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# *Lake Goodwin Landfill 2015 1<sup>st</sup> Quarter Environmental Monitoring Report*

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DEPARTMENT OF ECOLOGY



## Contents

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1.0 INTRODUCTION .....	1
1.1 Background .....	1
1.2 Permit Information .....	1
1.3 Site Description and Physical Conditions .....	2
1.4 Local Hydrogeology .....	2
1.5 Existing Monitoring Network .....	3
2.0 GROUND WATER MONITORING .....	3
2.1 Ground Water Level Measurements .....	4
2.2 First Quarter Ground Water Sampling Event .....	4
2.3 Evaluation of First Quarter Ground Water Analytical Results .....	5
2.4 Statistical Evaluation .....	5
3.0 GAS PROBE MEASUREMENTS .....	6
4.0 SUMMARY AND RECOMMENDATIONS .....	7
4.1 Conclusions/Recommendations .....	7
4.2 Signatures and Licenses .....	8

## Tables

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Table 1 – 1 <sup>st</sup> Quarter Groundwater Measurements and Elevations .....	4
Table 2 – 1 <sup>st</sup> Quarter Summary of Test Results .....	5
Table 3 – 1 <sup>st</sup> Quarter Statistical Summary Prediction Limit Exceedances .....	6

## List of Figures

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Figure 1 Vicinity Map
Figure 2 Site Map
Figure 3 Topographic Map
Figure 4 Geologic Map
Figure 5 Network Monitoring Map
Figure 6 First Quarter Groundwater Contour Map

## Table of Appendices

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Appendix A - Well Hydrographs
Appendix B - Analytical Data
Appendix C - Stiff, Trilinear, and Time Series Analysis Plots

## **1.0 INTRODUCTION**

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The following report presents the first quarter ground water monitoring results for 2015 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, sections 17, 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*).

This report has been prepared in compliance with the sites **Safety and Analysis Plan (SAP)** as approved by the **Snohomish Health District**, June, 2012.

### **1.1 Background**

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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 County's 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, 2015). Monitoring results are reviewed by both the **SHD** and the **Department of Ecology**.

### **1.2 Permit Information**

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Monitoring activities at the landfill are governed by the Solid Waste Facility Permit SW-085 (landfill permit, Snohomish Health District 2015). 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. There is an approved **Sampling & Analysis Plan (SAP)** for this landfill.

### 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 known as the Tulalip Plateau, a rolling upland area bounded by the Stillaguamish 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 on the Tulalip Plateau close to the project site. Lake Martha, Lake Howard and Lake Goodwin are all located within a few miles of the Landfill. There are no named drainages, creeks or rivers located within a ½ mile radius of the landfill. Elevations at 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 Hydrogeology

Mapped surficial geology of the site area is shown on the **Geologic Map** (figure 4). Based on the Geologic Map and our interpretation of the many site explorations, surficial geology at the landfill site consists of Advance Outwash (*Qva*) sands and gravels locally overlain on the south side of the landfill by sandy silts to silty sands and gravels – Glacial Till (*Qvt*).

The most productive aquifer below the Tulalip Plateau is the Advance Outwash (*Qva*) aquifer, which is underlain by Transitional Bed (*Qtb*) silts and clays. Where overlain by Glacial Till (*Qvt*), the aquifer is confined. In the vicinity of the Lake Goodwin Landfill where Glacial Till (*Qvt*) is absent, the aquifer is unconfined. With the exception of the surficial Glacial Till (*Qvt*) found overlying the Advance Outwash (*Qva*) sands and gravels along the southern edge of the

landfill (LG-02), permeable soils were encountered from the surface down in all site explorations at the landfill. Ground water elevations below the landfill during the fourth quarter sampling event ranged from el. 150.97 to el. 152.95 with a north to northeast gradient in an unconfined condition within the Advance Outwash (Qva) aquifer.

### 1.5 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 are currently four-(4) ground water monitoring wells (LG-01, LG-02, LG-04, and LG-05) at the Lake Goodwin Landfill site that are read on a quarterly basis. Well locations are shown on the **Network Monitoring 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 three-(3) wells are located down gradient of the landfill (LG-01, and LG-04 and LG-05) and monitor ground water conditions that may be impacted from the site. First quarter monitoring results are discussed in section 2.0 below.

## 2.0 GROUND WATER MONITORING

Ground water quality within Snohomish County is generally good. Water types are typical for glacial soils. There are no wide spread areas of ground water contamination, however, salt water intrusion, agricultural and septic system impacts locally occur. According to the 1996 USGS ground water study, the most common and wide-spread water quality problems in Snohomish County are from natural causes. High iron and manganese concentrations are fairly common throughout the County. These minerals cause mostly nuisance issues because of objectionable odors and/or stained laundry and plumbing fixtures. Another naturally occurring water quality problem in Snohomish County is arsenic. Arsenic levels vary depending on the ground water aquifer and the proximity to bedrock units. Arsenic concentrations are the highest in areas located closest to surficial bedrock, such as in and around the Granite Falls area, where tested arsenic levels present health concerns. In most areas of the County, arsenic levels in ground water exceed current USEPA MCL reporting limits but are not high enough to present health concerns.

First quarter 2015 monitoring of the ground water wells at the Lake Goodwin Landfill was performed by **Snohomish County** personnel. Depth to water was measured and ground water samples were collected following approved sampling protocol. The following sections describe field procedures used and analytical results derived from the sampling event.

## *2.1 Ground Water Level Measurements*

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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.

**First Quarter Ground Water Measurements** are shown in *Table 1* below. **Hydrographs** of the first quarter 2015 monitoring well readings are contained in *Appendix A* of this report. First quarter well readings show a general decrease in water levels. Readings confirm that the aquifer is unconfined in the immediate vicinity of the site. The **First Quarter Ground Water Contour Map** developed from the field data is shown in *Figure 6* of this report.

Measured precipitation at the Stanwood Weather Station (WA-SN-11 <http://www.cocorahs.org/state.aspx?state=wa>) during the first quarter monitoring period through 2/13/15 was 4.16". This is a decrease of 6.59" over the last quarter 2014 precipitation. For reference purposes, precipitation measured at station WA-SN-11 during the monitoring period has been included on the hydrographs.

**Table 1 – 1<sup>st</sup> Quarter Groundwater Measurements and Elevations**

Well Numbers	Casing Elevation	1 <sup>st</sup> Quarter Delta/Elevation	
LG-01	239.18	+2.56	154.01
LG-02	268.67	+0.07	152.70
LG-04	206.93	-0.45	150.52
LG-05	235.00	+0.28	152.03

## *2.2 First Quarter Ground Water Sampling Event*

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Purging and sampling of each of the four-(4) sampled monitoring wells was performed during the first quarter by Snohomish County personnel in accordance with the facilities closure permit. Approximately 1.7 to 3.5 gallons of water were purged from each well prior to sampling. 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 4C 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 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 groundwater and secondary drinking water standards. A complete statistical analysis of the data was also performed utilizing **DUMPStat**. Results are discussed below.

### 2.3 Evaluation of First Quarter Ground Water Analytical Results

**First Quarter Ground Water Test Results** for each well are summarized in *Table 2* below. Comparison of results to regulatory criteria shows:

**First Quarter:** Other than arsenic in all wells and pH in LG-04, there were no measured exceedances of the standards in any well except LG-05. There were measured exceedances of the groundwater standards for conductivity, nitrate nitrogen, pH, sodium, total dissolved solids and arsenic in well LG-05. No other dissolved metals were observed exceeding WAC level groundwater or secondary drinking water standards during this sampling event.

**Table 2 – 1<sup>st</sup> Quarter Summary of Test Results**

Well	1 <sup>st</sup> Quarter 2015 Groundwater Standard Exceedances
LG-01	Arsenic
LG-02	Arsenic
LG-04	pH, arsenic
LG-05	Conductivity, nitrate nitrogen, pH, sodium, TDS, arsenic

### 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, and Dissolved Metals – 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. Each of these exceedances has been statistically analyzed using **DUMPStat Software** (*version 2.1.9 by Robert D. Gibbons Lt., 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**.

The Sans Trend analysis test was performed for the entire data set stretching back to 1988 and the results of that analysis – increasing or decreasing trends are recorded on the spreadsheet in Appendix B. The trend analysis in Appendix C is run between 2006 and current time. This allows us to place multiple constituents on a single graph to better see any potential correlation between the geochemistry and dissolved metals. Per Ecology and Snohomish Health District request, the prediction limit is updated in the first quarter of the year and subsequent data sets are compared against that prediction limit.

Based on the statistical analysis, exceedances to the prediction limits in down-gradient wells LG-01 and LG-05 were high for conventional chemistry parameters and minimal for the dissolved metals. Down-gradient well LG-04 was less impacted by leachate and had only minimal exceedances to the calculated prediction limits during the 1<sup>st</sup> quarter sampling event. There were twenty one-(21) exceedances to the calculated prediction limits for all wells during this quarter, two fewer than last quarter. Calculated exceedances to the prediction limits in the first quarter are shown in *Table 3* below.

**Table 3 – 1<sup>st</sup> Quarter Statistical Summary Prediction Limit Exceedances**

Well	1 <sup>st</sup> Quarter 2015 Exceedances
LG-01	Alkalinity, bicarbonate, conductivity, magnesium, potassium, sulfate, barium
LG-02	None
LG-04	pH, Barium
LG-05	Alkalinity, bicarbonate, calcium, chloride, conductivity, magnesium, nitrate, nitrite, potassium, sodium, sulfate, TDS, barium

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

### **3.0 GAS PROBE MEASUREMENTS**

New probes were placed in three of the original nine locations at the Lake Goodwin Landfill November 15, 2013. First quarter measurements were taken February 5, 2015.

**Table 4 – 1<sup>st</sup> Quarter Gas Probe Measurements**

Probe / depth	Methane	Oxygen	CO2
LG-A1 / 44"	13	0	17
LG-B2 / 47"	25	0	11
LG-C2 / 46"	20	0	13

Gas probe measurements were fairly constant for methane between the 4<sup>th</sup> quarter and 1<sup>st</sup> quarter measurements while O<sup>2</sup> and CO<sub>2</sub> decreased slightly. Staff recorded the barometric pressure between 29.07 and 29.05 while sampling.

#### **4.0 SUMMARY AND RECOMMENDATIONS**

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The ground water data collected during the 2015 first quarter sampling events indicates the following:

- Precipitation during the first quarter decreased compared to that received during the fourth quarter of 2015 between 1/1/15 – 2/13/15. Ground water elevations decreased slightly in LG-02 and LG-04 and increased significantly in LG-01 and slightly in LG-05. Overall, the ground water elevation trend of all wells has been steadily rising since 2005.
- The conductivity level observed at well LG-05 was significantly higher than the surrounding wells during this sampling event.
- Statistical analysis did show significant impacts to well LG-05. Lesser impacts were indicated in wells LG-01 and minimal impacts were measured for LG-04. Time series plots based on the **DUMPStat** analysis indicates that there were fewer significant decreasing trends (12) than increasing trends (18) during this sampling event, same as last quarter.
- There were very minimal impacts to the ground water from dissolved metals. Small exceedances to the calculated prediction limits for arsenic were found in all wells and for barium in all down gradient wells.
- Every well exceeded the arsenic groundwater standard.
- Gas probe measurements were fairly constant for methane between the 4<sup>th</sup> quarter of 2014 and the 1<sup>st</sup> quarter 2015 measurements while O<sup>2</sup> and CO<sub>2</sub> measurements decreased slightly.

#### **4.1 Conclusions/Recommendations**

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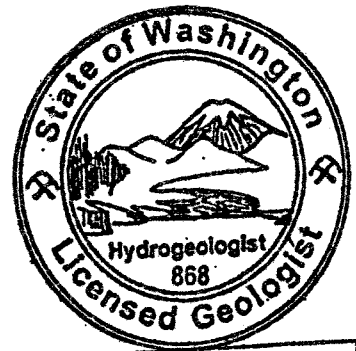
First quarter 2015 data indicates a continued moderate leachate impact to the underlying Advance Outwash (Qva) aquifer below the Lake Goodwin Landfill. Statistical analysis indicates a number of significantly decreasing trends which would suggest that the leachate impact to the ground water below the landfill is decreasing at this time, however, increasing trends were calculated for down gradient wells LG-01 and LG-05 during this sampling event. While we have started to look at intrawell statistical analysis, as long as there continues to be several increasing trends being monitored for LG-01, we will continue utilizing inter-well analysis for this site.

