
Lake Goodwin Landfill

2015 2nd Quarter Environmental

Monitoring Report



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DEPARTMENT OF ECOLOGY

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1.0 INTRODUCTION

The following report presents the second 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

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

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 feet 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 perimeter site explorations. Ground water elevations below the landfill during the second quarter sampling event ranged from el. 151.06 to el. 154.18 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. Second 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.

Second 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

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.

2nd Quarter Ground Water Measurements and Elevations are shown in *Table 1* below. **Hydrographs** of the second quarter 2015 monitoring well readings are contained in *Appendix A* of this report. Second quarter 2015 well readings show no real trend in water levels, however, readings over the last six-(6) years show an overall increasing ground water elevation trend below the landfill. Readings confirm that the aquifer is unconfined in the immediate vicinity of the site. The **Second 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 second quarter monitoring period through 5/8/15 was 5.06". This is a decrease of 6.83" over the first quarter 2015 precipitation. For reference purposes, precipitation measured at station WA-SN-11 during the monitoring period has been included on the hydrographs.

Table 1 – 2nd Quarter Groundwater Measurements and Elevations

Well Numbers	Casing Elevation	2 nd Quarter Delta/Elevation	
LG-01	239.18	-1.64	152.37
LG-02	268.67	+1.48	154.18
LG-04	206.93	+0.54	151.06
LG-05	235.00	-0.42	151.61

2.2 Second Quarter Ground Water Sampling Event

Approximately 1.6 to 3.1 gallons of water was purged from each of the four-(4) monitoring wells 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 Second Quarter Ground Water Analytical Results

2nd Quarter 2015 Ground Water Test Results for each well are summarized in *Table 2* below. Comparison of results to regulatory criteria shows:

Second Quarter: Other than arsenic in all wells and pH in all down gradient wells, 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 – 2nd Quarter 2015 Ground Water Test Results

Well	Ground Water Standard Exceedances Summary
LG-01	Arsenic, pH
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 2007 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 2nd quarter sampling event. There were 24 exceedances to the calculated prediction limits for all wells during this quarter, three-(3) more than last quarter. Calculated exceedances to the prediction limits in the second quarter are shown in *Table 3* below. There were 19 increasing trends, mostly found in wells LG-01 and LG-05, and 11 decreasing trends, mostly found in LG-04.

Table 3 – 2nd Quarter Statistical Summary Prediction Limit Exceedances

Well	2 nd Quarter 2015 Exceedances
LG-01	Alkalinity, bicarbonate, conductivity, magnesium, potassium, sulfate, barium
LG-02	None
LG-04	pH, TOC
LG-05	Alkalinity, bicarbonate, calcium, chloride, conductivity, magnesium, nitrate, nitrite, potassium, sodium, sulfate, TDS, barium, iron, nickel

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. These gas probes were measured during this sampling event, the results are shown on *Table 4 – 2nd Quarter 2015 Gas Probe Measurements* below.

Table 4 – 2nd Quarter 2015 Gas Probe Measurements

Probe / depth	Methane	Oxygen	CO ₂
LG-A1 / 44"		0	
LG-B2 / 47"		0	
LG-C2 / 46"		0	

Gas probe measurements were fairly constant for methane between the 1st quarter and 2nd quarter measurements while O₂ and CO₂ decreased slightly. Staff recorded the barometric pressure between and while sampling.

4.0 SUMMARY AND RECOMMENDATIONS

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

- Precipitation during the second quarter decreased compared to that received during the first quarter of 2015 between 4/1/15 – 5/7/15. Ground water elevations decreased slightly in LG-02 and increased in LG-01, LG-04, and 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 a significant impact 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 (11) than increasing trends (19) during this sampling event.
- 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 except LG-04.
- Every well exceeded the arsenic groundwater standard.
- Gas probe measurements were fairly constant for methane between the 1st quarter of 2015 and the 2nd quarter 2015 measurements while O₂ and CO₂ measurements decreased slightly.

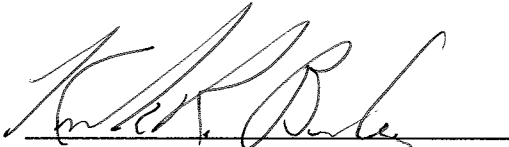
4.1 Conclusions/Recommendations

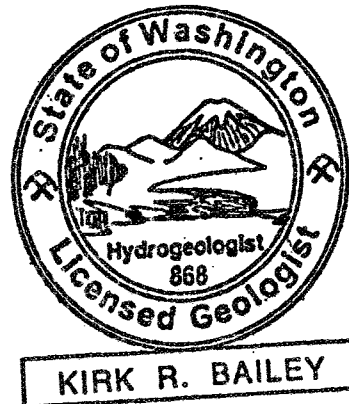
Second quarter 2015 data indicates a continued moderate leachate impact to the underlying Advance Outwash (Qva) aquifer below the Lake Goodwin Landfill. Statistical analysis indicates a number of significantly decreasing trends in LG-01 and LG-05, which has been occurring over the


last several sampling events. Down gradient well LG-04 has shown a significant number of decreasing trends during this same time period.

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. The cause of the increasing trends in LG-01 is unknown at this time.

4.2 Signatures and Licenses


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

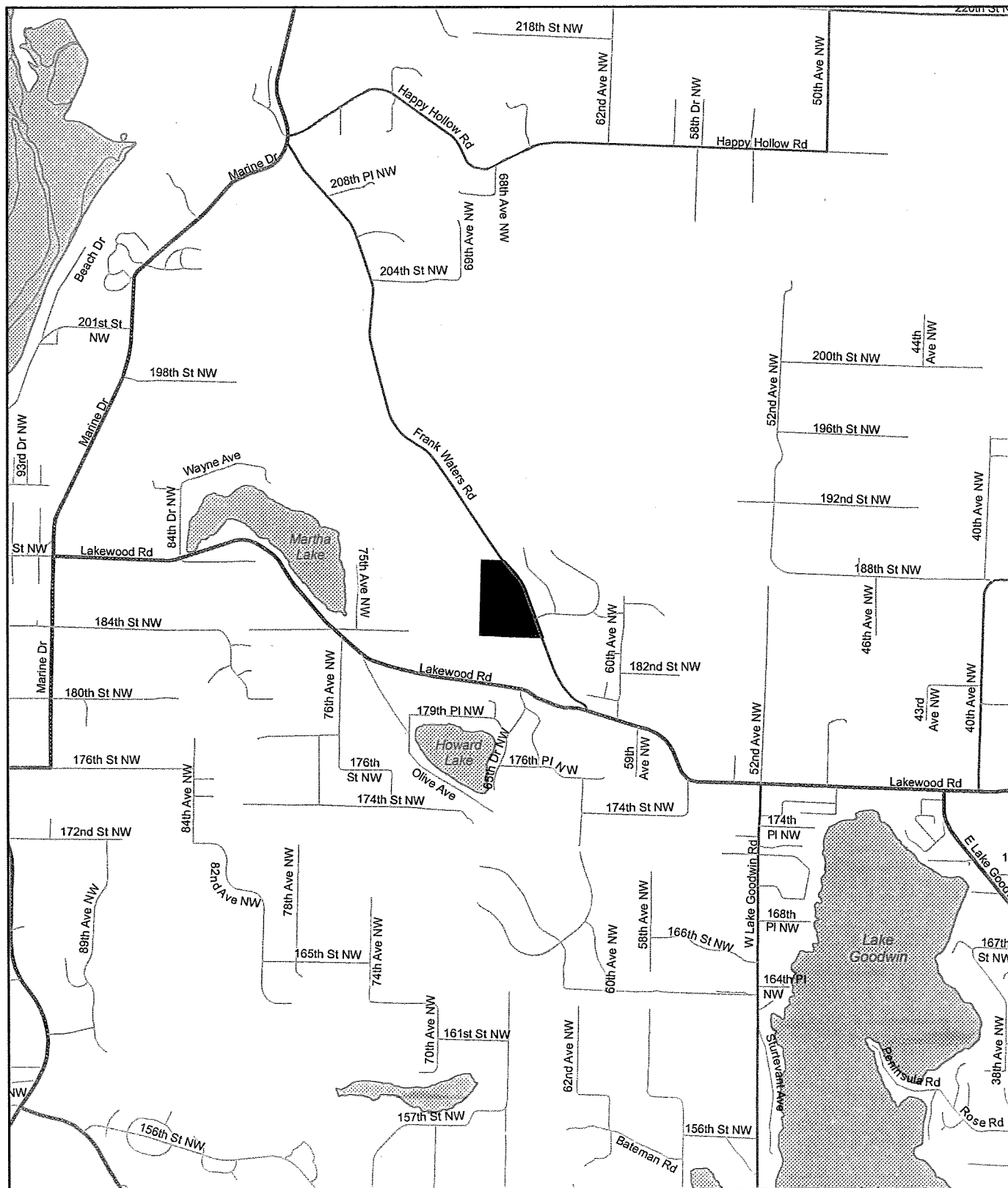



Deanna Seaman
SCPW – Solid Waste Division

June 5, 2015
Attachments
Figures

Figure 1

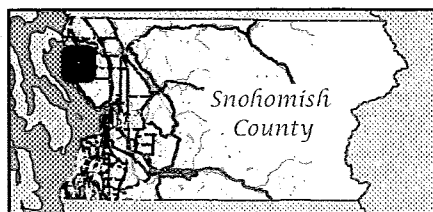
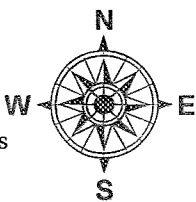
Lake Goodwin Landfill



