Geo-Logic
ASSOCIATES
Geologists, Hydrogeologists and Engineers

January 21, 2014
Job No. 2013-0021

Forward Landfill
9999 South Austin Road
Manteca, CA 95336

Attention: Mr. Don Litchfield

EVALUATION OF METAL SHREDDING RESIDUE WASTE FOR ALTERNATIVE DAILY COVER

Geo-Logic Associates (GLA) is pleased to present this letter report evaluating potential effects of metal shredding residue (MSR) on leachate chemistry at landfills in the northern California. Since MSR has been regulated as hazardous waste in California due to lead, cadmium, copper, and zinc levels that exceed regulatory thresholds, metal concentrations in leachate from facilities that accept MSR waste and facilities that do not accept MSR waste were compared to evaluate differences in metal constituent concentrations. For the evaluation, GLA compared leachate data from three Republic Services Inc. (Republic) sites that accept MSR waste (Austin Road Landfill, Forward Landfill, and Vasco Road Landfill) to two Republic sites that do not accept MSR waste (Keller Canyon Landfill and Ox Mountain Landfill). The comparison included leachate data collected between 2009 and 2013 and was limited to metals data (total and dissolved).

BACKGROUND

Forward Landfill

The Forward Landfill (Forward) is an active Class II landfill located in Manteca, California. Currently the Forward is permitted for 744 acres. Refuse disposal at the Forward Landfill began in 1973. On average Forward accepts approximately 2,500 tons of waste per day including non-hazardous solid waste, inert waste, and certain designated wastes (ash, sludge, petroleum hydrocarbon contaminated soil, asbestos, and MSR). Forward has been accepting MSR waste for about 20 years. Best Management Practices (BMPs) include regular profiling and approval of the MSR, tracking of the amount, source and transporter delivered to the site under manifest, inspection of the MSR as it is unloaded at the working face, and spreading the material with water application as needed to control dust. If greater than a 40 percent chance of rain is forecast in the area within eight hours of application of the MSR as daily cover, the MSR is covered by a minimum of 2-inches of soil so that no voids are left exposed.

.

Austin Road Landfill

In 2003, the Austin Road Landfill (Austin) was combined with the Forward Landfill into one landfill, now known as the Forward Landfill. Refuse disposal at Austin began in 1954. BMPs and general site information are the same as for Forward.

Keller Canyon Landfill

The Keller Canyon Landfill (Keller) is an active Class II landfill located in Pittsburg, California. Currently Keller is permitted for waste disposal on 244 acres of which 104 acres have been landfilled. Refuse disposal at the Keller began in 1992. On average Keller handles 2,500 tons of waste per day including non-hazardous solid waste, inert waste, and certain designated wastes (ash, sludge, grit, and contaminated soils). Keller does not accept MSR waste. Best Management Practices (BMPs) include the use of soil and green waste to a minimum of six inches in thickness, or tarps for daily cover.

Ox Mountain Landfill

The Ox Mountain Landfill (Ox) is an active Class III landfill located in Half Moon Bay, California. Currently Ox is permitted for 191 acres of which 157 acres have been landfilled. Refuse disposal at the Ox began in 1976. On average Ox handles 1,500 tons of waste per day including putrescible and non-putrescible solid, semi-solid, and liquid wastes including waste, and certain designated wastes (ash, sludge, industrial waste, demolition and construction wastes, and soil). Ox does not accept MSR waste. Best Management Practices (BMPs) include placement of a minimum of six inches of daily cover or tarps.

Vasco Road Landfill

The Vasco Road Landfill (Vasco) is an active Class II landfill located in Livermore, California. Currently, Vasco is permitted for 246 acres. Refuse disposal at Vasco began in 1963 and has been accepting MSR waste since 1995 in Subtitle D lined Unit 6. Waste accepted at the site includes non-hazardous solid waste, inert waste, and certain designated wastes (ash, sludge, grit, MSR, and contaminated soils). Best Management Practices (BMPs) include regular profiling and approval of the MSR, tracking of the amount, source and transporter delivered to the site under manifest, inspection of the MSR as it is unloaded at the working face, and spreading the material with water application as needed to control dust, or mixing the MSR with biosolids, which works as a binding agent.

LEACHATE SAMPLING AND ANALYSES

Leachate samples are collected regularly at each of the above landfills in accordance with their site specific Waste Discharge Requirements (WDRs). Each WDR specifies the leachate monitoring points, analytical constituents, and sample frequency. Forward and Austin are sampled annually, while Keller, Ox, and Vasco are sampled on a quarterly basis. Review of the metals analyses indicate that Ox samples are analyzed for both total and dissolved metals,

while Keller and Vasco samples are only analyzed for total metals, and Forward and Austin samples are only analyzed for dissolved metals. As presented herein, based on metals that may be associated with MSR, the following metal constituents were evaluated.

- Cadmium, Chromium, Copper, Lead, Nickel, and Zinc (EPA Method - 6010B).

For Austin and Forward, leachate is pumped from each sump to lined leachate ponds for evaporation where a composite leachate sample is collected from each pond using a disposable bailer. For Ox and Keller, leachate is pumped from the leachate sumps to leachate holding tanks for treatment and/or disposal where a composite leachate sample is collected from a sample port (ball valve) at the holding tanks. For Vasco, leachate is pumped from each of four sumps to holding tanks at each sump location for disposal. Discrete samples are collected from a sample port (ball valve) at each of the holding tanks.

RESULTS

GLA understands that the California Department of Toxic Substances Control (DTSC) has asked for information on the composition and characteristics of MSR currently being generated. Since Forward, Austin, and Vasco currently use MSR in their landfilling operations, GLA compared metal concentrations in the leachate data from these sites to other sites in the northern California area where MSR is not accepted (Ox and Keller) to see if there were measureable differences in the metal concentrations in leachate. For comparison GLA prepared time-series charts for leachate total and dissolved metals data collected between 2009 and 2013. The time-series charts are presented in Attachment A. Based on the analytical results for each site the following comparisons were made.

- Dissolved Metals - MSR (Forward, Austin) vs. non-MSR (Ox)
- Total Metals – MSR (Vasco) vs. non-MSR (Ox, Keller)

Dissolved Metals

The following is a discussion of the leachate data collected for dissolved metal constituents for those metals commonly associated with MSR.

Cadmium – Cadmium concentrations were rarely detected at Austin and Forward (80% non-detect [ND]) and infrequently detected at Ox (68% ND). Cadmium concentrations for Austin, Forward, and Ox did not exceed the state MCL in drinking water (5 ug/L), and were well below the STLC (1 mg/L).

Chromium –Chromium was only sampled at MSR facilities (Austin, Forward, Vasco), therefore, a comparison with non-MSR facilities could not be performed. However, the chromium concentrations at the MSR facilities did not exceed the state MCL in drinking water (50 µg/L), and were well below the STLC (5 mg/L).

Copper – Copper concentrations were rarely detected at Forward (80% ND), and infrequently detected at Austin (60% ND) and Ox (62% ND). Copper concentrations for Austin, Forward, and Ox were well below the state MCL in drinking water (1,300 µg/L) and STLC (25 mg/L).

Lead – Lead concentrations were not detected at Austin and infrequently detected at Forward (60% ND) and Ox (68% ND). Lead concentrations for Austin, Forward, and Ox did not exceed the state MCL in drinking water (15 µg/L) and were well below the STLC (5 mg/L).

Nickel – Nickel concentrations are very similar at Austin, Forward, and Ox. Nickel concentrations for all sites often exceed the state maximum contaminant level (MCL) in drinking water (0.1 mg/L), but were well below the STLC (20 mg/L).

