Lake Goodwin Landfill 2009 Groundwater Monitoring Report

Photo taken 8/1/08

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1.0 INTRODUCTION

The following report presents the quarterly ground water monitoring results for 2009 at the Lake Goodwin Landfill (*Lake Goodwin Landfill, Site*). The site is located immediately west of Frank Waters Road in northwestern Snohomish County, about one and one half (*1.5*) miles northwest of Lake Goodwin and about five-(*5*) miles south of Stanwood (*T31N, R4E, section 20 Willamette Meridian*). The landfill is located at 18520 Frank Waters Road, Stanwood, Washington, 98292. The location of the site relative to existing municipal improvements is shown on the **Vicinity Map** (*figure 1*).

1.1 BACKGROUND

The Lake Goodwin Landfill is sited within a former County gravel pit. Waste disposed at the landfill reportedly consisted of municipal waste, including garbage and demolition debris, and some industrial waste. Waste was placed in the landfill starting in the early 1960's under the direction of **Snohomish Counties Road Maintenance Division**. The landfill was closed in September 1982. Upon closure a cover system was installed. The landfill is not lined nor does it have leachate or gas collection systems. The Lake Goodwin Landfill is currently permitted for post-closure monitoring by the **Snohomish Health District** (*SHD*) with a Solid Waste Facility Permit (*SW-085, 2009*). Monitoring results are reviewed by both the **SHD** and the **Department of Ecology**.

1.2 PERMIT INFORMATION

Monitoring activities at the landfill are governed by the Solid Waste Facility Permit SW-085 (*landfill permit, Snohomish Health District 2009*). This permit requires post-closure ground water monitoring on a quarterly basis until the facility has been shown to be stable and/or not harmful to human health or the environment. The **SHD** permits and evaluates post-closure conditions at the Lake Goodwin Landfill using the Snohomish Health District Sanitary Codes, *Chapter 3.1, Solid Waste Handling Regulations*; *Chapter 173-304 WAC Minimum Functional Standards for Solid Waste*; *Chapter 173-200 WAC Water Quality Standards for Ground Waters*; and *Chapter 246-290 WAC Drinking Water Regulations.*

1.3 SITE DESCRIPTION AND PHYSICAL CONDITIONS

The closed landfill is approximately 11.5 acres in size and is part of a larger County owned parcel of land. The Lake Goodwin Landfill is bounded by private residential property or commercial forest to the south, west and north. The Frank Waters Road is located along the eastern side of the site. Access into the site is from a partially paved and partially graveled driveway off of the Frank Waters Road. Existing site improvements are shown on the **Site Map** (*figure 2*).

The Lake Goodwin Landfill is located on a topographic feature locally referred to as the Tulalip Plateau, a rolling upland area bounded by the Stillaquamish River to the north, the Puget Sound to the west and south, and by a topographic low called the Marysville Trough to the east. The general topography in the immediate vicinity of the site is typical of glaciated areas within western Washington State – gently rolling landscapes bisected by seasonal and/or year round drainages, creeks and rivers. Several small to medium sized lakes are found in the immediate vicinity of the site. Lake Martha, Lake Howard and Lake Goodwin are all located within a few miles of the Landfill site. There are no named drainages, creeks or rivers located in the immediate vicinity of the site. Elevations in the immediate vicinity of the landfill range from approximately el. 320 to el. 380 feet above mean sea level. Relative to existing surrounding topography the landfill itself is approximately 60 ft high. It has been graded and slopes gently in a north to northeast direction. Site Topography is shown on the **Topographic Map** (*figure 3*). In most places the landfill cover is well vegetated with grass, clover and weeds. A few Douglas fir have naturally reseeded in the fill cover near the edge of the site. There are no stormwater detention ponds or leachate collection ponds located on the site.

1.4 LOCAL GEOLOGY

Surficial geology of the site area has been mapped by the **USGS** and is shown on the "Geologic Map of the Stanwood Quadrangle, Snohomish County, Wa." by J.P. Minard dated 1985. Surficial soil types mapped in the vicinity of the project site are typical for glaciated landscapes throughout Snohomish County. As shown on the **Geologic Map** (*figure 4*), Vashon Glacial Till (*Qvt*) and Vashon Advance Outwash (*Qva*) are the predominately mapped surficial soil units in the immediate vicinity of the project site.

Glacial Till (*Qvt*) consists of a nonsorted mixture of silt, sand and gravel deposited as a lodgment till below the Vashon aged glaciers as they advanced through this area. The deposits are generally very compact and where undisturbed will have a consistency similar to concrete. In this area Glacial Till (*Qvt*) is fairly sandy, with significant amounts of gravels and cobbles. Glacial Till (*Qvt*) is generally considered to be an aquiclude, not readily transmitting ground water through it. Locally, ground water may travel through and along discontinuous lenses of sand and gravel or through sandier portions of the Glacial Till (*Qvt*) within the upper couple of feet of the section. However, these discontinuous lenses of sand and gravel are difficult to characterize or quantify and are not considered to be reliable sources of ground water.

Advance Outwash (*Qva*) consists primarily of fine- to coarse-grained layers of sand and gravel deposited as the Vashon aged glaciers advanced into this area. At depth, these deposits can contain significant amounts of silt and/or clay. There is a gradational contact with the underlying Transitional Beds (*Qtb*) found below this geologic unit, with the silt/clay beds becoming thicker and more predominant with depth. The Advance Outwash (*Qva*) sands and gravels are generally very compact, having been overridden by thousands of feet of glacial ice. Advance Outwash (*Qva*) sands and gravels contain significant amounts of ground water and because of their relative shallow stratigraphic depth throughout the County, are the predominant source for ground water.

Glacial Till (*Qvt*) was encountered within one upgradient well at the site (*LG-02*). The Glacial Till (*Qvt*) was overlying basal Advance Outwash (*Qva*) sands and gravels. All other explorations at the site (*LG-01, LG-03, LG-04 and LG-05*) encountered only and were completed within Advance Outwash (*Qva*) sands and gravels. Several of the test borings were terminated in the gradational zone at the base of the Advance Outwash (*Qva*) unit.

1.5 HYDROGEOLOGY

Hydrogeologic conditions in the vicinity of the landfill have been studied by many including **EPA, USGS** and the **Army Corps of Engineers**. In the early to late 1980's, the **Seven Lakes Water Association** petitioned the **EPA** for consideration of a sole source aquifer area that included the landfill site. This petition was made in order to protect their rapidly degrading ground water resource which was the only source of ground water for the residences of the area at that time. The **EPA** consulted with the **USGS**, who, upon closer investigation, recommended that the boundaries of the proposed sole source aquifer be expanded to include a much larger area, which was renamed the Tulalip Sole Source Aquifer. The **USGS** expanded the boundaries of the Seven Lakes proposed sole source aquifer in order to protect the recharge source for a deep aquifer, found below the Tulalip Plateau and a larger area of Snohomish County. Recharge areas for this deep aquifer were determined to be located along the west margins of the Cascade Mountains. This deep aquifer is within pre-Glacial Undifferentiated Sands and Gravels (*Qu*) that are found stratigraphically lower than the Advance Outwash (*Qva*) aquifer. A thick sequence of Transitional Bed (*Qtb*) silts and clays act as an aquitard between the Advance Outwash (*Qva*) and Undifferentiated (*Qu*) aquifers. The petition for the Tulalip Sole Source Aquifer was eventually denied because other sources of water were available for domestic and commercial use over a large portion of the area.

Hydrogeologic conditions at the landfill were investigated by **Converse Consultants NW**. The results of their investigations were reported in their study titled "Hydrogeologic Study, Lake Goodwin Landfill" dated July 1991. Subsequent site explorations were completed by **Golder Associates** and were documented in their report titled "Snohomish County Lake Goodwin Landfill" dated December 1991. With the exception of the surficial Glacial Till (*Qvt*) found overlying Advance Outwash (*Qva*) sands and gravels in LG-02, permeable soils were encountered from the surface down in all site explorations. Ground water was found within the Advance Outwash (*Qva*) sands and gravels ranging between approximate elevations el. 148 and el. 153 during the reporting time period. The Advance Outwash (*Qva*) ground water flow direction was found to be in the north-northeast direction below the landfill at a calculated velocity of about 1.6 ft./day.

1.6 EXISTING MONITORING NETWORK

As outlined in the Solid Waste Facility Permit SW-085, quarterly monitoring of ground water is required at the Lake Goodwin Landfill. There is currently a total of five-(*5*) ground water monitoring wells (*LG-01 thru LG-05*) at the Lake Goodwin Landfill site that are read on a quarterly basis. Well locations are shown on the **Monitoring Network Map** (*figure 5*). Of these wells, one-(*1*) is considered to be an up-gradient well monitoring background ground water conditions in the immediate vicinity of the site (*LG-02*). The remaining four-(*4*) wells are located in and/or down gradient of the landfill (LG-1, *LG-03 thru LG-05*) and monitor ground water conditions that may be impacted from the site. Quarterly monitoring results are discussed in section 2.0 below.

2.0 GROUND WATER MONITORING

Quarterly monitoring of the ground water wells is performed by **Snohomish County** personnel. Depth to water is measured and ground water samples are collected following approved sampling protocol. The following sections describe field procedures used and analytical results derived from each sampling event.

2.1 Ground Water Level Measurements

The depth to ground water within each well was measured prior to ground water sampling activities. The depth to ground water was measured using an electronic water level indicator in increments to the nearest 0.01 ft. as taken from a marked survey point on the top of each well casing. In order to avoid cross contamination between wells, the electronic indicator probe and cable are decontaminated between uses.

Quarterly Ground Water Measurements are shown in *Table 1* below. **Hydrographs** of the 2009 monitoring well readings are contained in *Appendix A* of this report. Based on the ground water readings, small fluctuations in the ground water gradient below the site were observed during the year – with the largest fluctuation in the gradient occurring during the second quarter. Overall ground water elevations remained fairly constant over the monitoring period. Readings suggest that the aquifer is unconfined in the immediate vicinity of the site. **Quarterly Ground Water Contour Maps** developed from the field data are shown in *Figures 6-9* of this report.

Measured precipitation at the Arlington Airport during the monitoring period was: 1st Quarter – 14.3", 2nd Quarter – 9.2", 3rd Quarter – 6.2" and 4th Quarter – 16.2". For reference purposes, precipitation measured at the Arlington Airport during the monitoring period has been included on the hydrographs.

TABLE 1
Quarterly Ground Water Measurements and Elevations

Well Numbers	Casing Elevation	1st Quarter Reading/Elevation		2nd Quarter Reading/Elevation		3rd Quarter Reading/Elevation		4th Quarter Reading/Elevation	
LG-01	239.18	88.12	151.06	85.75	153.43	87.70	151.48	87.13	152.04
LG-02	268.99	NA	NA	117.43	151.56	117.40	151.59	116.74	152.25
LG-03	241.20	90.34	150.86	NA	NA	90.69	150.51	NA	NA
LG-04	206.93	58.43	148.50	57.59	149.34	57.47	149.46	58.09	148.84
LG-05	235.00	85.29	149.71	84.89	150.11	84.61	150.39	84.21	148.79

Note: NA readings were deemed unreliable upon review

2.2 Quarterly Ground Water Sampling Events

Purging and sampling of each of the five-(*5*) monitoring wells was performed on a quarterly basis by **Snohomish County** personnel in accordance with the facilities closure permit. Approximately 1.5 to 3.0 gallons of water were purged from each well prior to sampling during each event. Water samples were collected by slowly filling laboratory-supplied containers in such a manner as to reduce aeration. Sample containers were filled so that no headspace or air bubbles remained within the container. Samples were placed in coolers and packed in ice to keep samples at approximately 4 deg C for delivery to the laboratory for testing. Samples were picked up by **Amtest** and taken to their Kirkland, WA laboratory for analysis of dissolved metals, volatile organic compounds (*VOC's*), and conventional chemistry parameters. **Analytical Data** is included in *Appendix B*, Ground Water Analytical Data of this report. The analytical data was compared to the maximum contaminant levels (*MCL's*). A complete statistical analysis of the data was also performed utilizing **DUMPStat**. Results are discussed below.

2.3 Evaluation of Ground Water Analytical Results

Quarterly Ground Water Test Results for each well are summarized in *Tables 2 thru 5* below. A comparison of results to regulatory criteria shows:

First Quarter: Elevated conductivity levels above 700 micro ohms per centimeter (*umhos/cm*) and dissolved sodium levels above 20 mg/l were found in down gradient wells LG-03 and LG-05. Arsenic was also slightly elevated in LG-02 during this sampling event. No VOC's were detected in any well during this sampling event.

TABLE 2
Summary of Test Results – First Quarter

Well	First Quarter 2009 Exceedances
LG-01	None
LG-02	Arsenic

Well	First Quarter 2009 Exceedances
LG-03	Conductivity, dissolved sodium
LG-04	None
LG-05	Conductivity, dissolved sodium

Second Quarter: Elevated conductivity levels above 700 micro ohms per centimeter (*umhos/cm*), below normal pH levels, and slightly higher than normal dissolved sodium levels were found in down gradient wells LG-03 andLG-05 during this sampling event. A below normal pH level was measured in well LG-04. Exceedances for arsenic or beryllium were found in wells LG-01, LG-02, LG-03 and LG-04 during this sampling event. No VOC's were detected in any well during this sampling event.

TABLE 3
Summary of Test Results – Second Quarter

Well	Second Quarter 2009 Exceedances
LG-01	Beryllium
LG-02	Arsenic
LG-03	Conductivity, pH, dissolved sodium, arsenic
LG-04	pH, beryllium
LG-05	pH, dissolved sodium

Third Quarter: Elevated conductivity levels above 700 micro ohms per centimeter (*umhos/cm*), below normal pH levels, slightly higher than normal dissolved sodium levels and elevated total dissolved solids levels were measured in down gradient wells LG-03 and LG-05 during this sampling event. Exceedances for arsenic and thallium were found in down gradient well LG-03 and up gradient well LG-02 during this sampling event. No VOC's were detected in any well during this sampling event.

TABLE 4
Summary of Test Results – Third Quarter

Well	Third Quarter 2009 Exceedances
LG-01	None
LG-02	Arsenic, thallium
LG-03	Conductivity, dissolved sodium, TDS, arsenic thallium
LG-04	None
LG-05	pH, dissolved sodium, TDS

Fourth Quarter: Elevated conductivity levels above 700 micro ohms per centimeter (umhos/cm), below normal pH levels, and slightly higher than normal dissolved sodium levels were found in down gradient wells LG-03 and LG-05 during this sampling event. An above normal nitrate level was also measured in well LG-05 during this sampling event. A below normal pH level was measured in well LG-04. Exceedances in arsenic were measured in up gradient well LG-02 during this sampling event.

TABLE 5
Summary of Test Results – Fourth Quarter

Well	Fourth Quarter 2009 Exceedances
LG-01	None
LG-02	Arsenic
LG-03	Conductivity, pH, dissolved sodium
LG-04	pH
LG-05	Conductivity, nitrate, pH, dissolved sodium

While downgradient well LG-01 and upgradient well LG-02 showed only minor elevated levels of arsenic and thallium above the MCL's, the down gradient wells showed elevated readings for conductivity, pH and dissolved sodium during the 2009 sampling events. LG-03 and LG-05 both had elevated TDS levels during the third quarter sampling event.

2.4 Statistical Evaluation

State health regulations under which the Lake Goodwin Landfill closure is permitted require that the landfill "...shall not cause exceedances of *Chapter 173-200 WAC*, **Water Quality Standards for Groundwater**, and *Chapter 246-290 WAC*, **Drinking Water Regulations**." The intent of these state regulations is to limit the impact that a landfill will have on the surrounding ground water resources. Collected ground water samples are tested for Primary and Secondary Drinking Water Standards, Dissolved Metals and Volatile Organic Compounds – and compared to the standards listed in the above referenced WAC's. Where an exceedance to the standards occurs, a statistical analysis is provided to determine the significance of the change or exceedance.

The items listed in *Tables 2 thru 5* above exceed the most stringent of the criteria in each **WAC**. Each of these exceedances has been statistically analyzed using **DUMPStat Software** (*version 2.1.8 by Robert D. Gibbons Ltd,, 2000*) per the *Subtitle D* regulations and as specifically referenced in the **U.S. EPA** guidance manual. Mean, standard deviation, prediction limits, and confidence values were calculated by **DUMPStat**.

Based on the statistical analysis, exceedances to the prediction limits were high for all of the conventional chemistry parameters, fairly minimal for the dissolved metals and there were no exceedances in the VOC's at any well during 2009. Calculated exceedances to the prediction limits per quarter are shown in *Table 6* below.

TABLE 6
Statistical Summary - Prediction Limit Exceedances for 2009

Well	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
LG-01	Alkalinity, Bicarbonate, Calcium, Magnesium, pH, Potassium, Sulfate, TOC	Alkalinity, Bicarbonate, Magnesium, pH, Beryllium	Alkalinity, Ammonia, Bicarbonate, Magnesium, pH, Potassium, Sulfate	Alkalinity, Bicarbonate, Calcium, Magnesium, Potassium, Sulfate, TOC
LG-02	TOC, Cobalt	Selenium	Ammonia, Lead, Thallium	None
LG-03	Alkalinity, Bicarbonate, Calcium, Chloride, Conductivity, Magnesium, Nitrate, pH, Sodium, Sulfate, TOC	Alkalinity, Calcium, Chloride, Conductivity, Magnesium, Nitrate, pH, Potassium, Sodium, Sulfate, Barium	Alkalinity, Ammonia, Bicarbonate, Calcium, Chloride, Conductivity, Magnesium, Nitrate, pH, Potassium, Sodium, Sulfate, TDS, TOC, Barium, Lead, Thallium	Alkalinity, Bicarbonate, Calcium, Chloride, Conductivity, Magnesium, Nitrate, pH, Potassium, Sodium, Sulfate, Barium, Copper
LG-04	Alkalinity, Bicarbonate, pH, TOC	Calcium, pH, Beryllium, Copper, Lead	Ammonia, Calcium, Magnesium, pH, TOC, Barium, Cobalt	pH, Sodium, Barium
LG-05	Alkalinity, Ammonia, Bicarbonate, Calcium, Chloride, Conductivity, Magnesium, Nitrate, pH, Potassium, Sodium, Sulfate, TOC, Cobalt	Alkalinity, Bicarbonate, Calcium, Conductivity, Magnesium, Nitrate, pH, Potassium, Sodium, Sulfate, Barium, Selenium	Alkalinity, Ammonia, Bicarbonate, Calcium, Chloride, Conductivity, Magnesium, Nitrate, pH, Potassium, Sodium, Sulfate, TDS, TOC, Barium	Alkalinity, Bicarbonate, Calcium, Chloride, Conductivity, Magnesium, Nitrate, pH, Potassium, Sodium, Sulfate, Barium

Stiff Diagrams, Trilinear Diagrams and **Statistically Significant Trends Analyses** results are included in *Appendix C* of this report.

3.0 SUMMARY AND RECOMMENDATIONS

SUMMARY:

The ground water data collected during the 2009 quarterly sampling events indicate the following:

- VOCs were not detected in any monitoring well during the 2009 sampling events.
- Measured conductivity was well above background levels (LG-02) in all down gradient wells during all sampling events. Conductivity levels observed at wells LG-03 and LG-05 were twice as high as those in the surrounding wells during all four sampling events.
- pH levels were not significantly low or significantly high in any of the wells - but did show slight variations from the normal range during the four sampling events.
- Statistical analysis did show significant impacts to wells LG-03 and LG-05. Lesser impacts where indicated in wells LG-01 and LG-04. Alkalinity appears to be increasing significantly in all wells, including up gradient well LG-02. Time series plots based on the DUMPStat analysis indicates that the majority of the other impact trends are decreasing in the monitoring wells at this time.
- There were very minimal impacts to the ground water from dissolved metals. Occasional small hits were recorded in the wells that were limited to: Beryllium, Barium, Cobalt, Copper, Selenium and Thallium.

CONCLUSIONS/RECOMMENDATIONS

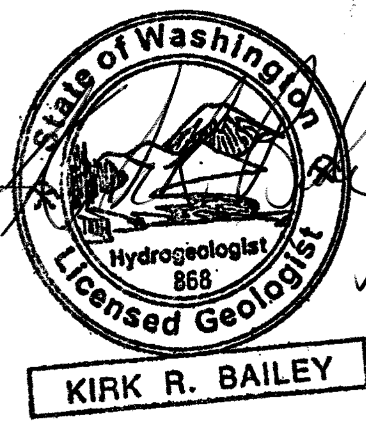
2009 quarterly data indicates that there is a leachate impact to the underlying Advance Outwash (*Qva*) ground water aquifer below the Lake Goodwin Landfill. Statistical analysis indicates a large number of significantly decreasing trends which would suggest that the leachate impact to the ground water below the landfill is decreasing at this time. The data also suggests that the leachate plum extends beyond the landfill boundaries following the ground water gradient to the north-northeast.

Based on the results of the 2009 quarterly monitoring at the Lake Goodwin Landfill as analyzed and presented in this report, we recommend that quarterly monitoring of the landfill continue through 2010.

4.0 CERTIFICATIONS AND STAMP

Deanna Carveth
SCPW – Solid Waste Division

Kirk R. Bailey, LEG, LHG
SCPW – Engineering Services



April 22, 2010
attachments

Figure 1

Lake Goodwin Landfill

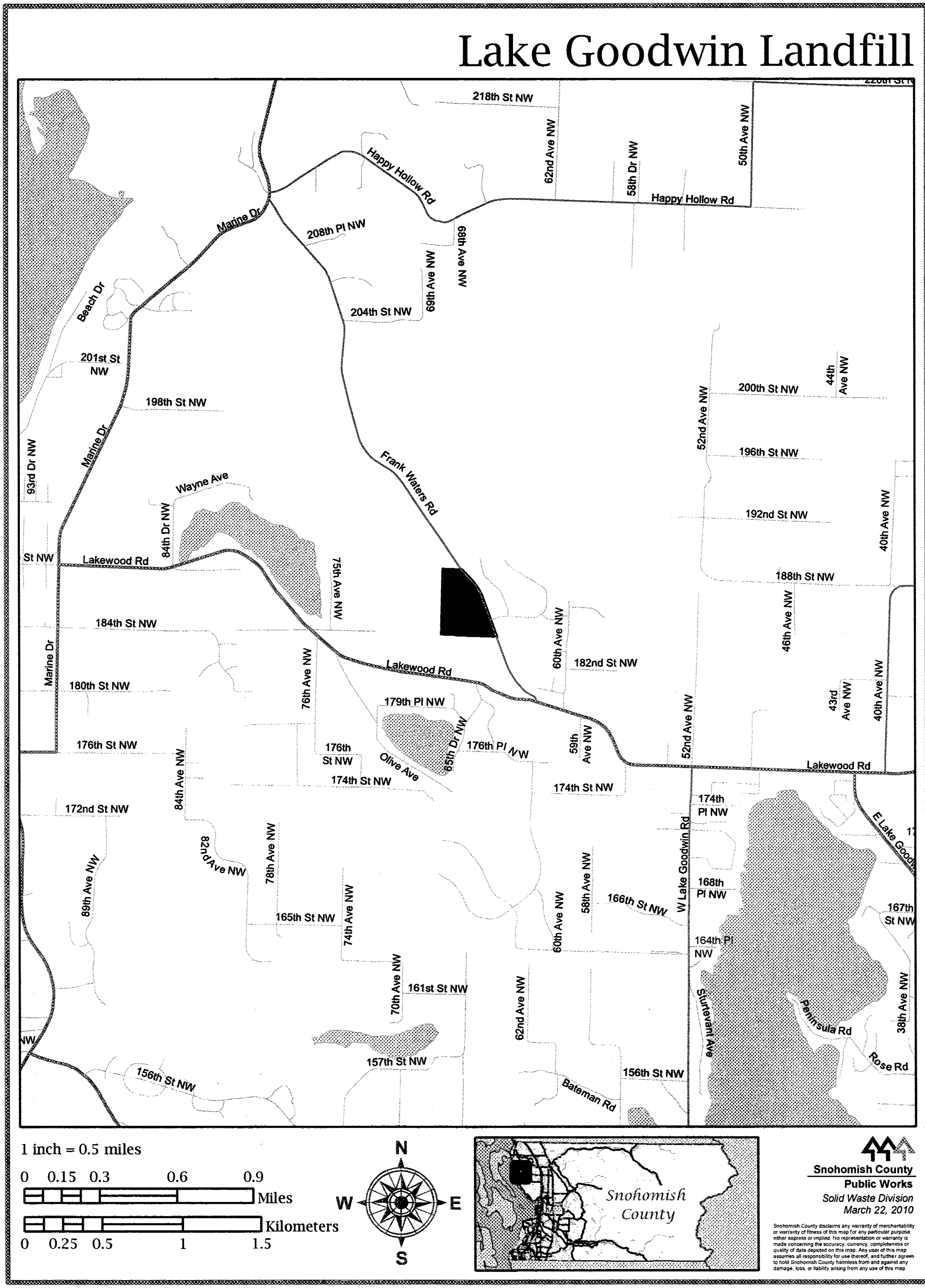
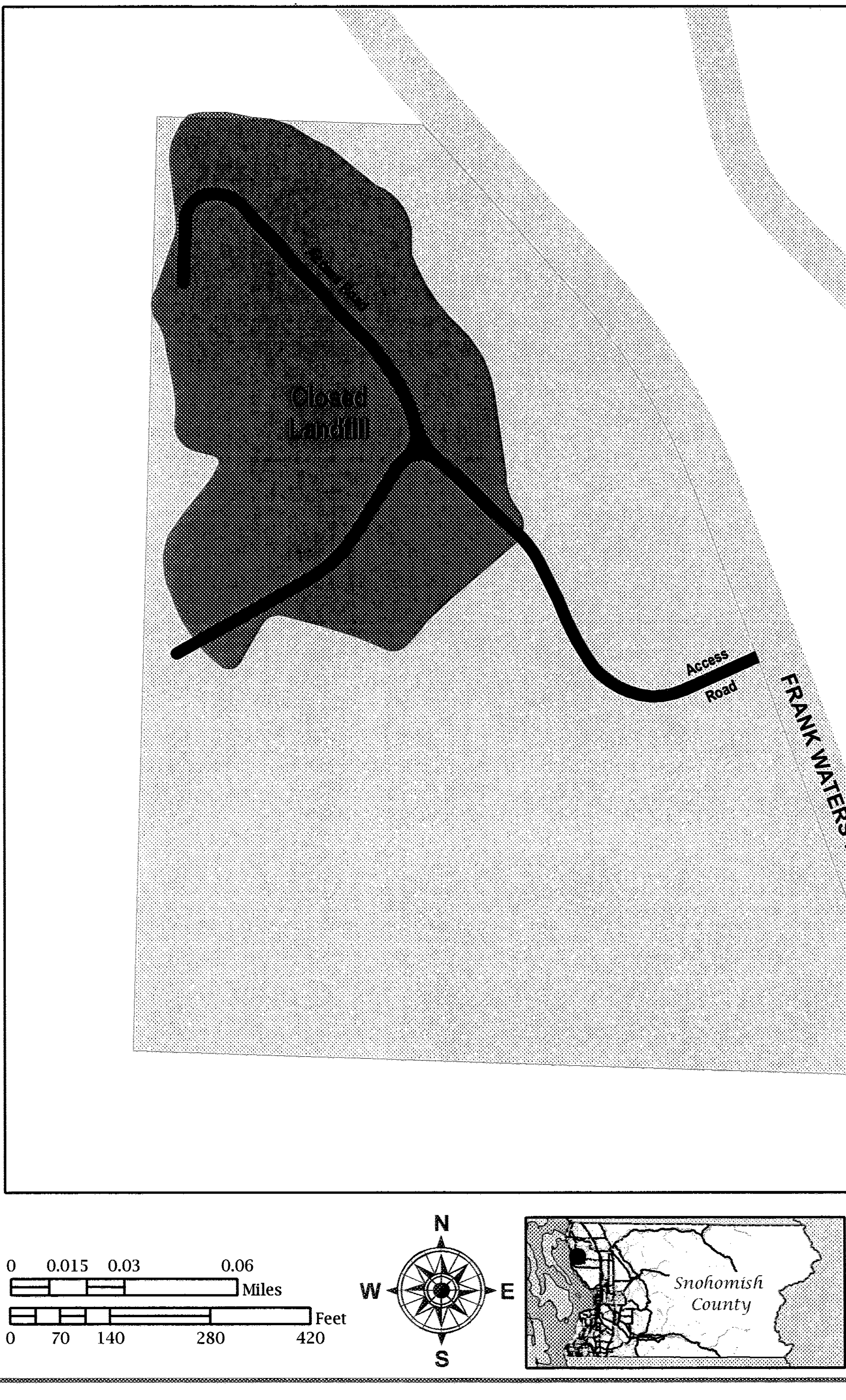


Figure 2

Lake Goodwin Landfill Site Map



Snohomish County
Public Works
Solid Waste Division
March 25, 2010

Figure 3

Lake Goodwin Landfill

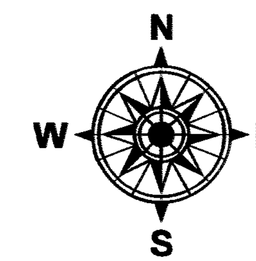
Topography

Map Features

Parcel Boundary

Subject Property Boundary

5 Foot Contours



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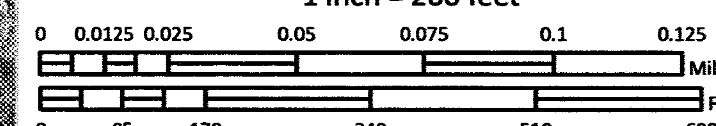
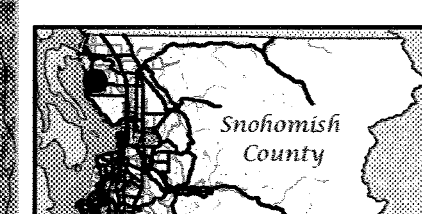




Snohomish County
Public Works
Solid Waste Division
March 23, 2010

Figure 4

Lake Goodwin Landfill

Geologic Map

Map Features

Parcel Boundary

Subject Property Boundary

Geologic Description

Vashon advance outwash (Qva)

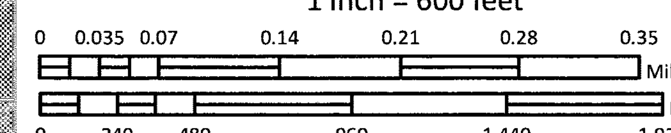
Vashon recessional outwash

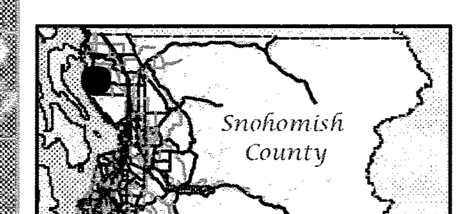
Vashon till (Qvt)

Water

Modified Land

1 inch = 600 feet





N W E S

Snohomish County Public Works

Solid Waste Division

May 6, 2010

Figure 5

Lake Goodwin Landfill

Groundwater Monitoring Network

Map Features

Parcel Boundary

Subject Property Boundary

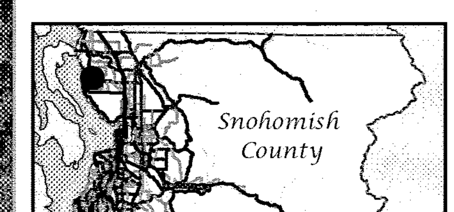
Aquifer Unit (Active Wells)

● Deep Aquifer

1 inch = 200 feet

0 0.0125 0.025 0.05 0.075 0.1 0.125 Miles

0 80 160 320 480 640 Feet



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Snohomish County
Public Works
Solid Waste Division
April 15, 2010

Figure 6

Lake Goodwin Landfill

Water Elevation Contours 1st Quarter 2009

DIRECTION OF GROUNDWATER FLOW
3.15 ft/day
1150 ft/year
64.00 degrees to the positive x-axis

PARCEL BOUNDARY

SUBJECT PROPERTY BOUNDARY

1 FT CONTOUR

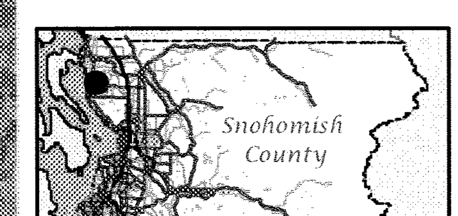
WELL LOCATION

WELL_ID	SAMP_DATE	MEAS_HEAD
LG-01	01/27/2009	151.06
LG-03	01/27/2009	150.86
LG-04	01/27/2009	148.5
LG-05	01/27/2009	149.71

1 inch = 200 feet

0 0.0125 0.025 0.05 0.075 0.1 0.125 Miles

0 85 170 340 510 680 Feet



Snohomish County Public Works
Solid Waste Division
May 10, 2010

Figure 7

Lake Goodwin Landfill

Water Elevation Contours 2nd Quarter 2009

DIRECTION OF GROUNDWATER FLOW
1.61 ft/day
588 ft/year
15.38 degrees to the positive x-axis

PARCEL BOUNDARY

SUBJECT PROPERTY BOUNDARY

1 FT CONTOUR

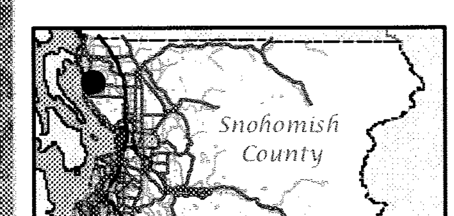
WELL LOCATION

WELL_ID	SAMP_DATE	MEAS_HEAD
LG-02	04/21/2009	151.56
LG-04	04/21/2009	149.34
LG-05	04/21/2009	150.11

1 inch = 200 feet

0 0.0125 0.025 0.05 0.075 0.1 0.125 Miles

0 85 170 340 510 680 Feet



Snohomish County Public Works
Solid Waste Division
May 10, 2010

Figure 8

Lake Goodwin Landfill

Water Elevation Contours 3rd Quarter 2009

DIRECTION OF GROUNDWATER FLOW
.971 ft/day
354 ft/year
88.90 degrees to the positive x-axis

PARCEL BOUNDARY

SUBJECT PROPERTY BOUNDARY

1 FT CONTOUR

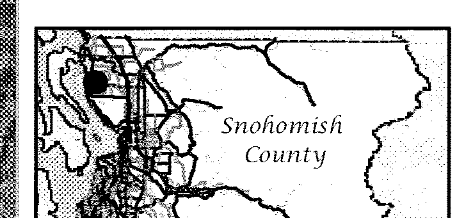
WELL LOCATION

WELL_ID	SAMP_DATE	MEAS_HEAD
LG-01	07/29/2009	151.48
LG-02	07/29/2009	151.59
LG-03	07/29/2009	150.51
LG-04	07/29/2009	149.46
LG-05	07/29/2009	150.39

1 inch = 200 feet

0 0.0125 0.025 0.05 0.075 0.1 0.125 Miles

0 85 170 340 510 680 Feet



N W E S

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Solid Waste Division
April 30, 2010

Figure 9

Lake Goodwin Landfill

Water Elevation Contours 4th Quarter 2009

DIRECTION OF GROUNDWATER FLOW
4.01 ft/day
1460 ft/year
113.59 degrees to the positive x-axis

PARCEL BOUNDARY

SUBJECT PROPERTY BOUNDARY

1 FT CONTOUR

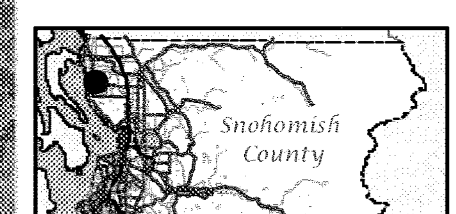
WELL LOCATION

WELL_ID	SAMP_DATE	MEAS_HEAD
LG-01	10/08/2009	152.04
LG-02	10/08/2009	152.25
LG-04	10/08/2009	148.84

1 inch = 200 feet

0 0.0125 0.025 0.05 0.075 0.1 0.125 Miles

0 85 170 340 510 680 Feet

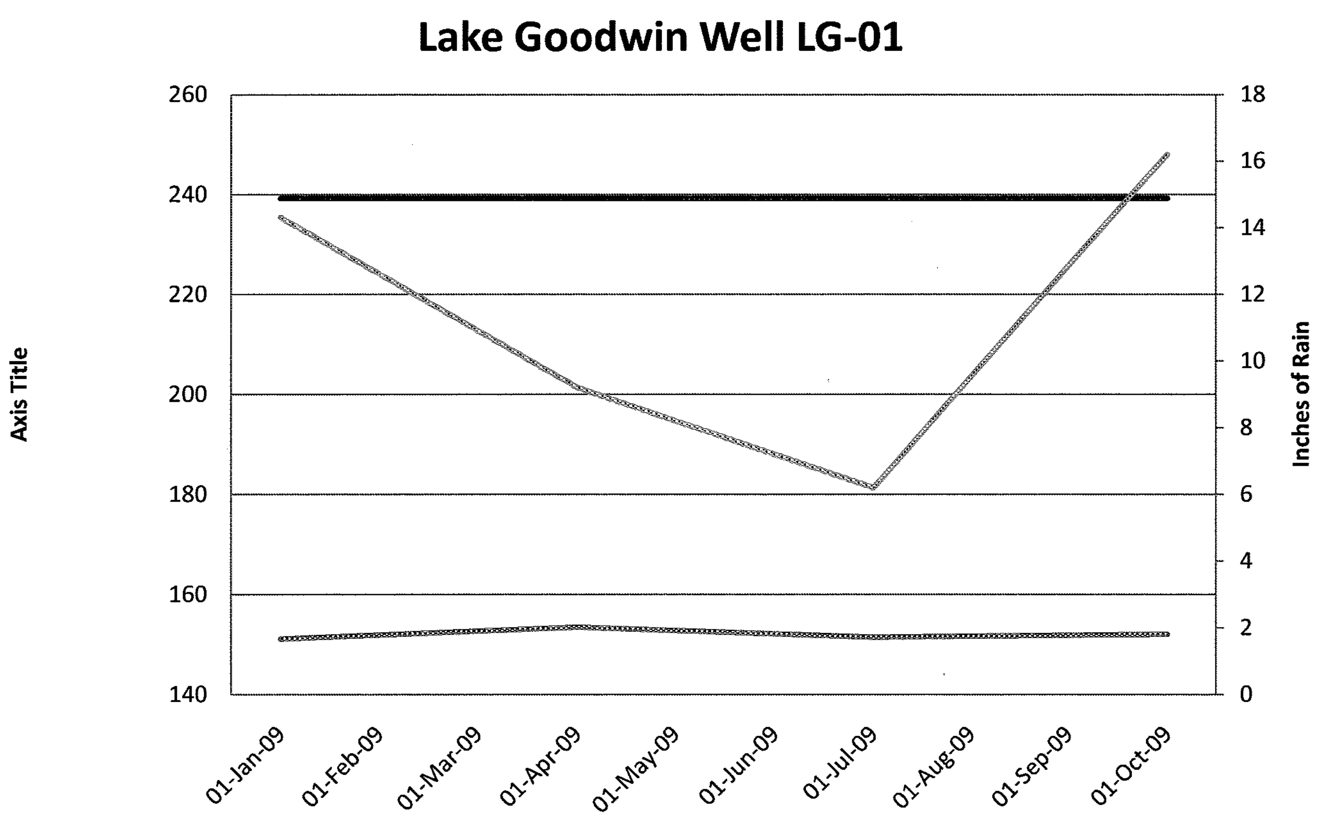


N W E S

Snohomish County
Public Works
Solid Waste Division
May 10, 2010

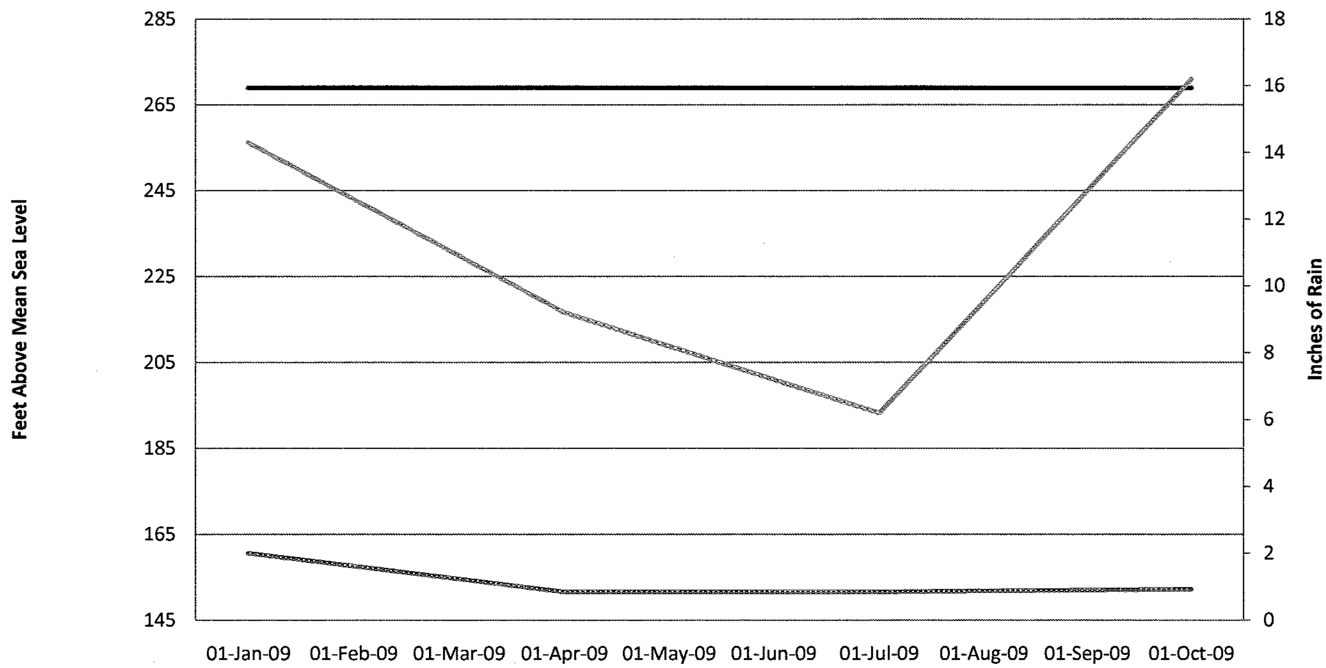
Appendix A

Hydrographs

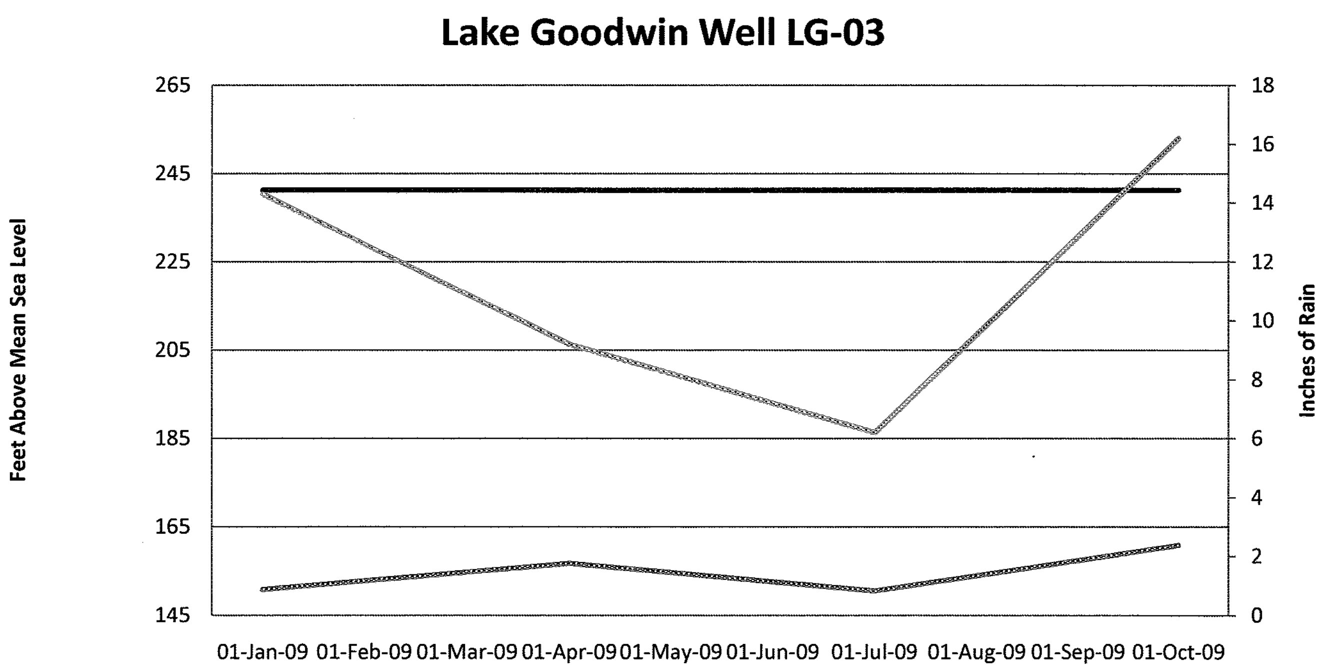


	27-Jan-09	21-Apr-09	29-Jul-09	08-Oct-09
Depth to Water	151.06	153.43	151.48	152.04
Well Casing	239.18	239.18	239.18	239.18
Precipitation	14.3	9.2	6.2	16.2

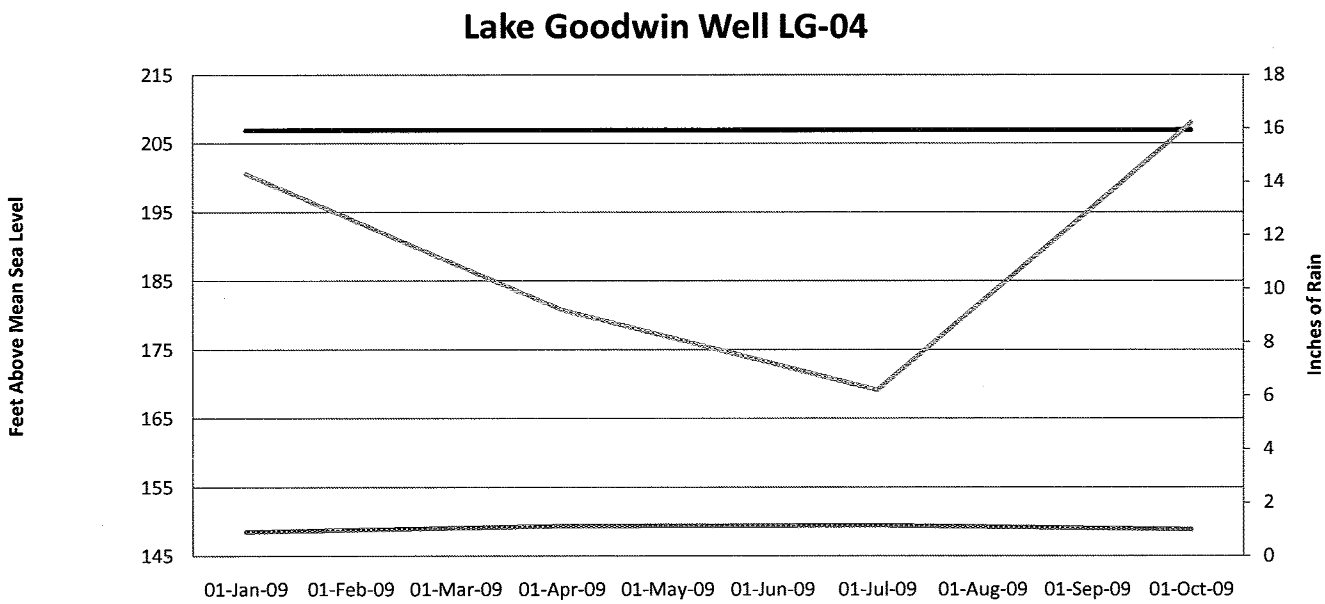
Lake Goodwin Well LG-02



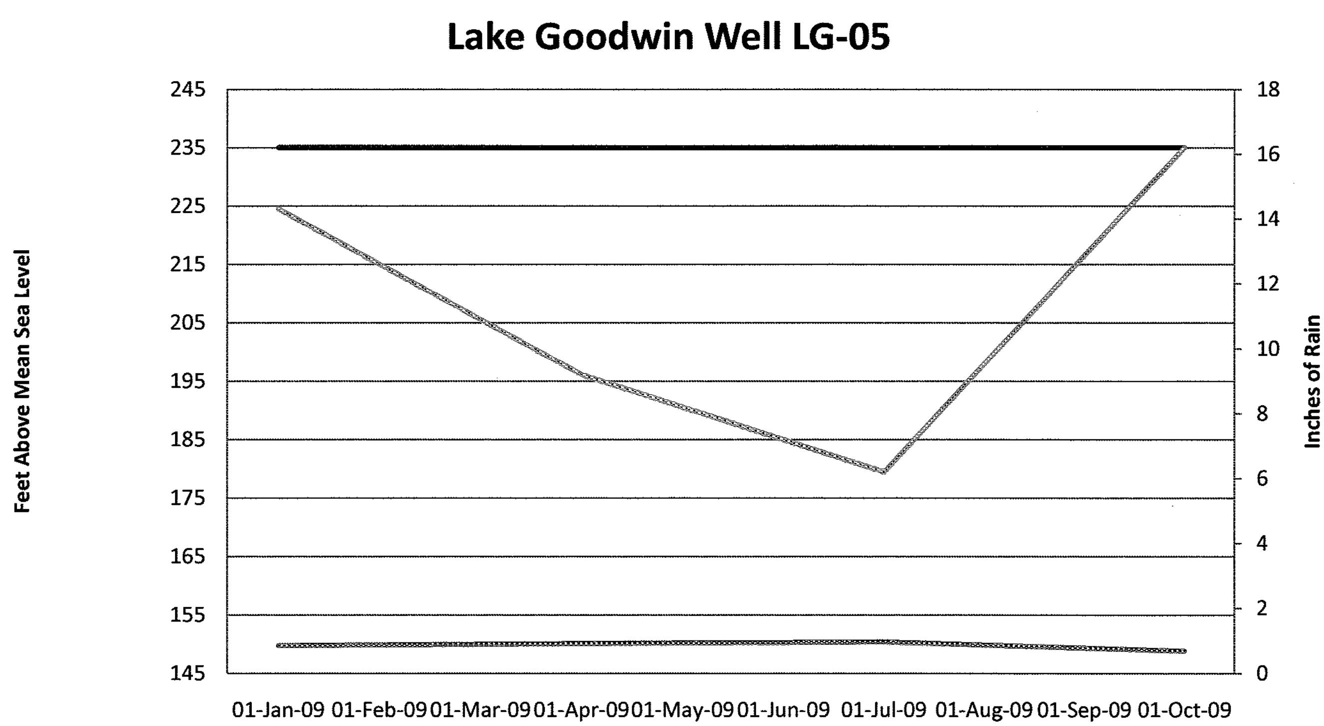
	27-Jan-09	21-Apr-09	29-Jul-09	08-Oct-09
Depth to Water	160.57	151.56	151.59	152.25
Well Casing	268.99	268.99	268.99	268.99
Precipitation	14.3	9.2	6.2	16.2



	27-Jan-09	21-Apr-09	29-Jul-09	08-Oct-09
Depth to Water	150.86	156.82	150.51	160.84
Well Casing	241.2	241.2	241.2	241.2
Precipitation	14.3	9.2	6.2	16.2



	27-Jan-09	21-Apr-09	31-Jul-09	08-Oct-09
Depth to Water	148.5	149.34	149.46	148.84
Well Casing	206.93	206.93	206.93	206.93
Precipitation	14.3	9.2	6.2	16.2



	27-Jan-09	21-Apr-09	29-Jul-09	08-Oct-09
MSL Water Level	149.71	150.11	150.39	148.79
Well Casing	235	235	235	235
Precipitation	14.3	9.2	6.2	16.2

Appendix B

Analytical Data

1st QUARTER

TABLE 2
GROUNDWATER ANALYTICAL DATA: SHALLOW WELLS
FIRST QUARTER 2009
CATHCART LANDFILL
SNOHOMISH COUNTY, WASHINGTON

	Combined Criteria (a)(c)	Downgradient LG-01 1/27/09	Downgradient LG-03 1/27/09	Downgradient LG-04 1/27/09	Downgradient LG-05 1/27/09	Updradient LG-02 1/27/09
CONVENTIONAL CHEMISTRY PARAMETERS (mg/L unless noted)						
Alkalinity (as CaCO3)	--	**160**	**200**	**130**	**285**	**78**
Ammonia Nitrogen	--	**0.046**	**0.03**	**0.054**	**0.0705**	**0.056**
Bicarbonate	--	**160**	**200**	**130**	**285**	**78**
Calcium, Dissolved	--	**24.3**	**41.9**	**21.7**	**32.95**	14.9
Chemical Oxygen DemaU	--	10 U	10 U	10 U	10 U	10 U
Chloride	250	**6.1**	**22**	**11**	**15.5**	**8.4**
CoUuctivity (umhos/cm)	700	**320**	**790**	**320**	**730**	**250**
Magnesium, Dissolved	--	**32.8**	**67.4**	**20.4**	**50.15**	**15.3**
Nitrate Nitrogen (mg-N/L)	10	**2.7**	**5.5**	**1.4**	**11.5**	**2.6**
Nitrite Nitrogen (mg-N/L)	1	0.001 U	**0.001**	0.001 U	**0.001**	**0.001**
pH (std units)	6.5-8.5	6.7	6.65	6.6	6.56	7.25
Potassium, Dissolved	--	**3.94**	**5.37**	**3.3**	**6.265**	**2.76**
Sodium, Dissolved	20	**12.5**	**29.9**	**12.4**	**43.6**	**8.5**
Sulfate	250	**33**	**72**	**13**	**27.5**	**12**
Total Dissolved Solids	500	**260**	**490**	**200**	**415**	**160**
Total Organic Carbon	--	**29**	**38**	**24**	**22.3**	**13**
DISSOLVED METALS EPA Methods 6010B/7131A (mg/L)						
Antimony	0.05	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Arsenic	0.001	**0.001**	0.001 U	0.001 U	**0.001**	**0.004**
Barium	1.0	**0.0201**	**0.049**	**0.02**	**0.2512**	**0.0096**
Beryllium	0.004	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
Cadmium	0.005	**0.00003**	**0.00003**	**0.00004**	0.005 U	**0.00002**
Chromium	0.05	0.001 U	0.001 U	0.001 U	0.001 U	0.0017
Cobalt	--	**0.004**	**0.007**	**0.007**	**0.0095**	**0.008**
Copper	1.0	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Iron	0.30	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Lead	0.015	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Manganese	0.05	**0.0023**	**0.003**	**0.0028**	**0.005**	**0.0016**
Nickel	0.1	0.005 U	**0.008**	0.005 U	0.005 U	0.005 U
Selenium	0.005	0.001	0.001 U	0.001 U	0.001 U	0.001 U
Silver	0.010	**0.0001**	0.0001 U	0.0001 U	0.0001 U	0.0001 U
Thallium	0.002	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Vanadium	--	0.005 U	0.005 U	0.005 U	0.006	0.005 U
Zinc	5.0	0.002	0.002	0.002	0.003	0.003
VOLATILE ORGANIC COMPOUUS (VOCs) EPA Method 8260 (µg/L)						
1,1,1-Trichloroethane	200	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	--	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	--	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	1	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethylene	7	1 U	1 U	1 U	1 U	1 U
1,2,3-Trichloropropane	--	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	5	5 U	5 U	5 U	5 U	5 U
1,2-Dibromoethane	1	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	--	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	1	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	4	4 U	4 U	4 U	4 U	4 U
2-Butanone	--	5 U	5 U	5 U	5 U	5 U
2-Hexanone	--	5 U	5 U	5 U	5 U	5 U
4-Methyl-2-Pentanone (MIBK)	--	5 U	5 U	5 U	5 U	5 U
Acetone	--	5 U	5 U	5 U	5 U	5 U
Acrylonitrile	5	5 U	5 U	5 U	5 U	5 U
Benzene	1	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	1	1 U	1 U	1 U	1 U	1 U
Bromoform	5	1 U	1 U	1 U	1 U	1 U
Bromomethane	--	1 U	1 U	1 U	1 U	1 U
Carbon Disulfide	--	1 U	1 U	1 U	1 U	1 U
Carbon Tetrachloride	1	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	100	1 U	1 U	1 U	1 U	1 U
Chlorodibromomethane	1	1 U	1 U	1 U	1 U	1 U
Chloroethane	--	1 U	1 U	1 U	1 U	1 U
Chloroform	7	1 U	1 U	1 U	1 U	1 U
Chloromethane	--	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	--	1 U	1 U	1 U	1 U	1 U

TABLE 2
GROUNDWATER ANALYTICAL DATA: SHALLOW WELLS
FIRST QUARTER 2009
CATHCART LANDFILL
SNOHOMISH COUNTY, WASHINGTON

	Combined Criteria (a)(c)	Downgradient LG-01 1/27/09		Downgradient LG-03 1/27/09		Downgradient LG-04 1/27/09		Downgradient LG-05 1/27/09		Updradient LG-02 1/27/09	
Dibromomethane	--	1	U	1	U	1	U	1	U	1	U
Ethyl Benzene	700	1	U	1	U	1	U	1	U	1	U
m,p-Xylene	10000	1	U	1	U	1	U	1	U	1	U
Methyl Iodide	--	5	U	5	U	5	U	5	U	5	U
Methylene Chloride	5	1.5	U	**1.8**		1.5	U	**1.7**		1.5	U
o-Xylene	10000	1	U	1	U	1	U	1	U	1	U
Styrene	100	1	U	1	U	1	U	1	U	1	U
Tetrachloroethylene	1	1	U	1	U	1	U	1	U	1	U
Toluene	1	1	U	1	U	1	U	1	U	1	U
trans-1,2-Dichloroethene	100	1	U	1	U	1	U	1	U	1	U
trans-1,3-Dichloropropene	--	1	U	1	U	1	U	1	U	1	U
trans-1,4-Dichloro-2-butene	--	5	U	5	U	5	U	5	U	5	U
Trichlorethene (1,1,2-Trichloroethylene)	3	1	U	1	U	1	U	1	U	1	U
Trichlorofluoromethane	--	1	U	1	U	1	U	1	U	1	U
Vinyl Acetate	--	5	U	5	U	5	U	5	U	5	U
Vinyl Chloride	0.2	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U

mg/L = milligrams per liter (ppm).
µg/L = micrograms per liter (ppb).
U = IUicates compouU was not detected at the given reporting limit.
Boxed cells iUicate an exceedance of combined criteria.
Bold cells iUicate a detected compouU.
-- = No criteria available for this compouU.
(a) Combined criteria iUicates the most conservative criteria of WAC 173-200 or WAC 246-290 where available

