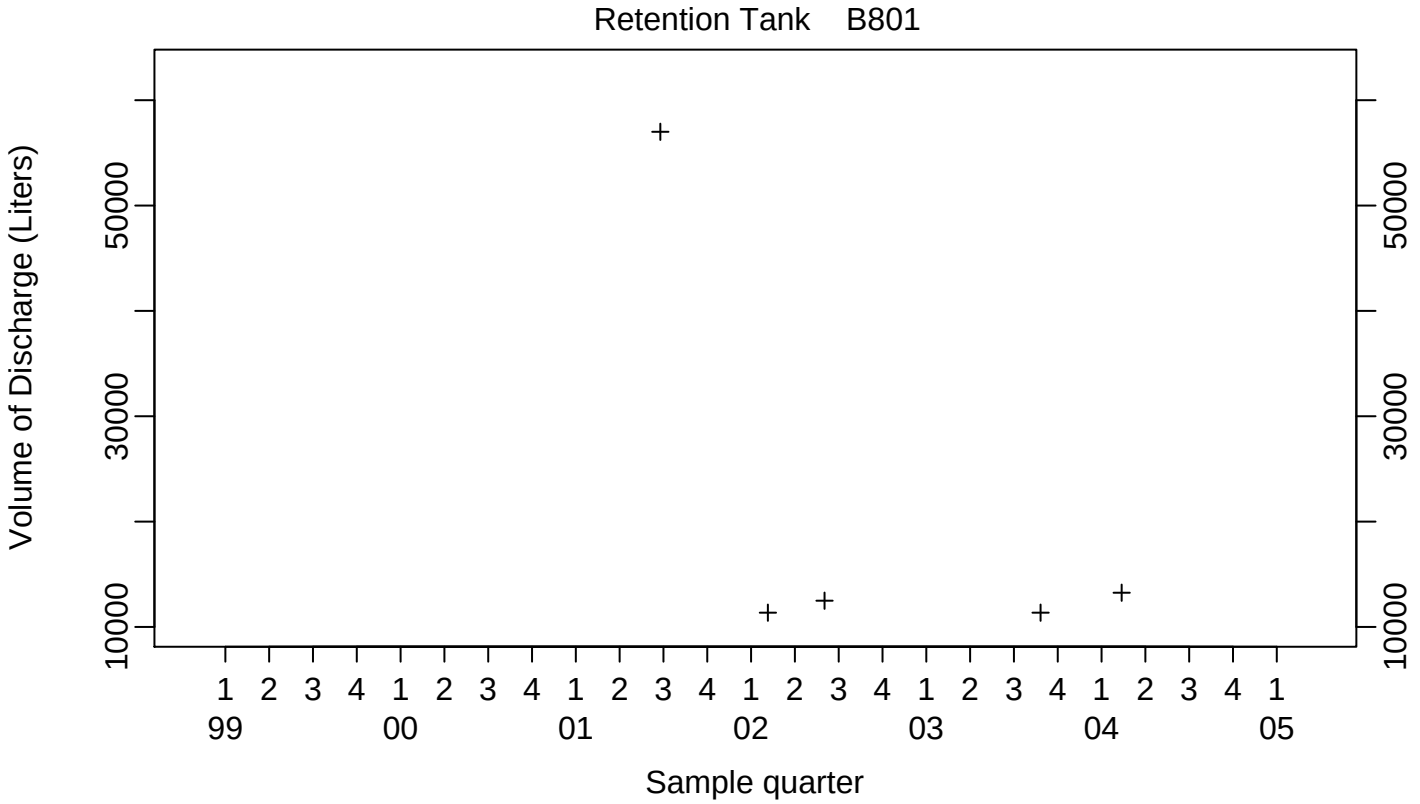
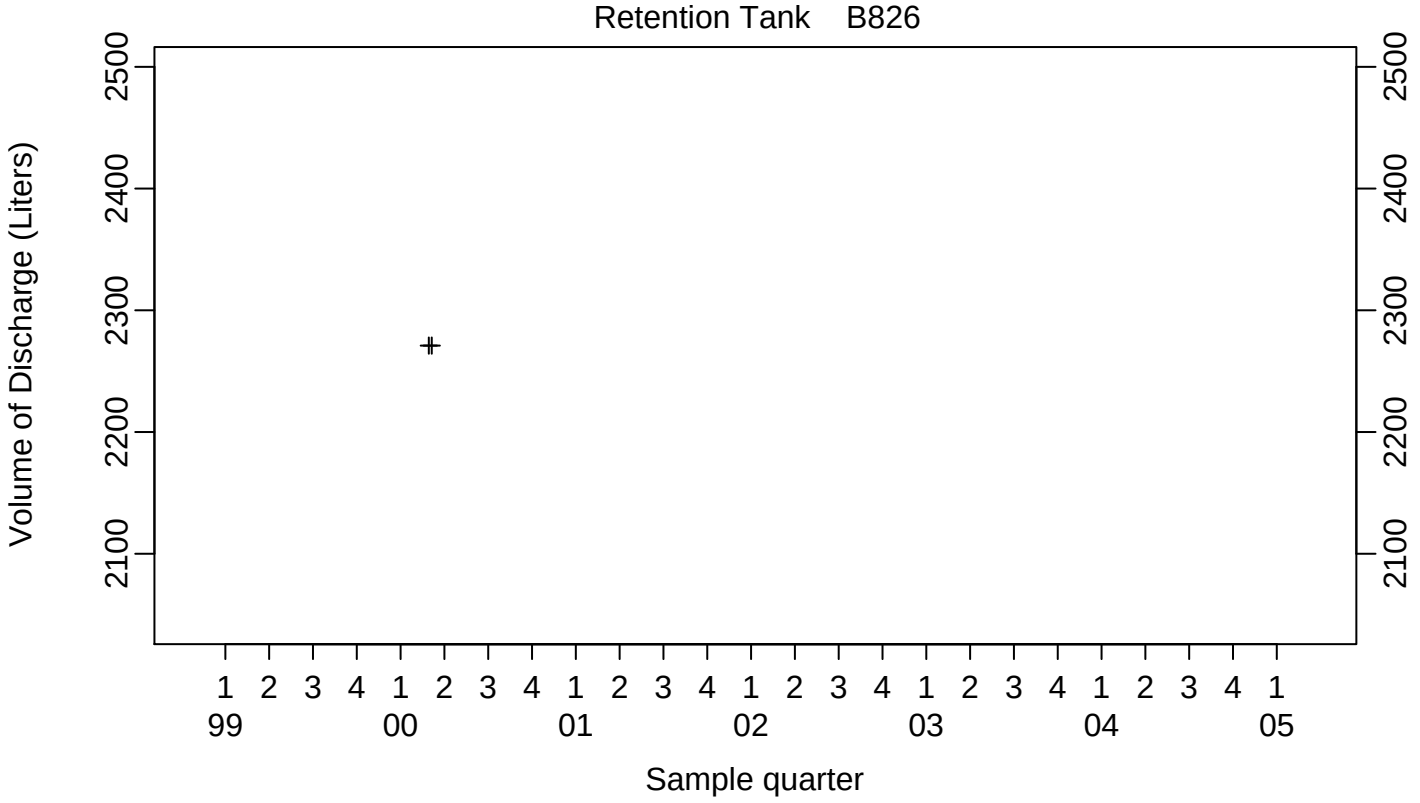
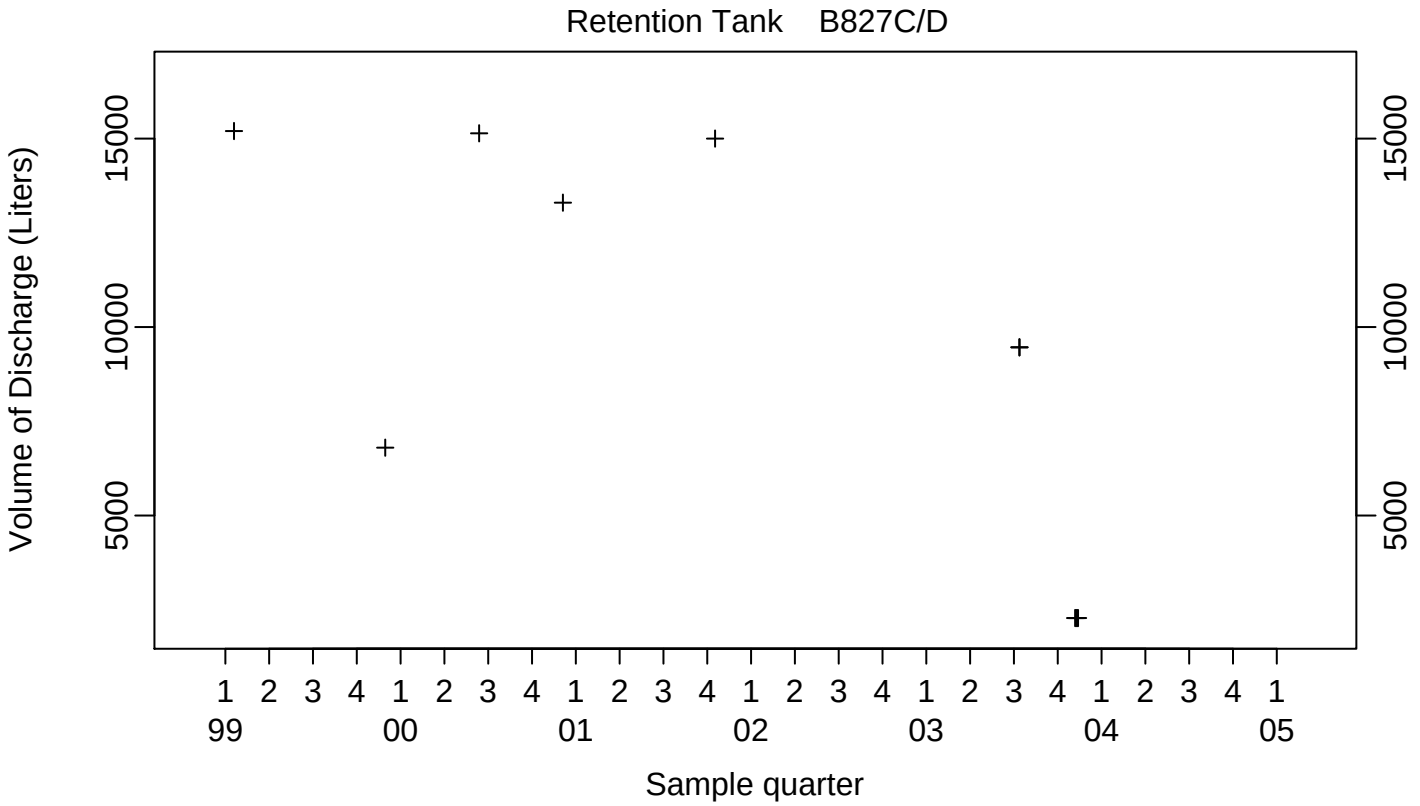
Annual Plots of Surface Impoundments Process Water Monitoring Data

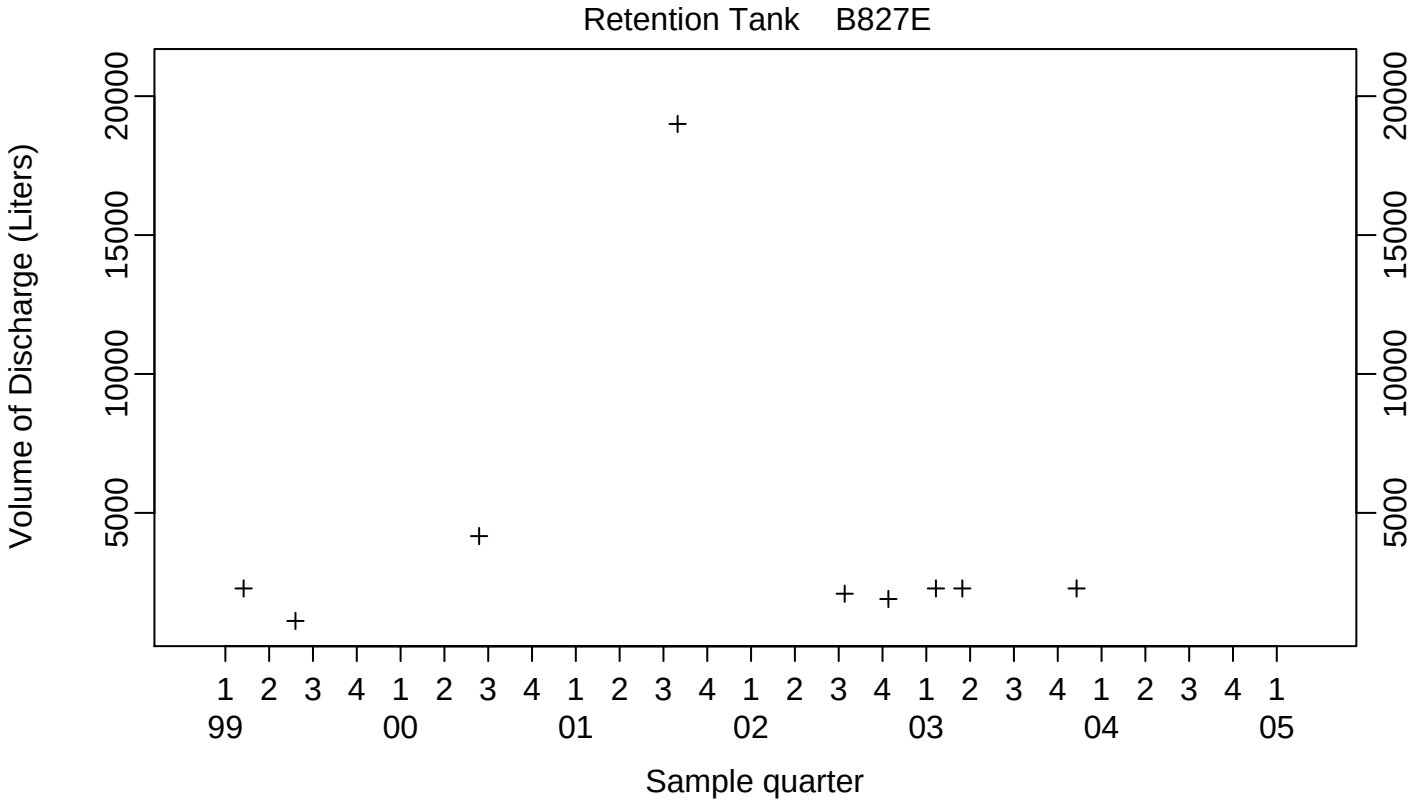
Surface Impoundments Process Water
Volume of Discharge (Liters)

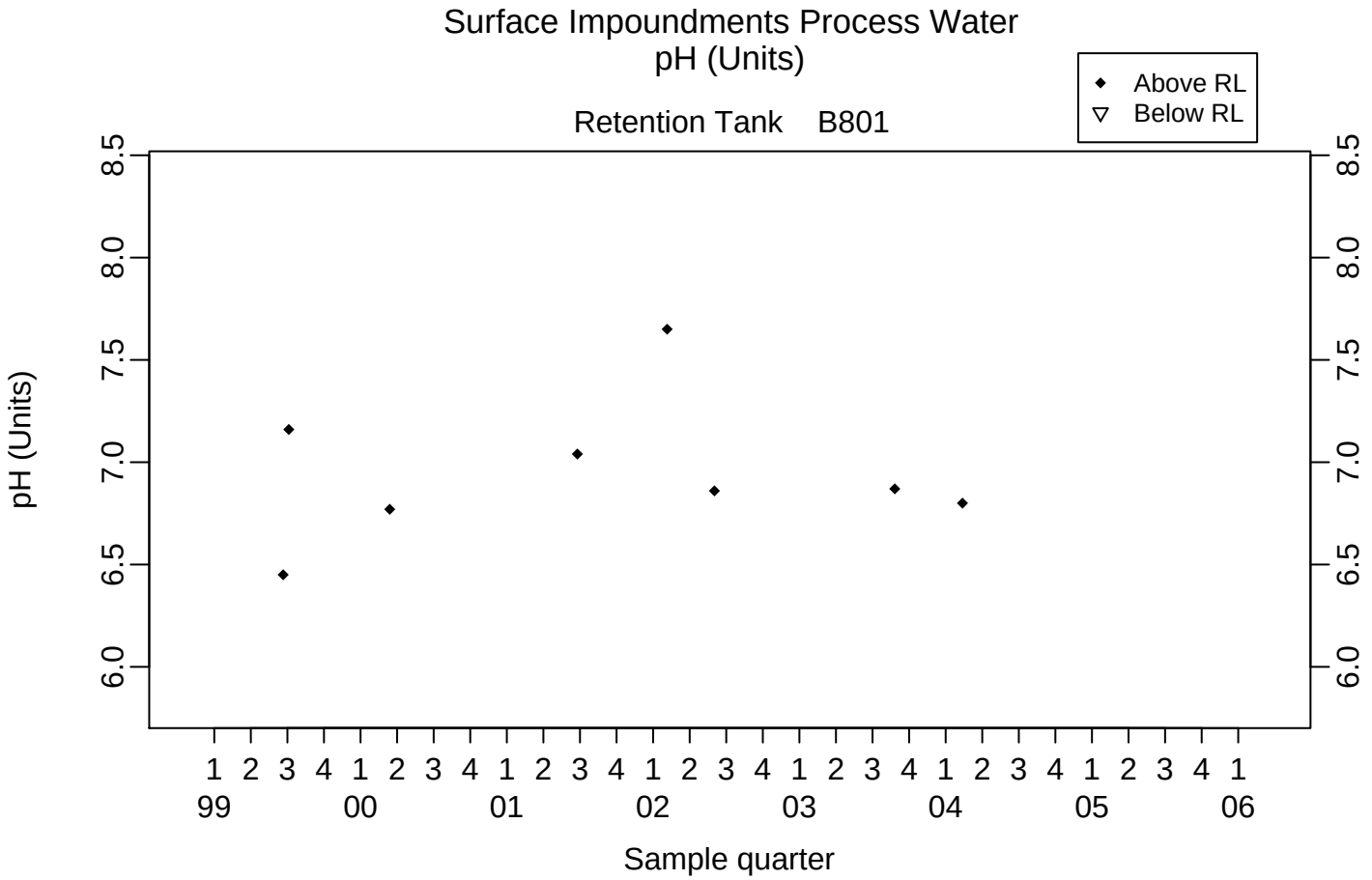


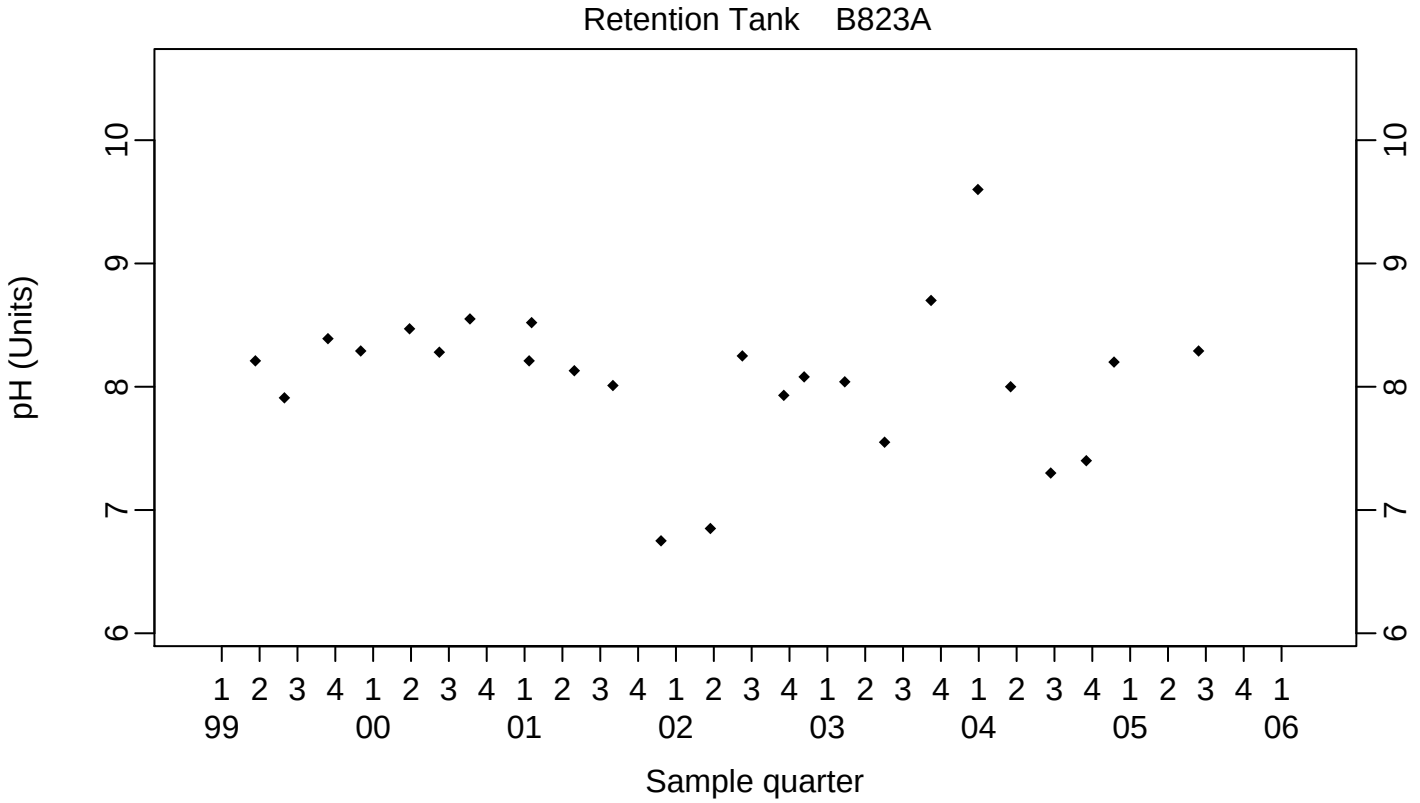


Surface Impoundments Process Water
Volume of Discharge (Liters)

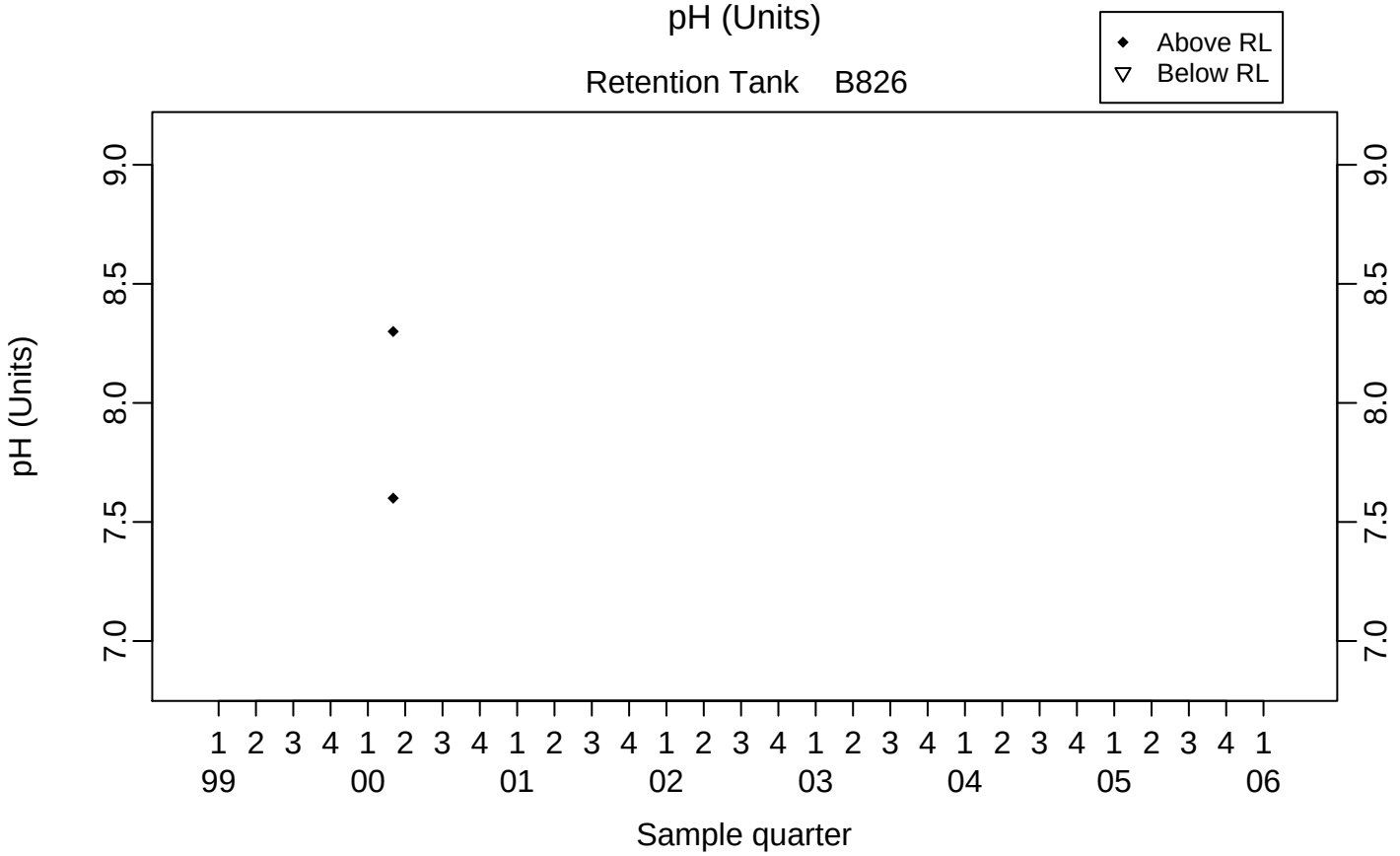


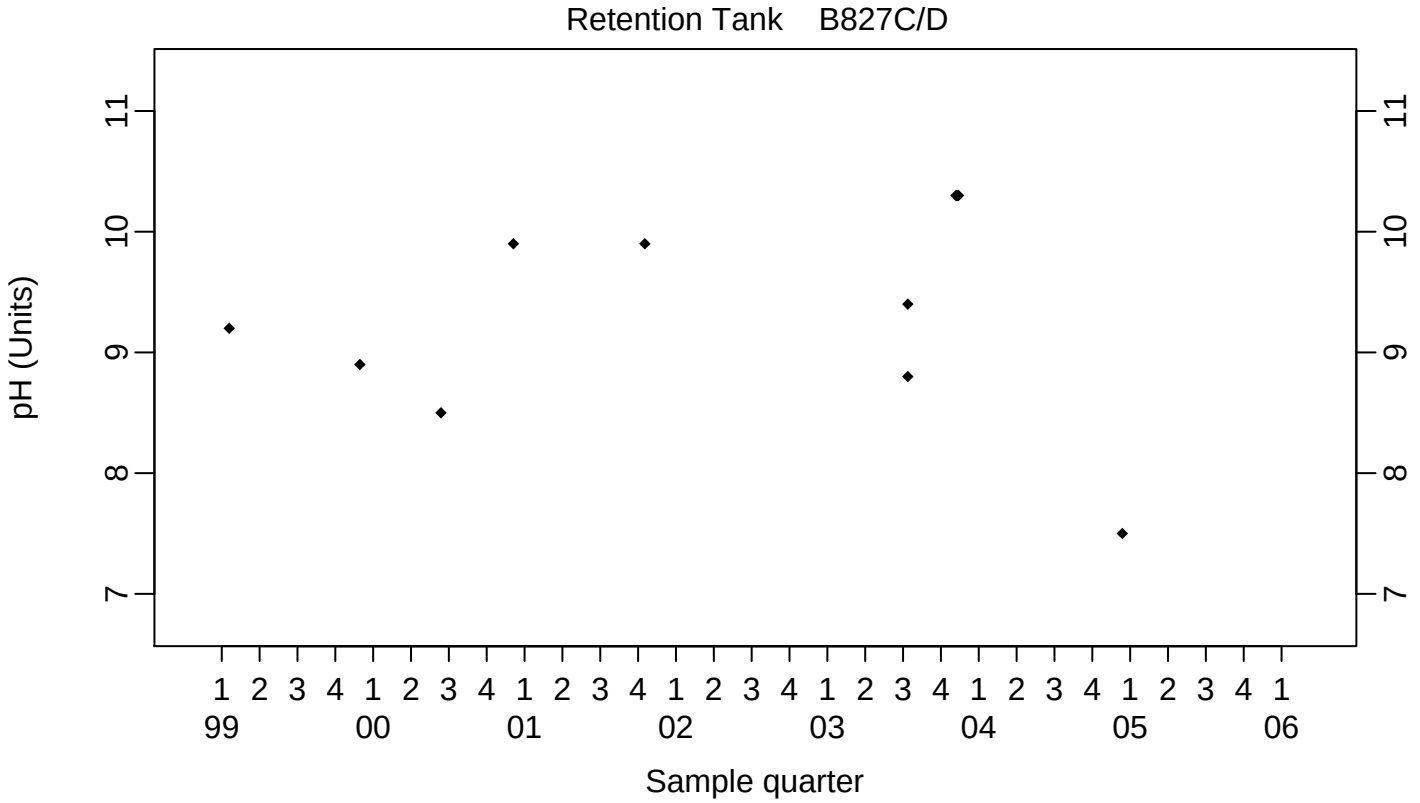



Surface Impoundments Process Water
pH (Units)
Above RL
Below RL
Retention Tank B801
pH (Units)
6.0
6.5
7.0
7.5
8.0
8.5
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

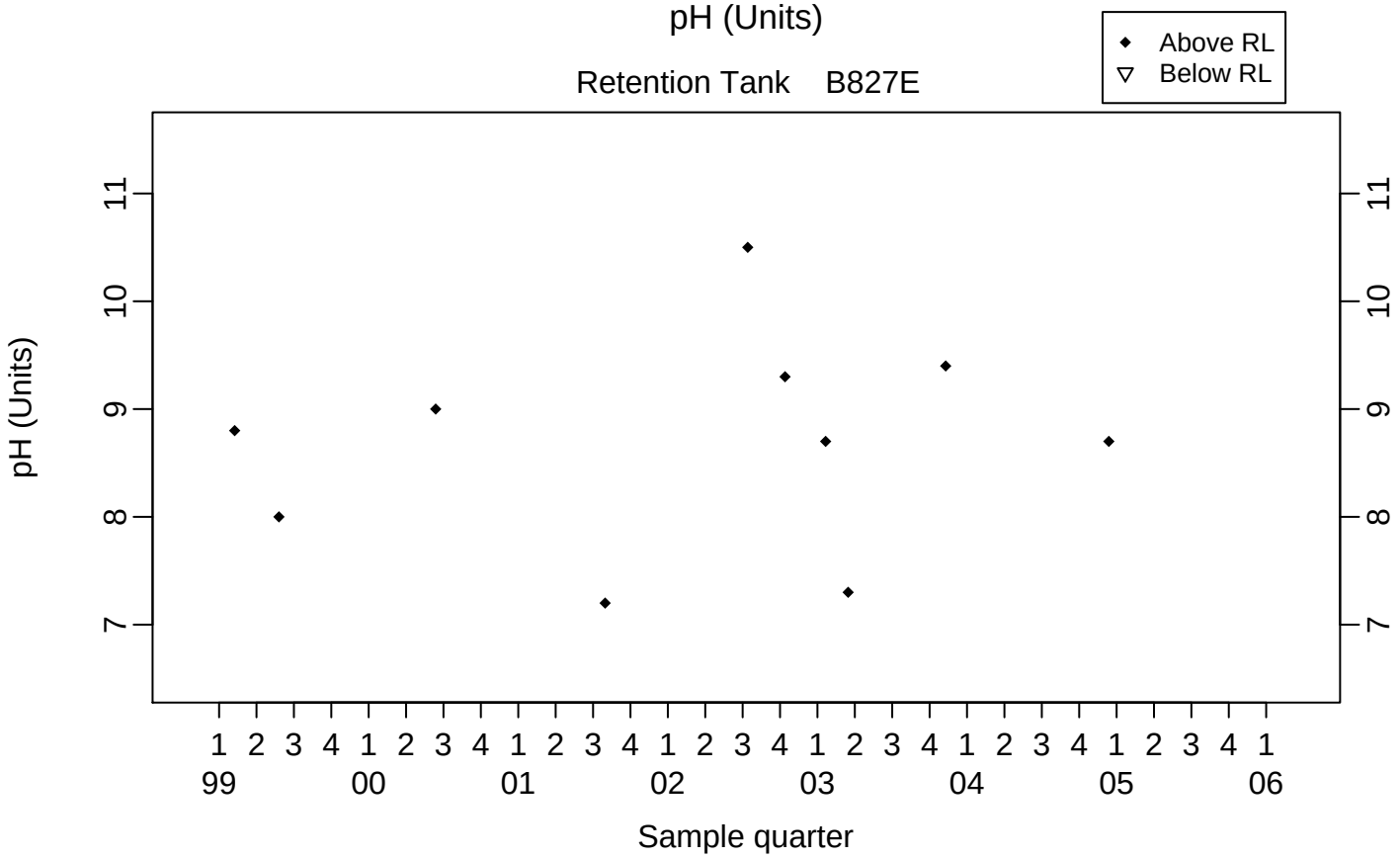

Retention Tank B823A
pH (Units)
6
7
8
9
10
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

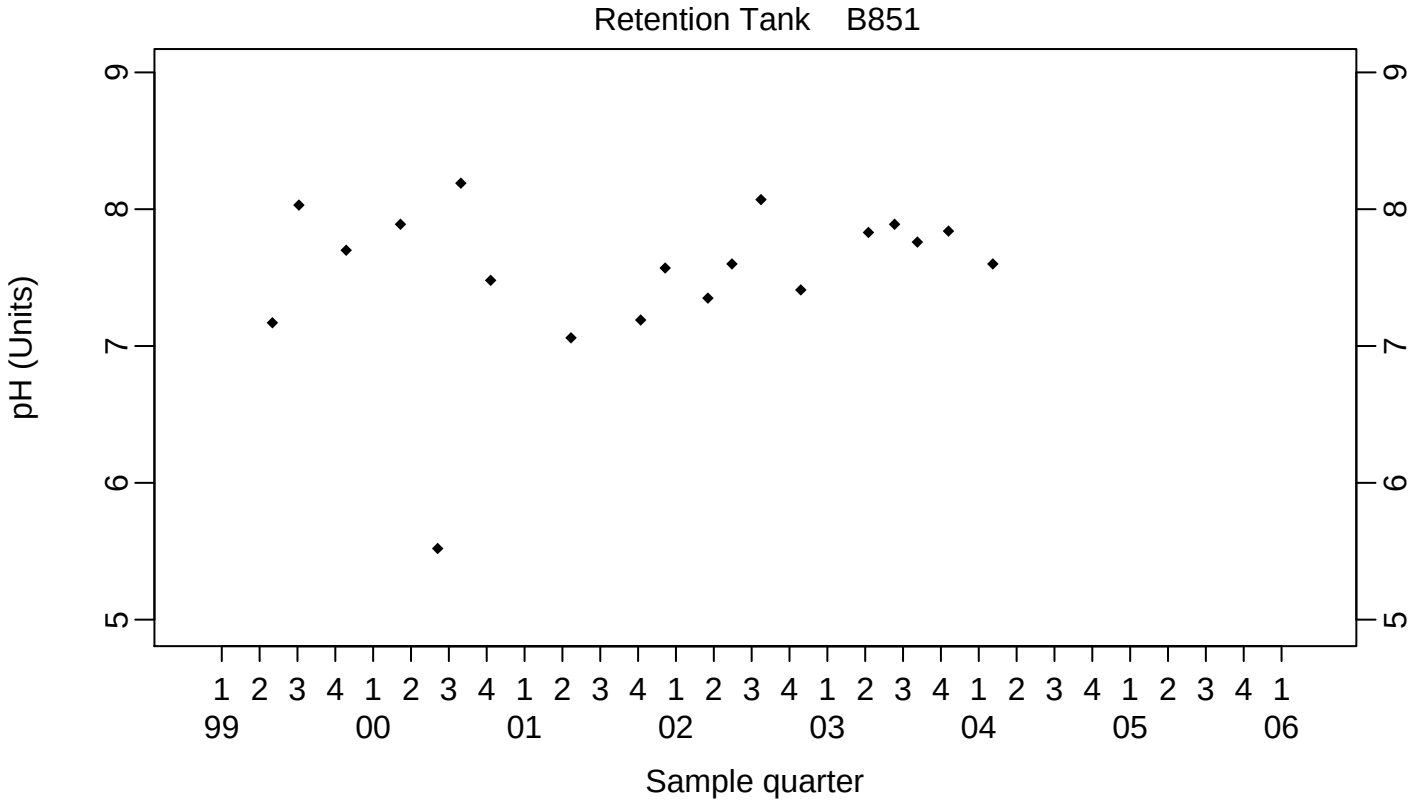
Surface Impoundments Process Water
pH (Units)



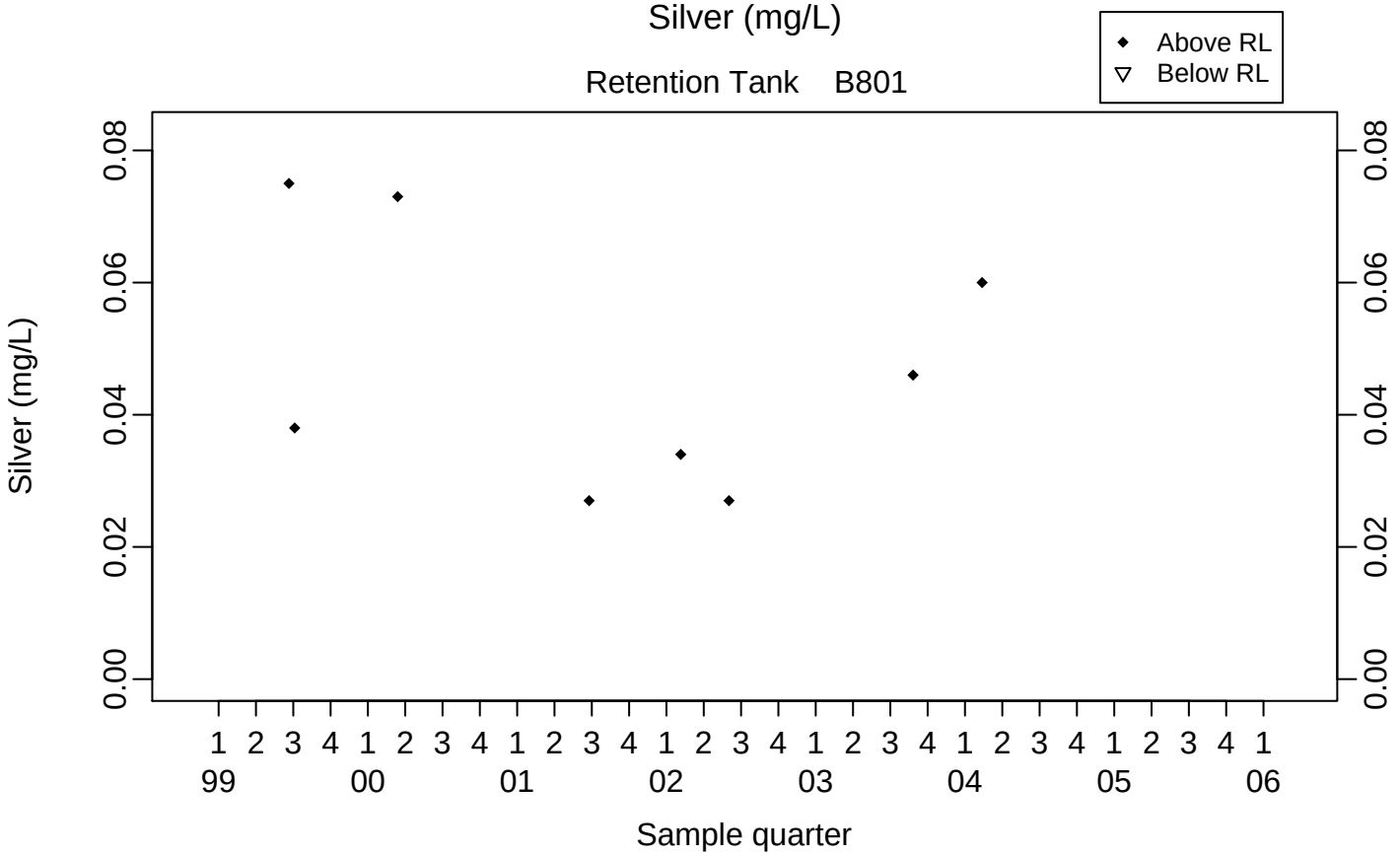


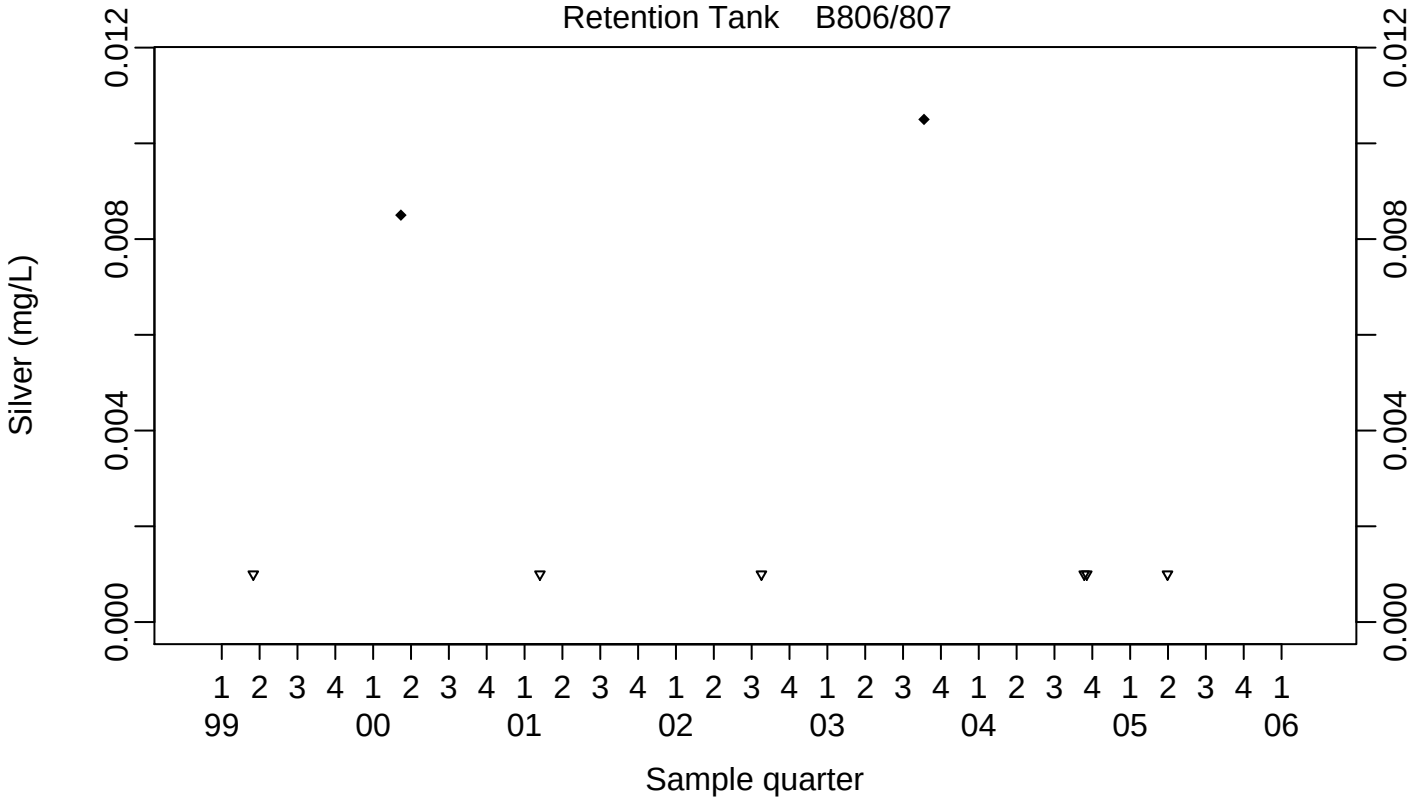
Surface Impoundments Process Water
pH (Units)



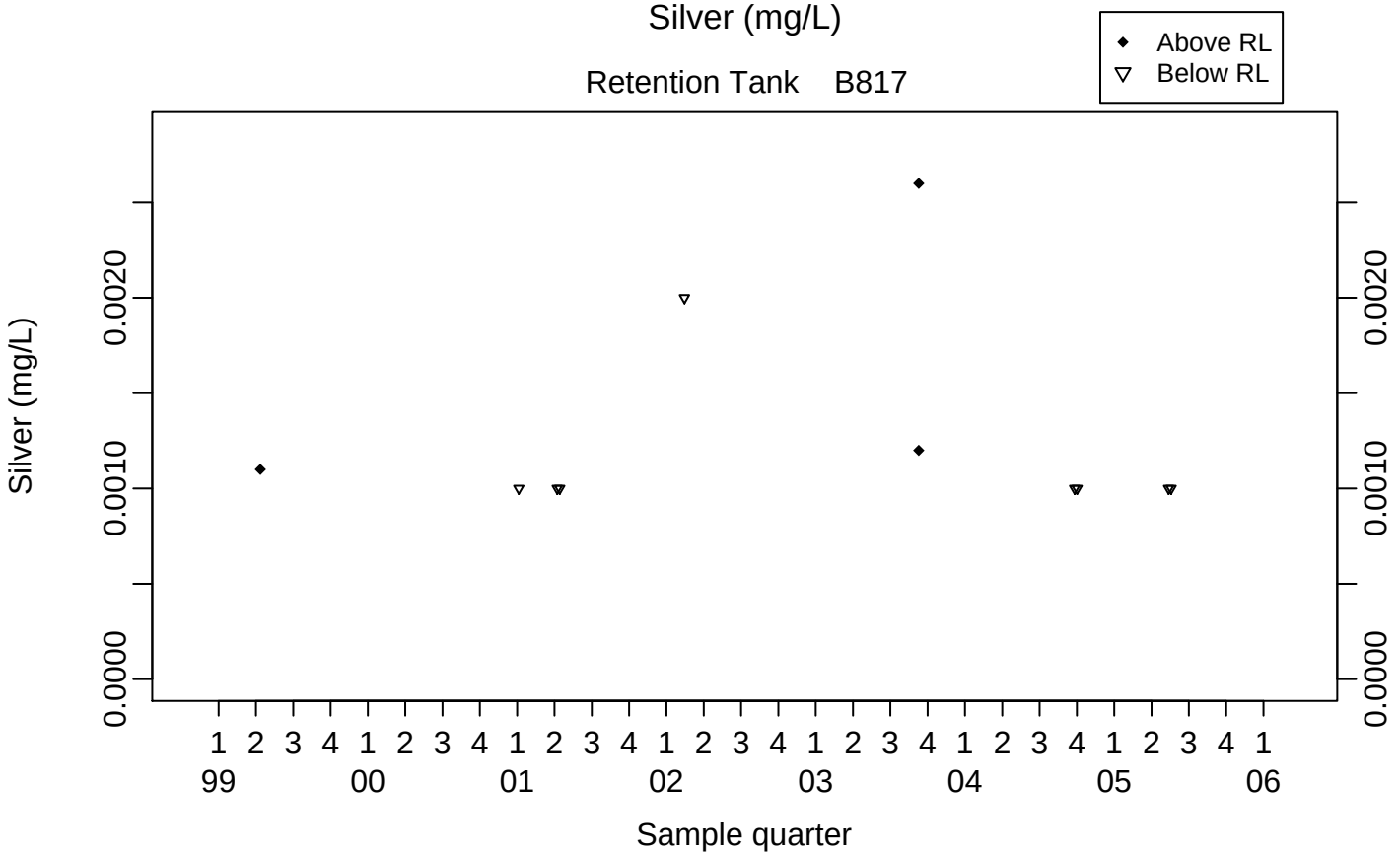


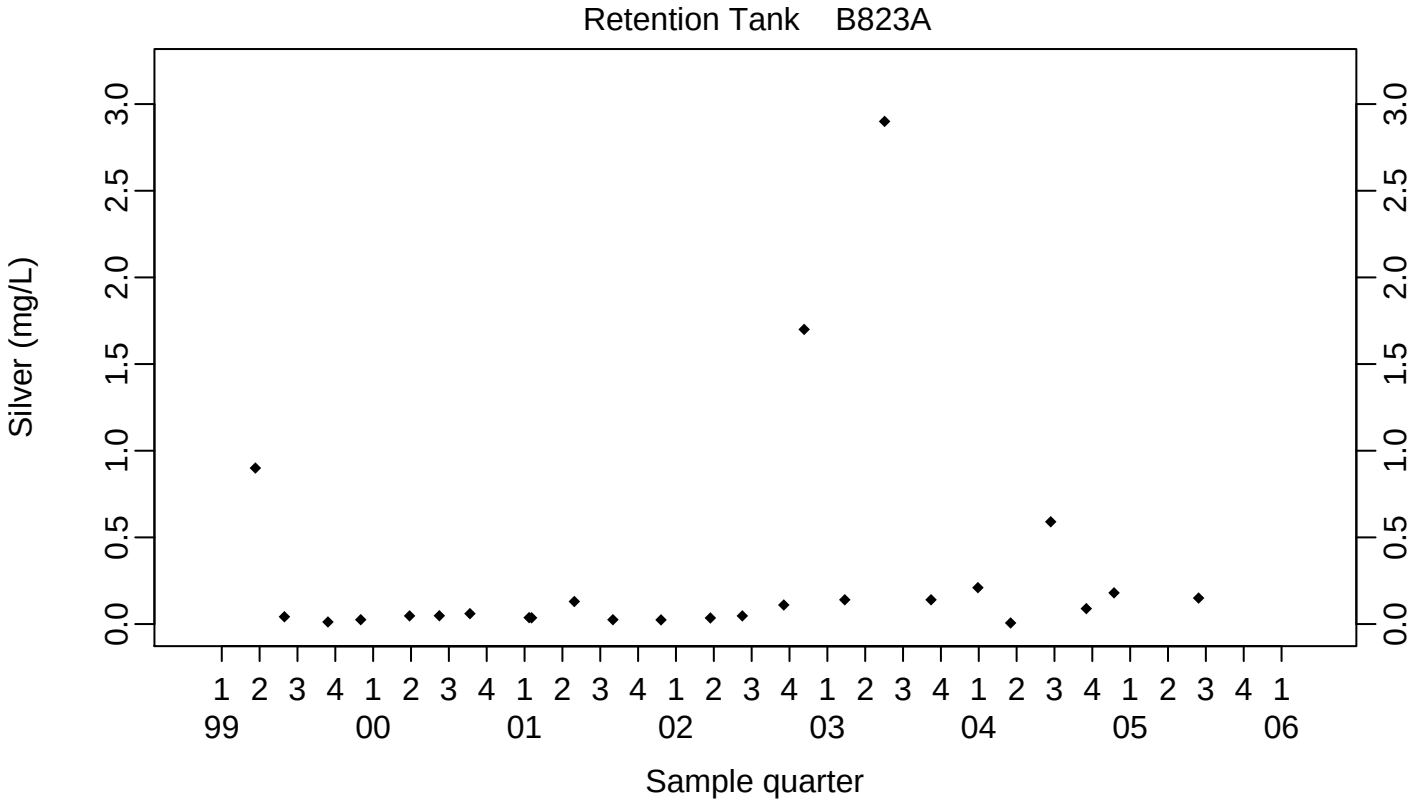
Surface Impoundments Process Water
Silver (mg/L)

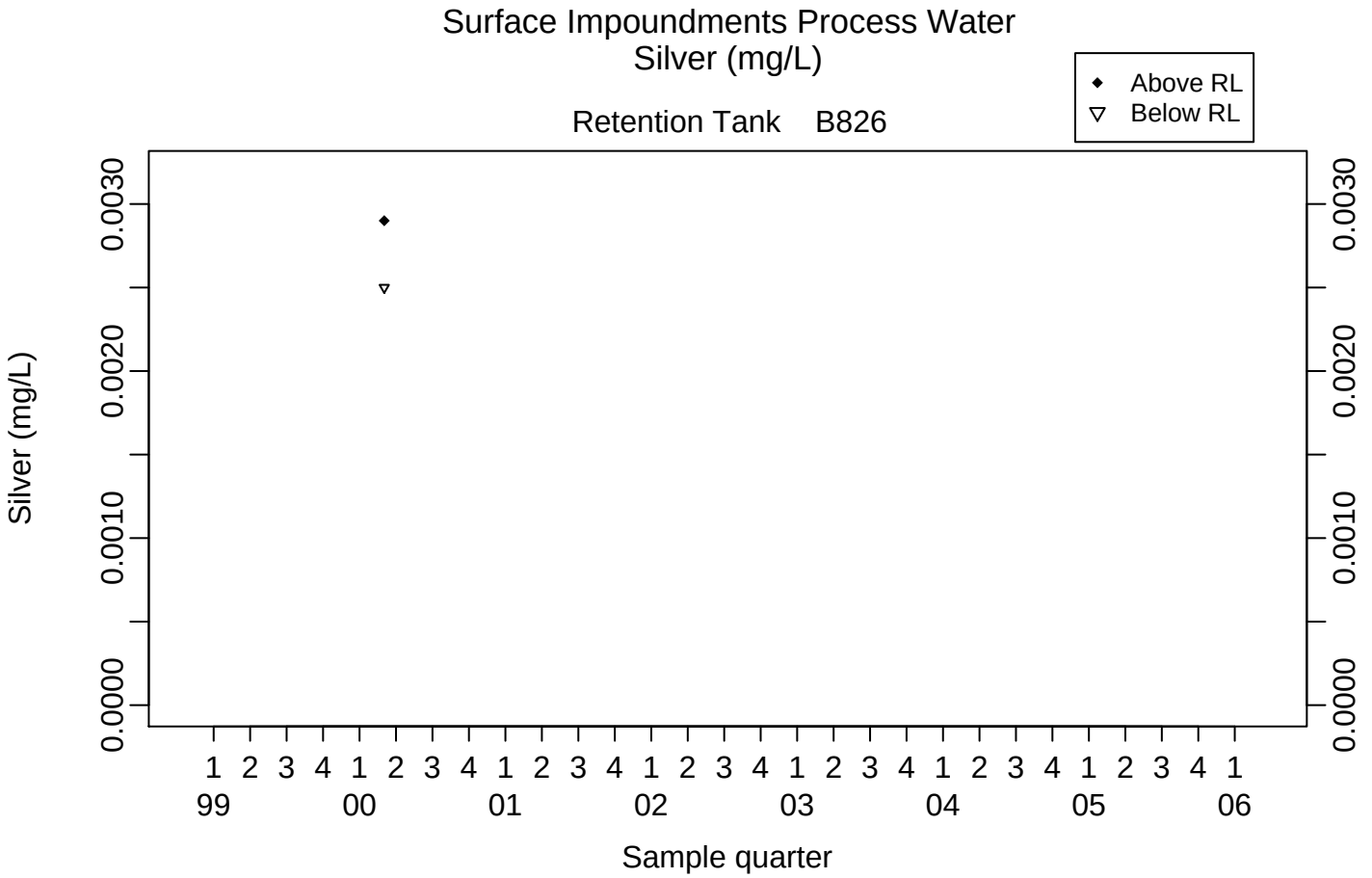


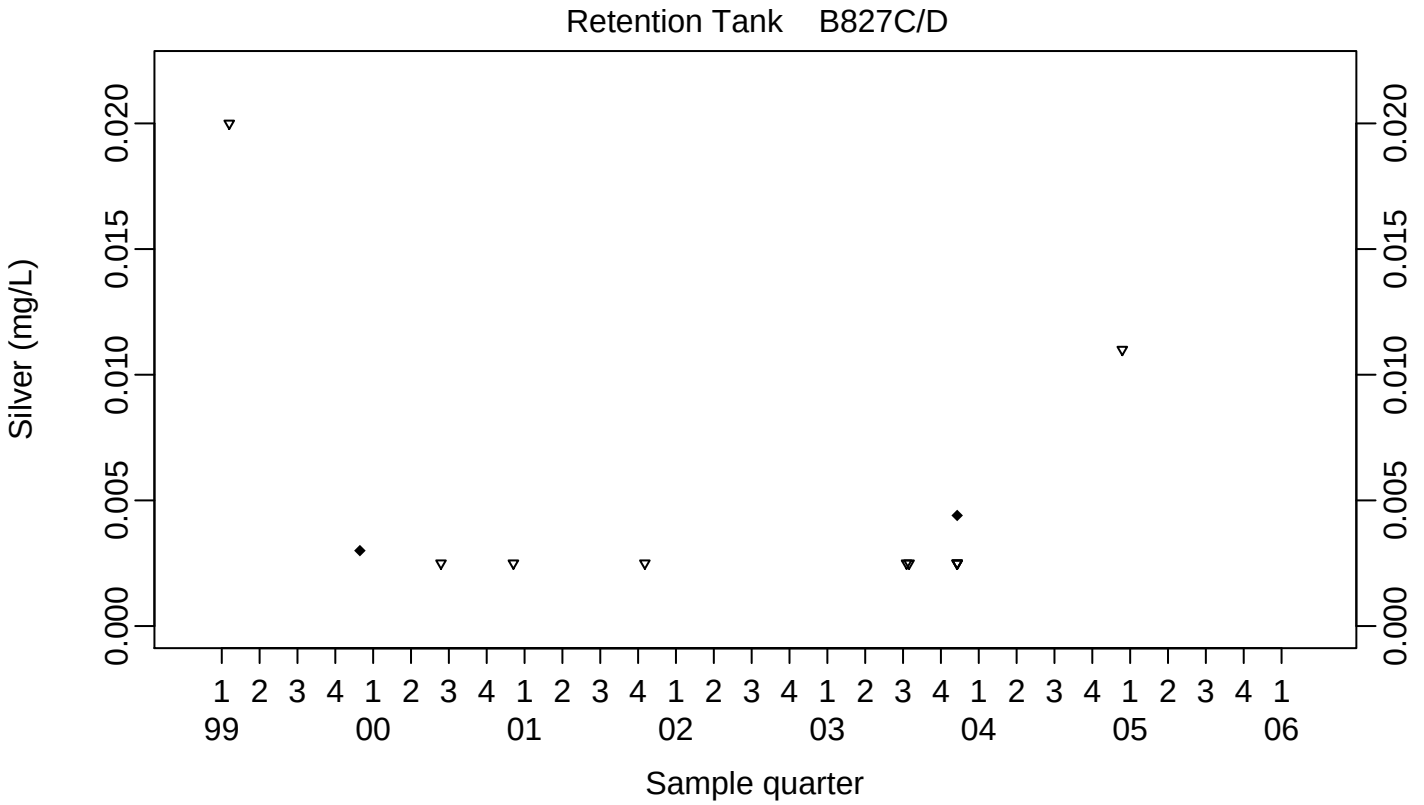


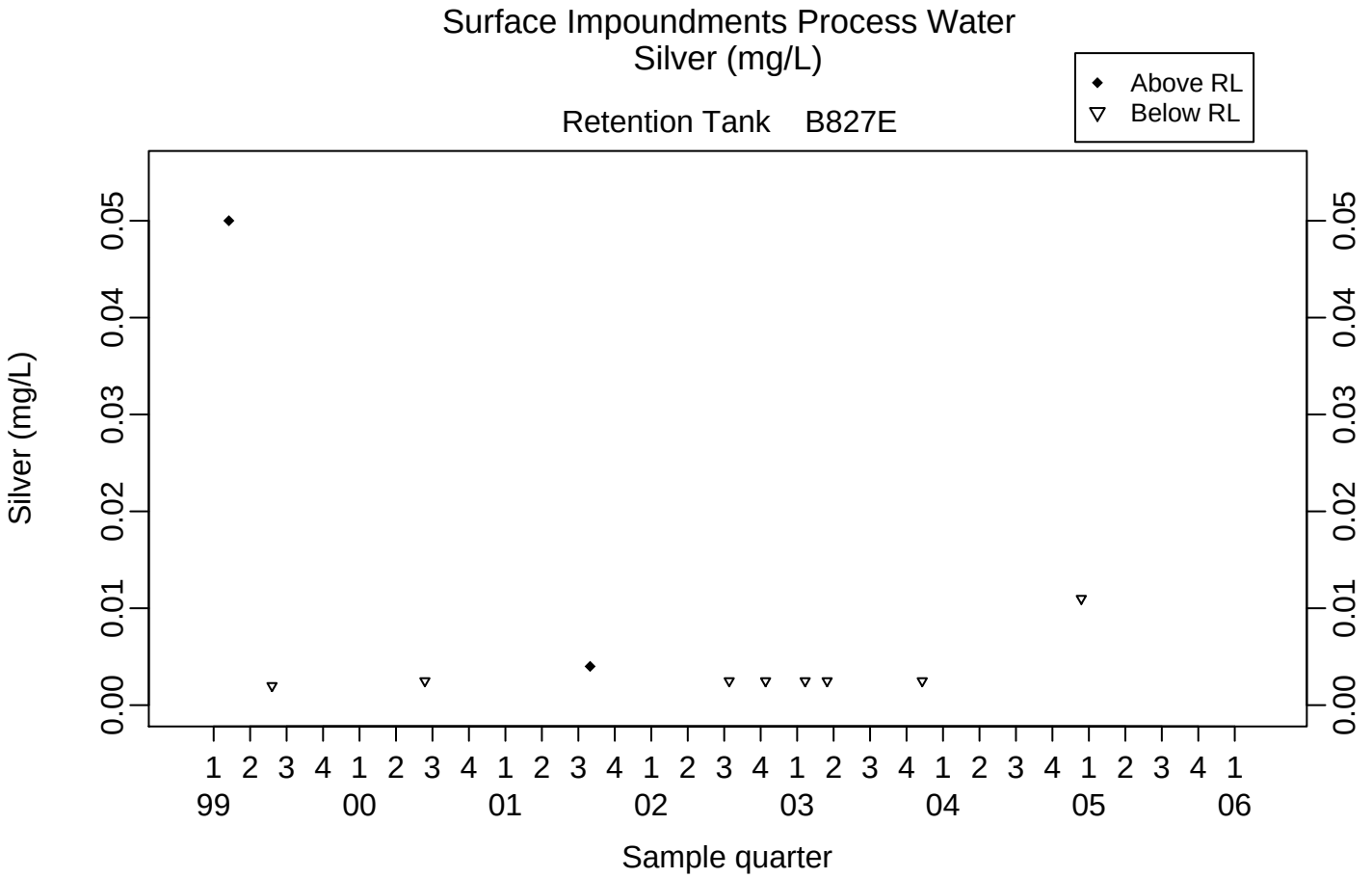
Surface Impoundments Process Water
Silver (mg/L)

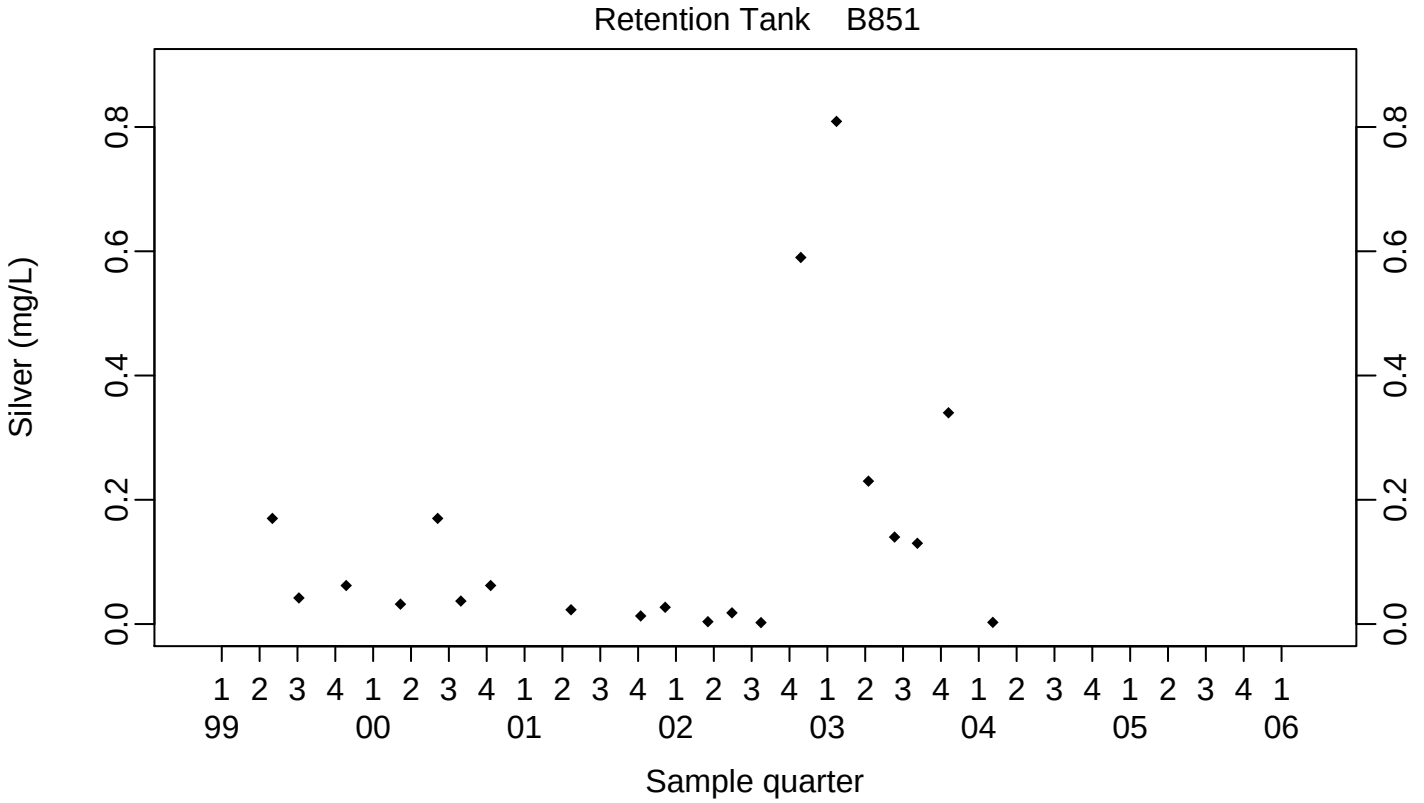


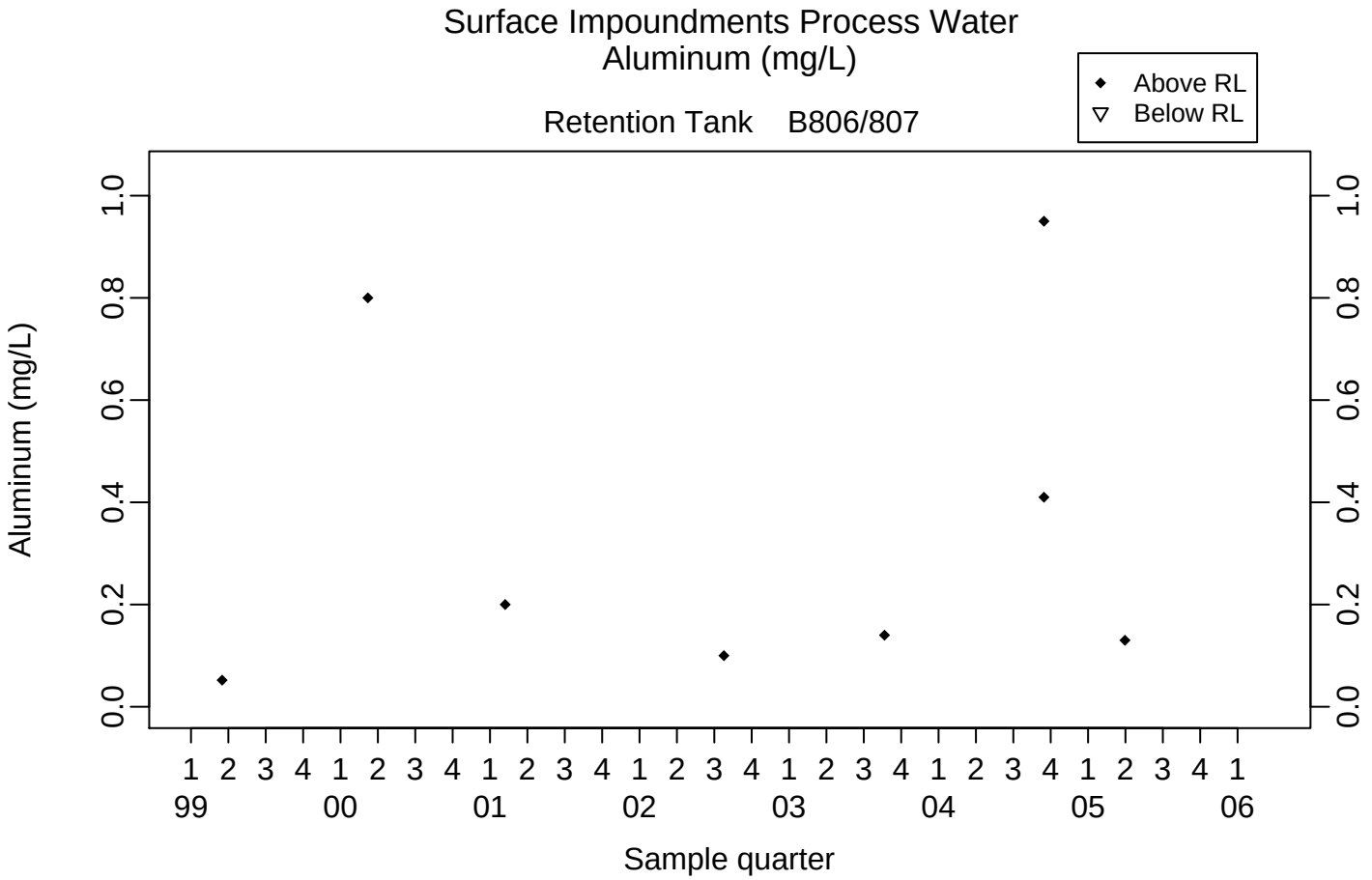


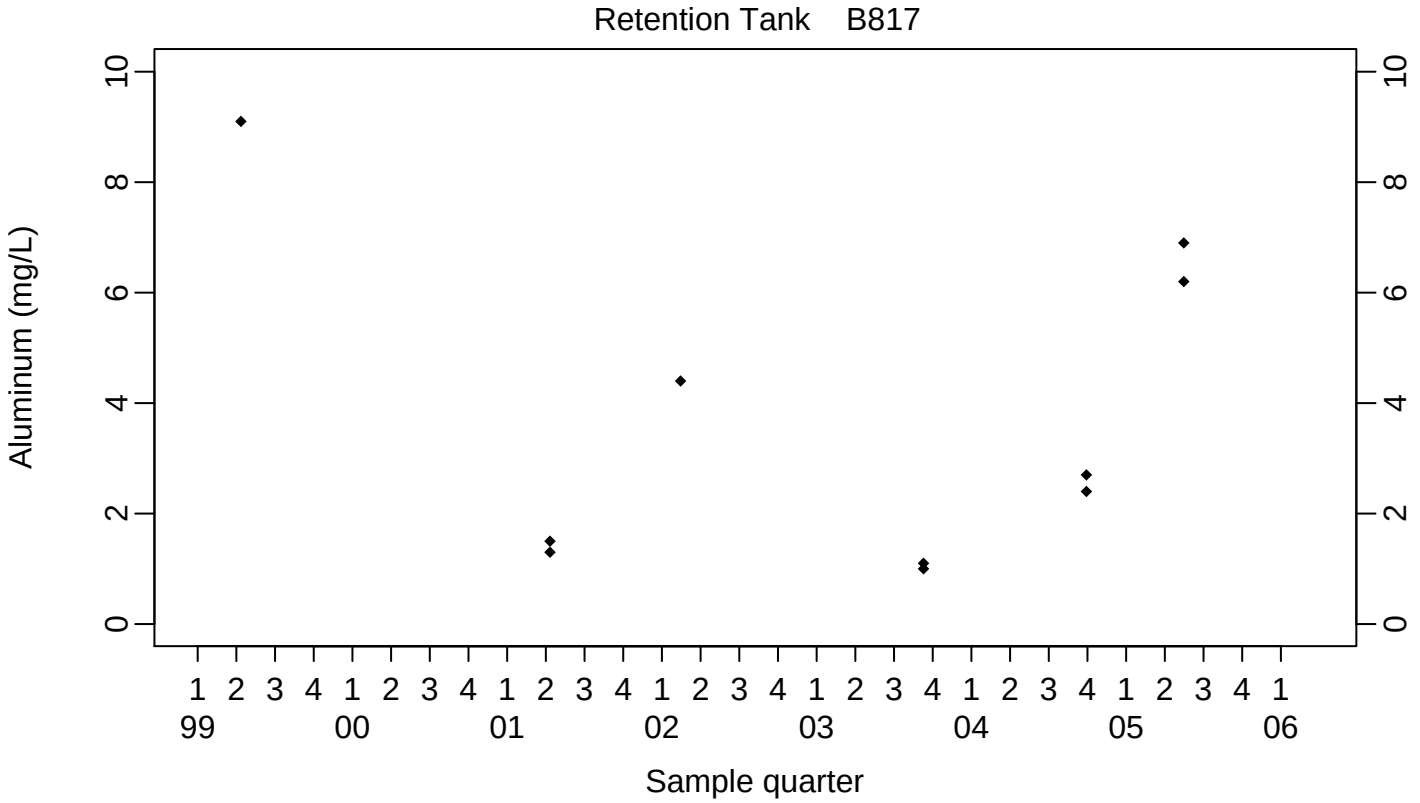

Surface Impoundments Process Water
Silver (mg/L)
Above RL
Below RL
Retention Tank B826
Silver (mg/L)
0.0000
0.0010
0.0020
0.0030
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

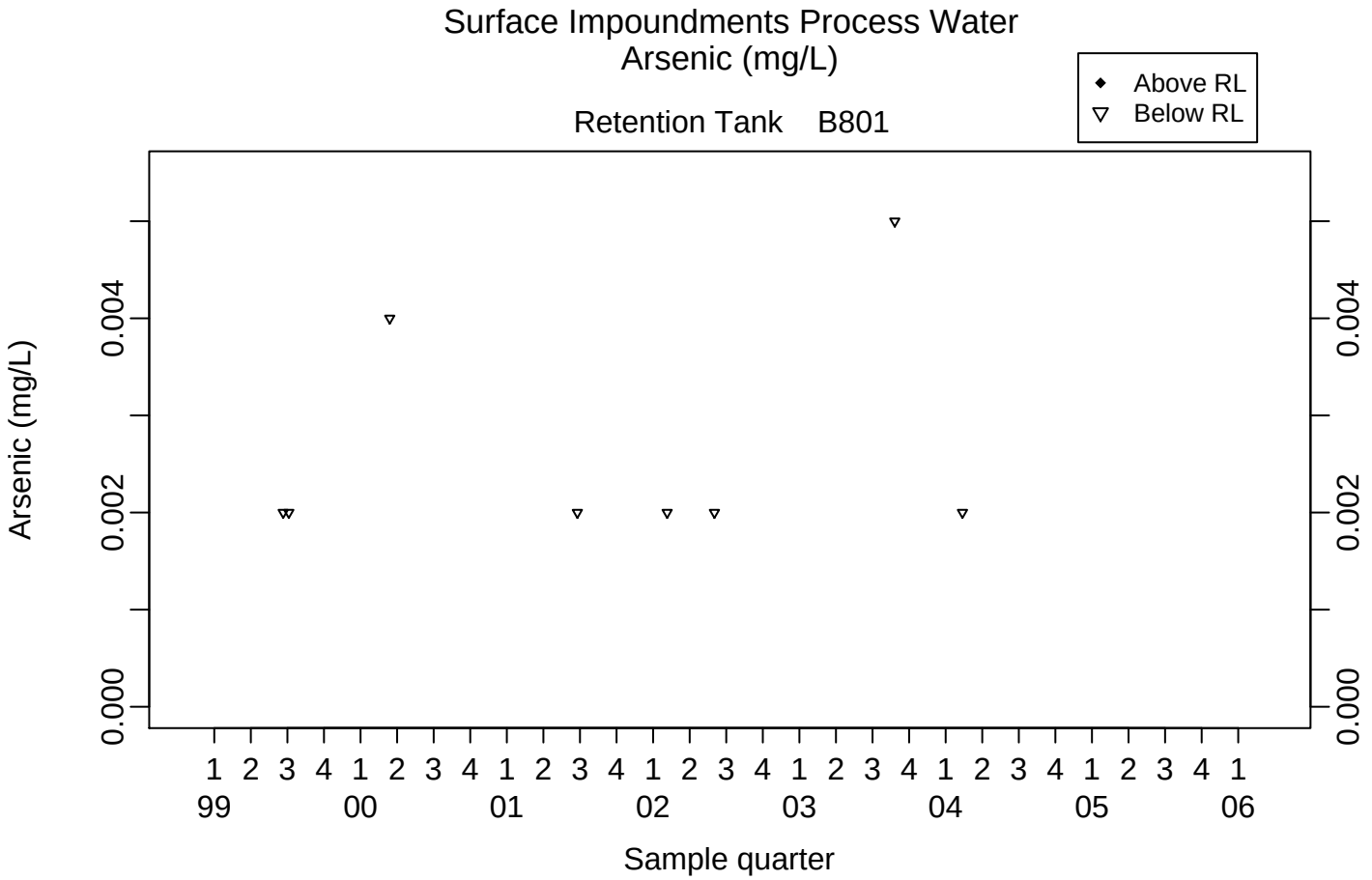

Retention Tank B827C/D
Silver (mg/L)
0.000
0.005
0.010
0.015
0.020
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

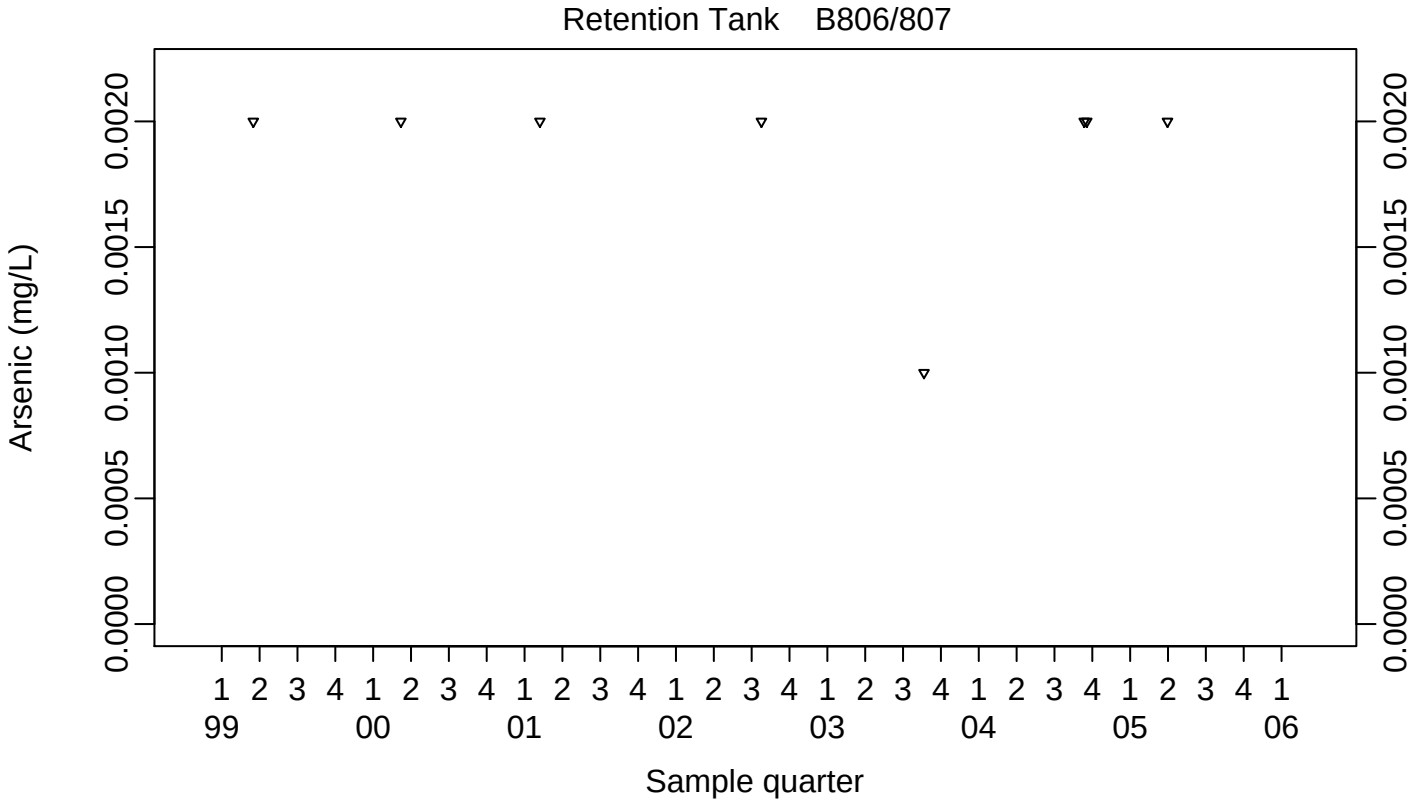

Surface Impoundments Process Water
Silver (mg/L)
Above RL
Below RL
Retention Tank B827E
Silver (mg/L)
0.00
0.01
0.02
0.03
0.04
0.05
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

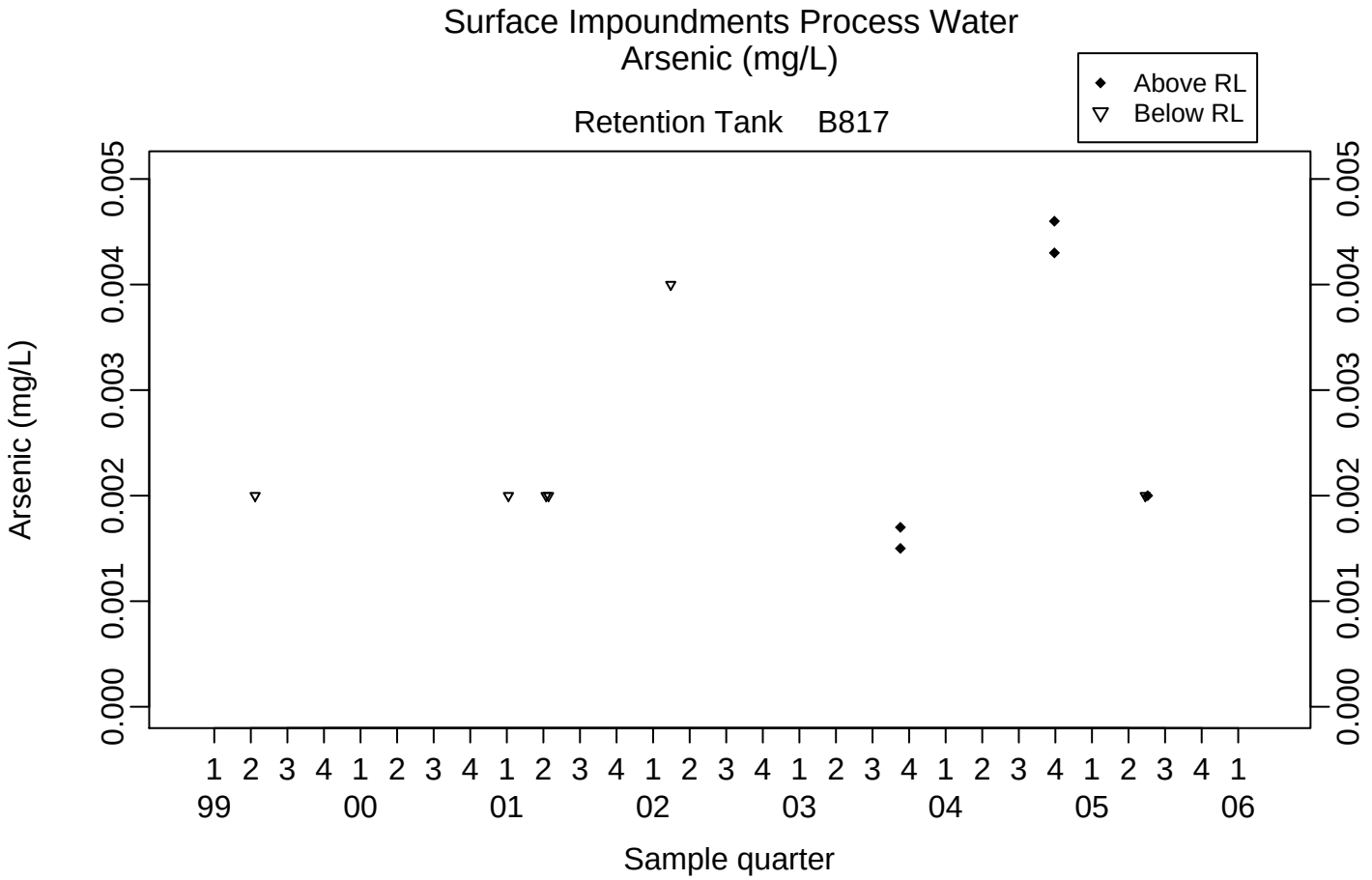

Retention Tank B851
Silver (mg/L)
0.0
0.2
0.4
0.6
0.8
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

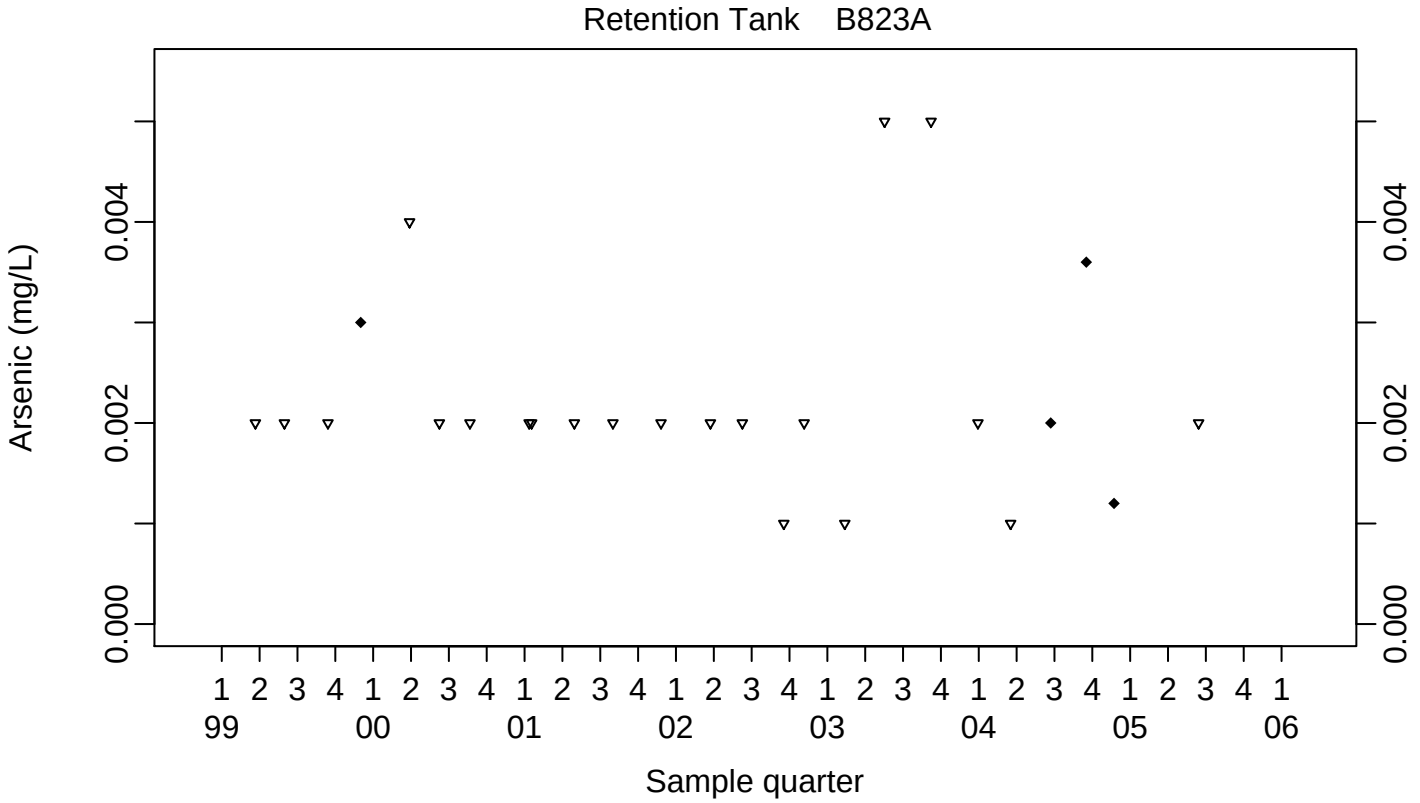

Surface Impoundments Process Water
Aluminum (mg/L)
Above RL
Below RL
Retention Tank B806/807
Aluminum (mg/L)
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


Retention Tank B817
Aluminum (mg/L)
0
2
4
6
8
10
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

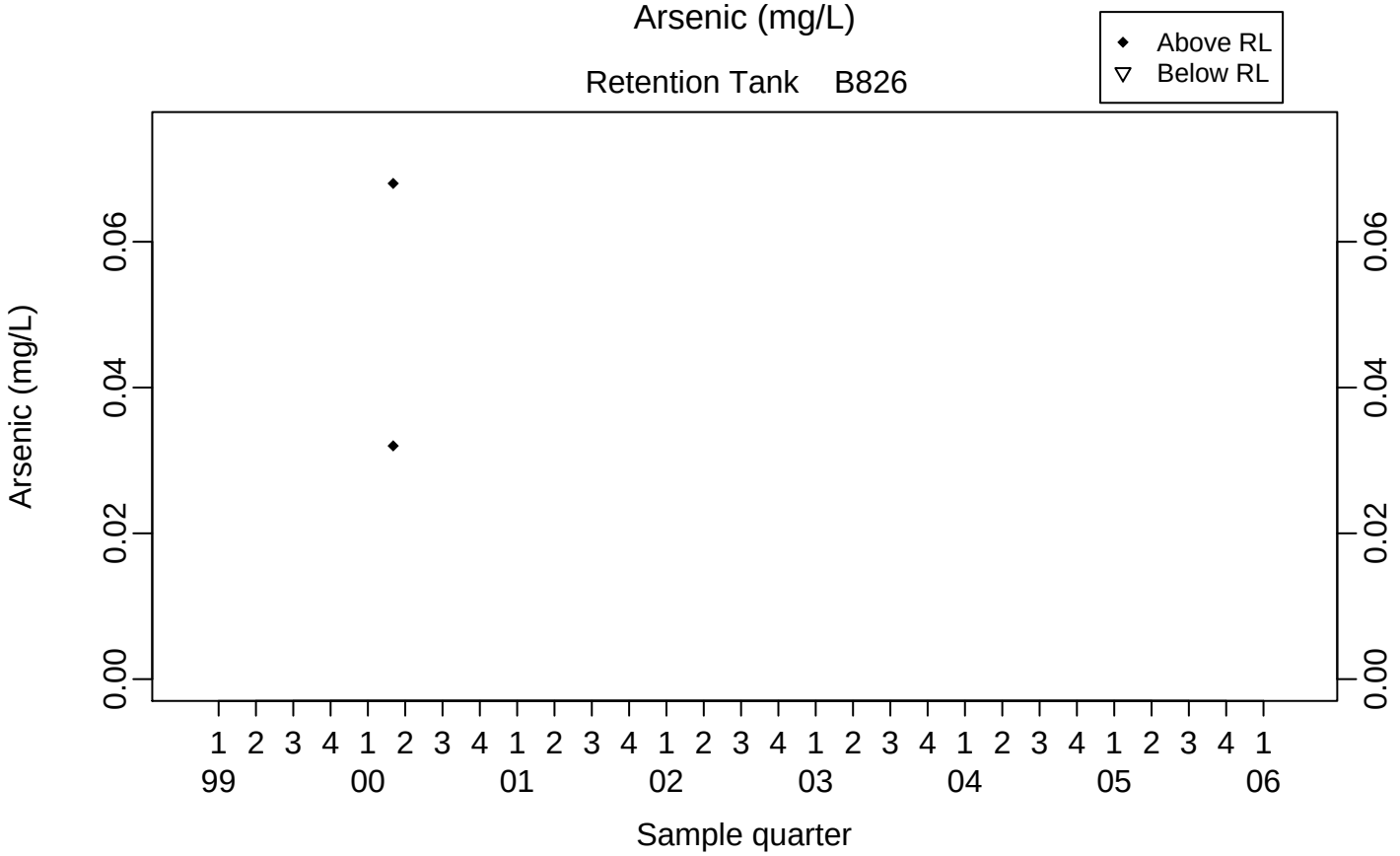

Surface Impoundments Process Water
Arsenic (mg/L)
Above RL
Below RL
Retention Tank B801
Arsenic (mg/L)
0.000
0.002
0.004
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

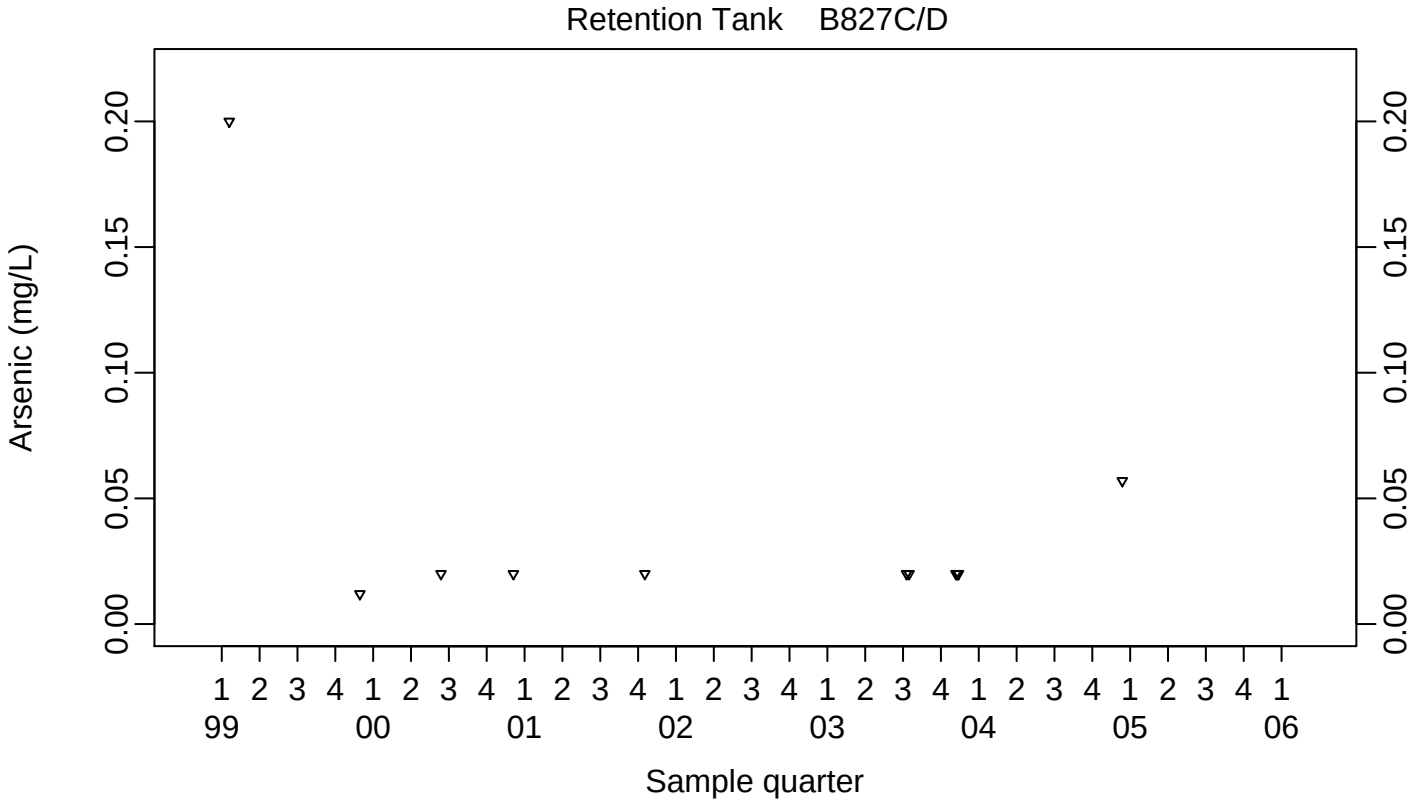

Retention Tank B806/807
Arsenic (mg/L)
0.0000
0.0005
0.0010
0.0015
0.0020
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

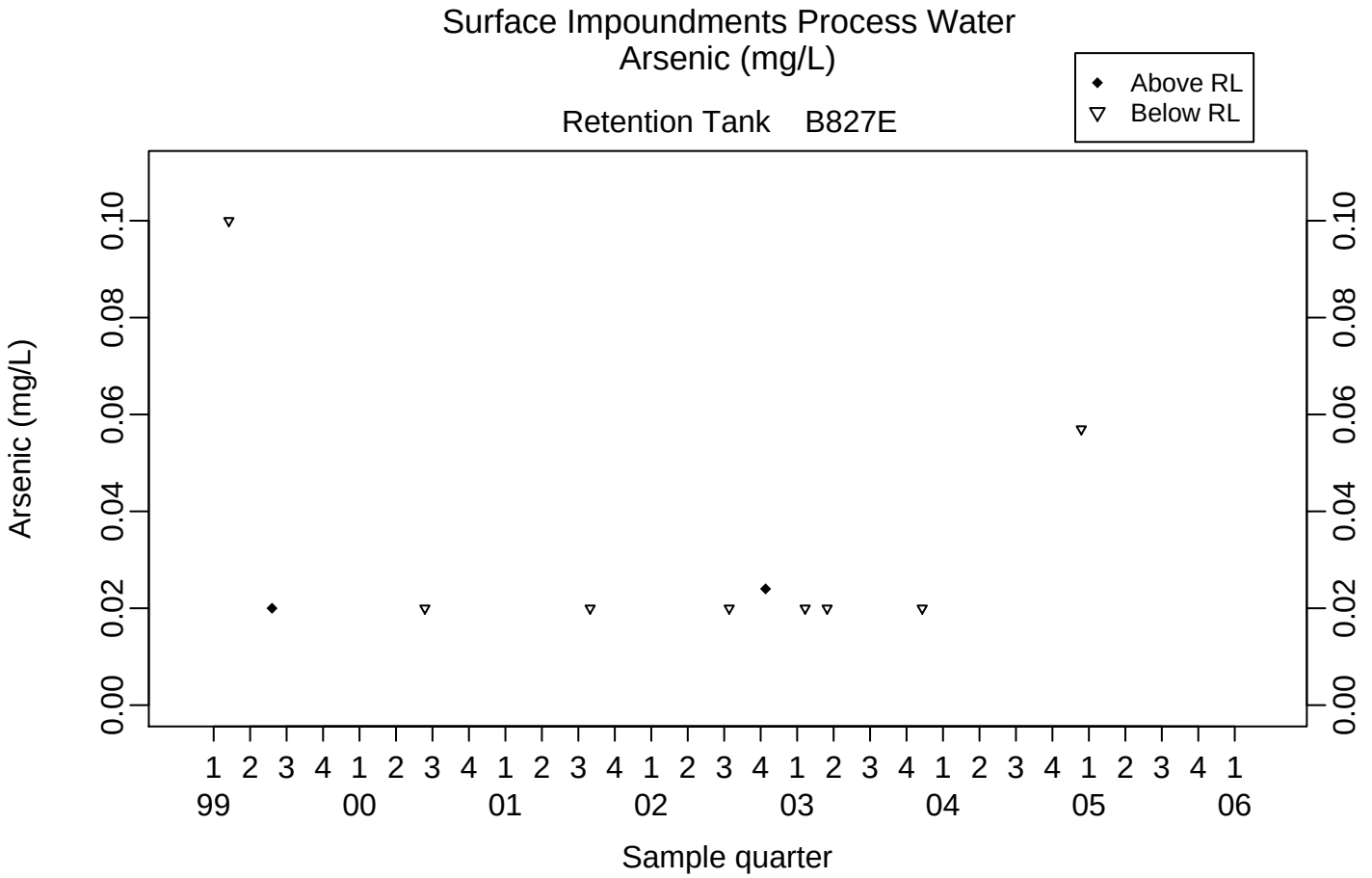

Surface Impoundments Process Water
Arsenic (mg/L)
Above RL
Below RL
Retention Tank B817
Arsenic (mg/L)
0.000
0.001
0.002
0.003
0.004
0.005
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

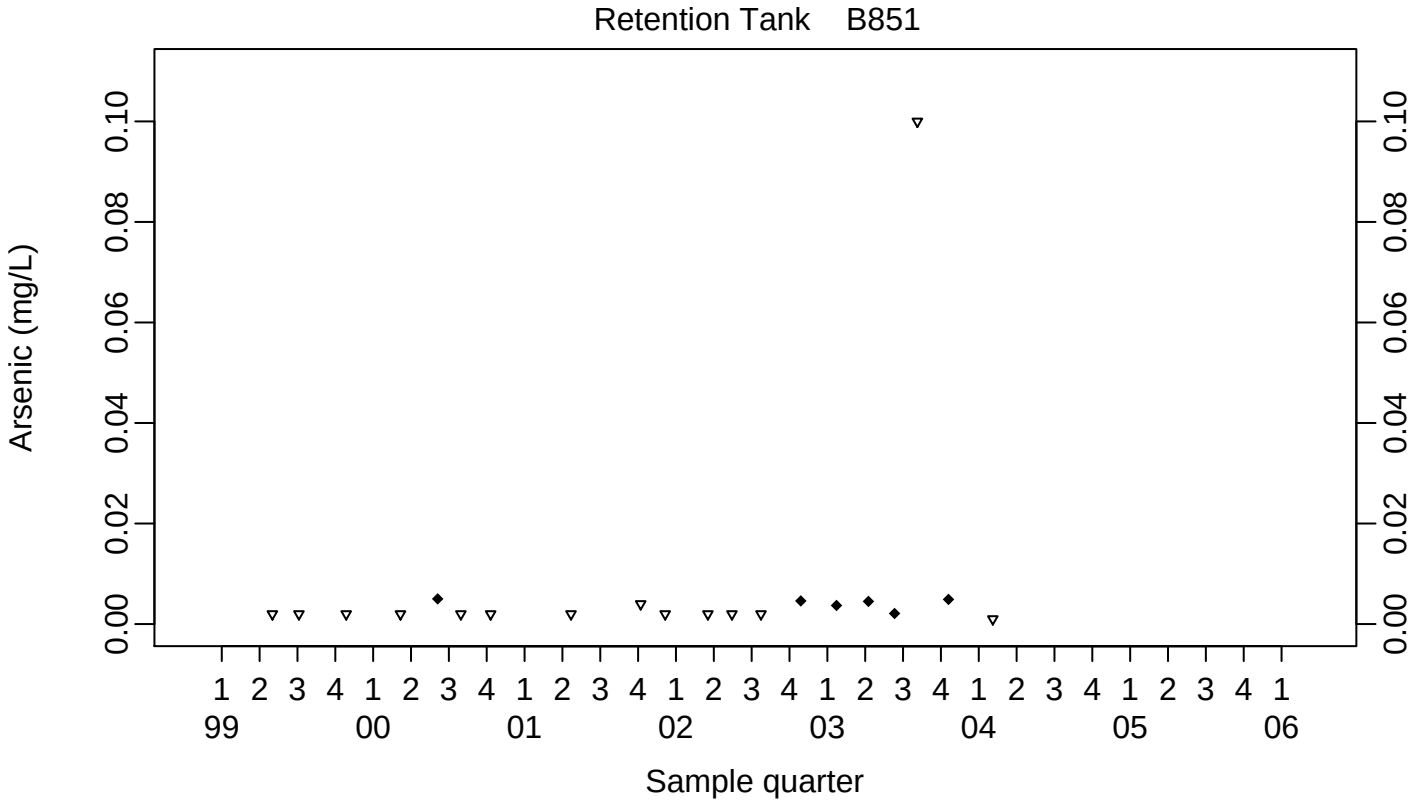

Retention Tank B823A
Arsenic (mg/L)
0.000
0.002
0.004
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

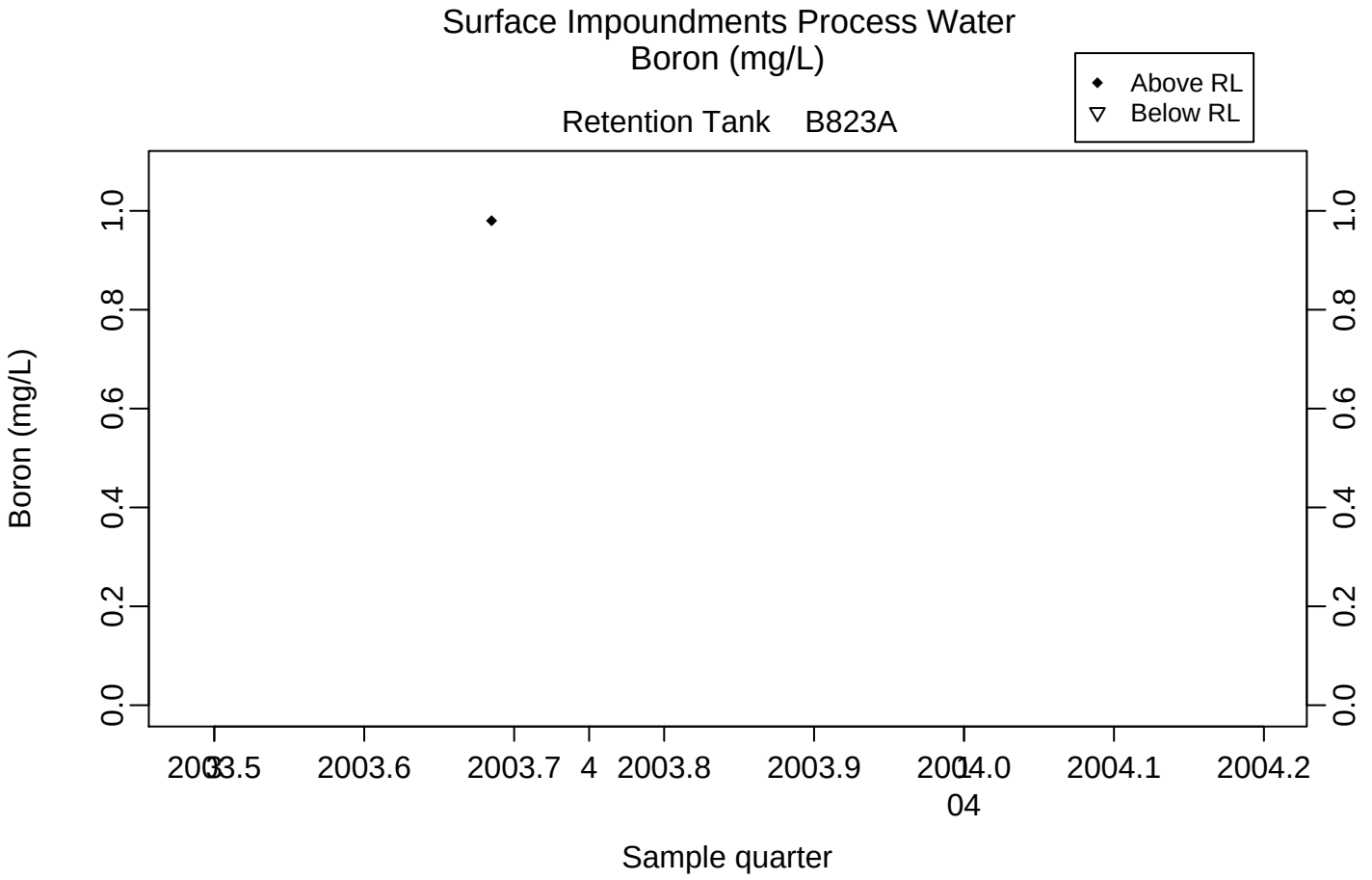
Surface Impoundments Process Water
Arsenic (mg/L)

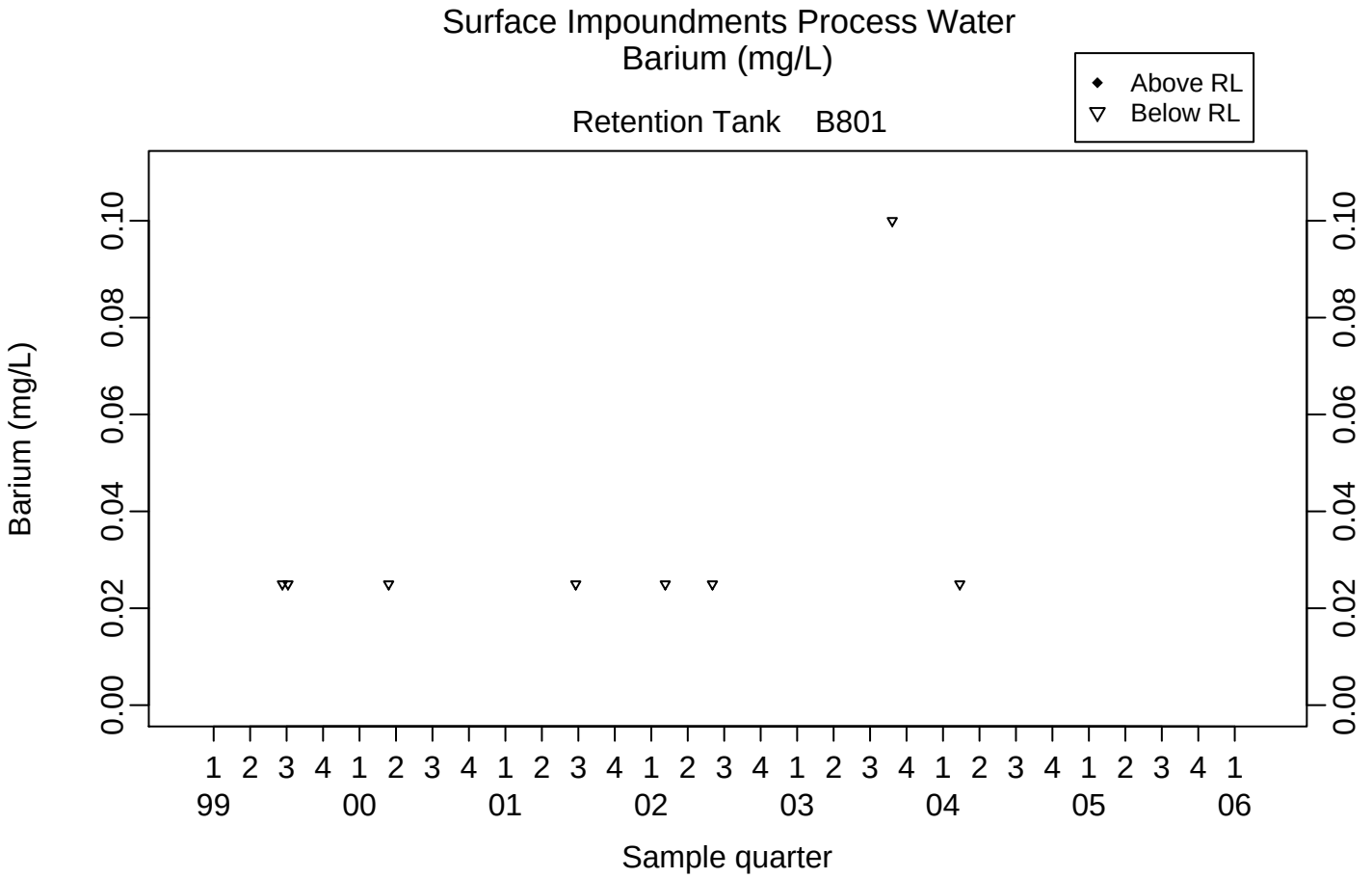


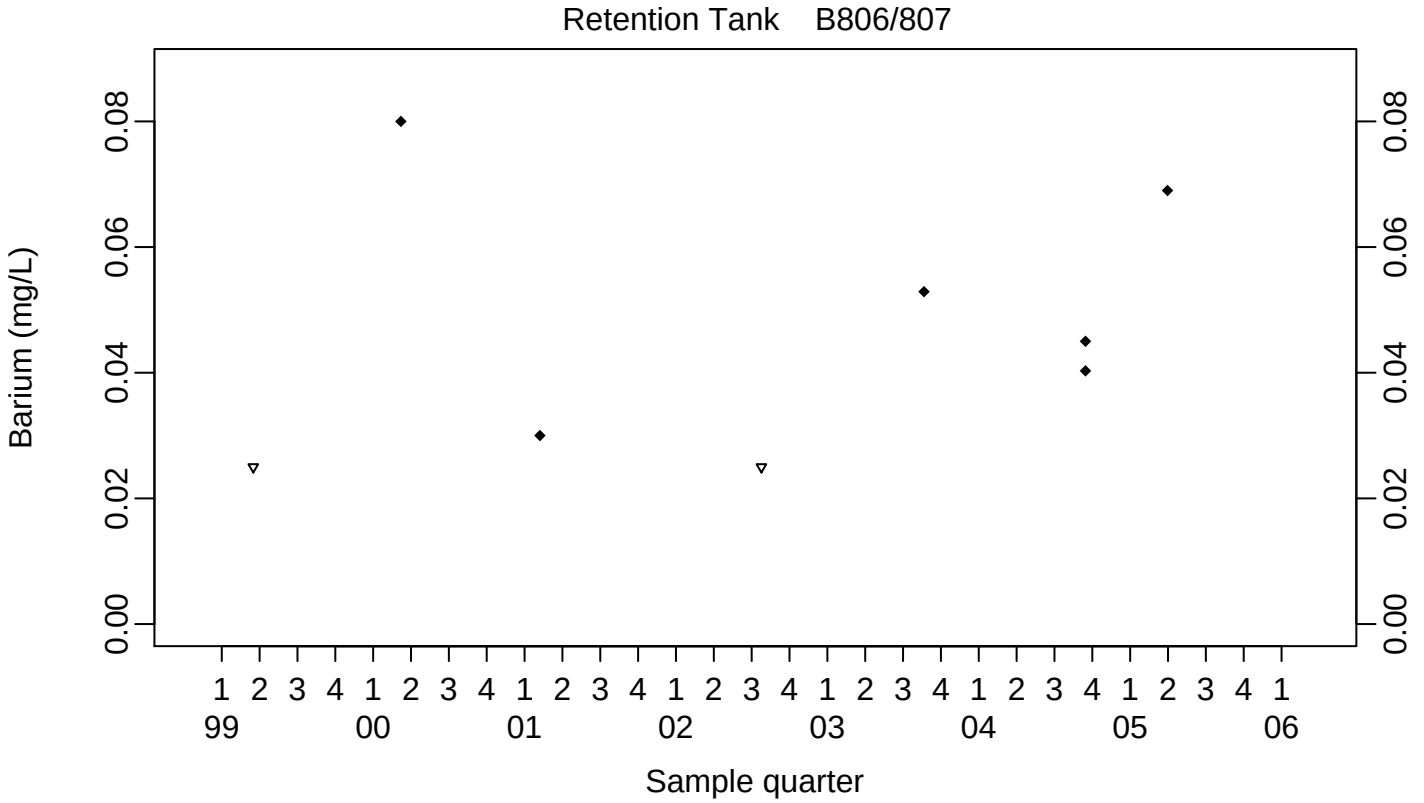


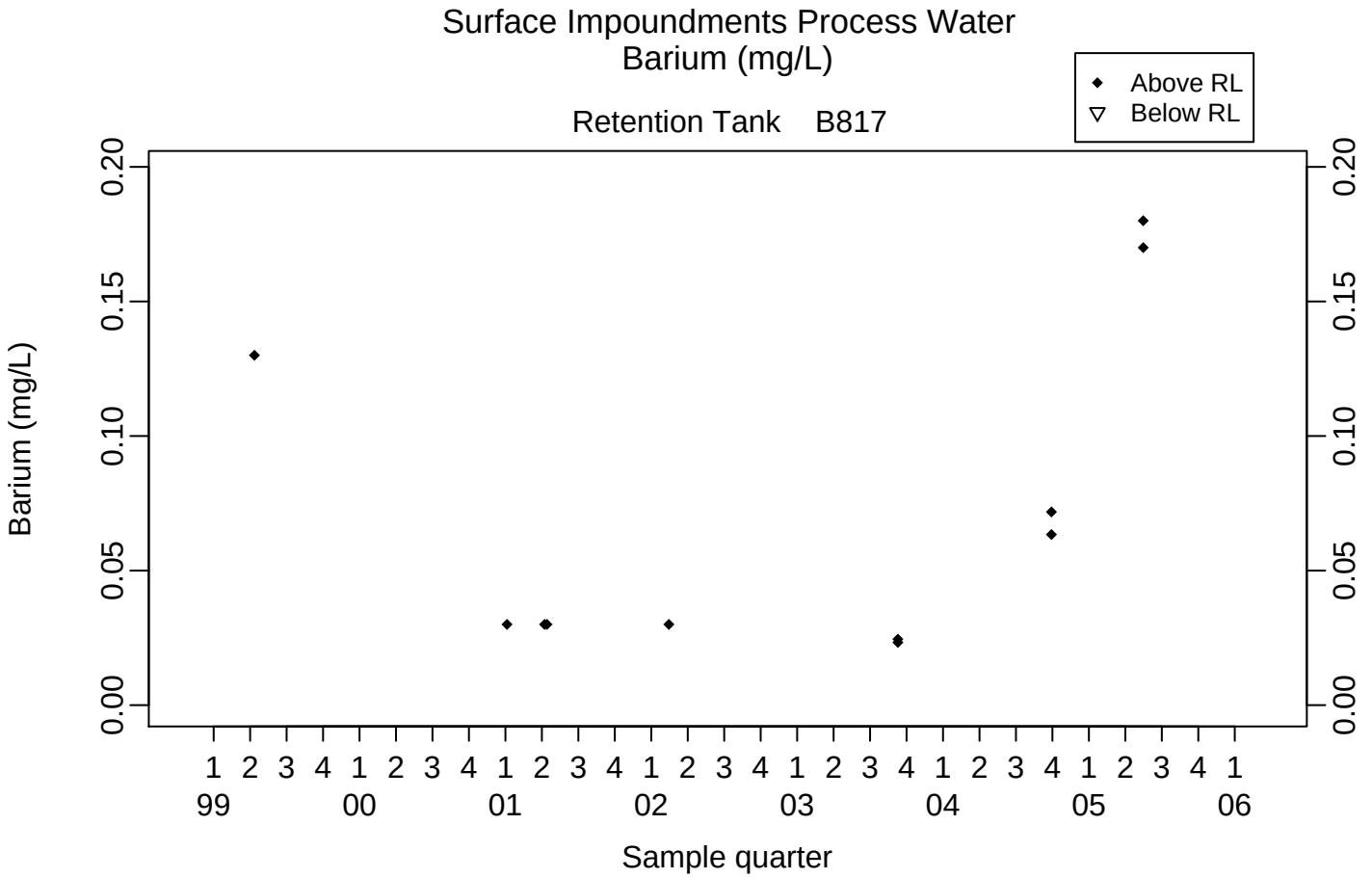

Surface Impoundments Process Water
Arsenic (mg/L)
Above RL
Below RL
Retention Tank B827E
Arsenic (mg/L)
0.00
0.02
0.04
0.06
0.08
0.10
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

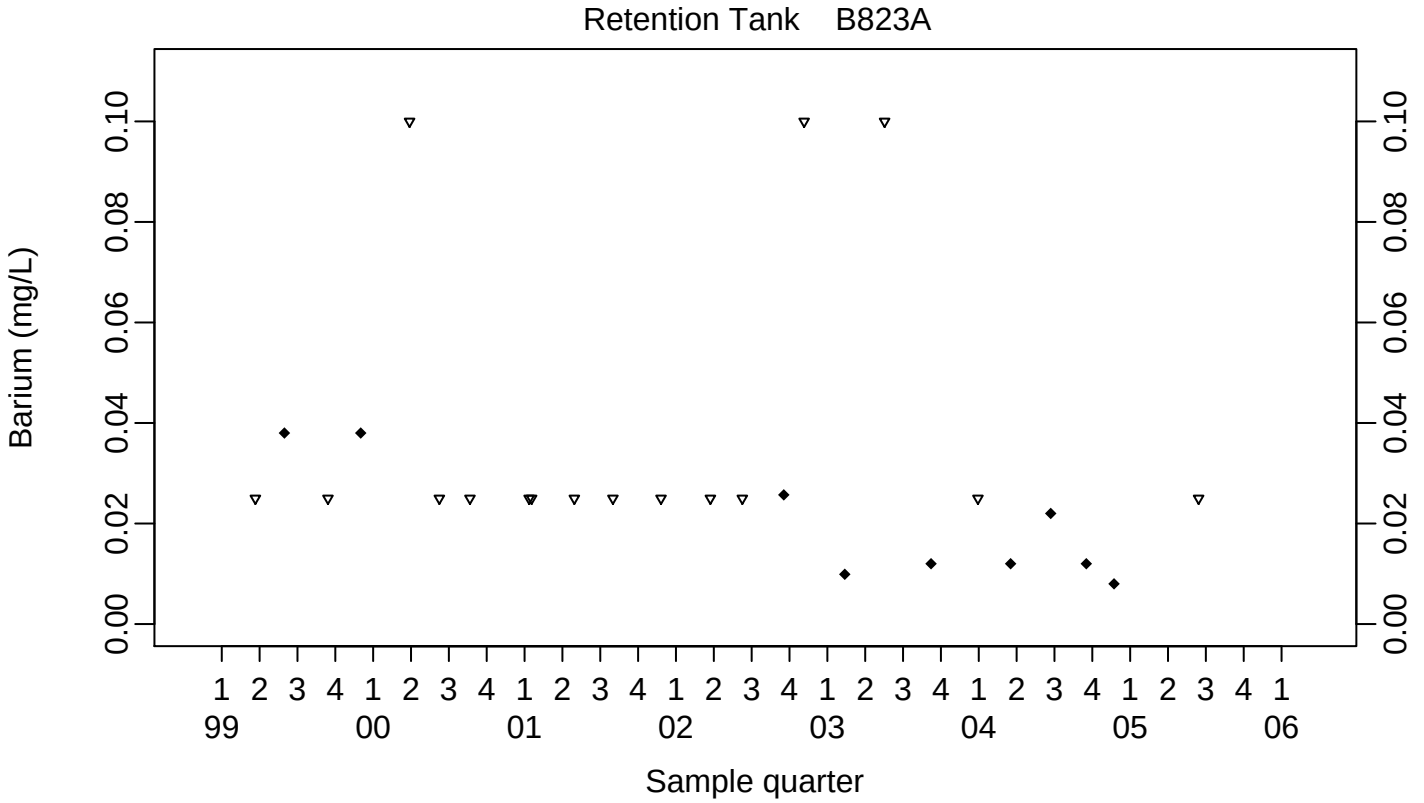

Retention Tank B851
Arsenic (mg/L)
0.00
0.02
0.04
0.06
0.08
0.10
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

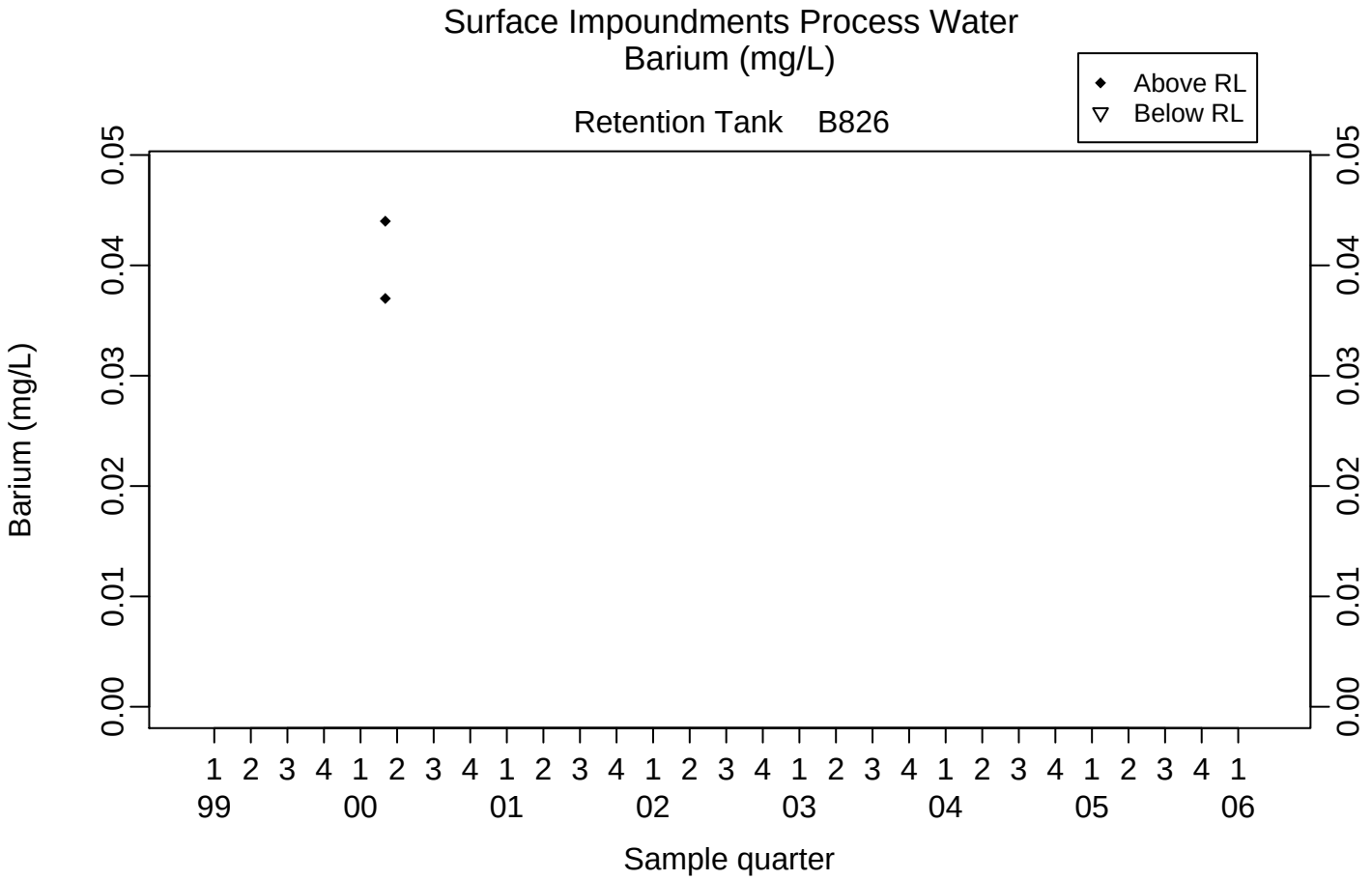

Surface Impoundments Process Water
Boron (mg/L)
Retention Tank B823A
Above RL
Below RL
Boron (mg/L)
0.0
0.2
0.4
0.6
0.8
1.0
2003.5
2003.6
2003.7
2003.8
2003.9
2004.0
2004.1
2004.2
Sample quarter

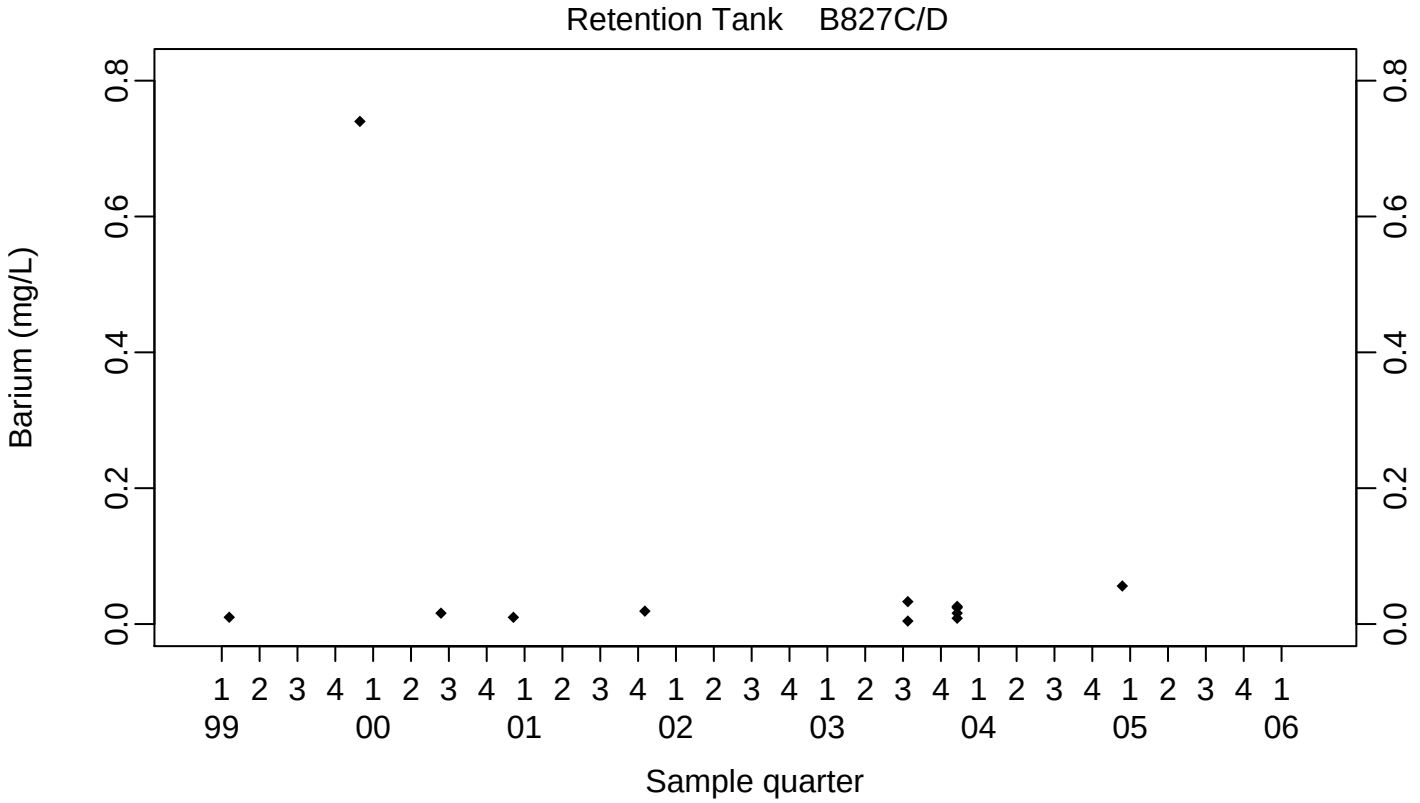

Surface Impoundments Process Water
Barium (mg/L)
Above RL
Below RL
Retention Tank B801
Barium (mg/L)
0.00
0.02
0.04
0.06
0.08
0.10
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

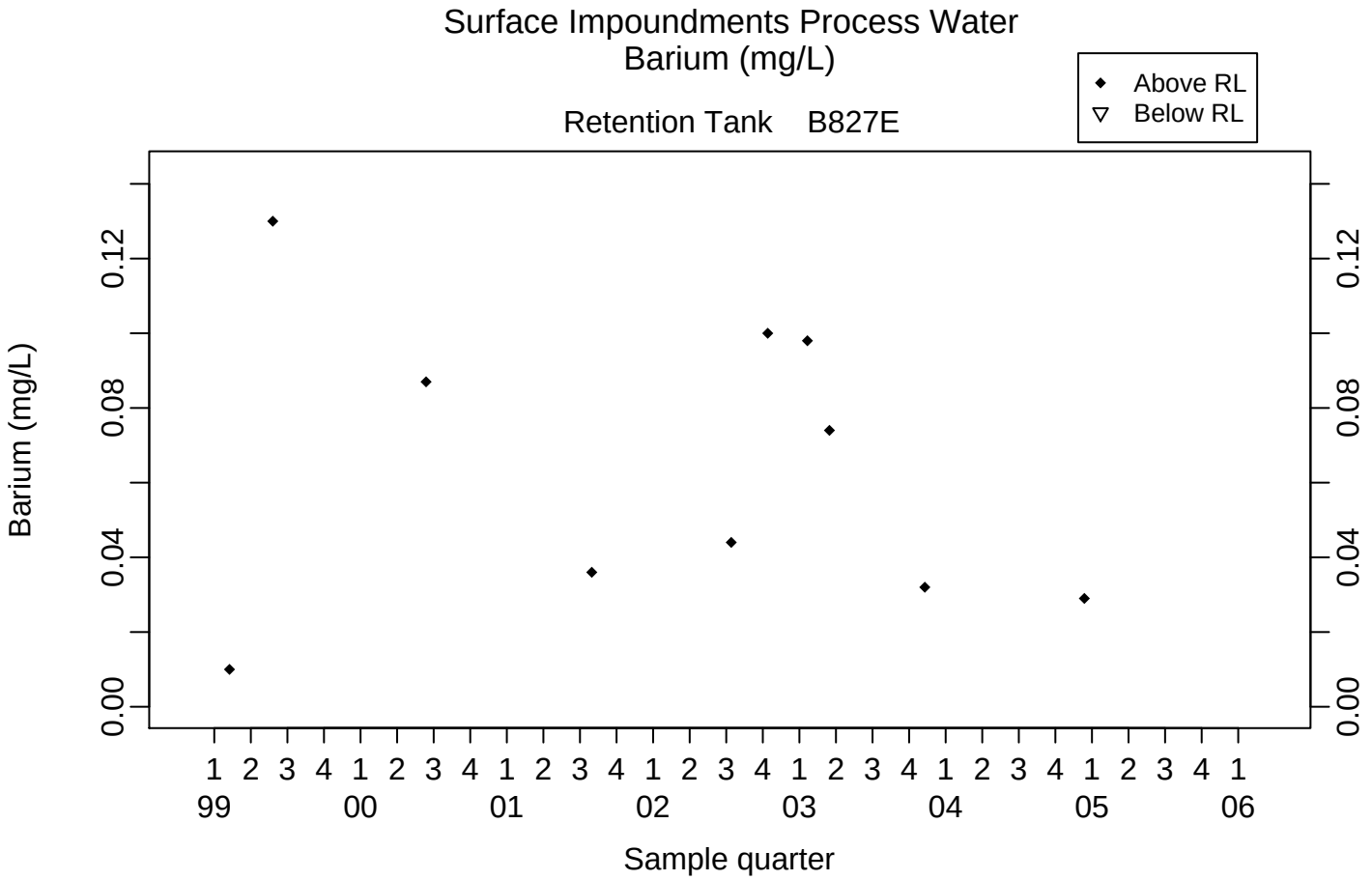

Retention Tank B806/807
Barium (mg/L)
0.00
0.02
0.04
0.06
0.08
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

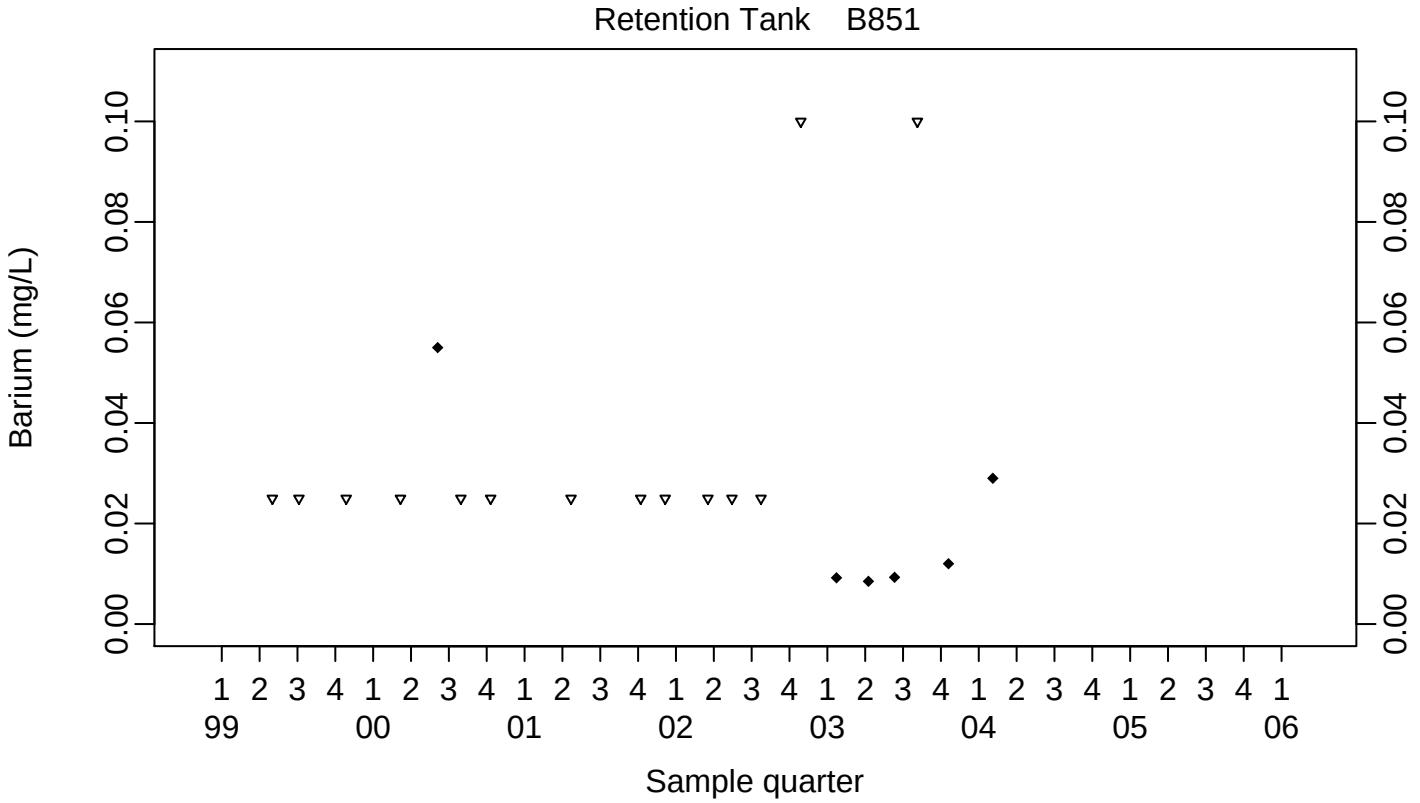

Surface Impoundments Process Water
Barium (mg/L)
Above RL
Below RL
Retention Tank B817
Barium (mg/L)
0.00
0.05
0.10
0.15
0.20
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


Retention Tank B823A
Barium (mg/L)
0.00
0.02
0.04
0.06
0.08
0.10
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

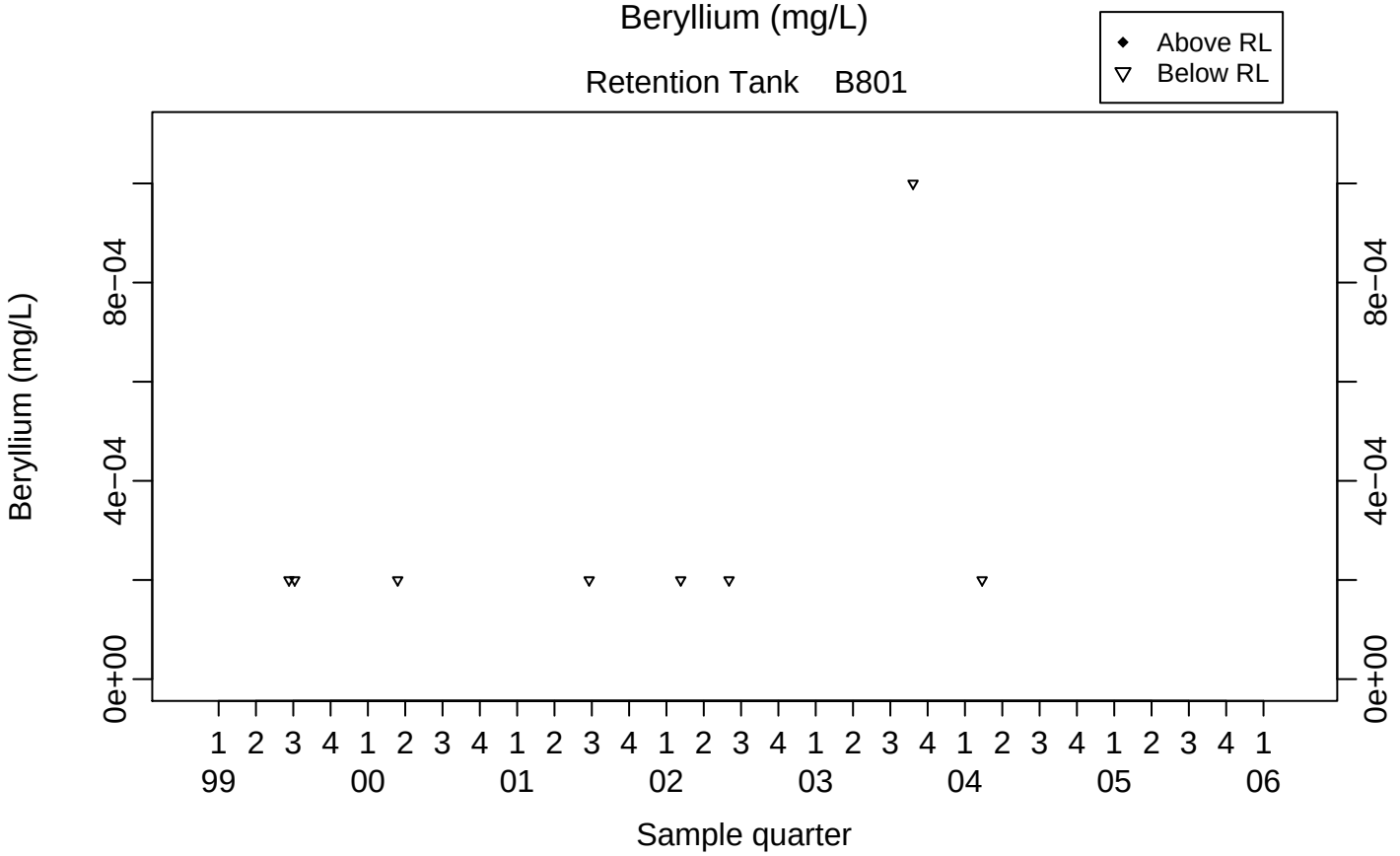

Surface Impoundments Process Water
Barium (mg/L)
Above RL
Below RL
Retention Tank B826
Barium (mg/L)
0.00
0.01
0.02
0.03
0.04
0.05
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

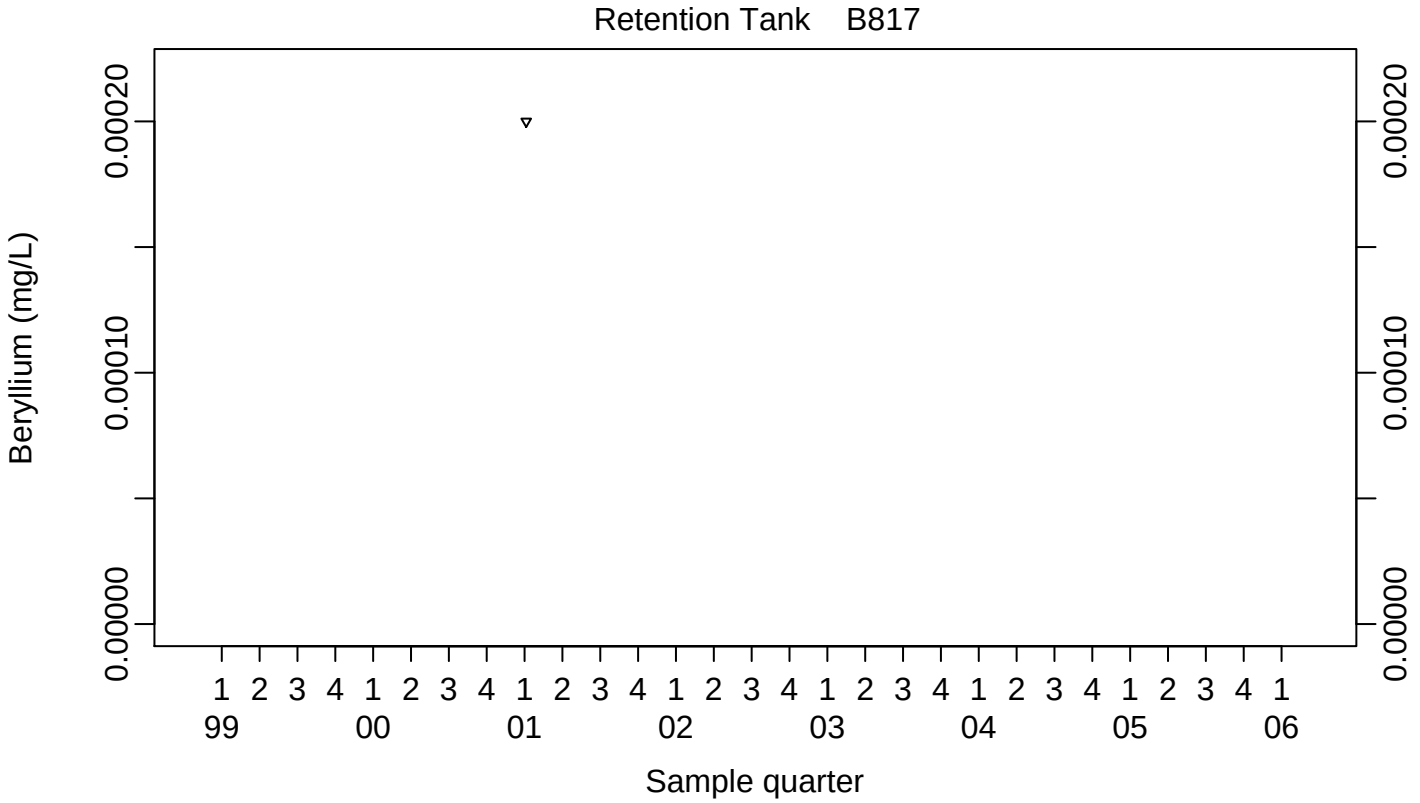

Retention Tank B827C/D
Barium (mg/L)
0.0
0.2
0.4
0.6
0.8
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

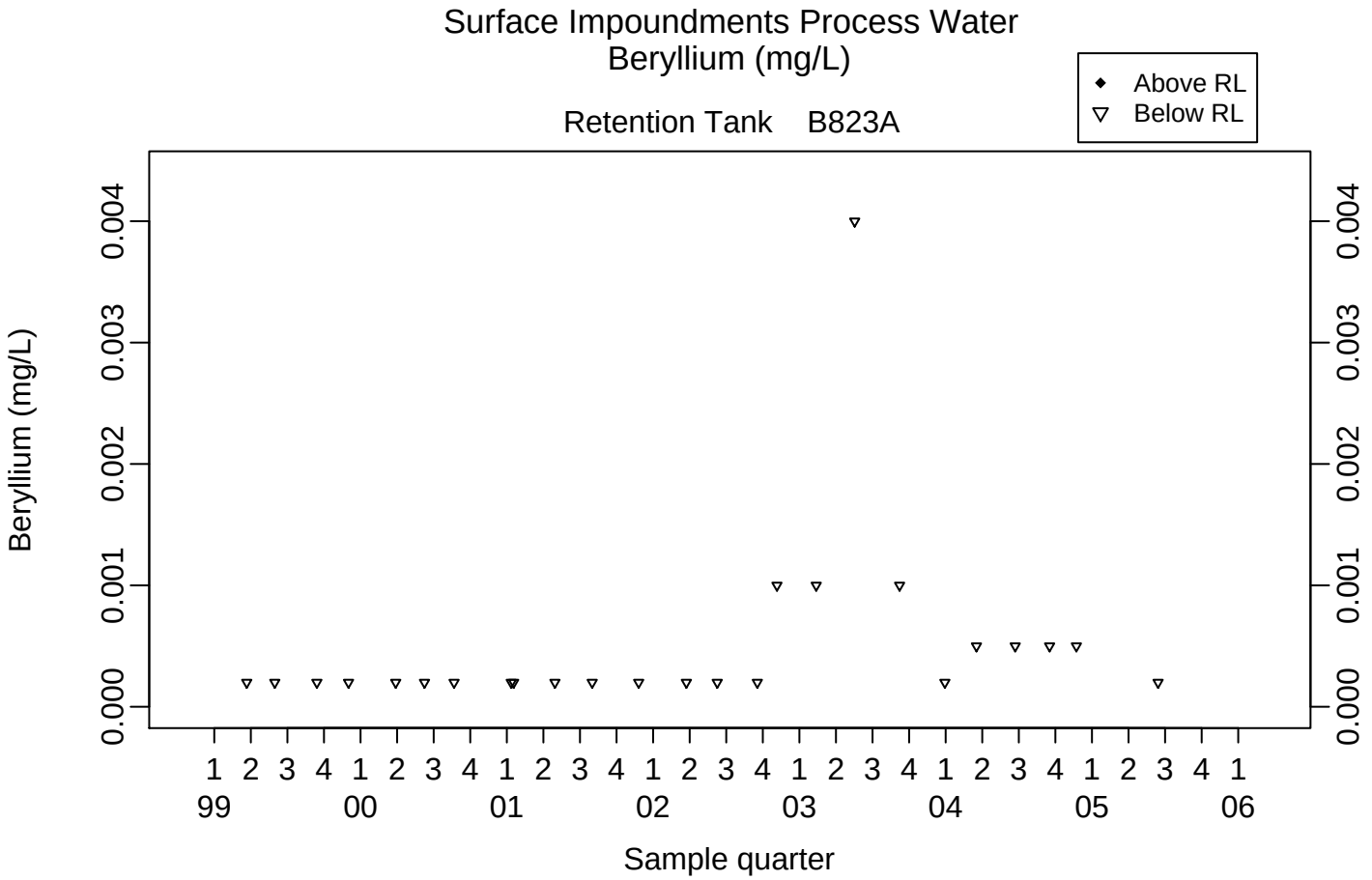

Surface Impoundments Process Water
Barium (mg/L)
Above RL
Below RL
Retention Tank B827E
Barium (mg/L)
0.00
0.04
0.08
0.12
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

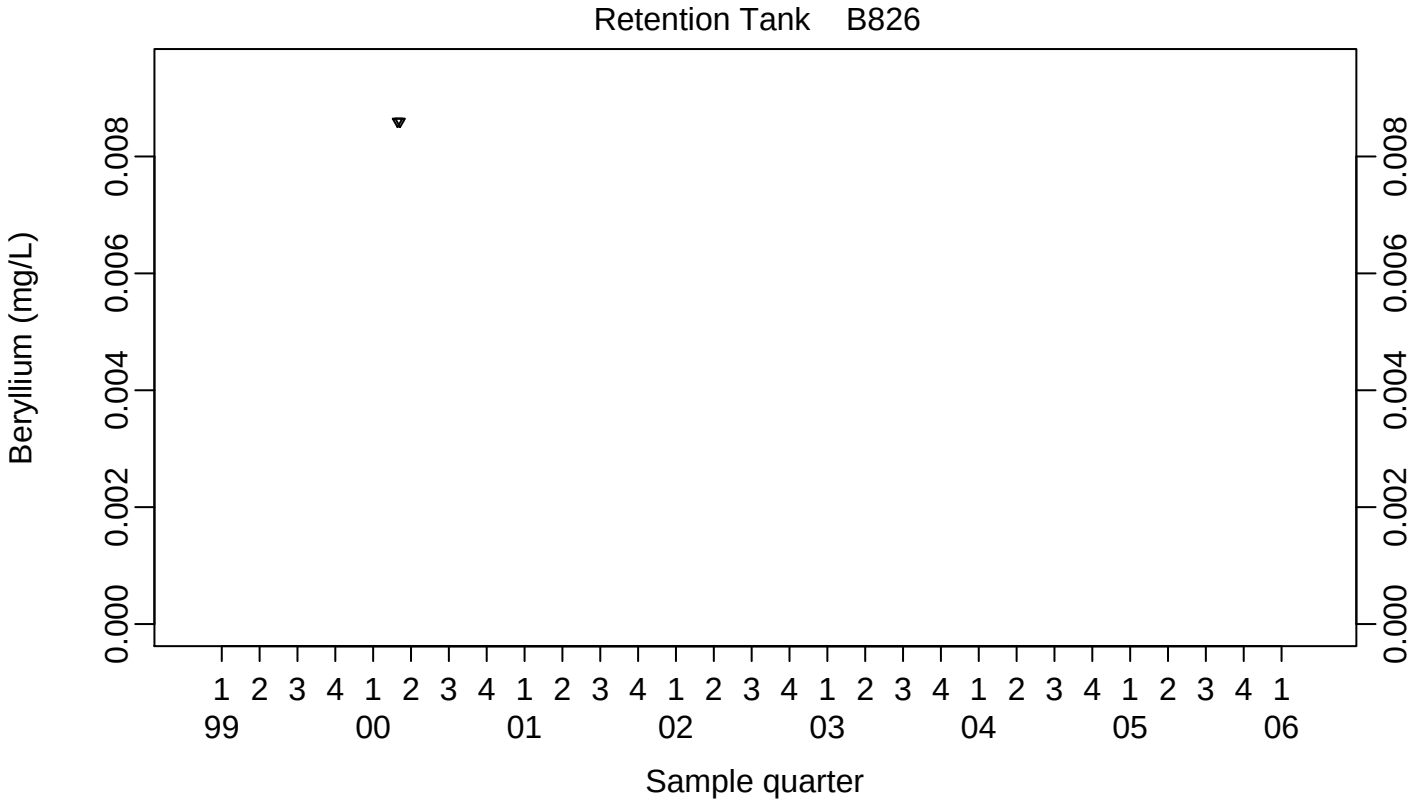

Retention Tank B851
Barium (mg/L)
0.00
0.02
0.04
0.06
0.08
0.10
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

Surface Impoundments Process Water
Beryllium (mg/L)

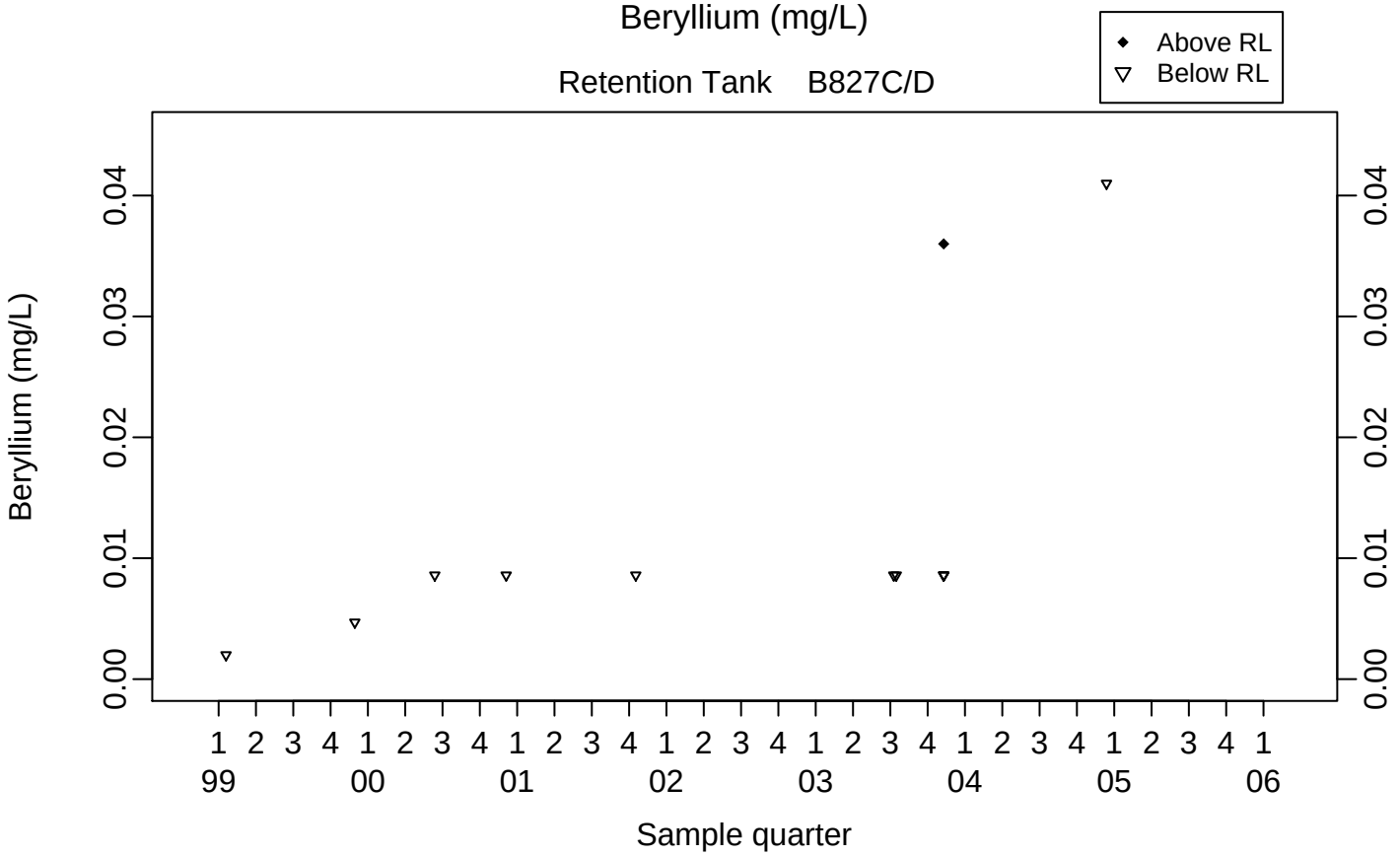


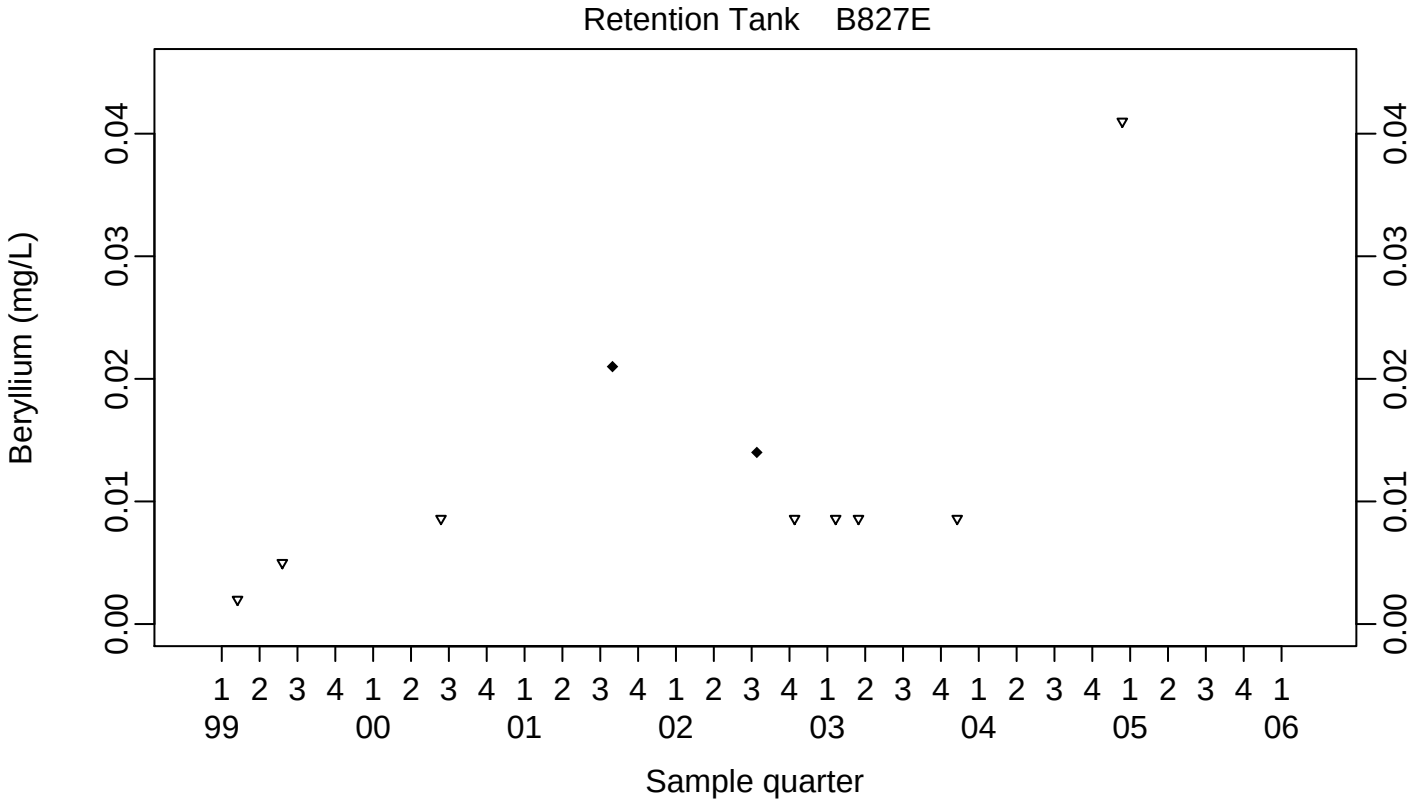


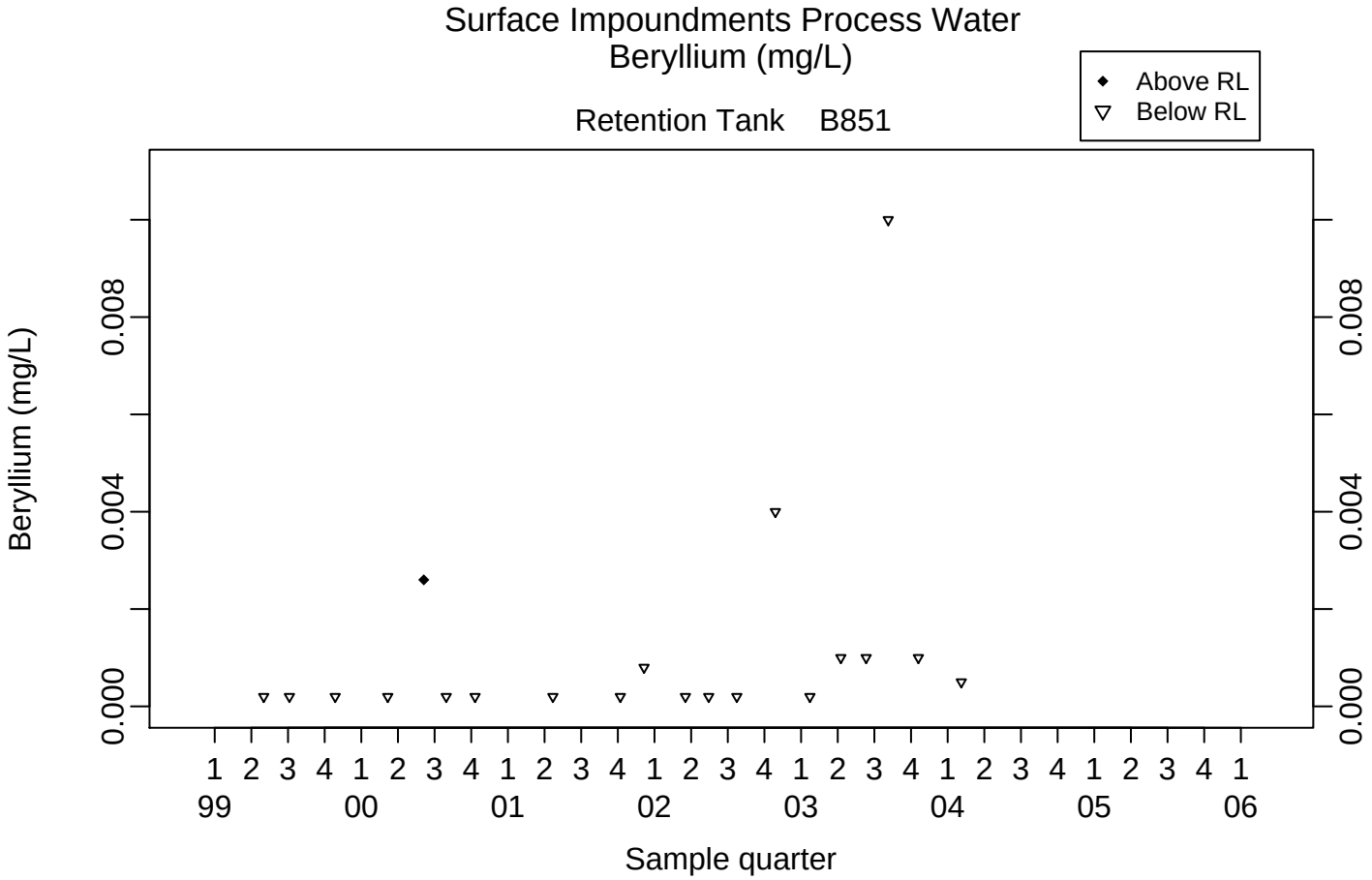

Surface Impoundments Process Water
Beryllium (mg/L)
Above RL
Below RL
Retention Tank B823A
Beryllium (mg/L)
0.000
0.001
0.002
0.003
0.004
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


Retention Tank B826
Beryllium (mg/L)
0.000
0.002
0.004
0.006
0.008
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

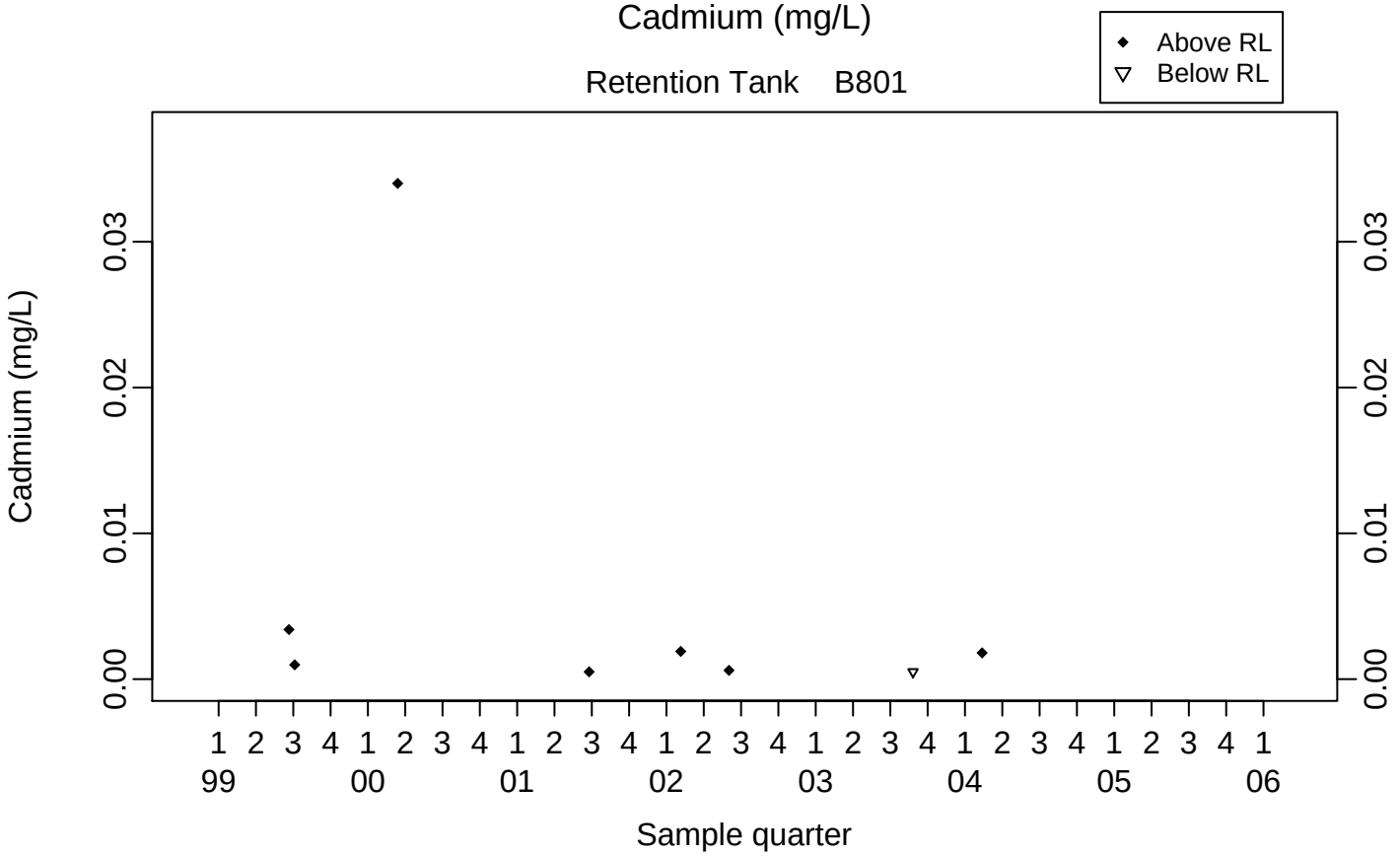
Surface Impoundments Process Water
Beryllium (mg/L)

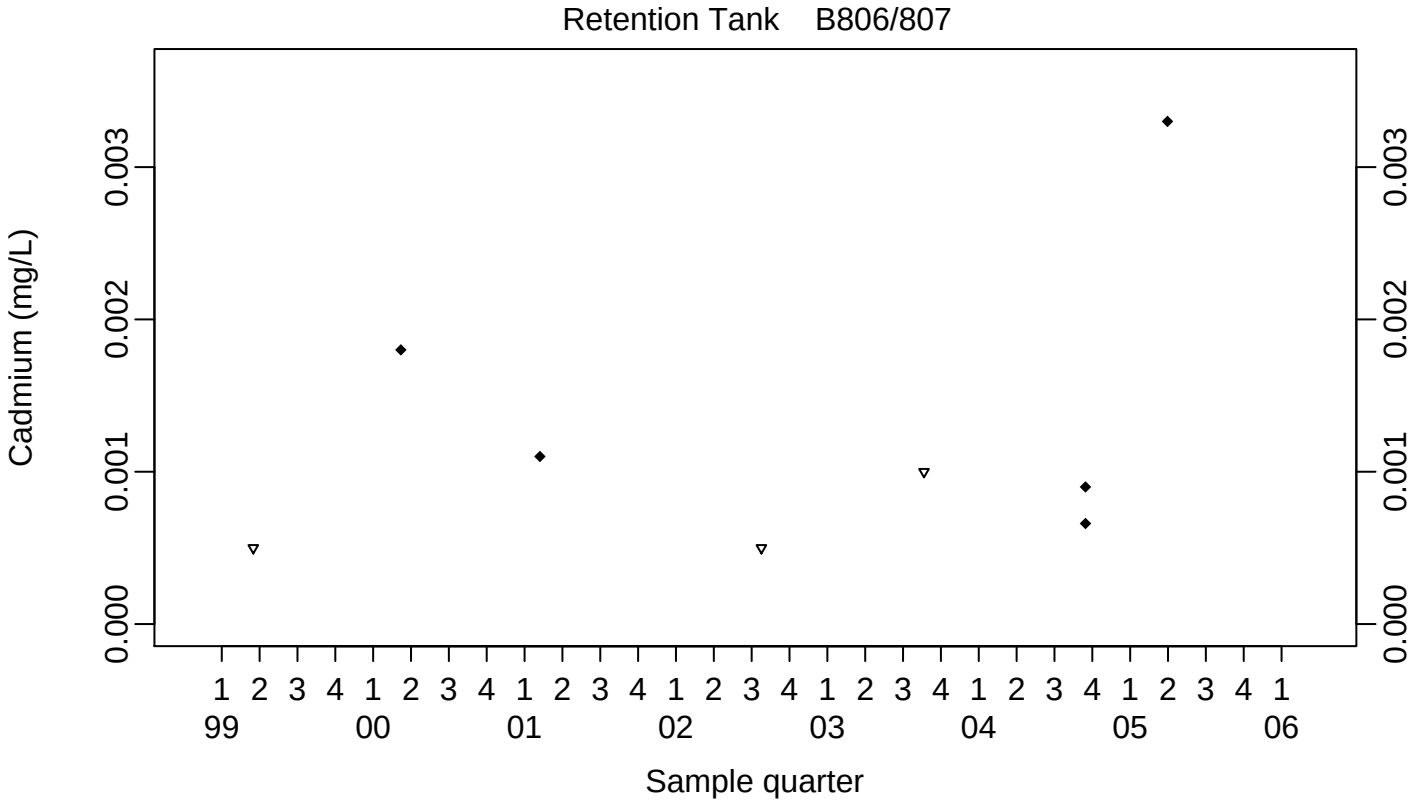


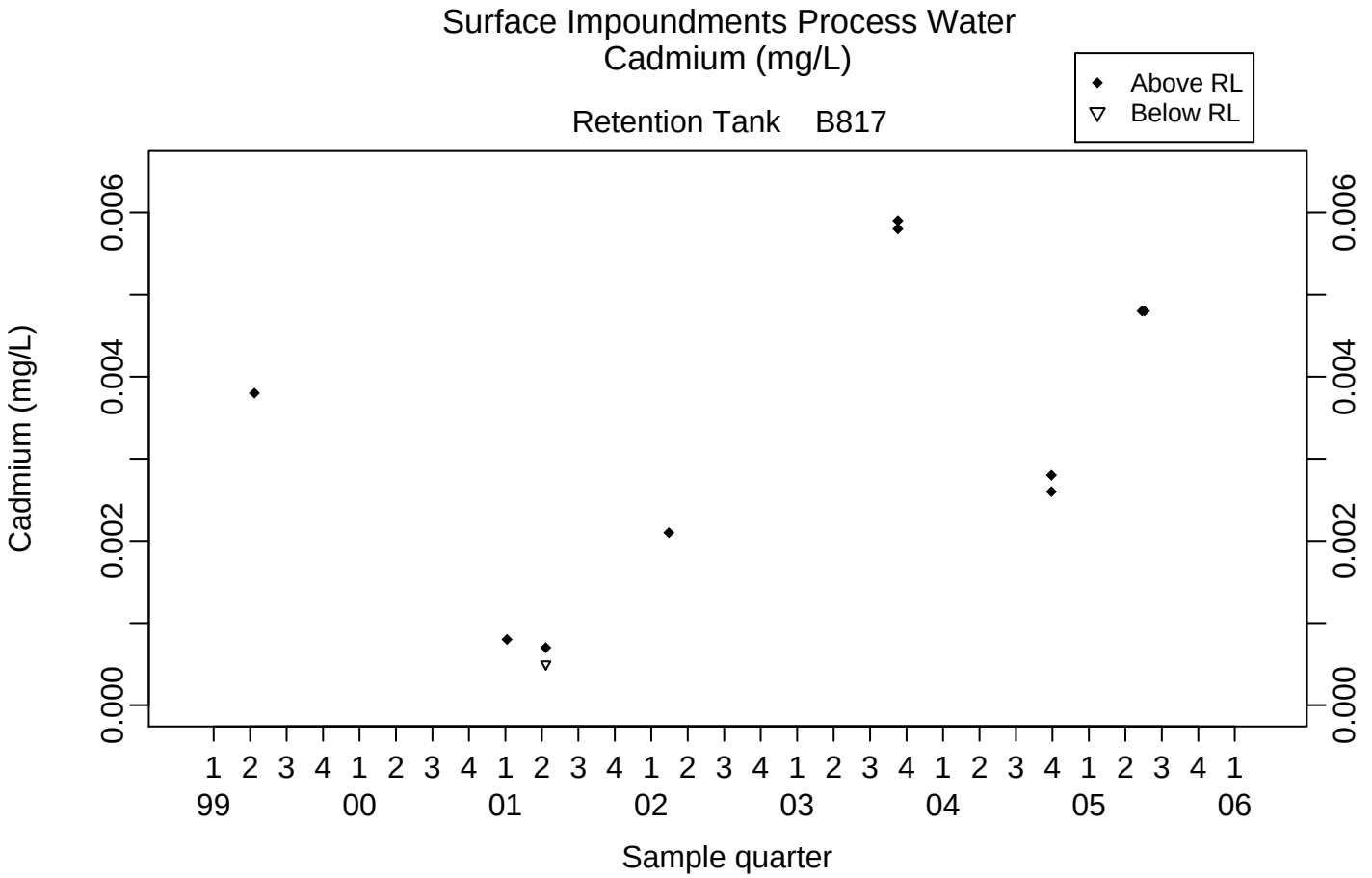


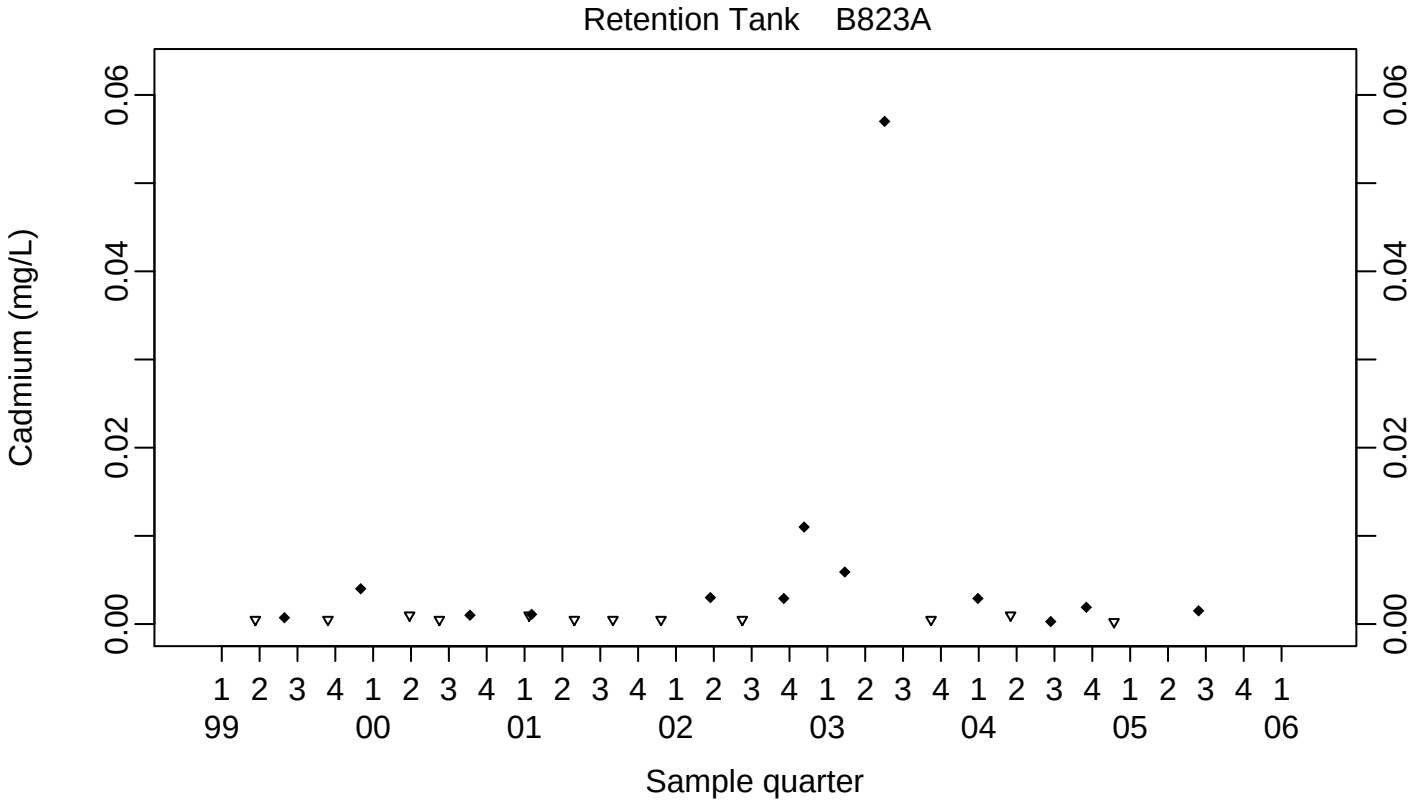

Surface Impoundments Process Water
Beryllium (mg/L)
Retention Tank B851
Above RL
Below RL
Beryllium (mg/L)
0.000
0.004
0.008
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

Surface Impoundments Process Water
Cadmium (mg/L)

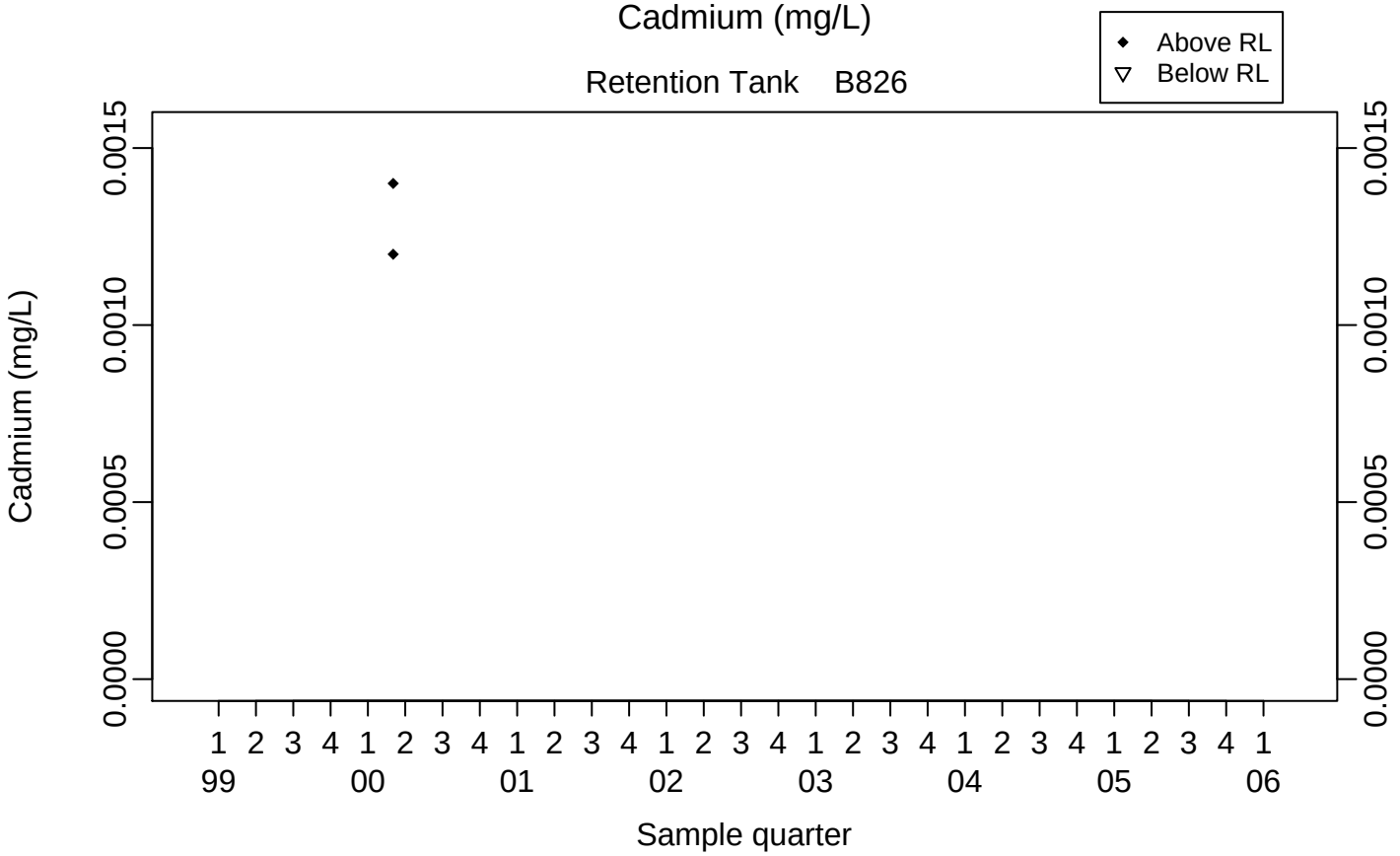


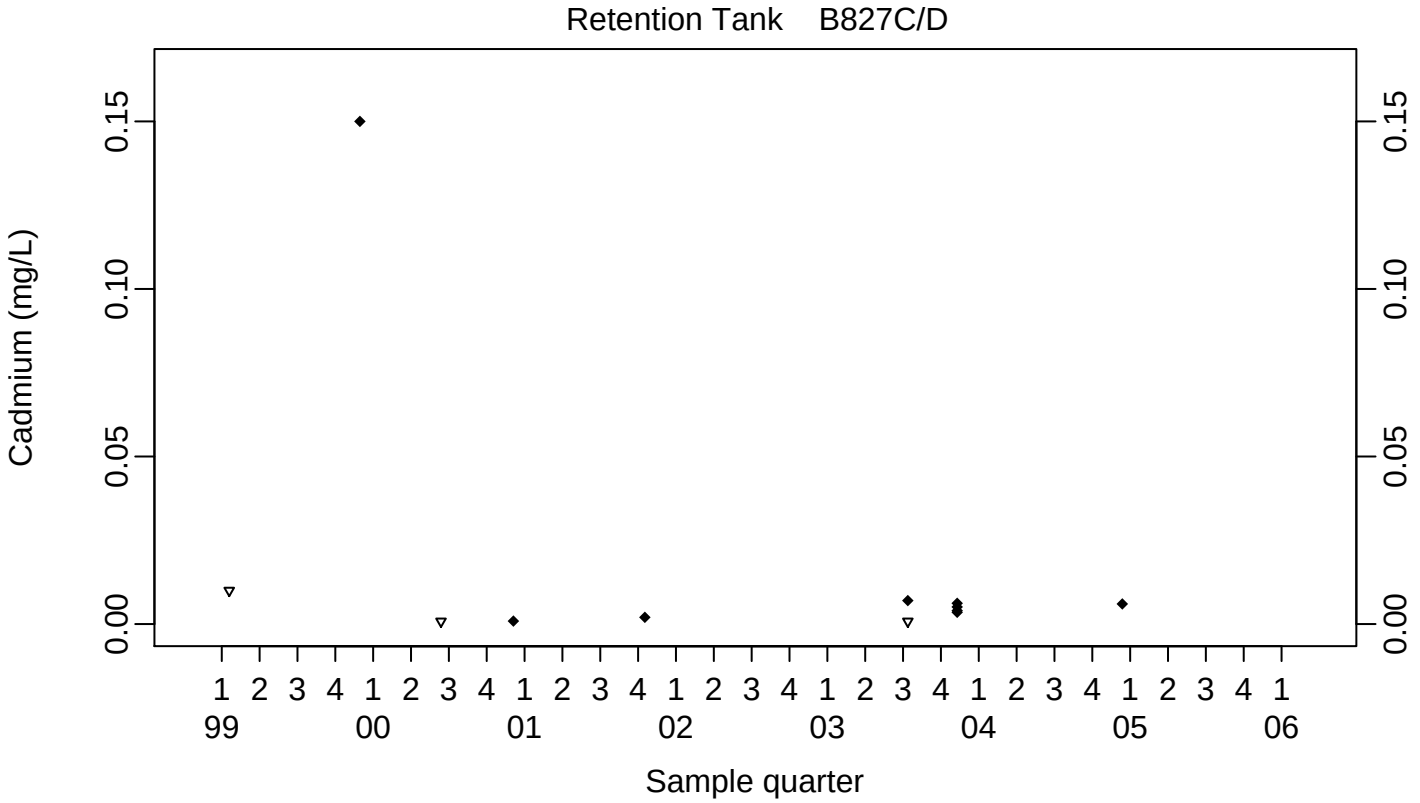



Surface Impoundments Process Water
Cadmium (mg/L)
Above RL
Below RL
Retention Tank B817
Cadmium (mg/L)
0.000
0.002
0.004
0.006
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

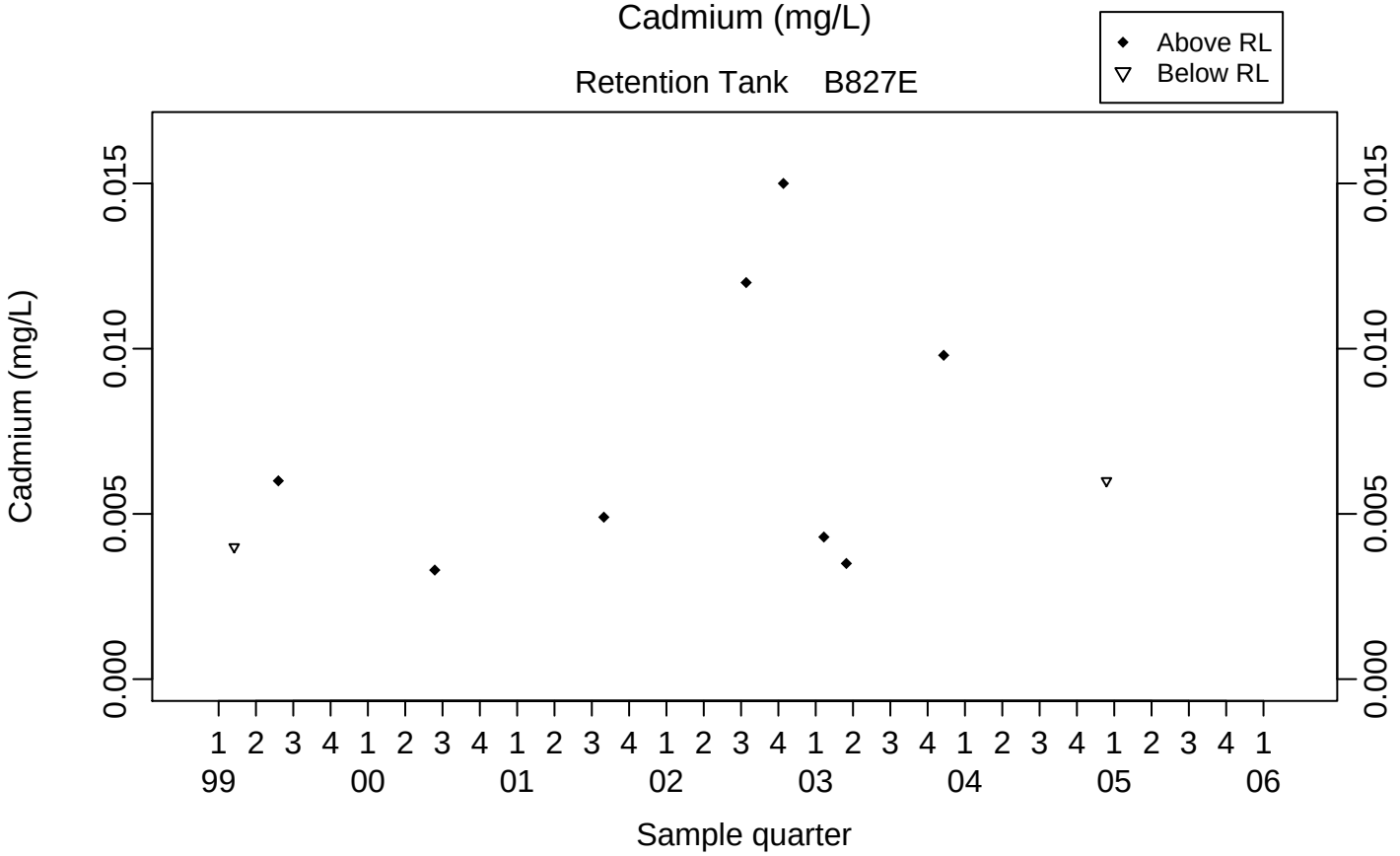

Retention Tank B823A
Cadmium (mg/L)
0.00
0.02
0.04
0.06
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

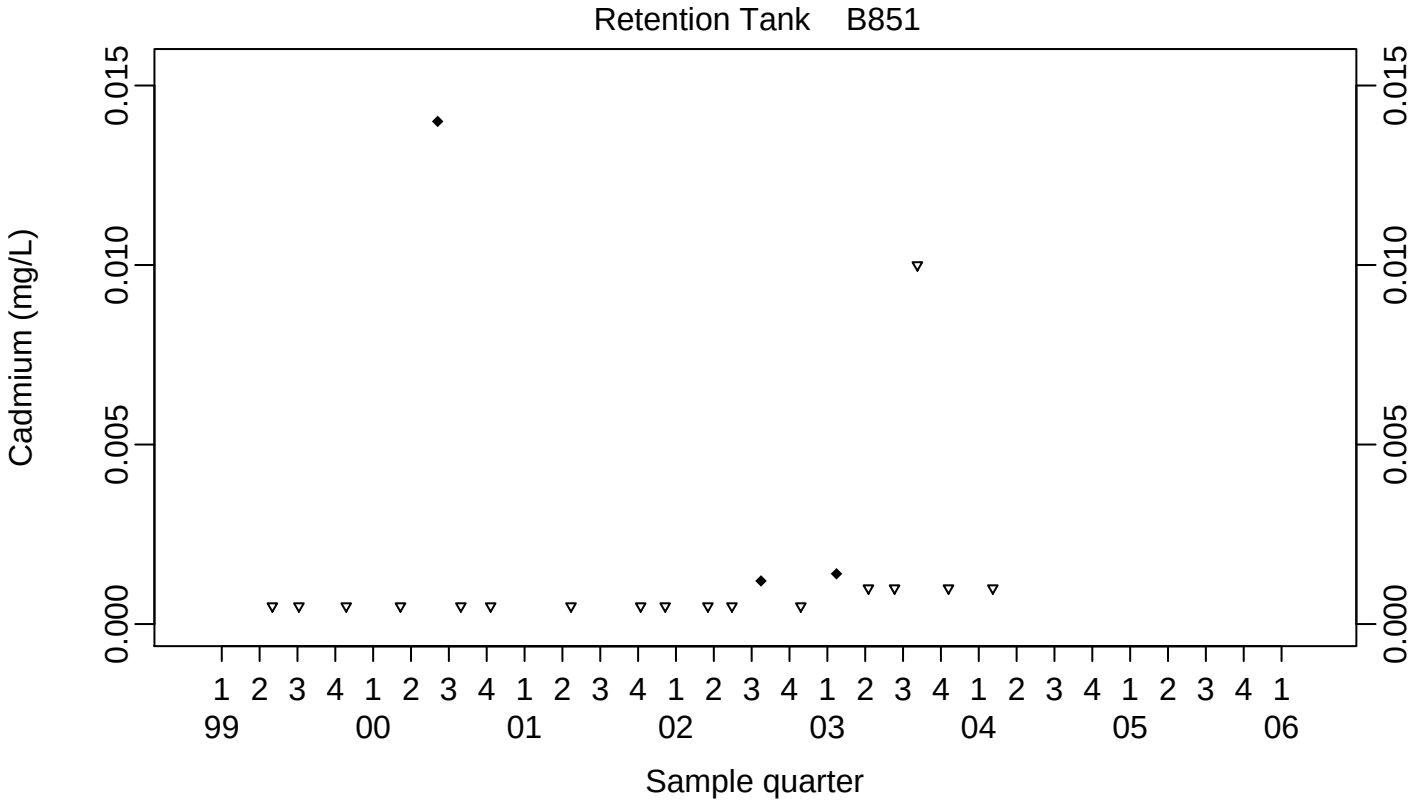
Surface Impoundments Process Water
Cadmium (mg/L)

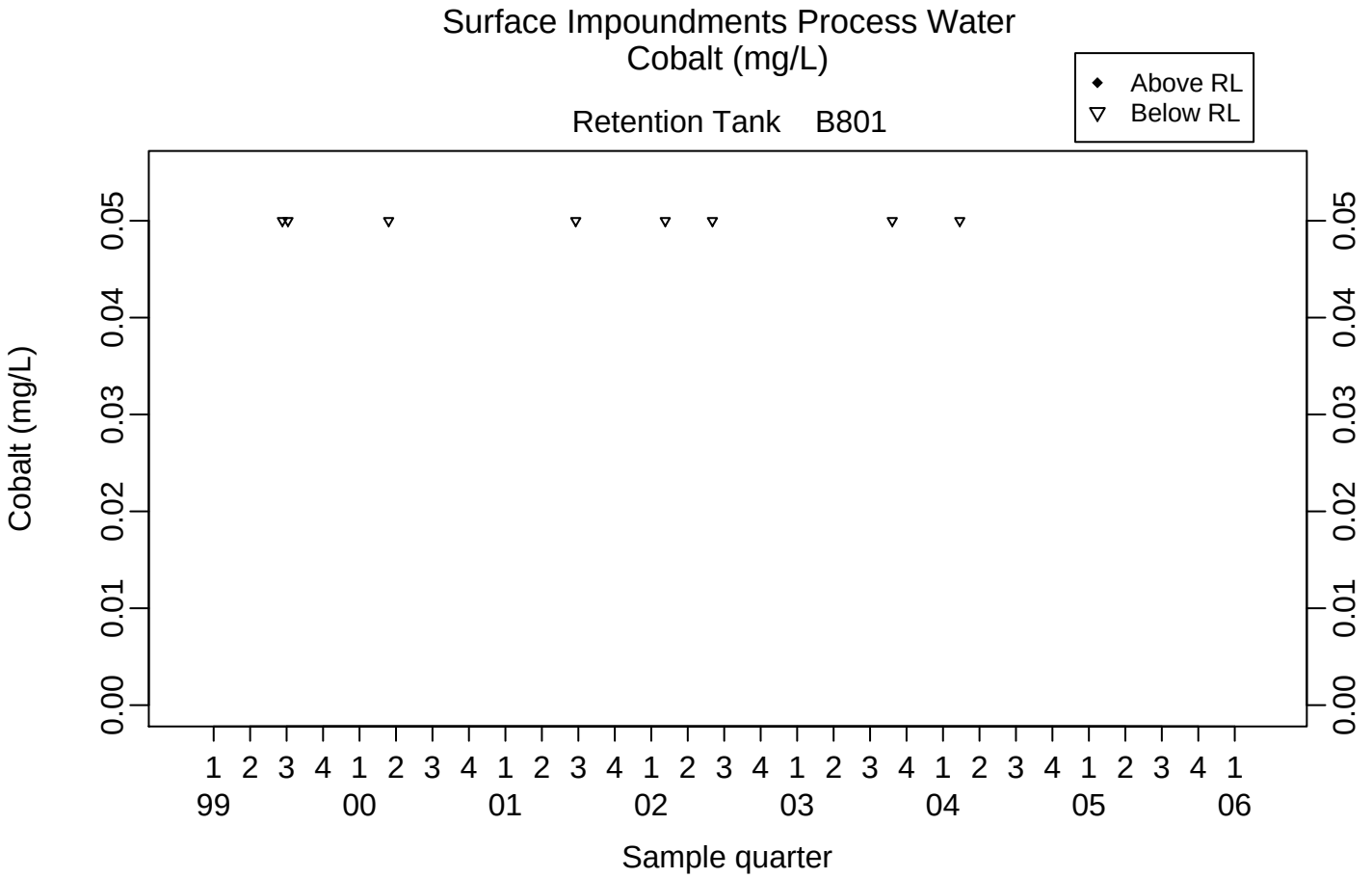


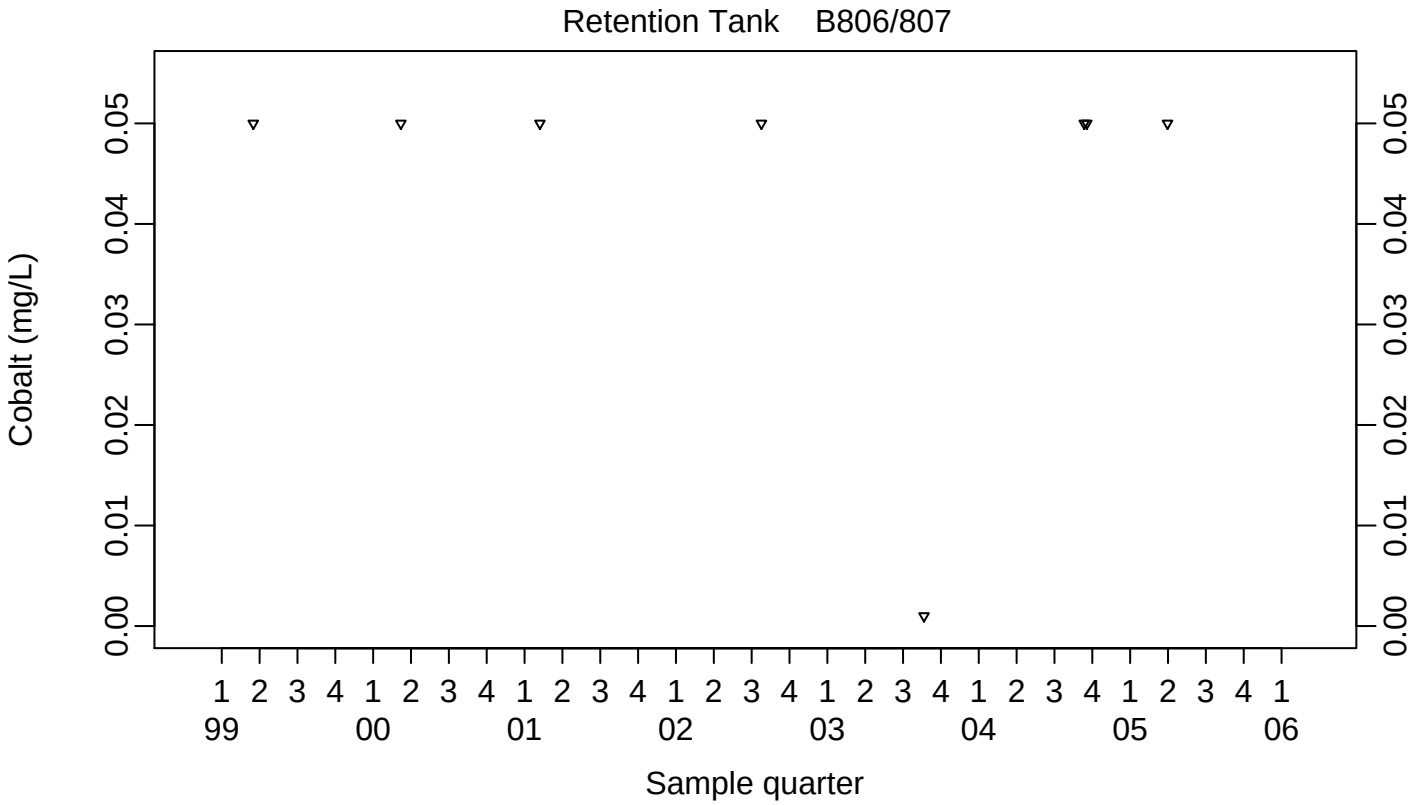


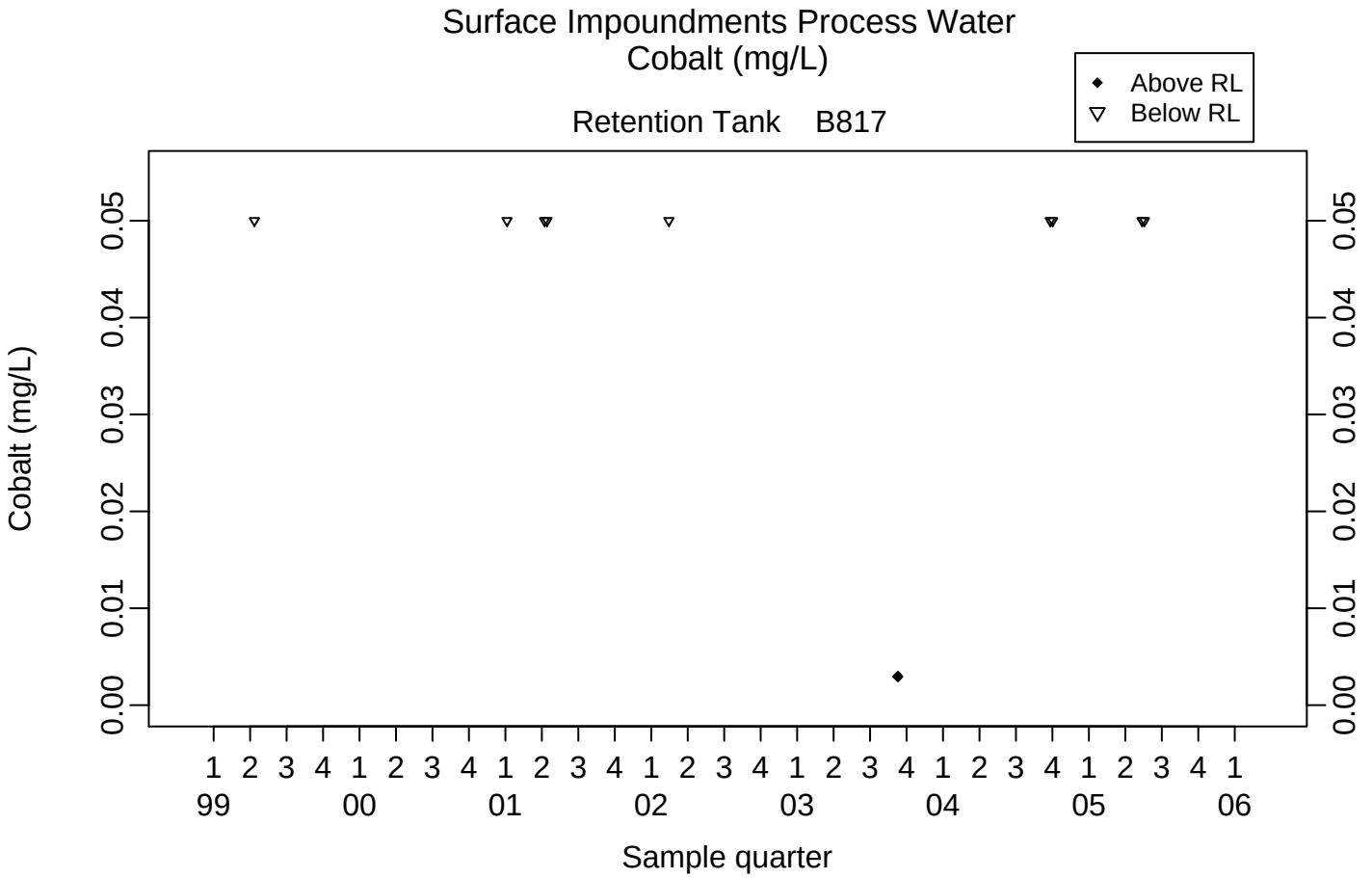
Surface Impoundments Process Water
Cadmium (mg/L)

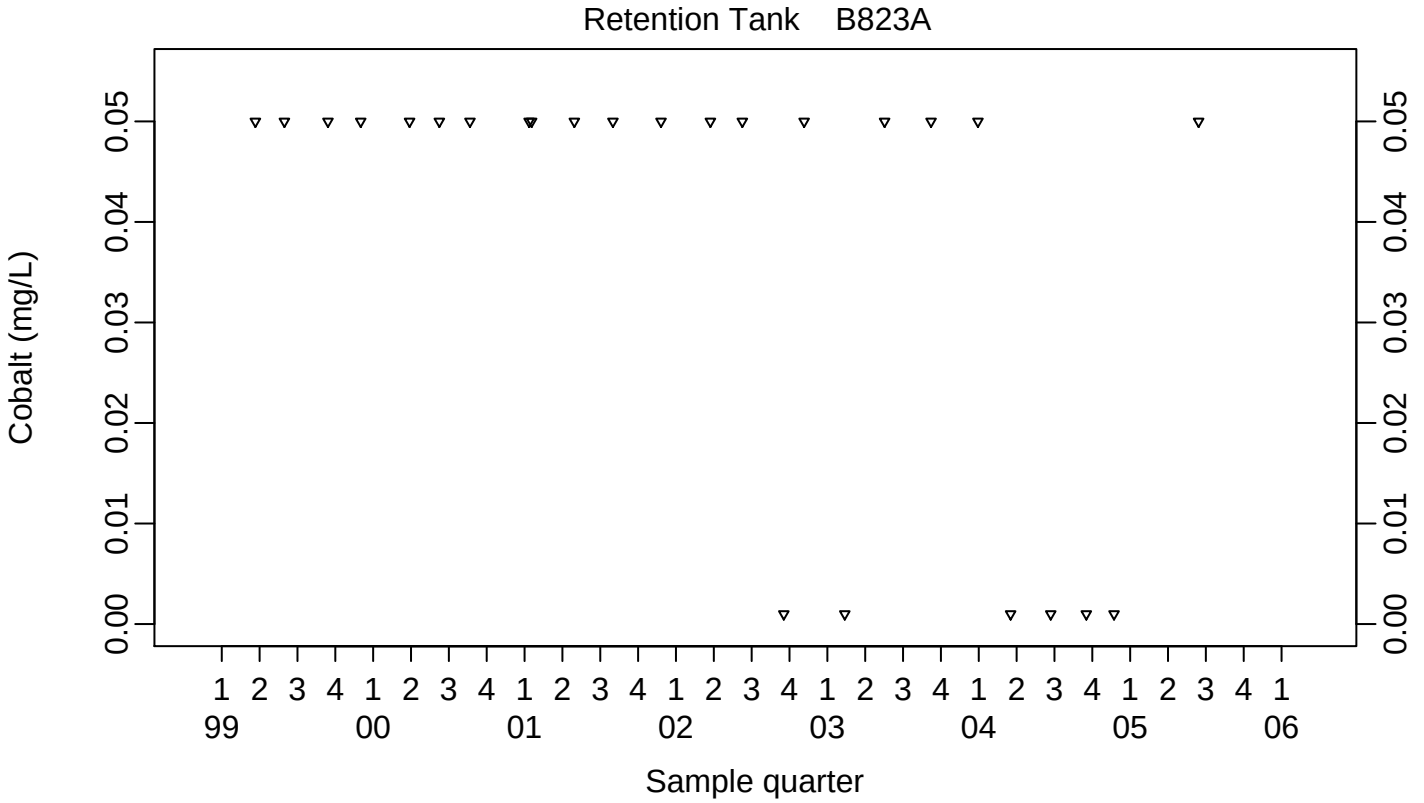




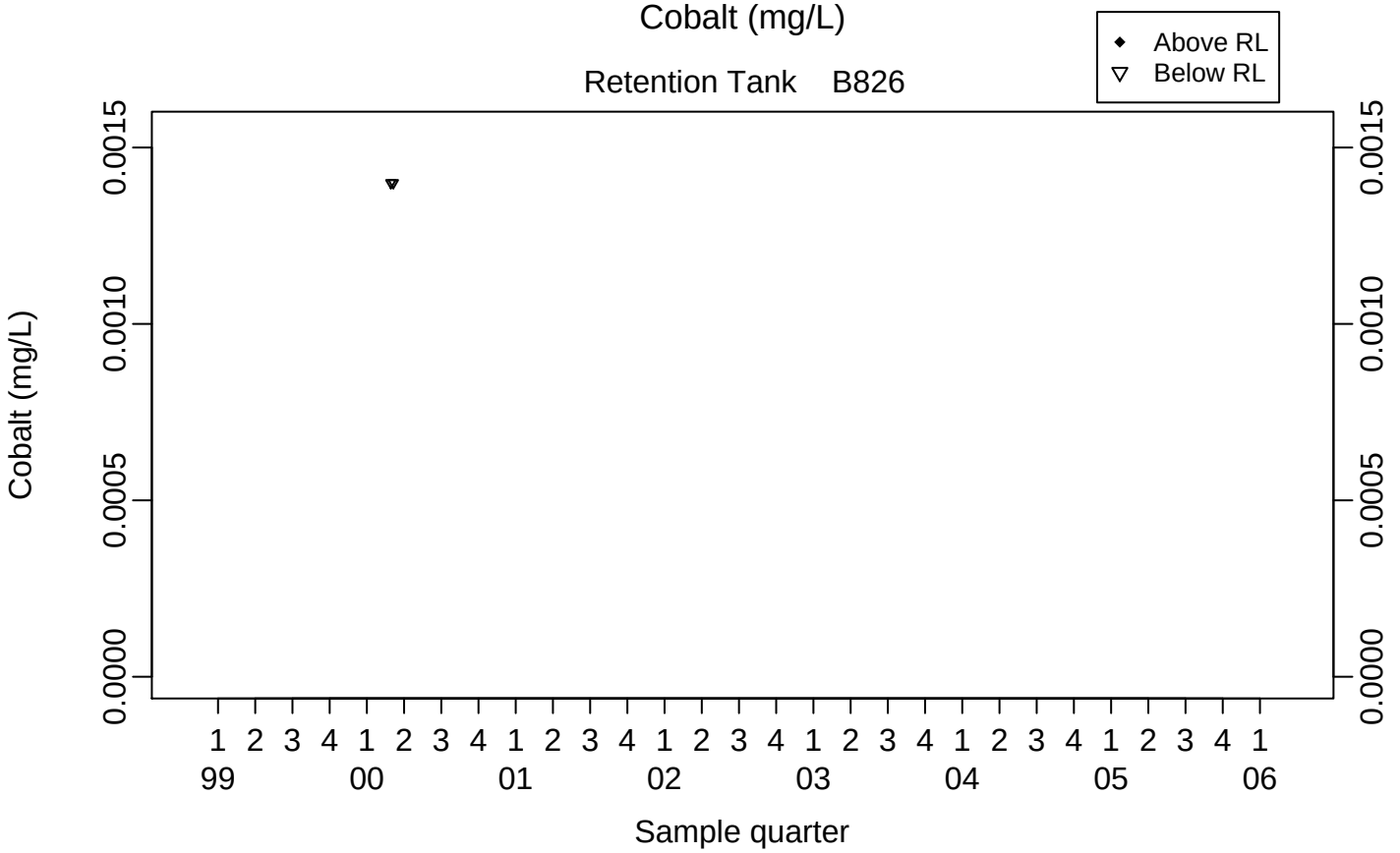

Surface Impoundments Process Water
Cobalt (mg/L)
Above RL
Below RL
Retention Tank B801
Cobalt (mg/L)
0.00
0.01
0.02
0.03
0.04
0.05
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

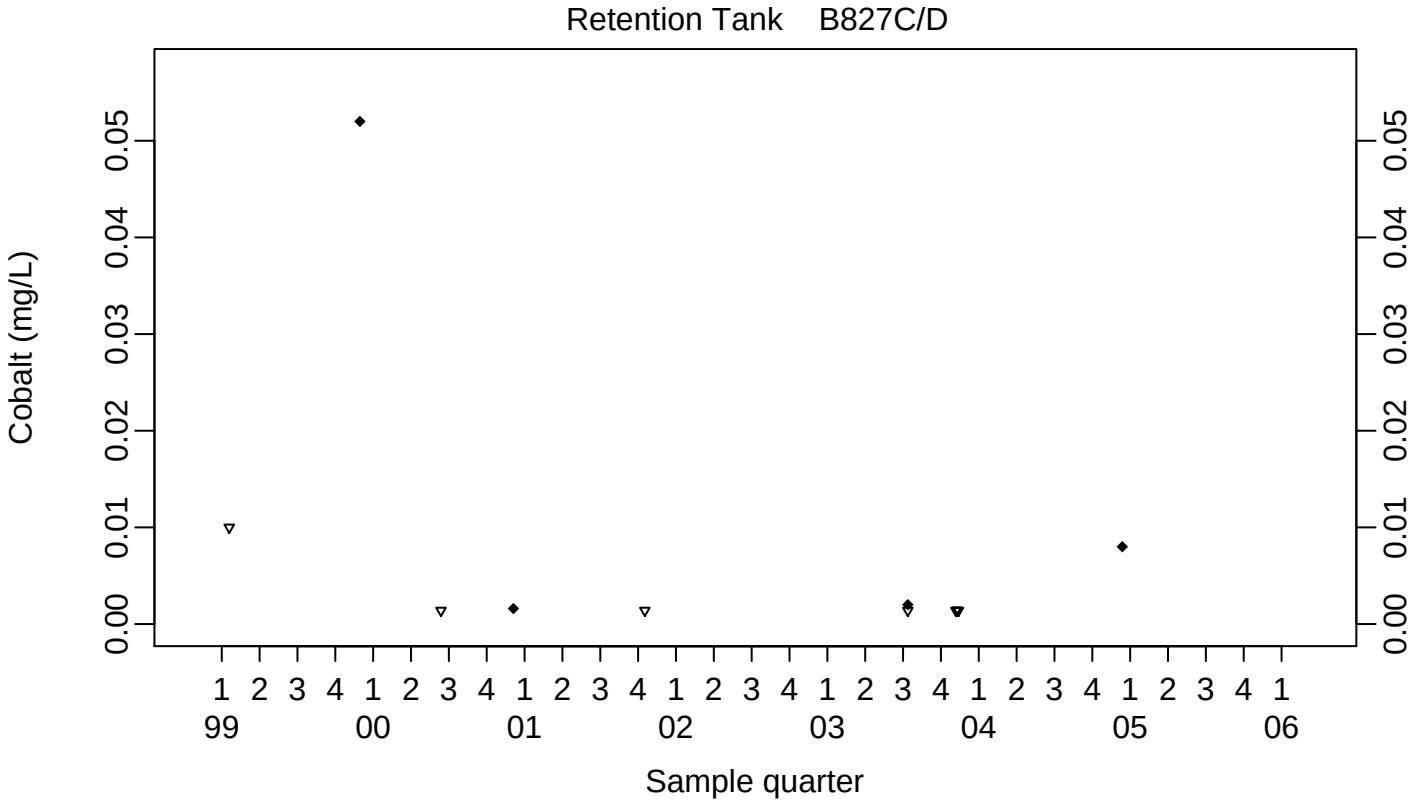

Retention Tank B806/807
Cobalt (mg/L)
0.00
0.01
0.02
0.03
0.04
0.05
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

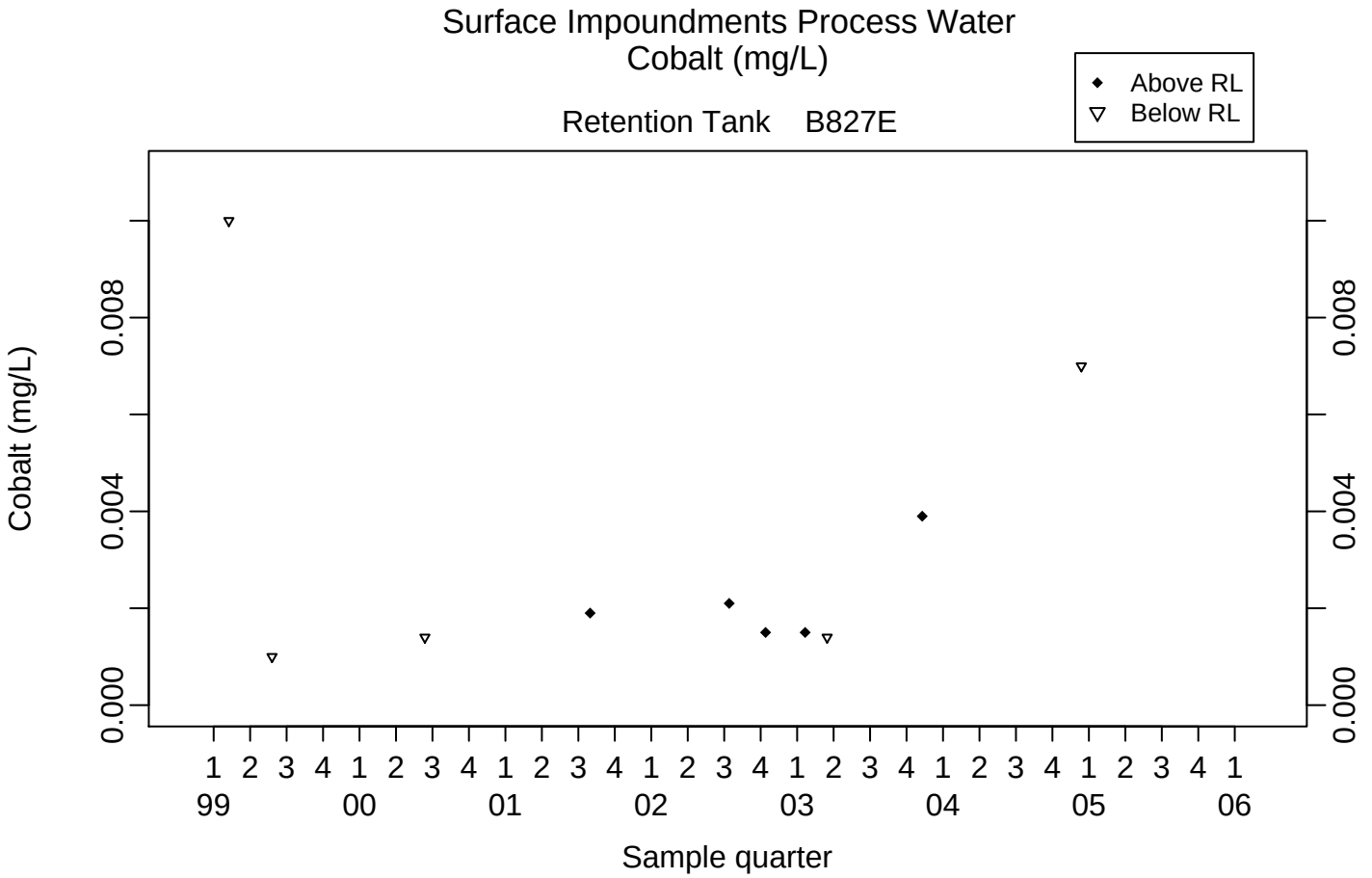

Surface Impoundments Process Water
Cobalt (mg/L)
Above RL
Below RL
Retention Tank B817
Cobalt (mg/L)
0.00
0.01
0.02
0.03
0.04
0.05
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

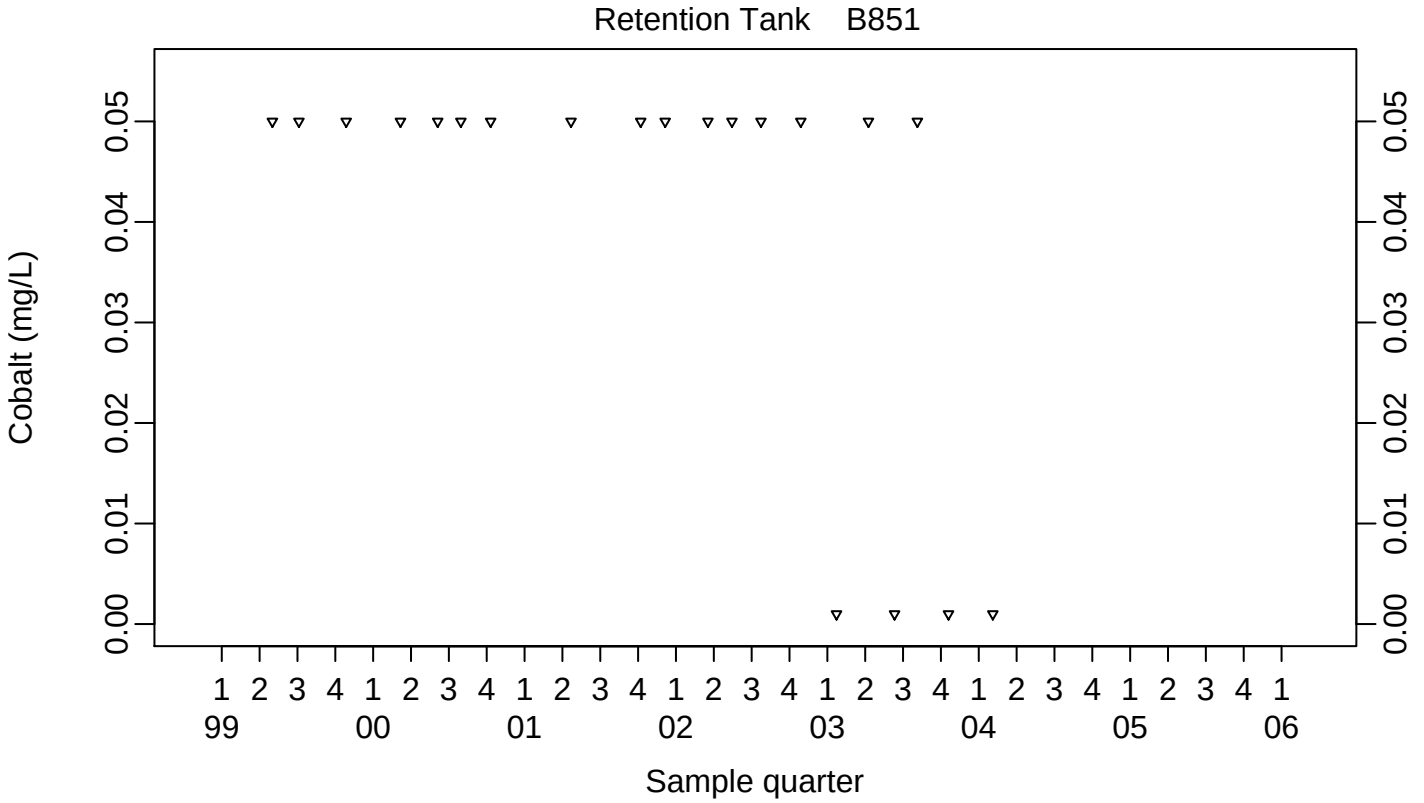

Retention Tank B823A
Cobalt (mg/L)
0.00
0.01
0.02
0.03
0.04
0.05
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

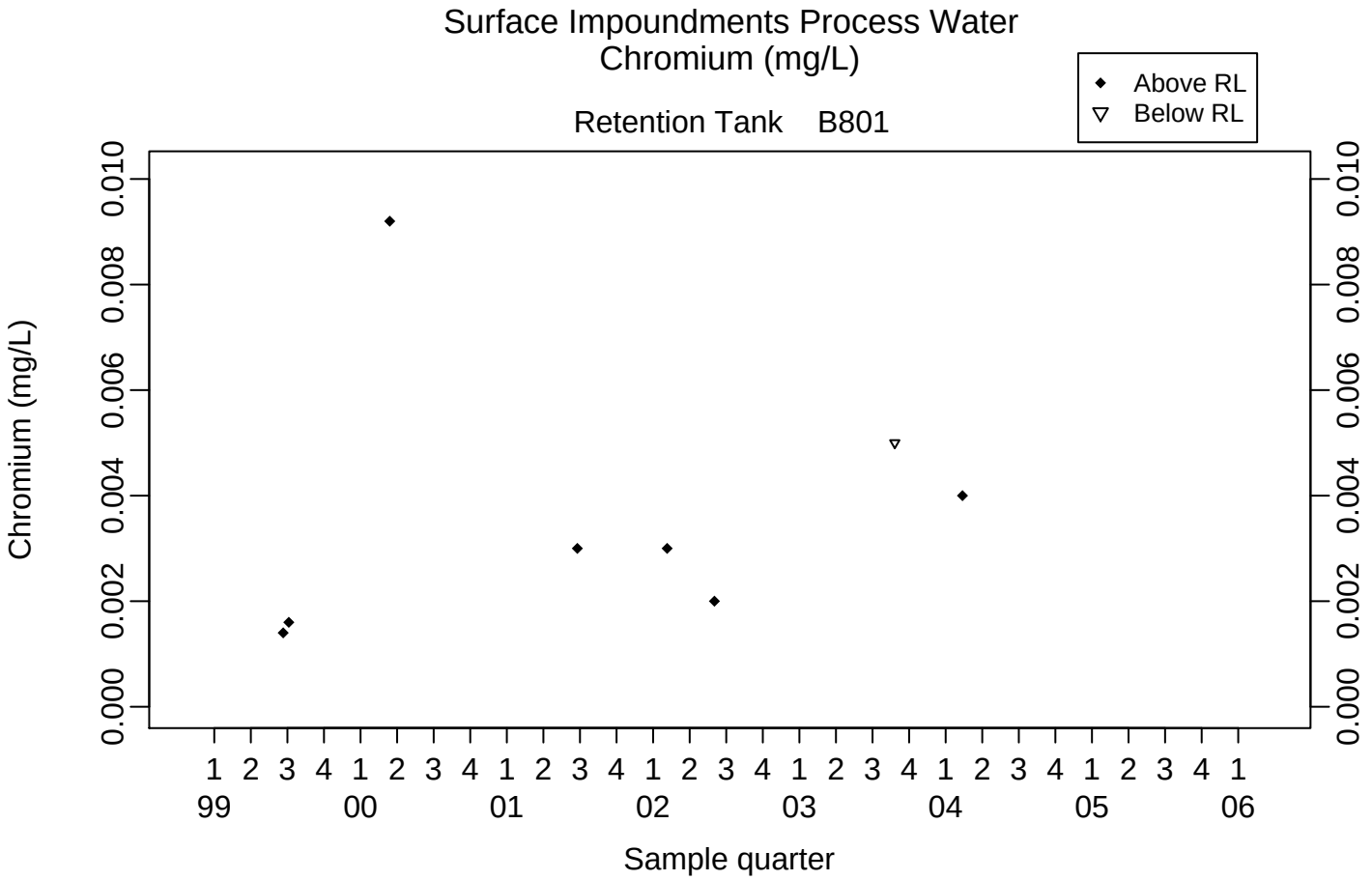
Surface Impoundments Process Water
Cobalt (mg/L)