Zinc – Zinc concentrations are slightly higher at Austin and Forward compared to Ox. However, zinc concentrations for all sites were well below the STLC (250 mg/L). Of note, there is no drinking water MCL for zinc.

Total Metals

The following is a discussion of the leachate data collected for total metal constituents for those metals commonly associated with MSR.

Cadmium – Cadmium concentrations were rarely detected at Vasco (91% ND), and infrequently detected at Keller (73% ND) and Ox (75% ND). Cadmium concentrations for Vasco, Keller, and Ox did not exceed the state MCL in drinking water (5 ug/L), and were well below the STLC (1 mg/L).

Chromium –Keller and Ox exhibit slightly higher chromium concentrations compared to Vasco. None of the chromium concentrations exceeded the state MCL in drinking water (50 ug/L), and were well below the STLC (5 mg/L).

Copper – Copper concentrations were infrequently detected at Keller (63% ND) and Ox (58% ND) and rarely detected at Vasco (83% ND). Copper concentrations for Keller, Vasco, and Ox were well below the state MCL in drinking water (1,300 ug/L) and STLC (25 mg/L).

Lead – Lead concentrations were infrequently detected at Keller (63% ND), Ox (75% ND), and Vasco (75% ND). With the exception of Ox (on two occasions), lead concentrations for Keller, Ox, and Vasco did not exceed the state MCL in drinking water (15 ug/L) and were well below the STLC (5 mg/L).

Nickel – Ox and Keller exhibit slightly higher nickel concentrations compared to Vasco. Nickel concentrations for Keller and Ox often exceed the state maximum contaminant level (MCL) in drinking water (0.1 mg/L), but were well below the STLC (20 mg/L).

Zinc – Zinc concentrations are very similar at Keller, Ox, and Vasco, and were well below the STLC (250 mg/L). Of note, there is no drinking water MCL for zinc.

DISCUSSION

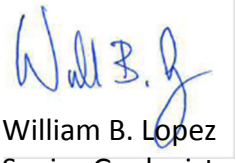
Based on the comparison of leachate data for both dissolved and total metals, there appears to be no conclusive evidence to suggest that MSR waste in landfills has resulted in increased metal concentrations in leachate. Concentrations of metals in leachate at sites that accept MSR are generally similar to metal concentrations in leachate at sites that do not accept MSR. None of the metals exceeded an established STLC and only nickel exceeded a drinking water MCL. However, in both cases the nickel concentrations were generally the same for MSR and non-MSR sites. Based on the data presented herein there does not appear to be a correlation between sites that accept MSR waste and increased metal concentrations in leachate that may result in a hazardous waste.

CLOSURE

This MSR waste evaluation was conducted with the specific intent to compare metals concentrations in leachate to evaluate if significant changes were evident in leachate samples collected from sites that accept MSR waste. The findings of this report are considered valid as of the present date. However, changes involving the earth do occur over time, whether due to natural processes or the works of man on this or adjacent properties. Accordingly, the findings of this report may be invalidated wholly or in part by conditions beyond our control.

This report has not been prepared for use by parties or projects other than those named above. It may not contain sufficient information for other parties or other purposes. This document conforms to generally accepted geotechnical practice and makes no other warranties, either expressed or implied, as to the professional advice or data included.

Geo-Logic Associates



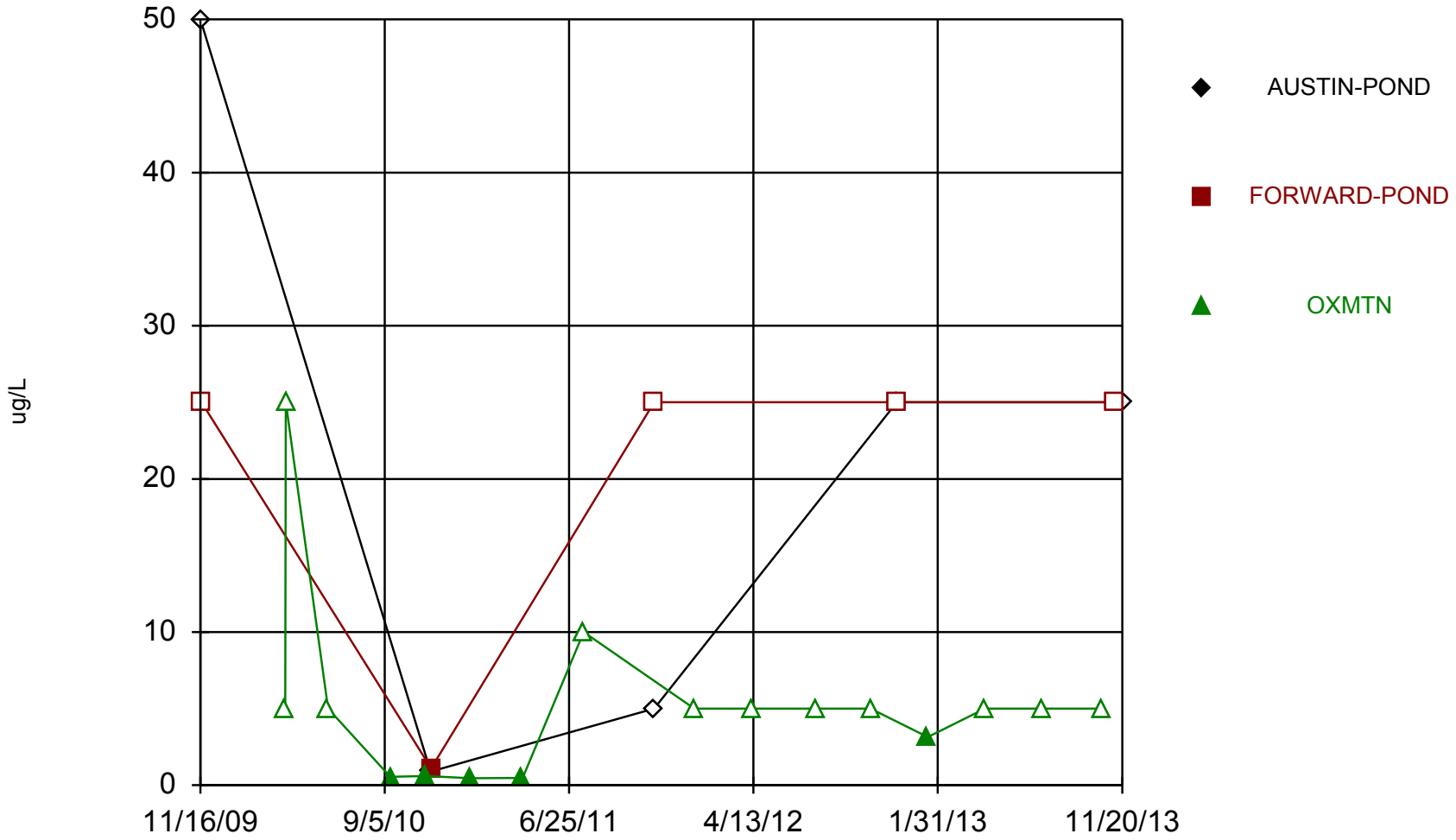
William B. Lopez
Senior Geologist

ATTACHMENT A

TIME-SERIES CHARTS

Hollow symbols indicate censored values.