TABLE 3

GROUNDWATER STATISTICAL SUMMARY: SHALLOW WELLS QUATER 1 2009
LAKE GOODWIN LANDFILL
SNOHOMISH COUNTY, WASHINGTON

	Statistical Method	No. of Samples	No. of Detects	Prediction Limit (a)	Downgradient				Updradient
					LG-01 1/27/09	LG-03 1/27/09	LG-04 1/27/09	LG-05 1/27/09	LG-02 1/27/09
CONVENTIONAL CHEMISTRY PARAMETERS (mg/L unless noted)									
Alkalinity (as CaCO3)	nonpar	25	25	130	**160**	**200**	**130**	**285**	**78**
Ammonia Nitrogen	nonpar	70	30	0.069	**0.046**	**0.03**	**0.054**	**0.0705**	**0.056**
Bicarbonate	lognor	25	25	129.9844	**160**	**200**	**130**	**285**	**78**
Calcium, Dissolved	normal	25	25	22.3843	**24.3**	**41.9**	**21.7**	**32.95**	**14.9**
Chemical Oxygen DemaU	nonpar	57	9	26	10 U	10 U	10 U	10 U	10 U
Chloride	lognor	71	71	11.2953	**6.1**	**22**	**11**	**15.5**	**8.4**
CoUuctivity (umhos/cm)	normal	66	66	374.6345	**320**	**790**	**320**	**730**	**250**
Magnesium, Dissolved	normal	24	24	20.8723	**32.8**	**67.4**	**20.4**	**50.15**	**15.3**
Nitrate Nitrogen (mg-N/L)	nonpar	62	62	2.8	**2.7**	**5.5**	**1.4**	**11.5**	**2.6**
Nitrite Nitrogen (mg-N/L)	nonpar	69	16	0.012	0.001 U	0.001	0.001 U	0.001	0.001
pH (std units)	nonpar	74	74	6.92- 8.71	**6.7**	**6.65**	**6.6**	**6.56**	**7.25**
Potassium, Dissolved	normal	25	25	3.5762	**3.94**	**5.37**	**3.3**	**6.265**	**2.76**
Sodium, Dissolved	nonpar	23	23	13.8	**12.5**	**29.9**	**12.4**	**43.6**	**8.5**
Sulfate	lognor	71	71	17.8319	**33**	**72**	**13**	**27.5**	**12**
Total Dissolved Solids	nonpar	24	24	550	**260**	**490**	**200**	**415**	**160**
Total Organic Carbon	nonpar	71	22	13	**29**	**38**	**24**	**22.3**	**13**
DISSOLVED METALS EPA Methods 6010B/7131A (mg/L)									
Antimony	nonpar	23	0	0.01	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Arsenic	nonpar	59	58	0.006	**0.001**	0.001 U	0.001 U	**0.001**	**0.004**
Barium	nonpar	59	59	0.021	**0.0201**	**0.049**	**0.02**	**0.2512**	**0.0096**
Beryllium	nonpar	22	0	0.0005	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
Cadmium	nonpar	60	10	0.002	**0.00003**	**0.00003**	**0.00004**	0.005 U	**0.00002**
Chromium	nonpar	59	31	0.015	0.001 U	0.001 U	0.001 U	0.001 U	0.0017
Cobalt	nonpar	22	5	0.008	**0.004**	**0.007**	**0.007**	**0.0095**	**0.008**
Copper	nonpar	58	14	0.008	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Iron	nonpar	70	17	0.14	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Lead	nonpar	59	4	0.002	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Manganese	nonpar	68	21	0.0136	**0.0023**	**0.003**	**0.0028**	**0.005**	**0.0016**
Nickel	nonpar	59	1	0.01	0.005 U	**0.008**	0.005 U	0.005 U	0.005 U
Selenium	nonpar	59	2	0.002	**0.001**	0.001 U	0.001 U	0.001 U	0.001 U
Silver	nonpar	59	2	4.2501	**0.0001**	0.0001 U	0.0001 U	0.0001 U	0.0001 U
Thallium	nonpar	23	0	0.001	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Vanadium	nonpar	23	6	0.01	0.005 U	0.005 U	0.005 U	**0.006**	0.005 U
Zinc	nonpar	68	26	0.06	**0.002**	**0.002**	**0.002**	**0.003**	**0.003**
VOLATILE ORGANIC COMPOUUS (VOCs) EPA Method 8260 (µg/L)									
1,1,1-Trichloroethane	nonpar	59	0	1	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	nonpar	66	0	1	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	nonpar	66	0	1	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	nonpar	66	0	1	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethylene	nonpar	66	0	1	1 U	1 U	1 U	1 U	1 U
1,2,3-Trichloropropane	nonpar	21	0	1	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	nonpar	10	0	5	5 U	5 U	5 U	5 U	5 U
1,2-Dibromoethane	nonpar	10	0	1	1 U	1 U	1 U	1 U	1 U

TABLE 3
GROUNDWATER STATISTICAL SUMMARY: SHALLOW WELLS QUATER 1 2009
LAKE GOODWIN LANDFILL
SNOHOMISH COUNTY, WASHINGTON

	Statistical Method	No. of Samples	No. of Detects	Prediction Limit (a)	Downgradient LG-01 1/27/09	LG-03 1/27/09	LG-04 1/27/09	LG-05 1/27/09	Updradient LG-02 1/27/09
1,2-Dichlorobenzene	nonpar	13	0	1	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	nonpar	66	0	1	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	nonpar	66	0	1	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	nonpar	42	0	1	4 U	4 U	4 U	4 U	4 U
2-Butanone	nonpar	66	1	370	5 U	5 U	5 U	5 U	5 U
2-Hexanone	nonpar	66	0	5	5 U	5 U	5 U	5 U	5 U
4-Methyl-2-Pentanone (MIBK)	nonpar	66	1	61	5 U	5 U	5 U	5 U	5 U
Acetone	nonpar	66	2	73	5 U	5 U	5 U	5 U	5 U
Acrylonitrile	nonpar	10	0	5	5 U	5 U	5 U	5 U	5 U
Benzene	nonpar	66	0	1	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	nonpar	66	0	1	1 U	1 U	1 U	1 U	1 U
Bromoform	nonpar	66	1	1.4	1 U	1 U	1 U	1 U	1 U
Bromomethane	nonpar	66	0	1	1 U	1 U	1 U	1 U	1 U
Carbon Disulfide	nonpar	66	2	12	1 U	1 U	1 U	1 U	1 U
Carbon Tetrachloride	nonpar	66	0	1	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	nonpar	66	0	1	1 U	1 U	1 U	1 U	1 U
Chlorodibromomethane	nonpar	55	0	1	1 U	1 U	1 U	1 U	1 U
Chloroethane	nonpar	66	0	2	1 U	1 U	1 U	1 U	1 U
Chloroform	nonpar	66	1	1.1	1 U	1 U	1 U	1 U	1 U
Chloromethane	nonpar	66	0	1	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	nonpar	47	0	1	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	nonpar	66	0	1	1 U	1 U	1 U	1 U	1 U
Dibromomethane	too few	3	0		1 U	1 U	1 U	1 U	1 U
Ethyl Benzene	nonpar	66	0	1	1 U	1 U	1 U	1 U	1 U
m,p-Xylene	nonpar	40	0	1	1 U	1 U	1 U	1 U	1 U
Methyl Iodide	too few	3	0		5 U	5 U	5 U	5 U	5 U
Methylene Chloride	nonpar	66	5	3	1.5 U	**1.8**	1.5 U	**1.7**	1.5 U
o-Xylene	nonpar	34	0	1	1 U	1 U	1 U	1 U	1 U
Styrene	nonpar	66	0	1	1 U	1 U	1 U	1 U	1 U
Tetrachloroethylene	nonpar	66	0	1	1 U	1 U	1 U	1 U	1 U
Toluene	nonpar	66	1	1	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	nonpar	47	0	1	1 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	nonpar	66	0	1	1 U	1 U	1 U	1 U	1 U
trans-1,4-Dichloro-2-butene	nonpar	10	0	5	5 U	5 U	5 U	5 U	5 U
Trichlorethene (1,1,2-Trichloroethylene)	nonpar	47	0	1	1 U	1 U	1 U	1 U	1 U
Trichlorofluoromethane	nonpar	59	0	1	1 U	1 U	1 U	1 U	1 U
Vinyl Acetate	nonpar	58	0	5	5 U	5 U	5 U	5 U	5 U
Vinyl Chloride	nonpar	66	0	1	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U

mg/L = milligrams per liter (ppm).
µg/L = micrograms per liter (ppb).
U = IUicates compouU was not detected at the given reporting limit.
Boxed cells iUicate an exceedance of prediction limit criteria.
Bold cells iUicate a detected compouU.
U = CompouU not detected in any sample; a valid prediction limit is not available for this compouU.
(a) Prediction limit calculated using DUMPStat.

2ND QUARTER

TABLE 2
GROUNDWATER ANALYTICAL DATA:
SECOND QUARTER 2009
LAKE GOODWIN LANDFILL
SNOHOMISH COUNTY, WASHINGTON

	Combined	Downgradient				Updradient
	Combined Criteria (a)(c)	LG-01 1/27/09	LG-03 1/27/09	LG-04 1/27/09	LG-05 1/27/09	LG-02 1/27/09
CONVENTIONAL CHEMISTRY PARAMETERS						
(mg/L unless noted)						
Alkalinity (as CaCO3)	--	**150**	**350**	**125**	**260**	**76**
Ammonia Nitrogen	--	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Bicarbonate	--	**150**	**350**	**125**	**260**	**76**
Calcium, Dissolved	--	**21.5**	**49.8**	**23.8**	**31.5**	**14.8**
Chemical Oxygen Demand	--	**14**	**14**	10 U	10 U	10 U
Chloride	250	**5.2**	**23**	**5.45**	**10**	**7.2**
Conductivity (umhos/cm)	700	**310**	**860**	**295**	**640**	**230**
Magnesium, Dissolved	--	**26.3**	**62.2**	**19.35**	**38.8**	**13.7**
Nitrate Nitrogen (mg-N/L)	10	**1.8**	**5.7**	**1.1**	**8.2**	**2.2**
Nitrite Nitrogen (mg-N/L)	1	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
pH (std units)	6.5-8.5	**6.67**	**6.38**	**6.31**	**6.33**	**6.86**
Potassium, Dissolved	--	**3.44**	**5.55**	**3.025**	**5.68**	**2.57**
Sodium, Dissolved	20	**11.4**	**33.1**	**12.3**	**38.8**	**8.8**
Sulfate	250	**15**	**86**	**13**	**23**	**12**
Total Dissolved Solids	500	**210**	**440**	**195**	**380**	**140**
Total Organic Carbon	--	**2.6**	1 U	**4.95**	**6.8**	1 U
DISSOLVED METALS						
EPA Methods 6010B/7131A (mg/L)						
Antimony	0.05	1 U	0.01 U	1 U	0.01 U	0.01 U
Arsenic	0.001	0.01 U	**0.001**	0.01 U	0.001 U	**0.004**
Barium	1.0	0.001 U	**0.0523**	0.001 U	**0.0412**	**0.0093**
Beryllium	0.004	**0.0165**	0.0005 U	**0.0206**	0.0005 U	0.0005 U
Cadmium	0.005	0.0005 U	**0**	0.0005 U	0 U	**0.0001**
Chromium	0.05	0 U	0.001 U	0 U	0.001 U	**0.0032**
Cobalt	--	0.001 U	**0.005**	**0.0012**	**0.006**	**0.007**
Copper	1.0	**0.007**	**0.002**	**0.009**	**0.003**	**0.001**
Iron	0.30	**0.002**	0.005 U	**0.0015**	0.005 U	0.005 U
Lead	0.015	0.005 U	0.001 U	**0.0135**	0.001 U	0.001 U
Manganese	0.05	0.001 U	0.0005 U	0.001 U	0.0005 U	0.0005 U
Nickel	0.1	0.0005 U	**0.007**	0.0005 U	0.0005 U	0.0005 U
Selenium	0.005	0.005 U	0.001 U	**0.0015**	**0.004**	**0.002**
Silver	0.010	0.001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U
Thallium	0.002	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Vanadium	--	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Zinc	5.0	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
VOLATILE ORGANIC COMPOUNDS (VOCs)						
EPA Method 8260 (µg/L)						
1,1,1-Trichloroethane	200	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	--	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	--	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	1	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethylene	7	1 U	1 U	1 U	1 U	1 U
1,2,3-Trichloropropane	--	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	5	5 U	5 U	5 U	5 U	5 U
1,2-Dibromoethane	1	1 U	1 U	1 U	1 U	1 U

TABLE 2
GROUNDWATER ANALYTICAL DATA:
SECOND QUARTER 2009
LAKE GOODWIN LANDFILL
SNOHOMISH COUNTY, WASHINGTON

1,2-Dichlorobenzene	--	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	1	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	4	4 U	4 U	4 U	4 U	4 U
2-Butanone	--	5 U	5 U	5 U	5 U	5 U
2-Hexanone	--	5 U	5 U	5 U	5 U	5 U
4-Methyl-2-Pentanone (MIBK)	--	5 U	5 U	5 U	5 U	5 U
Acetone	--	5 U	5 U	5 U	5 U	5 U
Acrylonitrile	5	5 U	5 U	5 U	5 U	5 U
Benzene	1	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	1	1 U	1 U	1 U	1 U	1 U
Bromoform	5	1 U	1 U	1 U	1 U	1 U
Bromomethane	--	1 U	1 U	1 U	1 U	1 U
Carbon Disulfide	--	1 U	1 U	1 U	1 U	1 U
Carbon Tetrachloride	1	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	100	1 U	1 U	1 U	1 U	1 U
Chlorodibromomethane	1	1 U	1 U	1 U	1 U	1 U
Chloroethane	--	1 U	1 U	1 U	1 U	1 U
Chloroform	7	1 U	1 U	1 U	1 U	1 U
Chloromethane	--	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	--	1 U	1 U	1 U	1 U	1 U
Dibromomethane	--	1 U	1 U	1 U	1 U	1 U
Ethyl Benzene	700	1 U	1 U	1 U	1 U	1 U
m,p-Xylene	10000	1 U	1 U	1 U	1 U	1 U
Methyl Iodide	--	5 U	5 U	5 U	5 U	5 U
Methylene Chloride	5	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U
o-Xylene	10000	1 U	1 U	1 U	1 U	1 U
Styrene	100	1 U	1 U	1 U	1 U	1 U
Tetrachloroethylene	1	1 U	1 U	1 U	1 U	1 U
Toluene	1	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	1 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	--	1 U	1 U	1 U	1 U	1 U
trans-1,4-Dichloro-2-butene	--	5 U	5 U	5 U	5 U	5 U
Trichlorethene (1,1,2-Trichloroethylene)	3	1 U	1 U	1 U	1 U	1 U
Trichlorofluoromethane	--	1 U	1 U	1 U	1 U	1 U
Vinyl Acetate	--	5 U	5 U	5 U	5 U	5 U
Vinyl Chloride	0.2	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U

mg/L = milligrams per liter (ppm).
µg/L = micrograms per liter (ppb).
U = Indicates compound was not detected at the given reporting limit.
Boxed cells indicate an exceedance of combined criteria.
Bold cells indicate a detected compound.
-- = No criteria available for this compound.
(a) Combined criteria indicates the most conservative criteria of WAC 173-200 or WAC 246-290 where available, as established in the 2006 Sampling and Analysis Plan for Cathcart Landfill.
(b) Compound not analyzed due to change in Draft SAP Table 3 after the SAP was adopted. Will be sampled starting 2nd quarter 2008.
(c) Dissolved Sodium combined criteria of 20 mg/L as "recommended level" from DOE per 4/3/07 correspondence.

TABLE 3
GROUNDWATER STATISTICAL SUMMARY: SECOND QUARTER 2009
LAKE GOODWIN LANDFILL
SNOHOMISH COUNTY, WASHINGTON

	Statistical Method	No. of Samples	No. of Detects	Prediction Limit (a)	Downgradient LG-01 1/27/09	Downgradient LG-03 1/27/09	Downgradient LG-04 1/27/09	Downgradient LG-05 1/27/09	Updradient LG-02 1/27/09
CONVENTIONAL CHEMISTRY PARAMETERS									
(mg/L unless noted)									
Alkalinity (as CaCO3)	nonpar	26	26	130	**150**	**350**	**125**	**260**	**76**
Ammonia Nitrogen	nonpar	71	30	0.069	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Bicarbonate	lognor	26	26	129.6358	**150**	**350**	**125**	**260**	**76**
Calcium, Dissolved	normal	26	26	22.2091	**21.5**	**49.8**	**23.8**	**31.5**	**14.8**
Chemical Oxygen Demand	nonpar	58	9	26	**14**	**14**	10 U	10 U	10 U
Chloride	lognor	72	72	11.2597	**5.2**	**23**	**5.45**	**10**	**7.2**
Conductivity (umhos/cm)	normal	67	67	373.4284	**310**	**860**	**295**	**640**	**230**
Magnesium, Dissolved	normal	25	25	20.7501	**26.3**	**62.2**	**19.35**	**38.8**	**13.7**
Nitrate Nitrogen (mg-N/L)	nonpar	63	63	2.8	**1.8**	**5.7**	**1.1**	**8.2**	**2.2**
Nitrite Nitrogen (mg-N/L)	nonpar	70	16	0.012	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
pH (std units)	nonpar	75	75	6.86- 8.71	**6.67**	**6.38**	**6.31**	**6.33**	**6.86**
Potassium, Dissolved	normal	26	26	3.5562	**3.44**	**5.55**	**3.025**	**5.68**	**2.57**
Sodium, Dissolved	nonpar	24	24	13.8	**11.4**	**33.1**	**12.3**	**38.8**	**8.8**
Sulfate	lognor	72	72	17.7844	**15**	**86**	**13**	**23**	**12**
Total Dissolved Solids	nonpar	25	25	550	**210**	**440**	**195**	**380**	**140**
Total Organic Carbon	nonpar	72	22	13	**2.6**	1 U	**4.95**	**6.8**	1 U
DISSOLVED METALS									
EPA Methods 6010B/7131A (mg/L)									
Antimony	nonpar	24	0	0.01	1 U	0.01 U	1 U	0.01 U	0.01 U
Arsenic	nonpar	60	59	0.006	0.01 U	**0.001**	0.01 U	0.001 U	**0.004**
Barium	nonpar	60	60	0.021	0.001 U	**0.0523**	0.001 U	**0.0412**	**0.0093**
Beryllium	nonpar	23	0	0.0005	**0.0165**	0.0005 U	**0.0206**	0.0005 U	0.0005 U
Cadmium	nonpar	61	11	0.002	0.0005 U	0	0.0005 U	0 U	**0.0001**
Chromium	nonpar	60	32	0.015	0 U	0.001 U	0 U	0.001 U	**0.0032**
Cobalt	nonpar	23	6	0.008	0.001 U	**0.005**	**0.0012**	**0.006**	**0.007**
Copper	nonpar	59	15	0.008	**0.007**	**0.002**	**0.009**	**0.003**	**0.001**
Iron	nonpar	71	17	0.14	**0.002**	0.005 U	**0.0015**	0.005 U	0.005 U
Lead	nonpar	60	4	0.002	0.005 U	0.001 U	**0.0135**	0.001 U	0.001 U
Manganese	nonpar	69	21	0.0136	0.001 U	0.0005 U	0.001 U	0.0005 U	0.0005 U
Nickel	nonpar	60	1	0.01	0.0005 U	**0.007**	0.0005 U	0.005 U	0.005 U
Selenium	nonpar	60	3	0.002	0.005 U	0.001 U	**0.0015**	**0.004**	**0.002**

TABLE 3
GROUNDWATER STATISTICAL SUMMARY: SECOND QUARTER 2009
LAKE GOODWIN LANDFILL
SNOHOMISH COUNTY, WASHINGTON

Silver	nonpar	60	2	4.2501	0.001 U	0.0001 U	0.0001 U	0.0001 U	**0.0001** U
Thallium	nonpar	24	0	0.001	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Vanadium	nonpar	24	6	0.01	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Zinc	nonpar	69	26	0.06	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
VOLATILE ORGANIC COMPOUNDS (VOCs)									
EPA Method 8260 (µg/L)									
1,1,1-Trichloroethane	nonpar	60	0	1	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	nonpar	67	0	1	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	nonpar	67	0	1	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	nonpar	67	0	1	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethylene	nonpar	67	0	1	1 U	1 U	1 U	1 U	1 U
1,2,3-Trichloropropane	nonpar	22	0	1	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	nonpar	11	0	5	5 U	5 U	5 U	5 U	5 U
1,2-Dibromoethane	nonpar	11	0	1	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	nonpar	14	0	1	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	nonpar	67	0	1	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	nonpar	67	0	1	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	nonpar	43	0	1	4 U	4 U	4 U	4 U	4 U
2-Butanone	nonpar	67	1	370	5 U	5 U	5 U	5 U	5 U
2-Hexanone	nonpar	67	0	5	5 U	5 U	5 U	5 U	5 U
4-Methyl-2-Pentanone (MIBK)	nonpar	67	1	61	5 U	5 U	5 U	5 U	5 U
Acetone	nonpar	67	2	73	5 U	5 U	5 U	5 U	5 U
Acrylonitrile	nonpar	11	0	5	5 U	5 U	5 U	5 U	5 U
Benzene	nonpar	67	0	1	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	nonpar	67	0	1	1 U	1 U	1 U	1 U	1 U
Bromoform	nonpar	67	1	1.4	1 U	1 U	1 U	1 U	1 U
Bromomethane	nonpar	67	0	1	1 U	1 U	1 U	1 U	1 U
Carbon Disulfide	nonpar	67	2	12	1 U	1 U	1 U	1 U	1 U
Carbon Tetrachloride	nonpar	67	0	1	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	nonpar	67	0	1	1 U	1 U	1 U	1 U	1 U
Chlorodibromomethane	nonpar	56	0	1	1 U	1 U	1 U	1 U	1 U
Chloroethane	nonpar	67	0	2	1 U	1 U	1 U	1 U	1 U
Chloroform	nonpar	67	1	1.1	1 U	1 U	1 U	1 U	1 U
Chloromethane	nonpar	67	0	1	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	nonpar	48	0	1	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	nonpar	67	0	1	1 U	1 U	1 U	1 U	1 U
Dibromomethane	too few	4	0		1 U	1 U	1 U	1 U	1 U

TABLE 3
GROUNDWATER STATISTICAL SUMMARY: SECOND QUARTER 2009
LAKE GOODWIN LANDFILL
SNOHOMISH COUNTY, WASHINGTON

Ethyl Benzene	nonpar	67	0	1	1 U	1 U	1 U	1 U	1 U
m,p-Xylene	nonpar	41	0	1	1 U	1 U	1 U	1 U	1 U
Methyl Iodide	too few	4	0		5 U	5 U	5 U	5 U	5 U
Methylene Chloride	nonpar	67	5	3	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U
o-Xylene	nonpar	35	0	1	1 U	1 U	1 U	1 U	1 U
Styrene	nonpar	67	0	1	1 U	1 U	1 U	1 U	1 U
Tetrachloroethylene	nonpar	67	0	1	1 U	1 U	1 U	1 U	1 U
Toluene	nonpar	67	1	1	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	nonpar	48	0	1	1 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	nonpar	67	0	1	1 U	1 U	1 U	1 U	1 U
trans-1,4-Dichloro-2-butene	nonpar	11	0	5	5 U	5 U	5 U	5 U	5 U
Trichlorethene (1,1,2-Trichloroethylene)	nonpar	48	0	1	1 U	1 U	1 U	1 U	1 U
Trichlorofluoromethane	nonpar	60	0	1	1 U	1 U	1 U	1 U	1 U
Vinyl Acetate	nonpar	59	0	5	5 U	5 U	5 U	5 U	5 U
Vinyl Chloride	nonpar	67	0	1	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U

mg/L = milligrams per liter (ppm).

µg/L = micrograms per liter (ppb).

U = Indicates compound was not detected at the given reporting limit.

Boxed cells indicate an exceedance of prediction limit criteria.

Bold cells indicate a detected compound.

ND = Compound not detected in any sample; a valid prediction limit is not available for this compound.

(a) Prediction limit calculated using DUMPStat.

3RD QUARTER

TABLE 2
GROUNDWATER ANALYTICAL DATA: THIRD QUARTER 2009
LAKE GOODWIN LANDFILL
SNOHOMISH COUNTY, WASHINGTON

	Combined Criteria (a)(c)	Downgradient LG-01 1/27/09	Downgradient LG-03 1/27/09	Downgradient LG-04 1/27/09	Downgradient LG-05 1/27/09	Updradient LG-02 1/27/09
CONVENTIONAL CHEMISTRY PARAMETERS						
(mg/L unless noted)						
Alkalinity (as CaCO3)	--	**140**	**340**	**125**	**270**	**80**
Ammonia Nitrogen	--	**0.7**	**0.14**	**0.1**	**0.1**	**0.123**
Bicarbonate	--	**140**	**340**	**125**	**270**	**80**
Calcium, Dissolved	--	**21.6**	**49.2**	**22.8**	**29.8**	**14.5**
Chemical Oxygen Demand	--	10 U	10 U	10 U	10 U	10 U
Chloride	250	**3.2**	**22**	**5.35**	**12**	**5.7**
Conductivity (umhos/cm)	700	**340**	**820**	**290**	**620**	**220**
Magnesium, Dissolved	--	**28.6**	73.7	**20.8**	**42.8**	**14.1**
Nitrate Nitrogen (mg-N/L)	10	**0.9**	**5.7**	**1**	**9.4**	**0.94**
Nitrite Nitrogen (mg-N/L)	1	0.001 U	**0.002**	0.001 U	0.001 U	**0.002**
pH (std units)	6.5-8.5	**6.76**	**6.51**	**6.53**	**6.43**	**6.93**
Potassium, Dissolved	--	**3.6**	**6.01**	**3.2**	**5.7**	**2.96**
Sodium, Dissolved	20	**11.5**	**37.4**	**13**	**42.8**	**9.2**
Sulfate	250	**23**	**84**	**12.5**	**25**	**15**
Total Dissolved Solids	500	**220**	**810**	**175**	**1000**	**150**
Total Organic Carbon	--	**6**	**23**	**15**	**20**	**8.6**
DISSOLVED METALS						
EPA Methods 6010B/7131A (mg/L)						
Antimony	0.05	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Arsenic	0.001	0.001 U	**0.004**	0.001 U	0.001 U	**0.005**
Barium	1.0	**0.0165**	**0.0536**	**0.0206**	**0.0412**	**0.0094**
Beryllium	0.004	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
Cadmium	0.005	0 U	**0.00008**	0 U	0 U	**0.00011**
Chromium	0.05	0.001 U	0.001 U	**0.0012**	0.001 U	**0.0025**
Cobalt	--	0.001 U	0.001 U	**0.009**	0.001 U	0.001 U
Copper	1.0	**0.002**	**0.007**	**0.0015**	**0.003**	**0.001**
Iron	0.30	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Lead	0.015	0.001 U	**0.002**	0.001 U	0.001 U	**0.002**
Manganese	0.05	0.0005 U	0.00005 U	0.0005 U	0.0005 U	**0.001**
Nickel	0.1	0.005 U	**0.006**	0.005 U	0.005 U	0.005 U
Selenium	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Silver	0.010	0.0001 U	**0.0001**	0.0001 U	0.0001 U	0.0001 U
Thallium	0.002	0.001 U	**0.003**	0.001 U	0.001 U	**0.002**
Vanadium	--	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Zinc	5.0	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
VOLATILE ORGANIC COMPOUNDS (VOCs)						
EPA Method 8260 (µg/L)						
1,1,1-Trichloroethane	200	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	--	1 U	3.1	1 U	1 U	1 U
1,1,2-Trichloroethane	--	1 U	1.8	1 U	1 U	1 U
1,1-Dichloroethane	1	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethylene	7	1 U	1 U	1 U	1 U	1 U
1,2,3-Trichloropropane	--	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	5	5 U	5 U	5 U	5 U	5 U
1,2-Dibromoethane	1	1 U	1 U	1 U	1 U	1 U

TABLE 2
GROUNDWATER ANALYTICAL DATA: THIRD QUARTER 2009
LAKE GOODWIN LANDFILL
SNOHOMISH COUNTY, WASHINGTON

		Downgradient				Updradient
	Combined Criteria (a)(c)	LG-01 1/27/09	LG-03 1/27/09	LG-04 1/27/09	LG-05 1/27/09	LG-02 1/27/09
1,2-Dichlorobenzene	--	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	1	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	4	4 U	4 U	4 U	4 U	4 U
2-Butanone	--	5 U	5 U	5 U	5 U	5 U
2-Hexanone	--	5 U	5 U	5 U	5 U	5 U
4-Methyl-2-Pentanone (MIBK)	--	5 U	5 U	5 U	5 U	5 U
Acetone	--	5 U	5 U	5 U	5 U	5 U
Acrylonitrile	5	5 U	5 U	5 U	5 U	5 U
Benzene	1	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	1	1 U	1 U	1 U	1 U	1 U
Bromoform	5	1 U	1 U	1 U	1 U	1 U
Bromomethane	--	1 U	1 U	1 U	1 U	1 U
Carbon Disulfide	--	1 U	1 U	1 U	1 U	1 U
Carbon Tetrachloride	1	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	100	1 U	1 U	1 U	1 U	1 U
Chlorodibromomethane	1	1 U	1 U	1 U	1 U	1 U
Chloroethane	--	1 U	1 U	1 U	1 U	1 U
Chloroform	7	1 U	1 U	1 U	1 U	1 U
Chloromethane	--	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	--	1 U	1 U	1 U	1 U	1 U
Dibromomethane	--	1 U	1 U	1 U	1 U	1 U
Ethyl Benzene	700	1 U	1 U	1 U	1 U	1 U
m,p-Xylene	10000	1 U	1 U	1 U	1 U	1 U
Methyl Iodide	--	1 U	1.5 U	1 U	1 U	1 U
Methylene Chloride	5	1.5 U	1 U	1.5 U	1.5 U	1.5 U
o-Xylene	10000	1 U	1 U	1 U	1 U	1 U
Styrene	100	1 U	1 U	1 U	1 U	1 U
Tetrachloroethylene	1	1 U	1 U	1 U	1 U	1 U
Toluene	1	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	1 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	--	1 U	1 U	1 U	1 U	1 U
trans-1,4-Dichloro-2-butene	--	5 U	5 U	5 U	5 U	5 U
Trichlorethene (1,1,2-Trichloroethylene)	3	1 U	1 U	1 U	1 U	1 U
Trichlorofluoromethane	--	1 U	1 U	1 U	1 U	1 U
Vinyl Acetate	--	5 U	5 U	5 U	5 U	5 U
Vinyl Chloride	0.2	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U

mg/L = milligrams per liter (ppm).

μg/L = micrograms per liter (ppb).

U = Indicates compound was not detected at the given reporting limit.

Boxed cells indicate an exceedance of combined criteria.

Bold cells indicate a detected compound.

-- = No criteria available for this compound.

(a) Combined criteria indicates the most conservative criteria of WAC 173-200 or WAC 246-290 where available, as established in the 2006 Sampling and Analysis Plan for Cathcart Landfill.

(b) Compound not analyzed due to change in Draft SAP Table 3 after the SAP was adopted. Will be sampled starting 2nd quarter 2008.

(c) Dissolved Sodium combined criteria of 20 mg/L as "recommended level" from DOE per 4/3/07 correspondence.

TABLE 3
GROUNDWATER STATISTICAL SUMMARY: THIRD QUARTER 2009
LAKE GOODWIN LANDFILL
SNOHOMISH COUNTY, WASHINGTON

	Statistical Method	No. of Samples	No. of Detects	Prediction Limit (a)	Downgradient LG-01 1/27/09	Downgradient LG-03 1/27/09	Downgradient LG-04 1/27/09	Downgradient LG-05 1/27/09	Updradient LG-02 1/27/09
CONVENTIONAL CHEMISTRY PARAMETERS									
(mg/L unless noted)									
Alkalinity (as CaCO3)	nonpar	27	27	130	140	340	125	270	80
Ammonia Nitrogen	nonpar	72	31	0.1	0.7	0.14	0.1	0.1	0.123
Bicarbonate	lognor	27	27	128.7346	140	340	125	270	80
Calcium, Dissolved	normal	27	27	22.0463	21.6	49.2	22.8	29.8	14.5
Chemical Oxygen Demand	nonpar	59	9	26	10 U	10 U	10 U	10 U	10 U
Chloride	lognor	73	73	11.2295	3.2	22	5.35	12	5.7
Conductivity (umhos/cm)	normal	68	68	372.1912	340	820	290	620	220
Magnesium, Dissolved	normal	26	26	20.6171	28.6	73.7	20.8	42.8	14.1
Nitrate Nitrogen (mg-N/L)	nonpar	64	64	2.8	0.9	5.7	1	9.4	0.94
Nitrite Nitrogen (mg-N/L)	nonpar	70	16	0.012	0.001 U	0.002	0.001 U	0.001 U	0.002
pH (std units)	nonpar	76	76	6.86- 8.71	6.76	6.51	6.53	6.43	6.93
Potassium, Dissolved	normal	27	27	3.5367	3.6	6.01	3.2	5.7	2.96
Sodium, Dissolved	nonpar	25	25	13.8	11.5	37.4	13	42.8	9.2
Sulfate	lognor	73	73	17.8978	23	84	12.5	25	15
Total Dissolved Solids	nonpar	26	26	550	220	810	175	1000	150
Total Organic Carbon	nonpar	73	23	13	6	23	15	20	8.6
DISSOLVED METALS									
EPA Methods 6010B/7131A (mg/L)									
Antimony	nonpar	25	0	0.01	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Arsenic	nonpar	60	59	0.006	0.001 U	0.004	0.001 U	0.001 U	0.005
Barium	nonpar	60	60	0.021	0.0165	0.0536	0.0206	0.0412	0.0094
Beryllium	nonpar	24	0	0.0005	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
Cadmium	nonpar	61	11	0.002	0 U	0.00008	0 U	0 U	0.00011
Chromium	nonpar	60	32	0.015	0.001 U	0.001 U	0.0012	0.001 U	0.0025
Cobalt	nonpar	24	6	0.008	0.001 U	0.001 U	0.009	0.001 U	0.001 U
Copper	nonpar	59	15	0.008	0.002	0.007	0.0015	0.003	0.001
Iron	nonpar	72	17	0.14	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Lead	nonpar	60	4	0.002	0.001 U	0.002	0.001 U	0.001 U	0.002
Manganese	nonpar	69	21	0.0136	0.0005 U	0.00005 U	0.0005 U	0.0005 U	0.001
Nickel	nonpar	61	1	0.01	0.005 U	0.006	0.005 U	0.005 U	0.005 U
Selenium	nonpar	61	3	0.002	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Silver	nonpar	61	2	4.2501	0.0001 U	0.0001	0.0001 U	0.0001 U	0.0001 U
Thallium	nonpar	24	0	0.001	0.001 U	0.003	0.001 U	0.001 U	0.002
Vanadium	nonpar	25	6	0.01	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Zinc	nonpar	70	26	0.06	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
VOLATILE ORGANIC COMPOUNDS (VOCs)									
EPA Method 8260 (µg/L)									
1,1,1-Trichloroethane	nonpar	61	0	1	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	nonpar	68	0	1	1 U	3.1	1 U	1 U	1 U
1,1,2-Trichloroethane	nonpar	68	0	1	1 U	1.8	1 U	1 U	1 U
1,1-Dichloroethane	nonpar	68	0	1	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethylene	nonpar	68	0	1	1 U	1 U	1 U	1 U	1 U
1,2,3-Trichloropropane	nonpar	23	0	1	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	nonpar	12	0	5	5 U	5 U	5 U	5 U	5 U
1,2-Dibromoethane	nonpar	12	0	1	1 U	1 U	1 U	1 U	1 U

TABLE 3
GROUNDWATER STATISTICAL SUMMARY: THIRD QUARTER 2009
LAKE GOODWIN LANDFILL
SNOHOMISH COUNTY, WASHINGTON

	Statistical Method	No. of Samples	No. of Detects	Prediction Limit (a)	Downgradient LG-01 1/27/09		Downgradient LG-03 1/27/09		Downgradient LG-04 1/27/09		Downgradient LG-05 1/27/09		Updradient LG-02 1/27/09	
1,2-Dichlorobenzene	nonpar	15	0	1	1	U	1	U	1	U	1	U	1	U
1,2-Dichloroethane	nonpar	68	0	1	1	U	1	U	1	U	1	U	1	U
1,2-Dichloropropane	nonpar	68	0	1	1	U	1	U	1	U	1	U	1	U
1,4-Dichlorobenzene	nonpar	44	0	1	4	U	4	U	4	U	4	U	4	U
2-Butanone	nonpar	68	1	370	5	U	5	U	5	U	5	U	5	U
2-Hexanone	nonpar	68	0	5	5	U	5	U	5	U	5	U	5	U
4-Methyl-2-Pentanone (MIBK)	nonpar	68	1	61	5	U	5	U	5	U	5	U	5	U
Acetone	nonpar	68	2	73	5	U	5	U	5	U	5	U	5	U
Acrylonitrile	nonpar	12	0	5	5	U	5	U	5	U	5	U	5	U
Benzene	nonpar	68	0	1	1	U	1	U	1	U	1	U	1	U
Bromodichloromethane	nonpar	68	0	1	1	U	1	U	1	U	1	U	1	U
Bromoform	nonpar	68	1	1.4	1	U	1	U	1	U	1	U	1	U
Bromomethane	nonpar	68	0	1	1	U	1	U	1	U	1	U	1	U
Carbon Disulfide	nonpar	68	2	12	1	U	1	U	1	U	1	U	1	U
Carbon Tetrachloride	nonpar	68	0	1	1	U	1	U	1	U	1	U	1	U
Chlorobenzene	nonpar	68	0	1	1	U	1	U	1	U	1	U	1	U
Chlorodibromomethane	nonpar	57	0	1	1	U	1	U	1	U	1	U	1	U
Chloroethane	nonpar	68	0	2	1	U	1	U	1	U	1	U	1	U
Chloroform	nonpar	68	1	1.1	1	U	1	U	1	U	1	U	1	U
Chloromethane	nonpar	68	0	1	1	U	1	U	1	U	1	U	1	U
cis-1,2-Dichloroethene	nonpar	49	0	1	1	U	1	U	1	U	1	U	1	U
cis-1,3-Dichloropropene	nonpar	68	0	1	1	U	1	U	1	U	1	U	1	U
Dibromomethane	too few	5	0		1	U	1	U	1	U	1	U	1	U
Ethyl Benzene	nonpar	68	0	1	1	U	1	U	1	U	1	U	1	U
m,p-Xylene	nonpar	42	0	1	1	U	1	U	1	U	1	U	1	U
Methyl Iodide	too few	5	0		1	U	1.5	U	1	U	1	U	1	U
Methylene Chloride	nonpar	68	5	3	1.5	U	1	U	1.5	U	1.5	U	1.5	U
o-Xylene	nonpar	36	0	1	1	U	1	U	1	U	1	U	1	U
Styrene	nonpar	68	0	1	1	U	1	U	1	U	1	U	1	U
Tetrachloroethylene	nonpar	68	0	1	1	U	1	U	1	U	1	U	1	U
Toluene	nonpar	68	1	1	1	U	1	U	1	U	1	U	1	U
trans-1,2-Dichloroethene	nonpar	49	0	1	1	U	1	U	1	U	1	U	1	U
trans-1,3-Dichloropropene	nonpar	68	0	1	1	U	1	U	1	U	1	U	1	U
trans-1,4-Dichloro-2-butene	nonpar	12	0	5	5	U	5	U	5	U	5	U	5	U
Trichlorethene (1,1,2-Trichloroethylene)	nonpar	49	0	1	1	U	1	U	1	U	1	U	1	U
Trichlorofluoromethane	nonpar	61	0	1	1	U	1	U	1	U	1	U	1	U
Vinyl Acetate	nonpar	60	0	5	5	U	5	U	5	U	5	U	5	U
Vinyl Chloride	nonpar	68	0	1	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U

mg/L = milligrams per liter (ppm).

µg/L = micrograms per liter (ppb).

U = Indicates compound was not detected at the given reporting limit.

Boxed cells indicate an exceedance of prediction limit criteria.

Bold cells indicate a detected compound.

ND = Compound not detected in any sample; a valid prediction limit is not available for this compound.

(a) Prediction limit calculated using DUMPStat.

4TH QUARTER

TABLE 2
GROUNDWATER ANALYTICAL DATA: FOURTH QUARTER 2009
LAKE GOODWIN LANDFILL
SNOHOMISH COUNTY, WASHINGTON

	Combined Criteria (a)(c)	Downgradient LG-01 1/27/09	Downgradient LG-03 1/27/09	Downgradient LG-04 1/27/09	Downgradient LG-05 1/27/09	Updradient LG-02 1/27/09
CONVENTIONAL CHEMISTRY PARAMETERS						
(mg/L unless noted)						
Alkalinity (as CaCO3)	--	**170**	**320**	**6**	**320**	**80**
Ammonia Nitrogen	--	0.005 U	0.005 U	0.005 U	**0.021**	**0.026**
Bicarbonate	--	**170**	**320**	**6**	**320**	**80**
Calcium, Dissolved	--	**24.1**	**42.7**	**21.3**	**36.6**	**14.8**
Chemical Oxygen Demand	--	10 U	**13**	10 U	10 U	10 U
Chloride	250	**5.2**	**18.5**	**5.5**	**11**	**8.2**
Conductivity (umhos/cm)	700	**190**	**740**	**330**	**730**	**230**
Magnesium, Dissolved	--	**29.9**	**53.7**	**20**	**43.8**	**13.4**
Nitrate Nitrogen (mg-N/L)	10	**2.4**	**6.3**	**1.2**	**12**	**2.1**
Nitrite Nitrogen (mg-N/L)	1	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
pH (std units)	6.5-8.5	**7.9**	**6.48**	**6.44**	**6.41**	**7.29**
Potassium, Dissolved	--	**3.61**	**6.15**	**3.18**	**6.77**	**2.4**
Sodium, Dissolved	20	**11.7**	**34.7**	**13.8**	**42.5**	**8.5**
Sulfate	250	**38**	**76**	**14**	**26**	**14**
Total Dissolved Solids	500	**260**	**430**	**220**	**440**	**160**
Total Organic Carbon	--	**14**	**7**	**2.8**	**5.8**	**5.4**
DISSOLVED METALS						
EPA Methods 6010B/7131A (mg/L)						
Antimony	0.05	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Arsenic	0.001	0.001 U	0.001 U	0.001 U	0.001 U	0.004
Barium	1.0	**0.0203**	**0.0495**	**0.0258**	**0.0487**	**0.0107**
Beryllium	0.004	0.0005 U	0.0005 U	0.0005 U	0.0005 U	**0.0005** U
Cadmium	0.005	0.00002 U	**0.00012**	**0.00008**	0.00003	0.00002 U
Chromium	0.05	**0.0035**	**0.0015**	**0.0023**	**0.0033**	**0.0047**
Cobalt	--	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Copper	1.0	0.001 U	**0.01**	**0.003**	0.001 U	**0.005**
Iron	0.30	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Lead	0.015	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Manganese	0.05	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
Nickel	0.1	0.005 U	**0.009**	0.005 U	**0.006**	0.005 U
Selenium	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Silver	0.010	0.0001 U	0.0001 U	**0.0005**	0.0001 U	**0.0004**
Thallium	0.002	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Vanadium	--	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Zinc	5.0	0.001 U	**0.007**	**0.001**	**0.002**	**0.003**
VOLATILE ORGANIC COMPOUNDS (VOCs)						
EPA Method 8260 (µg/L)						
1,1,1-Trichloroethane	200	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	--	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	--	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	1	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethylene	7	1 U	1 U	1 U	1 U	1 U
1,2,3-Trichloropropane	--	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	5	5 U	5 U	5 U	5 U	1 U
1,2-Dibromoethane	1	1 U	1 U	1 U	1 U	1 U

TABLE 2
GROUNDWATER ANALYTICAL DATA: FOURTH QUARTER 2009
LAKE GOODWIN LANDFILL
SNOHOMISH COUNTY, WASHINGTON

	Combined Criteria (a)(c)	Downgradient LG-01 1/27/09	Downgradient LG-03 1/27/09	Downgradient LG-04 1/27/09	Downgradient LG-05 1/27/09	Updradient LG-02 1/27/09
1,2-Dichlorobenzene	--	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	1	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	4	4 U	4 U	4 U	4 U	1 U
2-Butanone	--	5 U	5 U	5 U	5 U	1 U
2-Hexanone	--	5 U	5 U	5 U	5 U	1 U
4-Methyl-2-Pentanone (MIBK)	--	5 U	5 U	5 U	5 U	1 U
Acetone	--	5 U	5 U	5 U	5 U	1 U
Acrylonitrile	5	5 U	5 U	5 U	5 U	1 U
Benzene	1	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	1	1 U	1 U	1 U	1 U	1 U
Bromoform	5	1 U	1 U	1 U	1 U	1 U
Bromomethane	--	1 U	1 U	1 U	1 U	1 U
Carbon Disulfide	--	1 U	1 U	1 U	1 U	1 U
Carbon Tetrachloride	1	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	100	1 U	1 U	1 U	1 U	1 U
Chlorodibromomethane	1	1 U	1 U	1 U	1 U	1 U
Chloroethane	--	1 U	1 U	1 U	1 U	1 U
Chloroform	7	1 U	1 U	1 U	1 U	1 U
Chloromethane	--	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	--	1 U	1 U	1 U	1 U	1 U
Dibromomethane	--	1 U	1 U	1 U	1 U	1 U
Ethyl Benzene	700	1 U	1 U	1 U	1 U	1 U
m,p-Xylene	10000	1 U	1 U	1 U	1 U	1 U
Methyl Iodide	--	1 U	1 U	1 U	1 U	1 U
Methylene Chloride	5	2 U	2 U	2 U	2 U	2 U
o-Xylene	10000	1 U	1 U	1 U	1 U	1 U
Styrene	100	1 U	1 U	1 U	1 U	1 U
Tetrachloroethylene	1	1 U	1 U	1 U	1 U	1 U
Toluene	1	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	1 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	--	1 U	1 U	1 U	1 U	1 U
trans-1,4-Dichloro-2-butene	--	5 U	5 U	5 U	5 U	5 U
Trichlorethene (1,1,2-Trichloroethylene)	3	1 U	1 U	1 U	1 U	1 U
Trichlorofluoromethane	--	1 U	1 U	1 U	1 U	1 U
Vinyl Acetate	--	5 U	5 U	5 U	5 U	5 U
Vinyl Chloride	0.2	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U

mg/L = milligrams per liter (ppm).

µg/L = micrograms per liter (ppb).

U = Indicates compound was not detected at the given reporting limit.

Boxed cells indicate an exceedance of combined criteria.

Bold cells indicate a detected compound.

-- = No criteria available for this compound.

(a) Combined criteria indicates the most conservative criteria of WAC 173-200 or WAC 246-290 where available

TABLE 3
GROUNDWATER STATISTICAL SUMMARY: FOURTH QUARTER 2009
LAKE GOODWIN LANDFILL
SNOHOMISH COUNTY, WASHINGTON

	Statistical Method	No. of Samples	No. of Detects	Prediction Limit (a)	Downgradient LG-01 1/27/09		LG-03 1/27/09		LG-04 1/27/09		LG-05 1/27/09		Updradient LG-02 1/27/09	
CONVENTIONAL CHEMISTRY PARAMETERS														
(mg/L unless noted)														
Alkalinity (as CaCO3)	nonpar	28	28	130	**170**		**320**		**6**		**320**		**80**	
Ammonia Nitrogen	nonpar	72	31	0.1	0.005	U	0.005	U	0.005	U	**0.021**		**0.026**	
Bicarbonate	nonpar	28	28	130	**170**		**320**		**6**		**320**		**80**	
Calcium, Dissolved	normal	28	28	21.8918	**24.1**		**42.7**		**21.3**		**36.6**		**14.8**	
Chemical Oxygen Demand	nonpar	60	9	26	10	U	**13**		10	U	10	U	10	U
Chloride	lognor	74	74	11.2378	**5.2**		**18.5**		**5.5**		**11**		**8.2**	
Conductivity (umhos/cm)	normal	69	69	371.0426	**190**		**740**		**330**		**730**		**230**	
Magnesium, Dissolved	normal	27	27	20.5183	**29.9**		**53.7**		**20**		**43.8**		**13.4**	
Nitrate Nitrogen (mg-N/L)	nonpar	65	65	2.8	**2.4**		**6.3**		**1.2**		**12**		**2.1**	
Nitrite Nitrogen (mg-N/L)	nonpar	71	16	0.012	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
pH (std units)	nonpar	77	77	6.86- 8.71	**7.9**		**6.48**		**6.44**		**6.41**		**7.29**	
Potassium, Dissolved	normal	28	28	3.5267	**3.61**		**6.15**		**3.18**		**6.77**		**2.4**	
Sodium, Dissolved	nonpar	26	26	13.8	**11.7**		**34.7**		**13.8**		**42.5**		**8.5**	
Sulfate	lognor	74	74	17.9403	**38**		**76**		**14**		**26**		**14**	
Total Dissolved Solids	nonpar	27	27	550	**260**		**430**		**220**		**440**		**160**	
Total Organic Carbon	nonpar	74	24	13	**14**		**7**		**2.8**		**5.8**		**5.4**	
DISSOLVED METALS														
EPA Methods 6010B/7131A (mg/L)														
Antimony	nonpar	26	0	0.01	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
Arsenic	nonpar	60	59	0.006	0.001	U	0.001	U	0.001	U	0.001	U	**0.004**	
Barium	nonpar	60	60	0.021	**0.0203**		**0.0495**		**0.0258**		**0.0487**		**0.0107**	
Beryllium	nonpar	25	0	0.0005	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U
Cadmium	nonpar	62	11	0.002	0.00002	U	**0.00012**		**0.00008**		**0.00003**		0.00002	U
Chromium	nonpar	60	32	0.015	**0.0035**		**0.0015**		**0.0023**		**0.0033**		**0.0047**	
Cobalt	nonpar	25	6	0.008	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
Copper	nonpar	59	15	0.008	0.001	U	**0.01**		**0.003**		0.001	U	**0.005**	
Iron	nonpar	73	17	0.14	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
Lead	nonpar	61	4	0.002	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
Manganese	nonpar	70	21	0.0136	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005	U
Nickel	nonpar	62	1	0.01	0.005	U	**0.009**		0.005	U	**0.006**		0.005	U
Selenium	nonpar	62	3	0.002	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U

TABLE 3
GROUNDWATER STATISTICAL SUMMARY: FOURTH QUARTER 2009
LAKE GOODWIN LANDFILL
SNOHOMISH COUNTY, WASHINGTON

	Statistical Method	No. of Samples	No. of Detects	Prediction Limit (a)	Downgradient LG-01 1/27/09		LG-03 1/27/09		LG-04 1/27/09		LG-05 1/27/09		Updradient LG-02 1/27/09	
Silver	nonpar	61	2	4.2501	0.0001	U	0.0001	U	**0.0005**		0.0001	U	**0.0004**	
Thallium	nonpar	25	0	0.001	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
Vanadium	nonpar	26	6	0.01	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
Zinc	nonpar	70	26	0.06	0.001	U	**0.007**		**0.001**		**0.002**		**0.003**	
VOLATILE ORGANIC COMPOUNDS (VOCs)														
EPA Method 8260 (µg/L)														
1,1,1-Trichloroethane	nonpar	62	0	1	1	U	1	U	1	U	1	U	1	U
1,1,2,2-Tetrachloroethane	nonpar	69	0	1	1	U	1	U	1	U	1	U	1	U
1,1,2-Trichloroethane	nonpar	69	0	1	1	U	1	U	1	U	1	U	1	U
1,1-Dichloroethane	nonpar	69	0	1	1	U	1	U	1	U	1	U	1	U
1,1-Dichloroethylene	nonpar	69	0	1	1	U	1	U	1	U	1	U	1	U
1,2,3-Trichloropropane	nonpar	24	0	1	1	U	1	U	1	U	1	U	1	U
1,2-Dibromo-3-chloropropane	nonpar	13	0	5	5	U	5	U	5	U	5	U	1	U
1,2-Dibromoethane	nonpar	13	0	1	1	U	1	U	1	U	1	U	1	U
1,2-Dichlorobenzene	nonpar	16	0	1	1	U	1	U	1	U	1	U	1	U
1,2-Dichloroethane	nonpar	69	0	1	1	U	1	U	1	U	1	U	1	U
1,2-Dichloropropane	nonpar	69	0	1	1	U	1	U	1	U	1	U	1	U
1,4-Dichlorobenzene	nonpar	45	0	1	4	U	4	U	4	U	4	U	1	U
2-Butanone	nonpar	69	1	370	5	U	5	U	5	U	5	U	1	U
2-Hexanone	nonpar	69	0	5	5	U	5	U	5	U	5	U	1	U
4-Methyl-2-Pentanone (MIBK)	nonpar	69	1	61	5	U	5	U	5	U	5	U	1	U
Acetone	nonpar	69	2	73	5	U	5	U	5	U	5	U	1	U
Acrylonitrile	nonpar	13	0	5	5	U	5	U	5	U	5	U	1	U
Benzene	nonpar	69	0	1	1	U	1	U	1	U	1	U	1	U
Bromodichloromethane	nonpar	69	0	1	1	U	1	U	1	U	1	U	1	U
Bromoform	nonpar	69	1	1.4	1	U	1	U	1	U	1	U	1	U
Bromomethane	nonpar	69	0	1	1	U	1	U	1	U	1	U	1	U
Carbon Disulfide	nonpar	69	2	12	1	U	1	U	1	U	1	U	1	U
Carbon Tetrachloride	nonpar	69	0	1	1	U	1	U	1	U	1	U	1	U
Chlorobenzene	nonpar	69	0	1	1	U	1	U	1	U	1	U	1	U
Chlorodibromomethane	nonpar	58	0	1	1	U	1	U	1	U	1	U	1	U
Chloroethane	nonpar	69	0	2	1	U	1	U	1	U	1	U	1	U
Chloroform	nonpar	69	1	1.1	1	U	1	U	1	U	1	U	1	U
Chloromethane	nonpar	69	0	1	1	U	1	U	1	U	1	U	1	U

TABLE 3
GROUNDWATER STATISTICAL SUMMARY: FOURTH QUARTER 2009
LAKE GOODWIN LANDFILL
SNOHOMISH COUNTY, WASHINGTON

	Statistical Method	No. of Samples	No. of Detects	Prediction Limit (a)	Downgradient LG-01 1/27/09		LG-03 1/27/09		LG-04 1/27/09		LG-05 1/27/09		Updradient LG-02 1/27/09	
cis-1,2-Dichloroethene	nonpar	50	0	1	1	U	1	U	1	U	1	U	1	U
cis-1,3-Dichloropropene	nonpar	69	0	1	1	U	1	U	1	U	1	U	1	U
Dibromomethane	too few	6	0	--	1	U	1	U	1	U	1	U	1	U
Ethyl Benzene	nonpar	69	0	1	1	U	1	U	1	U	1	U	1	U
m,p-Xylene	nonpar	43	0	1	1	U	1	U	1	U	1	U	1	U
Methyl Iodide	too few	6	0	--	1	U	1	U	1	U	1	U	1	U
Methylene Chloride	nonpar	69	5	3	2	U	2	U	2	U	2	U	2	U
o-Xylene	nonpar	37	0	1	1	U	1	U	1	U	1	U	1	U
Styrene	nonpar	69	0	1	1	U	1	U	1	U	1	U	1	U
Tetrachloroethylene	nonpar	69	0	1	1	U	1	U	1	U	1	U	1	U
Toluene	nonpar	69	1	1	1	U	1	U	1	U	1	U	1	U
trans-1,2-Dichloroethene	nonpar	50	0	1	1	U	1	U	1	U	1	U	1	U
trans-1,3-Dichloropropene	nonpar	69	0	1	1	U	1	U	1	U	1	U	1	U
trans-1,4-Dichloro-2-butene	nonpar	13	0	5	5	U	5	U	5	U	5	U	5	U
Trichlorethene (1,1,2-Trichloroethylene)	nonpar	50	0	1	1	U	1	U	1	U	1	U	1	U
Trichlorofluoromethane	nonpar	62	0	1	1	U	1	U	1	U	1	U	1	U
Vinyl Acetate	nonpar	61	0	5	5	U	5	U	5	U	5	U	5	U
Vinyl Chloride	nonpar	69	0	1	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U

mg/L = milligrams per liter (ppm).

µg/L = micrograms per liter (ppb).

U = Indicates compound was not detected at the given reporting limit.

Boxed cells indicate an exceedance of prediction limit criteria.

Bold cells indicate a detected compound.

ND = Compound not detected in any sample; a valid prediction limit is not available for this compound.