Interpretation of the data suggests that a leachate plume impacting ground water extends beyond the landfill boundaries following the ground water gradient to the north-northeast in the immediate vicinity of LG-05.

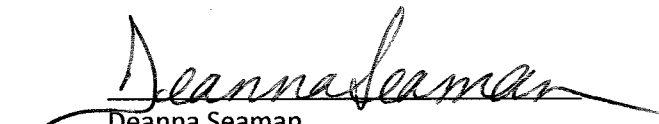
#### 4.2 Signatures and Licenses

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



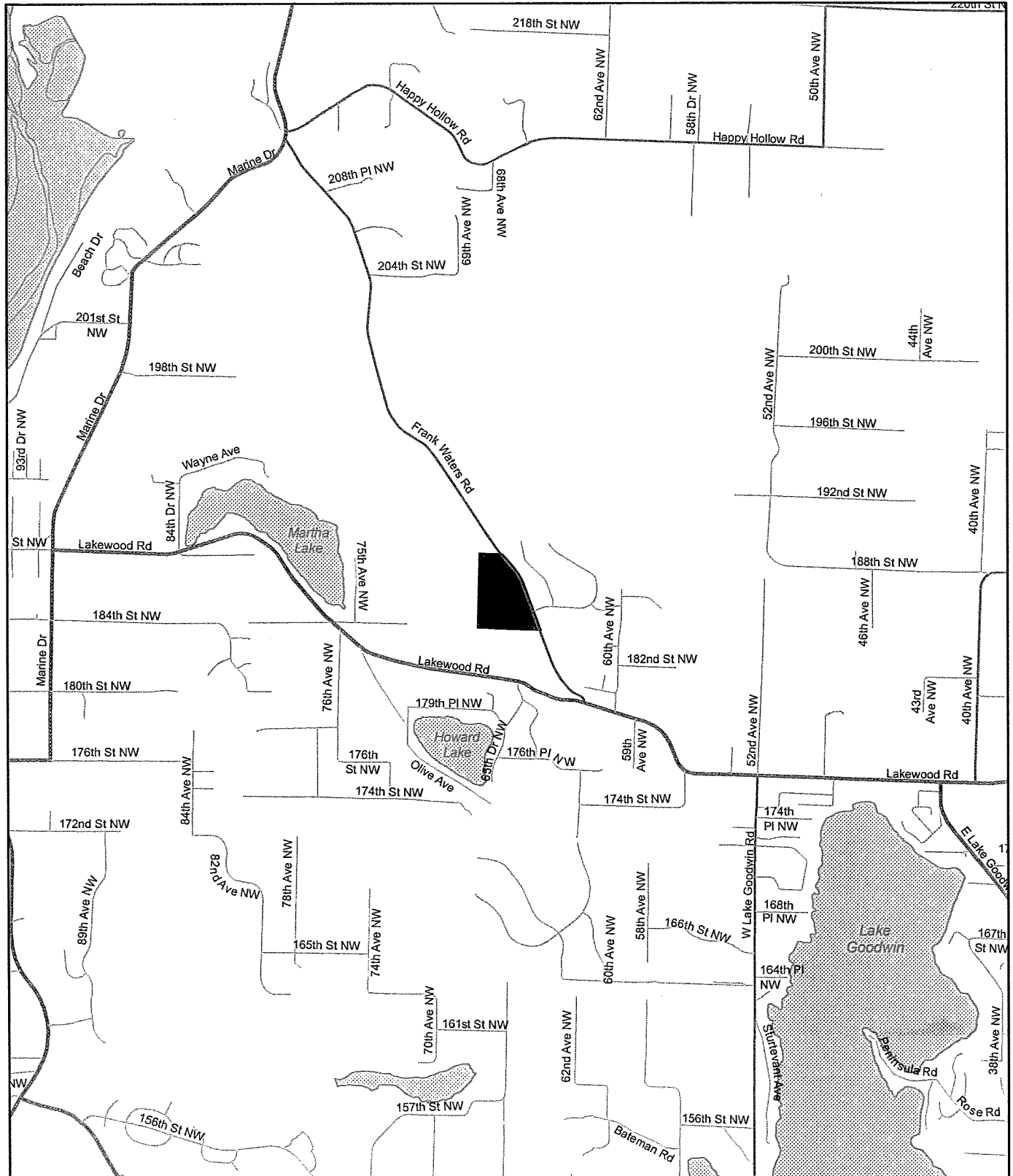
KIRK R. BAILEY

  
Deanna Seaman  
SCPW – Solid Waste Division

March 31, 2015  
Attachments  
Figures

Figure 1

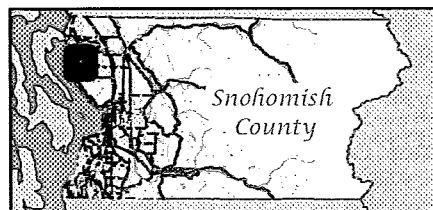
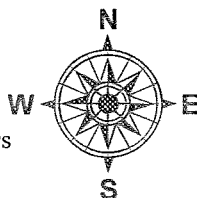
# Lake Goodwin Landfill



1 inch = 0.5 miles

0 0.15 0.3 0.6 0.9  
Miles

0 0.25 0.5 1 1.5  
Kilometers

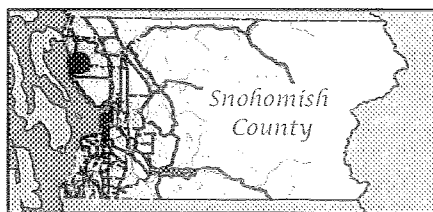
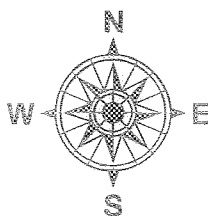
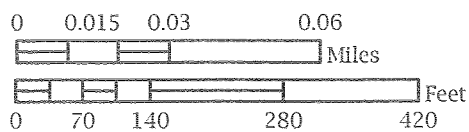
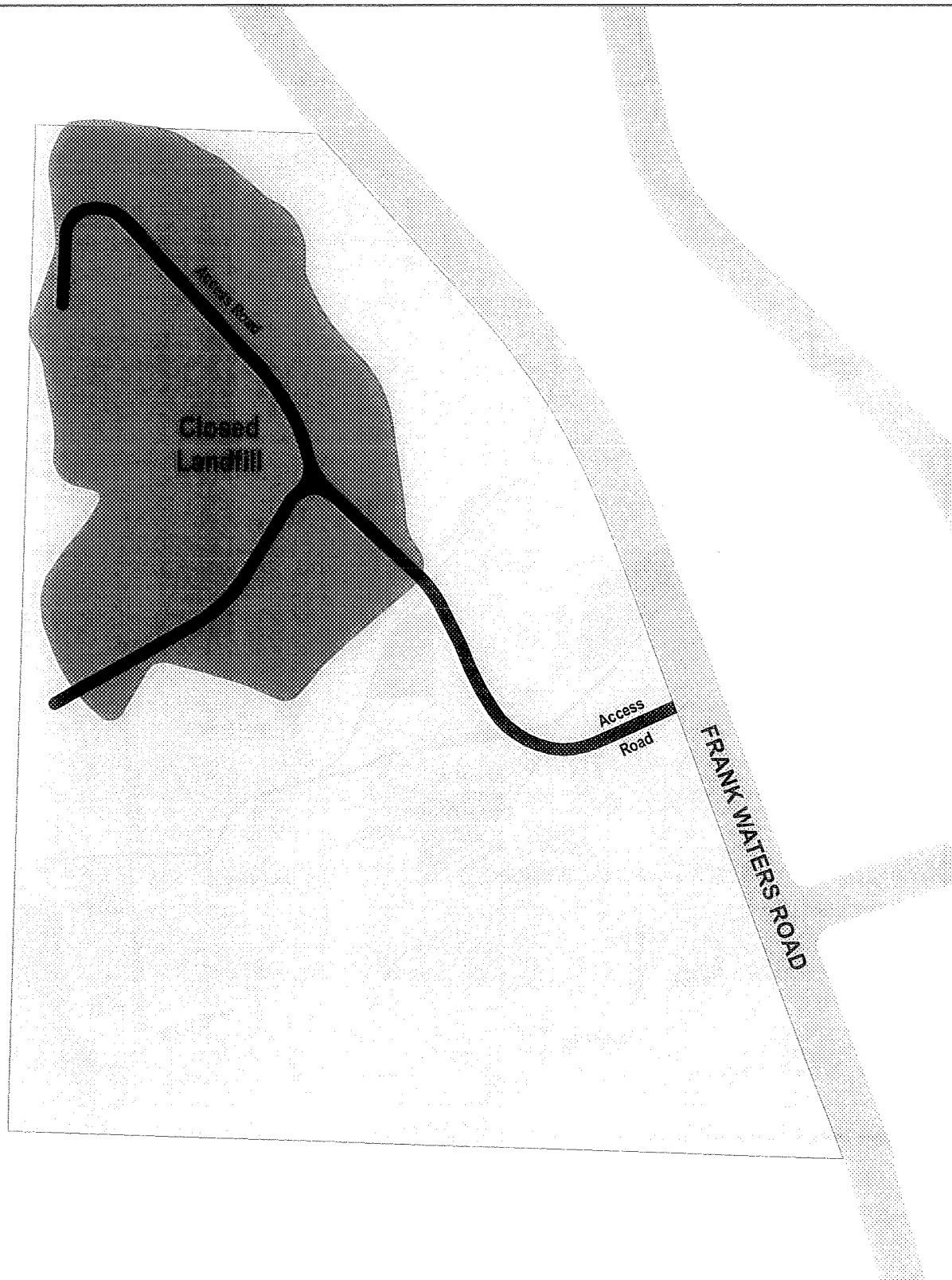


**Snohomish County**  
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Solid Waste Division  
March 22, 2010

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Figure 2

# Lake Goodwin Landfill Site Map






Snohomish County  
Public Works  
Solid Waste Division  
March 25, 2010

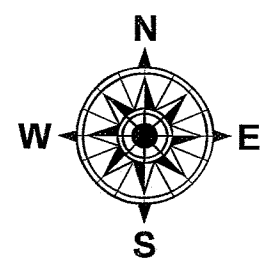
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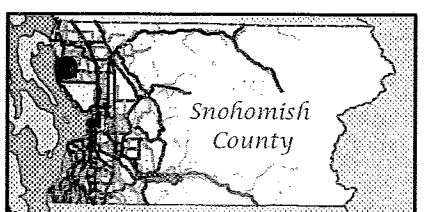
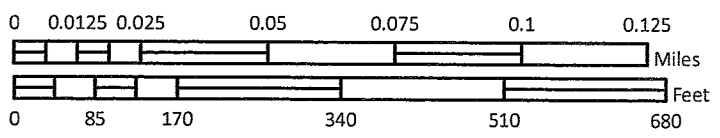
Figure 3

# Lake Goodwin Landfill Topography

- Map Features**
-  Parcel Boundary
  -  Subject Property Boundary
  -  5 Foot Contours



1 inch = 200 feet



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March 23, 2010

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Figure 4

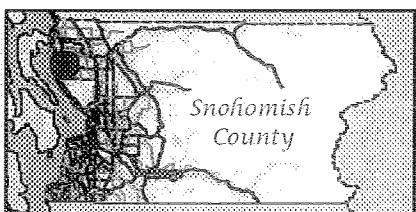
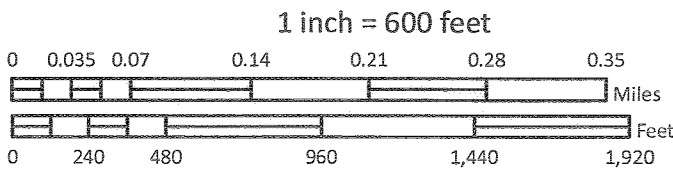
# Lake Goodwin Landfill Geologic Map

## Map Features

- Parcel Boundary
- Subject Property Boundary

## Geologic Description

- Vashon advance outwash (Qva)
- Vashon recessional outwash
- Vashon till (Qvt)
- Water
- Modified Land