Time Series

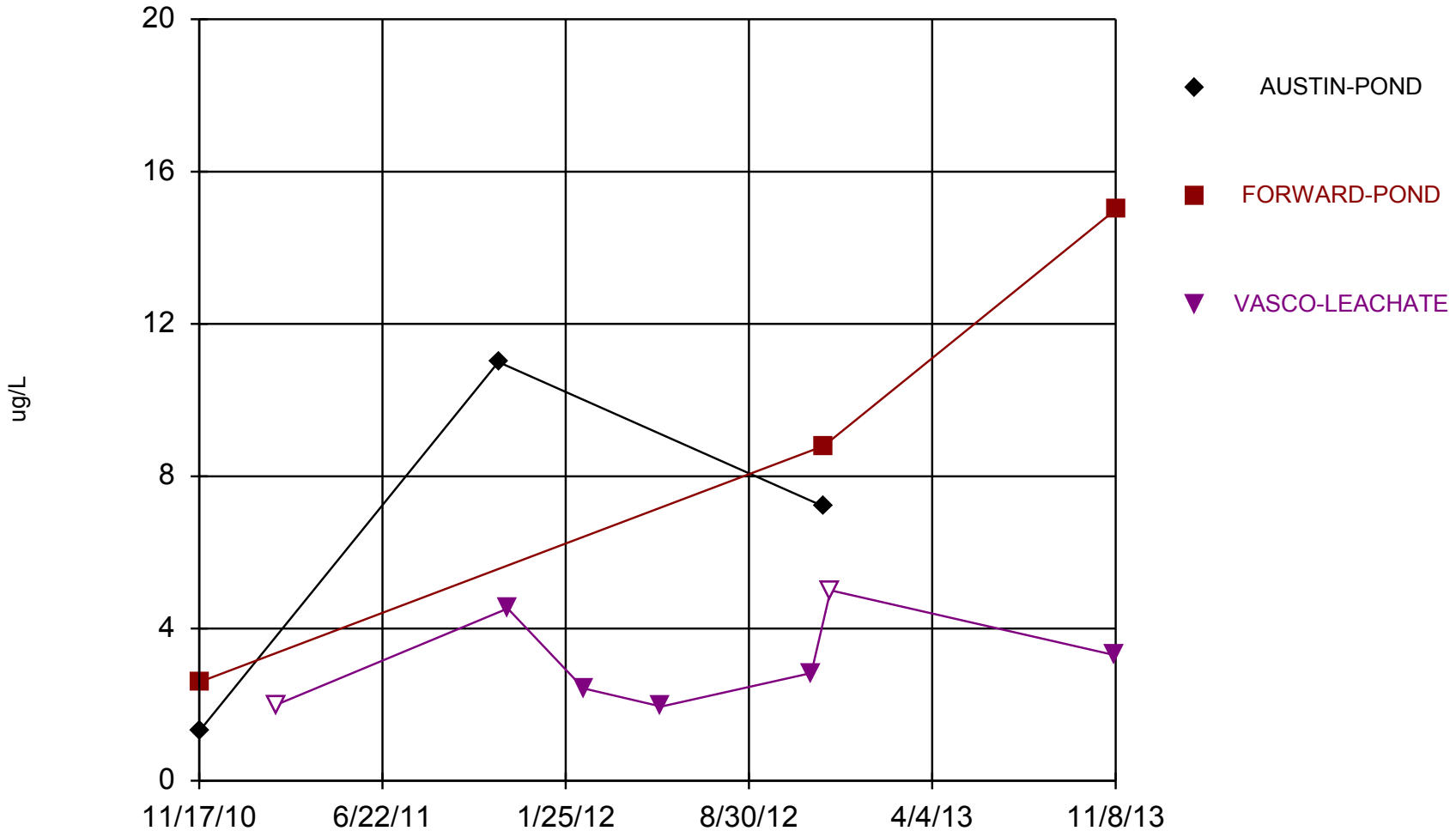


Constituent: Cadmium, Dissolved Analysis Run 1/13/2014 2:26 PM

Facility: Forward Landfill Client: RSI Data File: Forward Leachate Metals Dissolved

Hollow symbols indicate censored values.

Time Series

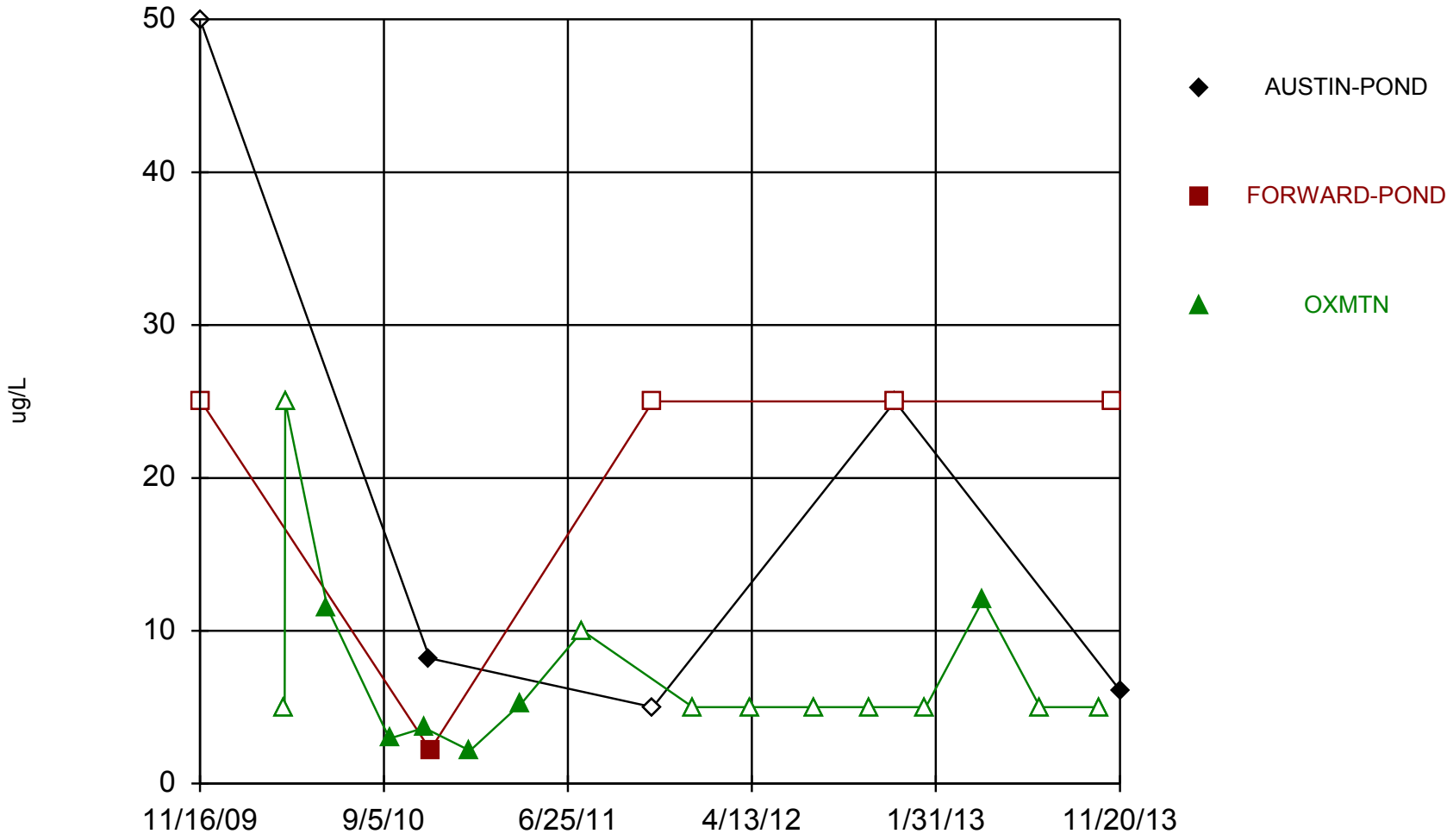


Constituent: Chromium, Dissolved Analysis Run 1/13/2014 2:26 PM

Facility: Forward Landfill Client: RSI Data File: Forward Leachate Metals Dissolved

Hollow symbols indicate censored values.