1 inch = 0.5 miles

0 0.15 0.3 0.6 0.9
Miles

0 0.25 0.5 1 1.5
Kilometers

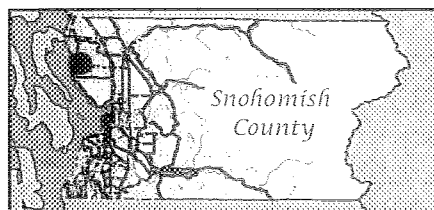
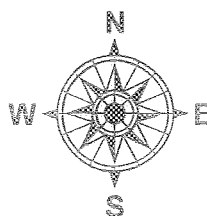
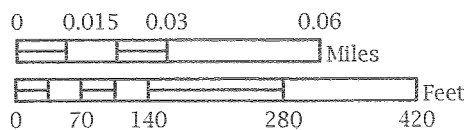
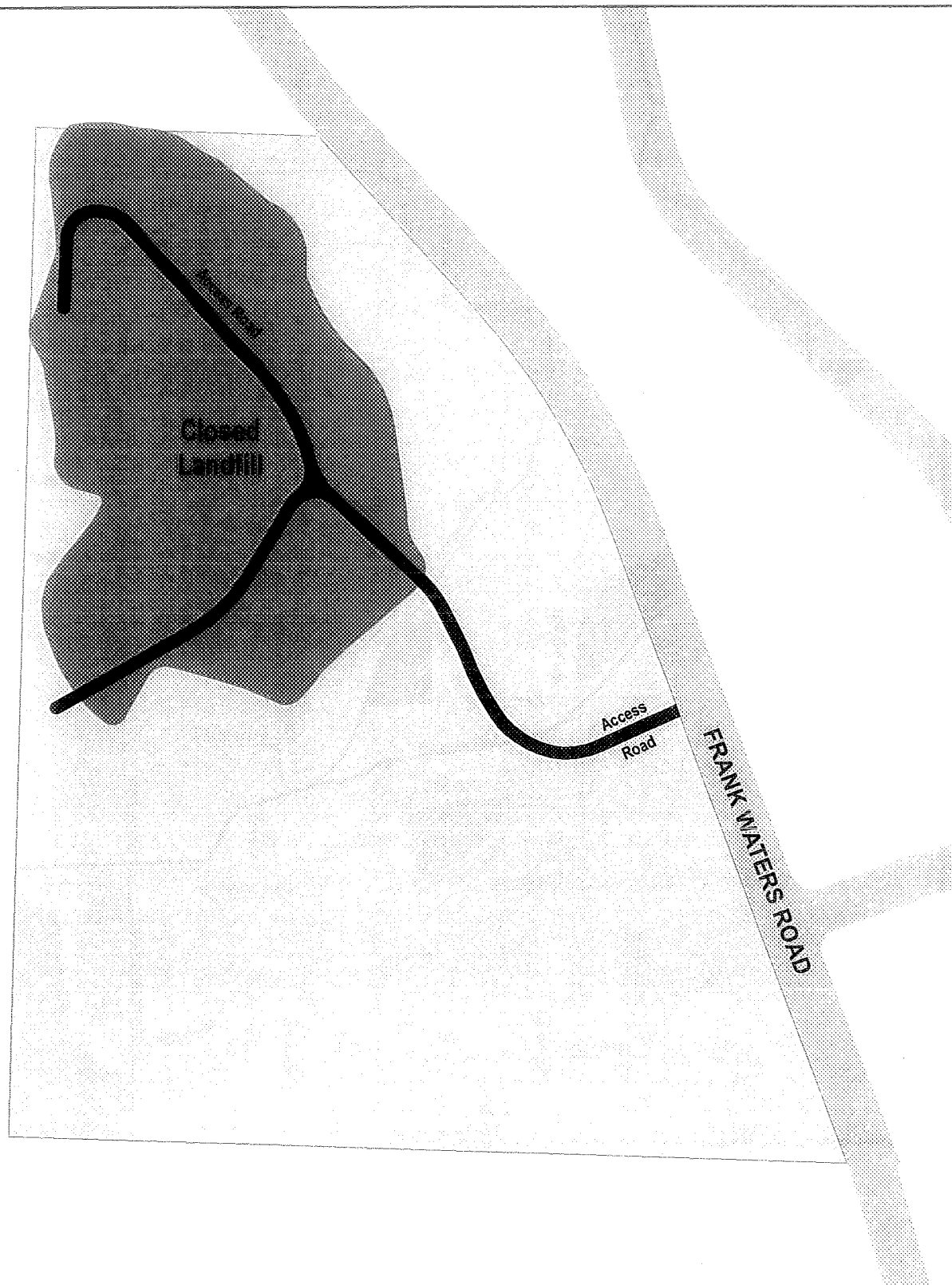


Snohomish County
Public Works
Solid Waste Division
March 22, 2010

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Figure 2

Lake Goodwin Landfill Site Map






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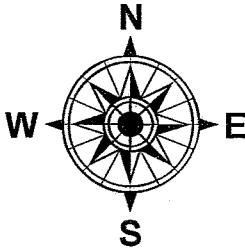
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Figure 3

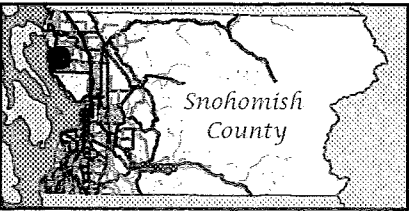
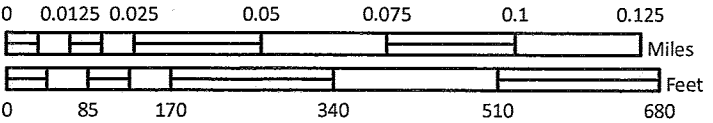
Lake Goodwin Landfill Topography

Map Features

-  Parcel Boundary
-  Subject Property Boundary
-  5 Foot Contours



1 inch = 200 feet



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Figure 4

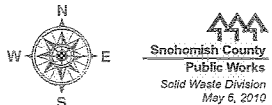
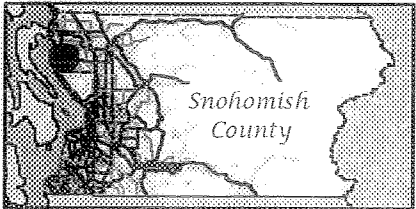
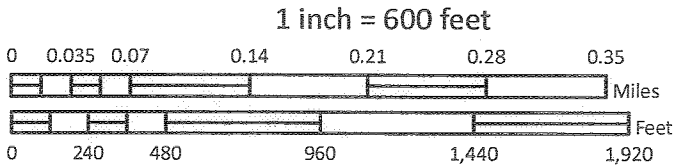
Lake Goodwin Landfill Geologic Map

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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Figure 5

Lake Goodwin Landfill Monitoring Network

Map Features

Parcel Boundary

Subject Property Boundary

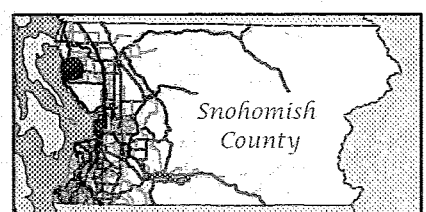
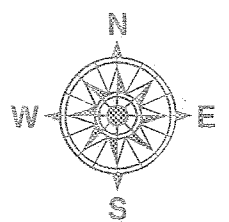
Aquifer Unit (Active Wells)

● Deep Aquifer

Additional Sampling Points

▲ Bar Hole Punch Gas Probe

X = decommissioned




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March 2, 2012

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Figure 6

Lake Goodwin Landfill

Water Elevation Contours 2nd Quarter 2015

 DIRECTION OF GROUNDWATER FLOW
1.59 ft / day
581 ft / year
63.22 degrees to the positive x - axis

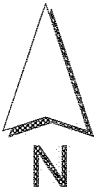
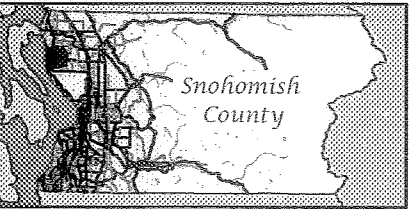
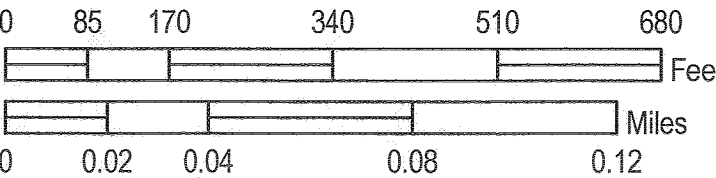
PARCEL BOUNDARY

 SUBJECT PROPERTY BOUNDARY

 1 FT CONTOUR

 WELL LOCATION

WELL_ID	SAMP_DATE	MEAS_HEAD
LG-01	4/15/2015	152.37
LG-02	4/15/2015	154.18
LG-04	4/15/2015	151.06
LG-05	4/15/2015	151.61



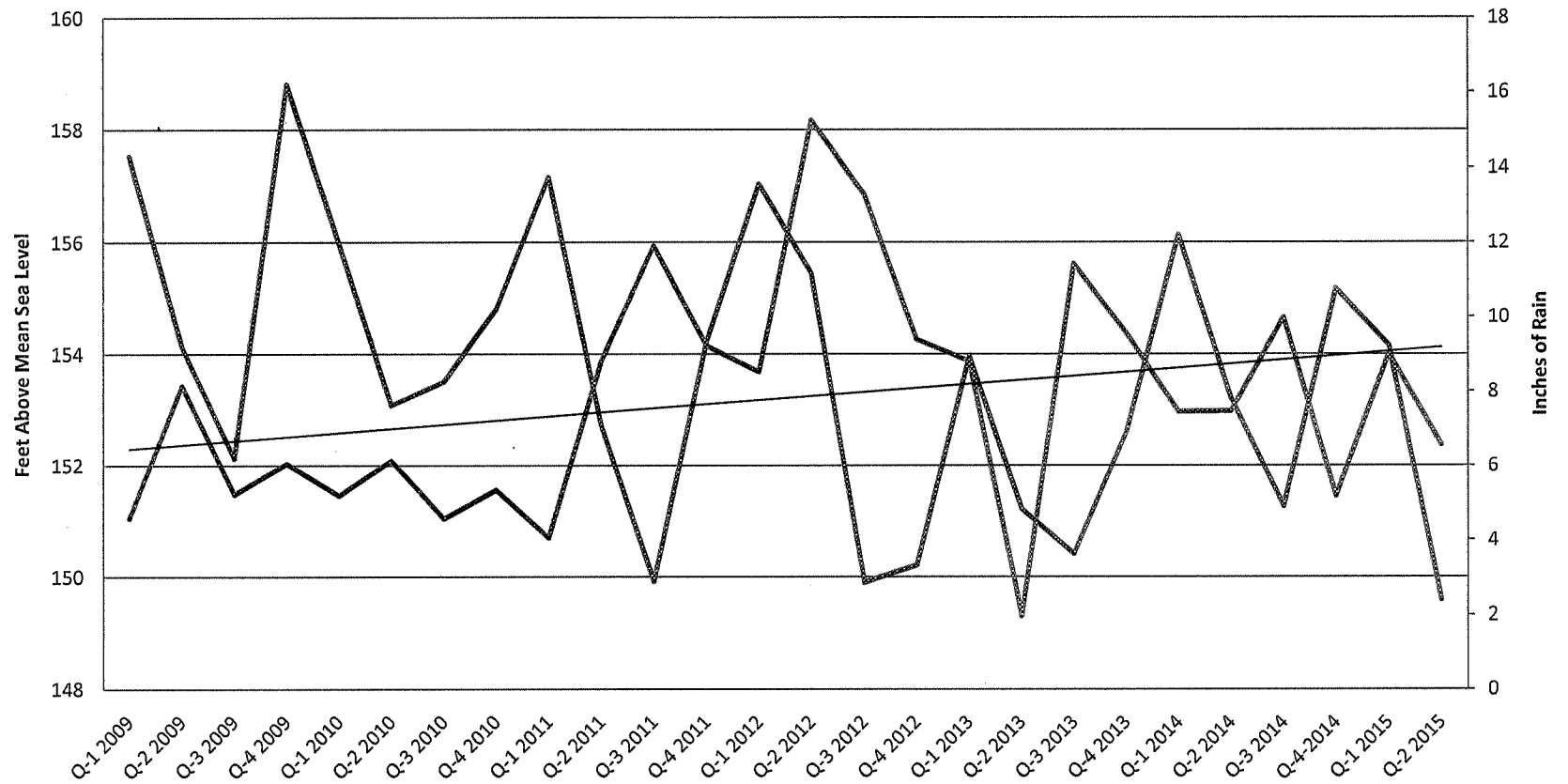

Snohomish County
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Solid Waste Division
June 15, 2015