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May 6, 2010

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Figure 5

# Lake Goodwin Landfill Monitoring Network

**Map Features**

Parcel Boundary

Subject Property Boundary

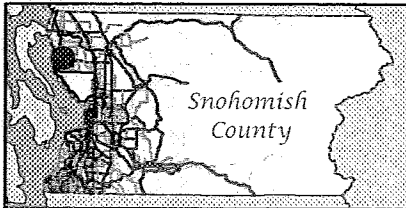
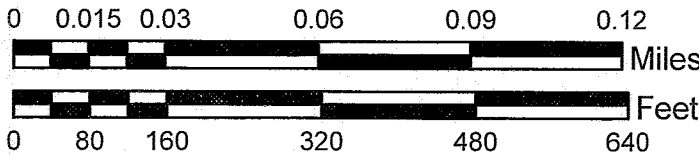
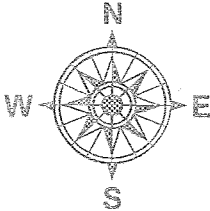
**Aquifer Unit (Active Wells)**

● Deep Aquifer

**Additional Sampling Points**

▲ Bar Hole Punch Gas Probe

X = decommissioned



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Public Works  
Solid Waste Division  
March 2, 2012

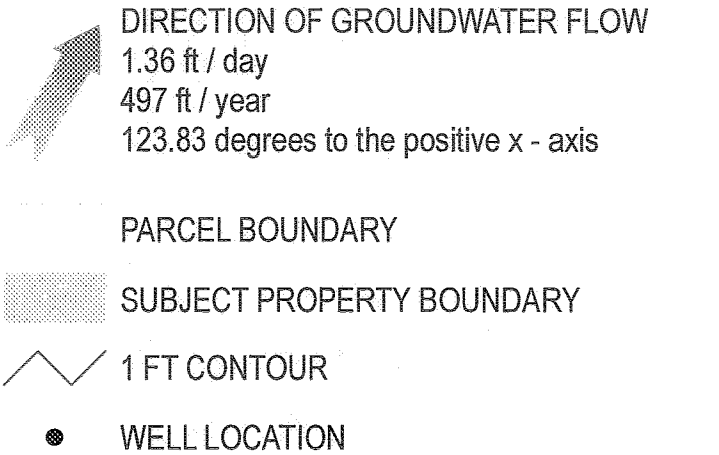
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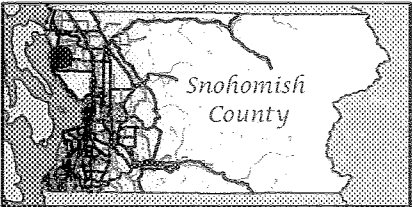
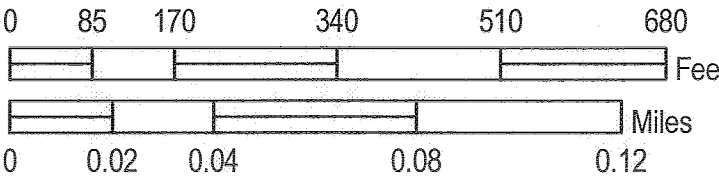
Figure 6

# Lake Goodwin Landfill

## Water Elevation Contours 1st Quarter 2015



WELL_ID	SAMP_DATE	MEAS_HEAD
LG-01	1/28/2015	154.01
LG-02	1/28/2015	152.70
LG-04	1/28/2015	150.52
LG-05	1/28/2015	152.03



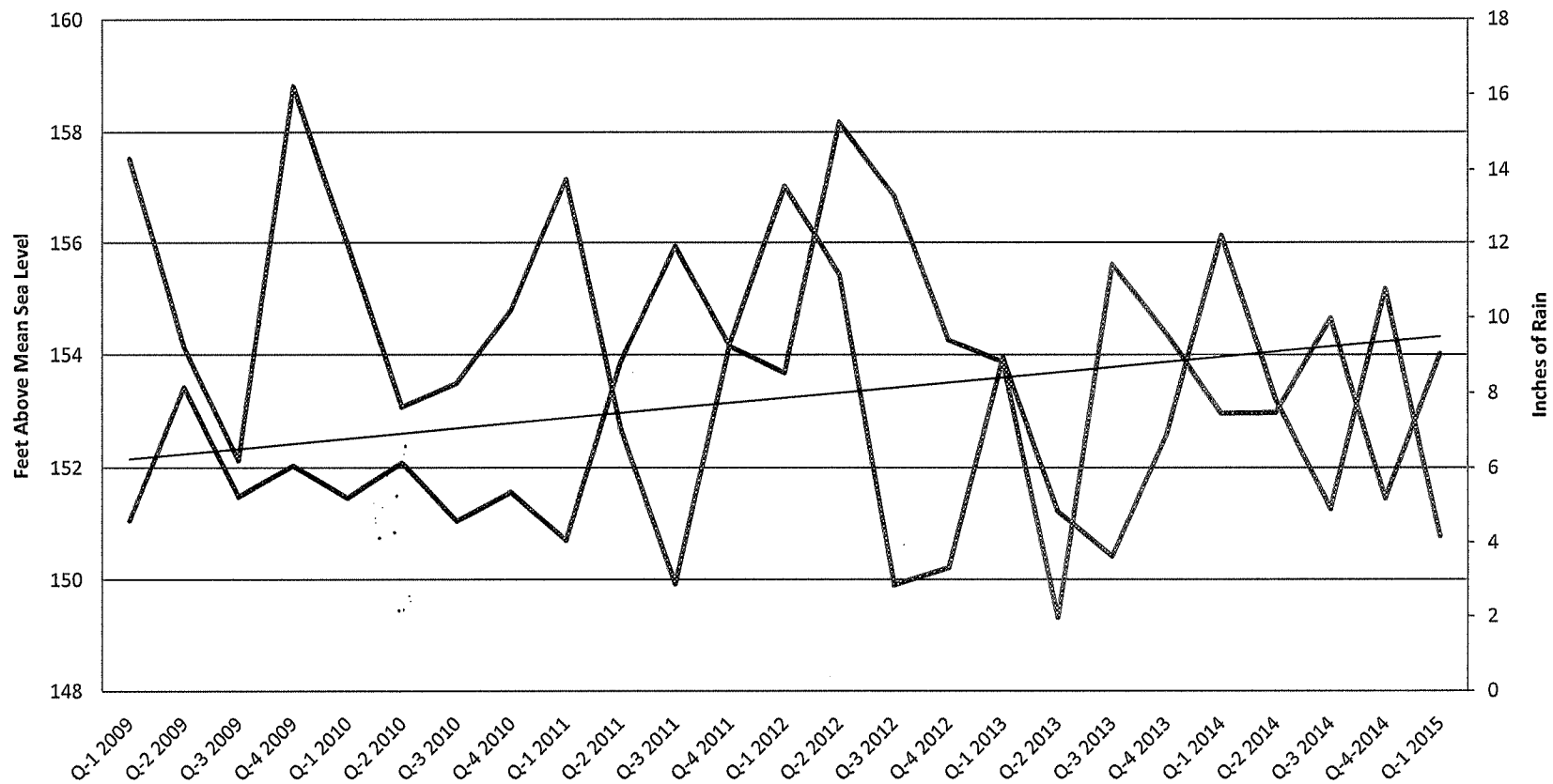
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# Appendix A

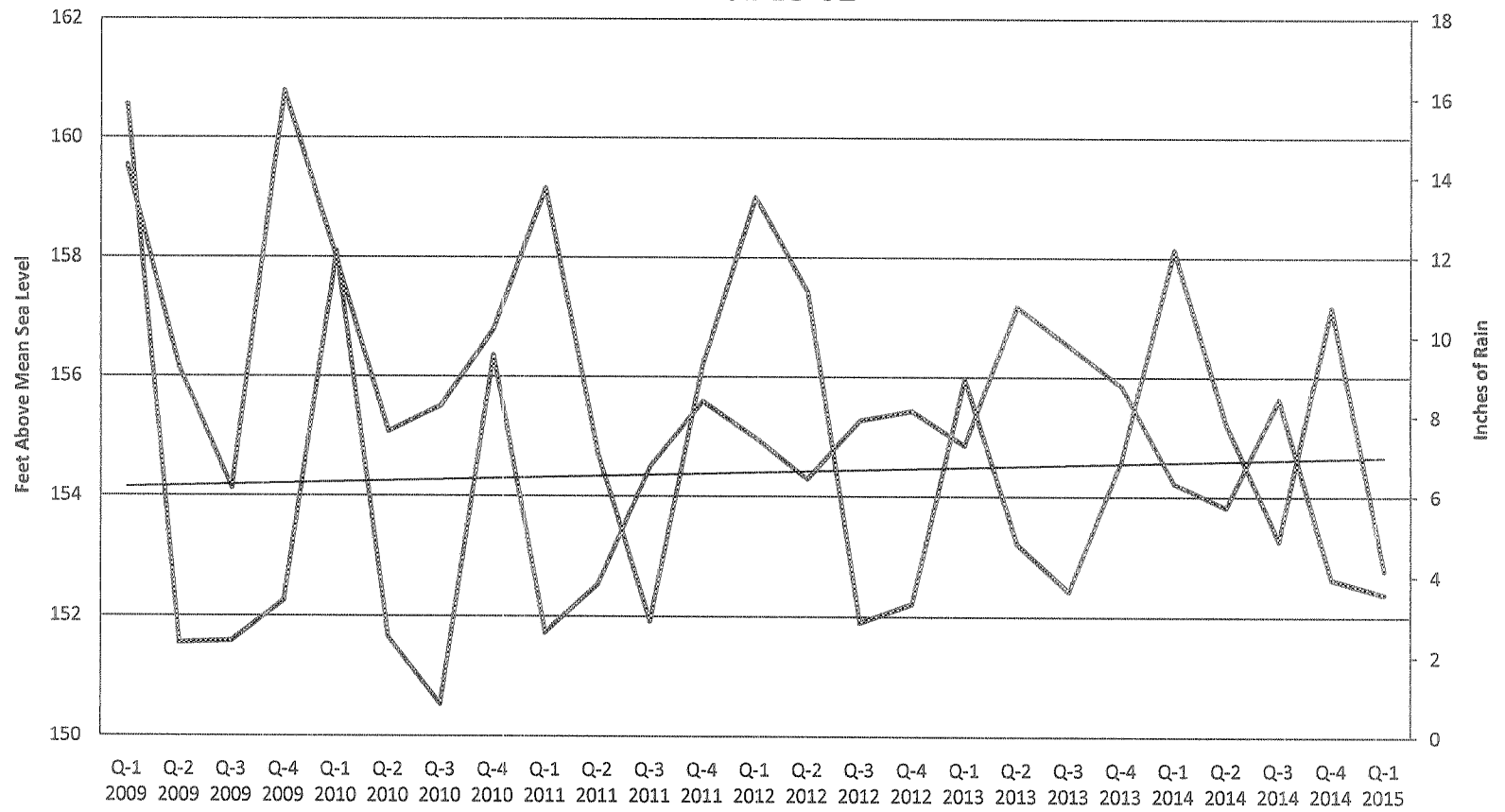
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## Hydrographs