Time Series

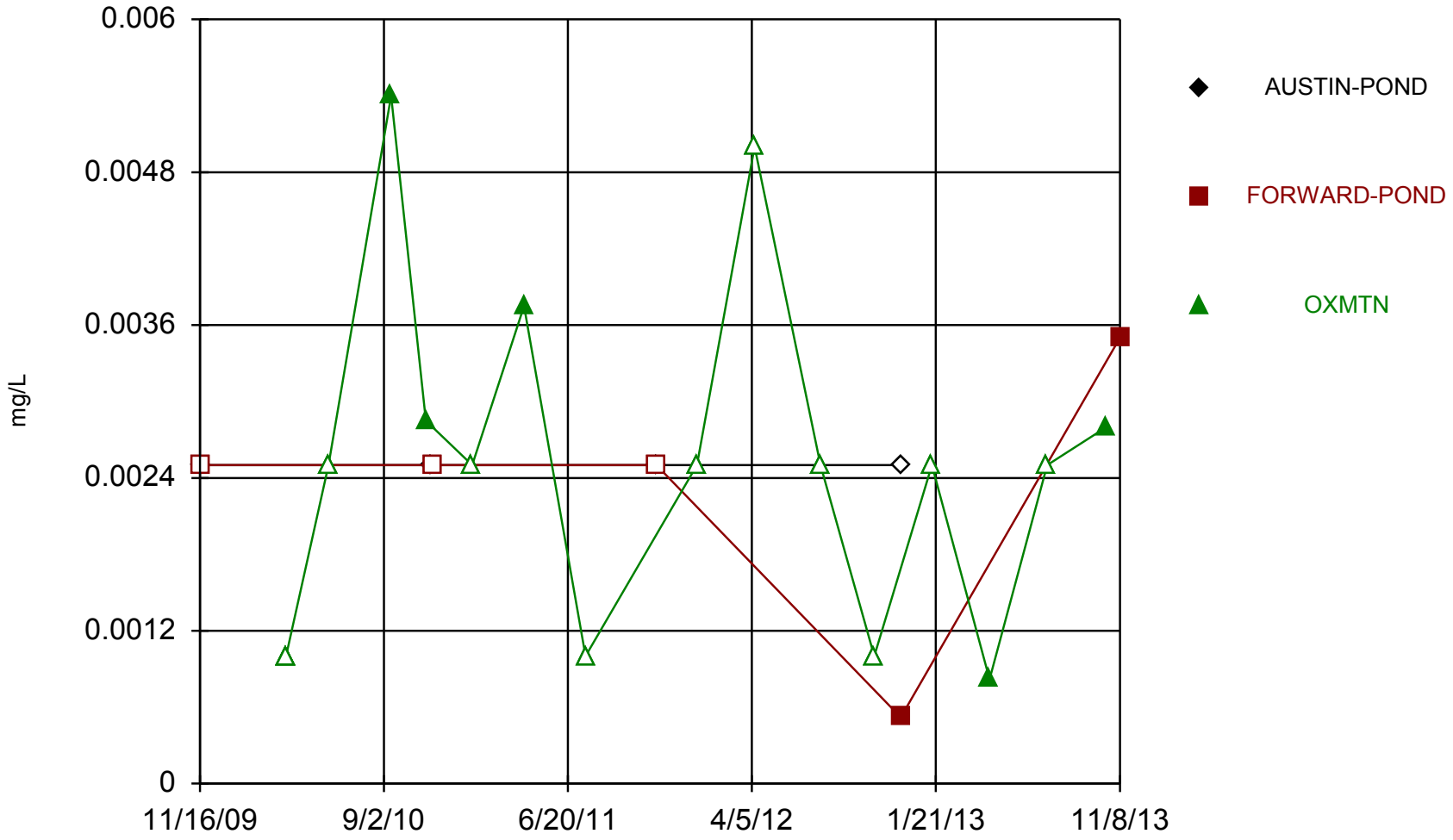


Constituent: Copper, Dissolved Analysis Run 1/13/2014 2:26 PM

Facility: Forward Landfill Client: RSI Data File: Forward Leachate Metals Dissolved

Hollow symbols indicate censored values.