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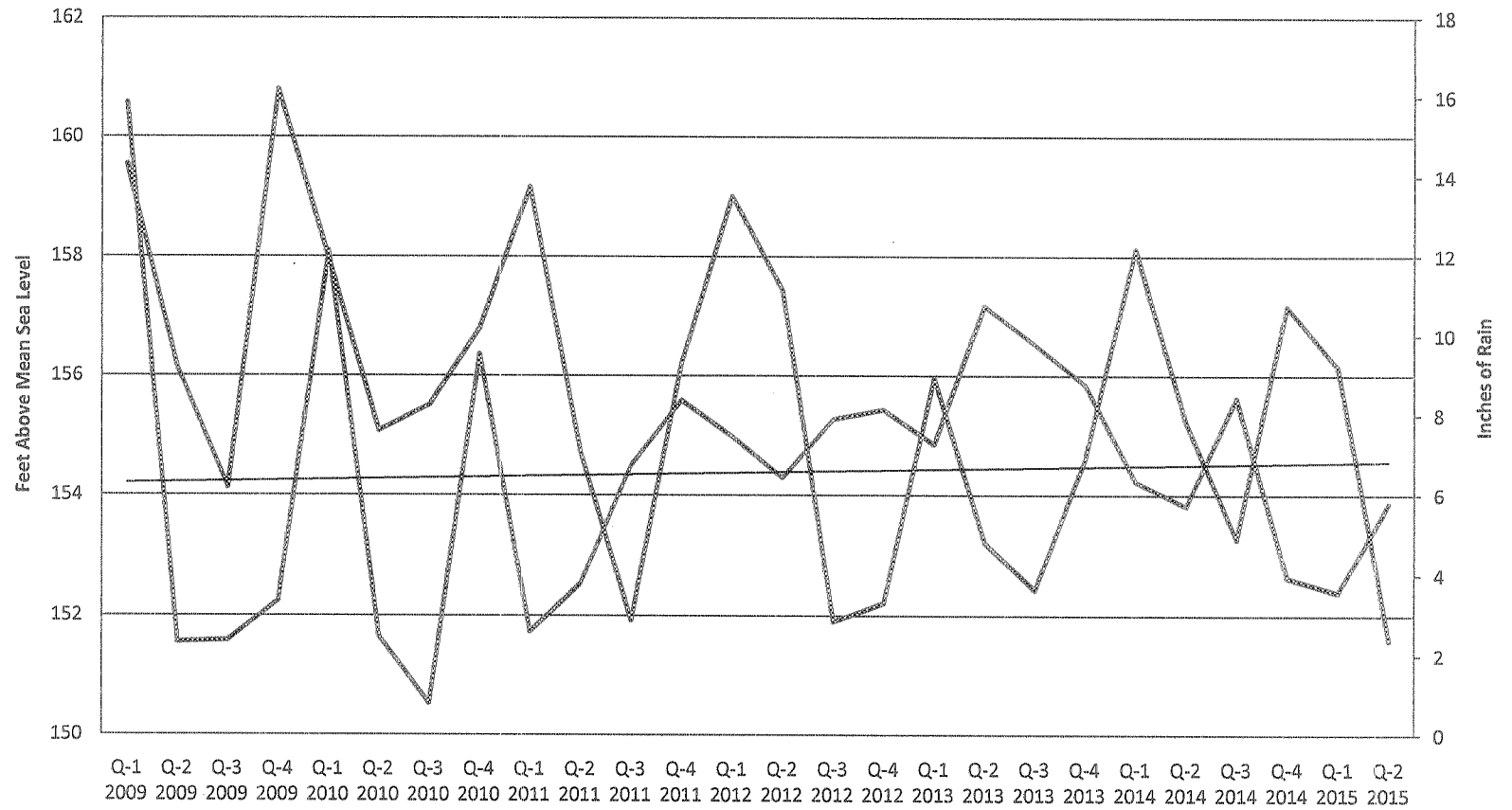
Appendix A