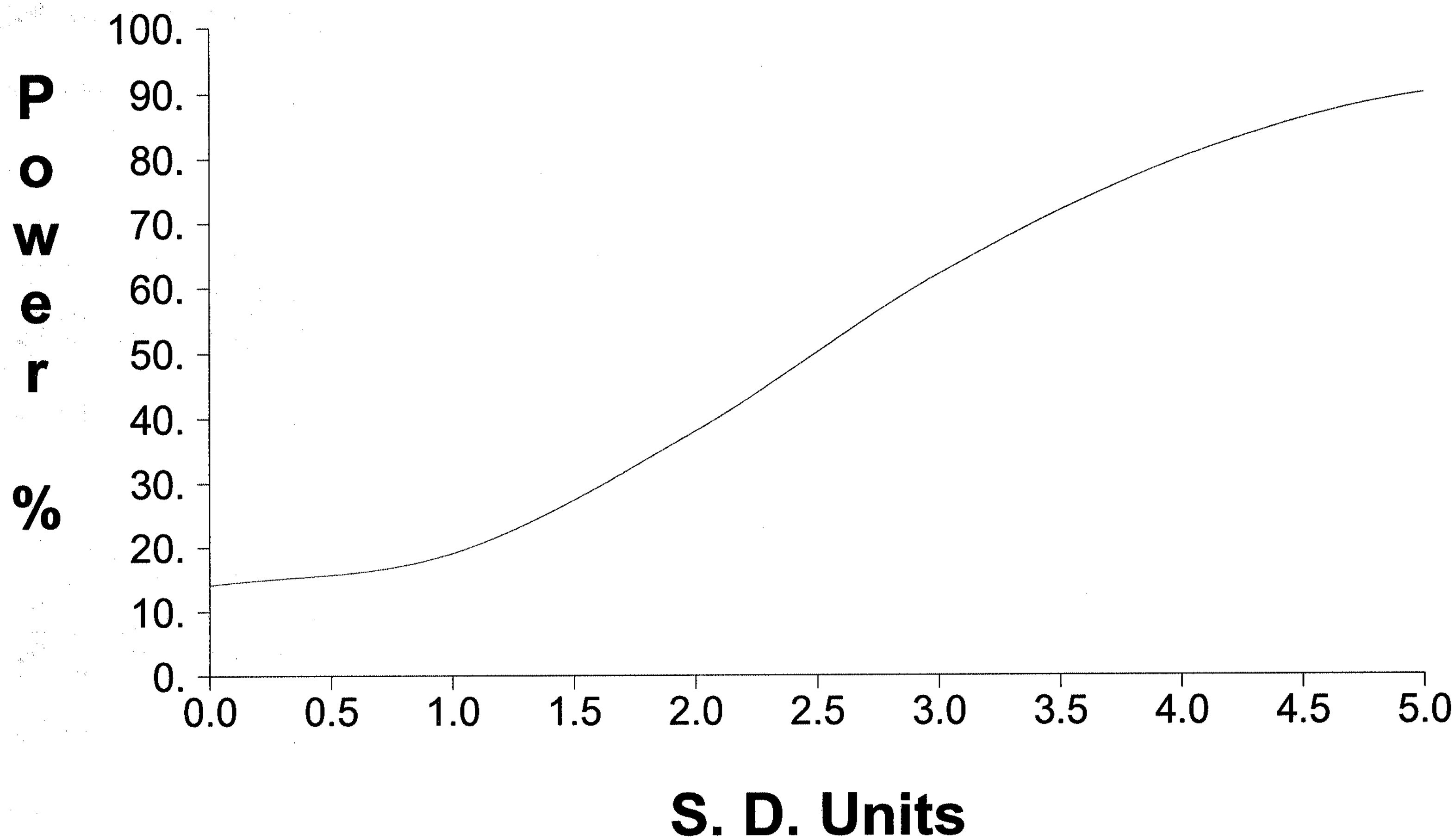
(a) Prediction limit calculated using DUMPStat.

Appendix C

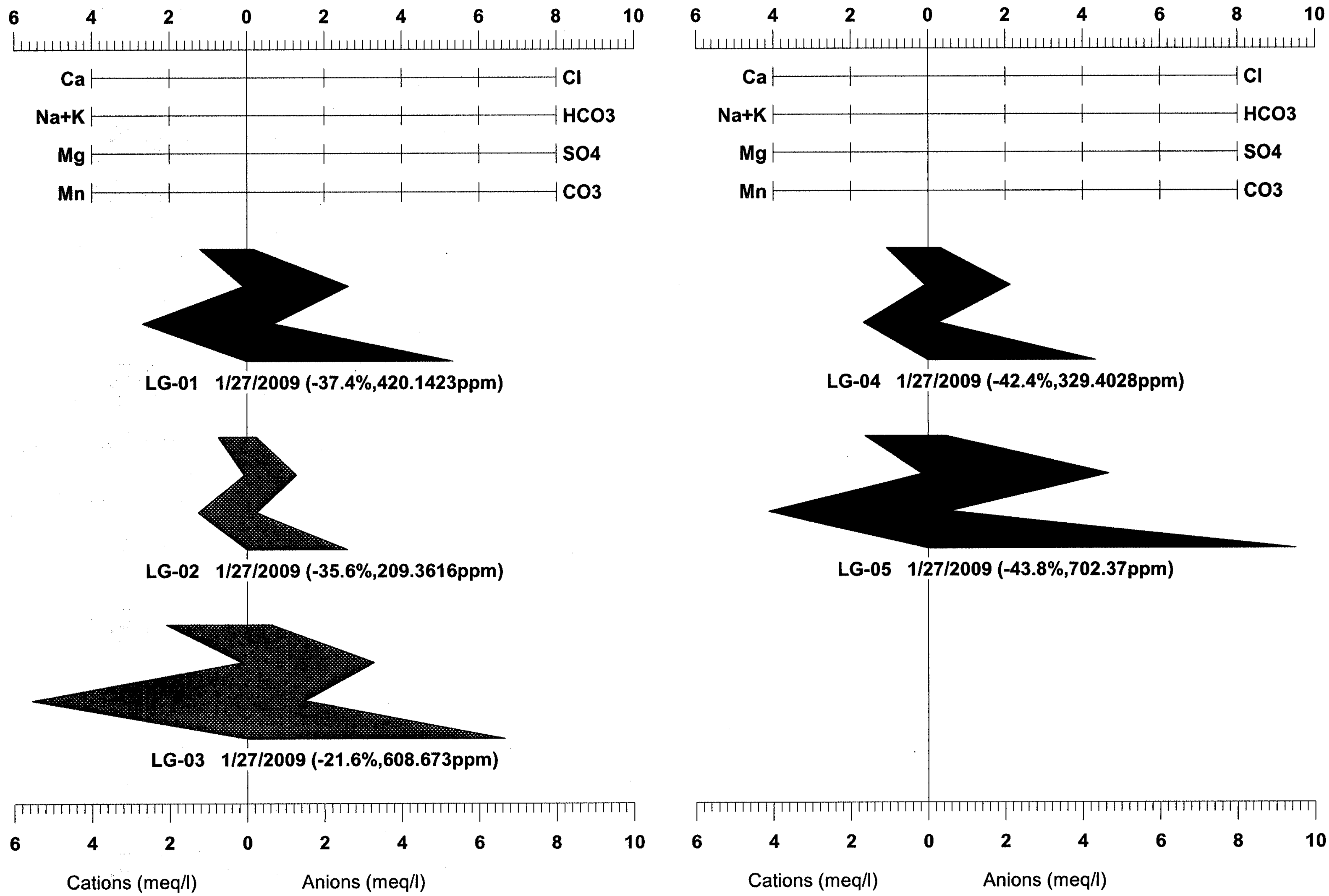
Stiff, Tri-linear and Trend Analysis

1st QUARTER

False Positive and False Negative Rates for Current Upgradient vs. Downgradient Monitoring Program



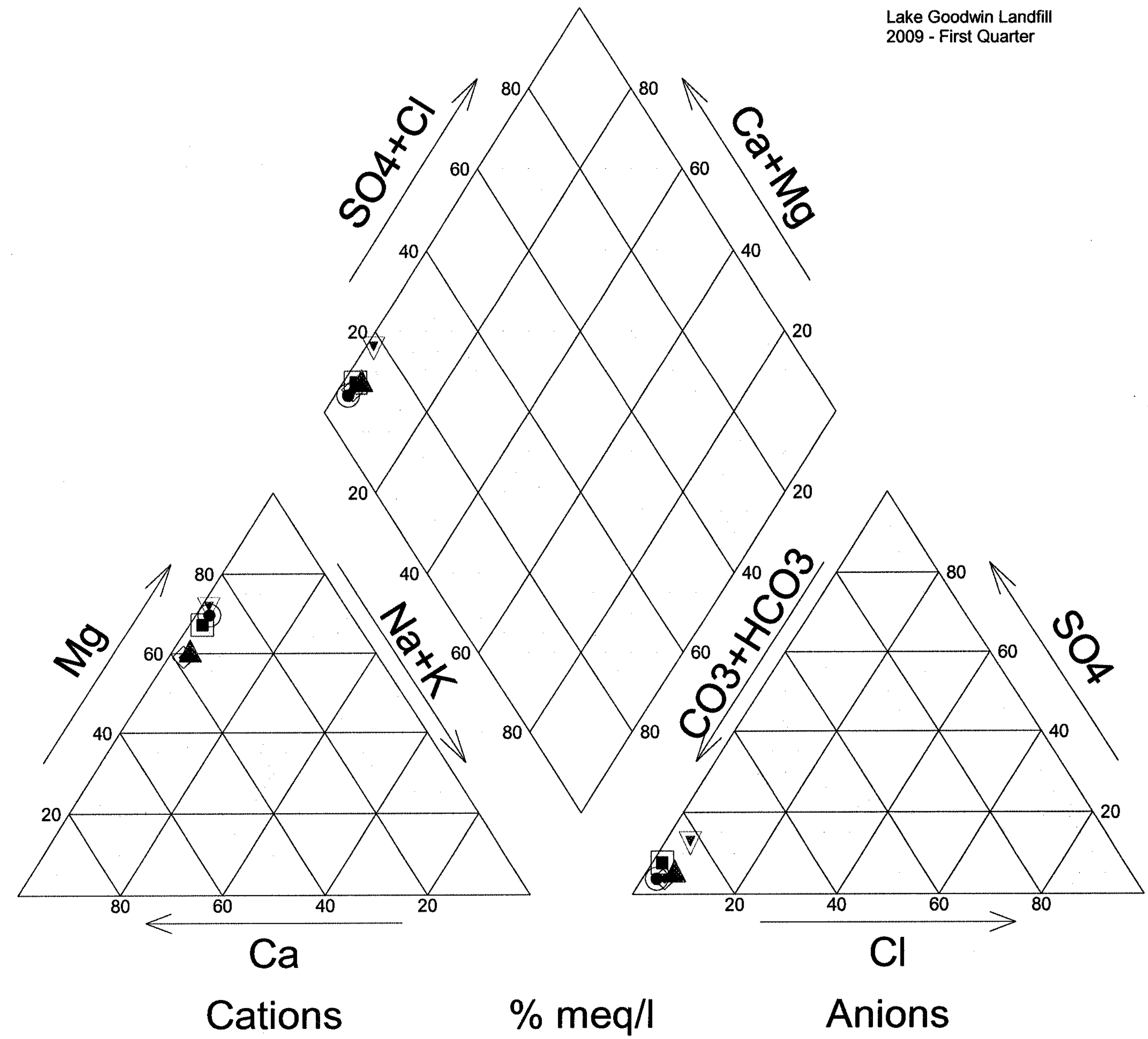
Goodwin Landfill



Prepared by: Snohomish County Solid Waste

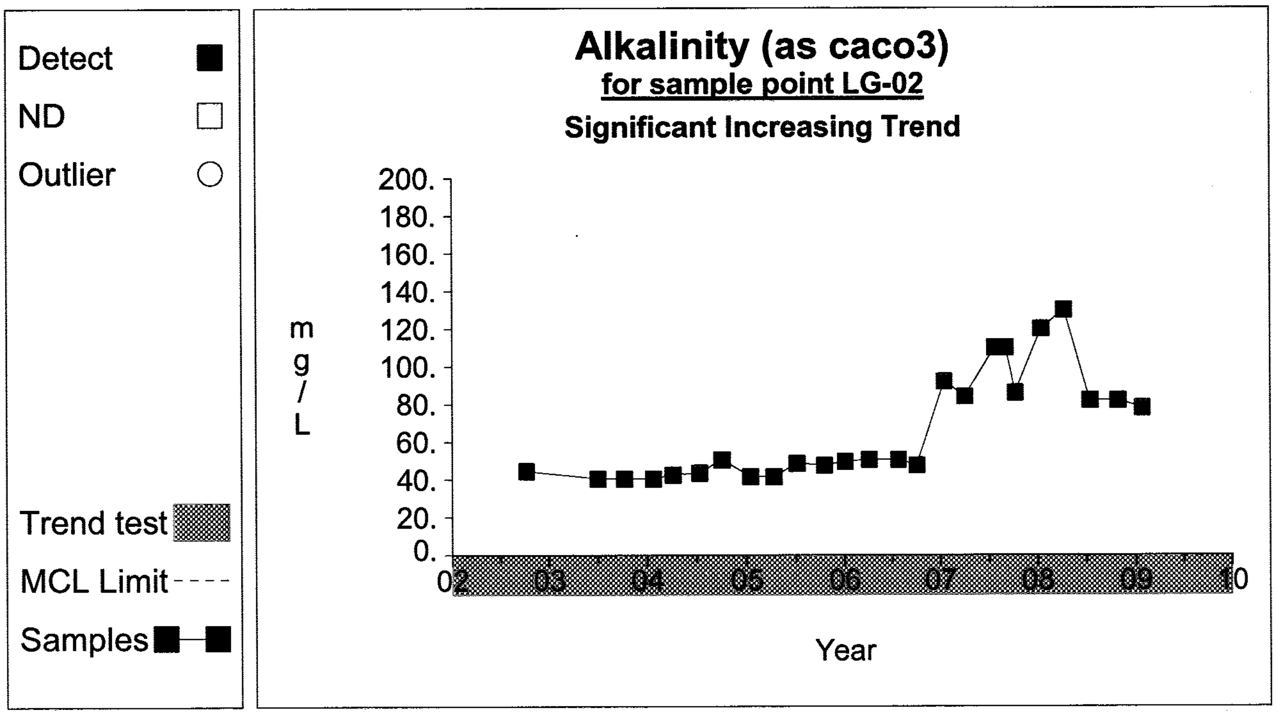
Goodwin Landfill

■	LG-01	1/27/2009 (-37.4%,420.14ppm)
▲	LG-02	1/27/2009 (-35.6%,209.36ppm)
▽	LG-03	1/27/2009 (-21.6%,608.67ppm)
◈	LG-04	1/27/2009 (-42.5%,329.4ppm)
◉	LG-05	1/27/2009 (-43.8%,702.365ppm)