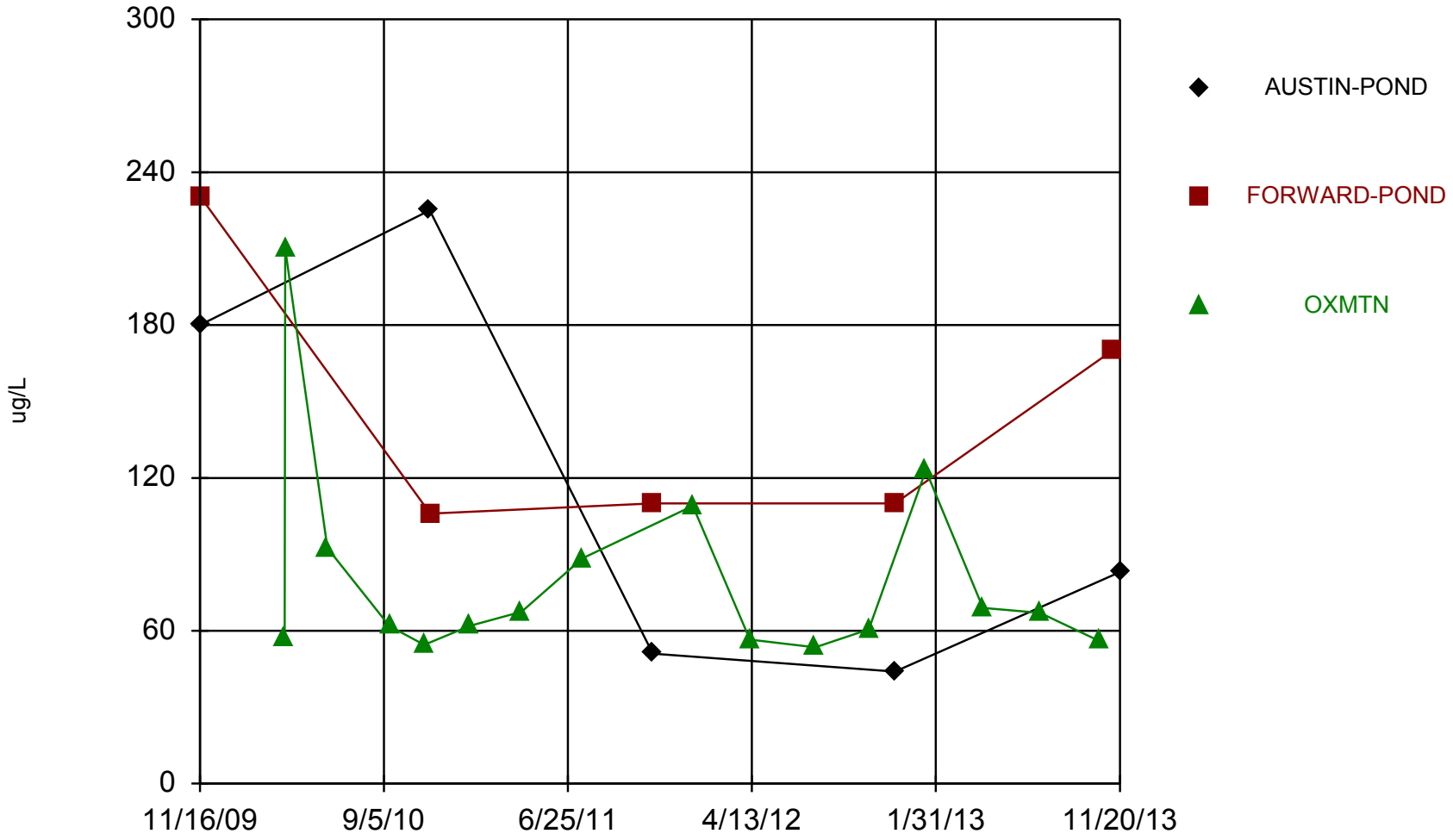
Time Series



Constituent: Lead, Dissolved Analysis Run 1/13/2014 2:26 PM

Facility: Forward Landfill Client: RSI Data File: Forward Leachate Metals Dissolved

Time Series

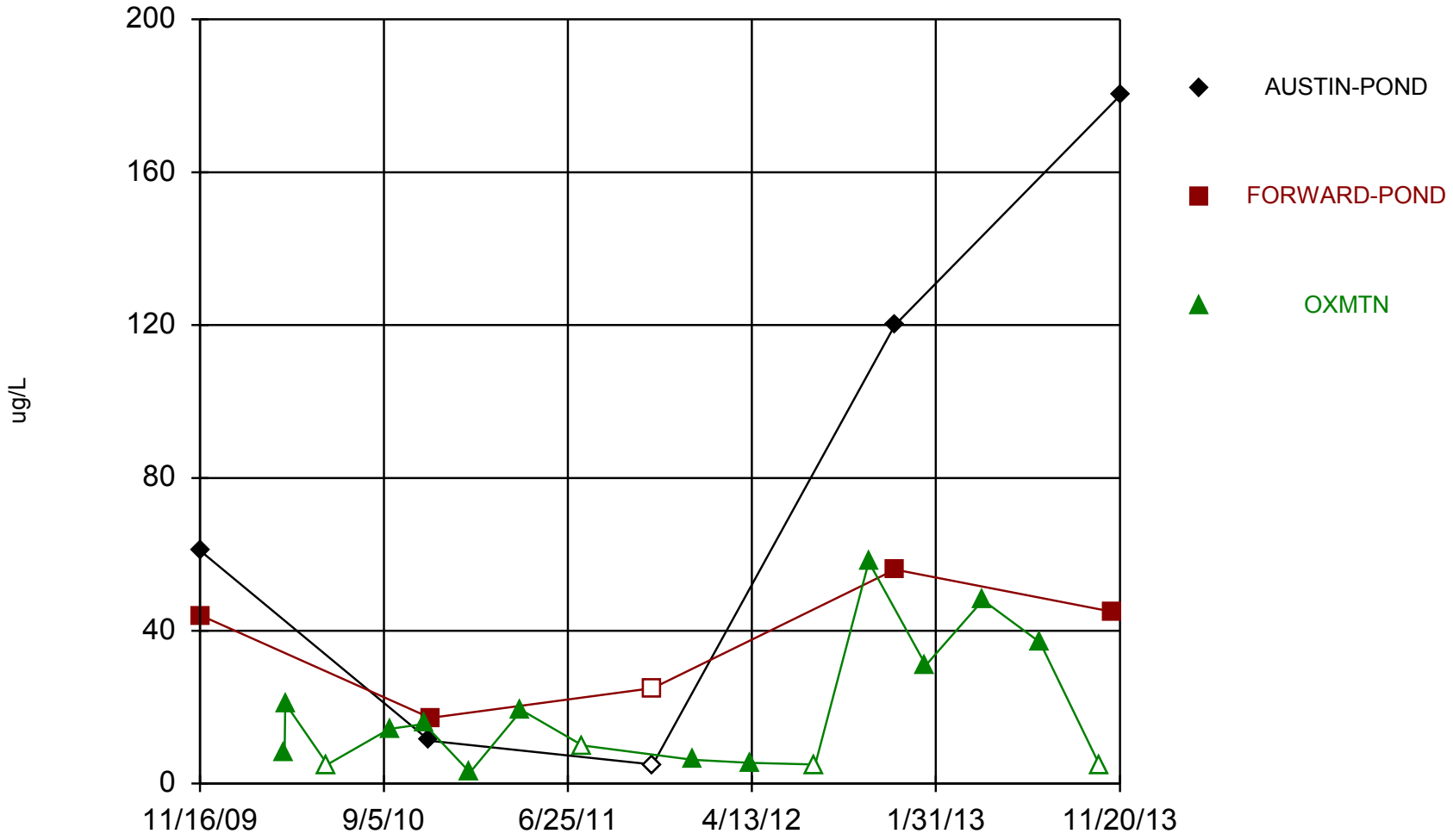


Constituent: Nickel, Dissolved Analysis Run 1/13/2014 2:26 PM

Facility: Forward Landfill Client: RSI Data File: Forward Leachate Metals Dissolved

Sanitas™ v.9.4.30 For the statistical analyses of ground water by Geologic Associates only. EPA
Hollow symbols indicate censored values.