Hydrographs

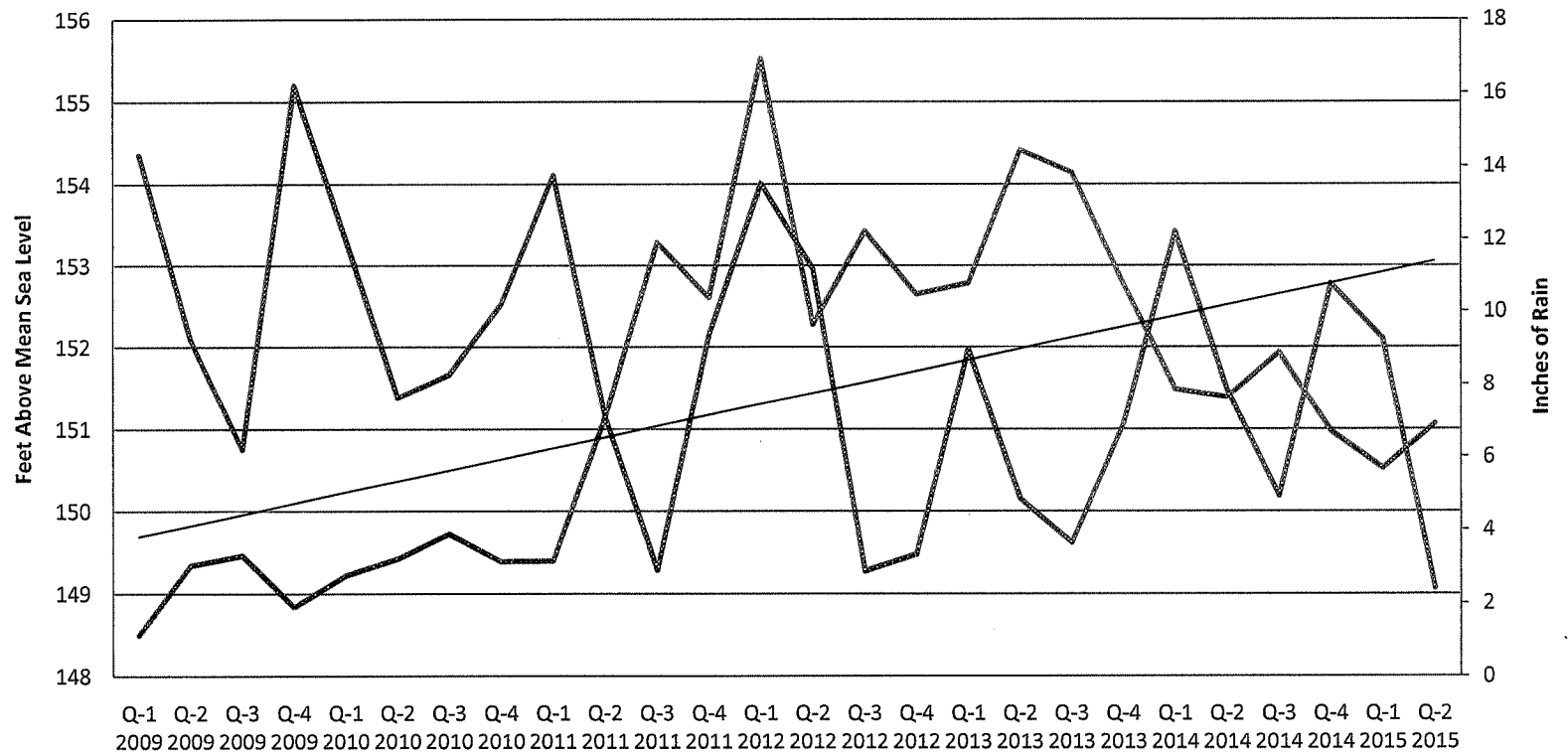
Lake Goodwin Well LG-01



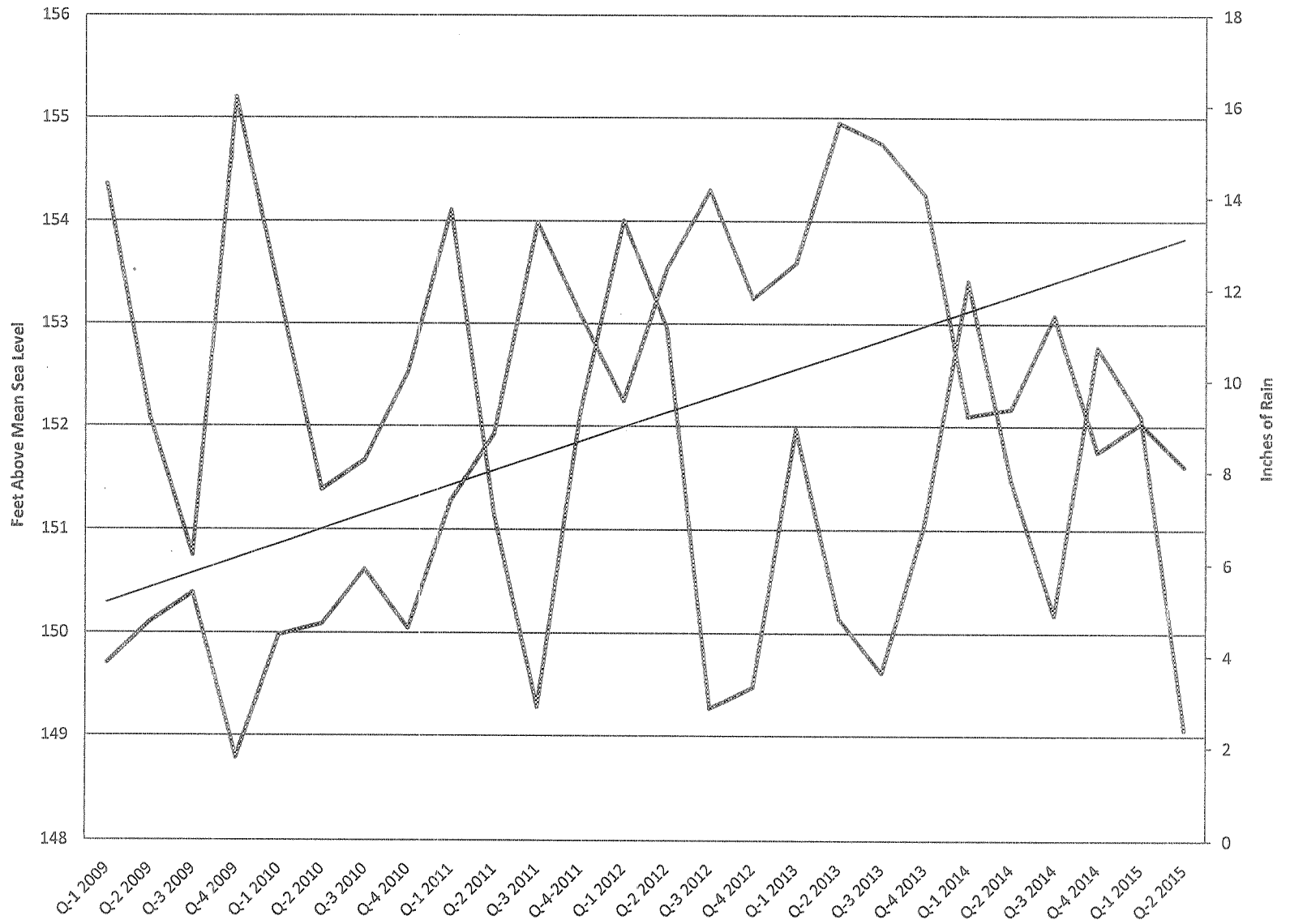
Lake Goodwin Well LG-02



Lake Goodwin Well LG-04



Lake Goodwin Well LG-05



Appendix B

Analytical Data

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

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

CONVENTIONAL CHEMISTRY PARAMETERS

Alkalinity (as CaCO3)	normal	43	43	165.2534	--	--	220	V	I	N	98			560	V	I	N	110		I	N	
Ammonia Nitrogen	nonpar	39	10	0.069	--	--	0.005	U			0.005	U		0.005				0.005	U			
Bicarbonate	lognor	43	43	159.4437	--	--	220	V	I	N	98	D	N	560	V			110				
Calcium, Dissolved	nonpar	43	43	31.2	--	--	27.7		I	N	20.2	D	N	62.4	V	I	N	18.5				
Chemical Oxygen Demand	nonpar	35	3	26	--	--	10	U			10	U		10	U			10	U			
Chloride	normal	43	43	9.7232	250	250	6.29		I	N	9.59	I	N	27.8	V			6.74				
Conductivity (umhos/cm)	lognor	43	43	360.0914	--	700	450	V	I	N	270	D	N	1100	V	I	N	250				
Magnesium, Dissolved	nonpar	43	43	25.15	--	--	36.7	V	I	N	18.3			102	V	I	N	16				
Nitrate Nitrogen (mg-N/L)	nonpar	42	42	6	10	10	2.3		I	N	1.2			19	V	I	N	2.1				
Nitrite Nitrogen (mg-N/L)	nonpar	40	8	0.011	1	1	0.001				0.001	U		0.037	V			0.001	U			
pH (std units)	normal	43	43	6.27-7.89	6.5-8.5	6.5-8.5	6.47		D		6.26	V	D	N	6.36		D	N	7.11		D	N
Potassium, Dissolved	normal	43	43	3.6467	--	--	3.99	V			2.99			8.82	V			2.76				
Sodium, Dissolved	nonpar	42	42	13.8	--	20	11.1		I	Y	10.2	D	N	60	V	D	N	8.99				
Sulfate	nonpar	43	43	24	250	250	34.1	V			13	D	N	43.8	V			15.2				
Total Dissolved Solids	nonpar	43	43	550	500.0	500	260		I	N	170			690	V	I	N	140				
Total Organic Carbon	nonpar	43	19	19	--	--	0.91				20	E		5.8				0.5	U			

DISSOLVED METALS

Arsenic	nonpar	37	37	0.0078	0.01	0.00005	0.000596				0.000368			0.000898			0.00363				
Barium	nonpar	38	38	0.0193	2	2	0.0204	V	I	N	0.0166	P	D	N	0.0825	V		0.0087		I	N
Cadmium	nonpar	39	14	0.0002	0.005	0.005	0.000068				0.0005	U		0.000056	U		0.0005	U			
Chromium	normal	40	30	0.0091	0.1	0.1	0.001	U			0.000025	U		0.001	U		0.0046				
Cobalt	nonpar	43	7	0.008	--	--	0.001	U			0.001	U		0.001	U		0.001	U			
Copper	nonpar	39	11	0.007	1	1.3	0.001	U			0.001	U		0.001	U		0.001	U			
Iron	nonpar	43	7	0.032	0.3	0.3	0.009				0.009	U		0.038	V		0.009	U			
Manganese	nonpar	40	16	0.0061	0.05	0.05	0.0005	U			0.0005	U		0.0005	U		0.0005	U			
Nickel	nonpar	43	0	0.005	--	0.1	0.005	U			0.005	U		0.009	E		0.005	U			

TOTAL METALS

Arsenic					0.01	0.00005	0.000577				0.000358			0.000818			0.00361				
Barium					2	2	0.0232				0.018			0.0847			0.01				
Cadmium					0.005	0.005	0.000025	U			0.000025	U		0.000044			0.000025	U			
Chromium					0.1	0.1	0.0025	U			0.0025	U		0.0025	U		0.0036				
Cobalt					--	--															

Groundwater Summary: Second 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				
						4/15/15	D	V	T	C	4/15/15	D	V	T	C	4/15/15	D	V	T	C	4/15/15	D	V	T	C
Copper				1	1.3	0.005 U					0.005 U					0.005 U					0.005				
Iron				0.3	0.3	0.038					0.022					0.207					0.023				
Manganese				0.05	0.05	0.0009 U					0.0009 U					0.0009 U					0.0009 U				
Nickel				--	0.1	0.005 U					0.005					0.013					0.005 U				

mg/L = milligrams per liter (ppm), µg/L = micrograms per liter (ppb).

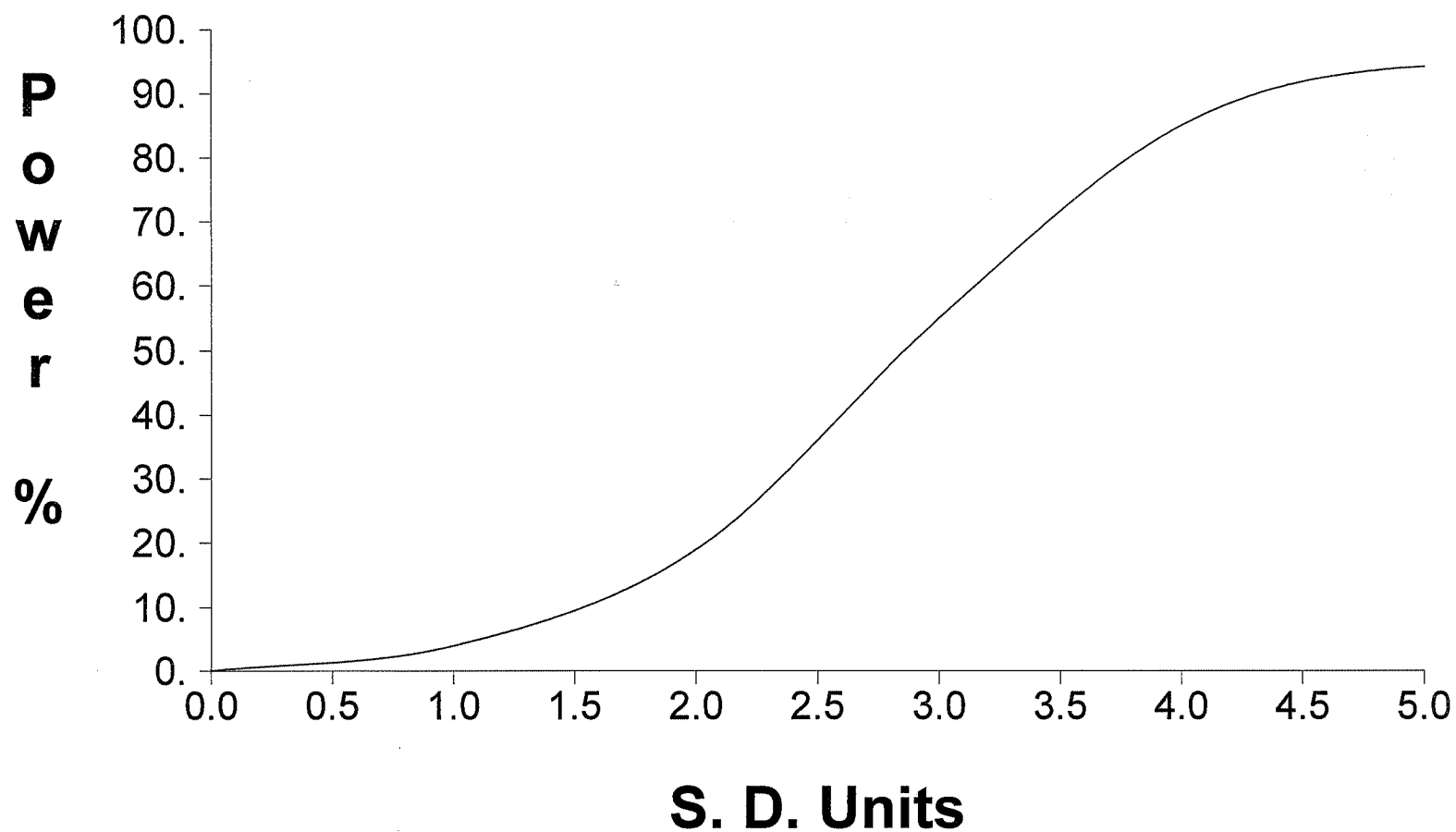
D Column: U = Compound not detected in any sample. V Column: V = verified hit, E = exceedance, waiting verification; P = Passed, exceedance not verified

I means increasing trend, D means decreasing trend via Mann-Kendall Analysis. Ch? = a change in the trend analysis, N is no, Y is yes. Compared to previous quarter.