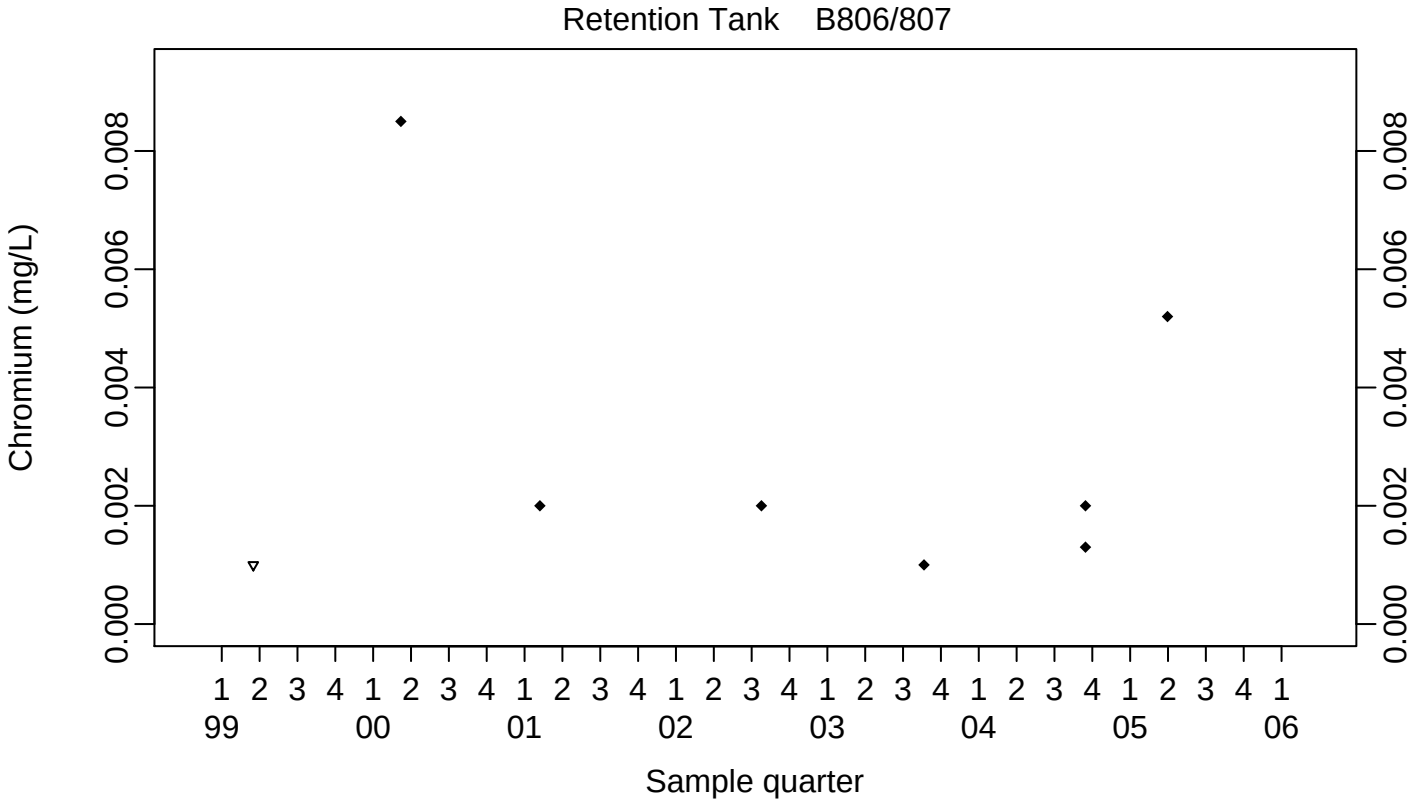


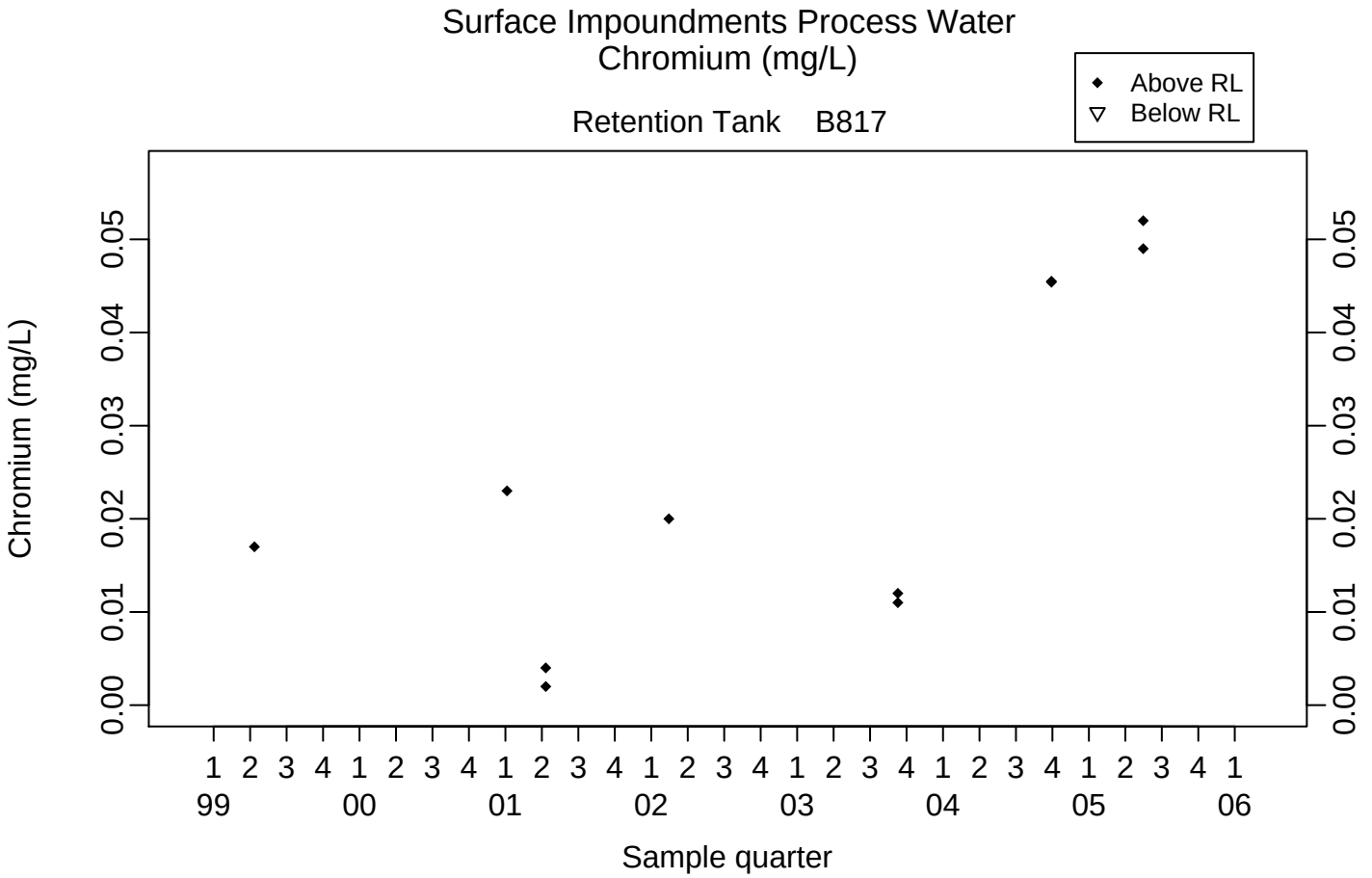


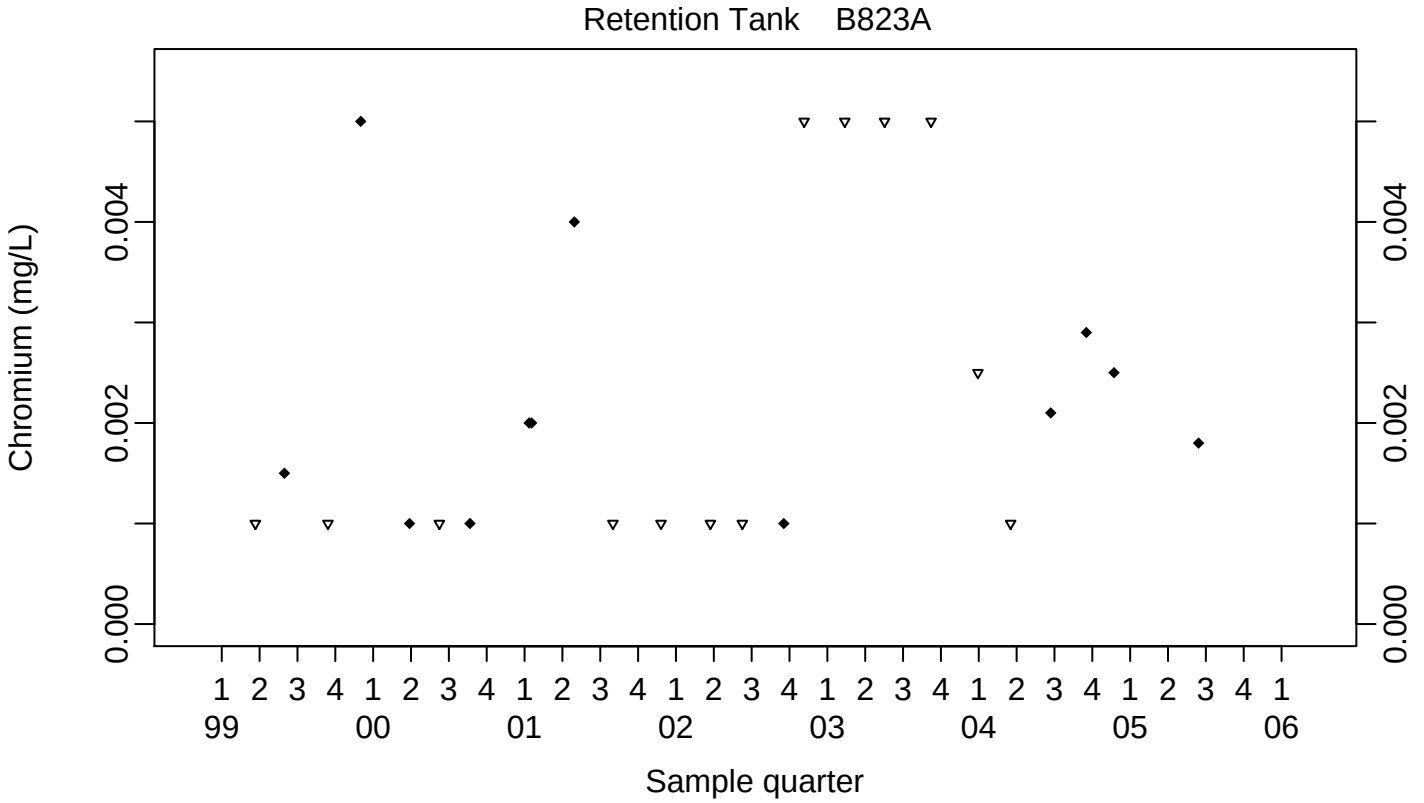

Surface Impoundments Process Water
Cobalt (mg/L)
Above RL
Below RL
Retention Tank B827E
Cobalt (mg/L)
0.000
0.004
0.008
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


Retention Tank B851
Cobalt (mg/L)
0.00
0.01
0.02
0.03
0.04
0.05
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

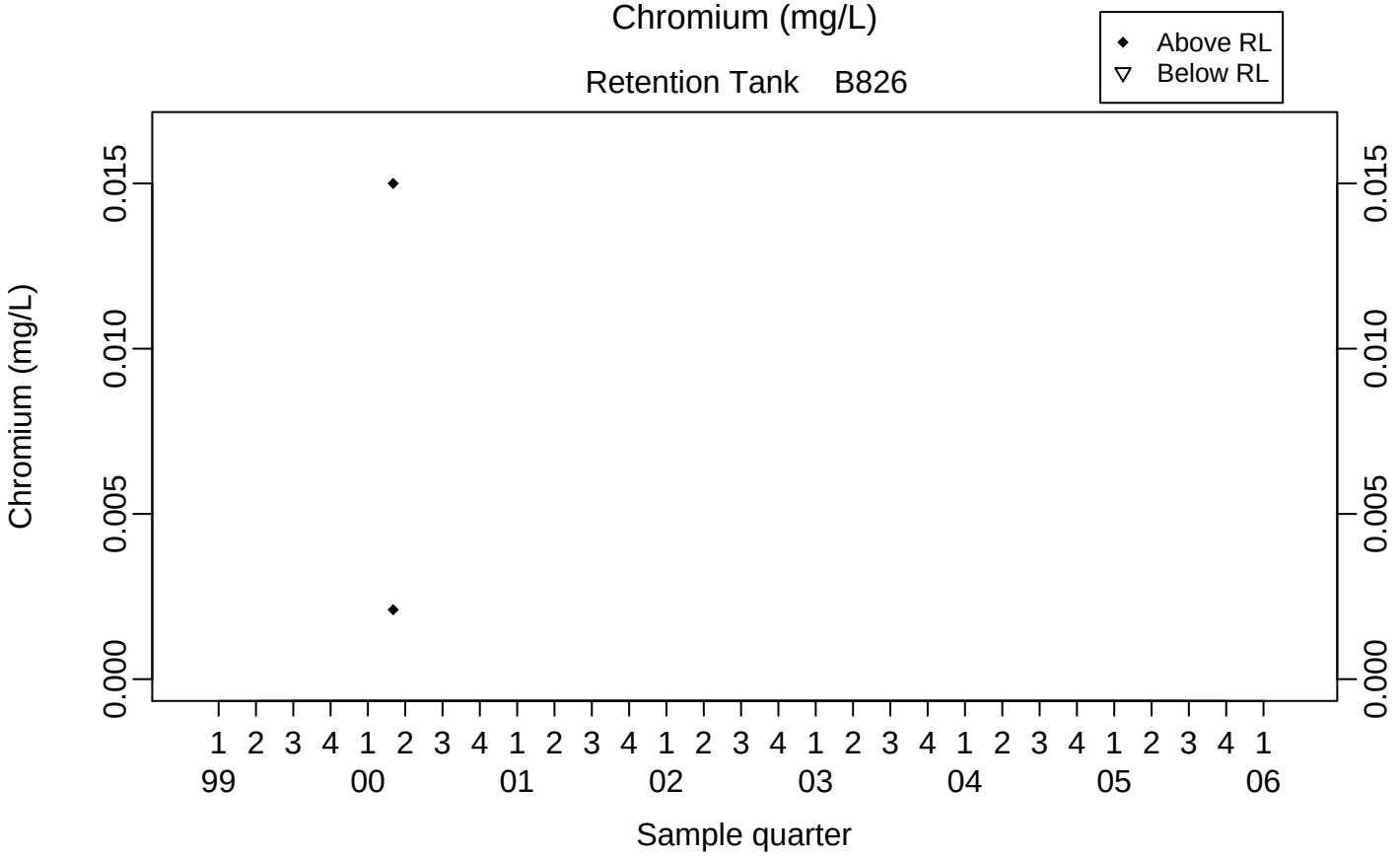

Surface Impoundments Process Water
Chromium (mg/L)
Above RL
Below RL
Retention Tank B801
Chromium (mg/L)
0.000
0.002
0.004
0.006
0.008
0.010
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

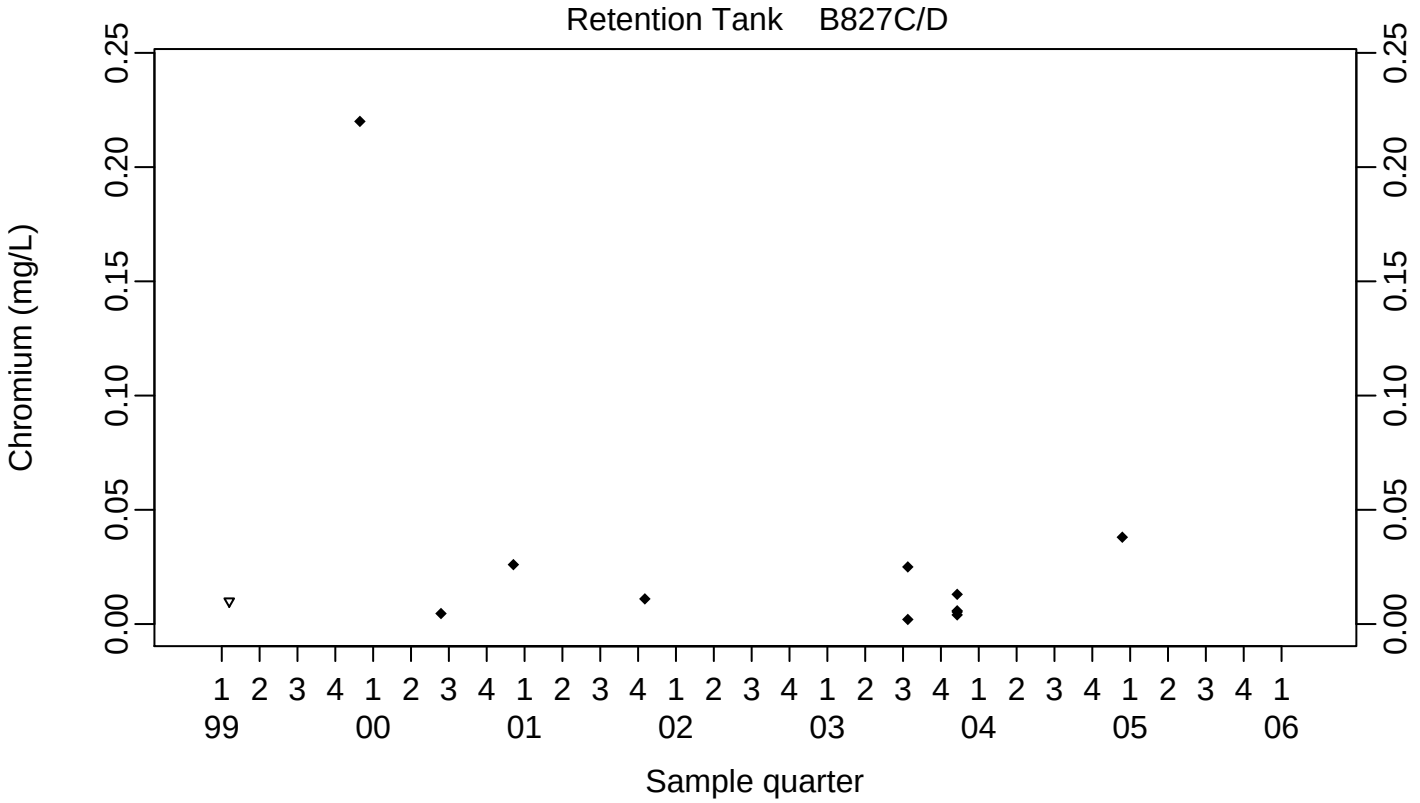

Retention Tank B806/807
Chromium (mg/L)
0.000
0.002
0.004
0.006
0.008
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

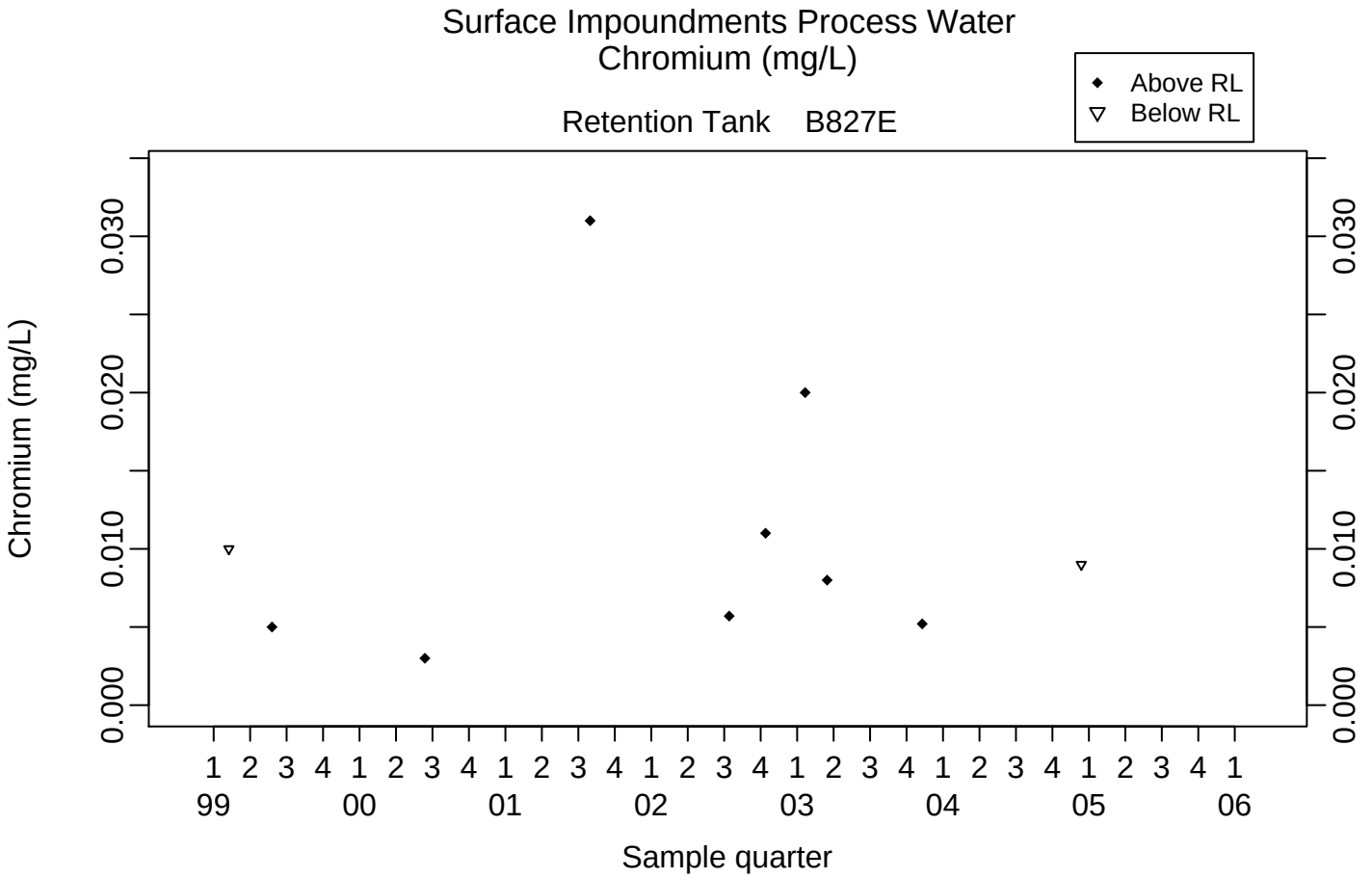

Surface Impoundments Process Water
Chromium (mg/L)
Above RL
Below RL
Retention Tank B817
Chromium (mg/L)
0.00
0.01
0.02
0.03
0.04
0.05
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

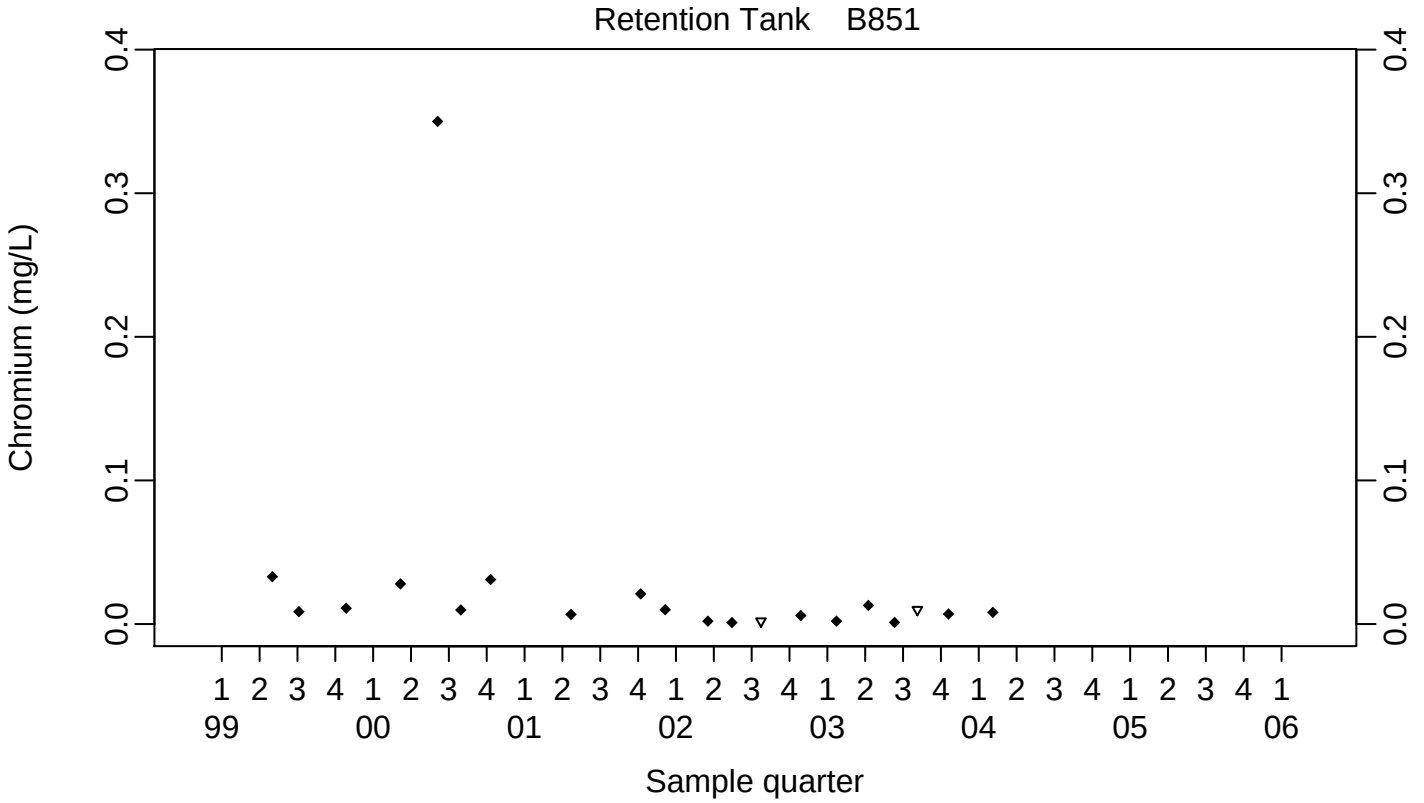

Retention Tank B823A
Chromium (mg/L)
0.000
0.002
0.004
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

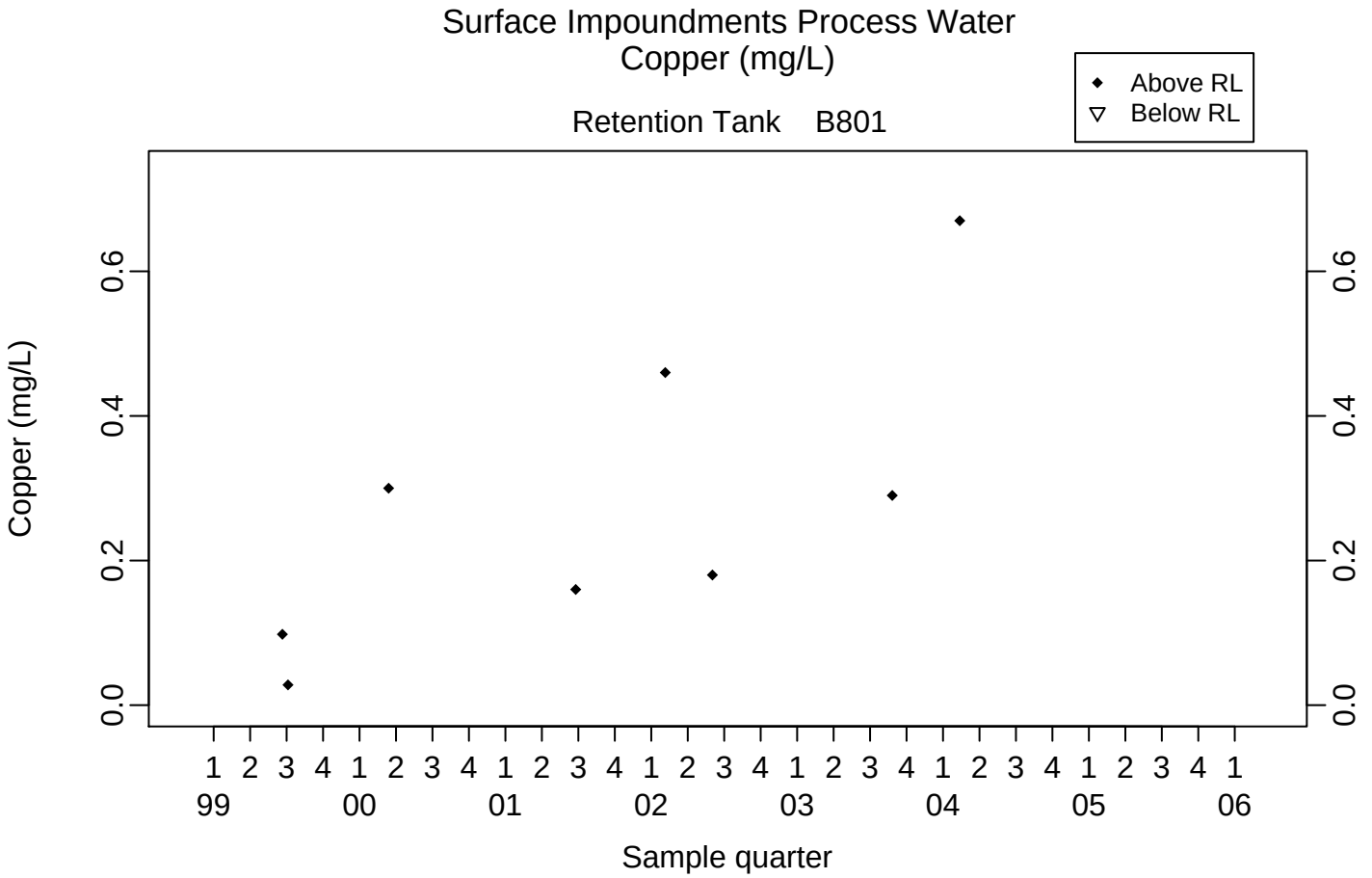
Surface Impoundments Process Water
Chromium (mg/L)

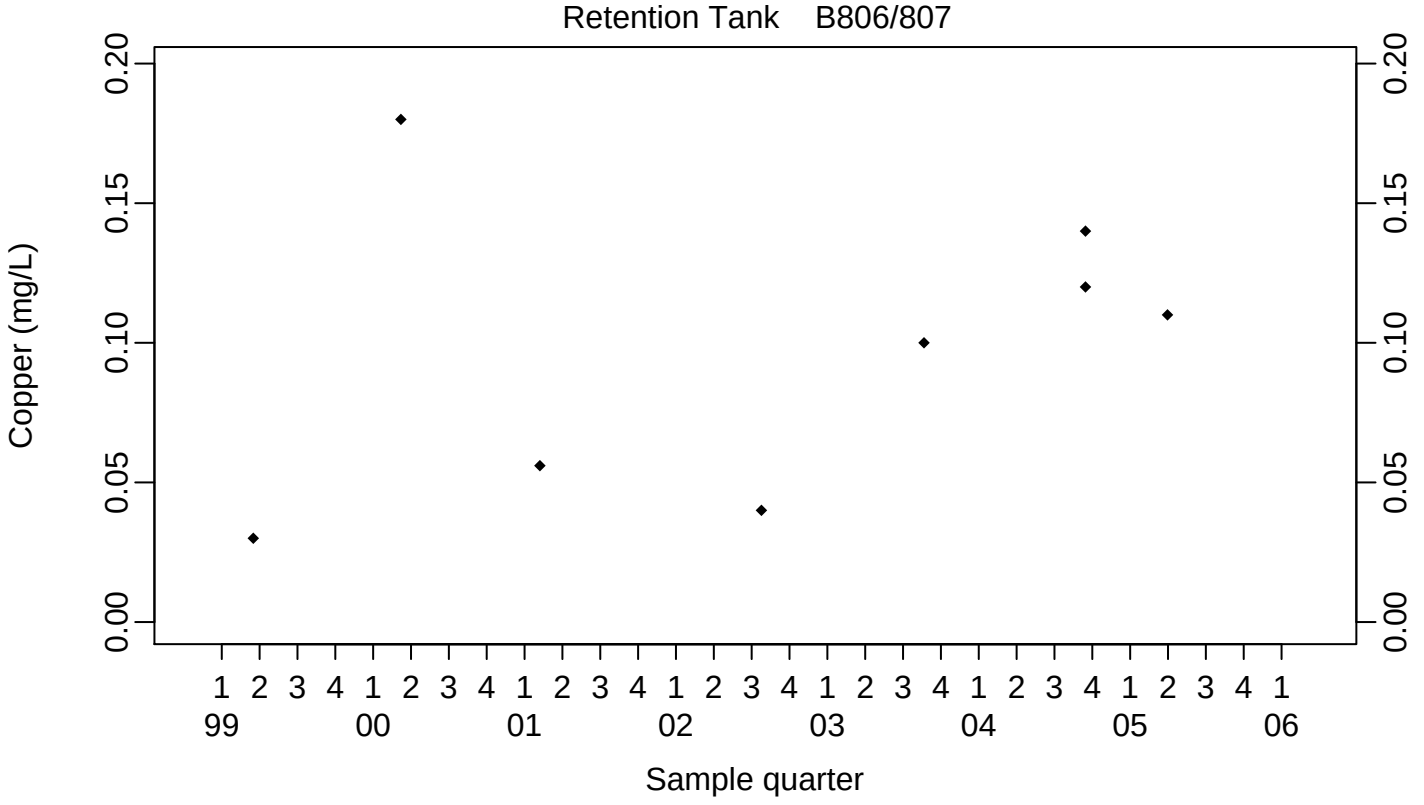


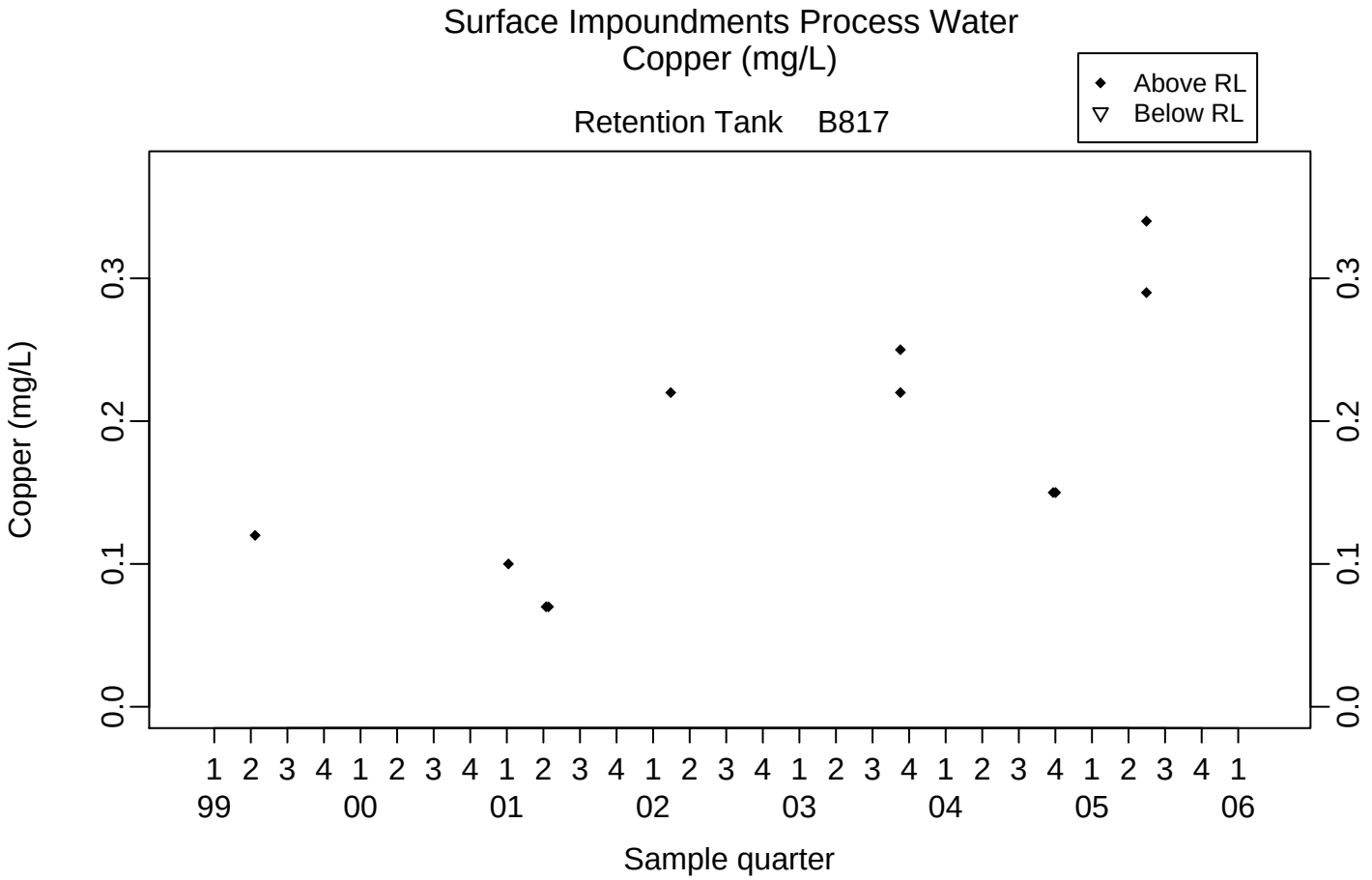


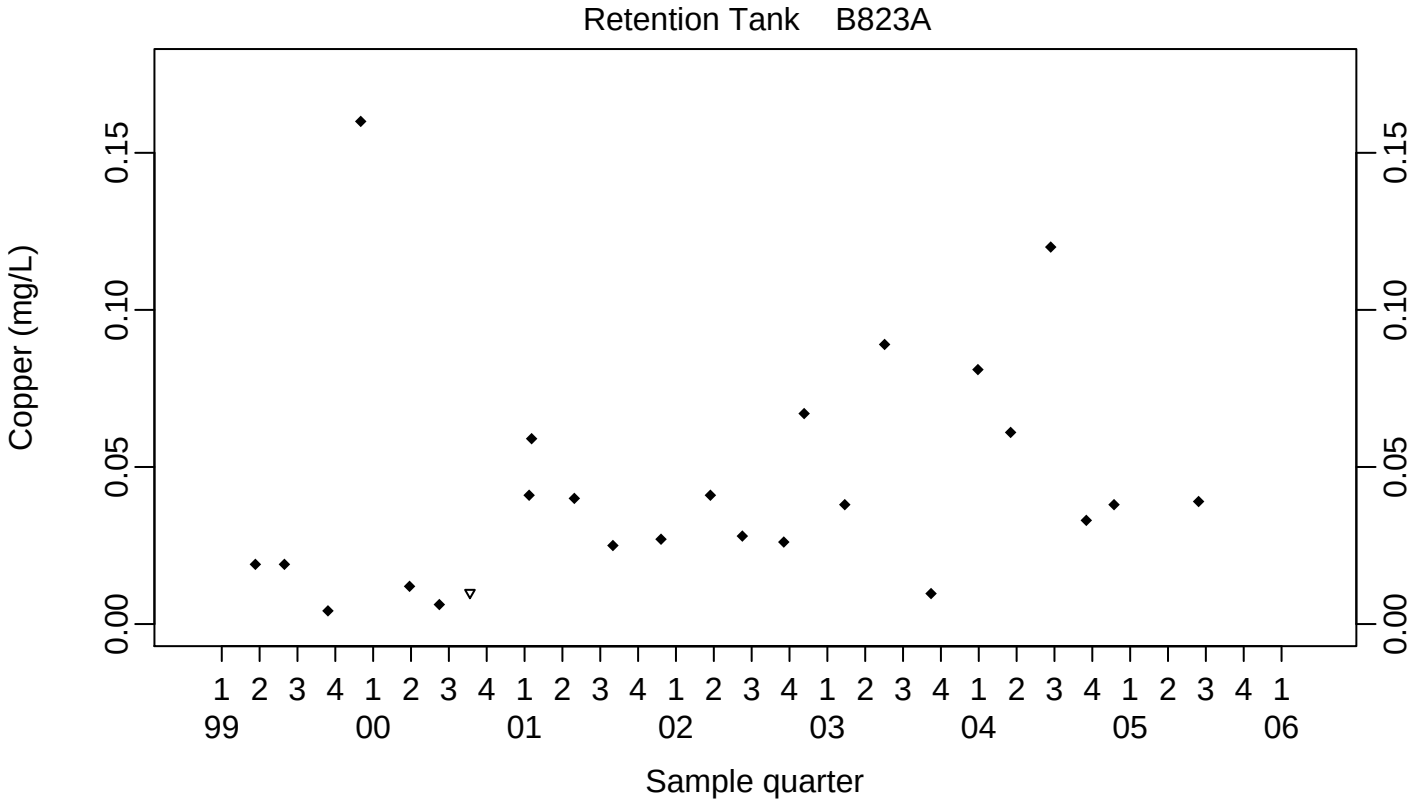

Surface Impoundments Process Water
Chromium (mg/L)
Above RL
Below RL
Retention Tank B827E
Chromium (mg/L)
0.000
0.010
0.020
0.030
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

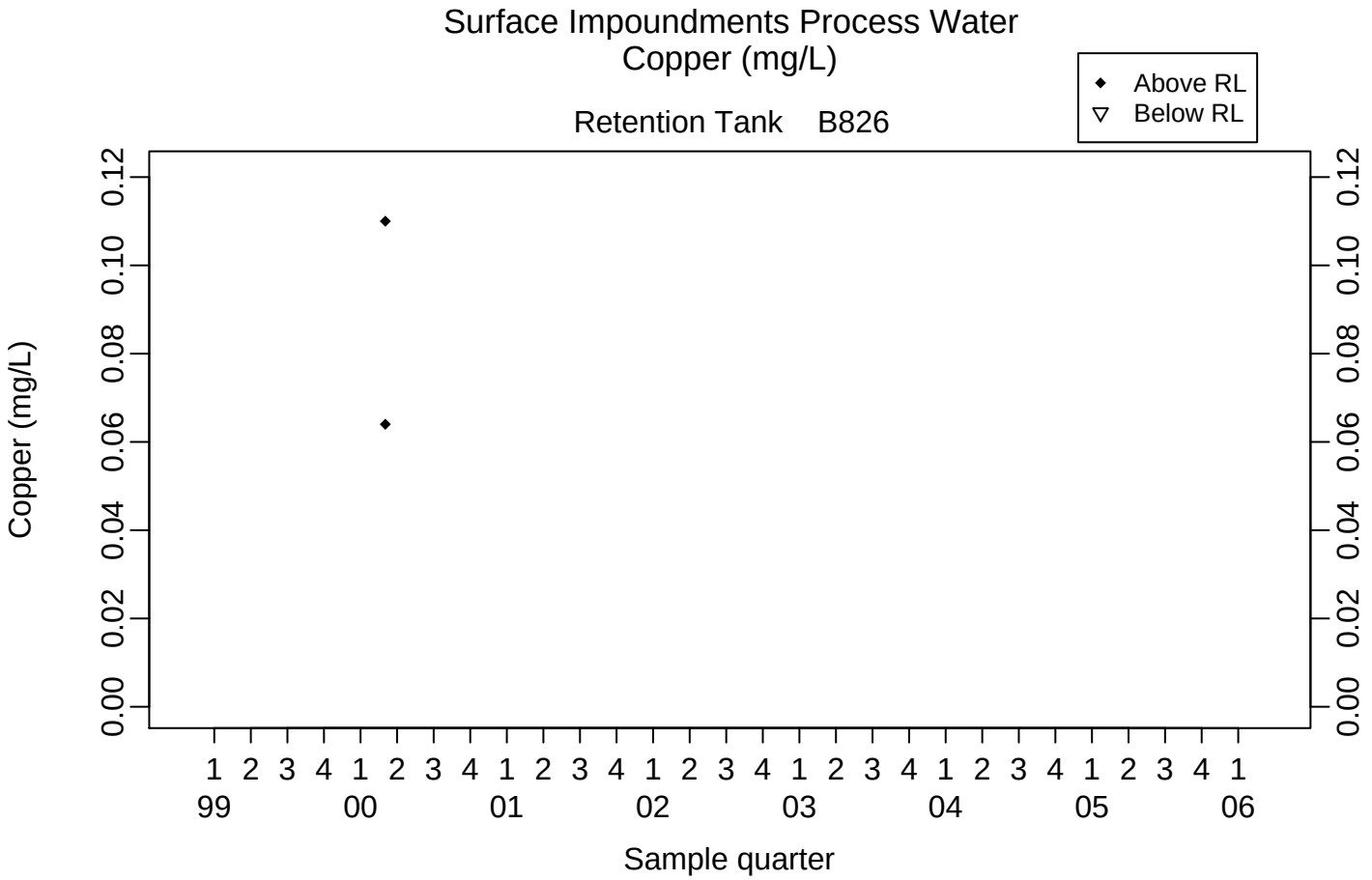

Retention Tank B851
Chromium (mg/L)
0.0
0.1
0.2
0.3
0.4
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

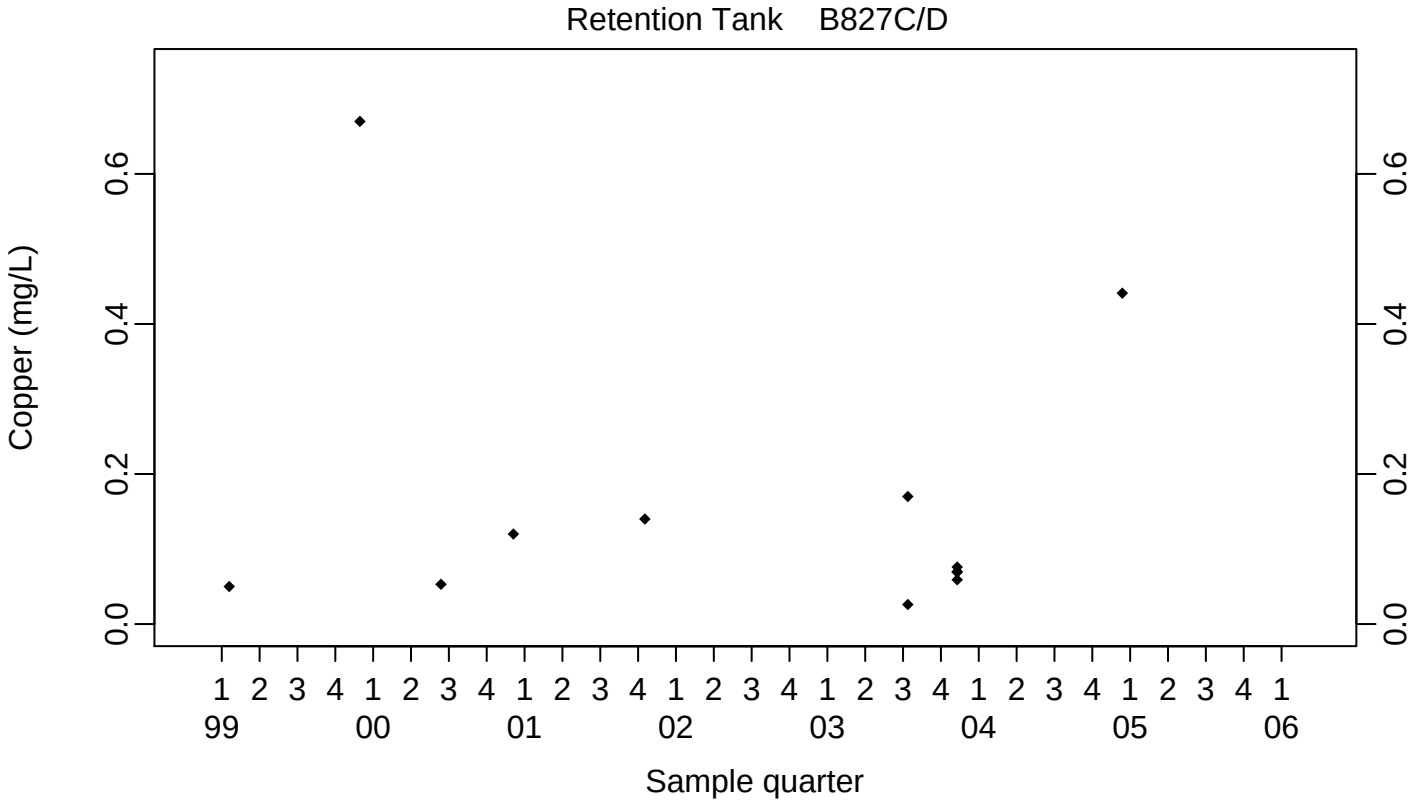

Surface Impoundments Process Water
Copper (mg/L)
Above RL
Below RL
Retention Tank B801
Copper (mg/L)
0.0
0.2
0.4
0.6
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

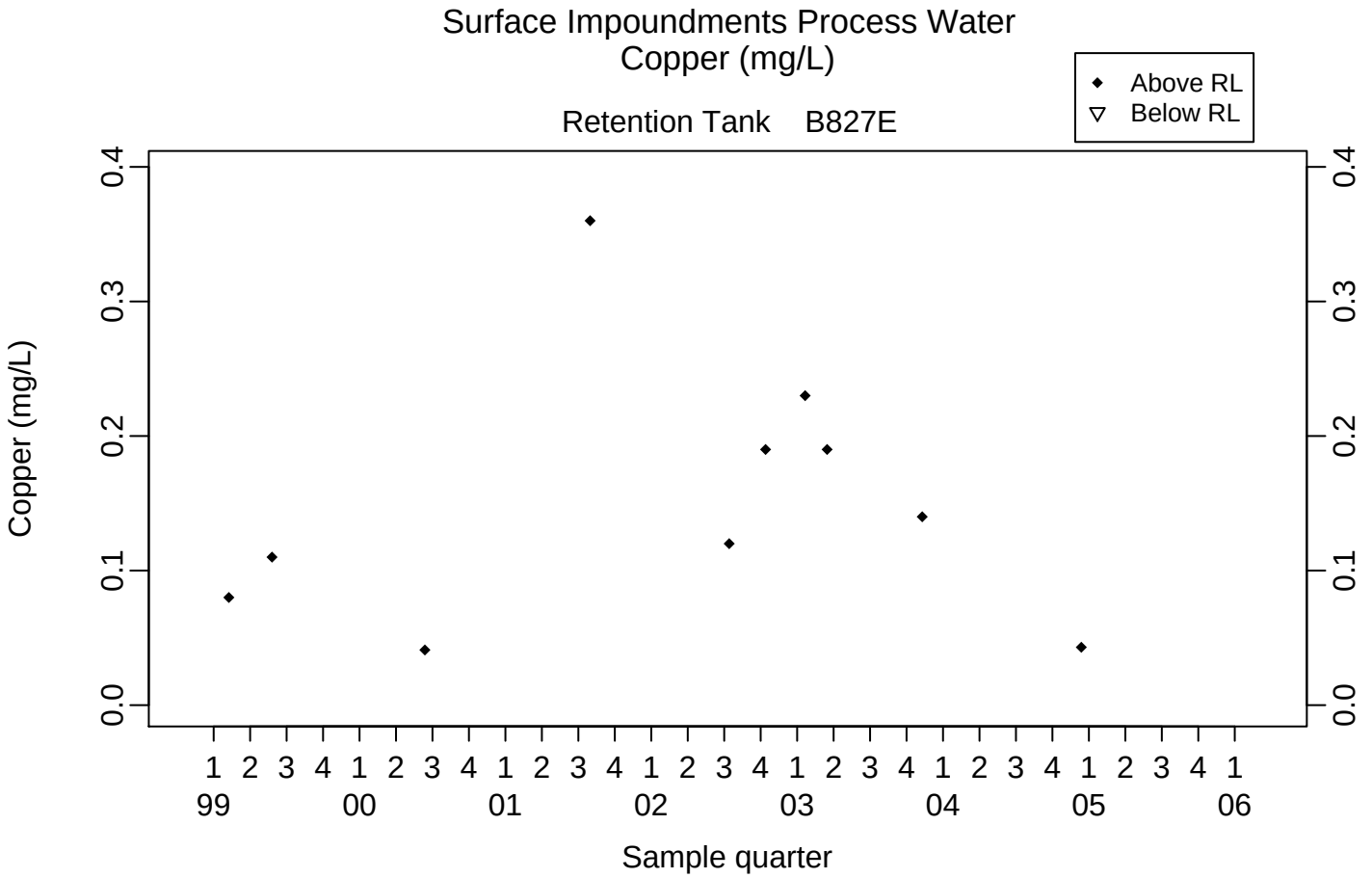

Retention Tank B806/807
Copper (mg/L)
0.00
0.05
0.10
0.15
0.20
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

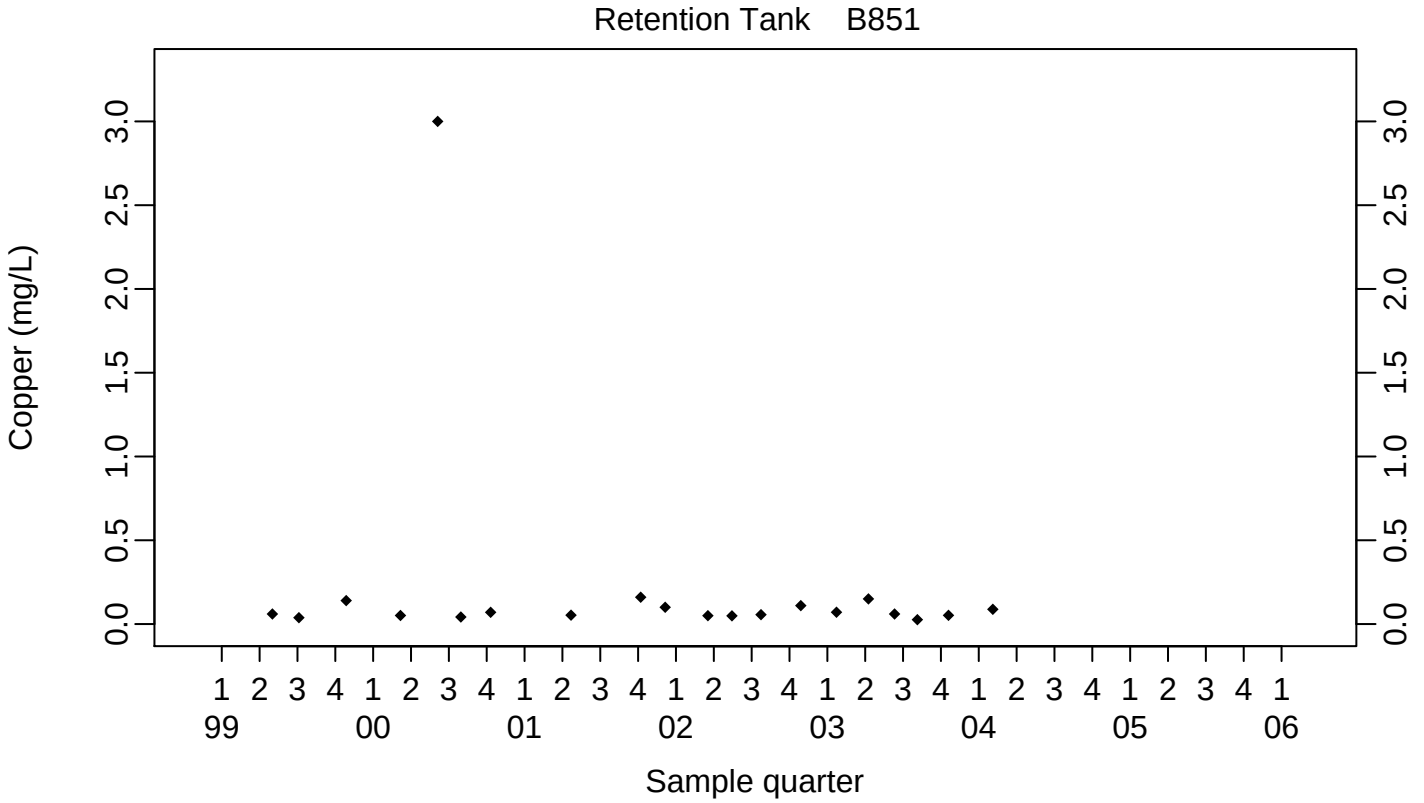

Surface Impoundments Process Water
Copper (mg/L)
Above RL
Below RL
Retention Tank B817
Copper (mg/L)
0.0
0.1
0.2
0.3
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

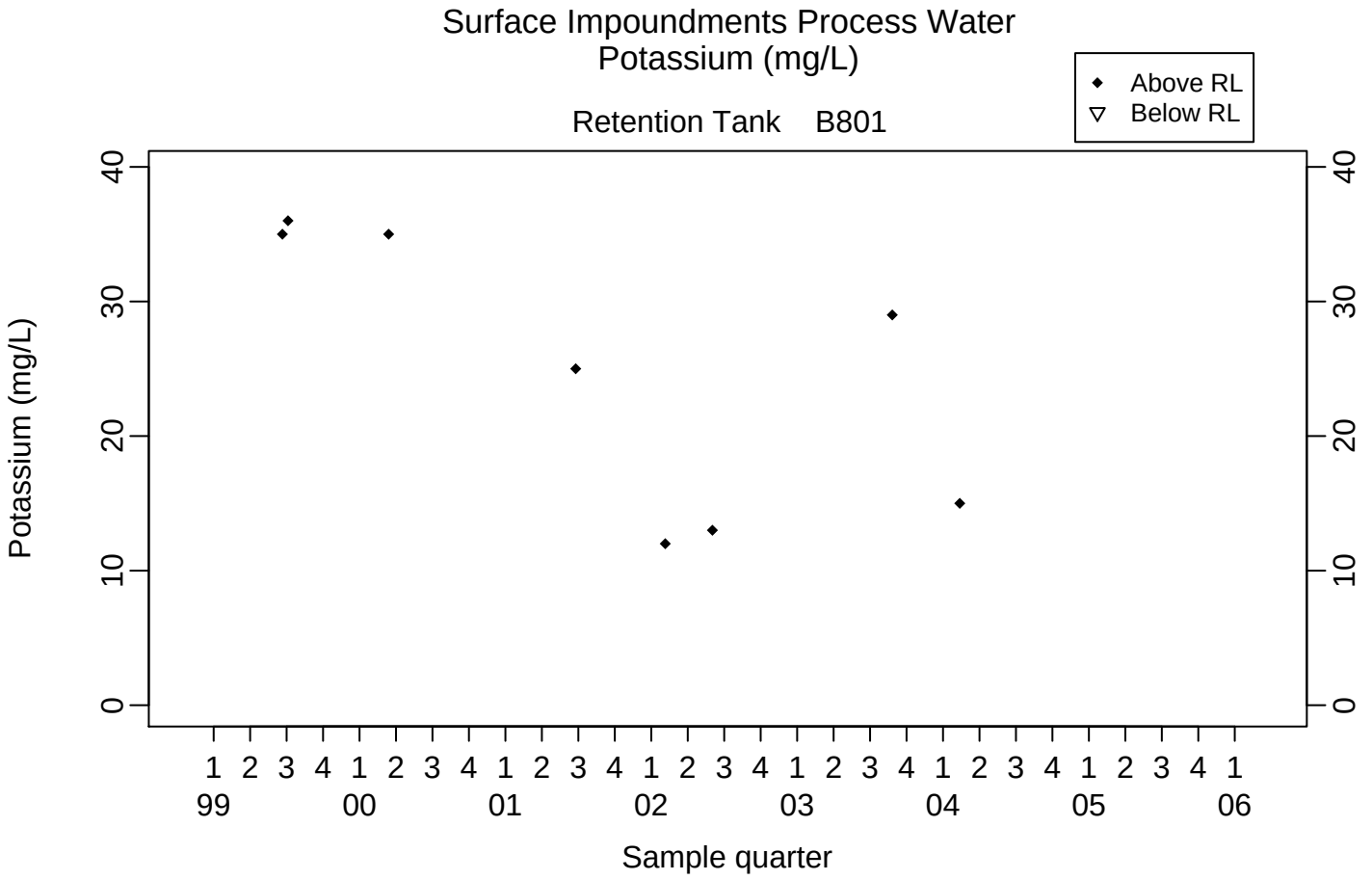

Retention Tank B823A
Copper (mg/L)
0.00
0.05
0.10
0.15
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

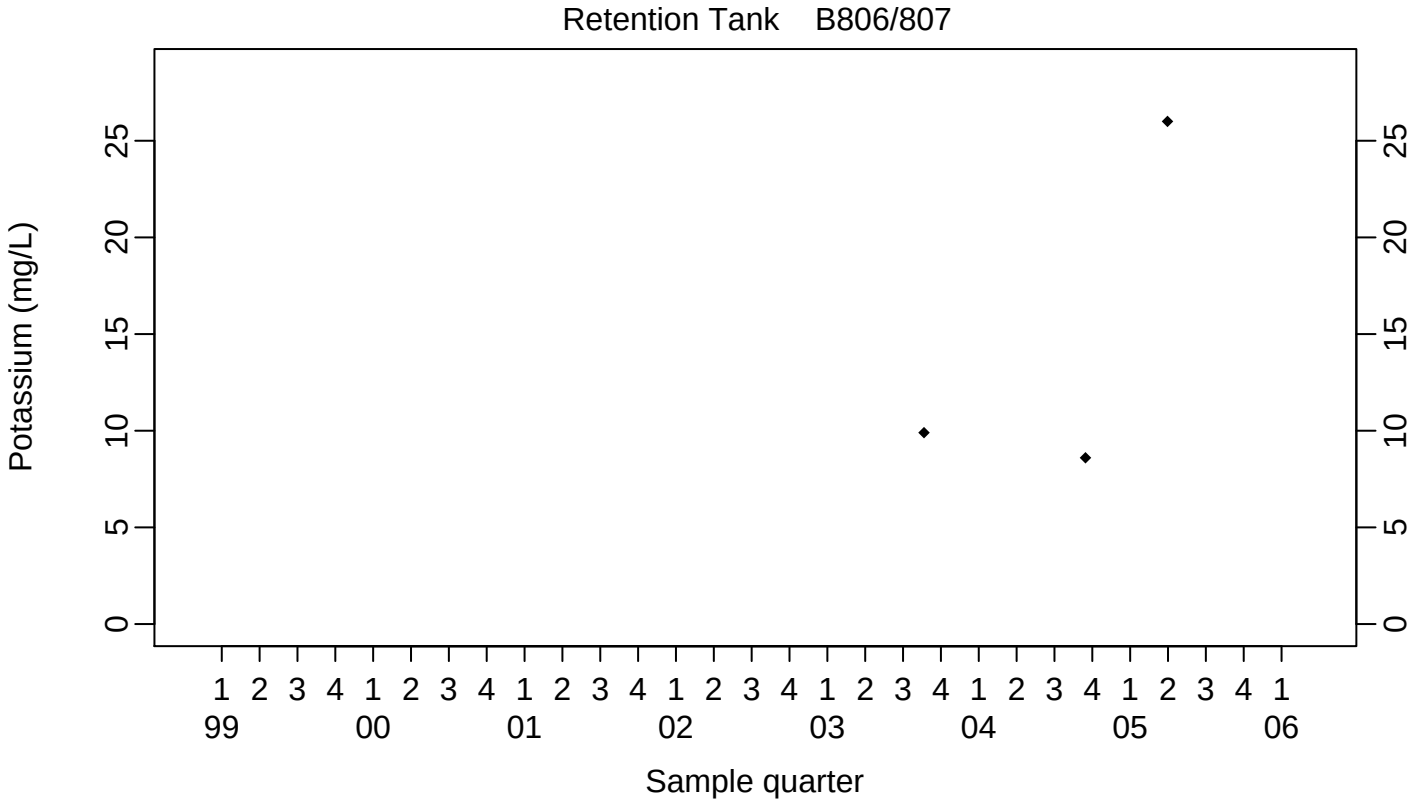

Surface Impoundments Process Water
Copper (mg/L)
Above RL
Below RL
Retention Tank B826
Copper (mg/L)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


Retention Tank B827C/D
Copper (mg/L)
0.0
0.2
0.4
0.6
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

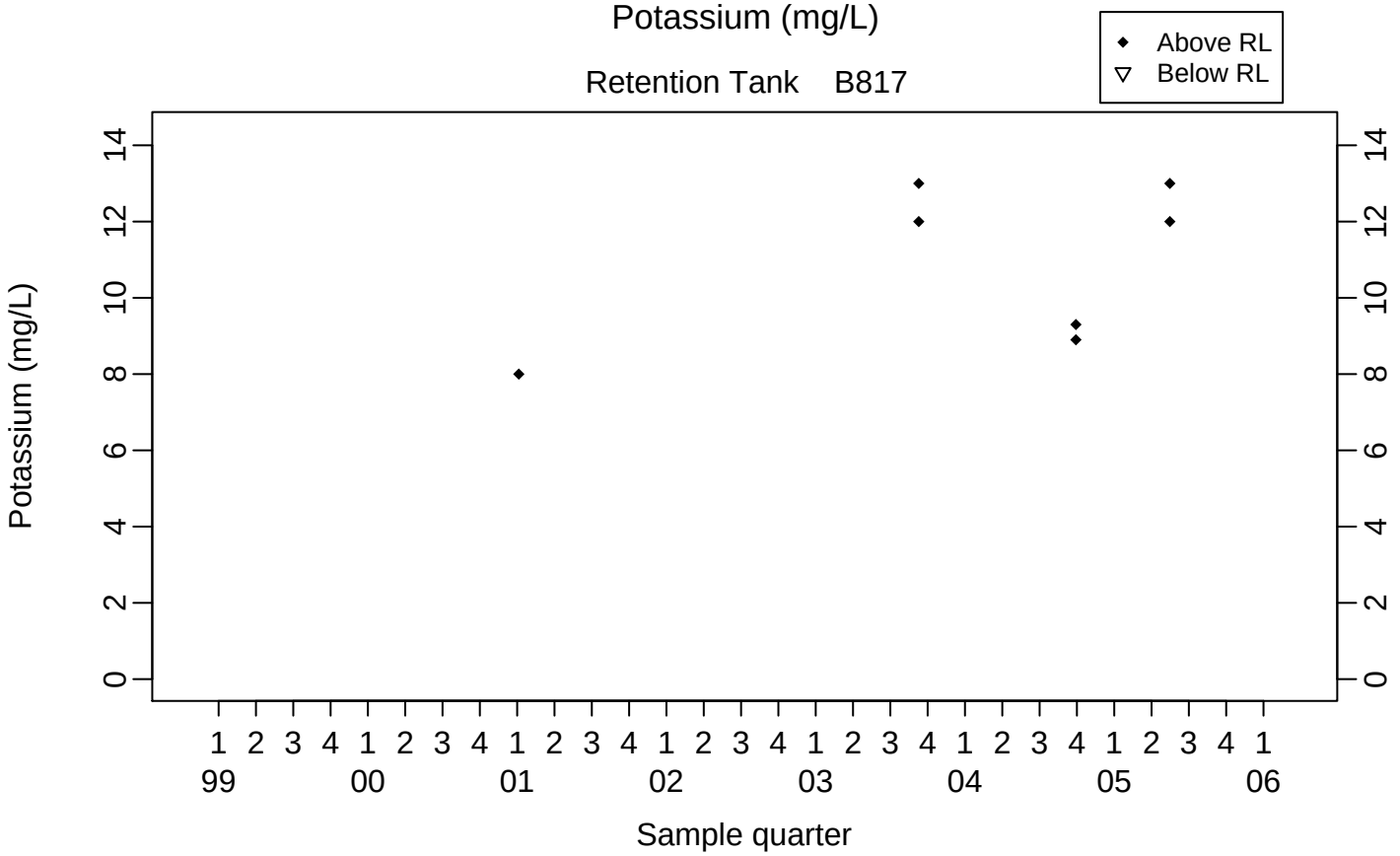

Surface Impoundments Process Water
Copper (mg/L)
Above RL
Below RL
Retention Tank B827E
Copper (mg/L)
0.0
0.1
0.2
0.3
0.4
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

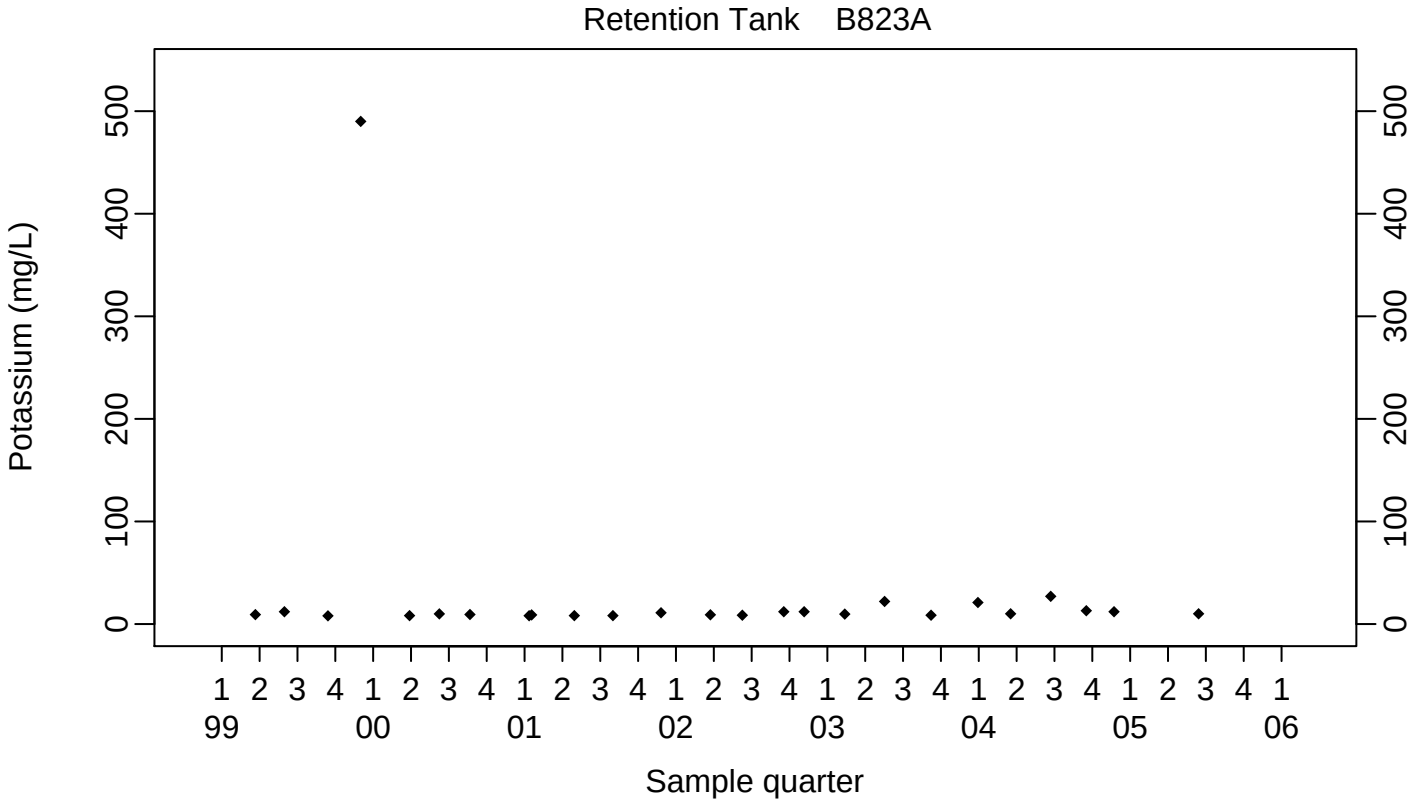

Retention Tank B851
Copper (mg/L)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


Surface Impoundments Process Water
Potassium (mg/L)
Above RL
Below RL
Retention Tank B801
Potassium (mg/L)
0
10
20
30
40
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

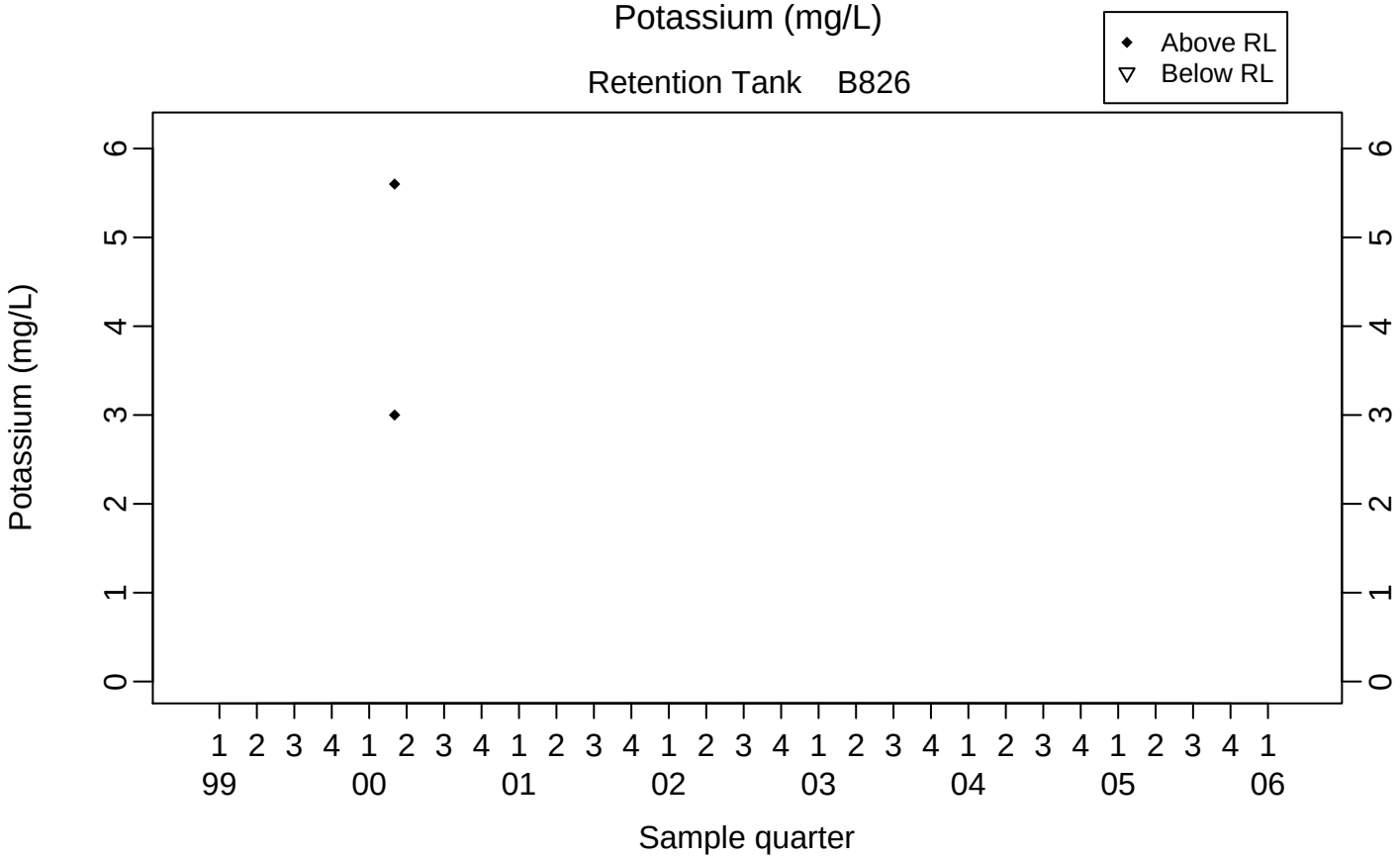

Retention Tank B806/807
Potassium (mg/L)
0
5
10
15
20
25
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

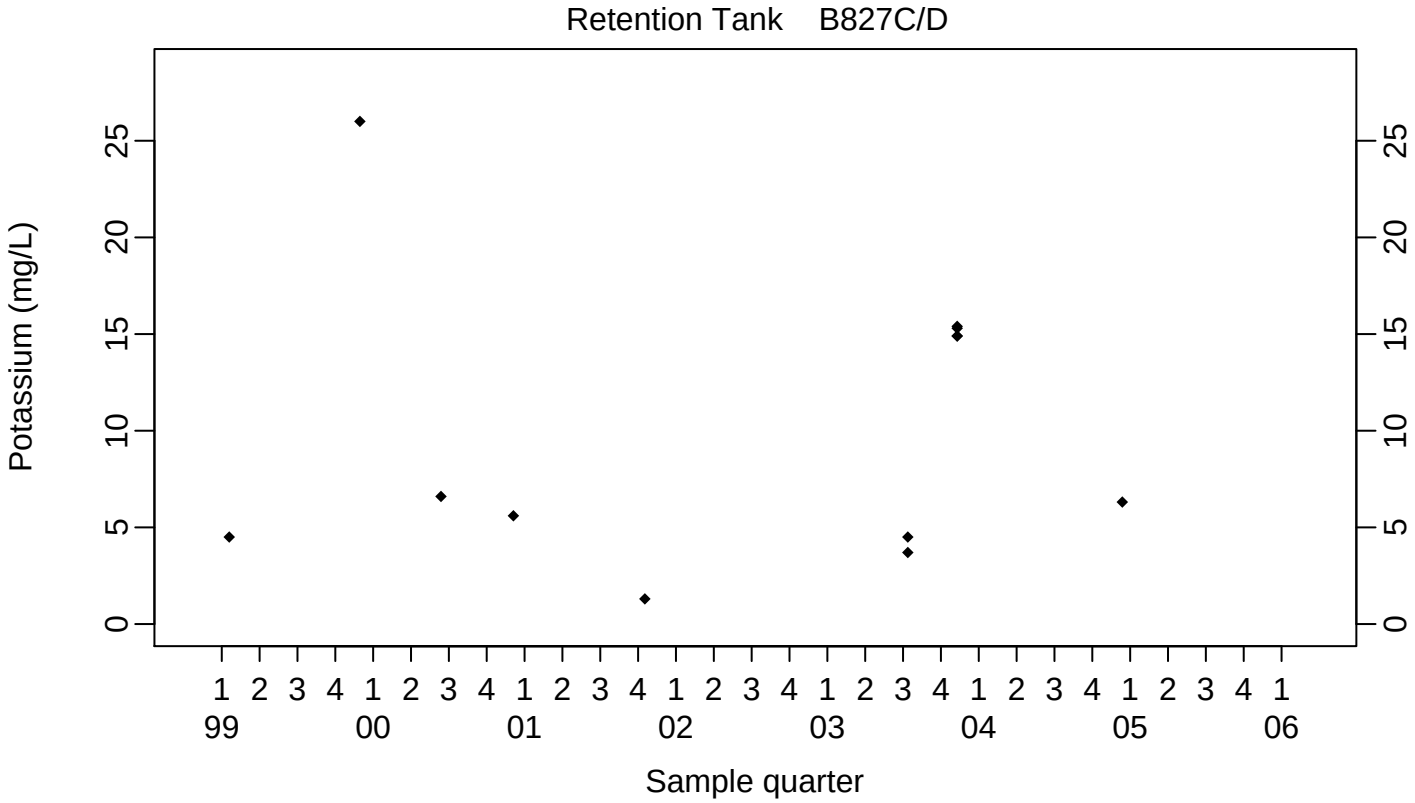
Surface Impoundments Process Water
Potassium (mg/L)



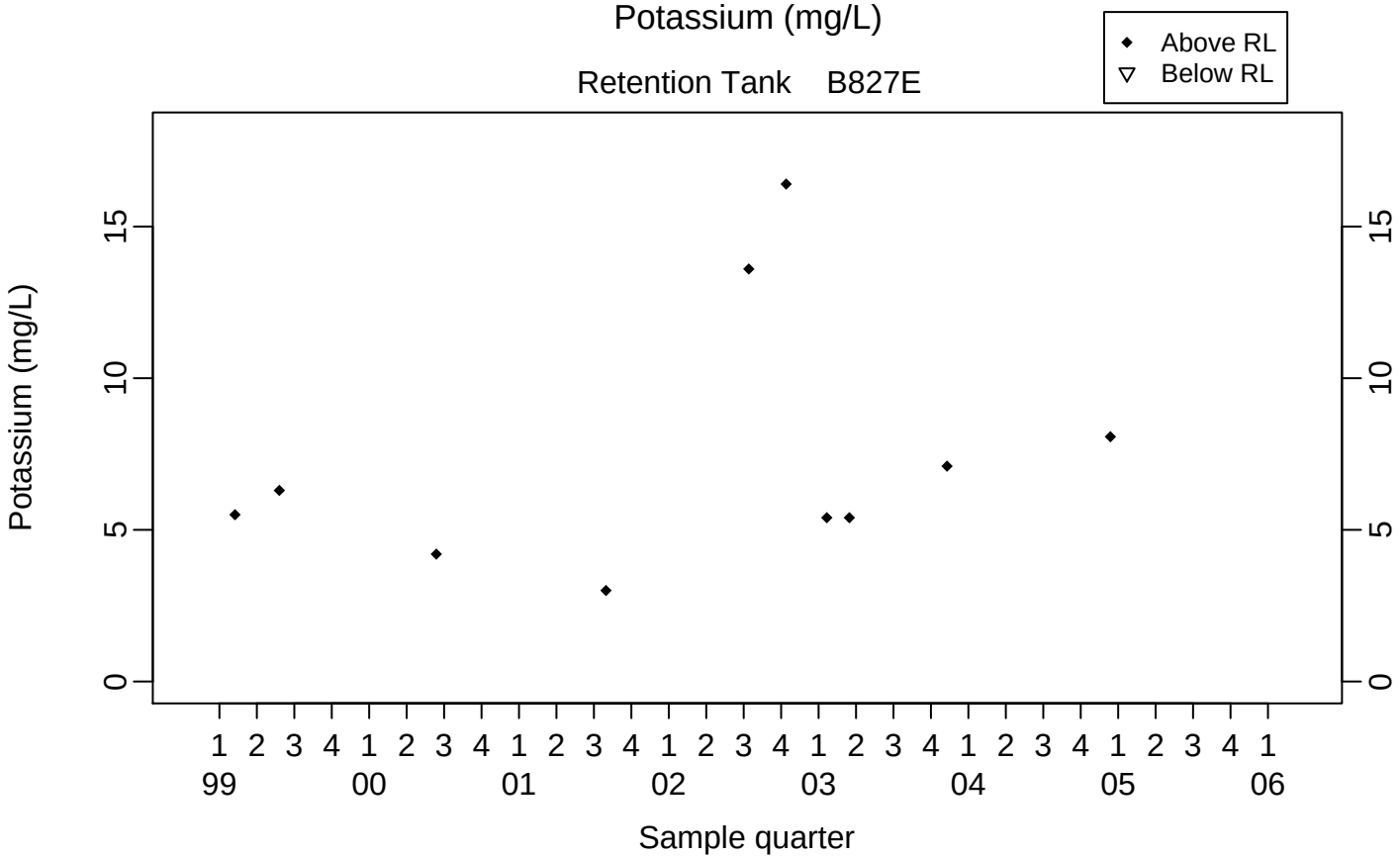


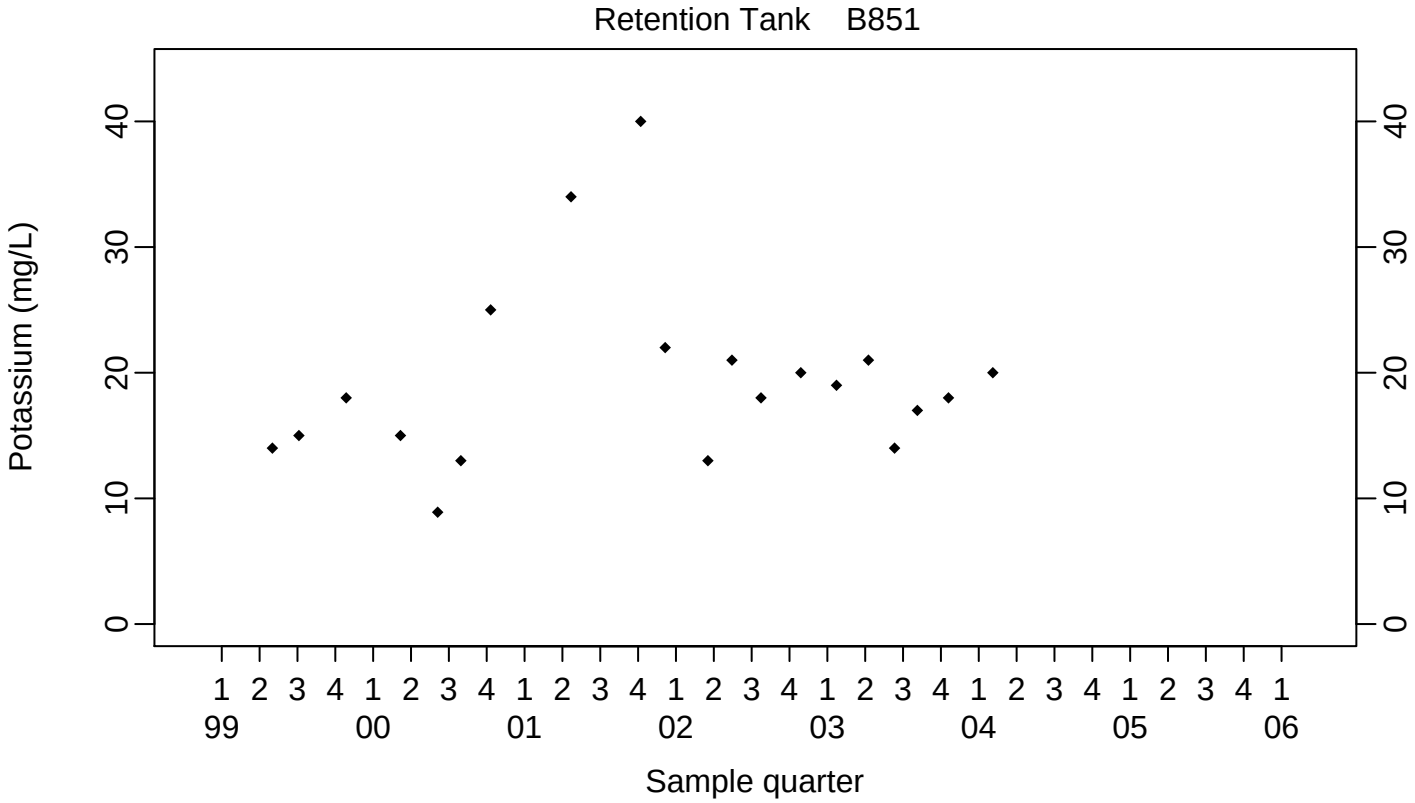
Surface Impoundments Process Water
Potassium (mg/L)



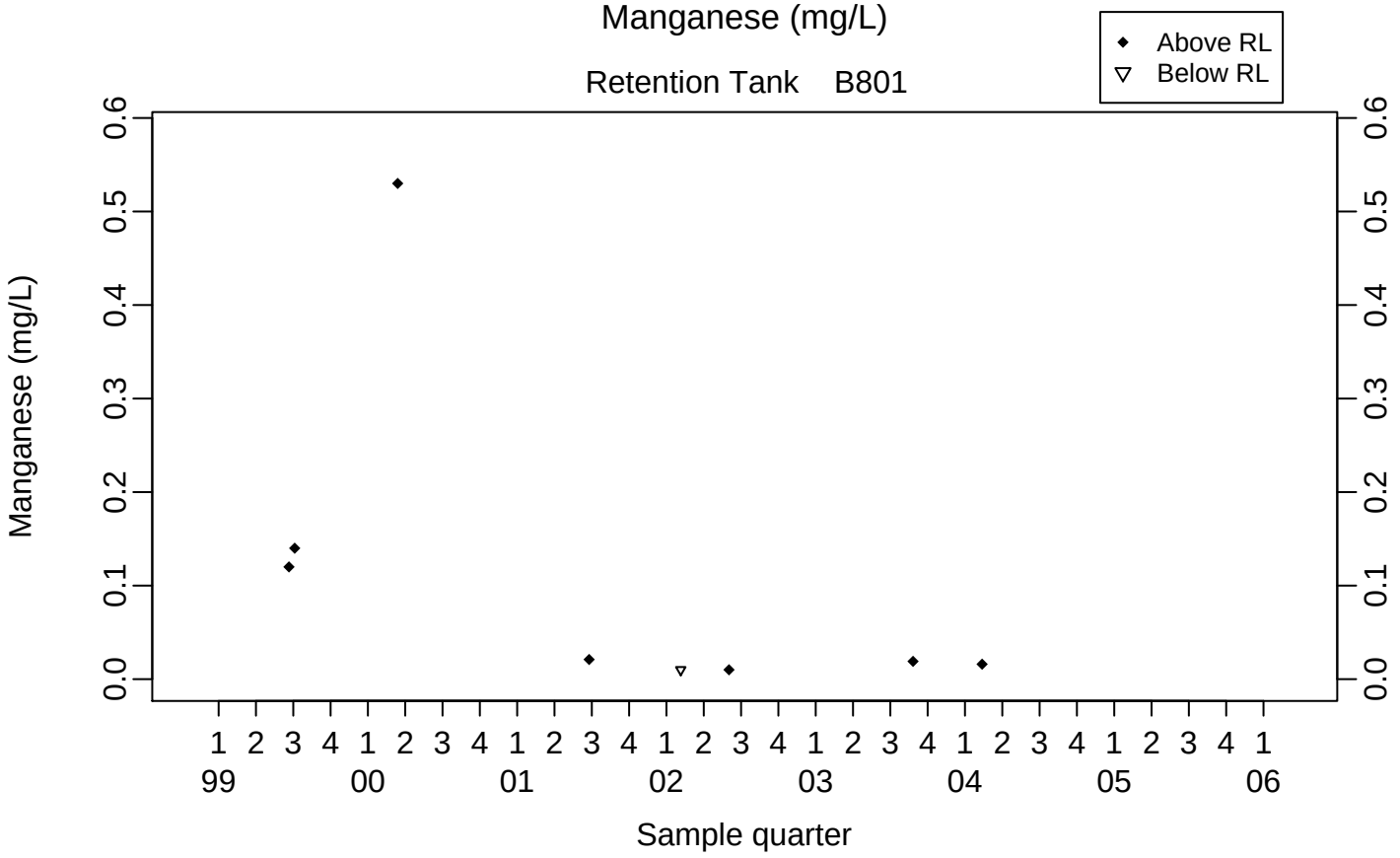


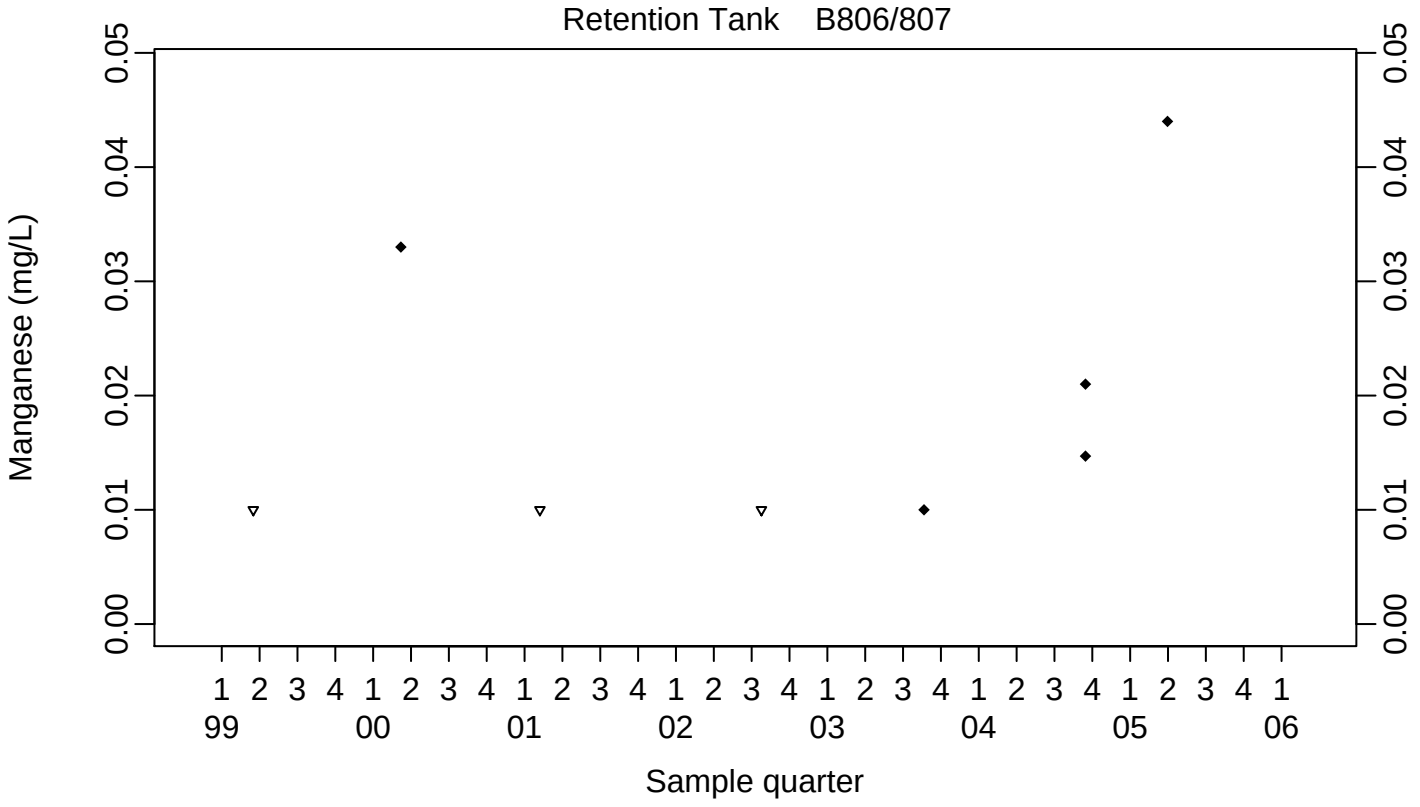
Surface Impoundments Process Water
Potassium (mg/L)



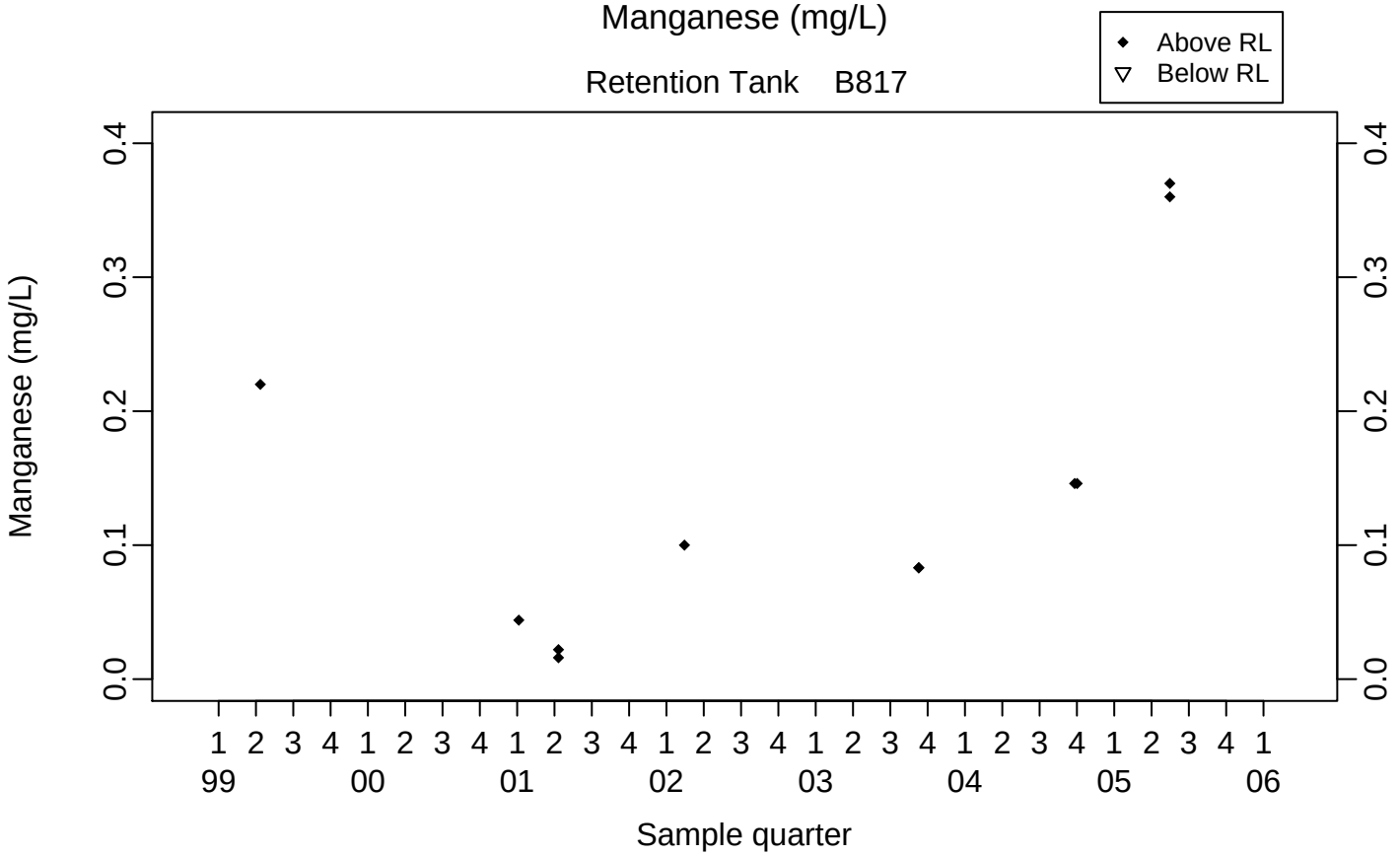


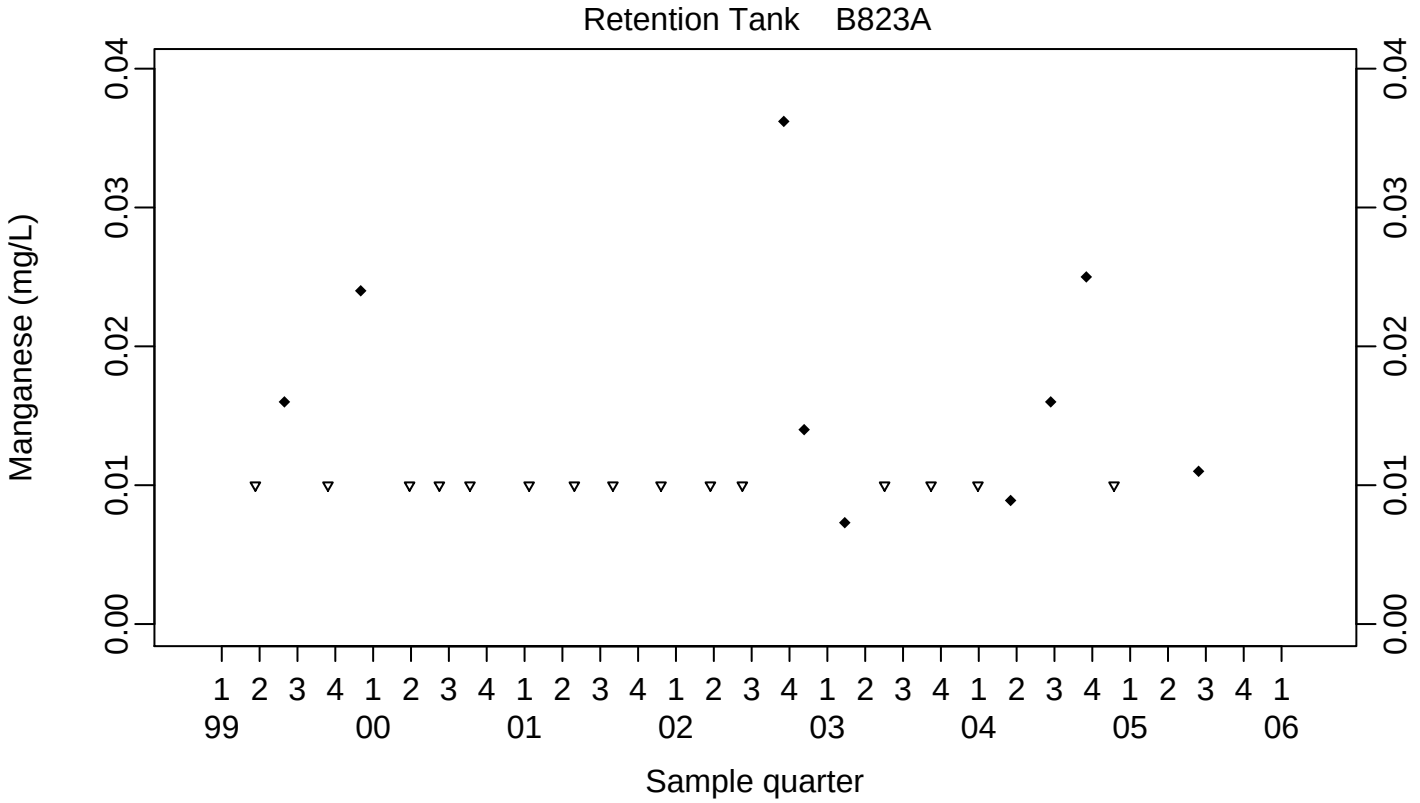
Surface Impoundments Process Water
Manganese (mg/L)



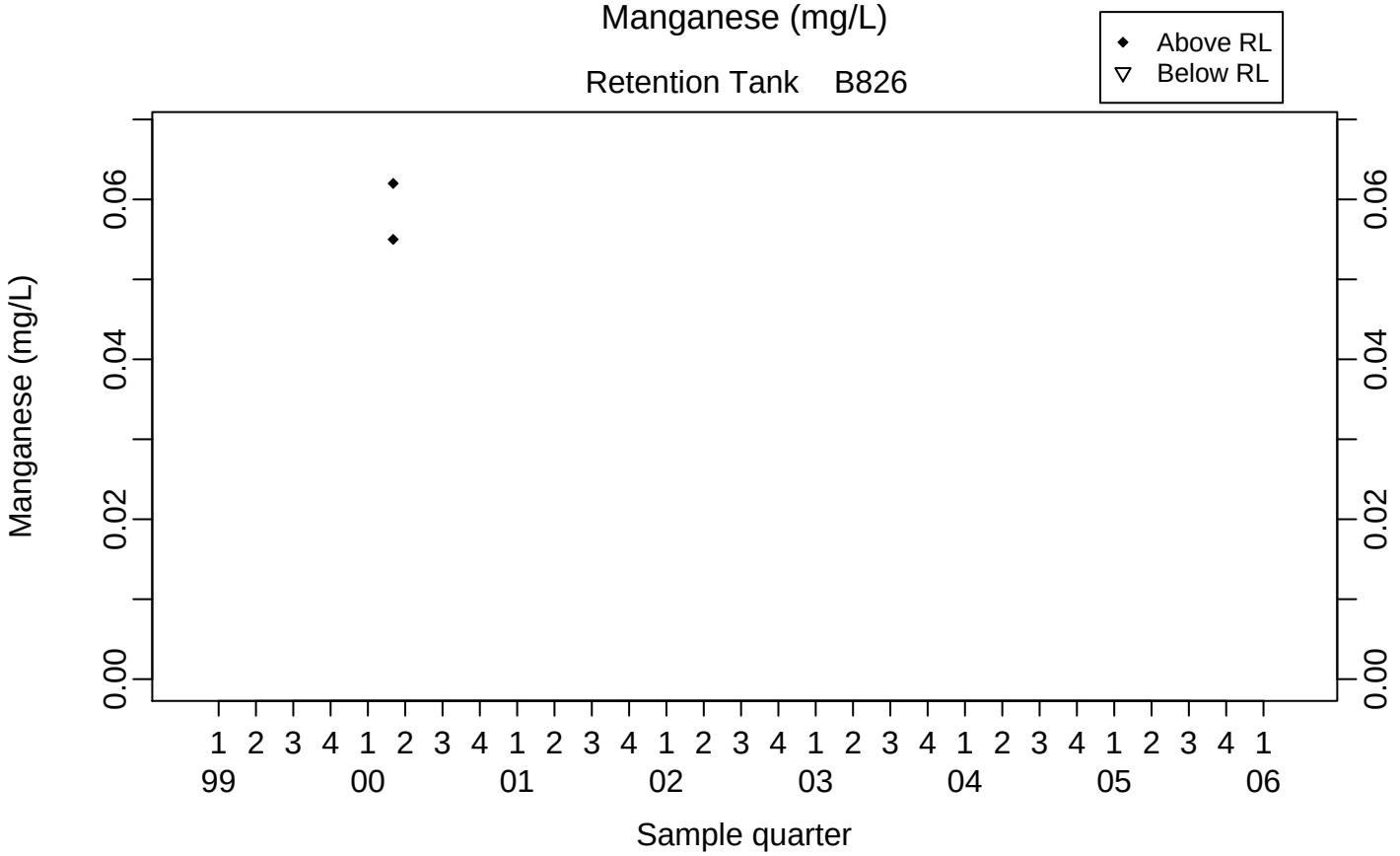


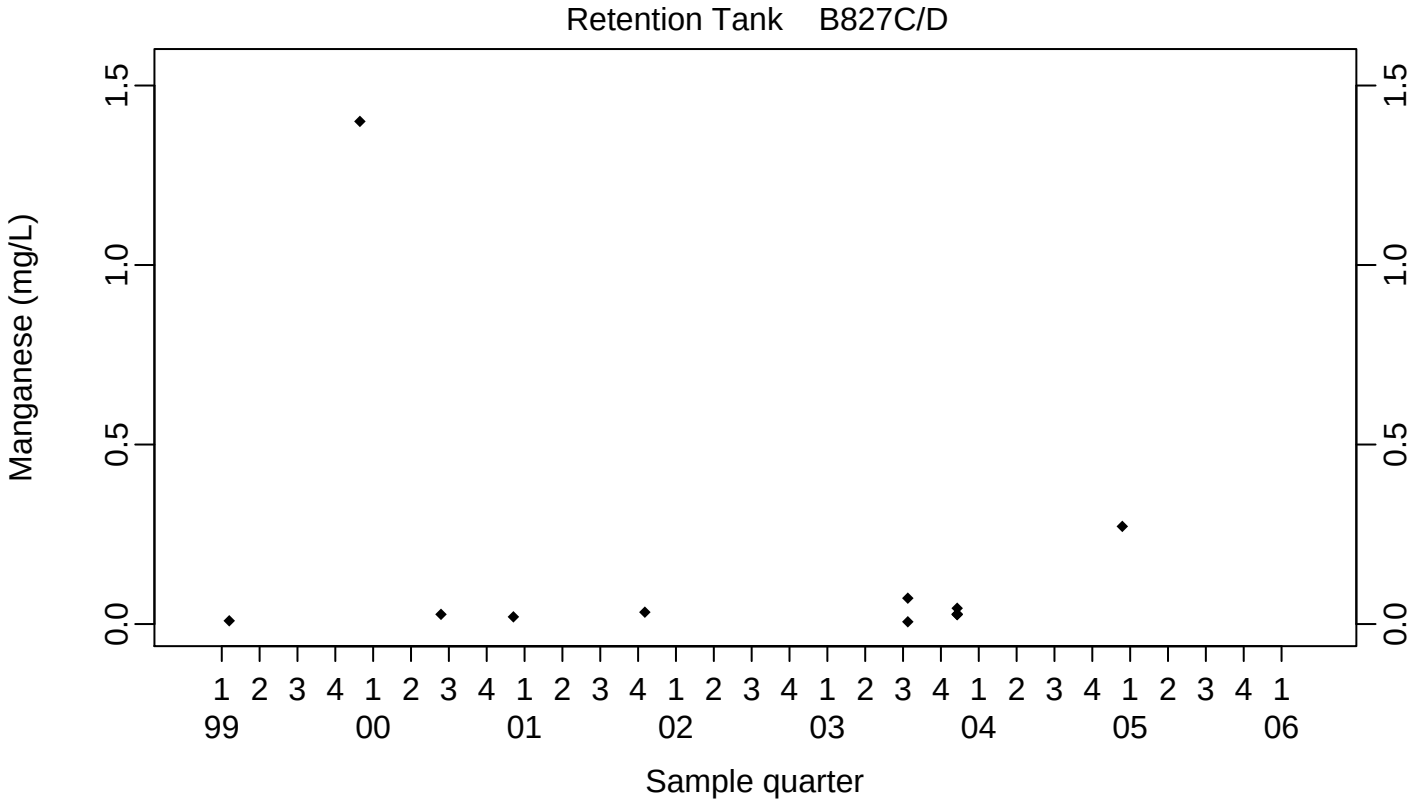
Surface Impoundments Process Water
Manganese (mg/L)

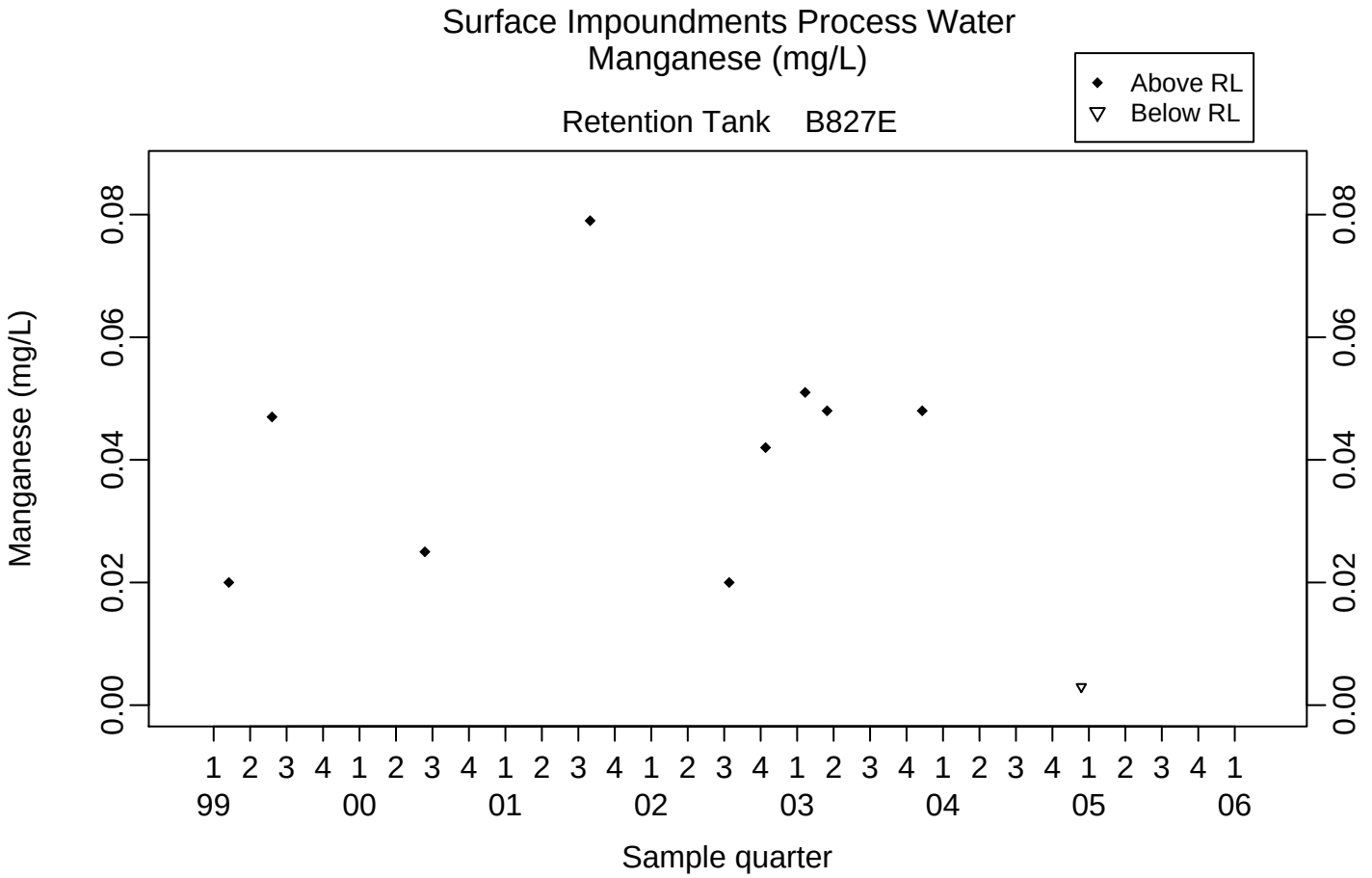


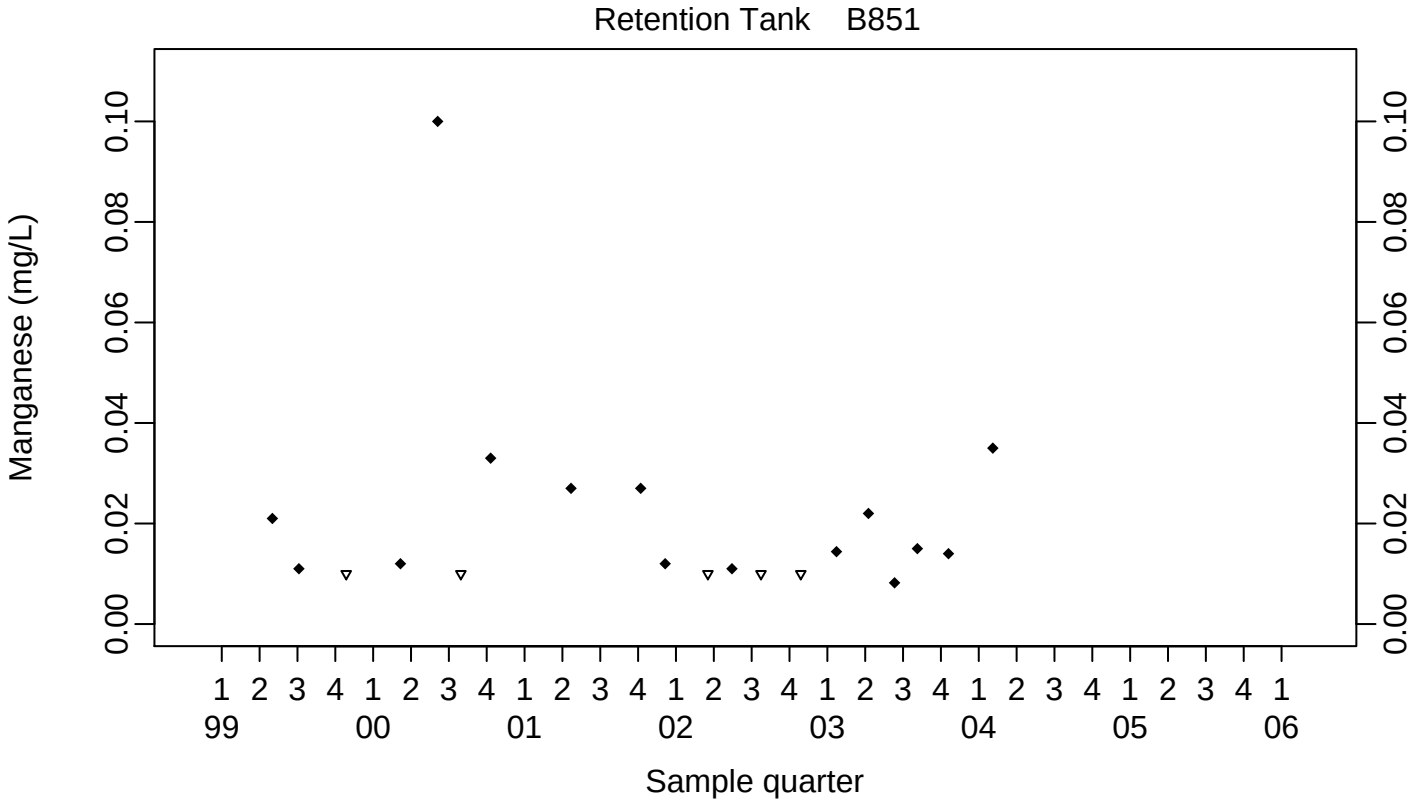


Surface Impoundments Process Water
Manganese (mg/L)

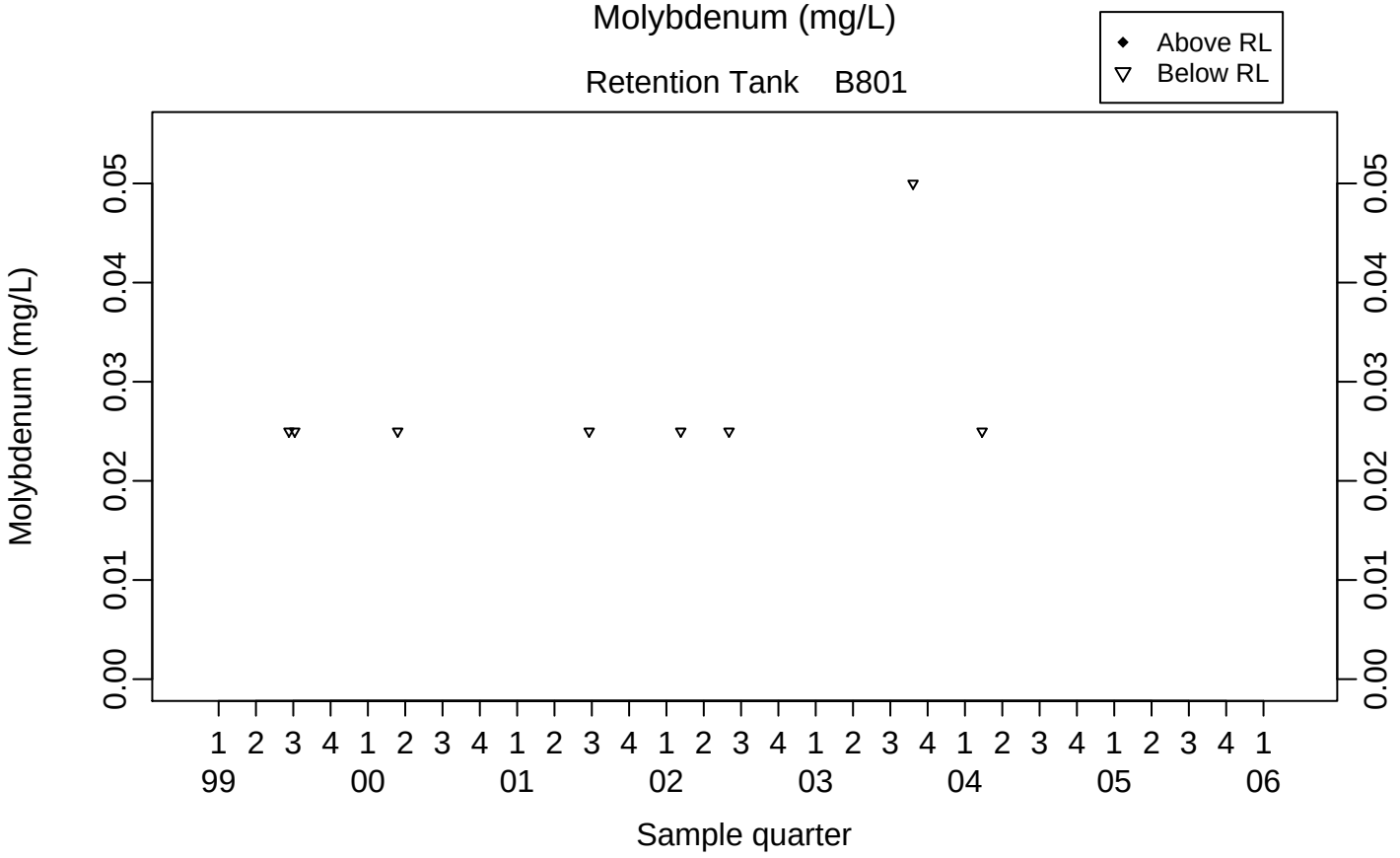


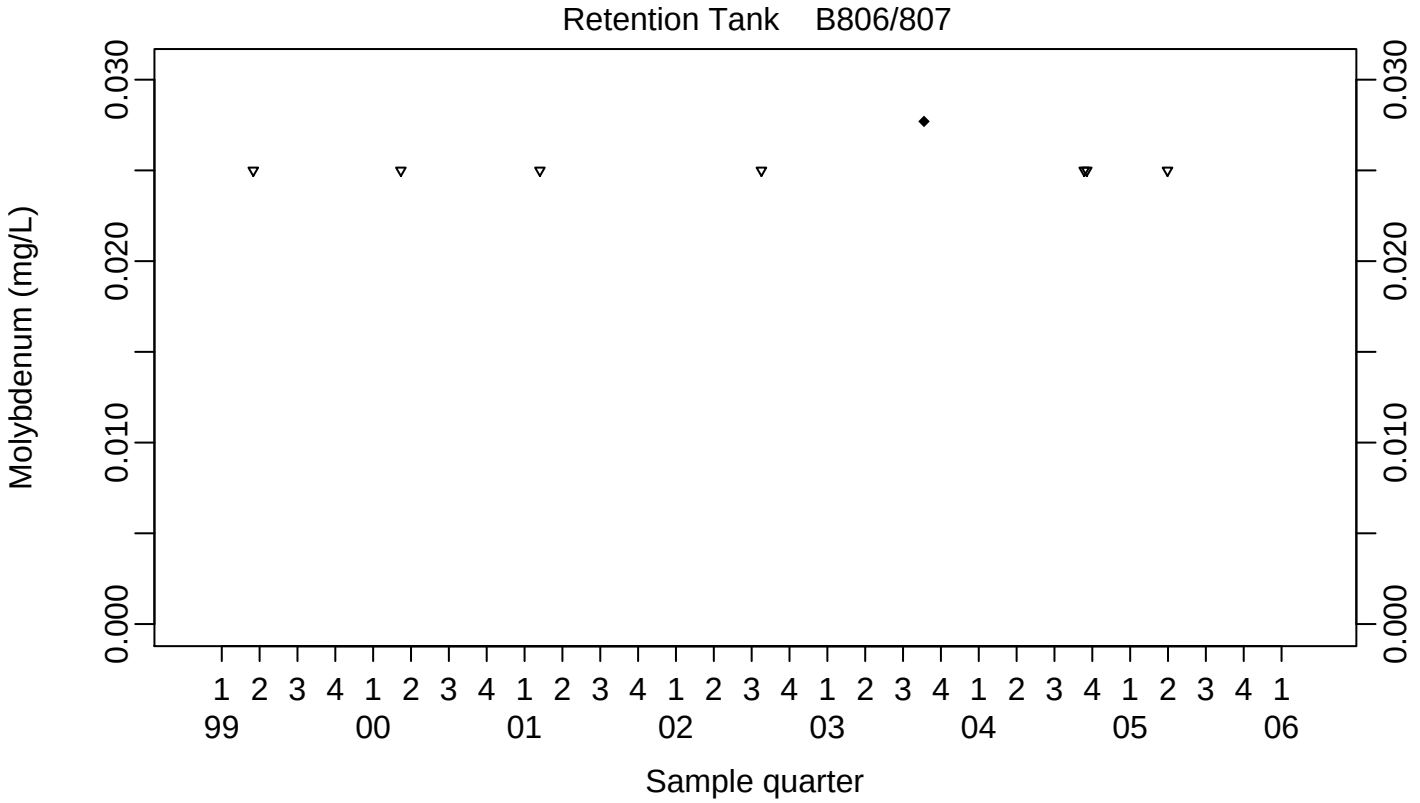



Surface Impoundments Process Water
Manganese (mg/L)
Above RL
Below RL
Retention Tank B827E
Manganese (mg/L)
0.00
0.02
0.04
0.06
0.08
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

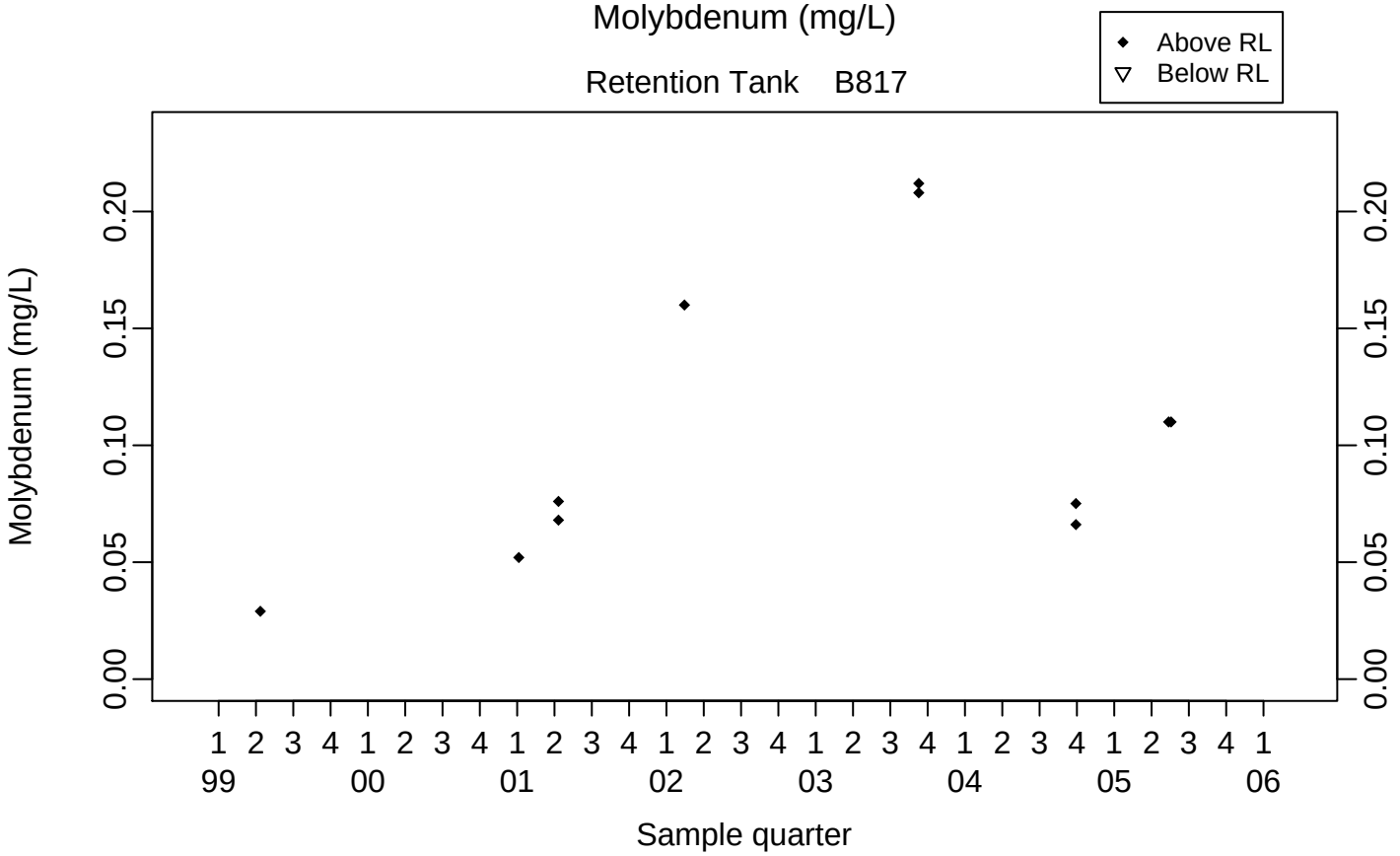

Retention Tank B851
Manganese (mg/L)
0.00
0.02
0.04
0.06
0.08
0.10
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

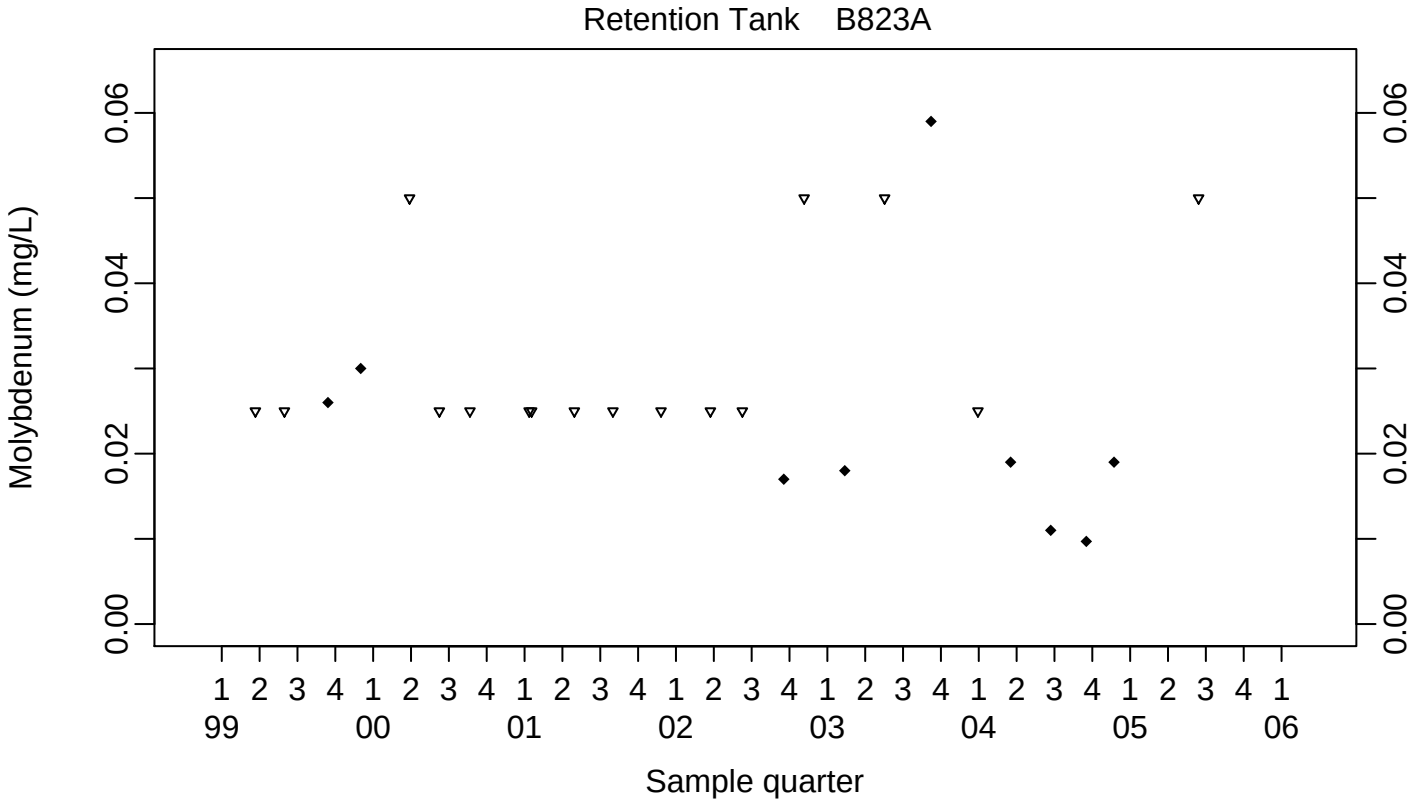
Surface Impoundments Process Water
Molybdenum (mg/L)



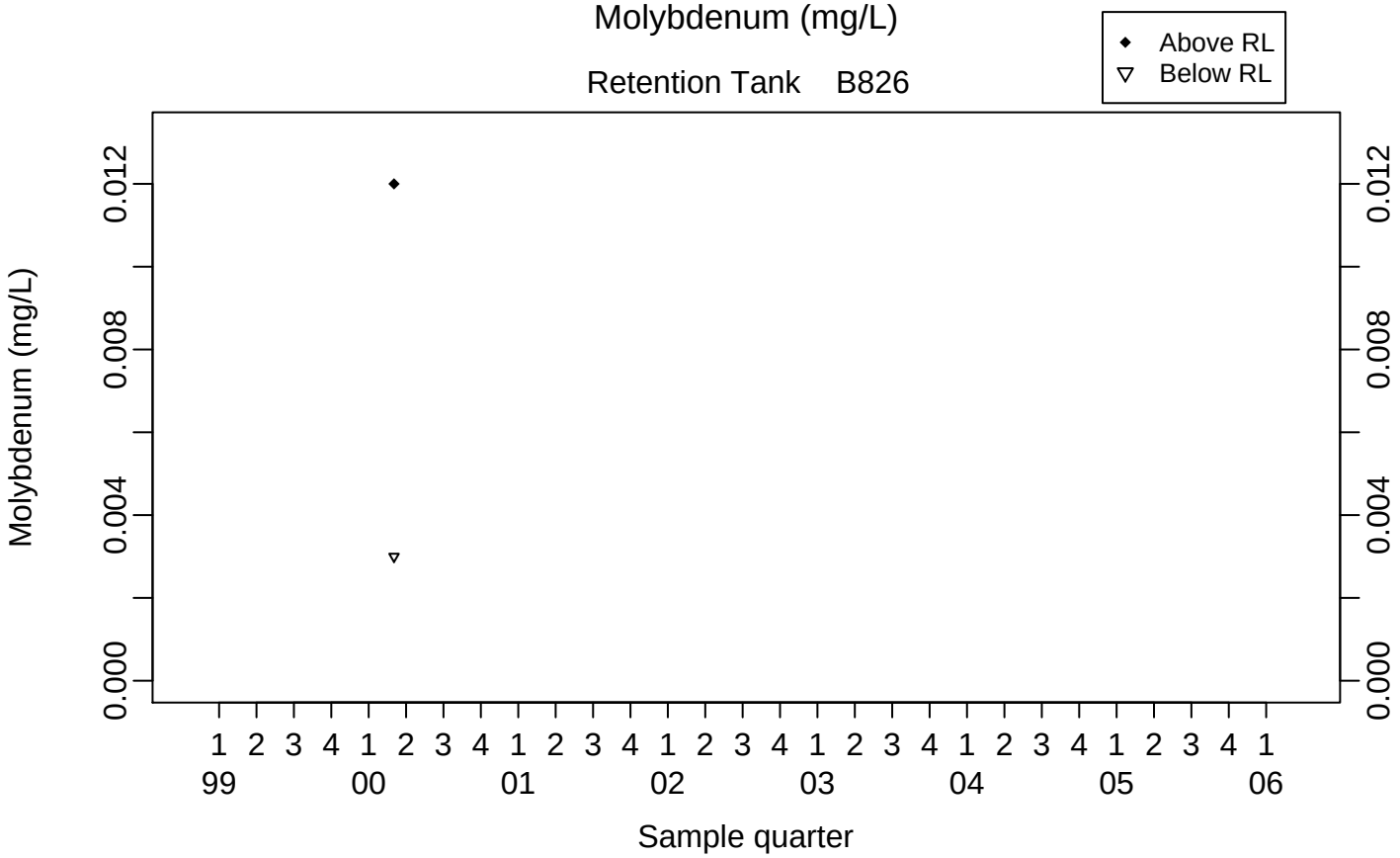


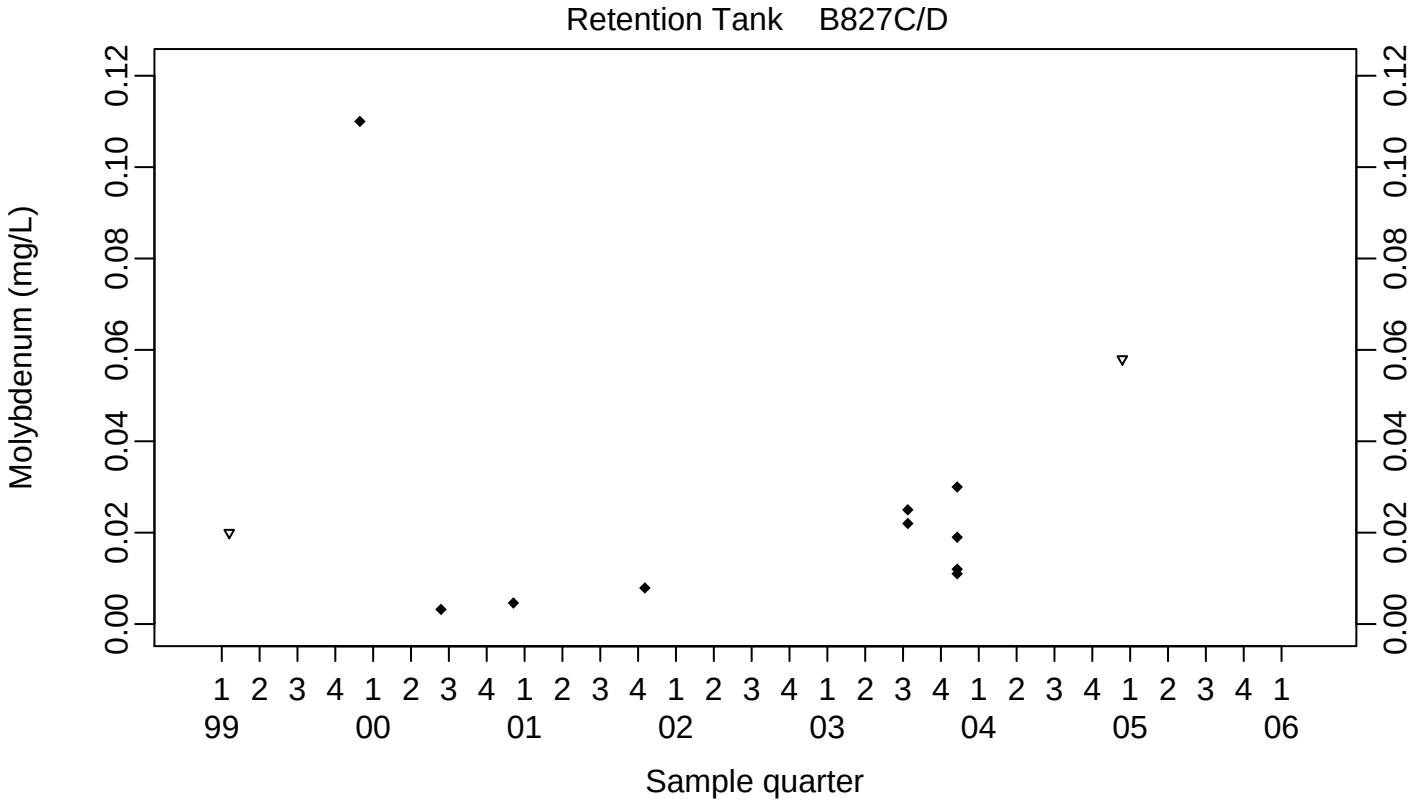
Surface Impoundments Process Water
Molybdenum (mg/L)



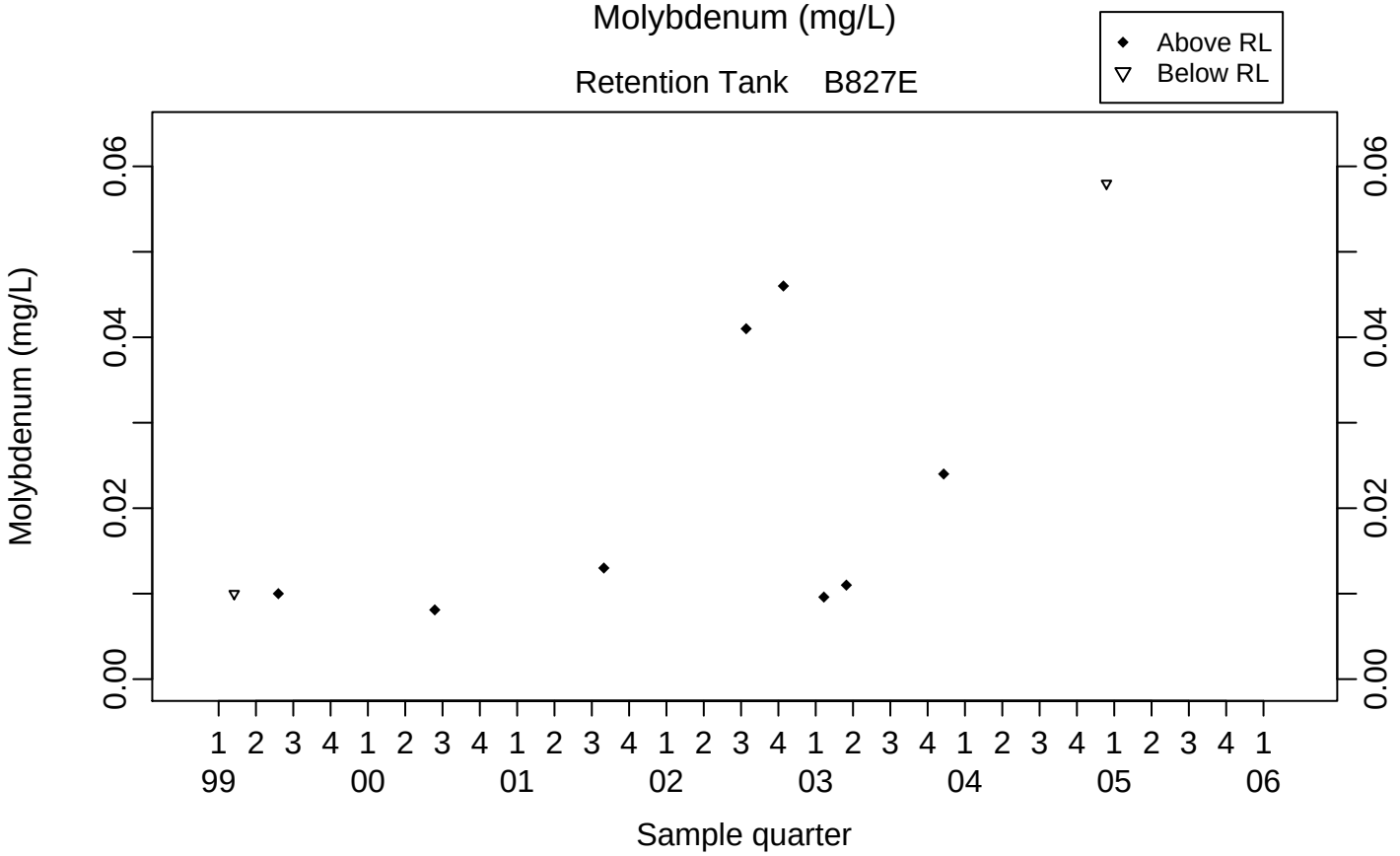


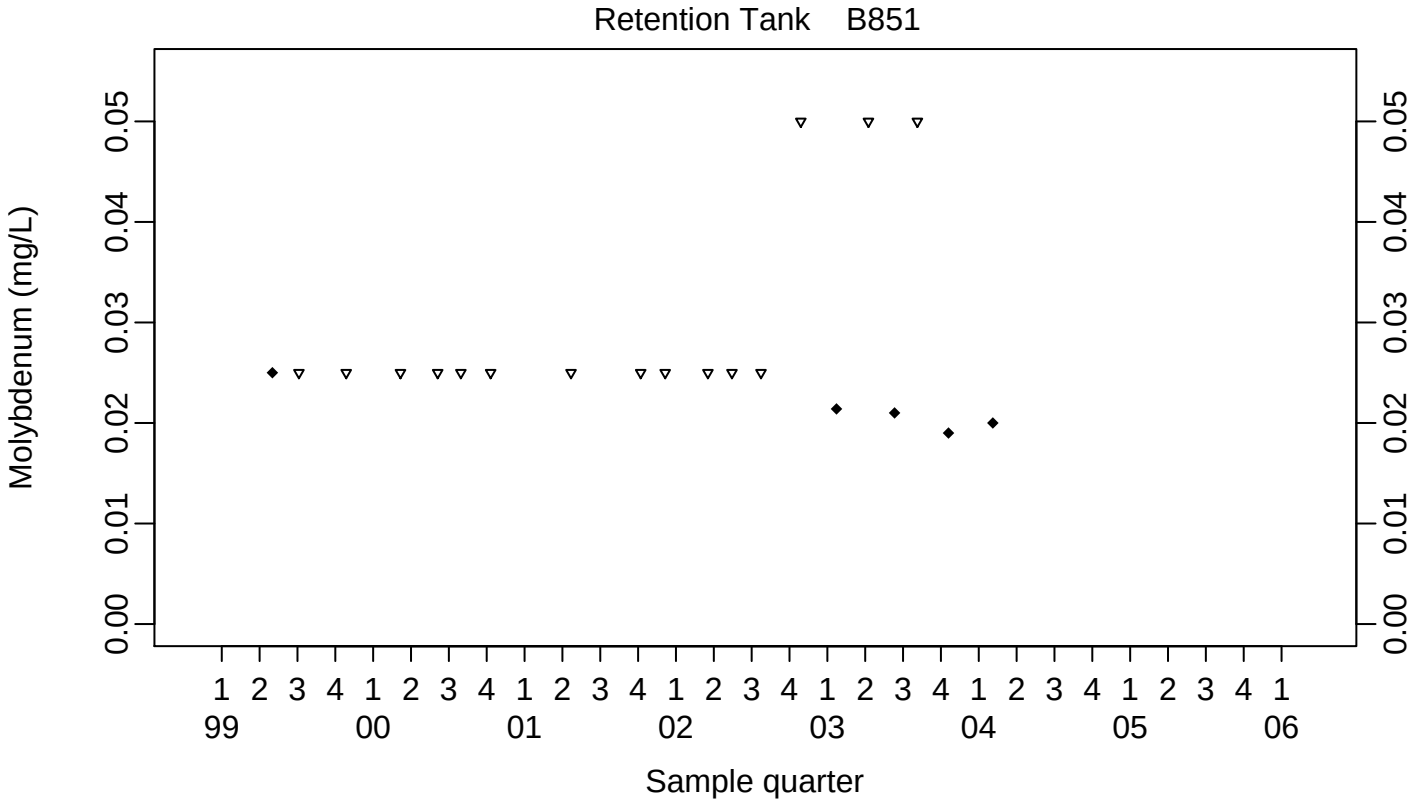
Surface Impoundments Process Water
Molybdenum (mg/L)



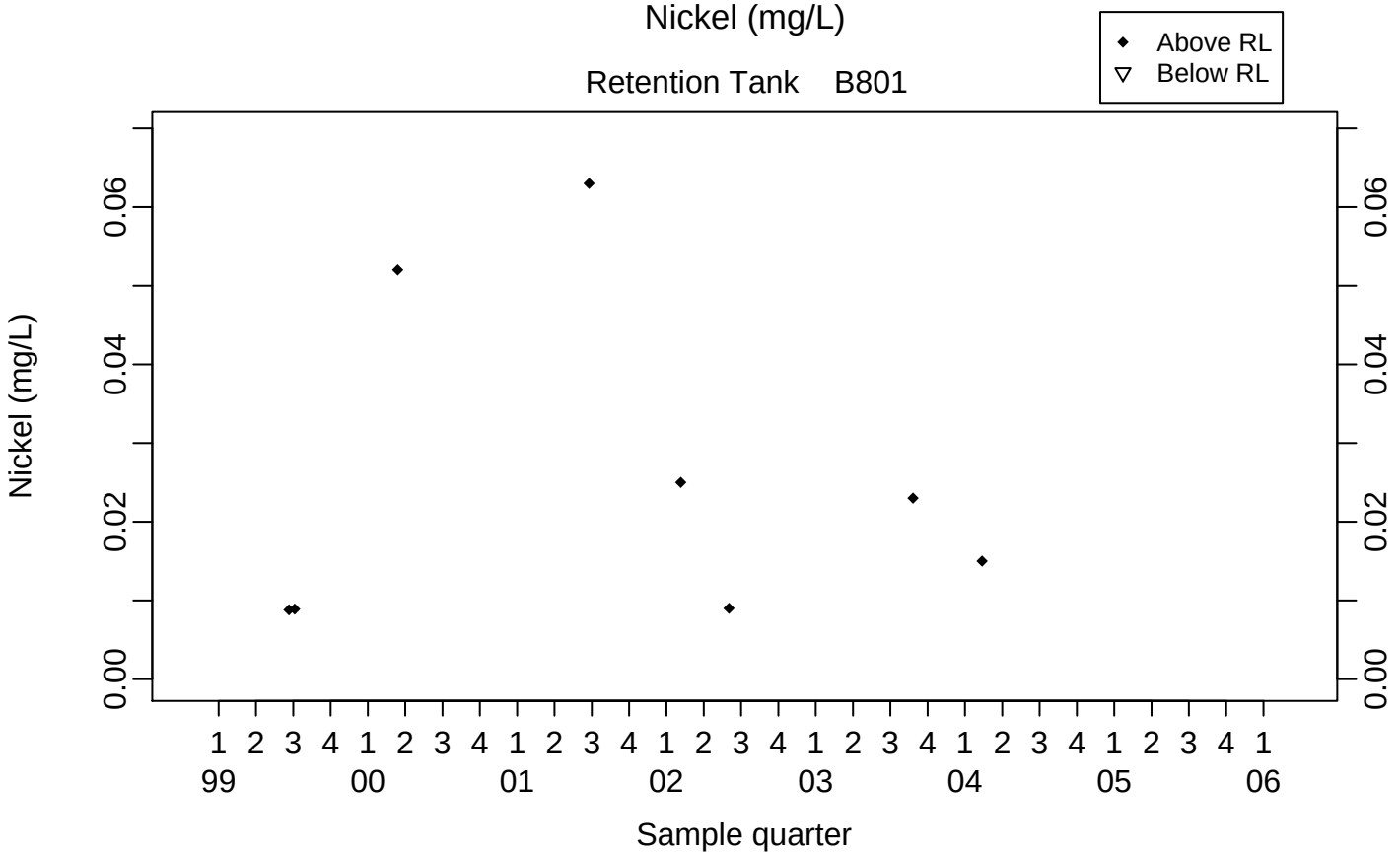


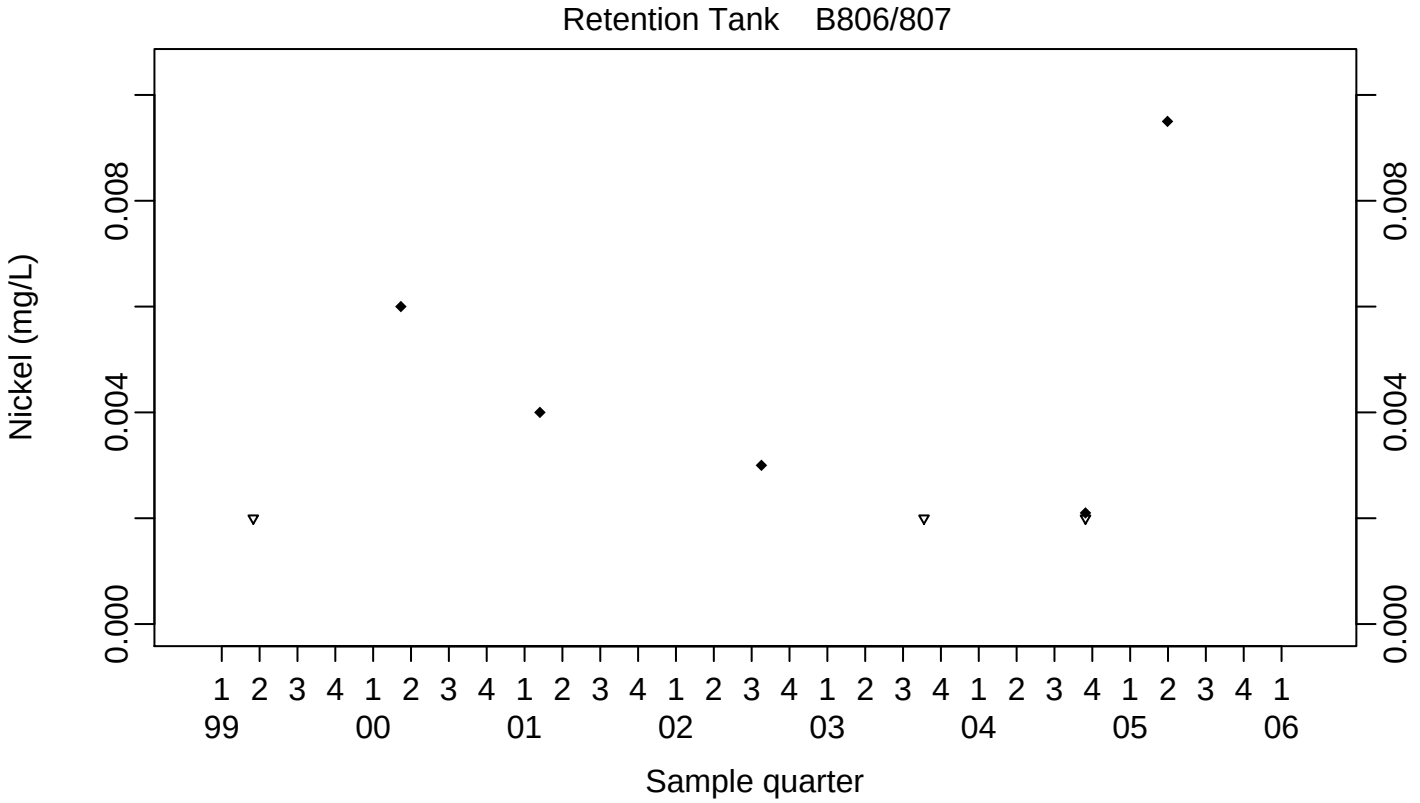
Surface Impoundments Process Water
Molybdenum (mg/L)



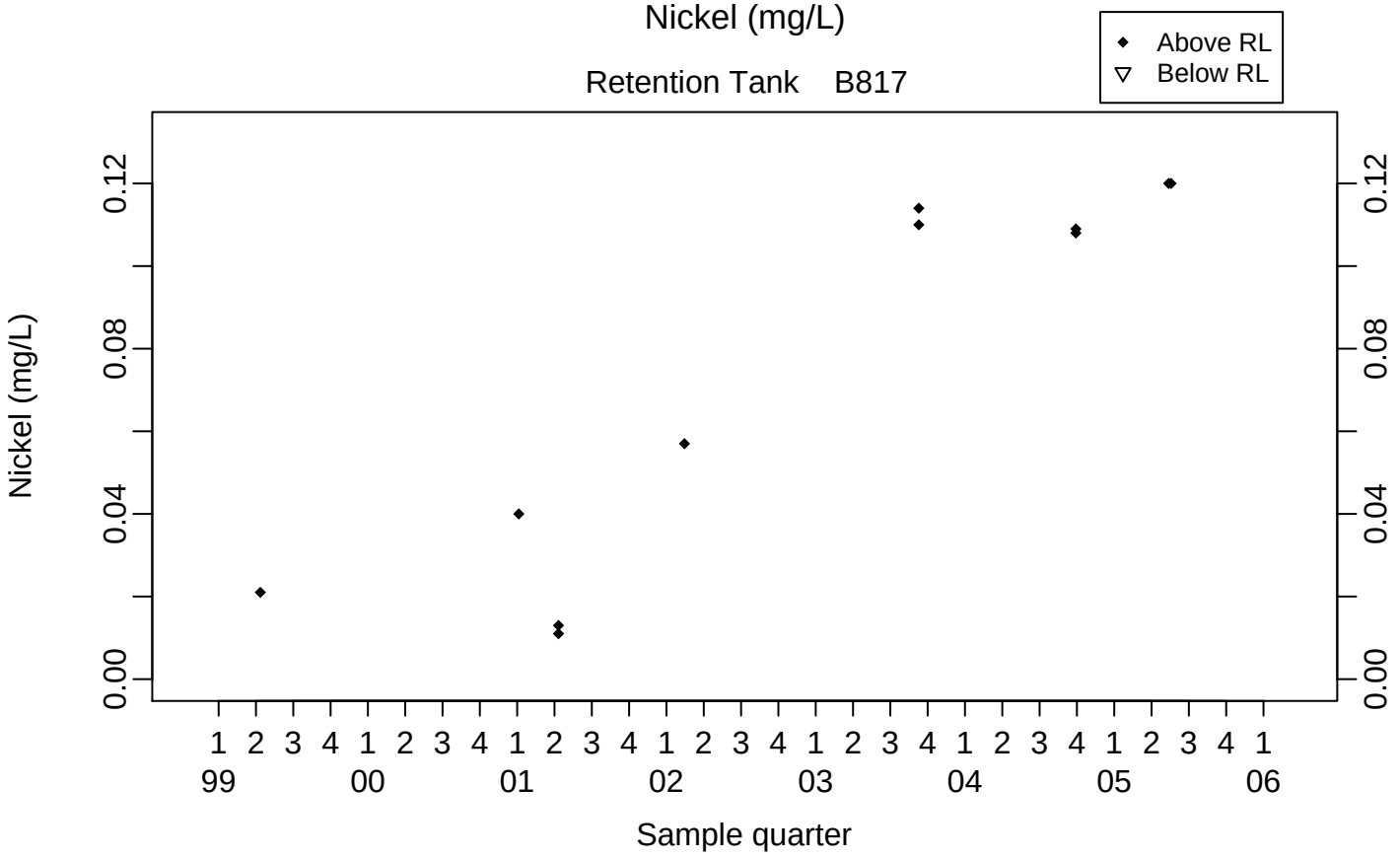


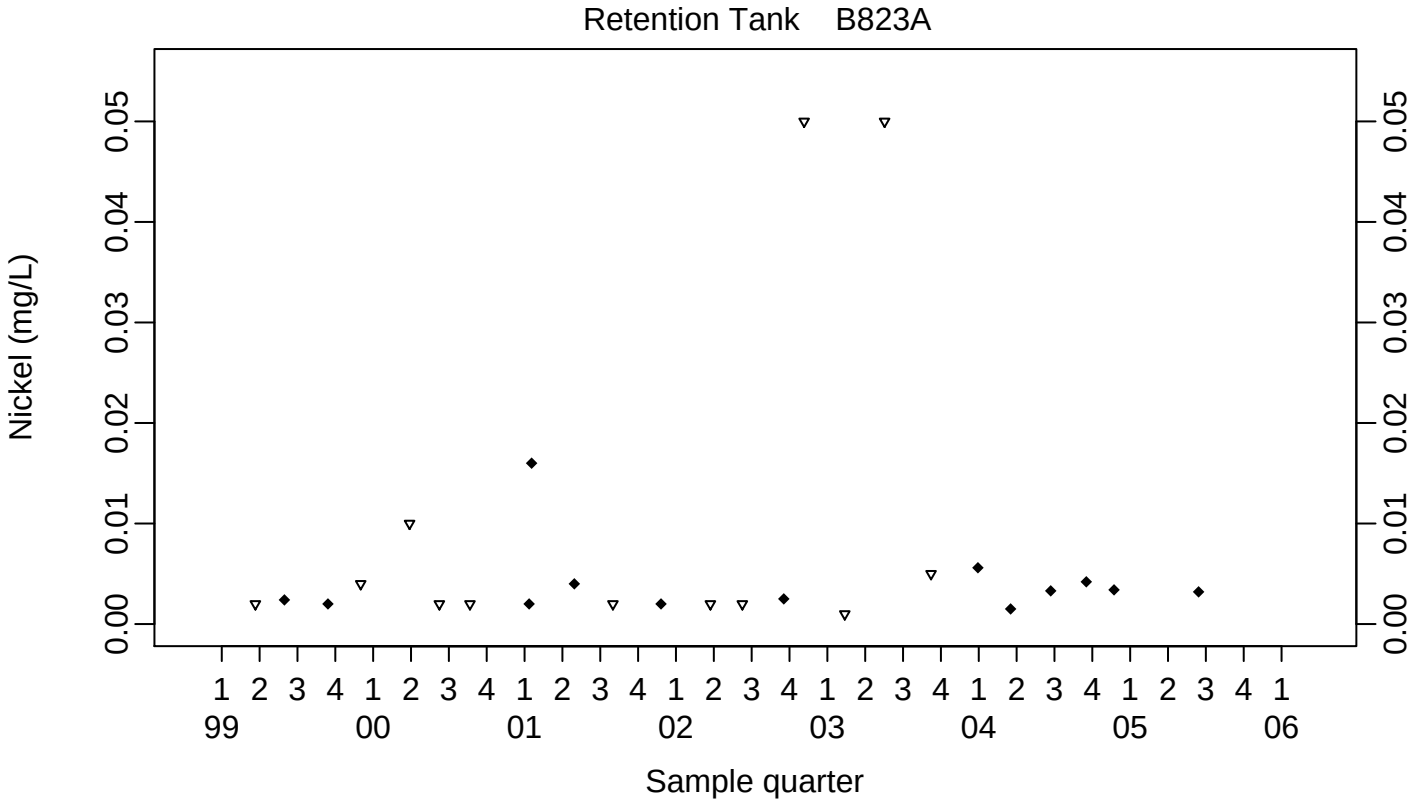
Surface Impoundments Process Water
Nickel (mg/L)

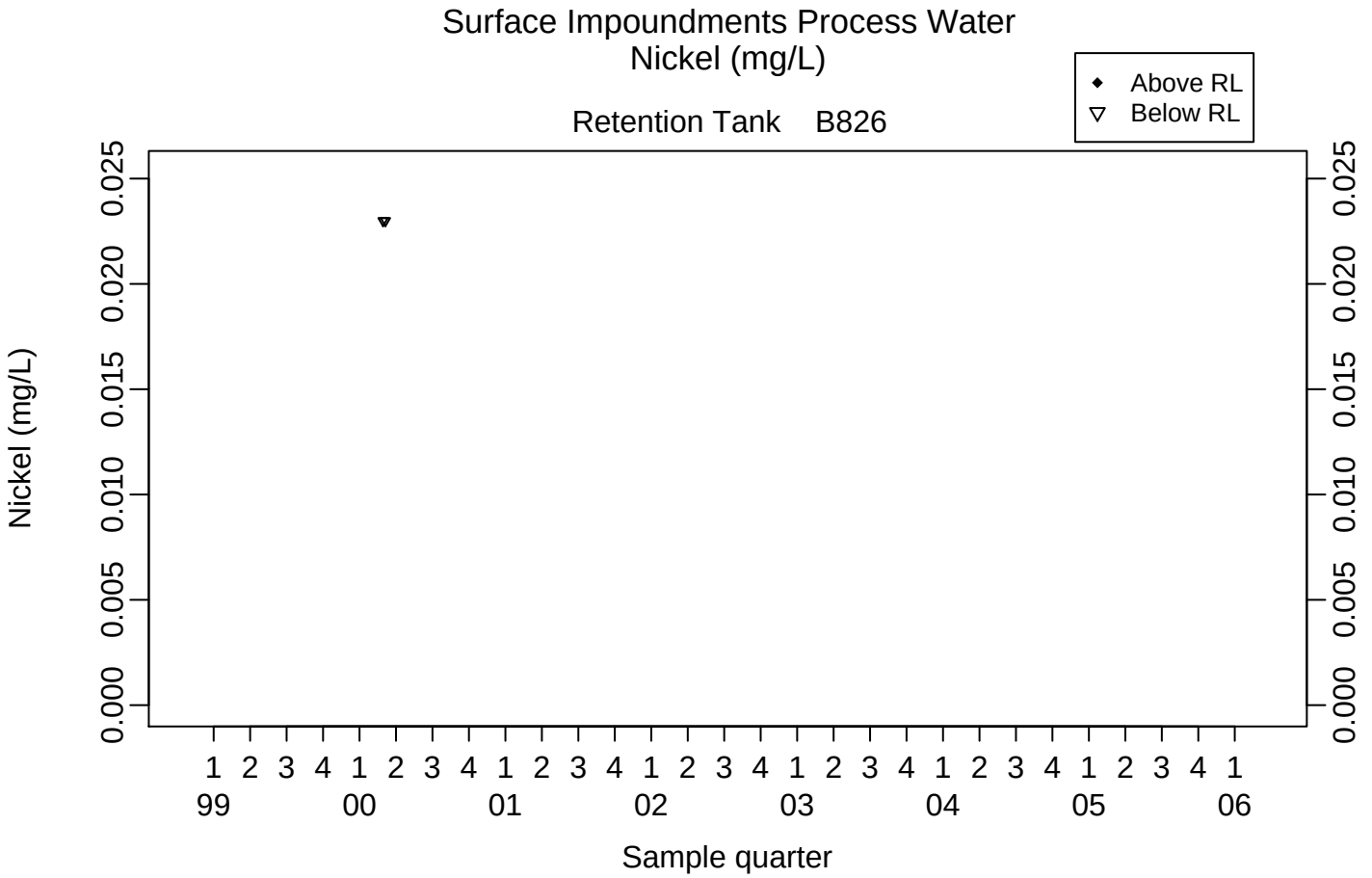


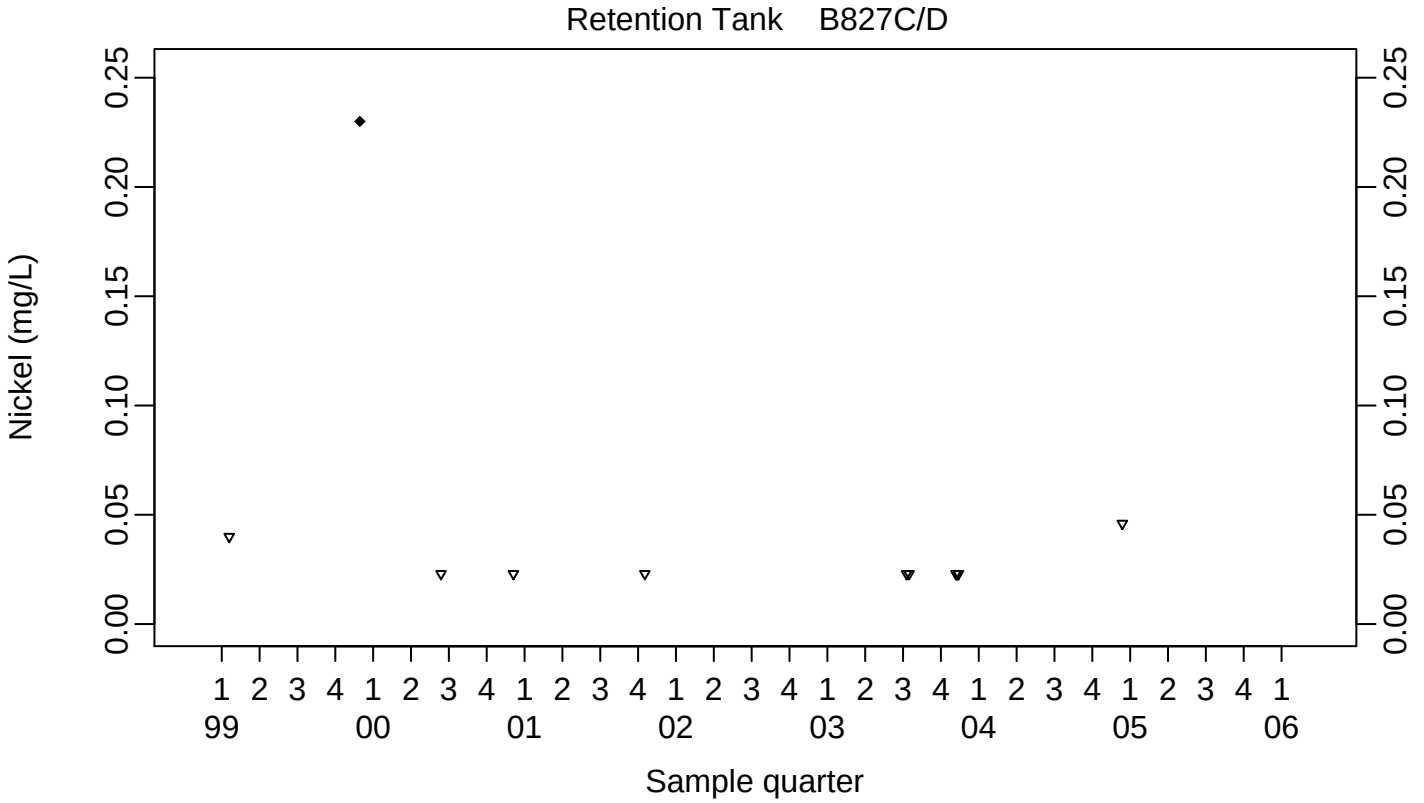


Surface Impoundments Process Water
Nickel (mg/L)

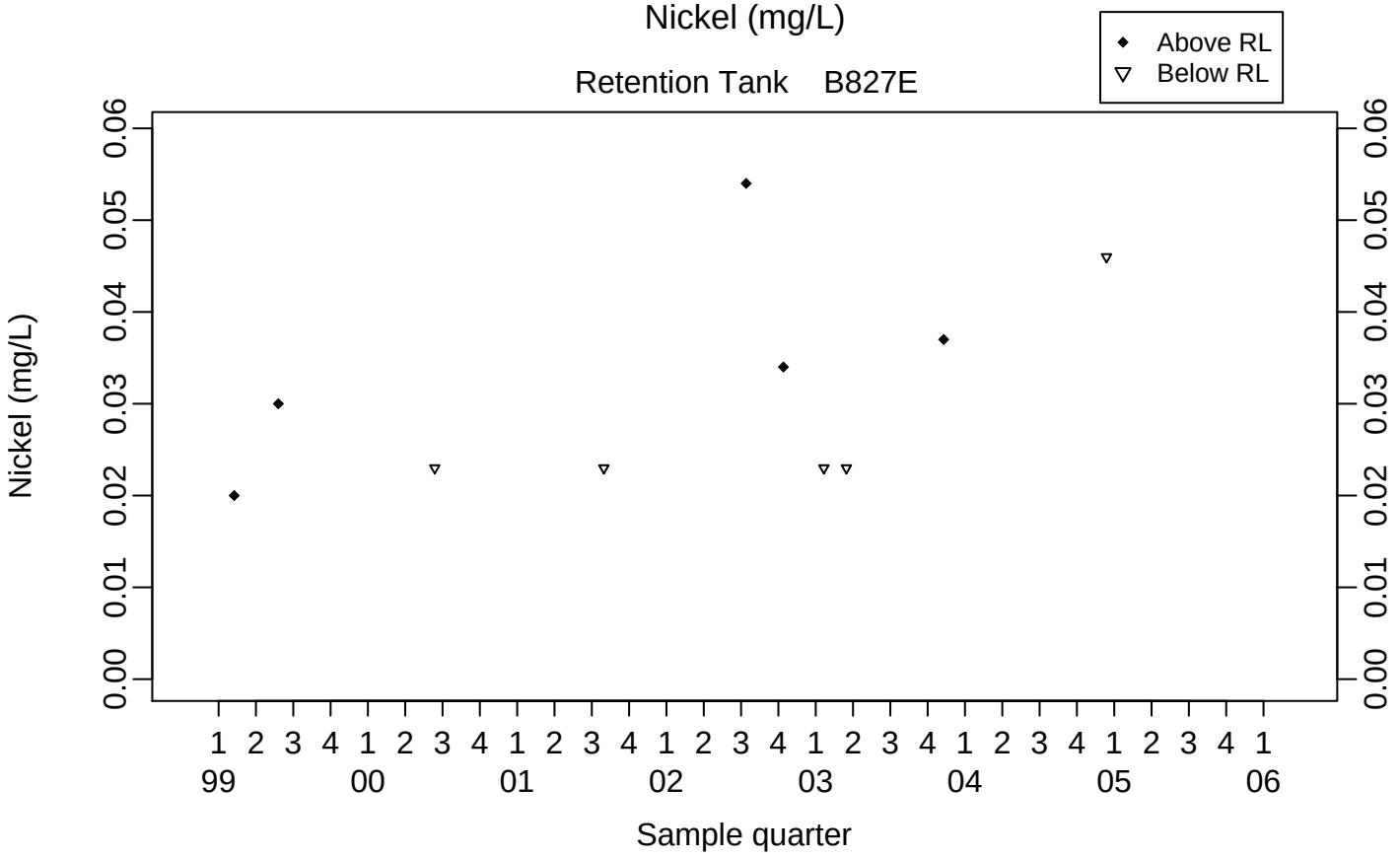


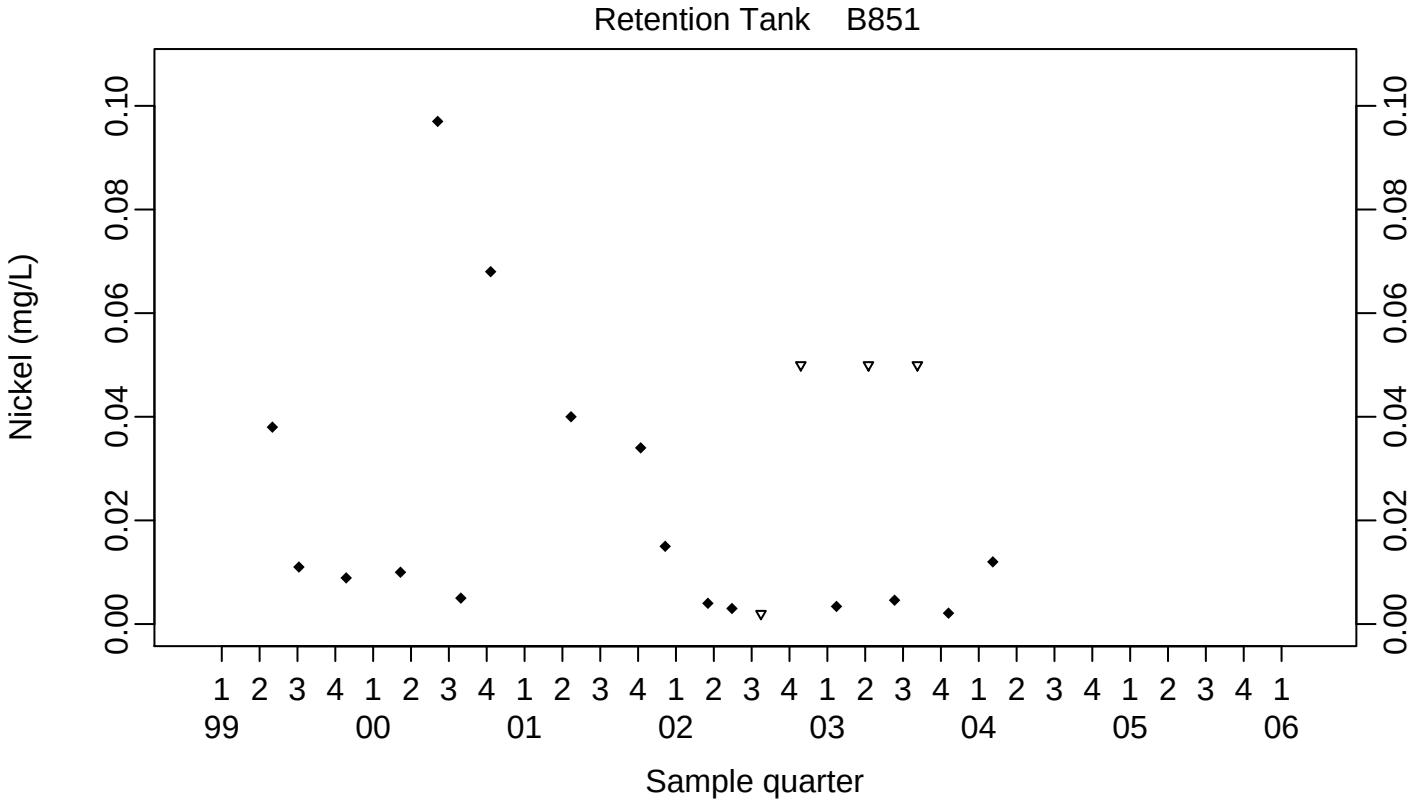



Surface Impoundments Process Water
Nickel (mg/L)
Above RL
Below RL
Retention Tank B826
Nickel (mg/L)
0.000
0.005
0.010
0.015
0.020
0.025
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

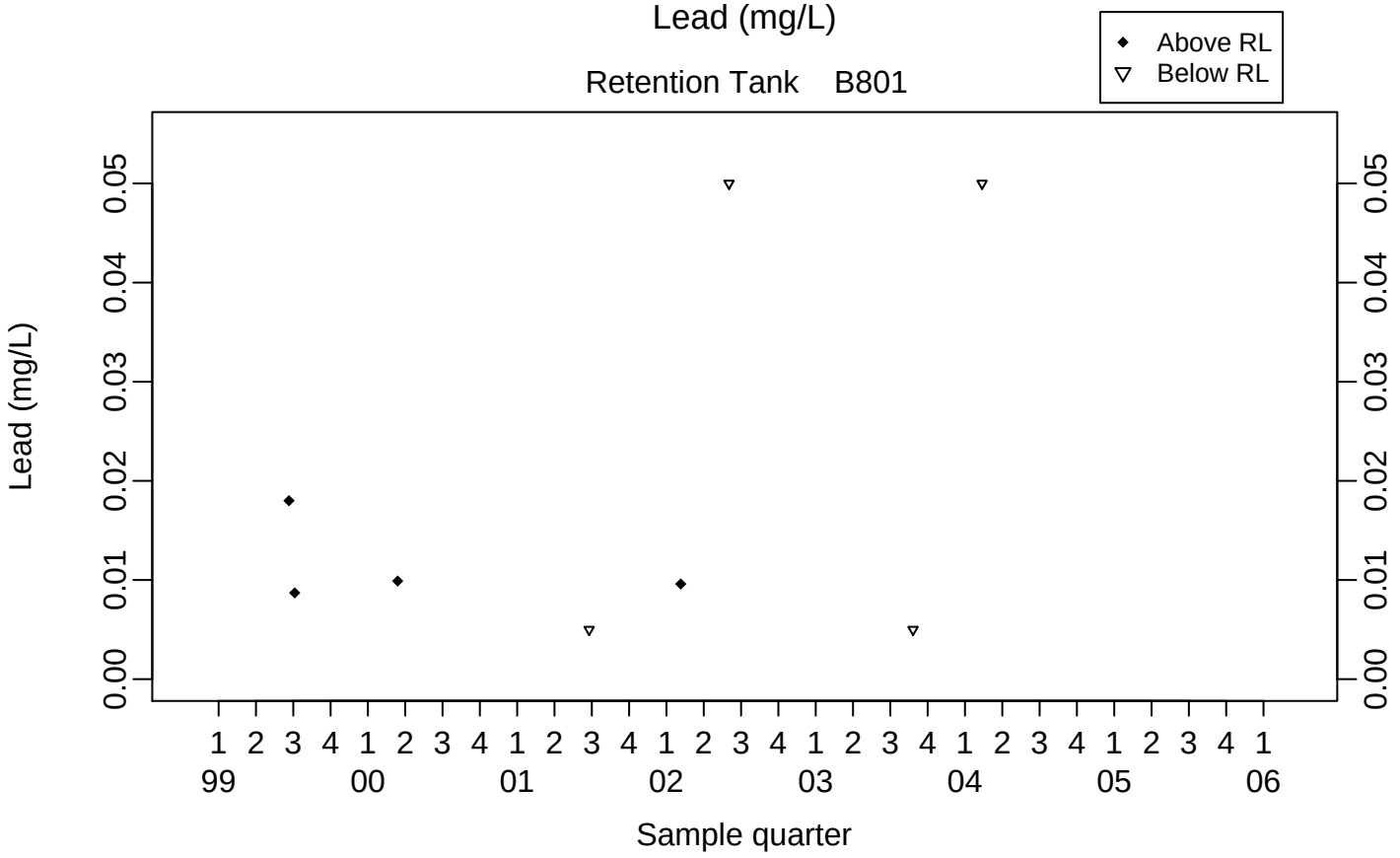

Retention Tank B827C/D
Nickel (mg/L)
0.00
0.05
0.10
0.15
0.20
0.25
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

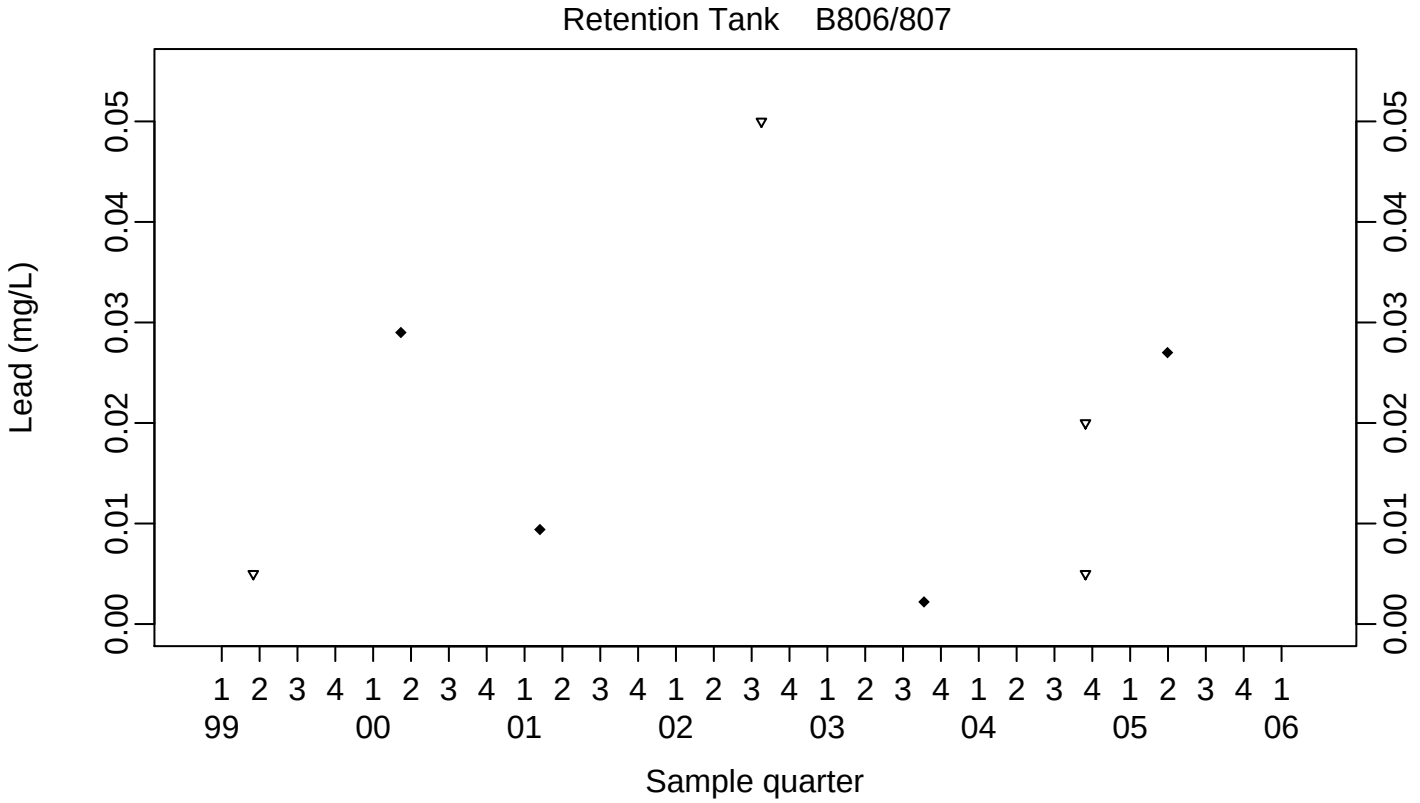
Surface Impoundments Process Water
Nickel (mg/L)



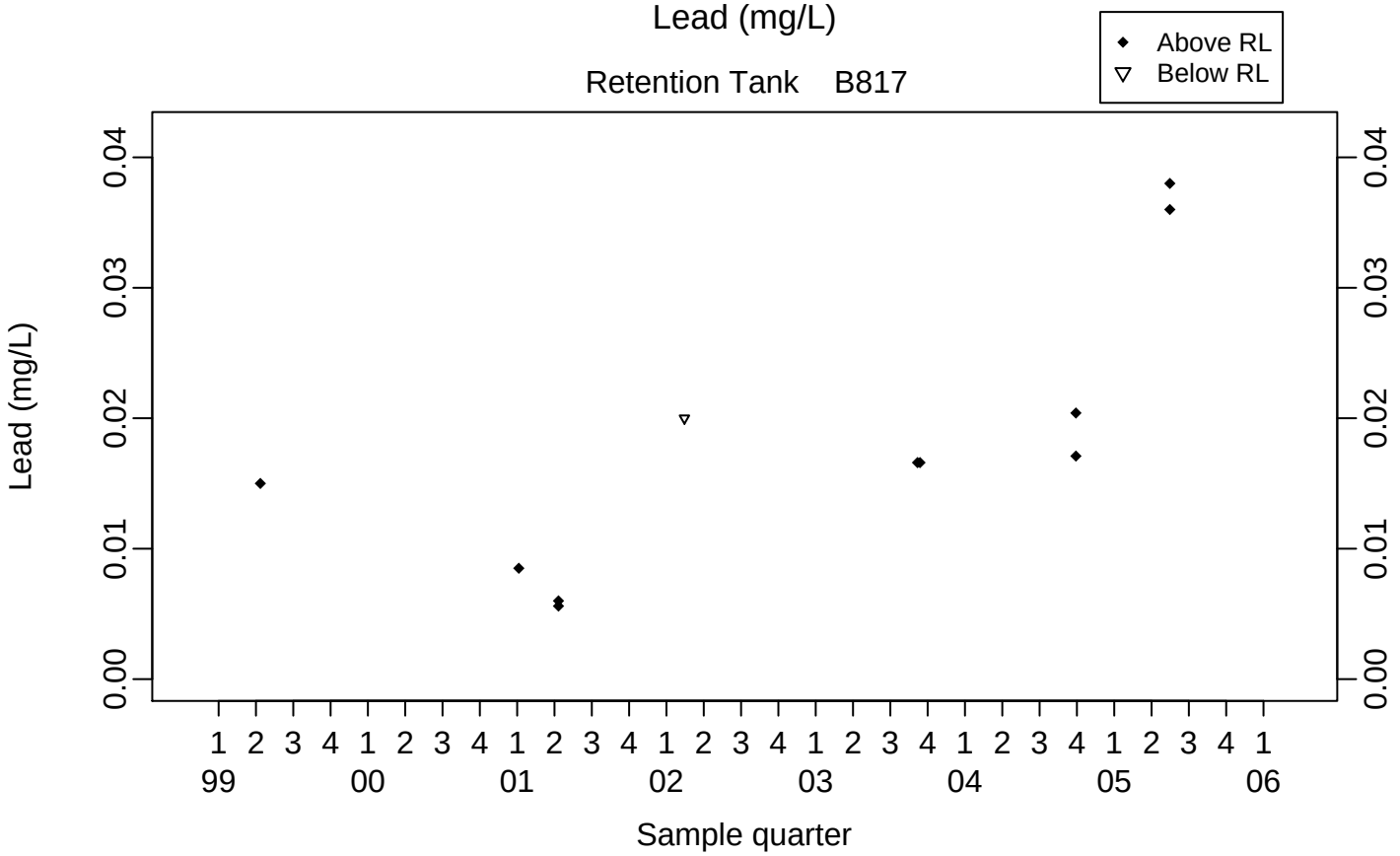


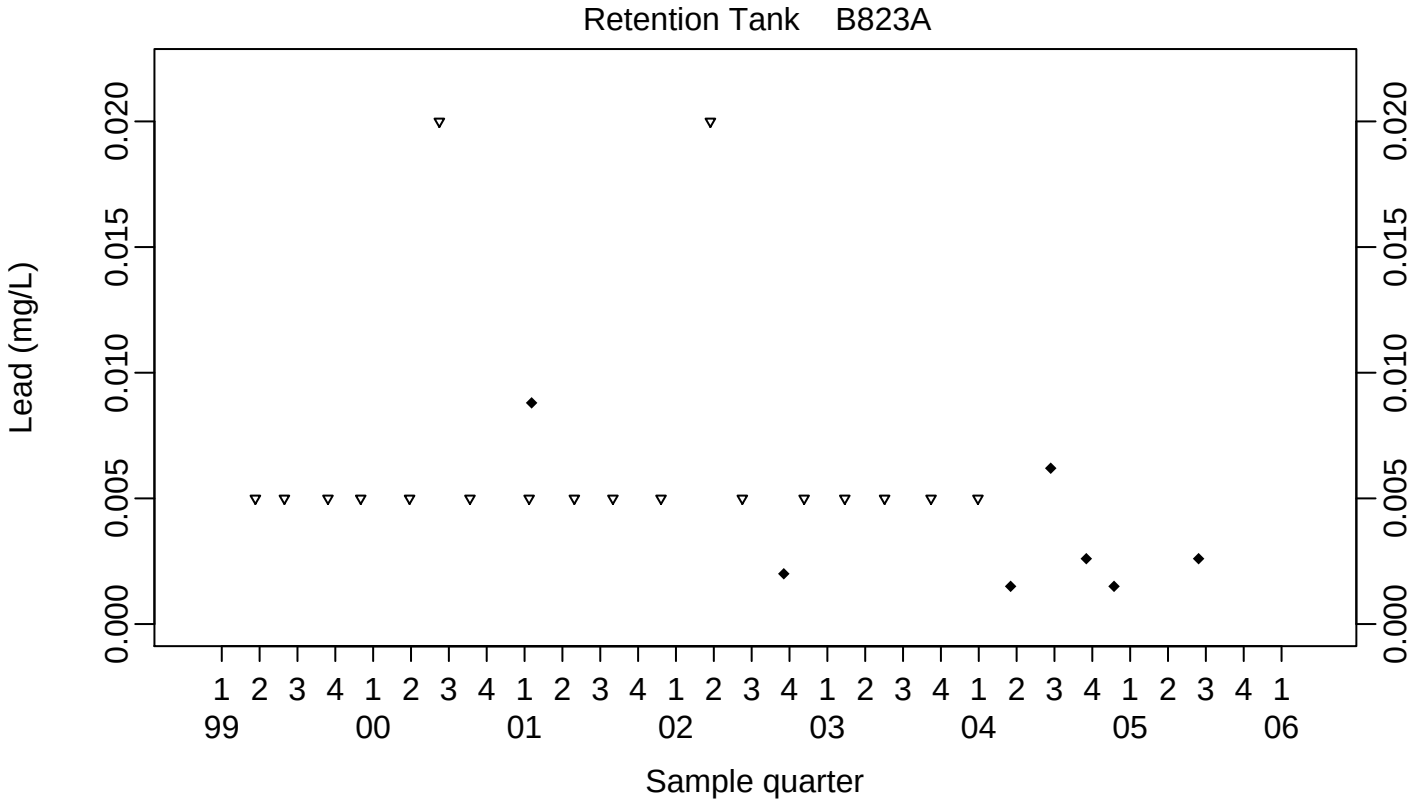
Surface Impoundments Process Water
Lead (mg/L)

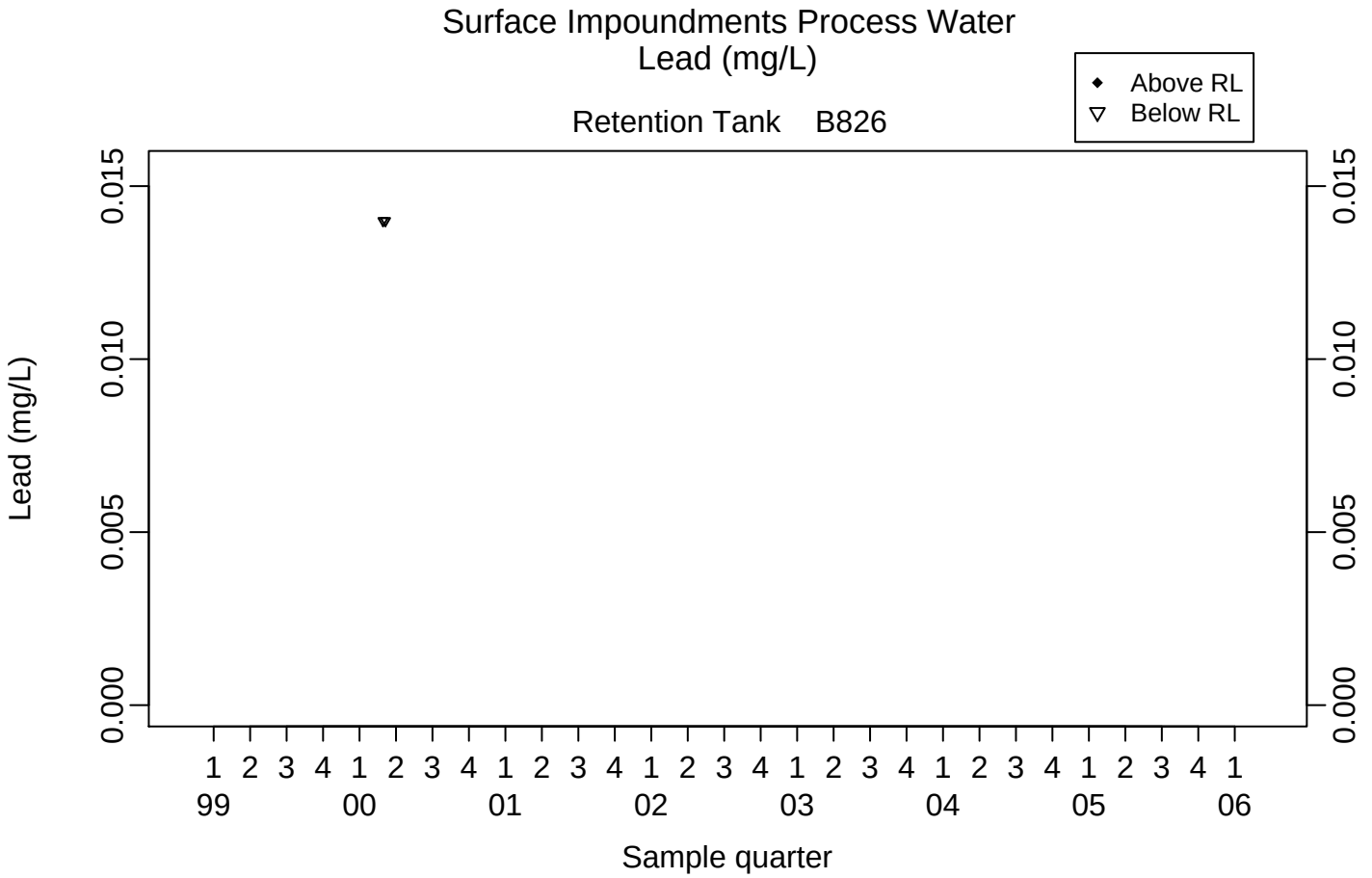


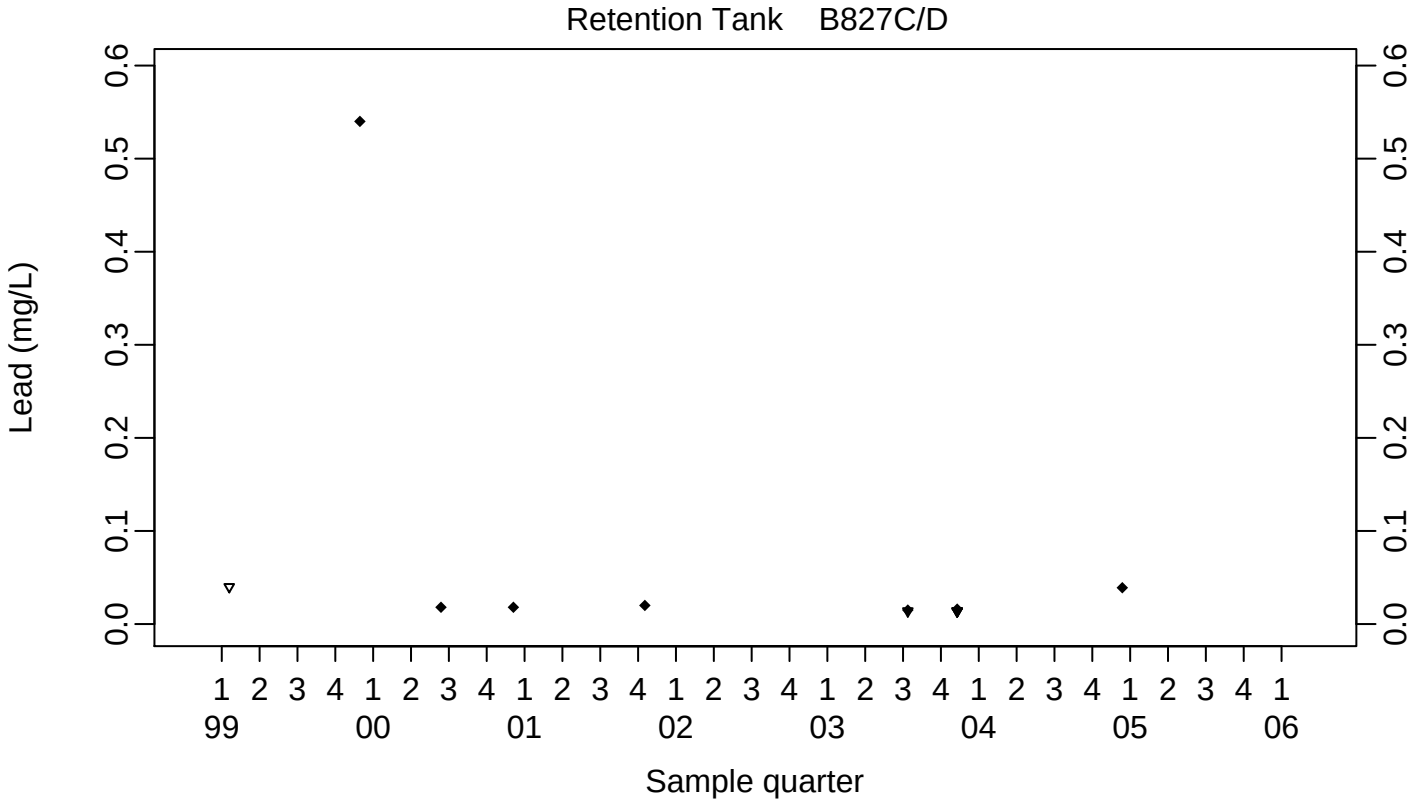


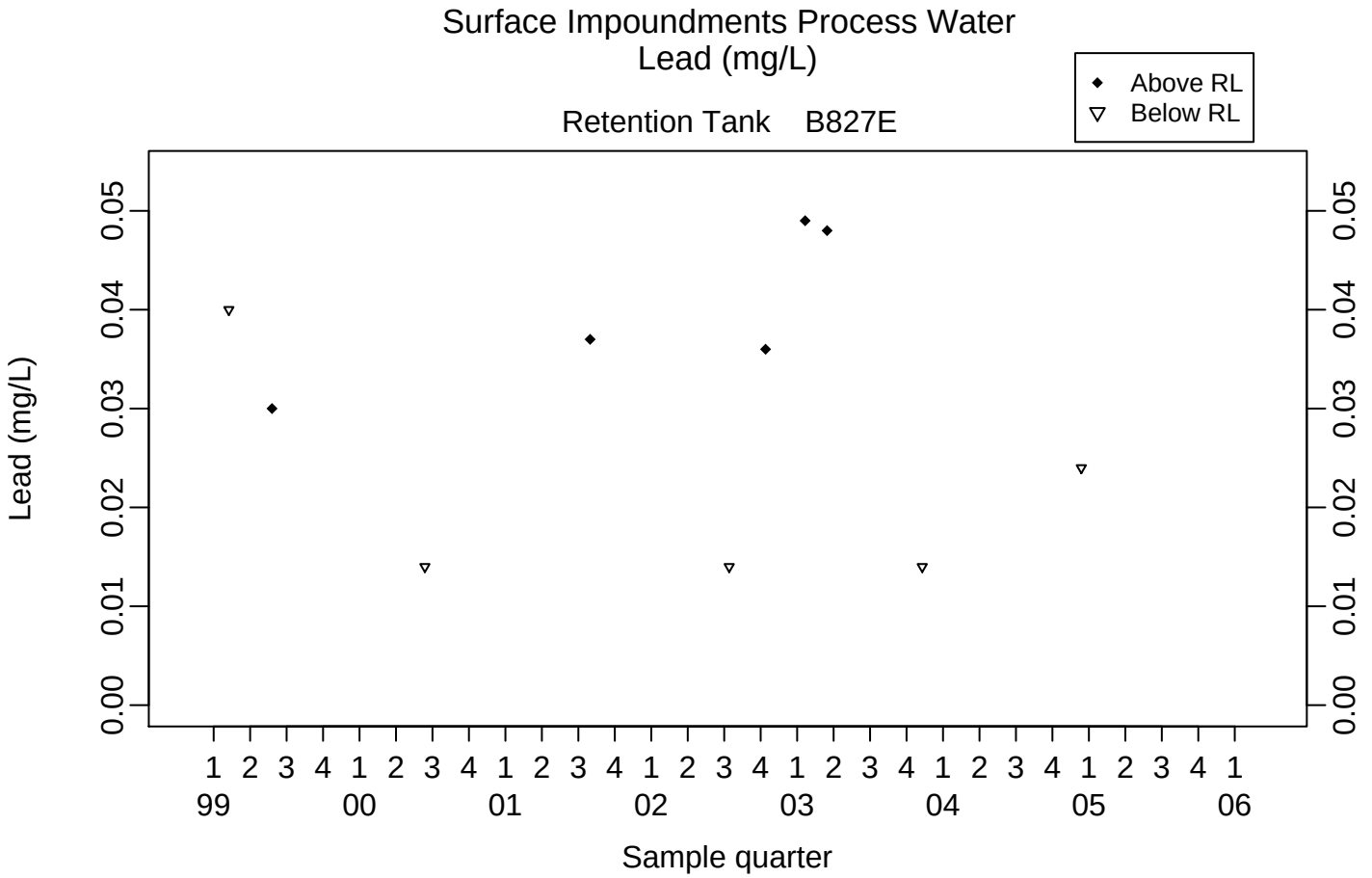
Surface Impoundments Process Water
Lead (mg/L)

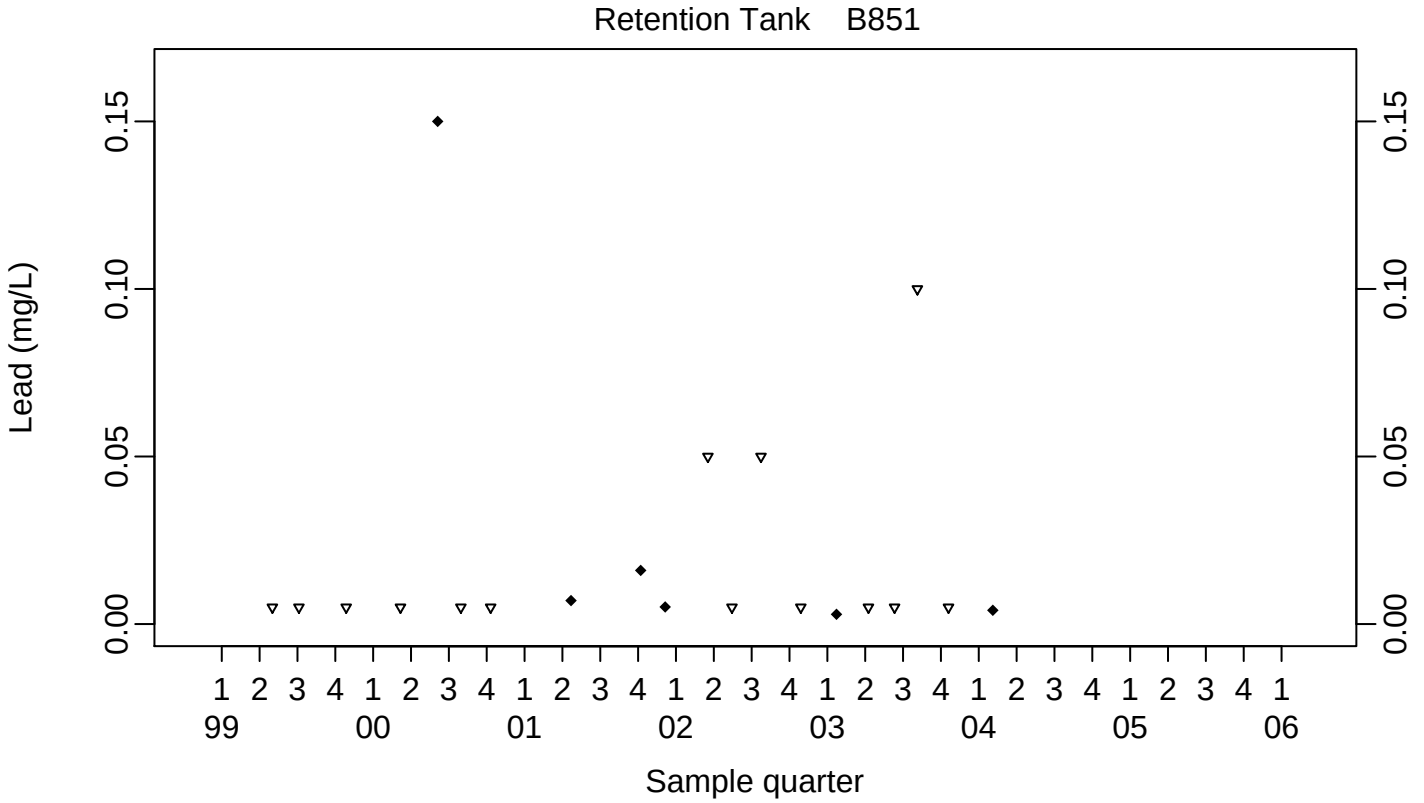


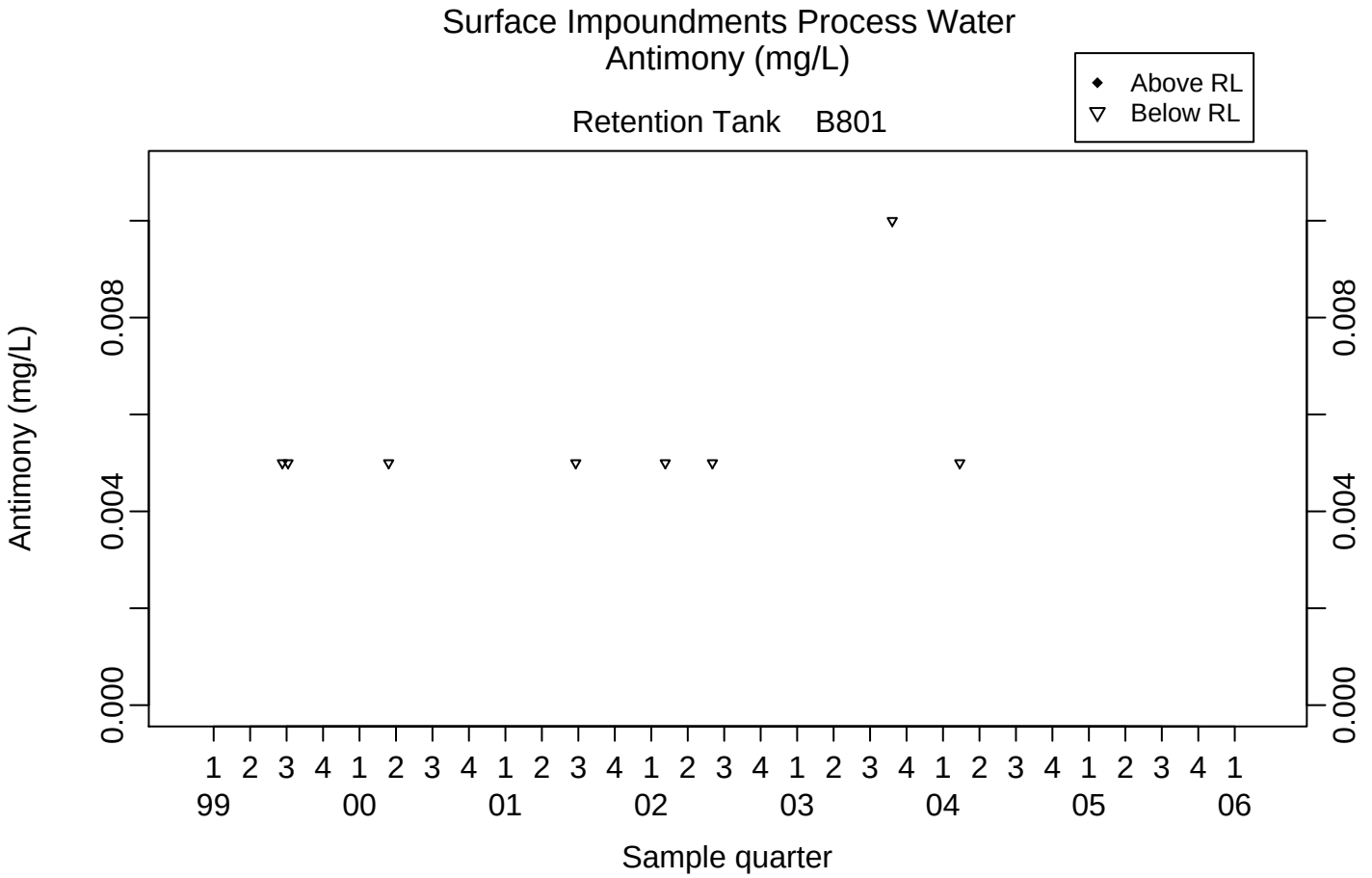


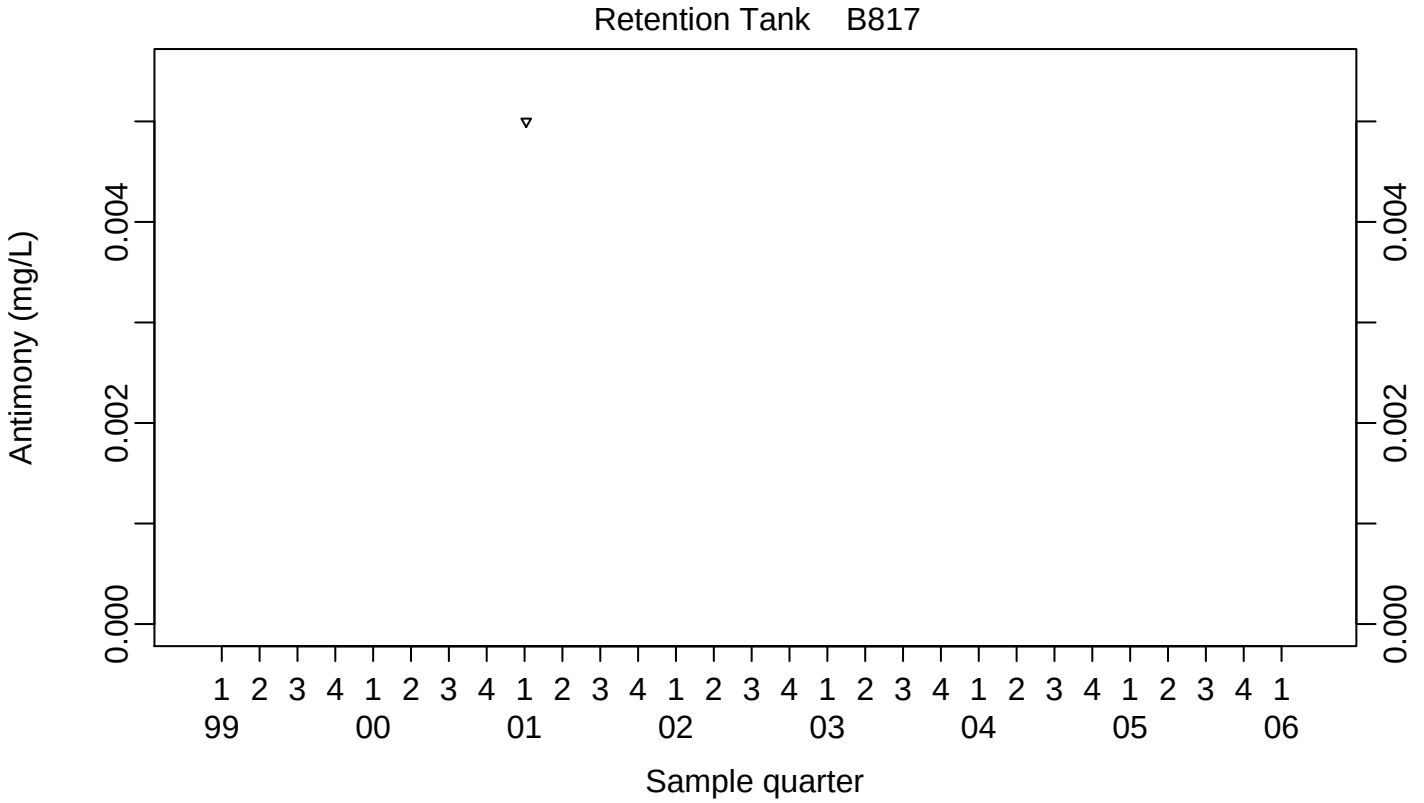

Surface Impoundments Process Water
Lead (mg/L)
Above RL
Below RL
Retention Tank B826
Lead (mg/L)
0.000
0.005
0.010
0.015
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

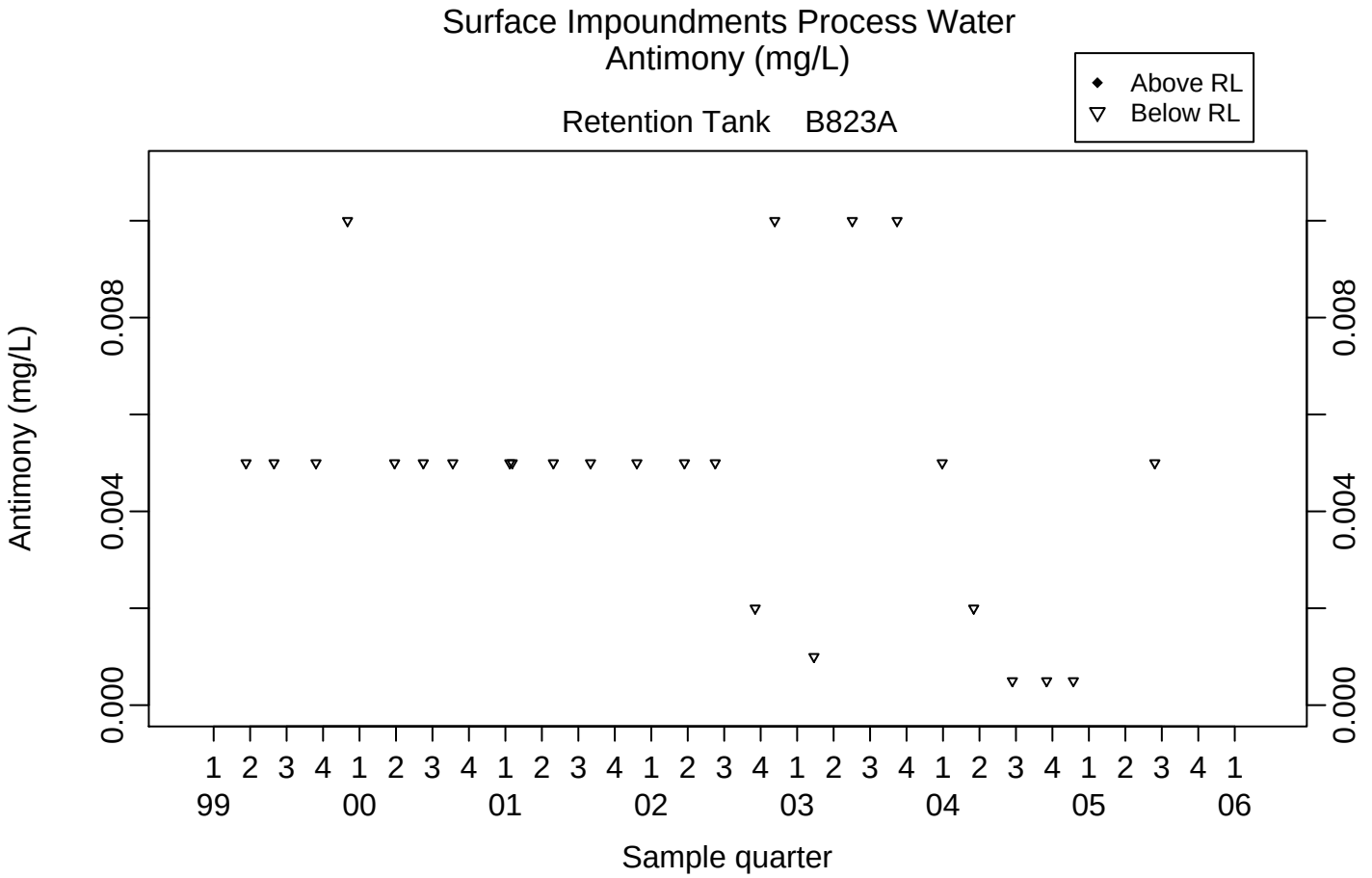

Retention Tank B827C/D
Lead (mg/L)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

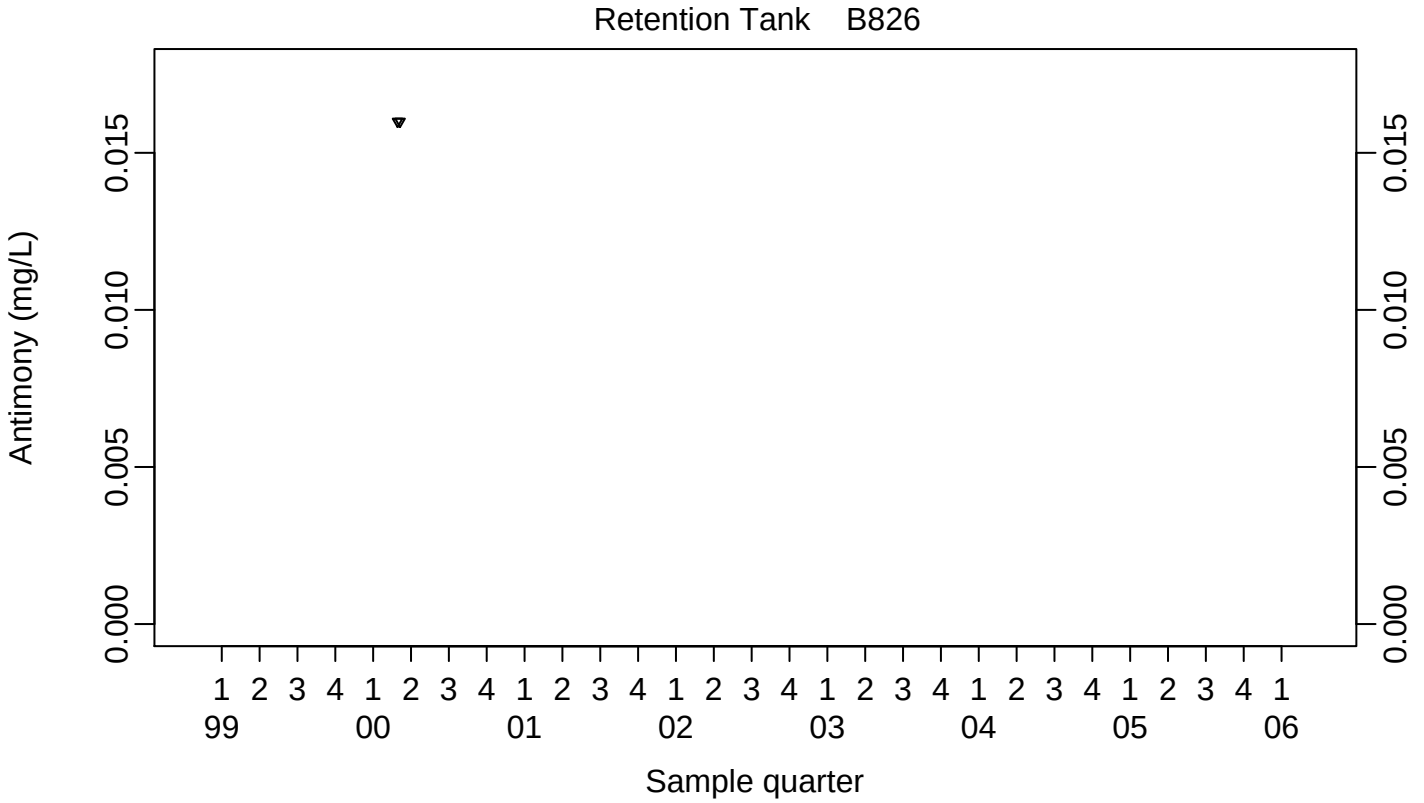

Surface Impoundments Process Water
Lead (mg/L)
Above RL
Below RL
Retention Tank B827E
Lead (mg/L)
0.00
0.01
0.02
0.03
0.04
0.05
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

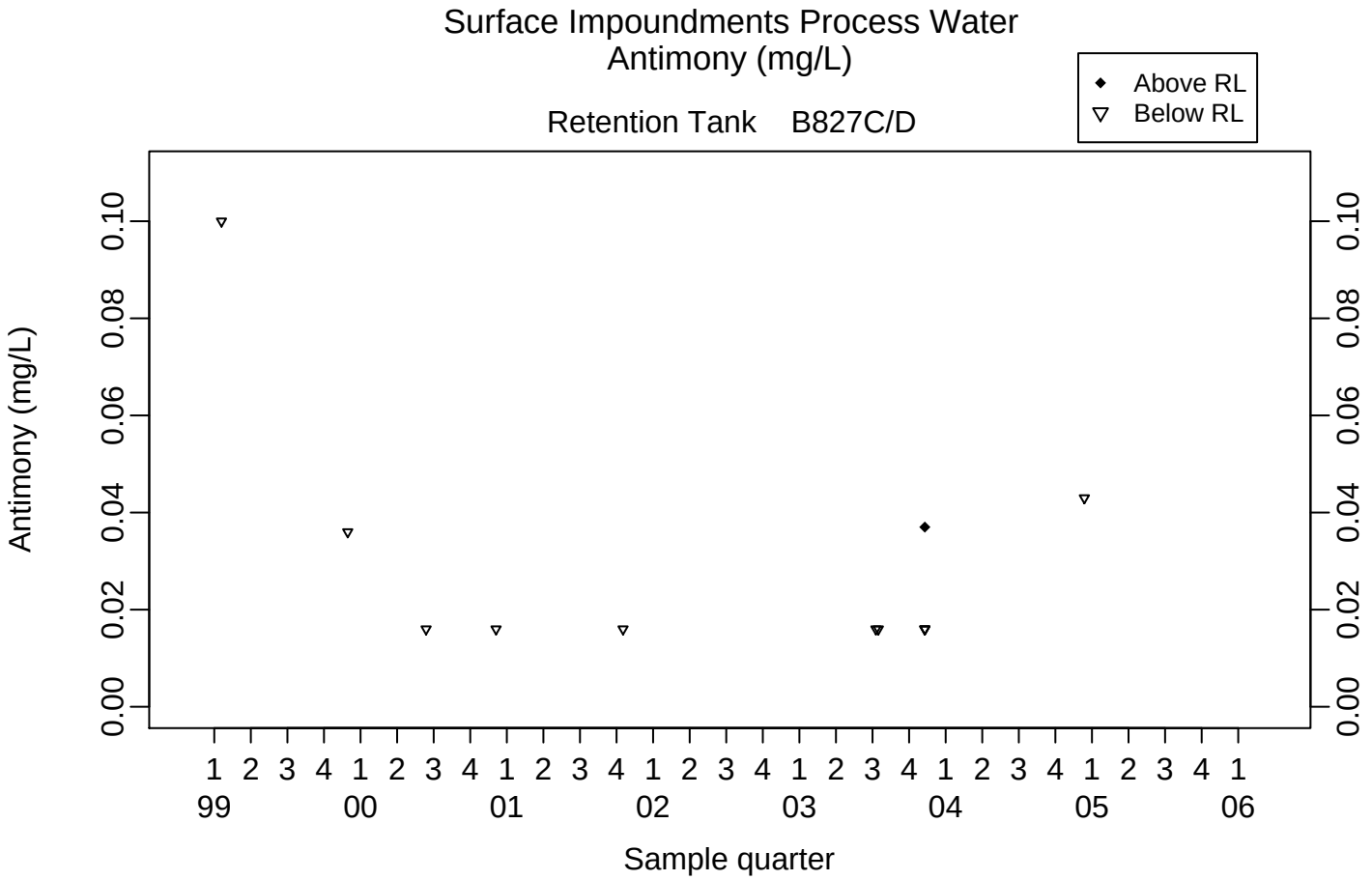

Retention Tank B851
Lead (mg/L)
0.00
0.05
0.10
0.15
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

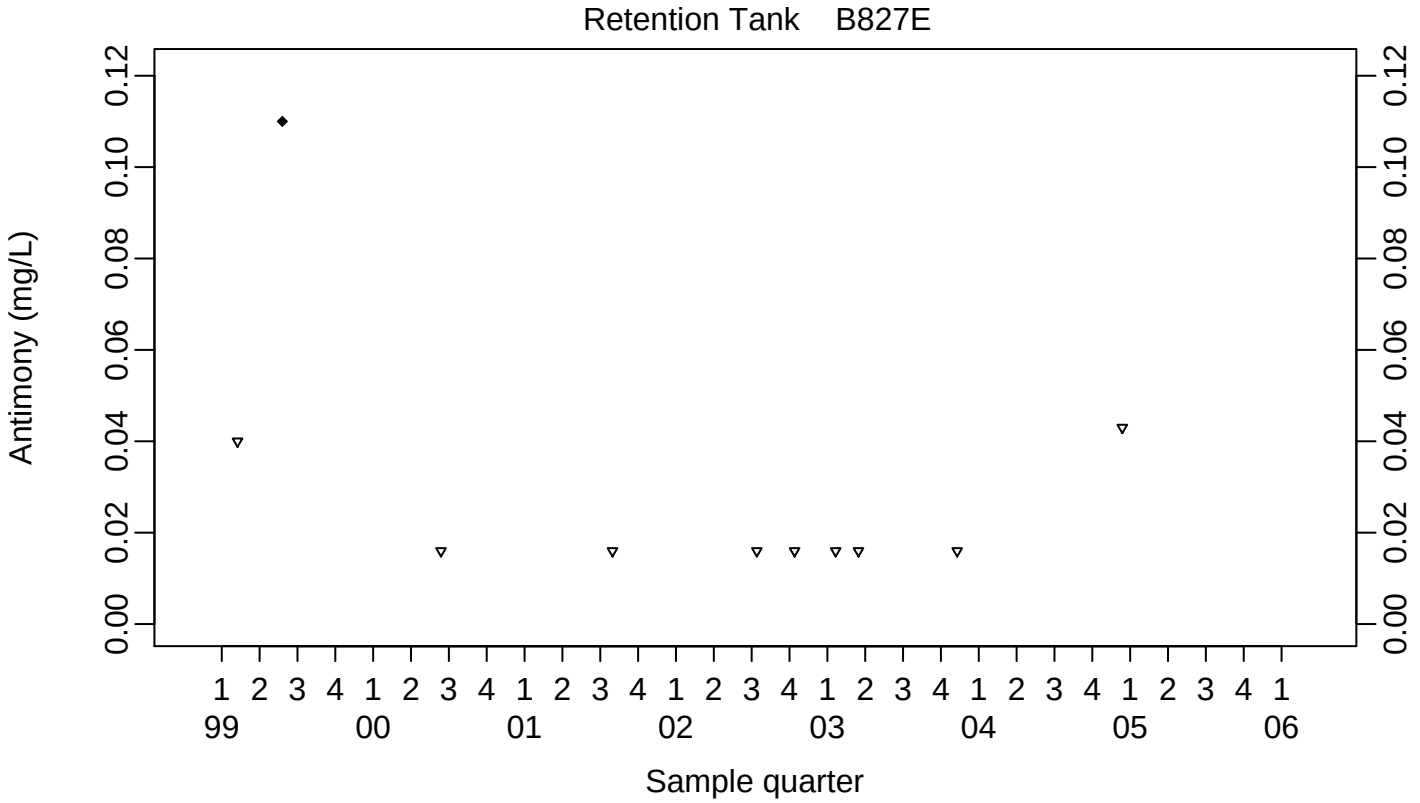

Surface Impoundments Process Water
Antimony (mg/L)
Above RL
Below RL
Retention Tank B801
Antimony (mg/L)
0.000
0.004
0.008
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

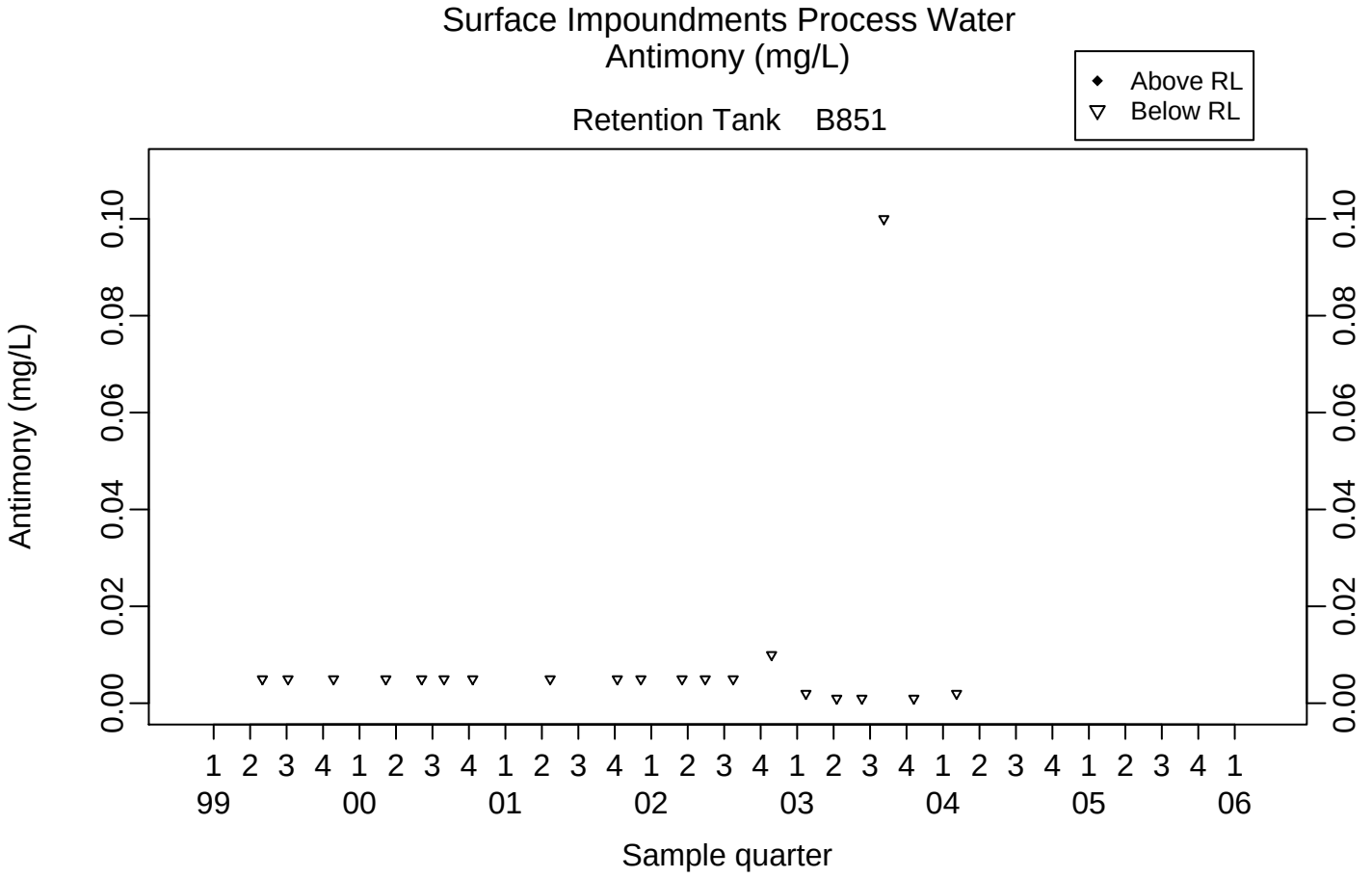

Retention Tank B817
Antimony (mg/L)
0.000
0.002
0.004
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


Surface Impoundments Process Water
Antimony (mg/L)
Above RL
Below RL
Retention Tank B823A
Antimony (mg/L)
0.000
0.004
0.008
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