Lake Goodwin Well LG-01

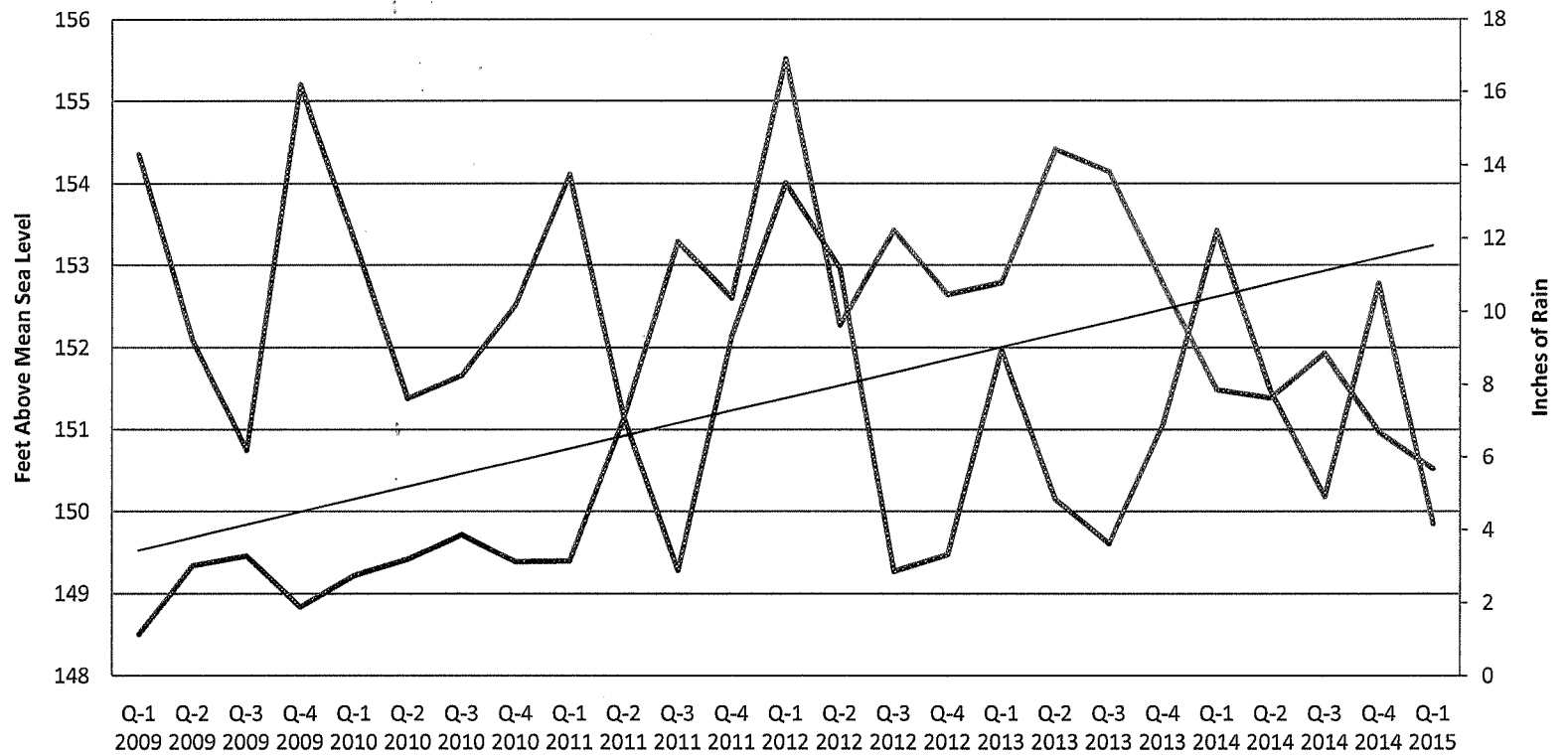


# Lake Goodwin Well LG-02

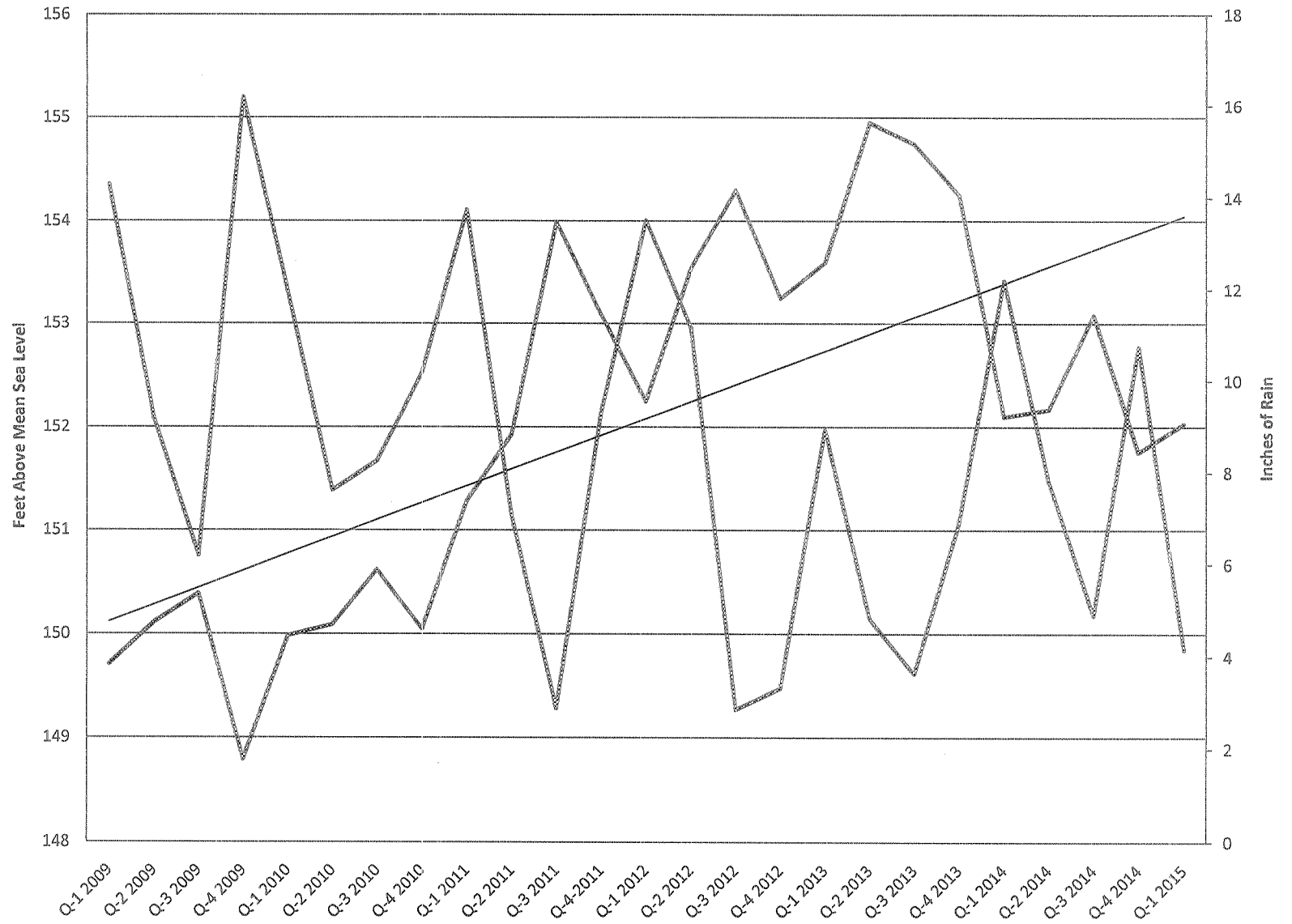




# Lake Goodwin Well LG-04



# Lake Goodwin Well LG-05



# Appendix B

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## Analytical Data

**Groundwater Summary: First Quarter 2015 Lake Goodwin Landfill, Snohomish County WA**

Statistical Method	No. of Samples	No. of Detects	Prediction Limit (a)	Secondary Drinking	Ground Water	Downgradient												Upgradient						
						LG-01					LG-04					LG-05					LG-02			
						1/28/15	D	V	T	C	1/28/15	D	V	T	C	1/28/15	D	V	T	C	1/28/15	D	V	T

**CONVENTIONAL CHEMISTRY PARAMETERS**

Alkalinity (as CaCO3)	normal	42	42	165.2534	--	--	210	V	I		130			560	V	I		110		I					
Ammonia Nitrogen	nonpar	38	10	0.069	--	--	0.008				0.011			0.015			0.008								
Bicarbonate	lognor	42	42	159.4437	--	--	210	V	I		130		D	560	V		110								
Calcium, Dissolved	nonpar	42	42	31.2	--	--	27.9		I		21.1		D	61.8	V	I	19.3								
Chemical Oxygen Demand	nonpar	34	3	26	--	--	19				10	U		16	P		10	U							
Chloride	normal	42	42	9.7232	250	250	6.74		I		9.64		I	28.3	V		6.69								
Conductivity (umhos/cm)	normal	42	42	360.0914	--	700	460	V	I		300		D	1200	V	I	260								
Magnesium, Dissolved	nonpar	42	42	25.15	--	--	40.5	V	I		20.8			100	V	I	17.5								
Nitrate Nitrogen (mg-N/L)	nonpar	41	41	6	10	10	1.9		I		1.1			19	V	I	1.7								
Nitrite Nitrogen (mg-N/L)	nonpar	39	8	0.011	1	1	0.002				0.001	U		0.028	V		0.001	U							
pH (std units)	normal	42	42	6.27-7.89	6.5-8.5	6.5-8.5	7.06		D		6.24	E	D	6.48		D	7.36		D						
Potassium, Dissolved	normal	42	42	3.6467	--	--	4.63	V			3.43			9.9	V		3.2								
Sodium, Dissolved	nonpar	41	41	13.8	--	20	11.8		D		10.8		D	63.4	V	D	9.59								
Sulfate	nonpar	42	42	24	250	250	33.6	V			13.8		D	49.9	V		15.4								
Total Dissolved Solids	nonpar	42	42	550	500.0	500	270		I		180			720	V	I	170								
Total Organic Carbon	nonpar	42	18	19	--	--	0.5	U			0.5	U		5.5			0.5	U							

**DISSOLVED METALS (mg/L)**

Arsenic	nonpar	36	36	0.0078	0.01	0.00005	0.000755				0.000529			0.001200			0.00449								
Barium	nonpar	37	37	0.0193	2	2	0.0255	V	I		0.0215	V	D	0.0904	V		0.0123	I							
Cadmium	nonpar	38	14	0.0002	0.005	0.005	0.000136	U			0.000025	U		0.000091			0.000025	U							
Chromium	normal	39	29	0.0091	0.1	0.1	0.0023				0.0027			0.001	U		0.0068								
Cobalt	nonpar	42	7	0.008	--	--	0.001	U			0.001	U		0.001	U		0.004								
Copper	nonpar	38	11	0.007	1	1.3	0.001	U			0.001	U		0.001	U		0.001	U							
Iron	nonpar	42	7	0.032	0.3	0.3	0.011				0.009	U		0.101	V		0.009	U							
Manganese	nonpar	39	16	0.0061	0.05	0.05	0.0005	U			0.0005	U		0.0005	U		0.0005	U							
Nickel	nonpar	42	0	0.005	--	0.1	0.005	U			0.005	U		0.005	U	P	0.005	U							