Time Series

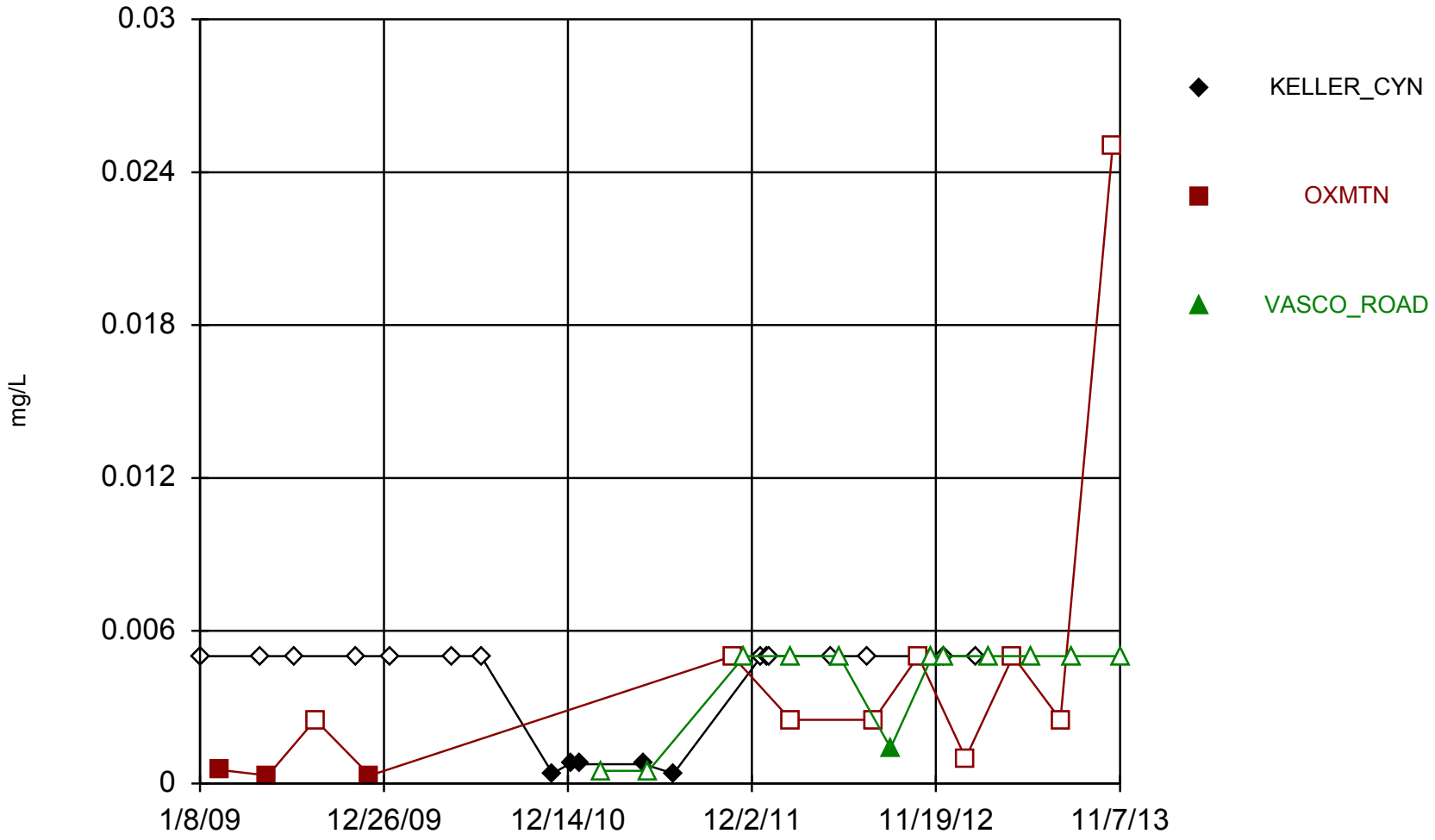


Constituent: Zinc, Dissolved Analysis Run 1/13/2014 2:26 PM

Facility: Forward Landfill Client: RSI Data File: Forward Leachate Metals Dissolved

Hollow symbols indicate censored values.

Time Series

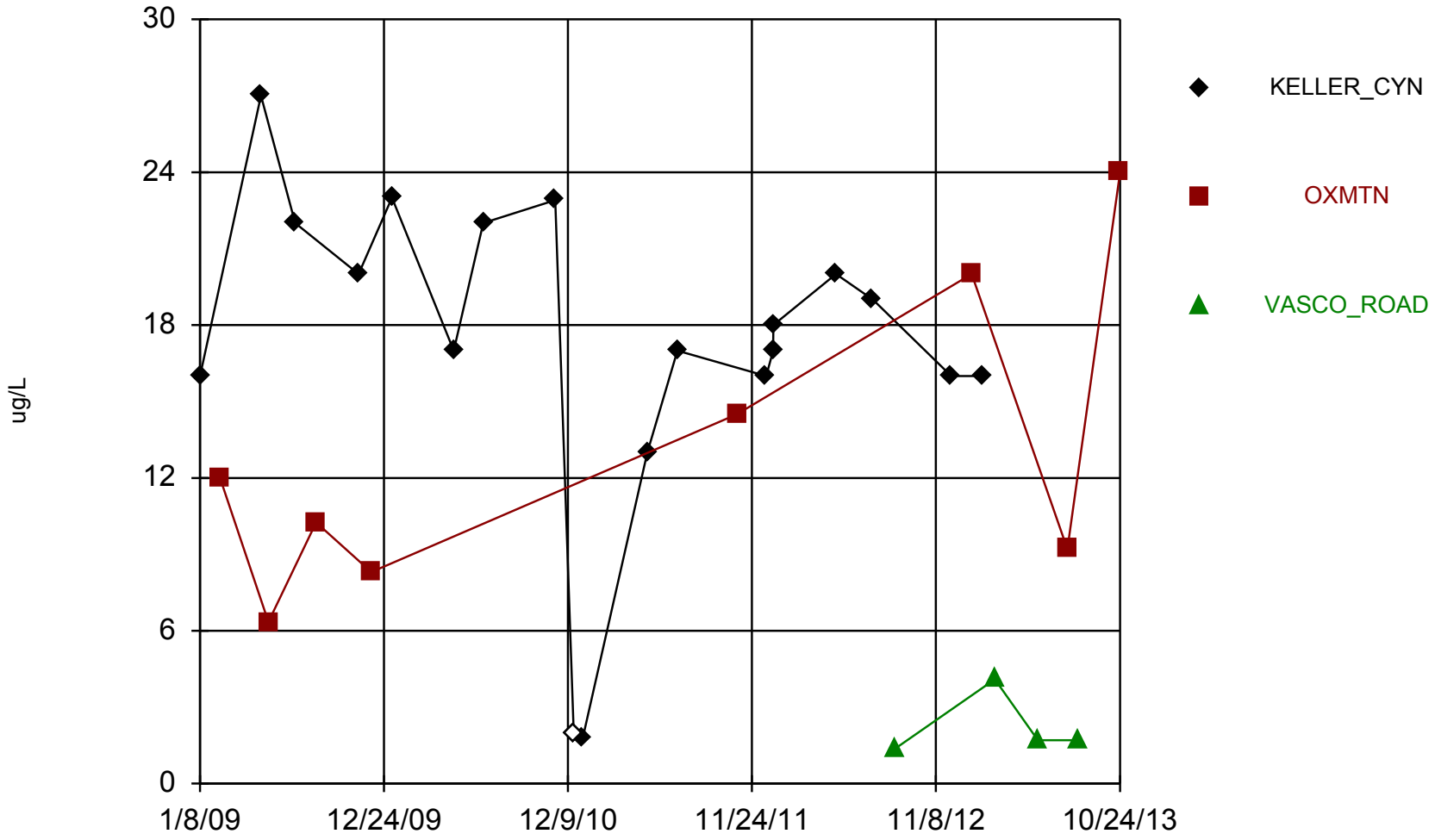


Constituent: Cadmium, Total Analysis Run 1/13/2014 2:34 PM

Facility: Vasco Road LF Client: RSI Data File: Vasco Leachate Metals Total

Hollow symbols indicate censored values.