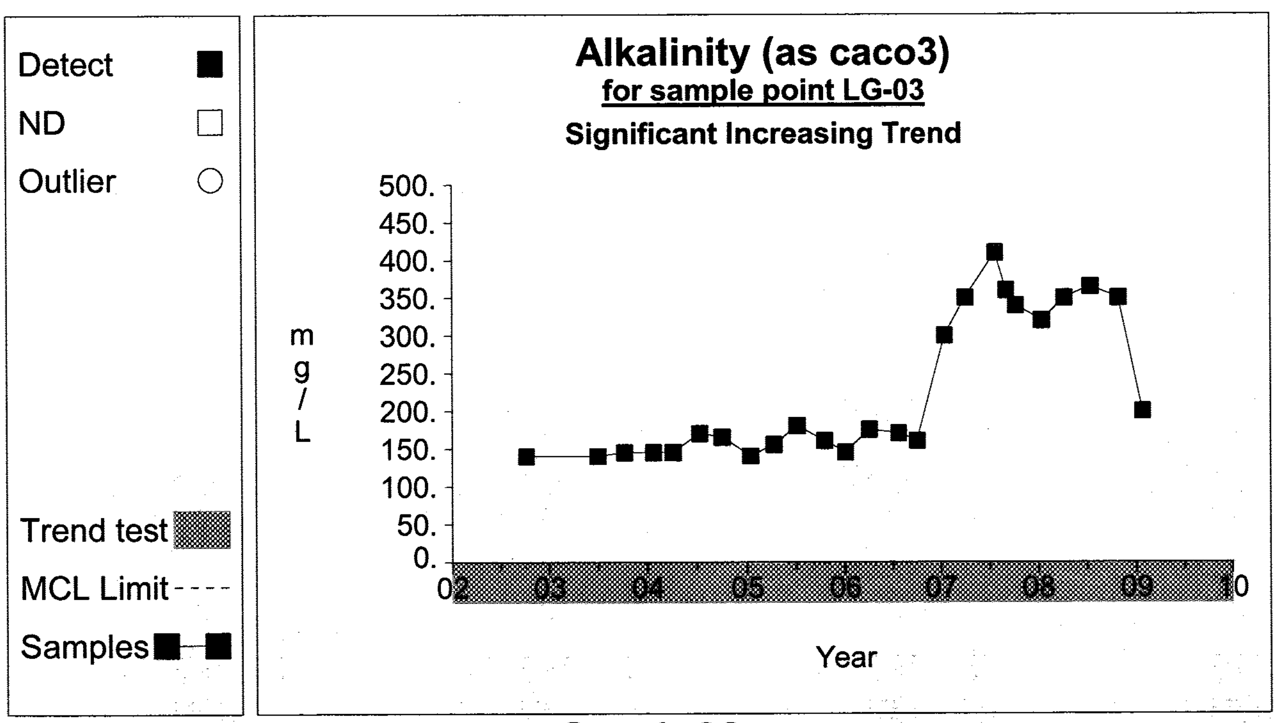


Prepared by: Snohomish County Solid Waste

Time Series

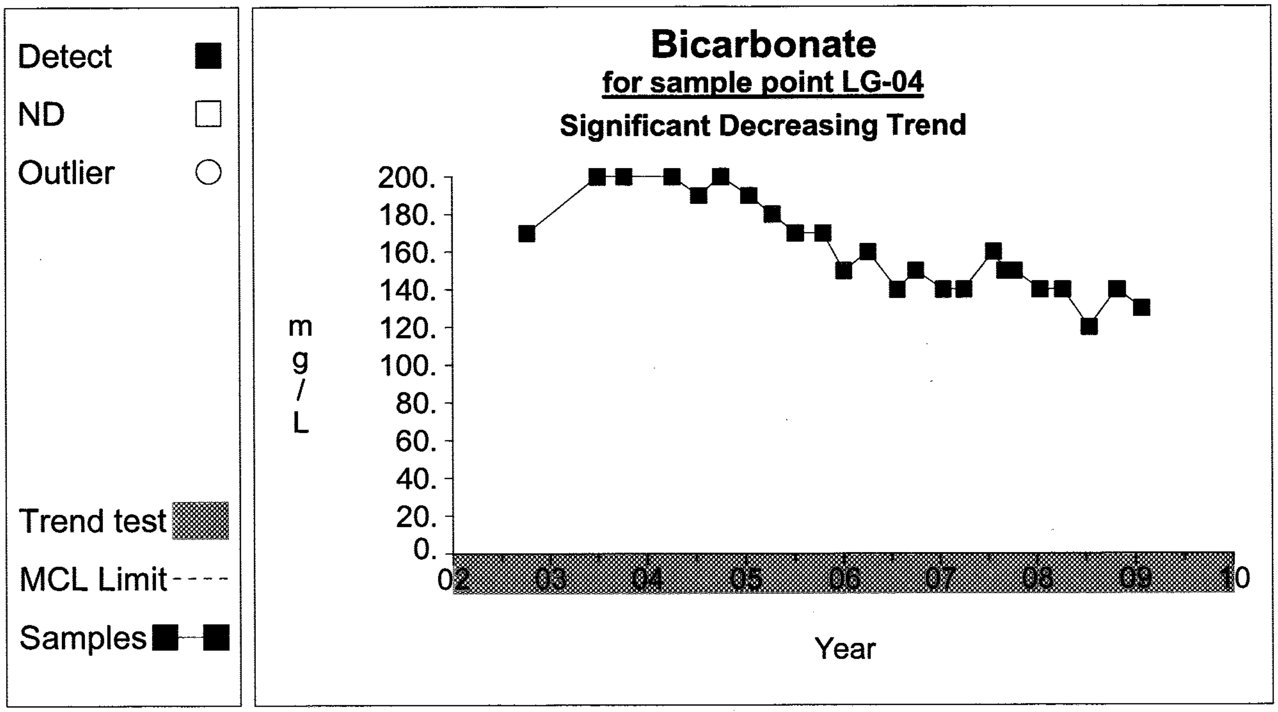


Graph 87

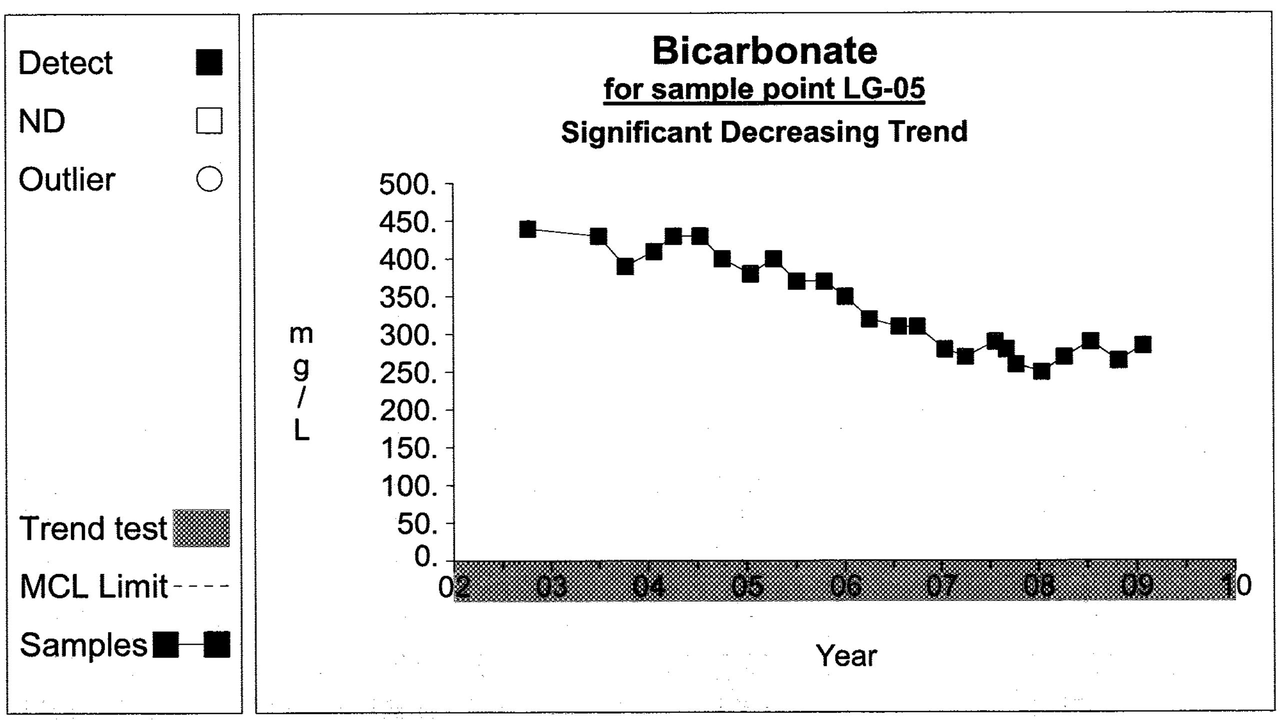


Graph 88

Time Series

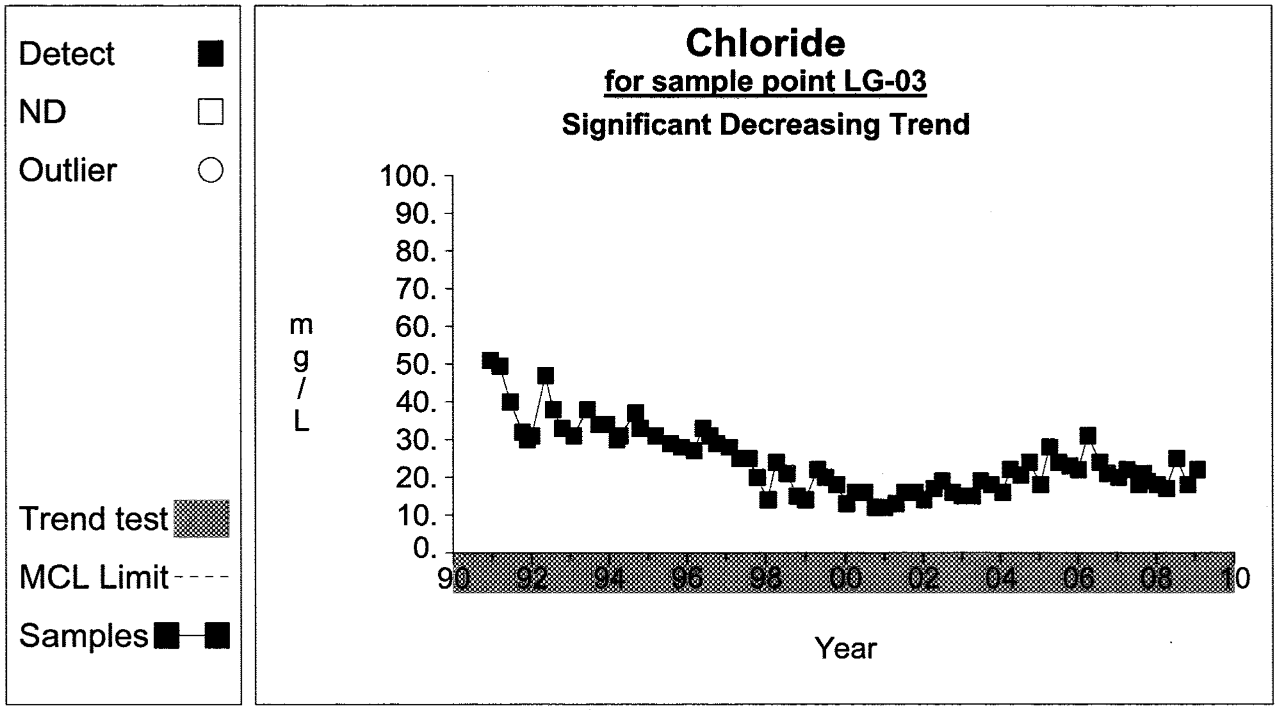


Graph 104

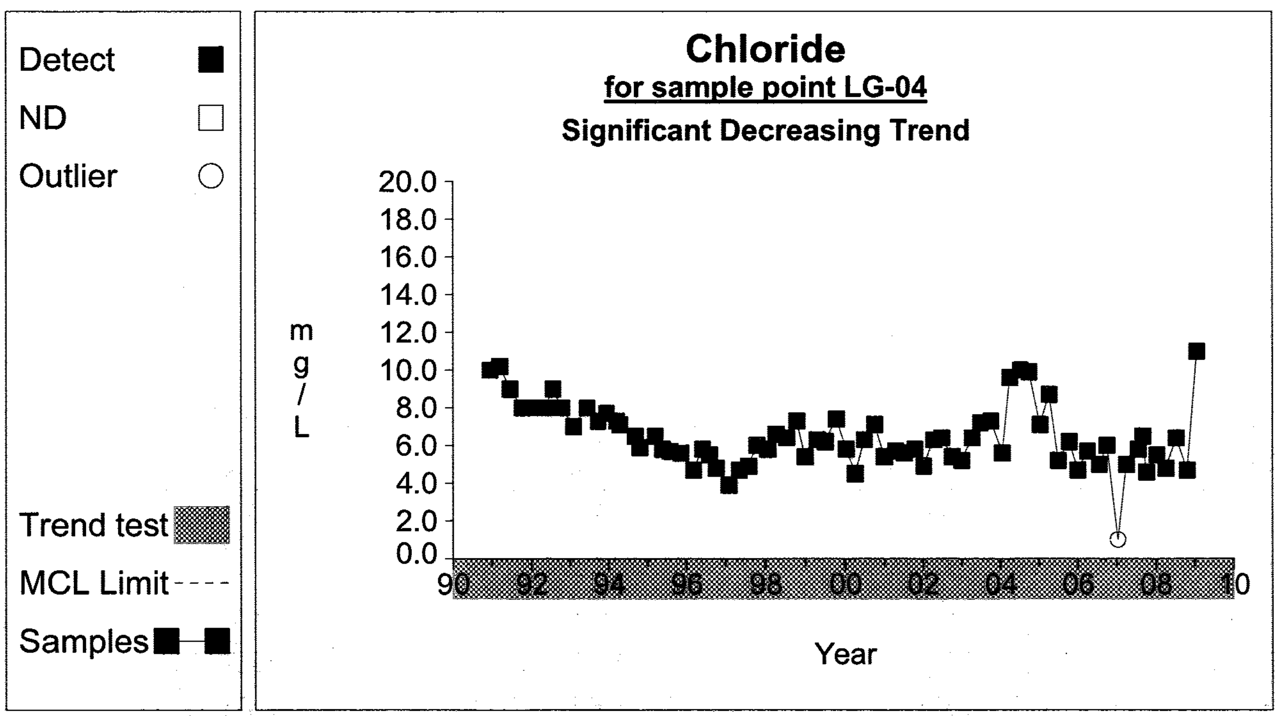


Graph 105

Time Series

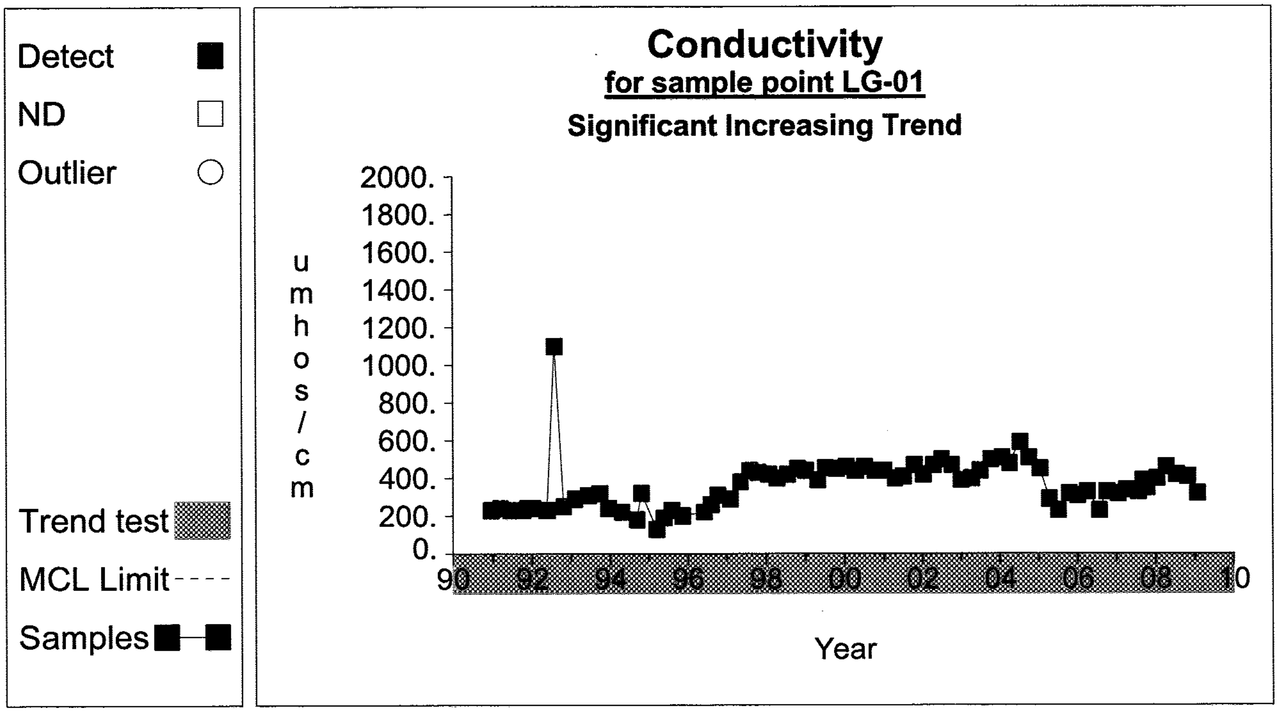


Graph 138

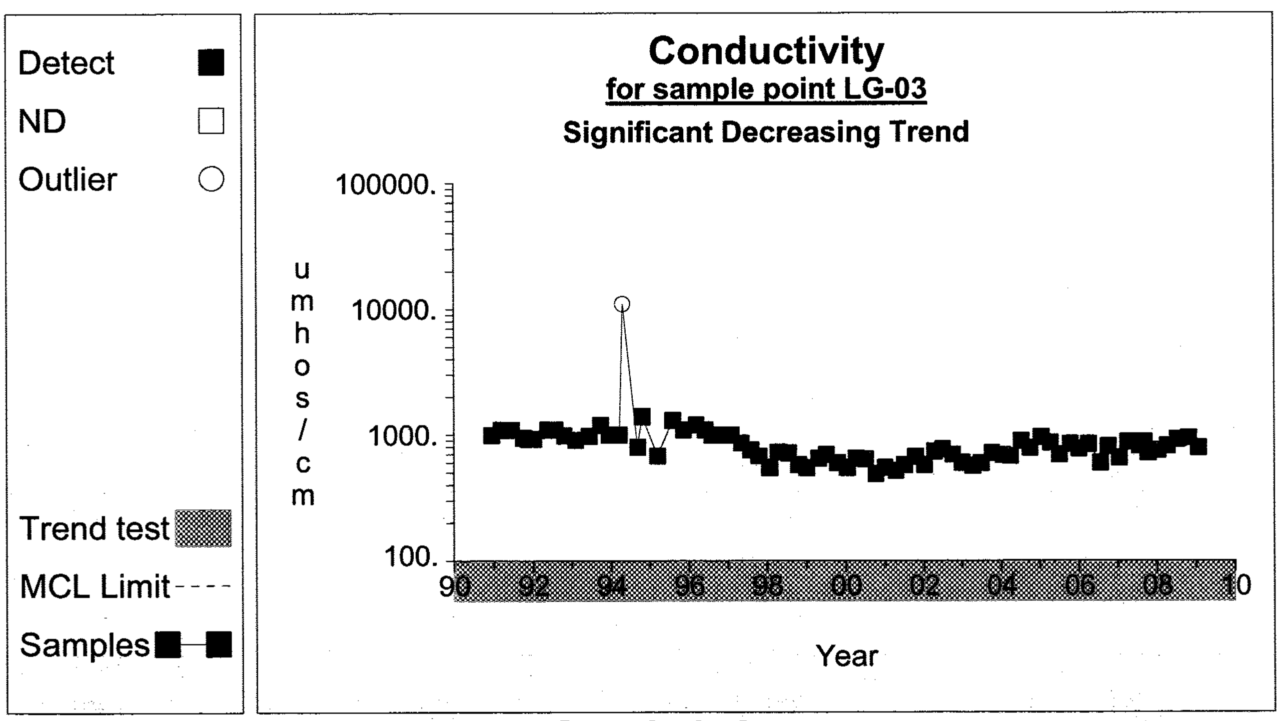


Graph 139

Time Series

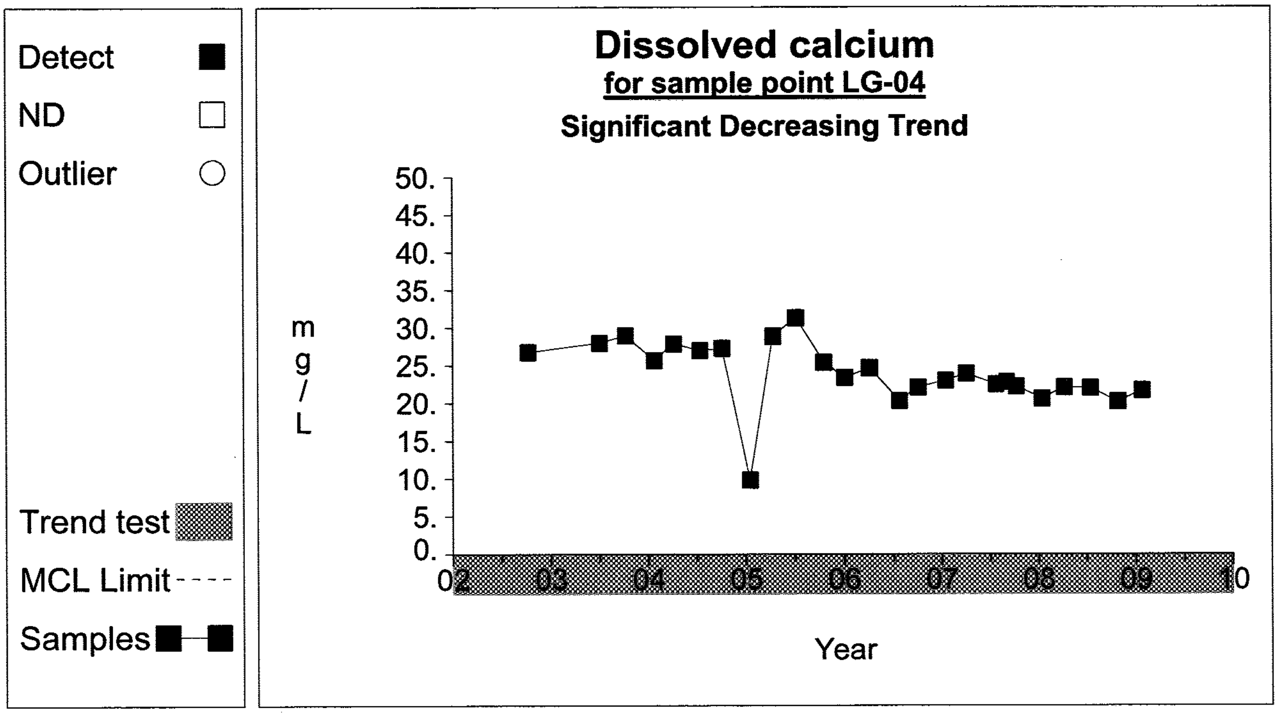


Graph 176

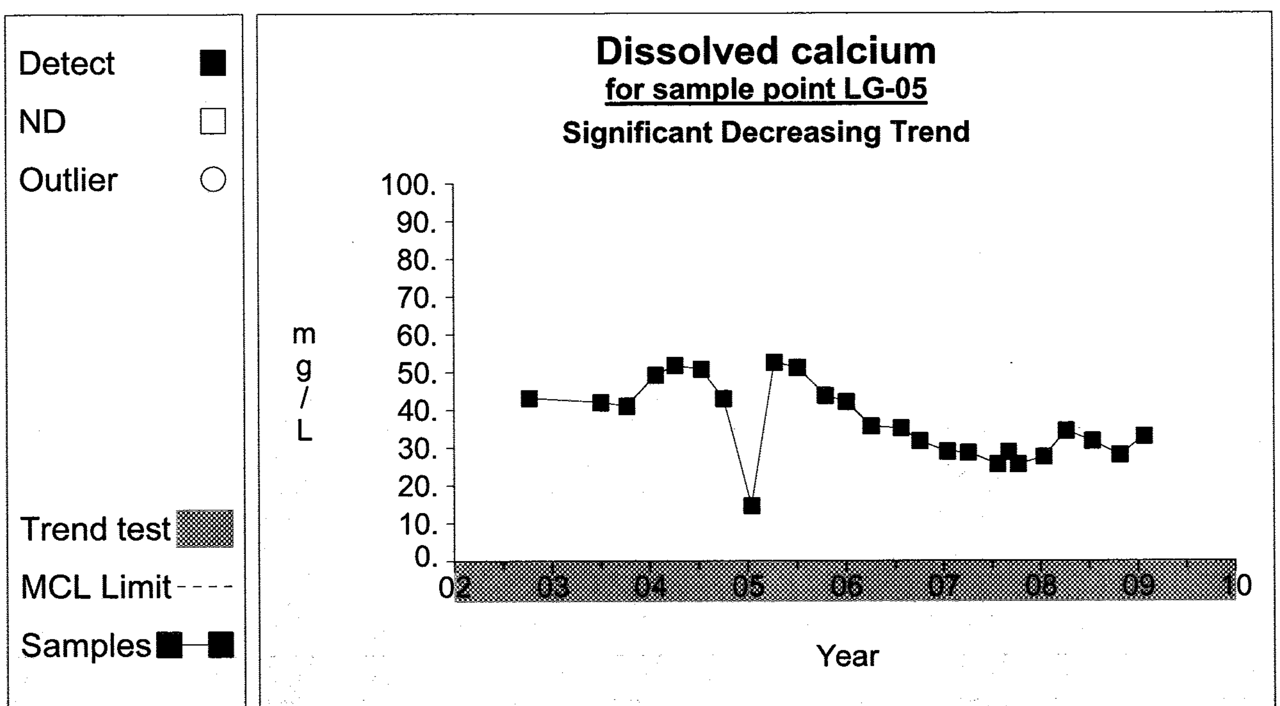


Graph 178

Time Series

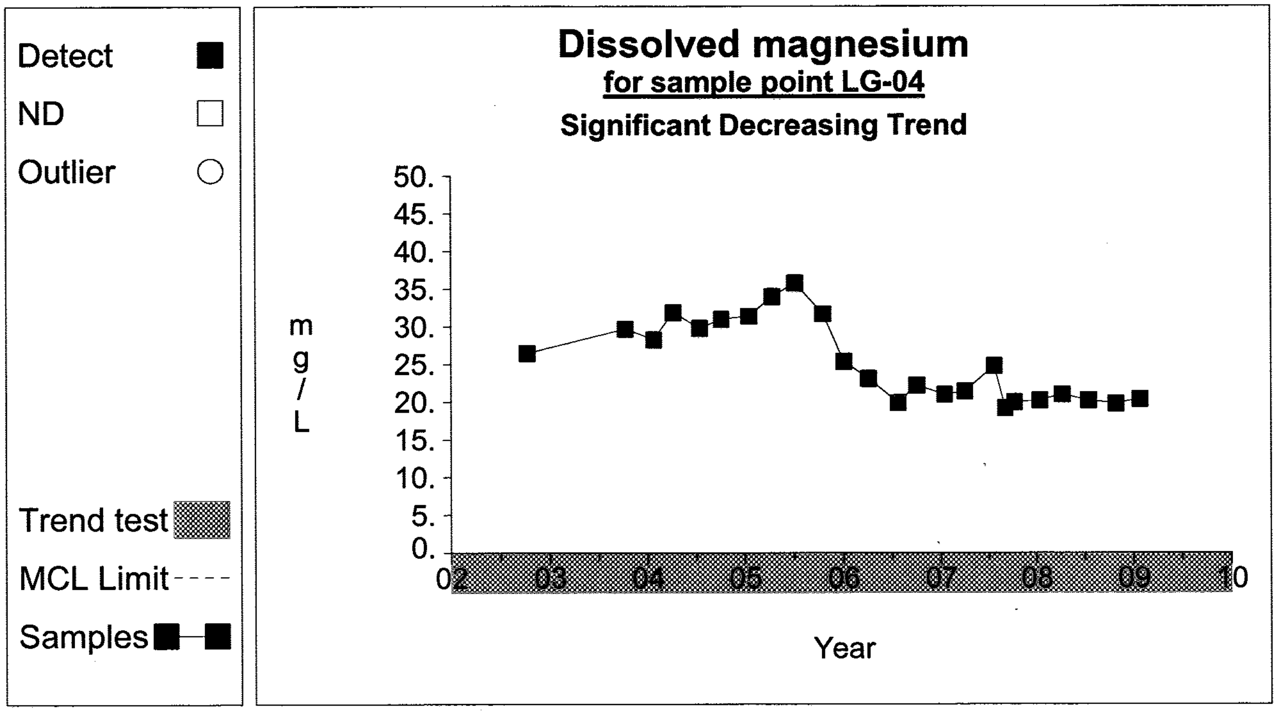


Graph 214

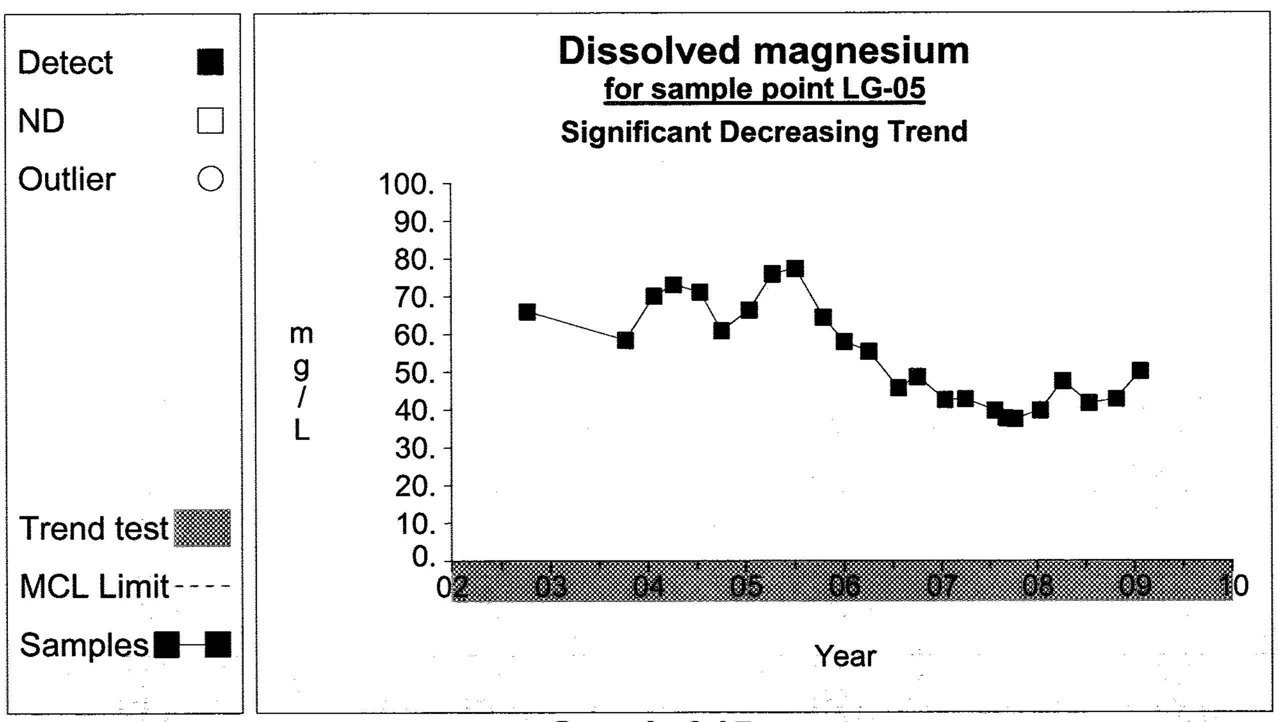


Graph 215

Time Series

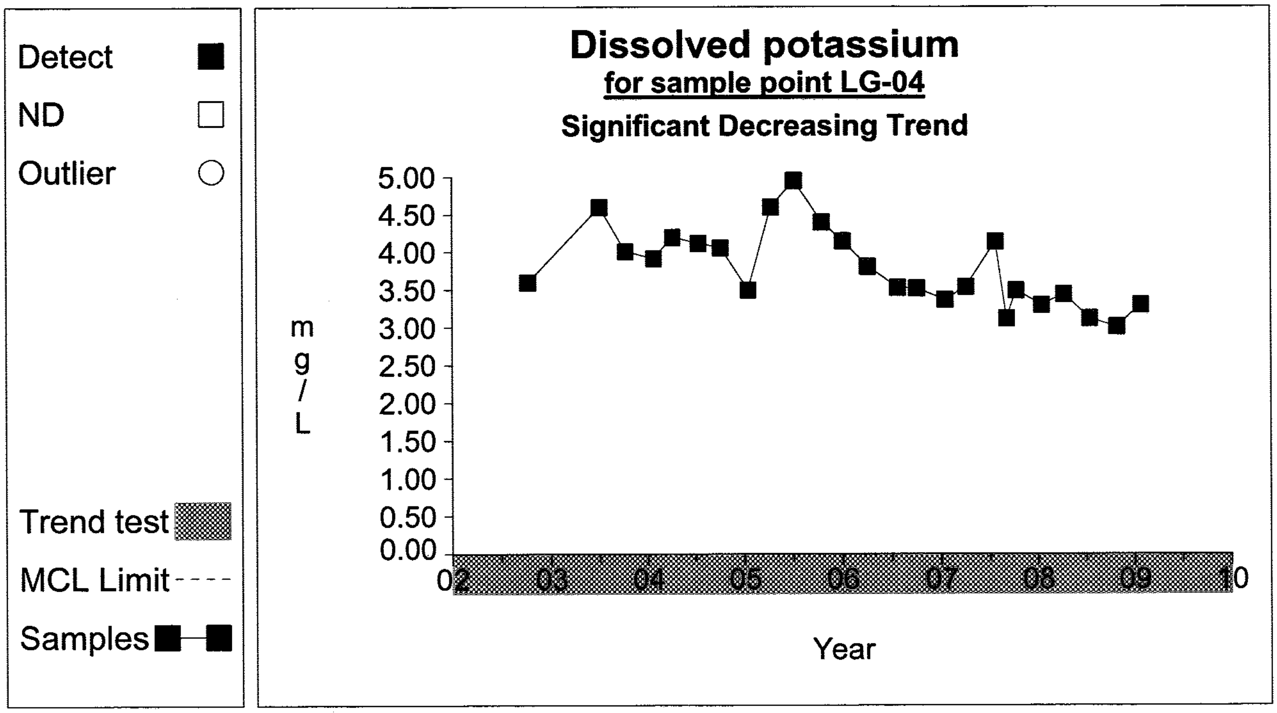


Graph 244

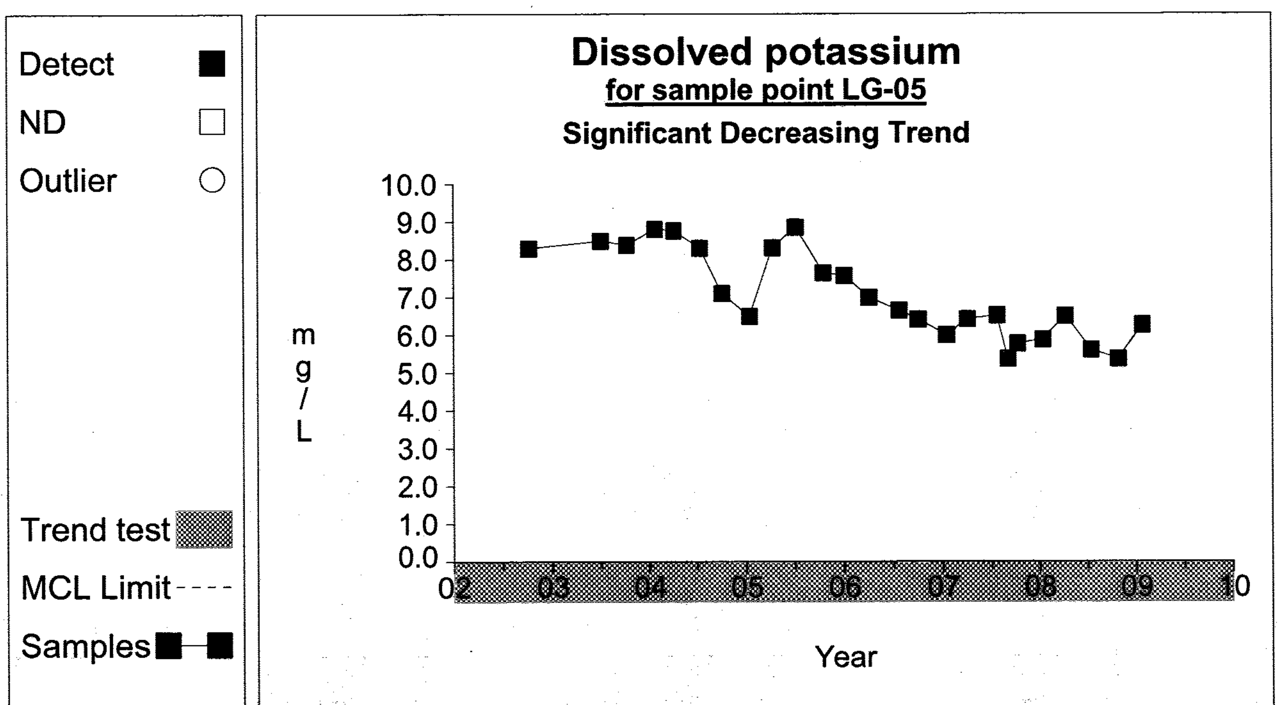


Graph 245

Time Series

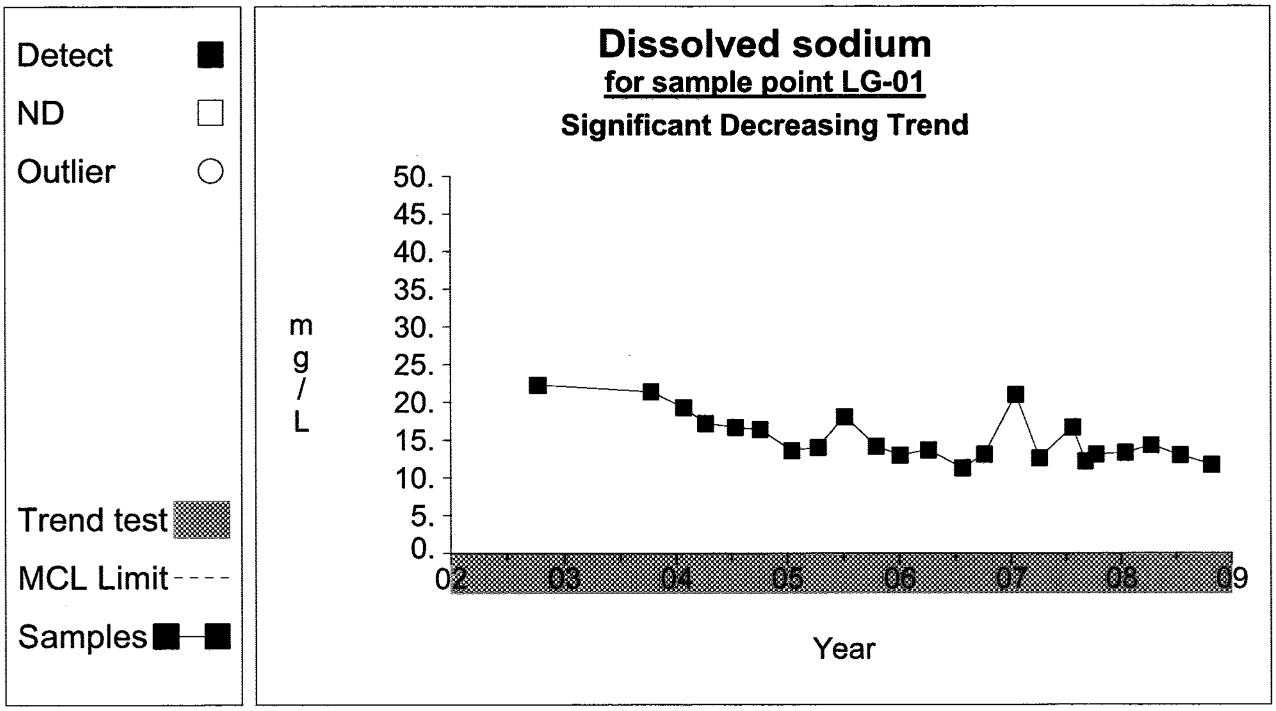


Graph 259

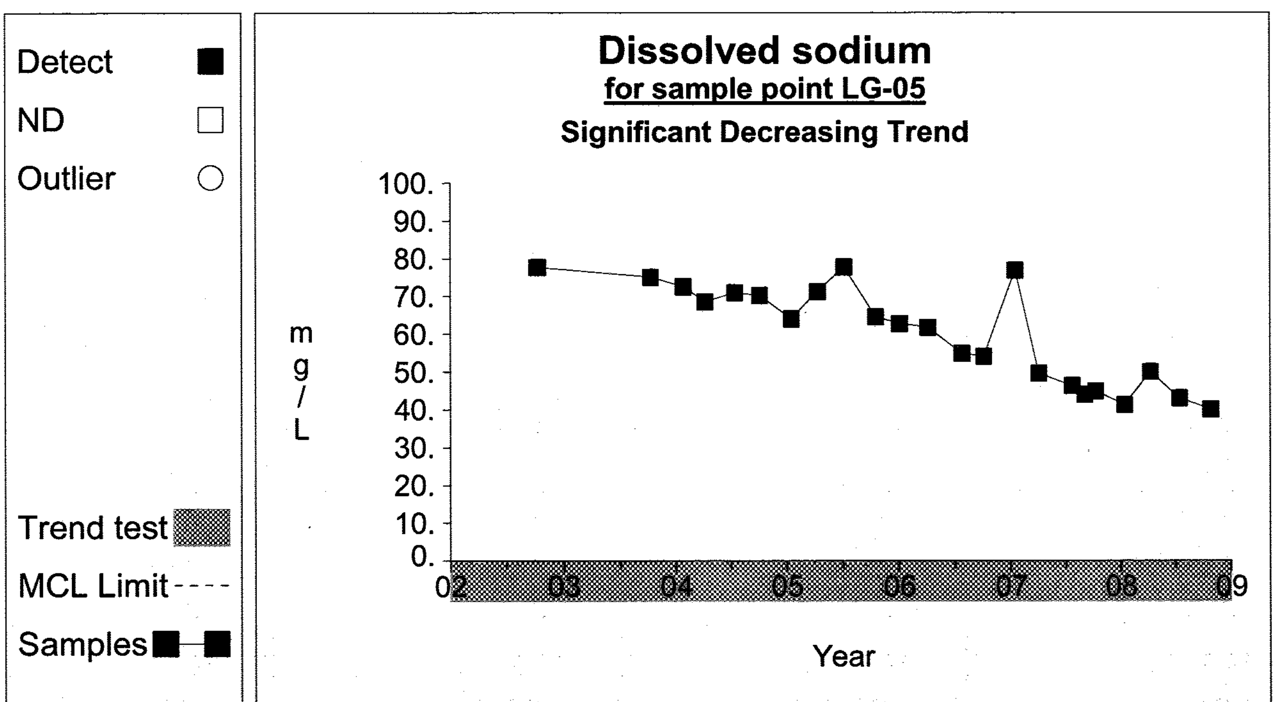


Graph 260

Time Series

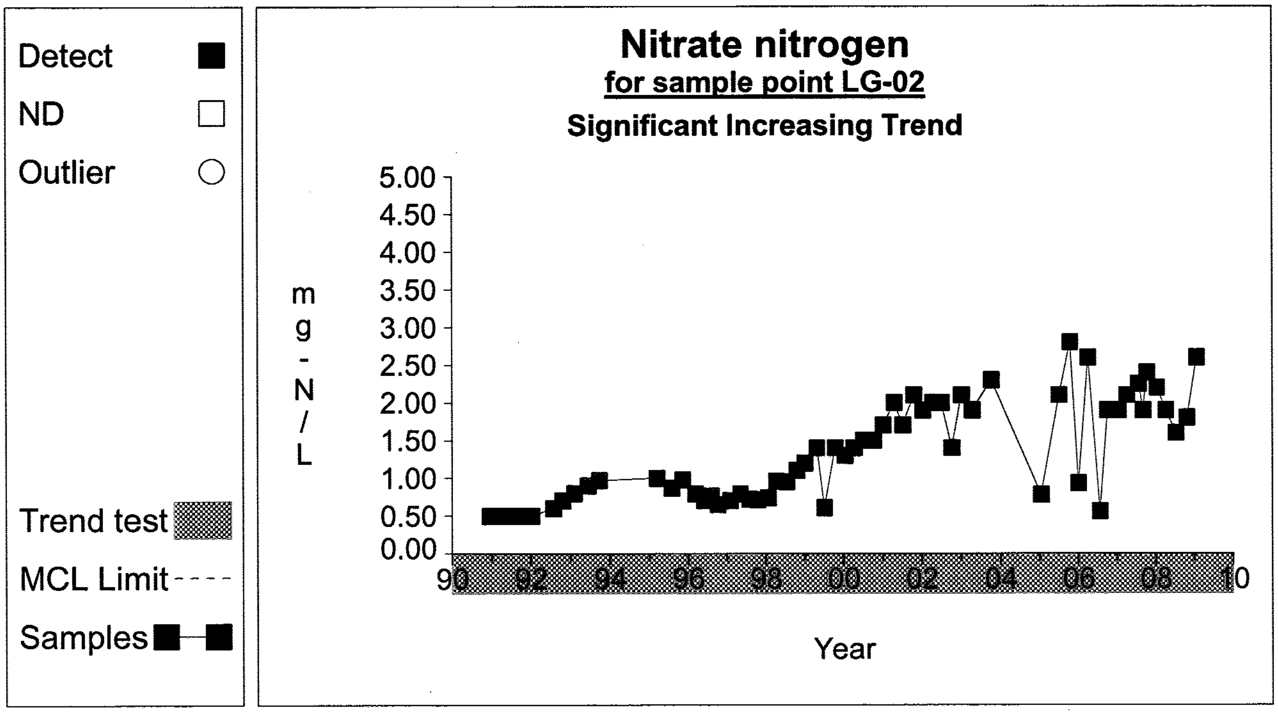


Graph 271

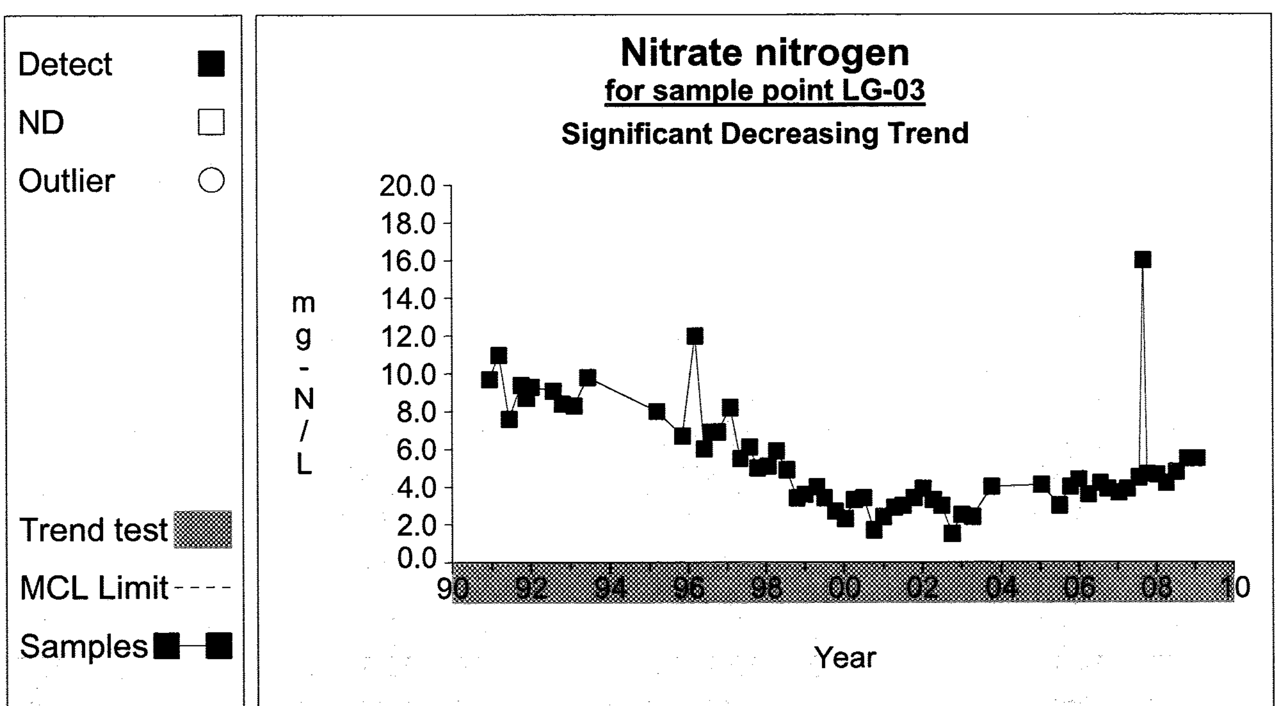


Graph 275

Time Series

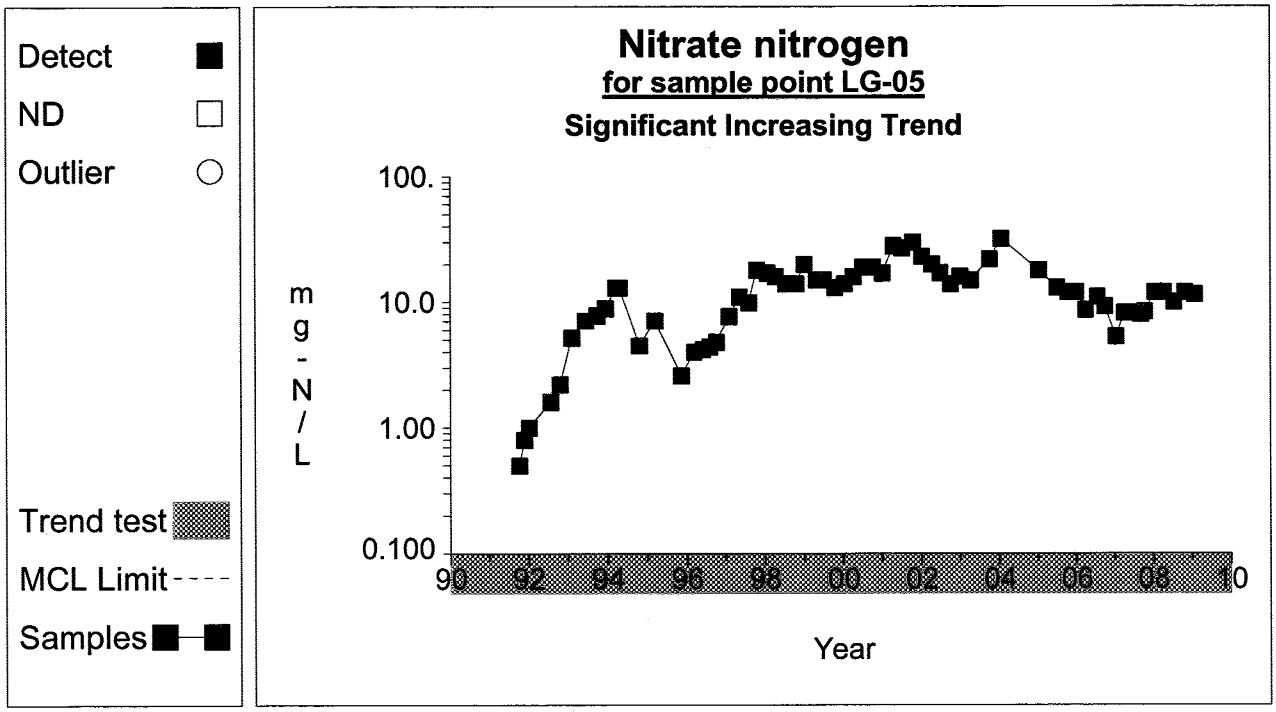


Graph 312



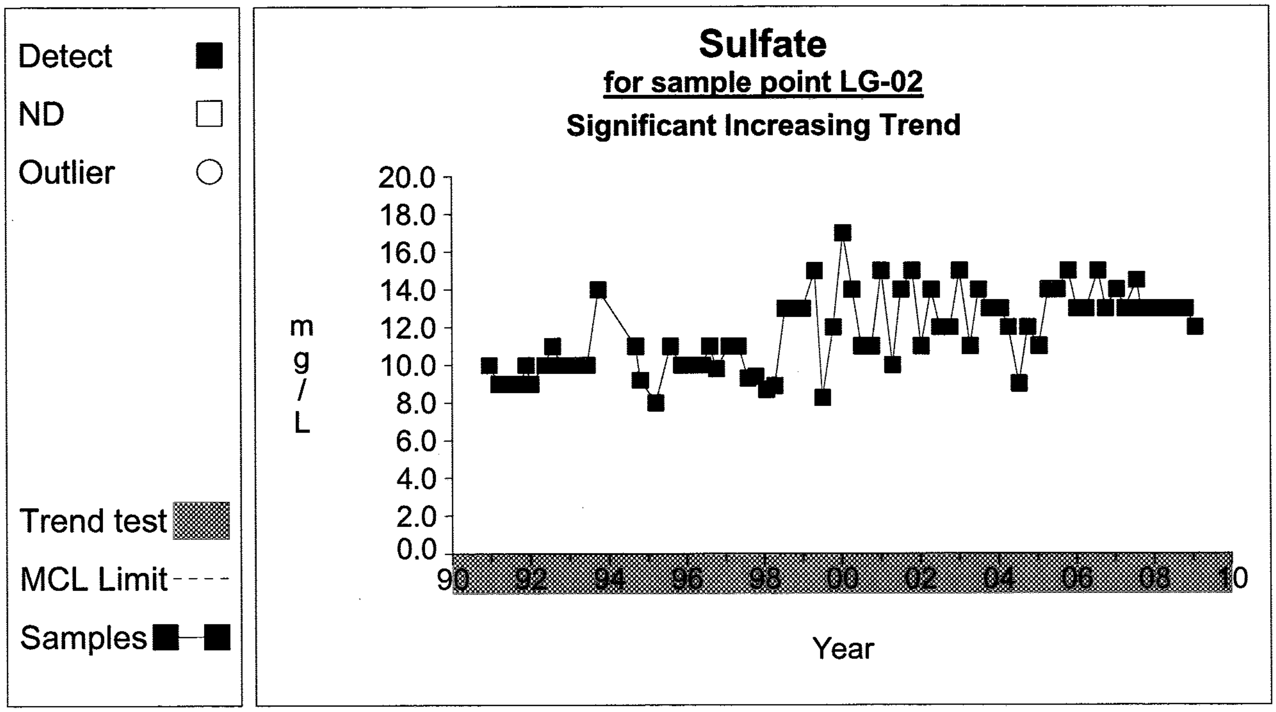
Graph 313