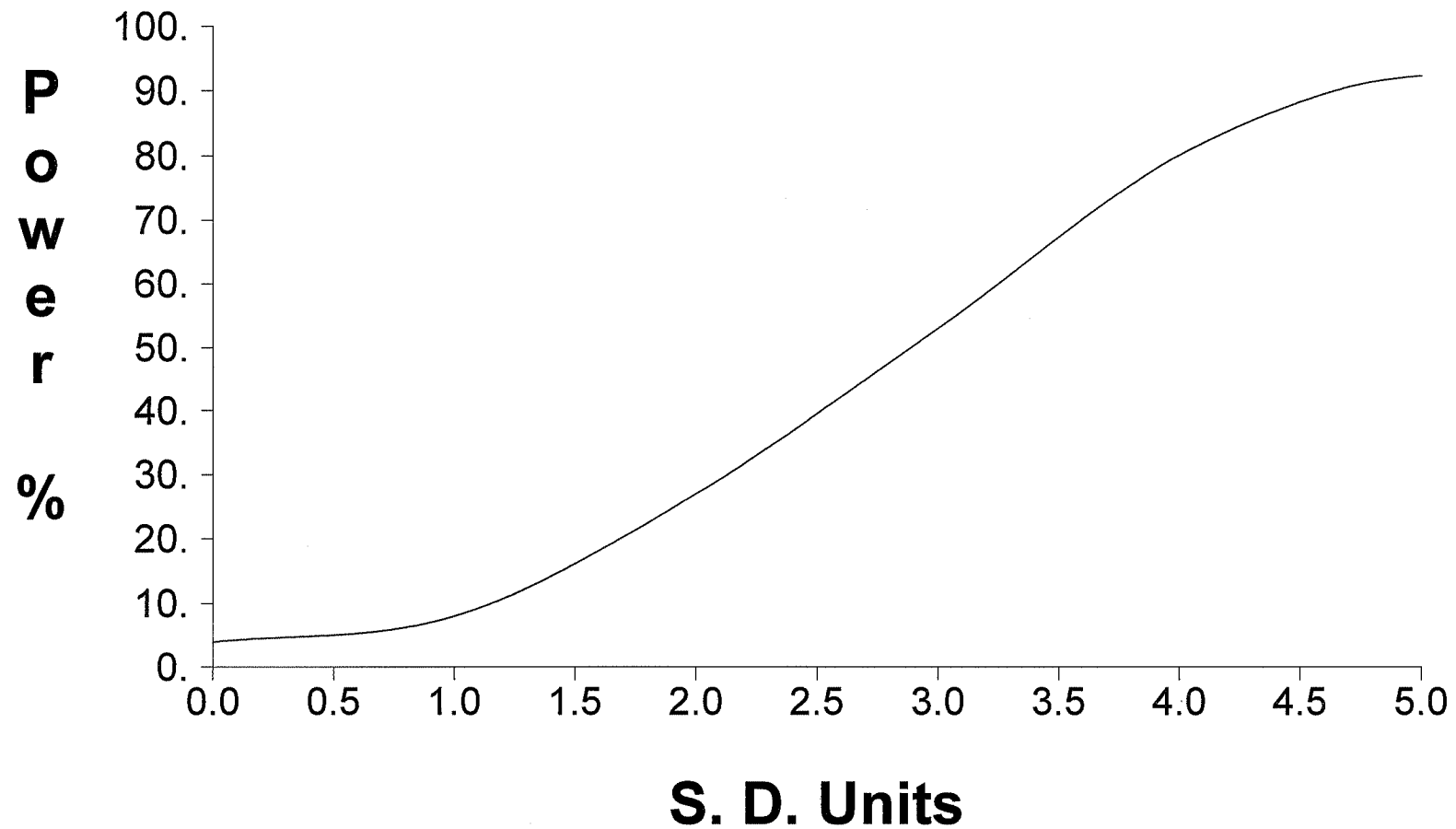


# Appendix C

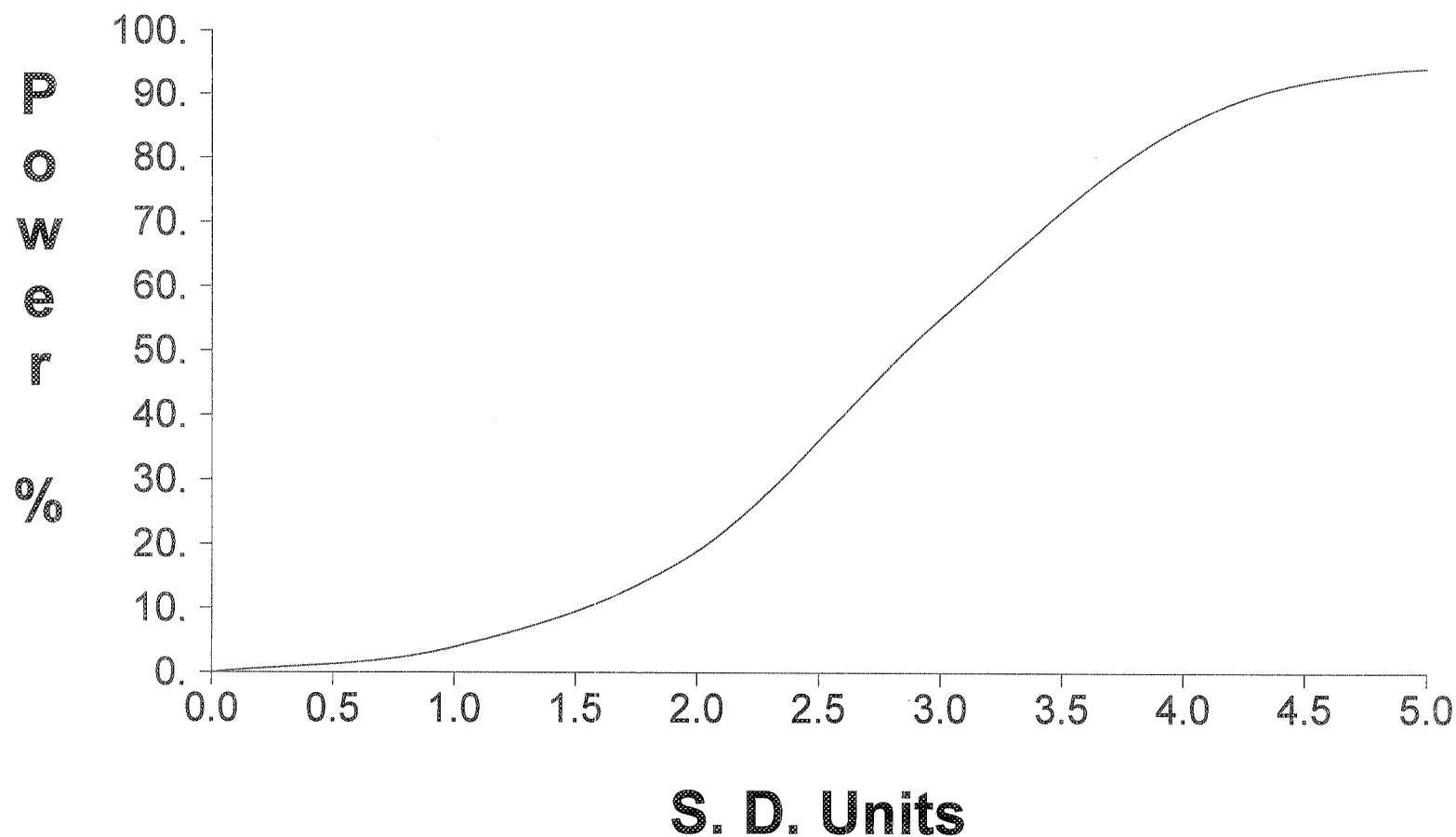
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## **Stiff, Tri-linear and Trend Analysis**

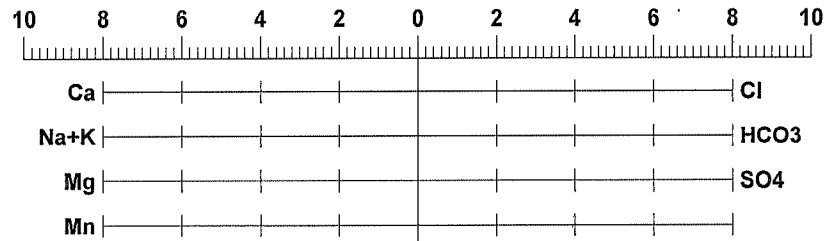
## False Positive and False Negative Rates for Current Upgradient vs. Downgradient Monitoring Program



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



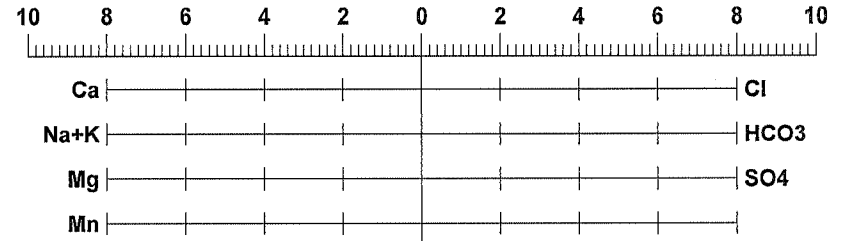
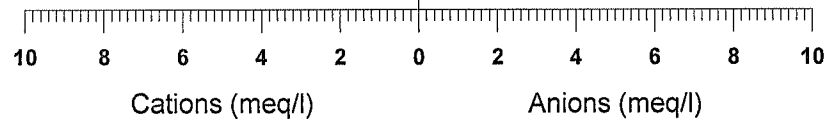
# **Q-1 2015 Goodwin Landfill**