Time Series

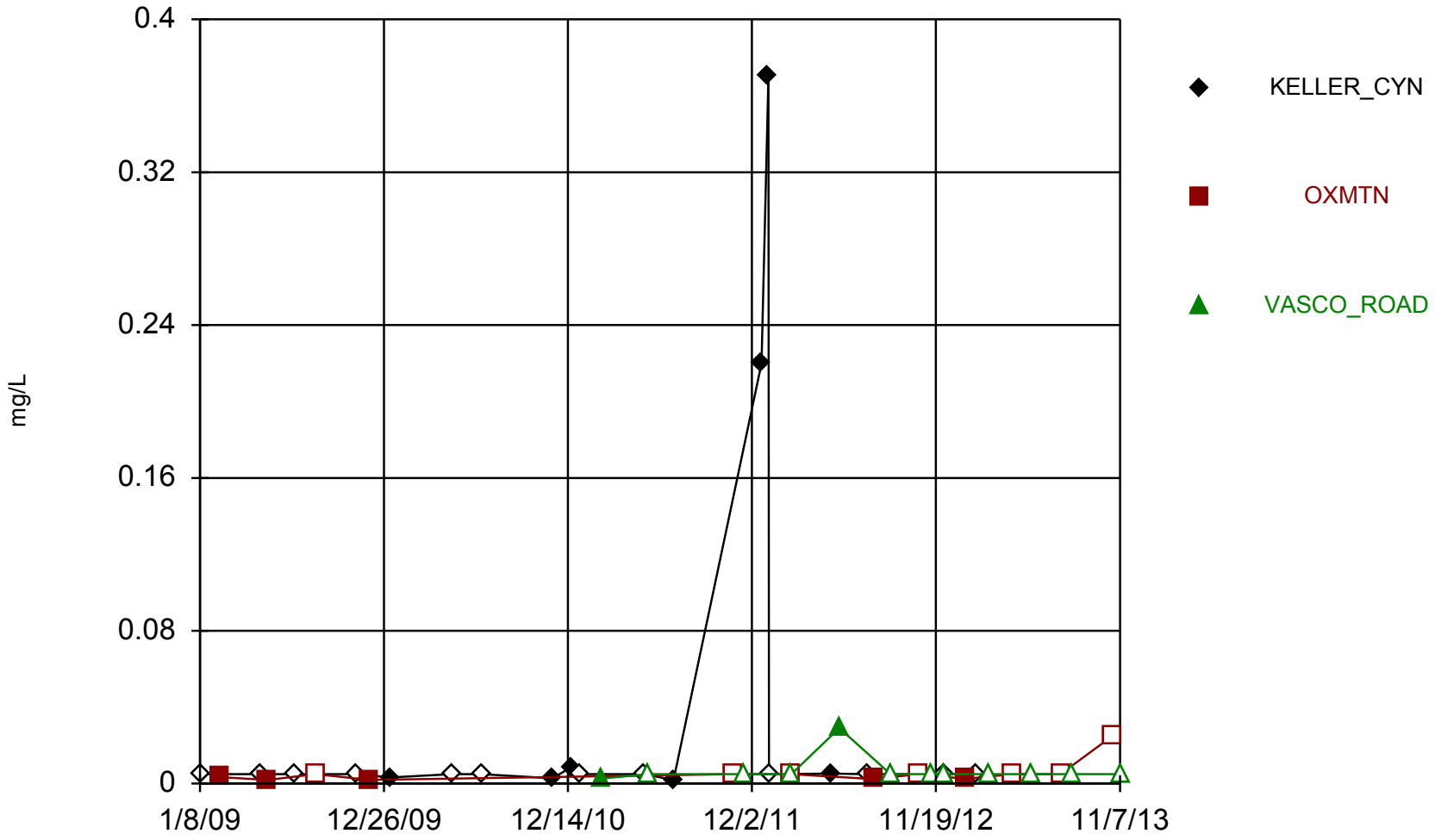


Constituent: Chromium, Total Analysis Run 1/13/2014 2:34 PM

Facility: Vasco Road LF Client: RSI Data File: Vasco Leachate Metals Total

Hollow symbols indicate censored values.

Time Series

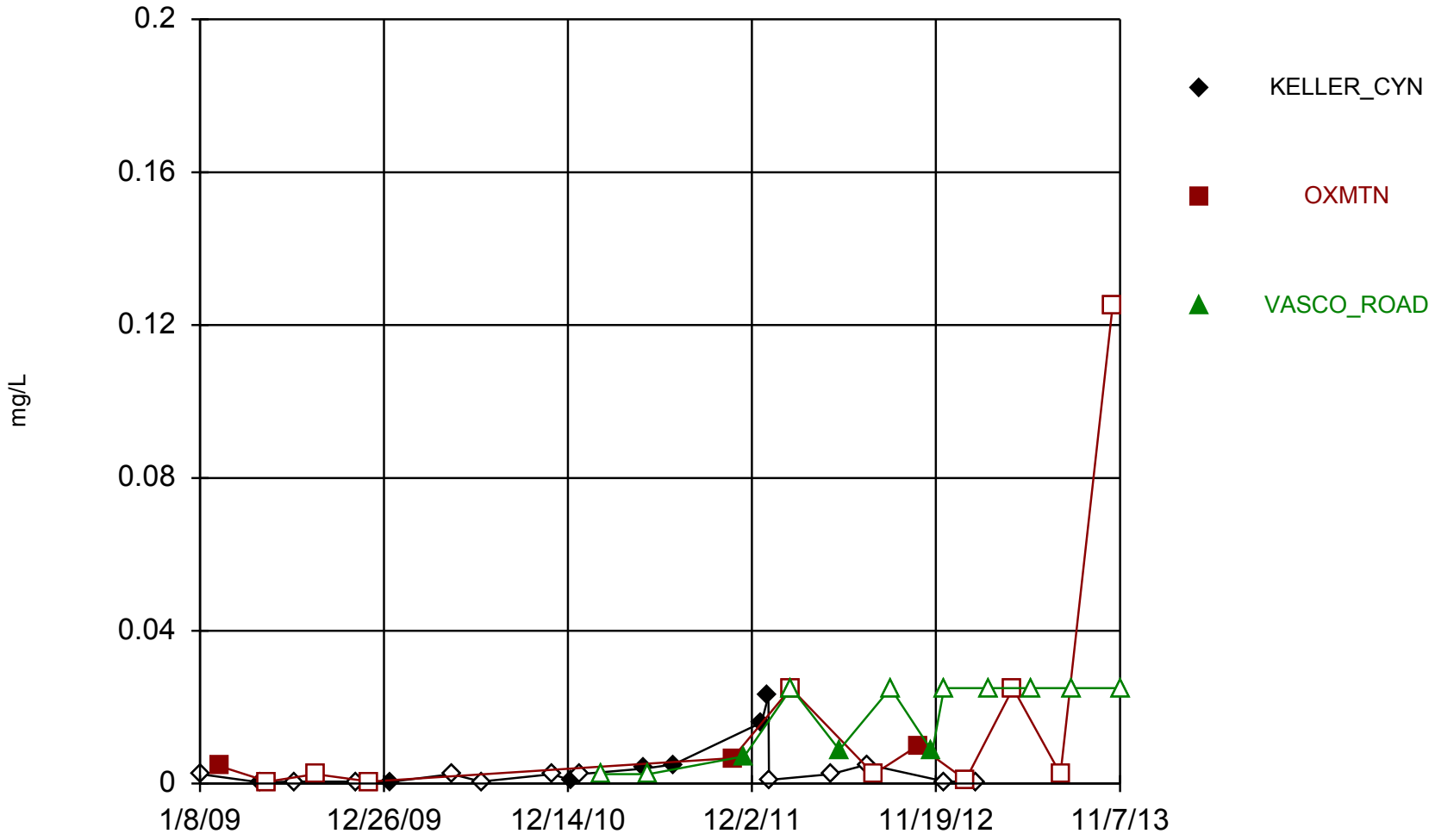


Constituent: Copper, Total Analysis Run 1/13/2014 2:34 PM

Facility: Vasco Road LF Client: RSI Data File: Vasco Leachate Metals Total

Hollow symbols indicate censored values.