Time Series

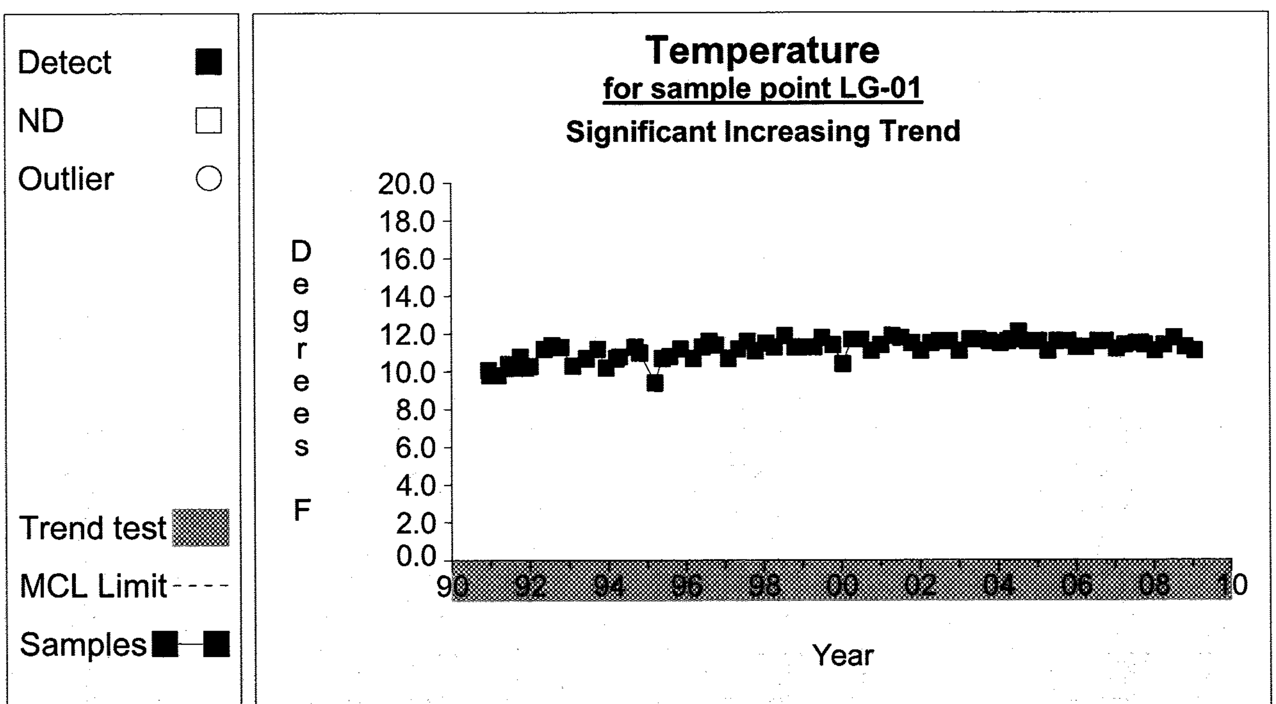


Graph 315

Time Series

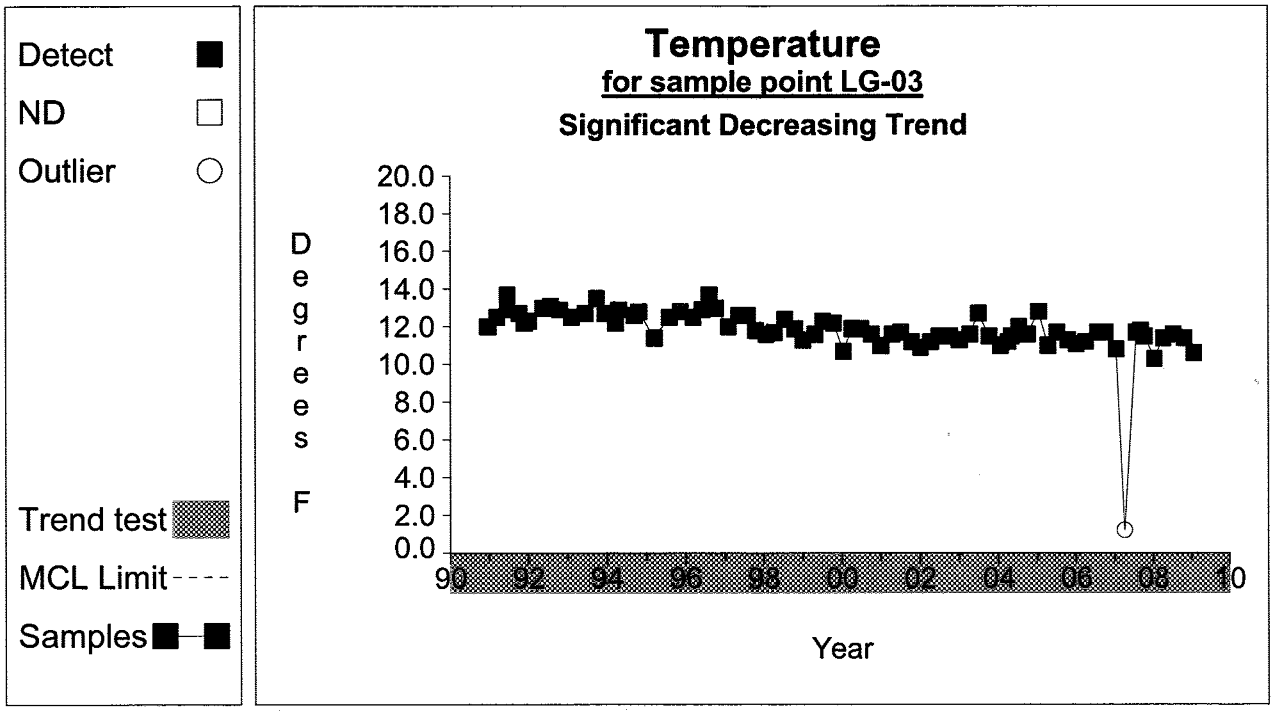


Graph 337

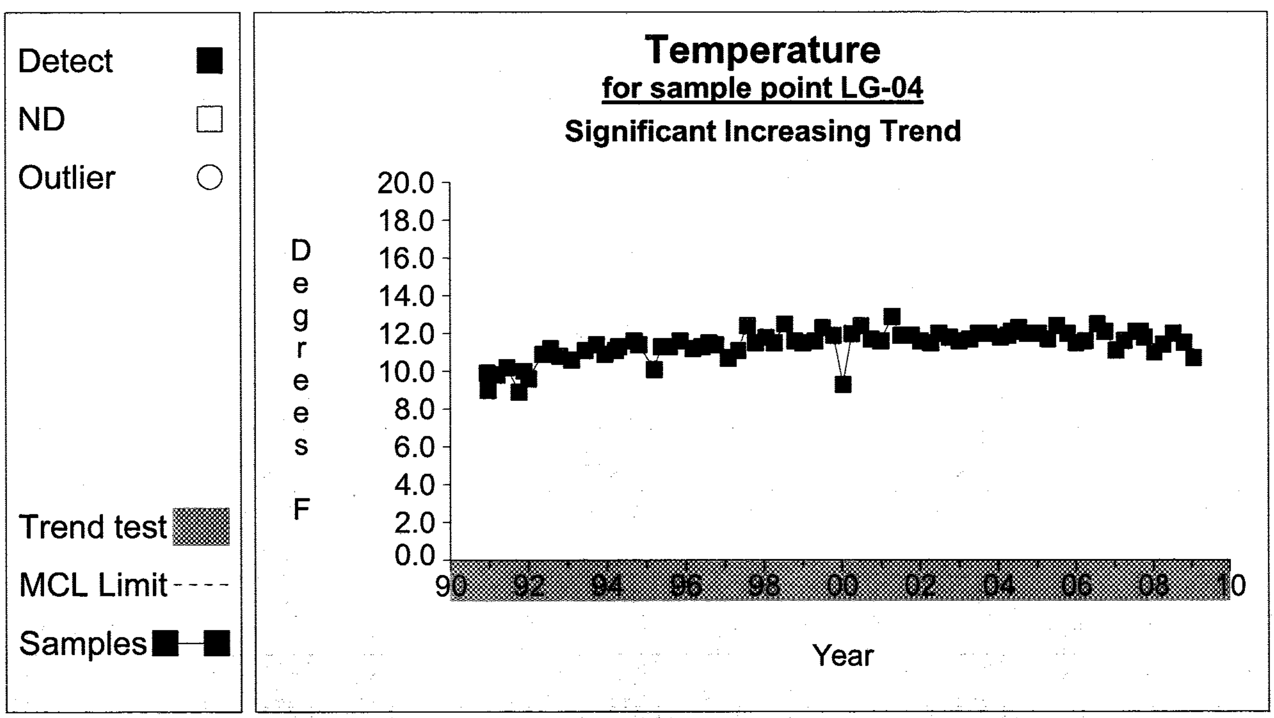


Graph 341

Time Series

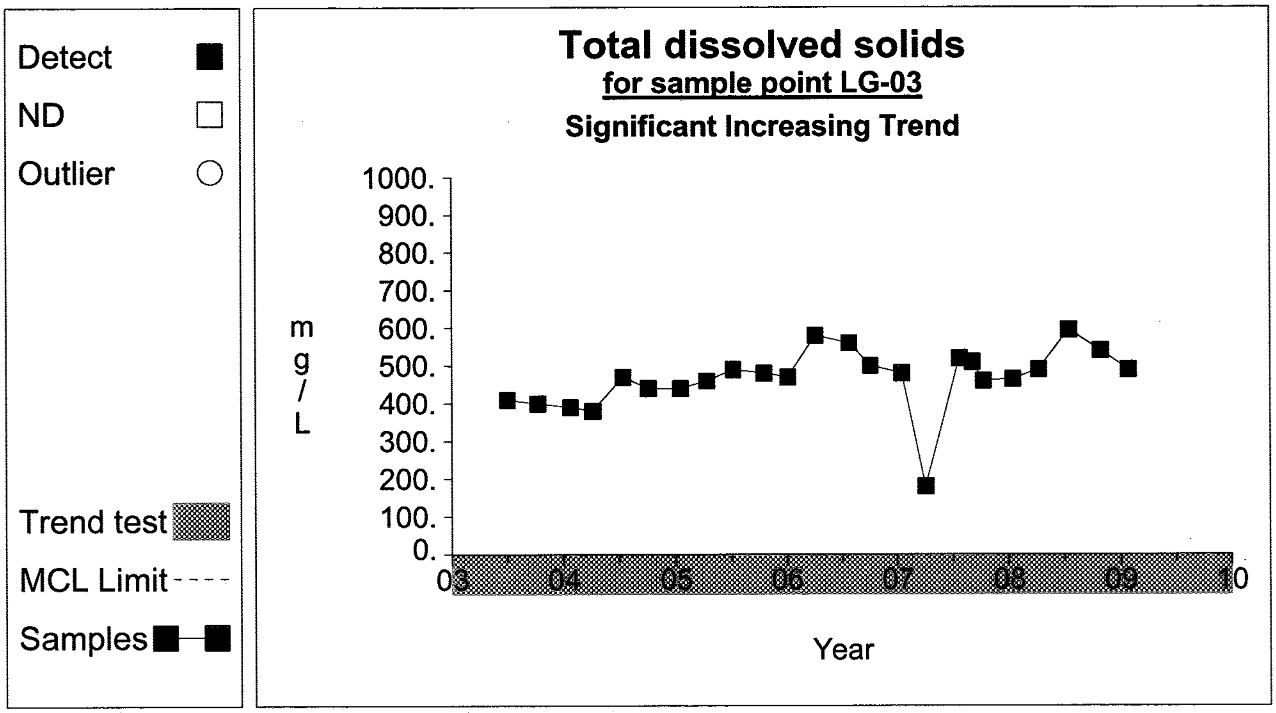


Graph 343

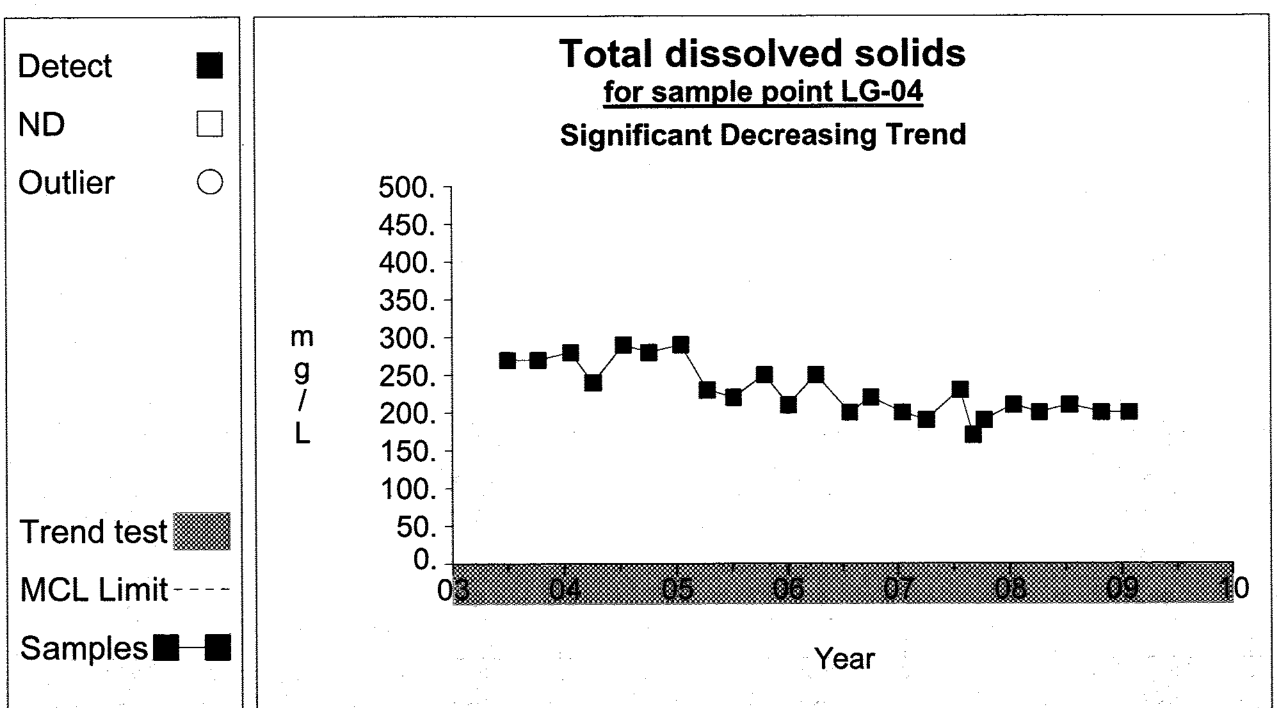


Graph 344

Time Series

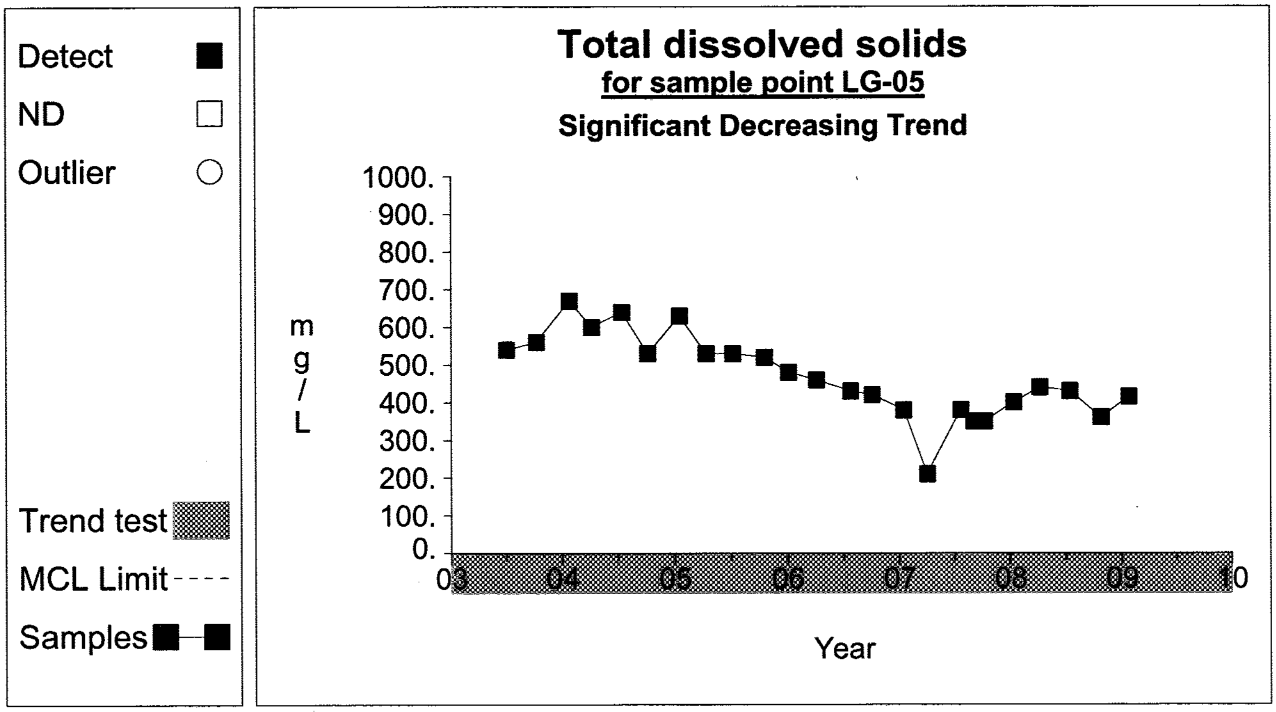


Graph 358



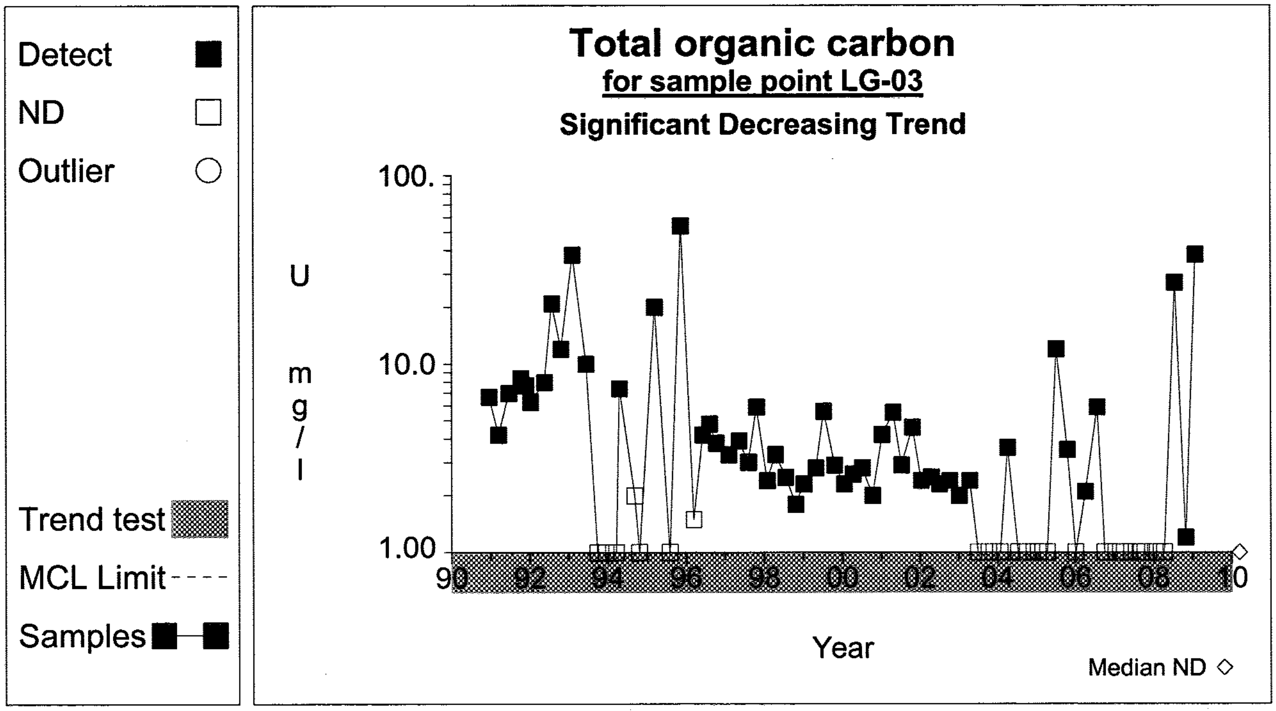
Graph 359

Time Series



Graph 360

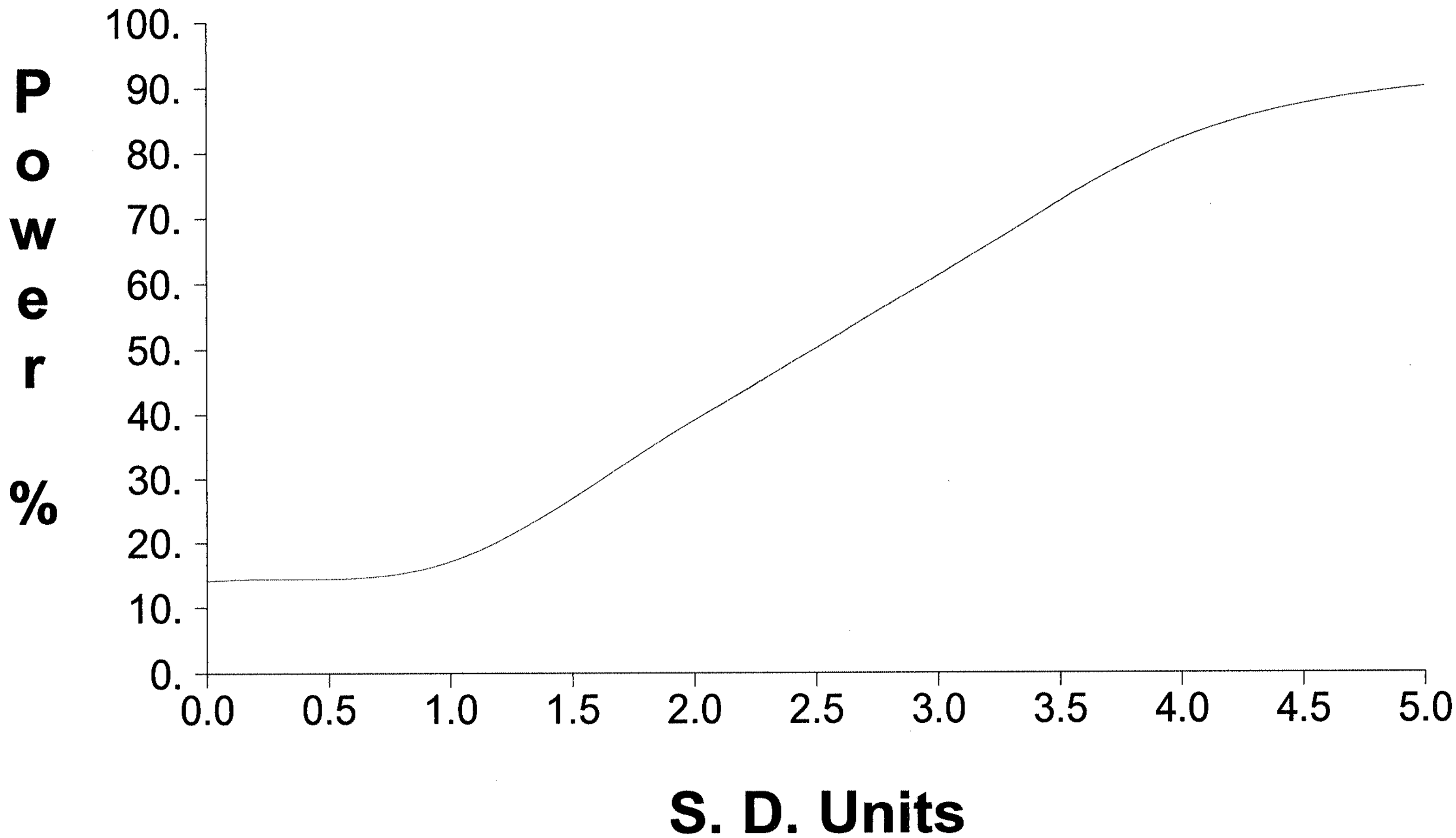
Time Series



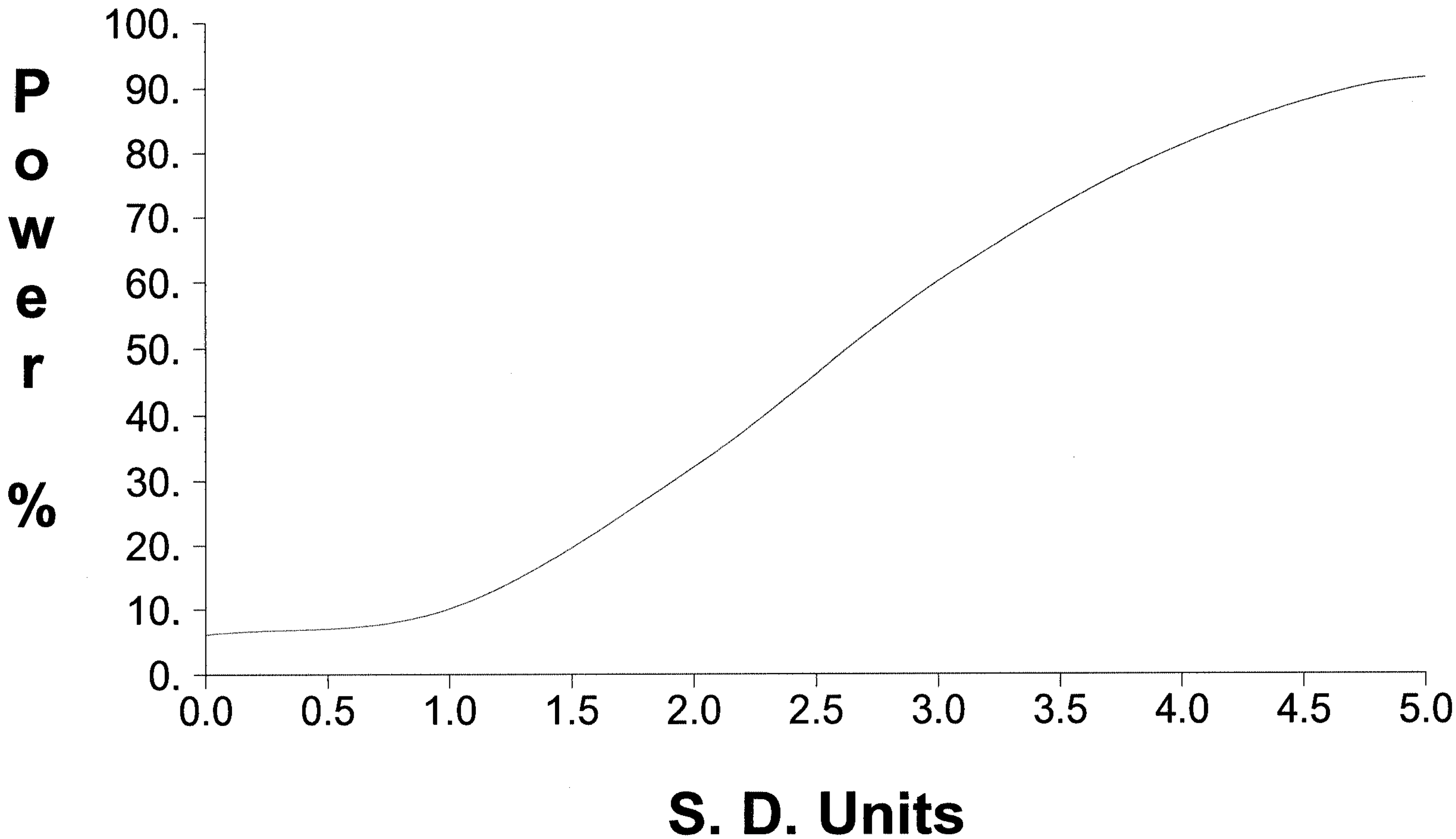
Graph 363

2ND QUARTER

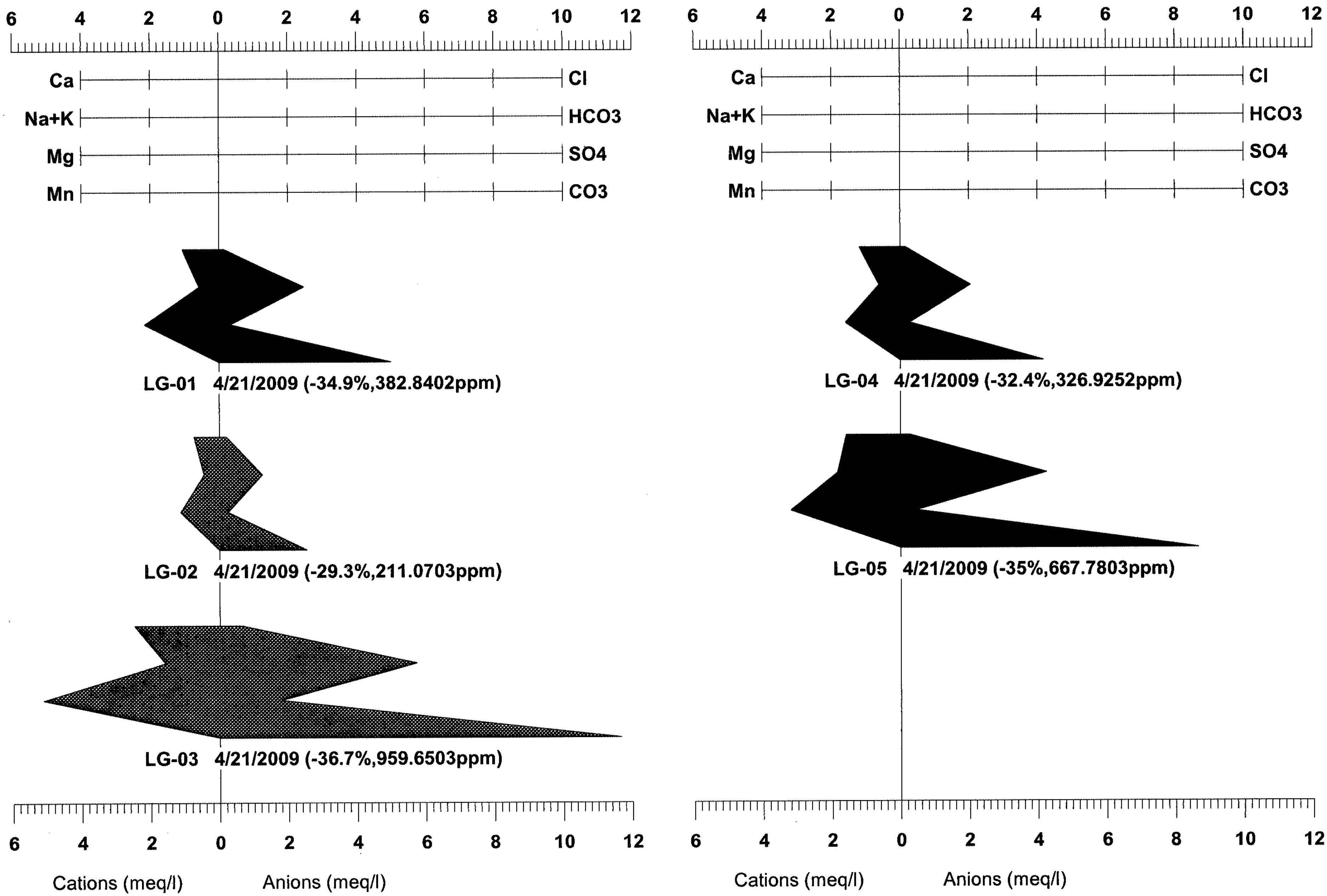
False Positive and False Negative Rates for Current Upgradient vs. Downgradient Monitoring Program



False Positive and False Negative Rates for Current Intra-Well Prediction Limits Monitoring Program



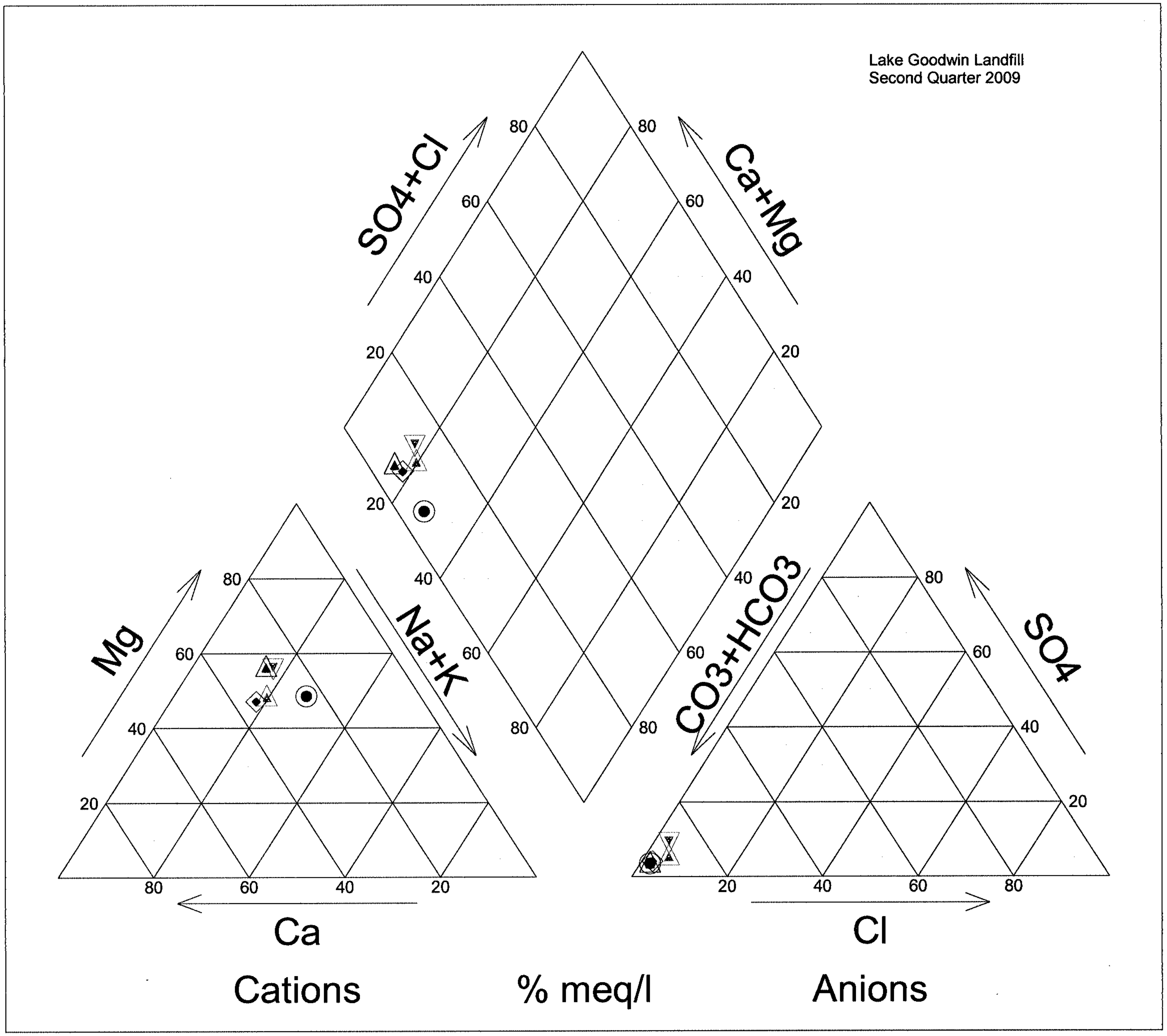
Goodwin Landfill



Prepared by: Snohomish County Solid Waste

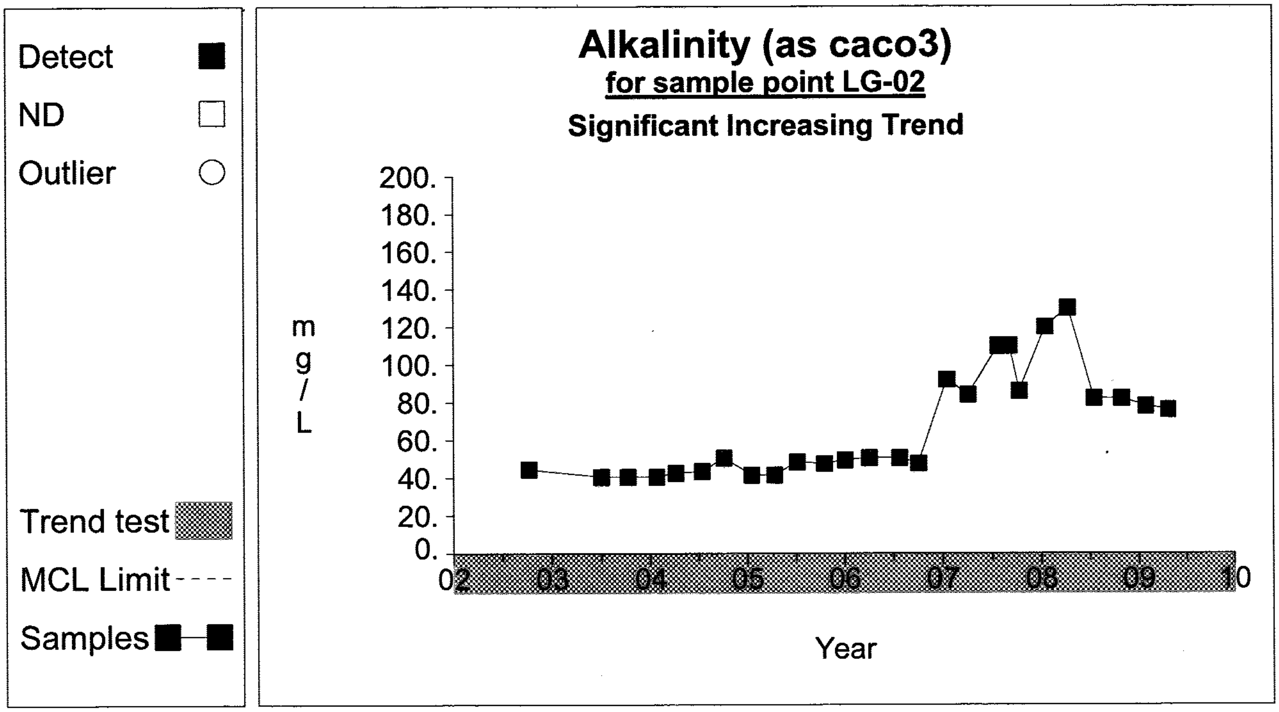
Goodwin Landfill

- LG-01 4/21/2009 (-34.9%,382.84ppm)
- LG-02 4/21/2009 (-29.3%,211.07ppm)
- LG-03 4/21/2009 (-36.7%,959.65ppm)
- LG-04 4/21/2009 (-32.4%,326.925ppm)
- LG-05 4/21/2009 (-35%,667.78ppm)