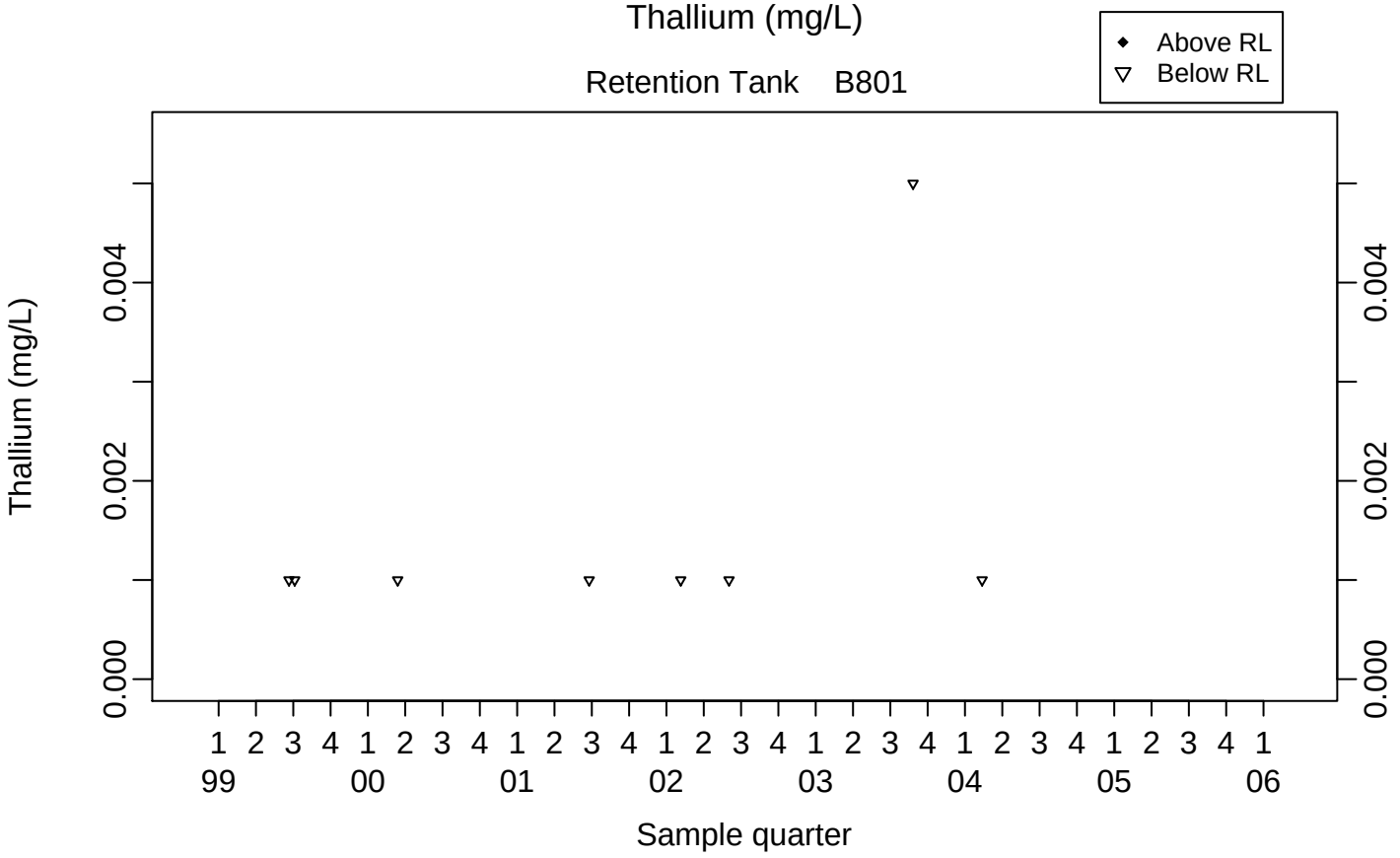

Retention Tank B826
Antimony (mg/L)
0.000
0.005
0.010
0.015
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

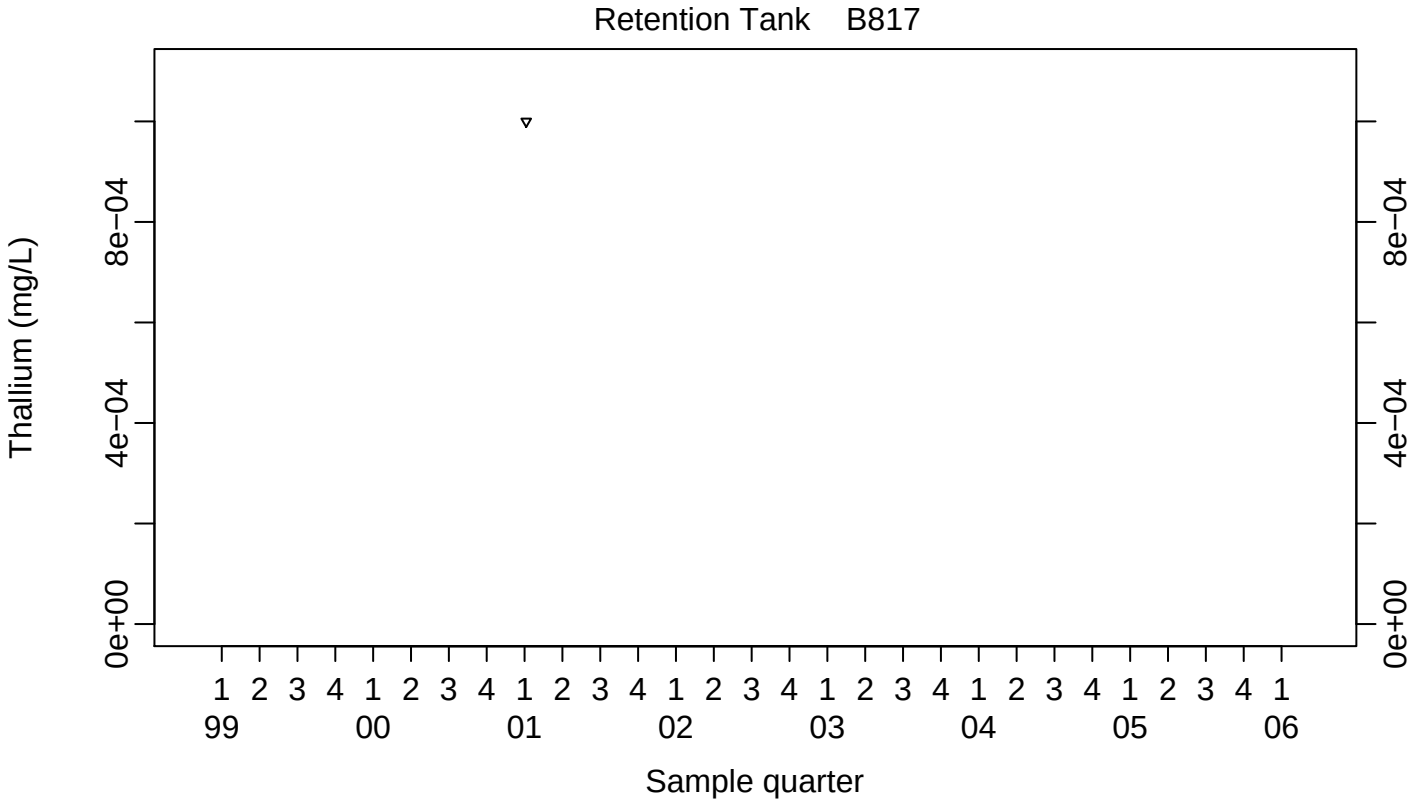

Surface Impoundments Process Water
Antimony (mg/L)
Above RL
Below RL
Retention Tank B827C/D
Antimony (mg/L)
0.00
0.02
0.04
0.06
0.08
0.10
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

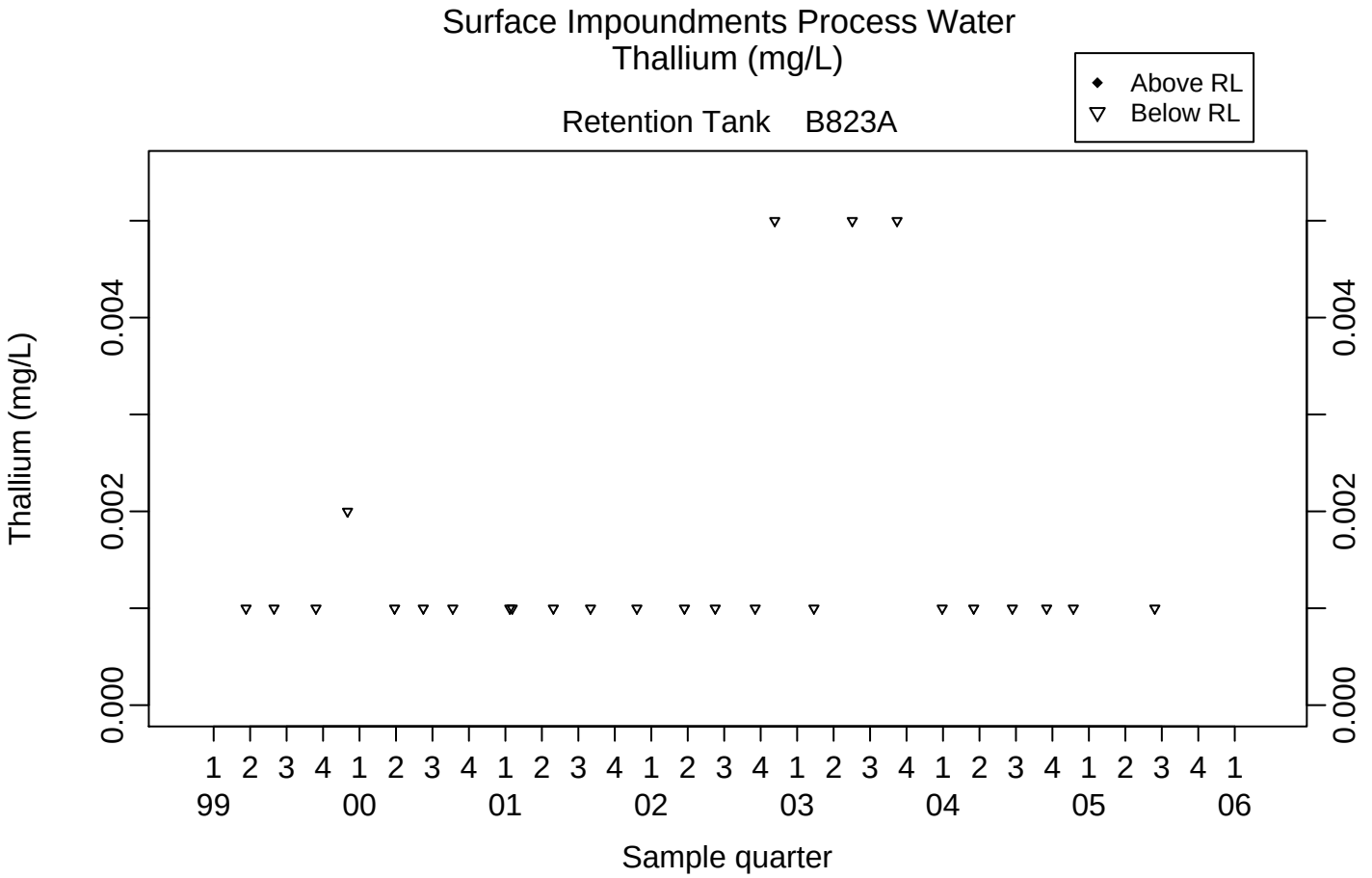

Retention Tank B827E
Antimony (mg/L)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

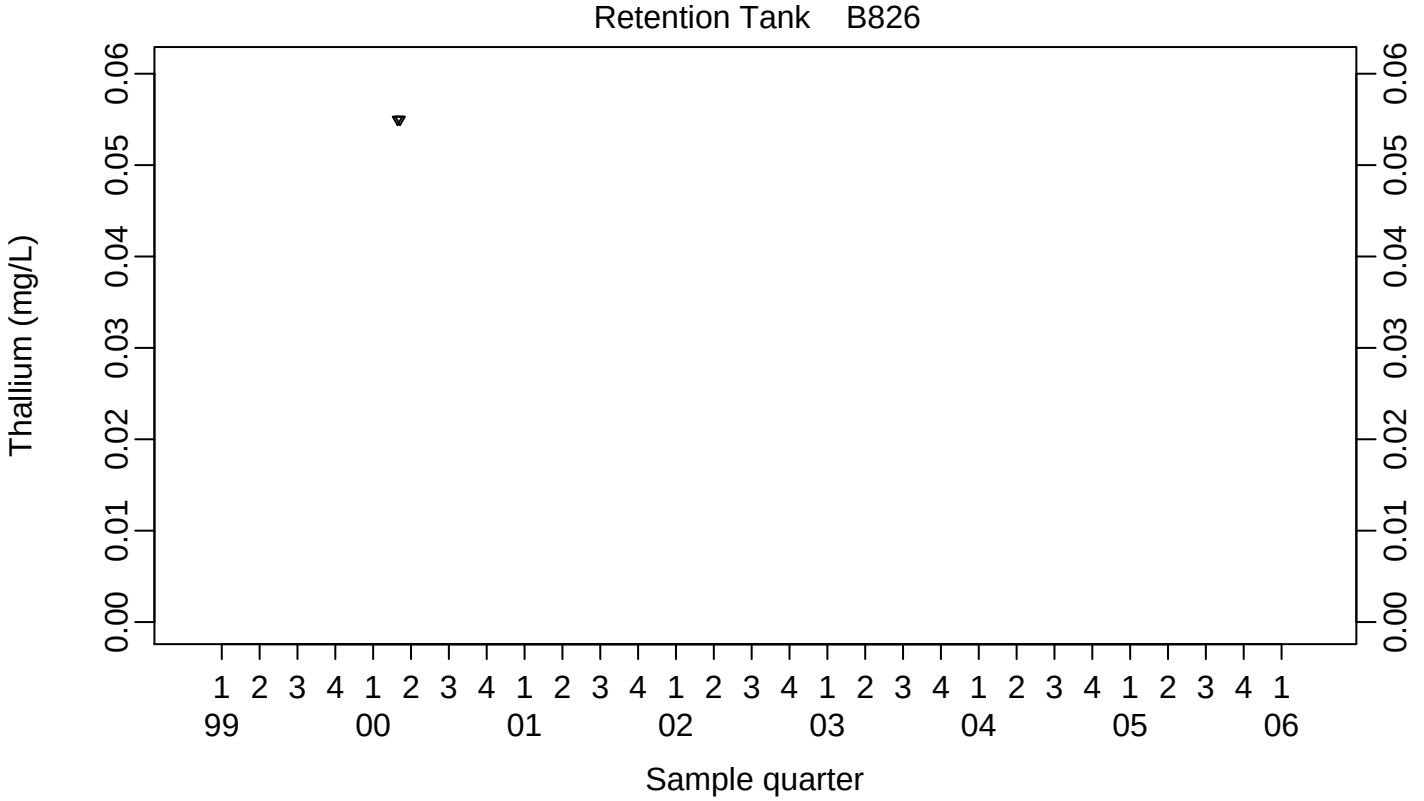

Surface Impoundments Process Water
Antimony (mg/L)
Retention Tank B851
Above RL
Below RL
Antimony (mg/L)
0.00
0.02
0.04
0.06
0.08
0.10
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

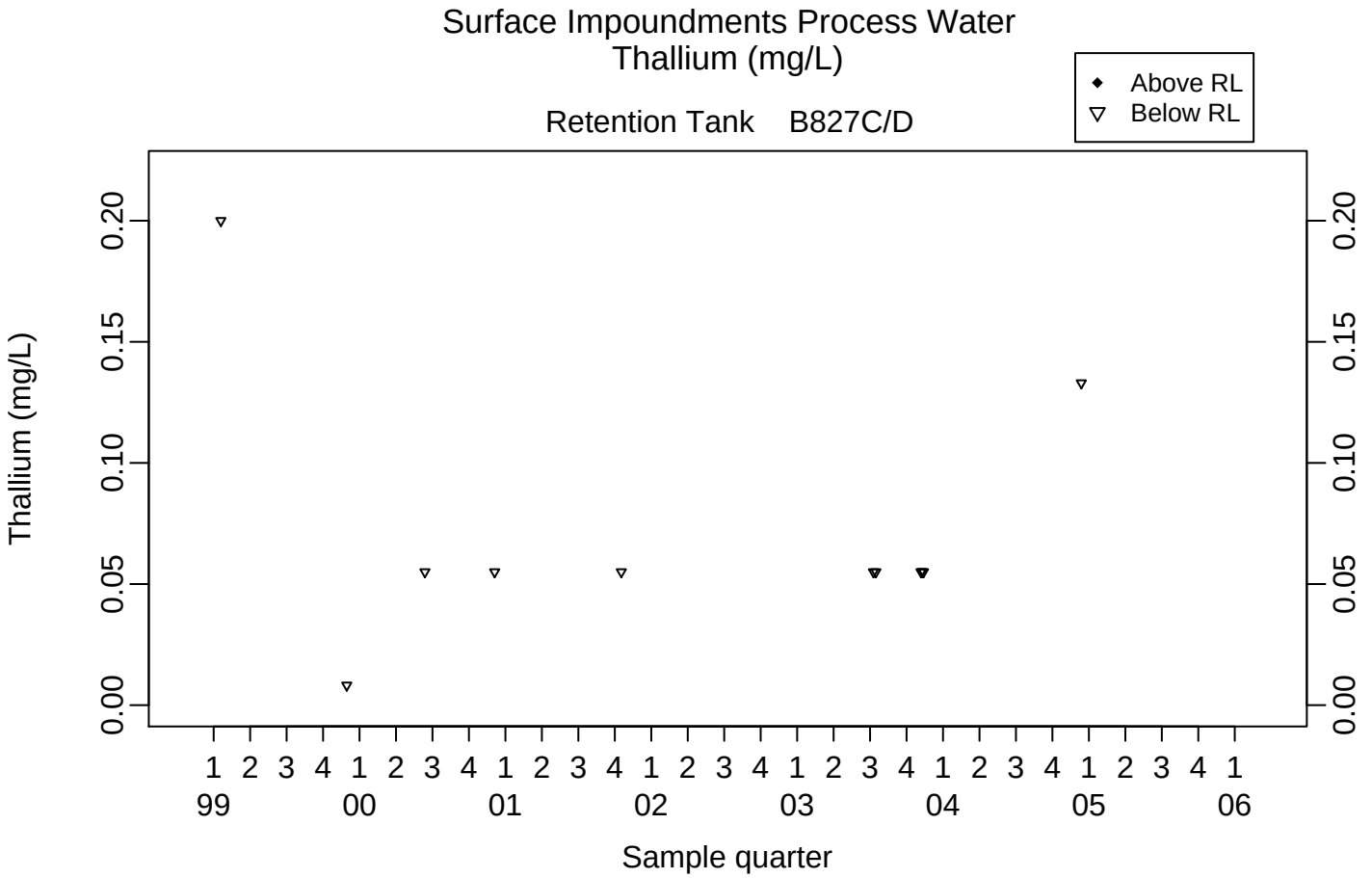
Surface Impoundments Process Water
Thallium (mg/L)

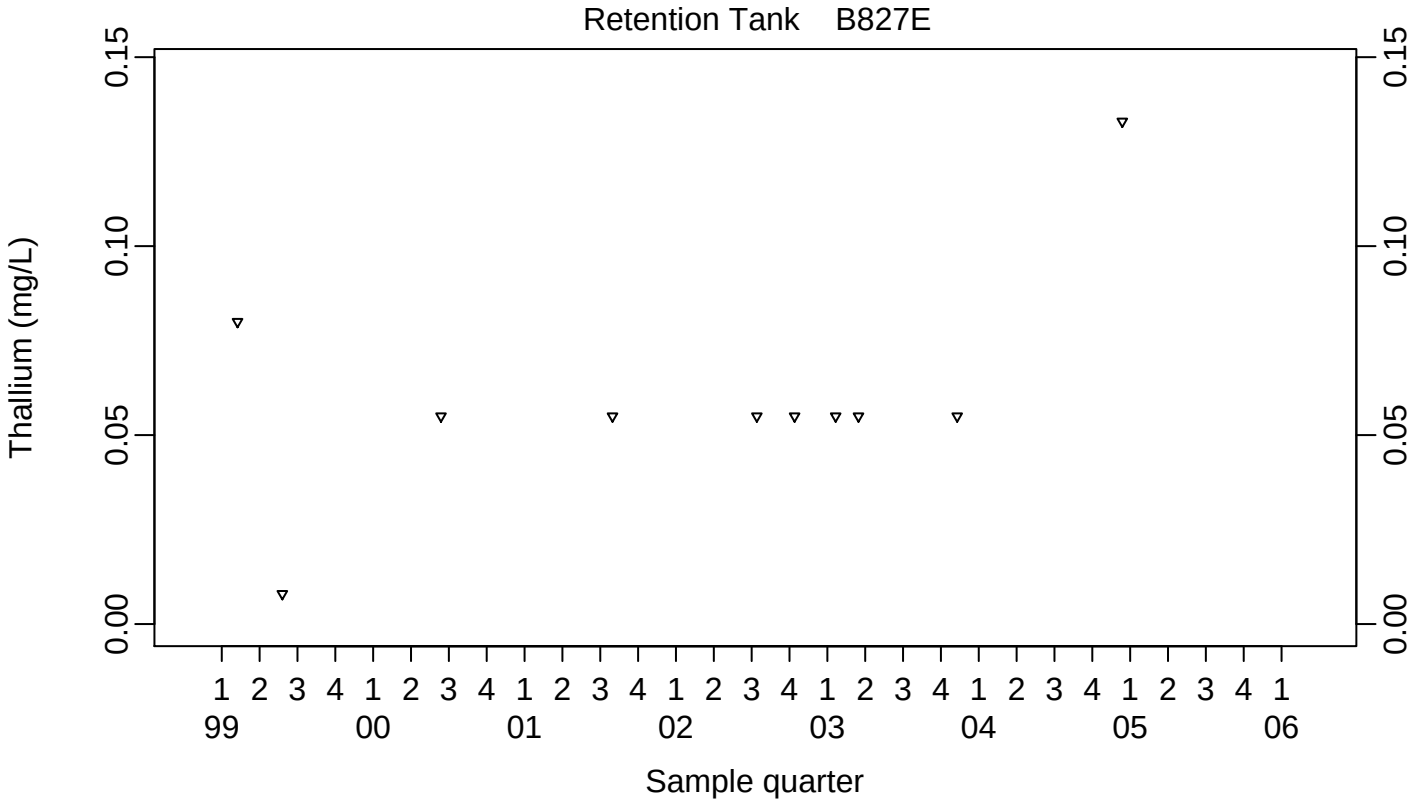


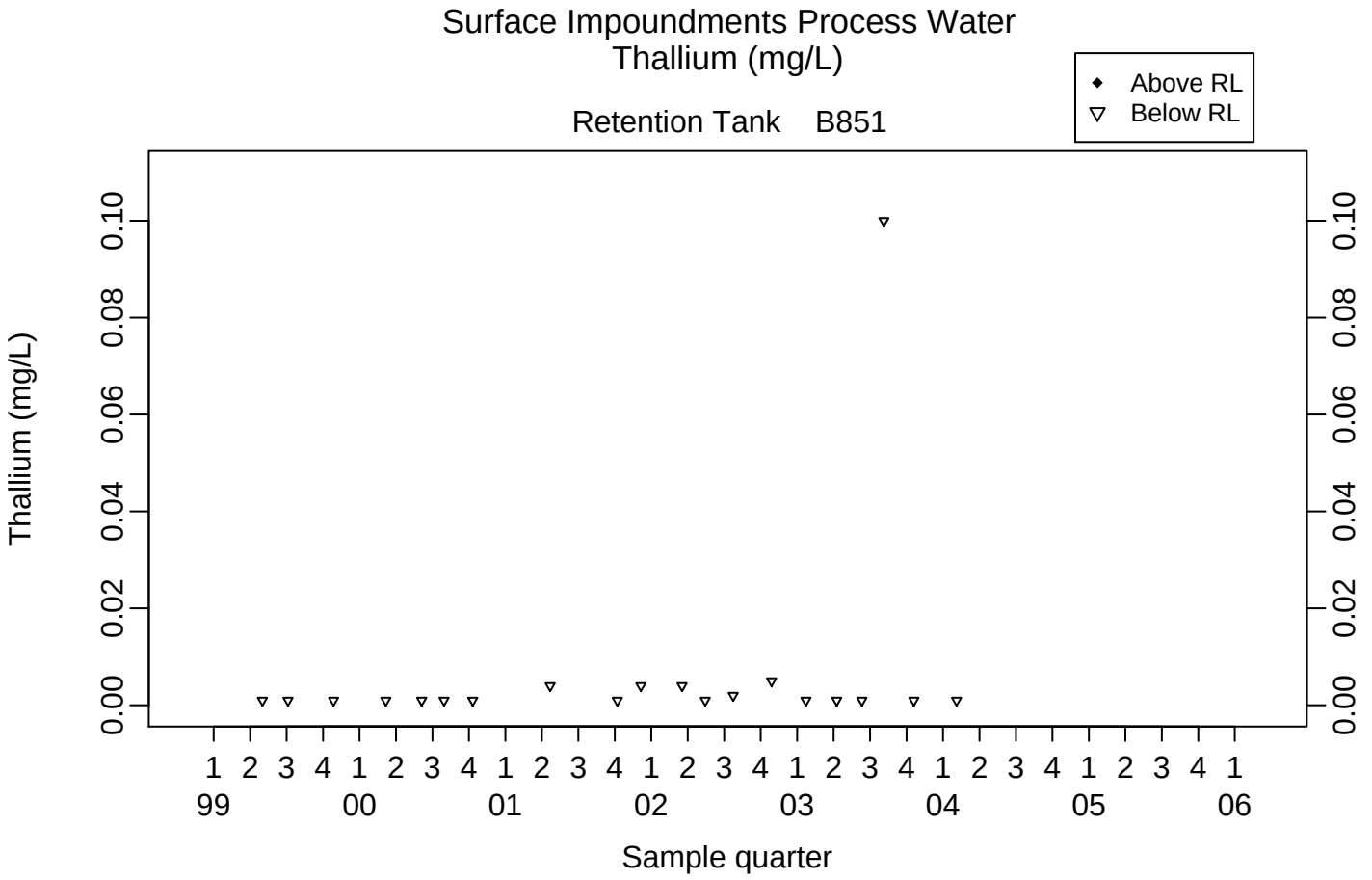



Surface Impoundments Process Water
Thallium (mg/L)
Above RL
Below RL
Retention Tank B823A
Thallium (mg/L)
0.000
0.002
0.004
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

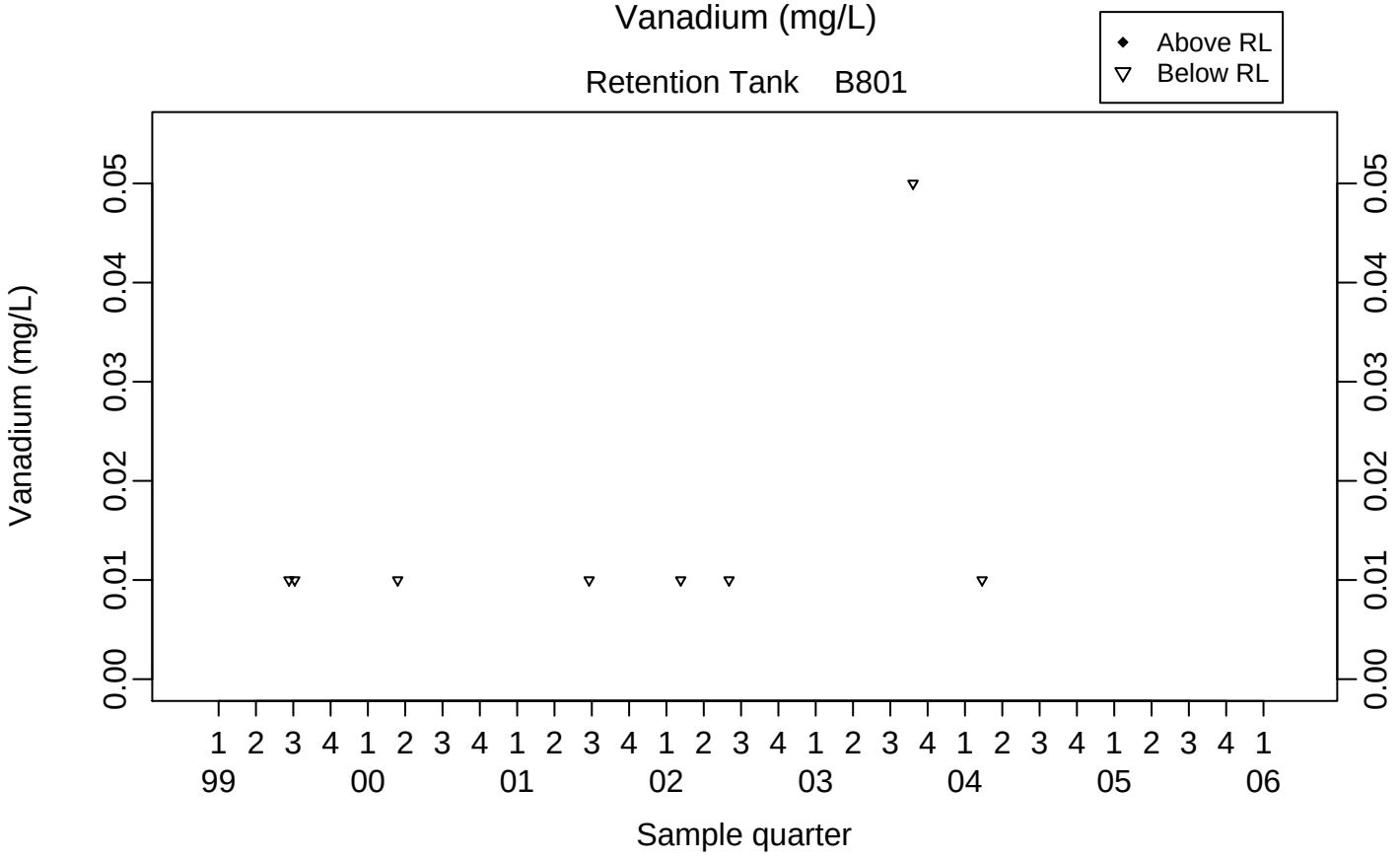

Retention Tank B826
Thallium (mg/L)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

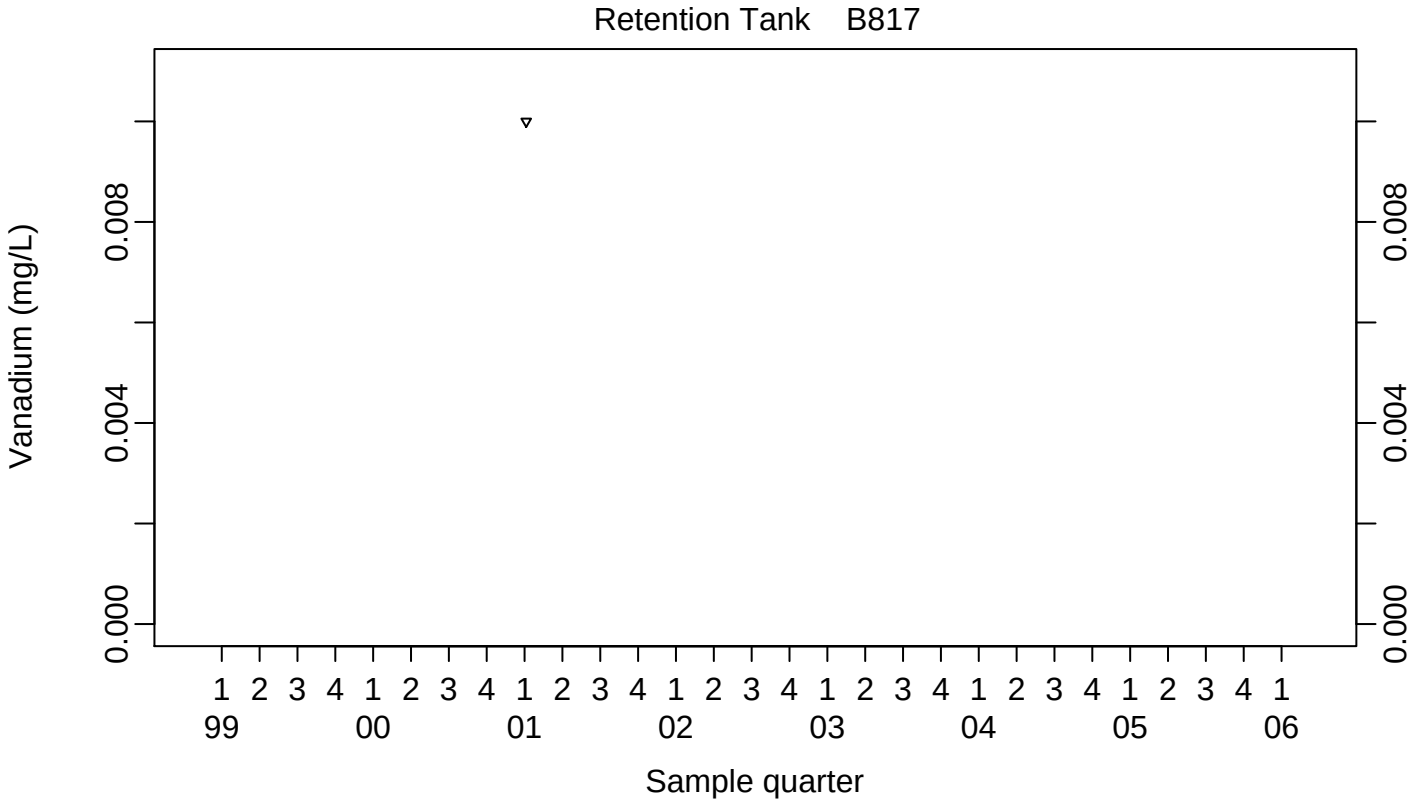

Surface Impoundments Process Water
Thallium (mg/L)
Retention Tank B827C/D
Above RL
Below RL
Thallium (mg/L)
0.00
0.05
0.10
0.15
0.20
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


Retention Tank B827E
Thallium (mg/L)
0.00
0.05
0.10
0.15
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

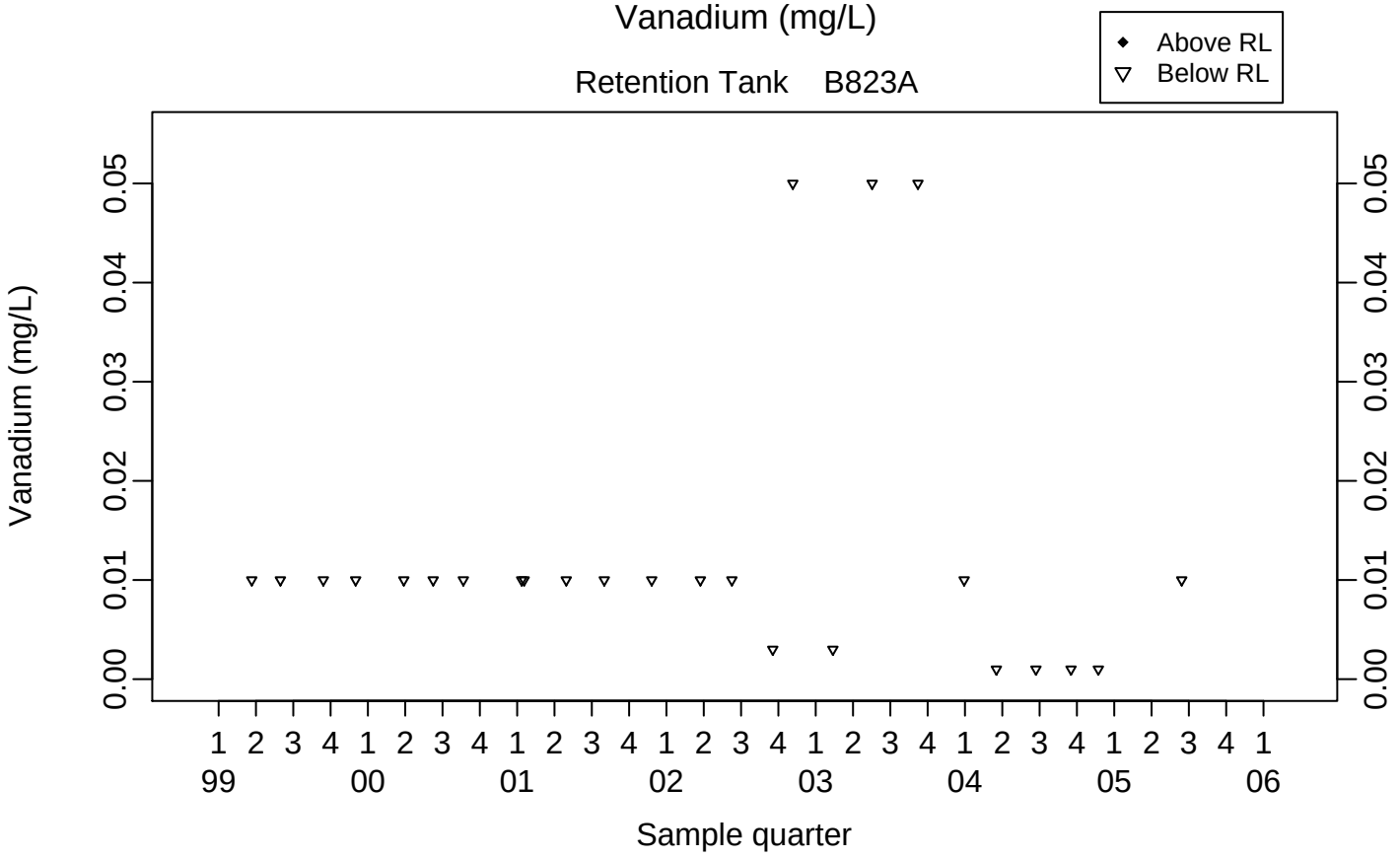

Surface Impoundments Process Water
Thallium (mg/L)
Retention Tank B851
Above RL
Below RL
Thallium (mg/L)
0.00
0.02
0.04
0.06
0.08
0.10
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

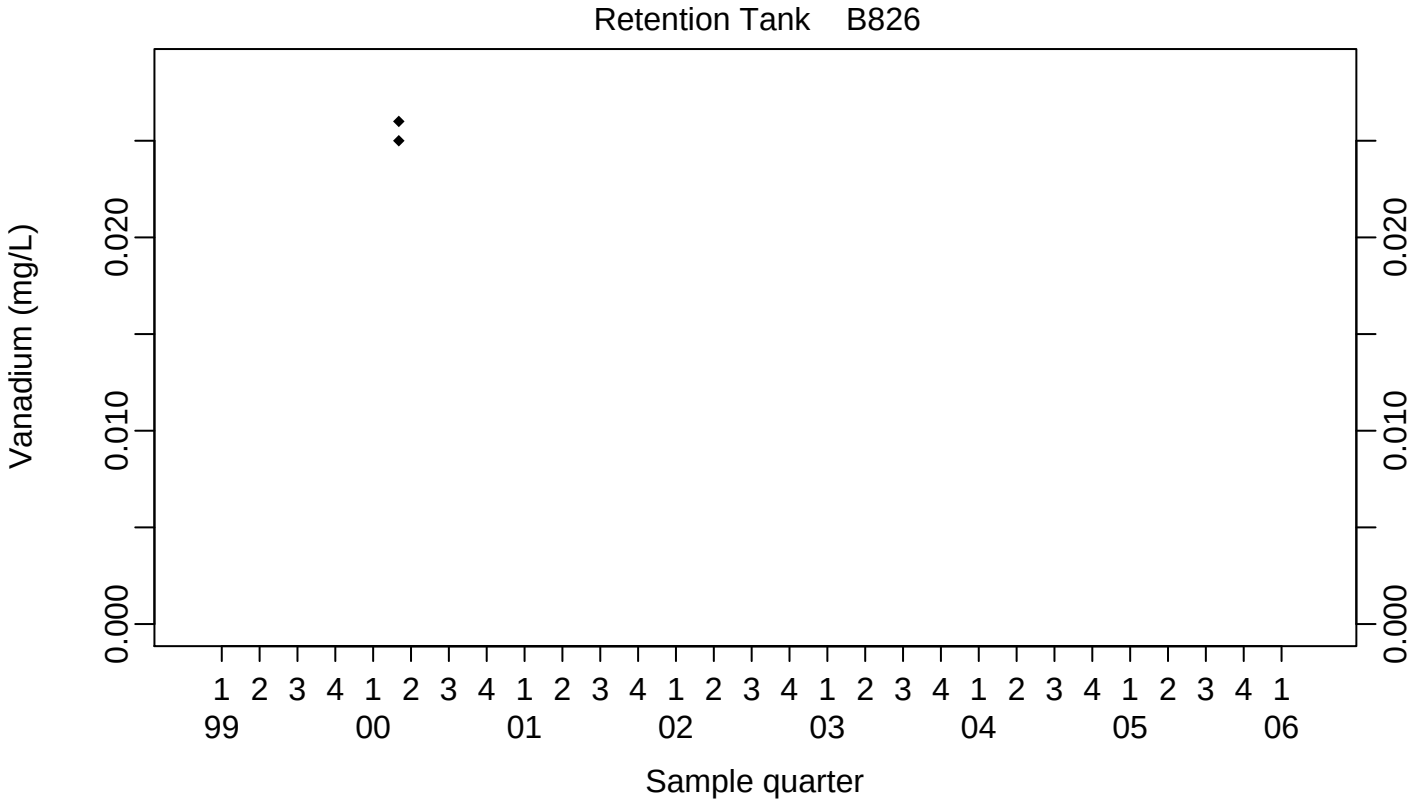
Surface Impoundments Process Water
Vanadium (mg/L)

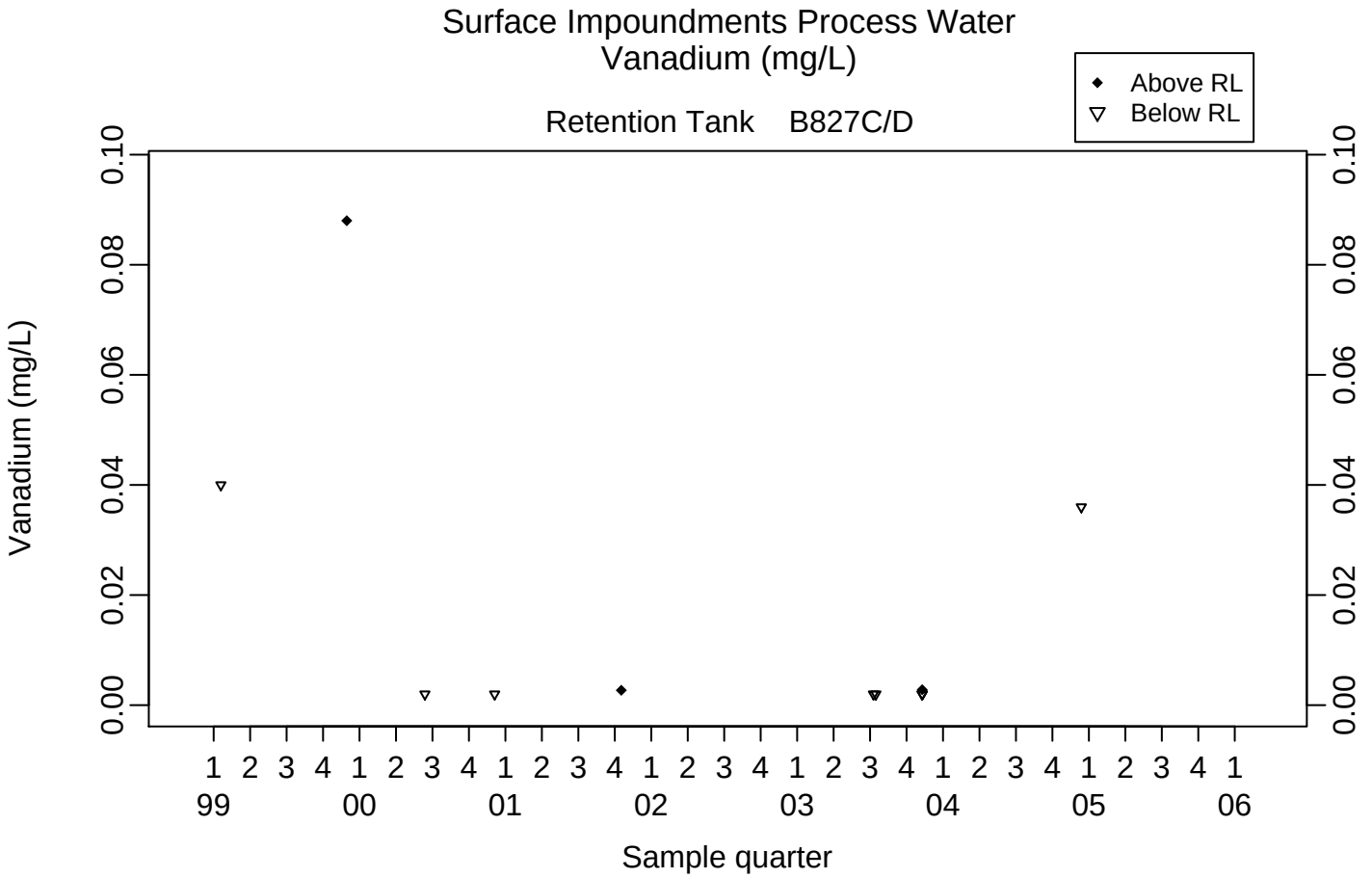


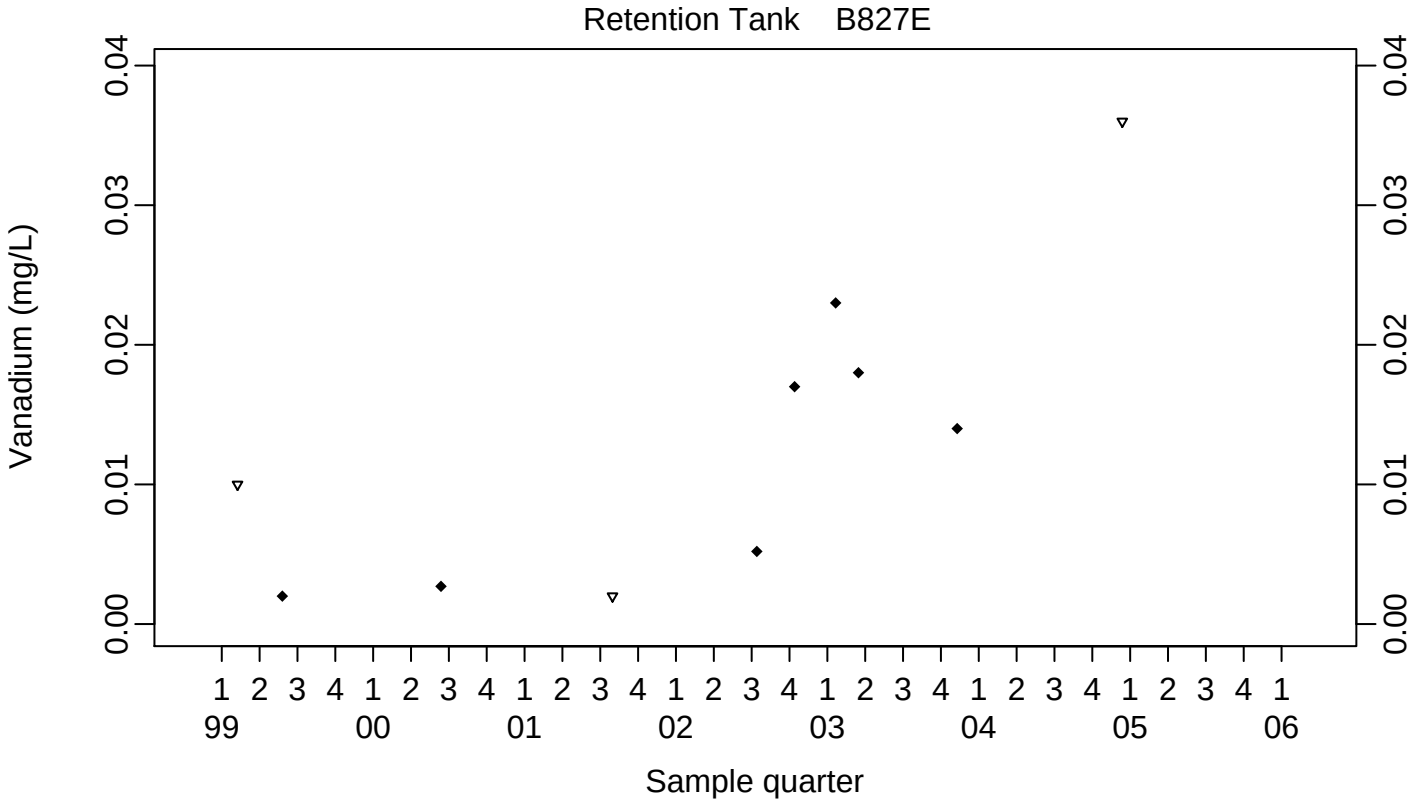


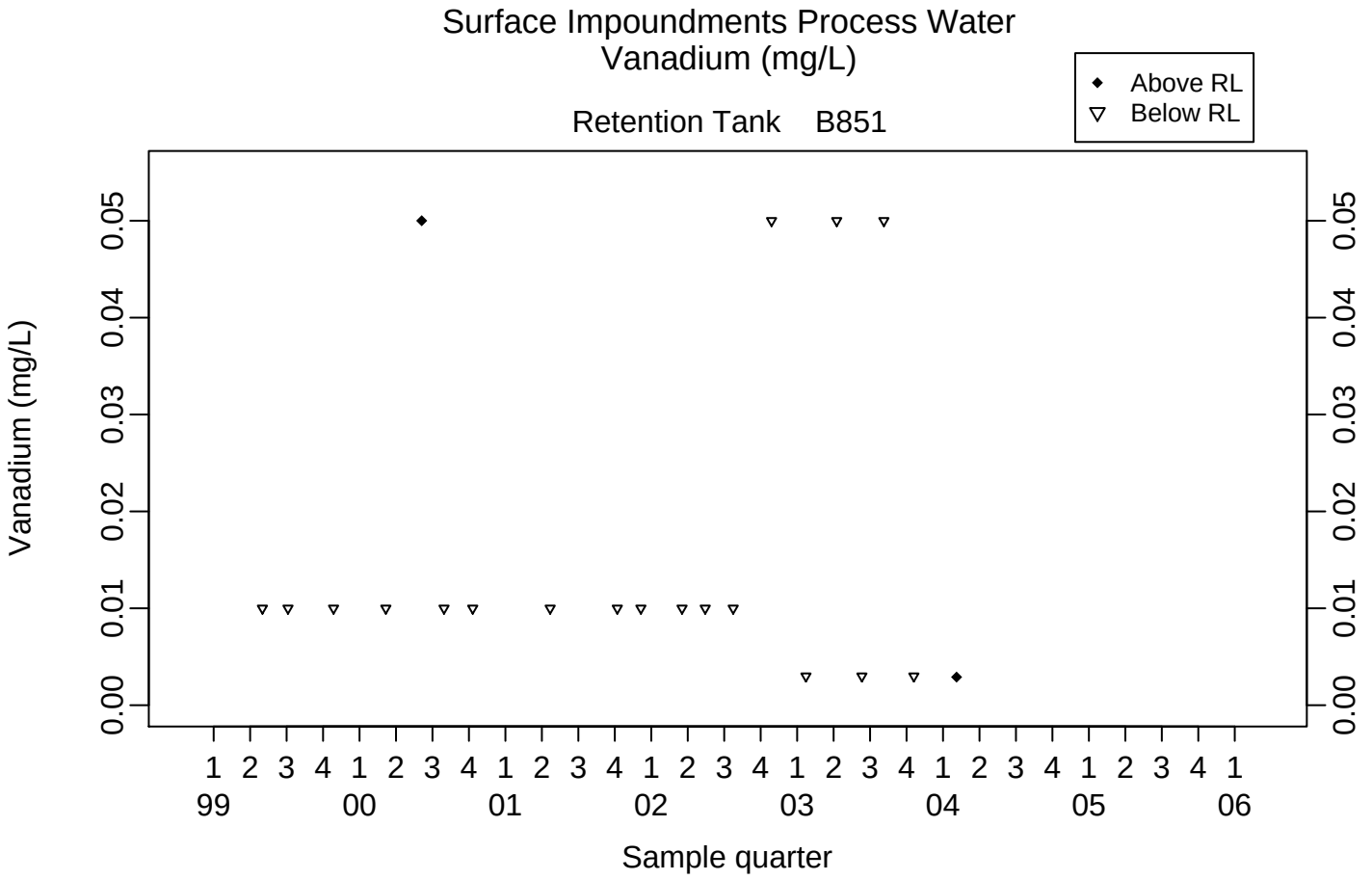
Surface Impoundments Process Water
Vanadium (mg/L)



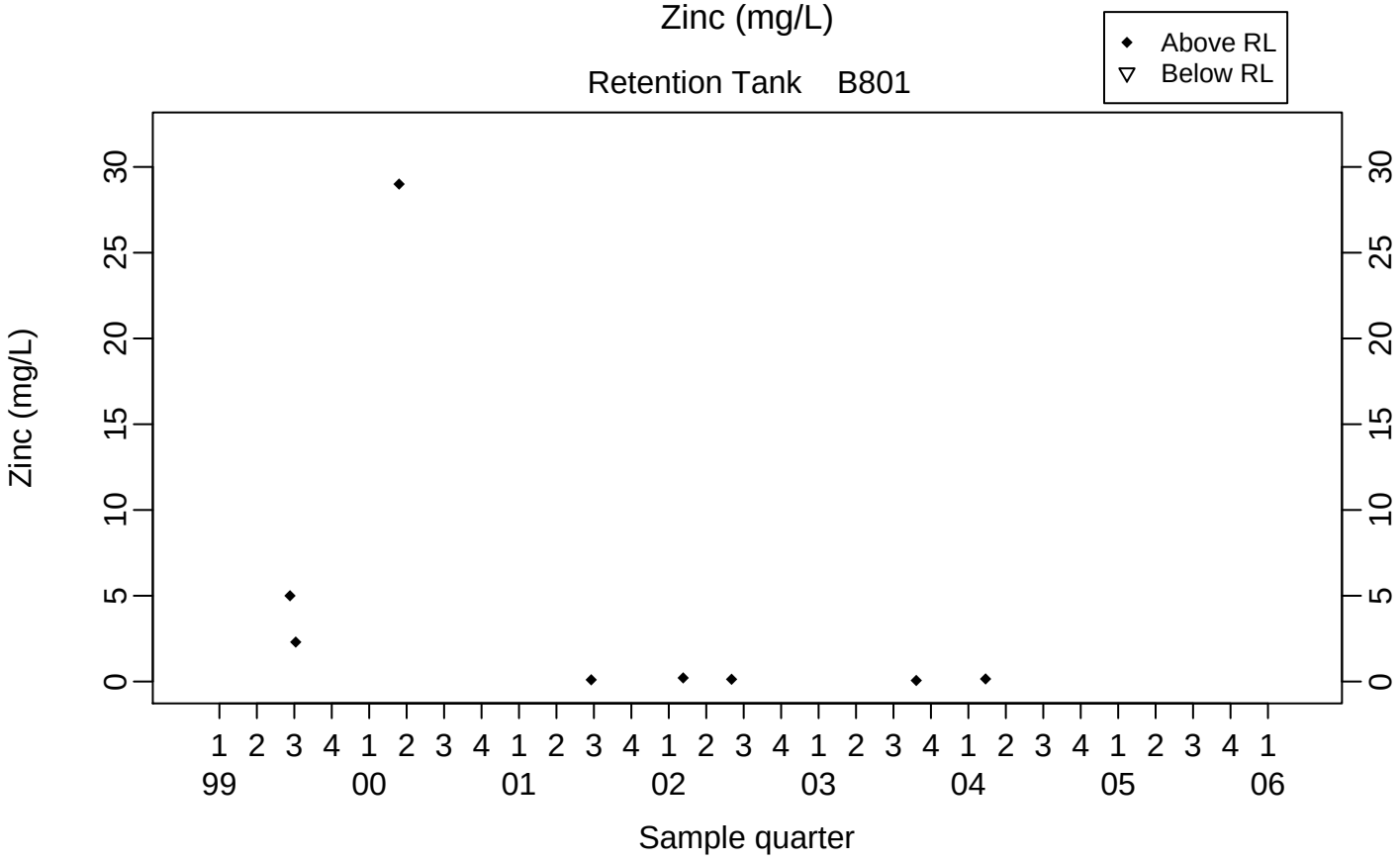


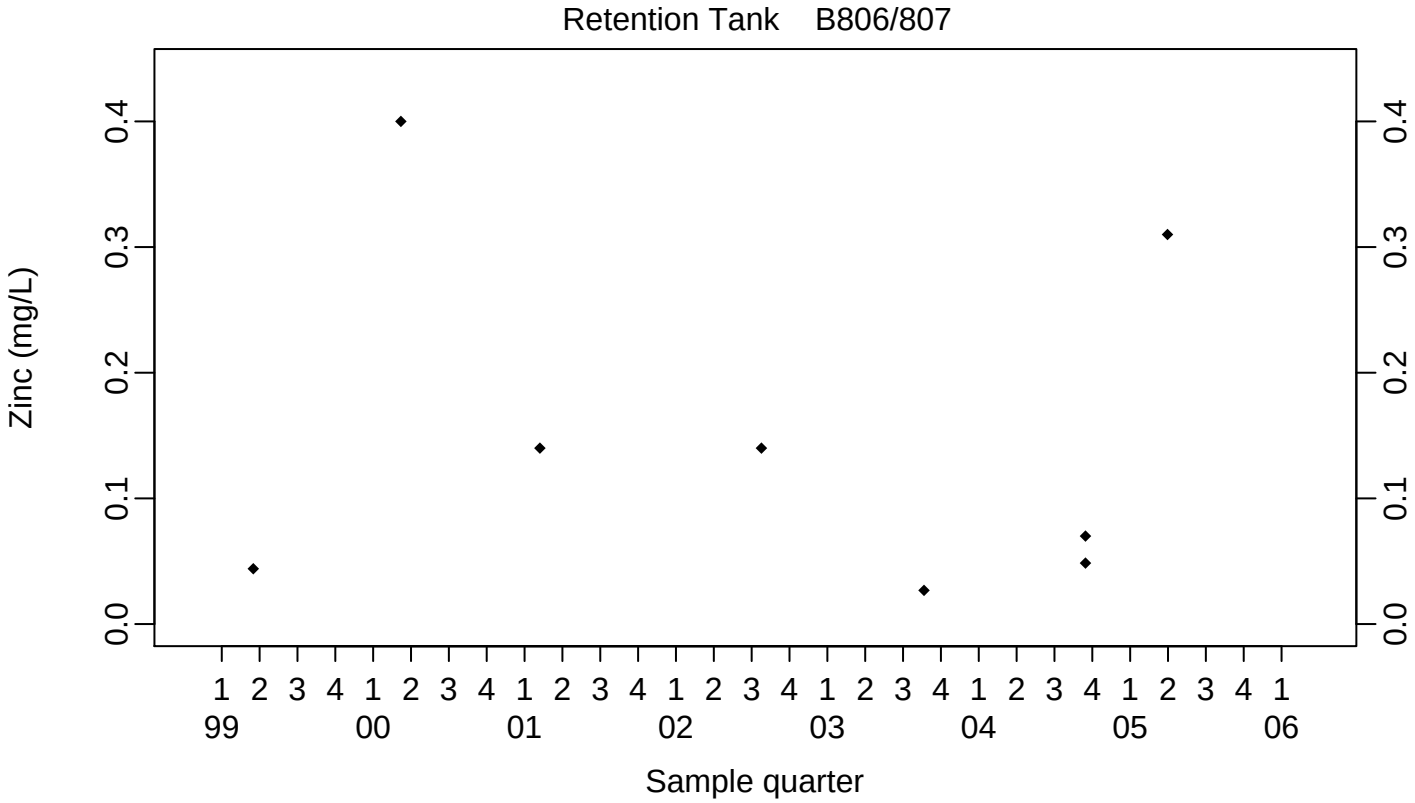

Surface Impoundments Process Water
Vanadium (mg/L)
Above RL
Below RL
Retention Tank B827C/D
Vanadium (mg/L)
0.00
0.02
0.04
0.06
0.08
0.10
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

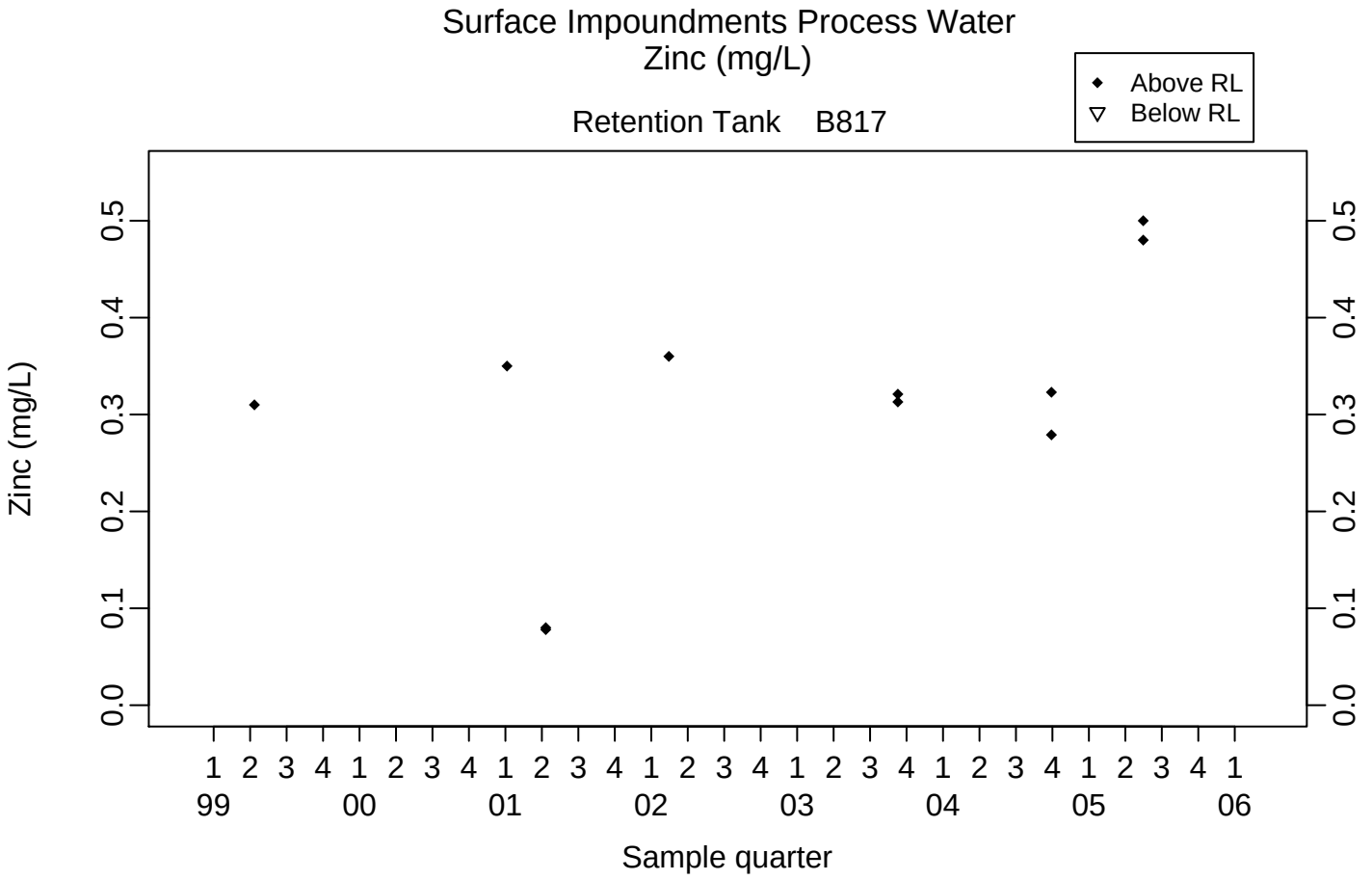

Retention Tank B827E
Vanadium (mg/L)
0.00
0.01
0.02
0.03
0.04
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

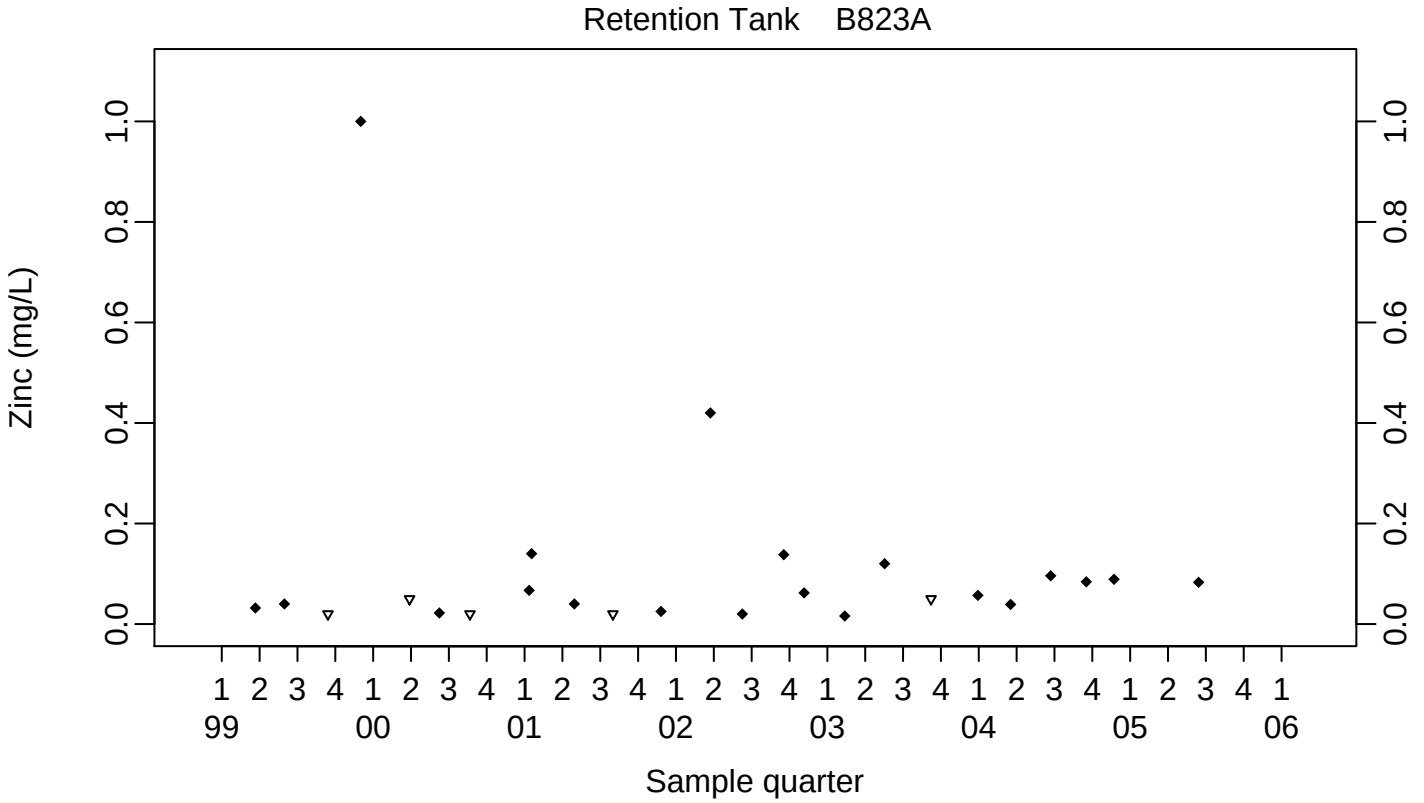

Surface Impoundments Process Water
Vanadium (mg/L)
Retention Tank B851
Above RL
Below RL
Vanadium (mg/L)
0.00
0.01
0.02
0.03
0.04
0.05
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

Surface Impoundments Process Water
Zinc (mg/L)

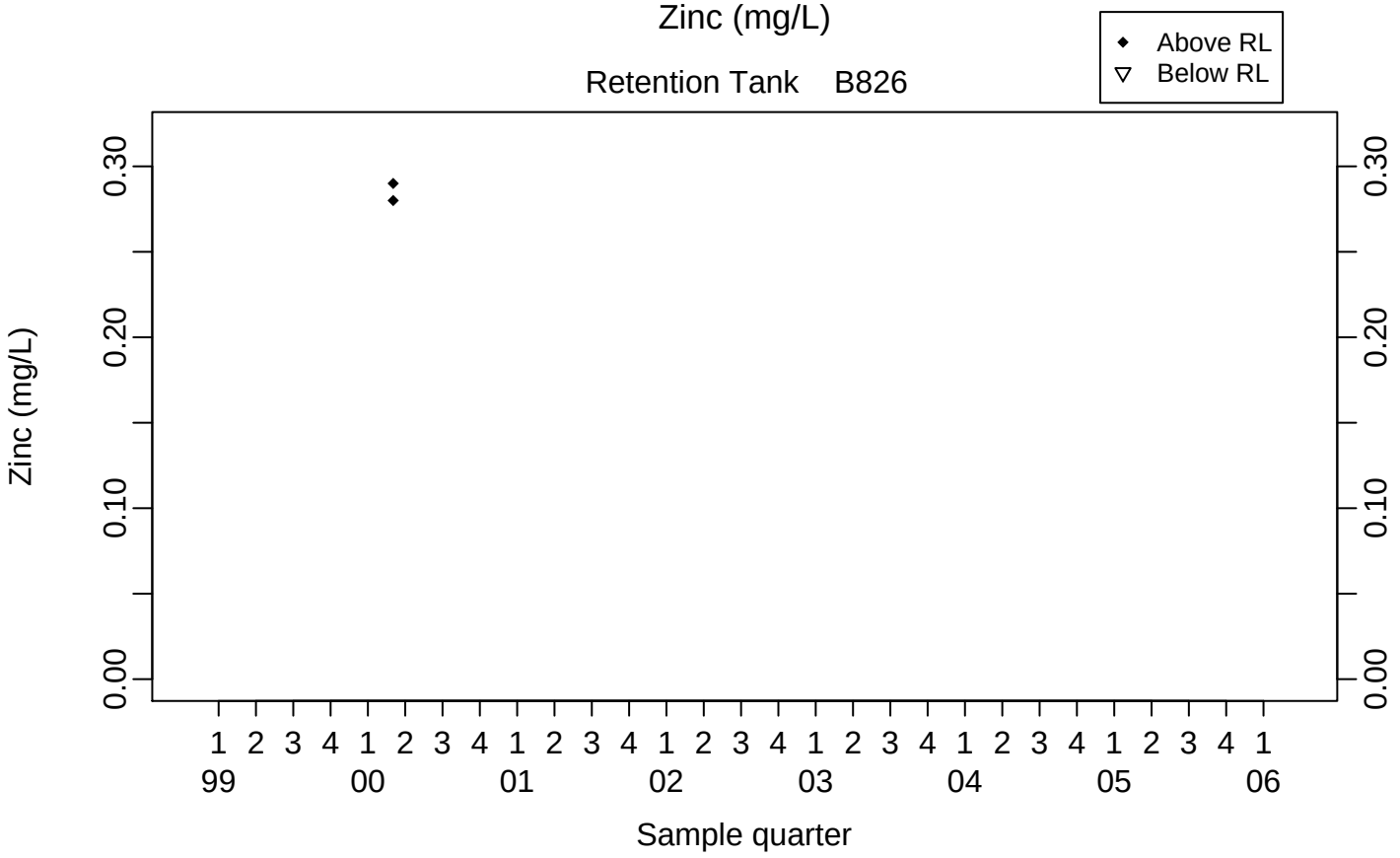


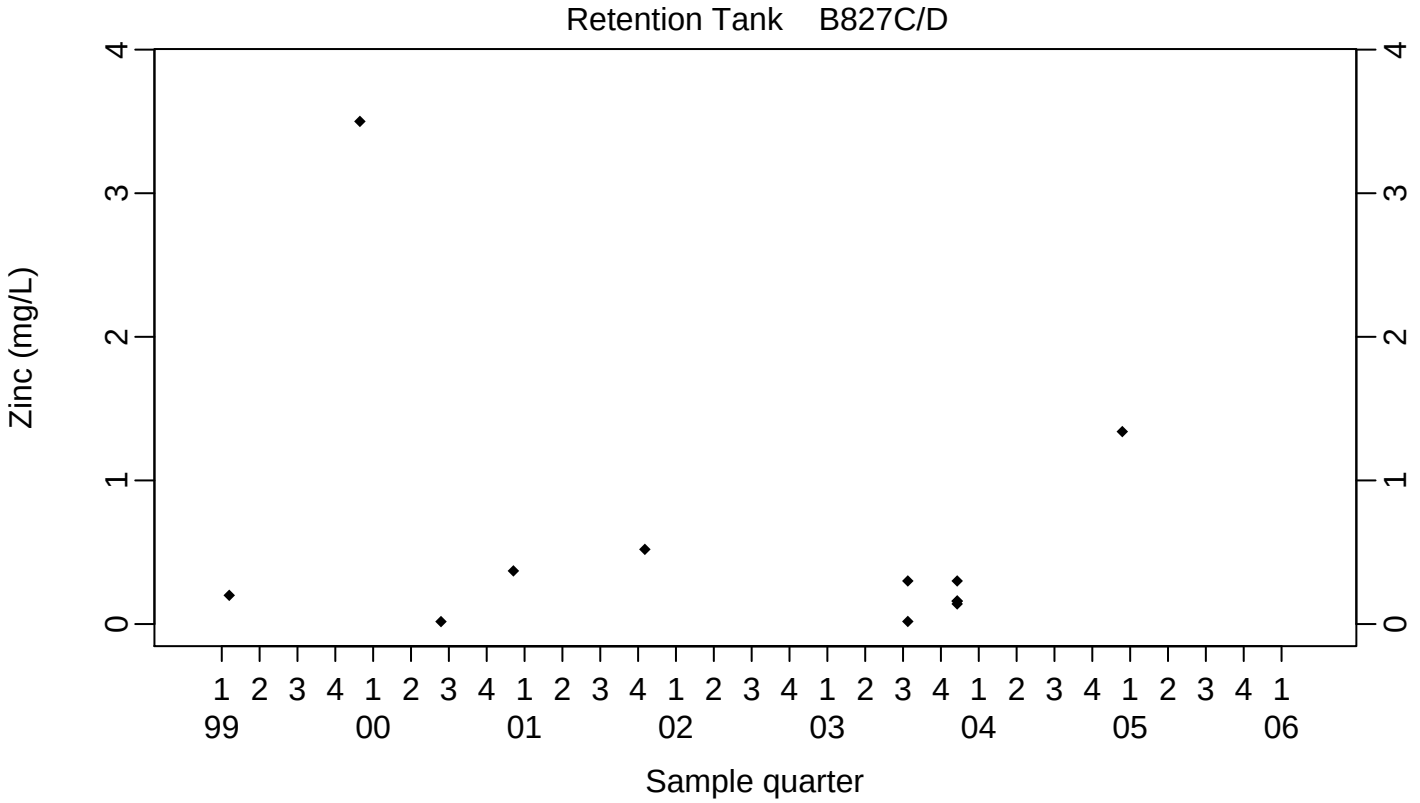



Surface Impoundments Process Water
Zinc (mg/L)
Above RL
Below RL
Retention Tank B817
Zinc (mg/L)
0.0
0.1
0.2
0.3
0.4
0.5
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

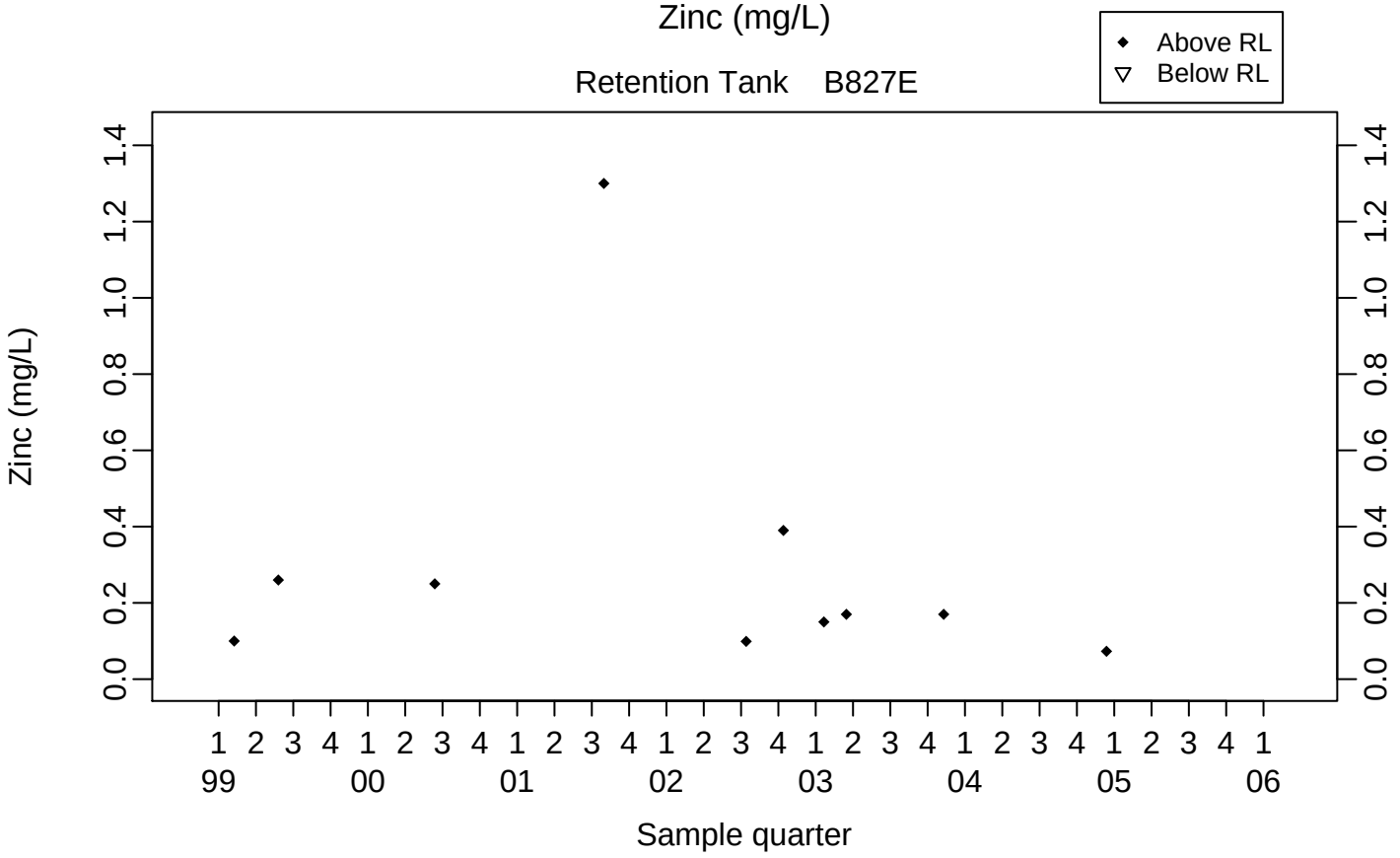

Retention Tank B823A
Zinc (mg/L)
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

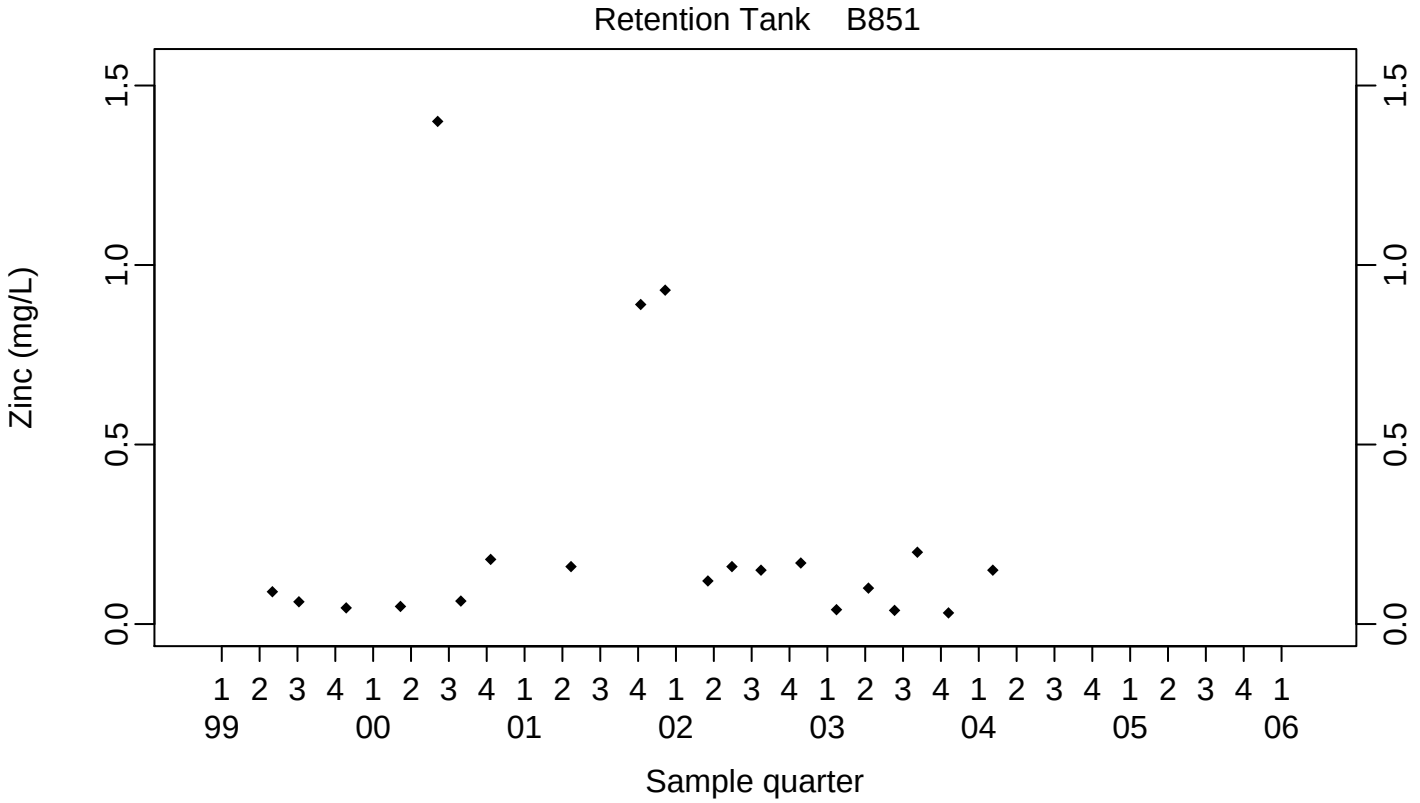
Surface Impoundments Process Water
Zinc (mg/L)

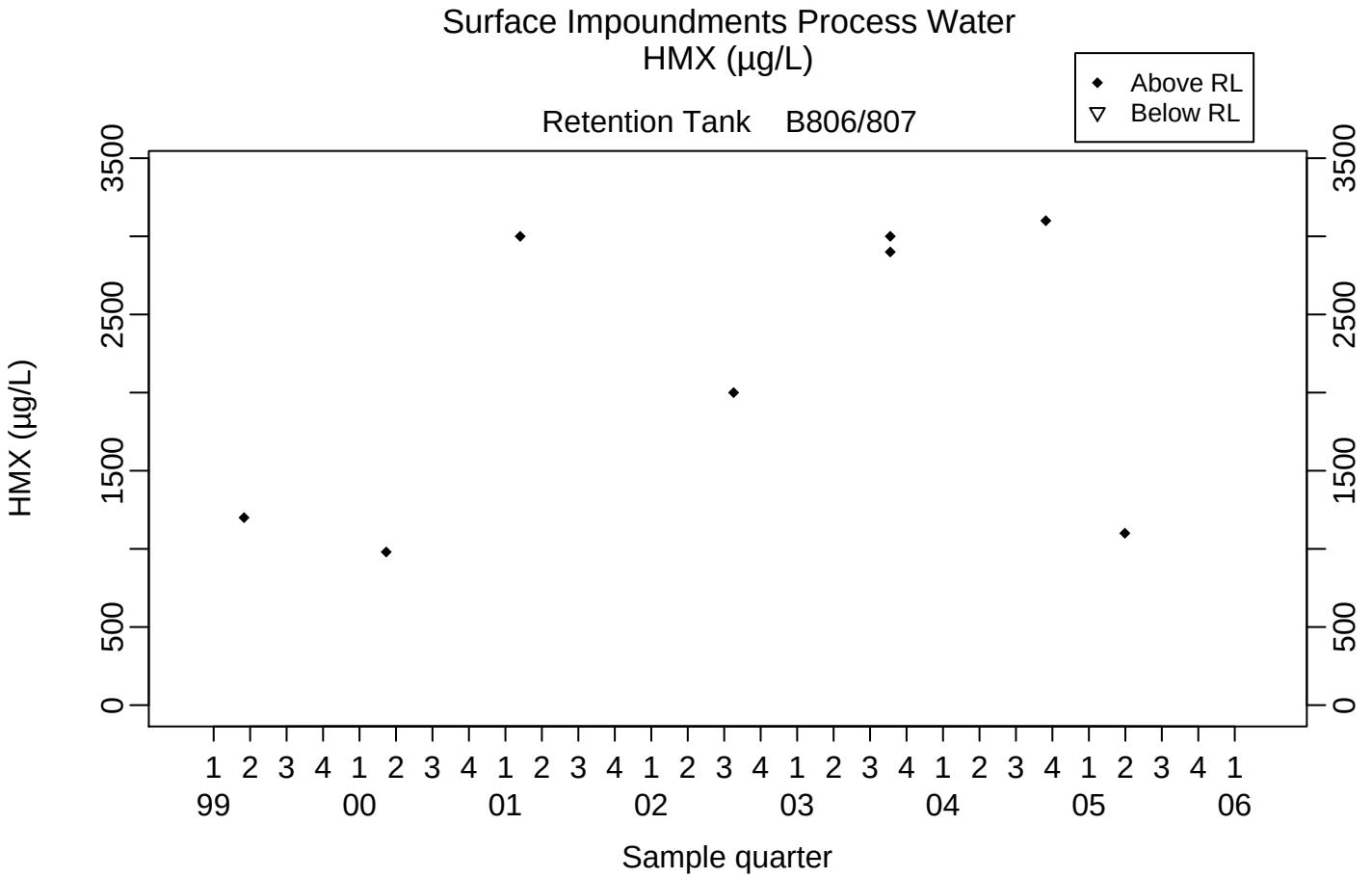


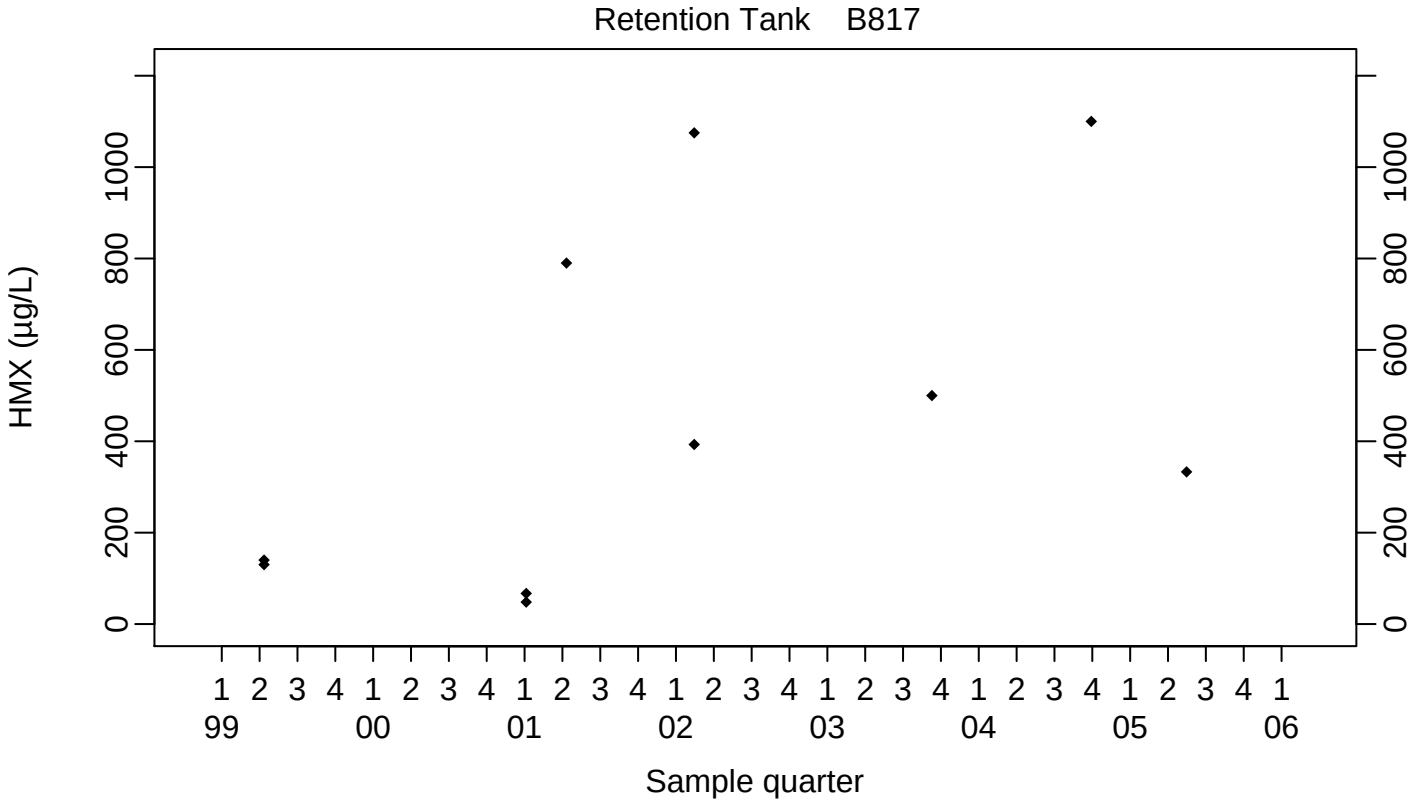


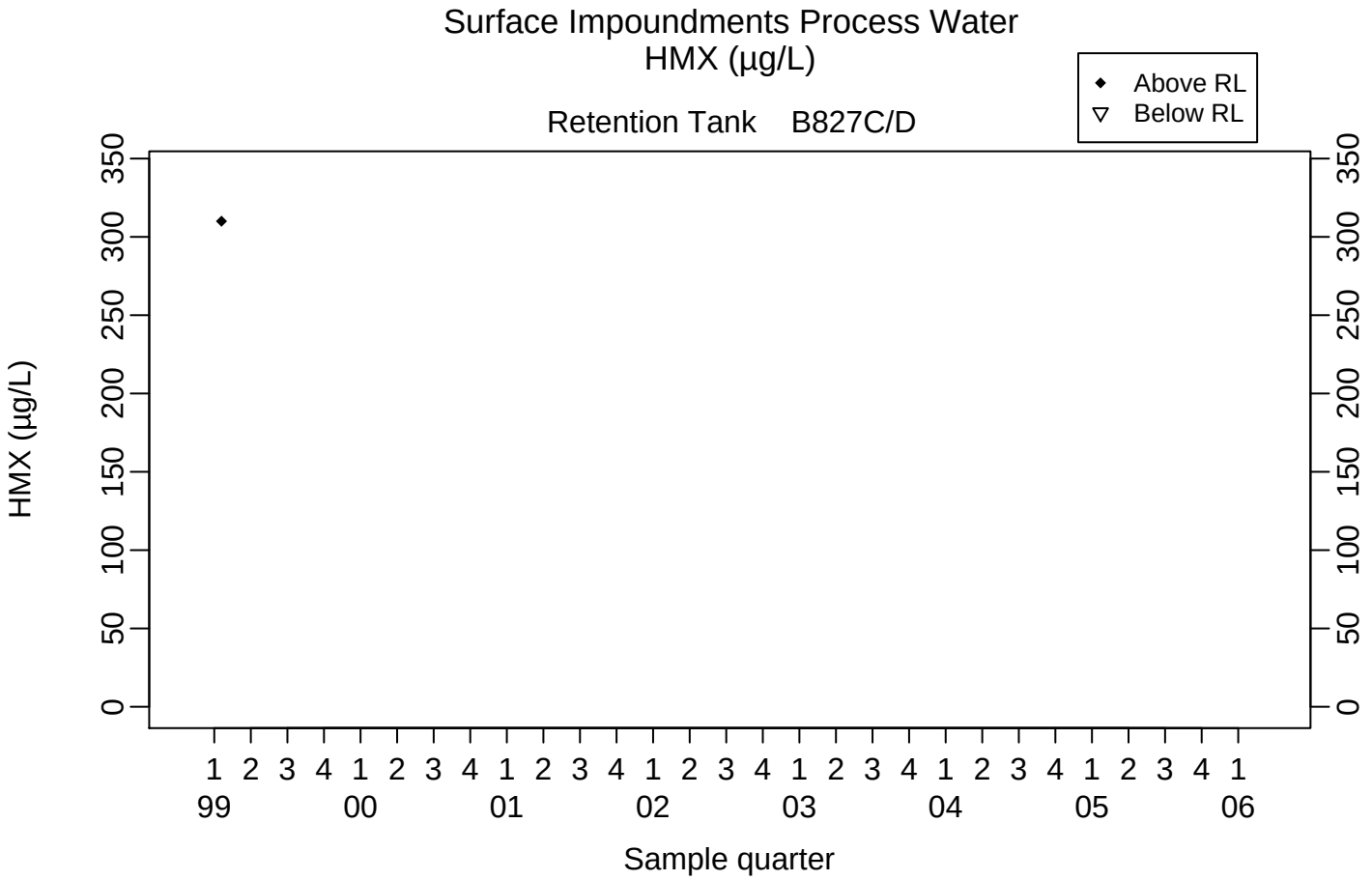
Surface Impoundments Process Water
Zinc (mg/L)

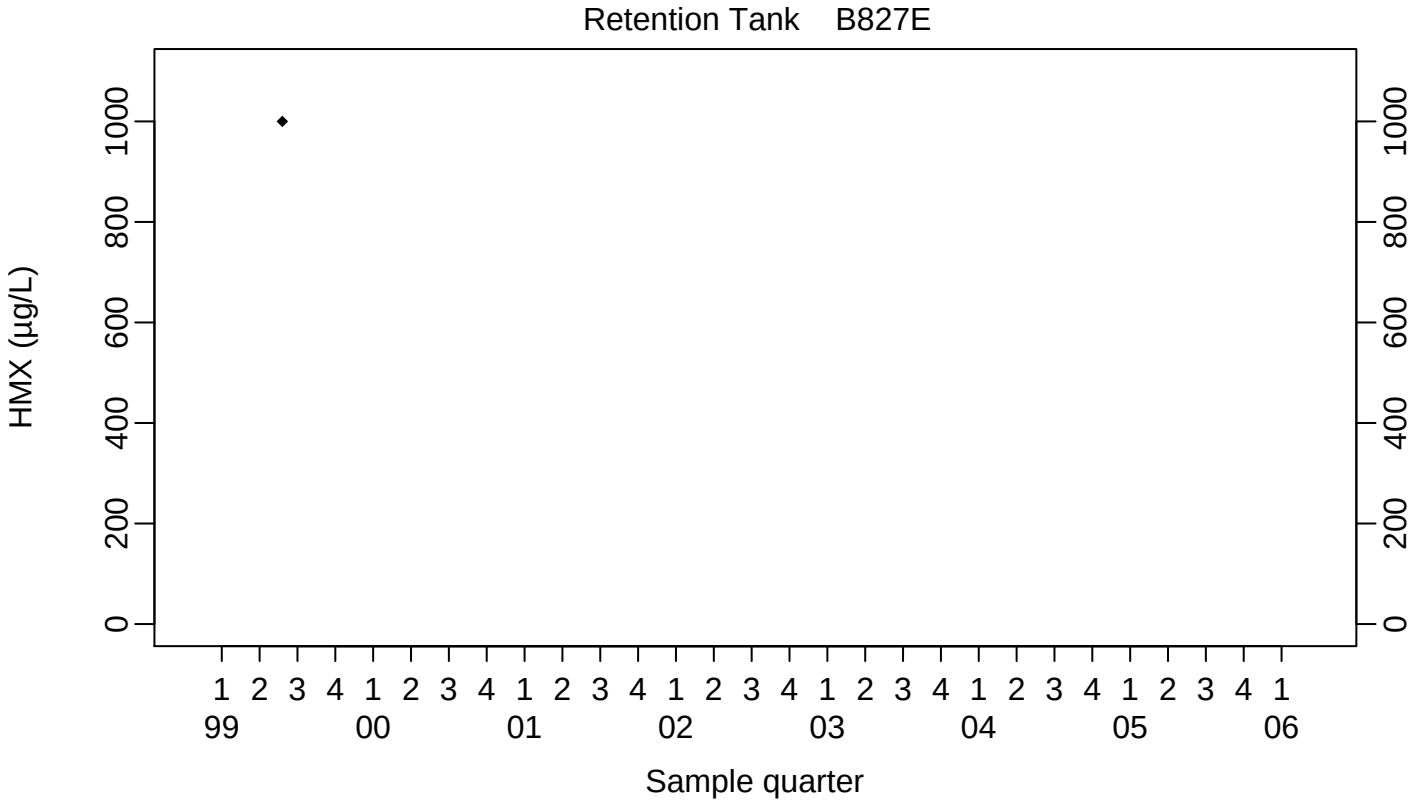




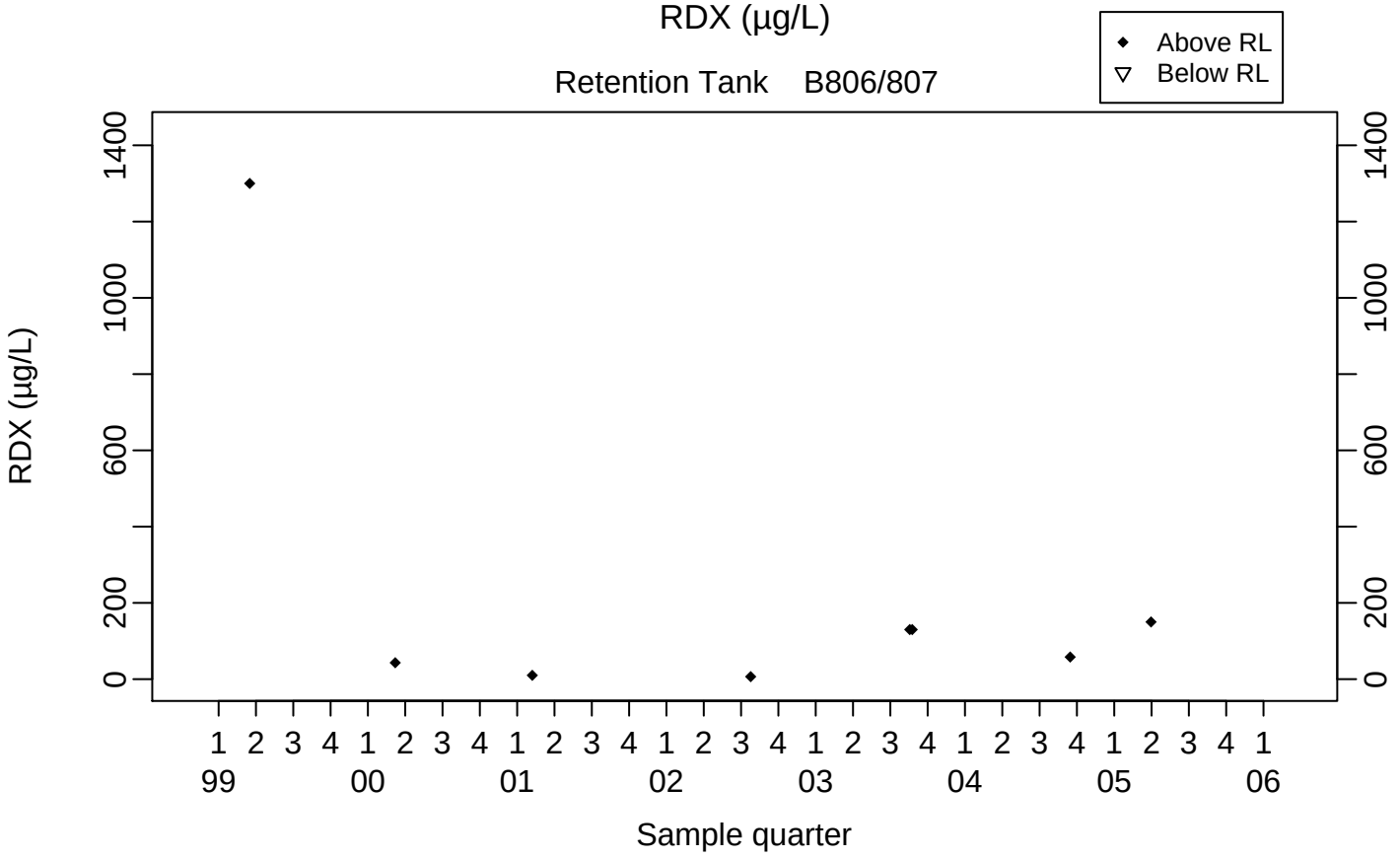

Surface Impoundments Process Water
HMX (µg/L)
Above RL
Below RL
Retention Tank B806/807
HMX (µg/L)
0
500
1500
2500
3500
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

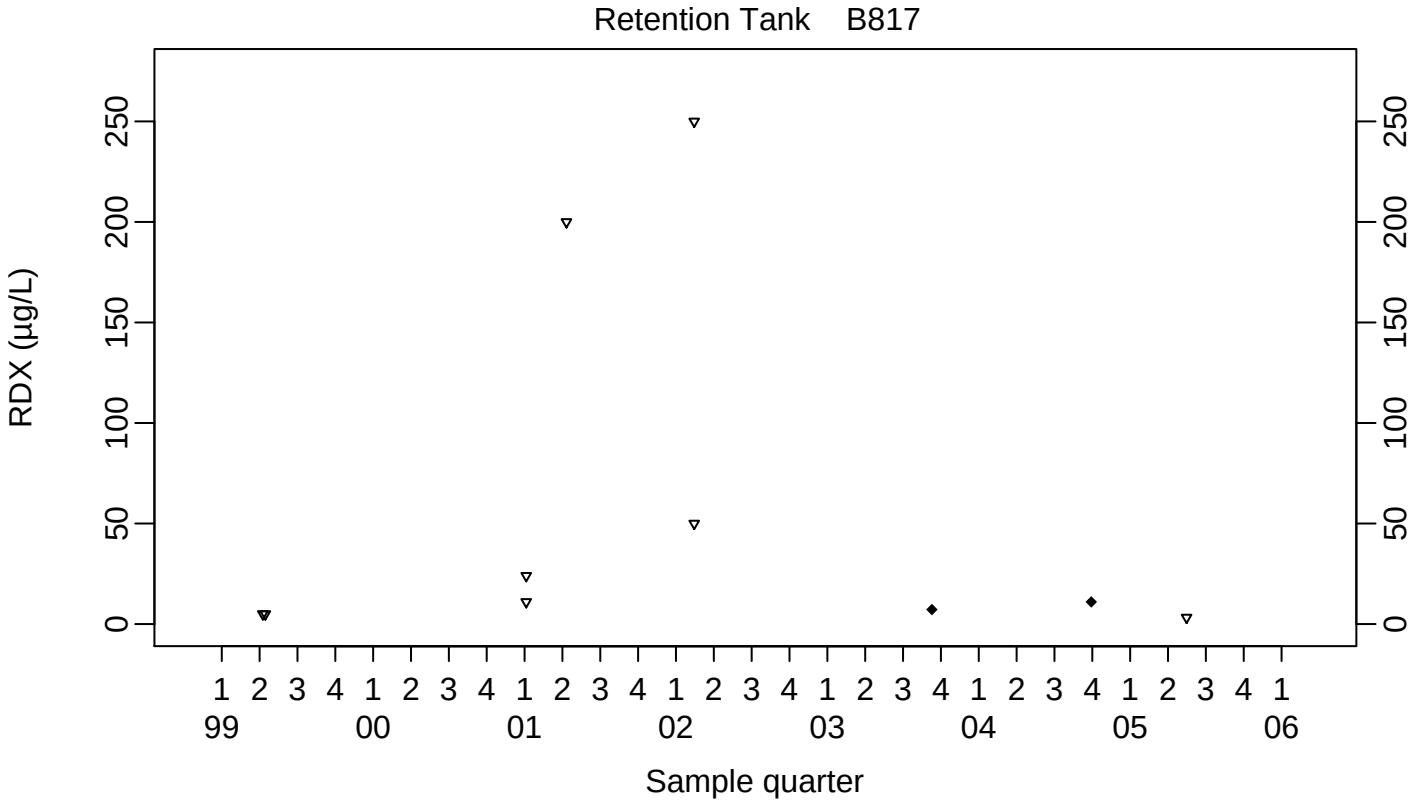

Retention Tank B817
HMX (µg/L)
0
200
400
600
800
1000
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


Surface Impoundments Process Water
HMX (µg/L)
Above RL
Below RL
Retention Tank B827C/D
HMX (µg/L)
0
50
100
150
200
250
300
350
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

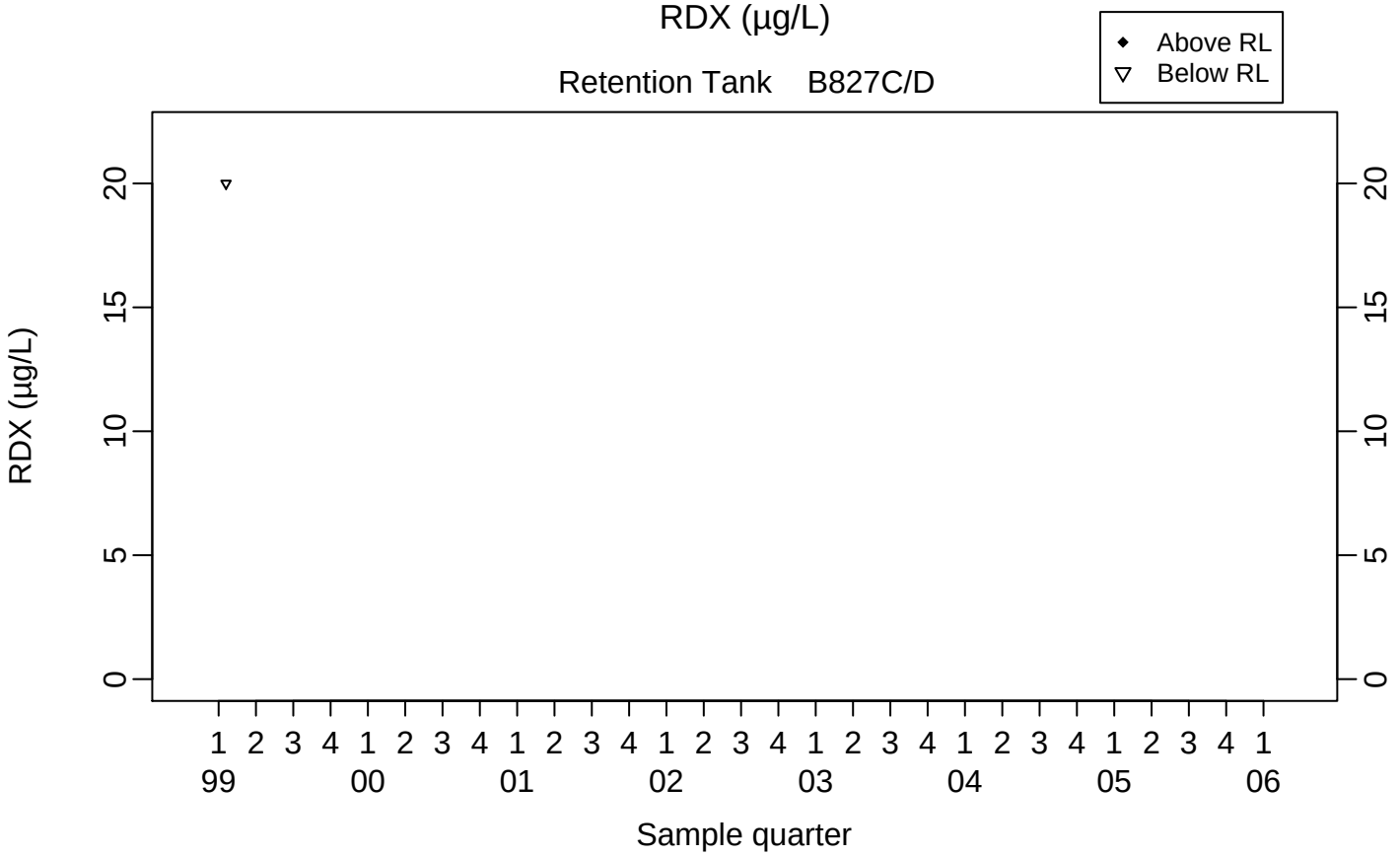

Retention Tank B827E
HMX (µg/L)
0
200
400
600
800
1000
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

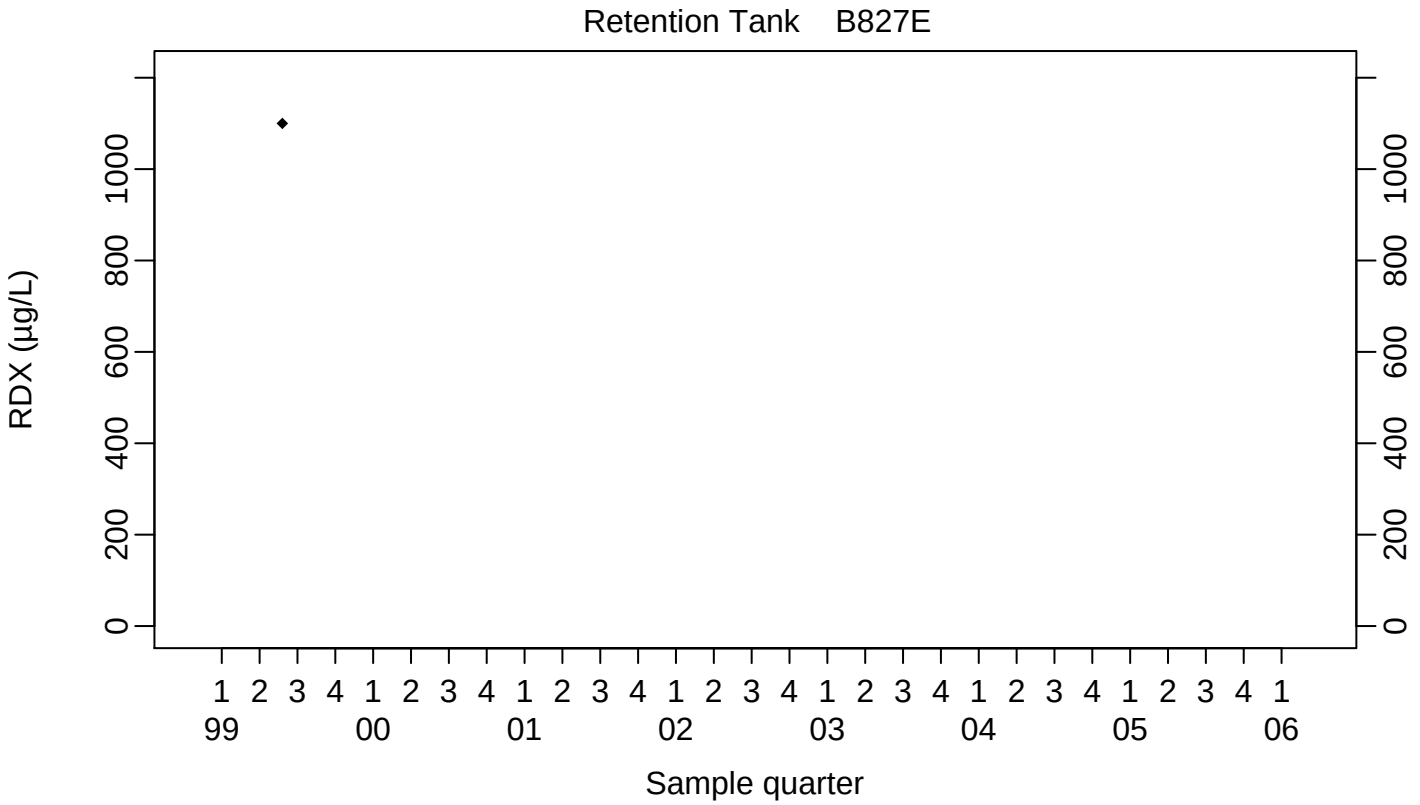
Surface Impoundments Process Water
RDX (µg/L)



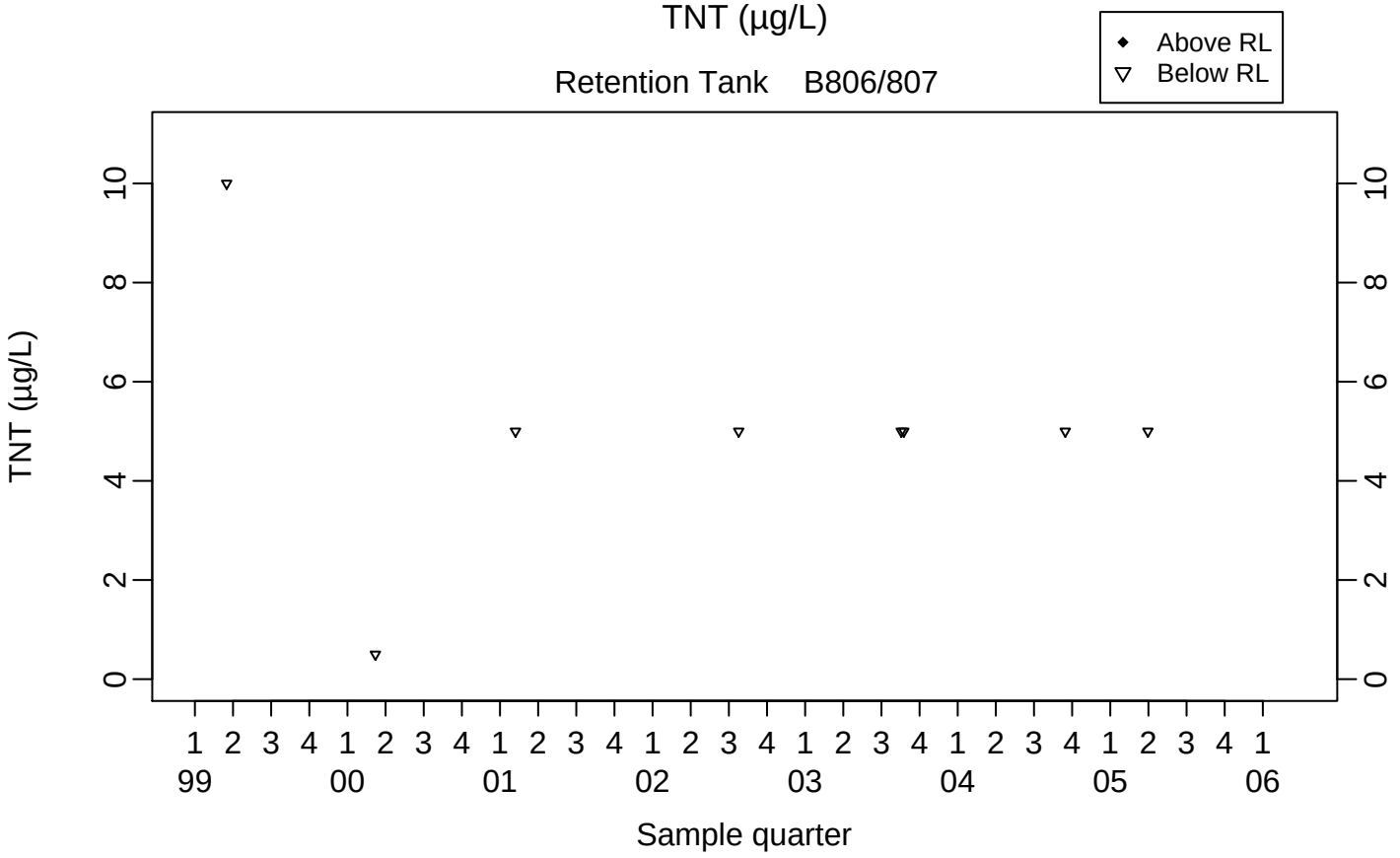


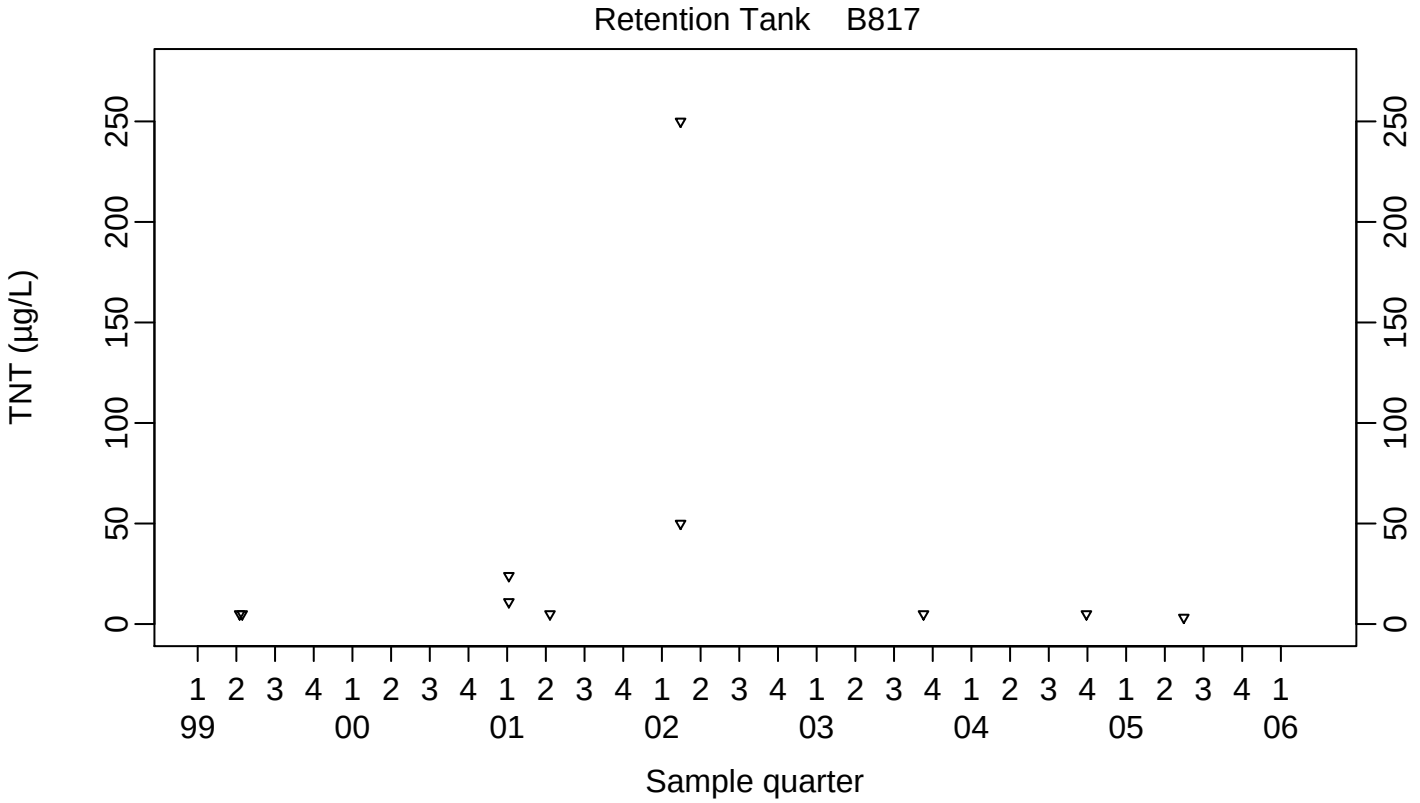
Surface Impoundments Process Water
RDX (µg/L)

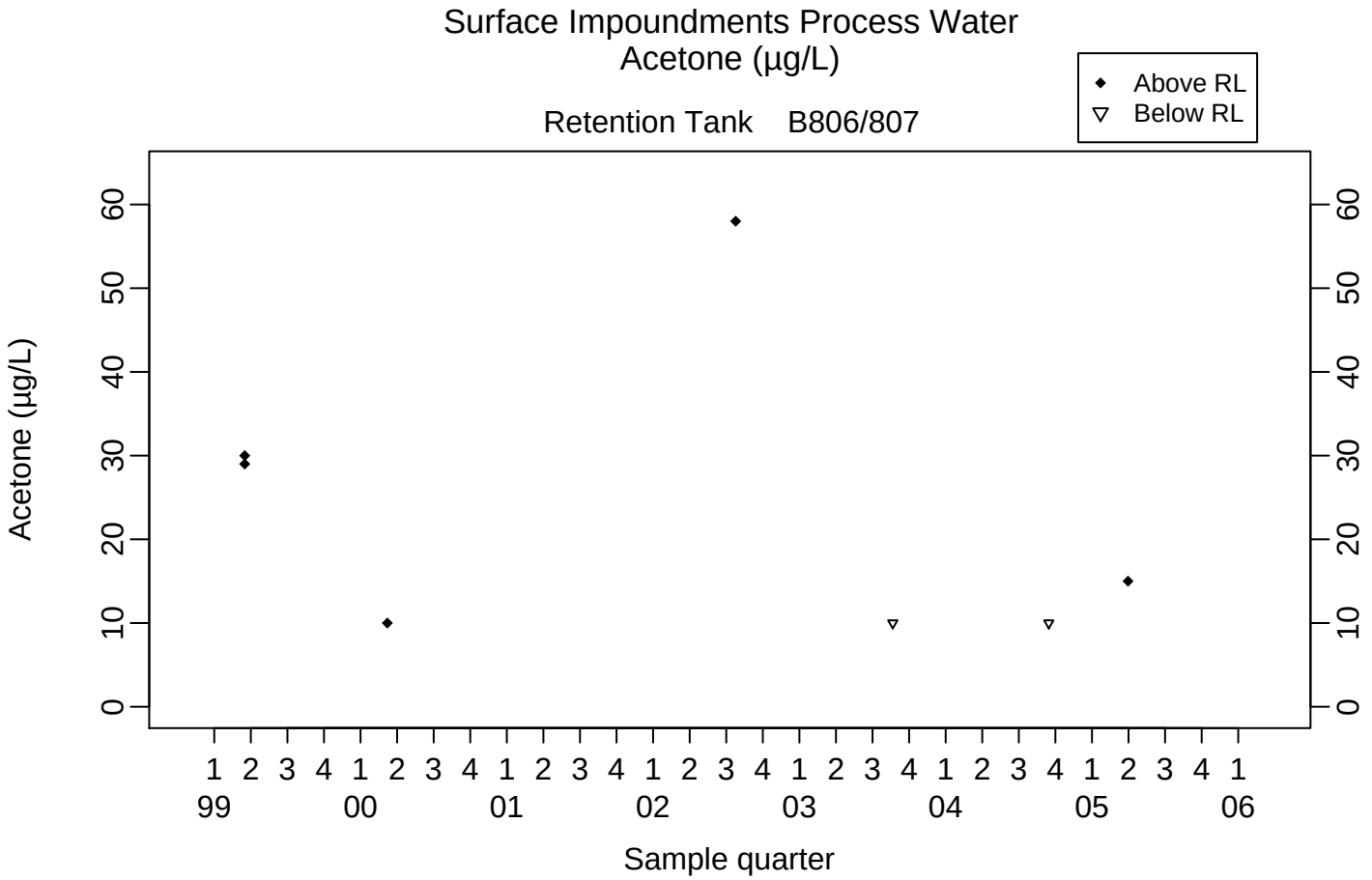


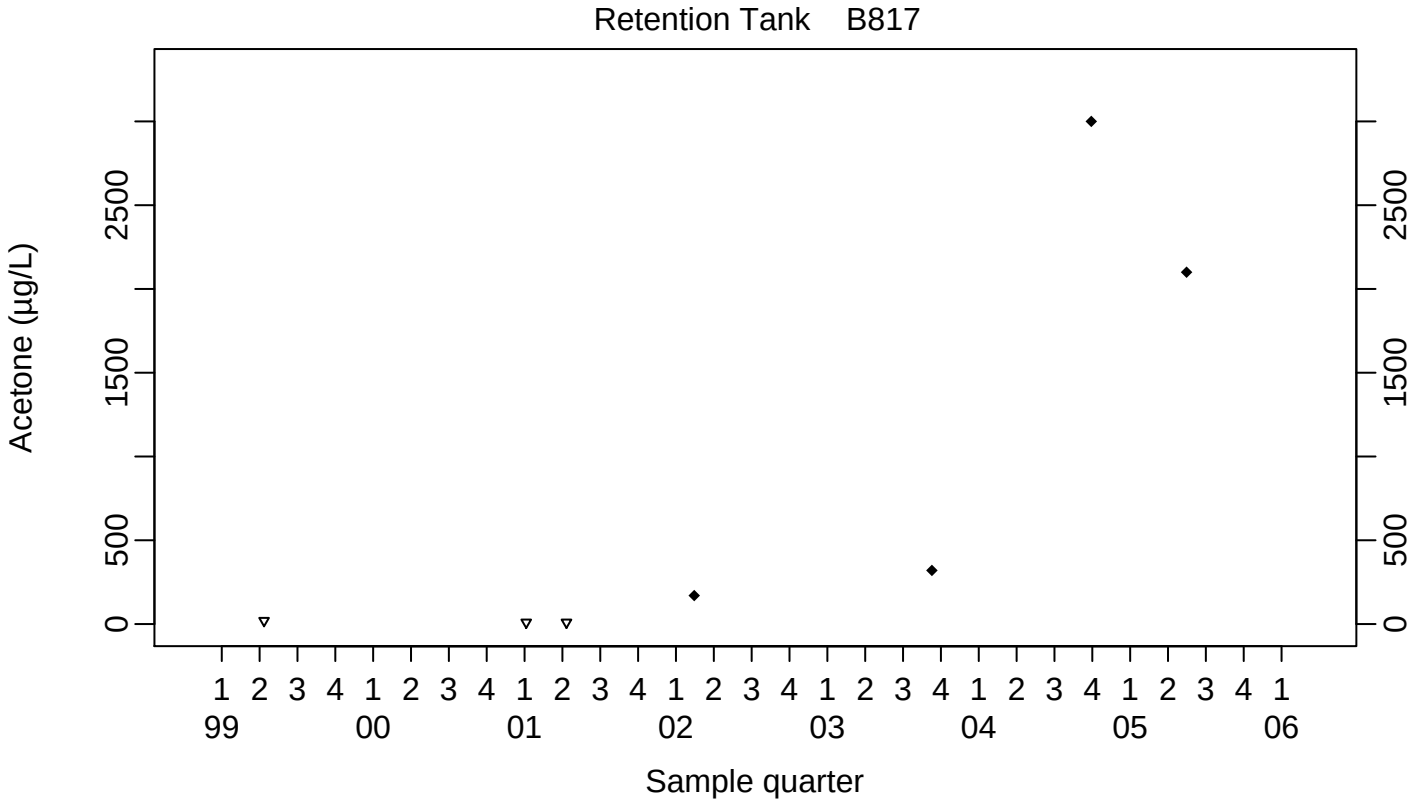


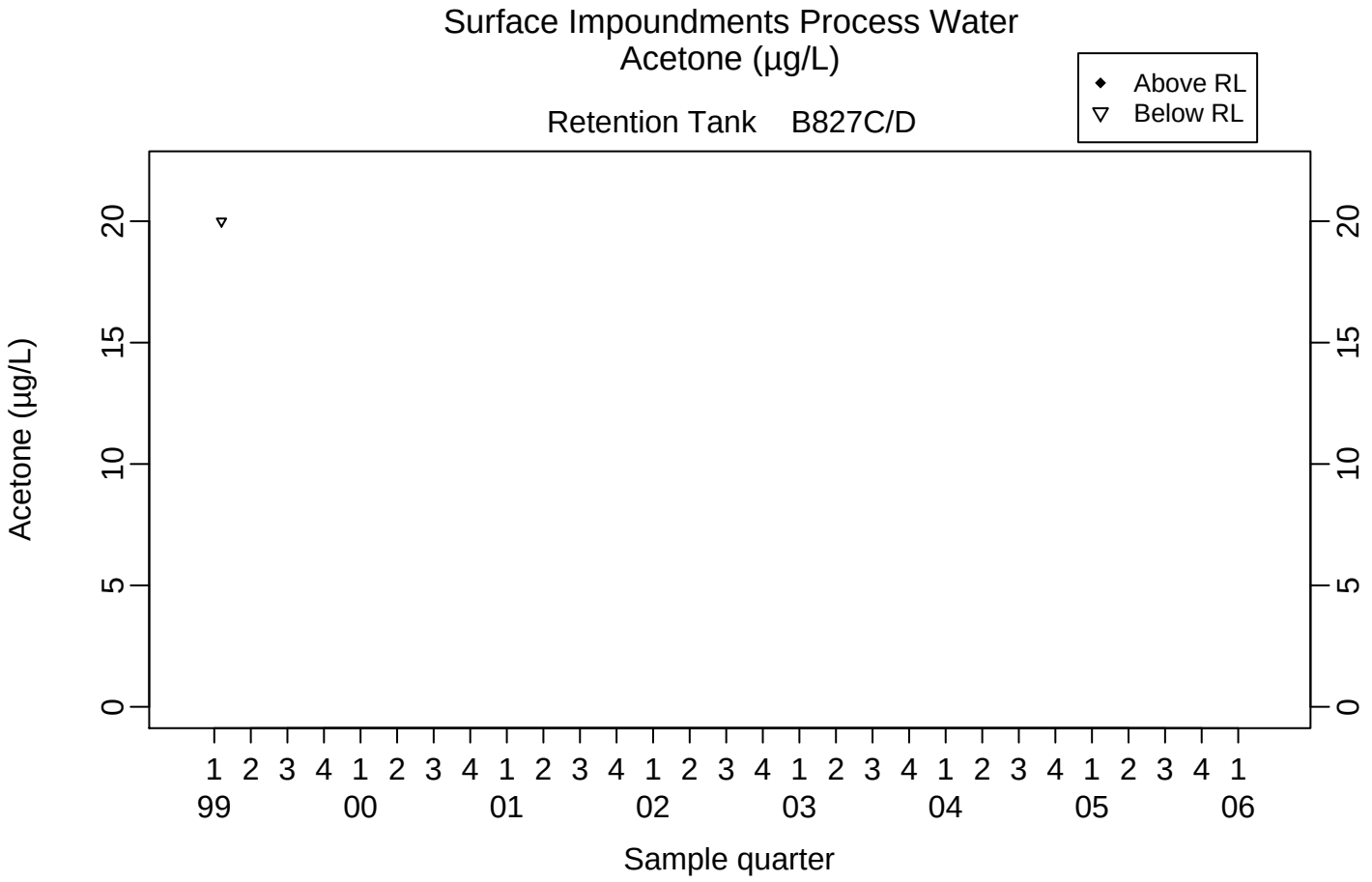
Surface Impoundments Process Water
TNT (µg/L)

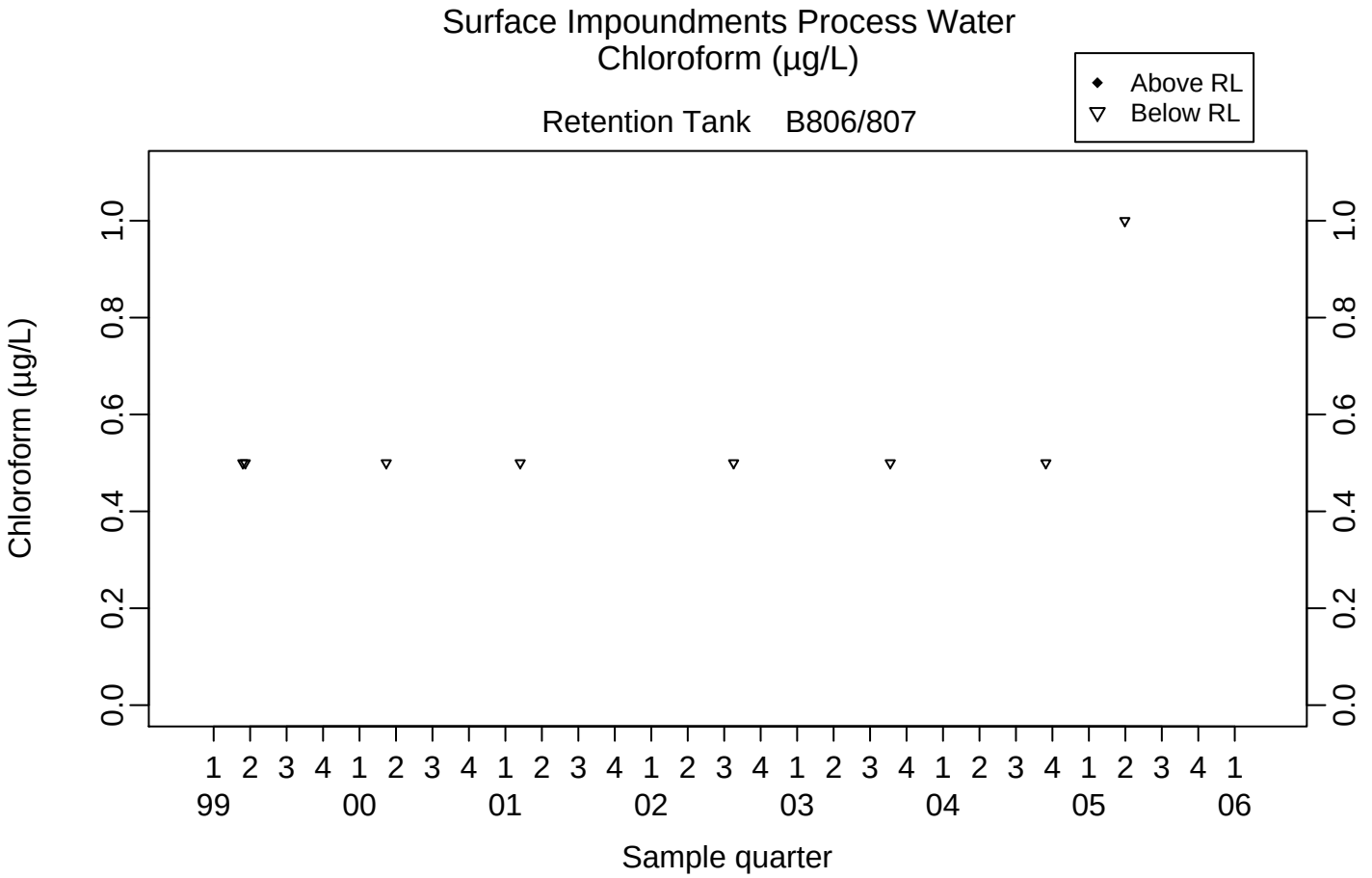


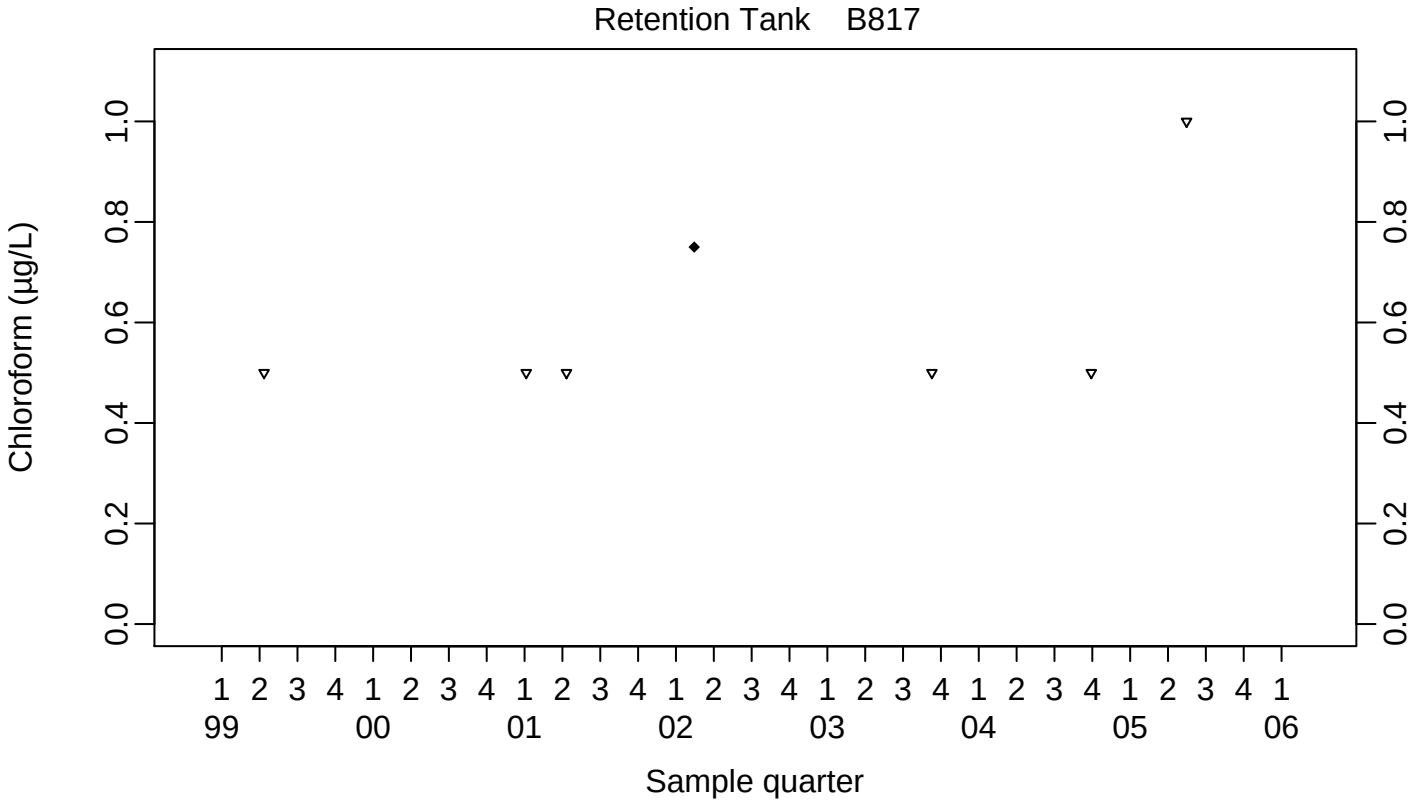


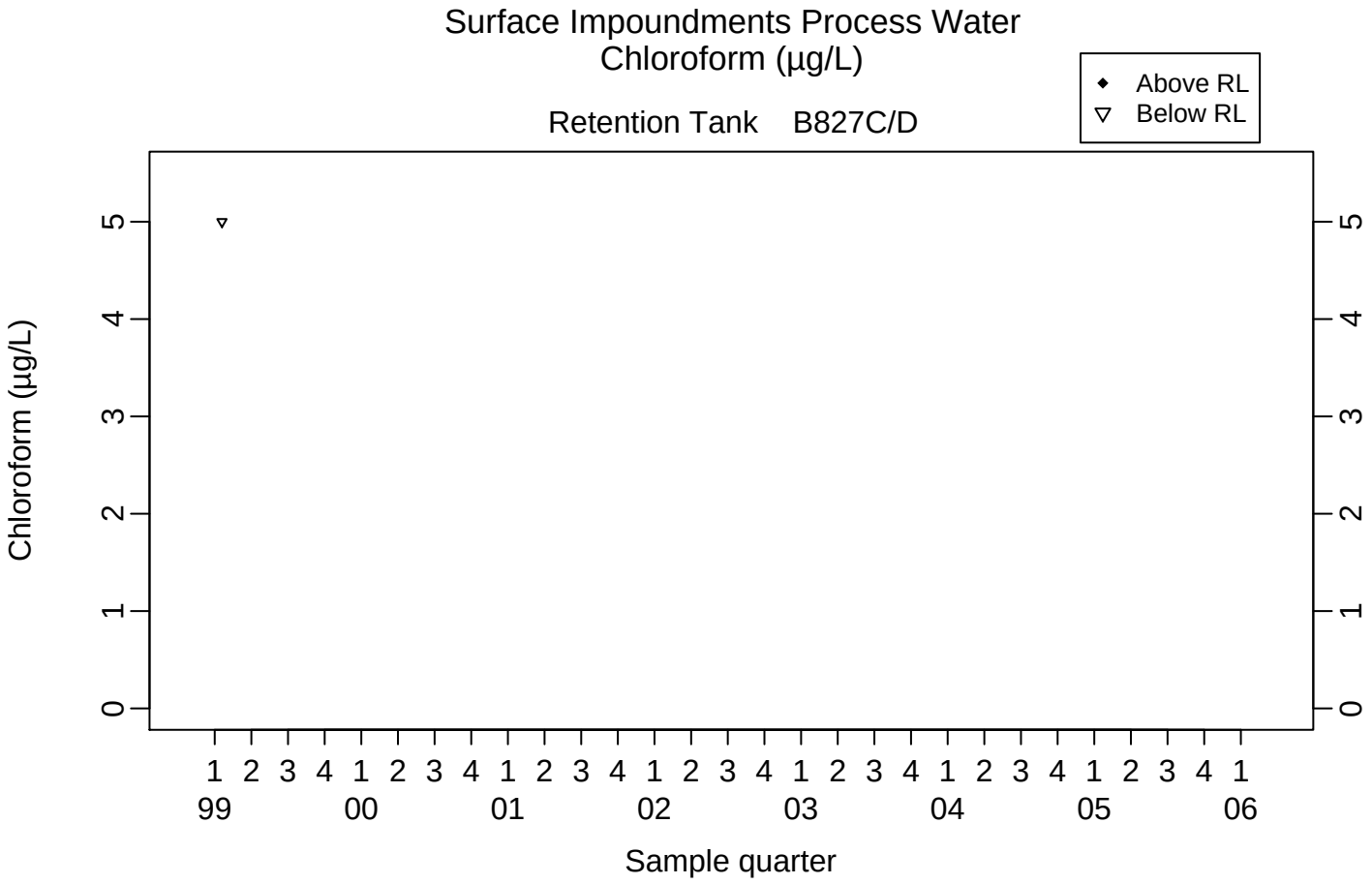

Surface Impoundments Process Water
Acetone (µg/L)
Above RL
Below RL
Retention Tank B806/807
Acetone (µg/L)
0
10
20
30
40
50
60
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

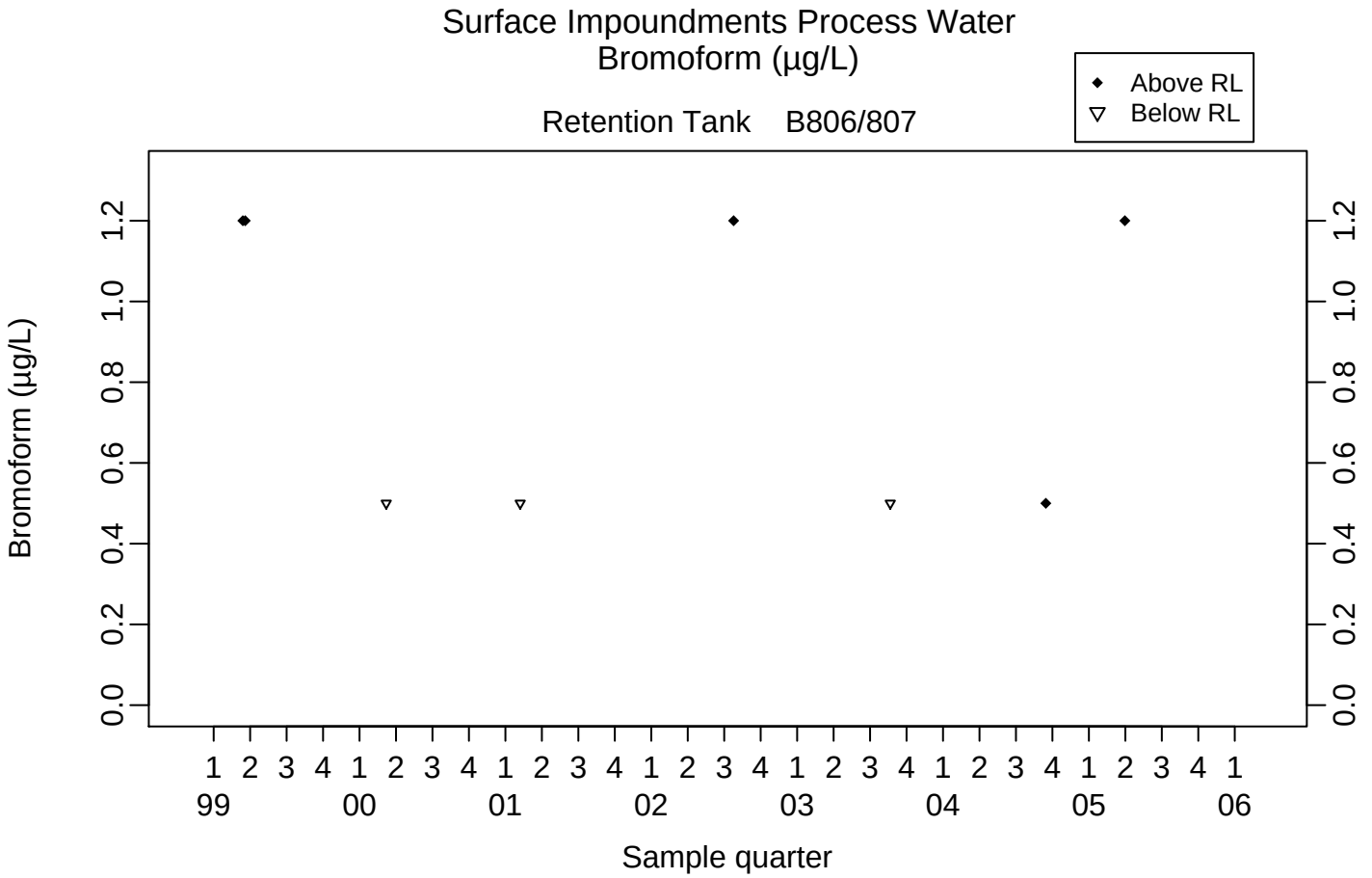

Retention Tank B817
Acetone (µg/L)
0
500
1500
2500
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

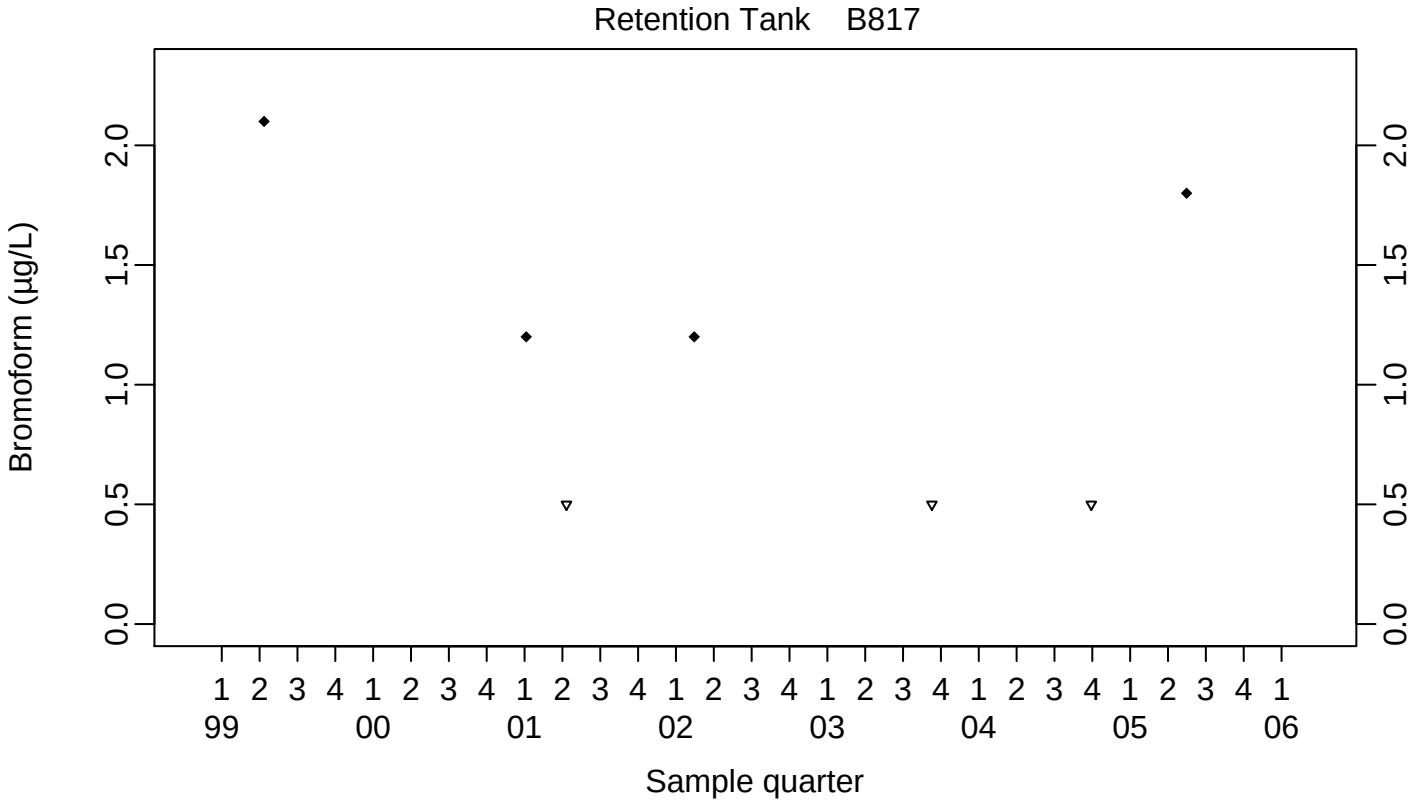

Surface Impoundments Process Water
Acetone (µg/L)
Retention Tank B827C/D
Above RL
Below RL
Acetone (µg/L)
0
5
10
15
20
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

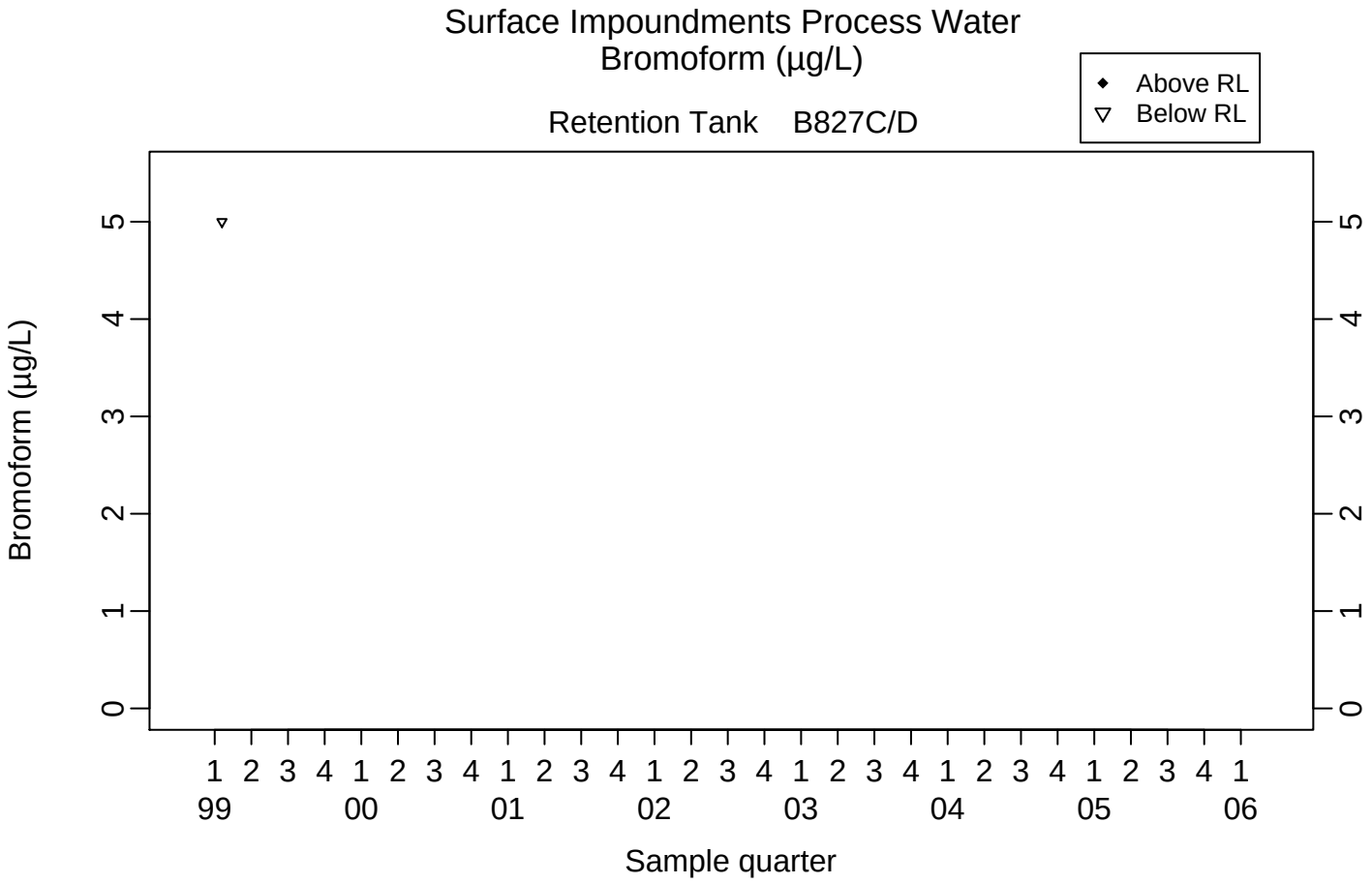

Surface Impoundments Process Water
Chloroform (µg/L)
Above RL
Below RL
Retention Tank B806/807
Chloroform (µg/L)
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

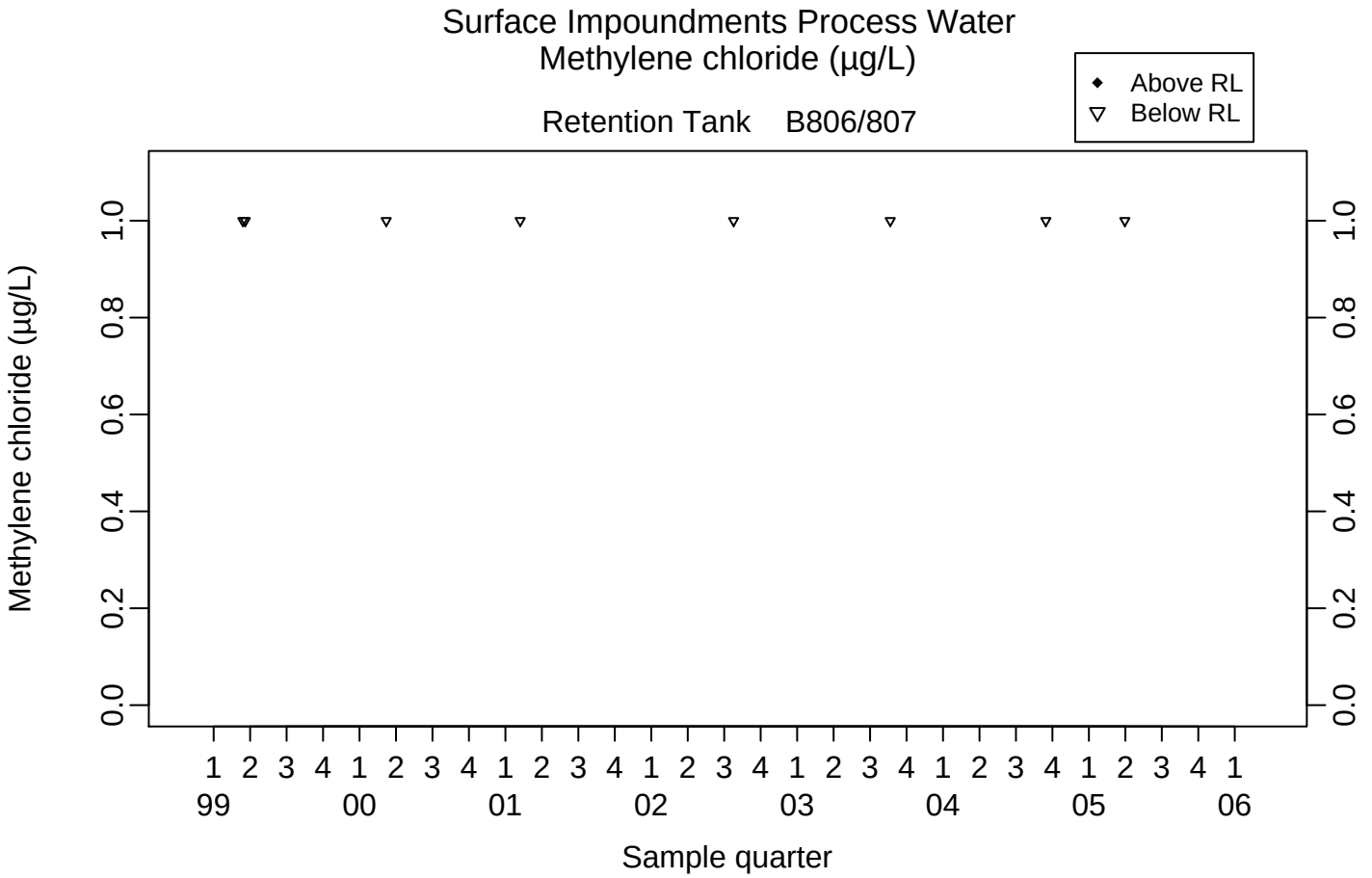

Retention Tank B817
Chloroform (µg/L)
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

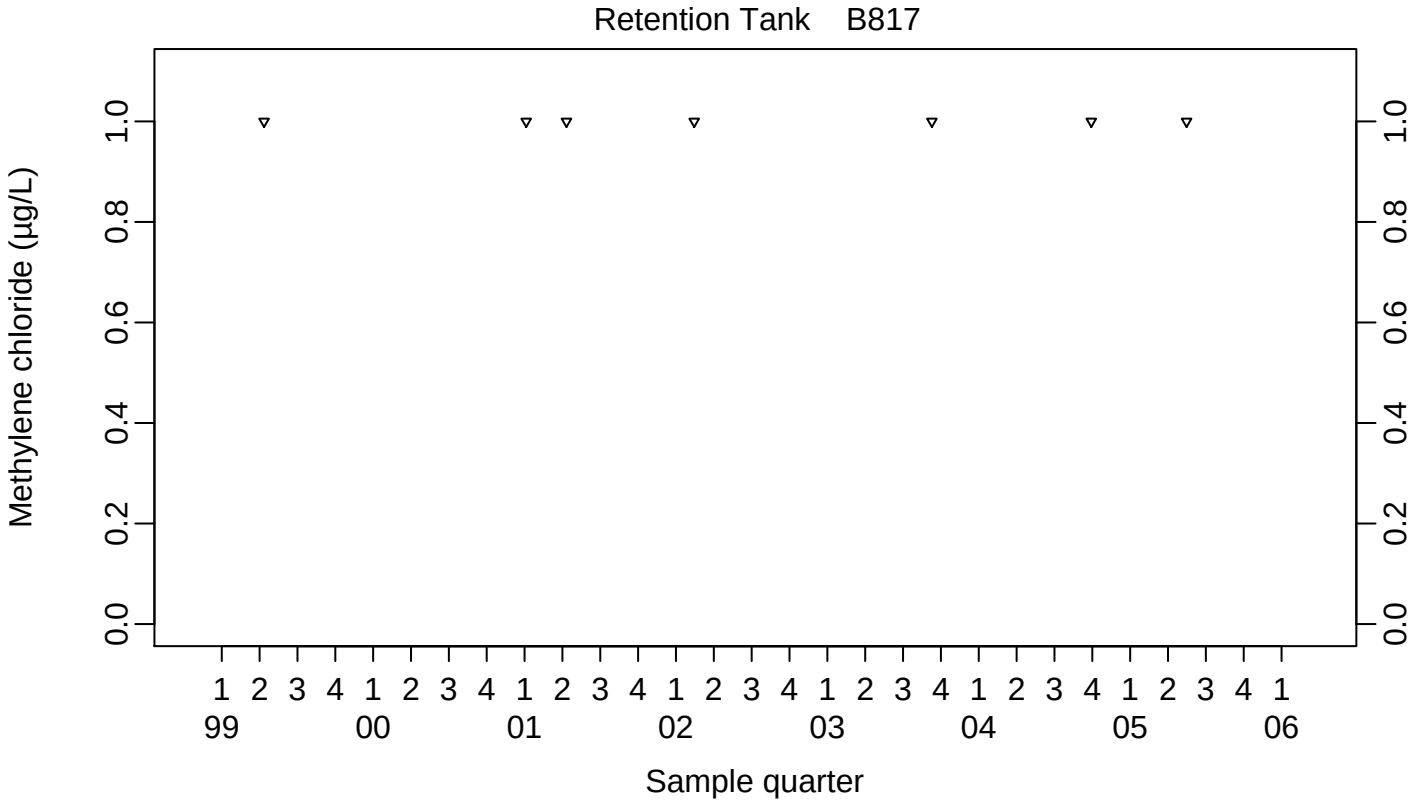

Surface Impoundments Process Water
Chloroform (µg/L)
Retention Tank B827C/D
Above RL
Below RL
Chloroform (µg/L)
0
1
2
3
4
5
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

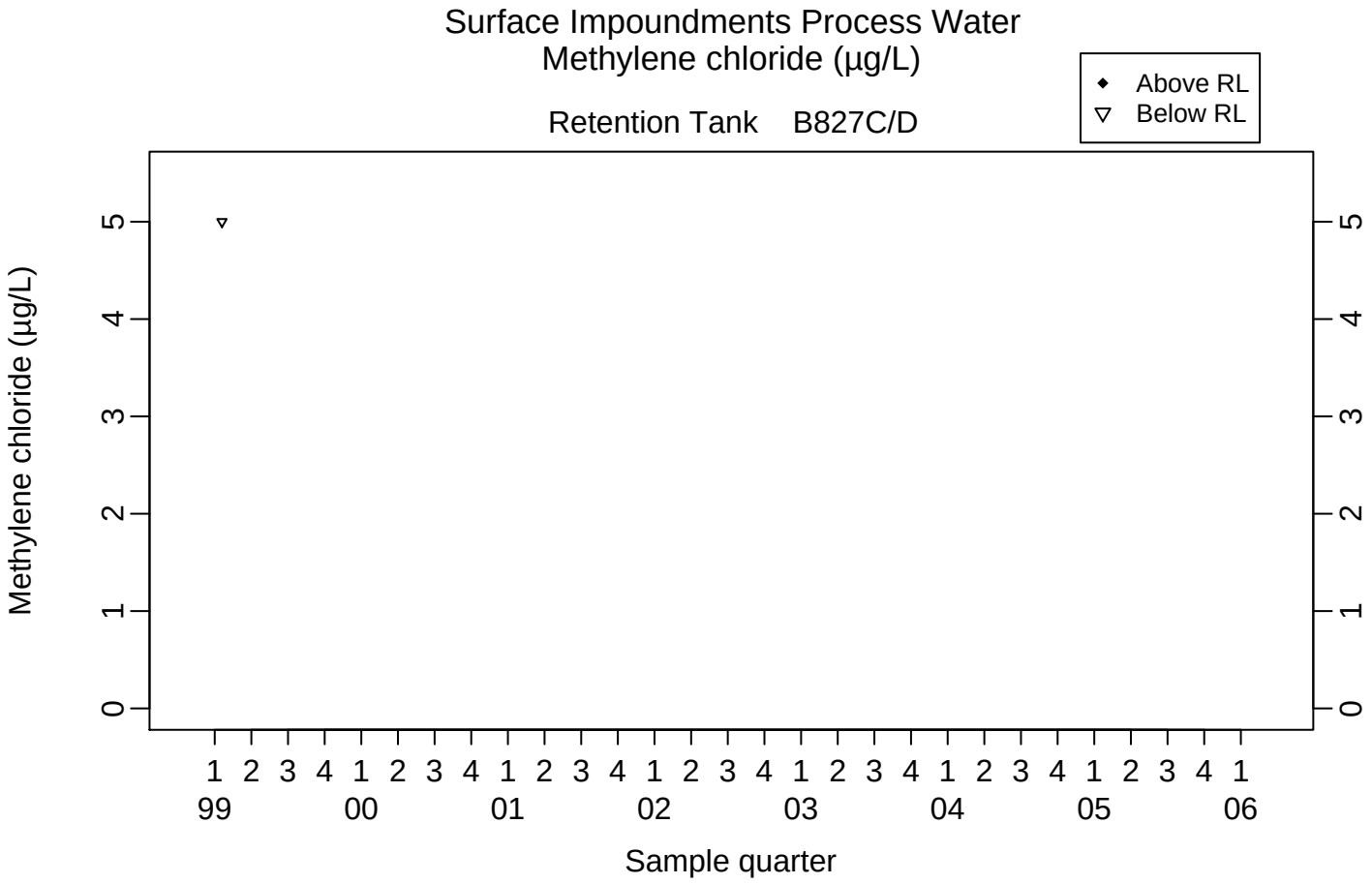

Surface Impoundments Process Water
Bromoform (µg/L)
Above RL
Below RL
Retention Tank B806/807
Bromoform (µg/L)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


Retention Tank B817
Bromoform (µg/L)
0.0
0.5
1.0
1.5
2.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

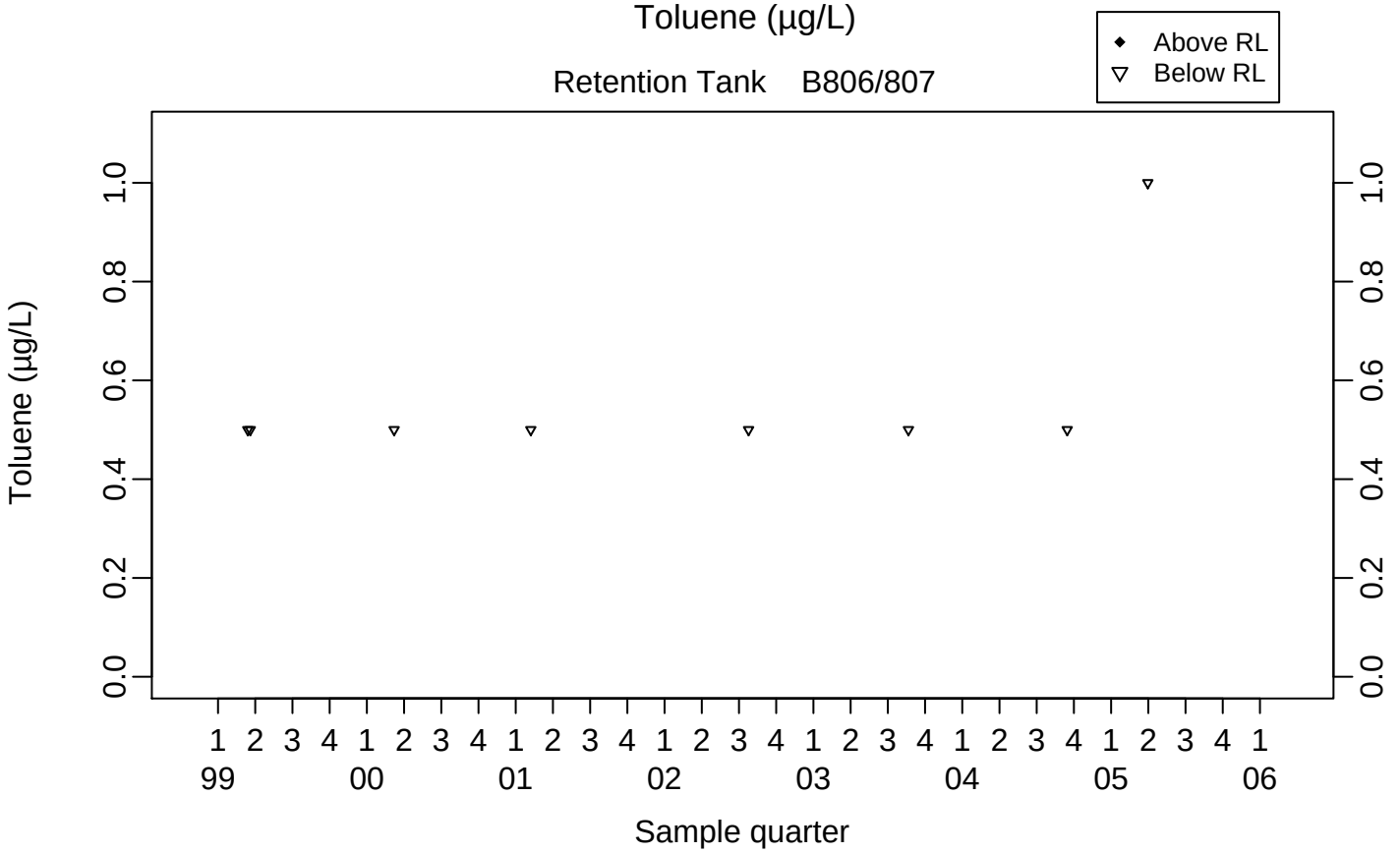

Surface Impoundments Process Water
Bromoform (µg/L)
Retention Tank B827C/D
Above RL
Below RL
Bromoform (µg/L)
0
1
2
3
4
5
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

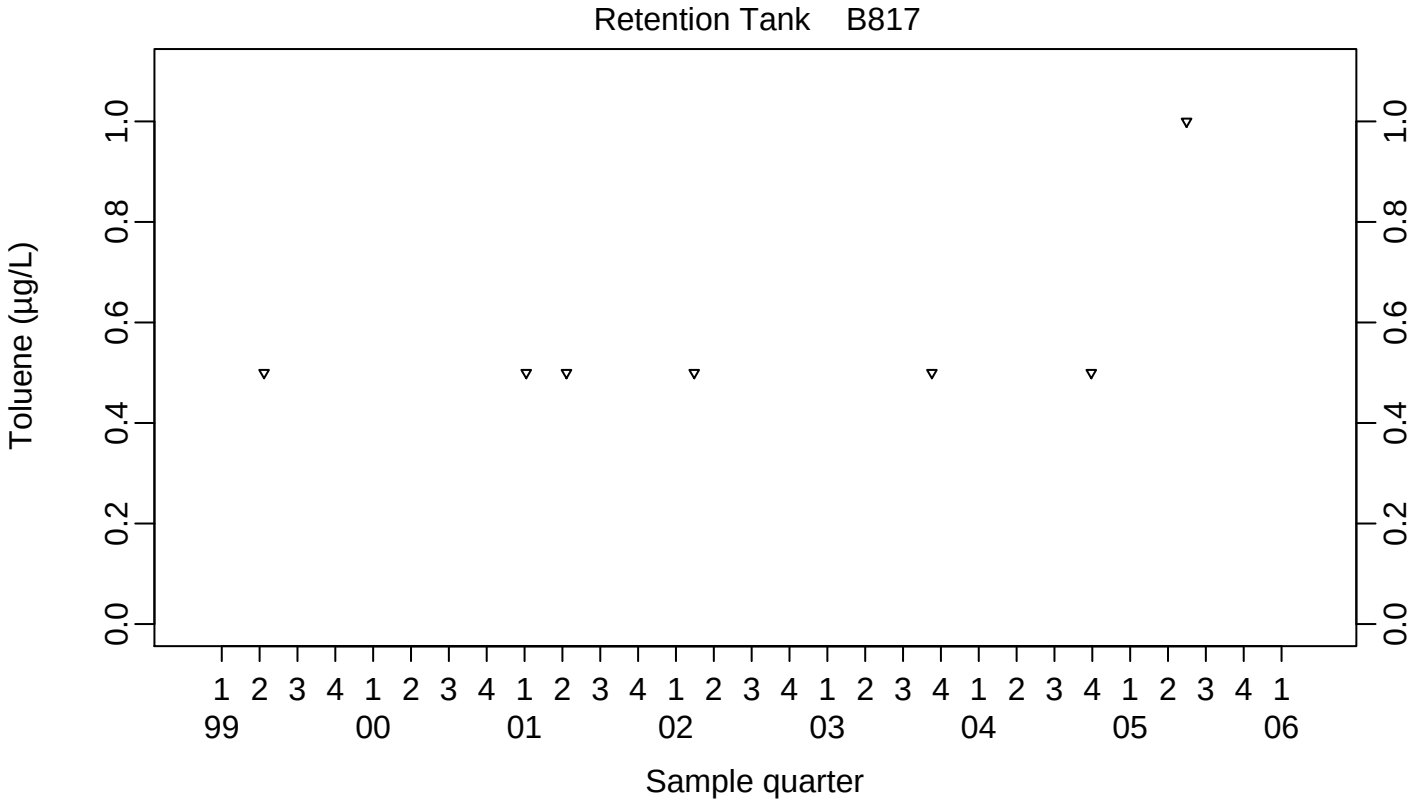

Surface Impoundments Process Water
Methylene chloride (µg/L)
Above RL
Below RL
Retention Tank B806/807
Methylene chloride (µg/L)
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

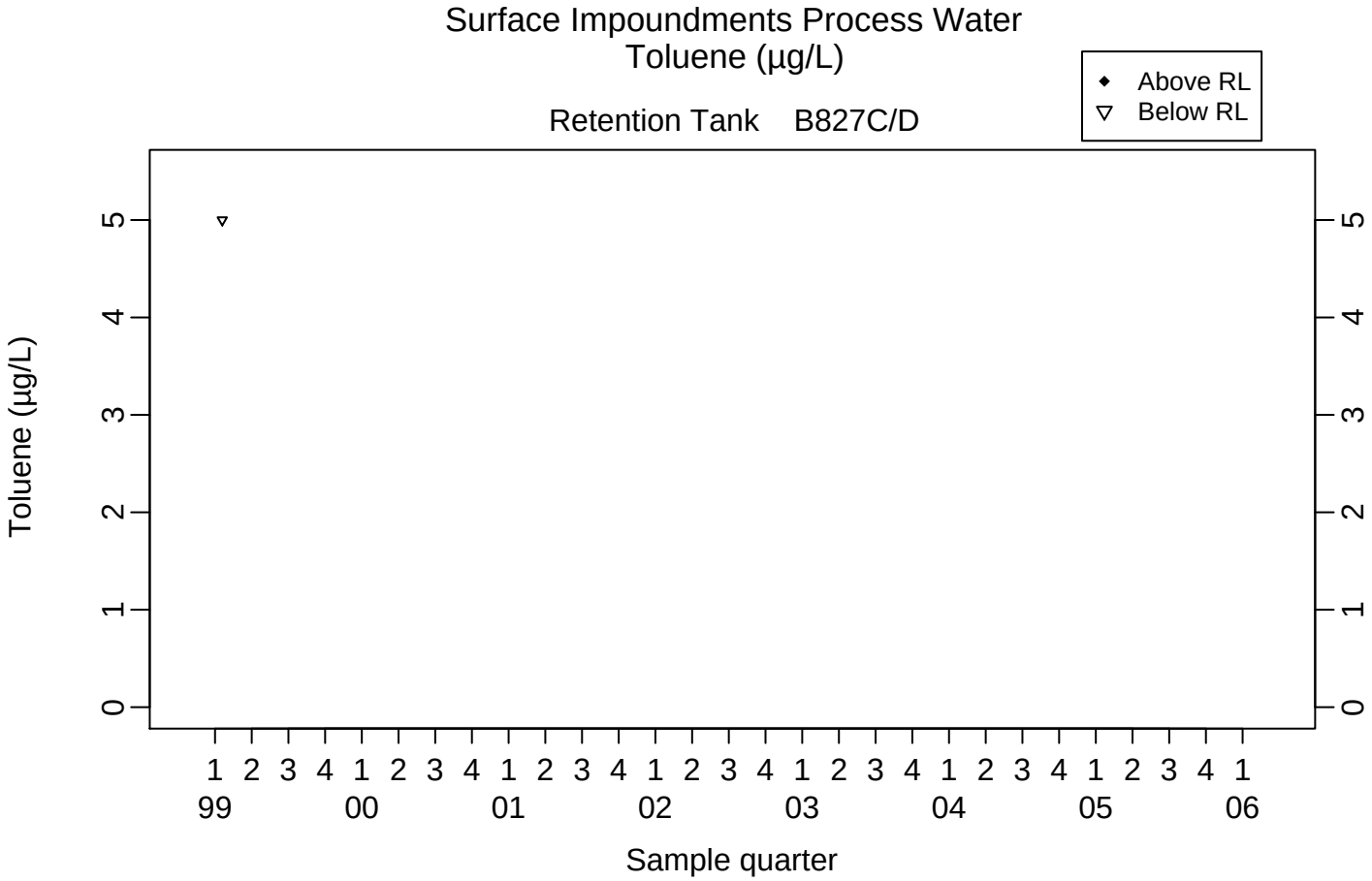

Retention Tank B817
Methylene chloride (µg/L)
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


Surface Impoundments Process Water
Methylene chloride (µg/L)
Retention Tank B827C/D
Above RL
Below RL
Methylene chloride (µg/L)
0
1
2
3
4
5
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

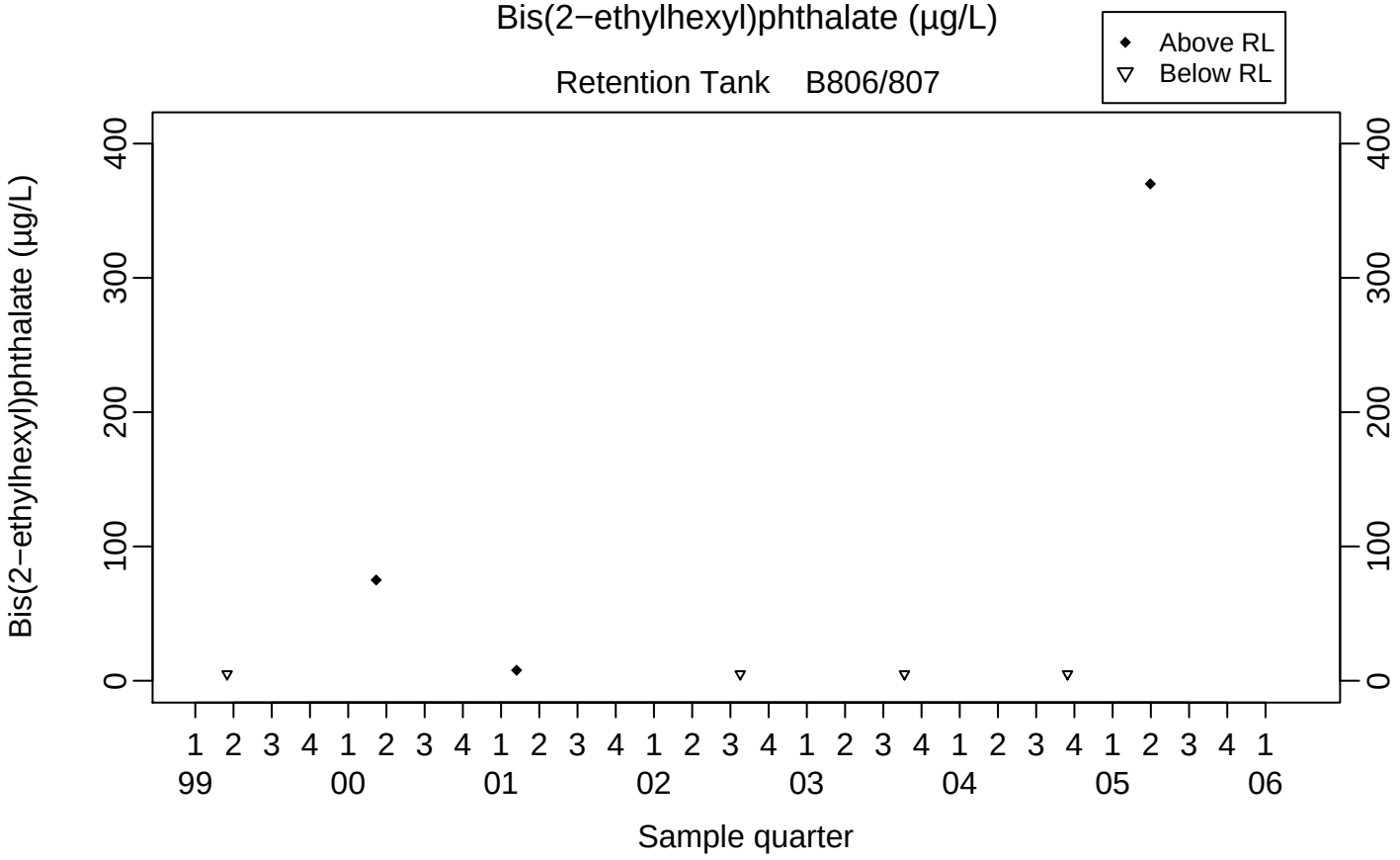
Surface Impoundments Process Water
Toluene (µg/L)

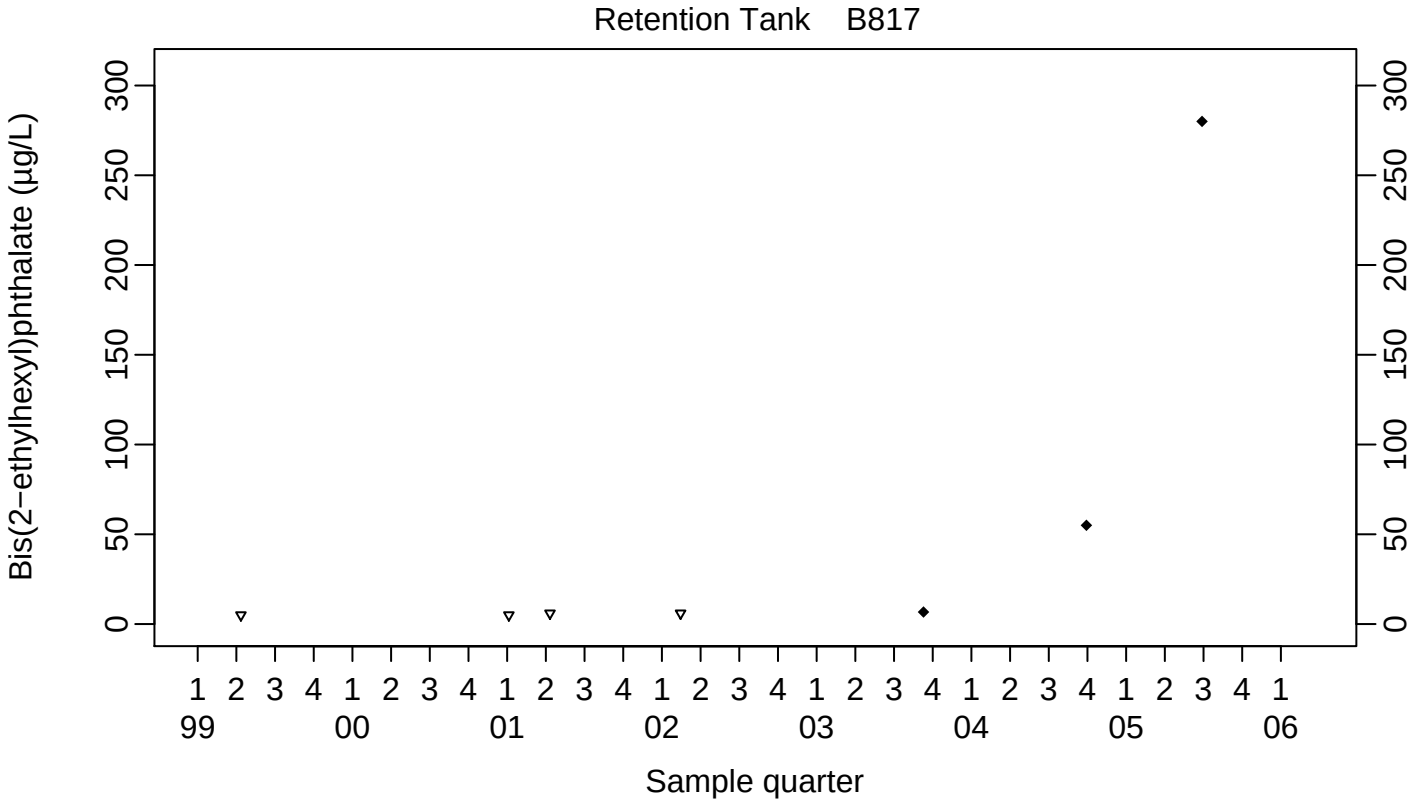





Surface Impoundments Process Water
Toluene (µg/L)
Retention Tank B827C/D
Above RL
Below RL
Toluene (µg/L)
0
1
2
3
4
5
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

Surface Impoundments Process Water
Bis(2−ethylhexyl)phthalate (µg/L)





Annual Summary Tables of Surface Impoundments Process Water Monitoring Data

Table A-1 Photographic process rinsewater monitoring, Building 823, constituents of concern required by WDR 96-248.

Parameter	MDL[a] range	Reporting limit range	2/1/05 result	6/15/05 result	WDR effluent limits[b]
General					
pH (unitless)	0.05	0.05	8.27	8.29	2<pH≤12.5
Metals (mg/L)					
Antimony	0.00038 - 0.0004	0.005	< 0.005	0.0005 est[c]	15[d]
Arsenic	0.00035 - 0.0004	0.002	0.0006 est	< 0.002	5
Barium	0.00083 - 0.0013	0.025	0.011 est	0.009 est	100
Beryllium	0.00002 - 0.000041	0.0002	< 0.0002	< 0.0002	0.75[d]
Cadmium	0.000068 - 0.0004	0.0002 - 0.004	0.0057	0.0015	1
Chromium	0.00034 - 0.0004	0.001	0.002	0.0018	5
Cobalt	0.0012 - 0.0062	0.05	< 0.05	< 0.05	80
Copper	0.0018 - 0.002	0.005 - 0.01	0.061	0.039	25
Lead	0.00002 - 0.0004	0.001 - 0.005	0.001 est	0.0026	5
Manganese	0.00046 - 0.0013	0.01	0.0055 est	0.011	NL[e]
Molybdenum	0.002 - 0.0062	0.025 - 0.05	0.021 est	0.019 est	350
Nickel	0.000034 - 0.0002	0.002	0.003	0.0032	20
Potassium	0.065 - 0.095	1.0	10.0	10.0	NL
Silver	0.00035 - 0.002	0.005 - 0.01	0.041	0.15	5
Thallium	0.000095 - 0.0002	0.001	< 0.001	< 0.001	7[d]
Vanadium	0.00093 - 0.0021	0.01	0.0061 est	0.0037 est	24[d]
Zinc	0.0014 - 0.0021	0.01 - 0.02	0.13	0.083	250

a MDL = Method detection limit

b These discharge limits are found in the Monitoring and Reporting Program No. 96-248, adopted on September 20, 1996, or in Appendix C of the *Amended Report of Waste Discharge* (Fisher 1995)

c Results followed by “est” have estimated values between the MDL and the reporting limit for that compound

d California soluble threshold limit concentration (STLC), i.e., hazardous waste limit, not noted in WDR 96-248

e NL = No limit

Table A-2.1 Chemistry area process wastewater monitoring, Building 827C/D, constituents of concern required by WDR 96-248.

Parameter	Building 827C/D Sampled 12/13/04			WDR Effluent Limits[b]
	MDL[a]	Reporting Limit	Result	
Energetic materials (µg/L)				
HMX	3.63	5	32	NL[c]
RDX	3.19	5	< 5	NL
TATB[d]	5	20	17 est[e]	NL
Volatile organic compounds (µg/L)[f]				
1,1,1-Trichloroethane	0.13	0.5	< 0.5	100,000
1,2-Dichloroethane	0.18	0.5	< 0.5	500
2-Butanone	1.3	20	< 20	200,000
Acetone	4.7	10	< 10	1,000,000
Bromoform	0.063	0.5	< 0.5	100,000
Chlorobenzene	0.093	0.5	< 0.5	100,000
Ethanol	51	1000	< 1000	1,000,000
Freon 113	0.078	0.5	< 0.5	100,000
Methyl isobutyl ketone	1	20	< 20	1,000,000
Methylene chloride	0.15	1	< 1	100,000
Naphthalene	0.035	0.5	< 0.5	200,000
Styrene	0.076	0.5	< 0.5	1,000,000
Tetrachloroethene	0.069	0.5	< 0.5	700
Toluene	0.15	0.5	< 0.5	200,000
Vinyl chloride	0.17	0.5	< 0.5	200
Semi-volatile organic compounds (µg/L)[f]				
Dimethyl sulfoxide (DMSO)	0.35	100	< 100	1,000,000

a MDL = Method detection limit

b These discharge limits are found in the Monitoring and Reporting Program No. 96-248, adopted on September 20, 1996 or in Appendix C of the *Amended Report of*

c NL = No limit

d Analyzed using an uncertified method (there is no certified method for analysis of TATB)

e Results followed by "est" are compounds detected with concentrations estimated between the MDL and the reporting limit for that compound

f No other volatile or semi-volatile organic compounds were detected via EPA Methods 624 or 625

Table A-2.2 Chemistry area process wastewater monitoring, Building 827E, constituents of concern required by WDR 96-248.

Parameter	Building 827E Sampled 12/13/04			WDR Effluent Limits[b]
	MDL[a]	Reporting Limit	Result	
Energetic materials (µg/L)				
HMX	3.63	10	290	NL[c]
RDX	3.19	5	26	NL
TATB[d]	5	20	< 20	NL
Volatile organic compounds (µg/L)[e]				
1,1,1-Trichloroethane	0.13	0.5	< 0.5	100,000
1,2-Dichloroethane	0.18	0.5	< 0.5	500
2-Butanone	1.3	20	< 20	200,000
Acetone	4.7	10	< 10	1,000,000
Bromoform	0.063	0.5	< 0.5	100,000
Chlorobenzene	0.093	0.5	< 0.5	100,000
Chloroform	0.095	0.5	0.15 est[f]	100,000
Ethanol	51	1000	< 1000	1,000,000
Freon 113	0.078	0.5	< 0.5	100,000
Methyl isobutyl ketone	1	20	< 20	1,000,000
Methylene chloride	0.15	1	< 1	100,000
Naphthalene	0.035	0.5	< 0.5	200,000
Styrene	0.076	0.5	< 0.5	1,000,000
Tetrachloroethene	0.069	0.5	< 0.5	700
Toluene	0.15	0.5	< 0.5	200,000
Vinyl chloride	0.17	0.5	< 0.5	200
Semi-volatile organic compounds (µg/L)[e]				
Dimethyl sulfoxide (DMSO)	0.031	10	< 10	1,000,000

a MDL = Method detection limit

b These discharge limits are found in the Monitoring and Reporting Program No. 96-248, adopted on September 20, 1996 or in Appendix C of the *Amended Report of Waste*

c NL = No limit

d Analyzed using an uncertified method (there is no certified method for analysis of TATB)

e No other volatile or semi-volatile organic compounds were detected via EPA Methods 624 or 625

f Results followed by "est" are compounds detected with concentrations estimated between the MDL and the reporting limit for that compound

Table A-2.3 Chemistry area process wastewater monitoring, Building 827C/D, other constituents.

Parameter	Building 827C Sampled 12/13/04			WDR Effluent Limits[b]
	MDL[a]	Reporting Limit	Result	
General				
pH (unitless)	NAFL[c]	NAFL	7.5	2<pH≤12.5
Metals (mg/L)				
Antimony	0.015	0.043	< 0.043	15[d]
Arsenic	0.016	0.057	< 0.057	5
Barium	0.004	0.006	0.056	100
Beryllium	0.005	0.041	< 0.041	0.75[d]
Cadmium	0.001	0.006	0.006	1
Chromium	0.004	0.009	0.038	5
Cobalt	0.004	0.007	0.008	80
Copper	0.008	0.018	0.441	25
Lead	0.011	0.024	0.039	5
Manganese	0.001	0.003	0.272	NL[e]
Mercury	0.0005	0.0014	< 0.0014	0.2[d]
Molybdenum	0.002	0.058	0.01 est[f]	350
Nickel	0.002	0.046	0.026 est	20
Potassium	0.085	0.429	6.31	NL
Selenium	0.02	0.084	< 0.084	1[d]
Silver	0.004	0.011	< 0.011	5
Thallium	0.058	0.133	< 0.133	7[d]
Vanadium	0.012	0.036	< 0.036	24[d]
Zinc	0.005	0.03	1.34	250

a MDL = Method detection limit

b These discharge limits are found in the Monitoring and Reporting Program No. 96-248, adopted on September 20, 1996, or in Appendix C of the *Amended Report of Waste Discharge* (Fisher, 1995)

c NAFL= Not available from laboratory

d California soluble threshold limit concentration (STLC), i.e., hazardous waste limit, not noted in WDR 96-248

e NL = No limit

f Results followed by "est" are compounds detected with concentrations estimated between the MDL and the reporting limit for that compound

Table A-2.4 Chemistry area process wastewater monitoring, Building 827E, other constituents.

Parameter	Building 827E Sampled 12/13/04			WDR Effluent Limits[b]
	MDL[a]	Reporting Limit	Result	
General				
pH (unitless)	NAFL[c]	NAFL	8.7	2<pH≤12.5
Metals (mg/L)				
Antimony	0.015	0.043	0.019 est[d]	15[e]
Arsenic	0.016	0.057	< 0.057	5
Barium	0.004	0.006	0.029	100
Beryllium	0.005	0.041	< 0.041	0.75[e]
Cadmium	0.001	0.006	0.004 est	1
Chromium	0.004	0.009	< 0.009	5
Cobalt	0.004	0.007	< 0.007	80
Copper	0.008	0.018	0.043	25
Lead	0.011	0.024	< 0.024	5
Manganese	0.001	0.003	0.002 est	NL[f]
Mercury	0.0005	0.0014	< 0.0014	0.2[e]
Molybdenum	0.002	0.058	0.024 est	350
Nickel	0.002	0.046	0.016 est	20
Potassium	0.085	0.429	8.07	NL
Selenium	0.02	0.084	< 0.084	1[e]
Silver	0.004	0.011	< 0.011	5
Thallium	0.058	0.133	< 0.133	7[e]
Vanadium	0.012	0.036	< 0.036	24[e]
Zinc	0.005	0.03	0.073	250

a MDL = Method detection limit

b These discharge limits are found in the Monitoring and Reporting Program No. 96-248, adopted on September 20, 1996, or in Appendix C of the *Amended Report of Waste Discharge* (Fisher, 1995)

c NAFL= Not available from laboratory

d Results followed by "est" are compounds detected with concentrations estimated between the MDL and the reporting limit for that compound

e California soluble threshold limit concentration (STLC), i.e., hazardous waste limit, not noted in WDR 96-248

f NL = No limit

Table A-3.1 Explosive process area wastewater monitoring, Building 806/807, constituents of concern required by WDR 96-248.

Parameter	Building 806/807 Sampled: 4/1/05			
	MDL[a]	Reporting Limit	Result	WDR Effluent Limits[b]
Metals (mg/L)				
Aluminum	0.044	0.05	0.13	NL[c]
Arsenic	0.0009	0.002	< 0.002	5
Barium	0.000027	0.025	0.069	100
Cadmium	0.000011	0.0005	0.0033	1
Chromium	0.00064	0.001	0.0037	5
Cobalt	0.0000073	0.05	0.0012 est[d]	80
Copper	0.0037	0.01	0.11	25
Lead	0.00002	0.005	0.027	5
Manganese	0.000046	0.01	0.044	NL
Molybdenum	0.000015	0.025	0.021 est	350
Nickel	0.000034	0.005	0.0095	20
Potassium	0.95	1	26	NL
Silver	0.000008	0.001	0.00022 est	5
Zinc	0.0021	0.01	0.31	250
Energetic materials (µg/L)				
PETN	NR[e]	NR	NR	NL
RDX	2.9	20	150	NL
HMX	2.4	20	1,100	NL
TATB[f]	1.4	20	< 20	NL
TNT	0.49	5	< 5	NL
Semi-volatile organic compounds (µg/L)[g]				
Benzyl alcohol	3	20	< 20	1,000,000
meta- & para-Cresol	6	20	< 20	50,000
Dimethyl sulfoxide (DMSO)	0.31	100	< 100	1,000,000
Di-n-butyl phthalate	3.1	50	3.2 est	1,000,000
bis(2-Ethylhexyl)phthalate	13	50	370	1,000,000
Naphthalene	3.3	50	< 50	200,000

(continued)

Table A-3.1 Explosive process area wastewater monitoring, Building 806/807, constituents of concern required by WDR 96-248. (concluded)

Parameter	Building 806/807 Sampled: 4/1/05			
	MDL	Reporting Limit	Result	WDR Effluent Limits
Volatile organic compounds (µg/L)[g]				
Acetone	7.4	10	15	1,000,000
Bromodichloromethane	0.067	1	0.21 est	100,000
Bromoform	0.051	1	1.2	100,000
2-Butanone	1.8	20	< 20	200,000
Chlorobenzene	0.05	1	< 1	100,000
Chloroform	0.05	1	0.17 est	100,000
Dibromochloromethane	0.056	1	0.63 est	100,000
1,2-Dichloroethane	0.11	1	< 1	500
Ethanol	65	1000	< 1000	1,000,000
Freon 113	0.18	1	< 1	100,000
Methyl isobutyl ketone	0.99	20	< 20	1,000,000
Methylene chloride	0.16	1	< 1	100,000
Styrene	0.16	1	< 1	1,000,000
Tetrachloroethene	0.12	1	< 1	700
Toluene	0.057	1	0.17 est	200,000
1,1,1-Trichloroethane	0.093	1	< 1	100,000
Vinyl chloride	0.098	1	< 1	200

a MDL = Method detection limit

b These discharge limits are found either in the Monitoring and Reporting Program No. 96-248, adopted on September 20, 1996, or in Appendix C of the Amended Report of Waste Discharge (1995)

c NL = No limit

d Results followed by “est” are compounds detected with concentrations estimated between the MDL and the reporting limit for that compound

e NR = Not requested

f Analyzed using an uncertified method (there is no certified method for analysis of TATB)

g No other volatile or semi-volatile organic compounds were detected via EPA Methods 624 or 625

Table A-3.2 Explosive process area wastewater monitoring, Building 817, constituents of concern required by WDR 96-248.

Parameter	Building 817 Sampled[a]: 5/17/05			
	MDL[b]	Reporting Limit	Result	WDR Effluent Limits[c]
Metals (mg/L)				
Aluminum	0.044	0.05	6.9	NL[d]
Arsenic	0.0009	0.002	0.002	5
Barium	0.000027	0.025	0.18	100
Cadmium	0.000011	0.0005	0.0048	1
Chromium	0.00064	0.001	0.052	5
Cobalt	0.0000073	0.05	0.004 est[e]	80
Copper	0.018	0.05	0.29	25
Lead	0.00002	0.005	0.038	5
Manganese	0.000046	0.01	0.37	NL
Molybdenum	0.000015	0.025	0.11	350
Nickel	0.000034	0.002	0.12	20
Potassium	0.095	0.1	12	NL
Silver	0.000008	0.001	0.00088 est	5
Zinc	0.0021	0.01	0.5	250
Energetic materials (µg/L)				
PETN	1.62	6.49	< 6.49	NL
RDX	0.649	3.25	< 3.25	NL
HMX	0.325	3.25	333	NL
TATB[f]	1.4	20	< 20	NL
TNT	0.649	3.25	< 3.25	NL
Semi-volatile organic compounds (µg/L)[g]				
Benzoic acid	1.3	50	34 est	1,000,000
Benzyl alcohol	0.3	2	< 2	1,000,000
meta- & para-Cresol	0.6	5	22	50,000
Diethyl phthalate	0.39	5	8.7	1,000,000
Dimethyl phthalate	0.24	5	0.7 est	1,000,000
Dimethyl sulfoxide (DMSO)	0.031	10	< 10	1,000,000
bis(2-Ethylhexyl)phthalate	6.5	25	280	1,000,000
Naphthalene	0.33	5	< 5	200,000

(continued)

Table A-3.2 (concluded)

Parameter	Building 817 Sampled: 5/17/05			
	MDL	Reporting Limit	Result	WDR Effluent Limits
Volatile organic compounds (μg/L)[g]				
Acetone	37	50	2,100	1,000,000
Bromoform	0.051	1	1.8	100,000
2-Butanone	9	100	960	200,000
Carbon disulfide	0.33	1	1.2	1,000,000
Chlorobenzene	0.05	1	< 1	100,000
Dibromochloromethane	0.056	1	0.64 est	100,000
1,2-Dichloroethane	0.11	1	< 1	500
Ethanol	320	5,000	11,000	1,000,000
Freon 113	0.18	1	< 1	100,000
Methyl isobutyl ketone	0.99	20	< 20	1,000,000
Methylene chloride	0.16	1	< 1	100,000
Styrene	0.16	1	< 1	1,000,000
Tetrachloroethene	0.12	1	< 1	700
Toluene	0.057	1	0.1 est	200,000
1,1,1-Trichloroethane	0.093	1	< 1	100,000
Vinyl chloride	0.098	1	< 1	200
Xylenes, Total	0.23	2	0.23 est	200,000

a Semi-volatile organic compounds analyzed for sample taken 6/29/05

b MDL = Method detection limit

c These discharge limits are found either in the Monitoring and Reporting Program No. 96-248, adopted on September 20, 1996, or in Appendix C of the Amended Report of Waste Discharge (1995)

d NL = No limit

e Results followed by "est" are compounds detected with concentrations estimated between the MDL and the reporting limit for that compound

f Analyzed using an uncertified method (there is no certified method for analysis of TATB)

g No other volatile or semi-volatile organic compounds were detected via EPA Methods 624 or 625

Appendix B

Annual Summary Plots and Tables of Surface Impoundments Ground Water Monitoring Data

Appendix B

This appendix contains graphical and tabular summaries of ground water monitoring data from the surface impoundments ground water monitoring network. The constituents of concern for WDR 96-248 are shown graphically, and the tables at the end of this appendix list all 2003 ground water data. The data plots contain all monitoring data available since LLNL began sampling wells W-817-01, W-817-02, W-817-03, and W-817-04 in 1985.

These plots display the field parameter of ground water elevation, followed by volatile organic compounds (VOCs), trace metals, photographic chemicals (cresols), minerals and nutrients, energetic compounds, and finally, semi-volatile organic compounds (SVOCs). The upgradient (background) monitoring well W-817-01 is always plotted first for each analyte.

Each two-dimensional graph shows concentration plotted on the vertical axis versus time (years divided into four quarterly sampling periods) on the horizontal axis. Units of measure are given on the vertical axis label and in the header at the top of each page. Values above the analytical reporting limit for each analyte are plotted as solid diamonds, values below the reporting limit are plotted as open inverted triangles, and estimated values between the reporting limit and the method detection limit are plotted as crosses. The current statistical limits (SLs) for constituents of concern specified in WDR 96-248 are shown as horizontal dashed lines on the graph.

In order to provide more useful plot scales, some analytes at high concentrations are not plotted. **Table B-1.0** shows those concentrations. Some pre-1990 non-detection results have also been omitted from the plots.

Table B-1.0. Ground water analytes that are not plotted.