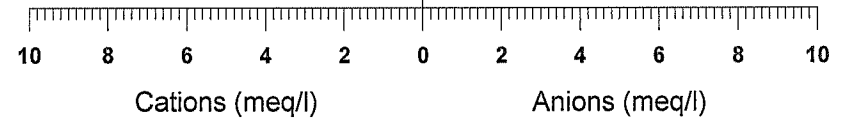
**LG-01 1/28/2015 (11%,334.3503ppm)**

**LG-02 1/28/2015 (11.3%,181.6802ppm)**

**LG-04 1/28/2015 (10.5%,209.5703ppm)**

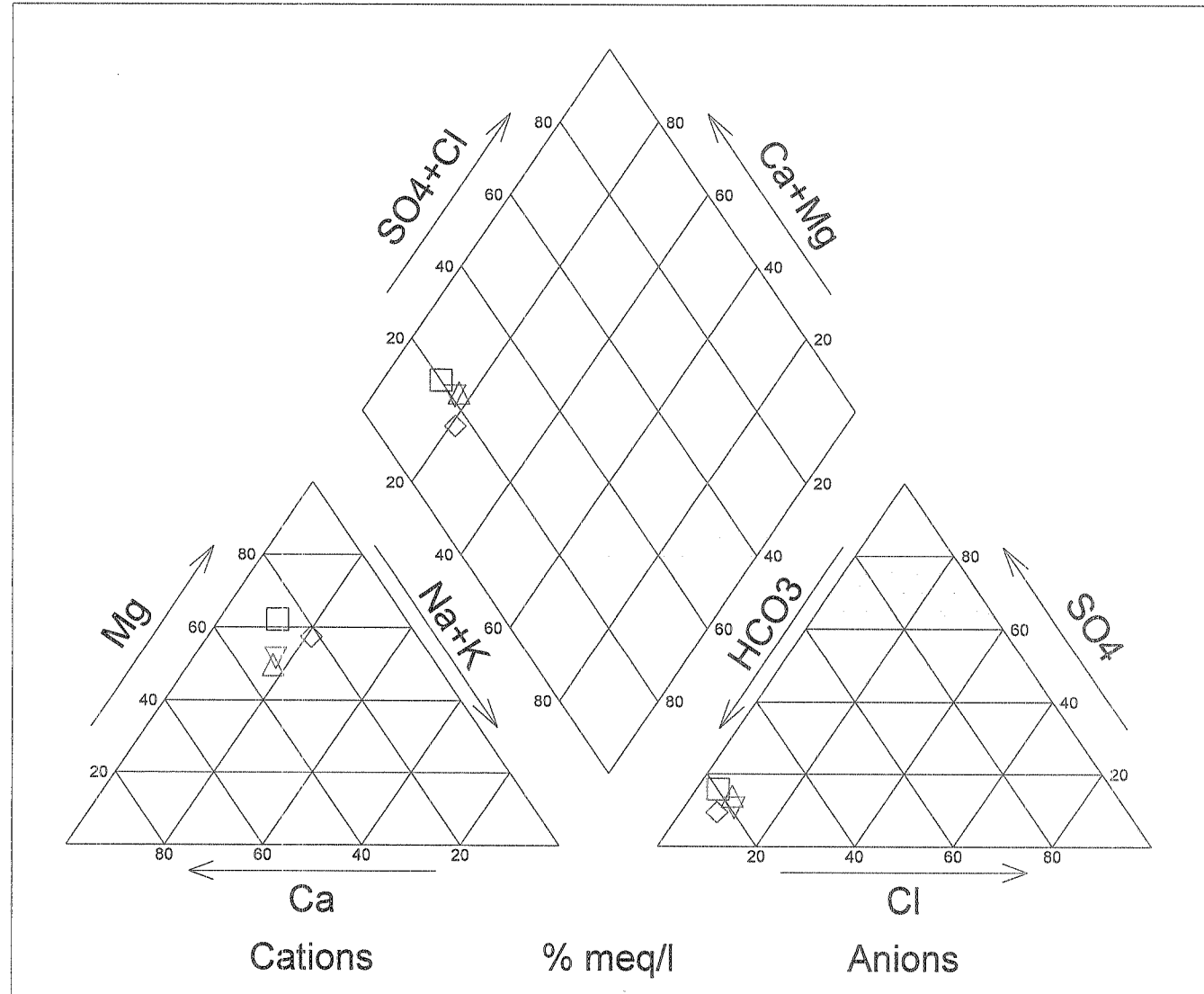


**LG-05 1/28/2015 (13.1%,873.3003ppm)**



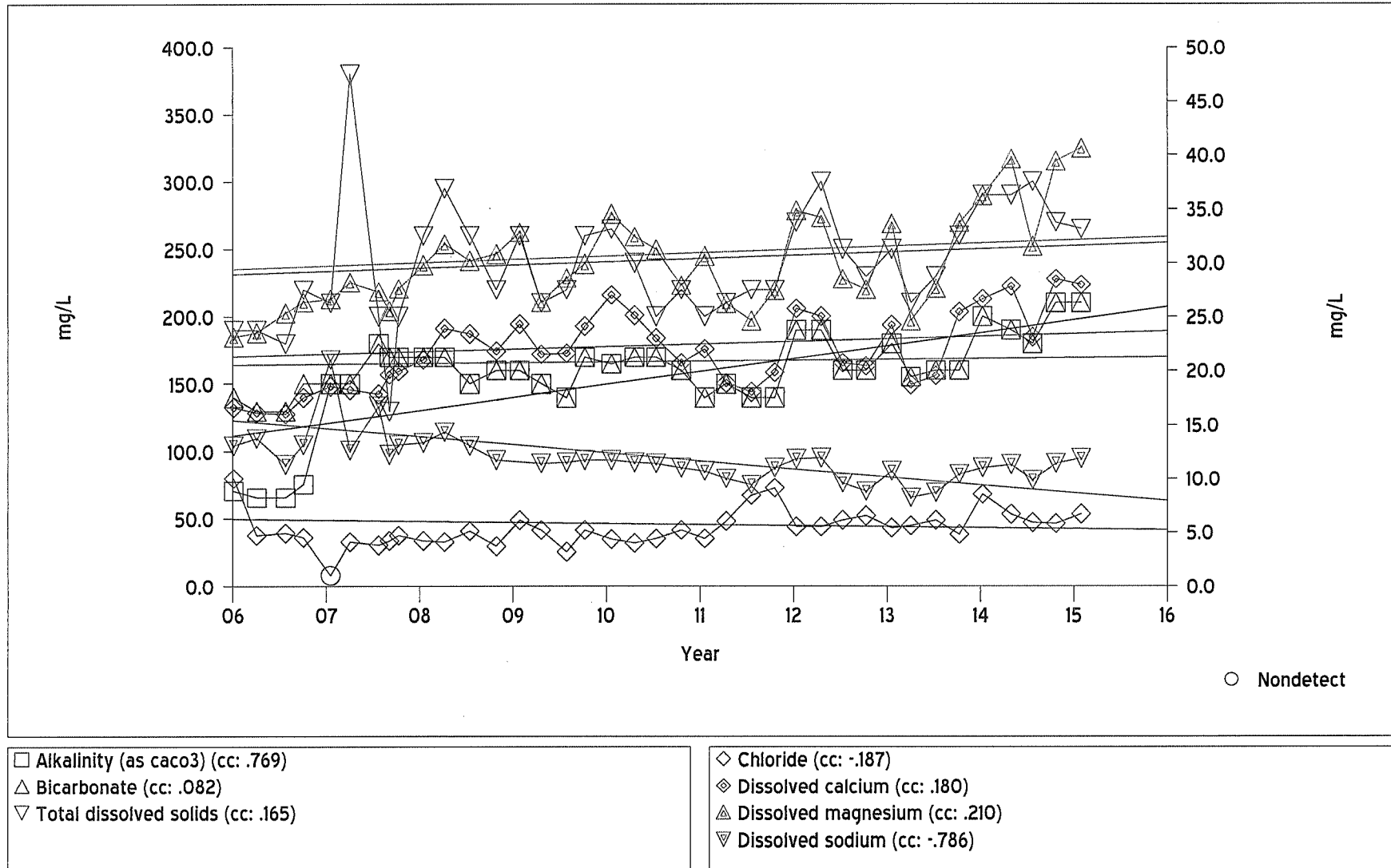
# **Q-1 2015 Goodwin Landfill**

□ LG-01	1/28/2015 (11%, 334.35ppm)
△ LG-02	1/28/2015 (11.3%, 181.68ppm)
▽ LG-04	1/28/2015 (10.5%, 209.57ppm)
◇ LG-05	1/28/2015 (13.1%, 873.3ppm)



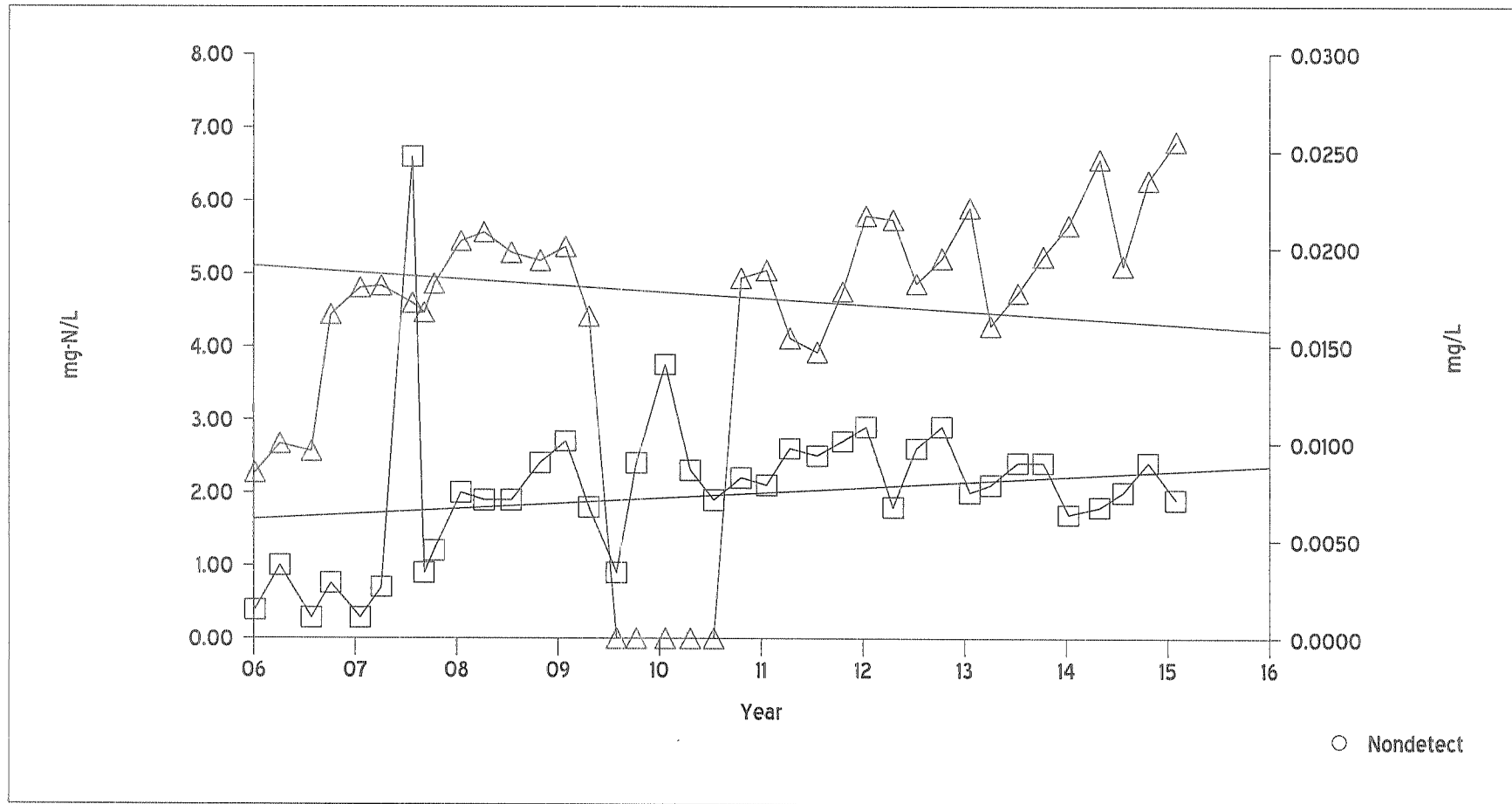
# **Q-1 2015 Goodwin Landfill**

Minerals Time Series Plot for LG-01



# **Q-1 2015 Goodwin Landfill**

NO3 v Ba Time Series Plot for LG-01

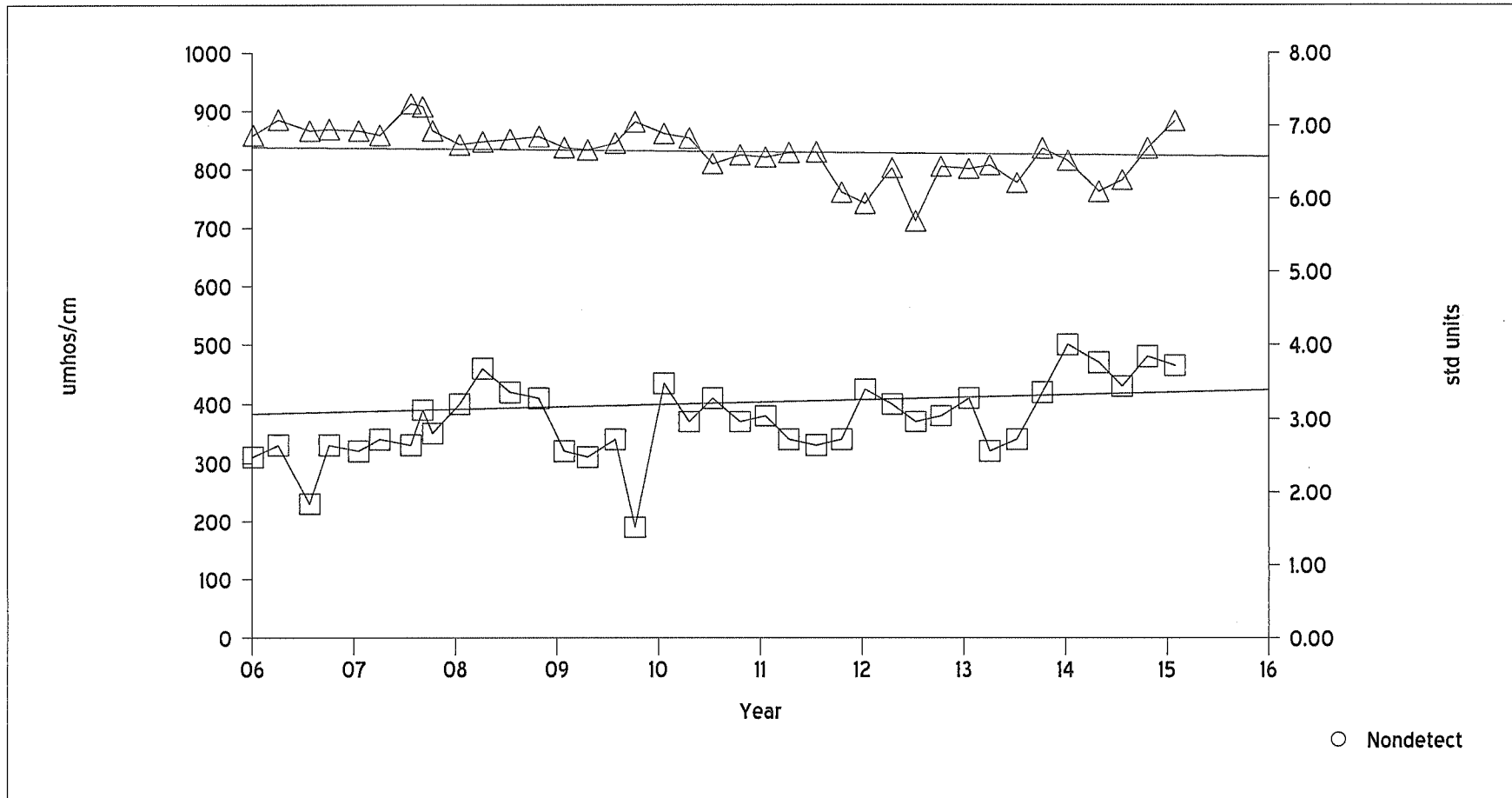


□ Nitrate nitrogen (cc: .532)

△ Dissolved barium (cc: -.218)

# Q-1 2015 Goodwin Landfill

Cond v pH Time Series Plot for LG-01



□ Conductivity (cc: .239)