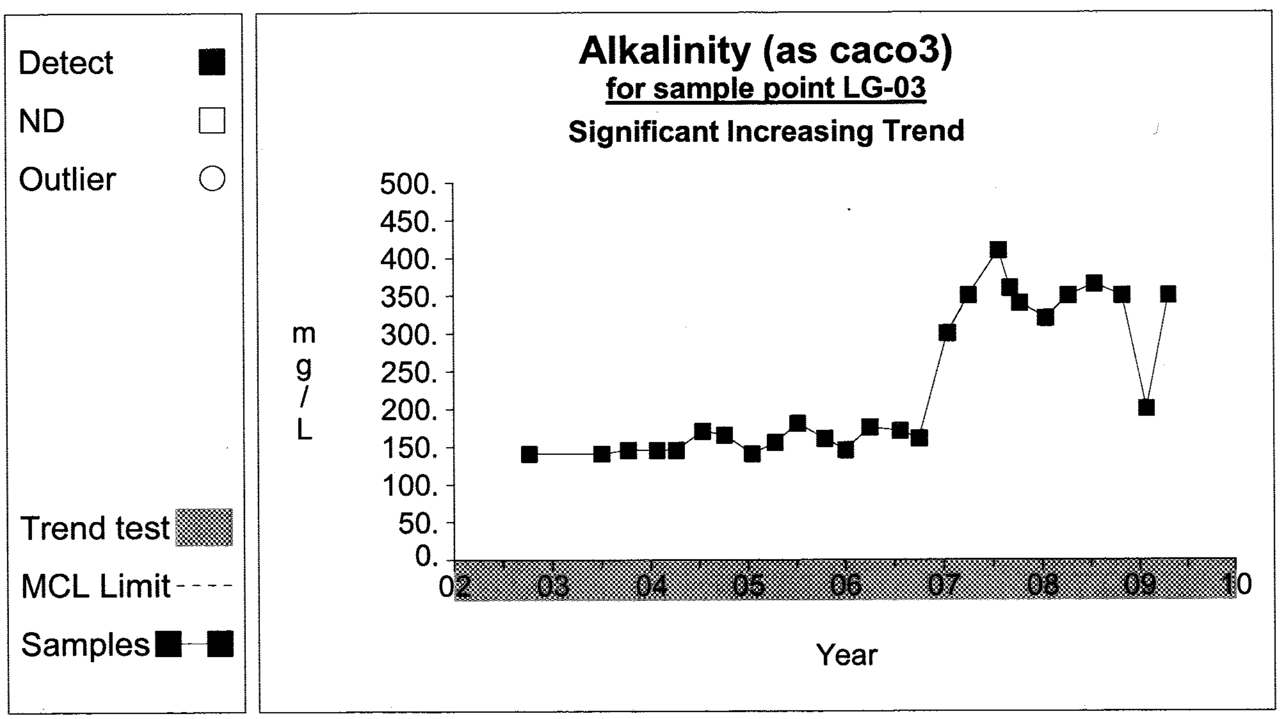


Prepared by: Snohomish County Solid Waste

Time Series

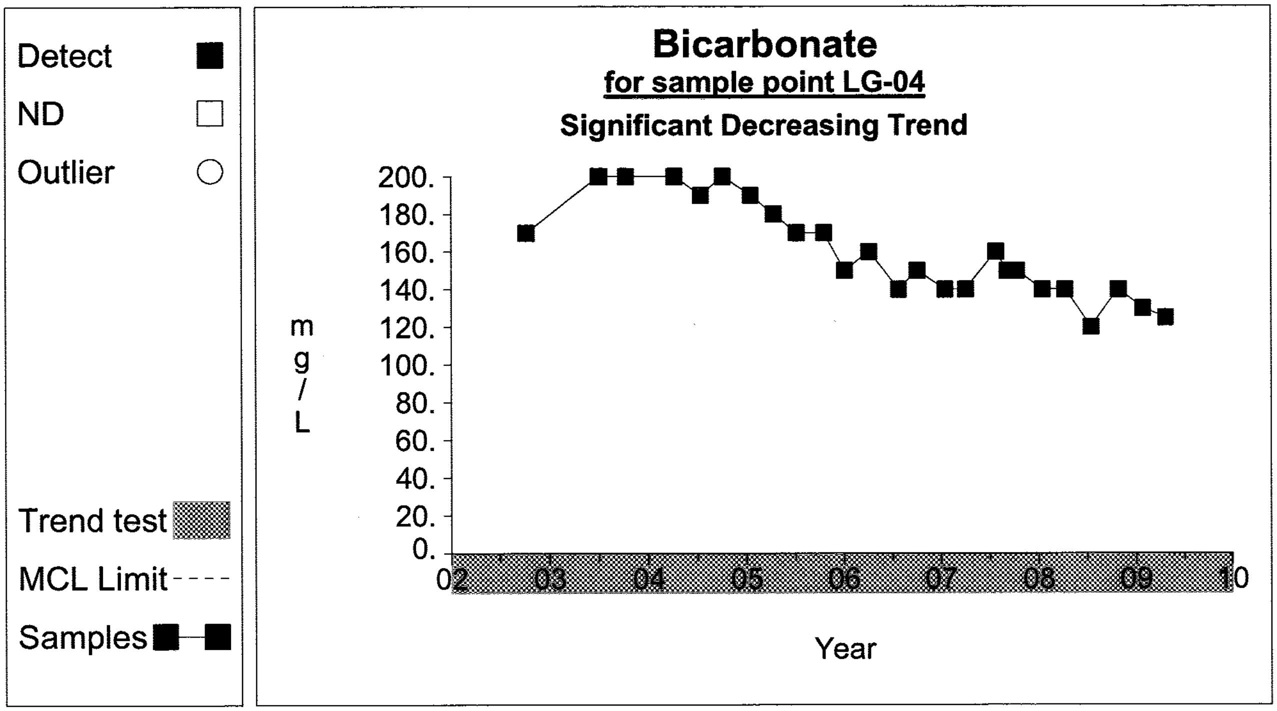


Graph 87

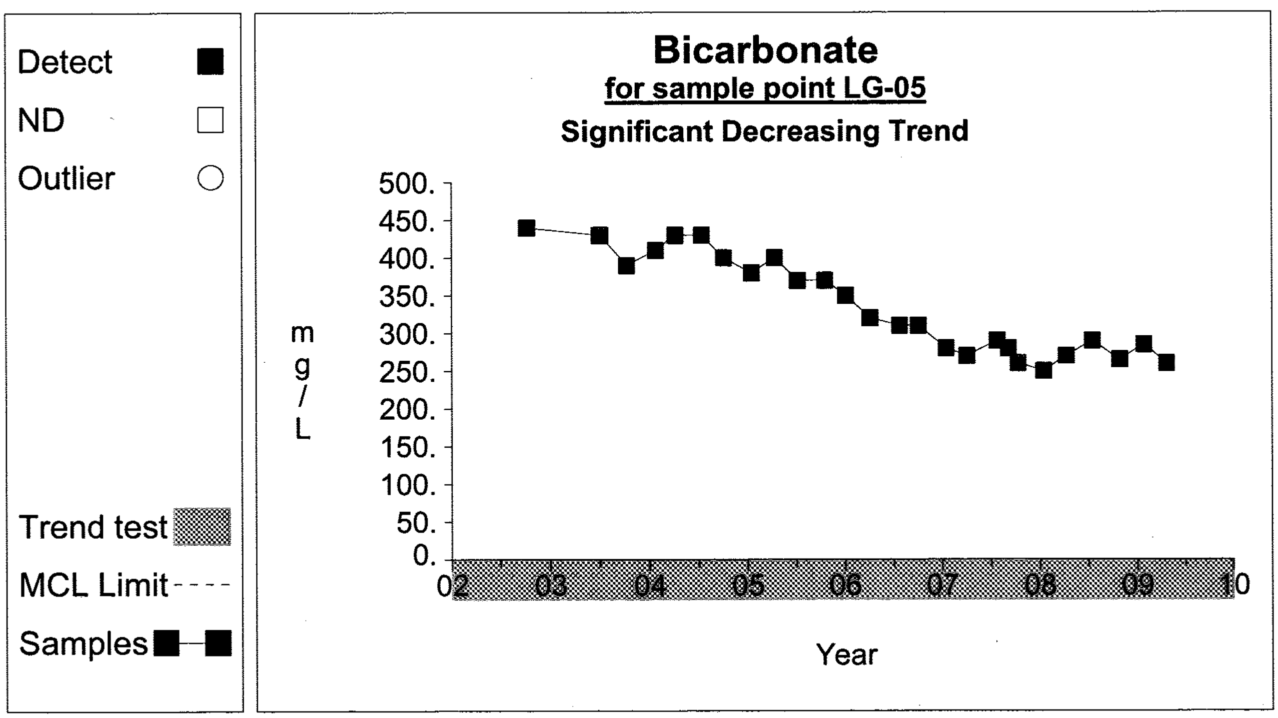


Graph 88

Time Series

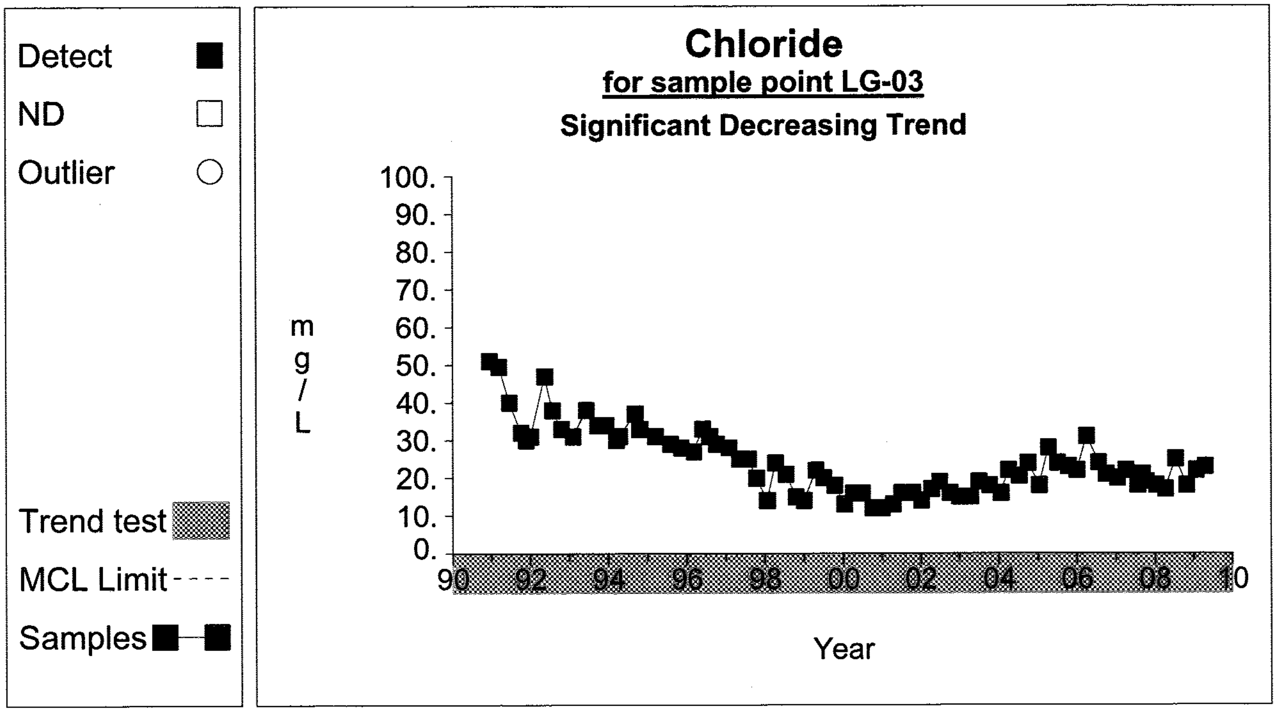


Graph 104

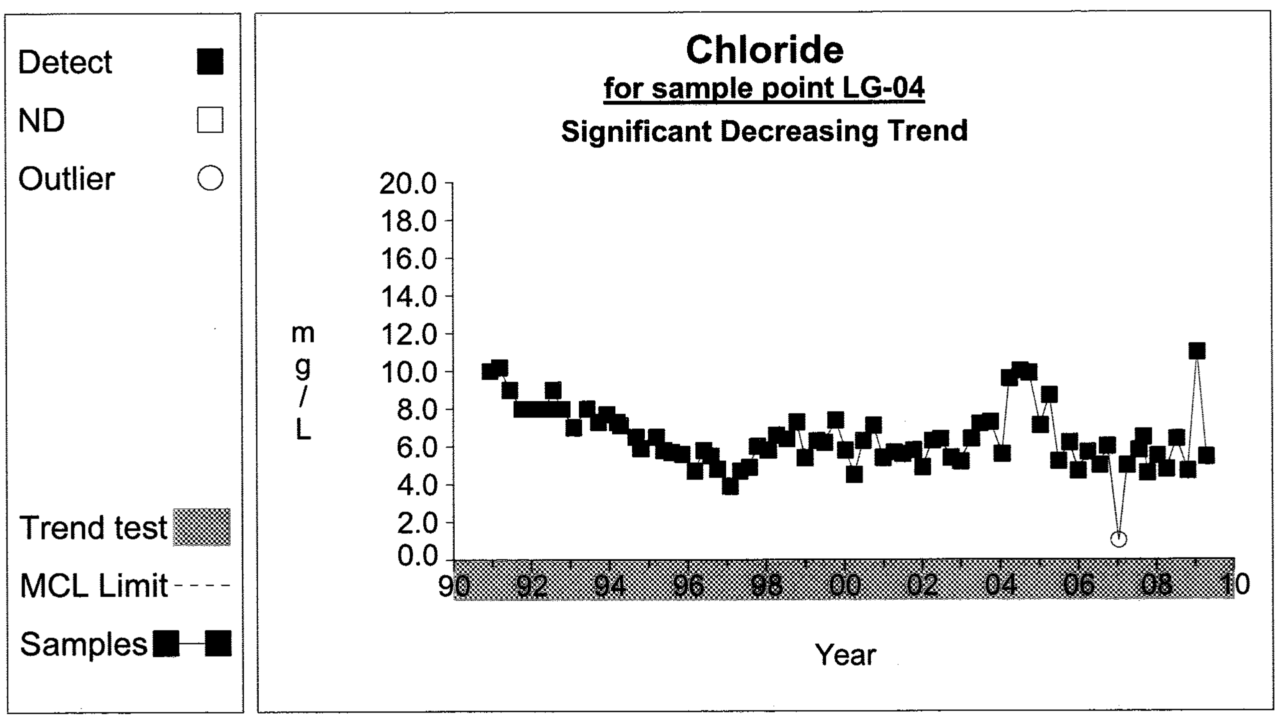


Graph 105

Time Series

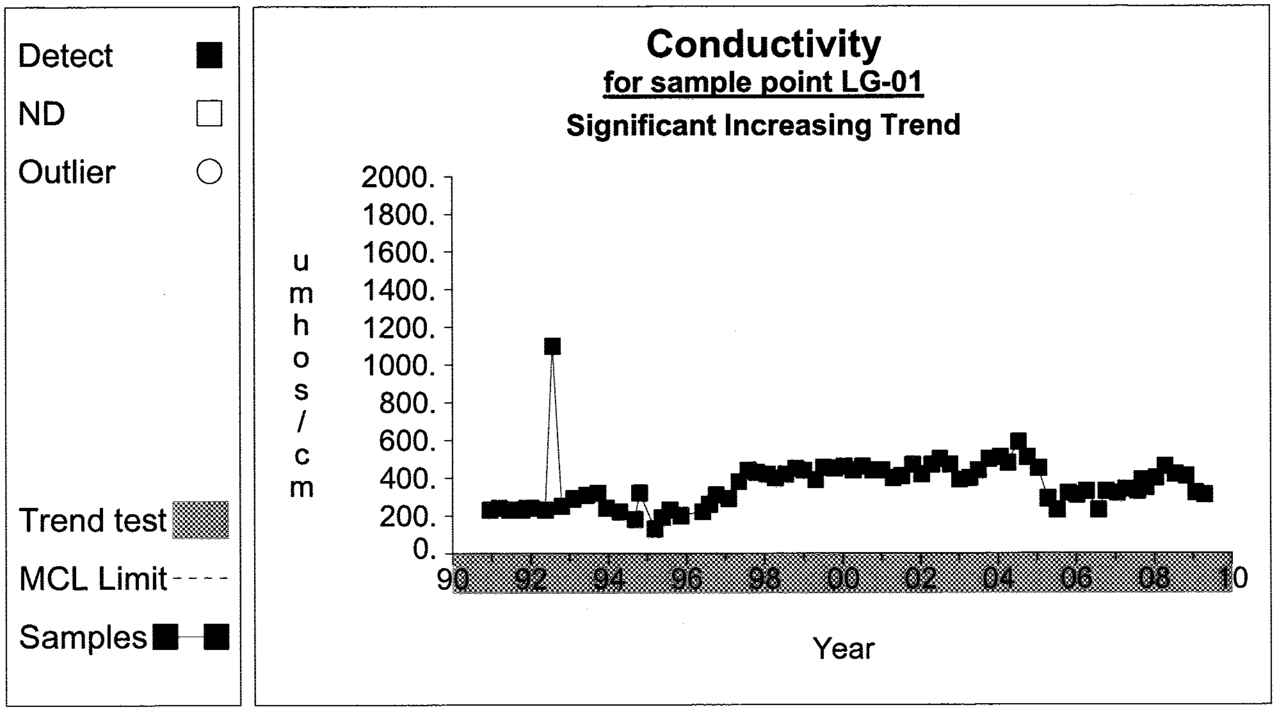


Graph 138

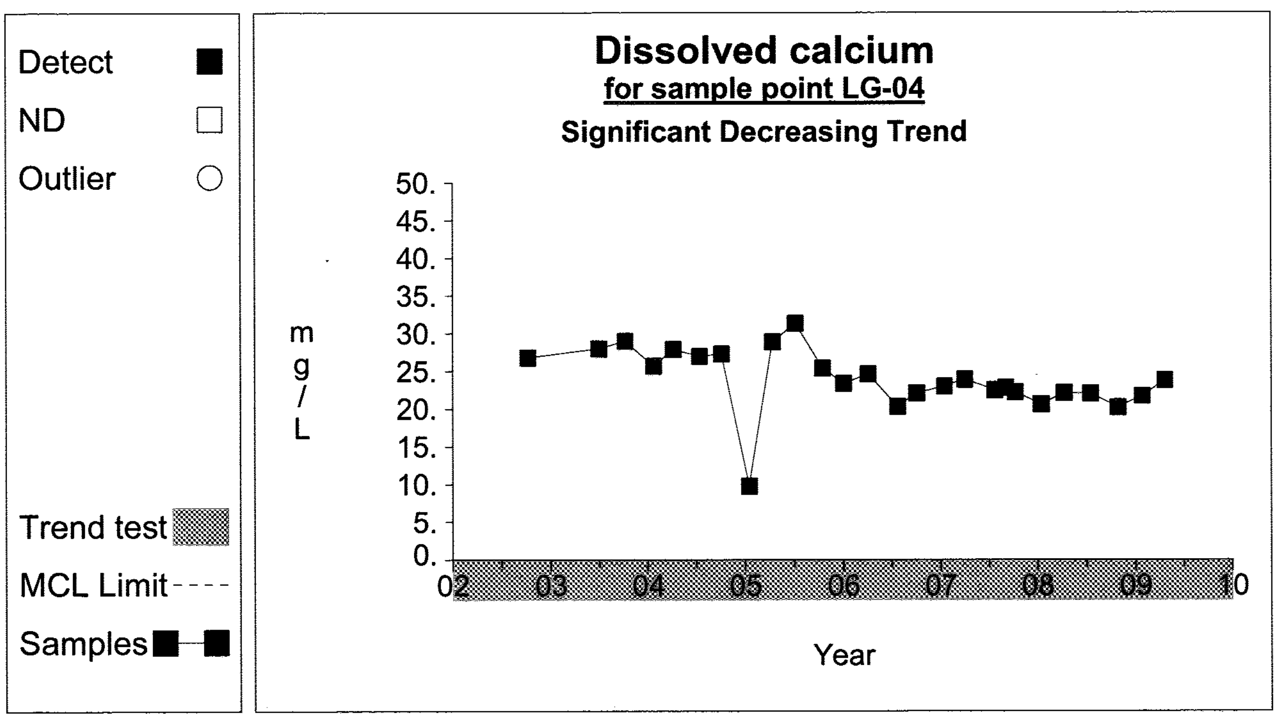


Graph 139

Time Series

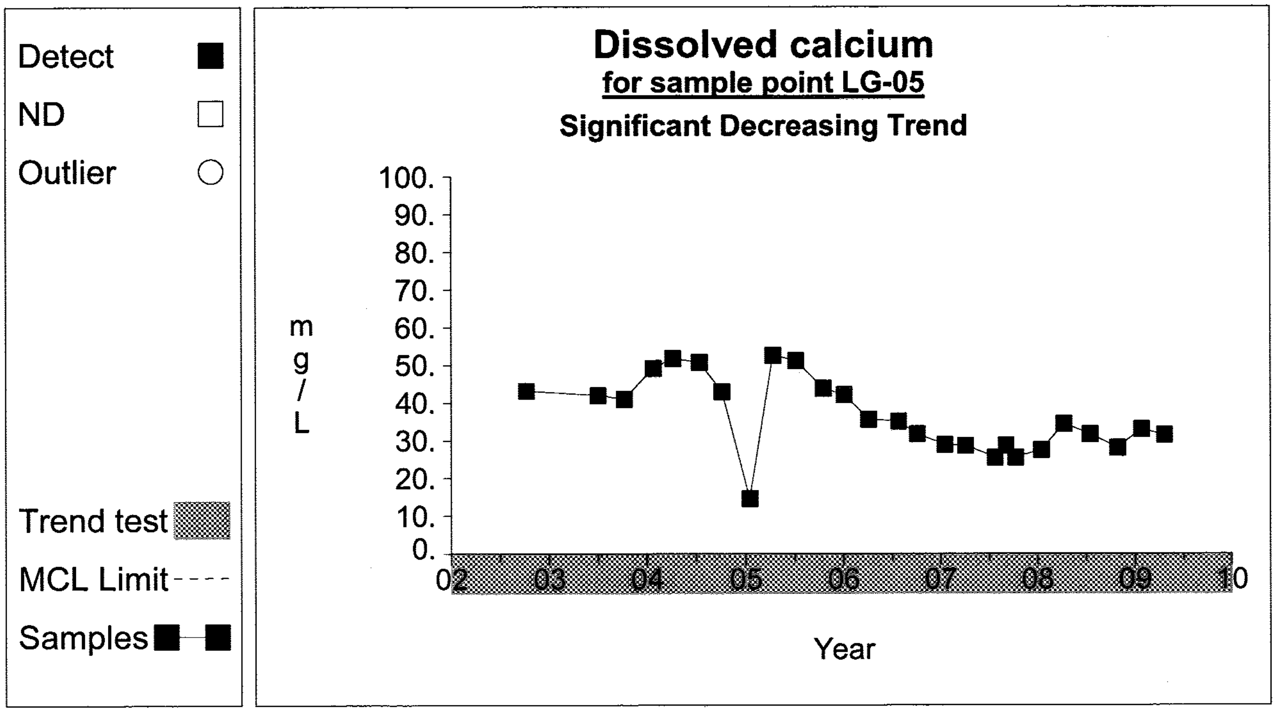


Graph 176



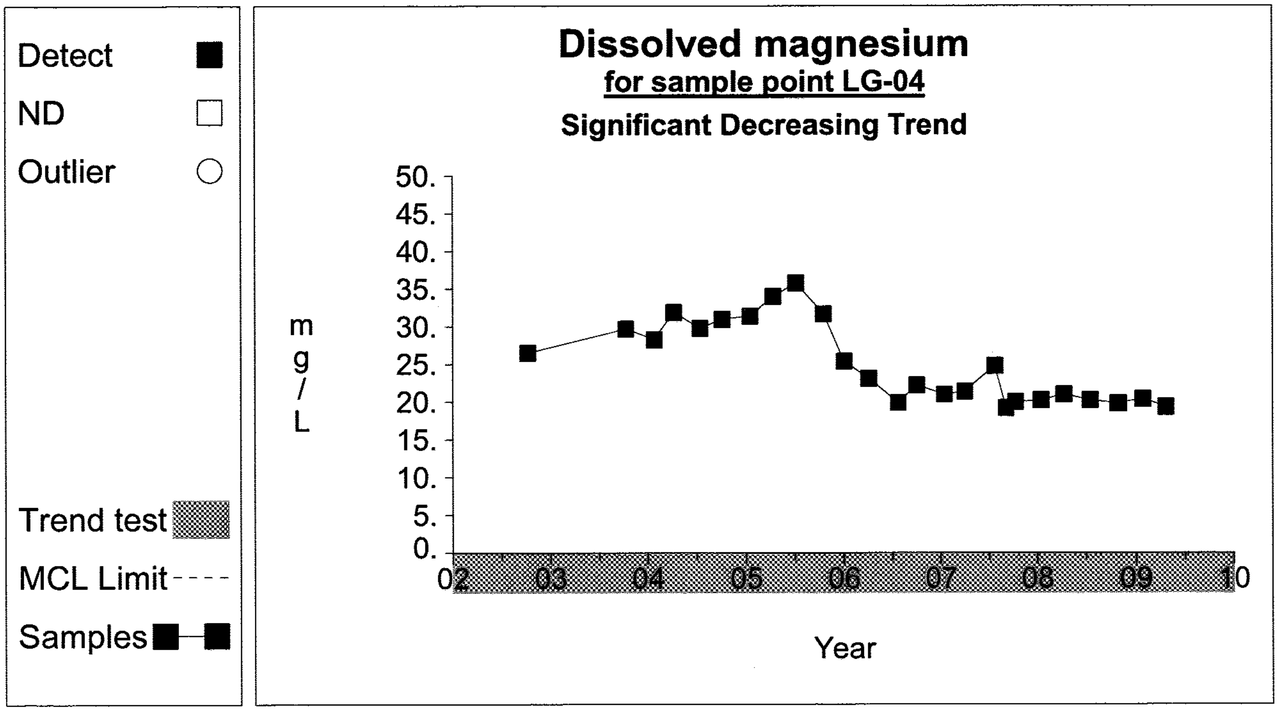
Graph 214

Time Series

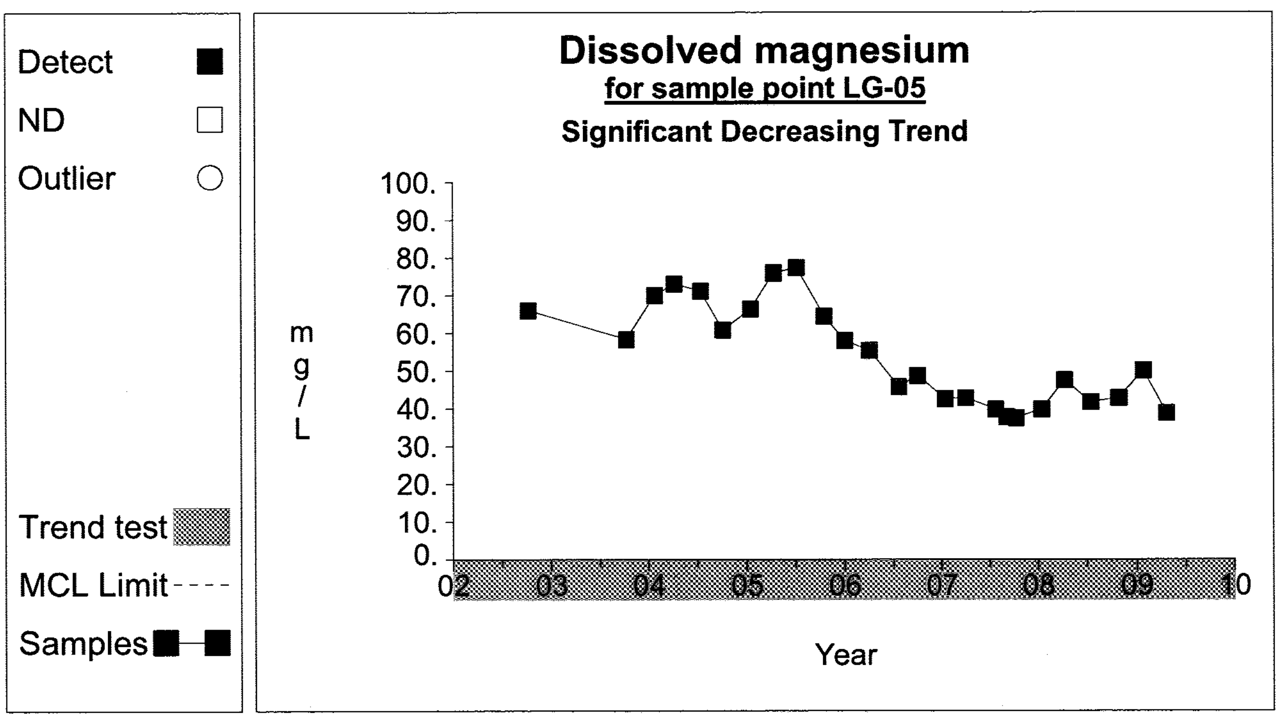


Graph 215

Time Series

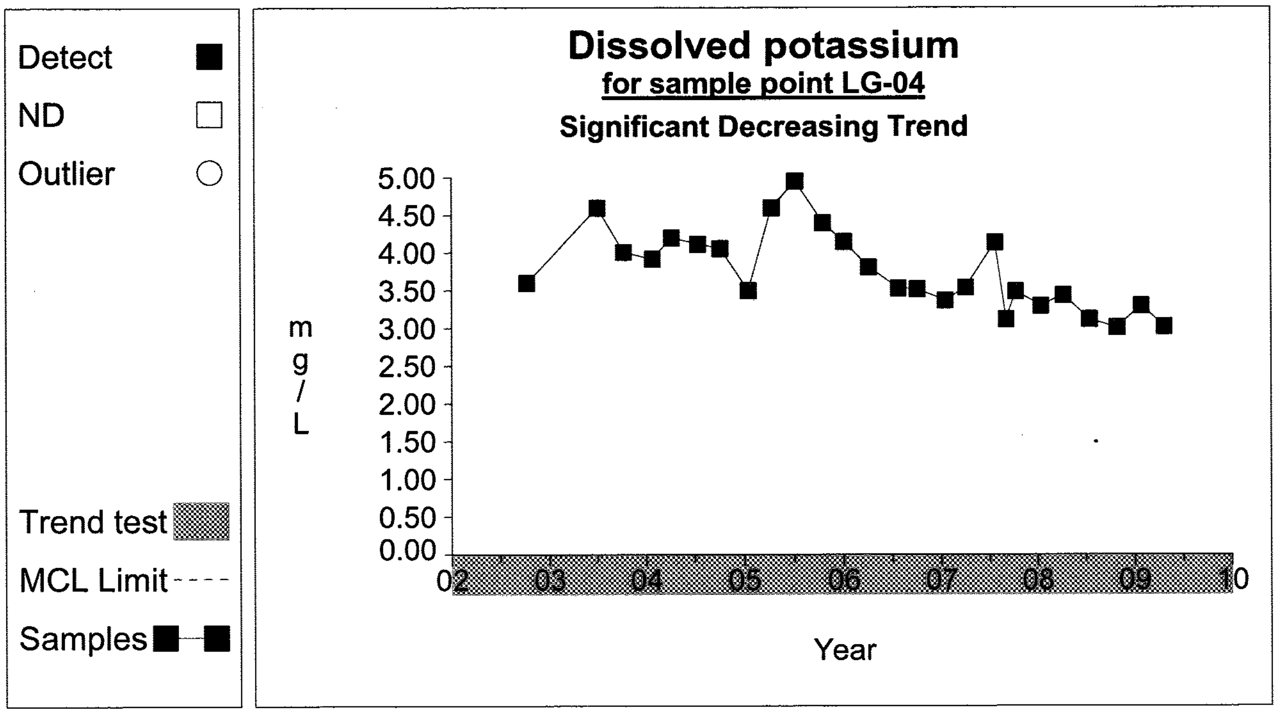


Graph 244

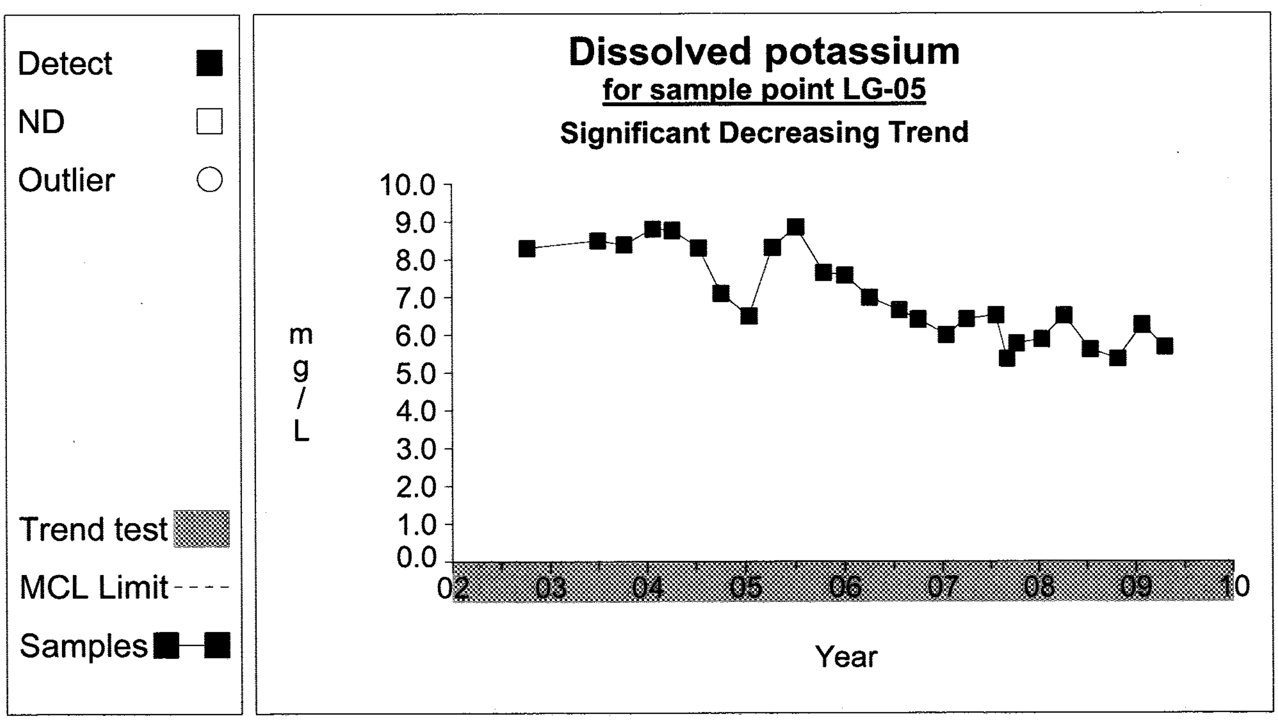


Graph 245

Time Series

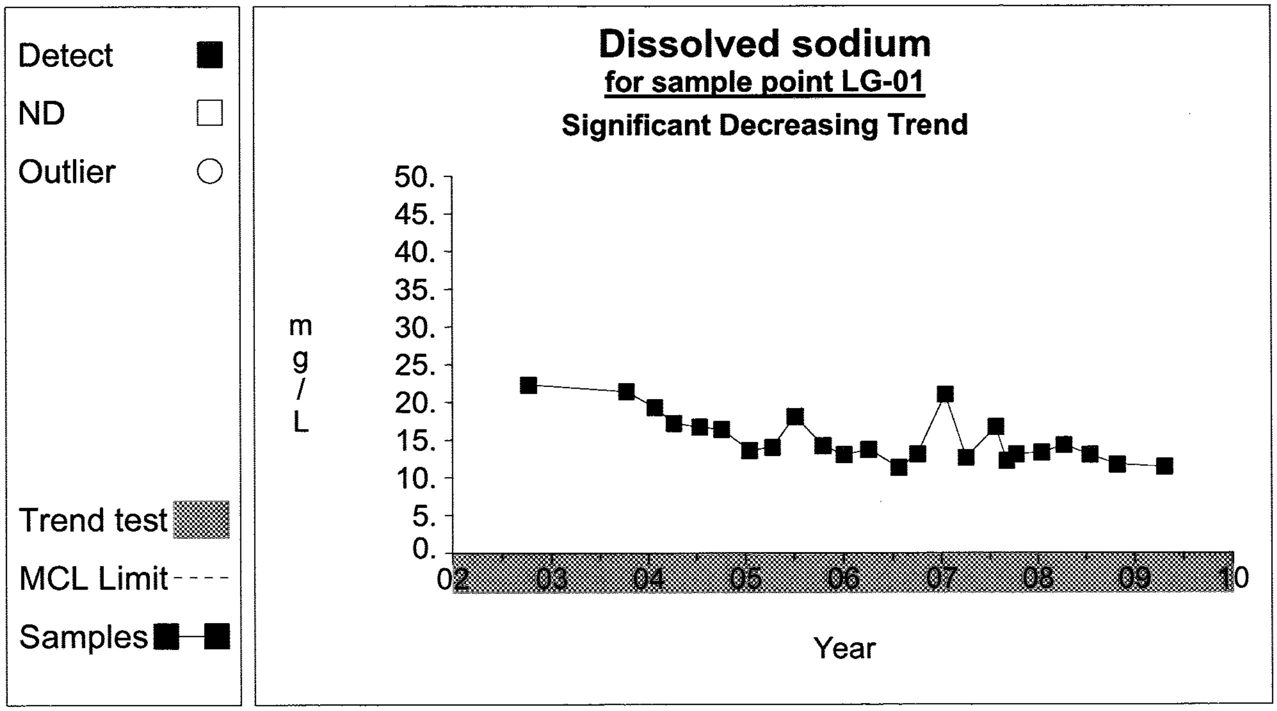


Graph 259

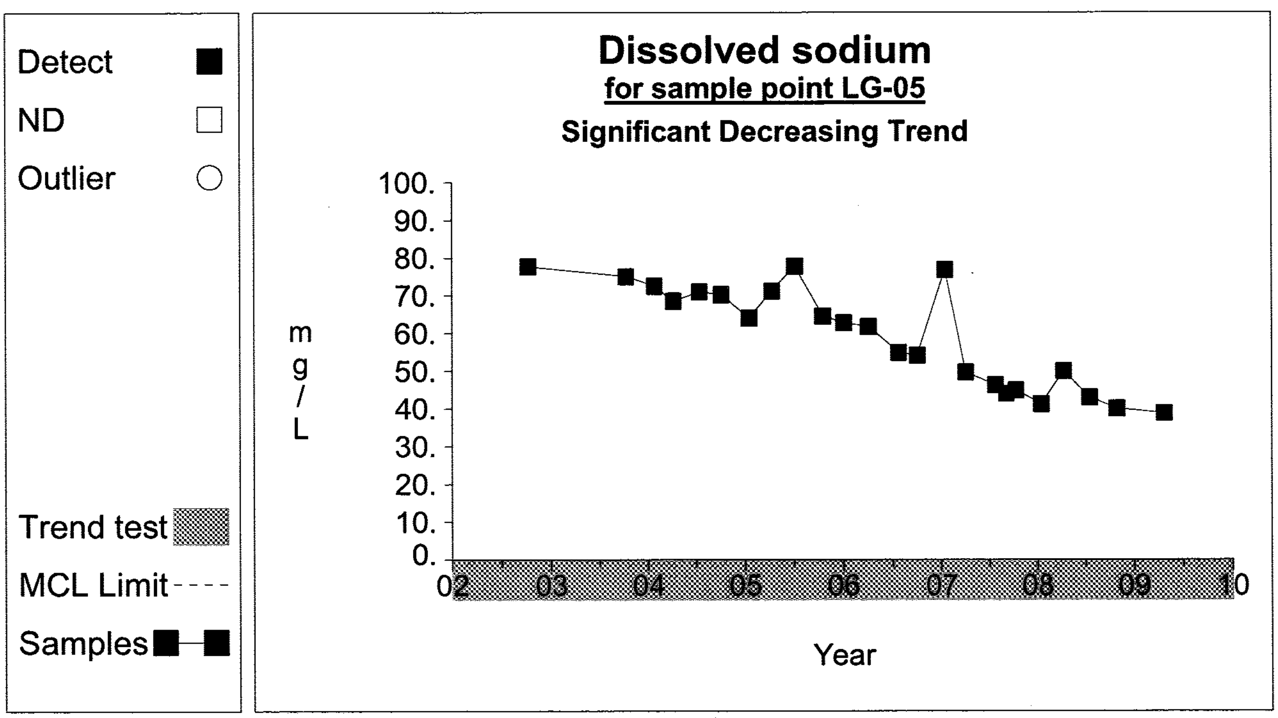


Graph 260

Time Series

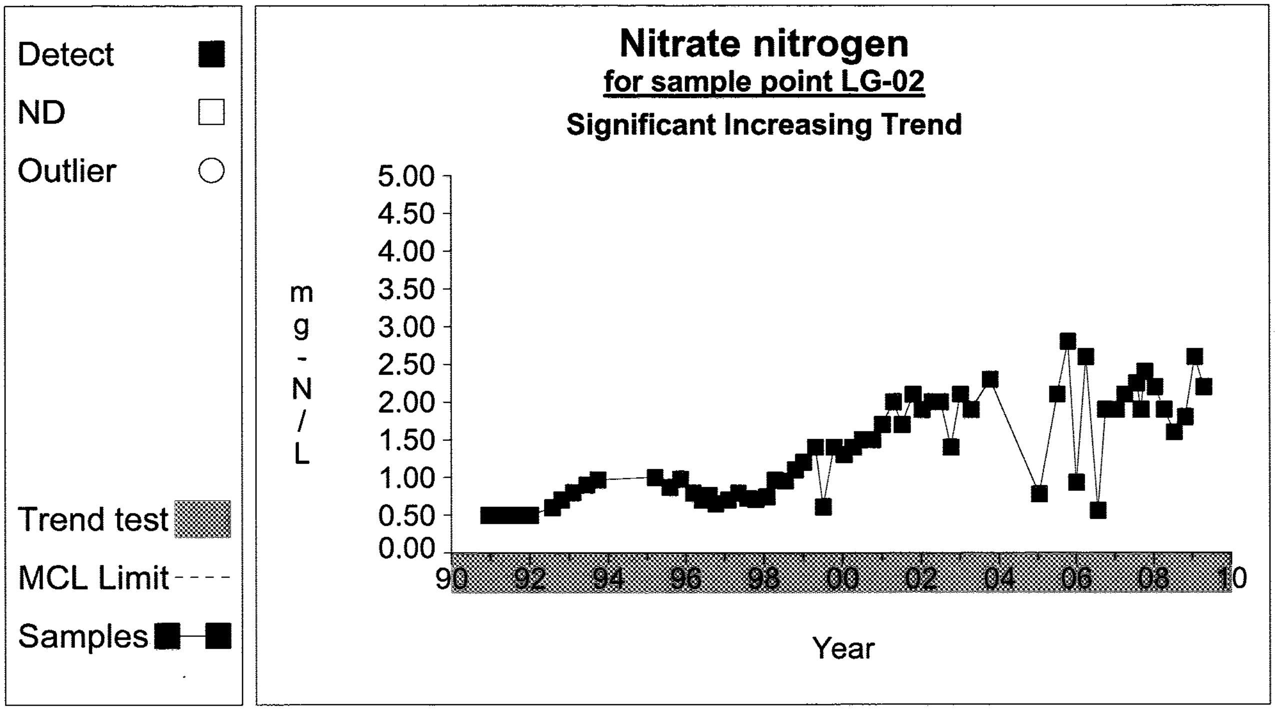


Graph 271

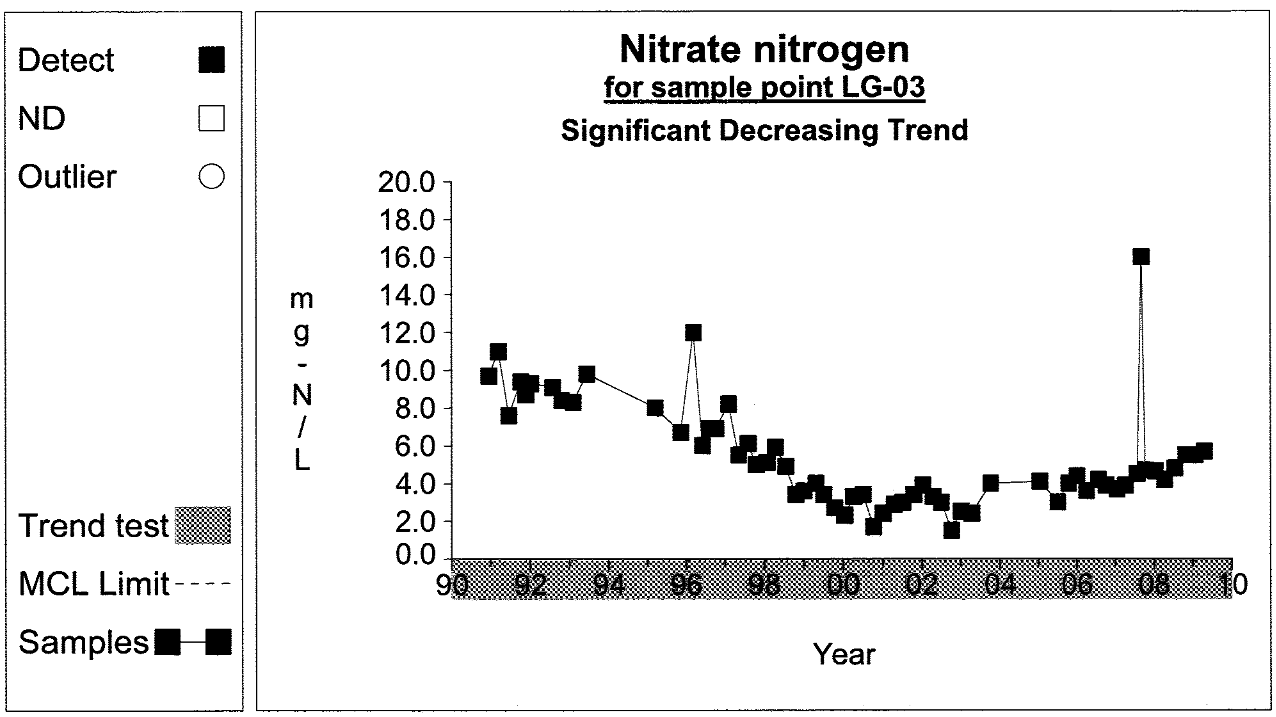


Graph 275

Time Series

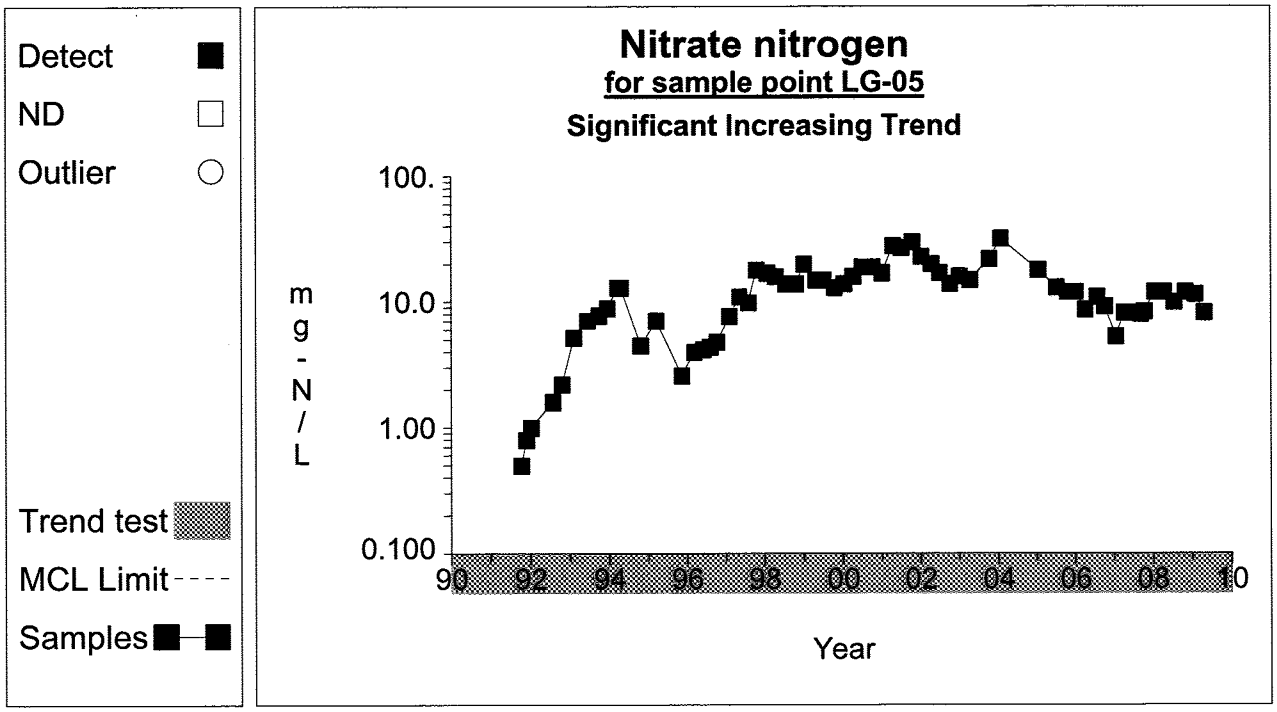


Graph 312



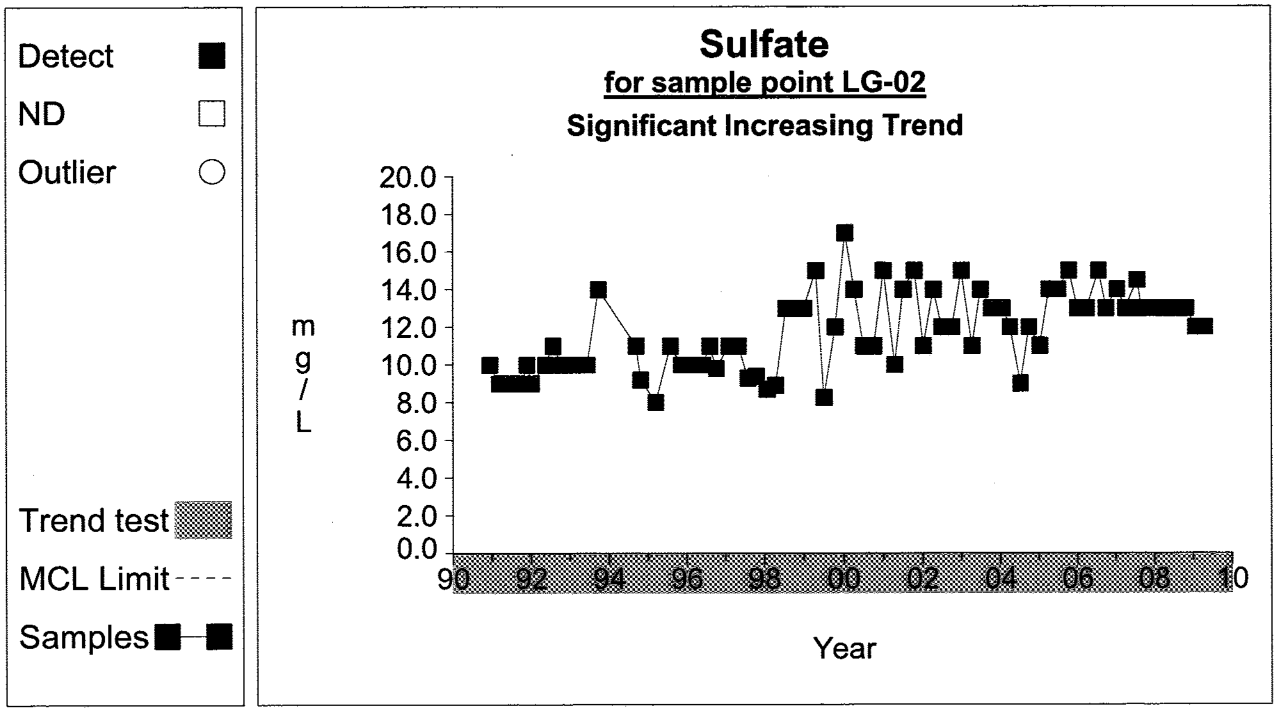
Graph 313

Time Series

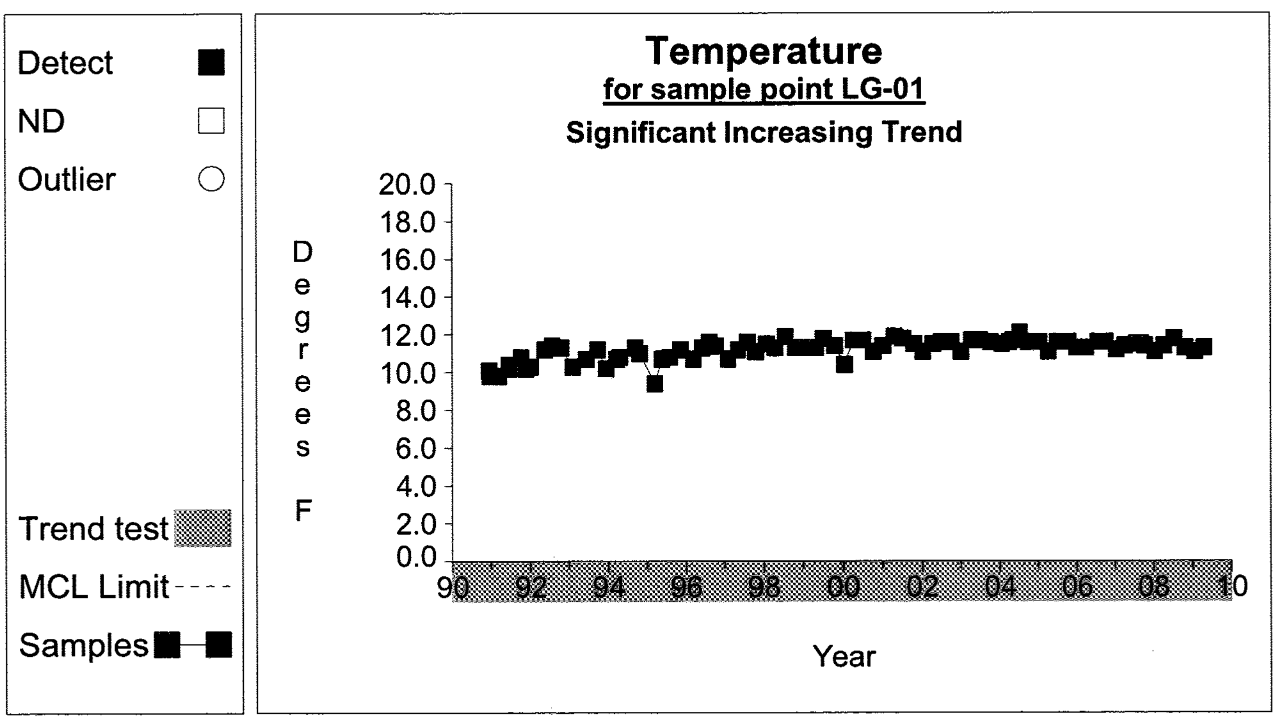


Graph 315

Time Series

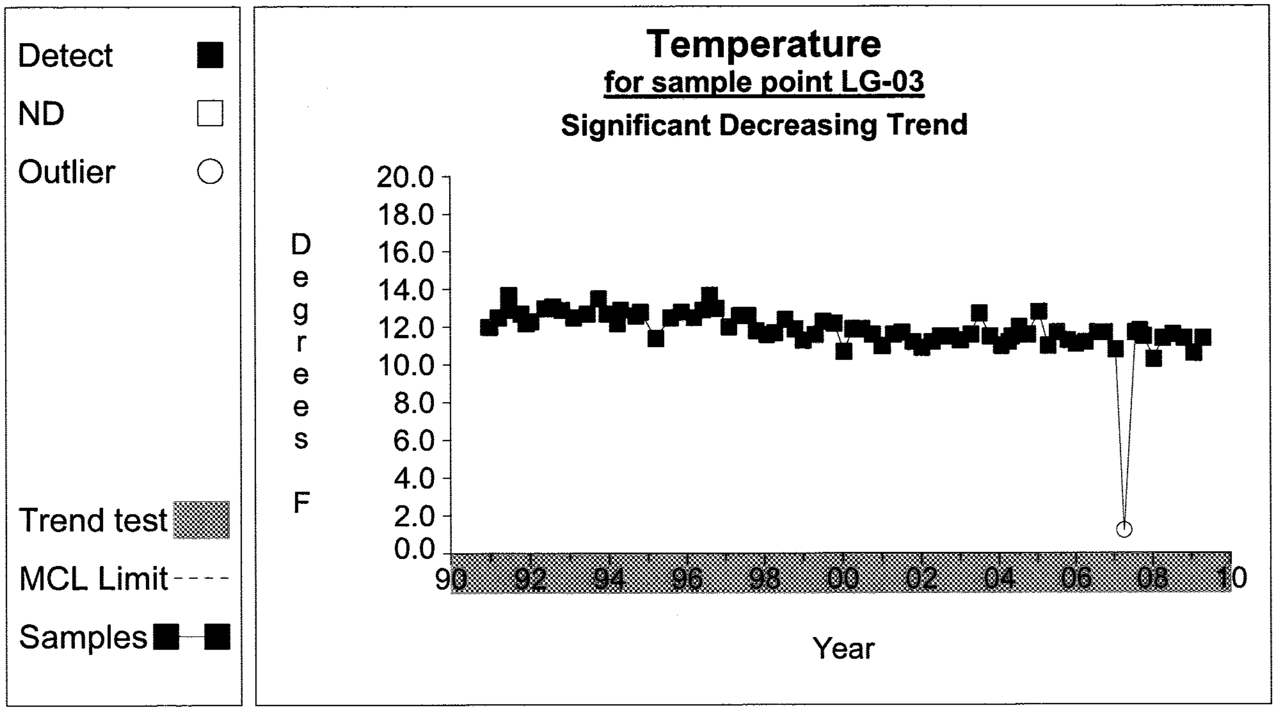


Graph 337

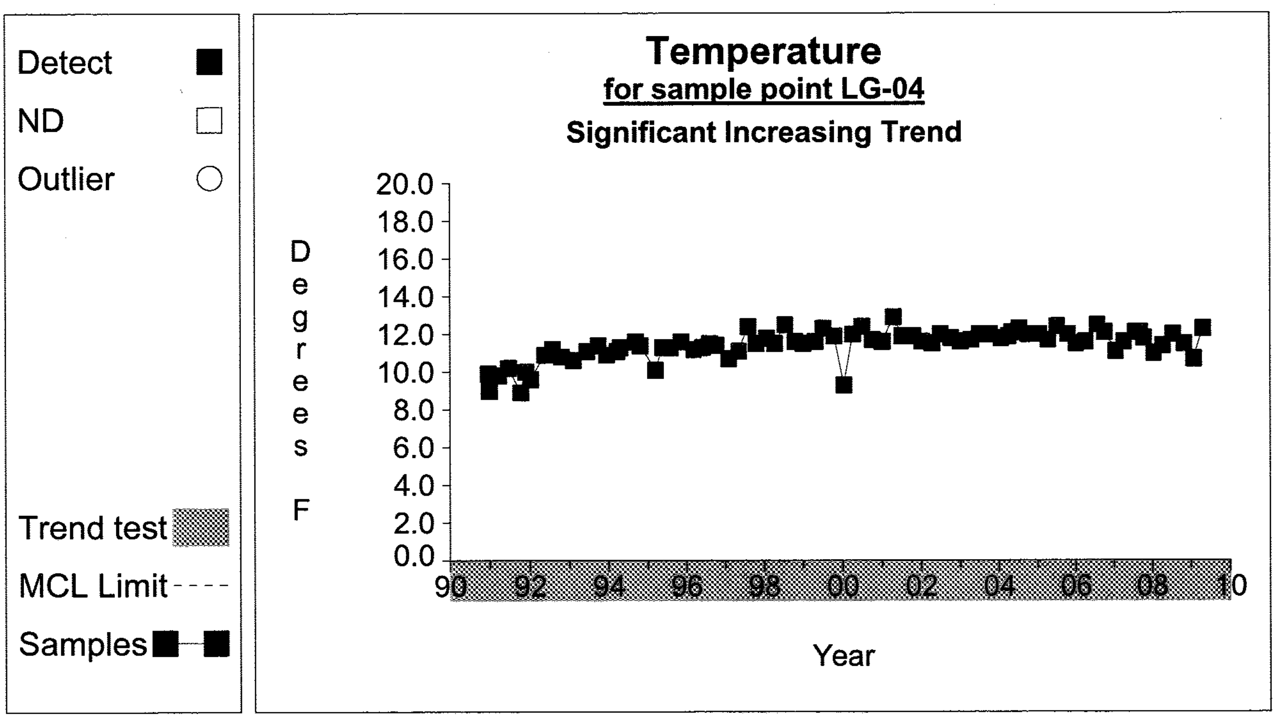


Graph 341

Time Series

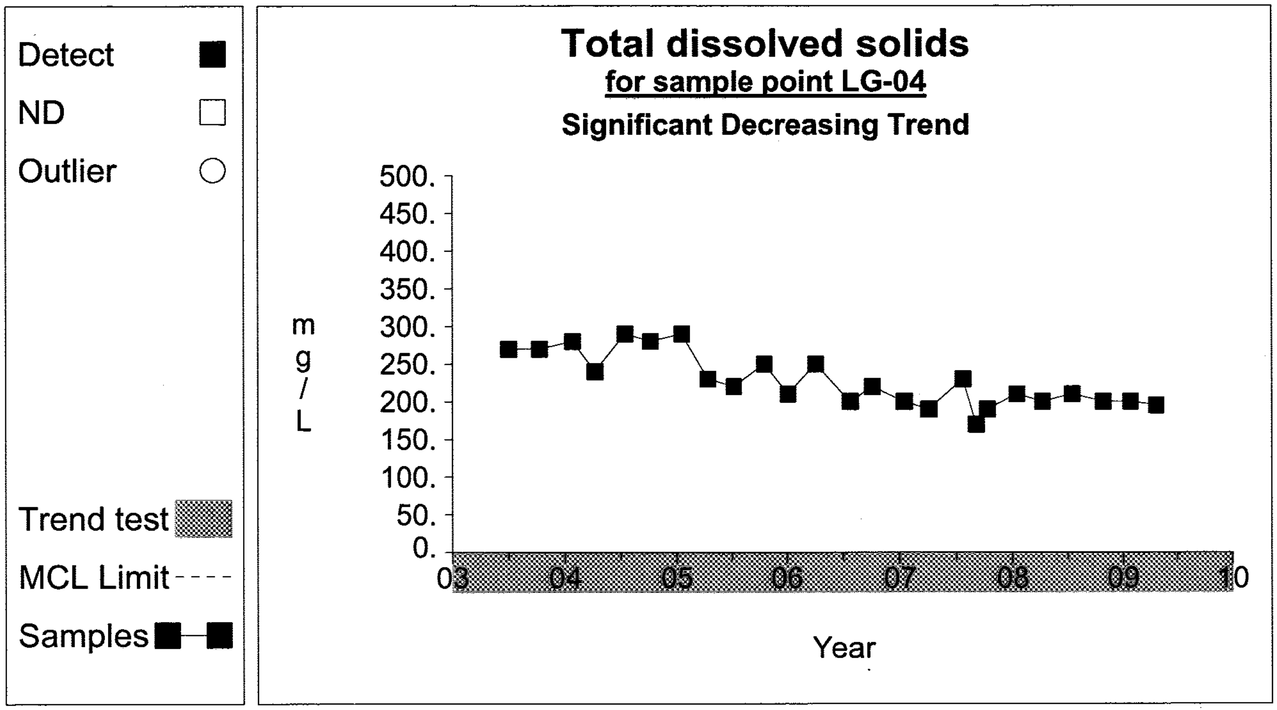


Graph 343

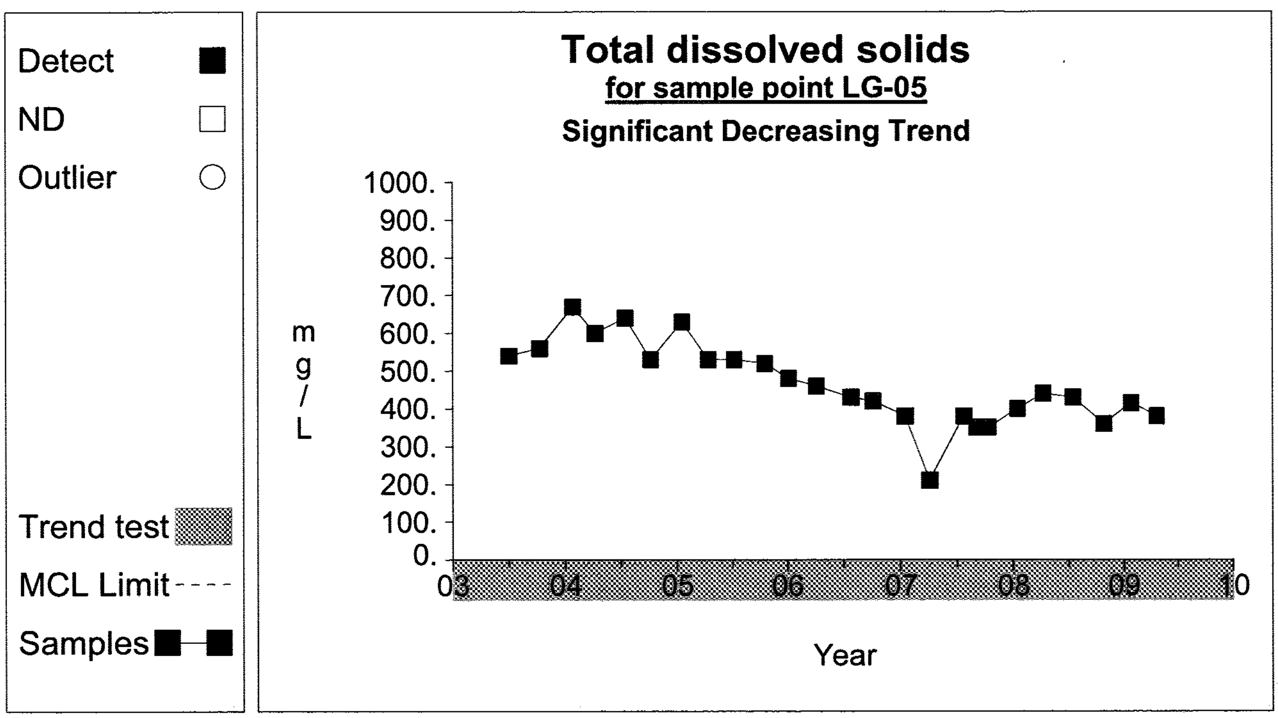


Graph 344

Time Series

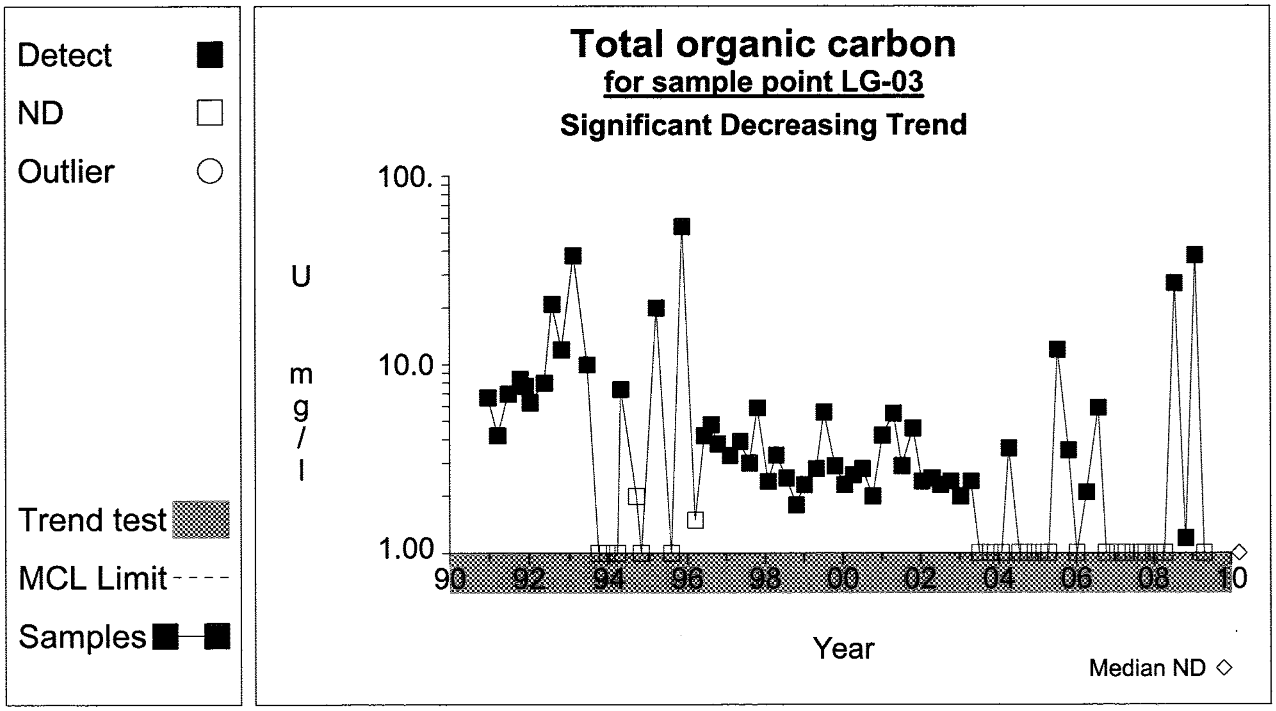


Graph 359



Graph 360

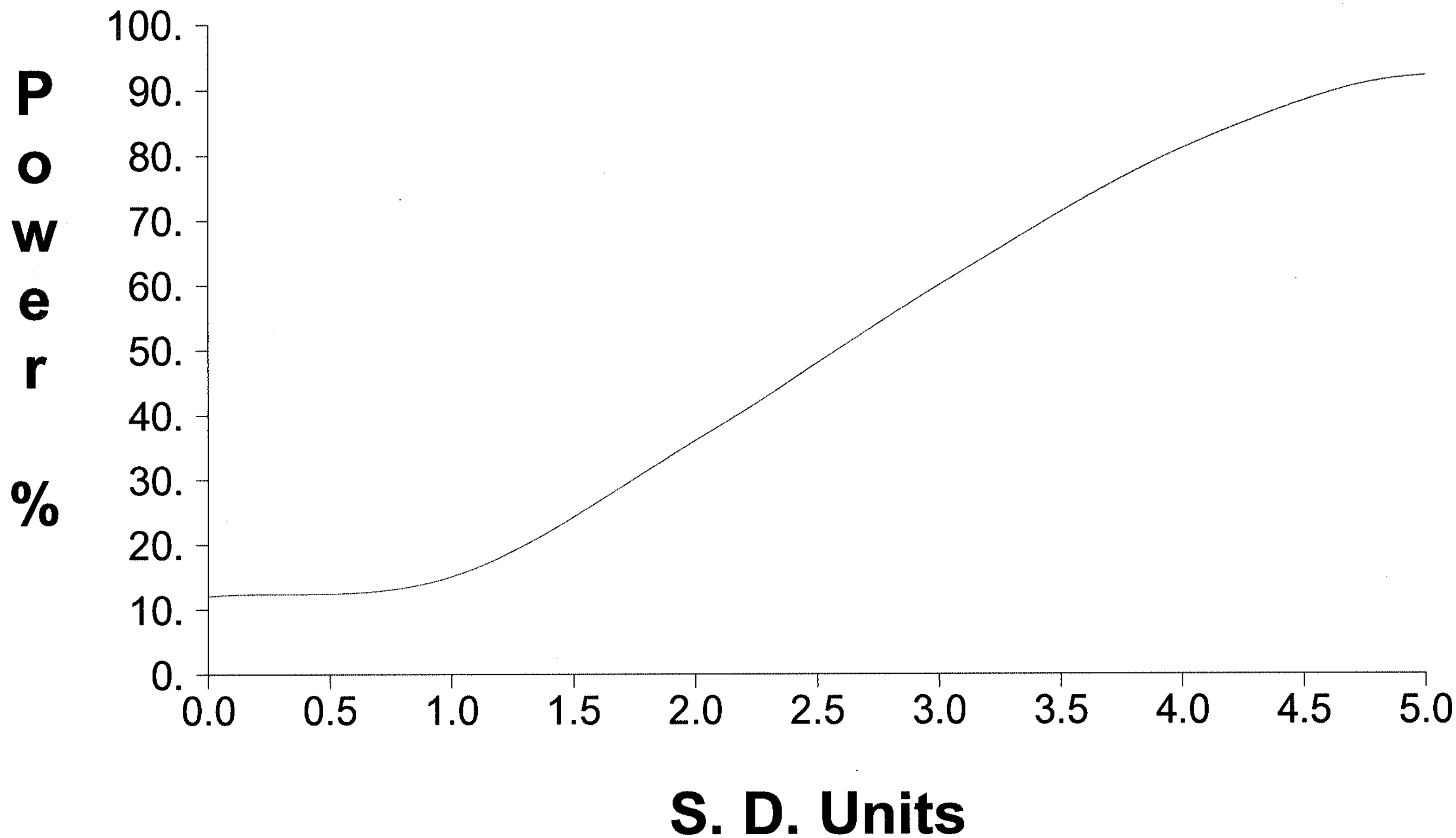
Time Series



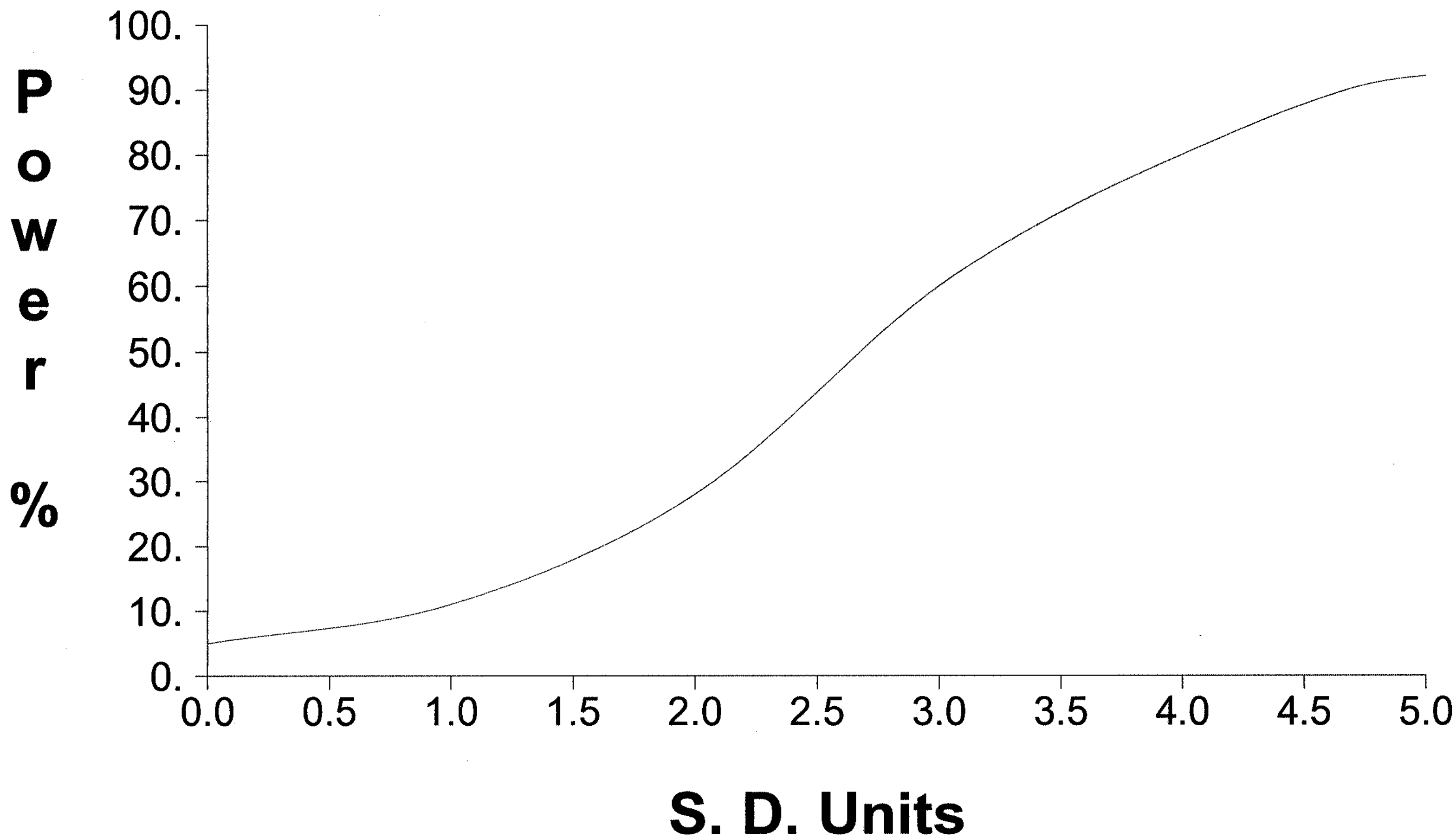
Graph 363

3RD QUARTER

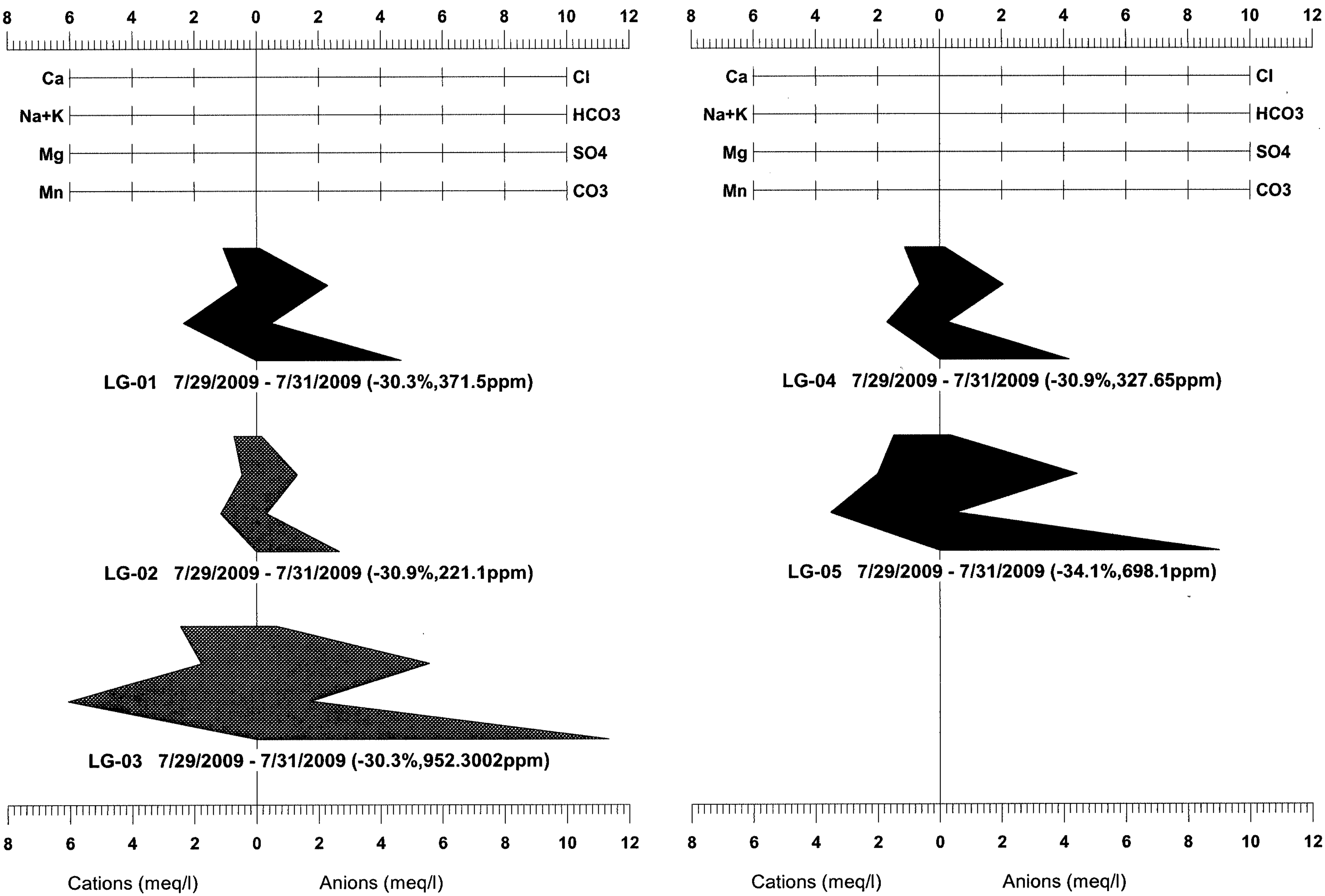
False Positive and False Negative Rates for Current Upgradient vs. Downgradient Monitoring Program



False Positive and False Negative Rates for Current Intra-Well Prediction Limits Monitoring Program



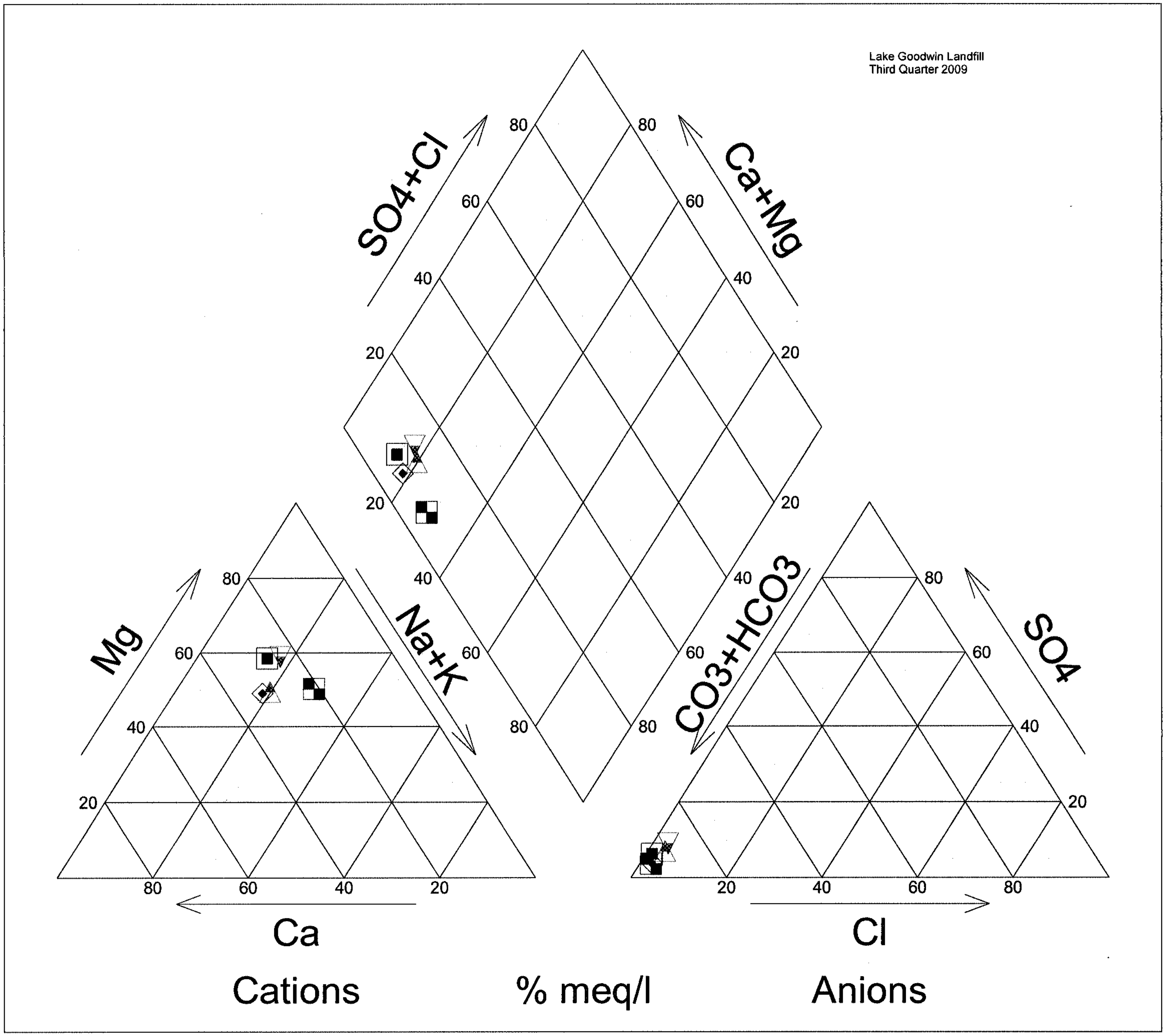
Goodwin Landfill



Prepared by: Snohomish County Solid Waste

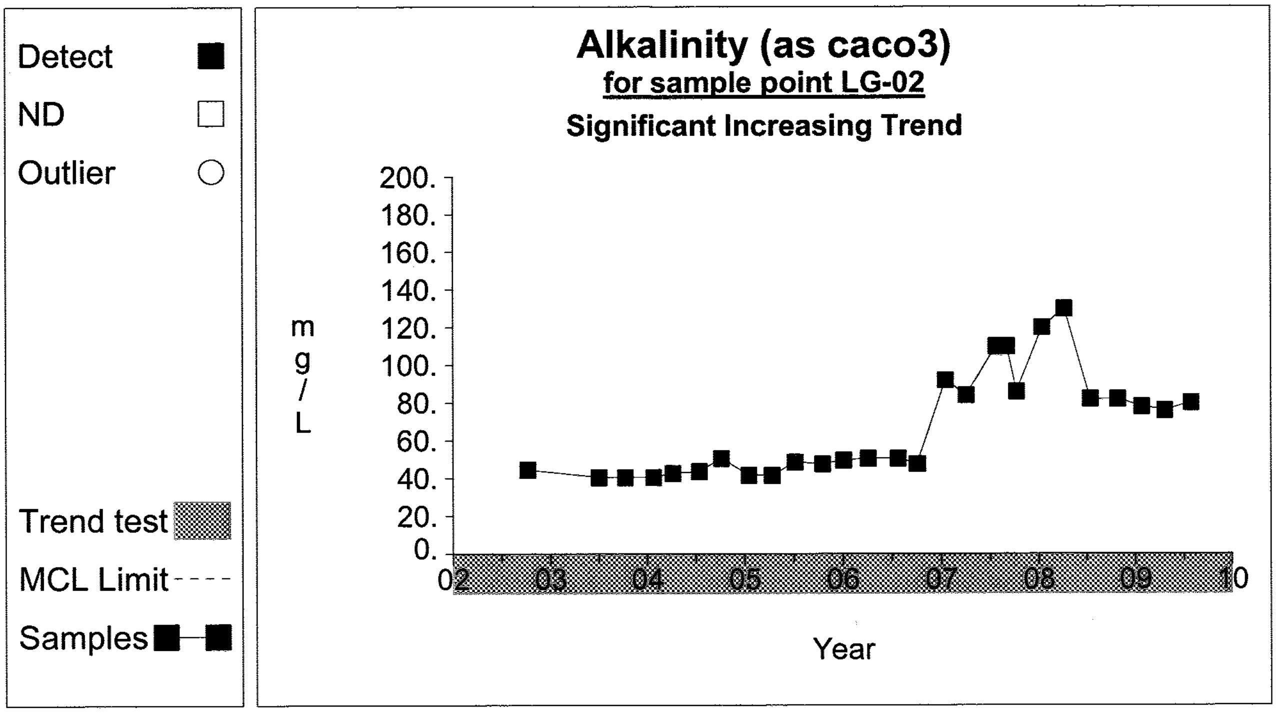
Goodwin Landfill

▣ LG-01	7/29/2009 - 7/31/2009	(-30.3%,371.5ppm)
△ LG-02	7/29/2009 - 7/31/2009	(-30.9%,221.1ppm)
▽ LG-03	7/29/2009 - 7/31/2009	(-30.3%,952.3ppm)
◈ LG-04	7/29/2009 - 7/31/2009	(-30.9%,327.65ppm)
◪ LG-05	7/29/2009 - 7/31/2009	(-34.1%,698.1ppm)