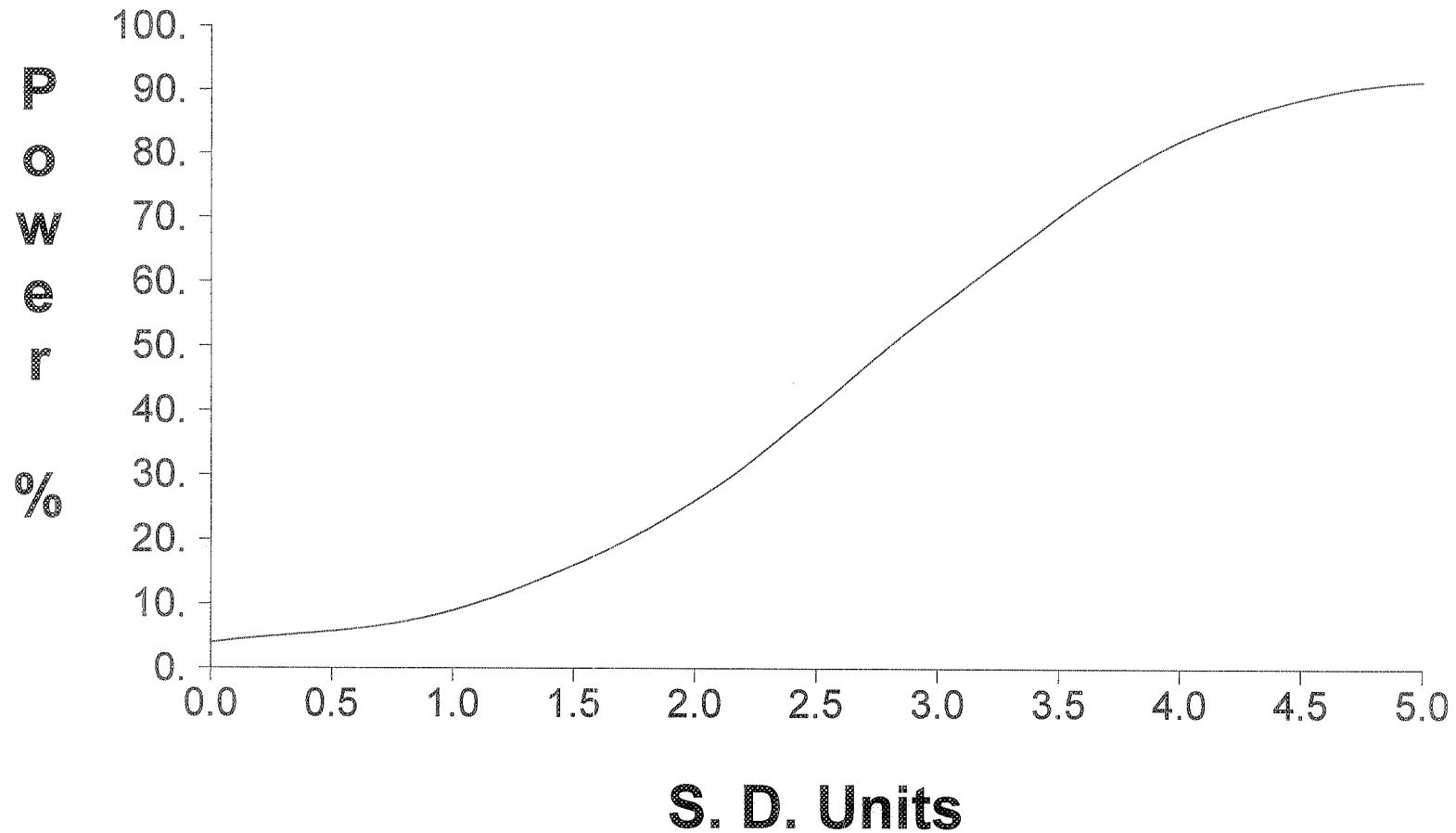
Appendix C

Stiff, Tri-linear and Trend Analysis

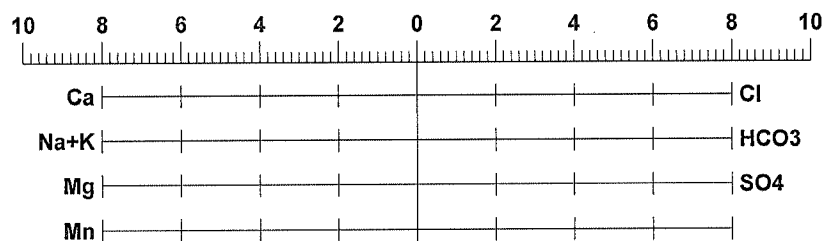
False Positive and False Negative Rates for Current Intra-Well Prediction Limits Monitoring Program



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



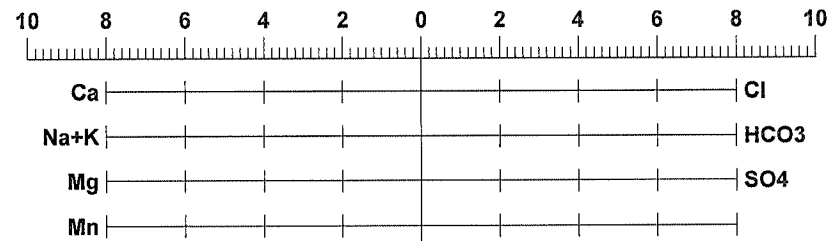
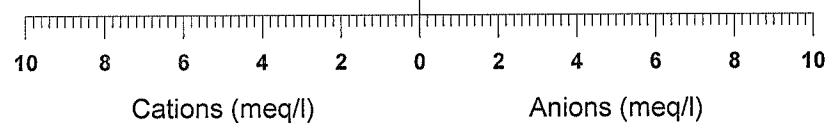
Q-2 2015 Goodwin Landfill



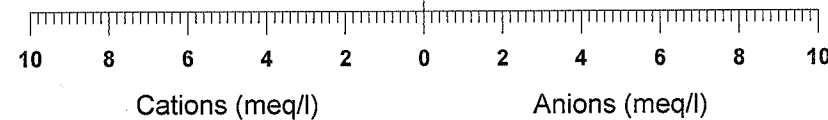
LG-01 4/15/2015 (5.21%,339.8803ppm)

LG-02 4/15/2015 (8.29%,178.4003ppm)

LG-04 4/15/2015 (17.1%,172.2803ppm)

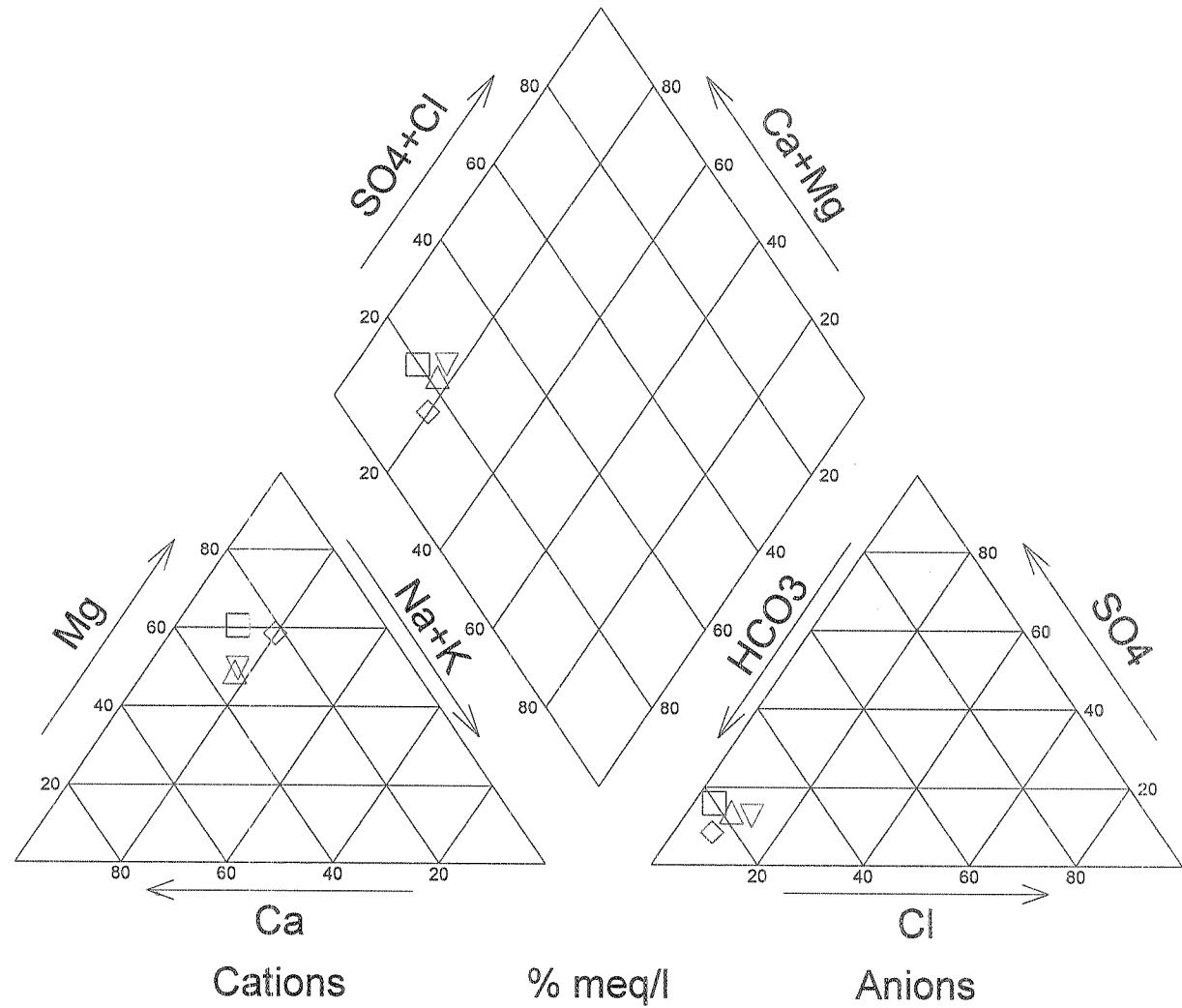


LG-05 4/15/2015 (13.8%,864.8203ppm)