Type	Analyte	Location	Date	Result
VOCs	Methylene chloride	W-817-04	07/27/89	3.6 μg/L
Metals	Barium	W-817-01	02/09/87	0.1 mg/L
Metals	Potassium	W-817-03	04/17/89	37 mg/L
Metals	Zinc	W-817-02	02/06/89	1 mg/L
Metals	Zinc	W-817-03	02/06/89	1 mg/L
Metals	Zinc	W-817-03	06/16/99	0.79 mg/L
Metals	Zinc	W-817-04	02/06/89	0.75 mg/L

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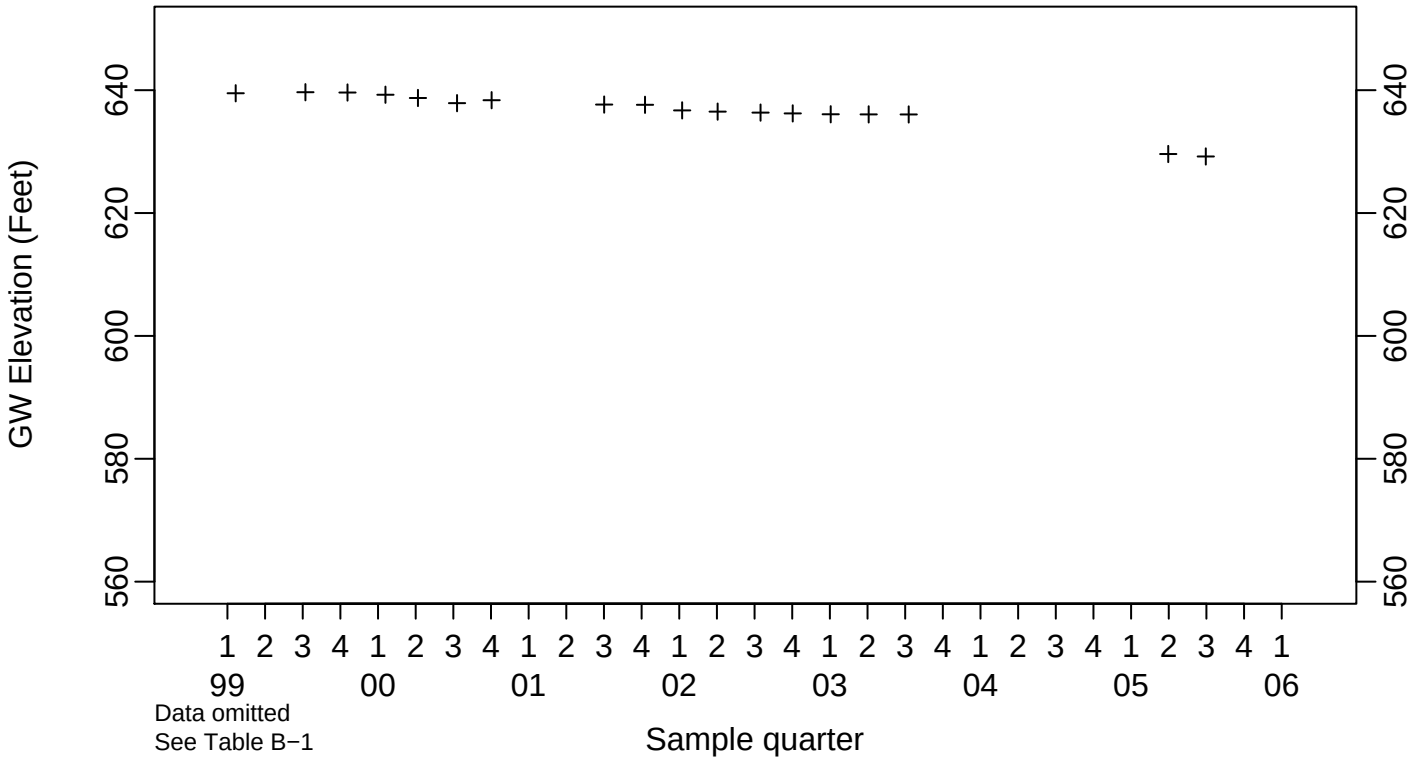
Annual Plots of Surface Impoundments Ground Water Monitoring Data

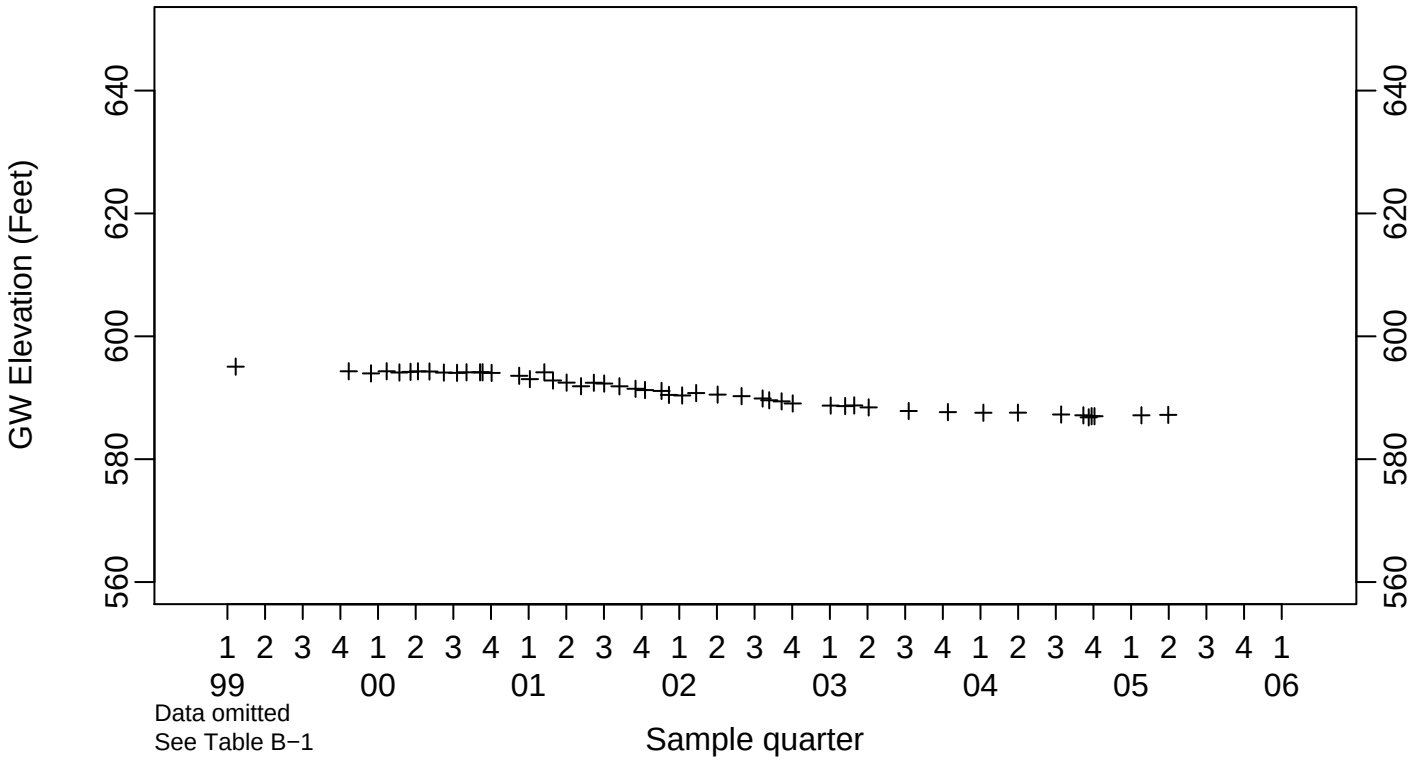
Surface Impoundments Ground Water
GW Elevation (Feet)

Background Monitoring Point W−817−01



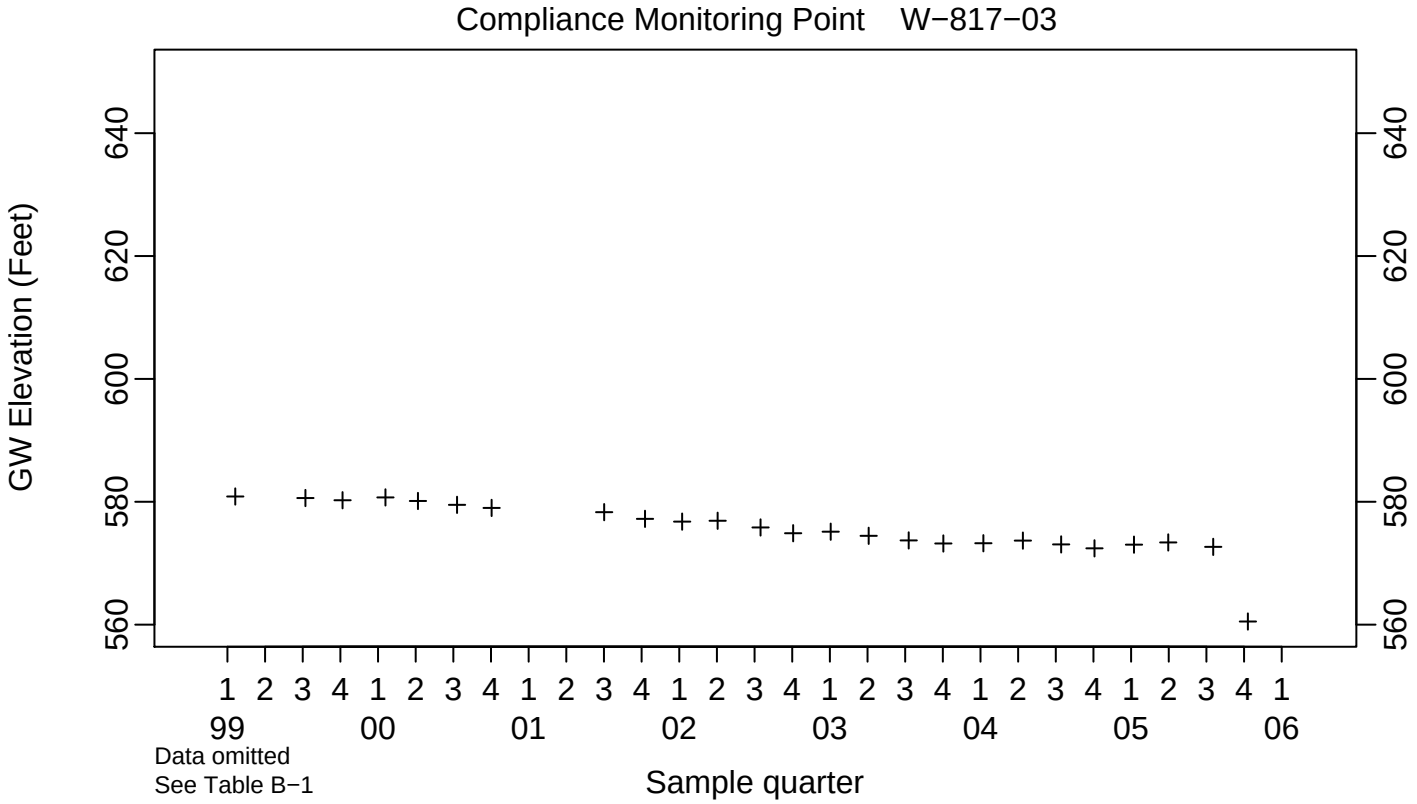
Data omitted
See Table B−1

Compliance Monitoring Point W−817−02

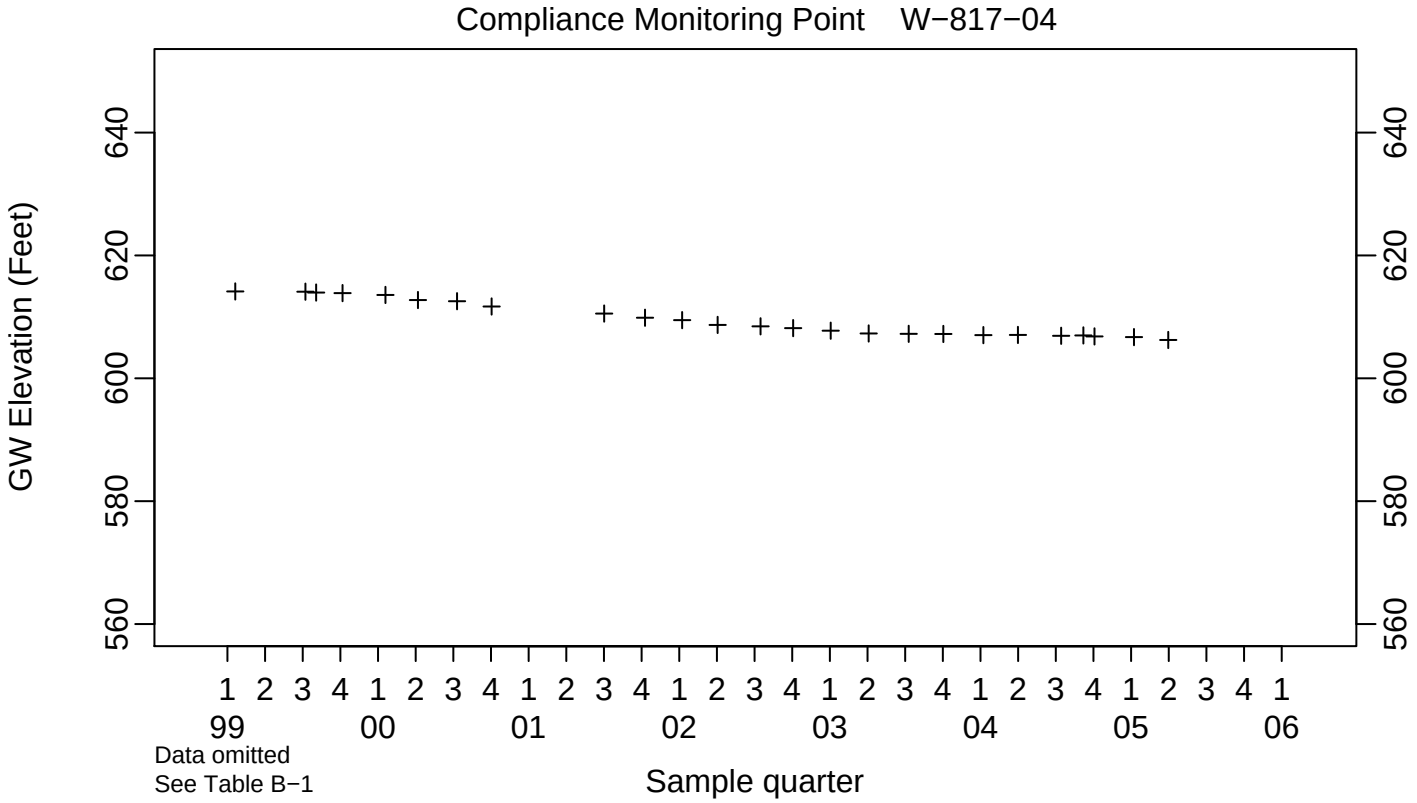


Data omitted
See Table B−1

Surface Impoundments Ground Water
GW Elevation (Feet)

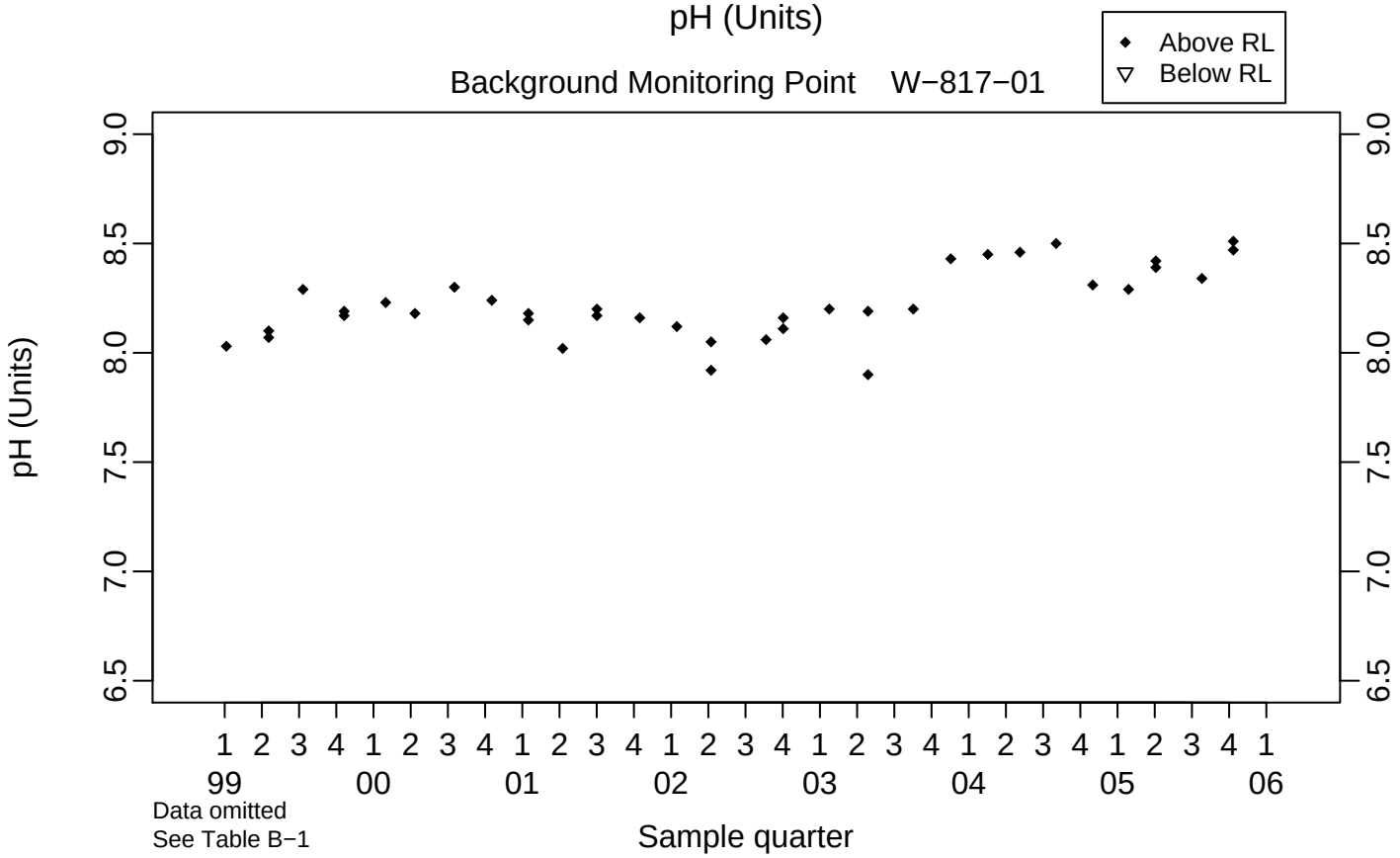


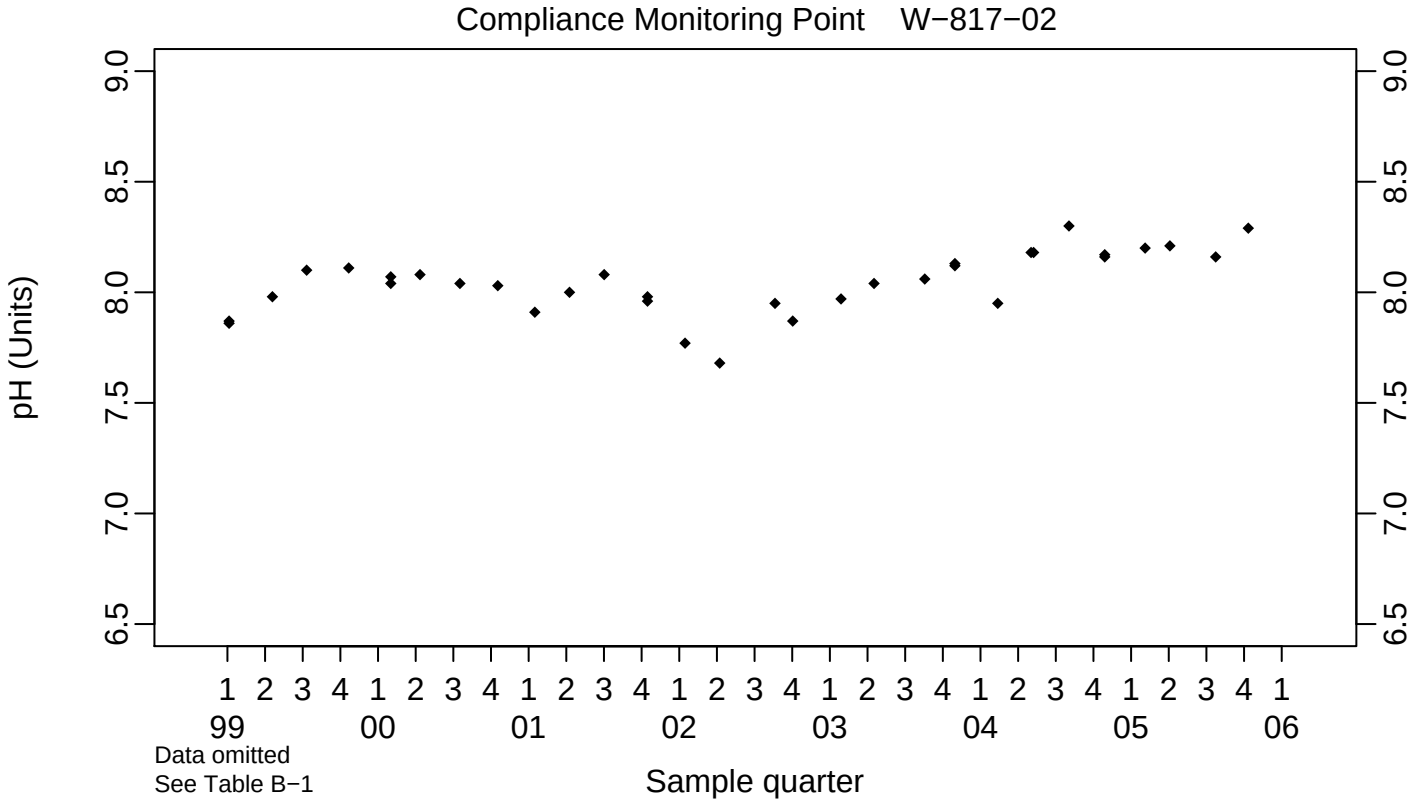
Data omitted
See Table B−1



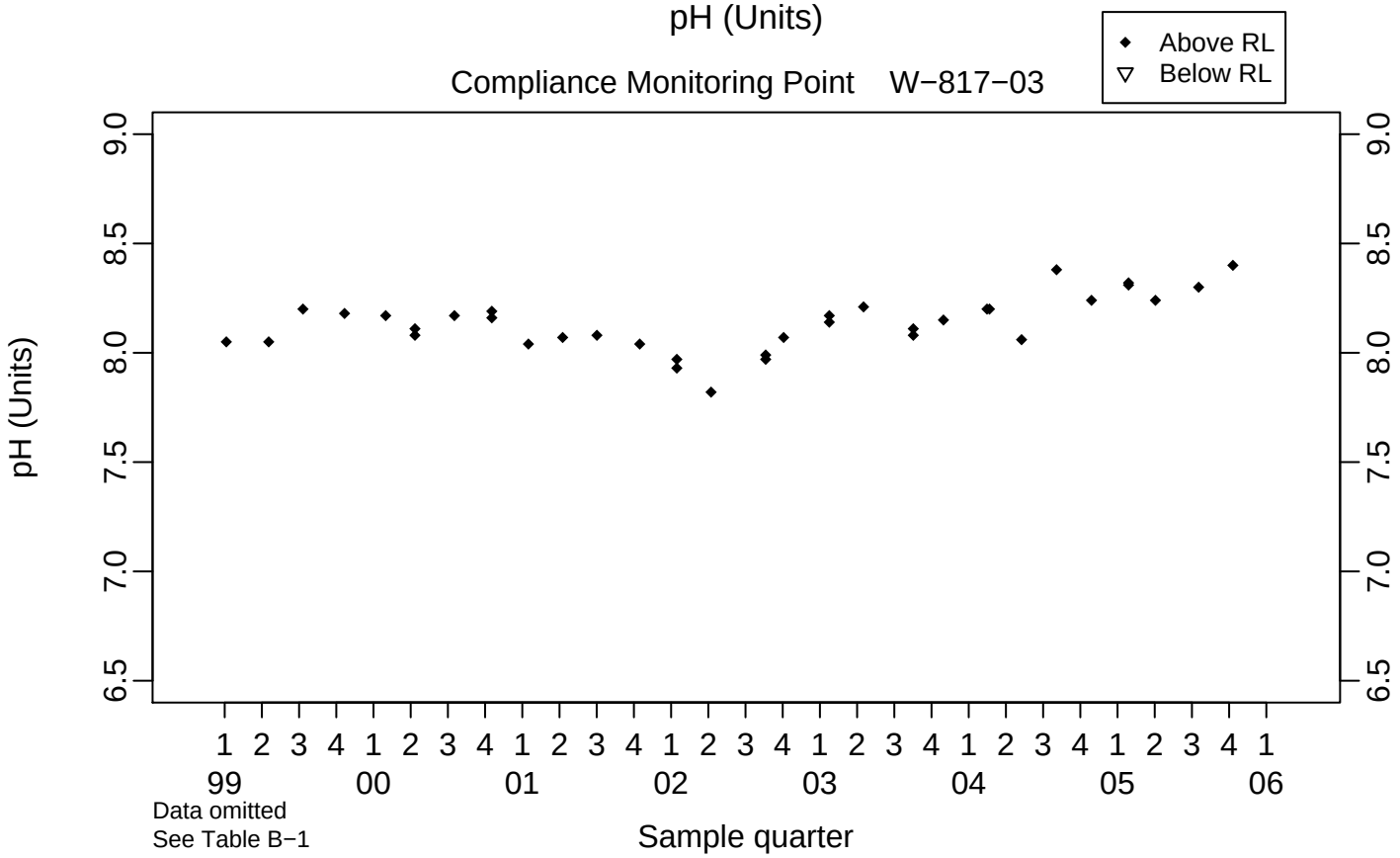
Data omitted
See Table B−1

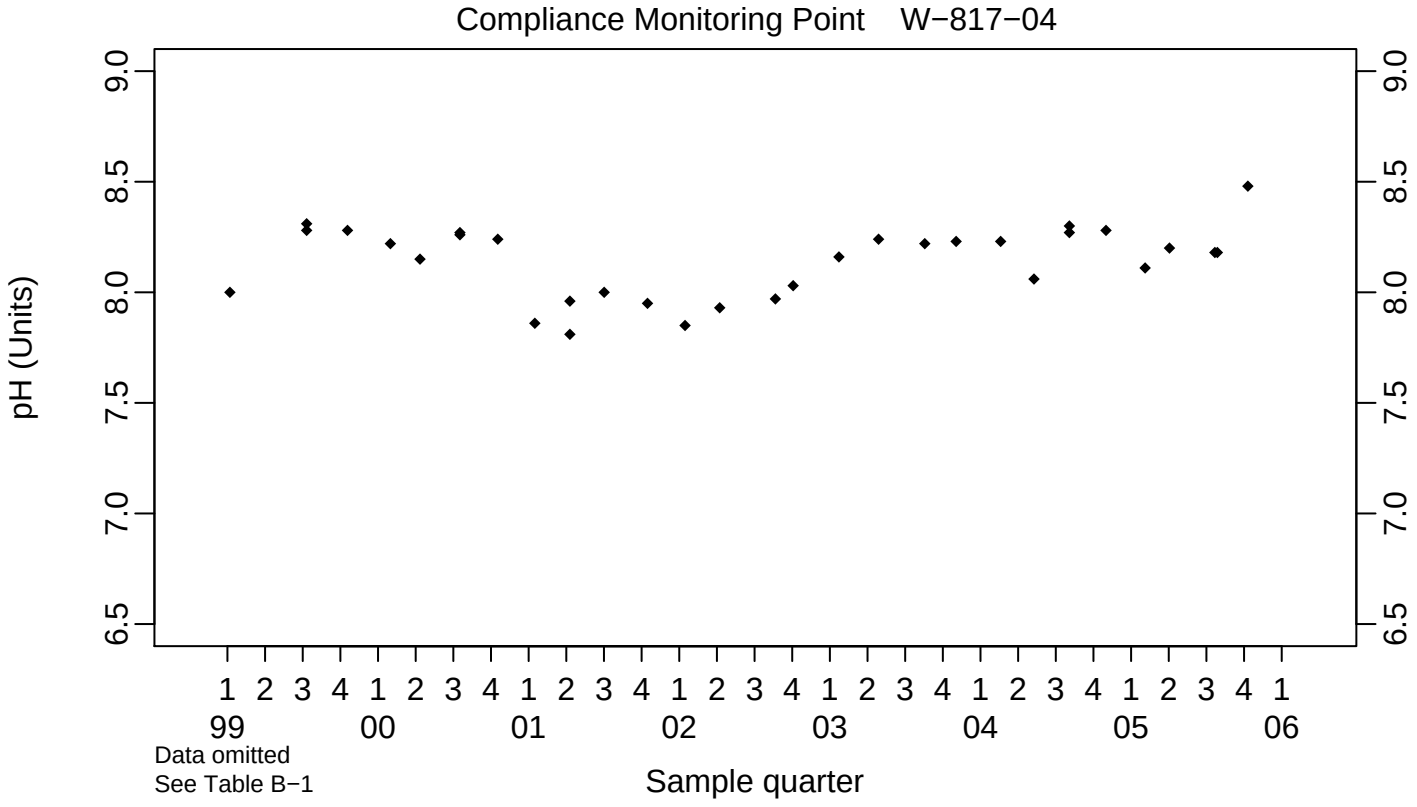
Surface Impoundments Ground Water
pH (Units)

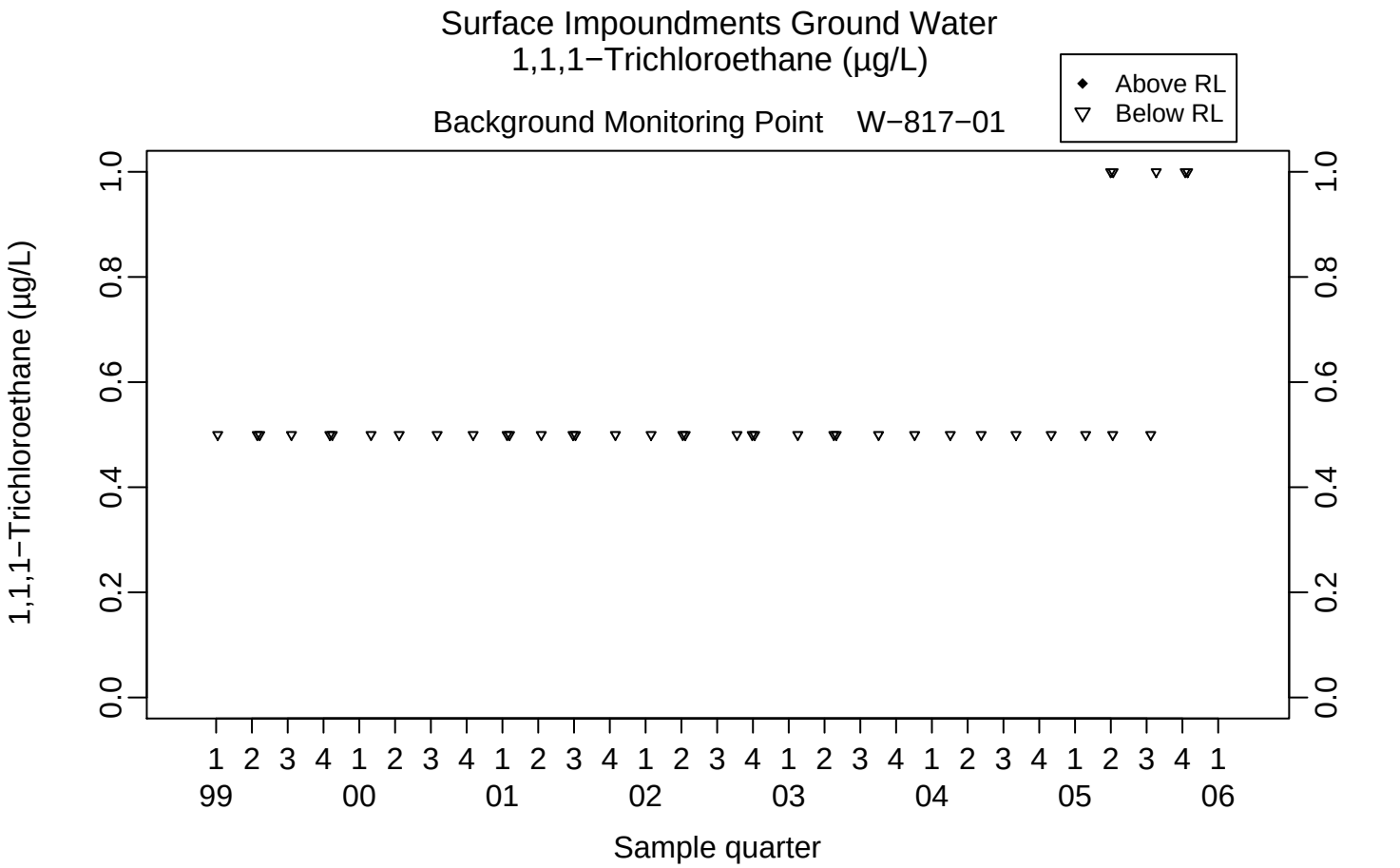


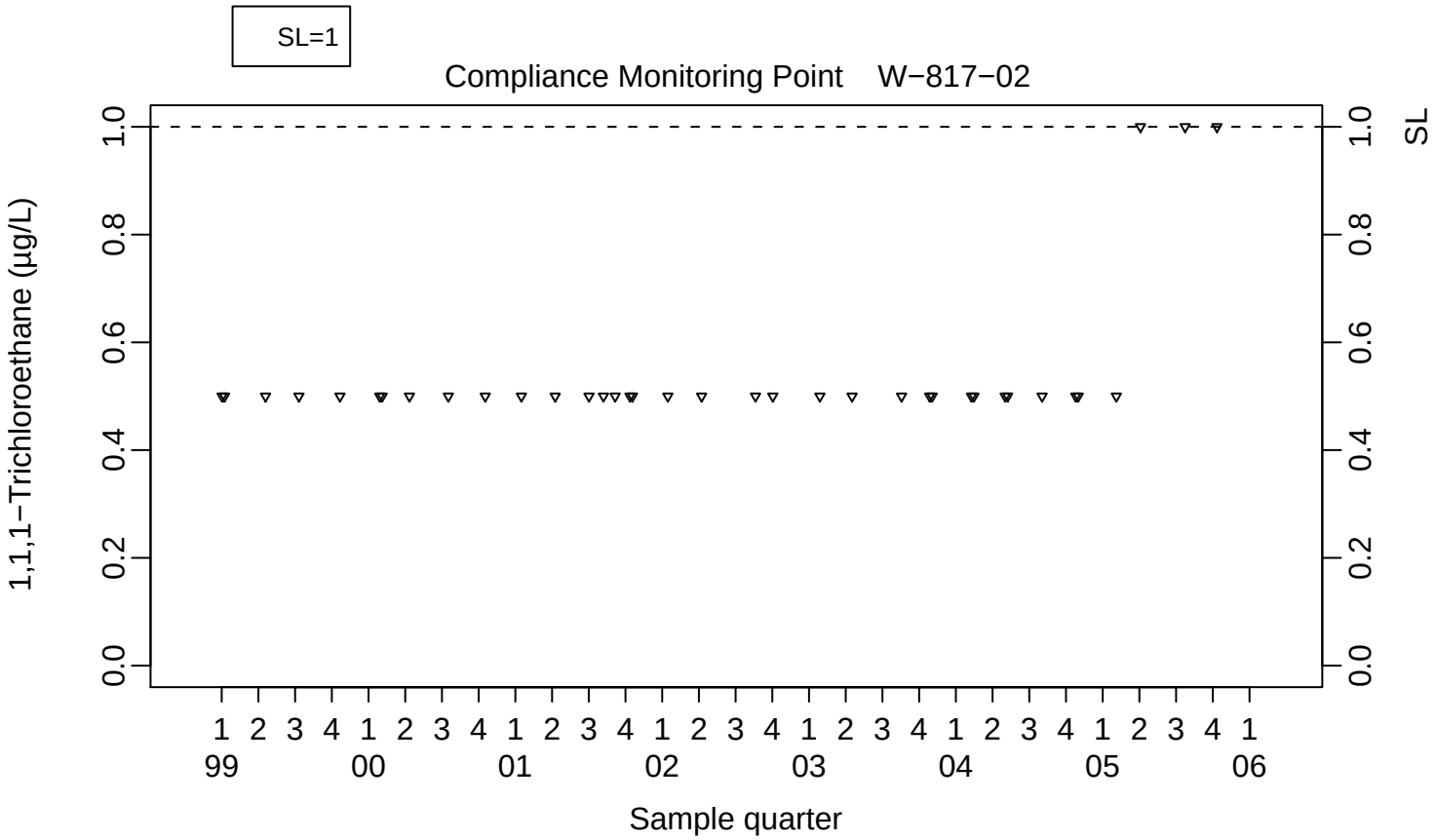


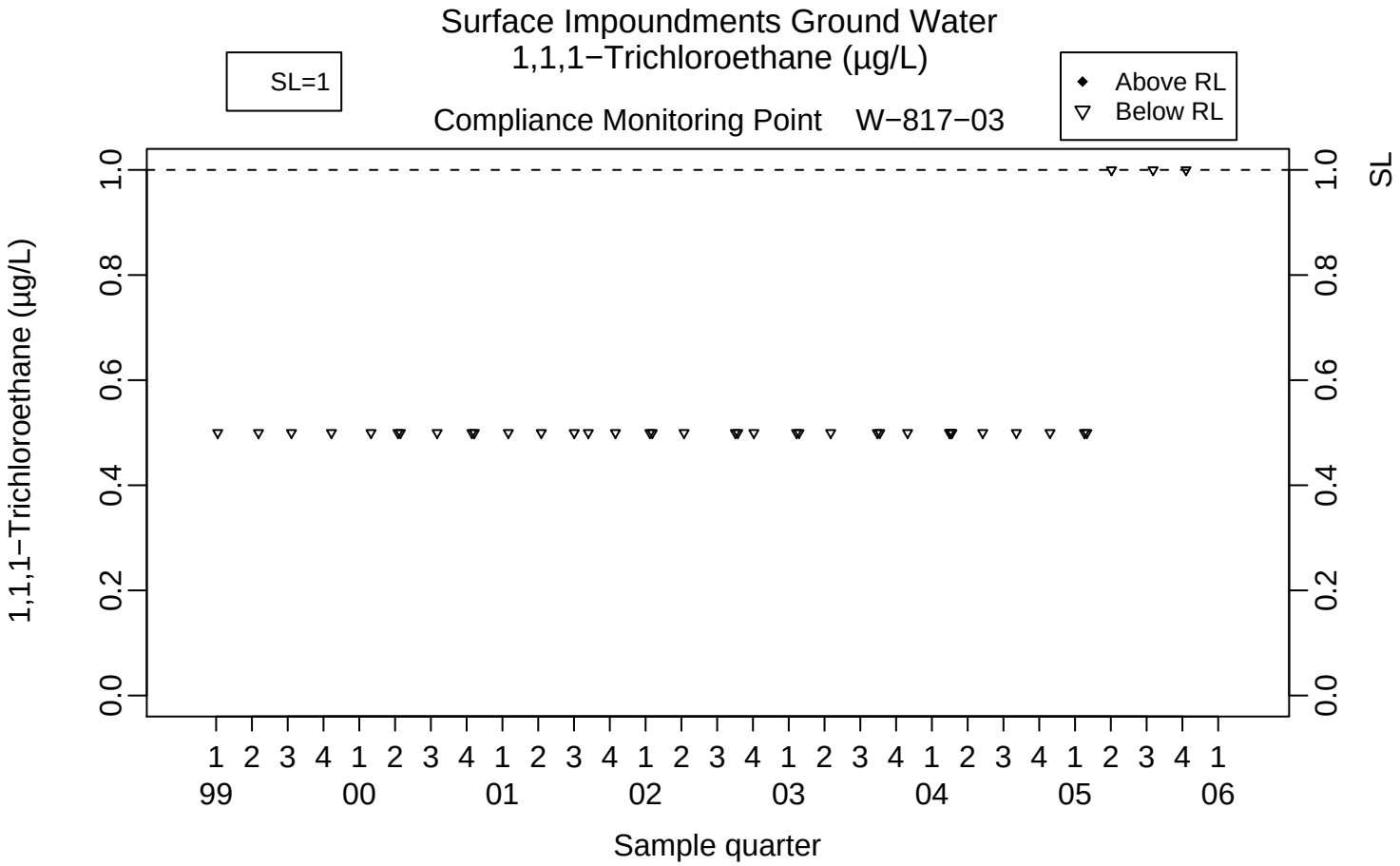
Surface Impoundments Ground Water
pH (Units)

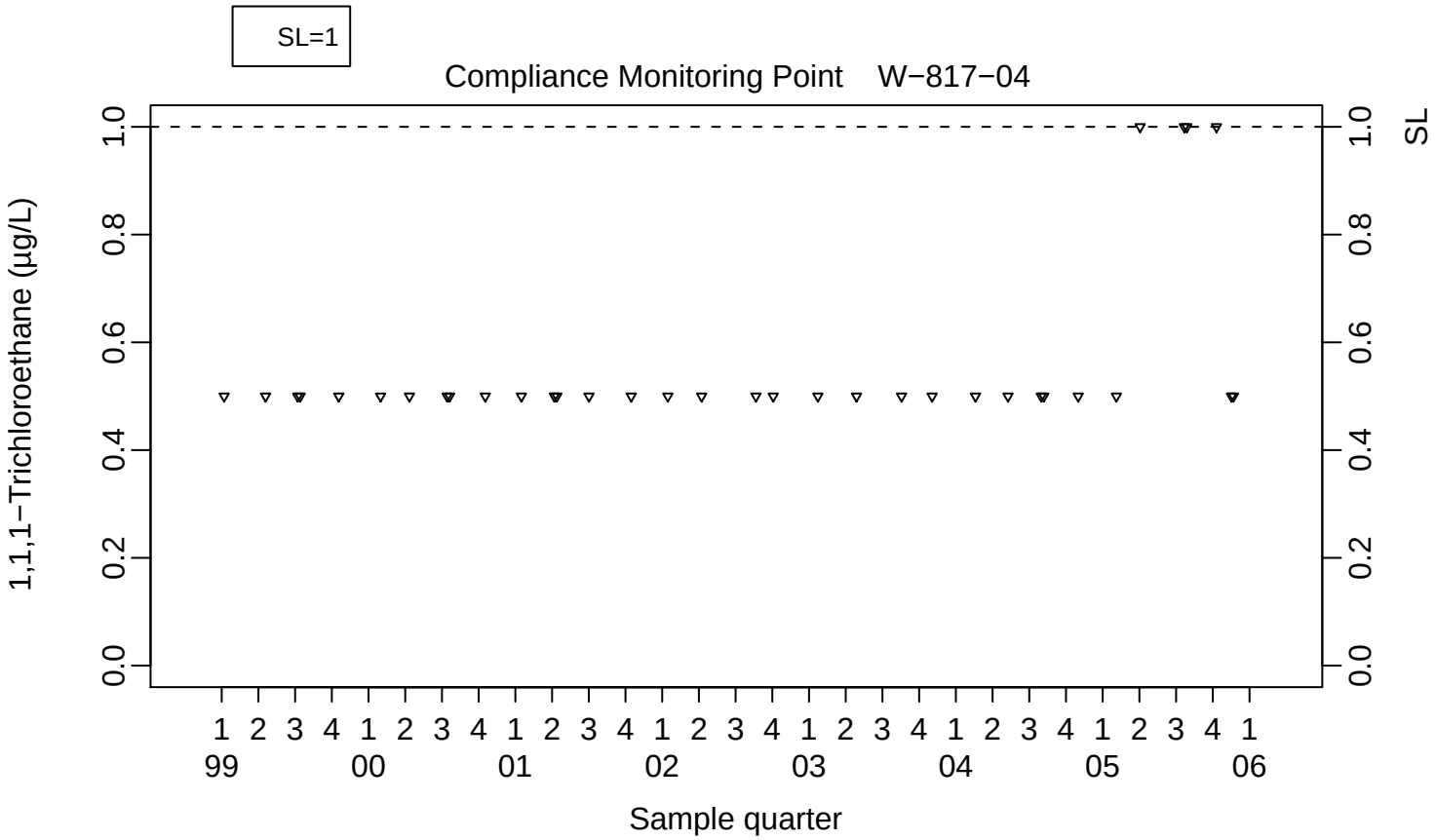


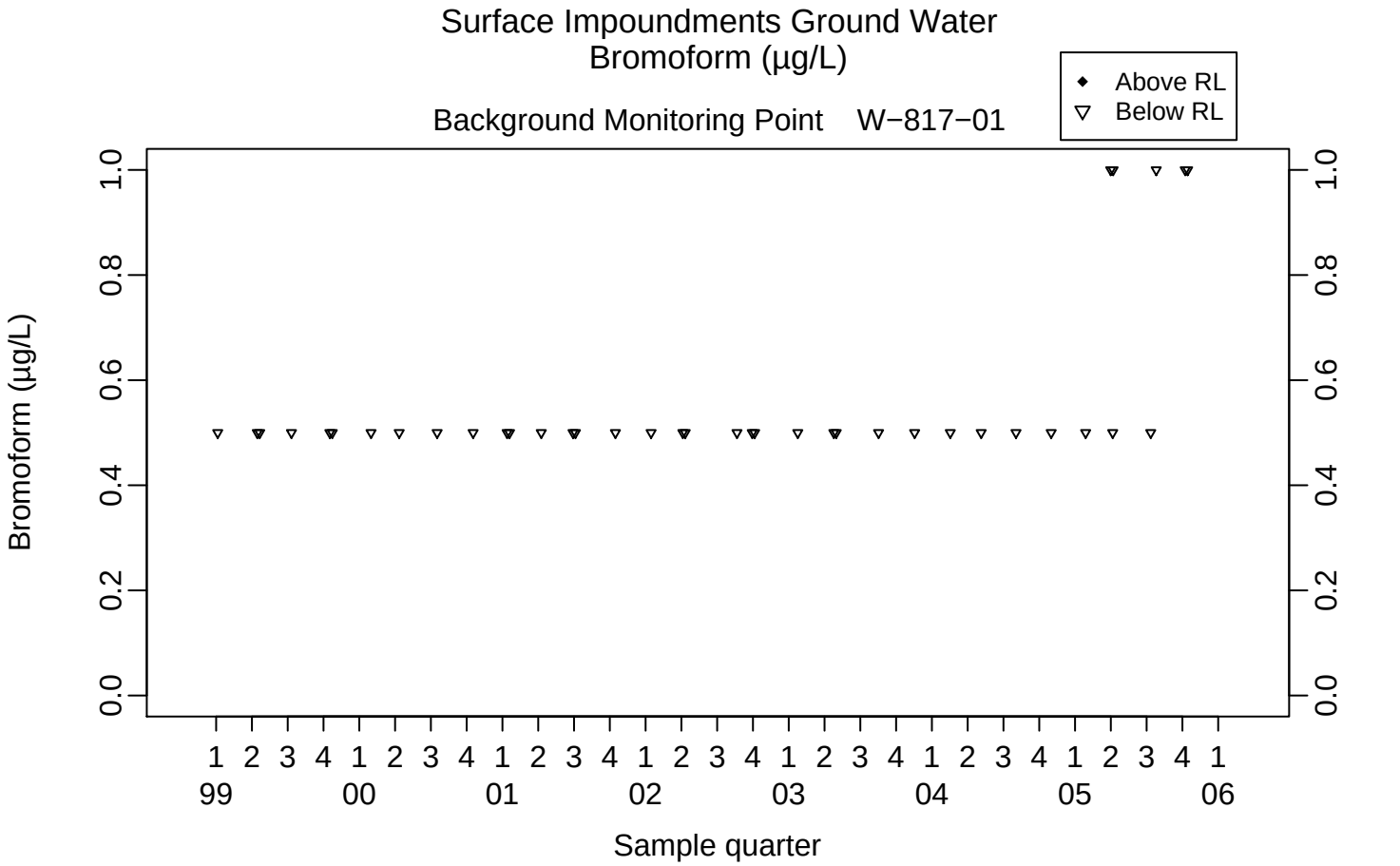


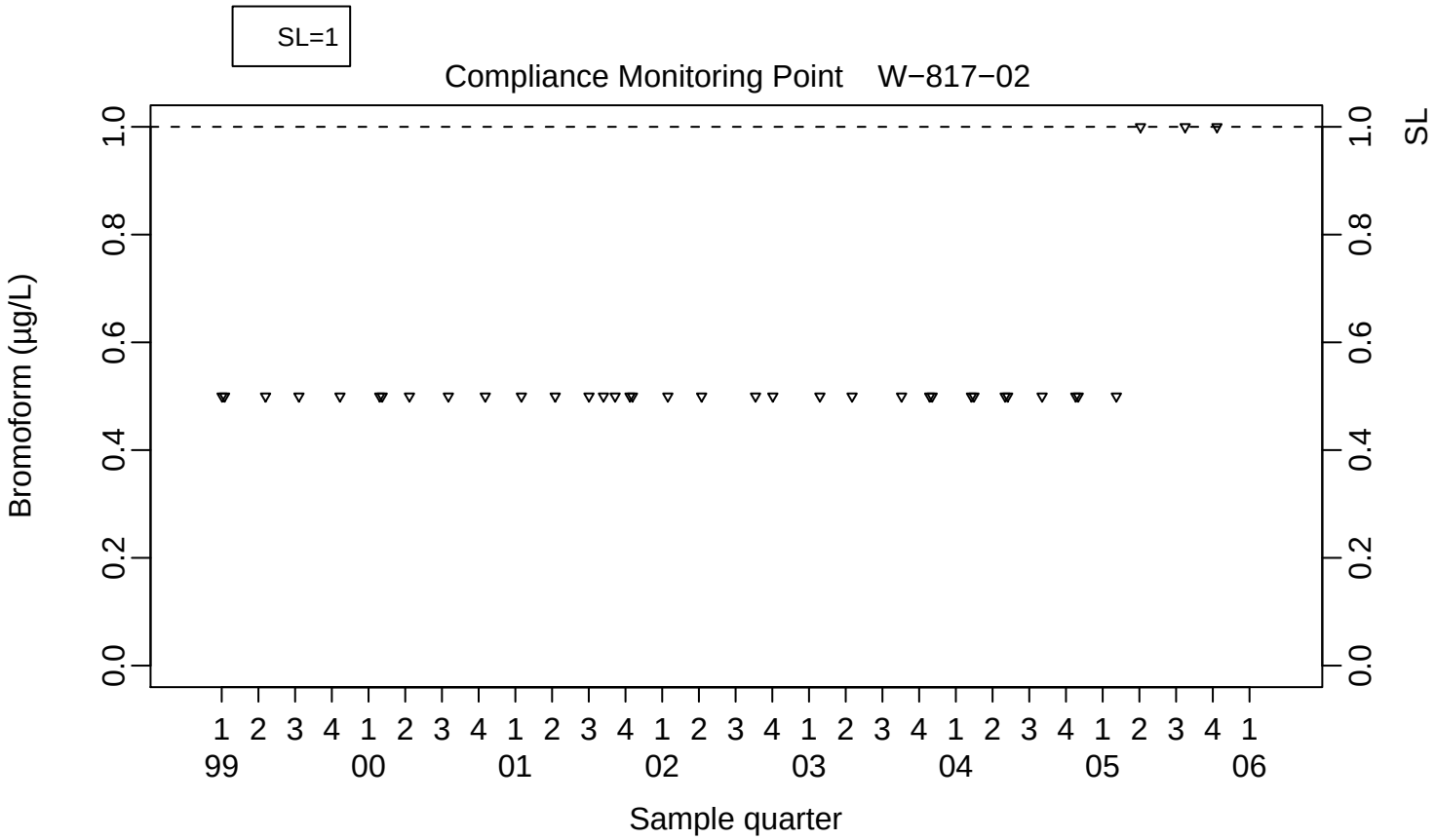

Surface Impoundments Ground Water
1,1,1−Trichloroethane (µg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
1,1,1−Trichloroethane (µg/L)
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

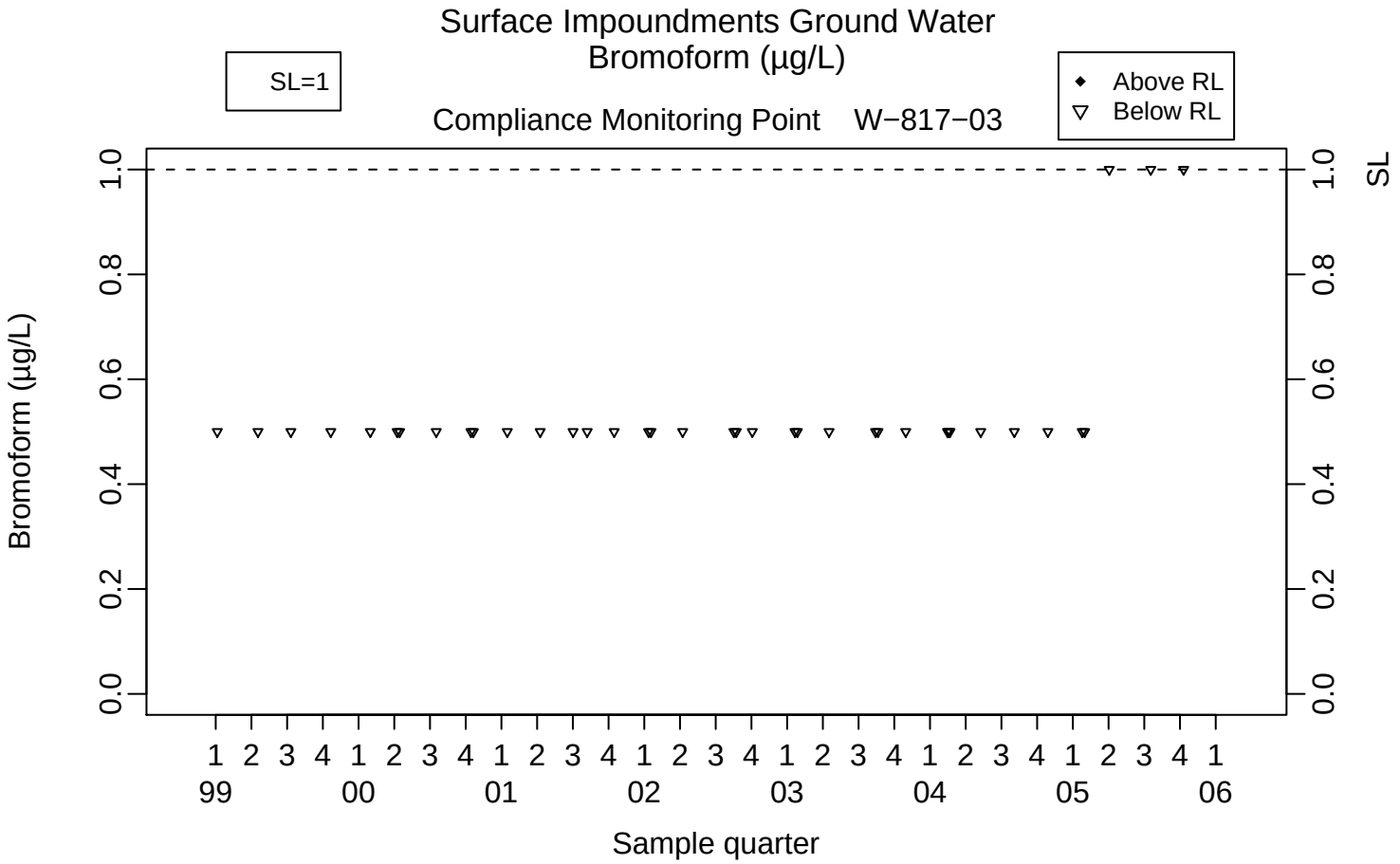

SL=1
Compliance Monitoring Point W−817−02
1,1,1−Trichloroethane (µg/L)
SL
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

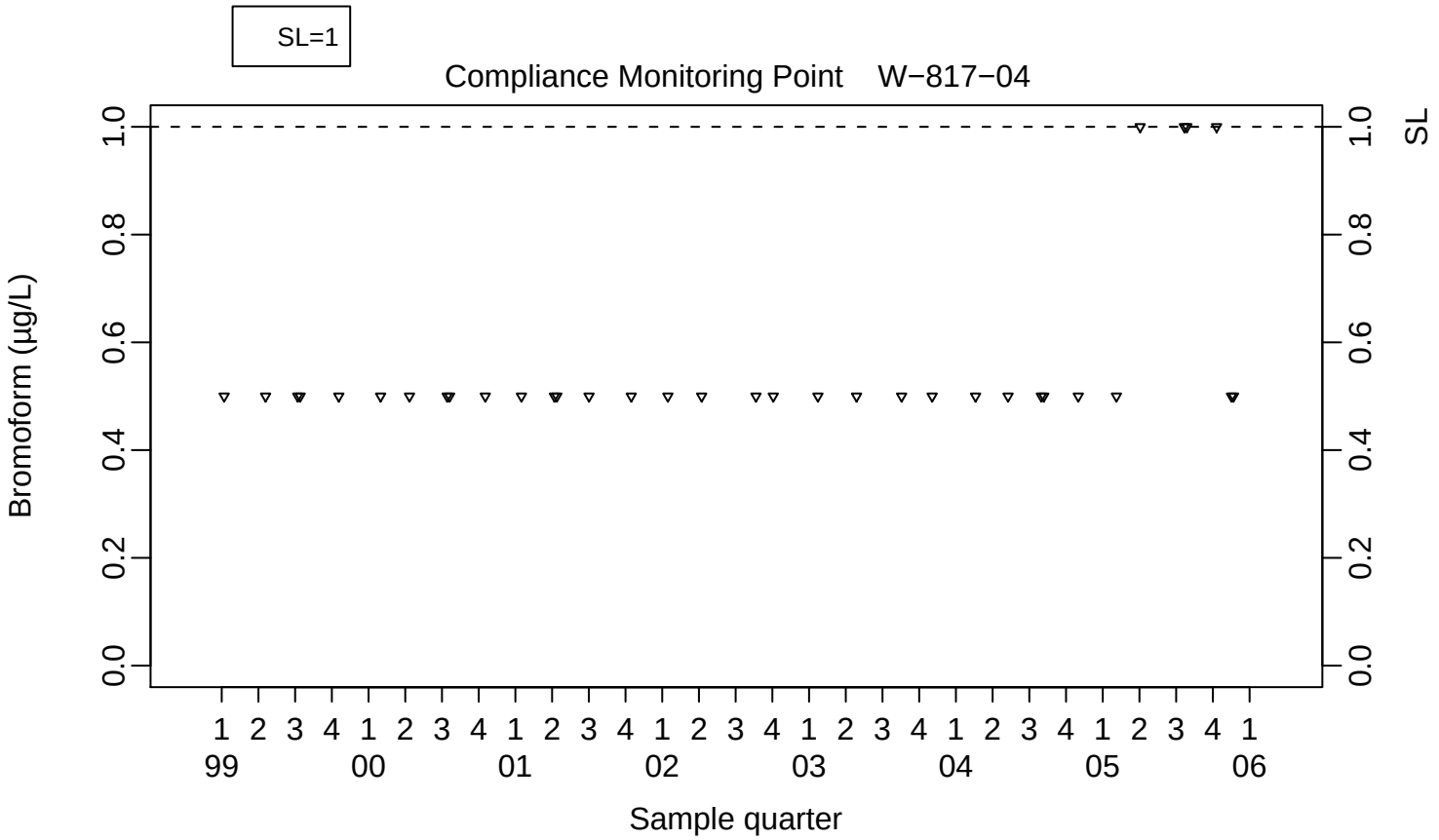

Surface Impoundments Ground Water
1,1,1−Trichloroethane (µg/L)
SL=1
Above RL
Below RL
Compliance Monitoring Point W−817−03
1,1,1−Trichloroethane (µg/L)
SL
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

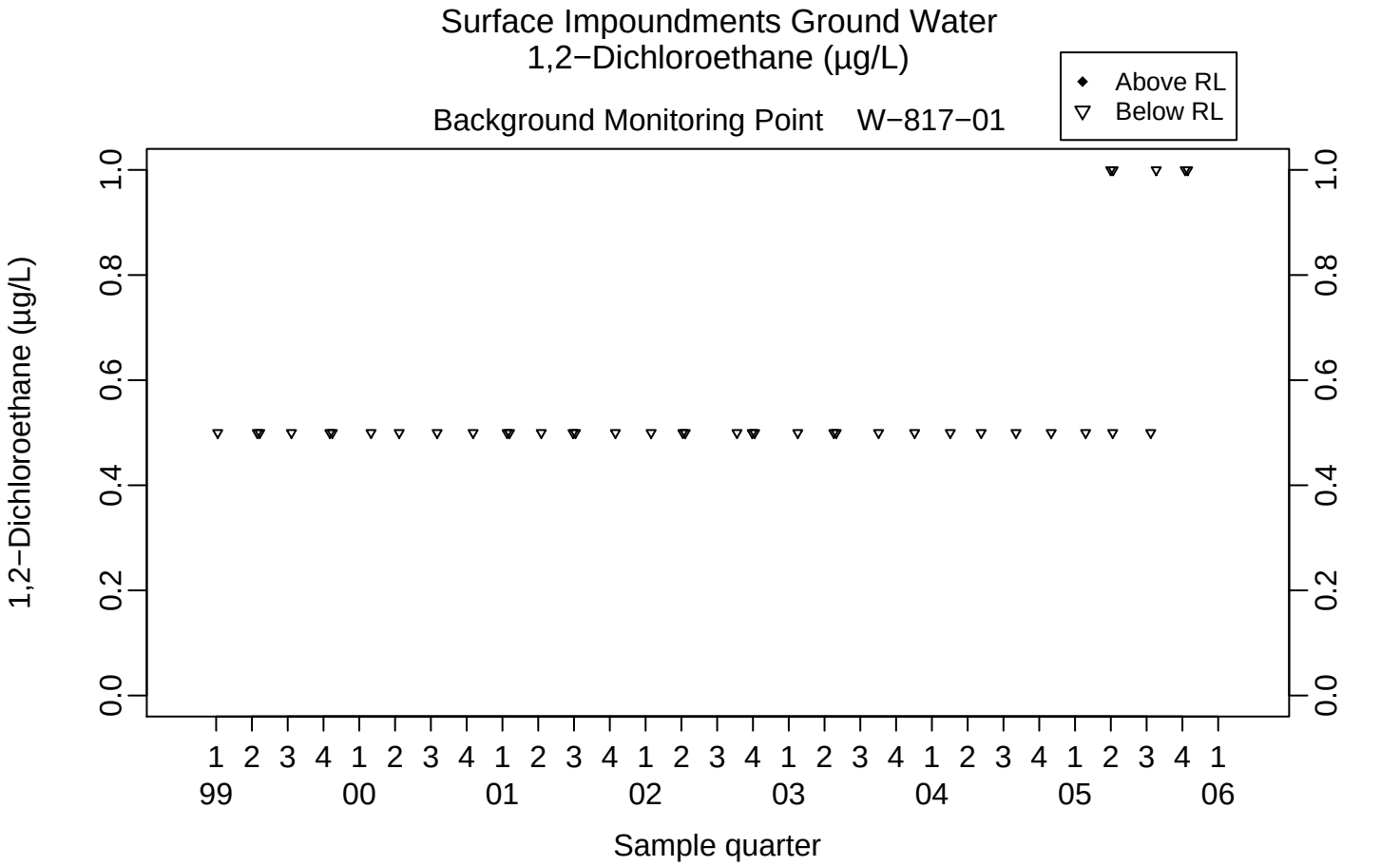

SL=1
Compliance Monitoring Point W−817−04
1,1,1−Trichloroethane (µg/L)
SL
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

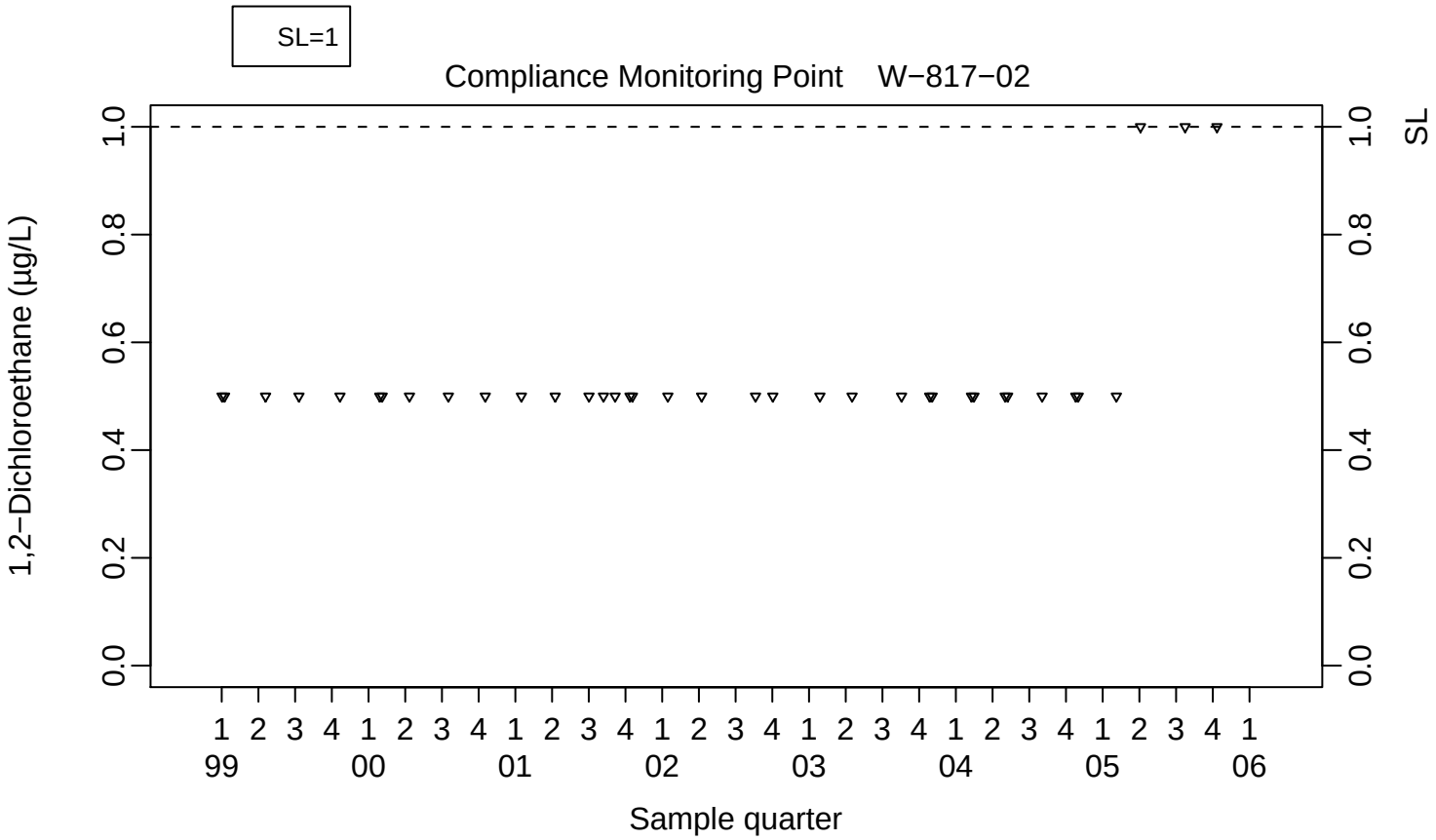

Surface Impoundments Ground Water
Bromoform (µg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Bromoform (µg/L)
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

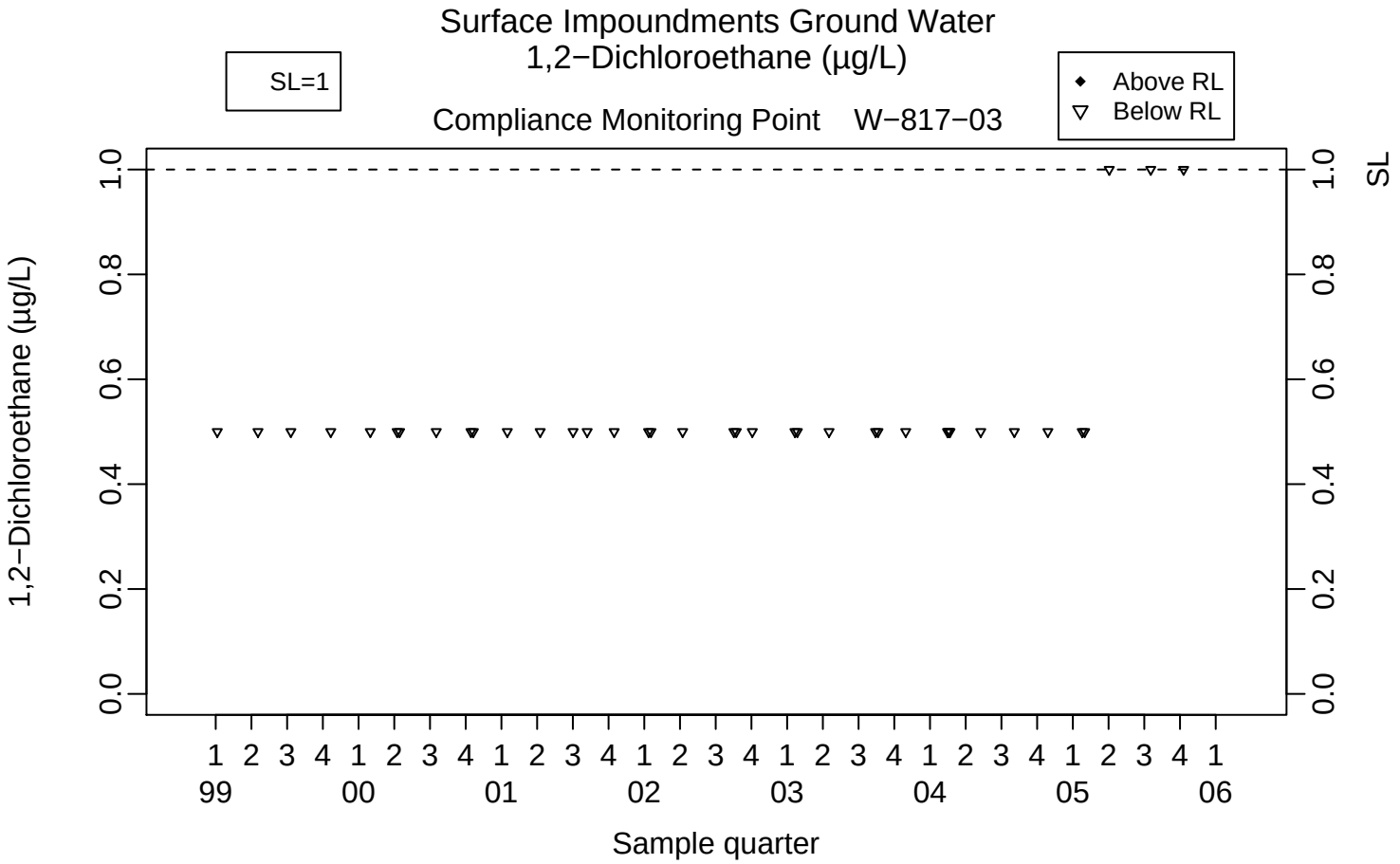

SL=1
Compliance Monitoring Point W−817−02
Bromoform (µg/L)
SL
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

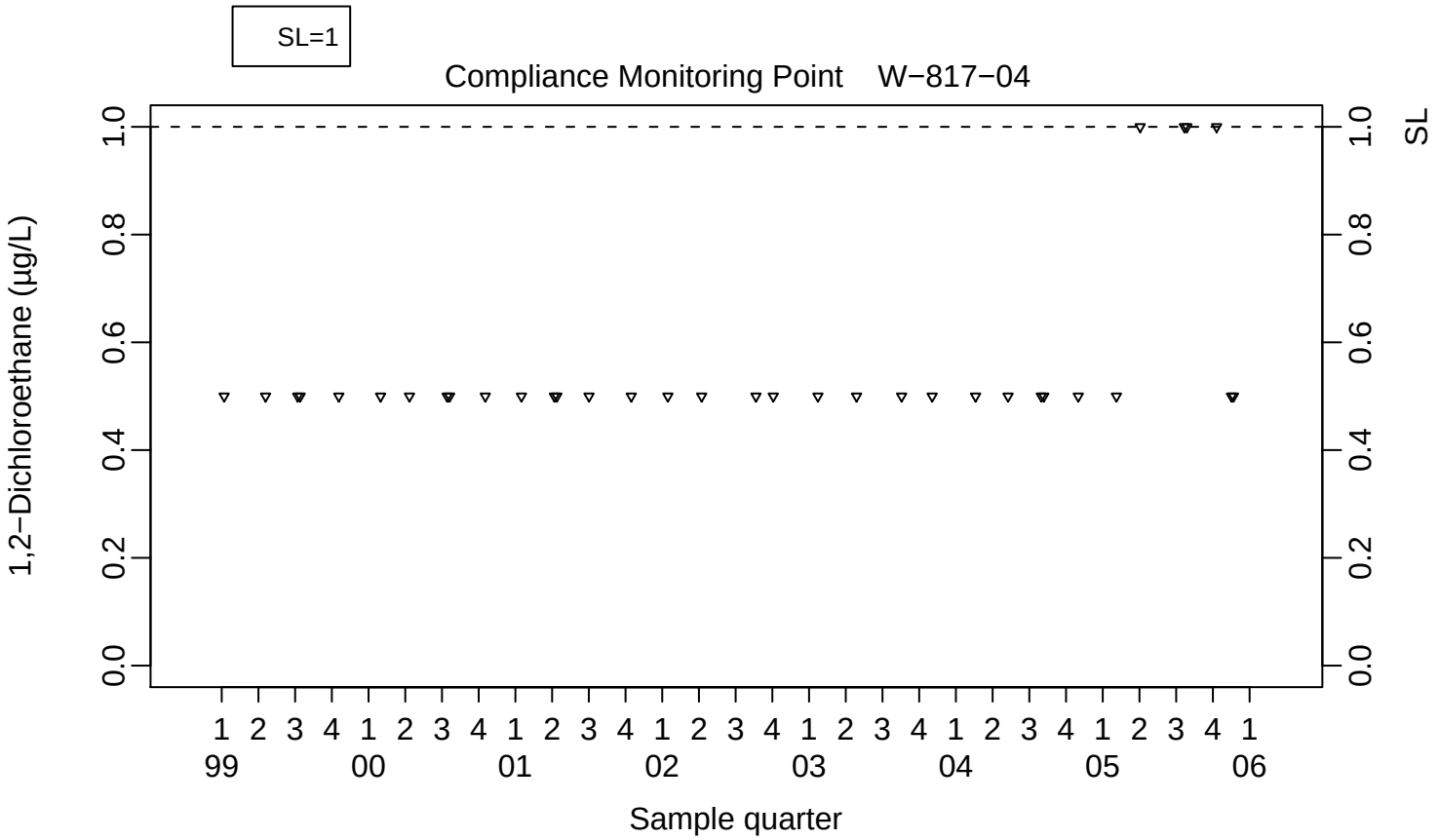

Surface Impoundments Ground Water
Bromoform (µg/L)
SL=1
Above RL
Below RL
Compliance Monitoring Point W−817−03
Bromoform (µg/L)
SL
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

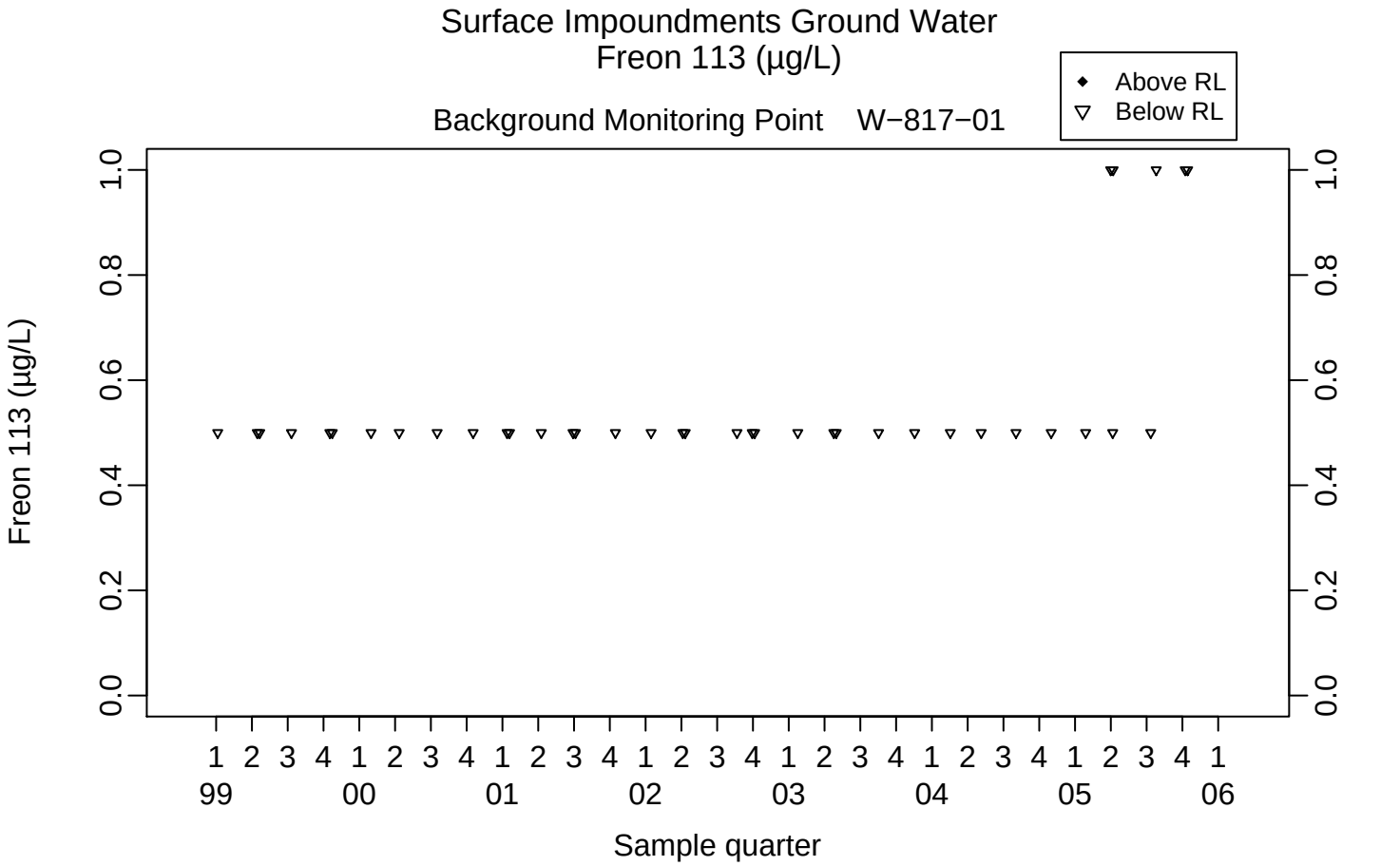

SL=1
Compliance Monitoring Point W−817−04
Bromoform (µg/L)
SL
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

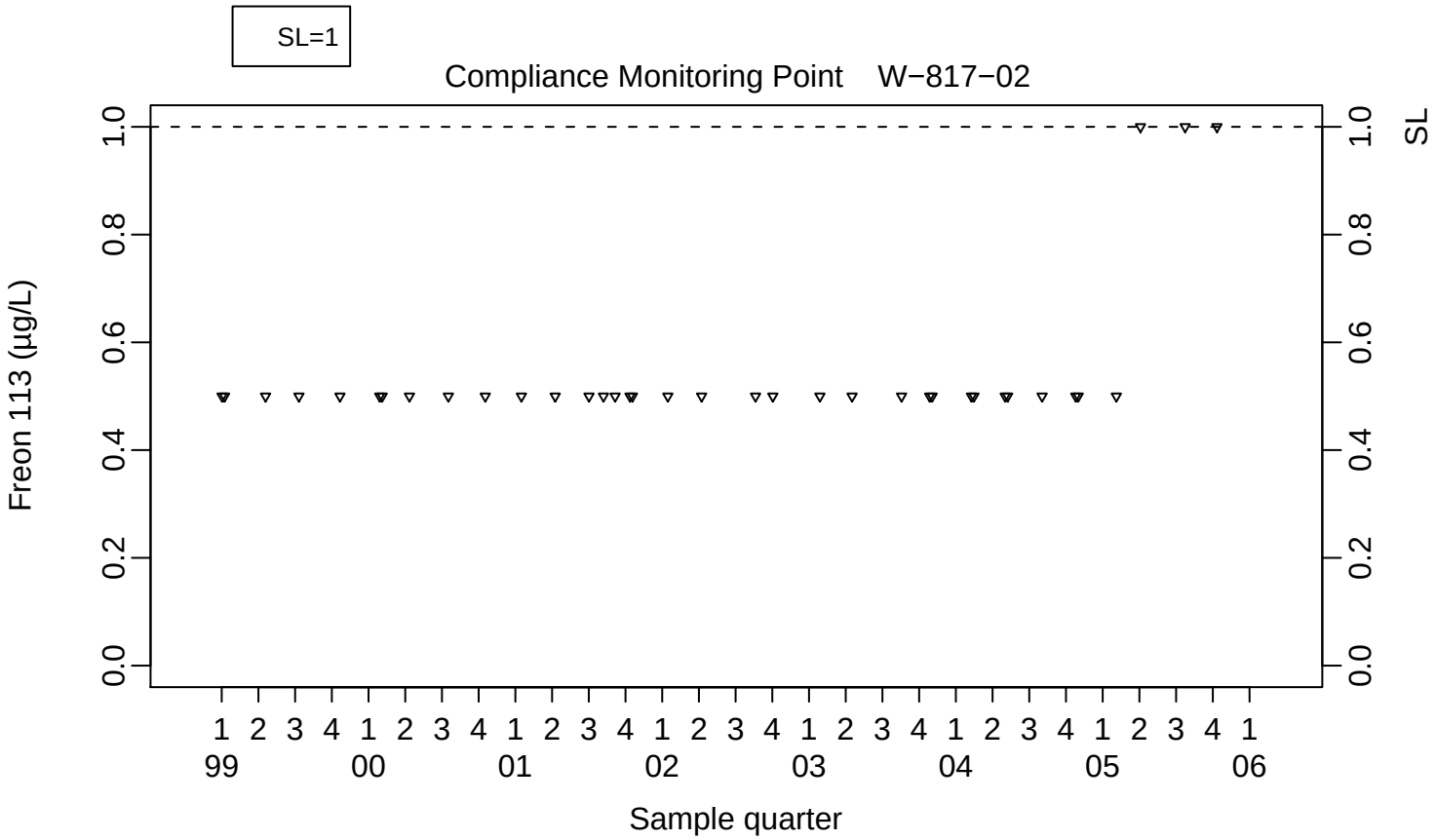

Surface Impoundments Ground Water
1,2−Dichloroethane (µg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
1,2−Dichloroethane (µg/L)
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

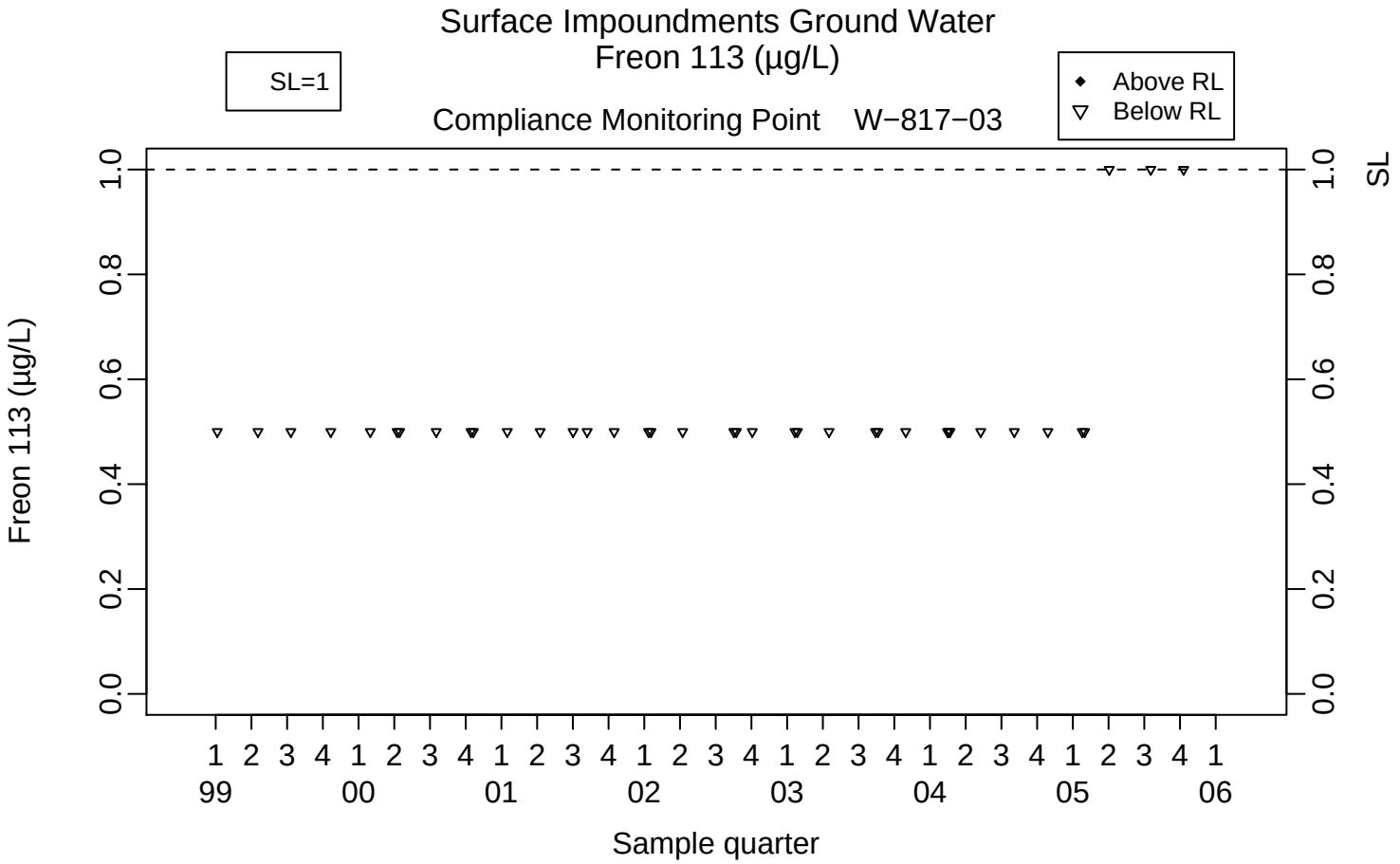

SL=1
Compliance Monitoring Point W−817−02
1,2−Dichloroethane (µg/L)
SL
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

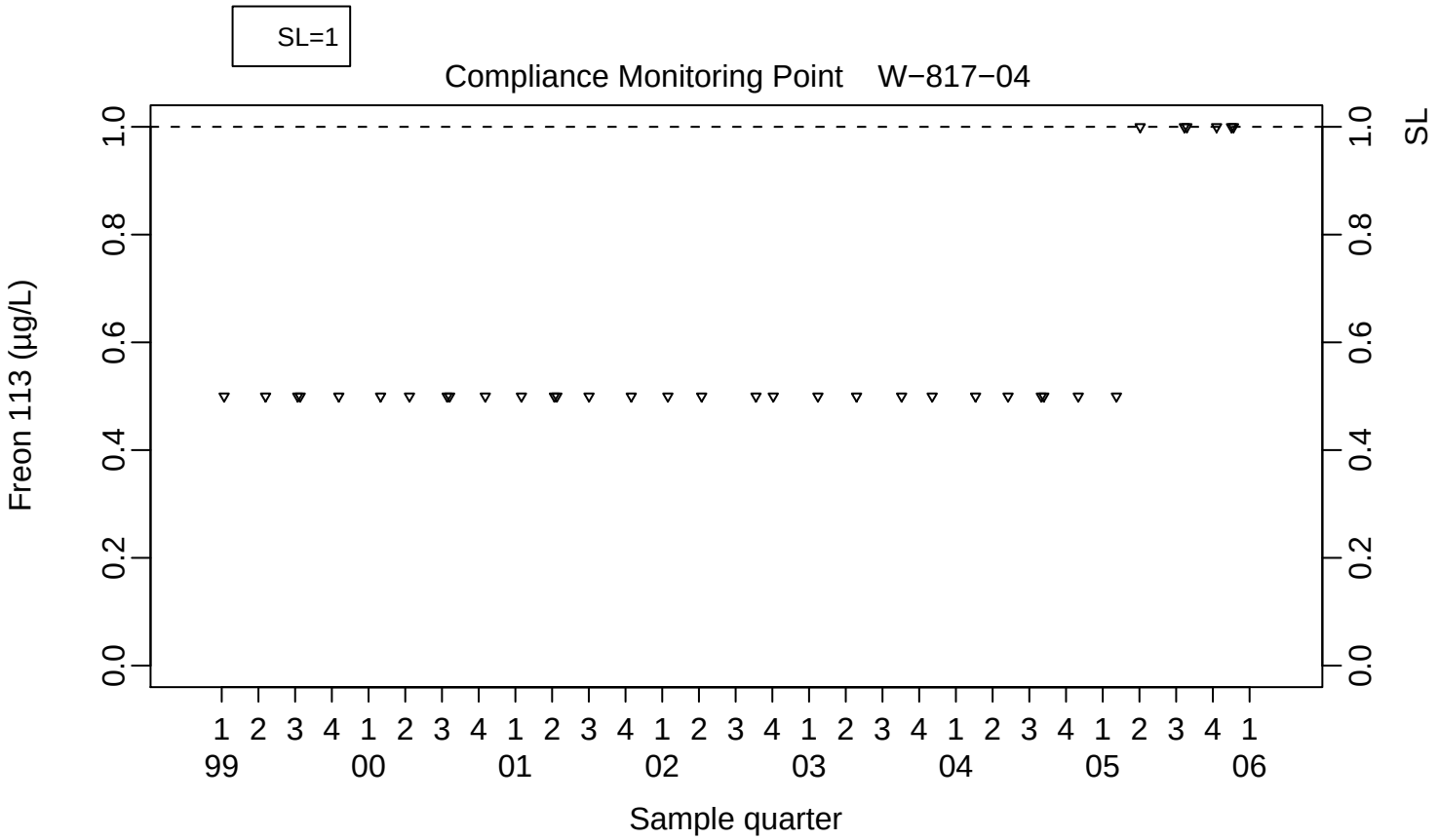

Surface Impoundments Ground Water
1,2−Dichloroethane (µg/L)
SL=1
Above RL
Below RL
Compliance Monitoring Point W−817−03
1,2−Dichloroethane (µg/L)
SL
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

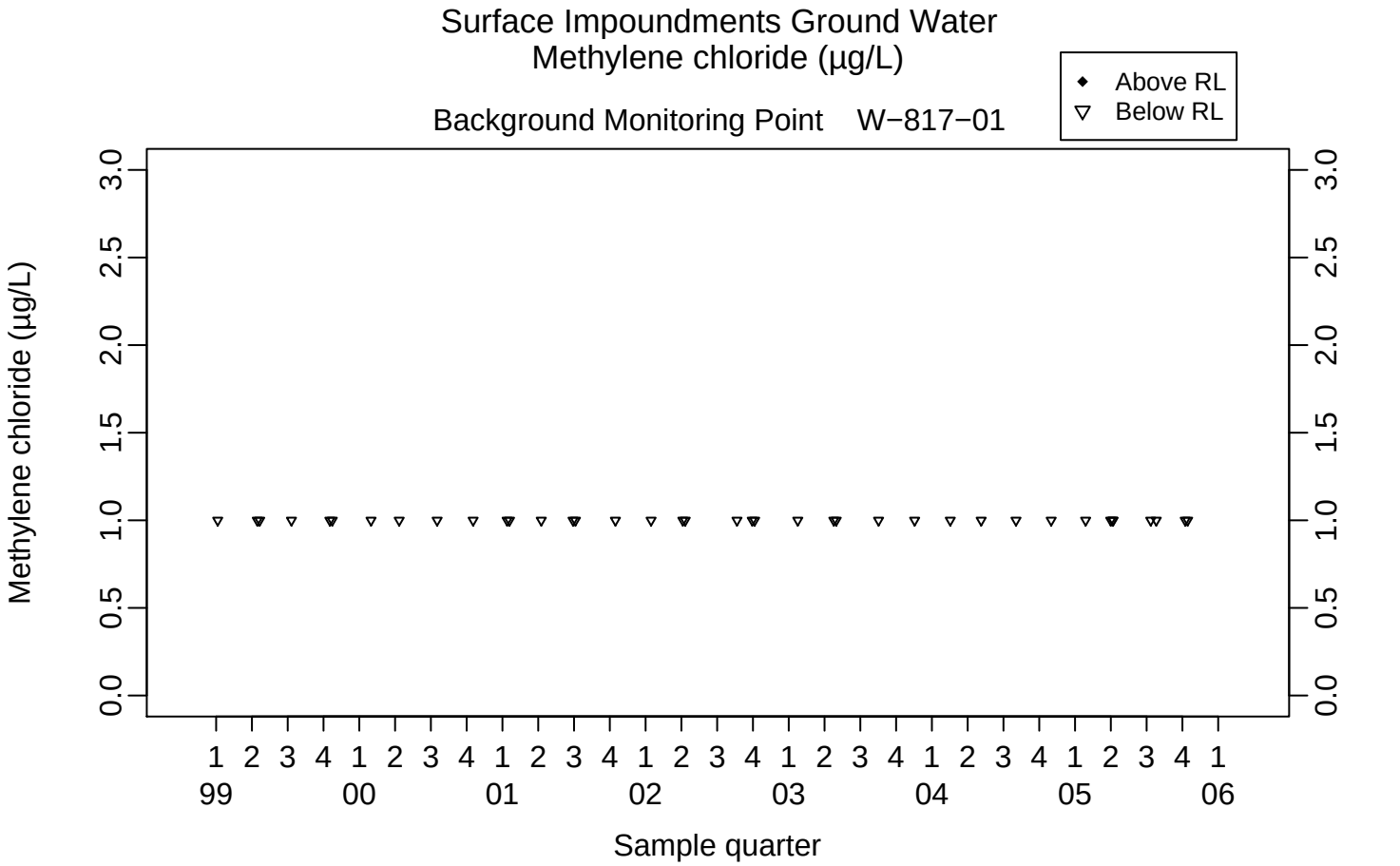

SL=1
Compliance Monitoring Point W−817−04
1,2−Dichloroethane (µg/L)
SL
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

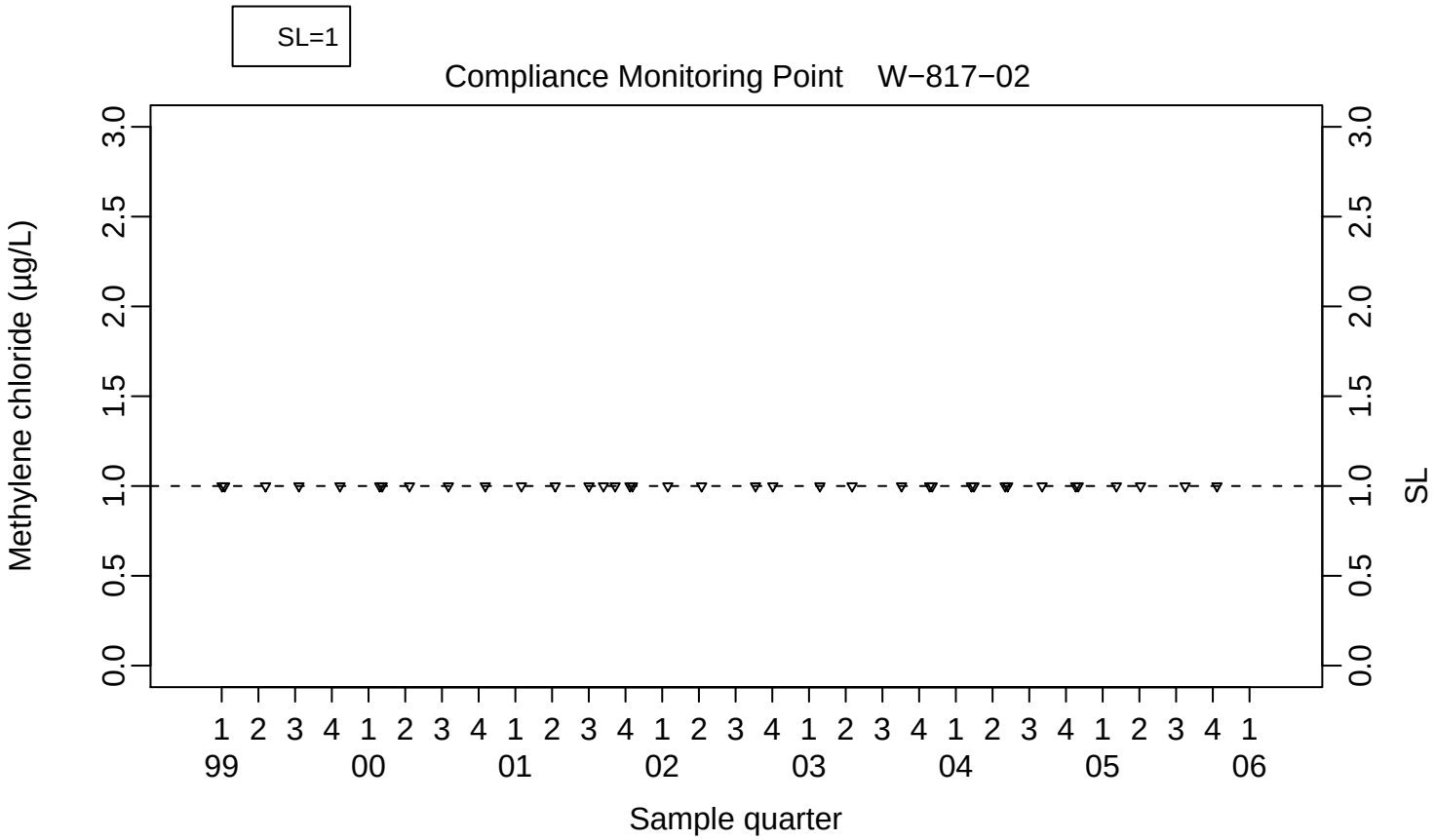

Surface Impoundments Ground Water
Freon 113 (µg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Freon 113 (µg/L)
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

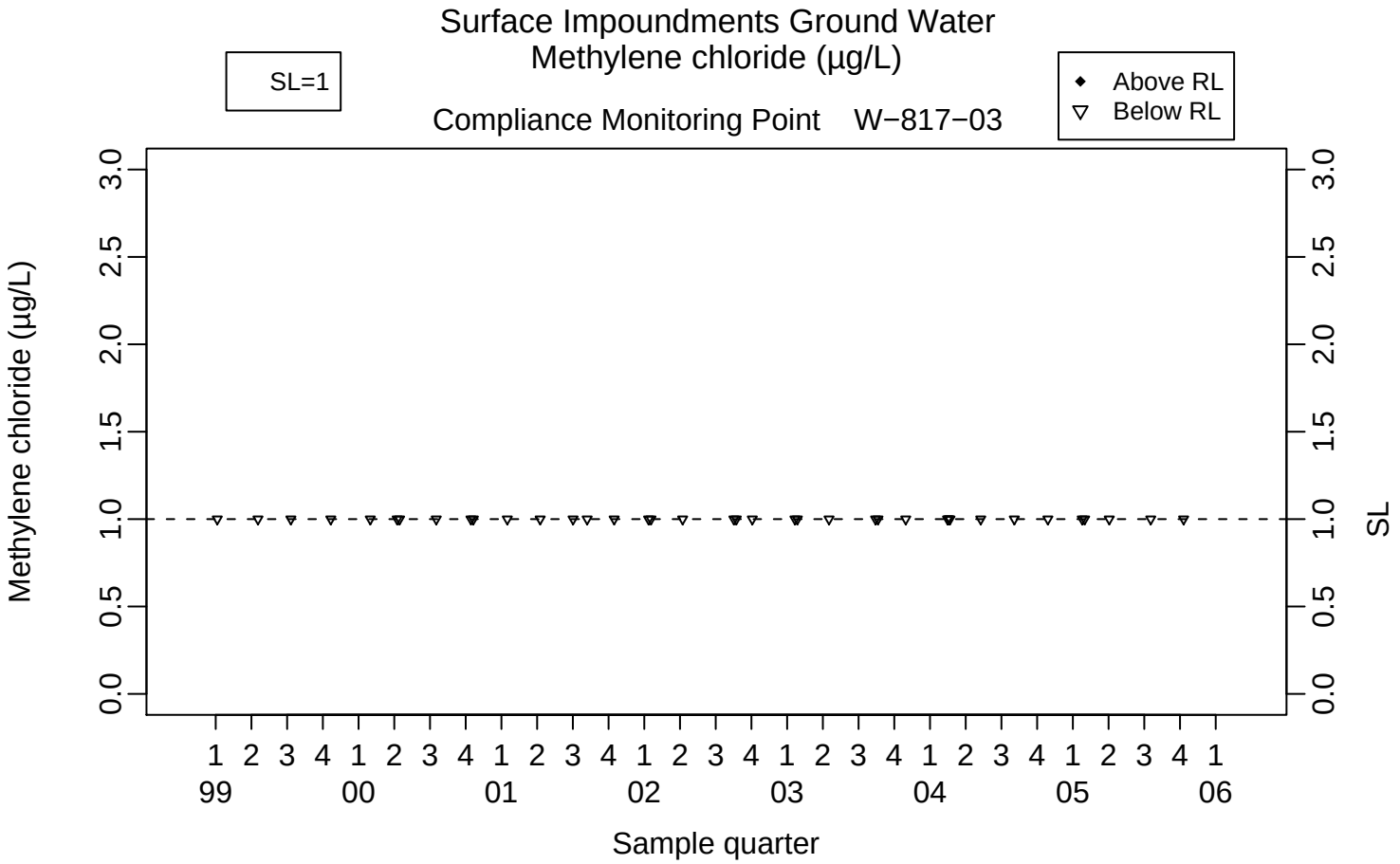

SL=1
Compliance Monitoring Point W−817−02
Freon 113 (µg/L)
SL
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

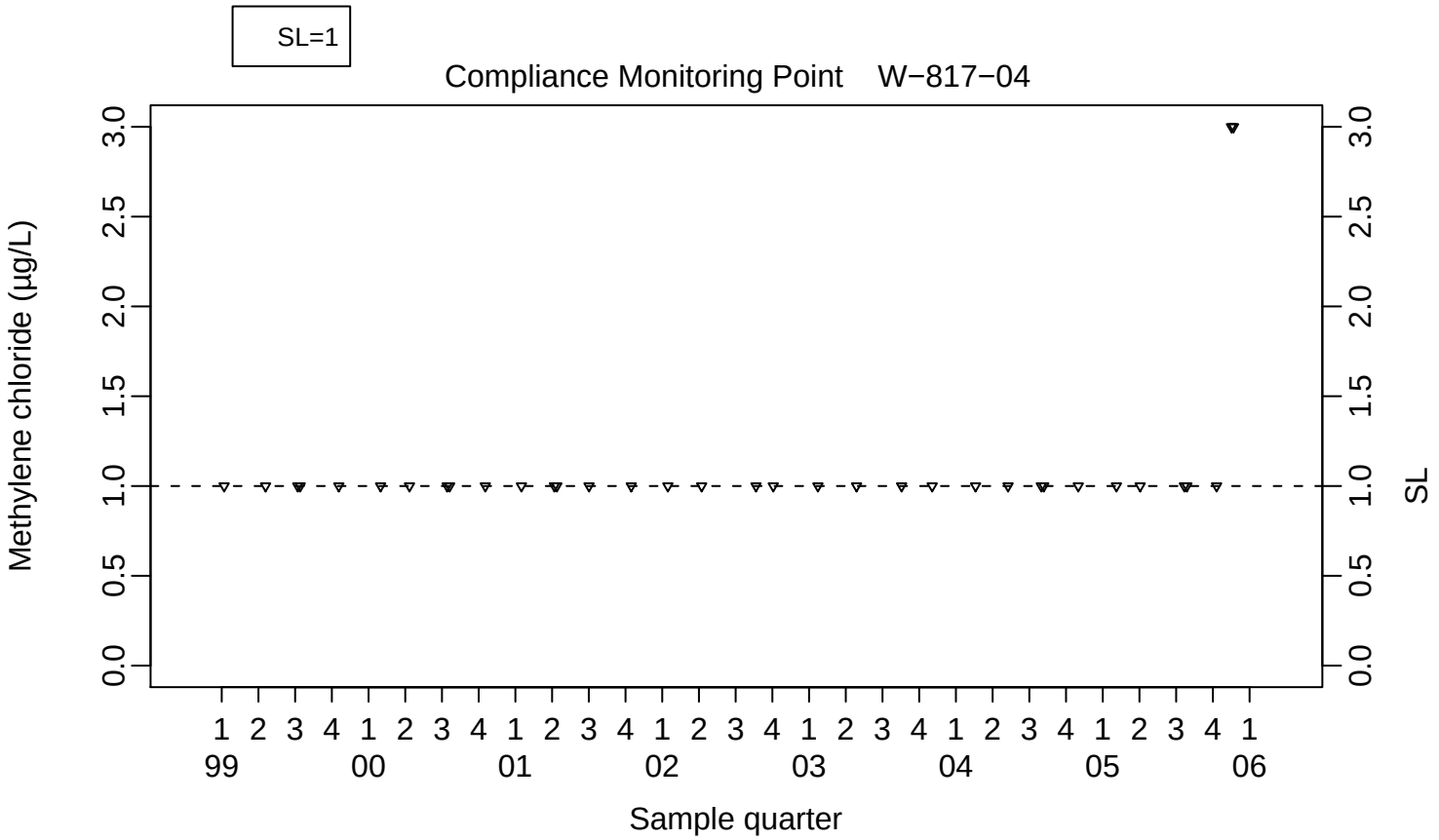

Surface Impoundments Ground Water
Freon 113 (µg/L)
SL=1
Above RL
Below RL
Compliance Monitoring Point W−817−03
Freon 113 (µg/L)
SL
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

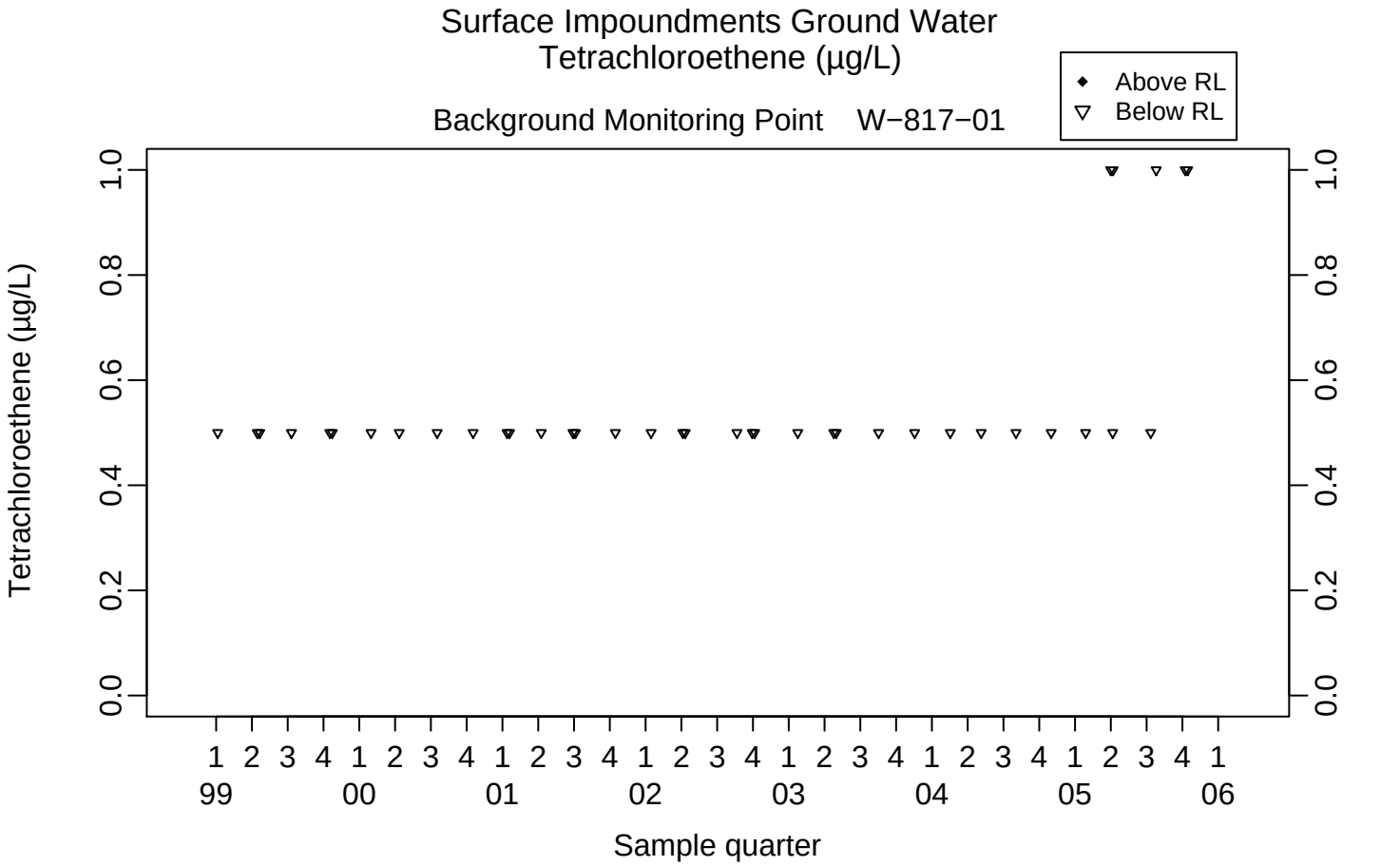

SL=1
Compliance Monitoring Point W−817−04
Freon 113 (µg/L)
SL
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

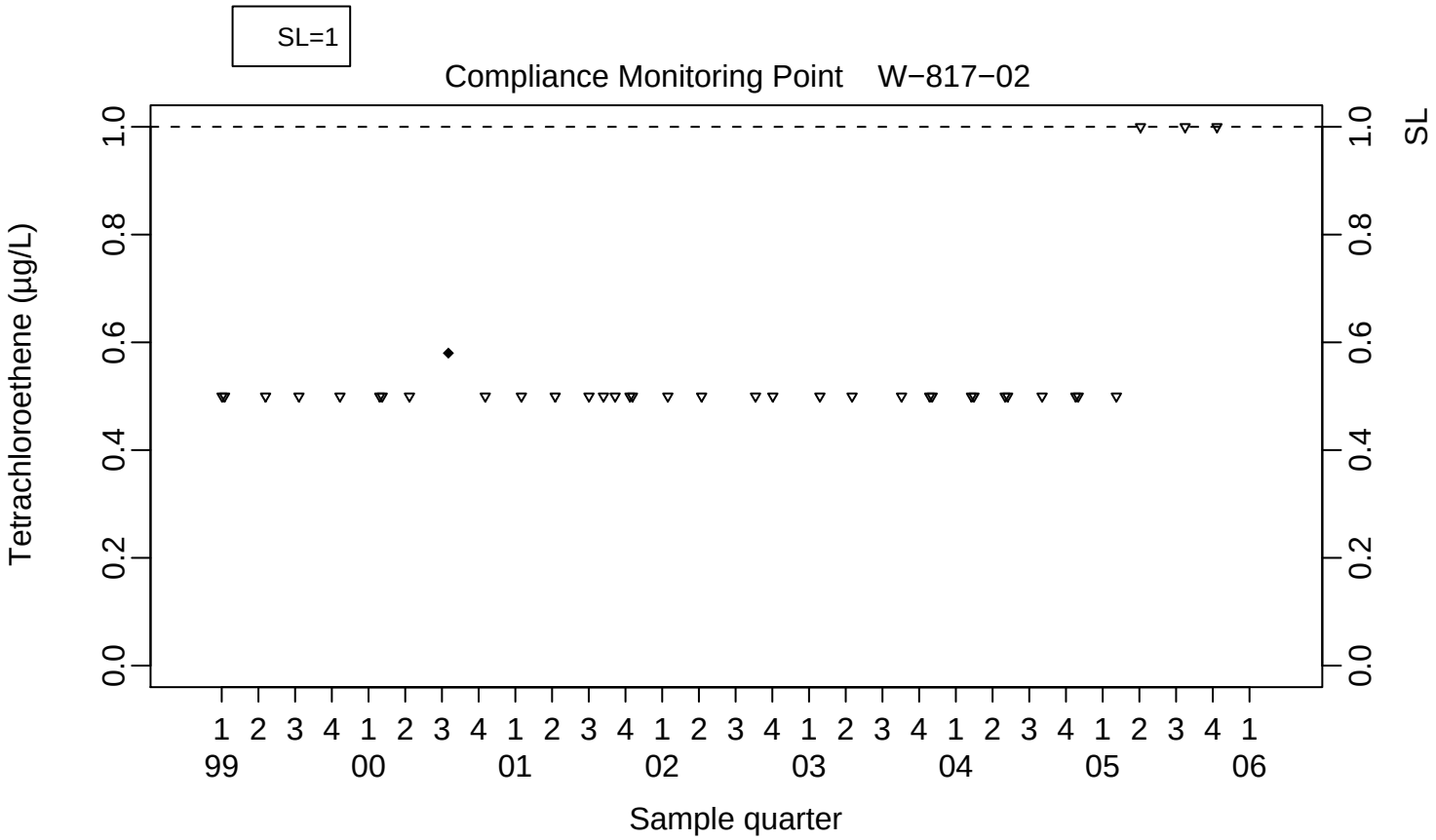

Surface Impoundments Ground Water
Methylene chloride (µg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Methylene chloride (µg/L)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

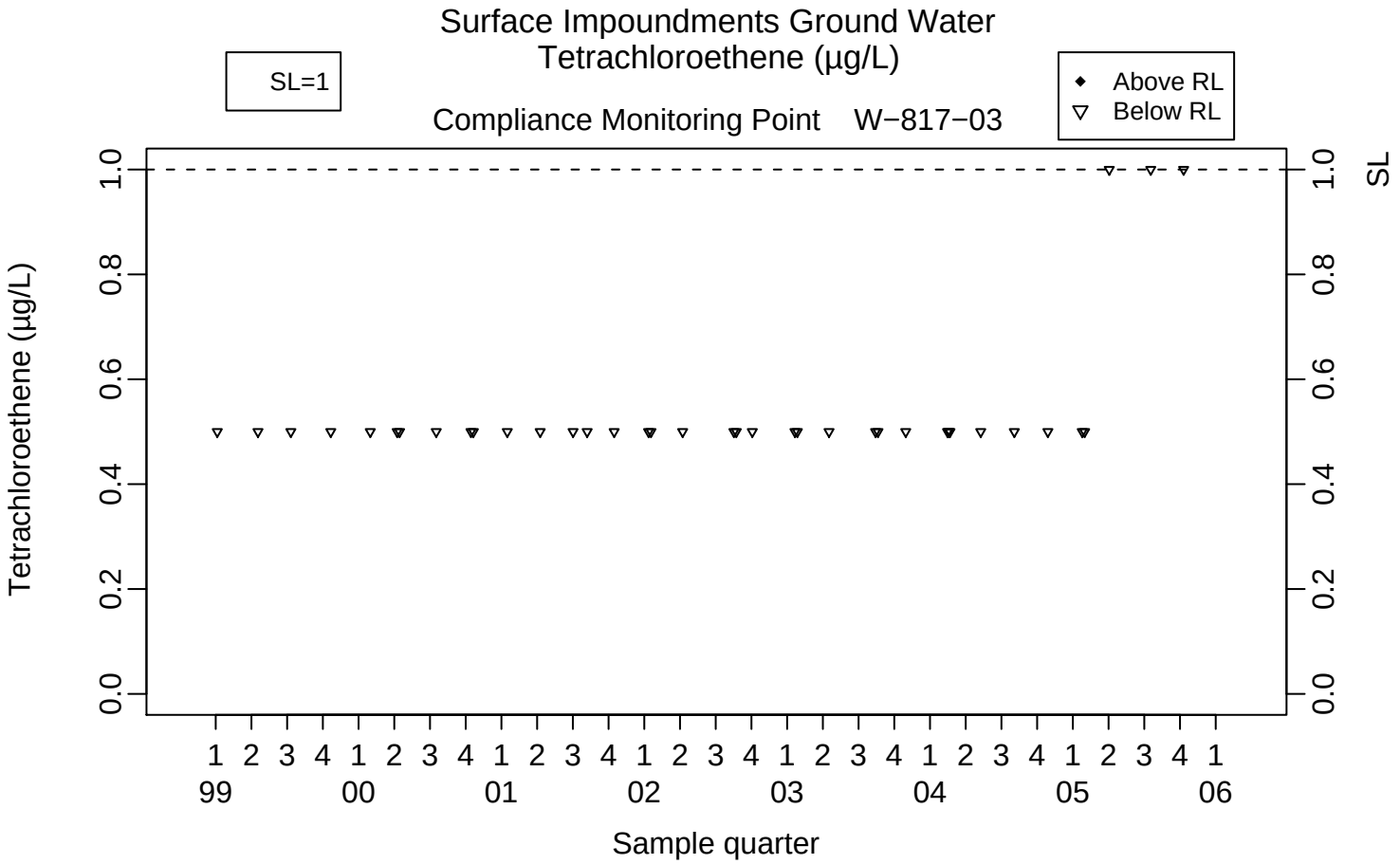

SL=1
Compliance Monitoring Point W−817−02
Methylene chloride (µg/L)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

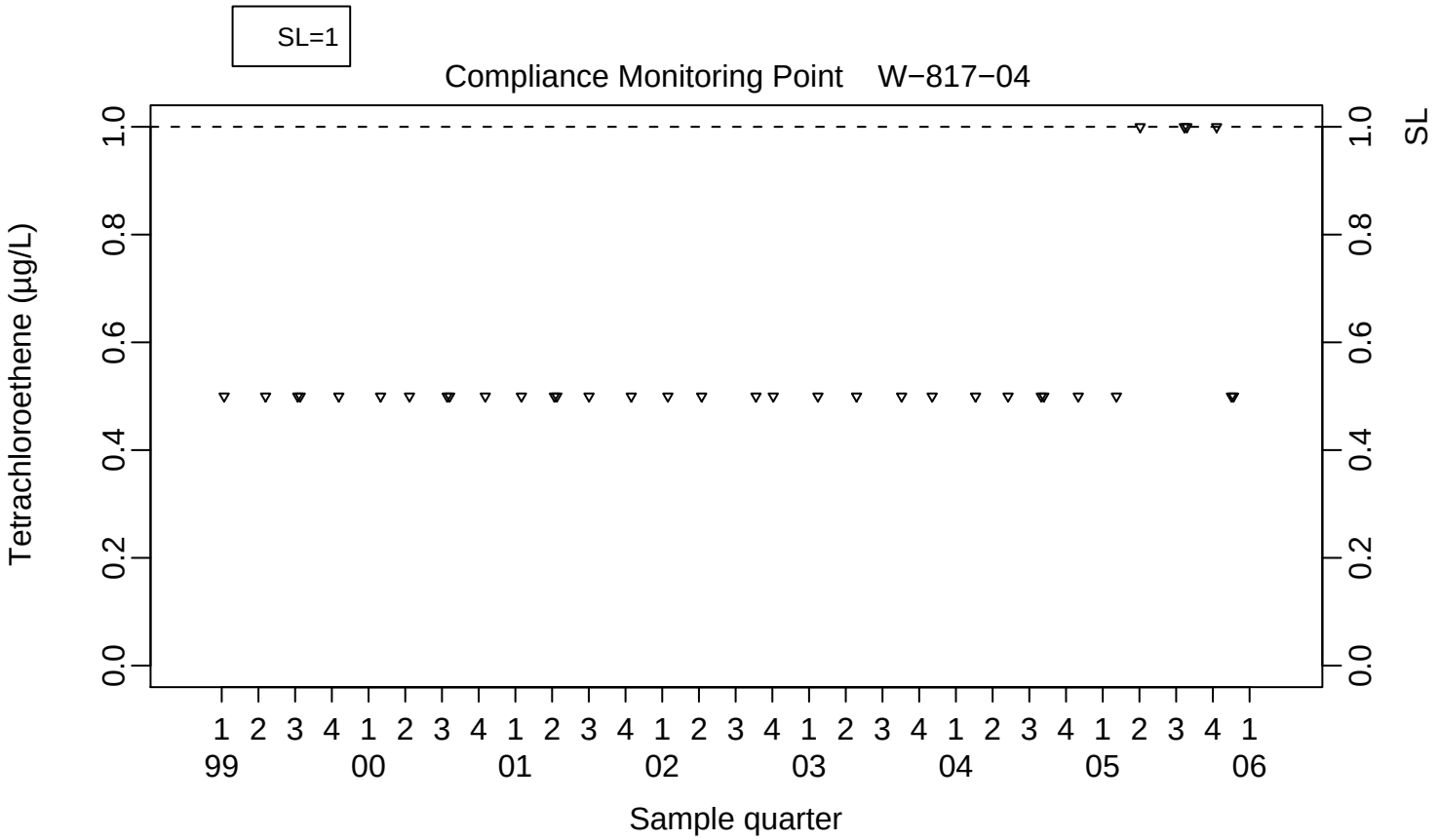

Surface Impoundments Ground Water
Methylene chloride (µg/L)
SL=1
Above RL
Below RL
Compliance Monitoring Point W−817−03
Methylene chloride (µg/L)
SL
0.0
0.5
1.0
1.5
2.0
2.5
3.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


SL=1
Compliance Monitoring Point W−817−04
Methylene chloride (µg/L)
SL
0.0
0.5
1.0
1.5
2.0
2.5
3.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

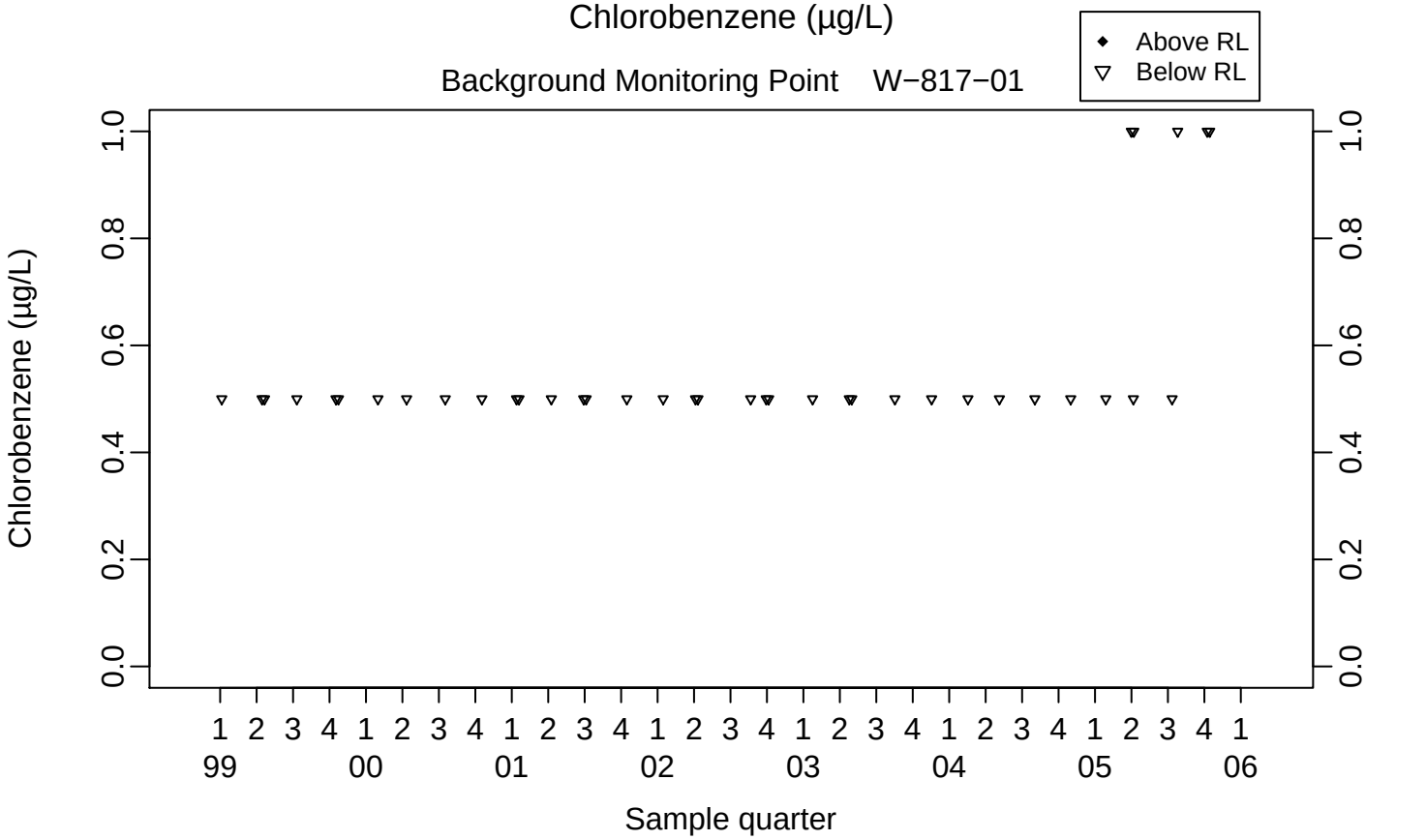

Surface Impoundments Ground Water
Tetrachloroethene (µg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Tetrachloroethene (µg/L)
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

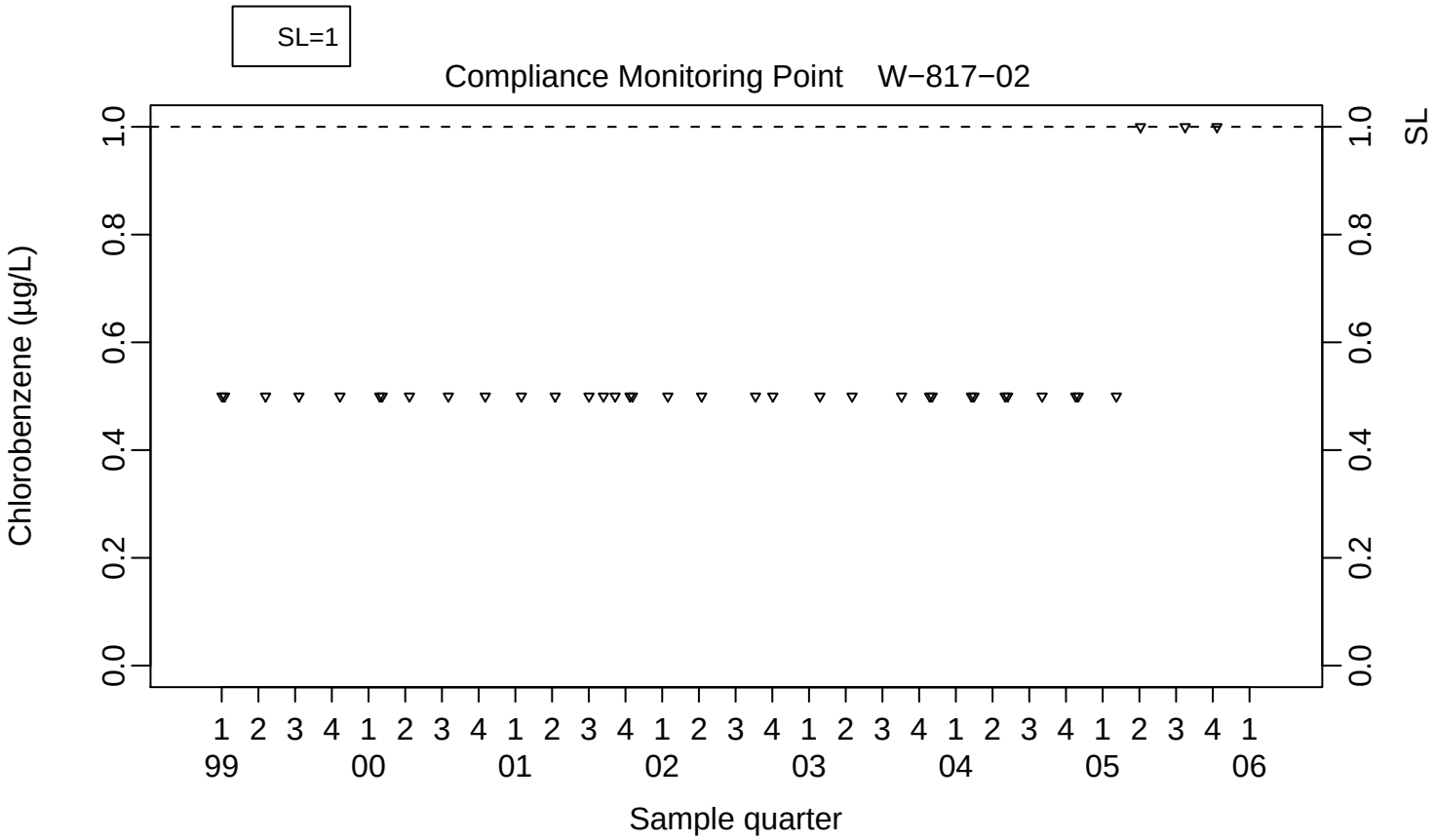

SL=1
Compliance Monitoring Point W−817−02
SL
Tetrachloroethene (µg/L)
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

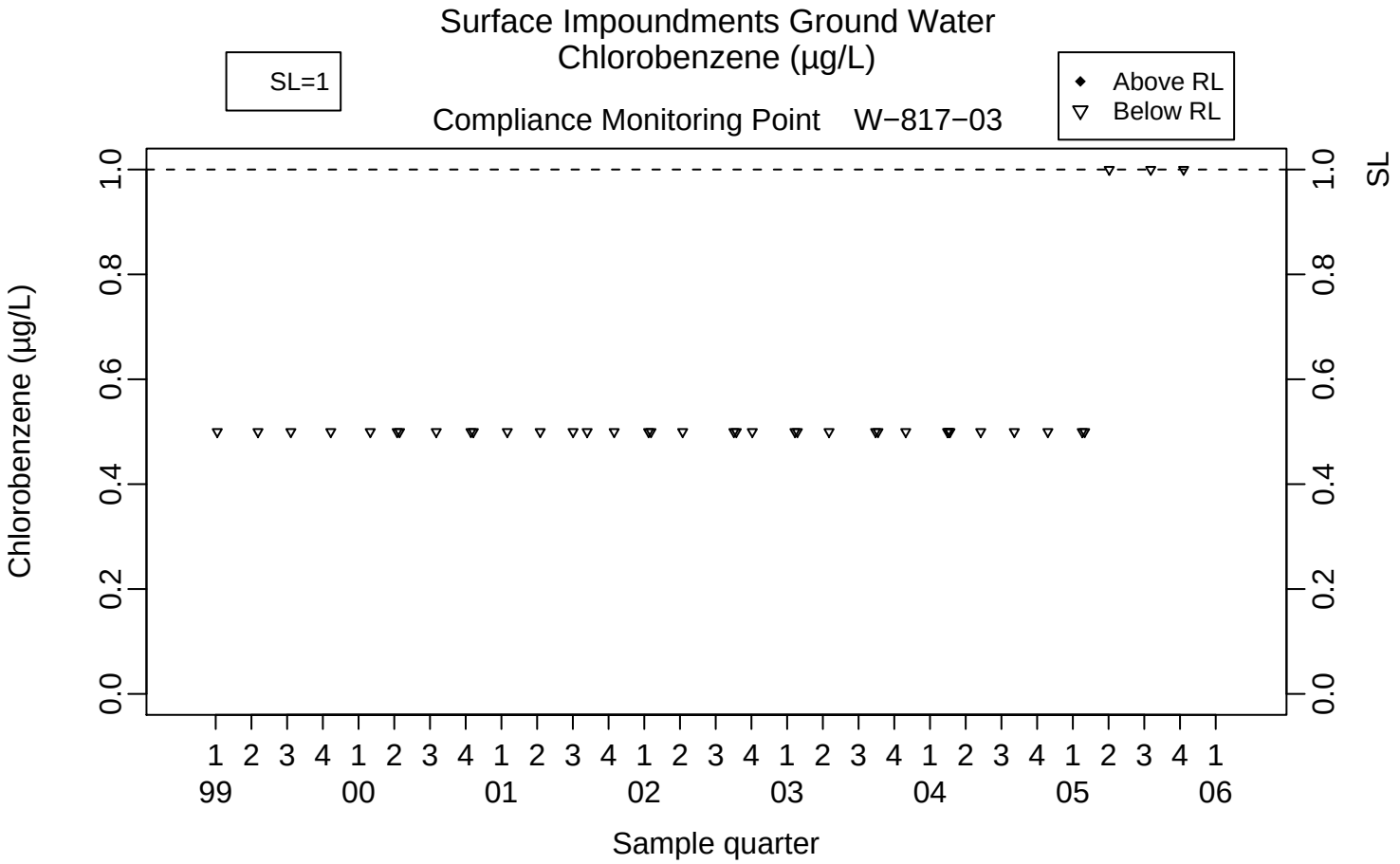

Surface Impoundments Ground Water
Tetrachloroethene (µg/L)
SL=1
Above RL
Below RL
Compliance Monitoring Point W−817−03
Tetrachloroethene (µg/L)
SL
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

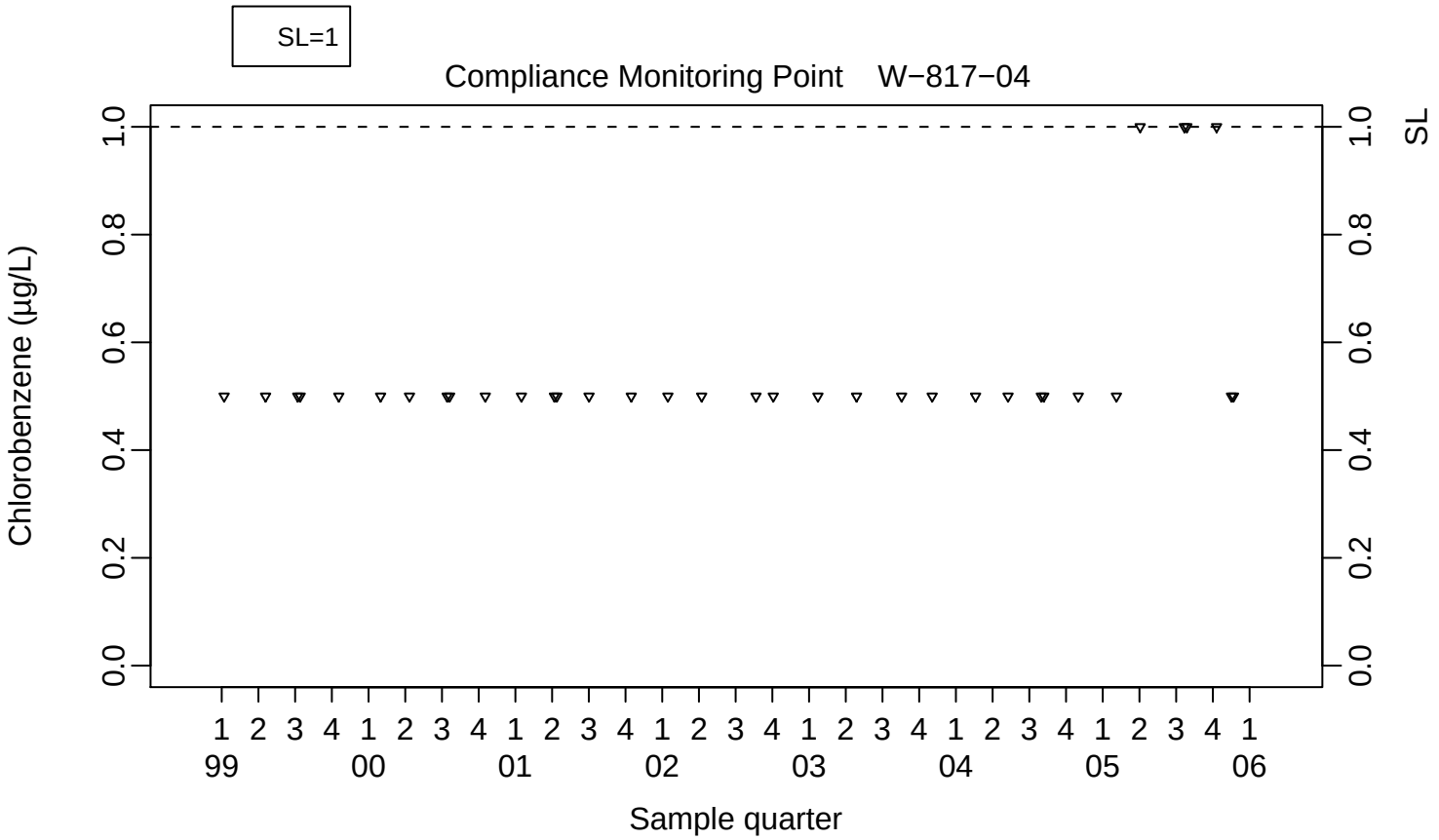

SL=1
Compliance Monitoring Point W−817−04
Tetrachloroethene (µg/L)
SL
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

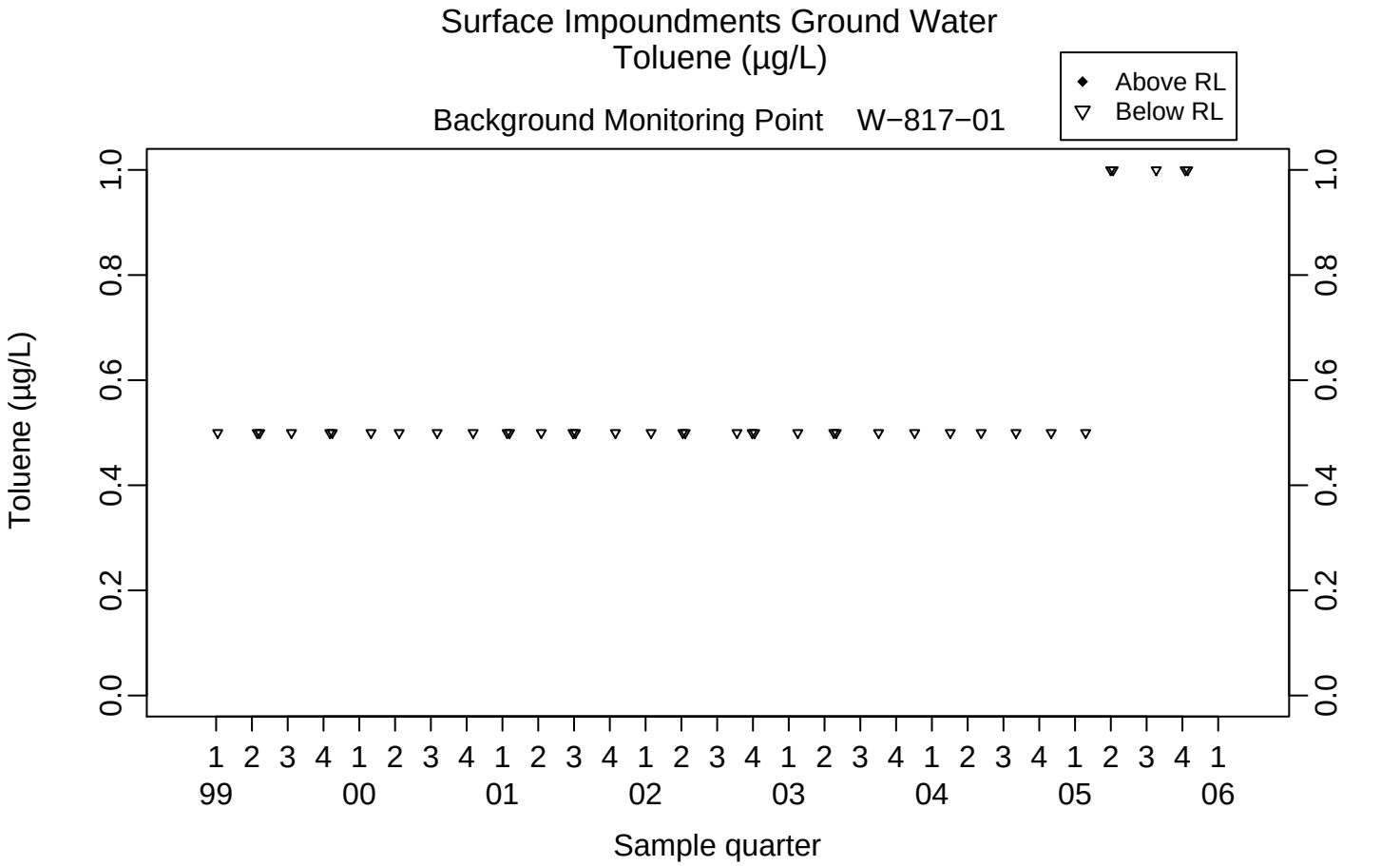
Surface Impoundments Ground Water
Chlorobenzene (µg/L)

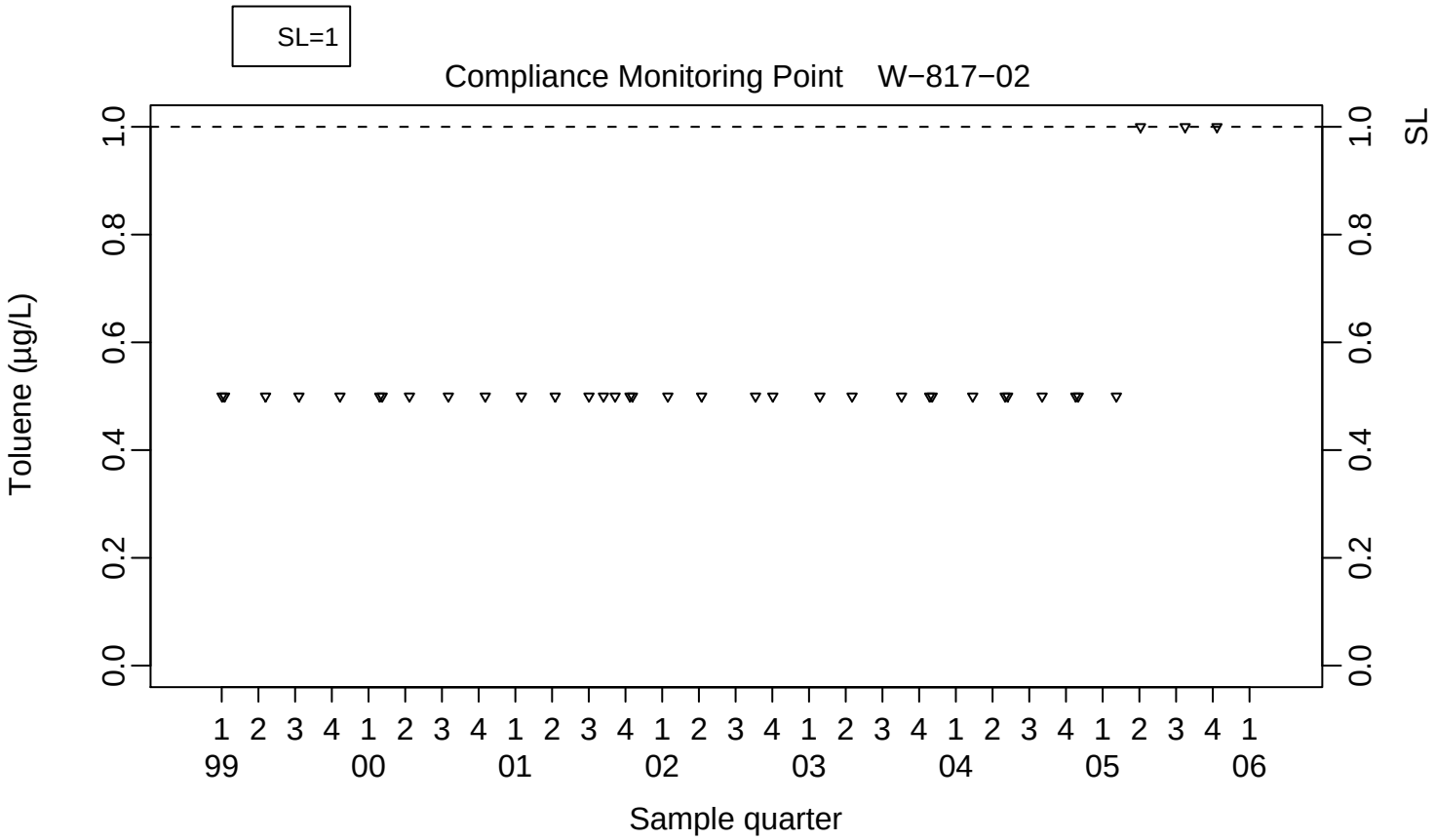


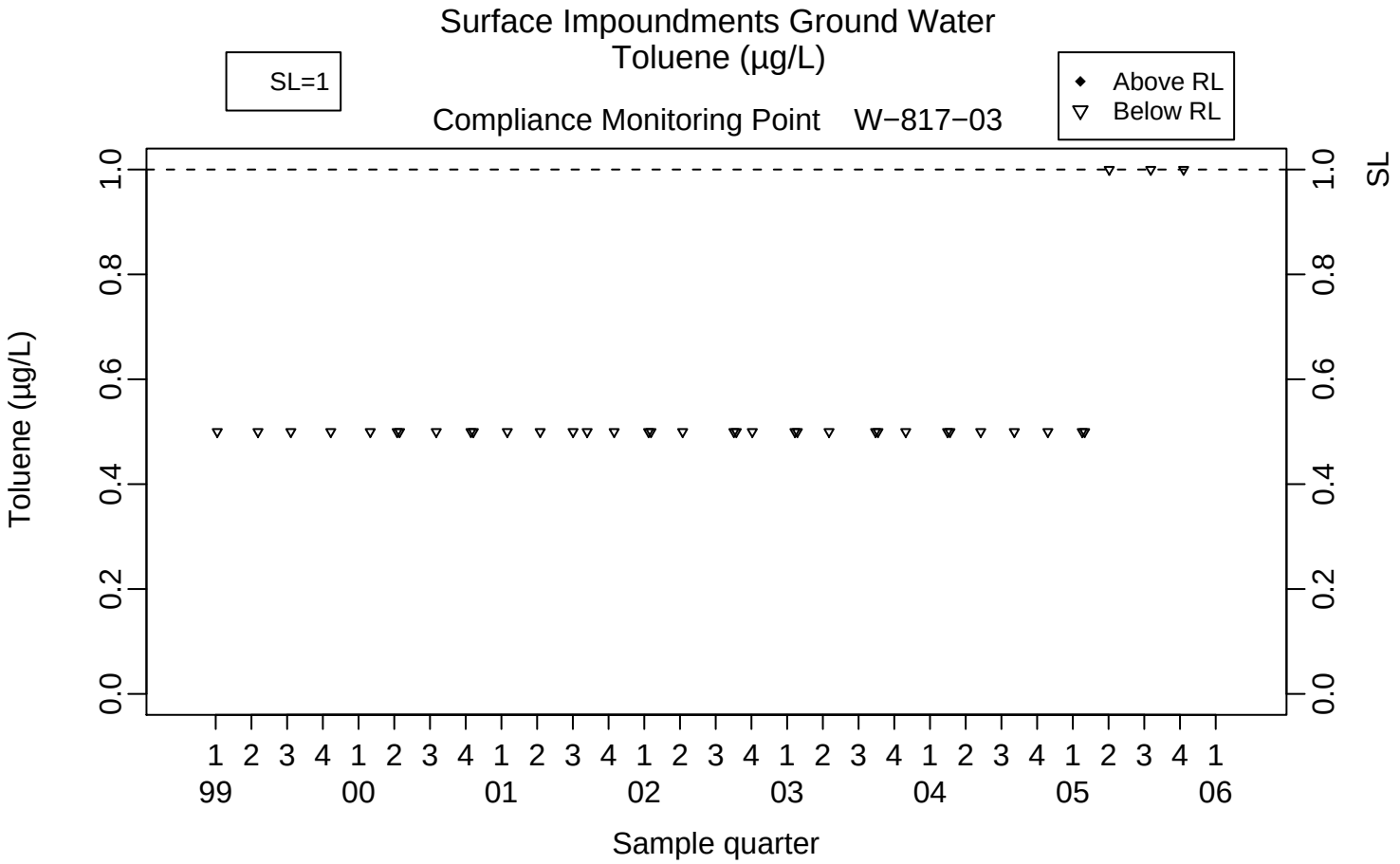


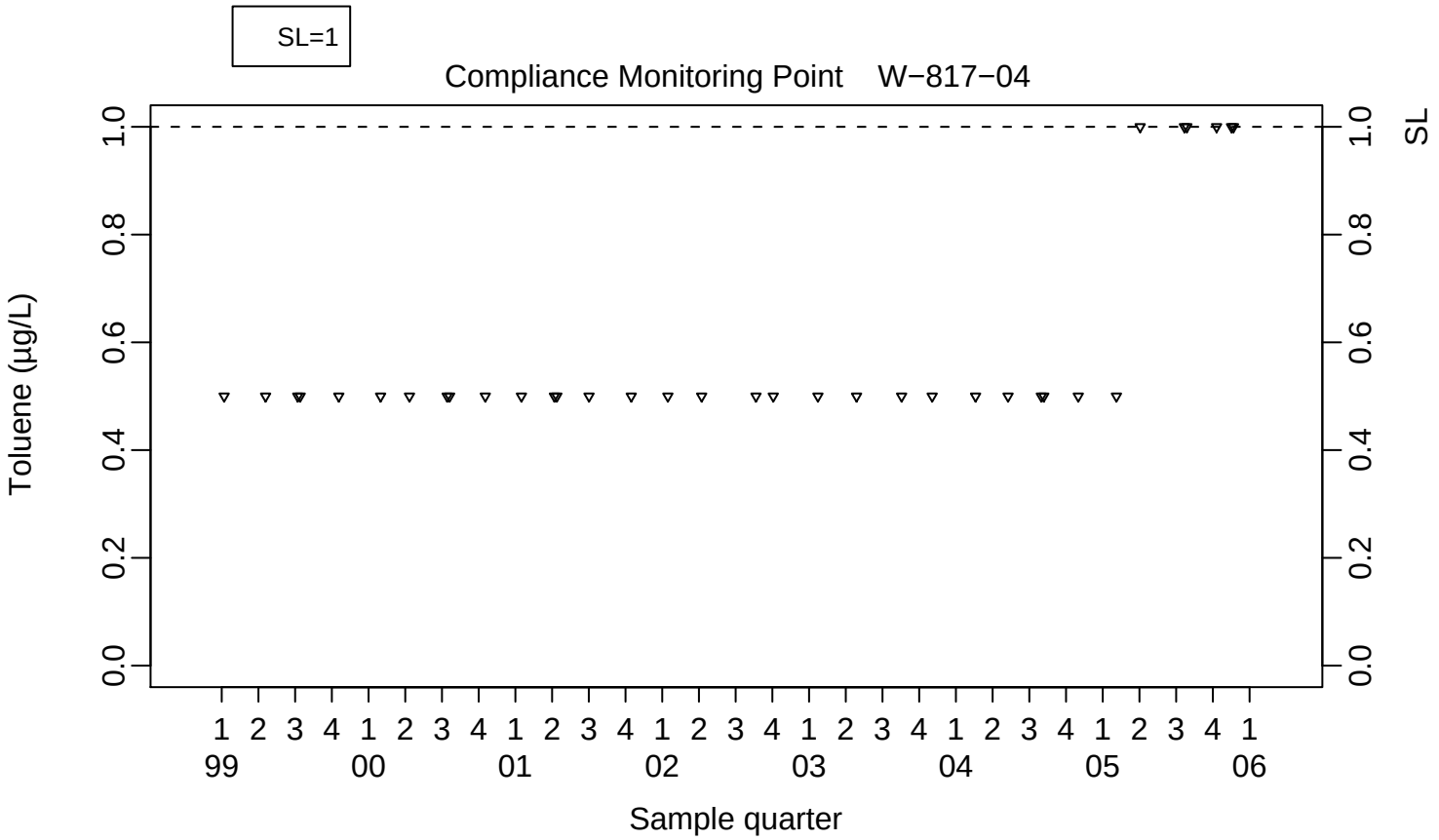

Surface Impoundments Ground Water
Chlorobenzene (µg/L)
SL=1
Above RL
Below RL
Compliance Monitoring Point W−817−03
Chlorobenzene (µg/L)
SL
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


SL=1
Compliance Monitoring Point W−817−04
Chlorobenzene (µg/L)
SL
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

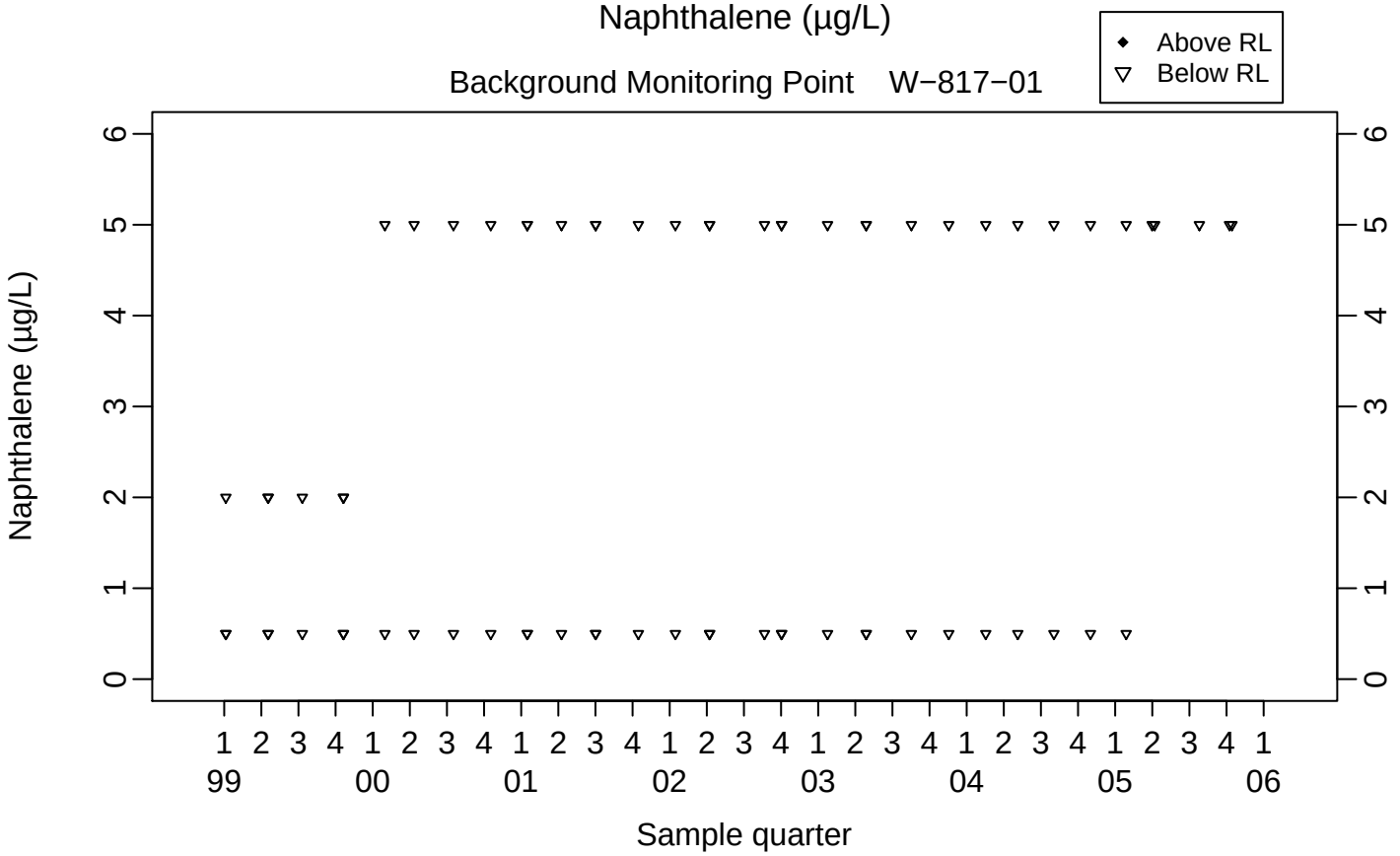

Surface Impoundments Ground Water
Toluene (µg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Toluene (µg/L)
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

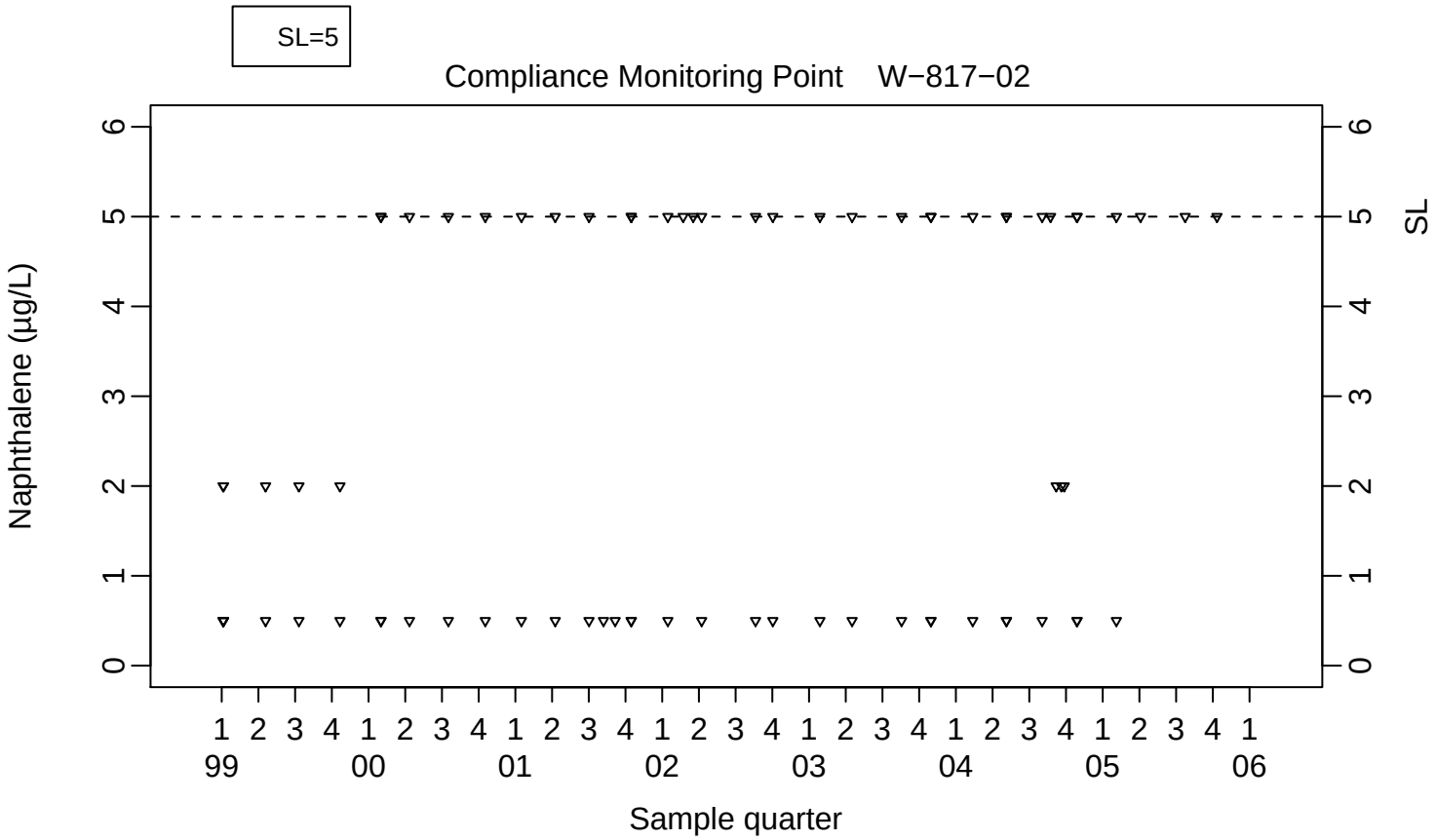

SL=1
Compliance Monitoring Point W−817−02
Toluene (µg/L)
SL
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

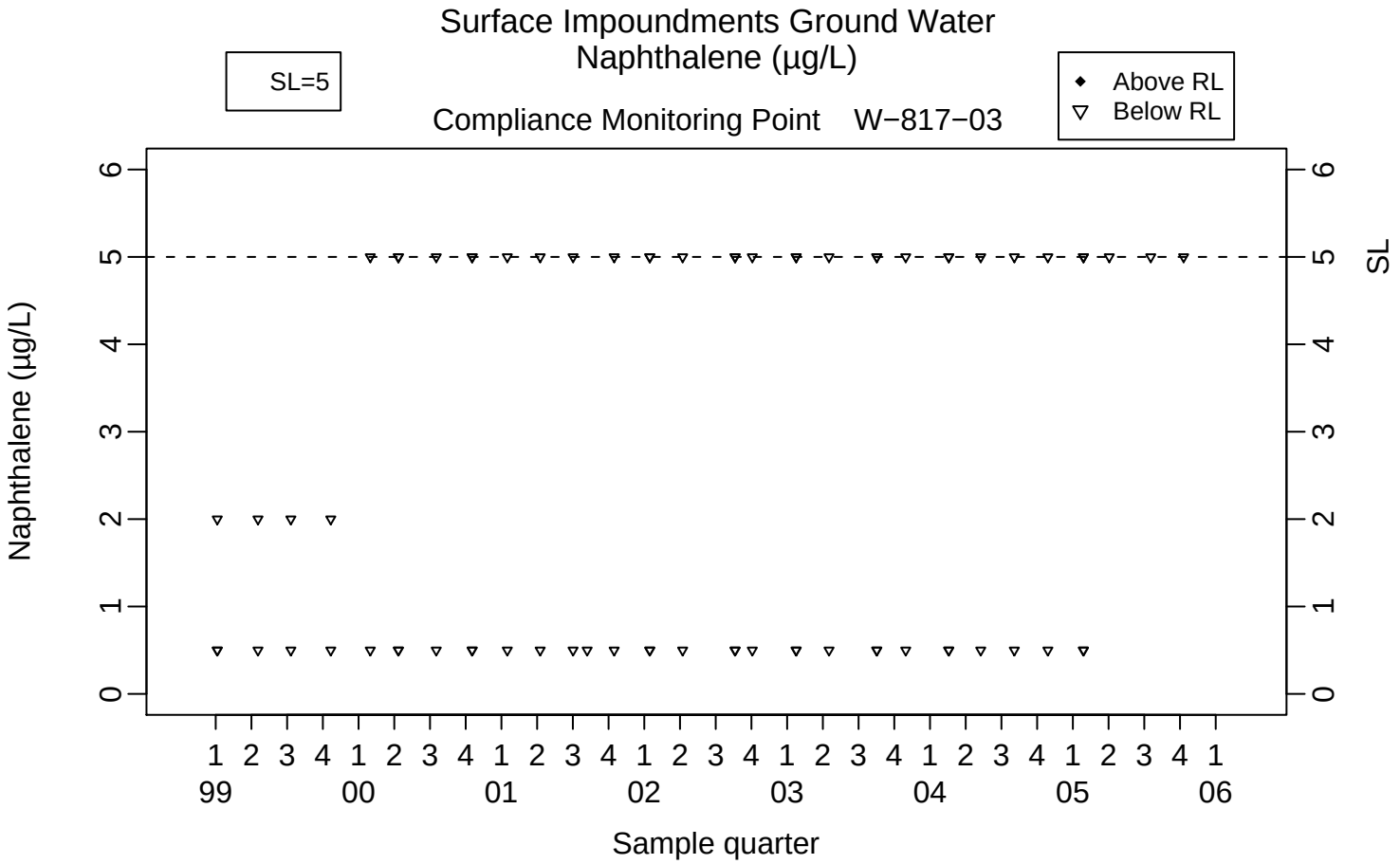

Surface Impoundments Ground Water
Toluene (µg/L)
SL=1
Above RL
Below RL
Compliance Monitoring Point W−817−03
Toluene (µg/L)
SL
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

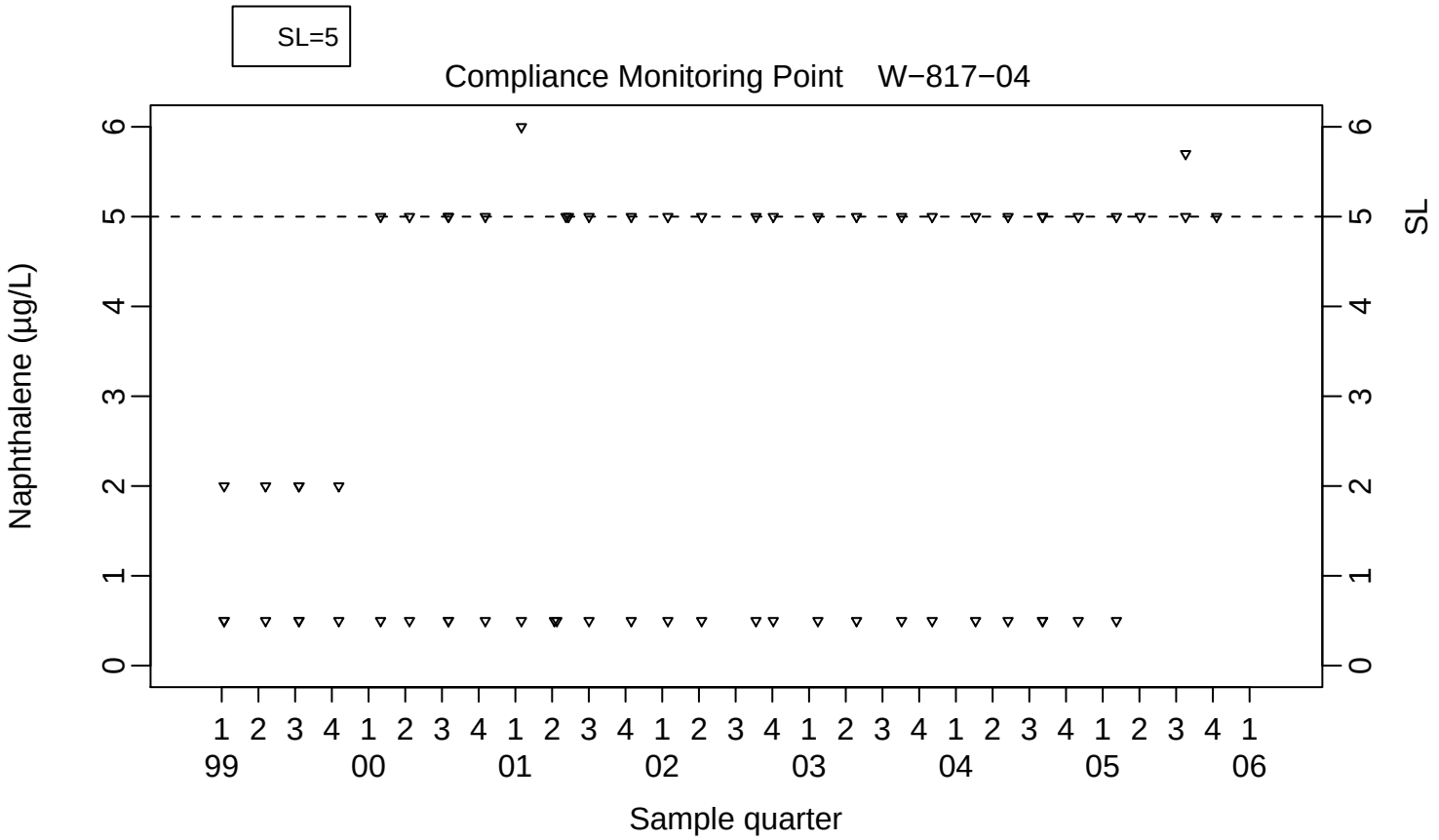

SL=1
Compliance Monitoring Point W−817−04
Toluene (µg/L)
SL
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

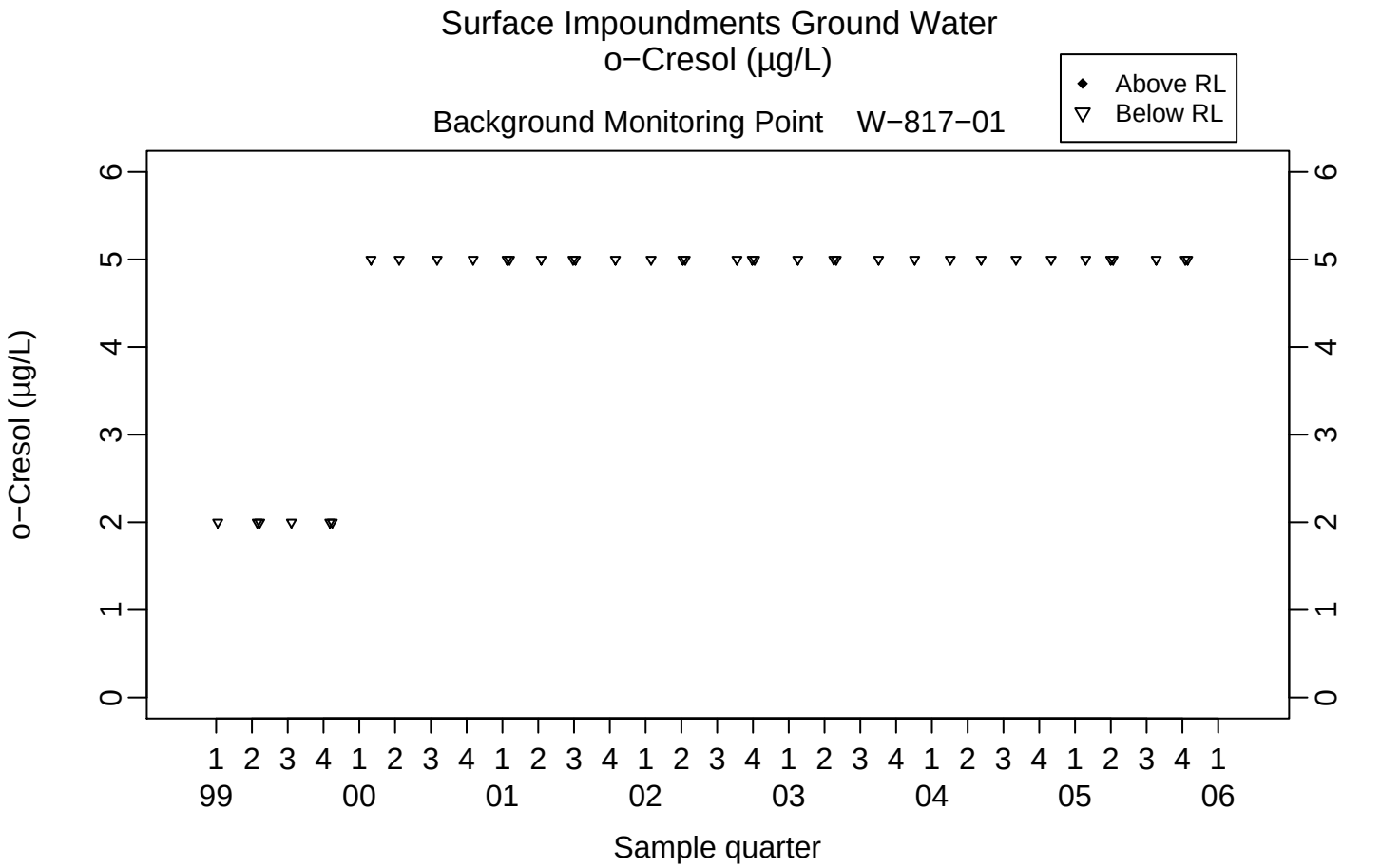
Surface Impoundments Ground Water
Naphthalene (µg/L)

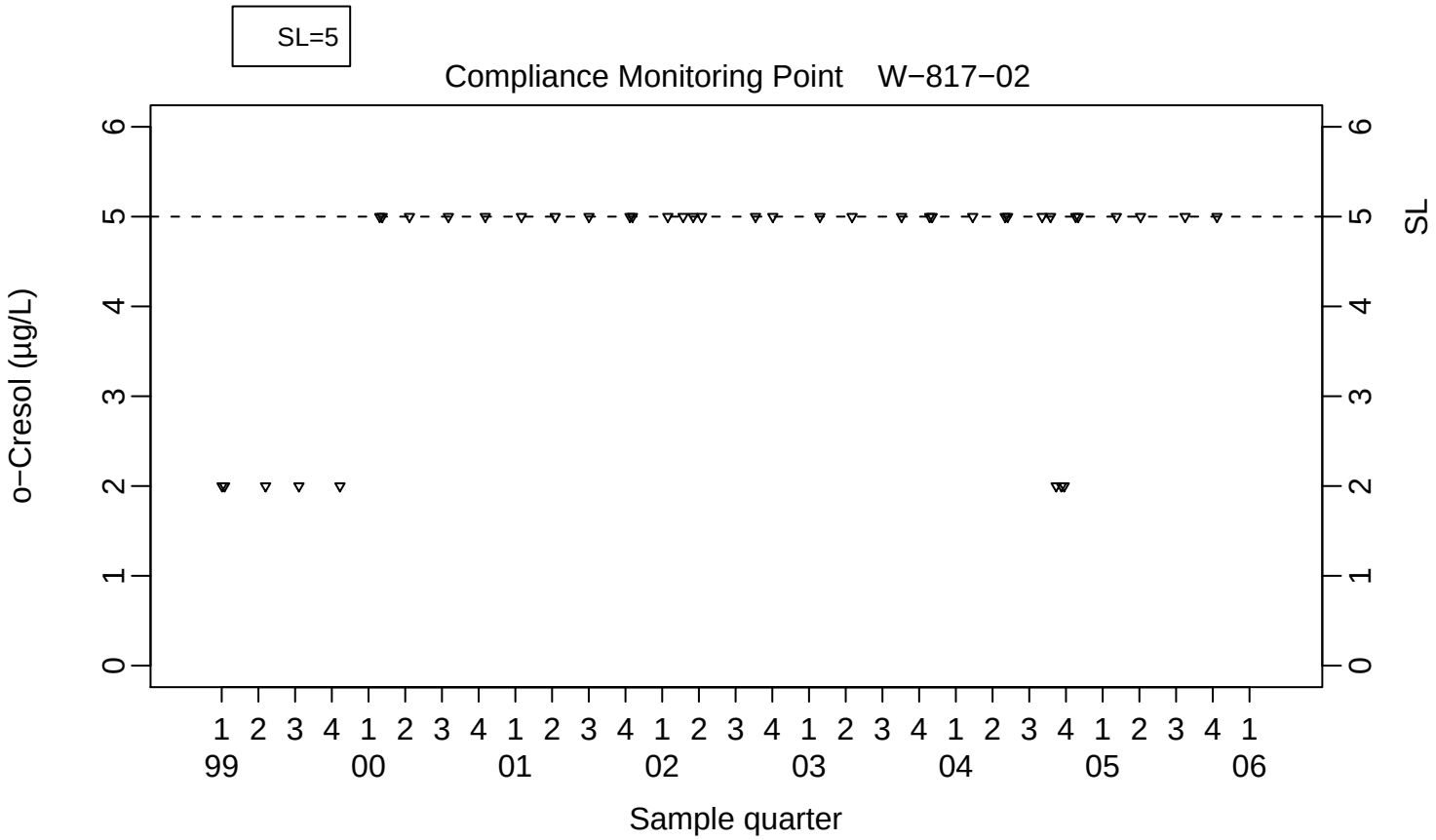


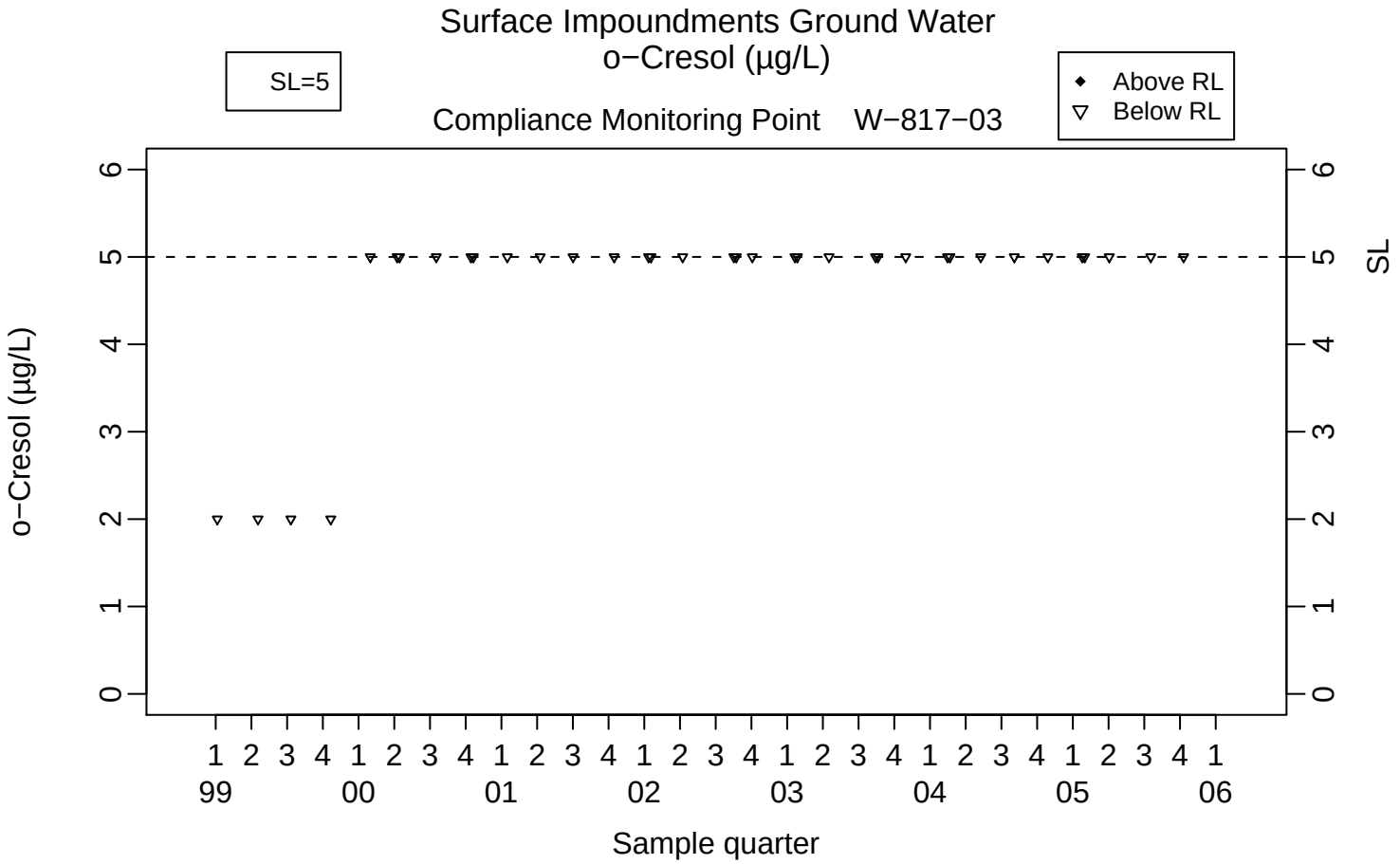


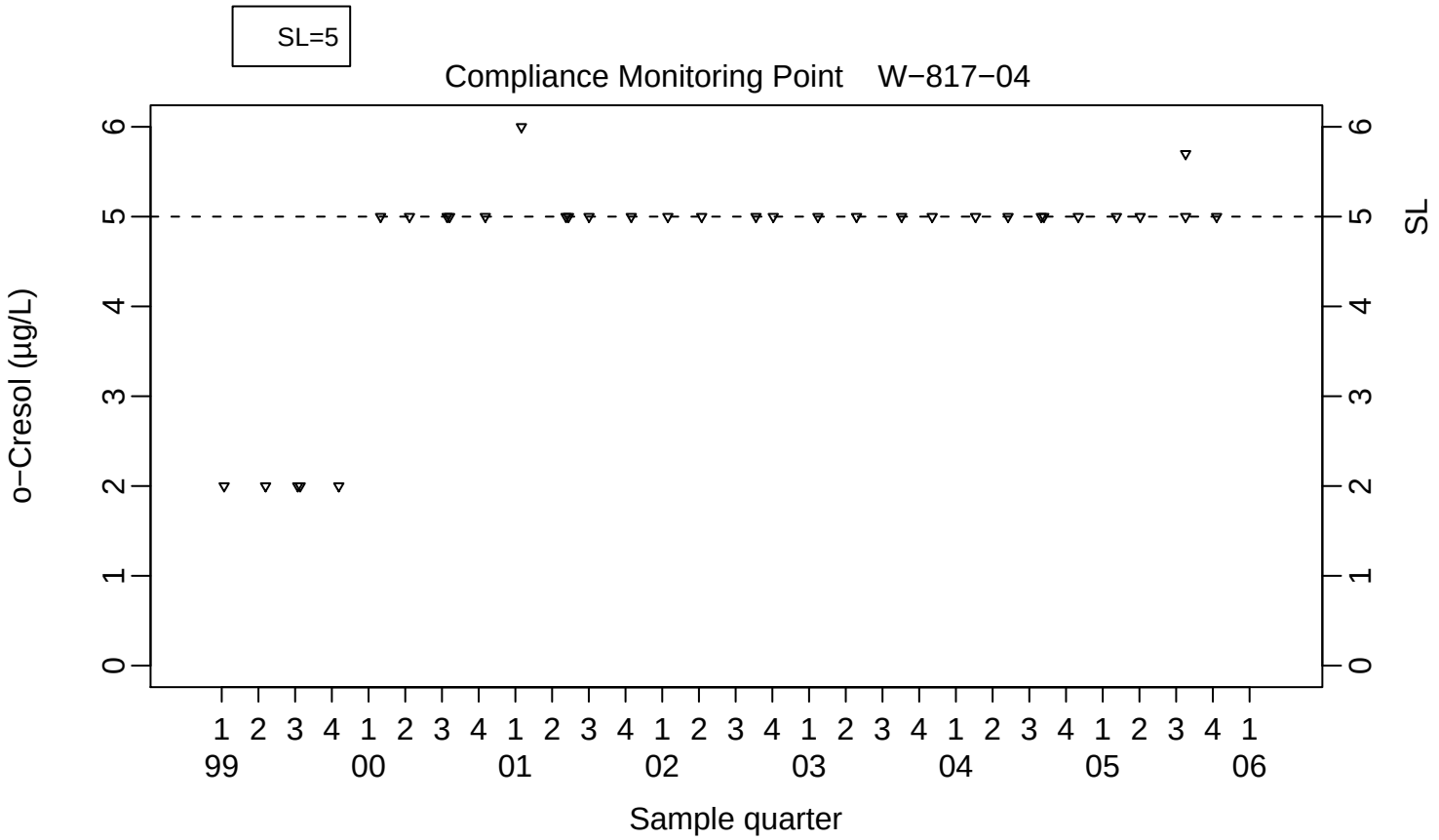

Surface Impoundments Ground Water
Naphthalene (µg/L)
SL=5
Above RL
Below RL
Compliance Monitoring Point W−817−03
Naphthalene (µg/L)
SL
0
1
2
3
4
5
6
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

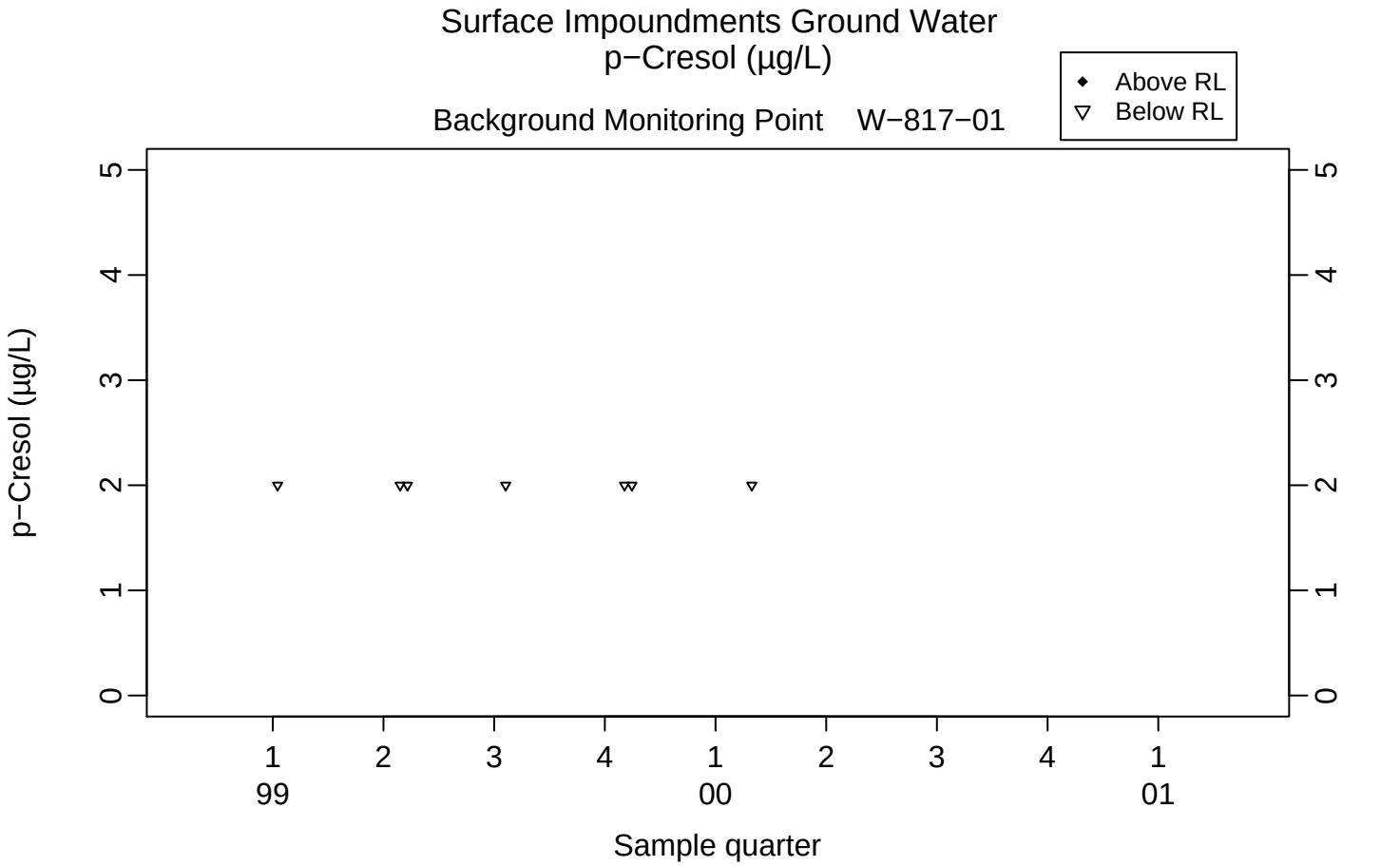

SL=5
Compliance Monitoring Point W−817−04
Naphthalene (µg/L)
SL
0
1
2
3
4
5
6
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

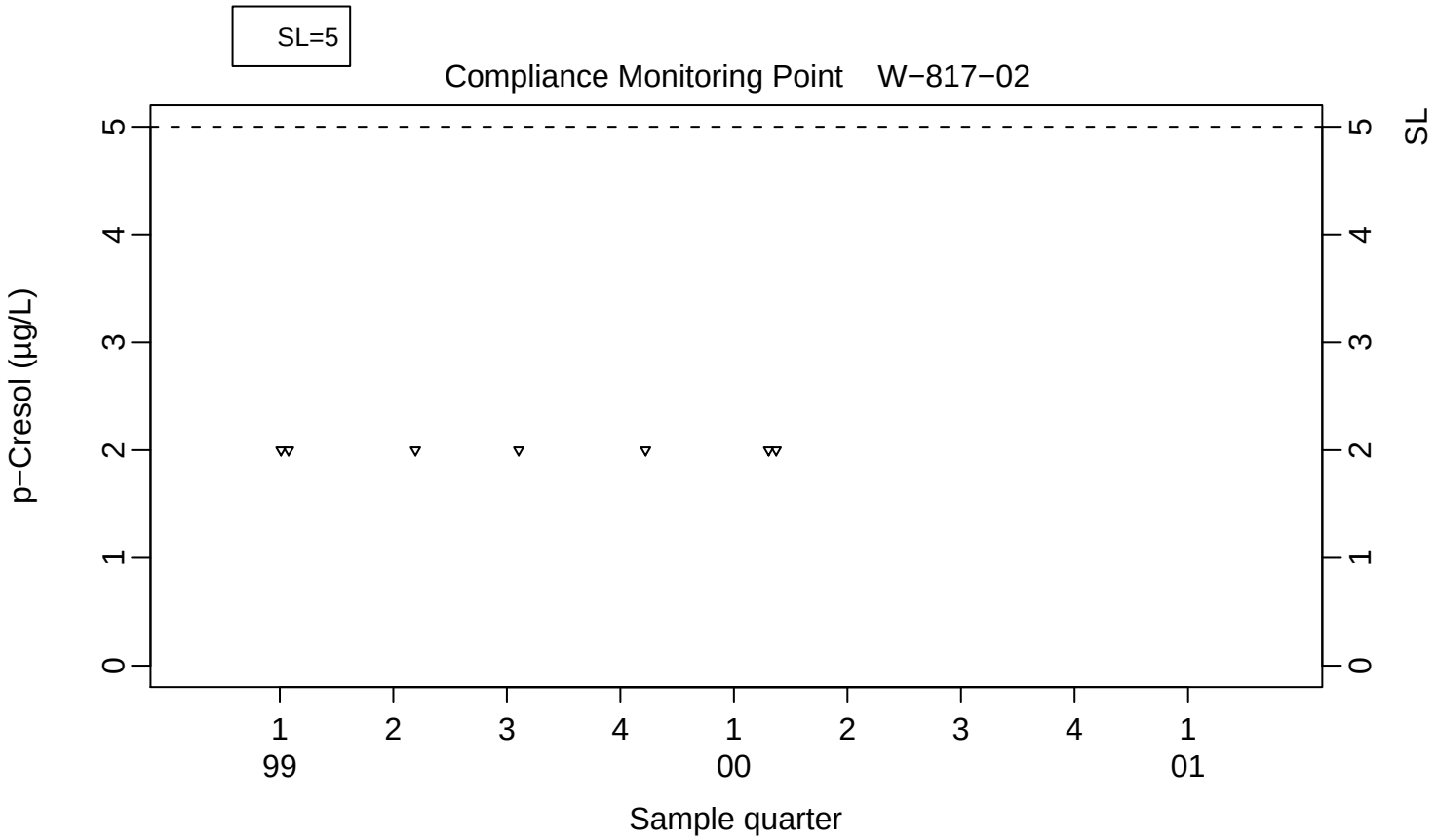

Surface Impoundments Ground Water
o−Cresol (µg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
o−Cresol (µg/L)
0
1
2
3
4
5
6
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

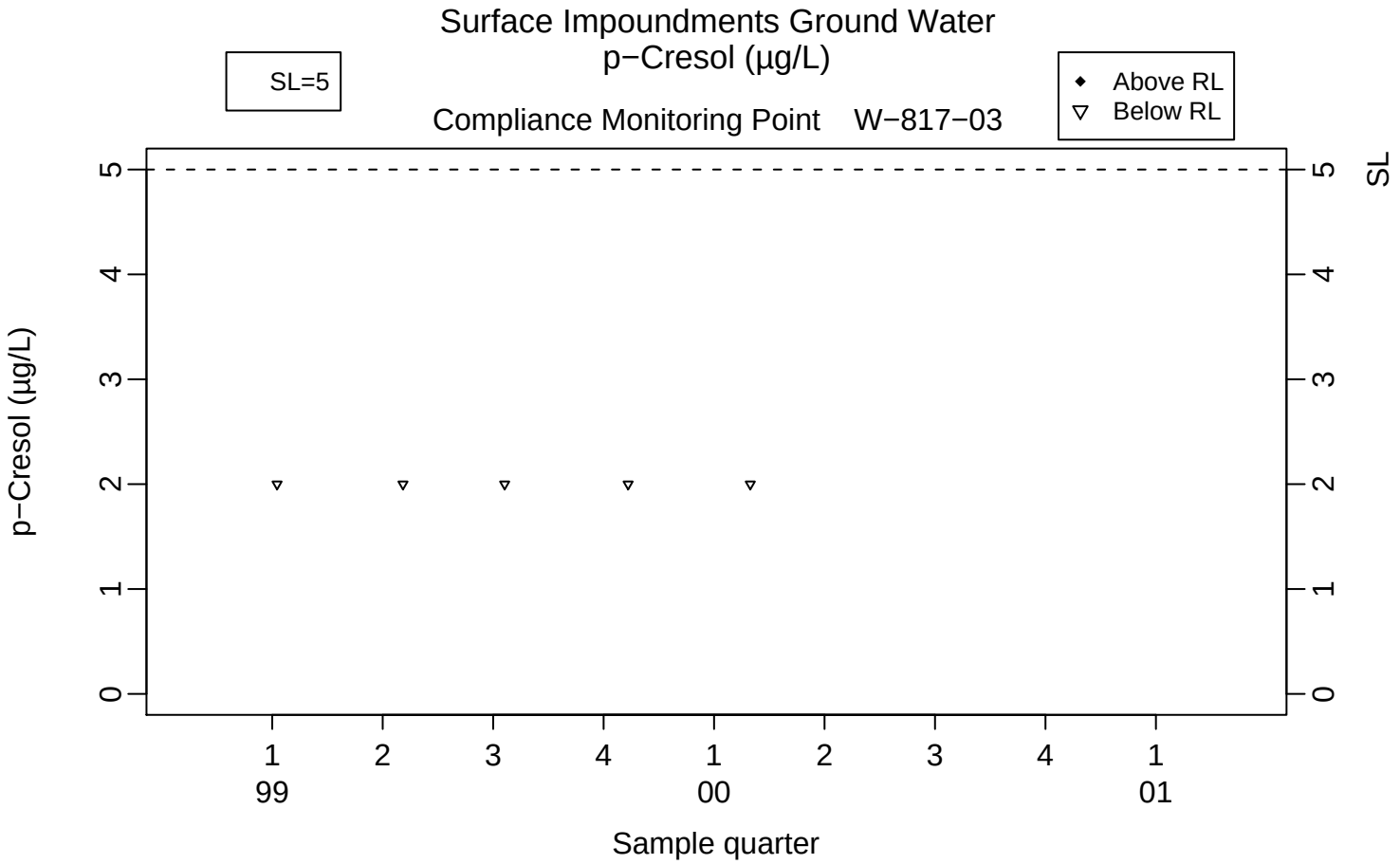

SL=5
Compliance Monitoring Point W−817−02
o−Cresol (µg/L)
SL
0
1
2
3
4
5
6
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

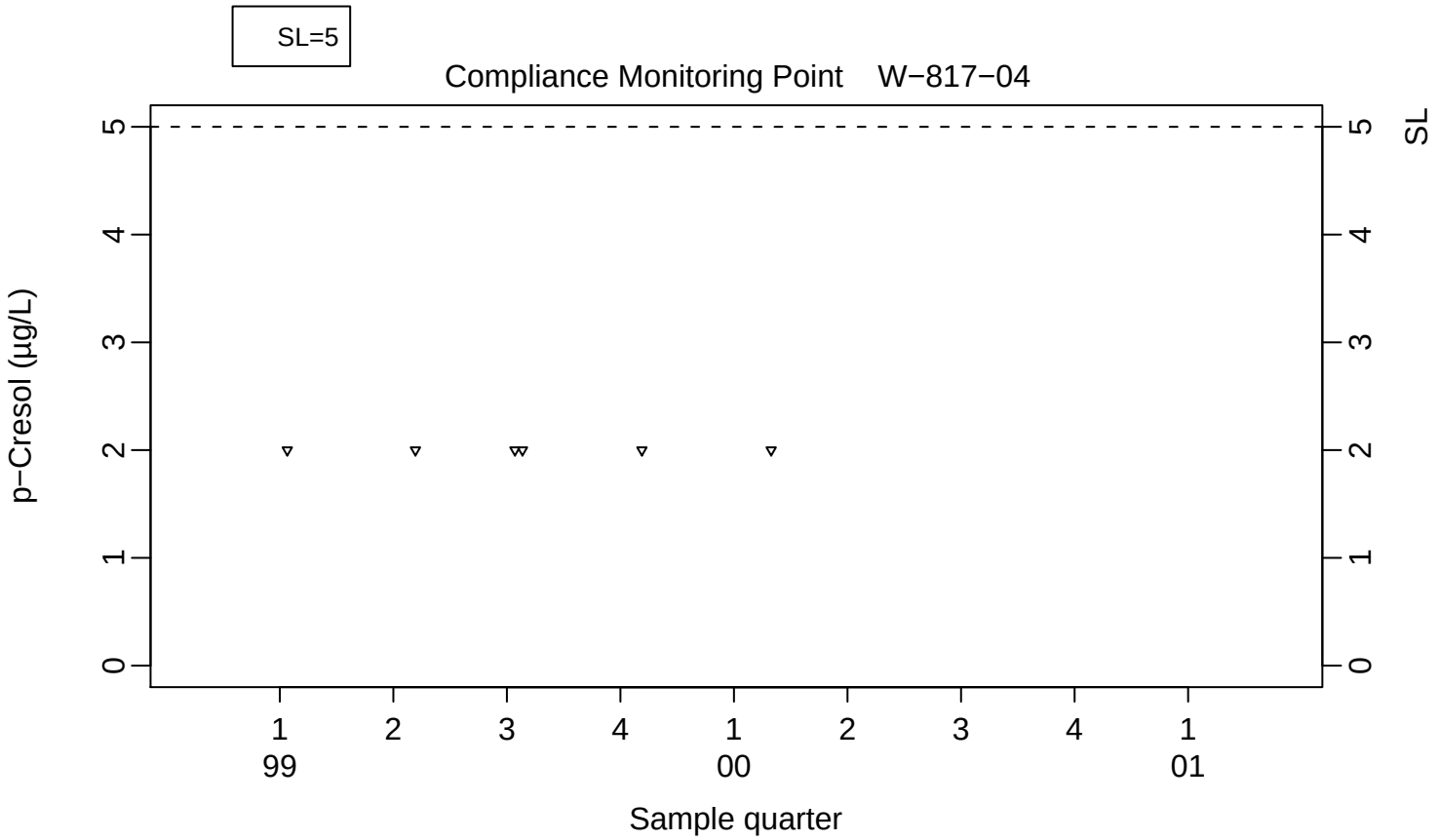

Surface Impoundments Ground Water
o−Cresol (µg/L)
SL=5
Above RL
Below RL
Compliance Monitoring Point W−817−03
o−Cresol (µg/L)
SL
0 1 2 3 4 5 6
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

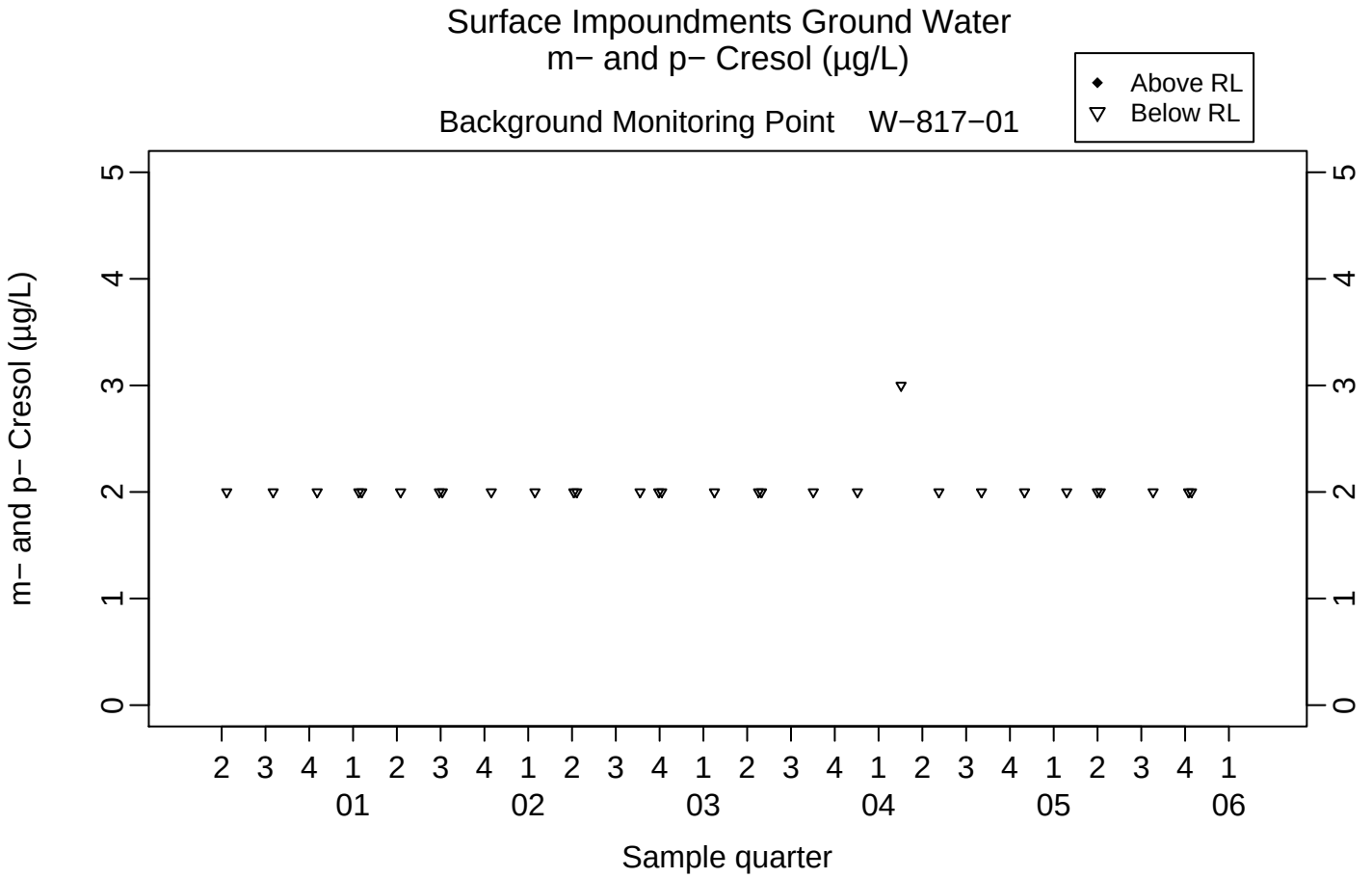

SL=5
Compliance Monitoring Point W−817−04
o−Cresol (µg/L)
SL
0 1 2 3 4 5 6
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

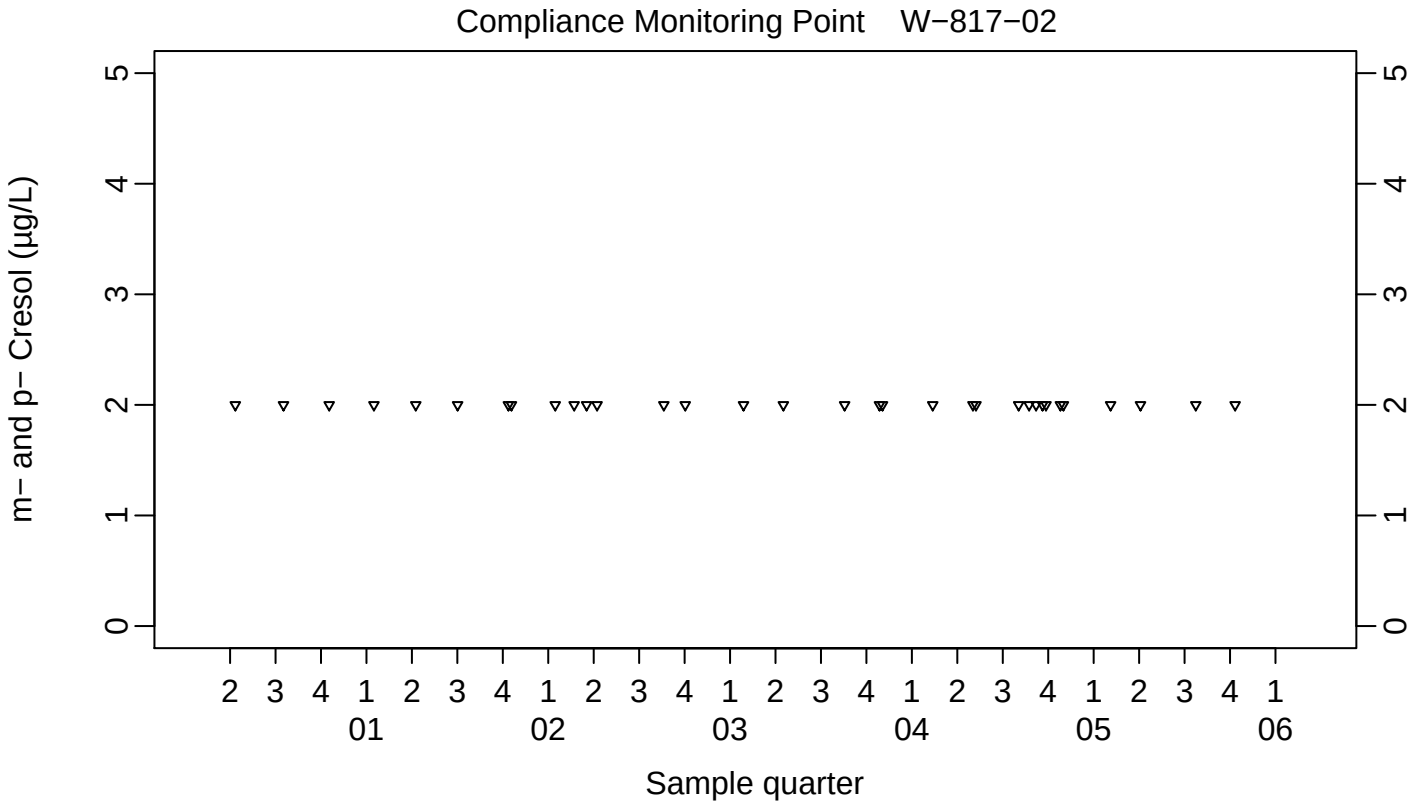

Surface Impoundments Ground Water
p−Cresol (µg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
p−Cresol (µg/L)
0
1
2
3
4
5
1
2
3
4
1
2
3
4
1
99
00
01
Sample quarter


SL=5
Compliance Monitoring Point W−817−02
p−Cresol (µg/L)
SL
0
1
2
3
4
5
1
2
3
4
1
2
3
4
1
99
00
01
Sample quarter

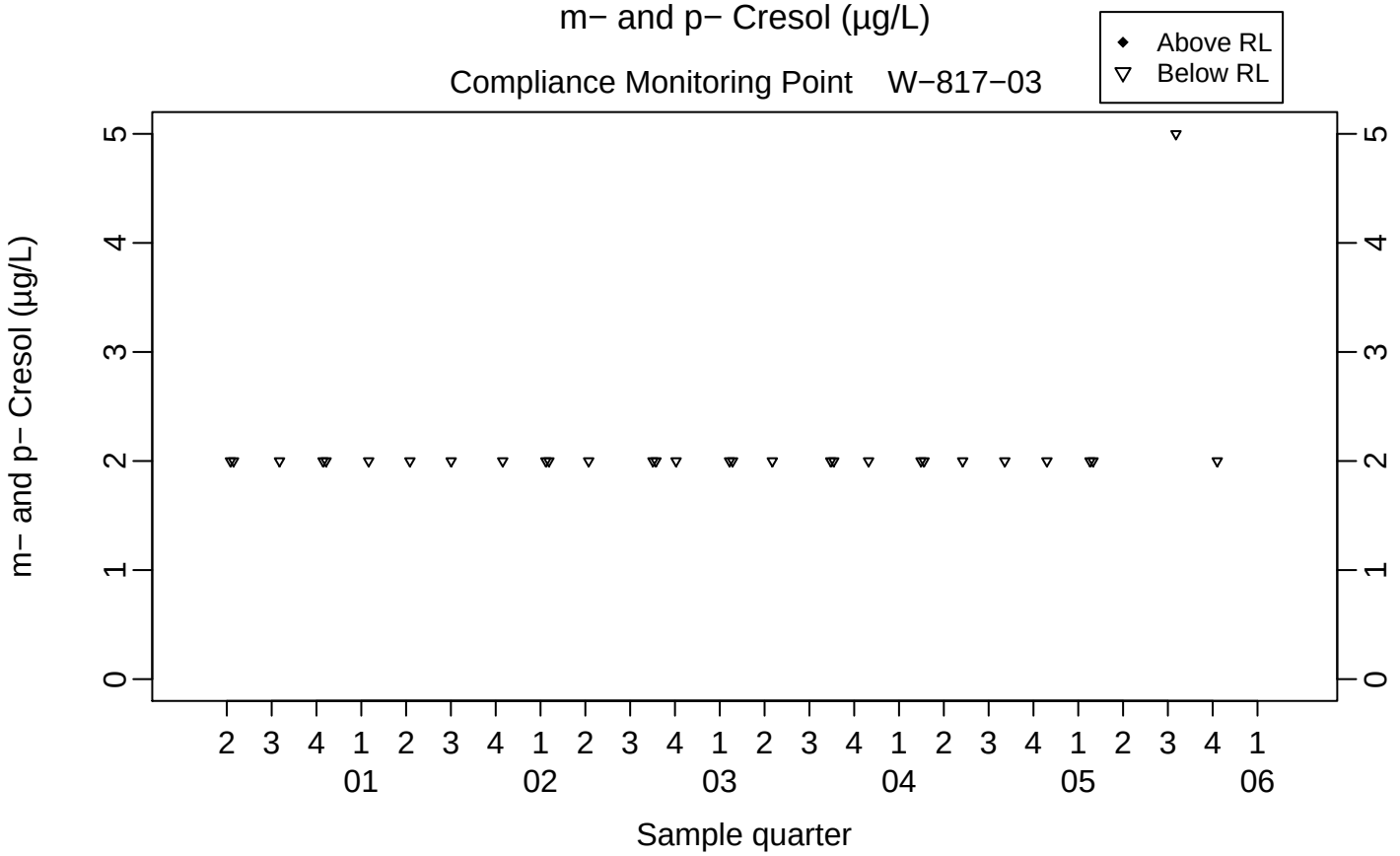

Surface Impoundments Ground Water
p−Cresol (µg/L)
SL=5
Above RL
Below RL
Compliance Monitoring Point W−817−03
p−Cresol (µg/L)
SL
0
1
2
3
4
5
1
2
3
4
1
2
3
4
1
99
00
01
Sample quarter

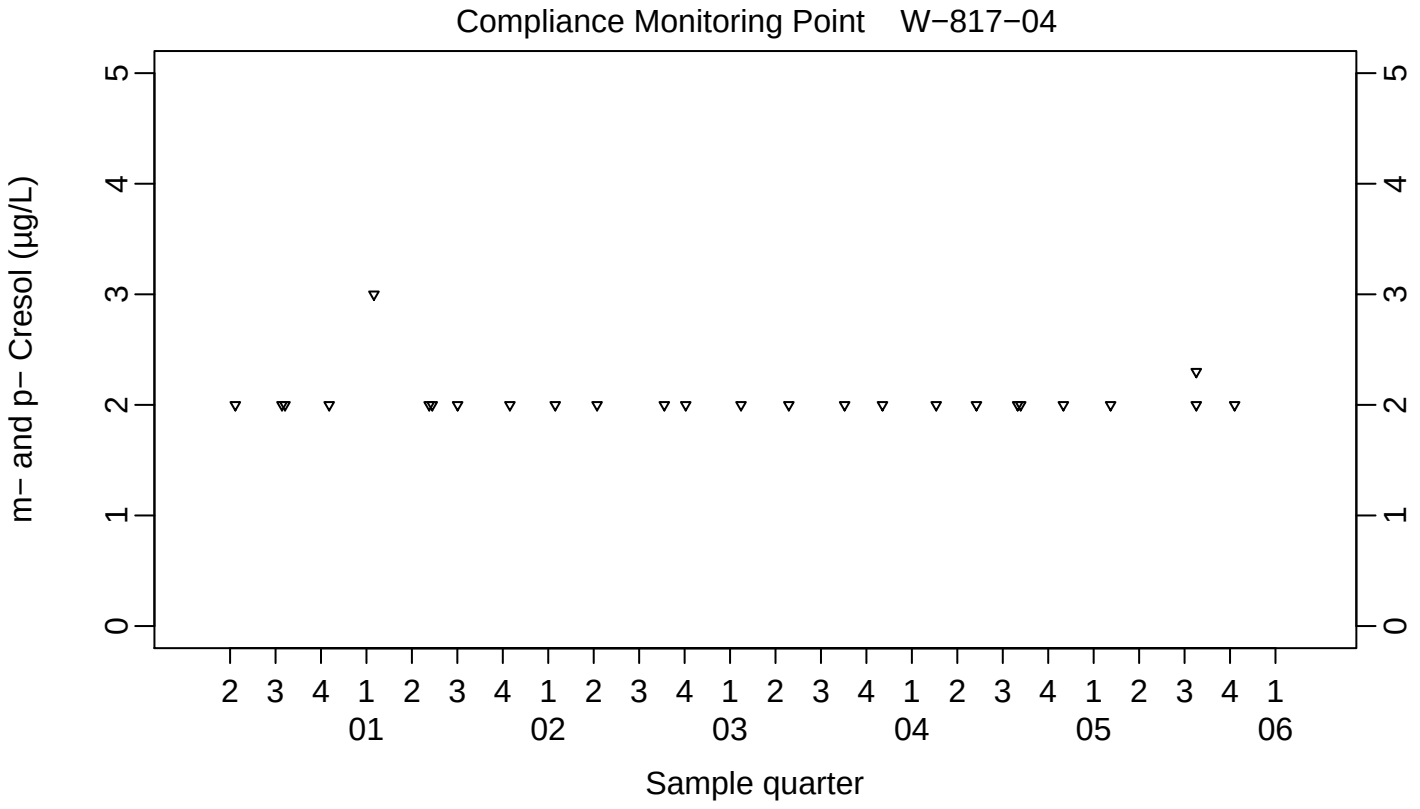

SL=5
Compliance Monitoring Point W−817−04
p−Cresol (µg/L)
SL
0
1
2
3
4
5
1
2
3
4
1
2
3
4
1
99
00
01
Sample quarter


Surface Impoundments Ground Water
m− and p− Cresol (µg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
m− and p− Cresol (µg/L)
0
1
2
3
4
5
2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
01 02 03 04 05 06
Sample quarter

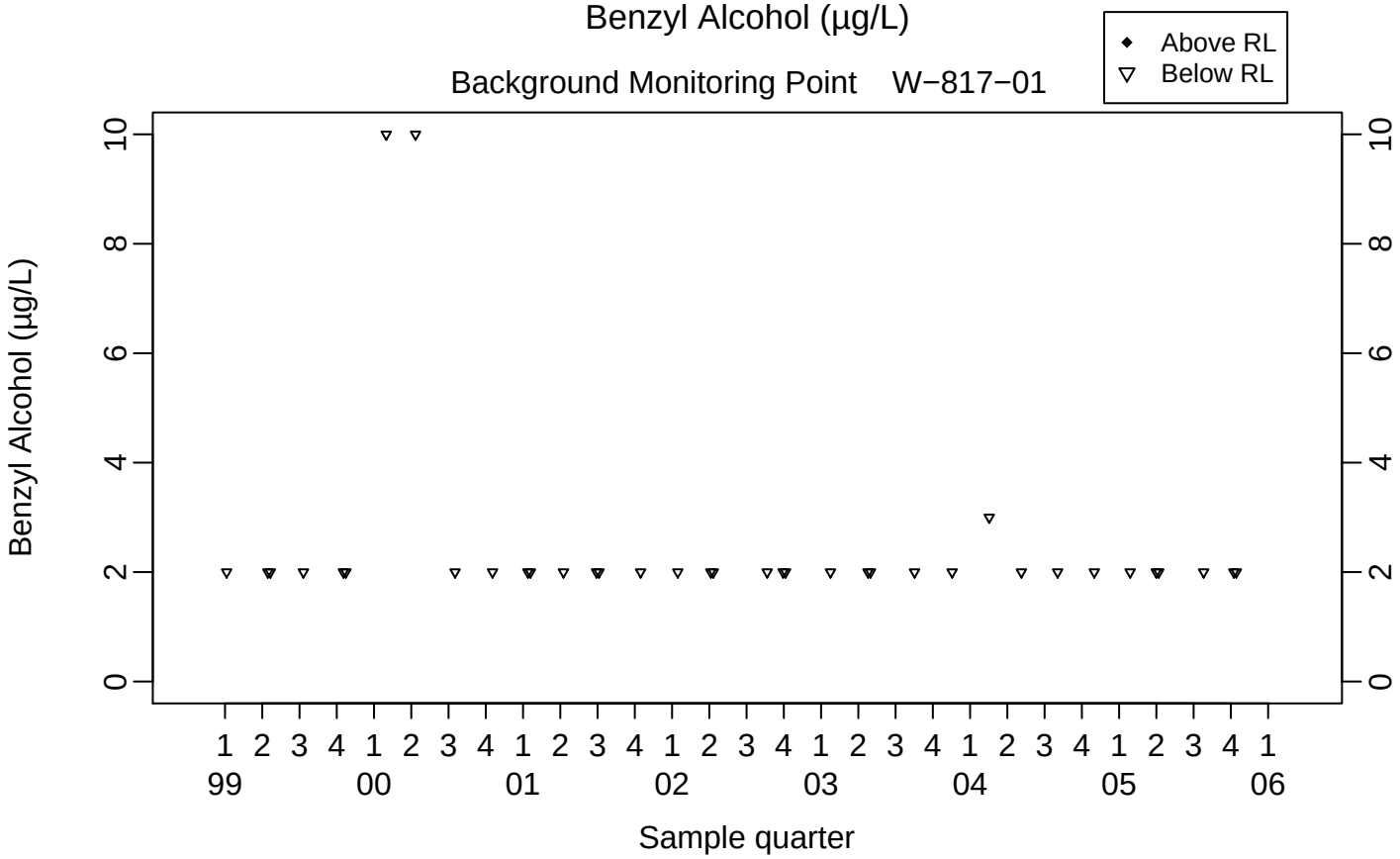

Compliance Monitoring Point W−817−02
m− and p− Cresol (µg/L)
0
1
2
3
4
5
2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
01 02 03 04 05 06
Sample quarter

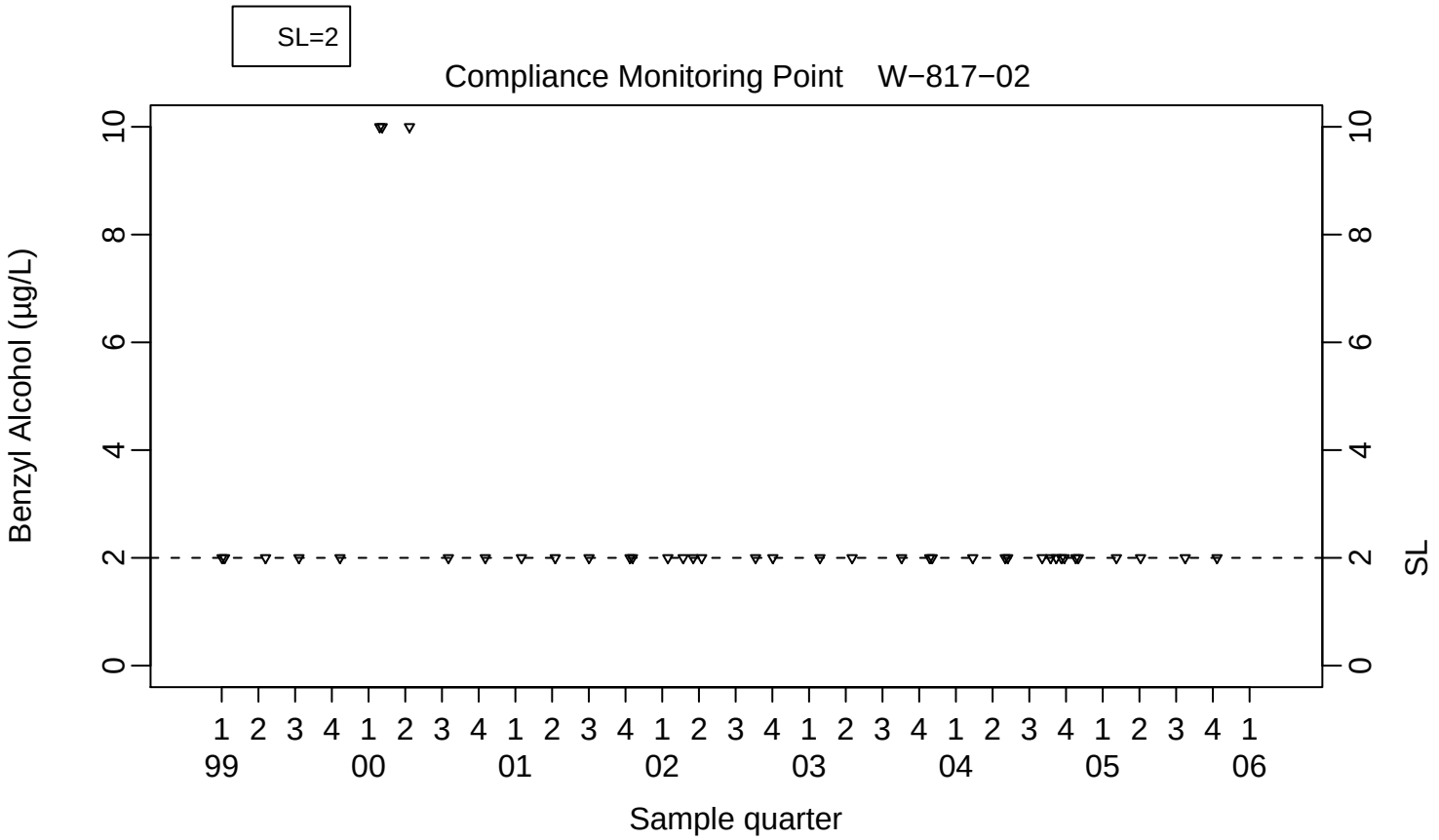
Surface Impoundments Ground Water
m− and p− Cresol (µg/L)

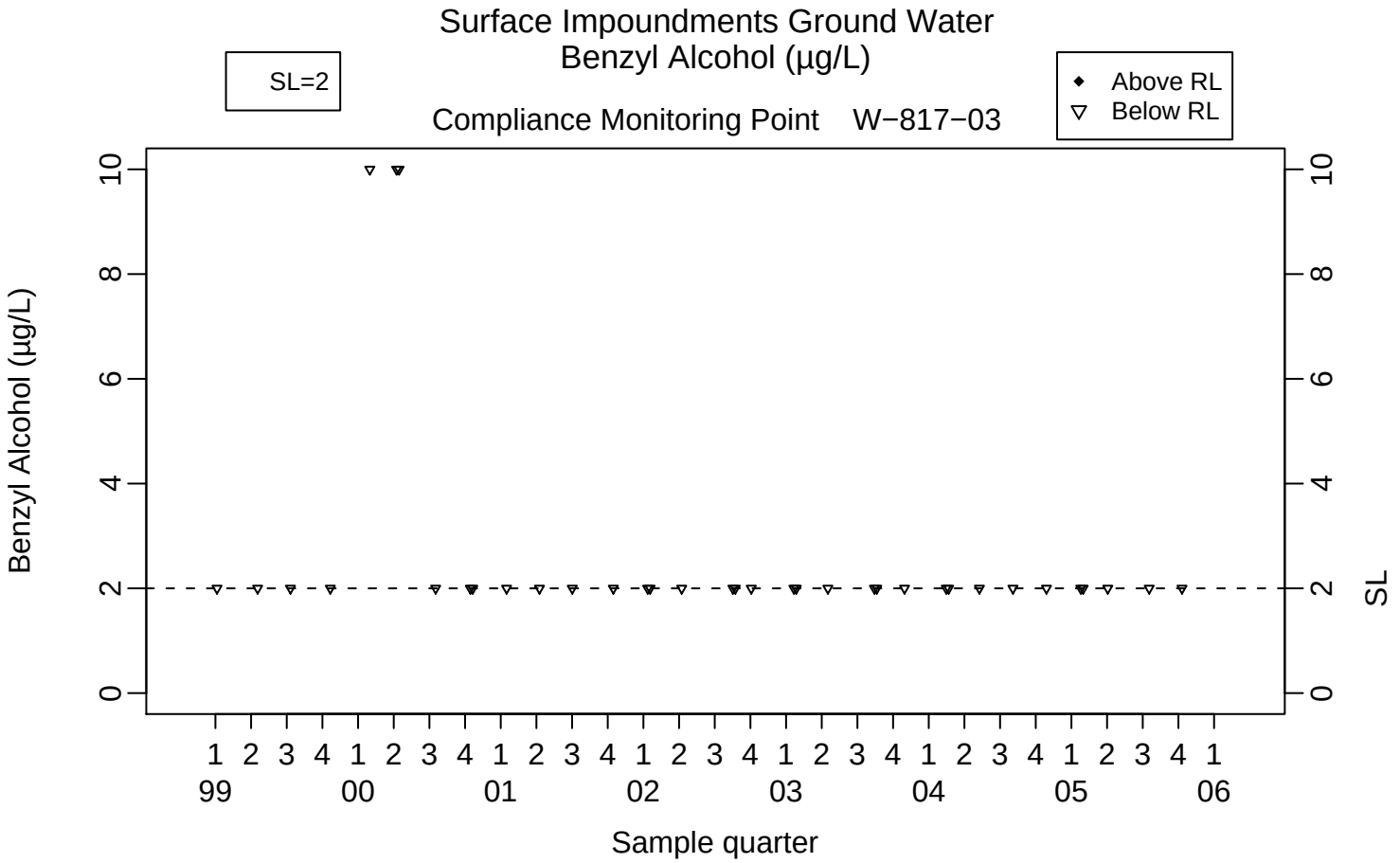


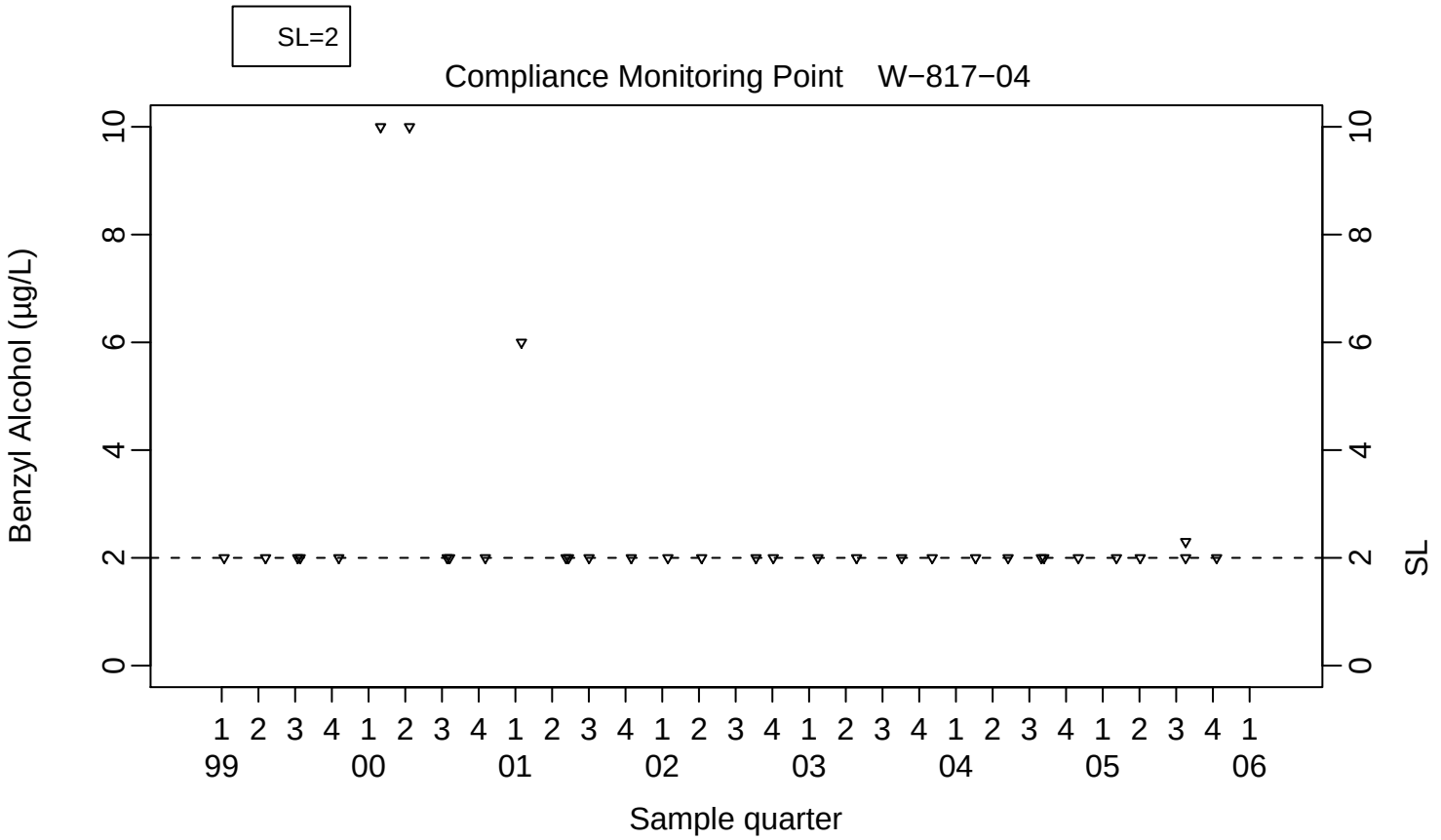


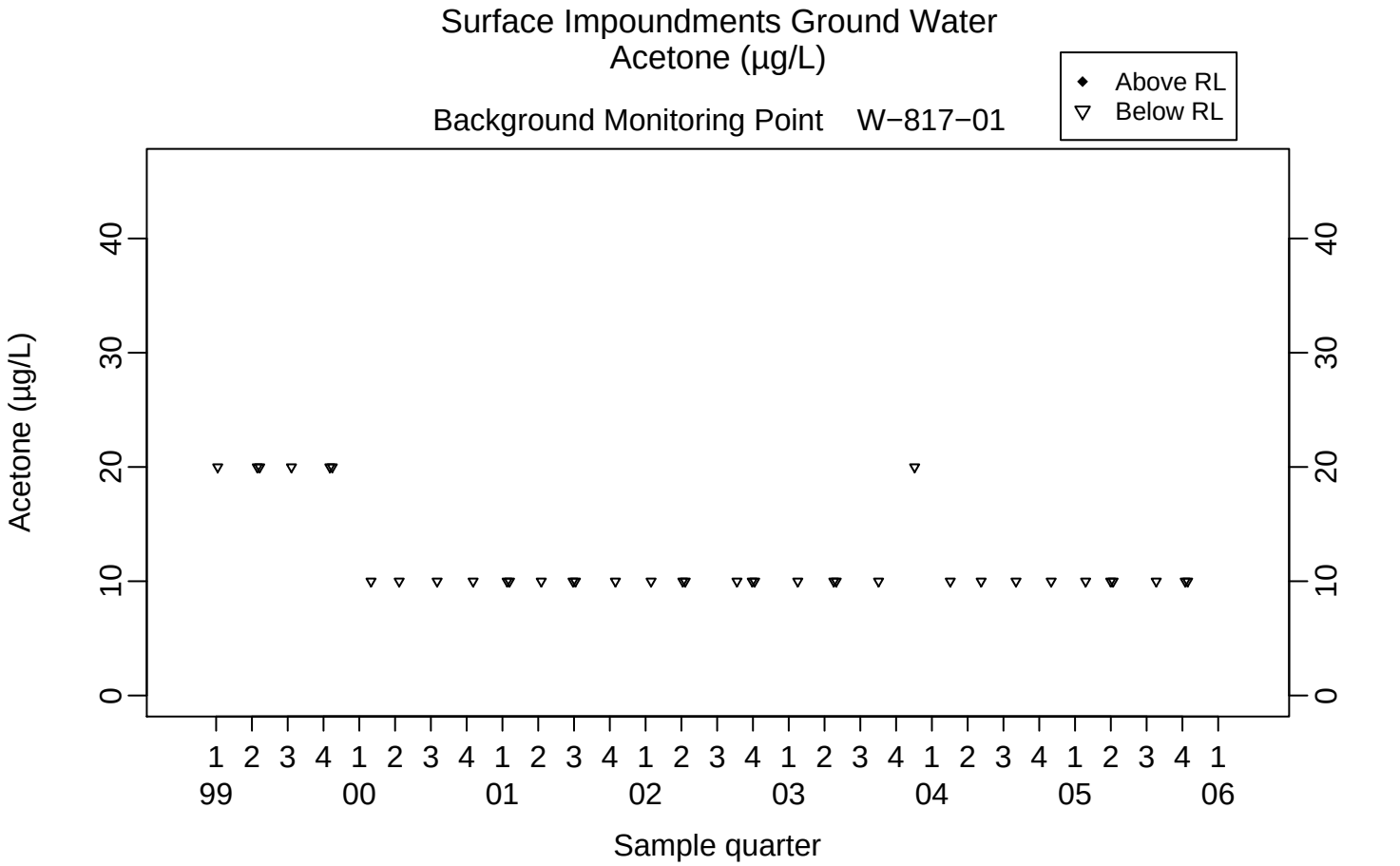
Surface Impoundments Ground Water
Benzyl Alcohol (µg/L)

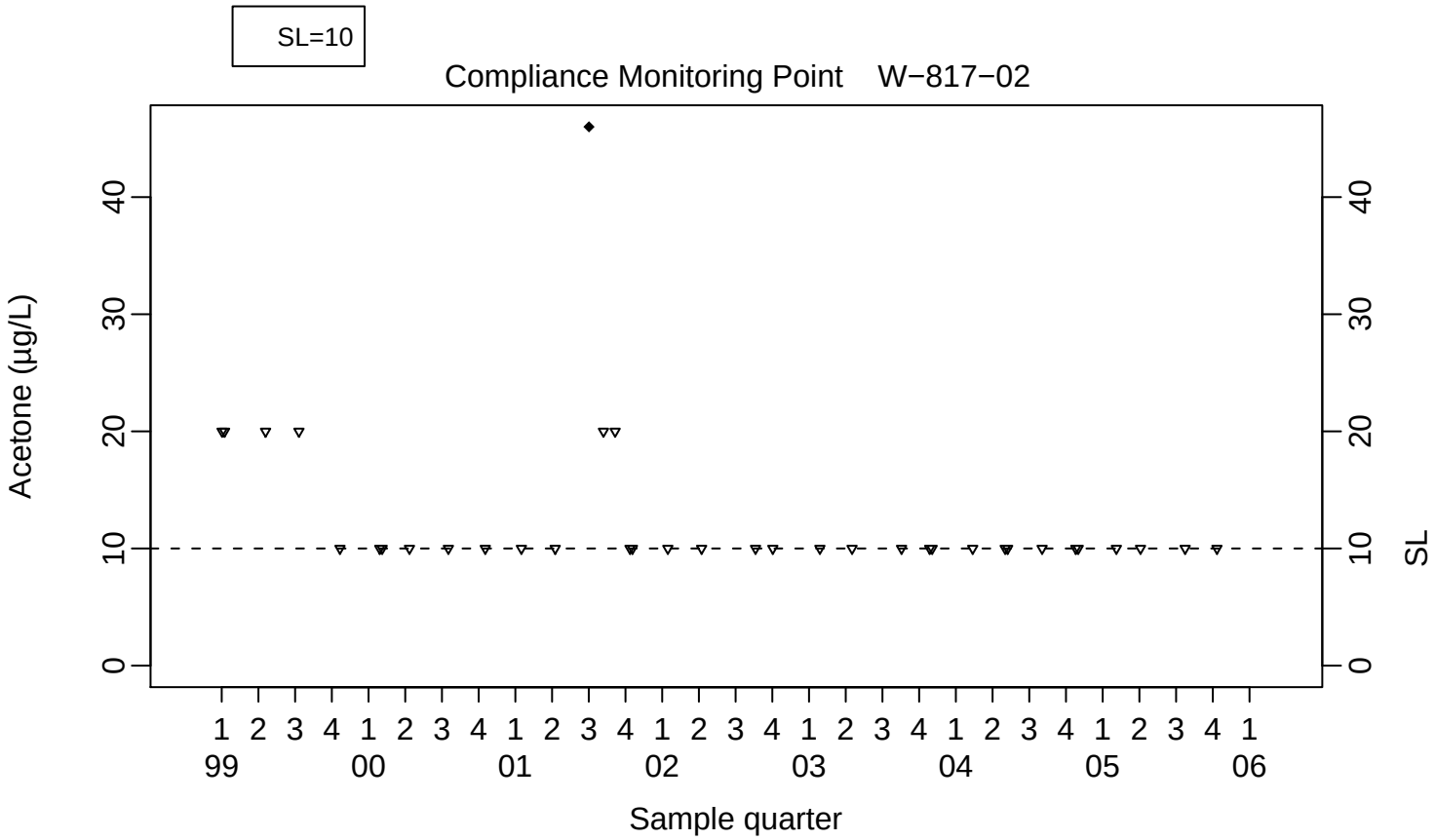


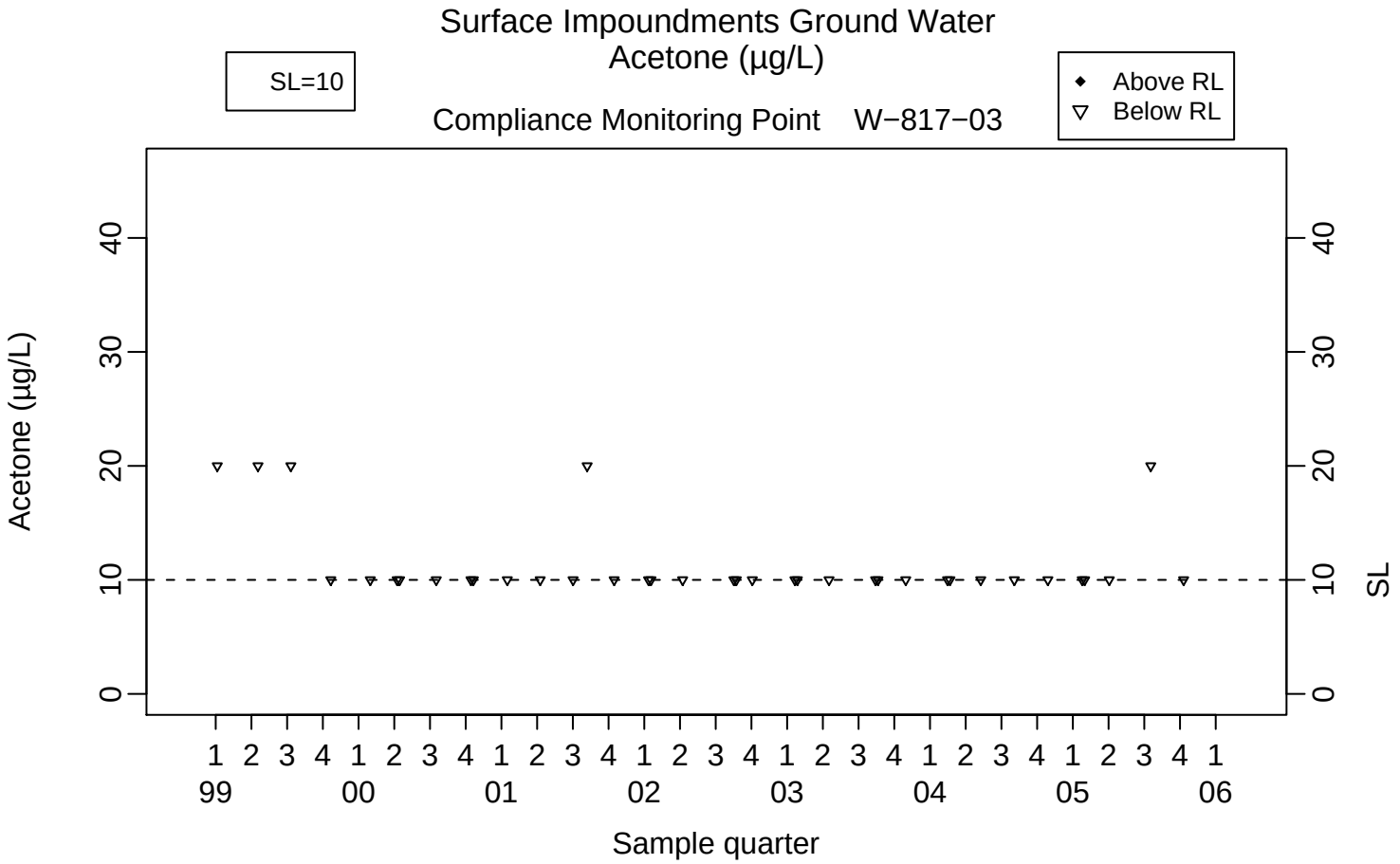


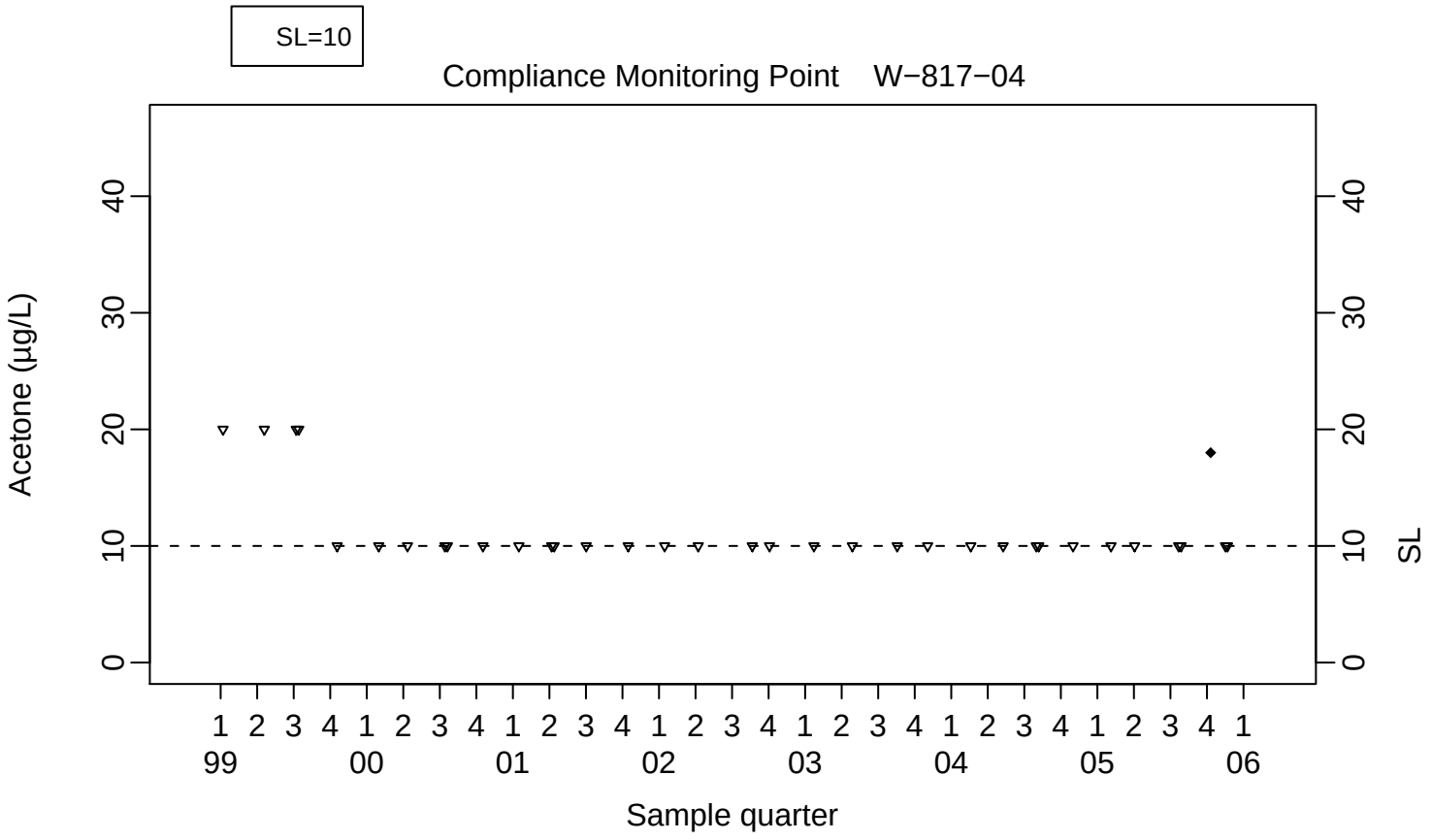

Surface Impoundments Ground Water
Benzyl Alcohol (µg/L)
SL=2
Above RL
Below RL
Compliance Monitoring Point W−817−03
Benzyl Alcohol (µg/L)
SL
0
2
4
6
8
10
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

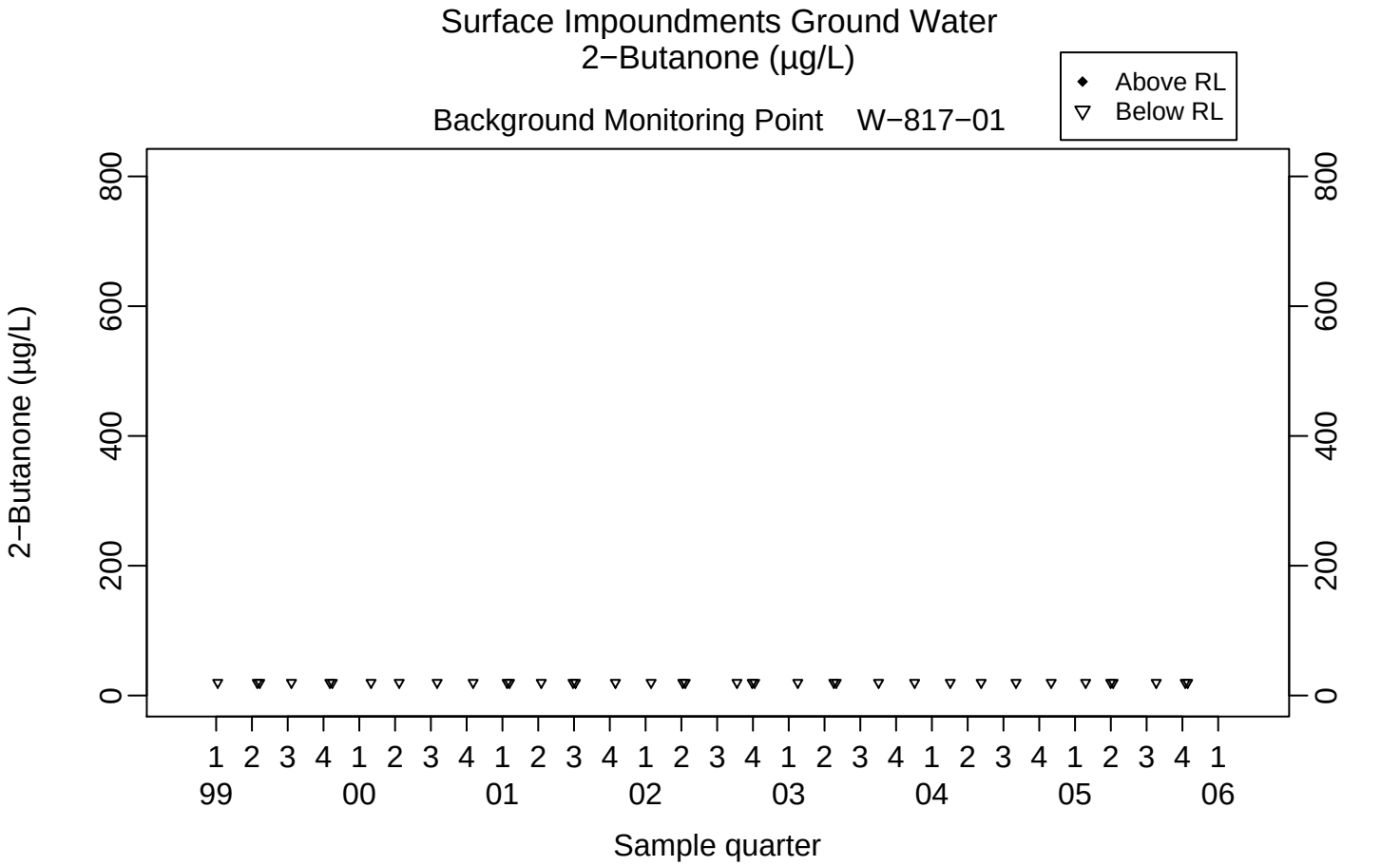

SL=2
Compliance Monitoring Point W−817−04
Benzyl Alcohol (µg/L)
SL
0
2
4
6
8
10
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

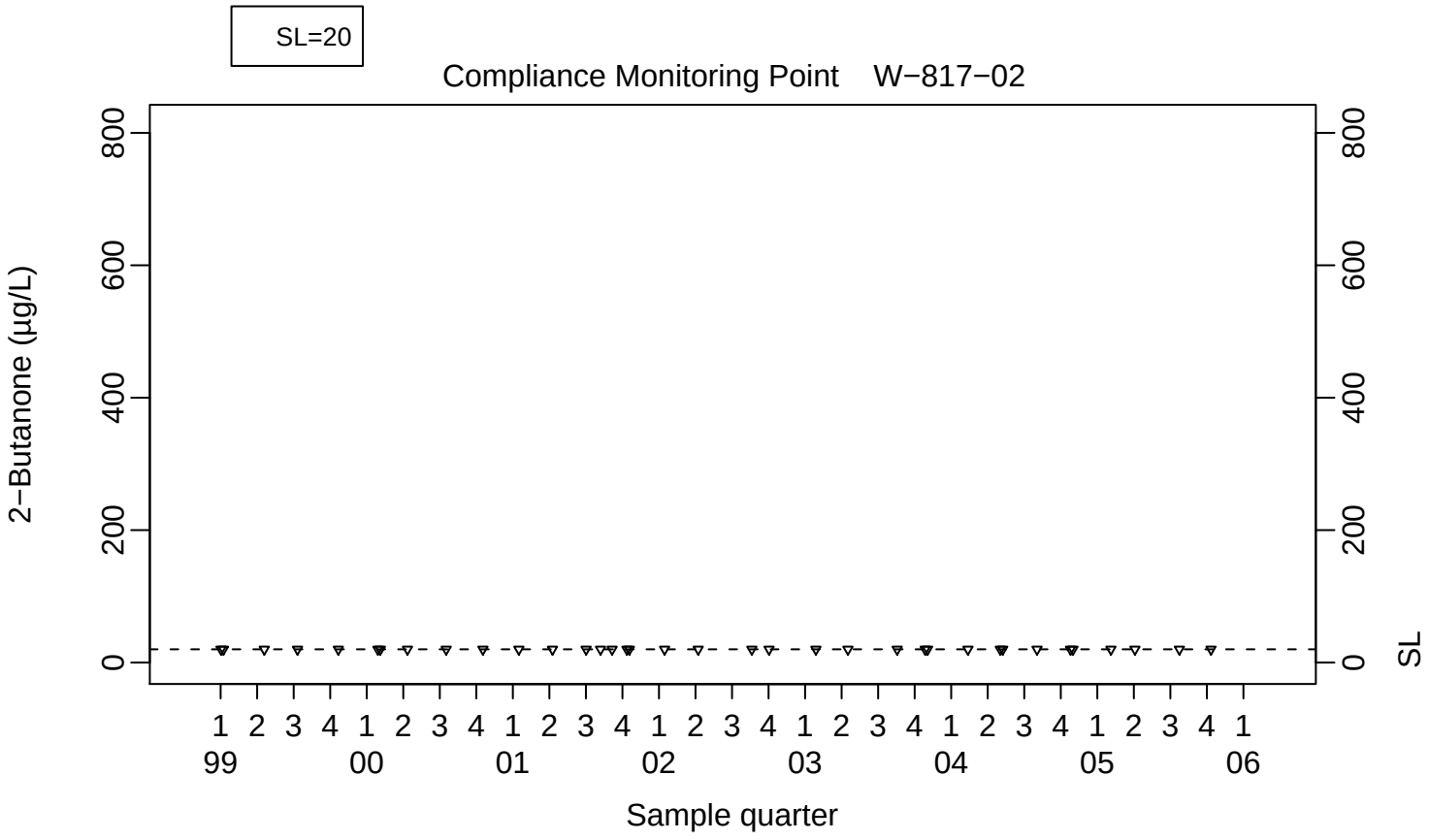

Surface Impoundments Ground Water
Acetone (µg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Acetone (µg/L)
0
10
20
30
40
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

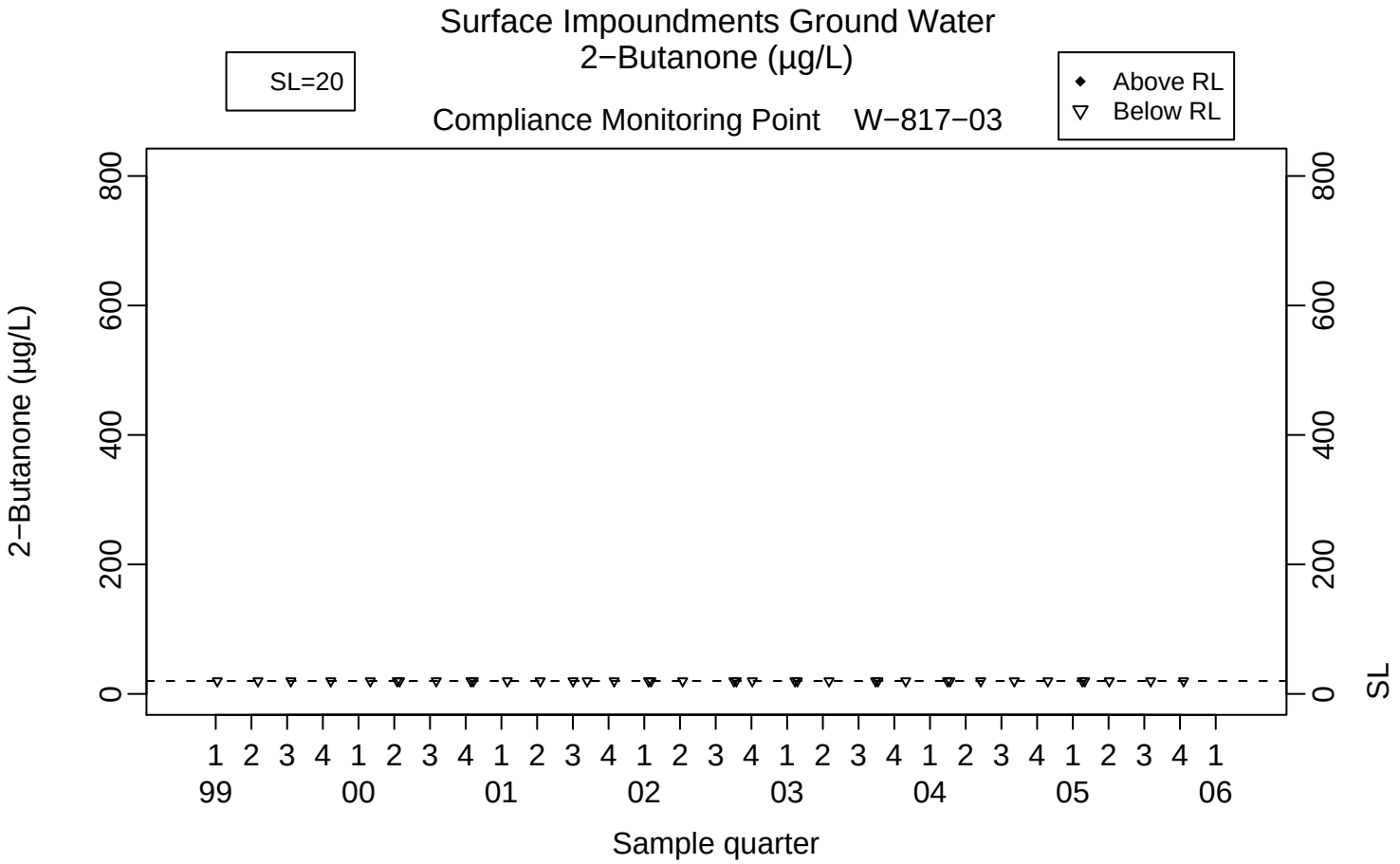

SL=10
Compliance Monitoring Point W−817−02
Acetone (µg/L)
0
10
20
30
40
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