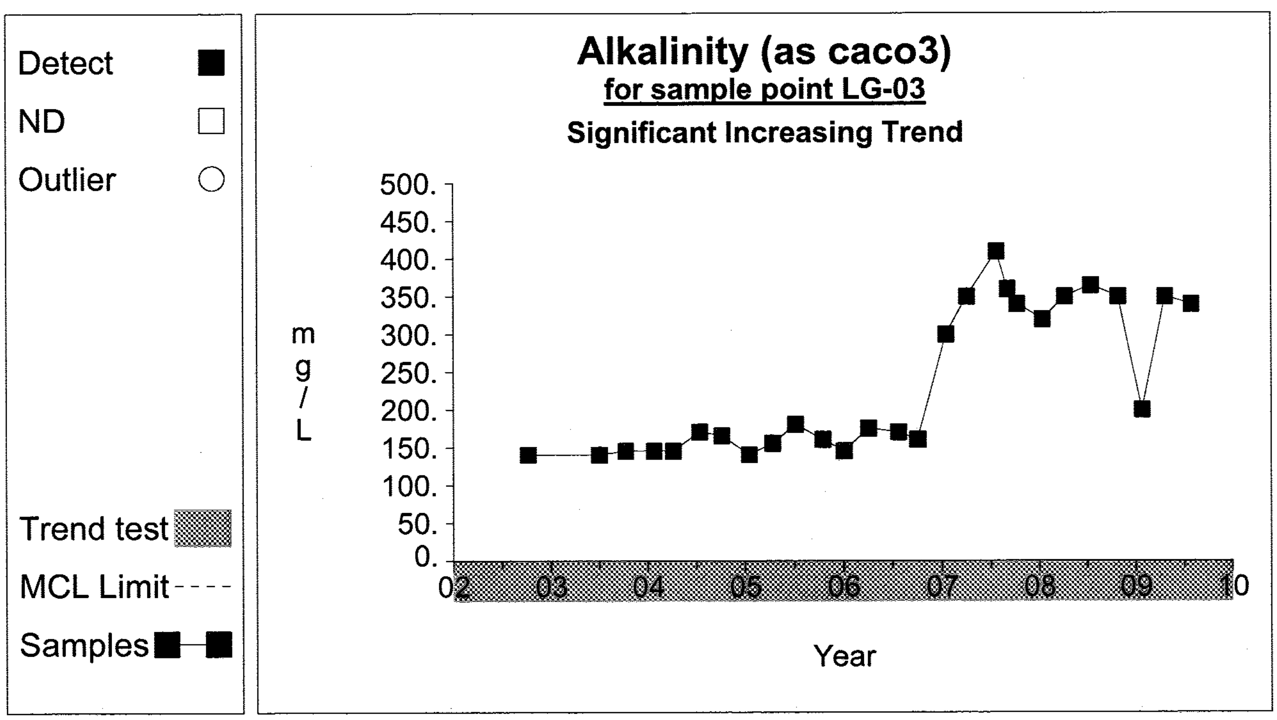


Prepared by: Snohomish County Solid Waste

Time Series

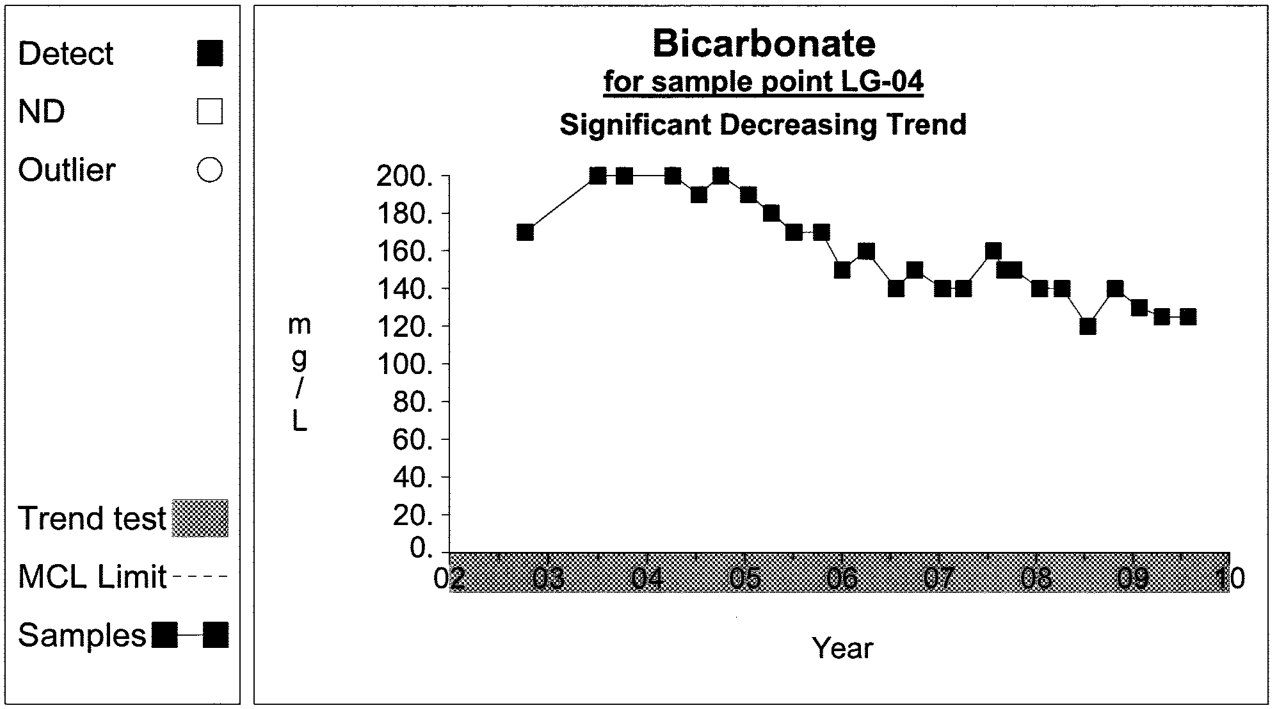


Graph 87

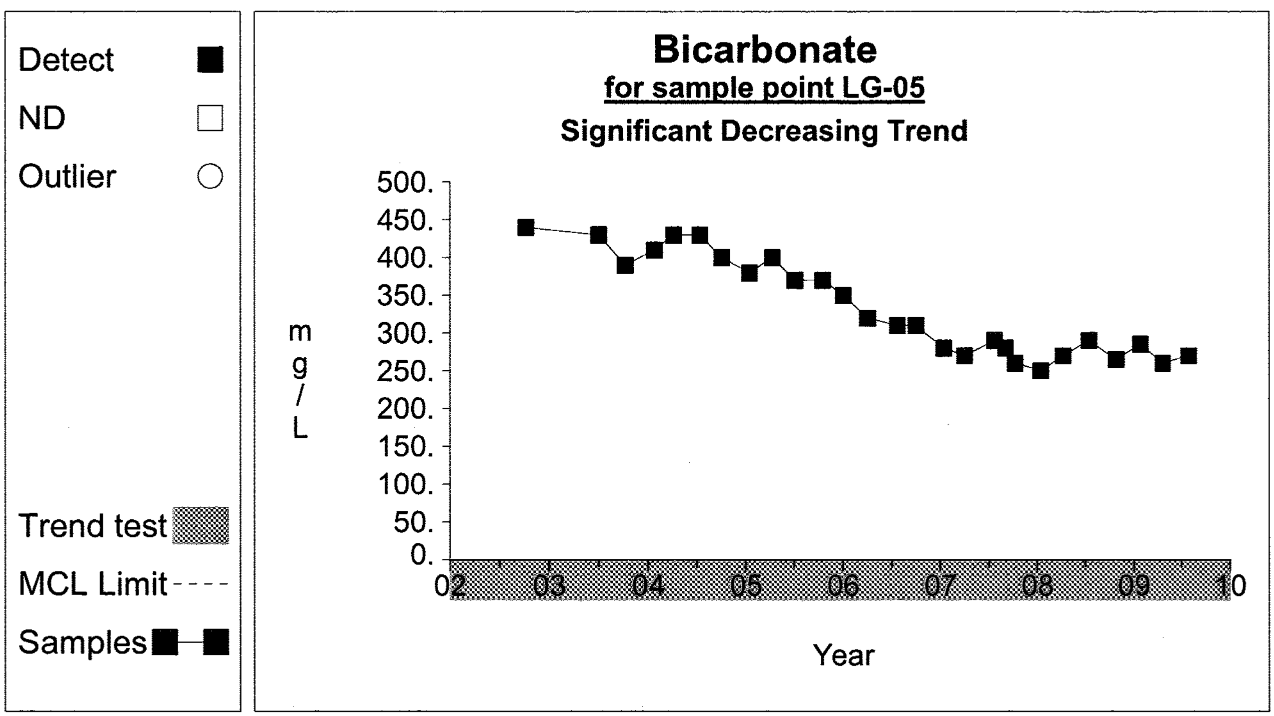


Graph 88

Time Series

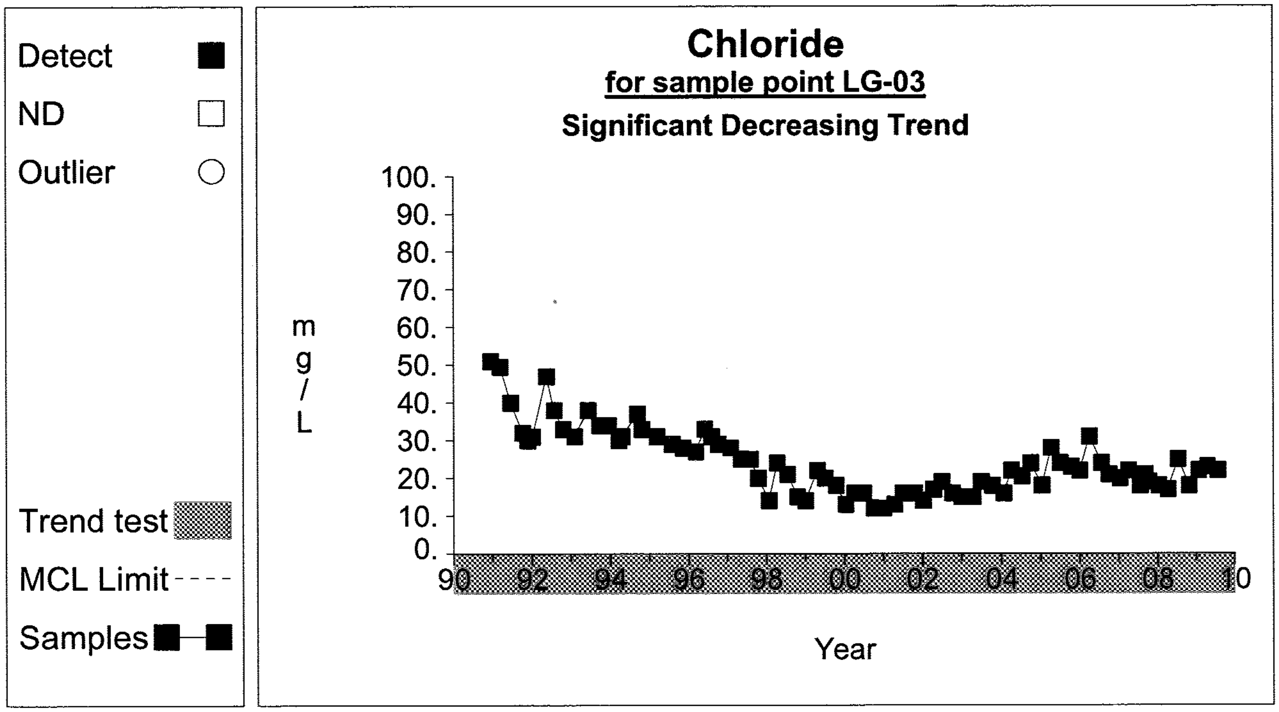


Graph 104

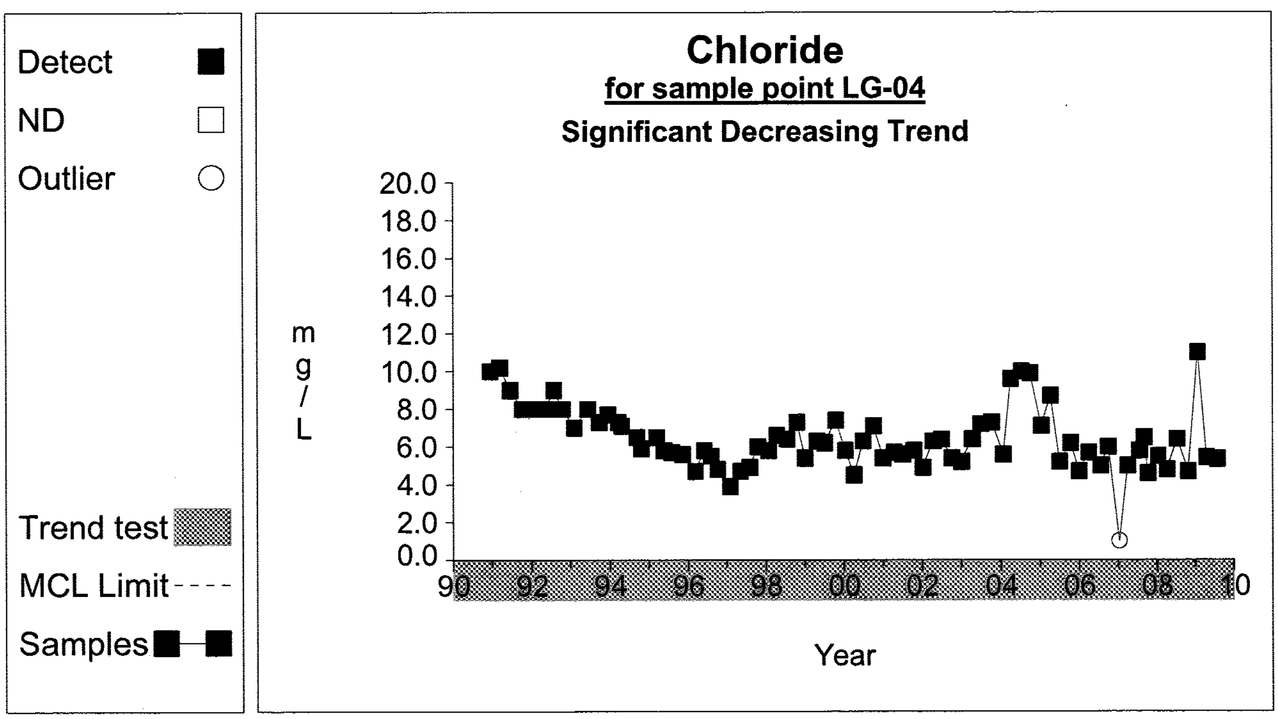


Graph 105

Time Series

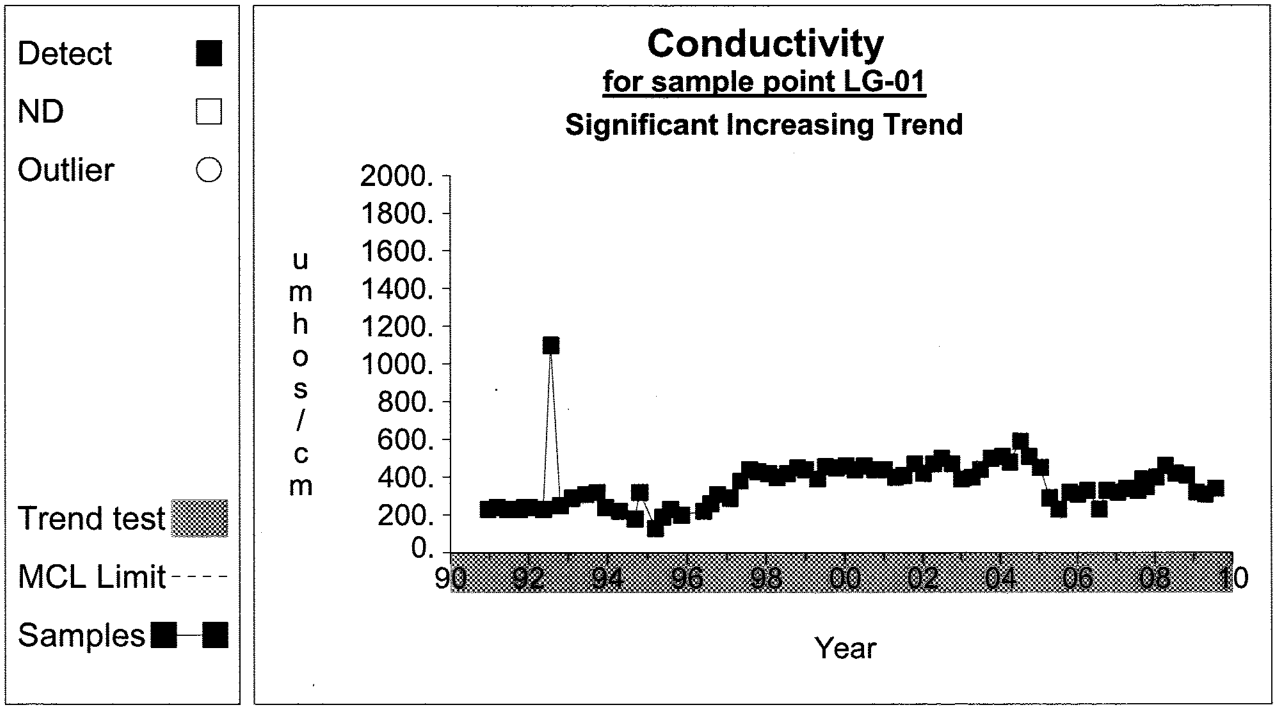


Graph 138

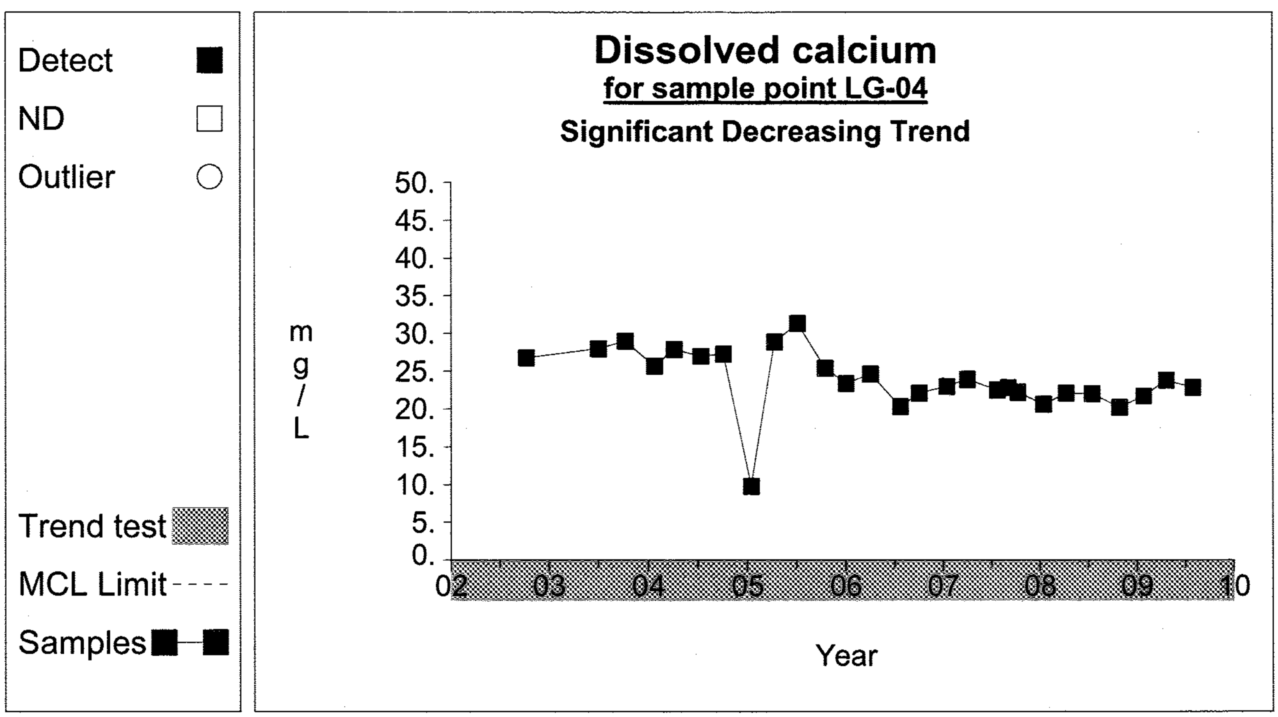


Graph 139

Time Series

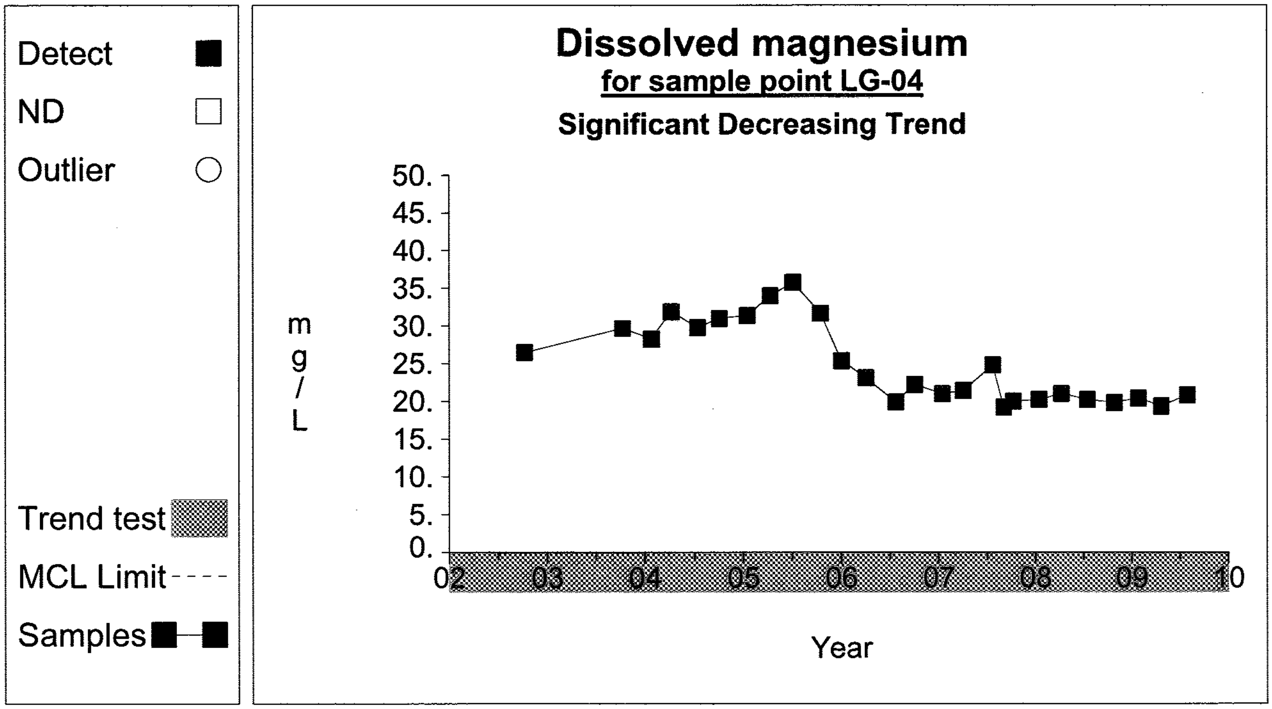


Graph 176

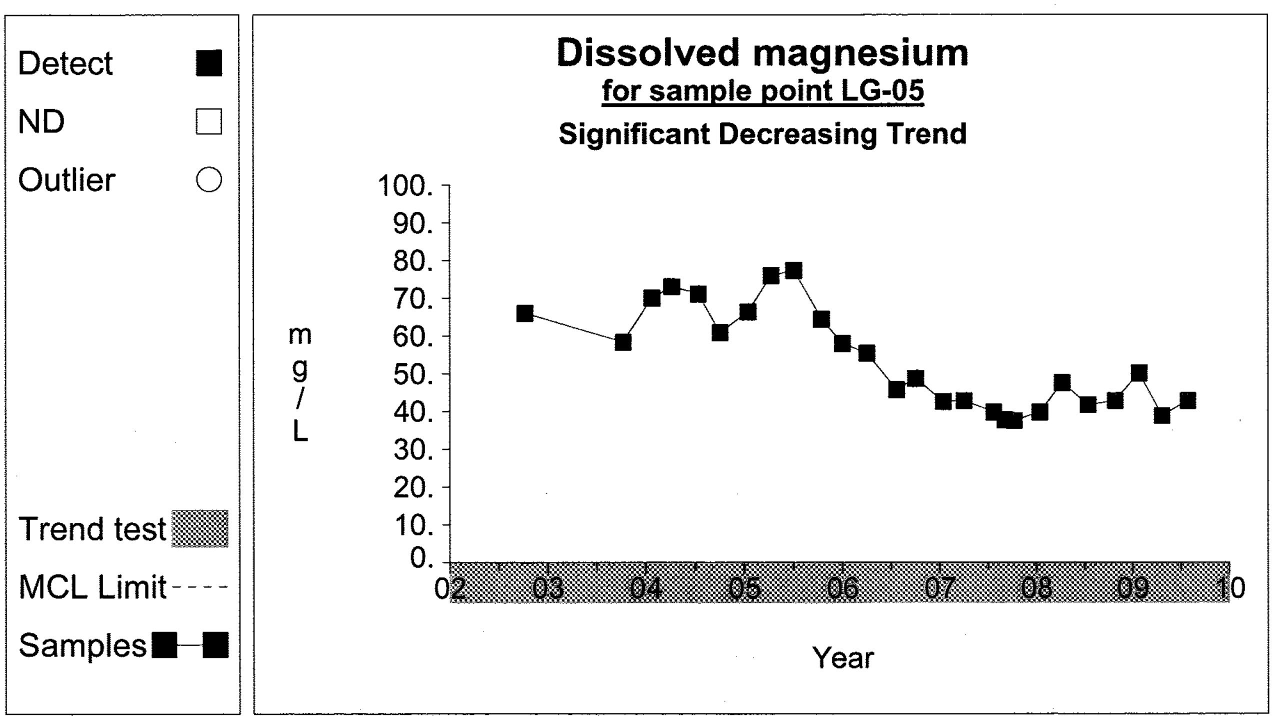


Graph 214

Time Series

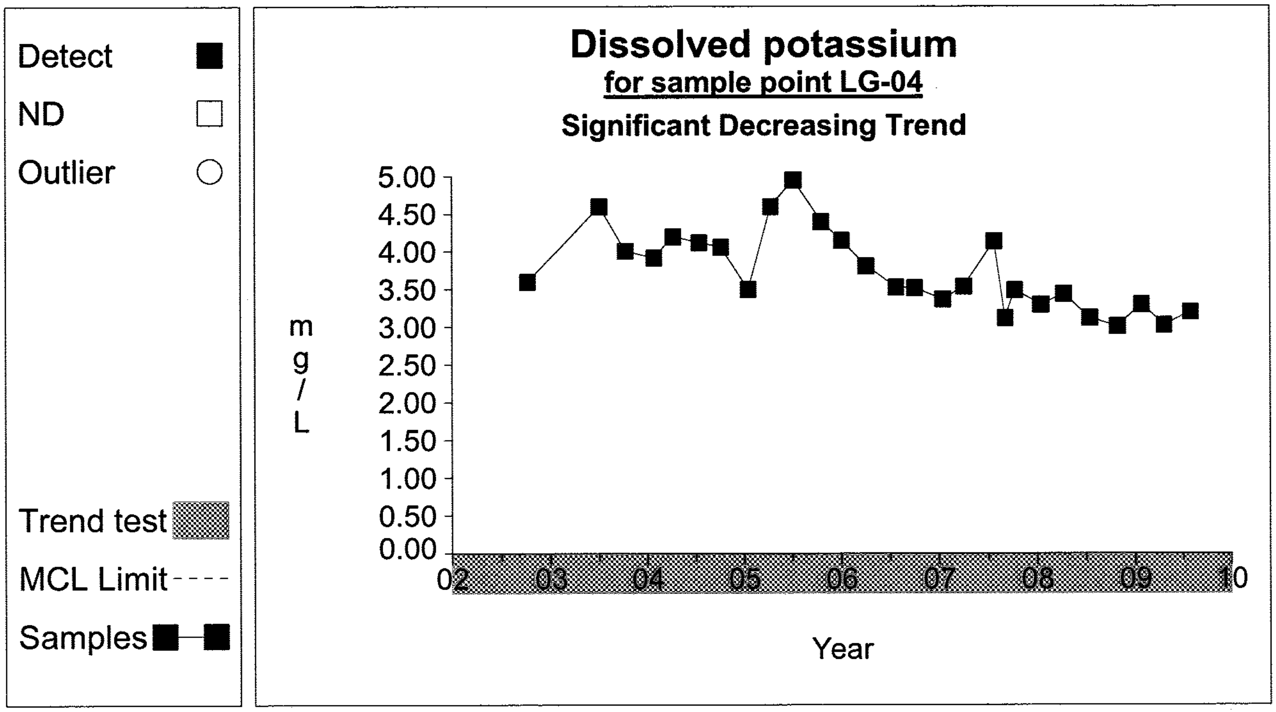


Graph 244

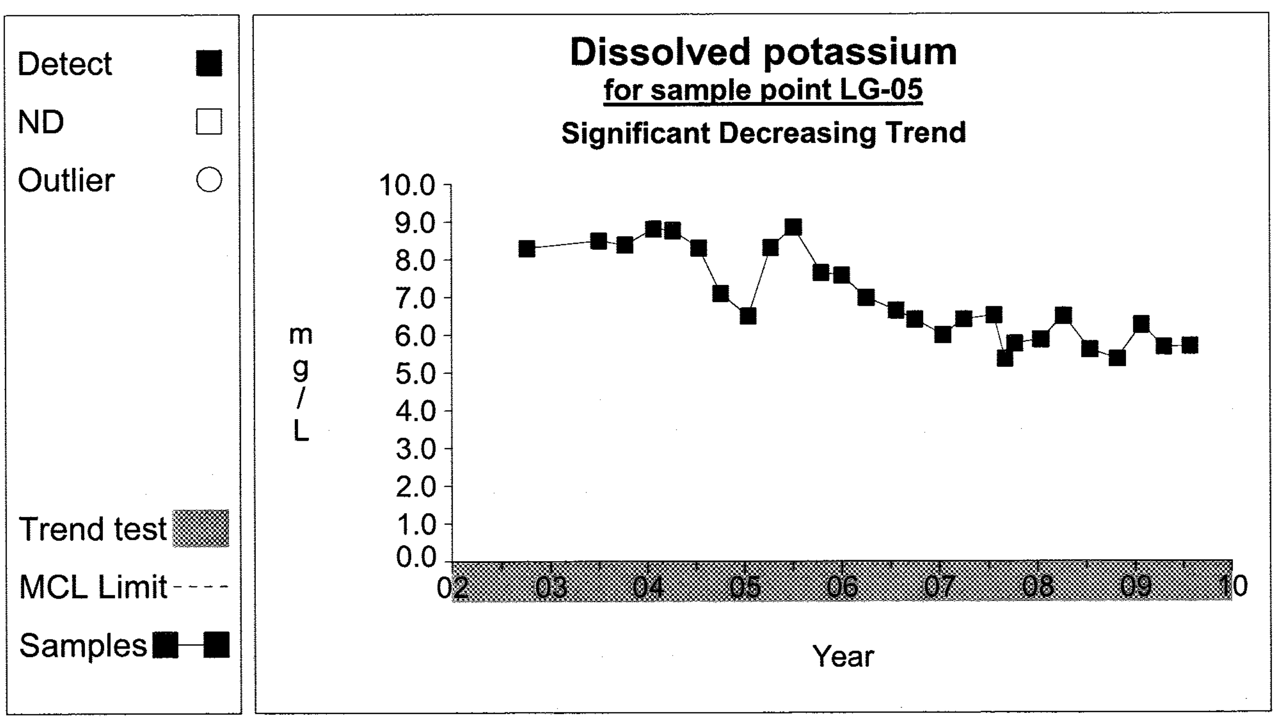


Graph 245

Time Series

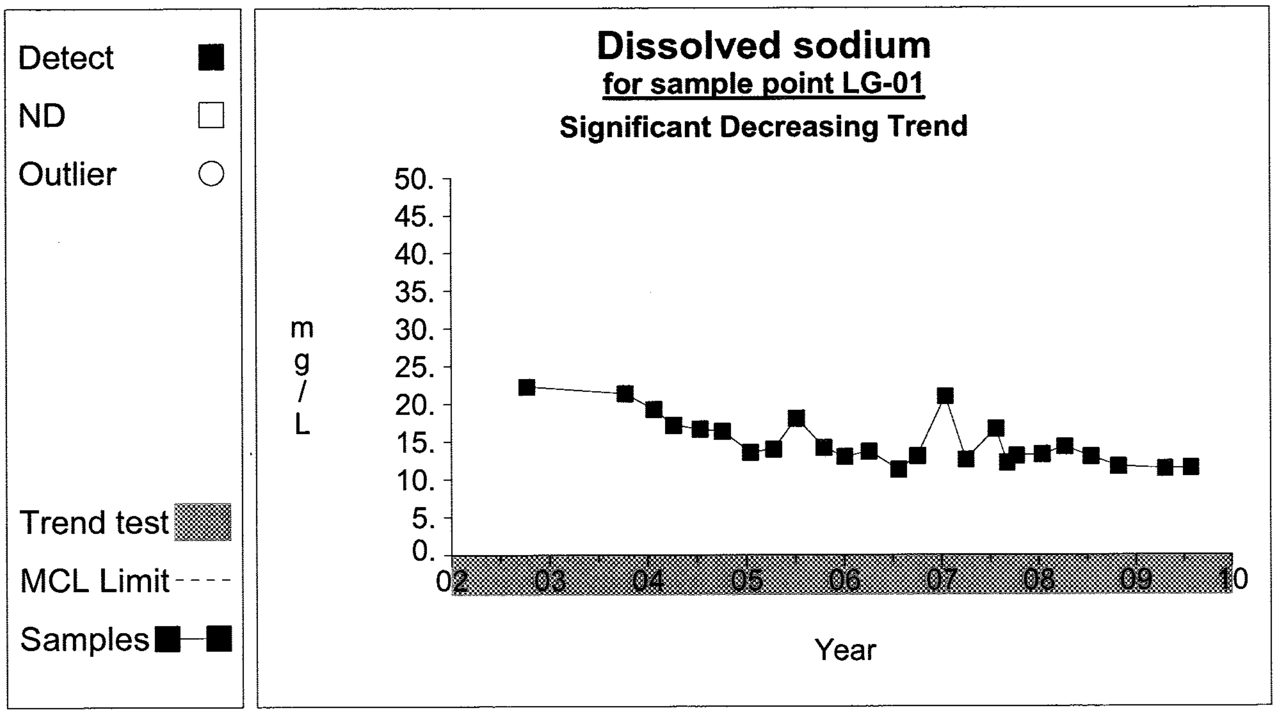


Graph 259

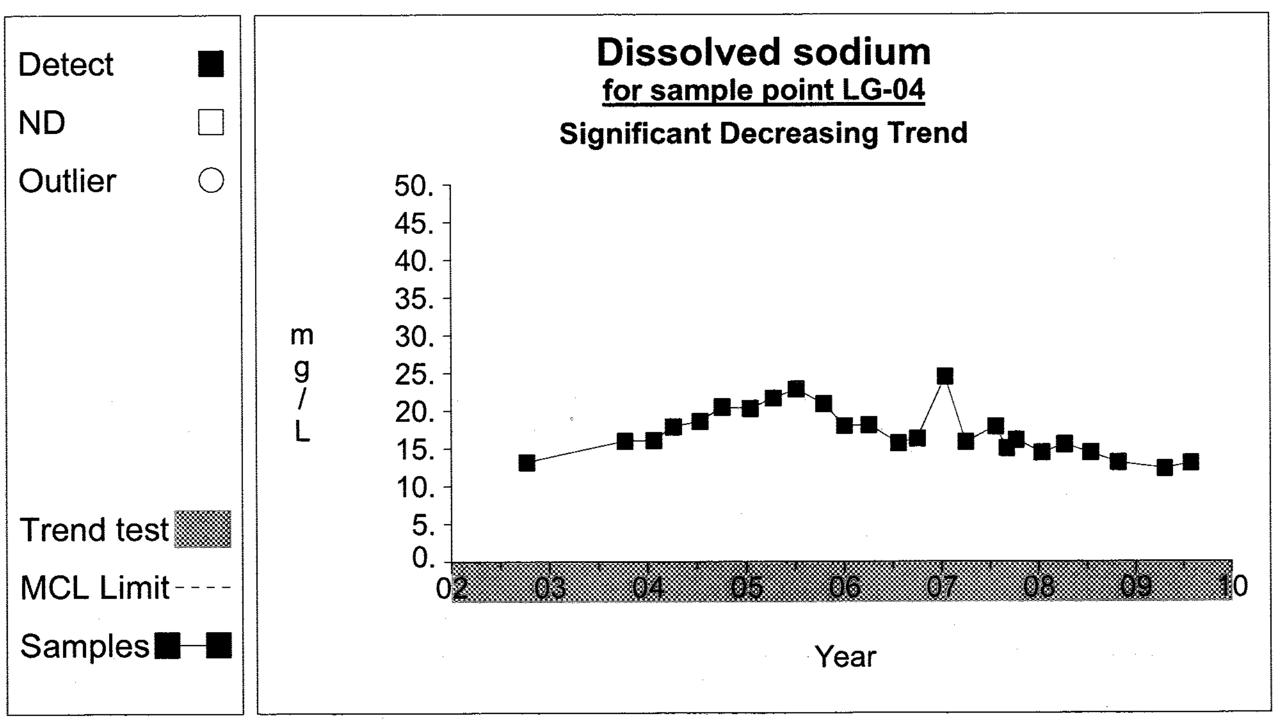


Graph 260

Time Series

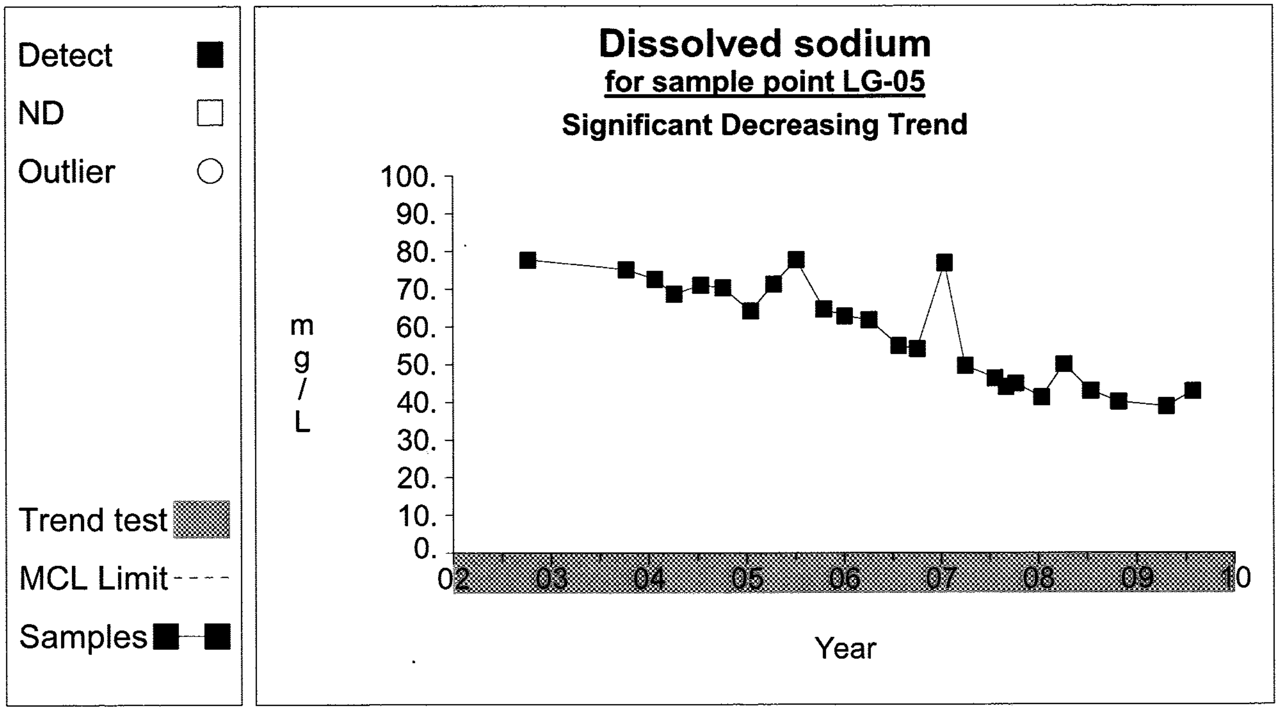


Graph 271



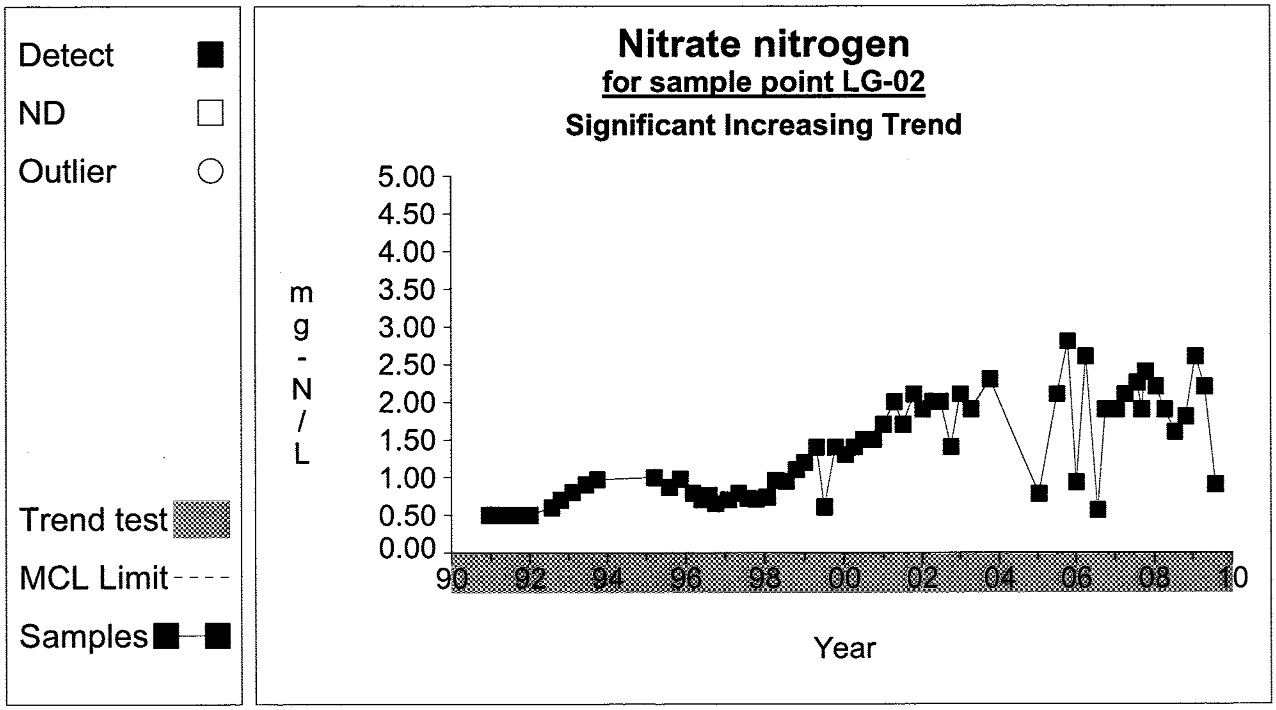
Graph 274

Time Series

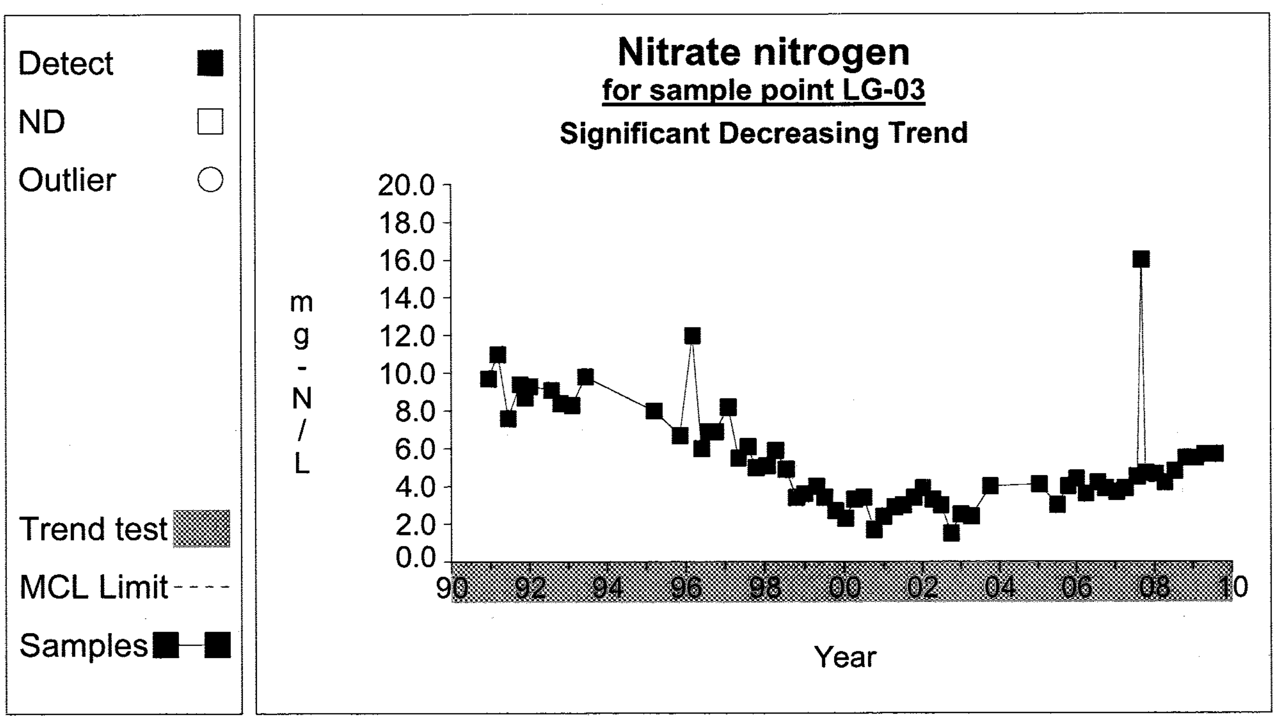


Graph 275

Time Series

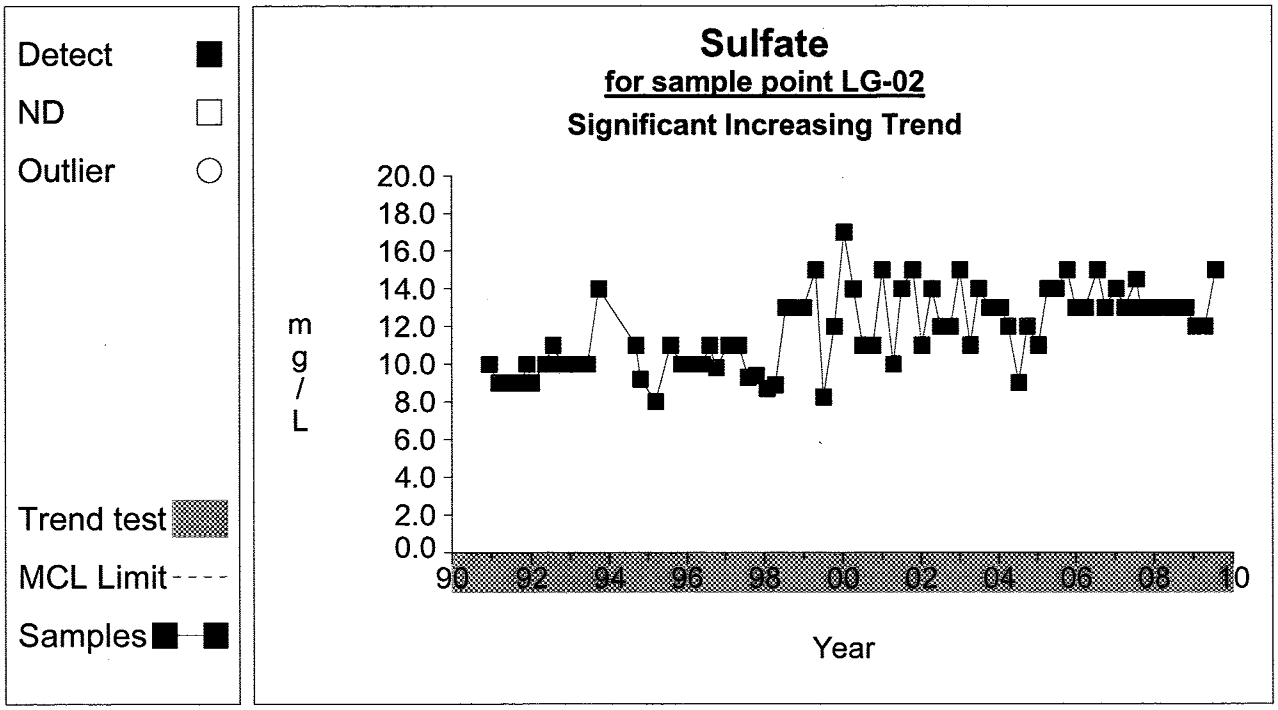


Graph 312

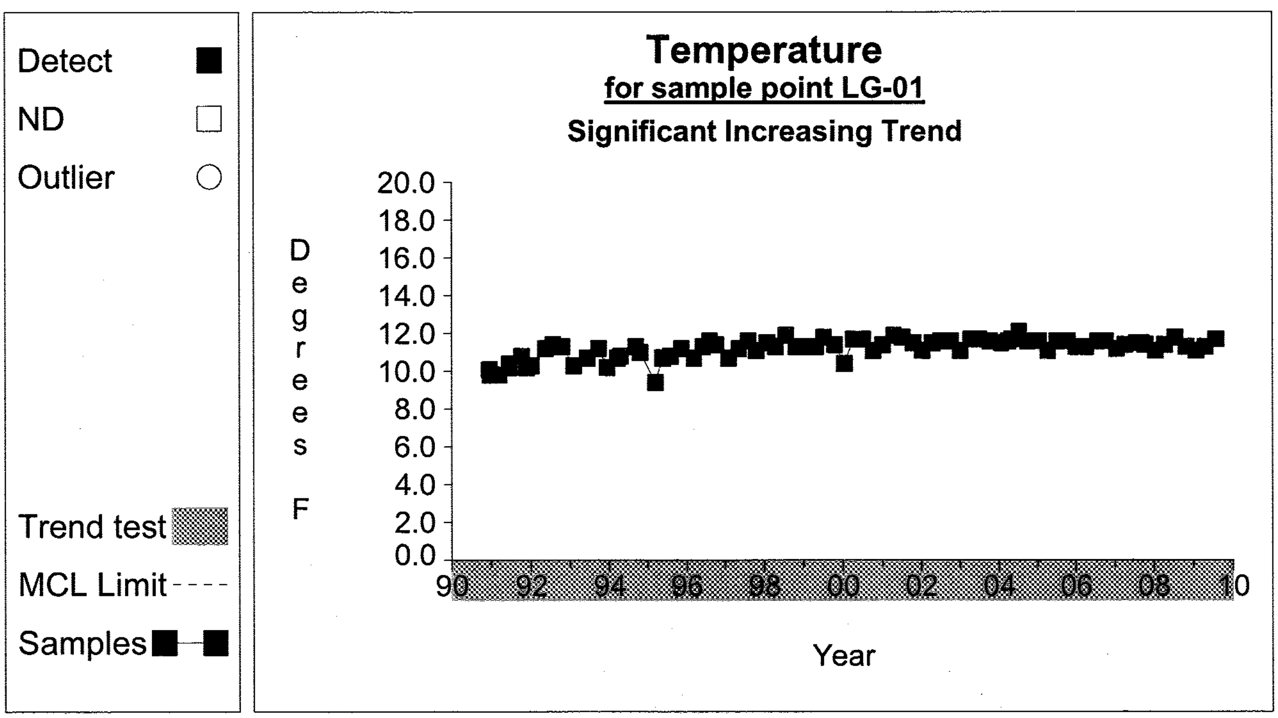


Graph 313

Time Series

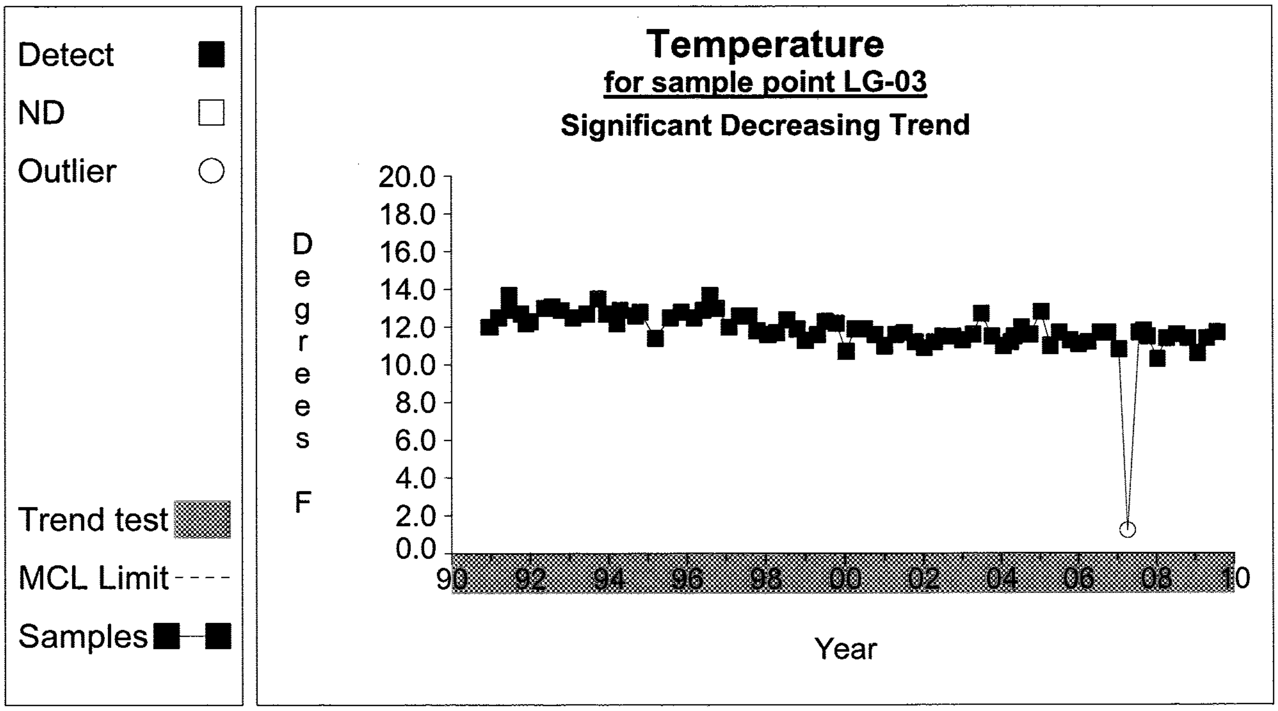


Graph 337

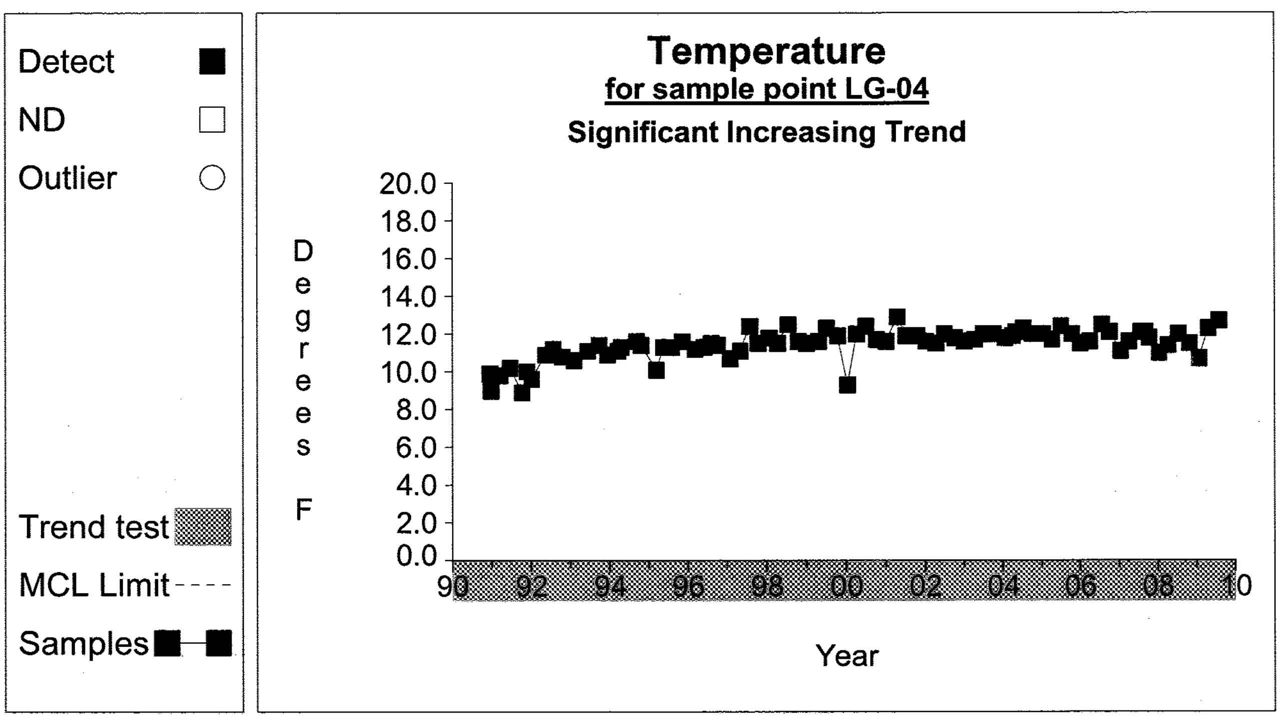


Graph 341

Time Series

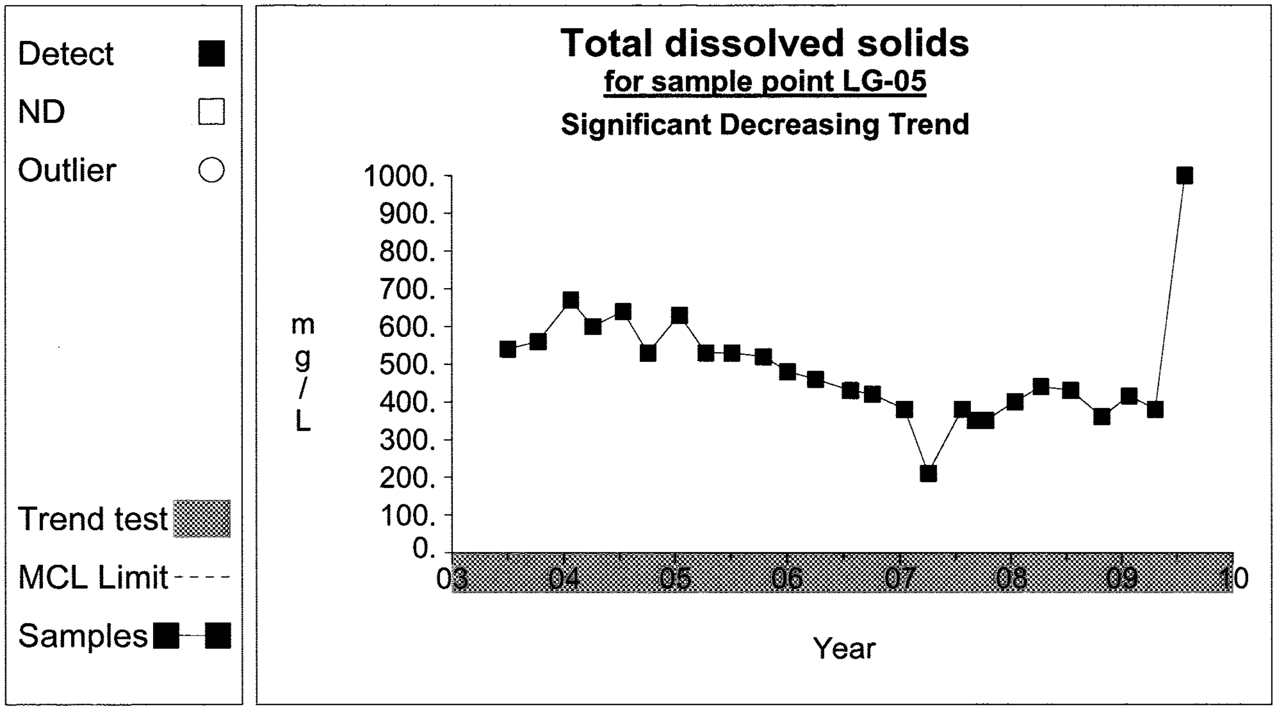


Graph 343



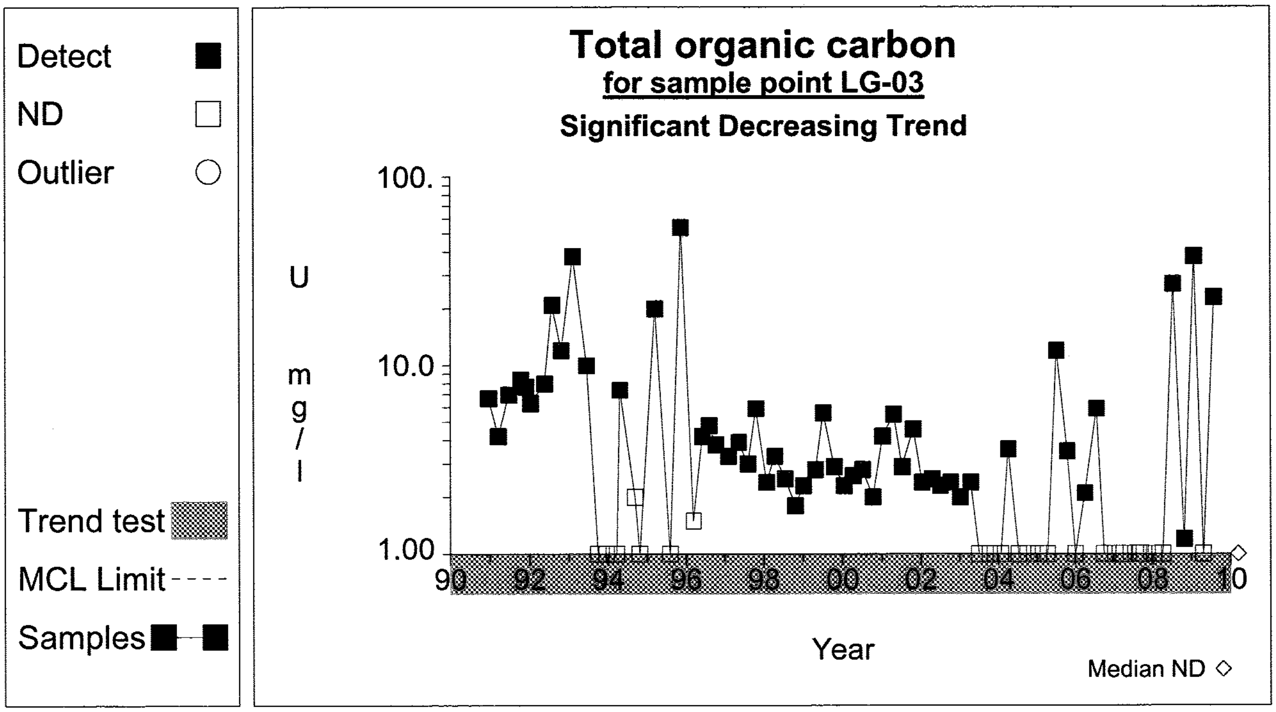
Graph 344

Time Series



Graph 360

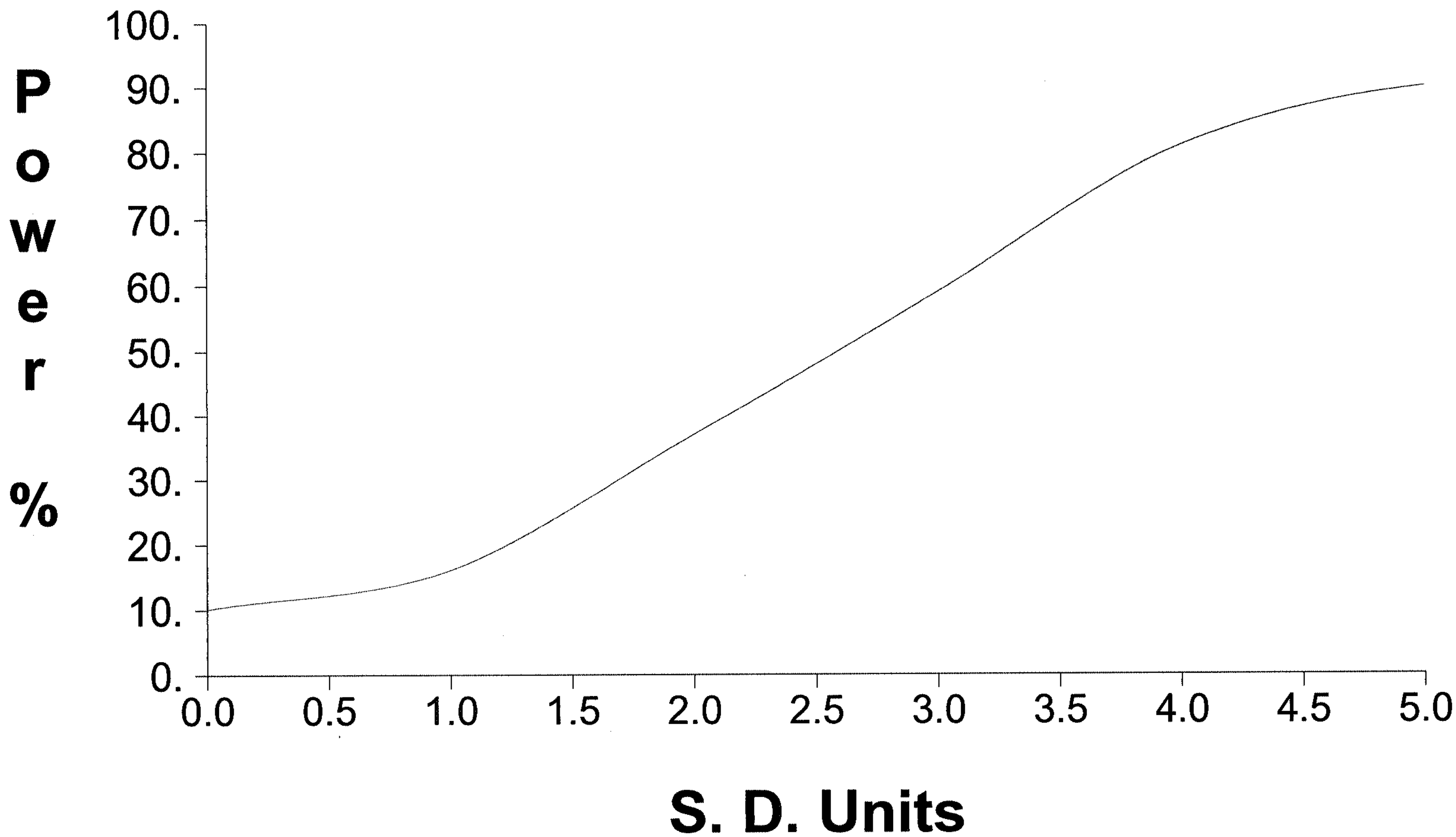
Time Series



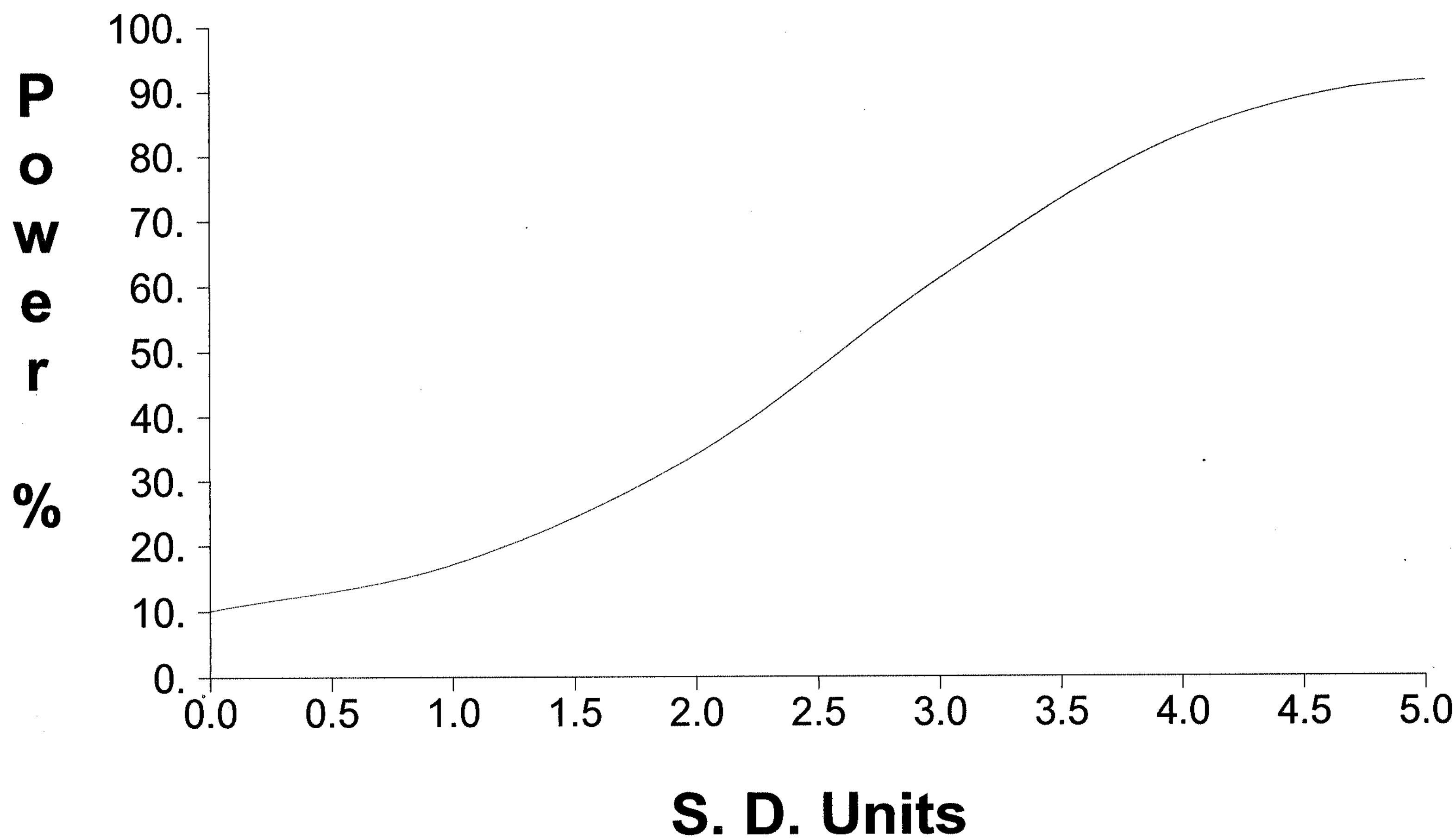
Graph 363

4TH QUARTER

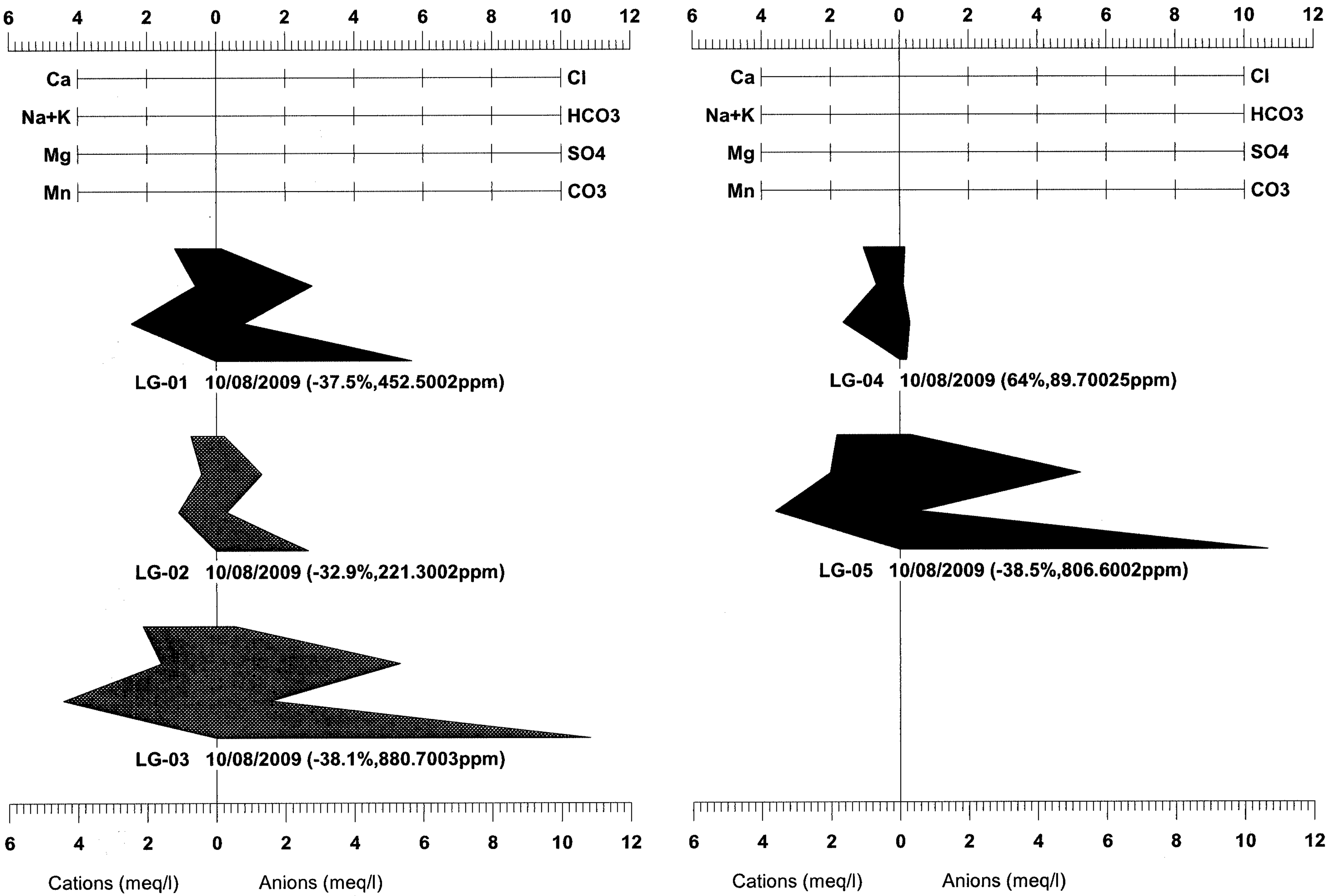
False Positive and False Negative Rates for Current Upgradient vs. Downgradient Monitoring Program



False Positive and False Negative Rates for Current Intra-Well Prediction Limits Monitoring Program



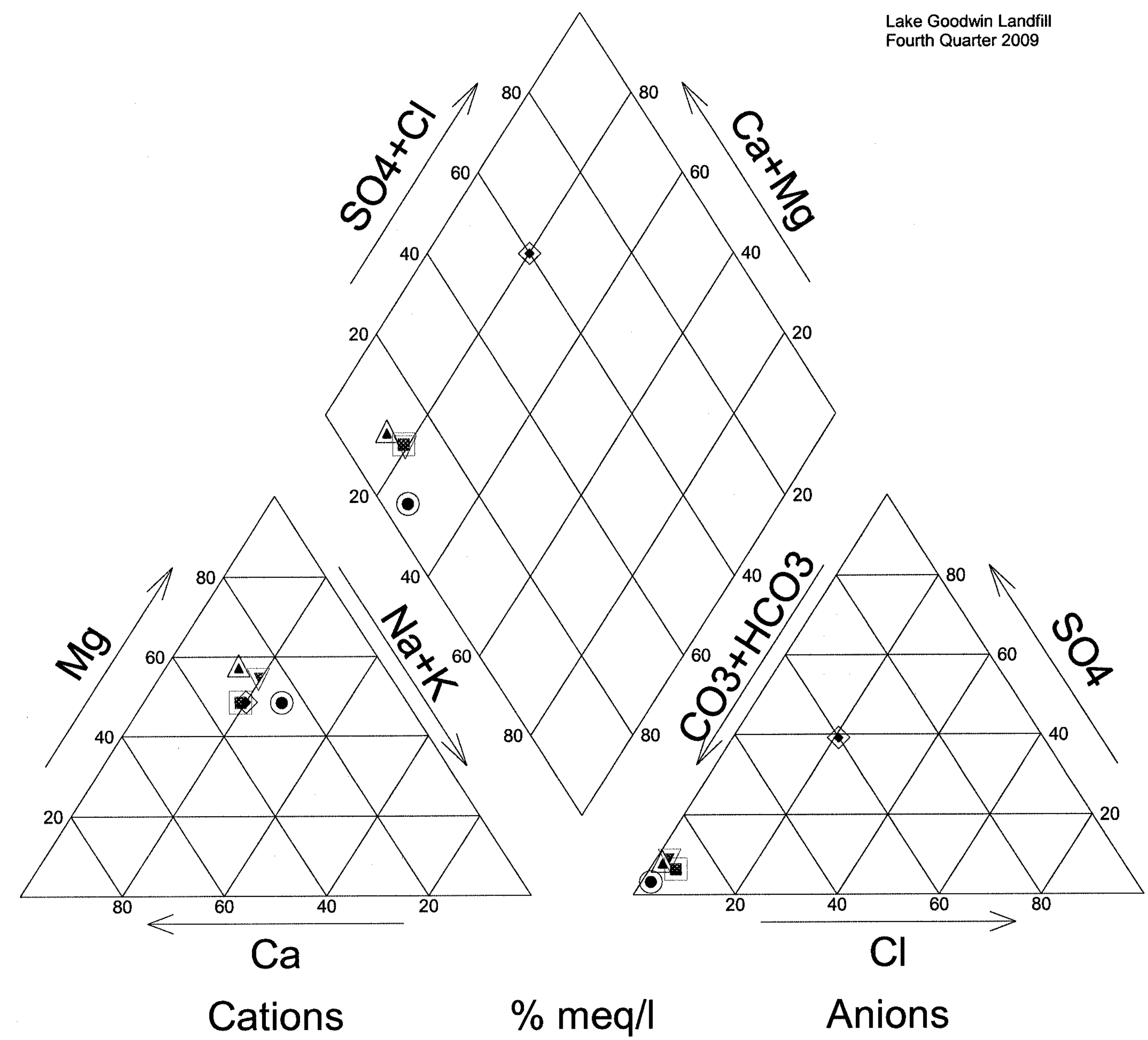
Goodwin Landfill



Prepared by: Snohomish County Solid Waste

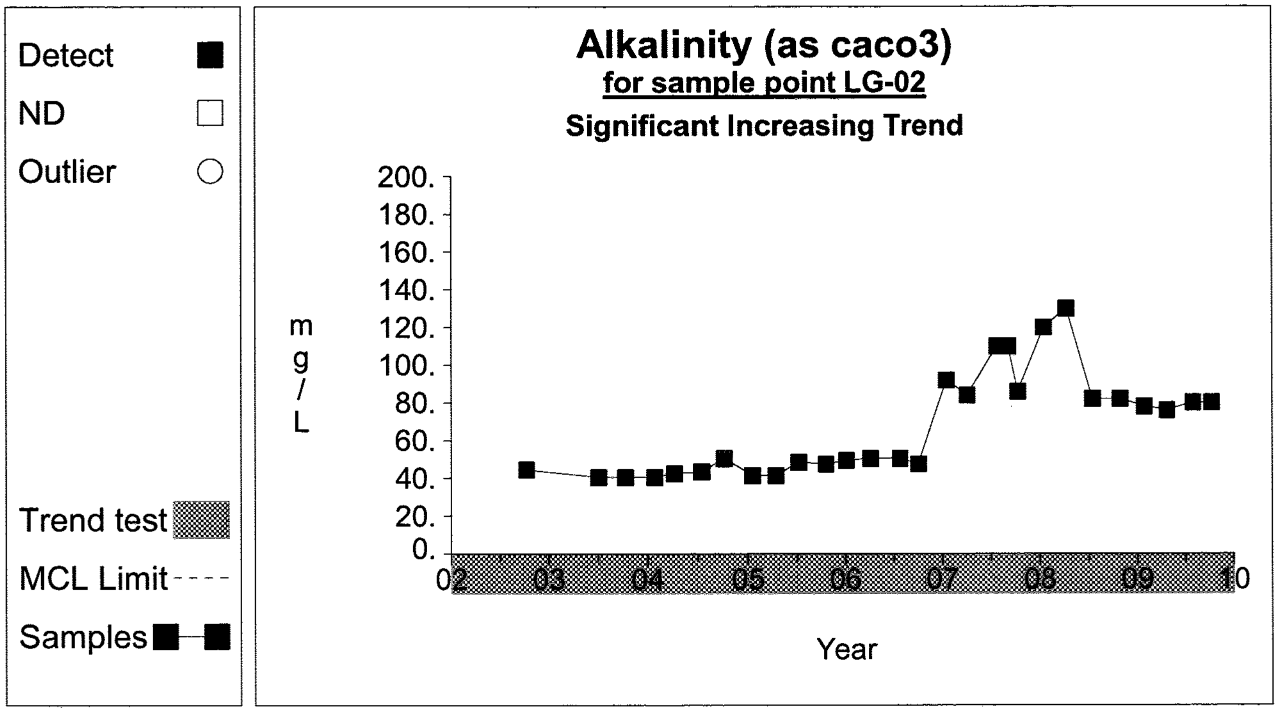
Goodwin Landfill

▲	LG-01	10/08/2009 (-37.5%,452.5ppm)
■	LG-02	10/08/2009 (-32.9%,221.3ppm)
▼	LG-03	10/08/2009 (-38.1%,880.7ppm)
◆	LG-04	10/08/2009 (64%,89.7ppm)
●	LG-05	10/08/2009 (-38.5%,806.6ppm)