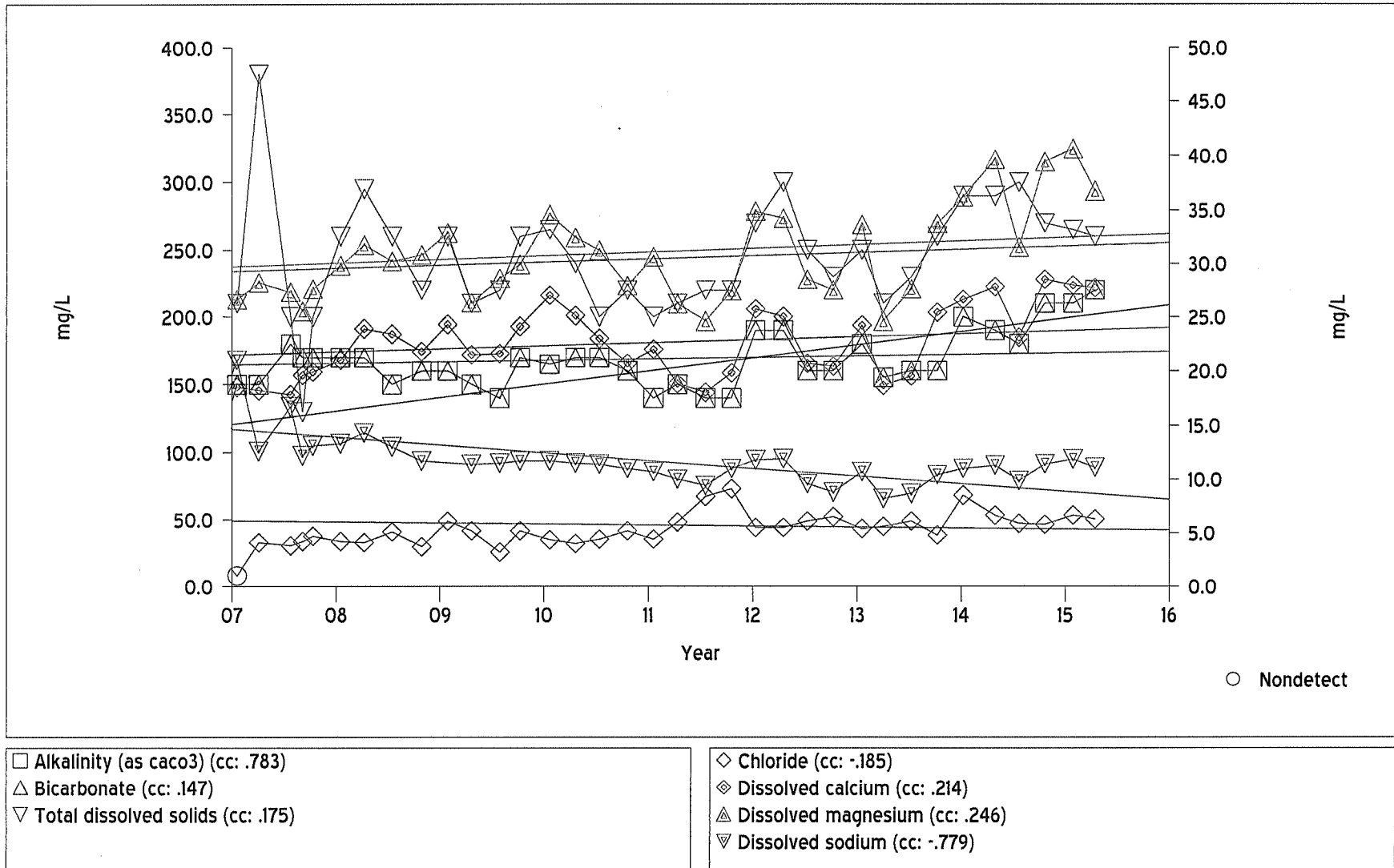
Q-2 2015 Goodwin Landfill

□ LG-01	4/15/2015 (5.21%, 339.88ppm)
△ LG-02	4/15/2015 (8.29%, 178.4ppm)
▽ LG-04	4/15/2015 (17.1%, 172.28ppm)
◇ LG-05	4/15/2015 (13.8%, 864.8199ppm)



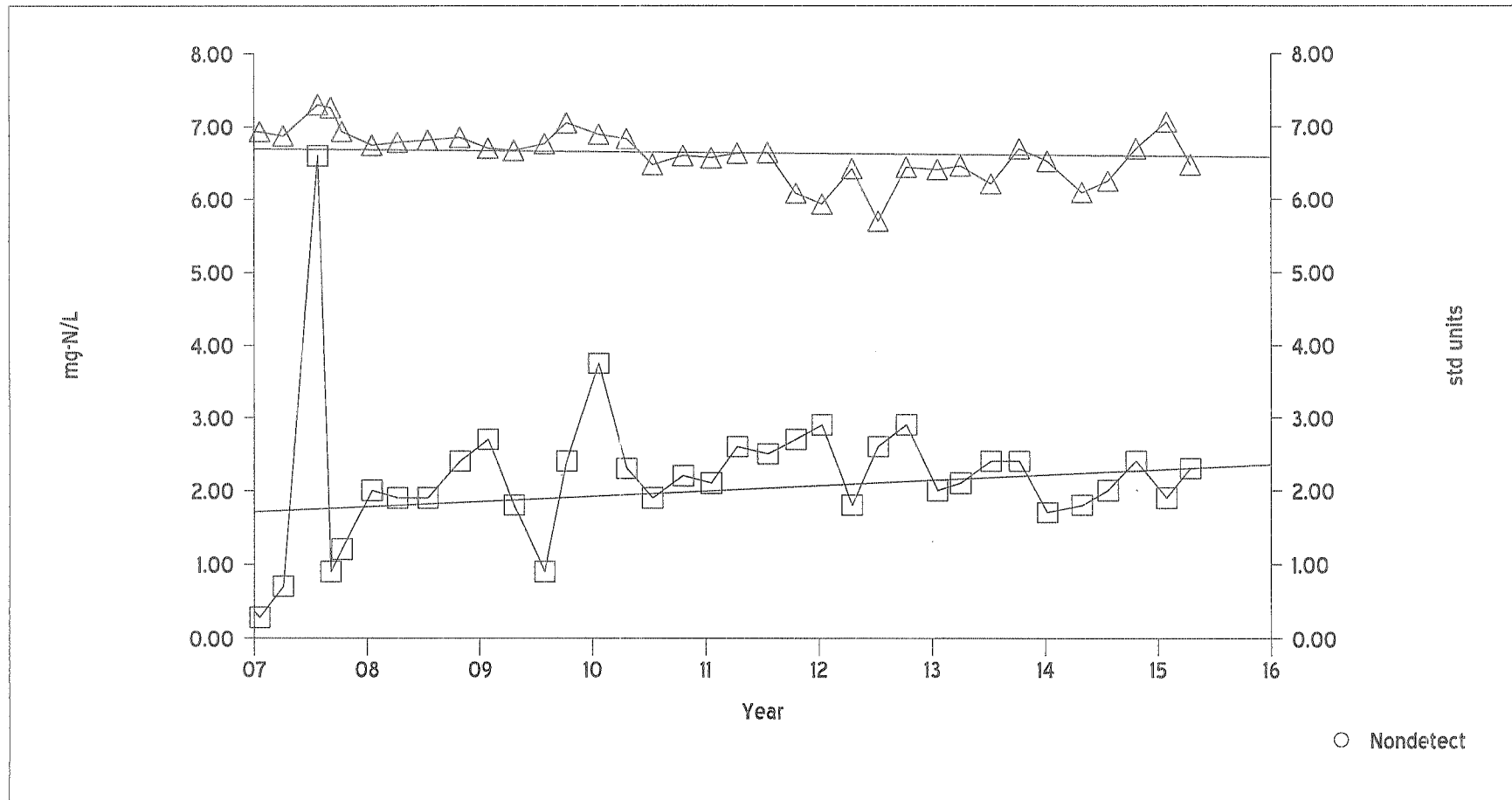
Q-2 2015 Minerals Goodwin Landfill

Time Series Plot for LG-01



Q-2 2015 NO3 v pH Goodwin Landfill

Time Series Plot for LG-01

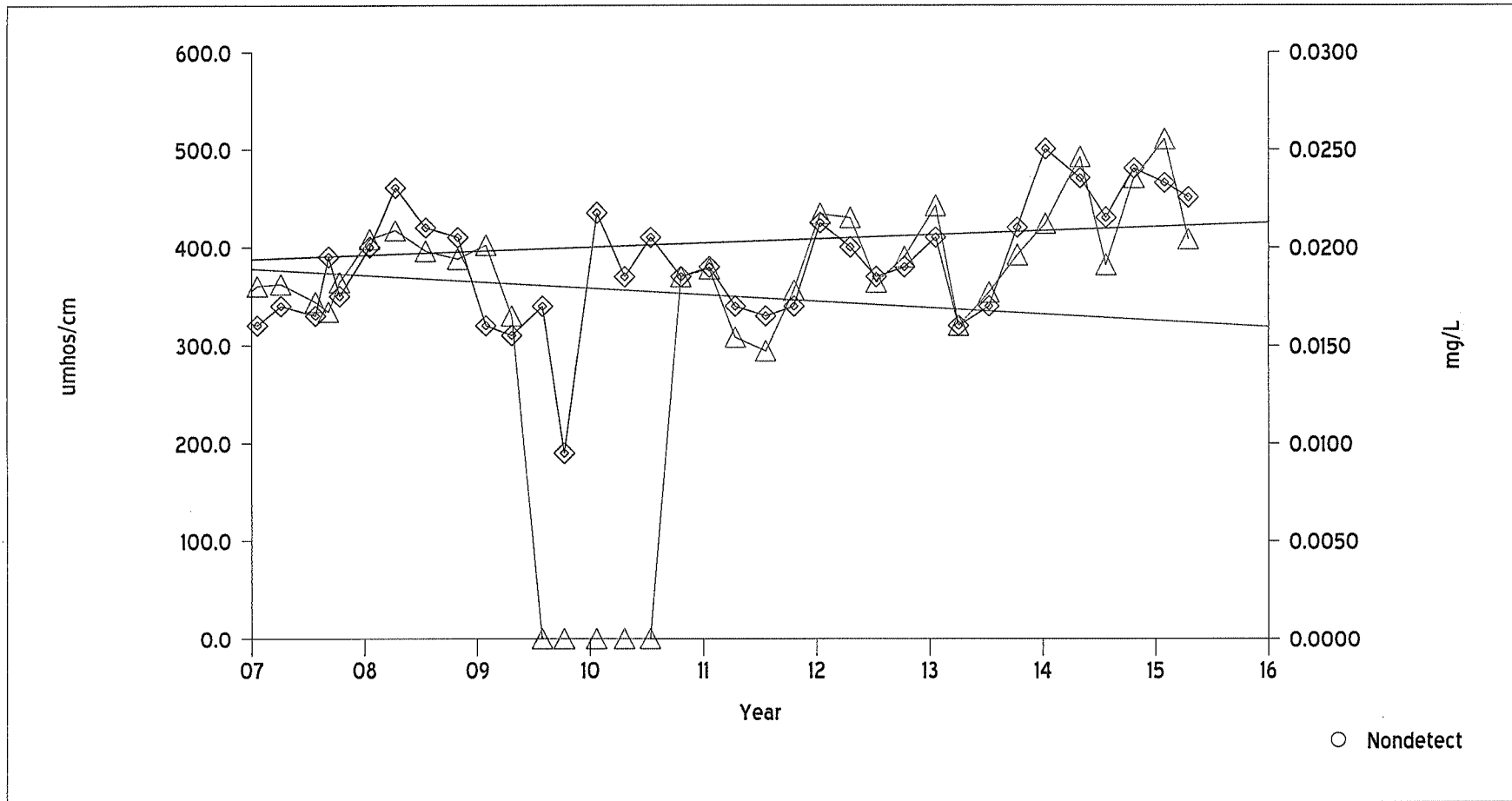


□ Nitrate nitrogen (cc: .538)