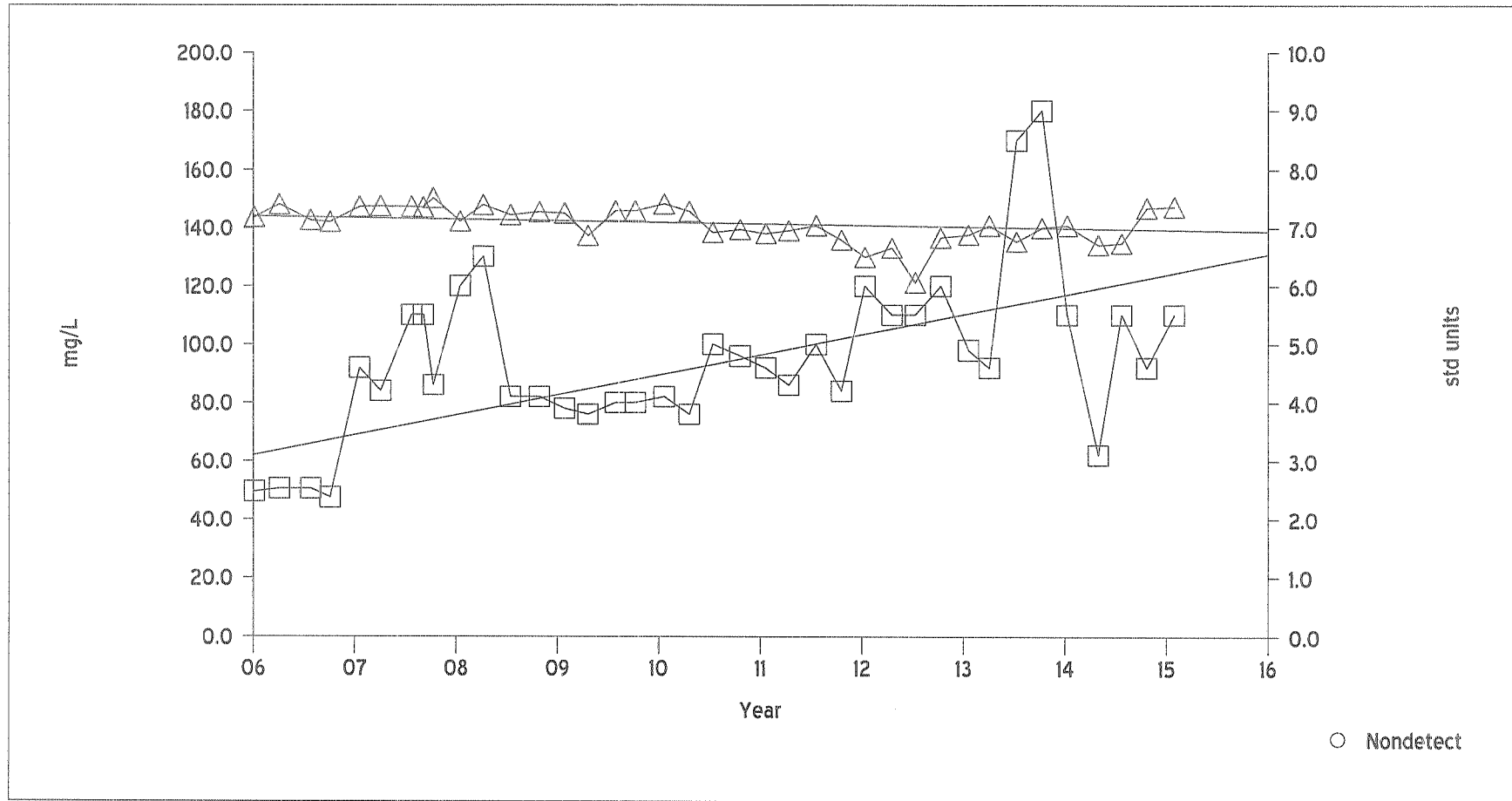
△ pH (cc: -.329)

○ Nondetect



# **Q-1 2015 Goodwin Landfill**

Alk v pH Time Series Plot for LG-02

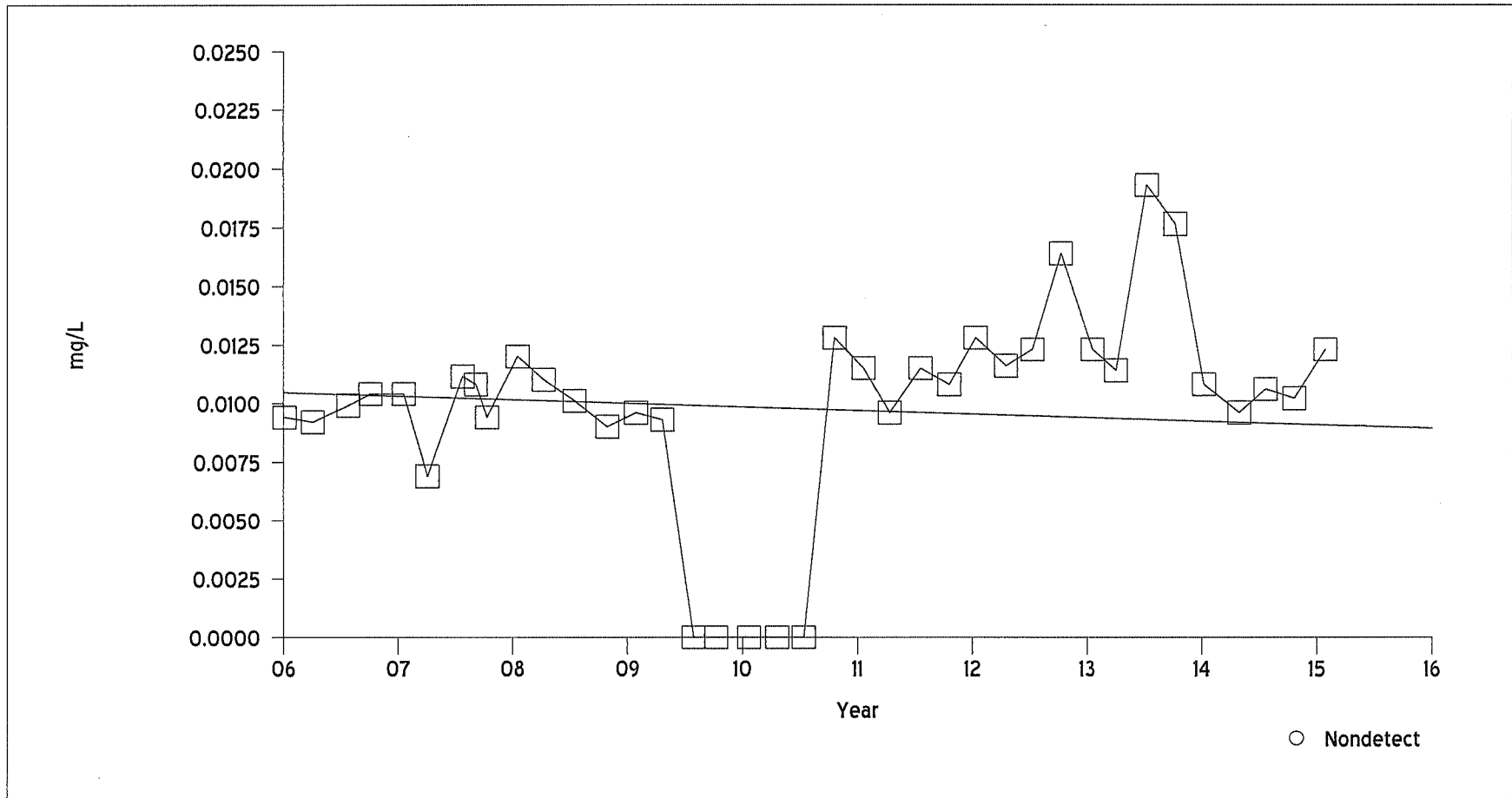


□ Alkalinity (as cac03) (cc: .731)

△ pH (cc: -.511)