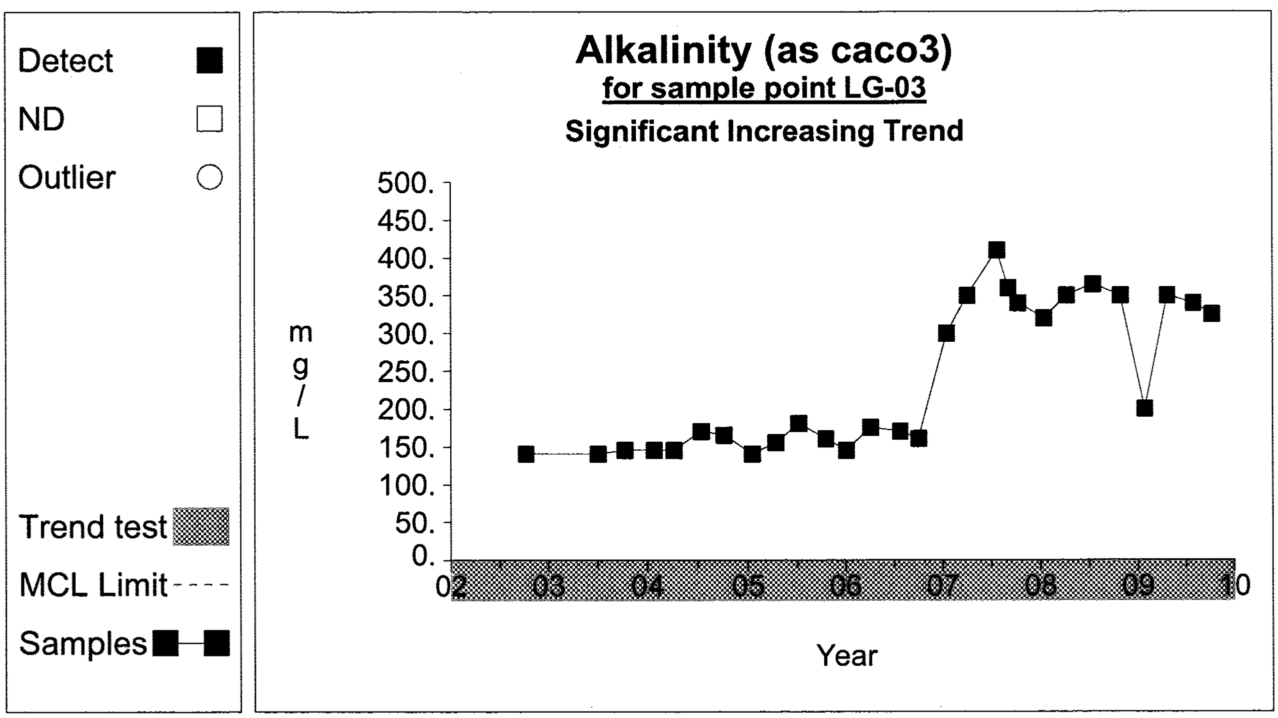


Prepared by: Snohomish County Solid Waste

Time Series

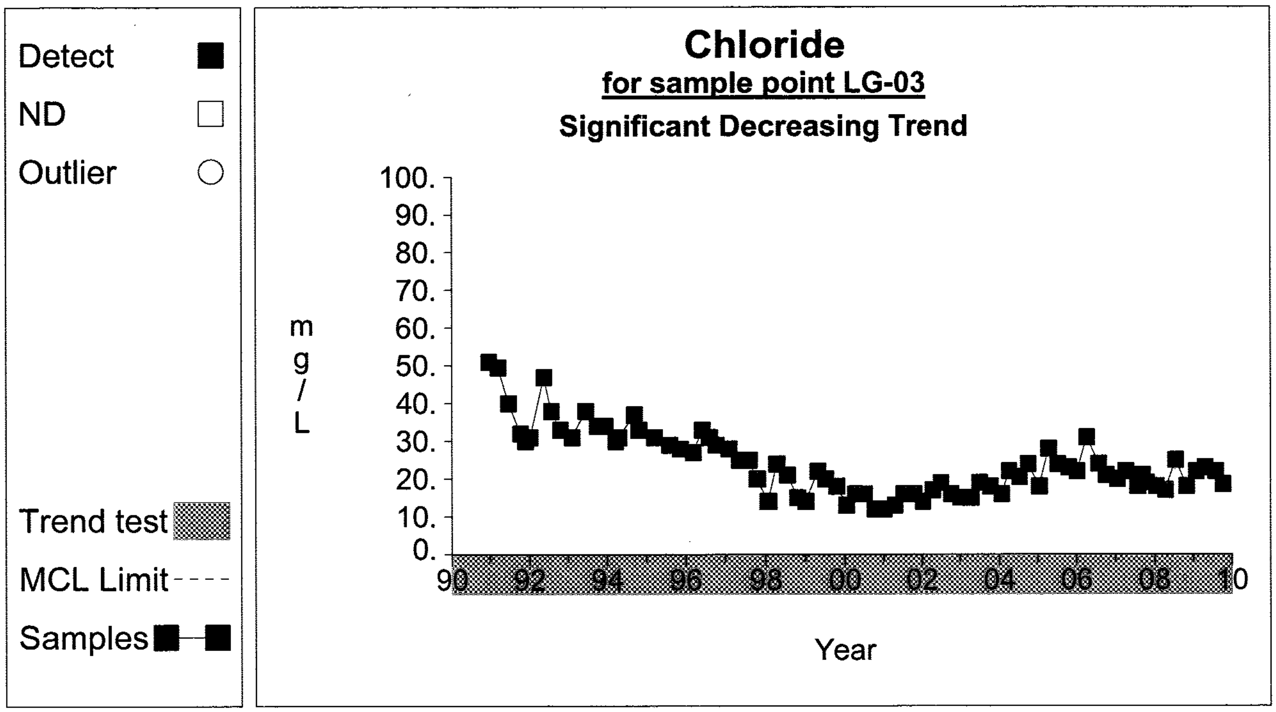


Graph 87

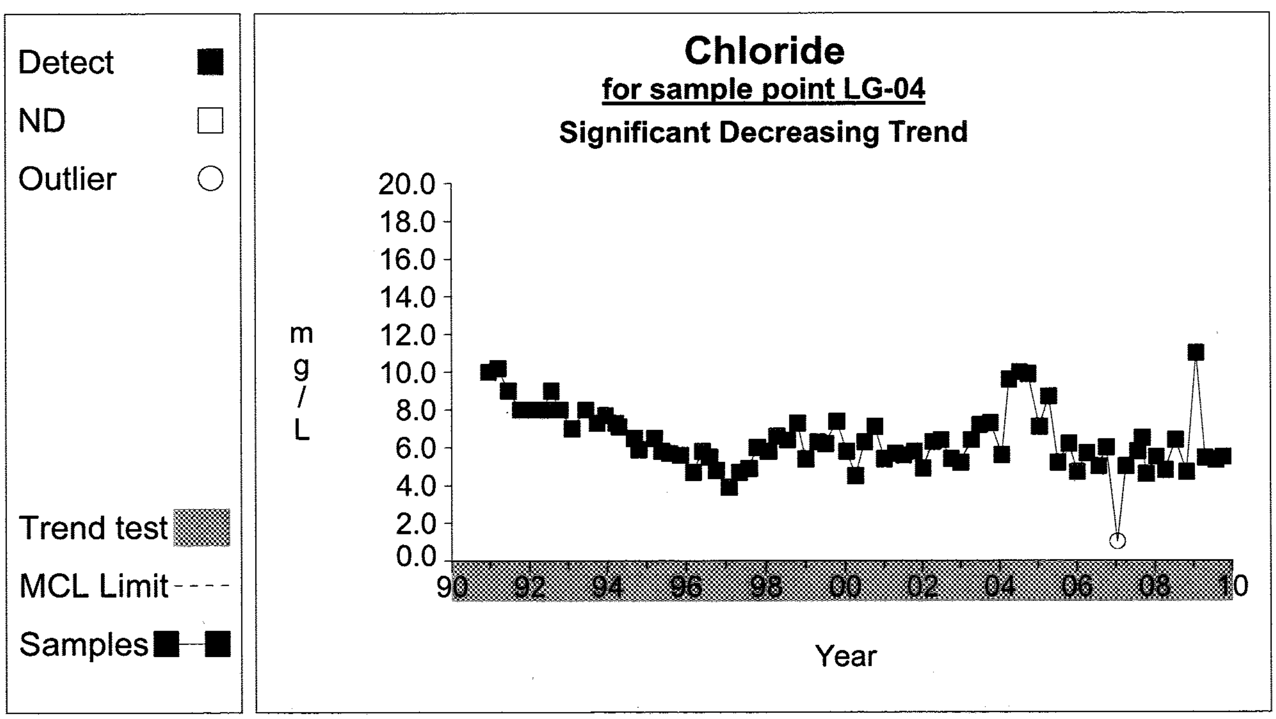


Graph 88

Time Series

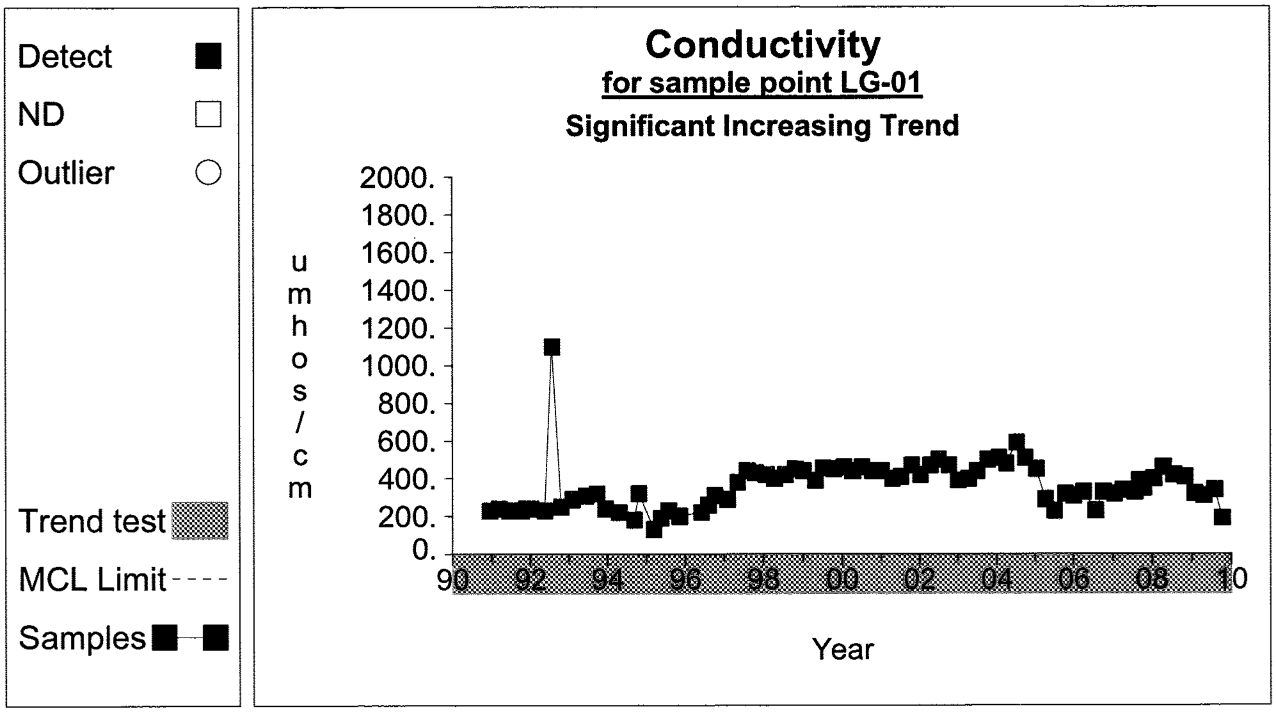


Graph 138

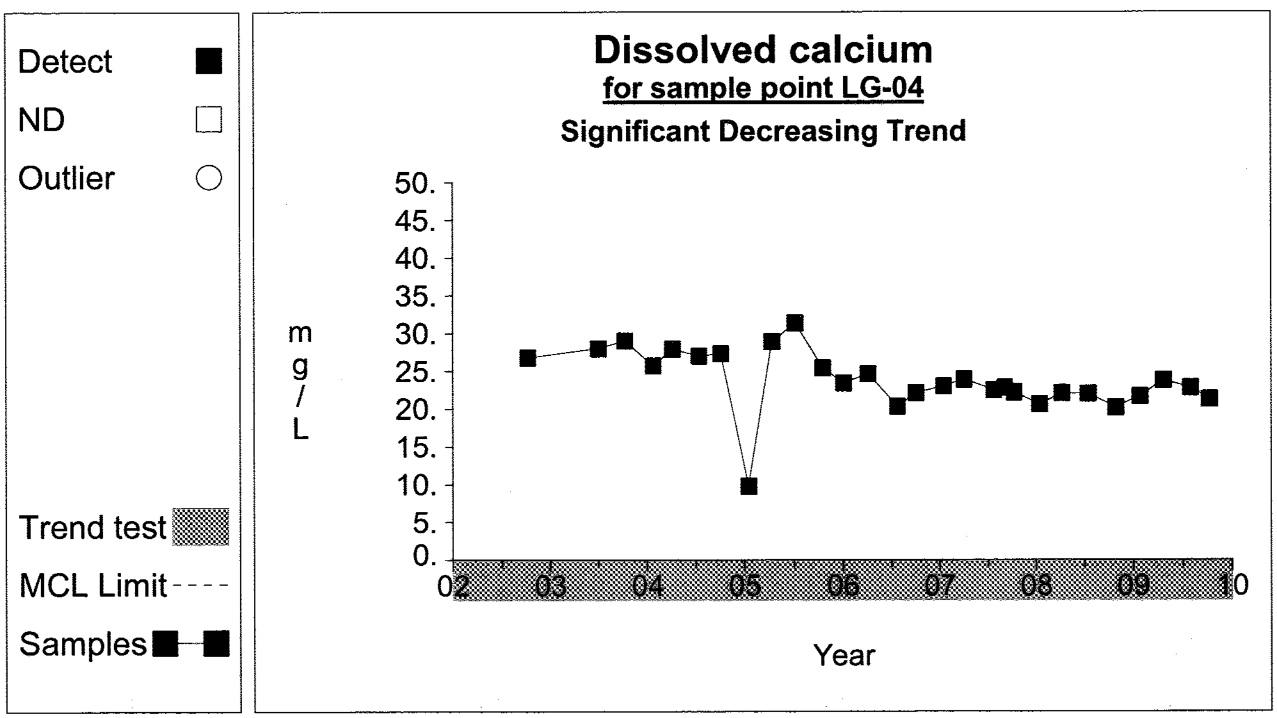


Graph 139

Time Series

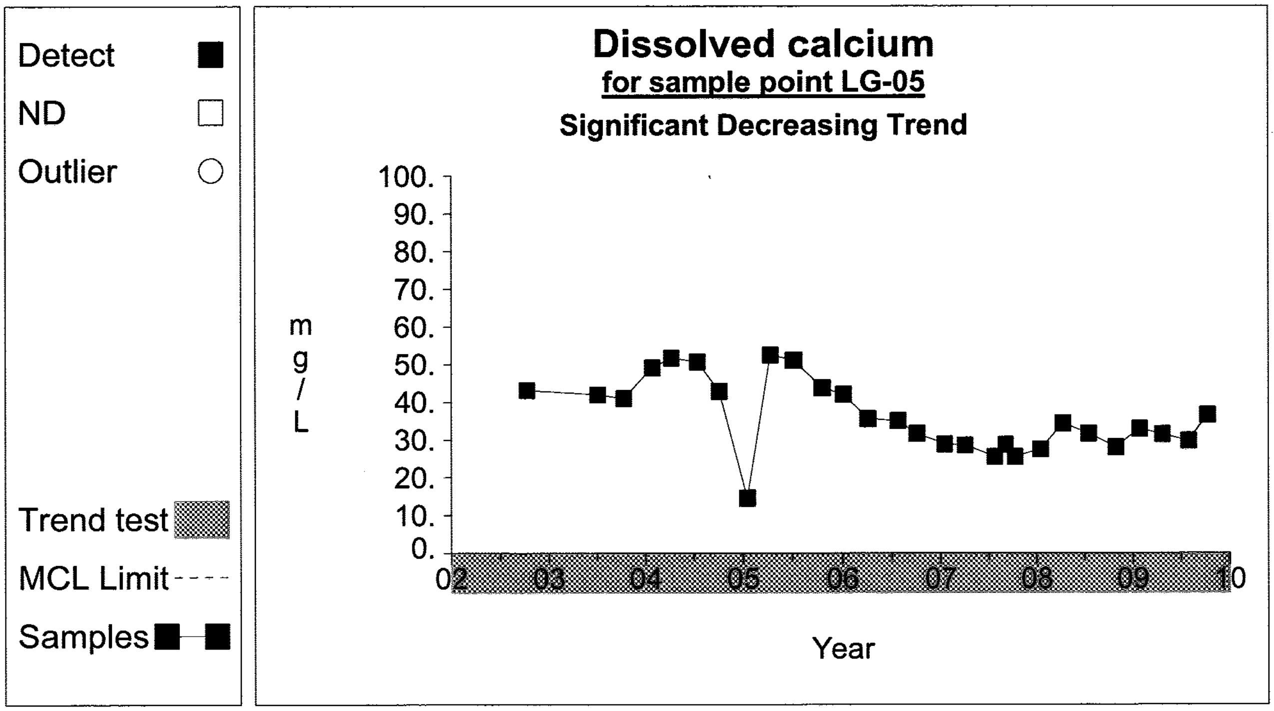


Graph 176



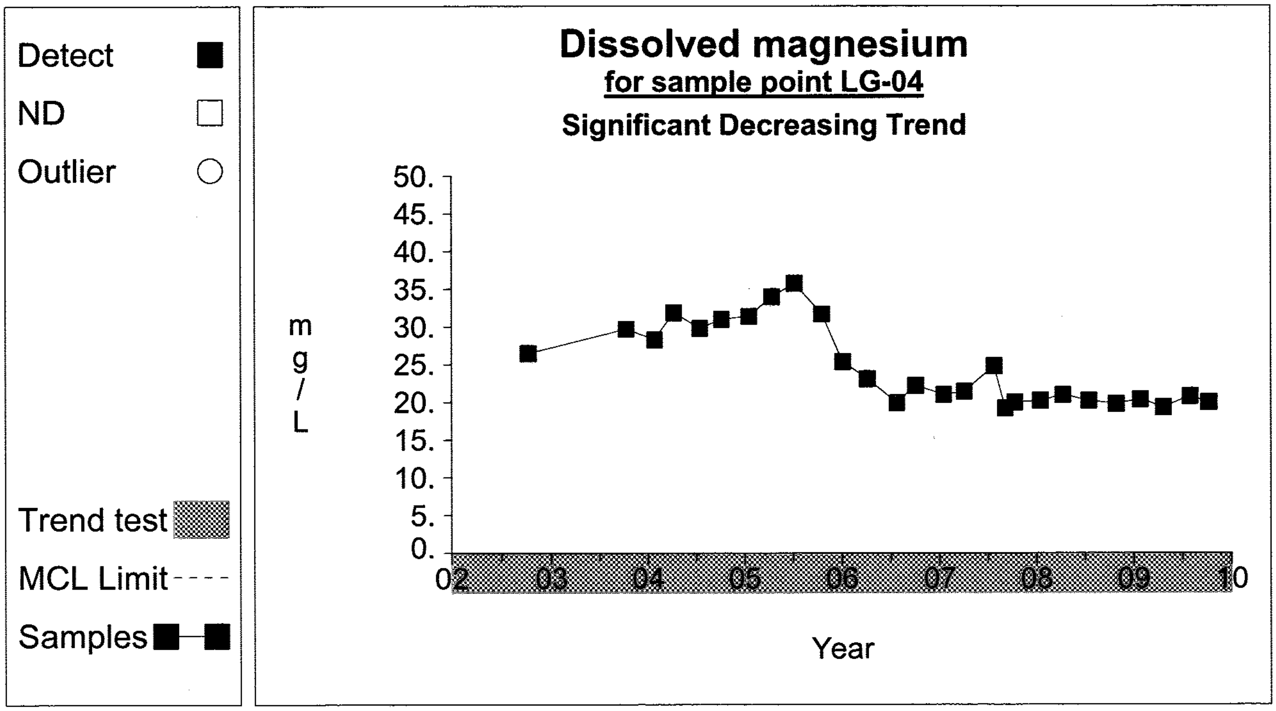
Graph 214

Time Series

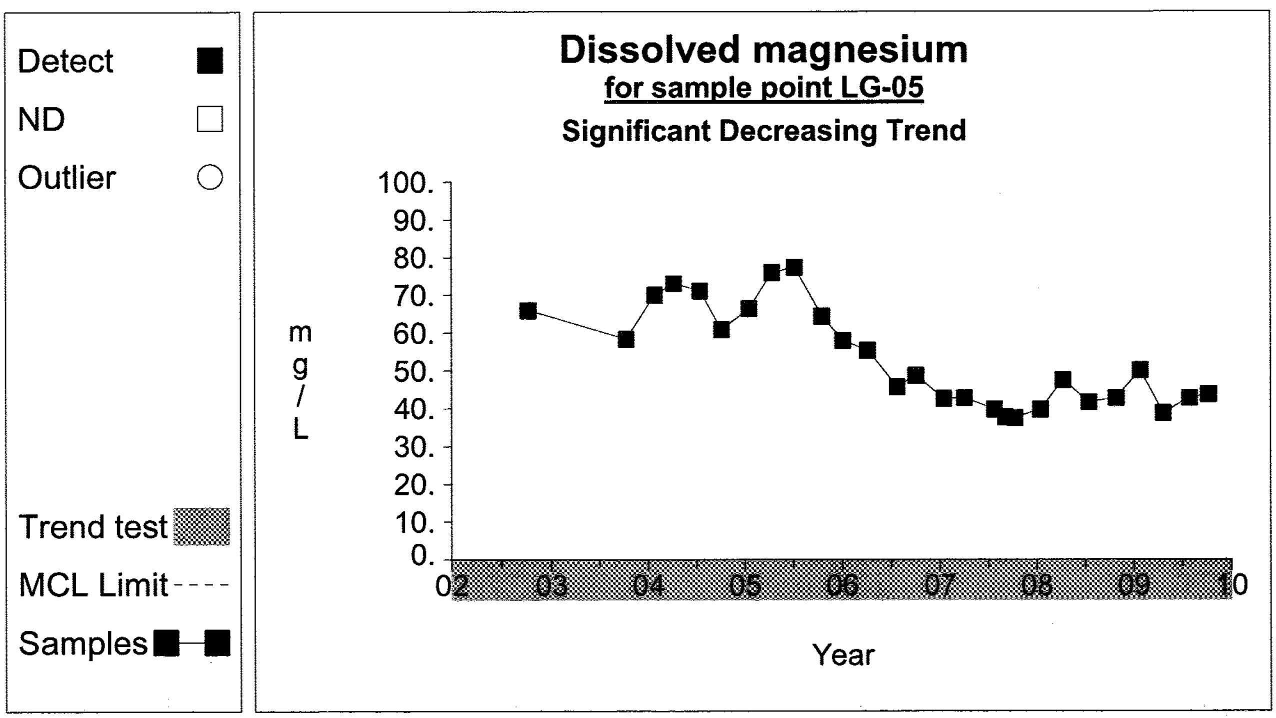


Graph 215

Time Series

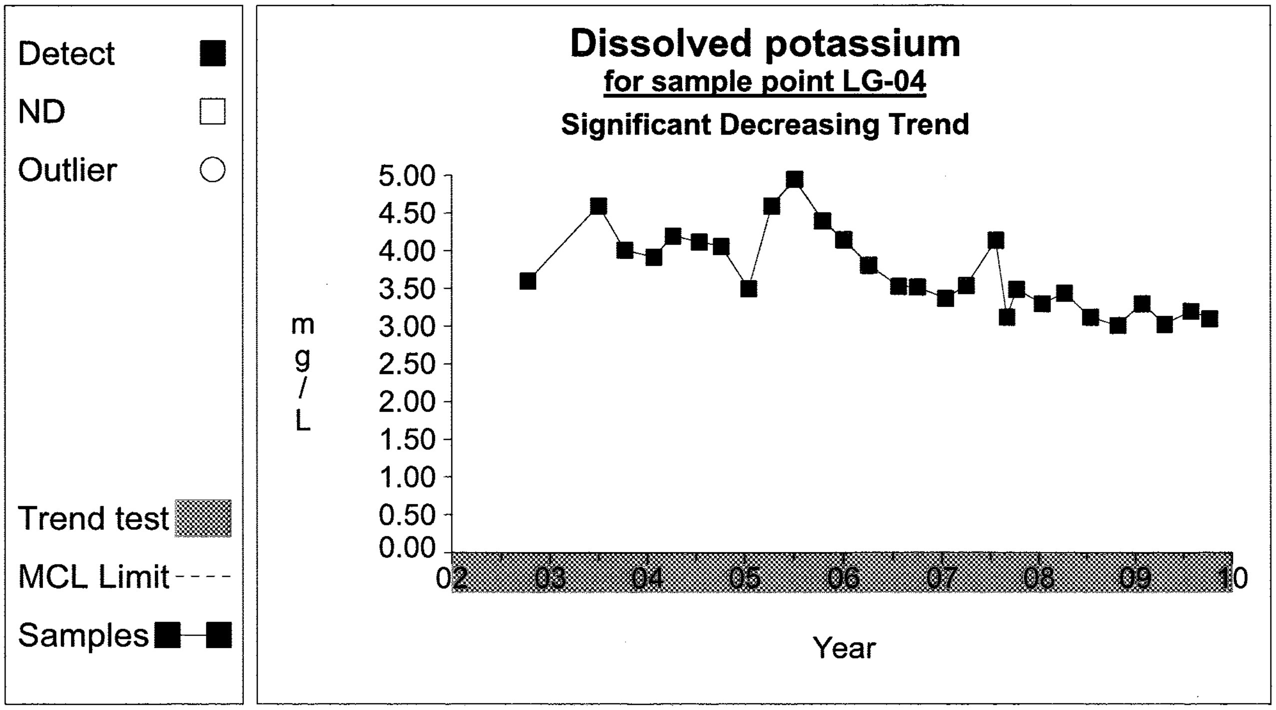


Graph 244

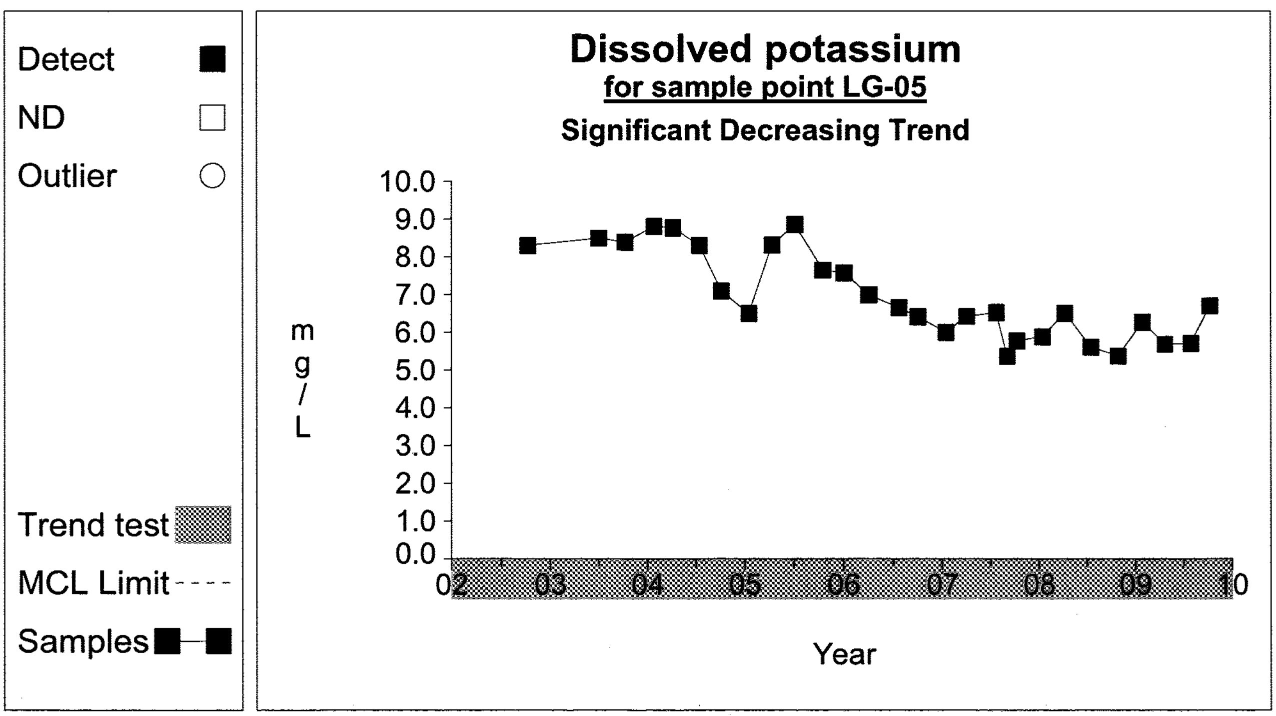


Graph 245

Time Series

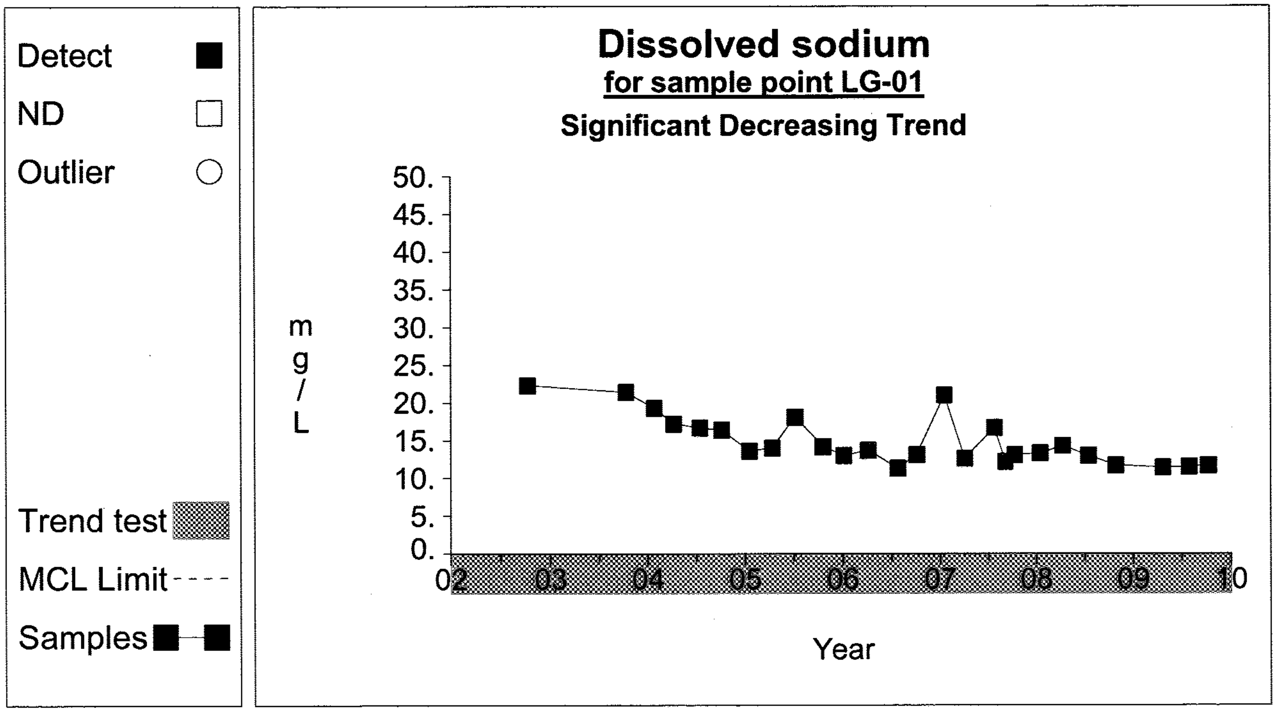


Graph 259

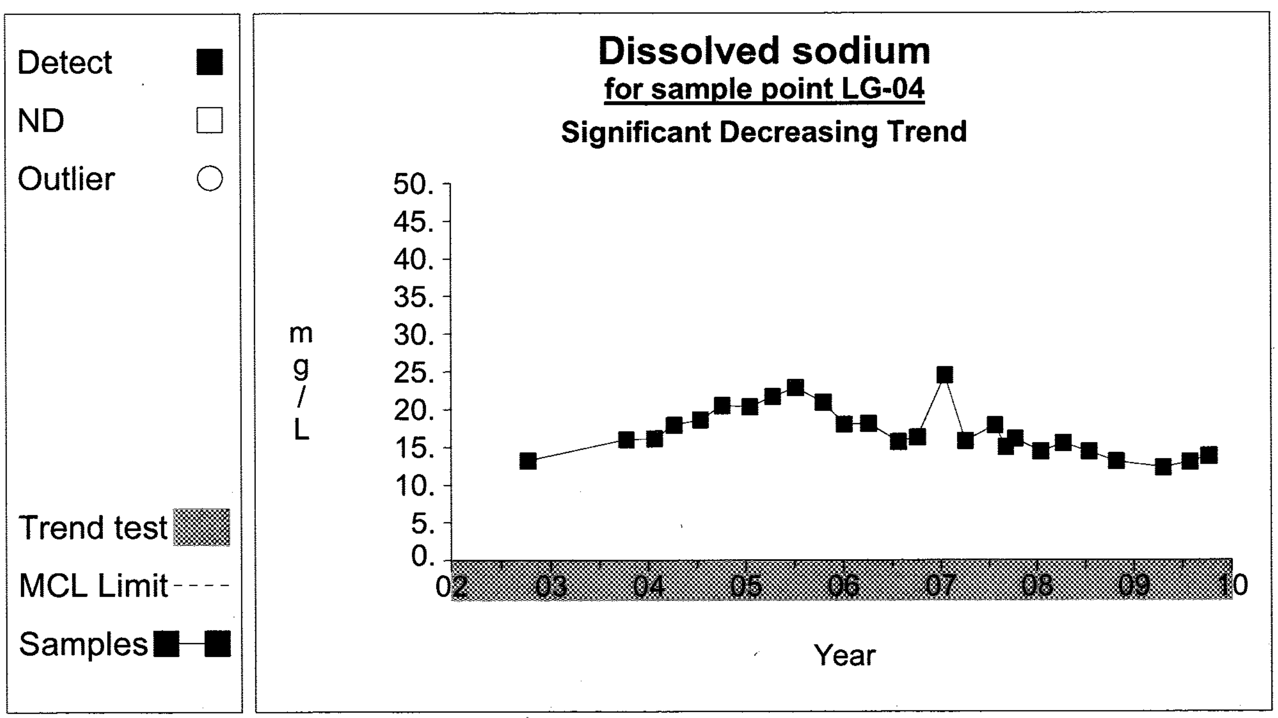


Graph 260

Time Series

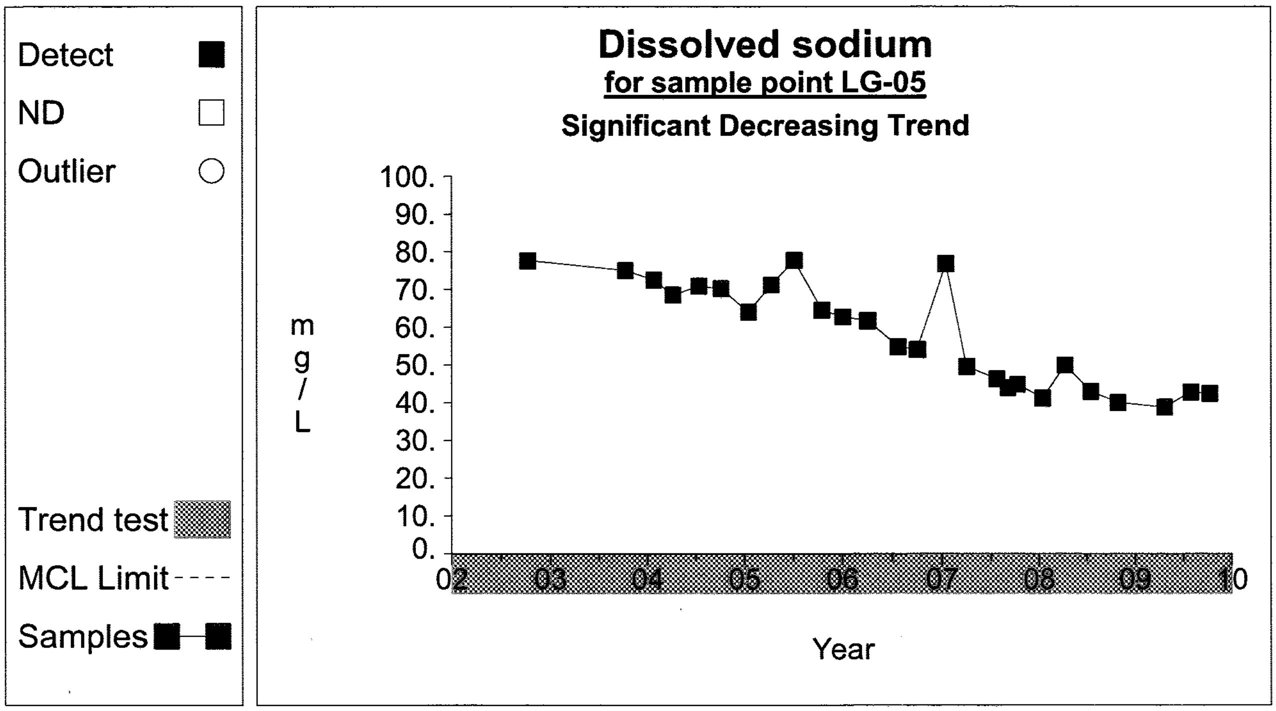


Graph 271



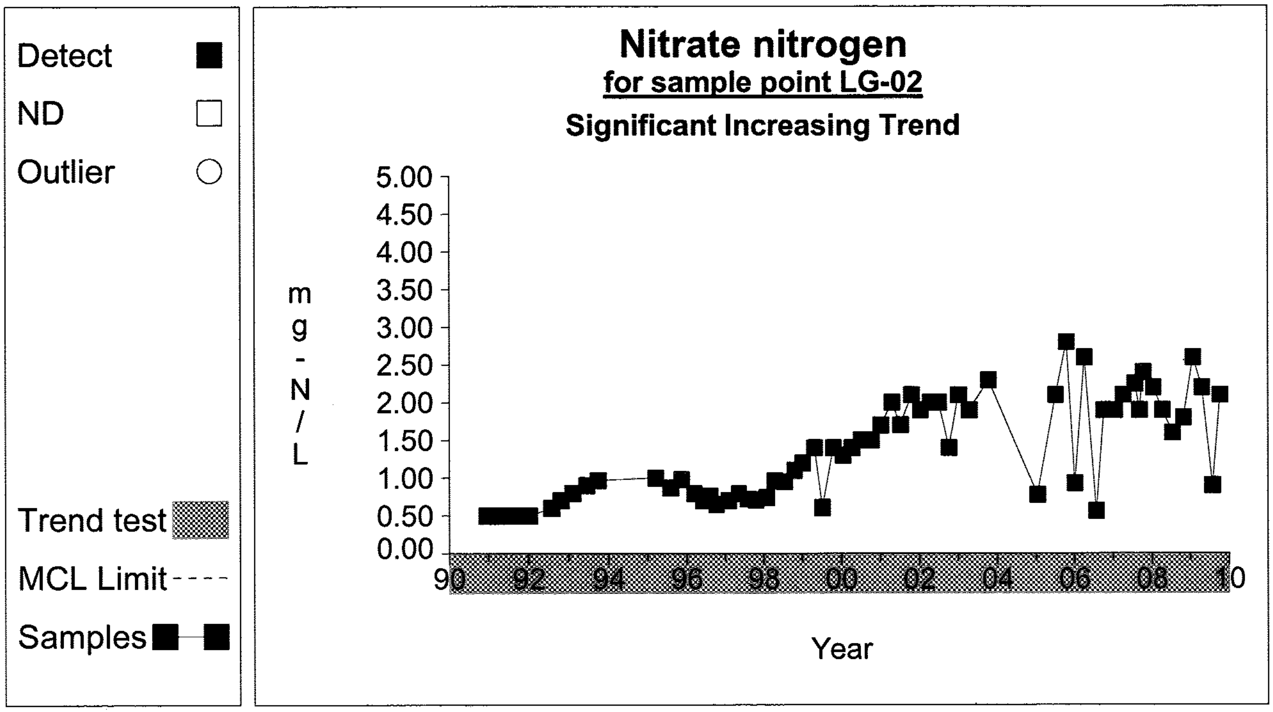
Graph 274

Time Series

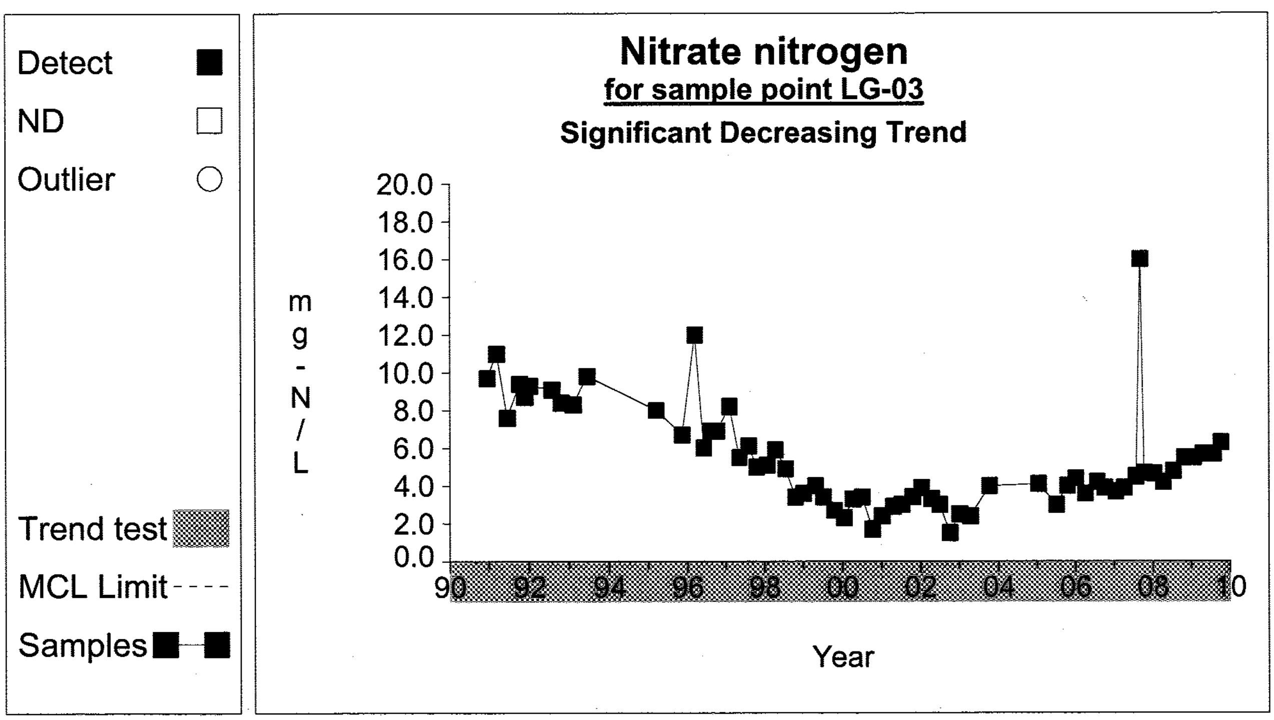


Graph 275

Time Series

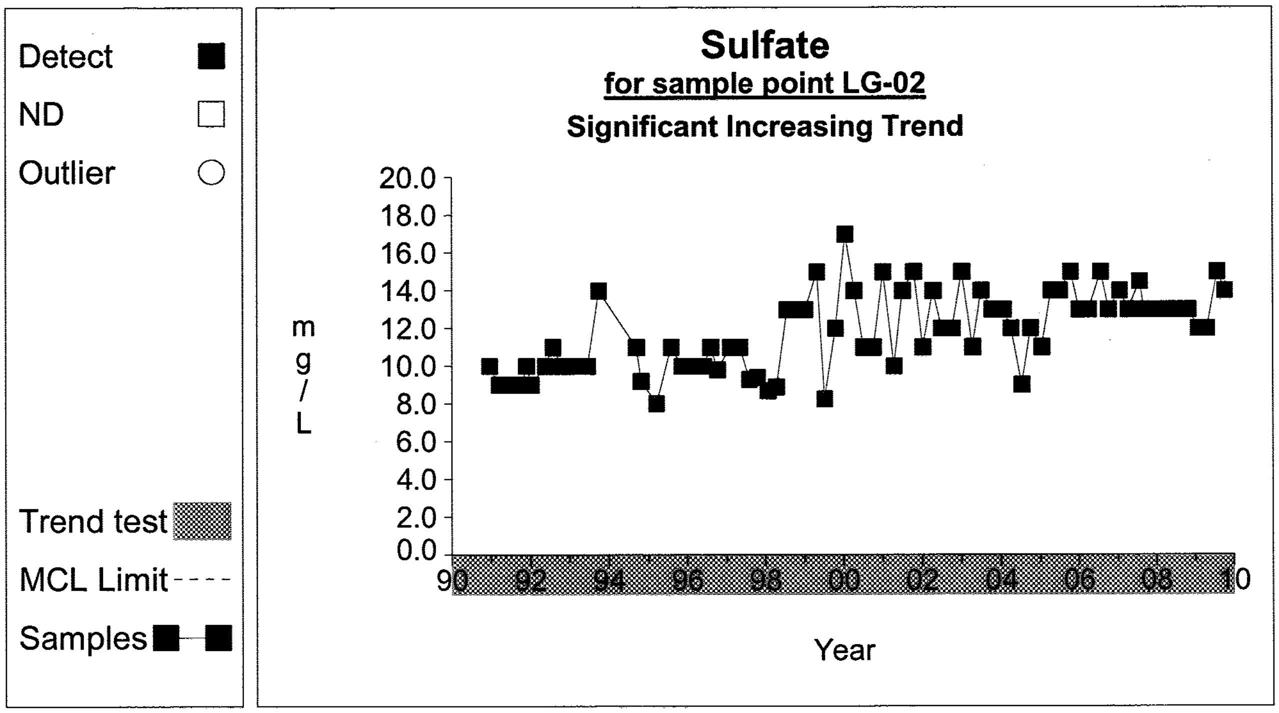


Graph 312

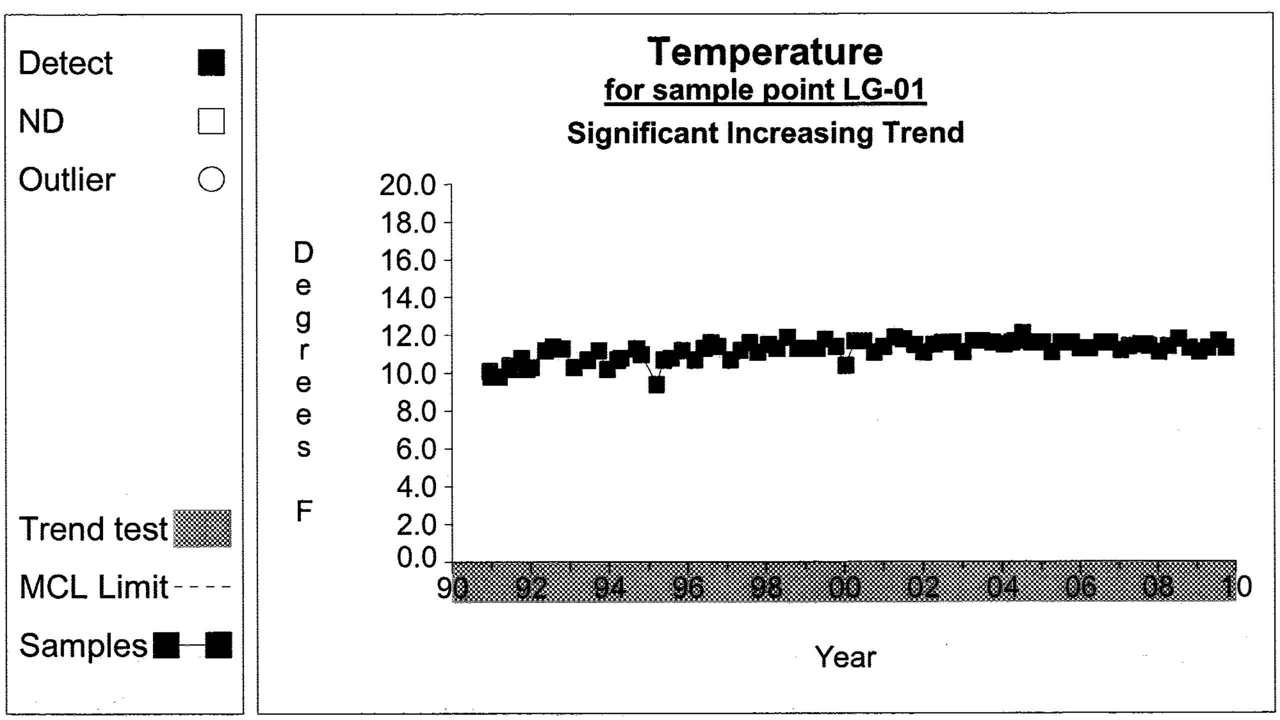


Graph 313

Time Series

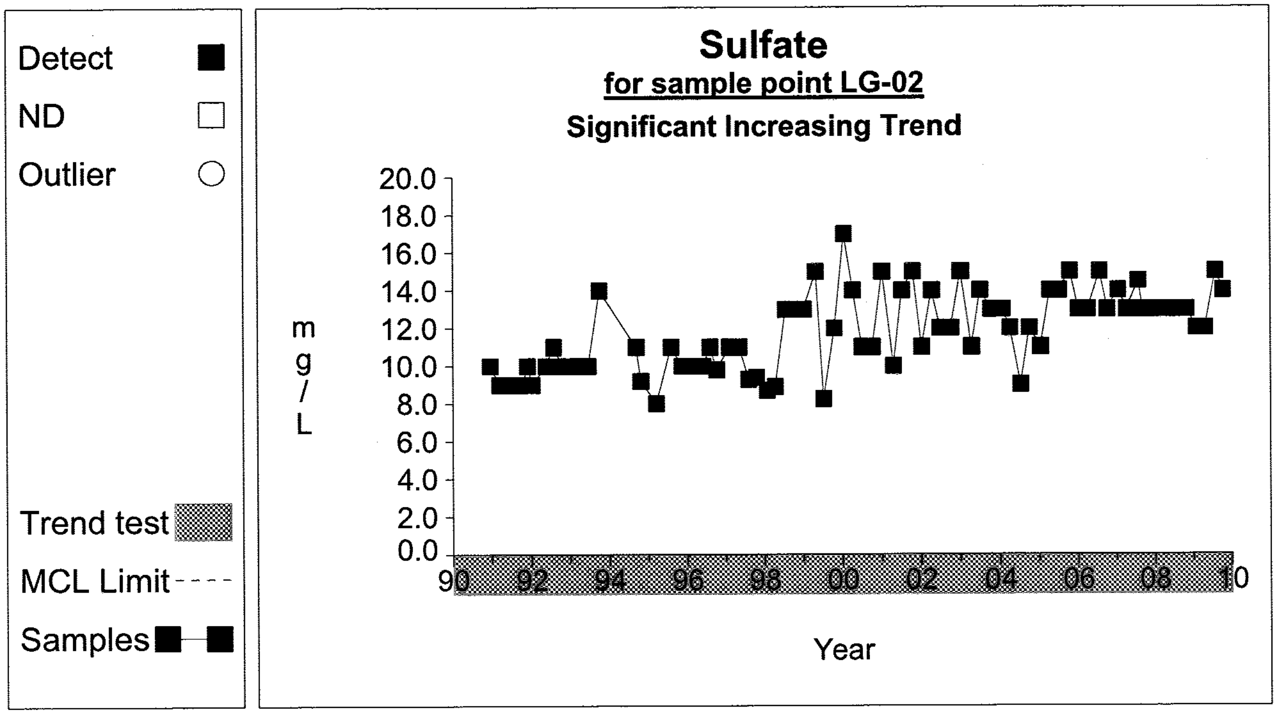


Graph 337

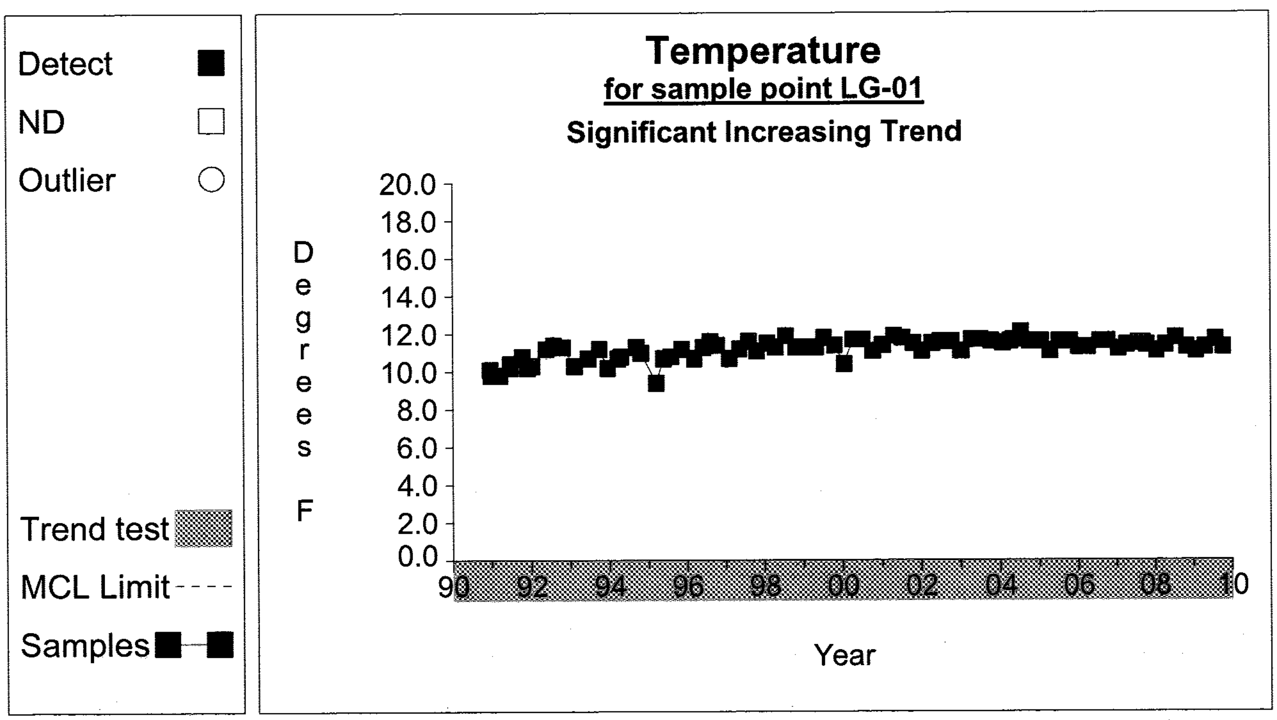


Graph 341

Time Series

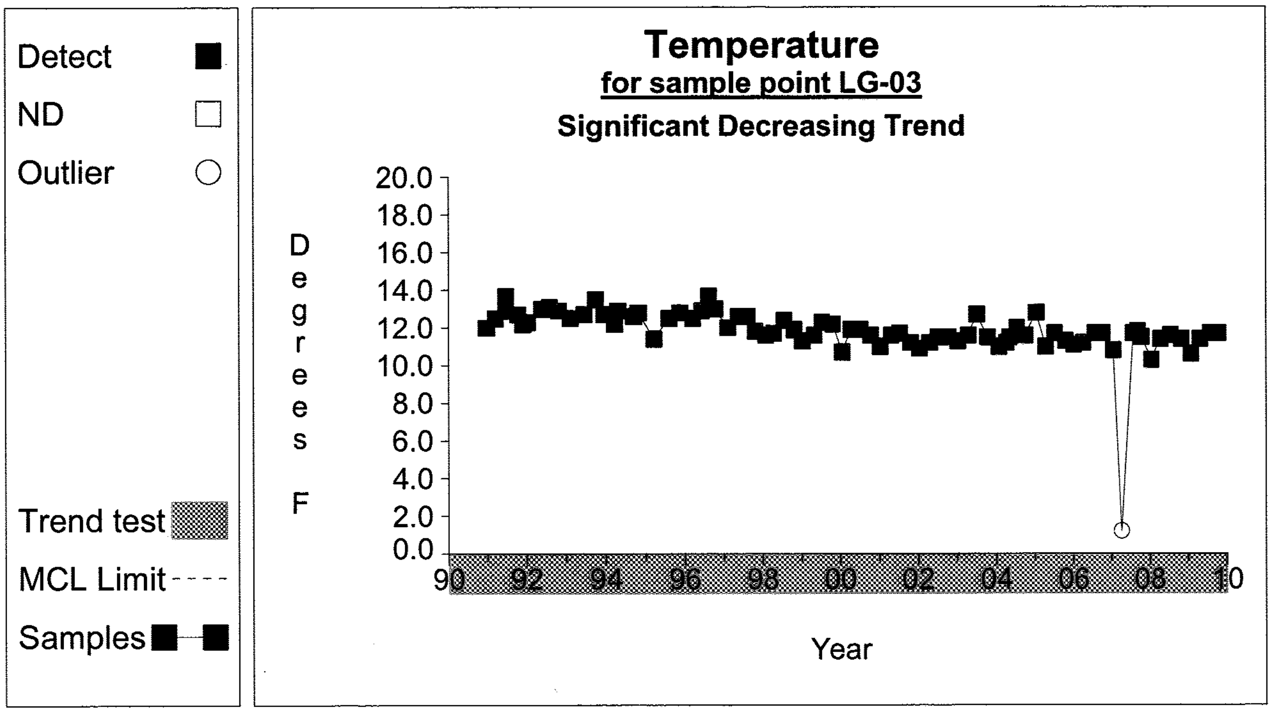


Graph 337

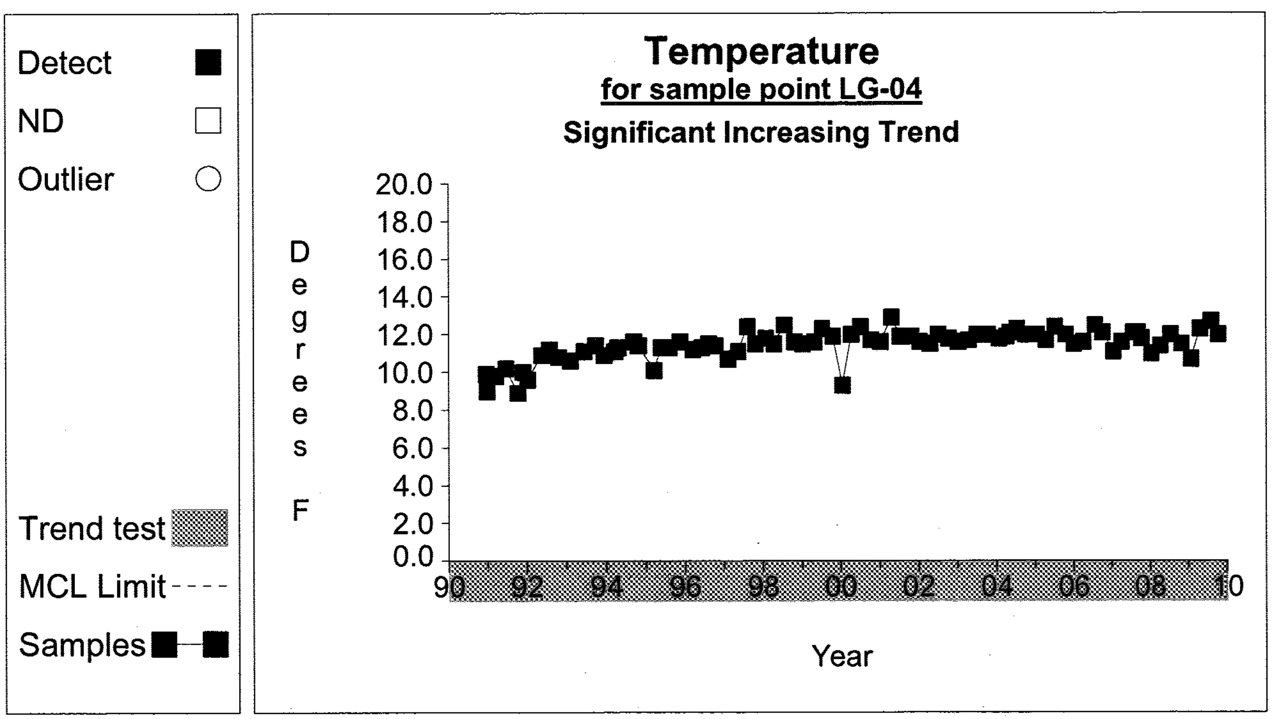


Graph 341

Time Series

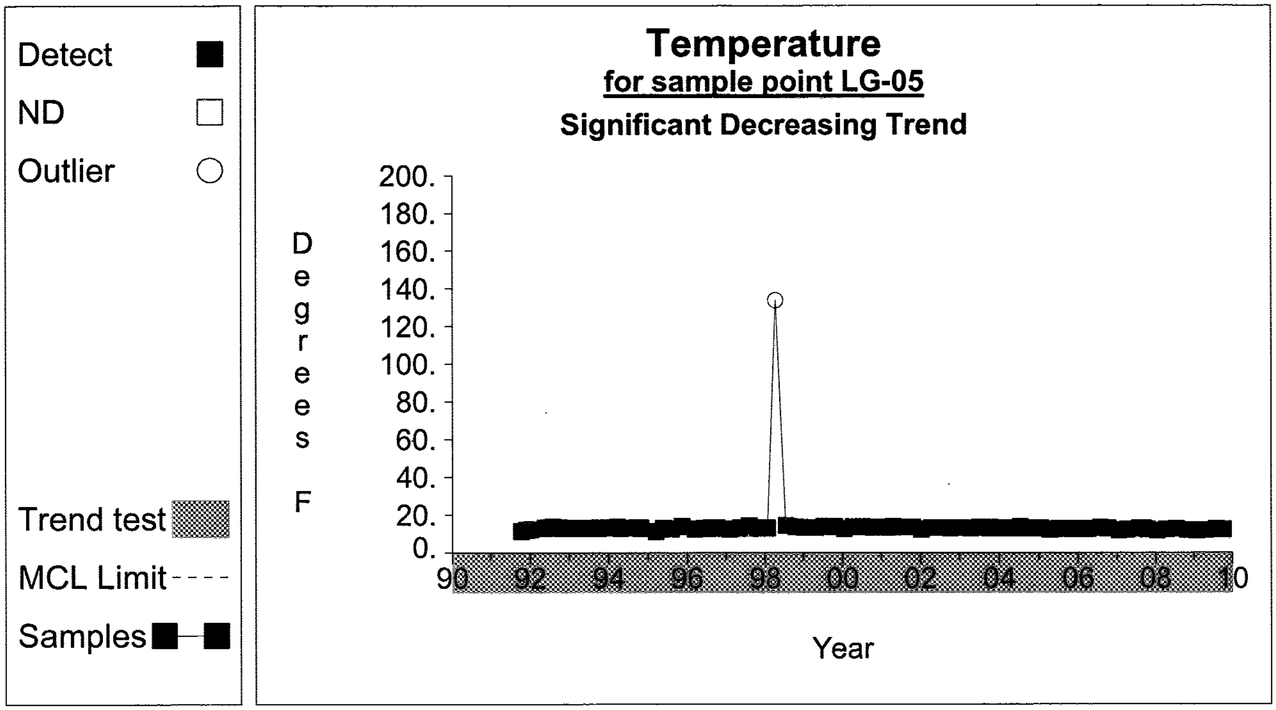


Graph 343



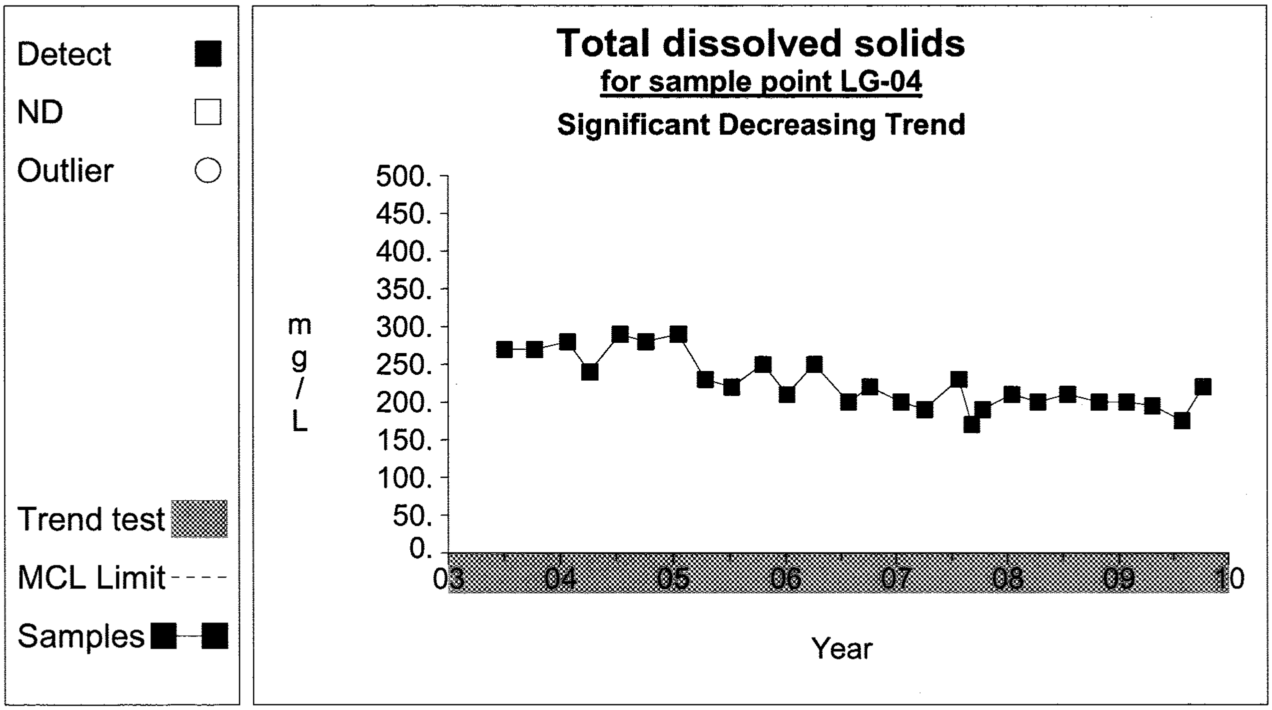
Graph 344

Time Series

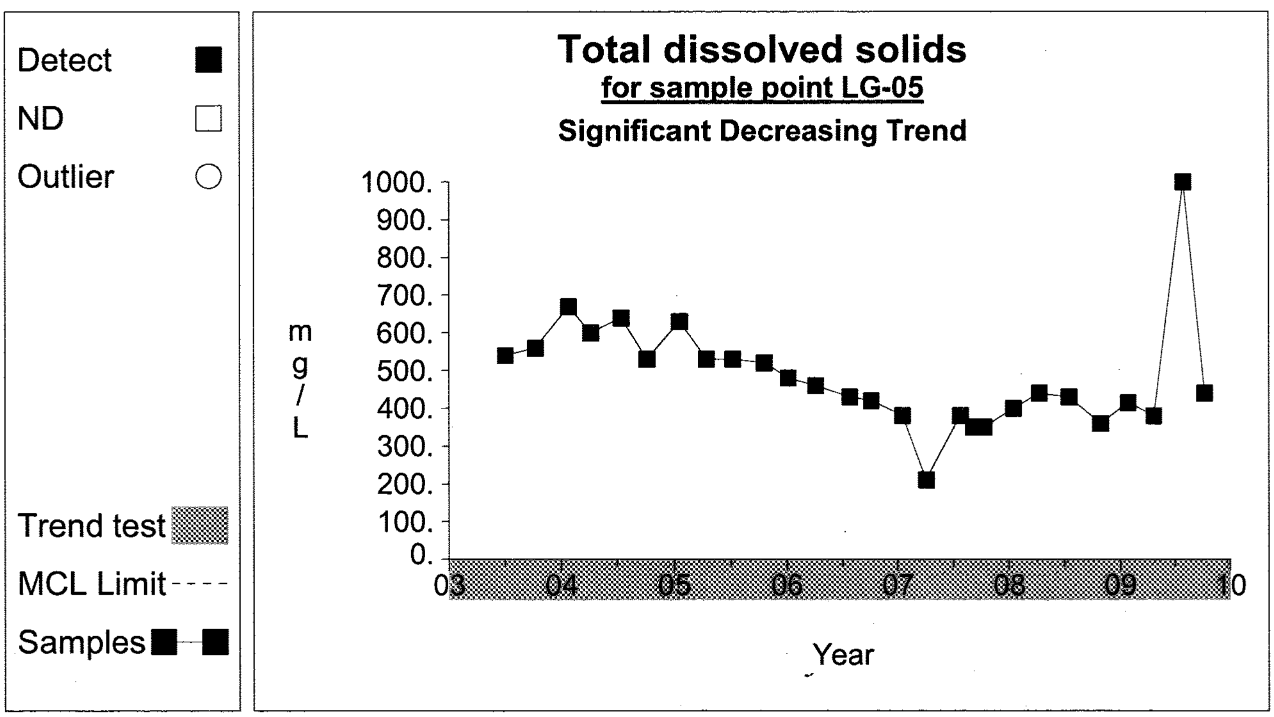


Graph 345

Time Series



Graph 359



Graph 360