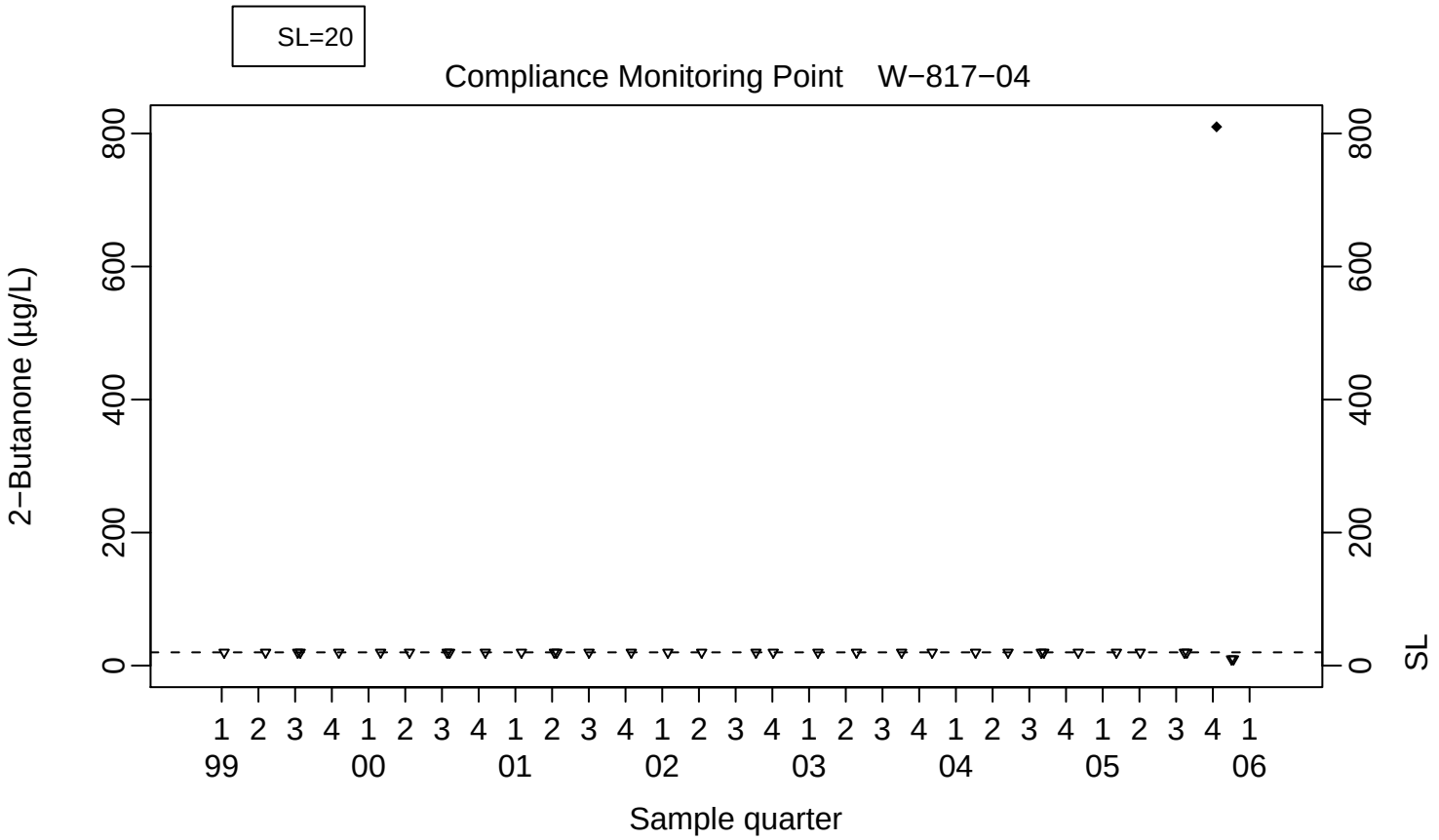

Surface Impoundments Ground Water
Acetone (µg/L)
SL=10
Above RL
Below RL
Compliance Monitoring Point W−817−03
Acetone (µg/L)
SL
0
10
20
30
40
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

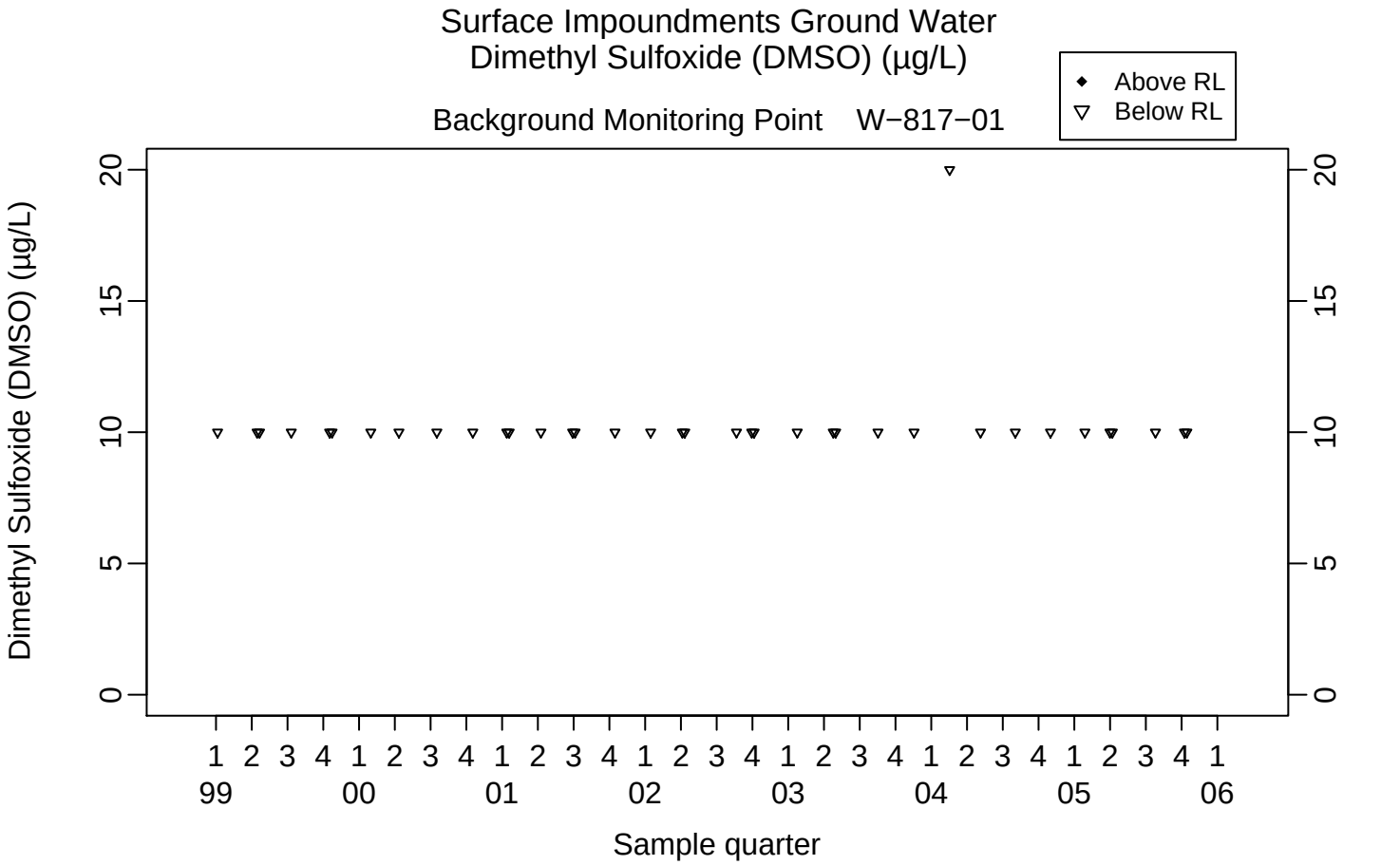

SL=10
Compliance Monitoring Point W−817−04
Acetone (µg/L)
SL
0
10
20
30
40
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

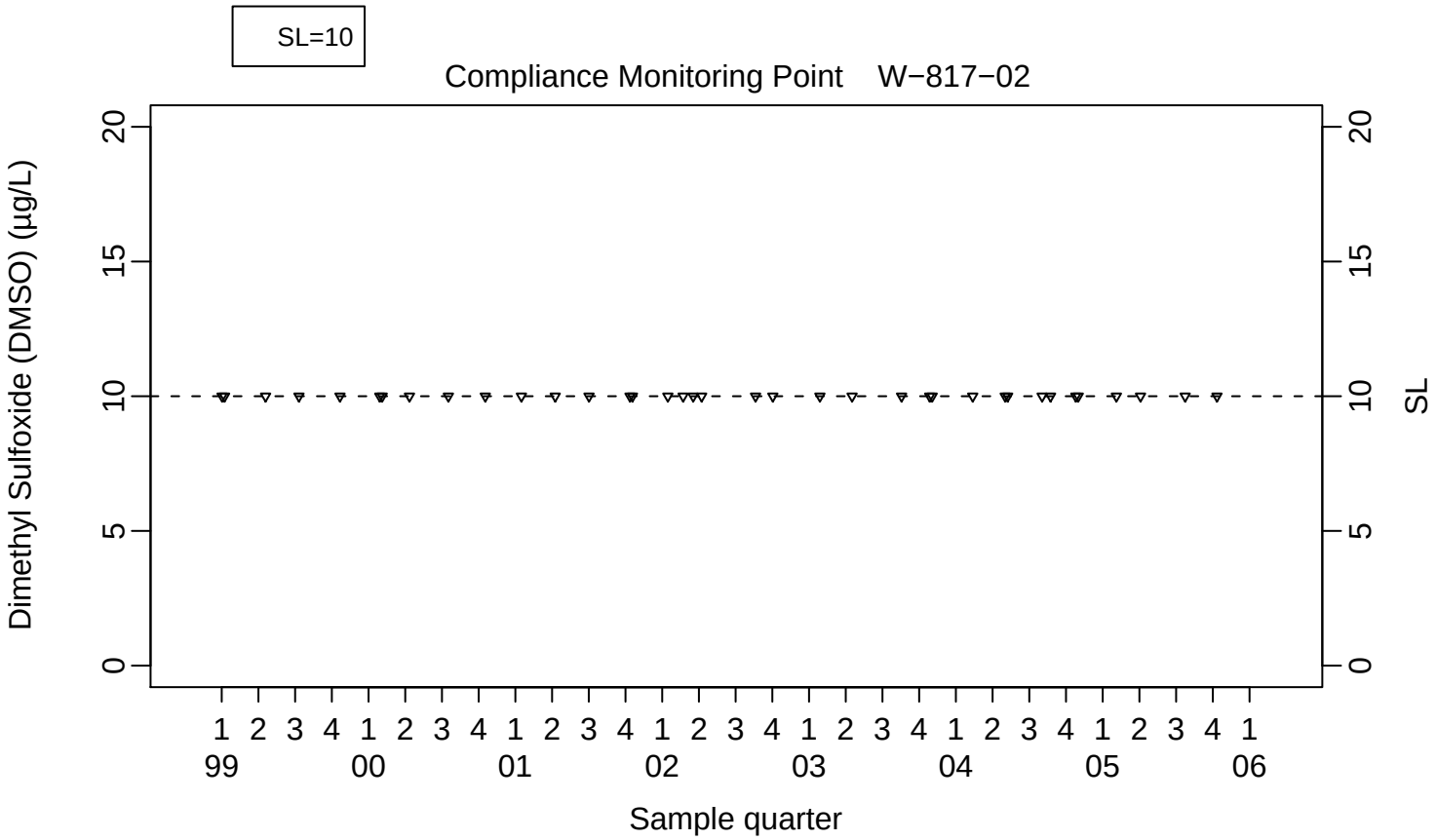

Surface Impoundments Ground Water
2−Butanone (µg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
2−Butanone (µg/L)
0
200
400
600
800
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

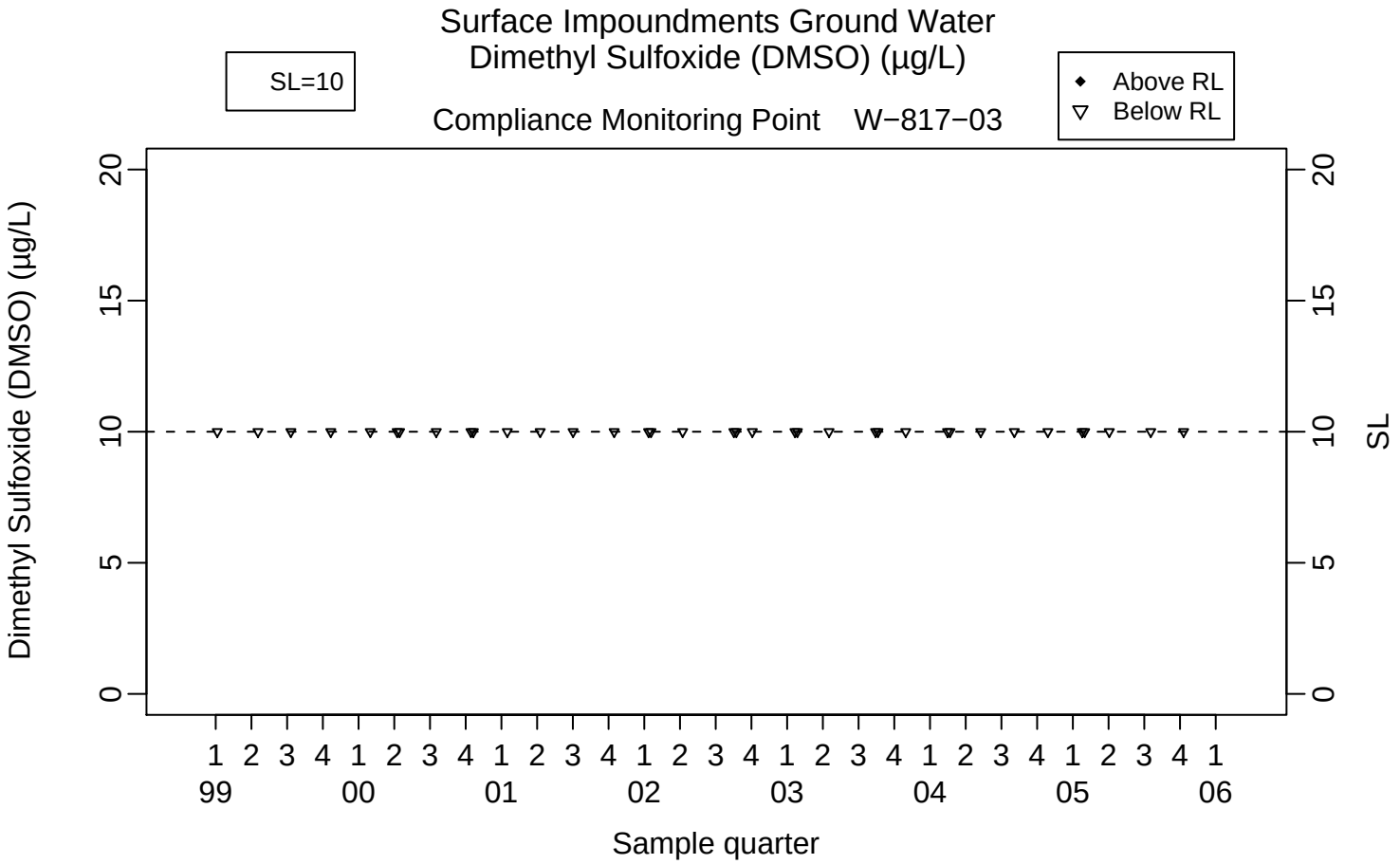

SL=20
Compliance Monitoring Point W−817−02
2−Butanone (µg/L)
0
200
400
600
800
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

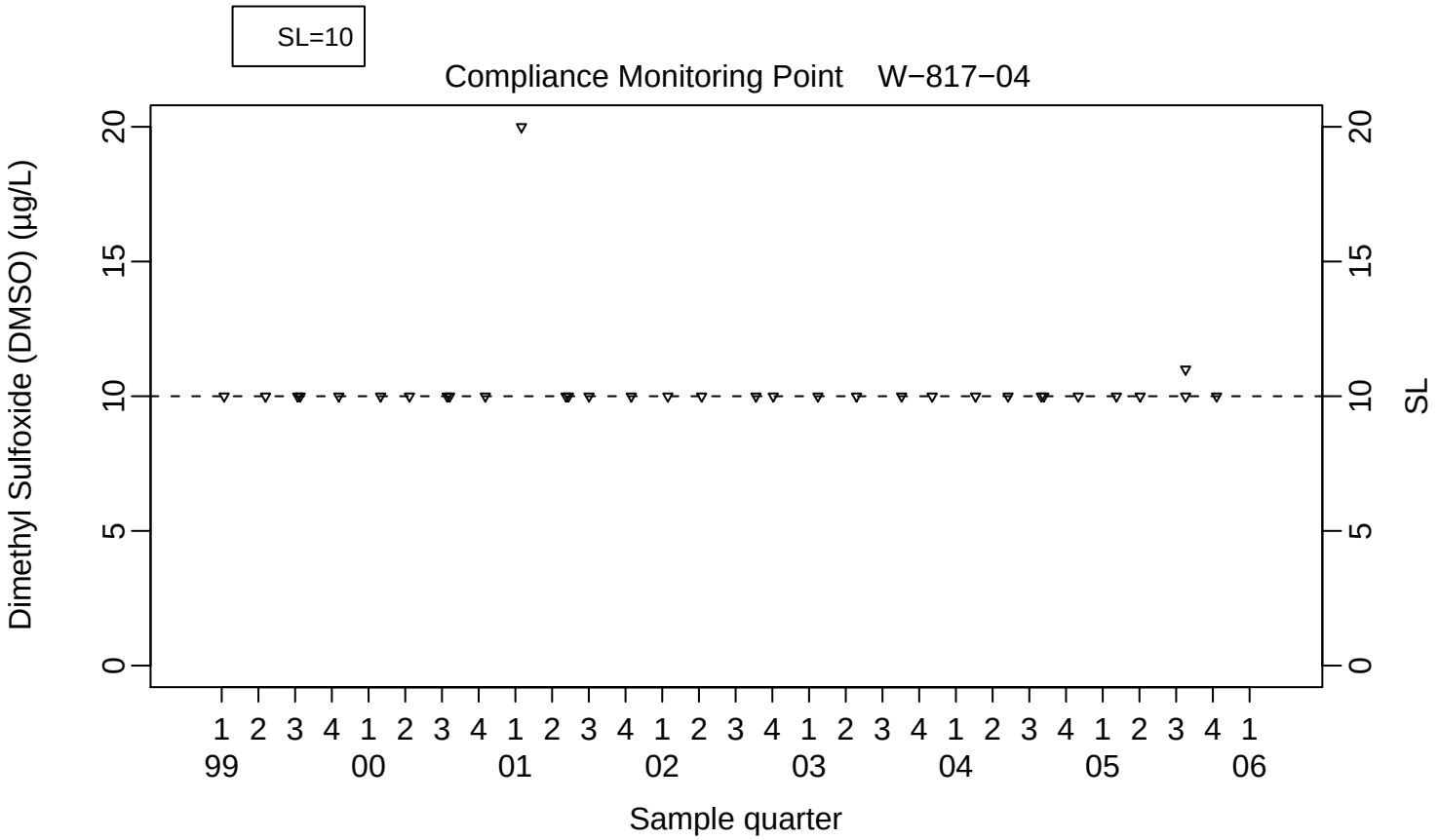

Surface Impoundments Ground Water
2−Butanone (µg/L)
SL=20
Above RL
Below RL
Compliance Monitoring Point W−817−03
2−Butanone (µg/L)
0
200
400
600
800
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

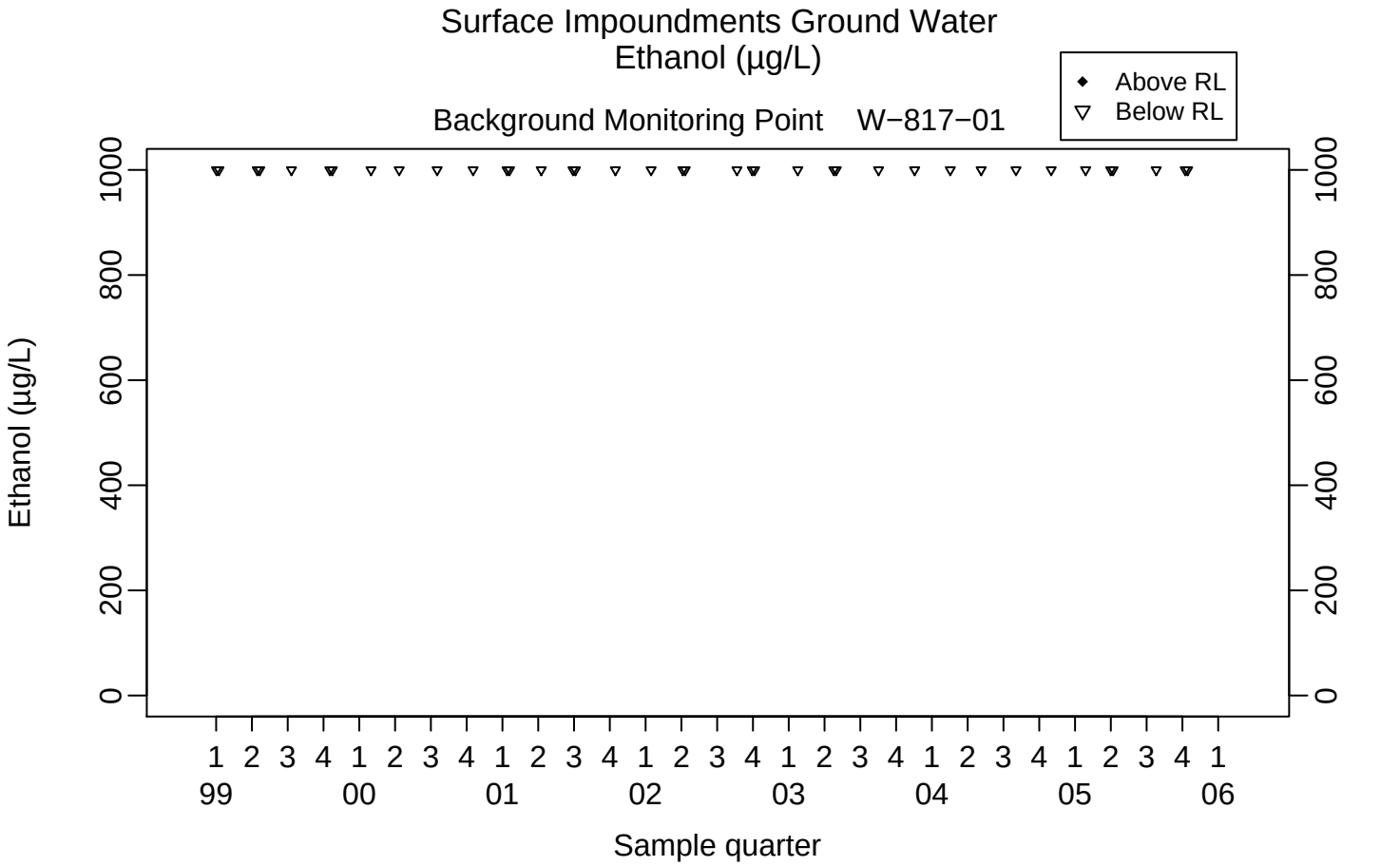

SL=20
Compliance Monitoring Point W−817−04
2−Butanone (µg/L)
0
200
400
600
800
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

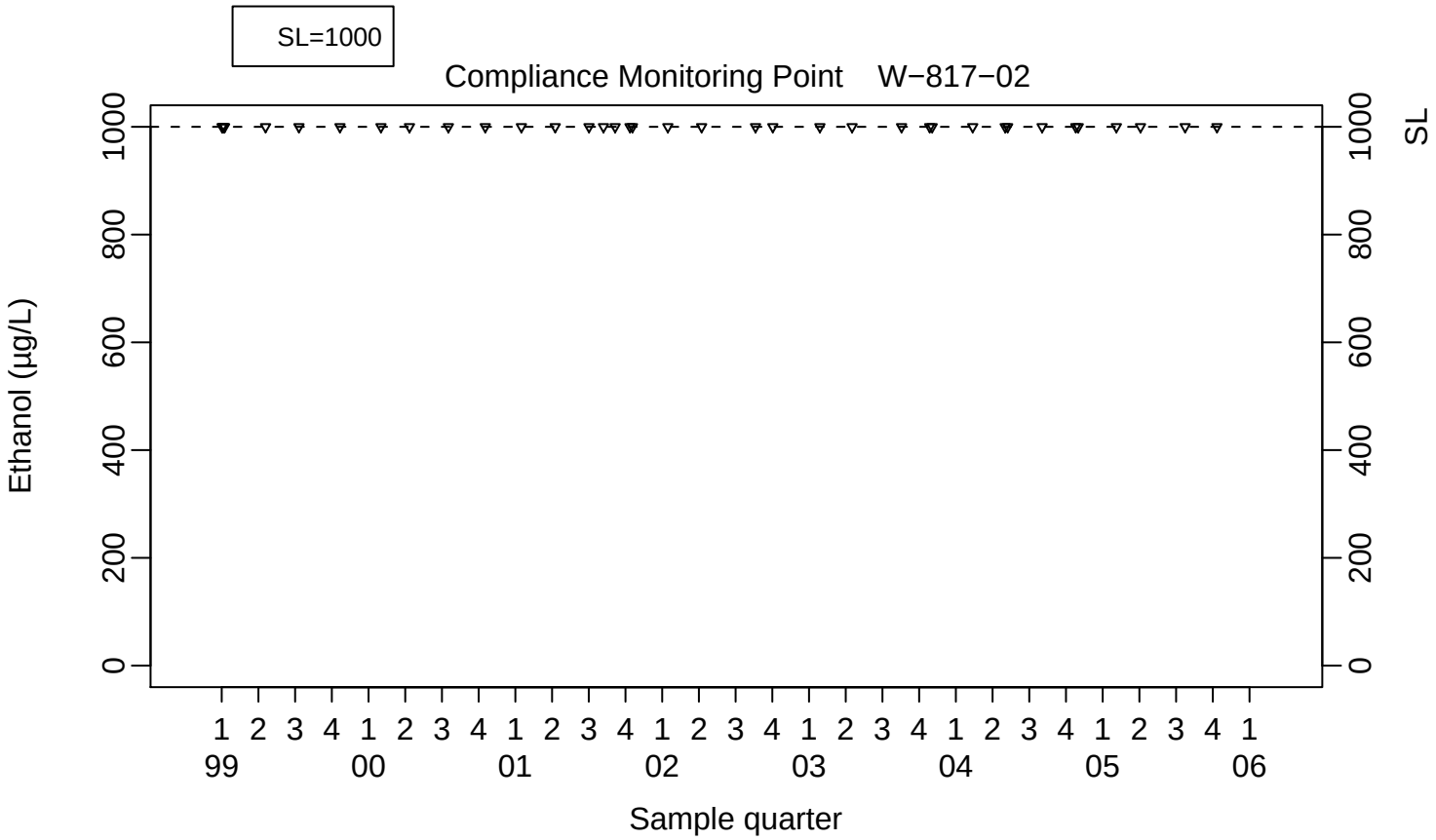

Surface Impoundments Ground Water
Dimethyl Sulfoxide (DMSO) (µg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Dimethyl Sulfoxide (DMSO) (µg/L)
0
5
10
15
20
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

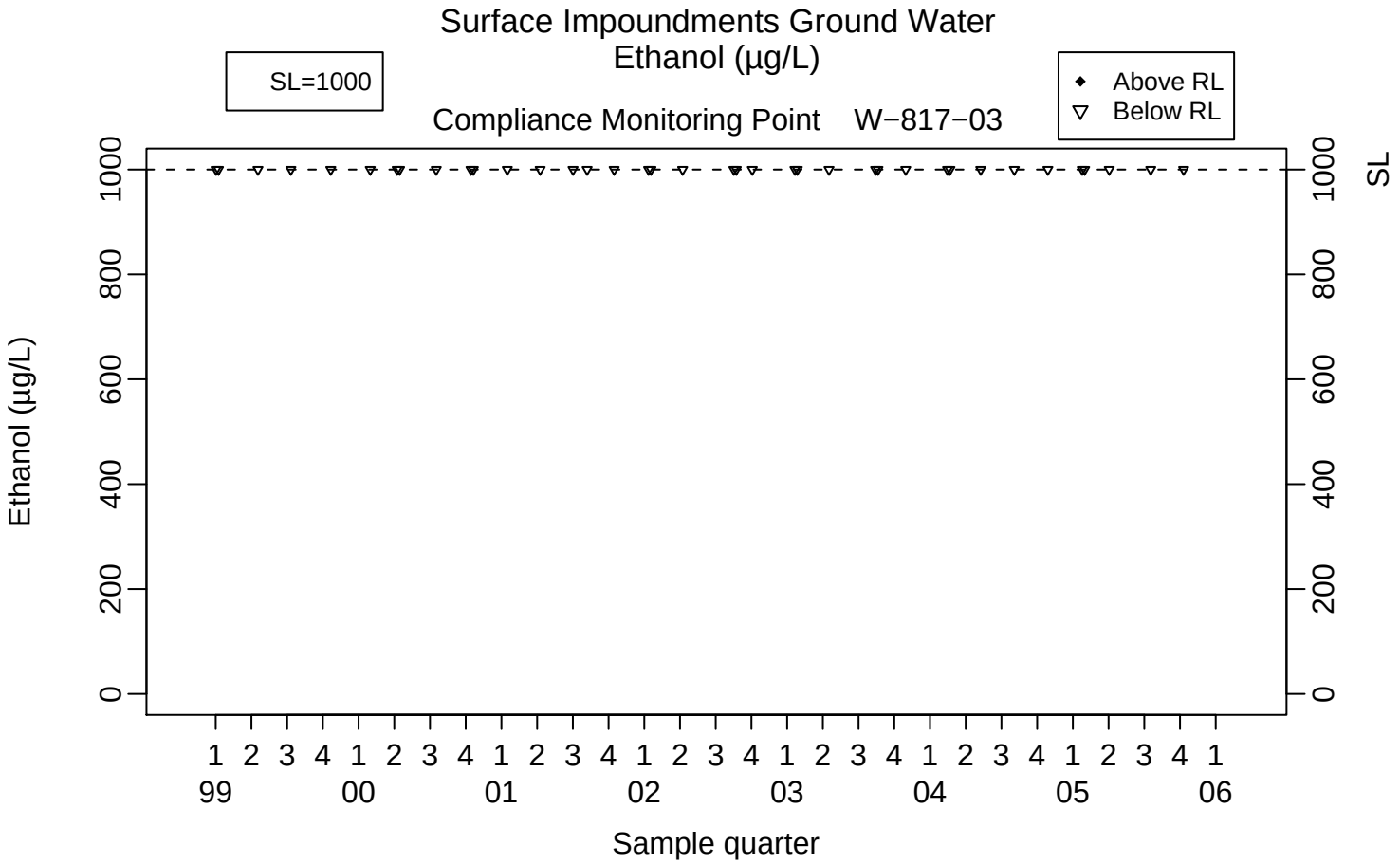

SL=10
Compliance Monitoring Point W−817−02
Dimethyl Sulfoxide (DMSO) (µg/L)
0
5
10
15
20
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

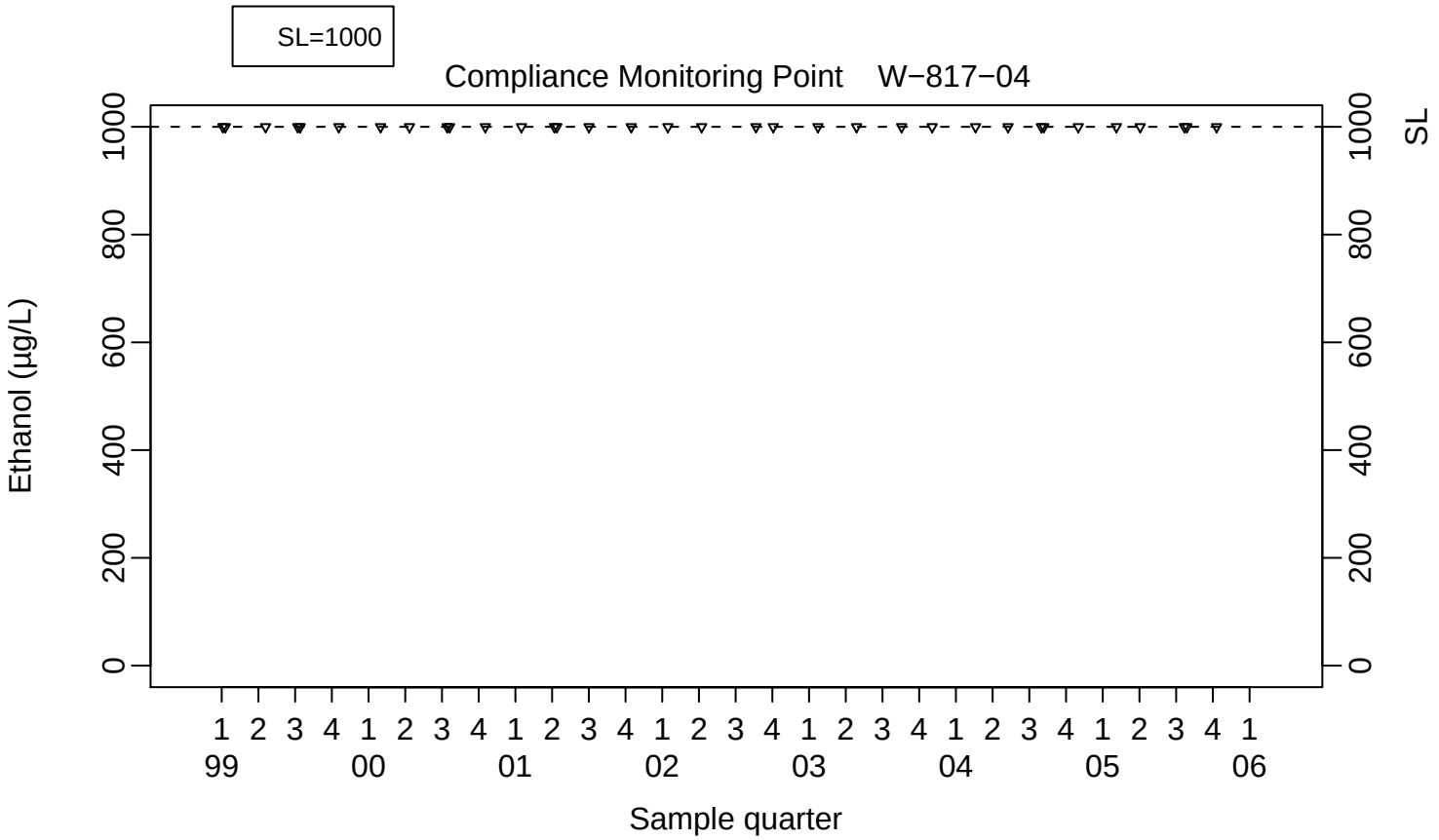

Surface Impoundments Ground Water
Dimethyl Sulfoxide (DMSO) (µg/L)
SL=10
Above RL
Below RL
Compliance Monitoring Point W−817−03
Dimethyl Sulfoxide (DMSO) (µg/L)
0
5
10
15
20
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

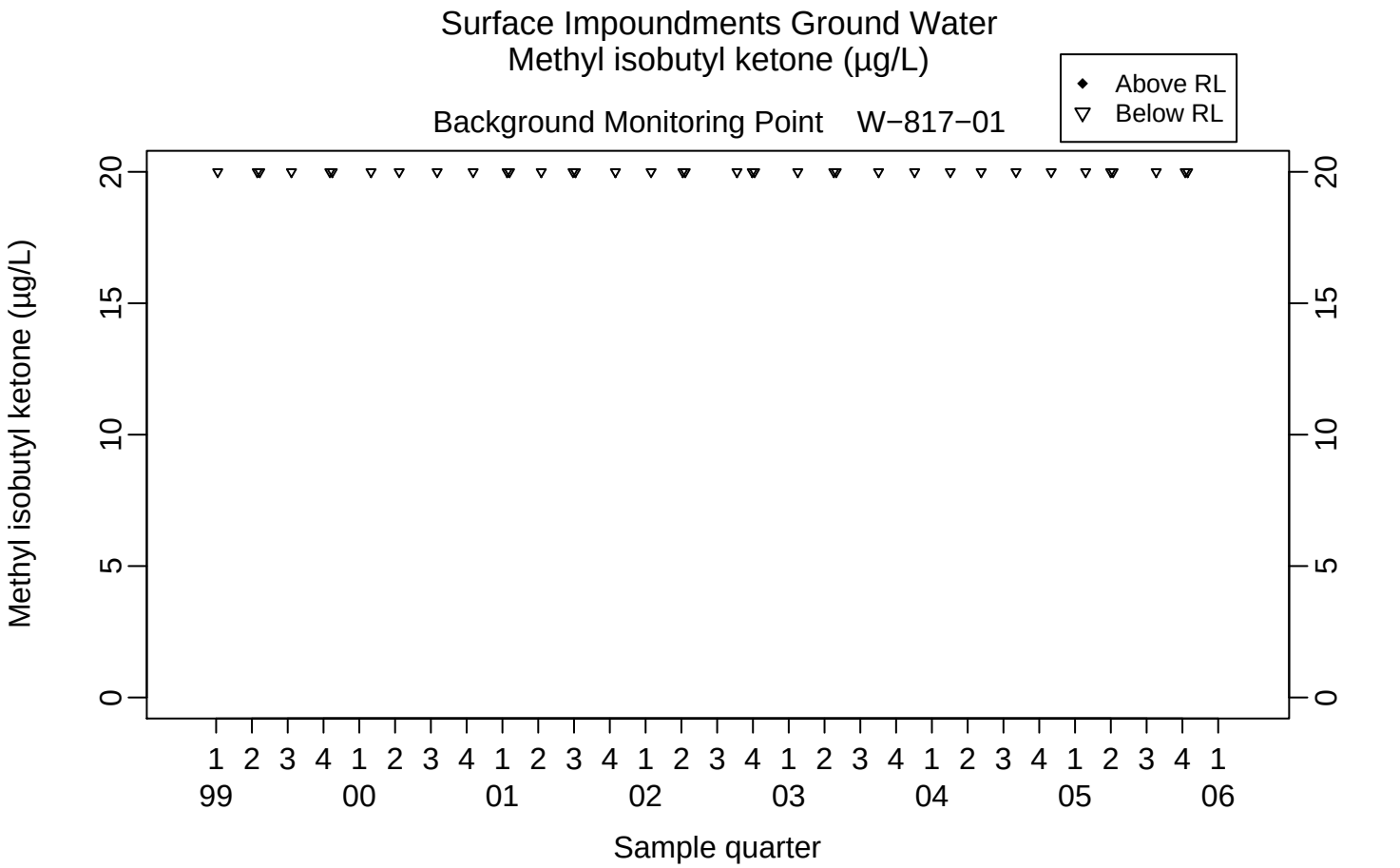

SL=10
Compliance Monitoring Point W−817−04
Dimethyl Sulfoxide (DMSO) (µg/L)
0
5
10
15
20
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

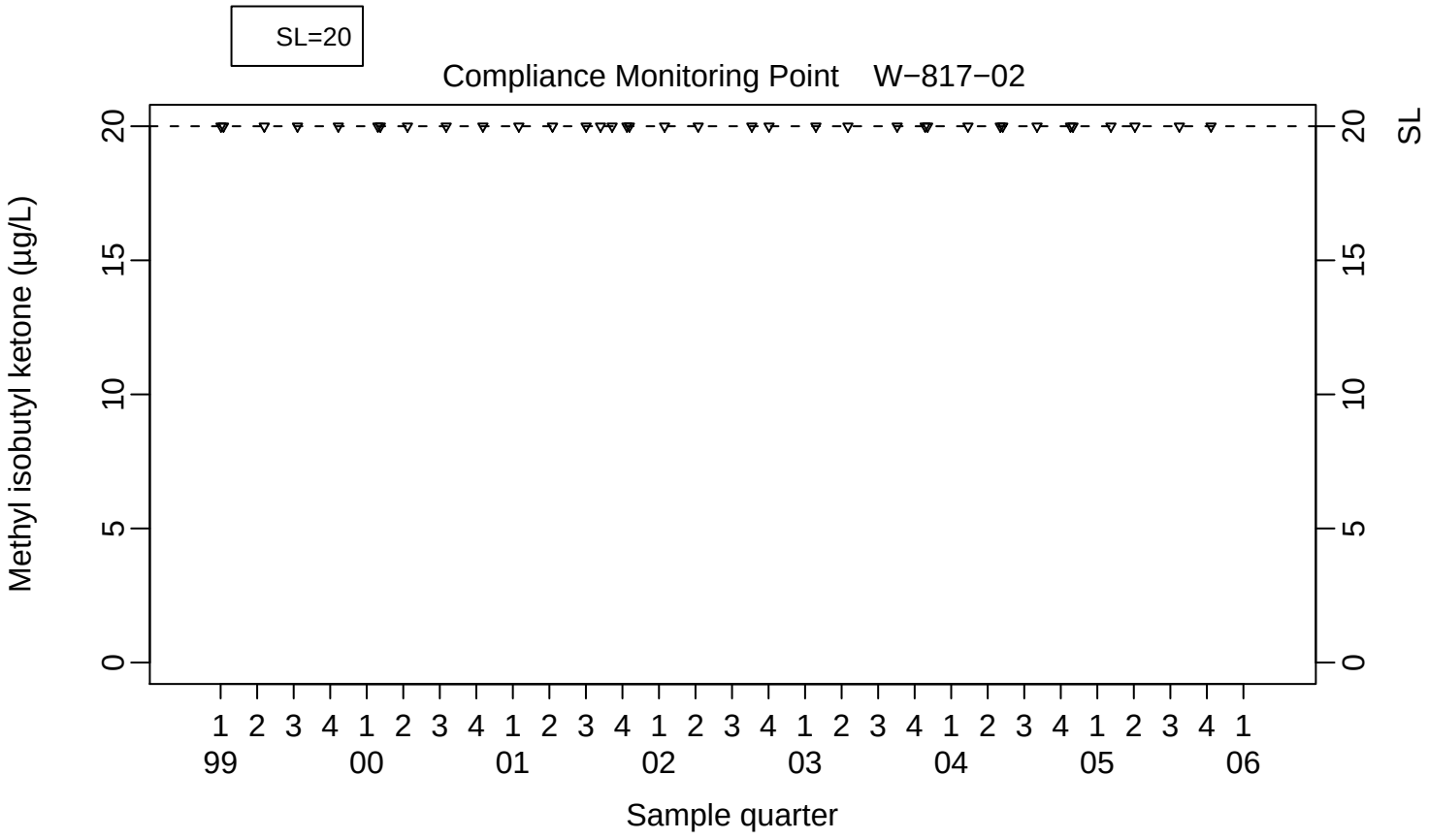

Surface Impoundments Ground Water
Ethanol (µg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Ethanol (µg/L)
0
200
400
600
800
1000
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

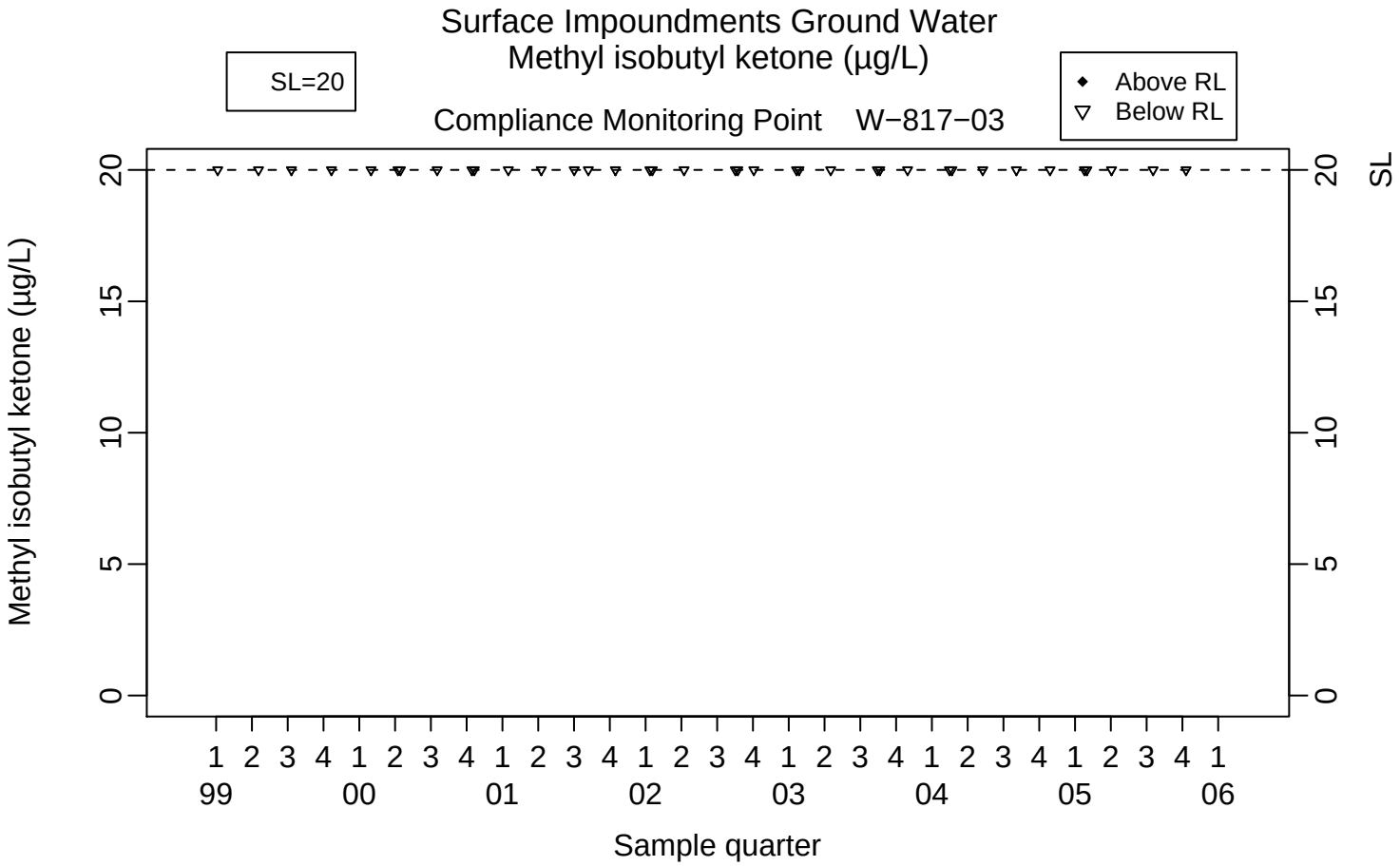

SL=1000
Compliance Monitoring Point W−817−02
Ethanol (µg/L)
SL
0
200
400
600
800
1000
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

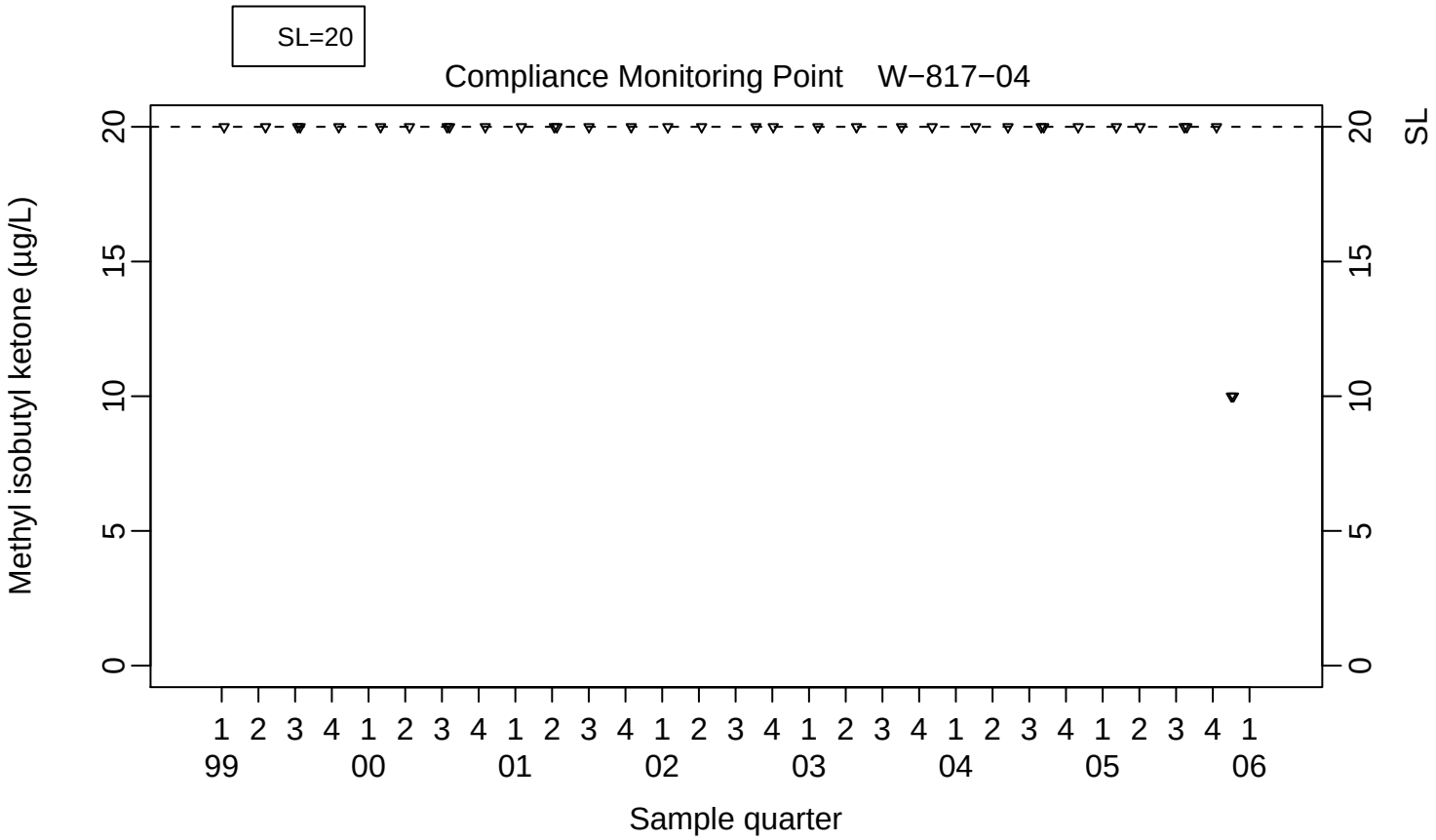

Surface Impoundments Ground Water
Ethanol (µg/L)
SL=1000
Above RL
Below RL
Compliance Monitoring Point W−817−03
Ethanol (µg/L)
0
200
400
600
800
1000
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

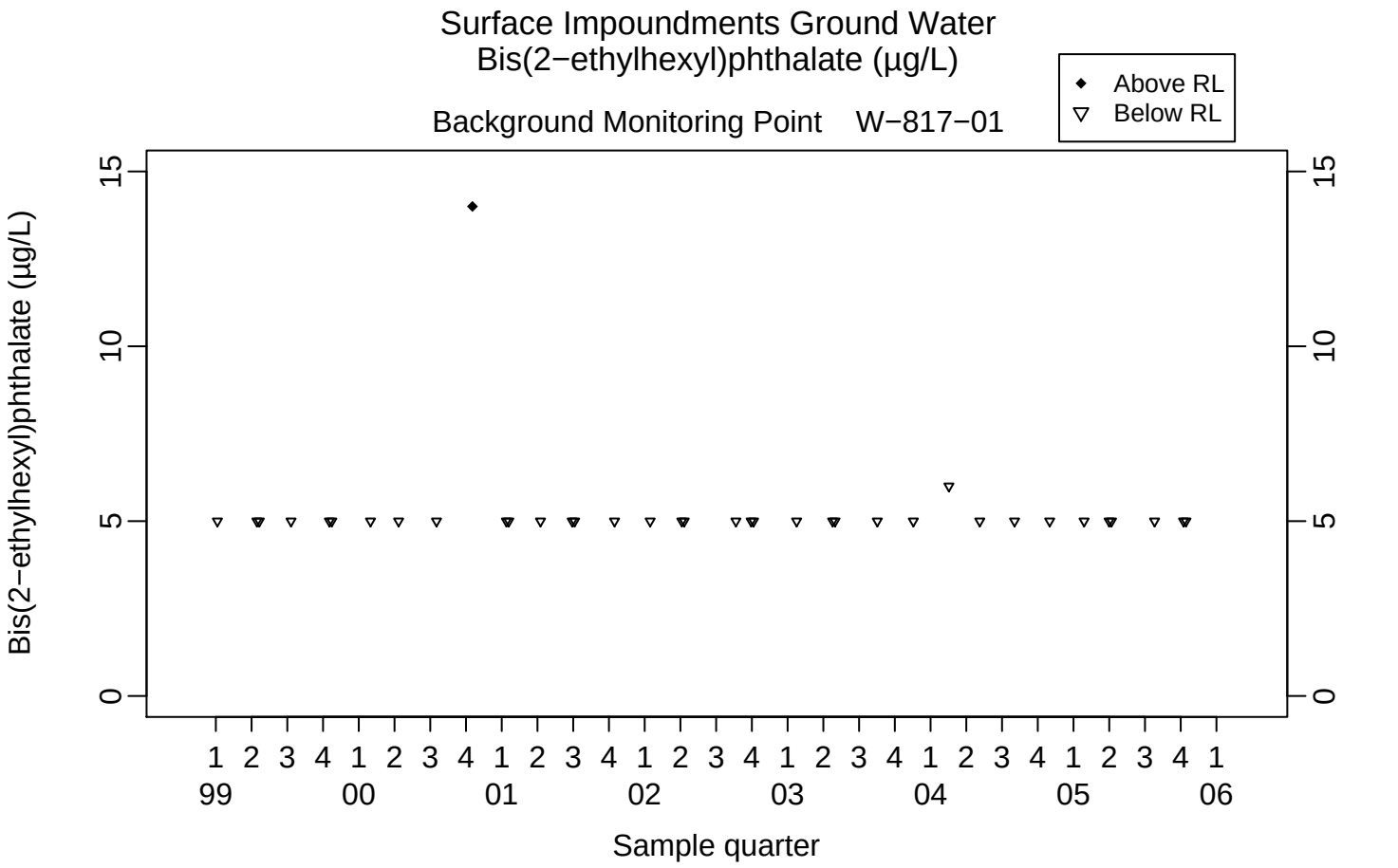

SL=1000
Compliance Monitoring Point W−817−04
Ethanol (µg/L)
0
200
400
600
800
1000
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

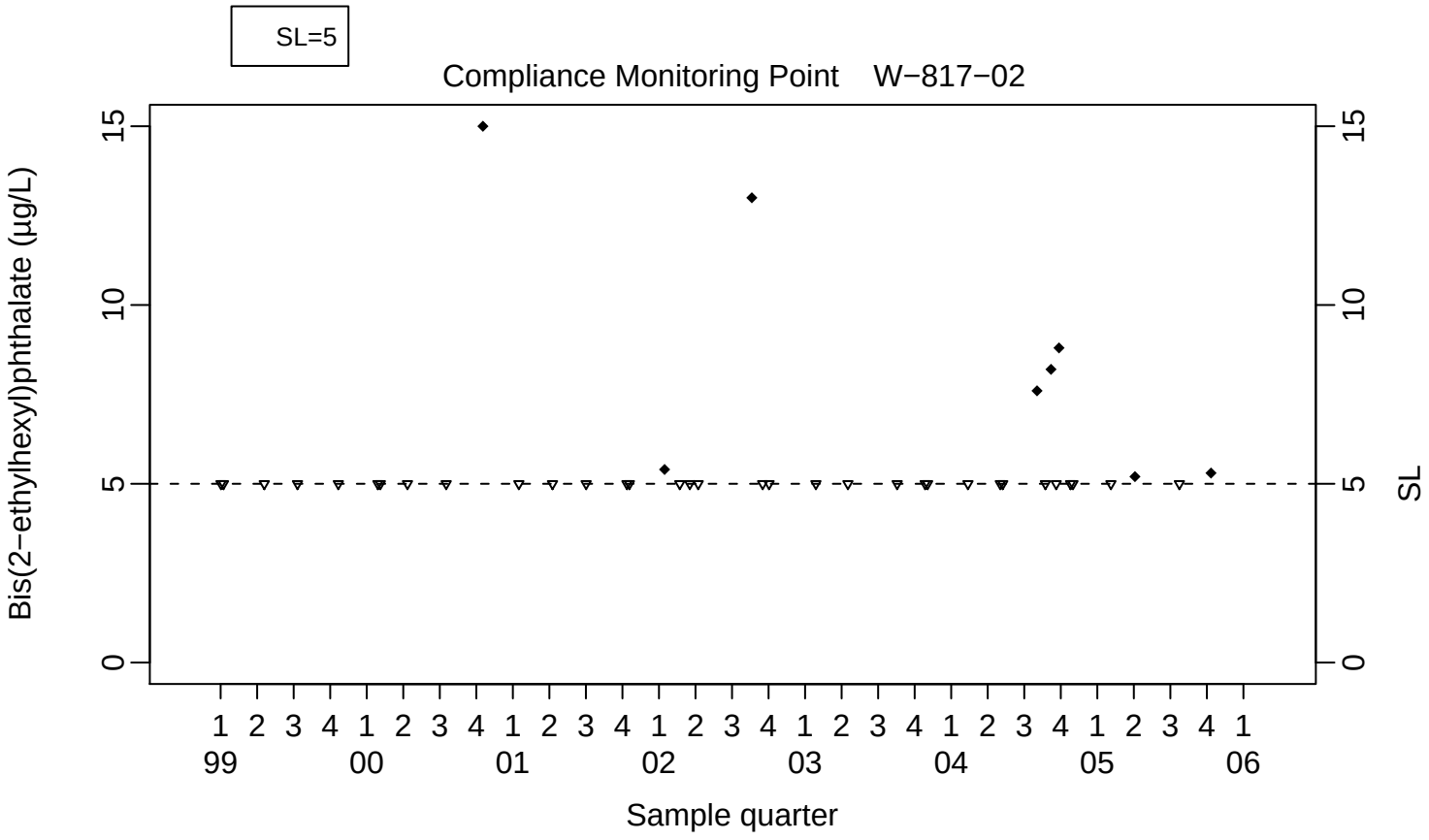

Surface Impoundments Ground Water
Methyl isobutyl ketone (µg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Methyl isobutyl ketone (µg/L)
0
5
10
15
20
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

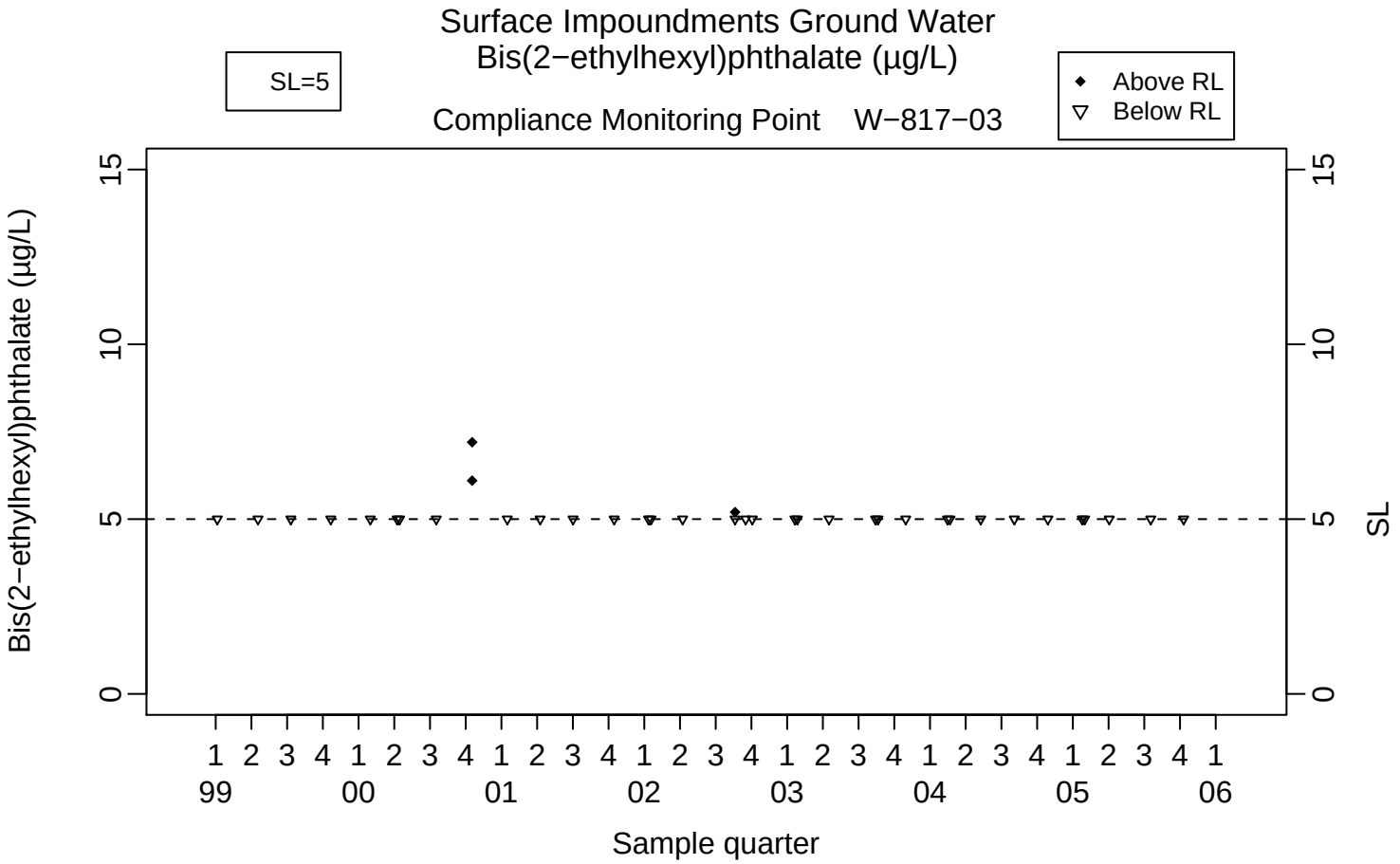

SL=20
Compliance Monitoring Point W−817−02
Methyl isobutyl ketone (µg/L)
SL
0
5
10
15
20
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

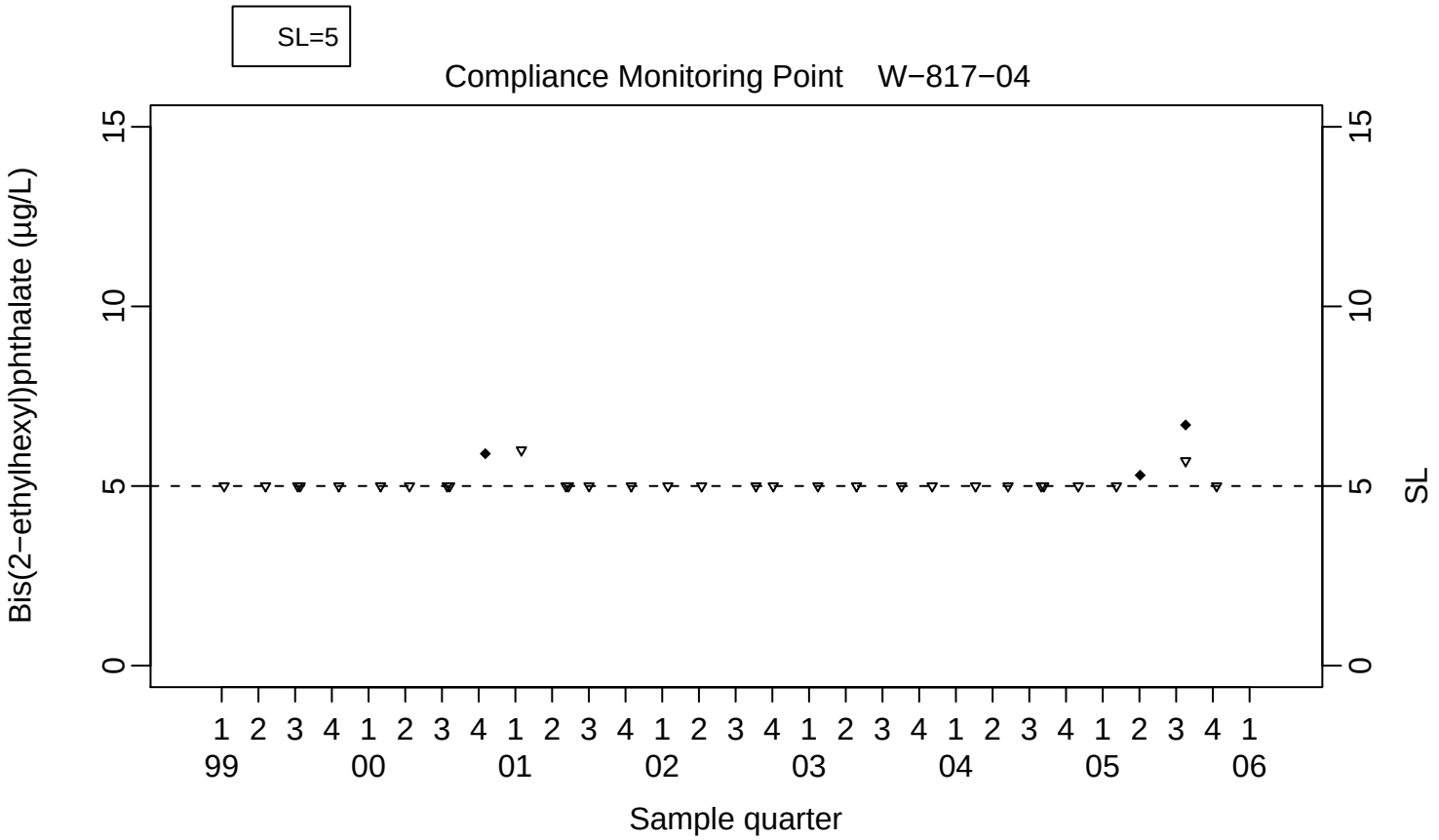

Surface Impoundments Ground Water
Methyl isobutyl ketone (µg/L)
SL=20
Above RL
Below RL
Compliance Monitoring Point W−817−03
Methyl isobutyl ketone (µg/L)
SL
0
5
10
15
20
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

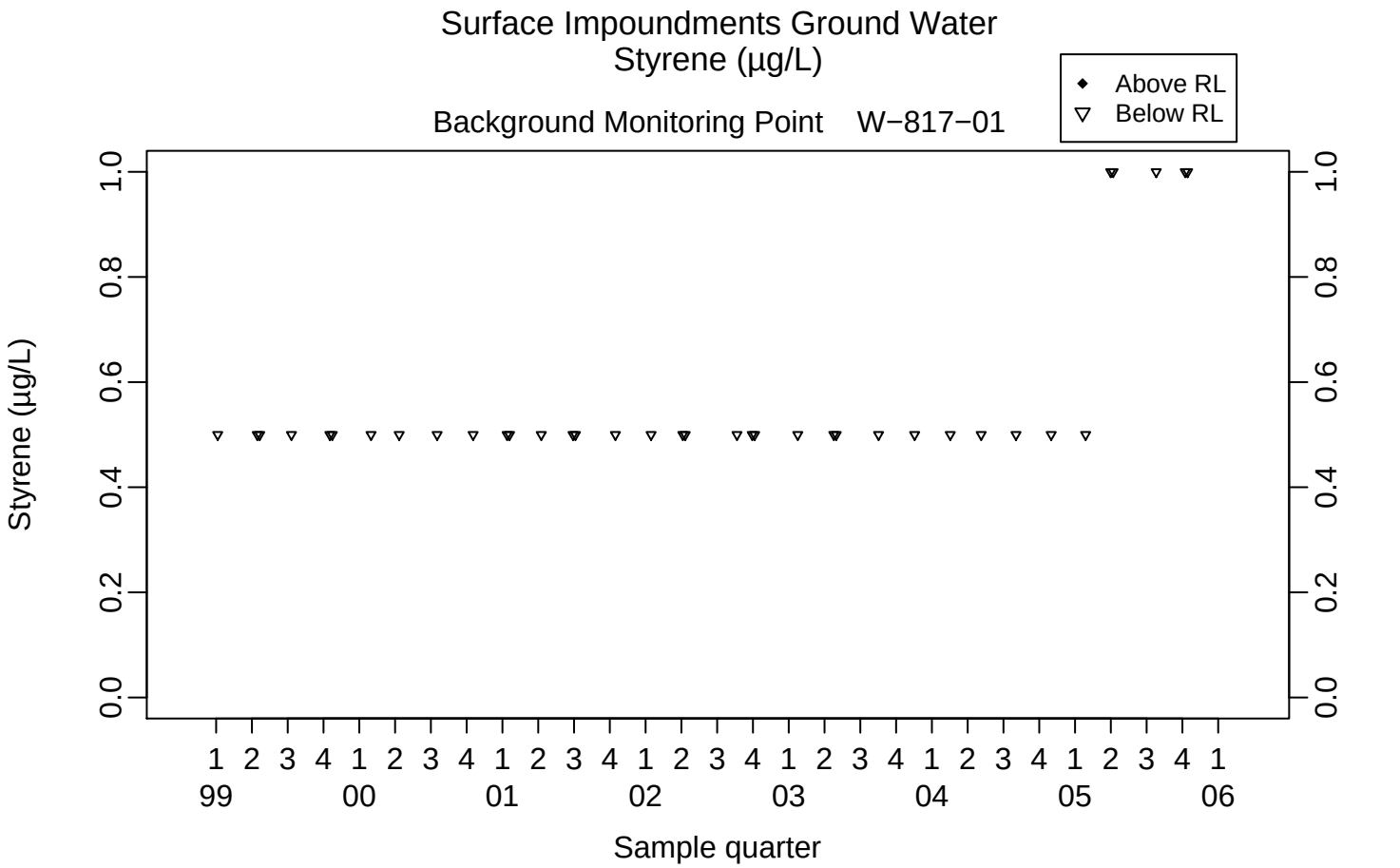

SL=20
Compliance Monitoring Point W−817−04
Methyl isobutyl ketone (µg/L)
SL
0
5
10
15
20
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

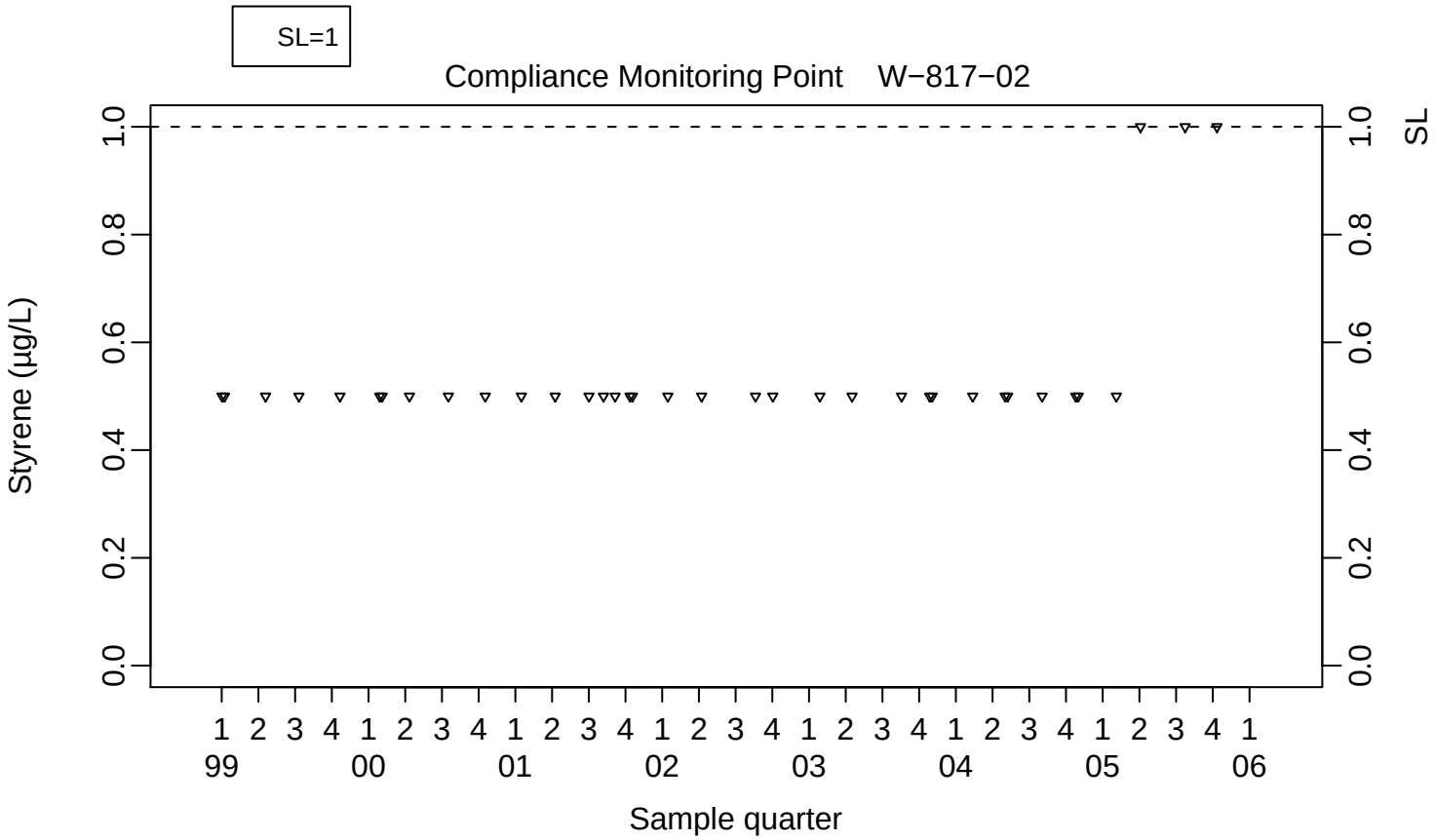

Surface Impoundments Ground Water
Bis(2−ethylhexyl)phthalate (µg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Bis(2−ethylhexyl)phthalate (µg/L)
0
5
10
15
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

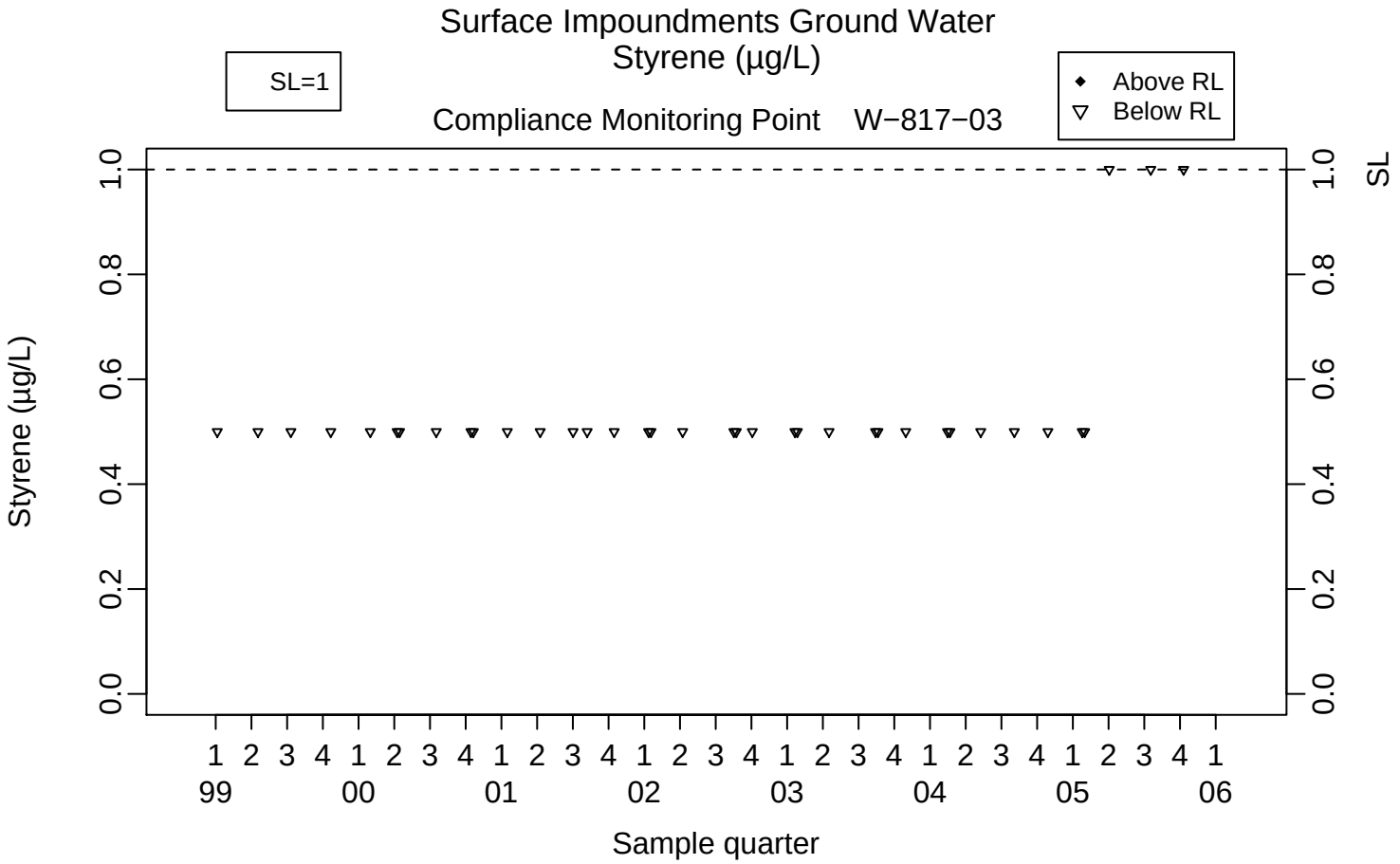

SL=5
Compliance Monitoring Point W−817−02
Bis(2−ethylhexyl)phthalate (µg/L)
0
5
10
15
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

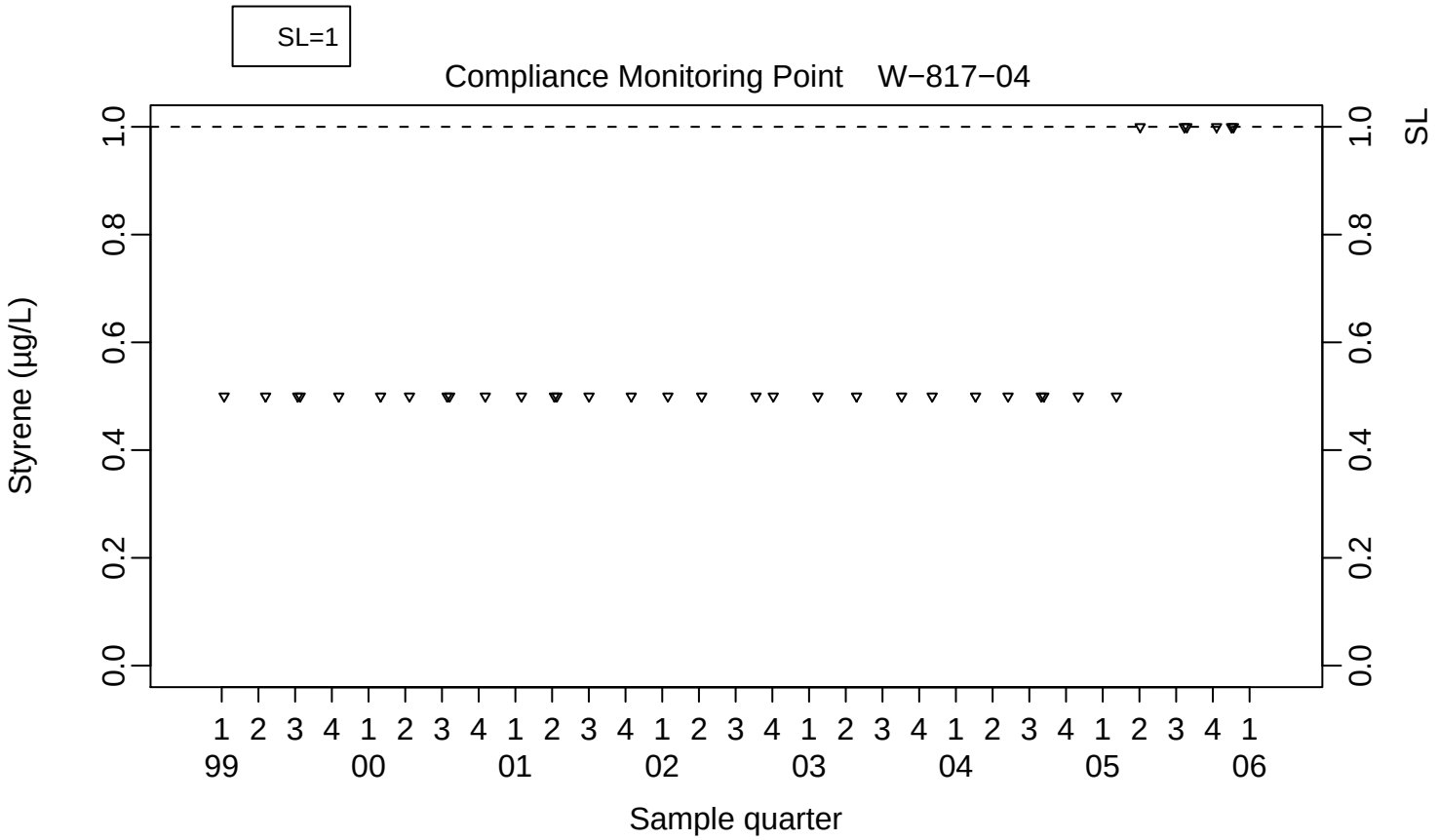

Surface Impoundments Ground Water
Bis(2−ethylhexyl)phthalate (µg/L)
SL=5
Above RL
Below RL
Compliance Monitoring Point W−817−03
Bis(2−ethylhexyl)phthalate (µg/L)
0
5
10
15
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

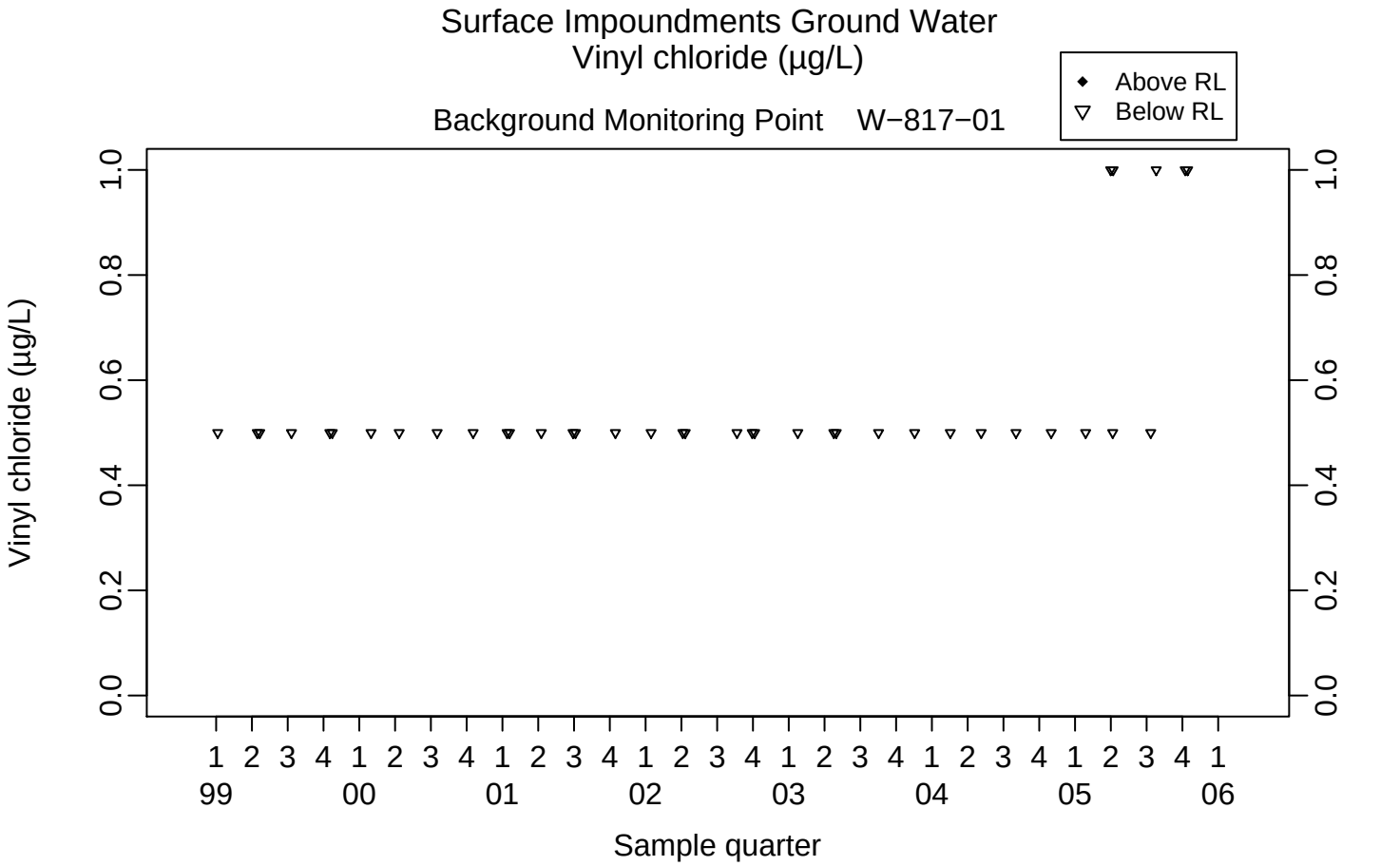

SL=5
Compliance Monitoring Point W−817−04
Bis(2−ethylhexyl)phthalate (µg/L)
0
5
10
15
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

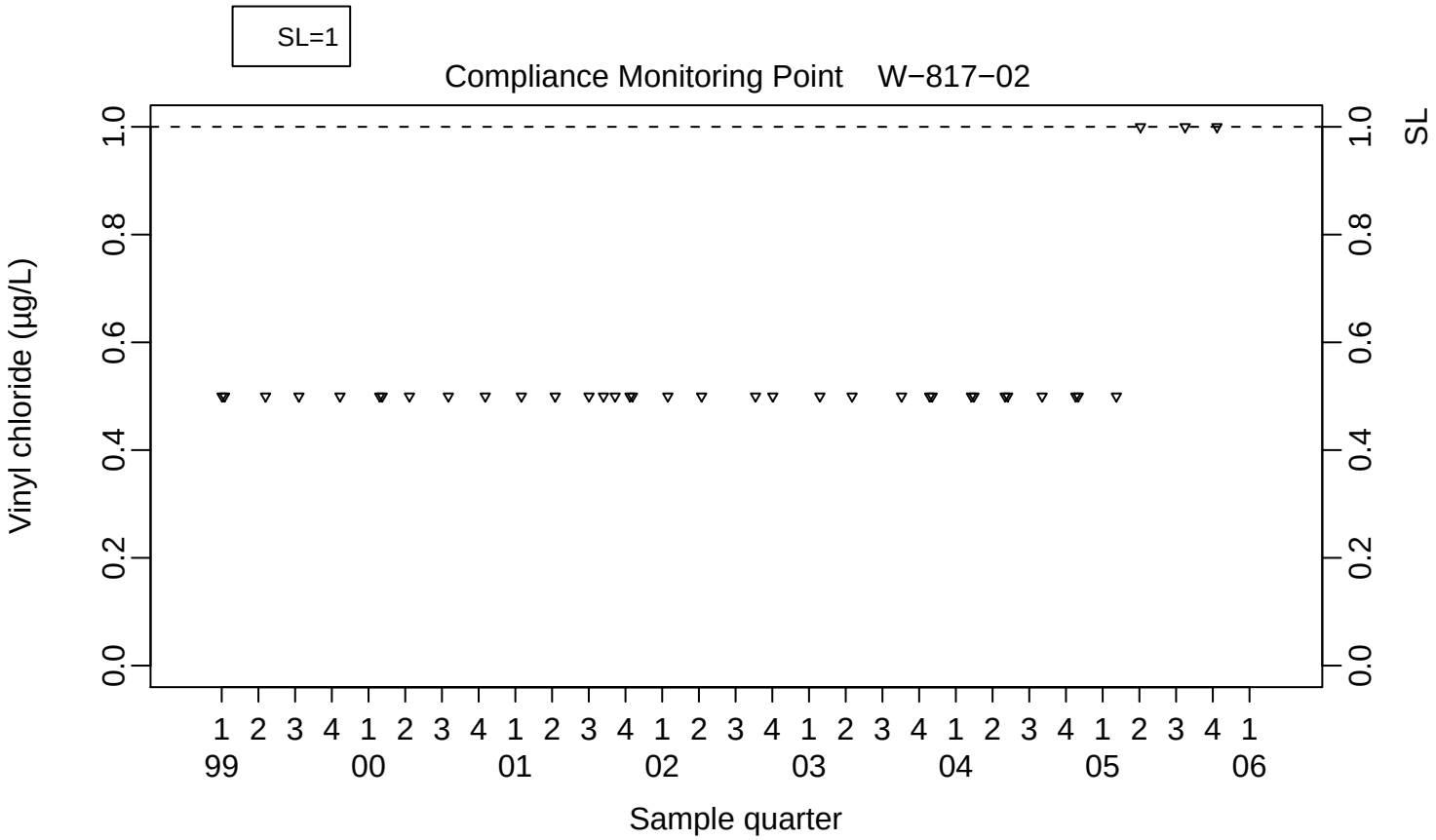

Surface Impoundments Ground Water
Styrene (µg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Styrene (µg/L)
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

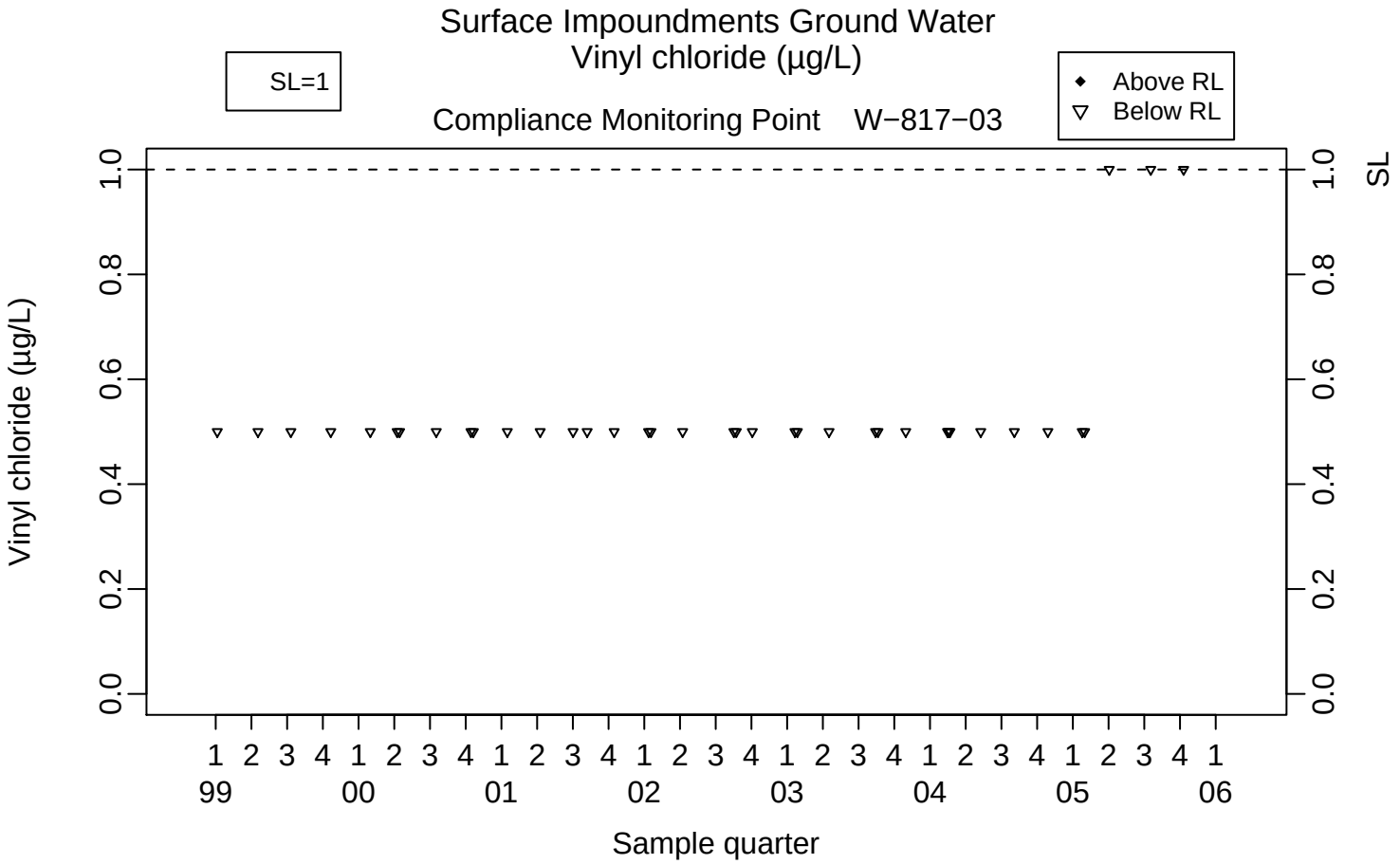

SL=1
Compliance Monitoring Point W−817−02
Styrene (µg/L)
SL
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

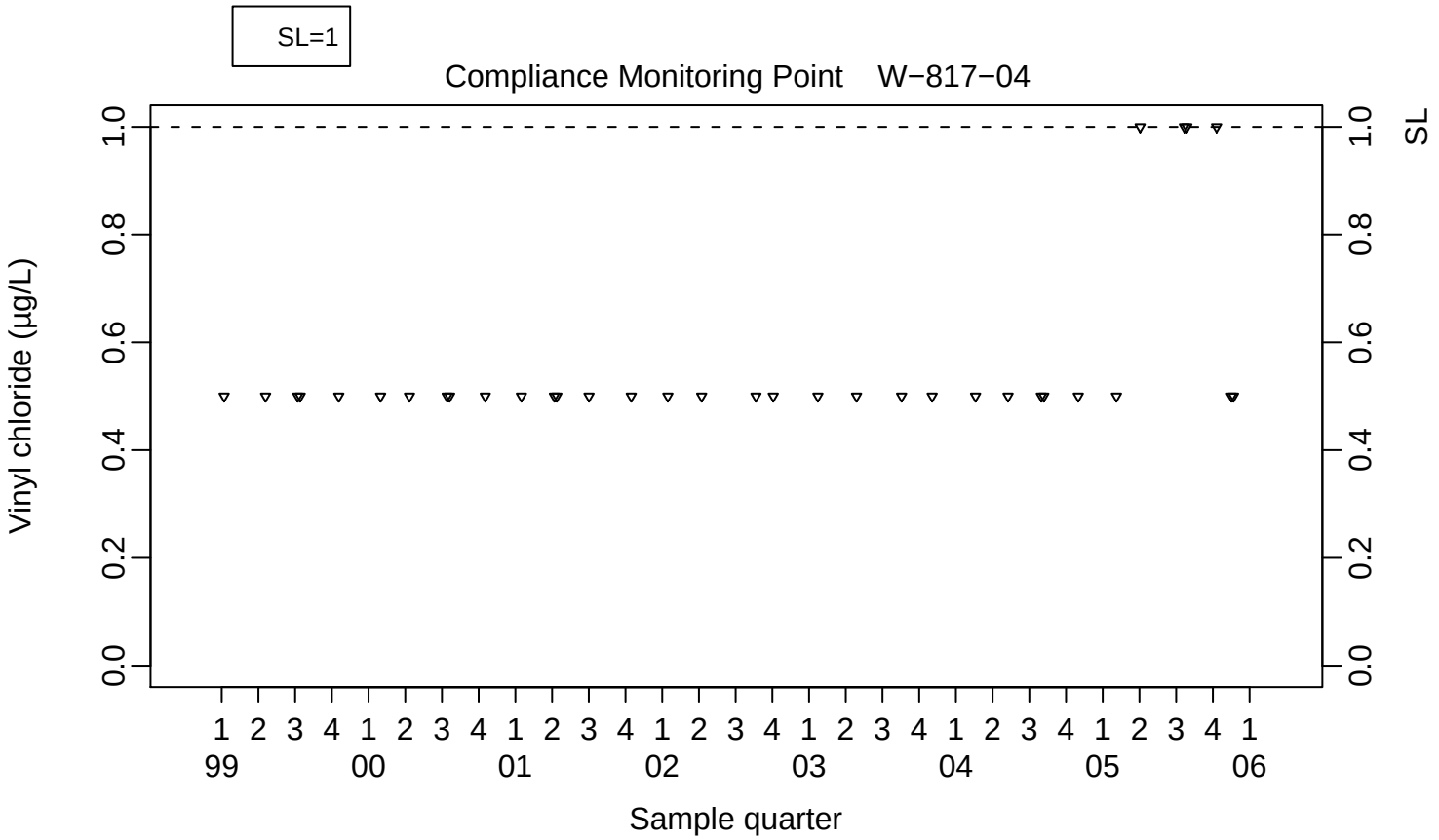

Surface Impoundments Ground Water
Styrene (µg/L)
SL=1
Above RL
Below RL
Compliance Monitoring Point W−817−03
Styrene (µg/L)
SL
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

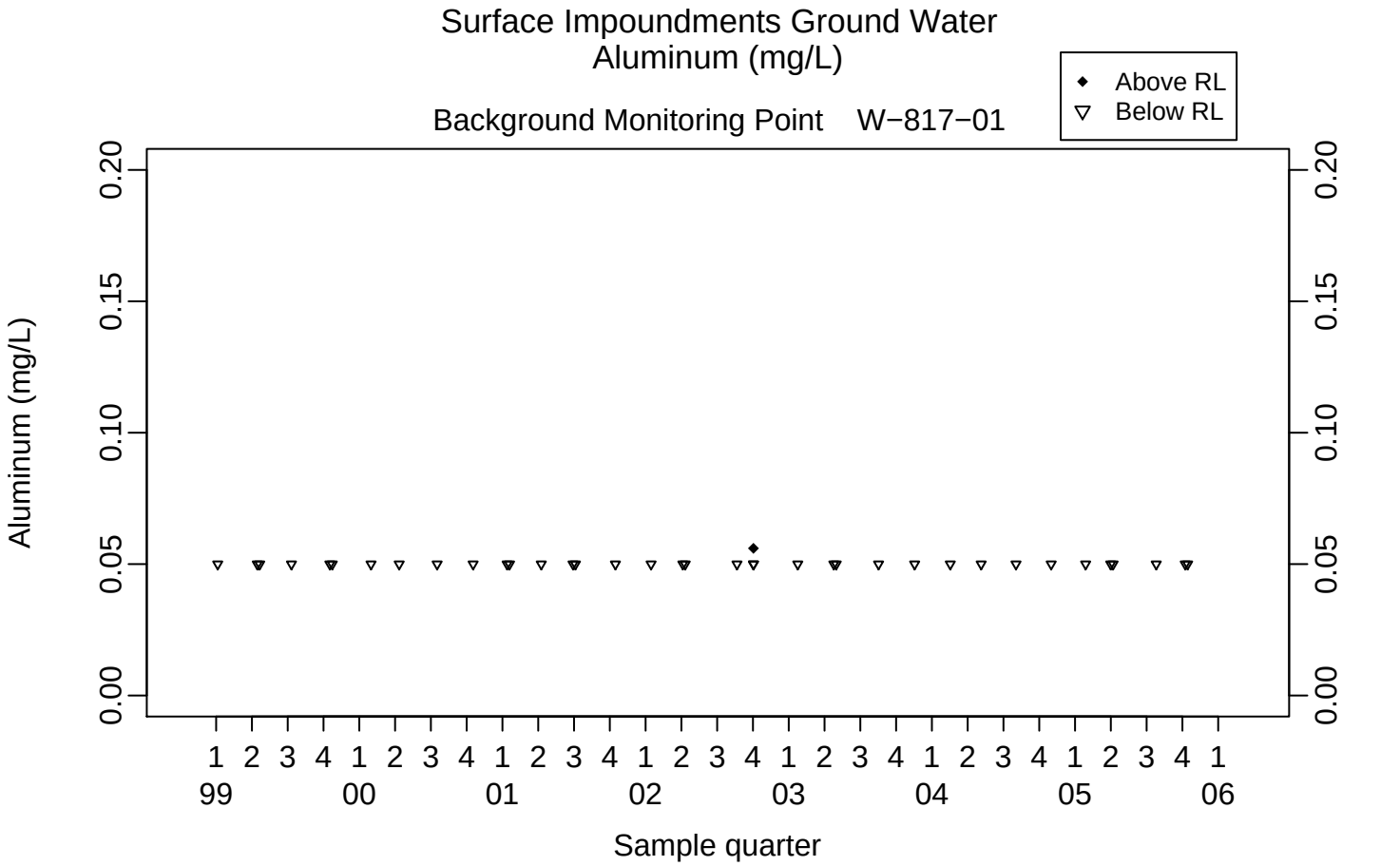

SL=1
Compliance Monitoring Point W−817−04
Styrene (µg/L)
SL
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

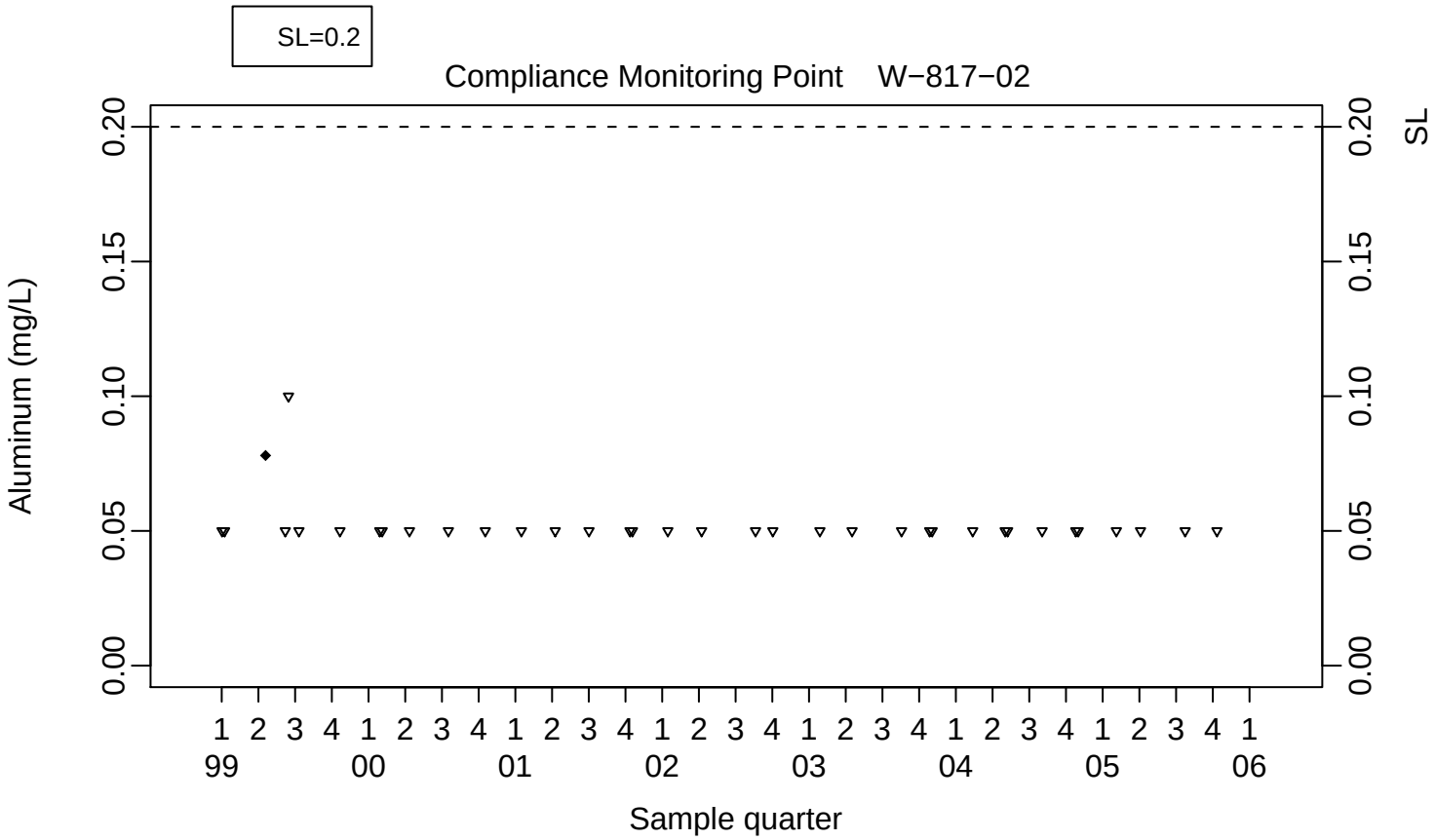

Surface Impoundments Ground Water
Vinyl chloride (µg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Vinyl chloride (µg/L)
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

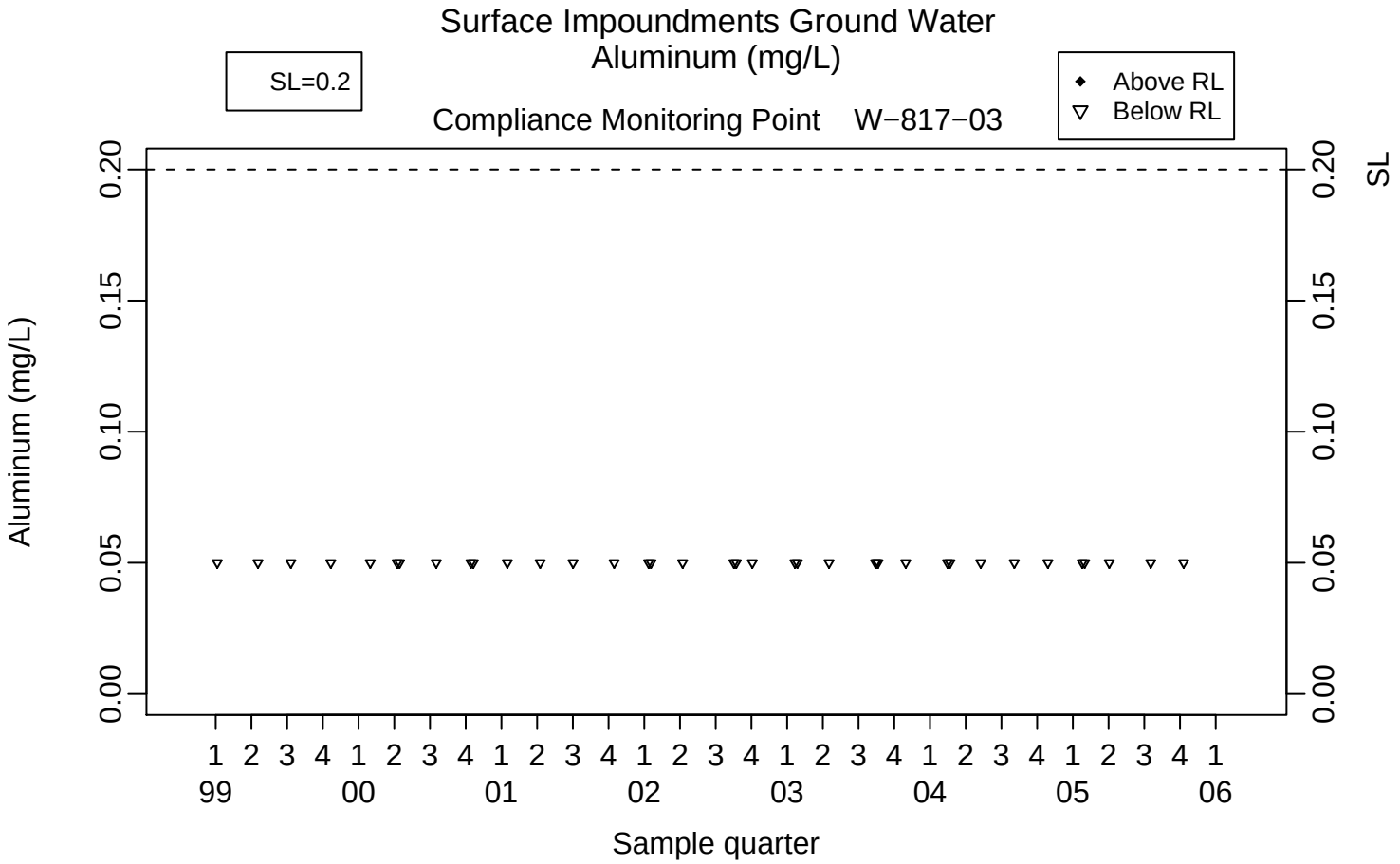

SL=1
Compliance Monitoring Point W−817−02
Vinyl chloride (µg/L)
SL
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

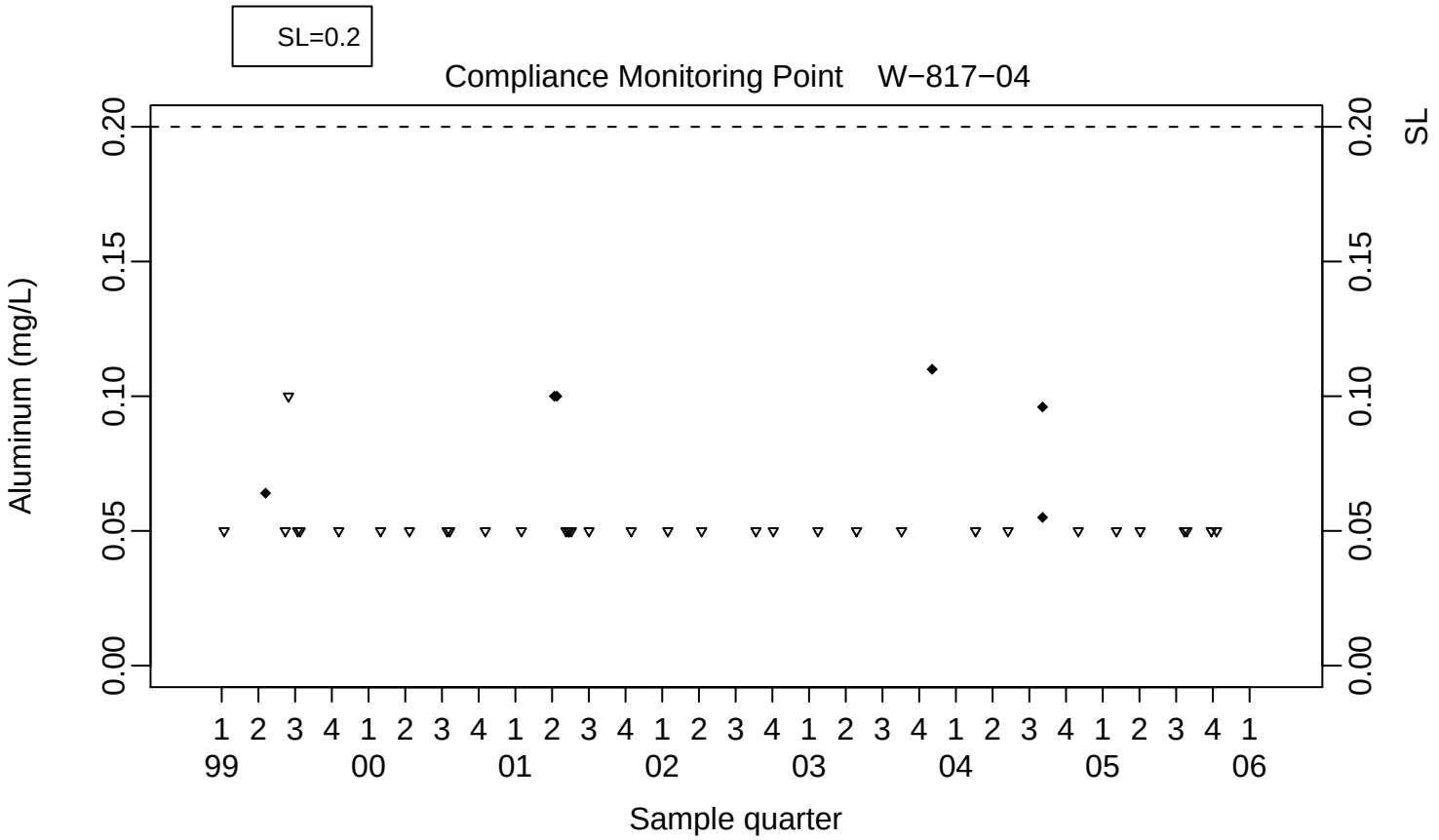

Surface Impoundments Ground Water
Vinyl chloride (µg/L)
SL=1
Above RL
Below RL
Compliance Monitoring Point W−817−03
Vinyl chloride (µg/L)
SL
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

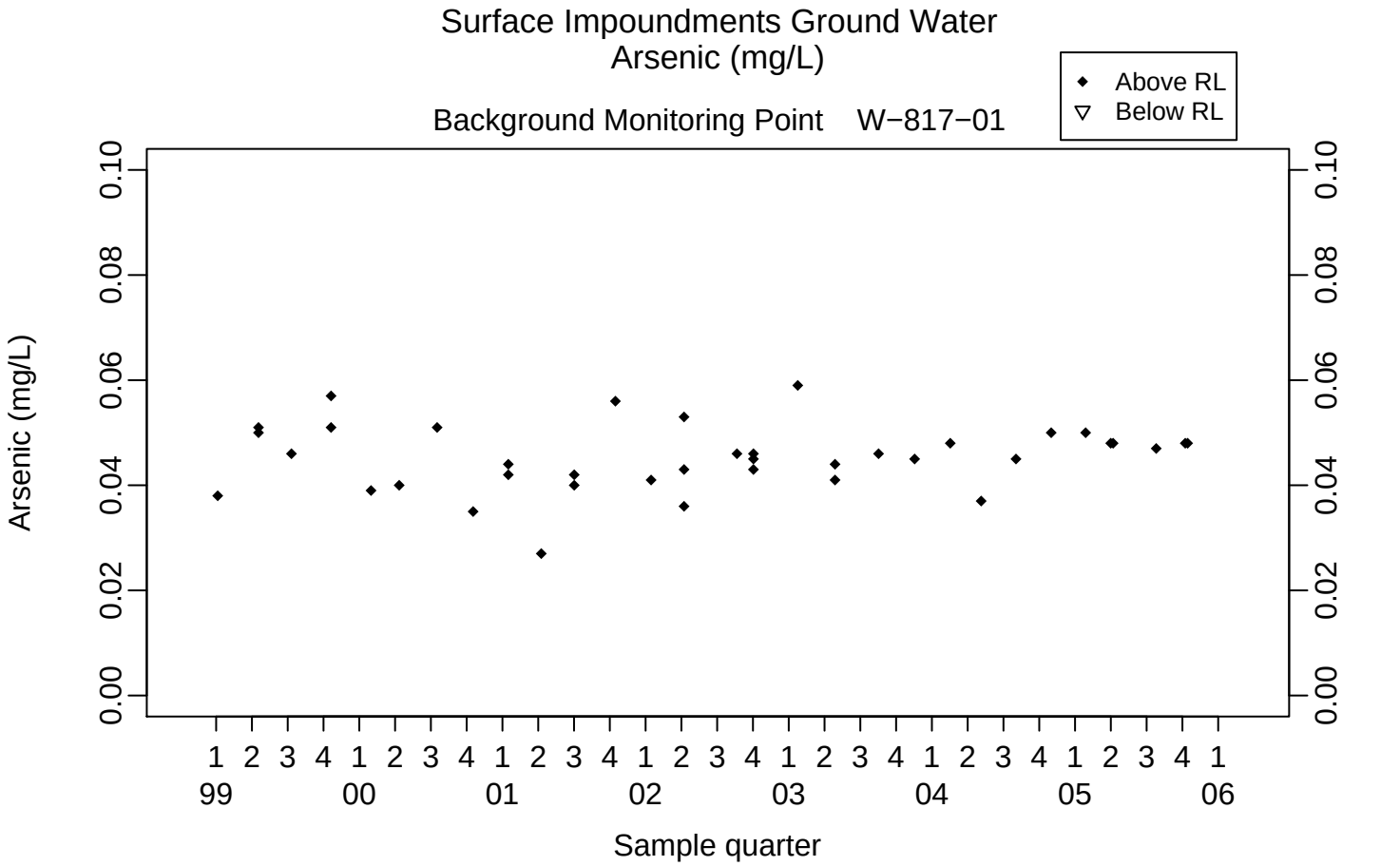

SL=1
Compliance Monitoring Point W−817−04
Vinyl chloride (µg/L)
SL
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

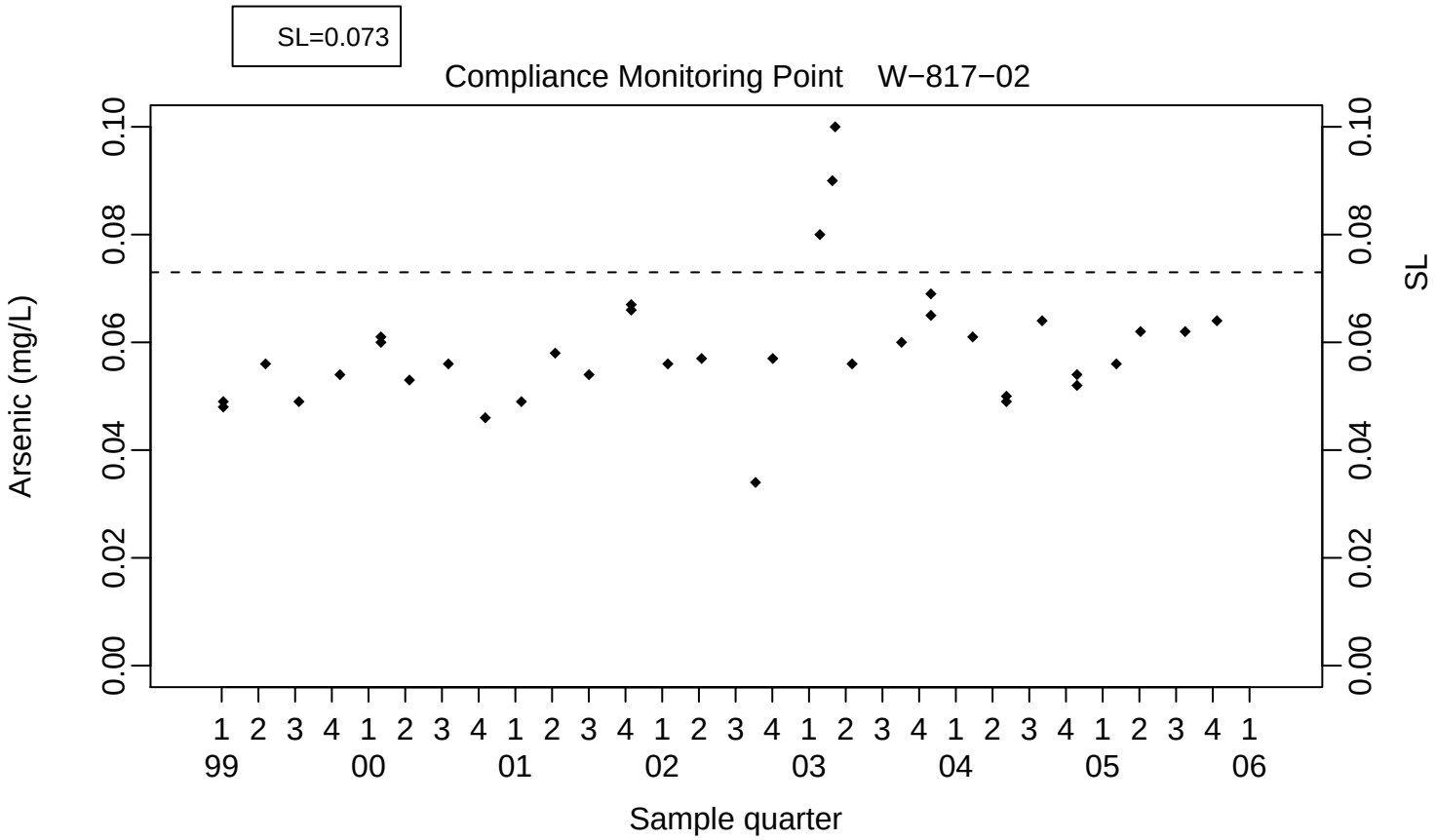

Surface Impoundments Ground Water
Aluminum (mg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Aluminum (mg/L)
0.00
0.05
0.10
0.15
0.20
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

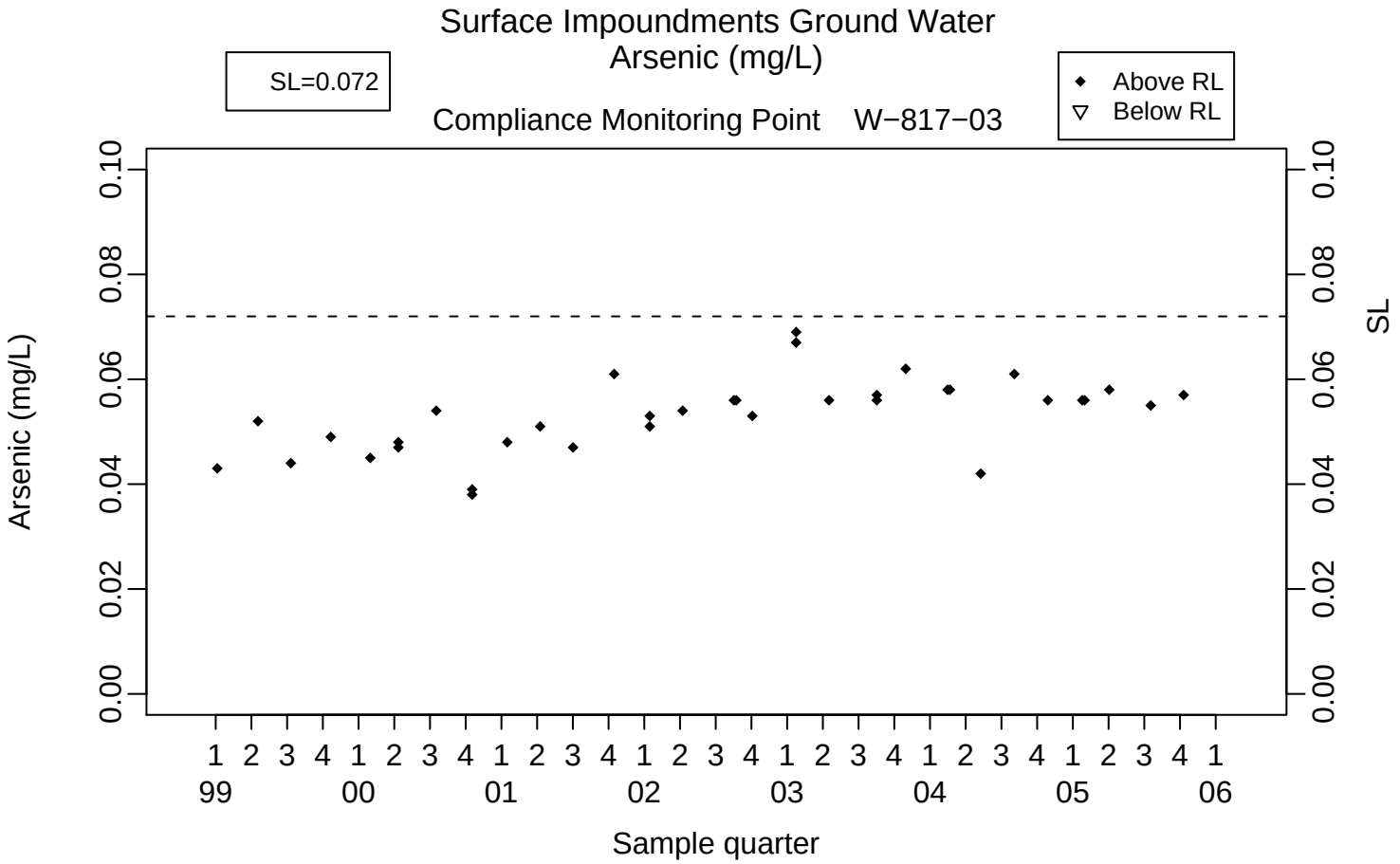

SL=0.2
Compliance Monitoring Point W−817−02
SL
Aluminum (mg/L)
0.00
0.05
0.10
0.15
0.20
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

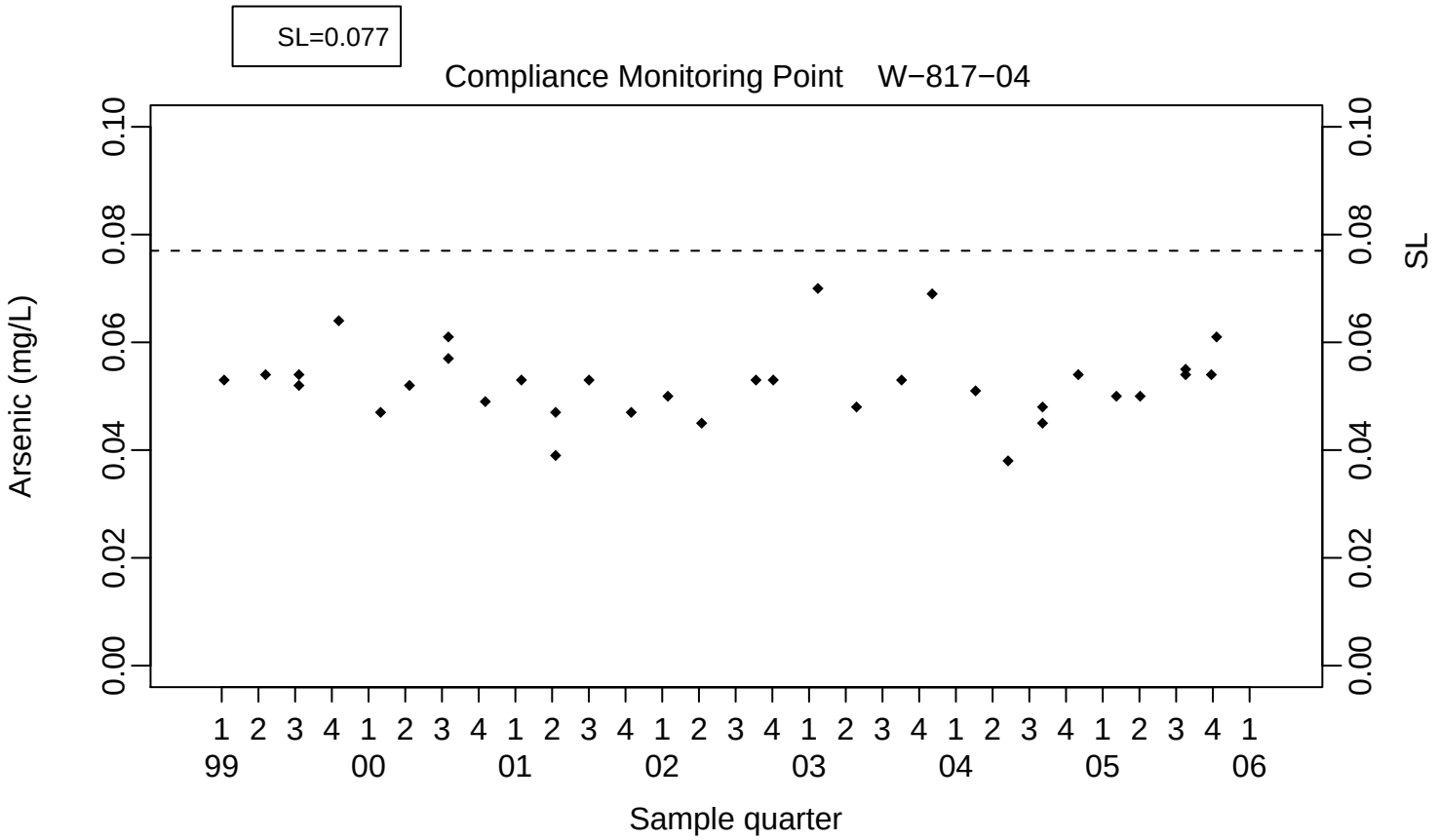

Surface Impoundments Ground Water
Aluminum (mg/L)
SL=0.2
Above RL
Below RL
Compliance Monitoring Point W−817−03
Aluminum (mg/L)
0.00
0.05
0.10
0.15
0.20
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

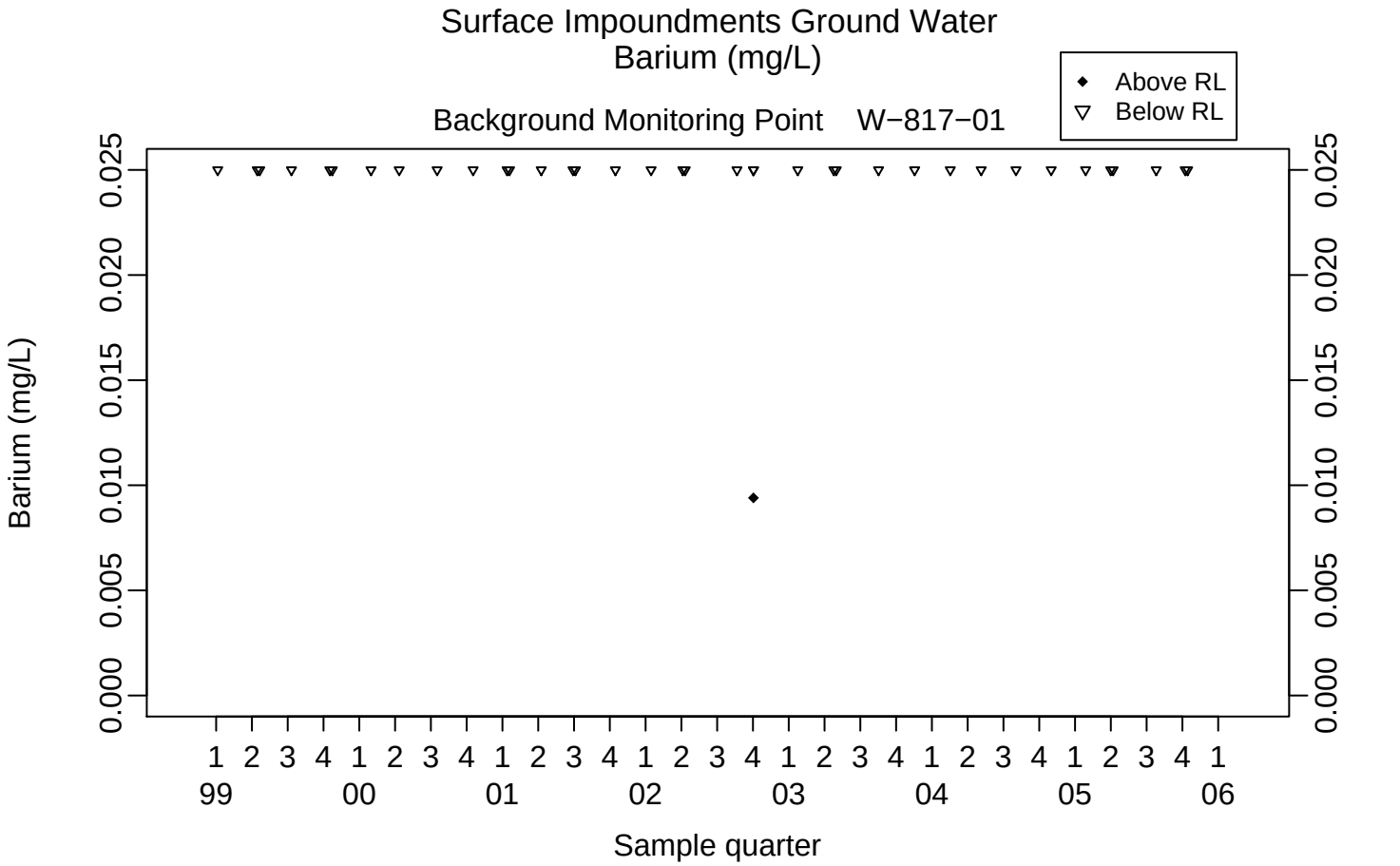

SL=0.2
Compliance Monitoring Point W−817−04
Aluminum (mg/L)
0.00
0.05
0.10
0.15
0.20
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

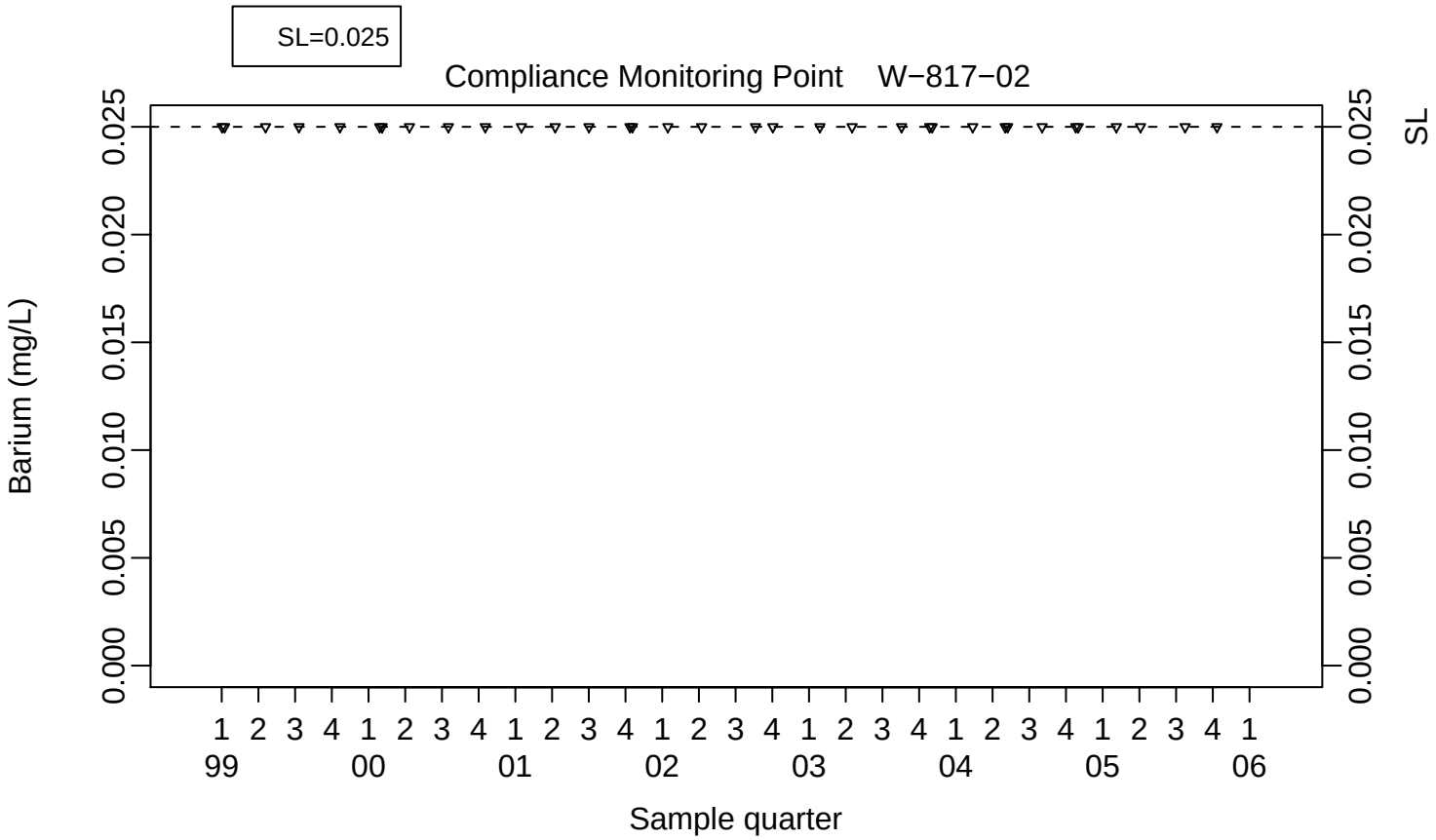

Surface Impoundments Ground Water
Arsenic (mg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Arsenic (mg/L)
0.00
0.02
0.04
0.06
0.08
0.10
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

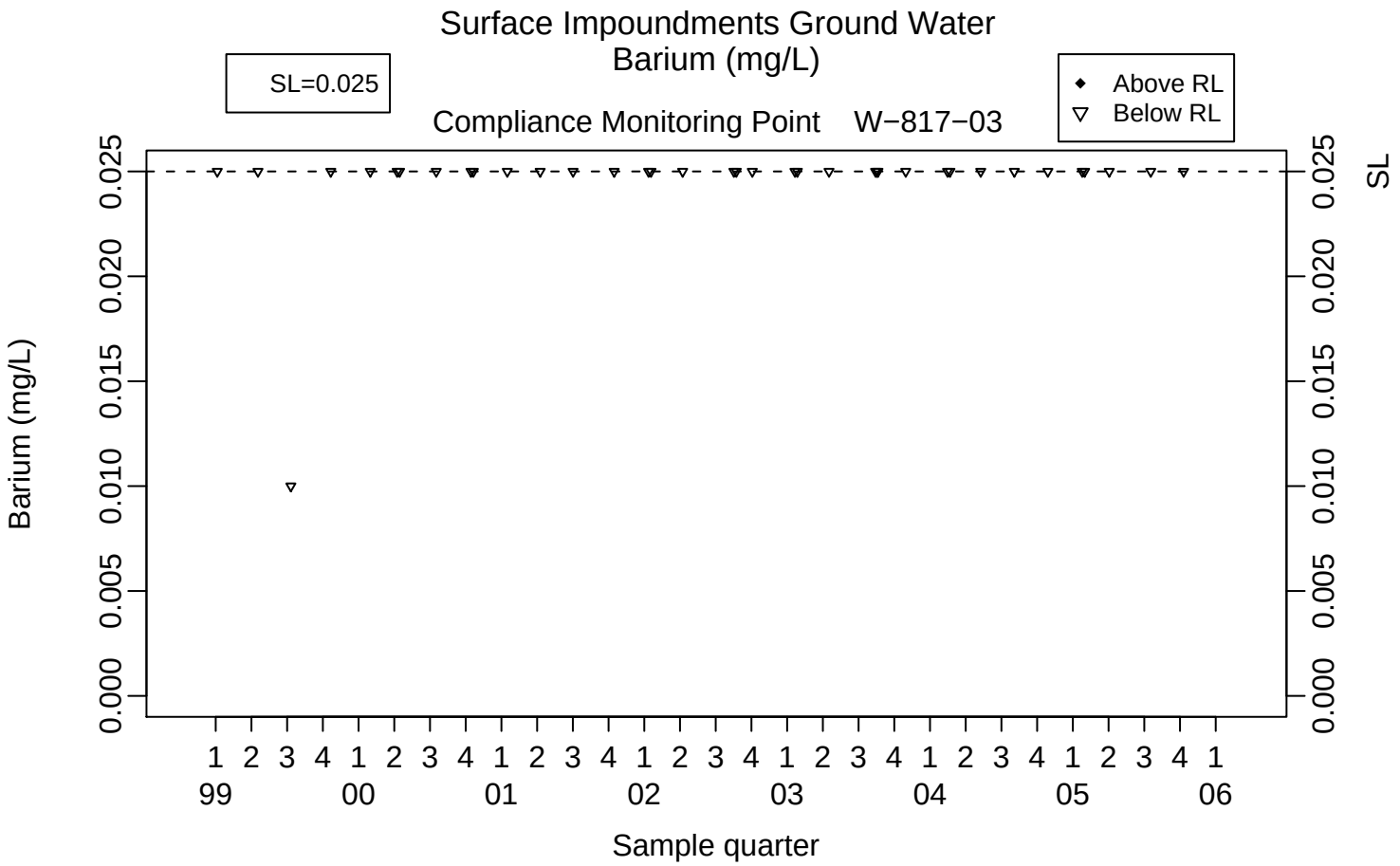

SL=0.073
Compliance Monitoring Point W−817−02
Arsenic (mg/L)
SL
0.00
0.02
0.04
0.06
0.08
0.10
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

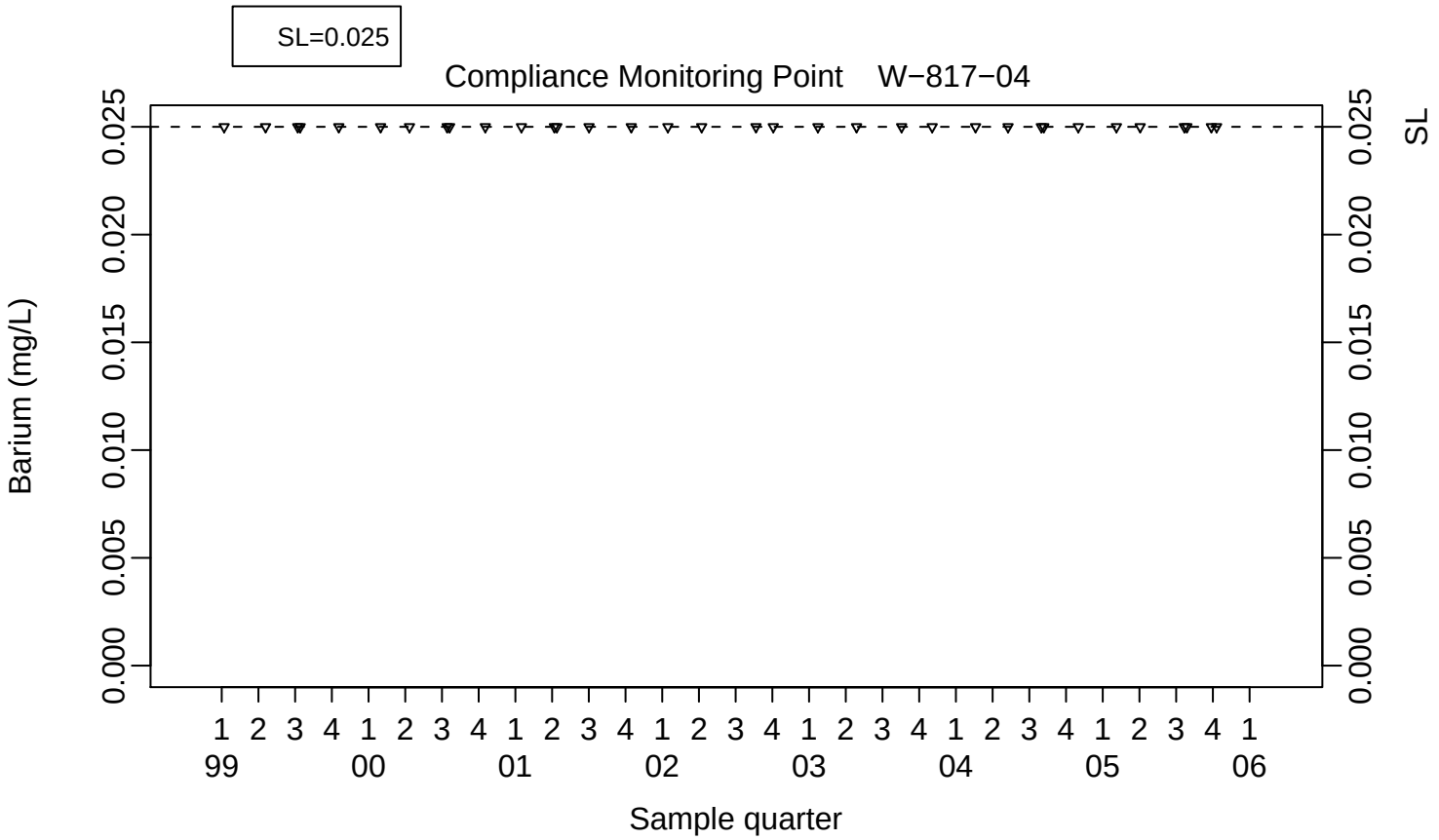

Surface Impoundments Ground Water
Arsenic (mg/L)
SL=0.072
Above RL
Below RL
Compliance Monitoring Point W−817−03
Arsenic (mg/L)
SL
0.00
0.02
0.04
0.06
0.08
0.10
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

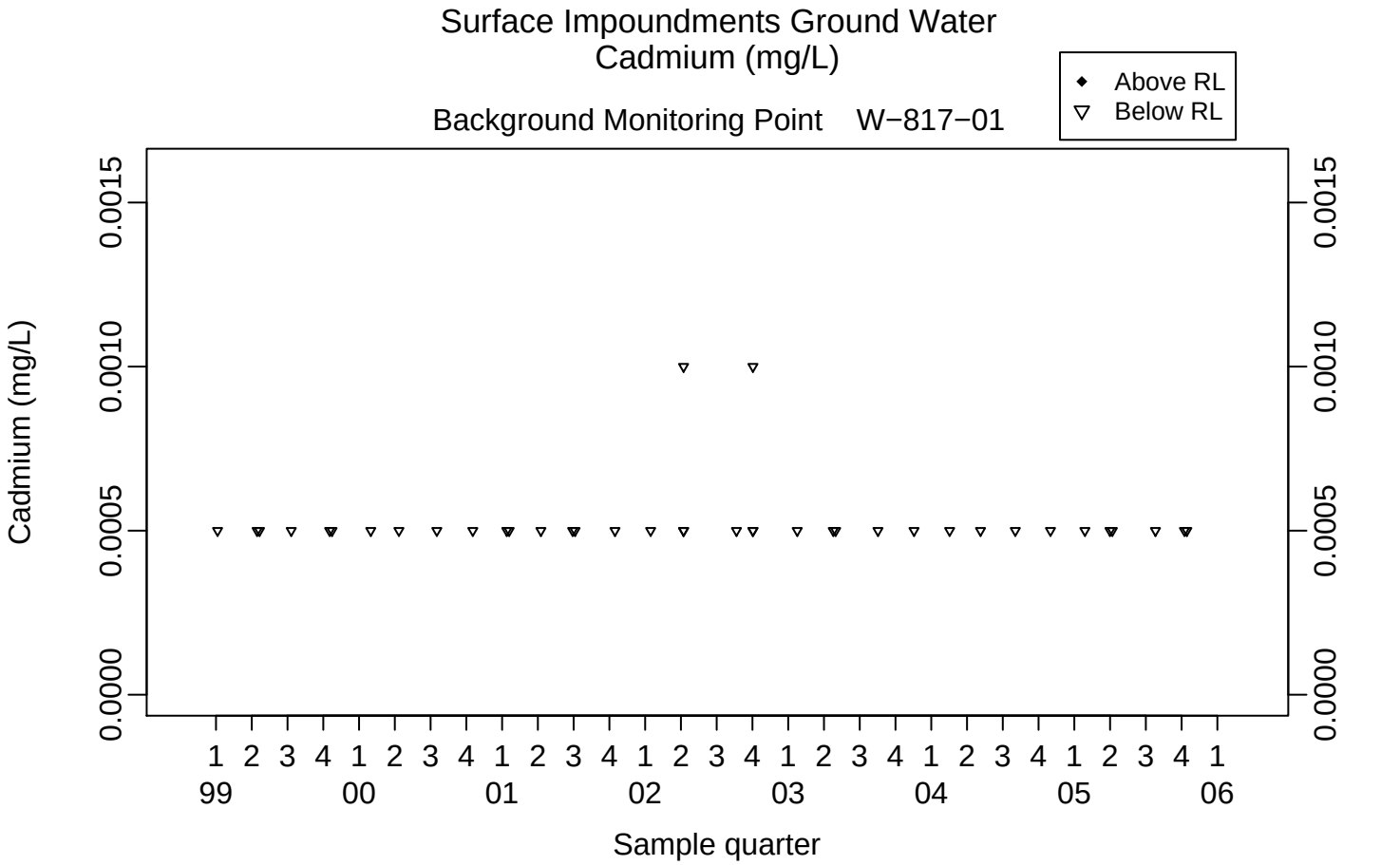

SL=0.077
Compliance Monitoring Point W−817−04
Arsenic (mg/L)
SL
0.00
0.02
0.04
0.06
0.08
0.10
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

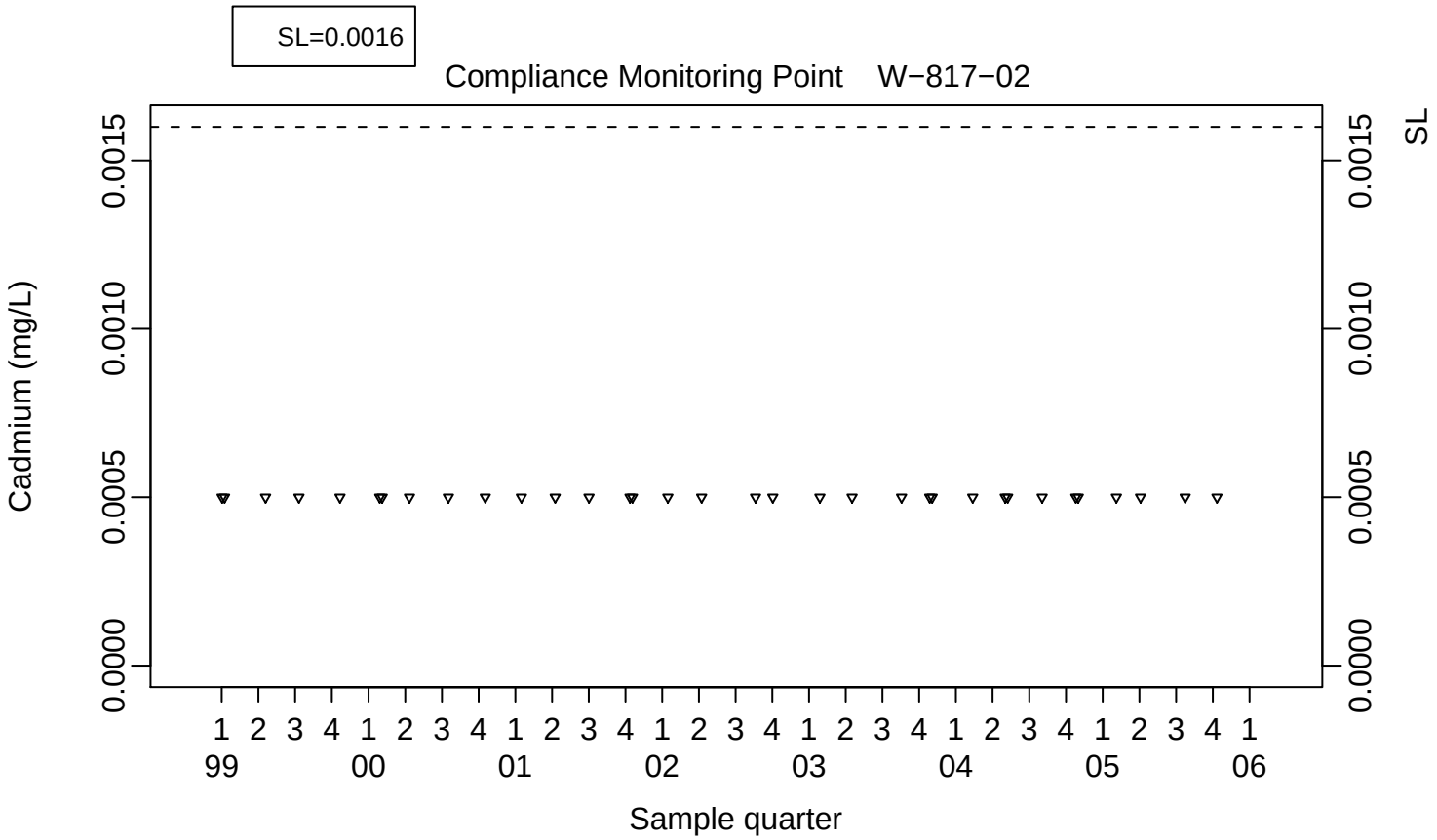

Surface Impoundments Ground Water
Barium (mg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Barium (mg/L)
0.000
0.005
0.010
0.015
0.020
0.025
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

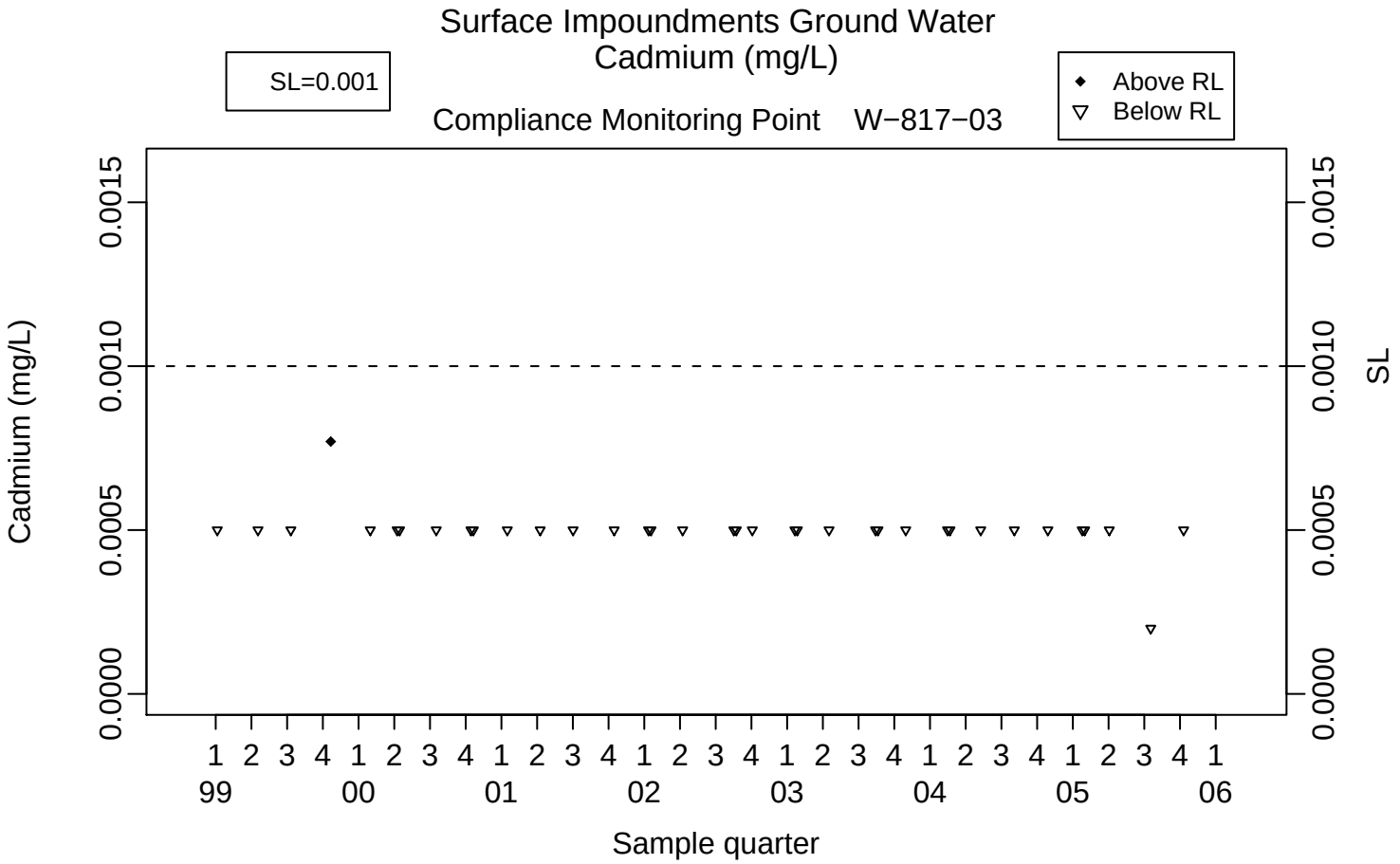

SL=0.025
Compliance Monitoring Point W−817−02
Barium (mg/L)
SL
0.000
0.005
0.010
0.015
0.020
0.025
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

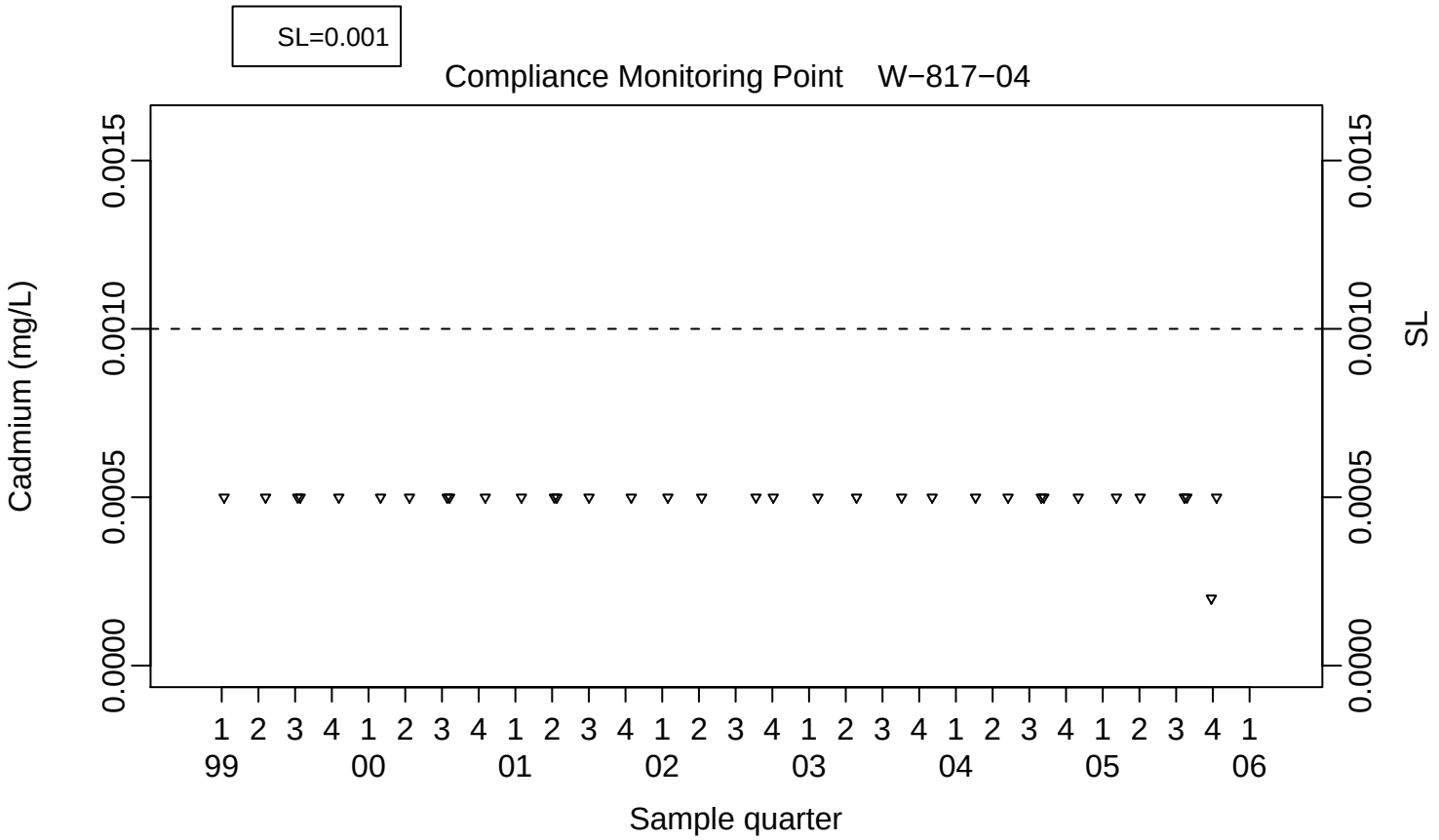

Surface Impoundments Ground Water
Barium (mg/L)
SL=0.025
Above RL
Below RL
Compliance Monitoring Point W−817−03
Barium (mg/L)
0.000
0.005
0.010
0.015
0.020
0.025
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

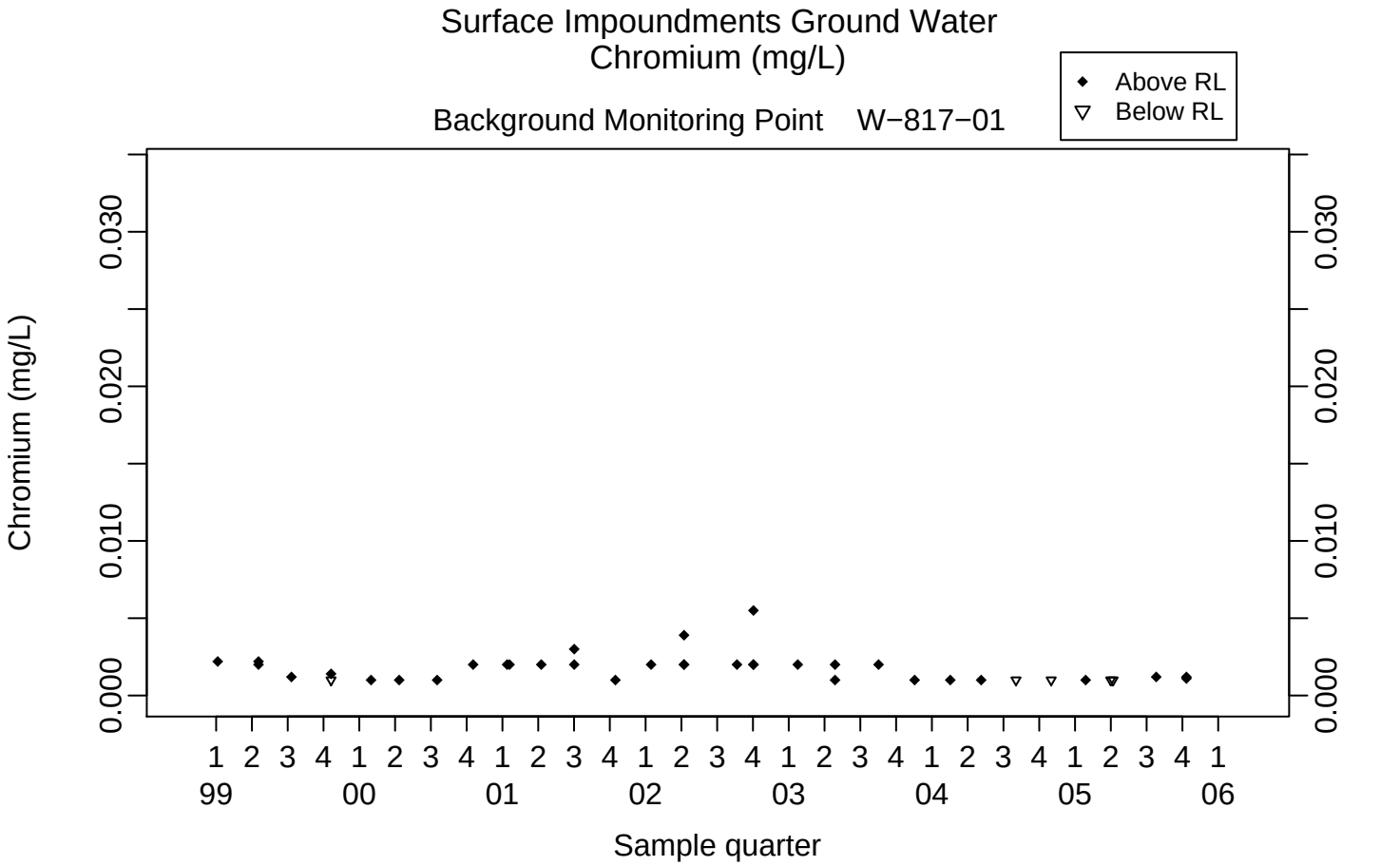

SL=0.025
Compliance Monitoring Point W−817−04
Barium (mg/L)
0.000
0.005
0.010
0.015
0.020
0.025
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

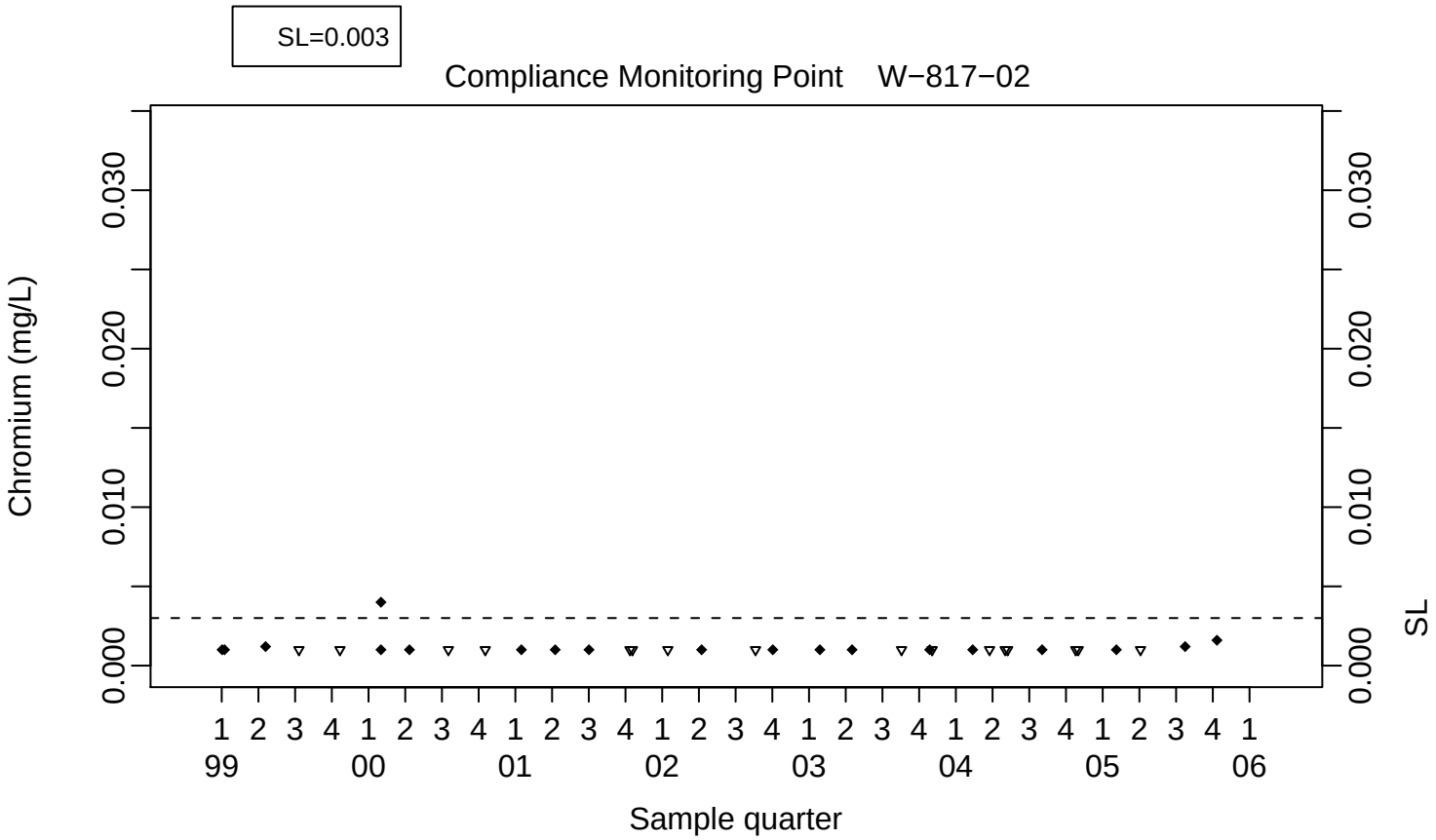

Surface Impoundments Ground Water
Cadmium (mg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Cadmium (mg/L)
0.0000
0.0005
0.0010
0.0015
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

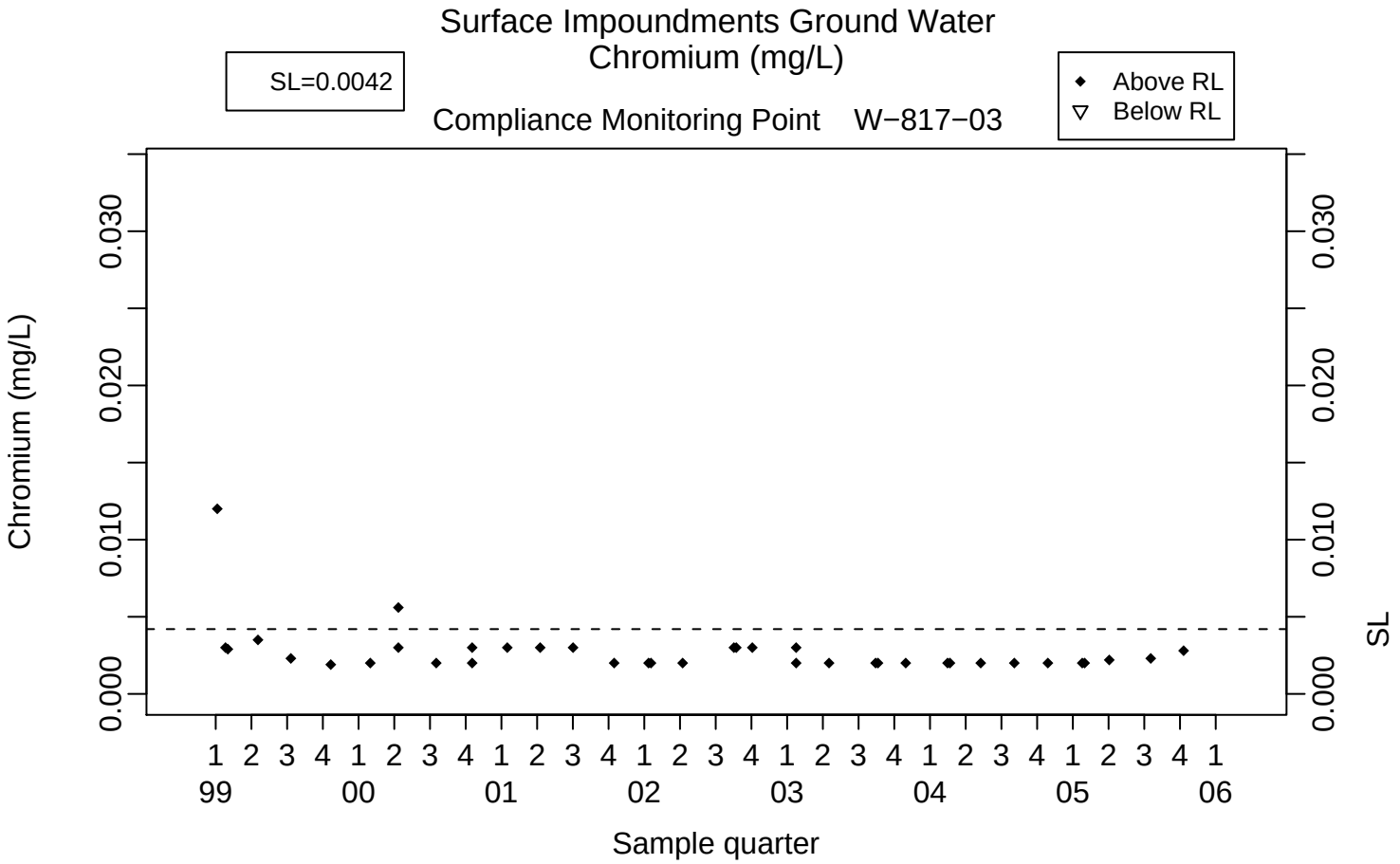

SL=0.0016
Compliance Monitoring Point W−817−02
SL
Cadmium (mg/L)
0.0000
0.0005
0.0010
0.0015
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

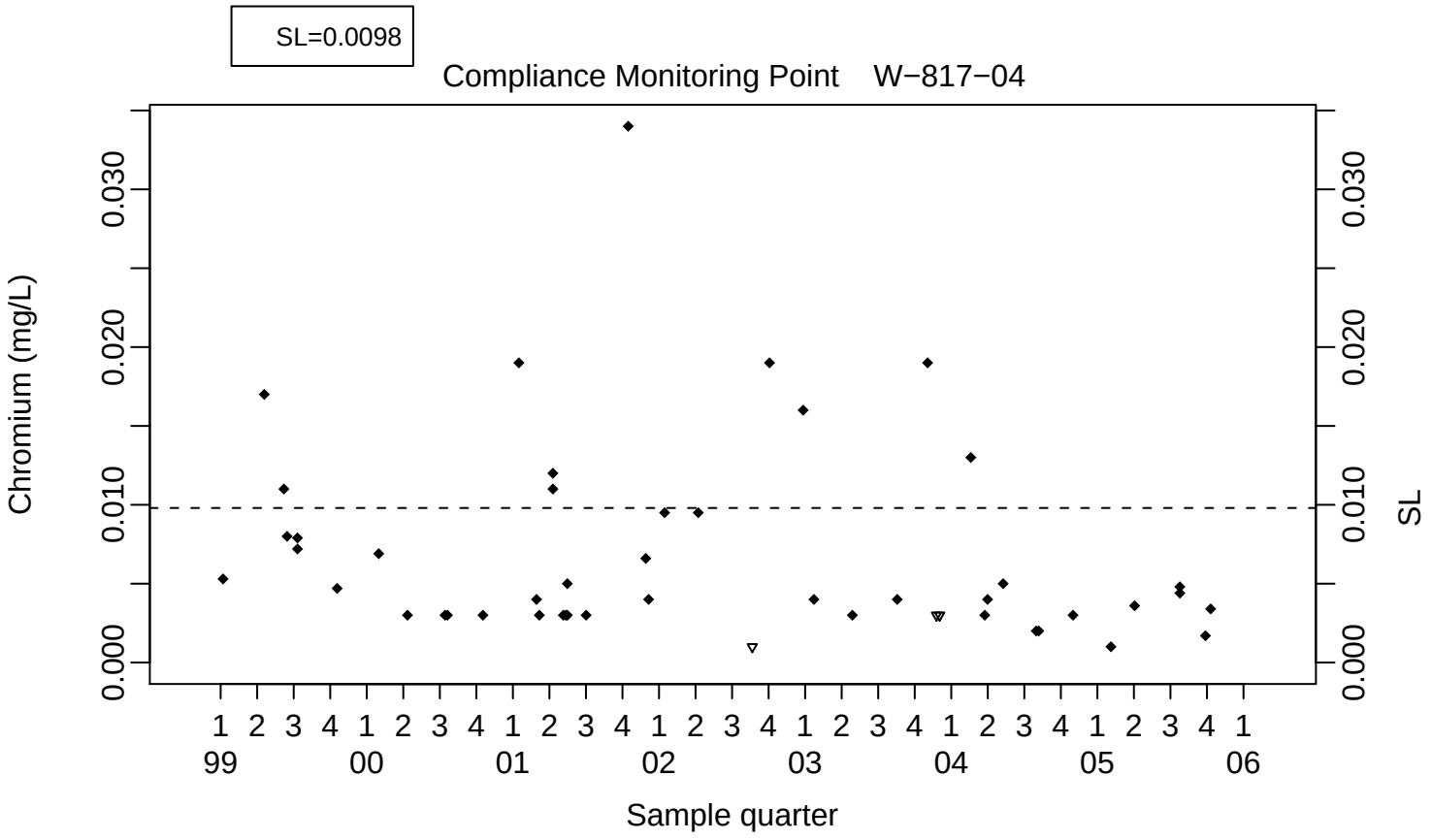

Surface Impoundments Ground Water
Cadmium (mg/L)
SL=0.001
Above RL
Below RL
Compliance Monitoring Point W−817−03
Cadmium (mg/L)
0.0000
0.0005
0.0010
0.0015
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

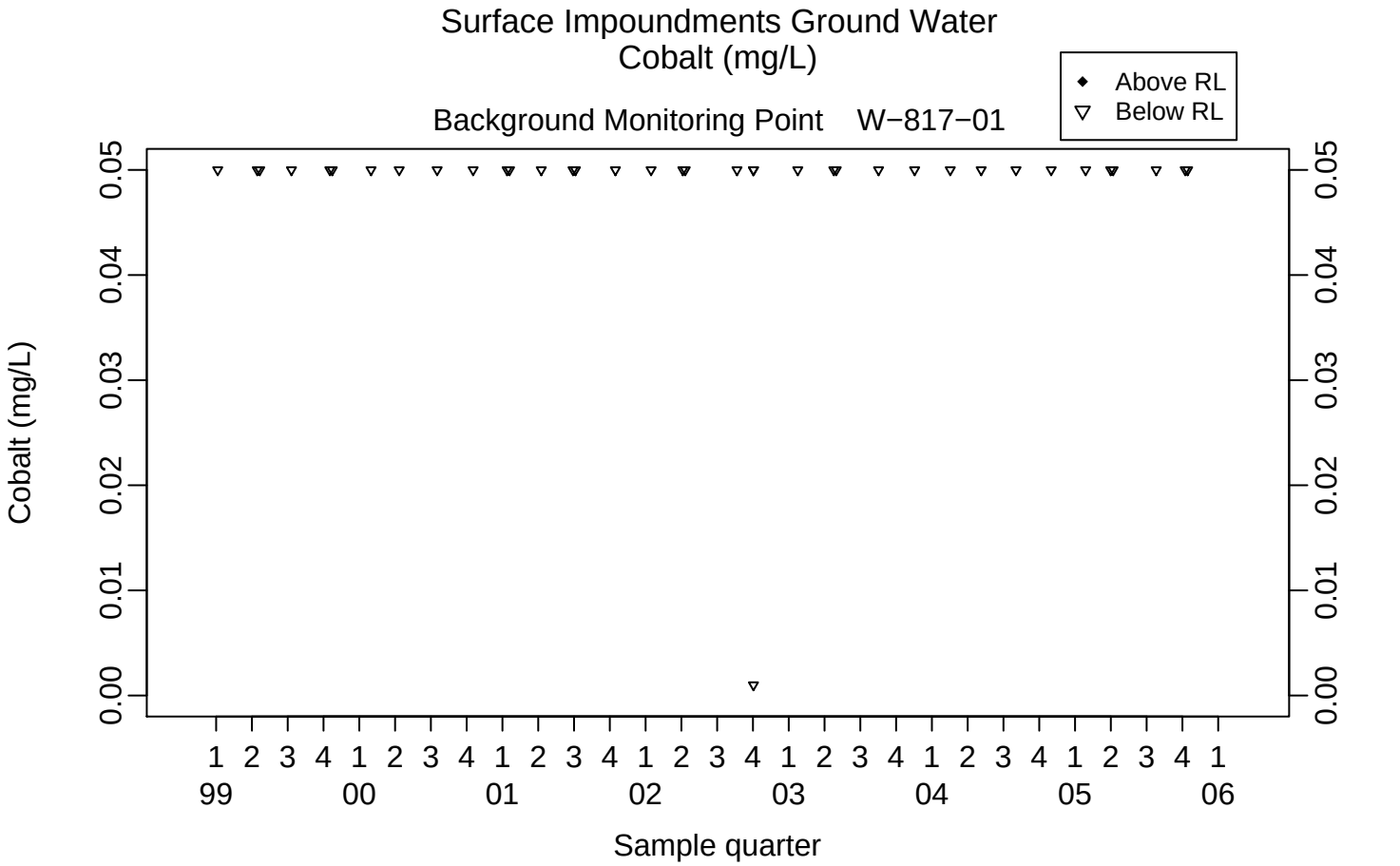

SL=0.001
Compliance Monitoring Point W−817−04
Cadmium (mg/L)
0.0000
0.0005
0.0010
0.0015
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

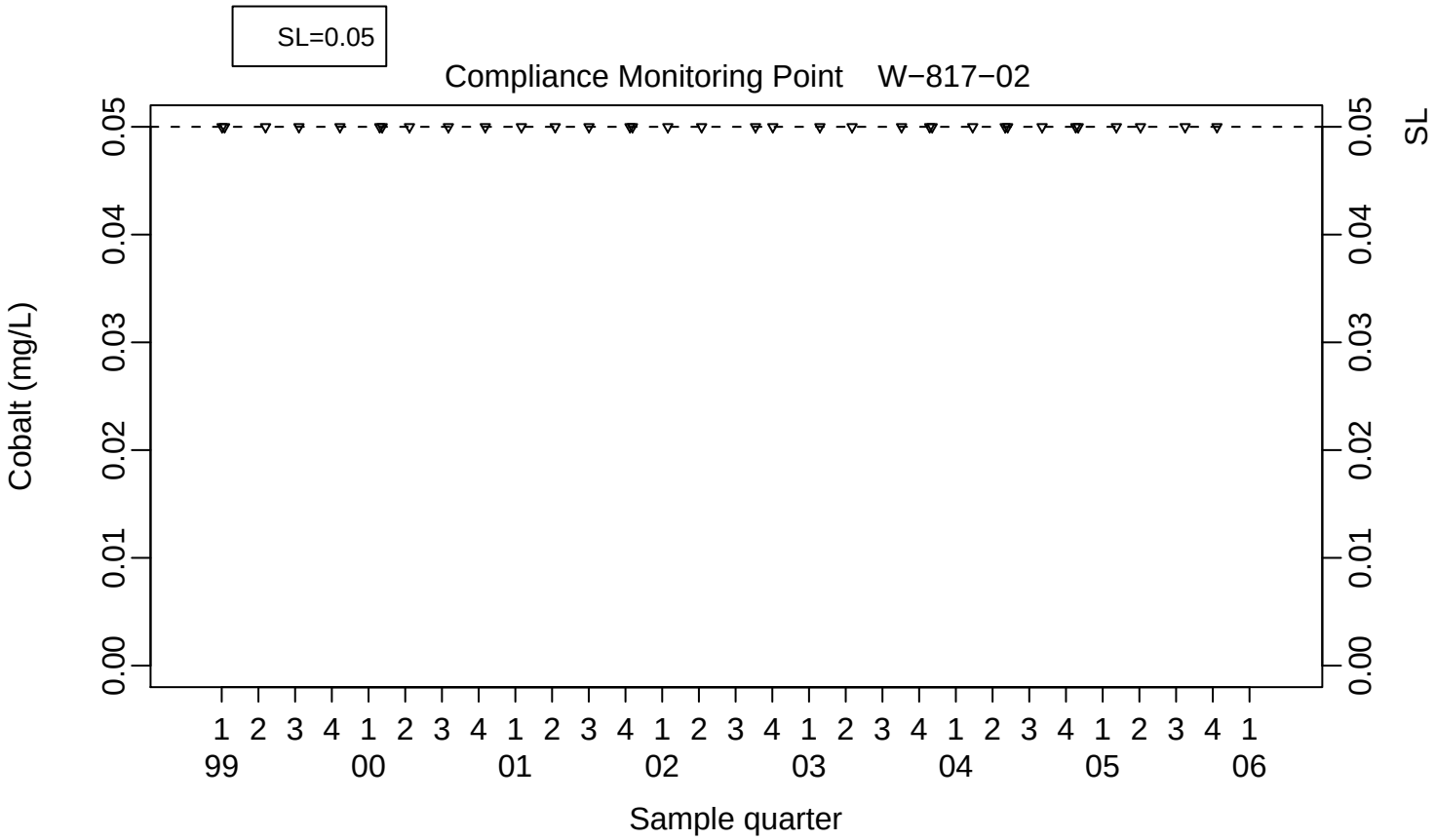

Surface Impoundments Ground Water
Chromium (mg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Chromium (mg/L)
0.000
0.010
0.020
0.030
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

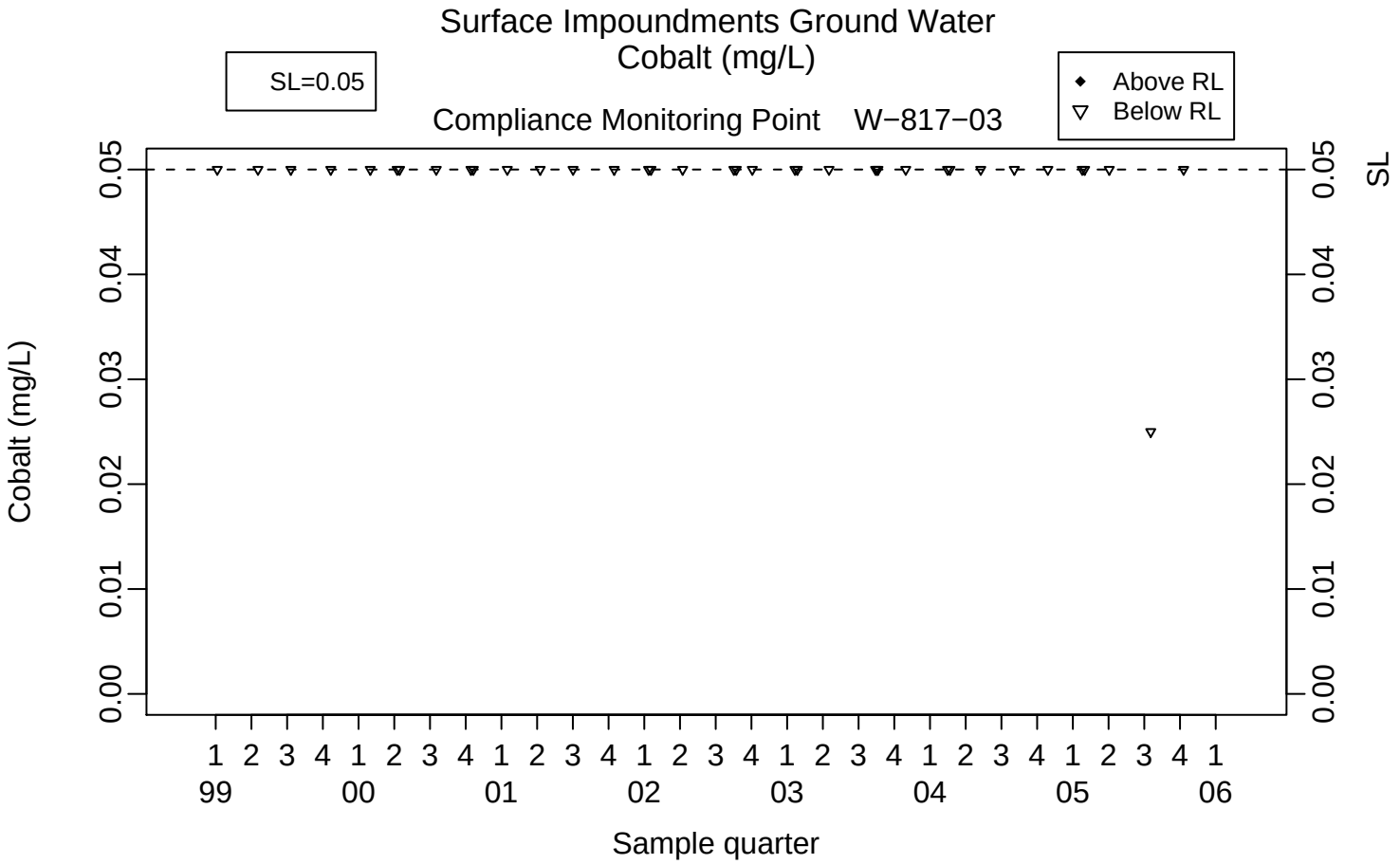

SL=0.003
Compliance Monitoring Point W−817−02
Chromium (mg/L)
0.000
0.010
0.020
0.030
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

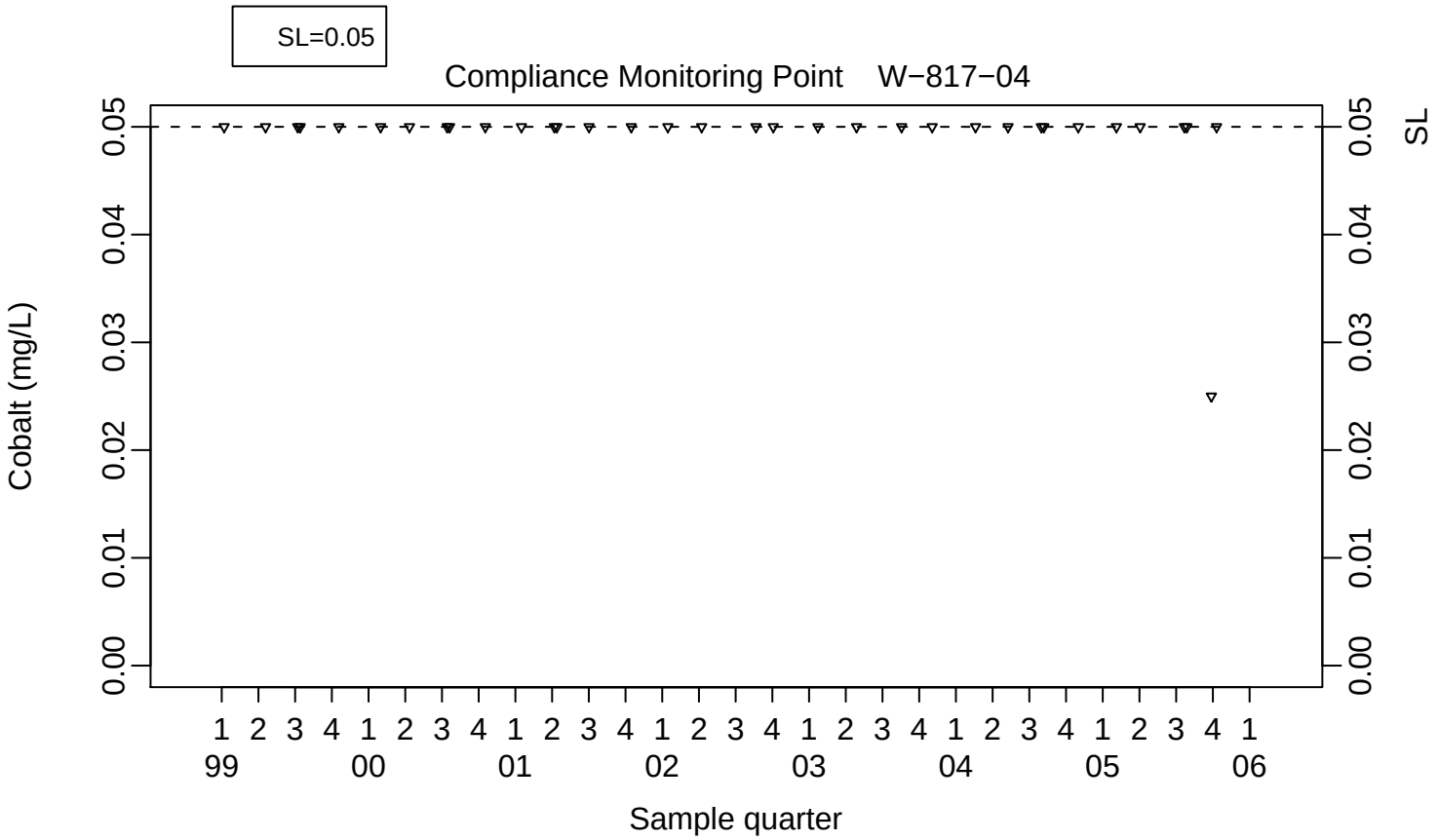

Surface Impoundments Ground Water
Chromium (mg/L)
SL=0.0042
Above RL
Below RL
Compliance Monitoring Point W−817−03
Chromium (mg/L)
0.000
0.010
0.020
0.030
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

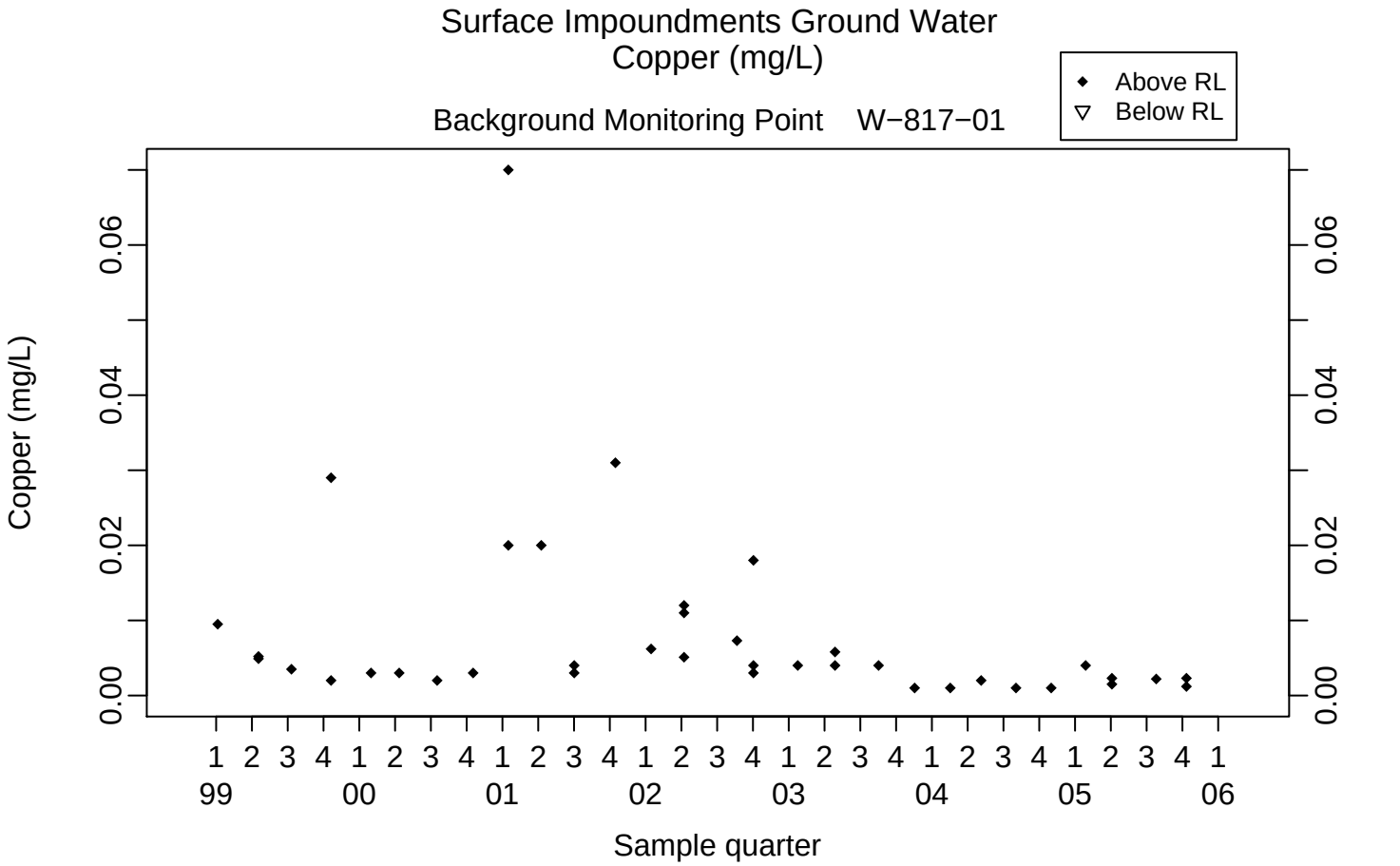

SL=0.0098
Compliance Monitoring Point W−817−04
Chromium (mg/L)
0.000
0.010
0.020
0.030
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

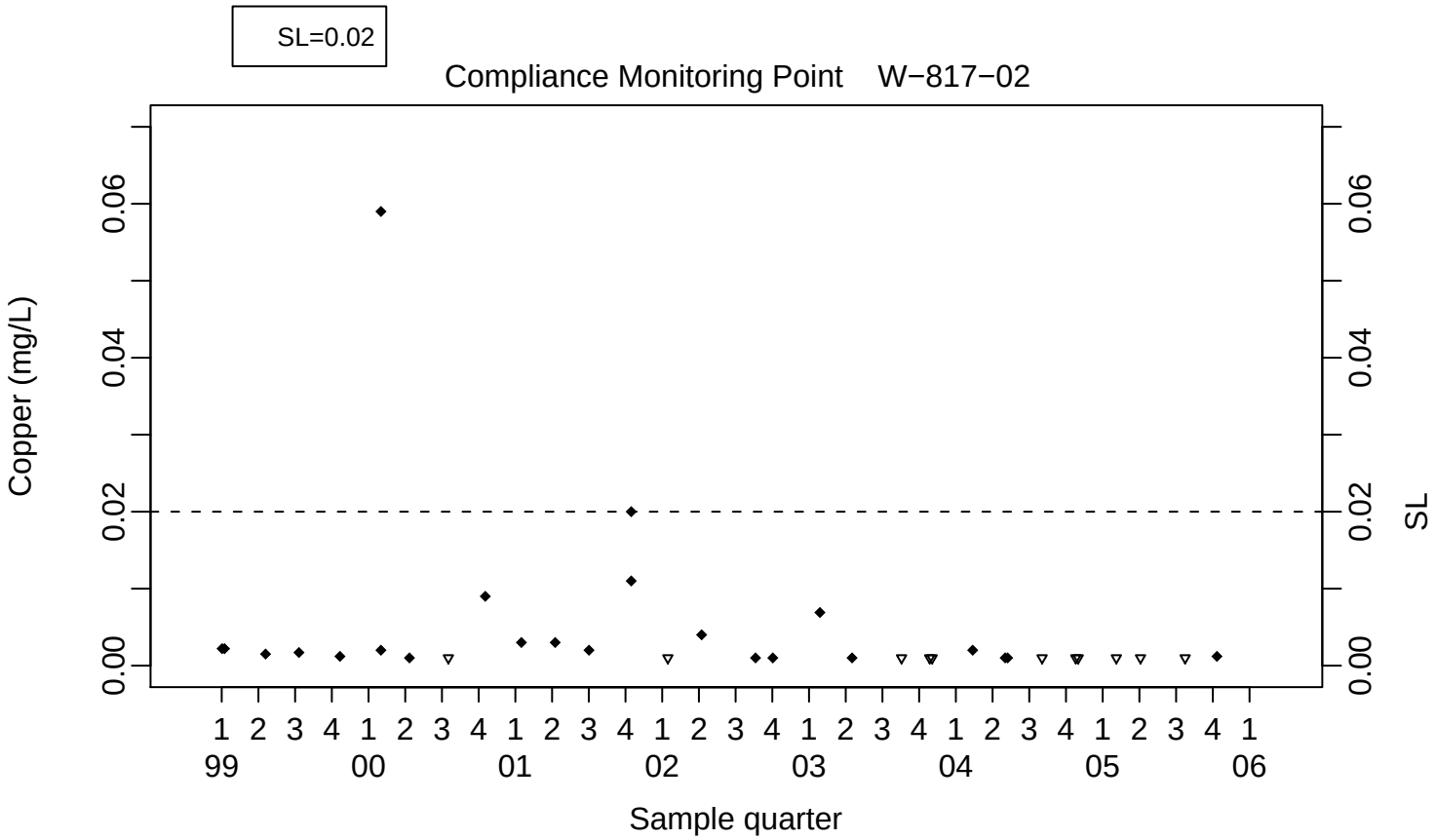

Surface Impoundments Ground Water
Cobalt (mg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Cobalt (mg/L)
0.00
0.01
0.02
0.03
0.04
0.05
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

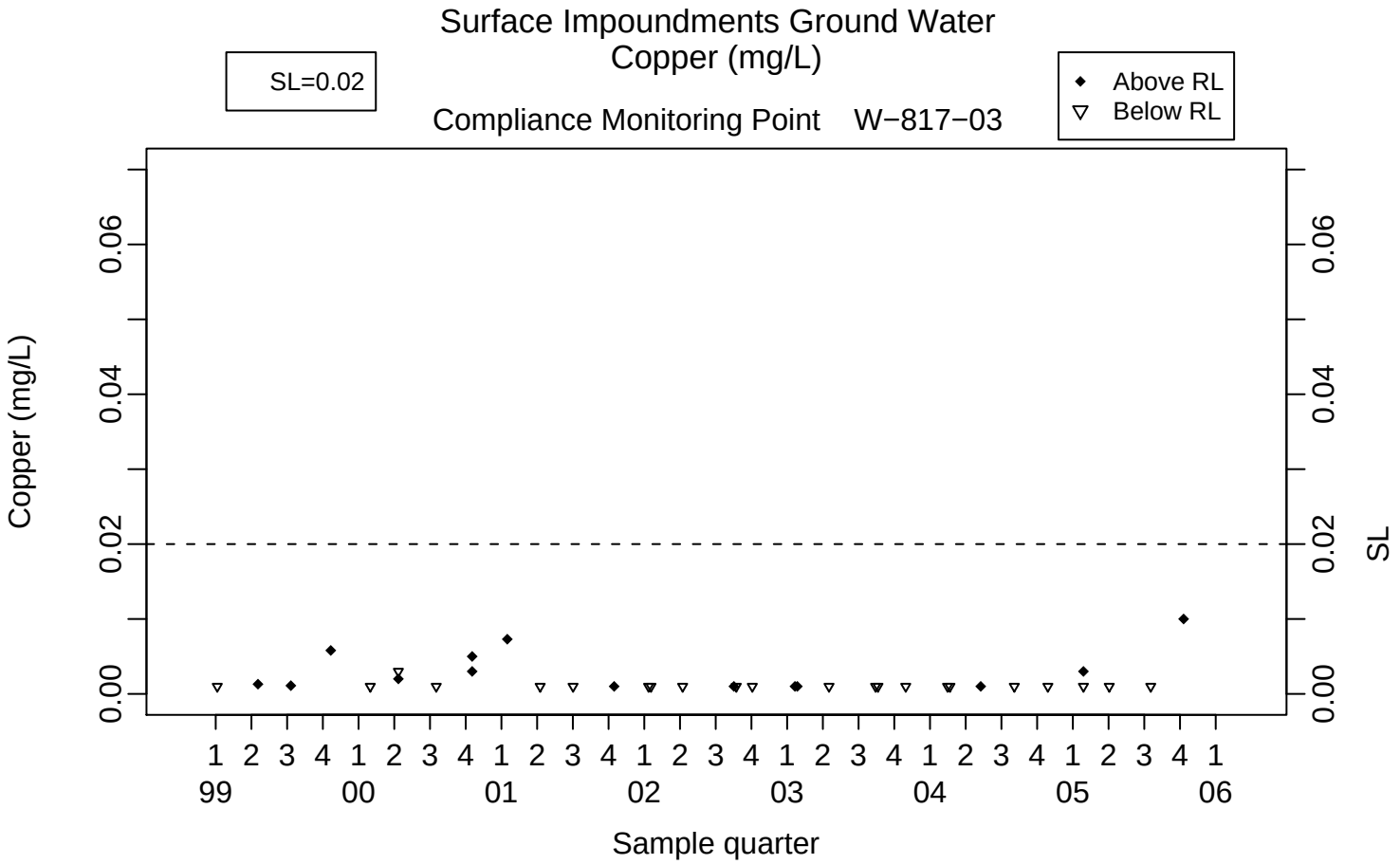

SL=0.05
Compliance Monitoring Point W−817−02
Cobalt (mg/L)
SL
0.00
0.01
0.02
0.03
0.04
0.05
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

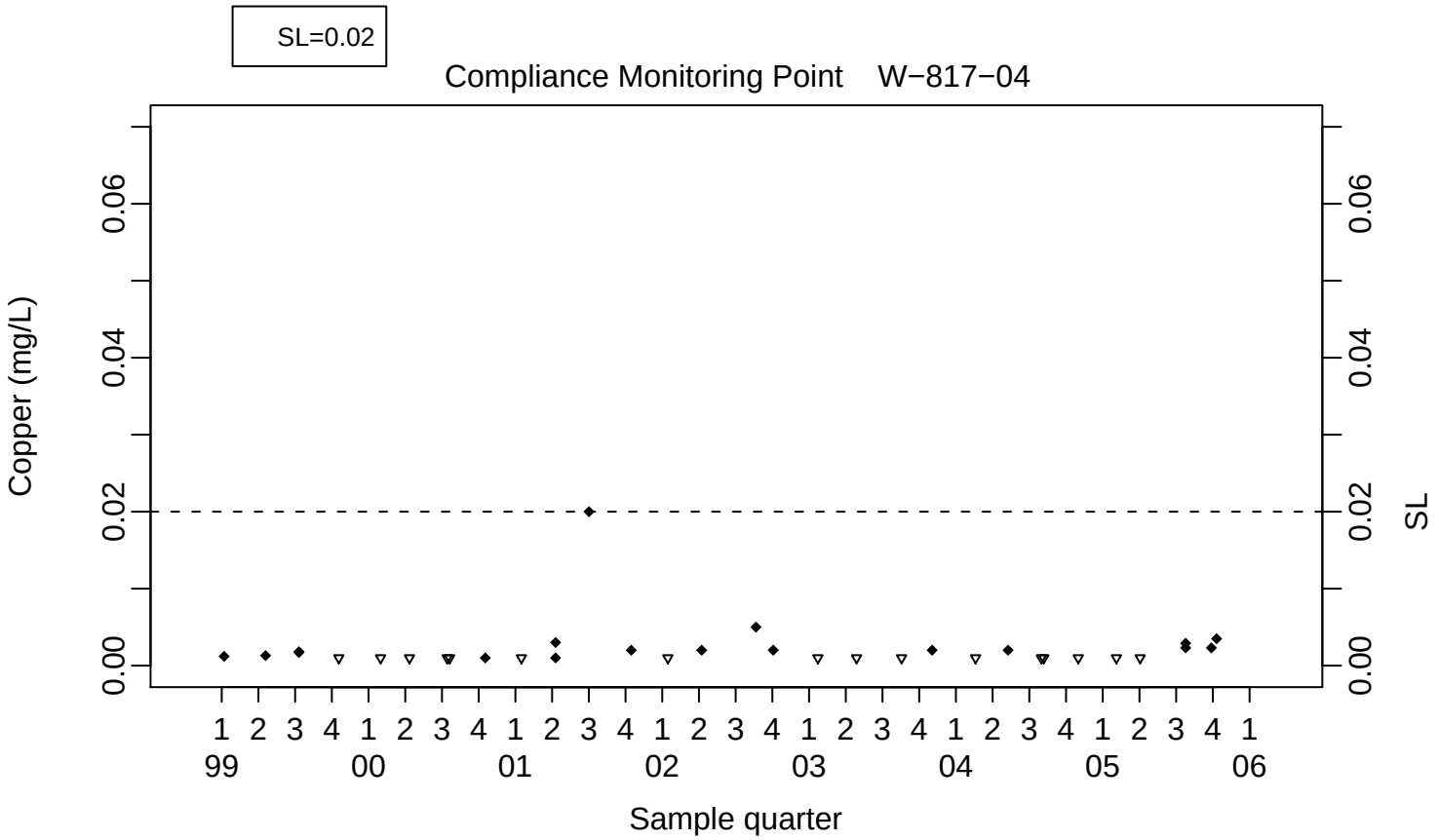

Surface Impoundments Ground Water
Cobalt (mg/L)
SL=0.05
Above RL
Below RL
Compliance Monitoring Point W−817−03
Cobalt (mg/L)
SL
0.00
0.01
0.02
0.03
0.04
0.05
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

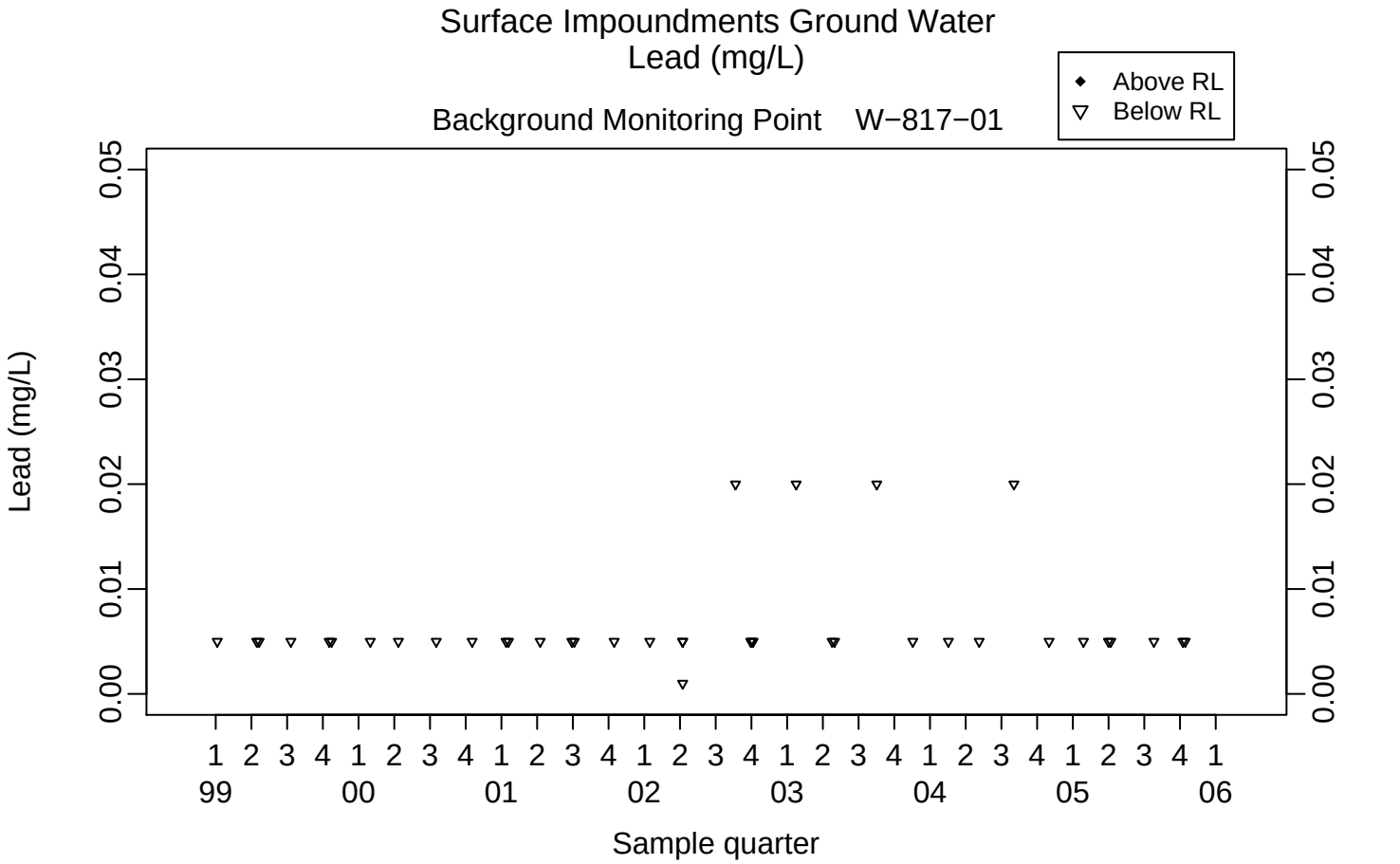

SL=0.05
Compliance Monitoring Point W−817−04
Cobalt (mg/L)
SL
0.00
0.01
0.02
0.03
0.04
0.05
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

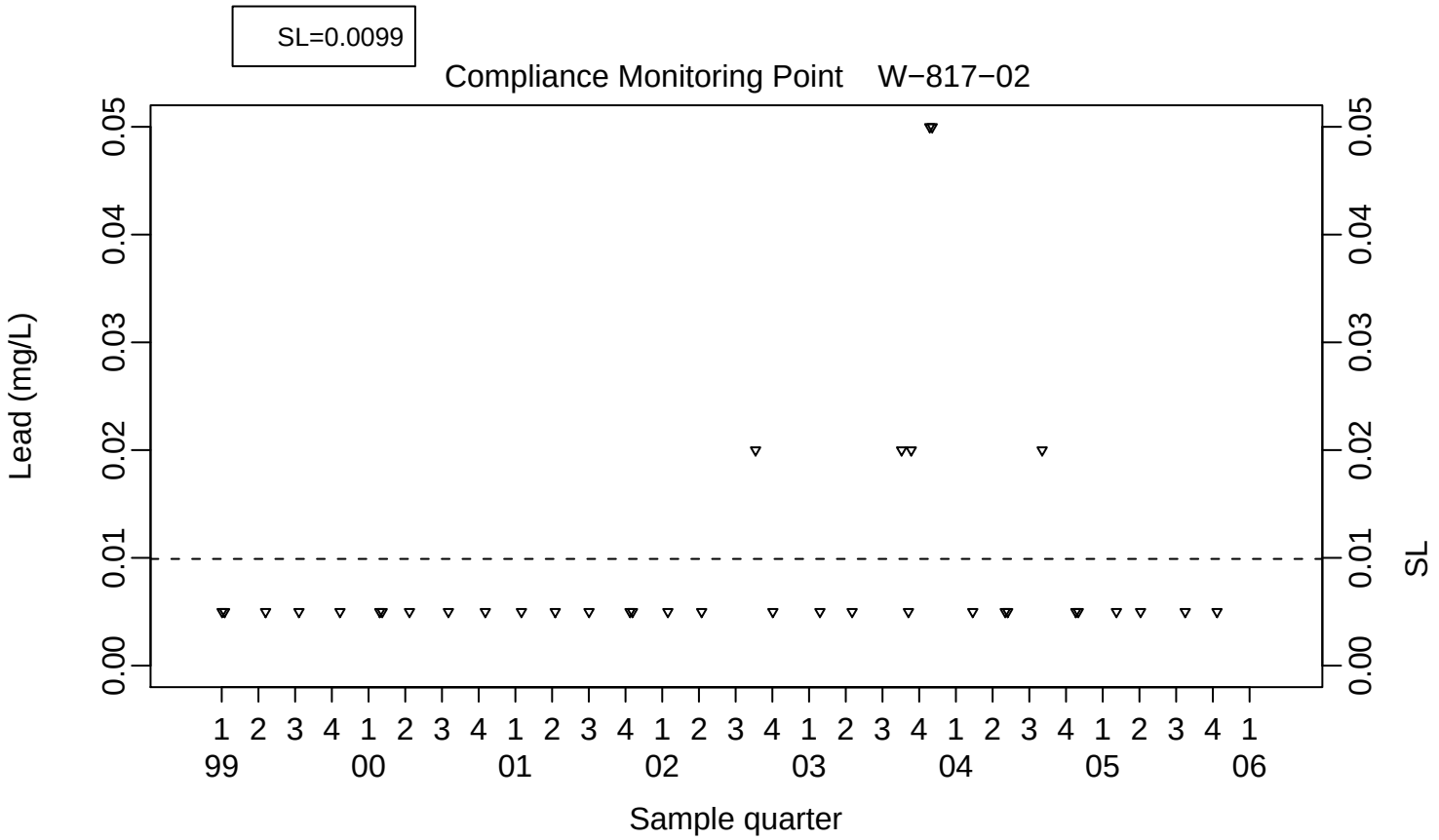

Surface Impoundments Ground Water
Copper (mg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Copper (mg/L)
0.00
0.02
0.04
0.06
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

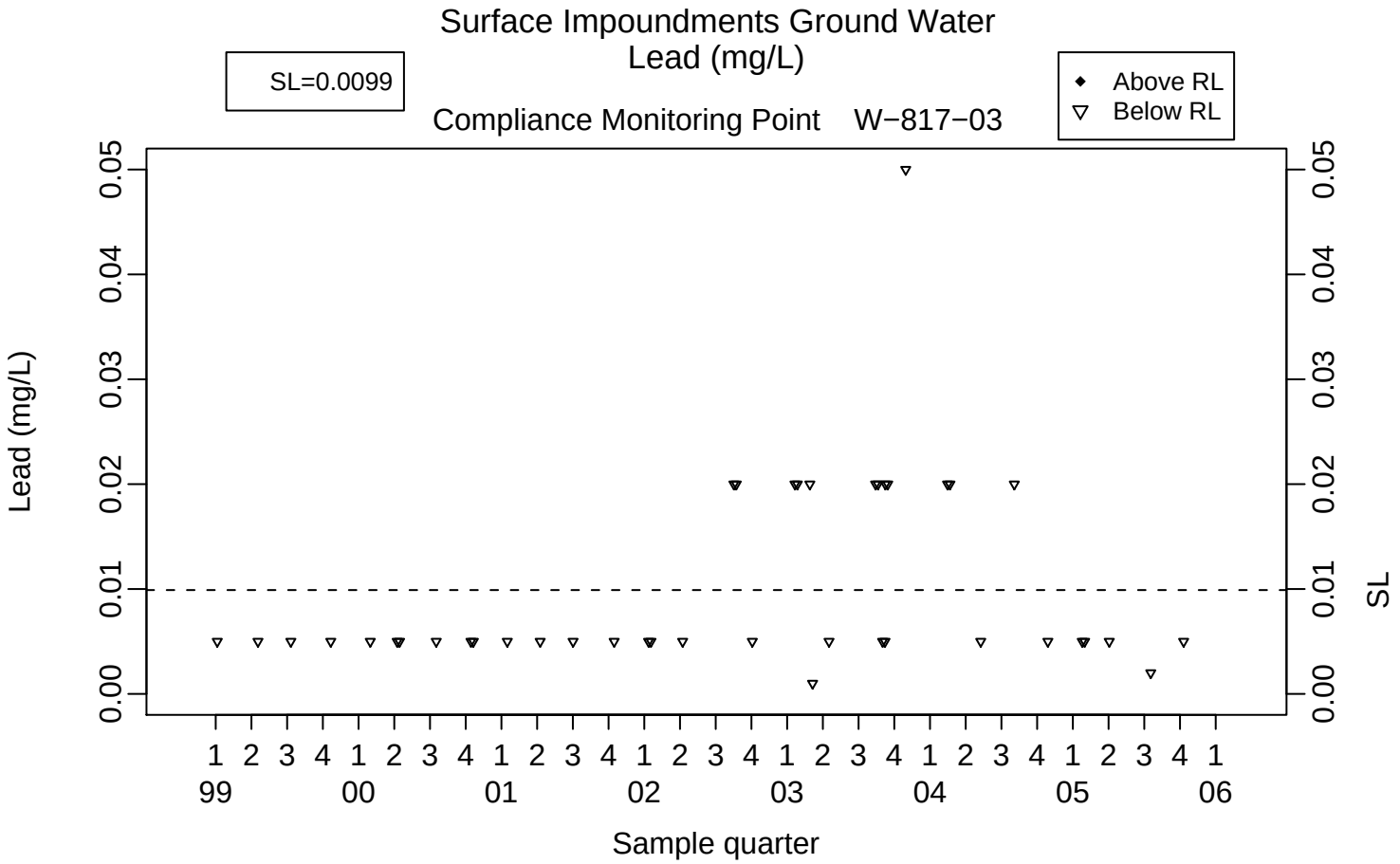

SL=0.02
Compliance Monitoring Point W−817−02
Copper (mg/L)
0.00
0.02
0.04
0.06
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

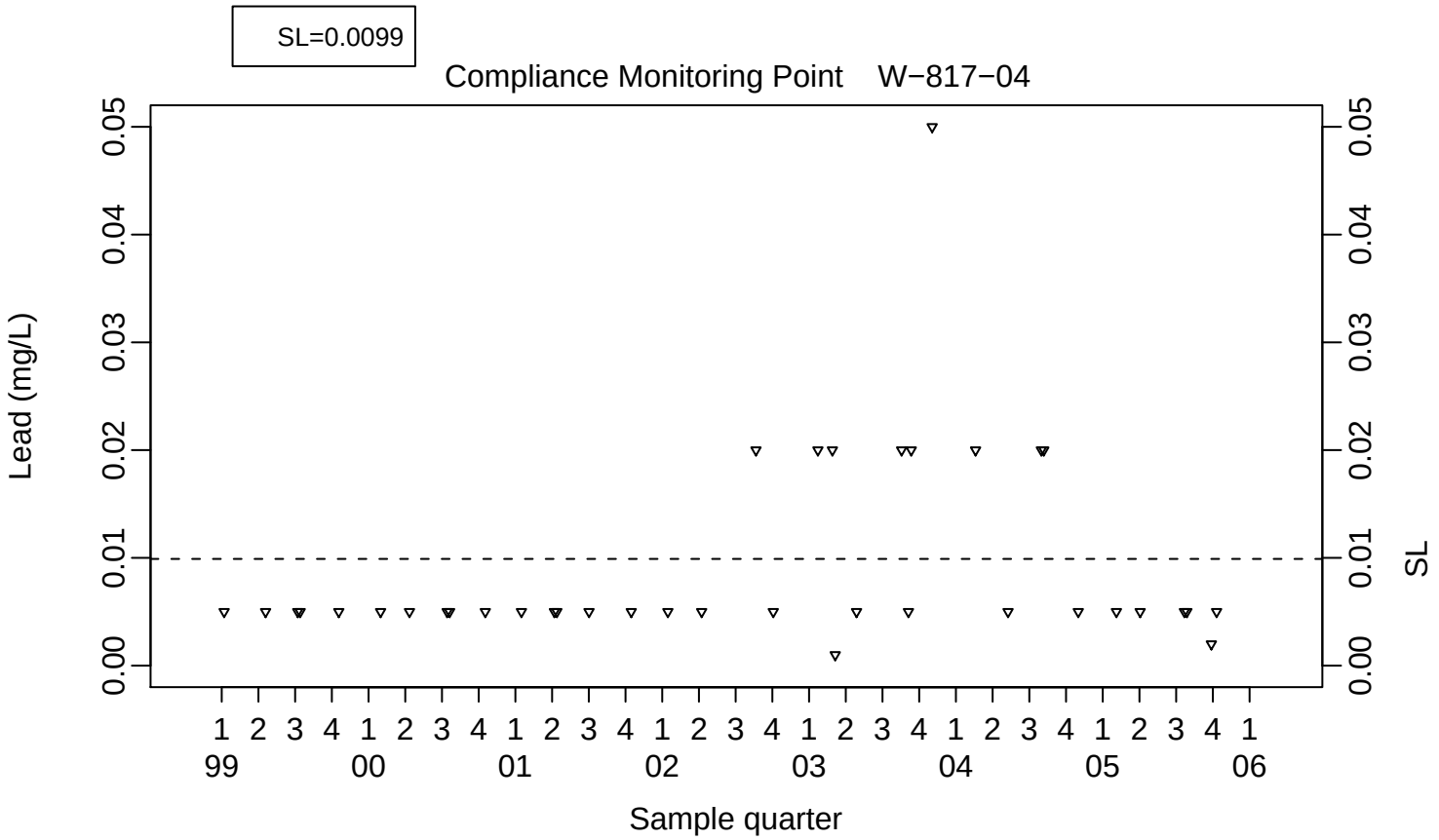

Surface Impoundments Ground Water
Copper (mg/L)
SL=0.02
Above RL
Below RL
Compliance Monitoring Point W−817−03
Copper (mg/L)
0.00
0.02
0.04
0.06
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

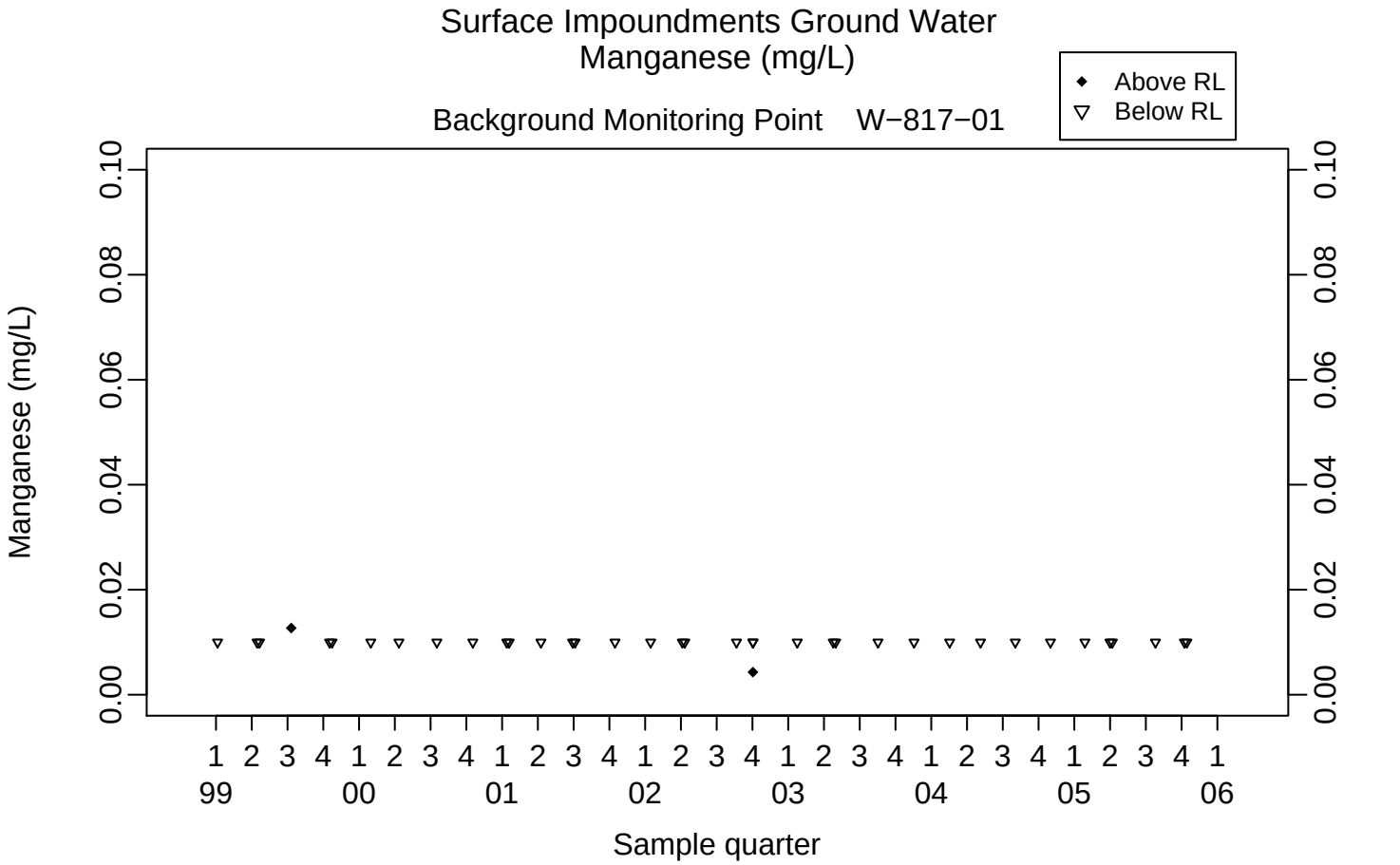

SL=0.02
Compliance Monitoring Point W−817−04
Copper (mg/L)
0.00
0.02
0.04
0.06
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

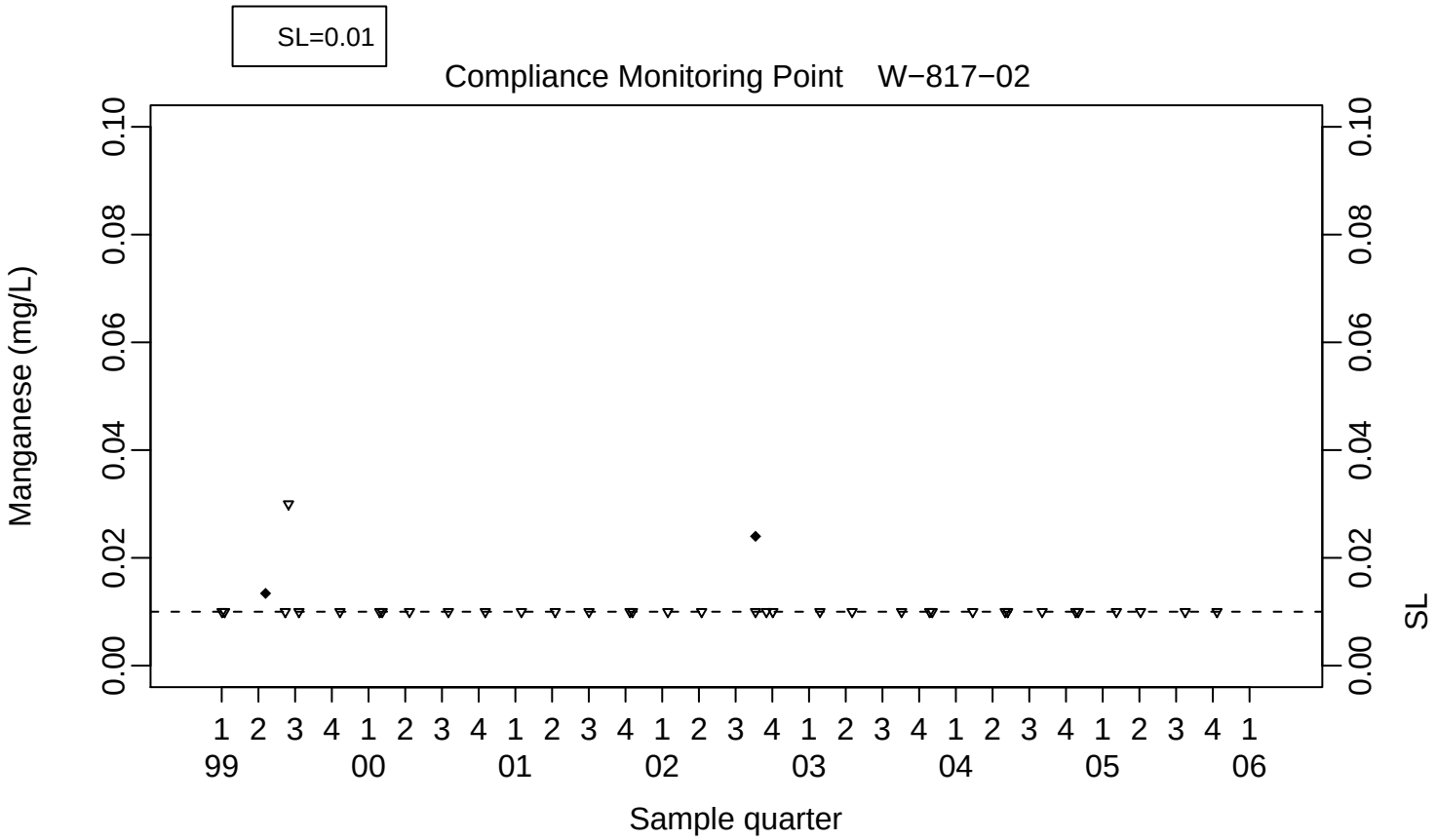

Surface Impoundments Ground Water
Lead (mg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Lead (mg/L)
0.00
0.01
0.02
0.03
0.04
0.05
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