△ pH (cc: -.340)

Q-2 2015 Cond. v Ba Goodwin Landfill

Time Series Plot for LG-01

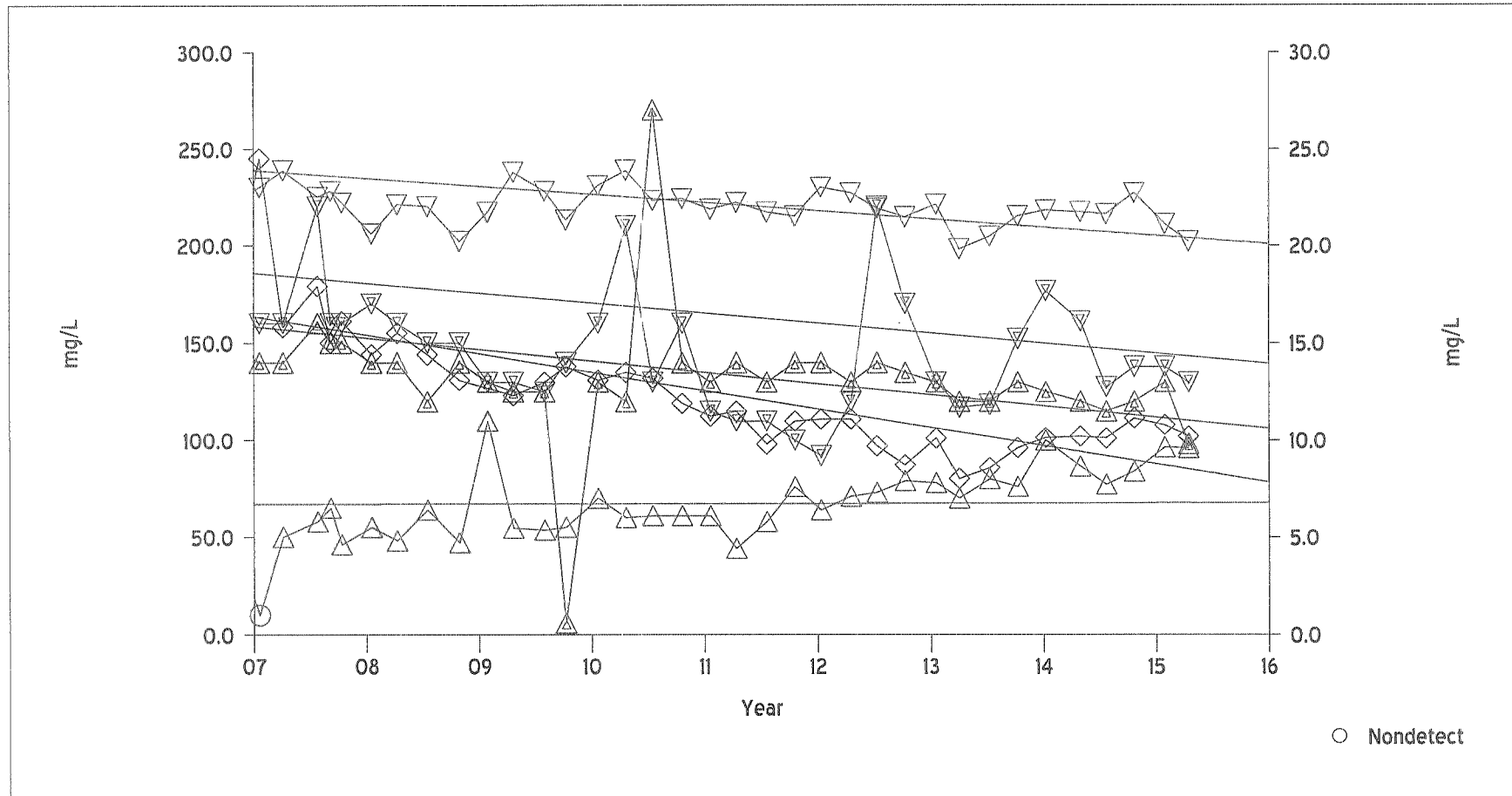


◆ Conductivity (cc: .247)

△ Dissolved barium (cc: -.213)

Q-2 2015 Minerals Goodwin Landfill

Time Series Plot for LG-04



△ Bicarbonate (cc: -.554)

△ Chloride (cc: .024)

▽ Dissolved calcium (cc: -.473)

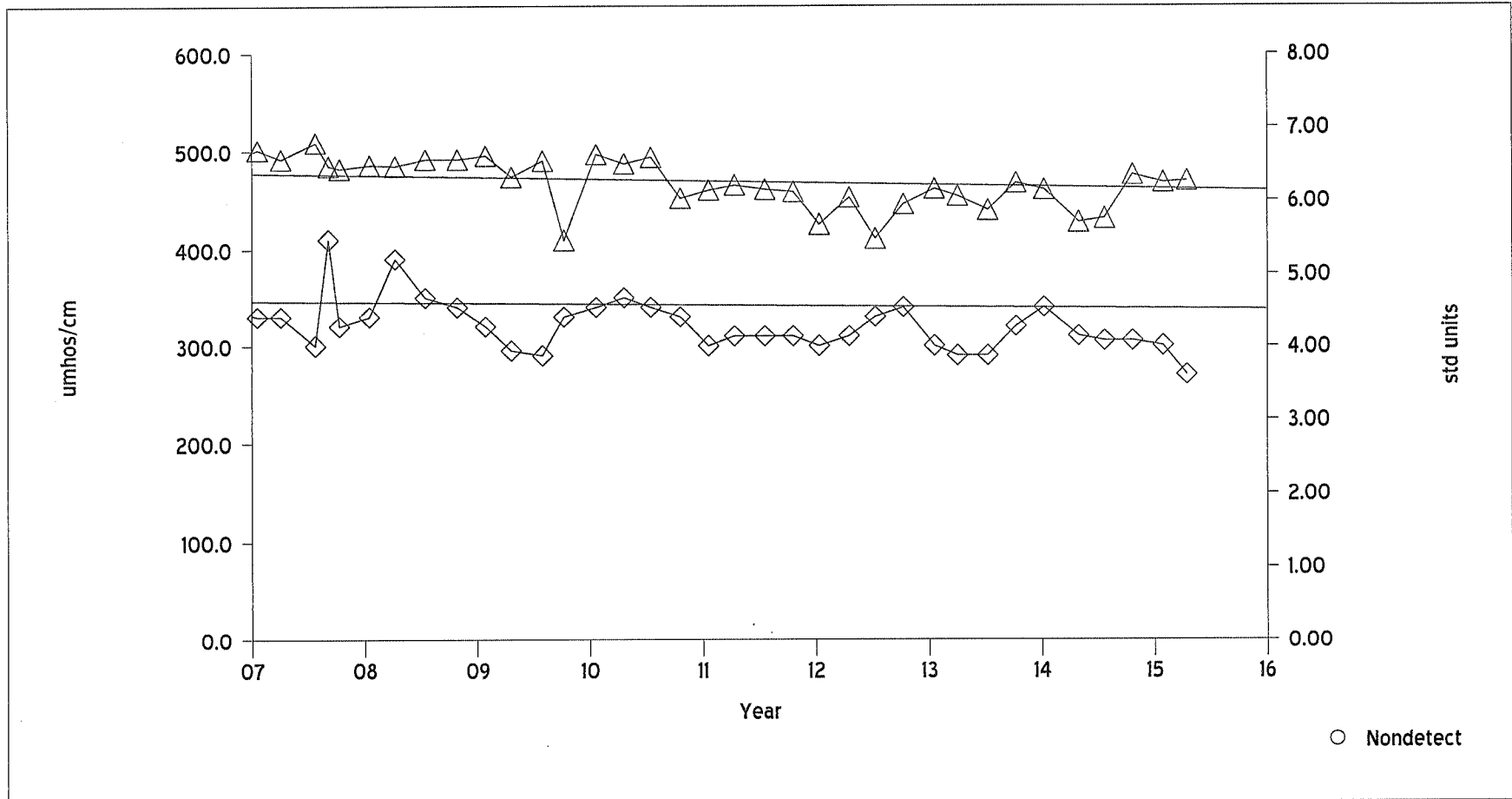
◇ Dissolved sodium (cc: -.821)

▽ Sulfate (cc: -.341)