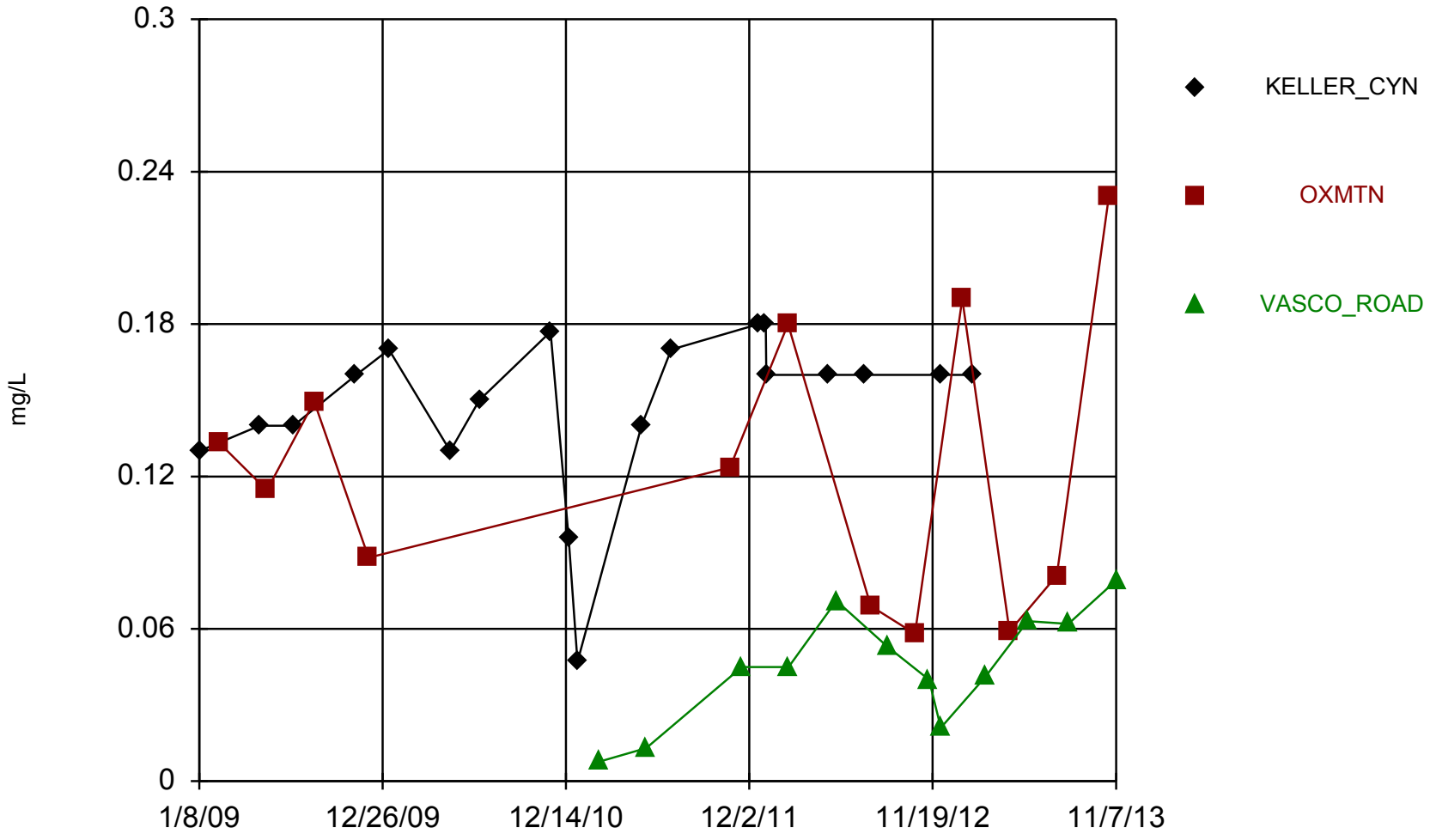
Time Series



Constituent: Lead, Total Analysis Run 1/13/2014 2:34 PM

Facility: Vasco Road LF Client: RSI Data File: Vasco Leachate Metals Total

Time Series

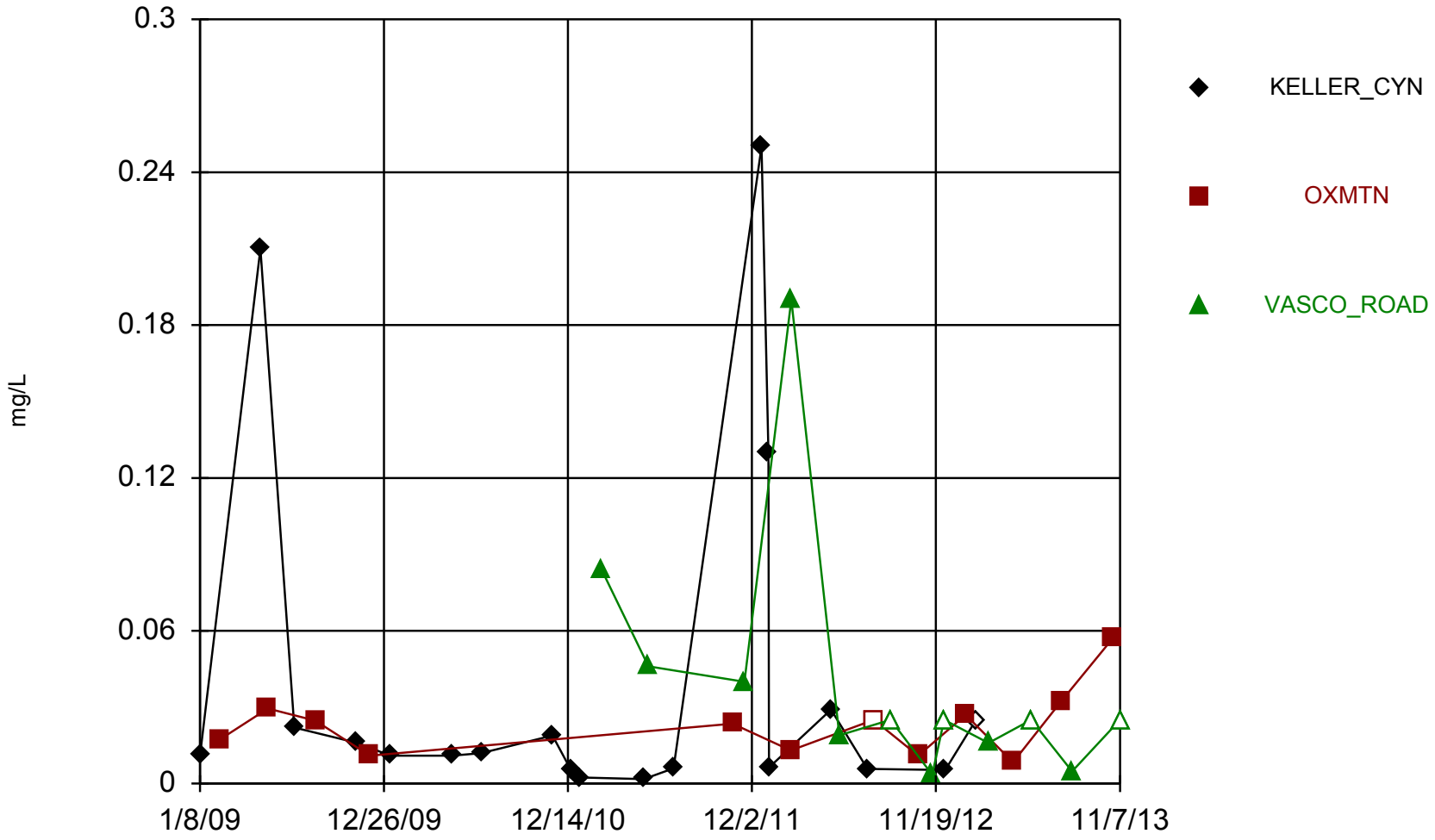


Constituent: Nickel, Total Analysis Run 1/13/2014 2:34 PM

Facility: Vasco Road LF Client: RSI Data File: Vasco Leachate Metals Total

Hollow symbols indicate censored values.

Time Series



Constituent: Zinc, Total Analysis Run 1/13/2014 2:34 PM

Facility: Vasco Road LF Client: RSI Data File: Vasco Leachate Metals Total