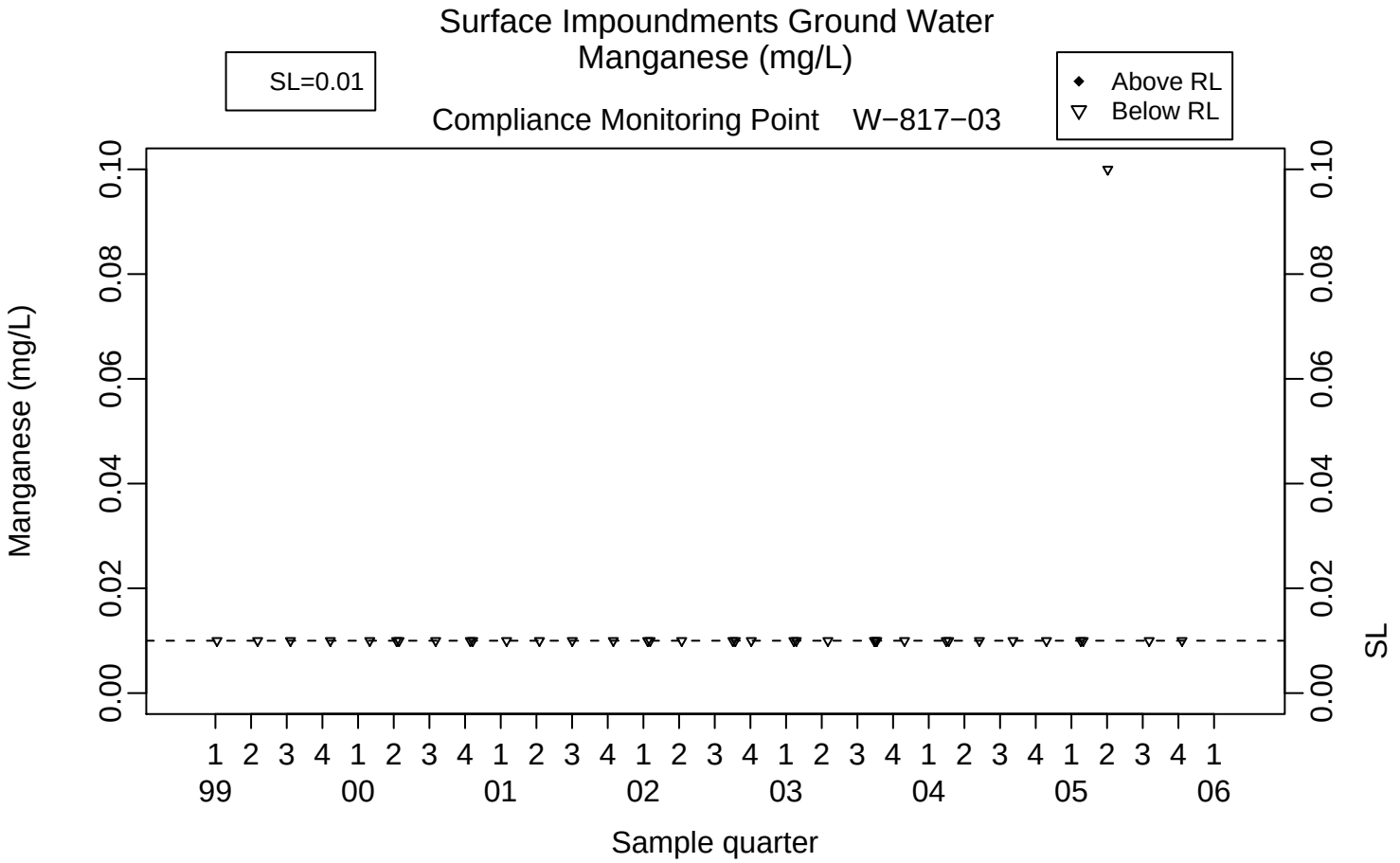

SL=0.0099
Compliance Monitoring Point W−817−02
Lead (mg/L)
0.00
0.01
0.02
0.03
0.04
0.05
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

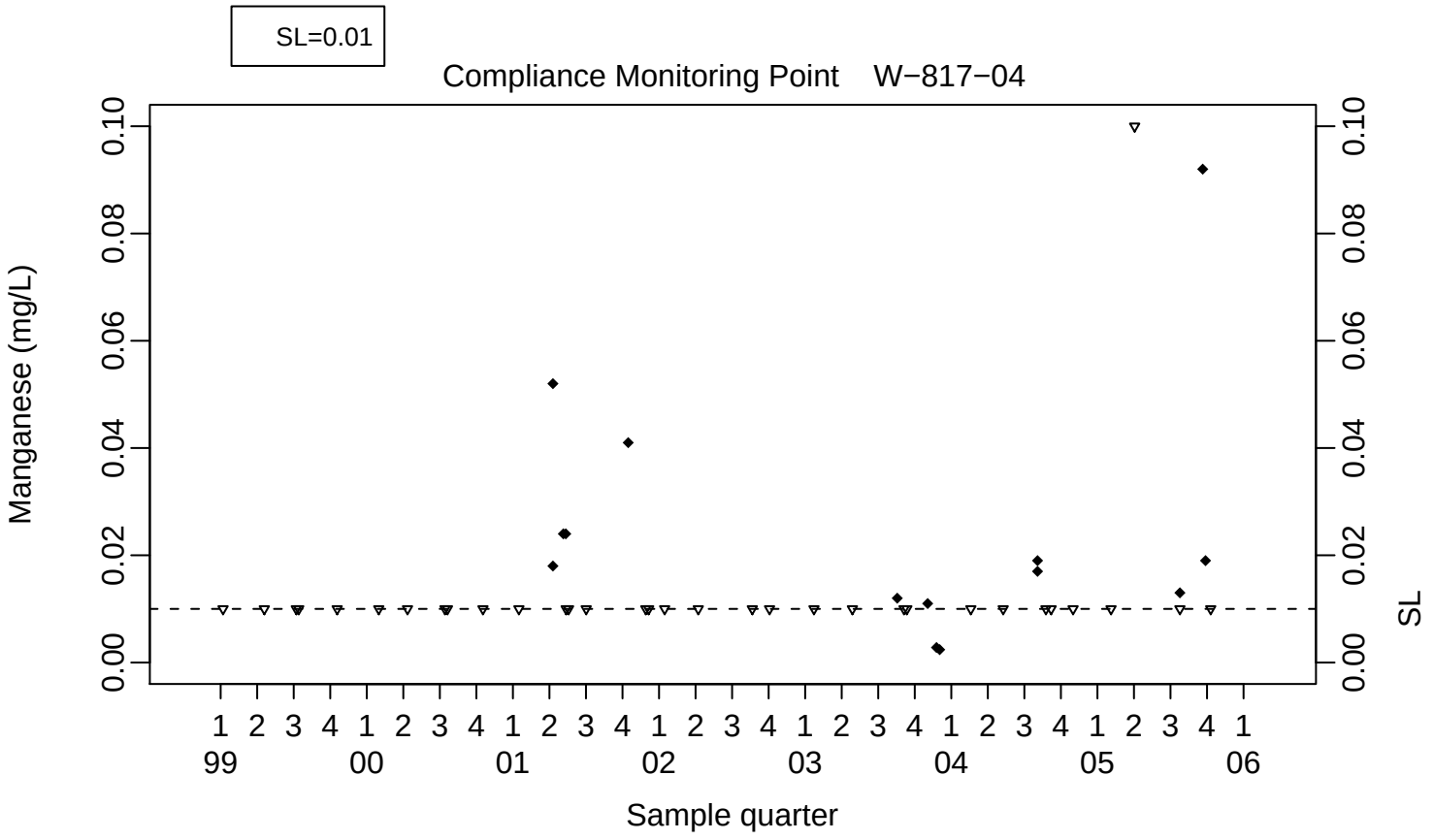

Surface Impoundments Ground Water
Lead (mg/L)
SL=0.0099
Above RL
Below RL
Compliance Monitoring Point W−817−03
Lead (mg/L)
0.00
0.01
0.02
0.03
0.04
0.05
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

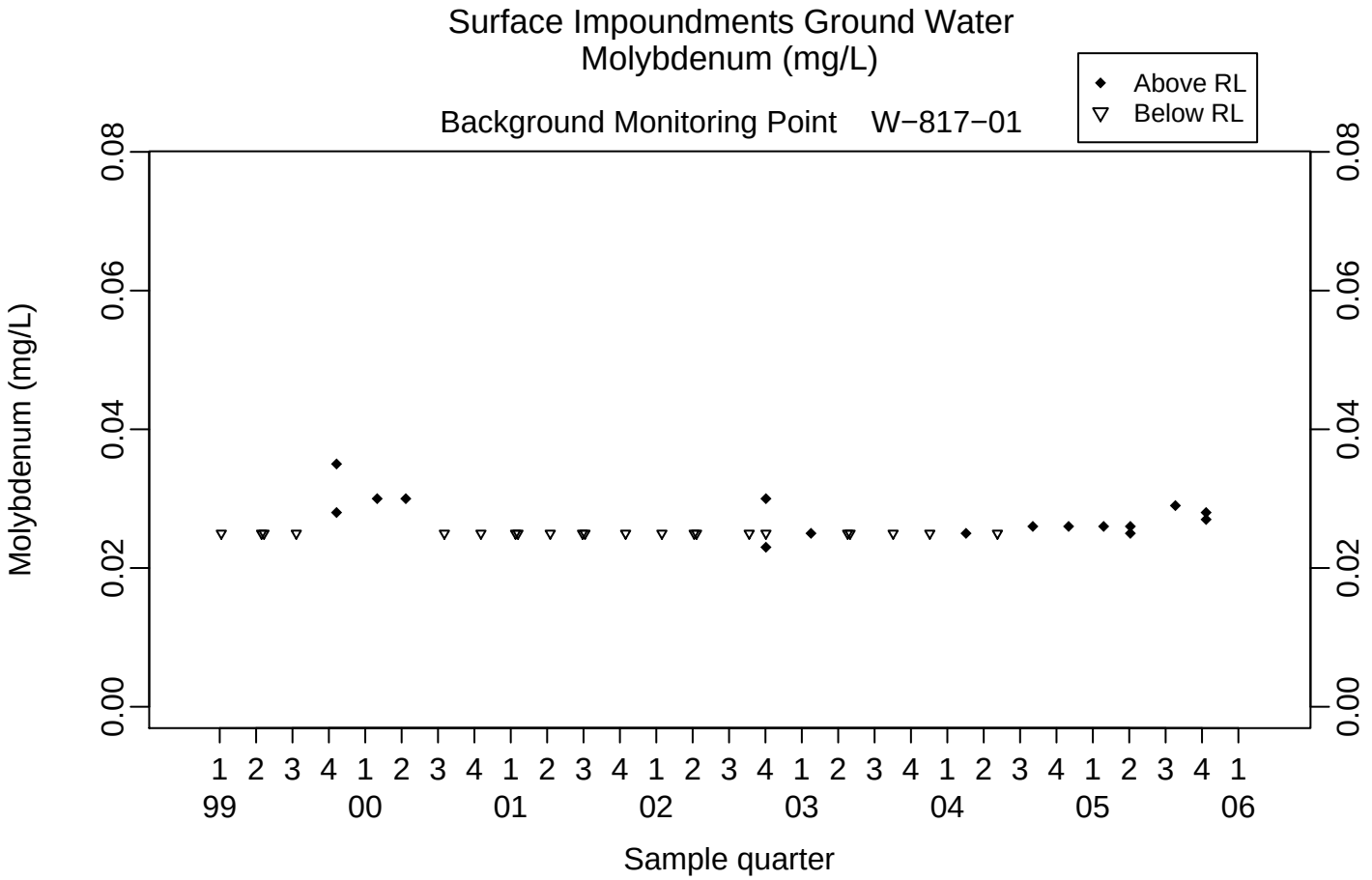

SL=0.0099
Compliance Monitoring Point W−817−04
Lead (mg/L)
0.00
0.01
0.02
0.03
0.04
0.05
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

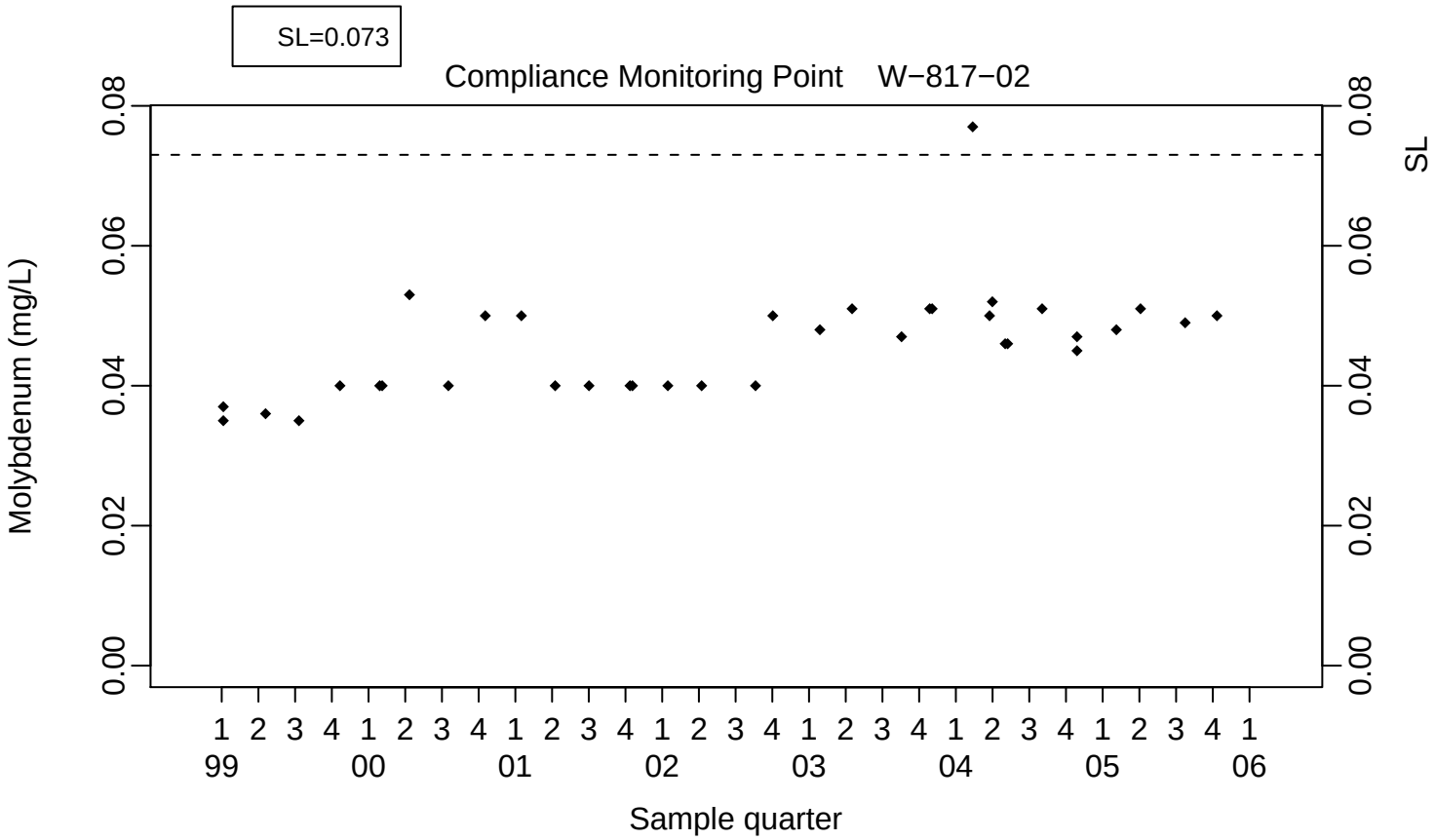

Surface Impoundments Ground Water
Manganese (mg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Manganese (mg/L)
0.00
0.02
0.04
0.06
0.08
0.10
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

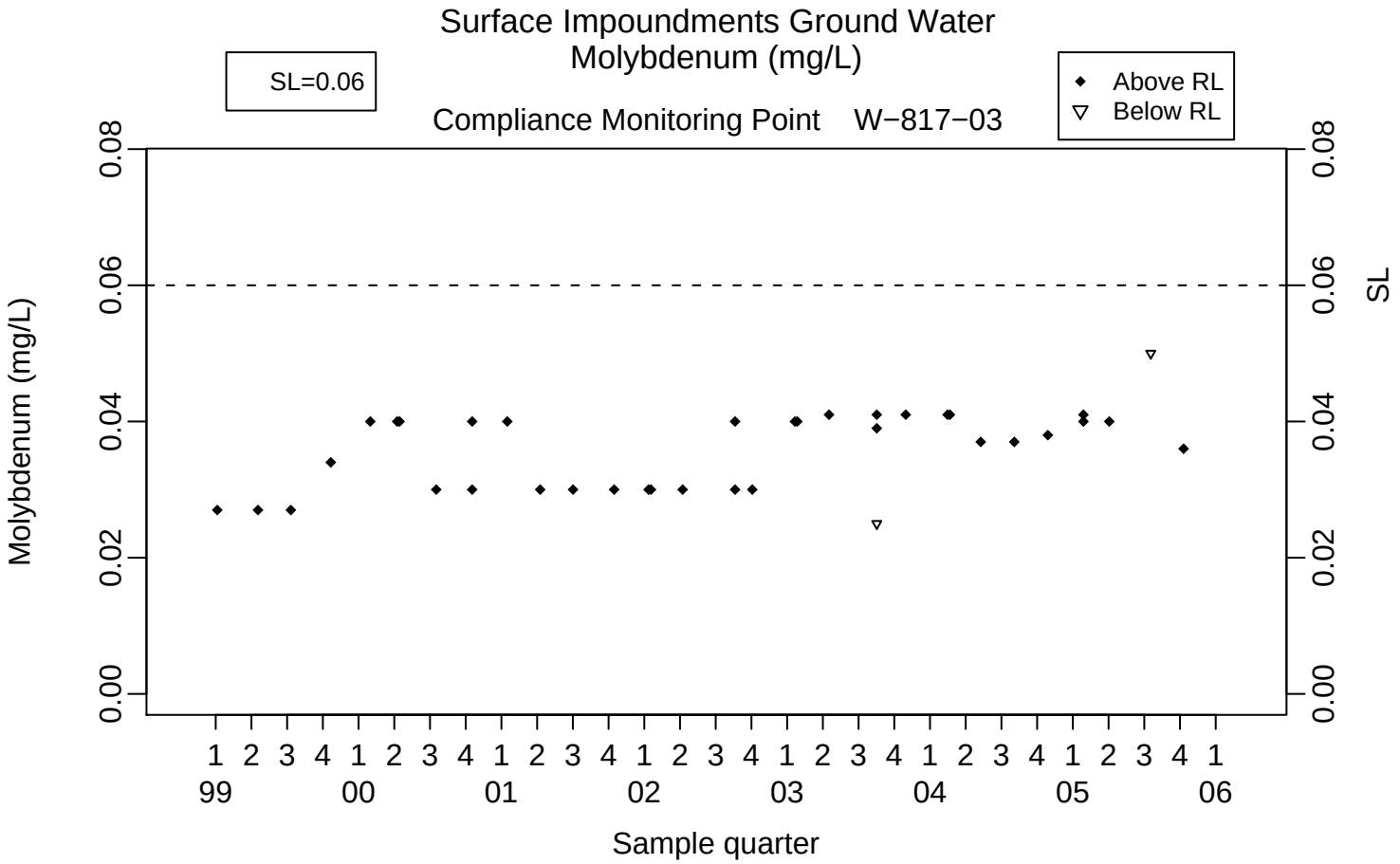

SL=0.01
Compliance Monitoring Point W−817−02
Manganese (mg/L)
0.00
0.02
0.04
0.06
0.08
0.10
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

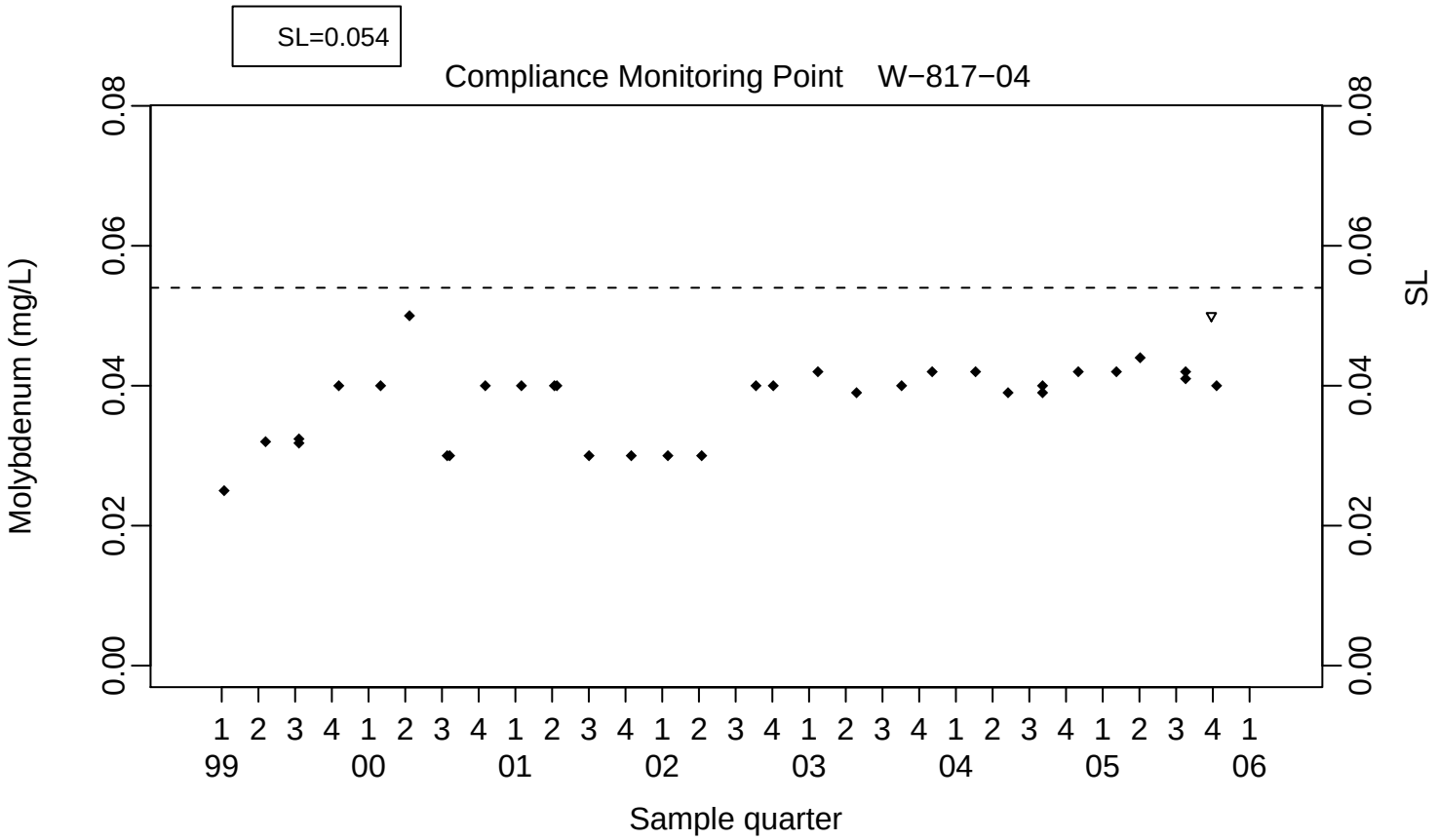

Surface Impoundments Ground Water
Manganese (mg/L)
SL=0.01
Above RL
Below RL
Compliance Monitoring Point W−817−03
Manganese (mg/L)
0.00
0.02
0.04
0.06
0.08
0.10
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

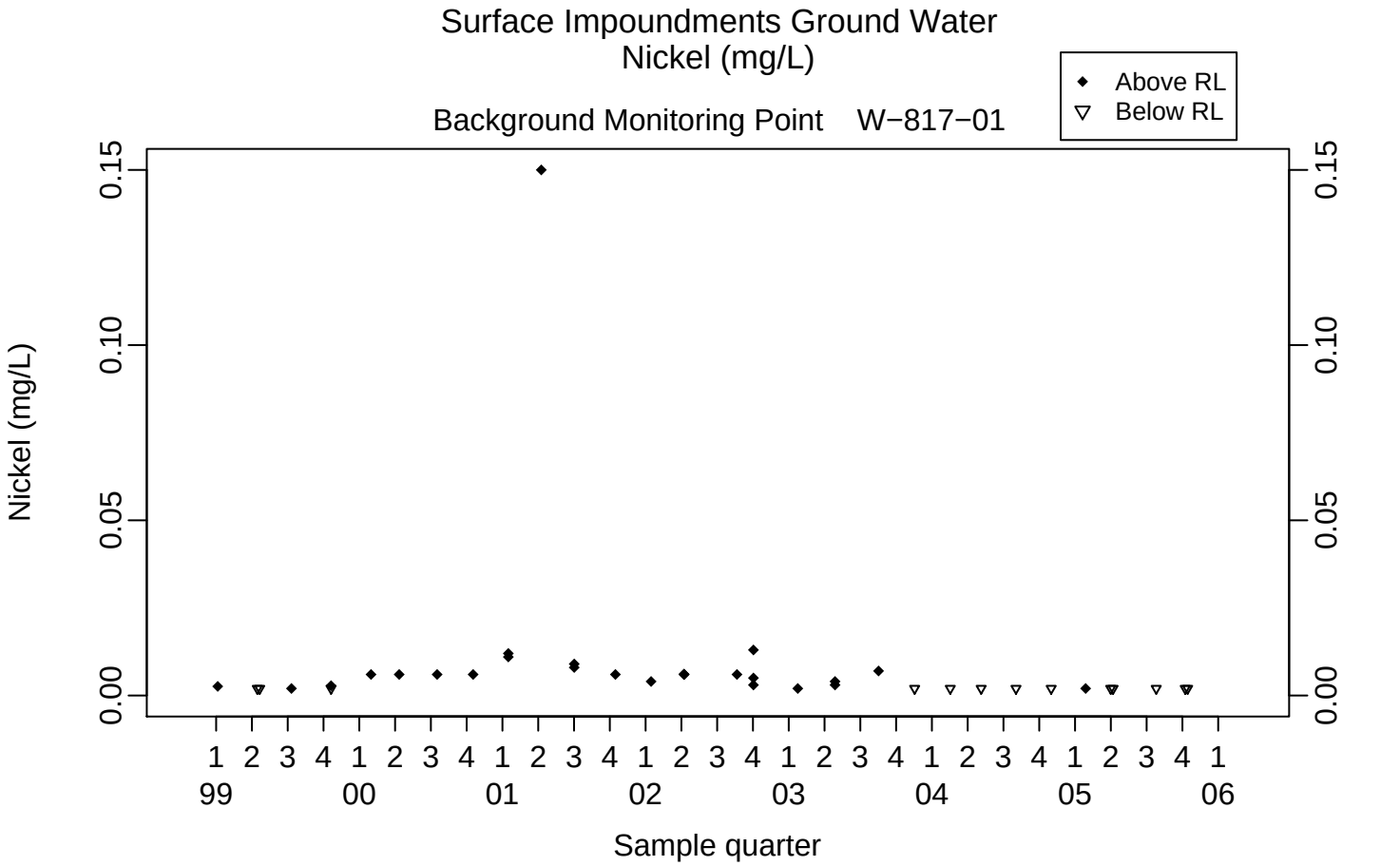

SL=0.01
Compliance Monitoring Point W−817−04
Manganese (mg/L)
0.00
0.02
0.04
0.06
0.08
0.10
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

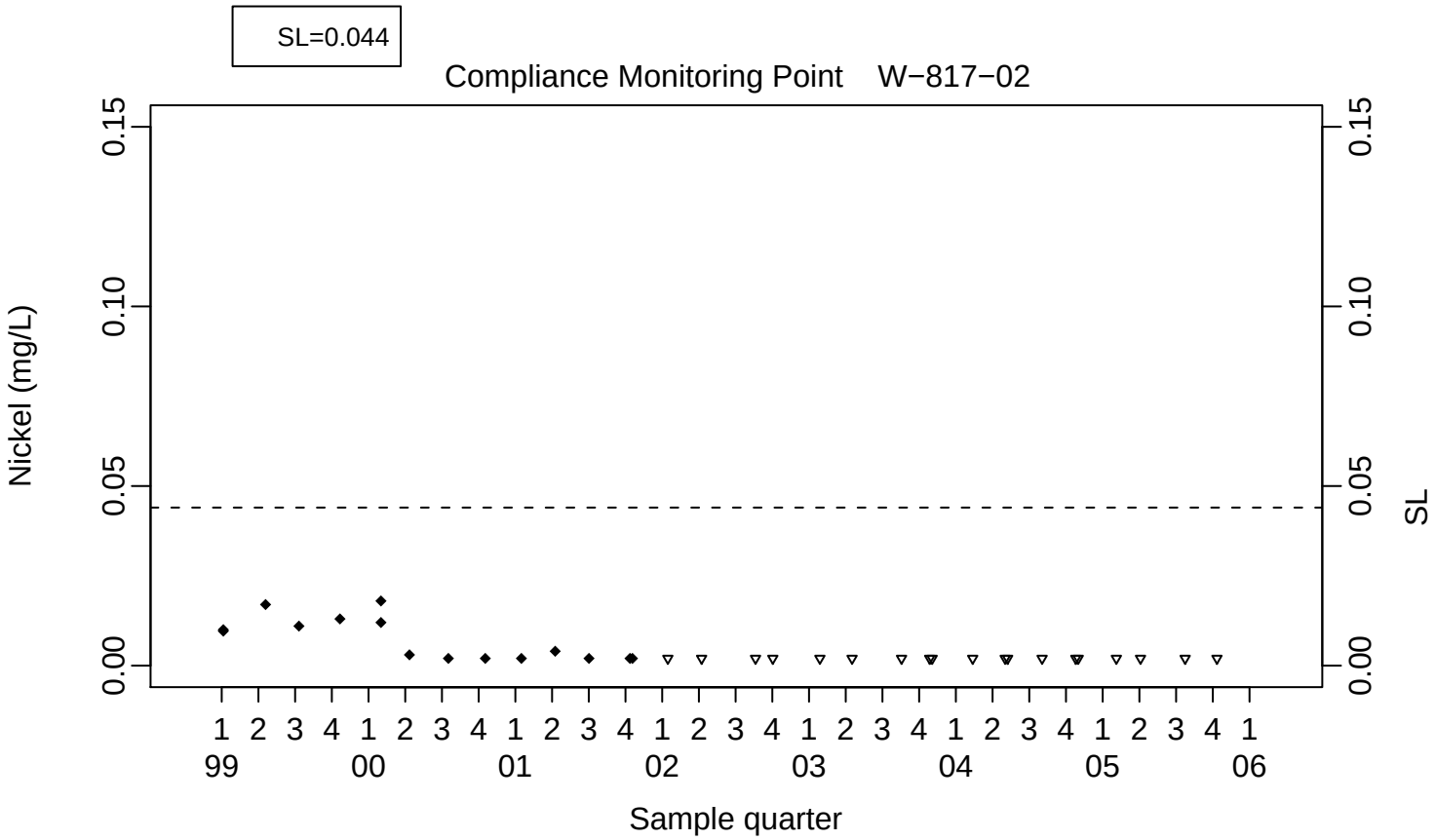

Surface Impoundments Ground Water
Molybdenum (mg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Molybdenum (mg/L)
0.00
0.02
0.04
0.06
0.08
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

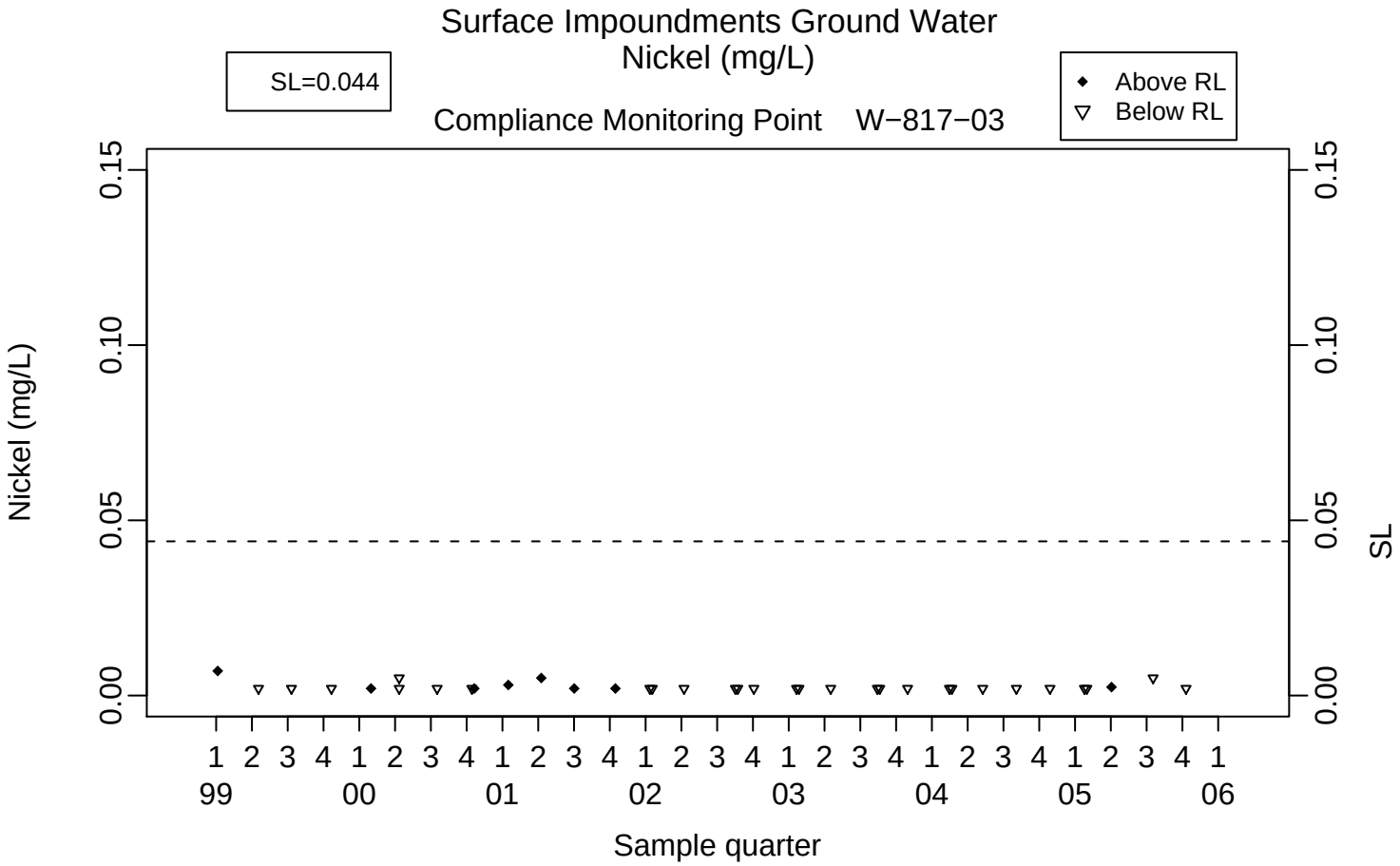

SL=0.073
Compliance Monitoring Point W−817−02
Molybdenum (mg/L)
SL
0.00
0.02
0.04
0.06
0.08
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

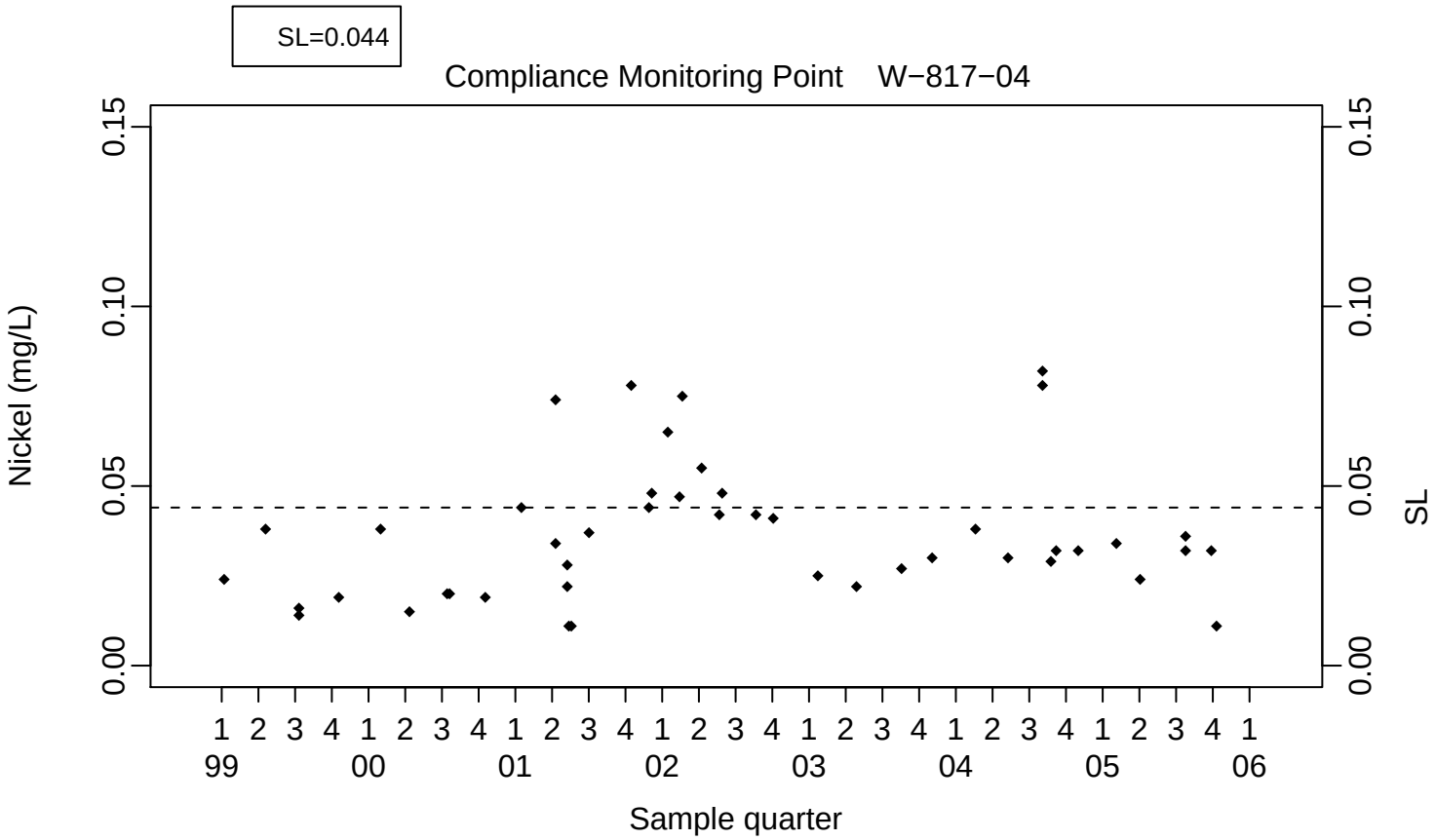

Surface Impoundments Ground Water
Molybdenum (mg/L)
SL=0.06
Above RL
Below RL
Compliance Monitoring Point W−817−03
Molybdenum (mg/L)
SL
0.00
0.02
0.04
0.06
0.08
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


SL=0.054
Compliance Monitoring Point W−817−04
Molybdenum (mg/L)
SL
0.00
0.02
0.04
0.06
0.08
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

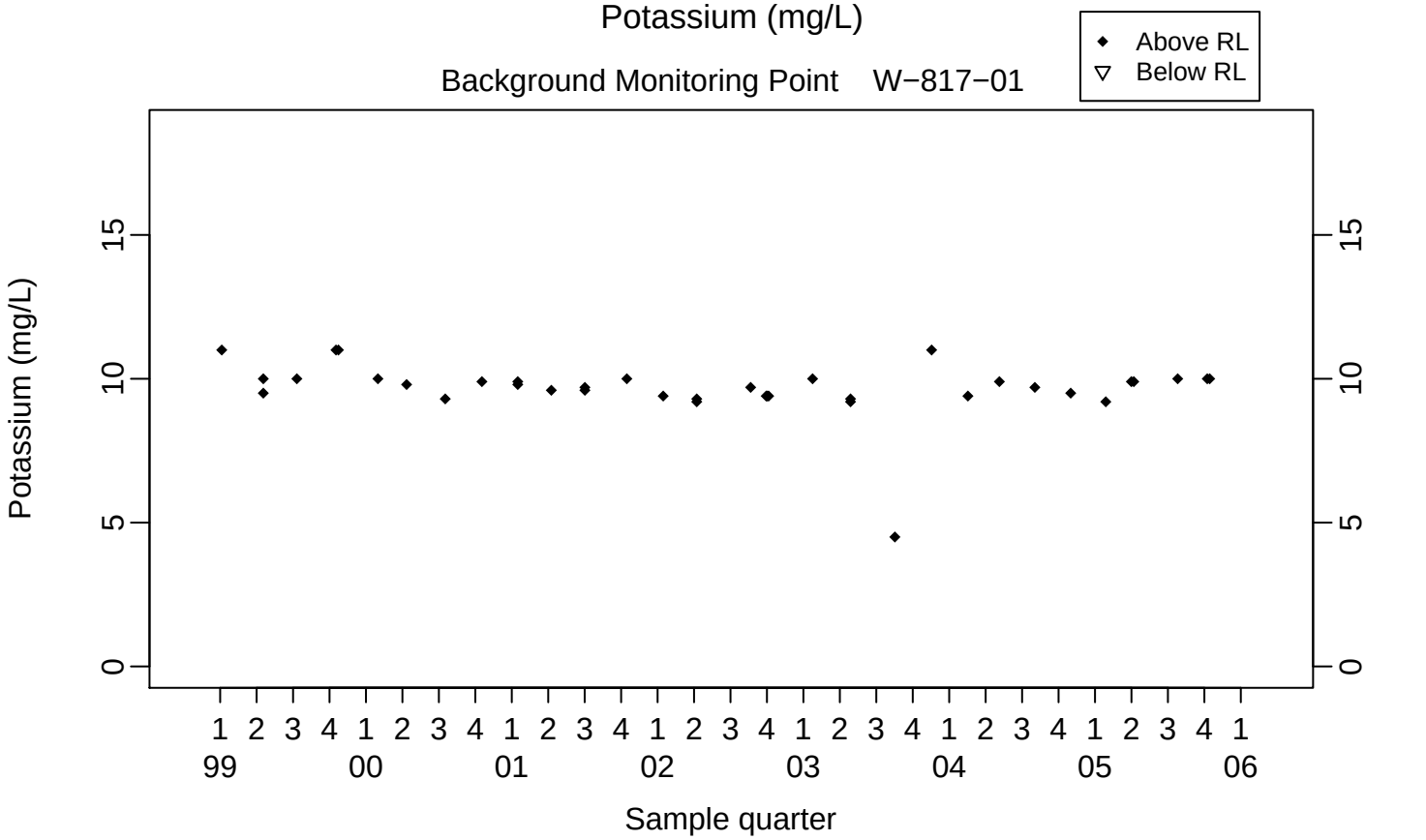

Surface Impoundments Ground Water
Nickel (mg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Nickel (mg/L)
0.00
0.05
0.10
0.15
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

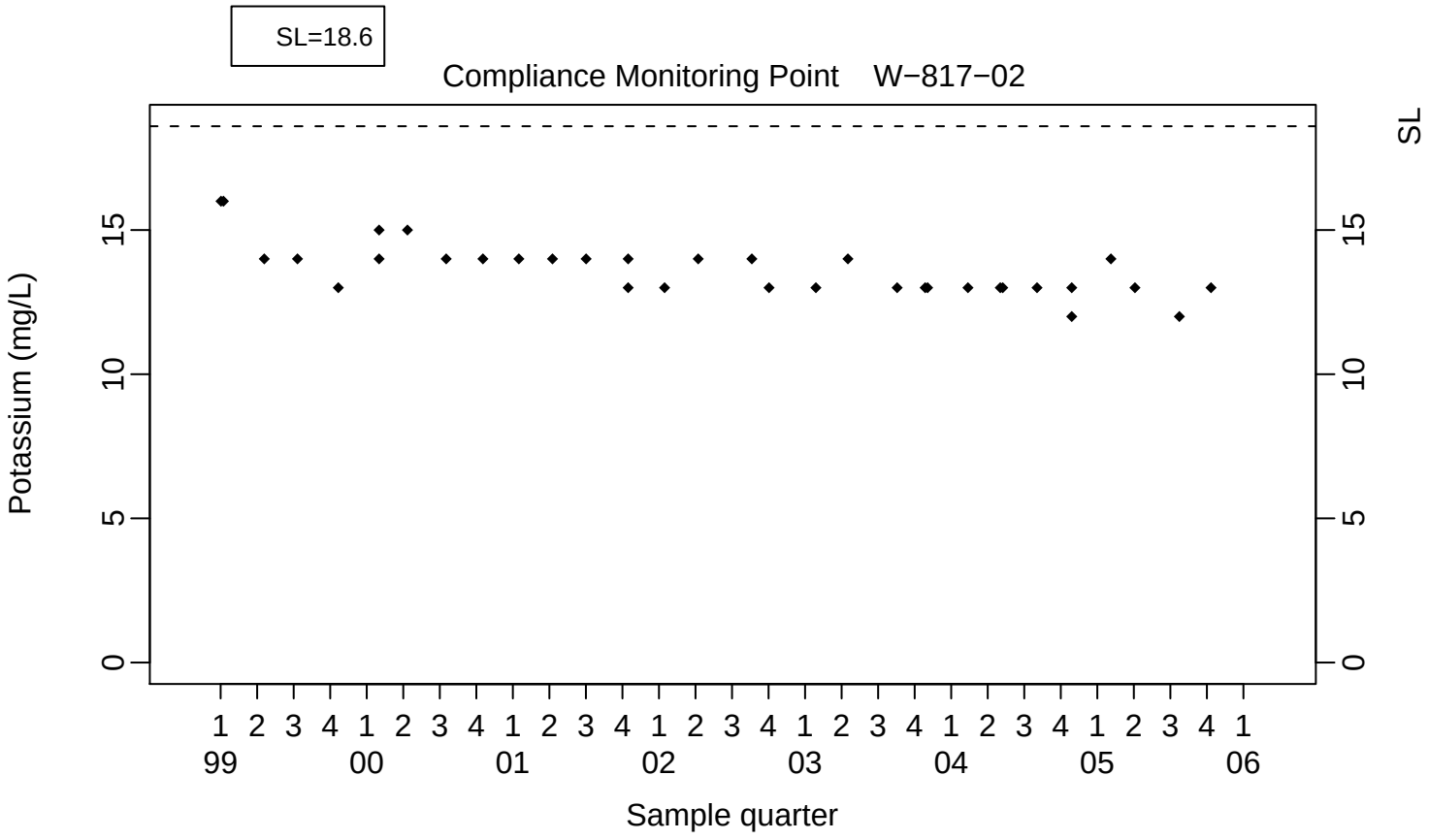

SL=0.044
Compliance Monitoring Point W−817−02
Nickel (mg/L)
0.00
0.05
0.10
0.15
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

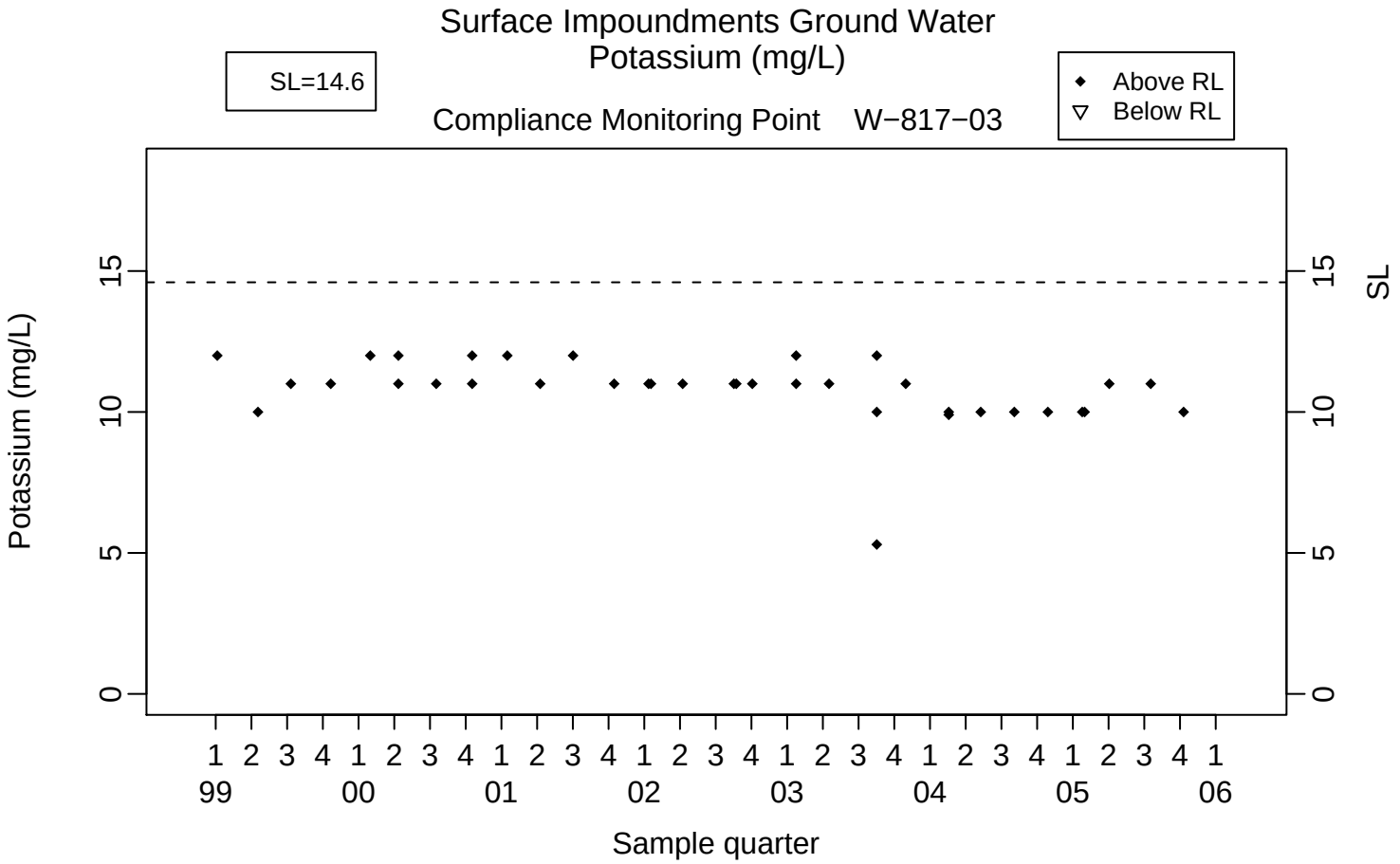

Surface Impoundments Ground Water
Nickel (mg/L)
SL=0.044
Above RL
Below RL
Compliance Monitoring Point W−817−03
Nickel (mg/L)
0.00
0.05
0.10
0.15
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

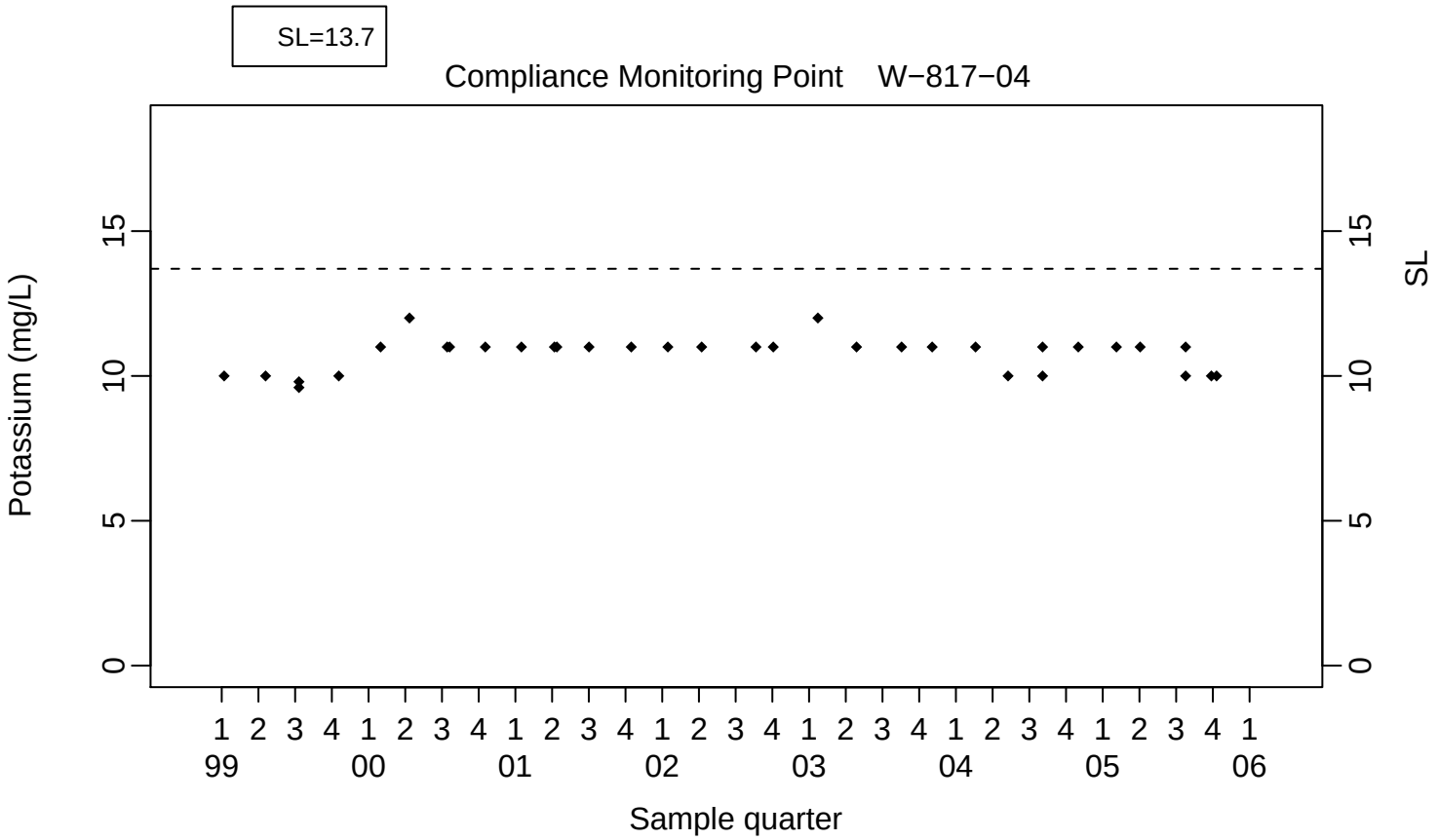

SL=0.044
Compliance Monitoring Point W−817−04
Nickel (mg/L)
0.00
0.05
0.10
0.15
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

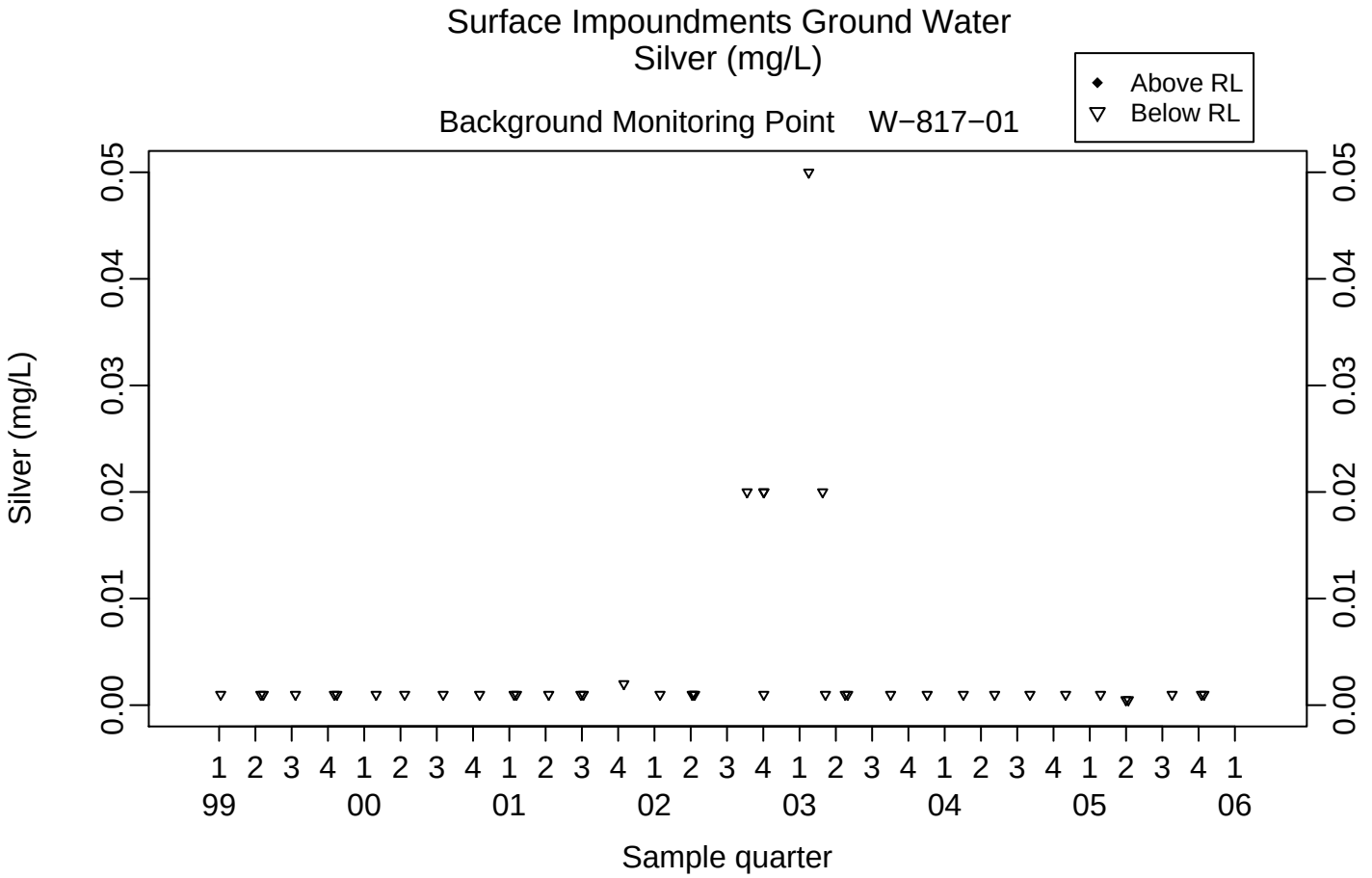
Surface Impoundments Ground Water
Potassium (mg/L)

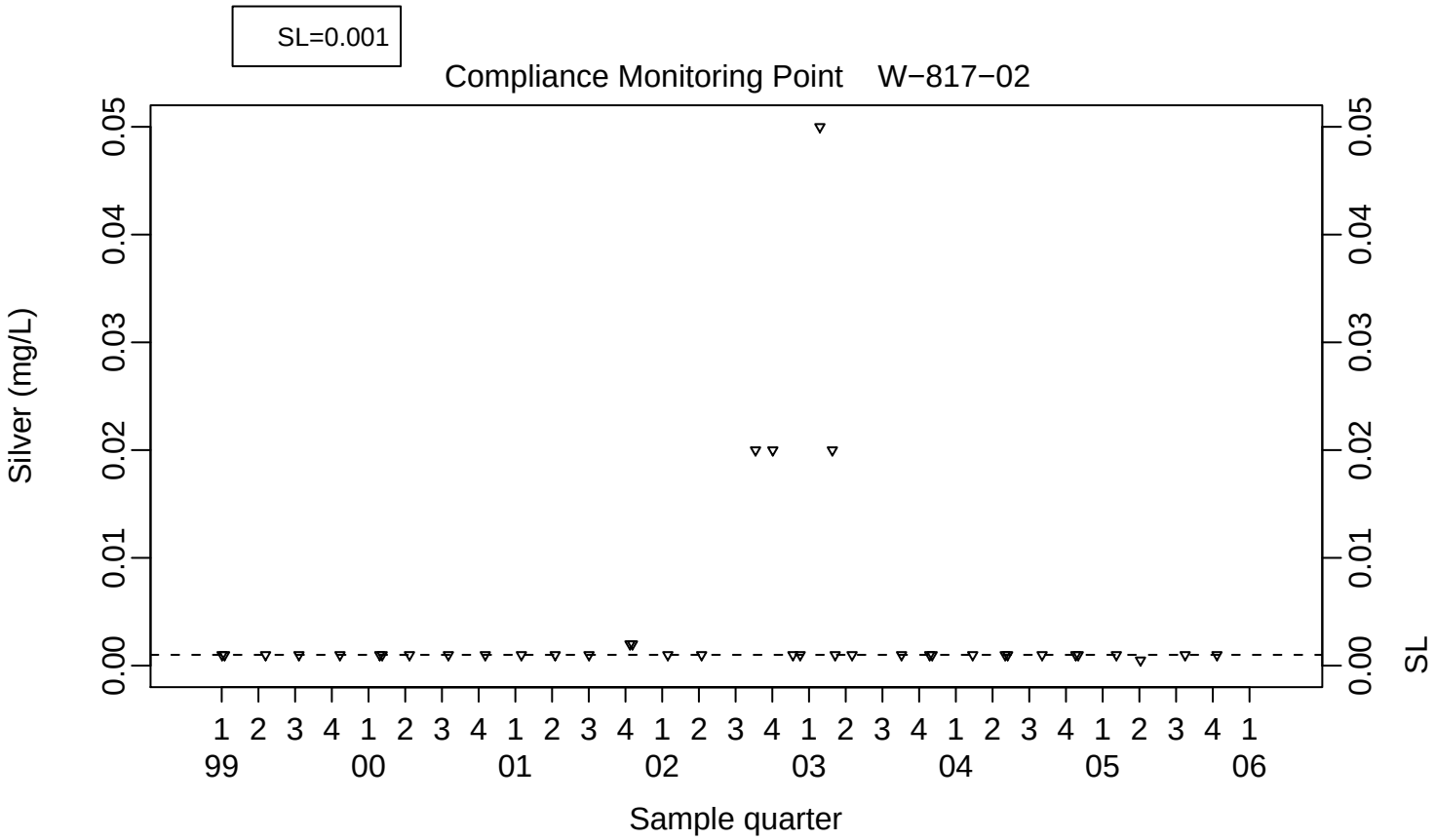


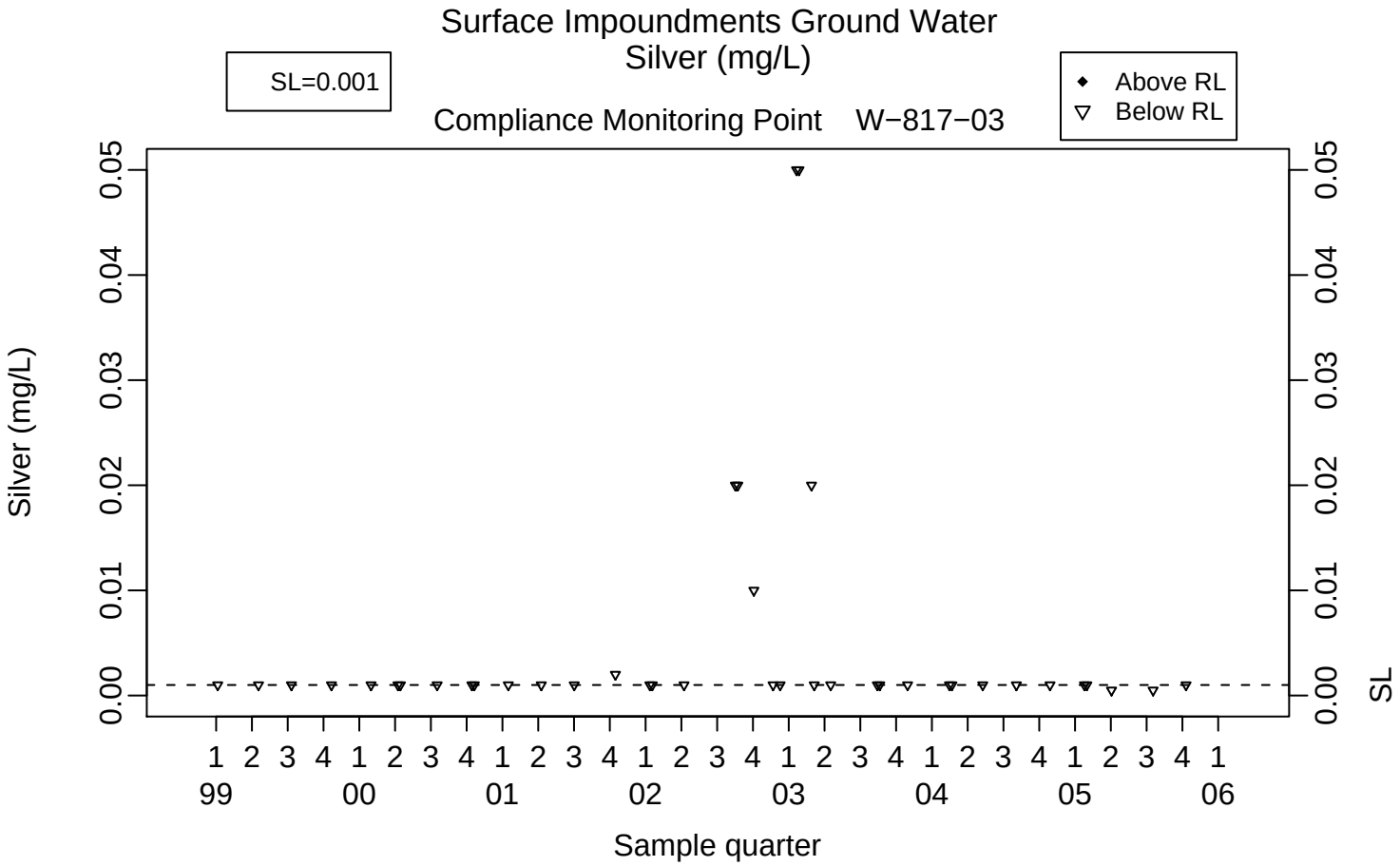


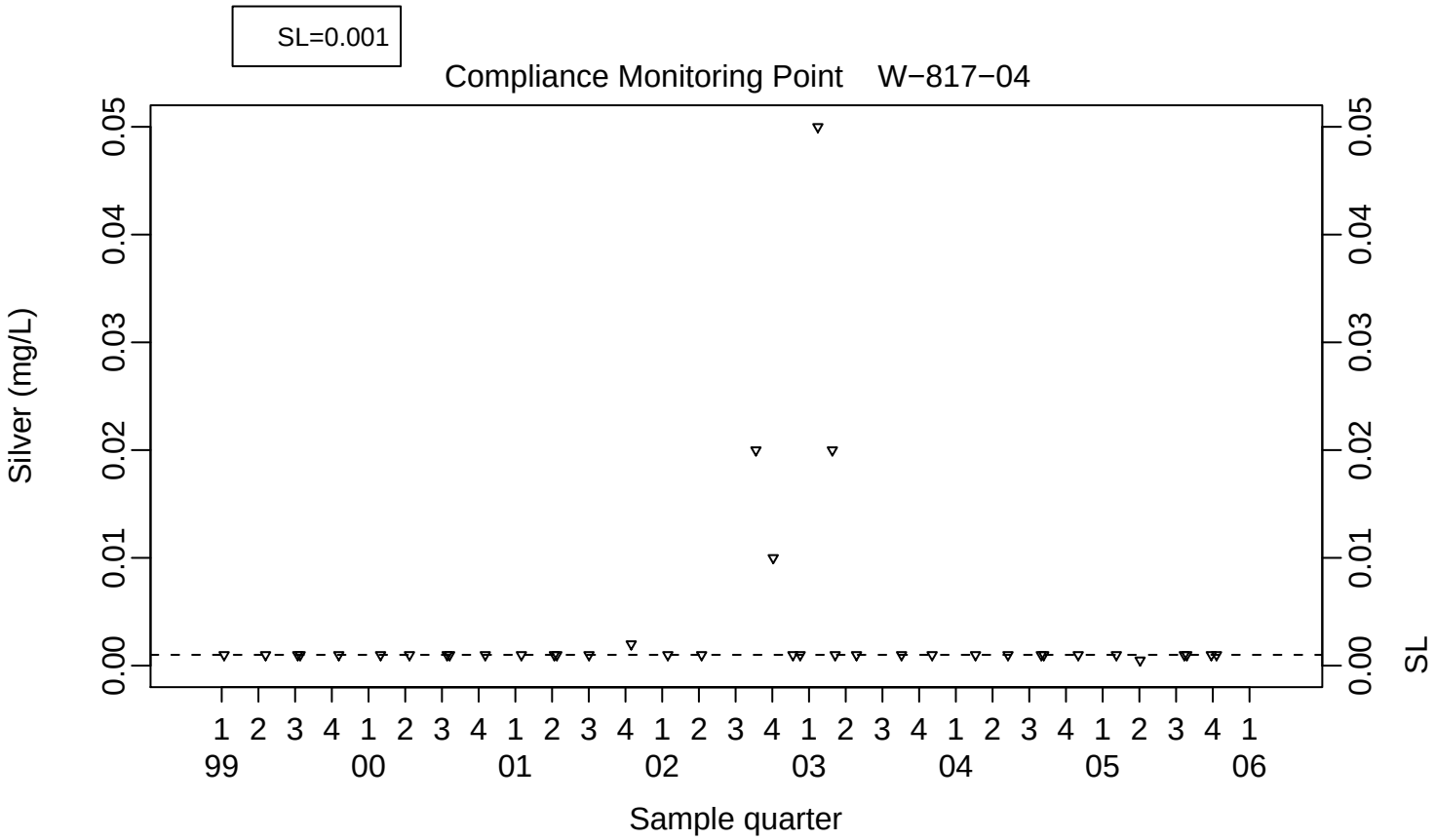

Surface Impoundments Ground Water
Potassium (mg/L)
SL=14.6
Above RL
Below RL
Compliance Monitoring Point W−817−03
Potassium (mg/L)
SL
0
5
10
15
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

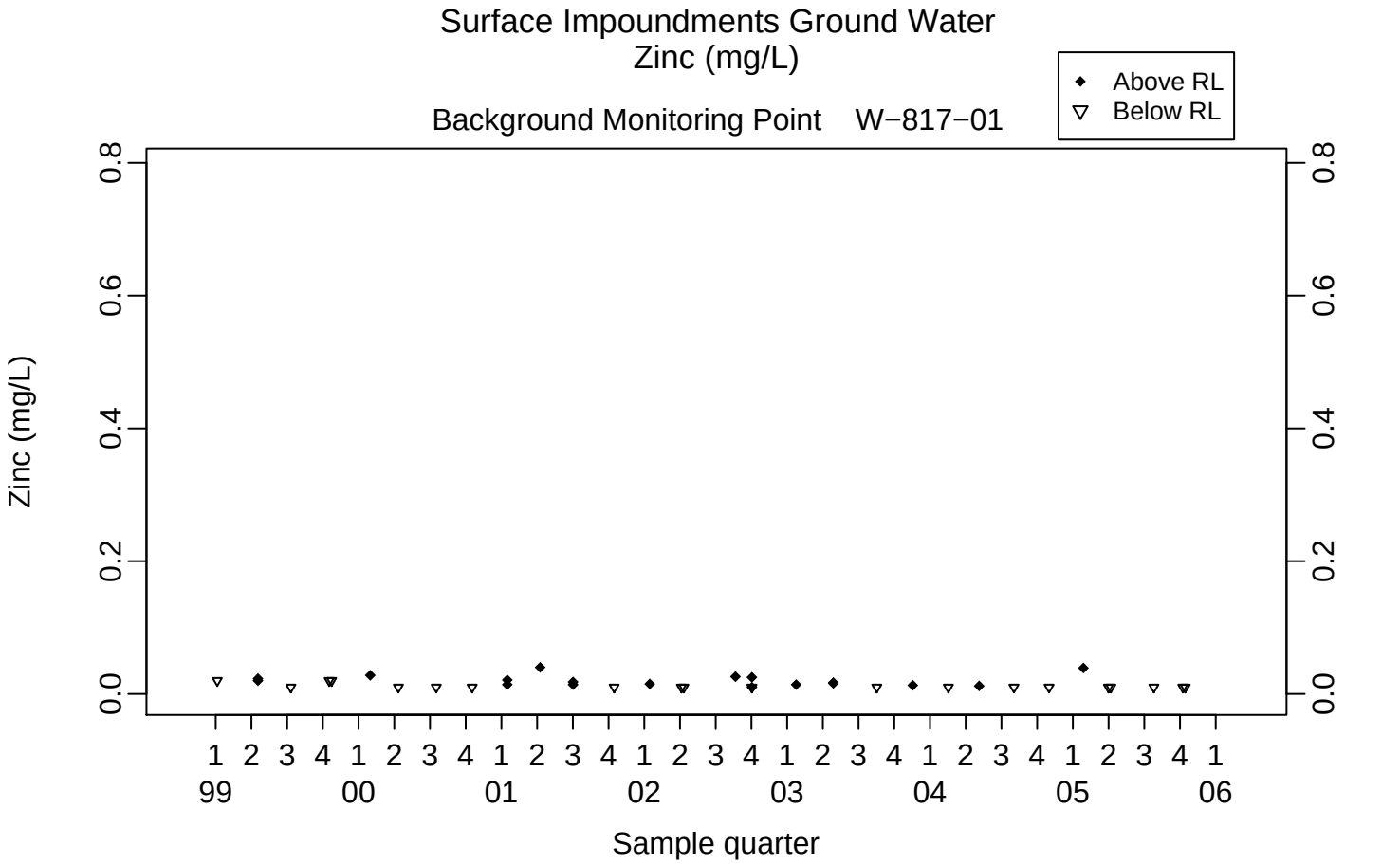

SL=13.7
Compliance Monitoring Point W−817−04
Potassium (mg/L)
SL
0
5
10
15
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

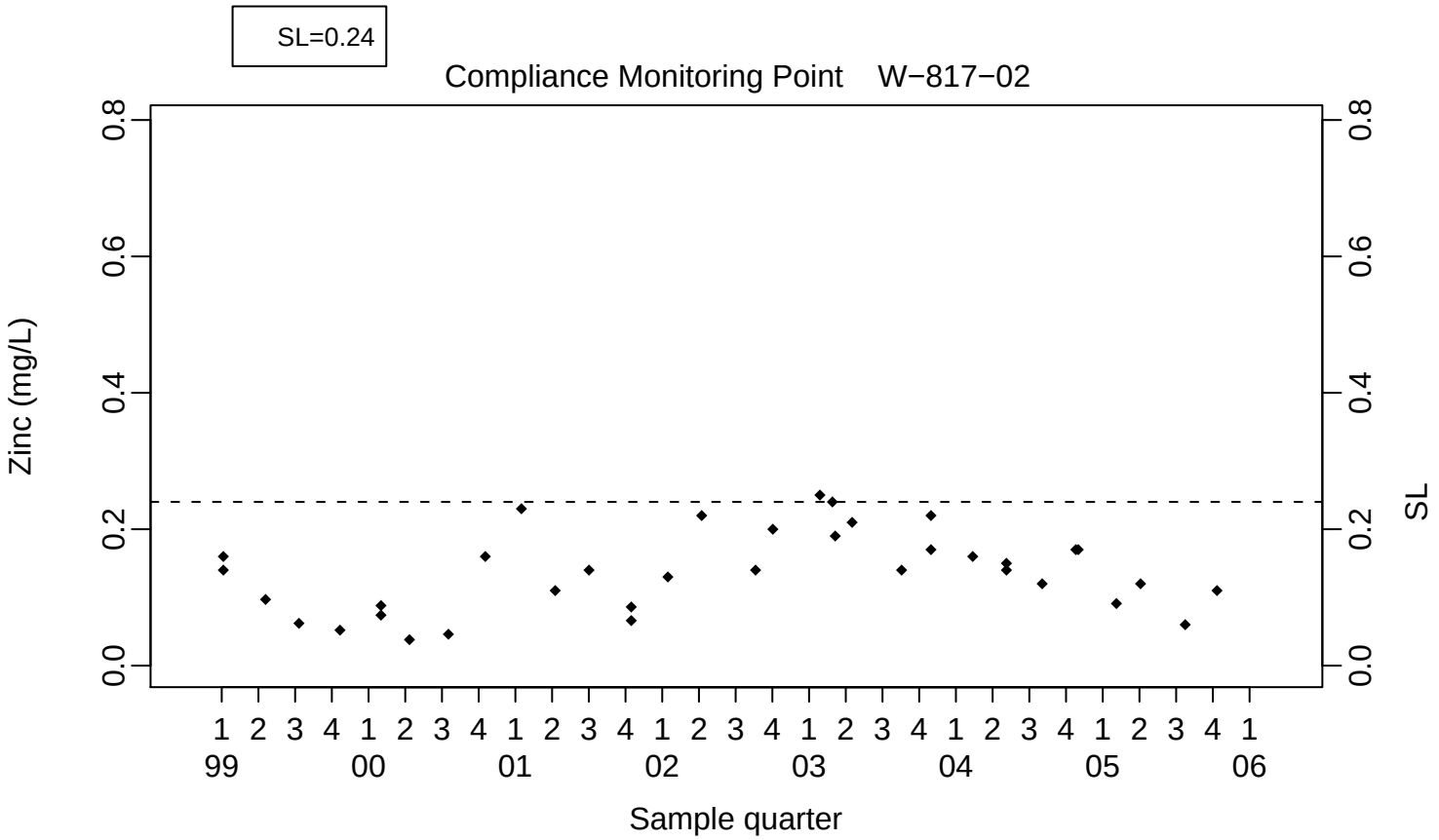

Surface Impoundments Ground Water
Silver (mg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Silver (mg/L)
0.00
0.01
0.02
0.03
0.04
0.05
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

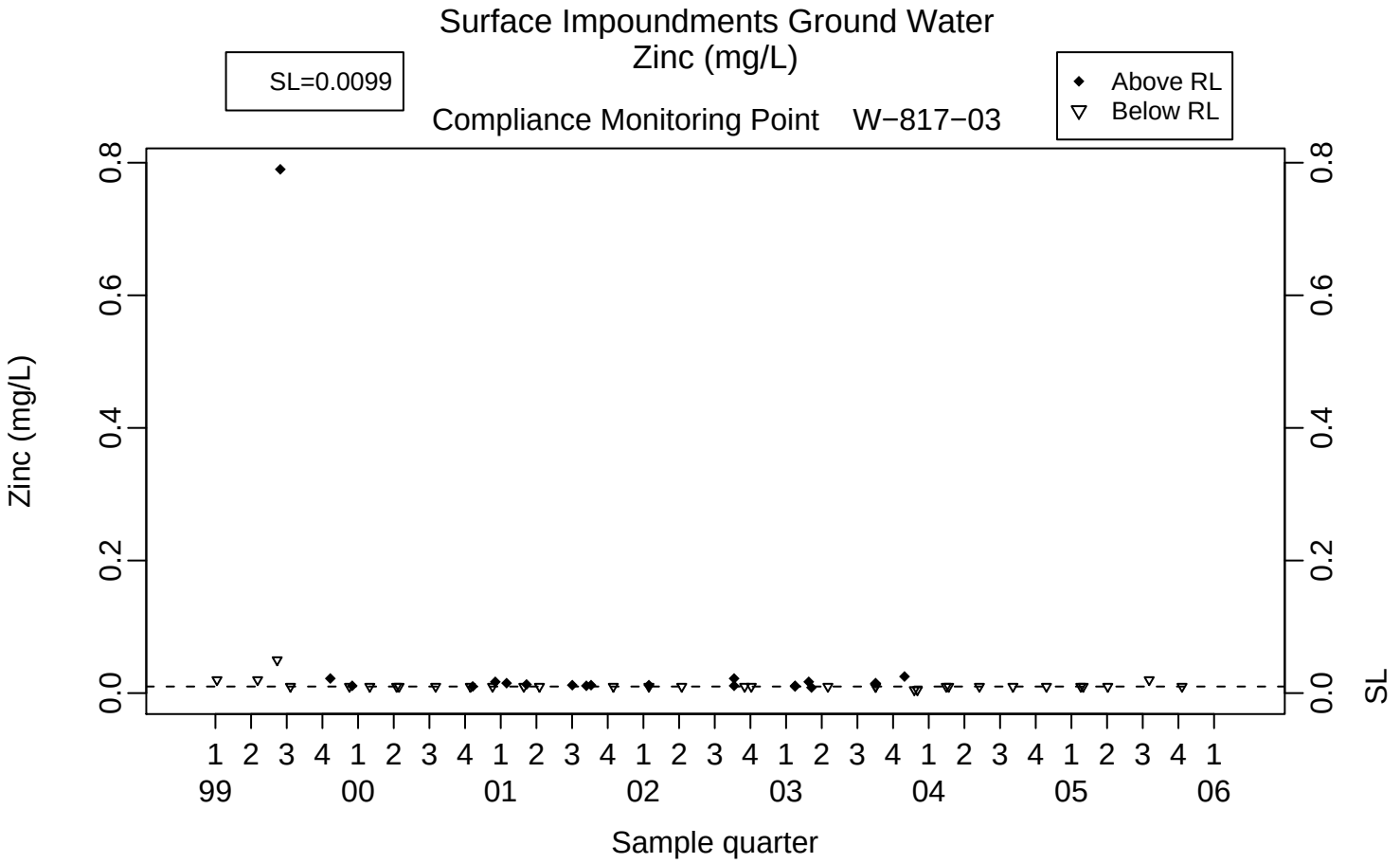

SL=0.001
Compliance Monitoring Point W−817−02
Silver (mg/L)
0.00
0.01
0.02
0.03
0.04
0.05
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

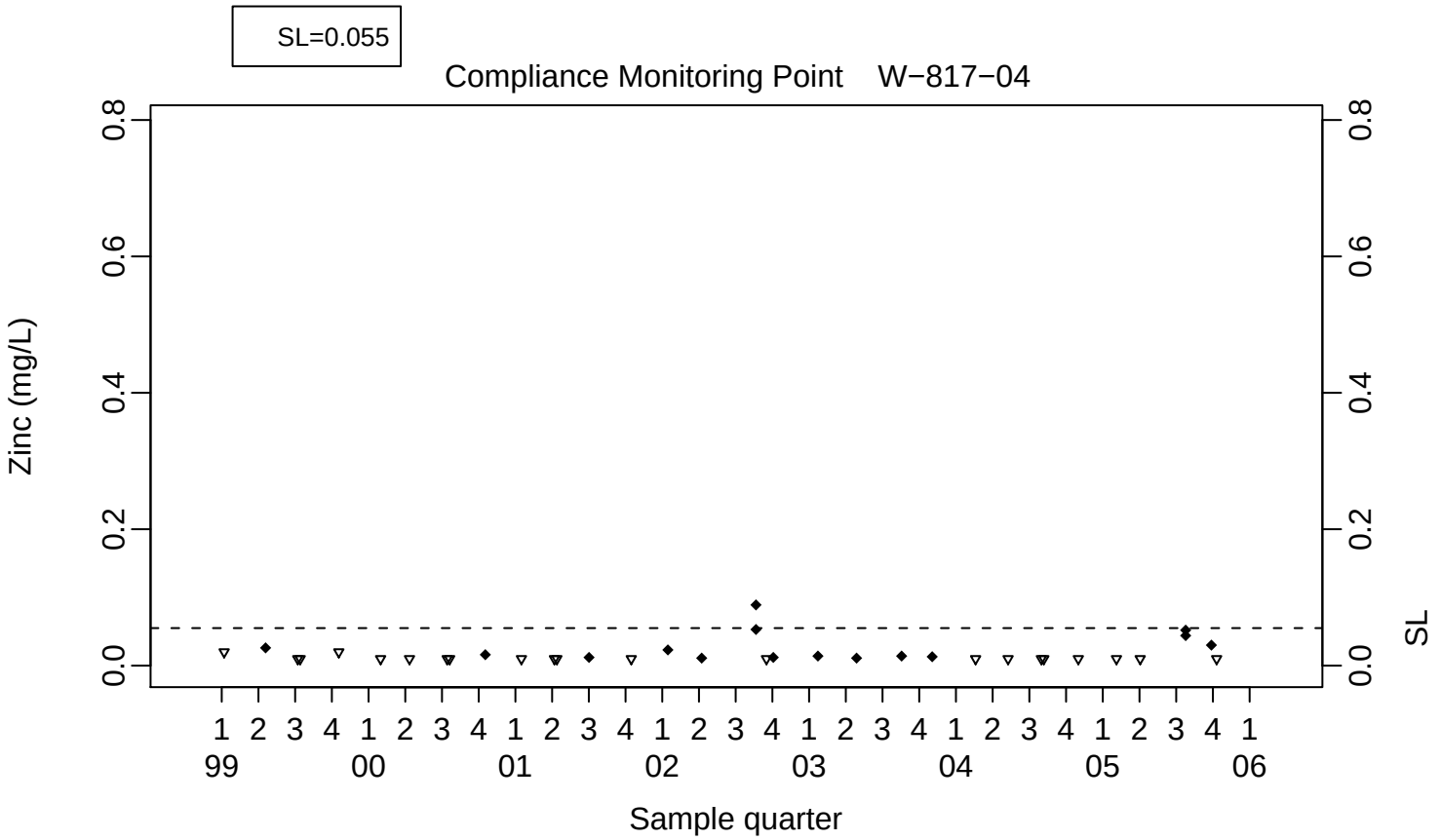

Surface Impoundments Ground Water
Silver (mg/L)
SL=0.001
Above RL
Below RL
Compliance Monitoring Point W−817−03
Silver (mg/L)
0.00
0.01
0.02
0.03
0.04
0.05
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

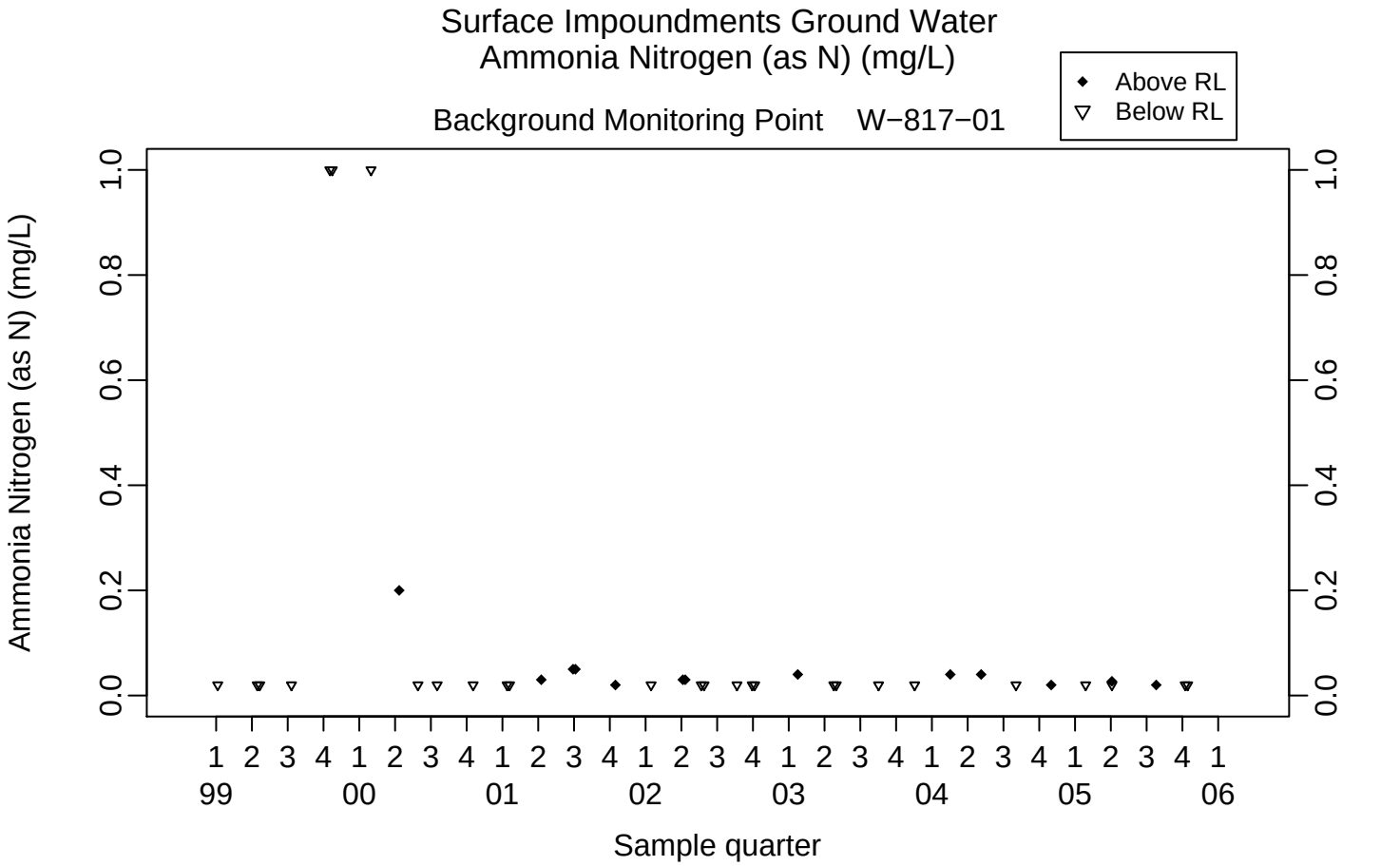

SL=0.001
Compliance Monitoring Point W−817−04
Silver (mg/L)
0.00
0.01
0.02
0.03
0.04
0.05
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

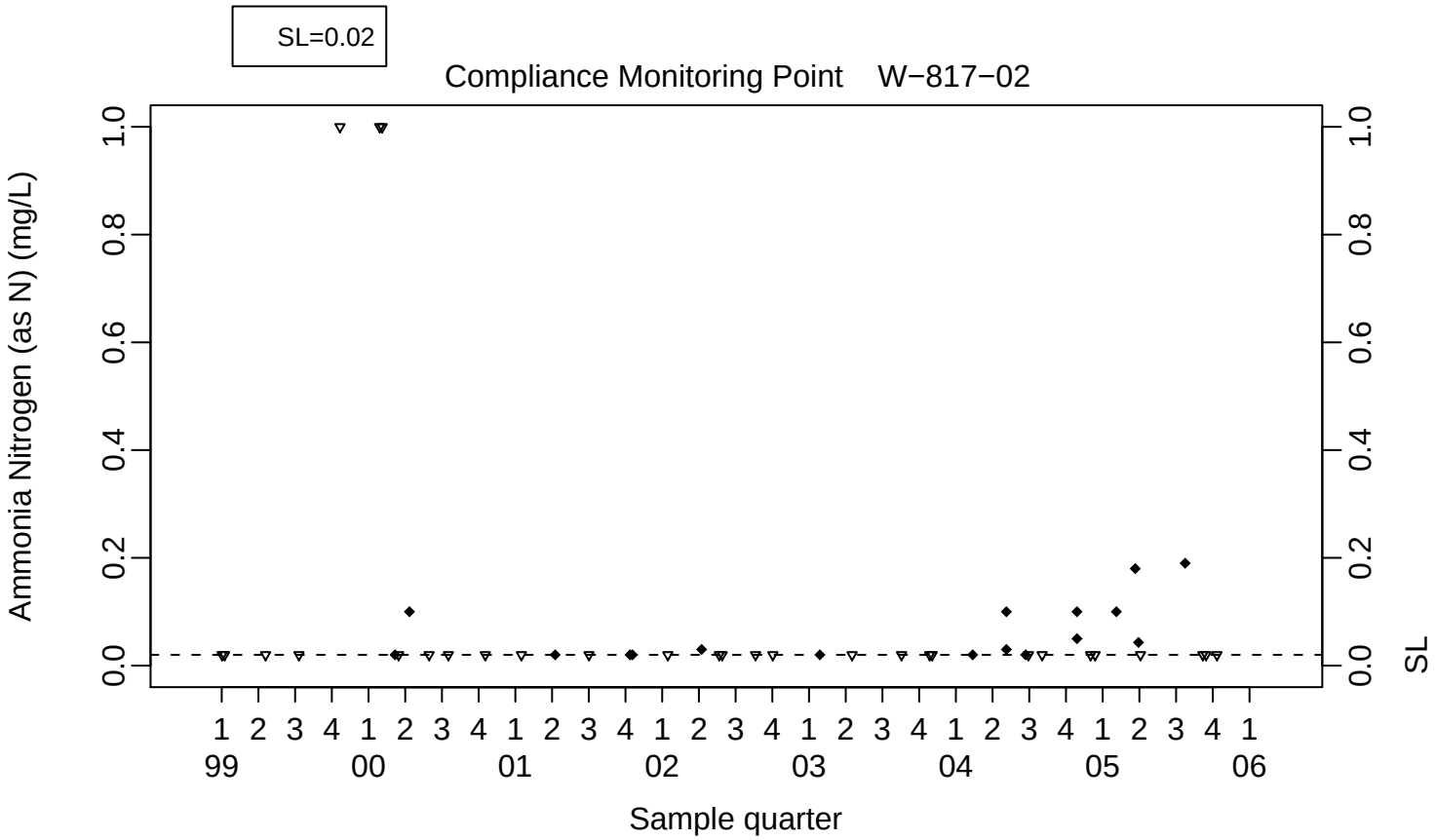

Surface Impoundments Ground Water
Zinc (mg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Zinc (mg/L)
0.0
0.2
0.4
0.6
0.8
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

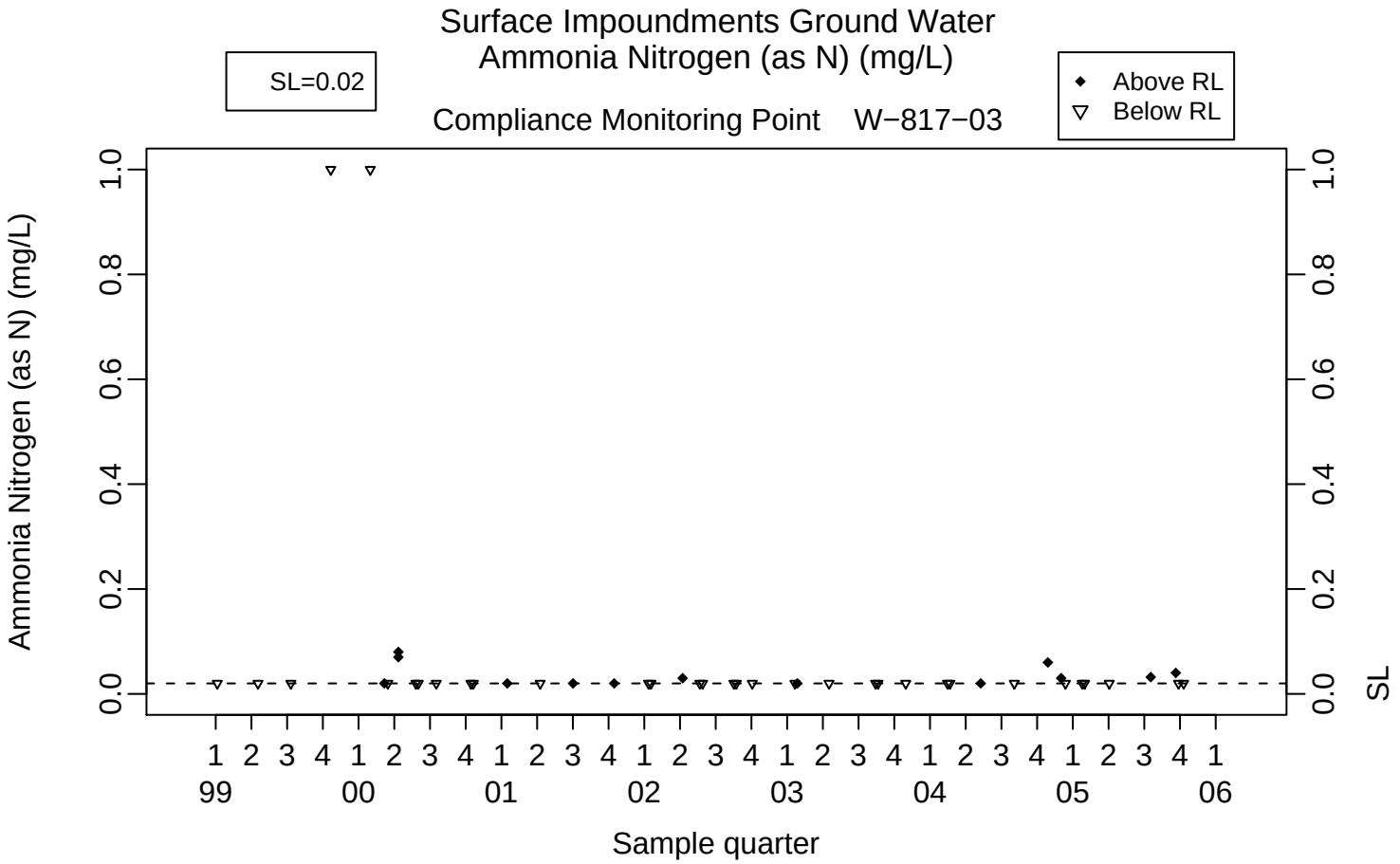

SL=0.24
Compliance Monitoring Point W−817−02
Zinc (mg/L)
SL
0.0
0.2
0.4
0.6
0.8
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

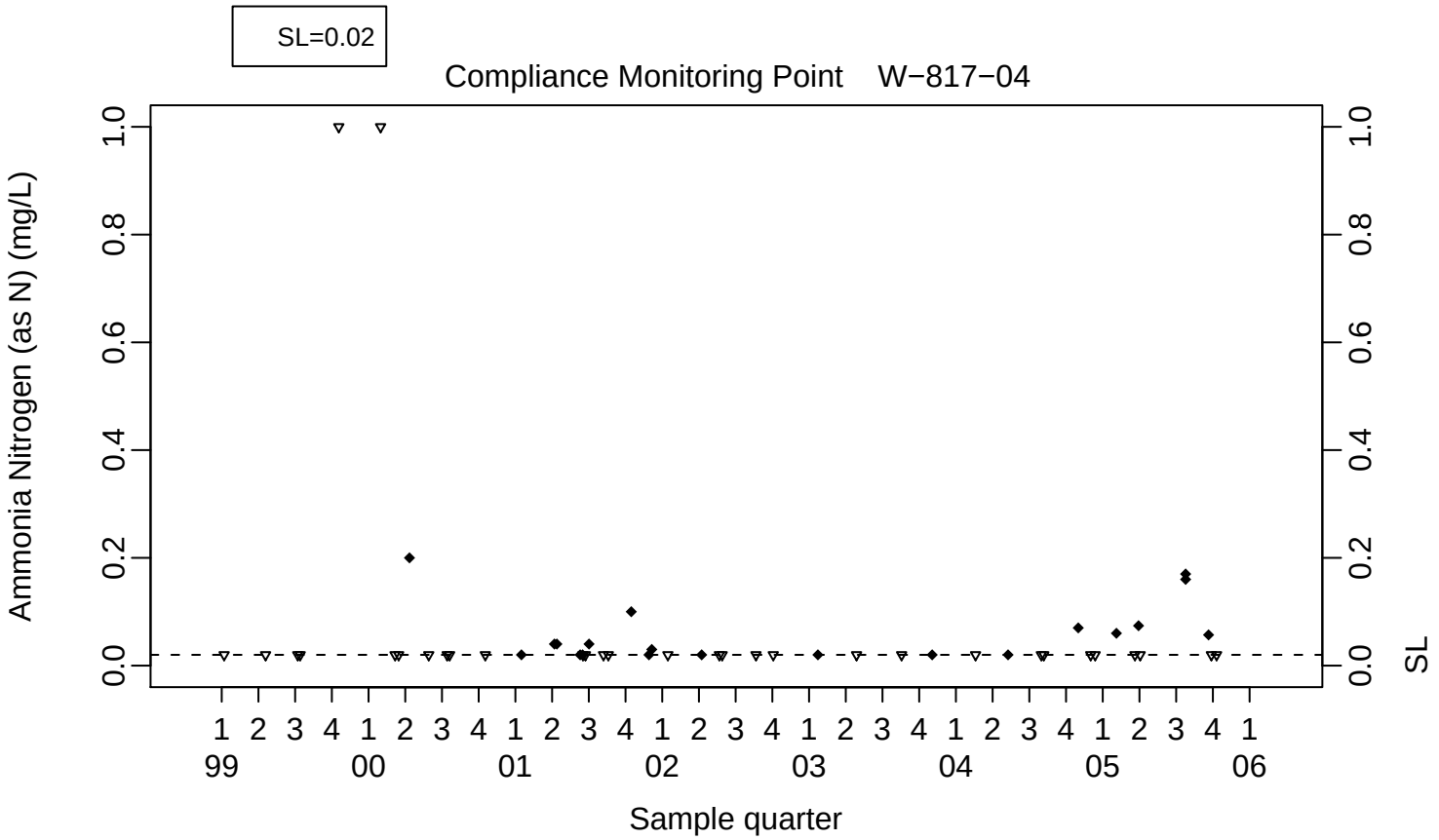

Surface Impoundments Ground Water
Zinc (mg/L)
SL=0.0099
Above RL
Below RL
Compliance Monitoring Point W−817−03
Zinc (mg/L)
0.0
0.2
0.4
0.6
0.8
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

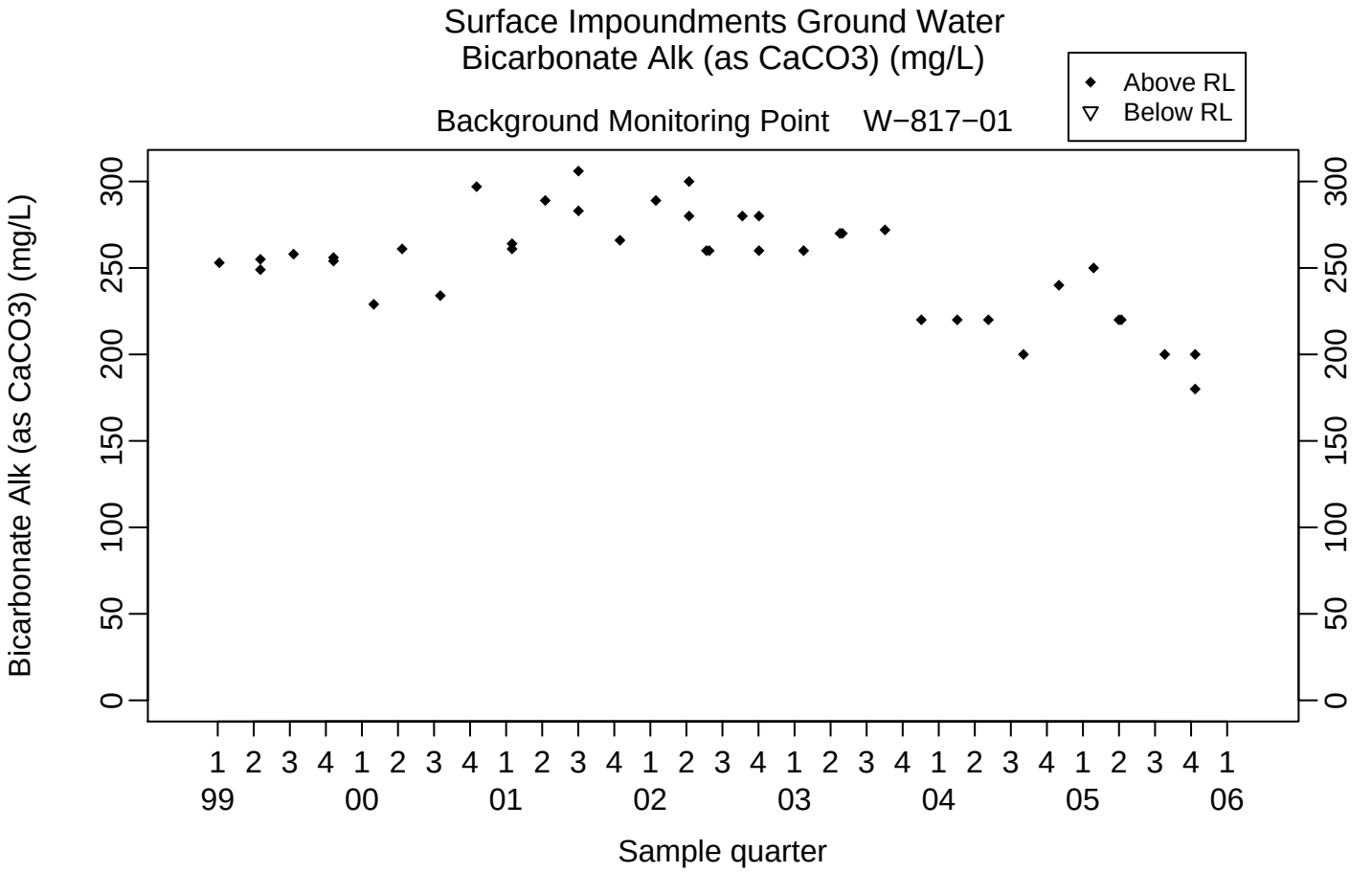

SL=0.055
Compliance Monitoring Point W−817−04
Zinc (mg/L)
0.0
0.2
0.4
0.6
0.8
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

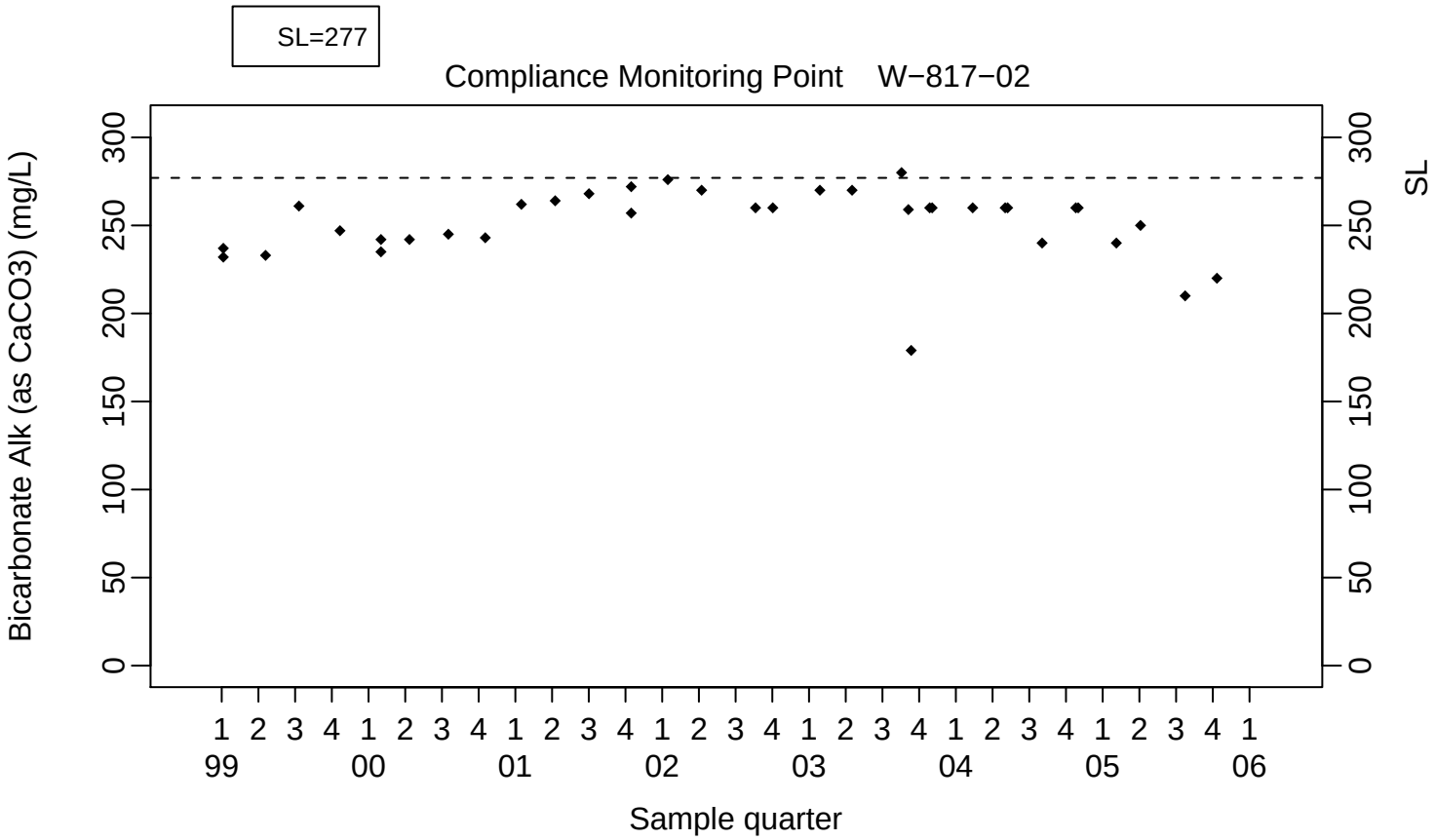

Surface Impoundments Ground Water
Ammonia Nitrogen (as N) (mg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Ammonia Nitrogen (as N) (mg/L)
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

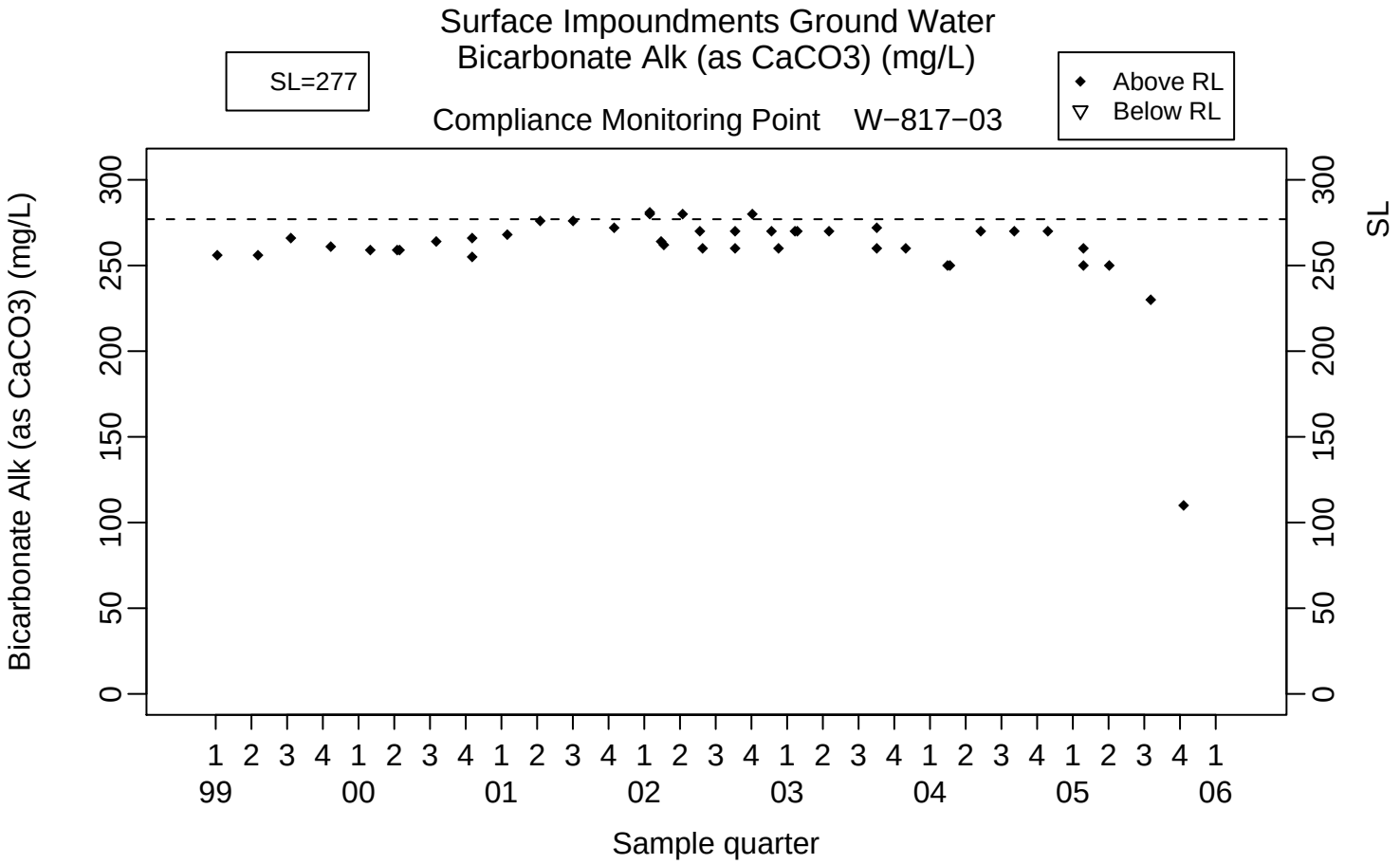

SL=0.02
Compliance Monitoring Point W−817−02
Ammonia Nitrogen (as N) (mg/L)
0.0
0.2
0.4
0.6
0.8
1.0
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

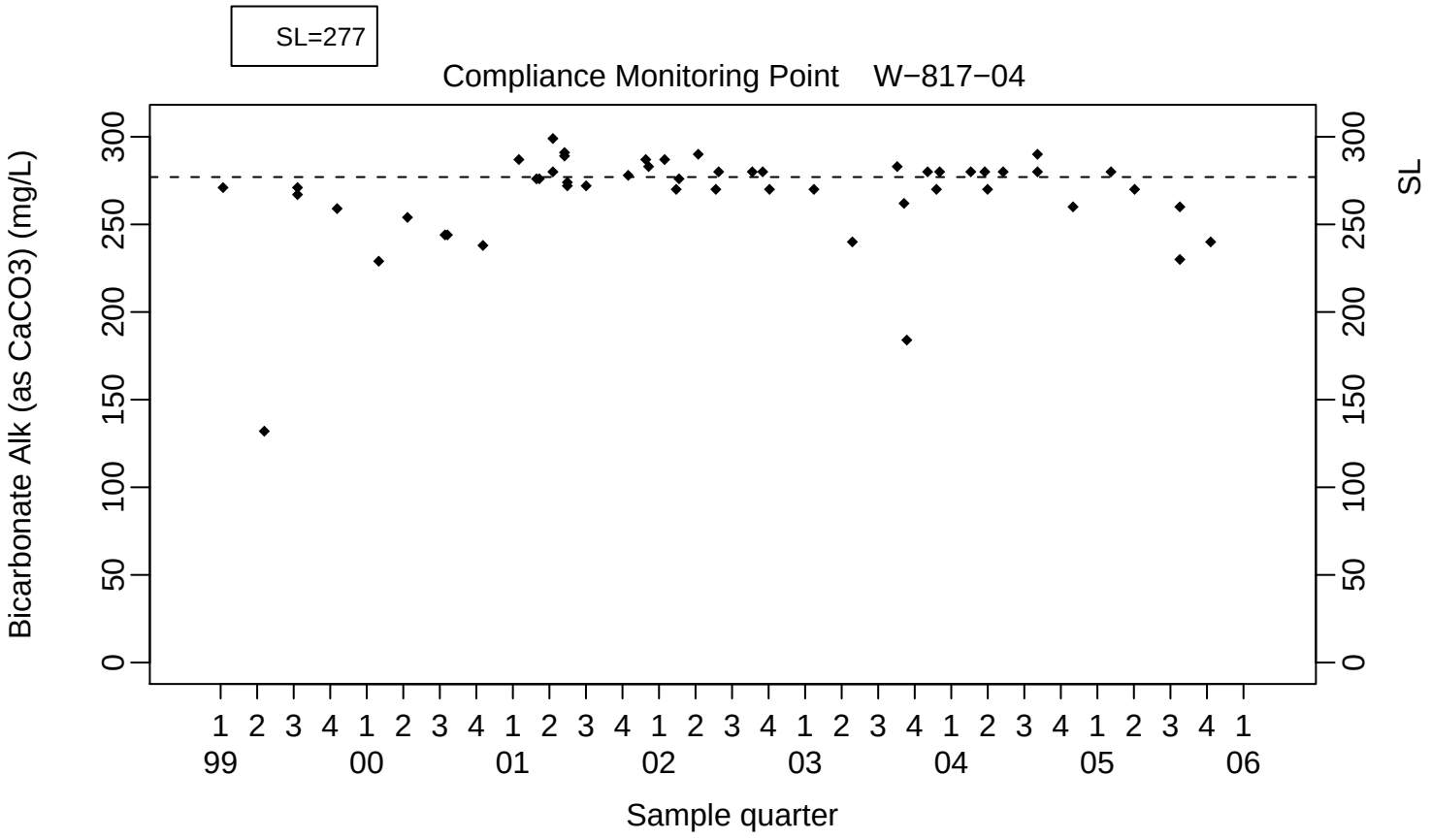

Surface Impoundments Ground Water
Ammonia Nitrogen (as N) (mg/L)
SL=0.02
Above RL
Below RL
Compliance Monitoring Point W−817−03
Ammonia Nitrogen (as N) (mg/L)
0.0
0.2
0.4
0.6
0.8
1.0
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


SL=0.02
Compliance Monitoring Point W−817−04
Ammonia Nitrogen (as N) (mg/L)
0.0
0.2
0.4
0.6
0.8
1.0
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

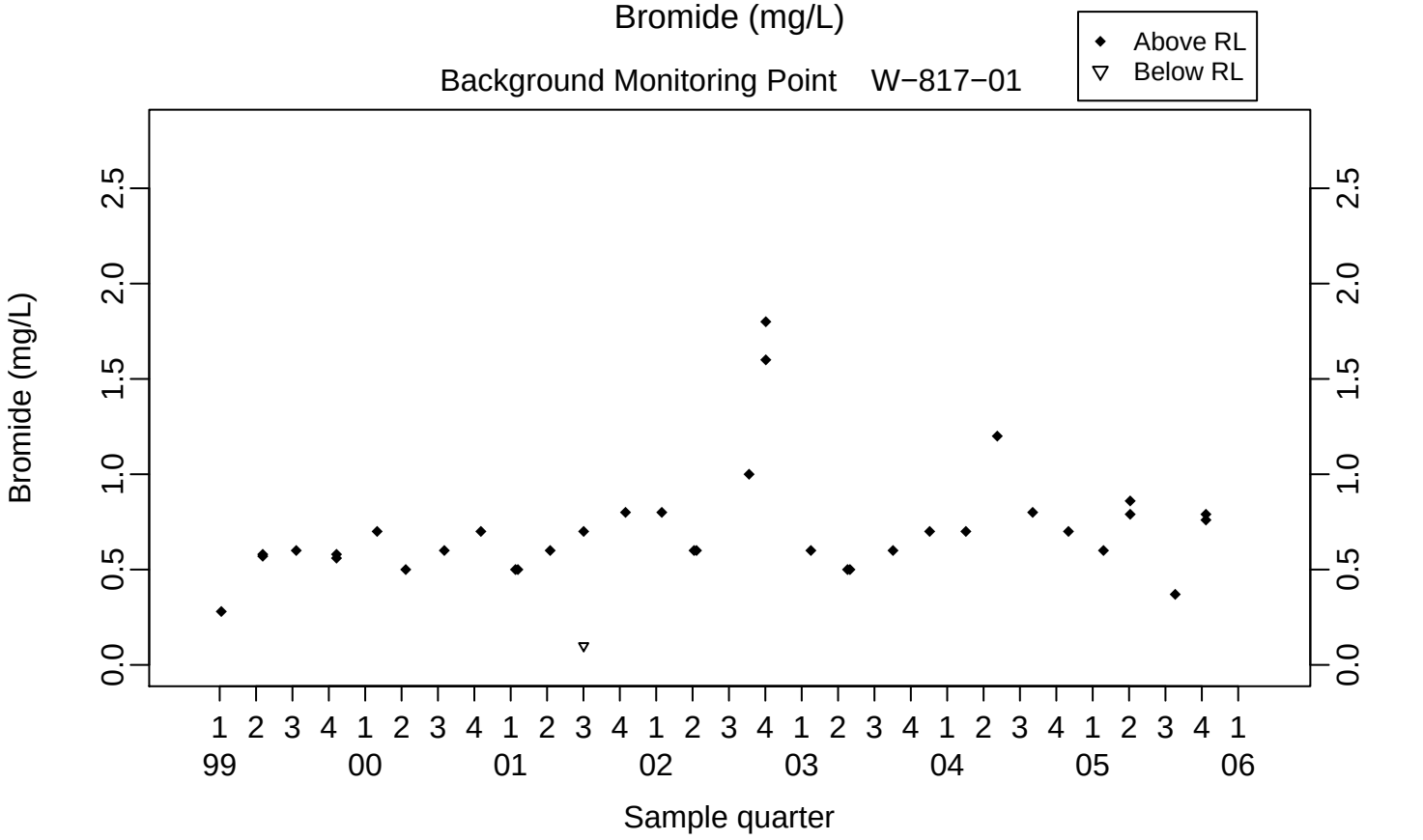

Surface Impoundments Ground Water
Bicarbonate Alk (as CaCO3) (mg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Bicarbonate Alk (as CaCO3) (mg/L)
0
50
100
150
200
250
300
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

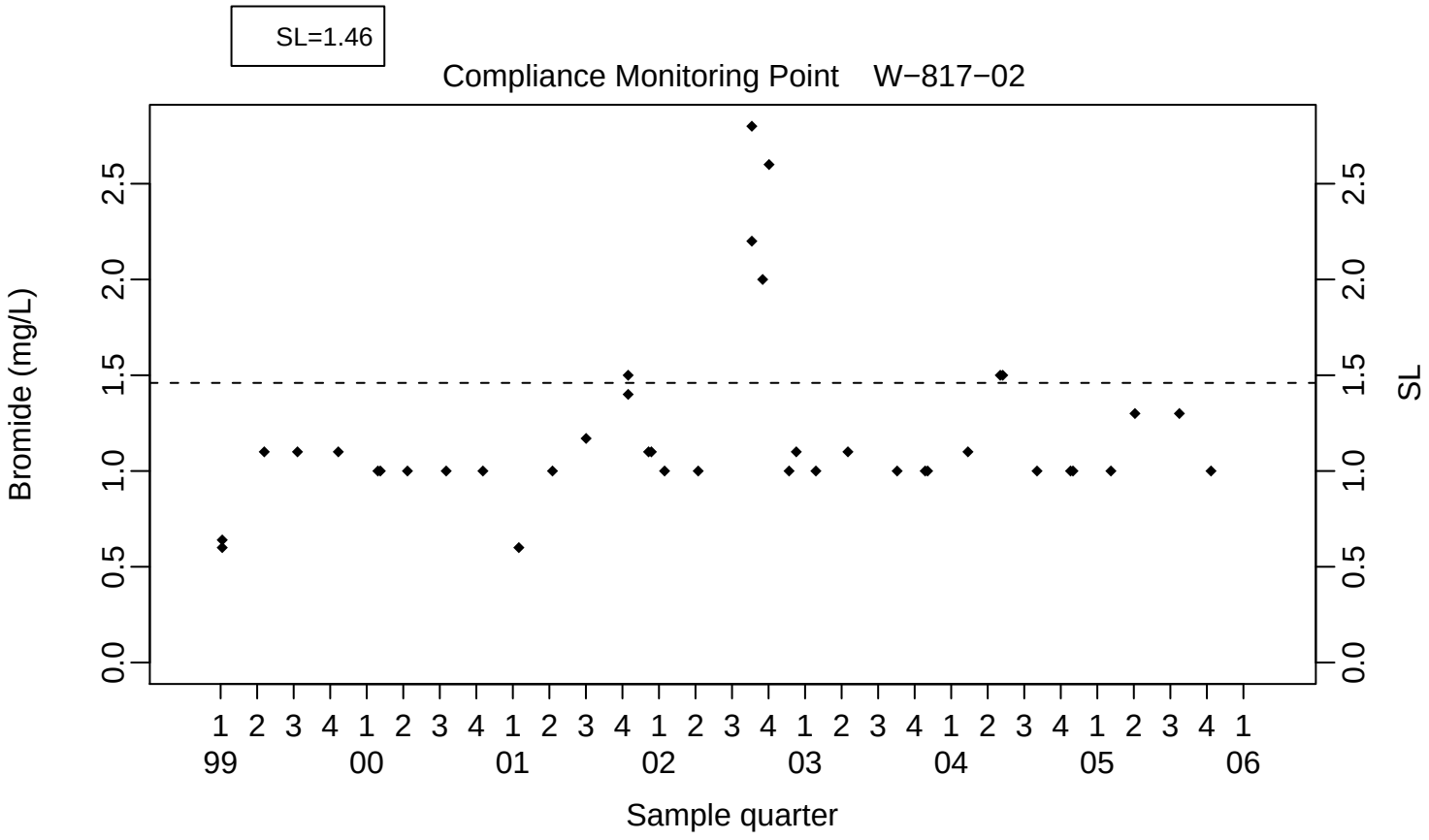

SL=277
Compliance Monitoring Point W−817−02
Bicarbonate Alk (as CaCO3) (mg/L)
SL
0
50
100
150
200
250
300
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

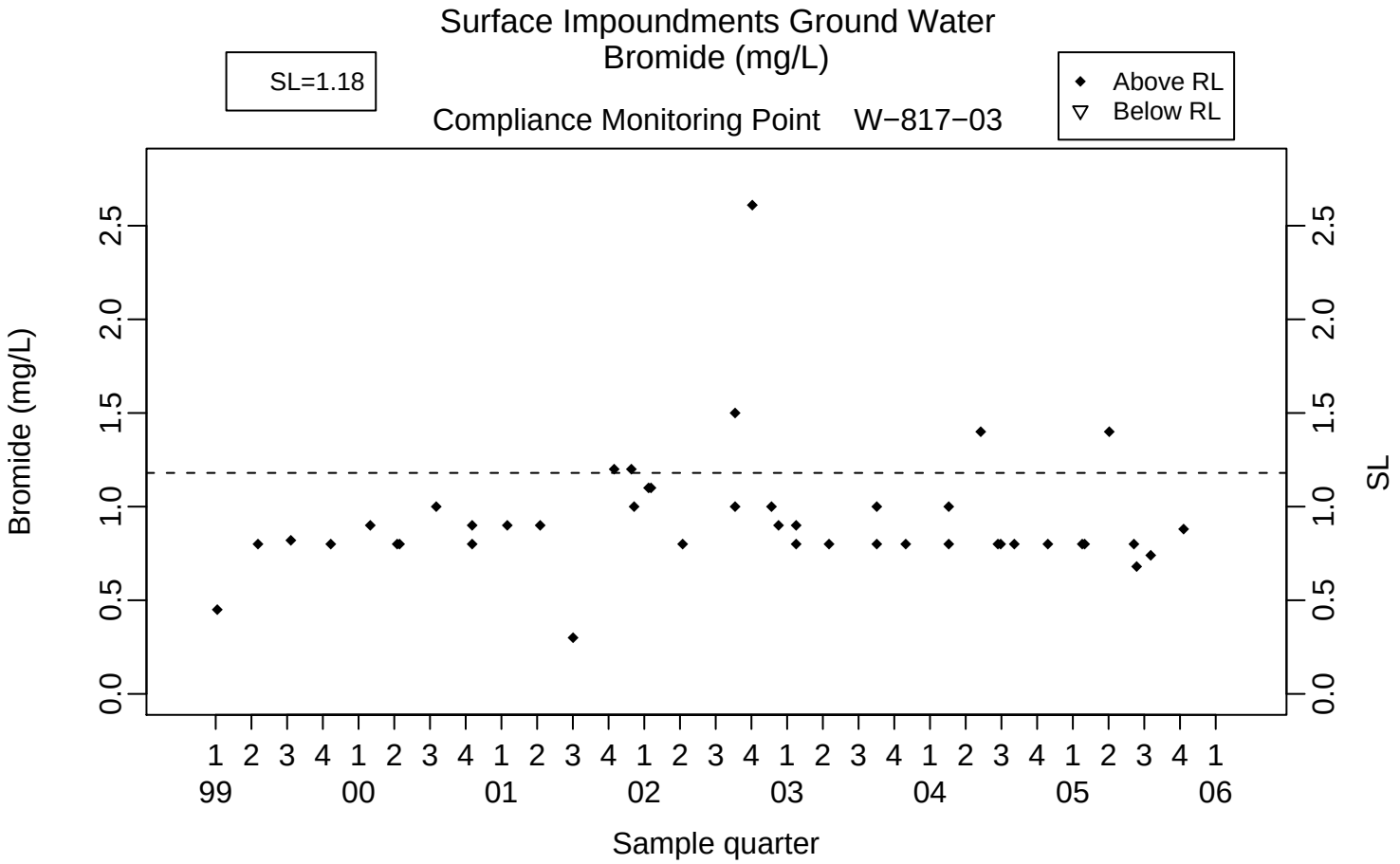

Surface Impoundments Ground Water
Bicarbonate Alk (as CaCO3) (mg/L)
SL=277
Above RL
Below RL
Compliance Monitoring Point W−817−03
Bicarbonate Alk (as CaCO3) (mg/L)
SL
0
50
100
150
200
250
300
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

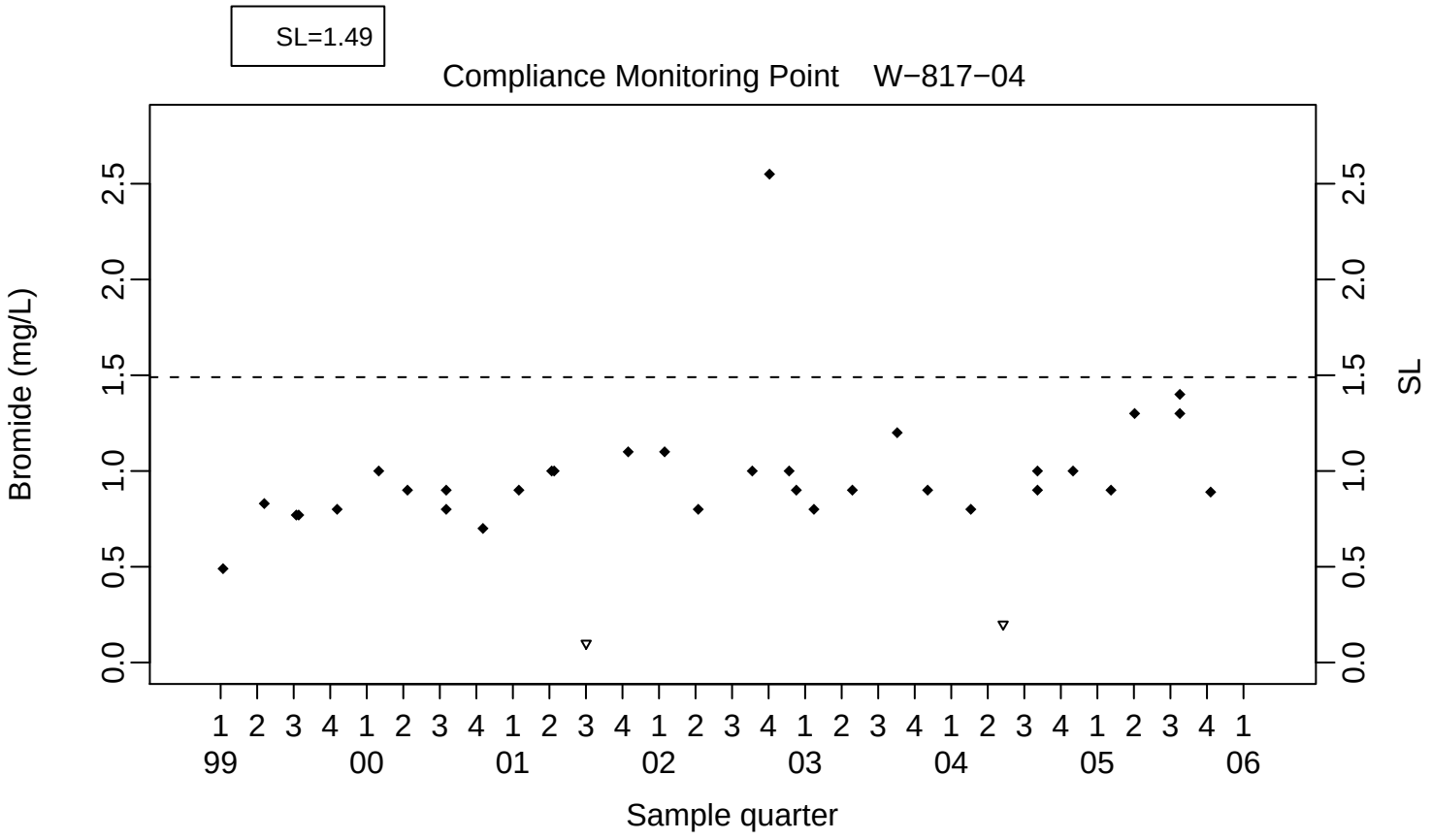

SL=277
Compliance Monitoring Point W−817−04
Bicarbonate Alk (as CaCO3) (mg/L)
SL
0
50
100
150
200
250
300
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

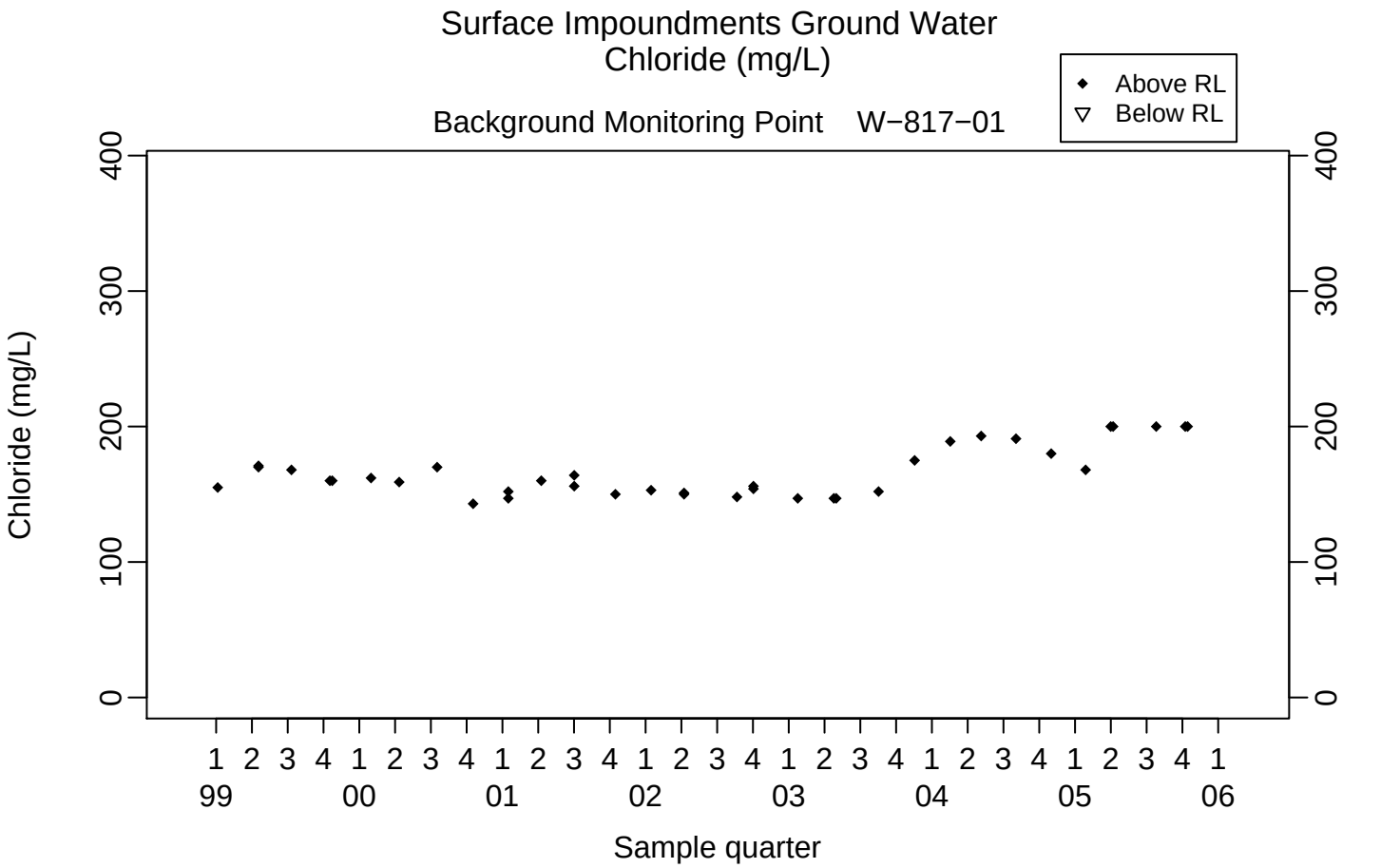
Surface Impoundments Ground Water
Bromide (mg/L)

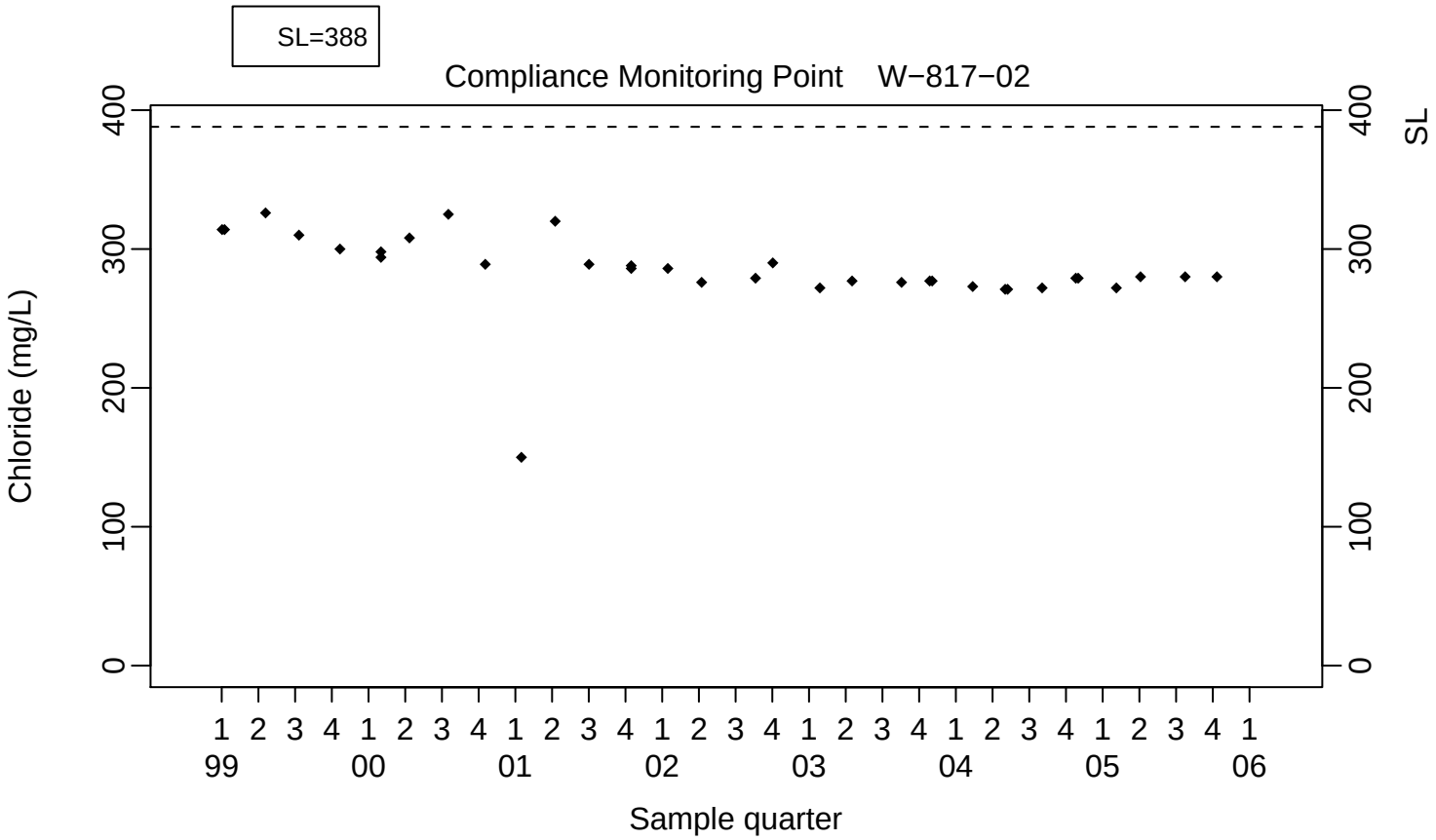


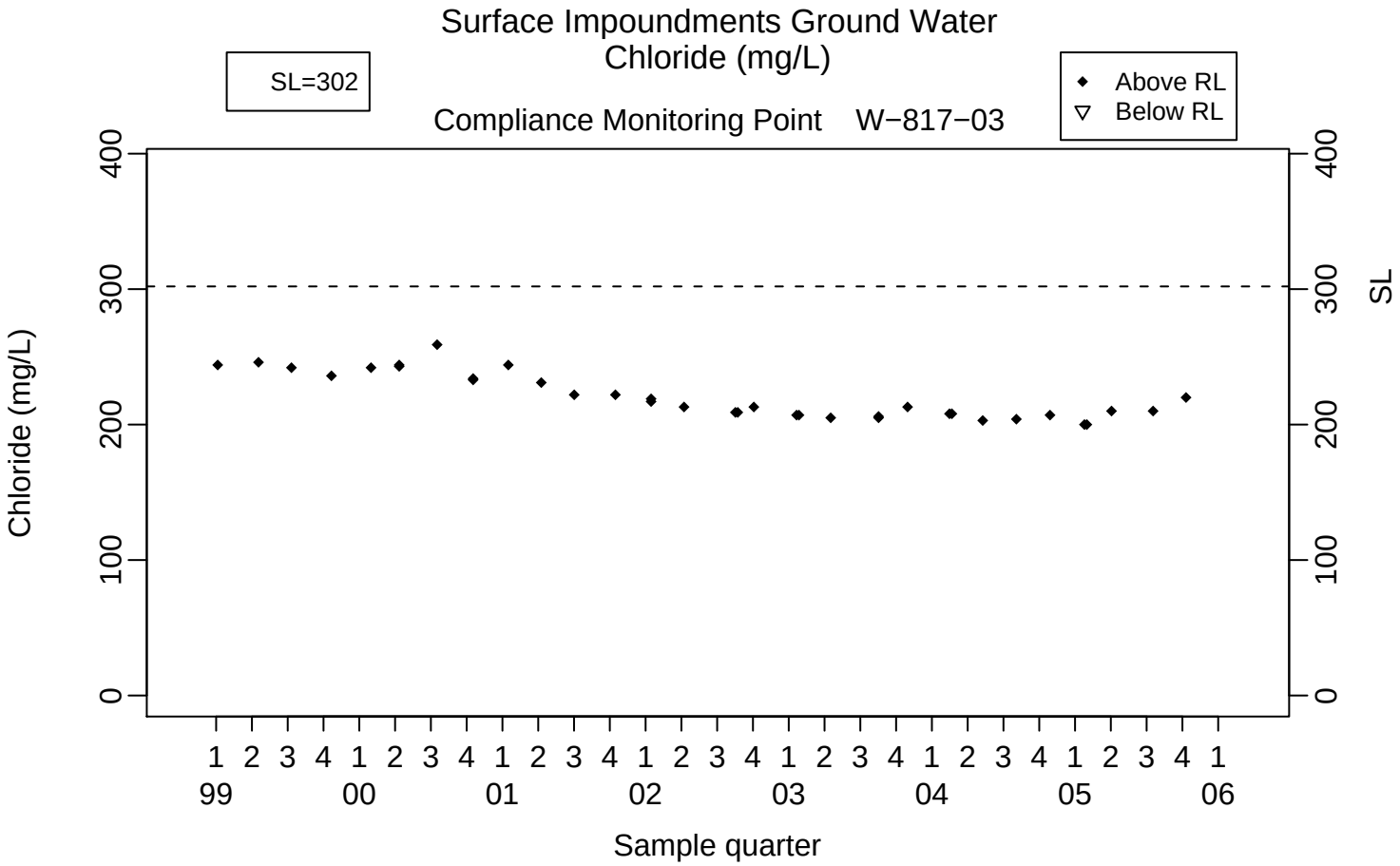


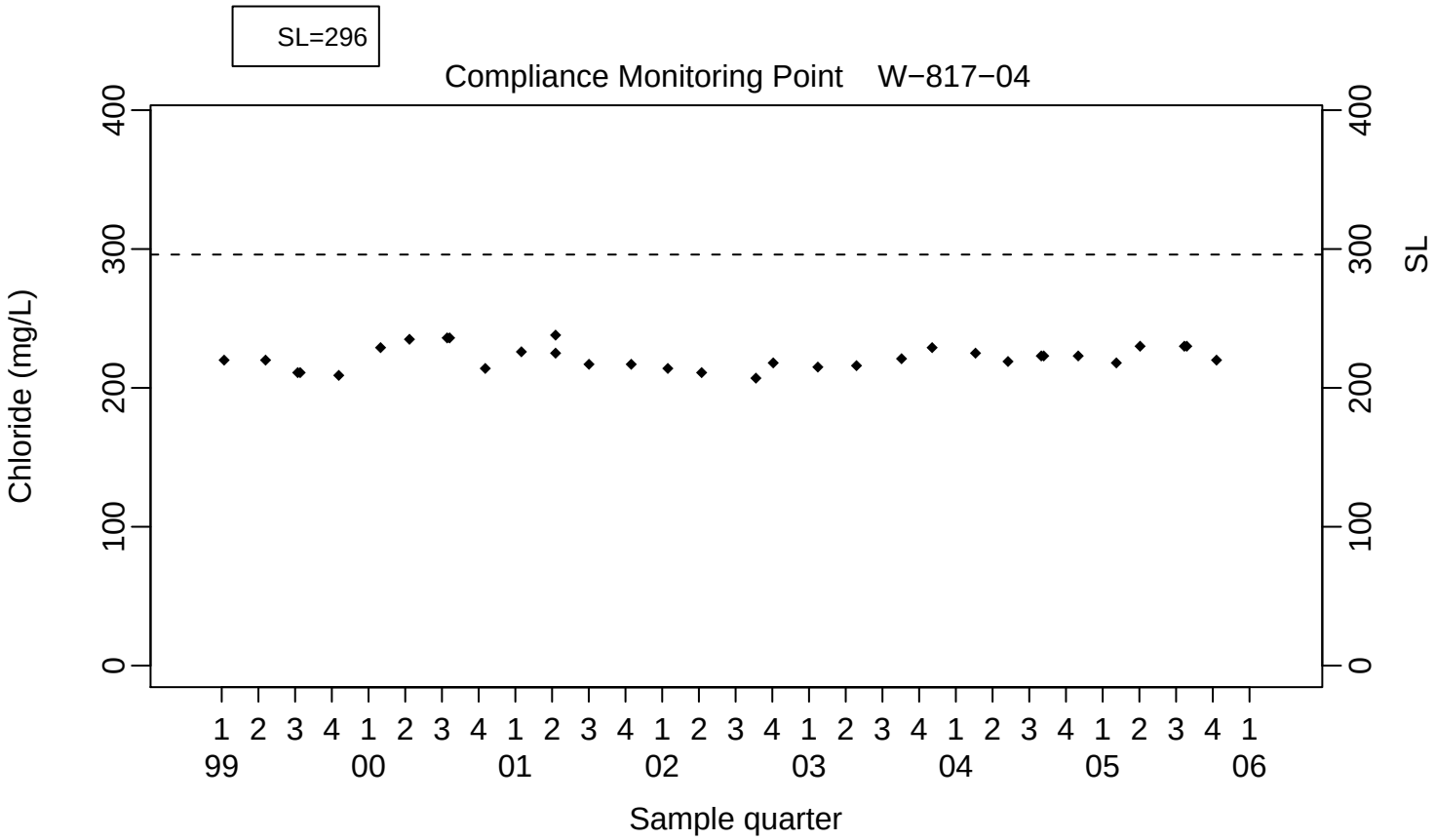

Surface Impoundments Ground Water
Bromide (mg/L)
SL=1.18
Above RL
Below RL
Compliance Monitoring Point W−817−03
Bromide (mg/L)
SL
0.0
0.5
1.0
1.5
2.0
2.5
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

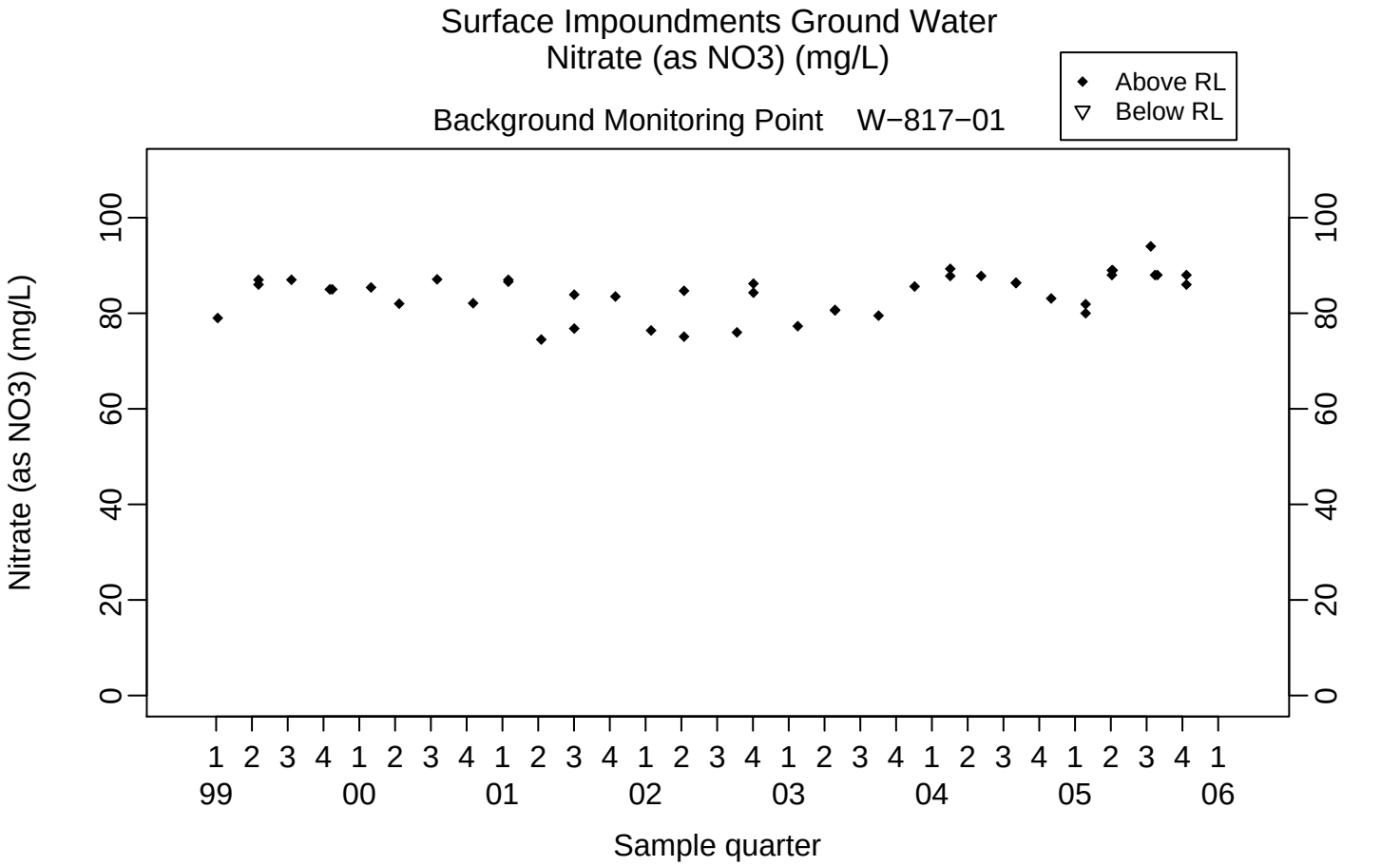

SL=1.49
Compliance Monitoring Point W−817−04
Bromide (mg/L)
SL
0.0
0.5
1.0
1.5
2.0
2.5
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

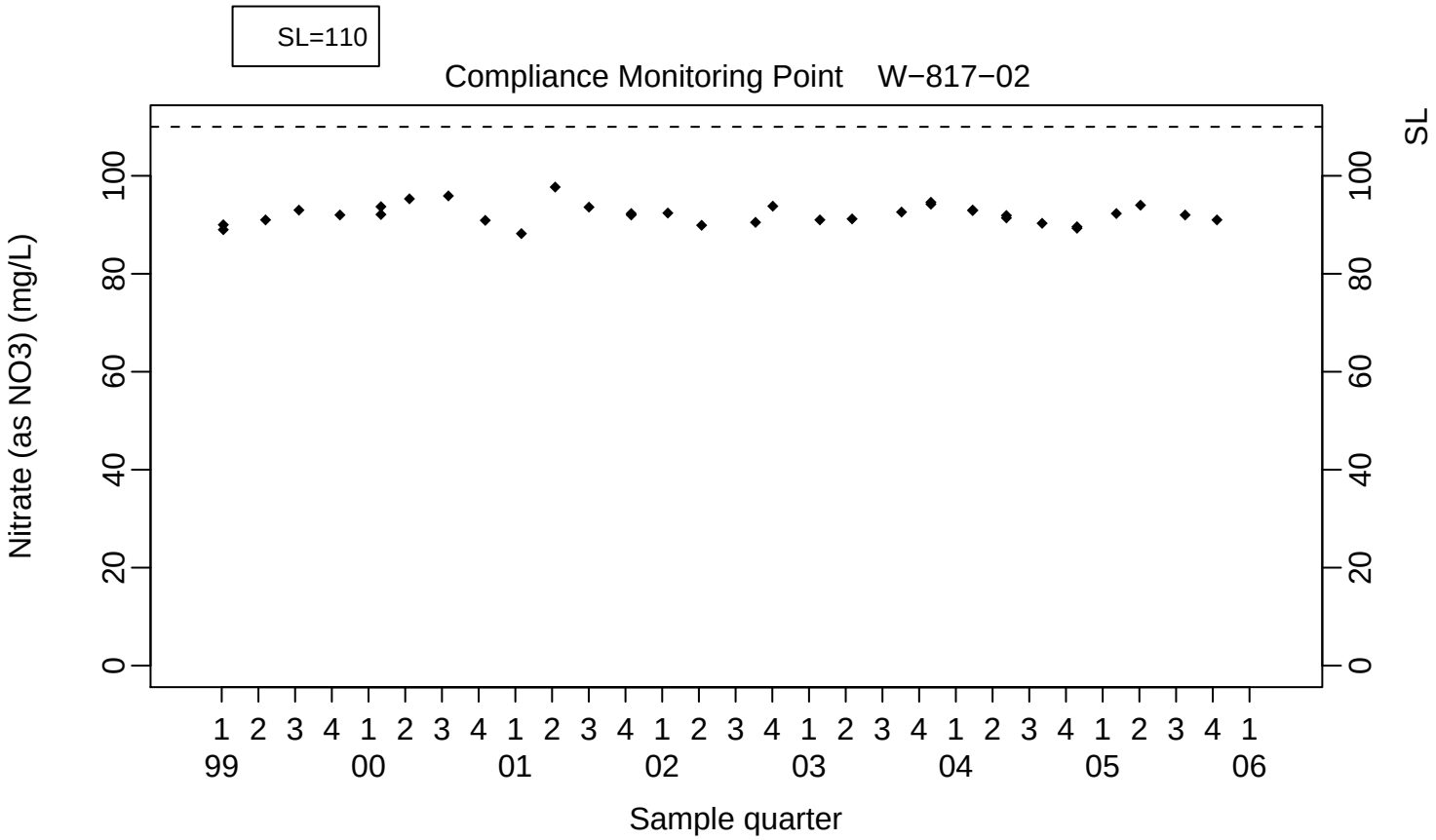

Surface Impoundments Ground Water
Chloride (mg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Chloride (mg/L)
0
100
200
300
400
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

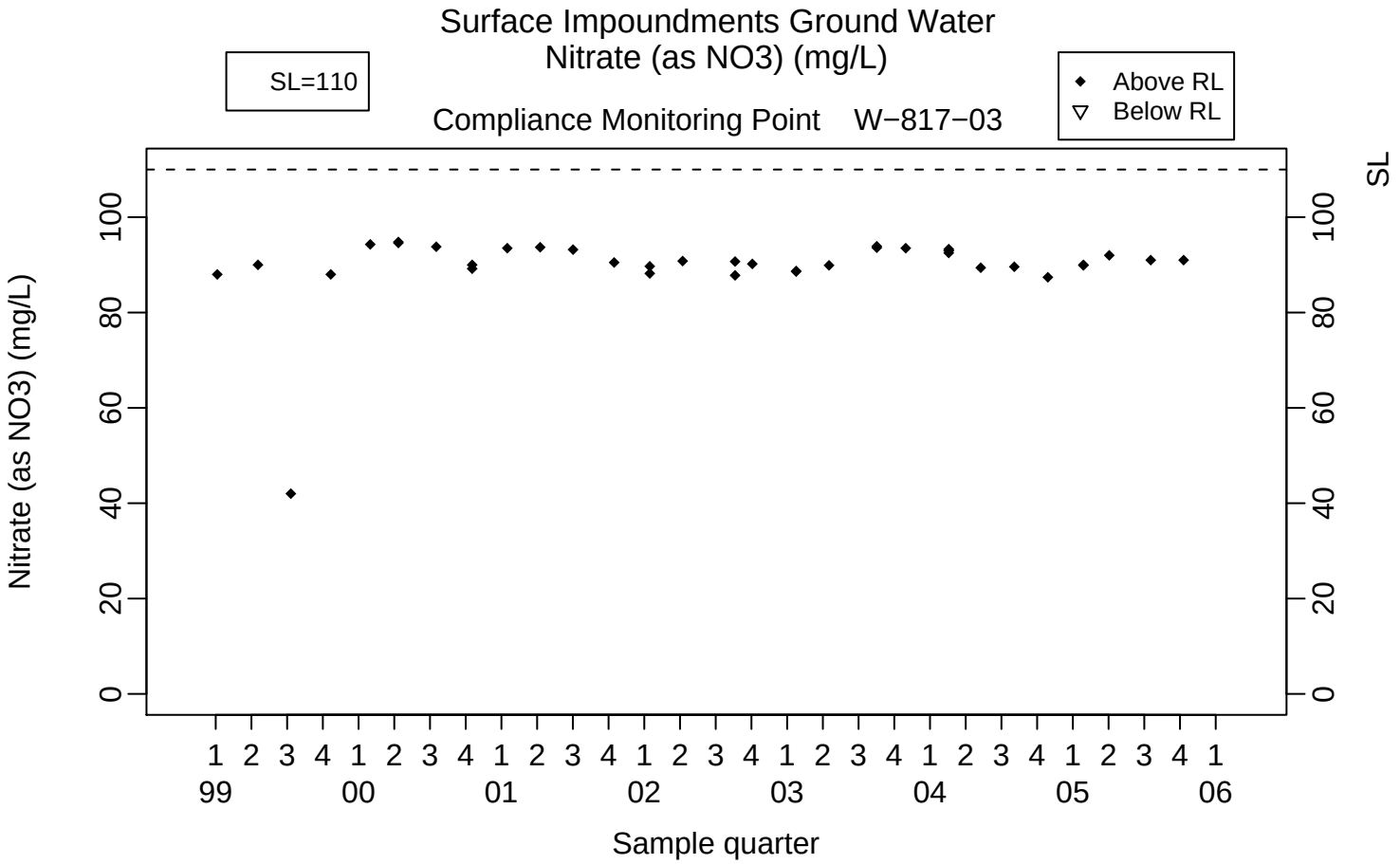

SL=388
Compliance Monitoring Point W−817−02
SL
Chloride (mg/L)
0
100
200
300
400
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

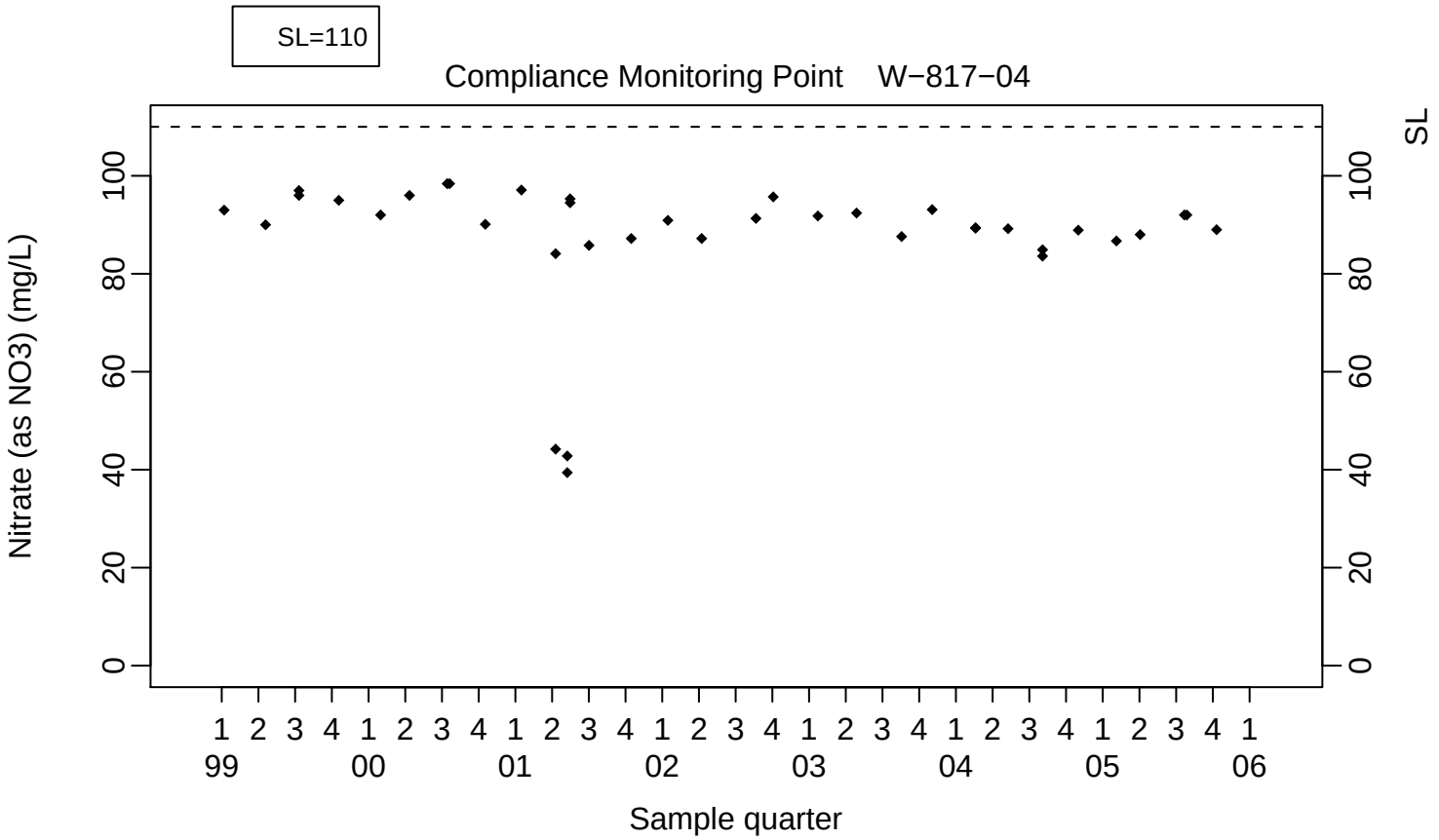

Surface Impoundments Ground Water
Chloride (mg/L)
SL=302
Above RL
Below RL
Compliance Monitoring Point W−817−03
Chloride (mg/L)
SL
0
100
200
300
400
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

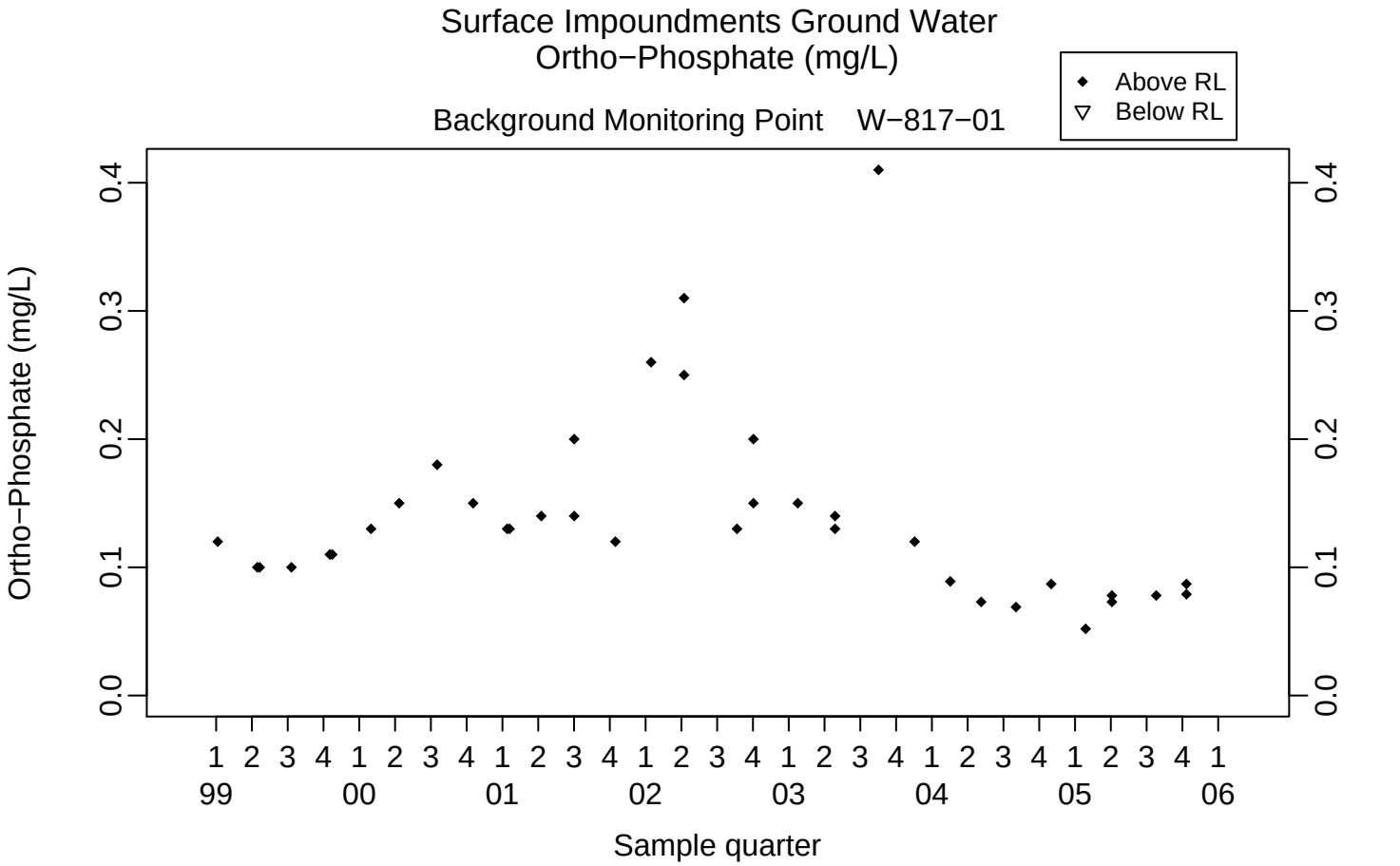

SL=296
Compliance Monitoring Point W−817−04
Chloride (mg/L)
SL
0
100
200
300
400
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

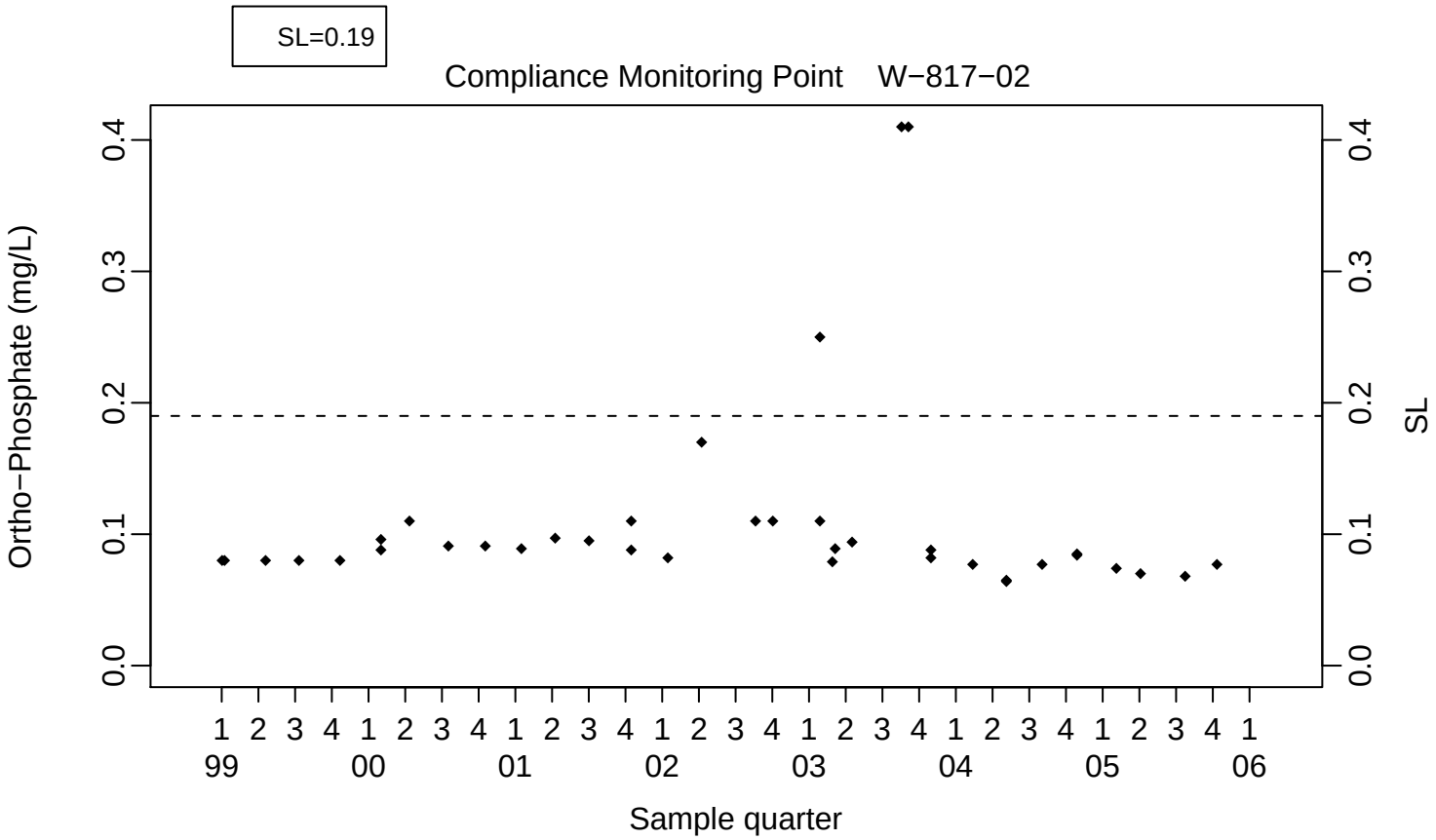

Surface Impoundments Ground Water
Nitrate (as NO3) (mg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Nitrate (as NO3) (mg/L)
0
20
40
60
80
100
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

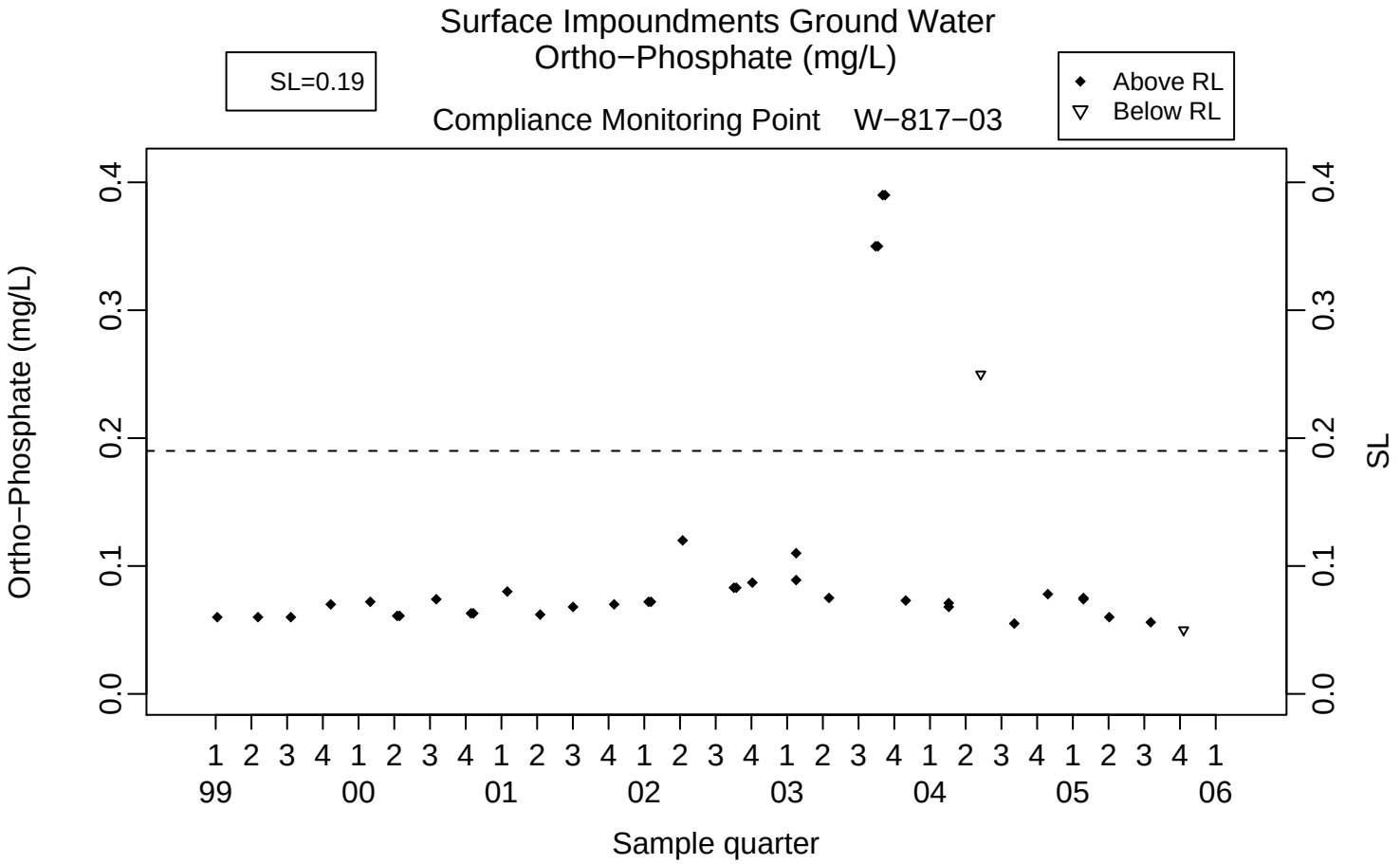

SL=110
Compliance Monitoring Point W−817−02
SL
Nitrate (as NO3) (mg/L)
0
20
40
60
80
100
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

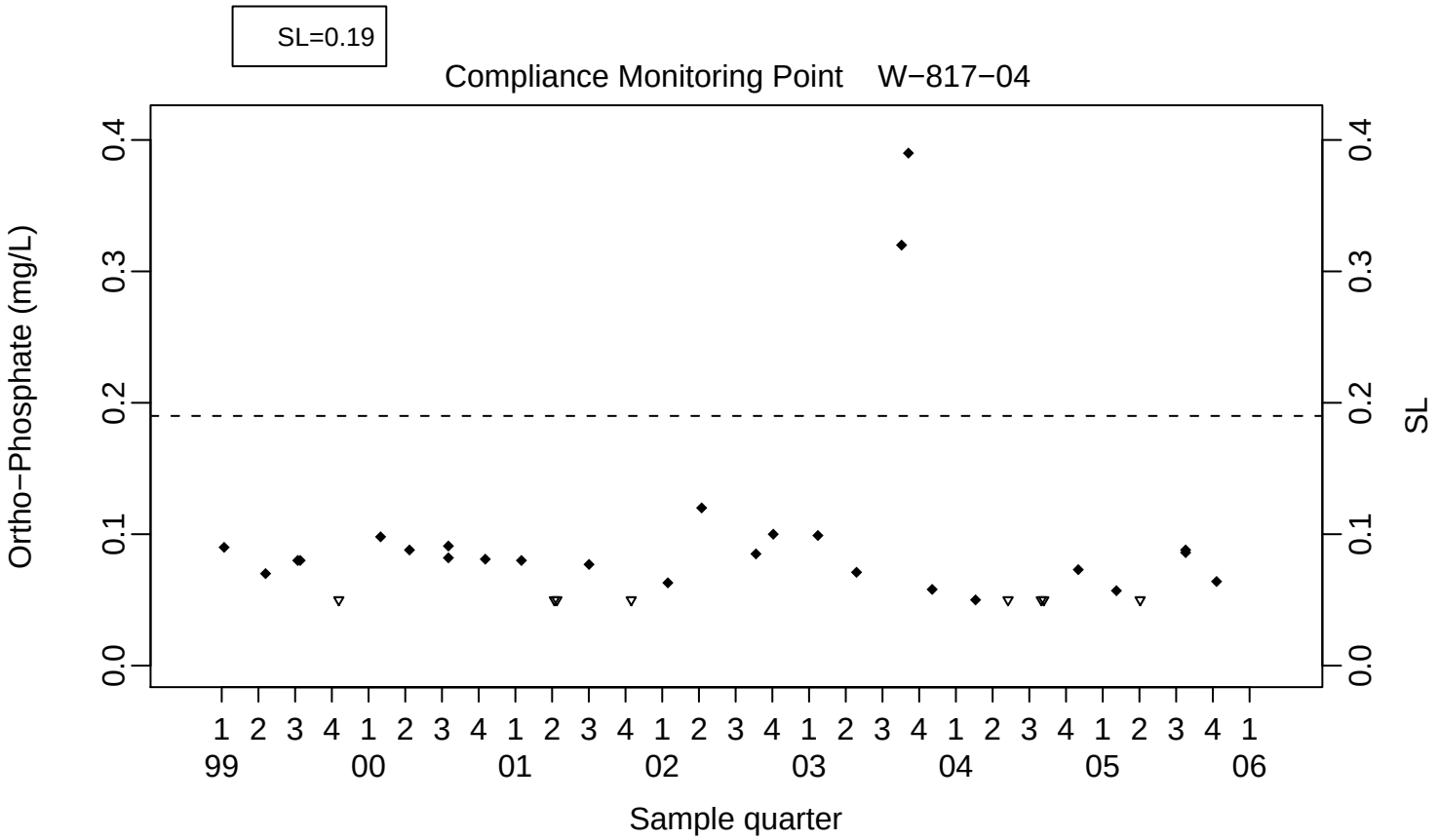

Surface Impoundments Ground Water
Nitrate (as NO3) (mg/L)
SL=110
Above RL
Below RL
Compliance Monitoring Point W−817−03
Nitrate (as NO3) (mg/L)
SL
0
20
40
60
80
100
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

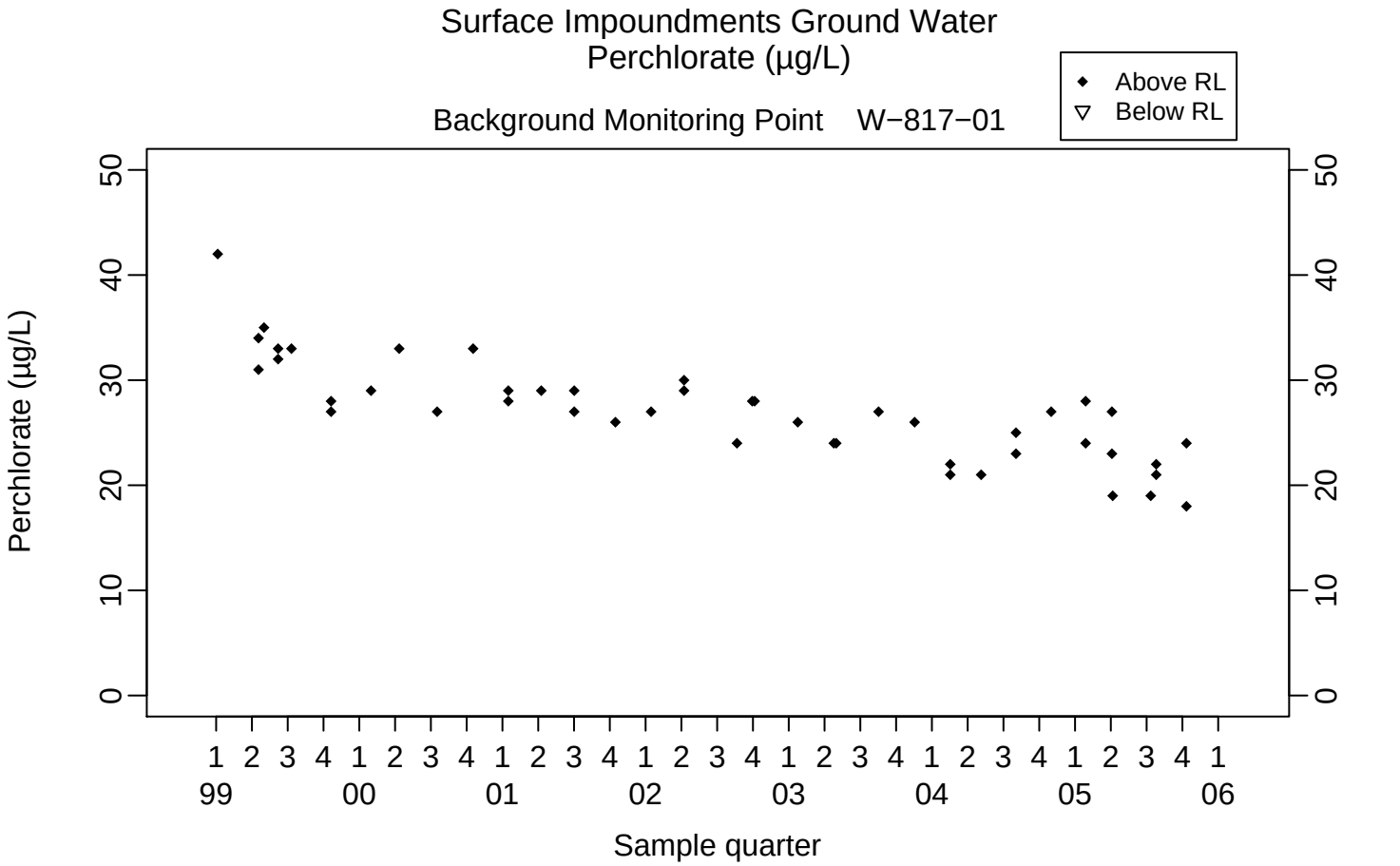

SL=110
Compliance Monitoring Point W−817−04
Nitrate (as NO3) (mg/L)
SL
0
20
40
60
80
100
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

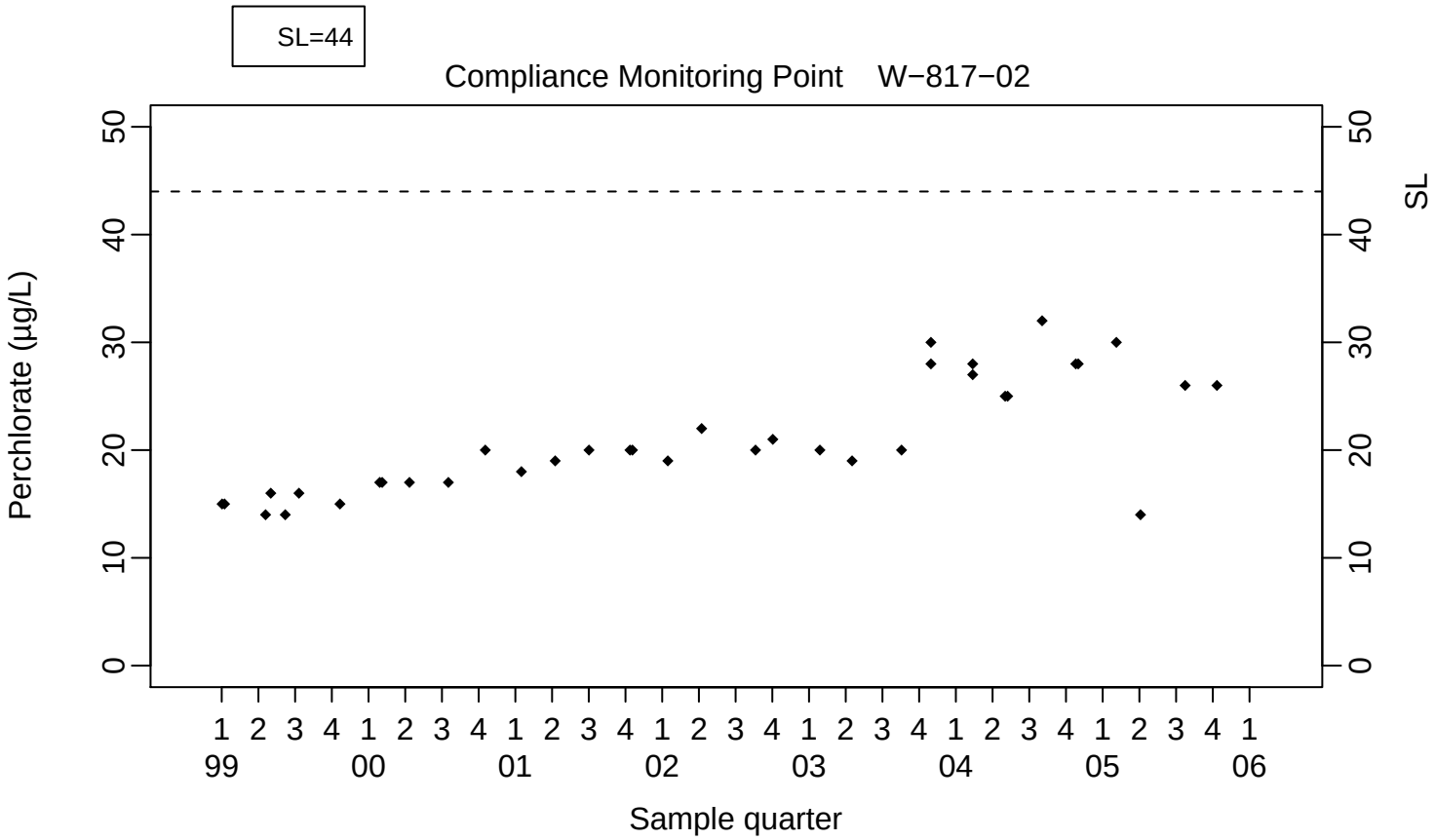

Surface Impoundments Ground Water
Ortho−Phosphate (mg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Ortho−Phosphate (mg/L)
0.0
0.1
0.2
0.3
0.4
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

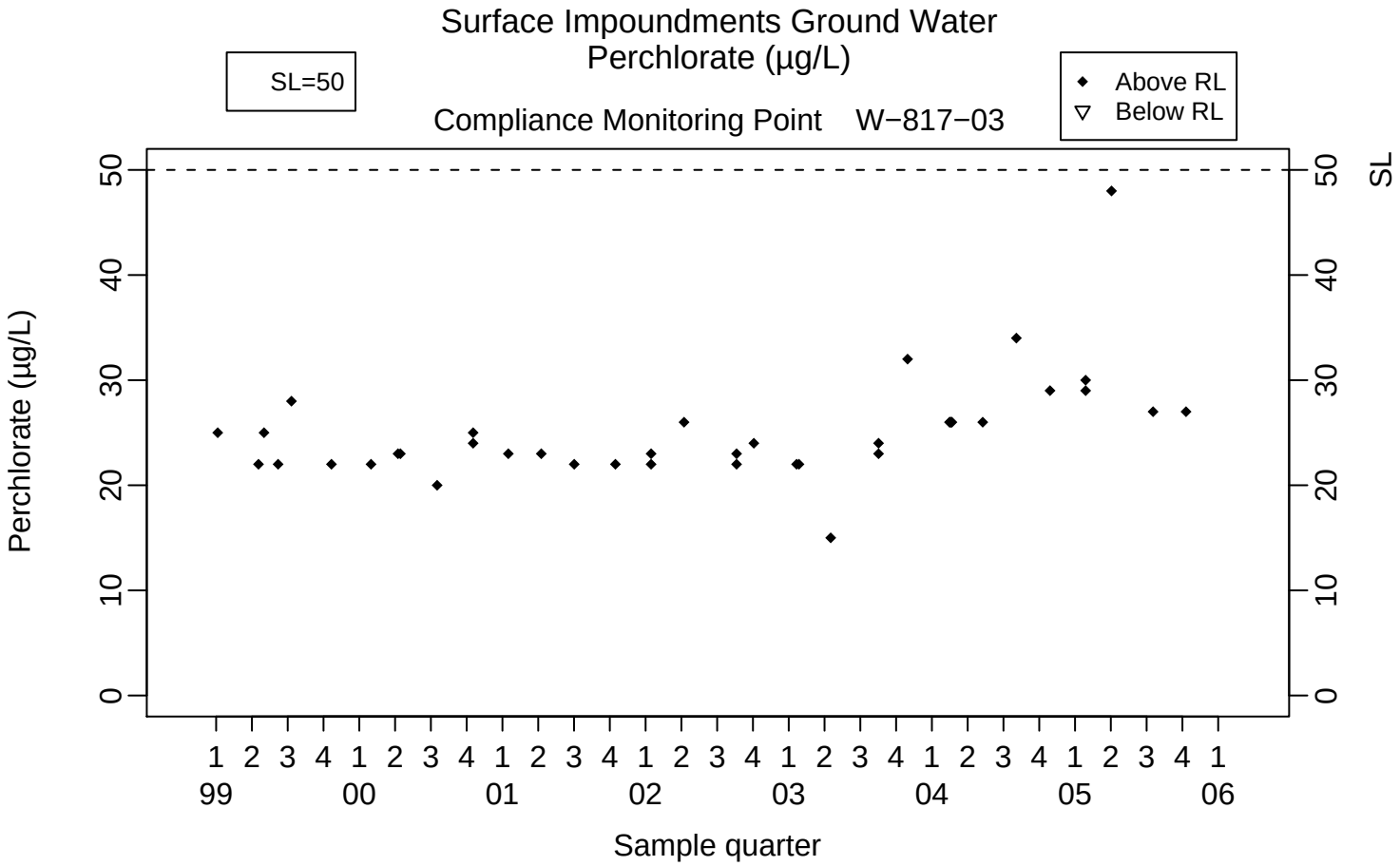

SL=0.19
Compliance Monitoring Point W−817−02
Ortho−Phosphate (mg/L)
0.0
0.1
0.2
0.3
0.4
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

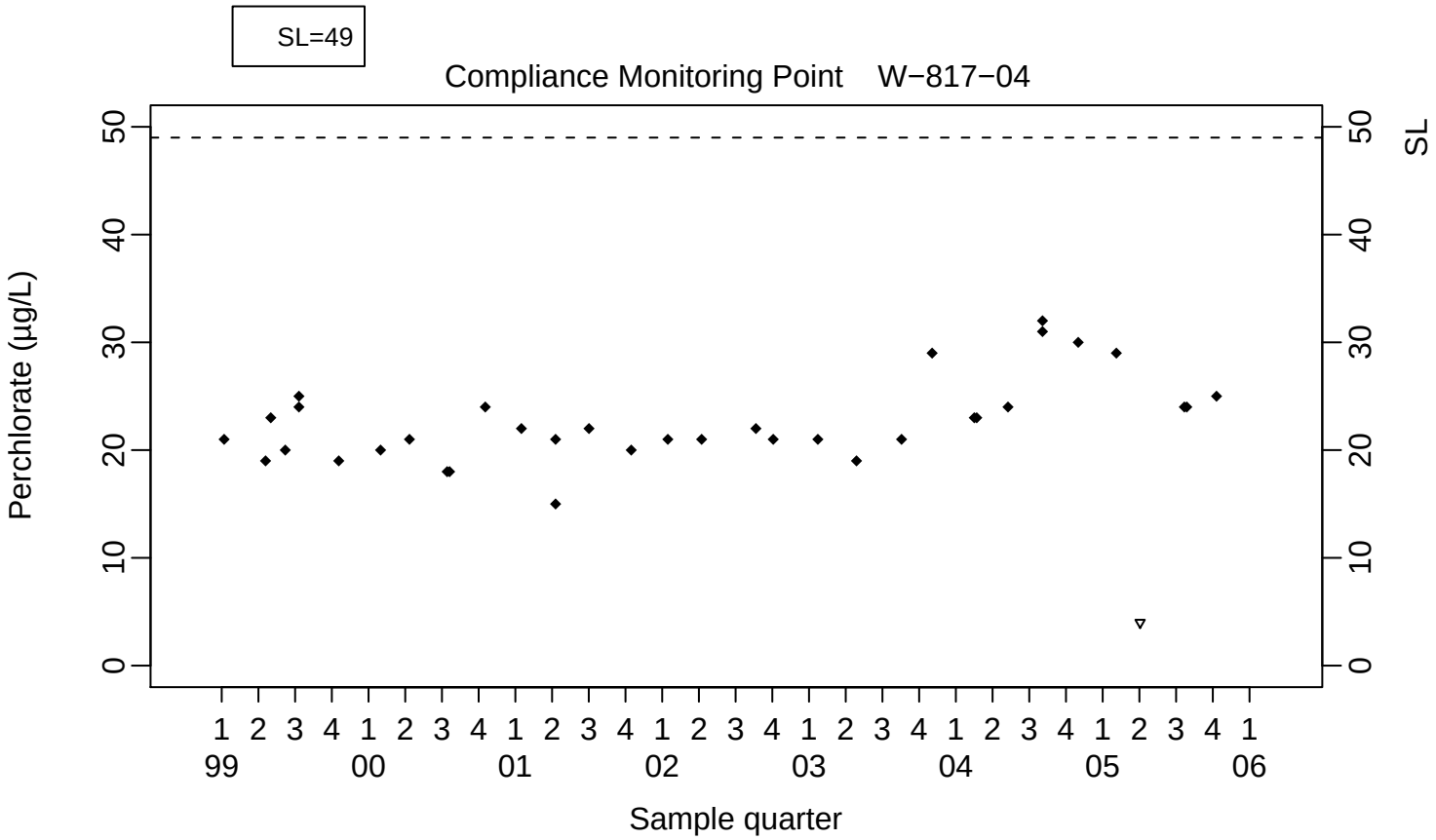

Surface Impoundments Ground Water
Ortho−Phosphate (mg/L)
SL=0.19
Above RL
Below RL
Compliance Monitoring Point W−817−03
Ortho−Phosphate (mg/L)
SL
0.0
0.1
0.2
0.3
0.4
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

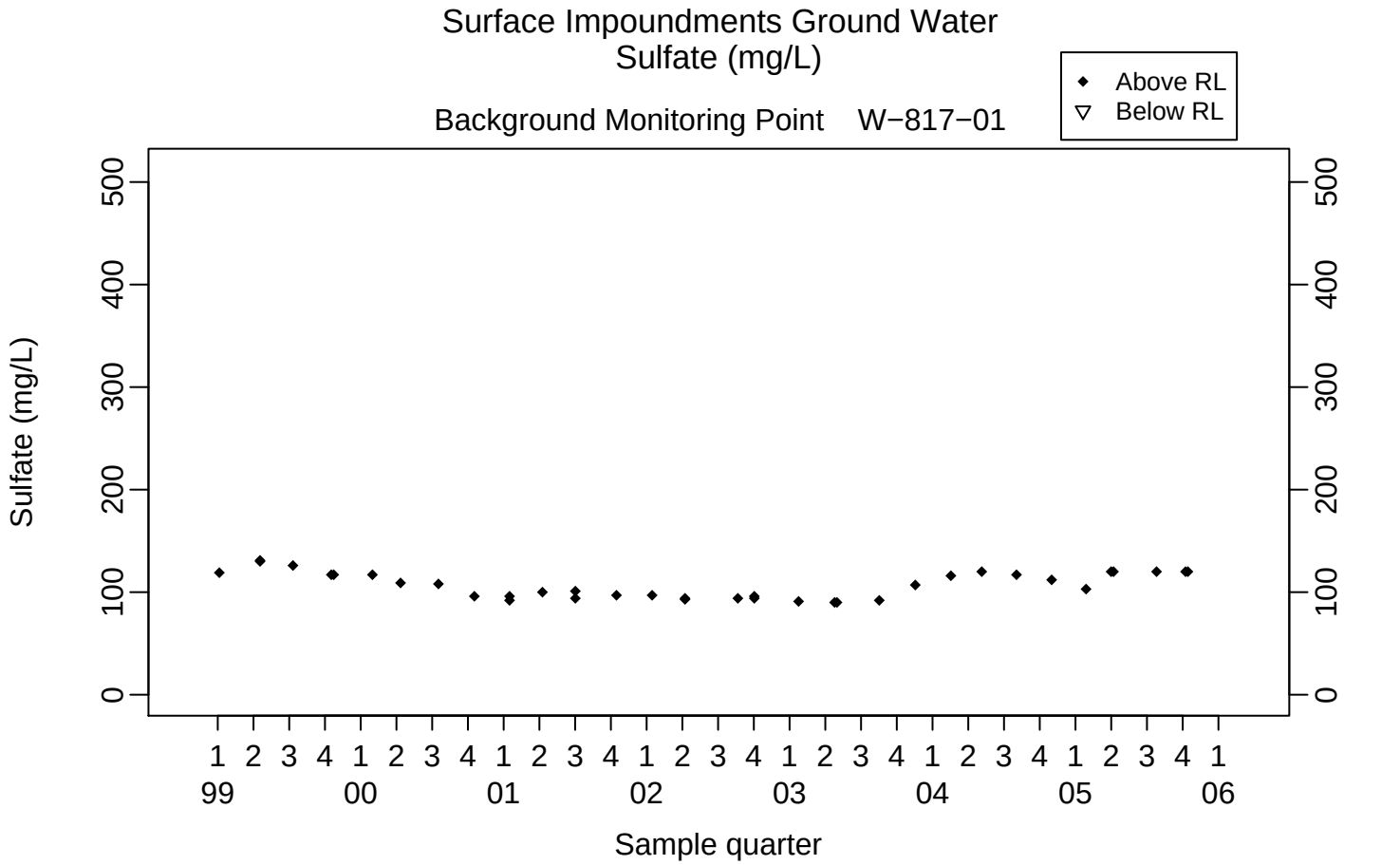

SL=0.19
Compliance Monitoring Point W−817−04
Ortho−Phosphate (mg/L)
SL
0.0
0.1
0.2
0.3
0.4
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

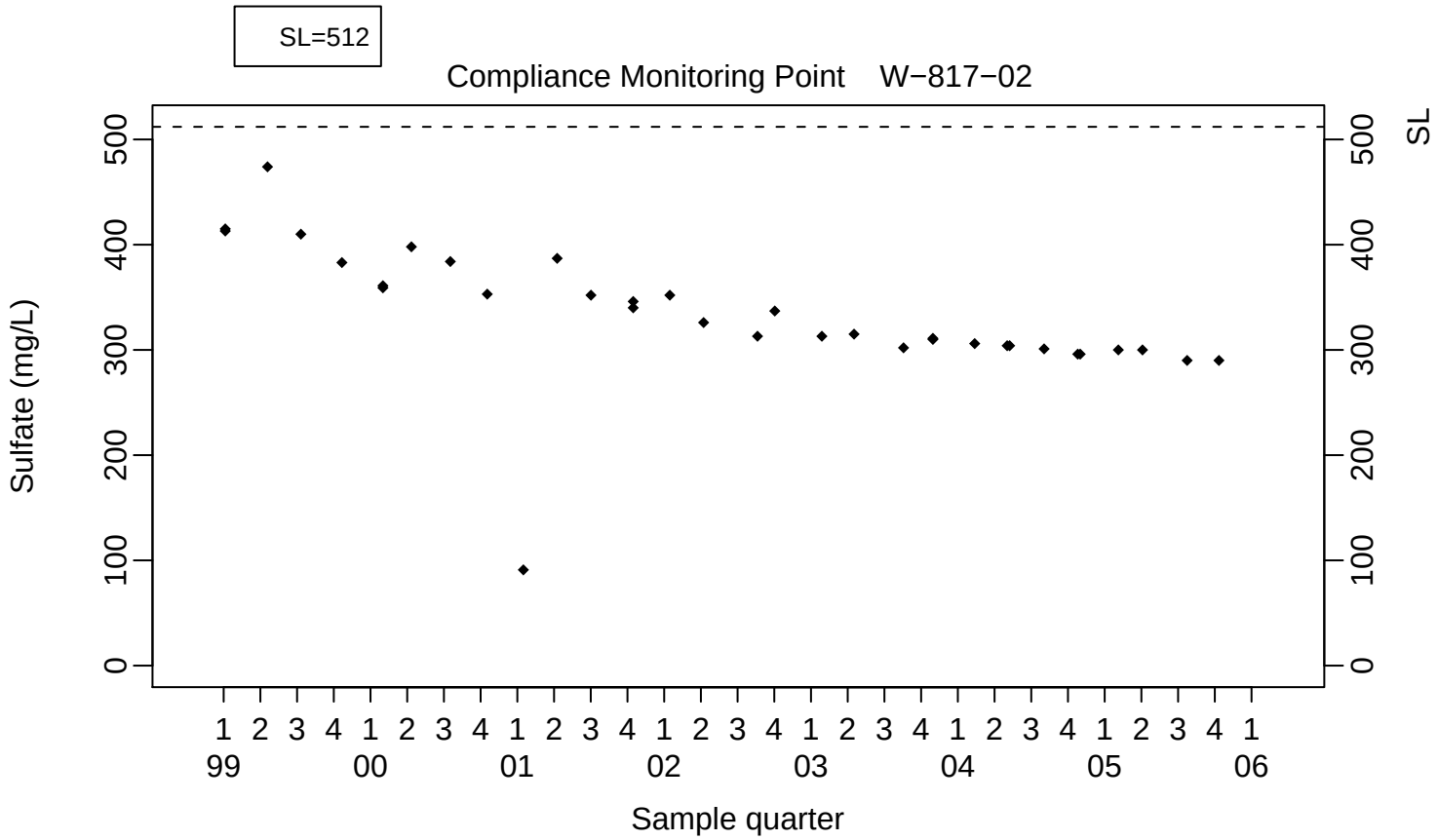

Surface Impoundments Ground Water
Perchlorate (µg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Perchlorate (µg/L)
0
10
20
30
40
50
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

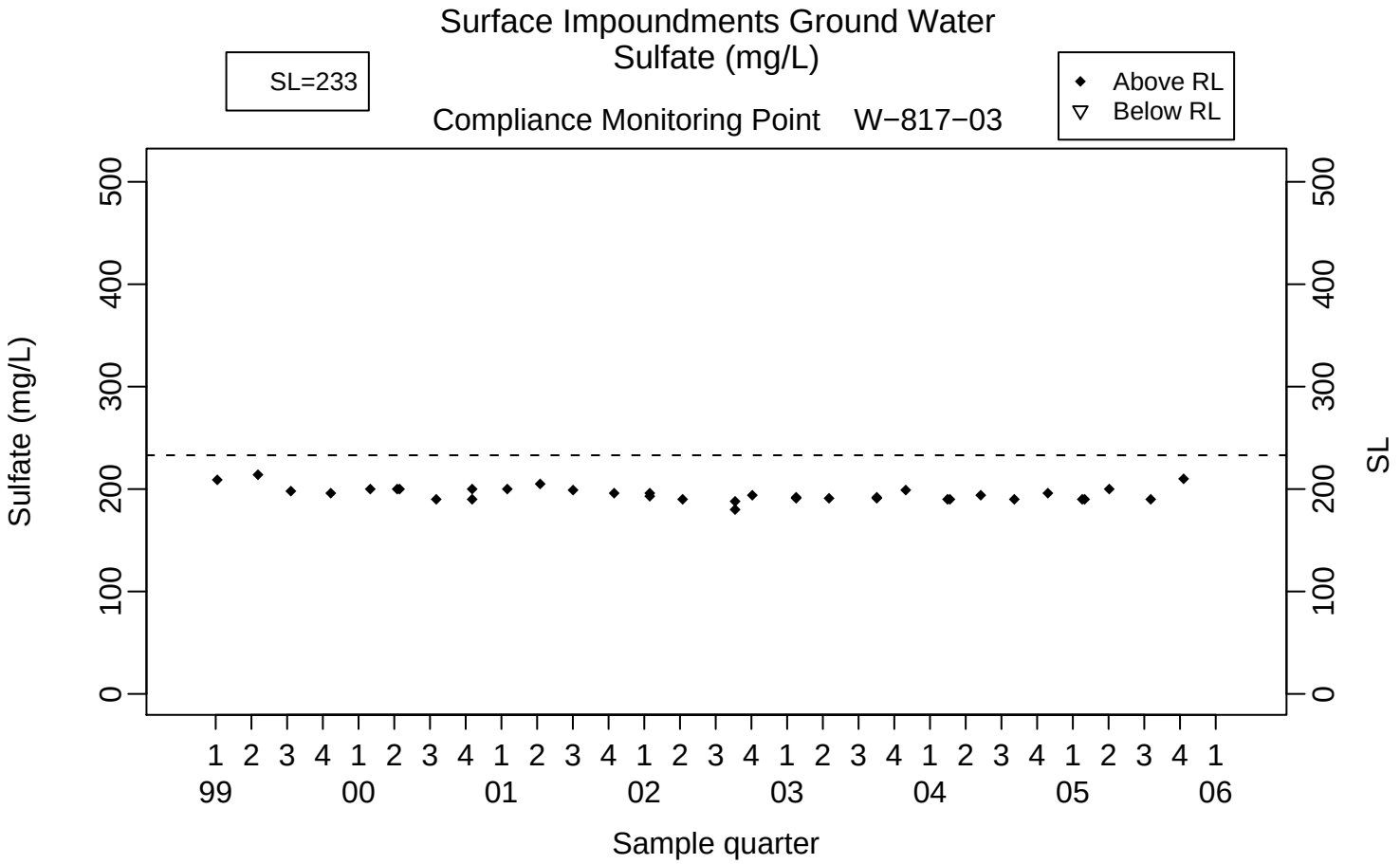

SL=44
Compliance Monitoring Point W−817−02
Perchlorate (µg/L)
SL
0
10
20
30
40
50
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

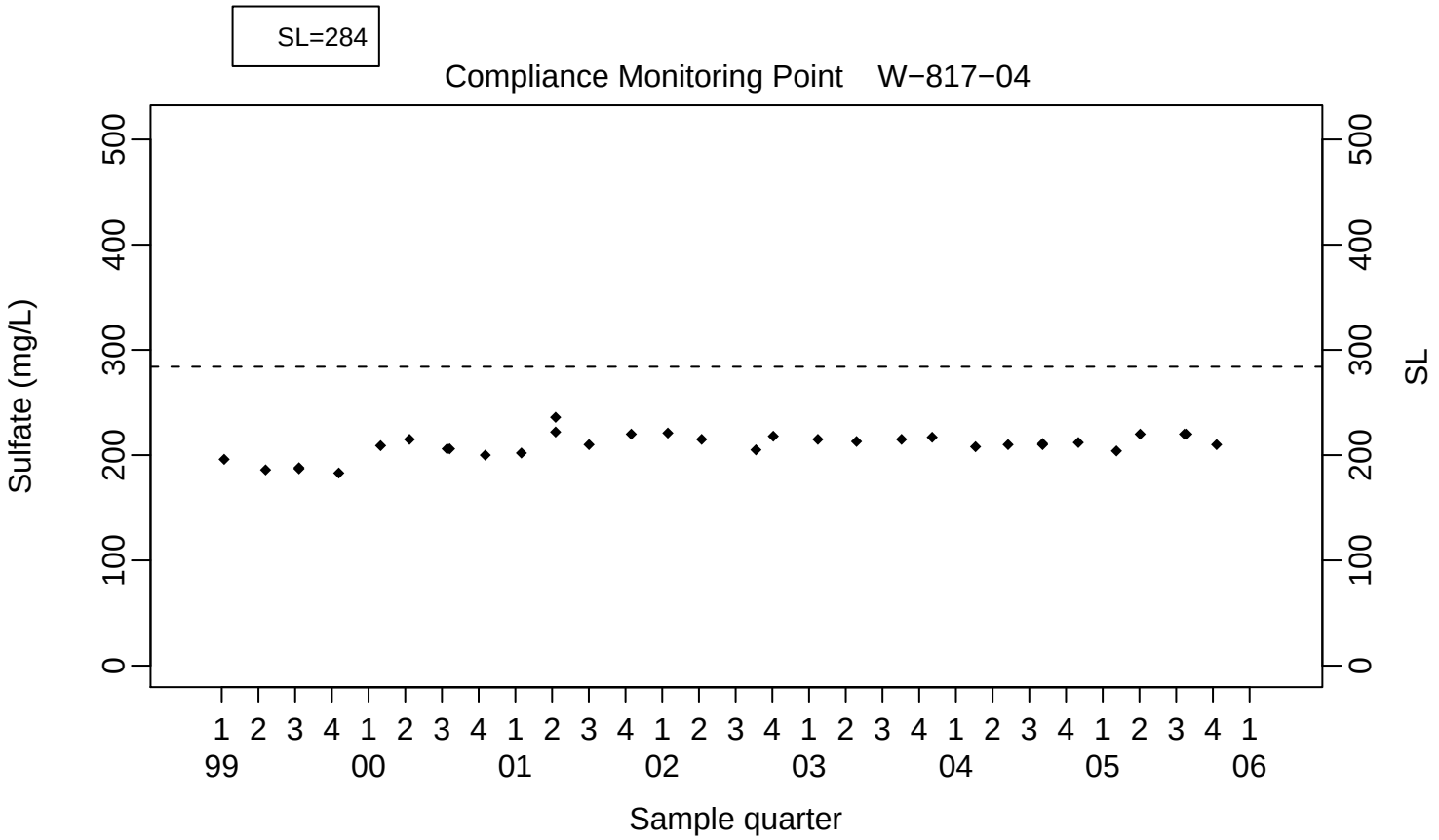

Surface Impoundments Ground Water
Perchlorate (µg/L)
SL=50
Above RL
Below RL
Compliance Monitoring Point W−817−03
Perchlorate (µg/L)
SL
0
10
20
30
40
50
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

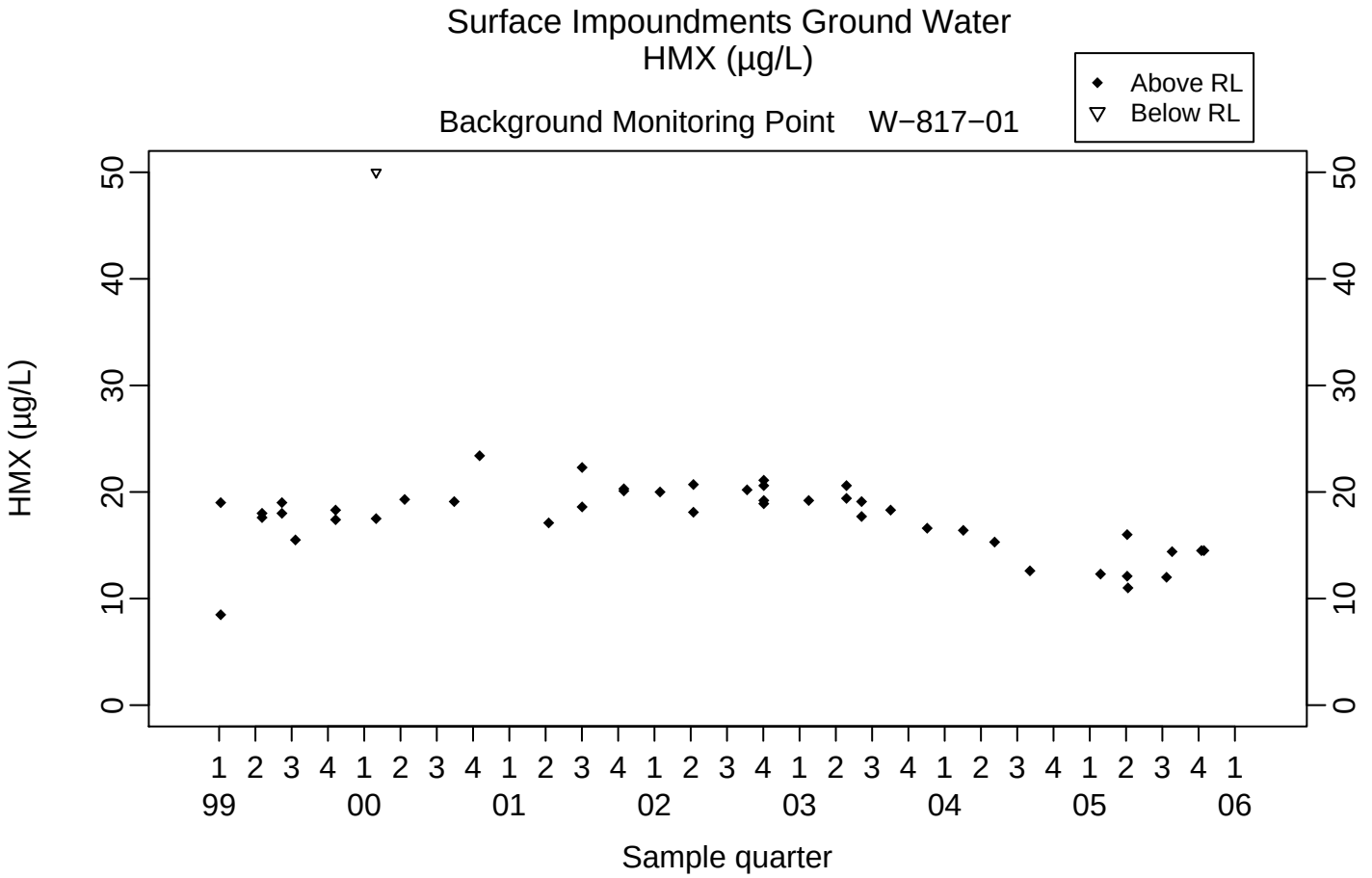

SL=49
Compliance Monitoring Point W−817−04
Perchlorate (µg/L)
SL
0
10
20
30
40
50
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

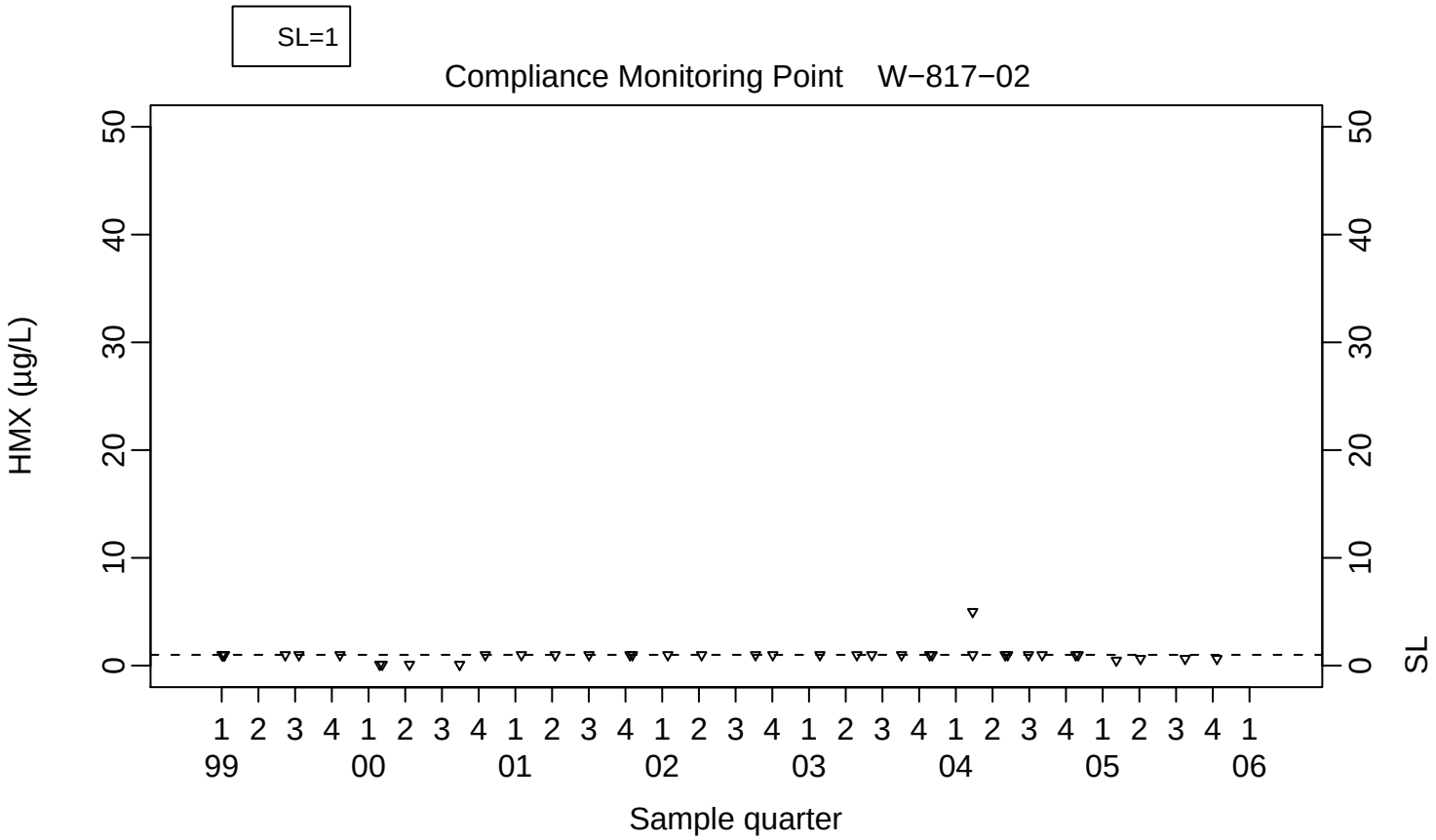

Surface Impoundments Ground Water
Sulfate (mg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
Sulfate (mg/L)
0
100
200
300
400
500
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

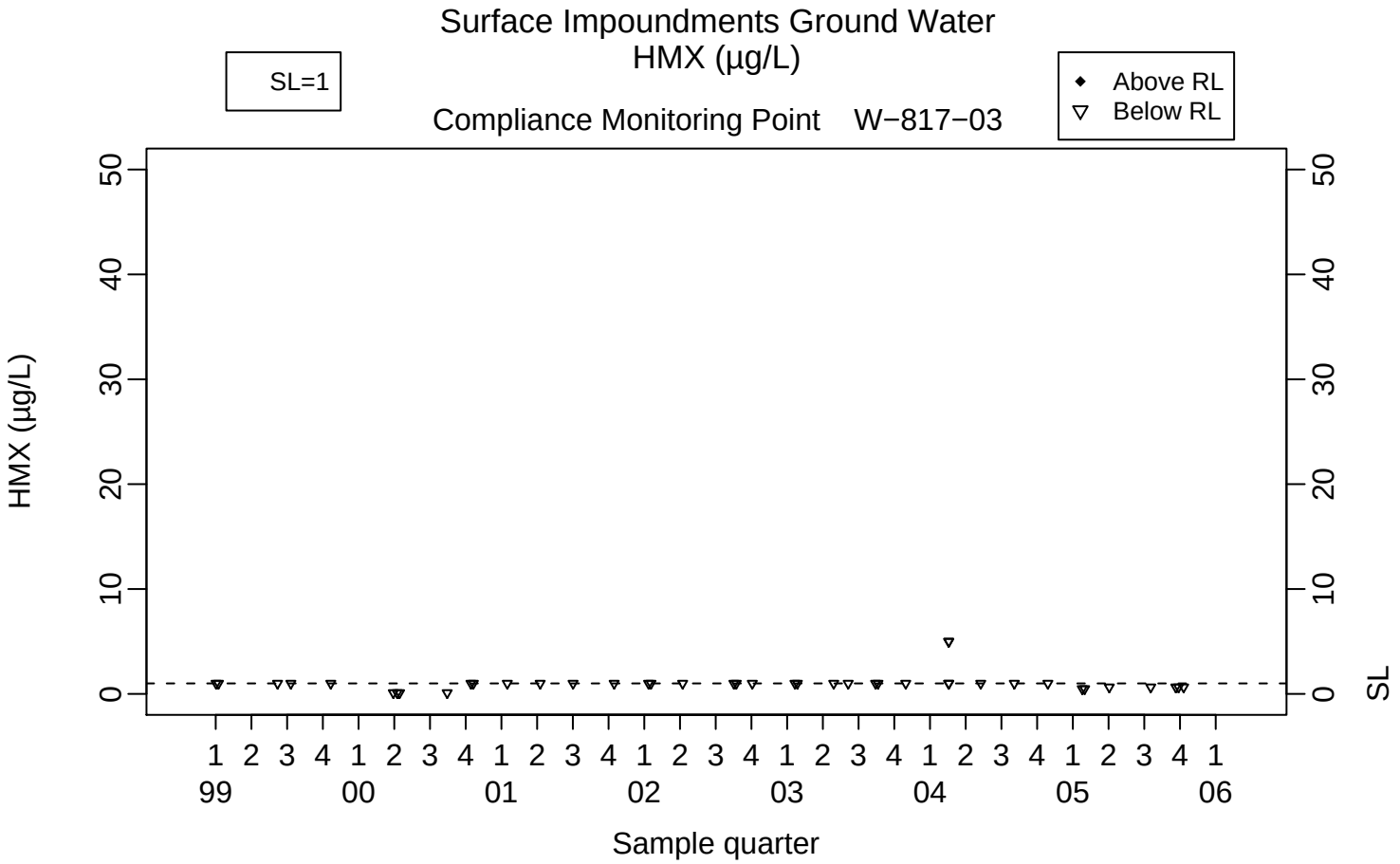

SL=512
Compliance Monitoring Point W−817−02
SL
Sulfate (mg/L)
0
100
200
300
400
500
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

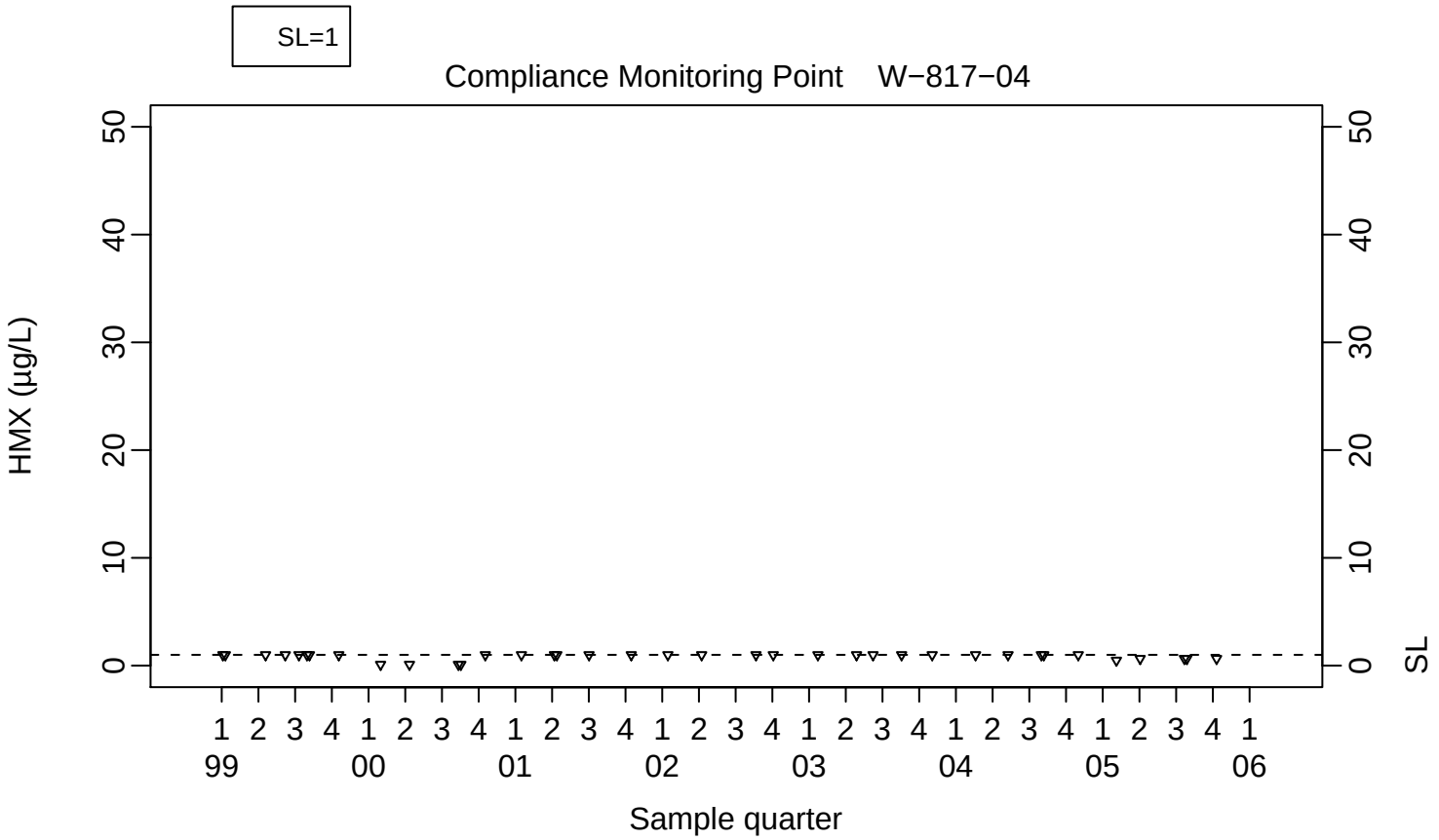

Surface Impoundments Ground Water
Sulfate (mg/L)
SL=233
Above RL
Below RL
Compliance Monitoring Point W−817−03
Sulfate (mg/L)
SL
0
100
200
300
400
500
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

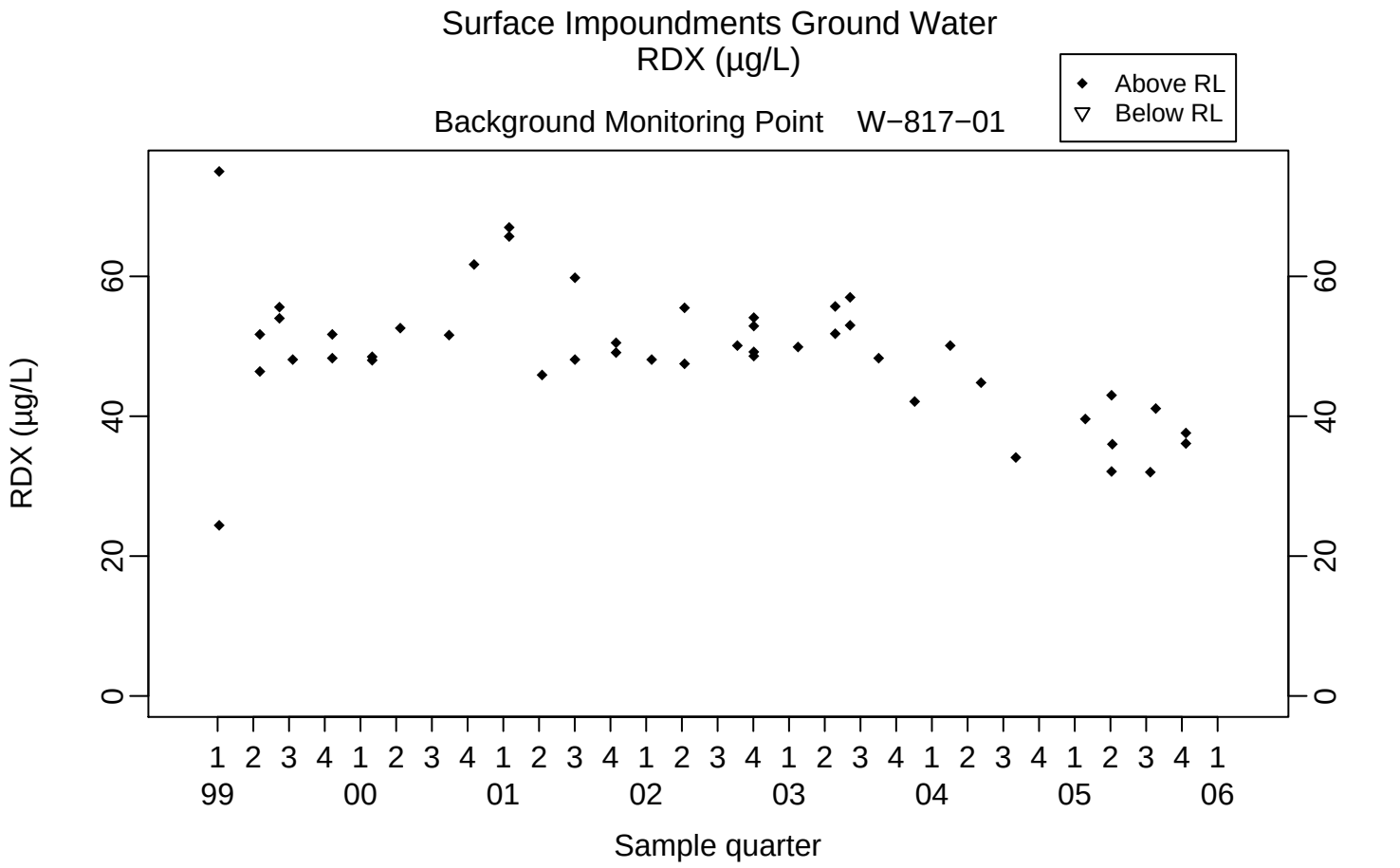

SL=284
Compliance Monitoring Point W−817−04
Sulfate (mg/L)
SL
0
100
200
300
400
500
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