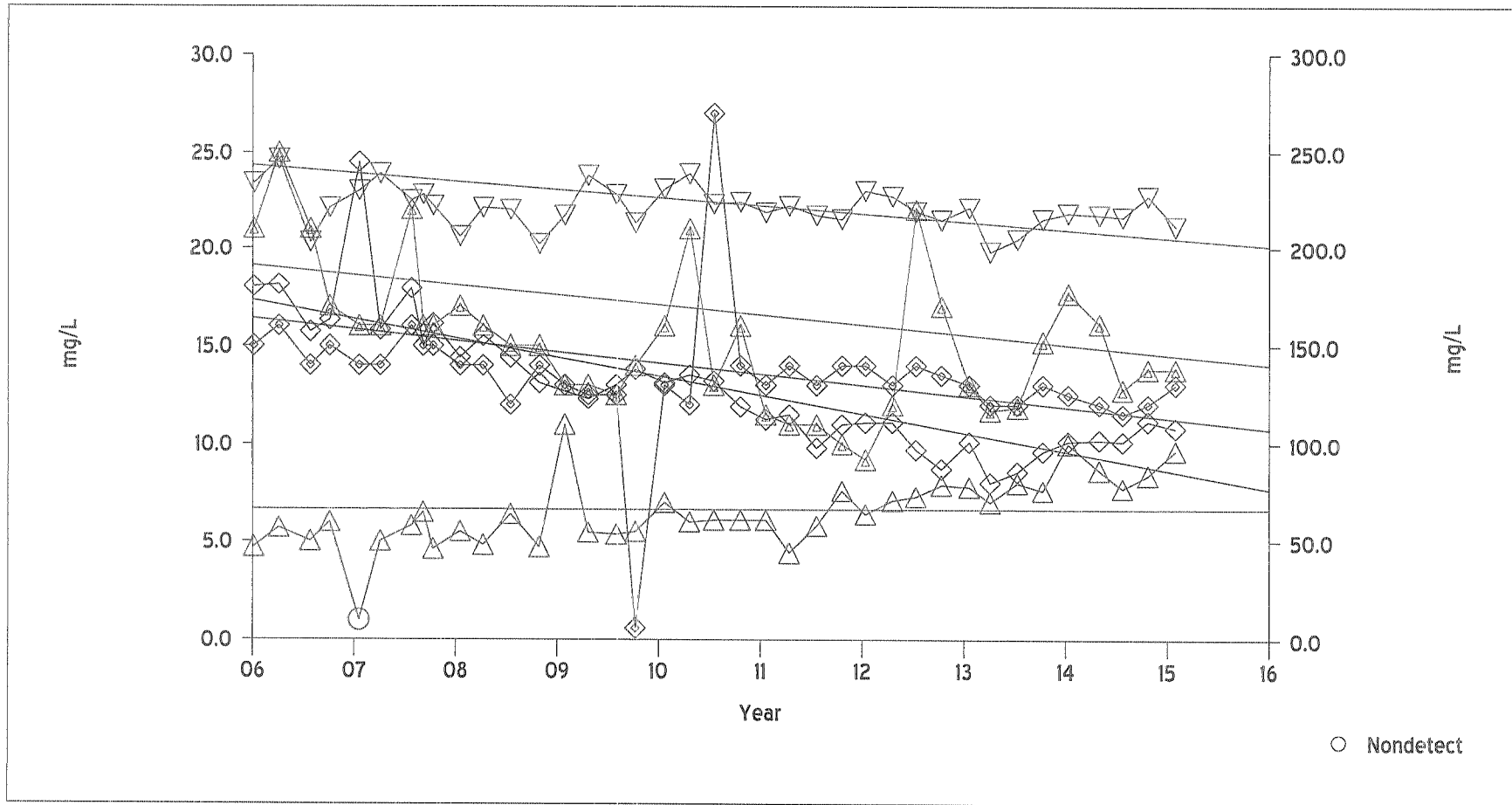
# Q-1 2015 Goodwin Landfill

Barium Time Series Plot for LG-02



# Q-1 2015 Goodwin Landfill

Minerals Time Series Plot for LG-04

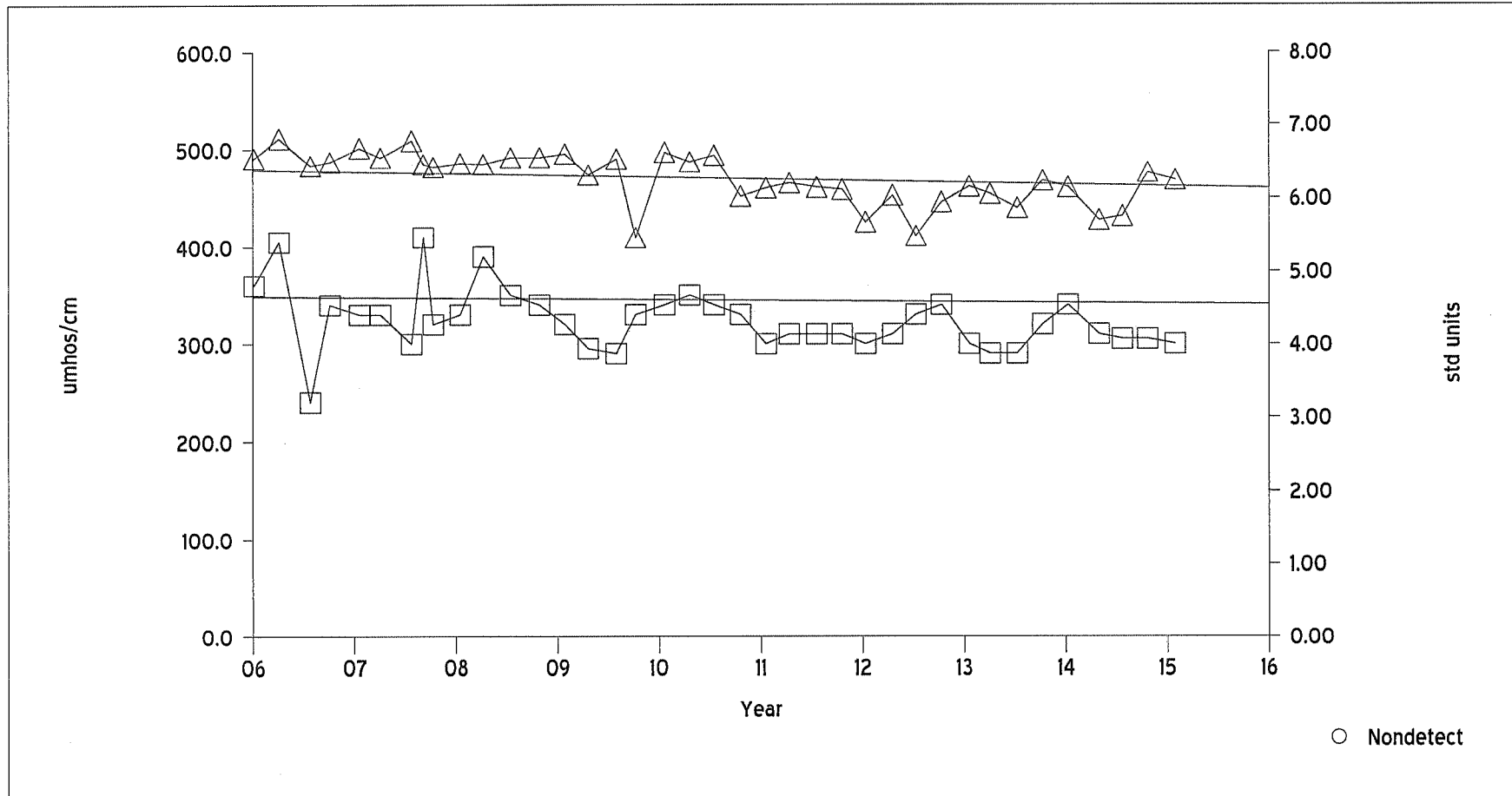


△ Chloride (cc: -.009)  
 ▽ Dissolved calcium (cc: -.461)  
 ◇ Dissolved sodium (cc: -.820)  
 ▲ Sulfate (cc: -.334)

◆ Bicarbonate (cc: -.534)

# **Q-1 2015 Goodwin Landfill**

Cond v pH Time Series Plot for LG-04



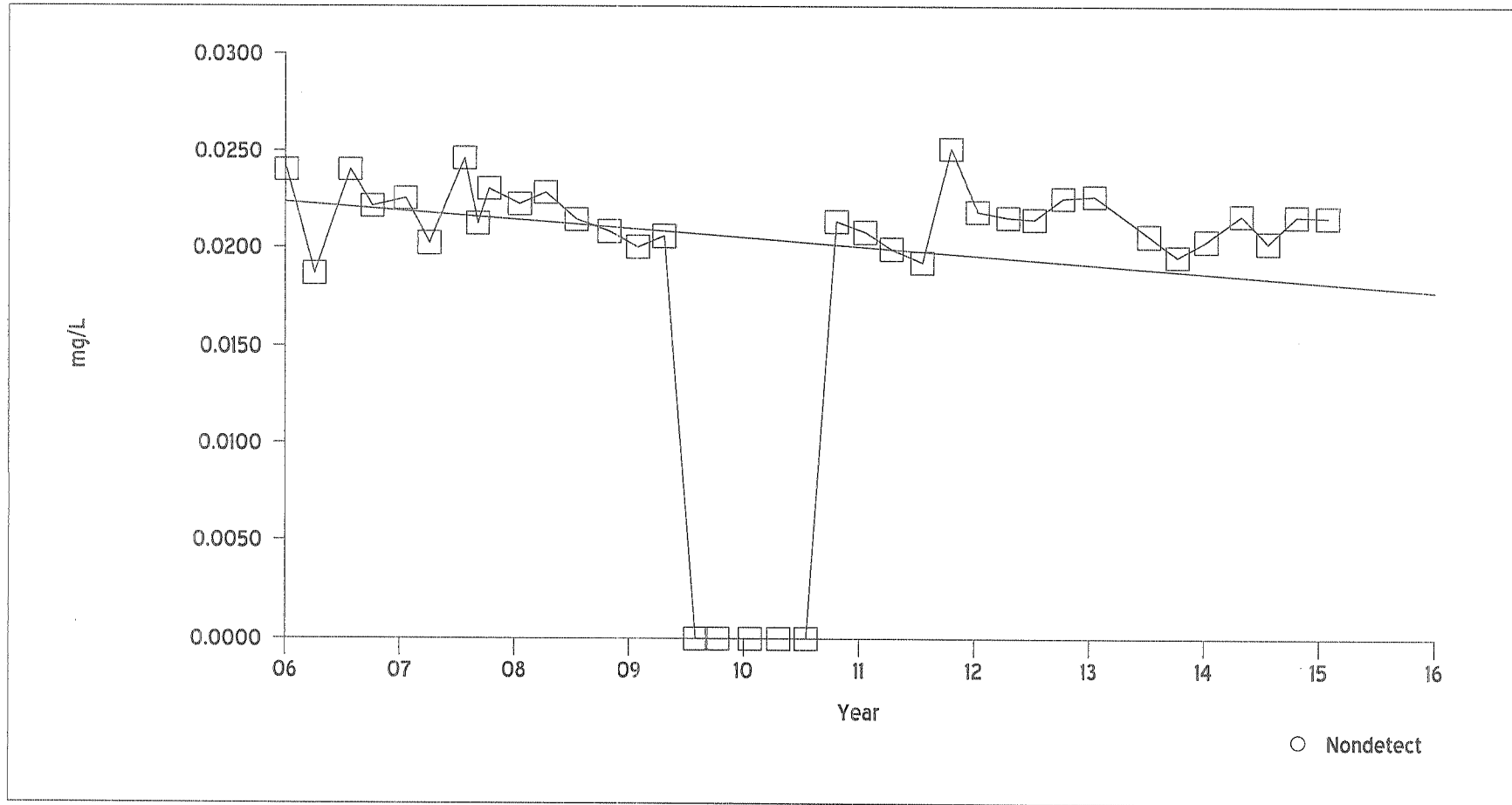
□ Conductivity (cc: -.103)

△ pH (cc: -.593)

○ Nondetect

# Q-1 2015 Goodwin Landfill

Barium Time Series Plot for LG-04

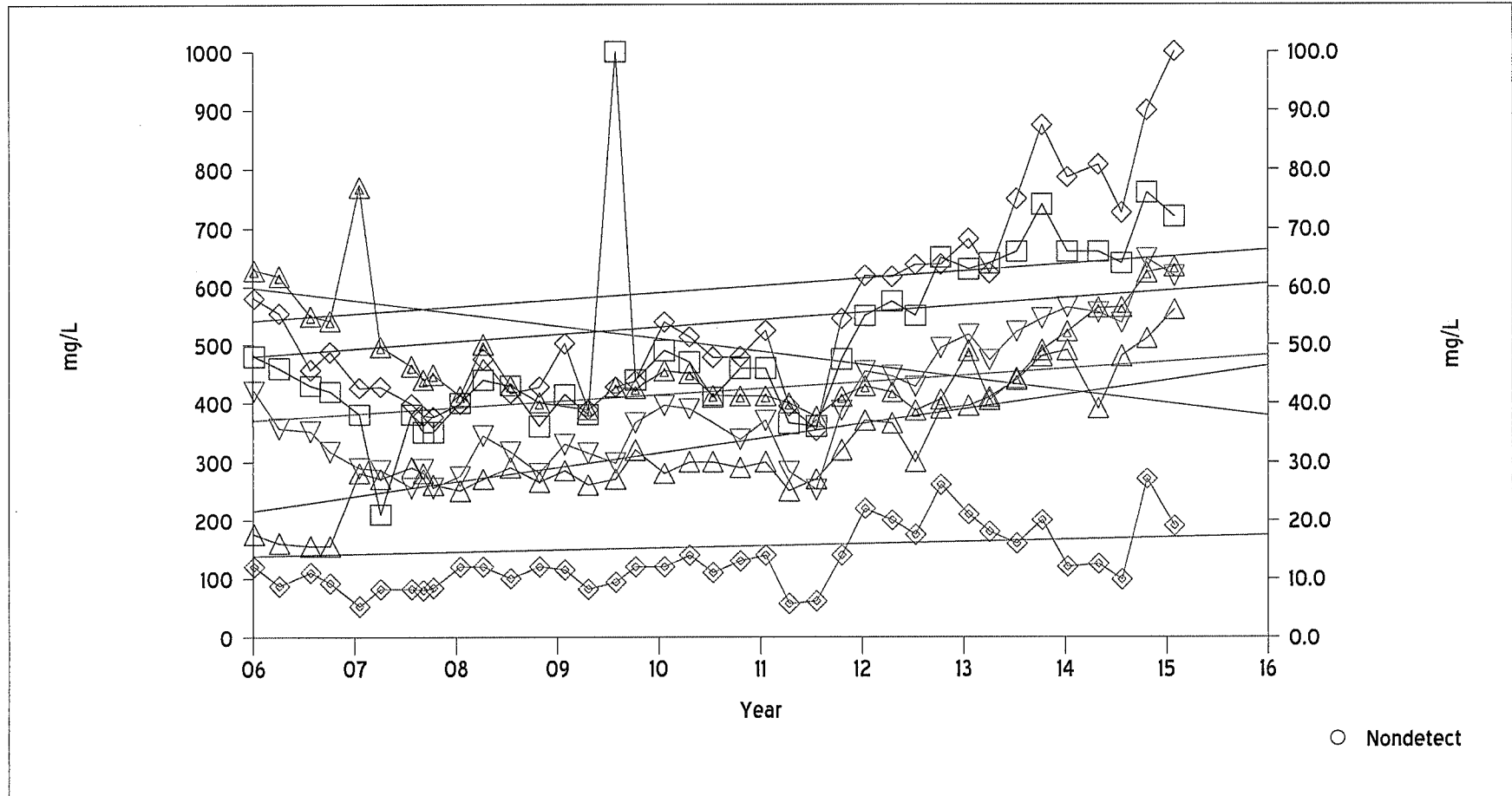


□ Dissolved barium (cc: -382)

○ Nondetect

# **Q-1 2015 Goodwin Landfill**

Minerals Time Series Plot for LG-05



△ Alkalinity (as  $\text{CaCO}_3$ ) (cc: .875)  
 □ Total dissolved solids (cc: .305)

▽ Dissolved calcium (cc: .358)  
 ◇ Dissolved magnesium (cc: .268)  
 ▲ Dissolved sodium (cc: -.599)  
 ◆ Nitrate nitrogen (cc: .366)

○ Nondetect

## Q-1 2015 Goodwin Landfill

Conductivity v pH Time Series Plot for LG-05