○ Nondetect

Q-2 2015 Cond. v. pH Goodwin Landfill

Time Series Plot for LG-04



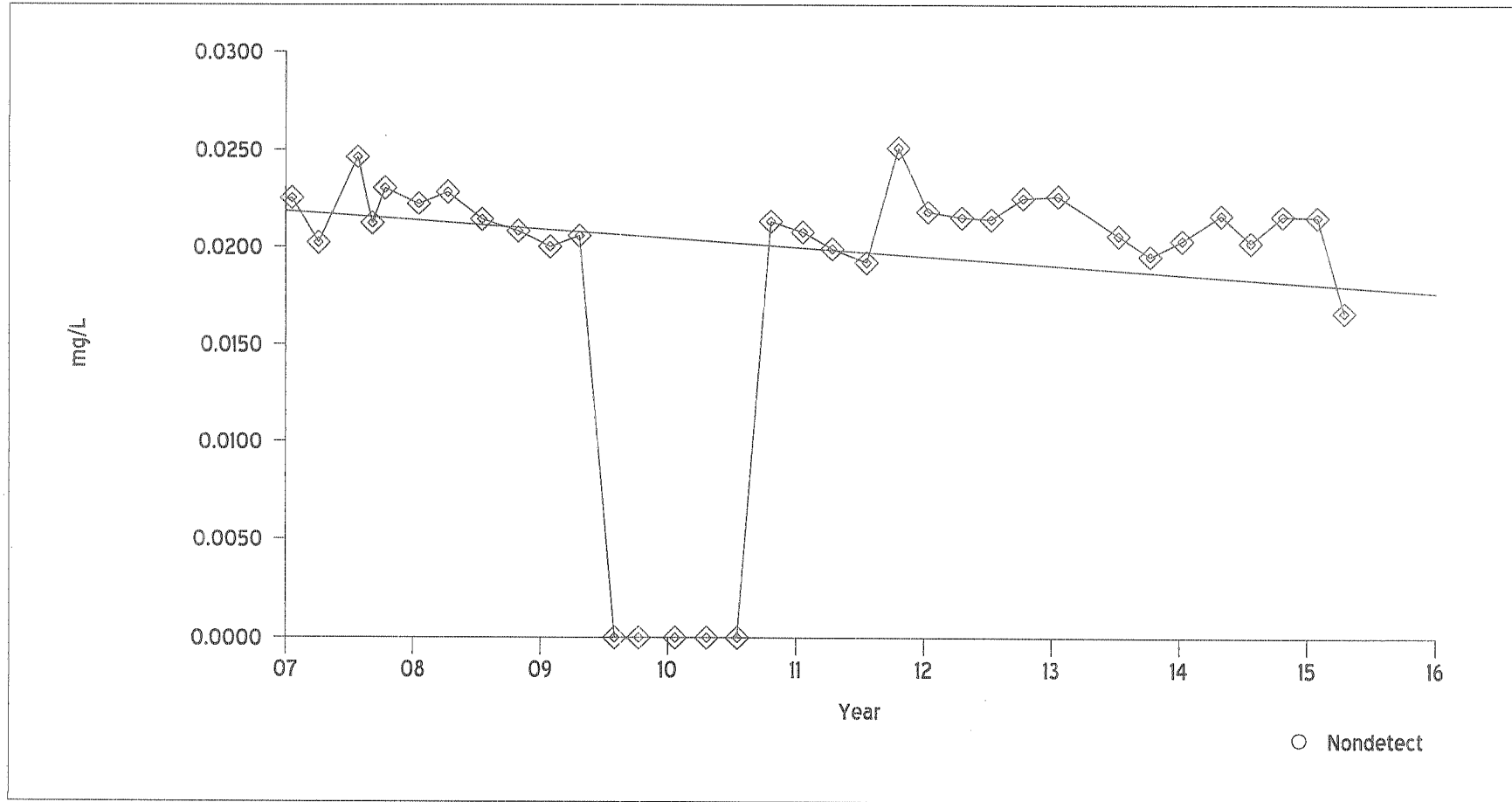
◇ Conductivity (cc: -.126)

△ pH (cc: -.595)

○ Nondetect

Q-2 2015 Ba Goodwin Landfill

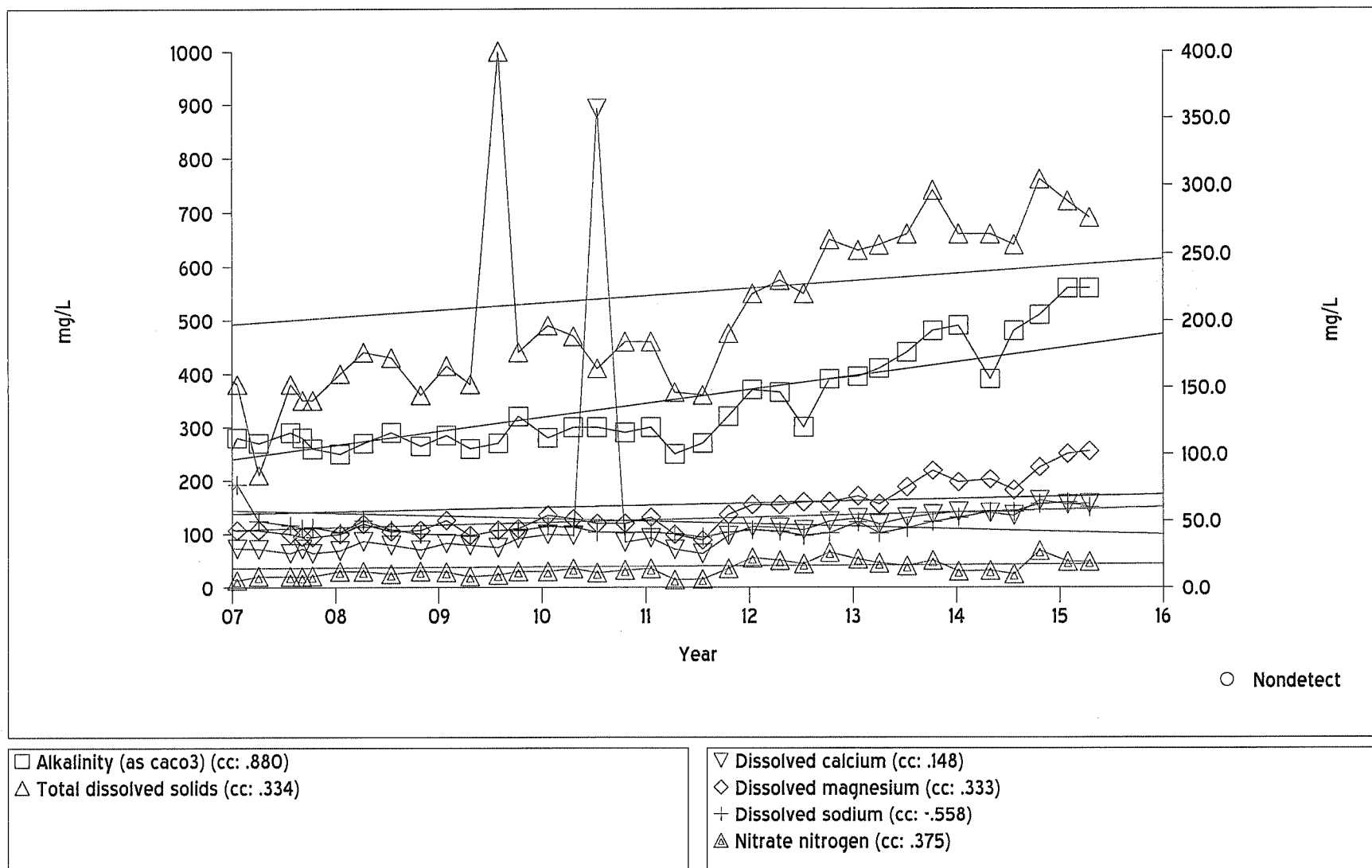
Time Series Plot for LG-04



◆ Dissolved barium (cc: -391)

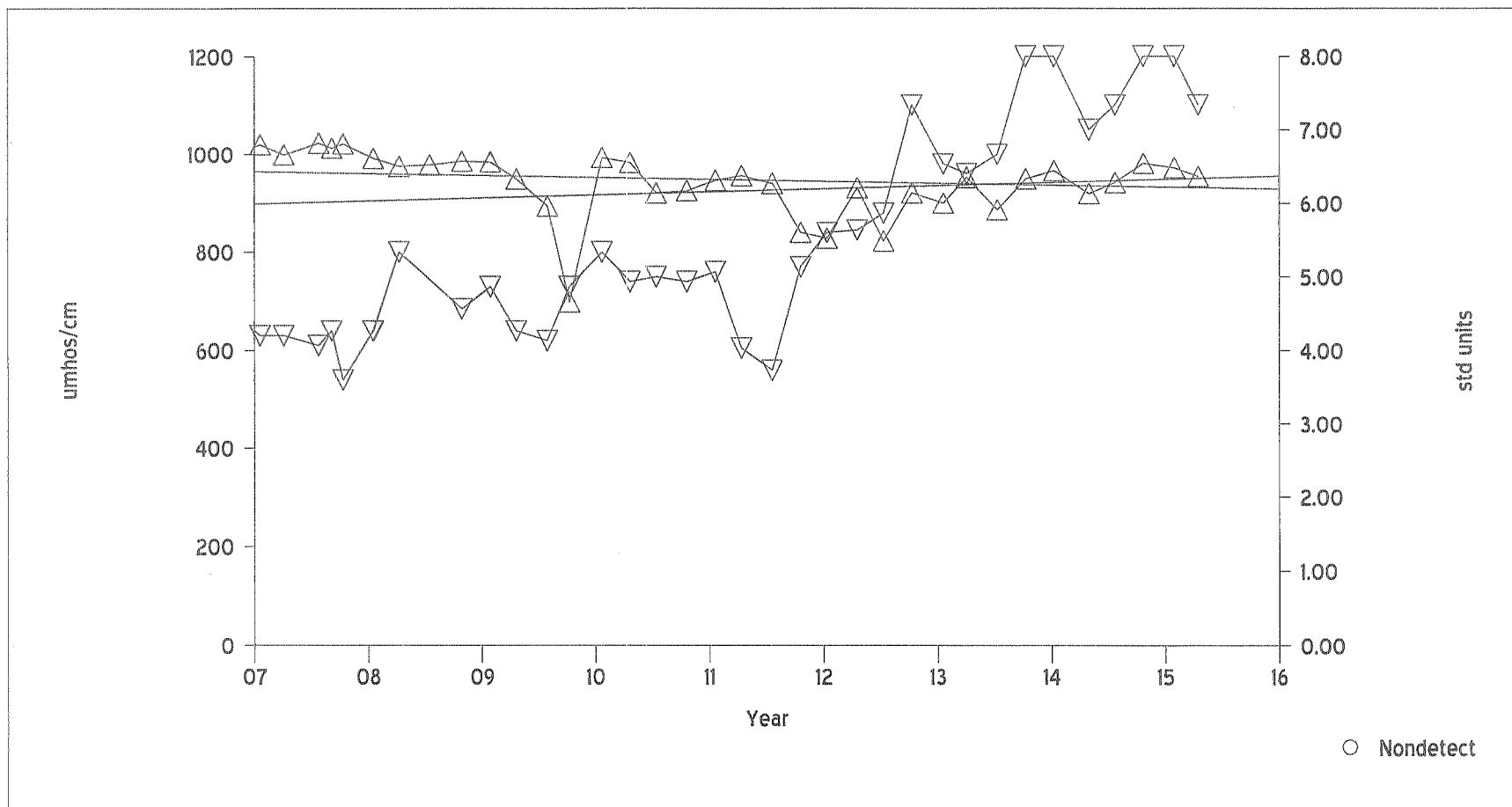
Q-2 2015 Minerals Goodwin Landfill

Time Series Plot for LG-05



Q-2 2015 Cond. v. pH Goodwin Landfill

Time Series Plot for LG-05



▽ Conductivity (cc: .192)

△ pH (cc: -.506)