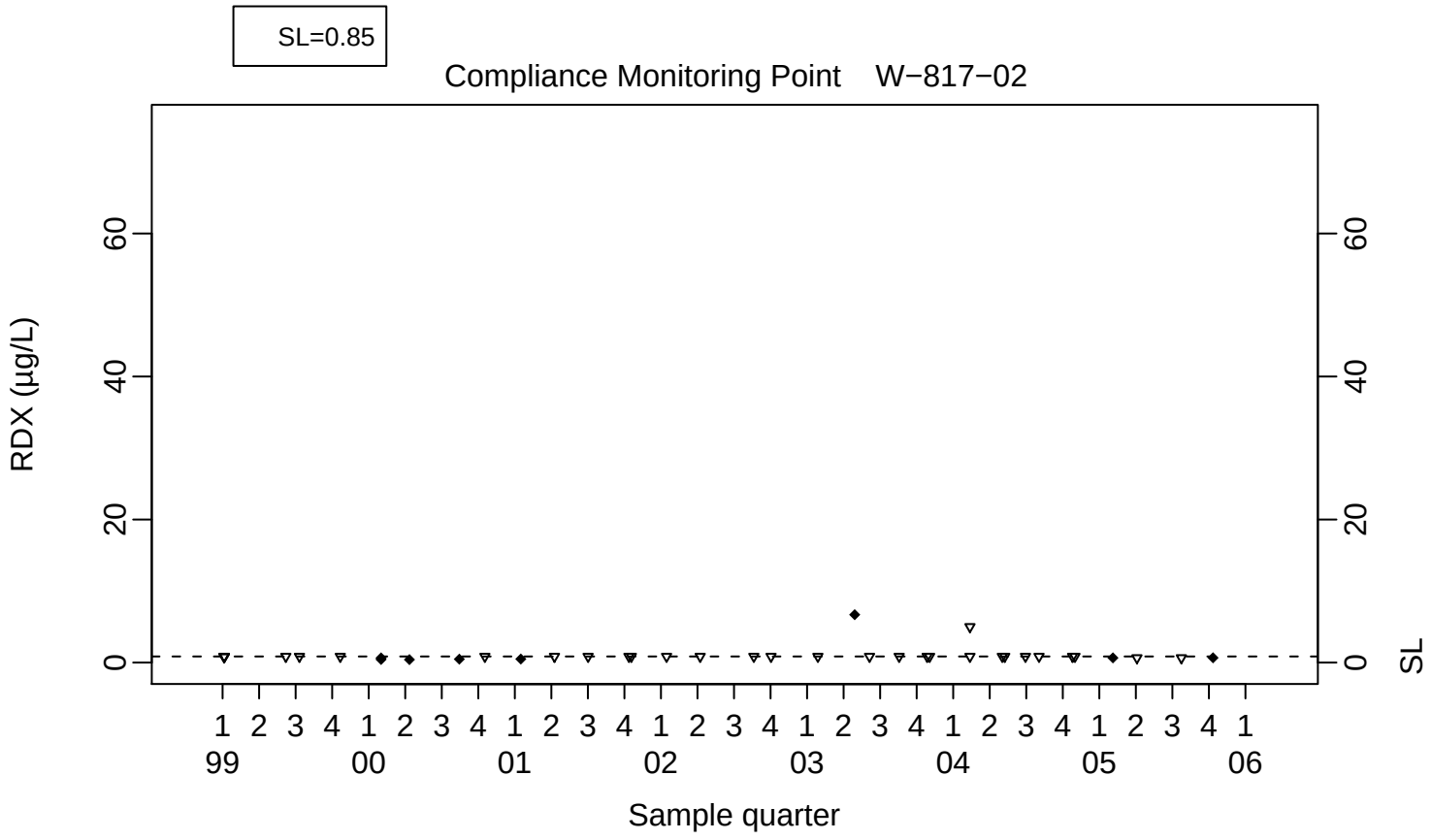

Surface Impoundments Ground Water
HMX (µg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
HMX (µg/L)
0
10
20
30
40
50
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

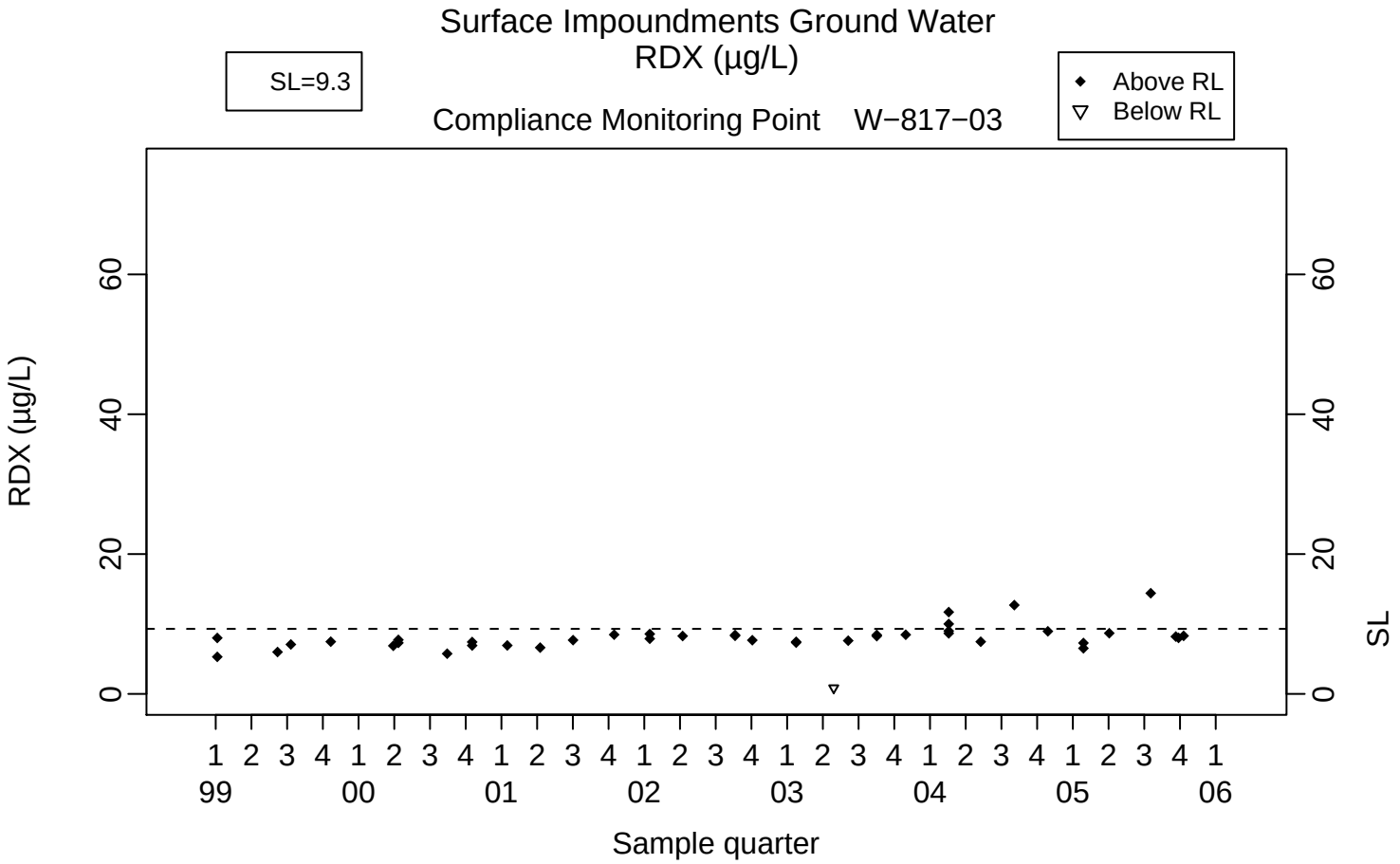

SL=1
Compliance Monitoring Point W−817−02
HMX (µg/L)
0
10
20
30
40
50
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

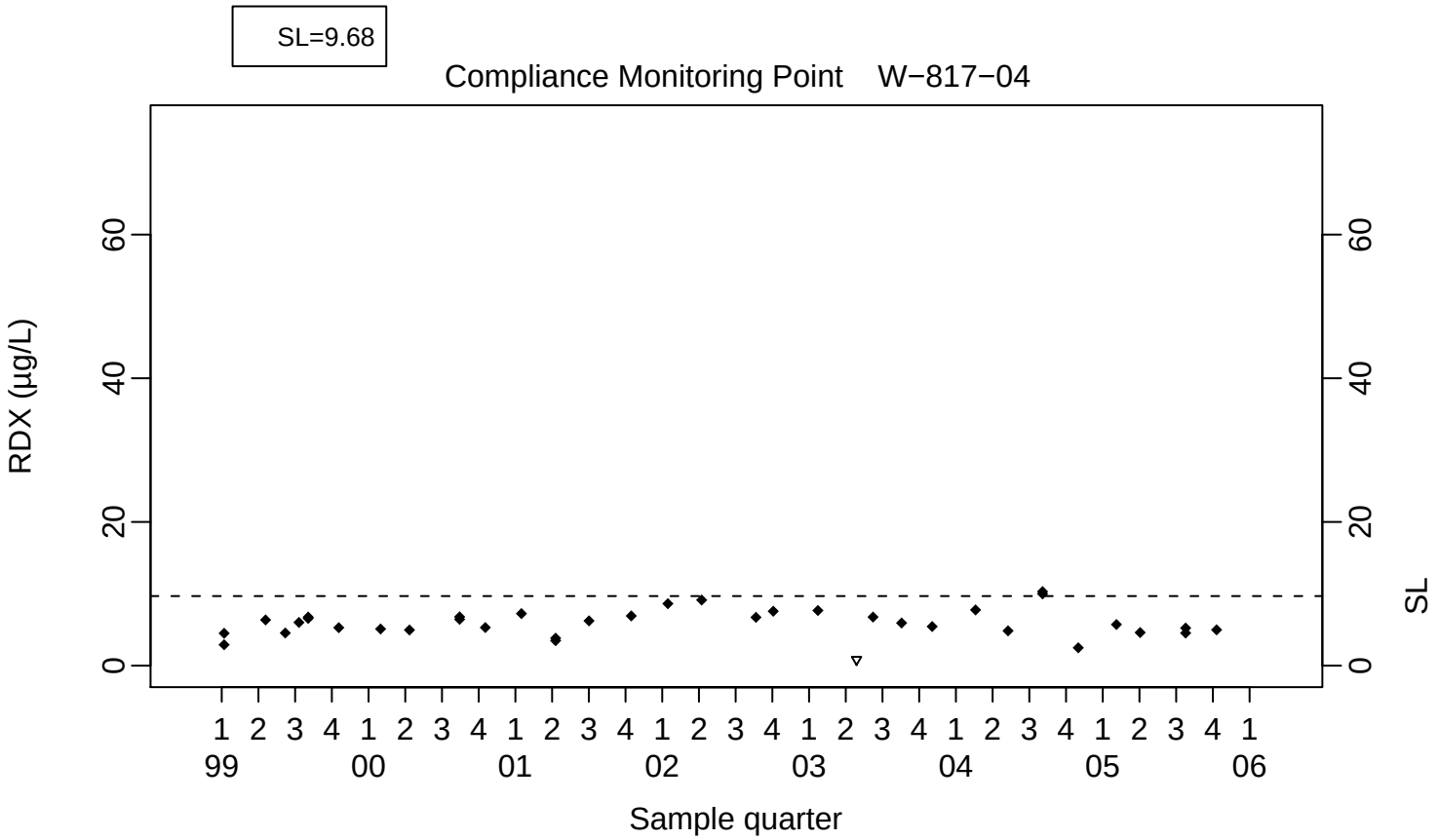

Surface Impoundments Ground Water
HMX (µg/L)
SL=1
Above RL
Below RL
Compliance Monitoring Point W−817−03
HMX (µg/L)
SL
0
10
20
30
40
50
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

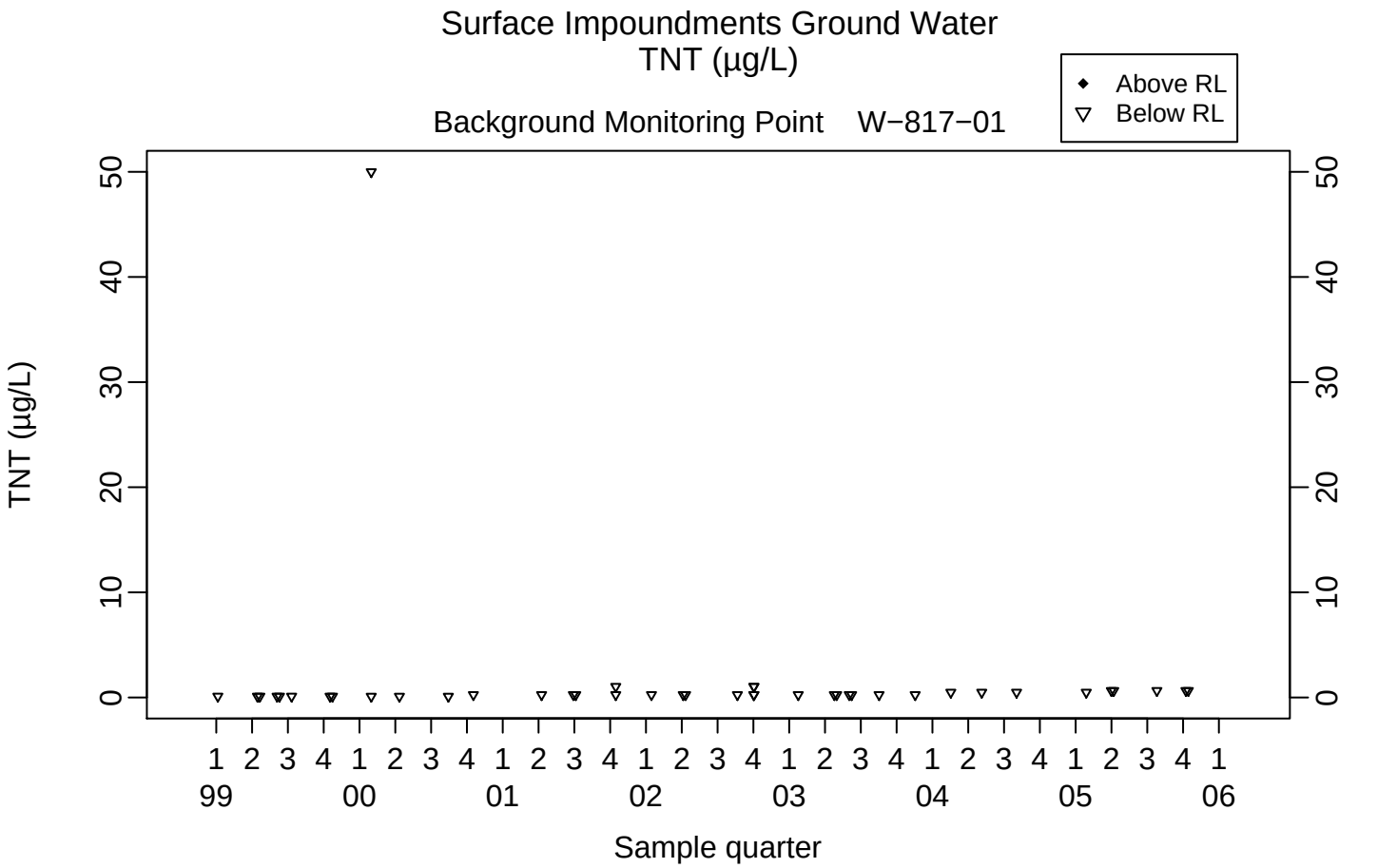

SL=1
Compliance Monitoring Point W−817−04
HMX (µg/L)
SL
0
10
20
30
40
50
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

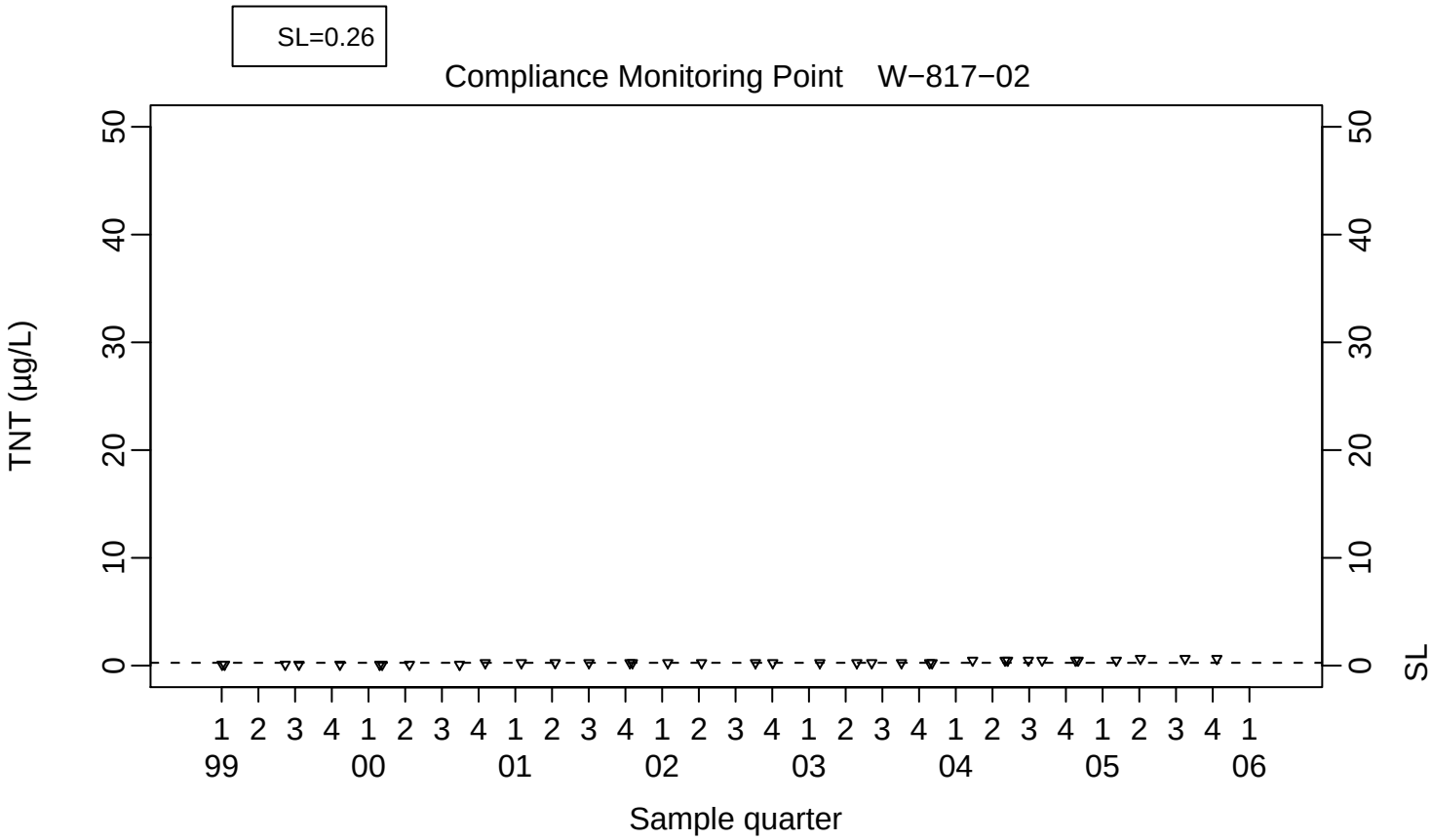

Surface Impoundments Ground Water
RDX (µg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
RDX (µg/L)
0
20
40
60
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

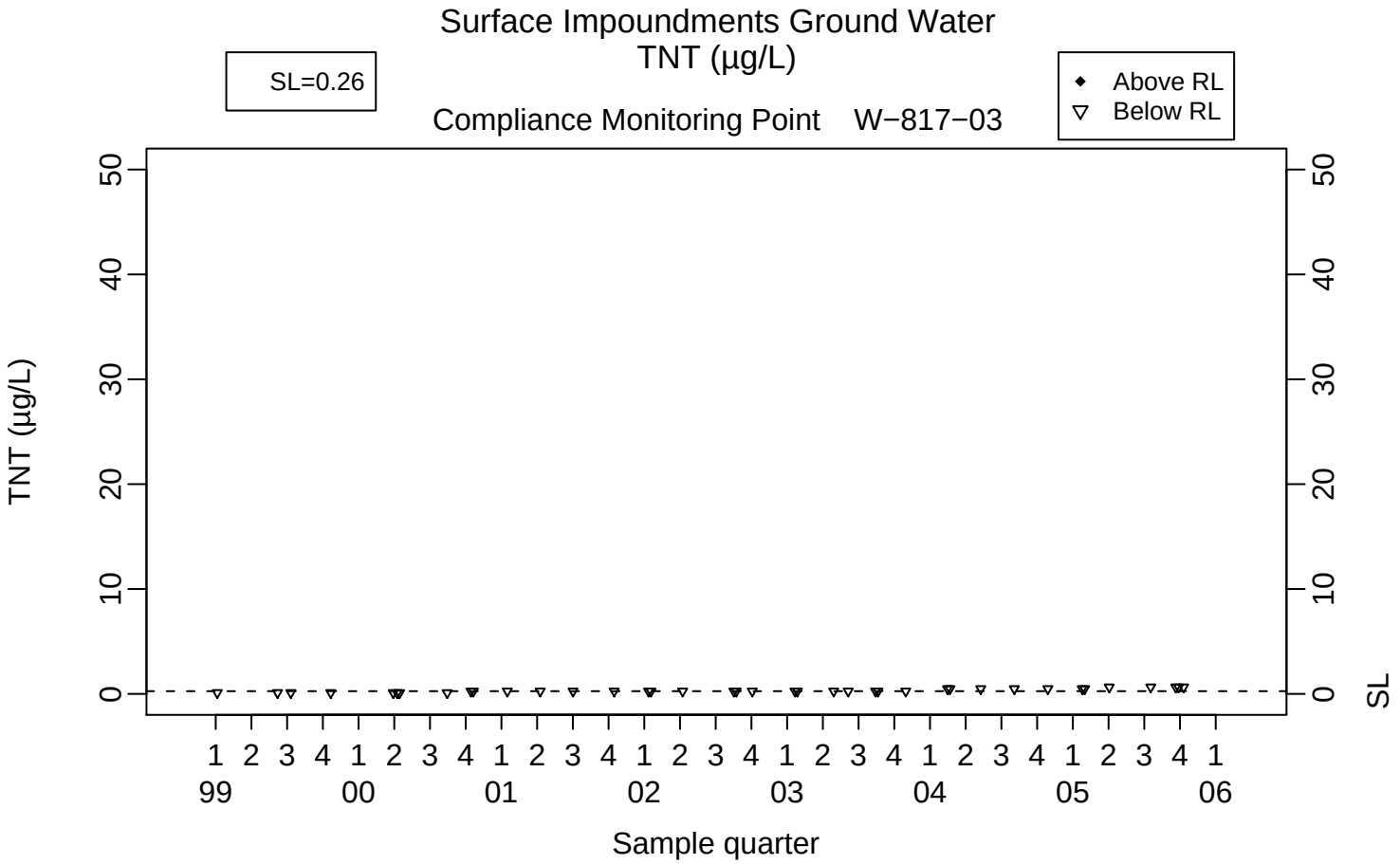

SL=0.85
Compliance Monitoring Point W−817−02
RDX (µg/L)
0
20
40
60
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

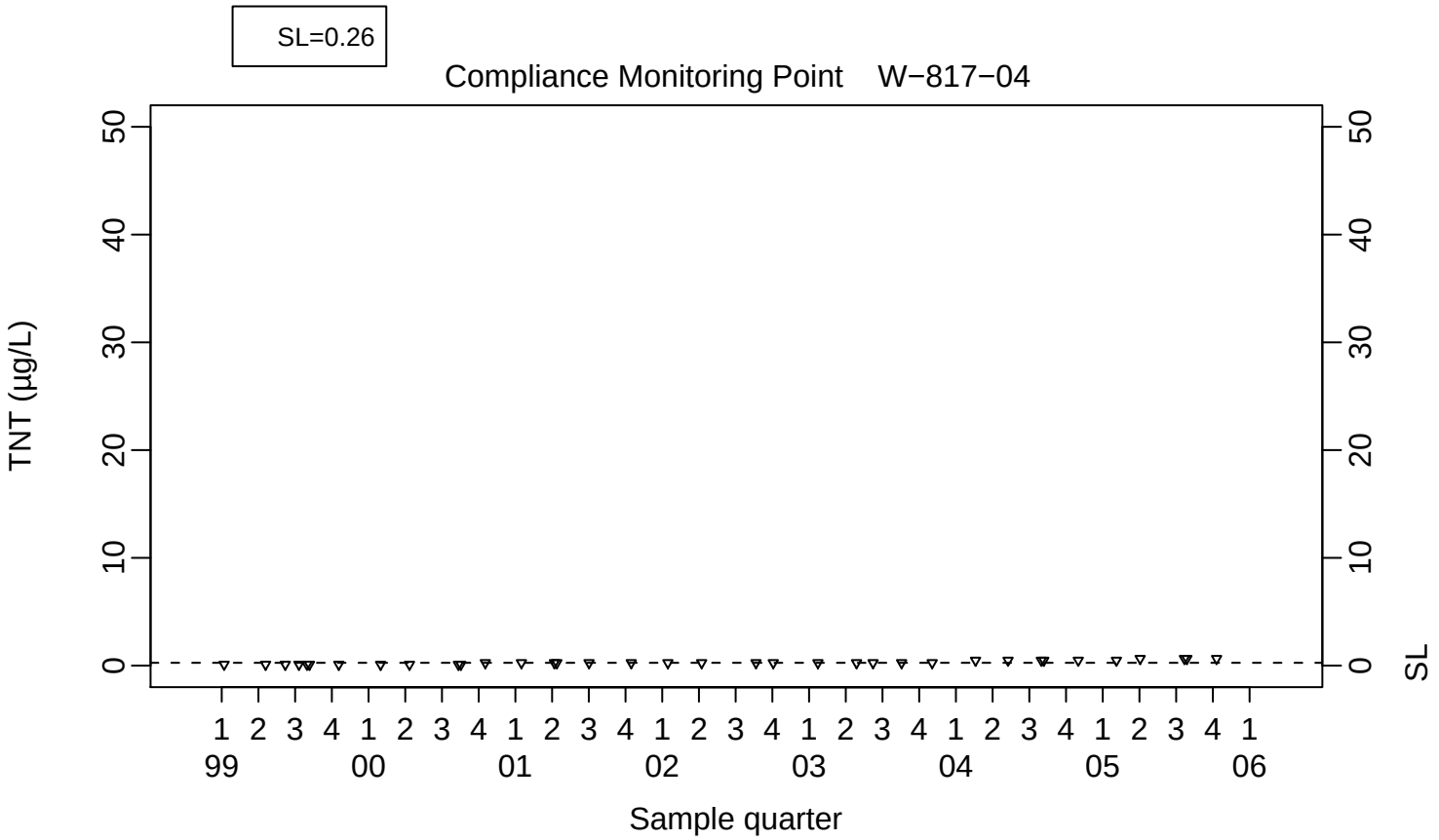

Surface Impoundments Ground Water
RDX (µg/L)
SL=9.3
Above RL
Below RL
Compliance Monitoring Point W−817−03
RDX (µg/L)
SL
0
20
40
60
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

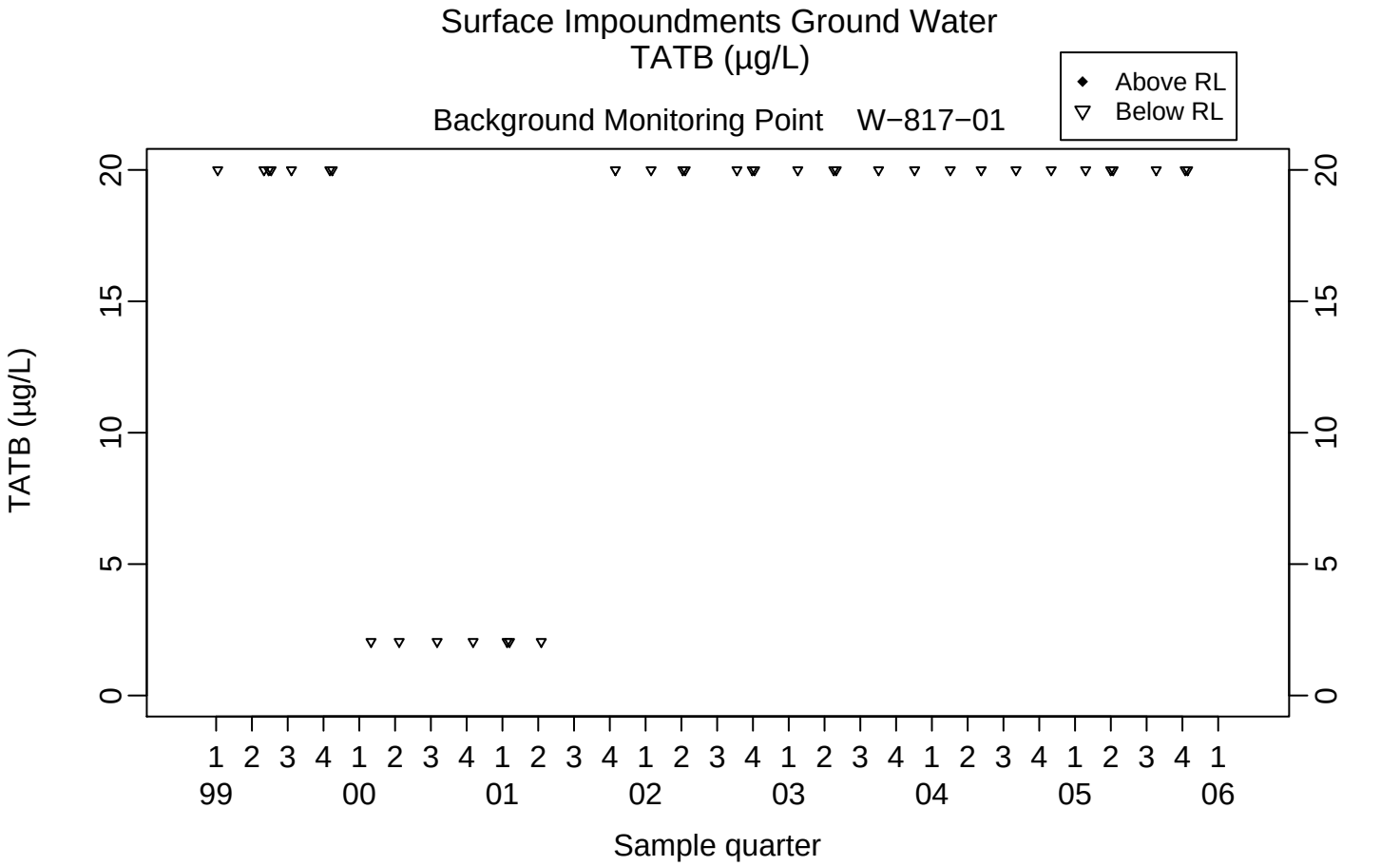

SL=9.68
Compliance Monitoring Point W−817−04
RDX (µg/L)
SL
0
20
40
60
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

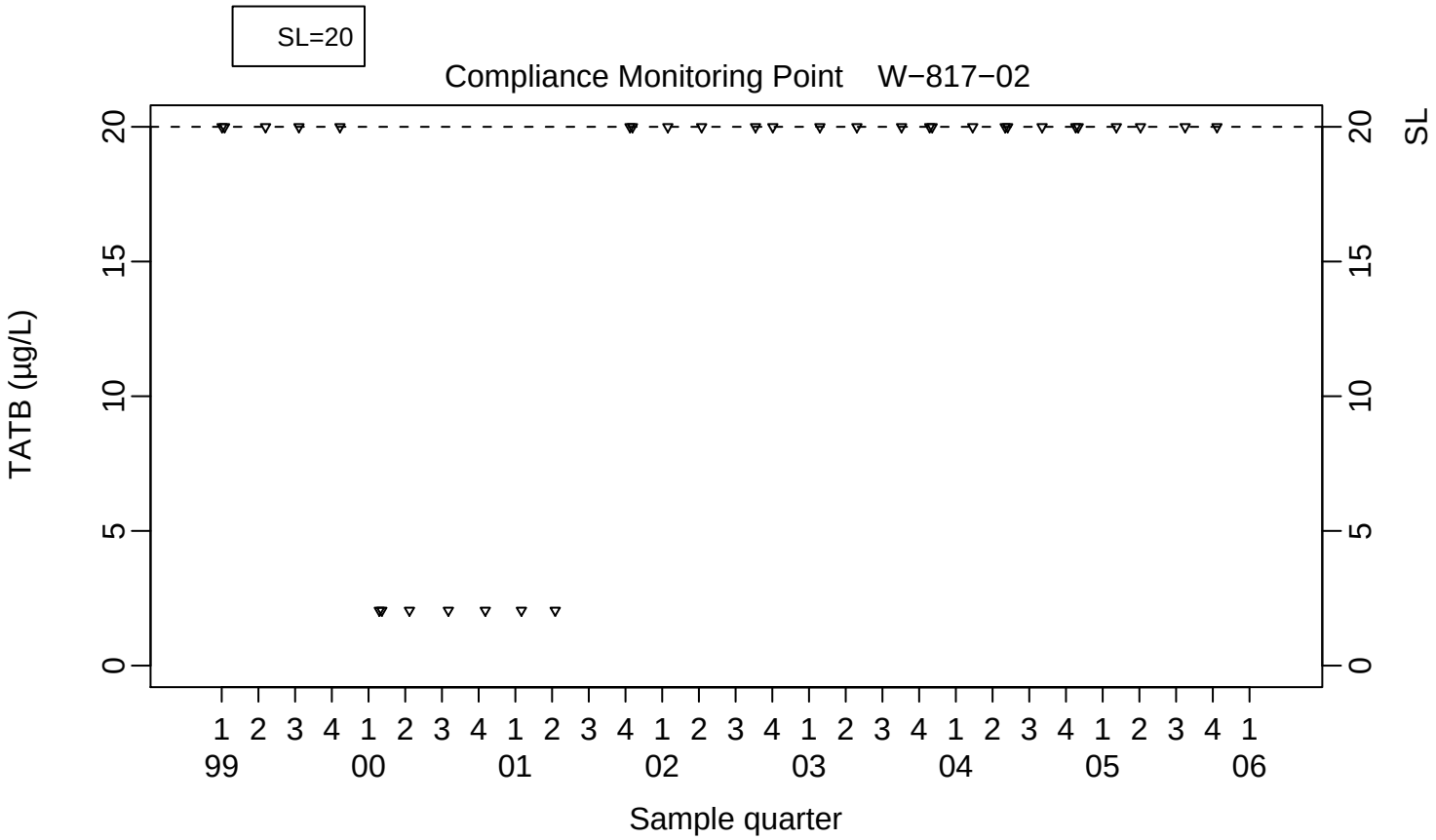

Surface Impoundments Ground Water
TNT (µg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
TNT (µg/L)
0
10
20
30
40
50
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

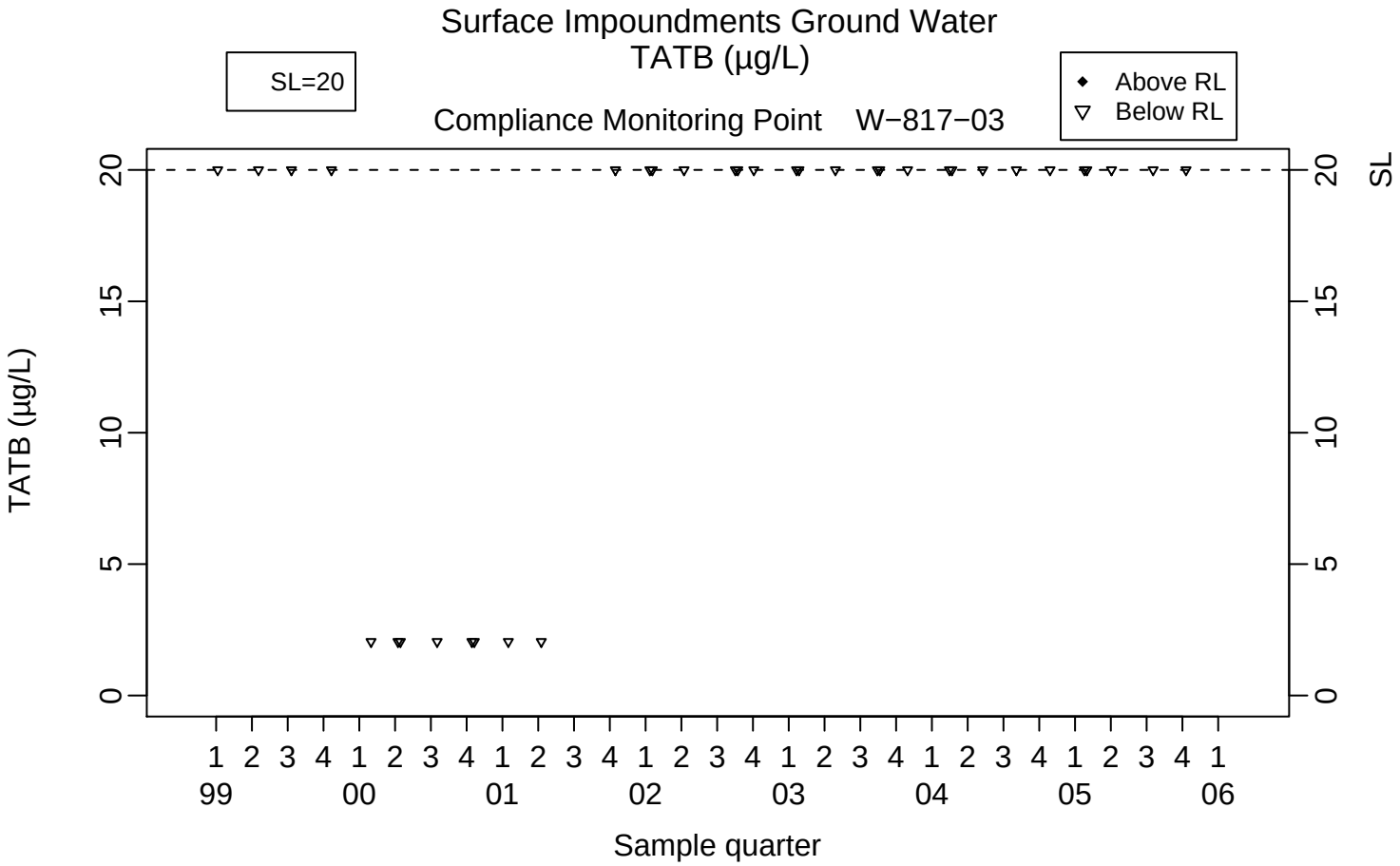

SL=0.26
Compliance Monitoring Point W−817−02
TNT (µg/L)
0
10
20
30
40
50
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

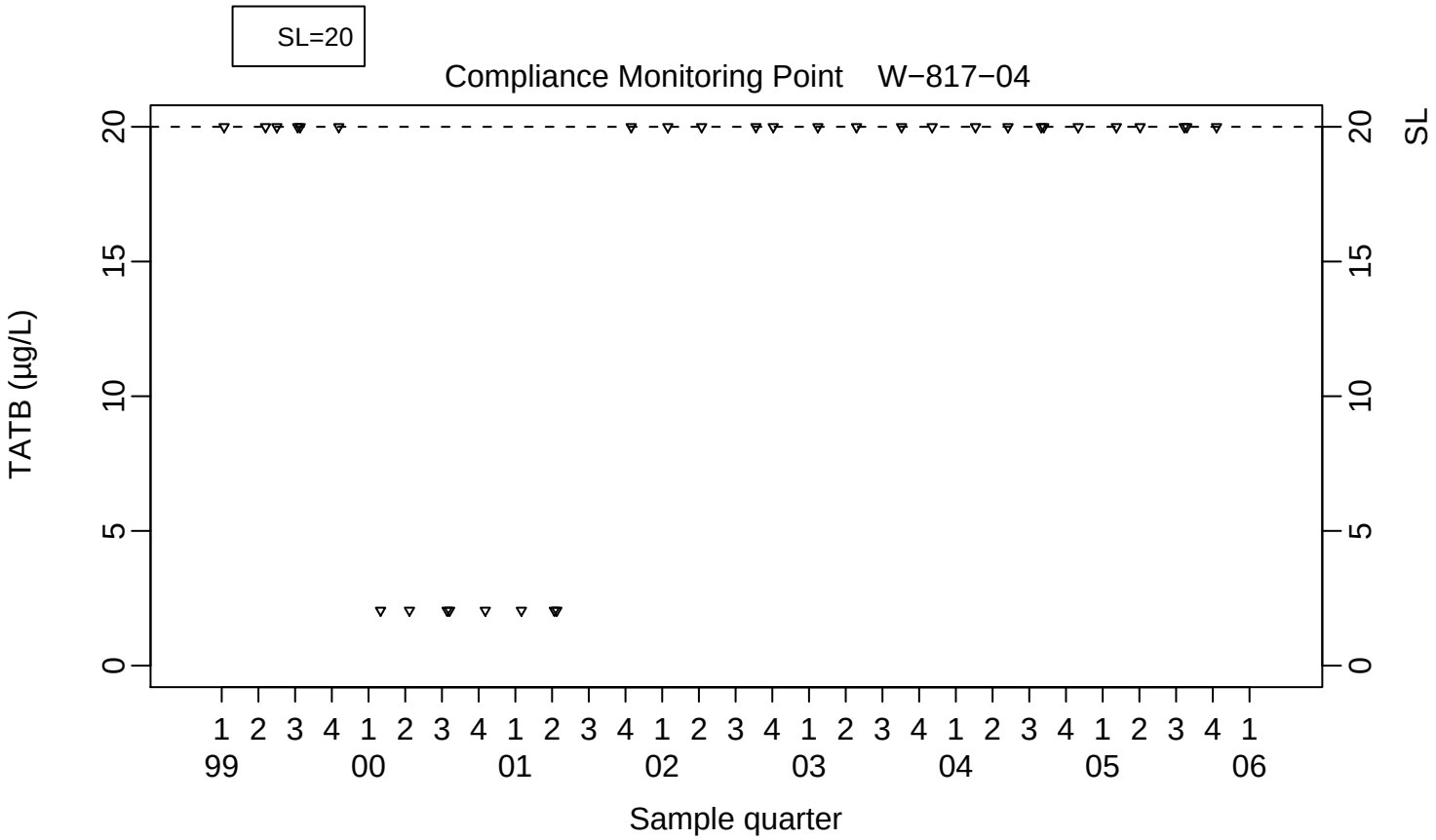

Surface Impoundments Ground Water
TNT (µg/L)
SL=0.26
Above RL
Below RL
Compliance Monitoring Point W−817−03
TNT (µg/L)
0
10
20
30
40
50
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

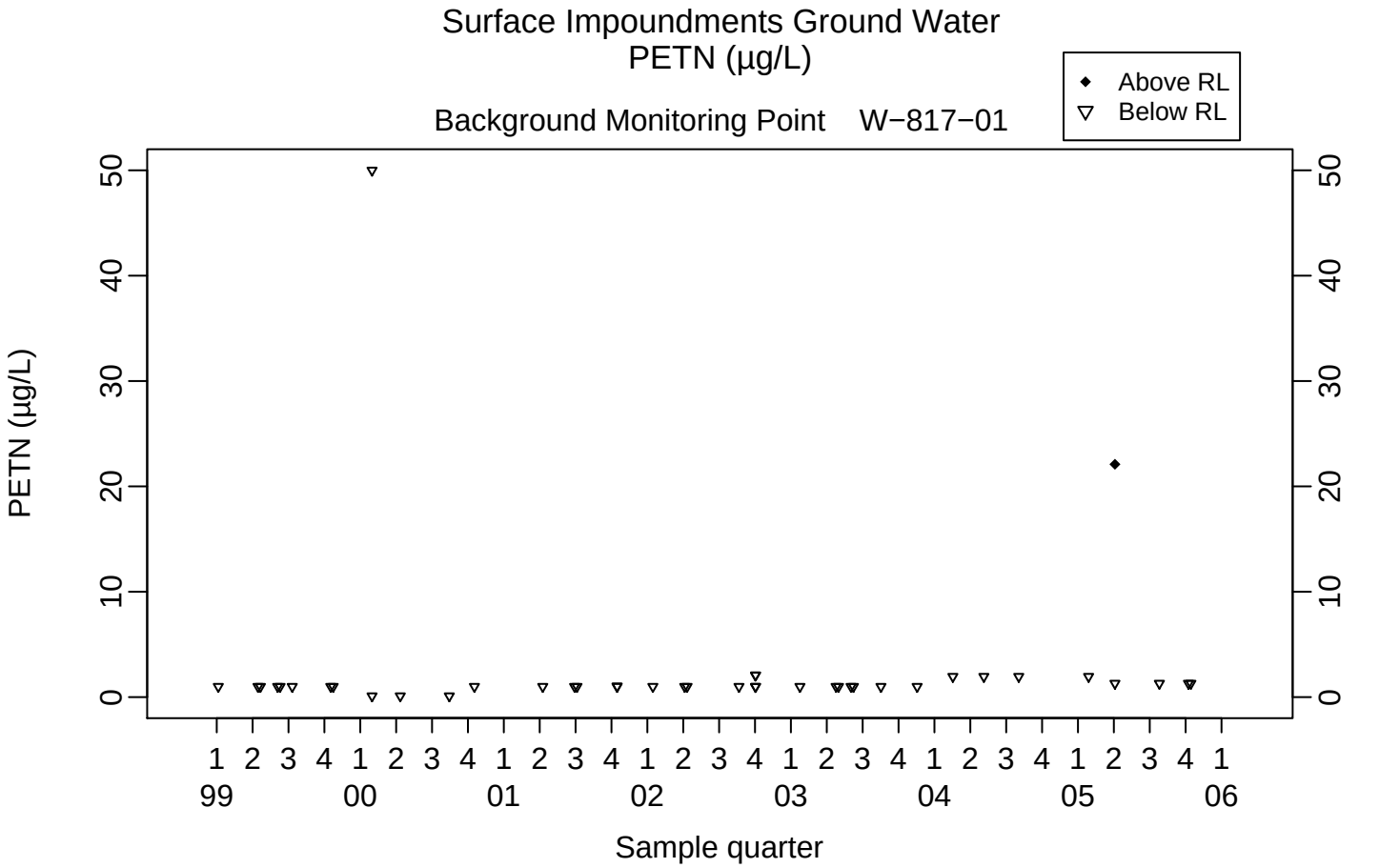

SL=0.26
Compliance Monitoring Point W−817−04
TNT (µg/L)
0
10
20
30
40
50
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

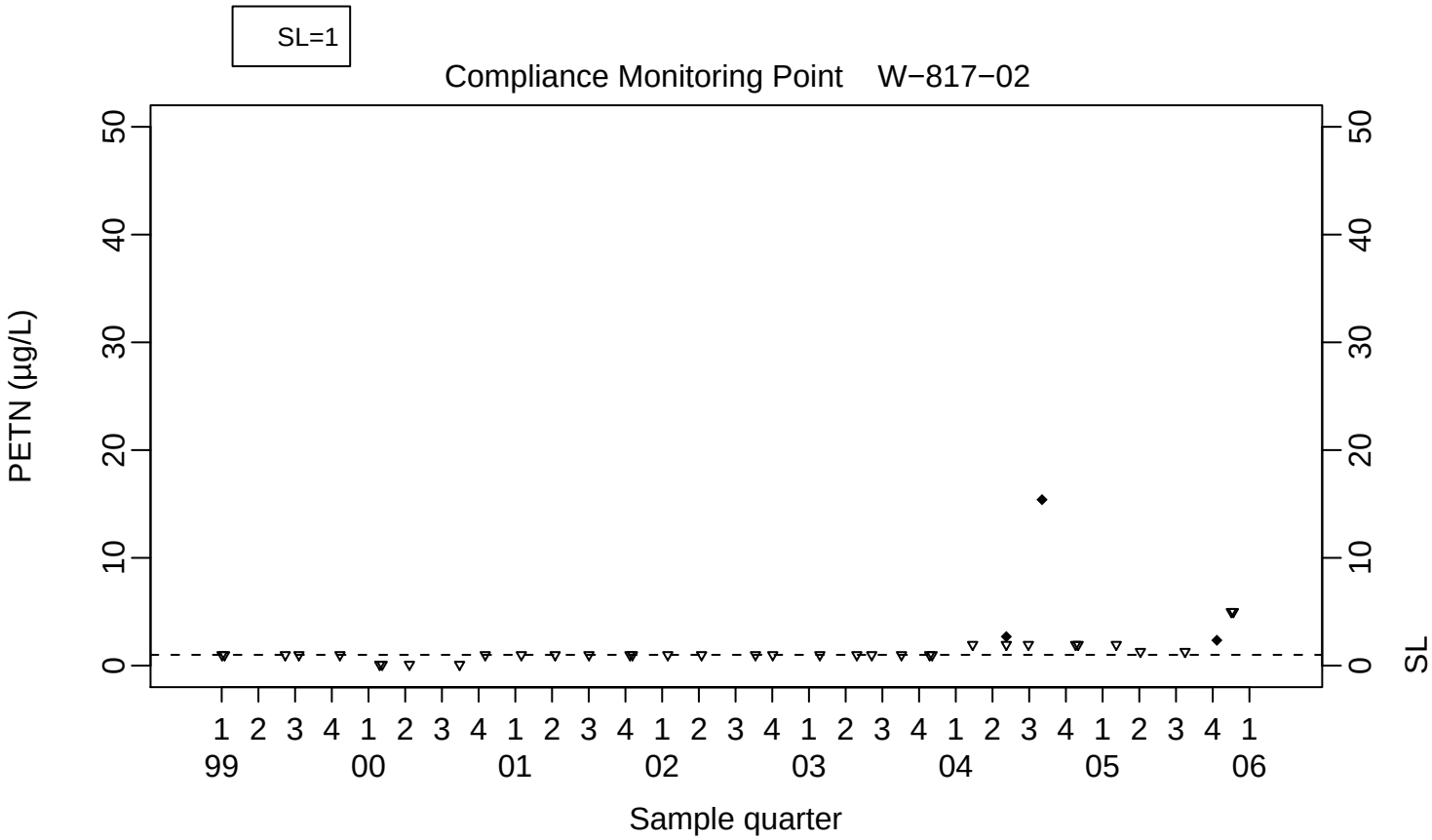

Surface Impoundments Ground Water
TATB (µg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
TATB (µg/L)
0
5
10
15
20
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

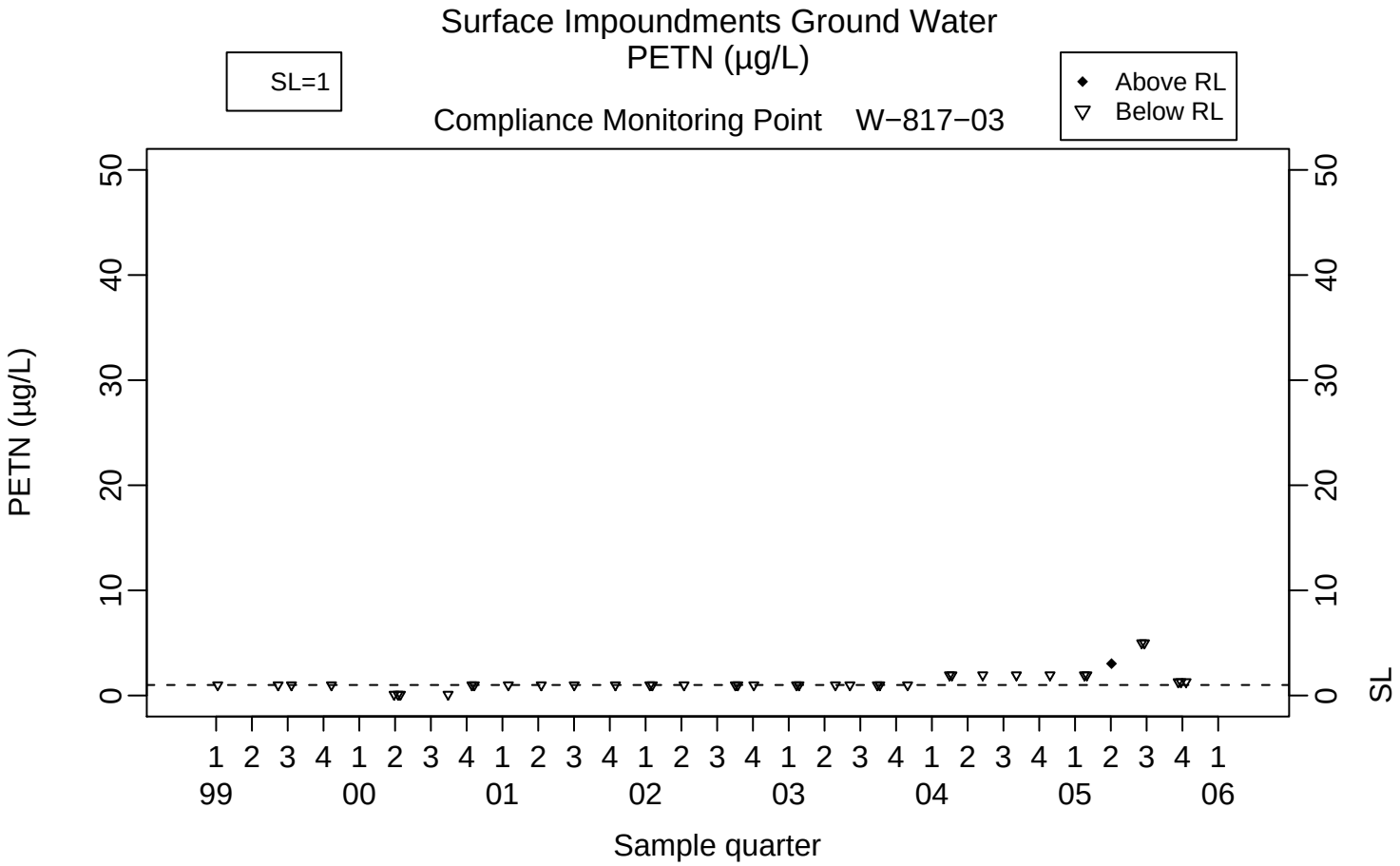

SL=20
Compliance Monitoring Point W−817−02
TATB (µg/L)
SL
0
5
10
15
20
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

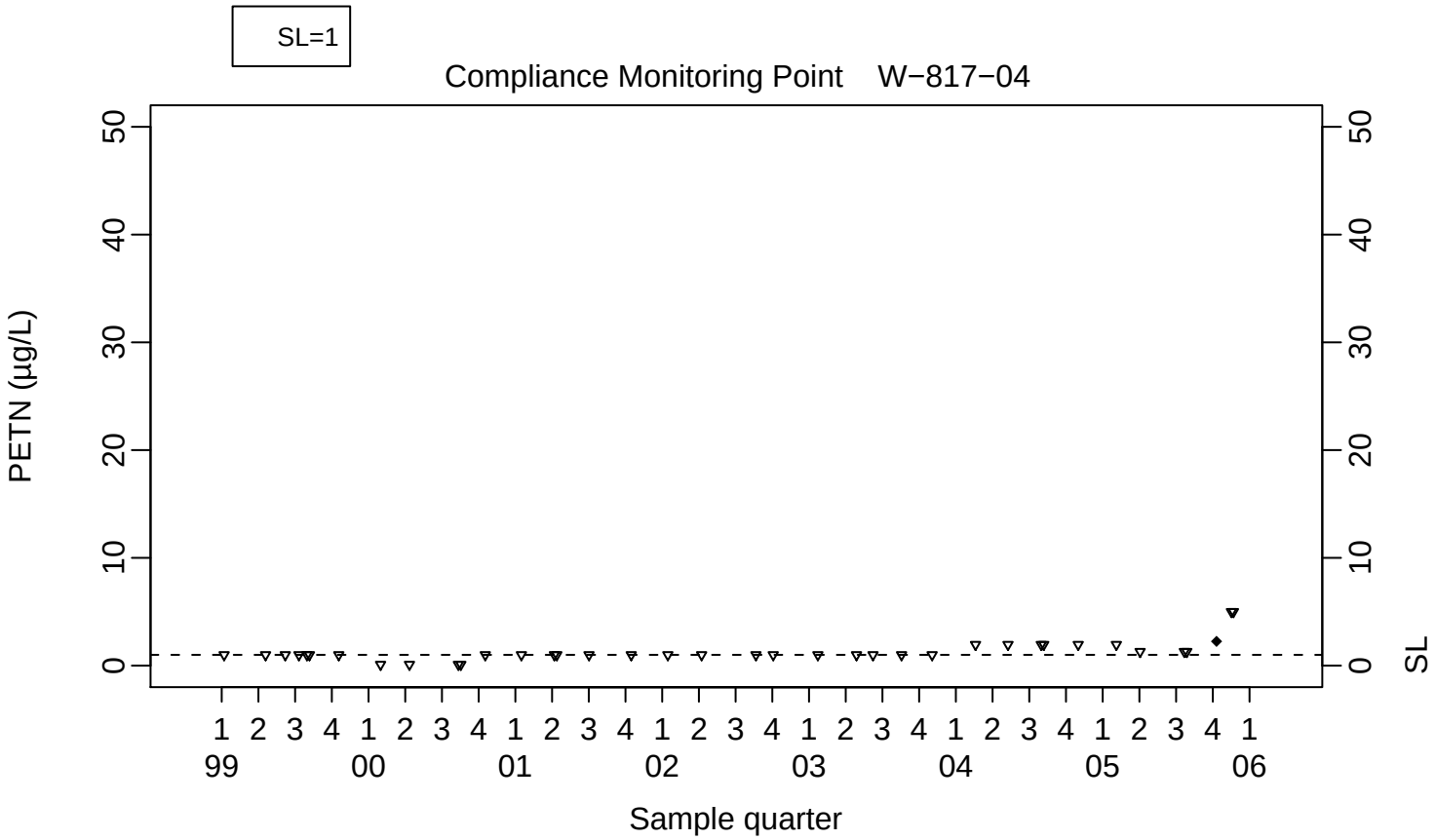

Surface Impoundments Ground Water
TATB (µg/L)
SL=20
Above RL
Below RL
Compliance Monitoring Point W−817−03
TATB (µg/L)
SL
0
5
10
15
20
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

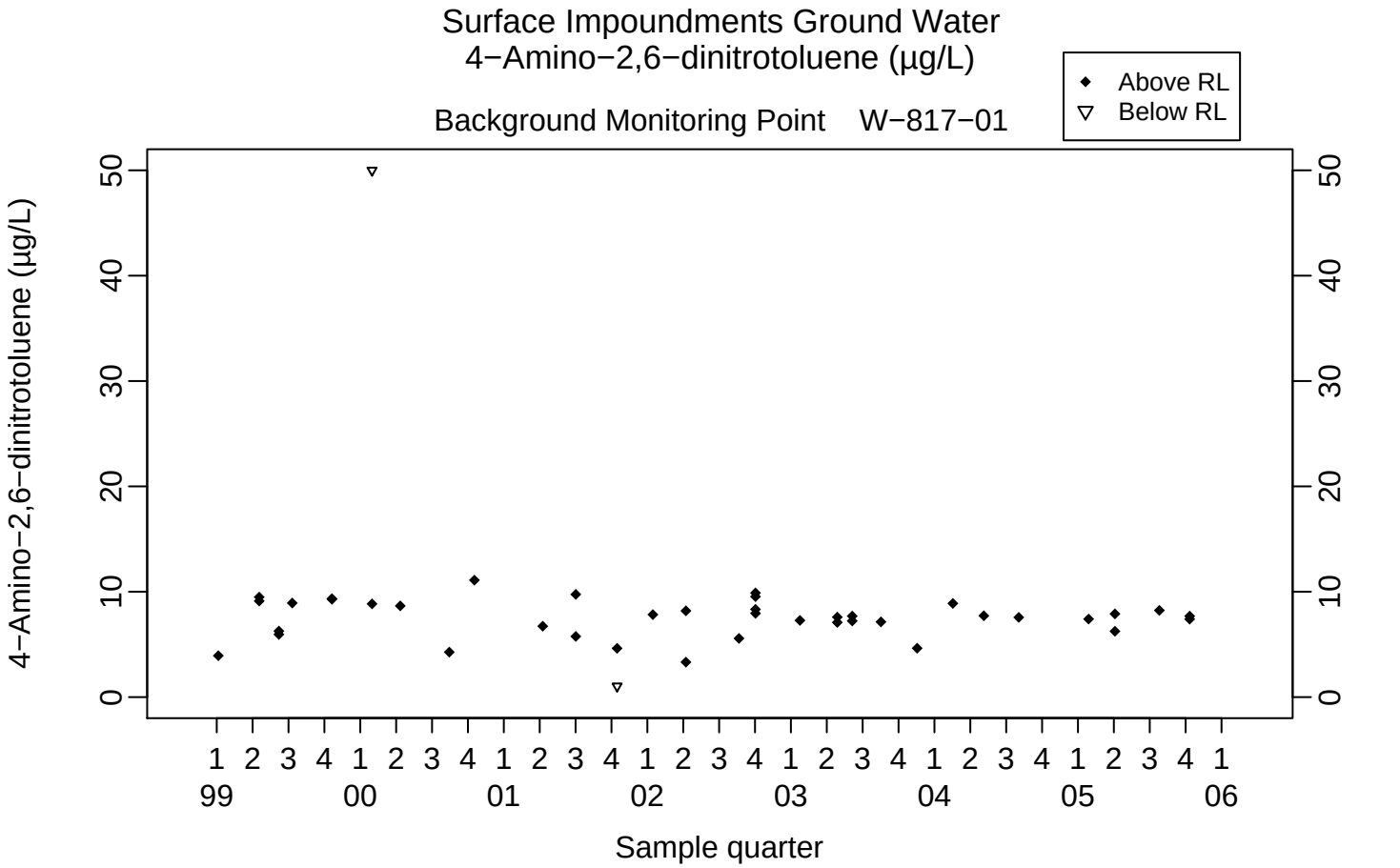

SL=20
Compliance Monitoring Point W−817−04
TATB (µg/L)
SL
0
5
10
15
20
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

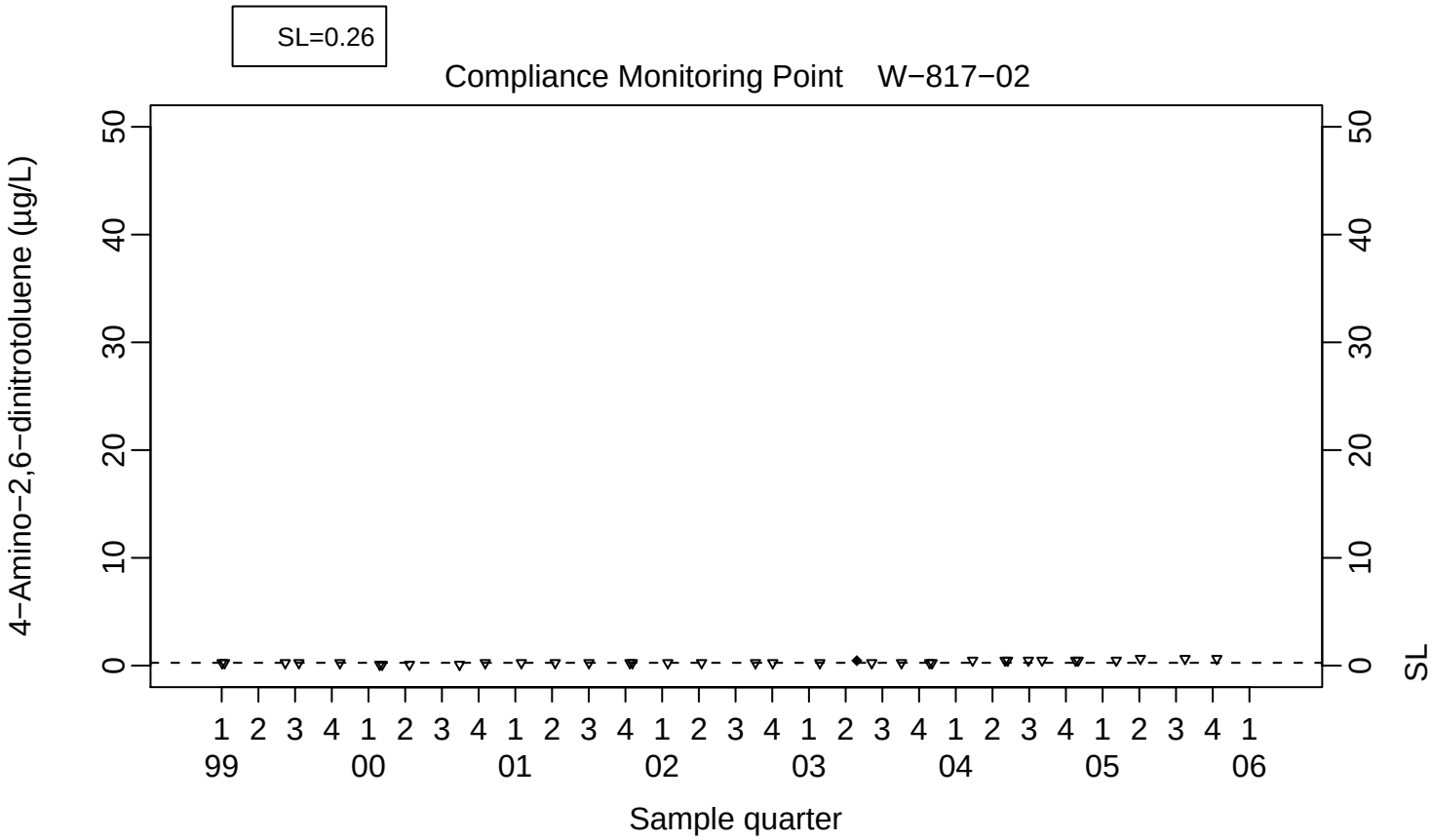

Surface Impoundments Ground Water
PETN (µg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
PETN (µg/L)
0
10
20
30
40
50
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

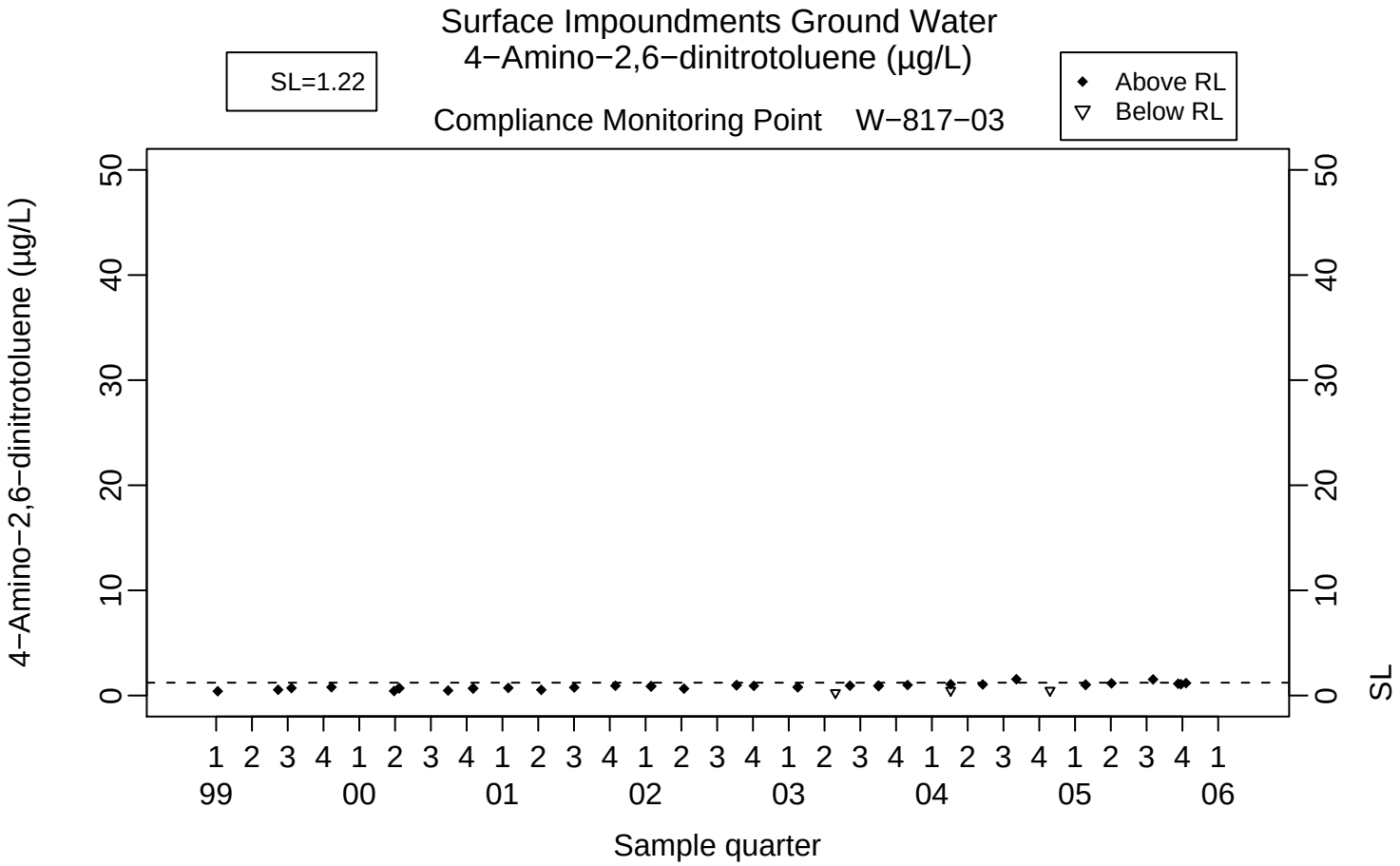

SL=1
Compliance Monitoring Point W−817−02
PETN (µg/L)
0
10
20
30
40
50
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

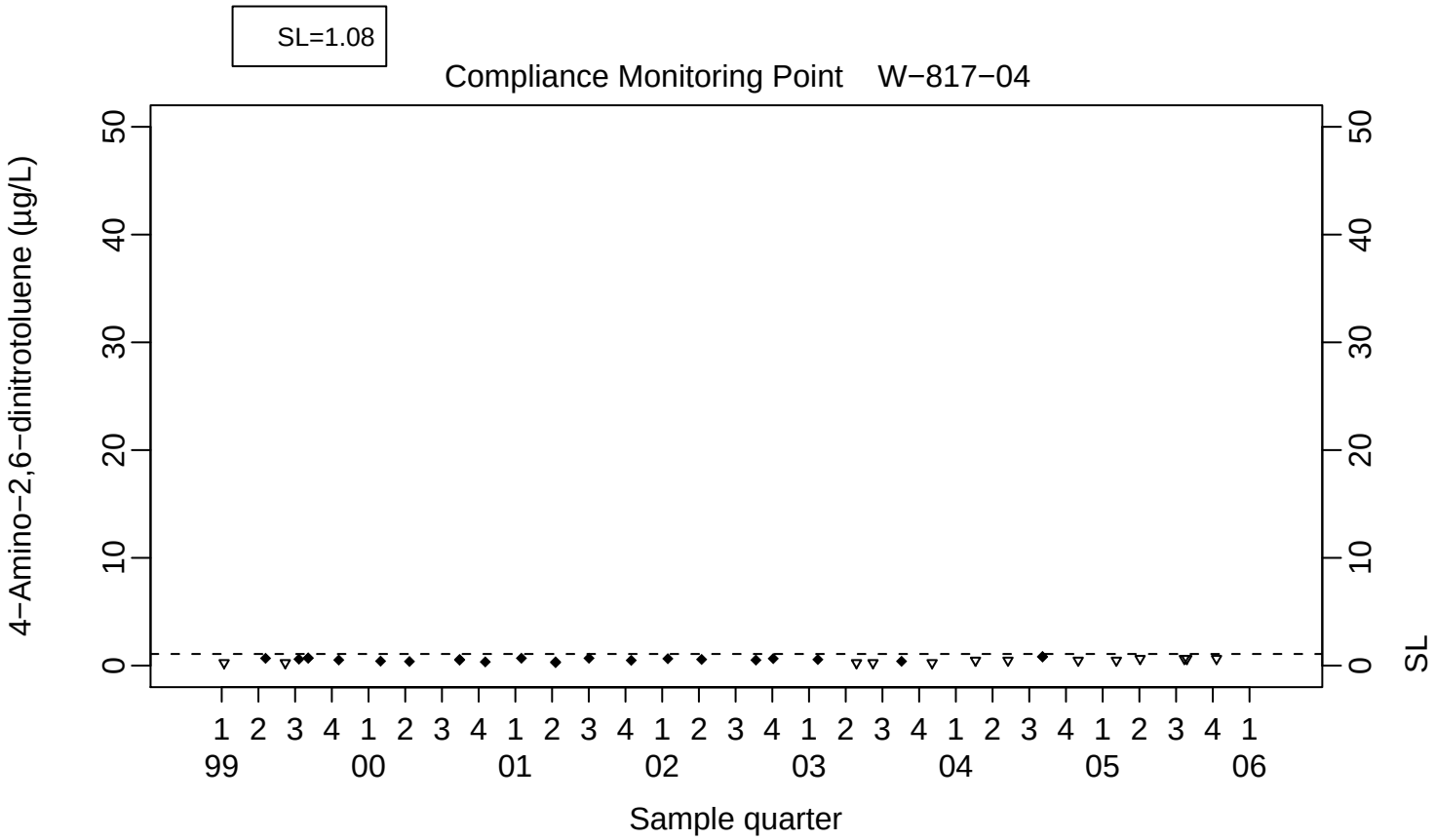

Surface Impoundments Ground Water
PETN (µg/L)
SL=1
Above RL
Below RL
Compliance Monitoring Point W−817−03
PETN (µg/L)
SL
0
10
20
30
40
50
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


SL=1
Compliance Monitoring Point W−817−04
PETN (µg/L)
SL
0
10
20
30
40
50
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


Surface Impoundments Ground Water
4−Amino−2,6−dinitrotoluene (µg/L)
Above RL
Below RL
Background Monitoring Point W−817−01
4−Amino−2,6−dinitrotoluene (µg/L)
0
10
20
30
40
50
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


SL=0.26
Compliance Monitoring Point W−817−02
4−Amino−2,6−dinitrotoluene (µg/L)
0
10
20
30
40
50
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


Surface Impoundments Ground Water
4−Amino−2,6−dinitrotoluene (µg/L)
SL=1.22
Above RL
Below RL
Compliance Monitoring Point W−817−03
4−Amino−2,6−dinitrotoluene (µg/L)
0
10
20
30
40
50
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


SL=1.08
Compliance Monitoring Point W−817−04
4−Amino−2,6−dinitrotoluene (µg/L)
0
10
20
30
40
50
SL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

Annual Summary Tables of Surface Impoundments Ground Water Monitoring Data

Table B-1.1. Summary of ground water analytical results, surface impoundments, constituents of concern required by WDR 96-248.

Parameter	Well	Statistical limit [a]	1st Quarter result	2nd Quarter result	3rd Quarter result	4th Quarter result
General						
pH (unitless)	W-817-01	None	8.29	8.42	8.34	8.47
	W-817-02	None	8.20	8.21	8.16	8.29
	W-817-03	None	8.31	8.24	8.30	8.40
	W-817-04	None	8.11	8.20	8.18	8.48
Halocarbons (µg/L)						
1,1,1-Trichloroethane	W-817-01	NA [b]	<0.5	<1.0	<1.0	<1.0
	W-817-02	1.0	<0.5	<1.0	<1.0	<1.0
	W-817-03	1.0	<0.5	<1.0	<1.0	<1.0
	W-817-04	1.0	<0.5	<1.0	<1.0	<1.0
Bromoform	W-817-01	NA	<0.5	<1.0	<1.0	<1.0
	W-817-02	1.0	<0.5	<1.0	<1.0	<1.0
	W-817-03	1.0	<0.5	<1.0	<1.0	<1.0
	W-817-04	1.0	<0.5	<1.0	<1.0	<1.0
1,2-Dichloroethane	W-817-01	NA	<0.5	<1.0	<1.0	<1.0
	W-817-02	1.0	<0.5	<1.0	<1.0	<1.0
	W-817-03	1.0	<0.5	<1.0	<1.0	<1.0
	W-817-04	1.0	<0.5	<1.0	<1.0	<1.0
Freon 113	W-817-01	NA	<0.5	<1.0	<1.0	<1.0
	W-817-02	1.0	<0.5	<1.0	<1.0	<1.0
	W-817-03	1.0	<0.5	<1.0	<1.0	<1.0
	W-817-04	1.0	<0.5	<1.0	<1.0	<1.0
Methylene chloride	W-817-01	NA	0.43 est [c]	<1.0	<1.0	<1.0
	W-817-02	1.0	<1.0	<1.0	<1.0	<1.0
	W-817-03	1.0	<1.0	<1.0	<1.0	<1.0
	W-817-04	1.0	<1.0	<1.0	<1.0	<1.0

(continued)

Table B-1.1. Summary of ground water analytical results, surface impoundments, constituents of concern required by WDR 96-248.

Parameter	Well	Statistical limit [a]	1st Quarter result	2nd Quarter result	3rd Quarter result	4th Quarter result
Halocarbons (µg/L) (continued)						
Tetrachloroethene	W-817-01	NA	<0. 5	<1. 0	<1. 0	<1. 0
	W-817-02	1. 0	0. 09 est	<1. 0	<1. 0	<1. 0
	W-817-03	1. 0	0. 10 est	0. 11 est	<1. 0	<1. 0
	W-817-04	1. 0	<0. 5	<1. 0	<1. 0	<1. 0
Chlorobenzene	W-817-01	NA	<0. 5	<1. 0	<1. 0	<1. 0
	W-817-02	1. 0	<0. 5	<1. 0	<1. 0	<1. 0
	W-817-03	1. 0	<0. 5	<1. 0	<1. 0	<1. 0
	W-817-04	1. 0	<0. 5	<1. 0	<1. 0	<1. 0
Hydrocarbons (µg/L)						
Toluene	W-817-01	NA	<0. 5	<1. 0	<1. 0	<1. 0
	W-817-02	1. 0	<0. 5	<1. 0	<1. 0	<1. 0
	W-817-03	1. 0	<0. 5	<1. 0	<1. 0	0. 19 est
	W-817-04	1. 0	<0. 5	<1. 0	<1. 0	<1. 0
Naphthalene	W-817-01	NA	<5	<5	<5.	<5
	W-817-02	5	<5	<5	<5.	<5
	W-817-03	5	<5	<5	<5.	<5
	W-817-04	5	<5	<5	<5. 7	<5
Photographic chemicals (µg/L)						
meta and *para*- Cresol	W-817-01	NA	<2	<2	<2	<2
	W-817-02	2	<2	<2	<2	<2
	W-817-03	2	<2	<2	<2	<2
	W-817-04	2	<2	<2	<2. 3	<2
Benzyl alcohol	W-817-01	NA	<2	<2	<2	<2
	W-817-02	2	<2	<2	<2	<2
	W-817-03	2	<2	<2	<2	<2
	W-817-04	2	<2	<2	<2. 3	<2

(continued)

Table B-1.1. Summary of ground water analytical results, surface impoundments, constituents of concern required by WDR 96-248.

Parameter	Well	Statistical limit [a]	1st Quarter result	2nd Quarter result	3rd Quarter result	4th Quarter result
Volatile/semivolatile organic compounds (μg/L)						
Acetone	W-817-01	NA	<10	<10	<10	<10
	W-817-02	10	<10	<10	<10	<10
	W-817-03	10	<10	<10	<20	<10
	W-817-04	10	<10	<10	<10	18 [d]
2-Butanone	W-817-01	NA	<20	<20	<20	<20
(methyl ethyl ketone)	W-817-02	20	<20	<20	<20	<20
	W-817-03	20	<20	<20	<20	<20
	W-817-04	20	<20	<20	<20	810 [d]
Dimethyl sulfoxide (DMSO)	W-817-01	NA	<10	<10	<10	<10
	W-817-02	10	<10	<10	<10	<10
	W-817-03	10	<10	<10	<10	<10
	W-817-04	10	<20	<10	<11	<11
Ethyl alcohol (ethanol)	W-817-01	NA	<1000	<1000	<1000	<1000
	W-817-02	1000	<1000	<1000	<1000	<1000
	W-817-03	1000	<1000	<1000	<1000	<1000
	W-817-04	1000	<1000	<1000	<1000	<1000
Methyl isobutyl ketone	W-817-01	NA	<20	<20	<20	<20
	W-817-02	20	<20	<20	<20	<20
	W-817-03	20	<20	<20	<20	<20
	W-817-04	20	<20	<20	<20	<20
Additives to energetic compounds (μg/L)						
Bis(2-ethylhexyl)phthalate	W-817-01	NA	<5	4. 1 [e]	3. 4 est [e]	2. 9 est [e]
	W-817-02	5	3. 0 est	5. 2 [e]	2. 8 est [e]	5. 3 [e]
	W-817-03	5	<5	4. 5 [e]	3. 9 est [e]	2. 5 est [e]
	W-817-04	5	<5	5. 3 [e]	5. 2 est [e]	1. 9 est [e]

(continued)

Table B-1.1. Summary of ground water analytical results, surface impoundments, constituents of concern required by WDR 96-248.

Parameter	Well	Statistical limit [a]	1st Quarter result	2nd Quarter result	3rd Quarter result	4th Quarter result
Unreactive polymers (µg/L)						
Styrene	W-817-01	NA	<0. 5	<1. 0	<1. 0	<1. 0
	W-817-02	1. 0	<0. 5	<1. 0	<1. 0	<1. 0
	W-817-03	1. 0	<0. 5	<1. 0	<1. 0	<1. 0
	W-817-04	1. 0	<0. 5	<1. 0	<1. 0	<1. 0
Vinyl chloride	W-817-01	NA	<0. 5	<1. 0	<1. 0	<1. 0
	W-817-02	1. 0	<0. 5	<1. 0	<1. 0	<1. 0
	W-817-03	1. 0	<0. 5	<1. 0	<1. 0	<1. 0
	W-817-04	1. 0	<0. 5	<1. 0	<1. 0	<1. 0
Metals (mg/L)						
Aluminum	W-817-01	NA	<0. 05	0. 036 est	<0. 05	<0. 05
	W-817-02	0. 20	<0. 05	<0. 05	<0. 05	0. 018 est
	W-817-03	0. 20	<0. 05	0. 035 est	<0. 05	<0. 05
	W-817-04	0. 20	<0. 05	<0. 05	<0. 05	<0. 05
Arsenic	W-817-01	NA	0. 050	0. 048	0. 047	0. 048
	W-817-02	0. 073	0. 056	0. 062	0. 062	0. 064
	W-817-03	0. 072	0. 056	0. 058	0. 055	0. 057
	W-817-04	0. 077	0. 050	0. 050	0. 054	0. 061
Barium	W-817-01	NA	0. 012 est	0. 013 est	0. 013 est	0. 013 est
	W-817-02	0. 025	0. 011 est	0. 011 est	0. 0094 est	0. 011 est
	W-817-03	0. 025	0. 0093 est	0. 012 est	0. 0095 est	0. 0089 est
	W-817-04	0. 025	0. 0099 est	0. 011 est	0. 012 est	0. 010 est
Cadmium	W-817-01	NA	<0. 0005	<0. 0005	<0. 0005	<0. 0005
	W-817-02	0. 0016	0. 0003 est	0. 00024 est	0. 00025 est	0. 00024 est
	W-817-03	0. 001	<0. 0005	<0. 0005	<0. 0002	<0. 0005
	W-817-04	0. 001	0. 00007 est	<0. 0005	<0. 0005	0. 0001 est

(continued)

Table B-1.1. Summary of ground water analytical results, surface impoundments, constituents of concern required by WDR 96-248.

Parameter	Well	Statistical limit [a]	1st Quarter result	2nd Quarter result	3rd Quarter result	4th Quarter result
Metals (mg/L) (continued)						
Chromium	W-817-01	NA	0. 001	0. 00089 est	0. 0012	0. 0011
	W-817-02	0. 003	0. 001	0. 00089 est	0. 0012	0. 0016
	W-817-03	0. 0042	0. 002	0. 0022	0. 0023	0. 0028
	W-817-04	0. 0098	0. 001	0. 0036	0. 0044	0. 0034
Cobalt	W-817-01	NA	<0. 05	<0. 05	<0. 05	<0. 05
	W-817-02	0. 05	<0. 05	<0. 05	<0. 05	<0. 05
	W-817-03	0. 05	<0. 05	<0. 05	<0. 025	0. 0017 est
	W-817-04	0. 05	<0. 05	<0. 05	<0. 05	<0. 05
Copper	W-817-01	NA	0. 004	0. 0023	0. 0022	0. 0012
	W-817-02	0. 02	0. 0007 est	0. 00059 est	0. 00081 est	0. 0012
	W-817-03	0. 02	0. 0003 est	<0. 001	0. 00056 est	0. 010
	W-817-04	0. 02	0. 0006 est	0. 00088 est	0. 0023	0. 0035
Lead	W-817-01	NA	0. 0004 est	0. 00072 est	0. 00058 est	<0. 005
	W-817-02	0. 0099	0. 0007 est	0. 00082 est	0. 00043 est	0. 00097 est
	W-817-03	0. 0099	<0. 005	0. 00047 est	<0. 002	0. 00033 est
	W-817-04	0. 0099	0 0004 est	0. 0021 est	0. 00055 est	0. 00099 est
Manganese	W-817-01	NA	<0. 01	<0. 01	<0. 01	<0. 01
	W-817-02	0. 01	<0. 01	<0. 01	0. 0044 est	<0. 01
	W-817-03	0. 01	<0. 01	<0. 01	0. 0064 est	0. 0057 est
	W-817-04	0. 01	0. 0097 est	0. 009 est	0. 013[f]	<0. 01
Molybdenum	W-817-01	NA	0. 026	0. 026	0. 029	0. 027
	W-817-02	0. 073	0. 048	0. 051	0. 049	0. 050
	W-817-03	0. 060	0. 040	0. 040	0. 038 est	0. 036
	W-817-04	0. 054	0. 042	0. 044	0. 041	0. 040
Nickel	W-817-01	NA	<0. 002	0. 00084 est	<0. 002	<0. 002
	W-817-02	0. 044	0. 0009 est	<0. 002	0. 0013 est	0. 00087 est
	W-817-03	0. 044	0. 0008 est	0. 0024	0. 0012 est	0. 00088 est
	W-817-04	0. 044	0. 034	0. 024	0. 032	0. 011

(continued)

Table B-1.1. Summary of ground water analytical results, surface impoundments, constituents of concern required by WDR 96-248.

Parameter	Well	Statistical limit [a]	1st Quarter result	2nd Quarter result	3rd Quarter result	4th Quarter result
Metals (mg/L) (continued)						
Potassium	W-817-01	NA	9.2	9.9	10	10
	W-817-02	18.6	14	13	12	13
	W-817-03	14.6	10	11	11	10
	W-817-04	13.7	11	11	10	10
Silver	W-817-01	NA	<0.001	<0.0005	<0.001	<0.001
	W-817-02	0.001	<0.001	<0.0005	<0.001	<0.001
	W-817-03	0.001	<0.001	<0.0005	<0.0005	<0.001
	W-817-04	0.001	<0.001	<0.0005	<0.001	<0.001
Zinc	W-817-01	NA	0.039	<0.01	<0.01	<0.01
	W-817-02	0.24	0.091	0.12	0.060	0.11
	W-817-03	0.0099	<0.01	0.006 est	0.0035 est	<0.01
	W-817-04	0.055	0.0092 est	0.0098 est	0.052	<0.01
Salts (mg/L)						
Ammonia nitrogen (as N)	W-817-01	NA	<0.02	0.027	0.020	0.010 est
	W-817-02	0.02	0.1[g]	<0.02	0.19[d]	<0.02
	W-817-03	0.02	<0.02	<0.02	0.032[g]	<0.02
	W-817-04	0.02	0.06[g]	<0.02	0.17[g]	<0.02
Bicarbonate alkalinity (as $CaCO_3$)	W-817-01	NA	250	220	200	200
	W-817-02	277	240	250	210	220
	W-817-03	277	250	250	230	110
	W-817-04	277	280	270	260	240
Bromide	W-817-01	NA	0.6	0.86	0.37	0.79
	W-817-02	1.46	1.0	1.3	1.3	1.0
	W-817-03	1.18	0.8	1.4[d]	0.74	0.88
	W-817-04	1.49	0.9	1.3	1.3	0.89
Chloride	W-817-01	NA	168	200	200	200
	W-817-02	388	272	280	280	280
	W-817-03	302	200	210	210	220
	W-817-04	296	218	230	230	220

(continued)

Table B-1.1. Summary of ground water analytical results, surface impoundments, constituents of concern required by WDR 96-248.

Parameter	Well	Statistical limit [a]	1st Quarter result	2nd Quarter result	3rd Quarter result	4th Quarter result
Salts (mg/L) (continued)						
Nitrate (as NO_3)	W-817-01	NA	81. 9	88	88	86
	W-817-02	110	92. 3	94	92	91
	W-817-03	110	90. 0	92	91	91
	W-817-04	110	86. 7	88	92	89
Ortho-phosphate	W-817-01	NA	0. 052	0. 078	0. 078	0. 087
	W-817-02	0. 19	0. 074	0. 070	0. 068	0. 077
	W-817-03	0. 19	0. 075	0. 060	0. 056	0. 049
	W-817-04	0. 19	0. 057	<0. 05	0. 086	0. 064
Perchlorate	W-817-01	NA	0. 028	0. 027	0. 021	0. 018
	W-817-02	0. 044	0. 030	0. 014	0. 026	0. 026
	W-817-03	0. 050	0. 030	0. 048	0. 027	0. 027
	W-817-04	0. 049	0. 029	<0. 004	0. 024	0. 025
Sulfate	W-817-01	NA	103	120	120	120
	W-817-02	512	300	300	290	290
	W-817-03	233	190	200	190	210
	W-817-04	284	204	220	220	210
Energetic materials (µg/L)						
HMX	W-817-01	NA	12. 3	12. 1	14. 4	14. 5
	W-817-02	1. 0	<0. 486	<0. 649	<0. 649	<0. 649
	W-817-03	1. 0	<0. 486	<0. 649	<0. 649	<0. 649
	W-817-04	1. 0	<0. 486	<0. 649	<0. 649	<0. 649
RDX	W-817-01	NA	39. 6	32. 1	41. 1	37. 6
	W-817-02	0. 85	0. 655	<0. 649	<0. 649	0. 665
	W-817-03	9. 30	6. 52	8. 68	14. 4[d]	8. 30
	W-817-04	9. 68	5. 72	4. 60	5. 23	4. 98
TNT	W-817-01	NA	<0. 486	<0. 649	<0. 649	<0. 649
	W-817-02	0. 26	<0. 486	<0. 649	<0. 649	<0. 649
	W-817-03	0. 26	<0. 486	<0. 649	<0. 649	<0. 649
	W-817-04	0. 26	<0. 486	<0. 649	<0. 649	<0. 649

(continued)

Table B-1.1. Summary of ground water analytical results, surface impoundments, constituents of concern required by WDR 96-248. (concluded)

Parameter	Well	Statistical limit [a]	1st Quarter result	2nd Quarter result	3rd Quarter result	4th Quarter result
Energetic materials (µg/L) (concluded)						
TATB	W-817-01	NA	<20	<20	<20	<20
	W-817-02	20	<20	<20	<20	<20
	W-817-03	20	<20	<20	<20	<20
	W-817-04	20	<20	<20	<20	<20
PETN	W-817-01	NA	<1.95	22.1[h]	<1.3	<1.3
	W-817-02	1.0	<1.95	<1.3	<1.3	2.35[d]
	W-817-03	1.0	<1.95	3.03[d]	<1.3	<1.3
	W-817-04	1.0	<1.95	<1.3	<1.3	2.25[d]
Tetryl	W-817-01	NA	<1.46	<0.649	<0.649	<0.649
	W-817-02	1.0	<1.46	<0.649	<0.649	<0.649
	W-817-03	1.0	<1.46	<0.649	<0.649	<0.649
	W-817-04	1.0	<1.46	<0.649	<0.649	<0.649
4-amino-2,6-dinitrotoluene	W-817-01	NA	7.41	6.25	8.23	7.40
	W-817-02	0.26	<0.486	<0.649	<0.649	0.132 est
	W-817-03	1.22	0.995	1.16	1.53[d]	1.18
	W-817-04	1.08	<0.486	0.250 est	0.372 est	0.459 est

[a] Statistical limit as listed in MRP 96-248, Table 5, modified by CVRWQCB letter (Cohen 1998) dated September 25, 1998.

[b] NA = Not applicable.

[c] Results followed by an "est" have estimated concentrations between the MDL and the reporting limit for that analyte.

[d] The exceedance of the SL was not confirmed by either of two retest sample results.

[e] The analytical results for bis(2-ethylhexyl)phthalate were contaminated as shown by detections in both the field blank and in the method blank samples.

[f] The exceedance of the SL was confirmed by two retest sample results.

[g] The analytical results for the retest samples collected and analyzed for ammonia nitrogen confirmed the statistically significant evidence for a release of that compound. For each detection of ammonia, however, there was corresponding contamination in the field blank samples, thus making these detections suspect.

[h] The analytical result reported for PETN in well W-817-01 was not confirmed by the analytical results for the collocated sample collected from the same well on the same day.

Table B-1.2 Fourth quarter ground water analytical results, surface impoundments, constituents of concern required by WDR 96-248.

Parameter	Well	Sample date	MDL[a]	Reporting limit	Statistical limit[b]	Result	Retest 1 result 11/16/05	Retest 2 result 11/22/05
General								
pH (unitless)	W-817-01	12-Oct-05	0. 05	0. 05	None	8. 47		
	W-817-02	12-Oct-05	0. 05	0. 05	None	8. 29		
	W-817-03	11-Oct-05	0. 05	0. 05	None	8. 40		
	W-817-04	11-Oct-05	0. 05	0. 05	None	8. 48		
Halocarbons (µg/L)								
1,1,1-Trichloroethane	W-817-01	12-Oct-05	0. 093	1. 0	NA[c]	<1. 0		
	W-817-02	12-Oct-05	0. 093	1. 0	1. 0	<1. 0		
	W-817-03	11-Oct-05	0. 093	1. 0	1. 0	<1. 0		
	W-817-04	11-Oct-05	0. 093	1. 0	1. 0	<1. 0		
Bromoform	W-817-01	12-Oct-05	0. 051	1. 0	NA	<1. 0		
	W-817-02	12-Oct-05	0. 051	1. 0	1. 0	<1. 0		
	W-817-03	11-Oct-05	0. 051	1. 0	1. 0	<1. 0		
	W-817-04	11-Oct-05	0. 051	1. 0	1. 0	<1. 0		
1,2-Dichloroethane	W-817-01	12-Oct-05	0. 11	1. 0	NA	<1. 0		
	W-817-02	12-Oct-05	0. 11	1. 0	1. 0	<1. 0		
	W-817-03	11-Oct-05	0. 11	1. 0	1. 0	<1. 0		
	W-817-04	11-Oct-05	0. 11	1. 0	1. 0	<1. 0		
Freon 113	W-817-01	12-Oct-05	0. 18	1. 0	NA	<1. 0		
	W-817-02	12-Oct-05	0. 18	1. 0	1. 0	<1. 0		
	W-817-03	11-Oct-05	0. 18	1. 0	1. 0	<1. 0		
	W-817-04	11-Oct-05	0. 18	1. 0	1. 0	<1. 0		
Methylene chloride	W-817-01	12-Oct-05	0. 16	1. 0	NA	<1. 0		
	W-817-02	12-Oct-05	0. 16	1. 0	1. 0	<1. 0		
	W-817-03	11-Oct-05	0. 16	1. 0	1. 0	<1. 0		
	W-817-04	11-Oct-05	0. 16	1. 0	1. 0	<1. 0		

(continued)

Table B-1.2 Fourth quarter ground water analytical results, surface impoundments, constituents of concern required by WDR 96-248.

Parameter	Well	Sample date	MDL[a]	Reporting limit	Statistical limit[b]	Result	Retest 1 result 11/16/05	Retest 2 result 11/22/05
Halocarbons (µg/L) (continued)								
Tetrachloroethene	W-817-01	12-Oct-05	0. 12	1. 0	NA[c]	<1. 0		
	W-817-02	12-Oct-05	0. 12	1. 0	1. 0	<1. 0		
	W-817-03	11-Oct-05	0. 12	1. 0	1. 0	<1. 0		
	W-817-04	11-Oct-05	0. 12	1. 0	1. 0	<1. 0	<1.0	0.07[d]
Chlorobenzene	W-817-01	12-Oct-05	0. 05	1. 0	NA	<1. 0		
	W-817-02	12-Oct-05	0. 05	1. 0	1. 0	<1. 0		
	W-817-03	11-Oct-05	0. 05	1. 0	1. 0	<1. 0		
	W-817-04	11-Oct-05	0. 05	1. 0	1. 0	<1. 0		
Hydrocarbons (µg/L)								
Toluene	W-817-01	12-Oct-05	0. 057	1. 0	NA	<1. 0		
	W-817-02	12-Oct-05	0. 057	1. 0	1. 0	<1. 0		
	W-817-03	11-Oct-05	0. 057	1. 0	1. 0	0. 19 est[e]		
	W-817-04	11-Oct-05	0. 057	1. 0	1. 0	<1. 0		
Naphthalene	W-817-01	12-Oct-05	0. 33	5	NA	<5		
	W-817-02	12-Oct-05	0. 33	5	5	<5		
	W-817-03	11-Oct-05	0. 33	5	5	<5		
	W-817-04	11-Oct-05	0. 33	5.	5	<5		
Photographic chemicals (µg/L)								
meta and *para*-Cresol	W-817-01	12-Oct-05	0. 6	2	NA	<2		
	W-817-02	12-Oct-05	0. 6	2	2	<2		
	W-817-03	11-Oct-05	0. 6	2	2	<2		
	W-817-04	11-Oct-05	0. 6	2	2	<2		
Benzyl alcohol	W-817-01	12-Oct-05	0. 3	2	NA	<2		
	W-817-02	12-Oct-05	0. 3	2	2	<2		
	W-817-03	11-Oct-05	0. 3	2	2	<2		
	W-817-04	11-Oct-05	0. 34	2	2	<2		

(continued)

Table B-1.2 Fourth quarter ground water analytical results, surface impoundments, constituents of concern required by WDR 96-248.

Parameter	Well	Sample date	MDL[a]	Reporting limit	Statistical limit[b]	Result	Retest 1 result 11/16/05	Retest 2 result 11/22/05
Volatile/semi volatile organic compounds (µg/L)								
Acetone	W-817-01	12-Oct-05	7. 4	10	NA [c]	<10		
	W-817-02	12-Oct-05	7. 4	10	10	<10		
	W-817-03	11-Oct-05	7. 4	10	10	<10		
	W-817-04	11-Oct-05	7. 4	10	10	18	<10[f]	<10[f]
2-Butanone	W-817-01	12-Oct-05	1. 8	20	NA	<20		
(methyl ethyl ketone)	W-817-02	12-Oct-05	1. 8	20	20	<20		
	W-817-03	11-Oct-05	1. 8	20	20	<20		
	W-817-04	11-Oct-05	9. 0	100	20	810	<10[f]	<10[f]
Dimethyl sulfoxide (DMSO)	W-817-01	12-Oct-05	0. 031	10	NA	<10		
	W-817-02	12-Oct-05	0. 031	10	10	<10		
	W-817-03	11-Oct-05	0. 031	10	10	<10		
	W-817-04	11-Oct-05	0. 036	11	10	<11		
Ethyl alcohol (ethanol)	W-817-01	12-Oct-05	65	1000	NA	<1000		
	W-817-02	12-Oct-05	65	1000	1000	<1000		
	W-817-03	11-Oct-05	65	1000	1000	<1000		
	W-817-04	11-Oct-05	65	1000	1000	<1000		
Methyl isobutyl ketone	W-817-01	12-Oct-05	0. 99	20	NA	<20		
	W-817-02	12-Oct-05	0. 99	20	20	<20		
	W-817-03	11-Oct-05	0. 99	20	20	<20		
	W-817-04	11-Oct-05	0. 99	20	20	<20		
Additives to energetic compounds (µg/L)								
Bis(2-ethylhexyl)phthalate	W-817-01	12-Oct-05	1. 3	5	NA	2. 9 est[e]		
	W-817-02	12-Oct-05	1. 3	5	5	**5. 3** [e]		
	W-817-03	11-Oct-05	1. 3	5	5	2. 5 est[e]		
	W-817-04	11-Oct-05	1. 3	5	5	1. 9 est[e]		

(continued)

Table B-1.2 Fourth quarter ground water analytical results, surface impoundments, constituents of concern required by WDR 96-248.

Parameter	Well	Sample date	MDL[a]	Reporting limit	Statistical limit[b]	Result	Retest 1 result 11/16/05	Retest 2 result 11/22/05
Unreactive polymers (µg/L)								
Styrene	W-817-01	12-Oct-05	0. 16	1. 0	NA[c]	<1. 0		
	W-817-02	12-Oct-05	0. 16	1. 0	1. 0	<1. 0		
	W-817-03	11-Oct-05	0. 16	1. 0	1. 0	<1. 0		
	W-817-04	11-Oct-05	0. 16	1. 0	1. 0	<1. 0		
Vinyl chloride	W-817-01	12-Oct-05	0. 098	1. 0	NA	<1. 0		
	W-817-02	12-Oct-05	0. 098	1. 0	1. 0	<1. 0		
	W-817-03	11-Oct-05	0. 098	1. 0	1. 0	<1. 0		
	W-817-04	11-Oct-05	0. 098	1. 0	1. 0	<1. 0		
Metals (mg/L)								
Aluminum	W-817-01	12-Oct-05	0. 017	0. 05	NA	<0. 05		
	W-817-02	12-Oct-05	0. 017	0. 05	0. 20	0. 018 est		
	W-817-03	11-Oct-05	0. 017	0. 05	0. 20	<0. 05		
	W-817-04	11-Oct-05	0. 017	0. 05	0. 20	<0. 05		
Arsenic	W-817-01	12-Oct-05	0. 002	0. 008	NA	0. 048		
	W-817-02	12-Oct-05	0. 002	0. 008	0. 073	0. 064		
	W-817-03	11-Oct-05	0. 002	0. 008	0. 072	0. 057		
	W-817-04	11-Oct-05	0. 002	0. 008	0. 077	0. 061		
Barium	W-817-01	12-Oct-05	0. 00083	0. 025	NA	0. 013 est		
	W-817-02	12-Oct-05	0. 00083	0. 025	0. 025	0. 011 est		
	W-817-03	11-Oct-05	0. 00083	0. 025	0. 025	0. 0089 est		
	W-817-04	11-Oct-05	0. 00083	0. 025	0. 025	0. 010 est		
Cadmium	W-817-01	12-Oct-05	0. 000045	0. 0005	NA	<0. 0005		
	W-817-02	12-Oct-05	0. 000045	0. 0005	0. 0016	0. 00024 est		
	W-817-03	11-Oct-05	0. 000045	0. 0002	0. 001	<0. 0005		
	W-817-04	11-Oct-05	0. 000045	0. 0005	0. 001	0. 0001 est		

(continued)

Table B-1.2 Fourth quarter ground water analytical results, surface impoundments, constituents of concern required by WDR 96-248.

Parameter	Well	Sample date	MDL[a]	Reporting limit	Statistical limit[b]	Result	Retest 1 result 11/16/05	Retest 2 result 11/22/05
Metals (mg/L) (continued)								
Chromium	W-817-01	12-Oct-05	0. 00014	0. 001	NA[c]	0. 0011		
	W-817-02	12-Oct-05	0. 00014	0. 001	0. 003	0. 0016		
	W-817-03	11-Oct-05	0. 00014	0. 001	0. 0042	0. 0028		
	W-817-04	11-Oct-05	0. 00014	0. 001	0. 0098	0. 0034		
Cobalt	W-817-01	12-Oct-05	0. 0014	0. 05	NA	<0. 05		
	W-817-02	12-Oct-05	0. 0014	0. 05	0. 05	<0. 05		
	W-817-03	11-Oct-05	0. 0014	0. 025	0. 05	0. 0017 est		
	W-817-04	11-Oct-05	0. 0014	0. 05	0. 05	<0. 05		
Copper	W-817-01	12-Oct-05	0. 00032	0. 001	NA	0. 0012		
	W-817-02	12-Oct-05	0. 00032	0. 001	0. 02	0. 0012		
	W-817-03	11-Oct-05	0. 00032	0. 001	0. 02	0. 010		
	W-817-04	11-Oct-05	0. 00032	0. 001	0. 02	0. 0035		
Lead	W-817-01	12-Oct-05	0. 00029	0. 005	NA	<0. 005		
	W-817-02	12-Oct-05	0. 00029	0. 005	0. 0099	0. 00097 est		
	W-817-03	11-Oct-05	0. 00029	0. 005	0. 0099	0. 00033 est		
	W-817-04	11-Oct-05	0. 00029	0. 005	0. 0099	0. 00099 est		
Manganese	W-817-01	12-Oct-05	0. 0053	0. 01	NA	<0. 01		
	W-817-02	12-Oct-05	0. 0053	0. 01	0. 01	<0. 01		
	W-817-03	11-Oct-05	0. 0053	0. 01	0. 01	0. 0057 est		
	W-817-04	11-Oct-05	0. 0053	0. 01	0. 01	<0. 01		
Molybdenum	W-817-01	12-Oct-05	0. 0027	0. 025	NA	0. 027		
	W-817-02	12-Oct-05	0. 0027	0. 025	0. 073	0. 050		
	W-817-03	11-Oct-05	0. 0027	0. 025	0. 060	0. 036		
	W-817-04	11-Oct-05	0. 0027	0. 025	0. 054	0. 040		
Nickel	W-817-01	12-Oct-05	0. 00067	0. 002	NA	<0. 002		
	W-817-02	12-Oct-05	0. 00087	0. 002	0. 044	0. 00087 est		
	W-817-03	11-Oct-05	0. 00067	0. 002	0. 044	0. 00088 est		
	W-817-04	11-Oct-05	0. 00067	0. 002	0. 044	0. 011		

(continued)

Table B-1.2 Fourth quarter ground water analytical results, surface impoundments, constituents of concern required by WDR 96-248.

Parameter	Well	Sample date	MDL[a]	Reporting limit	Statistical limit[b]	Result	Retest 1 result 11/16/05	Retest 2 result 11/22/05
Metals (mg/L) (continued)								
Potassium	W-817-01	12-Oct-05	0.061	1.0	NA[c]	10		
	W-817-02	12-Oct-05	0.061	1.0	18.6	13		
	W-817-03	11-Oct-05	0.061	1.0	14.6	10		
	W-817-04	11-Oct-05	0.061	1.0	13.7	10		
Silver	W-817-01	12-Oct-05	0.000034	0.001	NA	<0.001		
	W-817-02	12-Oct-05	0.000034	0.001	0.001	<0.001		
	W-817-03	11-Oct-05	0.000034	0.001	0.001	<0.001		
	W-817-04	11-Oct-05	0.000034	0.001	0.001	<0.001		
Zinc	W-817-01	12-Oct-05	0.0077	0.01	NA	<0.01		
	W-817-02	12-Oct-05	0.0077	0.01	0.24	0.11		
	W-817-03	11-Oct-05	0.0077	0.01	0.0099	<0.01		
	W-817-04	11-Oct-05	0.0077	0.01	0.055	<0.01		
Salts (mg/L)								
Ammonia nitrogen (as N)	W-817-01	12-Oct-05	0.01	0.02	NA	0.010 est		
	W-817-02	12-Oct-05	0.01	0.02	0.02	<0.02		
	W-817-03	11-Oct-05	0.01	0.02	0.02	<0.02		
	W-817-04	11-Oct-05	0.01	0.02	0.02	<0.02		
Bicarbonate alkalinity	W-817-01	12-Oct-05	5.0	5.0	NA	200		
(as $CaCO_3$)	W-817-02	12-Oct-05	10	10	277	220		
	W-817-03	11-Oct-05	5.0	5.0	277	110		
	W-817-04	11-Oct-05	10	10	277	240		
Bromide	W-817-01	12-Oct-05	0.035	0.1	NA	0.79		
	W-817-02	12-Oct-05	0.07	0.2	1.46	1.0		
	W-817-03	11-Oct-05	0.07	0.2	1.18	0.88		
	W-817-04	11-Oct-05	0.07	0.2	1.49	0.89		
Chloride	W-817-01	12-Oct-05	0.041	0.5	NA	200		
	W-817-02	12-Oct-05	0.082	10	388	280		
	W-817-03	11-Oct-05	0.082	10	302	220		
	W-817-04	11-Oct-05	0.082	10	296	220		

(continued)

Table B-1.2 Fourth quarter ground water analytical results, surface impoundments, constituents of concern required by WDR 96-248.

Parameter	Well	Sample date	MDL[a]	Reporting limit	Statistical limit[b]	Result	Retest 1 result 11/16/05	Retest 2 result 11/22/05
Salts (mg/L) (continued)								
Nitrate (as NO_3)	W-817-01	12-Oct-05	0. 055	0. 5	NA[c]	86		
	W-817-02	12-Oct-05	0. 11	1 0	110	91		
	W-817-03	11-Oct-05	0. 11	1 0	110	91		
	W-817-04	11-Oct-05	0. 11	1 0	110	89		
Ortho-phosphate	W-817-01	12-Oct-05	0. 03	0. 05	NA	0. 087		
	W-817-02	12-Oct-05	0. 03	0. 05	0. 19	0. 077		
	W-817-03	11-Oct-05	0. 03	0. 05	0. 19	0. 049		
	W-817-04	11-Oct-05	0. 03	0. 05	0. 19	0. 064		
Perchlorate	W-817-01	12-Oct-05	0. 00011	0. 004	NA	0. 018		
	W-817-02	12-Oct-05	0. 00011	0. 004	0. 044	0. 026		
	W-817-03	11-Oct-05	0. 00011	0. 004	0. 050	0. 027		
	W-817-04	11-Oct-05	0. 00011	0. 004	0. 049	0. 025		
Sulfate	W-817-01	12-Oct-05	0. 12	1 0	NA	120		
	W-817-02	12-Oct-05	0. 24	2 0	512	290		
	W-817-03	11-Oct-05	0. 24	2 0	233	210		
	W-817-04	11-Oct-05	0. 24	2 0	284	210		
Energetic materials (µg/L)								
HMX	W-817-01	12-Oct-05	0. 0649	0. 649	NA	14. 5		
	W-817-02	12-Oct-05	0. 0649	0. 649	1. 0	<0. 649		
	W-817-03	11-Oct-05	0. 0649	0. 649	1. 0	<0. 649		
	W-817-04	11-Oct-05	0. 0649	0. 649	1. 0	<0. 649		
RDX	W-817-01	12-Oct-05	0. 130	0. 649	NA	37. 6		
	W-817-02	12-Oct-05	0. 130	0. 649	0. 85	0. 665		
	W-817-03	11-Oct-05	0. 130	0. 649	9. 30	8. 30		
	W-817-04	11-Oct-05	0. 130	0. 649	9. 68	4. 98		
TNT	W-817-01	12-Oct-05	0. 130	0. 649	NA	<0. 649		
	W-817-02	12-Oct-05	0. 130	0. 649	0. 26	<0. 649		
	W-817-03	11-Oct-05	0. 130	0. 649	0. 26	<0. 649		
	W-817-04	11-Oct-05	0. 130	0. 649	0. 26	<0. 649		

(continued)

Table B-1.2 Fourth quarter ground water analytical results, surface impoundments, constituents of concern required by WDR 96-248. (concluded)

Parameter	Well	Sample date	MDL[a]	Reporting limit	Statistical limit[b]	Result	Retest 1 result 11/16/05	Retest 2 result 11/22/05
Energetic materials (μg/L) (concluded)								
TATB	W-817-01	12-Oct-05	1.40	20	NA[c]	<20		
	W-817-02	12-Oct-05	1.40	20	20	<20		
	W-817-03	11-Oct-05	1.40	20	20	<20		
	W-817-04	11-Oct-05	1.40	20	20	<20		
PETN	W-817-01	12-Oct-05	0.325	1.3	NA	<1.3		
	W-817-02	12-Oct-05	0.325	1.3	1.0	2.35	<0.70[f]	<0.70[f]
	W-817-03	11-Oct-05	0.325	1.3	1.0	<1.3		
	W-817-04	11-Oct-05	0.325	1.3	1.0	2.25	<0.70[f]	<0.70[f]
Tetryl	W-817-01	12-Oct-05	0.162	0.649	NA	<0.649		
	W-817-02	12-Oct-05	0.162	0.649	1.0	<0.649		
	W-817-03	11-Oct-05	0.162	0.649	1.0	<0.649		
	W-817-04	11-Oct-05	0.162	0.649	1.0	<0.649		
4-amino-2,6-dinitrotoluene	W-817-01	12-Oct-05	0.130	0.649	NA	7.40		
	W-817-02	12-Oct-05	0.130	0.649	0.26	0.132 est		
	W-817-03	11-Oct-05	0.130	0.649	1.22	1.18		
	W-817-04	11-Oct-05	0.130	0.649	1.08	0.459 est		

[a] MDL = Method detection limit.

[b] Statistical limit as listed in MRP 96-248, Table 5, modified by CVRWQCB letter (Cohen,1998) dated September 25, 1998.

[c] NA = Not applicable.

[d] Results followed by an "est" have estimated concentrations between the Method Detection Limit and the reporting limit for that analyte.

[e] The analytical results for toluene and for bis(2-ethylhexyl)phthalate are contaminated as shown by detections of both in the field blank sample at estimated concentrations of 0.57 μg/L and 1.9 μg/L, respectively. Bis(2-ethylhexyl)phthalate was also detected in the method blank sample at an estimated concentration of 1.7 μg/L. (See **Table F-1.1**)

[f] The analytical results for the retest samples collected and analyzed for acetone and 2-butanone in well W-817-04, and for PETN in wells W-817-02 and W-817-04 did not confirm the statistically significant evidence for a release of those COCs in those wells.

Table B-2. Fourth quarter ground water analytical results, surface impoundments, other constituents.

Parameter	Well	Sample date	MDL [a]	Reporting limit	Result
General					
Ground water elevation	W-817-01	12-Oct-05	NA [b]	NA	193. 34
(meters above mean sea level)	W-817-02	12-Oct-05	NA	NA	179. 04
	W-817-03	11-Oct-05	NA	NA	170. 84
	W-817-04	11-Oct-05	NA	NA	183. 70
Field pH (unitless)	W-817-01	12-Oct-05	NA	NA	8. 11
	W-817-02	12-Oct-05	NA	NA	7. 84
	W-817-03	11-Oct-05	NA	NA	7. 94
	W-817-04	11-Oct-05	NA	NA	7. 06
Specific conductance (μmhos/cm)	W-817-01	12-Oct-05	NA	NA	1470
	W-817-02	12-Oct-05	NA	NA	2034
	W-817-03	11-Oct-05	NA	NA	1639
	W-817-04	11-Oct-05	NA	NA	1743
Water temperature (°Celsius)	W-817-01	12-Oct-05	NA	NA	22. 0
	W-817-02	12-Oct-05	NA	NA	23. 5
	W-817-03	11-Oct-05	NA	NA	21. 6
	W-817-04	11-Oct-05	NA	NA	23. 1

Table B-2. Fourth quarter ground water analytical results, surface impoundments, other constituents. (concluded)

Parameter	Well	Sample date	MDL [a]	Reporting limit	Result
Volatile/semi-volatile organic compounds (µg/L) [c]					
1,1-Dichloroethene	W-817-01	12-Oct-05	0.088	1.0	<1.0
	W-817-02	12-Oct-05	0.088	1.0	<1.0
	W-817-03	11-Oct-05	0.088	1.0	<1.0
	W-817-04	11-Oct-05	0.088	1.0	<1.0
Benzoic Acid	W-817-01	12-Oct-05	1.3	50	<50
	W-817-02	12-Oct-05	1.3	50	<50
	W-817-03	11-Oct-05	1.3	50	<50
	W-817-04	11-Oct-05	1.3	50	<50
Chloroform	W-817-01	12-Oct-05	0.05	1.0	<1.0
	W-817-02	12-Oct-05	0.05	1.0	<1.0
	W-817-03	11-Oct-05	0.05	1.0	0.20 est[d]
	W-817-04	11-Oct-05	0.05	1.0	0.26 est
Trichloroethene (TCE)	W-817-01	12-Oct-05	0.055	0.5	<0.5
	W-817-02	12-Oct-05	0.055	0.5	0.6
	W-817-03	11-Oct-05	0.055	0.5	7.4
	W-817-04	11-Oct-05	0.055	0.5	6.0

[a] MDL = Method detection limit.
[b] NA = Not applicable.
[c] No other volatile or semi-volatile organic compounds (other than those listed in **Table B-1.2**) were detected by EPA Methods 624 and 625.
[d] Results followed by an "est" have estimated concentrations between the MDL and the reporting limit for that analyte.

Appendix C

Annual Summary Plots and Tables of Sewage Evaporation and Percolation Ponds Wastewater Monitoring Data

Appendix C

This appendix contains graphical and tabular summaries of the 2005 sewage evaporation and percolation ponds wastewater monitoring data. The monitoring requirements of WDR 96-248 began in the fourth quarter of 1996. LLNL collected data at the sewage ponds wastewater network prior to the permit issuance in the third quarter of 1996; these data are also plotted.

Wastewater influent monitoring at location ISWP consists of pH, electrical conductivity (EC), and biochemical oxygen demand (BOD). Routine wastewater monitoring at location ESWP consists of pH, EC, and dissolved oxygen (DO); BOD was also analyzed only during the first quarter of 2005. A continuous discharge from the sewage evaporation pond into the percolation pond at location DSWP began in January and continued through the first quarter of 2005. Samples of the continuous discharge were collected on January 3 and March 9, 2005, and analyzed for pH, EC, BOD, nitrate, and fecal and total coliform bacteria.

Each two-dimensional graph plots concentration on the vertical axis versus time (years divided into four quarterly sampling periods) on the horizontal axis. Units of measure are given on the vertical axis label and in the header at the top of each page. Values above the analytical reporting limit for each analyte are plotted as solid diamonds, and values below the analytical reporting limit are plotted as open inverted triangles. Data determined not to be valid are not plotted. Also those concentrations of fecal and total coliform bacteria greater than 1,000,000 most probable number (of organisms)/100 mL of sample are not plotted; those values are as follows listed in **Table C-1**:

Table C-1. Wastewater analytes that are not plotted.

Type	Analyte	Location	Date	Result (MPN[a]/100 mL)
Coliform bacteria	Fecal	3-ISWP-OW	12/01/99	>1,600,000
Coliform bacteria	Fecal	3-ISWP-OW	02/17/00	>16,000,000
Coliform bacteria	Fecal	3-ISWP-OW	05/23/00	3,500,000
Coliform bacteria	Fecal	3-ISWP-OW (dup)	05/23/00	1,700,000
Coliform bacteria	Total	3-ISWP-OW	02/17/00	>16,000,000
Coliform bacteria	Total	3-ISWP-OW	05/23/00	3,500,000
Coliform bacteria	Total	3-ISWP-OW (dup)	05/23/00	3,500,000

[a] MPN = Most probable number (of organisms)

Tabular summaries of the observations are contained in **Tables C-2** to **C-5**, starting on page C-20.

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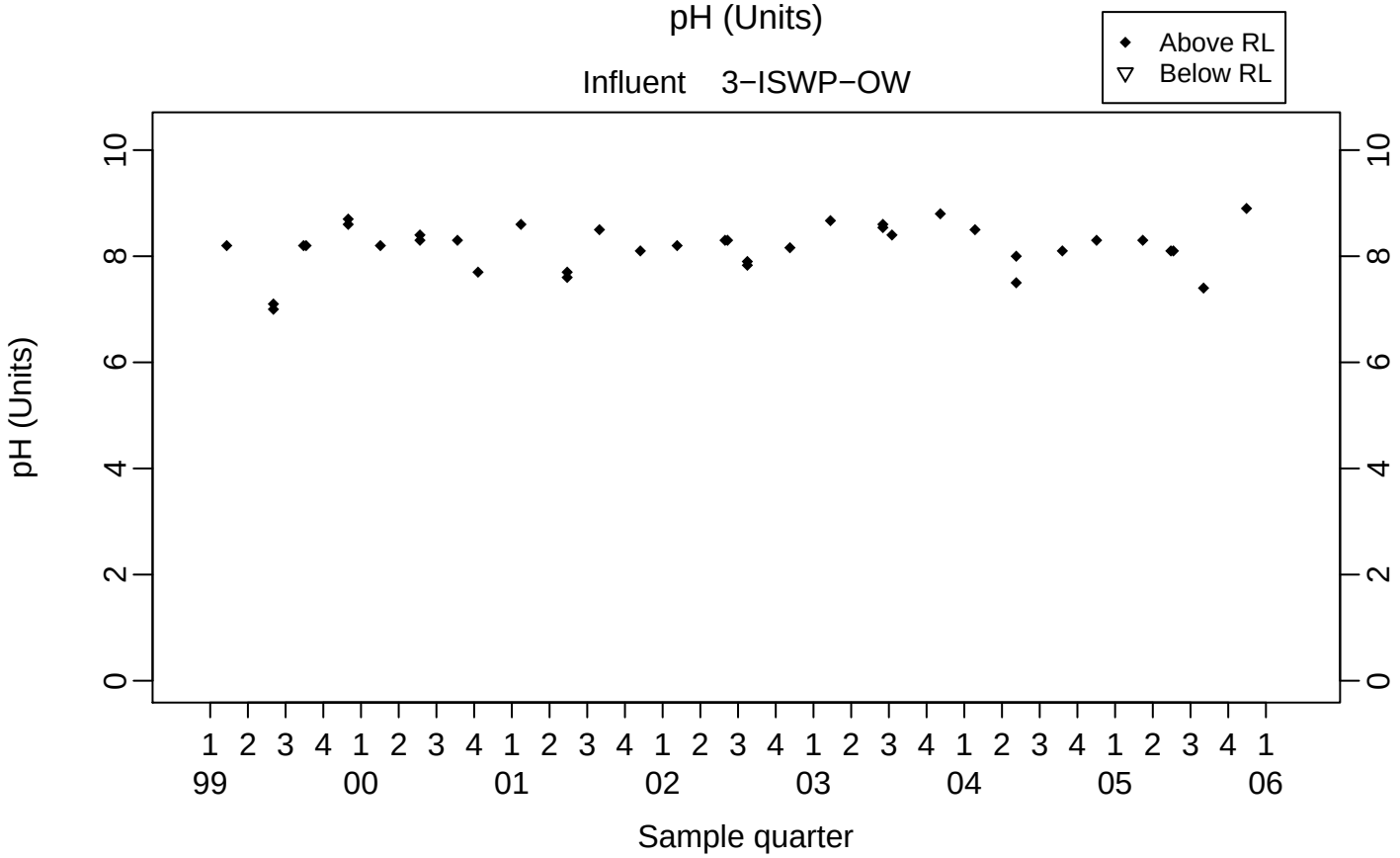
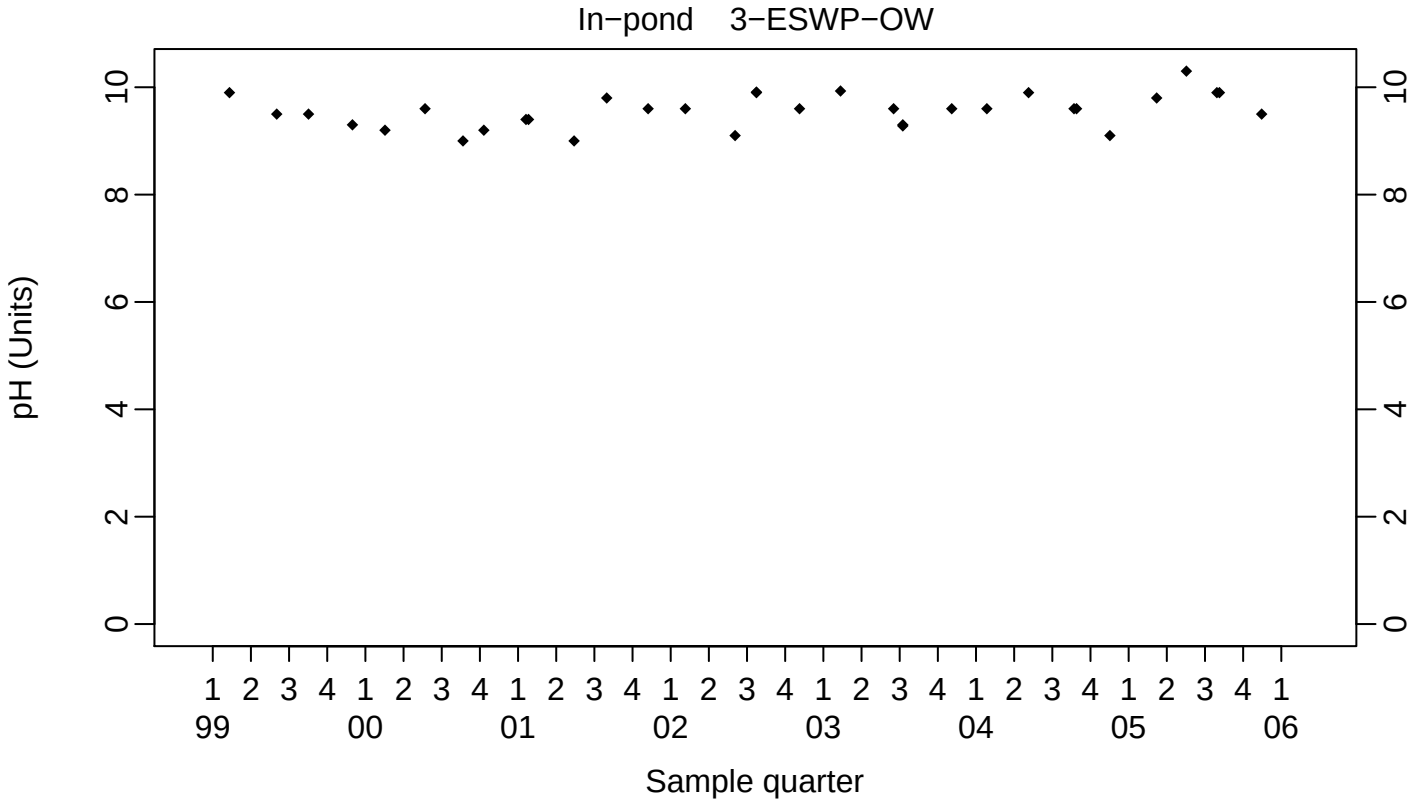
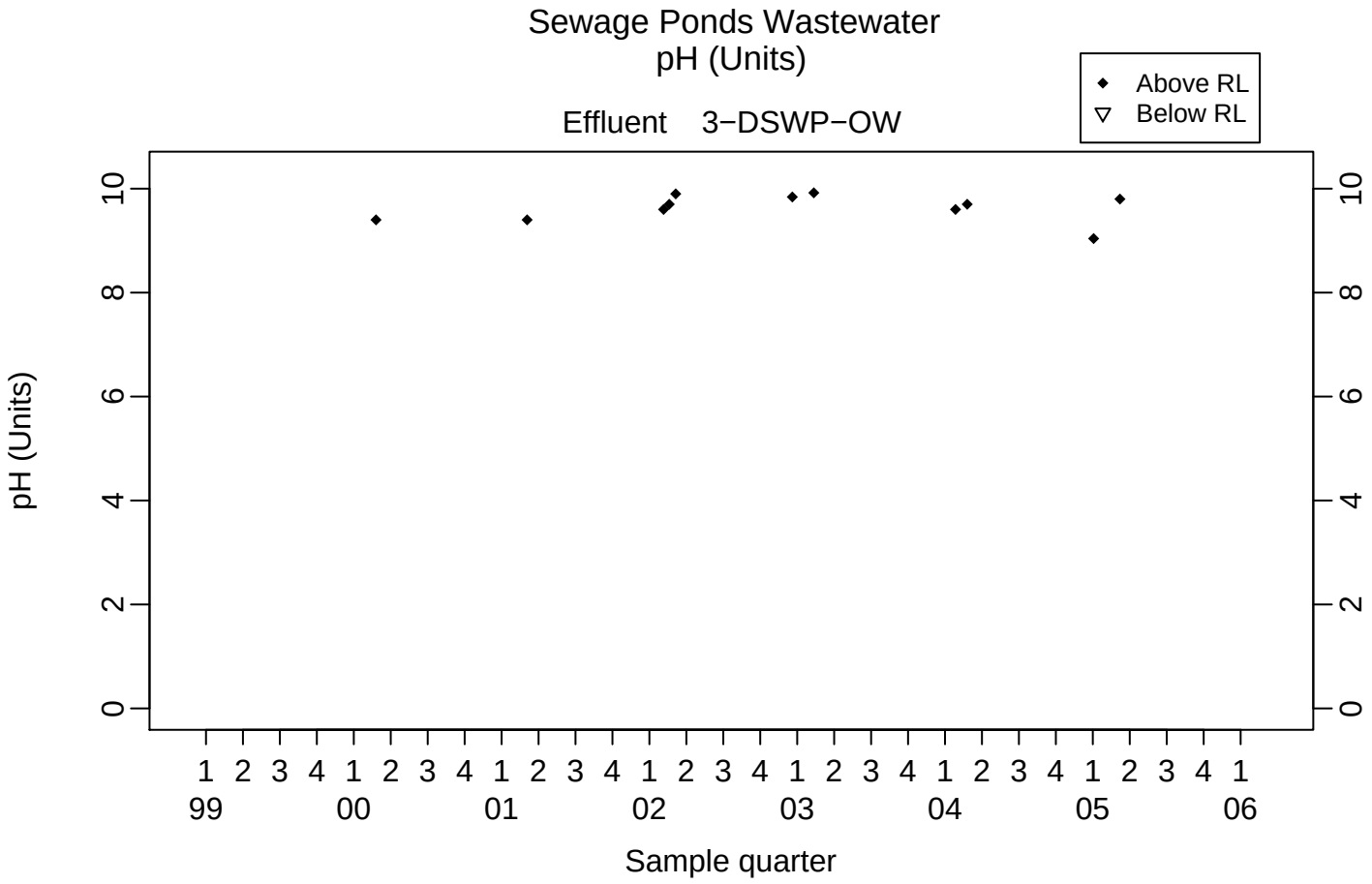
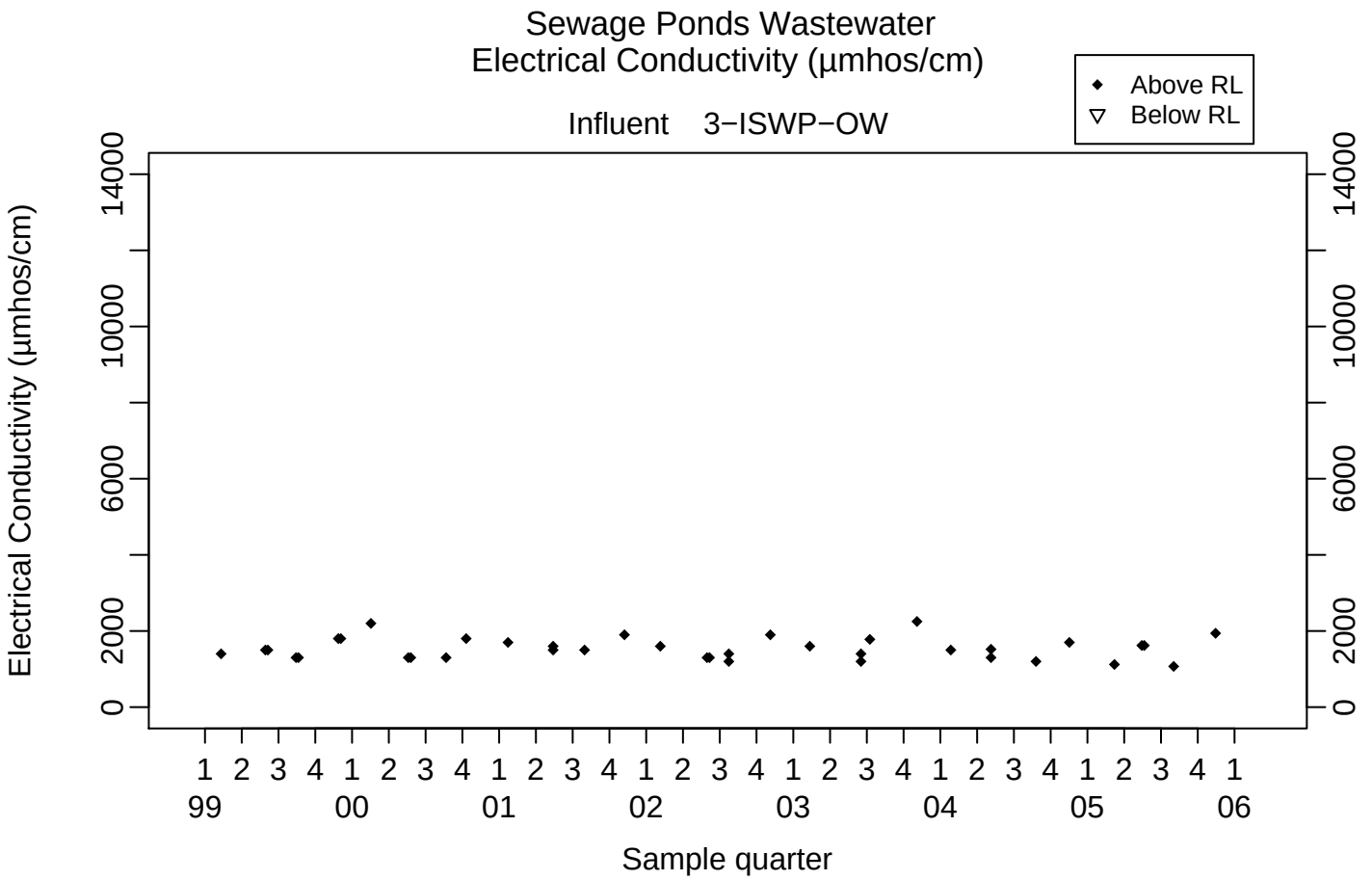
Annual Plots of Sewage Evaporation and Percolation Ponds Wastewater Monitoring Data

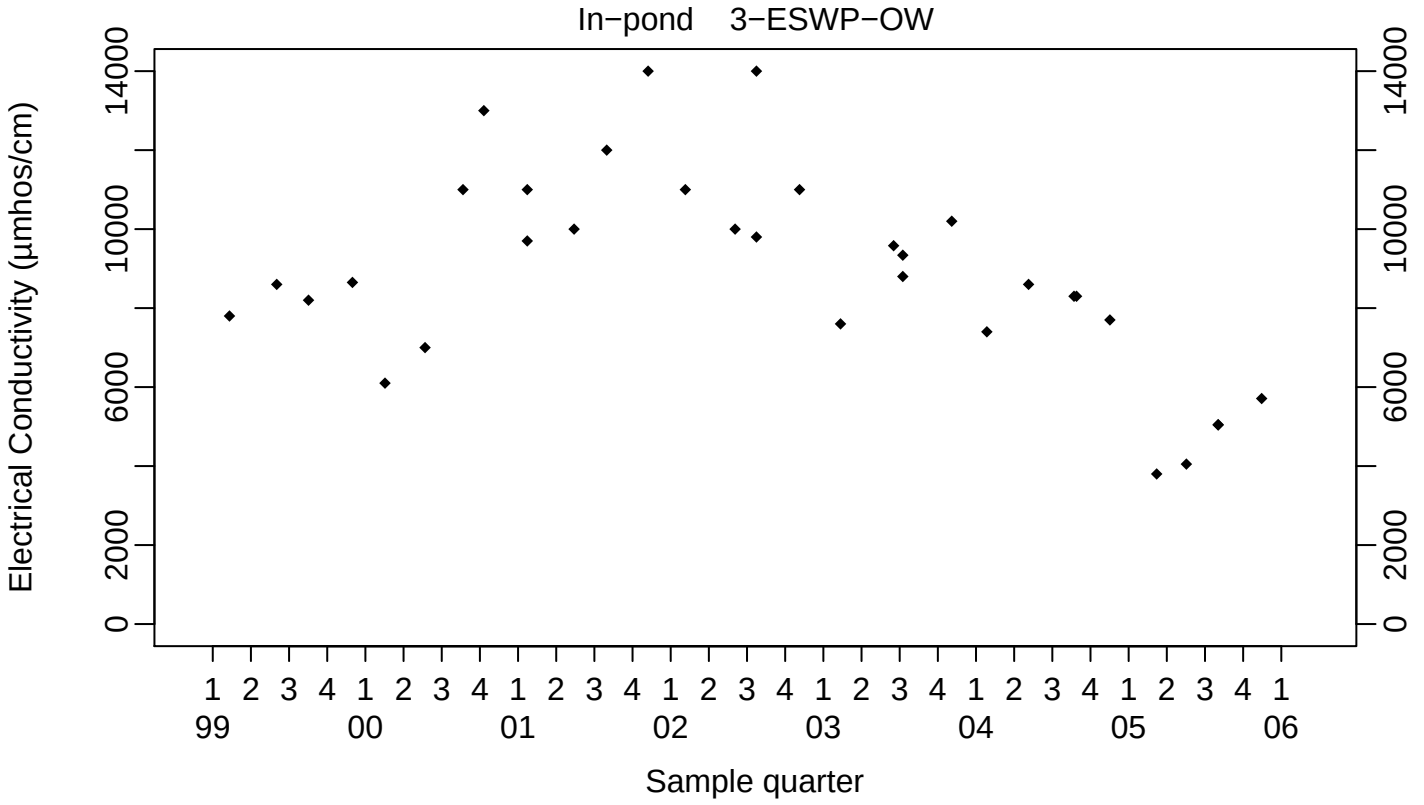
Sewage Ponds Wastewater
pH (Units)

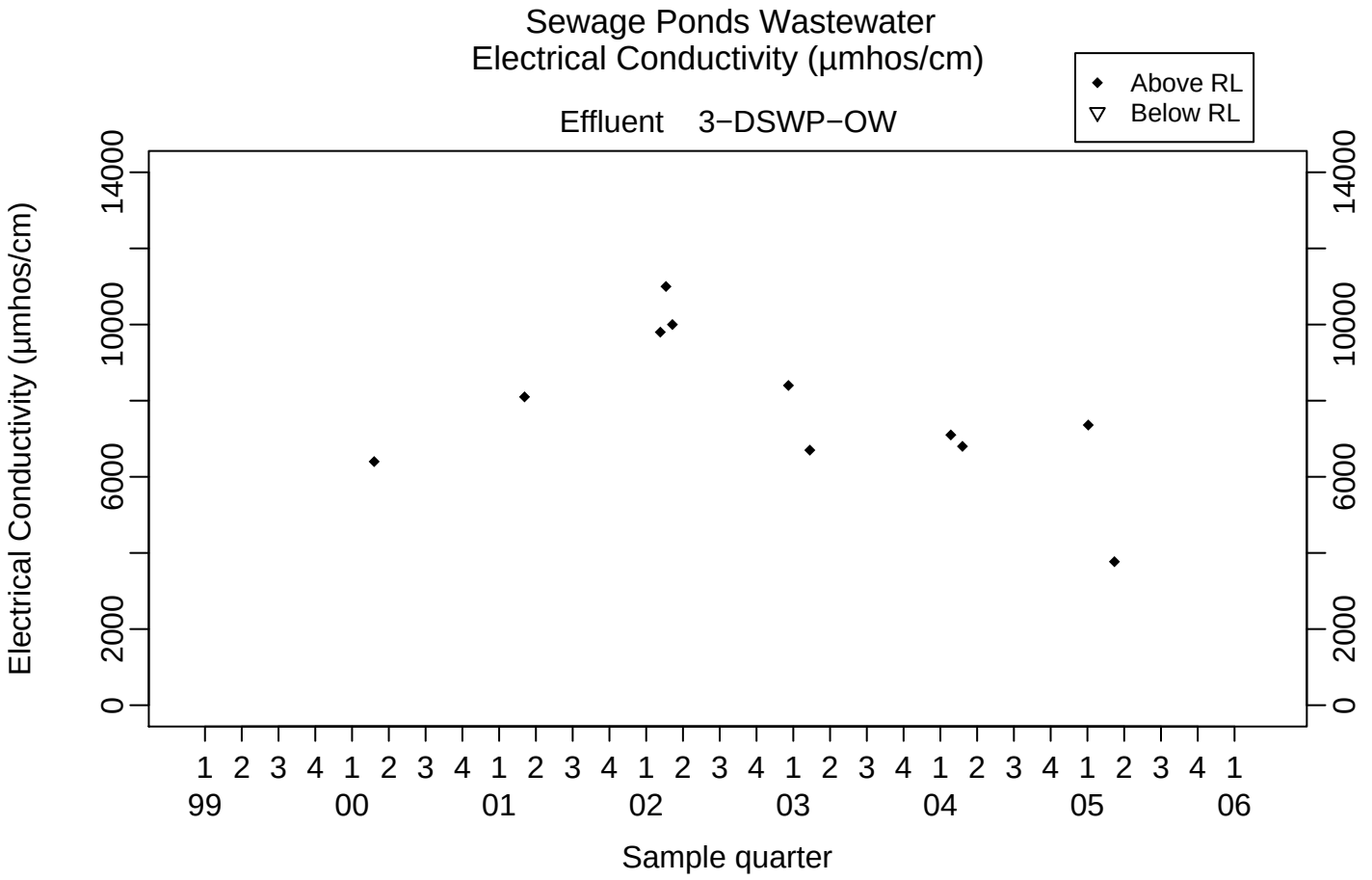


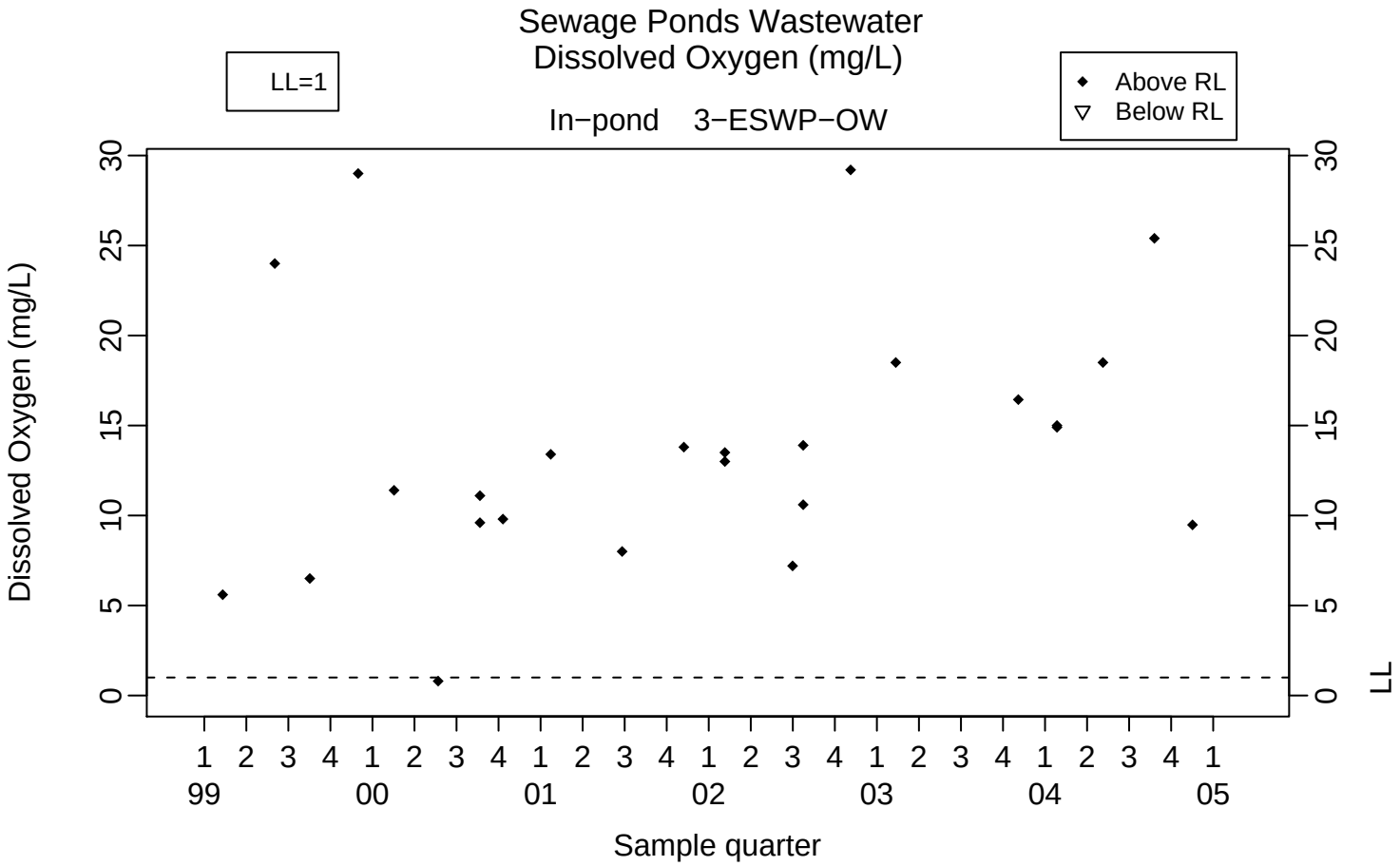


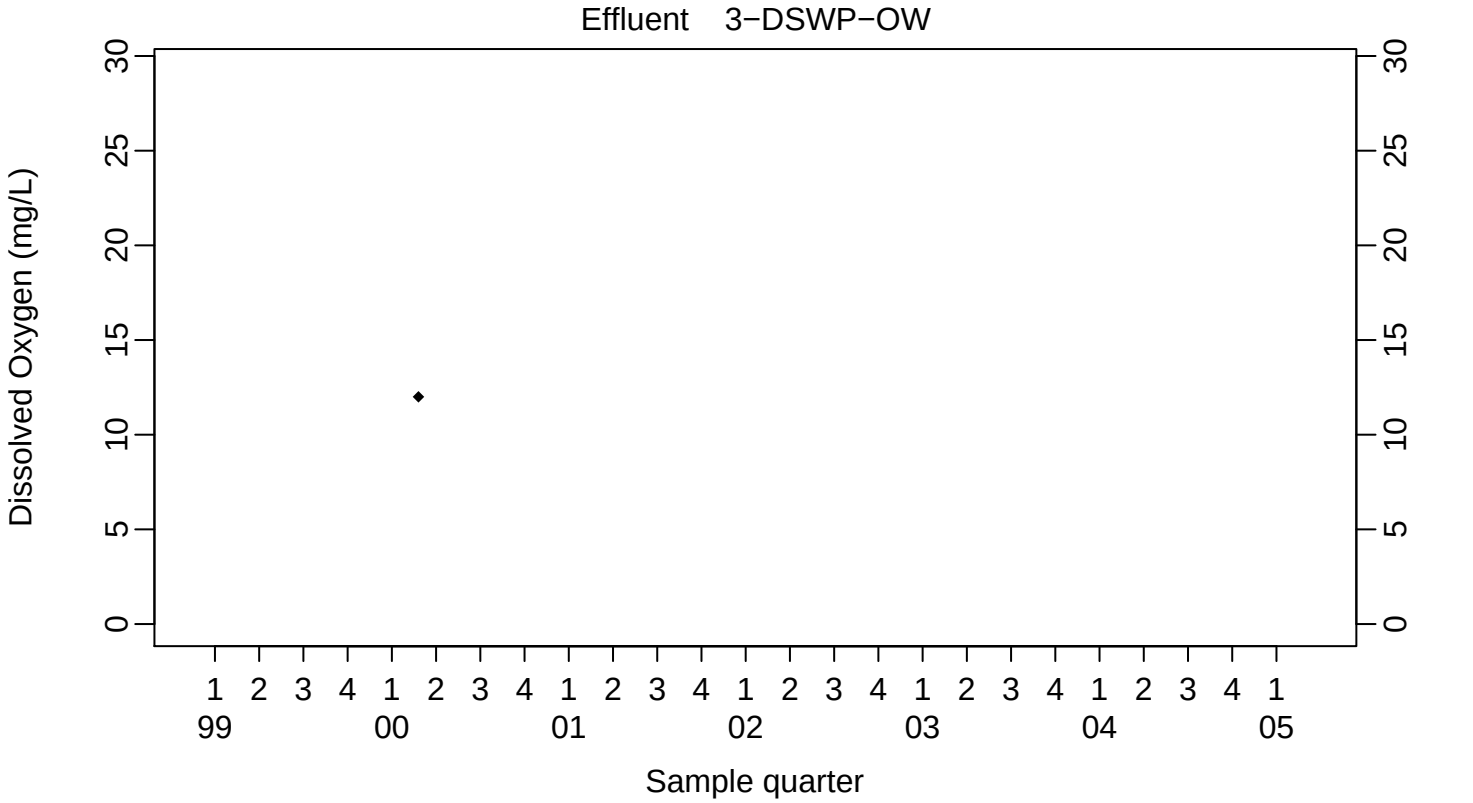

Sewage Ponds Wastewater
pH (Units)
Effluent 3−DSWP−OW
Above RL
Below RL
pH (Units)
0
2
4
6
8
10
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

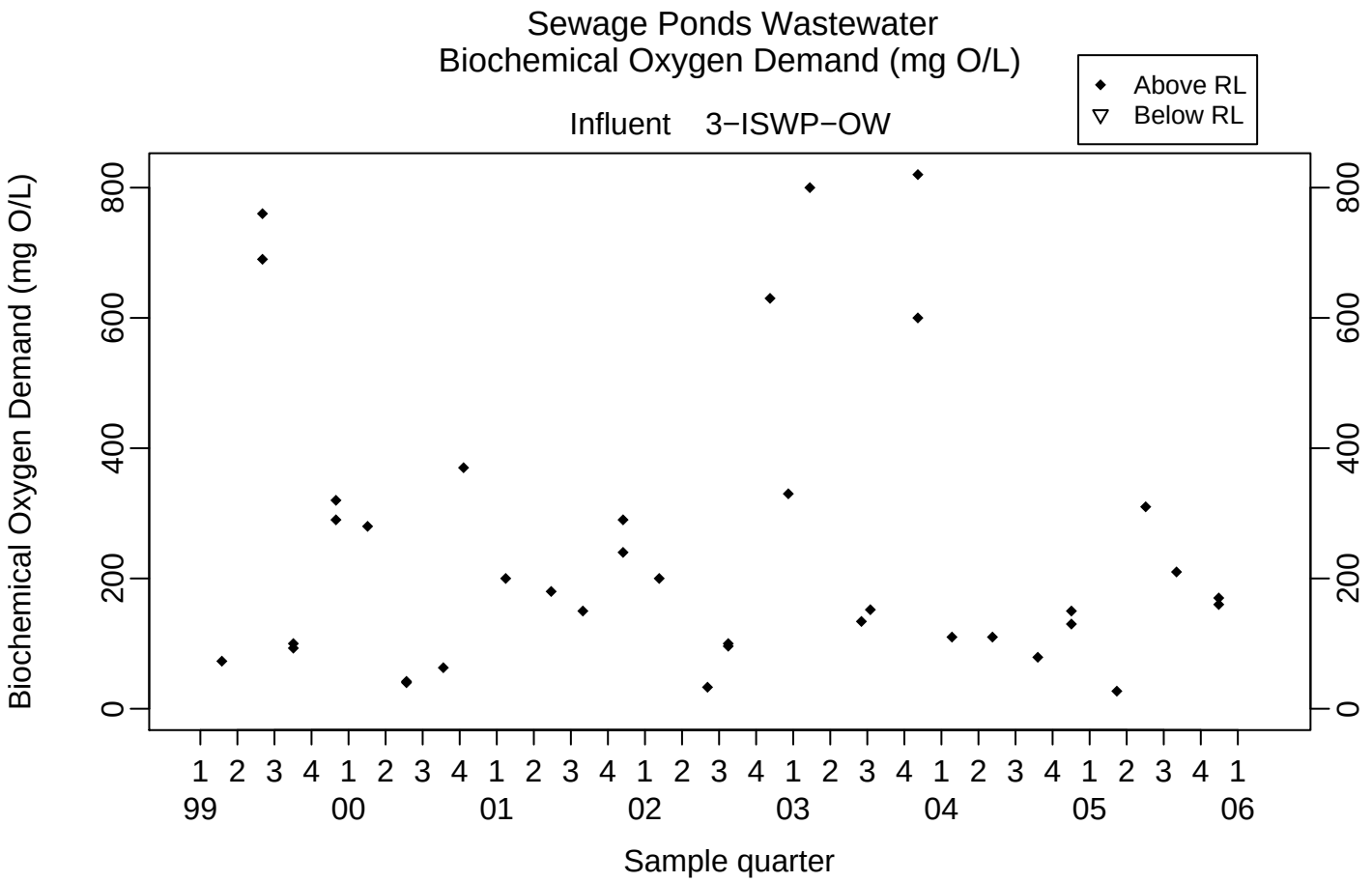

Sewage Ponds Wastewater
Electrical Conductivity (µmhos/cm)
Above RL
Below RL
Influent 3−ISWP−OW
Electrical Conductivity (µmhos/cm)
0
2000
6000
10000
14000
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

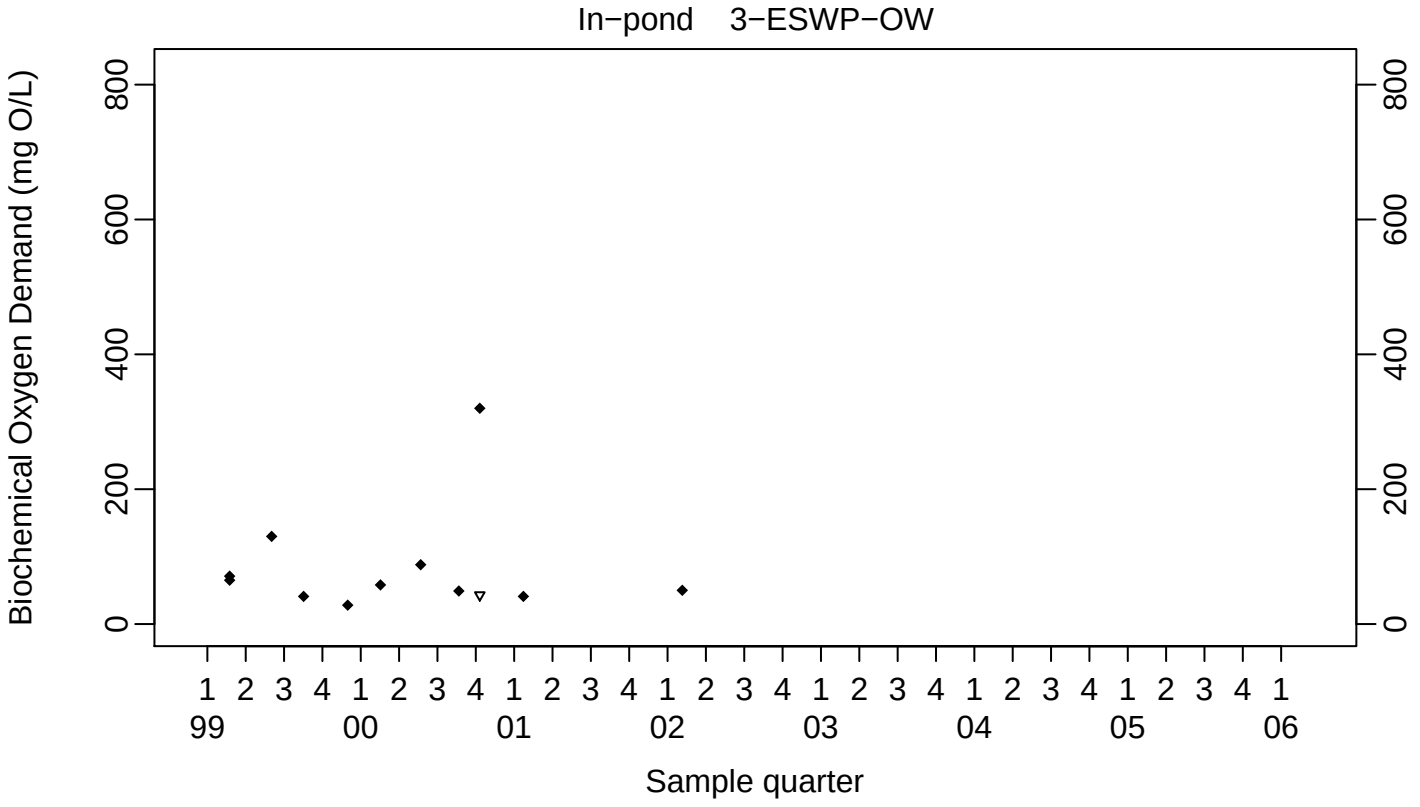

In−pond 3−ESWP−OW
Electrical Conductivity (µmhos/cm)
0
2000
6000
10000
14000
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

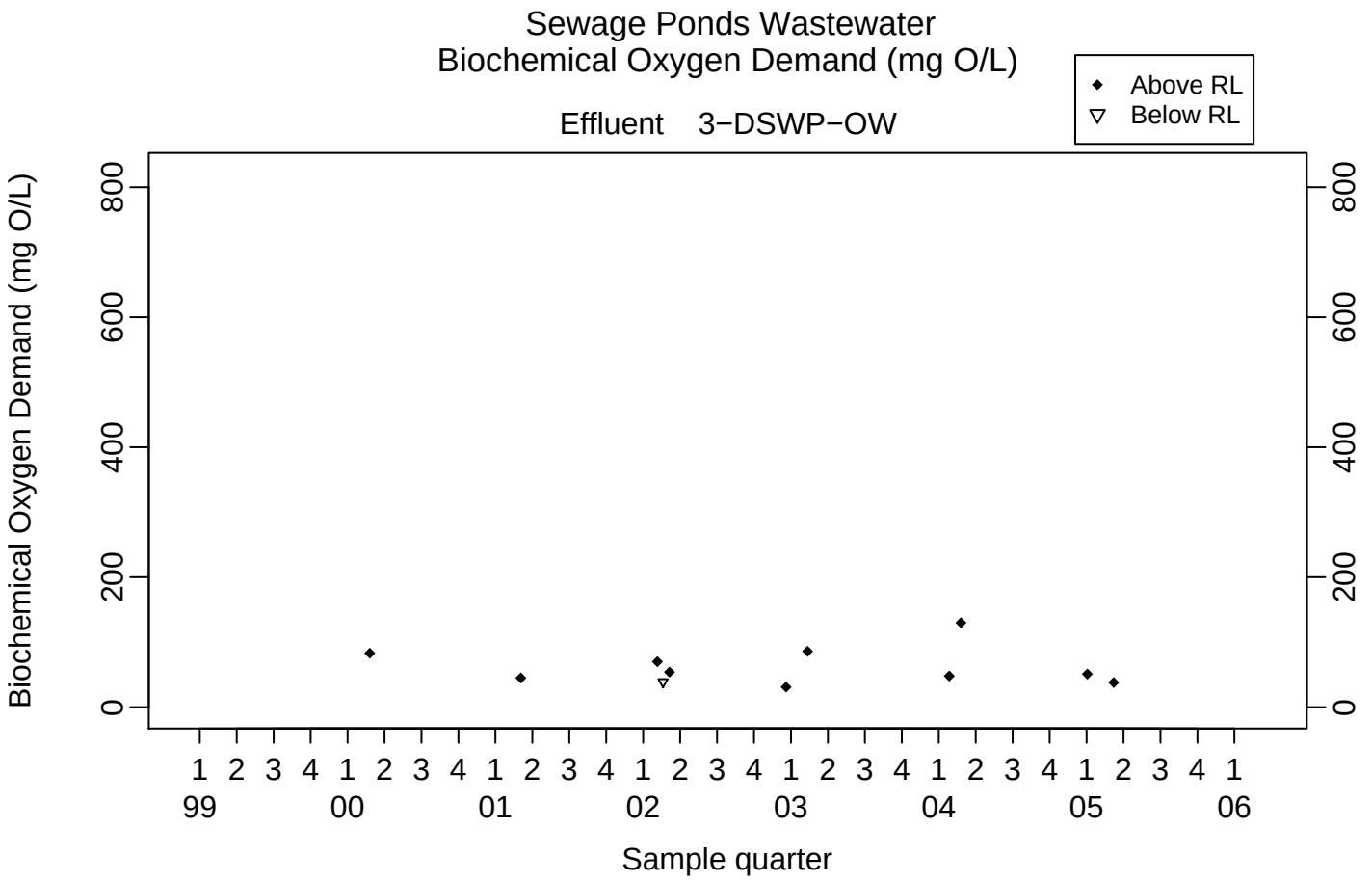

Sewage Ponds Wastewater
Electrical Conductivity (µmhos/cm)
Effluent 3−DSWP−OW
Above RL
Below RL
Electrical Conductivity (µmhos/cm)
0
2000
6000
10000
14000
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

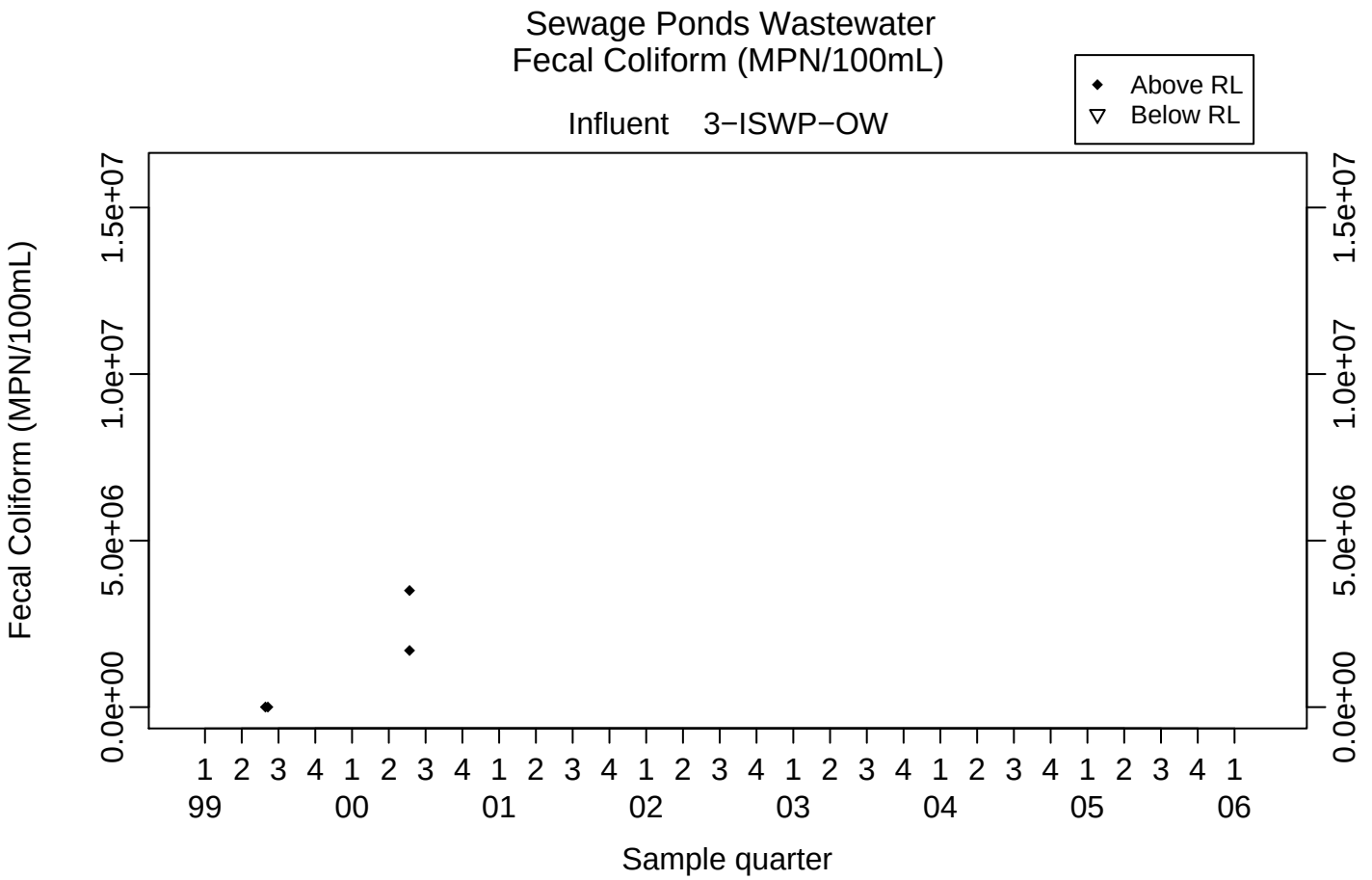

Sewage Ponds Wastewater
Dissolved Oxygen (mg/L)
LL=1
Above RL
Below RL
In−pond 3−ESWP−OW
Dissolved Oxygen (mg/L)
0
5
10
15
20
25
30
LL
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05
Sample quarter

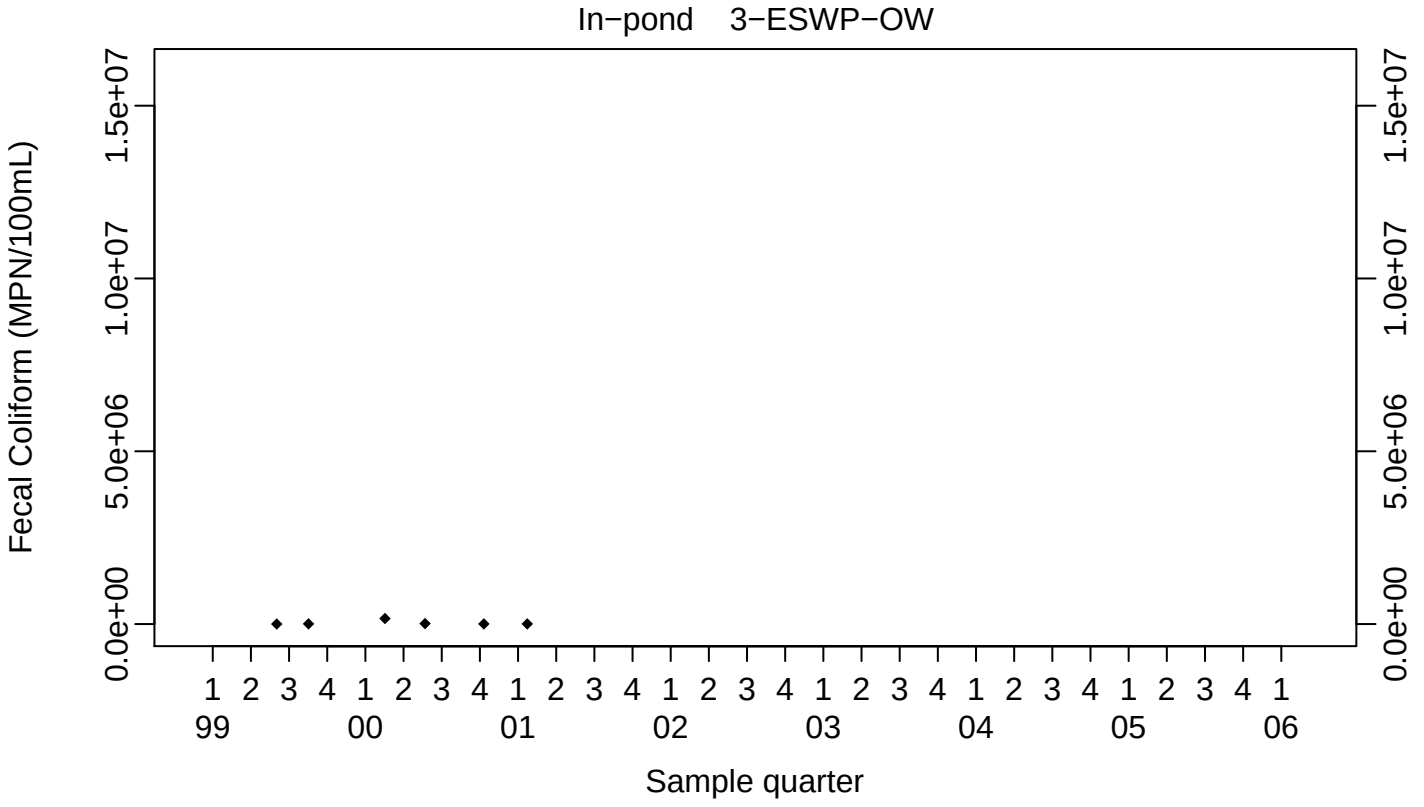

Effluent 3−DSWP−OW
Dissolved Oxygen (mg/L)
0
5
10
15
20
25
30
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05
Sample quarter

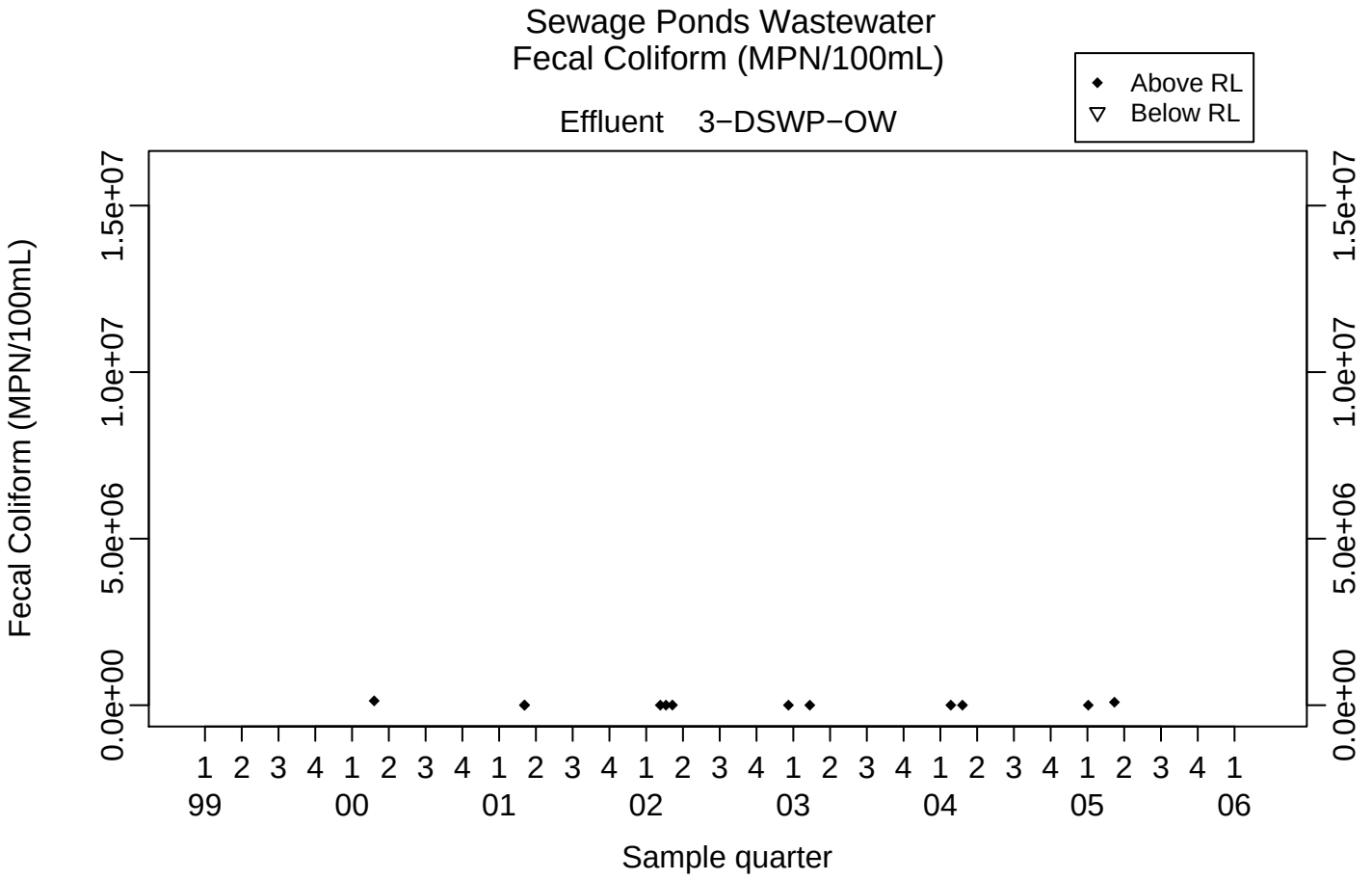

Sewage Ponds Wastewater
Biochemical Oxygen Demand (mg O/L)
Above RL
Below RL
Influent 3−ISWP−OW
Biochemical Oxygen Demand (mg O/L)
0
200
400
600
800
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


In−pond 3−ESWP−OW
Biochemical Oxygen Demand (mg O/L)
0
200
400
600
800
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

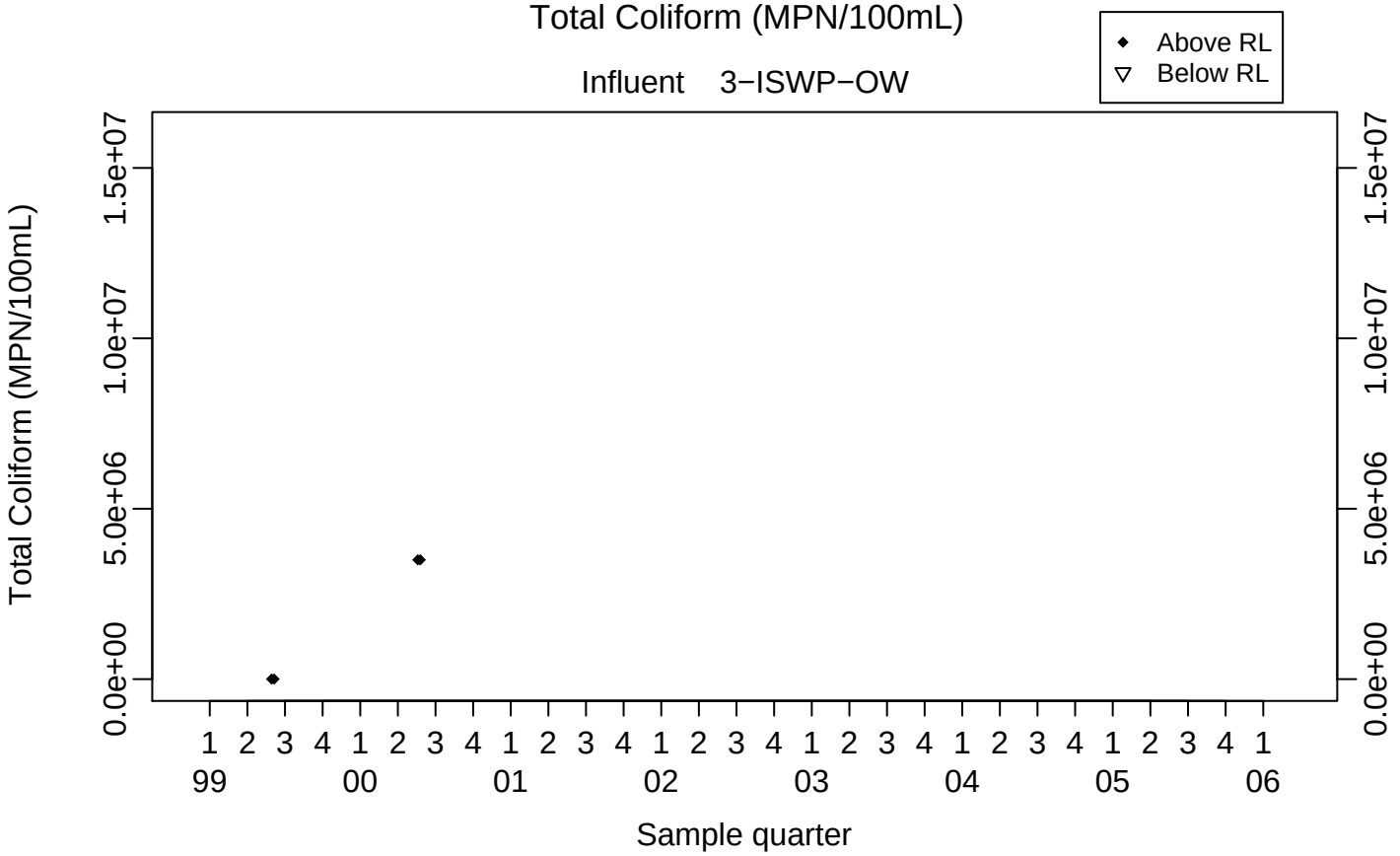

Sewage Ponds Wastewater
Biochemical Oxygen Demand (mg O/L)
Effluent 3−DSWP−OW
Above RL
Below RL
Biochemical Oxygen Demand (mg O/L)
0
200
400
600
800
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

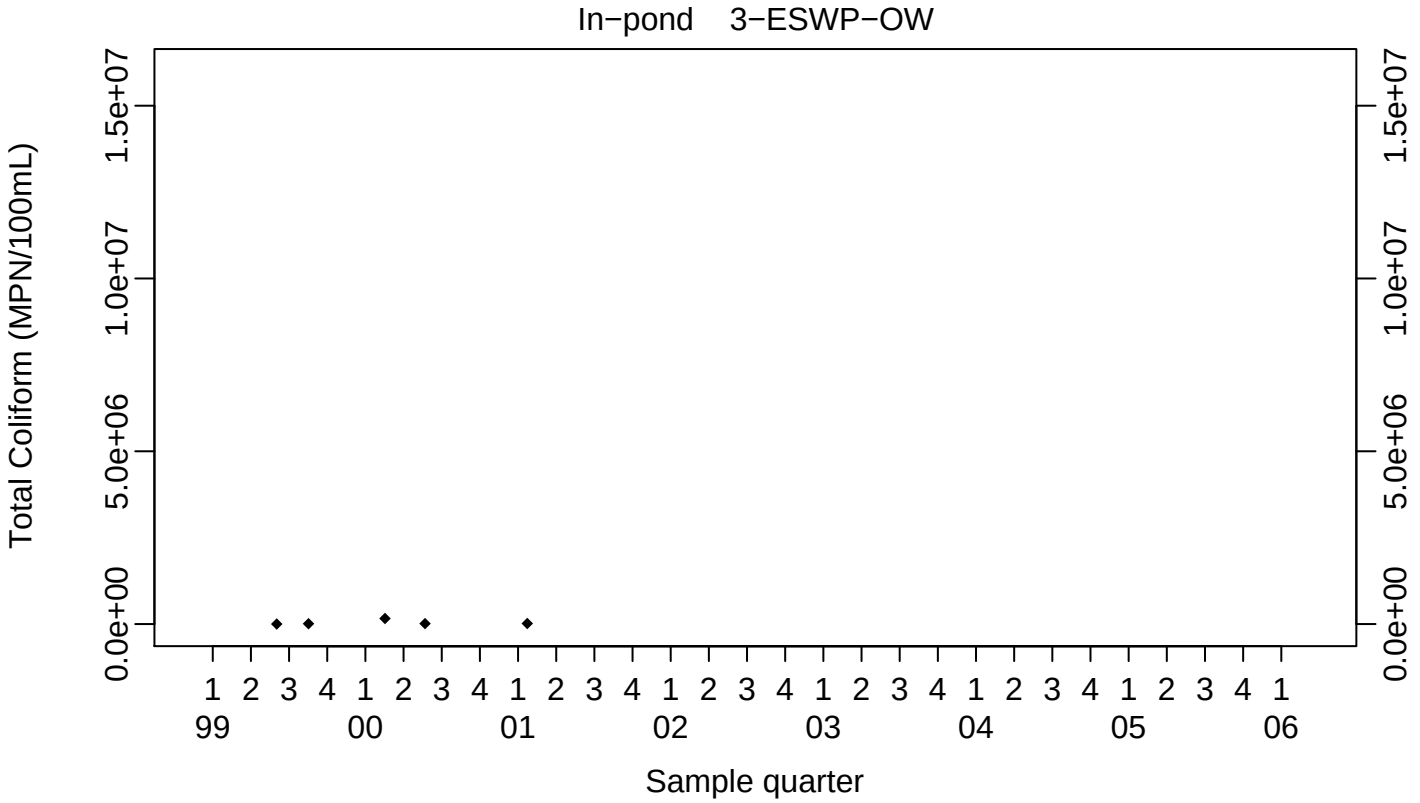

Sewage Ponds Wastewater
Fecal Coliform (MPN/100mL)
Above RL
Below RL
Influent 3−ISWP−OW
Fecal Coliform (MPN/100mL)
0.0e+00
5.0e+06
1.0e+07
1.5e+07
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

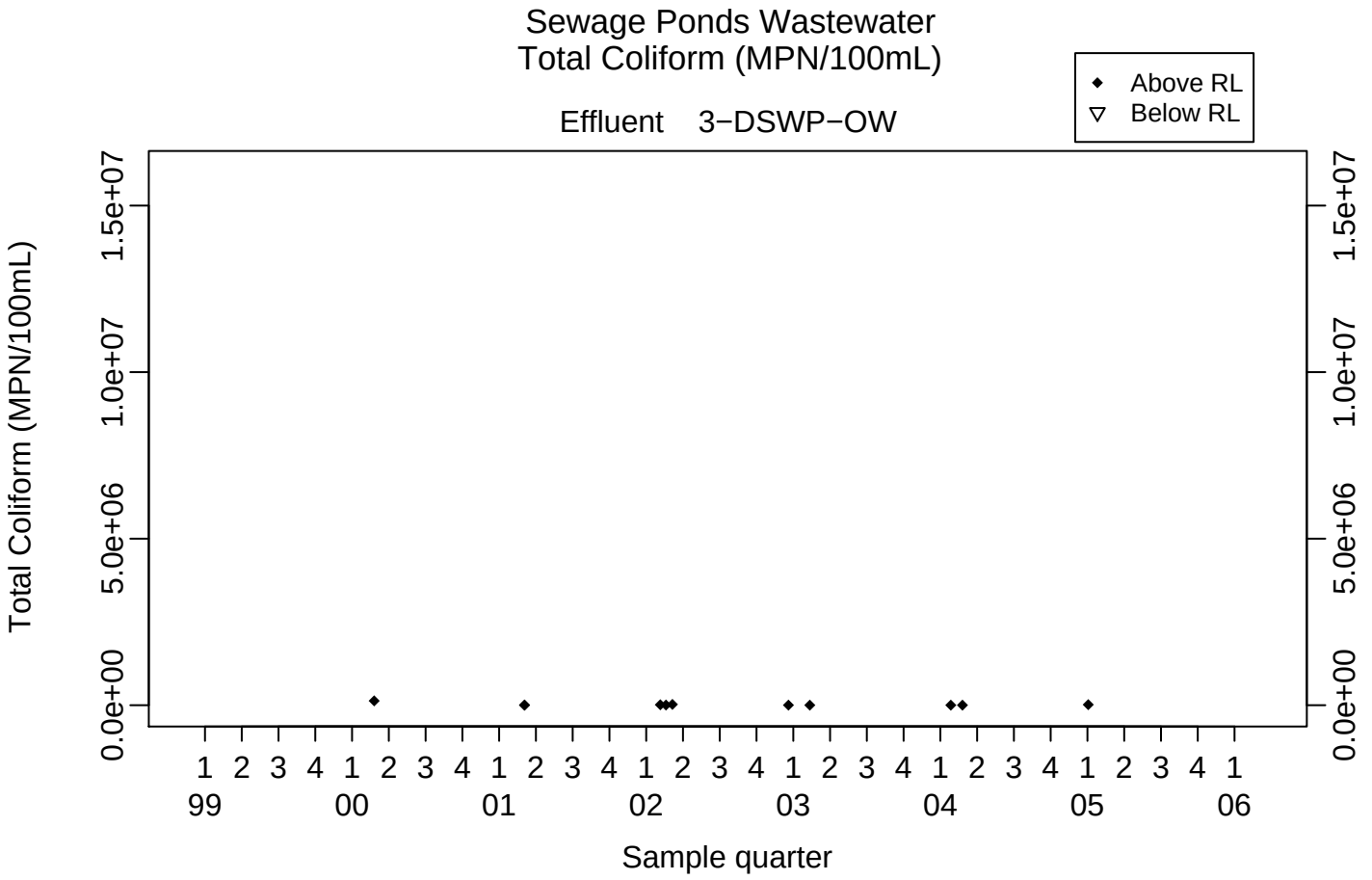

In−pond 3−ESWP−OW
Fecal Coliform (MPN/100mL)
0.0e+00
5.0e+06
1.0e+07
1.5e+07
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


Sewage Ponds Wastewater
Fecal Coliform (MPN/100mL)
Effluent 3−DSWP−OW
Above RL
Below RL
Fecal Coliform (MPN/100mL)
0.0e+00
5.0e+06
1.0e+07
1.5e+07
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

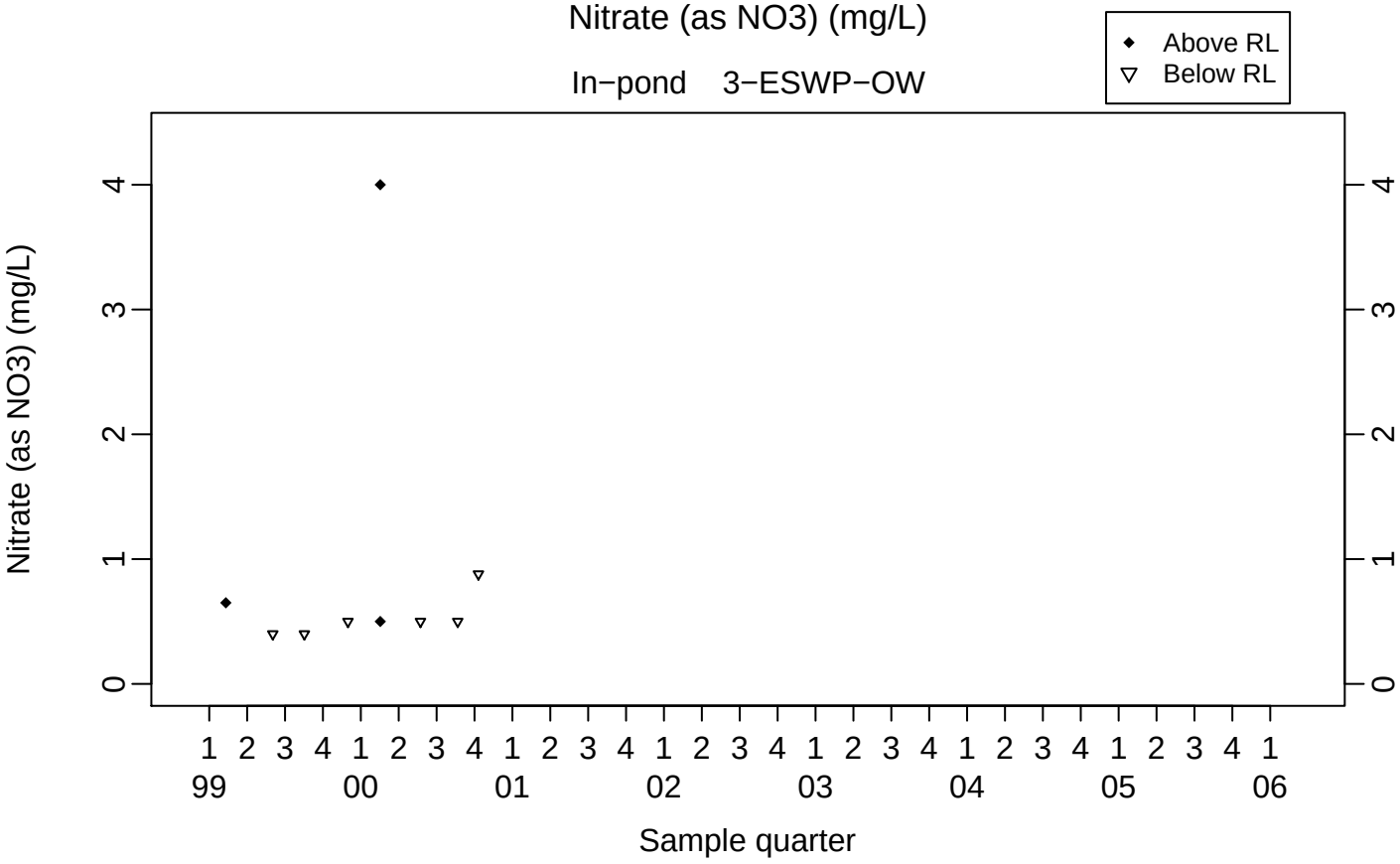
Sewage Ponds Wastewater
Total Coliform (MPN/100mL)

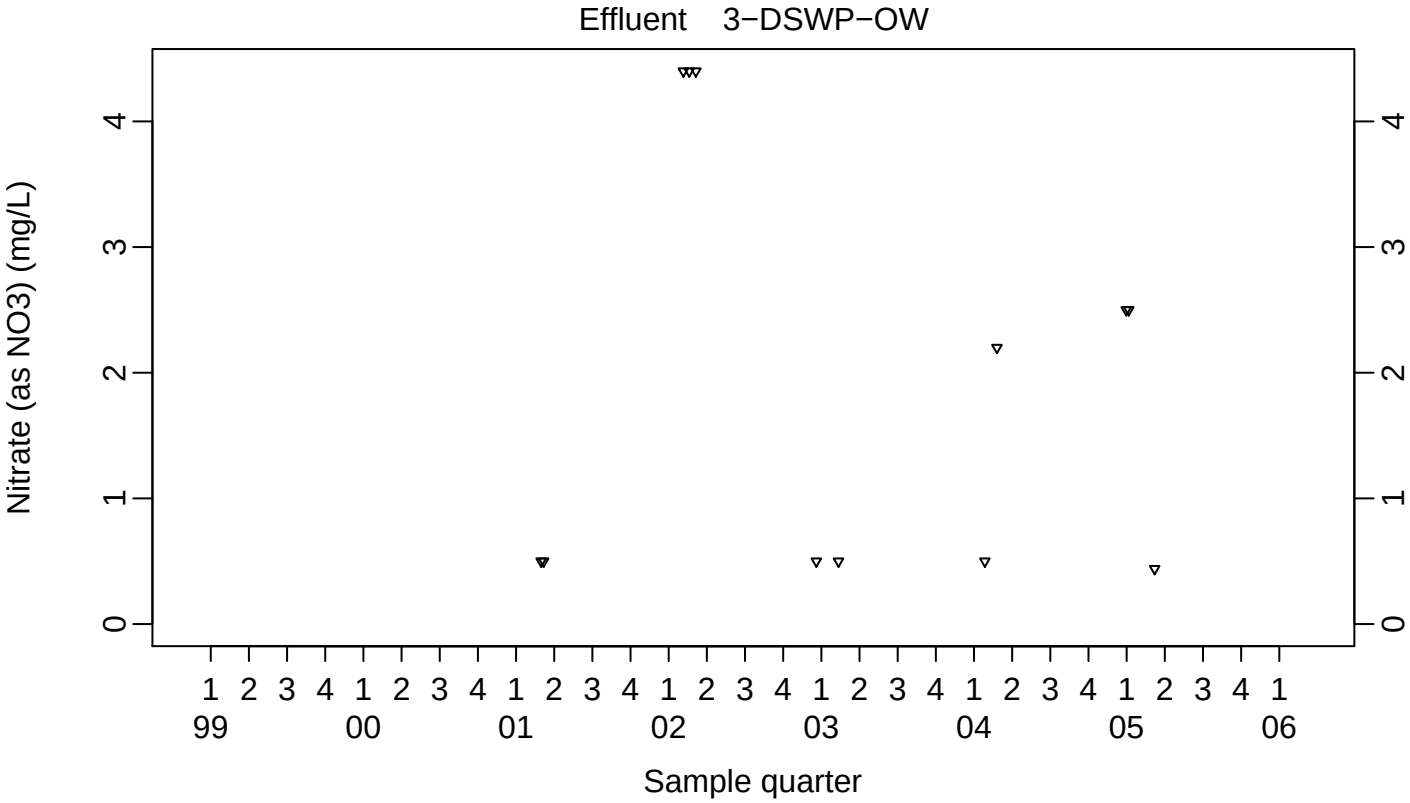


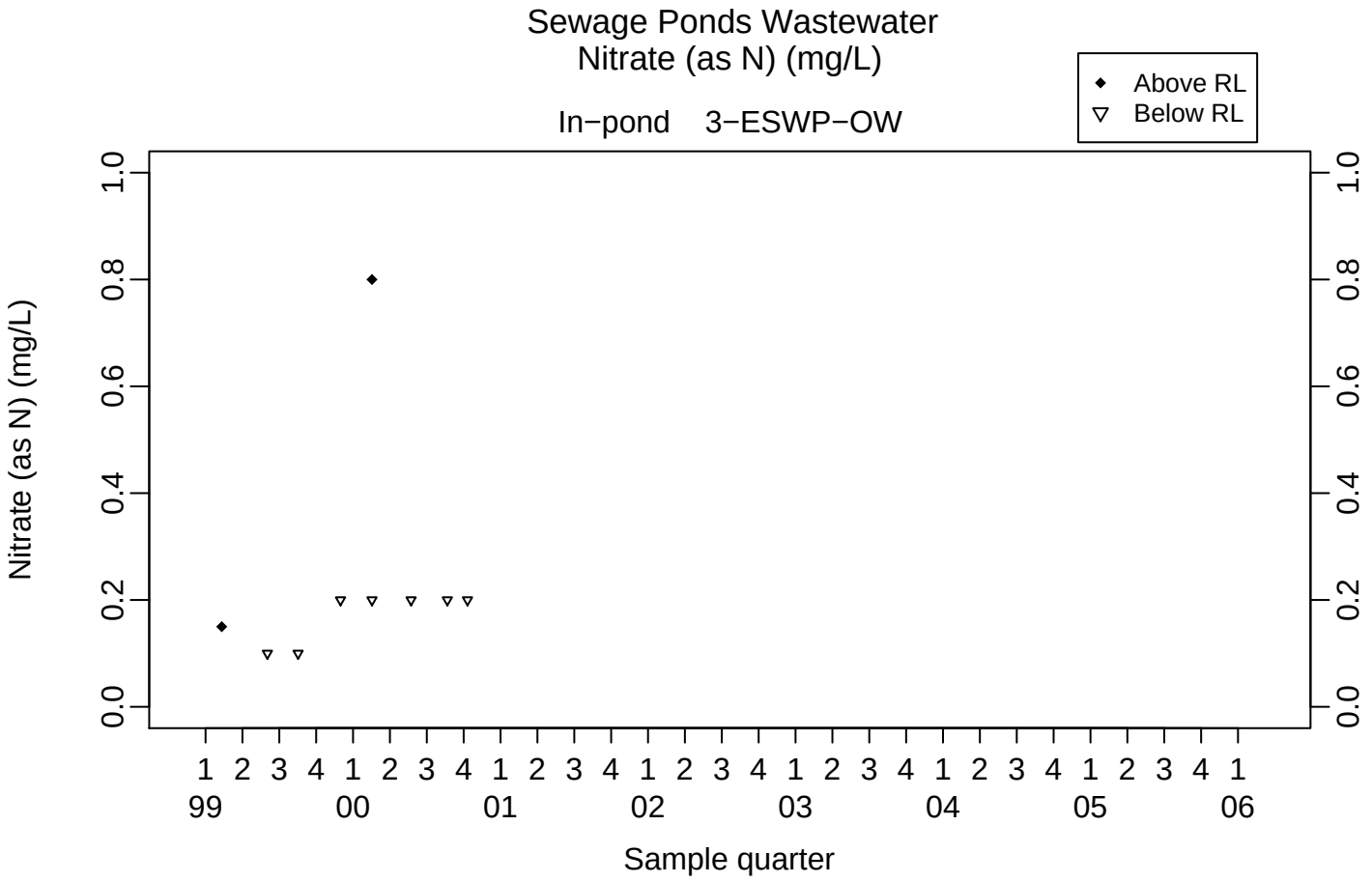


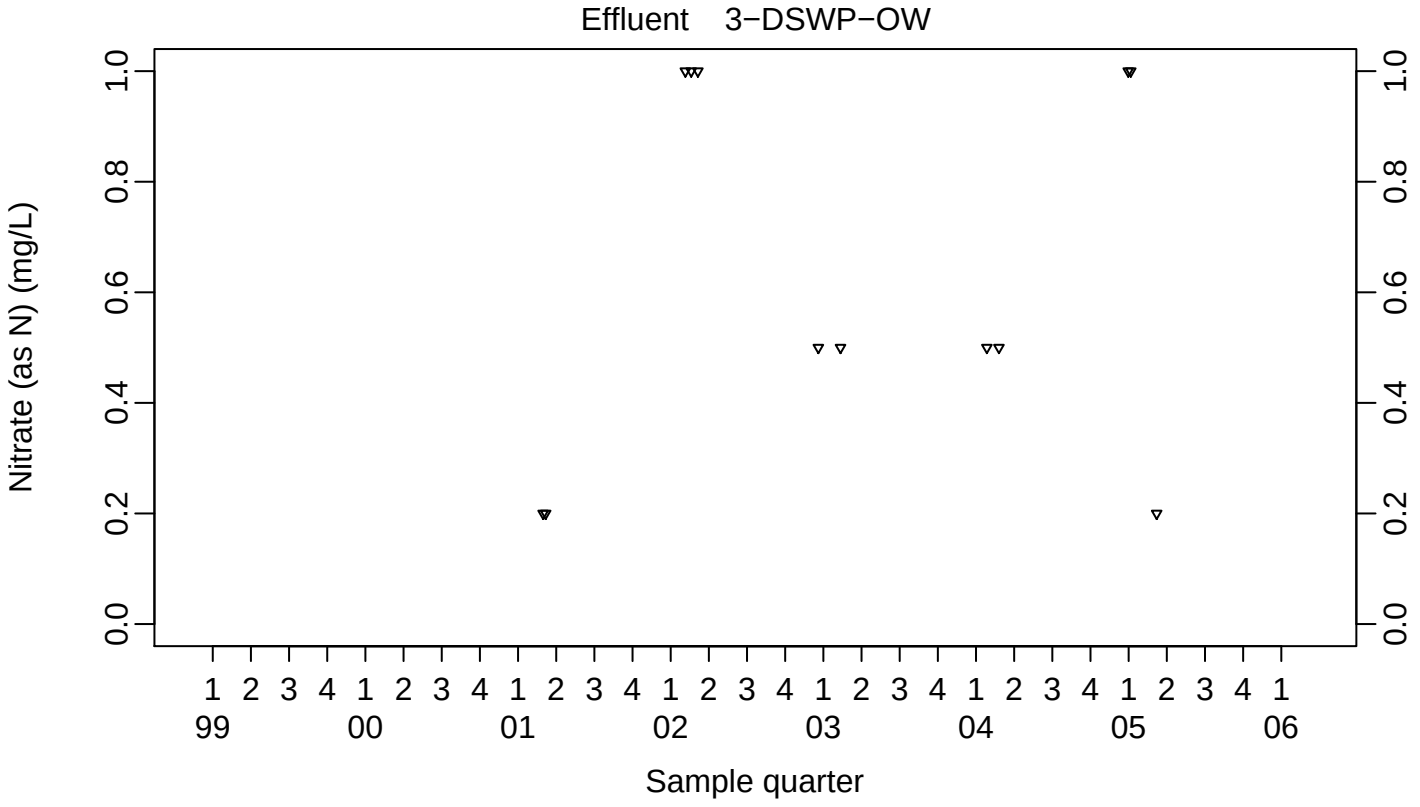

Sewage Ponds Wastewater
Total Coliform (MPN/100mL)
Effluent 3−DSWP−OW
Above RL
Below RL
Total Coliform (MPN/100mL)
0.0e+00
5.0e+06
1.0e+07
1.5e+07
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

Sewage Ponds Wastewater
Nitrate (as NO3) (mg/L)

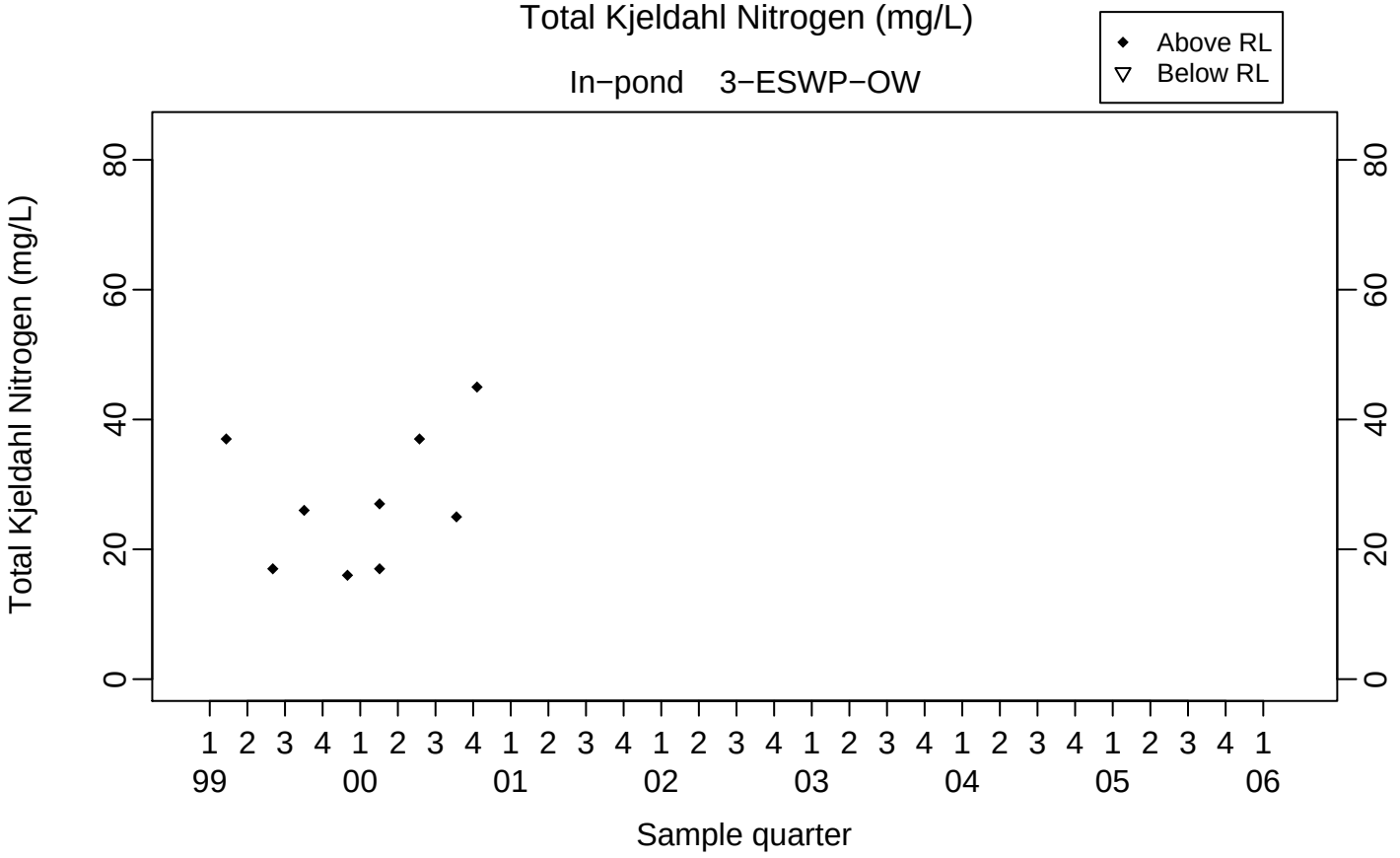


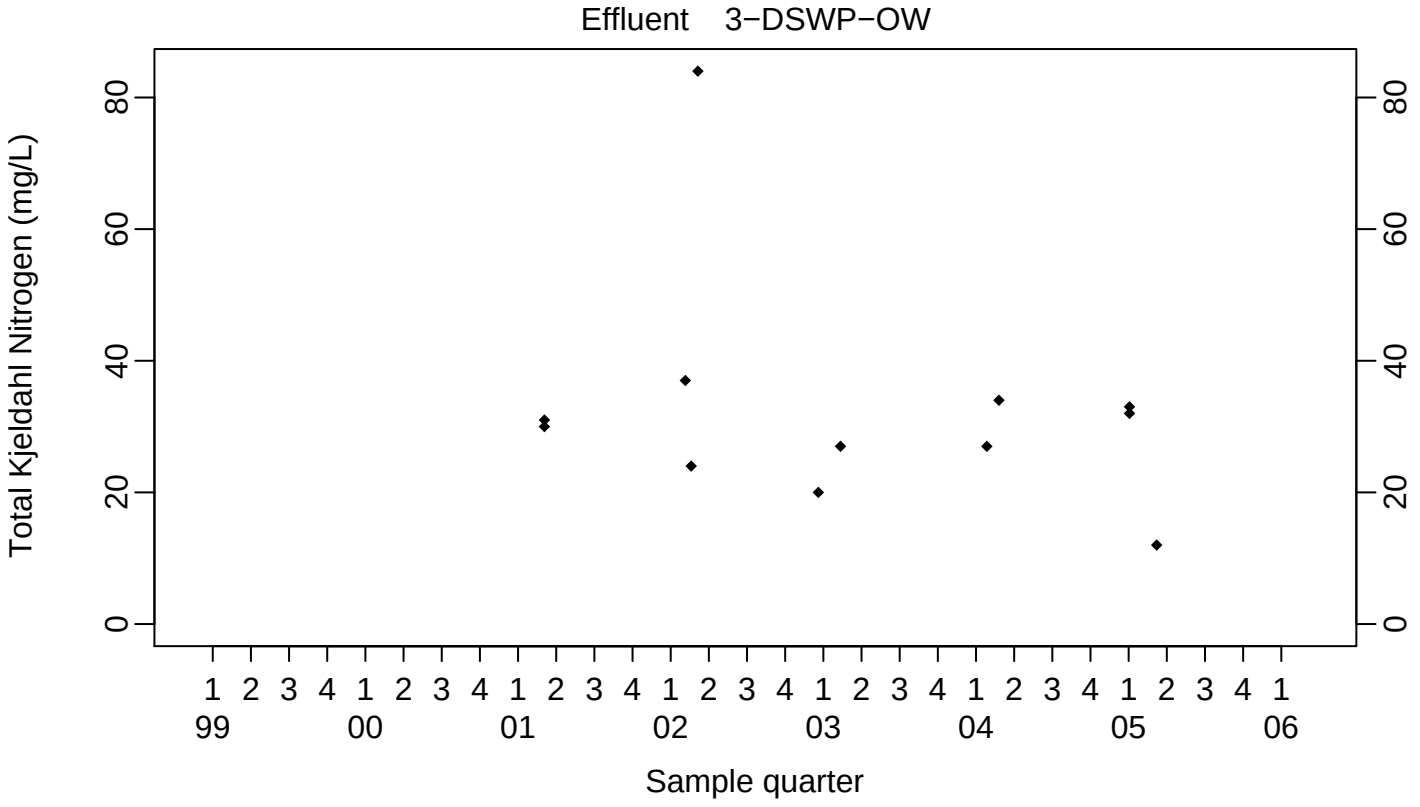


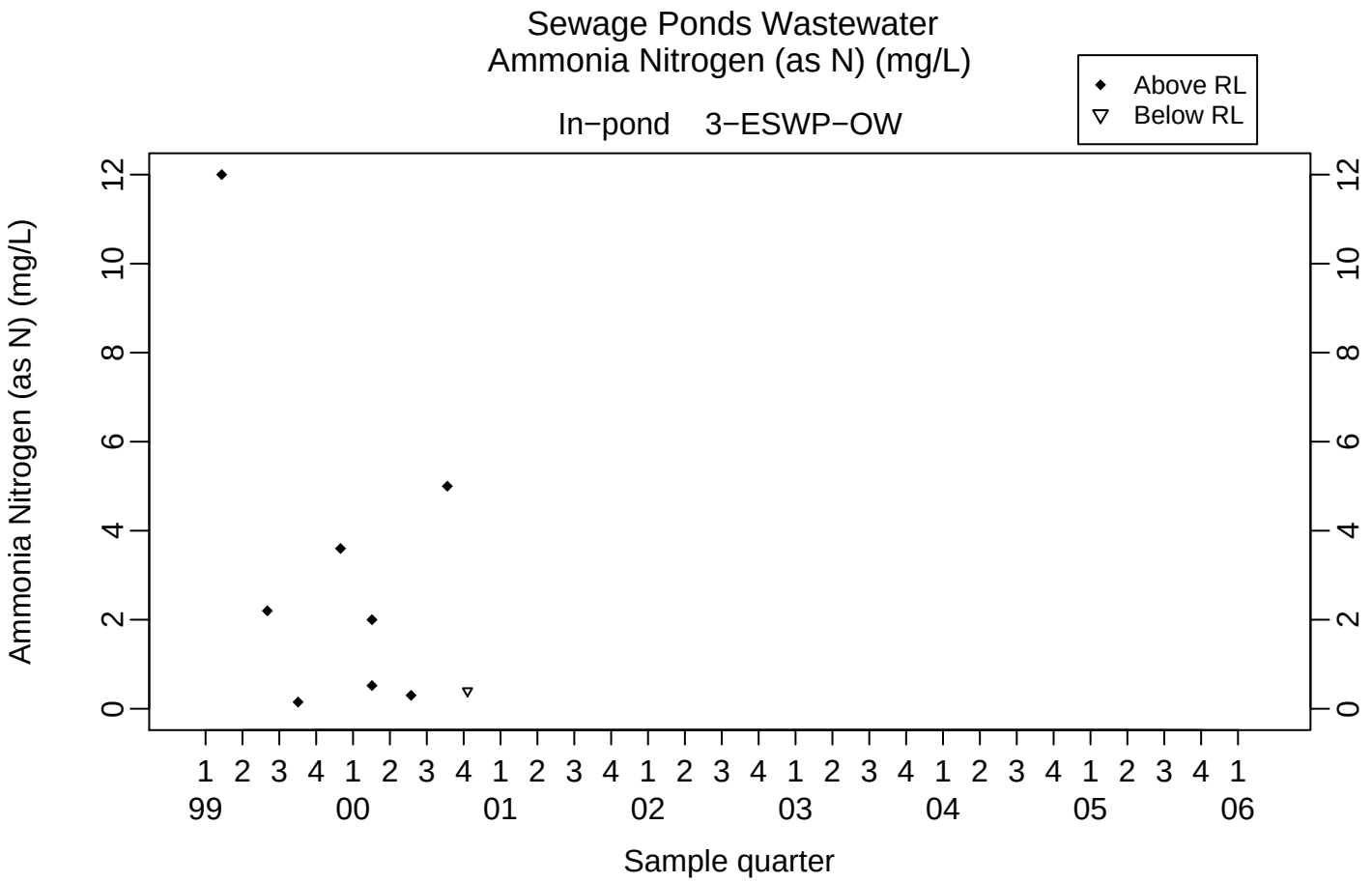

Sewage Ponds Wastewater
Nitrate (as N) (mg/L)
In−pond 3−ESWP−OW
Above RL
Below RL
Nitrate (as N) (mg/L)
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

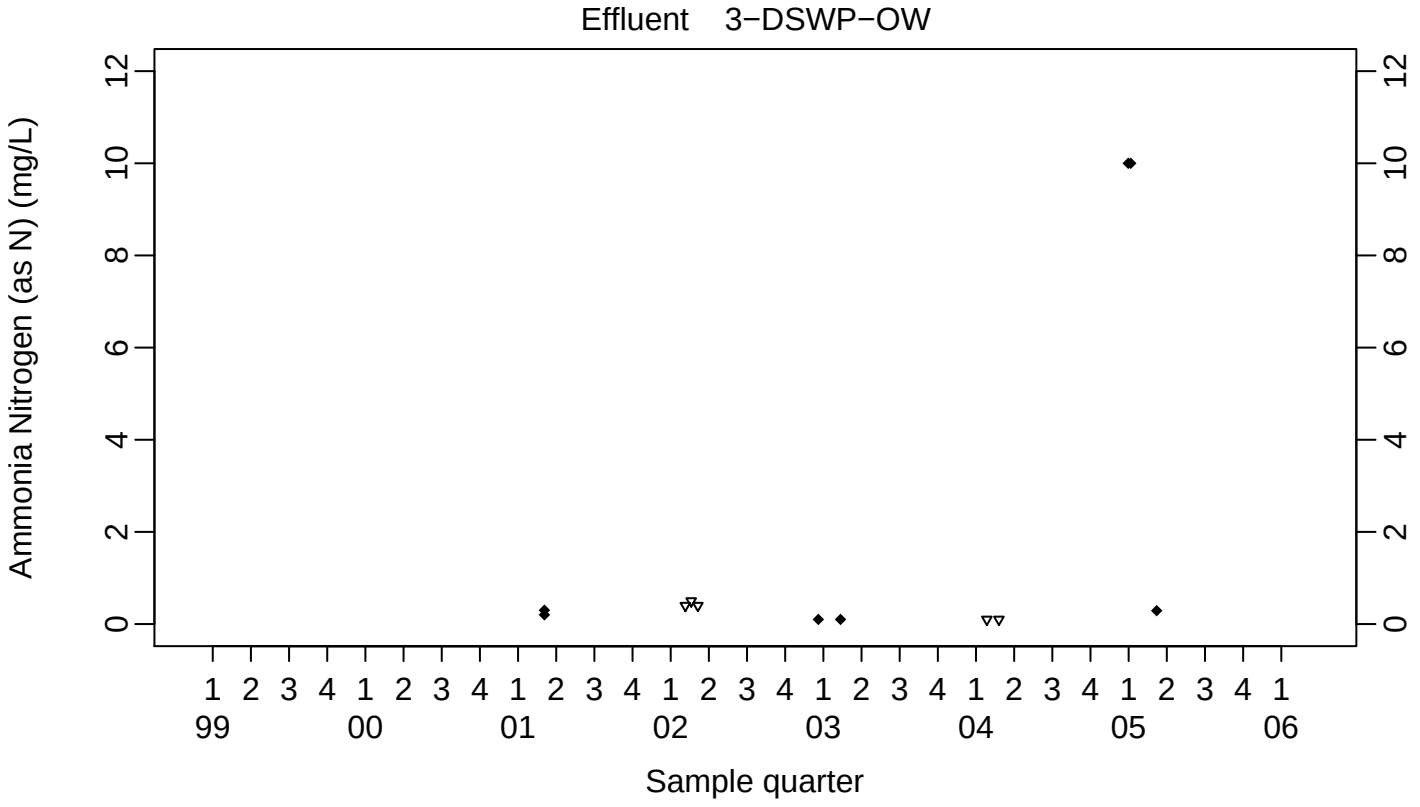

Effluent 3−DSWP−OW
Nitrate (as N) (mg/L)
0.0
0.2
0.4
0.6
0.8
1.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

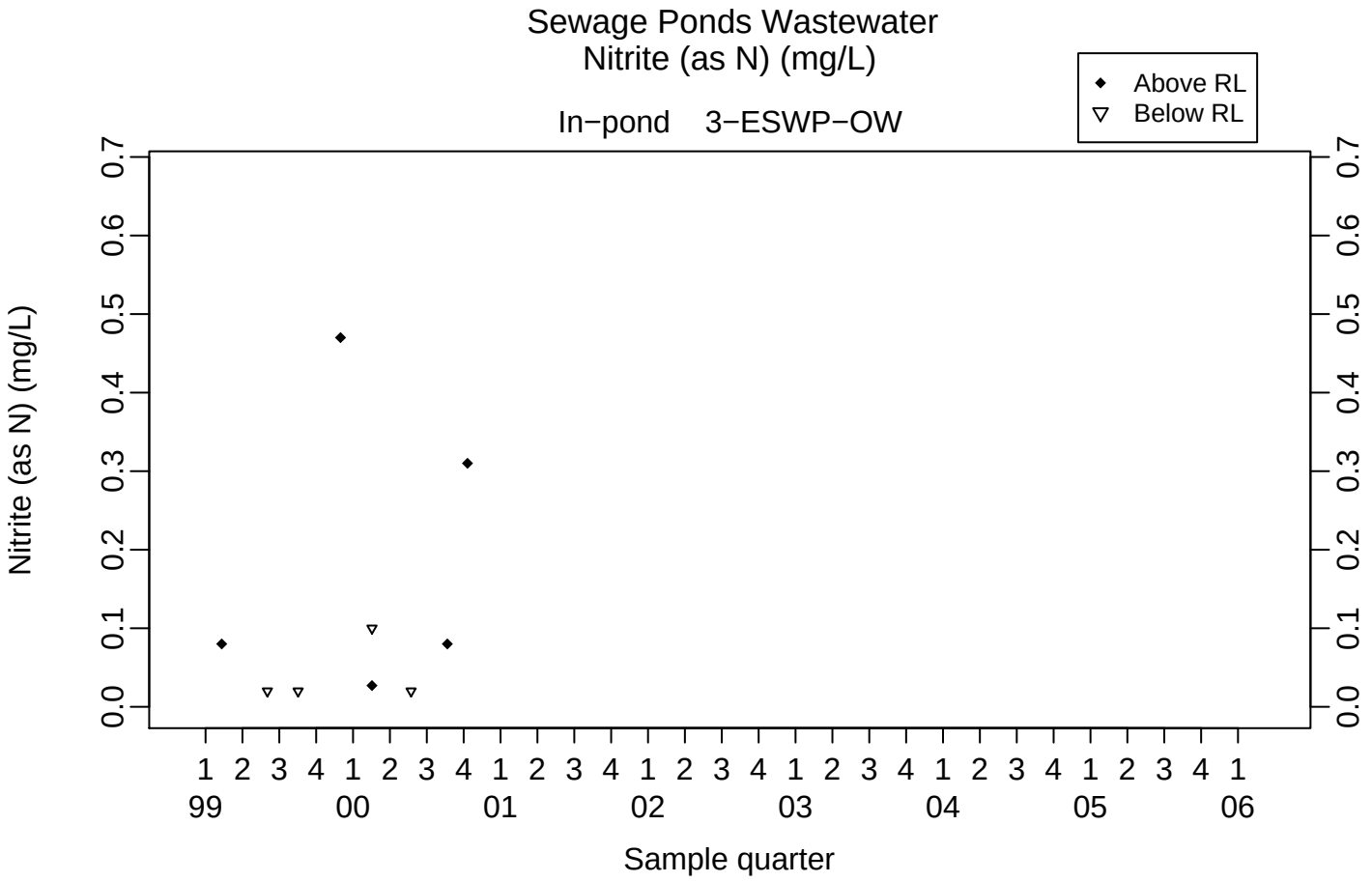
Sewage Ponds Wastewater
Total Kjeldahl Nitrogen (mg/L)

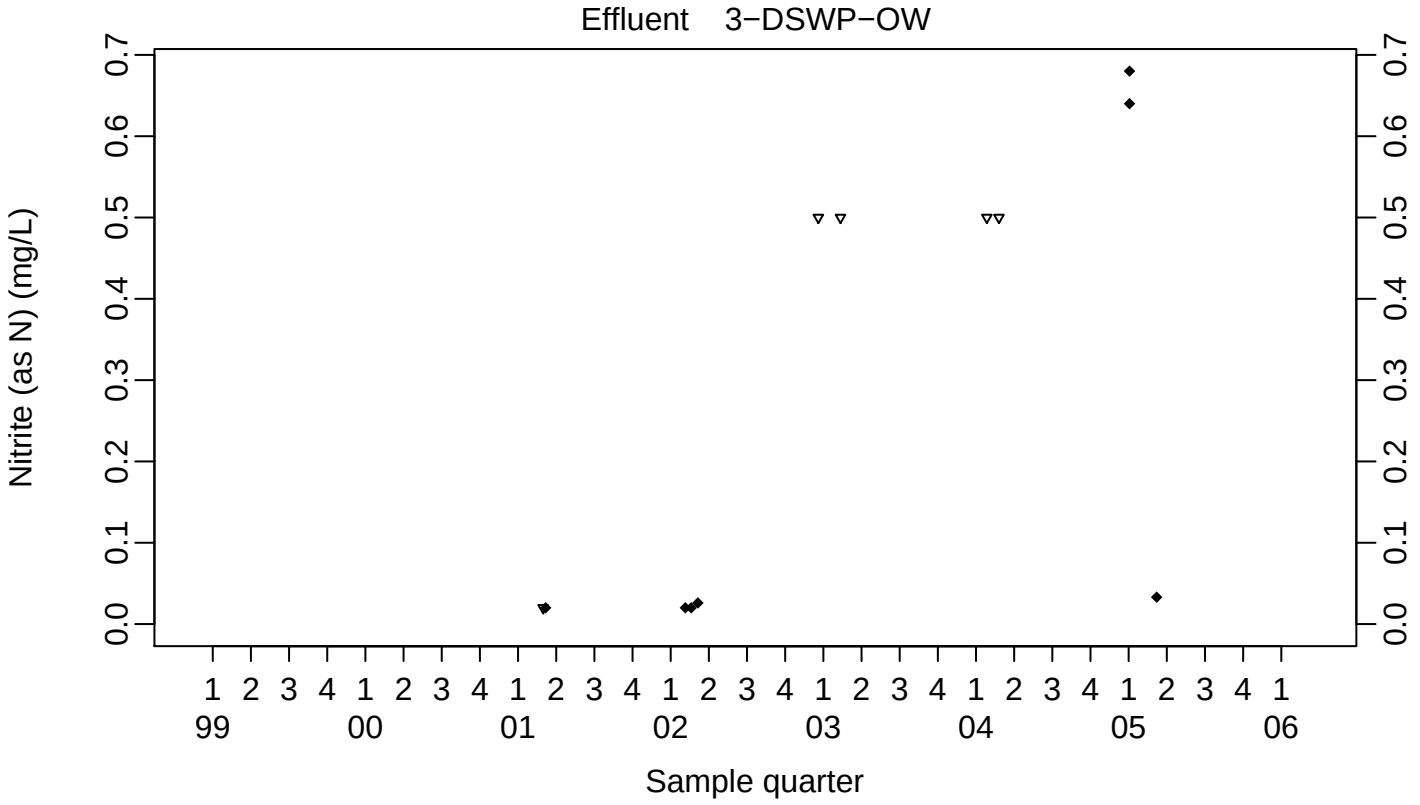


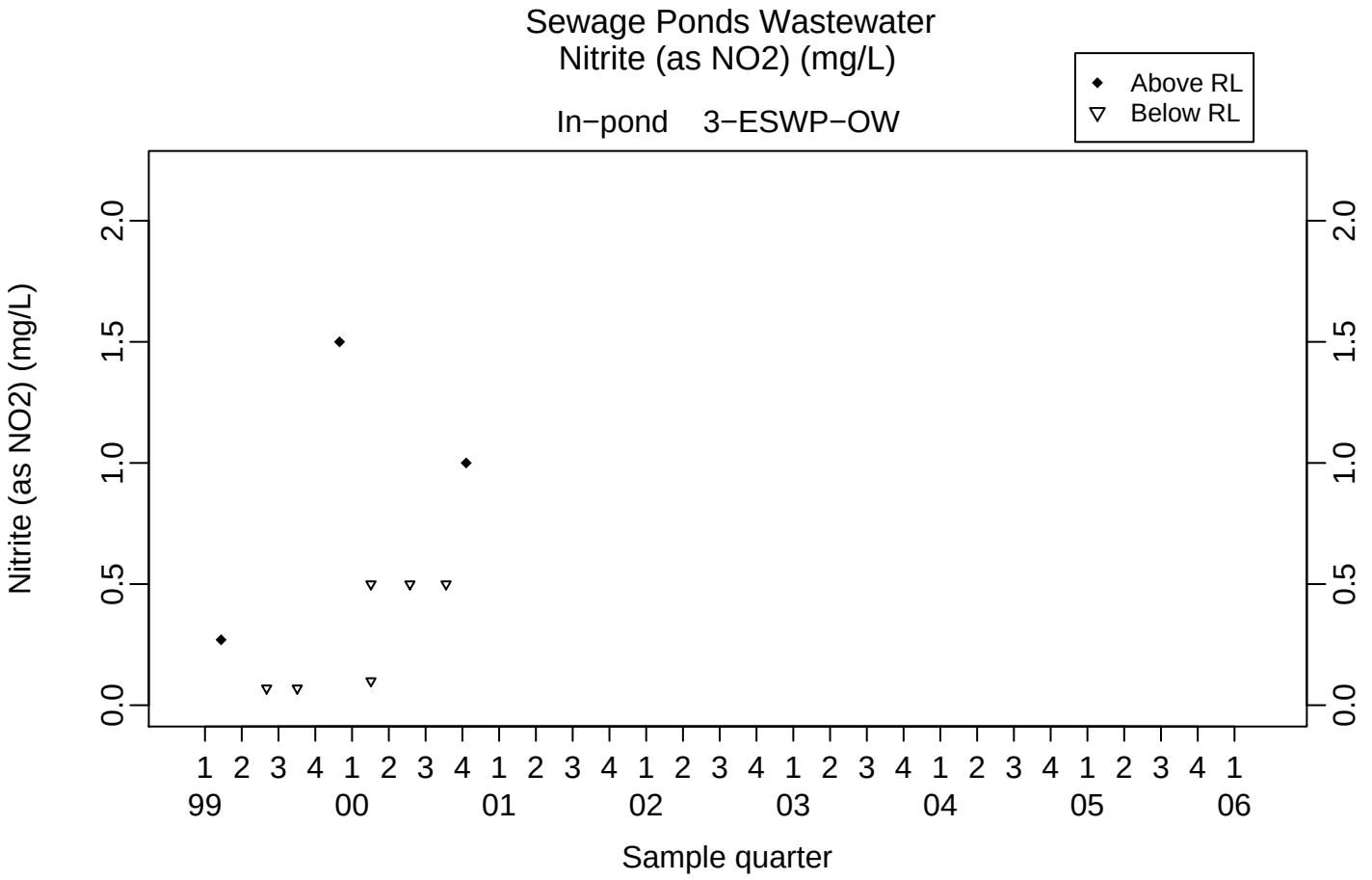


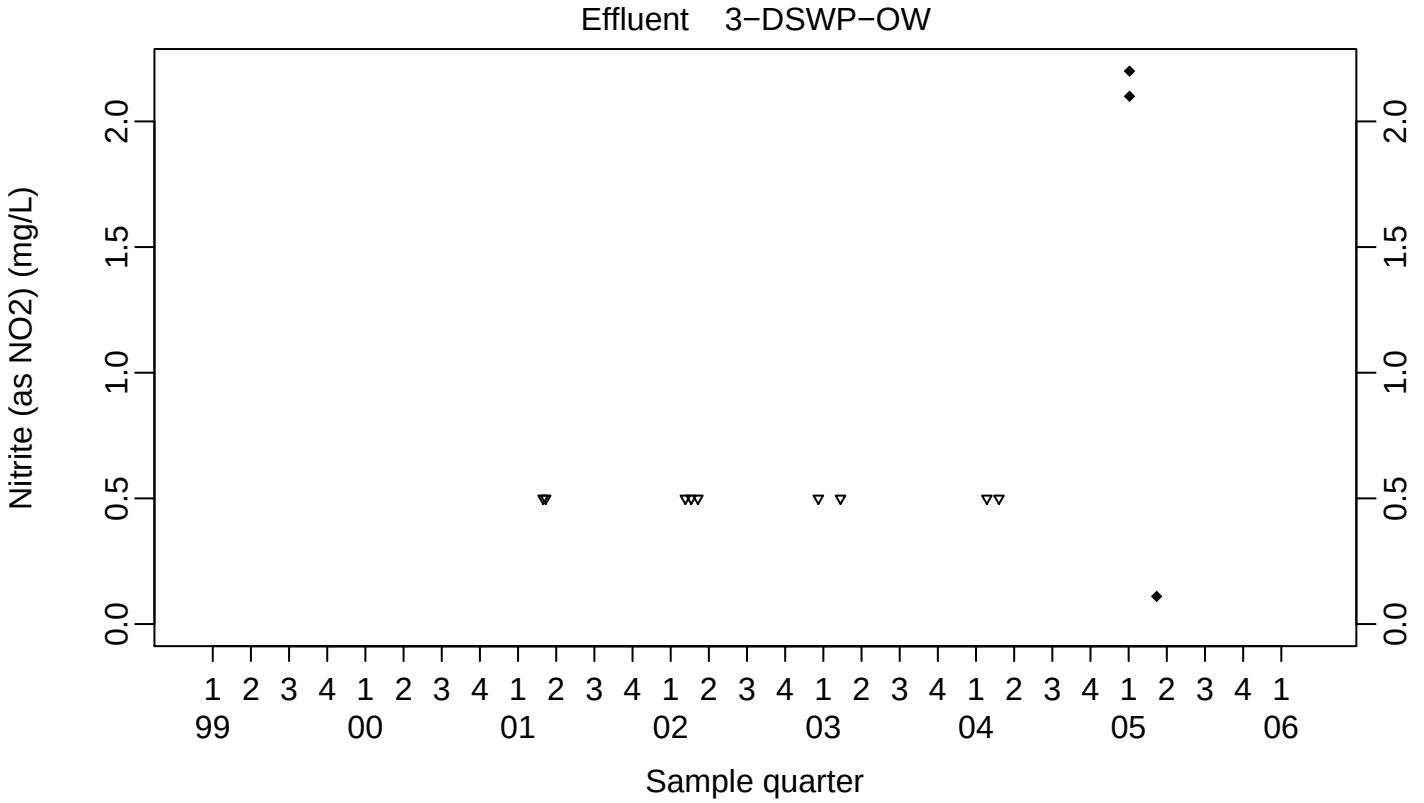

Sewage Ponds Wastewater
Ammonia Nitrogen (as N) (mg/L)
In−pond 3−ESWP−OW
Above RL
Below RL
Ammonia Nitrogen (as N) (mg/L)
0
2
4
6
8
10
12
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


Effluent 3−DSWP−OW
Ammonia Nitrogen (as N) (mg/L)
0
2
4
6
8
10
12
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


Sewage Ponds Wastewater
Nitrite (as N) (mg/L)
In−pond 3−ESWP−OW
Above RL
Below RL
Nitrite (as N) (mg/L)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


Effluent 3−DSWP−OW
Nitrite (as N) (mg/L)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


Sewage Ponds Wastewater
Nitrite (as NO2) (mg/L)
In−pond 3−ESWP−OW
Above RL
Below RL
Nitrite (as NO2) (mg/L)
0.0
0.5
1.0
1.5
2.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


Effluent 3−DSWP−OW
Nitrite (as NO2) (mg/L)
0.0
0.5
1.0
1.5
2.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

Annual Summary Tables of Sewage Evaporation and Percolation Ponds Wastewater Monitoring Data

Table C-2. 2005 summary of sewage pond observations.

Month	Freeboard[a]	Color	Odor	Levee condition
January	0.54 [b] –0.58 [b]	Green	Slight	Animal burrows and erosion are okay, weed control is okay
February	0.54 [b]–0.57 [b]	Green	Slight	Animal burrows and erosion are okay, weed control is okay
March	0.57 [b]–0.61	Green	Slight	Animal burrows and erosion are okay, weed control is okay
April	0.60-0.65	Green to brown	Slight	Animal burrows and erosion are okay, weed control is okay
May	0.64-0.74	Brown	Slight	Animal burrows and erosion are okay, weed control is okay
June	0.71-0.75	Brown to green	Slight	Animal burrows and erosion are okay, weed control is okay
July	0.70 –0.73	Green	Slight	Animal burrows and erosion are okay, weed control is okay
August	0.70–0.71	Green	Slight	Animal burrows and erosion are okay, weed control is okay
September	0.69–0.71	Green	Slight	Animal burrows and erosion are okay, weed control is okay
October	0.69–0.70	Green	Slight	Animal burrows and erosion are okay, weed control is okay
November	0.70–0.71	Green to green-brown	Slight	Animal burrows and erosion are okay, weed control is okay
December	0.61-0.69	Green	Slight	Animal burrows and erosion are okay, weed control is okay

[a] Minimum freeboard is 0.61 m = 2 ft.

[b] Freeboard in the evaporation pond was slightly less than 0.61 m (2 ft), as the evaporation pond overfilled and then continuously discharged to the percolation pond.

Table C-3. 2005 sewage wastewater influent monitoring results (Location ISWP).

Parameter	Permit limits	First quarter	Second quarter	Third quarter	Fourth quarter
pH (units)	6.5 < pH < 10	8.3	8.1/8.1 [a]	7.4	8.9
EC (μmhos/cm)	None	1,120	1,620/1,620 [a]	1,070	1,940
BOD (mg/L)	None	79	310	210	170/160[a]

[a] Sample and duplicate sample results for interlaboratory comparison.

Table C-4. 2005 sewage evaporation pond monitoring results (Location ESWP).

Parameter	Permit limits	First quarter	Second quarter	Third quarter	Fourth quarter
pH (units)	None	9.8	10.3	9.9/9.9	9.5
EC (μmhos/cm)	None	3,800	4,050	5,040/5,050	5,710
Laboratory DO (mg/L)	1.0 (min.)	30.3	20.5	7.9	28.1

[a] Sample was saturated with dissolved oxygen (DO), according to analytical laboratory.

Table C-5. 2005 sewage percolation pond discharge location (Location DSWP).

Parameter	Permit limits	January 3	March 9
pH (units)	6.5 < pH < 10	9.0	9.8
EC (μmhos/cm)	None	7,360	3,770
BOD (mg/L)	None	51	38
Fecal coliform (MPN [a]/100 mL)	None	700	90,000
Total coliform (MPN [a]/100 mL)	None	16,000	>160,000
Nitrate as NO_3	None	0.65	NR

[a] MPN = Most probable number (of organisms).

Appendix D

Annual Summary Plots and Tables of Sewage Evaporation and Percolation Ponds Ground Water Monitoring Data

Appendix D

This appendix contains graphical and tabular summaries of ground water monitoring data from the sewage ponds ground water network. These plots contain all monitoring data available since LLNL began sampling from upgradient ground water monitoring wells W-7E, W-7ES, and W-7PS; from cross-gradient ground water monitoring well W-35A-04; and from downgradient ground water monitoring wells W-26R-01, W-26R-11, W-26R-05, W-25N-20, and W-7DS in 1987.

The plots display field parameters of ground water elevation, pH, electrical conductivity (EC), total coliform bacteria, fecal coliform bacteria, and finally nitrate (as NO_3). The upgradient (background) monitoring wells W-7E, W-7ES, and W-7PS are always plotted first for each analyte.

Each two-dimensional graph shows concentration plotted on the vertical axis versus time (years divided into four quarterly sampling periods) on the horizontal axis. Units of measure are given on the vertical axis label and in the header at the top of each page. Values above the analytical reporting limit for each analyte are plotted as solid.

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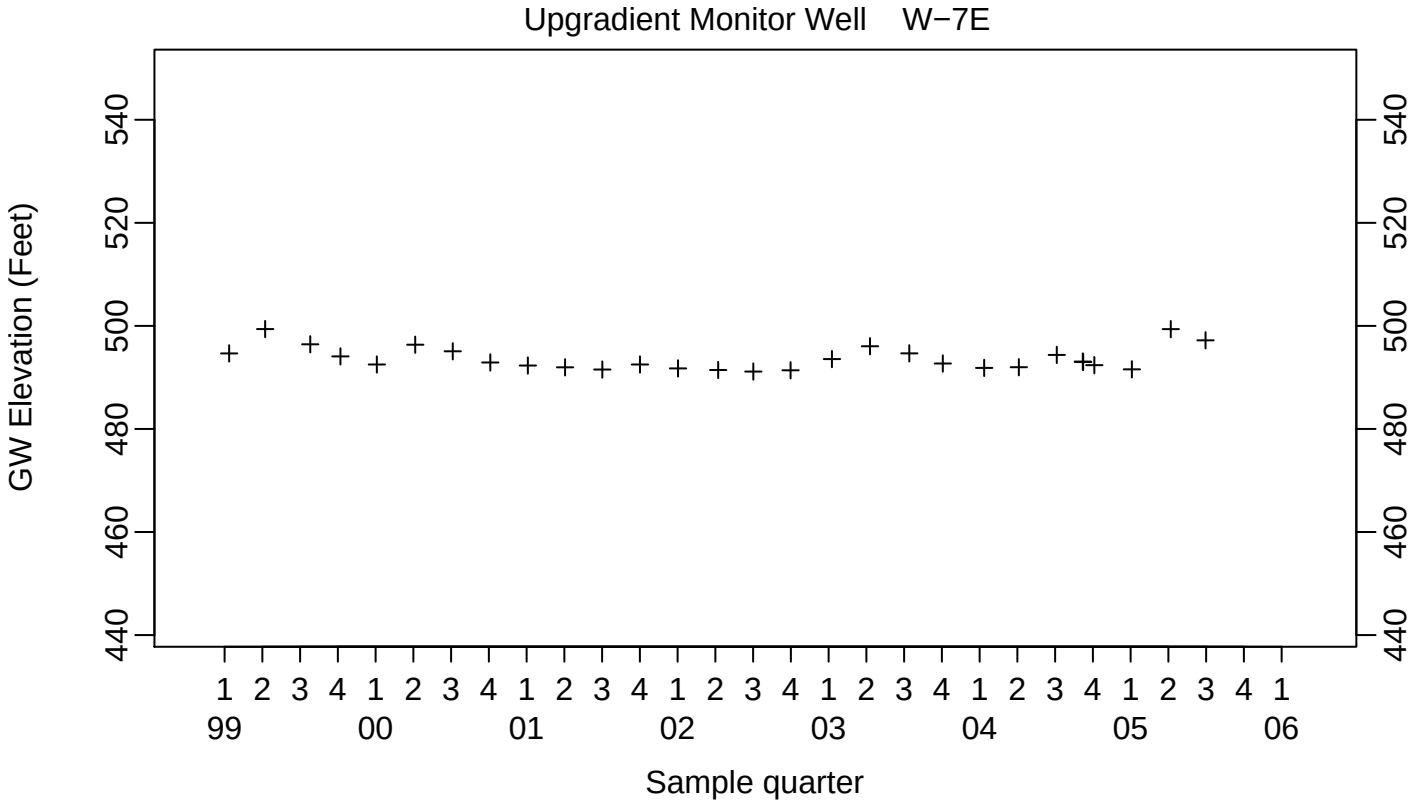
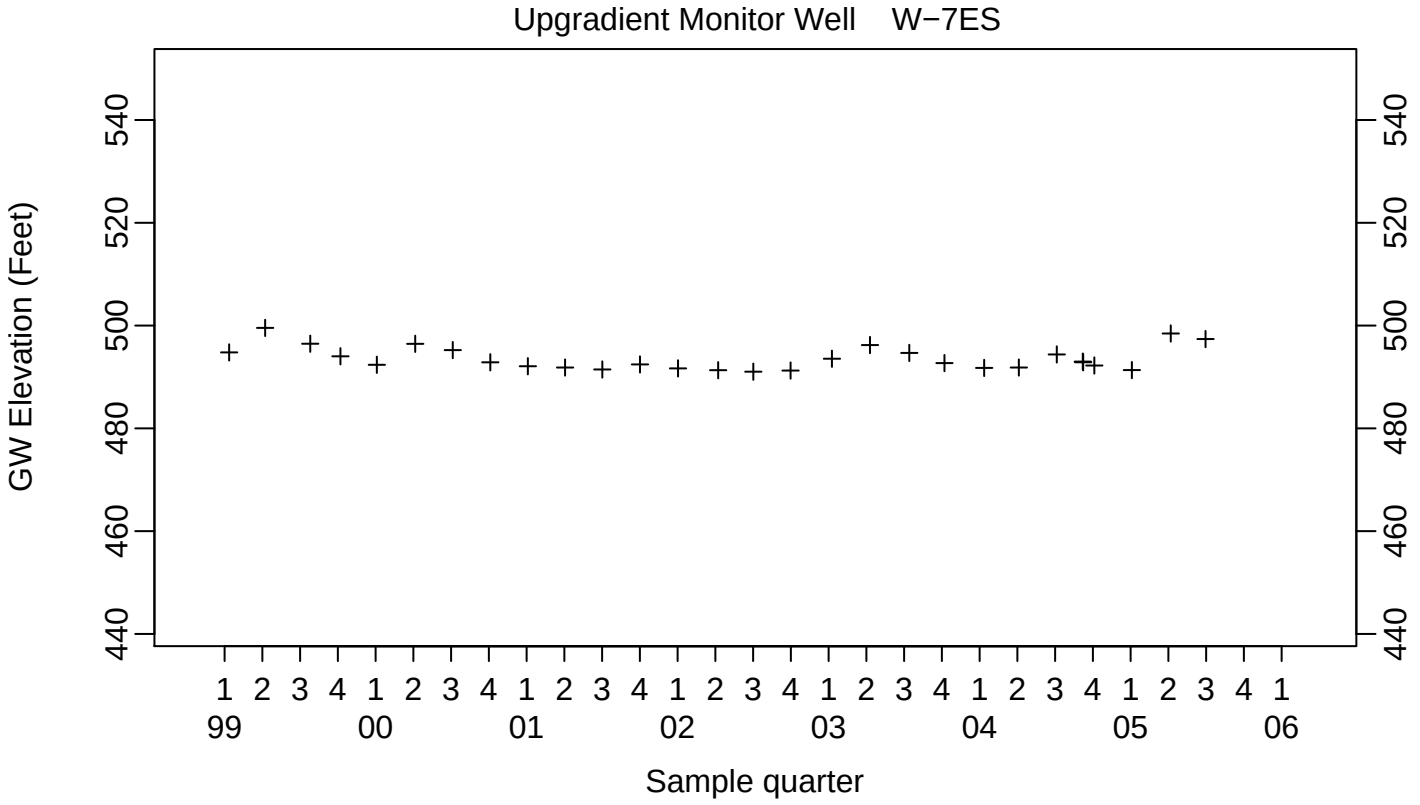
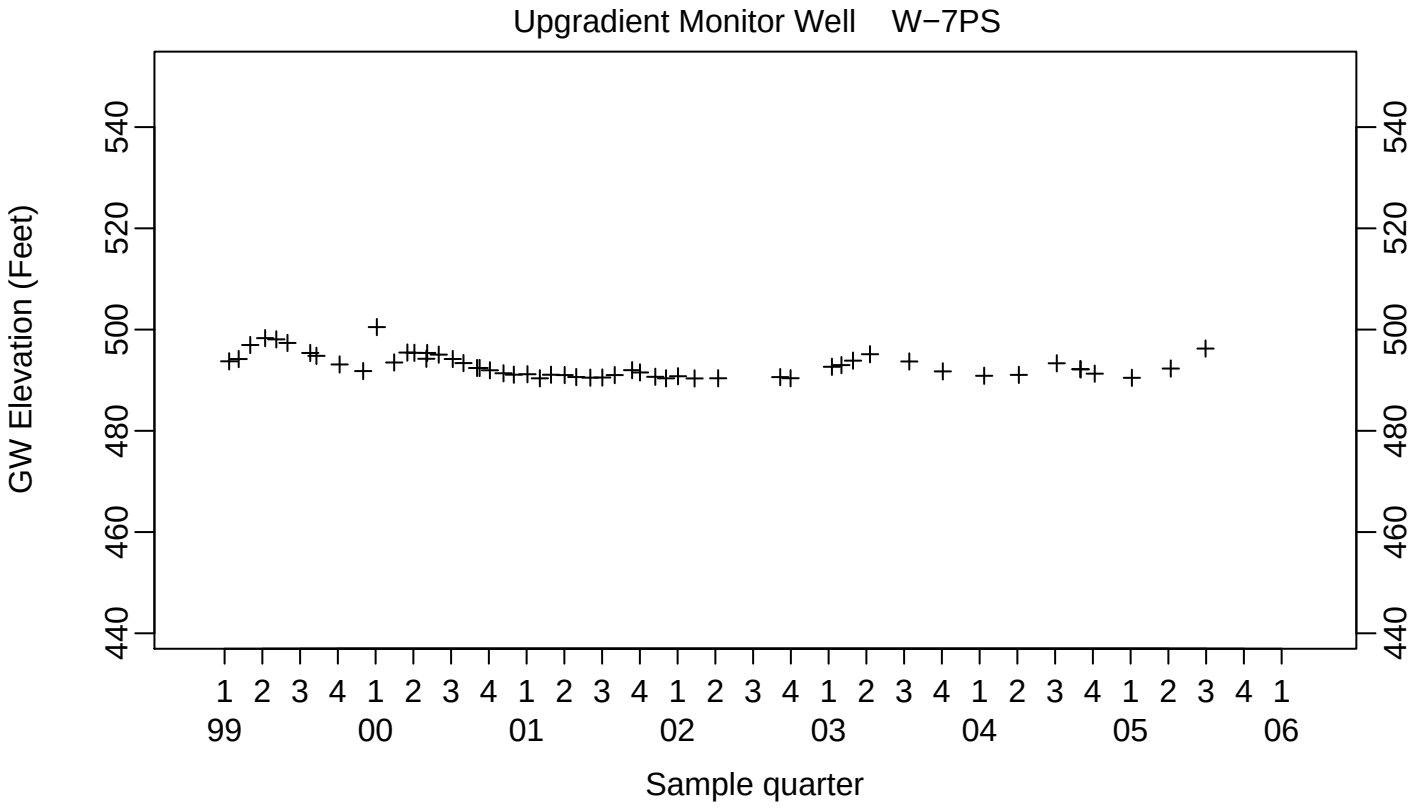
Annual Plots of Sewage Evaporation and Percolation Ponds Ground Water Monitoring Data

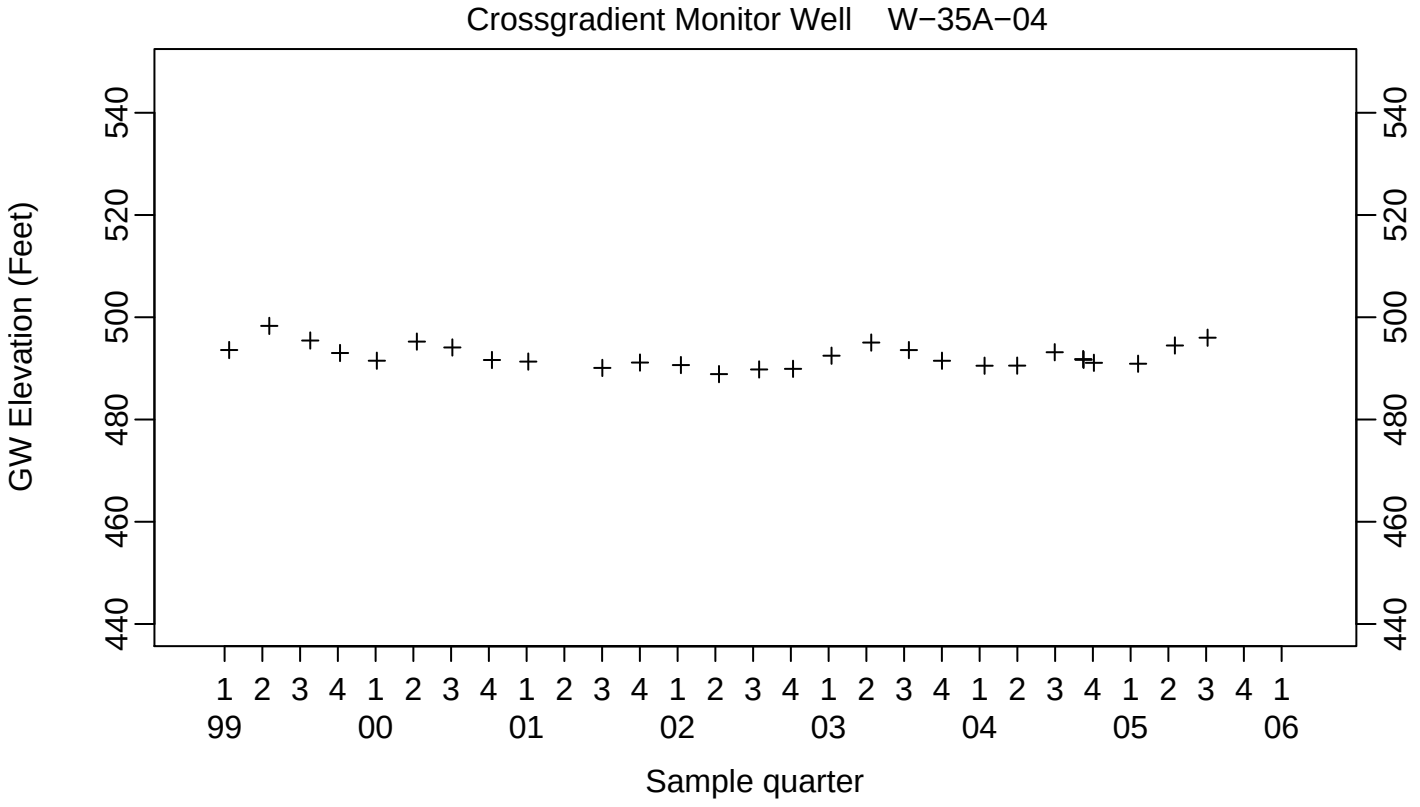
Sewage Ponds Ground Water
GW Elevation (Feet)



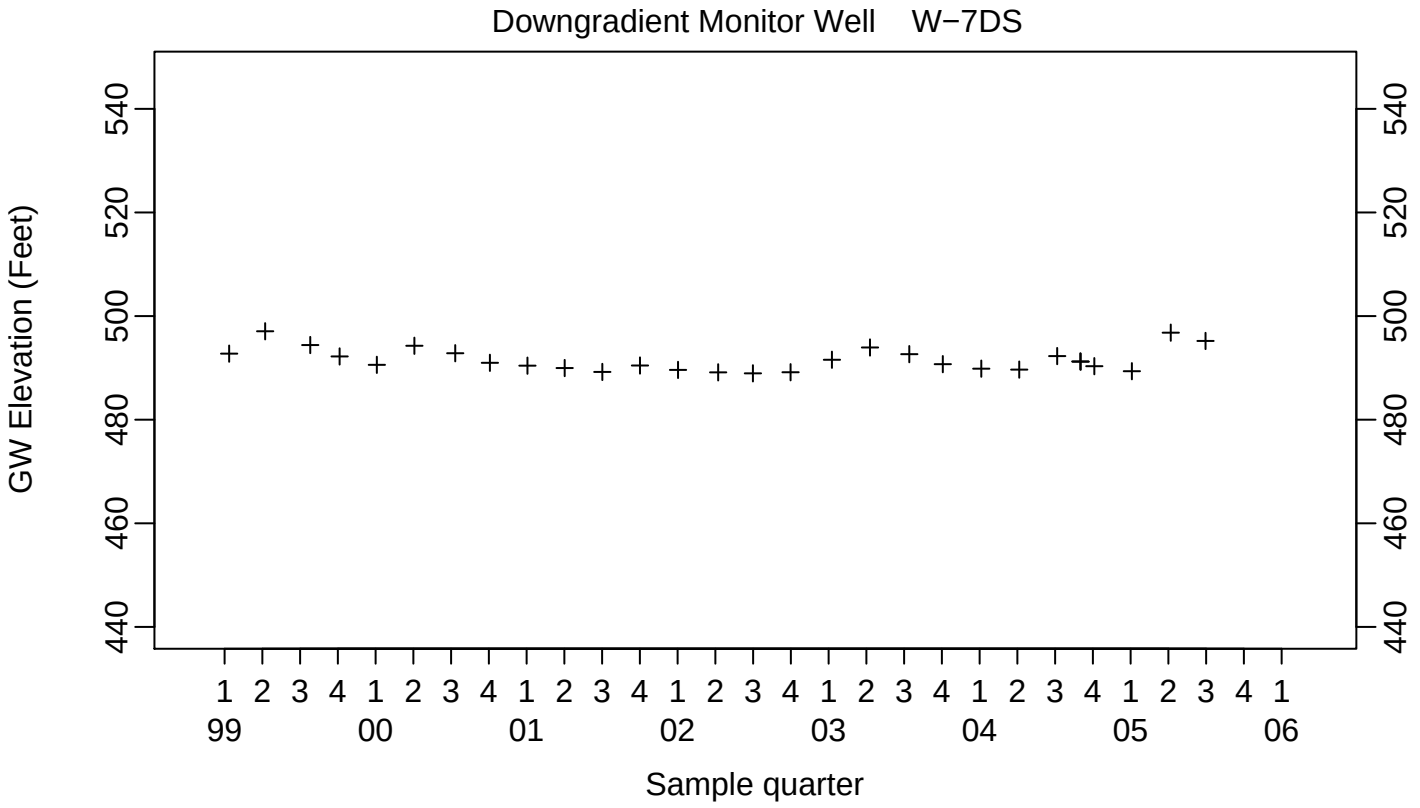


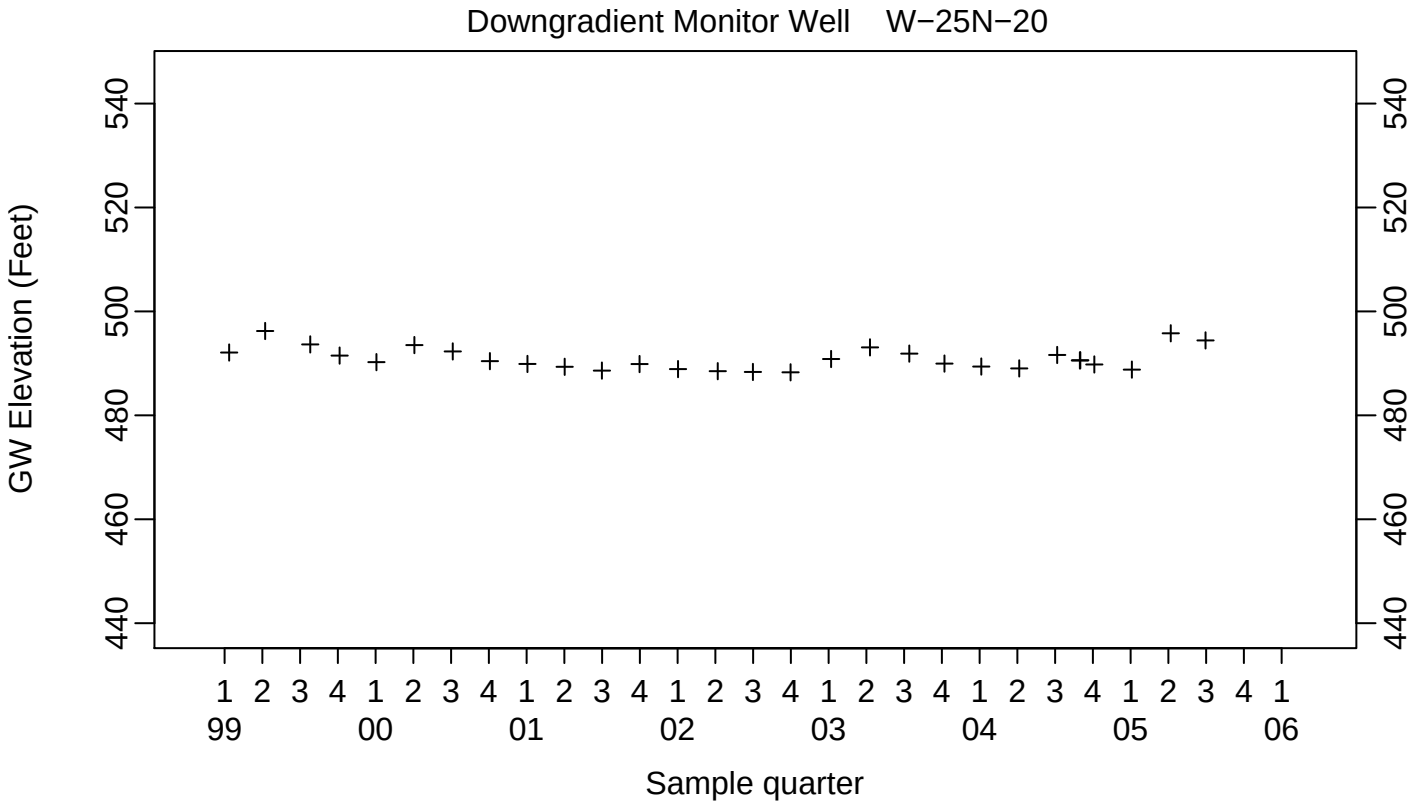
Sewage Ponds Ground Water
GW Elevation (Feet)



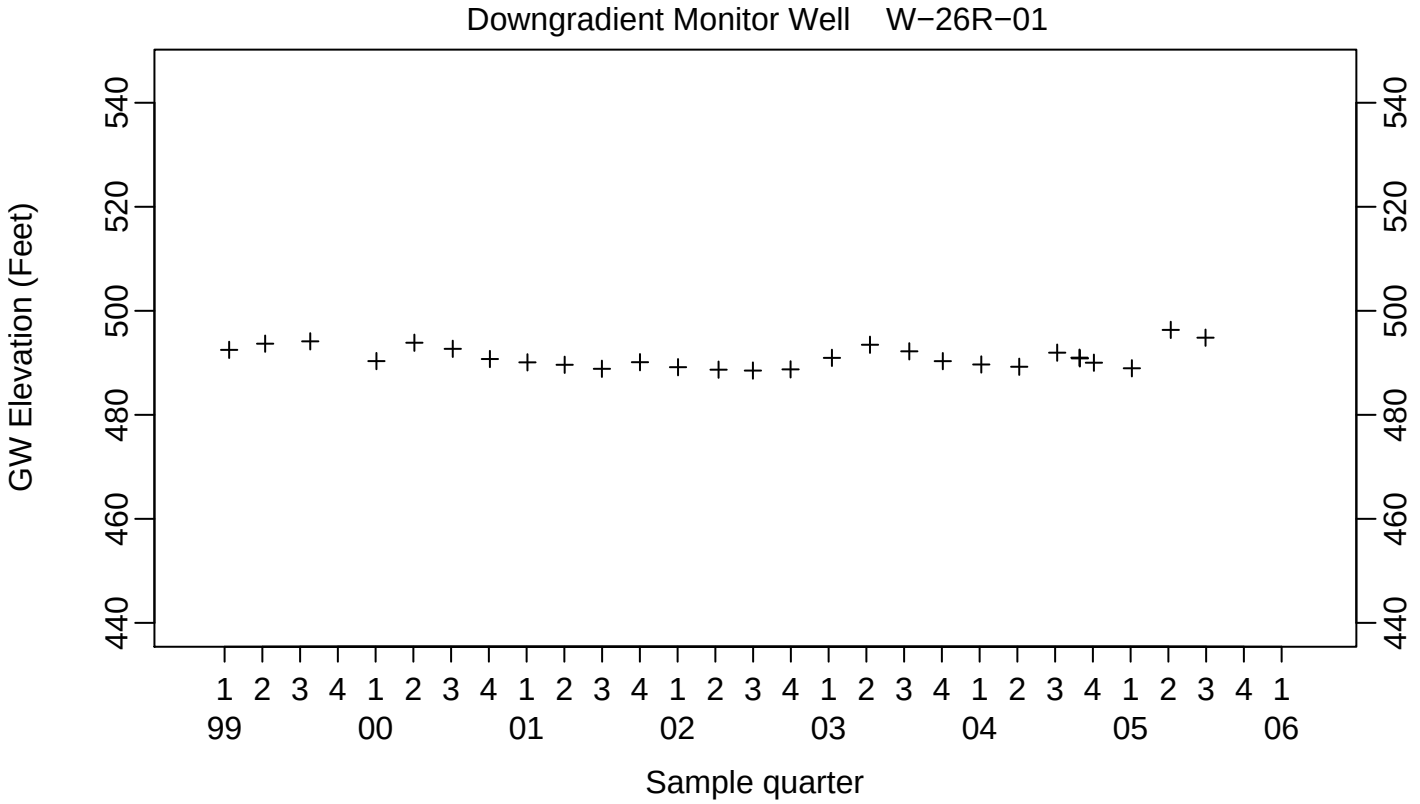


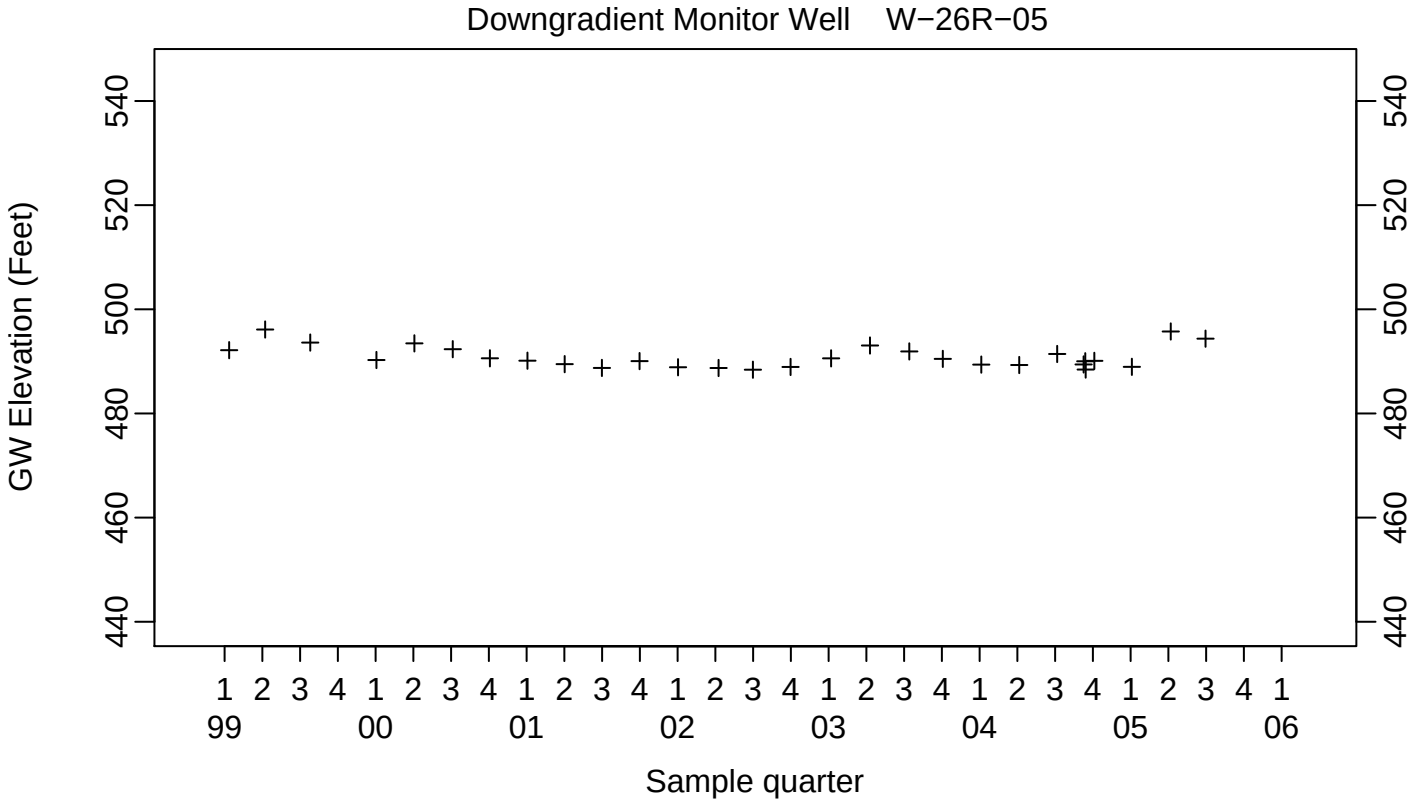
Sewage Ponds Ground Water
GW Elevation (Feet)



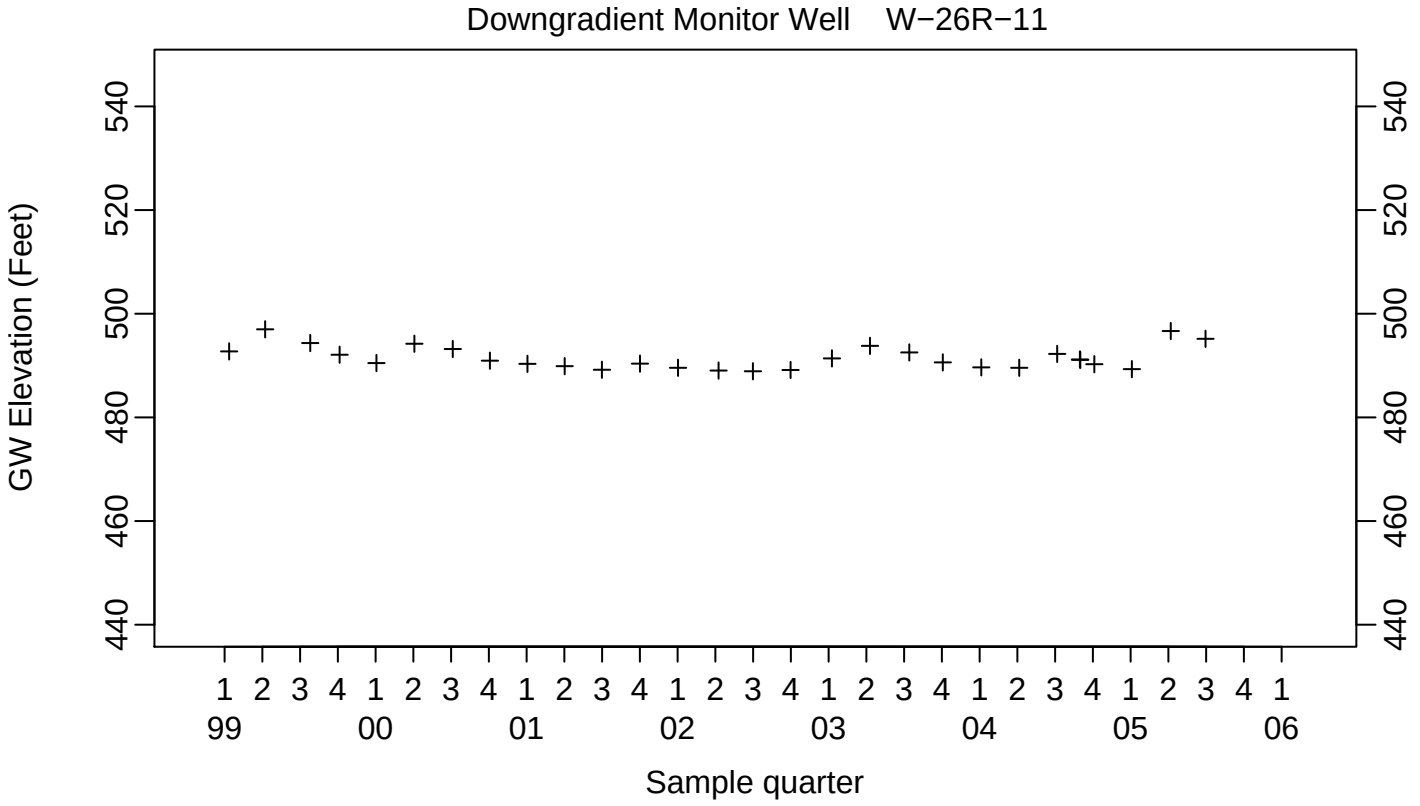


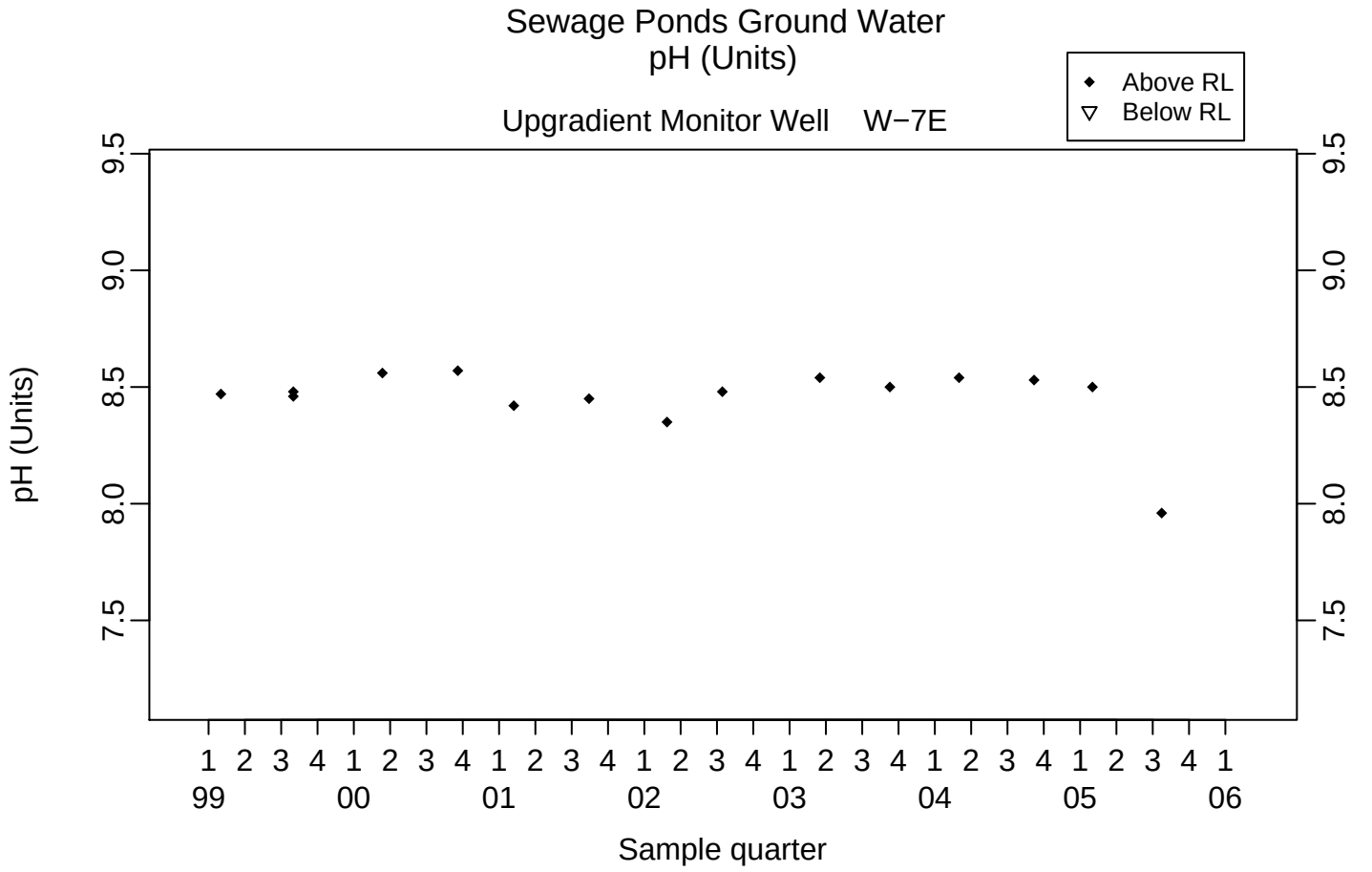
Sewage Ponds Ground Water
GW Elevation (Feet)

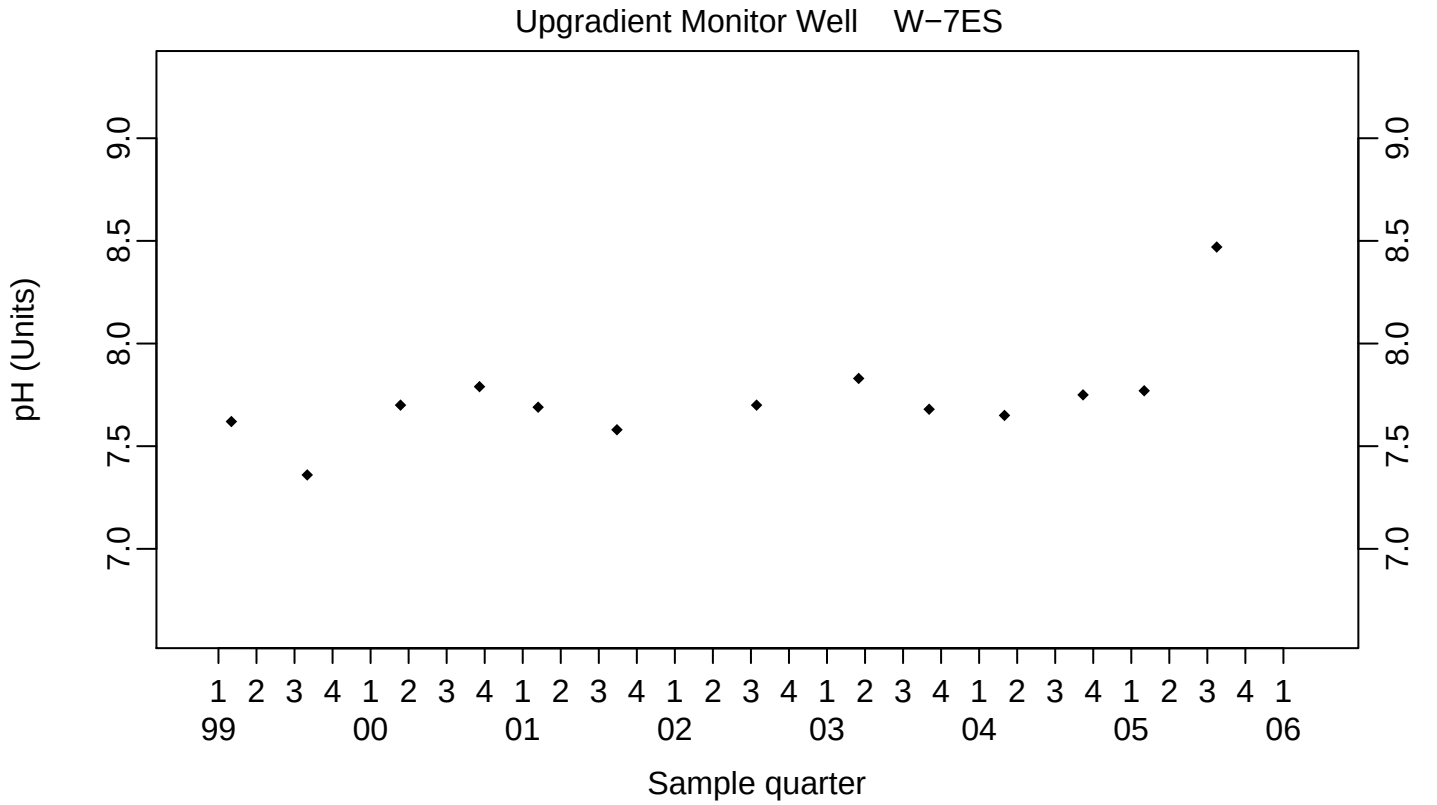


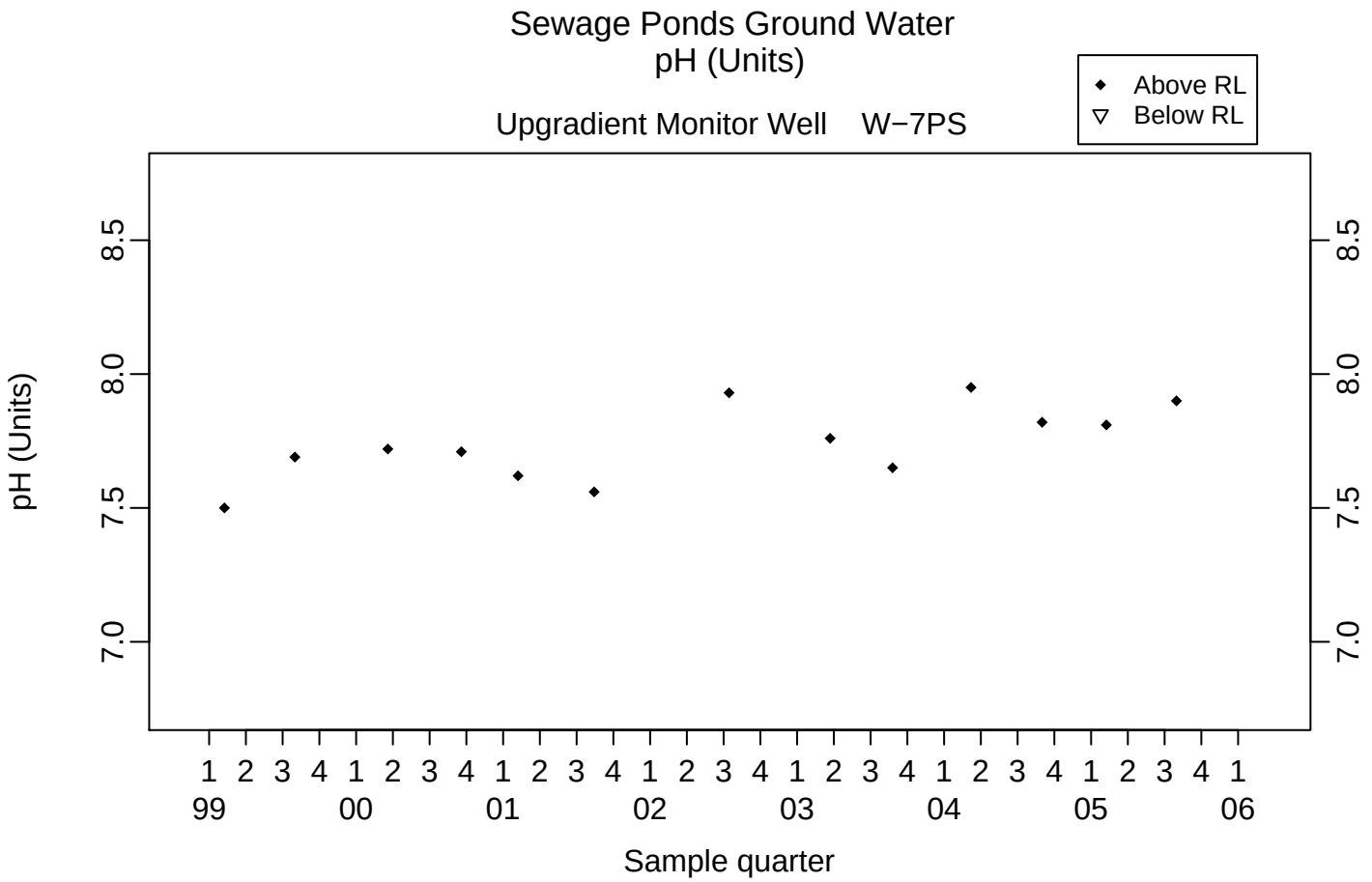


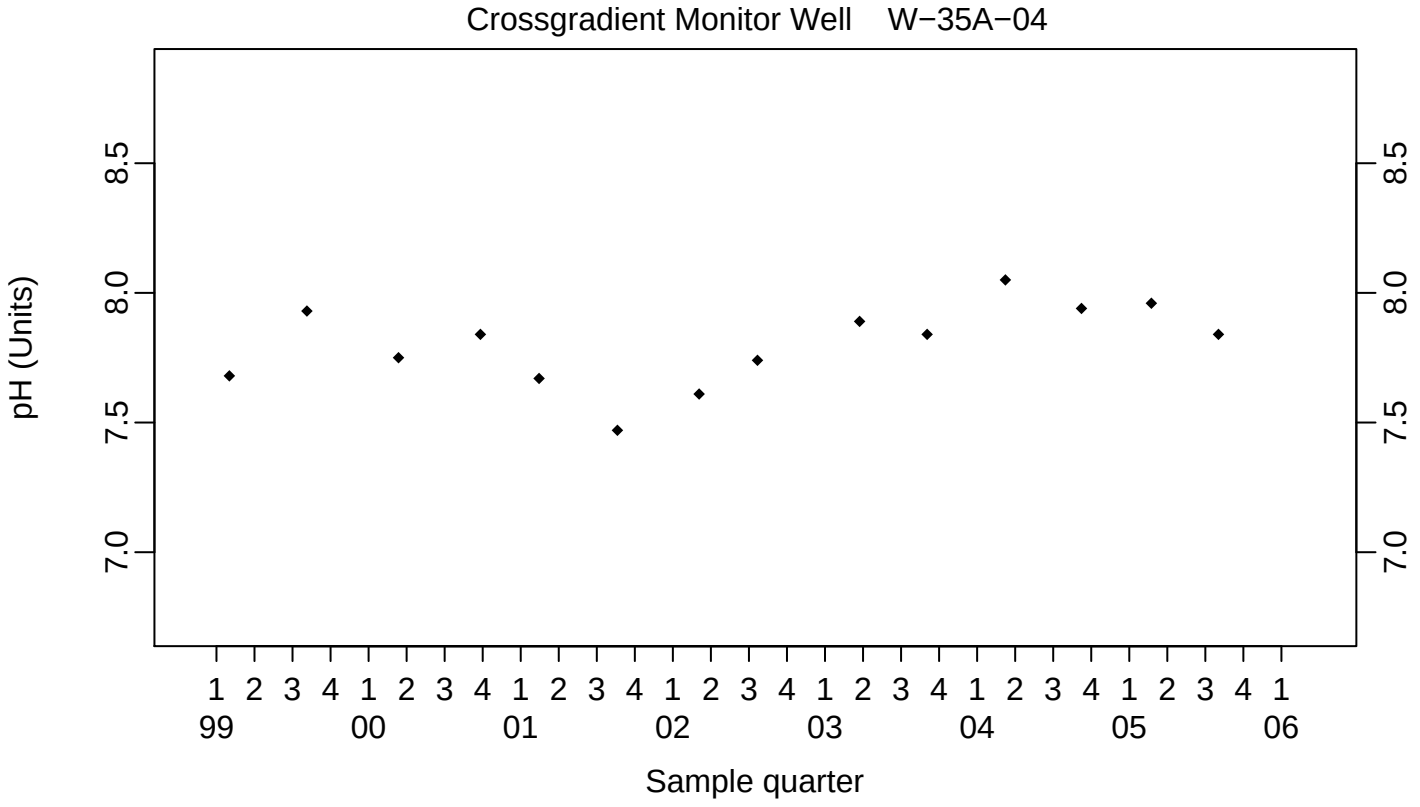
Sewage Ponds Ground Water
GW Elevation (Feet)

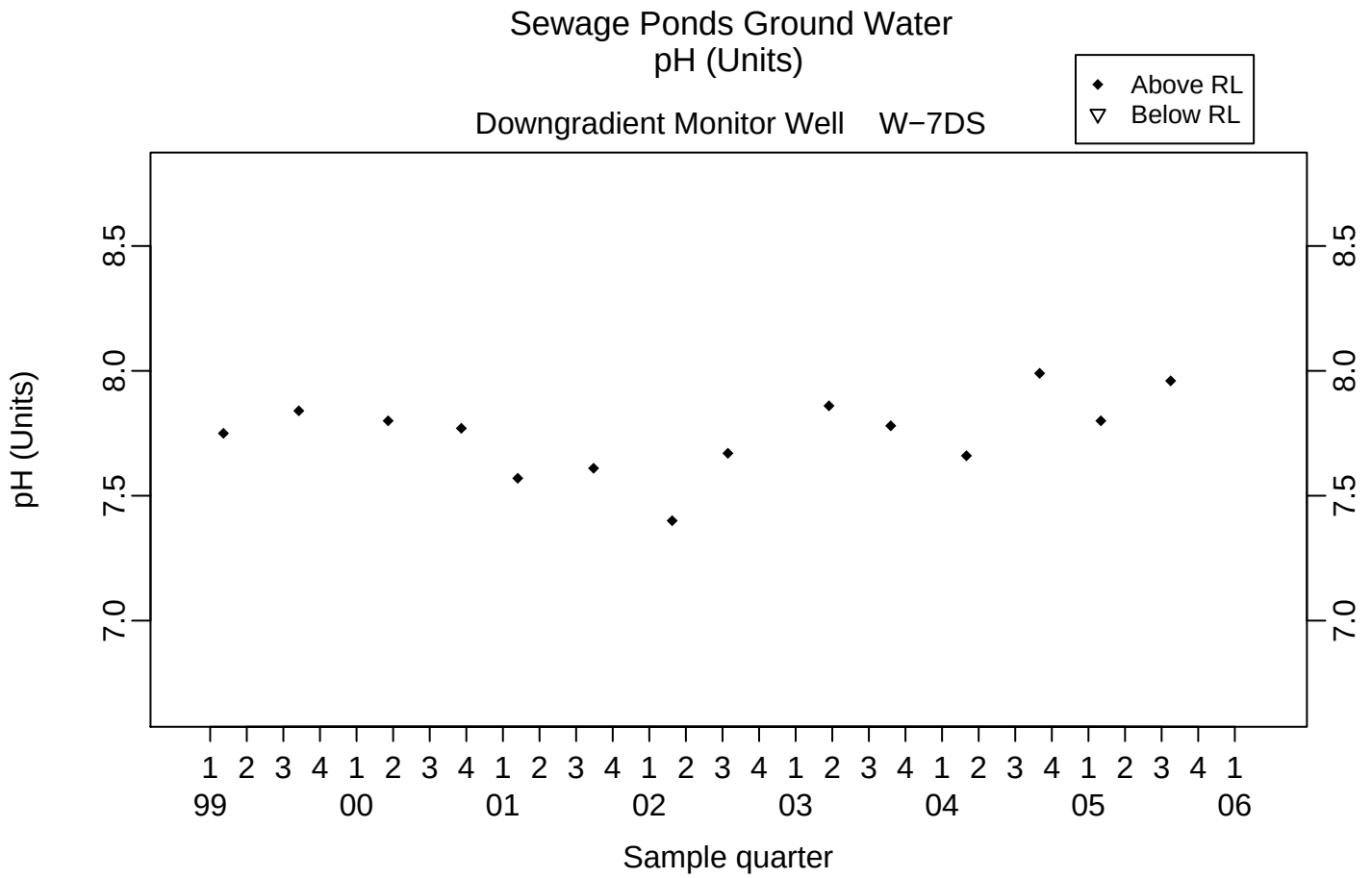


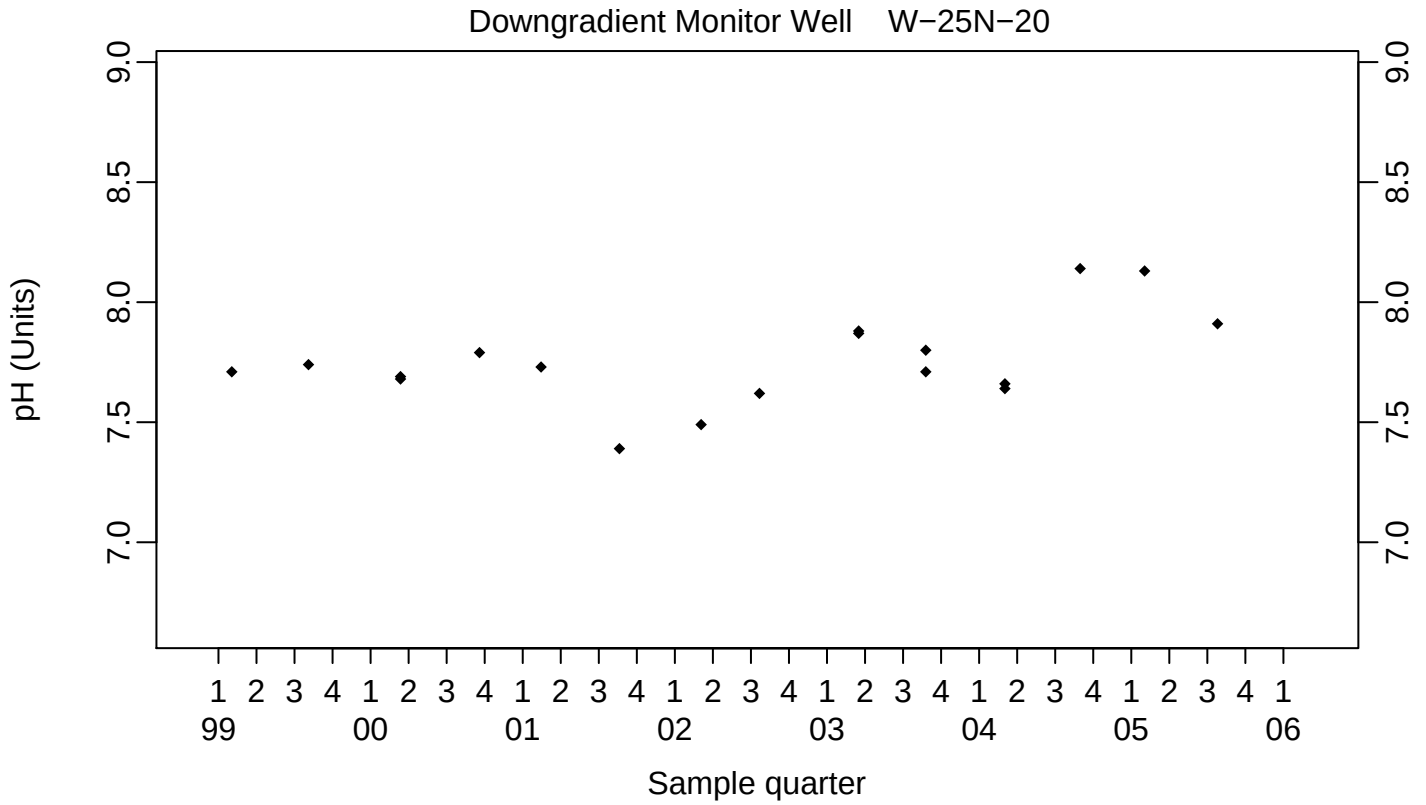

Sewage Ponds Ground Water
pH (Units)
Above RL
Below RL
Upgradient Monitor Well W−7E
pH (Units)
9.5
9.0
8.5
8.0
7.5
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

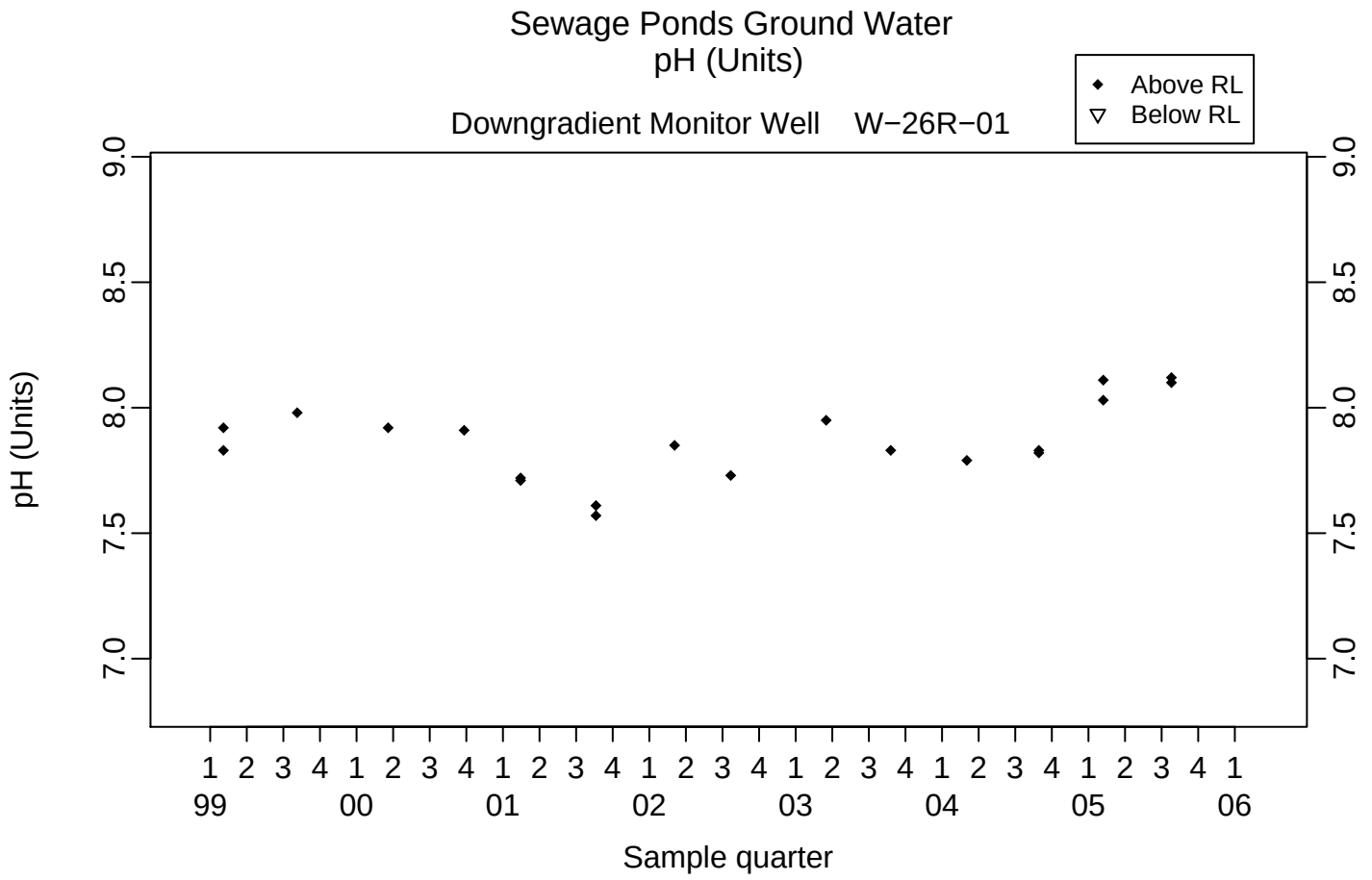

Upgradient Monitor Well W−7ES
pH (Units)
9.0
8.5
8.0
7.5
7.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

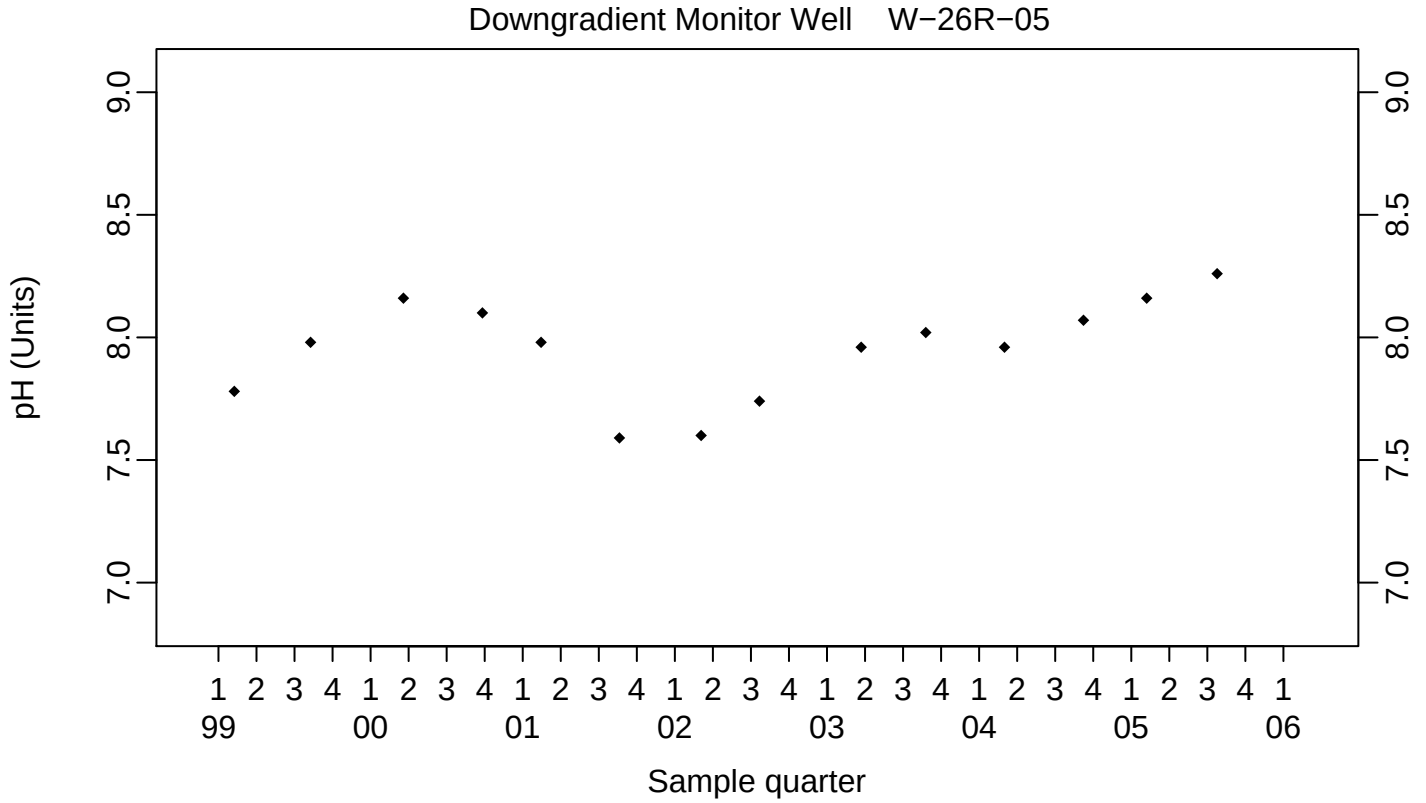

Sewage Ponds Ground Water
pH (Units)
Above RL
Below RL
Upgradient Monitor Well W−7PS
pH (Units)
7.0
7.5
8.0
8.5
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

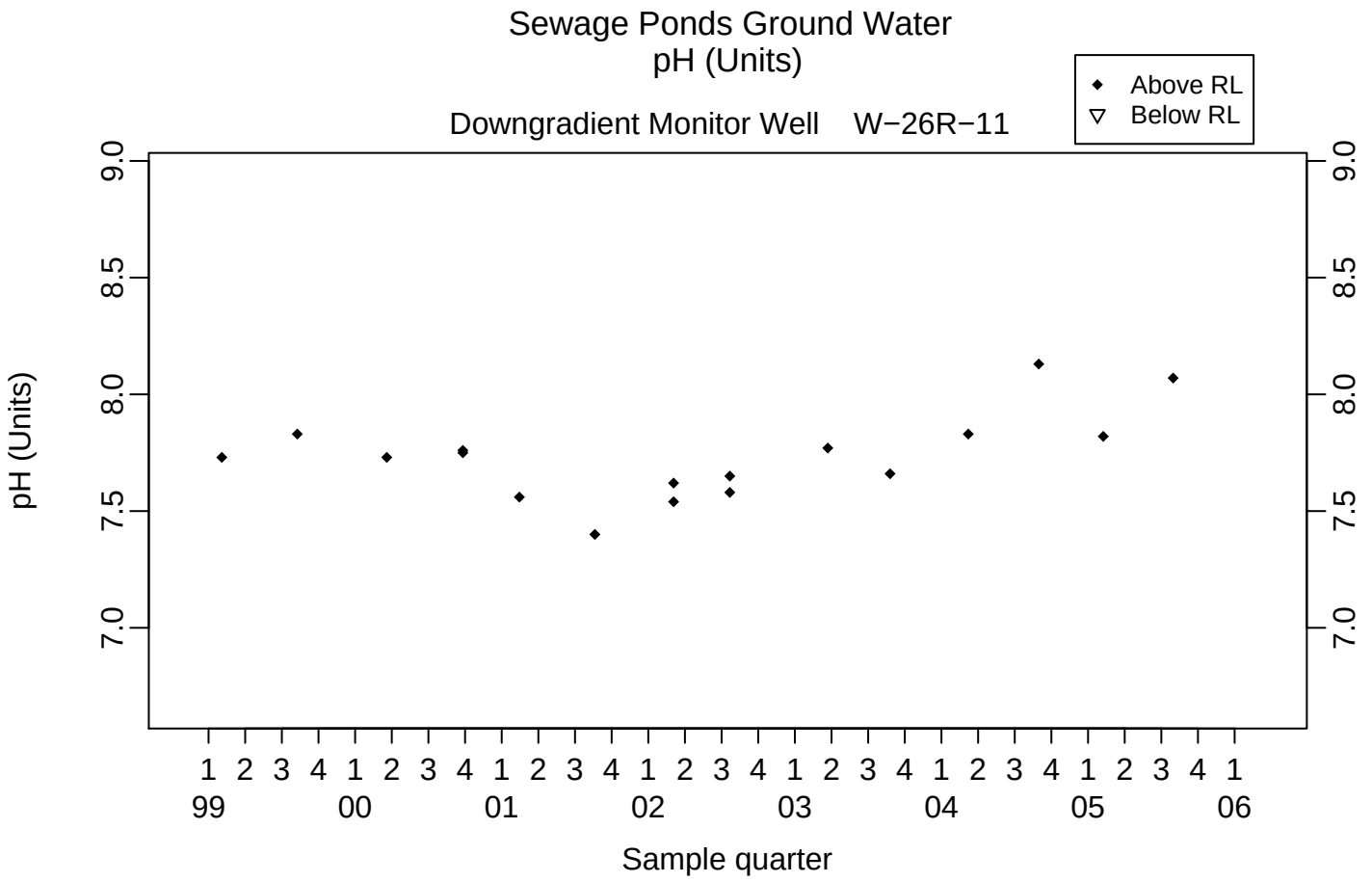

Crossgradient Monitor Well W−35A−04
pH (Units)
7.0
7.5
8.0
8.5
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

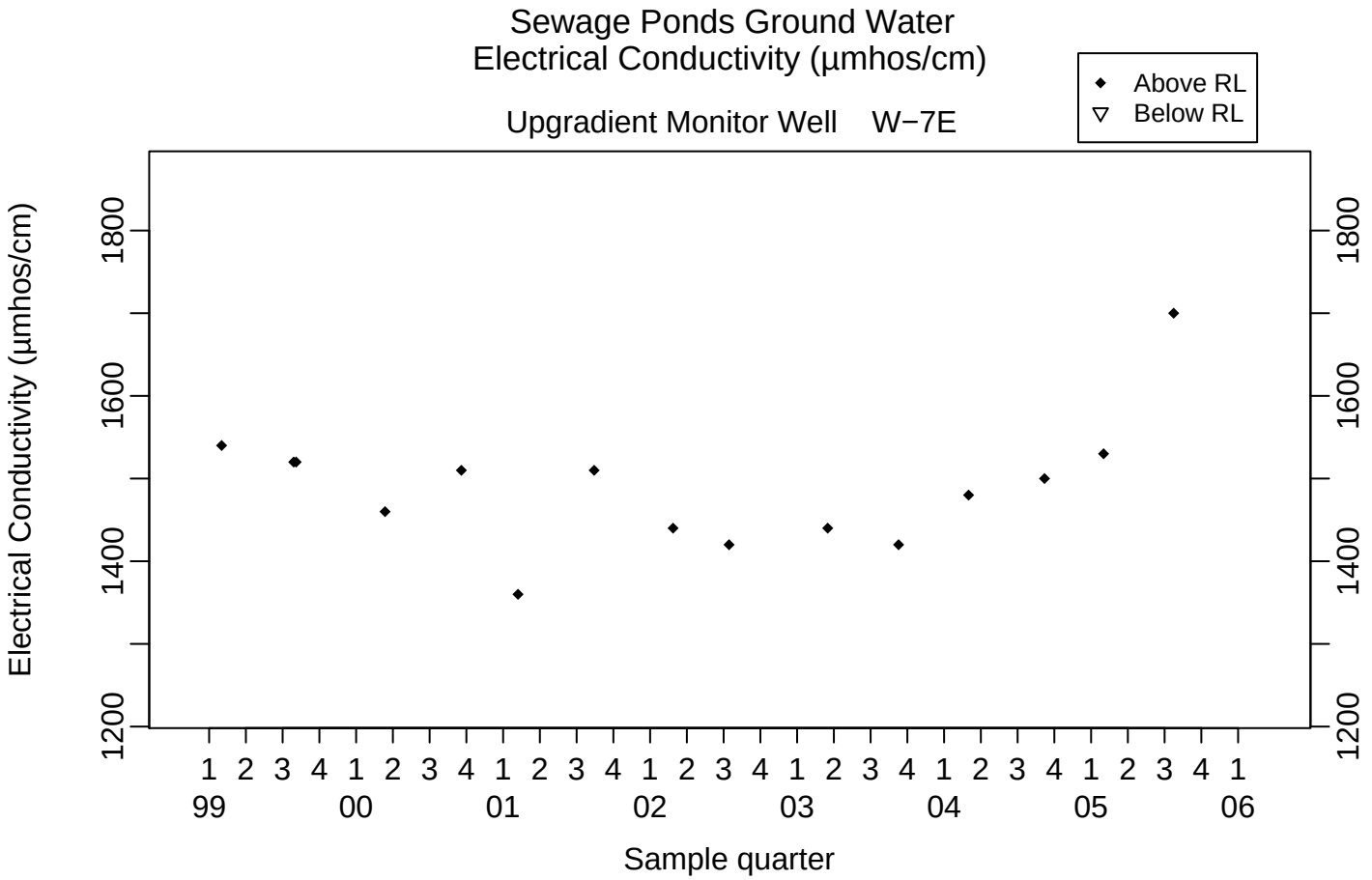

Sewage Ponds Ground Water
pH (Units)
Above RL
Below RL
Downgradient Monitor Well W−7DS
pH (Units)
7.0
7.5
8.0
8.5
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

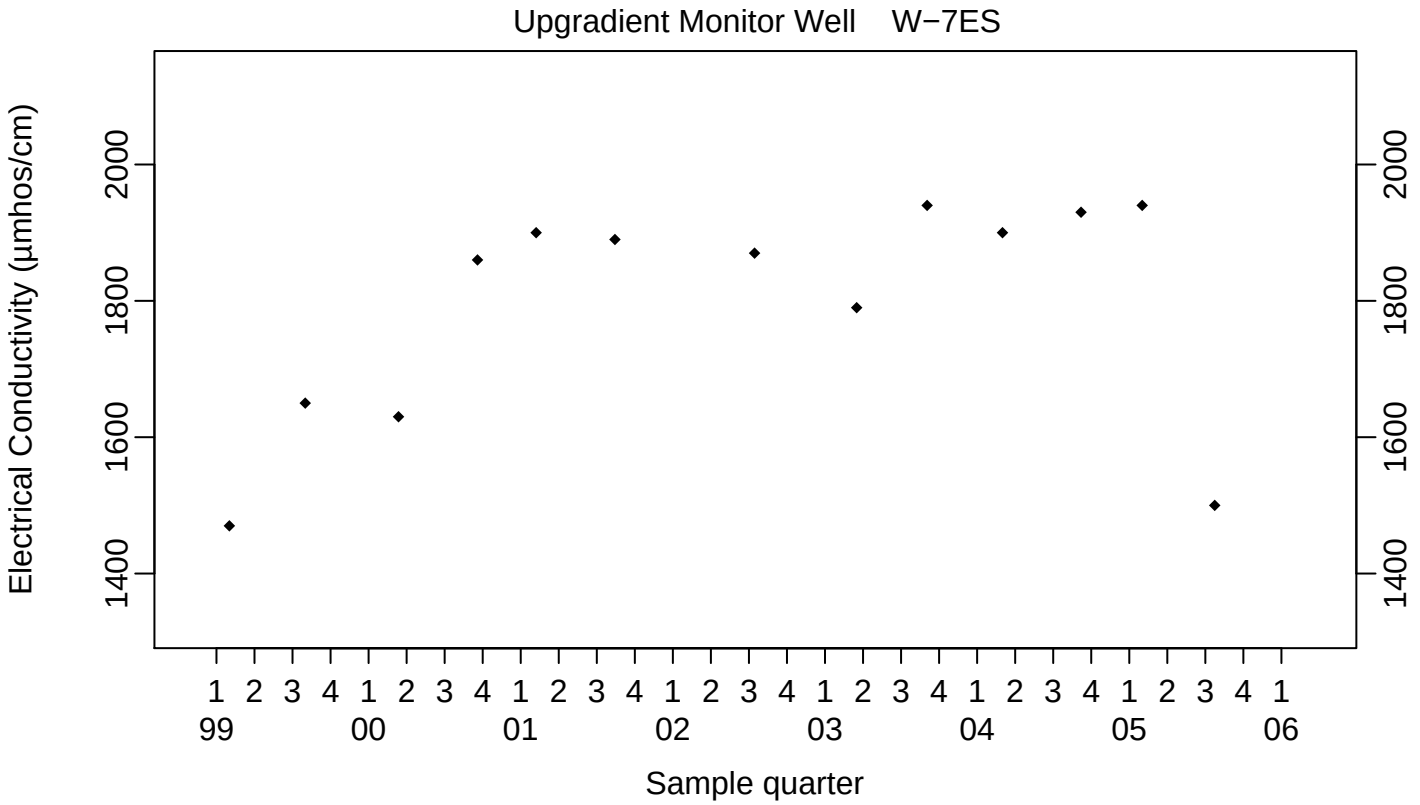

Downgradient Monitor Well W−25N−20
pH (Units)
7.0
7.5
8.0
8.5
9.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

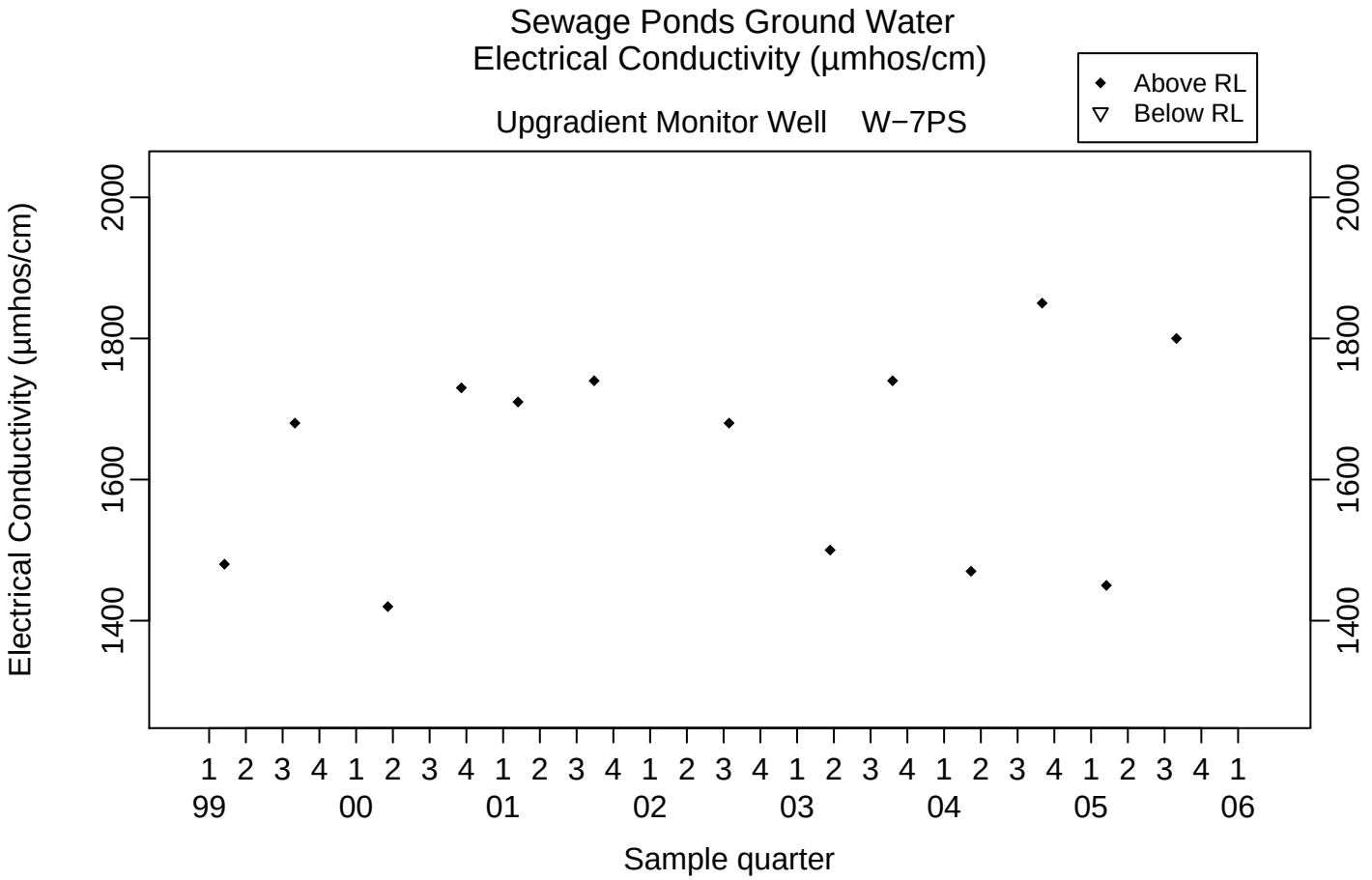

Sewage Ponds Ground Water
pH (Units)
Above RL
Below RL
Downgradient Monitor Well W−26R−01
pH (Units)
9.0
8.5
8.0
7.5
7.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

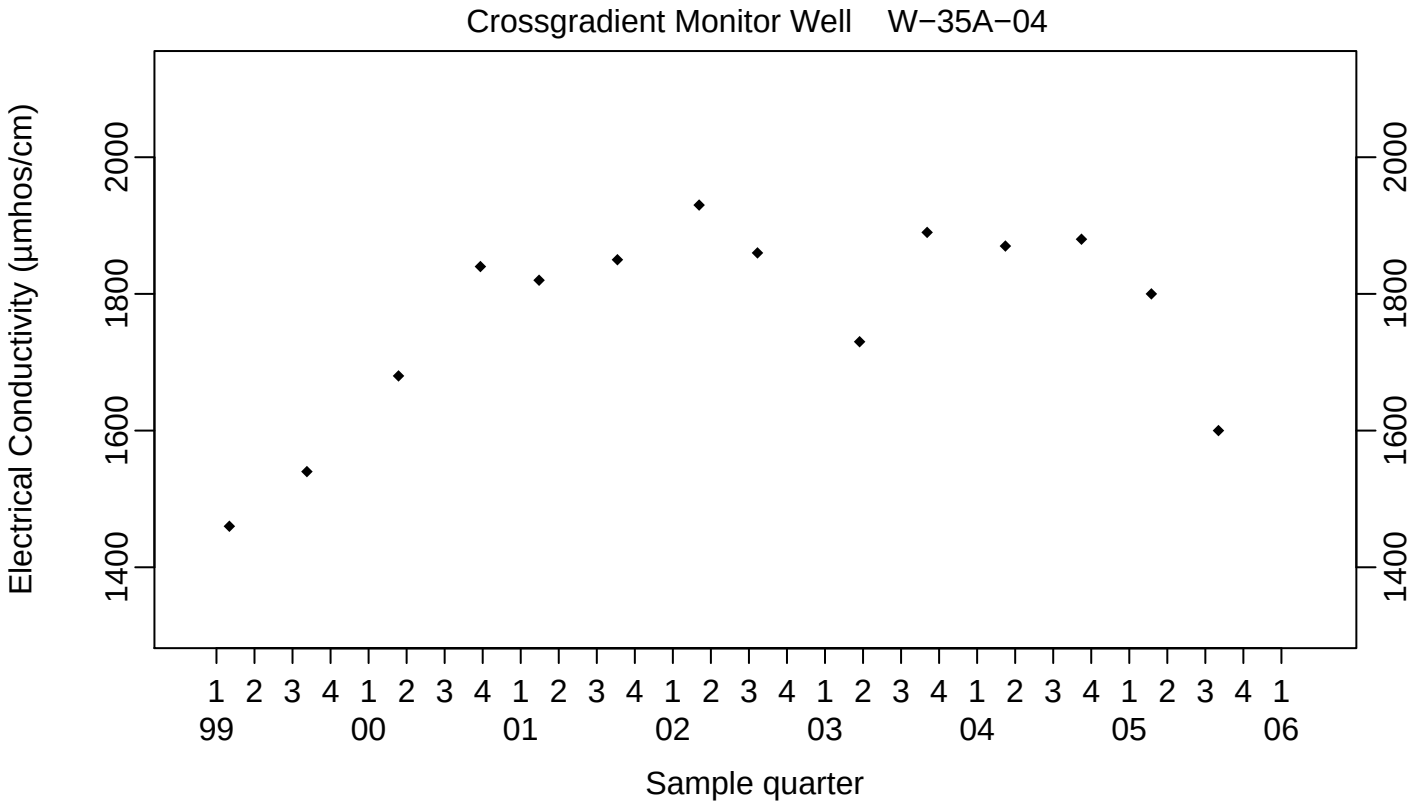

Downgradient Monitor Well W−26R−05
pH (Units)
9.0
8.5
8.0
7.5
7.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

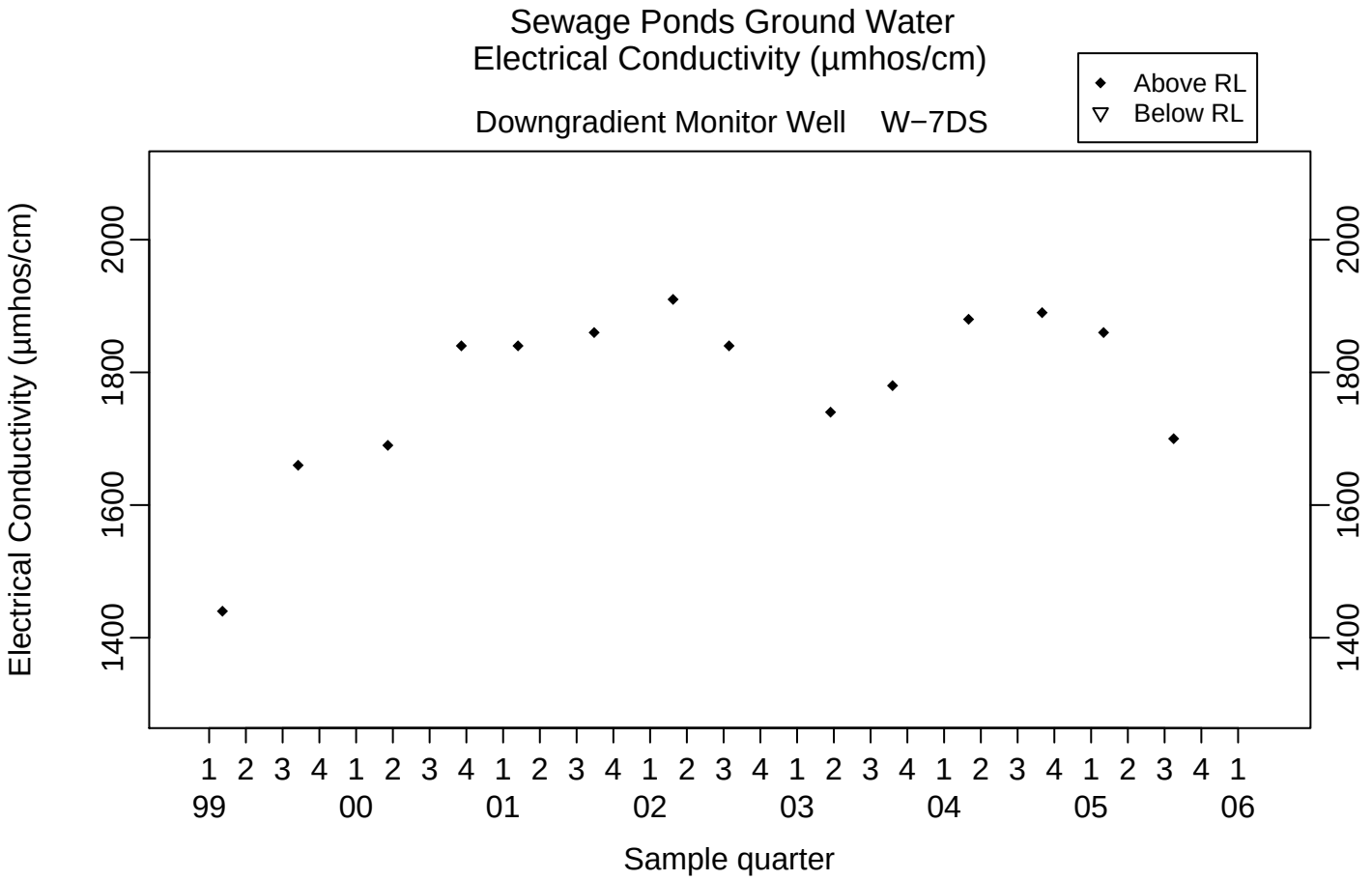

Sewage Ponds Ground Water
pH (Units)
Downgradient Monitor Well W−26R−11
Above RL
Below RL
pH (Units)
9.0
8.5
8.0
7.5
7.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

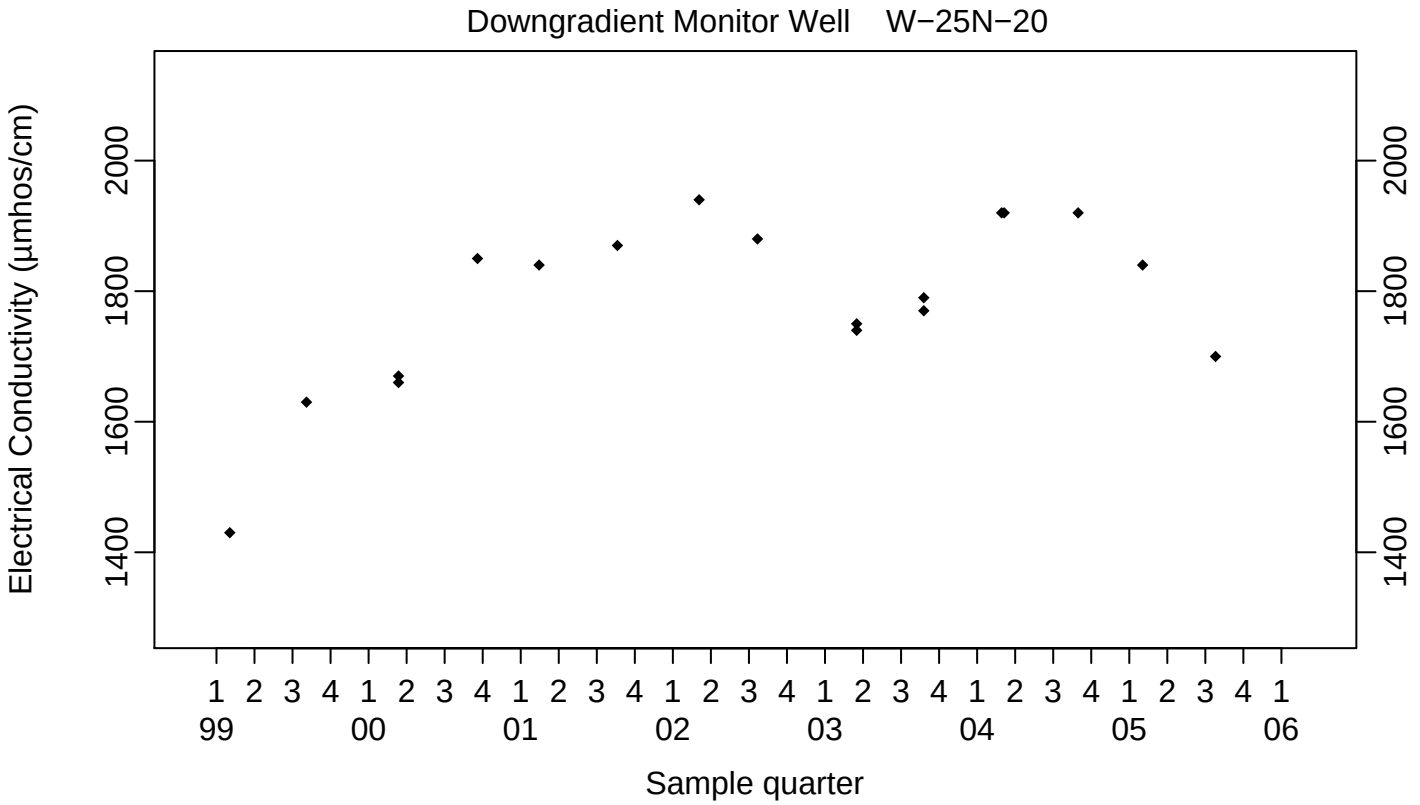

Sewage Ponds Ground Water
Electrical Conductivity (µmhos/cm)
Above RL
Below RL
Upgradient Monitor Well W−7E
Electrical Conductivity (µmhos/cm)
1200
1400
1600
1800
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

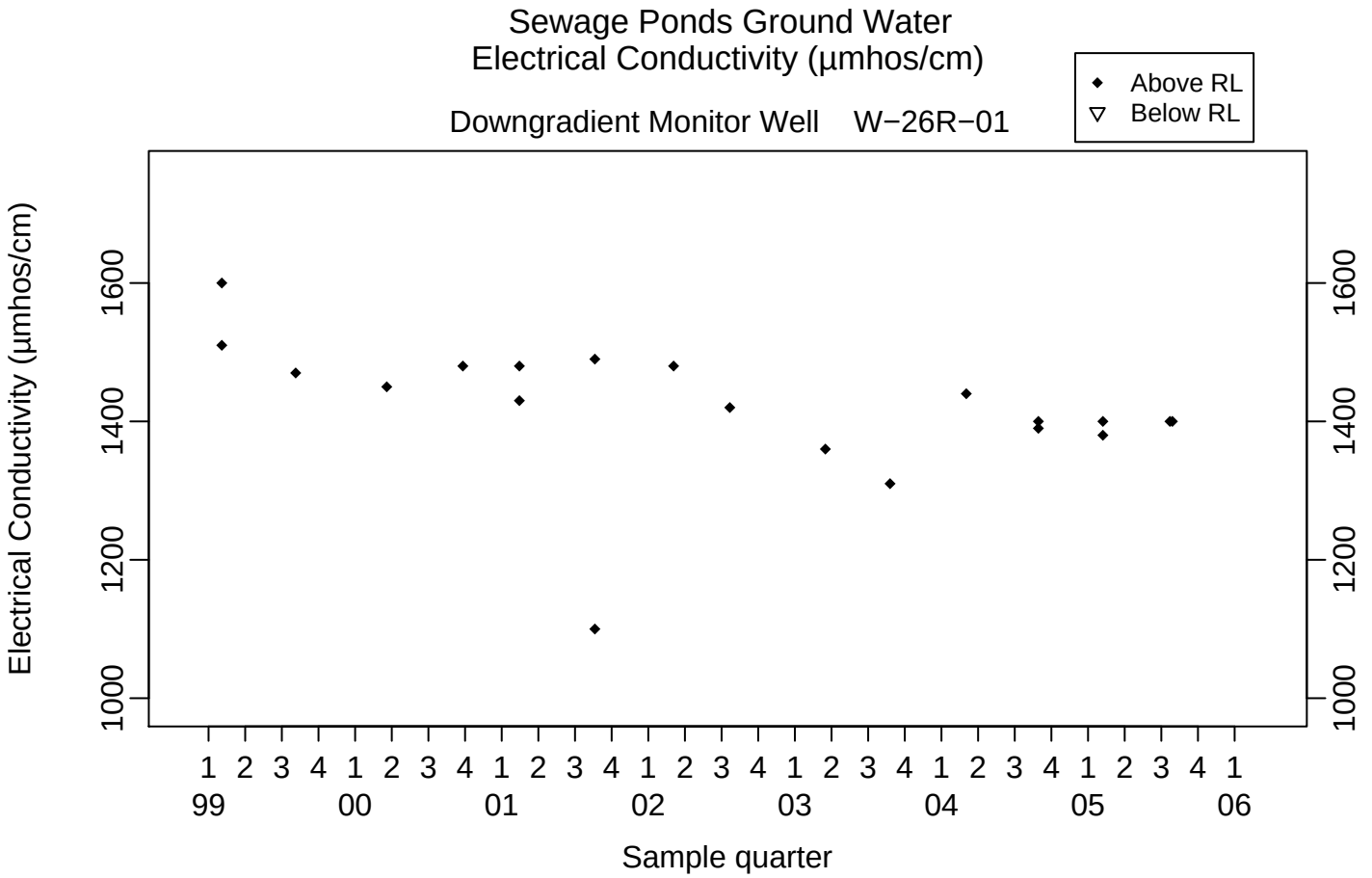

Upgradient Monitor Well W−7ES
Electrical Conductivity (µmhos/cm)
1400
1600
1800
2000
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

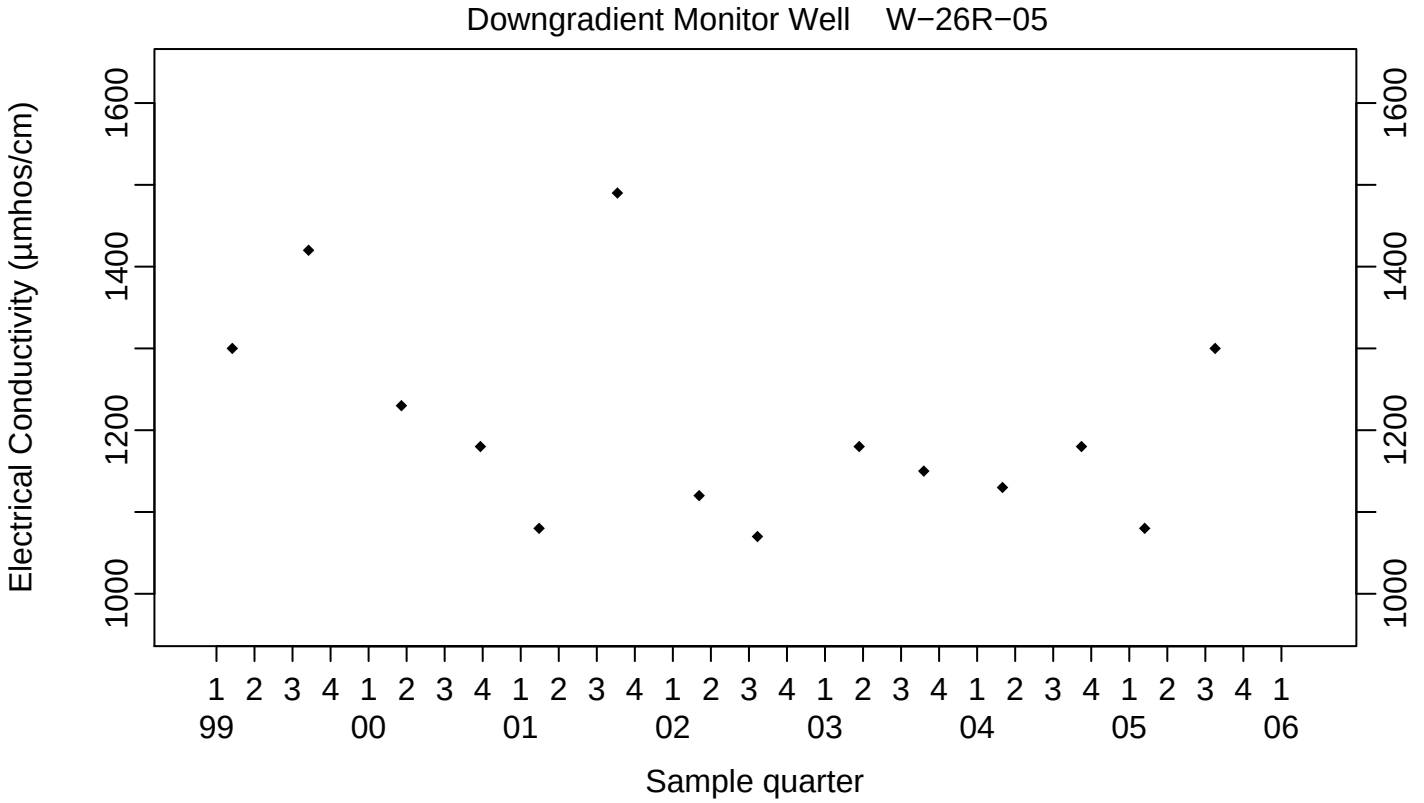

Sewage Ponds Ground Water
Electrical Conductivity (µmhos/cm)
Above RL
Below RL
Upgradient Monitor Well W−7PS
Electrical Conductivity (µmhos/cm)
1400
1600
1800
2000
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

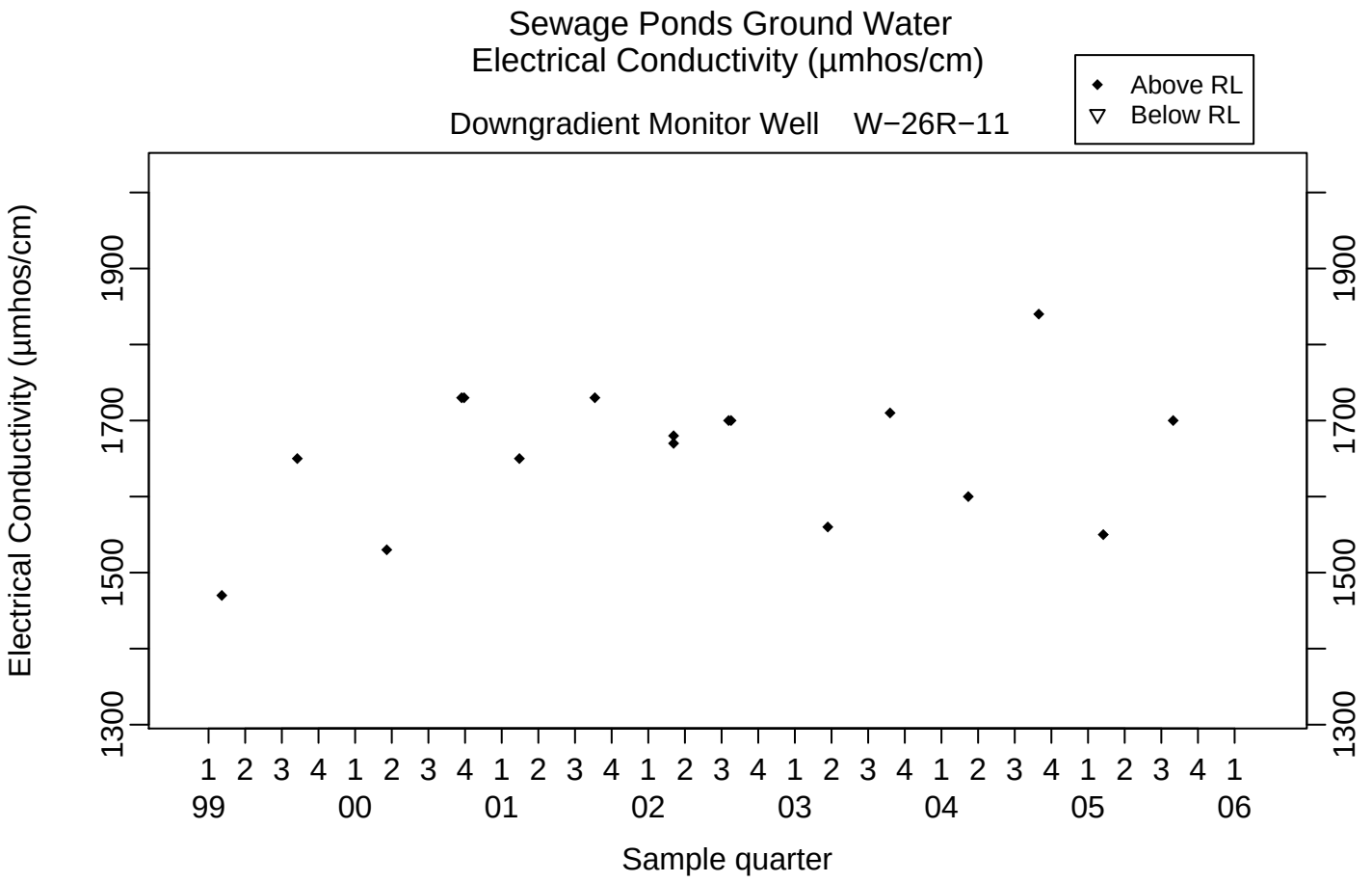

Crossgradient Monitor Well W−35A−04
Electrical Conductivity (µmhos/cm)
1400
1600
1800
2000
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

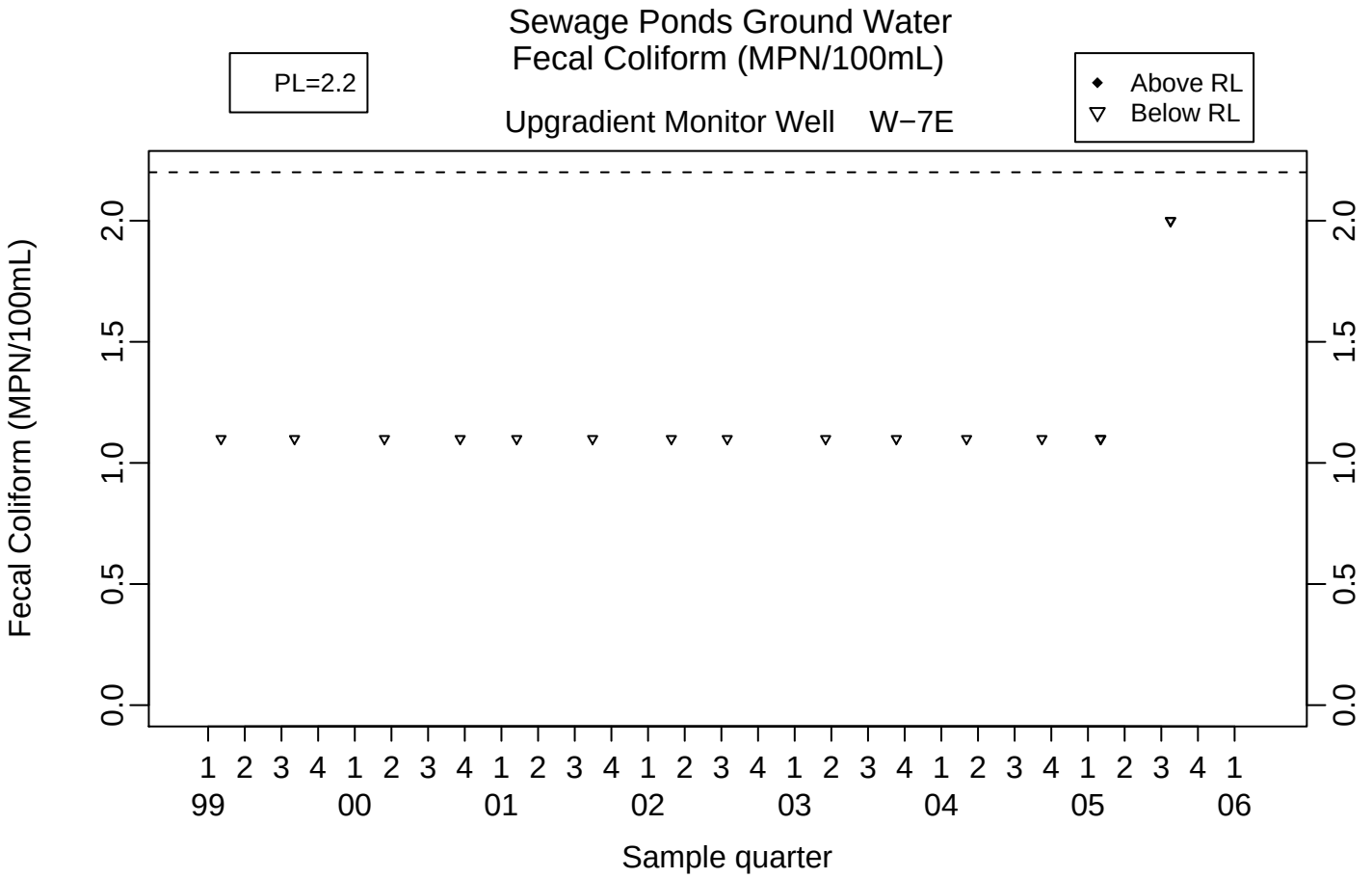

Sewage Ponds Ground Water
Electrical Conductivity (µmhos/cm)
Above RL
Below RL
Downgradient Monitor Well W−7DS
Electrical Conductivity (µmhos/cm)
1400
1600
1800
2000
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

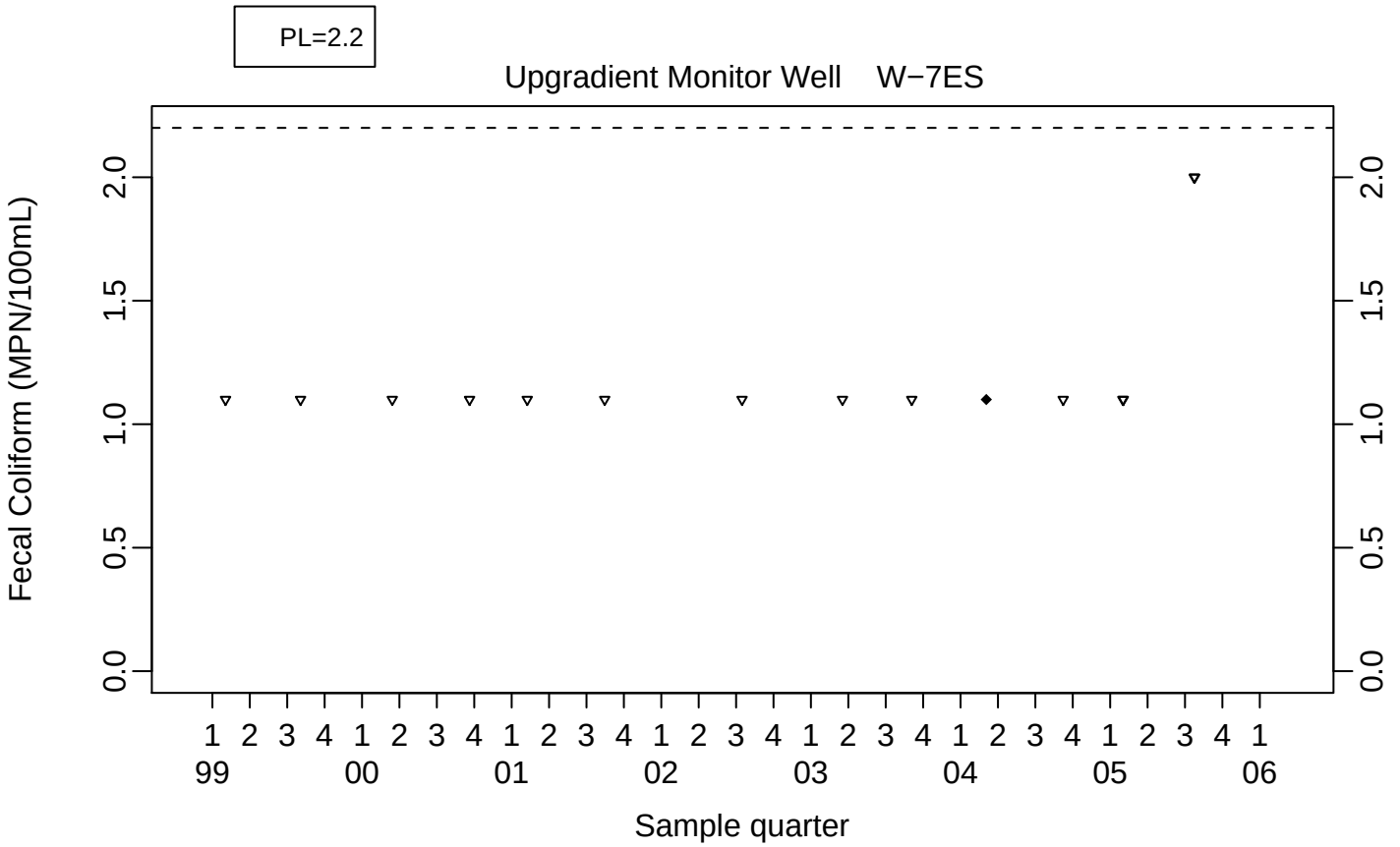

Downgradient Monitor Well W−25N−20
Electrical Conductivity (µmhos/cm)
1400
1600
1800
2000
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

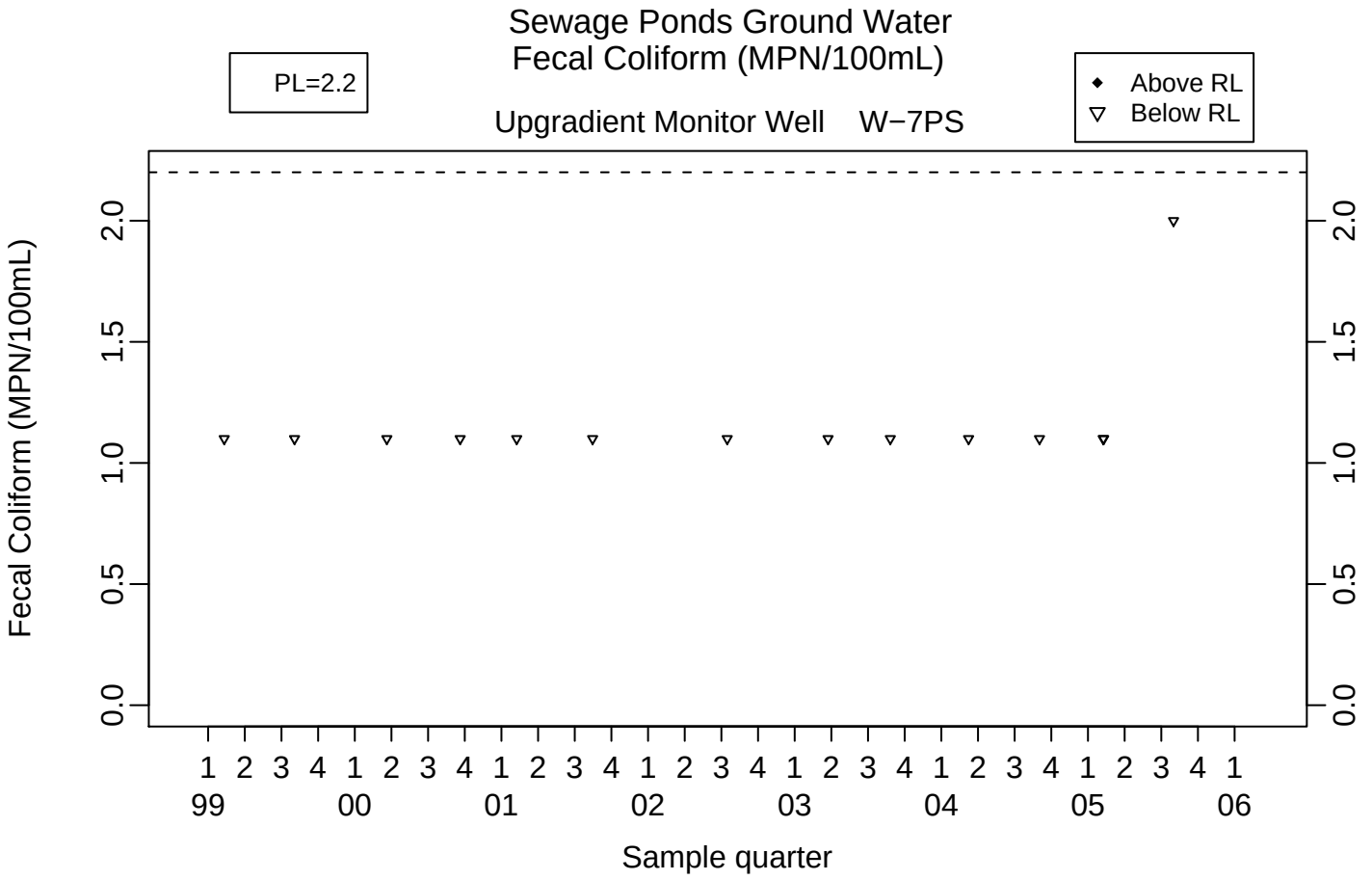

Sewage Ponds Ground Water
Electrical Conductivity (µmhos/cm)
Above RL
Below RL
Downgradient Monitor Well W−26R−01
Electrical Conductivity (µmhos/cm)
1000
1200
1400
1600
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

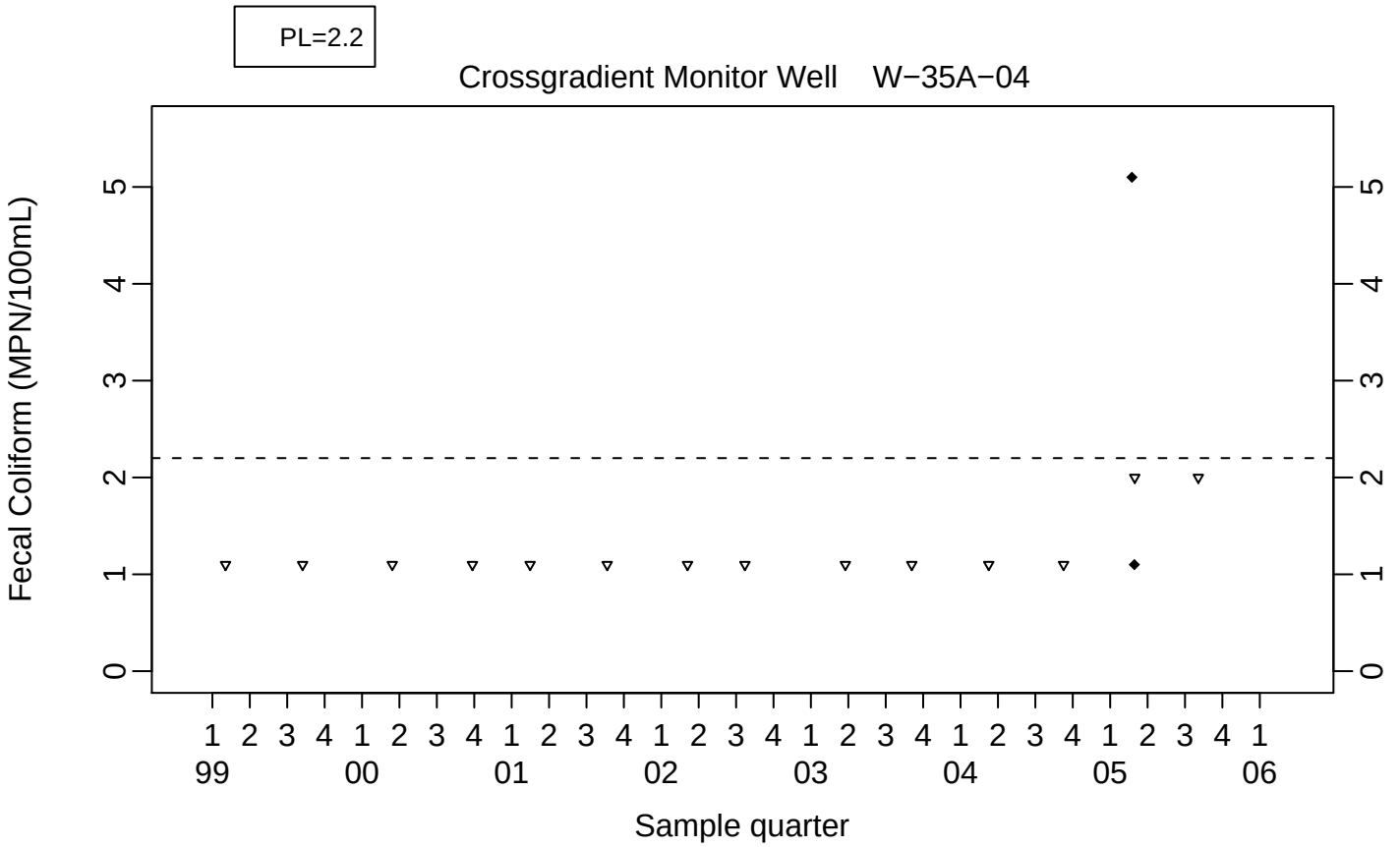

Downgradient Monitor Well W−26R−05
Electrical Conductivity (µmhos/cm)
1000
1200
1400
1600
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

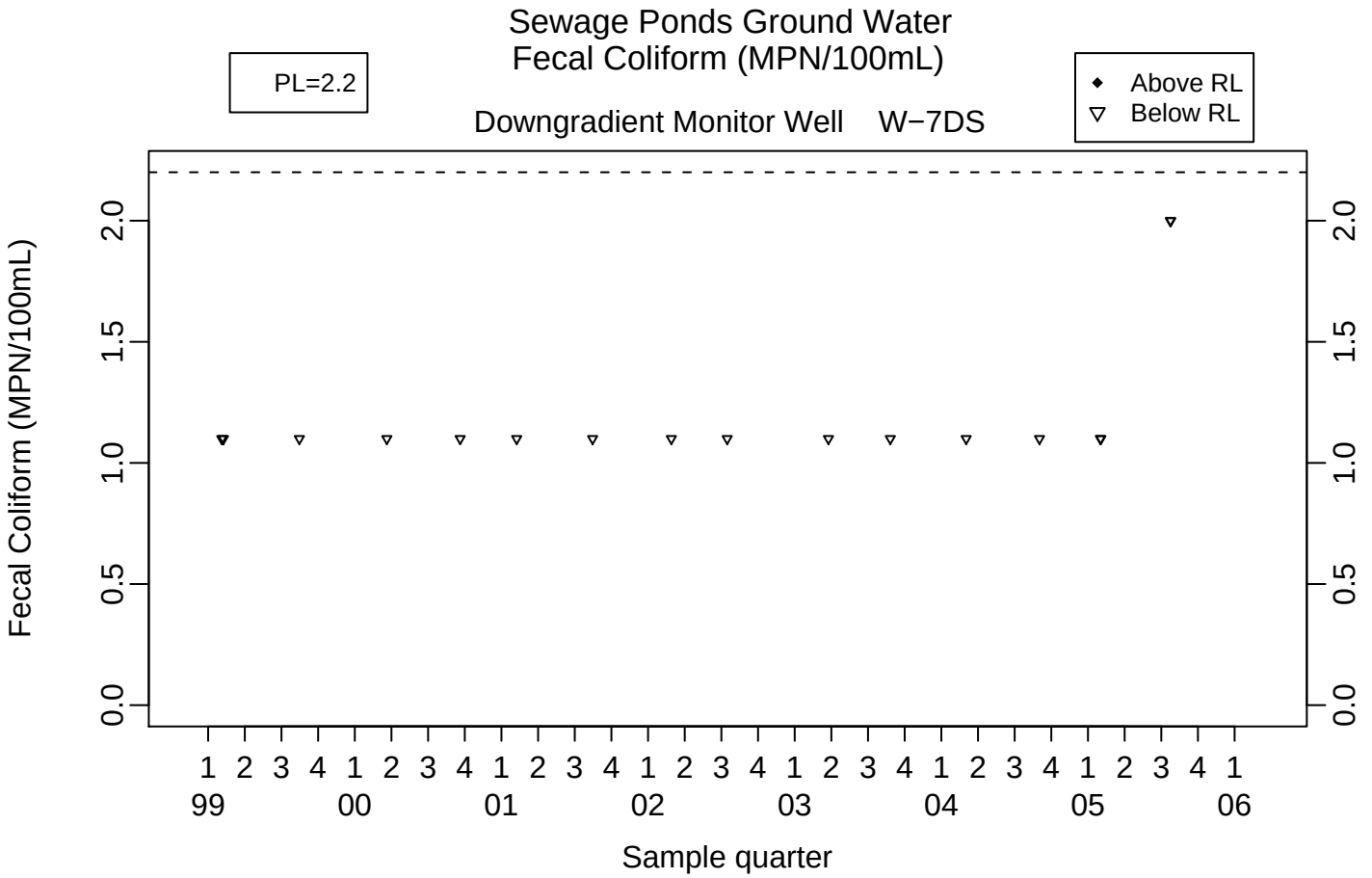

Sewage Ponds Ground Water
Electrical Conductivity (µmhos/cm)
Downgradient Monitor Well W−26R−11
Above RL
Below RL
Electrical Conductivity (µmhos/cm)
1300
1500
1700
1900
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

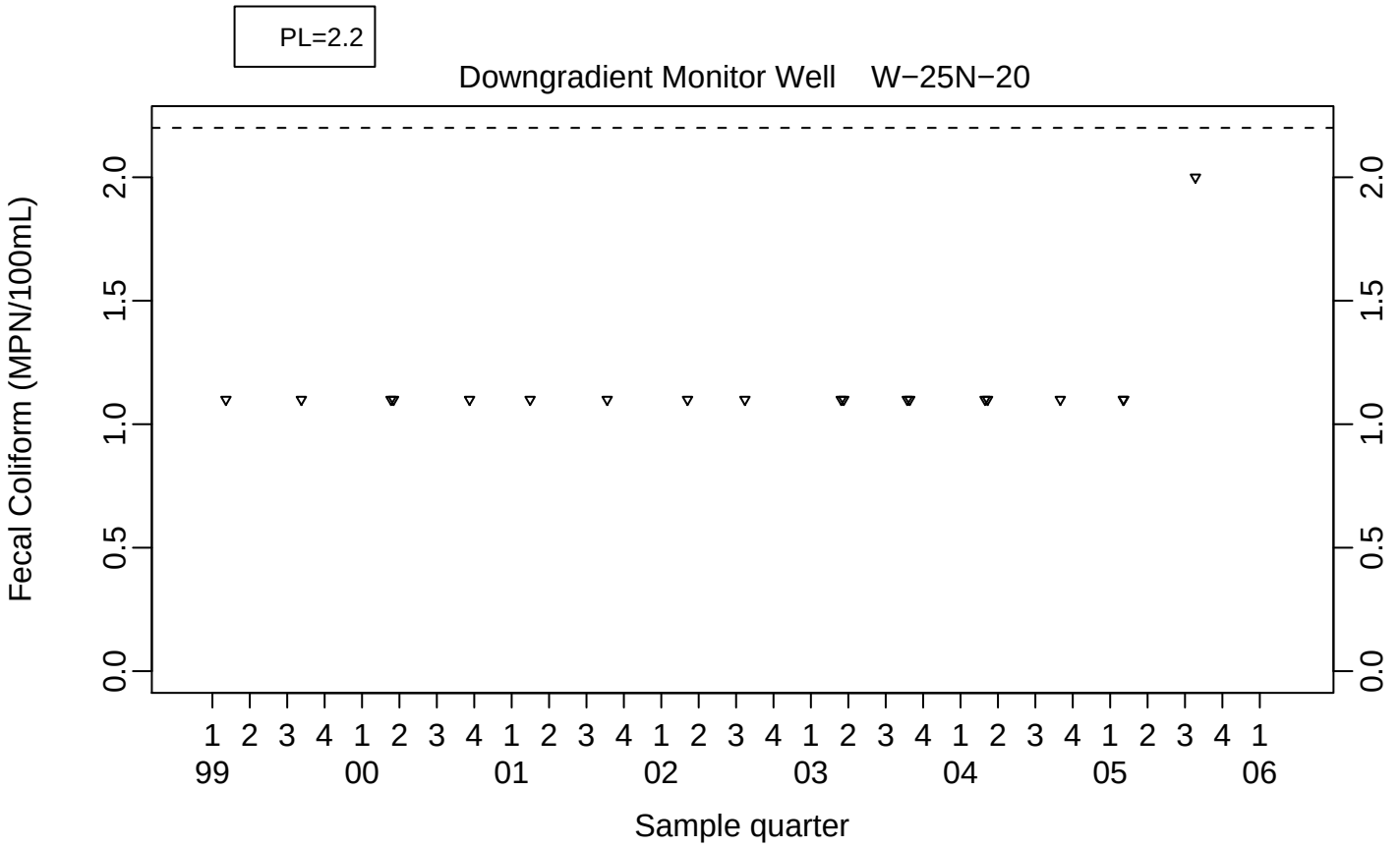

Sewage Ponds Ground Water
Fecal Coliform (MPN/100mL)
PL=2.2
Above RL
Below RL
Upgradient Monitor Well W−7E
Fecal Coliform (MPN/100mL)
0.0
0.5
1.0
1.5
2.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

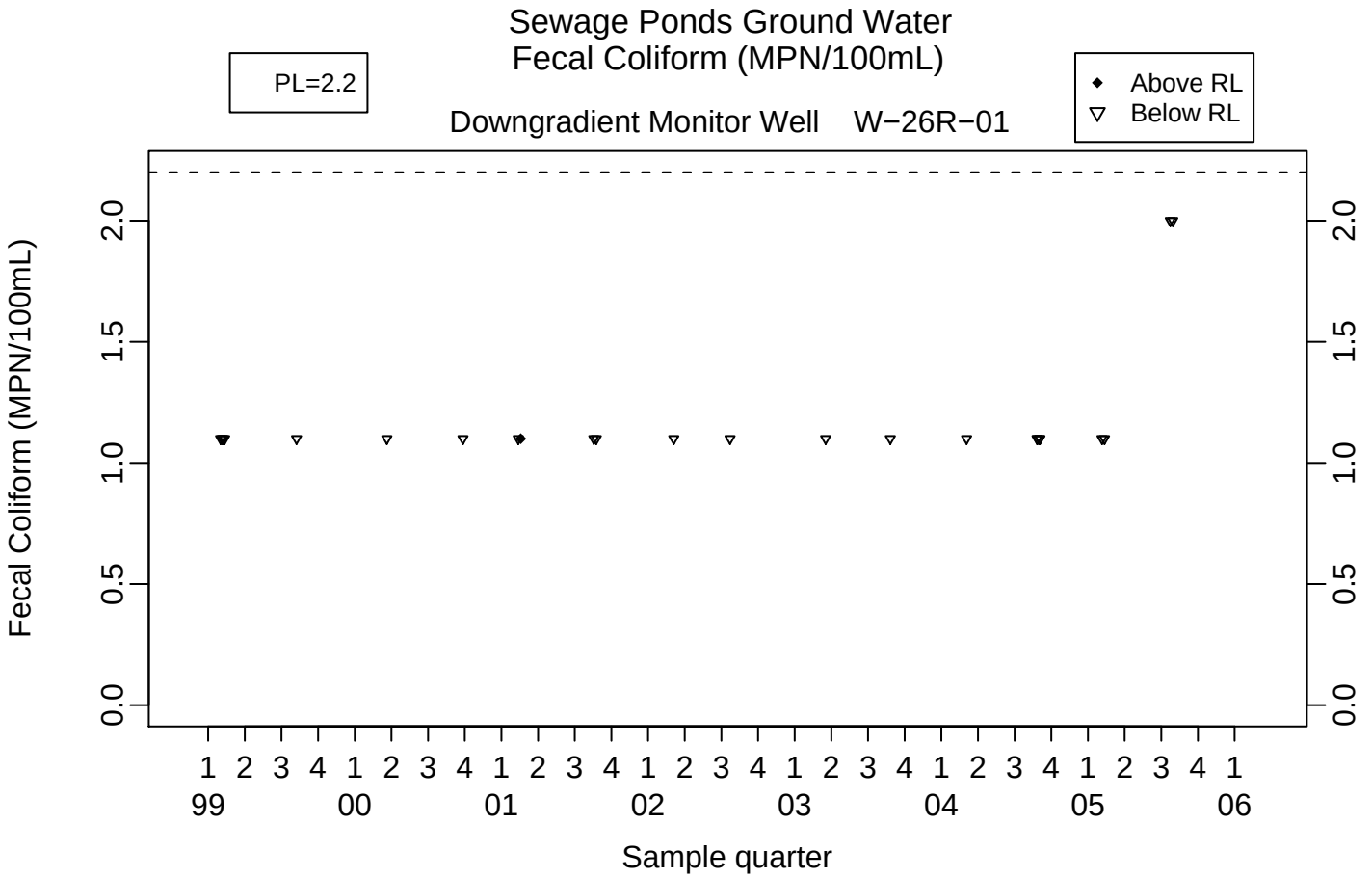

PL=2.2
Upgradient Monitor Well W−7ES
Fecal Coliform (MPN/100mL)
0.0
0.5
1.0
1.5
2.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

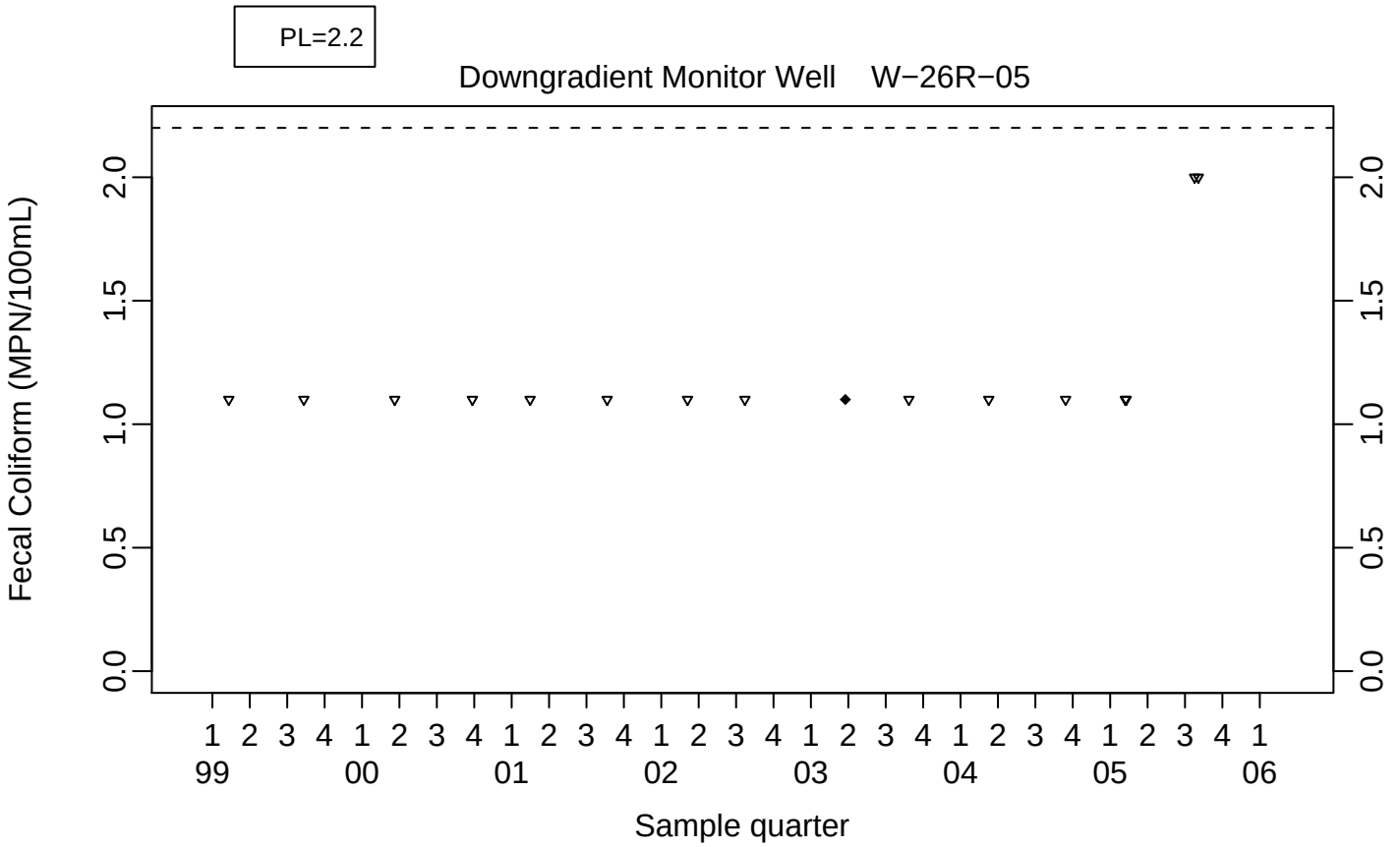

Sewage Ponds Ground Water
Fecal Coliform (MPN/100mL)
PL=2.2
Above RL
Below RL
Upgradient Monitor Well W−7PS
Fecal Coliform (MPN/100mL)
0.0
0.5
1.0
1.5
2.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

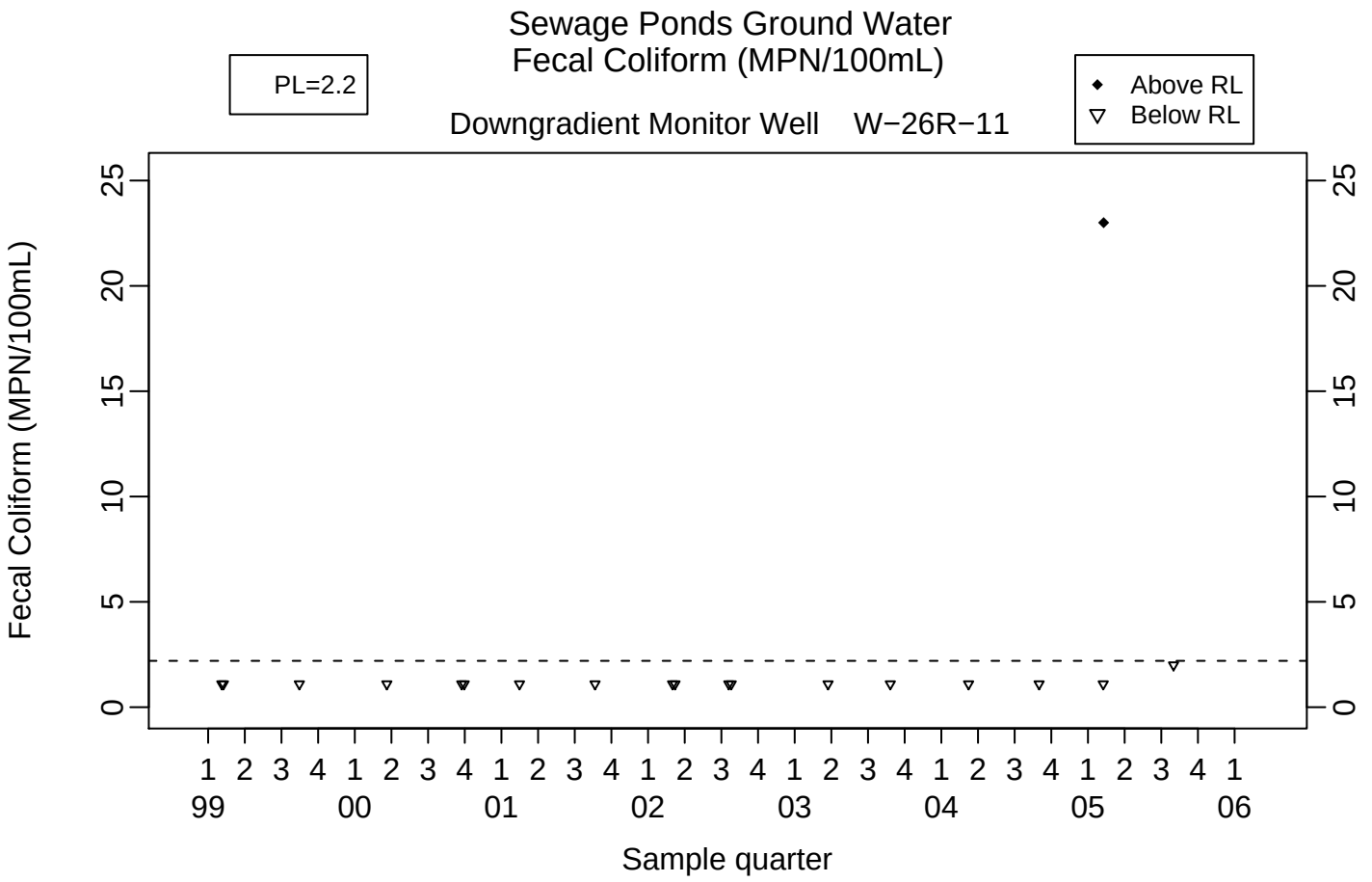

PL=2.2
Crossgradient Monitor Well W−35A−04
Fecal Coliform (MPN/100mL)
0
1
2
3
4
5
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

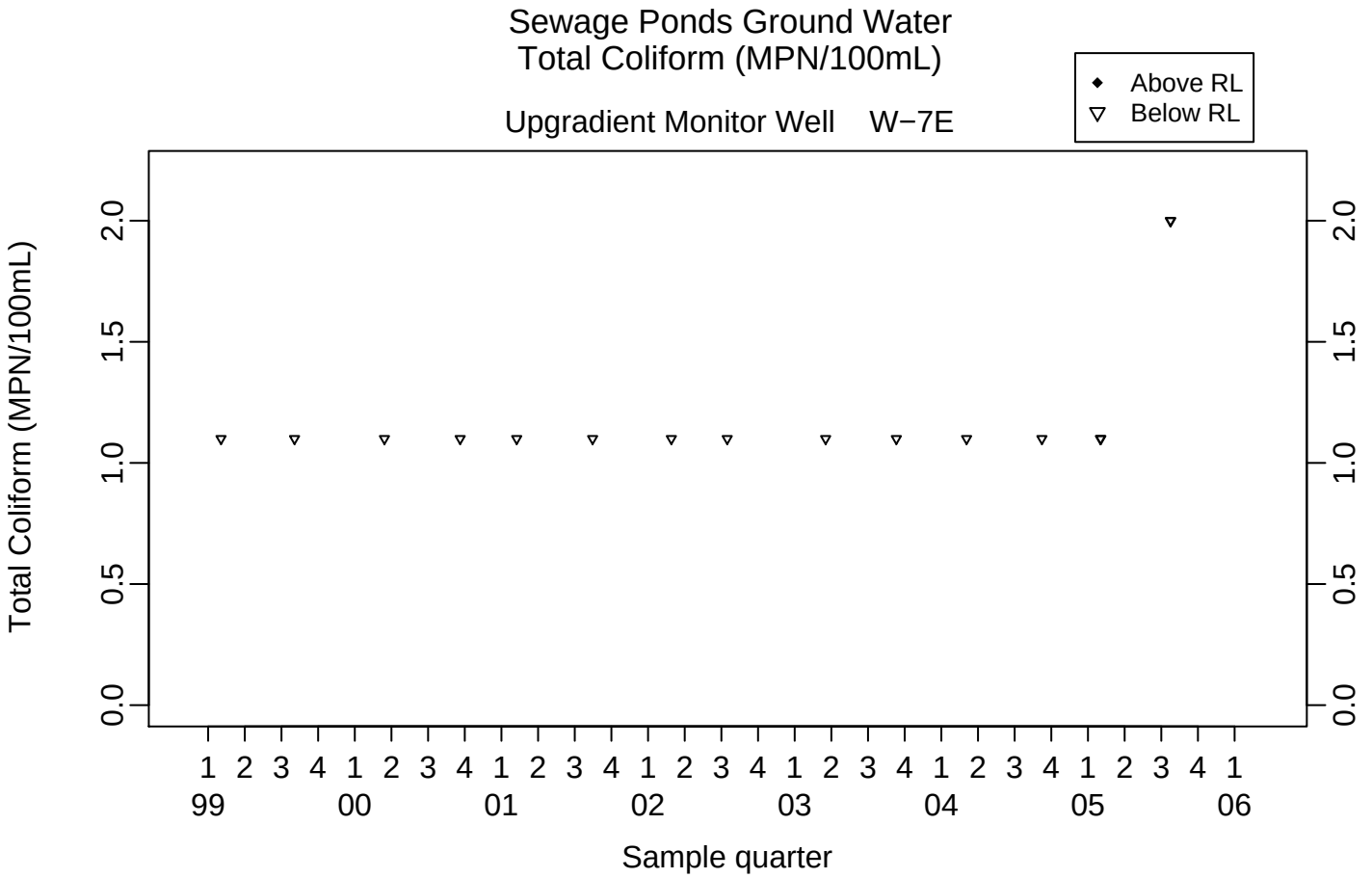

Sewage Ponds Ground Water
Fecal Coliform (MPN/100mL)
PL=2.2
Above RL
Below RL
Downgradient Monitor Well W−7DS
Fecal Coliform (MPN/100mL)
0.0
0.5
1.0
1.5
2.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

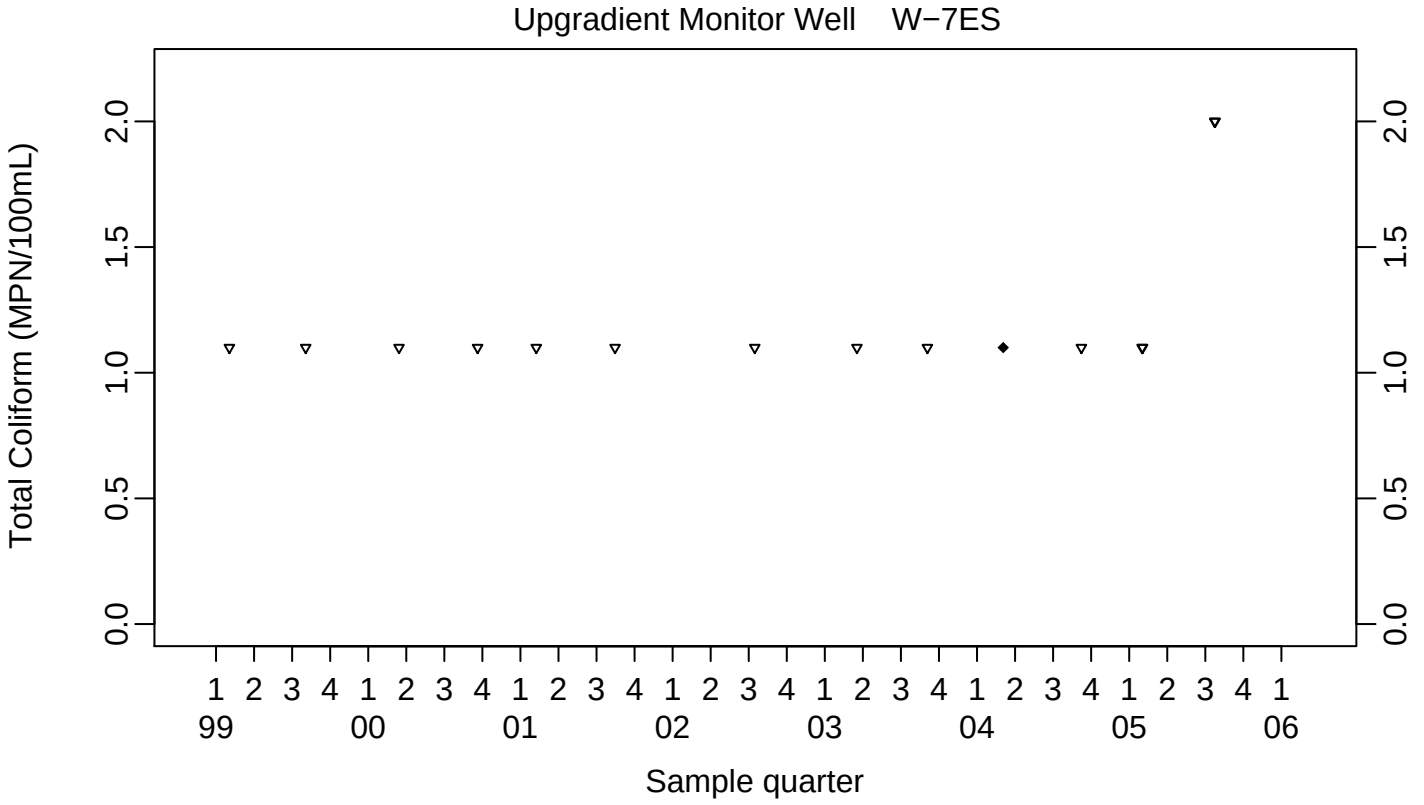

PL=2.2
Downgradient Monitor Well W−25N−20
Fecal Coliform (MPN/100mL)
0.0
0.5
1.0
1.5
2.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


Sewage Ponds Ground Water
Fecal Coliform (MPN/100mL)
PL=2.2
Above RL
Below RL
Downgradient Monitor Well W−26R−01
Fecal Coliform (MPN/100mL)
0.0
0.5
1.0
1.5
2.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

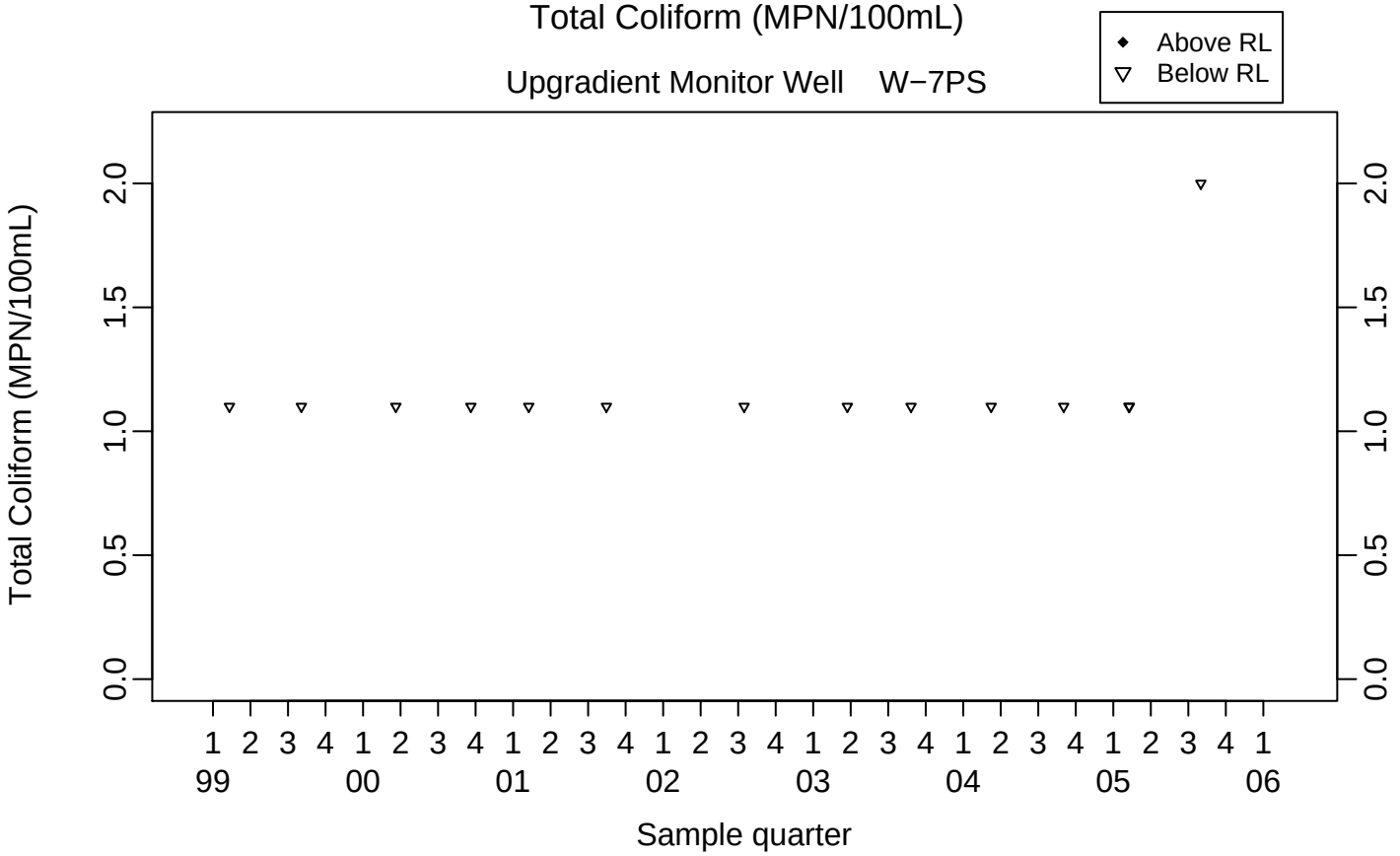

PL=2.2
Downgradient Monitor Well W−26R−05
Fecal Coliform (MPN/100mL)
0.0
0.5
1.0
1.5
2.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

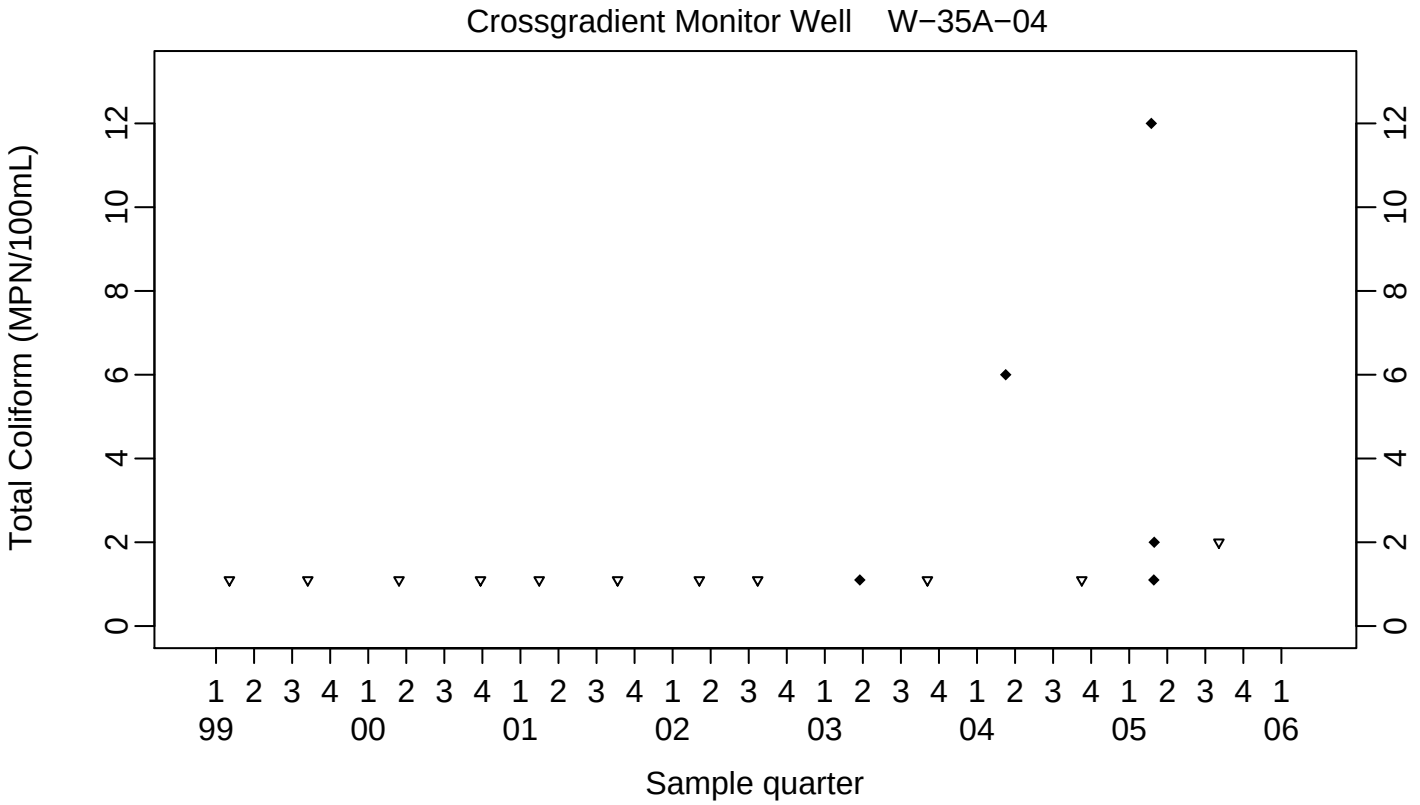

Sewage Ponds Ground Water
Fecal Coliform (MPN/100mL)
PL=2.2
Above RL
Below RL
Downgradient Monitor Well W−26R−11
Fecal Coliform (MPN/100mL)
0
5
10
15
20
25
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

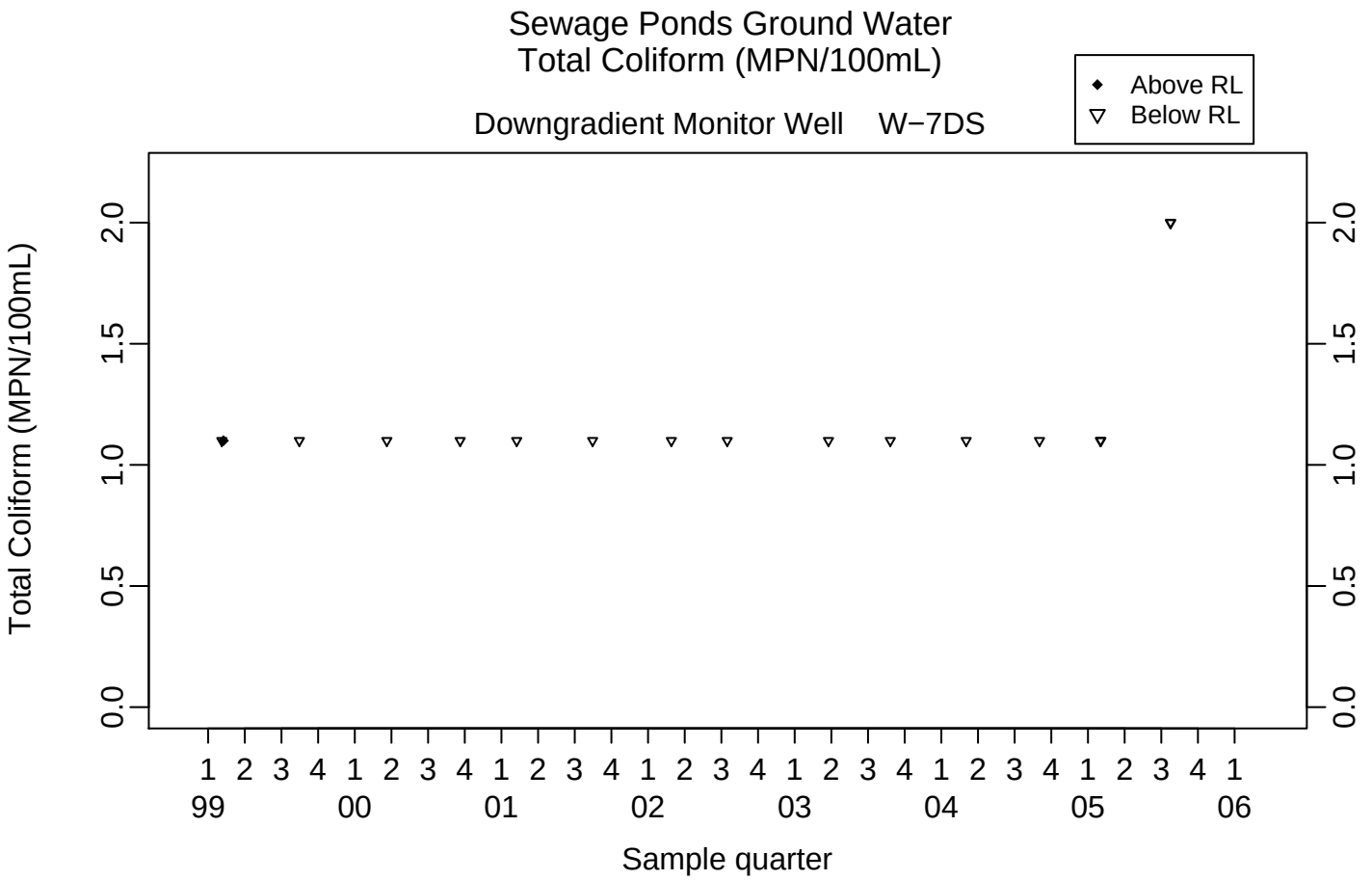

Sewage Ponds Ground Water
Total Coliform (MPN/100mL)
Above RL
Below RL
Upgradient Monitor Well W−7E
Total Coliform (MPN/100mL)
0.0
0.5
1.0
1.5
2.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

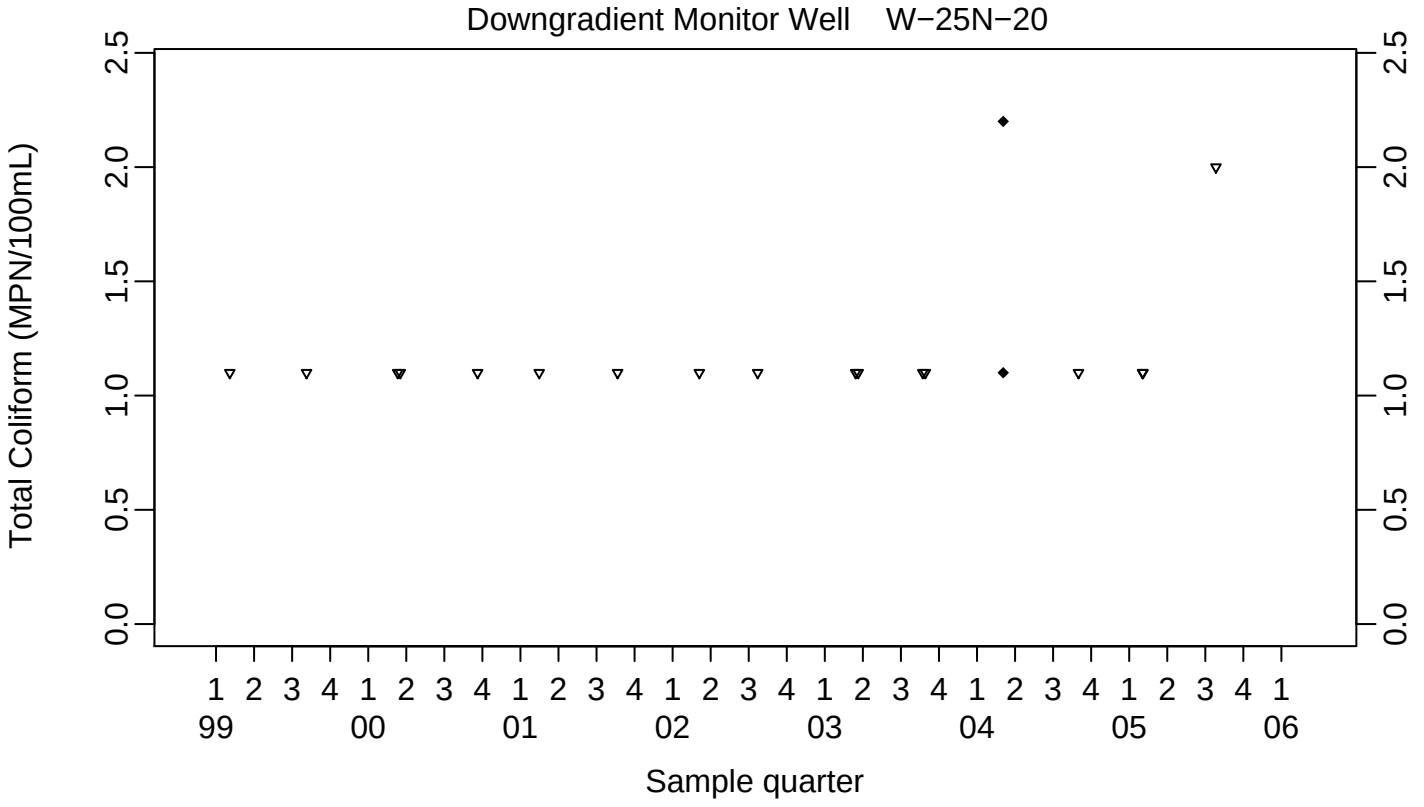

Upgradient Monitor Well W−7ES
Total Coliform (MPN/100mL)
0.0
0.5
1.0
1.5
2.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

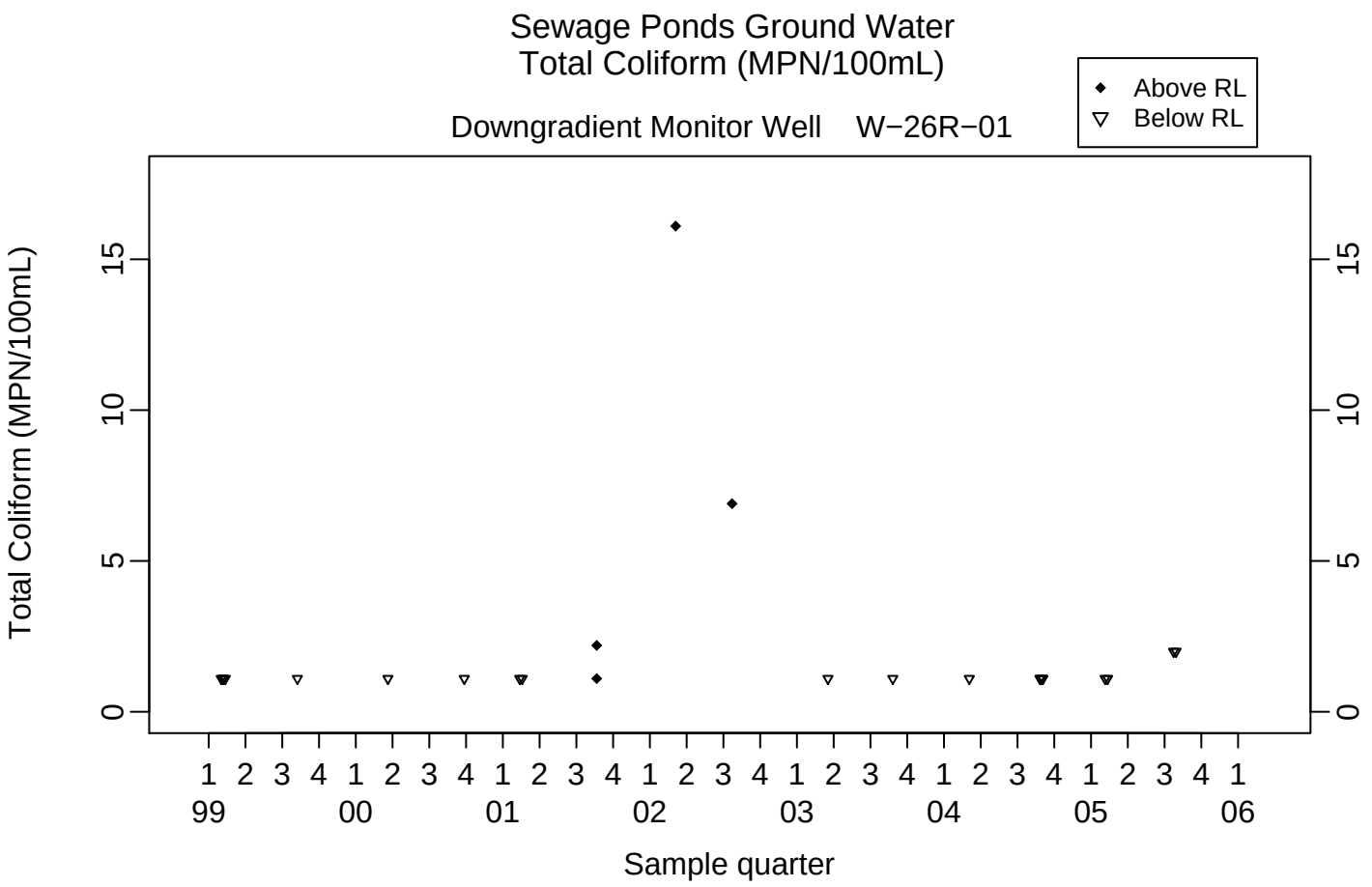
Sewage Ponds Ground Water
Total Coliform (MPN/100mL)

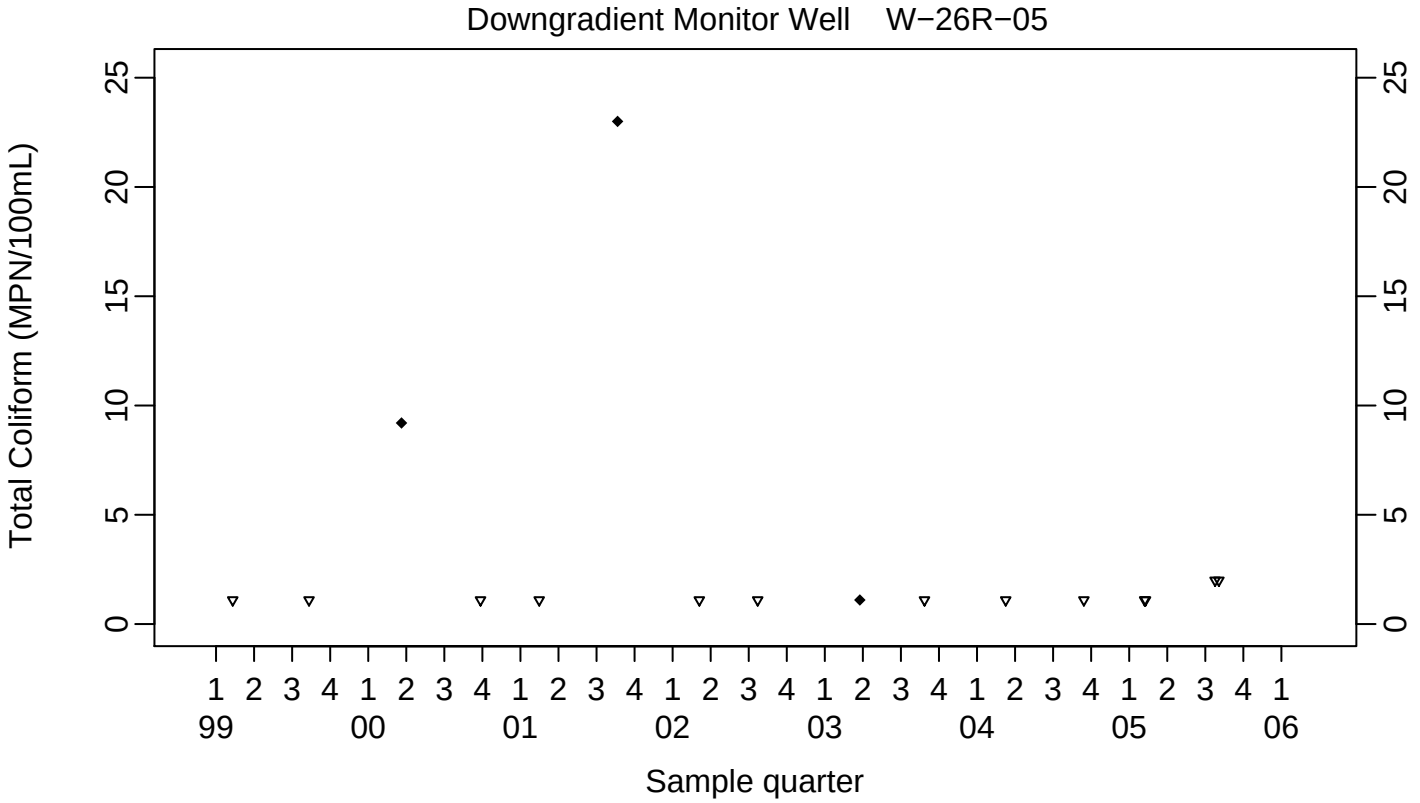


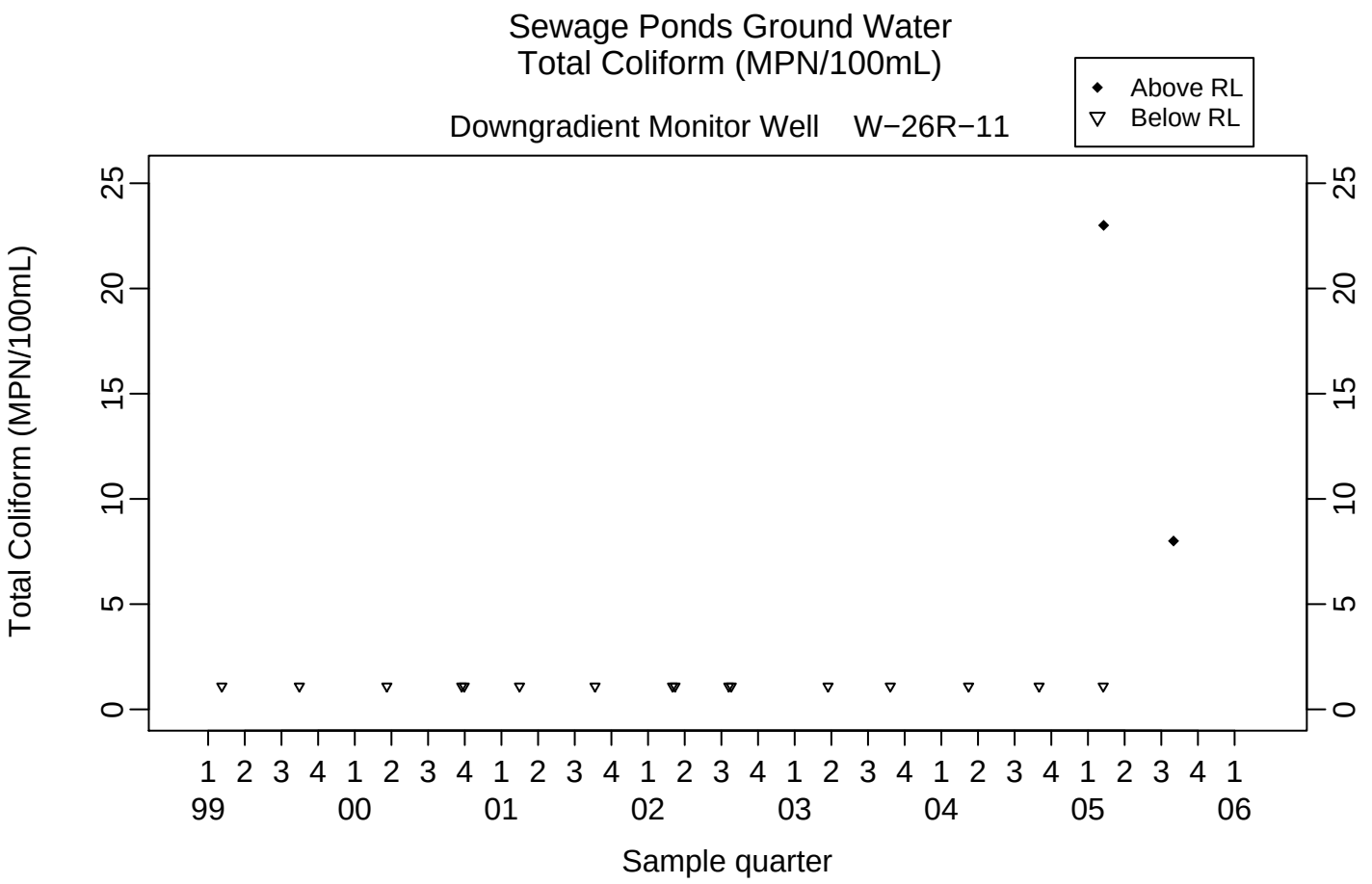


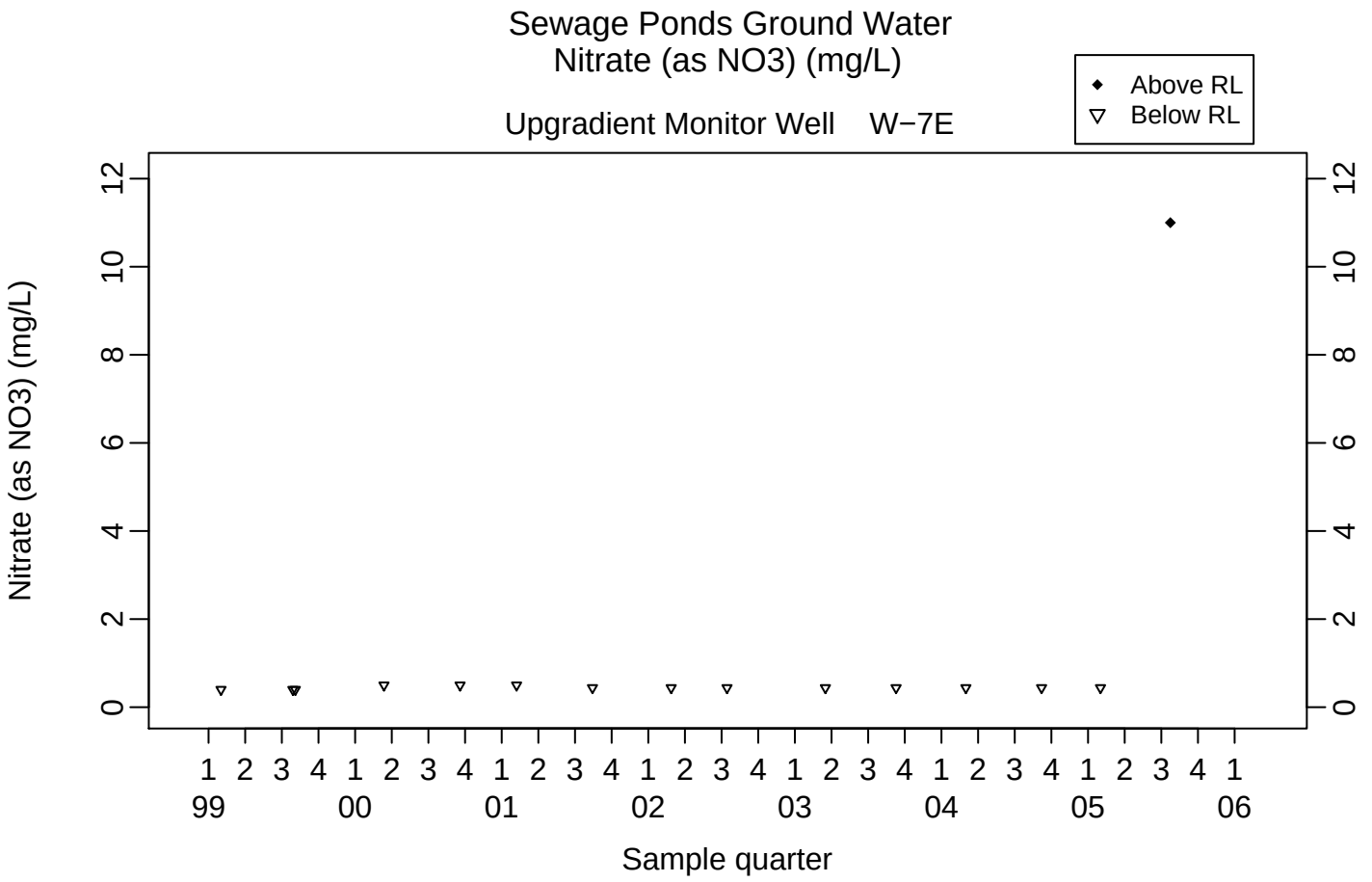

Sewage Ponds Ground Water
Total Coliform (MPN/100mL)
Above RL
Below RL
Downgradient Monitor Well W−7DS
Total Coliform (MPN/100mL)
0.0
0.5
1.0
1.5
2.0
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

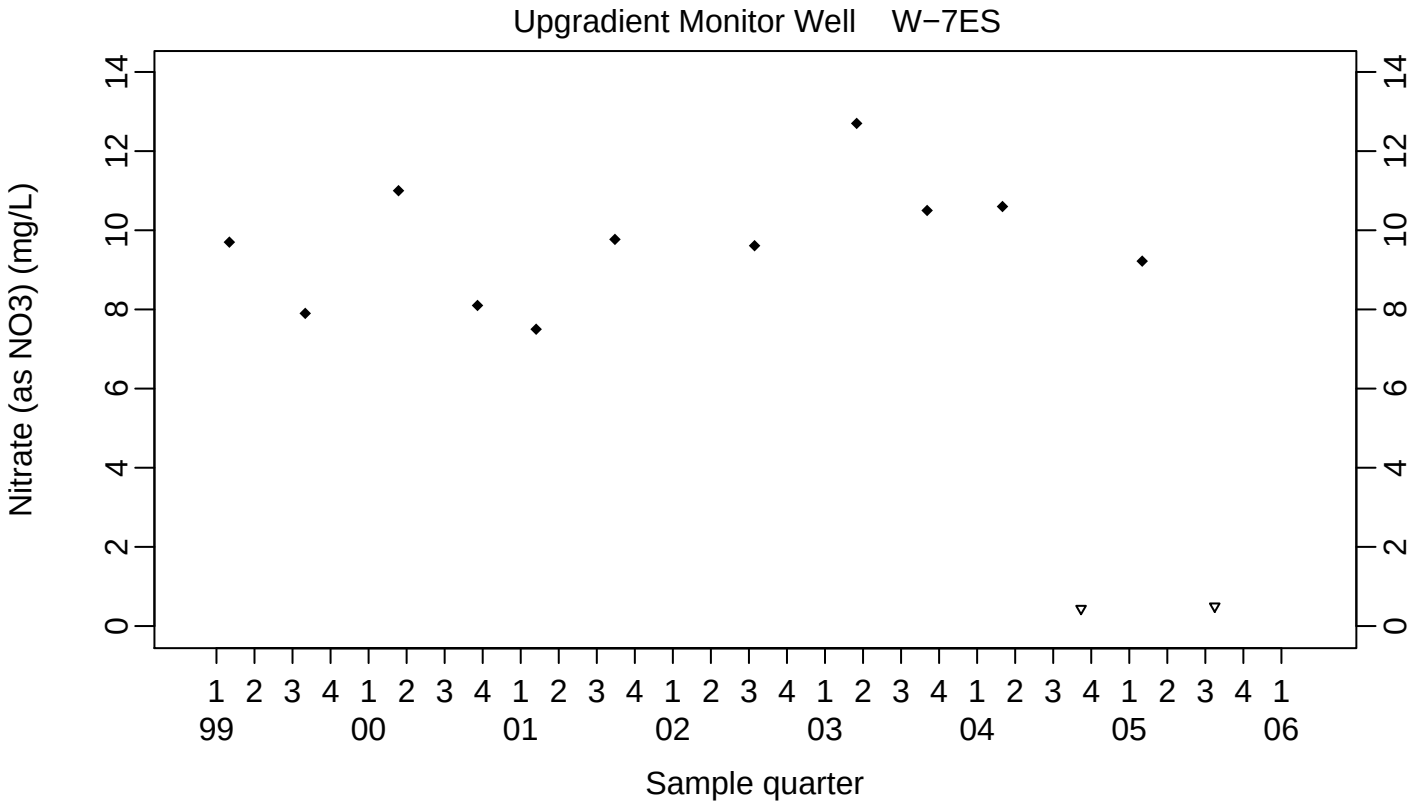

Downgradient Monitor Well W−25N−20
Total Coliform (MPN/100mL)
0.0
0.5
1.0
1.5
2.0
2.5
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

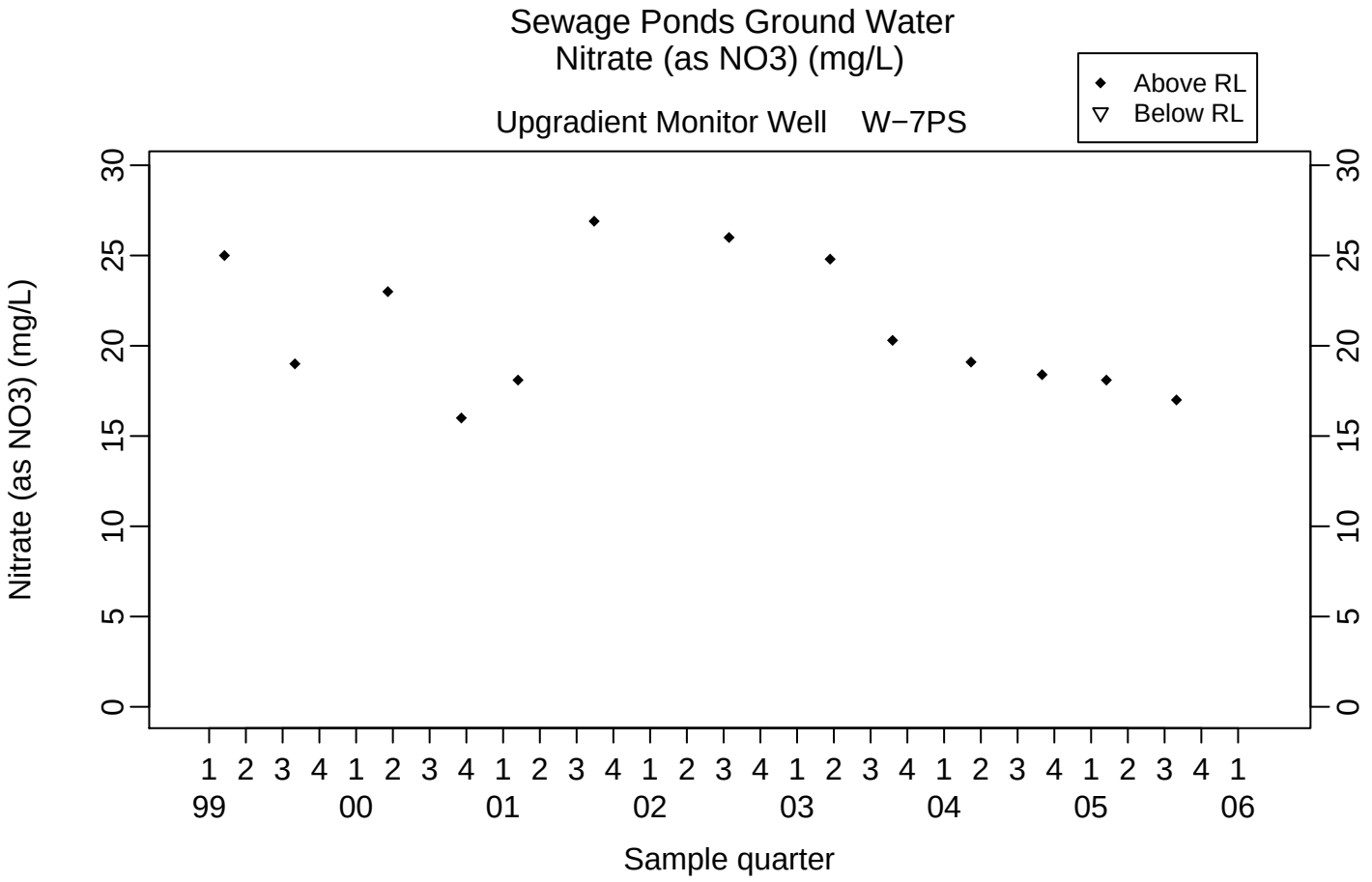

Sewage Ponds Ground Water
Total Coliform (MPN/100mL)
Above RL
Below RL
Downgradient Monitor Well W−26R−01
Total Coliform (MPN/100mL)
0
5
10
15
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

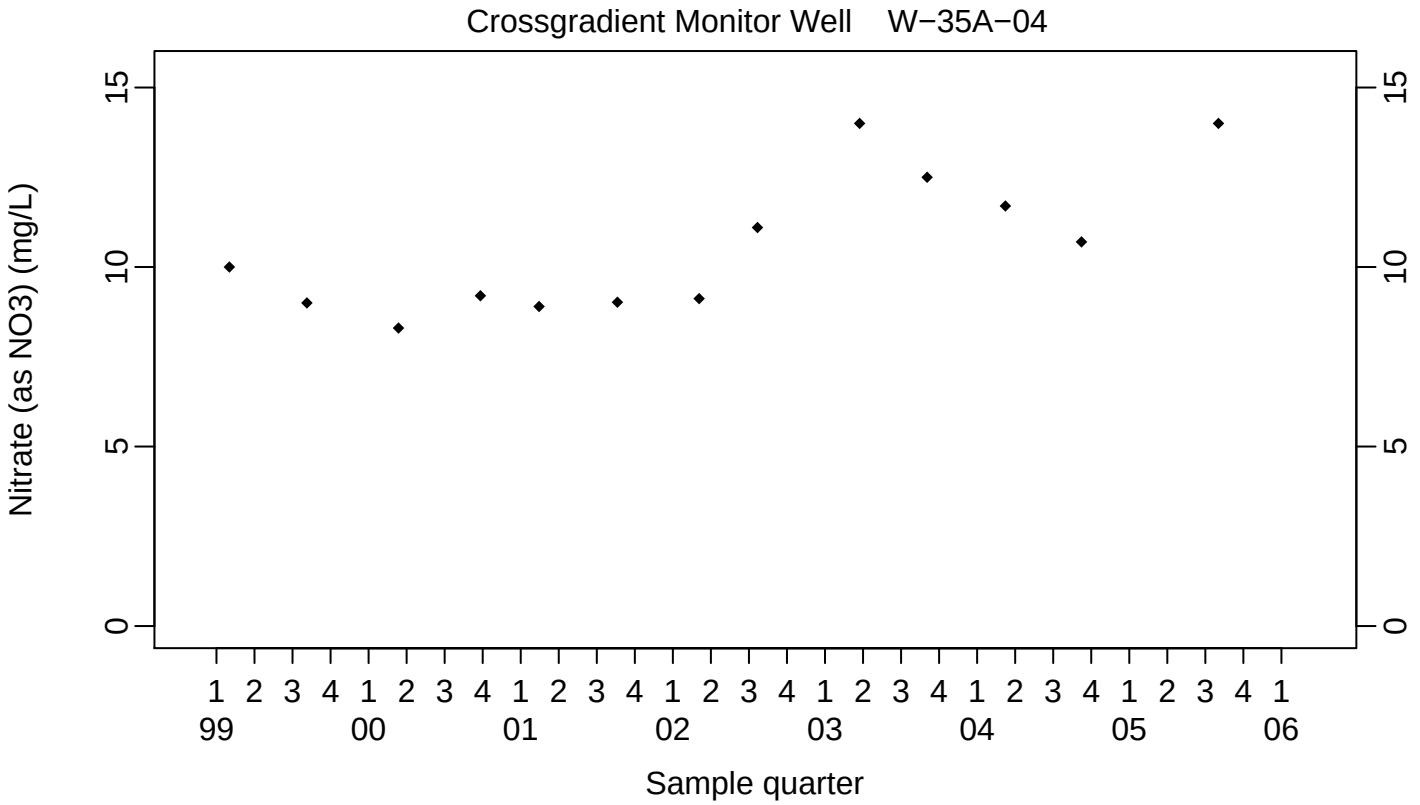

Downgradient Monitor Well W−26R−05
Total Coliform (MPN/100mL)
0
5
10
15
20
25
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

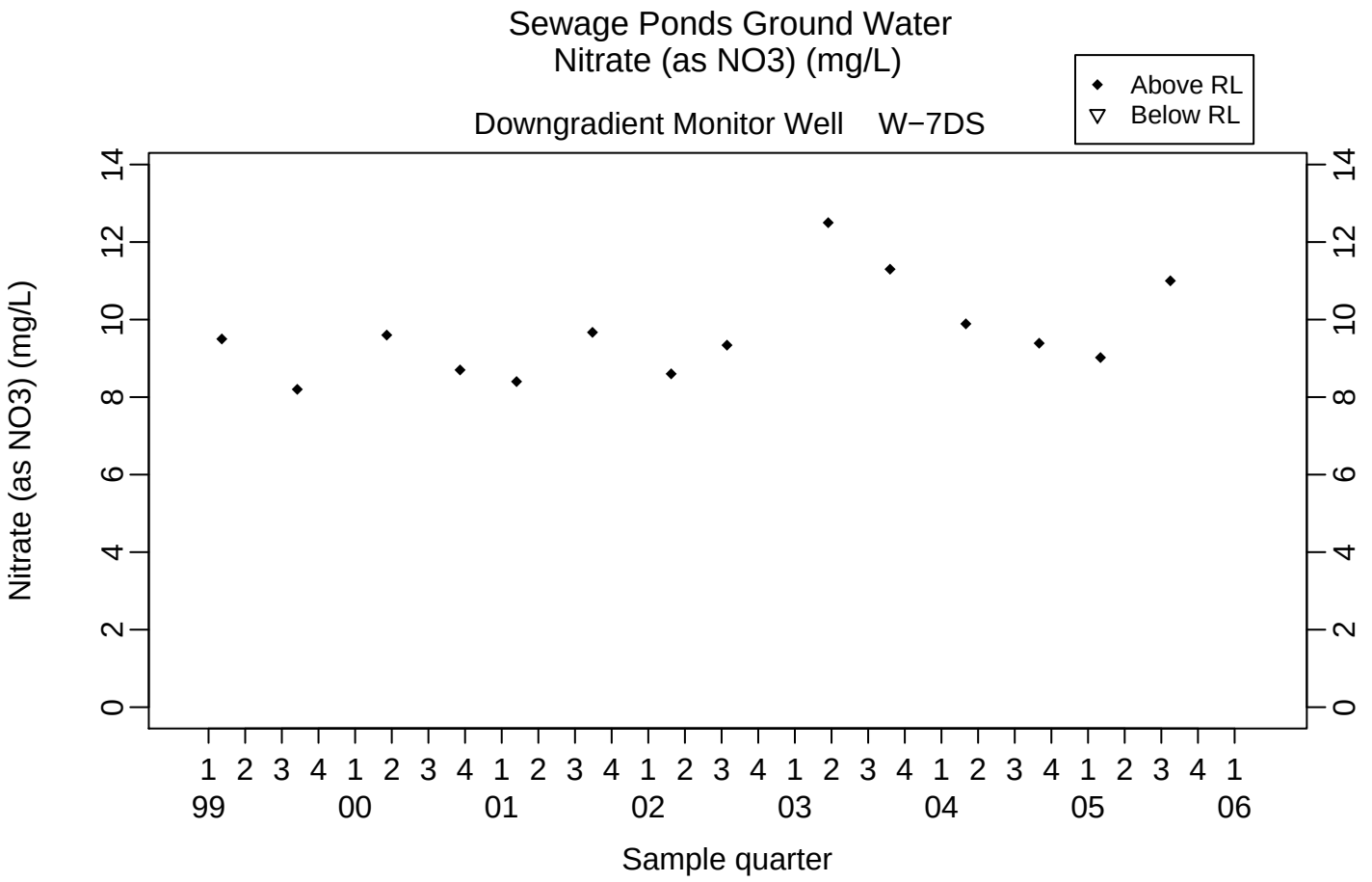

Sewage Ponds Ground Water
Total Coliform (MPN/100mL)
Downgradient Monitor Well W−26R−11
Above RL
Below RL
Total Coliform (MPN/100mL)
0
5
10
15
20
25
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

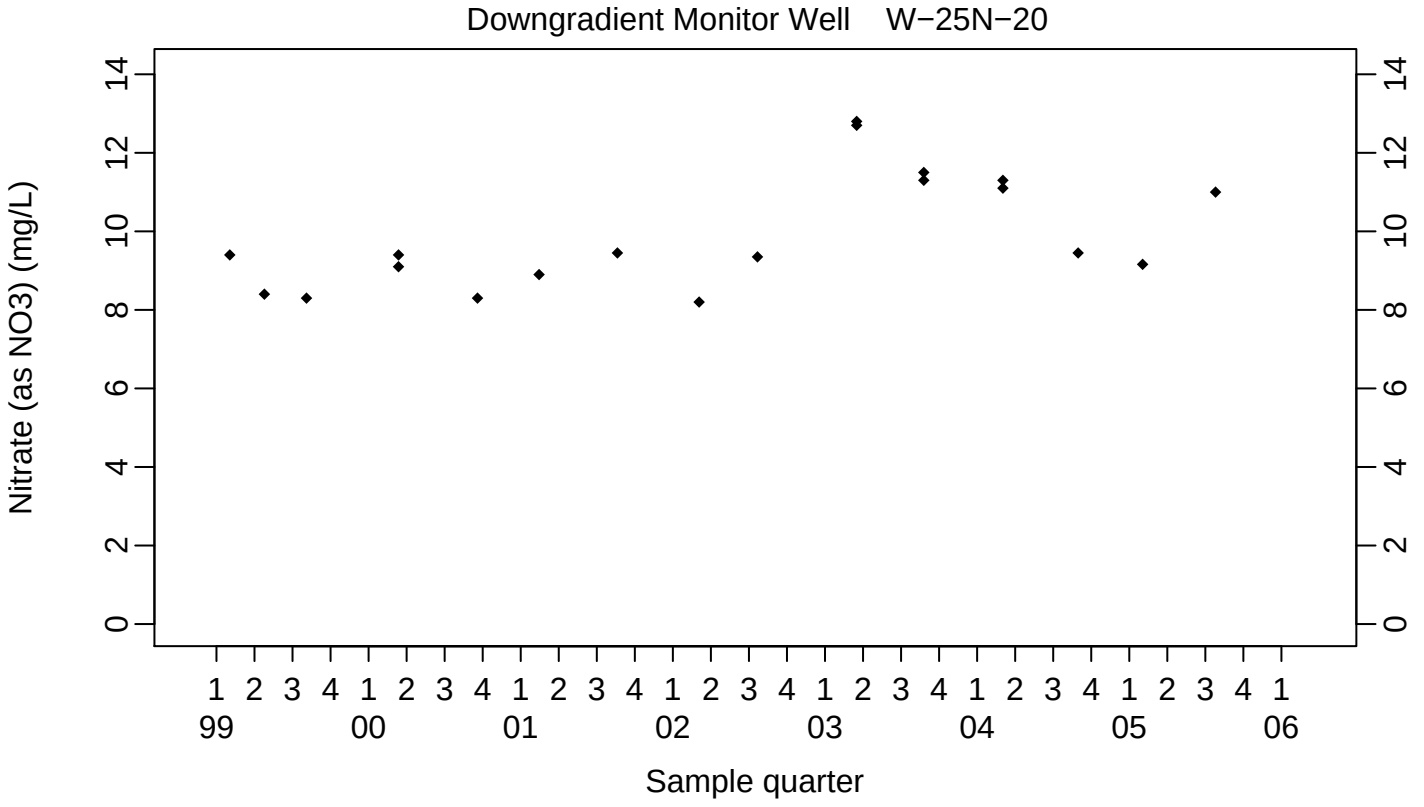

Sewage Ponds Ground Water
Nitrate (as NO3) (mg/L)
Above RL
Below RL
Upgradient Monitor Well W−7E
Nitrate (as NO3) (mg/L)
0
2
4
6
8
10
12
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

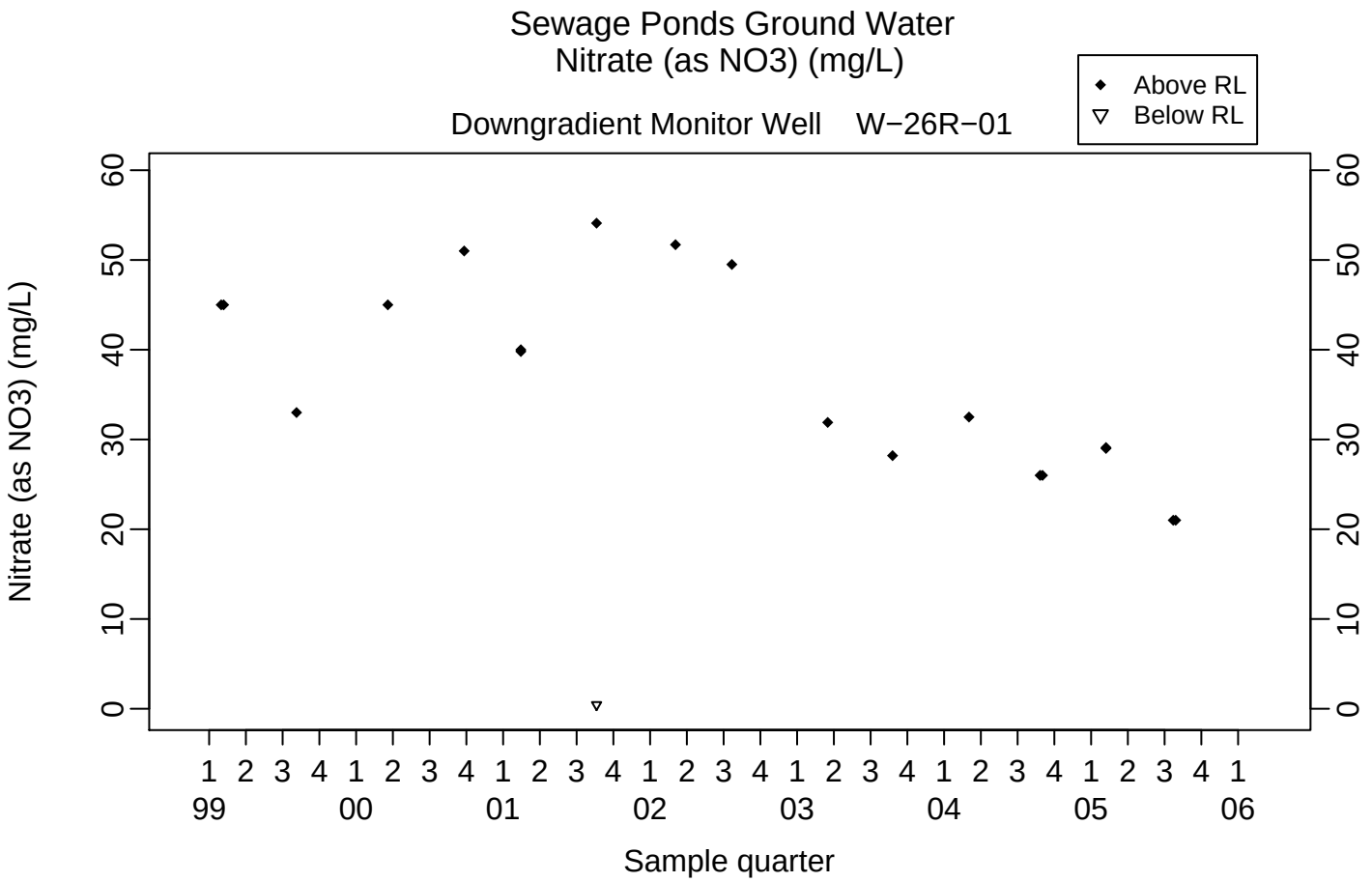

Upgradient Monitor Well W−7ES
Nitrate (as NO3) (mg/L)
0
2
4
6
8
10
12
14
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

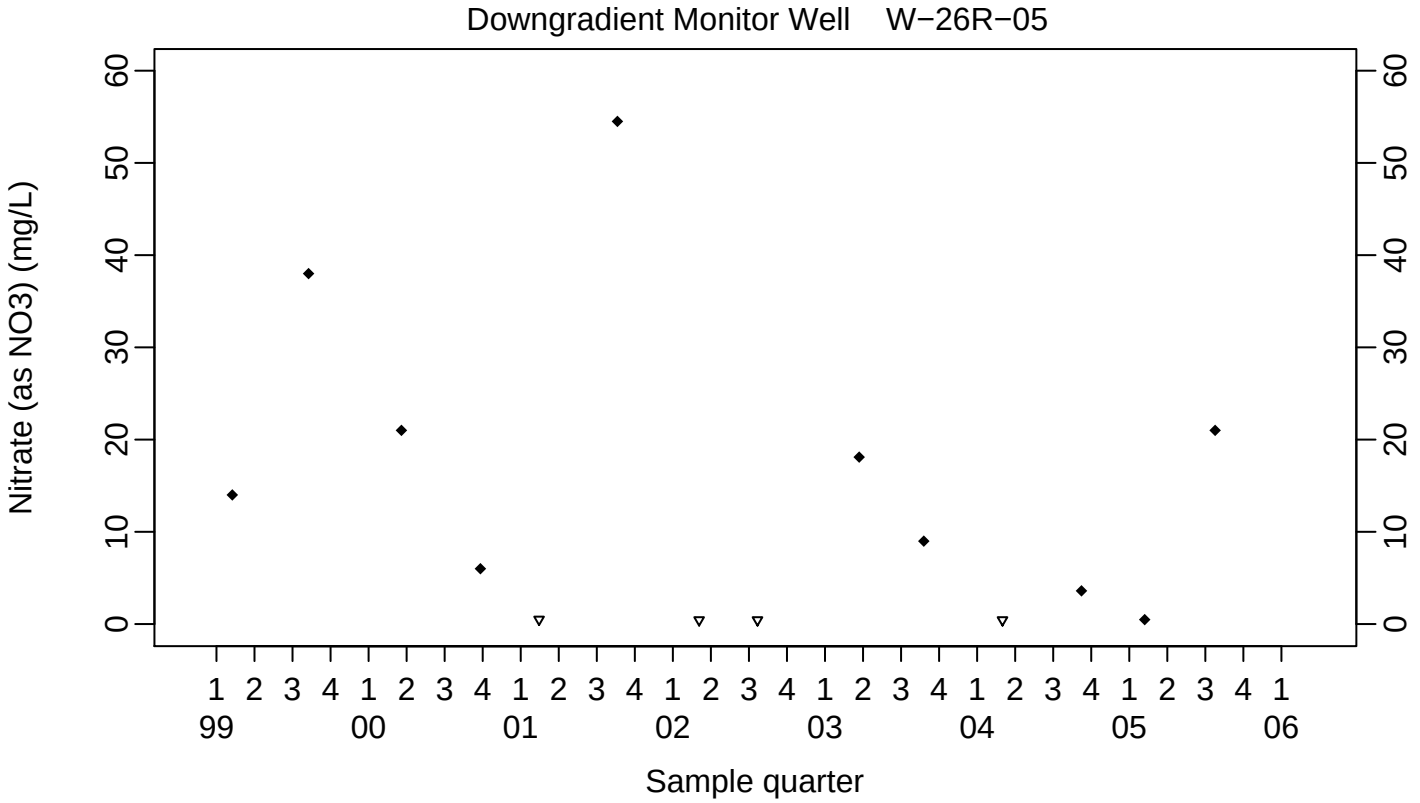

Sewage Ponds Ground Water
Nitrate (as NO3) (mg/L)
Above RL
Below RL
Upgradient Monitor Well W−7PS
Nitrate (as NO3) (mg/L)
0
5
10
15
20
25
30
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

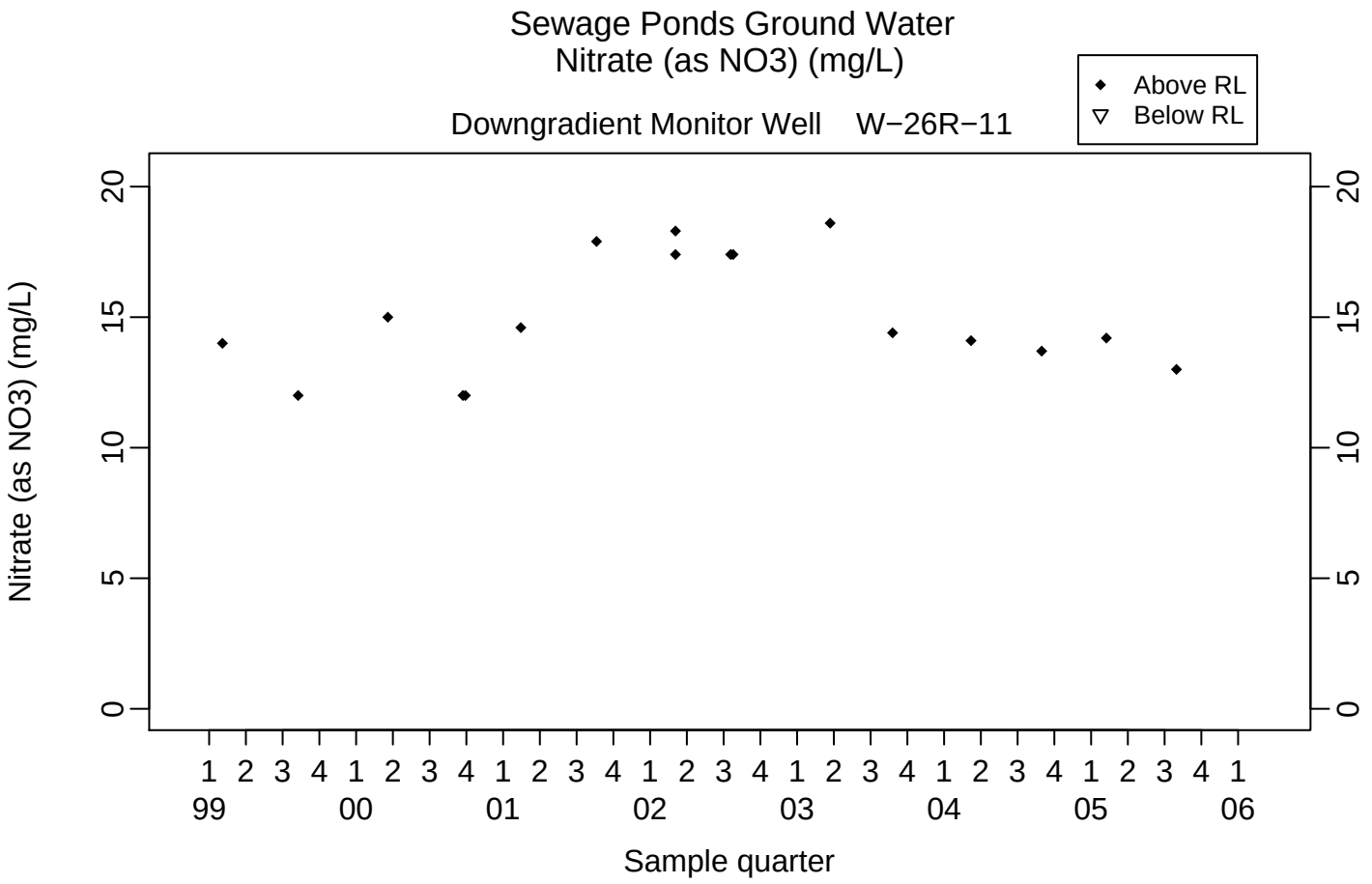

Crossgradient Monitor Well W−35A−04
Nitrate (as NO3) (mg/L)
0
5
10
15
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


Sewage Ponds Ground Water
Nitrate (as NO3) (mg/L)
Above RL
Below RL
Downgradient Monitor Well W−7DS
Nitrate (as NO3) (mg/L)
0 2 4 6 8 10 12 14
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


Downgradient Monitor Well W−25N−20
Nitrate (as NO3) (mg/L)
0 2 4 6 8 10 12 14
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


Sewage Ponds Ground Water
Nitrate (as NO3) (mg/L)
Above RL
Below RL
Downgradient Monitor Well W−26R−01
Nitrate (as NO3) (mg/L)
0
10
20
30
40
50
60
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


Downgradient Monitor Well W−26R−05
Nitrate (as NO3) (mg/L)
0
10
20
30
40
50
60
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter


Sewage Ponds Ground Water
Nitrate (as NO3) (mg/L)
Above RL
Below RL
Downgradient Monitor Well W−26R−11
Nitrate (as NO3) (mg/L)
0
5
10
15
20
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1
99 00 01 02 03 04 05 06
Sample quarter

Annual Summary Tables of Sewage Evaporation and Percolation Ponds Ground Water Monitoring Data

Table D. Ground water analytical results, sewage ponds, constituents of concern required by WDR 96-248.

Parameter	Well	Reporting limit	WDR 96-248 limit	(Feb. 2 - Feb. 10) First quarter result	(Jul. 25 - Aug. 5) Third quarter result
General					
pH (unitless)	W-7E	NA [a]	None	8. 50	7. 96
	W-7ES	NA	None	7. 77	8. 47
	W-7PS	NA	None	7. 81	7. 90
	W-35A-04	NA	None	7. 96	7. 84
	W-25N-20	NA	None	8. 13	7. 91
	W-26R-01	NA	None	8. 03	8. 12
	W-26R-05	NA	None	8. 16	8. 26
	W-26R-11	NA	None	7. 82	8. 07
	W-7DS	NA	None	7. 80	7. 96
Specific conductance	W-7E	1	None	1530	1700
(μmhos/cm)	W-7ES	1	None	1940	1500
	W-7PS	1	None	1450	1800
	W-35A-04	1	None	1800	1600
	W-25N-20	1	None	1840	1700
	W-26R-01	1	None	1400	1400
	W-26R-05	1	None	1080	1300
	W-26R-11	1	None	1550	1700
	W-7DS	1	None	1860	1700
Nutrients (mg/L)					
Nitrate (as NO_3)	W-7E	0. 44	None	<0. 44	11
	W-7ES	0. 88	None	9. 22	<0. 5
	W-7PS	0. 44	None	18. 1	17
	W-35A-04	NS[b]	None	NS	14
	W-25N-20	0. 88	None	9. 16	11
	W-26R-01	0. 44	None	29. 1	21
	W-26R-05	0. 44	None	0. 48	21
	W-26R-11	0. 44	None	14. 2	13
	W-7DS	0. 44	None	9. 02	11

(continued)

Table D. Ground water analytical results, sewage ponds, constituents of concern required by WDR 96-248.

Parameter	Well	Reporting limit	WDR 96-248 limit	First quarter		Third quarter	
				Sampled date	Analytical results	Sampled date	Analytical results
Bacteria							
Fecal coliform (MPN [c]/100 mL)	W-7E	1. 1	2. 2	1-Feb-05	<1. 1	25-Jul-05	<2
		1. 1	2. 2	2-Feb-05	<1. 1	26-Jul-05	<2
	W-7ES	1. 1	2. 2	1-Feb-05	<1. 1	25-Jul-05	<2
		1. 1	2. 2	2-Feb-05	<1. 1	26-Jul-05	<2
	W-7PS	1. 1	2. 2	8-Feb-05	<1. 1	2-Aug-05	<2
		1. 1	2. 2	9-Feb-05	<1. 1		NR[d]
	W-35A-04	1. 1	2. 2	23-Feb-05	5. 1[e]	4-Aug-05	<2
		1. 1	2. 2	1-Mar-05	1. 1		NR
		2 [f]	2. 2	2-Mar-05	<2		NR
	W-25N-20	1. 1	2. 2	2-Feb-05	<1. 1	28-Jul-05	<2
		1. 1	2. 2	3-Feb-05	<1. 1		NR
	W-26R-01	1. 1	2. 2	8-Feb-05	<1. 1	28-Jul-05	<2
		1. 1	2. 2	8-Feb-05	<1. 1[g]	28-Jul-05	<2 [g]
	W-26R-05	1. 1	2. 2	7-Feb-05	<1. 1	26-Jul-05	<2
		1. 1	2. 2	9-Feb-05	<1. 1	4-Aug-05	<2
	W-26R-11	1. 1	2. 2	8-Feb-05	<1. 1	2-Aug-05	<2
		1. 1	2. 2	9-Feb-05	23		NR
	W-7DS	1. 1	2. 2	1-Feb-05	<1. 1	25-Jul-05	<2
		1. 1	2. 2	2-Feb-05	<1. 1	26-Jul-05	<2

(continued)

Table D. Ground water analytical results, sewage ponds, constituents of concern required by WDR 96-248. (concluded)

Parameter	Well	Reporting limit	WDR 96-248 limit	First quarter		Third quarter	
				Sampled date	Analytical results	Sampled date	Analytical results
Bacteria							
Total coliform (MPN [c]/100 mL)	W-7E	1. 1	None	1-Feb-05	<1. 1	25-Jul-05	<2
		1. 1	None	2-Feb-05	<1. 1	26-Jul-05	<2
	W-7ES	1. 1	None	1-Feb-05	<1. 1	25-Jul-05	<2
		1. 1	None	2-Feb-05	<1. 1	26-Jul-05	<2
	W-7PS	1. 1	None	8-Feb-05	<1. 1	2-Aug-05	<2
		1. 1	None	9-Feb-05	<1. 1		NR[d]
	W-35A-04	1. 1	None	23-Feb-05	12	4-Aug-05	<2
		1. 1	None	1-Mar-05	1. 1		NR
		2 [f]	None	2-Mar-05	2		NR
	W-25N-20	1. 1	None	2-Feb-05	<1. 1	28-Jul-05	<2
		1. 1	None	3-Feb-05	<1. 1		NR
	W-26R-01	1. 1	None	8-Feb-05	<1. 1	28-Jul-05	<2
		1. 1	None	8-Feb-05	<1. 1[g]	28-Jul-05	<2 [g]
	W-26R-05	1. 1	None	8-Feb-05	<1. 1	28-Jul-05	<2
		1. 1	None	7-Feb-05	<1. 1	26-Jul-05	<2
	W-26R-11	1. 1	None	8-Feb-05	<1. 1	2-Aug-05	8
		1. 1	None	9-Feb-05	23		NR
	W-7DS	1. 1	None	9-Feb-05	<1. 1	25-Jul-05	<2
		1. 1	None	1-Feb-05	<1. 1	26-Jul-05	<2

[a] NA = Not applicable.

[b] NS = Not sampled, sample was missed.

[c] MPN = Most probable number (of organisms).

[d] NR = Not requested to be sampled and analyzed.

[e] Fecal coliform result above the Permit Limit of 2.2 MPN/mL was followed within 6 days by a retest sample with analytical result below the Permit Limit.

[f] Reporting limit for coliform increased to 2 MPN for samples sent to different analytical laboratory after March 1.

[g] Duplicate (or collocated) sample result.

Appendix E

Statistical Analyses for Ground Water Data

Appendix E

Statistical Analyses

Statistical Methods

Statistical methods are used to detect increases in concentrations of COCs that may indicate releases of COCs to ground water. The CVRWQCB *Standard Provisions* (1993) accompanying WDR 96-248 require the use of statistical methods from the *California Code of Regulations* (CCR), Title 23, Chapter 3, Subchapter 15.

Two statistical methods, prediction intervals and control charts, are used to generate concentration limits and statistical test limits (SLs) for COCs in ground water samples from the surface impoundments monitoring network. Both methods are sensitive in indicating COC concentration increases, and both methods require only one sample per monitoring well for each COC per quarter. Prediction intervals are used when COC concentrations are statistically similar in each of the three down gradient wells to those in the upgradient well, W-817-01. The method of control charts is used when COC concentrations in the downgradient wells are statistically different from those in the upgradient well. A COC is considered to have exceeded its concentration limit when a single ground water analytical result exceeds its SL and either of two subsequent re-tests also exceeds the SL (see **Table B-1.2**). **Table E-1** provides a summary and status of the reported COCs that have shown statistically significant evidence of release.

Table E-1. Reported COCs showing statistically significant evidence of release.

Constituent	Date first reported	Monitor wells	Status of investigation
Zinc	1/9/97	W-817-02, W-817-03	In progress, CERCLA
Chloride	2/7/97	W-817-03	Complete
Arsenic	4/14/97	W-817-02, W-817-03, W-817-04	In progress, under CERCLA
Chromium	7/14/99	W-817-04	Transferred to CERCLA
Bicarbonate alkalinity	7/2/2001	W-817-04	Complete
Manganese	7/2/2001	W-817-04	Complete
Ammonia, as nitrogen	1/24/2002 1/27/05	W-817-04 W-817-02	Complete In progress
Bromide	10/23/02	W-817-03, W-817-02	Transferred to CERCLA
Nickel	1/24/2002	W-817-04	Complete
Ortho-phosphate	10/13/2003	W-817-02, W-817-03, W-817-04	Complete
Bis(2-ethylhexyl)phthalate	10/24/2004	W-817-02	Complete

Appendix F

Fourth Quarter Quality Assurance/Quality Control Monitoring Data Discussion, Surface Impoundments Monitoring Networks

Appendix F

Quality Assurance/Quality Control

1.0 Quality Assurance (QA) Program

To ensure data quality, LLNL utilizes an extensive written set of protocols and procedures that covers all aspects of ground water and surface water sampling, sample tracking, and environmental data management. The *LLNL Livermore Site and Site 300 Environmental Restoration Project Standard Operating Procedures* (Goodrich and Depue, 2004), and the *Environmental Monitoring Plan* (Althouse *et al.*, 2002) form the set of written instructions to be followed. Observing these protocols prevents inadvertent sample contamination and maintains sample integrity from the sampling location to the analytical laboratories. Data management procedures ensure that all laboratory measurements are received, accurately recorded, and properly stored in a computer database for easy and fast retrieval. Hard copies of the data are also archived. All sample analyses for the surface water impoundments meet the reporting criteria delineated in the Permit as modified by Wendy Cohen of CVRWQCB on September 25, 1998 (Cohen, 1998) (**Tables F-1.1** through **F-2.2**).

1.1 Field Procedures

As a part of the QA program, data quality for the sampling activities during each quarter is assessed by the following method: field blanks use analyte-free water for the analyses of organic compounds and high-performance liquid chromatography (HPLC)-grade water for all other required analyses. Field blanks, which are prepared at monitor wells and wastewater sample locations chosen at random, are analyzed for parameters identical to those for the routine samples. Field blank data are reviewed by analysts to determine whether contamination has been introduced into the samples as a result of field conditions or sample handling procedures.

1.1.1 Process Wastewater Influent

Field QA procedures include adherence to the *Environmental Monitoring Plan* (Althouse et al., 2002). These include approved procedures for: sample preparation, handling, preservation, custody, and equipment decontamination procedures. Field activities are recorded on field tracking forms and/or in logbooks, and sample tracking is maintained through the chain-of-custody process. Field QA protocols include the preparation of at least 10 percent duplicate or collocated samples. The purpose of field duplicates is to verify the precision and comparability of the sampling activity. Additionally, temperature blanks are included in each shipping container of samples to verify that the temperature is maintained at $4^{\circ} \pm 2^{\circ}$ Celsius until receipt at the analytical laboratories.

1.1.2 Ground Water Monitoring

Field QA procedures include adherence to the sampling and analysis protocols of the *LLNL Livermore Site and Site 300 Environmental Restoration Project Standard Operating Procedures* (Goodrich and Depue, 2004). These include approved procedures for: sample collection, preparation, handling, preservation, custody, and equipment decontamination procedures. Field activities are recorded on field sampling sheets and/or in logbooks, and sample tracking is maintained through the chain-of-custody process. Field QA protocols include the preparation of at least 10 percent duplicate or collocated samples. The purpose of field collocated samples is to verify the precision of the sampling and analysis activities. Significant differences between duplicate samples (which should have identical results within the margin of sampling and analytical errors) are investigated by the responsible analysts, in collaboration with an LLNL quality control chemist. Field blanks are prepared at random locations to assess sample hygiene and handling practices.

1.2 Analytical Laboratories

LLNL contracts with several outside analytical laboratories. They provide routine analytical services that meet the requirements of LLNL's QA documents, as well as the requirements cited in the Permit. Analytical laboratories used by LLNL and each laboratory's responsible person are:

- BC Laboratories, Inc.
  4100 Atlas Court
  Bakersfield, CA 93308
  Laboratory Responsible Person: Juliane Gauss
- Caltest Analytical Laboratory
  1885 N. Kelly Rd.
  Napa, CA 94558
  Laboratory Responsible Person: William Svoboda
- General Engineering Laboratories
  P.O. Box 30712
  2040 Savage Road
  Charleston, SC 29414
  Laboratory Responsible Person: Cheryl Jones
- Sequoia
  885 Jarvis Drive
  Morgan Hill, CA 95037
  Laboratory Responsible Person: Lisa Race

These laboratories perform extensive quality control analyses including: method blank analyses, analyses of laboratory control samples (LCS), matrix spike (MS), and matrix spike duplicates (MSD), and analyses of surrogate samples for organic compounds.

Additionally, these laboratories provide data reports of tentatively identified compounds (TICs) for volatile and semivolatile organic compounds (VOCs and SVOCs), analyzed by gas chromatography/mass spectroscopy, and provide estimated concentrations. (TICs are currently reported in the data tables of this report.) Each of these laboratories is accredited by the California Department of Health Services for the analyses performed. Résumés of the analysts' education and qualifications are available through each laboratory.

2.0 Quality Assurance and Quality Control Results

2.1 Process Wastewater Influent

No process wastewater was discharged into the surface impoundments during the fourth quarter, so that there is no field QA/QC data discussed in this section.

2.2 Ground Water Monitoring

Analyte concentrations of routine and duplicate samples collected from up gradient monitor well W-817-01 are in very good agreement for the COCs detected above their respective reporting limits (**Table F-2.1**).

No COC or non-COC compounds were detected in method blank samples above laboratory reporting limits during the fourth quarter (**Tables F-2.1** and **F-2.2**). Of the COCs, only dissolved zinc (0.014 mg/L) was detected in a field blank sample at concentration that could potentially be of regulatory significance (**Table F-2.1**). The concentration of 0.014 mg/L of dissolved zinc detected in the field blank sample indicates that the concentrations detected in the ground water samples collected from all four wells might be biased high due to field contamination. However, this is not a significant issue for zinc because concentrations in the down gradient wells did not exceed any SL for zinc. Recoveries for all LCS samples and for all MS and MSD samples are within laboratory acceptance limits, so that these data meet all requirements for data accuracy as well as precision.

Laboratory QA/QC (i.e., MS/MSD and LCS) data associated with all ground water samples and evaluated per EPA Functional Guidelines for data review (U.S. Environmental Protection Agency, 1994a and 1994b), showed all parameters within acceptable ranges for data usability.

During 2005, the COC bis(2-ethylhexyl)phthalate has been detected in ground water samples from all four monitor wells at concentrations close to the reporting limit (also the SL) of 5 μg/L. It has also been detected in method blank and field blank samples analyzed by the laboratory at approximately the same concentrations. Those concentrations of bis(2-ethylhexyl)phthalate in the routine fourth quarter ground water samples collected from all four monitor wells were likely biased high due to the detectable presence of the COC in both the method blank and field blank samples (see also **Table F-2.1**).

Table F-1. Detections of bis(2-ethylhexyl)phthalate in 2005 ground water and blank samples.

Sample	Sample date	Reporting limit (μg/L)	Statistical limit (μg/L)	Result (μg/L)
Method blank	04-Apr-05	5	NA[a]	4.5 est[b]
Field blank	04-Apr-05	5	NA	4.7 est
Well W-817-03	04-Apr-05	5	5	4.5 est
Well W-817-04	04-Apr-05	5	5	5.3
Method blank	05-Apr-05	5	NA	4.3 est
Well W-817-01	05-Apr-05	5	5	4.1 est
Well W-817-02	05-Apr-05	5	5	5.2
Method blank	26-Jul-05	5.7	NA	2.5 est
Field blank	26-Jul-05	5	NA	2.7 est
Well W-817-01	27-Jul-05	5	5	3.4 est
Well W-817-02	25-Jul-05	5	5	2.8 est
Well W-817-03	19-Jul-05	5	5	3.9 est
Well W-817-04	26-Jul-05	5.7	5	5.2 est
Well W-817-04 (dup.)	26-Jul-05	5	NA	6.7
Method blank	12-Oct-05	5	NA	1.7 est
Field blank	12-Oct-05	5	NA	1.9 est
Well W-817-01	12-Oct-05	5	5	2.9 est
Well W-817-01 (dup.)	12-Oct-05	5	NA	3.8 est
Well W-817-02	12-Oct-05	5	5	5.3
Well W-817-03	11-Oct-05	5	5	2.5 est
Well W-817-04	11-Oct-05	5	5	1.9 est

[a] NA = Not applicable.

[b] Results followed by an "est" have estimated concentrations between the method detection limit and the analytical reporting limit for bis(2-ethylhexyl)phthalate.

Table F-2.1. Ground water field QA/QC results, constituents of concern required by WDR 96-248.

Monitoring well W-817-01	MDL[a]	Reporting limit	Routine sample	Duplicate sample	Field blank sample	Method blank sample
General						
pH (unitless)	0.05	NA[b]	8.47	8.51	6.21	NA
Halocarbons (µg/L)						
1,1,1-Trichloroethane	0.093	1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	0.051	1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	0.11	1.0	<1.0	<1.0	<1.0	<1.0
Freon 113	0.18	1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride	0.16	1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene	0.12	1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	0.05	1.0	<1.0	<1.0	<1.0	<1.0
Hydrocarbons (µg/L)						
Toluene	0.057	1.0	<1.0	<1.0	0.57 est[c]	<1.0
Naphthalene	0.33	5	<5	<5	<5	<5
Photographic chemicals (µg/L)						
meta and *para*-Cresol	0.6	2	<2	<2	<2	<2
Benzyl alcohol	0.3	2	<2	<2	<2	<2
Volatile/semivolatile organic compounds (µg/L)						
Acetone	7.4	10	<10	<10	<10	<20
2-Butanone	1.8	20	<20	<20	<20	<20
Dimethyl sulfoxide (DMSO)	0.031	10	<10	<10	<10	<10
Ethyl alcohol (ethanol)	65	1000	<1000	<1000	<1000	<1000
Methyl isobutyl ketone	0.99	20	<20	<20	<20	<20
Additives to energetic compounds (µg/L)						
Bis(2-ethylhexyl)phthalate	1.3	5	2.9 est	3.8 est	1.9 est	1.7 est
Unreactive polymers (µg/L)						
Styrene	0.16	1.0	<1.0	<1.0	<1.0	<0.5
Vinyl chloride	0.098	1.0	<1.0	<1.0	<1.0	<0.5

(continued)

Table F-2.1. Ground water field QA/QC results, constituents of concern required by WDR 96-248.

Monitoring well W-817-01	MDL[a]	Reporting limit	Routine sample	Duplicate sample	Field blank sample	Method blank sample
Metals (mg/L)						
Aluminum	0.017	0.05	<0.05	0.027 est	<0.05	<0.05
Arsenic	0.002	0.008	0.048	0.048	<0.008	<0.002
Barium	0.00083	0.025	0.013 est	0.012 est	<0.025	<0.025
Cadmium	0.000045	0.0005	<0.0005	<0.0005	<0.0005	<0.001
Chromium	0.00014	0.001	0.0011	0.0012	<0.001	<0.001
Cobalt	0.0014	0.05	<0.05	<0.05	<0.05	<0.025
Copper	0.00032	0.001	0.0012	0.0023	<0.001	<0.001
Lead	0.00029	0.005	<0.005	0.0055	<0.005	<0.005
Manganese	0.0053	0.01	<0.01	<0.01	<0.01	<0.01
Molybdenum	0.0027	0.025	0.027	0.028	<0.025	<0.025
Nickel	0.00067	0.002	<0.002	<0.002	<0.002	<0.002
Potassium	0.061	1.0	10	10	<1.0	<1.0
Silver	0.000034	0.001	<0.001	<0.001	<0.001	<0.001
Zinc	0.0077	0.01	<0.01	<0.01	0.014	<0.02
Salts (mg/L)						
Ammonia nitrogen (as N)	0.01	0.02	0.01 est	0.01 est	<0.02	<0.02
Bicarbonate alkalinity (as CaCO3)	5	5	200	180	2.8	<2.5
Bromide	0.035	0.1	0.79	0.76	<0.1	<0.1
Chloride	0.041	0.5	200	200	<0.5	<0.5
Nitrate (as NO_3)	0.055	0.5	86	88	<0.5	<0.5
Orthophosphate	0.03	0.05	0.087	0.079	<0.05	<0.05
Perchlorate	0.00011	0.004	0.018	0.024	<0.004	<0.004
Sulfate	0.12	1.0	120	120	<1.0	<1.0

(continued)

Table F-2.1. Ground water field QA/QC results, constituents of concern required by WDR 96-248 (concluded).

Monitoring well W-817-01	MDL[a]	Reporting limit	Routine sample	Duplicate sample	Field blank sample	Method blank sample
Energetic materials (µg/L)						
HMX	0. 0649	0. 649	14. 5	14. 5	<0. 649	<0. 649
RDX	0. 13	0. 649	37. 6	36. 1	<0. 649	<0. 649
TNT	0. 13	0. 649	<0. 649	<0. 649	<0. 649	<0. 649
TATB	1. 4	20	<20	<20	<20	<20
PETN	0. 325	1. 3	<1. 3	<1. 3	<1. 3	<1. 3
Tetryl	0. 162	0. 649	<0. 649	<0. 649	<0. 649	<0. 649
4-amino-2,6-dinitrotoluene	0. 13	0. 649	7. 40	7. 69	<0. 649	<0. 649

[a] MDL = Method detection limit.

[b] NA = Not applicable.

[c] Results followed by an "est" have estimated concentrations between the MDL and the reporting limit for that analyte.

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